

**BUILDING IT BACK BETTER TO REDUCE RISKS  
AFTER MULTIPLE DISASTER EVENTS**

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## Abstract

*The Queensland Reconstruction Authority is currently managing a \$13.3 billion disaster reconstruction program, following consecutive years of major flood and cyclone events from 2009-2015. Building back better in order to reduce risk to communities and accelerate recovery after disasters is recognised as a key element in the post disaster reconstruction process. In an Australian first, the Queensland Betterment Fund was announced in February 2013 following Tropical Cyclone Oswald, a disaster event that caused \$2.4 billion in damage to many public assets that had been repeatedly impacted and restored following earlier disasters in 2011 and 2012. The intent of the Betterment Fund is to deliver global good practice in disaster reconstruction by increasing the resilience of Queensland communities to natural disasters, while at the same time reducing risk and future expenditure on asset restoration. In a landmark agreement between the Queensland and Australian Governments, a joint, targeted fund of \$80 million was approved to allow assets to be built back to a standard that would be more disaster resilient, reducing cost and risk to the community from future events. Under the Fund, local government assets were to receive the funding with a focus on assets identified at a local level that have been repeatedly damaged and are integral to community well-being. The assets would also provide maximum benefit in terms of resilience and risk reduction for a relatively minimal investment of public funds. This paper explores the establishment of the Queensland Betterment Fund and the significant role the fund plays in increasing the resilience of Queensland communities to natural disasters, and improving asset utility during and after natural disasters.*

**Keywords:** *Betterment; Queensland Reconstruction Authority; resilience; NDRRA; Queensland Floods*

## Introduction

Building back better in order to reduce risk to communities and accelerate recovery after disasters is recognised as a key element in the post disaster reconstruction process. The intent of the Betterment Fund is to deliver global good practice in disaster reconstruction by increasing the resilience of Queensland communities to natural disasters, while at the same time reducing risk and future expenditure on asset restoration.

Potential benefits for community recovery and resilience include reducing the risk of incidents, injuries and fatalities and improving asset utility during and after natural disasters. This will be achieved by restoring or replacing essential public assets to a more disaster-resilient standard.

While the provision for betterment works had been in place under Australia's disaster recovery funding arrangements since 2007, existing policy had typically made the process of applying for betterment slow and unwieldy. Natural Disaster Relief and Recovery Arrangements (NDRRA) generally fund only 'like-for-like' restoration or replacement of assets to pre-disaster standards (Commonwealth of Australia, 2014, p. 3). While this doesn't restrict assets from being rebuilt or replaced to a higher standard—it only determines the amount payable by the Commonwealth under the NDRRA (3). However, the principle tends to discourage states and local government from investing in mitigation (3).

A *Framework for Betterment* was developed by the Queensland Reconstruction Authority giving consideration to the financial implications of betterment and addressing

circumstances including evidence of prior and repeated damage, loss of utility and potential impact on economic or social factors of the community.

In a landmark agreement between the Queensland and Australian Governments, a joint, targeted fund of \$80 million was approved to allow assets to be built back better and to a higher standard that would be more disaster resilient, reducing risk to the community from future events. Under the Fund, local government assets were to receive the funding with a focus on assets identified at a local level that have been repeatedly damaged and are integral to community well-being. The assets would also provide maximum benefit in terms of resilience and risk reduction for a relatively minimal investment of public funds.

The Queensland Betterment Fund targets essential public assets owned by Local Government Authorities damaged by January 2013 disaster events. Some 57 out of a total of 73 Local Government Authorities were activated for disaster assistance under Australia's disaster funding program - NDRRA for the 2013 event, and as such were eligible to apply for betterment funding.

Eligible local government authorities were asked to identify key local infrastructure that had been repeatedly damaged in events including those of 2013 that would benefit from a more resilient reconstruction solution. Expressions of Interest (EOI) were received from 48 local governments with approximately \$1 billion worth of betterment projects proposed to improve the resilience of infrastructure to natural disasters.

As at 31 December 2014, more than 230 betterment projects with a total reconstruction cost of approximately \$170 million (including \$80 million in Betterment funding and local government contributions of more than \$12 million) will be delivered by councils to build more resilient infrastructure. The projects include stronger roads, drainage, water and sewerage treatment plants, bridges and culverts.

