Wetland Design Manual A1: Design, Construction and Establishment of Wetlands

Manual

December 2020

VICTORIA State Government

Melbourne Water makes a vital contribution to the famous Melbourne lifestyle through the supply of high-quality water, reliable sewerage services, integrated drainage and flood management services and by enhancing our waterways and land for greater community use.

Melbourne Water
Enhancing Life and Liveability

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Acknowledgements

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Project Consultant: DesignFlow - Georgie Wettenhall and Jason Sonneman

Steering Committee: Melbourne Water - Jesse Barrett, Griffin Barry, David Carew, Luis Correia, Michael Flanagan, Leon Harvey, Birgit Jordan, Andrew Mellor and David Reginato

Stakeholder Interviews:

- Water Technology - Sarah Law,
- E2DesignLab – Gary Walsh, Dr Peter Breen, Dr Dale Browne, Dr Sara Lloyd and Kerrie Burge,
- Alluvium – Jonathon McLean,
- Storm Consulting – Rod Weisse,
- Stormy Water Solutions - Valerie Mag,
- Aquatic Systems Management – Scott Seymour,
- The University of Melbourne - Professor Tim Fletcher,
- Monash Water for Liveability - Professor Ana Deletic,
- Life Saving Victoria – Rob Andronaco,

Peer Review: E2DesignLab, University of Melbourne, Alexandra Brown – Spiire Rodger Studd – Breese Pitt Dixon, Sasha Jelicic – Reeds Consulting, Thomas Cousland – Water Technology

Industry Groups:

- Association of Land Development Engineers (ALDE),
- Urban Development Institute Australia (UDIA),
- Australian Institute of Landscape Architects (AILA),
- Drainage Scheme Review Group (DSRG)

Review Process

Recognising the complex and continuously evolving nature of wetlands, Melbourne Water will undertake regular reviews of this design manual. We welcome feedback on the design manual and the implementation success at all times and we will endeavour to involve all key stakeholders and customers in any future review.

Feedback can be provided in writing with comments addressed to:

Manager, Development Planning, Waterways & Land Group

Melbourne Water Corporation

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Melbourne VIC 3001

Further information on wetlands and the land development process can be found on our Planning and Building website.

Online Document

As part of Melbourne Water's commitment to sustainability, no printed copies of this document are available. An online version is available at melbournewater.com.au

Executive Summary

Urban development places significant pressure on waterways and their environmental and social value. The increased magnitude and frequency of urban stormwater can be a major force in stream erosion and habitat disturbance. In addition, stormwater contains considerable levels of contaminants and pollutants that can further degrade the health of waterways. Wetlands are one option for improving stormwater quality within a suite of other treatment measures.

Wetlands are built to remove pollutants carried such as fine sediments and water soluble nutrients, primarily nitrogen and phosphorous. These wetlands are shallow, vegetated systems that fill and drain in a controlled manner following rain events. The design hydrological regime and vegetation configuration throughout the wetland is critical to the treatment function of the system. The type, density and quality of vegetation in the wetland have a direct relationship to the treatment performance. If the vegetation does not meet the design configuration it is unlikely that the wetland is providing satisfactory pollutant removal.

This manual has been prepared to assist the land development industry when designing, constructing and establishing wetlands on behalf of Melbourne Water.

This document has been developed with a strong focus on:

- Designing and building robust wetland systems;
- Ensuring safety for both the community and maintenance staff;
- Cost effective asset management through design, construction, operation and maintenance;
- Improvements and efficiencies to the design acceptance process and when dealing with Melbourne Water;
- Clarity and consistency in decision making; and
- Training and guidance to the land development industry with tools, templates, and checklists.

This document can be used as a reference for external stakeholders, such as developers and consultants, and council.

Introduction to the Manual

Melbourne Water recognises the importance of wetlands and their role and function within urban environments. Melbourne Water's previous wetland guidelines have been updated in consultation with the land development industry and other stormwater management professionals; and will assist the industry to deliver best practice wetland designs. We expect this will help us to achieve our shared objectives for the treatment of stormwater and improvement of our urban waterways.

The purpose of this part of the wetland manual, titled "*Design, Construction and Establishment of Wetlands":* is to provide greater transparency of the requirements for constructed wetland systems in the Port Phillip and Western Port region.

The manual has evolved from previous guidelines and documents, the latest being the *Constructed Wetlands Guidelines* (2010). Wetland guidelines have been refined over many years since the industry publication *Managing Urban Stormwater Using Constructed Wetlands*

was released in 1998. The stormwater industry has matured through advancements in engineering practice, practical knowledge and further understanding of natural ecosystems.

The manual reflects current thinking and best practice design, and responds to a range of needs within the land development industry, including:

- Melbourne Water's need to see consistent improvement in the quality of wetland designs being submitted for review and approval; and
- The need from the land development industry for clear guidance from Melbourne Water regarding:
  - Expectations and requirements for wetlands;
  - The appropriate and efficient design approach required of consultants; and
  - The design acceptance process for wetland designs.

Meeting the above needs provides greater certainty and confidence within the industry that the designs submitted to Melbourne Water will be accepted. This will increase the efficiency of the design acceptance process, potentially saving time and money.

This manual should be read in conjunction with the following documents (or current versions of these documents):

- Melbourne Water's Building and Works website
- Urban Stormwater: Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999)
- MUSIC tool guidelines
- WSUD Engineering Procedures: Stormwater

This document is a revision of the previous *Melbourne Water Constructed Wetlands Guidelines* and provides the current best practice in constructing wetlands. Any variations between this document and those listed above are superseded by the new manual.
Wetland fundamentals including form and function and the physical features available to wetland designers are the drivers of typical wetland designs and treatment is provided in more detail in Melbourne Water's Planning and Building website. Planning, funding and management arrangements for wetlands (as supported by relevant legislation, policy, strategy and guidelines) are also outlined and available from our Building and Works website.

