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**TRANSPORT SCOTLAND**  
**SCOTTISH TRUNK ROAD INFRASTRUCTURE**  
**PROJECT EVALUATION**

3YA Evaluation Report for A876(T) Clackmannanshire Bridge



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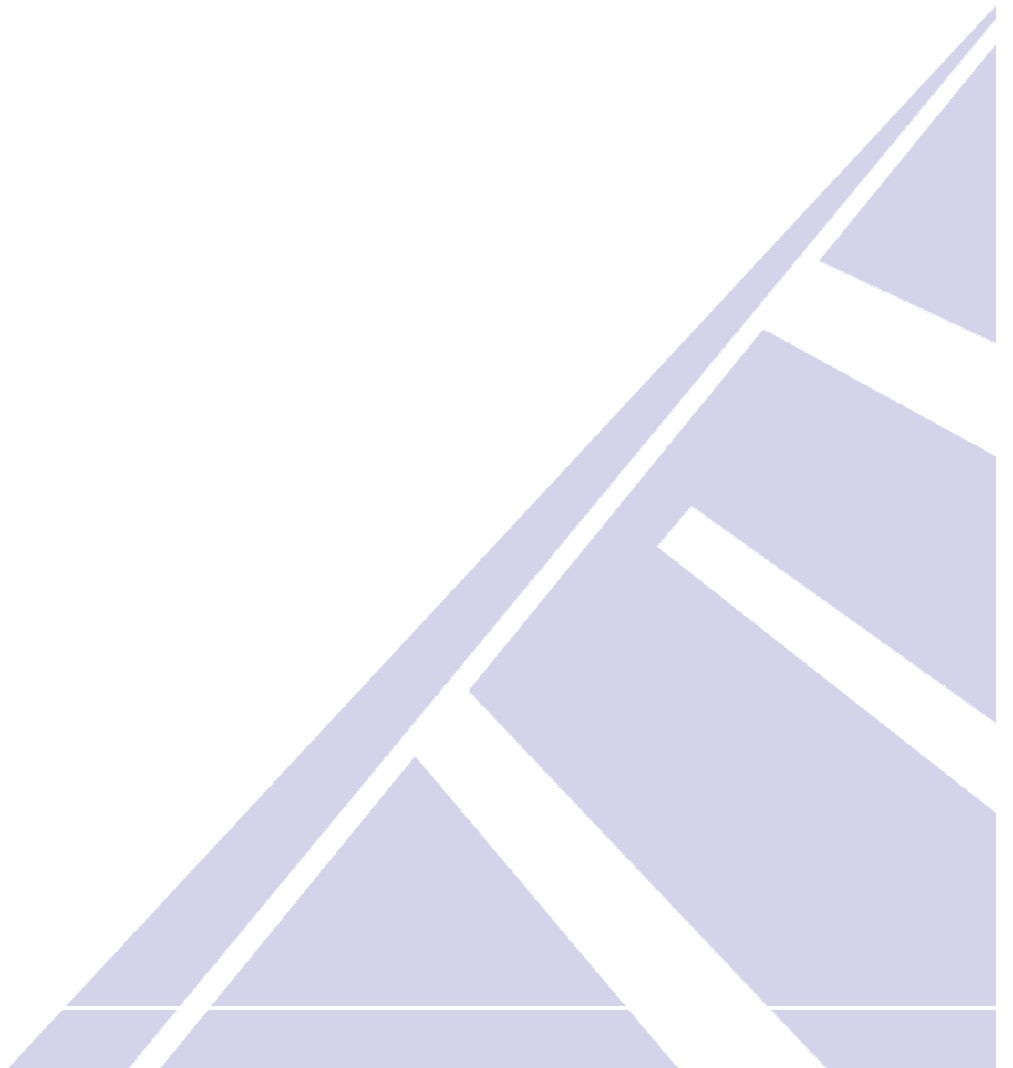
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## **GLOSSARY**

The following abbreviations have been used in this report:

AADT	Annual Average Daily Traffic
ATC	Automatic Traffic Counter
BCR	Benefit to Cost Ratio
DMRB	Design Manual for Roads and Bridges
ES	Environmental Statement
HRA	Habitats Regulation Assessment
ITS	Intelligent Transportation Systems
LDP	Local Development Plan
NPV	Net Present Value
NRTF	National Road Traffic Forecasts
PIA	Personal Injury Accidents
RSA	Road Safety Audit
SPA	Special Protection Area
STAG	Scottish Transport Appraisal Guidance
STRIPE	Scottish Trunk Road Infrastructure Project Evaluation
SUDS	Sustainable Urban Drainage System
WS2+1	Wide Single 2+1 Carriageway
1YA	One-Year After
3YA	Three-Year After

# **SUMMARY OF IMPACTS**



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## 1 SUMMARY OF IMPACTS

This section provides a short summary of the key elements contained within this Three-Year After Evaluation report of the A876(T) Clackmannanshire Bridge project. The summary provides a background to the project and commentary on performance and delivery in terms of operation, process, forecasting, performance against objectives and cost.

### 1.1 Introduction

The evaluation of a project is undertaken after completion to determine if the objectives have been achieved, assess how well it was implemented and if it is performing as expected. Transport Scotland applies such an evaluation process through the Scottish Transport Infrastructure Project Evaluation (STRIPE) Guidance for all projects listed within its Motorway and Trunk Road Programme that cost over £5m.

The A876(T) Clackmannanshire Bridge project involved the construction of a 4 kilometre bypass to the west of Kincardine, including the new Clackmannanshire Bridge, a 1.2 kilometre multi-span structure. The project also incorporated the upgrade of 2.4 kilometres of the existing A876(T) carriageway, grade-separation of Bowtrees Roundabout and construction of two major roundabouts. The project was officially opened to traffic on 19 November 2008. Figure 1.1 shows the Clackmannanshire Bridge looking north.



Figure 1.1: A876(T) Clackmannanshire Bridge looking north



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Prior to construction of this bypass, traffic (both strategic and local) crossing the Firth of Forth via the existing Kincardine Bridge had to pass through Kincardine. This caused delay for strategic traffic as it passed through the town and also had a detrimental impact on the quality of life for residents, in terms of noise, air pollution, and general amenity.

The project was targeted principally to reduce delay for strategic traffic by removing the need to travel through Kincardine. It was also brought forward to address a poor accident history along the existing A876(T) plus the immediate north section of the A977(T), which was heavily utilised by strategic traffic. The project would also help alleviate traffic noise, air pollution and community severance within Kincardine, by reducing congestion and the relatively high traffic volumes that led to a general loss of amenity within the town, in addition to providing an alternative crossing of the upper Forth to allow the refurbishment of the existing Kincardine Bridge.

## **1.2 Operational Indicators – How is the project operating?**

Traffic flows on the bypassed route through Kincardine have reduced significantly by approximately 76%, following the opening of the A876(T) Clackmannanshire Bridge. However, traffic flows on the new crossing are still significantly lower than predicted, by between 26% and 32%. The disparity has fallen from between 42% and 48% one year after the project opened.

No formal average journey time data was collected for the project due to the fact that the project was initiated pre-STRIPE guidance, so there was no baseline available for comparison purposes. Anecdotal evidence suggests, however, that journey times on the new road are lower than those on the bypassed route through Kincardine.

Since the new bridge opened, there has been a reduction in the number and severity of personal injury accidents occurring on the trunk road network in the vicinity of the scheme. There was a decline from 16 to ten accidents between three years before and three years after opening.

## **1.3 Process Indicators – How well was the project implemented?**

Approval to proceed with implementation of the project was made by Transport Scotland in 2006. The construction contract was awarded in March 2006 and the project opened to traffic in November 2008.

Some remedial works were required at one of the over-bridge structures. An area of potential settlement was also the subject of negotiation with the contractor.

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Mitigation which was included within the Environmental Statement has been implemented on site, is in good condition and performing as expected, but there were some issues noted. These relate to (i) the effectiveness of mammal fencing at certain locations (ii) failed woodland/hedgerow planting (although this has improved since the 1YA evaluation) (iii) monitoring of the intertidal habitat that has been created. Further details are provided within Appendix A.

A Road Safety Audit (RSA) was undertaken, with a number of reports prepared, including a final Stage 5 RSA report, undertaken in October 2012. No outstanding safety issues have been identified by the RSA process.

No significant outstanding issues have been identified by the Cycle Audit process. It would be beneficial to ensure vegetation adjacent to cycle / foot paths is well maintained.

The project was implemented prior to the publication of Transport Scotland's *Disability Discrimination Act: Good Practice Guidance for Roads* document. As such, no DDA audits have been undertaken. It was also not considered the nature of the project would have a particular impact in this regard because it was primarily a road-based scheme.

## **1.4 Forecasting – How accurate were predictions?**

Actual traffic flows on the new road were significantly lower than predicted values for the first year of opening by up to 48%. The variation has fallen more recently, although actual 2012 flows are still lower than predicted flows by up to 36%.

In terms of journey times on the new road, no pre-construction surveys were undertaken nor any post-opening surveys as there was not a baseline available for the purposes of comparison. However, anecdotal evidence suggests average journey times on the new road, both northbound and southbound, are lower than for the bypassed route.

The evaluation has not identified any significant design changes being made to the project. Some remedial works to an over-bridge structure were required.

The out-turn cost for the project was approximately £2.3m lower than the predicted cost estimate. This is an approximate 3% decrease.

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### 1.5 Objectives – Has the project met its objectives?

The evaluation indicates the project has achieved the ten objectives set. The project's objectives mainly focussed on the improvement of road safety and reduction of the risk and incidence of accidents occurring within the vicinity of the project. In addition, objectives also related to a reduction of travel costs through an improvement in journey times.

The number of accidents occurring within the vicinity of the project three years after opening compared to three years before opening reduced by six. The Stage 5 Road Safety Audit concluded that the road layout of the Clackmannanshire Bridge project continues to operate safely and efficiently. Based on the accident statistics and results of the Stage 5 RSA, the project is considered to be operating safely and to have had a positive impact on safety.

Anecdotal comments from stakeholders suggests that the project has resulted in significant savings in journey times for cross Forth traffic as a result of traffic no longer being required to negotiate the delays experienced within Kincardine. No pre-opening journey time surveys were undertaken and there is no project information to clarify the reasoning for not doing so, hence a comparable baseline is not available. However, a spot-check in the off-peak period between the M876/A905 Bowtrees Junction and A876/A977 Kilbagies Roundabout suggests savings of between approximately two and three minutes may have been achieved, contributing towards lower travel costs for both motorists and commercial vehicles.

Due to the environmentally sensitive nature of the Firth of Forth Estuary within which the crossing is located, the project had several objectives relating to the environment. As a consequence of removing a significant volume of traffic from within Kincardine, a substantial number of properties in the town will have experienced an improvement in air quality and reduced noise levels. It is considered that the impact of the project has been minimised through significant environmental mitigation measures that have been implemented.

### 1.6 Cost to Government – Is the project delivering value for money?

The key benefits of the A876(T) Clackmannanshire Bridge project are considered to be:

- Significant reduction in traffic flows through Kincardine, reducing detrimental impacts for the town centre and local community;
- Improved road safety through a reduction in the number and severity of personal injury accidents;
- Anecdotal evidence of improved average journey times for strategic traffic using the A876(T), reducing travel costs; and

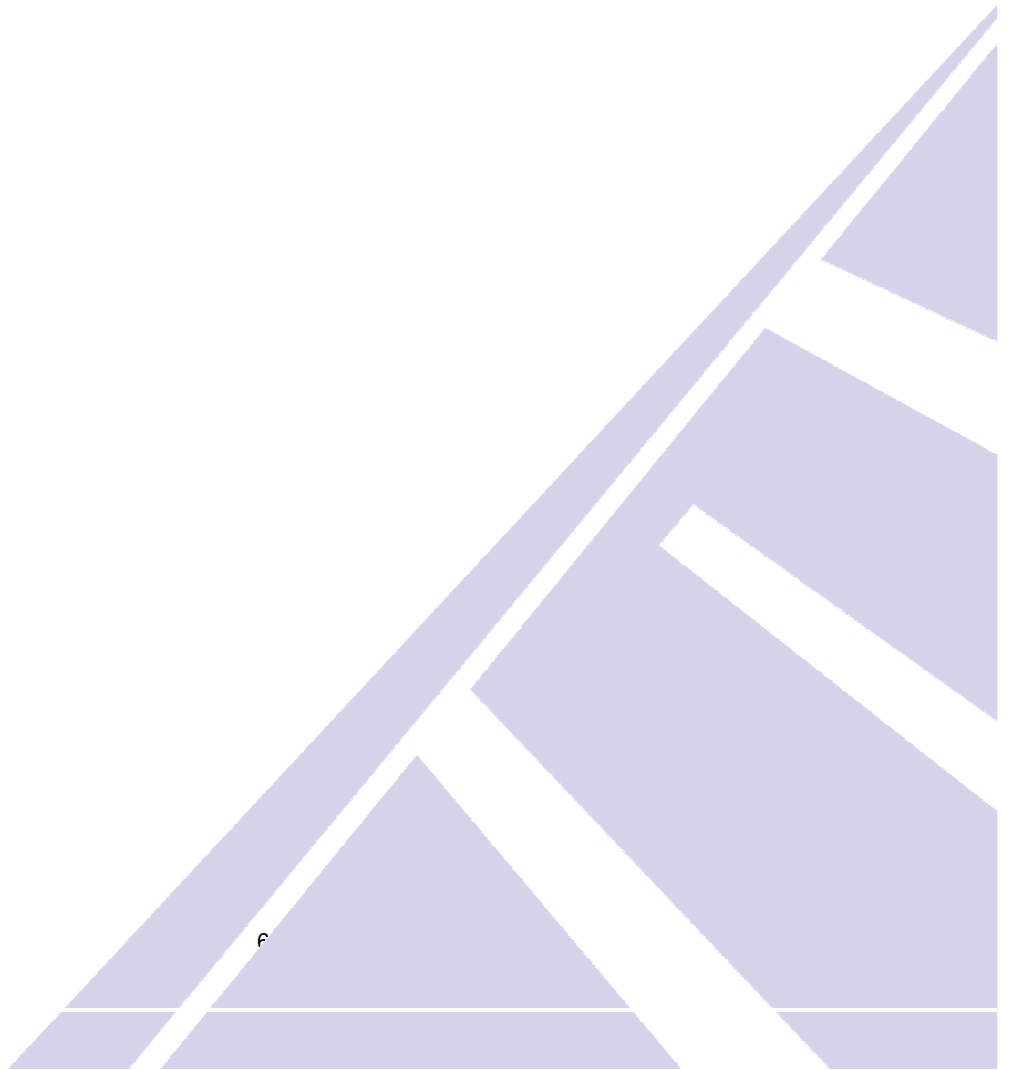
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- Enhanced connectivity in the area.

