

TRANSPORT SCOTLAND
TRUNK ROAD PROJECT EVALUATION

Evaluation Report for Trunk Road Projects
Opened between April 05 and March 07

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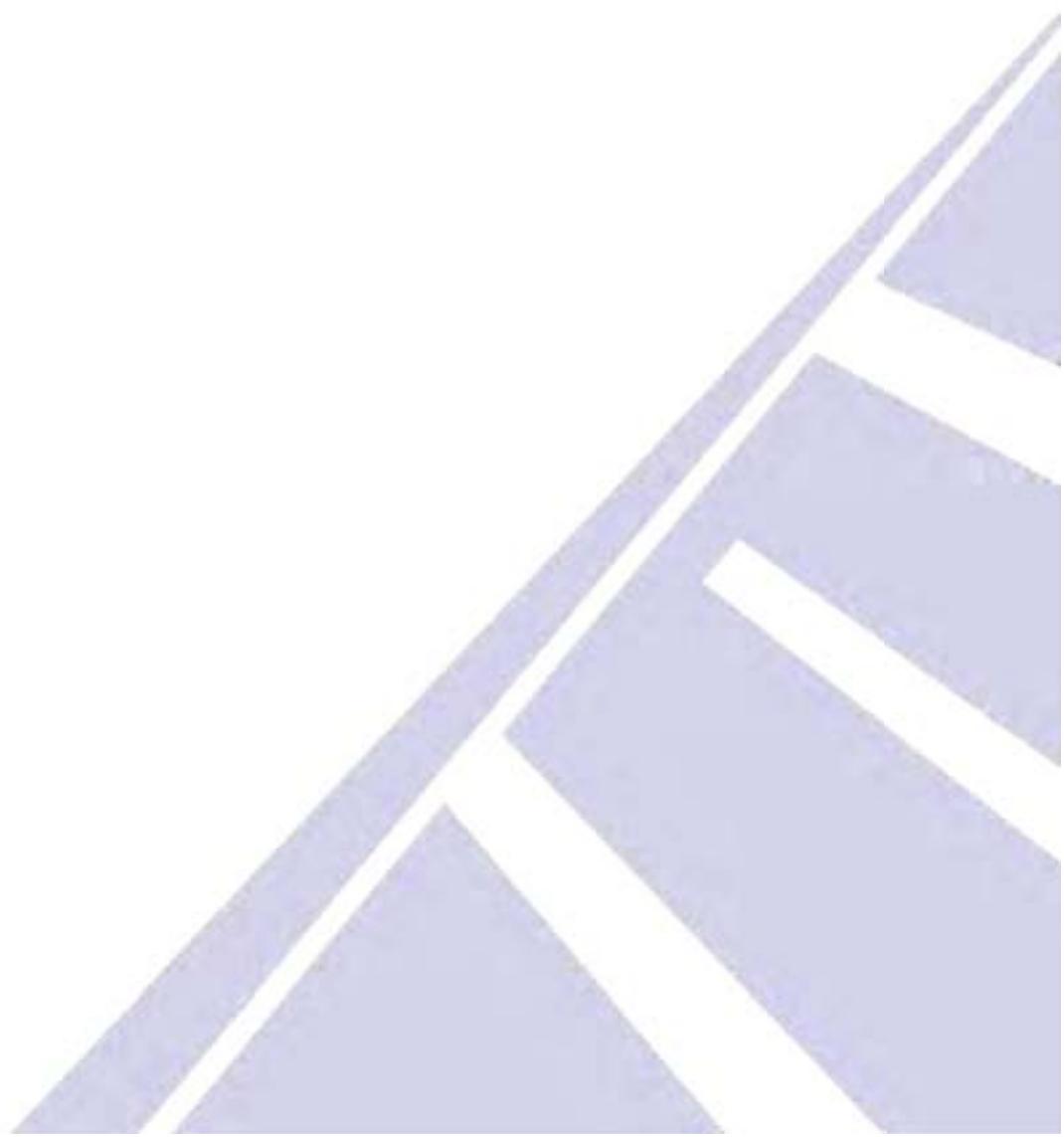
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INTRODUCTION



1 INTRODUCTION

1.1 Introduction to Project Evaluation

The aims of Project Evaluation for trunk roads reflect those 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’. These 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.

Transport Scotland currently undertakes a reporting system of „Project Evaluation’ for all trunk road projects costing over £5m. This compares the:

- traffic flows resulting from the implementation of a trunk road project with those predicted during the project’s preparation;
- carriageway standard provided with that required by observed flows;
- estimated project cost with the actual out-turn cost;
- accident statistics before and after project opening; and
- environmental mitigation measures put forward in the project’s Environmental Statement with those actually included as part of the project’s construction.

