Australian Government

Murray–Darling Basin Authority

Hydrometric Networks and Remote Sensing (HNRS) Program Evaluation Report

September 2024

Published by the Murray–Darling Basin Authority
MDBA publication no: 27/24
ISBN (online): 978-1-922699-74-9

GPO Box 1801, Canberra ACT 2601
1800 230 067
engagement@mdba.gov.au
mdba.gov.au

Cataloguing data
Title: Hydrometric Networks and Remote Sensing (HNRS) Program Evaluation Report, Murray–Darling Basin Authority Canberra, 2024. CC BY 4.0

Accessibility
The Murray–Darling Basin Authority makes its documents and information available in accessible formats. On some occasions the highly technical nature of the document means that we cannot make some sections fully accessible. If you encounter accessibility problems or the document is in a format that you cannot access, please contact us.

Acknowledgement of the Traditional Owners of the Murray–Darling Basin
We acknowledge the Traditional Owners and Custodians of Country throughout the Murray–Darling Basin and their continuing connection to land, waters and community. We offer our respects to the people, the cultures and the Elders past and present.

Aboriginal people should be aware that this publication may contain images, names or quotations of deceased persons.

Contents

Table index

Figure index

List of Acronyms

BAU	Business as usual
BoM	Bureau of Meteorology
CHA	Collaborative Heads Agreement
Commonwealth DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DAWE	Australian Government's former Department of Agriculture, Water, and the Environment
DRDMW	State of Queensland Department of Regional Development, Manufacturing and Water
GA	Geoscience Australia
HNRS	Hydrometric Networks and Remote Sensing
HNRS Program	Hydrometric Networks and Remote Sensing Program
ITA	Independent Technical Assessor
LiDAR	Light Detection and Ranging
MER	Monitoring, evaluation, and reporting
M–D Basin	Murray–Darling Basin
MDBA	Murray–Darling Basin Authority
MDB WIP	Murray–Darling Basin Water Information Portal
MOU	Memorandum of Understanding
NRAR	State of New South Wales Natural Resources Access Regulator
NSW DCCEEW	State of New South Wales Department of Climate Change, Energy, the Environment and Water
PMO	Project Management Office
PoC	Proof of Concept
OFWSE	On-Farm Water Storage Explorer
SWOT	Strengths, Weaknesses, Opportunities and Threats

Executive Summary

Introduction

The health of the Murray–Darling Basin (M–D Basin) is of major interest throughout the eastern Australian states. Off the back of growing community concern about increased use of water, water theft, declining health of the northern Basin rivers, and the need for accurate water use and water flow information, the Hydrometric Networks and Remote Sensing Program (HNRS Program) was established.

The HNRS Program was funded $35 million by the Australian Government with additional cash and in-kind contributions from the program's partners to be delivered collaboratively to strengthen public confidence in Basin water management.

Prepared at the conclusion of the HNRS Program, this report has undertaken an evaluation that will support future monitoring, evaluation, and reporting (MER) and further evaluation of long-term program outcomes.

Figure ES-1: Word cloud description of the HNRS Program by Program Partners

HNRS Program overview

The HNRS Program was a collaborative effort between the State of New South Wales Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), the State of Queensland Department of Regional Development, Manufacturing and Water (DRDMW), the Bureau of Meteorology (BoM), Geoscience Australia (GA), and the Murray–Darling Basin Authority (MDBA).

Collectively for the purposes of reporting this group of agencies and government departments are referred to as Program Partners.[1]

The HNRS Program created an opportunity for the Program Partners to work together to deliver outputs that improve decision making by water users and those involved in water management including water compliance. Ultimately, the HNRS Program sought to improve public confidence in management of the northern Basin. A part of a survey of Program Partners generated the word cloud shown as Figure ES-1.

The HNRS Program was scoped as four projects that were delivered with support from a program management office (PMO). These projects provided program outputs, which can be grouped as:

- new and improved data sources
- new and improved methods and tools to monitor and evaluate water use
- new portals for accessing data, methods, insights and tools.

Jointly, these outputs will over time contribute to more efficient management and improved compliance of water taken across the northern Basin.

For more information on the projects and outputs developed by the HNRS Program, refer to the HNRS Program Closure Report.

Approach

In evaluating the HNRS Program best practice literature was consulted to inform the approach taken. The overall approach to evaluation as described in this literature is demonstrated in Figure ES-2.

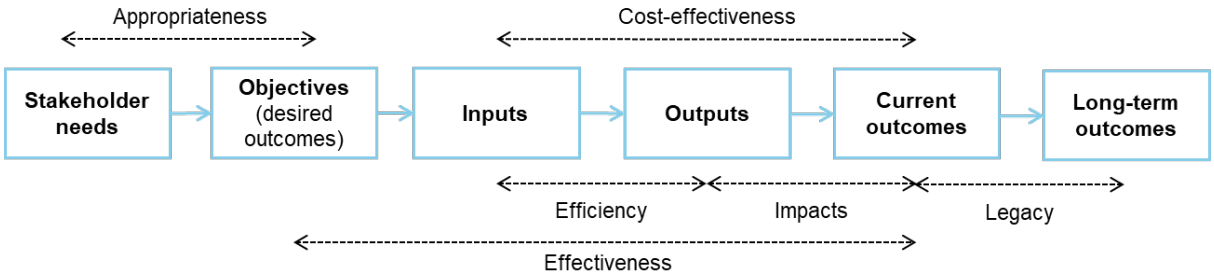

Figure ES-2: Evaluation logic.

In summary, this approach seeks to answer the questions of whether the program:

- objectives were appropriate and effective
- outputs were produced efficiently
- outputs are likely to result in the desired impacts.

[1] The Program Partners also relied on inputs from agencies and organisations who have functions in water management and governance. Post HNRS Program recalibration Geoscience Australia assumed an observer role with access to Steering Committee meetings and other documents.

In preparing this evaluation, original evidence obtained during delivery of the HNRS Program has been sourced and supplemented with two new qualitative data sources:

- a survey of Program Partners
- a SWOT (strength, weaknesses, opportunities, and threats) analysis workshop with Program Partners.

Findings

This report has obtained compelling evidence to support that the HNRS Program demonstrated an appropriate, efficient, and effective use of resources. The program inputs and outputs have demonstrated that even in the short-term, the HNRS Program has improved water management across the entire Basin that will provide legacy outcomes for decades to come.

The HNRS Program involved the right Program Partners who were willing to employ new thinking and new technology to achieve required outcomes. The cooperation and collaboration that the HNRS Program facilitated has shown what can be achieved when state objectives and systems are aligned and people in different organisations are working towards a common cause.

Specifically, the evaluation of the HNRS Program found that:

- the need for the HNRS Program was real and governments were the appropriate stakeholders to address this need.
- the objectives and benefits sought by the HNRS Program were logical.
- the outcomes will increasingly become successful in addressing the identified need; however, evidence to demonstrate how the program has been effective in delivering the benefits sought remains "work in progress" and will become more evident over the longer term.
- there is evidence of organisations outside HNRS Program Partners using or seeking to use the tools and to potentially avail themselves of data sharing arrangements.
- the Program Partners supported by flexible governance arrangements encouraged adaptive management and candour when recalibration of program deliverables occurred.
- there were some inefficiencies in processes due to the doubling up of reporting efforts, but overall Program Partners thought that the Program was the best use of available resources.
- there are implications / applications of the outputs delivered by the HNRS Program for other areas where water management is important.

The success of the HNRS Program is best captured in this quote from Phil Duncan, Gomeroi Nation Indigenous man and former Chair of the Murray–Darling Basin Community Committee (BCC). In relation to the Cultural Water Information Pilot undertaken for the Murray–Darling Basin Water Information Portal (MDB WIP) on the lands of the Gomeroi Nations, Phil stated:

- *"These last 6 months with the Bureau mapping my country has been one of the most rewarding projects I've been involved in for the last 15 to 20 years."*

- *"The opportunity to do the Water Information Portal on the Gwydir River that has such a significant impact for sustainability of country and people has just been majestic for me."*

Conclusion

The HNRS Program has produced foundational outputs that, with continued use, will contribute to the intended benefits of the program, namely improved compliance outcomes, improved access to water information, improved measurement and monitoring of water use, and reduced data costs. Ultimately, the HNRS Program will improve public confidence in the management of water resources in the northern Basin.

However, the full realisation of benefits and long-term outcomes from using these outputs will require continued investment in the maintenance, operation, and awareness of these foundational outputs by all stakeholders.

1 Introduction

1.1 Program context

Growing community concerns during the decades from the 1980s to the 2000s about how the northern Murray–Darling Basin (M–D Basin) water resources were being exploited and how the rivers were showing environmental decline led to governments taking stock of what was happening. The *Murray–Darling Basin Plan (2012)*[2] focused attention on the need to maintain and restore the M–D Basin's rivers to health with a suite of initiatives including increasing the understanding around how much water was being taken out of them.