The project was predicted to achieve a Net Present Value (NPV) of £41.27m and a Benefit to Cost Ratio (BCR) of 1.53. The evaluation suggests that the predicted economic benefits may not have been fully achieved and, therefore, overestimated. Whilst the out-turn cost was slightly lower than the predicted cost, it is expected that actual NPV and BCR values for the project would be slightly lower than predicted. However, it is considered unlikely that the overestimation of economic benefits would have affected the original decision to proceed with the project in view of the other benefits delivered by the project and reflected in this evaluation.

# INTRODUCTION



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## 2 INTRODUCTION

### 2.1 Background to Project Evaluation

Road infrastructure projects normally take a minimum of five to seven years to plan prior to the commencement of construction. It is not possible to know exactly what will happen when a project is opened, nor what would have happened had the project not been built, particularly when the project is opened a number of years after its assessment.

The aims of evaluation, as set out in the Design Manual for Roads and Bridges (DMRB), Volume 5, SH 1/97 'Traffic and Economic Assessment of Road Schemes in Scotland', are as follows:

- To satisfy the demands of good management and public accountability by providing the answers to questions about the effects of a new or improved road;
- To identify the strengths and weaknesses in the techniques used for appraising projects, so that confidence in the roads programme is maintained;
- To allow the predictive ability of the traffic or transport models used to be monitored to establish whether any particular form of model is consistently more reliable than others when applied to particular types of projects; and
- To assist in the assessment of compensation under Part 1 of the Land Compensation (Scotland) Act 1973 for depreciation due to the physical factors caused by the use of public works.

The evaluation of trunk road projects is evolving as Transport Scotland improves its process and reporting to reflect the principles of monitoring and evaluation set out in the Scottish Transport Appraisal Guidance (STAG). STAG advocates evaluation against indicators and targets derived for the Transport Planning Objectives originally set for the project, STAG criteria (Environment, Safety, Economy, Integration and Accessibility & Social Inclusion) and relevant policy directives, the aim of which is to identify:

- Whether the project is performing as originally intended;
- Whether, and to what extent, it is contributing to established policy directives; and
- Whether the implemented project continues to represent value for money.

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Furthermore, Scottish Trunk Road Infrastructure Project Evaluation (STRIPE) guidance, prepared by Transport Scotland, sets out the requirements for evaluation which draws on DMRB and STAG. This document was finalised in 2013 and acts as a guide to evaluation for relevant projects. STRIPE states that two programmed evaluations should be carried out on relevant projects, as follows:

- A One-Year After Evaluation (1YA) – prepared one year after opening, this report should “provide Transport Scotland with an early indication (as far as is practicable) that the project is operating as planned and is on-track to achieve its objectives. The 1YA Evaluation also provides a Process Evaluation including an assessment of actual vs. forecast project cost, and programme together with reasons for variance”. STRIPE also states that a stand-alone report should be prepared on each individual project. Information gathering should be supported by a site visit and stakeholder interviews.
- A Detailed Evaluation – three or five years after opening. This second evaluation “considers a project’s impacts, whether it has achieved its objectives and reviews the actual impacts against forecasts and determines the causes of any variances”.

## 2.2 This Evaluation and Project Reported

As recommended in STRIPE, this report effectively constitutes a Three-Year After (3YA) Evaluation Report, which updates the earlier One-Year After (1YA) Evaluation Report. It is a standalone report on the A876(T) Clackmannanshire Bridge. This project fits the criteria for evaluation at this stage, as it cost over £5m and has previously been evaluated at the One Year After (1YA) Stage. Table 2.1 summarises the characteristics of the project. The location of the project is presented in Figure 2.1.

**Table 2.1: Project Summary Details**

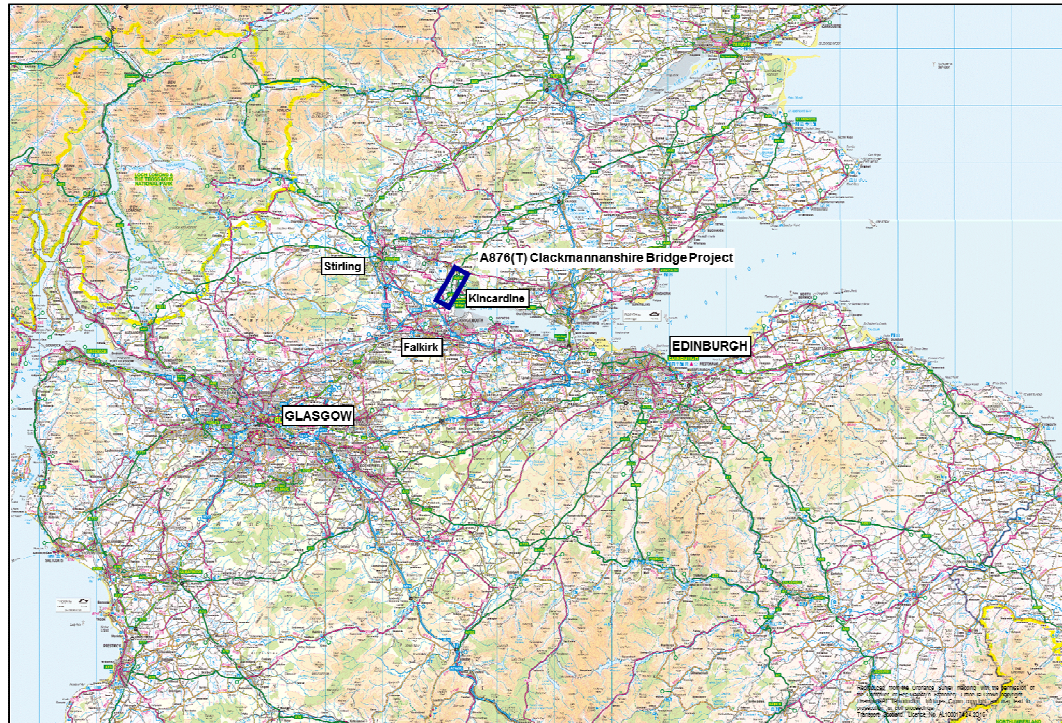
Route	Project Name	Standard	Length (km)	Open to Traffic
A876(T)	Clackmannanshire Bridge	WS2+1	4.0	Nov 2008

Key: WS2+1 Wide Single 2+1 Lane Carriageway

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Figure 2.1: Project Location Plan



## 2.3 Previous Evaluations

A 1YA Evaluation was carried out for the A876(T) Clackmannanshire Bridge project. The findings were reported within the *Evaluation Report for Trunk Road Projects Opened between April 2007 and March 2009*, published by Transport Scotland in January 2013. The key findings from the 1YA Evaluation report were as follows:

### *Comparison Between Pre and Post Opening Traffic Flows*

The comparison between pre and post project opening traffic volumes on the bypassed route through Kincardine indicated that traffic flows through the town reduced by over 70%. This reflects traffic re-routing to use the new Clackmannanshire Bridge.

### *Comparison Between Predicted and Actual Traffic Flows*

The comparison between predicted and actual AADT flows indicated that the predicted 2009 flows for the Clackmannanshire Bridge were significantly higher than the observed flows by between approximately 42% – 48%. In addition, predicted flows on the bypassed A977 north of the town centre were significantly lower than the observed flow, by between approximately 76% – 78%.



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## *Change in Travel Times*

It should be noted the 1YA Evaluation did not undertake a comparison of pre and post opening journey times. This was because no baseline data was available for comparison.

## ***Environment***

The 1YA review of mitigation measures implemented for the project confirmed that the majority of measures committed within the Environmental Statement were in place. Whilst some variations from the proposed mitigation measures had been identified, relating to drainage, mammal protection and some failings in planting, these were not considered to have had a material detrimental impact on the general integration of the project into its surroundings, however the project's objective on natural environment had not yet been met fully. These issues were further investigated as part of the 3YA evaluation.

## ***Safety***

An assessment of the one year post opening personal injury accidents and a review of the Stage 4 RSA report was undertaken. This suggests that the project is operating safely.

## ***Economy***

The 1YA concluded the economic benefits of the project are likely to have been overestimated. This conclusion is based on the general over prediction of traffic flows within the study area, in addition to an over prediction by between 42% - 48% in the volume of traffic predicted to transfer from the bypassed route (through Kincardine) to the new bridge crossing. However, it should be noted the discounted out-turn costs were less than predicted by approximately 5%.

## ***Accessibility & Social Inclusion***

By removing the need to travel through Kincardine, the project can be expected to positively impact on journey times within the area. This is to the benefit of bus services using the new bridge and also travelling through Kincardine.

The project involved the inclusion of new footpaths and cycle tracks for pedestrians and cyclists, including a shared footway/cycleway on the new bridge. This, in turn, is positive in terms of promoting access and active travel by non-motorised modes.

## ***Integration***

The project is improving connectivity and access within Clackmannanshire and wider central Scotland. This is consistent with land use planning policies and supportive of facilitating future economic development in the area.

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The project is providing lower and more reliable journey times which can be expected to benefit public transport services. This is consistent with policies to promote social inclusion through improved access.

## ***Cost to Government***

The 1YA Evaluation Report noted the discounted out-turn cost of the project was approximately £3.4m. This is 5% lower than was predicted at the time of assessment.

## ***Value for Money***

The 1YA Evaluation Report noted that the estimated NPV of £41.27m and BCR of 1.53 are unlikely to be as great as calculated at the time of assessment, as a result of the over-estimation of change in traffic flows. It was however expected that the project would continue to provide a benefit to road users.

## ***Achievement of Objectives***

The initial indications noted within the 1YA Evaluation Report suggested that for eight of the ten project objectives progress was being made towards achieving them. The 1YA evaluation did note that progress could not yet be confirmed for the objective relating to social inclusion, whilst there was an initial indication the objective relating to the natural environment may not be achieved.

# **DETAIL OF EVALUATION**

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### 3 PROJECT EVALUATION

#### 3.1 Introduction

##### *Project Description*

The A876(T) is an important crossing point of the Firth of Forth at Kincardine, locally connecting Clackmannanshire and Fife with Falkirk and West Lothian. It also provides an alternative strategic transport connection between north-east Scotland and Glasgow and south-east Scotland.

Prior to construction of the project, the A876(T) was a short 3 kilometre link running between the east end of the M876(T) motorway and the junction with the A985(T) and A977(T) within Kincardine. The route included the Kincardine Bridge crossing over the Firth of Forth.

The project involved the construction of a 4 kilometre bypass to the west of Kincardine between the A977(T) at Kilbagie, to the north of Kincardine, and Higgins Neuk on the west side of the Kincardine Bridge. It also included a new 1.2 kilometre multi-span crossing of the Firth of Forth (called the Clackmannanshire Bridge) comprising one of the longest incrementally launched bridges in the world. In addition, 2.4 kilometres of existing A876(T) carriageway were upgraded and grade-separation of Bowtrees Roundabout was implemented, together with new major roundabouts at Kilbagie and Higgins Neuk. Four other bridges were also constructed and 5 kilometres of cycle routes and footways incorporated into the project. The general location of the project is shown in Figure 3.1.

The bypass section comprises a wide single 2+1 (WS2+1) carriageway. This provides a dedicated southbound overtaking opportunity over the bridge and a section of dedicated northbound overtaking opportunity to the north. Figure 3.2 shows the southbound approach to the bridge crossing.

The existing section of the A876(T) was upgraded to motorway standard to extend the M876(T) from Bowtrees to the new junction at Higgins Neuk. At this point traffic splits to cross the Firth of Forth either via the Clackmannanshire Bridge or the Kincardine Bridge, depending on subsequent destination.

The Kincardine Bridge was reclassified as the A985(T). This was undertaken to provide continuity with the rest of the A985(T), which is located on the Fife side of the Firth of Forth, and which had been realigned in 2006 to tie in with the north side of the crossing.

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Approval to proceed with implementation of the project was made by Transport Scotland in 2006. Construction commenced on site in the same year and the project officially opened to traffic on 19 November 2008.

Figure 3.1: Project General Location Plan

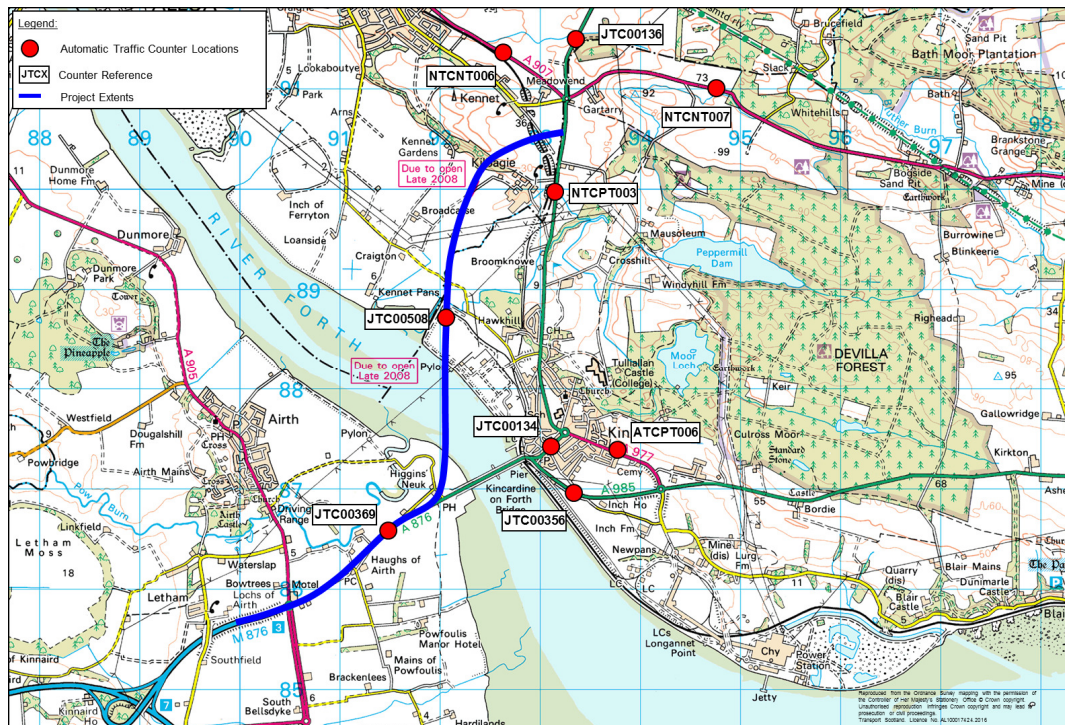


Figure 3.2: A876 (T) Looking south towards the Clackmannanshire Bridge



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## ***Project Objectives***

The objectives of the A876(T) Clackmannanshire Bridge project were set as follows:

- *Objective 1* - To provide a cost effective solution to meet the reasonable needs of existing and future traffic crossing the Firth of Forth at Kincardine, whilst minimising the intrusion of roads and traffic on the communities in Fife, Clackmannan and Falkirk;
- *Objective 2* - To aid economic prosperity and development in central Scotland and Fife, by reducing travel costs, particularly for business and commercial traffic serving existing and proposed business and commercial developments (including tourism);
- *Objective 3* - To facilitate use of the crossing by public transport and non-motorised road users;
- *Objective 4* - To improve the relative ease with which individuals can reach those destinations or amenities important to that person including but not limited to public transport, recreation areas, education and health facilities both in and around Kincardine;
- *Objective 5* - To improve road safety and reduce, as far as practical, the risk and incidence of accidents involving vehicles on the A876(T), A985(T) and A977(T) trunk roads and non-motorised users in and around Kincardine;
- *Objective 6* - To protect and improve the natural environment;
- *Objective 7* - To improve the quality of life for residents living in Kincardine by reducing the effects of traffic in terms of noise and air pollution, whilst minimising the impact on the internationally important bird feeding and breeding grounds south and north of the Forth Estuary, which forms part of the Firth of Forth Special Protection Area (SPA), other communities in the study area, land use and landscaping;
- *Objective 8* - To improve and develop local and express bus services, and integrate with the proposed reopening of the Stirling-Alloa-Kincardine railway line;
- *Objective 9* - To optimise the relationship between the proposed scheme and land-use as identified in the structure plans; and
- *Objective 10* - To maximise the improvement in transport links to employment, education and health for vulnerable groups to promote social inclusion.