With the exception of the environmental mitigation measures, these comparisons are undertaken as proxies for the economic performance of the project as the time and resource implications of re-running full economic assessments with actual costs, traffic flows and accidents for all projects would be excessive. The evaluation of the environmental mitigation measures monitors the implementation and success of the measures proposed within the original Environmental Statement.

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1.2 Projects Reported

The *Evaluation Report for Trunk Road Projects Opened between April 05 and March 07* presents the evaluation undertaken for projects completed and opened to traffic in the 2005/06 and 2006/07 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 05 and March 07

Route	Project Name	Standard	Length (km)	Open to Traffic
M77	Fenwick to Malletsheugh	Dual 2-Lane Motorway	15.20	Apr. 05
A80	Auchenkilns Junction Improvement	Junction Improvement		Nov. 05
A96	Coachford	Climbing Lane	1.23	Nov. 05
A90	Glendoick Interchange	Junction Improvement		Dec. 06
A90	Kinfauns Interchange	Junction Improvement		Feb. 07



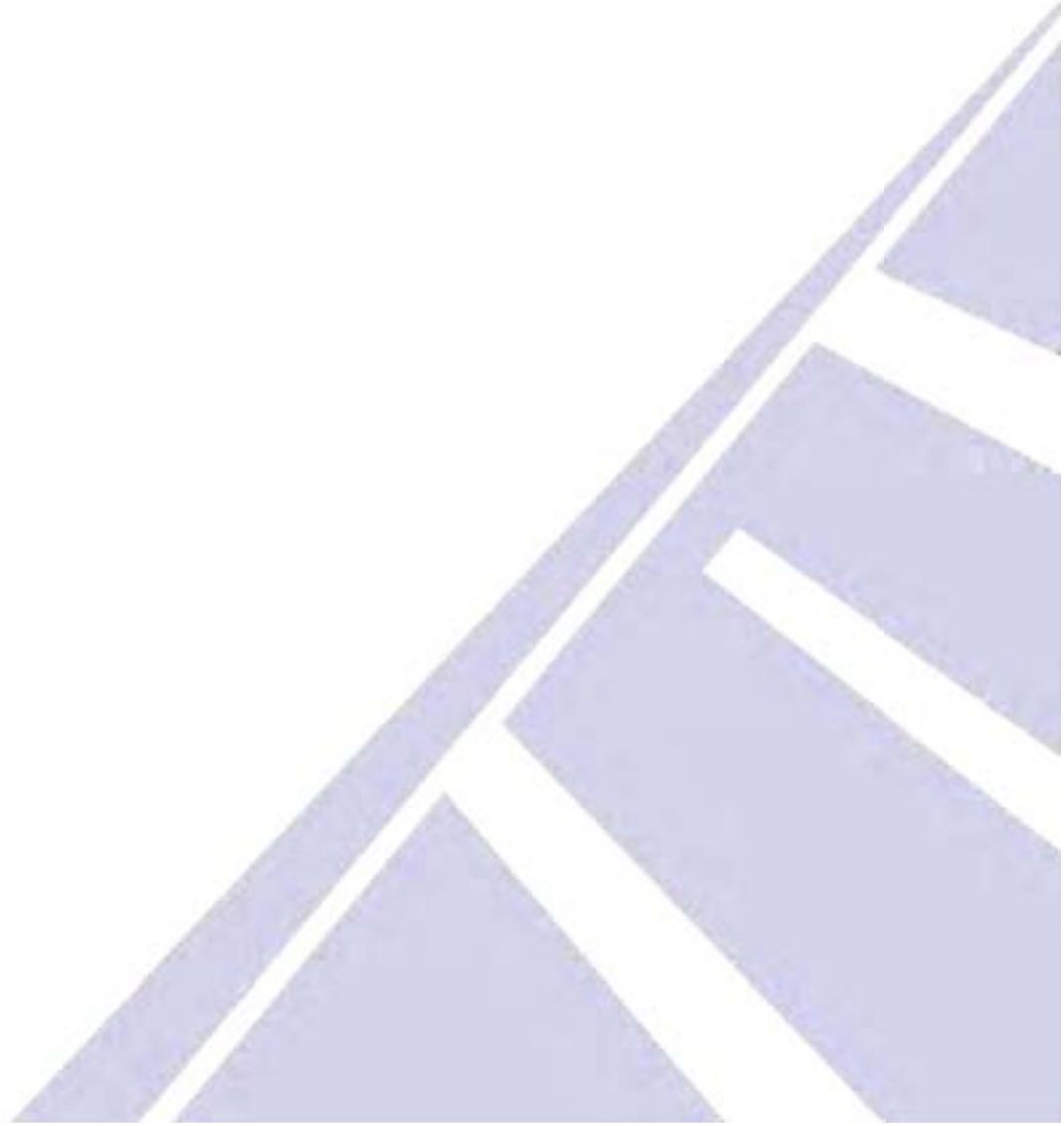
1. M77 Fenwick to Malletsheugh
2. A80 Auchenkilns Improvement
3. A96 Coachford
4. A90 Glendoick & Kinfauns Interchanges

