

Comprehensive Review and Strategic Renewal of the largest river works program in the Murray-Darling Basin

Bowman, H¹. 2024

1. NSW Department of Climate Change, Energy, the Environment, and Water (DCCEEW).

Albury, NSW, 2604. Email: hugo.bowman@dpie.nsw.gov.au

Key Points

- The Hume to Yarrawonga River works program, the largest in the Murray-Darling Basin, has been undertaken continuously since 2001.
- In 2021, after operating under the same strategic plan for two decades, the program underwent a comprehensive review
- Based on the review's recommendations, a strategic reset was implemented in 2022.
- The reset involved developing a new Strategic Plan, Program Logic, MERI Plan, standardized engineering design drawings, a Decision Making Framework, a revised governance model and reporting framework, and a communication and engagement plan.

Abstract

A comprehensive review and strategic reset of the Hume to Yarrawonga (H2Y) River Works Program, the largest in the Murray Darling Basin, was recently completed to address critical knowledge gaps and the need for an updated strategic direction after two decades of implementation. The review aimed to align the program with contemporary investment drivers and integrate it with a more holistic view of the river reach.

Using a two-stage approach, the review first conducted a quantitative analysis of the program's performance, followed by a qualitative evaluation of its governance, planning, and delivery mechanisms. The findings revealed a strong need for a new Strategic Plan, focusing on the entire reach scale rather than sub-reach segments. This approach ensures enhanced flexibility of program implementation and improved prioritisation of projects.

Key outcomes included the development of a comprehensive strategic plan; an updated works management standard; detailed standard engineering design drawings for a range of river works intervention techniques; a Monitoring, Evaluation, Reporting, and Improvement (MERI) plan; and a revised governance model providing clarity for program partners. Additionally, an annual and multi-year planning and reporting framework, coupled with a communication and engagement plan were established. The significant work that has comprised this strategic reset not only addresses the immediate needs of the H2Y River Works Program but also offers insights and adaptable strategies for other river works programs in similar contexts.

Keywords

River Murray, Hume to Yarrawonga, Works Program, Review, Strategic Plan.

Introduction

The Hume to Yarrawonga reach of the Murray River is a significant alluvial floodplain that includes approximately 200km of parent river channel and 43 major anabranches (floodplain channels), extending off the main channel adding a further 160 kms of river length (totaling 720 km of riverbank). The H2Y River Works Program, the largest ongoing river works project in the Murray Darling Basin and one of Australia's most comprehensive, represents an investment exceeding \$36.7M over two decades from 2004 to 2024.

Aimed primarily at mitigating detrimental geomorphic impacts associated with the operation of Hume Dam, this program focuses on maintaining channel capacity and building resilience in the River Murray to ensure it can continue to be used as a key water delivery asset for downstream water users.

The considerable achievements of the program to date have included extensive bank stability and erosion control measures, addressing woody weed infestations, enhancing riparian vegetation, thus improving the river's overall environmental values and improving channel stability.

Prior to 2001, delivery of erosion control and revegetation works along the Hume to Yarrawonga reach were largely reactive. In response, an Advisory Group was established, and a Scoping Study completed to provide a more strategic and coordinated approach to the planning and delivery of works in the Hume to Yarrawonga reach of the Murray River. This program envisioned a self-sustaining ecosystem, balancing water conveyance, economic outputs, and environmental conservation. The program also aimed to work in a manner that was sympathetic to the laterally migrating and anabranching behaviour of the river. This vision was operationalised through the development of 15 sub-reach River Management Plans (RMPs) completed between 2005 and 2008, that provided a nuanced framework for managing the river's varied values and addressing identified risks across various management zones.

Over time, the program evolved in its delivery, adapting to changing management structures and objectives, with the latest changes to the delivery model undertaken in 2017-18, with NSW Soil Conservation Service (SCS) as contractors, the NSW government (now DCCEEW) responsible for delivery and MDBA continuing their oversight role on behalf of the Joint Venture Governments of the Murray Darling Basin. The allocation of funding was also amended to align with the delivery of discrete program components, namely, construction, maintenance and monitoring.