## **3.2 Evaluation Methodology**

As set out in Section 2.1, this evaluation report presents the results of a Three Year after opening evaluation of the A876(T) Clackmannanshire Bridge, focusing on:

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- The operation of the project: how the project is operating (in terms of traffic and safety in particular); and
- Objectives: whether the project has achieved its objectives.

A process evaluation has also been carried out, which considers how the project was implemented across the elements of project cost, programme and key processes. The main aspects of the process evaluation are summarised in Section 1 of this report and commentary included within this section under the appropriate criteria. For example, the RSA process is considered as part of the discussion on how the project is operating in terms of Safety.

This 3YA Evaluation has been informed by the analysis of survey data supported by site visits carried out in August and October 2014. Consultation was also undertaken with stakeholders. Feedback was received from a variety of respondents, which is presented within the report. In summary, those stakeholders who responded generally consider the project successful particularly in removing traffic from the bypassed route through Kincardine.

Appendix B provides further information on the methodology employed and data sources used to inform this 3YA Evaluation.

### **3.3 The Operation of the Project**

The evaluation is supported by the consideration of pre and post opening comparison of operational indicators. These focus on network traffic volumes presented in the following section.

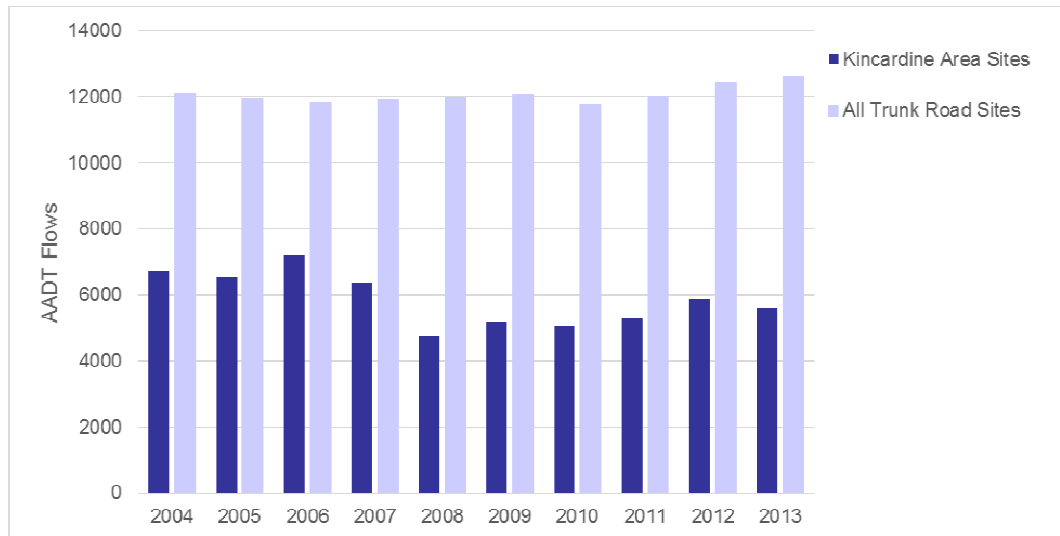
#### ***Background Traffic Growth***

The growth in traffic across the network between 2004 and 2013 is presented in Figure 3.3. This is included to put the A876(T) Clackmannanshire Bridge project into the context of prevailing trends in traffic growth across the wider Scottish Trunk Road Network.

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**Figure 3.3: Scottish Trunk Road Network Trends in Traffic Growth (2004 – 2013)**



The trends presented in Figure 3.3 indicate that, from the ATCs located on the routes within the vicinity of the project, there has been a general increase in traffic since 2008. An increase in AADT flows of approximately 800 vehicles per day (around 15%) has occurred since the opening of the project in late 2008.

An increase in AADT flows of approximately 650 vehicles per day (around 5%) has been observed across the Scottish trunk road network since 2008. This suggests that traffic growth within the Kincardine area is higher compared to national trends.

## ***Traffic Volumes***

The Automatic Traffic Counters (ATC) located with the study area and used to record traffic flows within are shown in Figure 3.1. The ATCs include:

- JTC00508 A876(T) Clackmannanshire Bridge;
- JTC00134 Bypassed A977 within Kincardine;
- NTCPT003 Bypassed A977 north of Kincardine;
- ATCPT006 A977(T) east of Kincardine;
- JTC00136 A977 north of Gartarry Roundabout;
- JTC00356 A985(T) Kincardine Eastern Link Road;
- JTC00369 M876(T) South of Kincardine Bridge; and
- NTCNT006 & NTCNT007 A907.



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## *Comparison Between Pre and Post Opening Traffic Flows*

A comparison between pre and post opening annual average daily traffic (AADT) flow volumes within the vicinity of the project has been undertaken and is presented in Figure 3.4a and Figure 3.4b. Due to technical issues with the equipment, some ATC data was not available for JTC00508 in 2012 and 2013, for ATCPT006 in 2011 and 2012, for NTCNT007 in 2012 and 2013 and for JTC00136 in 2011, 2012 and 2013.

For the **1YA Evaluation**, a key comparison between the pre and post opening traffic volumes indicated traffic flows in 2009 were around 11,300 vpd (77%) lower in Kincardine and 10,700 vpd (70%) lower on the A977(T) compared with 2007 flow levels. This suggests traffic previously using the Kincardine Bridge and travelling through Kincardine onto the A977(T) was now using the new bridge.

This 3YA Evaluation could have focused on 2011 data, as that is three years after the Clackmannanshire Bridge project opened. However, as the evaluation is being undertaken during 2014, 2012 and 2013 data has also been drawn on where available to provide the most up-to-date position.

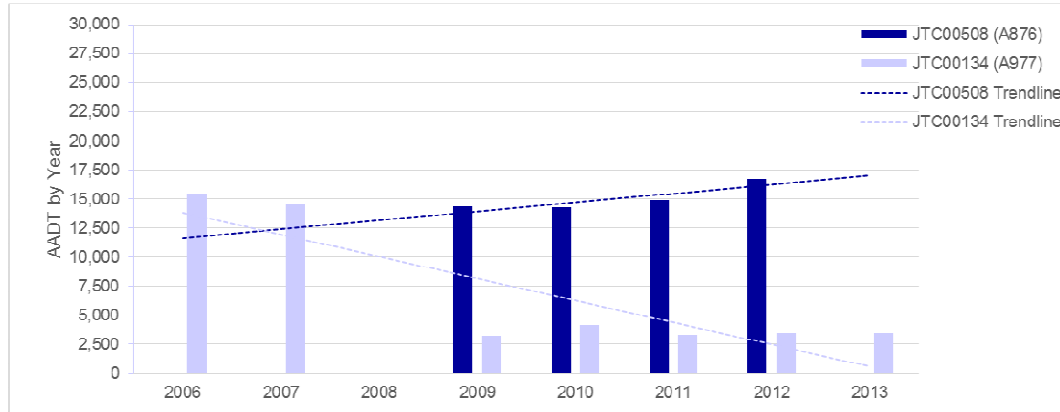
Since opening, the A876(T) Clackmannanshire Bridge route initially experienced only very minor growth in traffic volumes during the first three years. However, 2012 saw approximately 2,000 vpd (12%) growth from 2011 based on the data available. Unfortunately, 2013 data is not available to confirm if this growth continued, stabilised or fell back but there was similar 2012 growth (2,100 vpd (8%)) on the M876(T) south of Kincardine Bridge, although this fell by 800 vpd (3%) in 2013.

As well as the A876(T) and the M876(T), the A985(T) Kincardine Eastern Link Road also saw traffic flow growth in 2012 from 2011, increasing by approximately 1,000 vpd (14%) then followed by no growth in 2013. This suggests that more traffic may be using this route to travel between central Scotland and Fife, rather than alternative routes, such as the Forth Road Bridge and M8(T). It is possible that extended roadworks on the A90(T) and M90(T), associated with the installation of Intelligent Transport System (ITS) measures, may have influenced traffic patterns. However, 2012 and 2013 traffic levels are still below pre-opening levels, by approximately 16%, suggesting that some 1,750 vpd continue to use an alternative route (such as the Forth Road Bridge and M8(T)) for journeys between Central Scotland and Fife following the opening of the new bridge.

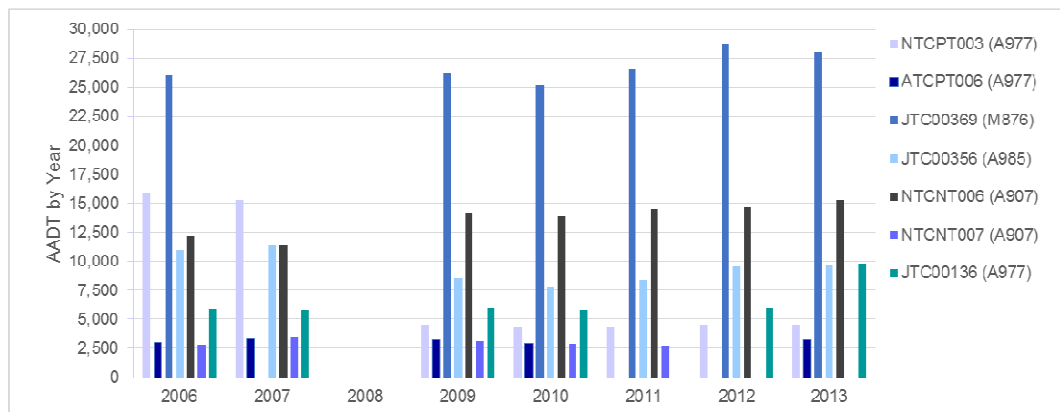
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**Figure 3.4a: Long Term ATC Data – A876(T) and Bypassed A977(T)**



**Figure 3.4b: Long Term ATC Data – other routes**



Overall, the traffic flows on other links with available ATC data have remained fairly static in the period since the project opened. This includes the bypassed section of the A977 north of Kincardine. The exception to this is the A977 north of Gartarry Roundabout, which experienced growth of approximately 3,800 vpd (64%) between 2012 and 2013, although this figure is based on partial data which was available for this period.

The level of increase in traffic on the A876(T) Clackmannanshire Bridge in 2012, may in part be accounted for by the increase in traffic flow experienced on the A977 north of Gartarry Roundabout. However, due to partial data available from this counter for this period, this cannot be confirmed. The increase in traffic observed on the A977 north of Gartarry Roundabout would suggest a potential significant change in travel patterns between the north-east and south (i.e. traffic using the M90(T) and the Forth Road Bridge transferring to the Clackmannanshire Bridge and the A977) in 2012 that settled in 2013.

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Again, it is possible that any change in travel patterns observed during this period could be due to the A90(T) and M90(T) roadworks associated with the construction of the Fife ITS project and, therefore of a temporary nature.

Following immediate opening of the A876(T) Clackmannanshire Bridge, traffic on the A907 west of Gartarry Roundabout increased by approximately 2,800 vpd (25%), suggesting an increase in traffic from the west (Alloa and Clackmannan) using the new bridge. Since 2009, this increased traffic has continued, although being fairly static through to 2012 but seeing a 7% increase in 2013.

2012 and 2013 ATC data for the A907 east of Gartarry Roundabout is not available. If a change in travel patterns had been observed to and from the Dunfermline area this could provide another potential source for the increased traffic on the A876(T), but this cannot be confirmed.

The A876(T) Clackmannanshire Bridge has led to a decrease in traffic on the bypassed route through Kincardine in the order of approximately 11,000 vpd. Within the vicinity of the town centre, 2013 traffic volumes are approximately 76% lower than pre-opening levels, even though post-opening traffic levels within the area have increased by approximately 7%. Traffic flows on the bypassed route to the north of Kincardine have remained fairly static post-opening and 2013 flows are approximately 70% lower than pre-opening levels. This suggests the A876(T) Clackmannanshire Bridge continues to operate as an effective Kincardine bypass for traffic from the north and west.

## *Stakeholder feedback*

*One stakeholder commented “AADT data generally shows that traffic has reduced on the A907 (W) towards Stirling as more vehicles are now travelling on the A907 (E) over the Clackmannanshire Bridge. The bridge has had more impact on the A907, however it is also worth bearing in mind that some of the traffic on the A907 (W) will have been pulled onto the reopened Stirling - Alloa - Kincardine railway at Alloa. Therefore would anticipate that some of the traffic growth on the A907 at Gartarry are new trips to the network due to the bridge and easier access to the trunk road. We have also been in recession and at other locations in Clackmannanshire we have seen a drop in traffic levels, which we haven't seen on the A907 east and A977”.*

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## Comparison Between Predicted and Actual Traffic Flows

Actual traffic flows are compared with predicted flows, to review the accuracy of the model assessment. For this 3YA Evaluation, as the most recent data (2013) for the A876(T) Clackmannanshire Bridge was not available for analysis, actual traffic flows for 2012 have been used and compared with predicted 2012 traffic flows. Predicted traffic flows for 2012 were derived by interpolating between the 2006 and 2021 modelled assessment year design network flows. A summary of the actual and predicted traffic data is shown in Table 3.1.

**Table 3.1: Traffic Analysis Summary**

ATC Ref	Actual AADT (2012)	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
<b>A876(T) Clackmannanshire Bridge</b>							
JTC00508	16,743 <sup>1</sup>	21,091	21,634	22,816	26.0%	29.2%	36.3%
<b>Bypassed A977(T) (North of Kincardine)</b>							
NTCPT003	4,544	1,081	1,099	1,127	-76.2%	-75.8%	-75.2%
<b>A985(T) Kincardine Eastern Link Road</b>							
JTC00356	9,524	16,560	17,397	18,653	73.9%	82.7%	95.8%
<b>A907 West of Gartarry Roundabout (To/from Alloa, Clackmannan &amp; Stirling)</b>							
NTCNT006	14,656	14,490	14,794	15,249	-1.1%	0.9%	4.0%
<b>A907 East of Gartarry Roundabout (To/from Dunfermline)</b>							
NTCNT007	N/A	4,738	4,839	4,991	-	-	-
<b>A977(T) North of Gartarry Roundabout (To/from M90(T))</b>							
JTC00136	6,004 <sup>2</sup>	9,016	9,320	9,775	50.2%	55.2%	62.8%

Note 1 – based on neutral months only, due to incomplete data

Note 2 – based on partial records, due to incomplete data for whole year

The **1YA Evaluation** indicated that the predicted 2009 flows (being approximately 21,000 – 23,000 AADT) on the A876(T) Clackmannanshire Bridge were between 42% and 48% higher than the observed 2009 flows under low and high traffic forecast scenarios respectively. The latest comparison between the predicted and actual AADT flows in Table 3.1 indicates that the predicted 2012 AADT flows on the A876(T) Clackmannanshire Bridge are now between approximately 26% and 36% higher than the observed 2012 flows for low and high growth scenarios respectively.

