The Mardi-Mangrove Link Pipeline

The largest water infrastructure project on the Central Coast in 25 years

2009-2011

This commemorative booklet provides a historic record of construction of the Mardi-Mangrove Link Pipeline. It celebrates the people and their experiences while working on this important project. Thank you to everyone who contributed.

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Australian Government
Water for the Future

GOSFORD CITY COUNCIL

Wyong Shire Council

CENTRAL COAST

Senator The Honourable Don Farrell
Parliamentary Secretary for Sustainability and Urban Water
Australian Government

The need to secure our water supplies, and manage our water resources more productively and sustainably, is one of the great challenges Australia faces into the future.

The Australian Government is meeting this challenge through its Water for the Future initiative. This is a comprehensive national response to managing water resources in both rural and urban areas, and has four key priorities: taking action on climate change; using water wisely; supporting healthy rivers and securing water supplies.

I have been impressed with the response communities have made across the country to meet these challenges. The Mardi Dam to Mangrove Creek Dam Link project embodies these four key priorities, and in particular will help secure water supply for the Central Coast into the future in the face of population growth and increasing climate variability. The Australian Government has been pleased to contribute $80.3 million from the Water Smart Australia program towards the $120 million Mardi-Mangrove Link project.

This project is a great example of what can be achieved when governments across jurisdictions cooperate to deliver major regional infrastructure, and I welcome the collaboration between the Wyong Shire and Gosford City Councils in undertaking this significant project.

I would like to congratulate all those who have contributed to the planning and construction of the Mardi to Mangrove Link project.

Clr Doug Eaton
Mayor
Wyong Shire Council

The Mardi-Mangrove Link is a historic project for the Central Coast and was an initiative of Gosford City and Wyong Shire Councils with funding from the Australian Government's Water Smart Australia Program.

It is the largest infrastructure project undertaken for many years and is a positive step forward to secure the region's water supply over the next four decades by linking Wyong River and Ourimbah Creek to Mangrove Creek Dam via Mardi Dam.

I commend all involved in delivering this project in a timely and cost effective way for the benefit of the community of the Central Coast.

On behalf of my fellow Councillors I would like to thank everyone involved and in particular the Yarramalong Valley residents for their patience and assistance throughout this project.

Clr Laurie Maher
Mayor
Gosford City Council

The Mardi-Mangrove Link has been a momentous project for the people of the Central Coast. After many years of drought, this link will help restore our water supply levels and ensure we have a more secure water supply for years to come.

This project is a strong example of how Gosford and Wyong Councils can work together to achieve great things. I would like to congratulate all those involved for their commendable efforts and acknowledge the community for their patience during construction.

On behalf of Gosford City Council and my fellow Councillors I would like to extend my appreciation and thanks to all involved.

The Central Coast

The Central Coast is a thriving community with a coastline of beautiful beaches, deep rural valleys and unspoilt mountain backdrop. Located on the northern fringe of Sydney and close to the industrial powerhouse of Newcastle, the Central Coast has a population of about 300,000 people.

As a growing business centre, the region has strong and long-established rural, construction and retail sectors.

Although a rich and vibrant place to live, the Central Coast has limited water resources.

The region was in dire straights in 2007 when total storage levels dropped to just over 10% and Level 4 restrictions were enforced banning all outdoor water use.

The Mardi-Mangrove Link was an activity proposed in *WaterPlan 2050*, the long term water supply strategy.

The Mardi-Mangrove Link works by taking water from Wyong River during medium and high flows and transporting it to the largest dam in the region, Mangrove Creek Dam, for storage.

Left: A rural valley typical of the Central Coast
Right: A popular Central Coast beach; drastically low water levels during the drought

Mardi-Mangrove Link

Linking Wyong River to Mangrove Creek Dam

Australian Government
Water for the Future

Gosford City Council
Wyong Shire Council
CENTRAL COAST

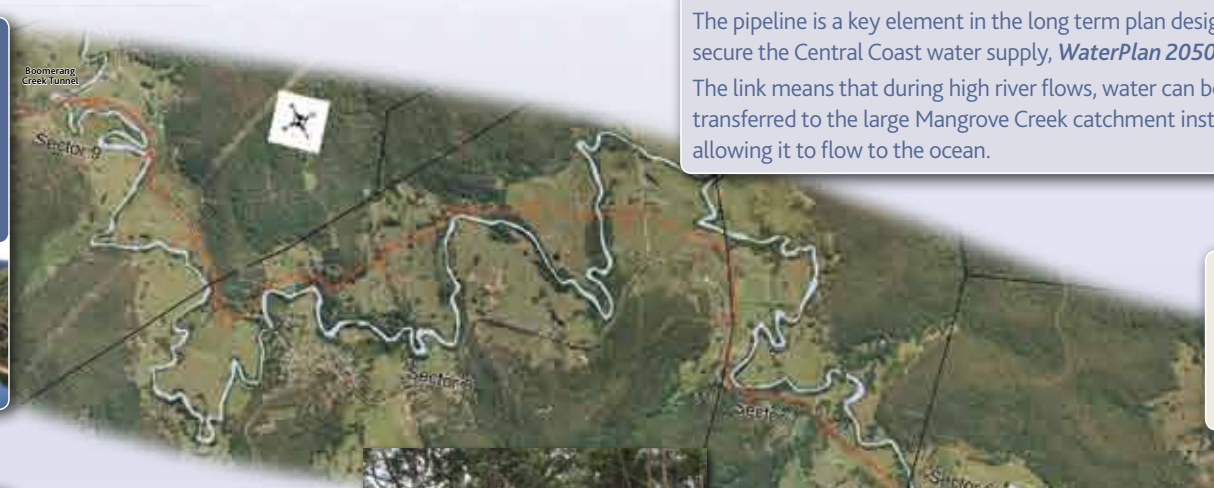
The Mardi-Mangrove Link pipeline is made up of two pipelines totalling **21 kilometres** in length. The Wyong River to Mardi Dam pipeline is 2 km long and the Mardi to Mangrove pipeline is 19km.

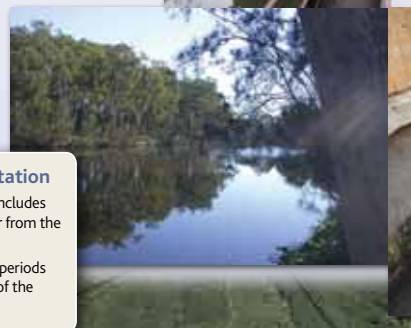
The pipeline is a key element in the long term plan designed to secure the Central Coast water supply, ***WaterPlan 2050***.

The link means that during high river flows, water can be transferred to the large Mangrove Creek catchment instead of allowing it to flow to the ocean.

