New Tabulam bridge for Bruxner Highway

Preferred Route Option Report

MAY 2014
Executive summary

Introduction

Tabulam is in the Northern Rivers region of New South Wales, situated on the Bruxner Highway (HW16), between Tenterfield and Casino, and located on the Clarence River.

The existing Bruxner Highway bridge over the Clarence River at Tabulam, which is a State heritage listed structure, is primarily a timber structure and has an overall length of about 300 metres, comprising 13 timber approach spans and five composite timber/steel de Burgh truss central spans. The overall width between kerbs is only 4.6 metres, accommodating only single lane traffic. The main spans are supported by concrete piers located in the river, whilst the approaches are supported by timber trestles.

Extensive maintenance works have been carried out over recent years to ensure the bridge remains safe for legally loaded vehicles. However, the bridge presents significant transport limitations both now and into the future and also requires a disproportionate share of NSW Roads and Maritime Services (Roads and Maritime) bridge maintenance funding.

Roads and Maritime is currently carrying out investigations for a new bridge over the Clarence River and to remove the existing structure. The study area for the project is located on the Bruxner Highway incorporating the village of Tabulam and the Clarence River.

The process to identify a preferred route for the new Tabulam bridge project involves:

- The development and assessment of the route options
- Community and stakeholder consultation
- Investigations of the study area
- The identification and display of the preliminary route options for community comment
- Field investigations and technical studies
- A value management workshop
- The identification and display of a preferred route option.

Following the display of the preferred option, Roads and Maritime will prepare a concept design and an environmental impact assessment (EIA) for further community input. Issues raised by the community will be considered before project approval is sought.

This report focuses on the development and display of the preferred route option.
Project objectives

The project objectives are as follows:

- Enhance road safety for all road users over the length of the project, including improving safety for pedestrians and cyclists. Investigate and determine the appropriate treatment for pedestrians and cyclists on the new structure
- Remove the existing bridge
- Improve traffic efficiency
- Improve road transport productivity and reliability
- Support regional and local economic development including improved opportunity for economic and tourist development for Tabulam
- Provide a value for money solution
- Minimise impacts on the natural, social and built environment
- Coordinate construction traffic to minimise its impact and damage to the existing structure and to make allowance for potential maintenance works that may need to be conducted during the course of this project
- Involve all stakeholders and consider their interests
- Consider constructability impacts
- Consider Work Health and Safety impacts of the project options.

Strategic transport and planning context

A number of plans and strategies are referenced in this report that provides an overview of the transport planning context for NSW and more locally the Bruxner Highway. These are:

- NSW Long Term Transport Master Plan
- State Plan - NSW 2021
- State Infrastructure Strategy
- Ballina to Tenterfield Corridor Strategy.

Furthermore, two additional studies relate directly to the strategy of providing a new bridge at Tabulam and demolishing the existing bridge. These are:

- Timber Truss Bridge Conservation Strategy.
- Bridges for the Bush.

Timber Truss Bridge Conservation Strategy

The Timber Truss Bridge Conservation Strategy was completed in July 2012. The strategy was developed to address the long term management of timber truss bridges in NSW. The strategy, carried out in consultation with the Heritage Council of NSW, aims to establish a balance between infrastructure provision and heritage conservation.
The strategy identified the existing bridge over the Clarence River at Tabulam as requiring replacement and for the existing structure to be removed. It found that the existing bridge could not be upgraded to meet current or future transport needs.

Furthermore, the strategy found that any form of retention of the bridge would present continuing conservation, operational and financial challenges. The report noted that conservation of the bridge would not substantially strengthen the representative sample and would come at a high ongoing cost to government.

**Bridges for the Bush**

In October 2012 the NSW Government committed to improving road freight productivity by replacing or upgrading bridges over the next five years at 17 key locations in regional NSW.

One of the priority programs to help manage ageing assets and provide a benefit to freight productivity includes the replacement of six heritage timber truss bridges to modern standards, including the existing bridge over the Clarence River at Tabulam.

**Community involvement**

A community and stakeholder consultation strategy has been implemented since the project began in May 2013. The local community has important information on issues and constraints in the study area that has assisted in identifying a preferred route for the new bridge.

Activities to date have included:

- Announcement of the project and mail out to local residents and stakeholders
- A staffed drop-in session in Tabulam following the announcement of the project and study area
- Announcement of the shortlisted route options and publication of a community update
- A staffed drop-in session in Tabulam following the announcement of the shortlisted route options
- Advertising and media coverage (print and electronic) informing the community of key aspects of the project and opportunities for involvement
- Provision of a free call community information line (1800 810 680) and email for project inquiries - community.input@ghd.com
- Meetings/briefings to local councils, Tabulam Chamber of Commerce and special interest groups
- Dedicated project webpages on the Roads and Maritime website
- An Early Feedback Summary report following the display of the study area and receipt of community feedback, which is available on the Roads and Maritime project website
- A Feedback Summary report following the display of the shortlisted route options and receipt of community feedback
- Community and stakeholder participation at the value management workshop, providing input into the selection of a preferred route option for the project.
The preferred route option, along with this report, will be placed on public display for a period of four weeks and public comment invited.

Roads and Maritime will continue to work closely with the community throughout the remainder of the project.

**Community feedback and retention of the existing bridge**

Roads and Maritime acknowledges there is some community opposition to the removal of the existing bridge over the Clarence River at Tabulam. Roads and Maritime has received this feedback verbally, in written form and via two community petitions.

Options that were considered for retaining the existing bridge included:
- Retain the existing bridge for pedestrian access only
- Retain the bridge for visual aesthetics only until the bridge collapses into the river
- Retain the existing bridge for its current use.

This feedback has been carefully considered. However, due to ongoing conservation, operational and financial challenges presented by retaining the existing bridge, Roads and Maritime is proceeding with the current project. This includes identifying a replacement bridge location and removal of the existing bridge.

Roads and Maritime is investigating ways to recognise the heritage significance of the existing bridge and will work with the community to determine the most appropriate ways that the bridge could be remembered. The community is encouraged to continue to provide feedback and ideas.

**Study area characteristics**

To assist in the development of the preliminary route options a number of preliminary desktop studies were carried out to understand the key characteristics within the study area.

Findings from the studies were used to build constraint mapping across areas such as socio-economic, environmental and engineering, which were used to assess the potential impacts for each of the preliminary route options developed within the study area.

**Route options development**

The route option development process includes several steps:
- Review of existing data including reports, maps and other information available
- Site familiarisation and site visits including inspections of road, bridges and study area
- Preliminary investigations and assessments to determine the opportunities and constraints for route options
- Development of preliminary route options
- Shortlisting workshop to review and assess preliminary route options and establish a shortlist of route options worthy of further development and investigation
- Route options development report and display
• Onsite investigations including geotechnical investigations, flora and fauna surveys, noise monitoring and Aboriginal heritage survey and consultation
• Value management workshop for the selection of a preferred route option
• Preferred route report and display – where we are now.

Selection of the shortlisted route options

A shortlisting workshop was held in August 2013 to evaluate eleven preliminary route options against the project objectives and establish a shortlist of route options for further development and investigation.

At the conclusion of the preliminary route option assessment process the following route options were shortlisted for public display and further development and investigation:

• **Option A** - starts at the existing highway on the western approach, crossing the river upstream and parallel to the existing bridge, then converges and re-joins the highway at the Clarence Street intersection. This option uses only one of the existing overflow bridges on the western side of the river.

• **Option B** - starts at the highway on the western approach, crossing the river upstream and parallel (curved alignment) to the existing bridge, connecting to the existing highway at the Clarence Street intersection. This option utilises both overflow bridges on the western side of the river.

• **Option C** - starts at the existing highway on the western approach, crossing the river downstream and parallel to the existing bridge, then converges and re-joins the highway at the Clarence Street intersection. This option uses only one of the existing overflow bridges on the western side of the river.

• **Option D** – starts at the existing highway at the most western overflow structure, crossing the river downstream on a slight angle to the existing bridge, then converges and re-joins the highway at the Clarence Street intersection. This option uses only one of the existing overflow bridges on the western side of the river.

A description of the preliminary option development and selection of the shortlisted route options process is documented in the Route Option Development Report which is available on the Roads and Maritime website.

Selection of the preferred route option

Shortly after the display of the four route options, additional onsite investigations were carried out including geotechnical investigations, flora and fauna surveys, noise monitoring and Aboriginal heritage survey and consultation.

Following the site investigations and analysis of community comment a value management workshop was held in February 2014 to evaluate the four route options using assessment criteria based on the project objectives.

A description of the value management workshop and process is documented in the Value Management Workshop Report which is available on the Roads and Maritime website.
Following the workshop and further investigation Option D has been identified as the preferred option for the new Tabulam bridge as it would:

- Have little or no impact on flora and fauna
- Provide improved access to Clarence River Road and the pre-school
- Be located away from the existing bridge, resulting in minimal traffic impacts during construction
- Not impact on known Aboriginal cultural heritage
- Minimise private land acquisition
- Have least impact on public utilities
- Result in a better and safer horizontal and vertical alignment outcome
- Provide the best value for money solution.

Next steps

Following the display of the preferred route option, Roads and Maritime will review submissions received during the display period and consider them during the development of the concept design and environmental assessment. A community feedback report will be prepared to summarise the feedback received and published on the Roads and Maritime website.

In addition, more detailed field investigations will be carried out for the preferred route option corridor to assist the development of the concept design and environmental impact assessment.

The concept design and environmental impact assessment will be displayed for community comment.
## Contents

1 Introduction.................................................................................................................. 1  
   1.1 Project overview ................................................................................................. 1  
   1.2 Report purpose and structure ............................................................................. 3  
   1.3 The need for the project ...................................................................................... 3  
   1.4 Project objectives................................................................................................ 3  
   1.5 Project details ...................................................................................................... 4  
   1.6 The study area .................................................................................................... 4  
   1.7 Design requirements............................................................................................ 6  
   1.8 The planning process .......................................................................................... 6  
   1.9 Working papers................................................................................................... 8  

2 Strategic transport and planning context................................................................. 9  
   2.1 Strategic transport and planning ........................................................................ 9  
   2.2 Higher Mass Limits (HML) vehicles ................................................................... 12  
   2.3 Implications of doing nothing ........................................................................... 12  

3 Approach to the project .......................................................................................... 13  
   3.1 Development of a long list of route options ....................................................... 13  
   3.2 Development of the shortlist of route options .................................................. 13  
   3.3 Development and assessment of the preferred route ....................................... 14  

4 Characteristics of the study area and issues for route option development............ 15  
   4.1 Overview of the study area ................................................................................. 15  
   4.2 Existing highway ................................................................................................ 16  
   4.3 Traffic and transportation characteristics........................................................ 18  
   4.4 Road safety ......................................................................................................... 19  
   4.5 Land use and planning issues.............................................................................. 20  
   4.6 Heritage .............................................................................................................. 26  
   4.7 Visual amenity ..................................................................................................... 30  
   4.8 Noise, vibration and air quality .......................................................................... 32  
   4.9 Biodiversity ......................................................................................................... 33  
   4.10 Hydrology and hydraulics ................................................................................. 34  
   4.11 Water quality .................................................................................................... 36  
   4.12 Geotechnical conditions .................................................................................. 36  
   4.13 Public utilities ................................................................................................... 38  

5 Route options ........................................................................................................... 40  
   5.1 Community input to route options ..................................................................... 40  
   5.2 Process for development of the route options .................................................. 41  
   5.3 Development of the long list of route options .................................................. 41  
   5.4 Selection of the shortlisted route options ......................................................... 45  
   5.5 Short listed route options ................................................................................... 49  

6 Consultation and value management workshop ...................................................... 52  
   6.1 Public display activities ....................................................................................... 52  
   6.2 Value management workshop ............................................................................ 56
7 Selection of the preferred route ......................................................................... 63
  7.1 Overview of process to date...................................................................... 63
  7.2 Value management workshop outcome ................................................. 63
  7.3 Investigations following the value management workshop ................. 63
  7.4 Technical group option assessment workshop ..................................... 64
  7.5 The preferred route ............................................................................... 64
  7.6 Reasons why the preferred route was selected................................... 65
8 The preferred route ............................................................................................ 66
  8.1 Overview................................................................................................... 66
  8.2 Benefits of the preferred route ................................................................. 66
  8.3 Potential impacts of the preferred route ................................................. 68
9 The next steps ................................................................................................... 70
10 References ................................................................................................... 71

Tables
Table 1-1 Project details ...................................................................................... 4
Table 1-2 Geometric performance and design requirements......................... 6
Table 4-1 Average daily traffic volumes for Tabulam Bridge....................... 19
Table 4-2 LEP zone objectives and provisions .............................................. 21
Table 5-1 Assessment criteria and weightings ................................................. 45
Table 5-2 Initial evaluation results.................................................................... 47
Table 5-3 Preliminary route option evaluation results................................... 48
Table 5-4 Strategic cost estimates for shortlisted route options..................... 50
Table 6-1 Summary of benefits and challenges raised by the community .... 53
Table 6-2 Assessment ranking and strategic cost estimates ......................... 61

Figures
Figure 1-1 Locality sketch ............................................................................... 2
Figure 1-2 Study area ....................................................................................... 5
Figure 2-1 View to the west of traffic crossing the Tabulam Bridge ............. 11
Figure 4-1 Existing bridge over the Clarence River at Tabulam – view east ... 17
Figure 4-2 Existing Clarence River Overflow bridges ................................... 17
Figure 4-3 Land Use and Planning ................................................................. 25
Figure 4-4 Aboriginal sites and predictive mapping ..................................... 27
Figure 4-5 Non-Aboriginal heritage ............................................................... 29
Figure 4-6 Landscape character zones ......................................................... 31
Figure 4-7 Flooding 100 yr ARI .................................................................. 35
Figure 4-8 Geotechnical ............................................................................... 37
<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-9</td>
<td>Utilities</td>
<td>39</td>
</tr>
<tr>
<td>5-1</td>
<td>All Route Options</td>
<td>44</td>
</tr>
<tr>
<td>5-2</td>
<td>Shortlisted options</td>
<td>51</td>
</tr>
<tr>
<td>6-1</td>
<td>Plan view of possible bridge approach treatment</td>
<td>55</td>
</tr>
<tr>
<td>6-2</td>
<td>Perspective view of possible bridge approach treatment</td>
<td>56</td>
</tr>
<tr>
<td>8-1</td>
<td>Preferred route option</td>
<td>67</td>
</tr>
</tbody>
</table>
1 Introduction

This chapter provides an overview of the project details, the study area and project objectives. It also describes the purpose and need for the project along with the planning process and working papers produced to date.

1.1 Project overview

Tabulam is in the Northern Rivers region of New South Wales and is situated on the Bruxner Highway (HW16), between Tenterfield and Casino. Located on the Clarence River, its position on the northern catchment of one of Australia’s largest rivers affords it geographical and environmental significance.

