

A Case Study of applying an asset management approach to constructed urban waterways

Smith, L¹

¹ Melbourne Water, 990 La Trobe Street Melbourne, 3008 leigh.smith@melbournewater.com.au

Key Points

- An evaluation of constructed waterways against the asset management framework was undertaken to:
 - determine how aligned Melbourne Water's approach to managing constructed waterways is with best practice asset management
 - develop recommendations to improve alignment where required
- The evaluation identified that the majority of the required components of the asset management framework are already in place, albeit informally, and highlighted key gaps to address, such as the need:
 - to update the *Land Development Manual* to align with Melbourne Water's enterprise wide asset management approach;
 - for a *Constructed Waterways Asset Management Plan* that clearly defines services levels and management regimes;
 - for a failure mode analysis and risk assessment to support an investment planning process that prioritises and optimises asset maintenance and renewal;
 - to introduce service level performance and asset condition monitoring and inspection regimes;
 - to establish an accreditation program for waterway designers and constructors to support the industry to achieve best practice.

Keywords

Constructed urban waterways, asset management, levels of service, best practice

Introduction

In 2016, Melbourne Water commenced the transition from a traditional *waterway management* approach to a *waterway asset management* approach in order to align with the rest of the business. The driver for the change was the introduction of an enterprise wide asset management system that required all areas of the business to program the management of their assets based on the risk of failing to achieve the required levels of service to customers. With respect to waterways, the customer is the community and there are many levels of service that waterways provide that have benefits socially, ecologically and economically.

'The intended outcome of employing an asset management approach is maximisation of value from an asset class over its life cycle via optimal utilization of existing assets; and meeting financial, health, safety, environmental, and other regulatory and non-regulatory obligations. A key requirement of effective asset management is to ensure sufficient funding is available to maintain and enhance the service delivery

capacity of the asset class, both through provision of new assets and replacement of deteriorated ones' (Marlow et al., 2014).

Constructed waterways are typically entirely new waterways that provide a diverse range of services to the community living in new developments, typically in Greenfield areas around Melbourne. They are not only a core part of the major drainage and flood conveyance system of urbanising catchments, but provide for a range of ecological and amenity values.

Adopting an asset management approach for waterways, including constructed waterways is engendering a shift from managing the condition of waterways for conditions sake to the management of those elements of waterway condition that are critical in sustaining the performance of the waterway in delivering on its service levels. The traditional waterway management approach is driven by the philosophy of getting as many of our regions waterways as possible into what is considered to be an ecologically healthy state in order to protect biodiversity values and the functioning of waterways that also deliver social and economic benefits. The current approach recognises the current condition of waterways as being highly varied¹ and that opportunities to alter condition are constrained by various factors, such as catchment wide land use and hydrological change and the extent of historical modification to the waterway, through riparian vegetation clearance and channelisation works, for example.

Results and Discussion

The asset management framework (after Marlow et al., 2014) can be presented as four interdependent phases:

1. Asset planning
2. Asset design and construction
3. Asset maintenance and monitoring
4. Asset evaluation

How well Melbourne Water's current approach to planning, delivering and maintaining constructed waterways fulfils the requirements of each of the four phases was assessed by undertaking a review of existing policies, procedures, guidelines, design and construction outcomes and maintenance regimes. The results of this review are the focus of this paper.

Asset Planning

Asset Planning relates to the overall portfolio of planned future assets as well as planning for maintenance of the existing asset stock. The following seven components are representative of best practice asset planning (Marlow et al., 2014). The current status of Melbourne Water's approach to asset planning for constructed waterways has been evaluated across all seven components.

1. **Legal and regulatory requirements and expectations** – Sets the level of service required and defines what is expected from the service provider.

These components are well defined for Melbourne Water through the Water Act (Vic.) (1989) and Statement of Obligations (2015) formed under the Water Industry Act (1994) which define Melbourne Water's waterway and floodplain management and regional drainage functions and powers and Melbourne Water's obligations with regards to a waterways and drainage implementation plan which brings into effect its functions under the Water Act (Vic.) (1989).

