



Australian Government

BUILDING OUR FUTURE



An iconic journey

Pacific Highway upgrade 1996-2020



Contents

Aerial view of the
Nambucca Heads to Urunga project

Forewords	5
The long and winding road – history of the Pacific Highway	6
Tragedy sparks next chapter of highway upgrade	12
Pacific Highway upgrade – By the numbers	13
The sections	
<hr/>	
Hexham to Port Macquarie	14
Port Macquarie to Coffs Harbour	22
Coffs Harbour to Ballina	30
Ballina to the Queensland border	38
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Savings lives was driving force behind the upgrade from day one	46
Upgrade leaves behind legacy of innovation	48
Caring for the environment came naturally	50
An upgrade built for the people, by the people	54
Connection to Country at heart of upgrade	56
An economic boost – now and into the future	58
Opportunity knocks for bypassed towns	60
Highway upgrade a game changer for movement of freight	62
Keeping workers safe has been no accident	64
Then and now	66

COVER: The new bridge over the Clarence River at Harwood, built as part of the Woolgoolga to Ballina project

BACK COVER: Sun sets on the new bridge at Harwood

*The Banora Point upgrade
at night in October 2012*



Forewords

Highway upgrade will leave a lasting legacy



The Pacific Highway is an iconic stretch of road. Since it was first sealed in 1958, it has been the key link between Sydney and Brisbane.

It is both a significant freight route, keeping the Australian economy moving, and an important part of many Australian family driving holidays and the stories that go with them.

Boasting almost 660 kilometres of four-lane divided road, travel time along the Pacific Highway has been reduced by more than two and a half hours, and fatal road crashes by more than half.

The Pacific Highway duplication program has been a 25-year long effort and speaks to a very productive partnership between the Australian and New South Wales governments.

Since 2013, the Liberal and Nationals Government has committed more than \$5.64 billion towards the duplication and it has been my pleasure to oversee the past three years of these works as Minister for Infrastructure.

This book provides a history of the highway and the upgrade program, since it began in 1996 and celebrates this story of achievement. It shows what can be done when governments work together to benefit the communities we serve.

A better Pacific Highway means a safer commute for motorists – that’s what we are delivering.

I want to thank every single worker, business and motorist involved – this is a great infrastructure success story.

Michael McCormack
Deputy Prime Minister

Minister for Infrastructure, Transport and Regional Development



The horrific Cowper and Clybucca bus crashes, which happened within months of one another in 1989 and claimed the lives of 56 people, started a

conversation about the need to improve the Pacific Highway to ensure safer journeys for everyone who uses it.

It has taken 31 years to get here, upgrading more than 657 kilometres of road to dual-carriageway, building about 600 bridges, and bypassing more than 30 towns and villages.

It’s delivered a safer, more efficient dual-lane highway from Hexham to the Queensland border.

Since 1996, the NSW and Australian Governments have invested more than \$15 billion to upgrade the Pacific Highway into a world-class highway, fit for the future growth of New South Wales. The multi-generational

project has transformed communities along the North Coast, delivering new opportunities for businesses and tourism and supporting local economies throughout construction.

This book details the journey that we have been on since 1989, the stories of those who worked on the upgrade and the difference it has made to communities all along the New South Wales North Coast.

From the people who have worked on the upgrade over 20 years to the communities that have been transformed, it captures the history of the most significant regional road infrastructure project in our State’s history and the legacy of that project on communities, businesses and individuals.

The Hon. Paul Toole, MP

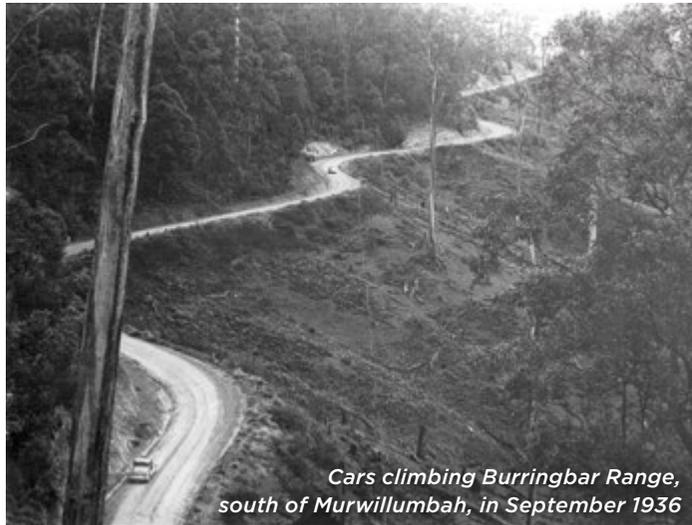
NSW Minister for Regional Transport and Roads

The long and winding road

For almost 100 years the Pacific Highway, originally the North Coast Highway, has provided a vital link between Sydney and the Queensland border. But it hasn't always been the smooth road motorists enjoy today.

Wide rivers and mountain ranges made building roads along the east coast very difficult. In fact, it was not until 1909 that a continuous route, similar to the Pacific Highway, was available between Hexham and Tweed Heads. And even then there were few bridges over the rivers, with crossings being made by ferries.

Following are some of the key dates in the development of the highway up until 1996.



Cars climbing Burringbar Range, south of Murwillumbah, in September 1936

1920s

7 August 1928: proclaimed State Highway No. 10 and named North Coast Highway between Hexham and Tweed Heads

September 1928: opening of deviation and old bridge over Kalang River at Urunga

1929: Ulmarra deviation completed.



Bogged vehicles on the Pacific Highway between Brunswick Heads and Murwillumbah (c1930-31)

1930s

1930s: highway relocated in Taree

1931: opening of bridge over Brunswick River, Mullumbimby

29 May 1931: highway renamed Pacific Highway and extended from Hexham to North Sydney. Route altered to follow direct route between Bangalow and Ewingsdale over St Helena Hill

June 1931: reconstruction between Murwillumbah and Tweed Heads completed

December 1931: opening of bridge over Nambucca River, Macksville

1932: opening of old bridge over Stewarts River

1932: Korora deviation replaced Old Coast Road route between Korora and Moonee Beach

1933: opening of bridge over Lansdowne River, Coopernook

1933: opening of bridge over Dawson River, Cundletown

September 1933: opening of old bridge over Myall River, Bulahdelah

March 1934: Dirty Creek Range deviation (original) completed

December 1934: opening of Boyds Bay Bridge over Terranora Creek, Tweed Heads

March 1935: opening of old Raleigh Bridge over Bellinger River, Raleigh

June 1935: opening of Mororo Bridge over the Clarence River North Arm

1936: Long Cutting deviation, south of Urunga, completed

1936: Five deviations completed in Tintenbar Shire

July 1936: opening of old Barneys Point Bridge over Tweed River, Banora Point

December 1938: Burringbar Range reconstruction completed, including deviation at Billinudgel

1939: Herons Creek deviation completed

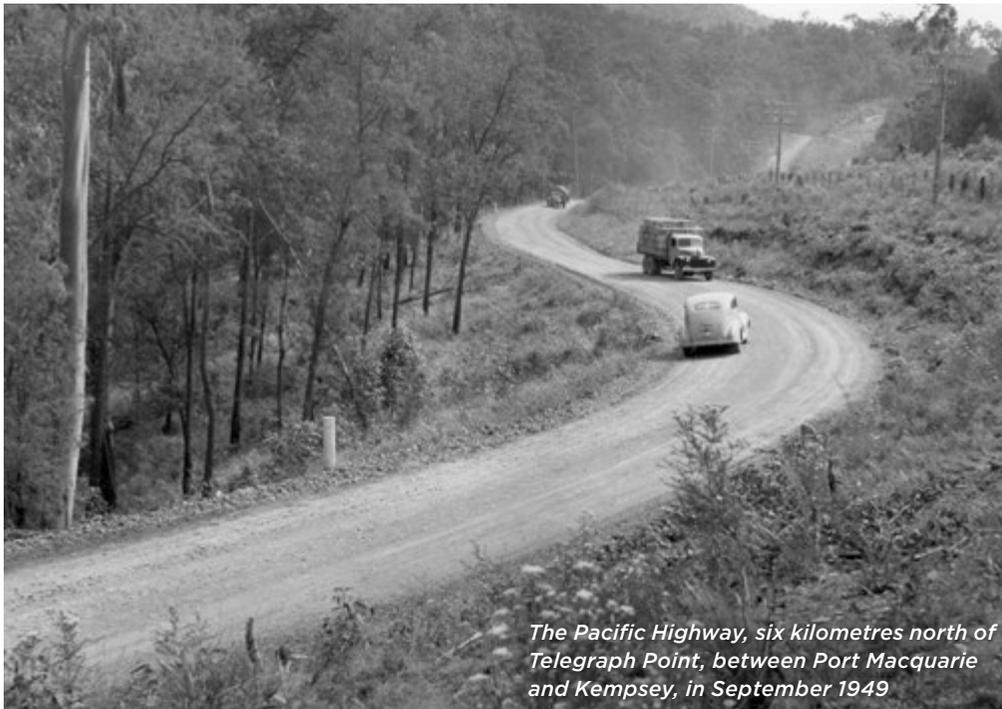
1939: concrete pavement completed between South Grafton and Ulmarra.



The Pacific Highway in September 1949 at Emigrant Creek, south of Newrybar



The Pacific Highway, Tweed Heads, showing the state border crossing at Coolangatta in May 1949



The Pacific Highway, six kilometres north of Telegraph Point, between Port Macquarie and Kempsey, in September 1949



Building waterbound macadam pavement, five kilometres south of Coffs Harbour, in September 1951

1940s

- 1940:** opening of second bridge over Camden Haven River
- 1940:** Bulahdelah to Wang Wauk section constructed
- May 1940:** opening of Martin Bridge over the Manning River, Taree

- March 1945:** route altered between Tyagarah and Billinudgel, passing through Brunswick Heads
- 1949:** reconstruction between Repton and Boambee completed.

1950s

- 1950:** Boambee deviation completed
- June 1950:** Repton bypass completed
- August 1952:** highway re-gazetted between 12 Mile Creek and Taree via Karuah, Bulahdelah and Nabiac
- December 1952:** opening of Hexham Bridge over Hunter River, replacing ferry
- 1953:** deviation at Cassons Creek, north of Corindi Beach, completed
- 1954:** opening of bridge over Brunswick River, Brunswick Heads
- December 1955:** Fernvale deviation completed
- 1956:** deviation on approach to old Shark Creek bridge, near Maclean, completed

- 1957:** deviation north of Woolgoolga completed
- June 1957:** Wang Wauk to Bundacree Creek reconstruction and sealing completed
- December 1957:** opening of bridge over Karuah River, Karuah
- 1958:** Cooperook deviation completed
- 1958:** McGraths Creek deviation, south of Urunga, completed
- April 1958:** Pacific Highway sealing completed
- March 1959:** opening of bridge over Wallamba River, Nabiac
- November 1959:** opening of bridge over Macleay River, Kempsey.

1960s

December 1961: opening of Dennis Bridge over Hastings River and deviation, replacing Blackmans Point Ferry

March 1962: opening of bridge over Balickera Channel

1963: opening of bridge over Ghinni Ghinni Creek, Jones Island

1963: Herons Creek bypass completed

December 1963: opening of Karuah to Bulahdelah reconstruction, completing realignment between 12 Mile Creek and Taree

April 1964: opening of bridge over Richmond River at Wardell and deviation, replacing Burns Point Ferry

1965: deviation on south side of Myall River, Bulahdelah, completed

1965: deviation on southern approach to Macksville completed

May 1965: Woolgoolga deviation completed

1966: realignment through Bulahdelah completed

1966: deviation at Cunninghams Creek, north of Woolgoolga, completed

August 1966: opening of Harwood Bridge over Clarence River South Arm, replacing last remaining ferry crossing on Pacific Highway

1968: Newrybar deviation completed

July 1968: Grahamstown Dam deviation completed

November 1969: opening of bridge over Myall River, Bulahdelah (replaced 1933 bridge).



