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TRANSPORT SCOTLAND
SCOTTISH TRUNK ROAD INFRASTRUCTURE PROJECT EVALUATION

Evaluation Report for Trunk Road Projects
Opened between April 07 and March 09

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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
CL	Climbing Lane
DAL	Differential Acceleration Lane
DMRB	Design Manual for Roads and Bridges
HGV	Heavy Goods Vehicle
NPV	Net Present Value
NRTF	National Road Traffic Forecasts
RSA	Road Safety Audit
S2	Single 2-Lane Carriageway
STAG	Scottish Transport Appraisal Guidance
VPD	Vehicles Per Day
WS2	Wide Single 2-Lane Carriageway
WS2+1	Wide Single 2+1 Carriageway

INTRODUCTION

1 INTRODUCTION

1.1 Background to Project Evaluation

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.

1.2 Projects Reported

The *Evaluation Report for Trunk Road Projects Opened between April 07 and March 09* presents the evaluations undertaken for projects costing over £5m that were completed and opened to traffic in the 2007/08 and 2008/09 financial years.

The projects evaluated in this report are listed in Table 1.1 and their locations are shown in Figure 1.1.

Table 1.1: Projects Opened Between April 07 and March 09

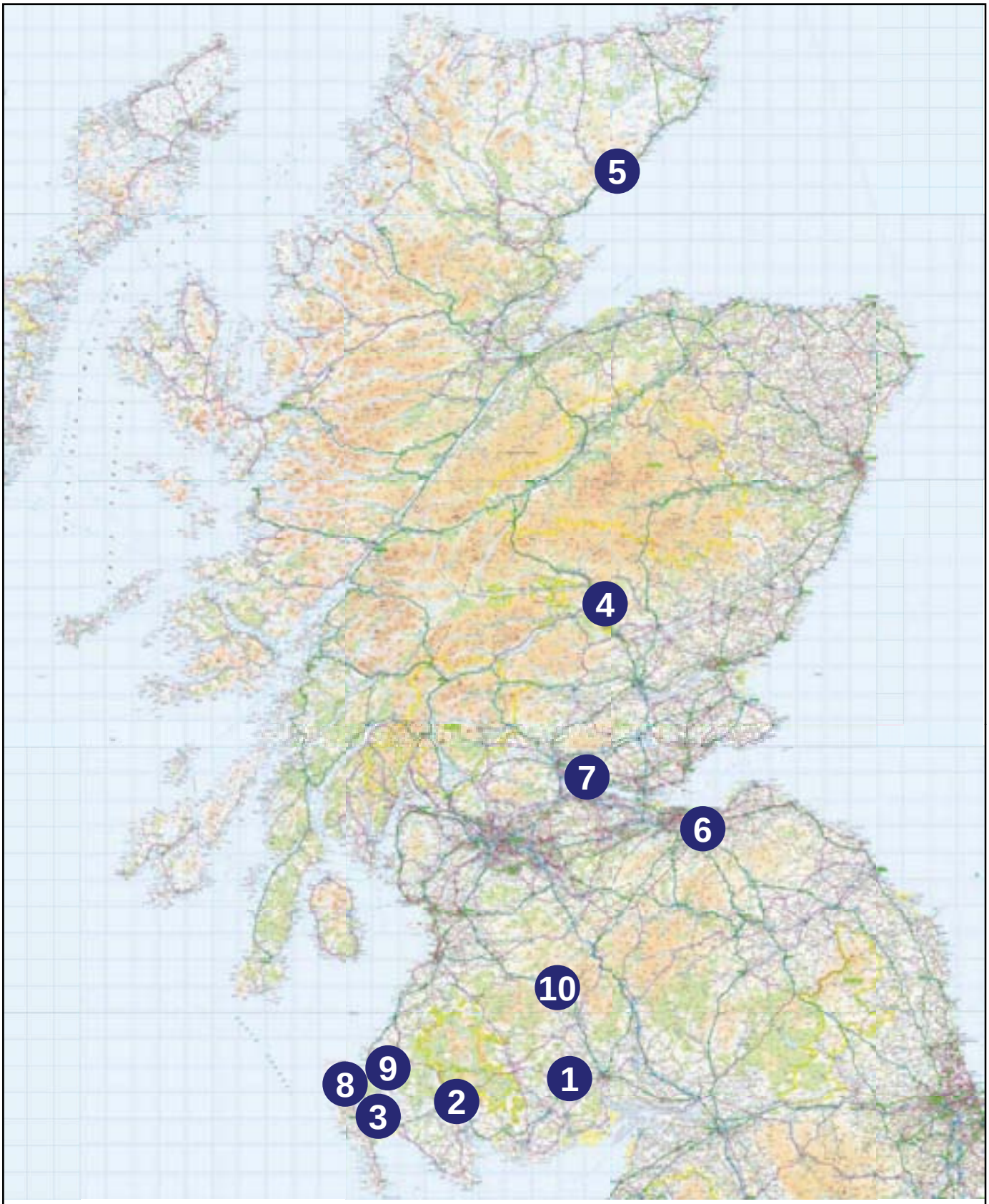
Route	Project Name	Standard	Length (km)	Open to Traffic
A75(T)	Barfil to Bettyknowes	WS2+1	1.4	April 08
A75(T)	Newton Stewart	DAL	0.4	April 08
A75(T)	Planting End to Drumflower	WS2+1	1.0	April 08
A9(T)	Ballinluig Junction Improvement	Junction Improvement		May 08
A9(T)	Helmsdale Phase 2	S2 & CL	2.4	August 08
A68(T)	Dalkeith Bypass	S2 & CL	5.4	September 08
A876(T)	Clackmannanshire Bridge	WS2+1	4.0	November 08
A77(T)	Haggstone	CL	1.0	December 08
A77(T)	Glen App	WS2	1.0	December 08
A76(T)	Glenairlie	WS2+1	2.5	March 09

Key:

WS2	Wide Single Carriageway
WS2+1	Wide Single 2+1 Carriageway
S2	Single 2 Lane Carriageway
DAL	Differential Acceleration Lane
CL	Climbing Lane

Chapter 2 of this report presents the methodology and data sources used in the evaluations of projects that opened between April 07 and March 09. Chapter 3 provides a summary of the evaluations and the key findings are presented in Chapter 4.

Full details of the evaluations for the projects are contained in Appendix A.



1. A75(T) Barfil to Bettyknowes
2. A75(T) Newton Stewart
3. A75(T) Planting End to Drumflower
4. A9(T) Ballinluig Junction Improvement
5. A9(T) Helsmdale Phase 2
6. A68(T) Dalkeith Bypass
7. A876(T) Clackmananshire Bridge
8. A77(T) Haggstone
9. A77(T) Glen App
10. A76(T) Glenairlie

Locations of Projects Evaluated
Figure 1.1

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METHODOLOGY AND DATA SOURCES

2 METHODOLOGY AND DATA SOURCES

2.1 Overview

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

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

As the evaluations focus on impacts relating to the project's objectives, evaluations against all of the above criteria may not be undertaken for all projects.

The evaluations are supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times, as presented in the following section.

Road infrastructure projects normally take a minimum of 5 to 7 years to plan prior to the commencement of construction and 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.

2.2 Network Traffic Indicators

Traffic Volumes

The amount of traffic data presented is dependent upon the complexity of the project.

Comparison Between Pre and Post Opening Traffic Flows

A comparison of traffic flows pre and post opening has been undertaken for all projects to provide an indication of the impact that the project has had on traffic volumes. 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 for all projects to confirm the accuracy of predictions during the project's preparation. The comparison can also serve as a proxy for the whether the predicted impacts 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% was established by the National Audit Office and is accepted as being a reasonable range for future year forecast traffic flow comparisons.

Data Sources	
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 study area.

Carriageway Standard Assessment

A carriageway standard assessment has been carried out for all projects (excluding junction improvements) using DMRB, Volume 5, TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project's design, to determine the appropriateness of the carriageway standard constructed based on the opening year flow.

Overtaking Opportunities

Comparison Between Pre and Post Opening Overtaking Opportunities

A comparison between pre and post overtaking opportunities has been carried out for the majority of projects that have a specific objective relating to overtaking. The percentage of vehicles travelling through the survey site that carried out an overtaking manoeuvre pre and post opening has been compared to provide an indication of the effect that the project has had on overtaking. Commentary is provided confirming the project's effect on vehicle platoons.

The results of the overtaking surveys undertaken are considered to provide a reasonable indication of the overall effects of providing overtaking opportunities for other projects in the same geographic region. Where pre opening information is not available, the level of post opening overtaking has been presented along with commentary confirming the project's effect on vehicle platoons.

Data Sources	
Pre Opening Overtaking Conditions	Confirmed through pre opening survey information collected to support the project's economic assessment.
Post Opening Overtaking Conditions	Confirmed through post opening survey information.

Travel Times

Comparison Between Pre and Post Opening Travel Times

A comparison between pre and post opening travel times has been carried out for the majority of projects that have a specific objective relating to travel times.

For those projects where overtaking surveys were undertaken, the mean vehicle speeds over the extents of the survey site has been used as a proxy for changes in travel times. The results of the overtaking surveys undertaken are considered to provide a reasonable indication of the overall change in travel times for other projects providing increased overtaking opportunities in the same geographic region. Where pre opening information is not available, commentary is provided on the likely effect of the project on travel times.

Comparison Between Predicted and Actual Travel Times

A comparison between predicted and actual opening travel times has been carried out for projects where predicted and post opening travel time information is readily available.

Data Sources	
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.

2.3 Environmental

Mitigation Measures

A review of the environmental mitigation measures implemented during construction has been undertaken for all projects 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	
Proposed Mitigation Measures	Presented in the Environmental Statement produced during the project's preparation.
Implemented Mitigation Measures	Confirmed through site visit.

Noise and Air Quality

A review of noise and air quality has been undertaken for projects that have a specific objective relating to the impact of the project on noise and air quality.

A comparison between pre and post opening traffic flows within the study area and/or a comparison between predicted and actual traffic flows has been undertaken to provide an indication of the effect of the project on noise and air quality, supported by commentary on available noise survey information.

Data Sources	
Noise Levels	Confirmed through noise survey information collected as part of the project's preparation.

2.4 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 for all projects to provide and an early indication of whether the project is operating safely.

The number of personal injury accidents for the 3 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 year of operation. The comparison shall be updated to include the observed number of accidents in the three year period after opening when the accident data is available.

It is important to realise that road infrastructure projects normally take a minimum of 5 to 7 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 3 year pre and post opening accidents, therefore, only demonstrate 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.

In the case of bypass projects, it is necessary to collect details of any accidents on the bypassed sections of the old roads after projects open, as well as on the new projects themselves, in order to obtain a true comparison of accidents pre and post project opening.

Road Safety Audits

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

Data Sources	
Personal Injury Accident Numbers	Obtained from the STATS19 data collection system.
Safety Issues	Detailed within RSA reports produced following audits carried out 1 year after project opening,

2.5 Economy

Transport Economic Efficiency

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

A comparison where the actual observed flow is lower than the predicted flow 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 actual observed flow is higher than the predicted flow or actual travel times are less (i.e. speeds higher) than predicted, the economic benefits of the project may have been under predicted.

A project with predicted flows in the range +/-20% of the actual flows indicates that the economic benefits are within acceptable limits.

2.6 Integration

Commentary on Transport Integration, Transport & Land-use Integration and/or Policy Integration has been provided as appropriate for projects that have specific objectives relating to the Integration criterion.

Data Sources	
Bus Services	Obtained from automatic traffic counters in the study area.
Land-Use	Outlined within the Structure Plan.
Local Government Policies	Outlined within the Local Plan.

2.7 Accessibility & Social Inclusion

Commentary on Community Accessibility and Comparative Accessibility has been provided for projects that have specific objectives relating to the Accessibility & Social Inclusion criterion.

Data Sources	
Provision for Non-motorised Users	Confirmed through site visits.
Bus Services for Socially Excluded Groups	Confirmed through bus service information.
Cycling Provisions	Detailed within the Cycle Audit report produced during the project's preparation.

2.8 Costs to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

A comparison between predicted and out-turn costs has been undertaken for all projects 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. All project costs include 25% optimism bias.

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	
Predicted Project Costs	Obtained from the pre-tender economic assessment undertaken during the project's preparation.
Out-turn Costs	Obtained from out-turn cost records.

2.9 Value for Money

Initial Indications

Based on the evaluation of economic benefits and project costs outlined in sections 2.5 and 2.8 respectively, a judgement in terms of the potential impact on the projects' 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	
Predicted NPV and BCR	Obtained from the economic assessment undertaken during the project's preparation.

2.10 Achievement of Objectives

Initial Indications

The evaluation includes an indication of how the projects that opened between April 07 and March 09 are progressing towards achieving their objectives. Where specific indicators to measure the project's performance against its objectives have not been developed, an indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

EVALUATION SUMMARY

3 EVALUATION SUMMARY

The projects that opened between April 07 and March 09 consist of two bypass projects, seven carriageway improvements and a junction improvement. A summary of the evaluations is provided below.

Full details of the evaluations for the projects are provided in Appendix A.

3.1 Network Traffic

Traffic Volumes

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes of the bypass projects are shown in Table 3.1a.

Table 3.1a: Bypass Projects – ATC Data

Project	AADT by Year				
	2007	2008	2009	2010	2011
A68(T) Dalkeith Bypass					
Bypass (North)	-	Year of Opening	10,492	10,580	11,615
Bypass (South)	-		8,675	8,935	10,030
Bypassed Route (within Dalkeith)	15,589	Year of Opening	8,461	8,582	9,416
A876(T) Clackmannanshire Bridge					
Bridge	-	Year of Opening	14,396	14,272	14,878
Bypassed A977 (within Kincardine)	14,586	Year of Opening	3,240	4,134	3,346

The comparison between pre and post opening traffic flows for the bypass projects indicates that whilst the total volume of traffic in the study area has increased following the opening of the projects, the bypassed routes have experienced a significant decrease in traffic flow as a result of traffic transferring to the bypasses.

The AADT flows pre and post project opening on the main route of the carriageway and junction improvement projects are shown in Table 3.1b.

Table 3.1b: Carriageway and Junction Improvement Projects – ATC Data

Project	AADT by Year				
	2007	2008	2009	2010	2011
A75(T) Barfil to Bettyknowes	9,072	Year of Opening	9,034	8,681	8,650
A75(T) Newton Stewart	4,536	Year of Opening	4,438	4,363	4,307
A75(T) Planting End to Drumflower	6,904	Year of Opening	6,708	6,837	6,826
A9(T) Ballinluig Junction Imp.	13,849	Year of Opening	13,705	13,463	13,311
A9(T) Helmsdale Phase 2	2,068	Year of Opening	2,084	1,936	-
A77(T) Haggstone	3,164	Year of Opening	3,079	3,113	3,066
A77(T) Glen App					
A76(T) Glenairlie	3,416	3,415	Year of Opening	3,397	3,118

The comparison between pre and post opening traffic flows for the carriageway and junction improvement projects indicates that all experienced a decrease in traffic flows over the period 2007 to 2010/11.

Given the nature of these projects, changes in post opening traffic levels are not likely to be as a consequence of the improvements and, in part, are likely to be as a result of reductions in traffic volumes across the wider trunk road network in recent years (the reduction between 2009 and 2010 was around 2%) due to the economic downturn.

Comparison Between Predicted and Actual Traffic Flows

A summary of the actual and predicted traffic data on key routes of the bypass projects is shown in Table 3.2a.

Table 3.2a: Bypass Projects – Traffic Analysis Summary

Project	Actual AADT*	Model Growth Scenario	Predicted AADT	(Predicted – Actual) / Actual
A68(T) Dalkeith Bypass				
Bypass (North)	10,492	Alternative Model	10,755	2.5%
Bypass (South)	8,675		8,527	-1.7%
A876(T) Clackmannanshire Bridge				
Bridge	14,396	60/40	20,833	44.7%
Bypassed A977 (north of Kincardine)	4,562		1,067	-76.6%

* based on first full year of ATC data available after project opening

The comparison between predicted and actual AADT flows for the bypass projects indicates that the actual flows on key routes within the Dalkeith Bypass study area are generally in line with predictions.

There are significant variations between the predicted and actual AADT flows on key routes within the Clackmannanshire Bridge study area, which suggests that the forecast increase in strategic trips using the bridge has not yet occurred.

A summary of the actual and predicted traffic data on the main route of the carriageway and junction improvement projects is shown in Table 3.2b.

Table 3.2b: Carriageway and Junction Improvement Projects – Traffic Analysis Summary

Project	Actual AADT*	Model Growth Scenario	Predicted AADT	(Predicted – Actual) / Actual
A75(T) Barfil to Bettyknowes	9,034	60/40	10,747	19.0%
A75(T) Newton Stewart	4,438	60/40	5,538	24.8%
A75(T) Planting End to Drumflower	6,708	60/40	7,490	11.7%
A9(T) Ballinluig Junction Imp.	13,705	Central	12,709	-7.3%
A9(T) Helmsdale Phase 2	2,084	Average of Low & High	1,941	-6.9%
A77(T) Haggstone	3,079	60/40	3,523	14.4%
A77(T) Glen App				
A76(T) Glenairlie	3,397	60/40	3,438	1.2%

* based on first full year of ATC data available after project opening

The comparison between predicted and actual AADT flows for the carriageway and junction improvement projects indicates that the majority of predictions are within the National Audit Office's threshold of +/-20%, which suggests that the modelling techniques used for appraising these types of projects are generally appropriate.

The exception to this is the A75(T) Newton Stewart project, where it can be seen that the predicted flow is around 25% higher than the actual flow.

It is considered that the variations between predicted and actual flows on the A75(T) and A77(T) routes have arisen from a combination of the general fall in traffic volumes in recent years across the wider trunk road network due to the economic downturn and changes in Sea Ferry operations. An overall reduction in the total number of cars using the ferry services may also have contributed to observed flows being lower than forecast (*Ref. Scottish Transport Statistics No 29: 2010 Edition*).

Carriageway Standard Assessment

In order to satisfy the projects' objectives, a higher standard of carriageway has been constructed (generally as part of a series of improvements along the route), providing increased overtaking opportunities to help reduce platooning, reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the projects' design, is shown in Table 3.3 based on the opening (or nearest to opening) year flow.

Table 3.3: All Projects – Assessment of Carriageway Standard (TA 46/97)

Project	Actual AADT*	TA 46/97 Standard	Constructed Standard
A75(T) Barfil to Bettyknowes	9,034	Wide Single 2-Lane	Wide Single 2+1
A75(T) Newton Stewart	4,438	Single 2-Lane	Differential Acceleration Lane
A75(T) Planting End to Drumflower	6,708	Wide Single 2-Lane	Wide Single 2+1
A9(T) Ballinluig Junction Imp.	Not appropriate		
A9(T) Helmsdale Phase 2	2,084	Single 2-Lane	Single 2-lane & Climbing Lane
A68(T) Dalkeith Bypass	8,675 to 10,492	Single 2-Lane	Single 2-Lane & Climbing Lane

Project	Actual AADT*	TA 46/97 Standard	Constructed Standard
A876(T) Clackmannanshire Bridge	14,396	Wide Single 2-Lane	Wide Single 2+1
A77(T) Haggstone	3,079	Single 2-Lane	Climbing Lane
A77(T) Glen App	3,079	Single 2-Lane	Wide Single 2-Lane
A76(T) Glenairlie	3,397	Single 2-Lane	Wide Single 2+1

* based on first full year of ATC data available after project opening

There are no specific flow ranges for the justification of a wide single 2+1, differential acceleration lane or climbing lane given in TA 46/97 and, given the projects' objectives and nature of traffic on a number of the routes, the constructed carriageway standards are considered appropriate.

Overtaking Opportunities

Six projects in this report have objectives relating to Overtaking – the A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart, A75(T) Planting End to Drumflower, A77(T) Haggstone, A77(T) Glen App and A76(T) Glenairlie projects.

Comparison Between Pre and Post Opening Overtaking Opportunities

For the three projects where pre opening overtaking survey information was available, a summary of the level of overtaking pre and post opening is shown in Table 3.4.

Table 3.4: All Projects – Level of Overtaking Summary

Project	Dir'n of Dedicated O'taking	Pre Opening				Post Opening			
		AM Survey Period		PM Survey Period		AM Survey Period		PM Survey Period	
		N'bd	S'bd	N'bd	S'bd	N'bd	S'bd	N'bd	S'bd
A77(T) Haggstone	N'bd	18%	10%	21%	12%	44%	11%	45%	8%
A77(T) Glen App	N'bd & S'bd	20%	14%	20%	19%	26%	20%	17%	21%
A76(T) Glenairlie	N'bd & S'bd	8%	10%	14%	22%	28%	31%	33%	28%

The comparison indicates that the A77(T) Haggstone, A77(T) Glen App and A76(T) Glenairlie projects have increased the number of overtaking manoeuvres in the direction of the dedicated overtaking opportunity, which helps disperse vehicle platoons.

Post Opening Overtaking Opportunities

Post opening overtaking survey information was also collected for two projects where no pre opening data was available – the A75(T) Barfil to Bettyknowes and A75(T) Planting End to Drumflower projects. The post opening information for these projects suggests that platoons were dispersed in the direction of the dedicated overtaking opportunity.

The impact of the A75(T) Newton Stewart project on overtaking has been based on the evaluation of A75(T) Barfil to Bettyknowes and A75(T) Planting End to Drumflower projects implemented as part of a wider Route Action Plan.

The provision of the Differential Acceleration Lane in the westbound direction of travel is judged to have a positive impact on the number of overtaking manoeuvres in this direction. The impact in the eastbound direction, over which overtaking is restricted, is unlikely to be significant given that vehicles are likely to be slowing on approach to the A75(T)/A714 roundabout at the eastern extent of the project.

Travel Times

Eight projects in this report have objectives relating to travel times – the A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart, A75(T) Planting End to Drumflower, A9 Ballinluig Junction, A68 Dalkeith Bypass, A77(T) Haggstone, A77(T) Glen App and A76(T) Glenairlie projects.

Comparison Between Pre and Post Opening Travel Times

Pre and post opening travel time information was available for four projects.

A comparison of pre and post opening travel times on key routes within the A68(T) Dalkeith Bypass project study area indicates time savings of around 2 to 4 minutes for vehicles using the bypass, whilst travel times on the bypassed route through Dalkeith remain largely unchanged.

Mean vehicle speeds for the A77(T) Haggstone, A77(T) Glen App and A76(T) Glenairlie projects have been estimated from the information collected as part of the pre and post opening overtaking surveys as a proxy for travel times. A comparison of the survey data indicates that the mean vehicle speeds in both directions of travel over the extents of the A77(T) project survey sites remain largely unchanged and mean speeds over the extents of the A76(T) project survey site have increased.

Based on the evaluation of other projects providing dedicated overtaking opportunities in the same geographic region, it is likely that the A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects will have improved journey times in the direction of the dedicated overtaking opportunity.

Whilst post opening travel times have not been measured for the A9(T) Ballinluig junction, it can be expected that journey times will have reduced as a result of the grade separated junction on the A9(T) and the removal of the temporary 50mph speed limit within the vicinity of the junction.

Comparison Between Predicted and Actual Travel Times

A comparison between predicted and actual travel times has been undertaken for the A68(T) Dalkeith Bypass and indicates that the predicted AM peak northbound journey times are consistent with the actual journey times on the A68(T) Dalkeith Bypass and on the bypassed route through Dalkeith.

Predicted AM peak journey times are significantly longer than actual times on the A720(T) Edinburgh City Bypass and this may be due to improvements implemented at Sheriffhall Roundabout in 2008 that were not considered as part of the original modelling of the project.

3.2 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures contained in the environmental reports, produced at the time the projects were originally assessed, have been examined and compared against the actual measures put in place.

The review of mitigation measures confirmed that the majority of measures committed within the Environmental Statements were in place and were providing appropriate levels of mitigation.

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 surrounding.

Areas that require maintenance were identified as part of the environmental mitigation measures review undertaken for A68(T) Dalkeith project.

Noise and Air Quality

An evaluation of noise and air quality has been undertaken for those projects in which a significant impact on noise and air quality was predicted during the appraisal process, i.e. the A68(T) Dalkeith Bypass and A876(T) Clackmannanshire Bridge projects.

The removal of traffic and congestion from within Dalkeith and Kincardine will have reduced local noise levels and improved air quality in the towns.

Noise surveys were undertaken for the A68(T) Dalkeith Bypass project between January and March 2009 to assess the level of noise impact on properties within the vicinity of the bypass and to establish whether any noise insulation measures were required. The surveys indicated that of the twenty-one properties identified as potentially being subject to changes in noise levels as a result of the project:

- fourteen had experienced a reduction in ambient noise levels;
- five had experienced a slight to moderate increase in ambient noise levels, although the increase in noise was within acceptable limits; and
- two had experienced a substantial increase in ambient noise levels and an acoustic barrier was provided to reduce levels to acceptable limits.

None of the properties identified satisfied the criteria where noise insulation compensation would be required.

Noise surveys were undertaken for the A876(T) Clackmannanshire Bridge project during 2003 and 2009 to confirm the impact of the project on noise levels and compare post opening levels with those predicted during the project's preparation.

Whilst the surveys indicated that noise levels for some properties were higher than predicted, it was acknowledged that the properties were experiencing a significant improvement in noise levels and that the higher than predicted levels could not be attributed to the design of the project.

It is likely that the impact on noise and air quality along the A876(T) corridor in the vicinity of the Clackmannanshire Bridge will be less than predicted due to lower flows using the bridge than forecast during the project's preparation.

3.3 Safety

Accidents

Comparison between Pre and Post Opening Personal Injury Accident Numbers

A summary of the personal injury accident data for all projects is shown in Table 3.5.

Table 3.5: All Projects – Personal Injury Accident Data Summary

Project	3 Years Before				1 Year After			
	Fatal	Serious	Slight	Total	Fatal	Serious	Slight	Total
A75(T) Barfil to Bettyknowes	0	0	1	1	0	0	0	0
A75(T) Newton Stewart	0	1	1	2	0	0	0	0
A75(T) Planting End to Drumflower	0	0	2	2	0	0	0	0
A9(T) Ballinluig Junction Imp. *	1	2	0	3	0	0	0	0
A9(T) Helmsdale Phase 2 **	0	2	3	5	0	0	1	0
A68(T) Dalkeith Bypass **	0	9	48	57	0	2	13	15
A876(T) Clackmannanshire Bridge **	2	3	11	16	0	0	2	2
A77(T) Haggstone	0	0	1	1	0	0	0	0
A77(T) Glen App	0	0	0	0	0	0	1	1
A76(T) Glenairlie	1	1	2	4	0	0	1	1

* values are totals for A9(T) & A827; ** 1 year after values include bypassed routes

For the majority of projects examined in this report, the numbers of personal injury accidents recorded in the 1 year after opening (and their severity) are lower than those recorded during the 3 years before opening.

The one exception is the A77(T) Glen App project, where one slight personal injury accident occurred in the 1 year period following project opening compared with no personal injury accidents in the 3 years before opening. A review of the personal injury accident data suggests that the accident was not attributable to the design or layout of the A77(T) Glen App project.

Road Safety Audits

Stage 4 Road Safety Audit (RSA) reports are available for the majority of projects opened between April 07 and March 09. The one exception is the A76(T) Glenairlie project, where the completion of the RSA is awaited.

The findings are summarised within the evaluations presented in Appendix A and generally indicate that the projects are operating safely.

Although concerns surrounding vehicle speeds were raised as part of the RSA for the A75(T) Planting End to Drumflower project, there is no evidence to suggest that the project is not operating safely.

3.4 Economy

Transport Economic Efficiency

The comparison between predicted and actual traffic flows and travel times, presented in section 3.1, can be considered a proxy for whether the predicted economic benefits of the projects are likely to be realised.

A qualitative evaluation of the benefits, relative to those predicted, is summarised in Table 3.6.

Table 3.6: All Projects – Qualitative Evaluation of Benefits

Project	Benefits (Relative to Predicted)	Within Acceptable Limits?
A75(T) Barfil to Bettyknowes	⇩	Yes
A75(T) Newton Stewart		No
A75(T) Planting End to Drumflower		Yes
A9(T) Ballinluig Junction Imp.	⇧	Yes
A9(T) Helmsdale Phase 2	⇧	Yes
A68(T) Dalkeith Bypass	⇧	Yes
A876(T) Clackmannanshire Bridge	⇩	No
A77(T) Haggstone	⇩	Yes
A77(T) Glen App		
A76(T) Glenairlie	⇩	Yes

⇩ actual lower than predicted (over predicted)
⇧ actual higher than predicted (under predicted)
= actual as predicted

Due to external factors that could not have readily been foreseen at the time of the assessments, such as the economic downturn, there is a tendency for predicted flows to be overestimated. Whilst this may have resulted in the over-prediction of economic benefits for seven of the projects that opened between April 07 and March 09, the comparison between predicted and actual traffic flows and travel times for the majority of projects is within acceptable limits.

3.5 Integration

Two projects in this report have objectives that relate to Integration – the A9(T) Ballinluig Junction Improvement (Policy Integration) and the A876(T) Clackmannanshire Bridge (Transport Integration, Transport & Land-use Integration and Policy Integration) projects.

Whilst the Local Plan, relevant at the time that the Ballinluig Junction Improvement project was progressed, does not contain any Local Government policies specific to project, the project supports Central Government policy through its objective of reducing fatal and serious accidents.

The Clackmannanshire Bridge project supports:

- the improvement of local and strategic bus services serving the Clackmannanshire and wider Central Scotland area.
- the integration of land use and transport planning as the bridge was built within the vicinity of brownfield sites (identified within the Clackmannanshire Council Structure Plan) to facilitate the regeneration and re-use of the sites for strategic employment.
- Local and Central Government policy through the provision of improved transport links to services and employment and wider policy in respect of social inclusion through lower and more reliable journey times.

3.6 Accessibility & Social Inclusion

Three projects in this report have objectives that relate to Accessibility & Social Inclusion – the A9(T) Ballinluig Junction Improvement, the A876(T) Clackmannanshire Bridge and the A76(T) Glenairlie projects.

Community and Comparative Accessibility

Observations from the environmental mitigation site visits indicate that the A9(T) Ballinluig Junction Improvement, the A876(T) Clackmannanshire Bridge and the A76(T) Glenairlie projects incorporate measures for both cyclists and pedestrians.

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

Examination of available data indicates that bus services, which provide access for disabled travellers, operate via the Clackmannanshire Bridge to regional healthcare facilities within the Clackmannanshire area.

Cycle Audits

The Stage 2 Cycle Audit for the A76(T) Glenairlie project notes, but does not confirm, implementation of cycle tracks in both verges and utilisation of sections of old road where possible. On site observations have confirmed that a shared cycle and pedestrian facility has been provided that utilises the redundant section of the bypassed A76.

3.7 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted costs for all projects are shown in Table 3.7.

The costs are presented in either mid 1998 prices discounted to 1998 at 3.5% or mid 2002 prices discounted to 2002 at 3.5%, depending on the 'present value year' used in the pre-tender economic assessment.

Table 3.7: All Projects – Project Cost Summary

Project	Project Cost		Difference (Out-turn – Pred)
	Out-turn	Predicted	
Mid 1998 prices discounted to 1998 at 3.5%			
A75(T) Barfil to Bettyknowes	£7,889,543	£6,889,094	£1,010,449 (15%)
A75(T) Newton Stewart			
A75(T) Planting End to Drumflower			
A9(T) Helmsdale Phase 2	£4,003,546	£4,070,280	-£66,734 (-2%)
A876(T) Clackmannanshire Bridge	£73,777,589	£77,183,890	-£3,406,301 (-5%)
A77(T) Haggstone	£11,486,943	£14,736,160	-£3,249,257 (-22%)
A77(T) Glen App			
A76(T) Glenairlie	£3,125,035	£2,812,183	£312,851 (11%)
Mid 2002 prices discounted to 2002 at 3.5%			
A9(T) Ballinluig Junction Imp.	£11,327,012	£9,245,528	£2,081,485 (23%)
A68(T) Dalkeith Bypass	£29,421,520	£26,480,007	£2,941,512 (11%)

Of the seven comparisons between predicted and actual costs presented in this report, four have an actual project cost higher than the predicted cost.

Taken collectively, the projects evaluated using a 1988 present value year have a total actual cost of £100.3m compared to a total predicted cost of £105.7, which represents a total overall over prediction of £5.4m.

For the projects evaluated using a 2002 present value year, taken collectively, these have a total actual cost of £40.7m compared to a total predicted cost of £35.7m, which represents a total overall under prediction of £5.0m.

3.8 Value for Money

A summary of the value for money for all projects is shown in Table 3.8 based on the qualitative evaluation of economic benefits and quantitative evaluation of project costs presented in sections 3.4 and 3.7 respectively.

Table 3.8: All Projects – Value for Money Summary

Project	Predicted		Actual (Relative to Predicted)		
	NPV (£m)	BCR	Benefits	Project Costs	Value for Money
A75(T) Barfil to Bettyknowes	2.42	3.9	⇩	⇧	⇩
A75(T) Newton Stewart					
A75(T) Planting End to Drumflower					
A9(T) Ballinluig Junction Imp.	9.92	1.95	⇧	⇧	⇩
A9(T) Helmsdale Phase 2	2.27	1.65	⇧	⇩	⇧
A68(T) Dalkeith Bypass	-4.42	0.88	⇧	⇧	⇧
A876(T) Clackmannanshire Bridge	41.27	1.53	⇩	⇩	⇩
A77(T) Haggstone	-9.69	0.54	⇩	⇩	=
A77(T) Glen App					
A76(T) Glenairlie	0.09	1.02	⇩	⇧	⇩

⇩ actual lower than predicted (over predicted)
⇧ actual higher than predicted (under predicted)
= actual as predicted

Based on the evaluation of economic benefits and project costs, it is likely that two projects will deliver value for money over and above that predicted at the time of assessment and that the combined value for money of two projects will be as expected.

