Introduction

Objective 1

Objective 2

OBJECTIVE

WE DEVELOP A SUSTAINABLE, COST-EFFECTIVE TRANSPORT NETWORK ACCESSIBLE TO EVERYONE

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• We provide increased value for money

// Performance areas

Integrate land use and transport

to promote community cohesion, economic development and environmental sustainability

Promote agile, innovative solutions

to problems to keep pace with the

// Strategies

rate of change

4.1

4.2

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In 2016–17, we continued to build and maintain our road and marine infrastructure across the state. Some of our key achievements are listed below.

BRUCE HIGHWAY UPGRADE PROGRAM

Continued to deliver and upgrade the Bruce Highway as a part of the \$8.5 billion Bruce Highway Upgrade Program (page 82–84 and 89).

BOUNDARY ROAD BRIDGE

Opened the \$100.4 million Boundary Road Bridge over the Bruce Highway north of Brisbane ahead of schedule (page 84).

TOWNSVILLE RING ROAD

Completion of the \$200 million, 22 kilometre Townsville Ring Road in north Queensland (page 84).

CAPE YORK REGION PACKAGE

Construction continued on the \$260.5 million Cape York Region Package to upgrade critical infrastructure in far north Queensland (page 86).

BURRUM HEADS BOAT RAMP UPGRADE

Upgraded the \$5 million Burrum Heads boat ramp upgrade, including a two-lane boat ramp, floating walkway, car-trailer parks and improved pedestrian access (page 93).

PACKERS CAMP BOAT RAMP UPGRADE

Completed a major upgrade to Packers Camp boat ramp to improve safety and accessibility by allowing for faster and improved boat launching and retrieval operations (page 95).

VELOWAY 1 CYCLEWAY

Continued construction on Stage D of the 17 kilometre Veloway 1 cycleway connecting Brisbane city to Eight Mile Plains (page 96).

TRAFFIC MANAGEMENT AT ROADWORKS

Improved traffic management at roadworks by focussing on upgrading key areas (engineering, enforcement and education) (page 99).

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We integrate land use and transport to promote community cohesion, economic development and environmental sustainability

This section outlines the considerable amount of infrastructure improvement coordinated by TMR and constructed across the state. It showcases the wide variety of projects planned, underway and completed as well as the associated financial cost and source.

This work delivers on our objective to create liveable regions and active cities and is also a significant source of jobs for Queensland.

Major Infrastructure

Bruce Highway safety and capacity improvements

Bruce Highway Upgrade Project – Tinana Interchange

In July 2016, we started works to upgrade the Bruce Highway interchange at Tinana. The project involves constructing a northbound off-ramp to provide a left-hand diverge and building a new overpass structure with both through lanes of highway traffic travelling under the new overpass.



Girder placement at Tinana Interchange.

The project also includes installing traffic signals at the Gympie Road and Iindah Road West intersection at Tinana. Dedicated right-turn lanes will be provided on Gympie Road to improve traffic efficiency.

Once completed, the project will improve safety and operational efficiency and support future growth in the Fraser Coast. The new interchange is expected to be operational in late 2017, weather permitting. Traffic signals at the Gympie Road and lindah Road intersection are expected to be installed by early 2018.

The federal government has provided \$30.4 million towards the total project cost of \$38 million, with state government contributing \$7.6 million.

The 32 metre girders, each weighing about 80 tonnes, will support the new two-span overpass that will serve as the new northbound off-ramp from the Bruce Highway to Gympie Road.

For more information visit: tmr.qld.gov.au/Projects/Name/B/ Bruce-Highway-Tinana-interchange-upgrade

Watch the video here: facebook.com/TMRQld/ videos/1413890231987189/

Bruce Highway - Cooroy to Curra (Section A)

This \$490 million federal and state funded (in a 50:50 split) upgrade has delivered a new 13.5 kilometre, four-lane divided highway between the interchange south of Cooroy and the new section of highway in Federal near Sankeys Road.

An early works contract completed in April 2014 realigned Black Mountain Range Road and constructed an overpass for the new Bruce Highway.

The first major construction contract was completed in May 2016 and delivered:

- over seven kilometres of new four-lane highway between Cudgerie Drive and Sankeys Road
- an all-movements interchange north of Cooroy
- bridges over Skyring Creek and Gardners Road.

The second major construction contract was completed in early May 2017 and delivered:

- six kilometres of new northbound lanes to duplicate the existing Cooroy bypass
- reconstruction of southbound highway lanes
- upgrading the Cooroy southern interchange
- constructing new bridges over Six Mile Creek.

The new four-lane highway opened to traffic in April 2017.

This newly completed Section A upgrade for the Bruce Highway between Cooroy and Sankeys Road has received a top safety rating (a mixture of 4 and 5 stars, 5 stars being the safest) from the Australia Road Assessment Program (AusRap) (see glossary page 230).

For more information visit: tmr.qld.gov.au/Projects/Name/B/ Bruce-Highway-Cooroy-to-Curra/Bruce-Highway-Upgrade-Cooroy-to-Curra-Section-A-Cooroy-southern-interchange-to-Sankeys-Road



Aerial view of the completed Cooroy to Curra (Section A) northern interchange. Photo by Above Photography.

Bruce Highway – Cooroy to Curra (Section C)

The third section of the 62 kilometre Bruce Highway – Cooroy to Curra upgrade continued construction and is on track to be completed in early 2018, weather permitting.

The \$384.2 million state and federally funded project will deliver a new 10.5 kilometre four-lane divided highway on a new and improved alignment, to the east of the existing Bruce Highway between Traveston and Woondum. The project includes the construction of 13 bridges.

An early package of safety works to upgrade the southern access to Gympie between Woondum and the Venardos Avenue intersection started in late July 2015 and was completed ahead of schedule in late March 2016.

The federal government is providing \$307.4 million towards the project, with the state government contributing \$76.8 million.

For more information visit: tmr.qld.gov.au/Projects/Name/B/ Bruce-Highway-Cooroy-to-Curra/Bruce-Highway-Cooroy-to-Curra-Section-C-Traveston-to-Woondum



New Bruce Highway bridges over Tandur Road looking north.

Bruce Highway – Cooroy to Curra (Section D)

Detailed design continued on the final section of the Bruce Highway – Cooroy to Curra upgrade which will provide a 26 kilometre long, four-lane, divided highway on a new alignment between Woondum and Curra.

The alignment for the new highway is east of Gympie and will separate long distance traffic from local traffic, improving safety and allowing the highway to function as a high-speed, high-volume corridor.

The detailed design for the new highway section is expected to be complete in early 2018.

For more information visit: tmr.qld.gov.au/Projects/Name/B/ Bruce-Highway-Cooroy-to-Curra

Caloundra Road to Sunshine Motorway Interchange

This year, we started construction on the \$929.3 million Bruce Highway Upgrade from Caloundra Road to the Sunshine Motorway. The federal and state government-funded project (80:20) will widen the highway from four lanes to six and includes a new service road for local traffic on the western side of the highway. This also means a major upgrade to the Sunshine Motorway interchange and construction of Australia's first Diverging Diamond Interchange at Caloundra Road.