Widening and realignment at Sextons Hill, Tweed Heads, in June 1964



Concreting during construction of the bridge over the Hastings River, near Port Macquarie, in March 1961

ABOVE: New concrete bridge alongside old low-level bridge at Wootton in February 1960



A dozer and scraper working on highway realignment about 17km from Karuah in August 1960



The Harwood Bridge, seen here under construction, opened in 1966, replacing the ferry



Climbing lanes in the Burringbar Range, 40 kilometres north of Bangalow, in June 1970



Work in progress at Clybucca Flat in June 1976



Construction of the Bellwood deviation, bypassing Nambucca Heads, in February 1979



Construction of the Cooperabung deviation, 22 kilometres south of Kempsey, in November 1974

1970s

1971: deviation at Tabbimoble completed

1971: Korora deviation completed

May 1971: opening of Lower Warrell Creek Bridge

March 1972: opening of Kalang River Bridge, Urunga

1973: Tumbulgum deviation completed

April 1974: opening of bridge over Wilson River, Telegraph Point (replaced 1902 bridge)

June 1974: Newee Creek deviation completed

1975: Telegraph Point to Cooperabung Range deviation completed

1976: Sandy Beach deviation completed

August 1976: reinforced concrete pavement at Clybucca Flat completed

1978: deviation at Two Mile Creek, near Moorland, completed

1978: Cooperabung Range deviation completed

1978: dual carriageways at Oak Ave, near Chinderah, completed.

1980s

1980: completion of multiple deviations at Condong, Eungai, Double Crossing Creek, Corindi Beach

1980: Marshalls Creek reconstruction, Billinudgel, completed

December 1980: Bellwood deviation at Nambucca Heads completed

1982: Kerr Street realignment, Ballina, completed

1982: Tyagarah deviation completed, replacing level crossing

1982: Burringbar railway bridge completed

1983: Eungai railway bridge completed

June 1983: Deep Creek deviation completed

1984: Cooperabung Range deviation completed

1984: deviation at Jacky Bulbin, north of Mororo, completed

1984: Sextons Hill dual carriageway completed

1985: Wedding Bells deviation, south of Corindi Beach, completed

1985: opening of new Boyds Bay Bridge over Terranora Creek, Tweed Heads

July 1985: opening of Tweed Heads bypass stage one

1986: Smiths Creek deviation, Kundabung, completed

1986: Shark Creek bridge and deviation completed

1986: deviation at Devils Pulpit State Forest completed

October 1986: Chatsworth Island deviation completed

December 1986: opening of Wang Wauk River Bridge

March 1987: Dirty Creek Range deviation completed

April 1987: Hexham Bridge duplication completed

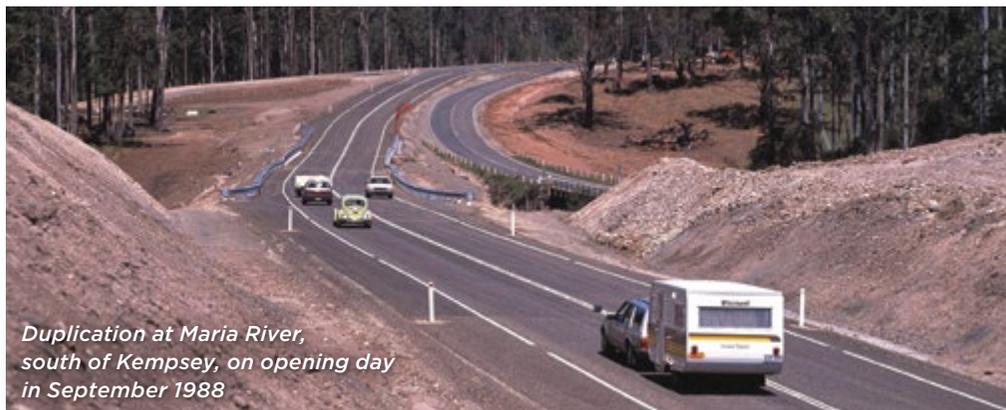
September 1987: reconstruction and realignment just south of Maria River completed

November 1987: Englands Road to Arthur Street duplication, Coffs Harbour, completed

December 1987: Warrell Creek deviation completed

September 1988: Maria River duplication completed

April 1989: deviation from Alipou Creek to Swan Creek, north of Grafton, completed.



Duplication at Maria River, south of Kempsey, on opening day in September 1988



Aerial view of the highway at Condong, north of Murwillumbah, in August 1980. The previous alignment can be seen on the right



Opening day for the dual carriageway at Possum Brush, north of Nabriac, in August 1991

1990s

January 1990: Tomago Road to Masonite Road duplication completed

December 1990: Herons Creek deviation, Ryans Road to 1km north of Oxley Highway, completed

June 1991: Swan Creek duplication completed

August 1991: Possum Brush dual carriageway completed

April 1992: Christmas Creek deviation completed

November 1992: Tweed Heads bypass stage 2 completed

May 1993: Possum Brush dual carriageway extended south to Failford Road and north to Rainbow Flat

June 1993: Cowper deviation completed

November 1993: Herons Creek deviation, Herons Creek to Ryans Road, completed

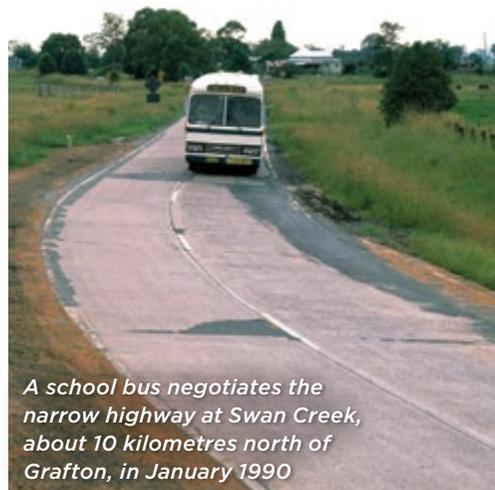
December 1993: Mororo Bridge duplication completed

December 1994: Bangalow bypass (first carriageway)

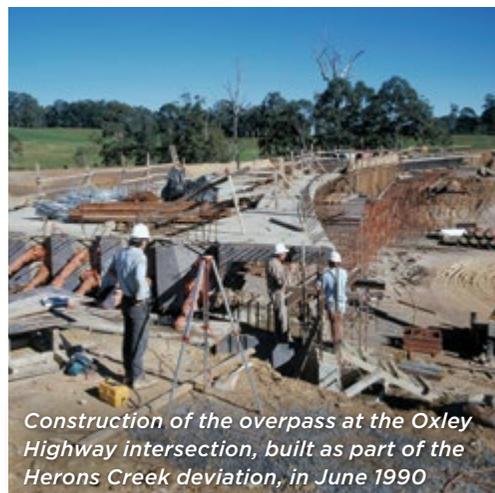
1996: agreement between Australian and NSW governments to duplicate the Pacific Highway between Hexham and the Queensland border.

Source: OzRoads.com

Photos: Transport for NSW library



A school bus negotiates the narrow highway at Swan Creek, about 10 kilometres north of Grafton, in January 1990



Construction of the overpass at the Oxley Highway intersection, built as part of the Herons Creek deviation, in June 1990



View looking along the Tweed Heads bypass construction taken in June 1990

Tragedy sparks next chapter of highway upgrade

"The road was so horrendous that it was rare for a week to go by – or a month – where nobody was killed."

Dr Ray Jones, Cowper first-responder and spokesman for Doctors for a safe Pacific Highway



Prior to the mid-1990s, most of the Pacific Highway from Hexham to the Queensland border was two-lane undivided highway.

This popular route for travellers and freight passed through more than 30 towns and villages and meandered through hilly terrain that prevented B-Double trucks from using the route.

The Pacific Highway had a higher fatality rate than other major highways. An upgrade was required to meet road transport needs between Sydney and Brisbane. There were also safety concerns with heavy vehicles intermingling with holiday traffic, especially through towns. In addition, many of the bridges constrained efficient movement of vehicles, created safety problems and were expensive to maintain.

In 1989, two catastrophic head-on bus crashes occurred near Kempsey and Grafton, two months apart. Fifty-six people were killed and many others were injured in these devastating crashes that impacted so many lives.

These tragedies prompted the coroner to recommend the entire Pacific Highway be upgraded to divided dual carriageway to improve safety on the increasingly busy corridor. By the late 1990s, there were more than 100 head-on crashes and more than 50 fatalities annually.

In 1989, two catastrophic head-on bus crashes occurred near Kempsey and Grafton, two months apart.

In the early 1990s the NSW Government funded a five-year highway improvement program and commissioned a study on the road transportation needs of the Hexham-Queensland coast corridor.

In 1996, an agreement between the NSW and Australian governments was reached for a 10-year program of



The Cowper bus crash in 1989, in which 21 people died, was the first of two major bus crashes creating pressure to upgrade the Pacific Highway

work to upgrade the highway. At this time, the Raymond Terrace bypass and Taree bypass were already underway (opening 1998 and 2000, respectively).

The joint strategy for improving the highway needed to address local community needs, including changes to land use and population growth, and accommodate different types of highway users including freight, tourist, long-distance and local traffic.

The initial joint funding commitment was the first in a series of agreements between the two governments, culminating with the Woolgoolga to Ballina project.

In 1997 the Pacific Highway upgrade program office opened in Grafton, with staff also based in Newcastle, to deliver on the commitment to duplicate the highway between Hexham and the Queensland border.

Pacific Highway upgrade 1996-2020

By the numbers

More than
\$15+ billion
invested over life of program



More than
30
towns and villages bypassed



Final length of
657km
between Hexham and
the Queensland border

More than
100,000
direct and indirect jobs generated
over the life of the program

Travel time cut by about
2hr 30min
between Hexham and
the Queensland border



More than
40
individual projects
delivered

About
600
bridges built



More than
9000
hectares of high-value
native vegetation protected
through biodiversity offsets



Hexham to Port Macquarie

The upgrade between Hexham and the Oxley Highway at Port Macquarie was completed to four-lane divided carriageway in 2012 and consisted of 16 projects.



