LOGAN
CITY COUNCIL

Recent Advancement in Bridge Asset Management in Logan

By

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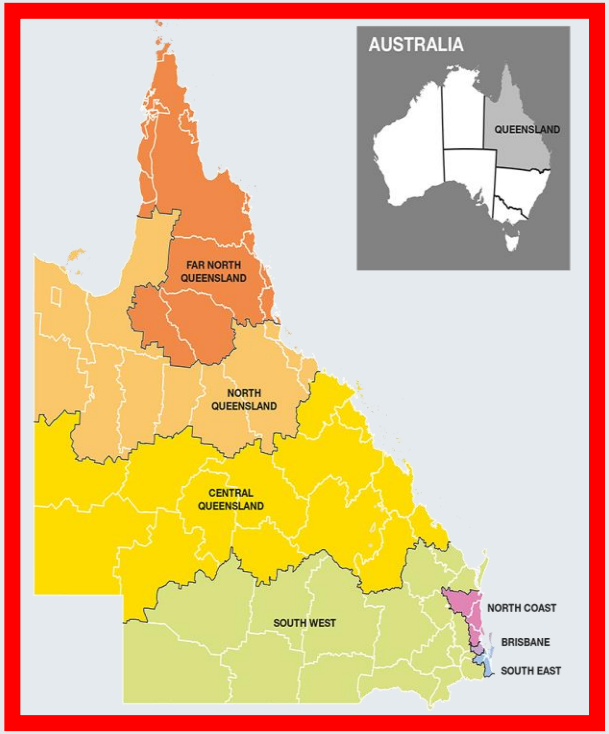
BUILDING OUR **COMMUNITIES**
BUSINESSES AND **PRIDE**

WHERE ARE WE IN AUSTRALIA



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RIP main focus is to minimise the whole of life cycle cost in managing our bridge portfolio

LCC Bridge Stock as at 2008 – Followed by LG Reform in 2008

Year	Boundary Bridges between LCC/SRRC	Boundary Bridges between LCC/GCCC	Logan City Council	Total
2008 – Road Timber	7	1	6	14
2008 - Road Concrete	1	5	27	33
2008 – Pedestrian Bridges	0	1	62	63
Total	8	7	95	110

LCC– Logan City Council SRRC- Scenic RIM Regional Council GCCC- Gold Coast City Council

DESIGN ERAS IN AUSTRALIA

Design Era	Design Load	Represents
Pre 1948	Various vehicle configurations plus UDL	Approximately equivalent to 15 to 20 tonne rigid truck
1948 – 1976	MS 18 (metric equivalent of H20-S16-44)	Approximately equivalent to 33 tonne semi-trailer
1976 – 1992	T44	Approximately equivalent to 47 tonne semi-trailer
1992 – 2004	T44, but to limit state principles	Approximately equivalent to 47 tonne semi-trailer
2004 -	SM1600	Approximately equivalent to 2 x 75 tonne semi-trailers, nose to tail

Table 3.1 from AUSTROADS Guide to Bridge Technology Part 1 – Page 18

TIMBER BRIDGE MANAGEMENT ISSUES

1. Constructed before 1960s and most bridges are load limited and reaching the end of their useful life.
2. Funding constraints.
3. Often do not cater for modern heavy commercial vehicles as defined in National Heavy Vehicle Regulator.
4. High Maintenance Cost – Termites and Fungal attack, Shrinkage and Splitting, Fire Damage, Weathering.
5. Data Management.