Caloundra Road Interchange design layout (May 2017)

In September 2016, the design and construction contract was awarded with preliminary construction commencing in November 2016. In May 2017, the first sod was turned to mark the start of major construction.

The Diverging Diamond Interchange design is a first for Australia. It has been used with great success in the US since 2009 and while this type of interchange will improve safety, importantly it will reduce the impact to the former Beerwah State Forest by using around six hectares.

Through the detailed planning and procurement process, the department has reduced the project budget from \$1.134 billion to \$929.3 million.

Construction is expected to be completed in late 2020, weather permitting.

For more information visit: tmr.qld.gov.au/brucehwycaloundra2sunshinemwy

> Over 40,000 motorists are estimated to use the Sunshine Motorway interchange and the Caloundra Road interchange daily.

Logan Enhancement Project

Transurban Queensland's \$512 million Logan Enhancement Project was approved late last year. Construction commenced in June 2017 on the Logan Motorway and Gateway Motorway Extension, Stretton and Drewvale.

The project scope includes upgrades at key congestion hotspots along the Logan Motorway, widening parts of the Logan Motorway and Gateway Extension Motorway constructing new south-facing ramps at Compton Road, upgrading the Beaudesert Road/Mount Lindesay Motorway interchange and upgrading the Wembley Road interchange.

The upgrade will enhance safety and connectivity on the roads. When complete, motorists will benefit from a more reliable road network with fewer stop-start traffic conditions, resulting in quicker journey times and lower fuel consumption.

This project is Queensland's first Market-Led Proposal, which involves an exclusive commercial arrangement between the private sector and government to provide a service or infrastructure to meet a community need. It will be delivered at no cost to the Queensland Government, and is financed by Transurban Queensland.

For more information visit: loganenhancementproject.com.au

Bruce Highway – Boundary Road interchange upgrade

Construction commenced in mid-2016 to upgrade the Boundary Road interchange on the Bruce Highway at Narangba. The \$100.4 million upgrade (funded by the federal and state government in an 80:20 split) will improve safety, ease congestion and increase capacity to cater for future traffic volumes.

The project includes a new six-lane bridge over the highway, longer on and off-ramps to improve safety for motorists entering and exiting the highway, and a new shared user path for pedestrians and cyclists.

Construction of the new six-lane bridge is now complete. The new overpass structure opened to traffic in early April 2017.

Townsville Ring Road (Section 4)

The \$200 million Townsville Ring Road (Section 4) project was completed and the road officially opened in December 2016.

Section 4 completes the 22 kilometre Townsville Ring Road link, forming a new section of the National Highway. The completed ring road has enhanced freight connectivity, increased efficiency and reliability of the network and improved flood immunity.

It has also significantly reduced congestion on the local road network, with approximately 10,400 vehicles a day being removed from nearby Woolcock Street.

The project was jointly funded, with the federal government contributing \$160 million and the state government contributing \$40 million.

Bruce Highway Flood Resilience Project

Haughton River Floodplain Upgrade project

Construction of the \$515 million Haughton River Floodplain Upgrade project will be one of the largest upgrades in north Queensland, and will address one of the worst flooding spots on the Bruce Highway.

The tender process for the design and construction of the project commenced in May 2017. Construction is expected to commence in August 2018 and be completed by mid-2021, weather permitting.

It will involve upgrading a 14 kilometre section of the Bruce Highway approximately 50 kilometres south of Townsville and 30 kilometres north of Ayr, including replacement of the narrow Haughton River bridge.

Flooding at the Haughton River bridge severely impacts this thoroughfare for days on end, with floodwaters sometimes extending five kilometres south and nine kilometres north of the Haughton River bridge. The existing low-level bridges at Horseshoe Lagoon and Pink Lily Lagoon will also be replaced.

Safety will be significantly improved, with the upgrade of nine rural intersections and the construction of two new cane-tramway overpasses. The project is jointly funded with the federal government providing up to \$412 million and the state government providing \$103 million.



Barge drilling at Haughton River bridge.

Granite Creek bridge restoration

Located between Mackay and Rockhampton along the Bruce Highway, Granite Creek bridge experienced significant damage, during Tropical Cyclone Debbie. The north abutment was completely washed out by storm runoff resulting from huge rainfall tallies (greater than 400 millimetres over two days). Access to the bridge was temporarily limited after inspections found a large void had been created under the reinforced concrete relieving slab, which meant it was the only thing supporting the bitumen and pavement.

Just 36 hours after work commenced, temporary repairs to the bridge were completed and the highway was able to be reopened to two-way traffic.

A concrete truck and crane were immediately sourced to install a temporary sandbag wall and backfill the void to make the approach and abutment trafficable to all vehicles again.

To allow traffic to continue to use the bridge safely until repairs were complete, a load limit was placed on the bridge. This restricted travel over the bridge to vehicles under five tonnes, under traffic control and with a 10 kilometre per hour speed limit. Vehicles greater than five tonnes attempting to travel through the area were redirected to an alternative route by Transport Inspectors.

Arnot Creek bridge replacement

The \$10 million Arnot Creek (Bruce Highway) bridge replacement involved removing the old bridge, providing a temporary crossing and the construction of a new wider bridge, including widening the approaches from 10 metres width to approximately 11.5 metres.

The project was part of the state government's Accelerated Works Program. Work commenced in May 2016 and was completed in February 2017. The completed works have delivered vital improvements to road safety, freight connectivity and productivity on the highway.

The project was jointly funded by the federal and state governments, with contributions of \$8 million and \$2 million respectively.



Existing decking being removed from the Arnot Creek bridge.

Ipswich Motorway – Rocklea to Darra (Stage 1)

We have commenced early works to upgrade the Ipswich Motorway from four to six lanes along a three kilometre stretch between Rocklea and Oxley.

The contract was awarded in April 2017 to Bielby Hull Albem Joint Venture, with construction expected to start in October 2017. The joint federal and state funded project will improve motorway travel time, reliability, safety, local connectivity and flood immunity for all road users, pedestrians and cyclists.

Rocklea to Darra (Stage 1) of the \$400 million upgrade includes:

- upgrading the Motorway from four to six lanes
- seven new bridges including higher bridges over Oxley Creek
- new southern service road connection from Rocklea industrial precinct to the Oxley commercial and retail areas
- new northern service road connection over Oxley Creek floodplain
- new traffic signals at the Suscatand Street intersection.

The project is expected to be completed late 2020.

For more information visit: tmr.qld.gov.au/Projects/Name/I/ Ipswich-Motorway-Planning-Study-Darra-to-Rocklea

Mackay Ring Road (Stage 1)

Detailed design of the \$497.8 million Mackay Ring Road (Stage 1) project, jointly funded by the federal and state governments, was completed in April 2017.

A key benefit of the project will be to reduce hazardous and heavy loads travelling through the city centre and improve the operation of local, regional and national road networks.

The 11.3 kilometre two-lane rural highway deviation includes construction of:

- 13 new bridges
- major overpasses of local roads and the rail network
- underpasses for local traffic and farming activities.

The project also paves the way for the first 2.6 kilometres of the Mackay to Bowen Basin Service Link (Walkerston Bypass). Construction of Stage 1 of Mackay Ring Road is scheduled to commence in September 2017 for completion in mid-2020.