Mangrove Creek Dam

At 190,000 megalitres, Mangrove Creek Dam has the largest water storage capacity on the Central Coast. Built from 1978 – 1982, Mangrove Creek Dam provides over 93% of the region's water storage. Mangrove Creek Dam is connected to the link through the Boomerang Creek Tunnel.





Wyong River Offtake and Pumping Station

The offtake and pumping station at Wyong River includes two small and four large pumps to transport water from the river to Mardi Dam.

The pumps work by harvesting more water in wet periods and less in dry periods, following the natural flow of the river.

Mooney Mooney Dam

Mooney Mooney Dam is the coast's oldest dam being built in 1961. Located on Mooney Mooney Creek around 10km north-west of Gosford, the dam has a capacity of 4,600 megalitres. Water is pumped to Somersby Treatment Plant and then to Gosford and Wyong residents.

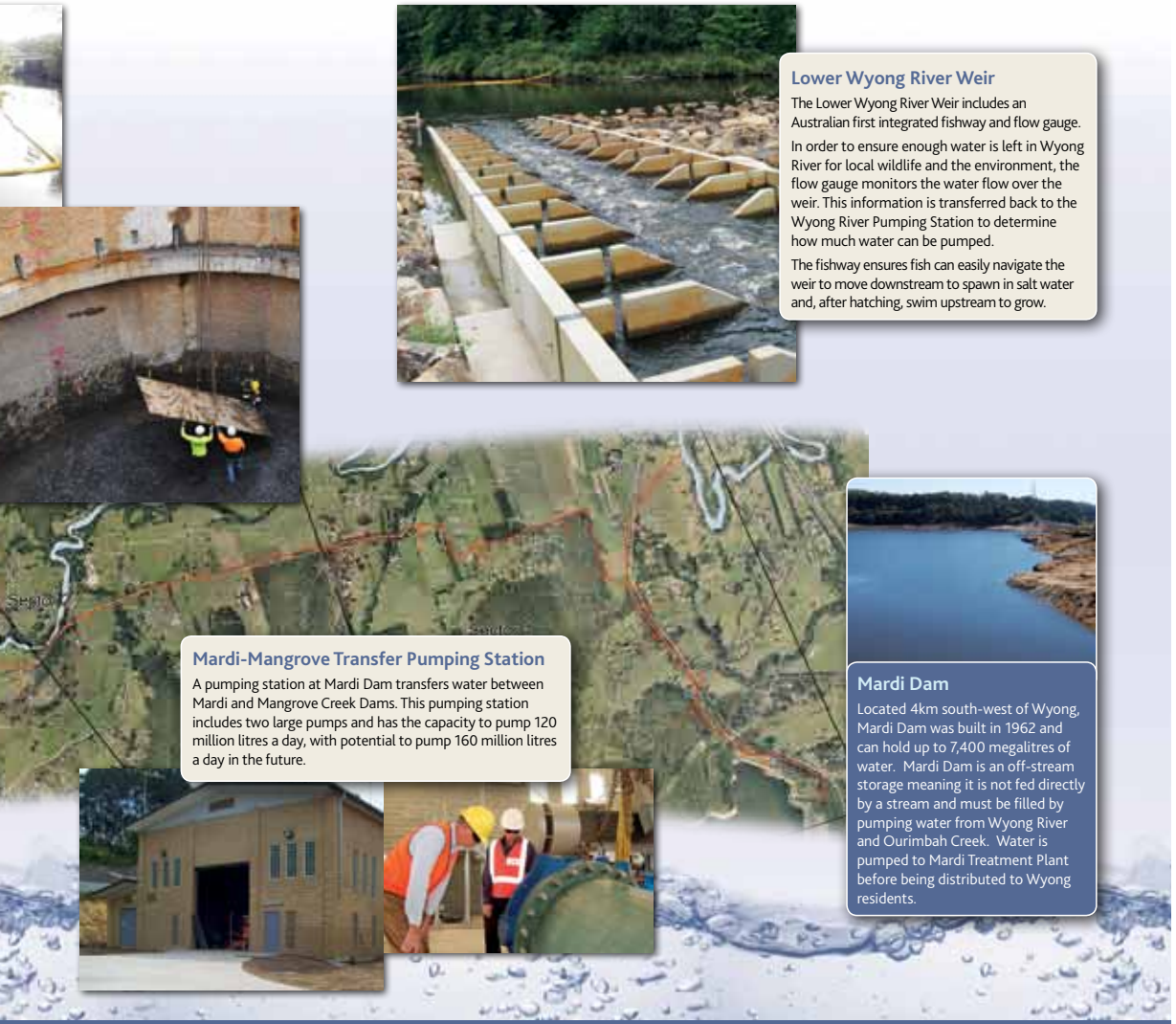
The water pipeline

The 21 kilometre pipeline was laid across private property, along the road and through bushland. The pipe was laid using a combination of open trenching, horizontal directional drilling and pipe bridging methods.

The pipes are made of **mild steel**, lined with cement and covered in polyethylene plastic coating. They are **one metre** in diameter and 13 metres long.

The pipes are rubber ring jointed and are welded together near bends and valves.

Water in the pipeline can flow from Mardi Dam to Mangrove Creek Dam or from Mangrove Creek Dam to Mardi Dam.



Lower Wyong River Weir

The Lower Wyong River Weir includes an Australian first integrated fishway and flow gauge.

In order to ensure enough water is left in Wyong River for local wildlife and the environment, the flow gauge monitors the water flow over the weir. This information is transferred back to the Wyong River Pumping Station to determine how much water can be pumped.

The fishway ensures fish can easily navigate the weir to move downstream to spawn in salt water and, after hatching, swim upstream to grow.

Mardi-Mangrove Transfer Pumping Station

A pumping station at Mardi Dam transfers water between Mardi and Mangrove Creek Dams. This pumping station includes two large pumps and has the capacity to pump 120 million litres a day, with potential to pump 160 million litres a day in the future.

Mardi Dam

Located 4km south-west of Wyong, Mardi Dam was built in 1962 and can hold up to 7,400 megalitres of water. Mardi Dam is an off-stream storage meaning it is not fed directly by a stream and must be filled by pumping water from Wyong River and Ourimbah Creek. Water is pumped to Mardi Treatment Plant before being distributed to Wyong residents.

The project is an initiative of Gosford City and Wyong Shire Councils with Australian Government funding of $80.3 million from the Water Smart Australia Program and an additional $40 million combined from the two Councils.

The project

The Mardi-Mangrove Link is the largest infrastructure project on the Central Coast since the building of Mangrove Creek Dam 25 years ago.