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For the bypassed A977, to the north of Kincardine, the predicted 2012 AADT flows (being approximately 1,000 AADT) are now between approximately 75% and 76% lower than the observed 2012 flows. However, the lower bypassed A977 baseline flow than that for the A878(T) Clackmannanshire Bridge means any noticeable change is likely to result in a more significant percentage difference. For the A977 north of Gartarry Roundabout, the predicted 2012 flow is between 50% and 63% higher than the observed 2012 flows.

Comparing 2009 results with 2012 results, predicted AADT flows on the A876(T) Clackmannanshire Bridge are still significantly greater than actual flows, but the range of disparity has reduced slightly. For the bypassed A977 north of Kincardine, predicted AADT flows are significantly less than actual flows, although again the range of disparity has reduced very slightly.

The comparison suggests that the forecast increase in strategic trips using the A876(T) Clackmannanshire Bridge from the A985(T), A907 and A977 routes has not yet occurred. This has resulted in a lower than predicted traffic flow on the Clackmannanshire Bridge.

## **Traffic Volumes: Key Findings**

The A876(T) Clackmannanshire Bridge is now carrying approximately 12.5% more traffic than during its initial year of opening. Actual traffic flows on the A876(T) Clackmannanshire Bridge are now between approximately 26% and 36% lower than predicted for low and high growth scenarios respectively. This is an improvement on the initial post opening situation. Actual traffic flows on the bypassed A977, to the north of Kincardine, are now between approximately 75% and 76% higher than predicted for low and high growth scenarios respectively, although the high % difference is against a low baseline flow. Again, this is a slight improvement on the initial post opening situation.

Traffic flows on the bypassed A977 route to the north of Kincardine and within Kincardine itself are approximately 70% and 76% lower than pre-opening levels for low and high growth scenarios respectively.

The results suggest the A876(T) Clackmannanshire Bridge is operating effectively as a bypass. This, however, is not to the levels predicted as traffic flows on the bypassed route through Kincardine have not reduced to the predicted levels, although it has seen a significant 70-76% reduction.

## **Travel Times**

Pre-opening journey time surveys were not carried out for the project. Therefore, post-opening journey time surveys have not been carried out due to the absence of a comparable baseline.

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However, due to the nature of the improvement, the average journey time between Bowtrees Roundabout and Kilbagie Roundabout via the A876(T) Clackmannanshire Bridge is expected to be less than the average journey time along the now bypassed A977 route through Kincardine. This view is supported by a ‘snapshot’ single journey time comparison undertaken during the August 2014 site visit. Whilst outside the AM or PM peak periods, the recorded journey times shown in Table 3.2 do suggest the new road provides significant average time savings.

**Table 3.2: Travel Time Data**

Direction	Recorded Journey Time		Time Savings (mins / secs)	% Saving
	A977 Bypassed Route	A876(T) Clackmannanshire Bridge		
<b>10:00 – 10:30</b>				
Northbound	7m 0s	4m 12s	-2m 48s	40%
Southbound	6m 30s	4m 20s	-2m 10s	33%

It should be noted that during peak periods, journey times on the A977 bypassed route can be expected to be higher as a result of queuing at a number of signal controlled junctions. However, peak period journey times on the A876(T) route are also likely to be higher due to probable increased queuing on the approaches to the roundabouts at either end.

### *Stakeholder feedback*

Feedback received from a number of stakeholders observed the bridge to have had a positive impact on journey times and also in reducing through traffic travelling through Kincardine. Feedback received from one of the stakeholders stated *“From personal observations, the Clackmannanshire Bridge has saved some staff between 5 and 10 minutes of journey time in the morning, due to not needing to go via Kincardine and its associated delays and congestion”*.

**“From personal observations, the Clackmannanshire Bridge has saved some staff between 5 and 10 minutes of journey time in the morning, due to not needing to go via Kincardine and its associated delays and congestion”**

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A number of stakeholders commented on operational factors concerning the design, capacity issues and congestion at Gartarry and Kilbegie Roundabouts during the AM and PM peak periods, with two stakeholders suggesting the project could have improved the two roundabouts to address congestion.. Another stakeholder commented the layout of the Feregait/Toll Road/North Approach Road junction should have been changed as part of the Clackmannanshire Bridge and Eastern Link Road schemes.

## **Travel Times: Key Findings**

While only limited post opening journey time information is available, the project is considered to have had a positive impact on journey times. A one-off survey suggests inter-peak travel times via the A876(T) Clackmannanshire Bridge are considerably less compared with the bypassed route through Kincardine by between approximately two and three minutes. Stakeholder feedback received is also supportive of the project having delivered an improvement in journey times.

Overall, the available travel time data and anecdotal feedback received suggests that the project is operatively effectively. This is likely to have resulted in savings in journey time following project opening.

## **3.4 Environment**

This section provides a summary of the assessment of environmental mitigation measures that were proposed for the A876(T) Clackmannanshire Bridge. A full report is provided in Appendix A.

### ***Review of Environmental Mitigation Measures***

The environmental mitigation measures originally proposed for the project were obtained from the project's Environmental Review document providing the commitment table from the Environmental Statement (ES).

In summary, the key mitigation measures implemented as part of the project were as follows:

- Limits on the timing of construction to minimise disruption to wintering birds;
- Use of the existing landscape and topography to fit the project into the wider landscape;
- Noise mitigation measures at North Carse and Higgins' Neuk Roundabout;
- Sustainable Urban Drainage Systems (SUDS) and attenuation ponds;
- Hedgerow and woodland planting;
- Specific measures for the protection of otters; and

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- Provision of measures to facilitate the needs of pedestrians and cyclists.

The **1YA Evaluation** was also reviewed during the 3YA desk study to identify key environmental issues. The 1YA report concluded that the majority of measures committed within the ES were in place and providing appropriate levels of mitigation, although missing elements included one SUDS pond, evergreen planting and an area of scrub planting, with maintenance being recommended in two woodland areas. Whilst some variations from the proposed mitigation measures had been identified, such as broadleaved planting instead of evergreen planting, these were not considered to have had a material detrimental impact on the general integration of the project into its surroundings.

As part of the 3YA Evaluation, a site visit was carried out in October 2014 to confirm the implementation and condition of the environmental mitigation measures and check the above comments raised in the 1YA Evaluation.

## ***Findings***

Overall, the design and construction of the project has led to successful integration into the surrounding open estuarine and farmland landscape, making effective use of the landform of the area as much as possible. The new crossing is considered to fit well within the wider landscape setting. As reported in the 1YA Evaluation, the establishment of some of the woodland planting and a hedge had not been effective everywhere. This is found to have improved since the 1YA Evaluation. Some recommendations for further maintenance and replacement planting are made in certain areas.

Acoustic fencing has been installed in two areas. A willow wall was also included at the wall at Keith Arms for visual screening of the wall. The ES set out that low noise surfacing was to be used. The 1YA Evaluation could not determine this but consultation following the 3YA site visit confirmed a thin wearing course had been used during construction which can significantly reduce tyre/road generated noise emission compared to hot rolled asphalt. Furthermore, the findings of the 3YA Evaluation indicate that, as actual traffic flows are found to be 26% and 36% lower than predicted, the noise mitigation is sufficient to reduce noise impacts.



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Various areas of habitat creation and biodiversity mitigation measures had been stipulated in the ES, including intertidal habitat (from coastal realignment), wetland habitat (ditches and ponds), woodland and hedges, grassland, and other protection measures. Three attenuation ponds were found to be in good condition, as were the open ditches either side of the southern section carriageway. A range of aquatic plants have become well established in many areas of these, although recommendations are made for maintaining the biodiversity value and their capacity. There was confirmation that the relevant bodies were consulted regarding removal of one of the SUDS ponds from the ES commitments. Otter ledges and mammal fencing has been provided along the length of the scheme and spot checks indicated they are in good condition, although fencing had not been dug down into the ground at one point in accordance with DMRB standards and there was a gap in one place. Both these factors reduce the effectiveness of such mitigation.

At the area directly to the north of the crossing, adjacent to the northbound carriageway, coastal realignment was carried out to create an area of saltmarsh and mudflat, providing roosting and feeding habitats for birds. A close inspection could not be made during the 3YA Evaluation due to access restrictions, but large areas of mudflat and pioneer saltmarsh were observed by viewing from a high level. Reviews in 2012 and 2013 of the managed realignment area to the north and the restored hard core ramp to the south concluded that the works successfully created a natural habitat, although commented on the need for managing vegetation on the artificial island to achieve its intended function.

A number of measures, including footpaths, cycle paths, an underpass and over-bridge have all been provided to maintain access for walkers and cyclists. Routes were noted to be well signposted.

## **Environment: Key Findings**

Overall, the design and construction of the project has led to successful integration into the surrounding open estuarine and farmland landscape, making effective use of the landform of the area as much as possible. The establishment of some of the woodland planting and a hedge has not been as effective as in other areas, but has improved since the 1YA Evaluation.

Acoustic fencing has been installed in two areas. A low noise, thin wearing course was utilised to reduce tyre/road generated noise emissions. The lower than forecast traffic flows would suggest the noise mitigation is sufficient to reduce noise impacts.

Various areas of habitat creation and biodiversity mitigation measures had been implemented including intertidal habitat (from coastal realignment),

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wetland habitat, woodland, and hedges and otter protection measures. Three attenuation ponds were found to be in good condition, as were the open ditches either side of the southern section carriageway.

Spot checks of otter ledges and mammal fencing indicated they are in generally good condition with the exception of two locations requiring attention to ensure the mitigation is effective. Large areas of the coastal realignment saltmarsh/mudflat were observed, although a comment was made on the development of the saltmarsh.

Access provision for cyclists and walkers was observed. Sign posting of routes was also noted.

Some issues were observed and the following issues noted for attention:

- The mammal fencing should be inspected immediately to ensure it has been installed to the right depth and that there are no gaps (such as where there are gates) to maintain the effectiveness of the mitigation.

- Some tree maintenance and additional planting is recommended at the woodland area at Higgins Neuk, the poorly established hedge north of the bridge and the area of willows north of the bridge.

- The vegetation (especially willow) in/around the ponds and open ditch is likely to require maintenance in the near future to maximise biodiversity and so as not to compromise the capacity of the ponds and ditch. Also, biodiversity could be further enhanced by managing the area dominated by the invasive plant horsetail (a native species that can easily be spread through disturbance) and the areas dominated by ruderal vegetation.

- Consideration should be given to longer term monitoring of the development of the intertidal habitat (saltmarsh and mudflats) created at the Kennet Pans coastal realignment site and any management required to maximise biodiversity of this valuable habitat where possible.

The issues that have been identified as part of the environmental evaluation process have been provided to Transport Scotland's operating companies for actioning.

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## 3.5 Safety

### *Accidents*

#### *Comparison Between Pre and Post Opening Personal Injury Accident Numbers*

One of the objectives of the project was to improve road safety and reduce, as far as practical, the risk and incidence of accidents on the A876(T), A985(T) and A977 routes in and around Kincardine. A summary of the Personal Injury Accident (PIA) data is shown in Table 3.3. The locations and severities of personal injury accidents occurring within the vicinity of the project three years before and after the project opened are shown in Figures 3.5a and 3.5b, respectively.

**Table 3.3: Personal Injury Accident Data Summary**

Period	Fatal	Serious	Slight	Total Accidents
<b>3 Years Before</b>				
A876(T)	1	2	7	10
A977(T)	1	1	4	6
A985(T) East Link Road	0	0	0	0
<b>Total</b>	<b>2</b>	<b>3</b>	<b>11</b>	<b>16</b>
<b>1 Year After</b>				
A876(T) Clackmannanshire Bridge	0	0	2	2
A977 Bypassed Route	0	0	0	0
A985(T) East Link Road	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>3 Years After</b>				
A876(T) Clackmannanshire Bridge	1	2	5	8
A977 Bypassed Route	0	0	2	2
A985(T) East Link Road	0	0	0	0
<b>Total</b>	<b>1</b>	<b>2</b>	<b>7</b>	<b>10</b>

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Figure 3.5a: 3 Years Before Opening Personal Injury Accident Numbers