Locations of Projects Evaluated
Figure 1.1

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DATA COLLECTION AND ANALYSIS



2 DATA COLLECTION AND ANALYSIS

2.1 Economic Assessment Data

During the period that the projects in this report were originally assessed, there were a number of changes to the „present value year’ and the discount rate. In 2002, the „present value year’ changed from 1994 to 1998 whilst the discount rate remained at 6%. Then in January 2003 the discount rate changed from 6% to 3.5% (which requires Optimism Bias to be applied to both the project costs and the works’ duration).

In July 2005 the „present value year’ changed again, this time to 2002 and the appraisal period was extended from 30 years to 60 years. The 3.5% discount rate is now used for the first 30 years of the 60 year appraisal period and reduces to 3.0% in years 31 to 60.

The following programs were used to assess the economic impact of projects that opened between April 05 and March 07:

- the Strathclyde Integrated Transport Model (SITM), a four stage multi-modal model;
- the TREVAL/PTEVAL modules (for highway and public transport, respectively) forming part of the CSTM (Central Scotland Traffic Model) package;
- the NESAs (Network Evaluation from Surveys and Assignments) computer program, developed and maintained by Transport Scotland (TS); and
- the PEARS (Program for the Economic Assessment of Road Schemes) program (supported by NESAs runs to assess the economic impact of accidents).

The version of SITM used had a „present value year’ of 1994 and a discount rate of 6%, whereas the version of TREVAL/PTEVAL had a „present value year’ of 1998 and a discount rate of 6%. For the NESAs and PEARS assessments, the versions used had a „present value year’ of 1998 and a discount rate of 3.5%.

Cost comparisons have been carried out on the projects assessed in this report using:

- a „present value year’ of 1998 and a discount rate of 6.0%; or
- a „present value year’ of 1998 and a discount rate of 3.5%.

The economic assessment reports generally contain information on the traffic projections and cost estimates used in the original project assessments. Where necessary, this is supplemented by information from the project consultants responsible for the detailed project assessment.

2.2 Traffic Flow Data

Data Retrieval

The „Before’ traffic data used in this report is the information collected and used in the economic assessment during the detailed project design stage.

The amount of traffic data is dependent upon the area wide complexity of the project and ranges from outputs from a detailed traffic model to single one day link and junction surveys.

With the continued development of the Scottish Road Traffic Database (SRTDb), both the quality and quantity of observed traffic data have increased substantially in recent years. In 2007, there were approximately 1,650 automatic traffic counter sites across the trunk road network providing continuous traffic flow data. Of these, approximately 1,200 are capable of recording classified traffic count data and almost 1,300 are capable of recording speed data as well.

The level of accuracy and reliability of traffic flow information is improving as the extent of the trunk road network covered by SRTDb traffic counters increases.

Following the opening of each project, long-term Automatic Traffic Count (ATC) monitoring is undertaken on appropriate sections of the route.

Data Analysis

The traffic flow data analysis conducted for this report consists of factoring either the base year or the predicted opening year, design network flows to the actual opening year using growth factors obtained from the National Road Traffic Forecasts (NRTF) in use at the time of the detailed scheme assessment. For all the projects assessed in this report, NRTF(97) was applicable.

From the ATC information collected after project opening, the Annual Average Daily Traffic (AADT) flow is determined. This value is then compared with the low and high growth traffic predictions for the opening year.

The difference between the actual traffic flow and the low and high growth predictions is calculated and expressed as a percentage of the actual flow. A project with predicted flows in the range +/- 20% of the actual flows is accepted as being a reasonable range for future year forecast traffic flow comparisons, as established by the National Audit Office.

An assessment of the appropriateness of the road standard built is also undertaken. This compares the carriageway standard implied by the observed traffic flows with that actually constructed.