Projects delivered

- 1 Raymond Terrace bypass**
Opened to traffic December 1998
- 2 Raymond Terrace to Karuah**
Opened to traffic December 2000
- 3 Karuah bypass**
Opened to traffic September 2004
- 4 Karuah to Bulahdelah (section 1)**
Opened to traffic December 2006
- 5 Karuah to Bulahdelah (sections 2 and 3)**
Opened to traffic October 2009
- 6 Bulahdelah upgrade**
Opened to traffic June 2013
- 7 Bulahdelah to Coolongolook**
Opened to traffic October 1999
- 8 Coolongolook to Wang Wauk**
Opened to traffic July 2001
- 9 Wang Wauk to Bundacree Creek**
Opened to traffic December 1998
- 10 Bundacree Creek to Possum Brush**
Opened to traffic November 2006
- 11 Taree bypass**
Opened to traffic May 2000
- 12 Taree to Coopernook**
Opened to traffic August 2005
- 13 Coopernook bypass**
Opened to traffic March 2006
- 14 Coopernook to Herons Creek**
Opened to traffic July 2010
- 15 Herons Creek to Stills Road**
Opened to traffic September 2013
- 16 Herons Creek duplication**
Opened to traffic July 1998



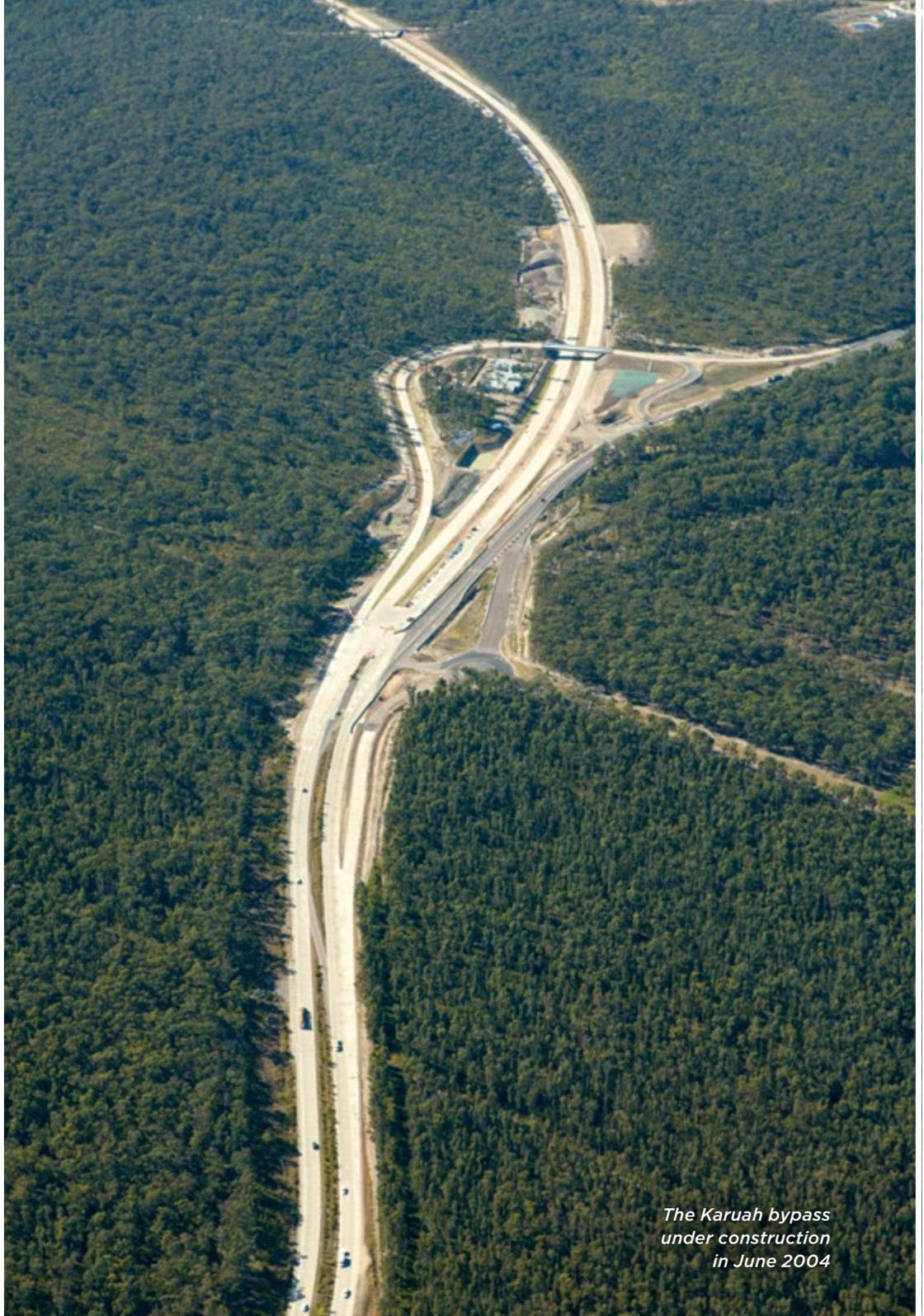
Aerial view, looking south, of the Bulahdelah upgrade in July 2013



The Pacific Highway at Nabiac, built as part of the Bundacree Creek to Possum Brush project

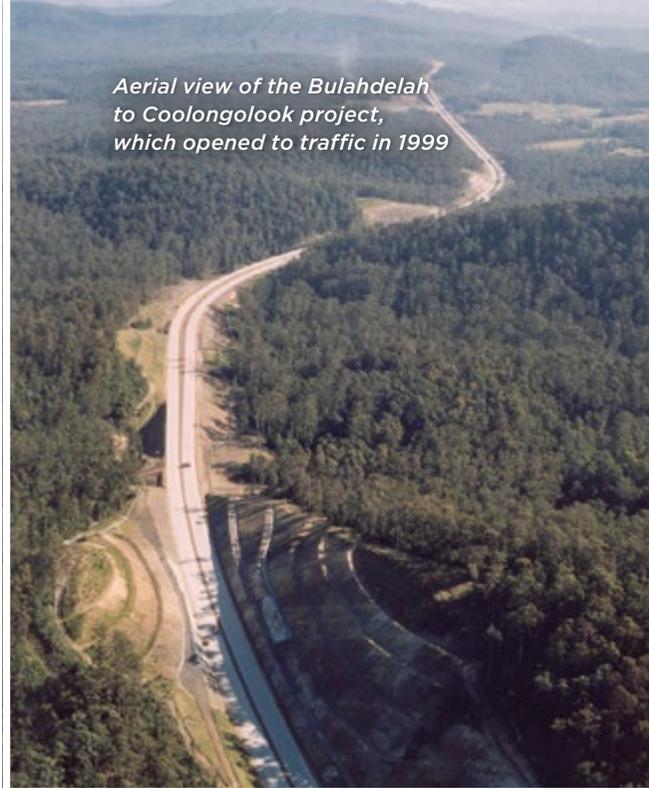


An aerial view of the Raymond Terrace bypass, which opened to traffic in 1998

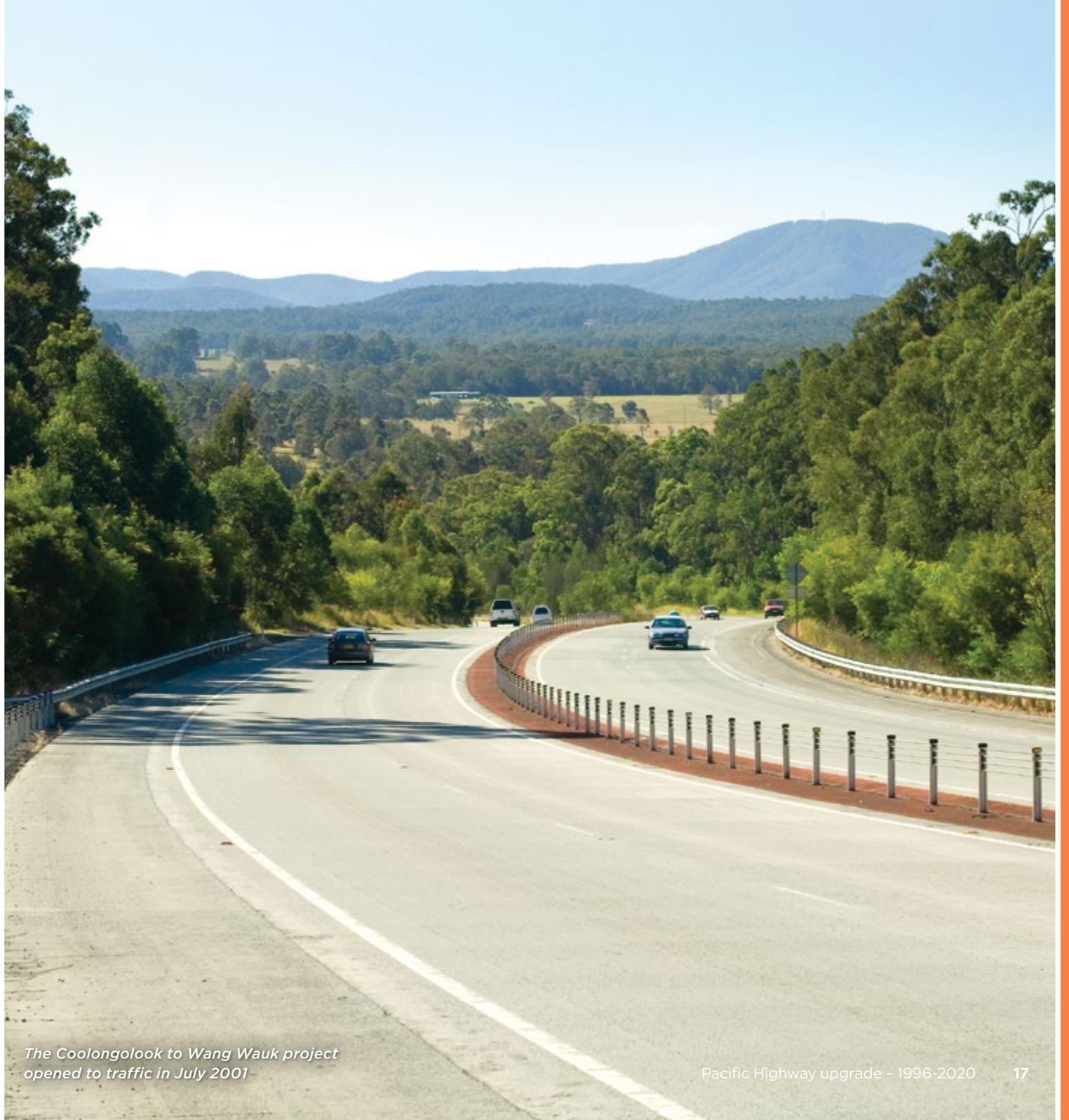
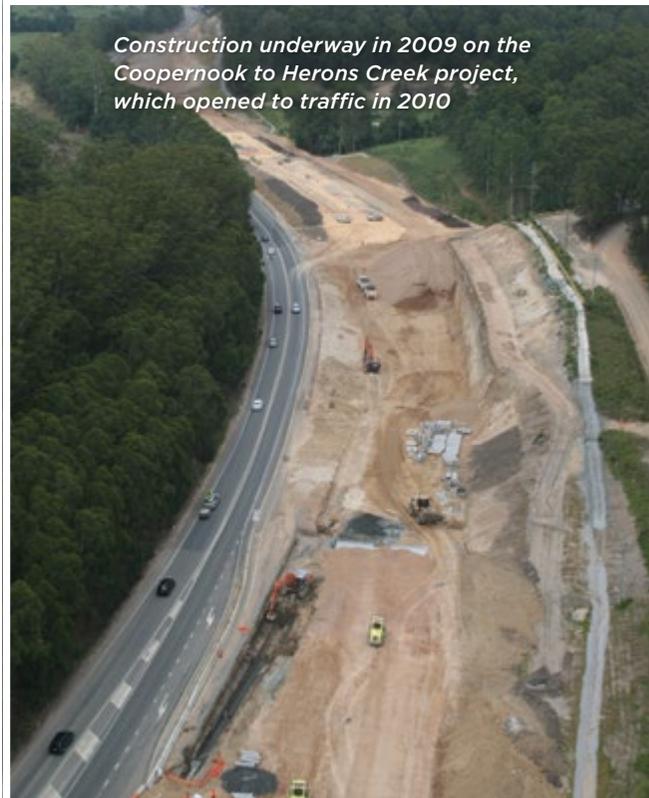


The Karuah bypass under construction in June 2004

Aerial view of the Bulahdelah to Coolongolook project, which opened to traffic in 1999



Construction underway in 2009 on the Coopernook to Herons Creek project, which opened to traffic in 2010



