

## 2 Need for the Scheme and Consideration of Alternatives

### 2.1 Introduction

2.1.1 This chapter summarises the need for the scheme and describes the option evaluation that has been undertaken during the development of the proposed scheme including consideration of environmental effects.

### 2.2 Need for the Scheme

2.2.1 In parallel with the routine maintenance of the Kincardine Bridge, a phased programme of refurbishment works is being undertaken by Transport Scotland. This EIA Report relates to the main item of the refurbishment works: the replacement of the existing piled viaduct which is located at the southern end of the Kincardine Bridge.

2.2.2 The piled viaduct was assessed in 1983 as substandard by Sir Alexander Gibb & Partners. A subsequent report, again by Sir Alexander Gibb & Partners, proposing replacement of the piled viaduct was produced in 1987. In 1992, as an interim measure a steel propping system was installed beneath the deck of the existing piled viaduct to provide structural support.

2.2.3 Jacobs prepared an Improvement Options Report in February 2007 (Jacobs 2007) in which it noted the assessment and interim measure referred to in paragraph 2.2.2 above and reviewed and further developed options for the refurbishment of the existing piled viaduct. The report recommended that the piled viaduct be replaced for the following reasons:

- The original superstructure has insufficient load carrying capacity, with the deck slab and transverse beams having insufficient strength.
- The original substructure is unsuitable for incorporation into the refurbished bridge owing to the poor condition of the visible portions of the substructure piles. Furthermore, the condition of the buried portion of substructure piles cannot be assessed.
- The steel propping system is unsuitable for incorporation in the refurbished bridge.

2.2.4 Transport Scotland commissioned a study into the effect on traffic movements of closing Kincardine Bridge to carry out the piled viaduct replacement, and this concluded that there would be major congestion caused to the surrounding road network. For this reason, Transport Scotland now intends to replace the piled viaduct, whilst keeping the existing bridge open to traffic. Further analysis commissioned by Transport Scotland indicates that two way traffic would need to be catered for; this is discussed further in paragraphs 2.4.5 of this chapter.

2.2.5 In summary, the existing piled viaduct structure at the southern end of the Kincardine Bridge is required to be replaced in order to maintain the long-term use of the Kincardine Bridge for all road users. The long term use of the Kincardine Bridge will contribute to minimising disruption to road users in the surrounding area and the avoidance of traffic delays under normal circumstances which is considered to meet one of the key project objectives.

### 2.3 Scheme Objectives

2.3.1 The key objectives of the proposed scheme are as follows:

- to minimise construction impacts on users of the road network;
- to minimise adverse impacts on environmental receptors, including the cultural heritage importance of the Kincardine Bridge; and
- to preserve the long-term use of the Kincardine Bridge.