¹ as measured by the Statewide Index of Stream Condition (DEPI, 2010)

2. **Organizational strategic plan** – Details the strategic plan, vision, mission, goals and objectives of the service provider. The organizational strategic plan is defined with a long-term focus.

The organisations strategic plan has been defined through Melbourne Water's *Strategic Direction* which emphasises the importance of strengthening the wellbeing of the community, co-creating the world's most desirable place to live and enhancing the natural environment.

3. **Asset management policy** – Translates the organizational strategic goals and objectives into a policy with more tangible objectives and targets.

Melbourne Water has an enterprise-wide *Asset Management Policy* and has also maintained a *Land Development Manual* (LDM) which incorporates a range of elements including policy directions specific to assets such as constructed waterways, however the LDM has not been holistically reviewed and updated for over ten years.

4. **Asset management strategy** – Provides an understanding of how asset infrastructure aligns with service delivery requirements, both now and into the future. The strategy must address four key questions: (a) what is the current condition of in-service assets (b) what are the service delivery requirements, now and into the future (c) What is the gap between the current infrastructure and the infrastructure needed to meet projected requirements (d) What is the timeframe within which investment needs to be made to meet projected needs?

Melbourne Water has an enterprise-wide *Asset Management Strategy* (AMS), which provides high level guidance regarding the organisations asset management principles and overall approach. In the constructed waterways context, a *Development Services Scheme* (DSS) can be considered to be the equivalent strategy for defining how asset infrastructure best aligns with service delivery requirements in each developing catchment. DSS also provide the pricing mechanism and funding arrangement for the required infrastructure. The AMS and DSS together therefore provide the framework within which the four key questions should be addressed. Whether or not this is the case was reviewed and the results are summarised as follows:

- (a) The framework is currently deficient in that inadequate information exists on the condition of existing constructed waterways assets.
 - (b) New constructed waterways are planned through *Development Services Schemes* to meet the urban growth projections of *Precinct Structure Plans*. Constructed waterways are designed to deliver on a range of services that will cater for the ultimate development scenario of the catchment they are located within.
 - (c) Approximately 400km of new constructed waterway will be required to be constructed across the regional *Scheme* portfolio (~260 Schemes) over the next 20-25 years in order to meet the service requirements of new development across all *Growth Corridors*.
 - (d) Because *Development Services Schemes* have a 20-25 year life, constructed waterways planned under a *Scheme* may be delivered at any point in the life of the *Scheme* depending on development triggers. Information on development activity is used to forecast when constructed waterways are likely to be required to be delivered.
5. **Asset management plan** – A formal plan building on the *Asset Management Strategy* that provides details of how assets are to be managed.

8ASM Short Communication/Technical Note

Smith - Constructed Waterways & Asset Management

This requirement is not being met because there is no *Asset Management Plan* for constructed waterways.

6. **Operational planning** - flows on from the asset management plan, and allocates necessary resources, based on measurable performance indicators that promote efficient service delivery.

This requirement is not being met due to the absence of an *Asset Management Plan*.

7. **Knowledge management** – Feeds back into the asset management plan in that asset data and failure data are used to improve asset management strategies across all facets of the asset management framework.

This requirement is not being met due to the absence of an *Asset Management Plan*.

Recommendations

- The LDM should be reviewed and updated to align with Melbourne Water's *Asset Management* approach
- A constructed waterways *Asset Management Plan*, and accompanying *Investment Plan* and the collection of Levels of Service performance and condition data are currently key gaps that need to be addressed.

Asset Design

Recognizing the importance of constructed waterways, Melbourne Water, in consultation with the land development industry and waterway management professionals, prepared the '*Constructed Waterways in New Urban Developments: Design Manual*' (draft, 2016) (the 'Manual') to assist the land development industry deliver best practice waterway designs that achieve our shared vision for constructed waterways.