Originally occupied by the Bundjalung people, Tabulam and surrounding land was first settled by Europeans in 1839. A postal service from Grafton was established in 1848 and eventually a courthouse and post office opened in 1849. The river crossing remained a problem with many sheep-droving teams stranded when the river flooded. The existing bridge was built in 1903, though a punt had aided river crossings as early as 1863. As such the heritage of the town is an important consideration when planning for a new bridge over the Clarence River.

A map of Tabulam and its location in northern NSW is provided as Figure 1-1.

The existing Bruxner Highway bridge over the Clarence River at Tabulam, which is a State heritage listed structure, is primarily a timber structure and has an overall length of about 300 metres, comprising 13 timber approach spans and five composite timber/steel de Burgh truss central spans. The overall width between kerbs is 4.6 metres, accommodating single lane traffic only. The main spans are supported by concrete piers located in the river, whilst the approaches are supported by timber trestles.

Extensive maintenance works have been carried out over recent years to ensure the bridge remains safe for legally loaded vehicles. However, the bridge presents significant transport limitations both now and into the future and also requires a disproportionate share of NSW Roads and Maritime Services (Roads and Maritime) bridge maintenance funding.

Roads and Maritime is currently carrying out investigations to replace the existing Bruxner Highway bridge over the Clarence River at Tabulam with a modern structure and to remove the existing structure.

Planning activities include:

- Desktop studies for the study area focusing on environmental, physical, socio-economic and existing infrastructure constraints in and around the town
- Development of feasible route options
- Selection of shortlisted route options for further assessment and site investigations
- Selection of a preferred route for further assessment and site investigations
- Concept design for the preferred route
- Environmental impact assessment (EIA).
1.2 Report purpose and structure
This report describes the process that has led to the identification of a preferred route option. This includes the route option development process, shortlisting and preferred option selection workshops and the outcomes of community involvement.

This report includes the following information:

- Section 1 – Provides introductory information, need for the project, project objectives, study area and other general information
- Section 2 – Summarises the strategic transport and planning context
- Section 3 – Describes the route selection process
- Section 4 – Describes the characteristics of the study area and issues for the project relevant to the route selection process
- Section 5 – Describes the community consultation process for the route option development process, development of the preliminary route options and shortlisting of the route options
- Section 6 – Summarises the consultation received on the project, the value management workshop and additional investigations carried out on the shortlisted route options
- Section 7 – Presents the investigations on and reasons for the preferred route
- Section 8 – Presents an overview of the benefits and issues for the preferred route option
- Section 9 - Describes the next steps in the process to complete a concept design and EIA
- Section 10 – Provides the references for this report.

1.3 The need for the project
The existing bridge over the Clarence River at Tabulam is costly to maintain and is considered a major capacity constraint on the Bruxner Highway due to current load restrictions and bridge type.

The length and width of the bridge allows only a single lane of traffic and thus requires traffic to stop and give way to oncoming vehicles. Additionally the bridge does not have any dedicated pedestrian or cyclist facilities forcing vulnerable road users to share the road with heavy vehicles.

The annual average maintenance expenditure for the bridge over the last 10 years is in the order of $700,000. Future maintenance costs are likely to increase significantly as the existing critical timber elements, such as trestles, approach the end of their life.

1.4 Project objectives
The objectives for the project are:

- Enhance road safety for all road users over the length of the project including improving safety for pedestrians and cyclists. Investigate and determine the appropriate treatment for pedestrians and cyclists on the new structure
- Remove the existing bridge
- Improve traffic efficiency
• Improve road transport productivity and reliability
• Support regional and local economic development including improved opportunity for economic and tourist development for Tabulam
• Provide a value for money solution
• Minimise impacts on the natural, social and built environment
• Coordinate construction traffic to minimise its impact and damage to the existing structure and to make allowance for potential maintenance works that may need to be conducted during the course of this project
• Involve all stakeholders and consider their interests
• Consider constructability impacts
• Consider Work Health and Safety impacts of the project options.

1.5 Project details

<table>
<thead>
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<th>Table 1-1 Project details</th>
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<tr>
<td><strong>Project</strong>: Tabulam New Bridge</td>
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<td><strong>Region</strong>: NSW Roads and Maritime Services, Northern Region</td>
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<tr>
<td><strong>Road Name</strong>: Bruxner Highway</td>
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<td><strong>Road Number</strong>: HW16</td>
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<tr>
<td><strong>Project Location</strong>: Tabulam NSW</td>
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<tr>
<td><strong>Project Length</strong>: Approximately one kilometre</td>
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<td><strong>Council Area(s)</strong>: Kyogle Council, Tenterfield Shire Council</td>
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1.6 The study area
The study area for the project is located on the Bruxner Highway incorporating the village of Tabulam and the Clarence River.
A map of the study area for the project is provided as Figure 1-2 below.
1.7 Design requirements

The proposed bridge over the Clarence River, minor bridges, and any approach roads must be designed to comply with the design requirements of the Austroads Standards, Roads and Maritime supplement(s) and AS 5100 for bridge design. An outline of these is as follows.

### Table 1-2 Geometric performance and design requirements

<table>
<thead>
<tr>
<th>Design criteria</th>
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<tr>
<td>Horizontal and vertical alignment</td>
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<tr>
<td>Design speed</td>
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<tr>
<td>Maximum grade</td>
<td>10%</td>
</tr>
<tr>
<td>Road cross section</td>
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<tr>
<td>Number of travel lanes</td>
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</tr>
<tr>
<td>Travel lane width</td>
<td>3.5 metres</td>
</tr>
<tr>
<td>Shoulder width</td>
<td>1.0 metre</td>
</tr>
<tr>
<td>Bridges</td>
<td></td>
</tr>
<tr>
<td>Width between kerbs</td>
<td>9.0 metres</td>
</tr>
<tr>
<td>Length of bridge (between abutments)</td>
<td>300 - 320 metres</td>
</tr>
<tr>
<td>Lane numbers per carriageway and widths</td>
<td>3.5 metre wide lanes with one in each direction</td>
</tr>
</tbody>
</table>

1.8 The planning process

1.8.1 The process

The planning process for the new Tabulam bridge project involves two stages and numerous tasks as follows:

- Stage 1: Development and assessment of route options:
  - A program of community and stakeholder consultation
  - Development of project criteria which are based on the project objectives
  - Development of a long list of route options using a geographic information system, investigations of the study area, other project requirements such as design standards and input from the community
  - Assessment of the long list of route options against the project objectives and criteria to identify a shortlist of feasible options
  - Development and display of a shortlist of route options
  - Development of a preferred option based on information collected during targeted fieldwork, issues raised by the community and stakeholders in relation to the options and a value management workshop.
Stage 2: Assessment and approval of the preferred route:

- Refinement and display of the preferred option
- Concept design and environmental impact assessment of the preferred option
- Determination of the project.

This report focuses mainly on the development of a preferred route option, value management workshop, refinement and display of the preferred route option.

1.8.2 Community and stakeholder involvement

A community and stakeholder consultation strategy has been implemented since the project began. The local community has important information on issues and constraints in the study area that has assisted in identifying a preferred route option for the new bridge.

Activities to date have included:

- A letter informing each resident of the project and study area
- A staffed drop-in session in Tabulam following the announcement of study area and project
- Announcement of the shortlisted route options and publication of a community update
- A staffed drop-in session in Tabulam following the announcement of the shortlisted route options
- Advertising and media coverage (print and electronic) informing the community of key aspects of the project and opportunities for involvement
- Provision of a free call community information line (1800 810 680) and email for project inquiries - community.input@ghd.com
- Meetings/briefings to both Tenterfield Shire Council and Kyogle Council, Tabulam Chamber of Commerce and special interest groups
- Creating a dedicated project webpages on the Roads and Maritime website
- An Early Feedback Summary report following the display of the study area and receipt of community feedback
- A Feedback Summary report following the display of the shortlisted route options and receipt of community feedback
- Community and stakeholders participation in the value management workshop, providing input into the selection of a preferred route option for the project.

The preferred route option, along with this report, will be placed on public display for a period of four weeks and public comment invited.
1.8.3 The next steps

The public display of the preferred route will announce the preferred route option and provide the community and stakeholders the opportunity to provide comment for incorporation into the concept design development and environmental assessment phase.

A community update will be sent to the project mailing list and property owners within or near the preferred route option corridor. The update includes a description of the preferred route option, outcomes of value management process and details about the displays, and explains how to make a submission.

A staffed drop-in session will be held during the display period to enable the community to ask questions about the route options and provide feedback.

Advertising will be used to assist in raising public awareness of the preferred route option displays, where and how people can make a submission on the preferred route option and provide contact details for the project.

Following exhibition of the preferred route option, submissions will be reviewed and comments considered during the development of the concept design and environmental assessment process.

Further investigations and assessments will be conducted on the preferred route such as geotechnical investigations, traffic and transportation assessment, cost estimate and environmental investigations for incorporation into environmental assessment.

Community and stakeholder consultation activities will continue throughout the process of developing the concept design and preparation of an EIA for project approval.

1.9 Working papers

To date the following working papers have been produced to document the project development which are available on the Roads and Maritime website:

- An Early Feedback Summary report following the initial drop-in session at Tabulam
- A Route Options Development Report
- A Feedback Summary report following the drop-in session at Tabulam for the announcement of shortlisted route options.

As part of the display of the preferred route option the following working papers will be placed on the Roads and Maritime website:

- The Value Management Workshop Report which documents the process of selecting and recommending a preferred route option for approval
- This Preferred Route Report.
2 Strategic transport and planning context

This chapter describes the context of the project upgrade in terms of the strategic planning framework.

2.1 Strategic transport and planning

2.1.1 NSW Long Term Transport Master Plan

The Long Term Transport Master Plan was released by Transport for NSW in December 2012. It identifies the key transport challenges for NSW over the next 20 years to support NSW’s development and outlines specific actions to address these challenges. Though not addressed specifically, the proposal to replace the Tabulam Bridge supports targeted measures to reduce stoppages, better use existing road capacity and improve road safety.

The plan makes reference to the Bridges for the Bush program which aims to improve regional connectivity and freight efficiency through the replacement of heritage timber truss bridges with modern structures allowing for Higher Mass Limits (HML) vehicles. The plan recognises the replacement of the bridge over the Clarence River at Tabulam as an important activity for realising its objectives. Further detail on the Bridges for the Bush program is outlined in Section 2.1.6.

2.1.2 State Plan - NSW 2021

NSW 2021: A plan to make NSW number one (NSW Government, 2011) is a 10 year plan with goals and targets to rebuild the economy, provide quality services, renovate infrastructure, restore government accountability, and strengthen the local environment and communities. It replaces the State Plan as the NSW Government’s strategic business plan, setting priorities for action and guiding resource allocation. NSW 2021 lists a number of actions to achieve these goals and targets including:

- Reduce travel time
- Improve road safety
- Protect our natural environment.

The proposal would assist in achieving the goal of reducing travel times by increasing the capacity of the bridge thereby improving safety and reducing stoppages. Easing transport congestion and reducing travel times is also one of the priority actions in NSW 2021 for improving the efficiency of the State’s road network.

The NSW 2021 strategy includes the Northern Rivers Regional Action Plan (NRRAP) that aims to deliver the growth of a strong and diversified regional economy, which is carefully managed to ensure the protection of the region’s natural features. The NSW Government in partnership with the community has a vision for the region that is:

- Sustainably managed, through the protection of natural resources and the local environment, and recognised for biodiversity, tourism and recreation
- Socially inclusive, providing appropriate support for all community members by investing in quality health and community services
- Economically strong, by investing in infrastructure, education and training to drive job growth supporting knowledge-based and clean, green industries.
NRRAP acknowledges the Bridges for the Bush program and the need for the replacement of the bridge over the Clarence River at Tabulam to provide for HML semi-trailers.

The proposal to replace the Tabulam Bridge is therefore consistent with NSW 2021.

2.1.3 NSW State Infrastructure Strategy

The NSW Government State Infrastructure Strategy, released by the NSW Department of Premier and Cabinet in December 2012, assists in understanding NSW infrastructure needs for the next 20 years, particularly in light of key drivers for infrastructure demand in NSW. The strategy recognises that major arterial roads across the State road network will require improvement and that there will be value in addressing regional connectivity and freight efficiency in the short term.

In this regard, the strategy references the Bridges for the Bush program which aims to improve regional connectivity and freight efficiency through the replacement of heritage timber truss bridges with modern structures allowing for HML vehicles.

Though the proposal is not specifically listed in the strategy, it is considered to be consistent with this goal.

2.1.4 Ballina to Tenterfield Corridor Strategy

The Ballina to Tenterfield Corridor Strategy provides an overall view of the road transport system from Ballina on the NSW Far North Coast to Tenterfield in the Northern Tablelands. The Bruxner Highway dominates this corridor with the strategy focusing on the 183 kilometre section of this road which carries the majority of traffic, between the Pacific Highway and Tenterfield.

The strategy nominates, whilst recognising its heritage importance, the existing bridge over the Clarence River at Tabulam is a major constraint on the western section of the route and presents very challenging environmental, structural and maintenance issues for Roads and Maritime.

The strategy states that the existing bridge is a physical restriction on access for higher productivity vehicles and acknowledges that managing the heritage of the bridge while catering for any growing and changing traffic demands is a challenge.

Short and long term priorities for the bridge include enhanced road safety, increased freight efficiency, maintenance and improvement of existing road asset and management of the impacts of road traffic in the local environment.

2.1.5 Timber Truss Bridge Conservation Strategy

The Timber Truss Bridge Conservation Bridge Strategy was completed in July 2012. The strategy was developed to address the long term management of timber truss bridges in NSW. The strategy, carried out in consultation with the Heritage Council of NSW aims to establish a balance between infrastructure provision and heritage conservation.

The strategy explains that timber truss bridges are expensive to maintain in terms of planning, approvals, materials, maintenance frequency and skilled resources. The timber truss bridge stock comprise one per cent of Roads and Maritime’s bridge inventory but require around 20 per cent of the bridge maintenance budget. This current level of expenditure in timber truss bridges is compromising bridge maintenance and replacement needs across the remainder of the State’s bridge stock.
The strategy also recognises that the road network plays a key role in the efficient transport of freight. Timber truss bridges are a major limitation in allowing for more efficient road freight vehicles such as those carrying HML. Furthermore is the risk of damage to these bridges due to their intrinsic design which features a structural support frame above the bridge deck. They are generally narrow single lane bridges making their trusses even more vulnerable to damage from trucks.

The bridge over the Clarence River at Tabulam was assessed as part of the strategy. The strategy found that the existing bridge is on a major State highway and cannot be upgraded to meet future operational requirements such as providing for HML vehicles. The existing structure is currently the only impediment to opening the Bruxner Highway to HML semi-trailers between Casino and Tenterfield.

The strategy also found that any form of retention of the bridge would present continuing conservation, operational and financial challenges. The report noted that its conservation would not substantially strengthen the representative sample and would come at a high cost to government.