RIP/RAM NEW APPROACH

RIP – Road Infrastructure Planning RAM – Road Asset Management Program

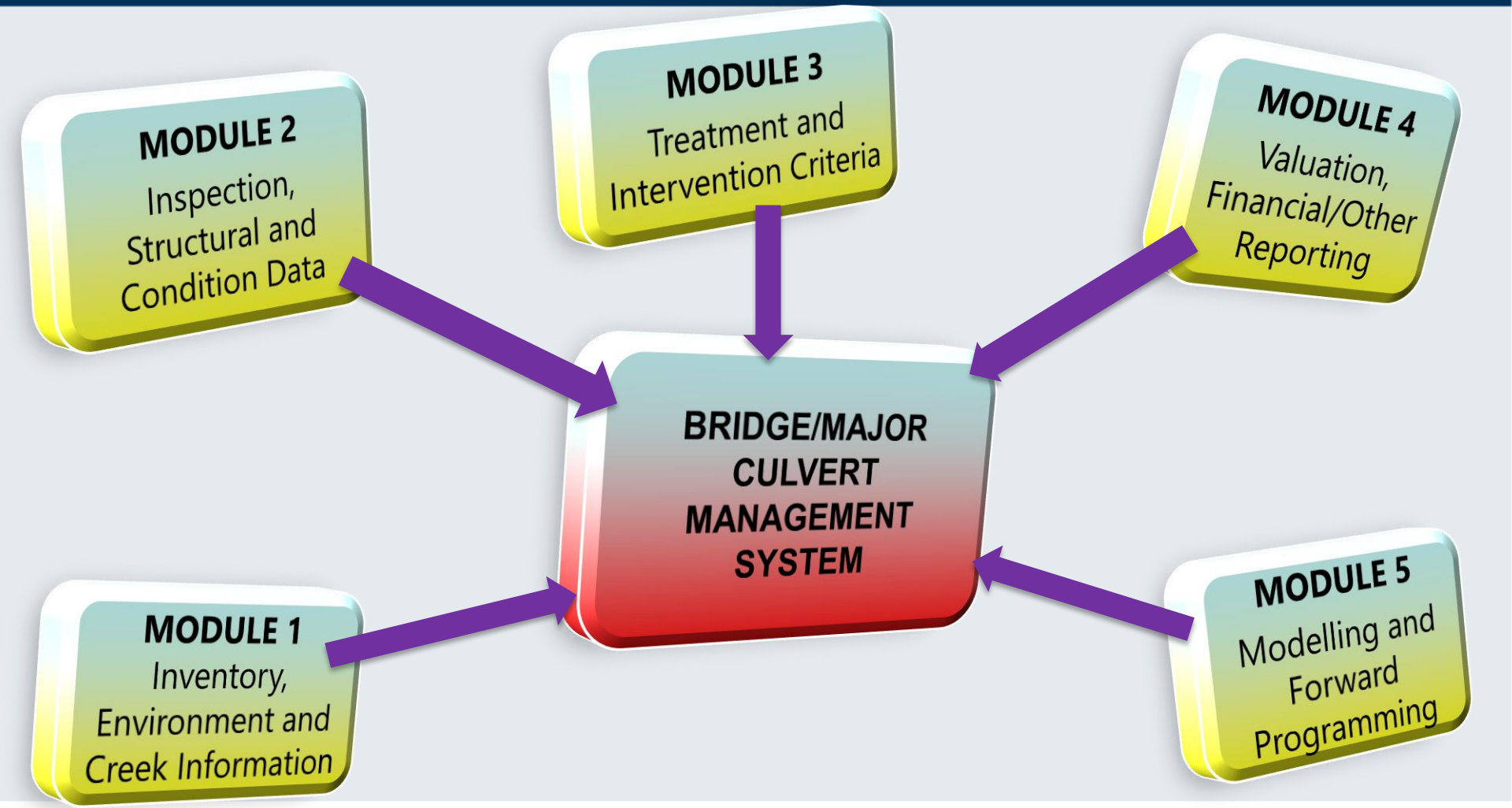
1. Working towards purchasing a Bridge Management System.

2. Explore possible external funding sources.

3. Replace existing timber bridges with concrete structures where ever possible.

4. Life cycle cost analysis prior to recommend any rehabilitation treatment.

LOGAN RIP/RAM NEW BMS



SUMMARY OF THE PRESENTATION

PART 1. Implementation of Bridge Management System

- Software installation and training
- Data validation and upload data
- Strategy for more data validation and upload

PART 2. Federal Government BRP funding submission process

- Council Selection Criteria
- Background Information
- Options and life cycle cost analysis
- BRP Submission
- Final Approval

PART 3. Edward O'Neill Bridge Replacement Case Study

- Structural Assessments and impact on road users
- Planning Consideration, negotiation and agreements
- Community Engagement
- Final Product
- Short video

PART 1
IMPLEMENTATION OF BRIDGE MANAGEMENT SYSTEM

IMPLEMENTATION OF BMS – PART 1

The implementation of the Bridge management System is divided into two stages

STAGE 1

- Software was installed in the Council network.
- Software training was completed.
- Validity of the data for concrete bridges was verified by the bridge. consultant as a part of a Level 2 Concrete Bridge inspection contract.
- New data is ready to upload.

