

SAYING GOODBYE TO THE STORMWATER TREATMENT DEVICES DESIGN GUIDELINE MANUAL TP10

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ABSTRACT

The original Auckland Regional Council's Technical Publication 10, "Stormwater Treatment Devices Design Guideline Manual" (TP 10) has been actively used by design engineers, developers and councils around New Zealand since October 1992. The document has been the mainstay of stormwater managers and spans a time of immense changes in Auckland. These have included not only evolution in stormwater management thinking - with a growing emphasis on developing water sensitive city philosophies - but also the enormity of amalgamation and the formation of Auckland Council. All these factors have necessitated a fundamental review of TP10 and the development for technical design guidance for stormwater management devices in the Auckland Region. This paper will present the core changes in Auckland's stormwater management philosophy, the move towards adaptable management and the elements of consultation being undertaken by Auckland Council.

KEYWORDS

Stormwater, management, devices, TP10, water sensitive design

PRESENTER PROFILE

Dr Gretel Silyn Roberts has worked in the area of stormwater for over 20 years with a focus on water quality microbiology and pollutant load reductions. For over ten years she worked in California as a technical expert on microbial risk assessments and compliance with Total Maximum daily Loads. She recently joined the Auckland Council as Principal – Guidance Documents and is the project manager for the revision of the *Design Guideline Manual: Stormwater Treatment Devices, Technical Publication 10* (TP10, 2003). She works in the Engineering and Technical Services Unit.

1 INTRODUCTION

In 1992, the Auckland Regional Council (ARC) published *Design Guideline Manual: Stormwater Treatment Devices, Technical Publication 10, First Edition* (TP10 1992). The purpose of this document was to provide guidance on the design of a range of devices to treat stormwater quality in the Auckland region.

In 2003, a revised edition of TP10 was published which incorporated new philosophies in the approach to stormwater design, and aligned with the hydrological approach set out in ARC's *Guideline for Stormwater Runoff modelling in the Auckland Region, Technical*

*Publication 108 (TP108)*¹, published in 1999. This revision contained designs for improving both water quality and quantity based on key criteria in the ARC's Air, Land and Water Plan (ALWP); a 75% sediment removal was stipulated along with hydrologic management of different runoff events.

Six years on, Auckland Council is revising the stormwater management devices guidance document to incorporate updated methodologies and approaches to stormwater design and management and to align with the requirements of the Auckland Unitary Plan. The new stormwater management guidance document will be released in 2016 as Guidance Document 01 (GD01).

2 ALIGNING STORMWATER MANAGEMENT WITH THE WATER SENSITIVE DESIGN PHILOSOPHY

As Auckland continues to grow and manage urban expansion, stormwater management in the Auckland region is being guided by the Water Sensitive Design (WSD) philosophy. The 2015 guidance document – “Water Sensitive Design for Stormwater” (GD 2015/004)” - presents Auckland's adaptive approach to the changing needs of a growing city. With population forecasts for Auckland projected to increase by over one million people in the next 30 years, more pressure will be placed on our natural systems (and associated ecosystem services²) and the infrastructure designed to support the city's growth. WSD is essential to support the vision of the Auckland Plan which aims to make Auckland the “world's most liveable city”. With effective land use, planning practices and a balance between land development needs, we can ensure a long-term alignment with ecosystem services.

The Proposed Auckland Unitary Plan (PAUP) seeks to better address the relationship between land use and development, and the corresponding adverse effects through the promotion of WSD principles. Discussions through the plan process sought to resolve the definition and application of WSD to the point where a revised definition of WSD was proposed and generally agreed:

Water Sensitive Design (WSD) approach means an interdisciplinary approach to land use and development planning, design and implementation which integrates land use and water management, to minimise adverse effects on freshwater systems and coastal environments, particularly from stormwater runoff.

Some of the tools and techniques that can be used for stormwater management under a WSD approach (noting that there are other tools and techniques and that not all tools and techniques will be appropriate for any particular site) include:

- a. Keeping and enhancing freshwater systems, including intermittent and permanent streams*
- b. Keeping or otherwise providing overland flow paths*
- c. Minimising changes to predevelopment hydrology in stream catchments, including maintaining soil infiltration, base flow, groundwater recharge, and*

¹ TP108 is in the process of being reviewed and revised.

² Ecosystem services: The Auckland Plan (2012) defines this as the benefits people obtain from the environment, including goods (soil, food, animals, water, scenery) and services (functions such as water filtration, flood protection, pollination).

reducing runoff volumes and the duration and intensity of flows which cause erosion and habitat degradation

- d. Minimising impervious area on individual sites including through site design, clustering of houses, use of pervious paving and provision of open or vegetated spaces*
- e. Minimising the generation of contaminants, including minimising the use of high contaminant yielding building materials*
- f. Mitigating stormwater contaminants and runoff at or close to source.*
- g. Using green infrastructure which also provides other benefits and values and can be integrated into the urban landscape.*

WSD approaches focus on reducing, or eliminating, stormwater runoff generation through source control, and using natural systems and processes to manage stormwater quantity and quality effects. WSD uses a combination of conventional stormwater infrastructure, WSD devices (such as swales and raingardens), and enhanced natural systems to achieve the best practical stormwater management outcome. This approach also provides the opportunity for stormwater to be used, as a resource instead of a waste product.