## **Recent history of natural disasters in Queensland**

In Australia, natural disasters such as floods, bush-fires and tropical cyclones occur regularly, causing more than AUS\$1.14 billion damage each year to homes, businesses and infrastructure, and serious disruption to communities (Prestipino, 2004). Flooding is historically the most costly disaster with average losses estimated at \$400 million a year (Healey, 2006).

Scientific research indicates that more extreme weather events, and large-scale single events with more severe cyclones, storms and floods, are expected in the future (Latham et al, 2010).

Since 2007, natural disasters have claimed more than 200 lives and directly affected hundreds of thousands of Australians. Deloitte Access Economics estimates that the total economic cost of disasters for 2012 alone exceeded \$6 billion. It predicts total economic costs will double by 2030, and will 'rise to an average of \$23 billion per year by 2050, even without any consideration of the potential impact of climate change. (Australian Attorney General's Department, 2014, p. 2)

In Queensland, communities are facing regular natural disasters, from bushfires to flooding and cyclones. It is unlikely that Queensland will avoid ongoing major natural disaster events in future years. As well as tropical cyclones, the continuing drought and dry weather in inland Queensland has led to predictions of an increased number of bushfires, possible heat waves and severe thunderstorms.

## The last decade in Queensland

Between November 2010 and April 2011, Queensland was struck by a series of natural disasters. Extensive flooding caused by periods of extremely heavy rainfall, destruction caused by a number of storm cells including Cyclones Tasha, Anthony and Severe Tropical Cyclone Yasi, and subsequent monsoonal rainfall, resulted in much of Queensland being declared disaster affected.

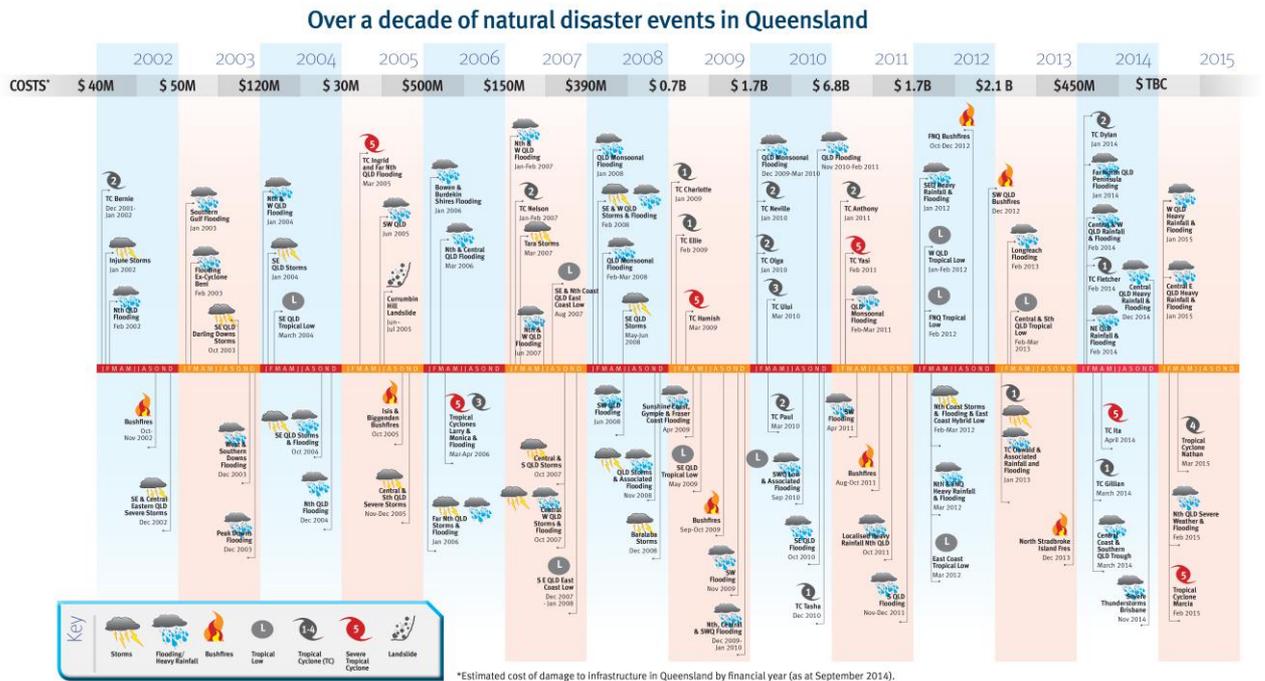
These events led to loss of life, the evacuation of over 70 towns and in excess of US\$15 billion of damages and losses. The events washed away roads, railways and other integral community infrastructure, and brought Queensland's \$20 billion coal export industry to a near halt. This flooding was one of Australia's largest and most expensive natural disasters (The International Bank for Reconstruction and Development, 2011).