In 2017 the Murray–Darling Basin Water Compliance Review [3] found low levels of public confidence in the management of water and compliance with water regulations. The review also noted concerns about the lack of transparency about and resourcing of water compliance activities in the northern M–D Basin.

The review identified the value of better measurement of water diversion through increased use of emerging technologies such as remote sensing and improvements in hydrometrics[4].

The Hydrometric Networks and Remote Sensing Program (HNRS Program) was established in 2020 by the Australian Government (through the then Department of Agriculture, Water, and the Environment [DAWE] to strengthen public confidence in Basin water management (i.e. improve transparency and compliance outcomes) by:

- expanding the hydrometric network, supplemented with low-cost measurement devices
- automating and making available online water accounting, monitoring and reporting tools for water entitlement holders and compliance officers
- using remote sensing data to improve measurement and monitoring to support water management and compliance
- making water information available to the public via the Murray–Darling Basin Water Information Portal (MDB WIP).

[2] WATER ACT 2007 (austlii.edu.au)
[3] 22 Sep 2020 - www.mdba.gov.au/sites/default/files/pubs/MDB-Compliance-Review-Final-Report.pdf - Trove (nla.gov.au)
[4] The "science and practice of measuring the components of the hydrological cycle (3.92), including rainfall (9.10), water level (3.64), flow and sediment transport (8.2) of surface waters, and groundwater (11.1) characteristics". *ISO 772:2022 (en) Hydrometry - Vocabulary and symbols. International Organization of Standardization.*

1.2 Purpose of this report

The overall aim of this evaluation report is to uphold government accountability, facilitate continuous improvement, inform strategic decisions, and build an evidence base for policy-making that will demonstrate effective and efficient use of public resources.

Generally, this evaluation report serves several purposes including:

- **Accountability:** Demonstrating transparency and accountability to stakeholders, decision-makers, and the public on how government funds have been utilised and whether the HNRS Program achieved its intended objectives.
- **Informing Decision-Making:** This report evaluates the appropriateness, effectiveness, and efficiency of the HNRS Program. The findings will inform decisions on future investment based on evidence of what is working well or needs improvement.
- **Learning and Knowledge-Building:** This evaluation will contribute to organisational learning by documenting strengths, weaknesses and lessons learned influencing program success or failure.
- **Evidence-Based Policymaking:** This evaluation has generated a credible evidence base to support data-driven decision-making and policy formulation.

Prepared at the conclusion of the HNRS Program, this report documents a summative evaluation that will support future monitoring, evaluation, and reporting (MER) of long-term program outcomes.

1.3 Overarching approach

The program evaluation undertaken in this report sought to test whether the HNRS Program objectives have been met. Consistent with the evaluation logic (Figure 1), the evaluation has evaluated whether the program:

- objectives were appropriate and effective
- outputs were produced efficiently
- outputs were likely to result in the desired impacts.

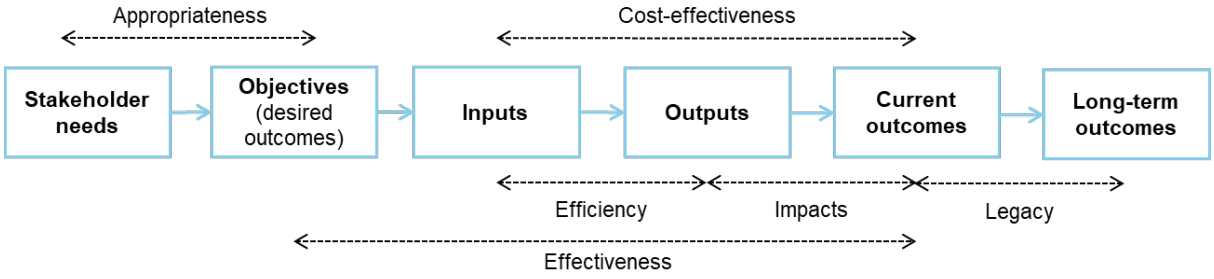

Figure 1: Evaluation logic.

In preparing this report it is noteworthy that many of the outputs developed by the HNRS Program are new and/or innovative. While every attempt has been made to analyse available performance

data, the intermediate and long-term outcomes of investment in the HNRS Program will become increasingly obvious as exposure to the products is increased over time.

The widespread adoption of the data, methodologies and tools developed by the HNRS Program will become business as usual (BAU) for the northern Basin states, by the Commonwealth agencies and all other stakeholders. It has developed and provided useable tools for water licence holders, communities and First Nations peoples that enhance environmental water protection. Therefore, this report focuses on the appropriateness of HNRS Program objectives, their effectiveness in contributing to short-term outcomes and the efficiency of the Program in using inputs to produce outputs.

Wherever possible, this evaluation report has used quantitative measures to explore value for money and has supported this with available qualitative data.

2 Case for change

2.1 Background

The Murray–Darling Basin (M–D Basin) is approximately 1 million square kilometres (km) in size and comprises a complex arrangement of catchments, rivers and groundwater sources. The M–D Basin has multiple governments, varied densities of communities, over 50 First Nations, differing landscape types, assorted industry and agricultural endeavours and complex water dependent environments. The common thread in the M–D Basin is water which flows inevitably towards its end at the Murray Mouth in Goolwa, South Australia. The productivity of the end of the M–D Basin and everything in between depends on how well the water upstream is managed, treated, and administered.

In the late 20th century and into the 21st century, the northern M–D Basin, which constitutes the Border Rivers between NSW and Queensland, the rivers that intersect the NSW/Queensland border (the "Intersecting Streams") and the NSW northern M–D Basin rivers, experienced accelerated irrigated agriculture development. The northern M–D Basin shown in Figure 2 is relatively sparsely populated compared with the southern M–D Basin and requires water measurement at scales involving complex and difficult logistics given the sheer size and remoteness of the region. Inevitably the effects of behaviour and misuse of water upstream draws scrutiny from communities downstream and from those concerned with the health of the waterways.

Figure 2: Northern M–D Basin.

2.2 Program drivers

Since the development of irrigated agriculture, the M–D Basin's water systems have been managed with a complex array of regulation that seeks to ensure that upstream water capture and use leaves sufficient water shares for downstream users. Drought, compliance failures (including water theft), river health issues such as blue green algae blooms, fish deaths, and blackwater events have increased the community's awareness and concerns that governments need to be managing water with accurate information to back up the regulations that ensure the equitable and legal distribution of water.

In 2017, governments came under scrutiny arising from the ABC's Four Corners *Pumped* (https://www.abc.net.au/news/2017-07-24/pumped/8727826), which threw a light on the plight of communities and river environments that were feeling the effects of water mismanagement, irregularities in official dealings and water theft. In response, the NSW Government appointed Mr Ken Matthews AO to independently investigate the allegations from the television program. An interim report found "…that water-related compliance and enforcement arrangements in NSW have been ineffectual and require significant and urgent improvement." [5] Further, and relevant to the HNRS Program, the interim report found that, "Arrangements for metering, monitoring and measurement of water extractions, especially in the Barwon–Darling river system, are not at the standard required for sound water management and expected by the community."

The service need that demonstrates the case for change is shown in Figure 3.

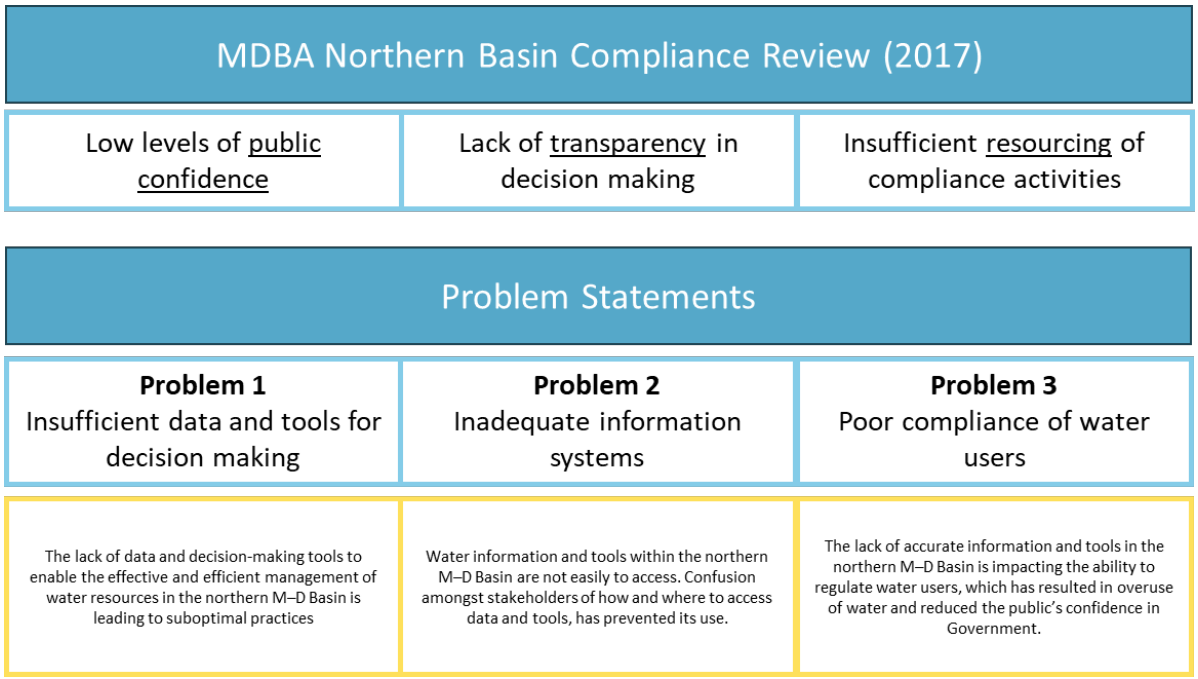

Figure 3: The service need.