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For all the projects assessed in this report, the carriageway assessment was carried out using DMRB, Volume 5, TA 46/97 „Economic Assessment and Recommended Flow Ranges for New Rural Road Links’. This technical memorandum uses observed opening year flows to determine the appropriateness of the carriageway standard constructed and was the memorandum in place at the time all the projects in this report were originally assessed.

2.3 Project Cost Data

It is clearly important to gauge the accuracy of project cost estimates used in detailed scheme assessment compared with the actual project out-turn costs. An under or over-estimate of project costs during the economic assessment will result in the economic benefits of the project being over or under predicted.

Data Retrieval

Information on the predicted project cost used in the pre-tender economic assessment is obtained and used as it is at this stage of the project preparation that the decision is taken on whether or not to proceed with the project and the output from the pre-tender economic assessment influences this decision.

Data Analysis

Retail Price Index (RPI) and discount corrections are performed to both the estimated and out-turn project costs in order to convert the figures to a common „present value year’ for prices and values. A comparison of predicted and actual costs is then made.

It should be noted that only out-turn costs incurred after the pre-tender economic assessment are included. 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. This is in accordance with HM Treasury Guidance, The Green Book – Appraisal and Evaluation in Central Government.

While the analysis of estimated and actual out-turn costs can provide guidance on the accuracy of the predictions, it should be noted that a number of issues will distort any comparisons and these include:

- Timing of Expenditure – this will affect the conversion of costs to base year prices and values. If the actual project expenditure commences either sooner or later than predicted, the validity of the cost comparisons may be diminished.

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- Expenditure Profile – similarly, if the actual project expenditure profile varies significantly from the predicted profile then the price and value corrections will distort any comparisons. The actual expenditure on projects clearly takes place over a longer period than that expenditure profile estimates used in the cost benefit analysis, although the bulk of the costs should be concentrated over a few years as predicted.
- On-Going Expenditure – expenditure on landscaping, land acquisition and claims can continue for a number of years after a project opens. Therefore, the actual costs presented to date may not be the final project costs.

2.4 Accident Data

Data Retrieval

“Before” accident data is defined as the 3 year accident statistics prior to the project opening.

“After” accident data is collected as part of the Stage 4 and 5 Road Safety Audits (RSAs) which are carried out 1 and 3 years respectively after project opening. These report on all accidents on the improved section of road and recommendations are made for ameliorative measures if appropriate. In the absence of RSA reports, the source “After” opening accident data is reviewed.

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 such circumstances, an additional accident study may be undertaken by the relevant local authority to supplement the Stage 4 and 5 RSAs for the project.

In the cases 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 before and after project opening.

Data Analysis

A comparison of injury accident numbers before and after project opening is undertaken. The number of injury accidents for the 3 years prior to a project opening is initially compared with the observed number of injury accidents for the project in its first year of operation. Two years later, when 3 years post opening accident data is available, a subsequent accident comparison with 3 years observed accident data is performed.

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For projects that opened between April 05 and March 07, it has been possible to obtain accident data for the 3 years after opening for all of the reported projects. The 3 year after accident analysis is included in this report, where possible, together with a discussion of any of the issues raised in the Stage 5 RSA reports (if available).

A further examination of the causes of accidents may be undertaken if this broad accident comparison highlights accident types or numbers that require further investigation.