Program Review

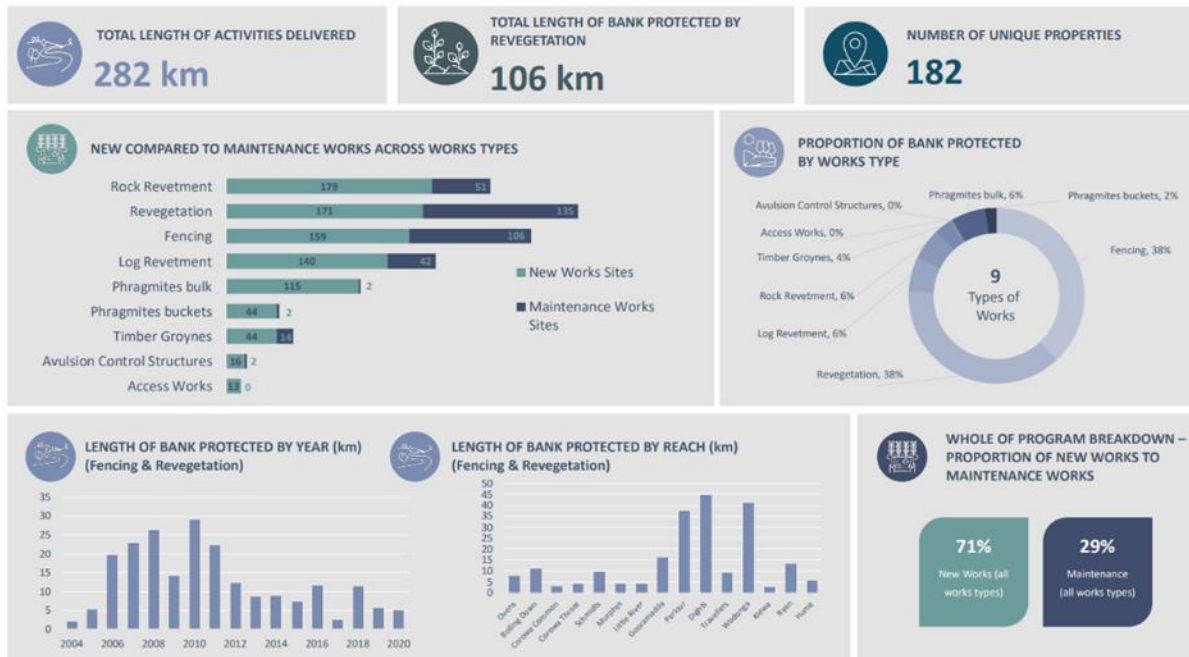
Whilst the 2001 Scoping Study and sub-reach management plans played an important early role in setting objectives and planning for river works, it was identified that they were in need of review and updating. Accordingly, a comprehensive program review was undertaken by RMCG in 2021, which aimed to evaluate the program across design, delivery, and impact.

The review confirmed the program's outputs and achievements, noting significant bank protection at 1,235 sites and 106 km of bank protection via revegetation were completed between 2004 and 2020. The achievements of the program were summarised in a series of dashboards (figure 1).

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Figure 1. Achievements dashboard for works delivered between 2004 – 2020 (RMCG, 2021).



The review also found certain riverbank stabilisation methods changed over time, most markedly in the program's utilisation of timber, with a shift from the use of timber groynes (2004–2008) to log revetment (~2008–2020). In addition, Engineered Log Jams were constructed at offtakes of anabranches that exhibited a trajectory of increased flow capture from the Murray main channel, and *Phragmites australis* (common reed), was also increasingly incorporated into bank protection works. These changes reflect a commitment to evolving river work techniques. The consistency and accuracy of data collection and reporting had evolved and improved over time, particularly through the introduction of annual work summaries and the extensive River Assets and Monitoring Database.