2.1.6 Bridges for the Bush

In October 2012 the NSW Government committed to improving road freight productivity by replacing or upgrading bridges over the next five years at 17 key locations in regional NSW.

The NSW Government has made a commitment of $145 million. In August 2012 the NSW Government made a submission to the Australian Government seeking half the funding of the approximately $290 million program.

One of the priority programs to help manage ageing assets and provide the biggest benefit to freight productivity includes the replacement of six heritage timber truss bridges to modern standards.

The existing bridge over the Clarence River at Tabulam was identified to be replaced with a new structure and the existing structure removed.
2.2 Higher Mass Limits (HML) vehicles

In 2006 the Council of Australian Governments agreed to implement higher mass limits for heavy vehicles with road friendly suspension. A commitment was also made to examine and, if necessary, upgrade sections of highway, bridges and appropriate arterial and local roads. Different levels of HML access are permitted on the road network in NSW according to vehicle type. It is expected that upon completion of the new bridge the Bruxner Highway between Casino and Tenterfield would be open to HML semi-trailers.

Higher mass limits allow semi-trailer operators to increase their total mass from 42.5 tonnes to 45.5 tonnes. In order to operate a HML vehicle in NSW the operator of the vehicle must follow strict management measures. Operators must enrol in the Intelligent Access Program which enables Roads and Maritime to track the locations and speeds of these vehicles to ensure compliance and trucks must have road friendly suspension which reduces damage to the road pavement.

2.3 Implications of doing nothing

The implications of not constructing a new bridge are three fold – reduced safety and transport productivity, as well as ongoing maintenance costs.

2.3.1 Safety

The existing bridge is a single lane structure with a width of 4.6 metres between kerbs. The existing trusses show signs of being struck by heavy vehicles and crash data also indicates crashes on the bridge in recent years between vehicles attempting to cross in opposite directions at the same time.

In addition, the bridge does not provide a dedicated and safe provision for pedestrians or cyclists who cross the 300 metre long bridge.

2.3.2 Bridge maintenance

The annual average maintenance expenditure for the bridge over the last 10 years is in the order of $700,000. Future maintenance costs are forecast to be higher due to critical elements which will need replacement. If funding were reduced there could be the need to place load limits on the bridge, therefore further impacting east-west freight movement through this region.

2.3.3 Transport efficiency

The existing bridge is the only limitation to allowing more efficient semi-trailers to use the Bruxner Highway between Casino and Tenterfield. This has a long term impact on transport productivity and efficiency through this region.

Carrying out bridge maintenance often results in the bridge being closed during the day for extended periods, inconveniencing local and through traffic, in particular heavy vehicles. Repeated disruptions can cause a significant reduction in transport efficiency.
3 Approach to the project

This chapter briefly describes the approach to develop a preferred route option.

3.1 Development of a long list of route options

The process for development of a long list of preliminary route options included several steps which are outlined below:

- Review of existing data including reports, maps and other available information
- Site familiarisation and site visits including road, bridge and study area inspection
- Preliminary investigations and assessments to determine the opportunities and constraints for feasible route options
- Incorporate spatial data obtained for the project into the project Geographic Information System (GIS) to assist in understanding constraints in developing preliminary route options
- Development of preliminary route options and optimisation of route options using road geometry and consideration of constraints and opportunities. Once route corridor options were developed, preliminary engineering alignments were fitted to these corridors based on design standards and performance requirements.

A description of this process including the preliminary route options is provided in the Route Options Development Report, which is on the Roads and Maritime project website.

3.2 Development of the shortlist of route options

Following on from the development of a long list of preliminary route options a shortlisting workshop was held in August 2013 to evaluate 11 preliminary route options based on the project objectives. The purpose of this workshop was to review and assess the preliminary route options and establish a shortlist of four route options for further development and investigation.

The workshop was attended by representatives from Roads and Maritime Services, Transport for NSW, GHD (Roads and Maritime Contractor) and Australian Centre for Value Management (workshop facilitator).

The route option development process, including the shortlisting workshop was documented in the Route Options Development Report. A community update was also produced for the announcement of the shortlisted route options, which invited the community to provide feedback on the options. The shortlisted route options were announced in early December 2013.

The Route Options Development Report and community update is available on the Roads and Maritime website.

Following the announcement of the shortlisted options, onsite investigations were carried out to provide additional information for the assessment of a preferred route. These investigations included geotechnical investigations, flora and fauna surveys, noise monitoring and Aboriginal heritage survey and consultation.
3.3 Development and assessment of the preferred route

The process for further development of the shortlisted route options and selection of a preferred route option was as follows:

- Following on from the announcement of shortlisted route options, the designs of the shortlisted route options were further developed and strategic cost estimates prepared
- Geotechnical investigations, flora and fauna surveys, noise monitoring and Aboriginal heritage survey and consultation were carried out
- Comments received from the community following the display of the shortlisted route options was evaluated and a Feedback Summary report was published
- A value management workshop was facilitated to review the shortlisted route options, and evaluate them against assessment criteria aligned with the project objectives. A preferred route option was recommended for further development and environmental assessment.

The value management process including the selection of a preferred route option is discussed in further detail in sections 6, 7 and 8.
4 Characteristics of the study area and issues for route option development

This chapter describes the various characteristics of the study area and issues for the project and developing the route options.

4.1 Overview of the study area

4.1.1 Local community

Tabulam is a rural village in the Northern Rivers region of NSW, where the Bruxner Highway crosses the Clarence River between Casino and Tenterfield. The Clarence River forms the boundary between Kyogle and Tenterfield Shire local government areas (LGA). The town of Tabulam is located to the east of the river, within the Kyogle LGA, whilst other areas which are considered to be part of Tabulam lie to the west of the river within the Tenterfield Shire LGA.

4.1.2 Socio-economic characteristics

The total population of the Tabulam area was 644 people living in 241 dwellings in 2011. More than a third of the population (224 people) live within Tabulam village statistical area (within the Kyogle LGA) according to the ABS 2011 Census. Of the 224 just over 20 per cent of the population live in the nearby Jubullum Village, a local Aboriginal community. Anecdotally the population of Tabulam village is believed to be approximately 110 people.

The Jubullum Village has a much younger population than other parts of Tabulam. With a median age of only 28 years, more than one third of the population (34.5 percent) is under the age of 18. Single parent families are also common, representing almost three quarters (74.2 per cent) of all families.

Local economy

The main employment categories for residents of Tabulam are agricultural and forestry based industries, representing between 30 and 50 per cent of workers, compared with closer to 20 per cent for both Kyogle and Tenterfield LGA’s. The next most common industries are accommodation and food services, public administration and safety, retail trade and construction.

Unemployment levels vary across Tabulam. Tabulam village and Tabulam South West display unemployment rates in 2011 that are comparable to the averages for the LGA’s, with rates between six and nine per cent. The unemployment rates for Tabulam West are higher than average for Tenterfield LGA, at 15 per cent compared to 6.8 per cent. Labour force participation is also lower across Tabulam small areas (from 40.1 to 44.4 per cent) than the LGA averages (50 per cent). The Jubullum Village has a labour force participation rate of 16.3 per cent, and unemployment of 35.7 per cent.

Social infrastructure

There is limited social infrastructure in Tabulam. The town supports a public primary school and playground, pre-school, church, SES and rural fire service and a licensed post office. Retail outlets include a newsagent which provides local tourist information, petrol station, general store, café and a hotel. A number of commercial/agricultural services are also located in Tabulam.
The nearest hospital and high school are at Bonalbo, approximately 27 kilometres from Tabulam. Tertiary technical studies are available through TAFE campuses at Casino and Tenterfield.

4.2 Existing highway

4.2.1 Road reserve

The existing road reserve width along the length of the Bruxner Highway within the study area varies in width. Typically the road reserve width between property boundaries is in the order of 30 metres west of the Clarence River, approximately 60 metres immediately east of Clarence River and approximately 40 metres through the Tabulam village.

4.2.2 Carriageway configuration

Existing travel lanes on the Bruxner Highway consist of two 3.5 metre wide sealed lanes with little or no sealed shoulder provided. At the approaches to the existing Tabulam bridge the carriageway tapers to a narrower width of 4.6 metres, this being the width between kerbs on the bridge.

Due to the existing bridge being only a single lane configuration, the flow of traffic on the bridge is give way controlled at the western end.

4.2.3 Horizontal and vertical alignment

The horizontal alignment west of the Clarence River is a combination of tight bends and lower standard reverse curves. The alignment east of the Clarence River comprises large radius bends and straights. At the western end of the bridge the grade of the existing road drops down to Clarence River Overflow Bridge No 1.

The sign posted speed limit through Tabulam village is 50 km/h.

4.2.4 Intersections and private accesses

Since the existing Bruxner Highway travels through Tabulam village there are a number of private properties fronting the highway. These properties have direct access to the highway.

The major intersections east to west are Lawrence Street, Clarence Street and Tabulam Road east of the bridge, and Clarence River Road west of the bridge.

4.2.5 Structures

**Bridge over Clarence River at Tabulam**

The existing bridge over Clarence River at Tabulam is primarily a timber structure and has an overall length of about 300 metres, comprising 13 timber approach spans and five composite timber/steel de Burgh truss central spans. The overall width between kerbs is 4.6 metres, accommodating single lane traffic only. The main spans are supported by concrete piers located in the river, whilst the approaches are supported by timber trestles. The bridge is shown in Figure 4-1 below.

The existing bridge deck is above the approximate 1 in 100 year flood level.
On the western side of the bridge over the Clarence River at Tabulam there are two concrete overflow bridges. These bridges span the overflow channels of the greater Clarence River flood plain. The lane configuration of the two bridges consists of two 3.5 metre lanes and one metre shoulders. These bridges were both open to traffic in the year 2001.

The bridge deck and approach levels for both overflow bridges are below the 1 in 100 year flood level and thus provide a lower flood immunity to the existing bridge over the Clarence River. These bridges are shown in Figure 4-2 below.
4.3 Traffic and transportation characteristics

4.3.1 Existing road network

Bruxner Highway
The Bruxner Highway extends from the Pacific Highway near Ballina to the northwest town of Tenterfield. The role of the Bruxner Highway is to provide an important link for the rural communities of the upper northwest of NSW to travel and to transport their products to the wider markets of Casino, Lismore and Ballina.

Tabulam Road
Tabulam Road is a rural local road that provides access to several residential properties in Tabulam and services the localities of Jacksons Flat and Lower Bottle Creek to the north of Tabulam and beyond to Bonalbo, which provides access to a hospital and high school. The road extends to the north from the intersection of Bruxner Highway and generally follows the alignment of Bottle Creek, joins Woodenbong Road which leads to Bonalbo and beyond to Woodenbong. The daily traffic volume provided by Kyogle Council for Tabulam Road is 137 vehicles per day.

Lawrence Street / Court Street / Clarence Street
This combination of local streets are the main local streets in the southern area of the Tabulam village. The roads are all sealed and provide local access to residences and businesses in the town. No traffic count data is available for these local roads. Based on the number of properties serviced, the roads are estimated to carry less than 500 vehicles per day.

Clarence River Road
Clarence River Road is a local road with a narrow sealed surface in poor condition. It intersects the Bruxner Highway approximately midway between the bridge over the Clarence River and the Clarence River Overflow No 2 Bridge and provides access for approximately seven rural properties. No traffic count data is available for Clarence River Road and based on the number of properties serviced, it is estimated to carry less than 50 vehicles per day.

4.3.2 Traffic data

The historical records for two sites on the Bruxner Highway, one approximately 9 kilometres to the west of Tabulam and the other approximately 20 kilometres to the east of Tabulam, show that traffic volumes on the highway are tending to trend slightly upwards. These counts indicate a growth rate at each site of approximately 0.2 percent per annum.

A traffic count survey was carried out between August and October 2013 on the Bruxner Highway at the eastern approach to the existing bridge. The collection of daily traffic volume data was by way of 7 day/24 hour continuous data collection of vehicles passing over automatic traffic counters. The traffic counter device has the capacity to record axle configurations and as such the data collected provides a classification profile of heavy vehicle usage as well as cars.

Table 4-1 presents the average daily traffic volumes for both light and heavy vehicles for a five day week (Monday to Friday only) and for a seven day week (Monday to Sunday).
Table 4-1  Average daily traffic volumes for Tabulam Bridge

<table>
<thead>
<tr>
<th>Survey Period</th>
<th>Light</th>
<th>Heavy</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 day week (M to F)</td>
<td>1121</td>
<td>148</td>
</tr>
<tr>
<td>7 day week (M to S)</td>
<td>1076</td>
<td>128</td>
</tr>
</tbody>
</table>

Points to note from the traffic surveys carried out on the Bruxner Highway at Tabulam in August 2013 are:

- Two way peak volumes for light vehicles are generally between 90 and 100 vehicles per hour over a sustained period from 9 am to 4 pm. Heavy vehicle numbers are also relatively consistent over this time at between 10 and 15 vehicles per hour. The total two way traffic volume over this period ranges from 100 to 115 vehicles per hour
- Night time (11 pm to 4 am) volumes drop to 10 vehicles per hour or less for both light and heavy vehicles
- The proportion of heavy vehicles is approximately 12 per cent for the seven day week count
- The average 85th percentile travel speed is 58 km/hr.

4.3.3 Public transport

The local Tabulam Bus Service operates a local school bus service which picks up children from local homes to be transported to Tabulam Public Schools and Bonalbo Central School. Northern Rivers Bus Lines provide two services daily during week days, from Tabulam to Tenterfield and Casino/Lismore, and a school bus service linking Tabulam with surrounding areas. Northern Rivers Community Transport provides transport for Home and Community Care patients, a regular bus service two days a week to Lismore/Casino, and a service for young people to access recreational activities.

4.3.4 Pedestrians and cyclists

There are no dedicated pedestrian or cyclist facilities on the Bruxner Highway in the study area. Large sections of the Bruxner Highway have no shoulders often with steep drop offs making walking difficult. While considered a rural area there are pedestrian trip generators on the western side of the bridge. A pre-school is sited around 300 metres west of the existing bridge and the Jubullum Aboriginal community village around 3.5 kilometres west of the bridge. Both these sites generate pedestrian trips with previous discussions with Jubullum residents highlighting this issue.

4.4 Road safety

4.4.1 Existing carriageway configuration

Existing travel lanes on the Bruxner Highway consist of two 3.5 metre wide sealed lanes with little or no sealed shoulder provided. At the approaches to the existing Tabulam Bridge the carriageway tapers to a narrower width of 4.6 metres, this being the width between kerbs on the bridge.
Due to the existing bridge being only a single lane configuration, the flow of traffic on the bridge is give way controlled at the western end. The existing bridge is considered substandard in terms of road width as it caters for only a single lane of traffic and has no provisions for pedestrians or cyclists. The new bridge would provide two lanes of traffic and pedestrian and cyclists facilities.