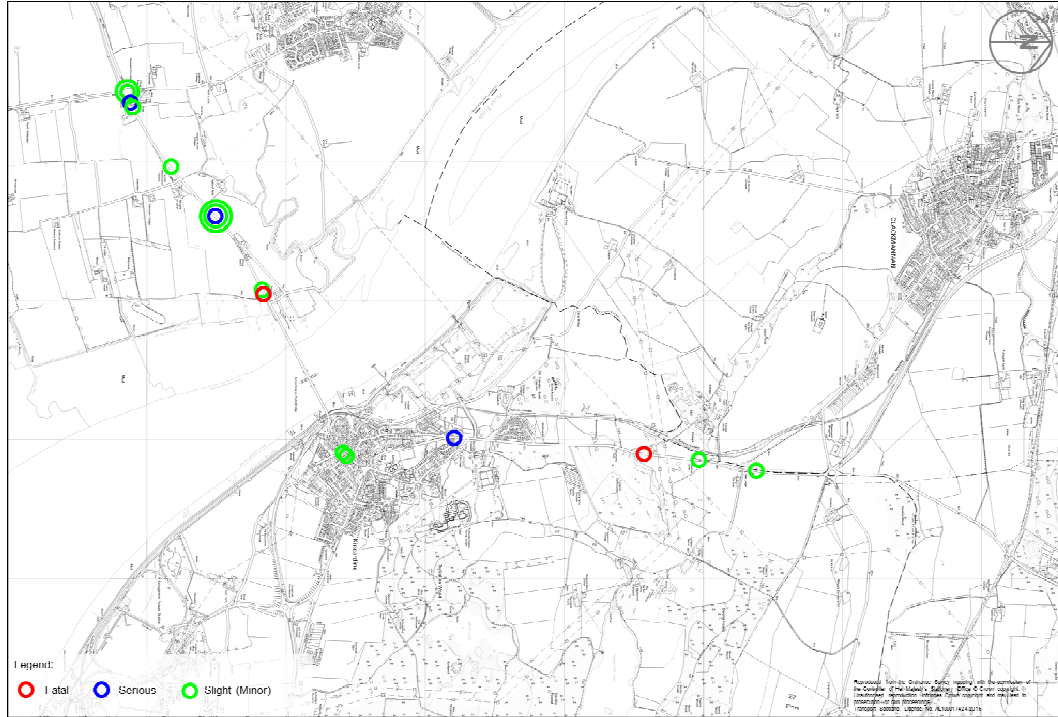
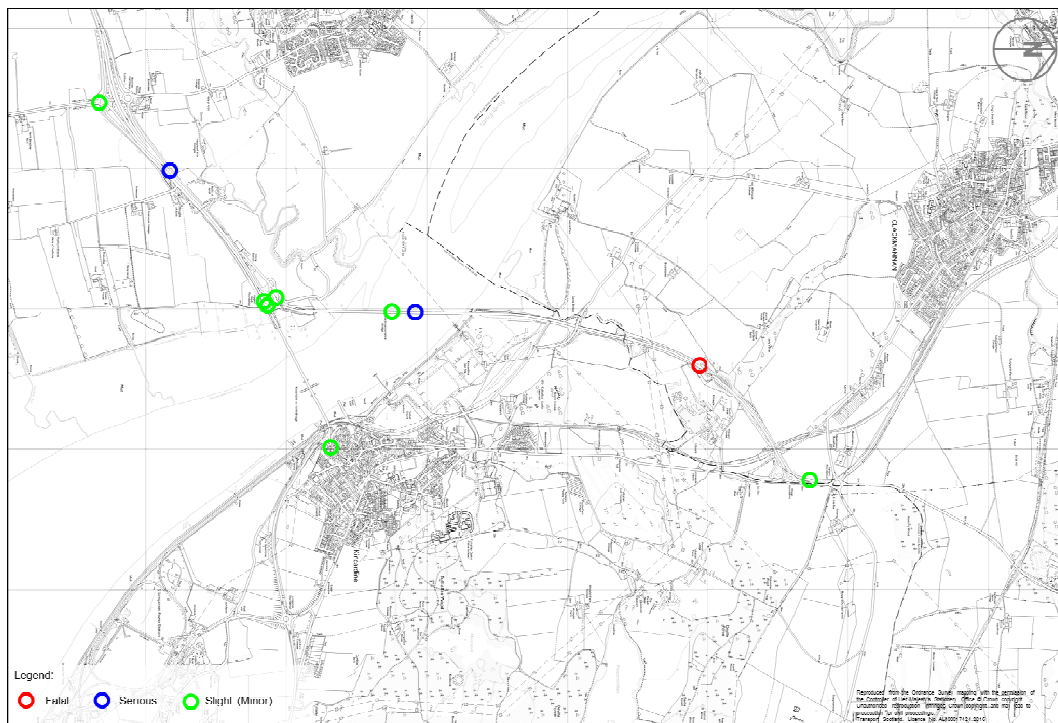


Figure 3.5b: 3 Years After Opening Personal Injury Accident Numbers



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For the previous A876(T) route, which included Kincardine Bridge, ten PIA (one fatal, two serious and seven slight) occurred during the three-year period before opening of the Clackmannanshire Bridge. During the same period, six PIA (one fatal, one serious and four slight) occurred on the A977(T) route through Kincardine. No PIAs were reported for the A985(T) East Link Road during this period.

For the new A876(T) Clackmannanshire Bridge, including the upgraded section of the A876(T), eight PIAs (one fatal, two serious and five slight) occurred during the three-year period after opening. The bypassed A977 had just two PIAs during the same period, with the A985(T) East Link Road not experiencing any PIAs.

For the A876(T) Clackmannanshire Bridge, of the eight PIAs that occurred post-opening five of these occurred on the upgraded section of the road (one serious and four slight), which is a reduction from the pre-opening situation where there were ten PIAs on the same section of the A876(T) (one fatal, two serious and seven slight). For the post-opening PIAs, two occurred in the vicinity of the Bowtrees Interchange junction whilst the other three occurred at the Higgins Neuk Roundabout.

Three PIAs occurred on the new Clackmannanshire Bridge/bypass section of the A876(T) (one fatal, one serious and one slight). It is understood the fatal accident was the result of a driver being impaired by alcohol and disobeying the central double white line.

The removal of a significant volume of traffic from the bypassed section of the A977 to the north of Kincardine indicates a positive impact. The number of PIAs fell from six (one fatal, one serious and four slight) in the three-year period prior to opening to just two slight PIAs in the three-year period after opening.

Comparing the number of PIAs occurring pre and post opening of the A876(T) Clackmannanshire Bridge, the data indicates an overall reduction in the number and severity of PIAs occurring post opening of the project. This indicates a noticeable improvement in road safety since the project opened.

## *Road Safety Audits*

The RSA process has been followed with Stage 1, 2, 3, 4 and 5 Audits carried out. The Stage 5 RSA report was available to inform this 3YA Evaluation.

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The **1YA Evaluation** reviewed a Stage 4 RSA carried out in March 2010. The RSA report indicated that only one slight PIA occurred in the one year after opening. It did not include the slight PIA that occurred in the vicinity of the southern roundabout at Bowtrees Interchange, but the reason for this was not provided. The report concluded that the project was operating safely and efficiently one year after opening.

This 3YA Evaluation has considered the Stage 5 RSA carried out in October 2012. This RSA report noted seven PIA (one fatal, two serious and four slight) have occurred on the A876(T) in the three years after opening. It is understood the fatal accident was attributable to the result of a driver being impaired by alcohol and disobeying the central double white line. Similar to the Stage 4 RSA report, the report did not include the slight PIA that occurred in the vicinity of the southern roundabout at Bowtrees Interchange nor has it considered the bypassed A977 route.

The Stage 5 RSA report suggests there is no discernible pattern linked to the PIAs. The report notes 19 damage only accidents have also occurred during the three years since opening, almost all of which involved driver error. The report concludes that none of the 26 (seven PIAs and 19 damage only accidents) accidents could be attributed to project design faults and that the road layout of the A876(T) Clackmannanshire Bridge project was operating safely and efficiently.

The report identified a number of matters that should be addressed, including:

- A “Roundabout Ahead” sign and “Reduce Speed Now” sign that should be removed or placed behind a safety barrier;
- An additional “Reduce Speed Now” that should be removed to reduce sign clutter;
- An advance direction sign with a gap on it that should be closed up; and
- An overhanging thorn hedge obstructing a section of footway/cycleway that should be trimmed back.

The site visit undertaken in August 2014 did not record any significant safety concerns and the matters identified in the Stage 5 RSA report appeared to have been addressed. It was noted that on a number of shared footway/cycle tracks there were sections of overgrown hawthorn hedging which should be trimmed to remove obstruction.

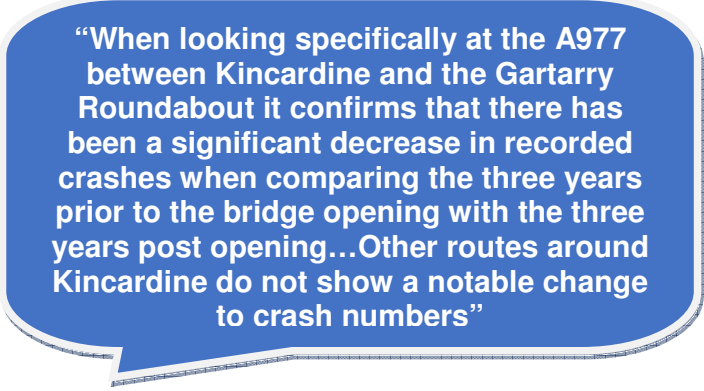
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## *Stakeholder feedback*

Comments received from a number of stakeholders noted that the new crossing has been successful in removing unnecessary traffic from Kincardine. This is viewed to have had a positive impact on road safety within the village.

A stakeholder commented that, while accident numbers have reduced on the road network in the Kincardine area, accident and casualty numbers have also fallen across the whole road network throughout Fife in recent years. The stakeholder stated *“When looking specifically at the A977 between Kincardine and the Gartarry Roundabout it confirms that there has been a significant decrease in recorded crashes when comparing the three years prior to the bridge opening with the three years post opening...Other routes around Kincardine do not show a notable change to crash numbers.”*



**“When looking specifically at the A977 between Kincardine and the Gartarry Roundabout it confirms that there has been a significant decrease in recorded crashes when comparing the three years prior to the bridge opening with the three years post opening...Other routes around Kincardine do not show a notable change to crash numbers”**

Some concerns were raised by the nature of the project with overtaking only permitted in one direction across some sections. Provision of warning signs/driver information signs were identified as a possible solution to help alert drivers to the risk of inappropriate overtaking.

Another stakeholder provided anecdotal feedback on safety that includes evidence of a number of non-injury unreported damage events to the safety barrier on the new bridge. The stakeholder also commented that wind management had not been prepared as part of the original project.

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## Safety: Key Findings

An assessment of the three-year post opening personal injury accidents indicates a reduction in the number and severity of such accidents occurring since the project opened. Findings from the Stage 5 RSA concluded the A876(T) Clackmannanshire Bridge project was operating safely and efficiently. Some matters were identified for attention regarding signage and the maintenance of vegetation in proximity to footpaths / cycleways.

Stakeholder feedback suggests the project has positively impacted on road safety. There was the suggestion for the provision of some signage where overtaking is provided in one direction of travel along the extent of the project.

## 3.6 Economy

### *Transport Economic Efficiency*

Traffic flows are a key input to the economic assessment of a project. The comparisons between predicted and actual traffic flows, presented in Section 3.3, can therefore be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

No baseline pre-opening travel time surveys were undertaken. Whilst post opening observations would suggest the new A876(T) route provides shorter journey times compared to the pre-opening situation, this cannot be confirmed through analysis with comparable baseline data.

### *Comparison Between Predicted and Actual Traffic Flows*

The **1YA Evaluation** indicated that the predicted 2009 flows were up to 48% greater than the observed 2009 flow on the new A876(T) and up to 77% less than the observed 2009 flow on the bypassed A977(T). The comparison also indicated significant variations in traffic flows on a number of the main routes within the study area. This suggested that forecast changes to the level of strategic trips using the A985(T), A907 and A977 routes had not yet occurred during the first year after opening.

The 3YA Evaluation indicates the A876(T) Clackmannanshire Bridge is now carrying approximately 12.5% more traffic than during its initial year of opening. However, actual traffic flows on the A876(T) are still approximately 26% and 32% lower than predicted flows. Actual traffic flows on the bypassed A977, to the north of Kincardine, are now approximately 75% higher than predicted.



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Whilst significant volumes of traffic are now using the A876(T) Clackmannanshire Bridge there is a general over prediction of traffic flows within the study area. This is in addition to an over prediction in the volume of traffic predicted to transfer from the bypassed route (through Kincardine) to the new crossing. As a result, the economic benefits of the project are expected to have been overestimated.

## *Stakeholder feedback*

Two stakeholders noted the reduction in traffic through Kincardine. This was not, however, viewed to be having a detrimental impact on passing trade in the village.

## **Economy: Key Findings**

The comparison of predicted and actual traffic flows suggests that the predicted economic benefits from the model may have been overestimated. As such, the project is unlikely to be achieving the predicted economic benefits as a result of less traffic using the bridge compared to forecast traffic flows.

## **3.7 Accessibility & Social Inclusion**

### ***Community and Comparative Accessibility***

The project has an objective relating to use of the new bridge crossing by public transport and non-motorised road users. Consideration of the impact of the project on these modes is therefore of particular note.

Improved facilities for cyclists and pedestrians were provided as part of the project, including a traffic-free cycle link connecting with National Cycle Network Route 76 (St Andrews to Stirling and Edinburgh to Stirling). A Stage 3 Cycle Audit was undertaken in November 2008, immediately after the project was officially opened. The Audit noted that some sections of shared footway/cycle tracks were still to be completed. The Audit recommended two direction signs be provided, noted a potential hazard with a sunken utility cover and suggested the need for a maintenance regime for a section of hawthorn hedge adjacent to a section of cycle track.

The August 2014 site visit included an inspection of the surrounding shared footway/cycle tracks and this suggests all sections have been constructed, associated signage erected and the sunken utility cover issue addressed. Sections of overgrown hawthorn hedging were noted, particularly on the northern section. Longitudinal cracking was observed on the shared footway/cycle path across the new bridge. During the site visit, a number of cyclists were observed on the bridge route and also using surrounding routes.

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The removal of significant volumes of traffic that passed through Kincardine will have improved conditions within the town in terms of general improved local amenity, surrounding environment and connectivity. This will be of benefit to improving conditions for pedestrians and cyclists within the town.

A number of bus services use the A876(T) Clackmannanshire Bridge, specifically express services, serving Clackmannanshire and the wider Central Scotland area. Services also provide access to the Forth Valley Royal Hospital. In addition, other bus services continue to use the Kincardine Bridge, serving Kincardine and the wider Fife area. Details of the services are provided in Table 3.4.

**Table 3.4: Bus Service Routing**

Service No.	Operator	Origin	Destination	Bridge Crossed
X24	Stagecoach	St. Andrews	Glasgow	Kincardine Bridge
X26	Stagecoach	Leven	Glasgow	Kincardine Bridge
X27	Stagecoach	Leven	Glasgow	Kincardine Bridge
F15	Stagecoach	Alloa	Falkirk	Kincardine Bridge
28	Stagecoach	Dunfermline	Falkirk	Kincardine Bridge
391	First	Polmont	Dollar Academy	Kincardine Bridge
H1	WAVE	Dollar	Forth Valley Royal Hospital (Larbert)	Clackmannanshire Bridge
H2	WAVE	Alva	Forth Valley Royal Hospital (Larbert)	Clackmannanshire Bridge

Table 3.4 indicates that bus services are still routing through Kincardine and, as such, while the new bridge provides the opportunity for express bus services to and from the Clackmannan area to bypass Kincardine, service information indicates that services are still routing via Kincardine avoiding an adverse impact on local access by public transport. It is expected that bus services travelling on the new bridge and through Kincardine will also benefit from improved journey times and journey time reliability as a result of the project.

The A876(T) Clackmannanshire Bridge can be expected to also contribute positively to reducing social exclusion within the local and wider region, through improved access to employment and education opportunities, healthcare, shopping and leisure facilities.

### ***Roads for All (Equality Act)***

The project was implemented prior to the publication of Transport Scotland's *Disability Discrimination Act Good Practice Guidance for Roads* document, which relates to Disability Discrimination Act (2005) (now superseded by the Equality Act (2010)) aspects and requirements. As such, no DDA audits were

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specifically undertaken. The nature of the project is not expected to present any access issues.

## **Accessibility & Social Inclusion: Key Findings**

The project improves conditions and facilities for pedestrians and cyclists, both within Kincardine and in the surrounding vicinity. This is primarily achieved through the provision of measures as part of the project design and the removal of traffic from Kincardine.

The project contributes positively towards reducing social exclusion within the local and wider region. This includes improved access to employment and education opportunities, healthcare, shopping and leisure facilities.

### **3.8 Integration**

#### ***Transport Integration***

Both the A876(T) Clackmannanshire Bridge and the rail passenger service between Alloa and Stirling, introduced as part of the Stirling-Alloa-Kincardine Railway project, now provide improved access to job opportunities in the local and wider areas. These infrastructure improvements, together, support measures to enhance access to employment opportunities within Clackmannanshire and wider central Scotland.