In January 2013, Ex-Tropical Cyclone Oswald hit the coast of Queensland resulting in catastrophic effects. This event brought damaging winds including mini-tornados, extreme rainfall and flooding across the State before extending into New South Wales. The flooding caused destruction to 57 Queensland local government areas—many of which were only just recovering from the unprecedented loss and damage brought by the destructive natural disasters of 2010-2012. Even regions which were particularly devastated by the 2011 floods were not spared.

Since January 2014, 59 councils have been activated for natural disaster relief and recovery assistance with more than 30 activated for multiple disasters. Queensland experienced its strongest tropical cyclone in three years when Tropical Cyclone Ita crossed the coastline at Cape Flattery in April 2014. As the cyclone tracked south, it dumped large volumes of rain on the council areas in its path, with some heavily impacted. Events of 2014, including Tropical Cyclone Ita, were forecast to cost approximately \$450 million. As at 24 March 2015, Queensland has weathered two cyclones; Tropical Cyclone Marcia (Cat 5), with an estimated cost up to \$750 million, and Tropical Cyclone Nathan (Cat 4) – costs to still be collated.

The community, infrastructure and economic impacts of these natural disasters are enormous. The following diagrams represent the increasing cost to Queensland of natural disasters – approximately 90 per cent of damage costs since 2002 occurred between (2009-2014).

**Figure 1: Natural disaster events in Queensland since 2002**



## The establishment of Queensland Reconstruction Authority

The Queensland Reconstruction Authority was established in February 2011 immediately following the catastrophic floods of late December 2010 and January 2011. Its initial role was to oversee and co-ordinate the massive recovery and reconstruction efforts in affected communities across the State. Now, it is responsible for the full management and administration of the Natural Disaster Relief and Recovery Arrangements (NDRRA), relating to all 47 Queensland natural disaster events that occurred between 2007 and 2015.

Its role focuses on working with state and local government partners to deliver value for money and best practice expenditure and acquittal of public reconstruction funds. Its overarching goal is to facilitate the rebuilding of a safer, more resilient State that can withstand future natural disasters and mitigate future risks.

## The scale of the reconstruction task and associated costs

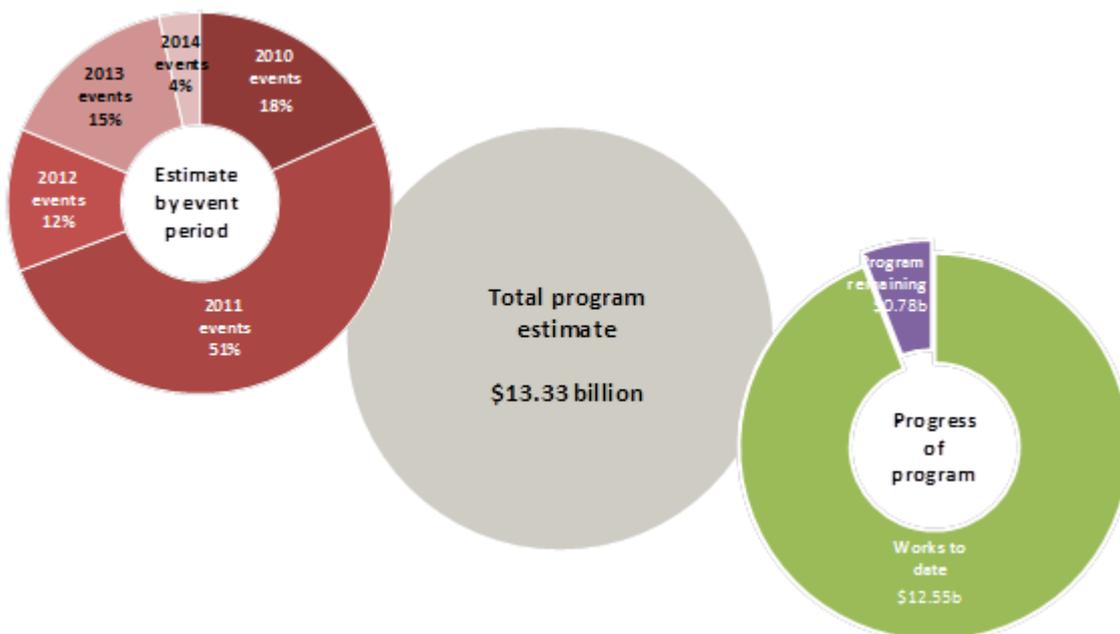
The frequency, severity and cost of natural disasters worldwide have significantly increased over the past 50 years and are expected to continue increasing in the future. (Latham et al, 2010)