[5] Accessed via; https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0016/120193/Matthews-interim-report-nsw-water.pdf, p4.

2.3 Investment logic

An investment logic map has been developed to characterise the relationship between the problem statements, the benefits sought and the expected outcome from addressing the service need. This is shown in Figure 4.

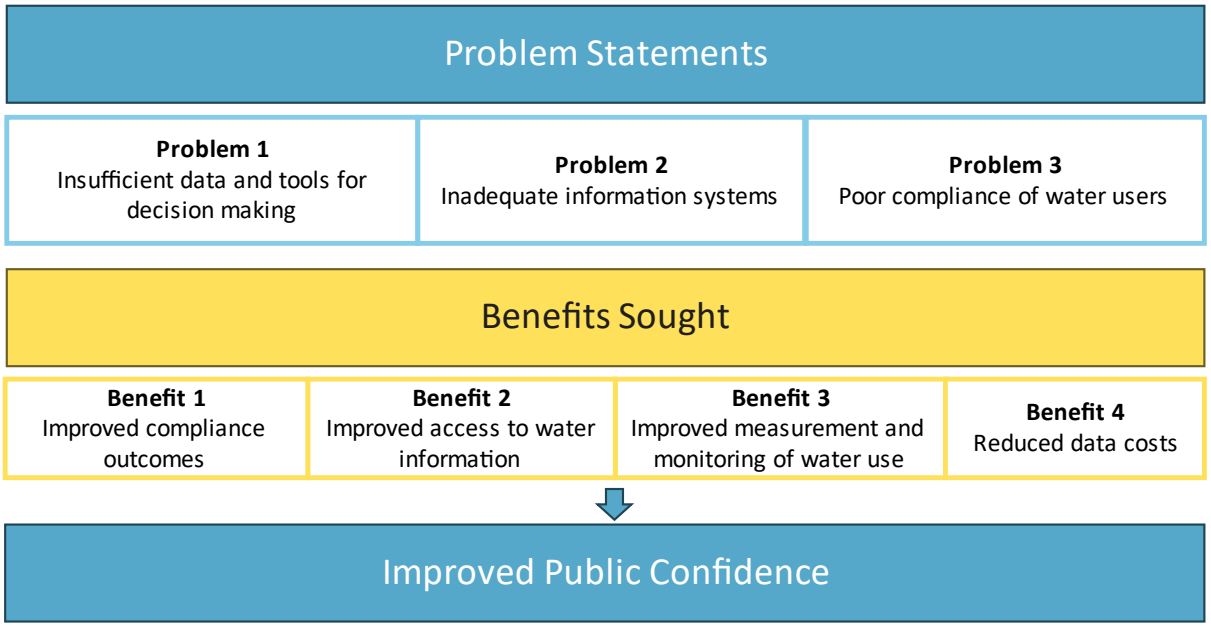

Figure 4: Investment logic map.

A more detailed graphical representation of how the HNRS Program was designed to improve transparency and compliance outcomes is provided in Appendix A.

2.4 Addressing the case for change

The Murray–Darling Basin Water Compliance Review (2017) [6] and the Ken Matthews reports provided evidence to support the case for change. The Review (op. cit.) recommended a comprehensive assessment and upgrade of the systems to provide data and information for better measurement of water diversion (extractions and floodplain/overland flow capture) through increased use of emerging technologies such as remote sensing and improvements in hydrometrics/measurement.

In scoping solutions that would contribute to the benefits sought (refer to Figure 4), State water management and policy agencies and organisations tasked with roles in water data collection, compliance and management were engaged to design a program of works measures and tools to fill

[6]Accessed via; https://webarchive.nla.gov.au/awa/20200921173818/https://www.mdba.gov.au/sites/default/files/pubs/MDB-Compliance-Review-Final-Report.pdf.

the information gaps and encourage and embed the mechanisms by which the information can be shared.

As a result of the scoping a long list of interventions were proposed. These interventions were grouped as 4 projects and presented to government to demonstrate program logic and highlight how the program needs were consistent with a role of government, and how the solutions proposed demonstrate value for money.

From an economic and public policy perspective, government intervention is considered appropriate if each of the following conditions are met:

1. there is evidence of market failure (e.g. due to externalities, public good non-commercial outcomes, or information failures)
2. the total benefits of intervention exceed the total costs
3. the policy tools selected form the best possible approach to address the problem.

In satisfying these requirements, as outlined in a proposal to the Australian Government, the HNRS Program was announced, and solutions that would address the identified problems, and benefits sought were developed.

Section 3 describes the HNRS Program that was developed to address the case for change.

3 About the HNRS Program

3.1 Overview

The HNRS Program was established by the Australian Government (the present Department of Climate Change, Energy, Environment and Water [Commonwealth DCCEEW] through the former Department of Agriculture, Water and Environment [DAWE]) to strengthen public confidence in M–D Basin water management (i.e. improve transparency and compliance outcomes) by:

- expanding the hydrometric network, supplemented with low-cost measurement devices
- automating and making available online water accounting, monitoring and reporting tools for water entitlement holders and compliance officers
- using remote sensing data to improve water measurement and monitoring to support water management and compliance.

The HNRS Program was originally costed at $10m. However, after detailed investigation and planning, funding of $35 million was provided by the Australian Government and delivered in collaboration with the program's delivery partners.

The objective of the HNRS Program was to:

> *Facilitate an efficient and effective framework for northern Murray–Darling Basin state governments, the Murray–Darling Basin Authority and the Commonwealth to work together to improve, develop, build, install and implement tools, techniques, devices, processes and systems for enhancing the quality, availability and transparency of water monitoring and information for the northern Murray–Darling Basin.*

The HNRS Program was a collaborative effort between the State of New South Wales Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW), State of Queensland Department of Regional Development, Manufacturing and Water (DRDMW), the Bureau of Meteorology (BoM), Geoscience Australia (GA) and the Murray–Darling Basin Authority (MDBA). Collectively this group was referred to as the Program Partners.

The program was underpinned by a Collaborative Heads Agreement (CHA) and overseen by an independently chaired HNRS Program Steering Committee, supported by a HNRS Program Technical Panel.

The four projects that comprise the HNRS Program are described in Table 1. The table also demonstrates the delivery partners involved and the lead reporting agency. Full program details including budgets and milestones can be found in the HNRS Program Project Closure Report.

Table 1: Program overview (lead agency in bold).

Project	Project description	Delivery partners
Project 1	This project aimed to improve the transparency and accountability of water management and decision making across northern Basin catchments. The project collected, managed, and reported data, to create a water accounting and reporting tool for entitlement holders and compliance officers.	**QLD** MDBA NSW
Project 2	This project developed a public water information portal that makes water information available to the public in a clear and transparent way, drawing information from a range of sources. This project also reported on environmental watering within the M–D Basin.	**MDBA** BoM NSW QLD
Project 3	This project improved water monitoring and compliance across the northern Basin by expanding the hydrometric network and using remote sensing technologies to provide additional data for compliance monitoring and reporting. This project supported improvement in measurement of flows and floodplain harvesting / overland flow take technologies.	**QLD** MDBA NSW
Project 4	This project operationalised remote sensing undertaken in Project 3, to enhance real-time measurement and compliance at a Basin scale. This project improved information on water balance in the M–D Basin.	**NSW** MDBA QLD GA

The outputs produced from the projects is shown in Table 2.

Table 2: HNRS Program outputs.