4.4.2 Safety on the existing highway in the study area

The Jubullum Village Aboriginal community is situated around 3.5 kilometres west of Tabulam on the Bruxner Highway. Earlier consultation with this community highlighted their concern about a lack of safe pedestrian/cycle facilities along both the Bruxner Highway and across the bridge providing access to Tabulam.

A pre-school is located just west of the existing bridge. It has no pedestrian access to Tabulam and its driveway has poor sight distance. The pre-school raised the issue of safe access to the Bruxner Highway during the staffed displays.

4.4.3 Crash history

In the five year period to the end of 2012 there were a total of two crashes within the study area. Both crashes occurred on the existing bridge and were of a minor nature.

4.4.4 Road Safety Audits

Two road safety audits have been conducted so far - a stage 5 road safety audit of the existing Bruxner Highway within the study area and a stage 1 road safety audit for the four shortlisted route options.

The stage 5 road safety audit raised the issue of no formal pedestrian or cyclist provision across the existing bridge. Otherwise, no major deficiencies were found.

The stage 1 road safety audit raised a number of minor safety issues across the four shortlisted route options, including limited road width to allow for highway through movements to pass right-turn movements turning at intersections.

In addition to the above road safety audits, the Ballina to Tenterfield Corridor Strategy highlights road design deficiencies for the highway between Casino and Tenterfield. Over 90 per cent of the highway has either narrow or very narrow shoulder widths. There are high proportions of the highway with vertical grades greater than the desirable maxima and there are a high proportion of curves with radii less that the recommended values.

4.5 Land use and planning issues

4.5.1 Land use

The village of Tabulam supports a range of land uses typical of most rural villages of similar size (refer Figure 4-3 below). Beside residential dwellings, the town supports a public primary school and playground, pre-school, church, SES and fire facility and a licensed post office. Retail outlets include a newsagent which provides local tourist information, petrol station, general store, café and a hotel. A number of commercial/agricultural services are also located in Tabulam.

Surrounding land use is predominately agricultural and forestry. Agricultural pursuits are identified as sheep, cattle and grain farming in the ABS statistics for Tabulam. There is a sand and gravel quarry across the river approximately five kilometres to the south west of Tabulam.
4.5.2 Statutory planning

Tabulam village has been zoned RU5 Village under the Kyogle Local Environmental Plan (LEP) 2012. The village zone allows for a range of land uses including residential, commercial, industrial, infrastructure and tourism related development. Development must reflect or enhance the local character and identity of the village and should not adversely affect the amenity of the village.

Beyond the village zone, the surrounding land has been zoned RU1 Primary Production under the Kyogle LEP and Tenterfield LEP 2013 respectively. The RU1 zone allows for a range of rural and agricultural development provided it leads to sustainable primary industry production by maintaining and enhancing the natural resource base (refer Figure 4-3 below).

As the proposal involves road infrastructure facilities and is to be carried out by Roads and Maritime, it can be assessed pursuant to Clause 94 of the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP). Development consent from council is not required.

Relevant environmental planning instruments

Environmental planning instruments relevant to the proposal and study area include:

- State Environmental Planning Policy (Infrastructure) 2007
- Kyogle Local Environmental Plan 2012 (Kyogle LEP)
- Tenterfield Local Environmental Plan 2013 (Tenterfield LEP).

Local Environmental Plans

The study area encompasses the following zones under each Local Environmental Plan (LEP):

- Kyogle LEP– RU5 Village, RU1 Primary Production
- Tenterfield LEP– RU1 Primary Production.

Permissibility of proposal against Kyogle LEP 2012 and Tenterfield LEP 2013

The relevant zone objectives and provisions of the LEPs are addressed below.

Table 4-2 LEP zone objectives and provisions

<table>
<thead>
<tr>
<th>LEP/Zone</th>
<th>Objectives/ requirements</th>
<th>Permissibility/ comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kyogle LEP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RU5</td>
<td>To provide for a range of land uses, services and facilities that are associated with a rural village. To promote development in existing villages that reflects or enhances their local character and identity. To ensure that the amenity of existing developments is not adversely affected by new development.</td>
<td>‘Roads’ permitted with consent</td>
</tr>
<tr>
<td>LEP/Zone</td>
<td>Objectives/ requirements</td>
<td>Permissibility/ comments</td>
</tr>
<tr>
<td>-----------------</td>
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<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>RU1</td>
<td>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.</td>
<td>‘Roads’ permitted with consent</td>
</tr>
<tr>
<td></td>
<td>To encourage diversity in primary industry enterprises and systems appropriate for the area.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To minimise the fragmentation and alienation of resource lands.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To minimise conflict between land uses within this zone and land uses within adjoining zones.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>To ensure that the productive capacity of agricultural land is appropriately recognised and managed.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clause 5.10 - Heritage conservation</th>
<th>Development consent is required for any of the following:</th>
<th>Tabulam bridge is listed under Schedule 5 - Environmental Heritage of the LEP. Consent would be required to demolish the bridge.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) a heritage item,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) an Aboriginal object,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(iii) a building, work, relic or tree within a heritage conservation area,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(c) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d) disturbing or excavating an Aboriginal place of heritage significance,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(e) erecting a building on land:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) on which a heritage item is located or that is within a heritage conservation area, or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,</td>
<td></td>
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<tr>
<td></td>
<td>(f) subdividing land:</td>
<td></td>
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<tr>
<td></td>
<td>(i) on which a heritage item is located or that is within a heritage conservation area, or</td>
<td></td>
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<tr>
<td></td>
<td>(ii) on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.</td>
<td></td>
</tr>
<tr>
<td>LEP/Zone</td>
<td>Objectives/ requirements</td>
<td>Permissibility/ comments</td>
</tr>
<tr>
<td>----------</td>
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<td>--------------------------</td>
</tr>
<tr>
<td>Tenterfield LEP</td>
<td>To encourage sustainable primary industry production by maintaining and enhancing the natural resource base. To encourage diversity in primary industry enterprises and systems appropriate for the area. To minimise the fragmentation and alienation of resource lands. To minimise conflict between land uses within this zone and land uses within adjoining zones.</td>
<td>‘Roads’ permitted without consent</td>
</tr>
</tbody>
</table>

**Approval pathway**

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. As the proposal involves road infrastructure facilities and is to be carried out by the Roads and Maritime, it can be assessed under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). Development consent from council is not required.

**Legislation**

A preliminary review of relevant legislation is as follows:

**NSW Heritage Act 1977**

The Heritage Act 1977 is administered by the NSW Heritage Council and its purpose is to ensure that the heritage of NSW is adequately identified and conserved. The Heritage Act 1977 is concerned with all aspects of conservation ranging from the most basic protection against damage and demolition, to restoration and enhancement.

Under Section 57 of the Heritage Act 1977, a permit must be obtained for works, which have the potential to interfere with a heritage item or place, which is either listed on the State Heritage Register or the subject of an interim heritage order. The existing Bridge over the Clarence River at Tabulam is listed on the State Heritage Register.

As previously detailed in Section 2.1.5 of this report, the existing bridge over the Clarence River at Tabulam was identified to be replaced with a new structure as part of the Timber Truss Bridge Conservation Strategy and the existing structure demolished.

Pursuant to Section 38 of the Heritage Act, the Minister may, after considering the recommendation of the Heritage Council on the matter, direct the removal of a listing from the State Heritage Register. The existing bridge will therefore require delisting from the State Heritage Register in accordance with Section 38 in order for the proposal to proceed.
**NSW Threatened Species Conservation Act 1995 (TSC Act)**

The TSC Act lists a number of threatened species, populations or ecological communities to be considered in deciding whether an activity is likely to have a significant impact on threatened biota, or their habitats. If an impact is considered likely, an assessment of significance that addresses the requirements of Section 5A of the EP&A Act must be completed to determine the significance of the impact. If the impact is significant, a species impact statement (SIS) would be required. The requirements to be addressed in the SIS are described in section 110 of the TSC Act.

**NSW Fisheries Management Act 1994 (FM Act)**

The FM Act requires a permit is sought for certain works including dredging or reclamation works that block fish passage or harm marine vegetation. Pursuant to section 199 of the FM Act, a public authority (other than a local government authority) must, before it carries out or authorises the carrying out of dredging or reclamation work, give the Minister written notice of the proposed work, and consider any matters concerning the proposed work that are raised by the Minister within 28 days after the giving of the notice (or such other period as is agreed between the Minister and the public authority).

**National Parks and Wildlife Service Act 1974 (NPW Act)**

Aboriginal cultural heritage in NSW is protected under the NPW Act. An assessment of the presence and potential impact on sites or items of Aboriginal cultural heritage will be carried out. If a site or object will be impacted by the proposal, an Aboriginal heritage impact permit (AHIP) will be required to be sought under Section 90A of the NPW Act.

**Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)**

Under the EPBC Act, a referral is required to the Australian Government for proposed “actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land.” If the Australian Government deems the proposal a ‘controlled action’ approval would be required under this Act.

**Commonwealth Native Title Act 1993**

If native title has been granted over the study area under the Native Title Act, consultation with the native title holder or claimants must be carried out. A search of the National Native Title Tribunal has found that there is a pending application for native title over the study area. This claim is under further investigation by the heritage sub-consultants.

**Relevant determining authorities**

Determining authorities for approval under the Acts described above are as follows:

- NSW Heritage Act 1977 – NSW Heritage Branch, Office of Environment and Heritage
- TSC Act – Office of Environment and Heritage
- FM Act – Department of Primary Industries, Fishing and Aquaculture
- NPW Act – Office of Environment and Heritage
- EPBC Act - Australian Government Department of Sustainability, Environment, Water, Population and Communities
- Native Title Act 1993 – National Native Title Tribunal.
Figure 4-3

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Study area
- Cadastre
- E1 National Parks and Nature Reserves
- RE1 Public Recreation
- RE2 Private Recreation
- RU1 Primary Production
- RU5 Village
- W2 Recreational Waterways
- SP2 Infrastructure
- DM Deferred matters

Land Use and Planning
4.6 Heritage

4.6.1 Aboriginal cultural heritage overview

Traditionally, the Tabulam region is a land of the Bundjalung people and is culturally significant, with the Koori place name of Tabulam meaning “the originals”.

European settlement of Tabulam resulted in the forced relocation of many of the Bundjalung people from areas in and around Tabulam to a nearby Aboriginal reserve, which later became a mission. This area is now known as the Jubullum Village, located approximately 3.5 kilometres west of the Tabulam Township (DECC 2007).

The Jubullum Flat Camp Aboriginal Area (managed by NSW National Parks, approximately 0.5 km north of Tabulam village) is also a culturally significant site for the Bundjalung people.

Aboriginal Heritage Information Management System (AHIMS) data indicates one Aboriginal site in the study area. This is a burial site, reference number AHIMS #03-06-0009.

The burial site named Tabulam 1 was registered with NSW NPWS in 1967. The site is ‘place marked’ as being located in Lawrence Street at the base of the ridge slope at the eastern end of the study area and the Tabulam village. The ridge slope containing the burial location comprises the eastern sector of the study area bounded by the Bruxner Highway, Lawrence Street and the ridge crest.

Predictive archaeological modelling of Aboriginal cultural heritage was carried out to assist in the assessment of preliminary route options. The predictive mapping utilised AHIMS search results, a literature review, topographic features and land use history to classify areas of Aboriginal heritage importance. Figure 4-4 shows areas of Aboriginal archaeological sensitivity.

4.6.2 Claim under Aboriginal Land Rights Act, 1983

One of the shortlisted options (Option D) may need to acquire a small portion of Crown land that is subject to an Aboriginal Land Claim under the NSW Aboriginal Land Rights Act. This land cannot be compulsorily acquired and may delay the acquisition process or cause the preferred route to be changed to avoid the property.

Preliminary advice is that it is unlikely that the acquisition would be opposed by the Aboriginal community.

4.6.3 Consultation with the Aboriginal community

Roads and Maritime have consulted with Aboriginal representatives following the guidelines as set out in the Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHI).

Site surveys of the four route options have been carried out with Jubullum Local Aboriginal Land Council representatives and Western Bundjalung Native Title Claimants in accordance with the PACHI process.

No known Aboriginal objects or places were identified within the project area, despite the project area being within a significant archaeological and cultural landscape for Aboriginal cultural heritage. However, directly north of the existing bridge on the eastern side of the Clarence River are three places of cultural importance - the ‘Big House’, ‘Black Camp’ and ‘The Birthplace’. This area is indicated on Figure 4-4.

The sensitivity and cultural importance of the past presence of the ‘Big House’, ‘Black Camp’ and ‘The Birthplace’ have been considered in route option development.
Aboriginal Sites and Predictive Mapping

Figure 4-4

LEGEND

- Study area
- Aboriginal Site
- Predicted Risk
  - High
  - Moderate
  - Low - Moderate

Site of Big House, Black Camp and The Birthplace
4.6.4 Non-Aboriginal heritage

Searches of non-Aboriginal heritage registers identified nine heritage listings for the Tabulam area, all of which are located within a 1.8 km radius of the study area.

Tabulam Racecourse, Tabulam Cemetery and Tabulam Old Cemetery are located outside of the study area, with the remaining six items located within Tabulam village. The existing bridge over the Clarence River at Tabulam is listed on the State Heritage Register. The remaining five heritage items are locally significant and listed in the Kyogle LEP 2012. They include Chauvel Park, St Johns Church, Hotel, Post Office and the Police Station.

Figure 4-5 below indicates the various locations for the non-Aboriginal heritage. None of these heritage sites are impacted by the shortlisted route options.

In addition to the items listed above, the preliminary inspection noted two stone and plaque memorials at Harry Mundine Place and Chauvel Park installed by the West of the Range Historical Society.

 Literary research found that a large boulder and burial was placed on the bank of the Clarence River to commemorate the death of William May and William Sloman, drowned in the 1863 flood (Wilkinson n.d.: 36-37). The location of the memorial is south of the Tabulam village and outside the study area.

None of the above memorials are impacted by the shortlisted route options.

On the western side of the Clarence River south of the pre-school, adjacent to the Bruxner Highway, there is a boulder with a plaque noting the now demolished house for Harry Lasseter, of Lasseter’s Lost Reef fame. This memorial is in the study area and is impacted by the western end of Option D of the shortlisted route options.
Figure 4-5

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Legend:
- Study area
- Cadastre
- Non-Aboriginal Heritage

Non-Aboriginal Heritage
4.7 Visual amenity

4.7.1 Local context and setting
Tabulam is a rural village with the main part of the village located east of the Clarence River and located within the Kyogle Council LGA. Tabulam has a range of services including a public school, post office, grocery store, police station and community facilities. There are also a number of recreation/open space areas within the village and adjoining the Clarence River.

Tabulam village is generally bordered by the Clarence River to the west, the south eastern extent of the Tabulam Rivulet to the north and gentle rolling hills to the south east. Tabulam is also located to the west of the Clarence River in the Tenterfield LGA. This area mainly includes rural properties with the exception of the Tabulam and District Community Preschool.

Tabulam lies on a large floodplain associated with the Clarence River, which generally flows in a southerly direction in the vicinity of the study area. Part of the village is subject to inundation from the Clarence River.