Experience from both Australia and around the world shows an upward trend over time in the economic burden caused by natural disasters. The events of 2010/11, 2012, 2013, 2014 and 2015 resulted in an unprecedented number of essential public assets destroyed and damaged in Queensland. The NDRRA defines an 'essential public asset' as being 'an integral and necessary part of the state's infrastructure which is associated with health, education, transport, justice or welfare' (Commonwealth of Australia, 2012).

The estimated cost of damage from the 2013 events, which led to the creation of the Queensland Betterment Fund, is estimated at \$2.4 billion.

Queensland is dealing with more than \$13 billion of public infrastructure reconstruction from natural disaster events over the past six years.

**Graph 1: Reconstruction Progress Snapshot**



*A cumulative value of \$12.55 billion (94%) of the \$13.33 billion works program has been reported to the Authority at 31 January 2015 as in progress or delivered.*

*Source: the Authority, September 2014 NDRRA Estimates Review & 2 March 2015*

## Betterment

**Betterment means the difference between the cost of restoring or replacing an essential public asset to its pre-disaster standard, and the cost of restoring or replacing the asset to a more disaster-resistant standard.**

Since 2005, when the World Conference on Disaster Reduction adopted the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, there has been an international acknowledgement that efforts to reduce disaster risks must be systematically integrated into government policies, plans and programs.

At any point in time, more than a third of all countries are recovering from disasters, and for many communities recovery is an ever-present concern. This is therefore a critical moment not only for reassessing risk and pushing forward on risk reduction reforms and investments, but also for building comprehensive resilience to disaster. Ill-informed recovery often worsens the underlying conditions of risk and can lead to future events having even worse effects. (United Nations Development Program, 2014, p. 3)

The betterment approach to reconstruction is predicated on the potential for long-term cost savings. It embraces the rationale that an upfront increase in asset/infrastructure investment will provide significant future savings in terms of rebuilding or replacement costs, and consequent economic losses, in the event of a damaging natural disaster in the future. Repairs and restoration of damaged infrastructure and public assets are the most significant component of the cost of natural disaster events.

A study of 5,500 mitigation grants approved by the United States Federal Emergency Management Agency (FEMA) between 1993 and 2003 report an overall benefit cost ratio of 4:1 (Rose et al, 2007); approximately \$4 saved for every \$1 spent on mitigation.

Betterment has been applied in a number of international natural disaster events in the last decade including the devastating Indian Ocean tsunami in 2004, the Kashmir earthquake in Pakistan and Hurricane Katrina in the United States in 2005, Cyclone Nargis in Myanmar in 2008 and the Haiti earthquake in 2010.