Output Group	Key Outputs
New and improved **data sources**	• 23 gauging stations (new or upgraded) • Acquisition of 93,000 square kilometres of Light Detection and Ranging (LiDAR) in targeted floodplains • 50+ supplementary rainfall telemetry Proof of Concept (PoC) stations (new) • 8,294 km longitudinal survey of part of the Moonie and Border Rivers catchments
New and improved methods and tools to **monitor and evaluate** water use	• Reach/Catchment Water Balance Model Tool (public facing) • Floodplain Harvesting Analytics Tool (internal) • Data Quality Improvement Register (internal) • On-Farm Water Storage Explorer (OFWSE) calculation tool (internal) • Synthetic Aperture Radar (SAR) derived elevation and interferometry (InSAR) Tool for Catchment and Farm scale change detection PoC (internal) • Farm Scale Water Balance Tool (internal)

Output Group	Key Outputs
New Portals for accessing data, methods and tools	• WaterIQ Customer Portal (Qld) WaterIQ App – android / iOS (Qld) • WaterIQ Manager (internal) (Qld) • Water Insights Portal (public facing) (NSW) WaterInsights - WaterNSW • NRAR's Intranet Hub (Compliance Officer Interface and Dashboards) (internal) • Water Information Portal (M-D Basin) • https://water-monitoring.information.qld.gov.au/

The relationship between each project, the project scope, and the intended beneficiaries is shown in Figure 5 (next page).

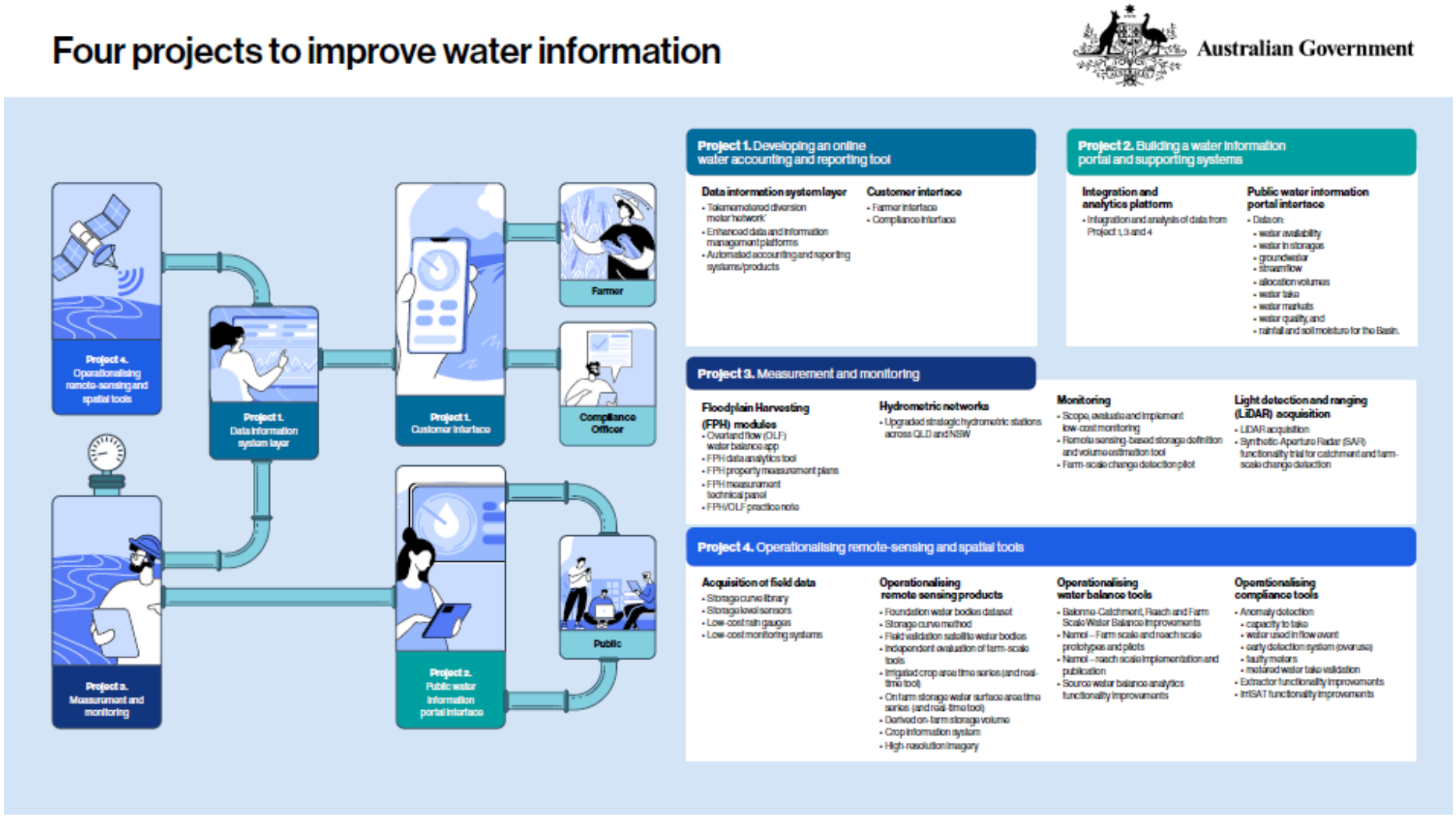

Figure 5: Project scope and relationship with intended beneficiaries.

3.2 Benefits (objectives)

The four interlinked projects that comprise the HNRS Program improve the quality and accessibility of information available to irrigators, compliance officers, water managers and the public about water in the northern Basin by using remote sensing, enhanced analytics and data portals.

The four benefit groups sought to be delivered by the HNRS Program were defined as:

- **B1 Improved compliance outcomes** – Compliance officers will have access to improved compliance tools, including access to real-time water use information and remote sensing and water balance tools and analytics allowing State and Commonwealth compliance staff to focus on areas or individuals at highest risk of non-compliance.
- **B2 Improved access to water information** – The public will have access to real-time or near-real-time information on flows, extractions, as well as registers of water entitlements and trade improving transparency in northern M–D Basin water management. Entitlement holders will have access to real-time or near-real-time information on water flows, extractions, and rules relevant to their entitlements, reducing administration and compliance costs for the entitlement holder.
- **B3 Improved measurement and monitoring of water use** – Compliance officers and water managers will have improved water monitoring capability through the use of remote sensing tools, application of automated reporting of water takes and agreed specifications for the measurement of floodplain harvesting / overland flow.
- **B4 Reduced data costs** – A data sharing agreement clarifies the arrangements for sharing data between partners, including the status, availability, and treatments. This agreement reduces the effort required to agree individual data use requirements and will be used as a template for future data-based programs.

3.3 Program change and continuity (recalibration)

Prior to mid-2021 the HNRS Program was primarily one of investigations and design administered by a committee with the same configuration as the HNRS Program Steering Committee.[7] The HNRS Program was understood to be subject to evolution because its deliverables were partly developmental and, in some cases, new technology. The governance arrangements were set up to provide a robust and auditable assessment framework and to allow for planning and delivery agility.

As a result of understandings gained via project milestone delivery, project element developments, timeline and resourcing risk considerations, as well as changes to HNRS Program partnerships in October 2022, the HNRS Program Steering Committee approved a series of project change orders that authorised the scope, delivery approach and schedule for deliverables in HNRS Program Project 3 (improved measurement and monitoring) and Project 4 (operationalising remote sensing and water balance tools) to be changed. Importantly, however, the foundational objectives of the Program

[7] The program governing committee was known as the Water Information in the northern Basin Steering Committee

were maintained and, indeed, all future change orders were also consistent with the originally stated agreed objectives of the Program.

In approving the changes, the Steering Committee asked the HNRS Program Technical Panel to also undertake a review of Project 1 and Project 2. The change requests sought to align the deliverables under Project 1 and Project 2 with the recalibrated Project 3 and Project 4 to ensure that program linkages and data flows were appropriately mapped across all four projects. Included in the change request were minor changes to Project 3 and Project 4 due to flooding and minor project corrections.

The purpose of the recalibration was to align the scope, delivery approach and schedule of Project 1 and Project 2 deliverables with the recalibrated Project 3 and Project 4 (change requests September and October 2022). In December 2022, the Steering Committee (Meeting 25, 5 December 2022) further approved the recalibration of Projects 1 and 2 to align the scope, delivery approach and schedule of Project 1 and 2 workstreams / deliverables with the previously recalibrated Projects 3 and 4. The changes ensured that the authorised scope of program deliverables would achieve the HNRS Program objectives and maintain the original program logic.

Steering Committee Member Reflection

Support to undertake recalibration was important, built on lessons learned early through the program, and lead to better products and deliverables - co-learning by doing also built relationships and team efforts to achieve solutions.

4 About the evaluation

4.1 Approach

In evaluating the HNRS Program, numerous best practice literatures were consulted to inform the approach taken. This can be defined by the following steps:

1. defining clear objectives that define the purpose and scope of the evaluation
2. developing an evaluation plan that uses multiple levels and lines of evidence (MLLE) and data collection methods
3. using a program logic model to demonstrate how the program is intended to work, including inputs, activities, outputs, and outcomes
4. collecting and analysing quantitative and qualitative data sources
5. developing recommendations from the evaluation and communicate findings.

