



# **Berkeley Rail Bridges**

Full Business Case (for schemes of less than £5m)



Full Business Case Proforma



# What changes have been made to the scheme since that described in the Strategic Outline Case or Growth Deal Business Case Proposal submission?

There has been no change to the scheme. The scheme is to replace the northernmost bridge (of the pair of bridges) due to the poor structural state that will in due course lead to failure of the structure and closure. Drawings for the proposals are included with the Business Case application, Appendix A.

# What approach has been taken to modelling the economic and financial impacts of the scheme?

The scheme is a replacement of the existing infrastructure, and therefore as long as the bridge is replaced there will be no change to the existing capacity of the link or anticipated traffic flows. However, if the scheme is not undertaken, failure of the structure supporting the A38 is inevitable leading to significantly reduced capacity of a major route.

Therefore, an analysis (undertaken by Amey) has been made of existing and future flows along the A38, and a technical assessment of the alternative to replacing the bridge. The only option, if the bridge was not replaced, would be to install 'shuttle' traffic signals that would enable alternate northbound and southbound travel along the remaining single carriageway section. Note that detailed costings of the signals have not been carried out, but for BCR calculations an estimate of £200,000 for the signal installation has been assumed.

### TRAFFIC FLOWS

The existing and predicted traffic flows for the peak periods are shown in the figures included as Appendix B.

#### LINSIG ASSESSMENT OF ONE-WAY SIGNALISED ALTERNATE WORKING

To compare the predicted delay for traffic flows, LINSIG modelling results have been derived for the bridge with and without signal control. The AM and PM results for each option is summarised in the tables below. A draft layout drawing of the signals has also been prepared by Amey (Appendix C).

Signals (1-way) Scenario 2017	AM Peak			PM Peak		
	RFC	MMQ	Tot Delay	RFC	MMQ	Tot Delay
1/1 Breadstone Rd	11.3%	0.5	0.2	11.3%	0.5	0.2
2/1 A38 Sthbound	100.2%	32.7	20.0	127.1%	79.5	72.6
3/1 A38 Nthbound	102.9%	16.8	13.4	131.7%	126.2	116.1
Signals (1-way) Scenario 2041	AM Peak				PM Peak	
1/1 Breadstone Rd	11.3%	0.5	0.2	12.4%	0.5	0.3
2/1 A38 Sthbound	104.1%	44.7	32.2	139.8%	110.7	103.1

3/1 A38 Nthbound	107.0%	21.2	17.8	144.7%	171.0	160.5		
New Bridge (2-way)			k		DM Doal			
Scenario 2017	AIVI FEAK				FIVI FEAN			
	RFC	MMQ	Tot Delay	RFC	MMQ	Tot Delay		
1/1 Breadstone Rd	5.8%	0.3	0.1	5.5%	0.3	0.1		
2/1 A38 Sthbound	41.3%	0.4	0.4	28.6%	0.2	0.2		
3/1 A38 Nthbound	14.1%	0.1	0.1	42.8%	0.4	0.4		
New Bridge (2-way)								
Scenario 2041		AIVI Pea	ĸ		FINI Peak	1		
1/1 Breadstone Rd	6.0%	0.3	0.1	6.3%	0.3	0.1		
2/1 A38 Sthbound	43.0%	0.4	0.4	31.5%	0.2	0.2		
3/1 A38 Nthbound	14.7%	0.1	0.1	47.0%	0.4	0.4		

Note that a sensitivity test has been undertaken for the future year flows to establish the level of traffic reduction that would be required for the signals to operate satisfactorily for the Do Minimum 1-way (PM peak). From this test, it is estimated that a 40% reduction in the traffic levels would be required for the signals to operate within acceptable capacity limits.

### OTHER SIGNIFICANT IMPACTS OF NOT REPLACING THE BRIDGE

A BCR of the scheme (compared to the Do-Minimum with one-way signalised operation) has been calculated and is detailed in this report. It is however important to also consider significant potential detriment to the local area and economy if the bridge is not replaced, including the following;

1. Potential diversion of trips on to minor (inappropriate) local roads of low quality, due to the delay at the signals;

The shortest logical alternative southbound would be to turn left just before the bridge on to the B4066, across the M5 on to Wick Lane and then west back across the M5 and returning on to the A38. This is an estimated additional minimum 10 minute diversion. This could also be repeated in the alternate northbound direction with a similar additional journey time. There are numerous other local routes that could be taken away from the A38, but all involving significant alternative time on minor roads.