Former US President Bill Clinton, as UN Special Envoy for Tsunami Recovery (2006), states in his report entitled, 'Key Propositions for Building Back Better':

A key test of a successful recovery effort is whether it leaves survivors less vulnerable to natural hazards. It is therefore vital that recovery plans identify the mechanisms to substantially reduce risk, and the resources for implementing such plans must be included from the outset. Successful risk reduction pays for itself many times over in the form of disasters avoided and lives safeguarded. Recovery efforts should, at minimum, ensure that communities become safer than they were before the disaster. We must bear in mind that each brick laid in the recovery process can either contribute to risk reduction or become an enabler for the next big disaster. Schools, homes, and other buildings and critical infrastructure should be rebuilt to higher standards and on safer ground. Restoring a community physically, only to leave it just as vulnerable to hazards as it was before the disaster, is unacceptable. (Office of the UN Secretary-General's Special Envoy for Tsunami Recovery, 2006)

In Australia, the financial case for Betterment is demonstrated when the allocation of funding to rebuild communities damaged by natural disaster is examined.

The majority of NDRRA expenditure is for the reconstruction and restoration of essential public assets to their pre-disaster standard. For the decade 2006-07 to 2015-16, it is estimated that the Commonwealth cash outlay to states will exceed \$12 billion for events that have occurred to date, with nearly \$10 billion (over 80 per cent) attributable to essential public assets. From 2013-14 to 2015-16, the government's estimated cash payments to states will account for nearly half of this (\$6 billion) of which around 85 per cent (\$5 billion) is for the reconstruction and restoration of essential public assets. (Commonwealth of Australia, 2013).

Beyond financial considerations, the Council of Australian Governments' National Strategy for Disaster Resilience (NSDR) notes that there is a strong link between development of community disaster resilience and implementation of risk reduction strategies, including the building of public assets to withstand the range of risks and hazards identified in a community's risk and hazard profile. Strengthening a public asset so that during or directly following a natural disaster it remains operational, or is non-operational for a shorter period, is a core element to enhancing a community's resilience, and increased public safety during and after a disaster event is an example of the broader social benefits that can be achieved through asset betterment.

Betterment of an essential public asset was introduced to Australia's Natural Disaster Relief and Recovery Arrangements (NDRRA) in 2007 to reduce recovery and rebuilding costs and encourage increased disaster-resilience in essential public assets. While the previous betterment arrangements have existed since 2007, cumbersome application processes have seen only one Australian project receiving betterment funding since its introduction into the NDRRA Determination.

## **The Queensland Betterment Fund**

The Queensland Betterment Fund is a Queensland Government initiative supported by the Australian Government under NDRRA. The \$80 million Betterment Fund was launched in the immediate aftermath of Tropical Cyclone Oswald, which caused damage in excess of \$2.4 billion to large areas of Queensland, adding to the significant cost of reconstruction from other natural disasters over recent years.

The Fund was open to Local Government Authorities across the State that were declared eligible for NDRRA assistance after these 2013 events. A total of 57 local government areas were deemed eligible. The Fund comprises \$40 million funded by the Commonwealth Government and \$40 million funded by the Queensland Government. The total \$80 million Betterment Fund is managed by the Queensland Reconstruction Authority.

The intent of this fund is to increase the resilience of Queensland communities to natural disasters, while at the same time reducing future expenditure on asset restoration, reducing incidents, injuries and fatalities during and after natural disasters, and improving asset utility during and after natural disasters.

## **The Betterment Framework**

The Queensland Betterment Fund was approved for Essential Public Assets damaged in the 2013 events. To underpin its delivery, the Queensland Reconstruction Authority developed a 'Framework Proposal for Betterment', that allows local governments to restore or replace damaged essential public assets damaged by Tropical Cyclone Oswald to a more disaster-resilient standard than their pre-disaster standard so they

achieve greater long-term social and economic benefits for affected communities.

The Framework significantly streamlined the process of eligibility, submission, assessment criteria for funding and distribution of betterment funds, which aligned with the Queensland Reconstruction Authority's existing approval processes.

Affected Local Government Authorities were required to prepare a submission in line with the requirements of the Framework. The Authority then assessed the proposal for completeness, eligibility and Value for Money. A key component of the assessment is a Benefit Analysis of both the financial and non-financial benefits of the proposal, such as prior damage, loss of utility and its impact on the economic or social wellbeing of the community including risk to health and safety.

Integral to the Queensland Betterment Fund was the focus on speed of assessment, approval and release of funds. This allowed local government to factor betterment works into their reconstruction schedule and begin works as soon as possible, mitigating the impact on their local communities.