Purpose of the Manual

The manual is intended for use by members of the land development industry who design, construct and establish wetlands on behalf of Melbourne Water. This manual is also a resource for other professionals working within the stormwater management, drainage and land development industry (including other authorities and interested community members).

The manual facilitates the consistent delivery of high quality wetlands across the Port Phillip and Westernport region and will improve the customer experience of working with Melbourne Water during the design, construction and establishment process.

The manual:

- Articulates why it is important to implement best practice design standards, in terms of values of and objectives for wetlands (**Part A1**).

- Articulates the requirements of Melbourne Water's wetland design approach and design acceptance process (**Part B**), including the deemed to comply and alternative approach (**Part A2** & **Part A3**); and
- Describes the approach and tools necessary to deliver best practice wetland design (**Part C** & **Part D**);

How to use the Manual

The manual is structured as a series of parts and associated products to maximise the flexibility of its use within the land development industry.

There are four main Parts within this manual, each with a distinct purpose:

Parts A-D: Wetland Design

- **Part A1: Vision, core outcomes and aspirational outcomes** sets out Melbourne Water's required core outcomes for wetlands.
- **Part A2: 'Deemed to comply' design criteria** presents the design criteria that must be met to achieve 'deemed to comply' acceptance, and demonstrates how this criteria aligns with the design intent and core outcomes.
- **Part A3: Design considerations for wetlands** provides a set of key design considerations and minimum standards when considering an appropriate wetland design and/or when the alternative design approach is sought.
- **Part B: Design acceptance process** details the concept, functional and detailed design stages and the associated requirements of Melbourne Water's wetland design acceptance process.
- **Part C: Technical design, construction and establishment approach** provides resources for designing, constructing and establishing wetlands.
- **Part D: Design tools, resources and glossary** outlines the various analytical design tools, information sources and Melbourne Water resources that can be used to develop a best practice wetland design.

Familiarity with the manual will allow the land development industry to gain a full understanding of Melbourne Water's requirements for best practice wetlands. However, the manual has been written in a way that the Parts can be used independently as required. It is expected that the most heavily used parts of the design manual will be **Part A2** Deemed to Comply Design Criteria, **Part A3** Design Considerations and **Part B** Design Acceptance Process.

Supporting Resources

The design approach set out in the manual draws on a large body of existing information and design tools, many of which will be familiar to the land development industry. However, there are several new concepts and tools (see **Part D** of this manual for tools). A range of supporting resources has also been developed to assist designers to completely understand Melbourne Water's requirements for wetlands and apply them to their work (see Building and Works website for relevant resources and templates).

Support Resources

A number of resources have been developed to support the design approach set out in the manual:

- MUSIC Auditing tool including wet spells analysis tool
- Inundation Frequency Analysis tool
- Hydrological event modelling
- Continuous simulation (water quality, residence time and water level analysis)
- Hydraulic analysis of flow velocities

Forms, Templates And Checklists - Design Acceptance Process

The following forms and certification statements are required as part of the land development process.
Design package templates have been provided for each stage of the design acceptance process. It is expected that all design submissions to Melbourne Water will adhere to the structure of the templates, as this will enable efficient processing of applications.
Design packages must be complete and the declaration at the front of each design package signed prior to submitting the package to Melbourne Water. Additional project specific information may be added to the design package, as necessary.

Melbourne Water must be advised in writing of any variations from the requirements set out in the Agreement and the policies and procedures outlined in the Building and Works website (aka Land Development Manual), with supporting explanations, when the Certification Statements are forwarded to us.

Concept Design Stage

- Concept design package template
- Concept design calculation summary table
- Concept design deemed to comply checklist

Functional Design Stage

- Functional design package template
- Functional design calculation summary table
- Functional design deemed to comply checklist
- Application for Offer of Conditions of Agreement for the Provision of Stormwater Facilities
- Land Development – Acceptance of Offer of Conditions of Agreement for the provision of Drainage Facilities

Detailed Design Stage

- Detailed design package template
- Detailed design deemed to comply checklist
- Design certification checklist - Wetlands
- Consultant's Design Certification Statement

- Template for Site Environmental Management Plan
- Template for Maintenance Agreement / Plan

Pre-Construction Stage

- Consultant's Pre-Construction Certification Checklist
- Consultant's Pre-Construction Certification Statement
- Permit to Work
- Site Environmental Awareness Training (SEAT) trained

As-Constructed and Establishment Stage

- Consultant's Construction Certification Checklist
- Consultant's Construction Certification Statement
- Consultant's 'As Constructed' Survey Certification Checklist
- Consultant's 'As Constructed' Survey Certification Statement
- Consultant's Submission of Digital Data
- End of Defects Liability Period Certification Checklist
- End of Defects Liability Period Certification Statement

Example Design Plans

- Concept design plan example (refer Appendix 1 part A2 of manual)
- Functional design plan example (refer Appendix 2 part A2 of manual)
- Detailed design plan example (refer Appendix 3 part A2 of manual)
- Design of works
- Generic plan contents
- Sample notes for design plans
- Standards for plans and design drawings

Example As-Constructed Plans

- Connection to title boundaries
- As constructed requirements for digital format
- Media and file naming conventions

Example Maintenance Agreement and Plan

Maintenance agreement template (ZIP, 1.63 MB)

Example Operational Plan

- Operational Plan

Standard Drawings

All of our standard drawings and concept drawings are located on our website:

- Standard drawings

Document History

Date	Reviewed/ Actioned By	Version	Action
December 2020	Senior Asset Practitioner – Water Quality	2	Template and links updated