4.7.2 Landscape character zones
A series of landscape character zones (LCZ) were identified that have a distinct character resulting from a similar combination of urban and landscape features that include landform, built form, vegetation and land use for the study area. The landscape character zones include:

- LCZ 1 - Existing bridge and curtilage
- LCZ 2 - Tabulam village
- LCZ 3 - Lower river flood plain
- LCZ 4 - Upper river reach
- LCZ 5 - Saleyards/rural west
- LCZ 6 - Golf course/rural transition
- LCZ 7 - Rural east
- LCZ 8 - Currabubula Hill/rural lands.

A preliminary assessment has been carried out to measure the impact of the proposal on the landscape character zones with these incorporated into the preliminary route option evaluation process. LCZ1 and LCZ2 are assessed as having a high impact with the effect of LCZ2 based on a variance in new bridge alignment. LCZ3 to LCZ8 are assessed as a high to moderate impact due to the viewpoints downstream of the existing bridge.

Refer to Figure 4-6 for landscape character zones.
Figure 4-6

Legend:
- LCZ 1 - Existing bridge and curtilage
- LCZ 2 - Tabulam Village
- LCZ 3 - Lower River Flood Plain
- LCZ 4 - Upper River Reach
- LCZ 5 - Saleyards / Rural West
- LCZ 6 - Golf course / Rural transition
- LCZ 7 - Rural East
- LCZ 8 - Currabubula Hill / Rural

Visual Landscape Zones

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

Legend:
- Study area
- Visual Landscape Zones
- LCZ 1 - Existing bridge and curtilage
- LCZ 2 - Tabulam Village
- LCZ 3 - Lower River Flood Plain
- LCZ 4 - Upper River Reach
- LCZ 5 - Saleyards / Rural West
- LCZ 6 - Golf course / Rural transition
- LCZ 7 - Rural East
- LCZ 8 - Currabubula Hill / Rural

Figure 4-6
4.8 Noise, vibration and air quality

4.8.1 Noise and vibration

The study area comprises residential dwellings and other sensitive receivers such as a school and pre-school. The majority of the study area is already subject to some noise from the Bruxner Highway with little other noise generating sources located within the area.

Noise from road related activities includes construction of new highways and noise from heavy vehicles and other motorised transport.

There are two sensitive areas that have the potential to be affected by road traffic noise during the construction and operation phases. These are residences on the eastern side of the bridge, near the intersection of the Bruxner Highway and Tabulam Road and the pre-school which is located on the western side of the bridge.

In December 2013 noise monitoring was carried out at these two locations for the shortlisted route options. Noise monitoring data indicates that the road traffic noise criteria are currently met at the monitoring locations in both night time and day time conditions.

Results indicate that there were only minor changes in road traffic noise levels between the different options and minimal change to the existing noise environment due to proximity to existing bridge. However, Option D would result in road traffic noise coming from the south at the pre-school, rather than the north. Although predicted noise levels are under the criteria, this directional change may be perceived more intrusive than the other options at the pre-school.

Further noise assessment will be carried out for the preferred route corridor as part of the EIA. Construction noise will be assessed in accordance with the Interim Noise Construction Guideline (DECCW 2009). Noise from the operation of the proposal would be assessed using the NSW Road Noise Policy (DECCW 2011). The NSW Road Noise Policy sets noise assessment criteria for road traffic noise based on protecting amenity and wellbeing.

Impacts due to vibration would be managed in accordance with Assessing Vibration – Technical Guide (DEC 2006).

4.8.2 Air quality

A review of the National Pollutant Inventory revealed that there are no scheduled industries operating within the study area. The nearest scheduled industries are approximately 55 kilometres east in Casino. Since the study area is remote from any major ‘airshed’-sized sources of air pollution, ambient air quality pollution levels can safely be assumed to be low (zero at below detection limits or negligible).

The transport and dispersion of air emissions from the proposal will be influenced by the rain and wind climate experienced within the study area. Vehicle emissions should be considered the same for all options.

Construction activities have the potential to result in dust emissions which may impact on nearby sensitive receivers, in particular residences. Wherever ground is disturbed, or spoil is handled, there is the potential for the generation of dust. Individual assessment of the air quality impacts of each of the route options has not been carried out at this stage.
4.9 Biodiversity

4.9.1 Overview

The majority of the study area has either been urbanised in the Tabulam village or disturbed by agriculture. However the options cross the banks of the Clarence River which has a potential for impact on either flora or fauna in this area.

Desktop investigations and assessment have been carried out for the study area. The following data sources were reviewed:

- Atlas of NSW Wildlife for species listed under the NSW Threatened Species Conservation Act, 1995 (TSC Act)
- Protected Matters Search Tool for matters of national environmental significance listed under the Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act)
- NSW Department of Primary Industries for records of threatened species listed under the Fisheries Management Act, 1994 (FM Act).

The desktop review indicates that a number of TSC Act and EPBC Act listed species have either been recorded or are predicted to occur within a 10 kilometres search area. Based on the desktop assessment and previous records, it is possible that a number of these species could occur on (or utilise) the site, at least on a temporary, seasonal or transient basis. In particular, it is possible that individuals of threatened microbat species utilise the space underneath the existing bridge for roosting and the riparian vegetation and open water of the Clarence River for foraging.

Both the Eastern Freshwater Cod (FM Act) and Black-necked Stork (TSC Act) have been recorded previously in this section of the Clarence River, and are likely to occur in the study area. The Brush Tailed Phascogale is also likely to occur within the study area. Several threatened flora species also have the potential to occur within the study area including the Creek Triplarina which is endangered and only found in a few locations such as watercourses near Tabulam.

4.9.2 Ecological field investigations

Ecological field investigations were conducted during January 2014 to identify environmental issues and constraints to inform the route selection process. The results indicate that the study area contained limited habitat for terrestrial flora and fauna species, and in general route options to the north of existing bridge are more likely to impact on a Forest Red Gum (Eucalyptus tereticornis) community which contains hollow-bearing trees supporting fauna.

Terrestrial habitat is limited and all options are located within highly modified grassland. It is comprised of tall introduced grasses with a scattering of Weeping Bottlebrush (Melaleuca viminalis) and a large Mulberry tree (Morusrubra). River Oaks (Casuarina cunninghamiana) are present downstream and Forest Red Gums (Eucalyptus tereticornis) are present upstream.

The adjacent upstream and downstream riparian vegetation provides habitat for fauna and the river contains native aquatic flora and fauna. Most bird species are transient within the route options, apart from the Welcome Swallows (Hirundo neoxena) nesting in the bridge rails. Aquatic flora and fauna ranges extend up and downstream from the site.

One threatened species, the East-coast Free-tailed Bat (Mormopterus norfolkensis) was identified during surveys. This species may potentially roost under bridge structures, however was not observed during targeted searches.
Based upon previous records within five kilometres of the site the Eastern Freshwater Cod (*Maccullochella ikei*) is likely to occur, and habitats along the Clarence River are likely to be suitable for the species. The environmental impact assessment for the project will assess the significance of the impact.

4.10 Hydrology and hydraulics

The existing bridge spans the Clarence River with an upstream catchment of over 7000 square kilometres. A flood level frequency analysis utilising historical rainfall and flood level data indicates that the 100 year Average Recurrence Interval (ARI) flood level of 128.2 metres Australian Height Datum (AHD) should be adopted at the alignment of the existing bridge.

The ARI is a statistical estimate of the average period of time (in years) between the occurrences of a specified flood. For example, a 100 year ARI flood is a flood that occurs (or is exceeded) on average once every 100 years.

The existing bridge over the Clarence River at Tabulam has a deck level of approximately 129.0 metres AHD which corresponds to an immunity of approximately 130 year ARI.

A more detailed hydraulic model will be prepared as the bridge design assessment is advanced. Refer to Figure 4-7 for the extent of the 100 year ARI flooding around the Tabulam village.

The approximate flood immunities of the Clarence River Overflow Bridges No 1 and 2 is 33 years and 40 years ARI respectively.

The new Tabulam bridge and associated overflow structures will have a flood immunity of 1 in 100 year ARI (deck level) with the levels to be confirmed after the completion of detail flood modelling, which will be carried as part of the concept design development for the preferred route option.
4.11 Water quality

The NSW Government conducts discreet and continuous water quality monitoring throughout NSW with the nearest data for the Clarence River collected around Grafton. These sites are approximately 90 kilometres to the southeast of the study area, therefore are of limited value.

Review of aerial photography for Tabulam did not identify any potential point sources of water pollution, such as effluent pipelines draining into the river or riverbank developments, within the study area. There is an auto repair workshop close to the river within the township.

Tenterfield Shire Council and Kyogle Council were not aware of any sites of potential groundwater pollution.

Further water quality assessment will be carried out as part of the EIA process.

4.12 Geotechnical conditions

4.12.1 Topography, geology and soils

Tabulam lies within the geological setting of the Clarence-Moreton basin. Metallogenic resources indicate that the Tabulam area is underlain by Quaternary alluvium along the Clarence River, and the Gatton Sandstone unit of the Marburg Subgroup. Details of these units are as follows.

- Quaternary alluvium (Qa), dominates the study area featuring “undifferentiated alluvial deposits of sand, silt, clay, gravel and some residual colluvial deposits”
- Gatton Sandstone (Jbgs), may be present within the eastern side of the study area, featuring “thin to thick bedded, coarse to medium grained feldspathic to lithic feldspathic sandstone with clay matrix, subordinate intervals of granule, pebble and minor cobble polymictic conglomerate with abundant ferruginised fossil wood logs and fragments”.

Limited existing hydrological information is available for the study area with alluvial soils observed at variable depths, underlain by sandstone bedrock.

No acid sulphate soil risk maps are available of the study area. The potential for acid sulphate soils (ASS) is considered low, considering that the elevation of the study area is in the order of 130 metres AHD and ASS are usually located in coastal areas at an elevation of less than 10 metres AHD.

Being on an alluvial plain, potential construction material sources in the immediate vicinity of the town are limited, with the majority of historical and current extractive industries focused on gold and silver production. Topographical maps identify a small number of potential material sources in the area with the closest identifiable commercial sources for construction material predominantly centred on Casino, 55 kilometres to the east.

Refer to Figure 4-8 for geotechnical characteristics for the Tabulam area.
4.12.2 Geotechnical investigations

Preliminary geotechnical investigations were carried out during January 2014. A total of nine boreholes and four test pits were completed across the eastern and western banks of the river within the area covered by the four shortlisted options.

The boreholes indicated coarse to medium grained sandstone at depths of 7.7 metres to 14.0 metres. Layers of clay, sandy clay, sand, gravel and pockets of organic material were encountered above the sandstone layer.

In general, the material profiles and geotechnical conditions in the investigated area are relatively consistent. More detailed and targeted geotechnical investigations will be carried out following the display of the preferred route to assist the development of the concept design for the preferred route option.

4.13 Public utilities

The preliminary public utilities assessment indicates that there are Essential Energy and Telstra assets within the study area.

Essential Energy assets were identified as being dispersed through the study area. The assets are generally confined to the township extents and road reserves. An overhead 11kV transmission line crosses the Clarence River just south of the existing bridge.

Telstra plans indicate underground utilities dispersed throughout the study area. In general, the utilities follow the alignment of roads within the immediate township area and are confined to the road reserve. Major optic fibre cables are present within the study area crossing the Clarence River cross section. The alignment extends from the south of the village to near the pre-school on the western bridge abutment, before continuing further west beyond the study area.

Tenterfield Shire Council and Kyogle Council indicted that there are no reticulated water or sewer assets at Tabulam (refer to Figure 4-9 below).
5 Route options

This chapter describes briefly the consultation process for the route option development phase, development of the preliminary route options and the assessment and shortlisting of route options.

5.1 Community input to route options

The community and other stakeholders have provided input in to the development of the route options through a number of avenues since the start of the project. Local residents and property owners have provided invaluable knowledge about the history of Tabulam, the existing bridge, the behaviour of floods and other aspects of the project.

Attendance at drop-in sessions by the community and visits to individual properties have greatly enhanced the appreciation of local and site issues and have enabled the potential impact of options to be better identified.

A number of project announcements, public displays and drop-in sessions have been carried out since starting the project along with the publication of community updates and project information being made available on the Roads and Maritime website.

5.1.1 Announcement of study area

The commencement of investigations was announced in August 2013 by the local member Thomas George MP. To supplement the study area announcement and project commencement, a community information drop-in session was held on Thursday 15 August 2013 at the Tabulam Community Hall. Approximately 60 people attended the drop-in session with 36 feedback forms returned either on the day of the drop-in session or sent by email or post following the session.

A Preliminary Feedback Summary Report was published and made available on the Roads and Maritime website. The report summarises the community feedback received during the initial stages of the project. This feedback was integrated into the development of the route options.

5.1.2 Announcement of shortlisted route options

The announcement of four shortlisted route options was made in December 2013. Following the announcement, a drop-session was held on Tuesday 10 December at the Tabulam Community Hall. A total of 29 community members attended, which included local residents and other interested community members.

A variety of information was provided at the drop-in session, including a map outlining each of the four route options and copies of the Route Options Development Report. Feedback forms were also provided and total of 34 feedback forms were received following the session.

Meetings with landowners affected by any of the four route options were also held in December 2013. The outcomes of these discussions and information provided on the feedback forms have been integrated into the development of the route options.

A Community Feedback Summary Report was published and the report summarised the community feedback received on the shortlisted route options and was integrated into the further development and assessment of the route options.
5.2 Process for development of the route options

The route option development process includes several steps.

- Review of existing data including reports, maps and other available information
- Site familiarisation and site visits including road, bridge and study area inspection
- Preliminary investigations and assessments to determine the opportunities and constraints for route options
- Development of preliminary route options and optimisation of route options using road geometry and consideration of constraints and opportunities. Once route corridor options were developed, preliminary engineering alignments were fitted to these corridors based on design standards and performance requirements
- Shortlisting workshop to review and assess preliminary route options and establish a shortlist of route options worthy of further development and investigation
- Route options development report and display
- Selection of a preferred route and display – where we are now.

5.3 Development of the long list of route options

A wide range of preliminary route options were developed within the study area and are shown in Figure 5-1. The preliminary route options are numbered from north (upstream) to south (downstream) from Option 1 to Option 11. For the purposes of comparing the options a 20 metre wide road corridor has been assumed for each option.

Each of the preliminary route options is described as follows.

Option 1

Option 1 traverses around the northern edges of the Tabulam village. It starts on the Bruxner Highway on the western side at the intersection with Clarence River Road and extends to the north of existing Clarence River Overflow Bridge No 1 before turning and crossing the Clarence River at an angle. Option 1 uses a small section of Charles Street road corridor before re-joining the Bruxner Highway east of town at the Hoare Street intersection. A new intersection where it crosses Tabulam Road would be required. This option uses only one of the existing overflow bridges (No 2) on the western approach and will require construction of a new overflow bridge No 1. Property acquisition is required on both sides of the river and there is the possible acquisition of one residence.