The NPV and BCR presented in the table above for the A68(T) Dalkeith Bypass project relates to the alternate model (that better reflects the improvements that were implemented within Dalkeith town centre), which may be greater than predicted at the time of assessment. This will not have affected the decision to proceed with the project as the main model developed during the preparation of the project (which reflected current thinking at the time in regards to improvements within Dalkeith) would have continued to provide value for money.

Whilst the remaining four evaluations indicate that the value for money is unlikely to be as great as predicted, it is judged that the projects will continue to provide a benefit to road users.

3.9 Achievement of Objectives

Initial Indications

Table 3.9 provides an indication of how the projects that opened between April 07 and March 09 are progressing towards achieving their objectives.

Table 3.9: All Projects – Progress Towards Achieving Objectives

Project	Progress
A75(T) Barfil to Bettyknowes	• **Four** objectives were set, which cover the project's operational performance and the Safety criterion. • Progress towards all **four** objectives has been positive. • The provision of the wide single 2+1 lane carriageway is judged to have a positive impact on the number of overtaking manoeuvres in the westbound direction and, as a result, is likely to reduce improve journey time reliability in this direction.
A75(T) Newton Stewart	• **Four** objectives were set, which cover the project's operational performance and the Safety criterion. • Progress towards all **four** objectives has been positive. • The provision of the differential acceleration lane can be expected to help disperse platoons in the westbound direction and, as a result, is likely to reduce improve journey times in this direction.
A75(T) Planting End to Drumflower	• **Four** objectives were set, which cover the project's operational performance and the Safety criterion. • Progress towards all **four** objectives has been positive. • The provision of the wide single 2+1 lane carriageway is judged to have a positive impact on the number of overtaking manoeuvres in the eastbound direction and, as a result, is likely to reduce improve journey time reliability in this direction.
A9(T) Ballinluig Junction Imp.	• **Nine** objectives were set, which cover the project's operational performance and the following criteria: Environment, Safety, Integration, Accessibility & Social Inclusion and Value for Money. • Progress towards all **nine** objectives has been positive.
A9(T) Helmsdale Phase 2	• **Six** objectives were set, which cover the project's operational performance and the following criteria: Environment and Safety. • Progress towards all **six** objectives has been positive.
A68(T) Dalkeith Bypass	• **Six** objectives were set, which cover the project's operational performance and the following criteria: Environment, Safety, Economy and Value for Money. • Progress towards **five** of the objectives has been positive. • Progress towards the objective relating to value for money cannot be confirmed.

Project	Progress
A876(T) Clackmannanshire Bridge	• **Ten** objectives were set, which cover the following criteria: Environment, Safety, Economy, Integration, Accessibility & Social Inclusion and Value for Money. • Progress towards **seven** of the objectives has been positive. • Progress towards the objective relating to value for money cannot be confirmed. • It cannot be confirmed that the improvement in transport links to employment, education and health for vulnerable groups to promote social inclusion has been maximised. • The objective relating to protecting and improving the environment may not be achieved.
A77(T) Haggstone	• **Five** objectives were set, which cover the project's operational performance and the following criteria: Environment, Safety and Value for Money. • Progress towards **four** of the objectives has been positive. • The objective relating to value for money cannot be confirmed.
A77(T) Glen App	• **Five** objectives were set, which cover the project's operational performance and the following criteria: Environment, Safety and Value for Money. • Progress towards **four** of the objectives has been positive. • The objective relating to value for money cannot be confirmed.
A76(T) Glenairlie	• **Six** objectives were set, which cover the project's operational performance and the following criteria: Environment, Accessibility & Social Inclusion and Value for Money. • Progress towards **five** of the objectives has been positive. • The objective relating to value for money cannot be confirmed.

Although progress could not be confirmed for six objectives (five of which relate to Value for Money), the initial indication is that the majority of objectives may be achieved.

Overall, it can be concluded that the projects that opened between April 07 and March 09 are generally progressing towards achieving their objectives.

4 KEY FINDINGS

4.1 Introduction

This chapter provides a summary of the key findings from the evaluations undertaken for the ten trunk road infrastructure projects that opened between April 07 and March 09, highlighting any trends and stand-out issues.

4.2 Network Traffic

- The evaluations undertaken indicate that the projects are generally operating as expected.
- The standards of carriageway constructed are appropriate.
- The available survey information for projects that increase overtaking opportunities on the A75(T), A76(T) and A77(T) routes indicates that, in the direction of the dedicated overtaking opportunity, these projects have facilitated safe overtaking opportunities, the dispersal of vehicles in platoon and generally improve travel times. In the direction of restricted overtaking, the impact on platooning and travel times can be negative.
- Predicted traffic flows for bypass projects, which are commonly estimated using wide area traffic models, can vary significantly from actual flow levels due to the complex interaction between transport and land use.
- Whilst there appears to be a general bias towards the over prediction of traffic flows for carriageway improvement projects that opened between April 07 and March 09 (due to the economic downturn, changes in Sea Ferry operations, etc.), predicted flows are (with a few exceptions) within accepted limits, which suggests that the forecasting techniques used for appraising these types of projects are generally appropriate.

4.3 Environment

- A review of the proposed mitigation measures contained in the environmental reports for each of the projects opened between April 07 and March 09 confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.
- Whilst some mitigation measures were not evident on site, these may be due to variations and/or separate arrangements with the relevant landowners. Transport Scotland is looking at ways to improve the environmental review process to provide a better record of the mitigation measures that have been implemented, including details of any agreed variations.
- Areas that require maintenance were identified as part of the environmental mitigation measures review undertaken for A68(T) Dalkeith project.

4.4 Safety

- Initial indications from the available personal injury accident data are that the projects opened between April 07 and March 09 are contributing towards an overall improvement in road safety.
- Stage 4 RSA reports for projects that opened between April 07 and March 09 have (with one exception) been available and provide evidence supporting this apparent improvement in road safety.
- One slight accident occurred on the A77(T) Glen App project during the 1 year period following project opening compared with no personal injury accidents in the 3 years before opening, although a review of the personal injury accident data suggests that the accident was not attributable to the design or layout of the project.
- The RSA for the A75(T) Planting End to Drumflower project raises concerns over vehicle speeds, although there is no evidence to suggest that the project is not operating safely.

4.5 Economy

- As a result of the general bias towards the over prediction of traffic flows for projects that opened between April 07 and March 09, the economic benefits of a number of projects may have been overestimated.
- The over prediction of economic benefits due to external factors that could not readily have been seen at the time of the assessments supports the need for appropriate sensitivity testing to understand the range of possible economic outcomes.

4.6 Integration

- The projects evaluated against the Integration criteria generally support Local and Central Government policy.

4.7 Accessibility & Social Inclusion

- A review of the proposed measures for cyclists and pedestrians indicates that the measures are generally being delivered.
- The projects (particularly bypass projects) provide lower journey times for public transport.
- The bypass projects provide an alternative to the bypassed routes, which has resulted in improvements to pedestrian accessibility in town centres.

4.8 Cost to Government

- There appears to be a slight bias towards the under prediction of project costs for projects that opened between April 07 and March 09.
- Whilst the overall total cost of projects evaluated using a 1998 present value year were under predicted, the overall total cost of projects evaluated using a 2002 present value year were overestimated by a similar amount.

4.9 Value for Money

- Based on the evaluation of economic benefits and project costs, the value for money associated with a number of projects that opened between April 07 and March 09 are unlikely to be as great as predicted, although it is judged that they will continue to provide a benefit to road users.

4.10 Achievement of Objectives

- The majority of objectives for projects that opened between April 07 and March 09 have not been expressed with SMART (Specific, Measurable, Attainable, Relevant and Timed) principles in mind having been set prior to the publication of the Scottish Transport Appraisal Guidance (STAG).
- The majority of objectives where progress could not be confirmed relate to Value for Money. It is not always possible to confirm whether projects are likely to deliver value for money at an early stage after opening for a number of reasons, which may include uncertainty regarding future traffic flow trends, the magnitude of benefits attributable to after opening traffic conditions, etc.
- Overall, the projects that opened between April 07 and March 09 are generally progressing towards achieving their objectives.

Appendix A: Evaluations for Projects That Opened Between April 07 and March 09

A APPENDIX A: EVALUATIONS FOR PROJECTS THAT OPENED BETWEEN APRIL 07 AND MARCH 09

A.1 A75(T) BARFIL TO BETTYKNOWES

A.1.1 Introduction

Project Overview

The project involved the upgrading of 1.4 kilometres of single carriageway to wide single 2+1 carriageway on the A75(T) between Barfil and Bettyknowes, providing a dedicated westbound overtaking opportunity over approximately 0.9 kilometres, and the improvement of the route's horizontal and vertical alignment.

The general location of the project is shown in Figure A.1a.

The A75(T) Barfil to Bettyknowes project was officially opened to traffic on 7th April 2008.

The project was implemented as part of a wider Route Action Plan including the A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects for which evaluations are included in section A.2 and A.3 respectively.

Project Objectives

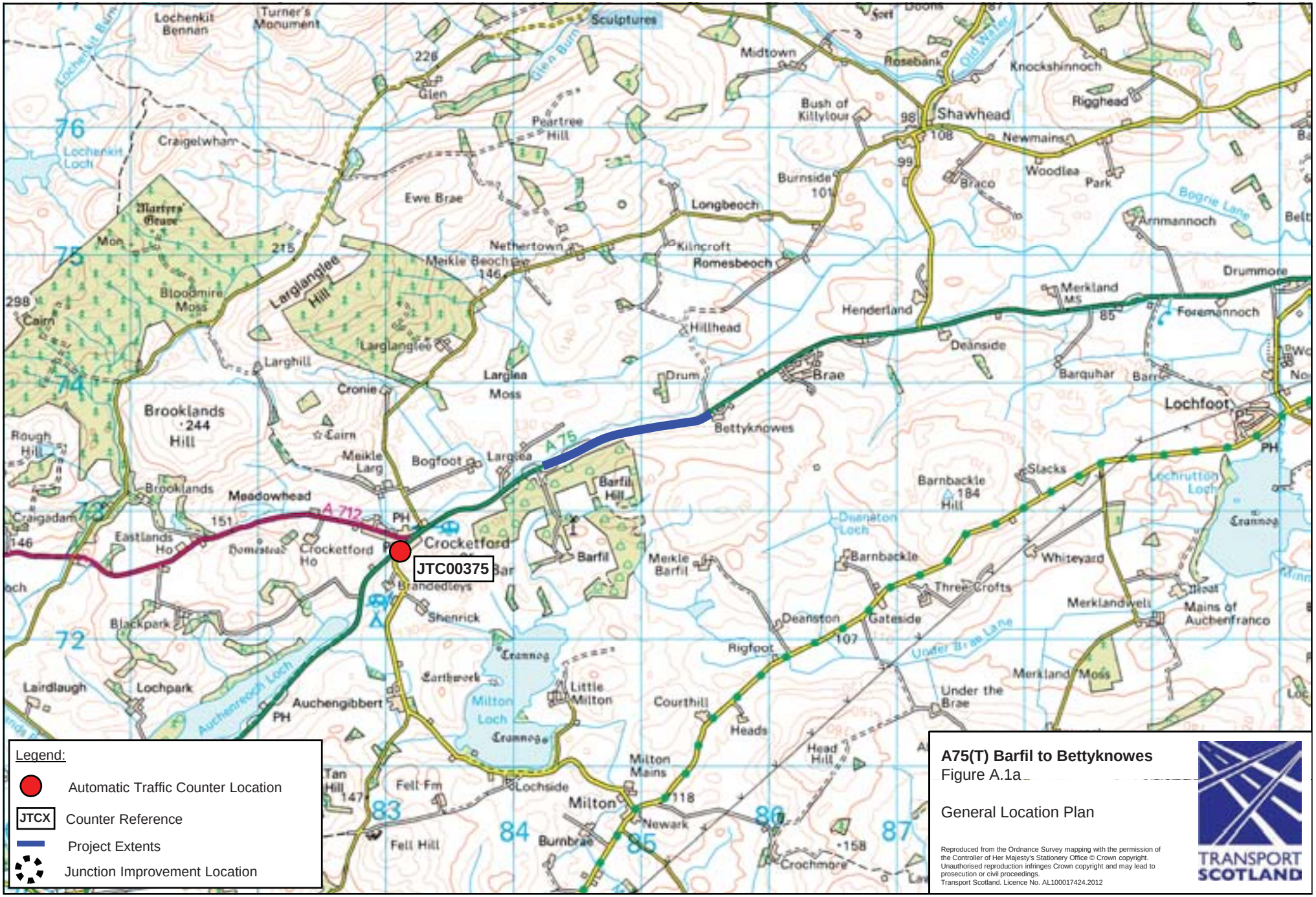
The objectives of the A75(T) Barfil to Bettyknowes project were set as follows:

- to reduce vehicle 'platoons' developing behind commercial vehicles;
- to reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network;
- to reduce delays and improve travel time for drivers using the trunk road; and
- to be implemented as part of a wider Route Action Plan to improve operational performance and level of service.

Evaluation Methodology

The A75(T) Barfil to Bettyknowes project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.



A75(T) Barfil to Bettyknowes
Figure A.1a

General Location Plan

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As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.1.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.1a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.1.1.

Table A.1.1: A75(T) Barfil to Bettyknowes – ATC Data

ATC Reference	AADT by Year				
	2007	2008	2009	2010	2011
A75(T) at Crocketford					
JTC00375	9,072	Year of Opening	9,034	8,681	8,650

A comparison between pre and post project opening traffic volumes on the A75(T) mainline at Crocketford indicates that traffic flows in 2009 were comparable with 2007 flow levels, whilst flows in 2010 reflected a marginal reduction of around 300 vehicles per day (vpd) (approximately 5%). Traffic flows in 2011 were broadly consistent with 2010 traffic flow levels.

Given the nature of the A75(T) Barfil to Bettyknowes project, changes in traffic are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A75(T) Barfil to Bettyknowes project are based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2003 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.1.2 below.

Table A.1.2: A75(T) Barfil to Bettyknowes – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A75(T) at Crocketford							
JTC00375	9,034	10,518	10,747	11,091	16.4%	19.0%	22.8%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.1.2 indicates that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 16% and 23% greater than the observed 2009 flow under low and high traffic forecast scenarios respectively.

Whilst this comparison indicates that traffic growth on the A75(T) has fallen significantly short of the assumed NRTF forecasts, it is recognised that there has been a general fall in traffic volumes across the wider trunk road network in recent years due to the economic downturn that may in part account for the difference.

Changes in Irish Sea Ferry operations since the original assessment in 2003 coupled with an overall reduction in the total number of cars using the ferry services of approximately 6.5% between 2003 and 2009 (*Ref. Scottish Transport Statistics No 29: 2010 Edition*), which may also have contributed to observed flows being lower than forecast.

Carriageway Standard Assessment

In order to satisfy the project objectives, a wide single 2+1 carriageway was constructed on the A75(T) between Barfil and Bettyknowes as part of a series of improvements along the route, providing dedicated overtaking opportunities to help reduce platooning (seen as a particular issue on this route due to the nature of ferry traffic) as well as to reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.1.3 based on the observed 2009 traffic flow.

Table A.1.3: A75(T) Barfil to Bettyknowes – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
9,034	Wide Single 2-Lane	Wide Single 2+1

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a wide single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a wide single 2+1 carriageway given in TA 46/97 (or TD 70/80 – Design of Wide Single 2+1 Roads) and, given the project objectives and the nature of traffic on the route, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Post Opening Overtaking Opportunities

A post opening overtaking survey was undertaken on the A75(T) in October 2011 to provide an indication of conditions between Barfil and Bettyknowes.

Analysis of the results from the post opening survey indicates that approximately 37% of vehicles that travelled through the survey site in the 2-lane westbound direction during the AM and PM survey periods carried out an overtaking manoeuvre. Overtaking in the 1-lane eastbound direction was limited due to the restriction on overtaking in this direction of travel.

The results suggest that westbound vehicles in platoon were dispersed over the extents of the survey site as a consequence of vehicles carrying out overtaking manoeuvres. In the eastbound direction of travel, the length of platoons increased over the extents of the survey site as a consequence of the restriction on overtaking in this direction.

Travel Times

Change in Travel Times

The provision of a dedicated overtaking opportunity in the westbound direction of travel is likely to have improved journey times between Barfil and Bettyknowes in this direction.

Whilst journey times may have increased in the eastbound direction, as a consequence of the restriction on overtaking in this direction and an increase in the number of vehicles travelling in platoon, any increase is likely to be alleviated, to some extent, by the provision of overtaking opportunities on the dual carriageway section to the east of the A75(T) Barfil to Bettyknowes project.

A.1.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A75(T) Barfil to Bettyknowes project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A75(T) Barfil to Bettyknowes project, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A75(T) Barfil to Bettyknowes 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.1.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A75(T) Barfil to Bettyknowes project 3 years before and 1 year after project completion are shown in Figures A.1b and A.1c.

A summary of the personal injury accident data is shown in Table A.1.4.

Table A.1.4: A75(T) Barfil to Bettyknowes – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A75(T)	0	0	1	1
1 Year After				
A75(T)	0	0	0	0

As can be seen from Table A.1.4, no personal injury accidents occurred in the 1 year period following the opening of the project in comparison to one personal injury accident (slight) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in July and August 2009. The RSA report notes that one personal injury accident (slight) occurred during the construction of the project (i.e. during the period 3 years before opening) and involved the collision of five vehicles during a period when a temporary traffic management scheme was active.

A75(T) Barfil to Bettyknowes
Figure A.1b

Project Opening Date: 07 April 08
3 Years Before Opening Accidents

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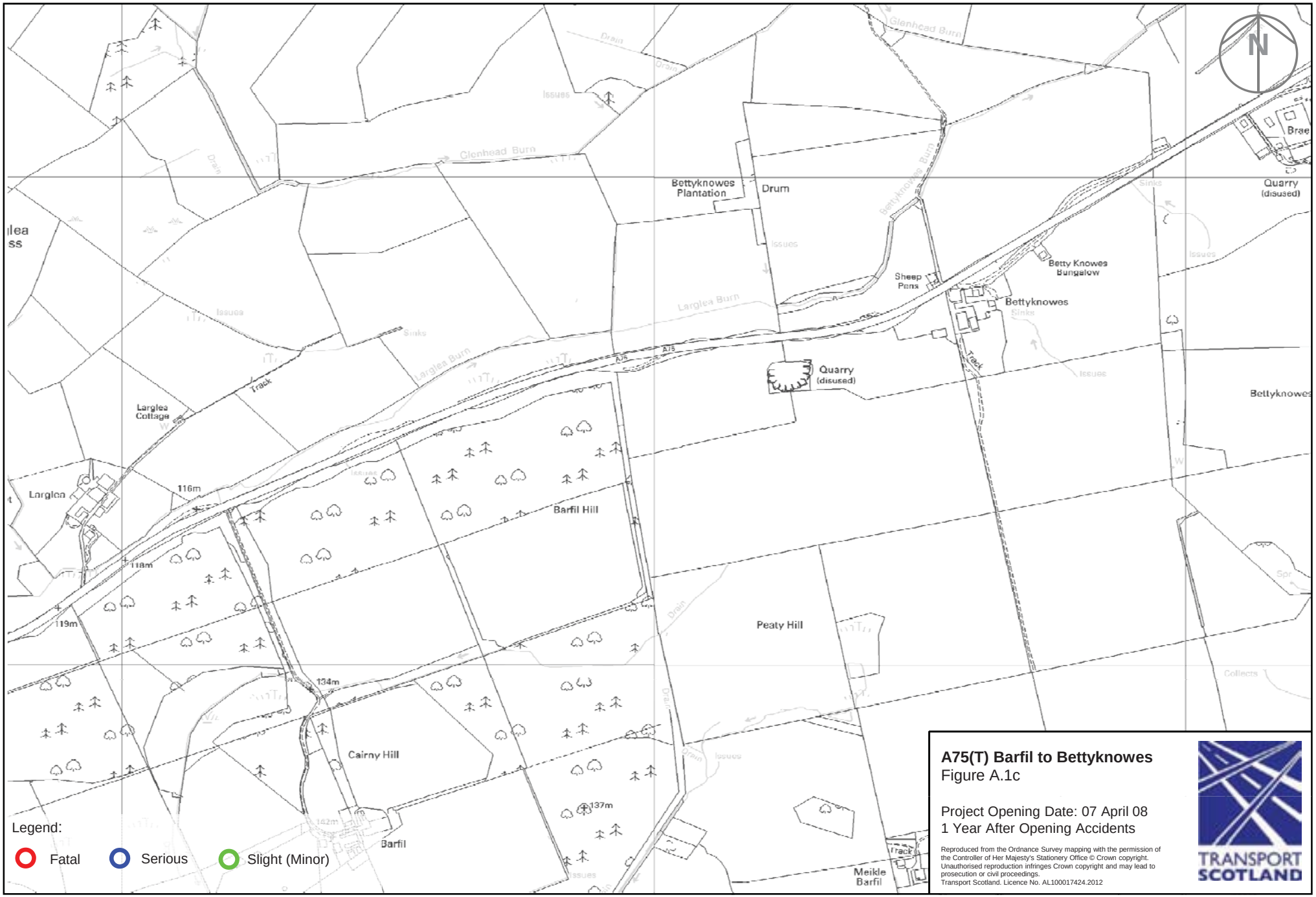

A75(T) Barfil to Bettyknowes
Figure A.1c

Project Opening Date: 07 April 08
1 Year After Opening Accidents

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The RSA report also notes that the collision was caused by a vehicle braking suddenly due to an oncoming Heavy Goods Vehicle (HGV), in wet conditions. The report suggests that the main factors were reduced lane widths through the works and possible reckless driving by the driver of the HGV.

The RSA report concluded that as the collision occurred during construction of the overtaking section, it could not be considered to be connected to the layout of the project.

The RSA report also noted two non-injury accidents which occurred within the vicinity of the project during the period 1 year after opening. It was concluded, however, that both of these accidents were attributable to poor driving rather than the layout of the project.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A75(T) Barfil to Bettyknowes project is operating safely.

A.1.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single outturn cost. Accordingly the evaluation under the economy and cost to government criteria considers the collective performance of the projects.

The comparisons between predicted and actual traffic flows, presented in sections A.1.2, A.2.2 and A.3.2 can be considered a proxy for whether the predicted economic benefits of the combined projects are likely to be realised.

The comparison indicates that the predicted 2009 flows were up to 23% greater than the observed 2009 flows on the A75(T) within the vicinity of Barfil and Bettyknowes, up to 29% greater within the vicinity of Newton Stewart and up to 15% greater within the vicinity of Planting End to Drumflower. This overestimation is likely due to the combination of changes in Irish Sea Ferry operations and general economic downturn.

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the combined projects will have been overestimated due to external factors that could not have readily been foreseen at the time of assessment.

A.1.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single out-turn cost. The predicted project costs used in the economic assessment of each project have been combined to allow the comparison between predicted and out-turn costs to be undertaken.

The combined out-turn and predicted project costs for the three A75(T) projects are shown in Table A.1.5. This confirms that the combined out-turn cost of the three A75(T) projects was approximately £1.0m (15%) greater than the predicted cost.

Table A.1.5: A75(T) Barfil to Bettyknowes, Newton Stewart & Planting End to Drumflower – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid 98 Prices in 1998 at 3.5% Discount	Apr 06 Prices	Mid 98 Prices in 1998 at 3.5% Discount	Mid 98 Prices in 1998 at 3.5% Discount
Total	£13,551,294	£7,889,543	£11,472,500	£6,889,094	£1,010,449 (15%)

Cost to Government: Key Findings

The combined out-turn cost of the three A75(T) projects is approximately £1.0m (15%) greater than was predicted at the time of assessment.

A.1.7 Value for Money

Initial Indications

The economic appraisal results predicted a combined Net Present Value (NPV) of £2.42m and Benefit to Cost Ratio (BCR) of 1.34 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.1.5 and A.1.6, which suggest that the benefits will have been overestimated and indicate that the cost is greater than predicted, the NPV and BCR of the combined projects are unlikely to be as great as predicted.

Value for Money: Key Findings

Although the NPV and BCR of the combined projects are unlikely to be as great as predicted at the time of assessment, it is judged that the projects will continue to provide a benefit to road users.

A.1.8 Achievement of Objectives

As specific indicators to measure the performance of the A75(T) Barfil to Bettyknowes project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A75(T) Barfil to Bettyknowes project is progressing towards achieving its objectives, is presented in Table A.1.6.

Table A.1.6: A75(T) Barfil to Bettyknowes – Progress Towards Achieving Objectives

Objective	Commentary	Progress
To reduce vehicle 'platoons' developing behind commercial vehicles	The results of the post opening overtaking survey suggest that platoons disperse over the wide single 2+1 section of carriageway as a consequence of westbound vehicles carrying out overtaking manoeuvres. In the eastbound direction of travel with the restriction on overtaking, the survey data indicates that platoons are merging to give longer but fewer platoons exiting the project.	+ve for westbound vehicles
To reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network	The results of the post opening overtaking survey indicate that approximately 37% of westbound vehicles carried out an overtaking manoeuvre, which suggests that the project facilitates overtaking. Whilst the level of overtaking in the 1-lane eastbound direction was significantly lower due to the restriction on overtaking in this direction of travel, the Barfil to Bettyknowes project forms part of a series of improvements along the A75(T) corridor that provide vehicles travelling both east and west with dedicated overtaking opportunities. An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A75(T) Barfil to Bettyknowes project is operating safely.	+ve
To reduce delays and improve travel times for drivers using the trunk road	As a result of the provision of a dedicated overtaking opportunity in the westbound direction of travel, the journey times between Barfil and Bettyknowes in this direction are likely to have reduced. Whilst journey times may have increased in the eastbound direction, as a consequence of the restriction on overtaking in this direction, any increase is likely to be alleviated, to some extent, by the provision of overtaking opportunities on the dual carriageway section to the east of the A75(T) Barfil to	+ve for westbound vehicles

Objective	Commentary	Progress
	Bettyknowes project.	
Implemented as part of a wider Route Action Plan to improve operational performance and level of service	The A75(T) Barfil to Bettyknowes project forms part of a series of improvements along the A75(T) corridor that have positively contributed to the operational performance and level of service of the route.	+ve

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.2 A75(T) NEWTON STEWART

A.2.1 Introduction

Project Overview

The project involved the construction of a Differential Acceleration Lane to the west of the A75(T)/A714 Roundabout, south of Newton Stewart, providing a dedicated westbound overtaking opportunity over a length of 375 metres. The project included the stopping up of the A75(T)/Station Road Junction.

The general location of the project is shown in Figure A.2a.

The A75(T) Newton Stewart project was officially opened to traffic on 7th April 2008.

The project was implemented as part of a wider Route Action Plan including the A75(T) Barfil to Bettyknowes and A75(T) Planting End to Drumflower projects for which evaluations are included in section A.1 and A.3 respectively.

Project Objectives

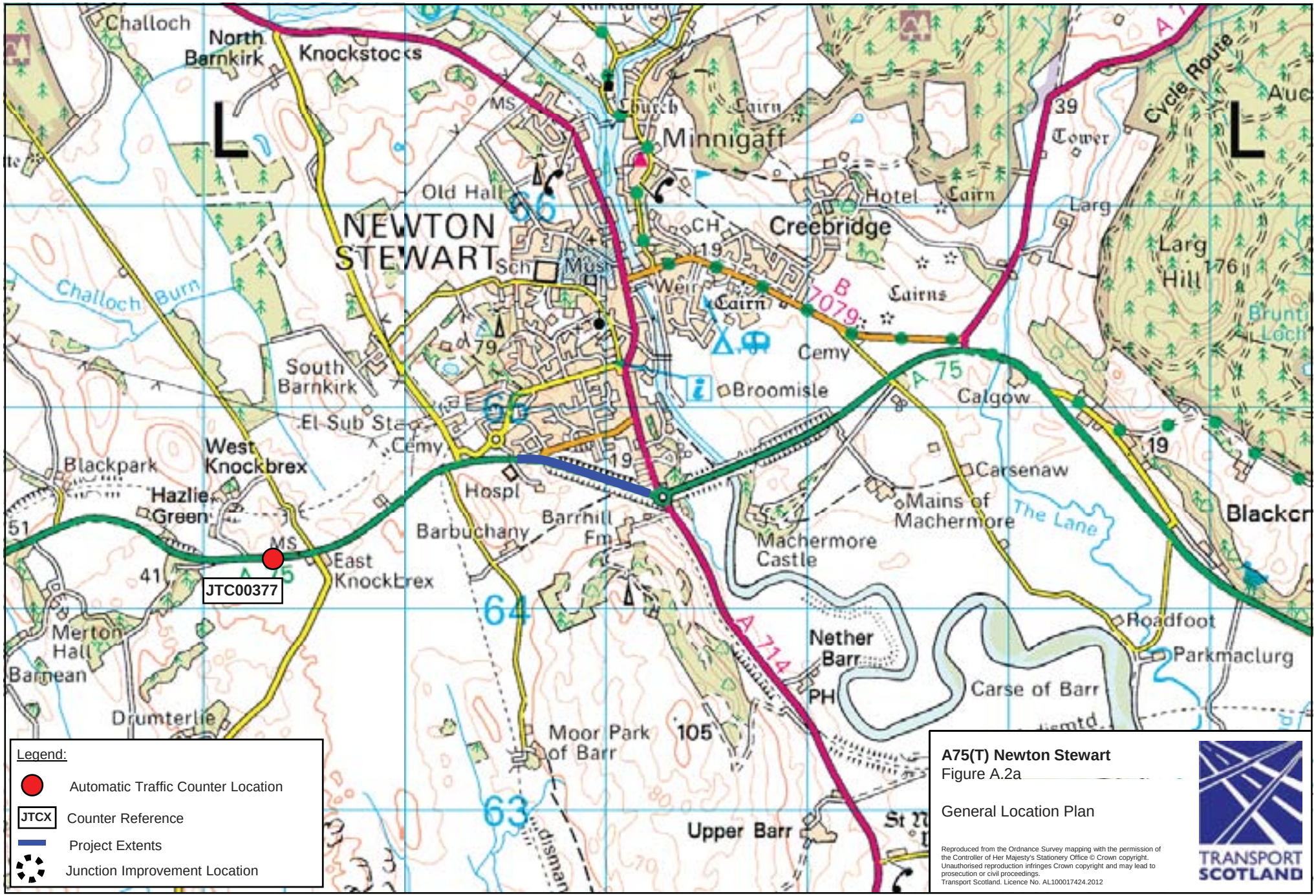
The objectives of the A75(T) Newton Stewart project were set as follows:

- to reduce vehicle 'platoons' developing behind commercial vehicles;
- to reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network;
- to reduce delays and improve travel time for drivers using the trunk road; and
- to be implemented as part of a wider Route Action Plan to improve operational performance and level of service.

Evaluation Methodology

The A75(T) Newton Stewart project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.



A75(T) Newton Stewart
Figure A.2a

General Location Plan

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As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.2.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.2a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.2.1.

Table A.2.1: A75(T) Newton Stewart – ATC Data

ATC Reference	AADT by Year				
	2007	2008	2009	2010	2011
A75(T) West of Newton Stewart					
JTC00377	4,536	Year of Opening	4,438	4,363	4,307

A comparison between pre and post opening traffic volumes on the A75(T) mainline west of Newton Stewart indicates that traffic flows in 2009 were around 100 vehicles per day (vpd) (approximately 2%) lower than 2007 flow levels with a similar annual reductions in flows between 2009 and 2011.

Given the nature of the A75(T) Newton Stewart project, changes in traffic are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A75(T) Newton Stewart project are based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2003 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.2.2 below.

Table A.2.2: A75(T) Newton Stewart – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A75(T) West of Newton Stewart							
JTC00377	4,438	5,418	5,538	5,718	22.1%	24.8%	28.8%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.2.2 indicates that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 22% and 29% greater than the observed 2009 flow under low and high traffic forecast scenarios respectively.

Whilst this comparison indicates that traffic growth on the A75(T) has fallen significantly short of the assumed NRTF forecasts, it is recognised that there has been a general fall in traffic volumes across the wider trunk road network in recent years due to the economic downturn that may in part account for the difference.

Changes in Irish Sea Ferry operations since the original assessment in 2003 coupled with an overall reduction in the total number of cars using the ferry services of approximately 6.5% between 2003 and 2009 (*Ref. Scottish Transport Statistics No 29: 2010 Edition*), which may also have contributed to observed flows being lower than forecast.

Carriageway Standard Assessment

In order to satisfy the project objectives, a differential acceleration lane was constructed on the A75(T) at Newton Stewart as part of a series of improvements along the route, providing dedicated overtaking opportunities to help reduce platooning (seen as a particular issue on this route due to the nature of ferry traffic) as well as to reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.2.3 based on the observed 2009 traffic flow.

Table A.2.3: A75(T) Newton Stewart – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
4,438	Single 2-Lane	Differential Acceleration Lane

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a differential acceleration lane given in TA 46/97 and, given the project objectives and the nature of traffic on the route, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Post Opening Overtaking Opportunities

Based on the evaluation of other projects within the same geographic region for which overtaking surveys have been carried out, the provision of the Differential Acceleration Lane in the westbound direction of travel is judged to have a positive impact on the number of overtaking manoeuvres in this direction. The impact in the eastbound direction, over which overtaking is restricted, is unlikely to be significant given that vehicles are likely to be slowing on approach to the A75(T)/A714 roundabout at the eastern extent of the project.

As a consequence of providing overtaking opportunities, the project is also likely to help reduce platooning.

