

ANGUS COUNCIL

INFRASTRUCTURE SERVICES COMMITTEE

25 AUGUST 2009

U444/3 RAILWAY BRIDGE OF DUN - FUNDING IMPLICATIONS AND OPTIONS FOR LONG TERM FUTURE MAINTENANCE

REPORT BY THE DIRECTOR OF INFRASTRUCTURE SERVICES

ABSTRACT

This report updates the Committee following an investigation of the maintenance and repair options for Railway Bridge of Dun, one of three road-over-rail bridges on the railway line between Brechin and Bridge of Dun. It summarises five options and recommends one of them for implementation.

1 RECOMMENDATION

1.1 It is recommended that the Committee:

- (i) agrees to adopt Option 1 remedial strengthening, as the best course of action to repair and maintain Railway Bridge of Dun;
- (ii) agrees to instruct the Head of Roads to proceed with the project as part of the Council's bridges maintenance programme, commencing in financial year 2009/10 which can be contained in the Roads Capital budget for Bridge Repairs/Strengthening.

2 INTRODUCTION

2.1 The Committee was informed in August 2005 (Caledonian Railways – Maintenance Liabilities Report No 989/05) of a problem regarding the maintenance and repair of three road-over-rail bridges on the private railway line between Brechin and Bridge of Dun leased to the Caledonian Railway Company.

2.2 At that time the Committee's instructions were:-

- (i) the terms of the lease were amended to relieve the Caledonian Railway Company of its obligations to maintain three bridges which carry public roads over the private railway;
- (ii) the Director of Roads, in conjunction with the Economic Development Manager, were instructed to undertake studies to determine the best options for the future of these bridges;
- (iii) the Director of Roads, the Economic Development Manager and the Acting Director of Finance were instructed to bring forward further reports on the funding implications and options for the long term future maintenance of these three bridges.

2.3 This report sets out the implications and options for the long term future maintenance of one of these bridges, Railway Bridge of Dun, which is located immediately west of the station at Bridge of Dun, carries the U444/3 and serves as a designated diversionary route for local traffic in the event of a closure of Montrose Bridge (A92) (as shown on the attached plans in Appendix A of this report).

3 DETAILS

3.1 The Railway Bridge of Dun probably dates from circa. 1900. The line opened in 1848 and maps show some form of at-level crossing of the track near the site of the present bridge.

- 3.2 This bridge was assessed in 1998 and, following tensile strength tests of the bolts in the cross beam/longitudinal beam connections in 2001, was found to be capable of carrying the maximum 40/44 tonne legal load. A feasibility study into the potential engineering solutions for the bridge was completed in 2008. Both the assessment and feasibility reports noted defects relating to severe corrosion of the cross beam elements, beam connections and bearings, localised light corrosion of the main beams, and the presence of open joints in the masonry and cracks in the abutments and wingwalls. The corrosion is an on-going, continuous problem; the open joints and cracks do not appear to be the result of present day overstressing or ground movements.
- 3.3 There are a number of options for the long-term future of this bridge:

Option 1: Remedial strengthening

This solution makes good and retains the present bridge superstructure and substructure. It would involve replacing the bolts and some parts of the steelwork in and around the most heavily corroded cross beam/longitudinal beam connections, replacing the bridge bearings and deck movement joints, installing a deck waterproofing system, resurfacing the road and footway, repainting the steelwork and repointing the masonry.

Advantages:

- Increased bridge design life
- Minimum changes to abutments
- Optimum sustainability of existing structure
- Only intermittent, short temporary closures of the road required

Disadvantages:

- Steelwork maintenance painting approximately every 15 years
- Maintenance liability of existing substructure retained
- Bearing replacement requires complex temporary works
- Deck movement joints may require replacement during design life of bridge

Option 2: Superstructure replacement

This solution makes good and retains the present bridge substructure but replaces the present superstructure with new steel beam and reinforced concrete deck of a similar design. It would involve the demolition of the existing superstructure, repointing of the abutments and the construction of a similar new superstructure, new bridge bearings and deck movement joints, installing a deck waterproofing system, resurfacing the road and footway.