The Mardi-Mangrove Link is made up of:

- a 2.1 kilometre buried water pipeline from Wyong River to Mardi Dam
- a 19 kilometre buried pipeline from Mardi Dam to the existing Boomerang Creek Tunnel connected to Mangrove Creek Dam
- a new pump station at Mardi Dam
- a new offtake and pump station beside Wyong River
- an upgrade of the Lower Wyong River weir and fishway.

The project is an initiative of Gosford City and Wyong Shire Councils with Australian Government funding of $80.3 million from the Water Smart Australia Program and an additional $40 million combined from the two Councils.

Construction of the link began in March 2010 and took 18 months to complete.

The benefits

The link will help to:

- boost dam storage levels
- speed up drought recovery
- protect the region against periods of below average rainfall.

It is expected the storage level of Mangrove Creek Dam will rise to 70% within the first five years of operation.

The link will help to secure the region's water supply for the next four decades. It will ensure there is enough water for the growing population and may assist in the easing of water restrictions.

Left: An aerial view of Mangrove Creek Dam
Right: Former Gosford City Mayor Chris Holstein and Former Wyong Shire Mayor Bob Graham discuss the construction schedule with Craig Thomson MP, Federal Member for Dobell; Somersby Water Treatment Plant

> This project is extremely important for the people of the Central Coast. By banking water in Mangrove Creek Dam when it rains we will have more water available for periods of drought. Without this project, the Central Coast would not be equipped for future growth and development.
>
> **Michael Whittaker, General Manager, Wyong Shire Council**

> The Mardi-Mangrove Link is a key element of *WaterPlan 2050*, the region's long term water supply strategy. This plan for the future works to avoid another instance where our total dam storage dropped below 11 percent like it did in 2007. With this project complete, it will help sustain our water supplies for years to come and we will have a more reliable water supply for everyone on the Central Coast.
>
> **Peter Wilson, General Manager, Gosford City Council**

Left: Clearing the pipeline corridor
Right: Unloading the pipes at Mardi-Mangrove Transfer Pumping Station; Putting the pipes into place at the Wyong River Pumping Station

The pipelines

Key to the Mardi-Mangrove Link is the construction of two separate pipelines.

The first from Wyong River to Mardi Dam is 2.1 kilometres in length and carries 320 million litres a day.

The second from Mardi Dam to Boomerang Creek Tunnel is 19 kilometres in length and carries 120 million litres a day.

These pipelines cross 56 properties and include four river crossings, 17 smaller tributary crossings, 38 scour valves, 43 air valves, three section valves and one surge tank.

The pipeline was constructed using open trenching, pipe bridges and horizontal directional drilling.

The pipelines took 13 months to build.

Quick facts:

Total pipeline length: 21.1 kilometres

Nominal diameter: 1 metre

Steel grade: Sintakote mild steel cement lined pipe

Pressure rating: 160 metre head or 1,600 kilopascals.

Left: Compressing the compaction sand around the pipe
Right: Applying primer to the pipe joints; Laying pipe in Yarramalong Road for the Mardi-Mangrove Link

The Wyong River Offtake and Pumping Station

The project includes a new offtake structure at Wyong River. This offtake is capable of taking 500 million litres a day from Wyong River.

To build the offtake, about 50 large steel sheet piles were inserted into the bank and bed of the river to create a coffer dam. The pool created was then drained so work could begin below the normal water level.

The new pumping station at the offtake includes four large pumps and associated equipment such as telemetry and control.

The NSW Office of Water granted a new licence to take 320 million litres a day from Wyong River depending on river flow rates. The pumps will work by harvesting more water in wet periods and less water in dry periods, following the natural flow variability of the river.

To minimise the chances of marine life being drawn into the offtake, the design incorporates 25 millimetre screens.

The offtake and water pumping station took 14 months to build.

Left: Constructing the Wyong River Offtake within the coffer dam
Right: Constructing the Wyong River Pumping Station; An aerial view of the Wyong River Pumping Station Wet Well

One of the major challenges in building the offtake was the discovery of several large logs in the river bank when constructing the cofferdam. The trees must have been washed down the river during floods and settled on the bottom, some two metres under the river bed. It was quite an operation to remove the logs and lifting chains and a crane were used.

It is thought some of the trees could have been fossilised and there was talk of trying to date the trees but this proved too costly. We also had the idea of keeping them as a memorial somewhere, however once exposed to the air the logs started breaking down fairly quickly.

The comments at the time were quite amusing and ranged from 'geez, that's a big one' to 'I reckon the timber in that tree would look really good as a dining table or bench top'.

Joe Weston, Mardi-Mangrove Link Technical Manager

Left: Putting the sheet piles into place to construct the coffer dam
Right: The logs lodged in the river bank; Extracting the logs from Wyong River

Upgrade of Lower Wyong River Weir

As part of an upgrade of the Lower Wyong River Weir, an Australian first integrated fishway and flow gauge were installed.

In order to ensure enough water is left in Wyong River for local wildlife and the environment, the flow gauge monitors the water flow over the weir. This information is transferred back to the Wyong River Pumping Station to determine how much water can be pumped.

The new fishway ensures fish can easily navigate the weir to move downstream to spawn in salt water and, after hatching, swim upstream to grow. The fishway is designed to flow even when the river is low.

The fishway is based on research from Europe and designed by leading aquatic expert Dr Martin Mallen-Cooper from Fishway Consulting Services.

It's expected the new fishway will operate 99 percent of the time, in all but the driest of conditions.

It will boost local fish stocks including Australian Bass.

The structure took about five months to build.

Left: Inspecting the site of the upgrade of the Lower Wyong River Weir
Right: Project Director Greg McDonald with Wyong Mayor Doug Eaton and Gosford Mayor Laurie Maher at the fishway; Constructing the fishway

> In my opinion the reconstruction of the weir incorporating the new low flow fishway and rebuilding a more effective high flow fishway are the environmental crown jewels for the project.
>
> During the height of the drought there were periods where fish within Wyong River were unable to effectively breed or disperse to other systems feeding into Tuggerah Lakes. They can now do this easily.
>
> **Paul Shelley, Mardi-Mangrove Link Environmental Manager**

Left: The completed fishway
Right: Drilling holes for bolting at the new fishway

Mardi-Mangrove Transfer Pumping Station

A new pumping station at Mardi Dam transfers water between Mardi and Mangrove Creek Dams. This pumping station includes two large pumps and has the capacity to pump 120 million litres a day, with potential for a future upgrade to pump 160 million litres a day.

The transfer pumping station includes strainers to screen raw water transferred from Mardi Dam to Mangrove Creek Dam, and so restrict the movement of pests between the two catchments.

The water is supplied into Mardi Dam from the Wyong River Pumping Station through an inlet on the western side of the dam.