Travel Times

Change in Travel Times

Based on the evaluation of other projects within the same geographic region for which journey time data is available, the provision of the Differential Acceleration Lane in the westbound direction of travel is judged to reduce journey times in this direction. In the restricted eastbound direction of travel, given vehicles are approaching the roundabout at the eastern extent of the project, impacts on journey times will not be significant.

A.2.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A75(T) Newton Stewart project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A75(T) Newton Stewart project, no significant impact on noise and air quality is expected It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A75(T) Newton Stewart 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.2.4 Safety

Accidents

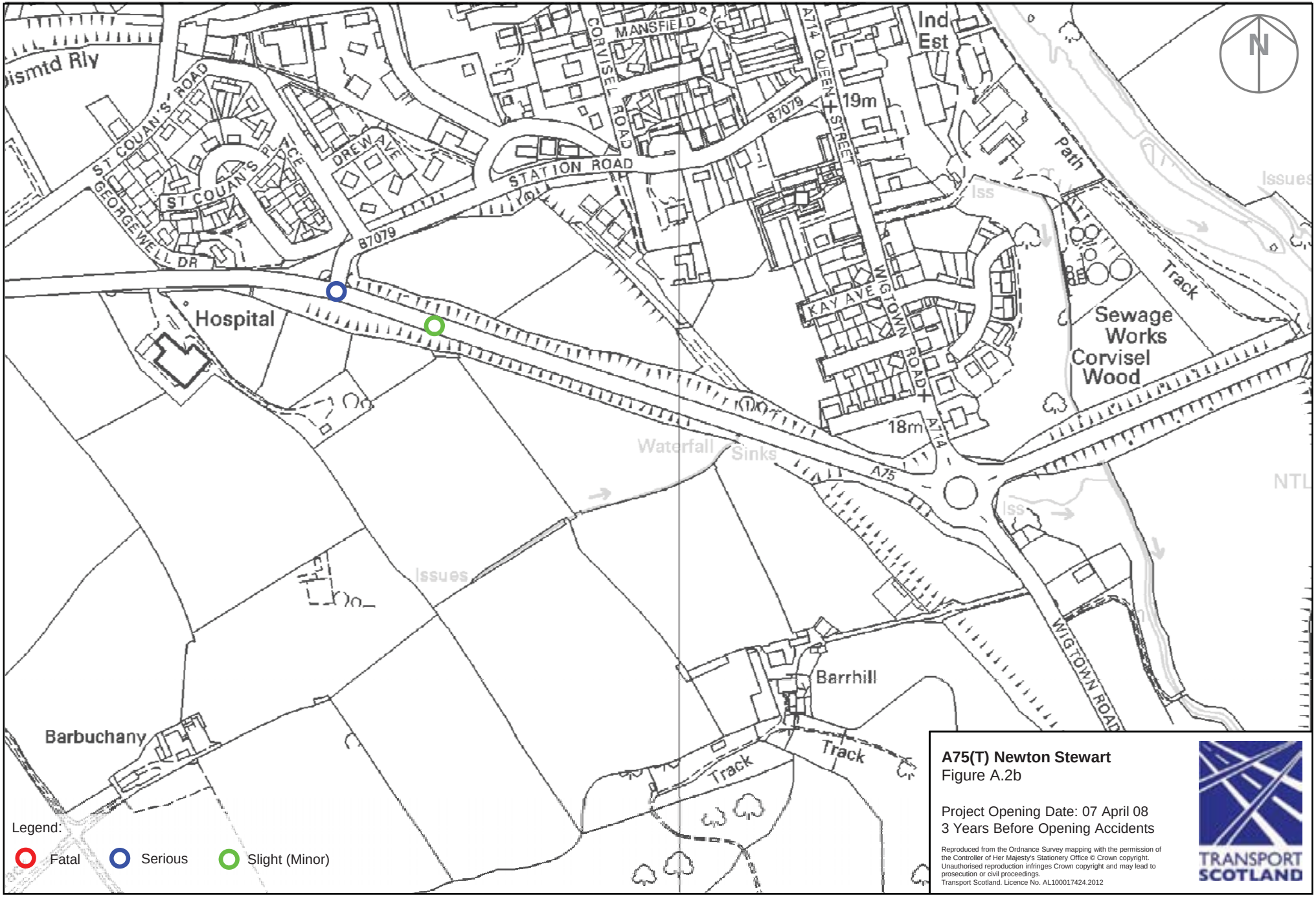
Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A75(T) Newton Stewart project 3 years before and 1 year after project completion are shown in Figures A.2b and A.2c.

A summary of the personal injury accident data is shown in Table A.2.4.

Table A.2.4: A75(T) Newton Stewart – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A75(T)	0	1	1	2
1 Year After				
A75(T)	0	0	0	0



A75(T) Newton Stewart
Figure A.2b

Project Opening Date: 07 April 08
3 Years Before Opening Accidents

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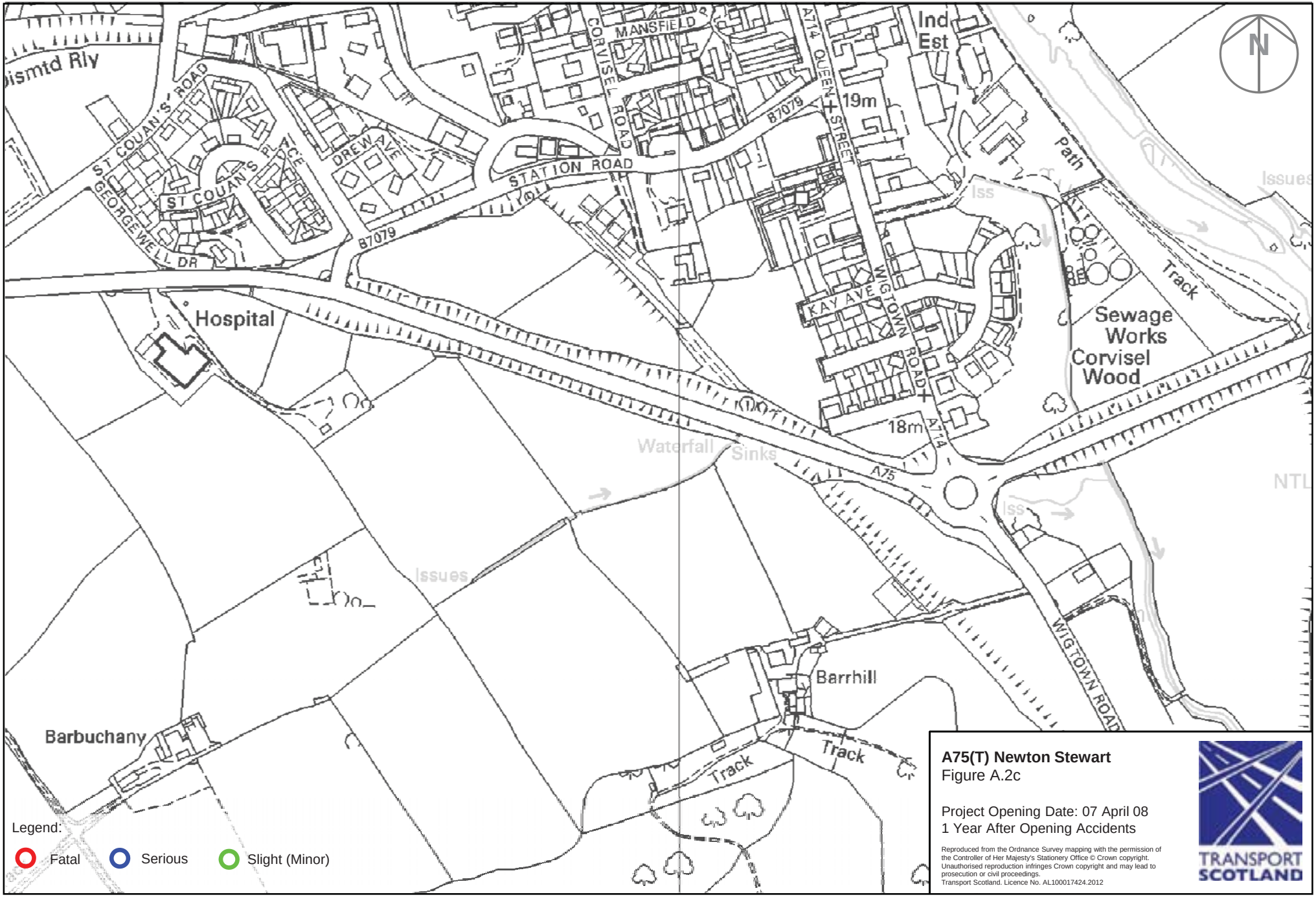

A75(T) Newton Stewart
Figure A.2c

Project Opening Date: 07 April 08
1 Year After Opening Accidents

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As can be seen from Table A.2.4, no personal injury accidents occurred in the 1 year period following the opening of the project in comparison to two personal injury accidents (one serious and one slight) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in July and August 2009. The RSA report confirmed that no personal injury accidents occurred in the 1 year period after project opening.

The RSA report also noted four non-injury accidents which occurred within the vicinity of the project during the period 1 year after opening. It was concluded that these accidents were related to traffic approaching the Wigtown Roundabout and, as such, were not attributable to the design or layout of the project.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A75(T) Newton Stewart project is operating safely.

A.2.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single outturn cost. Accordingly the evaluation under the economy and cost to government criteria considers the collective performance of the projects.

The comparisons between predicted and actual traffic flows, presented in sections A.1.2, A.2.2 and A.3.2 can be considered a proxy for whether the predicted economic benefits of the combined projects are likely to be realised.

The comparison indicates that the predicted 2009 flows were up to 23% greater than the observed 2009 flows on the A75(T) within the vicinity of Barfil and Bettyknowes, up to 29% greater within the vicinity of Newton Stewart and up to 15% greater within the vicinity of Planting End to Drumflower. This overestimation is likely due to the combination of changes in Irish Sea Ferry operations and general economic downturn.

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the combined projects will have been overestimated due to external factors that could not have readily been foreseen at the time of assessment.

A.2.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single out-turn cost. The predicted project costs used in the economic assessment of each project have been combined to allow the comparison between predicted and out-turn costs to be undertaken.

The combined out-turn and predicted project costs for the three A75(T) projects are shown in Table A.2.5. This confirms that the out-turn cost of the three A75(T) projects was approximately £1.0m (15%) greater than the predicted cost.

Table A.2.5: A75(T) Barfil to Bettyknowes, Newton Stewart & Planting End to Drumflower – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid 98 Prices in 1998 at 3.5% Discount	Apr 06 Prices	Mid 98 Prices in 1998 at 3.5% Discount	Mid 98 Prices in 1998 at 3.5% Discount
Total	£13,551,294	£7,889,543	£11,472,500	£6,889,094	£1,010,449 (15%)

Cost to Government: Key Findings

The combined out-turn cost of the three A75(T) projects is approximately £1.0m (15%) greater than was predicted at the time of assessment.

A.2.7 Value for Money

Initial Indications

The economic appraisal results predicted a combined Net Present Value (NPV) of £2.42m and Benefit to Cost Ratio (BCR) of 1.34 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.2.5 and A.2.6, which suggest that the benefits will have been overestimated and indicate that the cost is greater than predicted, the NPV and BCR of the combined projects are unlikely to be as great as predicted.

Value for Money: Key Findings

Although the NPV and BCR of the combined projects are unlikely to be as great as predicted at the time of assessment, it is judged that the projects will continue to provide a benefit to road users.

A.2.8 Achievement of Objectives

As specific indicators to measure the performance of the A75(T) Newton Stewart project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A75(T) Newton Stewart project is progressing towards achieving its objectives, is presented in Table A.2.6.

Table A.2.6: A75(T) Newton Stewart – Progress Towards Achieving Objectives

Objective	Commentary	Progress
To reduce vehicle 'platoons' developing behind commercial vehicles	The provision of the Differential Acceleration Lane can be expected to help disperse platoons in the westbound direction of travel as a consequence of the positive impact the A75(T) Newton Stewart project is likely to have on overtaking manoeuvres in this direction. In the eastbound direction, despite the restricted overtaking section, it is judged that there is unlikley to have been any significant impact on platooning given the proximity of the project to the Wigtown Roundabout at its eastern extent.	+ve for westbound vehicles
To reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network	The provision of the Differential Acceleration Lane in the westbound direction of travel is likely to have a positive impact on the number of overtaking manoeuvres. An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A75(T) Newton Stewart project is operating safely.	+ve for westbound vehicles
To reduce delays and improve travel times for drivers using the trunk road	The provision of overtaking opportunities in the westbound direction of travel is likley to reduce journey times in this direction. In the eastbound direction, despite the restricted overtaking section, it is judged that there is unlikley to have been any significant impact on journey times given the proximity of the project to the Wigtown Roundabout at its eastern extent.	+ve for westbound vehicles
Implemented as part of a wider Route Action Plan to improve operational performance and level of service	The A75(T) Newton Stewart project has been constructed as part of a wider set of improvements along the A75(T) route that have contributed to an improvement in the operational performance and level of service of the route.	+ve

Key: +ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.3 A75(T) PLANTING END TO DRUMFLOWER

A.3.1 Introduction

Project Overview

The project involved the construction of a wide single 2+1 (WS2+1) carriageway on the A75(T) between Planting End and Drumflower, providing a dedicated eastbound overtaking opportunity over a length of 1 kilometre with the horizontal and vertical alignment of the route being improved to current design standards.

The general location of the project is shown in Figure A.3a.

The A75(T) Planting End to Drumflower project was officially opened to traffic on 7th April 2008.

The project was implemented as part of a wider Route Action Plan including the A75(T) Barfil to Bettyknowes and A75(T) Newton Stewart projects for which evaluations are included in section A.1 and A.2 respectively.

Project Objectives

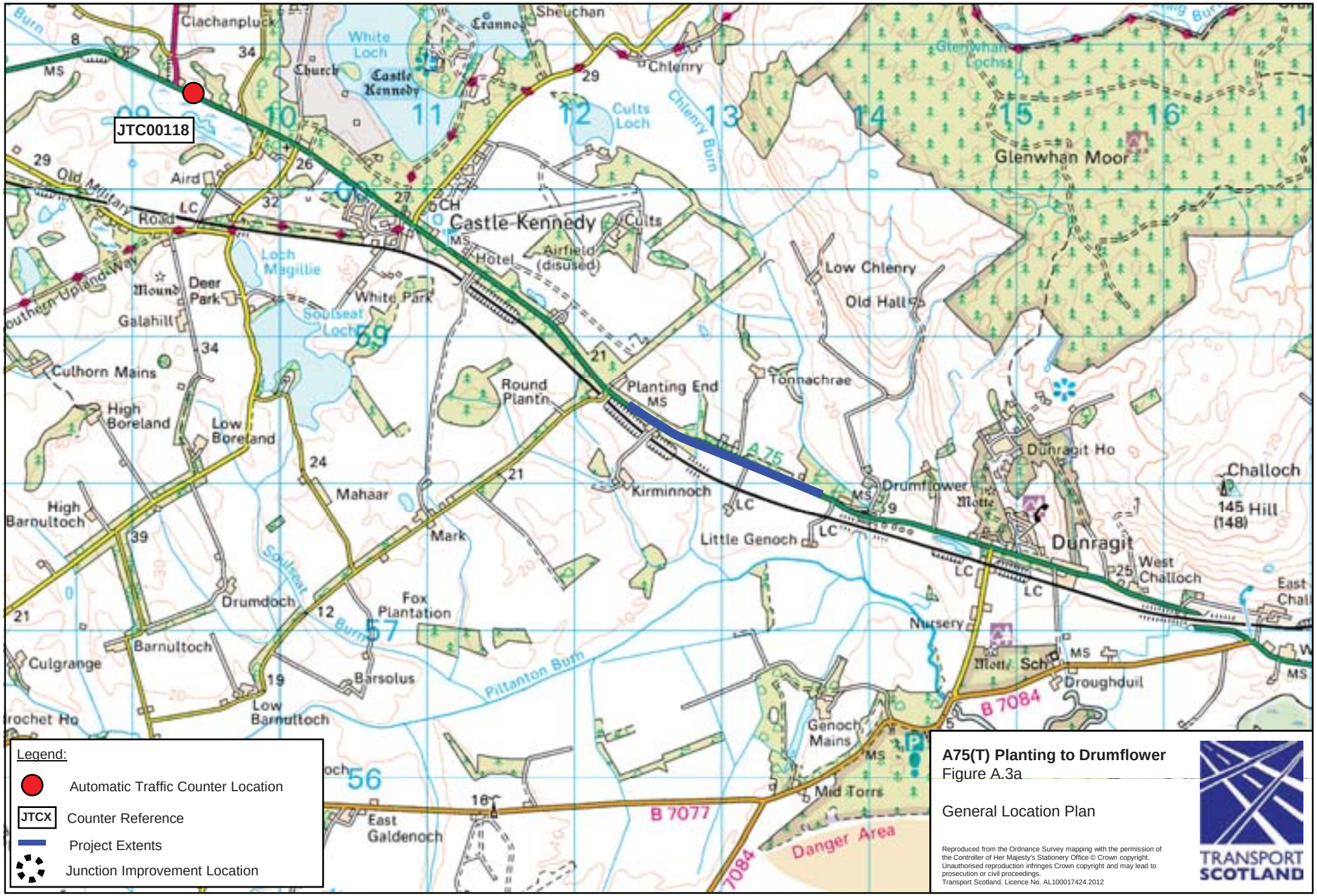
The objectives of the A75(T) Planting End to Drumflower project were set as follows:

- to reduce vehicle 'platoons' developing behind commercial vehicles;
- to reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network;
- to reduce delays and improve travel time for drivers using the trunk road.; and
- to be implemented as part of a wider Route Action Plan to improve operational performance and level of service.

Evaluation Methodology

The A75(T) Planting End to Drumflower project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.



A75(T) Planting to Drumflower
Figure A.3a

General Location Plan

TRANSPORT SCOTLAND

As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.3.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.3a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.3.1.

Table A.3.1: A75(T) Planting End to Drumflower – ATC Data

ATC Reference	AADT by Year					
	2006	2007	2008	2009	2010	2011
A75(T) West of Castle Kennedy						
JTC00118	6,609	6,904	Year of Opening	6,708	6,837	6,826

A comparison between pre and post opening traffic volumes on the A75(T) mainline west of Castle Kennedy indicates that traffic flows in 2009 were around 200 vehicles per day (vpd) (approximately 3%) lower than 2007 flow levels, whilst flows in 2010 reflected a marginal increase of around 100 vpd compared with 2009. Traffic flows in 2011 were broadly consistent with 2010 traffic flow levels.

Given the nature of the A75(T) Planting End to Drumflower project, changes in traffic are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A75(T) Planting End to Drumflower project are based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2003 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and the predicted traffic data is shown in Table A.3.2 below.

Table A.3.2: A75(T) Planting End to Drumflower – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A75(T) West of Castle Kennedy							
JTC00118	6,708	7,350	7,490	7,700	9.6%	11.7%	14.8%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.3.2 indicates that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 10% and 15% greater than the observed 2009 flow low and high traffic forecast scenarios respectively.

Whilst this comparison indicates that traffic growth on the A75(T) has fallen significantly short of the assumed NRTF forecasts, it is recognised that there has been a general fall in traffic volumes across the wider trunk road network in recent years due to the economic downturn that may in part account for the difference.

Changes in Irish Sea Ferry operations since the original assessment in 2003 coupled with an overall reduction in the total number of cars using the ferry services of approximately 6.5% between 2003 and 2009 (*Ref. Scottish Transport Statistics No 29: 2010 Edition*), which may also have contributed to observed flows being lower than forecast.

Carriageway Standard Assessment

In order to satisfy the project objectives, a wide single 2+1 carriageway was constructed on the A75(T) between Planting End and Drumflower as part of a series of improvements along the route, providing dedicated overtaking opportunities to help reduce platooning (seen as a particular issue on this route due to the nature of ferry traffic) as well as to reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.3.3 based on the observed 2009 traffic flow.

Table A.3.3: A75(T) Planting End to Drumflower – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
6,708	Wide Single 2-Lane	Wide Single 2+1

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a wide single 2-lane standard of carriageway. There are no specific flow ranges for the justification of wide single 2+1 carriageways given in TA 46/97 (or TD 70/80 – Design of Wide Single 2+1 Roads) and, given the project objectives and the nature of traffic on the route, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Post Opening Overtaking Opportunities

A post opening overtaking survey was undertaken on the A75(T) in October 2011 to provide an indication of conditions between Planting End and Drumflower.

Analysis of the results from the post opening survey indicates that approximately 30% of vehicles that travelled through the survey site in the 2-lane eastbound direction during the AM and PM survey periods carried out an overtaking manoeuvre. Overtaking in the 1-lane westbound direction was limited due to the restriction on overtaking in this direction of travel.

The results suggest that eastbound vehicles in platoon were dispersed over the extents of the survey site as a consequence of vehicles carrying out overtaking manoeuvres. In the westbound direction of travel, the length of platoons increased over the extents of the survey site as a consequence of the restriction on overtaking in this direction.

Travel Times

Change in Travel Times

As a result of the provision of a dedicated overtaking opportunity in the eastbound direction of travel, journey times between Planting End and Drumflower in this direction are likely to have reduced.

Journey times may have increased in the westbound direction, as a consequence of the restriction on overtaking in this direction and an increase in the number of vehicles travelling in platoon.

A.3.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A75(T) Planting End to Drumflower project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A75(T) Planting End to Drumflower project, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures for the A75(T) Planting End to Drumflower 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.3.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A75(T) Planting End to Drumflower project 3 years before and 1 year after project completion are shown in Figures A.3b and A.3c.

A summary of the personal injury accident data is shown in Table A.3.4.

Table A.3.4: A75(T) Planting End to Drumflower – Personal Injury Accident Data Summary

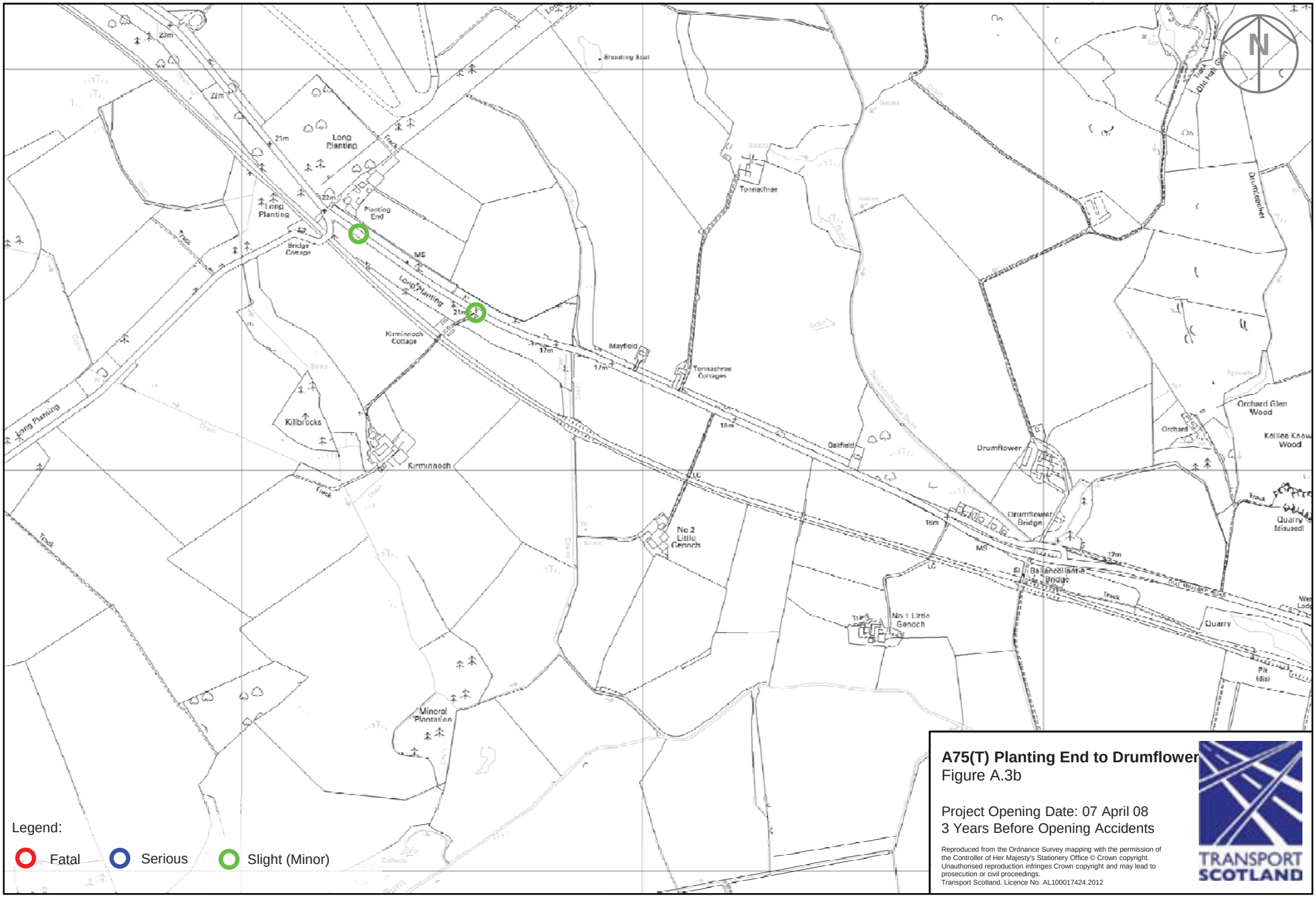
Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A75(T)	0	0	2	2
1 Year After				
A75(T)	0	0	0	0

As can be seen in Table A.3.4, no personal injury accidents occurred in the 1 year period following the opening of the project in comparison to two personal injury accidents (two slight) in the 3 years before opening suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in July and August 2009. The RSA report referred to one personal injury accident (serious) that occurred in the 1 year period following the opening of the project. The accident (involving a single vehicle which lost control and collided with a tree on the verge) occurred outwith the extents of the project and, as such, does not appear in the analysis of 1 year after opening personal injury accidents presented in Table A.3.4 above.

The RSA report also notes that the driver lost control at a bend before coming to rest further along the road and that the alignment of the road had not changed due to the overtaking section, however, the wider cross-section may be encouraging higher vehicle speeds. It is stated that it is unclear from the data provided what the main contributing factors to the accident were, however, it is noted that Dumfries and Galloway Police have indicated concerns from the public regarding this tie-in and increased vehicle speeds.



A75(T) Planting End to Drumflower
Figure A.3b

Project Opening Date: 07 April 08
3 Years Before Opening Accidents

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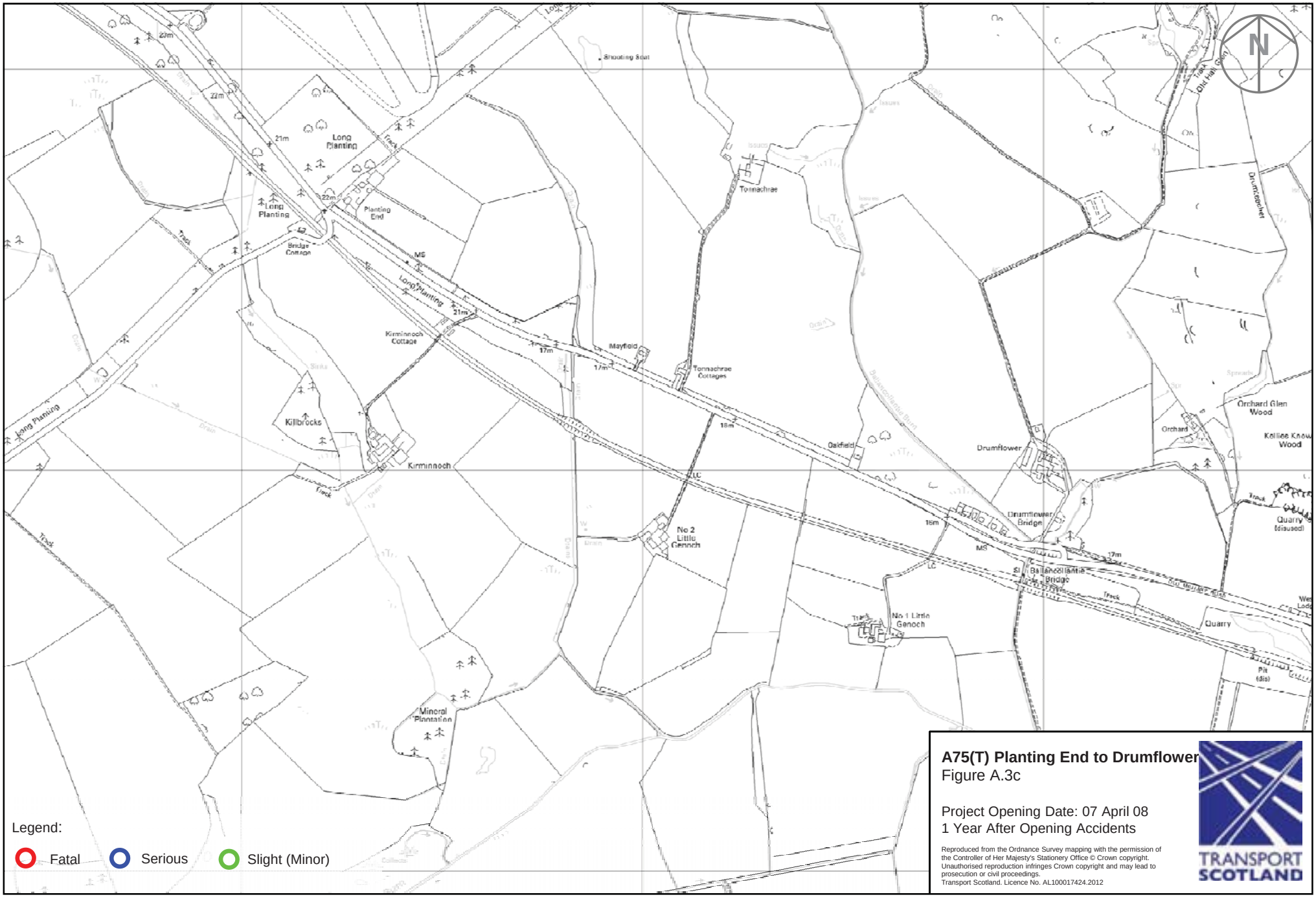

A75(T) Planting End to Drumflower
Figure A.3c

Project Opening Date: 07 April 08
1 Year After Opening Accidents

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The report recommended that a 'junction on bend' warning sign and a 'slow' carriageway marking be provided in place of the existing side road ahead sign to provide sufficient warning of both the junction and the change in horizontal alignment. A site visit carried out in October 2011, however, confirmed that neither the warning sign nor the 'slow' carriageway marking had been provided.

The RSA report also confirmed one non-injury accident which occurred within the vicinity of the project during the period 1 year after opening. It was concluded, however, that the accident was attributable to the Temporary Traffic Management Scheme associated with the completion of the project rather than the layout of the project.

Safety: Key Findings

From an assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, there is no evidence to suggest that the A75(T) Planting End to Drumflower project is not operating safely, however, concerns have been raised surrounding vehicle speeds.

A.3.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single outturn cost. Accordingly the evaluation under the economy and cost to government criteria considers the collective performance of the projects.

The comparisons between predicted and actual traffic flows, presented in sections A.1.2, A.2.2 and A.3.2 can be considered a proxy for whether the predicted economic benefits of the combined projects are likely to be realised.

The comparison indicates that the predicted 2009 flows were up to 23% greater than the observed 2009 flows on the A75(T) within the vicinity of Barfil and Bettyknowes, up to 29% greater within the vicinity of Newton Stewart and up to 15% greater within the vicinity of Planting End to Drumflower. This overestimation is likely due to the combination of changes in Irish Sea Ferry operations and general economic downturn.

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the combined projects will have been overestimated due to external factors that could not have readily been foreseen at the time of assessment.

A.3.6 Cost to Government

Investment Costs

Comparison Between Predicted and Actual Project Costs

The A75(T) Barfil to Bettyknowes, A75(T) Newton Stewart and A75(T) Planting End to Drumflower projects were constructed under a single contract with a single out-turn cost. The predicted project costs used in the economic assessment of each project have been combined to allow the comparison between predicted and out-turn costs to be undertaken.

The combined out-turn and predicted project costs for the three A75(T) projects is shown in Table A.3.5. This confirms that the combined out-turn cost of the three A75(T) projects was approximately £1.0m (15%) greater than the predicted cost.

Table A.3.5: A75(T) Barfil to Bettyknowes, Newton Stewart & Planting End to Drumflower – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid 98 Prices in 1998 at 3.5% Discount	Apr 06 Prices	Mid 98 Prices in 1998 at 3.5% Discount	Mid 98 Prices in 1998 at 3.5% Discount
Total	£13,551,294	£7,889,543	£11,472,500	£6,889,094	£1,010,449 (15%)

Cost to Government: Key Findings

The combined out-turn cost of the three A75(T) projects is approximately £1.0m (15%) greater than was predicted at the time of assessment.

A.3.7 Value for Money

Initial Indications

The economic appraisal results predicted a combined Net Present Value (NPV) of £2.42m and Benefit to Cost Ratio (BCR) of 1.34 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.3.5 and A.3.6, which suggest that the benefits will have been overestimated and indicate that the cost is greater than predicted, the NPV and BCR of the combined projects are unlikely to be as great as predicted.

Value for Money: Key Findings

Although the NPV and BCR of the combined projects are unlikely to be as great as predicted at the time of assessment, it is judged that the projects will continue to provide a benefit to road users.

A.3.8 Achievement of Objectives

As specific indicators to measure the performance of the A75(T) Planting End to Drumflower project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A75(T) Planting End to Drumflower project is progressing towards achieving its objectives, is presented in Table A.3.6.