For more information visit: tmr.qld.gov.au/Projects/Featuredprojects/Mackay-Ring-Road.aspx

Cape York Region Package

The Cape York Region Package (CYRP) is a \$260.5 million program of works jointly funded by the federal and state governments to upgrade critical infrastructure in far north Queensland.

The package consists of three sub-programs:

- \$200 million program of works to progressively seal sections of the Peninsula Developmental Road (PDR)
- \$10 million over four years for sealing works on the Endeavour Valley Road through to Hope Vale
- \$50.5 million for priority community infrastructure works identified by the Cape Indigenous Mayors Alliance.

In 2016 the CYRP team successfully delivered the following project milestones:

- completing Stages 3 and 4 of the Endeavour Valley Road upgrade
- road upgrades in Indigenous communities. For the communities of Pormpuraaw and Aurukun, this means improved travelling conditions on their access roads
- completing the PDR Mein Deviation (29 kilometres) road sealing project
- completing the PDR Musgrave (12 kilometres) and Little Laura to Fairview (5 kilometres) road sealing projects
- making progress on the PDR Coen South (22 kilometres) and Archer to Wolverton (13 kilometres) road sealing projects.

Works planned for 2017 are:

- Coen South (remaining 18 kilometres)
- Archer to Wolverton (remaining 8.6 kilometres)
- Laura Racecourse to Little Laura (8.7 kilometres)
- 10 Mile Creek and South of Duck Holes Creek (6.2 kilometres)
- Myall Creek to Rio Boundary (9.2 kilometres).

In October 2016, Indigenous trainees working on the PDR Coen South sealing project were issued with log books to record hours spent operating various pieces of equipment. This is an important step towards gaining their Certificate III in Civil Construction.



Construction on the Peninsula Developmental Road, Archer to Wolverton.

As at 30 June 2017, 86 Indigenous people, including 35 New Entrant trainees, were employed on the sealing and gravel production projects on the PDR, and 25 Indigenous businesses/ joint ventures were working on or sub-contracted to the PDR projects.

The contracts for construction works being delivered on the PDR through the CYRP have specified targets in relation to Key Result Areas (KRA). As at 30 June 2017, the 2016-17 projects had not only achieved, but exceeded, the KRA targets as required in the contracts:

- KRA 1 Indigenous and Non-Indigenous Training and Upskilling
- KRA 2 Implementation of the Indigenous Economic Opportunities Plan
- KRA 3 Local Industry Participation.

Eton Range Realignment Project

The \$189.2 million project, jointly funded by the federal and state governments, aims to improve the safety and reliability of the Peak Downs Highway, which is the only designated B-double route from Mackay west to the northern Bowen Basin.

The works include widening to four lanes, a split carriageway, and partial realignment of the existing Eton Range crossing, which will reduce the need to close the range when traversed by oversized vehicles.

Construction started in April 2016 and is due to be completed in mid-2019, weather permitting.

Toowoomba Second Range Crossing

Work is progressing well on the Toowoomba Second Range Crossing (TSRC). Major construction commenced in late April 2016 and is on track to be completed in late 2018.

The \$1.606 billion project is jointly funded by the federal government (\$1.137 billion) and the state government (\$469.3 million) and is being delivered in a 25 year Public Private Partnership with the Nexus Infrastructure (Nexus) consortium. A total of 23 bridges will be constructed as part of the TSRC with 20 of these under construction as at June 2017. Work also commenced in early May 2017 on the various interchanges connecting the TSRC with major highways, including the Gore Highway, Warrego Highway western interchange and Warrego Highway eastern interchange.

Earthworks are also well advanced between the New England Highway and Goombungee Road with construction commencing on the twin arch bridges that will carry New England Highway traffic 30 metres above traffic on the TSRC where the TSRC cuts through the Toowoomba Range at Mount Kynoch.



Construction of the New England Highway twin arch bridges.

When completed, the 41 kilometre long toll road will pass Toowoomba on its northern side, linking the Warrego Highway at Helidon Spa in the east and the Gore Highway at Athol in the west, via Charlton.

The TSRC will contribute to a safer and faster link in the National Land Transport Network, providing commercial vehicles with an alternative crossing of the Toowoomba Range to improve freight efficiency and driver safety, relieve pressure on roads in Toowoomba and the Lockyer Valley, and enhance liveability for the region's residents.

For more information visit: tmr.qld.gov.au/Projects/Name/T/ Toowoomba-Second-Range-Crossing

The number 13 may be lucky for some but for the superstitious types, or for those who are building a 41 kilometre long bypass, the Nexus consortium were not going to take the gamble and opted out of numbering a bridge '13'.

Gateway Upgrade North and sustainable initiatives

Work is well underway on the Gateway Upgrade North project, which includes widening the Gateway Motorway from four to six lanes between Nudgee and Deagon, with additional pavement and safety works through to Bracken Ridge.

The \$1.143 billion project, jointly funded by the federal government (\$914.18 million) and the state government (\$228.54 million) on an 80:20 split, is on track to be completed by late 2018.

The upgrade will ease congestion and improve safety on one of Queensland's busiest motorways, providing a critical transport corridor for more than 83,000 vehicles each day.

Since major construction work commenced in February 2016, significant milestones achieved include:

- realigning traffic onto new sections of motorway and opening the new southbound lanes of the Deagon Deviation
- significant progress in widening and upgrading 13 bridges across the length of the project
- the deconstruction and widening of bridges spanning Sandgate Road
- widening the Bicentennial Road interchange at Boondall
- construction of the new Nudgee Road overpass, which is nearing completion.



Aerial view of the Bicentennial Road interchange.

We are committed to delivering sustainable outcomes throughout design and construction, and in May 2017 the project was awarded the Infrastructure Sustainability Council of Australia design rating of 'Excellent' - the first major road project in Queensland to gain this rating.



One example of a sustainable initiative is the use of a new asphalt product, EME2, being demonstrated on a section of the Deagon Deviation works. In its first large-scale use in Australia, the demonstration involved the design, manufacture and placement of approximately 10,000

tonnes of EME2 asphalt. If successful, it could reduce the thickness of road pavements by up to 20 per cent and reduce the amount of non-renewable resources used to construct road pavements.

Western Roads Upgrade Program

The state government established the \$40 million Western Roads Upgrade Program (WRUP) to support economic development and job sustainability in western Queensland, to be delivered over two years (2015-17). By June 2017, all 15 projects under the program were complete.

WRUP projects completed in 2016-17 include works on the following roads:

- Balonne Highway
- Bulloo Developmental Road
- Burke Developmental Road
- Cloncurry-Dajarra Road
- Diamantina Developmental Road
- Eyre Developmental Road
- Gregory Downs-Camooweal Road*
- Gulf Developmental Road
- Mitchell Highway
- **Richmond-Winton Road**
- Wills Developmental Road*.

*The Myuma-TMR Alliance delivered maintenance works on sections of these roads (for more details on the Myuma-TMR Alliance see page 89)



Western Roads Upgrade Program.