Option 2

Option 2 starts on the Bruxner Highway on the western side at the intersection with Clarence River Road, crossing the Clarence River to the north and parallel to the existing bridge. The alignment then converges and re-joins the existing Bruxner Highway at the Clarence Street intersection. Reconstruction of the Tabulam Road intersection is required. This option uses only one of the existing overflow bridges (No 2) on the western approach and would require construction of a new overflow bridge No 1. Property acquisition is required on both sides of the river.
Option 3
Option 3 utilises both overflow bridges on the western side of the river and crosses the Clarence River to the north of the existing bridge before connecting into the existing Bruxner Highway at the Clarence Street intersection. The bridge alignment is curved to allow it to connect to the highway either side of river whilst providing a sufficient lateral clearance to the existing bridge. Reconstruction of the Tabulam Road intersection is required. This option requires a short connection on the western side to join into the existing No 1 overflow bridge. Minor property acquisition is required for this option on both sides of the river.

Option 4
Option 4 utilises the existing bridge alignment and highway approaches. As this option is in the same location as the existing bridge it would require the removal of the existing bridge before construction of the new bridge could commence. To allow traffic to continue to use the Bruxner Highway a detour or all-weather side track, including a temporary low level bridge over the Clarence River would be required to be constructed prior to removing the existing bridge. The location of the detour could impact on local streets on the eastern side of the river through Tabulam. No property acquisition is required for this option, but leasing of land for the detour may be required.

Option 5
Option 5 is a mirrored version of Option 3, crossing the Clarence River to the south of the existing bridge. This option is also a curved bridge structure to utilise the most eastern overflow bridge and connects into the existing Bruxner Highway on the eastern side at the Clarence Street intersection. Reconstruction of the Tabulam Road intersection is required. Minor property acquisition is required on the western side of the river.

Option 6
Option 6 starts on the Bruxner Highway on the western side at the intersection with Clarence River Road, crossing the Clarence River on the southern side and parallel to the existing bridge and connects into existing alignment at the Clarence Street intersection. Reconstruction of the Tabulam Road intersection is required. This option uses only one of the existing overflow bridges (No 2) on the western approach and will require construction of a new overflow bridge No 1. Property acquisition is required on the western side of the river.

Option 7
Option 7 starts on the Bruxner Highway on the western side at the eastern abutment of the Clarence River Overflow Bridge No 2 and traverses the land to the south of the preschool before crossing the Clarence River at an angle, connecting back to the existing Bruxner Highway at the Clarence Street intersection. A new overflow bridge No 1 is required on the downstream side of the existing overflow bridge. Reconstruction of the Tabulam Road intersection is required along with a new intersection to provide connection to Clarence River Road and the preschool. Property acquisition is required on the western side of the river.
Option 8
Option 8 starts on the Bruxner Highway on the western side at a bend west of the Clarence River Overflow Bridge No 2 and traverses the land to the south of the preschool before crossing the Clarence River at an angle, connecting back to the existing Bruxner Highway at the Clarence Street intersection. Reconstruction of the Tabulam Road intersection is required along with a new intersection to provide connection to Clarence River Road and the preschool. This option is the most direct of the southern options but would require a longer length of new road construction and two new Clarence River overflow bridges. Property acquisition is required on both sides of the river.

Option 9
Option 9 starts on the Bruxner Highway further west than Option 8 and crosses the Clarence River at an angle at a wider river cross section, aligning with an extension of Grafton Street that separates the school and football field before converging and re-joining the Bruxner Highway east of the town limits and Hoare Street. New intersections would be required at Clarence and Lawrence Streets and on the western side to provide connection to Clarence River Road and the preschool. One long bridge would be required to replace the overflow bridges and the existing bridge. Property acquisition is required on both sides of the river and there is the possible acquisition of one residence.

Option 10
Option 10 starts on the Bruxner Highway at the same location as Option 9 and crosses the Clarence River at a wider river cross section, aligning with Court Street before sweeping the south east boundary of the village, cutting into Currabubula Hill and re-joining the Bruxner Highway at the same location as Option 9. Intersection upgrades would be required along Court Street and a new intersection on the western side to provide connection to Clarence River Road and the preschool. One long bridge would be required to replace the overflow bridges and the existing bridge. Property acquisition is required on both sides of the river.

Option 11
Option 11 starts on the Bruxner Highway at the same location as options 9 and 10 and crosses the Clarence River at a much wider river cross section aligning with a road corridor south and parallel to Court Street before sweeping the south east boundary of the village and re-joining the Bruxner Highway at the same location as options 9 and 10. One long bridge would be required to replace the overflow bridges and the Tabulam Bridge and requires the longest bridge of all the options. Property acquisition is required on both sides of the river.
5.4 Selection of the shortlisted route options

A shortlisting workshop was held in August 2013 to evaluate the eleven preliminary route options based on the project objectives. The purpose of this workshop was to review and assess the eleven preliminary route options and establish a shortlist of route options for further development and investigation.

The workshop was attended by representatives from Roads and Maritime, Transport for NSW, GHD (Roads and Maritime Contractor) and Australian Centre for Value Management (workshop facilitator).

The assessment criteria were formulated and developed to enable each route option to be evaluated in relation to the project objectives. Workshop participants agreed to the assessment criteria and their relative weightings.

The weight comprised a numerical score between one and five where a numerical score of five was perceived to be very important ranging to a numeric score of one which is less important.

Table 5-1 details the assessment criteria agreed upon and their relative weightings.

**Table 5-1  Assessment criteria and weightings**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Criteria</th>
<th>Criteria Weight (5 -1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance road safety for all road users over the length of the project</td>
<td>Number of casualty crash sites treated.</td>
<td>4</td>
</tr>
<tr>
<td>including improving safety for pedestrians and cyclists. Investigate and</td>
<td>Optimise the geometry standards (network targets).</td>
<td>4</td>
</tr>
<tr>
<td>determine the appropriate treatment for pedestrians and cyclists on the</td>
<td>Minimise conflict points on the highway.</td>
<td>4</td>
</tr>
<tr>
<td>new structure.</td>
<td>Control operating speed through town.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Improve pedestrian and cyclists connectivity.</td>
<td>5</td>
</tr>
<tr>
<td>Improve road transport productivity and reliability.</td>
<td>Improved flood immunity of the highway.</td>
<td>2</td>
</tr>
<tr>
<td>Support regional and local economic development including improved</td>
<td>Minimise adverse impact on business/ service patronage.</td>
<td>4</td>
</tr>
<tr>
<td>opportunity for economic and tourist development for Tabulam.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimise impacts on the natural, cultural, social and built environment.</td>
<td>Minimise area of native vegetation impacted.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Minimise area of fauna habitat impacted.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Number of new noise receivers with 50m buffer either side of route option.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Minimise impact on Aboriginal</td>
<td>5</td>
</tr>
<tr>
<td>Objective</td>
<td>Criteria</td>
<td>Criteria Weight (5 -1)</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>heritage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Minimise the number of property lots impacted / farm land.</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>• Minimise the number of houses impacted.</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>• Minimise visual impact.</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>• Landscape character – sensitivity.</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>• Maintain community connectivity and limit severance of township.</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>• Minimise the impact on flooding regime within town.</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>• Minimise impact on major public utilities.</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>• Minimise impact on non-Aboriginal heritage (excluding the existing bridge).</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Consider constructability impacts.</td>
<td>• Access for construction traffic and impacts on local roads.</td>
<td>2</td>
</tr>
<tr>
<td>Consider WHS impacts of the project options</td>
<td>• Length of road constructed under traffic.</td>
<td>3</td>
</tr>
</tbody>
</table>

**Initial evaluation of the preliminary route options**

Following the overview of each preliminary route option a first pass evaluation of the route options was carried out to identify options that did not merit further consideration.

The three options ruled out for further investigation are summarised in Table 5-2.
Table 5-2  Initial evaluation results

<table>
<thead>
<tr>
<th>Option</th>
<th>Why rejected</th>
</tr>
</thead>
</table>
| 4      | • Poses a high risk of severance if any minor floods occur during the bridge construction period, either damaging or washing away the side track – highway cut whilst side track is reconstructed  
      | • Unacceptable community severance while bridge was being constructed  
      | • There would be significant construction difficulties and risks associated with Option 4  
      | • Eliminates some bridge construction methodologies.                                                                                       |
| 9      | • Would result in unacceptable community severance  
      | • Potential for unacceptable impacts on non-Aboriginal heritage  
      | • Significant adverse impacts on some local businesses  
      | • Unacceptable severance of primary school and oval.                                                                                       |
| 10     | • Unacceptable community severance  
      | • Potential for unacceptable impacts on Aboriginal and non-Aboriginal heritage  
      | • Potential road safety issues due to difficulty in controlling speed through town  
      | • Any advantage associated with Option 10 is seen as being less than for Option 11  
      | • Potential road safety issues due to mixing of local and through traffic.                                                               |

Assessment of preliminary route options

Following the initial evaluation, the eight remaining preliminary route options were assessed on a qualitative basis against the assessment criteria. Each option was assessed on a scale of one to five, where five was assigned when the performance of the option was considered to be excellent ranging down to a score of one where the performance against the criterion was considered to be relatively poor. Once the qualitative evaluation was completed, the options were scored using the agreed weightings.

In order to obtain a shortlist of route options worthy of further development and investigation, the total weighted score, the order of capital cost and comparative value for money assessment for each route option were compared. Value for money was determined by dividing the total weighted score by the indicative capital cost.

A shortlist of route options was obtained through a comparison of variables with the reasons for and against shortlisting detailed in Table 5-3 below.
Table 5-3  Preliminary route option evaluation results

<table>
<thead>
<tr>
<th>Option</th>
<th>Total weighted score</th>
<th>Indicative Capital Cost ($ M)</th>
<th>Value For Money (score/capital cost)</th>
<th>Short List Yes/no</th>
<th>Reasons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>216</td>
<td>42.4</td>
<td>5.1</td>
<td>No</td>
<td>Relatively low value for money option. Poor performance against some safety criteria and adverse, pedestrian and cyclist and vehicle connectivity. Potential adverse impact on business and high property impact.</td>
</tr>
<tr>
<td>2</td>
<td>291</td>
<td>37.2</td>
<td>7.8</td>
<td>Yes</td>
<td>Represents the highest value for money option. Provides an effective ‘on balance’ response to all criteria.</td>
</tr>
<tr>
<td>3</td>
<td>283</td>
<td>37.5</td>
<td>7.5</td>
<td>Yes</td>
<td>Provides a relatively high value for money option. Provides an effective ‘on balance’ response to all criteria.</td>
</tr>
<tr>
<td>5</td>
<td>265</td>
<td>38.9</td>
<td>6.8</td>
<td>No</td>
<td>Poor relative performance compared to other retained options and no material advantages over Option 3.</td>
</tr>
<tr>
<td>6</td>
<td>273</td>
<td>37.6</td>
<td>7.3</td>
<td>Yes</td>
<td>Provides a relatively high value for money option. Provides an effective ‘on balance’ response to all criteria.</td>
</tr>
<tr>
<td>7</td>
<td>272</td>
<td>37.4</td>
<td>7.3</td>
<td>Yes</td>
<td>Provides a relatively high value for money option. Provides an effective ‘on balance’ response to all criteria.</td>
</tr>
<tr>
<td>8</td>
<td>274</td>
<td>43.7</td>
<td>6.3</td>
<td>No</td>
<td>Similar score compared to Option 7 but slightly lower value for money option compared to Option 7.</td>
</tr>
<tr>
<td>11</td>
<td>207</td>
<td>63.8</td>
<td>3.2</td>
<td>No</td>
<td>Relatively low value for money option. Poor performance against some safety criteria and adverse, pedestrian and cyclist and vehicle connectivity. Potential adverse impact on business and high property impact. Potential adverse impact on flooding and Aboriginal heritage.</td>
</tr>
</tbody>
</table>

At the conclusion of the workshop and the route option assessment process the following route options were shortlisted for further development and investigation.

- **Option 2** - now called Option A
- **Option 3** - now called Option B
- **Option 6** - now called Option C
- **Option 7** - now called Option D.

- These shortlisted route options were place on display in early December 2013 where feedback from the community was invited.
- A more detailed description of the preliminary route option assessment process, in particular the detailed scoring assessment is available in the Route Option Development Report which is located on the Roads and Maritime project website.
5.5 Short listed route options

5.5.1 Further development of the short listed route options

Following on from the announcement of shortlisted route options the designs of the four shortlisted route options were further developed to geometric design and operating standards. This enabled strategic cost estimates to be calculated.

In addition, onsite investigations were carried out such as environmental fieldwork including ecology surveys, noise monitoring and geotechnical investigations. These investigations were carried out to quantify the risks and opportunities specific to each shortlisted option.

5.5.2 Description of the short listed route options

**Option A**

At its western end, Option A commences on the Bruxner Highway near Clarence River Road crossing the river upstream and parallel to the existing bridge, then rejoins the highway at the Clarence Street intersection. The option uses only one of the existing overflow bridges on the western side of the river. Option A is about 790m long with a new overflow bridge and a new 300 m main bridge.

**Option B**

Option B utilises both overflow bridges on the western side of the river and crosses the Clarence River to the north of the existing bridge before connecting into the existing Bruxner Highway at the Clarence Street intersection. The bridge alignment is curved to allow it to connect to the highway either side of river whilst providing a sufficient lateral clearance to the existing bridge. Reconstruction of the Tabulam Road intersection is required. This option requires a short connection on the western side to join into the existing No 1 overflow bridge. Minor property acquisition is required for this option on both sides of the river.

**Option C**

Option C starts on the Bruxner Highway on the western side at the intersection with Clarence River Road, crossing the Clarence River on the southern side and parallel to the existing bridge and connects into existing alignment at the Clarence Street intersection. Reconstruction of the Tabulam Road intersection is required. This option uses only one of the existing overflow bridges (No 2) on the western approach and will require construction of a new overflow bridge No 1. Property acquisition is required on the western side of the river.

**Option D**

At its western end, Option D commences on the Bruxner Highway east of the Clarence River Overflow No. 2 bridge crossing the river downstream on a slight angle to the existing bridge. It then converges and re-joins the highway at the Clarence Street Road intersection. The option uses only one of the existing overflow bridges on the western side of the river. Option D is about 1000 m long with a new 300 m main bridge.

The shortlisted route options are illustrated in Figure 5-2.
5.5.3 Strategic cost estimates of shortlisted route options

High level strategic cost estimates, including a large contingency, have been prepared for the shortlisted options and are provided in Table 5-4 below.