Table A.3.6: A75(T) Planting End to Drumflower – Progress Towards Achieving Objectives

Objective	Commentary	Progress
To reduce vehicle 'platoons' developing behind commercial vehicles	The results of the post opening overtaking survey suggest that platoons disperse over the wide single 2+1 section of carriageway as a consequence of eastbound vehicles carrying out overtaking manoeuvres. In the westbound direction of travel with the restriction on overtaking, the survey data indicates that the number of platoons increased.	+ve for eastbound vehicles
To reduce driver frustration by providing a guaranteed overtaking opportunity thus providing greater safety on the network	The results of the post opening overtaking survey indicate that approximately 30% of eastbound vehicles carried out an overtaking manoeuvre which suggests that the project facilitates overtaking. Whilst the level of overtaking in the 1-lane westbound direction was significantly lower due to the restriction on overtaking in this direction of travel, the Planting End to Drumflower project forms part of a series of improvements along the A75(T) corridor that provide vehicles travelling both east and west with dedicated overtaking opportunities. While there is no evidence to suggest that the A75(T) Planting End to Drumflower project is not operating safely from the 1 year post opening personal injury accident data, concerns have been raised surrounding vehicle speeds.	+ve
To reduce delays and improve travel times for drivers using the trunk road	As a result of the provision of a dedicated overtaking opportunity in the eastbound direction of travel, the journey times between Planting End and Drumflower in this direction are likely to have reduced. In the westbound direction of travel, over which overtaking is restricted, the project may have increased journey times as a result of an increase in the number of vehicles travelling in platoon.	+ve for eastbound vehicles

Objective	Commentary	Progress
Implemented as part of a wider Route Action Plan to improve operational performance and level of service	The A75(T) Planting End to Drumflower project forms part of a series of improvements along the A75(T) corridor that have positively contributed to the operational performance and level of service of the route.	+ve

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.4 A9(T) BALLINLUIG JUNCTION IMPROVEMENT

A.4.1 Introduction

Project Overview

The project involved the construction of a grade separated junction, including two new slip roads on the western side of the A9(T) at Ballinluig and improvements to the A9(T) carriageway, which enabled the removal of the temporary 50mph speed limit within the vicinity of the junction.

The general location of the project is shown in Figure A.4a.

The A9(T) Ballinluig Junction Improvement was officially opened to traffic on 26th May 2008.

Project Objectives

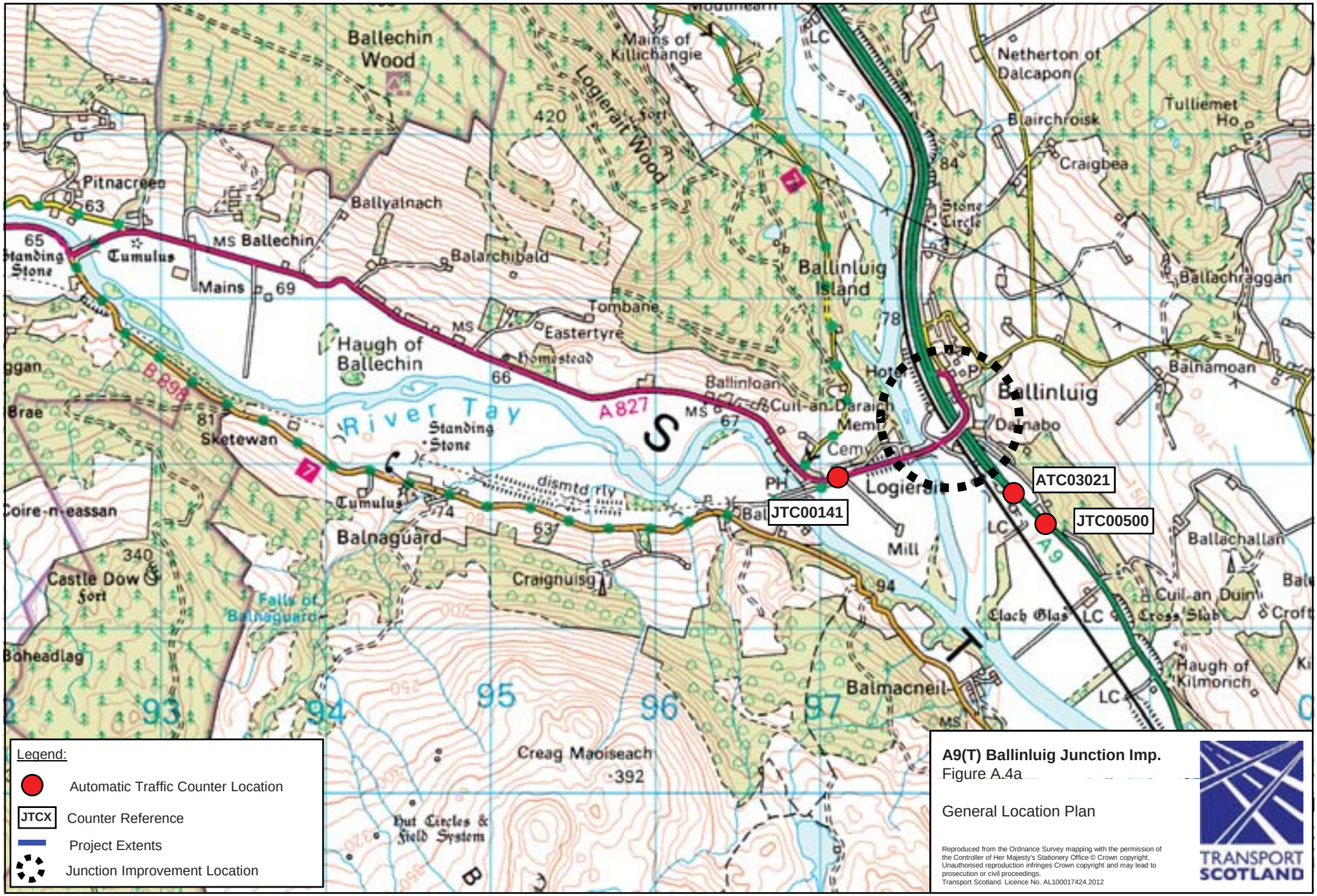
The objectives of the A9(T) Ballinluig Junction Improvement project were set as follows:

- to contribute to Government Safety Objectives for the reduction of fatal and serious accidents of 40% by 2010;
- to achieve good value for money;
- to maintain through movement on A9(T);
- to be able to be maintained and operated safely;
- to minimise disruption during construction;
- to incorporate measures for non motorised users;
- to avoid impacts on environmentally designated areas (Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI));
- to minimise environmental impact; and
- to be consistent with local planning objectives and policies.

Evaluation Methodology

The A9(T) Ballinluig Junction Improvement project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Integration;
- Accessibility & Social Inclusion;



A9(T) Ballinluig Junction Imp.
Figure A.4a

General Location Plan

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- Costs to Government; and
- Value for Money.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes and travel times presented in the following section.

A.4.2 Network Traffic Indicators

Traffic Volumes

The locations of Automatic Traffic Counters (ATCs) within the study area are shown in Figure A.4a.

Traffic counters ATC03021 and JTC00500 both experienced operational issues during the period 2006 to 2011. As such, to provide a robust assessment, traffic flows for 2006 and 2007 have been derived from ATC03021 and traffic flows for 2009 to 2011 have been derived from JTC00500.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.4.1.

Table A.4.1: A9(T) Ballinluig Junction Improvement – ATC Data

ATC Reference	AADT by Year					
	2006	2007	2008	2009	2010	2011
A9(T)						
ATC03021 / JTC00500	13,559	13,849	Year of Opening	13,705	13,463	13,311
A827 West of Ballinluig Junction						
JTC00141	3,092	3,085	Year of Opening	3,165	3,319	3,066

A comparison between pre and post opening traffic volumes on the A9(T) mainline indicates that traffic flows in 2009 were around 150 vehicles per day (vpd) (approximately 1%) lower than 2007 flow levels. Over the same period, traffic flows on the A827 west of Ballinluig junction have seen a marginal increase of approximately 100 vpd or 3%.

The comparison also indicates that traffic flows on the A9(T) mainline have decreased with annual reductions of approximately 150 vpd to 250 vpd (1% to 2%) between 2009 and 2011. Traffic flows along the A827 west of Ballinluig junction increased by approximately 150 vpd (around 5%) between 2009 and 2010 and decreased by approximately 250 vpd (8%) between 2010 and 2011.

Given the nature of the A9(T) Ballinluig Junction Improvement project, changes in traffic levels are not likely to be as a consequence of changes to the junction layout and carriageway.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A9(T) Ballinluig Junction Improvement project are based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) central growth factors were applied to the observed 2004 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by factoring the 2004 base year flows used in the economic assessment with NRTF 97 central growth factors.

A summary of the actual and the predicted traffic data is shown in Table A.4.2 below.

Table A.4.2: A9(T) Ballinluig Junction Improvement – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT	% Difference (Predicted – Actual) / Actual
		Central	Central
A9(T)			
JTC00500	13,705	12,709	-7.3%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.4.2 indicates that the predicted 2009 flow is 7.3% lower than the observed 2009 flow, which is within accepted limits.

Carriageway Standard Assessment

Whilst the 2-lane carriageway section on the A9(T) at Ballinluig was extended south as part of the Ballinluig Junction Improvement project, the works principally involved the construction of a new grade separated junction, therefore, it has not been necessary to carry out a carriageway standard assessment.

Travel Times

Change in Travel Times

As a result of the grade separated junction on the A9(T) which facilitates the through movement of traffic, the temporary 50mph speed limit enforced on the A9(T) within the vicinity of the junction has been removed. Whilst journey times have not been measured, it can be expected that journey times on the A9(T) will have reduced.

A.4.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A9(T) Ballinluig Junction Improvement project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in May 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

As no significant impact on noise and air quality is expected as a result of the A9(T) Ballinluig Junction Improvement project, it is not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

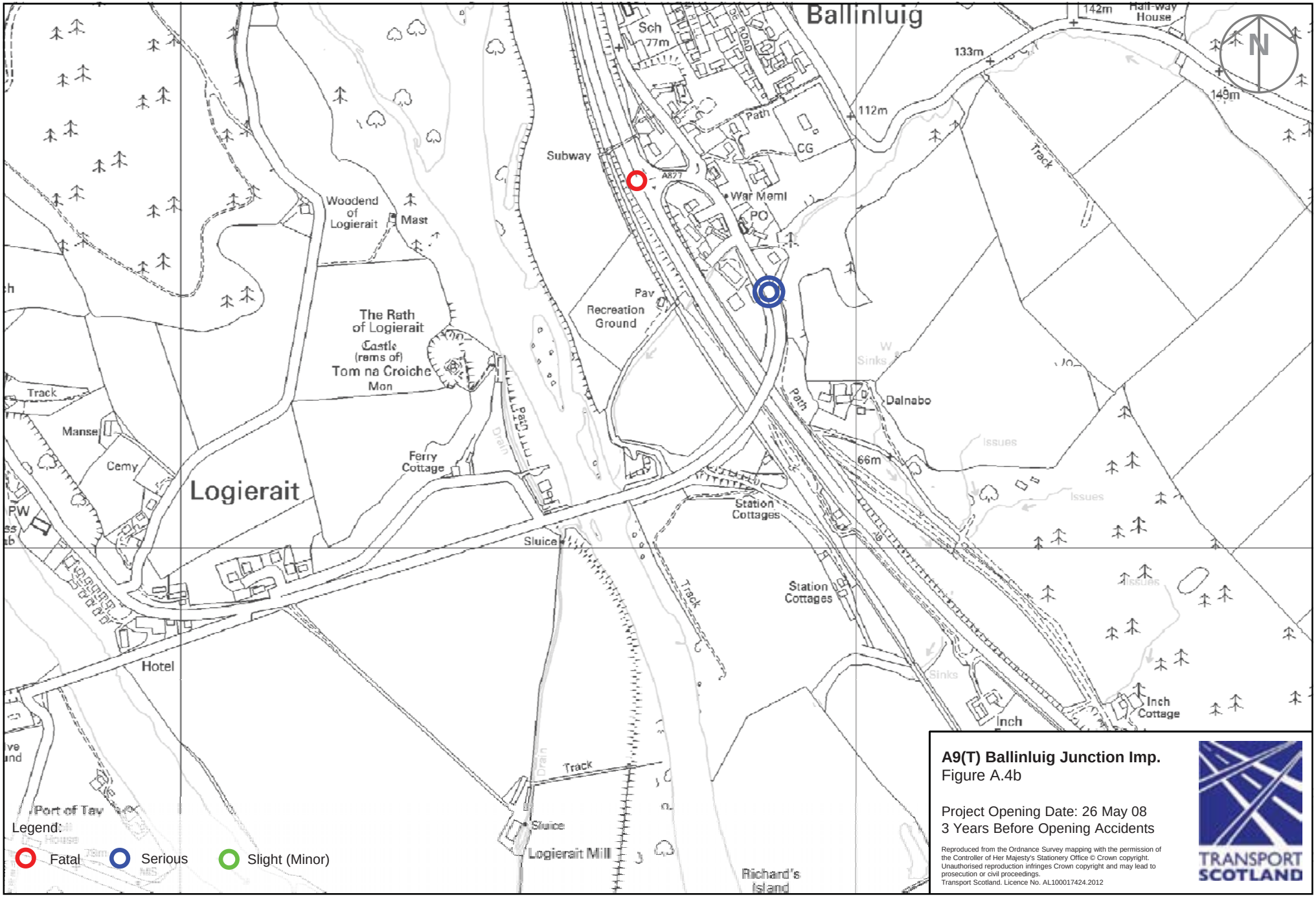
The review of the mitigation measures implemented for the A9(T) Ballinluig Junction improvement project indicated that, overall, the mitigation had been successful, particularly the provision of ecological mitigation and the integration of many of the engineering works into the landscape when viewed from Ballinluig Village.

A.4.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A9(T) Ballinluig Junction Improvement project 3 years before and 1 year after project completion are shown in Figures A.4b and A.4c.



A9(T) Ballinluig Junction Imp.
Figure A.4b

Project Opening Date: 26 May 08
3 Years Before Opening Accidents

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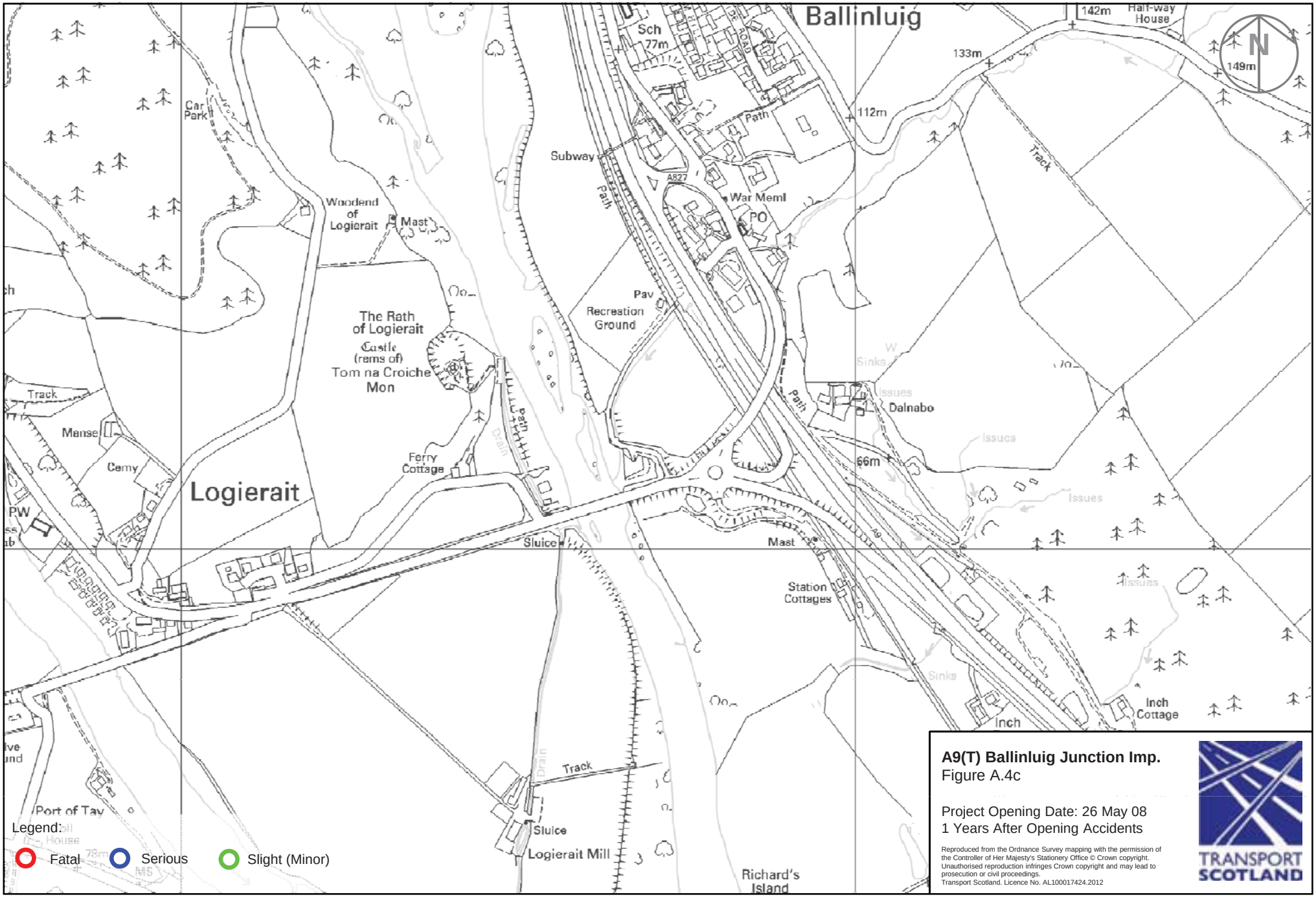

A9(T) Ballinluig Junction Imp.
Figure A.4c

Project Opening Date: 26 May 08
1 Years After Opening Accidents

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A summary of the personal injury accident data is shown in Table A.4.3.

Table A.4.3: A9(T) Ballinluig Junction Improvement – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A9(T)	1	0	0	1
A827	0	2	0	2
Total	1	2	0	3
1 Year After				
A9(T)	0	0	0	0
A827	0	0	0	0
Total	0	0	0	0

As can be seen in Table A.4.3, no personal injury accidents have occurred in the 1 year period following the opening of the project in comparison to three personal injury accidents (one fatal and two serious) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in June 2009. The RSA report confirmed that no personal injury accidents had occurred within the vicinity of the project within the 1 year period after opening. The report, however, did note that there was evidence of an accident occurring on the southbound entry to Ballinluig Village but no record of this accident had been received.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A9(T) Ballinluig project is operating safely.

A.4.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The comparison of predicted and actual traffic flows, presented in section A.4.2, can be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

The comparison indicates that the predicted 2009 flow was 7.3% lower than the observed 2009 flow on the A9(T). The project may, therefore, deliver additional benefits to road users than those predicted as part of the project's appraisal.

Economy: Key Findings

The difference between predicted and actual AADT flows is likely to have resulted in an underestimation of road user benefits.

A.4.6 Integration

Policy Integration

The Local Plan relevant at the time that the project was progressed does not contain any Local Government policies specific to Ballinluig Junction, the project supports Central Government policy through its objective of reducing accidents.

Integration: Key Findings

The project contributes to Government Safety Objectives for the reduction of fatal and serious accidents.

A.4.7 Accessibility & Social Inclusion

Community Accessibility

The following observations, relevant to community accessibility, were made during the environmental mitigation site visit in May 2010.

Observations

To the east of the A9(T), provision has been made for cyclists within the local access road and through segregated cycleways incorporated into the project design. Signs are present along the access road denoting the presence of cyclists and the road also incorporates several passing places to allow for traffic to pass safely.

Accessibility & Social Inclusion: Key Findings

Observations from the environmental mitigation site visit indicate that the project incorporates measures for both cyclists and walkers.

A.4.8 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Table A.4.4.

Table A.4.4: A9(T) Ballinluig Junction Improvement – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid 02 Prices in 2002 at 3.5% Discount	July 05 Prices	Mid 02 Prices in 2002 at 3.5% Discount	Mid 02 Prices in 2002 at 3.5% Discount
Total	£15,924,510	£11,327,012	£11,900,000	£9,245,528	£2,081,485 (23%)

Cost to Government: Key Findings

The out-turn cost of the A9(T) Ballinluig project is approximately £2.1m (23%) greater than was predicted at the time of assessment.

A.4.9 Value for Money

Initial Indications

The economic appraisal results for the A9(T) Ballinluig Junction Improvement project predicted a Net Present Value (NPV) of £9.92m and Benefit to Cost Ratio (BCR) of 1.95 under the NRTF central traffic forecast scenario.

Based on the comparisons presented in sections A.4.5 and A.4.8, which suggest that the benefits are likely to have been underestimated and indicate that the cost is greater than predicted, the NPV and BCR of the project are unlikely to be as great as predicted.

Value for Money: Key Findings

Although the NPV and BCR are unlikely to be as great as predicted at the time of assessment, it is judged that the project will continue to represent value for money.

A.4.10 Achievement of Objectives

As specific indicators to measure the performance of the A9(T) Ballinluig Junction Improvement project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A9(T) Ballinluig Junction Improvement project is progressing towards achieving its objectives, is presented in Table A.4.5.

Table A.4.5: A9(T) Ballinluig Junction Improvement – Progress Towards Achieving Objectives

Objective	Commentary	Progress
Contribute to Government safety objectives for the reduction of fatal and serious accidents of 40% by 2010	No personal injury accidents were recorded in the 1 year period following the opening of the project in comparison to 1 fatal and 2 serious accidents in the 3 years before opening suggesting an improvement in road safety.	+ve
Achieve good value for money	The economic assessment undertaken for the project indicates that the Ballinluig Junction improvements could deliver significant travel time and accident reduction benefits to road users. Whilst the out-turn costs were greater than the predicted project costs, a review of the economic assessment indicates that even with this increase the project would still have provided a benefit to road users and the project would continue to represent value for money.	+ve
Maintain through movement on A9(T)	The new grade separated junction on the A9(T) facilitates the through movement of traffic through the removal of vehicles turning on the mainline. As the temporary 50mph speed limit on the A9(T) within the vicinity of the junction has been removed, journey times of through traffic are likely to have reduced.	+ve
Be able to be maintained and operated safely	A servitude right of access is available along the surfaced track to the south of the A9(T), beyond the trunk road boundary. Whilst there are a few local issues being addressed, the junction can generally be maintained and operated safely.	+ve
Minimise disruption during construction	Controls / conditions were imposed through the contract to minimise disruption and these were monitored during construction. The traffic management arrangement adopted to slow traffic through the works and provide access to Ballinluig village is	+ve

Objective	Commentary	Progress
	considered to have worked well.	
Incorporate measures for non motorised users	Several measures were incorporated for non motorised users including a signed cycleway along the eastern access road, and dedicated cycleways and footpaths elsewhere within the project.	+ve
Avoid impacts on environmentally designated area (SAC and SSSI).	The site visit did not identify any significant impacts occurring to the SAC and SSSI, although no dedicated ecological surveys were undertaken. Cut-off lighting on the new roundabout adjacent to the River Tummel helps in minimising light affecting the interests of the designations.	+ve
Minimise environmental impact.	The design of the project has helped to minimise the environmental impact. The only residual impacts remaining are as a result of the materials and design of the wing walls and Network Rail safety barriers, which adversely affect views and also the quality of the planting on site.	+ve
Be consistent with local planning objectives and policies.	The Local Plan relevant at the time that the project was progressed does not contain any Local Government policies specific to Ballinluig Junction.	=

Key: +ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.5 A9(T) HELMSDALE PHASE 2

A.5.1 Introduction

Project Overview

Improvements to the A9(T) between Helmsdale and the Ord of Caithness were carried out in two phases.

The Phase 1 improvements were largely on-line and involved the construction of 2.5 kilometres of 7.3 metre-wide single carriageway and included the provision of a 515 metre-long, 10 metre-wide section of climbing lane for northbound traffic to the north of the Phase 2 works.

The Phase 2 improvements were largely off-line and involved the construction of 2.1 kilometres of 6 metre-wide single carriageway and a 280 metre-long, 10 metre-wide section of climbing lane for northbound traffic at the northern extent of the project to tie into the Phase 1 works.

The general location of the project is shown in Figure A.5a.

The A9(T) Helmsdale Phase 2 project was officially opened to traffic on 21st August 2008.

Project Objectives

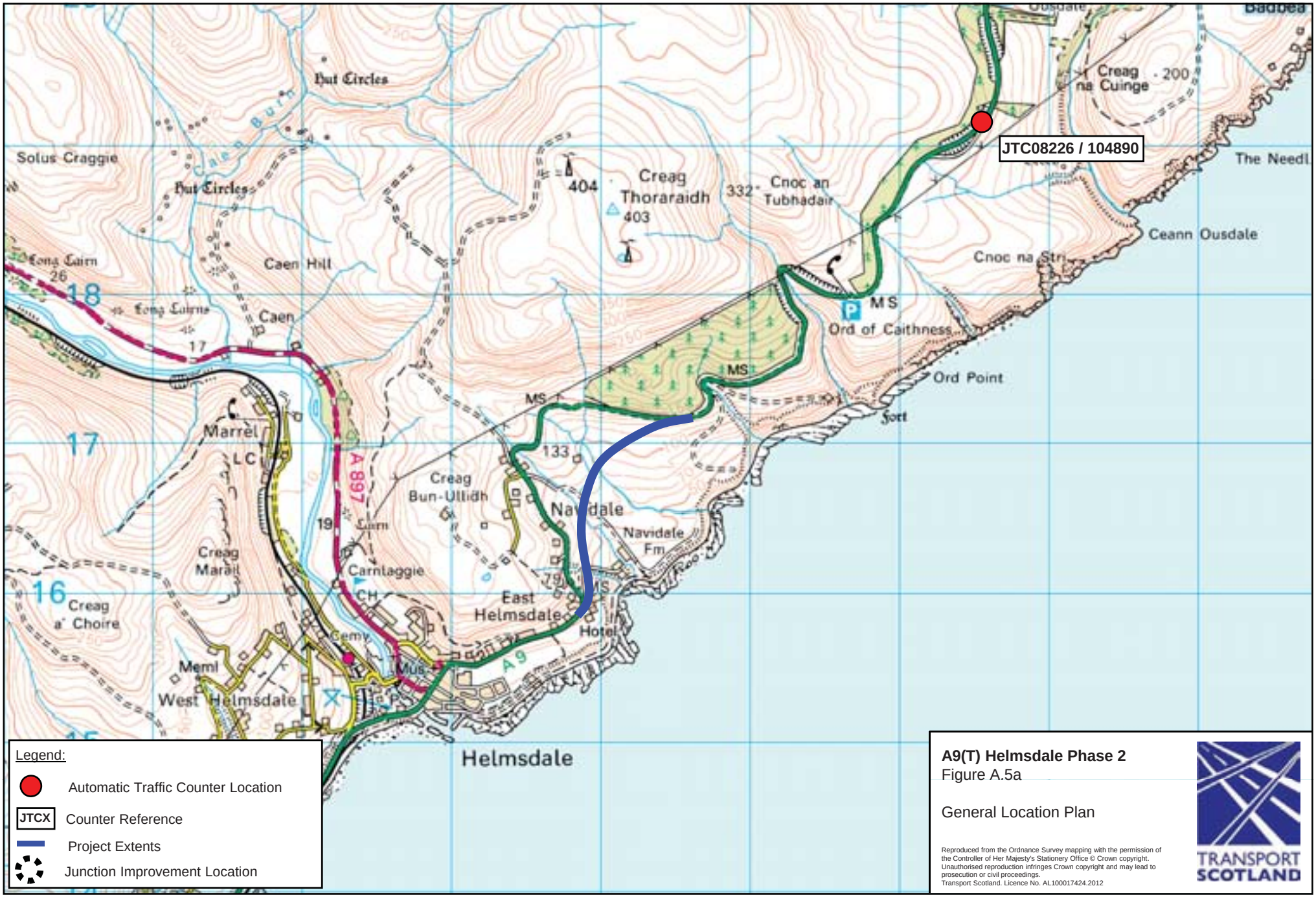
The objectives of the A9(T) Helmsdale Phase 2 project were set as follows:

- to improve safety on the A9(T);
- to improve through movement of traffic on the A9(T);
- to minimise environmental impact;
- to be promotable to the local community;
- to minimise disruption during construction; and
- to be maintainable and operable.

Evaluation Methodology

The A9(T) Helmsdale Phase 2 project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.



Legend:

- Automatic Traffic Counter Location
- JTCX — Counter Reference
- Project Extents
- Junction Improvement Location

A9(T) Helmsdale Phase 2
Figure A.5a

General Location Plan

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As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes and travel times presented in the following section.

A.5.2 Network Traffic Indicators

Traffic Volumes

The location of Transport Scotland's Automatic Traffic Counter (ATC) within the study area is shown in Figure A.5a.

Traffic counter JTC08226 was superseded by 104890 in 2007 which provided a more detailed classification of vehicles using the A9(T) at Berriedale.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.5.1.

Table A.5.1: A9(T) Helmsdale Phase 2 – ATC Data

ATC Reference	AADT by Year					
	2005	2006	2007	2008	2009	2010
A9(T) at Berriedale						
JTC08226 / 104890	1,950	1,953	2,068	Year of Opening	2,084	1,936

A comparison between pre and post opening traffic volumes on the A9(T) at Berriedale indicates that traffic flows in 2009 were consistent with 2007 flow levels, however, traffic flows between 2009 and 2010 have reduced marginally by around 100 vehicles per day (vpd), approximately 7%.

Given the nature of the A9(T) Helmsdale Phase 2 project, changes in post opening traffic levels are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A9(T) Helmsdale Phase 2 project is based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2002 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by factoring the 2007 opening year flows used in the economic assessment with NRTF 97 low and high growth factors.

A summary of the actual and predicted traffic data is shown in Table A.5.2 below.

Table A.5.2: A9(T) Helmsdale Phase 2 – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT		% Difference (Predicted – Actual) / Actual	
		Low	High	Low	High
A9(T) at Berriedale					
104890	2,084	1,904	1,977	-8.6%	-5.1%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.5.2 indicates that the predicted 2009 flow was 8.6% and 5.1% lower than the observed 2009 flow under low and high traffic forecast scenarios respectively.

Whilst this comparison indicates that actual traffic growth has exceeded the NRTF low and high growth factors used within the economic assessment, the difference is within the accepted limits.

Carriageway Standard Assessment

A single 2-lane carriageway with a climbing lane (tying into the existing climbing lane that was constructed as part of the Phase 1 works) was constructed on the A9(T), north of Helmsdale, improving the alignment of the route and providing dedicated overtaking opportunities to help reduce accident numbers, reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.5.3 based on the observed 2009 traffic flow.

Table A.5.3: A9(T) Helmsdale Phase 2 – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
2,084	Single 2-Lane	Single 2-lane & Climbing Lane

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a climbing lane given in TA 46/97 and, given the nature of the surrounding topography and the existing climbing lane constructed as part of a previous improvement, the constructed carriageway standards are considered appropriate.

Travel Times

Change in Travel Times

As the Helmsdale Phase 2 project has extended the climbing lane and resulted in a significant reduction in the overall length of the A9(T) route (by approximately 1 kilometre), it can be expected that journey times on the A9(T), over the extent of the project are highly likely to have reduced.

A.5.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A9(T) Helmsdale Phase 2 project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in May 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

As the A9(T) Helmsdale Phase 2 project has resulted in a significant reduction in the overall length of the A9(T) route, it is likely that the overall impact of noise and air quality over the extents of the project will have reduced.

Given the rural nature of the A9(T) Helmsdale Phase 2 improvements, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A9(T) Helmsdale Phase 2 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.5.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A9(T) Helmsdale Phase 2 project 3 years before and 1 year after project completion are shown in Figures A.5b and A.5c.

A summary of the personal injury accident data is shown in Table A.5.4.