CASE STUDY Myuma-TMR Alliance

TMR has been working in partnership with Myuma since 2000 and recognises the important work Myuma undertakes as a not-for-profit Indigenous training organisation. Myuma had an increased works program in the 2016-17 financial year, enabling the organisation to provide Indigenous employment and training opportunities in road construction projects.

Myuma conducts a diverse range of business and training operations on behalf of the Indjalandji–Dhidhnu People, the Aboriginal traditional owners of the Camooweal region in north west Queensland.

In 2016-17 Myuma delivered key maintenance works to the Western Roads Upgrade Program (see page 88).

Warrego Highway Upgrade Program

The Warrego Highway Upgrade Program (WHUP) is designed to upgrade the Warrego Highway between Toowoomba and Miles and comprises 15 projects being delivered over four years from 2014–15 to 2018–19. WHUP is funded by the federal and state governments on an 80:20 funding split arrangement of \$635 million (\$508 million federal funding and \$127 million state funding).

In 2016-17 we completed:

- Toowoomba to Oakey Duplication Stage One, extending the four lane Warrego Highway west from Nugent Pinch Road to west of Charlton.
- Jondaryan Sabine Road Intersection Upgrade provided safety improvements for all road users but especially heavy vehicles accessing the Warrego Highway at Jondaryan.
- **Brigalow to Chinchilla Highway Upgrade** widened 11 kilometres of the highway on the eastern approach to Chinchilla.

In 2016-17 we commenced work on:

- Jingi Jingi Creek Upgrade replacing the existing deteriorated culverts at Jingi Jingi Creek with a new concrete bridge.
- Oakey to Dalby overtaking lanes providing additional overtaking lanes at regular intervals in both directions between Oakey and Dalby.
- Oakey to Miles Safety Upgrade short-term works designed to improve safety and driver experience on the Warrego Highway between Oakey and Miles.
- Toowoomba to Oakey Duplication Stage 2 extending the four lane highway for four kilometres west of Charlton.

For more information visit: tmr.qld.gov.au/Projects/Featuredprojects/Warrego-Highway-Upgrade-Program

Road Infrastructure

The Bruce Highway is Queensland's major north-south freight and commuter corridor, connecting Brisbane to Cairns over a length of 1677 kilometres.

The federal and state governments have committed to a ten year, \$8.5 billion program of works to upgrade the Bruce Highway, with a focus on improving safety, flood resilience and capacity. The federal government has committed \$6.7 billion and the state government has committed \$1.8 billion to this important program of works.

The program commenced in mid-2013 and is the largest program of roadworks currently underway in Queensland.

Program status

The program is now entering its fifth year of delivery with:

- 240 projects completed
- 108 projects in the design phase or under construction
- 31 projects in the planning phase.

More projects are regularly being added to the program's scope of works as budget allows, delivering greater benefits for Queensland motorists.

Type of projects being delivered

Projects include major capital investment projects as well as smaller improvement projects that have been combined for more efficient delivery:

- Safety upgrades improving the overall safety of the highway by installing roadside barriers, upgrading intersections, widening pavements and road shoulders and installing wide centreline treatments and audio-tactile line marking.
- **Overtaking lanes** new overtaking lanes to allow more, safer opportunities for overtaking.
- **Black spots** installing new or updated traffic signals, provision of protected right-hand turn facilities, shoulder sealing, road delineation and removal and/or shielding of roadside hazards at known black spots.
- **Rest areas/stopping places** installing new rest areas where motorists can stop to rest and revive before continuing their journey.

Program benefits

The program has already achieved significant improvements to safety along the Bruce Highway with an approximately 30 per cent reduction in the number of crashes, fatalities and serious injuries^{*} since the program began (based on the baseline statistics – annual average of 2009–13).

The program has also resulted in an additional 67 kilometres of the Bruce Highway now rated at three safety stars (out of a possible five stars) or better according to the nationally recognised Australian Road Assessment Program (AusRAP) (see glossary page 230) safety star rating system. This means more than 81 per cent of the travel on Bruce Highway is now on road section, rated at three safety stars or more.

Improvements to flood resilience and road capacity along the Bruce Highway will become evident over the remaining years of the program as flood studies and construction works are completed, and the cumulative benefits of the Bruce Highway projects are realised.

*per 100 million vehicle kilometres travelled.

Safety improvement highlights

As at May 2017:

- 60 kilometres of wide centreline treatments and 43 kilometres of shoulder sealing/widening have been undertaken to provide greater separation between opposing lanes of traffic¹
- 88 kilometres of audio-tactile line marking (raised line markings) have been installed²
- 23 kilometres of pavement rehabilitation has been undertaken to improve ride quality
- 27 new rest areas/stopping places have been constructed and seven existing rest areas/stopping places have been improved
- 24 protected right-hand turns have been installed to help improve safety at known black spots
- 16 signalised intersections have been installed
- 59 overtaking lanes have been constructed, providing increased safety and travel efficiency
- 82 kilometres of new roadside barriers have been installed.

You can view all the Bruce highway projects on our interactive map here: tmr.qld.gov.au/Projects/Featured-projects/Aboutthe-Bruce-Highway-Upgrade-Program

For more information visit: tmr.qld.gov.au/Projects/Featuredprojects/About-the-Bruce-Highway-Upgrade-Program

Wide Centreline Treatment

The department has carried out Wide Centreline Treatment (see glossary page 233) works along the Bruce Highway, with a number of sections completed in 2016-17 including:

- McDonnell Creek completed in late 2016
- Todd Road to Canal Creek completed in February 2017
- Old Tully Road to Bookal Bookal Creek
 commenced in January 2017
- North of Innisfail Stage 1 completed in October 2016 and Stage 2 is underway.

The works form part of a \$50 million joint federal and state government funded program of works which is improving safety for motorists on various sections of the Bruce Highway between Ingham and Cairns.

As part of this program the Bruce Highway has been widened to an 11 metre seal, including a one metre gap between the north and southbound lanes for the installation of wide centreline treatment. The treatment is designed to reduce head-on collisions by providing greater spacing with any oncoming vehicles. The line marking also creates a buffer zone for motorists to safely move around vehicles stopped on the side of the road, without having to enter the oncoming lane.

This is an excellent initiative and is a cost effective solution to a safety problem.



Wide centreline treatment with audio tactile line marking.

This is in addition to 378 kilometres of audio-tactile line marking delivered on the Bruce Highway under other funding programs.

National Highway Upgrade Programme

The freight, mining and agriculture industries will benefit from the completion of \$25 million of upgrades to Queensland's Flinders Highway and will open the door for economic development in north Queensland. The \$25 million Flinders Highway pavement widening and strengthening project was jointly funded (80: 20) by the federal and state governments.

A total of 25 kilometres of road has been strengthened and widened, comprising of five sections being upgraded, one between Julia Creek and Cloncurry, two between Richmond and Julia Creek, and two between Hughenden and Richmond. These upgrades will improve safety and travel times from north-west Queensland to the east coast's ports and beyond.

The programme (see glossary page 231) was successfully delivered by TMR partnering with local government authorities, Flinders Shire Council, Richmond Shire Council, and McKinley Shire Council.