The transfer pumping station took nine months to build.

Left: Assembling the valve to the discharge manifold at Mardi-Mangrove Transfer Pumping Station
Right: The pipework at Mardi-Mangrove Transfer Pumping Station; Constructing the inlet into Mardi Dam

The scale of the Mardi-Mangrove Link project and the size of the pipe are quite different to anything I have worked on before. There are more complexities of scale in terms of handling such a large pipe and the larger fittings required.

The two large 1100 kilowatt transfer pump sets at the transfer pumping station are impressive and are far bigger than any others I have installed. The electric motors were manufactured in China while the two mechanical pumps were manufactured in Sweden.

Due to their size, it was extremely important that the motors and pumps aligned correctly to prevent any unwanted vibrations or rough running which could damage the pump sets.

The operation of the two strainers also had some 'teething problems' due to a tendency to backwash too frequently. This was overcome by the installation of pressure sensors which ignored 'spikes' in the pressure differential readings

Peter Rainsford, NSW Public Works

Mardi-Mangrove Link Technical Manager Joe Weston inspects the size of the pumps at the transfer pumping station

A project of this magnitude does not come about successfully without the skills and support of a number of groups of people.

I recognise the support of the people in the Yarramalong Valley. Without your patience and understanding this project could never have been completed.

I thank the Councillors of both Wyong and Gosford for their unfailing support for myself and the team over the last two years. Without the political support from both Councils, as well as the Australian Government, this project would never have been completed. Councillors Eaton, Maher, Graham and Holstein, your support in the role of Mayor during my tenure on this project has been appreciated.

Finally, to the project team and contractors - it has been my honour to lead and direct a team of skilled individuals with a common focus of securing the Central Coast's water supply into the future. Each member of the team has been a pleasure to work with and has acted in a thoroughly professional manner.

Greg McDonald, Mardi-Mangrove Link Project Director

The pipe work for the Mardi-Mangrove Link snakes across the Yarramalong Valley


150N
MANUAL
PFD
TYPE 1

Environment

The pipeline runs through Yarramalong Valley, which is a rich ecosystem bustling with native plants and wildlife.

Planning for the Mardi-Mangrove Link included extensive investigation of the potential impact on the environment.

Protection of platypus habitat was just one key focus.

A detailed platypus assessment was carried out by expert Dr Tom Grant. This assessment imposed rigorous environmental conditions to protect the platypus.

Protection of native microbats was another consideration.

Bridges can provide roosting sites for microbats such as the threatened Large-footed Myotis. The project required the upgrade of several river crossings. Before they were removed all bridges were inspected for roosting bats. To compensate for the loss of possible roosting habitat, several purpose built microbat nesting boxes were built within nearby trees. Four additional nesting boxes were also fitted to the underside of the new Bunning Creek Road Bridge.

Other activities to protect the local environment included temporary fencing or bunting tape to identify sensitive environmental areas, bank stabilisation measures and construction around water courses.

Left: Mardi-Mangrove Link Environmental Manager Paul Shelley inspects the boom at Lower Wyong River Weir
Right: A tree marked for protection; Platypus protection signs

> There was one instance where work stopped immediately when we were laying pipe at Schofields Creek and spotted a platypus. As a result we implemented a series of measures to protect any burrows and animals living nearby. This included the building of a special 'platypus run' in the form of a 200 mm poly-pipe so any animals trapped by the temporary damming of the creek could escape. It also included a special toothless bucket to excavate the creek bank so any burrows wouldn't be destroyed in the process.
>
> **Amber Gibbins, John Holland**

Left: Platypus expert Dr Tom Grant inspects the pipeline route with Phil Conacher from Conacher Environmental Group
Right: The special poly-pipe at Schofields Creek to allow the trapped platypus to escape

Heritage

As part of project planning, an Indigenous heritage study was carried out to check if any important cultural items existed in areas where the pipeline was to be built.

Aboriginal artefacts were discovered during test digs in the pipeline corridor. Work stopped in these locations and the sites were documented, reported and preserved in accordance with relevant State Government requirements and the Aboriginal community.

Another important find was a section of road dating back to the early 1920s, called a ‘corduroy road’, found while laying pipe in Kidmans Lane, Wyong Creek.

Umwelt Australia and Conacher Environmental Group excavated the section and took photographs and measurements for archival records.

Left: Laying pipe into the connection at Boomerang Creek Tunnel
Right: Protecting sensitive areas when laying pipe in Yarramalong Valley; Archaeologist Andy Roberts from Umwelt Australia excavating Kidmans Lane


MMLP

Excavating Kidmans Lane was a very interesting project principally as it was possible to interview people in the valley such as Mrs Eva Day and Mr Albert Butler who had not only used the road but could put it into the context of the wider history of the Yarramalong Valley. Their families were amongst the first to settle there and were heavily involved in the early timber industry.

You could almost hear the crack of the stockwhips in the forest as they described the old times.

People like these are an invaluable resource and can illuminate archaeological research remarkably.

Andy Roberts, Umwelt Australia

Umwelt Australia excavating the corduroy road on Kidmans Lane

Community and landholders

The needs of the local community affected by construction of the pipeline has been a key consideration throughout the project. The pipeline route crossed 56 private properties and there were disruptions to traffic and noise for other residents that lived nearby.

Extensive community and landholder liaison formed part of the project to ensure the impacts were minimised. Ongoing communication and liaison included community meetings, open house events, one-on-one discussions, letters, signs, newspaper articles and media advertisements.

There were also legacy benefits built into the project planning to ensure there were other positive benefits for the local community. One of these was the installation of eight fire hydrants along the main 19 kilometre pipeline. The locations were chosen in consultation with the Rural Fire Service to be easily accessible and to provide the best possible coverage of the area for fire fighting purposes.

Another is an upgrade of Bunning Creek Road Bridge from a load rating of 17 tonnes to 44 tonnes. The new bridge allows unrestricted access across Wyong River for the NSW Rural Fire Service and water tankers during bush fires. It also allows for better access for garbage collection and new developments.