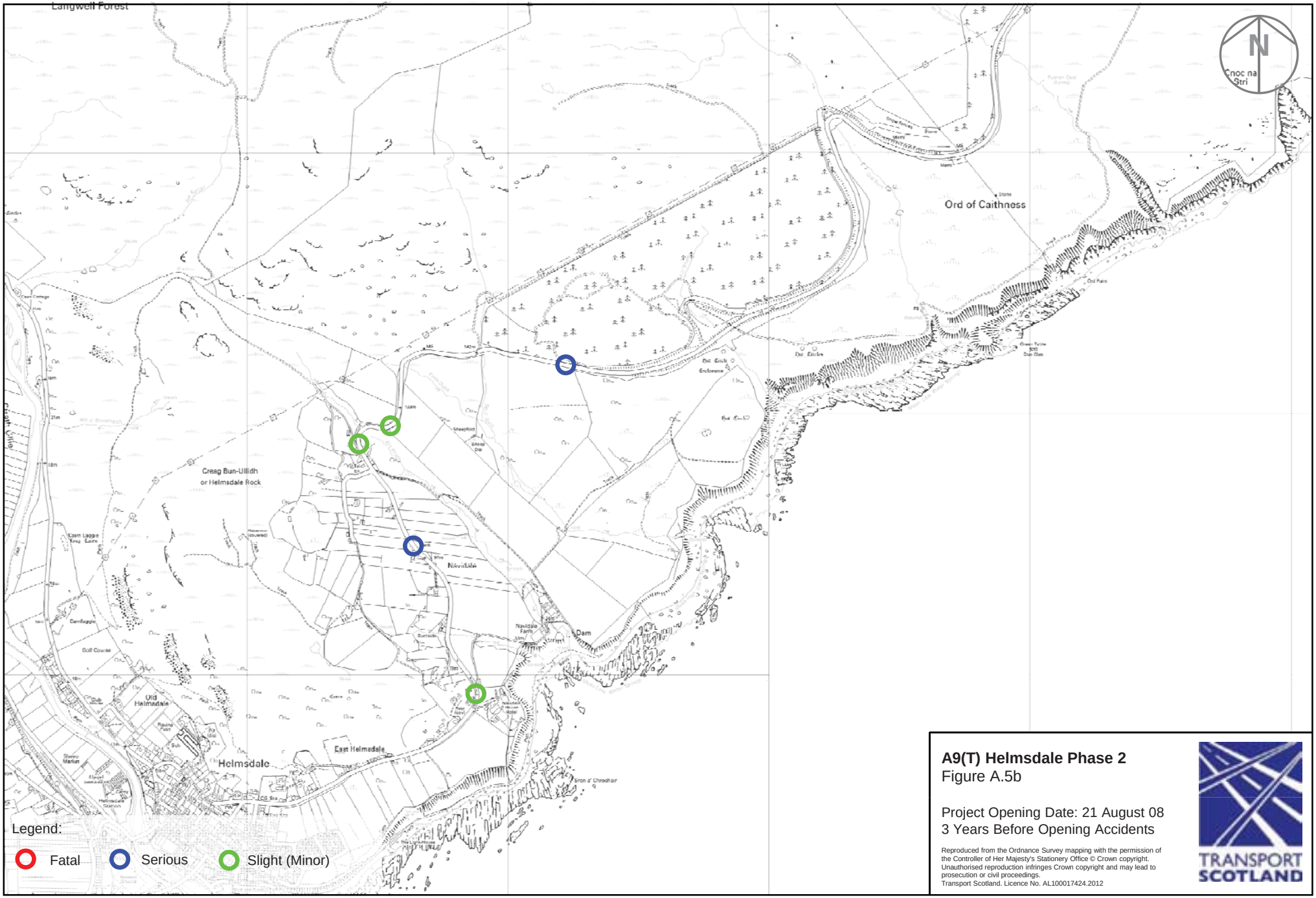
Table A.5.4: A9(T) Helmsdale Phase 2 – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A9(T)	0	2	3	5
1 Year After				
A9(T)	0	0	1	1
Bypassed Sections	0	0	0	0

As can be seen in Table A.5.4, one personal injury accident (slight) occurred in the 1 year period following the opening of the project in comparison to five personal injury accidents (two serious and three slight) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in November 2010. The RSA report confirmed that only one personal injury accident (slight) occurred during the period 1 year after project opening and involved a cyclist travelling southbound on a downhill section. The RSA report also noted that the cyclist may simply have been travelling too fast resulting in a loss of control.



A9(T) Helmsdale Phase 2
Figure A.5b

Project Opening Date: 21 August 08
3 Years Before Opening Accidents

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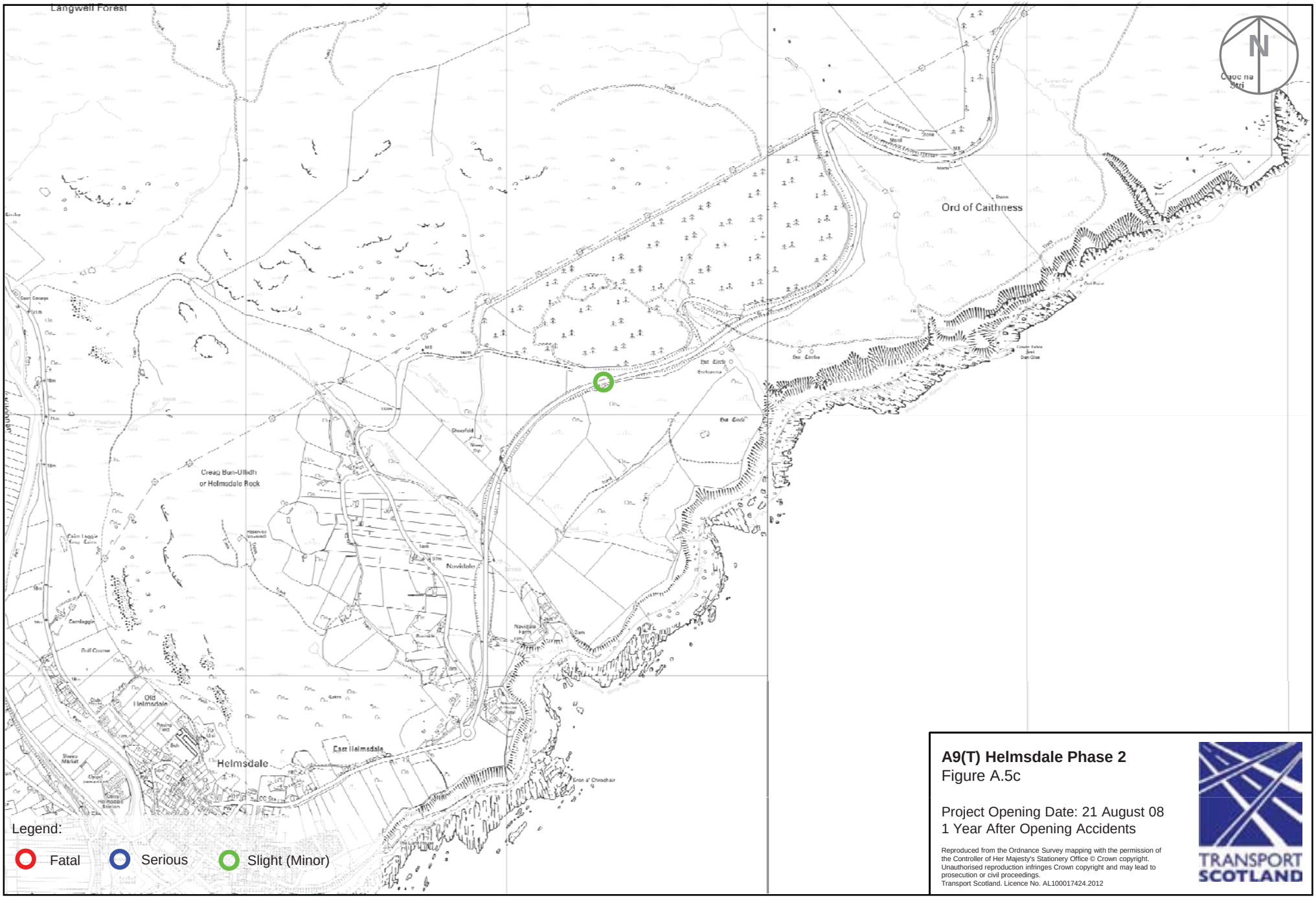

A9(T) Helmsdale Phase 2
Figure A.5c

Project Opening Date: 21 August 08
1 Year After Opening Accidents

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The report concluded that the safety record over the length of the project has improved significantly following the opening of the project and given the singular nature of the accident involving a single cyclist, there is no common factor or trends.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A9(T) Helmsdale Phase 2 project is operating safely.

A.5.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The comparison of predicted and actual traffic flows, presented in section A.5.2, can be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

The comparison indicates that the predicted 2009 flow was up to 8.6% lower than the observed 2009 flow on the A9(T), which may have resulted in an underestimation of the road user benefits of the project.

Economy: Key Findings

The difference between predicted and actual AADT flows is likely to have resulted in an underestimation of road user benefits.

A.5.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Table A.5.5.

Table A.5.5: A9(T) Helmsdale Phase 2 – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid 98 Prices in 1998 at 3.5% Discount	Q2 04 Prices	Mid 98 Prices in 1998 at 3.5% Discount	Mid 98 Prices in 1998 at 3.5% Discount
Total	£7,108,640	£4,003,546	£6,116,158	£4,070,280	-£66,734 (2%)

Cost to Government: Key Findings

The out-turn cost of the A9(T) Helmsdale Phase 2 project is around £0.1m (2%) lower than was predicted at the time of assessment.

A.5.7 Value for Money

Initial Indications

The economic appraisal results for the A9(T) Helmsdale project predicted a Net Present Value (NPV) of £2.27m and Benefit to Cost Ratio (BCR) of 1.65 based on an average of the results from the economic assessments carried out under NRTF low and high traffic scenarios.

Based on the comparisons presented in sections A.5.5 and A.5.6, which suggest that the benefits are likely to have been underestimated and indicate that the cost is marginally lower than predicted, the NPV and BCR of the project is likely to be greater than predicted.

Value for Money: Key Findings

It is judged that the project is likely to deliver value for money over and above that predicted as part of the project's assessment.

A.5.8 Achievement of Objectives

As specific indicators to measure the performance of the A9(T) Helmsdale project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A9(T) Helmsdale Phase 2 project is progressing towards achieving its objectives, is presented in Table A.5.6.

Table A.5.6: A9(T) Helmsdale Phase 2 – Progress Towards Achieving Objectives

Objective	Commentary	Progress
Improve safety on the A9(T).	A comparison between 3 years before opening and 1 year after opening personal injury accidents occurring within the vicincity of the project indicates that 5 accidents (2 serious and 3 slight) occurred prior to the opening of the project in comparison to 1 personal injury accident (slight) occuring in the 1 year period following the opening of the project suggesting an improvement in road safety.	+ve
Improve through movement of traffic on the A9(T).	Although pre and post opening journey time surveys have not been carried out for the A9(T) Helmsdale Phase 2 Improvements (and, therefore, actual changes in vehicle speeds and journey times can not be quantified), it can be expected that, as a result of the significant improvements in vertical and horizontal geometry shortening the route, any impacts on vehicle speeds and journey times are likely to be positive.	+ve
Minimise environmental impact.	No significant adverse environmental impacts were identified during the site visit. Changes to the design of the project occurred between the publishing of the Environmental Statement and the as-built project, however, these changes are not deemed to have resulted in a detrimental effect on the integration of the project into the wider landscape or upon receptors surrounding the A9(T) route, the use of the existing landform and the provision of new planting along the length of the route helps to create a 'visual fit' within the wider landscape whilst still maintaining open views to the east.	+ve
Be promotable to the local community.	During the public consultation exercise undertaken during the development and selection of the preferred scheme, the alignment adopted was favoured by 87% of respondents.	+ve

Objective	Commentary	Progress
Minimise disruption during construction.	Controls / conditions were imposed through the contract to minimise disruption and these were monitored during construction.	+ve
Be maintainable and operable.	Whilst there are a few local maintenance issues, the project can generally be considered to be maintainable and operable.	+ve

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.6 A68(T) DALKEITH BYPASS

A.6.1 Introduction

Project Overview

The project involved the construction of a 5.4 kilometre bypass to the north of Dalkeith between the A68(T) at Fordel Mains and the A720(T) Edinburgh City Bypass, with 2.6 kilometres of single carriageway and a 2.8 kilometre southbound climbing lane between the junctions with the A6094 Salters Road and A6106 Fordel Mains.

In parallel and on completion of the bypass construction, Midlothian Council were expected to implement a full closure of Dalkeith High Street to traffic and pedestrianise the historic town centre. Subsequently, however, this did not happen. Following public consultation by the council, the implemented measures included public realm enhancements and traffic calming measures whilst maintaining a through route for traffic.

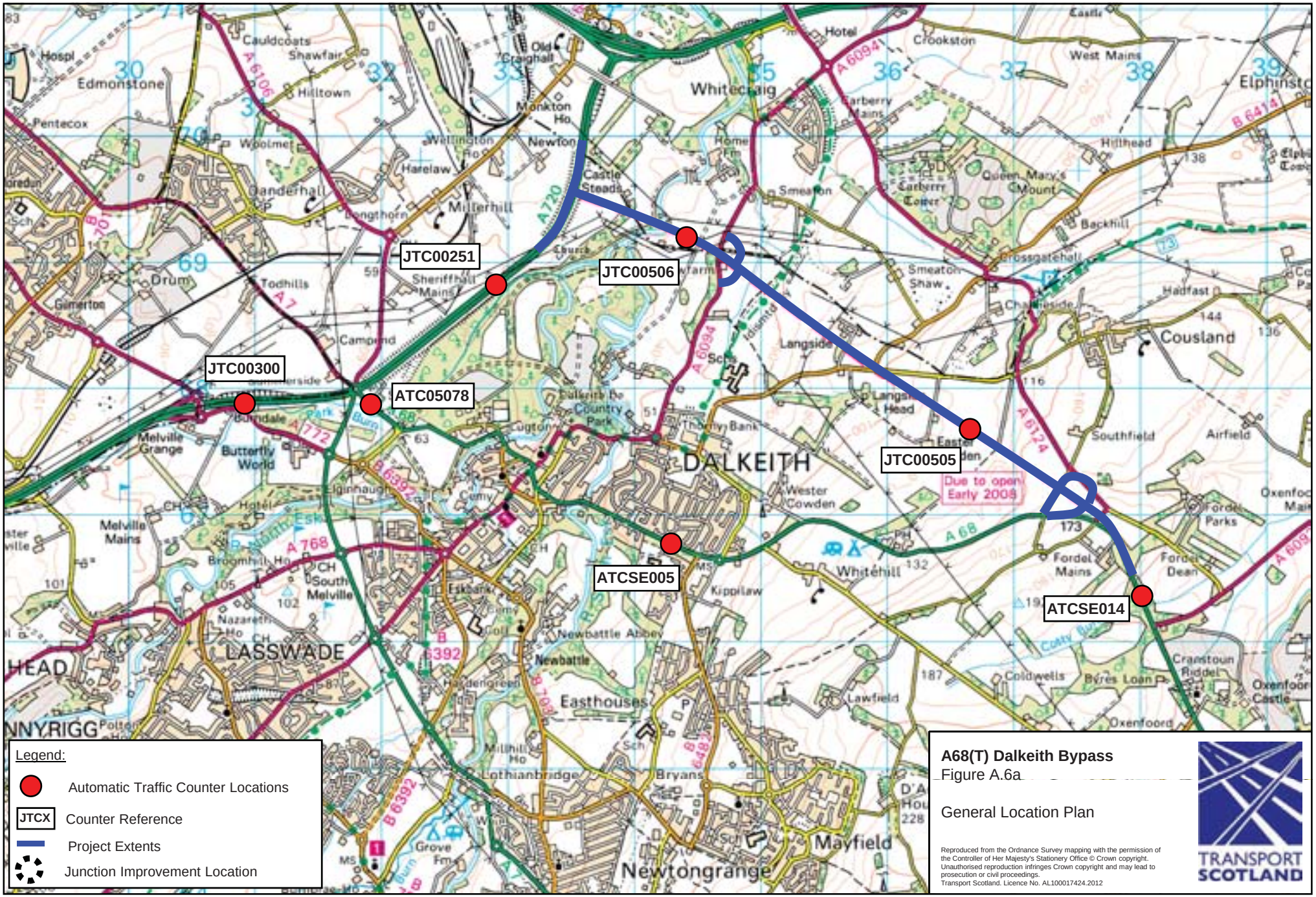
The general location of the project is shown in Figure A.6a.

The A68(T) Dalkeith Bypass project was officially opened to traffic on 23rd September 2008.

Project Objectives

The objectives of the A68(T) Dalkeith Bypass project were set as follows:

- to provide good quick and reliable inter-urban road links;
- to improve accessibility from Edinburgh to the Central Borders and the North of England;
- to aid economic prosperity and development by reducing travel costs particularly for business and commercial traffic serving existing and proposed business and commercial developments (including tourism and service industries);
- to improve road safety and contribute towards the Government's overall target of reducing road casualties;
- to minimise the intrusion of roads and traffic on communities and on the environment; and
- to use the limited resources available as effectively as possible to achieve good value for money for both taxpayers and transport users.



A68(T) Dalkeith Bypass
Figure A.6a

General Location Plan

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Evaluation Methodology

The A68(T) Dalkeith Bypass project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.

As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes and travel times presented in the following section.

As noted above, the decision to proceed with the project was based on the assumption that there would be a full closure of the High Street in Dalkeith, in line with the proposals of Midlothian Council at that time. Subsequent to public consultation by the council, the implemented measures included public realm enhancements and traffic calming measures, while maintaining a through route for traffic.

For the purposes of evaluation, therefore, the predicted traffic flows and journey times are taken from a model developed during the preparation of the project which better reflects the improvements that were implemented within Dalkeith town centre. This alternate model predicted economic benefits that did not outweigh the cost of the project and was used instead of the main model on which the decision to proceed with the project was based.

A.6.2 Network Traffic Indicators

Traffic Volumes

The locations of Automatic Traffic Counters (ATCs) within the study area are shown in Figure A.6a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area are presented in Table A.6.1.

Table A.6.1: A68(T) Dalkeith Bypass – ATC Data

ATC Reference	AADT by Year					
	2006	2007	2008	2009	2010	2011
A68(T) Dalkeith Bypass						
JTC00506	-	-	Year of Opening	10,492	10,580	11,615
JTC00505	-	-		8,675	8,935	10,030
A68(T) South of Dalkeith Bypass						
ATCSE014	11,390	11,927	Year of Opening	11,707	11,988	12,536
Bypassed Route through Dalkeith						
ATC05078	15,464	15,328	Year of Opening	10,212	10,339	10,573
ATCSE005	16,320	15,589		8,461	8,582	9,416
A720(T) Edinburgh City Bypass (West of Sheriffhall Rb)						
JTC00300	42,492	42,724	Year of Opening	43,940	43,093	N/A
A720(T) Edinburgh City Bypass (Between Sheriffhall Rb & A68(T) Junction)						
JTC00251	37,273	N/A	Year of Opening	40,121	41,123	40,652

A comparison between the pre and post opening traffic volumes on the bypassed route through Dalkeith, presented in Table A.6.1, indicates that traffic flows in 2009 were 7,100 vehicles per day (vpd) lower compared with 2007 levels within Dalkeith and 5,100 vpd lower south of Sheriffhall Roundabout, suggesting that approximately 45% of traffic previously travelling via Dalkeith town centre now uses the Dalkeith Bypass.

The traffic data indicates that the A68(T) Dalkeith Bypass, between the A720(T) Edinburgh City Bypass and the A6094, carried approximately 10,500 vpd in 2009, 10,600 vpd in 2010 and 11,600 vpd in 2011. To the south of the A6094, the Dalkeith Bypass carried approximately 8,700 vpd in 2009, 8,900 vpd in 2010 and 10,000 vpd in 2011.

Traffic data on the A68(T) to the south of the Dalkeith Bypass indicates that the route carried approximately 11,700 vpd in 2009 and that the traffic flows in 2009 were approximately 200 vpd lower compared with 2007 levels, however, 2010 flow levels were consistent with flow levels in 2007. Traffic flows in 2011 increased by around 550 vpd (approximately 5%) compared to 2010 flow levels.

Traffic flows on the A720(T) Edinburgh City Bypass, between Sheriffhall Roundabout and the A68(T) Dalkeith Bypass, were approximately 37,200 vpd in 2007 and increased to approximately 40,100 vpd in 2009 and 41,100 vpd in 2010 before reducing to approximately 40,700 vpd in 2011. Variations in traffic flows on this section of the A720(T) Edinburgh City Bypass are not unexpected given changes to the pattern of traffic entering and exiting the A720(T) Edinburgh City Bypass from the A68(T) Dalkeith Bypass rather than the bypassed route through Dalkeith.

Traffic flows on the A720(T) Edinburgh City Bypass to the west of Sheriffhall Roundabout were approximately 42,700 vpd in 2007 and increased to approximately 43,900 vpd in 2009, before reducing to approximately 43,100 vpd in 2010.

A comparison of the bypassed route through Dalkeith with the combined Dalkeith bypass and bypassed route traffic flows pre and post opening (i.e. 15,600 vpd vs 19,000 vpd) indicates an overall increase in traffic following opening of 3,400 vpd 22%. The data on the A68(T) trunk road south of the bypass, however, has remained consistent pre and post opening of the A68(T) Dalkeith Bypass which suggests that the increase in combined traffic is due to changes in local traffic patterns within the Dalkeith locality and is not a result of induced traffic on the bypass.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A68(T) Dalkeith Bypass project is based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counters within the study area.

Predicted traffic flows for 2009 were derived by extrapolating from the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.6.2 below.

Table A.6.2: A68(T) Dalkeith Bypass – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT	% Difference (Predicted – Actual) / Actual
A68(T) Dalkeith Bypass			
JTC00506	10,492	10,755	2.5%
JTC00505	8,675	8,527	-1.7%
A720(T) Edinburgh City Bypass (West of Sheriffhall Rb)			
JTC00300	43,940	40,402	-8.1%
A720(T) Edinburgh City Bypass (Between Sheriffhall Rb & A68(T) Junction)			
JTC00251	40,121	40,877	1.9%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.6.2 indicates that the predicted 2009 flow (derived by extrapolating from the modelled assessment year traffic flows) was between 2% lower and 3% greater than the observed 2009 flow on the A68(T) Dalkeith Bypass, which is well within accepted limits.

Similar comparisons demonstrate that the predicted 2009 flow was 2% greater than the observed 2009 flow on the A720(T) Edinburgh City Bypass between Sheriffhall Roundabout and the A68(T) Dalkeith Bypass and 8% lower than the observed 2009 flow on the A720(T) Edinburgh City Bypass to the west of Sheriffhall Roundabout.

Carriageway Standard Assessment

A single 2-lane carriageway with a climbing lane was constructed to bypass Dalkeith as part of a series of improvements along the A68(T) route, providing dedicated overtaking opportunities between the junctions with the A6094 Salters Road and A6106 Fordel Mains to help reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.6.3 based on the traffic flows observed on the bypass in 2009.

Table A.6.3: A68(T) Dalkeith Bypass – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
8,675 to 10,492	Single 2-Lane	Single 2-Lane & Climbing Lane

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a climbing lane given in TA 46/97 and, given the nature of improvements along the A68(T) route, the constructed carriageway standards are considered appropriate.

Travel Times

Comparison Between Pre and Post Opening Travel Times

Journey time surveys were carried out for the A68(T) Dalkeith Bypass project in September 2005 and March 2012, during the AM and PM survey periods, to provide an indication of the changes in average journey times between Fordel Mains and Sheriffhall Roundabout.

The average post opening savings in travel times between Fordel Mains and Sheriffhall Roundabout using:- (a) the A68(T) Dalkeith Bypass (& A720(T) Edinburgh City Bypass); and (b) the bypassed route through Dalkeith (compared with travel times along the A68(T) route through Dalkeith in 2005) are shown in Tables A.6.4a and A.6.4b respectively.

Table A.6.4a: A68(T) Dalkeith Bypass – Travel Time Savings: A68(T) Dalkeith Bypass

Direction	AM Peak		PM Peak	
	Time Savings (mins / secs)	% Saving	Time Savings (mins / secs)	% Saving
Northbound	- 3m 45s	40%	- 1m 46s *	21%
Southbound	- 4m 18s	46%	- 3m 21s	41%

* Value may be low due to signal timings at Sheriffhall Roundabout.

Table A.6.4b: A68(T) Dalkeith Bypass – Travel Time Savings: Bypassed Route Through Dalkeith

Direction	AM Peak		PM Peak	
	Time Savings (mins / secs)	% Saving	Time Savings (mins / secs)	% Saving
Northbound	- 13s	2%	+ 14s	-3%
Southbound	- 1m 38s	18%	- 34s	7%

The post opening savings in travel times presented in Table A.6.4a indicate the following travel time savings between Fordel Mains and Sheriffhall Roundabout for vehicles using the A68(T) Dalkeith Bypass:

- savings of around 3.5 minutes and 2 minutes during the AM and PM peak periods respectively in the northbound direction of travel; and
- savings of around 4 minutes and 3.5 minutes during the AM and PM peak periods respectively in the southbound direction of travel.

The travel time savings presented in Table A.6.4b indicate that pre and post opening travel times on the bypassed route through Dalkeith are broadly consistent.

Comparison Between Predicted and Actual Travel Times

The available predicted 2011 AM peak journey times have been compared with the post opening journey times collected in March 2012. The comparison between the available predicted and actual journey times indicates that:

- predicted AM peak journey times on the A68(T) Dalkeith Bypass, between Fordel Mains and the A720(T) Edinburgh City Bypass, were consistent with actual journey times in both directions of travel ;
- predicted AM peak journey times on the A720(T) Edinburgh City Bypass, between Sheriffhall Roundabout and the A68(T) Dalkeith Bypass, were significantly longer than the actual journey times in both directions of travel; and
- predicted AM peak journey times on the bypassed route through Dalkeith, between Fordel Mains and Sheriffhall Roundabout, were broadly consistent with the actual journey times in both directions of travel.

The predicted AM peak journey times may be significantly longer than actual times on the A720(T) Edinburgh City Bypass due to improvements implemented at Sheriffhall Roundabout in 2008 that were not considered as part of the modelling.

A.6.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A68(T) Dalkeith Bypass project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in March 2011, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation. The key mitigation measures implemented as part of the project are as follows:

- use of the existing landscape and topography to fit the project into the wider landscape;
- noise mitigation measures within the vicinity of Smeaton Burn;
- Sustainable Urban Drainage Systems (SUDS);
- hedgerow and woodland planting; and
- specific measures for the protection of mammals including badgers and otters.

As part of the review the following areas were identified that require maintenance:

- gaps beneath the acoustic barrier at Smeaton Burn;
- mammal fencing along the route; and
- the hedgerow planting at Fordel Mains.

Noise and Air Quality

The comparison between pre and post opening traffic flows within the study area (discussed in Section A.6.2) indicates that post opening traffic volumes through Dalkeith town are significantly lower, which will have reduced local noise levels and improved air quality.

Noise surveys were undertaken for the A68(T) Dalkeith Bypass project between January and March 2009 to assess the level of noise impact on properties within the vicinity of the bypass and to establish whether any noise insulation measures were required.

The survey indicated that, of the twenty-one properties identified as potentially being subject to changes in noise levels as a result of the project, fourteen properties had experienced a reduction in ambient noise levels with five properties having experienced a slight to moderate increase in ambient noise levels, however, the increase in noise was within the acceptable limits.

Two properties experienced substantial increases in ambient noise levels and an acoustic barrier was provided to limit the impact of this increase. As a result, the recorded increase in noise was within the acceptable limits.

The survey also indicated that none of the properties identified satisfied the criteria where noise insulation compensation would be required.

Environment: Key Findings

The review of the mitigation measures implemented for the A68(T) Dalkeith Bypass project confirmed that the majority of mitigation measures committed within the Environmental Statement were in place.

Whilst areas were identified that require maintenance, the project is considered to fit well within the existing open landscape.

Mitigation measures to reduce the impact of increased levels of noise within the vicinity of the bypass were implemented and are operating successfully.

A.6.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A68(T) Dalkeith Bypass project 3 years before and 1 year after project completion are shown in Figures A.6b and A.6c.

A summary of the personal injury accident data is shown in Table A.6.5.

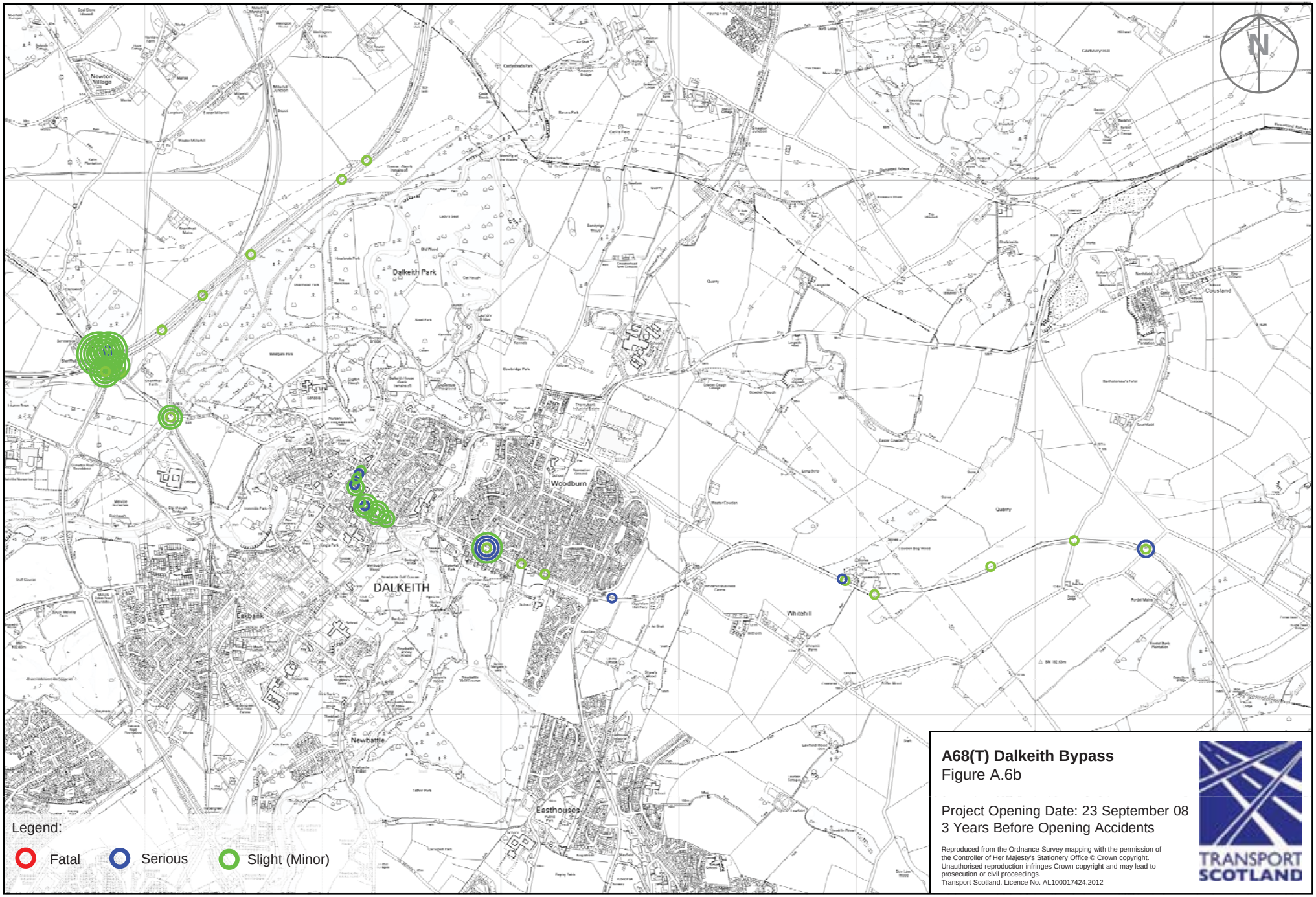
Table A.6.5: A68(T) Dalkeith Bypass – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A68(T)	0	9	48	57
1 Year After				
A68(T)	0	1	1	2
Bypassed Route	0	1	12	13
Total	0	2	13	15

As can be seen in Table A.6.5, two personal injury accidents (one serious and one slight) occurred on the A68(T) Dalkeith Bypass in the 1 year period following the opening of the project. In addition, thirteen personal injury accidents (one serious and twelve slight) occurred on the bypassed route through Dalkeith, resulting in a total of fifteen personal injury accidents (two serious and thirteen slight) occurring in the 1 year period following the opening of the project. This is in comparison to fifty-seven personal injury accidents (nine serious and forty-eight slight) in the 3 years before opening, which indicates a reduction in the number and severity of personal injury accidents occurring post opening of the project.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in June 2010 and examines the accidents which occurred on the bypass and in the vicinity of the tie-ins to the existing road network during the period 1st January 2009 to 31st December 2009. This period differs with the summary of pre and post opening accidents presented in Table A.6.5, which covers the 1 year period following the opening of the project from 23rd September 2008 to 22nd September 2009.



A68(T) Dalkeith Bypass
Figure A.6b

Project Opening Date: 23 September 08
3 Years Before Opening Accidents

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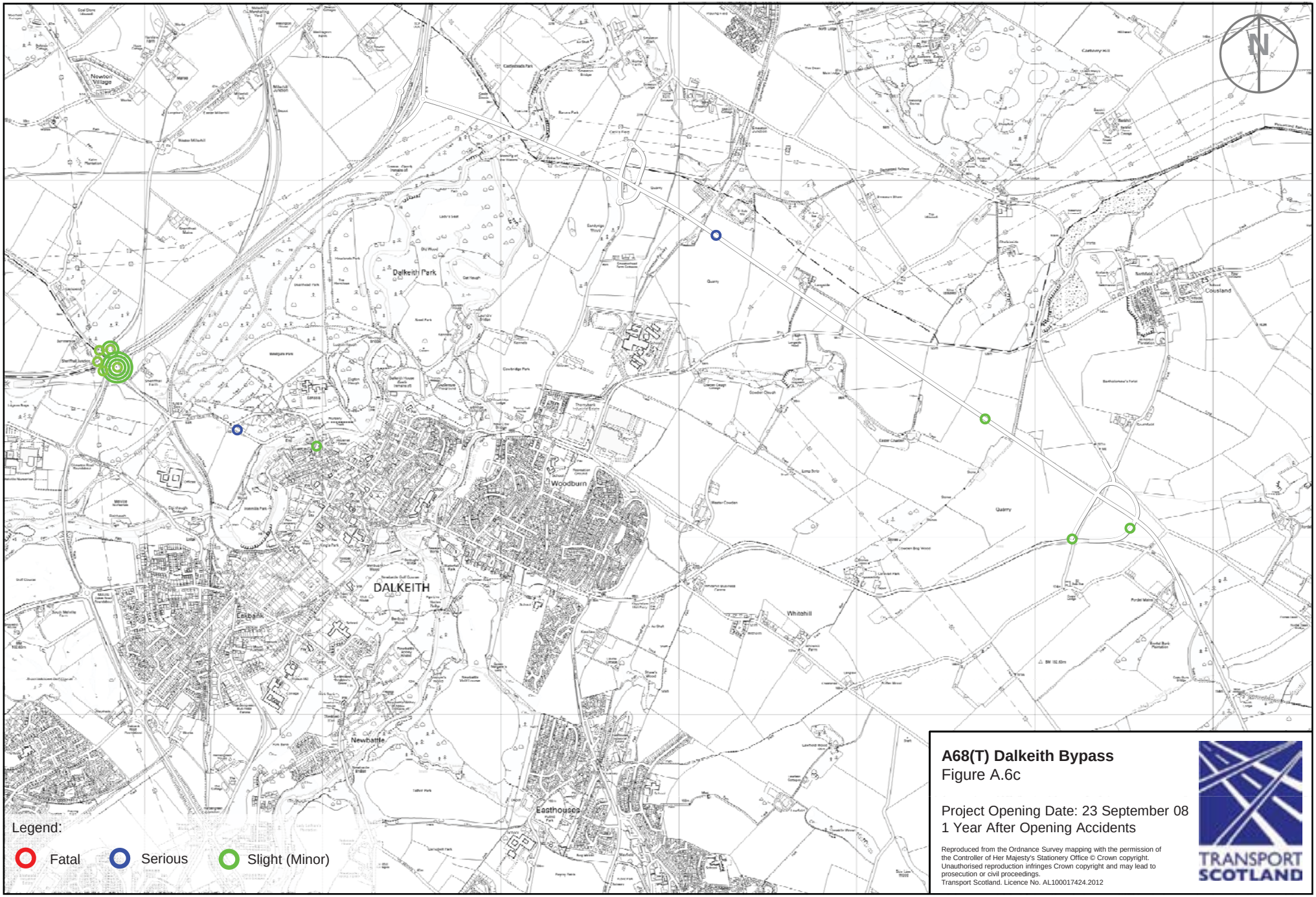

A68(T) Dalkeith Bypass
Figure A.6c

Project Opening Date: 23 September 08
1 Year After Opening Accidents

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The RSA report indicates that three personal injury accidents (one serious and two slight) occurred on the A68(T) Dalkeith Bypass, one personal injury accident (slight) occurred on a section of realigned local road and a further four personal injury accidents (slight) occurred on the A720(T) Edinburgh City Bypass, near to its junction with the A68(T).