2. Options for alternative diversion routes if there is an M5 closure between J13 and J14;

In the event of a major incident and an M5 closure between J13 and J14, consideration has to be given to alternative routes as the A38 is at present the signed diversion route. However, there are no other logical routes involving A roads that traffic could use other than the A38.The nearest alternative would be the A46 to Stroud, with traffic signed back on to the M5 at Junction 13. However, this alternative is a significant diversion, with traffic unable to access the A46 from M5 J14 and therefore possibly having to route via the M4.

3. Detriment to the local economy due to longer journey times and driver anticipated delay;

Local economic impact due to anticipated delay from drivers is difficult to quantify, but it is anticipated that if in the future there is delay on the bridge due to signalised operation, there would be significant opposition from local businesses and operators with loss of trade.

4. Impact on plans for significant development growth in the local area, including sites at Berkeley and Sharpness Docks;

There is significant future additional housing and employment planned for the Berkeley area, including major redevelopment at Sharpness Docks. All of the developers have assumed that the A38 would remain fully open as at present. If they were to be informed that the A38 was to be only partially open, it could affect their plans significantly, and development in the area may be jeopardised.

# Appraisal Summary Table

Impacts Summary of key impacts		Summary of key impacts	Assessment				
			Quantitative	Qualitative	Monetary £m(NPV)		
	Business users & transport providers	Avoidance of increased costs, increased journey times, increased delays and reduced reliability	See NPV Values and BCR calculations	Significant benefit	<b>30 Year</b> £1,662,505.98 <b>60 Year</b> £7,941,667.28		
	Reliability impact on Business users	Avoidance of increased journey time unreliability	Not quantified	Moderately beneficial			
Economy	Regeneration	<ul> <li>Safeguarding the significant development (housing and employment) planned for Berkeley, Sharpness Docks and the surrounding areas. Development includes;</li> <li>regeneration of the Sharpness/Newtown area (300 new dwellings and 7ha of employment land at Sharpness Dock)</li> <li>A potential 10ha of new employment land adjoining Severn Distribution Park</li> <li>Proposals for the Gloucestershire Science &amp; Technology Park at the former Berkeley Nuclear Power Station site.</li> </ul>	Not calculated for this scheme	Significantly beneficial			
	Noise Air Quality	Avoidance of increases in noise and air quality due to traffic diverting through villages During construction there will be local impacts on adjacent properties (hotel and 2 other properties) due to noise. Air quality is unlikely to be affected.	The AM and PM peak future traffic for YoO 2017 and future year 2041 has been calculated by applying future growth rate derived for the geographical area and extracted from TEMPRO. For future forecasted traffic in 2041 the traffic is predicted to increase by <b>4.5%</b> in the AM peak and <b>11%</b> in PM peak				
nental	Greenhouse gases	Avoidance of Increase in carbon emissions due to additional journey time for most users					
ironn	Landscape	Neutral Impact on landscape	Not quantified	Neutral Impact			
Envi	Townscape	The villages of Berkeley, Berkeley Heath, Breadstone etc will be significantly affected if the replacement scheme does not go ahead due to re- routing traffic					
	Historic Environment	Environmental factors will be actively managed					
	Biodiversity						