National Disaster Relief and Recovery Arrangements (NDRRA)

During 2016–17, we restored 14.8 kilometres of state roads through the Natural Disaster Relief and Recovery Arrangements (NDRRA) program at a cost of \$37.6 million. Works to replace the Burnett River Bridge on Monto-Mount Perry Road, which was washed away by Ex-Tropical Cyclone Marcia in 2015, were completed in May 2017.

In March-April 2017, Ex-Tropical Cyclone Debbie caused significant landslips and road damage across 29 local government areas, particularly in the Mackay/Whitsunday and South Coast Districts. Roads have been reopened or detours provided to ensure community access while road damage assessments are undertaken to progress long-term repairs.

Eligible reconstruction works will be funded under the NDRRA. Under these arrangements, the federal government provides up to 75 per cent of the funding, with 25 per cent from the state government.

Accelerated Works Program

As part of the state government's Accelerated Works Program (AWP), the department brought forward infrastructure projects to generate jobs in northern Queensland.

TMR has accelerated \$144.6 million in directly delivered infrastructure projects as part of this AWP. This is approximately 30 per cent of this government's total announced AWP value of \$443 million. At June 2017, TMR had expended \$93.4 million and completed 15 of the 21 infrastructure projects brought forward.



The department is embracing innovation in disaster management, with the introduction of a mobile application to expedite the collection of damage evidence and data following natural disasters.

After Ex-Tropical Cyclone Debbie, the Recording Asset Damage and Restoration (RADAR) mobile app provided TMR with realtime information about disaster damage to the state-controlled road network for the first time.

The RADAR app was developed to enable TMR to collect mandatory photo evidence with GPS data, which is required to prove the eligibility of disaster recovery works under the Natural Disaster Relief and Recovery Arrangements (NDRRA).

The RADAR initiative has two components:

- RADAR mobile app used on mobile devices to capture photos and data in the field via a simple site form, then save data to the cloud
- RADAR desktop where the data can be instantly downloaded, managed and reports generated.

The RADAR mobile app is helping TMR collect information more quickly and easily in the field by reducing manual data entry, which will ultimately speed the recovery process for the community.

Pacific Motorway – Coomera

The Pacific Motorway's Coomera Interchange (Exit 54) provides access to both sides of the motorway to significantly growing residential areas, schools, commercial facilities, industrial zones and major attractions such as Dreamworld. This interchange is the main access for 2018 Commonwealth Games venues at Coomera.

A \$74.7 million upgrade of the interchange (funded by the state government \$47.4 million; federal government \$10 million; and Queensland Investment Corporation/Scentre Group \$17.3 million) began in August 2015 and was completed in December 2016.

It included the construction of a new bridge to the north of the existing overpass, upgrading roundabouts to signalised intersections, and an eastbound loop ramp providing a northbound M1 connection to Foxwell Road.

Caboolture River bridge upgrade

The new southbound Caboolture River bridge opened to traffic in early June 2017. The \$17.1 million project was jointly funded (50:50) by the federal and state governments under the Bridge Renewal Program <u>(see glossary page 230)</u>. The project delivered a new two-lane southbound bridge on Morayfield Road over the Caboolture River, with a shared pedestrian and cyclist pathway.

The new southbound bridge provides a safer, higher-standard connection over the Caboolture River for motorists, and improves freight efficiency by allowing load limits placed on the previous bridge to be lifted. Active transport provisions are also improved, with pedestrians and cyclists benefiting from the three metre shared pathway.

For more information visit: tmr.qld.gov.au/Projects/Name/C/ Caboolture-River-Bridge-replacement-project

Royalties for the Regions

During the year, we administered the delivery of 25 projects under the state government's Royalties for the Regions program (see glossary page 232) on behalf of the Department of State Development (DSD).

The Royalties for the Regions program, which committed to new and improved infrastructure over four years from 2012–13 to 2015–16, has now closed. Work continues on infrastructure projects funded under the program, including successful Round 4 projects. The majority of projects awarded under this program were for upgrades to council infrastructure.

The department administers the delivery, and reports progress on road related council projects for DSD.

For more information visit: statedevelopment.qld.gov.au/ royalties-for-the-regions/regional-development/royaltiesfor-the-regions.html

Peak Downs Highway – Timber Bridges Replacement Project

Construction commenced in September 2016 on the Peak Downs Highway Timber Bridges Replacement Project with completion planned for January 2018. The \$70 million project is jointly funded by the federal and state governments and is part of the Bridge Renewal Program.

The four existing timber bridges at Fiery Creek, Lonely Creek, Boundary Creek and Cut Creek will be replaced with new concrete structures, and are being constructed on a new alignment, minimising traffic impacts to the travelling public.

The new bridges will provide at least Q50 flood immunity (one in 50 years flood), significantly increasing the reliability of the Peak Downs Highway. The new bridges will be a minimum of 10.1 metres wide between the kerbs (an increase of up to 2.9 metres) in order to accommodate over-sized vehicles. The road approaches to the new bridges will incorporate horizontal and vertical alignments based on 110 kilometres per hour design speed.



The new bridge at Boundary Creek under construction in June 2017 as part of the Peak Downs Highway Timber Bridges Replacement Project.

Marine Infrastructure Fund

Capital projects are funded through the Marine Infrastructure Fund, which is the capital component of the Marine Infrastructure Investment Program.

The state government has committed to a \$30 million two year extension of the Marine Infrastructure Fund running from July 2016 to June 2018 to provide new and upgraded recreational boating facilities. Some of the projects underway or completed as part of this program are outlined below.

The department works in partnership with local government and port and water authorities to provide new and improved recreational boating facilities throughout Queensland. Under these longstanding arrangements, TMR builds the in-water components of a facility and councils and port/water authorities provide the land-based components, and then manage the whole facility when completed.

Queensland has some of the best waterways and beaches in the country, and many residents and visitors enjoy boating throughout the state. It is only fitting that the large (and ever-growing) boatie population has safer, upgraded facilities such as boat ramps, floating walkways and pontoons that are capable of handling increased demand well into the future.

Boat facility upgrades

Burnett Heads boat ramp

Upgrade works have been completed on the \$350,000 project to improve safety and accessibility for boaties at low tide. Works included replacing the top section of the boat ramp with precast chevroned planks with non-slip surface to improve safety to this popular facility.

Burrum Heads boat ramp

Upgrade works were completed in October 2016 on the boat ramp. The new \$5 million two-lane boat ramp, rock groyne, floating walkway and 48 car-trailer parks has been provided to the community with improved pedestrian access and additional parking facilities. The existing stormwater pollution issue was corrected to improve water quality. This project was a great collaboration between the department and Fraser Coast Regional Council.



Opening of the new Burrum Heads boat ramp.

Colmslie boat ramp, Brisbane

We completed works in September 2016 on the \$850,000 project to rebuild the ramp to make it longer and wider which would allow better all-tide access for users. As part of the project, the existing floating walkway was also removed and replaced with a new longer one with two fingers to improve berthing opportunities.



Colmslie boat ramp construction.

Nojoor Road, Twin Waters boat ramp

Works were completed on the \$1.35 million project building a two-lane boat ramp and floating walkway at Nojoor Road, Twin Waters. This was undertaken in conjunction with Sunshine Coast Regional Council and completed on time in July 2016.