**Table 5-4 Strategic cost estimates for shortlisted route options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Strategic cost estimate amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>$49.0m</td>
</tr>
<tr>
<td>Option B</td>
<td>$40.9m</td>
</tr>
<tr>
<td>Option C</td>
<td>$48.7m</td>
</tr>
<tr>
<td>Option D</td>
<td>$48.5m</td>
</tr>
</tbody>
</table>

Following the display of the preferred route, receipt of community feedback and further detailed investigations, a concept design will be prepared for the preferred route option to inform the environmental assessment, at which time a more accurate cost estimate will be calculated.
Figure 5-2

Shortlisted Route Options

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- Study area
- Option 2 (A)
- Option 3 (B)
- Option 6 (C)
- Option 7 (D)
6 Consultation and value management workshop

This chapter describes the public display activities and feedback from the community following the display of the shortlisted route options. The chapter also outlines the value management process in recommending a preferred route option and additional considerations required to confirm a preferred route option.

6.1 Public display activities

6.1.1 Activities leading to the display of route options

Following on from the development of the preliminary route options, the major activities that took place in the lead up to the display of route options included:

- A shortlisting workshop was held to review and assess the preliminary route options and establish a shortlist of route options worthy of further development and investigation
- Roads and Maritime senior management approval of the shortlisted route options
- Documentation of the route option development process including the shortlisting workshop in the Route Options Development Report and preparation of a community update for publication
- Announcement and display of the shortlisted route options, including a drop-session for community comment.

6.1.2 Public display of the shortlisted route options

Following the announcement of the shortlisted route options a community update was mailed out to the community and a drop-in session to supplement the public display was held on Tuesday 10 December 2013 at the Tabulam Community Hall. A total of 29 community members attended the drop-in session, which included local residents and other interested community members.

Attendees spoke with members of the project team to discuss the route options, ask questions, identify areas of concern and provide suggestions on how to commemorate the existing bridge. A variety of information was provided at the session, including a map outlining each of the four route options and copies of the Route Options Development Report and community update.

Feedback forms were also provided and attendees encouraged to provide feedback that could be considered by the project team in the assessment of the shortlisted route options when selecting a preferred route option.

After the completion of the display and following receipt of all community feedback a Feedback Summary Report was published and is available on the Roads and Maritime website. A brief overview of the feedback is provided below.

**Overview of feedback received from the community**

The feedback form invited comment on the route options, how the existing bridge could be appropriately remembered and any other information relevant to the project.

The first section of the feedback form asked community members to identify the benefits, opportunities, challenges and issues of each shortlisted option.

A summary of the feedback received is outlined in Table 6-1.
<table>
<thead>
<tr>
<th>Option</th>
<th>Benefits/opportunities</th>
<th>Challenges/Issues</th>
</tr>
</thead>
</table>
| **A**  | • Good road alignment  
          • Reduced flooding impacts  
          • Minor impact on nearby properties  
          • Better approach to bridge  
          • Minimal traffic disruption. | • This option is longer and only uses one of the overflow bridges  
          • Safety impacts on pre-school  
          • Potential for drivers to speed  
          • Impacts to flora and fauna  
          • Dangerous bend at western approach  
          • Loss of existing overflow structure – perception bridge will not be replaced  
          • Loss of usable farmland. |
| **B**  | • Shortest and cheapest option  
          • Uses existing overflow bridges  
          • Pleasant view of the bridge from Tabulam Road  
          • Curved structure reduces degree of curve on first overflow bridge  
          • Most economical of the four options with less risk of a motor vehicle accident. | • Bridge is curved which can be a risk for drivers  
          • Likelihood of flooding impacts both during and after construction  
          • The loss of a cohesive village due to impact on farmland, picnic area and access points to river during construction  
          • Impacts to flora and fauna  
          • Traffic impacts during construction. |
| **C**  | • Minor impacts on properties located on both sides of the river  
          • Potential for less interference on livelihood (eg farming)  
          • Similar location to existing bridge. | • Corner very tight past pre-school on the western side  
          • Loss of useable farmland, picnic area and access to the river  
          • Encroachment on pre-school  
          • Dangerous bend near intersecting road (Clarence River Road)  
          • Only uses one overflow bridge. |
| **D**  | • Good alignment gives room to have a park on eastern side  
          • Least interruption and effect on residents  
          • Takes the highway away from the pre-school and eliminates a sharp corner  
          • A more direct route  
          • Fewer impacts on native fauna  
          • Still uses one of the overflow bridges  
          • Better for semi-trailers. | • Risk of flooding during construction  
          • Loss of useable farmland, picnic area and access to river  
          • The difficulty may be the cost of access roads  
          • Longer and therefore more expensive.  
          • Only uses one overflow bridge. |
Other feedback received during the community drop-in session and meetings with landowners identified a number of other key issues, similar to those identified above. These issues included:

- Pedestrian and motorist safety, particularly in relation to the pre-school and the bend near the intersection with Clarence River Road
- The size of vehicles utilising the new bridge, particularly B-Doubles
- The level of encroachment near the pre-school
- Removal of the existing bridge
- Flooding impact
- Speeding.

The feedback form also asked respondents to identify some suggestions for recognising the existing bridge in Tabulam. Respondents provided a range of suggestions which have been categorised into three key themes:

- Displays to show historical importance
- Use bridge for another purpose
- Retain or re-use old materials.

Following the display of the route options, meetings were held with affected landowners, including the management from the local preschool. The preschool is located on the western side of the Clarence River. The preschool management supported Option B as it had no impact on their business whereas the other options may require acquisition of their land and modification to their business.

6.1.3 Delisting of the existing bridge from the State Heritage Register

The bridge over the Clarence River at Tabulam is listed on the NSW State Heritage Register. While the Heritage Council has endorsed the Timber Truss Strategy the delisting from the Register is a statutory process. This process, under Section 38 of the Heritage Act, 1977 only allows for delisting on financial hardship or economic grounds.

Legal advice is the existing bridge is owned by the local councils, being both Tenterfield Shire and Kyogle Council as the bridge spans the council boundary. Roads and Maritime has consulted with both Councils and has received written support from both for the removal of the existing bridge.

Initial community consultation highlighted that the local community is generally opposed to the delisting and demolition of the bridge. A new bridge is generally supported however this is along with the retention of the existing bridge. The community has created a Facebook page and Roads and Maritime received a petition with 162 signatures. As part of the delisting process the Heritage Council will carry out its own consultation about the delisting of the bridge.

Feedback to date on retaining the existing bridge has been carefully considered. However, due to the ongoing conservation, operational and financial challenges presented by retaining the existing bridge, Roads and Maritime is proceeding with the project. This includes identifying a replacement bridge location and removal of the existing bridge.
Options that were considered for retaining the existing bridge included:

- Retain the existing bridge for pedestrian access only - retaining as a pedestrian access bridge would continue to require significant maintenance costs. It would still need to be maintained for vehicular traffic to allow for safety inspections and maintenance work. As such, it is considered too costly.

- Retain the bridge for visual aesthetics only until the bridge collapses into the river - retaining the bridge without ongoing maintenance costs would pose significant safety risks to the Tabulam community and river users and is not considered a viable option.

- Retain the existing bridge for its current use - as identified in the *Timber Truss Bridge Conservation Strategy* the existing bridge is expensive to maintain and cannot be upgraded to meet future operational requirements. A new bridge would substantially reduce maintenance costs and provide a new bridge suitable for future needs.

Ongoing discussions with the community since the initial drop-in session in 2013 have highlighted they would be more accepting of the bridge removal subject to it being appropriately commemorated in some way or form. Roads and Maritime is investigating ways to recognise the heritage significance of the existing bridge and will work with the community to determine the most appropriate ways the bridge could be remembered.

An example of how this could be provided is given in Figure 6-1 and Figure 6-2 below in a sketch form. The community is encouraged to continue to provide feedback and ideas.

![Figure 6-1 Plan view of possible bridge approach treatment](image-url)
6.2 Value management workshop

Following the display of the four shortlisted route options and analysis of community comment a value management workshop was held on 18 February 2014 at Casino to assess the four shortlisted route options and recommend a preferred route option.

The workshop was attended by 26 participants, which consisted of representatives from Roads and Maritime, Transport for NSW, GHD (Roads and Maritime Contractor), sub-consultants, Kyogle Council, Tenterfield Shire Council, six community members and a workshop facilitator.

The workshop was a forum where participants reviewed, assessed and evaluated route options against assessment criteria determined from the project objectives.

To allow the workshop to be held over one day, draft assessment criteria were predetermined before the workshop. The participants at the workshop were presented with the criteria and invited to review, confirm and suggest any additional criteria before they were weighted using a pair wise analysis.

6.2.1 The value management process

The following process was followed:

- Brief discussion on the background of the project
- Overview and confirmation of project purpose and project objectives
- Discussion on the givens and constraints of the project
- Confirmation of assessment criteria and methodology to evaluate shortlisted route options
- Weighting of assessment criteria against other criteria from same perspective (technical/functional, socio-economic, environmental)
• Overview of the shortlisted route options including the results of investigations and assessments
• A series of discussions and presentations were carried out to identify and describe the key constraints within the study area to ensure all workshop participants were familiar with the potential impacts on each route option
• Compilation of opportunities and risks of each shortlisted route option
• Evaluation of the route options using assessment criteria and weightings as previously confirmed
• Presentation of strategic cost estimates
• Summary of evaluation rankings and strategic cost estimates
• Recommendation of a preferred route by four groups which deliberated on the best option to move forward, the reasons why and any conditions relating to selecting that option as a preferred route
• Recommendation of preferred route option by workshop group
• Discussion of issues and conclusions drawn.
  • Following the completion of the value management workshop a report was prepared which provides a detailed overview of the assessment process. This report is available on the Roads and Maritime website.

6.2.2 What is important about the project
The workshop attendees shared from their various perspectives what was important about the project. The points raised included:
• The project needs to be sympathetic (in an urban design context) to the Tabulam environment
• The project needs to recognise the strategic importance of the new bridge as the Clarence River crossing and connection to the regions west of the river.

The group reflected on the givens and constraints within which the project was being developed. The givens and constraints outlined below were agreed to by the workshop attendees.

Givens we are working within
• Without removal of the existing bridge a new bridge will not be built
• Removal of the existing bridge is independent from the route selection process and environmental studies (this project)
• Options are designed to operate at a speed of 60 km/h, but signposted at 50 km/h
• Pedestrian and cyclist provision will be provided
• Standard cross section to be adopted is – two 3.5 metre lanes, 1.0 metre shoulders, and 2.5 metre shared path
• The new bridge deck level will be no lower than the existing bridge deck level, preferably with 1 in 100 year flood immunity
• Both overflow structures to the west of the bridge have a flood immunity below the 1 in 100 year flood event and there is minor flooding of the Bruxner Highway east of Clarence Street in a 1 in 100 year flood event.
Constraints to take into account

- Flooding regime considerations – Clarence River main channel and two overflow channels
- Existing bridge and approaches to remain operational whilst the new bridge is constructed
- The pre-school on the western side of the bridge needs to be considered. The main issues are safety of the pre-school users as well as access and traffic noise
- Residences and businesses on the eastern side of the bridge need to be considered
- The native vegetation in the north east section of the project needs to be considered
- Aboriginal cultural heritage constraints (ie the Birthing Place, Blacks Camp and the Big House location) in the north east section of the project needs to be considered
- The location of the public school and the access of the bus to that area.

6.2.3 Assessment criteria

As a result of the information shared in the workshop, attendees reviewed the draft assessment criteria that could be used to qualitatively evaluate the various options. The assessment criteria (in the three categories of technical/functional, socio-economic and environmental perspectives) would reflect the project objectives and items of importance, what the project must achieve to be successful and what can be used to differentiate between the route options.

The assessment criteria used to evaluate the options for the project within the three categories of technical/functional, socio-economic and environmental perspectives were as follows.

Technical/Functional:
- A – Optimising the geometry standards of the road and bridge
- B – Improve existing conflict points (intersections and accesses) on the highway
- C – Controlling operating speed through town
- D – Minimising impact on major public utilities
- E – Maximising use of existing infrastructure
- F – Ease and safety of construction and demolition.

Socio-economic:
- A – Improving pedestrian and cyclists connectivity and safety
- B – Minimising adverse impact on business/service patronage
- C – Minimising the number of lots impacted/farm land (ie land acquisition)
- D – Minimising visual impact of the receivers
- E – Impact on the sensitivity of the landscape character
- F – Road user impact during construction (ie impact of construction traffic on the highway and local roads)
- G – Minimising noise impact on identified sensitive receivers.
Environmental:
A – Minimising the area of native vegetation impacted
B – Minimising the area of fauna habitat and connectivity impacted
C – Minimising the impact on Aboriginal cultural heritage.

6.2.4 Weighting of assessment criteria

Relative weightings for the assessment criteria within each perspective were calculated qualitatively by the whole group using a paired comparison technique. In summary, the weighting of the assessment criteria for each perspective using the paired comparison approach indicated the following in order of importance.

From a technical/functional perspective
1. Optimising the geometry standards of the road and bridge
2. Controlling operating speed through town
3. Improve existing conflict points (intersections and accesses)
4. Ease and safety of construction and demolition
5. Minimising impact on major public utilities

From a socio-economic perspective
1. Improving pedestrian and cyclists connectivity and safety
2. Minimising adverse impact on business/service patronage
3. Minimising the number of lots impacted/farm land (ie land acquisition)
4. Minimising noise impact on identified sensitive receivers
5. Impact on the sensitivity of the landscape character
6. Minimising visual impact of the receivers
7. Road user impact during construction.

From an environmental perspective
1. Minimising the impact on Aboriginal heritage
2. Minimising the area of native vegetation impacted
3. Minimising the area of fauna habitat and connectivity impacted.

An overall summary of the weightings of the assessment criteria within the various themes as determined by the group is provided in the Value Management Workshop Report on the Roads and Maritime website.

These weighted assessment criteria was later used to evaluate the route options for the project.

6.2.5 Options review for opportunities and risks

Prior to an evaluation of the four route options the workshop attendees examined and recorded the opportunities and risks for each option. The purpose of the review was for the workshop group to obtain a common understanding of the route options and their differences, opportunities and risks so that they could be evaluated against the various assessment criteria that had been developed and then weighted.
The opportunities and risks for each of the route options are described in detail in the Value Management Workshop Report which is available on the Roads and Maritime project website.

6.2.6 Assessment of the options

Having reviewed the options and obtained a common understanding of the opportunities and risks specific to each option, the workshop attendees were able to evaluate each option against the weighted assessment criteria developed earlier in the workshop.

The workshop group split into three focus groups, technical/functional, socio-economic and environmental based on technical expertise or represented perspective. It should be noted that each focus group was (as much as possible) a representative cross section of the workshop participants (ie a mix of community, council, project team, Roads and Maritime, Transport for NSW).

The options were assessed relatively and qualitatively as to how each option performed against each criteria. The approach was to review the relevant information related to each criteria for each option, then to decide which of the options performed better against this criteria. The best performing option against each criteria would be scored ‘4’.

The next step was to assess how much better that route option was relative to the other route options. A major difference between them would score the other option as ‘1’, a medium difference would score the other option as ‘2’ or a minor difference between them would score the other option as ‘3’.