STAGE 2

- Working towards engaging an university engineering student in future to verify the dimensional accuracy of timber pedestrian bridges.
- Upload Level 1, 2 and 3 inspections information into BMS which are currently recorded in pdf/excel format.

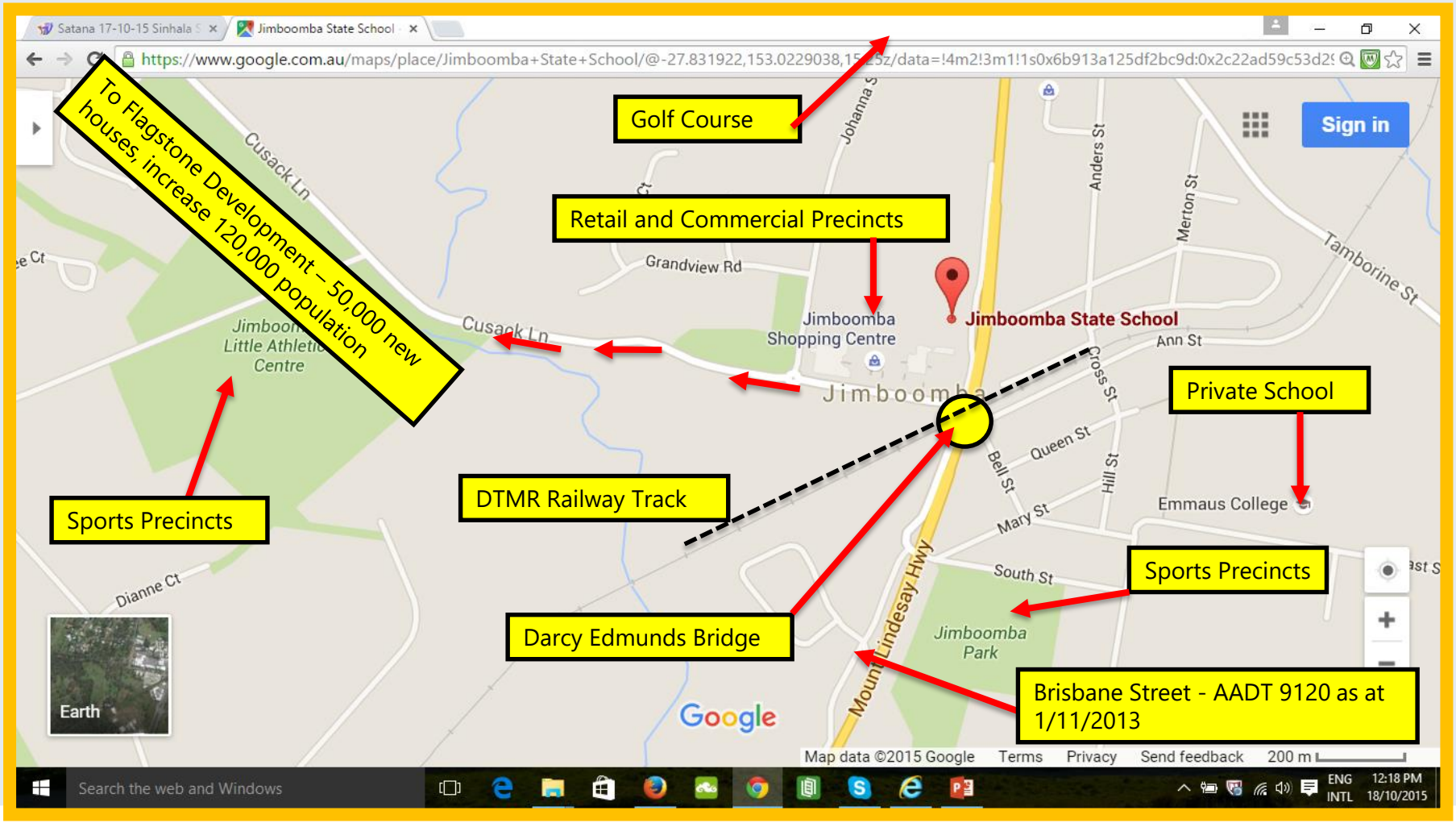
PART 2
FEDERAL GOVERNMENT BRIDGE RENEWAL PROGRAM LOGAN SUBMISSION

COUNCIL SELECTION CRITERIA

Road Infrastructure Planning established a criteria to select bridges which would qualify for the Federal Government Funding. They are;

- Should be a two way road timber bridge.
- Annual Average Daily Traffic should be more than 3000.
- Community Access/Benefits.
- Link to major development.