The RSA report notes that two of the three personal injury accidents which occurred on the A68(T) Dalkeith Bypass involved vehicles performing u-turn manoeuvres and the remedial works undertaken at the Fordel Mains junction in March 2010 should address the issue.

The report also notes evidence of recent accidents which may have been unreported non-injury accidents or may have occurred outwith the period examined.

The RSA report concludes that the recorded accident records on the A68(T), A720(T) and local road network within the vicinity of the project did not highlight any common accident factors and that there was no further evidence of an accident problem that warranted further engineering work.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A68(T) Dalkeith Bypass project is operating safely.

A.6.5 Economy

Transport Economic Efficiency

The decision to proceed with the project was based on the assumption that there would be a full closure of the High Street in Dalkeith, which was in line with the proposals of Midlothian Council at that time. Subsequent to public consultation by the council, the implemented measures included public realm enhancements and traffic calming measures, while maintaining a through route for traffic.

As noted above, for the purposes of evaluation, the predicted traffic flows and journey times are those from the model developed during the preparation of the project which best reflects the improvements that were implemented within Dalkeith town centre. This model predicted economic benefits that did not outweigh the cost of the project.

The comparisons of predicted and actual traffic flows and travel times, presented in section A.6.2, can be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

Comparison Between Predicted and Actual Traffic Flows

The comparison between predicted and actual traffic flows indicates that the predicted 2009 flows were within 3% of the observed 2009 flows on the Dalkeith Bypass, which is well within accepted limits.

Comparison Between Predicted and Actual Travel Times

The comparison between predicted and actual travel times indicates that the predicted journey times on the A68(T) Dalkeith Bypass are longer than the average observed journey times on some sections of the routes within the study area.

Economy: Key Findings

The comparison of predicated and actual traffic flows and journey times confirms that the predicted economic benefits from the model that best reflects the improvements that were implemented within Dalkeith town centre may be exceeded.

A.6.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Table A.6.6.

Table A.6.6: A68(T) Dalkeith Bypass – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn – Pred.)
	@ April 10	Mid 02 Prices in 2002 at 3.5% Discount	Q3 05 Prices	Mid 02 Prices in 2002 at 3.5% Discount	Mid 02 Prices in 2002 at 3.5% Discount
Total	£40,605,719	£29,421,520	£33,394,000	£26,480,007	£2,941,512 (11%)

Cost to Government: Key Findings

The out-turn cost of the A68(T) Dalkeith Bypass project is approximately £2.9m (11%) greater than was predicted cost at the time of assessment.

A.6.7 Value for Money

Initial Indications

The economic appraisal results from the model developed during the preparation of the project, which best reflects the improvements that were implemented within Dalkeith town centre, predicted a Net Present Value (NPV) of -£4.42m and Benefit to Cost Ratio (BCR) of 0.88.

Based on the comparisons presented in sections A.6.5 and A.6.6, which confirm that the predicted economic benefits from this model may have been underestimated and indicate that the cost is greater than predicted, the NPV and BCR of the project may be greater than expected.

Value for Money: Key Findings

The NPV and BCR relating to the alternate model (which better reflects the improvements that were implemented within Dalkeith town centre) may be greater than predicted at the time of assessment.

This will not have affected the decision to proceed with the project as the main model developed during the preparation of the project (which reflected current thinking at the time in regards to improvements within Dalkeith) would have continued to provide value for money.

A.6.8 Achievement of Objectives

As specific indicators to measure the performance of the A68(T) Dalkeith Bypass project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A68(T) Dalkeith Bypass project is progressing towards achieving its objectives, is presented in Table A.6.7.

Table A.6.7: A68(T) Dalkeith Bypass – Progress Towards Achieving Objectives

Objective	Commentary	Progress
To provide good quick and reliable inter-urban road links.	Average journey times for strategic traffic using the A68(T) Dalkeith Bypass in both directions of travel have reduced significantly in the peak periods as a result of the project.	+ve
To improve accessibility from Edinburgh to the Central Borders and the North of England.	The significant reduction in average journey times for strategic traffic using the A68(T) Dalkeith Bypass support the conclusion that the project has contributed towards an improvement in accessibility from Edinburgh to the Borders and the North of England.	+ve
To aid economic prosperity and development by reducing travel costs particularly for business and commercial traffic serving existing and proposed business and commercial developments (including tourism and service industries).	The project reduces journey times for strategic road users, providing travel cost benefits to transport users, which is expected to help encourage economic development within the Lothian, Borders and wider area.	+ve
To improve road safety and contribute towards the Government's overall target of reducing road casualties.	A comparison between 3 years before opening and 1 year after opening personal injury accidents occurring within the vicincity of the project indicates that 57 accidents (9 serious and 48 slight) occurred prior to the opening of the project in comparison to 15 accidents (2 serious and 13 slight) occuring in the 1 year period following the opening of the project suggesings that the project is operating safely and that the bypass is safer than the bypassed route.	+ve
To minimise the intrusion of roads and traffic on communities and on the environment.	Environmental and landscaping measures have been implemented to help the project fit within the existing open landscape.	+ve
To use the limited resources available as effectively as possible to achieve good value for money for both taxpayers and transport users.	As a result of the improvements in Dalkeith town centre that were implemented subsequent to public consultation, the full economic benefits of the project as anticipated during its preparation are unlikely to be realised.	=

Key: +ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.7 A876(T) CLACKMANNANSHIRE BRIDGE

A.7.1 Introduction

Project Overview

The project involved the construction of a 4.0 kilometre bypass to the west of Kincardine including the Clackmannanshire Bridge and 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, providing a dedicated southbound overtaking opportunity over the bridge and a section of dedicated northbound overtaking opportunity to the north.

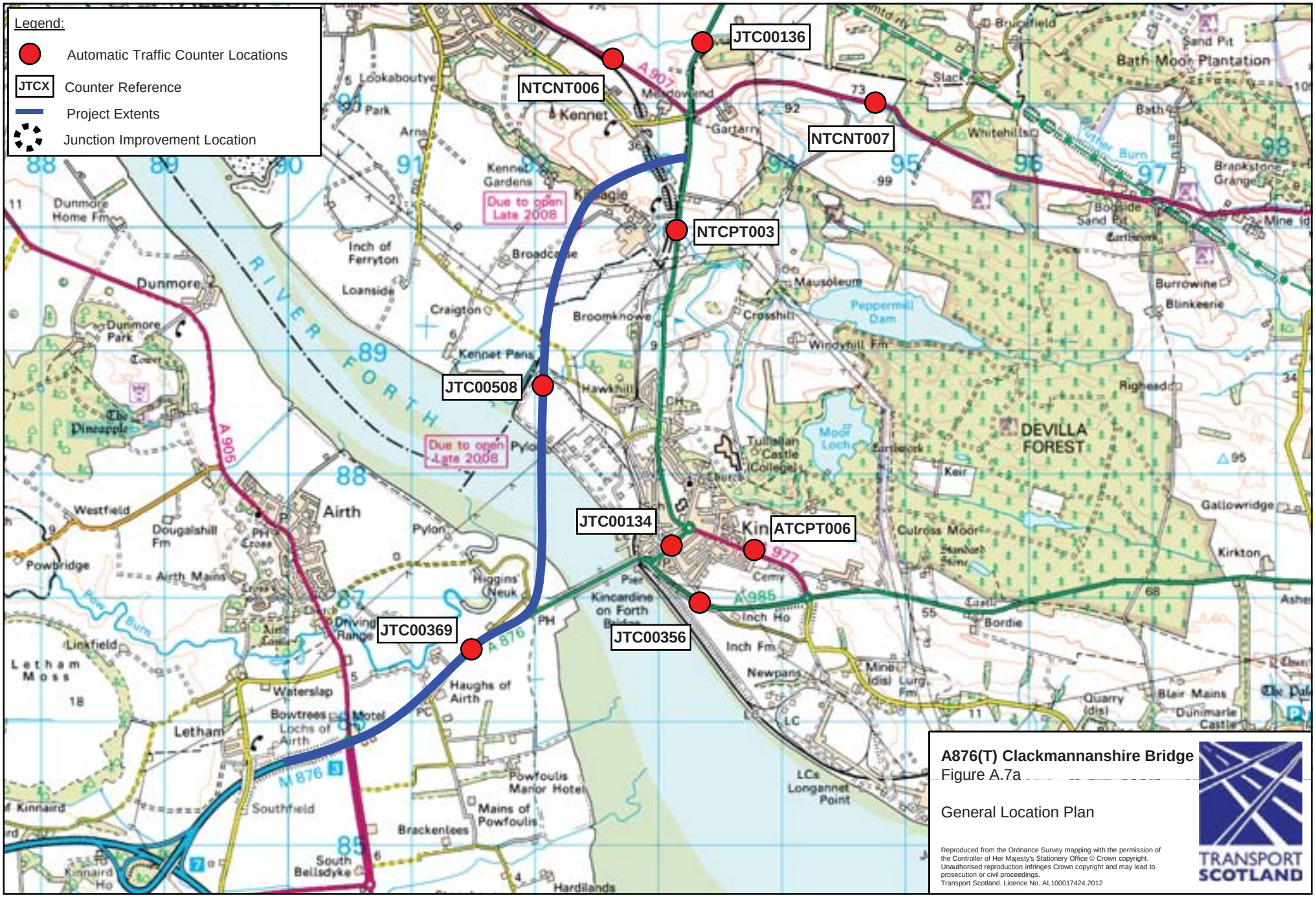
The general location of the project is indicated in Figure A.7a.

The A876(T) Clackmannanshire Bridge project was officially opened to traffic on 19th November 2008.

Project Objectives

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

- 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;
- 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);
- to facilitate use of the crossing by public transport and non-motorised road users;
- 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;
- to improve road safety and reduce, as far as practical, the risk and incidence of accidents involving vehicles on the A876(T)/ A985(T)/A977(T) trunk roads and non-motorised users in and around Kincardine;
- to protect and improve the natural environment;



A876(T) Clackmannanshire Bridge
Figure A.7a

General Location Plan

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- 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;
- to improve and develop local and express bus services, and integrate with the proposed reopening of the Stirling-Alloa-Kincardine railway line;
- to optimise the relationship between the proposed scheme and land-use as identified in the structure plans; and
- to maximise the improvement in transport links to employment, education and health for vulnerable groups to promote social inclusion.

Evaluation Methodology

The A876(T) Clackmannanshire Bridge project has been evaluated against the above objectives and the following criteria:

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

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes presented in the following section.

A.7.2 Network Traffic Indicators

Traffic Volumes

Comparison Between Pre and Post Opening Traffic Flows

A study to quantify the impact of the Clackmannanshire Bridge on traffic patterns and volumes within the vicinity of the bridge and wider central Scotland area was undertaken six months after project opening.

The study concluded that the opening of the Clackmannanshire Bridge had little impact on the overall volume of cross-Forth traffic (i.e. traffic using the A91, Clackmannanshire Bridge, Kincardine Bridge and Forth Road Bridge). It did, however, result in localised traffic flow changes – with total cross-Forth traffic in the Kincardine area increasing by approximately 8% (a corresponding fall being observed on the A91) whilst flows on the existing Kincardine Bridge reduced by approximately 52%.

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the key routes within the study area from Transport Scotland's Automatic Traffic Counters (ATCs) are presented in Table A.7.1. The locations of the ATCs are shown in Figure A.7a.

Table A.7.1: A876(T) Clackmannanshire Bridge – ATC Data

ATC Reference	AADT by Year					
	2006	2007	2008	2009	2010	2011
A876(T) Clackmannanshire Bridge						
JTC00508	-	-	Year of Opening	14,396	14,272	14,878
Bypassed A977 (within Kincardine)						
JTC00134	15,456	14,586	Year of Opening	3,240	4,134	3,346
Bypassed A977 (North of Kincardine)						
NTCPT003	15,895	15,291	Year of Opening	4,562	4,351	4,409
A985 (East of Kincardine)						
ATCPT006	2,995	3,273	Year of Opening	3,230	2,932	N/A
M876(T) South of Kincardine Bridge						
JTC00369	26,031	N/A	Year of Opening	26,135	25,195	26,596
A985(T) Kincardine Eastern Link Road						
JTC00356	10,955	11,337	Year of Opening	8,513	7,798	8,366
A907 West of Gartarry Roundabout (To/from Alloa, Clackmannan & Stirling)						
NTCNT006	12,155	11,436	Year of Opening	14,247	13,934	14,542
A907 East of Gartarry Roundabout (To/from Dunfermline)						
NTCNT007	2,806	3,574	Year of Opening	3,097	2,896	2,749
A977 North of Gartarry Roundabout (To/from M90(T))						
JTC00136	5,913	5,798	Year of Opening	6,009	5,822	N/A

Table A.7.1 indicates that Clackmannanshire Bridge carried around 14,400 vehicles per day (vpd) in 2009 with 3,200 vpd in Kincardine and 4,600 vpd on the bypassed A977 to the north of Kincardine. The M876(T) to the south of the Kincardine Bridge carried 26,100 vpd with 3,200 vpd on the A985 to the east of Kincardine and 8,500 vpd on the A985(T) Kincardine Eastern Link Road.

To the north of the Clackmannanshire Bridge, the A907 west of Gartarry Roundabout carried around 14,200 vpd in 2009, 6,000 vpd on the A977 to the north of the roundabout and 3,100 vpd on the A907 to the east.

A comparison between pre and post opening traffic volumes indicates that traffic flows in 2009 were around 11,300 vpd lower in Kincardine and 10,700 vpd lower on the A977 compared with 2007 flow levels, suggesting that traffic previously using the Kincardine Bridge and travelling through Kincardine onto the A977 is now using the new bridge.

While no traffic counters are located on the Kincardine Bridge itself, it can be deduced (from the counters on the M876(T) and the Clackmannanshire Bridge) that the Kincardine Bridge carried approximately 11,700 (i.e. 26,100 – 14,400) vpd in 2009, which is a reduction of around 55% compared to 2006 flow levels.

The traffic flow levels recorded on the M876(T) in 2009 are comparable with those recorded in 2006, which suggests that the opening of the Clackmannanshire Bridge has had little impact on the overall level of cross-Forth traffic flows in the Kincardine area.

Data for the Kincardine Eastern Link Road indicates that traffic flows in 2009 have reduced by around 2,800 vpd compared with 2007 flow levels, which suggests that traffic may now be using alternative routes (such as the Forth Road Bridge and M8(T)) for journeys between Central Scotland and Fife.

Data for the routes meeting at Gartarry Roundabout indicates that traffic flows on the A907 to the west and the A977 to the north in 2009 have increased by around 2,800 vpd and 200 vpd respectively compared with 2007 flow levels, which suggest that a greater volume of traffic from the west (Alloa and Clackmannan) and the north may be using the Clackmannanshire Bridge. Traffic flows have reduced by around 500 vpd on the A907 to the east of the roundabout in 2009 compared with 2007 flow levels, which suggests that traffic may now be using alternative routes (such as the Forth Road Bridge and M8(T)) for journeys between Central Scotland and Fife.

Comparison Between Actual and Predicted Traffic

The opening year flow comparisons for the A876(T) Clackmannanshire Bridge project is based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counters within the study area.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.7.2 below.

Table A.7.2: A876(T) Clackmannanshire Bridge – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A876(T) Clackmannanshire Bridge							
JTC00508	14,396	20,493	20,833	21,344	42.4%	44.7%	48.3%
Bypassed A977 (North of Kincardine)							
NTCPT003	4,562	1,058	1,067	1,081	-76.8%	-76.6%	-76.3%
A985(T) Kincardine Eastern Link Road							
JTC00356	8,513	15,755	16,243	16,974	85.1%	90.8%	99.4%
A907 West of Gartarry Roundabout (To/from Alloa, Clackmannan & Stirling)							
NTCNT006	14,247	14,145	14,366	14,697	-0.7%	0.8%	3.2%
A907 East of Gartarry Roundabout (To/from Dunfermline)							
NTCNT007	3,097	4,554	4,628	4,738	47.0%	49.4%	53.0%
A977 North of Gartarry Roundabout (To/from M90(T))							
JTC00136	6,009	8,648	8,823	9,085	43.9%	46.8%	51.2%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.7.2 indicates that the predicted 2009 flows (derived by interpolating between the modelled assessment year traffic flows) were 42% and 48% greater than the observed 2009 flow on the A876(T) Clackmannanshire Bridge, and 77% and 76% lower than the observed 2009 flow on the bypassed A977 north of Kincardine, under low and high traffic forecast scenarios respectively.

The comparison also indicates that the predicted 2009 flow was 85% to 99% greater than the observed 2009 flow on the Kincardine Eastern Link Road, 47% to 53% greater than the observed 2009 flow on the A907 to the east of Gartarry Roundabout and 44% to 51% greater than the observed 2009 flow on the A977 to the north of Gartarry Roundabout under low and high traffic forecast scenarios respectively. The predicted 2009 flow was consistent with the observed 2009 flow on the A907 to the west of Gartarry Roundabout.

The comparison between predicted and actual traffic flows in 2009 indicates significant variations in traffic flows on the various routes within the study area, with flows around 7,000 vpd lower than predicted using the Clackmannanshire Bridge and around 3,500 vpd higher than predicted using the bypassed A977 via Kincardine.

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.

Carriageway Standard Assessment

A wide single 2+1 carriageway was constructed to bypass Kincardine, providing dedicated overtaking opportunities to help reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.7.3 based on the traffic flows observed on the bridge in 2009.

Table A.7.3: A876(T) Clackmannanshire Bridge – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA46/97 Standard	Constructed Standard
14,396	Wide Single 2-Lane	Wide Single 2+1

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a wide single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a wide single 2+1 carriageway given in TA 46/97 (or TD 70/80 – Design of Wide Single 2+1 Roads) and, given the potential benefits attributable to the provision of dedicated overtaking opportunities, the constructed carriageway standard is considered appropriate.

A.7.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A876(T) Clackmannanshire Bridge project were obtained from the project's Environmental Statement.

As part of the Environmental Impact Assessment process, a consultation with government agencies, non-governmental organisations and landowners was undertaken to inform interested parties of the proposals and to request comments and relevant information concerning the project. This exercise contributed to the identification of possible environmental impacts and the selection of appropriate mitigation measures. The following key issues were identified and have been addressed in the Environmental Impact Assessment and reported in the Environmental Statement:

- Effects on saltmarsh, mudflat and estuarine birds;
- Effects on flooding, water quality and the tidal movement within the Forth;
- Nuisance to residents caused by increases in noise and vibration during construction and operation of the road;
- Effects on landowners' accesses and access to existing and proposed pathways;
- Impacts on the landscape and views due to the flatness of the area; and
- Impacts on the areas and sites of historic importance.

A review of the environmental mitigation measures was carried out in March 2011, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation. The key mitigation measures implemented as part of the project are 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
- provision of measures to facilitate the needs of pedestrians and cyclists.

Noise and Air Quality

Comparison Between Predicted and Actual Traffic Flows

The comparison between predicted and actual traffic flows within the study area (discussed in Section A.7.2) can be considered a proxy for the impact that the project is likely to have on noise and air quality.

Although the reduction in traffic within Kincardine has not been as significant as predicted during the project's preparation, it can be expected that the volume of traffic and congestion removed from within Kincardine will have a positive impact on noise and air quality for local residents. Whilst any improvement in noise and air quality within Kincardine and along the A985(T) could potentially be offset to some extent by localised changes in traffic elsewhere on the network, it is likely that the impact on noise and air quality along the A876(T) corridor in the vicinity of the Clackmannanshire Bridge will be less than predicted due to lower flows using the bridge than forecast during the project's preparation.

Noise surveys were undertaken for the A876(T) Clackmannanshire Bridge project during 2003 and 2009 to confirm the impact of the project on noise levels and compare post opening levels with those predicted during the project's preparation.

Whilst the surveys indicated that noise levels for some properties were higher than predicted, it was acknowledged that the properties were experiencing a significant improvement in noise levels and that the higher than predicted levels could not be attributed to the design of the project.

Environment: Key Findings

The review of mitigation measures implemented for the A876(T) Clackmannanshire Bridge 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

Whilst noise levels for some properties were higher than predicted, it was acknowledged that the affected properties were experiencing a significant improvement in noise levels and the higher than predicted levels could not be attributed to the design of the project.

A.7.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A876(T) Clackmannanshire Bridge project 3 years before and 1 year after project completion are shown in Figures A.7b and A.7c.

A summary of the personal injury accident data is shown in Table A.7.4.

Table A.7.4: A876(T) Clackmannanshire Bridge – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A876(T)	2	3	11	16
1 Year After				
A876(T)	0	0	2	2
Bypassed A977	0	0	0	0
Total	0	0	2	2

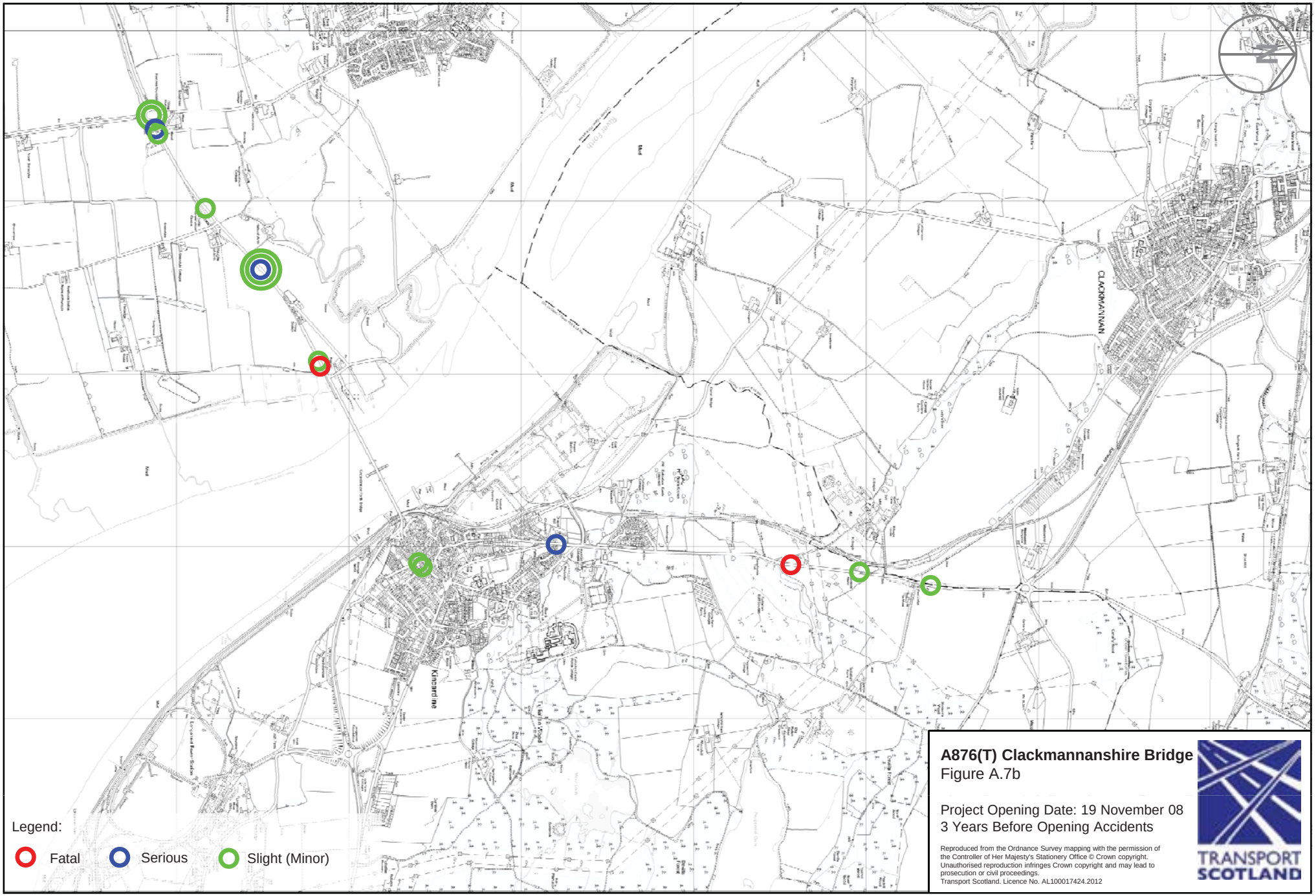
As can be seen Table A.7.4, two personal injury accidents (slight) occurred in the 1 year period following the opening of the project in comparison to sixteen personal injury accidents (two fatal, three serious and eleven slight) in the 3 years before opening, suggesting a significant improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in March 2010. The RSA report indicates that only one slight personal injury accident occurred in the 1 year after opening. The Stage 4 RSA report does not include the slight personal injury accident that occurred in the vicinity of the southern roundabout at Bowtrees Interchange and the reason for this can not be confirmed.

The accident considered within the report involved two vehicles. The RSA report indicates that the first vehicle, travelling southbound, collided with a safety barrier on the nearside of the road then crossed into the opposing carriageway, colliding with the second vehicle travelling northbound. Whilst the RSA report indicates that the accident may have been caused by the driver of the first vehicle being distracted by the views from the new bridge, it concludes that the project is operating safely and efficiently.

Six non-injury accidents within the vicinity of the project, which occurred during the 1 year period after opening, are also identified within the RSA report.



A876(T) Clackmannanshire Bridge
Figure A.7b

Project Opening Date: 19 November 08
3 Years Before Opening Accidents

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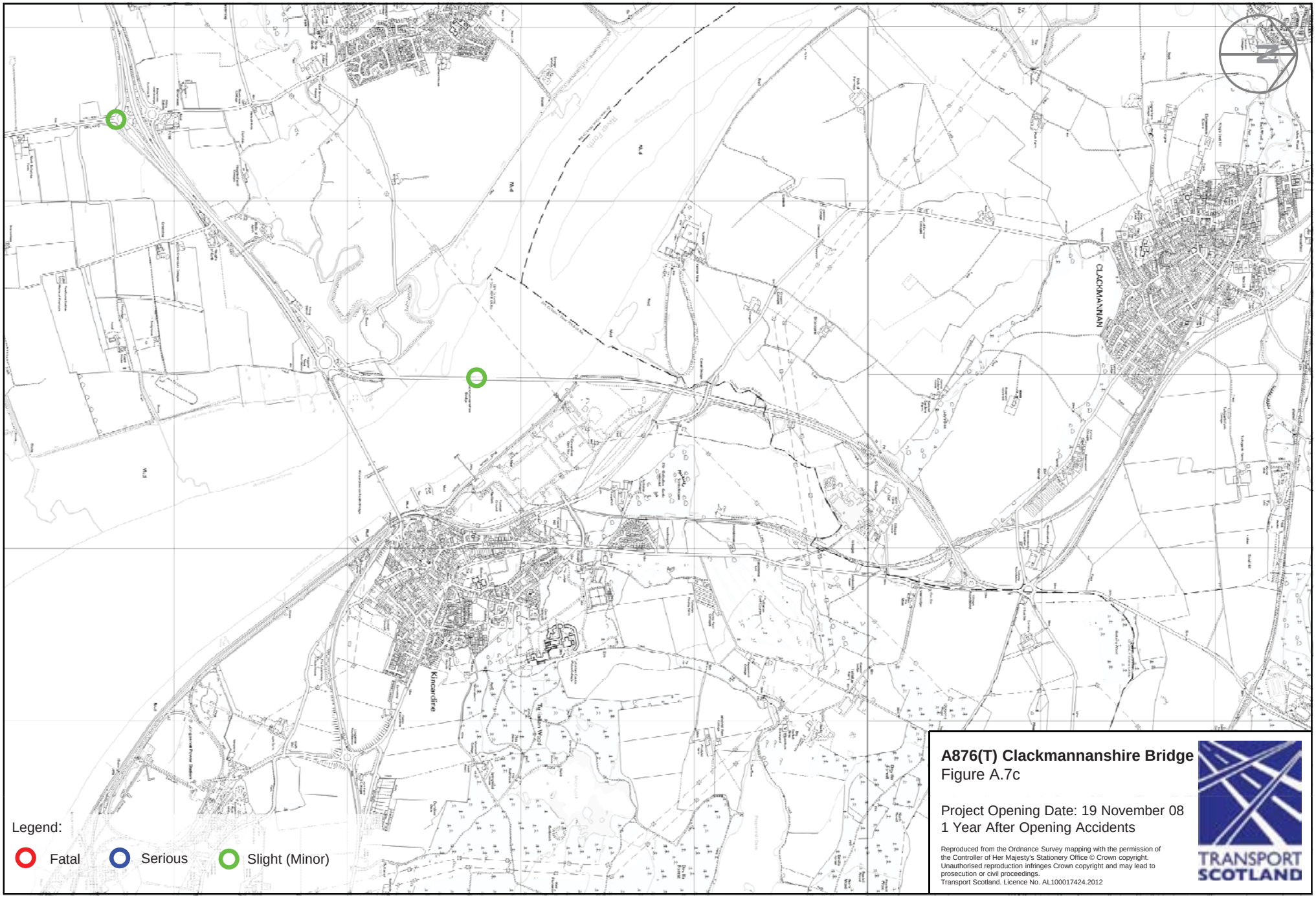

A876(T) Clackmannanshire Bridge
Figure A.7c

Project Opening Date: 19 November 08
1 Year After Opening Accidents

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Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A876(T) Clackmannanshire Bridge project is operating safely.

A.7.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The comparison between predicted and actual traffic flows, presented in section A.7.2, can be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

The comparison indicates 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.

The comparison also indicates significant variations in traffic flows on a number of the main routes within the study area and suggests that forecast changes to the level of strategic trips using the A985(T), A907 and A977 routes have not yet occurred.

Economy: Key Findings

A general over prediction of traffic flows within the study area, in addition to an over prediction in the volume of traffic predicted to transfer from the bypassed route (through Kincardine) to the new crossing, suggests that the economic benefits of the project are likely to have been overestimated.

A.7.6 Integration

Transport Integration

An analysis of the opening year traffic flow composition from Transport Scotland's ATCs within the study area indicates that a number of bus services are using the A876(T) Clackmannanshire Bridge. Examination of available data indicates that a number of these services are express bus services, serving the Clackmannanshire and wider Central Scotland area.

A number of bus services continue to use the Kincardine Bridge, serving Kincardine and the wider Fife area. Due to the reduction in traffic and congestion on the A985(T) route via the Kincardine Bridge, these bus services are likely to operate more efficiently.

Both the Clackmannanshire Bridge and the rail passenger service between Alloa and Stirling, introduced as part of the Stirling-Alloa-Kincardine Railway project, provide improved access to job opportunities in the local and wider areas, assisting in efforts to reduce long term unemployment within Clackmannanshire.

Transport and Land-Use Integration

The Clackmannanshire Council Structure Plan, applicable during the development of the A876(T) Clackmannanshire Bridge project, indicates 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 regeneration and re-use of brownfield sites for strategic employment within the vicinity of the project are to be given priority and several sites were identified within the structure plan, such as Castlebridge Business Park (a former industrial site) to the north of Gartarry Roundabout.

Policy Integration

Due to the reduction in congestion and the subsequent reduction in journey times between Clackmannanshire, Fife and Central Scotland as a result of the new crossing, the Clackmannanshire Bridge, in conjunction with other transport improvement projects within Central Scotland, supports economic development in Clackmannanshire.

The project is providing lower and more reliable journey times, which is consistent with wider policy in respect of social inclusion.

Integration: Key Findings

The project supports the improvement of local and strategic bus services serving the Clackmannanshire and wider Central Scotland area.

The Clackmannanshire Bridge was built within the vicinity of brownfield sites (identified within the Clackmannanshire Council Structure Plan) to facilitate the regeneration and re-use of the sites for strategic employment.

A.7.7 Accessibility & Social Inclusion

Community and Comparative Accessibility

It can be expected that, as a result of lower journey times to key employment areas within Clackmannanshire and the wider Central Scotland area, the Clackmannanshire Bridge contributes positively towards reducing social exclusion within the local and wider region through improved access to employment and education opportunities, healthcare, shopping and leisure facilities.