As noted in Section 3.7, a number of bus services are using the A876(T) Clackmannanshire Bridge or the A985(T) Kincardine Bridge, which serve the local area and wider Central Scotland. The new bridge, together with reduced traffic travelling through Kincardine and using the existing bridge, and associated improvement in journey times observed by stakeholders can be expected to also be of benefit to the journey time reliability for these bus services, making them attractive to users.

#### ***Transport and Land-Use Integration***

The **1YA Evaluation** noted that the Clackmannanshire Council Structure Plan, applicable during the period of development of the A876(T) Clackmannanshire Bridge project, indicated that the proposal for a new crossing of the Forth at Kincardine was considered of major strategic importance to the economic regeneration of Clackmannanshire. The Plan noted the regeneration and re-use of brownfield sites for strategic employment within the vicinity of the project were to be given priority and several specific sites were identified within the Plan, such as Castlebridge Business Park (a former industrial site) to the north of Gartarry Roundabout.

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The Draft Clackmannanshire Council Local Development Plan (LDP) states that the Clackmannanshire Bridge has significantly improved access to the central Scotland motorway and trunk road network. The site of the proposed Bridge Business Park is included in the Draft LDP, with the comment that it is close to the Clackmannanshire Bridge.

Fife Council is currently preparing its Draft LDP. The current Dunfermline and West Fife Local Plan (2012) states the new Clackmannanshire Bridge and road network have reduced the impact of through traffic in Kincardine and increased accessibility facilitated, providing the catalyst to expand Kincardine.

### *Stakeholder feedback*

*A stakeholder noted that “As yet, no new candidate sites have been brought forward in Kincardine or surrounding area as part of the preparation of the new Fife Development Plan (FIFEplan), as a result of the development of Clackmannanshire Bridge scheme.”*

*Another stakeholder stated “These queues (at Gartarry Roundabout) may also be exacerbated by the proposed expansion of Forestmill, as it is the traffic from the bridge going to the A977 that causes the queues.”*

**“As yet, no new candidate sites have been brought forward in Kincardine or surrounding area as part of the preparation of the new Fife Development Plan (FIFEplan), as a result of the development of Clackmannanshire Bridge scheme”**

**“These queues (at Gartarry Roundabout) may also be exacerbated by the proposed expansion of Forestmill, as it is the traffic from the bridge going to the A977 that causes the queues”**

### ***Policy Integration***

The A876(T) Clackmannanshire Bridge project, in conjunction with other transport improvement projects within Central Scotland, supports economic development in Clackmannanshire and Kincardine. This is primarily achieved through improved connectivity afforded by the new bridge between Clackmannanshire, Fife and wider central Scotland.

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The provision of enhanced pedestrian and cycle routes will help to promote and encourage active travel. This will in turn enhance local access and support wider policies in relation to, for example, health and local air quality. This is also consistent with wider policy in respect of social inclusion and access to opportunities and facilities by alternatives to the private car.

## Integration: Key Findings

The improvement in journey time commented in anecdotal feedback received from stakeholders can be expected to also benefit buses. Improved journey time reliability for local and strategic bus services serving Clackmannanshire, Kincardine and wider central Scotland area.

The project was built within the vicinity of brownfield sites (identified within the Clackmannanshire Council Structure Plan and Draft Clackmannanshire LDP) to facilitate the regeneration and re-use of the sites for strategic employment. The project also supports proposals to expand Kincardine.

The project integrates with policies to encourage active travel and support social inclusion. It also facilitates accessibility within Clackmannanshire and to wider central Scotland, supporting future economic development opportunities.

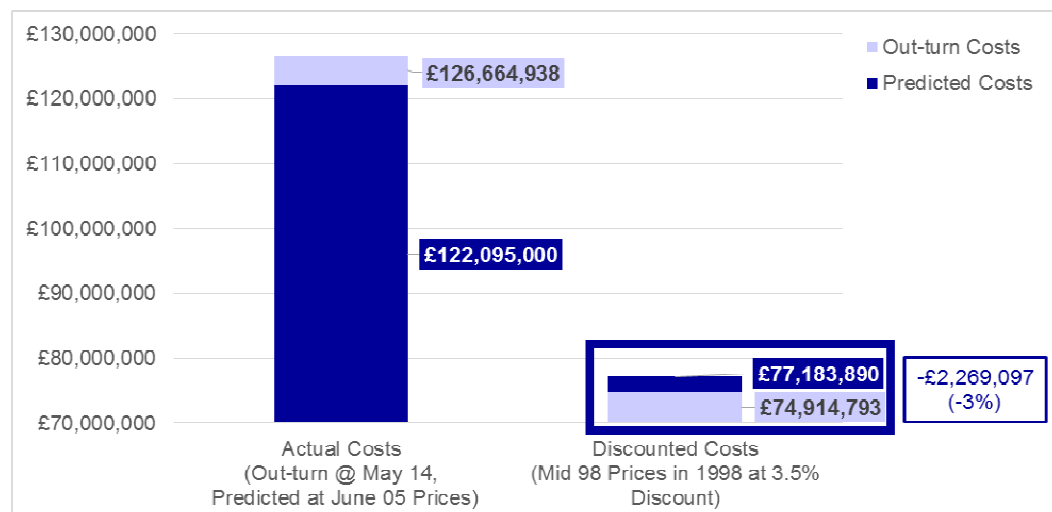
## 3.9 Cost to Government

### *Investment Costs*

#### *Comparison Between Predicted and Out-turn Costs*

The out-turn and predicted project costs for the project are shown in Figure 3.6.

**Figure 3.6: Project Cost Summary**



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The latest comparison indicates that the current out-turn cost for the project is broadly comparable with the out-turn costs at the time of the 1YA Evaluation. Actual out-turn costs in May 2014 were approximately £126.7 million, being some £4.6 million higher (3.7%) than the predicted June 2005 out-turn price of approximately £122.1 million. However, when the out-turn costs are discounted, the current discounted out-turn costs of £74.9 million are approximately £2.3m (3.1%) lower than the predicted £77.2 million at the time of assessment.

## **Cost to Government: Key Findings**

The discounted out-turn cost of the project is approximately £2.3m lower than predicted. This is 3.1% lower than the costs predicted at the time of assessment.

### **3.10 Value for Money**

The economic appraisal results from the model developed during the preparation of the project predicted a Net Present Value (NPV) of £41.27m and a Benefit to Cost Ratio (BCR) of 1.53, under the 60/40 traffic forecast scenario<sup>1</sup>.

Whilst the discounted out-turn cost was slightly lower than the predicted cost, the overall conclusion is that the actual NPV and BCR values for the project can be expected to be slightly lower than predicted as a result of the variation in actual and forecast traffic flows discussed in Section 3.3. It is, however, considered unlikely that this overestimation of economic benefits would have affected the original decision to proceed with the project in view of the wider benefit of the project in relation to supporting future economic development in the local area and enhancing access will complementing wider policies concerning social inclusion, active travel and local air quality.

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<sup>1</sup> 60/40 traffic forecast scenario calculated through factoring results of low and high traffic forecast scenarios by 0.6 and 0.4 respectively

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## Value for Money: Key Findings

The difference between predicted and actual AADT flows suggests that the economic benefits of the project have been overestimated.

Whilst the actual 2014 out-turn cost is slightly higher than the predicted out-turn cost in 2005, the discounted out-turn cost of the project is approximately £2.3m (3.1%) lower than was predicted at the time of assessment. This is relatively unchanged from the 1YA Evaluation.

While the NPV and BCR values are expected to be less than forecast as a result of the variation in traffic flows and investment costs, it is judged that the project will continue to provide a benefit to road users.

### 3.11 Achievement of Objectives

As stated in Section 2.3, the **1YA Evaluation** indicated that, for eight of the ten project objectives, progress was being made towards achieving them. Progress could not be confirmed at the stage for the objective relating to social inclusion, whilst there was an initial indication the objective relating to the natural environment would not be achieved.

A summary of the 3YA Evaluation, providing an indication of how the project has performed towards achieving its objectives, is presented in Table 3.5. The evaluation indicates the project has achieved its objectives.

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**Table 3.5: Achievement of Objectives**

Objective	Commentary	Progress
<p>1. To provide a cost effective solution to meet the reasonable needs of existing and future traffic crossing the Firth of Forth at Kincardine, whilst minimising the intrusion of roads and traffic on the communities in Fife, Clackmannan and Falkirk.</p>	<p>Actual NPV and BCR values are unlikely to be as high as predicted at the time of assessment. It is, however, considered that the project is providing and will continue to provide a significant benefit to road users.</p> <p>The impact of the project on Kincardine, in terms of roads and traffic, is positive, with approximately 11,000 vpd having diverted to the new bridge rather than routing through the town. Effects on communities outwith the immediate area are considered to be negligible.</p> <p>The discounted out-turn cost of the project is approximately 3% lower than the predicted cost estimate at time of assessment. This supports the case for the project being a cost effective solution.</p>	<p>+ve</p>
<p>2. To aid economic prosperity and development in central Scotland and Fife, by reducing travel costs, particularly for business and commercial traffic serving existing and proposed business and commercial developments (including tourism).</p>	<p>The new crossing at Kincardine has contributed towards a reduction in congestion within the local area and especially through the centre of Kincardine. Although no explicit data is available, it is reasonable to expect the project has resulted in a subsequent reduction in average journey times and improvement in journey time reliability for cross-Forth traffic travelling between Clackmannanshire, Fife and Central Scotland.</p> <p>It is likely to have benefited all traffic, particularly business and commercial traffic, with reduced congestion and improved journey times having resulted in reduced travel costs. This will have helped contribute towards wider economic benefits.</p>	<p>+ve</p>
<p>3. To facilitate use of the crossing by public transport and non-motorised road users.</p>	<p>The project provided significant new and improved facilities for pedestrians and cyclists. This included a traffic free cycle path connecting with the National Cycle Network Route. Pedestrians and cyclists can also cross the new bridge by way of dedicated route.</p>	<p>+ve</p>



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Objective	Commentary	Progress
	A number of bus services are using the A876(T) Clackmannanshire Bridge. The journey times of these services can be expected to have improved from the pre-opening situation and routing of all cross-Forth traffic at this point through Kincardine.	
4. To improve the relative ease with which individuals can reach those destinations or amenities important to that person including but not limited to public transport, recreation areas, education and health facilities both in and around Kincardine.	A significant volume of traffic has been removed from within Kincardine (approximately 11,000 vpd), and this will have reduced detrimental impacts relating to severance as a result of high traffic volumes. This will have improved accessibility to a range of services for local residents.	+ve
5. To improve road safety and reduce, as far as practical, the risk and incidence of accidents involving vehicles on the A876(T), A985(T) and A977(T) trunk roads and non-motorised users in and around Kincardine.	<p>Eight injury accidents (one fatal, two serious and five slight) have occurred on the upgraded and extended A876(T). Two slight injury accidents were reported on the bypassed A977 and no injury accidents reported on the adjacent section of A985(T) in the three year period following the opening of the project, giving a total of ten injury accidents. This compares with the total of 16 injury accidents (one fatal, two serious and seven accidents on the original shorter A876(T) and one fatal, one serious and four slight on the A977 route) in the three years before opening. This suggests there has been an improvement in road safety and the Stage 5 RSA report concludes the scheme is operating safely and efficiently.</p> <p>The project has also removed significant volumes of traffic from Kincardine, thereby reducing the potential for accidents occurring that involve non-motorised users.</p>	+ve
6. To protect and improve the natural environment.	The new bridge crosses over the nationally and internationally designated Firth of Forth Special Protection Area. A number of mitigation measures have been implemented that successfully minimise the detrimental impacts of the scheme in line with the ES. These have included the creation of estuarine habitats which involved the undertaking of a managed realignment at Kennet Pans	+ve

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Objective	Commentary	Progress
	<p>providing a considerable area of additional mud-flats. Works have also involved the creation of other ecological habitats such as hedgerows, woodlands, wetland areas (ponds and ditches).</p> <p>The design of the bridge was sensitively undertaken with due regard to the natural environment and to provide an improvement in terms of habitat creation.</p>	
<p>7. To improve the quality of life for residents living in Kincardine by reducing the effects of traffic in terms of noise and air pollution, whilst minimising the impact on the internationally important bird feeding and breeding grounds south and north of the Forth Estuary, which forms part of the Forth of Forth SPA, other communities in the study area, land use and landscaping.</p>	<p>As a consequence of removing a significant volume of traffic from within Kincardine, a substantial number of properties in the town will have experienced an improvement in air quality and reduced noise levels. It is acknowledged that, in some cases, the level of noise reduction will be slightly lower than forecast as less traffic has diverted from Kincardine than predicted but there has still been a significant improvement on the pre-opening situation. The project will have improved the quality of life for many residents living in Kincardine.</p> <p>Whilst some variations from the proposed mitigation measures had been identified, these were not considered to have had a material detrimental impact on the general integration of the project into its surroundings. It is considered that the impact of the project has been minimised.</p>	<p>+ve</p>
<p>8. To improve and develop local and express bus services and integrate with the proposed reopening of the Stirling-Alloa-Kincardine railway line.</p>	<p>The new Clackmannanshire Bridge provides a more direct route for express buses serving the Clackmannanshire and wider central Scotland area. The removal of significant volumes of traffic from Kincardine provides opportunities for improving those local services that continue to use the Kincardine Bridge.</p> <p>The Stirling-Alloa-Kincardine railway line, including a rail passenger service between Alloa and Stirling reopened in 2008. Alloa station being is directly served by buses from Kincardine and Clackmannan.</p>	<p>+ve</p>

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Objective	Commentary	Progress
	<p>Whilst the Clackmannanshire Bridge provides the infrastructure to help improve journey times for bus services in the area, Transport Scotland is not able to improve or develop bus services itself and that is a matter for commercial operators and local authorities to consider.</p>	
<p>9. To optimise the relationship between the proposed scheme and land-use as identified in the structure plans.</p>	<p>The project was built within the vicinity of brownfield sites identified as employment opportunities within the Clackmannanshire Council Structure Plan, relevant at the time of project assessment.</p> <p>The Draft Clackmannanshire Council LDP states that the Clackmannanshire Bridge has significantly improved access to the Central Scotland motorway and trunk road network. The LDP identifies the proposed Bridge Business Park, which is close to the new bridge.</p> <p>In addition, Fife Council is currently preparing its Draft LDP. The current Dunfermline and West Fife Local Plan (2012) states the new Clackmannanshire Bridge and road network have reduced the impact of through traffic in Kincardine and increased accessibility provides the catalyst to expand the town.</p>	<p>+ve</p>
<p>10. To maximise the improvement in transport links to employment, education and health for vulnerable groups to promote social inclusion.</p>	<p>The new crossing and improved trunk road network has provided infrastructure that supports economic development in Clackmannanshire and reduces social exclusion in Fife more generally through improved access to employment and education opportunities, healthcare, shopping and leisure facilities as a result of expected reduced and more reliable journey times between Clackmannanshire, Fife and Central Scotland. The project helps provide improved access to job opportunities outside the area, assisting in efforts to reduce long term unemployment in Clackmannanshire and the Kincardine areas.</p> <p>Cycle track and footpath connections have been improved/catered for. It is envisaged average journey times for bus services have also been improved, particularly during</p>	<p>+ve</p>

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Objective	Commentary	Progress
	peak periods.	