Advantages:

- Increased bridge design life
- Maintenance liability of existing deck eliminated

Disadvantages:

- Steelwork maintenance painting approximately every 15 years
- Maintenance liability of existing substructures retained
- Bearings and deck movement joints may require replacement during design life of bridge
- More material to be taken off site than with Option 1
- Full road closed for an extensive period

Option 3: Full bridge replacement

This solution completely removes the existing bridge and replaces it with a new bridge of a different design. It would require complete demolition and removal of the present bridge deck, beams, abutments and some of the present embankments and the construction of a new reinforced concrete deck on precast, prestressed beams supported on new piled integral bankseats and reinforced earth embankments.

Advantages:

- Increased bridge design life
- Minimum future maintenance of deck and abutments
- Deck movement joints eliminated

Disadvantages:

- More earthworks material to be stored on site for reuse than with Option 2
- Road closed for a longer period than with Option 2
- Higher embankments and steeper road approaches than present bridge

Option 4: Level crossing

This solution replaces the existing bridge and embankments with an at-grade crossing. It would involve the demolition and removal of the bridge and full length of approach abutments and the construction of a level crossing.

Advantages:

- Maintenance liability of bridge and embankments eliminated
- Minimum maintenance requirement for level crossing
- Simple to construct
- Only a short temporary closures of the road required

Disadvantages:

- Creates point of conflict between road users and trains
- Raises health and safety issues
- Level crossings have to inspected every three months
- More rail infrastructure required
- Electrical power supply necessary
- May have to be the subject of a special order under the Transport and Works (Scotland) Act 2007
- Largest amount of material to be taken off site of all the options

Option 5: Permanent weight restriction

This option is the do-minimum approach. It would involve allowing the bridge to continue to deteriorate. There would be a need to apply successive weight restrictions to the bridge over the rest of its life. It would eventually become closed to heavy or even eventually all traffic. The shortest diversion route is approximately 9 miles via Montrose.

Advantages:

- Lowest initial cost

Disadvantages:

- All maintenance liabilities of the present bridge are retained
- Danger of local failure of the bridge due to corrosion
- Serious overloading of the bridge cannot be easily prevented in practice
- More frequent inspections and load capacity assessments required
- Long term costs highest of all options
- Shortest design life of all options

4 FINANCIAL IMPLICATIONS

4.1 A comparative cost study has been performed and the results are summarised in the table below.

OPTION	CAPITAL COSTS	WHOLE LIFE COST
1	£63,000	£186,000
2	£195,000	£660,000
3	£365,000	£584,000
4	£662,352	£1,168,352
5	N/A	£178,500

4.2 Option 1 has the lowest estimated capital cost of £63,000, and its whole life cost is only slightly more than Option 5. Option 5 would result in a weight restriction on the road network, reducing accessibility and retaining the risk detailed above. Option 1 is therefore recommended.

4.3 If members approve Option 1, the costs can be contained within the Roads Capital allocation for Bridge Repairs for 2009/10.

5 HUMAN RIGHTS IMPLICATIONS

5.1 There are no human rights implications arising from the proposals in this report.

6 EQUALITIES IMPLICATIONS

6.1 The issues dealt with in this Report have been the subject of consideration from an equalities perspective (as required by legislation). An [equalities impact assessment](#) is not required.

7 SINGLE OUTCOME AGREEMENT

7.1 This report contributes to the following local outcome(s) contained within the Single Outcome Agreement for Angus.

- Communities in Angus are safe, secure and vibrant.

8 CONSULTATION

8.1 The Chief Executive, Director of Corporate Services, Head of Finance, and Head of Law and Administration have been consulted in the preparation of this report.

8.2 The Caledonian Railway Company has been involved in discussions which precipitated this report.

9 **CONCLUSION**

- 9.1 Option 1 appears to be the best course of action, offering the optimum balance of cost, time, sustainability, user convenience and safety advantages.

