Murrumbidgee Irrigation

LAKE WYANGAN MODERNISATION FINAL PROJECT REPORT

March 2019
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Murrumbidgee Irrigation Ltd, 86 Research Station Road, Hanwood, NSW 2680
Locked Bag 6010, Griffith NSW 2680

T (02) 6962 0200 **I F** (02) 6962 0209 **I www.mirrigation.com.au**

CONTENTS

1 EXECUTIVE SUMMARY

1.1 Project Summary

The Lake Wyangan Modernisation Project was an important infrastructure renewal project for Murrumbidgee Irrigation Limited (MI) that replaced the ageing channel supply system in the Lake Wyangan catchment with an integrated water delivery system. The $54 million project, delivered by the MIA Renewal Alliance (MIARA) – represented by John Holland Group, United Group Limited, GHD and MI, was co-funded by the Australian Government under Round 1 of the Private Irrigation Infrastructure Operators Program (PIIOP1) in New South Wales and MI.

The project area is a mixed irrigated agricultural district but predominately horticultural, with a total of 177 customers and 197 landholdings. Of the landholdings in the project area, around 52% use gravity on-farm irrigation systems and the remaining 48% use drip/sprinklers for on-farm irrigation.

Within the project area, water supplied by MI is used to irrigate a range of different crop types, including citrus, stone fruit and grapes.

The project scope included the following works:

- Widening and relining the Lake View Branch Canal (LVBC) over a total length of 15.7 km
- Raising the bank of the earthen section of the LVBC (where required) over a 6 km section
- Replacement and renewal of gravity open channels and pipelines with new gravity pipelines to minimise losses from leakage and escape flows
- Removal of decommissioned open channels with the surface restored back to natural levels
- Replacement of Dethridge wheels with flow meters complying with Australian Standard AS4747 for non-urban Water Metering
- Channel automation of flow control structures along the LVBC
- Installation of remote monitoring capability for metered outlets.

1.2 Project Aim

The objectives of the Lake Wyangan Modernisation Project were to:

- Replace ageing infrastructure that was at significant risk of failure or at the end of its service life (minimise MI's future asset replacement liability and cost of asset ownership)
- Provide irrigation infrastructure that delivers the contracted levels of service to MI's customers in the Lake Wyangan catchment
- Realise the agreed water savings target for the project (6000 ML).

1.3 Major Outcomes

Key outcomes of the Lake Wyangan Modernisation Project included:

- Upgrades of ageing irrigation delivery infrastructure including channel relining and the conversion of open channels to pipeline systems
- Increase in water delivery system efficiency and service delivery levels to meet customer demand

- Installation of remote monitoring and control technology
- Rationalisation and decommissioning of redundant irrigation infrastructure
- Reduction in WHS risk for system operations.

The Lake Wyangan Modernisation Project, completed in December 2014, now provides a modern and efficient water delivery system to a landholdings in the Lake Wyangan area. Works included rebuilding almost 16 kilometres of irrigation channel, extending its life by about 80 years, and the replacement of 13.7 kilometres of open channels with gravity pipelines, extending their life by 60 years.

Automation of the system has enabled increased reaction times compared with manual operation, improving the reliability and efficiency of the system, particularly during any periods of water supply restriction.

Modelling completed by the Department of Agriculture and Water Resources (DAWR) in 2018, has supported these benefits to availability and also demonstrated a net on farm benefit from the project.

1.4 Overview of Scheme and Planning

The Lake Wyangan irrigation system has a command area of approximately 27,000 ha with approximately 12,831 ha currently irrigated. Water supply to the irrigated area is via the LVBC which conveys water by gravity through the southern part of the catchment to adjoining irrigation areas. A total of 21 laterals from the LVBC and Ballingal Branch Canal (BBC) allow water to be diverted from the Main Canal into a network of earth channels, concrete lined channels and pipes that distribute water throughout the area.

The Lake Wyangan irrigation area has a mixture of crop types but is predominately horticulture, with a total of 177 water customers and 197 properties. The focus of production in Lake Wyangan is vines, citrus and vegetables, which account for over 70% of the planted area. Of the 197 properties in the project area, 52% use a gravity system, which represents approximately 36% of the Lake Wyangan irrigable area. Most of the on-farm pressure systems (drip) are found in the north-eastern and northern parts of the system where the largest farms are located.

The planning phase of the project involved baseline investigations and the development of a number of potential modernisation and system reconfiguration options. MIARA prepared a recommendation report that shortlisted three (3) modernisation scheme options for further consideration.

After careful consideration of the information provided by the Alliance on the shortlisted modernisation schemes against the project objectives, MI adopted the scope from the Scheme 1A master plan for the Lake Wyangan Modernisation Project and approved a total project budget of $54 million (including all related project expenditure to date).

The Lake Wyangan Modernisation Project accomplished a number of construction elements:

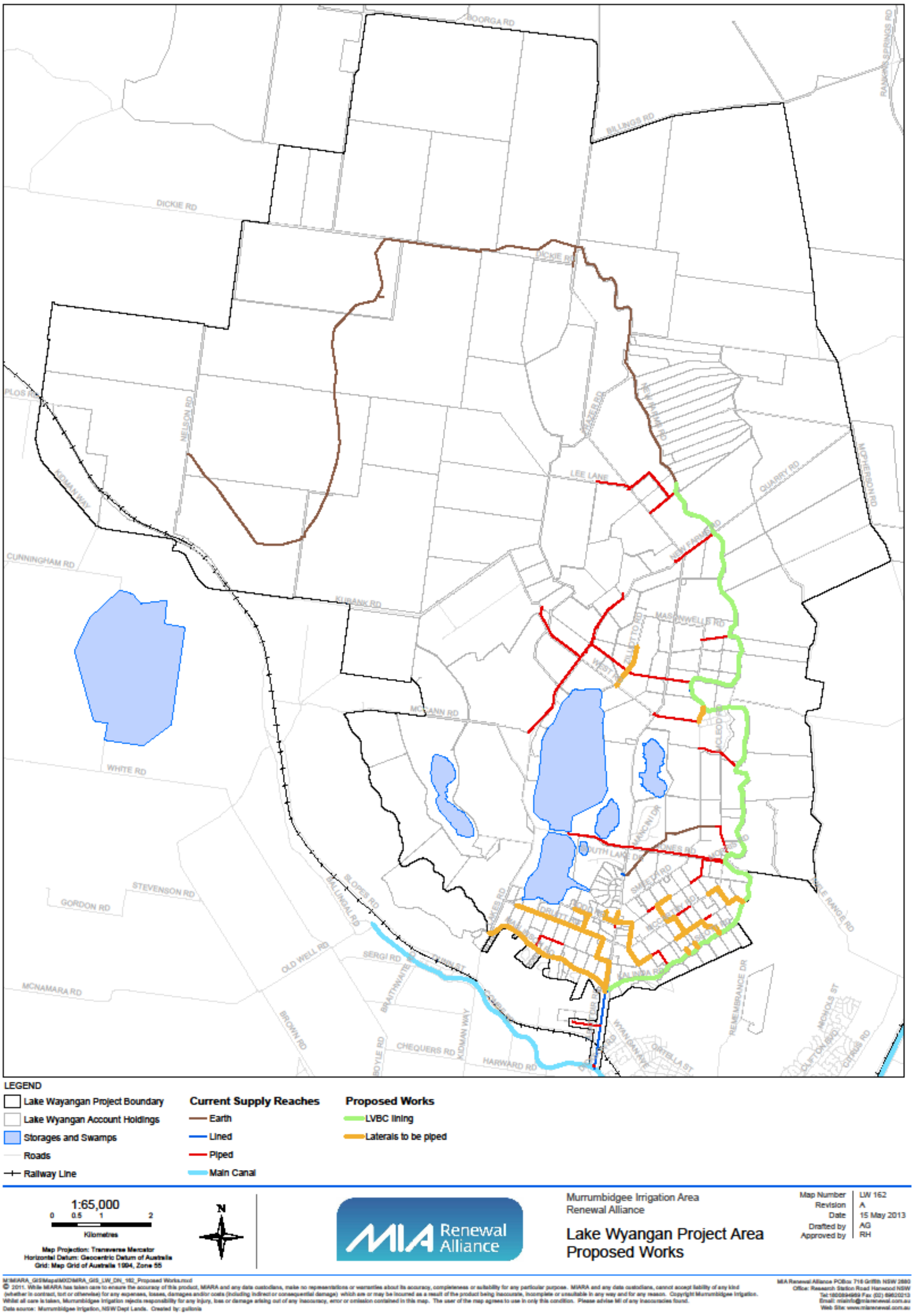
Sub-project 1 – Lateral pipelines sections and associated works

- Replacement of existing laterals with approximately 13.7 km of gravity pipelines
- Reinstatement approximately 30 existing farm outlet structures and the replacement of approximately 61 existing metered outlet structures with new electromagnetic flow meters

- Installation of remote monitoring on approximately 116 metered farm outlets

Sub-project 2 – Lake View Branch Canal relining, channel automation and associated works

- Widening and relining of approximately 15.7 km of the LVBC
- Raising sections of the banks along 6 km of the LVBC Extension
- Reinstatement of approximately 50 existing farm outlet structures and the replacement of approximately 17 existing metered outlet structures with new electromagnetic flow meters
- Installation of remote monitoring on approximately 77 metered farm outlets
- Automation of the LVBC.