Examination of available data indicates that bus services, which provide access for disabled travellers, operate via the Clackmannanshire Bridge to regional healthcare facilities within the Clackmannanshire area.

Improved facilities for cyclists, pedestrians and buses were provided as part of the contract, including a traffic free cycle link connecting with National Cycle Network Route 76 – St Andrews to Stirling and Edinburgh to Stirling.

Accessibility & Social Inclusion: Key Findings

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

Observations from a site visit confirm that the project incorporates the planned measures for both cyclists and pedestrians.

A.7.8 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Table A.7.5.

Table A.7.5: A876(T) Clackmannanshire Bridge – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid-98 Prices in 1998 at 3.5% Discount	June 05 Prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£124,397,456	£73,777,589	£122,095,000	£77,183,890	-£3,406,301 (5%)

Cost to Government: Key Findings

The out-turn cost of the A876(T) Clackmannanshire Bridge project is approximately £3.4m (5%) lower than was predicted at the time of assessment.

A.7.9 Value for Money

Initial Indications

The economic appraisal results for the A876(T) Clackmannanshire Bridge project predicted a Net Present Value (NPV) of £41.27m and Benefit to Cost Ratio (BCR) of 1.53 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.7.5 and A.7.8, which suggest that the benefits will have been overestimated and indicate that the cost is lower than predicted, it is judged that the NPV and BCR of the project is unlikely to be as great as predicted.

Value for Money: Key Findings

Although the NPV and BCR are unlikely to be as great as predicted at the time of assessment, it is judged that the project will continue to provide a benefit to road users.

A.7.10 Achievement of Objectives

As specific indicators to measure the performance of the A876(T) Clackmannanshire Bridge project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A876(T) Clackmannanshire Bridge project is progressing towards achieving its objectives, is presented in Table A.7.6.

Table A.7.6: A876(T) Clackmannanshire Bridge – Progress Towards Achieving Objectives

Objective	Commentary	Progress
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.	Although the NPV and BCR are unlikely to be as great as predicted at the time of assessment, it is judged that the project will continue to provide a benefit to road users. The impact of the project on Kincardine, in terms of roads and traffic is positive and the effect on communities outwith the immediate area is negligible.	+ve
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).	The provision of a new Forth crossing at Kincardine has contributed towards a reduction in congestion within the local area, and can be expected to result in a subsequent reduction in journey times and improvement in journey time reliability for cross-Forth traffic travelling between Clackmannanshire, Fife and Central Scotland. It is likely to benefit commercial traffic and achieve wide economic benefits.	+ve
To facilitate use of the crossing by public transport and non-motorised road users.	Improved facilities for cyclists, pedestrians and buses were provided as part of the contract, including, a traffic free cycle path connected with the National Cycle Network Route. A number of bus services are using the A876(T) Clackmannanshire Bridge and the journey times of bus services will have improved.	+ve
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 the town of Kincardine (approximately 10,000 vehicles per day), and that will have reduced impacts relating to severance as a result of high traffic volumes and, subsequently, will have improved accessibility to services for local residents.	+ve
To improve road safety and reduce, as far as practical, the risk and incidence of accidents involving vehicles on the A876(T)/A985(T)/A977(T) trunk roads and non-motorised	2 slight accidents occured on the A876(T) with no accidents reported to have occurred on the bypassed A977 or A985(T) in the 1 year period following the opening of the project in	+ve

Objective	Commentary	Progress
users in and around Kincardine.	comparison to 2 fatal, 3 serious and 11 slight accidents on the A876(T) in the 3 years before opening suggesting a significant improvement in road safety. The project has also removed traffic from Kincardine, reducing the potential for accidents occurring that involve non-motorised users.	
To protect and improve the natural environment.	Mitigation measures should ensure that the project is unlikely to have more than a moderately significant impact on ecology, including the ecology of the nationally and internationally designated Firth of Forth Special Protection Area.	O
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.	A substantial number of properties in Kincardine are likely to experience an improvement in air quality and reduced noise levels as a consequence of removing a significant volume of traffic from within the town, although it is acknowledged that is some cases, the level of noise reduction is lower than forecast. The majority of mitigation measures committed within the Environmental Statement were in place. 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.	+ve
To improve and develop local and express bus services and integrate with the proposed reopening of the Stirling-Alloa-Kincardine railway line.	The Clackmannanshire Bridge provides a more direct route for express buses serving the Clackmannanshire and wider central Scotland area, providing opportunities for improving local services, which continue to use the Kincardine Bridge. Both the Clackmannanshire Bridge and the rail passenger service between Alloa and Stirling, provide improved access to job opportunities outside the area, assisting in efforts to reduce long term unemployment in Clackmannanshire.	+ve

Objective	Commentary	Progress
To optimise the relationship between the proposed scheme and land-use as identified in the structure plans.	The A876(T) Clackmannanshire Bridge was built within the vicinity of brownfield sites identified within the Clackmannanshire Council Structure Plan - the regeneration and re-use of which for strategic employment would be given priority.	+ve
To maximise the improvement in transport links to employment, education and health for vulnerable groups to promote social inclusion.	The new crossing 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 reduced and more reliable journey times between Clackmannanshire, Fife and Central Scotland. Bus services, cycle lanes and footpaths have been improved/catered for.	=

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.8 A77(T) HAGGSTONE

A.8.1 Introduction

Project Overview

The project involved the construction of a 1.0 kilometre long climbing lane on the northbound carriageway of the A77(T), approximately four kilometres north of the Cairnryan ferry terminal.

The general location of the project is shown in Figure A.8a.

The A77(T) Haggstone project was officially opened to traffic on 22nd December 2008.

Project Objectives

The objectives of the A77(T) Haggstone project were set as follows:

- to improve and increase the number of overtaking opportunities to eradicate the conflicts between long distance users and local / agricultural traffic;
- to improve the operational performance and level of services and safety on the A77(T) by reducing the effects of driver stress and journey times by constructing dedicated overtaking sections designed to break up the effects of convoys / platoons;
- to maintain the asset value of the A77(T) route;
- to mitigate the environmental impact of the new works where possible; and
- to achieve good value for money for both taxpayers and transport users.

Evaluation Methodology

The A77(T) Haggstone project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.

As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.8.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.8a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the A77(T) within the study area are presented in Table A.8.1.

Table A.8.1: A77(T) Haggstone – ATC Data

ATC Reference	AADT by Year						
	2005	2006	2007	2008	2009	2010	2011
A77(T) at Auchencrosh							
ATC08527	3,196	3,205	3,164	Year of Opening	3,079	3,113	3,066

A comparison between pre and post opening traffic volumes on the A77(T) at Auchencrosh indicates that traffic flows in 2009 were around 100 vehicles per day (vpd) (4%) lower than 2005 flow levels. Traffic volumes between 2009 and 2011 were broadly consistent.

Given the nature of the A77(T) Haggstone project, changes in traffic levels are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A77(T) Haggstone project is based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2004 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.8.2 below.

Table A.8.2: A77(T) Haggstone – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A77(T) at Auchencrosh							
ATC08527	3,079	3,481	3,523	3,586	13.0%	14.4%	16.5%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.8.2 indicates that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 13% and 17% greater than the observed 2009 flows under low and high traffic forecast scenarios respectively.

Whilst the comparison indicates that traffic growth on the A77(T) has fallen short of the assumed NRTF forecasts, the difference is within accepted limits. It is recognised that there has been a general fall in traffic volumes across the wider trunk road network in recent years due to the economic downturn that may in part account for the difference.

Changes in Irish Sea Ferry operations since the original assessment in 2004 coupled with an overall reduction in the total number of cars using the ferry services of approximately 11.5% between 2004 and 2009 (*Ref. Scottish Transport Statistics No 29: 2010 Edition*), which may also have resulted in a redistribution of traffic and also have contributed to observed flows being lower than forecast.

Carriageway Standard Assessment

In order to satisfy the project objectives, a climbing lane was constructed on the A77(T) at Haggstone as part of a series of improvements along the route, providing dedicated overtaking opportunities to help reduce platooning (seen as a particular issue on this route due to the nature of ferry traffic) as well as to reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.8.3 based on the observed 2009 traffic flow.

Table A.8.3: A77(T) Haggstone – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
3,079	Single 2-Lane	Climbing Lane

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a climbing lane given in TA 46/97 and, given the project objectives, the nature of traffic on the route and the surrounding topography, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Comparison Between Pre and Post Opening Overtaking Opportunities

A post opening overtaking survey was undertaken on the A77(T) in November 2011 to provide an indication of conditions at Haggstone.

The pre and post opening surveys recorded the number of overtaking manoeuvres, platooning and vehicle speeds on the A77(T) in both directions of travel within the direct vicinity of the project and on the single carriageway sections on approach to the project's location.

The results from the post opening survey were compared against the results from a pre opening survey undertaken in March 2004 to provide an indication of the effect that the project has had on overtaking conditions.

The level of overtaking pre and post opening is shown in Table A.8.4 below.

Table A.8.4: A77(T) Haggstone – Level of Overtaking

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	18%	10%	21%	12%
Post Opening	44%	11%	45%	8%

The percentage of northbound vehicles that carried out an overtaking manoeuvre during the pre opening AM and PM survey periods was 18% and 21% respectively, which can be compared to 44% and 45% respectively during the post opening survey. This indicates that the A77(T) Haggstone project has increased overtaking in the northbound direction of travel.

In the southbound direction, 10% and 12% of all southbound vehicles that travelled through the survey site during the pre opening AM and PM survey periods respectively carried out an overtaking manoeuvre, which can be compared against 11% and 8% respectively during the post opening survey.

The project does not appear to have significantly affected the level of overtaking across the survey site in the southbound direction of travel in spite of the restriction on overtaking in this direction over the climbing lane section and indicates that opportunistic overtaking continues to occur over the sections of single carriageway within the vicinity of the project.

As a consequence of the increased overtaking in the northbound direction, a greater number of platoons were dispersed over the survey site post opening compared to the level of platoons dispersed during the pre opening survey.

The level of platoons dispersed over the survey site in the southbound direction during the survey periods were generally consistent between the pre and post opening surveys, which suggests that the project has not significantly affected the dispersal of platoons in the southbound direction.

Travel Times

Comparison Between Pre and Post Opening Travel Times

Mean vehicle speeds during the AM and PM survey periods, estimated from the information collected as part of the pre and post opening overtaking surveys, have been used as a proxy for changes in travel times.

A comparison between the mean vehicle speeds observed during the pre and post opening overtaking surveys is shown in Table A.8.5.

Table A.8.5: A77(T) Haggstone– Assessment of Mean Vehicle Speeds (mph)

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	49	52	52	49
Post Opening	52	50	51	50

The comparison between mean vehicle speeds over the extents of the survey site indicate that speeds in both directions of travel have not been significantly affected by the A77(T) Haggstone project.

A.8.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A77(T) Haggstone project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A77(T) Haggstone project and its limited effect on mean vehicle speeds, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A77(T) Haggstone 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.8.4 Safety

Accidents

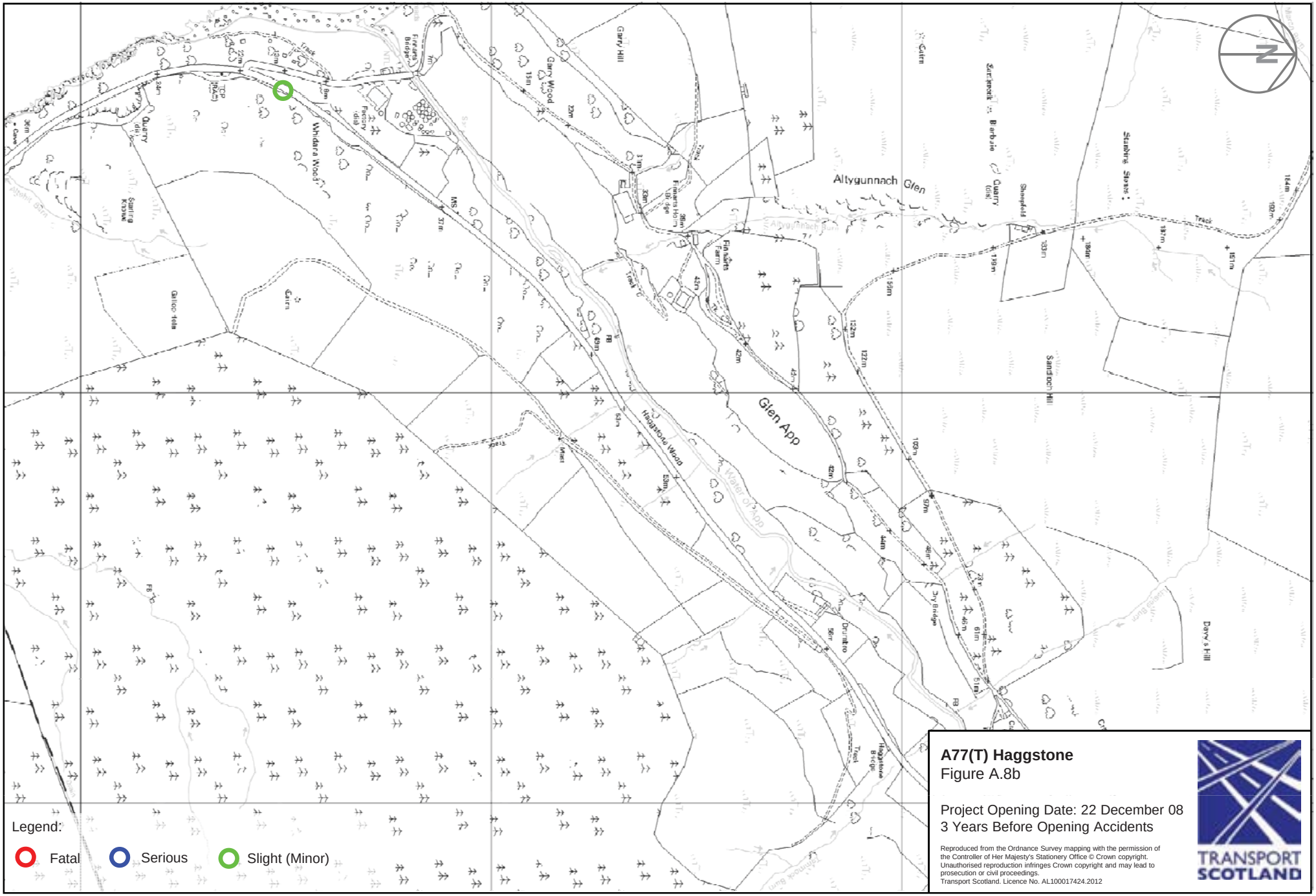
Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A77(T) Haggstone project 3 years before and 1 year after project completion are shown in Figures A.8b and A.8c.

A summary of the personal injury accident data is shown in Table A.8.6.

Table A.8.6: A77(T) Haggstone – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A77(T)	0	0	1	1
1 Year After				
A77(T)	0	0	0	0



A77(T) Haggstone
Figure A.8b

Project Opening Date: 22 December 08
3 Years Before Opening Accidents

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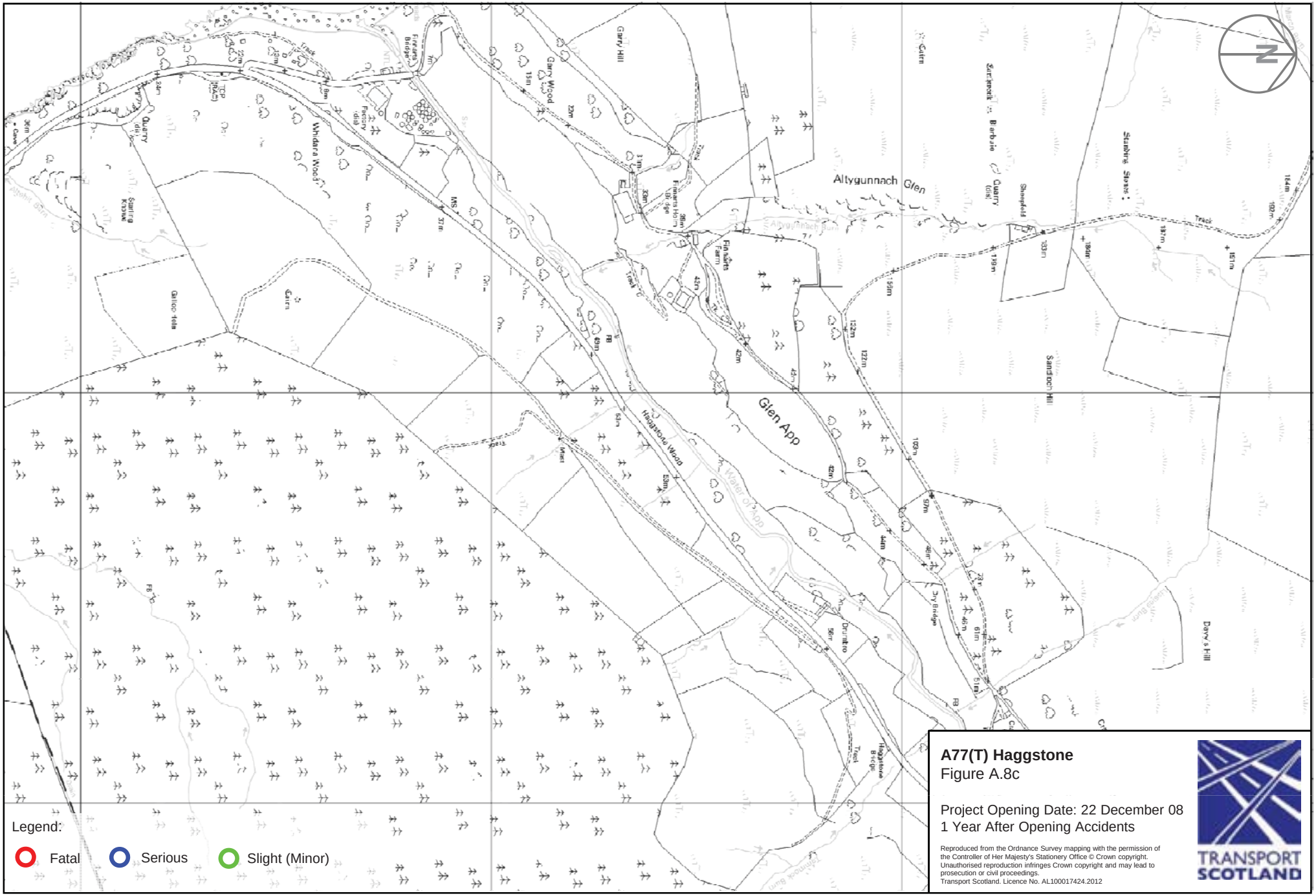

A77(T) Haggstone
Figure A.8c

Project Opening Date: 22 December 08
1 Year After Opening Accidents

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As can be seen from Table A.8.6, no personal injury accidents occurred in the 1 year period following the opening of the project in comparison to one personal injury accident (slight) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in October 2010. The RSA report confirmed that no accidents occurred within the vicinity of the project within the period 1 year after opening.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A77(T) Haggstone project is operating safely.

A.8.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The A77(T) Haggstone and A77(T) Glen App projects were constructed under a single contract with a single outturn cost. Accordingly the evaluation under the economy and cost to government criteria considers the collective performance of the projects.

The comparison between predicted and actual traffic flows, presented in sections A.8.2 and A.9.2, can be considered a proxy for whether the predicted economic benefits of the combined projects are likely to be realised.

The comparison indicates that the predicted 2009 flow was up to 17% greater than the observed 2009 flow on the A77(T). This overestimation is likely due to the combination of changes in Irish Sea Ferry operations and general economic downturn.

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the combined projects will have been overestimated due to external factors that could not have readily been foreseen at the time of assessment.

A.8.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The A77(T) Haggstone and Glen App projects were constructed under a single contract with a single out-turn cost. The predicted project costs used in the economic assessment of each project have been combined to allow the comparison between predicted and out-turn costs to be undertaken.

The combined out-turn and predicted project costs for both A77(T) projects are shown in Table A.8.7. This confirms that the out-turn cost of the two A77(T) projects was approximately £3.2m (22%) lower than the predicted cost.

Table A.8.7: A77(T) Haggstone & Glen App – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid-98 Prices in 1998 at 3.5% Discount	June 07 Prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£20,758,541	£11,486,943	£26,129,190	£14,736,160	-£3,249,257 (22%)

Cost to Government: Key Findings

The combined out-turn cost of the two A77(T) projects is approximately £3.2m (22%) lower than was predicted.

A.8.7 Value for Money

Initial Indications

The economic appraisal results predicted a combined Net Present Value (NPV) of -£9.69m and Benefit to Cost Ratio (BCR) of 0.54 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.8.5 and A.8.6, which suggest that the benefits will have been overestimated and indicate that the cost is lower than predicted, the NPV and BCR of the combined projects are unlikely to be significantly greater than predicted.

Value for Money: Key Findings

The NPV and BCR of the combined A77(T) projects are unlikely to be significantly greater than predicted at the time of assessment, although it is judged that the projects will continue to provide a benefit to road users and will help encourage economic development within south west Scotland and beyond.

A.8.8 Achievement of Objectives

As specific indicators to measure the performance of the A77(T) Haggstone project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A77(T) Haggstone project is progressing towards achieving its objectives, is presented in Table A.8.8.

Table A.8.8: A77(T) Haggstone – Progress Towards Achieving Objectives

Objective	Commentary	Progress
Improve and increase the number of overtaking opportunities to eradicate the conflicts between long distance users and local / agricultural traffic.	A comparison between the results of the pre and post overtaking surveys indicate that the provision of a dedicated overtaking opportunity has increased overtaking in the northbound direction of travel. In the southbound direction, despite the restricted overtaking section, the pre and post overtaking surveys indicate that there has been little impact as opportunistic overtaking still exists on the single carriageway sections to the north and south of the project.	+ve
Improve the operational performance and level of services and safety on the A77(T) by reducing the effects of driver stress and journey times by constructing dedicated overtaking sections designed to break up the effects of convoys / platoons.	Although mean vehicle speeds in both directions of travel have not been significantly affected by the A77(T) Haggstone project, a comparison between the results of the pre and post overtaking surveys indicate that as a consequence of the increased overtaking in the northbound direction, a greater number of platoons are dispersed. An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A77(T) Haggstone project is operating safely.	+ve
Maintain the asset value of the A77(T) route.	Given the nature of the A77(T) Haggstone project, which involved replacing 1.8 kilometres of existing single carriageway with 1.0 kilometre of climbing lane and 0.8 kilometres of on-line improvements, the asset value of the A77(T) between the project tie-in points is likely to have increased thus maintaining the value of the route.	+ve
Mitigate the environmental impact of the new works where possible.	The majority of measures committed within the Environmental Statement are in place. Whilst some variations from the proposed mitigation measures have been identified, these are not considered to have had a material detrimental impact on the general integration of the project into its surrounding.	+ve

Objective	Commentary	Progress
Achieve good value for money for both taxpayers and transport users.	Although the NPV and BCR are unlikely to be significantly greater than predicted at the time of assessment, the Haggstone and Glen App projects form part of a series of improvements along the A77(T) corridor that can be expected to provide benefits to transport users and help encourage economic development within south west Scotland and beyond.	=

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.9 A77(T) GLEN APP

A.9.1 Introduction

Project Overview

The project involved the construction of approximately 1.0 kilometre of off-line wide single carriageway (WS2) in addition to approximately 250 metres of on-line improvement.

The general location of the project is shown in Figure A.9a.

The A77(T) Glen App project was officially opened to traffic on 22nd December 2008.

Project Objectives

The objectives of the A77(T) Glen App project were set as follows:

- to improve and increase the number of overtaking opportunities to eradicate the conflicts between long distance users and local / agricultural traffic;
- to improve the operational performance and level of services and safety on the A77(T) by reducing the effects of driver stress and journey times by constructing dedicated overtaking sections designed to break up the effects of convoys / platoons;
- to maintain the asset value of the A77(T) route;
- to mitigate the environmental impact of the new works where possible; and
- to achieve good value for money for both taxpayers and transport users.

Evaluation Methodology

The A77(T) Glen App project has been evaluated against the above objectives and the following criteria:

- Environment;
- Safety;
- Economy;
- Costs to Government; and
- Value for Money.

As the evaluation focuses on impacts relating to the project objectives, specific evaluations against the Integration and Accessibility & Social Inclusion criteria have not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.9.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.9a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the A77(T) within the study area are presented in Table A.9.1.

Table A.9.1: A77(T) Glen App – ATC Data

ATC Reference	AADT by Year						
	2005	2006	2007	2008	2009	2010	2011
A77(T) at Auchencrosh							
ATC08527	3,196	3,205	3,164	Year of Opening	3,079	3,113	3,066

A comparison between pre and post opening traffic volumes on the A77(T) at Auchencrosh indicates that traffic flows in 2009 were around 100 vehicles per day (vpd) (4%) lower than 2005 flow levels. Traffic volumes between 2009 and 2011 were broadly consistent.

Given the nature of the A77(T) Glen App project, changes in traffic levels are not likely to be as a consequence of changes to the carriageway standard and may be as a result of reductions in traffic volumes across the wider trunk road network due to the economic downturn experienced during the evaluation period.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A77(T) Glen App project is based on AADT flows from 2009 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2004 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2009 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.9.2 below.

Table A.9.2: A77(T) Glen App – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A77(T) at Auchencrosh							
ATC08527	3,079	3,481	3,523	3,586	13.0%	14.4%	16.5%

* 2009 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.9.2 indicates that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 13% and 17% greater than the observed 2009 flows under low and high traffic forecast scenarios respectively.

Whilst this comparison indicates that traffic growth on the A77(T) has fallen short of the assumed NRTF forecasts, the difference is within accepted limits. It is recognised that there has been a general fall in traffic volumes across the wider trunk road network in recent years due to the economic downturn that may in part account for the difference.

Changes in Irish Sea Ferry operations since the original assessment in 2004 coupled with an overall reduction in the total number of cars using the ferry services of approximately 11.5% between 2004 and 2009 (*Ref. Scottish Transport Statistics No 29: 2010 Edition*), which may also have resulted in a redistribution of traffic and also have contributed to observed flows being lower than forecast.

Carriageway Standard Assessment

In order to satisfy the project objectives, a wide single 2-lane carriageway was constructed on the A77(T) at Glen App as part of a series of improvements along the route, providing increased overtaking opportunities to help reduce platooning (seen as a particular issue on this route due to the nature of ferry traffic) as well as to reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.9.3 based on the observed 2009 traffic flow.

Table A.9.3: A77(T) Glen App – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
3,079	Single 2-Lane	Wide Single 2-Lane

* 2009 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2009 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. Given the project objectives and the nature of traffic on the route, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Comparison Between Pre and Post Opening Overtaking Opportunities

A post opening overtaking survey was undertaken on the A77(T) in November 2011 to provide an indication of conditions at Glen App.

The results from the post opening survey were compared against the results from a pre opening survey undertaken in March 2004. This provides an indication of the effect that the project has had on overtaking conditions.

The level of overtaking pre and post opening is shown in Table A.9.4 below.

Table A.9.4: A77(T) Glen App – Level of Overtaking

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	20%	14%	20%	19%
Post Opening	26%	20%	17%	21%

The percentage of northbound vehicles that carried out an overtaking manoeuvre during both the pre opening AM and PM survey periods was 20%, which can be compared to 26% and 17% respectively during the post opening survey. The comparison indicates that the level of northbound overtaking has reduced during the PM period. This could be as a result of the higher opposing traffic flows on the route during the post opening PM survey period when compared with the pre opening survey, which may present fewer opportunities for northbound vehicles to carry out an overtaking manoeuvre.

In the southbound direction, 14% and 19% of all southbound vehicles that travelled through the survey site during the pre opening AM and PM survey periods respectively carried out an overtaking manoeuvre, which can be compared against 20% and 21% respectively during the post opening survey. This suggests that the A77(T) Glen App project has increased overtaking in the southbound direction of travel.

As a consequence of the increased overtaking in both directions of travel, a greater number of platoons were dispersed over the survey site post opening compared to the level of platoons dispersed during the pre opening survey.

Travel Times

Comparison Between Pre and Post Opening Travel Times

Mean vehicle speeds during the AM and PM survey periods, estimated from the information collected as part of the pre and post opening overtaking surveys, have been used as a proxy for changes in travel times.

A comparison between the mean vehicle speeds observed during the pre and post opening overtaking surveys is shown in Table A.9.5.

Table A.9.5: A77(T) Glen App – Assessment of Mean Vehicle Speeds (mph)

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	56	53	58	51
Post Opening	56	50	56	50

The comparison between mean vehicle speeds over the extents of the survey site indicate that speeds in both directions of travel have not been significantly affected by the A77(T) Glen App project.

A.9.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A77(T) Glen App project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A77(T) Glen App project and its limited effect on mean vehicle speeds, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A77(T) Glen App 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.9.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A77(T) Glen App project 3 years before and 1 year after project completion are shown in Figures A.9b and A.9c.

A summary of the personal injury accident data is shown in Table A.9.6.

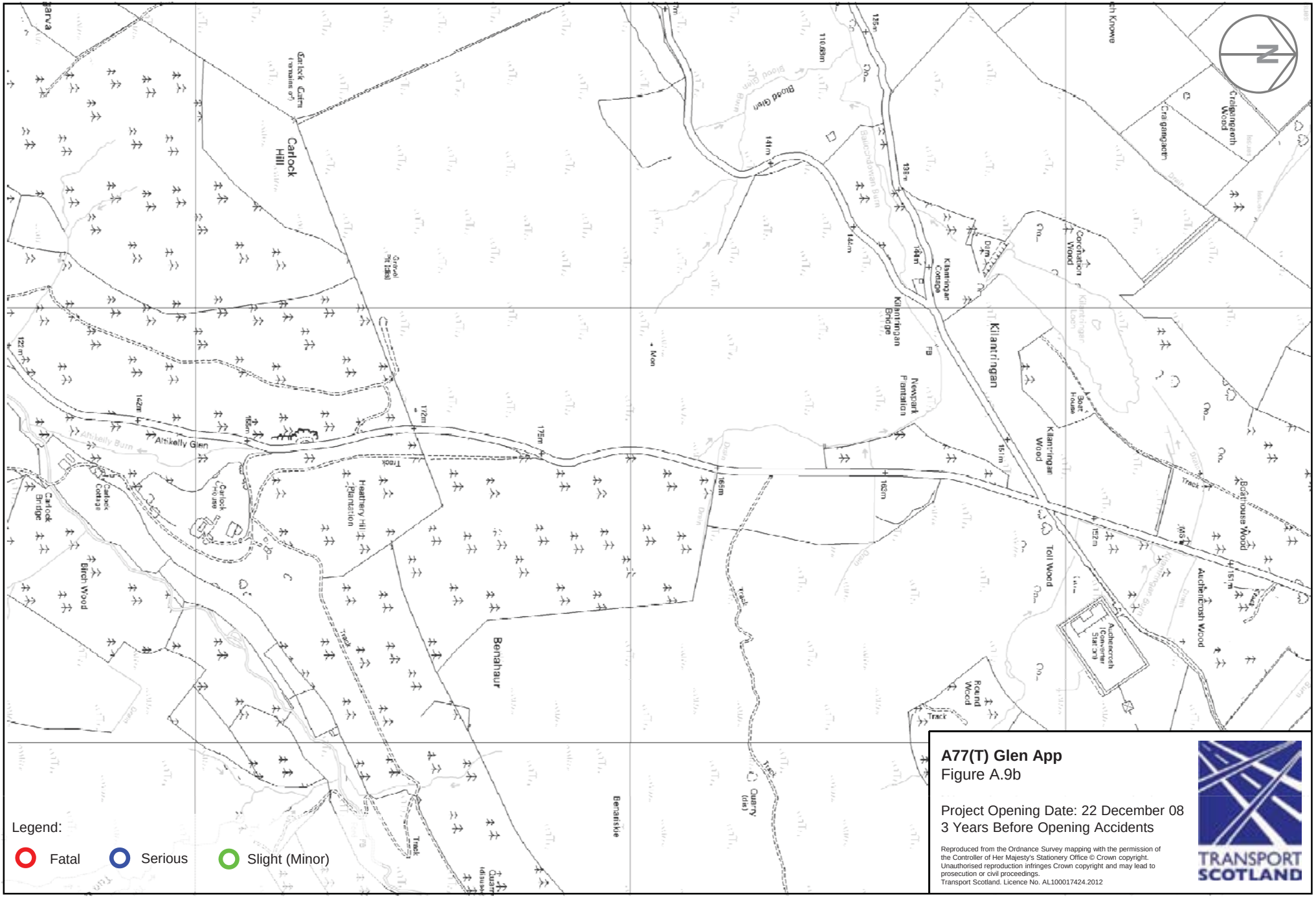
Table A.9.6: A77(T) Glen App – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A77(T)	0	0	0	0
1 Year After				
A77(T)	0	0	1	1

As can be seen from Table A.9.6, one personal injury accident (slight) occurred in the 1 year period following the opening of the project in comparison to no personal injury accidents in the 3 years before opening.

Road Safety Audits

The Stage 4 Road Safety Audit (RSA) was carried out in October 2010. The RSA report confirmed that only one personal injury accident (slight) occurred in the 1 year period following the opening of the project and involved a collision between three vehicles.