MAP OF THE DARCY EDMUNDS BRIDGE



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PHOTOGRAPHS FOR DARCY EDMUND TIMBER BRIDGE

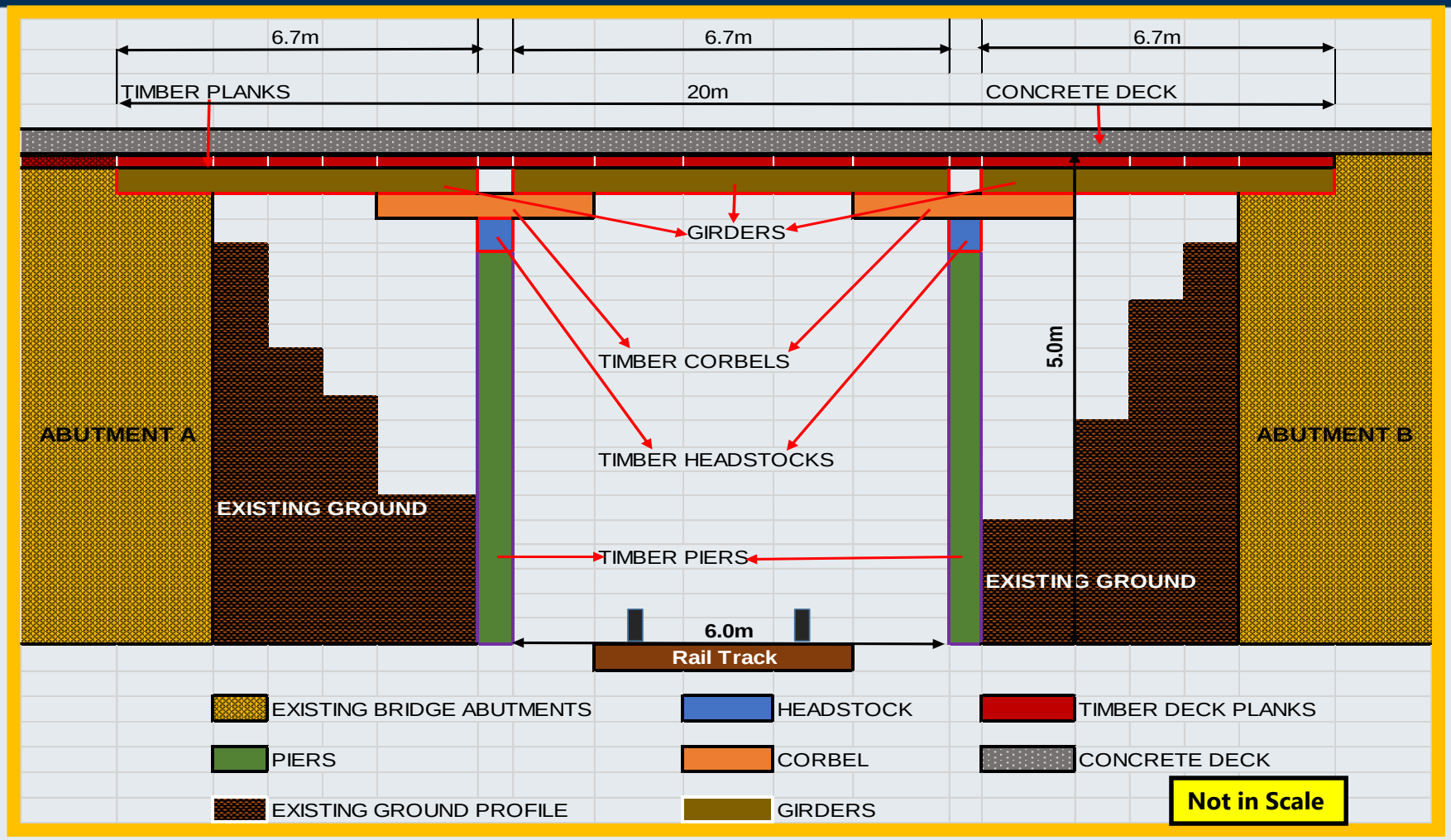
Looking from South Abutment

Looking from North Abutment