The Coolongolook to Wang Wauk project opened to traffic in July 2001





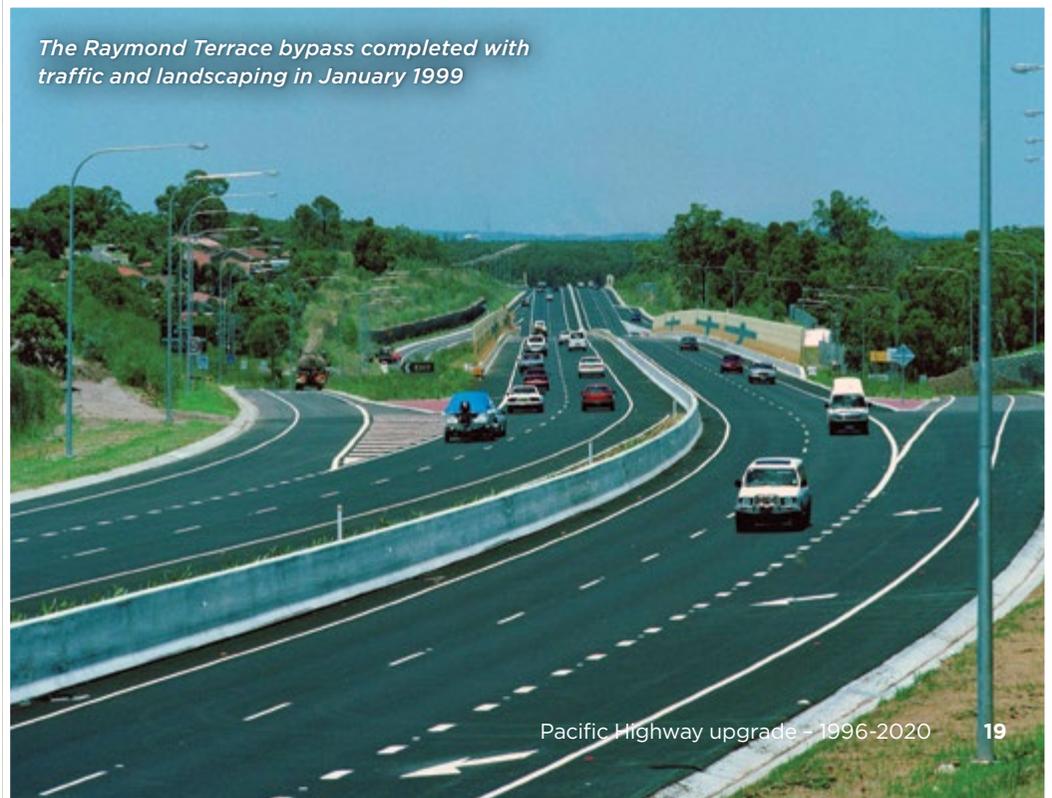
The Raymond Terrace to Karuah project opened to traffic in 2000



Aerial view of the Bundacree Creek to Possum Brush project under construction



The Karuah to Bulahdelah project after opening to traffic in December 2006



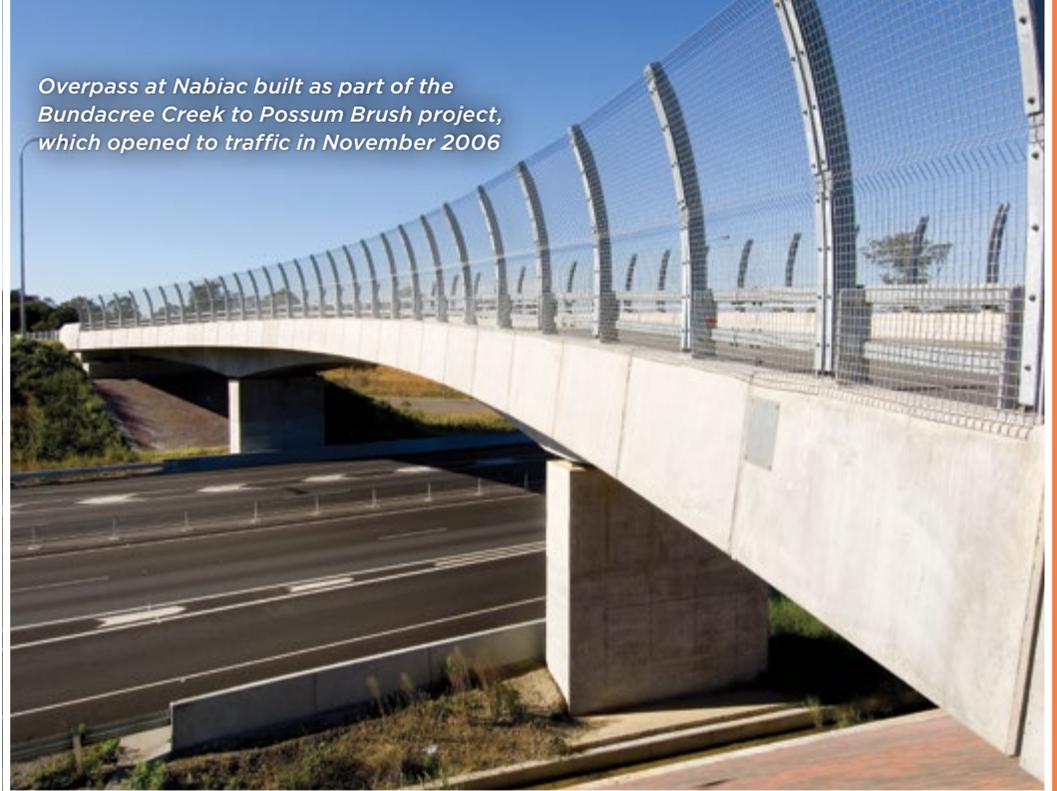
The Raymond Terrace bypass completed with traffic and landscaping in January 1999



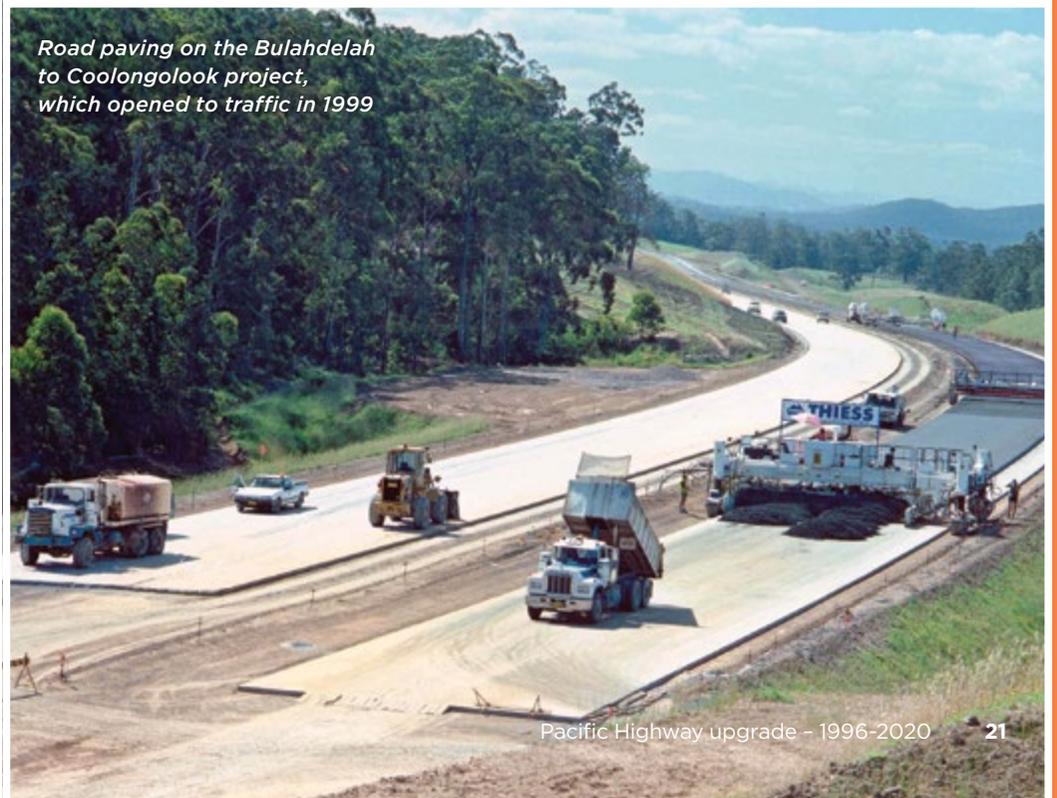
Construction of the bridge over the Karuah River and wetlands. This project passes through beautiful natural landscapes



Overpass at Nabitac built as part of the Bundacree Creek to Possum Brush project, which opened to traffic in November 2006



Road paving on the Bulahdelah to Coolongolook project, which opened to traffic in 1999



Port Macquarie to Coffs Harbour

The upgrade between Port Macquarie and Coffs Harbour was completed to four-lane divided carriageway in 2018 and consisted of 12 projects.



145 kilometres
in length



147 bridges



\$4.5 billion
total cost, funded by
the Australian and
NSW governments



17 interchanges



30+ minutes
reduced travel time



7 rest areas



Projects delivered

- 1 Sancrox interchange**
Opened to traffic November 2015
- 2 Oxley Highway to Kundabung**
Opened to traffic in two stages -
November 2017 and March 2018
- 3 Kundabung to Kempsey**
Opened to traffic September 2017
- 4 Kempsey bypass**
Opened to traffic March 2013
- 5 Fredickton to Eungai**
Opened to traffic May 2016
- 6 Eungai duplication**
Opened to traffic March 1999
- 7 Warrell Creek to Nambucca Heads**
Opened to traffic in two stages -
December 2017 and June 2018
- 8 Nambucca Heads to Urunga**
Opened to traffic July 2016
- 9 Raleigh deviation**
Opened to traffic September 1998
- 10 Bonville upgrade**
Opened to traffic September 2008
- 11 Lyons Road to Englands Road**
Opened to traffic May 2001
- 12 Bray Street to Arthur Street**
Opened to traffic August 2000



At 3.2 kilometres, the Macleay Valley Bridge, built as part of the Kempsey bypass project, is the longest bridge in Australia



Looking south between Kalang and Martells Road on the Nambucca Heads to Urunga project in 2014



The Raleigh deviation opened to traffic in September 1998



Built as part of the Oxley Highway to Kundabung project, the bridge over the Hastings River is almost 600 metres long



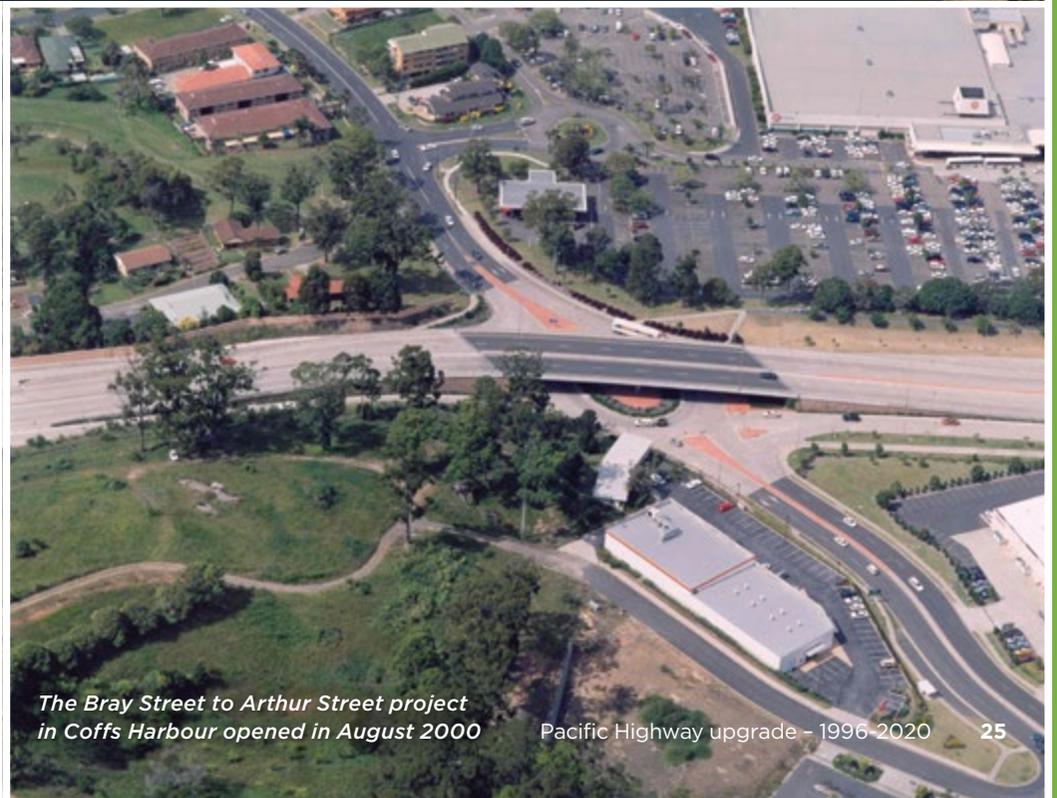
Aerial view of the final girder being placed on the Phillip Hughes Bridge over the Nambucca River