Ocean Creek, Burdekin boat ramp upgrade

We completed works on the boat ramp upgrade in September 2016 a month ahead of schedule. The \$820,000 boat ramp was realigned and widened to three lanes with the top of the ramp raised for improved access during high tides. The ramp is used by the community and Volunteer Marine Rescue group.

One in 19 Queenslanders are recreational boat enthusiasts.

Data source: Recreational ship census June 2016

Total Queensland coastline: 13,347 kilometres

\$450,000

Bellenden Ker Boat ramp upgrade

\$1.35M

Packers Camp Boat ramp upgrade

\$820,000

Ocean Creek Boat ramp upgrade

\$1.7m

Carpet Snake Point -St Helens Beach Boat ramp

\$1M

Mackay Harbour Floating walkway

\$350,000

Burnett Heads Boat ramp upgrade

\$5M

Burrum Heads Boat ramp and floating walkway

\$1.35M

Nojoor Road -Twin Waters Boat ramp and floating walkway

\$180,000

Bellara-Bribie Island Boat ramp upgrade

\$850,000

Colmslie- Brisbane Boat ramp

\$238,000 °

Dirranbandi Boat ramp upgrade

Packers Camp, North Queensland boat ramp

The \$1.35 million project was completed in June 2017. The single lane ramp at Packers Camp had a major upgrade, now featuring a new all-tide four-lane boat ramp with a floating walkway down the centre which will greatly improve safety and accessibility by allowing for faster and improved boat launching and retrieval operations and better access.



Packers Camp boat ramp.

Carpet Snake Point-St Helens Beach

Works commenced in early June 2017, on the St Helens Beach boat ramp with completion expected to be finalised by late October, weather permitting. The \$1.7 million project, to upgrade to the existing boat ramp and access causeway, with the addition of a rock groyne (see glossary page 232) to protect the ramp from wind and wave action.

Recreational Boating Facilities Demand Forecasting Study

In July 2016, consultant work commenced on the Recreational Boating Facilities Demand Forecasting Study, which takes place every five years. For the first time, we sought extensive public consultation as part of the study. The study was completed in December 2016 and has assisted the department planning the 2018–19 boating infrastructure works program. It will be similarly used to assist planning for subsequent years. The study consists of a statewide report plus one for each of the 78 local government areas. The study reports are available on the department's website.

For more information visit: tmr.qld.gov.au/Projects/Name/R/ Recreational-boating-facilities/Recreational-Boating-Facilities-Demand-Forecasting-Study-2016

Dredging

Rosslyn Bay Boat Harbour

The department completed dredging works on the \$1.5 million project to restore all-tide navigational access to the harbour in December 2016. Works included dredging of the entrance, navigational channels, access to the marina and all areas around the public mooring piles. Approximately 49,000 cubic metres of dredged material was taken to the approved disposal site which is 1.1 kilometres offshore from Rosslyn Bay Boat Harbour.

William Street, Cleveland

Maintenance dredging works are underway to improve depths in the access channel to the William Street, Cleveland boat ramps. The Redlands Boat Club and Volunteer Marine Rescue Unit will benefit from the dredging. The \$1.9 million project is jointly funded by TMR and Redland City Council. An estimated 43,000 cubic metres of dredge material is being disposed of to the approved Mud Island disposal area in Moreton Bay. The work is planned for completion by August 2017.

CASE STUDY Yarrabah jetty project

The department has continued to work with Yarrabah Aboriginal Shire Council to identify a suitable location to build the Yarrabah Jetty. Although Gribble Point was initially identified as the preferred site, an alternative site in the vicinity of Yarrabah's current boat ramp has been endorsed by council.

We will continue to work with federal and state agencies to progress this project as quickly as possible. A total of \$7 million has been allocated by the state government to fund this infrastructure initiative.

Cycling and Pedestrian Infrastructure

A key feature of the recently completed Moreton Bay Rail Link project is the 12 kilometre shared pathway adjacent to the rail line providing access to the rail stations from Petrie to Kippa-Ring, with connectivity to the region's existing pathway network. The Moreton Bay Rail shared pathway provides an off-road dedicated facility for both pedestrians and cyclists.

Further south, the Samford to Ferny Grove Cycle Link project will provide a new cycle path between the Ferny Grove Rail Station and Samford Village. The purpose of the project is to deliver a high-quality corridor that provides a safe, fast and direct cycle connection between Samford and Ferny Grove. The project is being delivered in two stages – Stage 1 (Ferny Grove Rail Station to Petersen Road, Samford) and Stage 2 (Petersen Road to Samford Village).

Stage 1 is completed and provides a link between Ferny Grove Rail Station and Petersen Road via sections of separated cycleway, as well as sections through local streets. The project involved improvement works to the existing cycle path along Lanita Road to connect to Samford Forest. A 1.5 kilometre path through the forest has been sealed, to connect with McLean Road South. This route was officially opened in March 2016.

Planning for Stage 2 is complete, following extensive technical investigations and rigorous community engagement. The planning recommends key safety improvements on Petersen Road, Camp Mountain Road and Samford Road to improve safety and connectivity for cyclists between the existing Stage 1 of the cycle link and Samford Village. Detailed planning and design are underway for those improvements and this work will be completed in late 2017.

Cycle lanes have recently been delivered on David Low Way between Petrie Avenue and Tamarindus Street, Marcoola and Petrie Creek to Godfreys Road in Bli Bli, and works are also underway between Mudjimba Esplanade and Boardwalk Boulevard, Marcoola. Design for a new cycle lane on David Low Way between Warran Road and Williams Street in Coolum is underway with construction anticipated to commence in late 2017.

For more information visit:

tmr.qld.gov.au/Projects/Name/D/David-Low-Way-Marcoolaintersection-upgrades https://www.tmr.qld.gov.au/Projects/ Name/S/Samford-to-Ferny-Grove-Cycle-Link

tmr.qld.gov.au/Projects/Featured-projects/ Moreton-Bay-Rail

North Brisbane Bikeway

The North Brisbane Bikeway is a critical cycle corridor for greater Brisbane, connecting the CBD through to Chermside. The project is being delivered in partnership with Brisbane City Council, and will encourage more cycling, more often, across all ages. Delivery of the North Brisbane Bikeway has been divided into the several stages, Stage 1A and 1B were completed in 2016. Stages 2 and 3 are currently in detailed design.

A feature of Stages 2 and 3 is the inclusion of priority pedestrian and cycle crossings at a number of intersections. These crossings operate similarly to pedestrian 'zebra' crossings, providing people walking and cycling with priority over vehicles when crossing the street.

The crossings will consist of a raised platform and coloured road surface to identify give way areas and the cycle crossing. Ample space has been provided to allow vehicles to stop safely, clear of the crossing.

For more information visit: tmr.qld.gov.au/Projects/Name/N/ North-Brisbane-Bikeway

Veloway 1, Pacific Motorway

The Veloway 1 cycleway (V1) is planned to connect cyclists from Brisbane city to the Gateway Motorway off-ramp at Eight Mile Plains (along the Pacific Motorway). A dedicated three metre-wide cycleway will extend 17 kilometres, providing a safe route for commuting cyclists. The Veloway is being delivered in stages. The 17 kilometre connection will successfully provide the missing links within existing cycleway and ensure a safe and dedicated commute for cyclists. The V1 will help promote an active and healthy lifestyle.