However, the review also revealed the need for a coherent program logic to connect activities with objectives and outcomes and recommended that a comprehensive Monitoring, Evaluation, Reporting, and Improvement (MERI) framework be integrated into program delivery. Inconsistencies in the method, scale and timeframe of condition monitoring data also made it difficult to draw evidence-based conclusions on condition change in the H2Y reach, associated from works/investment, over time. Further, while extensive records were maintained in the database, processes to extract meaningful information were not optimised.

The review also highlighted that program reporting could be strengthened to emphasise the connection between the works delivered and the objectives that they relate to. It also recommended a strategic realignment, advocating for a whole-reach scale approach to enhance funding flexibility and project prioritisation, aligned with contemporary investment priorities.

Furthermore, prioritisation of sites and adaptive practices required more transparency and better documentation, agreed upon by partners. Additionally, the role of the Advisory Group required clarification or exploration of alternative engagement models.

The review led to several key recommendations for the H2Y Program's improvement: developing a new strategic plan and decision-making framework; reviewing and updating the works management standard; establishing a MERI plan; and implementing a project planning and reporting framework. Additionally, developing a transition plan and a communication and engagement strategy were suggested.

Strategic Plan

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Following the comprehensive 2021 review of the H2Y River Works Program, a new Strategic Plan was developed to guide program delivery from 2022-2032. Developed in 2022 (RMCG), the Strategic Plan is a comprehensive document encompassing program history, the concept of a Working River, goals, methodologies, governance models, and performance monitoring. It sets a vision for the Hume to Yarrawonga Reach as a healthy and sustainable working river, primarily facilitating reliable water conveyance while enhancing (where possible) environmental, social, economic, and cultural values.

The Plan outlines three primary outcomes for the next decade:

Maintaining Hydraulic Conveyance: Focusing on efficient water delivery and removal of blockages to flow (i.e. willow islands).

Reducing Impact of River Regulation on Physical Form: Addressing bank erosion and channel changes.

Reducing Future Risks of River Regulation: Enhancing river system resilience through native vegetation protection and maintenance of river assets (i.e. all constructed river works assets).

The Strategic Plan introduces a program logic approach, clarifying how change is expected to occur and demonstrating the rationale behind the program. It includes a summary table of outcomes, actions and importantly short-term and medium-term targets. These provide a clear and structured roadmap for achieving the program's vision and objectives.

Monitoring and Evaluation

A Monitoring, Evaluation, Reporting, and Improvement (MERI) plan, essential for assessing progress toward program objectives, has been developed (Streamology, 2022). This plan facilitates the performance evaluation of the program across various timelines: short (1-5 years), medium (10-15 years), and long term (30 years), and delineates the program's reporting obligations. A mid-term (year 5) and end-of-program (year 9) review process is also planned, providing an opportunity to track progress, identify enhancements for strategic implementation and delivery of the program and ensures that the program continues to be adaptively managed over time.

Concurrently, a comprehensive set of monitoring specifications and methodologies were established, encompassing data collection for the period 2022-2032 in alignment with the MERI Plan (Streamology, 2022). This includes intervention and condition monitoring approaches like flow split measurements at the off-takes to anabranches, bank and asset condition assessments, woody weed surveys, LiDAR data collection, and geomorphic change assessments. These tools are designed to establish baselines, measure progress, and to guide strategic implementation and adaptive management. Furthermore, they provide clear reporting structures and processes, ensuring alignment to partner and stakeholder expectations.

Works Prioritisation and Delivery

A comprehensive works type decision-making tool has also been developed to facilitate the selection of works type based on identified erosional processes and values (Water Technology 2022). This tool operates on two levels: it assesses the specific erosion characteristics observed at the site in question, and also considers the broader erosional processes and context within the entire reach. By integrating site-specific data with a wider reach-based analysis, the tool aids in identifying the most effective intervention technique. Additionally, it considers various environmental and geomorphological factors to ensure that the chosen works type not only addresses the immediate erosion issues but also aligns with the overall health and sustainability of the river system.