The completed Phillip Hughes Bridge prior to opening in December 2017



Work underway in 2016 on the bridge over the Hastings River as part of the Oxley Highway to Kundabung project



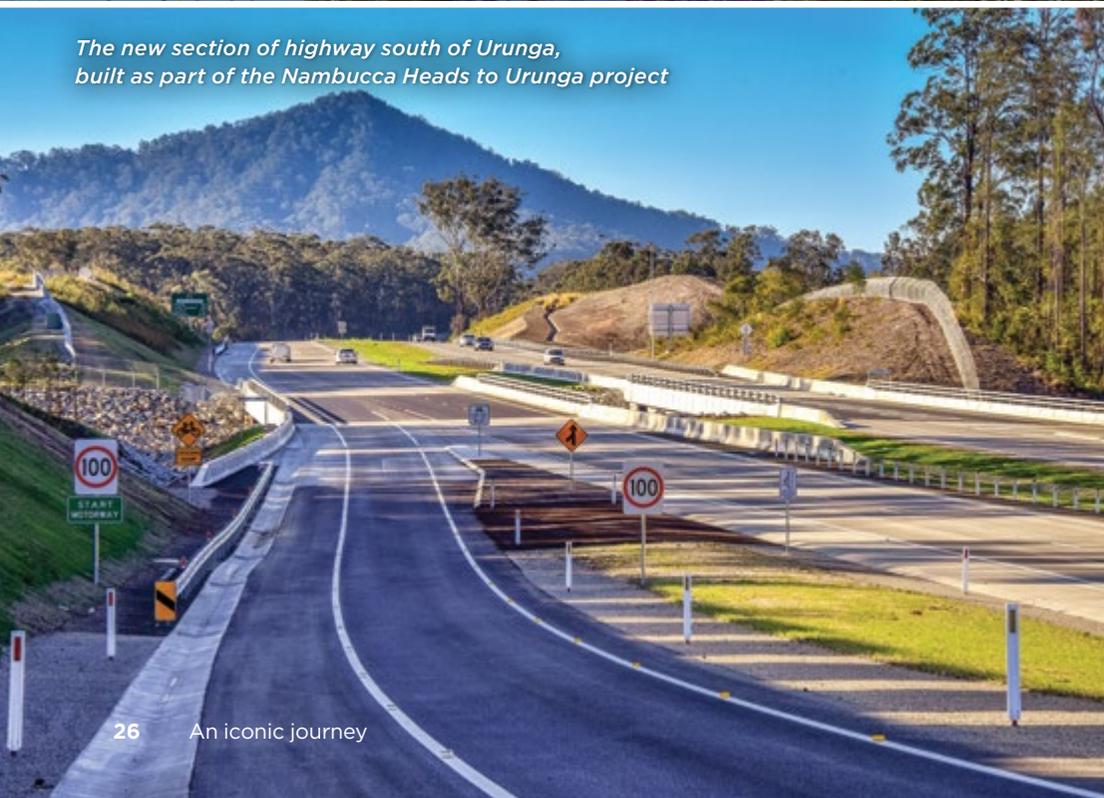
The Bray Street to Arthur Street project in Coffs Harbour opened in August 2000



Pouring concrete for the bridge over the Nambucca River in July 2016 on the Warrell Creek to Nambucca Heads project



Earthwork being carried out in Newry State Forest during 2014 as part of the Nambucca Heads to Urunga project



The new section of highway south of Urunga, built as part of the Nambucca Heads to Urunga project



The Frederickton to Eungai upgrade in July 2016. The project opened in May that year

*Aerial view, looking north,
of the section of highway near Valla*





Looking south towards the interchange at Waterfall Way, built as part of the Raleigh deviation



Bridge piling south of the Kalang River in 2014 on the Nambucca Heads to Urunga project



Construction activity on the Warrell Creek to Nambucca Heads project, looking north at Cockburns Lane



The Bonville upgrade opened to traffic in September 2008



The Warrell Creek bridge pad looking north from Bald Hill in July 2015



Aerial view of the Clybucca rest area, built as part of the Frederickton to Eungai project

Coffs Harbour to Ballina

The upgrade between Coffs Harbour and Ballina was completed to four-lane divided carriageway in 2020 and consisted of six projects.



204 kilometres in length



198 bridges



\$6 billion total cost, funded by the Australian and NSW governments



17 interchanges



30+ minutes reduced travel time



7 rest areas



Projects delivered

- 1 Korora Hill duplication**
Opened to traffic in December 1997
- 2 Sapphire to Woolgoolga**
Opened to traffic in July 2014
- 3 Woolgoolga to Ballina**
Opened to traffic in stages:
 - 2017 (26km)
 - 2019 (8km)
 - 2020 (121km)
- 4 Glenugie upgrade**
Opened to traffic September 2012
- 5 Devils Pulpit**
Opened to traffic in March 2014
- 6 Pimlico to Teven**
Opened to traffic in May 2016



The Pacific Highway bypass of Broadwater

*The Sapphire to Woolgoolga project
opened to traffic in 2014*



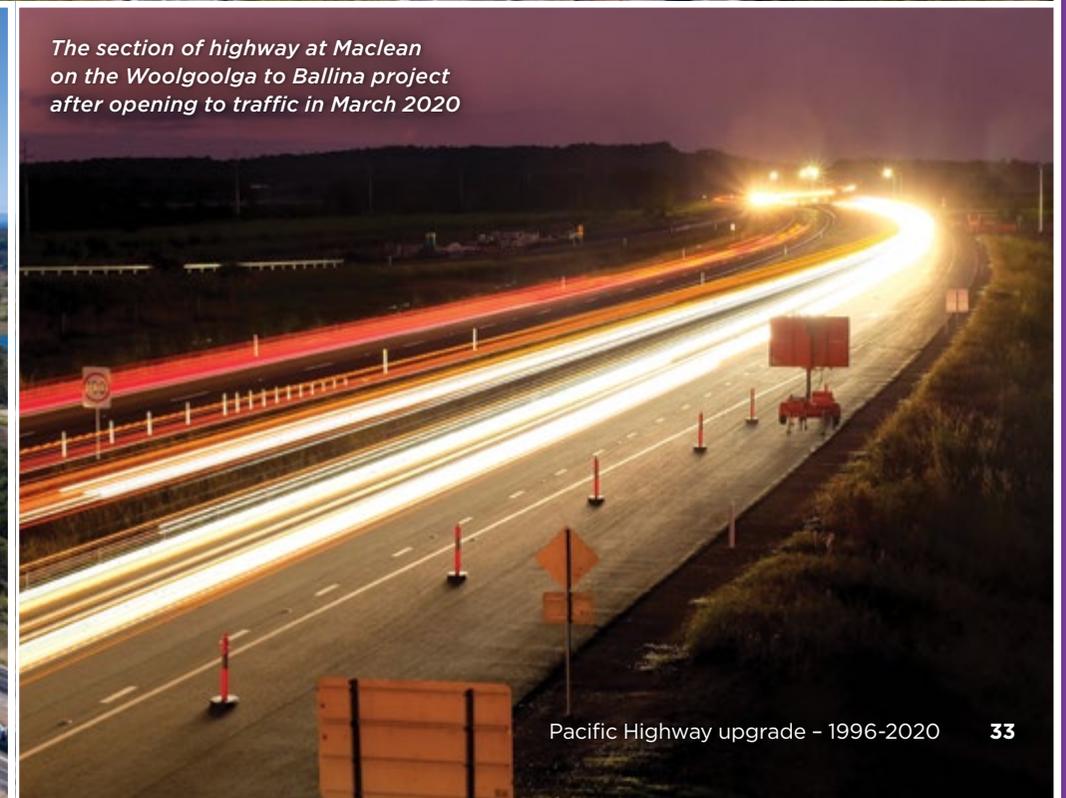
Aerial view of the Illuka interchange in July 2020



The Maclean interchange after opening to traffic in September 2020



The section of highway at Maclean on the Woolgoolga to Ballina project after opening to traffic in March 2020





Bridges built over Emigrant Creek, south of Ballina, in July 2019



Aerial view of the bridges over the Coldstream River in May 2020



The new bridge over the Richmond River at Broadwater





View of Tyndale, looking south, after opening in May 2020



The Pine Brush rest areas in May 2020, built as part of the Woolgoola to Ballina project



Aerial view of work underway on Dirty Creek Range in 2015 on the Woolgoola to Halfway Creek section



The Devils Pulpit project under construction in August 2013



Work underway on the Woolgoolga to Halfway Creek project in July 2016



Looking south to the Emerald Beach north interchange at Sandy Beach, April 2014

Ballina to the Queensland border

The upgrade between Ballina and the Queensland border was completed to four-lane divided carriageway in 2015 and consisted of 11 projects.



91 kilometres in length



119 bridges



\$2.7 billion total cost, funded by the Australian and NSW governments (this includes the \$543 million Tugun bypass, which was funded by the Queensland and Australian governments)



15 interchanges



6 rest areas



45 minutes reduced travel time



Projects delivered

- 1 Ballina bypass**
Opened to traffic in May 2012
- 2 Tintenbar to Ewingsdale**
Opened to traffic in December 2015
- 3 Ewingsdale interchange**
Opened to traffic in December 2000
- 4 Ewingsdale to Tyagrah**
Opened to traffic in October 1998
- 5 Tandys Lane realignment**
Opened to traffic in December 2001
- 6 Brunswick Heads bypass (stage one)**
Opened to traffic on June 1998
- 7 Brunswick Heads to Yelgun**
Opened to traffic in July 2007
- 8 Yelgun to Chinderah**
Opened to traffic in August 2002
- 9 Chinderah bypass**
Opened to traffic in November 1996
- 10 Banora Point upgrade**
Opened to traffic in April 2012
- 11 Tugun bypass**
Opened to traffic in June 2008