In preparing this evaluation, original evidence obtained during delivery of the HNRS Program (including tracking of "lessons learned") has been sourced and supplemented with two new qualitative data sources:

- a survey of Program Partners, a part of which generated the word cloud shown as Figure ES-1.
- a SWOT (Strength, Weaknesses, Opportunities and Threats) analysis workshop with Program Partners.

4.1.1 Survey

A survey was developed to ask the Program Steering Committee and observers (note this excluded other stakeholders for whom products were developed) to provide their opinions and observations about the performance of the HNRS Program.

The survey questionnaire is provided in Appendix B.

4.1.2 SWOT analysis workshop

Specifically for this evaluation report, a Strength, Weaknesses, Opportunities and Threats (SWOT) analysis was undertaken with the Steering Committee members. This SWOT analysis was facilitated by a consultant and forms additional evidence presented in this report. The summarised findings of this SWOT analysis are presented in Section 6.

4.2 Program logic (inputs, outputs and outcomes)

Program logic was used to describe how the HNRS Program worked by linking activities with outputs and short, and long-term outcomes. It shows the intended causal links for a program, making it easier to understand how inputs and activities lead to desired outcomes.

The program logic framework that has been used for the HNRS Program is shown in Table 3. This framework demonstrates that in evaluating performance, it is necessary to identify the performance indicators and the means for measuring them. Further, this framework recognises that in analysing the performance of indicators, that making assumptions is necessary.

Table 3: Program logic framework.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
Inputs: The resources allocated to the program.	Data relating to implementation budgets.	How implementation target will be monitored.	Indicator results for provision of inputs.	Assumptions for providing inputs.
Outputs: The initial measurable results of the program.	Evidence of the extent and nature of outputs.	How data on outputs will be collected and measured.	Indicator results for implementing outputs.	Assumptions for implementing outputs.
Outcomes: The ultimate impacts of the program.	Conditions that will indicate outcomes have been achieved.	How data on outcomes will be collected and measured.	Indicator results for achieving outcomes.	Assumptions for achieving outcomes.

The populated framework for the HNRS Program is shown in Table 4 (over-page).

Table 4: HNRS Program logic (inputs, outputs and outcomes).

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
Inputs				
Legal instruments	• Project Agreements • Collaborative Heads Agreement (CHA)	Signed Agreements	• All Program Partners signed the CHA and Project Agreements • No identified or reported breaches of CHA and Project Agreements within the Program.	• The signed agreements enabled project resourcing by government organisations. • The agreements prescribed the behaviours and responsibilities of the Program Partners.
Financial Resources	Budgets by project milestone aggregated to Project Agreements.	• Murray–Darling Basin Authority (MDBA) Project Management Office (PMO) provided funding inputs according to Project Agreements with Program Partners and in accordance with a Memorandum of Understanding (MoU) with the Commonwealth DCCEEW. • Program Partner financial reporting in Project Reports.	• Milestone payments were tracked and marked as complete when finalised and approved. • Financial reports requiring approval were tabled at each Steering Committee meeting. • MDBA financial delegate approval of all payments.	The financial resourcing enabled efficient HNRS Program delivery and was the greatest value for money.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
Data Sharing	Data Sharing Agreement	Signed Agreement and commitment to administer the Agreement.	All Program Partners signed the Data Sharing Agreement and committed to administering it during the life of the HNRS Program with an extension to 2027.	A signed agreement enables data sharing between governments and water/data management organisations.
Program Management	Program management arrangements for the HNRS Program established and functional.	• Establishment of MDBA HNRS Program (PMO). • Program planning financial and administrative processes resourced and working.	• The MDBA PMO was active in administering Program funding tracking delivery and reporting and keeping the Commonwealth DCCEEW informed and operating in accordance with the MoU. • Delivery of the Program was on time and within budget.	The program and project management arrangements enabled efficient HNRS Program delivery.
Program Governance	Governance arrangements for the HNRS Program established and functional.[8]	• Establishment of the HNRS Program Steering Committee and Technical Panel and the appointment of Independent Technical Assessors (ITA) of the achievement of project milestones. • Establishment of ad hoc technically specific	• The MDBA PMO provided: ○ Steering Committee secretariat duties. ○ Technical Panel chair and secretariat duties. • The MDBA PMO coordinated background reports for Technical Panel and Steering Committee meetings and kept Commonwealth DCCEEW informed.	The governance arrangements enabled HNRS Program delivery as efficiently as possible and with appropriate probity.

[8] This includes elements of relationship management and maintenance of program energy and momentum.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
		working groups and the organisation of relevant workshops as necessary.	• The MDBA PMO supported the ITA, ad hoc technically specific working groups and the organisation of relevant workshops as necessary.	
Outputs:				
New and improved data sources (Refer to Table 2)	Data is available to appropriate parties.	Data is collected and suitable for post-processing for appropriate applications.	Data sources are operational and data has been and continues to be produced for post-processing.	New and Improved data are required for program outcomes to be achieved.
New and improved methods and tools to monitor and evaluate water use (Refer to Table 2)	Delivery of methods and tools.	HNRS Program and Program Partner governance, project management and quality assurance arrangements.	Outputs were approved.	• New and Improved methods and tools are required for program outcomes to be achieved. • Quality assurance arrangements are suitable to justify the quality and quantity of outputs.
New and upgraded portals for accessing data, methods, information, and tools (Refer to Table 2)	Portals are developed and upgraded and available.	Website analytic trends.	There is a trend showing that new and upgraded portals are being accessed. (refer to Section 5.3.2).	New and upgraded portals are required for program outcomes to be achieved.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
Current Outcomes				
Improved northern M–D Basin compliance	Tools and methods are accessed and used.	Website analytics including the number of downloads. Compliance reports from relevant authorities.	• There is a trend showing that new tools and methods are being accessed (refer to Section 5.3.2). • The Program Partners report that the tools are being considered for applications outside the objectives of the HNRS Program by agencies and other organisations who are not Program Partners.	• New and improved methods and tools are needed for improved compliance. • The use of tools and methods will enable improved compliance.
Improved decision making by water users	Number of entitlement holders adopting Entitlement Holder Interfaces.	Website analytics including the number of repeat site visits and downloads from: • WaterInsights (NSW) • WaterIQ (QLD) • Water Management Information Portal (WMIP) (QLD)	• There is a trend showing that data and tools are increasingly being accessed and downloaded (refer to Section 5.3.2). • The Program Partners report that the tools are being considered for applications outside the objectives of the HNRS Program by agencies and other organisations who are not Program Partners.	• New and improved data and tools are needed for improved decision making. • The use of data and tools will enable improved decision making.
Improved public access to water data, information, and tools	Number of public users of data from the Bureau of Meteorology's (BoM) Murray	Number of repeat public users accessing the BoM's MDB WIP.	• There is a trend showing that data and information are increasingly being accessed and	Improving public access will improve public confidence in northern Basin management.

Narrative Summary	Objectively Verifiable Indicators	Means Of Verification (measurement criteria, method & tools)	Results and Observations	Important Assumptions
	Darling–Basin Water Information Portal (MDB WIP).		downloaded (refer to Section 5.3.2). • Initial customer feedback has been positive (refer to Section 5.3.2).	
Long-term Outcomes*				
Improved northern Basin compliance outcomes	Improved detection of non-compliance (i.e. unaccounted differences). Appropriate coverage of meters and metering.	Number of non-compliance instances detected by compliance organisations.	• Improved decision making by water users attributable to new and improved data and tools developed. • Reporting on metering installation and compliance (use and calibration).	Improved northern M–D Basin compliance will improve public confidence and contribute to positive outcomes for all stakeholders.
Improved decision making by water users	Water use efficiency.	Improved water use efficiency, measured using case studies and audits to demonstrate a change in behaviours.	Improved decision making by water users attributable to new and improved data and tools developed.	• Improved decision making by water users will reduce the occurrence of non-compliance. • Improved decision making will contribute to positive outcomes for all stakeholders.
Improved public access to water data, information, and tools	Number of public users of data from the BoM MDB WIP.	Number of repeat public users accessing the BoM MDB WIP.	There is a trend showing that data and information are increasingly being accessed and downloaded.	Improving public access will improve public confidence in norther Basin water management.

* Note that long-term outcomes are not evaluated in this report.

5 Evaluation findings

5.1 Appropriateness

5.1.1 Overview

Consistent with the evaluation logic shown in Figure 1, this report seeks to evaluate the linkage between stakeholder needs and the HNRS Program objectives. Specifically, evidence has been identified to determine whether:

- the need for the HNRS Program was real and well communicated
- governments were the appropriate stakeholders to address this need
- the objectives and benefits sought by the HNRS Program were logical and likely to be successful in addressing the identified need
- the objectives of the HNRS Program were consistent with governments' overall objectives and priorities
- the interests and expectations of all stakeholders were appropriately considered in the program design.

