Implementing Water Sensitive Urban Design:
Opportunities, Challenges and Limitations

The Case of Victoria

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The Office of Living Victoria and Melbourne Water commissioned a review to assess the implementation of, and compliance with, Clause 56.07-4 of the Victoria Planning Provisions, which mandates best practice stormwater management in residential subdivision. The review examined implementation issues and looked at applying current performance requirements for the management of stormwater more broadly. The review addressed the operation of the clause from a planning system perspective for local councils across the State, the attitudes of government and industry toward broadening of stormwater requirements, and the implications of this change for those entities and for achieving integrated water management more broadly. Research undertaken for the review included a literature review of the legal framework around stormwater management,

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identification of the existing resources available to assist policy makers and practitioners, two online qualitative surveys for local government councils and the development industry, in-depth interviews with four councils and Victorian representatives of peak bodies, and discussions with government stakeholders and the water industry. A series of recommendations based on the project analysis and conclusions will inform the implementation of this aspect of water policy.

I. Introduction

The effective drafting and implementation of statutory regulation to improve the management of urban stormwater can involve a complex set of issues. This paper addresses these issues from a Victorian perspective, citing research from a review commissioned by the Office of Living Victoria and Melbourne Water.

II. Statutory provision

Clause 56.07-4 is part of Victoria’s Sustainable Neighbourhood provisions for new residential land development (incorporated in the Victoria Planning Provisions). Clause 56.07 deals with integrated water management and part 4 of the Clause deals with managing urban runoff.

The Office of Living Victoria commissioned the review of Clause 56.07-4 to support its work “with the Department of Planning and Community Development to amend the Victoria Planning Provisions to apply current performance requirements for the management of stormwater more broadly” (Living Melbourne, Living Victoria Implementation Plan: Government Response). Melbourne Water co-commissioned the report to respond to issues raised by its internal and external customers about the implementation of Clause 56.07-4.


The objectives of Clause 56.07-4 are:

- To minimise damage to properties and inconvenience to residents from urban run-off.
- To ensure that the street operates adequately during major storm events and provides for public safety.
- To minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving waters from degradation by urban run-off.

A subdivision of land must be designed to comply with the following best practice environmental management objectives for stormwater quality that have been established by the Victorian government (note: these objectives are currently under review):

- Suspended solids (SS) - 80 per cent retention of the typical urban annual load.
- Total phosphorus (TP) - 45 per cent retention of the typical urban annual load.
- Total nitrogen (TN) - 45 per cent retention of the typical urban annual load.
- Litter - 70 per cent reduction of typical urban annual load.
- Flows - maintain discharges for the 1.5 year ARI at pre-development levels.

The objectives focus on removing pollutants common in urban stormwater and controlling stormwater runoff during smaller and relatively frequent storm events through the use of water sensitive urban design.

In addition to these runoff objectives, Clause 56.07-4 requires management of larger stormwater flows, e.g. the 5 year to the 100 year ARI storm event. This level of flood control is well understood in the planning and engineering professions and conventional implementation of these requirements was not revisited in the review. The single exception was identifying opportunities for on-site detention of rainfall, a control measure that is often used where there is limited capacity in local drainage pipes. The rainfall is held for regulated release into the drainage system so that local capacity is not exceeded. On-site detention could play a different role in integrated water management if the collected stormwater was harvested for use instead of released.
Various states and territories have incorporated elements of water sensitive urban design in their planning schemes, but none as comprehensively as the State of Victoria. A cross comparison between jurisdictions would be valuable so as to learn from the strengths and weaknesses of each approach.

Despite its strengths, a key difficulty of Clause 56.07-4 is that it does not apply to all land development. It is confined to proposals which create two or more residential lots (and in specific zones), but only where these lots do not represent subdivision of existing development. Because of the way in which the provision is written, any proposal which is approved prior to subdivision qualifies for the exemption. There are other exemptions as well. Overall, these exemptions apply to single dwelling construction, multi-unit residential development, apartments and, in some cases, brownfield development. Hence, one task of the review was to determine whether commensurate requirements should be included in the Victoria Planning Provisions for infill development, mixed use and non-residential land subdivision. Figure 1 illustrates the current statutory approval streams for residential development and the differences between them (note: Clause 55 now applies to 4 storey development):

![Diagram](image)

**Figure 1.** The separate approval streams for residential land and residential building approvals under the Victoria Planning Provisions and Victorian Building Regulations
III. Scope of the review

Esther Kay of Environment & Land Management Pty Ltd and Associate Professor Karen Hussey of ANU were commissioned to undertake the review of Clause 56.07-4. A Steering Committee comprised of representatives from Victorian government agencies including the Office of Living Victoria, Melbourne Water, the Victorian Department of Planning and Community Development (now Department of Transport, Planning and Local Infrastructure), and the Department of Sustainability and Environment (now Department of Environment and Primary Industries) provided project oversight.