BOORGA RD
BILLINGS RD
DICKIE RD
NELSON RD
LEE LANE
QUARRY RD
MCPHERSON RD
CUNNINGHAM RD
KIDMAN WAY
KUBANK RD
MASSNWELLS RD
MCCANN RD
WHITE RD
STEVENSON RD
GORDON RD
OLD WELL RD
MCNAMARA RD
BROWN RD
BOYLE RD
CHEQUERS RD
HARWARD RD
SERGI RD
REMEMBRANCE DR
LEGEND
Lake Wayangan Project Boundary
Lake Wyangan Account Holdings
Storages and Swamps
Roads
Railway Line
Current Supply Reaches
Earth
Lined
Piped
Main Canal
Proposed Works
LVBC lining
Laterals to be piped
1:65,000
0 0.5 1 2
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia
Grid: Map Grid of Australia 1994, Zone 55
N
MIA Renewal Alliance
Murrumbidgee Irrigation Area
Renewal Alliance
Lake Wyangan Project Area
Proposed Works
Map Number LW 162
Revision A
Date 15 May 2013
Drafted by AG
Approved by RH

1.5 Modernisation Plan

Murrumbidgee Irrigation developed a modernisation plan with funding provided by the Commonwealth Government (under the Irrigation Modernisation Planning Assistance program) to identify and consider the range of options available to respond to anticipated future challenges and to deliver water innovation that sustains future generations by focussing on:

- Increasing the efficiency of the irrigation distribution system, including investing in infrastructure to improve supply and drainage efficiencies
- Enhancing service delivery levels and adaptability to meet changing commodity demand
- Delivering environmental benefits that address the Australian Government's water priorities and improve the sustainability for the community.

The plan was used to assist the transition to a business environment that promotes innovation and delivers new business opportunities for the region and recognises the importance of securing the long-term future for the region. It supports an enduring vision of sustainable irrigated agriculture in the Murrumbidgee Irrigation Area (MIA).

To develop a sound basis for long-term planning, a number of foundation studies were commissioned to assist in identifying possible changes to the future landscape. These included:

- Customer demographics – found there were no distinct trends in customer behaviour and viability, that individual customer circumstances not biophysical or commodity characteristics drive changes in customer behaviour, and that change would be gradual, in the absence of significant shocks.
- Climate – identified the key impact on farming is from reduced rainfall and increased loss of soil moisture from higher temperatures, long-term reductions to water allocations and the higher water prices that might result from declining water availability, and impact of intense rainfall events of a shorter duration.
- Emissions – found that the conversion of gravity-fed channels to pressurised pipelines would likely increase greenhouse gas emissions and energy costs and identified opportunities to offset these costs from alternative energy investments.
- Land use – anticipated the major land use change from local government planning will result from rezoning agricultural land for residential development and the consolidation of industrial developments.

The key challenges identified included the integrated management of water and energy and developing effective strategies for mitigating risks associated with diversification decisions and infrastructure investments. The following are some of the strategies identified:

- Provide incentives for retaining investment and attracting new investment from outside the MIA
- Extend the customer base to outside the MIA
- Rationalise those parts of the infrastructure network that can be supported under different futures; develop flexible infrastructure options able to meet the changing needs of small and large customers
- Include renewable energy generation and sale in the business model
- Invest in research and development.

The views of customers and key stakeholders were also sought on how farm businesses and the region might change in the future, and what this means for service delivery. It provided an opportunity to better understand the level of customer support for a range of possible infrastructure modernisation options in the future. There are considerable risks in developing investment proposals for irrigation infrastructure in a climate of significant and rapid change that could leave under-utilised or stranded assets and a burden on remaining customers with additional costs. Modelling tools were developed to allow MI to identify and respond to changes to irrigation utilisation that may adversely impact on agreed levels of service. Initial results improved the level of understanding of the system wide impacts from individual farm behaviour, which will assist in the evaluation of potential modernisation infrastructure projects.

The Modernisation Plan was used to focus effort on retaining existing levels of farm investment and attracting new investment in agriculture and related businesses into the MIA to reduce the risks from future uncertainty. The Modernisation Plan set a strategic direction for MI and the MIA. Importantly, it formed the basis for positioning MI to respond to anticipated future challenges out to 2030 and to deliver water innovation that sustains future generations by focussing effort in:

- The efficient supply of irrigation water-related services that meet customer demand
- Investing in infrastructure to improve supply and drainage efficiencies in a cost-effective manner
- Managing costs and building new revenue streams to protect against future uncertainty
- Restoring ecosystems and preserving the environment for future generations
- Strengthening relationships with stakeholders able to enhance the sustainability of irrigation community
- Maintaining a healthy and safe workplace and enhancing the ability of employees to deliver business outcomes.

1.6 Hot Spots

Annual system water balances are prepared as part of MI's licence compliance reporting – a system efficiency of 80% was reported for 2008-09. In addition, a number of independent assessments have been conducted over the years to estimate the water losses from particular parts of the irrigation infrastructure within the MIA. One example is the Pratt Water Study (The Business of Saving Water - the Report of the Murrumbidgee Valley Water Efficiency Project), publicly available at http://www.napswq.gov.au/publications/books/pratt-water/index.html .

On behalf of the Australian Government under the Sustainable Rural Water Use and Infrastructure Program, a desk top analysis of water loss and hotspots assessment was conducted on the irrigation supply system within the MIA by external consultants Sinclair, Knight Merz. Based on assessment of the water data from 2003 to 2008, the efficiencies of the LVBC system was estimated to be 73-81% with unexplained annual water losses of 1.8-3.3 GL. This assessment did not include all areas of the "Lake Wyangan Modernisation Project" such as the BBC and Lateral 171.

2 PIIOP Proposal

2.1 Program Objectives

The Private Irrigation Infrastructure Operators Program (PIIOP) aims to improve the efficiency and productivity of water use and the management of private irrigation networks to deliver water savings for the environment. Water savings generated from the program will help to secure a sustainable future for irrigation communities.

The PIIOP will allow private irrigation infrastructure operators and their customers to reduce water losses and manage their water allocations more efficiently. It will also assist irrigation communities to adapt to a future scenario of reduced water availability due to climate change.

The PIIOP is intended to address future challenges facing the irrigation industry, including:

- Efficiency of the irrigation delivery system
- Service delivery levels and adaptability to meet changing commodity demand
- Environmental benefits that address the Australian Government's water priorities and improve the sustainability for the community**.**

2.2 Methodology Used to Plan and Implement

MI produced a submission for the PIIOP Round One program following a modernisation planning process conducted with funding from the Australian Government as part of an Irrigation Modernisation Planning Assistance grant.

The modernisation planning process confirmed the long-term sustainability of the MIA, noting that irrigation within the MIA impacts farm production in four important ways:

- Increased yield – in comparison to yields of conventional crops grown on dry land
- Crop diversification – irrigation makes possible the production of a broader range of crops – typically higher value crops
- Stability – yields are more stable and reliable providing some income stability
- Diversity – irrigation fosters diversity in farm production creating employment and opportunities to add value.

This reflected the community consultation in the 1990s that identified a need to upgrade the system infrastructure to improve the operation of the delivery system and overall environmental management within the catchment.

New Lake View Branch Canal regulator with automated gates

2.3 Planned Project Works

Of the original suite of projects submitted for funding, the Lake Wyangan Modernisation Project was successful and received a grant of $50,000,000 from the Australian Government.

Considerable work including data verification, numerous field investigations, options development and assessment, environmental studies and stakeholder engagement were completed during Stage 1 of the project. Over 20 reconfiguration options were considered and, after initial screening, a final list of eight schemes was incorporated into a Scheme Development and Assessment Report in June 2012. The recommendation of that report focused on three modernisation schemes that offered different means of achieving the overall project objectives. These schemes included:

- Scheme 1A – Upgrade the Lake View Branch Canal for current Delivery Entitlement needs
- Scheme 2A – Western Link for current Delivery Entitlement needs
- Scheme 3A – Lakes Road Pipeline for current Delivery Entitlement needs.