5.1.2 Findings

The program drivers, stakeholder needs, and program objectives are described in Section 2. In summary, the Program sought to develop processes, tools and web portals to enhance the quality, availability and transparency of water monitoring and information for the northern M–D Basin.

Based on their own observations and feedback from stakeholders with whom they interact as part of their activities, Steering Committee members and observers agreed that the need for the HNRS Program was real. Communication amongst Program Partners was considered appropriate, but survey respondents questioned whether greater communication efforts could have been made to the community to improve their understanding.

While the role of government in addressing the overarching program need was considered appropriate, Steering Committee members and observers did feel that government would have benefitted from greater involvement of researchers, industry, and irrigation and environmental groups, in delivering some aspects of the HNRS Program.

Therefore, while the logic for government's investment and design was evident, survey respondents had mixed views on whether the HNRS Program met the needs of all stakeholders. For example, survey respondents felt that across specific target stakeholder groups the HNRS Program needs were fully or partially met; however, they were less sure about whether the HNRS Program met the needs of the general public. Further evidence would have to be gathered from stakeholders before further conclusions on these matters could be drawn.

When asked if the HNRS Program was consistent with government's overall objectives and priorities, the majority of respondents reported that they were satisfied with the program's alignment.

In addressing the case for change (see Section 2.4), stakeholder's needs were a fundamental consideration in scoping the breadth of the HNRS Program and the proposed deliverables. This process of identifying and articulating Program Partner's and other stakeholders' needs were reflected in the project elements included in each Project Agreement.

At the time of the Murray–Darling Basin Water Compliance Review in 2017, the M–D Basin Plan water compliance function was within the Murray–Darling Basin Authority's (MDBA) Basin Plan remit. This changed in 2020 with the creation of the Inspector–General of Water Compliance (IGWC) which reports on Basin Plan compliance at an Australian government level.

States have their own water use compliance arrangements and the agencies and organisations with compliance responsibilities and data collection roles were involved as either Program Partners or adjunct partners (NSW Department of Natural Resources Access Regulator [NRAR], WaterNSW, QLD DRDMW).

- *"We can use the faulty meter dashboard, to enhance the way meter read anomalies are followed up; particularly better visibility for prioritising and resourcing efficiency." Compliance officer (Qld).*
- *"We can save time by being able to process data faster and with more confidence." Water manager (Qld).*
- *"When we have good rainfall information, we have improved and enhanced runoff and river flow information. Everyone in the community benefits, and that's better for our management and regulation and better for people on the ground because it helps them manage their livestock business in drought." Water manager (Qld).*

5.2 Efficiency

5.2.1 Overview

Consistent with the evaluation logic shown in Figure 1, this report seeks to evaluate the linkage between HNRS Program inputs and outputs. Specifically, evidence was identified to determine whether:

- the HNRS Program was the best use of available resources, or alternative approaches could have achieved the same outcomes with less cost
- the relationship between inputs and outputs was timely, cost-effective, and met the HNRS Program's expectations
- there are implications / applications of the outputs delivered by the HNRS Program for other areas where water management is important
- there were any bottlenecks or inefficiencies in the Program's processes
- the Program adapted to changing circumstances or unexpected challenges.

5.2.2 Findings

As described in Table 4, the HNRS Program involved all Program Partners signing the Collaborative Heads Agreement (CHA) and Project Agreements with no breaches of the CHA and Project Agreements experienced[9]. Financial resources were allocated to Program Partners consistent with documented Milestones in Project Agreements pre and post recalibration (refer to Section 3.3). Program administration was undertaken consistent with a MoU between the MDBA and the Commonwealth DCCEEW.

All Program Partners signed and adhered to a HNRS Program Data Sharing Agreement, which was an important foundational element of the Program. A Program Governance structure was developed involving a Steering Committee and Technical Panel comprised of Program Partners with support from a Project Management Office (PMO). Project management of the HNRS Program was assigned to the MDBA PMO. In this role, the PMO responsibilities included:

- administering project financial resources and providing financial reporting at each Steering Committee meeting
- coordinating background reports for Technical Panel and Steering Committee meetings
- providing Steering Committee secretariat duties and providing the Technical Panel chair and secretariat duties
- operating in accordance with the MoU with the Commonwealth DCCEEW.

SWOT Analysis Workshop Reflections

- *Independent technical assessment processes provided vital assurance*
- *New tools were developed to do our jobs in water management faster and better*
- *There was some overlap in the tools developed, however collaboration kept this minimal.*

These arrangements and inputs led to Program outputs, which can be grouped as:

- new and improved **data sources**
- new and improved methods and tools to **monitor and evaluate** water use
- new portals for accessing data, methods, and tools.

For more information on specific HNRS Program outputs see Table 2.

The majority of survey respondents felt that the program was good use of available resources in delivering program outputs. Respondents also felt that there was no alternative approach that would have produced the same outputs. Specifically, the Steering Committee and observers thought that government resources coupled with private sector contractors provided good value for money.

[9] The CHA and Project Agreements amounted to intergovernmental agreements and interagency contracts. Along with the rigorous governance arrangements and Program Partners' undertakings to "air issues" for resolution there were no departures from the agreed program of deliverables. Changes and adaptations were made in an orderly fashion with appropriate product descriptions, change orders and approvals, consistent with Program objectives.

The Steering Committee members and observers found that the early departure of Geoscience Australia did reduce the program's resources pool. However, the adaptive culture of the HNRS Program (as evidenced through recalibration (see section 3.3), changes in delivery and governance processes improved program outcomes and fostered better buy in, responsibility for delivery and extra "firepower" to deliver.

Survey respondents did report opportunities to improve cost effectiveness. It was considered that changes to the number of milestones, for example, by combining some of them and reducing their number, and refining some governance arrangements, for example, by delegating some additional responsibilities from the Steering Committee to the Technical Panel could have reduced management and administration costs and created some efficiencies.

SWOT Analysis Workshop Reflections

- *high admin workload - too many milestones of low $ value*
- *too much double reporting in the state and then to the project manager (PM)*
- *different approaches across jurisdictions - making the one stop approach hard to realise.*

5.3 Effectiveness

5.3.1 Overview

Consistent with the evaluation logic shown in Figure 1, this report seeks to evaluate the linkage between HNRS Program objectives, and the current outcomes achieved. Specifically, evidence was identified to determine whether:

- the HNRS Program achieved its intended outcomes
- the outcomes were delivered effectively
- the outcomes are likely to influence stakeholder / participants behaviours or actions
- the program is being implemented in areas where the greatest progress toward desired outcomes is likely.

5.3.2 Findings

The initial scoping of the Program focussed on the objective of providing or upgrading systems and tools to source reliable data and information on water use and misuse in the northern Basin.

The initial outputs that were scoped included providing data, developing tools and creating sites where this data could be accessed to improve the sustainability of the northern Basin rivers and floodplains, economy and communities including First Nations people.

The program inputs contributed to outputs and outcomes as described in Table 4. In evaluating the effectiveness of the program, it was necessary to make a distinction between current outcomes and long-term outcomes. Long-term outcomes were not evaluated in this report, as evidence to demonstrate how the program has been effective in delivering the longer-term benefits sought remains "work in progress".

Steering Committee members and observers overwhelmingly thought that the program was effective in achieving its outcomes. However, consistent with Table 4, this report has focused on the use of web analytics and stakeholder / user testimonials that demonstrate the HNRS Program's role in improved water management and compliance.

The SWOT analysis workshop with the Steering Committee identified several highlights that speak to the effectiveness of the program. For example: some of the key takeaways were that several of the products have a greater reach than anticipated and that the uptake of many applications suggests their use in business as usual (BAU) processes. In addition:

SWOT Analysis Workshop Reflections

- *There is an increase in professional technical interest in the products nationally and internationally*
- *Some products produced have wider reach than water management alone*
- *We have made baseline information services for future generations.*

- Interest from the MDBA Basin Plan sustainable yields program has been directed to the tools developed by the HNRS Program to assess farm dam take and outflows and the floodplain harvesting practice note.
- Tools and methods developed with the support of the HNRS Program have been embedded within relevant business areas in Qld and NSW agencies to enhance the monitoring and measurement of water availability and take.

The three public facing websites that were used to evaluate the effectiveness of the HNRS Program are:

- Water Monitoring Information Portal (Qld) — https://water-monitoring.information.qld.gov.au/
- Water Insights Portal (NSW) — https://waterinsights.waternsw.com.au
- Murray–Darling Basin Water Information Portal — https://mdbwip.bom.gov.au/murray-darling-basin/ .