The commissioning of the review by government acknowledged the significant shift over recent years in the perception of stormwater as a nuisance factor to be disposed of through drainage pipes to a more holistic and beneficial view of stormwater as a significant water asset with multiple benefits to the environment, for human use and in the constructed landscapes. It is now understood that good stormwater management can deliver better urban amenity and assist with climate change mitigation.

The review evaluated the implementation of Clause 56.07-4 in the Victorian context and in particular the application of the clause to the subdivision of residential land. Specifically, this research was designed to provide sufficient insight to be able to provide recommendations on the following matters:

- How to improve the operation of Clause 56.07-4, including particular recommendations for State government, Melbourne Water, and local government (councils).
- Potential changes to the objectives of Clause 56.07-4 to increase alignment with the Living Victoria program and a move to integrated water cycle management.
- Applying the current stormwater performance requirements to industrial and/or commercial developments and infill, as well as greenfield development.
- Consideration of stormwater management at the master planning stage of urban development.
• Whether the Stormwater Quality Offsets program (Melbourne Water) aids or impedes the achievement of the objectives of Clause 56.07-4.

• Improvements to guidelines and other supporting material or programs to assist implementation of integrated water management.

The review was based on extensive research including:

• Review of the legislation supporting stormwater quality management and the wide range of resources available to practitioners who design, evaluate, construct and monitor water sensitive urban design.

• The experience of council planners, engineers, design professionals and sustainability officers with implementing Clause 56.07-4 in the local planning system, based on an online survey distributed to Victorian councils (158 responses) and interviews with four case study councils.

• The experience of land developers and their consultants with the clause when preparing subdivision designs, based on an online survey with Victorian members of the Urban Development Institute of Australia and the Association of Land Development Engineers (47 responses).

• Interviews with Victorian representatives from peak bodies such as the Institute of Public Works, Engineering Australia, the Urban Development Institute of Australia, the Association of Land Development Engineers, and the Municipal Association of Victoria.

• Interviews with government stakeholders such as the Office of Living Victoria, Melbourne Water and the Department of Planning and Community Development.

• Discussions with stakeholders in the water industry such as staff in Melbourne’s water retailers and a regional water authority.
IV. Key findings

Ascertaining the extent to which any law – in this case Clause 56.07-4 – is effective in achieving its objectives involves consideration of a range of issues. In particular, there is a clear distinction to be drawn between the existence of legal arrangements designed to enable or require an action, such as implementing water sensitive urban design; the capacity of these legal arrangements to do so in practice; the differentiated capacity of these legal arrangements to be enforced; and ultimately the extent to which the implementation of these legal arrangements actually achieve the outcomes for which they have been designed.

In short, the effectiveness of Clause 56.07-4 depends on more than simply compliance; its effectiveness in achieving stormwater quality objectives and, ultimately, improved river health, depends to a very great extent on the context in which it operates. The review therefore considered the policy and planning issues which may inhibit effective implementation, such as:

i. information and knowledge gaps,

ii. overlap, ambiguity, or contradictions in legislative requirements or processes,

iii. inappropriate scale or scope of implementation and regulatory arrangements,

iv. incentive gaps and conflicts for private and public sector actors that risk impeding implementation,

v. conflicting strategic policy goals frameworks, which create unintended outcomes,

vi. the availability or lack thereof of human, financial and other (i.e. technical) resources,

vii. inappropriate working environments which impede application of the Clause (i.e. professionals not physically located in the same building).

All participants were asked about these matters within the context of the operation of Clause 56.04-7. Perhaps the most important finding from the research was that there is overwhelming support from all stakeholders for integrated water management more broadly, and stormwater quality treatment specifically. None of the responses indicated concerns with the best practice environmental management objectives for stormwater quality including their current configuration or their use as a standard in the planning system.
Almost all respondents stated there is significant awareness of Clause 56.07-4 within their organisations and almost 80% of council respondents felt that Clause 56.07-4 can make a difference to the environment.