After careful consideration of the shortlisted modernisation schemes, MI approved the Lake Wyangan Modernisation Project with the scope adopted in the Scheme 1A master plan, for a total project cost of $54 million (including all related project expenditure to date).

The key elements of the works included in the Lake Wyangan Project scope is summarised below:

- Widening of the LVBC where necessary to deliver the required flow rate share
- Replacement of the deteriorated lining of the LVBC over a total reach of 15.7 km
- Assessment and refurbishment options for LVBC where necessary to reduce seepage losses
- Modernisation of the laterals in the Southern Area through re-configuration, where possible, and the installation of gravity pipelines
- Modernisation of the laterals in other areas through re-configuration, where possible
- installation of gravity pipelines
- Assessment and potential replacement of the existing Dome pipeline
- Replacement of Dethridge wheels with flow meters complying with Australian Standard AS4747 for non-urban Water Metering
- Automation of flow control structures (regulators and escapes only - not metered outlets)
- Installation of remote monitoring capability for new metered outlets.

Further refinement of the project scope was undertaken during the detailed design stage to retain project expenditure within budget. The final project scope of works is noted in Section 4.3.

2.4 Overall Program Outcomes/Benefits

In addition to water savings outcomes, the PIIOP aims to provide additional economic benefits and employment during the funding period and to provide longer-term full-time employment opportunities.

The scheme aims to maintain the competitive advantage of the MIA in general, and particularly, for agri-processing activities, enhancing the key attributes of:

- Adequate quantity and quality of water for the processing activity
- Reliable supply of high quality raw material at a relatively low cost
- Technologically advanced, skilled and motivated workforce
- Strong institutions focused on the environment and long-term sustainability
- Excellent physical infrastructure (roads, power, water, natural gas);
- Excellent social infrastructure (schools, hospitals, recreational facilities, religious and cultural facilities)
- A diverse, multi-cultural community.

The PIIOP program will also assist in the transition to an environment that promotes innovation and delivers new business opportunities for the region, recognising that efficient irrigation infrastructure can drive regional development, investment and growth.

Early research by DAWR demonstrates:

- Increased delivery efficiency: MI is better placed to manage conveyance losses, particularly in a dry year.
- On farms works enable increased production, efficiency, return on assets, and improved cashflow, for large area rice, wheat and vines
- Benefits far exceed no charge and self-funded scenarios.

3 BACKGROUND

3.1 Scheme Management and Governance

An Alliance delivery model was adopted for the design and delivery of the Lake Wyangan Modernisation Project, consistent with National Alliance Contracting Guidelines issued by the Australian Government.

Under an Alliance, the risk and reward arrangements are designed so that exceptional performance will deliver good returns for participants, while poor performance will deliver poor returns. This underlying commercial alignment is intended to focus on promoting a positive culture of 'no-fault, no-blame, no-dispute, and unanimous decision making', requiring all participants to work together to find 'best for project' solutions and to achieve outstanding results.

In 2010, after a comprehensive tender process, the MIARA was formed with the following participants:

- Murrumbidgee Irrigation Limited - One of the largest private irrigation companies in Australia, MI serves over 3,260 landholdings owned by over 2,300 customers within an area of 680,500 hectares. Its core business is water distribution to the MIA, one of the nation's most intensive fruit, wine and rice producing regions.
- GHD - A world leading engineering, architecture and environmental consulting company, GHD serves clients in the global markets of water, energy and resources, environment, property and buildings, and transportation.
- John Holland Group - This diversified contracting, engineering and services provider group, employs people across Australia in the fields of telecommunications, power, roads, services, aviation engineering, water, mining, services, and rail, tunneling, energy and resources fields.
- United Group Limited Infrastructure - This diversified services company operates in maintenance, facilities management, engineering and construction to blue-chip companies, governments and institutions throughout Australia, New Zealand, Asia, North America and the Middle East.

An Infrastructure Modernisation Program Alliance Agreement was prepared that required all partners in the Alliance to work together in a co-operative and innovative manner to ensure the successful completion of the project. This defined the manner in which the Alliance objectives were met including demonstrating value for money, outstanding performance, reduced cost, and increased certainty for project outcomes.

A governance framework was established to manage the design and delivery of the Lake Wyangan Modernisation Project that reflected the responsibilities of MI. Key elements of the governance framework detailed in the Program Alliance Agreement (PAA) were reflected in the Program Management Plan. This included the responsibilities of an Alliance Leadership Team for establishing and implementing robust governance and accountability structures.

The MIARA must comply with requirements in the PAA, including the following:

- Building Code 2013
- WH&S ACTS Regulations of NSW and the Commonwealth
- Work Safe Australia Codes of Practices
- Comcare
- Work Cover NSW
- Federal Safety Commissioner
- Environmental Acts & regulations.

3.2 Project Communications

A stakeholder engagement plan was developed to ensure effective stakeholder engagement activities were undertaken throughout the project. A communications protocol was adopted to standardise the manner of communication and engagement activities throughout the project, whether conducted by MI or MIARA. The key stakeholder groups identified included:

- Customers of MI
- Staff of MI
- Local, State and Australian Government
- Community members.

Personnel involved in engagement activities had an understanding of the participation engagement spectrum of the International Association for Public Participation adopted for the project. These personnel also had sufficient presentation materials and project knowledge to assist in communicating key project information, and responding to questions clearly and concisely.

3.3 Resources

Organisational resources was based around the requirements to operate during summer at a consistent rate then ramp up significantly over the two winter periods. The workforce was expected to expand from approximately 40 resources during summer to 180 during winter.

The actual number of staff utilised for the program of works was in line with the number of staff allocated in the Target Outturn Cost (TOC) allowance. The main change in resourcing occurred during the transition from pipelines and canal relining, to canal relining and completion works. There was a limited change in the total number of resources as the same number of staff was required to complete the canal re-lining and completion works.

4 ADMINISTRATION

4.1 Budget Performance

Lake Wyangan project expenditure, excluding GST is provided below.

Lake Wyangan PIIOP Project Budget Performance over Life of Project

	2009-10 ($m)	*2010-11* ($m)	*2011-12* ($m)	*2012-13* ($m)	*2013-14* ($m)	*2014-15* ($m)	*Total* ($m)
Total – Actual Project Spend	**0.00**	**0.350**	**3.105**	**10.923**	**30.635**	**9.074**	**54.087**
Total – Original Application	**0.750**	**1.058**	**16.050**	**21.475**	**11.114**	**3.640**	**54.087**
Difference	**(0.750)**	**(0.708)**	**(12.945)**	**(10.552)**	**19.521**	**5.434**	**0.00**

The difference in the timing of expenditure between the actual project spend and the original funding submission can primarily be attributed to:

- Taxation concerns in relation to the PIIOP funding that delayed acceptance of funds until June 2011, approximately a year after the announcement of funding being awarded to MI
- This delay in acceptance of funds resulted in a delay to commencement of the project
- During the detailed design process, construction works were condensed to two, not three winter works periods.

4.2 Milestone & Deliverables

Evidence and tasks required to meet each of the ten milestones throughout the Lake Wyangan Modernisation Project are listed below.

Project Milestone Deliverables and Timeframes

Milestone	Task / Evidence	Proposed Date	Date Completed
1	Funding Agreement Signed	10 June 2011	10 June 2011
2	Project Workplan Workshop – Scheme options Stakeholder Engagement Project Inception Meeting	31 August 2011	31 August 2011
3	Stakeholder Engagement 600 ML Water Transfer	23 December 2011	13 April 2012
4	Preferred Scheme Approved	30 March 2012	11 April 2012
5	Updated Project Workplan Project Progress Meeting Planning and Environmental Approvals 1,200 ML Water Entitlement Transfer	5 April 2013	20 May 2013
6	Detailed Design Award Tenders for Procurement	5 July 2013	26 July 2013
7	Documentary evidence of installation of pipes, concrete lining and metered outlets 2,200 ML Water Entitlement Transfer	31 January 2014	20 March 2014

8	Documentary evidence of installation of pipes, concrete lining and metered outlets 2,000 ML Water Entitlement Transfer	25 July 2014	1 September 2014
9	Draft Final Project Plan Documentary evidence of installation of remaining pipes, concrete lining and metered outlets Final Project Progress Meeting	15 November 2014	15 December 2014
10	Final Project Report Certificate of Practical Completion All invoices received and in Expenditure Report Final Project Audit Report	15 March 2015	4 June 2015

All milestone requirements were achieved and all milestones were completed.