The Ballina bypass opened to traffic in August 2012

*The Environ Road overpass,
built as part of the
Yelgun to Chinderah project*



*Work outside the
St Helena tunnel
in January 2014*



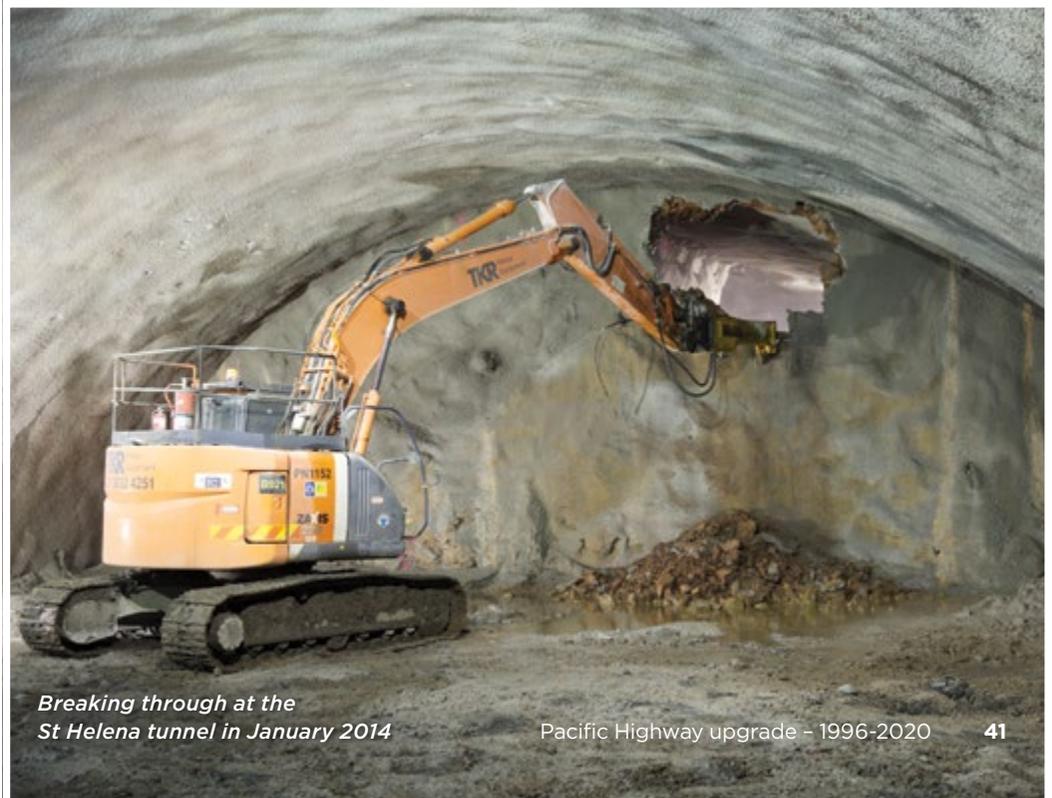
*Bridge work on the Tintenbar to Ewingsdale project
looking south over Byron Creek in October 2013*



Aerial view of new twin bridges over Minor and Emigrant creeks in 2015



Cyclists using the overpass at Billinudgel, built as part of the Brunswick Heads to Yelgun project



Breaking through at the St Helena tunnel in January 2014

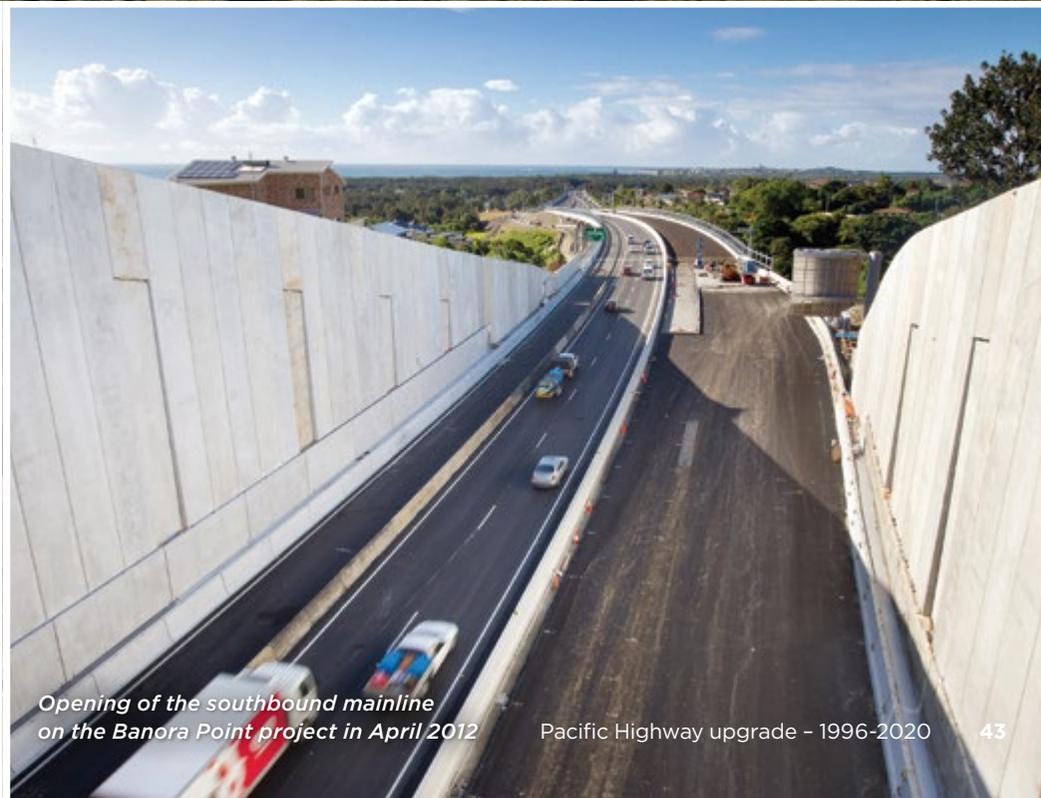




The Brunswick Heads to Yelgun project after opening to traffic in July 2007



Work on the main cutting on the Banora Point upgrade in December 2011



Opening of the southbound mainline on the Banora Point project in April 2012



Aerial view of the northern section of the Ballina bypass, which opened to traffic in May 2012



Steel reinforcements ready and in place for road pavement along the southbound carriageway at Bangalow in December 2014



The Cudgen tunnel, built as part of the Yelgun to Chinderah project



The Tugun bypass tunnel opened to traffic in 2008



Aerial view of the Banoria Point upgrade during the community day in September 2012

Saving lives was driving force behind the upgrade from day one

The team delivering the upgrade program never lost sight of the main objective – making the Pacific Highway safer for the millions of people who drive it each year.

While only one-third of people live in regional NSW, two-thirds of all fatal crashes occur in regional areas.

The fatality rate in regional NSW is more than four times higher than in metropolitan areas. Road crashes, injuries and deaths impact whole communities, and negatively affect many – those involved in the crash, their family and friends, rescue and emergency services workers, doctors and nurses, and everyone who lives or works on or near the highway.

When the upgrade program started in 1996, more than 40 people were dying on the Pacific Highway each year.

In the years immediately after the upgrade started, there were years when more than 50 people died on the highway.

It took time, but as the upgrade progressed and more and more sections of dual-lane highway opened to traffic, the number and severity of crashes began to fall.

Since 1996 the Pacific Highway upgrade, along with a number of interim safety

improvements to the existing highway, led to a substantial reduction in fatal and injury crashes. This was achieved despite an increase in the volume of traffic using the highway in the corresponding period.

As the graph shows, fatalities on the Pacific Highway have significantly reduced since the upgrade began in 1996.

With the entire route now upgraded to four-lane divided highway, it is expected that over a 30-year period, 8039 crashes, 4218 injuries and 3255 non-injury accidents will be avoided and 565 lives saved.

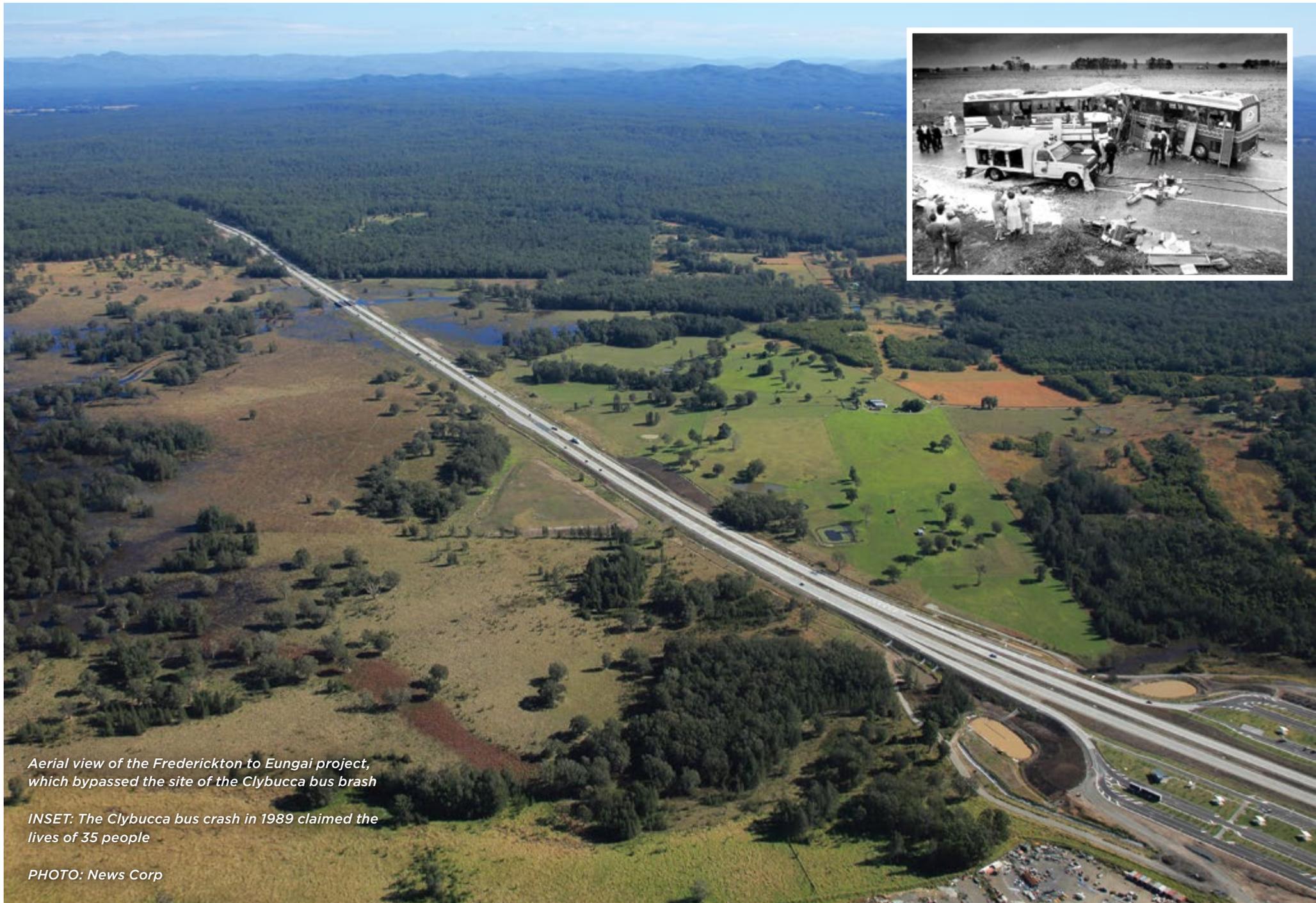
Achieving a more than 70 per cent reduction in fatalities because of the divided road is a statistic of immense importance for the team delivering the Pacific Highway upgrade program.

While the safety improvements since 1996 have been significant, every life lost on our roads is one too many. It is for this reason Transport for NSW will continue to work towards the goal of zero fatalities.

A safer highway

Fatalities on the Pacific Highway between Hexham and the Queensland border since the start of the upgrade program in 1996





Aerial view of the Frederickton to Eungai project, which bypassed the site of the Clybucca bus crash

INSET: The Clybucca bus crash in 1989 claimed the lives of 35 people

PHOTO: News Corp

Upgrade leaves behind legacy of innovation

For more than two decades the Pacific Highway program office has found ways to overcome a unique set of challenges and constraints to deliver a world-class highway.