A key outcome from the suite of strategic documents formulated during the program's reset was the updating of existing technical engineering Standard Design Drawings (SDDs). These SDDs encompass a range of works routinely executed in the program, including rock beaching, log revetment, a combination of log and rock revetment, fencing, and guidelines for revegetation.

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The primary objective of these SDDs is to offer scalable and adaptable design templates that can be applied across different sites. Each design drawing is comprehensive, providing detailed plans and section views, along with critical specifications such as material selection, dimensions, and structural integrity requirements. Moreover, the SDDs include practical advice on construction methodologies, taking into account environmental considerations and site-specific challenges. This approach ensures that the designs are not only effective in addressing site requirements but also promote consistency and efficiency in implementation across the program. The SDDs also provide a valuable communication tool to ensure that landholders, contractors, operational staff and program investors have a common understanding of what is to be delivered. Any variances to the SDD are documented through a series of proformas. A tool was also developed to accompany the application of the SDDs and assist identification of when SDDs were not appropriate wherein a site-specific detailed design drawings would be required.

A Decision-Making Framework and Prioritisation Tool (DMF & PT) was developed to promote unbiased, transparent, and scientifically grounded site selection (Water Technology 2023). This tool employs a weighted assessment approach, ensuring that each site evaluation is backed by justified, quantifiable reasoning.

While sound in its logic and conceptual implementation, the DMF & PT is undergoing continuous refinement to address identified knowledge gaps. It has become apparent that not all parameters can be quantified comprehensively, leading to the recognition that professional judgment remains a crucial component in multi-year works planning. This iterative improvement acknowledges the complexity of site selection and balances empirical data with expert insight to enhance decision-making processes.

Program Communication, Tracking and Governance

A Communications and Stakeholder Engagement Plan was also developed, designed to deepen stakeholders' comprehension of the program, promoting transparency and reinforcing partnerships, especially with Traditional Owners and community organisations.

A Works Management Standards manual was also developed, that summarises documents from the current program iteration, guiding planning, prioritisation, construction, maintenance, monitoring, evaluation, and reporting within the program. With the multitude of reports now underpinning this program, this summary document serves as a single reference point for all information and is updated with any changes to the respective documents as they invariably evolve.

A River Assets and Monitoring Database (RAMD), which has been in use for over a decade, was updated to reflect the updated requirements. This database is a very useful data management tool, capturing asset and monitoring data primarily, but can also assist in evaluations at various spatial scales. One of the updated features of the RAMD is the ability to produce a range of reports, including the annual report.

The Terms of Reference for the Advisory Group for Hume to Yarrawonga Waterway Management (AGHYWM) were also updated to reflect program partner priorities. The Group plays a pivotal role in guiding the program, ensuring its alignment with the Strategic Plan and fostering collaboration among the diverse group of stakeholders in this reach of the river. The existing Landholder Agreements was also refined, formalising the relationships and terms between relevant parties where works and activities are undertaken.

Conclusions

The program review and reset process undertaken for the H2Y River Works Program has produced detailed insights that could benefit similar initiatives. The comprehensive approach employed facilitated the development of a refined strategic framework, improved decision-making and communication tools, setting a robust precedent for future river management efforts. Among the successful achievements, the introduction of considered program logic underpinning a robust Strategic Plan and a multi-faceted MERI plan, stand out as best practices that ensure program objectives align with program partner requirements. However, the process also presented challenges, including establishing a transparent, scientifically quantifiable site selection tool, and striking the balance between relying on quantifiable metrics and professional judgment in

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decision-making. Sharing these learnings can guide other programs in developing more resilient and adaptive management strategies, ultimately enhancing the effectiveness and sustainability of river restoration projects worldwide.

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