4.3 Project/Scheme Performance

Detailed Description of the Project

The project involved a number of elements including:

Sub-project 1 – Lateral pipelines sections and associated works:

- Replacement of existing laterals with approximately 13.7 km of gravity pipelines
- Reinstatement of 30 existing farm outlet structures and the replacement of 61 existing metered outlet structures with new electromagnetic flow meters
- Installation of remote monitoring on 116 metered farm outlets.

Installing Ballingal Branch Canal pipeline

Sub-project 2 – Lake View Branch Canal relining, channel automation and associated works:

- Widening and relining approximately 15.7 km of the LVBC
- Bank raising of approximately 670 metres of the LVBC Extension
- Reinstatement of 50 existing farm outlet structures and the replacement of 17 existing metered outlet structures with new electromagnetic flow meters
- Installation of remote monitoring on 77 metered farm outlet
- Automation of the remaining open channels.

Local contractors using 7 cubic metre truck to deliver concrete to LVBC re-lining sites

Remote Monitored Metered Outlet and Automated Regulator on LVBC

Installation of the pipes, channel lining, new metered outlets and automation has realised the required water savings to ensure the project achieved this essential objective.

4.4 Transfer of Water Entitlements

All forecast Water Entitlement transfers were achieved, with 6,000 megalitres of MI Conveyance Water Entitlement transferred to the Commonwealth of Australia.

Schedule of Transfers for the Lake Wyangan Project

PIIOP Milestone	Proposed Date	Date Registered	Amount
PIIOP 1 - M3	23/12/2011	13/04/2012	600 ML
PIIOP 1 - M5	5/04/2013	20/05/2013	1,200 ML
PIIOP 1 - M7	31/01/2014	20/03/2014	2,200 ML
PIIOP 1 - M8	25/07/2014	1/09/2014	2,000 ML
TOTAL			**6,000 ML**

5 PLANNING, DESIGN AND CONTRACTING

5.1 Methodology

The Project design phase was split into three packages with each package covering a particular scope of works. The packages included:

- Lake View Branch Canal
- Southern Lateral Pipelines
- Automation.

A series of workshops were conducted to allow the opportunity to optimise the design and to incorporate changes such as those from the design review by MI operations and maintenance staff. The following items were developed in draft format to allow for comment and changes to be incorporated into the final design:

- Standard, detail, general arrangement and section drawings for pipelines and structures
- General and technical specifications
- Construction methodologies and schedules.

A formal review of the draft design consolidated inputs from the MIARA estimators, delivery, approvals, and stakeholder groups from MI's technical, operations and maintenance teams was conducted. MIARA proceeded to completion of the project design following the incorporation of comments into the draft design.

This figure summarises the planning and approval process used to proceed the design from the planning stage through to the final project design.

5.2 Design Processes

Lake Wyangan was a fully designed project starting from concept to commissioning. The main areas of design were:

- Pipelines
- Metered Outlets
- Lake View Branch Canal:
  - Structural and geotechnical
  - Hydraulic
  - Interface of Automation supplier to canal requirements.

The design was run through the typical design review of 30, 50, 80, 100% reviews with the MIARA team. This process worked well with robust designs that worked for the environment in which the works were constructed. This included Safety in Design and Construction Hazard Assessment Implication Review (CHAIR) workshops being held to ensure that the wider MI team were involved in ensuring the product was designed and constructed safely with a legacy of a safe infrastructure to be operated. Overall, the design concept for the package was of a high level.

Design Output Summary - Key Documents Produced

The key information produced by the design team was:

- Design Report
- CHAIR
- Safety in Design
- Preliminary and Issued for Construction Drawings
- Preliminary and Issued for Construction Specifications.

5.3 Overarching Practices

The Lake Wyangan Modernisation Project operated under a number of plans. These were separated into two areas: General Alliance Plans and Specific Lake Wyangan Project Plans. A full list of the plans utilised during the project are listed below.

General Alliance Plans

- Finance and Administration
- Program Contracting
- Program Reporting
- Human Resources Management
- Project Safety Management
- Electrical Works Management
- Workplace Emergency Response
- Fatigue Management
- Mobilisation

Program Management

- Industrial Relations
- Program Quality Management
- Information Technology Management
- Alliance Stakeholder Engagement and Communication
- Document Control and Records Management

Specific Lake Wyangan Plans

- Stage Three Design Management
- Construction Environmental Management
- Asbestos Management
- Commissioning and Handover
- Modernisation Project Engagement

5.4 Work Health and Safety

The safety performance on site was to a high standard and this is reflected in the project being delivered with a Lost Time Injury rate of 0. The team and safety representative worked very hard in this area to achieve this high standard. Some of the major items used to manage the safety were:

- Development of the Workplace Risk Assessment to capture project risks and controls
- Development of Activity Method Statements for each area of works - this is a full planning sheet that covers risk assessment, controls, methodology and resources
- Training of the workforce in our system and permits
- Pre-starts and toolboxes to transfer information and training
- Drug and Alcohol testing
- Operator assessments and equipment inspections

Ongoing auditing of:

- Risk assessments
- Site inspections
- High risk activities
- Global Mandatory Requirements
- Start cards
- Systems and procedures

There were a number of services strikes and property damage that the team fully investigated and put in place corrective actions. One of the main contributors was the fluctuation of the workforce from summer to winter periods with changes from 40 to 120 resources on site.

The work force was also very transient which required managing by the team to ensure consistency in safety knowledge and levels across the project.

Lake Wyangan Safety Statistics

Category	To Date
Total Alliance Hours	347,191
Total Recordable injury Frequency rate	2.8
Lost Time Injury Frequency rate	0.0
Lost Time Injury	0
Medical treatment injuries*	1
Alternate work injury	0
First aid injury	6
Near Miss	13
Unsafe Acts	18
Non-work related	2
Property Damage	30
Report Only	5
Completed HSE Targets (recommenced in April 2014)	721

*MTI - was an insect sting on site which had complications due to a pre-existing medical issue

MIARA inducted 773 resources onto the project and undertook 2,361 random alcohol tests.

Weekly Pre-start WH&S Toolbox Meeting

5.5 Environmental Management

The environmental performance and compliance on the Lake Wyangan Modernisation Project was of a very high standard with nil breaches registered. Some of the main items managed were:

- Vegetation removal - the team undertook easement reviews prior to work to ensure compliance with the requirements for vegetation removal/ pruning.

- Dust control - no complaints of dust were registered by the team as this was managed by water carts and planning of works to mitigate dust generation.
- Asbestos - team undertook any asbestos work with AD Envirotech who are a certified asbestos management specialist.
- Mud - the team used techniques such as rock rumble pits prior to access onto public roads to reduce the transport of mud. This combined with clean up by the way of bobcats with sweepers managed this risk on the project.
- Installation of egress devices along the concrete lined section of the canal assisted to protect fauna, particularly kangaroos attempting to cross the channel.

Lake Wyangan Lake Wyangan Environmental Statistics

Category	To date
Reportable Incidents	1
Completed Environmental Inspections	66
Actions arising from Inspections	20
Completed audits	7

Section of the LVBC reinstated after relining works

5.6 Quality Assurance

Quality documentation and reporting was critical for effective Milestone reporting, with a number of internal audits at project level carried out by project engineers. There was no major non-conformance recorded from the auditing process.

The project did experience some issues with the management of the Worklots due to the volume of works being undertaken. This was corrected as the project progressed with more mentorship of the engineers to close Worklots out as the works progressed.

Lake Wyangan Quality Statistics

Element	Total
Total Worklots	567
Total Nonconformity Report	8
Total Request for Information	76

Defects

MIARA undertook a comprehensive review of the works during and after the construction phase to compile and close out a defect list of the works.

A review was also undertaken of the CHAIR, HAZID *(hazard identification)* and Safety in Design and any outstanding items were added to the Defects list. A total of 886 defects were raised and closed by the team prior to the completion date.

Engineers reviewing plans to install new offtake at Lateral 175 Pipeline

5.7 Tender Process & Management

Tender Strategy

The project estimate development was based on a range of subcontract/supplier rates blended with First Principle estimating. The pricing used was bench marked against market rates and was market tested. First Principles rates were based on historical data but were also tested against current market rates.

Tender Assessment

Once the project estimate was approved all packages were put out to tender using the MIARA developed process. This required generally a minimum of three tenders being submitted on each package. Some procurement items did not meet the three tenders such as:

- Automation- only two providers for the scope available
- Plant Hire- used a range of suppliers instead of one supplier for all plant hire.

Tenders were assessed using a multi-criteria analysis with a number of mandatory compliance items combined with non-price and price criteria.