Left: Wyong Shire Mayor Doug Eaton and Deputy Mayor Bob Graham officially open the new Bunning Creek Road Bridge along with local residents
Right: Mardi-Mangrove Link Environmental Manager Paul Shelley and Property Manager Mary-Ellen Barry inspect the restoration of property; The NSW Rural Fire Service test out one of the new fire hydrants


MMLP

> The key to the success of landholder liaison was that Council appointed a specialised Property Team who were dedicated full time to this project.
>
> Managing the expectations of the community and the impact on landholders has been a mammoth task. Our challenge has been to try to achieve the delicate balance between what is best for the project while minimising the impact on landholders. Our key role was to secure land access for the contractor while at the same time trying to manage adverse affects on landholders and their homes, farms and businesses.
>
> We (the Property Team) come from farming and pipeline construction backgrounds. We set up a respectful, agreement based process for managing land access, and we tried to treat landholders as if they were our own families and the pipe was going through our own farms.
>
> I am extremely appreciative of the cooperation the people of the valley have shown. It has been a pleasure to work with them.
>
> **Mary-Ellen Barry, Mardi-Mangrove Link Property Manager**

Left: Mardi-Mangrove Link Property Liaison Manager Graham Meers speaks to local resident Geoff Broome about the project
Right: A Mardi-Mangrove Link display at the 2010 Australian Springtime Flora Festival; Community roadwork signs

Engineering

The Mardi-Mangrove Link utilised best practice project management and innovative engineering to be completed on time at the lowest cost to local ratepayers.

Horizontal directional drilling was used to lay 260 metres of pipe under Wyong River. Pipe bridges were used at three of the four river crossings, however, in this location the river was too wide and had environmental hazards. This was the first time a pipe of that size, length and pressure rating was successfully installed in Australia using this technology. This method was chosen as it is faster, safer, cheaper and less intrusive for residents than other techniques such as microtunnelling.

Cutter soil mixing method was used in construction of the Wyong River Pumping Station wet well. This method created an almost water tight low strength structural wall around the area to be excavated. This enabled construction of the concrete wall from the bottom up and countered uplift forces. Compared to the commonly used design approach of sinking a caisson from the surface, this method was cheaper, safer and less risky for achieving the required tolerances.

An all of life asset cost approach was applied to the project. Money was spent upfront on analysis of aspects such as electricity use, pumping and ongoing maintenance to produce a design that would minimise expenditure over the life of the asset. One example is the installation of a pipeline inspection gauge to ensure the main can be properly cleaned in the future.

Left: The cutter soil mixing method in the Wyong River Pumping Station Wet Well
Right: Washing the reamer and cutter for horizontal directional drilling under Wyong River; Rod Williams and Mayor Laurie Maher from Gosford City Council, Councillor Greg Best, Mayor Doug Eaton and Project Director Greg McDonald from Wyong Shire Council celebrating the laying of the final piece of pipe with local Federal Members Craig Thomson (Dobell) and Deborah O'Neill (Robertson)

Although based on proven technology, the engineering innovations used for the Mardi-Mangrove Link are relatively new to the water industry. Horizontal directional drilling originated in the US and the cutter soil mixing method in Germany. I credit our construction contractors John Holland for having the foresight to propose these innovations for our project.

The innovations not only saved us time and money but they also reduced the environmental impact and the safety risk for construction workers.

Although there were some problems with the size of the borehole in our Australian-first horizontal directional drilling project, in the end it was a superior technique and I am glad it was used.

Rod Jewell, Mardi-Mangrove Link Project Manager

Horizontal directional drilling under Wyong River

Project team

Wyong Shire Council managed the project on behalf of both Councils, employing a project team consisting of contractors and Council staff.

Over the course of the project, the project team was made up of experts in a range of different fields including project management, engineering, finance, environment, stakeholder liaison and administration.

The Project Office was located at 4 Anzac Avenue, Wyong.

The Project Team worked closely with both Councils as well as the principal contractors.

Left: Project Manager Rod Jewell and Project Director Greg McDonald speak to Wyong Councillor Bill Symington about the project
Right: Mardi-Mangrove Link Administration team members Shannon Longobardi and Debbie Knight; Mardi-Mangrove Link Property Liaison Manager Graham Meers inspects the pipe to be laid under Wyong River

> I think lamingtons actually became the official currency of the Mardi-Mangrove Link Project Office. There was always an occasion for lamingtons: if you were new to the project, you had to bring lamingtons. If it was your own birthday, you had to provide lamingtons. If things were not going too well, lamingtons were used to get everyone through it. And sometimes we had lamingtons, just because we needed lamingtons. The delicious little cakes were definitely a familiar part of our everyday work.
>
> **Shannon Longobardi, Mardi-Mangrove Administration Officer**

Left: The Mardi-Mangrove Link Project Team wave goodbye
Right: Mardi-Mangrove Link Technical Manager Joe Weston and Assistant Project Manager James Purcell inspect the horizontal directional drilling rig; Mardi-Mangrove Link Financial Manager Simon Stoney hard at work

Principal Contractors

As part of the project, Early Tenderer Involvement and a GC21 contracting methodology were used. Early Tenderer Involvement allowed for tenders that fully meet the requirements of the project. A GC21 contract facilitated a more collaborative working relationship between the principal construction contractor and the Project Team staff.

For this project, NSW Public Works was the construction management contractor and John Holland the principal construction contractor.

Throughout the project NSW Public Works and John Holland were located in a site office compound near the start of Yarramalong Road.

John Holland employed a number of sub contractors to assist in completing the project. Killard and Eire were used for pipe laying, while UEA was used for horizontal directional drilling under Wyong River.

Left: A GC21 Project Meeting
Right: Geoff Ward from NSW Public Works with the horizontal directional drill pieces; John Holland Environmental Coordinator Amber Gibbins gives a safety induction at the Lower Wyong River weir


UEA

Other Contractors

The Project Team also employed other contractors for different components of the project. Some of these included:

- GHD for technical design
- Conacher Environmental Group as environmental consultants
- Evans and Peck for consulting on water licenses
- Parsons Brinckerhoff for pipeline route marking.

All up it is estimated that over 1,000 contracting staff worked on the project at some stage.

The direct economic benefit to the region of the additional workforce is estimated at $27,000 per week or $1.4 million a year. This is a conservative estimate of spending on fuel and food on weekdays alone not including accommodation and other spending.

Left: The UEA horizontal directional drilling rig
Right: KenKar Plastics work to piece the pipe together before pulling into the drill hole under Wyong River; Platypus Expert Dr Tom Grant speaks to Phil Conacher from Conacher Environmental Group about the pipeline route

Cheers at start of big water project

ERROL SMITH

ONE of the most important dads of dirt in the history of Wyong shire was turned at a ceremony at Woodbury Park, Wyong Creek, on Monday.

The ceremony officially marked the start of construction work on the Mardi-Mangrove Creek Dam pipeline project that aims to meet the water needs of all Central Coast residents until at least 2020.

It represents the largest water infrastructure project to be built on the Central Coast since Mangrove Creek Dam was built and commissioned in 1962.

It will be built by John Holland Constructions at a cost of about $120 million, with the Federal Govern-

Robertson Federal Labor MP Belinda Neal, Bob Graham, Chris Holstein and Dobell Federal Labor MP Craig Thomson at the launch of the pipeline link.
Picture: WADE MAGUIRE

The entire project is scheduled for completion by June next year, although joint water supply officials hope it will

100 per cent capacity through pumping methods but to leave ample room for large rainfall events.