**ERIC S LOWSON
DIRECTOR OF INFRASTRUCTURE SERVICES**

NOTE:

The following background papers, as defined by Section 50D of the Local Government (Scotland) Act 1973 (other than any containing confidential or exempt information), were relied on to any material extent in preparing this Report:-

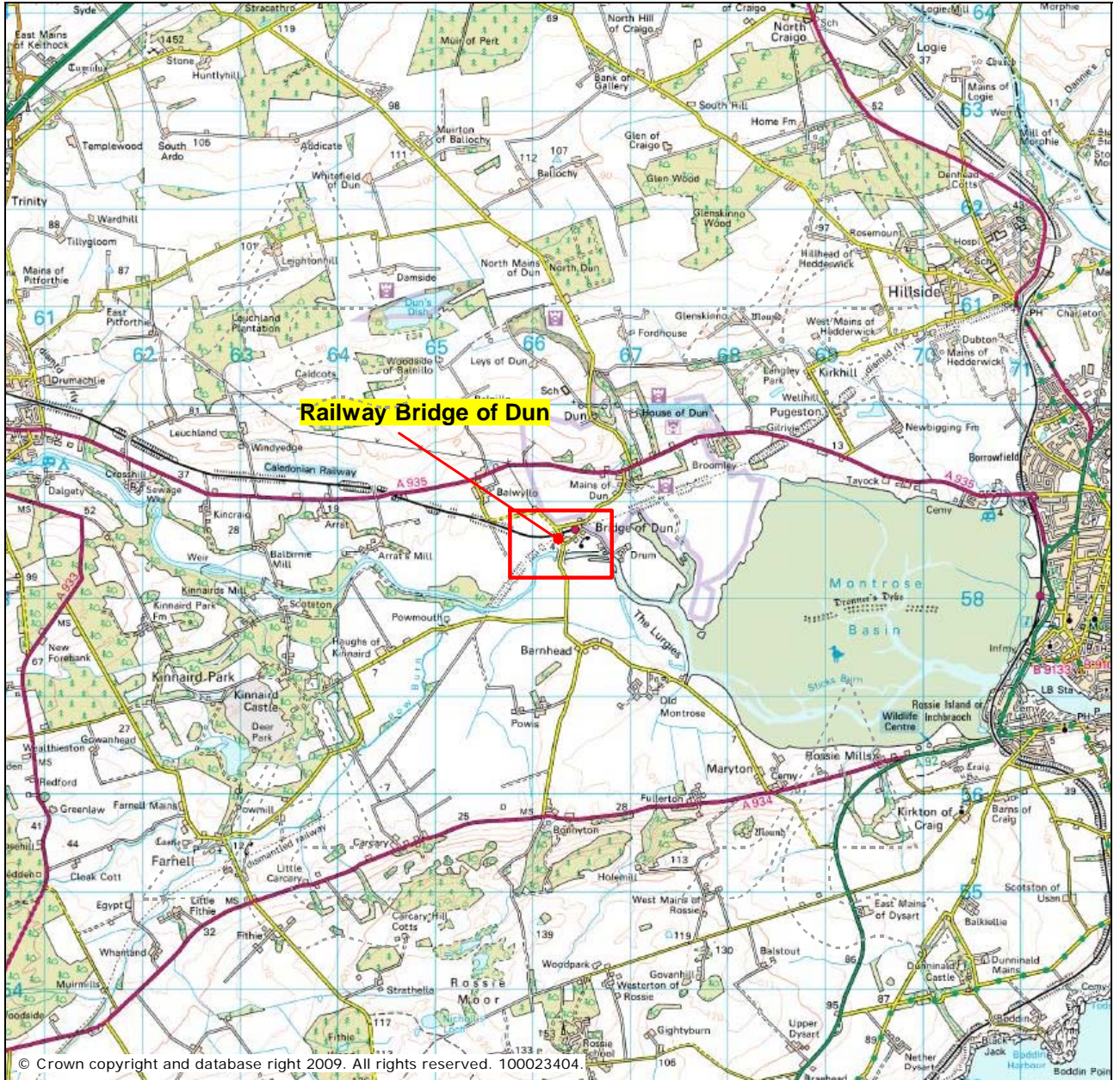
Report No 989/05 – Caledonian Railways – Maintenance Liabilities