Mandatory compliance items included National Code of Practice (Building Code 2013) compliance along with technical and commercial compliance specific to the scope of works being procured (i.e. Cranesafe accreditation for heavy lifting). MIARA managed Building Code 2013 compliance through the contracts team and by following the Building Code 2013 Compliance Flowchart.

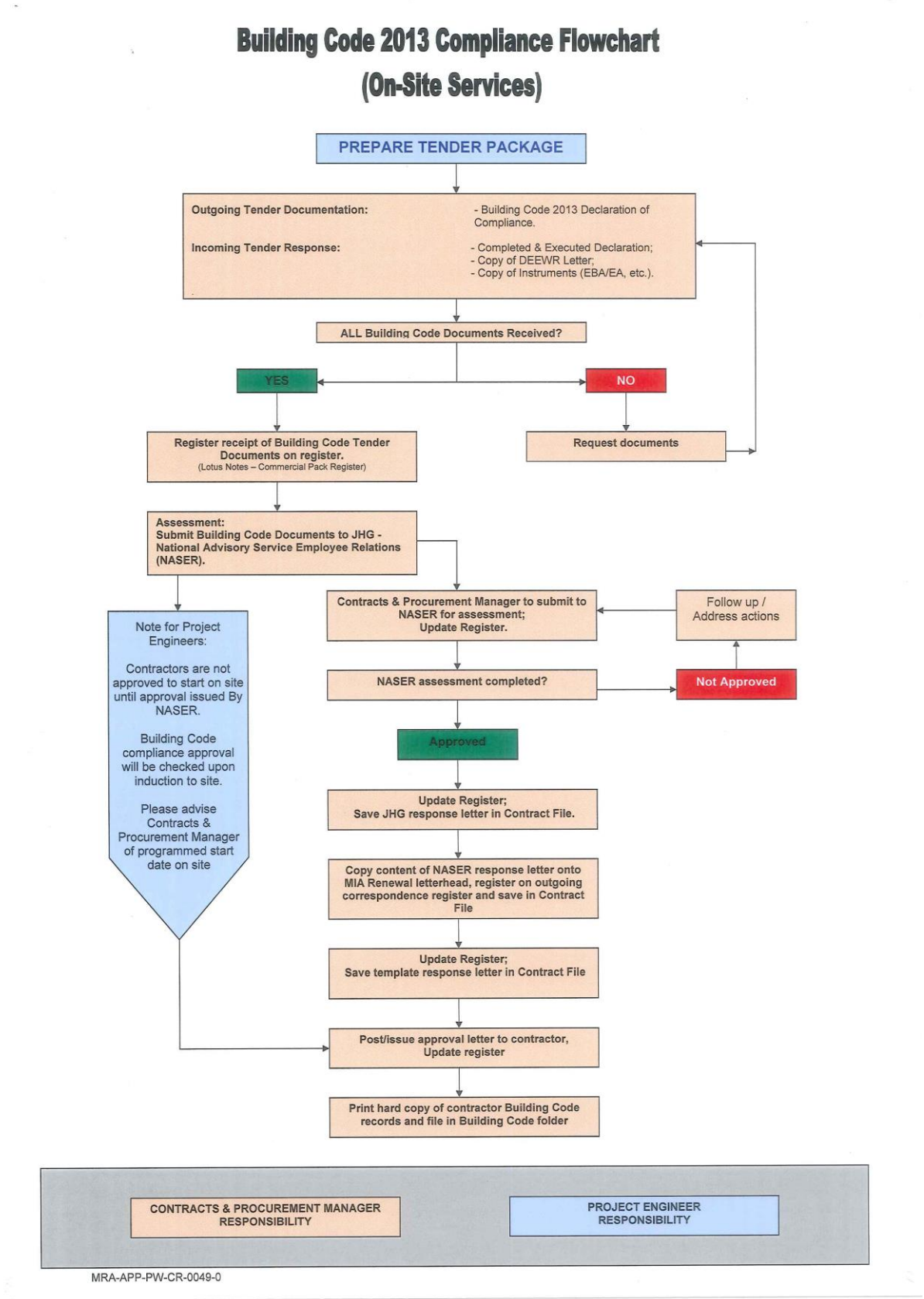
5.8 Methodology Used to Plan and Implement

MI produced a submission for the PIIOP Round One program following a modernisation planning process conducted with funding from the Australian Government as part of an Irrigation Modernisation Planning Assistance grant.

The modernisation planning process confirmed the long-term sustainability of the MIA, noting that irrigation within the MIA impacts farm production in four important ways:

- Increased yield – in comparison to yields of conventional crops grown on dry land
- Crop diversification – irrigation makes possible the production of a broader range of crops – typically higher value crops
- Stability – yields are more stable and reliable providing some income stability
- Diversity – irrigation fosters diversity in farm production creating employment and opportunities to add value.

This reflected the community consultation in the 1990s that identified a need to upgrade the system infrastructure to improve the operation of the delivery system and overall environmental management within the catchment.

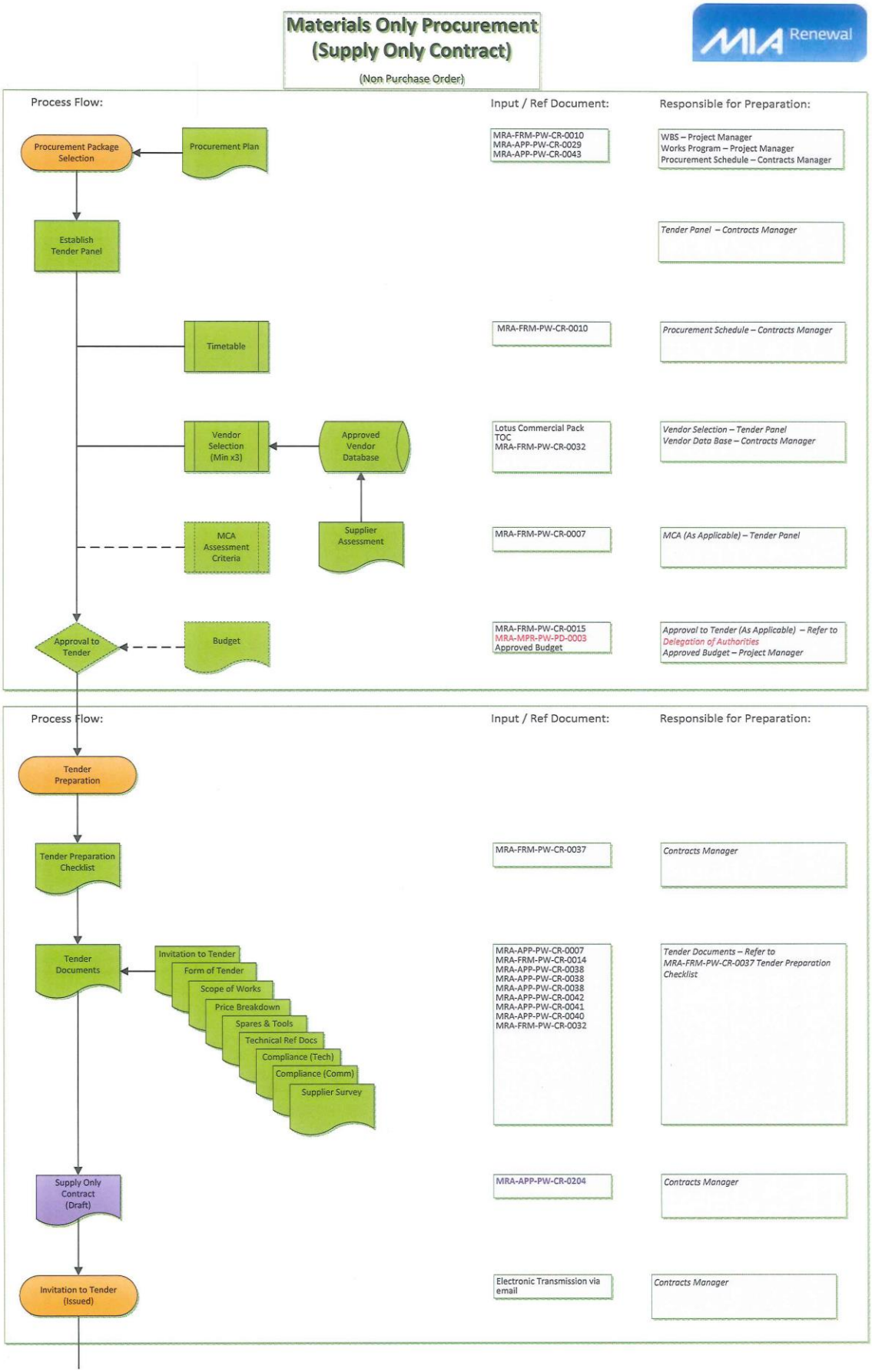


Non-price criteria were developed to maximise regional stakeholder benefits, delivery/functionality, safety and environmental criteria. These included:

- Local participation (ranked in order of MIA based, regional NSW, city/interstate)
- Relevant experience and past performance
- Delivery methodology
- Resource availability
- WHS plan and procedures
- Environmental policy

The tender price was included in the multi-criteria analysis to ensure the procurement of a value for money solution.