The website analytics for these three sites are presented in Appendix C.

WaterIQ (QLD)

The WaterIQ Manager, WaterIQ Customer Portal and WaterIQ App enable water users and managers to access water data and information. These products enable water users to submit and view meter reads, monitor water accounts, receive notifications related to their water accounts including reporting issues and validating meter reads. Along with accessing water entitlement information, contact records and trade data. WaterIQ Manager is an internally facing product that allows display of water dashboards, access various water reports, including trades and water meter data, publish water trades, conduct internal reporting against key performance indicators (KPIs) and workload allocation amongst other functionalities.

A case study on the WaterIQ Portal and its apps is located at Public Sector Network » Insights » Case Study: Rural Water Futures Program, where users of the new tools quoted:

- “I find the WaterIQ app great. I love how easy it is to use, even with entering the readings in manually. I hate having to use a computer, so this is perfect."
- “This is great! All the information I need is online and helps me to quickly determine what I need to do. I don’t even need to go into the RDMW office!”
- “I like the QR code thing….it saves you a lot of time and effort.”

Additional customer feedback on the WaterIQ app and customer portal is shown in Figure 10. In addition to the WaterIQ product suite, the development of alternative rainfall and river measurement devices was a key outcome of the HNRS Program, with data generated through these alternative devices publicly available through the Water Monitoring Information Portal https://water-monitoring.information.qld.gov.au/. This data has been accessed by numerous users to support farm and water resource management needs in the northern M–D Basin.

Figure 10: Customer feedback on the WaterIQ app and customer portal

Figure 6: Customer feedback on the WaterIQ app and customer portal.

Water information collected on the ground to pilot technology to increase the reach of rain and river data was published on the Queensland government water monitoring information portal.

Specifically, the web analytics showed that from 1 Jan 2023 to 16 April 2023 there were a reported 5,800 users who accessed the site, of whom about 10% were new users to the site. Of these users, data indicated over 4 sessions per user, supporting return visits to access the data[10].

[10] Bounce rates were low at 2.52% meaning that only 2.52% of users left their session without taking any action.

- *"Installing these sites provides more confidence and improved the timeliness of my decisions." – Water manager (Qld)*

- *"We want to help collect water information in remote areas of Australia and it's a useful tool for farmers to continue to operate at the whim of the weather. The data provides information needed to help farmers operate business. Farmers have been using water data for many years and we still review records." – Farmer (Qld)*

- *"Accurate, up to data rainfall/weather data is a key component to running any successful agricultural business. We are aware we can help improve the system in our area and believe this data would not be useful for the general community but will also be very beneficial to the local agricultural sector. Providing us all with the opportunity to access more accurate information on which to base our day-to-day business and farming decisions." – Farmer (Qld)*

- *"During the drought, we were unable to access our farm management deposits early because we were two properties away from a government determined line drawn determining what area we fell within a critical rainfall deficit percentile band. If there were more rainfall data collection points, this may have helped identify our area as being in a critical deficit area or could help make this decision making more accurate to reflect the situation on the ground." – Farmer (Qld)*

WaterInsights (NSW)

The WaterInsights Portal is a web portal that enables entitlement holders, the public, and compliance officers to actively manage environmental water, identify mandatory water take conditions (northern M–D Basin), identify available water by licence category, the status of pumping developments and aggregated data on water order history and meter reading.

Testimonials provided by WaterNSW Operations regarding users of the WaterInsights Portal and their improved access to water information include:

- *"access to near real time data through WaterInsights has made it easier to find the information I'm looking for and to better understand the Water Landscape in NSW."*
- *"WaterInsights helps us to better understand the water landscape in NSW, comply with our water licence and approval conditions, and inform better business decisions."*
- *"WaterInsights near real time data helps us consider when to move stock, make other business decisions, and know when access to roads might be impacted."*
- *"we are better able to comply with water licence and/or approval conditions and know when to take water."*
- *"inflows can help us decide what future allocations could possibly be."*
- *"I access WaterInsights weekly for recreational information, for temperature and flow rates for fishing."*

Across the period that data was available from May 2020 to May 2023 (3 years), the website reported almost 28,000 users of the site and over 200,000 page views. Of these visitors, over 20%

were new visitors, and the number of sessions per user approached 3, indicating that users were returning to the site for further information.

The greatest use of the website was in November to December 2021 which coincides with peak irrigation season and again in March and April.

The website data demonstrates that almost all users 'took action' once entering the portal. Extended session times (approaching four hours) and multiple page visits (2.80 pages/per session), which indicates users find the site useful.

Murray–Darling Basin Water Information Portal

The Murray–Darling Basin Water Information Portal (MDB WIP) provides customers with near-real time information from their desktop, mobile or iPad on key irrigation storages (volumes and capacities), flow and height information, salinity data, water quality information, water take, water markets data, groundwater data including trade, quality and use information, interactive river diagrams, photos of rivers, storage and significant locations and cultural information from the Gomeroi / Kamiliaroi nations.

The website was presented at the M–D Basin Community Committee (BCC) and at community forums for the following regions:

- Upper Murray, Mid Murray, Goulburn-Murray Irrigation
- Border NSW/QLD
- SA Murray
- Riverina NSW
- Sunraysia and Lower Darling
- Central West NSW.

The comments received were very positive and can be summarised as:

- praise for the site's clear design and easy access to key information
- appreciation that it works as a central source of information and links to other online sources
- suggestions for further data (river gauges, water quality, groundwater, more water markets information) that are planned for future versions
- positive comments from First Nations attendees
- approval of responsive design that can viewed on desktop, tablet or mobile.

The MDB WIP continued to receive positive feedback from users during community outreach, with Robert O'Connor, Technical Specialist, Irrigation Services at Victoria's Department of Jobs, Precincts and Regions saying the platform has changed the way he works.

> *"I have used the Bureau's MDB WIP quite a lot over the last 18 months and I think it's great," says Robert. "I use it to obtain storage volumes, current capacities, and capacities for the same time last year."*

Phil Duncan, Gomeroi Nation Indigenous man and former Chair of the BCC said the portal is easy to understand and easy to navigate.

> *"It means that all people have access to the same information at the same time. It builds a more confident understanding of the water that moves through different jurisdictions, catchments, towns and communities. I think it's a tool that can build stronger relationships and it is a great conversation starter,"* he said.

Further, Phil stated that regarding the Cultural Water Information Pilot undertaken for the MDB WIP on the lands of the Gomeroi Nations.

- *"this last six months with the Bureau mapping my country has been one of the most rewarding projects I've been involved in for the last 15-20 years."*
- *"this opportunity to do the Water Information Portal on the Gwydir River that has such a significant impact for sustainability of country and people has just been majestic for me."*

Specifically, the web analytics showed that from 1 July 2023 to 21 May 2024 there were over 50,000 visitors to the site. Of these visitors, the data over 90,000 page views during an estimated 65,000 sessions. Peak times for viewing the site were from December 2023 through to early April 2024.

6 HNRS Program performance

6.1 Introduction

Several workshops were held within the Program to identify any lessons that could be learnt from delivering the HNRS Program. For more information, refer to the HRNS Program Project Closure Report.

More recently, Program Partners (Steering Committee members and observers) provided their key observations by participating in a SWOT analysis. The SWOT analysis used a sailing analogy to capture observations relating to program delivery.

6.2 Findings

The SWOT analysis, which involved Program Partners providing comments anonymously on a Mural whiteboard, have been summarised below.

6.2.1 Wind in our sales (Strengths)

The key strengths that the Program Partners identified relate to the people and organisations involved and their commitment to realise program objectives. The HNRS Program involved the right Program Partners who were willing to employ new thinking and new technology to achieve required outcomes.

Cooperation and collaboration between Program Partners were program strengths, particularly given that collaboration across borders was always going to be challenging where the State's objectives and priorities may be different. These strengths enabled the increased resource capacity required for the program to be effective.

Program Partners were supported by having strong executive support and adaptive governance and controls. Program Partners were backed by this executive support when program change was required, consistent with enabling, development and new tech programs.

Another key strength of the program was in relation to quality control and quality assurance processes. Management of the program included independent technical assessment processes that provided vital assurance.

6.2.2 Anchors holding us back (Weaknesses)

Program Partners found delivery of the HNRS Program challenging due to the relatively high level of administration required. The program project management required reporting, as did State agencies, and project leads, resulting in a ‘doubling up’ of resources. Furthermore, reporting was often milestone based, including no differentiation between the dollar value of milestones – for example, the elements and administration of the reports required for either a $10,000 or a $500,000 milestone were basically the same.

The financial system administered by the Murray–Darling Basin Authority (MDBA) Project Management Office (PMO) was also milestone based, and due to the number of milestones, and their separate reporting requirements, appeared cumbersome. Furthermore, a weakness true of all government programs is the government procurement process, which can delay schedules and deter seeking additional resources (including knowledge).