As previously stated, under the previous national betterment arrangement established under the NDDRA, only one project was approved for betterment at a value of approximately \$700,000. By contrast, in 2013, within just six months of the Queensland Betterment Fund being established, the Queensland Reconstruction Authority had approved 220 projects with a betterment component of nearly \$80 million.

### **Progress of the Betterment Fund**

Following Ex-Tropical Cyclone Oswald, expressions of interest were received from 48 local governments. These equated to nearly \$1 billion worth of Betterment projects submitted to not just replace battered assets, but to make them more disaster resistant.

As at 31 December 2014, more than 230 betterment projects with a total cost of approximately \$170 million (including \$80 million in Betterment funding and local government contributions of more than \$12 million) will be delivered by councils to build more resilient infrastructure.

Spread across urban, rural and remote locations around Queensland, the projects are diverse, ranging from modest, yet essential improvements to drainage and road surfacing to larger infrastructure including bridges, levees and water treatment facilities. Councils report more than 107 projects are complete as at 31 December 2014. The remainder are due for completion by 30 June 2015.

**Table 1: The diversity of projects funded under the Betterment Fund**

<b>Asset Type/ Treatment</b>	<b>Amount</b>
Roads (realignment, resurfacing)	102
Flow and Drainage (floodway, culverts, causeways)	94
Bridge Upgrade or Repairs	25
Other (seawalls, embankments, levees, weirs, dams)	7
Water treatment or sewerage	5
<b>TOTAL</b>	<b>233</b>

## **Betterment Case Studies**

The following case studies demonstrate how Betterment projects have performed to expectation during subsequent events and are implementing disaster risk reduction and cost reduction measures with staying power.

### ***Gayndah Water Supply Intake – North Burnett Regional Council***

Gayndah is an established rural town situated approximately 320km north-west of Brisbane. An agricultural area, it is the nation's second biggest exporter of citrus and produces much of Australia's mandarin crops. The Gayndah Water Supply Intake Station on the Burnett River provides the town's only water supply and supports a population of approximately 2000, as well as local primary industries including dairy farming.

North Burnett Regional Council estimates \$3.85 million damage occurred to the asset following three years of disaster events. The pumping station was severely damaged in 2011 and was rebuilt at a cost of \$1.22 million. These works were completed just prior to Tropical Cyclone Oswald in early 2013, which subsequently destroyed the new jetty, raw water intakes, pumps and water discharge main. Reconstruction of the infrastructure in the existing position would not provide resilience to future natural disaster events and would place the community's water supply at risk again.

Council's betterment project for the Gayndah Water Supply included a new submersible-style pumping station, a water intake upstream of the weir and a new raw water main to the water treatment plant. The cost of relocating the Gayndah Water Supply Intake was \$3.95 million, with \$1.19 million funded through the Betterment Fund.

#### *Resilience*

During Tropical Cyclone Marcia in February 2015 the new water pump remained fully functional throughout, providing water to the community. The flood levels reached at Gayndah would have caused significant damage to the station at its original location. This equates to estimated savings of approximately \$2.7 million based on the estimated restoration costs from the 2013 damage.

**Photos 1-4: Repeated damage and repairs of Gayndah Water Supply Intake**



*Damaged in 2011 flood event*



*Repaired following 2011 flood event*



*Damaged again following 2013 flood event*



*Betterment underway*

**Photo 5: Works completed in 2014 (left)  
Photo 6: No damage during the 2015 event (right)**



## ***Gayndah-Mundubbera Road - North Burnett Regional Council***

As mentioned in the first case study, the rural town of Gayndah, approximately 320km north-west of Brisbane, is an important citrus-producing area of Queensland. Gayndah-Mundubbera Road is an essential freight and transport link for the North Burnett region. It connects Gayndah with Mundubbera, another highly productive agricultural town. The road was damaged in 2011 at a cost over the entire road in excess of \$801,780. The section proposed for betterment sustained significant damage in the 2011 and 2013 floods, restricting and interrupting traffic access for the local community. In the 2013 event, approximately two kilometres of the road was washed out and the damage sustained caused the road to be closed for three months. The estimated cost of emergent and restoration works was \$8,543,908.