	Water Environment	There will be no impact on any watercourses.				
	Commuting and Other users	Avoidance of increased costs, increased journey times, increased delays and reduced reliability. Journey time saving from the bridge being replaced compared to one-way signals is estimated at between 10 to 30 minutes if alternative routes need to be taken, most critically if the M5 is closed.	Value of	journey time changes(£) Not quantified		
	Reliability impact on Commuting and Other users	Improved journey time reliability	Not quantified		Moderately beneficial	
	Physical activity		Neu	utral Impact		
	Journey quality	If the scheme does not go ahead, journey quality (in te delays) will worsen considerably	rms of	Not quantified	Moderately beneficial	No
	Accidents	If the scheme does not go ahead there will may be increase in accidents, largely due to the increased ve mileage, the nature of the roads used as a diversion al possibly the installation of traffic signals on the A38.A barrier will be constructed across the bridge which substantially increase the safety of vehicles on the bi while crossing the railway.	an hicle nd the crash will idge	Not quantified	Slight benefit	No
	Security		Neu	itral Impact		
	Access to services	If the scheme does not go ahead, access to services or using the A38 will be reduced and access to other facil the area will be affected by congestion delays	irrently ities in	Not quantified	Slightly beneficial	No
	Affordability	Provision of LEP funds £2m, Capital funds £450,00	00	Funding Committed	Neutral	No
	Severance	Neutral Impact (if scheme goes ahead – severance impact if reverted to one-way signals)				
	Option and non-use values	Not relevant				
ounts	Cost to Broad Transport Budget	User benefits Non-user benefits		Cost of scheme (£2.45m)	Expected net overall benefit	No
Acc	Indirect Tax Revenues	If the scheme does not go ahead there will be an increa to additional fuel use.	se due	Not quantified	Moderately beneficial	No

### What is the Benefit to Cost Ratio (BCR) of the scheme?

Based on the anticipated traffic flows and the design of the Do-Minimum Signalisation one-way operation, the BCR has been calculated according to WebTAG criteria. These figures have been derived from the present value benefit cost (derived by comparing delay) calculated by comparing the benefit of a new replacement bridge (two way traffic) over a single lane bridge controlled by signals.

The construction cost of £2million has been converted to 2010 present value. This has been calculated by applying deflation and discounting to Departments base year. This methodology has followed the practice set out in WebTAG A1.2. Note that for the BCR calculations it is assumed that the £2million cost includes an initial stage 1 Optimism Bias of 44%.

The following steps for the BCR calculation have been followed:

- Extract delay and demand data from LINSIG models for opening year 2017 and design 2041.
- Derive mode/purpose splits from TEMPRO;
- Derive TAG values of time by mode/purpose;
- Assessment of scheme benefits;
- Convert scheme costs for economic input in line with WebTAG A1. The resource cost value associated with this delay for these modelled design years has then been extrapolated to 30 and 60 + future years. This is a recognised best practice for this type of scheme cost conversion.

The scheme nett benefit appraisal  $(\pounds)$  and the overall scheme benefit to cost ratio (BCR) for 30 years and 60 years is summarised in the table below:

	30 Years	60 Years
Present Value Cost (A)	£1,530,860	1,530,860
Present Value Benefit (B)	£3,480,687	£7,941,667
Scheme Nett Appraisal (B – A)	£1,662,505.98	£7,941,667.28
Scheme Benefit to Cost Ratio (BCR) - <b>(B / A)</b>	2.27	5.19

#### **Financial Case**

#### What are the latest financial costs of the scheme?

The latest estimate for the financial cost of the scheme is £2.45m. This breaks down as £2m construction costs plus £450,000 Preliminary Design and Contract Preparation. The costs are based on the breakdown in the Options Report (estimate dated December 2013) prepared by Atkins which can be reviewed if required. Costs will be revised once the tender returns are received at the end of December.

The bridge will be designed for a 120 year life, except the bearings which are designed for a 50 year life. The design is such that little maintenance should be necessary (weathering steel has been specified to avoid the requirement for painting), ongoing costs of regular inspection will be in line with that required for other similar bridges (approx. £10k for Principle Inspections every 6 years), and the replacement of the bearings should this be deemed necessary (estimate of £60k).

What are the non LEP contributions to the scheme and what is the status of these contributions (i.e. is the scheme fully funded)?

£450k Preliminary Design & Contract Preparation Fully Funded by GCC.

#### **Commercial Case**

# Have there been any changes to the assumptions regarding potential income generation?

The scheme is replacement of existing infrastructure; therefore there would be no change if the bridge is replaced. If the bridge is not replaced, there are no anticipated impacts on potential income generation.

What is the procurement strategy for the preferred option and how does it ensure that the optimum balance of risk is allocated between the scheme promoter and the contractor?