Councils see it as reasonable and/or necessary that private land should contribute to meeting stormwater quality objectives. In contrast, over 80% of industry respondents felt water sensitive urban design should be undertaken on public land, rather than private land.

Nevertheless, more than two-thirds of industry respondents were confident that the Victorian development industry can deliver and sustain innovation and individual solutions for water sensitive urban design.

There was strong consensus and support from all stakeholders, including industry, for the Victorian government’s plans to apply the stormwater requirements more broadly and were specifically in favour of extending the clause to industrial, commercial and infill developments, though with some revisions necessary. Some councils are already applying stormwater quality objectives to infill and non-residential developments.

There was also support for broadening the objectives of Clause 56.07-4 to include other public benefits, such as stormwater harvesting and water reuse.

When asked whether Clause 56.07-4 is effective in meeting best practice objectives for storm water runoff at the subdivision level, the responses were slightly different between council staff and industry stakeholders. Figure 2 and Figure 3 illustrate the responses, from council staff and industry, respectively.
Figure 2. Council staff response to the question ‘From your experience, Clause 56.07-4 is effective in meeting the best practice objectives for stormwater runoff in residential subdivisions’ (Total number of responses from council staff: 144)
Figure 3. Industry response to the question ‘From your experience, Clause 56.07-4 is effective in meeting the best practice objectives for stormwater runoff in residential subdivisions’ (Total number of responses from industry participants: 29)

There was also considerable doubt expressed about how the effectiveness of Clause 56.07-4 can actually be measured and understood, i.e. in the absence of regular monitoring of, and/or communication about, the quality of receiving waters, how are council staff, relevant government agencies, developers, and the broader public to know whether the clause is meeting its objectives? Attributing water quality to any one factor is also, clearly, a considerable constraint in accurately assessing the effectiveness of Clause 56.07-4. Nevertheless, on-going, longitudinal analysis of the health of Victoria’s waterways is an essential element in establishing whether water sensitive urban design is meeting its overall objectives.
V. Research outcomes

It was useful in this review to structure both research questions and recommendations for review and reform, including building on enabling factors and overcoming barriers, around the three distinct phases in the approval and implementation of Clause 56.07-4. These phases are illustrated in Figure 4:

Figure 4. Approval and implementation phases of Clause 56.07-4

The pre-planning application phase includes the first steps in organisations and individuals being aware of the negative environmental implications of traditional, piped drainage systems and a commitment to changing processes and behaviours to shift focus to a sustainable stormwater pathway. This was generally expressed by
councils as senior management support for use of water sensitive urban design, both as a municipal objective and through on-ground physical implementation, and appropriate staffing to deal with assessments of subdivision design submitted for approval against the requirements of Clause 56.07-4. Subsequent work in this phase includes clarity around responsibilities for water resource decisions in the planning system, an area which still seems to cause confusion, and moving toward integrated water management planning for regional, sub-regional and local areas. Industry buy-in and technical competencies complement the success of this phase.

Enabling factors underpinning successful implementation of Clause 56.07-4 were identified in this phase as including:

- Strong support from upper echelons of the Council and appropriate resourcing.
- Incorporation of water sensitive urban design and integrated water management in council strategic plans, and in turn use of plans in pre-application planning discussions to provide the “mandate” for high expectations (from council staff and developers) in relation to water sensitive urban design and compliance with Clause 56.07-4.
- Integration of stormwater considerations across the water, land and built forms, which in turn enables the planners, engineers and others involved in pre-application discussions to maximise win-win solutions across the catchment.
- Champions who promote the benefits of water sensitive urban design and integrated water management.
- Technical expertise and use of “fit for purpose” technical resources including sharing of information, manuals and guides.
- Participation in the Clearwater capacity building program.
By extension, barriers to successful implementation included a lack of these factors and, surprisingly, the implementation of Clause 56.07-4 without reference to technical standards. Other barriers identified through the research included:

- Inconsistency and limited scope of the application of the stormwater management requirements to other types of development applications, leading to confusion about when the requirements apply
- Lack of clarity about the authority responsible for stormwater management and integrated water management outcomes, eg. Melbourne Water, other water authority, local council.
- Lack of appropriate pre-application technical advice for use in the planning system.

The planning application and approval phase is where Clause 56.07-4 is used to benchmark planning assessments in terms of stormwater management and compliance with the best practice environmental management objectives. There is management software to determine numerical compliance. Either projects comply, in some cases through use of offsets, or they do not. Planning permit conditions require more detailed plans to be submitted and approved prior to the actual start of land development works. It is at this stage that there can be a need for more advanced technical expertise, to ensure that the constructed technologies are designed correctly and will perform as has been assumed in the numerical compliance assessment.