MIARA also developed a “Materials Only” procurement model as noted in the Diagram below.


Materials Only Procurement
(Supply Only Contract)
(Non Purchase Order)
MIA Renewal
Process Flow:
Input / Ref Document:
Responsible for Preparation:
Procurement Package Selection
Procurement Plan
MRA-FRM-PW-CR-0010
MRA-APP-PW-CR-0029
MRA-APP-PW-CR-0043
WBS – Project Manager
Works Program – Project Manager
Procurement Schedule – Contracts Manager
Establish Tender Panel
Tender Panel – Contracts Manager
Timetable
MRA-FRM-PW-CR-0010
Procurement Schedule – Contracts Manager
Vendor Selection (Min x3)
Approved Vendor Database
Lotus Commercial Pack
TOC
MRA-FRM-PW-CR-0032
Vendor Selection – Tender Panel
Vendor Data Base – Contracts Manager
MCA Assessment Criteria
Supplier Assessment
MRA-FRM-PW-CR-0007
MCA (As Applicable) – Tender Panel
Approval to Tender
Budget
MRA-FRM-PW-CR-0015
MRA-MPR-PW-PD-0003
Approved Budget
Approval to Tender (As Applicable) – Refer to Delegation of Authorities
Approved Budget – Project Manager
Process Flow:
Input / Ref Document:
Responsible for Preparation:
Tender Preparation
Tender Preparation Checklist
MRA-FRM-PW-CR-0037
Contracts Manager
Tender Documents
Invitation to Tender
Form of Tender
Scope of Works
Price Breakdown
Spares & Tools
Technical Ref Docs
Compliance (Tech)
Compliance (Comm)
Supplier Survey
MRA-APP-PW-CR-0007
MRA-FRM-PW-CR-0014
MRA-APP-PW-CR-0038
MRA-APP-PW-CR-0038
MRA-APP-PW-CR-0038
MRA-APP-PW-CR-0042
MRA-APP-PW-CR-0041
MRA-APP-PW-CR-0040
MRA-FRM-PW-CR-0032
Tender Documents – Refer to MRA-FRM-PW-CR-0037 Tender Preparation Checklist
Supply Only Contract (Draft)
MRA-APP-PW-CR-0204
Contracts Manager
Invitation to Tender (Issued)
Electronic Transmission via email
Contracts Manager

5.9 Contractors

The MIARA was formed to deliver the Lake Wyangan Modernisation Project along with the proposed PIIOP Two Program of Works. A key outcome when forming the alliance was to ensure opportunity for local designers and constructors to provide services to this and future projects, and maximise the potential to achieve MI staff development.

Although some sub-contractors engaged were not from the local area, these companies were engaged for their specialised services or for their ability to provide the resources and deliver in the tight timeframes required for this project. In excess of twenty-four local contractors and suppliers were engaged where best for project, which provided a capital injection into the local economy along with the opportunity to enhance local contractor's skills and exposure to "Tier 1" contractor practices. Several local contractors received training and attained qualifications and certification in areas where previously it was unviable or not attainable through the smaller regional projects.

Formwork and Relining of the LVBC

The project was delivered with nil Industrial Relations issues. This was achieved through the management of the works by MIARA in line with the Industrial Relations Plan developed for the project.

900 mm Glass Reinforced Pipes (GRP) in temporary storage close to construction site

5.10 Liaison with Landholders

Key Stakeholders

The key stakeholders that were critical to the project were:

- Local farmers
- MI Business Units
  - Operations
  - Irrigation Services
  - Planning
  - Delivery

Planned Engagement

The objectives of the Alliance engagement program were to ensure there was sufficient opportunity for stakeholder feedback during all stages of the project, that all stakeholders understood the projects and were kept informed of developments throughout. In order to achieve these objectives a strong emphasis was placed on managing stakeholder expectations and forming working relationships with local irrigators to utilise their knowledge of the existing system to inform the options development process.

However, the Alliance recognised early on that many irrigators are time poor and that a multi-level engagement approach would be needed to ensure there were sufficient opportunities to provide input to the development of options, without exposing stakeholders to 'consultation fatigue'. Subsequently, the Alliance took a two-tiered approach to stakeholder engagement for each project in order to achieve this balance.

The first involved regular meetings and activities with a core group of stakeholders to provide feedback on Alliance approach, potential design options and to act as a conduit to the wider customer base.

For the Lake Wyangan Modernisation Project, community leaders and key influencers in the area were identified and approached during the early stages of the project and briefed on how MIARA was planning to engage with irrigators and seek their feedback on this approach. This feedback helped to guide the engagement strategy during the early stage of the project. Additionally, these key influencers assisted MIARA by encouraging other irrigators to take part in the engagement process by attending workshops or having one-on-one meetings with the Lake Wyangan Project team.

The second level of engagement involved all stakeholders receiving regular updates on the progress of the project. This included giving them a number of opportunities to provide feedback through interactive workshops, one-on-one meetings and contact mechanisms such as a 1800 information line, email address and website.

It was found that the use of interactive workshops as a means of engaging stakeholders and drawing on their local knowledge to inform system design was very successful. These workshops allowed customers to speak about the condition of the existing system, suggest opportunities for making the system more efficient and provide feedback on different options developed by MIARA, while the one-on-one meetings gave MI customers the chance to discuss future plans for their properties and how a modernised system might impact on their current irrigation practices. These workshops and one-on-one meetings continued for the duration of the project to obtain customer input where required, while the project website and regular newsletters kept MI customers regularly updated on the progress of works.

Engaging with stakeholders from recreational and environmental groups at an early stage allowed the Alliance to consider their needs in the development of options. Discussions with local environmental groups about the Lake Wyangan Modernisation Project allowed MIARA to review the integration of mechanisms for the delivery of environmental flows to Nericon and Campbell's Swamps into system design at an early stage of the option development process.

Similarly, consultation with various groups that utilise the lake for recreational purposes has highlighted the importance of maintaining lake levels at a depth that would enable groups to continue safely using the lake for activities such as sailing and boating. The Alliance was able to consider this feedback when designing the system and worked with these groups along with MI and Griffith City Council to promote positive outcomes for all parties.

Irrigators displayed a sense of resilience in the face of issues such as the Murray-Darling Basin Plan and depressed produce prices by playing an active role in the development of options for the future, and in some cases, expressed an interest to alter their current operations if possible.

While poor produce prices and the potential impacts of carbon pricing and Murray-Darling Basin Plan were common concerns raised by stakeholders throughout the engagement process, the majority of MI customers consulted displayed a positive attitude and enthusiasm towards the modernisation work being undertaken. The willingness of irrigators and other stakeholders to participate in the development of options while facing the prospect of an uncertain future, demonstrates that irrigation communities believe they can continue to grow and survive in the years ahead. In addition to involvement in the scheme development process, some irrigators showed further resilience by expressing a desire to expand their current operations by purchasing additional water entitlements and increasing the size of their crops.

Others stated they would like to mitigate poor grape and citrus prices by diversifying their operations and growing alternative crops such as cherries, almonds and pomegranates. This positive and forward-thinking attitude displayed by irrigators is in line with the Alliance's purpose of making the MIA the most innovative, sustainable and prosperous irrigation region in Australia. The alignment of Alliance and stakeholder values has contributed to the positive outcomes witnessed during the early stages of these projects, including a high level of stakeholder support for projects and willingness to be involved in the option development process.

Actual engagement and lessons learned

Early engagement with stakeholders and clearly defining what aspects of the project are non-negotiable allowed the Alliance to effectively manage stakeholder expectations. Defining boundaries early in the project resulted in engagement activities being more focused on key aspects of the project relevant to stakeholders (e.g. gravity versus pressure delivery system) and not on other issues such as the target water savings.

The innovation in design and high level of stakeholder support across the project can be attributed to the implementation of a comprehensive and rigorous stakeholder engagement program that involved stakeholders from the beginning and gave them the opportunity to provide meaningful input to the option development process. Working closely with stakeholders through a Project Reference Group, key influencers and interactive customer workshops has provided the Alliance with valuable local knowledge and insight to issues that may not have been realised through a typical in-house option development approach.