The Preliminary Design, Preparation of AIP Documents and early involvement of Network Rail have been undertaken by GCC's appointed Highway Contractor, Amey. Amey are compiling the Contract Documents to go out to external Tender for the Design and Build phase of the replacement works. The contract will be let through the 'supplying the south west' Procontract portal.

Amey is responsible for risks associated with the outline design.

The contractor will be responsible for any risks associated with the final design and construction.

GCC will be responsible for any risks associated with unforeseen circumstances.

#### Management Case

What are the latest plans for design and construction methods and legal powers?

No change from previous proposals. The Bridge is a GCC asset, and the contract will be for a Design and Build tender.

Agreement from Network Rail for the work to go ahead is in 3 parts:

- The Basic Asset Protection Agreement (BAPA) is in place, and has been signed by GCC and Network Rail (Appendix D).
- A 'letter of no objection' to the Approval in Principle has been received from Network Rail.
- The final sign off will be the approval of the Contractor's method 16 weeks before the work over the railway.

The options for installing the bridge are currently being finalised. However, in a worst case scenario, the road may need to be closed for 10 days whilst the bridge is replaced to accommodate a crane capable of lifting the structure in and out of position. If this was the case, it is relevant to consider that the daily traffic is circa 11,000 pcus, and if the road was closed completely traffic would need to be signed to alternative routes. If during fitting of the bridge the southbound carriageway could remain open, temporary signals will be installed.

The design and build contractor will be involved with facilitating the construction from the start. The current bridge will removed by cutting away the existing structure and lifting it out of position. The new abutment top beam and deck beams will be lifted into position followed by in-situ concreting to stitch the deck beams together. Volume 5 of the tender pack 'Preconstruction Information' can be made available if this is of interest.

It is important to note that for temporary signals the speed of traffic through the signals would need to be slower (20 mph), and therefore the level of delay would be significantly greater than predicted for the permanent signals Do Minimum (LINSIG).

What were the results of public and stakeholder consultation activities? Please explain how any comments have been reflected in the scheme design / appraisal work.

Network Rail & BT are directly involved in the preliminary design phase (pre-tender); and as such have given their 'in principle' agreement. Letters of support are included as Appendix E.

As this is consider to be an asset replacement scheme there has not yet been formal public consultation but this is planned. It is anticipated local residents in the vicinity would be provided information through the post to highlight the disruption expected during the construction works; adjacent parish and county councillors will be provided detailed updates.

#### What are the key project risks and how will these be mitigated?

The main risks to delivery are as follows:

Risk	Consequence	Mitigation
Network Rail do not issue a	Construction cannot start	Network Rail has issued a
'letter of no objection to the 'Approval in Principal'	without this approval	'letter of no objection' on 24- 9-15
Rail possessions cannot be	Construction cannot be	A possession has been
obtained to carry out the	carried out without a	booked for September 2016.
work	possession	A contingency booking has
		also been made for
		Christmas 2016.
Documents are not ready to	Contractor would not have	Documents are due to be
send out for tender Autumn	sufficient time to design and	ready to go out to tender
2015	plan the scheme	November 2015
Funding for the scheme	Funding must be in place in	None
cannot be obtained	order to award the contract	
Network Rail not satisfied	Construction work will be	Contract to be awarded in
with Contractor's method	unable to go ahead	January 2016 to allow
statements 16 weeks before	_	adequate time for Contractor
start		to develop scheme

Detailed Risk Register is included in Appendix F.

#### What are the project governance arrangements?

The project has been raised and promoted by GCC. Amey have been commissioned to undertake the preliminary design, preparation of the AIP documents and tendering of the Design & Build Contract.

The Contract for the Design and Build will be awarded to an External Contractor by GCC. The Design & Build phase will be overseen and supervised by Amey.

Amey will undertake the Category 3 design check.

Allocation of project roles:

Client: Gloucestershire County Council Principal Contractor (Preliminary Design & Supervision): Amey Contractor (Design & Build): TBC - Yet to be Awarded

Project Sponsor: Mark Darlow-Joy (GCC) Project Promoter: Jen Dorman (GCC) Technical Manager: Chris Monks (Amey) Project Lead : Karen Ennis (Amey)

#### What is the project programme?

A full Gantt Chart is available and included with the application as Appendix G.