North Burnett Regional Council's Betterment project re-built and increased the resilience of a washed out two kilometre section adjacent to the Burnett River, as well as provided better functionality of the entire Gayndah-Mundubbera Road. The project relocated the road uphill by 11 metres and included new storm water drainage works, concrete lined channels, culverts and scour protection. The total cost of the project was \$6.1 million, including \$1.3 million from the Betterment Fund.

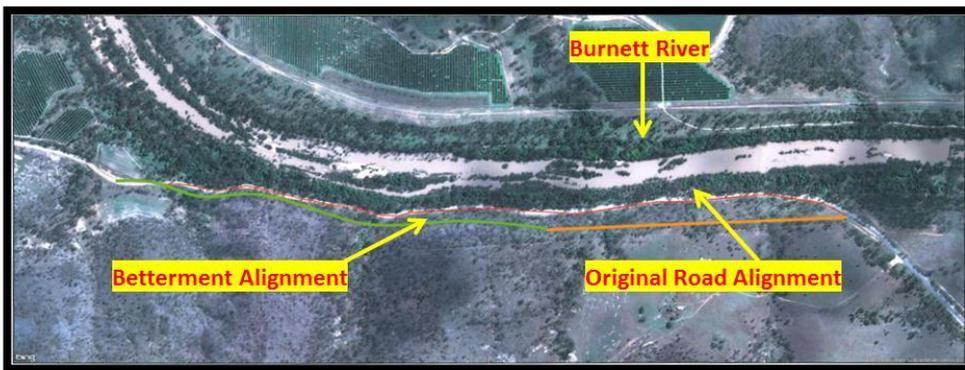
### *Resilience*

During the flooding associated with Tropical Cyclone Marcia, a 200 metre section along the lowest part of the road was inundated for approximately 48 hours. The road was re-opened within 3 hours of the flood waters receding, with an estimated \$1,500 expenditure required in emergent works to clean up and remove debris. This compares with the road's closure for four months in 2013, and emergent work costs of approximately \$1 million. This equates to an estimated savings of approximately \$4.6 million based on estimated 2013 restoration costs.

**Photos 7 & 8: Damage on Gayndah-Mundubbera Road**



**Map 1: Realignment of Gayndah-Mundubbera Road**



**Photo 8: Relocated road**



**Photo 9: Following the TC Marcia clean up**



## ***Grantleigh Pheasant Creek Road – Banana Shire Council***

Grantleigh Pheasant Creek Road provides access to a local farming community of 30 residents and primary producers near the small rural township of Wowan and the Capricorn Highway. The gravel floodway was completely washed out in the 2013 flood, forcing the community to use an alternate route, which was also subject to closures—adding 60 kilometres to travel times. The damage caused the floodway to be closed for eight weeks, with a further two weeks of traffic interruptions while emergent works were being completed to safely reopen the road.

Council's betterment project included the construction of a concrete floodway with aprons and cut off walls in lieu of the existing gravel floodway, as well as raising the level of the floodway to increase its flood immunity. The total cost of the project was \$104,500, including \$44,000 from the Betterment Fund.

### *Resilience*

Following Tropical Cyclone Marcia the floodway was again inundated, closing the road for three days until flood levels subsided. There was no damage to the betterment site and the road was immediately open to traffic after the water subsided. This equates to estimated savings of \$55,000, based on the estimated restoration costs for 2013.

### **Photos 11 & 12: Damage following the January 2013 flood**



**Photo 12**



**Photo 13: More resilient floodway survives TC Marcia in February 2015**



## ***Upper Mount Bentley Road - Palm Island Aboriginal Shire Council***

Palm Island is a remote Indigenous community situated off the coast of Townsville in North Queensland. Upper Mount Bentley Road on Palm Island provides the only on-ground access to vital telecommunications infrastructure located at the peak of Mount Bentley. The telecommunications tower is an integral part of Palm Island's infrastructure; associated with the health, education and welfare of the community of 2,400 residents. Providing Palm Island with the only form of communication throughout the island and to the mainland, the tower is essential to maintaining contact with emergency services and police on both the Island and the mainland.