Likewise, utilising experienced stakeholder engagement practitioners and designers from the Alliance combined with local designers and field staff has provided the right mix of technical experience and operational knowledge, resulting in more favourable outcomes than would be achieved by any of the Alliance partners independently.

Activities such as interactive workshops and joint technical tours with the Project Reference Group provided Alliance designers with valuable local knowledge to assist in system design, but more importantly, contributed significantly to developing working relationships with stakeholders and building trust in the option development and design process. By the end of the Lake Wyangan Modernisation Project, the Alliance had undertaken over 3000 stakeholder interactions.

5.11 Construction & Outcomes – Pre, and Post Project

MIARA was engaged for a period of approximately four years through to completion of the project. Processes and outcomes over this period were positive and MIARA is now well positioned to deliver greater benefits through the improved structures, lines of communication and commercial arrangements.

Some specific items that demonstrate added value were:

- Greater integration of MI personnel into the delivery (design, procure and construct) activities with the benefit of two-way knowledge transfer and up skilling of MI personnel with important project management skills.
- Project development activities have input from specialist alliance personnel allowing for benefit from particular skill sets (e.g. alliance irrigation specialists providing input into the MI automation strategy, estimators providing preliminary cost plans to assist MI in scope prioritisation and rationalisation - prior to the refining of business cases). All of this collaboration benefits MI through a reduction of time delay risks due to revisions of scope and / or estimate at TOC stage.

- Greater MI input and visibility into TOC development through joint reviews and scope clarification, and appointment of an Independent Estimator to validate the prospective TOCs prior to finalisation.
- Understanding the stakeholders: MIARA incorporated a comprehensive stakeholder engagement program which resulted in innovative irrigation delivery solutions that benefit local communities and the wider MIA. It was critical to fully understand the stakeholders' business in order to plan around any impacts that may arise during project delivery.
- Understanding the operations of MI enabled solid realistic methodologies and programs to be developed by the Alliance (thereby providing greater certainty of project outcomes).
- Understanding of local council: MIARA worked extensively with Griffith City Council to ensure no disruption to services and utilities whilst working to all local regulation and by-law requirements.
- Understanding of local capabilities: MIARA understood and worked within the local community and with local subcontractors. A range of local subcontractors and suppliers were utilised through the Alliance which provided a threefold benefit:
    - Utilisation of the local workforce: Understanding of the intricacies of working within the MIA. This helped develop relationships, which led to better understanding and consistency on pricing and performance.
    - Up-skilling of the local workforce in the areas of Safety, Quality, Environment and planning. The key value is that MI is left with a positive legacy of up-skilled contractors for future works.
    - Provided the lowest cost by using local suppliers and subcontractors, without risk to project objectives or Key Result Areas outcomes.
- Understanding of design requirements and constraints: An important factor that helped assist MIARA with fit-for-purpose projects was the understanding of the specific design requirements to deliver infrastructure to the MIA. In particular, the inherent variability in certain parameters (e.g. asset conditions, modelling results, scope rationalisation etc). This knowledge of MI operations and business helped to extract the relevant information to form the basis of sound design.
- Management of Risk and Opportunity: The Lake Wyangan Project included components that are not possible to fully quantify or assess. The MIARA team built an understanding of MI's preferred approach to the management of risk and opportunity and transferred risk management processes into the organisation.

Regulating structure

Key Results Area Objectives

Key Results Area trends as follows:

- *Environmental and Sustainability:* Zero environmental breaches were recorded with a proactive approach to managing environmental risks.
- *Delivery:* Project completed within the timeframes with certainty on time, cost and risk parameters. No major unplanned disruptions causing interference to customers.

- *Stakeholder:* MI's reputation has been enhanced through the stakeholder management that was implemented. MIARA has also increased MI's profile within the local and wider communities through media interaction and procurement of local goods and services.
- *Functionality:* The project complied with the functional requirements of the Project Notice.
- *Value:* The TOC was viewed as delivering the right solution.
- *Regional Benefit:* An increase in the local contracting capability was achieved through the execution of the project
- *Safety, people and wellbeing:*
    - Lost Time Injury of 0
    - Total Recordable Injury Frequency Rate of 3.03 (1 medical treatment injury from an insect bite)
    - Transfer of safety skills through interactions with the workforce and the integration of MI in the team
    - Increase of safety culture with subcontractors and suppliers
    - Management of fatigue for operating in a remote location and working rosters

Innovation

Innovation is one of the principles outlined in the Alliance Charter and was one of the key drivers during design and delivery of the project as demonstrated below.

The construction methodology was reviewed and challenged throughout the project and several changes were made to processes that allowed savings in construction costs and reduced safety risks while retaining high levels of quality and strict work health and safety guidelines.

- Undertaking construction works during normal irrigation operations allowed the team to complete works sooner, rather than waiting for the next irrigation off-season. This resulted in the team developing innovative methods suitable for safely undertaking construction works during summer.
- Installing regulating structures while the system was still in service was achieved by working very closely with farmers and operations staff to take advantage of any time available to work in the canals while maintaining safety standards and not impacting on customer's access to water.
- MI greatly improved the amount of detail included in the design criteria for outlets, regulators and other structures. Also, the move to a more collaborative design approach where design, construction and operations staff are all involved, provided a lot more flexibility during the design process. This allowed for better, more innovative design solutions that resulted in time and cost savings.
- Screeding of the concrete lining in the Lakeview Branch Canal was one of those tasks where an innovative mechanical device was mounted on an excavator, which removed the safety risk to construction staff and increased the productivity, resulting in time, safety, cost and performance benefits for the project. These tasks were also completed ahead of programmed timelines. It is thought that this innovation could be more widely utilised throughout the industry for similar types of work.

Innovation: Hydraulic driven Screeding Roller developed and used to increase productivity and reduce WH&S Risks to Employees

Future Innovation

Future opportunities for innovation have also been considered, and include:

- Identifying rationalisation opportunities.
- Involving customers early in the design process and working closely with them during construction will result in improved relationships, as well as cost and time saving.
- The Alliance placed a strong emphasis on training and up skilling local subcontractors to deliver works in a cost-effective manner and to a high standard. Alliance staff spent a great deal of time training and mentoring local subcontractors in construction methods and safety standards, which has resulted in them becoming trusted partners for the Alliance. By taking the time to up-skill local contractors, the Alliance has not had to rely on sourcing subcontractors from outside the area, which has led to economic benefits for the local community, along with Alliance benefits of subcontractor continuity and cost savings from long term contracts and not having to pay travel and accommodation costs.

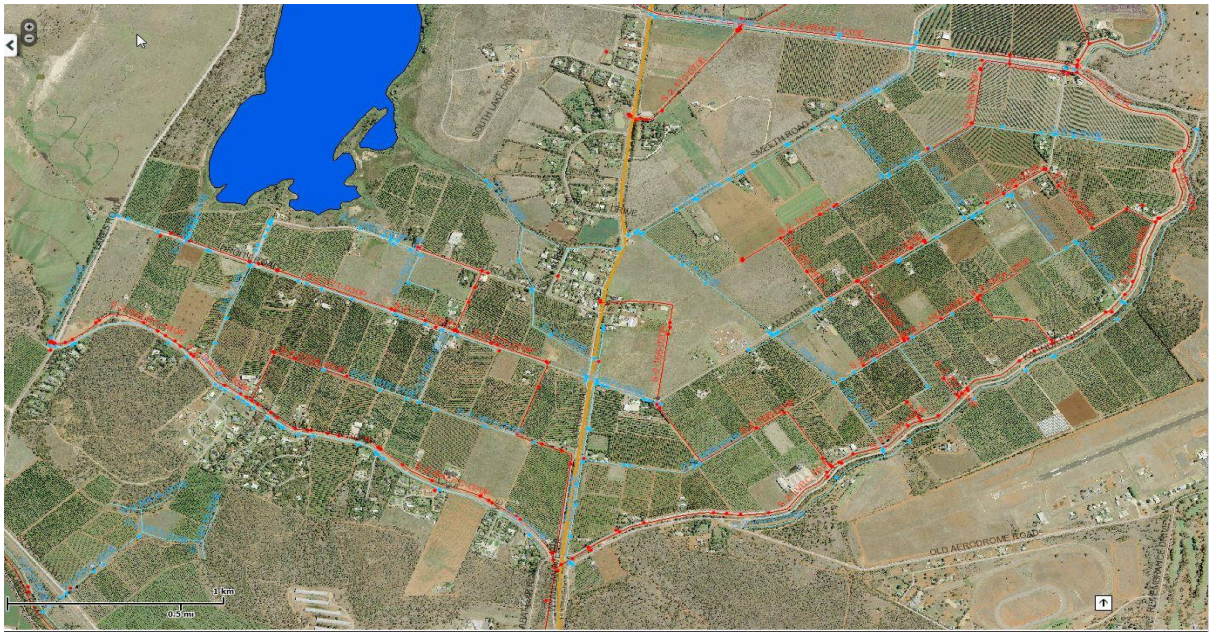
Program Delivery

Overall the program of works was delivered within the timeframe of the TOC program. The actual completion was nominally 3 weeks early with completion reached on the 27th October 2014 verse the original end date of the 18th of November 2014.