Longitudinal Section of the bridge

Sewer Rising Main and Water Mains

LONGITUDINAL SECTION OF EXISTING BRIDGE

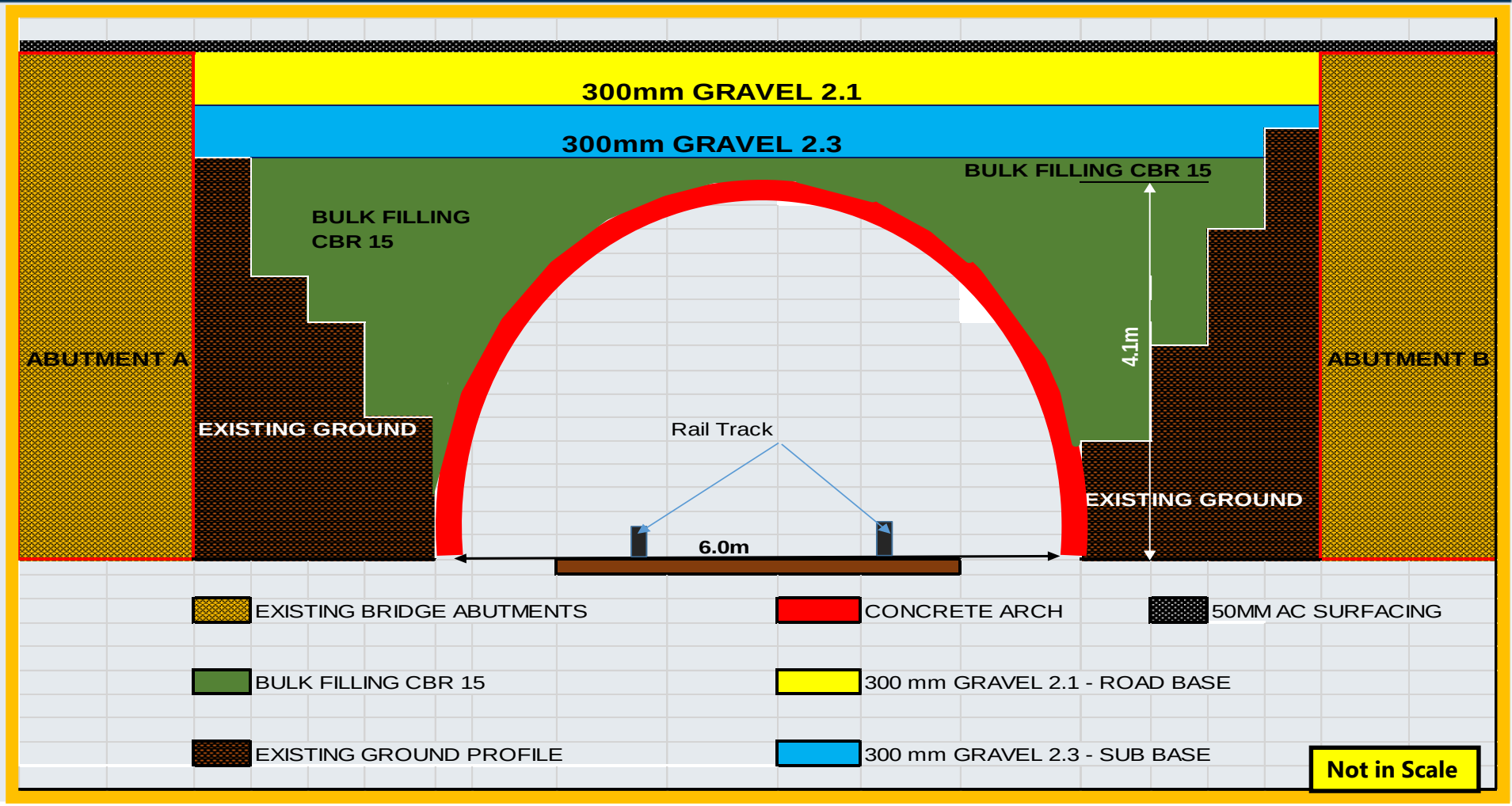


OPTION AND LIFE CYCLE COST ANALYSIS

The following three options were developed.