The HNRS Program investigated new technology to address water management across the northern M–D Basin. The nature of this work meant that more resourcing was required to scope and plan how a new solution would be developed before it was developed. This resulted in a common perception among some respondents of low-cost effectiveness; however, the value of pre-feasibility work has resulted in project outputs that are being used, are considered business as usual (BAU) already, and will provide lasting outcomes that meet the overall program objectives.

The investment in new technology where outputs were largely digital has meant that the perceived value of program investment is more difficult to evaluate. The community commonly need on ground things they can see and touch to recognise value although the value of web and app-based systems is widely acknowledged.

6.2.3 Beacons on the horizon (Opportunities)

Program Partners considered that the HNRS Program has been and will continue to be effective in delivering on the program's planned objectives, namely to "improve, develop, build, install and implement tools, techniques, devices, processes and systems for enhancing the quality, availability and transparency of water monitoring and information for the northern Basin".

The program has provided a primary data source, the benefits of which will be realised over decades to come. In delivering the program, subject matter experts have been engendered who will continue to advance thinking and knowledge that will improve water management throughout the entire Basin.

An opportunity that Program Partner's identified from implementing the program is the realisation that "*we don't have to influence each other's policy to get an outcome — we can still work in our own legislative areas*". There is an acceptance that while inter–jurisdictional frameworks are different; they can achieve the same outcomes.

Many of the outputs and products produced by the program have a much wider reach than water management alone. For example, the additional rainfall and river monitoring devices in Queensland are improving key information resources such as the SILO rainfall products and hydrological models used across many natural resource management and agricultural users, including flood forecasting. The LiDAR acquisitions supported through the HNRS Program, whilst primarily focussed on assessment of on-farm storages, are also being utilised by many agencies to improve understanding of floodplain and wetland behaviours and updating flood mapping for many communities in the northern M–D Basin.

6.2.4 Barriers we see ahead (Threats)

Program Partners considered that the greatest threat to the legacy of the HNRS Program was the resources required to further operationalise, maintain and market the program's outputs and products.

In addition, Program Partners identified that future funding and wider adoption of the products from the Program are dependent on supportive feedback from the Inspector-General of Water Compliance (IGWC). While initially involved in project scoping, the IGWC chose not to contribute to later stages of program delivery. However, the IGWC has been briefed on some of the key products and tools developed through the HNRS Program and informed about some of the key outputs and outcomes to date.

7 Concluding comments

In delivering the HNRS Program the Program Partners have developed a suite of online dashboards, tools and methods that will have long lasting benefits for all decision makers involved with the management of water resources in the northern M–D Basin. Furthermore, the program has highlighted the limitations to data availability, and invested in infrastructure, equipment and satellite services that will provide on-going benefits.

The evaluation of the HNRS Program in this report found that:

- the need for the HNRS Program was real and governments were the appropriate stakeholders to address this need
- the objectives and benefits sought by the HNRS Program were logical
- the outcomes will increasingly become successful in addressing the identified need; however, evidence to demonstrate how the program has been effective in delivering the benefits sought remains "work in progress" and will become more evident over time
- there is evidence of organisations outside HNRS Program Partners using or seeking to use the tools and to potentially avail themselves of data sharing arrangements
- the program governance arrangements and government executives supported adaptive management and encouraged candour when recalibration of program deliverables occurred
- there were some inefficiencies in processes due to the doubling up of reporting efforts, but overall Program Partners thought that Program was the best use of available resources
- there are implications / applications of the outputs delivered by the HNRS Program for other areas where water management is important.

The HNRS Program has produced foundational outputs that, with continued use, will contribute to the intended benefits of the program, namely improved compliance outcomes, improved access to water information, improved measurement and monitoring of water use, and reduced data costs. Ultimately, the HNRS Program will result in improved public confidence in the management of water resources in the northern M–D Basin.

However, the full realisation of benefits and long-term outcomes from using these outputs will require continued investment in the maintenance, operation, and awareness of these foundational outputs by all stakeholders.

In delivering the Program, Program Partners also benefitted greatly from their various levels of collaboration and learned a number of lessons along the way. A summary of lessons learnt and resulting recommendations is contained in sub-section 3.5 of the companion HNRS Program Project Closure Report, which provides further supporting material for this Program Evaluation Report.

Appendices

Appendix A

Program benefits

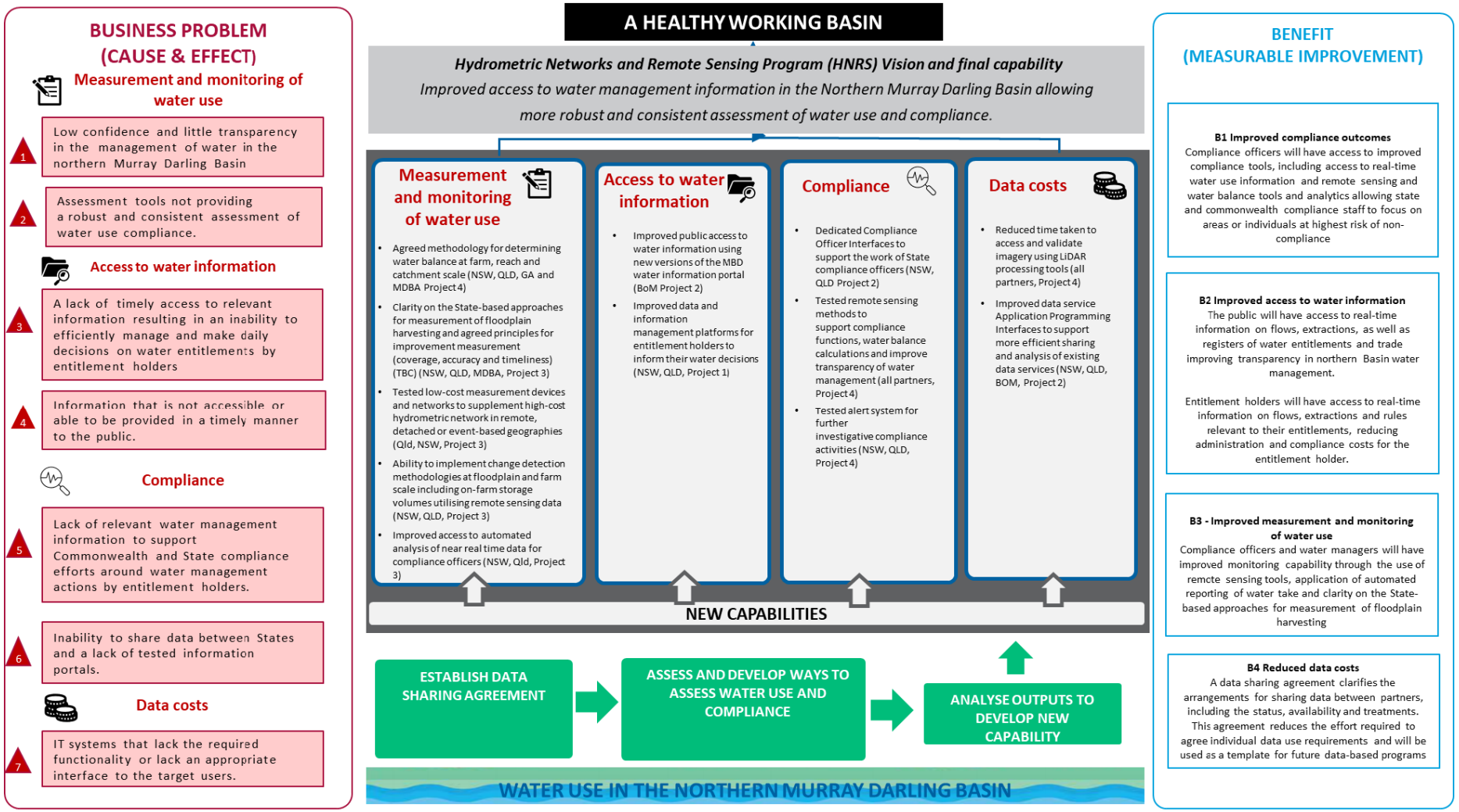

Figure A.1: HNRS Program benefits map.

Appendix B

Program survey

Please see Appendix B Survey on the Hydrometric Networks and Remote Sensing Program reports publication page.

Appendix C

Website analytics

Please see Appendix C Website Analytics on the Hydrometric Networks and Remote Sensing Program reports publication page.

Office locations
Adelaide – *Kaurna*
Canberra – *Ngunnawal*
Goondiwindi – *Bigambul*
Griffith – *Wiradjuri*
Mildura – *Latji Latji*
Murray Bridge – *Ngarrindjeri*
Wodonga – *Dhudhuroa*

mdba.gov.au 1800 630 114 engagement@mdba.gov.au