The V1's Stage D is currently under construction and runs from O'Keefe Street, Buranda to Lewisham Street, Greenslopes. When complete, Stage D will consist of three bridges and a ramp, and connect to Stage C at Greenslopes.

Stage D is due for completion in late 2017.

For more information about the completed sections and what next visit: tmr.qld.gov.au/Projects/Name/V/Veloway-1-Pacific-Motorway



Veloway 1 – Steel truss being lifted in to place for the Veloway 1 Stage D at Cornwall Street, Greenslopes.

Island runway reseal

Mornington Island is a remote community in the Gulf of Carpentaria, 200 kilometres away from Karumba on mainland Australia, and is accessible only by barge or aeroplane.

The airstrip is a vital piece of infrastructure for the community, and damage from the 2015–16 wet season meant it could no longer accommodate the aircraft which usually service the island.

In September 2016, we reconstructed the airstrip to full capacity before the 2016–17 wet season, whilst ensuring the airstrip remained functional for light aircraft and the Royal Flying Doctor Service.

We worked closely with Mornington Shire Council to manage the challenging task of procuring and transporting all required plant and material (including 15,000 tonnes of gravel, 1400 tonnes of aggregate, 440 tonnes of cement, 360 tonnes of lime, 160,000 litres of bitumen and 62 pieces of construction plant, equipment and vehicles) to the island via a succession of barge services from Darwin, Cairns, Weipa and Karumba.

TMR delivered the 1.6 kilometre airstrip reconstruction in 38 days, enabling normal flights to resume before Christmas and restoring a vital piece of infrastructure for a vulnerable remote community.



Our crews worked to ensure the remote community wasn't isolated.

We promote agile, innovative solutions to problems to keep pace with the rate of change.

TMR is paving the way of our future transport solutions by adopting innovative approaches to transport issues and planning. This section outlines new technologies that have become available and how they can be used to improve Queensland's transport network.

Intelligent transport systems

Intelligent transport systems (ITS) (see glossary page 231) are smart infrastructure applications that use innovative, computer-based tools, combined with state-of-the-art communications and control systems to provide integrated operations across the motorway network.

The department uses ITS tools such as variable speed limits, ramp metering, and lane use management signs, to improve road safety, traffic flow and manage congestion. These tools also enable road users to be better informed and make safer, more coordinated, and 'smarter' use of our transport networks.

In addition to the existing technologies already being used across the network, the department is continually investigating new technologies that may help to improve network performance.



Digital Engineering

The State Infrastructure Plan (SIP) released in March 2016 outlined five infrastructure directions for Queensland, including promoting a more efficient procurement process and the better use of existing assets.

Key Implementation Action (15) under the SIP directions is implementing the use of Building Information Management (BIM) progressively into all major state infrastructure projects by 2023.

Building Information Modelling (BIM) uses 3D technology to aid in the planning, design, construction, and asset management of infrastructure. Providing a 3D model as the single point of truth, BIM enables multiple disciplines to collaborate seamlessly on infrastructure projects, ensuring they are optimised in the 'virtual world' well before construction begins.

Implementing BIM will deliver significant savings for Queensland by improving efficiency throughout the infrastructure management lifecycle.

The systems and processes will help to:

- avoid errors BIM's clash detection technology will help eliminate costly design errors, allowing a problem to be fixed in the 'virtual' world before it costs money in construction
- reduce waste BIM's superior capability in programming and estimating quantities will reduce material wastage in construction
- optimise information BIM's reliable information management will make for more effective planning and delivery, as well as more dynamic asset operation and maintenance.

To assist the department in realising the benefits of BIM a new guideline 'Building Information Modelling (BIM) for Transport and Main Roads' was released in May 2017.

The department is already implementing BIM on the following projects:

- Ipswich Motorway Darra to Rocklea
- Bruce Highway Haughton River Floodplain Upgrade
- Pacific Motorway Mudgeeraba to Varsity Lakes.

As these projects progress, the true benefits of BIM will be tested and achieved.

Addressing traffic congestion

TMR recognises the community's concerns about increasing congestion on our road networks, particularly in the south east corner. Figure 12 (shown on the next page) compares the growth of vehicles registered, traffic and two congestion measures over the last five years. Addressing the traffic congestion task is challenging, particularly when there is significant growth in vehicle registrations (16 per cent) and traffic volumes (14 per cent).

Through implementing a number of key initiatives, TMR has limited the increase in travel times and reduction in travel time reliability when compared to the increase of vehicles on our roads.

In addition to specific projects that are increasing capacity on the network, such as the Gateway Upgrade North, the department has also worked to better manage congestion on the existing network through:

- development of a Smarter Solutions Network Optimisation Framework to help identify low-cost and non-infrastructure solutions
- improved incident management including traffic response units (with council)
- signal network optimisation
- managed motorway operations (for example, South East Freeway ramp signalling, Ipswich Motorway Lane Use Management, Port of Brisbane Variable Speed Limit operations and Bruce Highway ramp signals and variable speed limits)
- the further development of tools to quantify excessive congestion and causes of congestion
- statewide rollout of Emergency Vehicle Priority on state-controlled roads
- improved traffic management at roadworks.

While these initiatives support the department in better managing the network, TMR has also improved the community's access to traffic and congestion information through the refresh of the QLDTraffic website and the launch of the smartphone app. QLDTraffic allows road users to access real-time information and make informed decisions when planning their travel.

In 2016–17 average travel time has increased by 2.1 per cent and travel time reliability decreased by 2.5 per cent. However the combination of the measures outlined above has helped to limit the increases in congestion relative to vehicle and travel growth, which is higher.



Figure 12: Trend of the number of vehicles registered and traffic volumes travel time and reliability (cumulative with 2011–12 as base)

- Total registered vehicles: SEQ
- Vehicle Kilometres Travelled (VKT) from TMR detector counts: Brisbane Metro (calendar years, 24/7)
- Published Travel Time/10km: Brisbane Metro (6am-7pm on typical weekdays increase implies deterioration)
- Published Reliability: Brisbane Metro (6am-7pm on typical weekdays increase implies deterioration)

Data sources: TRAILS, TARS (TMR Traffic Analysis and Reporting System) and STREAMS (see glossary page 232)



The department reached a number of important milestones to improve traffic management at roadworks in 2016–17, focussing on the key areas of engineering, enforcement and education.

In engineering, the department has improved options for remote-controlled portable traffic signal devices at roadworks. Four new devices have been approved for use in high-risk road environments that include traffic signals and boom barriers from 1 July 2017 – an important step in removing traffic controllers from harm's way.

The department has also been working with the Queensland Police Service (QPS) to facilitate more speed enforcement at roadworks, with trailer mounted speed cameras targeted for deployment at the Boundary Road (Bruce Highway) and Gateway Upgrade North project sites. Both of these sites were chosen in light of what QPS described as 'excellent' or 'gold standard' speed signage.

On the education front, uptake of the new Traffic Management Design training has continued, with more than 588 qualifications issued as at 30 June 2017. In support of the new training, the project team has toured the state with the Traffic Management Roadshow, delivering awareness sessions to nearly 1000 people in 34 locations throughout Queensland.