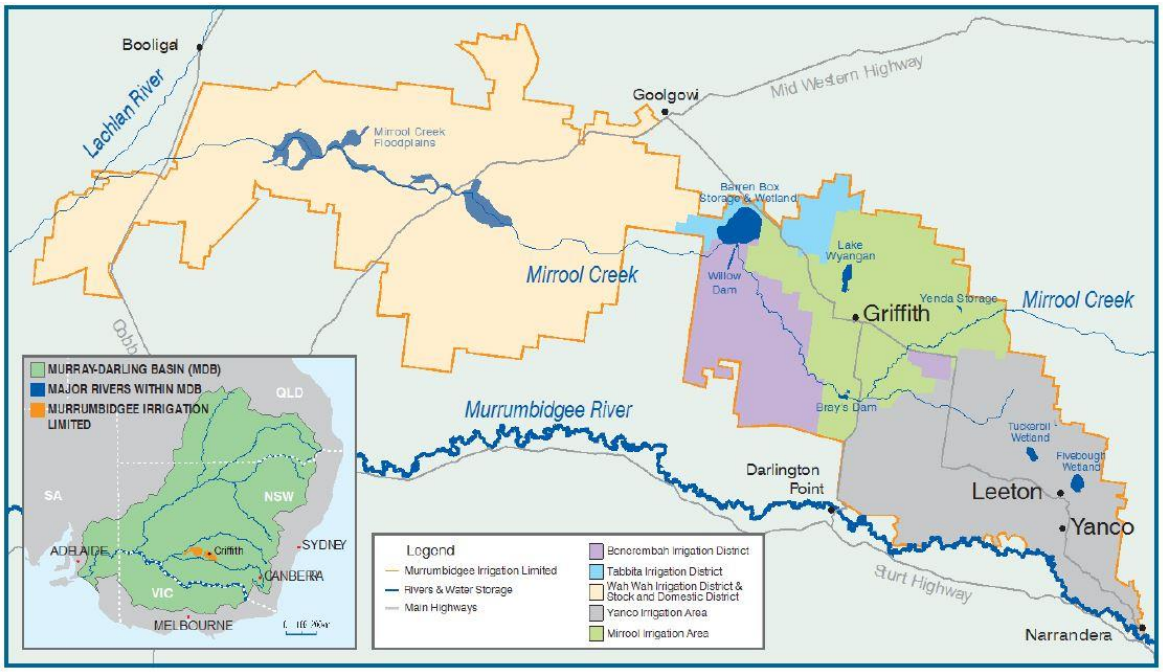
Discussion on Differences

There were some differences from the TOC program to the Final program. The main items being:

- The project had two separable portions: One for the pipelines and one for the channel re-lining. This was not achievable due to the nature of the project. With the two winter periods being intense in resources, pipelines were used as leveling activities through the summer period as channel re-lining took priority during winter. There was also a requirement to hold resources for another project which also attributed to this program leveling.
- There was a lack of understanding of the amount of works and resources required to undertake the lining works of the LVBC. In the first winter these activities took priority of plant and labour to complete 10km of re-lining over the planned 8km.
- The automation process was not fully understood with the finalisation of procurement of all items excessively exceeding the required timeframes which lead to a congestion of works at the back end of the project**.**



Approximate Location of Farms Represented in Model 1, Lake Wyangan, Griffith NSW



The Murrumbidgee Irrigation Area in relation to Murray Darling Basin

6 LESSON LEARNED

Key Themes

The Alliance team brought in lessons learned through previous experiences of design, delivery and the commissioning of other projects in the civil industry; however, this project was unique in many ways and created a new set of challenges. During the delivery of the Lake Wyangan project two lessons learned workshops were held, with the following outcomes.

Information

- The availability of information to MIARA and MI staff working on site and remotely was flagged as being an issue. The inability to record and access information easily impacted negatively on the process for approving and issuing design documentation.
- Information management was seen as a major area of improvement for the Alliance during all phases of projects and the procedures developed continue to be refined
- The timely receipt of information such as final design drawings has the potential to impact significantly on performance. The earlier this information is received by the delivery team, the more time there is available to plan for procurement. Conversely any delays to the issue of this information can impact procurement, which in turn can impact the overall program
- "Works as Executed" drawings took longer than expected to be delivered to MI and were handed over in bulk; whereas a steady supply of data as each work lot was completed would have been much more beneficial to MI and allowed a more even workflow and resource requirements more manageable.

Communication

- Pre-planning in the customer consultation process and more communication with customers was needed up-front to identify correct solutions for outlet design and installation.
- MI and MIARA must operate in line with Alliance principles as a single entity, instead of as client and contractor - this improved as the project progressed through 2014 with outstanding results being achieved.
- Understanding of infrastructure and water rationalisation across all project areas to develop a strategy that meets all goals.

Scope Definition

As the project scope was developed it became apparent more detail was required to improve the outcomes and performance of the teams. Clearer definition was required in the following areas:

- Alliance/Subcontractor scope
- Outlet scope
- Handover and commissioning scope.

Resourcing

- Resources brought into the delivery team too late. A strategy has been developed to retain resources for future works - e.g. leveling works through summer instead of the winter peak.
- Gaining the right resources with the right level of experience to deliver infrastructure in tight timeframes.
- Inadequate resources located on-site to resolve design issues in a timely manner. Remote access and support has been improved.
- Roles and responsibilities to be clearly defined for each project team member position to ensure efficient productivity and accountability.
- Some subcontractors provided inadequate resources in key areas such as supervision and restructure of roles and responsibilities provided improved efficiencies.

- The MIARA Management Team was disbanded to reduce costs. This is a critical role that is required to retain integration of the teams and timely response to issues, and was duly reinstated with a reduced number of members.

Policies & Procedures

- There were conflicting policies and a lack of enforcing rules on MI customers, which required further improvement. MI policies and procedures need to be reviewed and updated to reflect lessons learned, specifically Request for Information, Quality and Finance procedures.
- MI need to implement policies in key areas such as private infrastructure located on MI easement, retention of private bridges and modification of customer outlets, to improve the decision processes.
- The lack of clearly defined policy can result in time delays and inconsistent decisions, which in turn impacts on the ability to deliver “on program”.

Procurement

- More work is required on scope definition with suppliers and subcontractors to ensure all required scope is captured.
- Automation packages require more design upfront and definition prior to placing orders. Also need to investigate alternate options that may deliver slightly less capability for a significantly less outlay**.**

Safety

- Work Health and Safety policies, procedures and performance were extremely good and MI worked closely with the Alliance team to adopt improved procedures and much higher target levels of safety. This also raised WH&S awareness and culture in MI, resulting in safety statistics never previously achieved.

CASE STUDY

Lake Wyangan irrigator John Bissetto and division operator Vince Vitucci

Water savings have been realised both off and on farm following the Lake Wyangan Modernisation Project, with irrigators now getting the flow rate they want when they order it.

These water savings are in turn enabling irrigators to produce a lot more on farm.

“The Lake View Branch Canal has been excellent after the new works with the channel maintaining a constant level all the time,” Lake Wyangan irrigator John Bissetto said.

Vince Vittucci has been a channel operator along Lake View Branch Canal for the past 35 years and says the efficiency gains achieved through the PIIOP works are obvious, with the greater control over levels resulting in reduced water losses.

“You can definitely see there is water savings,” he said.

“With automation the channel now runs tight, with no fluctuations in levels.

“This has also been the feedback from irrigators along the channel.”

“Before I needed to pull the water down to the farmers manually and operate every structure with boards, which resulted in water losses throughout the Lake View Branch Canal,” Vince said.

“Now it is all automated and my role is now more so monitoring the flows, and being the conduit between the farmers and MI.”

The automation of the Lake View Branch Canal has also enabled Vince to cover a lot more ground on an expanded run, covering three times the amount of ground he did previously.

Lake Wyangan irrigator Darren Macedone with Division Operator Vince Vitucci