3 EFFECT OF THE PROPOSED AUCKLAND UNITARY PLAN ON STORMWATER MANAGEMENT

The Proposed Auckland Unitary Plan (PAUP) forms the basis of Auckland's approach to growth and development in coming years. In particular regard to the management of stormwater, the PAUP places a focus on both quality and quantity management with an emphasis on water quality improvements as well as detention (peak flow reduction) and retention (volume reduction) of storm events. The PAUP shifts away from a standard Extended Detention Volume (EDV) of 34.5 mm, to an approach based on the 90th percentile and 95th percentile storm events which differ around the Auckland region. The runoff from these frequent, smaller events will form the basis of the detention and retention volumes requiring management. Calculation of these event volumes will still be based on the TP108 guidance (Auckland Council, 1999). The PAUP also focuses on High Contaminant Generating Activities (HCGAs), such as car parks, roads and roofs with high copper or zinc content (Technical Report 2013/035). The PAUP also shifts away from the use of a 75% sediment removal requirement that was imposed under the Air, Land and Water Plan.

4 FUNDAMENTAL CONCEPTS

The new guidance focuses on a number of key concepts including:

- **Water sensitive design** – a fundamental focus of the revised document is placing water sensitive design at the core of every design. Whether a design is large (such as a subdivision) or small (such as an extension to a house) the design should minimise the impact of the urban build on the natural hydrology. Maintaining pre-development runoff values should be the aim of any development, and the impact on the receiving environment should, as a minimum, be the same, if not better.

WSD allows for multiple benefits to be realised. Water quality and quantity results can be achieved alongside improved social, cultural and amenity values:

- By incorporating crime prevention into environmental design, public safety and access can be enhanced
 - Educational aspects of a design can be used to improve knowledge and understanding of our natural environment
 - Green infrastructure can improve the amenity of a public space with walkways and public art providing social reference points and connection to an urban space.
 - Environmental benefits can be maximised with improvements to biodiversity, connections to green corridors and eco-sourced native plantings.
- **Mana whenua values** – fundamental to the design for Auckland’s urban landscape is incorporation of mana whenua values. Auckland Council is working with mana whenua to define and include these values, including approaches to the Te Aranga Design Principles.
 - **Treatment Suites** – in a shift from the “treatment train” approach (where a linear “train” of devices are often retro-fitted to a design) a treatment suite is emphasised to provide multiple benefits through an integrated approach.

5 TECHNICAL DESIGN GUIDANCE

GD01 will provide technical design guidance on a number of devices including:

- Wetlands – planted wetlands provide the full treatment suite of detention, retention and water quality treatment through processes which include plant uptake, microbial metabolism and sedimentation.
- Ponds – ponds can be used as detention, retention and water quality treatment devices.
- Bioretention – including rain gardens, planter boxes, tree pits and vegetated swales. This chapter provides the most current guidance on media and planting to ensure that evapotranspiration and infiltration effects are correctly accounted for.
- Swales – with an emphasis on their use as retention devices in narrow corridors these devices have comprehensive design specifications.
- Pervious pavement – with an emphasis on their use as on-site treatment or previously impervious areas (such as driveways and car parks), pervious pavements provide an important retention function in brownfields developments.
- Living roofs – as both retro-fits and as new-builds, living roofs provide added benefits such as urban heat reduction, and ecological connectivity, as well as treatment and retention of water that falls directly onto the roof.
- Infiltration – including trench systems, these devices provide retention and infiltration but are generally unplanted so provide little in the way of biological treatment.

- Rain tanks – as on-site detention (and potentially retention) devices, raintanks provide simple, but effective, at source solutions.

The document also provides a chapter on plants and soils with an emphasis on unique soils of Auckland and the species of plants best suited to the Auckland climate and to each specific device.

Two additional chapters cover construction requirements, and operation and maintenance, supplementing the device design sections. The document will also include Safety in Design elements.

6 CONSULTATION

During 2016, Auckland Council will engage with a number of key stakeholder groups to further develop this robust technical guidance for stormwater management. This will include:

- Continued partnership with mana whenua
- Community of Practice workshops with key stakeholders and practitioners
- Soft launch on the Auckland Design Manual (ADM) website
- Feedback opportunities through the ADM prior to finalisation of the document.

The document is scheduled to be published in 2016 as part of a soft launch. During the soft launch period, all stakeholders will have an opportunity to provide feedback and suggestions for improvement through the Auckland Design Manual website.

After this period of feedback the document will be launched as a living document, with continuous opportunity for feedback. Auckland Council will then develop training programmes for industry practitioners, a data management system will be implemented and workshops around innovations and learnings will be held.

7 CONCLUSIONS

Key changes are being made to how Auckland manages stormwater. The Unitary Plan provides a stormwater management framework that moves us away from the 75% sediment removal, and defines the detention and retention of stormwater based on more site-specific data. The GD01 document will provide a more easy-to-use, technical guidance document which promotes innovation and the WSD philosophy through an integrated water management approach.

GD01 is scheduled to be published, as a living document in 2016, after consultation with mana whenua, stakeholders and practitioners. With the Unitary Plan becoming operative, the new Guidance Document will provide Auckland Council and developers with clear direction to managing stormwater with resilience.

REFERENCES

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