- OPTION 1 – Rehabilitation of existing bridge - T44
  1. OPTION 1A – Plywood Deck and AC surfacing – $810k
  2. OPTION 1B – Timber Deck and AC surfacing - $700k
  3. OPTION 1C – Plywood Deck and Concrete surfacing – $810k
  4. OPTION 1D – Timber Deck and Concrete surfacing - $675k
- OPTION 2 – New Composite Modular Bridge - $ 1.4m (Steel Girders with concrete deck)
- OPTION 3 – Concrete Arch Culvert - $1.4m
- Life cycle cost analysis was completed for each option

LONGTITUDINAL SECTION OF PROPOSED ARCH CULVERT



ENDORSEMENTS FOR BRP SUBMISSION

RIP concluded the preferred option was to replace the existing timber bridge with a Concrete ARCH Culvert with following endorsements:

- Council endorsed to bring forward Darcy Edmund Bridge Replacement from 2017/18 to 2014/15.
- Council obtained approval from Department of Transport and Main Roads.
- In principle RIP and RID agreed to tender out Design and Construct (D & C) contract and it would commence in 2014/15 Financial Year.

RIP – Road Infrastructure Planning **RID – Road Infrastructure Delivery**

FINAL APPROVAL AND PROGRESS

- 17 February 2015, Council was advised the Darcy Edmunds Bridge proposal was successful.
- BRP advised $700k was allocated towards replacement of Darcy Edmunds Timber Bridge by a Concrete ARCH Culvert.
- Design and construct contract was established.
- Design currently under review.

PART 3
EDWARD O'NEILL BRIDGE REPLACEMENT PROJECT
KILMOYLAR ROAD
JIMBOOMBA

EDWARD O'NEILL BRIDGE LOCATION MAP

OLD TIMBER BRIDGE PHOTOGRAPHS

Bridge had standing water approximately 3-4m

Looking from Scenic Rim Regional Council approach as at 2012

HISTORY OF STRUCTURAL ASSESSMENT

- Before June 2010 – No Load Limit.
- June 2010 – Reduced load limit from 44 Tonne to 23 Tonne due to the structural deficiencies of the structure.
- August 2012 – Further reduction of load limit from 23 Tonne to 10 Tonne.
- 2014 – The joint Council's resolved that bridge is near or past its useful economical life.

IMPACT ON ROAD USERS

- Restricted to vehicles weighing more than 10 tonne.
- Fire Trucks and School Buses.
- Cattle Trucks and Water Tankers.
- Travel distance for a Heavy Vehicle is increased by 32Kms, increasing business running and maintenance costs.

PLANNING CONSIDERATION

Initial discussions includes the following items;

- a two way concrete bridge
- Build one lane now and duplicate the second lane for two way traffic latter stage
- Investigate other available options - Composite Uni-bridge, Timber and Culvert
- Consideration of straightening bridge approaches
- Flood immunity of existing bridge
- Limitation around funding

FINAL OUTCOME OF NEGOTIATION BETWEEN LCC AND SRRC

Two way bridge at same location and same approximate height

- Logan City Council undertook option analysis and they are

  Option 1 - Rehabilitate the existing bridge to maintain 23 Tonne - $808k

  Option 2 - Single Lane Modular Bridge on existing alignment - $1.5m

  Option 3 - Two Lane Concrete Bridge on existing alignment – $2.8m
  (Same Elevation and same alignment)

  Option 4 - Two Lane Concrete Bridge on new alignment – $5.1m
  (Option 4 is 10m higher than the existing bridge deck)

  Option 5 - Two Lane Modular Bridge with significant road works– $3.9m

- Both Councils have an in principle agreement to allocate funding for 2014/15 and total cost $2.8 million i.e. equates to $1.4 million commitment from each Council

FINAL AGREEMENT BETWEEN LCC AND SRRC

- Two Lane Concrete Bridge.
- Overall construction cost would be $2.8 million.
- Proceed with Design and Construct Contract
- Reduced number of piers on waterway from 4 to 1