Wyong Mayor Bob

Hilly area final obstacle in missing link plan

Rain delay work on da pipeline li

ERROL SMITH

About 9.2km of t now in the ground.

The project is c million and is exp pleted late next ye

Meanwhile dam in the wake of good the past few days.

More than 80m Mangrove Creek d evening and total three dams climbe

At the same tim

continues to -dollar Mardi dam pipeline

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Pipeline landholders join survey team

MORE than 30 landholders in the Yarramalong valley and around Old Maitland Rd have agreed to have their properties surveyed in preparation for work to begin on the Mardi-Mangrove Creek Dam pipeline.

Wyong Council water and waste manager Ken Grantham said the cost of the 76 affected householders were expected to sign up in coming weeks.

Mr Grantham said while the council had a legal right under the Water Management Act to undertake investigations and survey work on private property, it was keen to build up good relationships with landholders.

"We are working constructively with them to gain their written consent to this process where possible," he said.

"Feedback from landholders is that they are pleased the project team has taken the time and effort to seek their formal consent and co-operation before starting further work.

"They are also pleased we have invited them to work with the engineering team to help mark the proposed route on their land and have a say on any minor adjustments where possible."

Mr Grantham said the extra work being undertaken to ensure a well managed process for the Mardi-Mangrove Creek dam link project had taken more time and resources than anticipated and it was due to finish by March 2011.

He said costs for professional engineering services during the pre-construction phase needed to increase from $5.882 million to $7.724 million.

The project is an initiative of Gosford and with federal f ing of $80.3 water smart p

Water link advan beyond a pipe dr

ERROL SMITH

WORK GANGS narrowly beat the rain this week to lay the first of the pipes for the $120 million block to Mangrove Creek Dam project.

The pipes, which are each about one metre in diameter and 13 metres long, are being laid to function alongside Old Maitland Rd.

When joined, they will form the pipeline link from Wyong River to Mardi Dam. Further pipes will be laid through Yarramalong Valley to link Mardi Dam and Mangrove Creek Dam.

In the coming weeks trenches will also be dug and pipes laid at the other end of the pipeline, at Blueberry Close. Tunnel, which links to Mangrove Creek Dam.

The work is being carried out by John Holland Construction on behalf of Gosford City and Wyong Shire councils. Project director Greg McDonald said pre-existing sewers would continue having pipes

The first pipes in the Mardi to Mangrove dam link are laid.

Four firms vying for dam link work

DENICE BARNES

TENDERS have been called for construction of the Mardi to Mangrove Creek dam link project.

Four companies – Bovis Lend Lease Pty Ltd, Jemena Pty Ltd, John Holland Pty Ltd and McConnell Dowell Pty Ltd have been invited to tender.

The companies have 28

what's on?

Kids Day Out
Sunday 7 November
Come along to an exciting day out for the whole family. There will be rides and entertainment throughout the day, informative stalls and lots of food stalls. Tuggerah Lakes Secondary College, cnr The Entrance Road and Yakalla Street, Bateau Bay, 10am-3pm. For further information visit: www. cckdo.org.

Have your will prepared
Wednesday 10 November
Local solicitors and the Salvation Army are providing a special offer to prepare or change your will for only $40. Proceeds will go to the Salvation Army Selah Farm Rehabilitation Centre in Berkeley Vale. Mingara Recreation Club, Mingara Drive, Tumbi Umbi, 8am-6pm. Bookings: 4325 5614.

Children's author talk
Wednesday 10 November
Join local children's author Lisa Sheehy for the launch of her new book *Angel*

Stop! Platypus nearby

Work on the Mardi-Mangrove pipeline came to a sudden halt at Scholefels Creek on Yarramalong Road recently when a worker spotted a platypus.

Under the rigorous environmental conditions imposed on the project, steps are being taken to protect the platypus and other important species.

The sighting meant work stopped until steps were taken to protect any burrows or animals living nearby.

This included the building of a special 'platypus run' in the form of a 200 mm poly-pipe so any animals trapped by the temporary damming of the creek could escape.

A special toothless bucket was also used to excavate the creek bank so any burrows wouldn't be destroyed in the process.

Under the platypus management plan, any animals found in the construction zone will be captured and released to the nearest permanent stream.

Work on the pipeline is progressing well with around eight kilometres of the 21 km pipeline now in the ground and associated works also on schedule.

The project has Australian Government funding of $80.3 million through the Water Smart Australia Program and $40 million from both Councils.

Healthy kids = happy kids

Helping hand for Tuggerah Lakes

The first sod is

THE first sod of the Mardi-Mangrove pipeline link was turned in the footprint of the Wyong River pump station site at Woodbury Park last month, despite the Auditor General reporting last year that the proposal was behind schedule.

More than 60 members of the local community witnessed the event, including representatives from community and business groups, as well as Councillors and Members of Parliament.

Gosford Mayor Chris Holstein said that construction was now proceeding ahead of schedule and anticipated that it would be due for

supplied the drinking for the entire Central C

"It's important th don't allow a coal mi neath the catchment to our water. Otherwise money that is being spe be for nothing," he sai

Federal Member for Craig Thomson added t Federal Governmen proud to be part of suc nificant project for the

"The Federal Govern a proud supporter of the Mangrove Link," he sai

"It is important that part of such a major i ment in securing the r water supply system i

Councils approve $65m tender

ERROL SMITH

CONSTRUCTION giant John Holland Pty Ltd has won the contract to build the $120 million-dollar Mardi to Mangrove Creek Dam water pipeline link.

The decision by Gosford and Wyong councils marks the end of a crowded five-month tender process.

John Holland is one of Australia's largest construction companies and submitted a tender of $65 million.

approved a 20 per cent contingency cost to cover unforeseen risks and activities during construction such as the need for more design work and studies.

Pre-construction work, such as environmental investigations, engineering designs and project management, bring the total budget to $120 million.

This will be jointly funded by the two councils ($40 million) and the Federal Government ($80.3 million).

Construction work is due to completion and commissioning by mid-2011.

All tenders which were submitted for the work were assessed on price, ability to deliver, safety and environmental record, experience with sensitive community and landholder issues, experience with major projects, relevance of previous work, experience of key personnel and demonstrated understanding of the project.

Wyong Mayor Bob Graham said this was another great milestone for the project and a very exciting

Art centre close

IN another milestone this week, Wyong Council voted to accept a design tender for a new arts and cultural centre on the site of Wyong's Memorial Hall.

It has been won by Tonkin Zulaikha Greer Architects for just under $1.1 million.