Placing girders for the bridge over the Clarence River at Harwood

The highway upgrade was delivered by an experienced, dedicated and innovative team. While the office and upgrade staff were based primarily out of Grafton, the team comprised talented people up and down the length of the upgrade from Hexham to the border.

In delivering the program, the upgrade team developed a mindset of innovation and achievement.

Not singularly focused on time and cost, the Pacific Highway upgrade team consistently looked to provide public value in the delivery of each project. This focus on public value meant the upgrade team never lost sight of the fact the upgraded Pacific Highway needed to service the needs of the travelling public, while also achieving transport efficiencies, ensuring ecological sustainability and meeting the needs of the communities who live alongside the highway.

The long duration and pipeline of projects delivered along the Pacific Highway corridor allowed continuous learning and

the opportunity to try new ideas and develop them into the new benchmark.

The Pacific Highway upgrade program led the way in project delivery at Transport for NSW (TfNSW). A number of processes and procedures that started on the program were later rolled out across other TfNSW programs. Some of these innovations included:

- Internal alliances
- Construction management plan templates
- Bridge design and construction
- Design guidelines.

This is not to mention the numerous innovations in the areas of environment and safety.

The innovation achieved by the upgrade team was made possible by the highest level of executive support to make decisions about the best way to deliver projects with a range of challenges.

One of the successes of the program was the willingness of industry and our delivery partners to roll up their sleeves and work collaboratively with the team on all elements of project delivery through early planning, construction, stakeholder engagement, environmental compliance and safety.

The delivery of the Pacific Highway upgrade program was paralleled by increasing sophistication in the contractual relationships and has fostered a growing appetite and appreciation for partnership and innovation (see fact box).

Relationships were at the core of each contract model, relationships built on respect, trust, collaboration and an awareness of the skills and expertise available to TfNSW from private sector infrastructure providers. A program of this scale and ambition generated an array of engineering challenges.

The long duration and pipeline of projects delivered along the Pacific Highway corridor allowed continuous learning and the opportunity to try new ideas and develop them into the new benchmark

For example, the program delivered the first elevated roundabout interchange in the Southern Hemisphere and the longest road bridge in Australia at Kempsey, which spans 3.2 kilometres.

Soft soils have also caused many challenges and required engineering innovation to overcome. Highway and engineering standards changed over the 25 years of the upgrade program, requiring flexibility and adaptability on the part of the upgrade team.



Aerial view of soft soil work underway on the Woolgoolga to Ballina project in February 2016

Innovative partnerships

The following contract models were used to deliver the Pacific Highway:

Construct only: the traditional way of road construction. TfNSW provides a detailed design and tenders are invited for a separate construct-only contract. The majority of the projects in the Hexham to Port Macquarie section were built by construct only contracts.

Design, construct, maintain: structured like a standard design and construct arrangement except the contractor is also responsible for post-construction maintenance for a designated time period (usually 10 years). The first DCM project contracted out by TfNSW was the Bulahdelah to Coolongolook project.

Alliance: collaborative arrangements to deliver a road infrastructure project with decisions made on a 'best for project' basis. An Alliance is used for projects with high risks or those difficult to scope and are technically challenging. The first project on the Pacific Highway to use an Alliance for delivery was Cooperook to Moorlands in 2007.

Design and construct: used for higher cost and more complex projects. The contractor is engaged to design and construct the project work based on a design brief supplied by TfNSW. This model was adopted following collaboration with industry. Sapphire to Woolgoolga was the first project delivered under this model.

Delivery Partner: used to deliver the London Olympics, this model was used to deliver the 155km Woolgoolga to Ballina upgrade. The model involved embedding TfNSW staff in the integrated delivery team. The contractor, on behalf of TfNSW, oversaw delivery and procured contracts to directly engage skilled sub-contractors and suppliers.

Caring for the environment came naturally

The Pacific Highway traverses some of the most diverse ecological areas on the east coast and for this reason, the environment was front of mind for the team delivering the upgrade.

Given these important environmental considerations, one of the key objectives of the upgrade program was to manage the delivery of this vital piece of infrastructure with ecologically sustainable development principles.

To meet this challenge, the team adopted an 'avoid, minimise and mitigate' strategy for managing environmental impacts. During the almost quarter century of the upgrade program, more than 100 different threatened species were identified, and the project team developed and implemented a vast array of innovative design and management measures to build a highway through diverse ecological areas.

The project team always looked for ways to improve designs and management measures to minimise environmental impacts, including:

- Preserving the native orchid, *rhizanthella slateri*, on the Bulahdelah upgrade
- Modifying culvert designs to improve

functionality for native fauna movement

- Installing artificial hollows within existing trees
- Modifying bridge and culvert designs to create habitat for threatened microbat species
- Implementing long life (>30 year) design life nest boxes in habitat adjacent to the Pacific Highway
- Repurposing tree root balls salvaged from clearing to be used in waterway rehabilitation projects in conjunction with local Landcare groups and the National Parks and Wildlife Service
- Salvaging and relocating native beehives prior to clearing
- Implementing innovative erosion and sediment controls, which were recognised as industry best practice.

For close to two decades the project team carried out translocation of threatened flora prior to any mainline clearing. This translocation work substantially contributed to the scientific knowledge and improved scientific

community understanding on the ecology of threatened plant species.

Continual learning

The environment team, in collaboration with colleagues from the upgrade program office, focused on building relationships with contractors and stakeholders to ensure the value of the environment function was understood, and everyone worked together to deliver outcomes that minimised our environmental impacts, saved money and enhanced the reputation of TfNSW.

With the successful delivery of each project, the team developed robust processes and procedures that helped deliver superior outcomes as the program progressed.

For example, the construction management plan for the Woolgoolga to Ballina project was approved in only three months by the Department of Planning, Industry and Environment – almost unheard of in the industry for a project of its size and complexity.



A rufous bettong found on a biodiversity offset property

The culture of adding value and working together helped the Pacific Highway upgrade program win 25 external awards from best practice in ecology and transportation through to numerous awards in environmental management and sustainability.

Staying connected

Animal protection was also an important consideration.

Throughout the life of the program, fauna connectivity structures were built and monitored. The fauna structures protect wildlife, allow animals to safely cross over and under the highway, and lets them move freely through habitats to access food, water and mates.

Monitoring our animal connectivity structures for more than 20 years provided evidence they do work, with TfNSW designs at the leading

edge of animal connectivity measures in Australia.

Along the route, 'soft scour' treatments, incorporating native vegetation, have been installed at culverts to encourage the movement of animals under the highway. Elevated animal crossings have been installed and streams re-formed and landscaped for fish passage.

In the north, the protection of local koala populations was a key challenge. The Ballina Koala Plan was prepared as part of the Woolgoolga to Ballina project in response to better understand the potential impacts on the koala population. The plan outlined appropriate mitigation measures, such as 'closed fencing' in conjunction with koala grids along the highway, integrated predator control program and the planting of 130 hectares of koala habitat next to the highway alignment on previously cleared land.



Fauna land bridge built as part of the Bonville upgrade, south of Coffs Harbour



Coastal emus found on a biodiversity offset property

Biodiversity offsets

The biodiversity offset program adopted for the upgrade program has also been a success story.

Offset properties provide habitat for a huge range of threatened animals, including but not limited to koalas, spotted-tail quolls, giant-barred frogs, wallum sedge frogs, green-thighed frogs, squirrel gliders, yellow-belly gliders, glossy black cockatoos, oxleyan pygmy perch and the coastal emu population.

The Pacific Highway upgrade program has secured more than 9000 hectares of high-value native conservation

habitat in meeting its biodiversity offset obligations. TfNSW converted previously degraded cane land into what is now very high conservation habitat, including the creation of the Teven Wetlands, which supports bird diversity rivalling the Macquarie Marshes.

Under the offset program TfNSW successfully secured critically endangered ecological communities, such as littoral rainforest.

On the Woolgoolga to Ballina project, the 3600-hectare biodiversity offset was the largest offset program ever delivered by TfNSW and one of the largest in NSW.



A giant barred frog found on one of the upgrade program's biodiversity offset properties



A combined fauna culvert

Fast facts

- More than **480km** of fauna fencing installed
- More than **300** fauna connectivity structures built
- More than **600 nest boxes** installed
- More than **9000 hectares** of high-value native vegetation protected through biodiversity offsets.
- More than **20 years** of ecological monitoring undertaken, capturing learnings and applying to new projects.



*Large sections of the highway
have been built in sensitive environments*

An upgrade built for the people, by the people

At its core, the Pacific Highway upgrade program was delivered for the community - local communities along the highway, as well as the wider community in NSW and across Australia who use the highway to travel for work, education or leisure.

Ensuring the community was heavily involved in the delivery of the program was one of the key tasks of the delivery team.

Communities were involved in the program every step of the way, from route identification and selection, to operation of new sections of highway.

Community consultation was a vital source of local knowledge and provided an educational role when choosing options for projects. It often helped project teams better understand how people may be affected by proposals and the conflicting views of the community. The challenge was trying to manage community expectations with delivery.

While almost everyone in the community supported building a safer and more efficient highway, project teams often had to balance competing priorities among different pockets of the community when it came to route selection and access.

Route selection was a particularly challenging element of the upgrade. Project teams spent a significant amount of time working with all the various stakeholders, internal and external, during the route selection process. Teams worked closely with landowners to understand their concerns and aim to find solutions to help them when a route option passed through or near their property.



Community engagement was a key feature of every project delivered on the Pacific Highway upgrade

To meet this challenge, the project team embraced the concept of public value. This proved to be a delicate balancing act at times. Where possible, decisions were made taking into consideration the best outcome for the community and the project.

One example of this commitment to delivering public value and considering the needs of the community in decision making was the option to build tunnels for the new highway at St Helena, instead of duplicating the existing highway alignment across St Helena Hill.



Thousands of people took the opportunity to talk on the Kempsey bypass bridge in 2013 prior to it opening to traffic

During the development of the route alignment and environmental impact assessment for the section of highway between Bangalow and St Helena, the community expressed significant concerns about the upgraded highway following the existing alignment over St Helena Hill due to a history of slope instability and noise from trucks using compression braking due to the steep eight per cent grade of the alignment. As a result of these concerns, TfNSW revisited the route alignment and developed an alternative route that included twin tunnels through St Helena Hill. While this route was more expensive to build, it returned good economic

benefits by shortening the length of the highway, reducing the grade to a maximum of four per cent, and removing all at-grade access and egress to the highway.

Of course route selection was sometimes just the start of community interaction.

Communities along the route were often heavily impacted during construction and working closely with those people, as well as those with a strong interest in projects, was an important part of delivery.

Electronic correspondence was new to the workforce when the Pacific Highway



Lions Club volunteers at the Banora Point community day

upgrade program started, but in a very short time changed the way the project teams did business. For example, the Bulahdelah to Coolongolook project, which opened in 1999, was the first on the Pacific Highway to use email as the primary method of communication.

Technology advanced rapidly during the life of the upgrade program and changed the way TfNSW interacts with the community. While these changes proved to be highly effective for motivating participation, the upgrade team still had to cater for those people without access to technology. For this reason a mix of technology-based and conventional engagement activities,

such as face-to-face community information sessions, were utilised on all projects to keep communities engaged and informed. Of course, towards the latter stages of the upgrade program social media played a critical role in community engagement.

Celebrating the opening of new sections of road has been one of the highlights of the Pacific Highway program. These celebrations, often in the form of a community day during which members of the public can walk on the new alignment, have been TfNSW's way of thanking communities for their support and patience during projects.

Connection to Country at heart of upgrade

The Aboriginal communities of the North Coast played a key part in the development, delivery and successful completion of the Pacific Highway upgrade program.