Where information on a particular issue was incomplete, the group used the collective wisdom and expertise of the participants carrying out the evaluation to determine the relativity of the options against the criteria in question.

Once the qualitative evaluation was completed, the evaluation was scored using the weightings of the criteria and establishing a relative overall ranking for each option in each category/perspective.

It should be noted where the difference in score between route options was not greater than the highest weighted criteria within that category/perspective, the options were equally ranked as the difference in score was not considered significant within the sensitivity of the assessment tool adopted.

The findings of each focus group were presented to the whole group for discussion, amended if necessary and finally endorsement as to an agreed assessment to assist the group move forward.

Details of the evaluation and assessment of the route options against the assessment criteria for the three perspectives (technical/functional, socio-economic and environmental) is provided in the Value Management Report on the Roads and Maritime website.

6.2.7 Summary of option assessment rankings and strategic cost estimates

A summary of the rankings of the options based on the qualitative assessment together with the relative strategic cost estimates was then tabled as a value matrix so that the group could draw some conclusions as to which option provided best “value for money”.

Table 6-2 provides a summary of the assessment rankings and strategic cost estimates.
Table 6-2  Assessment ranking and strategic cost estimates

<table>
<thead>
<tr>
<th>Route Option</th>
<th>Technical/ Functional</th>
<th>Socio-economic</th>
<th>Environmental</th>
<th>Strategic Cost Estimates ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option A</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>$49.0M</td>
</tr>
<tr>
<td>Option B</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>$40.9M</td>
</tr>
<tr>
<td>Option C</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>$48.7M</td>
</tr>
<tr>
<td>Option D</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>$48.5M</td>
</tr>
</tbody>
</table>

Please note that a score of ‘1’ is the best assessment ranking, with ‘4’ being worst

6.2.8  Outcomes and conclusions
The outcomes of the value management workshop were:
- Option C scored higher than the other options however Option D was a very close second
- The workshop participants agreed that Options A and B are the least preferred options as they did not perform as well as options C and D when assessed against the agreed criteria
- Option B, while of lower cost, performed poorly due to vertical and horizontal road geometry considerations, impact on Aboriginal cultural heritage and environmental impact.

6.2.9  Recommendation from the workshop
The workshop recommended that options C and D should move forward as the preferred options to be progressed.

The workshop participants found:
- Options C and D were considered the best performing options when assessed against technical/functional and social-economic criteria
- Option C performed highest against environmental criteria
- Options C and D performed strongest against safety and transport efficiency criteria
- Options A and B were the least preferred because of their impact on environmental and Aboriginal sites and had greater impact on private land
- Options C and D are of similar cost but D may provide a safer option as it provides a better road alignment on the western side of the bridge
- If option D is selected, further consideration needs to be given to road design and how to connect the pre-school to the bridge footpath to improve safety.

In recommending options C and D, the workshop participants noted a number of ‘subject to’s’ requiring further consideration and investigation prior to recommending a preferred route option. A summary of these are:
- Consider a pedestrian underpass on the eastern and western sides to cross the highway
- Consider suitable visual screening for the pre-school
- Address potential speed issues
• Provide a satisfactory intersection treatment for the pre-school and Clarence River Road
• Bridge and overflow structures are designed to the 1:100 year flood immunity (bridge deck level), which caters for the future upgrade of the Bruxner Highway
• Consider in flood modelling the implications of climate change
• Investigate a refinement of Option C at its western extent to reduce the impact to the pre-school and improve sight distance and safety
• A more detailed comparison of impacts to Aboriginal heritage and biodiversity for Options C and D.

Following the value management workshop some of these subject to’s have been investigated to confirm a recommended preferred route option.
7 Selection of the preferred route

This chapter describes the selection of the preferred route following the value management workshop and additional investigative activities.

7.1 Overview of process to date

The process of arriving at a preferred route for a new bridge at Tabulam involved a number of stages in the development and assessment of options described in this report. The key stages have been:

- Review of background data and information to establish project constraints and opportunities
- Development of preliminary route options
- Shortlisting four route options for consideration by the community
- Value management process to assess the shortlisted route options and recommend a preferred route.

7.2 Value management workshop outcome

In recommending options C and D be progressed further for consideration as a preferred route option, attendees noted a number of subject to’s that required further investigation. Key subject to’s requiring further investigation are:

- Confirmation of a potential archaeological deposit in the vicinity of Option D on the eastern side of the river
- Confirmation of the flora and fauna impacts for Option D
- Refining the design of Option C around the pre-school bend to improve sight distance and safety.

7.3 Investigations following the value management workshop

7.3.1 Aboriginal heritage clarification

Clarification was sought following the value management workshop in regard to the scoring of Option D from an impact on Aboriginal heritage point of view. Preliminary advice was that there was a potential archaeological deposit (PAD) in the vicinity of Option D on the eastern side of the river that may be impacted and was the reason for the slight difference in scoring between options C and D for Aboriginal heritage impacts.

Following further investigation by the project archaeologist it was advised that due to the highly disturbed nature of the ground in this area that it was highly unlikely a PAD was present and therefore there is no measurable difference between options C and D.

7.3.2 Flora and fauna habitat clarification

Following the value management workshop the ecologists that conducted recent field surveys reviewed the findings of the survey work and confirmed that from an ecology impact point of view there was no measurable difference between options C and D.

This clarification was sought as at the value management workshop attendees scored a slight difference between options C and D. The difference was based on the perception that Option D was slightly worse due to the greater length of the option.
7.3.3 Refinement of Option C

A refinement of the western end of Option C was developed after the value management workshop to investigate if the sharp bend and impact on the preschool could be improved. Although the design was improved slightly, the revised design essentially remained the same as Option C with a similar sharp bend at the western end.

The revised Option C provided a straight bridge over the Clarence River Overflow Channel No 1 and reduced the impact on the pre-school land. However, it retained the same curve moved further to the west increasing the length and cost of the option. As a result Option D was confirmed as the better option from an alignment and safety point of view.

The remaining ‘subject to’s’ that were not specifically addressed as part of this investigative phase following the workshop will be considered in the development of the concept design for the preferred route option.

7.4 Technical group option assessment workshop

Due to the difference between the value management workshop recommendation of Option D and the slightly better scoring of Option C and subsequent investigations, a technical group option assessment workshop was held following the value management workshop to reassess these options.

This workshop included participants from the Roads and Maritime, Transport for NSW and the GHD project team.

The technical group option assessment was a forum where participants reviewed the work carried out at the value management workshop and subsequent investigative work into the subject to’s.

The technical group confirmed that options A and B were the worst scoring options and should not be considered further. However, the group agreed to re-evaluate options C and D based on new information around ecology, Aboriginal heritage and a refined design for Option C. The options were evaluated using the same assessment criteria and weightings established at the value management workshop.

Following this reassessment the group confirmed and recommended Option D as the preferred route option for the New Tabulam bridge project and that this option be recommended to the Roads and Maritime senior management for approval.

7.5 The preferred route

Key attributes of Option D is as follows:

- The most direct of the shortlisted route options consisting of a new 300 metre long bridge over the Clarence River and a 45 metre long bridge over the overflow channel No 1
- The option commences at the Clarence Street intersection, east of Clarence River, and connects to the existing Bruxner Highway at the eastern end of the Overflow No. 2 structure west of the river
- Does not utilise the existing overflow structure No. 1 and passes to the south of the pre-school
- Provides a new intersection and access point to Clarence River Road and the pre-school resulting in an improved safety to road users
- A pedestrian and cyclist path will be provided along the length of the route providing access to and from Tabulam village to the pre-school.
7.6 Reasons why the preferred route was selected

The confirmation of Option D as the preferred route option is based on the following factors as it would:

- Have little or no impact on flora and fauna
- Provide improved access to the pre-school and Clarence River Road
- Result in a better and safer road alignment outcome over Option C for a similar cost
- Provide a 1 in 100 year flood immunity for the Clarence River Overflow No 1 as well as the major bridge over the Clarence River
- Be located away from the existing bridge with minimal traffic impacts during construction
- Not impact on known Aboriginal cultural heritage
- Minimise private land acquisition
- Have least impact on public utilities
- Provide the best value for money solution.
8 The preferred route

This section provides an overview of the benefits and issues for Option D as the preferred route.

8.1 Overview

Option D commences on the Bruxner Highway east of the Clarence River Overflow No. 2 bridge, crossing the river downstream on a slight angle to the existing bridge. It then converges and re-joins the highway at the Clarence Street intersection. The option is about one kilometre in length with a new 300 m long bridge over the Clarence River and a new bridge at the Clarence River Overflow Channel No 1.

The preferred route is shown in Figure 8-1.

A detailed environmental assessment, along with development of the concept design will be part of the next stage of the project. The assessment will be carried out in accordance with the requirements of the NSW Environmental Planning and Assessment Act 1979.

The impact of the preferred route has been assessed on the basis of a preliminary design. The impact of the project will be subject to more detailed analysis as the concept design and environmental assessment of the preferred route are progressed.

The road is generally expected to be along the alignment of the preferred route unless detailed investigations identify significant issues that necessitate more substantial realignment of the road or change in corridor width.

Roads and Maritime will carry out more detailed investigations, such as targeted geotechnical investigations for the bridges and high embankments, as well as a wide range of environmental studies (flora and fauna, and noise).

8.2 Benefits of the preferred route

8.2.1 Traffic and transportation considerations

The preferred route would provide benefits to through traffic in terms of travel time and shorter distance. The route provides a more direct east west route than the existing alignment.

Traffic currently traverses a single lane bridge with a give way sign at the western end. The provision of a modern bridge with two travel lanes will result in no delays to traffic.

In addition, the replacement of the existing timber bridge with a modern structure at Tabulam allows HML semi-trailer access along the Bruxner Highway between Tenterfield and Casino.

8.2.2 Safety

The preferred route provides a safer outcome for access to the pre-school and connection to Clarence River Road. Realignment of the highway to the south of the preschool and provision of an intersection east of the overflow bridge No 2 provides access to the pre-school and beyond to Clarence River Road.

The provision of footways on the northern side of the new bridges and connections to Tabulam village to the east and the new intersection to the west provides safe pedestrian and cyclist connectivity that is currently not provided.
Clarence River Overflow Bridge No 1

Clarence River Overflow Bridge No 2

OPTION D

Clarence River

Bruxner Highway

Creek Street

Grafton

Street

Charles Street

Tabulam Road

Lawrence Street

Clarence Street

Clarence River Road

Existing Bridge

To Tenterfield

To Casino (Ballina)

Figure 8-1

Preferred Route Option

LEGEND

- Preferred Route Option - Option D

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

0 15 30 60 90 120 Metres

Preferred Route Option
8.2.3 Ecology

Subject to more detailed flora and fauna investigation, the preferred route has little or no impact on flora and fauna on each side of the Clarence River.

The potential impact on habitat for the Eastern Freshwater Cod will need to be considered during the concept design, specifically the positioning of bridge piers within the water body of the Clarence River.

8.2.4 Aboriginal heritage

Site surveys of the four route options have been carried out with Jubullum Local Aboriginal Land Council representatives and Western Bundjalung Native Title Claimants in accordance with the PACHI process. The preferred route, being on the south side of the existing bridge has no impact on Aboriginal cultural heritage.

8.2.5 Property acquisition

The preferred route does require property acquisition, but minimises the impact on private property acquisition. Crown land on the western side of the river is impacted, including a minor impact on Crown land that is subject to an Aboriginal Land Claim under the NSW Aboriginal Land Rights Act.

8.2.6 Overflow structure No 1

The preferred route requires the construction of a new overflow structure No 1, similar in length to the existing concrete structure. Although an additional cost to the project, the recycling of concrete components from the existing structure provides the opportunity to replace a number of small timber structures elsewhere, improving safety and reducing maintenance costs at those sites.

Tenterfield Shire Council has expressed an interest in recycling the existing concrete bridge and will undertake separate investigations following project approval for the new bridge at Tabulam.

8.3 Potential impacts of the preferred route

8.3.1 Ecology

The preferred route like the other shortlisted route options traverses a body of water at the Clarence River, which has potential habitat for the Eastern Freshwater Cod.

More detailed ecology work, particularly aquatic surveys will be required for the environmental assessment and an understanding of the impact on the Eastern Freshwater Cod habitat. This will be particularly important in understanding the positioning and construction of the bridge piers within the Clarence River.

Preliminary ecology survey work to date has raised the issue of potential roosting habitat for microbats. Roads and Maritime will carry out additional survey work for the environmental assessment to establish potential habitat and presence of microbats or other bat species.

8.3.2 Noise and vibration

The preferred route realigns the highway from the north side to the south side of the pre-school. Noise modelling for the preferred route will be carried out by Roads and Maritime to gain an understanding of the impact on the pre-school as a sensitive receiver.
8.3.3 Property acquisition

There is a minor impact on Crown land on the western end of the preferred route that is subject to an Aboriginal Land Claim under the NSW Aboriginal Land Rights Act. This land cannot be compulsorily acquired and may delay the acquisition process or cause the preferred route to be changed to avoid the property.

Preliminary advice is that it is unlikely that the acquisition would be opposed by the Aboriginal community.

8.3.4 Public utilities

The preferred route passes over underground optic fibre telecommunications cables on the western approach (refer Figure 4-9 in Section 4.13). Onsite investigations will be required to better understand the location and alignment of cables and impact by the preferred route alignment.

8.3.5 Geotechnical conditions

Preliminary geotechnical investigations have been carried out for the four shortlisted route options. The boreholes indicated coarse to medium grained sandstone at depths of 7.7 metres to 14.0 metres. Layers of clay, sandy clay, sand, gravel and pockets of organic material were encountered above the sandstone layer.

More detailed and targeted geotechnical investigations will be required to better inform the concept design of the new bridges and high embankments.

8.3.6 Constructability

The bridge type, form and final length are yet to be established. Therefore, constructability issues are still to be understood for the construction of an approximately 300 metre long bridge with a high deck level over the Clarence River.

Consideration of feasible bridge types and selection of a preferred option is proposed by Roads and Maritime. This will be followed by a constructability workshop to document and better understand the issues and impacts associated with construction of the bridge in a remote area with access constraints.

8.3.7 Demolishing the existing bridge

Following the construction of the new bridge and approaches and the switching of traffic to the new bridge, the removal of the existing timber bridge will be carried out.

Understanding the correct and most suitable methodology to remove the bridge will be critical to minimise impact on the environment, traffic and the community.

Investigations into different options available to remove the existing bridge safely and at the least cost to the project will be considered in detail at a separate constructability workshop.
9 The next steps

Following the display of the preferred route option, Roads and Maritime will review submissions received during the display period and consider them during the development of the concept design and environmental assessment. A community feedback report will be prepared to summarise the feedback received and published on the Roads and Maritime website.

In addition, more detailed field investigations will be carried out for the preferred route option corridor to assist the development of the concept design and environmental impact assessment.

The concept design and environment impact assessment will be displayed for community comment.
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