COMMUNITY ENGAGEMENT

Implementation of bridge load limit

- Council has informed all emergency services (Queensland Fire & Rescue Services, Rural Fire Services, Queensland Ambulance Services), Queensland Police, Department of Transport and Main Roads, Waste services, Bus companies, Telecom companies, Gas, Energex and other stake holders such as Federal Members of the Parliament, State Members and Local Councillors
- Detour Map was published on the Council Web site
- Variable message signs were installed until Regulatory Signs were in place

Pre-construction

- Commencement of bridge replacement was scheduled to start in early August 2014 – Published on Council's web site on 1 July 2014
- $2.8m upgrade for Edward O'Neill Bridge – Published in Jimboomba Times on 10 July 2014
- Road Infrastructure Delivery sent "Notice of work" letters out by mid August 2014
- **Road Closed** Variable Message Signs were installed at all major intersections on Kilmoylar Road
- Signs and posters displayed in the Local Community places

Post construction and open to public

- Progress on bridge replacement - Published in Council Web Site on 18 December 2014
- Open to traffic – 2 March 2015 published in Council Web Site

FINAL PRODUCT

- Final bridge structure is two lane, 48m long and 8.5m wide.
- Total construction cost was $2.19 million.
- New bridge deck level is 3m above the old timber bridge deck level.

DEMOLITION OF OLD TIMBER BRIDGE

NEW EDWARD O'NEILL CONCRETE BRIDGE

Construction of two abutments and middle pier

Completion of middle pier

NEW EDWARD O'NEILL CONCRETE BRIDGE

Beam launching

Beam Launching

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NEW EDWARD O'NEILL CONCRETE BRIDGE

Looking from Logan City Council

Looking from Scenic RIM Regional Council

NEW EDWARD O'NEILL CONCRETE BRIDGE

View from Western side of the bridge

View from Western side of the bridge

CURRENT STATUS OF TIMBER BRIDGE PORTFOLIO

We have achieved so far replacement of 4 timber bridges to minimise the overall life cycle costing as per RIP/RAM focus

Projected LCC Timber Bridge Stock as at 2016

Year	Boundary Bridges between LCC/SRRC	Boundary Bridges between LCC/GCCC	Logan City Council	Total
2008 – After reform	7	1	6	14
2015	4	1	5	10
2016 - Projected	4	1	3	8

Replacement of two Logan owned timber bridges are in progress and they are scheduled to be complete by end of June 2016

LCC– Logan City Council GCCC- Gold Coast City Council SRRC- Scenic RIM Regional Council

LINKED BACK TO RIP/RAM NEW APPROACH

1 Working towards the purchase of a Bridge Management System.

- Council purchased BMS.
- Implementation is underway.

2 Explore possible external funding sources

- Received Capability Development Funding from Road Alliance (through Southern Regional Road Group) to purchase a Bridge Management System on a 50:50 basis.
- This is a joint purchase with Redland City Council. The project specification and procurement led by Logan City Council.
- Received $700k funding from the Federal Government under their Bridge Renewal Program to replace the Darcy Edmunds Timber Bridge with a Concrete ARCH Culvert on a 50:50 basis.

3 Replace existing timber bridges with concrete structures would reduce overall Bridge Management Cost.

- Four timber bridges have been replaced with concrete structures since 2012 and two timber bridge replacement is scheduled to be completed by 30 June 2016.

EDWARD TIMBER BRIDGE REPLACEMENT, GREENBANK - 2012

Old Edward Timber Bridge

Old Edward Timber Bridge

New Edward Concrete Bridge

New Edward Concrete Bridge

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JONES TIMBER BRIDGE REPLACEMENT, UNDULLAH - 2012

Old Jones Timber Bridge

Old Jones Timber Bridge

New Jones Concrete Culvert

New Jones Concrete culvert

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HOLZHEIMER TIMBER BRIDGE REPLACEMENT, BETHANIA - 2014

Old Holzheimer Timber Bridge

Old Holzheimer Timber Bridge

New Holzheimer Concrete Culvert

New Holzheimer Concrete Culvert

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SHORT VIDEO

ENJOY
EDWARD O'NEILL BRIDGE CONSTRUCTION VIDEO