The road was unsealed prior to betterment. In past disaster events, Upper Mount Bentley Road had been damaged leaving the telecommunications tower inaccessible, causing severe disruption to the normal functioning of the Palm Island community and enhancing risk by impacting communications with essential services on the Island and the mainland. Palm Island Indigenous Council submitted that it was crucial that there is all weather 4WD access to this area to conduct repairs. Council's betterment project included the construction of concrete surfacing, to a total of approximately 400-500 metres of the steepest or most vulnerable sections of the road, allowing vehicle access to the telecommunications tower after heavy rain periods. The total cost of the project was approximately \$797,000, including \$438,998 from the Betterment Fund.

### *Resilience*

Betterment works were completed prior to the commencement of the Queensland monsoon season in December 2014. The works were put to the test when Palm Island was impacted by Tropical Cyclone Dylan in February 2014. Upper Mount Bentley Road successfully withstood heavy rains and subsequent flooding. The road remained open and access was maintained throughout the flood period, allowing repair work to the communications tower to be carried out without delay.

**Photo 14: Damage from the 2013 event**



**Photo 15: The repaired and more resilient road in Feb 2014, following TC Dylan**



## ***Upper Ulam Road – Rockhampton Regional Council***

Upper Ulam Road is a 15.56 kilometre unsealed road, located approximately 40 kilometres south of Rockhampton which services the rural community of Bajool—home to 40 residences, including 10 beef producers. The road is the only reliable access route to the Bruce Highway for these properties during flooding events.

The betterment site is a low level concrete floodway crossing Station Creek that is subject to frequent flooding from heavy rainfall and is susceptible to damage during major floods. The closure of the road for days at a time has a significant impact on the community by isolating them for attending work, school, acquiring food and supplies, medical facilities, and emergency vehicle access.

The crossing was damaged in the 2011 and 2013 events and suffered scouring and washout from flood waters. The total recommended cost of restoration from previous events was \$116,723.

Council's betterment project which is still being delivered and is currently only 75 per cent complete, has made the floodway more resilient by increasing the height and capacity of the culverts, to prevent the impact of overtopping and undermining by flood waters. The total cost of the project is estimated to be \$667,788, including \$474,758 from the Betterment Fund.

### *Resilience*

During Tropical Cyclone Marcia, high water levels over the floodway reached heights of 1.4 metres. Despite the project still being in delivery, no damage was evident.

Photos 16 & 17: Damage to Upper Ulam Road in 2013



Photos 18 & 19: No damage following TC Marcia in February 2015



## Conclusion

The Queensland Betterment Fund is an initiative born out of successive years of natural disaster and repetitive impacts that have damaged infrastructure and devastated communities around the State.

The Fund has been established with the fundamental principle that a strategically made investment of comparatively minor investment applied to rebuild targeted assets to be more resilient against future disasters will have a long standing economic and social benefit to impacted communities. By investing a little more to incorporate resilient construction solutions in the immediate aftermath of disaster, longer term risks can be mitigated, future reconstruction costs can be reduced and the human and social impacts of natural disaster can be minimised.

The betterment provision provides the link between recovery now and the mitigation of future disasters. With recovery costs of natural disasters in Australia and around the world escalating, a commonsense and effective means of reducing the impact of these events is to increase investment in more robust infrastructure that can withstand repeated impacts from natural disasters. Such investment has the potential to reduce the financial and social costs of disaster recovery in addition to minimising asset downtime, providing a strong incentive for governments at all levels to adopt betterment as a standard recovery and reconstruction concept following a natural disaster.

The Queensland experience has allowed communities to be closely monitored through the phases of disaster recovery over multiple events in a relatively short space of time. The Framework for Betterment that was developed in response to repeated damage to essential infrastructure made resilience and disaster risk reduction a priority for the State and empowered local governments to build back better to reduce future economic and social risk from natural disasters.

Building more resilient infrastructure that has been designed to withstand further impacts is an investment in future recovery that should lessen the impact on both the public purse long-term and the immediate health, safety and wellbeing of the community in the event of a natural disaster.

The reconstruction of assets post-disaster allows the opportunistic investment in improving the resilience of assets rather than rebuilding to their previous standard, effectively improving the resilience of communities.

With construction of \$170 million worth of projects that include a betterment component completed or underway around Queensland, the benefits of this innovative approach are already being realised. Queensland, with its history of natural disasters and the near certainty of future disasters, is in a unique position to showcase the practical and successful application of betterment in the reduction of risk from future and multiple natural disaster events.

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