The Manual clearly defines this vision and translates Melbourne Water's statutory obligations, policy directions and community expectations into clearly defined and achievable design objectives and corresponding design criteria for constructed waterways that are commensurate with Levels of Service and performance indicators and measures. This facilitates the integration of constructed waterways into Melbourne Waters waterway asset management approach.

Asset Construction

Melbourne Water operates an ISO 9001 Quality Assurance approach for the construction of Scheme assets. Overall this works well although ensuring consistency of consultant's and contractor's capability to deliver the required outcomes is a known issue.

Recommendation

- A recognised improvement opportunity is establishing an accreditation program for waterway designers and constructors to support the industry to achieve Best Practice standards.

Asset Maintenance

Regardless of waterway type and location all constructed waterways go on to a generalised programmed maintenance schedule for activities such as weed control and grass cutting. At present there is no

consideration of the service level failure modes for particular constructed waterways to guide specific maintenance activities.

Recommendation

- Establish clearly defined levels of service and management regimes for constructed waterways.
- Complete a failure mode analysis and risk assessment to identify priorities for maintenance intervention.

Asset Monitoring and Evaluation

No formal monitoring of constructed waterways presently occurs to inform asset condition reporting or preventative maintenance decision making. Corrective maintenance prevails and is driven by ad-hoc inspection during the programmed maintenance runs. This exposes Melbourne Water to the risk of unexpected waterway failure through unidentified or undetected failure modes.

No formal evaluation of the performance of constructed waterways in achieving their level of service is presently being undertaken. This is partly because Key Performance Indicators (KPIs) have not been clearly described and justified; and partly because the maintenance of constructed waterways has not yet been formalised into the asset management approach via an *Asset Management Plan (AMP)*. Effective constructed waterway maintenance will rely on establishing an inspection and monitoring schedule to provide asset condition and performance data. This data will support decision making regarding scheduling of preventative and corrective asset maintenance and where required capital renewal/replacement, in order to manage risk. Such data would also support reporting on how well the constructed waterways asset portfolio is meeting service levels.

The vision, design objectives and design criteria developed for the *Manual* support the articulation of levels of service and the identification of asset condition and performance measures that could be easily incorporated into a program of inspection and monitoring as part of the required AMP. Failure modes and an accompanying portfolio specific risk assessment framework would need to be defined in the AMP to provide the means with which to utilise condition and performance data in improved asset management decision making. Without this data, the management regime for constructed waterways cannot be optimised.

Recommendation

- Establish asset condition and service level performance measures
- Institute a regime of inspection, monitoring and evaluation

Conclusions

Melbourne Water has realised a significant opportunity in considering constructed waterways as part of the enterprise-wide *Asset Management System*. This evaluation has identified that many of the required asset management components are already in place, as well as highlighting the need and justification for an *Asset Management Plan* which would close all of the current asset management gaps, enabling Melbourne Water's approach to the planning, design, construction and maintenance of constructed waterways to be improved to demonstrate best practice waterway asset management. The outcome of this will be the ability to optimise investment in maintaining service levels across the asset class, mitigating the highest risks of service level failure and ensuring that the resources required for maintenance of the entire asset class are identified and well justified. Melbourne Water will be able to present a robust risk-based business case when seeking regulator endorsement of investment plans and

8ASM Short Communication/Technical Note

Smith - Constructed Waterways & Asset Management

associated works programs. Such a case would clearly demonstrate the service gap and the associated exposure of the business to risk within a continuing environment of potential funding constraints.

Acknowledgments

Dom Blackham, Jonathon Mclean and Darcy Moar (Alluvium Consulting Australia) and Jonathon Koehler (SPIIRE) for their work on the *Constructed Waterways Design Manual* which now represents a key piece of Melbourne Water's asset management documentation for constructed waterways.

References

Marlow, D., Beale, D., Gould, S. (2014). Practitioner's Guide for Economic Decision Making in Asset Management. Water Environment Research Foundation (WERF). CSIRO & IWA Publishing.

Department of Environment and Primary Industries (2010). Index of Stream Condition: The Third Benchmark of Victorian River Condition. State Government of Victoria.