Key Dates: Planned Tender Release 09/11/15 LEP Board Final Decision Date 15/12/15 Submissions returned anticipated 18/12/15 Contract Award 29/01/16 Design & Build Commence 19/02/16 Pre-works formal agreement with Network Rail May 2016 Start on site August 2016 Possession booked for construction works on the rail network September 2016 Lessons Learnt Review 09/01/17

#### How will benefits be realised, monitored and evaluated?

Full MEP not appropriate. Note that the Design-life of the bridge is 120 years. However, a brief **Benefits Realisation Plan** has been developed, as below.

#### Scope of the Plan

The Benefits Realisation Plan is designed to enable benefits that are expected to be derived from the scheme to be planned for, tracked and realised.

#### **Expected Benefits**

The outputs and benefits are those expected to be derived from the scheme:

- Outputs tangible effects that are funded and produced directly as a result of the scheme; and/or
- Outcomes final impacts brought about by the scheme in the short, medium and long term.

The scheme objectives are as follows;

- Replace the failing northernmost (eastbound) of the pair of bridges within budget and proposed timescales;
- Enable minimal closures and maintenance of the new bridge, due to the increased reliability and 120 design life of the bridge;
- Stimulate growth and investment in the local area (including Sharpness Docks and the regeneration of Berkeley Power Station);
- Provide a reliable and efficient M5 diversion route (in the event of closure between J13 and J14);

#### Benefit Measurement Methods

To determine whether the scheme benefits are being realised, the desired outputs and outcomes have been converted into measurable indicators of scheme benefits, as set out in the table below.

Benefits have been classified as 'Quantitative' (Qn) or 'Qualitative' (Ql). Quantitative benefits are those which can be measured in terms of specific numerical values on a continuous scale, whether in absolute or percentage terms, whereas qualitative benefits are measured in category-based or descriptive terms.

Ref	Benefit (Desired Output / Outcome)	Benefit Indicator	Target	Туре	Specific Data Requirements	Owner
Desi	red Outputs					
1	Replacement of the northernmost (eastbound) bridge	A38 remains open fully across both bridges with no restrictions	Minimal closure of the bridge	Qn	Information from maintenance team on any closures	GCC
Desi	red Outcomes				•	
2	Traffic flows maintained at the current level on the A38	Existing or increase in A38 flows	No net decrease in flows over 5 years	Qn	ATC Data from the A38 site	GCC
3	Minimal accidents on the bridge (safety enhanced by the new barrier)	Low number of accidents	No accidents on the bridge	Qn	Accident Data	GCC
4	To support the economic regeneration of Berkeley and Sharpness	Increase in jobs	Measure number of jobs created and houses built	QI	None	GCC
5	Increased residual life and structural integrity of highway network	Bridge inspections	Visual and technical surveys	Qn	Asset data collection surveys	GC

### **Baseline Data Requirements**

The current bridge has been assessed as failing. Traffic Data has been included for the Full Business Case, including flows from the ATC on the A38. The same locations will be used for

#### the 'after' study.

# The One Year After Study

The One Year After Study will be carried out no less than one year after the completion of the scheme. It will include:

- Assessment of the bridge
- Assessment against scheme objectives

Data collection will be done in the same locations as the Before Study in order to ensure that the data is directly comparable. An Evaluation Summary Table will be completed.

It may also be appropriate to carry out some consultation with stakeholders, statutory consultees and the public to gauge their opinions about the bridge.

## The Five Year After Study

The Five Year After Study will follow the same format as the One Year After Study but it will be able to provide a final appraisal of the scheme, including all costs and benefits.

The Evaluation Summary Table will be updated to include five year results. A further consultation exercise to consult on the views of stakeholders and the public is possible.

# Senior Responsible Owner Declaration

As Project Sponsor for [SCHEME NAME] I hereby submit this Full Business Case on behalf of [NAME OF ORGANISATION] and confirm that I have the necessary authority to do so.

Name:	Signed:
Position:	