- Key:
- +ve Indication(s) that objective has been / will be achieved
  - = Progress towards achievement of objective cannot be confirmed
  - Indication(s) that objective has not / will not be achieved

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### 3.12 Evaluation Summary

This 3YA Evaluation of the A876(T) Clackmannanshire Bridge project indicates that traffic flows on the bypassed route through Kincardine have reduced significantly following opening and this continues to be the case, although flows are still higher than predicted. Whilst no pre and post journey time data has been collected, anecdotal feedback suggests journey times on the new route are lower than for the bypassed route.

Actual traffic flows on the A876(T) Clackmannanshire Bridge are now between approximately 26% and 32% lower than predicted under low and high growth scenarios respectively. The variance is lower compared to the over prediction resulting one year after opening. The comparison suggests that the forecast increase in strategic trips using the A876(T) Clackmannanshire Bridge from the A985(T), A907 and A977 routes has not yet occurred, resulting in a lower than predicted traffic flow on the Clackmannanshire Bridge.

The project has resulted in a reduction in the number and severity of personal injury accidents. The total number of accidents reduced from sixteen three years before opening to ten three years after opening. The discounted out-turn cost for the project was approximately £2.3m (3.1%) less than predicted.

The evaluation indicates the project has achieved its objectives. The project's objectives, in relation to operation focussed on the improvement of road safety and reduction of the risk and incidence of accidents occurring within the vicinity of the project. This was in addition to a reduction of travel costs through an improvement in journey times. The project has delivered positive benefits in terms of road safety and anecdotal feedback from stakeholders suggests there has been an improvement in journey time.

Due to the environmentally sensitive nature of the Firth of Forth Estuary within which the crossing is located, the project had several objectives relating to the environment. As a consequence of removing a significant volume of traffic from within Kincardine, a substantial number of properties in the town will have experienced an improvement in air quality and reduced noise levels. It is considered that the impact of the project has been minimised through the environmental mitigation measures that have been implemented.

Stakeholder consultation was undertaken, as part of the project evaluation. Feedback received indicates stakeholders generally consider the project has been successful.

Whilst the project may not be seeing actual levels of traffic flows as predicted, the new bridge is an important crossing point of the Firth of Forth at Kincardine, locally connecting Clackmannanshire and Fife with Falkirk and West Lothian. It

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also provides an alternative strategic transportation connection between north-east Scotland and Glasgow and south-east Scotland. This provides particular benefits in terms of connectivity to support future economic development and access within and between Clackmannanshire and the wider region.

# **Appendix A: Environment**

## **A ENVIRONMENT**

This section provides details of the three-year after evaluation undertaken for the Environment criterion in the Scottish Trunk Road Infrastructure Project Evaluations (STRIPE).

### **A.1 INTRODUCTION**

#### ***Background***

Transport Scotland has commissioned CH2M to evaluate several schemes on the Scottish Trunk Road Network that were constructed and opened approximately three years ago. Part of this 'Three Year After Opening Evaluation' (3YA) comprised a review of the implementation of the schemes' environmental mitigation measures.

This report presents the findings of the 3YA Evaluation for the A876(T) Clackmannanshire Bridge. The scheme has previously been subject to a 'One Year After Opening Evaluation' (1YA) Evaluation. The findings of the 1YA Evaluation were reported in:

- Project Evaluation Environmental Mitigation Review October 2011, Report to Transport Scotland, Halcrow Group Ltd 2011

#### ***Environmental Evaluation Purpose***

The purpose of the environmental aspect of the 3YA Evaluation is to provide a review of the condition of the mitigation measures that had been implemented by the scheme at approximately three years after opening, and make any recommendations to improve the effectiveness of the mitigation or identify trends in the issues being observed so that Transport Scotland can implement improvements in future environmental impact assessment and scheme design or in the operation and maintenance of the existing schemes.

#### ***Methodology***

The methodology used for the 3YA environmental review selected relevant aspects of the STRIPE<sup>2</sup> 'Three Years After' methodology that comprised:

- A desk study review of the project objectives, ES<sup>3</sup> and 1YA environmental mitigation review to identify the likely key issues to be evaluated during the 3YA review and any questions remaining from the 1YA reviews.
- A site visit – to give an overview of the mitigation implemented with observations focused on any issues raised by the 1YA Evaluation

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<sup>2</sup> Transport Scotland Scottish Trunk Road Infrastructure Project Evaluation (STRIPE). Final Guidance August 2013.

<sup>3</sup> "Upper Forth Crossing at Kincardine B&A monitoring - Environmental Reviews. Section 5 Environmental Statement" Commitments table.



rather than to repeat a visit to every feature that was confirmed as being present and in good condition in the 1YA Evaluation.

- A report, setting out the key issues from the 1YA Evaluation, the observations from the site visit and comments on the condition of the environmental mitigation. The report will also identify any additional issues/mitigation requirements to improve the effectiveness of the mitigation, and identify any resultant trends in the recommendations being made.

### ***Structure of the Report***

The project objectives (including any specific environmental objectives) are provided, followed by the list of likely key environmental issues that were identified during the 3YA desk study and any questions remaining from the 1YA Evaluation, given in Section A2.

Observations made during the 3YA site visit focussed on these key issues, and are described in Section A3. Following this is Table A1 which sets out all of the mitigation proposed and the 3YA observations made against each of the mitigation measures, with the associated 1YA observations to aid comparison.

The report concludes with a summary of recommendations regarding further studies and suggestions for improving the effectiveness of the environmental mitigation where appropriate.

## **A.2 ENVIRONMENTAL FINDINGS**

### ***Project Objectives***

The project involved the construction of a 4 kilometre bypass to the west of Kincardine including the Clackmannanshire Bridge. It also incorporated the upgrade of 2.4 kilometres of the A876 carriageway and grade-separation of Bowtrees Roundabout.

The bypass comprises a wide single 2+1 (WS2+1) carriageway. This provides a dedicated southbound overtaking opportunity over the bridge and a section of dedicated northbound overtaking opportunity to the north.

The project was implemented to provide for the needs of existing and future traffic, supporting economic development, access, social inclusion. In terms of the environment, the objectives included the following:

- To protect and improve the natural environment; and
- To improve the quality of life for residents living in Kincardine by reducing the effects of traffic in terms of noise and air pollution, whilst minimising the impact on the internationally important bird feeding and breeding grounds south and north of the Forth Estuary, which

forms part of the Firth of Forth Special Protection Area (SPA), other communities in the study area, land use and landscaping;

### ***Key Issues to be Reviewed***

The 1YA Evaluation concluded that the majority of measures committed to within the ES were in place and were providing appropriate levels of mitigation. However, the 1YA Evaluation did identify some departures from the original ES and also noted that some landscape planting had failed to establish.

The key issues identified during the 3YA desk study are summarised below:

- Noise – including barriers and low noise road surfacing
- Biodiversity & habitats – including the saltmarsh/mudflat creation area adjacent to the Firth of Forth SPA/Ramsar site, mammal fencing
- Landscape/planting - including whether the 1YA recommendations for improvements had been implemented
- Water, drainage – including whether a record was produced for the change in the design and number of attenuation ponds

These formed the focus of the 3YA Evaluation instead of re-visiting everything that had been confirmed as being present during the 1YA site visits.

## **A.3 THREE-YEAR AFTER REVIEW FINDINGS**

### **Noise and vibration**

Acoustic fencing has been installed at North Carse and at Keith Arms. Additionally, a willow-clad acoustic fence and noise bund was also included at Keith Arms between the properties located there and Higgin's Neuk roundabout (see Figure A.1). A visual inspection confirmed this noise mitigation was in good condition and the live willow wall is establishing well. Additionally, whilst no noise measurements were taken during the 3YA site visit, a walkover of the site at Keith Arms allowed for a general observation of noise noticeably dropping behind the fences.

It is also noted the 3YA Evaluation indicates that actual traffic flows are found to be between 26% and 32% lower than predicted under low and high growth scenarios respectively. As such, it can be expected the noise impacts will also be less than forecast.

The ES set out that low noise surfacing was to be used. The 1YA Evaluation could not determine if this had been implemented, however, consultation following the 3YA site visit confirmed a thin wearing course had been used during construction. This can significantly reduce tyre/road generated noise emission compared to hot rolled asphalt.



**Figure A.1: Willow wall**

### **Water quality, drainage and flood defence**

Provision for four attenuation ponds was included in the original ES but it was established during the 1YA Evaluation that only three of these were built. The 1YA report queried whether the decision behind this alternation to the design was recorded but it has since been confirmed that the relevant bodies were consulted about this change.

This 3YA Evaluation inspected the three ponds and found them to be in good condition (please see 'Biodiversity and Habitats' section for more details).



**Figure A.2: Attenuation pond south of Higgin's Neuk roundabout**

At the southern section of the scheme, open ditches have been constructed along the length of both sides of the carriageway as shown in Figure A.3. Please refer to the 'Biodiversity and habitats' section for further comments regarding this mitigation.



**Figure A.3: Open drainage ditch with reeds and invasive horsetail in the foreground**

### **Biodiversity and habitats**

Various areas of habitat creation and biodiversity mitigation measures had been stipulated in the ES, including a large area of intertidal habitat (from coastal realignment), wetland habitat (ditches and ponds), woodland and hedges, grassland, and other protection measures. According to the 1YA Evaluation, these had mostly been implemented as expected. The 1YA Evaluation noted that the planted hedgerows and trees were generally in good condition, however the area at Lady's Brae and North Carse had not established well as shown in Figure A.4. A visual inspection during the 3YA site visit and comparison with photographs taken at the 1YA evaluation indicated the situation has improved, although there is still an area where inclusion of a concrete drainage channel has created a gap in the woodland landscape which is discussed further in the Landscape and visual section.



**Figure A.4: Planting near Lady's Brae plantation**

An area of willow trees planted adjacent to the Kennet Pans coastal realignment area, north of the crossing has grown to a height where the tree guards now need to be removed to avoid damaging the trunks and to be thinned out as shown in Figure A.5. Also, on the opposite side of the carriageway, the hedge has not taken and some trees have failed.



**Figure A.5: Willows north of Kennet Pans realignment area where tree guards need to be removed**

To the north of Bowtrees Roundabout, the grass verge of the northbound carriageway beside the cycle path is dominated by invasive horse-tail as illustrated in the foreground of Figure A.3. This is a native species which is easily spread by disturbance, so it is recommended that maintenance operations take precautions in this area to minimise its spread along the ditch and grass verge.

The proposed broadleaved woodland planting at the west side of Higgin's Neuk roundabout has not established well as illustrated in Figure A.6. It appears to extend over a smaller area than shown on the landscape plans and the saplings growth may have been hindered by the surrounding tall grasses.



**Figure A.6: Woodland planting to the west of Higgin's Neuk roundabout**

Several wetland habitats have been created as part of the project. In general, the ditches in the southern section were noted to be in good condition and a range of aquatic plants have become well established in many areas, although less so where the banks of the ditch are steeper and channels narrower and drier, where ruderal vegetation such as willowherb dominates. However, there are some locations along the ditch, where duckweed dominates large areas of the surface of the water, and can smother other aquatic plants and reduce oxygen levels if it dies back in large quantities, reducing species richness. This does not currently create an issue but it may be of benefit to monitor the situation.

To the south east of Bowtrees roundabout, willow trees have grown extensively within the ditch. It is recommended that these are managed to encourage other species and to minimise the risk of them affecting the operation of the ditch.

The pond south of Higgin's Neuk roundabout is surrounded by wetland plants such as reeds and rushes. There is also willow present here which is currently small and establishing well, but will need to be managed effectively in the future when larger so as not to compromise the capacity of the pond or outcompete marginal vegetation or shade out aquatic vegetation. The grassland around the pond is dominated by large patches of ruderal vegetation such as dock, which reduces the biodiversity of the grassland.

Coastal realignment was carried out at Kennet Pans, to the north of the crossing, adjacent to the northbound carriageway, to create a saltmarsh and mudflat providing habitats for invertebrates and roosting and feeding habitats for estuarine birds. Although a close inspection could not be made during the 3YA site visit due to access restrictions, large areas of mudflat were observed, and pioneer saltmarsh habitat (as shown in Figures A.7 and A.8.) Ecological reviews were completed in 2012 and 2013 of the managed realignment area to the north and the restored hard core ramp to the south of the bridge. These concluded that the works had successfully created natural habitats within the estuary, although they also commented on the need for managing vegetation on the artificial island in order to achieve its intended function.

It can take many years for saltmarsh to develop naturally, and consideration should be given to monitoring the quality of the development of the coastal habitat over time and maintain where possible to maximise biodiversity of this valuable habitat. For example, monitoring would help to identify if the site forms the intended habitats over time, inform any management regime and to design other managed realignment schemes. Also, SNH may be interested in understanding if this habitat supports the SPA/SSSI/Ramsar site and potentially incorporated into the designations.



**Figure A.7: Coastal realignment at Kennet Pans**



**Figure A.8: Coastal realignment showing poor saltmarsh establishment at the toe of the embankment**

Otter ledges and mammal fencing (Figure A.9) have been provided along the length of the scheme and visual inspections and spot checks indicated it is in good condition in most places. Notable exceptions include where the fence had not been dug down into the ground deeply enough at Higgin's Neuk roundabout. DMRB recommends mammal fencing be dug into the ground at least 500mm. Also, a farm access gate on the northbound carriageway to the north of the bridge created a gap in the otter fence, reducing its effectiveness (see Figure A.10).



**Figure A.9: Mammal fencing**





**Figure A.10: Gap in the mammal fencing created by farm access gate**

During the 3YA site visit, a large bird of prey was observed in the northern section of the scheme, foraging at one of the attenuation ponds.

### **Landscape and visual amenity**

The whole project is within an open, estuarine landscape containing the Kincardine Bridge, industrial areas and farmland. As the 1YA Evaluation reported, the project has been well graded and makes effective use of the landform of the area with cutting and embankment slopes reflecting the generally open nature of the surrounding landscape. The effect of the cut through Lady Brae's escarpment has been minimised through retaining mature woodland and planting. Different aspects of the project within the wider landscape setting are shown in Figures A.11, A.12 and A.13. Sensitive design has helped to ensure that overall the project fits in well with the landscape setting.



**Figure A.11: Clackmannanshire Bridge viewed from the southern end**



**Figure A.12: A876(T) Northern section, looking south**



**Figure A.13: Bowtrees roundabout, planting and segregated cycleway/footpath**

As described in the Biodiversity and Habitats section, the establishment of some of the woodland planting and a hedge has not been as effective as in other areas but has improved since the 1YA Evaluation was undertaken. The observation made in the 1YA report about the concrete drainage ditch at Lady's Brae being in line with drivers' views was again noted.