A77(T) Glen App
Figure A.9b

Project Opening Date: 22 December 08
3 Years Before Opening Accidents

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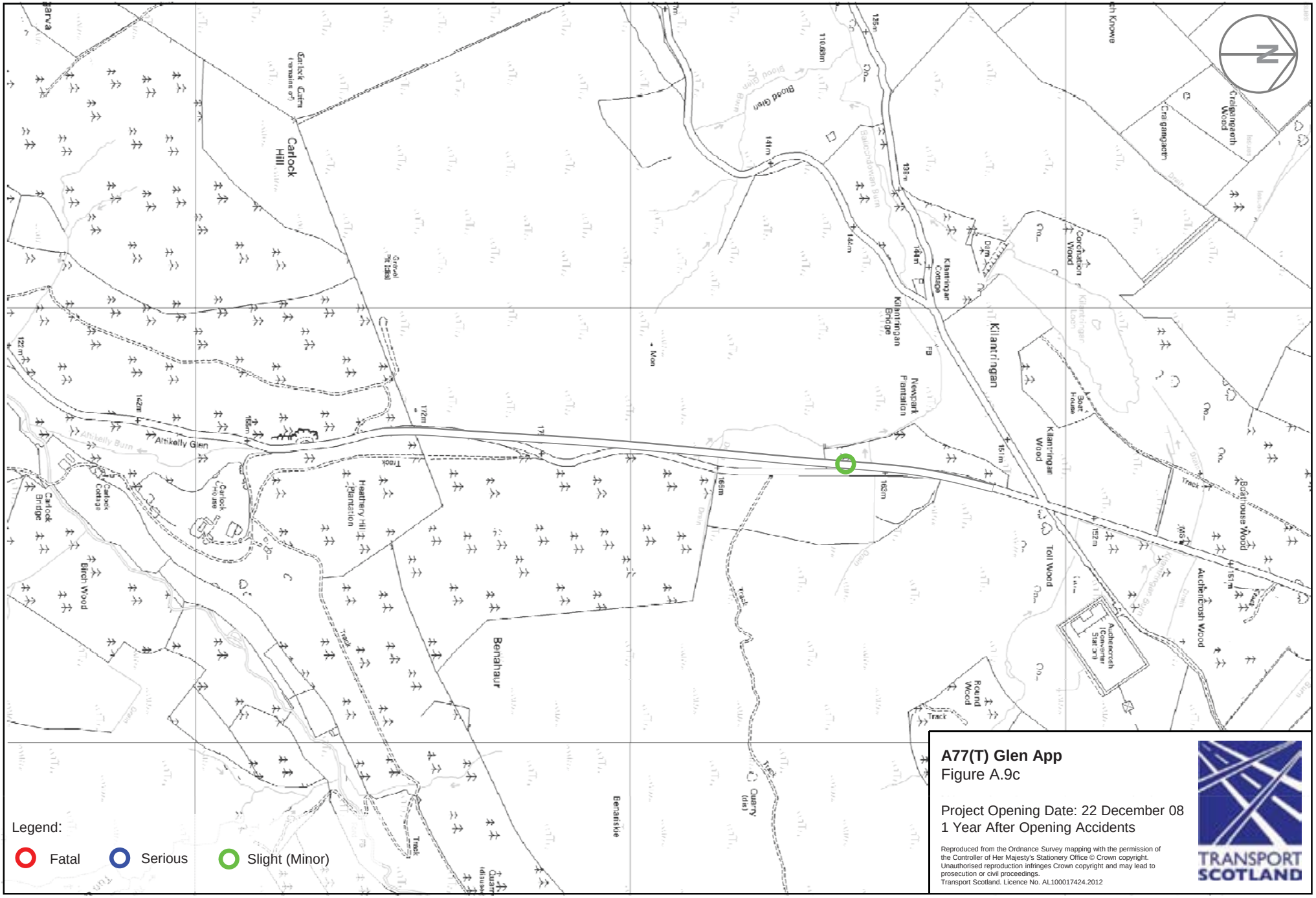

A77(T) Glen App
Figure A.9c

Project Opening Date: 22 December 08
1 Year After Opening Accidents

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The RSA report noted that the driver of the first vehicle lost control and swerved across both lanes of the carriageway then struck the rear of the second vehicle. The first vehicle then crossed the centre line markings and collided with the third vehicle.

The RSA report concluded that the action of overtaking does not appear to have contributed to the cause of the slight accident, and that no firm conclusions can be drawn from the accident information provided which would suggest road safety deficiencies in the design or layout of the project.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A77(T) Glen App project is operating safely.

A.9.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The A77(T) Haggstone and A77(T) Glen App projects were constructed under a single contract with a single outturn cost. Accordingly the evaluation under the economy and cost to government criteria considers the collective performance of the projects.

The comparison between predicted and actual traffic flows, presented in sections A.8.2 and A.9.2, can be considered a proxy for whether the predicted economic benefits of the combined projects are likely to be realised.

The comparison indicates that the predicted 2009 flow was up to 17% greater than the observed 2009 flow on the A77(T). This overestimation is likely due to the combination of changes in Irish Sea Ferry operations and general economic downturn.

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the combined projects will have been overestimated due to external factors that could not have readily been foreseen at the time of assessment.

A.9.6 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The A77(T) Haggstone and Glen App projects were constructed under a single contract with a single out-turn cost. The predicted project costs used in the economic assessment of each project have been combined to allow the comparison between predicted and out-turn costs to be undertaken.

The combined out-turn and predicted project costs for both A77(T) projects are shown in Table A.9.7. This confirms that the out-turn cost of the two A77(T) projects was approximately £3.2m (22%) lower than the predicted cost.

Table A.9.7: A77(T) Haggstone & Glen App – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid-98 Prices in 1998 at 3.5% Discount	June 07 Prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£20,758,541	£11,486,943	£26,129,190	£14,736,160	-£3,249,257 (22%)

Cost to Government: Key Findings

The combined out-turn cost of the two A77(T) projects is approximately £3.2m (22%) lower than predicted.

A.9.7 Value for Money

Initial Indications

The economic appraisal results predicted a combined Net Present Value (NPV) of -£9.69m and Benefit to Cost Ratio (BCR) of 0.54 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.9.5 and A.9.6, which suggest that the benefits will have been overestimated and indicate that the cost is lower than predicted, the NPV and BCR of the combined projects are unlikely to be greater than predicted.

Value for Money: Key Findings

The NPV and BCR of the combined A77(T) projects are unlikely to be significantly greater than predicted at the time of assessment, although it is judged that the projects will continue to provide a benefit to road users and will help encourage economic development within south west Scotland and beyond.

A.9.8 Achievement of Objectives

As specific indicators to measure the performance of the A77(T) Glen App project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A77(T) Glen App project is progressing towards achieving its objectives, is presented in Table A.9.8.

Table A.9.8: A77(T) Glen App – Progress Towards Achieving Objectives

Objective	Commentary	Progress
Improve and increase the number of overtaking opportunities to eradicate the conflicts between long distance users and local / agricultural traffic.	A comparison between the results of the pre and post overtaking surveys indicate that the provision of the improved carriageway standard has, generally, increased overtaking in both directions of travel.	+ve
Improve the operational performance and level of services and safety on the A77(T) by reducing the effects of driver stress and journey times by constructing dedicated overtaking sections designed to break up the effects of convoys / platoons.	Although mean vehicle speeds in both directions of travel have not been significantly affected by the A77(T) Glen App project,a comparison between the results of the pre and post overtaking surveys indicate that as a consequence of the increased overtaking in both directions of travel, a greater number of platoons are dispersed. An assessment of the 1 year post opening personal injury accidents and a review of the Stage 4 RSA report, suggests that the A77(T) Glen App project is operating safely.	+ve
Maintain the asset value of the A77(T) route.	Given the nature of the A77(T) Glen App project, which involved replacing 1.5 kilometres of existing single carriageway with 1.0 kilometre of off-line wide single carriageway and 250m of on-line improvements, the asset value of the A77(T) between the project tie-in points is likely to have increased thus maintaining the value of the route.	+ve
Mitigate the environmental impact of the new works where possible.	The majority of measures committed within the Environmental Statement are in place. Whilst some variations from the proposed mitigation measures have been identified, these are not considered to have had a material detrimental impact on the general integration of the project into its surrounding.	+ve
Achieve good value for money for both taxpayers and transport users.	Although the NPV and BCR are unlikely to be greater than predicted at the time of assessment, the Haggstone and Glen App projects form part of a series of improvements along the A77(T) corridor that can be expected to provide benefits to transport users and help encourage economic development	=

Objective	Commentary	Progress
	within south west Scotland and beyond.	

Key:
+ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

A.10 A76(T) GLENAIRLIE

A.10.1 Introduction

Project Overview

The project involved the construction of an off-line alternating wide single 2+1 carriageway (WS2+1) over 2.5 kilometres between Caynyen Glen and the village of Mennock, to provide a dedicated overtaking opportunity for vehicles travelling in both directions, with 0.5 kilometres of on-line improvements to the southern end of the project.

The new road consists of a dedicated 1.2 kilometre northbound overtaking section with a 0.8 kilometre southbound overtaking section.

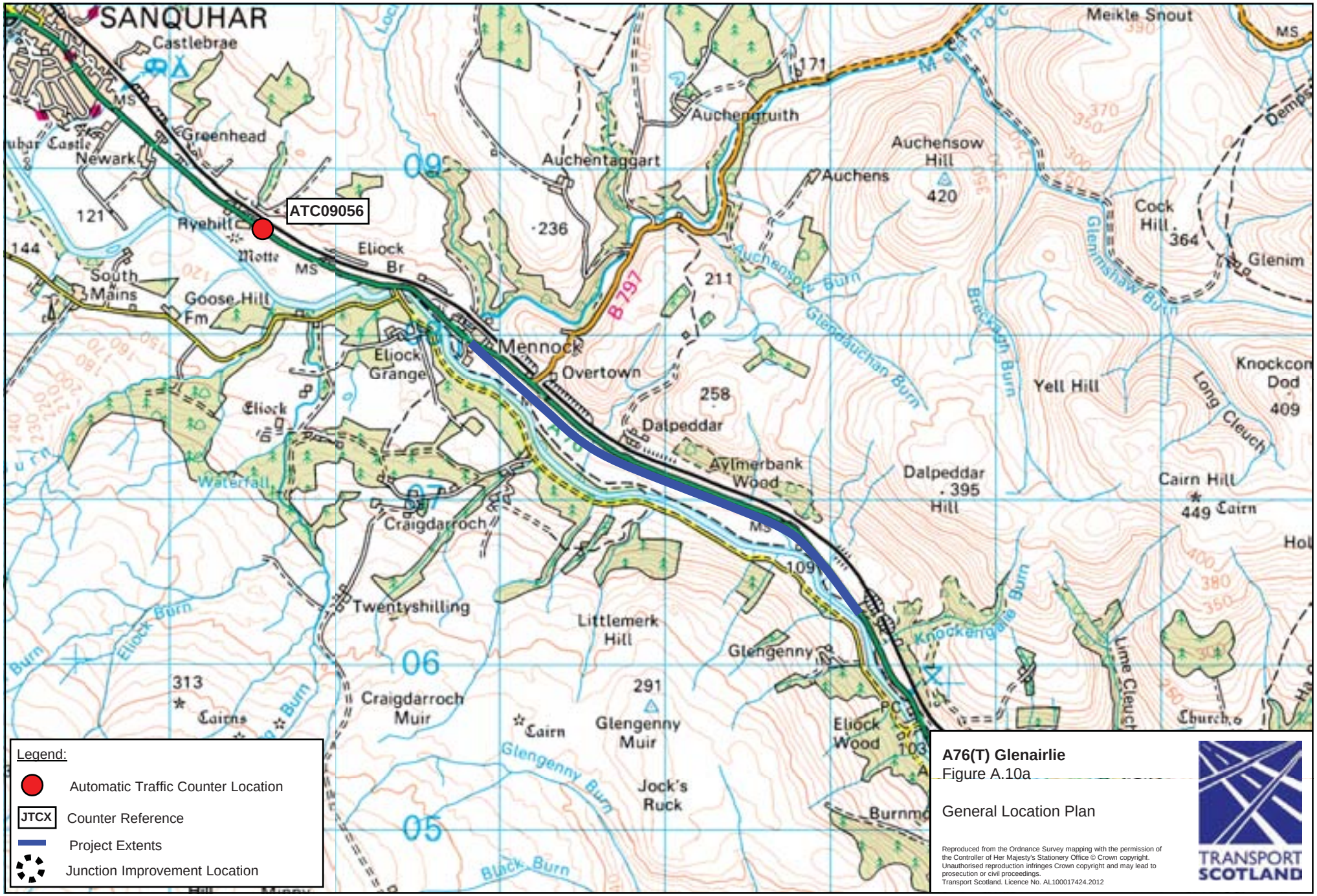
The general location of the project is shown in Figure A.10a.

The A76(T) Glenairlie project was officially opened to traffic on 3rd March 2009.

Project Objectives

The objectives of the A76(T) Glenairlie project were set as follows:

- to improve and increase the number of overtaking opportunities to reduce the conflicts between long distance users, local and agricultural traffic;
- to improve the operational performance and level of service on the A76(T) by reducing the effect of driver stress and journey times by constructing guaranteed overtaking sections designed to break up convoys/platoons;
- to incorporate measures for non-motorised users, wherever practicable. In particular, cycling proposals shall be designed in accordance with the "Trunk Road Cycling Initiative";
- to maintain the asset value of the A76(T) route;
- to mitigate the environmental impact of the new works where possible; and
- to achieve good value for money for both taxpayers and road users.



Legend:

- Automatic Traffic Counter Location
- JTCX — Counter Reference
- Project Extents
- Junction Improvement Location

A76(T) Glenairlie

Figure A.10a

General Location Plan

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Evaluation Methodology

The A76(T) Glenairlie project has been evaluated against the above objectives and the following criteria:

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

As the evaluation focuses on impacts relating to the project objectives, a specific evaluation against the Integration criterion has not been undertaken.

The evaluation is supported by the consideration of network traffic indicators, including traffic volumes, overtaking opportunities and travel times presented in the following section.

A.10.2 Network Traffic Indicators

Traffic Volumes

The location of the Automatic Traffic Counter (ATC) within the study area is shown in Figure A.10a.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the A76(T) within the study area are presented in Table A.10.1.

Table A.10.1: A76(T) Glenairlie – ATC Data

ATC Reference	AADT by Year					
	2006	2007	2008	2009	2010	2011
A76(T) East of Sanquhar						
ATC09056	3,369	3,416	3,415	Year of Opening	3,397	3,118

A comparison between pre and post opening traffic volumes on the A76(T) mainline east of Sanquhar indicates that traffic flows in 2010 were comparable with pre-opening levels. Traffic flows between 2010 and 2011 have reduced by approximately 300 vehicles per day (vpd), approximately 8%.

Given the nature of the A76(T) Glenairlie project, changes in traffic levels are not likely to be as a consequence of changes to the carriageway standard.

Comparison Between Predicted and Actual Traffic Flows

The opening year flow comparisons for the A76(T) Glenairlie project is based on AADT flows from 2010 as this was the first full year of reliable traffic data available from Transport Scotland's traffic counter within the study area.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high growth factors were applied to the observed 2003 base year traffic flows to derive opening and future modelled assessment year traffic flows.

Predicted traffic flows for 2010 were derived by interpolating between the modelled assessment year, design network flows.

A summary of the actual and predicted traffic data is shown in Table A.10.2.

Table A.10.2: A76(T) Glenairlie – Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT			% Difference (Predicted – Actual) / Actual		
		Low	60/40	High	Low	60/40	High
A76(T) East of Sanquhar							
ATC09056	3,397	3,368	3,438	3,545	-0.9%	1.2%	4.4%

* 2010 flows (first full year of ATC data available)

The comparison between predicted and actual AADT flows in Table A.10.2 indicates that the predicted 2010 flow (derived by interpolating between the modelled assessment year traffic flows) was consistent with the observed 2010 flow.

Carriageway Standard Assessment

In order to satisfy the project objectives, a wide single 2+1 carriageway was constructed on the A76(T) at Glenairie, providing dedicated overtaking opportunities to help reduce platooning, reduce journey times and improve journey time reliability.

An assessment of the carriageway standard according to TA 46/97 – Economic Assessment and Recommended Flow Ranges for New Rural Road Links, which applied at the time of the project design, is shown in Table A.10.3 based on the observed 2009 traffic flow.

Table A.10.3: A76(T) Glenairlie – Assessment of Carriageway Standard (TA 46/97)

Opening Year AADT*	TA 46/97 Standard	Constructed Standard
3,397	Single 2-Lane	Wide Single 2+1

* 2010 flows (first full year of ATC data available)

The carriageway assessment indicates that the observed 2010 flow lies within the flow range appropriate for a single 2-lane standard of carriageway. There are no specific flow ranges for the justification of a wide single 2+1 given in TA 46/97 and, given the project objectives, the constructed carriageway standard is considered appropriate.

Overtaking Opportunities

Comparison Between Pre and Post Opening Overtaking Opportunities

A post opening overtaking surveys was undertaken on the A76(T) in October 2011 to provide an indication of conditions at Glenairlie.

The results from the post opening survey were compared against the results from a pre opening survey undertaken in April 2004. This provides an indication of the effect that the project has had on overtaking conditions.

The level of overtaking pre and post opening is shown in Table A.10.4 below.

Table A.10.4: A76(T) Glenairlie – Level of Overtaking

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	8%	10%	14%	22%
Post Opening	28%	31%	33%	28%

The percentage of northbound vehicles that carried out an overtaking manoeuvre during the pre opening AM and PM survey periods was 8% and 14% respectively, which can be compared to 28% and 33% respectively during the post opening survey. This indicates that the A76(T) Glenairlie project has increased overtaking in the northbound direction of travel.

In the southbound direction, 10% and 22% of all southbound vehicles that travelled through the survey site during the pre opening AM and PM survey periods respectively carried out an overtaking manoeuvre, which can be compared against 31% and 28% respectively during the post opening survey. This suggests that the A76(T) Glenairlie project has increased overtaking in the southbound direction of travel.

As a consequence of the increased overtaking in both directions of travel, a greater number of platoons were dispersed over the survey site post opening compared to the level of platoons dispersed during the pre opening survey.

Travel Times

Comparison Between Pre and Post Opening Travel Times

Mean vehicle speeds during the AM and PM survey periods, estimated from the information collected as part of the pre and post opening overtaking surveys, have been used as a proxy for changes in travel times.

A comparison between the mean vehicle speeds observed during the pre and post opening overtaking surveys is shown in Table A.10.5.

Table A.10.5: A76(T) Glenairlie – Assessment of Mean Vehicle Speeds (mph)

	AM Survey Period		PM Survey Period	
	Northbound	Southbound	Northbound	Southbound
Pre Opening	44	48	48	51
Post Opening	63	59	64	60

A comparison between mean vehicle speeds over the extents of the survey site indicate that speeds in both directions of travel have increased following the opening of the A76(T) Glenairlie project and it can therefore be expected that journey times are likely to have reduced and become more reliable as a result of the provision of the dedicated overtaking opportunities.

A.10.3 Environment

Review of Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the A76(T) Glenairlie project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2010, which confirmed that the majority of measures committed within the Environmental Statement were in place and were providing appropriate levels of mitigation.

Noise and Air Quality

Given the rural nature of the A76(T) Glenairlie project, no significant impact on noise and air quality is expected. It is therefore not appropriate to evaluate the project's impact on noise and air quality.

Environment: Key Findings

The review of mitigation measures implemented for the A76(T) Glenairlie 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, these were not considered to have had a material detrimental impact on the general integration of the project into its surrounding.

A.10.4 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of personal injury accidents occurring within the vicinity of the A76(T) Glenairlie project 3 years before and 1 year after project completion are shown in Figures A.10b and A.10c.

A summary of the personal injury accident data is shown in Table A.10.6.

Table A.10.6: A76(T) Glenairlie – Personal Injury Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A76(T)	1	1	2	4
1 Year After				
A76(T)	0	0	1	1

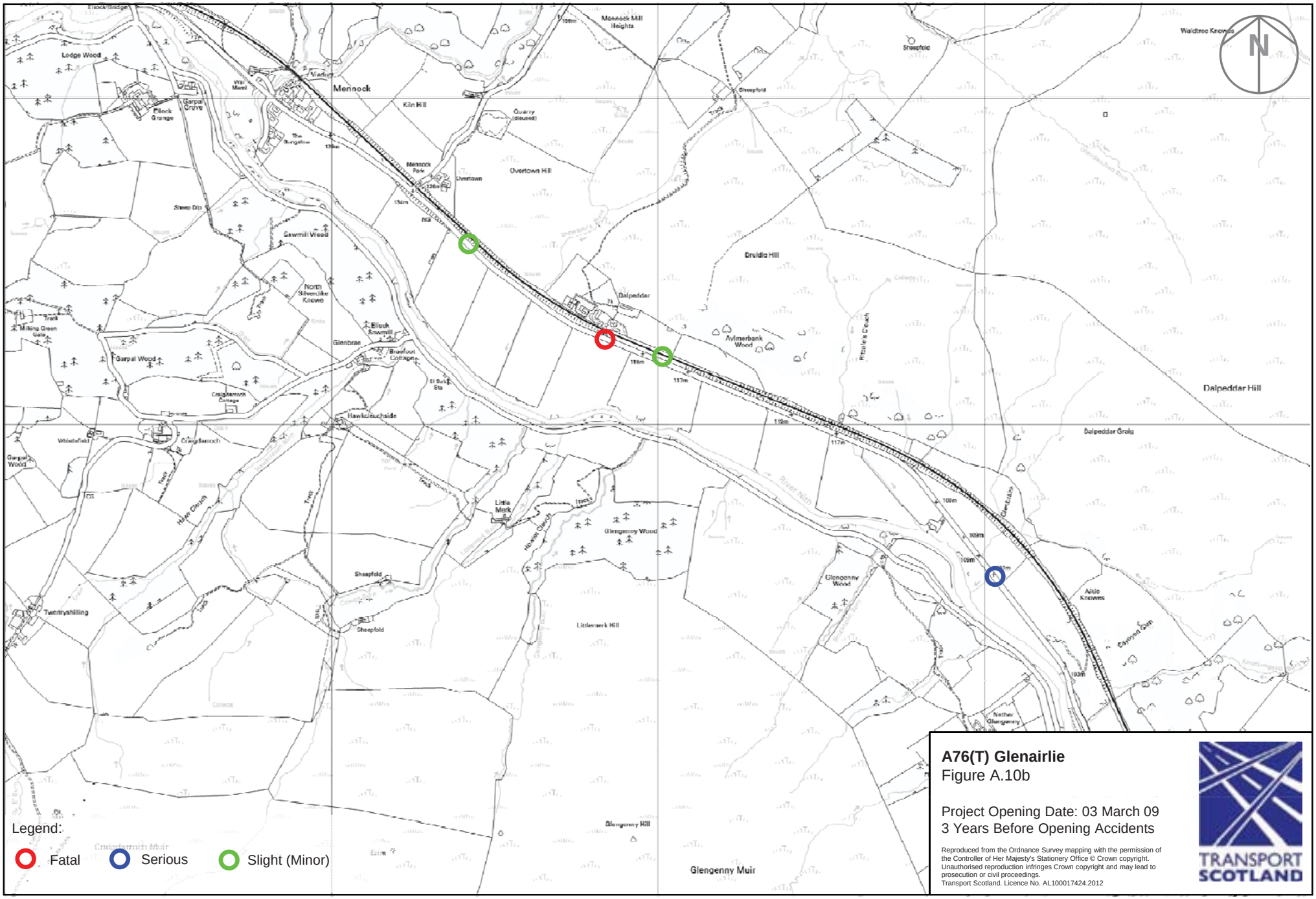
As can be seen in Table A.10.6, one personal injury accident (slight) occurred in the 1 year period following the opening of the project in comparison to four personal injury accidents (one fatal, one serious and two slight) in the 3 years before opening, suggesting a potential improvement in road safety.

Road Safety Audits

Transport Scotland has not yet received a copy of the Stage 4 RSA report for this project.

Safety: Key Findings

An assessment of the 1 year post opening personal injury accidents suggests that the A76(T) Glenairlie project is operating safely.



A76(T) Glenairlie
Figure A.10b

Project Opening Date: 03 March 09
3 Years Before Opening Accidents

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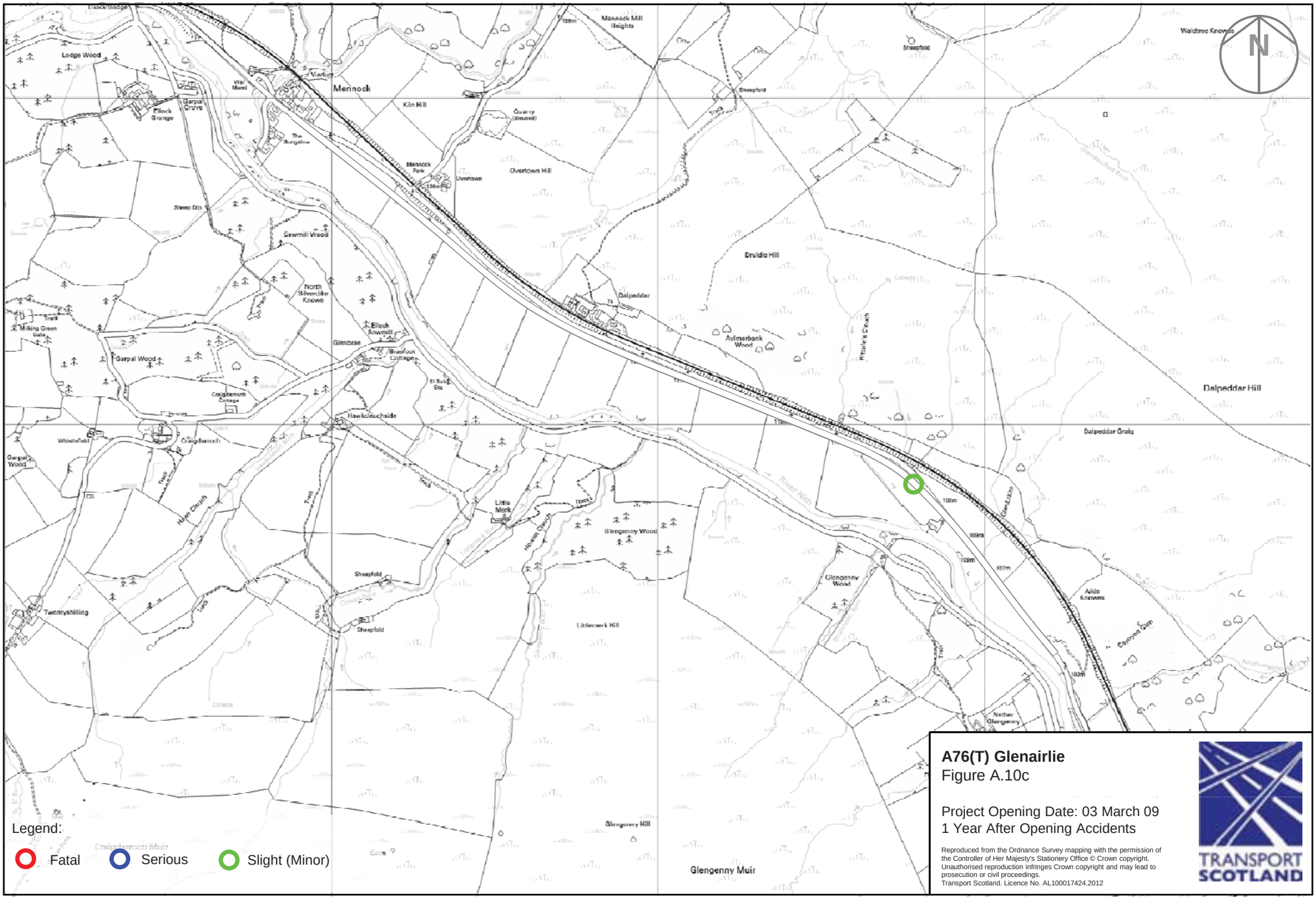

A76(T) Glenairlie
Figure A.10c

Project Opening Date: 03 March 09
1 Year After Opening Accidents

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A.10.5 Economy

Transport Economic Efficiency

Comparison Between Predicted and Actual Traffic Flows

The comparison between predicted and actual traffic flows, presented in section A.10.2, can be considered a proxy for whether the predicted economic benefits of the project are likely to be realised.

The comparison indicates that the predicted 2010 flow was within 4% of the observed 2010 flow on the A76(T).

Economy: Key Findings

A difference between predicted and actual AADT flows of this magnitude suggests that the economic benefits of the project may be realised.

A.10.6 Accessibility & Social Inclusion

Community Accessibility

Cycle Audits

In accordance with 'Cycling By Design' (1999), a Stage 2 Cycle Audit for the A76(T) Glenairlie project was carried out over the months of September to November in 2005.

An update to the Stage 2 Cycle Audit was carried out in August 2009 due to alignment changes to the cycleway route along the B797 at the northern end of the project.

The Stage 2 audit report notes, but does not confirm, implementation of the following cycling provisions in the A76(T) Glenairlie project:

- Cycle tracks in both verges and utilisation of sections of old road where possible.

Accessibility & Social Inclusion: Key Findings

On site observations have confirmed that a shared cycle and pedestrian facility has been provided that utilises the redundant section of the bypassed A76.

A.10.7 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Table A.10.7.

Table A.10.7: A76(T) Glenairlie – Project Cost Summary

	Out-turn Cost		Predicted Cost		Difference (Out-turn - Pred)
	@ April 10	Mid-98 Prices in 1998 at 3.5% Discount	Aug 05 prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£5,730,530	£3,125,035	£4,500,000	£2,812,183	£312,851 (11%)

Cost to Government: Key Findings

The out-turn cost of the A76(T) Glenairlie project is approximately £0.3m (11%) greater than was predicted at the time of assessment.

A.10.8 Value for Money

Initial Indications

The appraisal results for the A76(T) Glenairlie project predicted a Net Present Value (NPV) of £0.09m and Benefit to Cost Ratio (BCR) of 1.02 under the 60/40 traffic forecast scenario.

Based on the comparisons presented in sections A.10.5 and A.10.7, which suggest that the benefits may realised and indicate that the cost is marginally greater than predicted, the NPV and BCR of the project are unlikely to be as great as predicted.

Value for Money: Key Findings

The NPV and BCR are unlikely to be as great as predicted at the time of assessment, although it is judged that the project will continue to provide a benefit to road users.

A.10.9 Achievement of Objectives

As specific indicators to measure the performance of the A76(T) Glanairlie project against its objectives have not been developed, an initial indication of how the project is progressing towards achieving its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Initial Indications

A summary of the evaluation, providing an indication of how the A76(T) Glenairlie project is progressing towards achieving its objectives, is presented in Table A.10.8.

Table A.10.8: A76(T) Glenairlie – Progress Towards Achieving Objectives

Objective	Commentary	Progress
Improve and increase the number of overtaking opportunities to reduce the conflicts between long distance users, local and agricultural traffic.	A comparison between the results of the pre and post overtaking surveys indicate that the provision of a dedicated overtaking opportunity has increased overtaking in both directions of travel.	+ve
Improve the operational performance and level of service on the A76(T) by reducing the effect of driver stress and journey times by constructing guaranteed overtaking sections designed to break up convoys / platoons.	A comparison between the results of the pre and post overtaking surveys indicate that as a consequence of the increased overtaking in both directions of travel, a greater number of platoons are dispersed. Mean vehicle speeds in both directions of travel have increased following the opening of the A76(T) Glenairlie project and it can be expected that any overall impact on journey times is likely to be positive.	+ve
Wherever practicable incorporate measures for non-motorised users. In particular, cycling proposals shall be designed in accordance with the "Trunk Road Cycling Initiative".	A Cycle Audit was carried out for the project, which noted. cycling provisions. A shared cycle and pedestrian facility, as identified in the Environmental Statement, was provided which utilised the redundant section of the bypassed A76.	+ve
Maintain the asset value of the A76(T) route.	Given the nature of the A76(T) Glenairlie project, which involved replacing 2.9 kilometres of existing single carriageway with 2.5 kilometres of off-line wide single 2+1 carriageway and 500m of on-line improvements, the asset value of the A76(T) between the project tie-in points is likely to have increased thus maintaining the value of the route.	+ve
Mitigate the environmental impact of the new works where possible.	The majority of measures committed within the Environmental Statement are in place. Whilst some variations from the proposed mitigation measures have been identified, these are not considered to have had a material detrimental impact on	+ve

Objective	Commentary	Progress
	the general integration of the project into its surrounding.	
Achieve good value for money for both taxpayers and road users.	Although the NPV and BCR are unlikely to be as great as predicted at the time of assessment, it is judged that the Glenairlie project will continue to provide a benefit to road users.	=

Key: +ve Initial indication(s) that objective may be achieved
= Progress towards achievement of objective cannot be confirmed
O Initial indication(s) that objective may not be achieved

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Gheibhear lethbhreacan a bharrachd ann an cruth ris an èistear, ann an clò mòr agus ann an cànain coimhearsnachd. Cuir fios gu:

इस दस्तावेज़/काग़ज़ात की और प्रतियाँ, माँगे जाने पर, ऑडियो टैप पर और बड़े अक्षरों में तथा कम्यूनिटी भाषाओं में मिल सकती हैं, कृपया संपर्क करें:

ਇਸ ਦਸਤਾਵੇਜ਼/ਕਾਗ਼ਜ਼ਾਤ ਦੀਆਂ ਹੋਰ ਕਾਪੀਆਂ, ਮੰਗੇ ਜਾਣ ' ਤੇ, ਆੱਡਿਓ ਟੇਪ ਉੱਪਰ ਅਤੇ ਵੱਡੇ ਅੱਖਰਾਂ ਵਿਚ ਅਤੇ ਕੰਮਿਉਨਿਟੀ ਭਾਸ਼ਾਵਾਂ ਦੇ ਵਿਚ ਮਿਲ ਸਕਦੀਆਂ ਹਨ, ਕ੍ਰਿਪਾ ਕਰਕੇ ਸੰਪਰਕ ਕਰੋ:

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