Roads/JG/SP

Appendix A

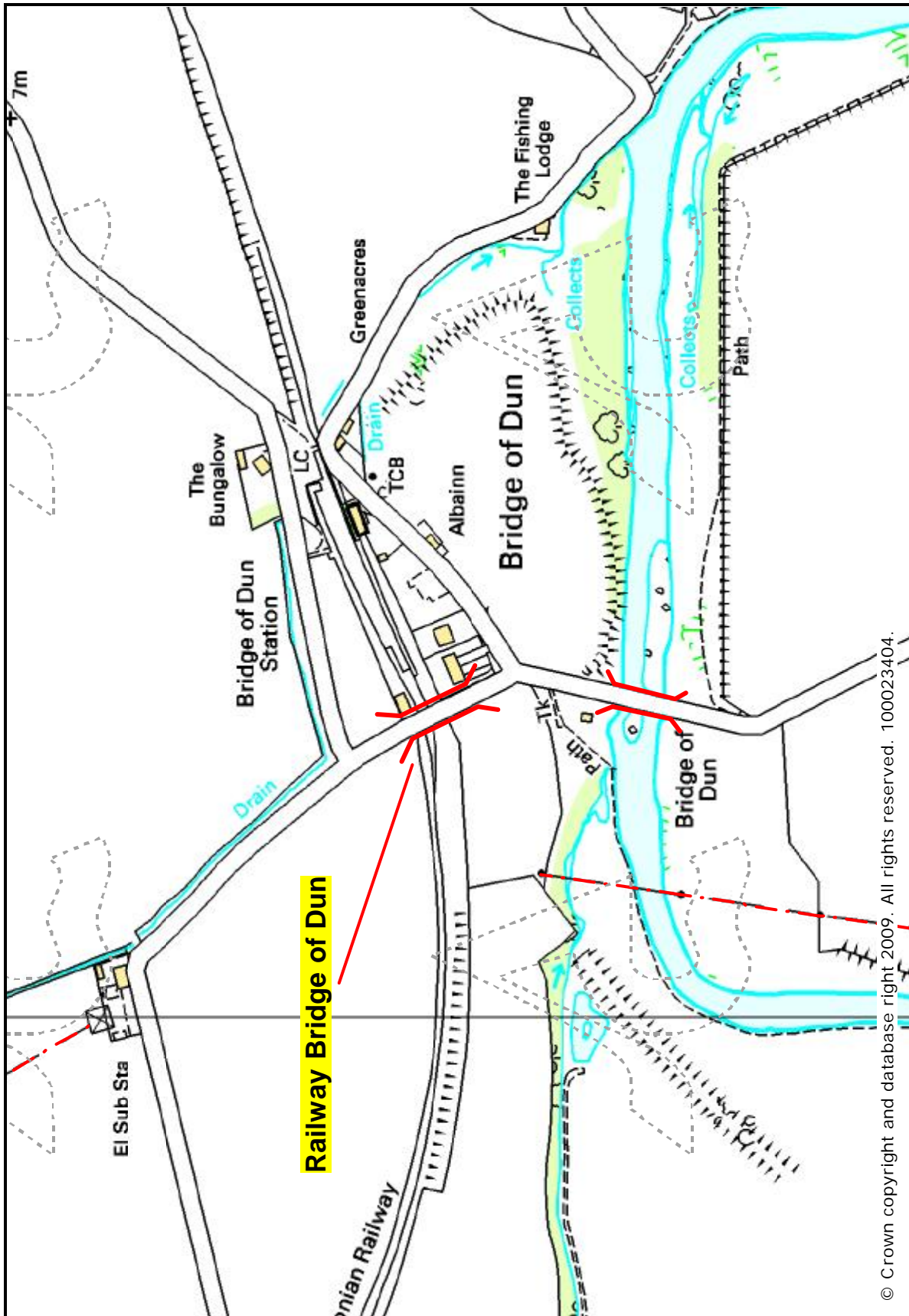
Railway Bridge of Dun

(i) Location Plan



Not to scale

(ii) Site Plan



Not to scale