The Biodiversity and Habitats section recommends some planting areas that would benefit from maintenance and replacement of any failed trees in the hedgerow, which would also maximise the effectiveness of this landscape mitigation. It is expected that over time the features will weather, vegetation will grow and the scheme will assimilate better into the surrounding landscape. However, overall the project is currently considered to fit into the wider surrounding landscape.

### Physical fitness, pedestrians, cyclists and community effects

A number of measures (Figure A.14) including footpaths, segregated cycle paths, an underpass and over-bridge have all been provided to maintain and improve opportunities for cyclists and walkers, aiding both local access as well as physical fitness through active travel. Routes are well signposted (Figure A.15) and several cyclists and walkers were observed during the 3YA site visit.



Figure A.14: Segregated cycle/ footpath



Figure A.15: Cycle signage

***Any new issues identified***

New issues identified during the 3YA Evaluation, as described above, include:

- The growth of certain plant species in the ditch, pond and grassland habitats that would require maintenance in the future;
- Issues with the installation of the mammal fencing which requires checking and repair where defects are identified; and
- Although the estuarine habitat creation and restoration areas were monitored in 2012 and 2013, there would be benefits from the long term monitoring of the habitats, to ensure the effectiveness of the mitigation and inform future schemes. The previous reports also recommended managing vegetation on the artificial island to meet its intended function, and it is understood that the site is not currently managed.

***Mitigation measures – detailed observations***

An update of the observations relating to individual mitigation measures provided in the 1YA report using the 3YA observations can be found in Table A1.

***Recommendations***

The following recommendations are presented for consideration:

- The mammal fencing should be inspected immediately along the extent of the project to ensure it has been installed to the right depth in line with DMRB standards and that there are no gaps (such as where there are gates). This is required to maintain the effectiveness of the mitigation.
- Some tree maintenance and additional planting is recommended at the woodland area at Higgins Neuk, the poorly established hedge north of the bridge and the area of willows north of the bridge.
- The vegetation (especially willow) in/around the attenuation ponds and open ditch is likely to require maintenance in the near future to maximise biodiversity and so as not to compromise the capacity of the ponds and ditch. Also, biodiversity could be further enhanced by managing the area dominated by the invasive plant horsetail (a native species that can easily be spread through disturbance) and the areas dominated by ruderal vegetation.
- The quality of the development of the intertidal habitat (saltmarsh and mudflats) at the Kennet Pans coastal realignment site is monitored over time (such as by a habitat survey in spring/early summer every

few years) and maintained where possible to maximise biodiversity for this valuable habitat.

- Consideration should be given to longer term monitoring of the development of the intertidal habitat (saltmarsh and mudflats) created at the Kennet Pans coastal realignment site and any management required to maximise biodiversity of this valuable habitat where possible, including the vegetation management recommended in the 2012/13 ecology reports.
- Consider some screening of the concrete drainage ditch at Lady's Brae to reduce the visual impact on the view of vehicle travellers.

The issues that have been identified as part of the environmental evaluation process have been provided to Transport Scotland's operating companies for actioning.

Scottish Trunk Road Infrastructure Project Evaluation - Appendix A  
Environment

**Table A1: Implementation of Mitigation Proposed in the Environmental Statement and Observations for 1YA and 3YA Evaluations**

<b>Mitigation Measure Proposed in the ES</b>	<b>1 YA Comments</b>	<b>3 YA Comments</b>
<b>Noise and vibration</b>		
Noise barriers and willow wall to be constructed.	Provision of noise mitigation has been implemented and is in good condition.	No noise measurements completed. A walkover behind the barriers suggests they are effective at reducing noise levels. Lower traffic levels than predicted reduces predicted noise impacts.
<b>Water quality, drainage and flood defence</b>		
Provision of 4 attenuation ponds to treat bridge/road runoff prior to discharge to estuary.	Only three of four ponds constructed.	Three ponds in good condition with aquatic vegetation present. The decision to alter the design to omit one pond was recorded, the environmental implications were considered and the appropriate bodies were consulted.
<b>Biodiversity and habitat</b>		
Scrub, hedgerow and woodland to be planted across the scheme to replace habitat.	Generally carried out and in good condition but some areas of failure.	Generally carried out and in good condition but some areas of failure. Future maintenance is required.
Otter ledges and mammal fencing to reduce the risk of otter road casualties.	In place as recommended. No reports of otters killed since scheme opening.	In place. Fencing may need to be inspected to ensure fit for purpose. Spot check noted one area where it does not extend below the ground surface and also a gap at the field entrance.
Coastal realignment to create saltmarsh and mudflat to create additional roosting and feeding habitat for birds.	No comment.	Mudflat area and pioneer saltmarsh habitat noted from a distance. Dominated by grass species in northern section.

Scottish Trunk Road Infrastructure Project Evaluation - Appendix A  
Environment

<b>Mitigation Measure Proposed in the ES</b>	<b>1 YA Comments</b>	<b>3 YA Comments</b>
<b>Landscape and visual amenity</b>		
Native broadleaved species hedge and trees to restore and enhance existing boundaries.	Mitigation carried out.	Locations where maintenance is required.
Balance cut and fill to minimise landscape impact.	Well graded, with effective use of landform to reflect natural surrounding area.	Well graded, with effective use of landform to reflect natural surrounding area.
<b>Pedestrians, cyclists and community effects</b>		
Provision and realignment of footpaths and cycle paths, including underpass and over-bridge.	Provision of all mitigation across the scheme maintained in good condition.	Provision of all mitigation across the scheme maintained in good condition. Well signposted.

## **Appendix B: Methodology and Data Sources**



## **B METHODOLOGY AND DATA SOURCES**

### **B.1 OVERVIEW**

The project presented in this report has been evaluated against their objectives and the following criteria, where applicable, to support the evaluation:

- Environment;
- Safety;
- Economy;
- Accessibility & Social Inclusion;
- Integration;
- Costs to Government; and
- Value for Money.

As the evaluation focuses on impacts relating to the project's objectives, evaluations against all of the above criteria may not be undertaken for all projects. The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times, as presented in the following section.

### **B.2 NETWORK TRAFFIC INDICATORS**

#### ***Traffic Volumes***

##### *Comparison Between Pre and Post Opening Traffic Flows*

A comparison of traffic flows pre and post opening has been undertaken to provide an indication of the impact that the project has had on traffic volumes. The amount of traffic data presented is dependent upon the complexity of the project. The comparison can also serve as a proxy for the effect that the project has had on noise and air quality.

##### *Comparison Between Predicted and Actual Traffic Flows*

A comparison of predicted and actual opening year traffic flows has been undertaken to confirm the accuracy of predictions during the project's preparation. The comparison can also serve as a proxy for whether the predicted benefits of the project are likely to be realised.

Depending on the nature of the traffic modelling undertaken to assess the project, the predicted traffic flow is either derived by:

- Factoring the base year or the predicted opening year, design network flows to the actual opening year using National Road Traffic Forecast (NRTF) growth factors; or
- Extrapolating from, or interpolating between, the modelled assessment year, design network flows.

The difference between the actual traffic flow and the predictions has been calculated and expressed as a percentage of the actual flow. A threshold of +/-20% is generally accepted by Transport Scotland as being a reasonable range for future year forecast traffic flow comparisons.

The amount of traffic data presented is dependent upon the complexity of the project. The comparison can also serve as a proxy for the likely impact of the project on noise and air quality.

#### Data Sources

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Predicted Traffic Flows	Obtained/derived from the traffic/economic modelling undertaken to support the pre-tender economic assessment.
Actual Traffic Flows	Obtained from automatic traffic counters in the vicinity of the project/study area.
Stakeholder Feedback	Obtained from SEStran, Clackmannanshire Council, Police Scotland, Kincardine Community Council and BEAR Scotland.

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#### ***Overtaking Opportunities***

##### *Post Opening Overtaking Opportunities*

Commentary on overtaking opportunities is provided for projects that have specific objectives relating to the improvement of overtaking levels. In this instance, there are no scheme objectives related to overtaking levels and, therefore, this aspect has not been assessed. A general observation has been included in the evaluation, based on carriageway standard and engineering judgement.

Anecdotal, qualitative evidence from stakeholders has also been gathered, where available.

Data Sources

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Post Overtaking Conditions	Opening	Judged from carriageway standard and engineering consideration.
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***Travel Times***

*Comparison Between Pre and Post Opening Travel Times*

A comparison between pre and post opening travel times has been carried out where travel time information is readily available. Where such information is not available, changes will be judged based on other projects of a similar nature for which an evaluation has been undertaken. In this instance, no specific travel time data is available and a general observation has been included in the evaluation, based on engineering judgement and stakeholder feedback.

*Comparison Between Predicted and Actual Travel Times*

A comparison between predicted and actual opening travel times has been carried out where predicted and post opening travel time information is readily available. In this instance, no specific travel time data is available.

Data Sources

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Pre Opening Travel Times	Confirmed through pre opening survey information collected to support the project's economic assessment.
Post Opening Travel Times	Confirmed through post opening survey information.
Predicted Travel Times	Obtained from the pre-tender economic assessment undertaken during the project's preparation.
Stakeholder Feedback	Obtained from SEStran, Clackmannanshire Council, Fife Council, Police Scotland, Kincardine Community Council and BEAR Scotland.

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### **B.3 ENVIRONMENTAL**

#### ***Mitigation Measures***

A review of the environmental mitigation measures implemented during construction has been undertaken to establish whether or not the measures proposed during the project's preparation have been introduced and to provide comment on their success. The mitigation measures implemented were confirmed through site visits.

#### Data Sources

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Proposed Mitigation Measures	Presented in the Environmental Statement produced during the project's preparation.
Implemented Mitigation Measures	Confirmed through site visit.

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#### ***Noise and Air Quality***

A comparison of traffic flows pre and post opening has been used as a proxy for the potential impact of the project on noise and air quality.

### **B.4 SAFETY**

#### ***Accidents***

##### *Comparison Between Pre and Post Opening Personal Injury Accident Numbers*

A comparison of the personal injury accident numbers pre and post opening has been undertaken to provide an indication of whether the project is operating safely.

The number of personal injury accidents for the three years within the vicinity of the project prior to opening has been compared with the observed number of personal injury accidents for the project in its first three years of operation.

It is important to realise that road infrastructure projects normally take a minimum of five to seven years to plan prior to the commencement of construction. Many proposed road projects are derived from safety concerns, such as fatal and serious accidents, and often these are treated in terms of Accident Investigation and Prevention work prior to planning the permanent solution. The comparison between three-year pre and post opening accidents, therefore, only demonstrates the minimum road safety improvement derived from the project.

Where the influence of a trunk road improvement project has a significant impact on the local road network, it may be appropriate to extend the scope of the accident analysis.

#### *Road Safety Audits*

Road Safety Audit (RSA) reports have been reviewed, where available, to confirm whether there is any evidence that the project is not operating safely and where any recommendations have been made for ameliorative measures, if appropriate.

#### Data Sources

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Personal Injury Accident Numbers	Obtained from the STATS19 data collection system.
Safety Issues	Detailed within RSA reports produced following audits carried out three years after project opening.
Stakeholder Feedback	Obtained from Clackmannanshire Council, Fife Council, Police Scotland and BEAR Scotland.

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## **B.5 ECONOMY**

### *Transport Economic Efficiency*

A comparison between predicted and actual traffic flows and/or travel times has been undertaken as a proxy for whether the predicted benefits of the project are likely to be realised.

A comparison which returns a positive traffic flow difference in an uncongested situation indicates that the economic benefits of the project may have been over predicted as fewer vehicles will actually accrue journey time savings than predicted. Similarly, the economic benefits of a project may also be over predicted where actual travel times are greater (i.e. speeds lower) than predicted.

Conversely, where the comparison returns a negative traffic flow difference or actual travel times are less (i.e. speeds higher) than predicted, the economic benefits of the project may have been under predicted.

Commentary on the impact of the project on local economic development has been provided where any anecdotal feedback is available.

Data Sources

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Predicted Traffic Flows      Obtained/derived from the traffic/economic modelling undertaken to support the pre-tender economic assessment.

Actual Traffic Flows      Obtained from automatic traffic counters in the vicinity of the project/study area.

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**B.6 INTEGRATION**

Commentary on Transport Integration and Policy Integration is provided for projects that have specific objectives relating to the Integration criterion.

Data Sources

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Public Transport Services      Obtained/derived from public transport services serving area.

Development      Obtained from relevant Local Development Plans and development proposals within study area.

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**B.7 ACCESSIBILITY & SOCIAL INCLUSION**

Commentary on Community Accessibility has been provided for projects that have specific objectives relating to the Accessibility & Social Inclusion criterion, supported by anecdotal evidence where available.

Data Sources

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Stakeholder Feedback      Obtained from SEStran, Police Scotland, Kincardine Community Council and BEAR Scotland.

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**B.8 COSTS TO GOVERNMENT**

***Investment Costs***

*Comparison Between Predicted and Out-turn Costs*

A comparison between predicted and out-turn costs has been undertaken to confirm the accuracy of predictions during the pre-tender stage and support the evaluation of value for money.

The project cost predicted during the pre-tender stage has been used in the evaluation as it is at this stage that the decision is taken on whether or not to proceed with the project.

One of the features of the progressive analysis of projects is that the economic assessment is undertaken at each stage based on the return on future investment. This means that project costs incurred prior to the pre-tender economic assessment, which are already spent and cannot be recovered (whether or not the project goes ahead) are excluded from the overall project costs input to the economic assessment. As such, only out-turn costs incurred after the pre-tender economic assessment have been included in the comparison.

Adjustments for Retail Price Indices and discount rates to both the predicted and out-turn costs have been made, taking expenditure by year into account, to convert the figures to a common 'present value year' for prices and values – either 1998 or 2002 depending on the 'present value year' used in the pre-tender economic assessment.

#### Data Sources

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Predicted Project Costs	Obtained from the pre-tender economic assessment undertaken during the project's preparation.
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Out-turn Costs	Obtained from out-turn cost records.
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## **B.9 VALUE FOR MONEY**

### ***Initial Indications***

Based on the evaluation of economic benefits and project costs outlined in sections 3.6, 3.9 and 3.10, respectively, a professional view has been made, in terms of the potential impact on the project's value for money has been made.

The value for money of a project is considered to be greater than predicted where the economic benefits have been under predicted and the project costs over predicted. Conversely, the value for money of a project is considered to be lower than predicted where the economic benefits have been over predicted and the project costs under predicted.

Where both the economic benefits and project cost have been under predicted or over predicted, a judgement has been made with regards to the likely overall impact on value for money.

#### Data Sources

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Predicted NPV and BCR	Obtained from the pre-tender economic assessment undertaken during the project's preparation.
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## **B.10 ACHIEVEMENT OF OBJECTIVES**

The evaluation includes an indication of how well the project has met its objectives. Where specific indicators to measure the project's performance against its objectives have not been developed, an indication of how well the project achieved its objectives is based on the pre-opening data available, supplemented by post opening data collected as part of the evaluation.

### Data Sources

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Objectives	Confirmed from reported Environmental Statements or Route Action Plan, where applicable.
Stakeholder Feedback	Obtained from SEStran, Police Scotland, and BEAR Scotland

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