The company has designed several successful arts facilities, including CarriageWorks at Eveleigh in Sydney and Powerhouse Regional Arts Centre.

A section of old road dating back to the early 1920s has been uncovered by workmen on the Mardi to Mangrove Creek dam water pipeline.

Restoration work starts

DETAILED restoration work has started on six properties where the pipes for the new Mardi to Mangrove Creek dam water link have been laid. This includes properties at the northern end after the Bumble Hill turnoff and east of Stinsons

Workers find corduroy road

ERROL SMITH

A SECTION of road dating

a large intact section in such good condition is

vironmental Group excavated the section and took photographs and other

Mardi-Mangrove Link | community update

Work underway - pipes arriving

CONSTRUCTION of the Mardi-Mangrove Link is now underway with work in progress on the off-take structure at Wyong River and areas being prepared for the new water pipes.

A coffer dam is being installed in Wyong River at Woodbury Park to enable the new off-take structure to be built within the river. Work on the off-take structure and new pump station will continue in the area over the next eight months.

Meanwhile, the new water pipes are starting to arrive in preparation for being laid in the ground. Each pipe is about one metre diameter and 13 metres long. They are made of steel and are lined with cement.

Surveying, clearing, fencing and other preparation work has also now begun in many areas of the pipeline route.

Mardi-Mangrove Link Project Director Greg McDonald said he was pleased the work was underway and moving ahead as planned.

project and is progressing well," he said. "It is still early days, of course, but hopefully we will continue to move ahead constructively over the coming months.

"If residents wish to stay informed of construction works and traffic impacts they can subscribe to an email alert which is issued by the Project Team every one-to-two weeks.

"This primarily gives notice of traffic controls in the work areas, and also gives an indication of construction activities underway.

"If anyone wishes to receive this alert, they can email mardimangrovelink@wyong.nsw.gov.au and provide their email details.

"A range of other information,

is also available on the Mardi-Mangrove Link pages of the Gosford/Wyong Councils' water Authority web www.gwcwater.nsw.gov.au

"I encourage people to subscribe the email alert or visit the website to stay informed of our progress.

"In recent weeks the M

Linked dams '

ERROL SMITH

Doug Eaton, Craig Thomson, Deborah O'Neill and Laurie Ma pipe.

Pipeline comp

Media and events

The community has supported the Mardi-Mangrove Link as a key building block for the future of the Central Coast.

Apart from the $80.3 million in funding provided by the Australian Government, local Federal politicians have showed their support.

Local media organisations were also keen to feature stories and updates on the project.

Expect traffic delays

YARRAMALONG: Traffic delays along Yarramalong Rd started to ease this week with only four crews working on the Mardi to Mangrove Creek dam water pipeline link.

Motorists had been experiencing lengthy delays while extra crews were working on sensitive areas along the pipeline route. Until the end of March, revised working hours are between 7am and 7pm Monday to Friday and 8am to 1pm Saturday.

The contractor is required to schedule work so only three crews are working at one time, however one extra crew will be working in the road shoulder and will require single lane closures.

The pipeline is being built at a cost of about $120 million and is designed to secure the coast water supply until 2050.

About 20km of the 21km of pipe is now in the ground.

John Holland representative Stuart Wing looks over the first of the pipes for the Mardi to Mangrove Creek dam link.

Picture: WADE MAGUIRE

Dam pipe dream a reality

ERROL SMITH

SE are the pipes in- d to safeguard the ral Coast's water ly for the next 40 to 50 s.

ey'll be used to carry r between Wyong r, Mardi Dam and rove Creek Dam as of the multimillion- r link project.

e pipes arrived on the of the John Holland tructions depot at di on Monday.

pokesman for the link to schedule and the arrival of the pipes was a signifi- cant milestone.

"There's been a lot of publicity surrounding the project and a lot of people will be interested in seeing the size and design of the pipes," the spokesman said.

"The link is the single biggest engineering project to be undertaken on the coast since the construc- tion of Mangrove Creek Dam itself and it has gener- ated a lot of community

be installed to link Wyong River with Mardi Dam.

Water levels in the dam will be allowed to drop in the coming weeks to allow upgrade works to proceed.

"Over the next few weeks we will use water from Mardi Dam when sup- plying the Central Coast community," Wyong Coun- cil water and sewer man- ager Greg McDonald said.

"All works are expected to be completed by late May or early June, at which time, depending on

Our dream pipe

Major breakthrough in Mardi-Mangrove link

Horizontal drilling

PM asked to do the honours

Final link in place

Last section of 21km pipeline in the ground

Laying the last length of buried water pipe at Yarramalong.

Repair work begins on road

ERROL SMITH

YARRAMALONG Valley drivers were constantly risking their lives.

road was inspected weekly to identify defects and proj- ect money had been allo-

Bunning Creek bridge open

ERROL SMITH

Wyong mayor Doug Eaton and deputy mayor Bob Graham open the new Bunning Creek Bridge as residents look on.

A selection of media articles about the project


GCC

The Mardi-Mangrove Link is the largest infrastructure investment ever on the Central Coast by a Federal Government and I am proud to have helped deliver this project.

There is nothing more important to a community, an area, a region, than its water supply. We will always understand how true those words are when we remember that at one stage during severe drought conditions, our water storage level was down to around 11 percent.

Before 2007 I knew that this vital piece of water infrastructure was my absolute priority and it was a fight I had to take up and win for the Central Coast.

Craig Thomson MP, Federal Member for Dobell

A long-term solution has been needed on the Coast for decades to guarantee the future of our water supply and I am proud to be part of a Government that acted so decisively to make this important investment.

The Mardi-Mangrove Link has created an effective and sustainable source of water that will service the families and businesses in our community for many years to come and ensure that we are prepared for any challenges that might arise in the future.

We can be sure that the Central Coast has the infrastructure in place to make the most of every drop of rain and to support the growth of our region.

Deborah O'Neill MP, Federal Member for Robertson

Left: Federal Member for Dobell Craig Thomson, and former Federal Member for Robertson Belinda Neal, turning the first sod with Project Director Greg McDonald and the then Mayors Bob Graham (Wyong) and Chris Holstein (Gosford)
Right: Filming the restoration process; Federal Members Deborah O'Neill (Robertson) and Craig Thomson (Dobell) celebrate the half way point with Mayors Doug Eaton (Wyong) and Laurie Maher (Gosford)

The future

The Central Coast water supply currently services a population of 300,000. The population on the Central Coast is predicted to increase to 465,000 by the year 2051. This would place stress on the existing water system.

The Mardi-Mangrove Link was just one activity in *WaterPlan 2050* to secure the long term water supply.