Aboriginal engagement in cultural heritage impact assessment and participation in the delivery of construction contracts was an integral element of successfully delivering the Pacific Highway upgrade program.

Between Hexham and the Queensland border the Pacific Highway passes through the traditional estate of at least seven Aboriginal language groups. Over almost a quarter of a century we have worked with Aboriginal communities during the delivery of each project to ensure impacts on Aboriginal cultural heritage were minimised.

The Pacific Highway upgrade program was committed to supporting employment of Aboriginal people. TfNSW recognises the benefits employment brings to an individual and the flow-on effect it can have on their family and their community. The Pacific Highway program office and its contractors worked closely with institutions like North Coast TAFE to attract, train and place Aboriginal



Aboriginal dancers perform at a NAIDOC Week celebration at the Pacific Highway office in Grafton

workers. Aboriginal participation in the project workforce approached 20 per cent on some of the highway projects delivered during the life of the program.

There are many examples over the course of the upgrade program where TfNSW worked closely with Aboriginal communities to develop solutions

to complex engineering and cultural landscape management issues. The two-way sharing of knowledge helped to build the cultural capability of TfNSW staff, ensure Aboriginal interests were respected and further developed Aboriginal community experience in civil construction.

At the peak of the 155-kilometre Woolgoolga to Ballina project, 281 (or nine per cent) of the 3300 strong project workforce identified as an Aboriginal person.

In addition, eight per cent of the Aboriginal or Torres Strait Islander workers had cultural associations with the Gumbaynggirr, Yaegl and Bundjalung people.

Aboriginal people performed a broad range of roles on the Woolgoolga to Ballina project, paving the way for a new generation of skilled workers and business owners and exceeded targets set under the NSW Government's Aboriginal Participation in Construction (APiC) policy.

The Aboriginal community has worked with Aboriginal businesses and TfNSW to interpret and present Aboriginal cultural knowledge along the Pacific Highway to enrich the travelling experience for all highway users.

“I am proud to have worked on an iconic project amongst three proud Indigenous nations. It was great to work with local communities and people I have known for many years.”

Gamilaraay man Kurt Scheuermann



Kurt Scheuermann worked as a safety adviser on the Woolgoolga to Ballina upgrade

An economic boost – now and into the future

It was an honour to work on so many Pacific Highway projects for more than a decade. The upgrade has impacted so many people – from families who have lost loved ones on the old highway to local communities that don't have B-doubles and tourist traffic on their local roads. And then there's the people who came together to make it happen. Love it.

Matt Howard, supervisor and surveillance officer for 12 years on various projects

The Pacific Highway provided significant economic benefit to regional communities between Hexham and the Queensland border.



Building the noise wall for the northbound off-ramp on the Banora Point project

The long-term nature of the Pacific Highway upgrade program and the scale of work required has been a great opportunity for local people to find fulfilling employment that provides professional development and the accumulation of skills.

Since 1996 it is estimated more than 100,000 direct and indirect jobs were generated across the more than 40 projects delivered between Hexham and the Queensland border.

On the Woolgoolga to Ballina project alone at the peak of construction, more than 3000 people were working directly on the 155-kilometre project, injecting millions of dollars into local economies.

The large workforces needed to deliver the upgrade also attracted new people to regional communities, with evidence showing many of those people chose to stay on after relocating to work on the highway program.

The future is bright

While the creation of jobs generated short-term boosts for regional communities, there are also multiple long-term benefits associated with the upgrade.

During a 50-year period from 1994 to 2044, business output is estimated to increase by \$9.07 billion, and Gross State Product is estimated to increase by \$3.55 billion.

But it's the wider economic benefits that will really help regional communities. The completed Pacific Highway upgrade program provides a route that supports economic development through consistency with regional strategies and progressive completion of key links.

The completion of the Pacific Highway upgrade will make it easier for residents to get to jobs, for visitors to access the wide range of tourist activities and for industries to expand through better

access from the region to Sydney and Brisbane.

Reducing travel times on the highway allows more people to commute to and from regional towns to the regional cities for employment and education opportunities. This will help accommodate projected population and housing growth and support a range of employment centres across the region.

Tourism on the North Coast is worth more than \$3.4 billion annually and supports about one in three jobs in the region. The upgrade of the Pacific Highway supports the continued growth of the tourism industry, which will continue to make a significant contribution to jobs growth as the number of visitors to the region continues to increase.



At the peak of construction more than 3000 people were working on the Woolgoolga to Ballina project



At the peak of construction on the Woolgoolga to Ballina project there were more than 1000 pieces of machinery onsite



The Pacific Highway upgrade program generated more than 40,000 direct jobs over the life of the program

Opportunity knocks for bypassed towns

Local communities that once had to live with highway traffic have been rejuvenated by the upgrade.

Since the start of the highway upgrade program in 1996 up to completion in 2020, more than 30 towns and villages have been bypassed.

In many instances the realignment of the highway to bypass towns has improved the appeal of towns for visitors, especially in the long term. In many cases the reduction in through traffic has made bypassed towns more pleasant places to live in and visit. While there is no doubt some businesses that relied primarily on passing highway traffic were impacted, particularly in the short-term, generally towns and villages have seized on the new long-term economic opportunities presented by the upgrade.

The Pacific Highway upgrade team worked closely with local councils and businesses throughout the life of the program to prepare towns and villages for bypasses and to mitigate the short-term impacts.

Town bypasses have been found to generally result in positive social impacts such as better quality of life and

environmental amenity for residents from reduced traffic volumes on local roads.

Bulahdelah

Bulahdelah is well-positioned as a convenient fatigue stop and the beautification of the town helped attract customers back, fuelling growth in the town. In the nine months post-opening of the bypass in mid-2013, there was a 7.7 per cent increase in visitors to Bulahdelah.

Kempsey

Until Kempsey was bypassed in 2013, the Pacific Highway was a thoroughfare that cut the town in half — bringing tourists and trucks, but discouraging locals. However, now the Kempsey CBD has become a retail hub after significant gentrification. A study by Dr Bruno Parolin found that despite significant fear amongst the business community before the bypass, between 2013 and 2017 there was an increase of 22% in jobs across all businesses.



A bypassed town sign being installed for Nambucca Heads



The Kempsey CBD has been revitalised since the bypass opened in 2013

Highway upgrade a game changer for movement of freight

Enabling the safe, productive and sustainable movement of freight was an important reason for building a world-class, four-lane highway between Hexham and the Queensland border.



A truck navigates the Pacific Highway, 13 kilometres north of Nambucca, in 1959

Prior to the mid-1990s, this popular route for travellers and freight passed through more than 30 towns and villages and meandered through hilly terrain, preventing some freight from using the route.

The freight industry is the lifeblood of the NSW economy – worth \$66 billion to the state economy. From big businesses to farmers, retailers to consumers, we all rely on our goods getting to us in a safe and efficient manner. At the most basic level, freight determines the availability of, and the prices we pay, for goods. It helps to create a worldwide market for NSW products by facilitating the transport of goods from the place of production to the place where they are consumed, including assembly of raw materials and distribution of finished goods.

Freight is particularly critical to the economic development of regional and rural NSW, by supporting the production

of goods best suited to specific regions, and allowing larger scale production than would otherwise occur.

Prior to the mid-1990s, this popular route for travellers and freight passed through more than 30 towns and villages and meandered through hilly terrain, preventing some freight from using the route.

By providing reduced travel times (around three hours in total for freight vehicles), increased and more consistent speeds and lower grades, the Pacific Highway upgrade program has reduced costs to the economy of travel time, fuel costs, vehicle costs and costs to business while significantly improving road safety.



“The dual carriageway means there is plenty of room for higher capacity vehicles, making it safer for all road users. It also means we can carry more goods in less time to get where they need to be, including supermarket shelves.”

Jim Pearson, owner of Jim Pearson Transport

Freight travelling south on the Pacific Highway at Glenugie

NSW plays a key role in the movement of freight across Australia, with the road network alone carrying over 60 per cent of the total NSW freight task.

NSW is also the connection for freight transport travelling to Brisbane, Adelaide and Melbourne, making the

movement of freight in NSW even more critical. In 2016, the Pacific Highway carried more than 12 million tonnes of freight and is forecast to reach 17 million tonnes in 2036 and increase to 23 million tonnes by 2056, which is almost double current volumes. The upgraded Pacific Highway ensures that this key

national transport route is able to meet the future task.

With the completion of the Pacific Highway upgrade, modern Higher Productivity Vehicles will be able to travel along the route, bringing significant productivity, environmental

and safety benefits for the community and industry.

This means fewer vehicles are required to carry the same amount of freight, reducing transportation costs and reducing the number of heavy vehicles on the road.

Keeping workers safe has been no accident

While the safety of the people building the Pacific Highway upgrade was always as important as the people driving the road, the approach changed dramatically during the delivery of the program.

The Pacific Highway upgrade was carried out during significant change in work health and safety in NSW, including the passing of the OHS Act in 2000, the WHS Act in 2011 and an update to the WHS Regulation in 2017.

Transport for NSW (TfNSW) and its industry partners rose to this challenge and completed the upgrade program with an outstanding health and safety record.

This was achieved by working collaboratively with contractors to establish standards and ways of working that incorporated innovation and improvements in machinery, equipment, systems and technology. Ideas and strategies were built over time, with lessons from one project taken to the next through a continuous improvement approach.

Following are some of the innovations and improvements the Pacific Highway team embraced during delivery of the program.

Robust reporting

The upgrade program integrated lead indicators into contractor performance measures within the WHS Traffic Lights reporting program. By incorporating hazard reporting, consultation and leadership activities as measures, the Pacific Highway upgrade projects brought a focus on prevention and behaviours identified in research as being key to developing better safety performance.

Workplace Health and Safety forums

These twice-yearly forums provided an opportunity for contractors and TfNSW to communicate and collaborate across all Pacific Highway upgrade projects. The forums allowed us to share lessons and innovation so the development of better safety practice was expedited and improved. Many of the innovations were published in the six-monthly highway upgrade reports.

Separate Yourself program

The Separate Yourself program was introduced to manage the interface between people, machinery and vehicles on Pacific Highway sites. The program brought a risk management approach and consistency to one of the highest risk operations in civil infrastructure. The program was adopted by a number of contractors as their own standard and ensured consistency was achieved across projects.

Embracing technology

Trials of technology, including variable speed limit signs and portable traffic lights, reduced the exposure of traffic controllers to live traffic, which is a frequent high-risk activity on upgrade projects. There were also trials of traffic management initiatives for working next to live traffic, including yellow line marking and a traffic control centre. Providing clear delineation and managing the impact of upgrade work to the travelling public were the focus of these two innovations.

The Pacific Highway upgrade was carried out during significant change in work health and safety in NSW.



How times have changed

Workplace health and safety has come a long way in a relatively short period of time in terms of how TfNSW builds roads. A visible example is the type of personal protective equipment (PPE) workers are required to use, as demonstrated by these photos taken less than 30 years apart. The top photo was taken in 1990 prior to the start of the Pacific Highway duplication program. It shows construction of the Pacific Highway Swan Creek deviation, north of Grafton, with workers wearing little or no PPE. The bottom photo was taken in 2017 during construction of the Woolgoolga to Ballina project, with workers in full PPE including hard hats, steel cap boots, long sleeves and pants, gloves and safety glasses.



Then



Now



These photos, taken more than 60 years apart, demonstrate how far the Pacific Highway has come over the years. The photo on the opposite page shows the Pacific Highway (now Hinterland Way) in July 1947 as it wraps around St Helena Hill, looking north towards Byron Bay. The photo on this page shows the St Helena tunnel in February 2018, looking south. The old highway, where the 1947 photo was taken, can be seen to the right of the tunnels.



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