2.3.2 It is considered that the proposed scheme meets the key project objectives described above.

## 2.4 Consideration of Alternatives

### Options

- 2.4.1 The Scottish Executive produced an Environmental Statement (ES) for the Upper Forth Crossing project (hereafter referred to as 2003 ES) in 2003 (Scottish Executive 2003). The Upper Forth Crossing project involved the improvement of the road network within and around the town of Kincardine including the construction of a new bridge (Clackmannanshire Bridge) upstream of the existing Kincardine Bridge. The 2003 ES also included the assessment of the replacement of the Kincardine Bridge piled viaduct and general refurbishment works to the rest of the Kincardine Bridge. An Improvement Options Report produced in 2002 (Babtie Group 2002) set out a recommended specimen design and programme for the refurbishment works and this formed the basis of the 2003 ES. The proposals for the piled viaduct assessed in 2003 involved the replacement of the existing piled viaduct with a 65m long piled embankment and a 15m long simple span bridge connecting the embankment to the existing structure.
- 2.4.2 The Improvement Options Report produced in 2002 (Babtie Group 2002) was revised in 2007. The 2007 Improvement Options Report (Jacobs 2007) reassessed the options for refurbishment on the basis of costs, aesthetics, constructability and environmental issues and concluded that the replacement of the existing piled viaduct with a new piled viaduct structure rather than a piled embankment was the best performing of the options considered. The piled viaduct replacement structure was considered to perform well aesthetically as it would reflect the form of the adjacent spans of the bridge, whilst maintaining a similar cross section and flow area with regards to hydro-dynamics. Furthermore, the piled viaduct structure would minimise the land-take on the saltmarsh which is designated a Special Conservation Area (SAC), Special Site of Scientific Interest (SSSI) and Ramsar site. On this basis the piled viaduct replacement structure was considered as the best performing option in relation to environmental effects and was considered to contribute towards one of the project objectives, provided in paragraph 2.3.1, of minimising adverse impacts on environmental receptors.
- 2.4.3 As part of the overall strategy, the contracts for the construction of the new crossing and approach roads was tendered separately from the refurbishment of the Kincardine Bridge and construction of the Clackmannanshire Bridge was completed and opened to traffic on 19 November 2008.
- 2.4.4 In 2009 an Environmental Review Report (Jacobs 2009) was prepared (hereafter referred to as the 2009 ERR) to update the 2003 ES in those areas where the recommended design options and/or construction methodologies for replacing the existing piled viaduct on Kincardine Bridge had been revised. The 2009 ERR assessed the replacement piled viaduct proposal described in the 2007 Improvement Options Report. The 2009 ERR concluded that, with the adoption of mitigation measures, the proposed revisions to the refurbishment proposals would not cause any significant adverse change in the impacts assessed in the 2003 ES.
- 2.4.5 For the Improvement Options Reports undertaken in 2002 and 2007 (Babtie Group 2002 and Jacobs 2007), it had been planned that when the new Clackmannanshire Bridge was fully operational, traffic could be diverted off the original Kincardine Bridge allowing it to be refurbished under a full closure. Since these reports were prepared Transport Scotland had reassessed the impact of a full closure on the A985 Kincardine Bridge and surrounding road network and concluded that full closure would cause major congestion to the surrounding road network. In consideration of this, traffic modelling has been undertaken which suggests that maintaining two-way traffic across the Kincardine Bridge during the period of construction works would, under normal circumstances, not cause significant delays to traffic. This would meet one of the project objectives for the proposed scheme, provided in paragraph 2.3.1, of minimising disruption to road users.
- 2.4.6 Transport Scotland considered the previous options reports for the replacement of the piled viaduct and concluded that the preferred option remained the proposed replacement of the existing piled viaduct

with a new piled viaduct structure comprising spans of similar appearance to the adjacent spans of the Kincardine Bridge (the piled viaduct replacement structure proposed in the Improvement Options Report 2007 (Jacobs 2007)).

2.4.7 The following options were considered for a bridge structure to allow traffic flow across the Kincardine Bridge during the construction of the piled viaduct replacement:

- a temporary bridge structure adjacent to the north-west side of the existing piled viaduct to allow construction of the new piled viaduct replacement structure online; and
- a permanent bridge structure constructed adjacent to the north-west side of the existing piled viaduct which would be slid into position to replace the existing piled viaduct.

2.4.8 It was assessed that the option of the temporary bridge structure was likely to require only limited periods of single lane working or full closure for specific short-term duration activities and the option of a permanent bridge to be constructed alongside and slid into position was likely to require closures of a longer duration. The temporary bridge structure option was therefore selected as the preferred option to maintain traffic flow across the Kincardine Bridge during the construction of the piled viaduct replacement structure. The temporary bridge structure was considered to meet one of the project objectives for the proposed scheme, provided in paragraph 2.3.1, of minimising disruption to road users.

## 2.5 References

Babtie Group (2002). Existing Kincardine Bridge Refurbishment Options Report.

Jacobs (2007) Improvement Options Report.

Jacobs (2009). Kincardine Bridge Refurbishment: Environmental Review Report.

Scottish Executive (2003). Upper Forth Crossing at Kincardine: Environmental Statement.