Enabling factors for successful implementation of Clause 56.07-4 during this phase include:

- Integrated and inclusive approval processes to ensure development proposals are considered by not only the planners, but also council engineers, sustainability officers, urban designers, landscape architects and asset managers.
- Close relationships between water authorities and councils - this was especially true for metropolitan Melbourne councils where Melbourne Water plays a critical role in providing advice and encouragement.
• Adequate use of council engineers and a reasonable level of engineering staff resources with technical expertise to provide technical support to planners in the assessment of planning applications.

• In-house advice from architects, urban designers and landscape architects and their contribution to identifying appropriate solutions for compliance with Clause 56.07-4.

• Knowledge about the long term costs of maintenance and management of proposed water sensitive urban design assets.

• Well-developed handover procedures within councils to identify potential solutions and mitigate potential problems.

Barriers identified through the research include:

• A lack of sufficient resources and technical expertise within councils to review submitted plans and for construction oversight.

• Unclear coordination between the building approvals system for planning permits with on-site water sensitive urban design.

• Internal planning approval processes which fail to incorporate all the significant functions within councils, i.e. asset managers, landscape architects, parks and maintenance staff, etc.

• Variable attitudes within and between the various functions in council around the rationale, and appropriate solutions for, water sensitive urban design.

• Lack of enforcement of the on-ground outcomes.

• Use of offsets to avoid on-site compliance.

The post-planning approval phase is one which is still evolving as experience with water sensitive urban design grows. This involves the actual construction of the stormwater management elements approved as part of the subdivision design; the timing, establishment and handover of assets usually to local government; and then a program of scheduled maintenance throughout the life of the asset. Ideally there would be some form of post-
construction monitoring to determine if the environmental benefit, in particular pollutant removal, is being achieved. However, this is rarely performed other than as part of a waterway monitoring program for water-borne pollution and targeted improvements in water quality.

To a very great extent, success in the “post-planning approval phase” is determined by the adequacy of the processes and expertise in-place in the previous two phases. In other words, with clearly articulated strategic plans in place, and well informed council staff who have a high level of expertise and experience with Clause 56.07-4, the post-planning application phase will have been considered prior to approval.

The main barrier identified during this phase of implementation is the lack of construction oversight and maintenance of water sensitive urban design assets.

VI. Conclusions

The overall conclusion of this review was that Clause 56.07-4 should be extended to other types of land development and redrafted to align with an integrated water cycle management approach. A series of recommendations were presented to the Office of Living Victoria and Melbourne Water; these are under consideration and are being implemented as appropriate. The recommendations have been grouped into the following four areas:

1. Recommendations to address regulatory implementation of integrated water management “to apply current performance requirements for the management of stormwater more broadly” including effective and efficient use of existing regulatory systems.

These recommendations support regulatory reform that provides a clearer understanding of how the stormwater component of integrated water management is to be implemented and for what types of approvals.

2. Recommendations to address complexity, ambiguity or contradiction in regulatory arrangements including roles and responsibilities for implementing integrated water management and regulatory provisions.

These recommendations address the interplay between different levels of government and government organisations that have a role in determining how integrated water management will be delivered through the planning system. The recommendations highlight the need for greater State level support in providing policy and technical guidance for planning system users, support for maintenance of water sensitive urban design assets once constructed, and addressing the legal ambiguity around protection of water sensitive urban design assets on private land and during building construction.

(3) Recommendations to address information, knowledge gaps and capacity building including boosting commitment to integrated water management and technical expertise within organisations.

These recommendations are varied and aim to improve the strategic tools, knowledge base and experience of practitioners dealing with the stormwater component of integrated water management. This includes pre-planning of integrated water management solutions for catchments at different scales, an increase in training opportunities and appropriate resources commensurate with professional roles, ensuring there are timely updates of guidelines for integrated water management/water sensitive urban design and commonly used assessment tools, and investigation of a certification program for design and construction of water sensitive urban design assets,

(4) Recommendations to address incentives for local government, industry and property purchasers.

These recommendations identify important activities that government can undertake to provide incentives for the development industry to comply with integrated water management planning provisions. This includes demonstrations of support for integrated water management when talking to councils, industry and the community, and recognition of sustainable development through industry rating systems, accreditation and awards programs.