Emergency Vehicle Priority

Emergency Vehicle Priority (EVP) is a revolutionary approach to creating safer communities by integrating Intelligent Transport Systems (ITS) with emergency service dispatch systems. First conceptualised in 2006, an initial proof of concept project was introduced in Bundaberg in 2008 to explore feasibility. The concept evolved to a successful trial of EVP on the Gold Coast from November 2012, and has since been expanded to a statewide rollout to be completed by June 2019.

The EVP solution deployed in Queensland is a dynamic intelligent transport system which is constantly tracking the position of Queensland Ambulance Services (QAS) emergency vehicles in 'Code 1' operation or Queensland Fire and Emergency Service (QFES) appliances in 'TO' operation; and automatically, without human intervention, interrupts normal traffic signal operations at the optimal timing for any given traffic condition. Objective 4

It provides a green traffic light signal to emergency response vehicles, when safe to do so, also considering the movement of pedestrians and the emergency vehicle itself through traffic. If the vehicle changes course, the EVP system adjusts itself accordingly to clear the way for the new route.

Independent project evaluation demonstrated a 17 per cent to 26 per cent improvement in travel time for ambulance vehicles. A user survey confirmed that the majority of respondents found that the Emergency Vehicle Priority System (EVPS) reduced travel time and perceived crash risk.

The EVP Project is progressing well, with over 1821 intersections across Queensland currently available for use with EVP.

Township Entry Treatment Program (pilot)

A Township Entry Treatment (TET) is a speed management treatment that involves providing physical measures at the transition from a high speed rural environment to a lower speed environment that coincides with entering a township.

A pilot of TET's was conducted at six Queensland townships during 2015. A preliminary evaluation of post implementation speeds showed a reduction on average of 2 kilometres per hour. There was a 13 kilometres per hour reduction noted at the Walkerston East township.

Following the successful trial, that showed TET's to be effective to reduce vehicle speeds and crash rates by enhancing drivers' awareness of the changing road environment, \$2.7 million has been made available under the *Targeted Road Safety Program* – *Mass Actions sub-program* for the implementation of a TET program of works at 49 locations across Queensland.

We are currently assessing the 49 identified locations for the suitability of installing a TET by completing a thorough field assessment. It is anticipated that all TETs will be installed by 30 June 2018.



New Township Entry Treatment at Walkerston East.

Mobile Laser Scanning (MLS) and 3D visualisation

The department has introduced a smarter way to capture terrain and feature information on the state road network. Over long corridor lengths, Mobile Laser Scanning (MLS) technology is faster, cheaper and safer than traditional surveying methods, producing three-dimensional models of the road network for use in asset management, road planning and design activities.

The department owns and operates a fleet of terrestrial surveying instruments and Remotely Piloted Aircrafts capable of scanning environments to collect data and create point clouds (visual representations of the data). In addition, TMR has delivered a multitude of airborne, terrestrial and mobile point cloud captures using our industry partners.

We have applied 3D printing capability to prototype steelwork parts for bridge jacking operations, prior to fabrications. This latest innovative application ensures components aligned within the structures tolerances and prevented any potential installation clashes.

Some examples of point cloud technology in practice over the last 12 months include:

- Point cloud technology was successfully employed in the wake of Ex-Tropical Cyclone Debbie to highlight issues facing the department at Sarina and Eungulla Ranges and Lamington National Park Road. 3D models and visualisations derived from point cloud and imaging technologies helped communicate to our stakeholders the scouring and slope failures caused by this extreme weather event.
- Terrestrial surveying was used to model heritage listed components of the Burnett River bridge for future reverse engineering purposes. The same technology was also used to calculate the volume of material contained in a number of Riverside Expressway bridges to better understand design life probability.
- point cloud information, derived from mobile laser scanning equipment, was used to find and assess 3000 kilometres of roadside conflicts along priority oversize vehicle routes.

Using point cloud technology to assist with Building Information Modelling for civil infrastructure, deformation monitoring, ever more complex 3D visualisation and modelling will be a strong focus for our department moving forward.

Drone bridge inspections

TMR utilises Remotely Piloted Aircraft (RPA – also commonly known as drones) to perform effective and economical programmed work and project support. Applications of use include inspection of road structures, aerial reconnaissance of greenfield construction sites, identifying shoaling locations at sandbars adjacent to navigation channels, identifying oil slick on seawater, post disaster damage assessments and monitoring of earth slope stability.

Using RPA footage and aerial photography is both high quality and low cost while adding value to the department and the community.

Community engagement opportunities for TMR projects have been enhanced with the sharing of drone flyover footage and aerial photography on the department's social media channels and website. This gives the community a unique visual of the progress of works underway across the state.

Contract reports that include flyover footage can clearly show the physical progress of deliverables such as earthworks, drainage structures, bridges and roads which add values to communication between customers and stakeholders.

During the flooding of Rockhampton caused by Ex-Tropical Cyclone Debbie, RPA footage was used to demonstrate the success of the very first implementation of traffic contraflow over Yeppen Flood Plain's high level bridge enabling continued road access into Rockhampton from the south at the peak of the flooding.

This rapidly advancing technology continues to be monitored within TMR to ensure that potential applications are identified and progressed from trial to implementation to add value to the work we deliver for Queensland.

Engineers Constructionarium October 2016

In 2016, six young Transport and Main Roads engineers took part in Australia's first ever Constructionarium event, helping to construct a scaled-down replica of the iconic Barcelona television tower.

Designed to complement theory with practice, the project gave young engineering professionals hands-on experience of a real construction project. Over a week at the University of Southern Queensland Springfield campus, participants were supported by a team of industry professionals through the whole life cycle of the project, providing them with a range of challenging teaching and learning conditions.

The event has proven itself a valuable tool in developing a skilled, professional and resilient workforce, with a follow-up event planned for late 2017.



TMR engineers participate in the first Constructionarium in Australia to create a replica of the Barcelona television tower.

Watch the timelapse video here: inside.tmr.qld.gov.au/corp/ news/Pages/Newsreel/TMR-engineers-bring-Barcelona-to-Queensland.aspx

Women in Engineering Exchange Program

Zoe Eather, a project engineer working on the Toowoomba Second Range Crossing, was the first recipient of a three-month placement with the South Korean Trade Office as part of an Engineering Exchange Pilot Program. The program was coordinated by TMR and Trade and Investment Queensland (TIQ), Seoul and took place from September until December 2016. This exchange is part of TMR's Women in Engineering and STEM program, an important initiative in our goal to achieve gender parity in the workforce.

The exchange provided Zoe with invaluable knowledge and hands on experience, particularly in areas of technological innovation including automatic pothole detection and Cooperative Intelligent Transport Systems.

The department is looking forward to further strengthening their partnership with TIQ, Seoul and identifying future opportunities for collaboration and knowledge sharing.

Read more about Zoe's exchange in her 'Letters from Korea' blog series: blog.tmr.qld.gov.au/blog/2016/09/19/zoes-letterskorea-1/



Zoe Eather and Daniel Kim, Trade and Investment Commissioner For Korea.