The Mardi-Mangrove Link was selected as it met time and cost criteria and supported other future improvements to the system. It is expected the Mardi-Mangrove Link will go a long way to securing the water supply for the Central Coast for the next four decades.

Other future options include desalination and water recycling.

An aerial view of the Central Coast

This list acknowledges people who are known to have made a contribution to the project throughout planning, design and construction. Due to the large scale of the project there are almost certainly others who played an important role that have been missed. Apologies to these people and thank you to everyone who contributed to making this project a success.

Name	Organisation
Achelles, Mike	Project Team Contractor
Barry, Mary-Ellen	Project Team Contractor
Bryne, Michelle	Project Team Contractor
Butteriss, Crispin	Project Team Contractor
Crozier, Matthew	Project Team Contractor
Hargreaves, Faye	Project Team Contractor
Hayes, Wayne	Project Team Contractor
Jewell, Rod	Project Team Contractor
Lalic, Mick	Project Team Contractor
Le Gros, Phil	Project Team Contractor
Low, Doug	Project Team Contractor
McDermott, Lisa	Project Team Contractor
Meers, Graham	Project Team Contractor
Peacocke, Bob	Project Team Contractor
Purcell, James	Project Team Contractor
Saunders, Janet	Project Team Contractor
Shelley, Paul	Project Team Contractor
Stoney, Simon	Project Team Contractor
Allen, Di	Wyong Shire Council
Best, Michelle	Wyong Shire Council
Brookes, Ken	Wyong Shire Council
Bushnell, Kimberly	Wyong Shire Council
Cashin, Greg	Wyong Shire Council
Clarke, Ian	Wyong Shire Council
Dignam, Stephen	Wyong Shire Council
Fullagar, Ben	Wyong Shire Council
Grantham, Ken	Wyong Shire Council
Glendenning, Brian	Wyong Shire Council
Home, Peter	Wyong Shire Council
Horo, Michelle	Wyong Shire Council
Johnson, Ian	Wyong Shire Council
Kemp, Daniel	Wyong Shire Council
Knight, Debbie	Wyong Shire Council
Long, Mike	Wyong Shire Council
Longobardi, Shannon	Wyong Shire Council
Lynar, Ion	Wyong Shire Council
McDonald, Greg	Wyong Shire Council
Mann, Daryl	Wyong Shire Council
Marchant, Doug	Wyong Shire Council
Pank, Dianne	Wyong Shire Council
Pepperall, Sarah	Wyong Shire Council
Schwartz, Hayley	Wyong Shire Council
Trivers, Cate	Wyong Shire Council
Whittaker, Michael	Wyong Shire Council
Casement, Garry	Gosford/Wyong Councils' Water Authority
Blumenthal, Dena	Gosford City Council
Koizumi-Smith, Brett	Gosford City Council
Low, Megan	Gosford City Council
McCann, Pam	Gosford City Council
Redrup, Michael	Gosford City Council
Weston, Joe	Gosford City Council
Williams, Rod	Gosford City Council
Wilson, Graham	Gosford City Council
Wilson, Peter	Gosford City Council
Adams, Neil	Adams Consulting and Training
Anderson, John	Afton Water
Bishop, Stephen	CBH Survey
Harvey, Ian	CBH Survey
Conacher, Phil	Conacher Environmental Group
Bergs, Martin	Department of Sustainability, Environment, Water, Population and Communities
Elliot, Nicole	Department of Sustainability, Environment, Water, Population and Communities
Ravenscroft, Anna	Department of Sustainability, Environment, Water, Population and Communities
Karm, Enn	Ellis Karm and Associates
Verhoeven, John	Evans and Peck
Mallen-Cooper, Dr Martin	Fishway Consulting Services
Bedford, Nigel	GHD
Hutton, Neville	GHD
Green, Polly	Hays Accountancy and Finance
Ariyan, Brendan	John Holland
Berarducci, Frank	John Holland
Bugarija, Kristo	John Holland
Canao, Tony	John Holland
Carnevale, Tony	John Holland
Cawthorne, Michael	John Holland
Connaughton, Shane	John Holland
Cooney, Kay	John Holland
Crawshaw-Fardouly, Ben	John Holland
Debono, Raymond	John Holland
Derwin, Michael	John Holland
Elizondo, Robert	John Holland
Fender, Gerald	John Holland
Gallon, Paul	John Holland
Gibbins, Amber	John Holland
Greening, Steve	John Holland
Gutierrez, Monica	John Holland
Hawes, Rod	John Holland
Holden, Paul	John Holland
Johnson, Ian	John Holland
Karaban, Ivan	John Holland
Knight, Brent	John Holland
Laughton, Mark	John Holland
McBride, Graeme	John Holland
Mcloskey, John	John Holland
Moloney, Celia	John Holland
Moujoodh, Sarfraz	John Holland
O'Connor, David	John Holland
O'Rooke, James	John Holland
Petith, Troy	John Holland
Ross, Jamie	John Holland
Ruiz, Robert	John Holland
Salem, Sam	John Holland
Santoso, Johnny	John Holland
Smith, Justine	John Holland
Smith, Lane	John Holland
Snape, Michael	John Holland
Sparrow, Paul	John Holland
Stalder, Caleb	John Holland
Sweeney, Nancy	John Holland
Tan, Daniel	John Holland
Thompson, Lynette	John Holland
Toms, Adrian	John Holland
Toms, Rodney	John Holland
Varela, Jose	John Holland
White, Darran	John Holland
White, Liz	John Holland
Wing, Stuart	John Holland
Baldwin, Brian	NSW Public Works
Bradley, Paul	NSW Public Works
Brown, Chris	NSW Public Works
Cruckshank, Andrew	NSW Public Works
Davies, Graeme	NSW Public Works
Henderson, Ron	NSW Public Works
Matuszyk, Dick	NSW Public Works
Mozammel, Abul Kalim Mohammed	NSW Public Works
Plummer, Joshua	NSW Public Works
Radley, Andrew	NSW Public Works
Rainsford, Peter	NSW Public Works
Ward, Geoff	NSW Public Works
Woodham, Gary	NSW Public Works
Fawcett, Tom	Parsons Brinckerhoff
Pearson, Brian	Pearson Beaver Consulting
Squire, Kendall	Tracey Brunstrom and Hammond
Neate, Michael	Trehy Ingold Neate
Roberts, Andy	Umwelt Australia
Grant, Dr Tom	University of NSW
Kliem, Mike	Woodcourt Productions

Left: A Killard crew work to lay pipe on private property

The Mardi-Mangrove Link project has been undertaken by Gosford City and Wyong Shire Councils. The Australian Government has contributed $80.3 million through the Water for the Future Initiative - Water Smart Australia Program to this $120 million project.