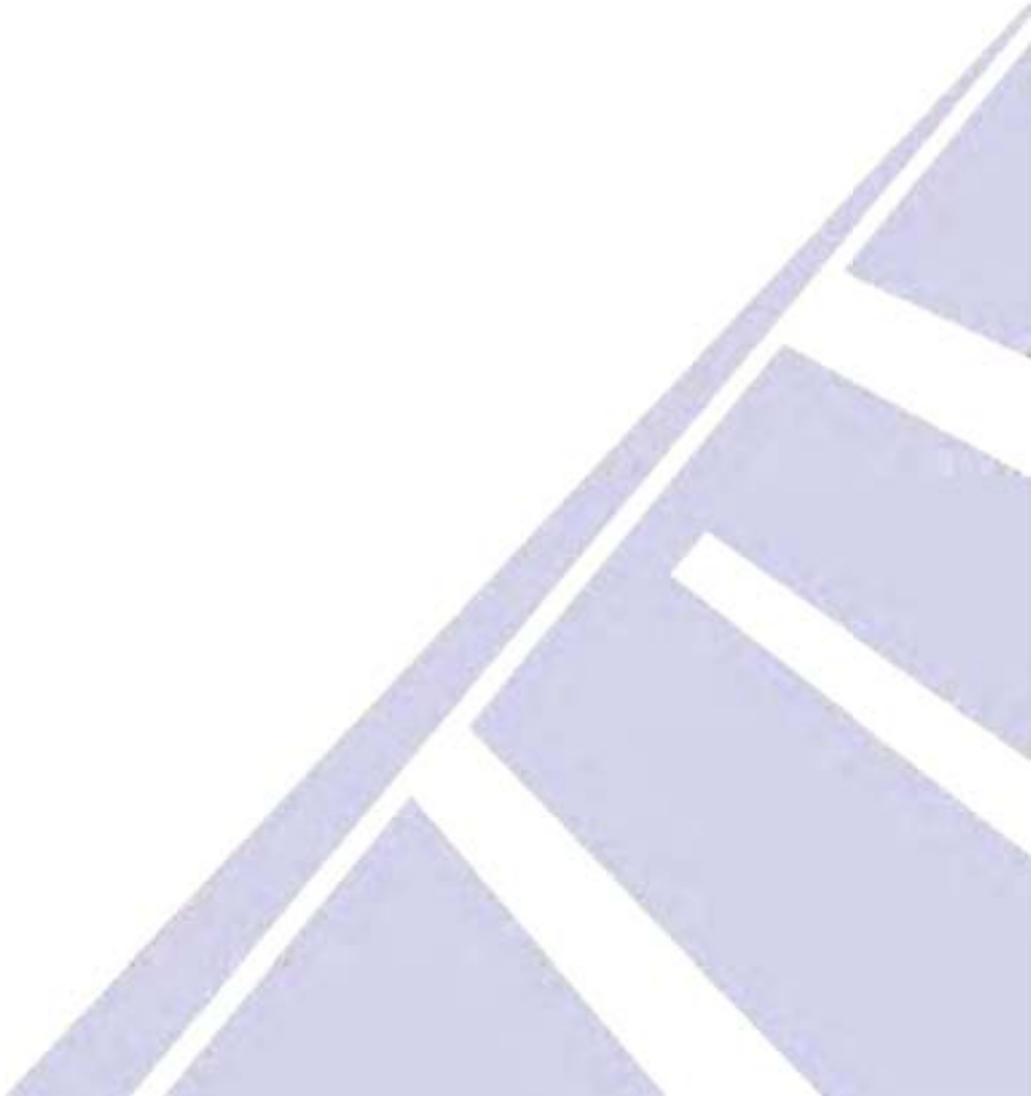
It is important to realise that road infrastructure projects normally take a minimum of 5 to 7 years to plan prior to the commencement of construction. Many proposed road projects are derived from safety concerns such as fatal and serious accidents. Often, these are treated in terms of Accident Investigation and Prevention work prior to planning the permanent solution. The 3 year before and after accidents therefore only demonstrate the minimum road safety improvement derived from the project.

2.5 Environmental Mitigation Measures

The project evaluation report includes a review of the environmental mitigation measures proposed within the Environmental Statements produced during the original project assessments to establish whether or not the measures proposed have been introduced and to provide comment on their success.

The *Evaluation Report for Trunk Road Projects Opened between April 05 and March 07* includes a review of environmental mitigation measures for selected projects.

PROJECTS



3 PROJECTS

3.1 M77 Fenwick to Malletsheugh

Project Description

The M77 Fenwick to Malletsheugh extension was officially opened to traffic on 27th April 2005.

The new motorway replaces an existing stretch of the A77, extending the existing M77 Motorway by 15.2 kilometres southwards from Malletsheugh to Fenwick and significantly reducing journey times from Glasgow to Ayrshire and beyond. The general location of the project is shown in Figure 3.1a.

Traffic Data

The ATCs used for the traffic assessment of this project were located on the M77, to the north of the junction with the A726 Glasgow Southern Orbital (SRTDb sites NTC01008 and NTC01010). The location of the ATCs is shown in Figure 3.1a.

The opening year flow comparisons for the M77 Fenwick to Malletsheugh project are based on AADT flows from 2006 as this was the first full year of traffic data available from the ATCs.

Predicted traffic flows for 2006 were obtained by factoring the 2004 base year flows used in the SITM assessment with NRTF(97) factors.

A summary of the observed traffic data and the predicted traffic data based on NRTF(97) is shown in Table 3.1a below.

Table 3.1a: M77 Fenwick to Malletsheugh – Traffic Analysis Summary NRTF(97)

Model Base Year	Opening Year	ATC AADT*	Predicted AADT			% Difference (Predicted – ATC) / ATC		
			LOW	60/40	HIGH	LOW	60/40	HIGH
2004	2005	29,602	29,386	30,295	31,659	-0.7%	2.3%	6.9%

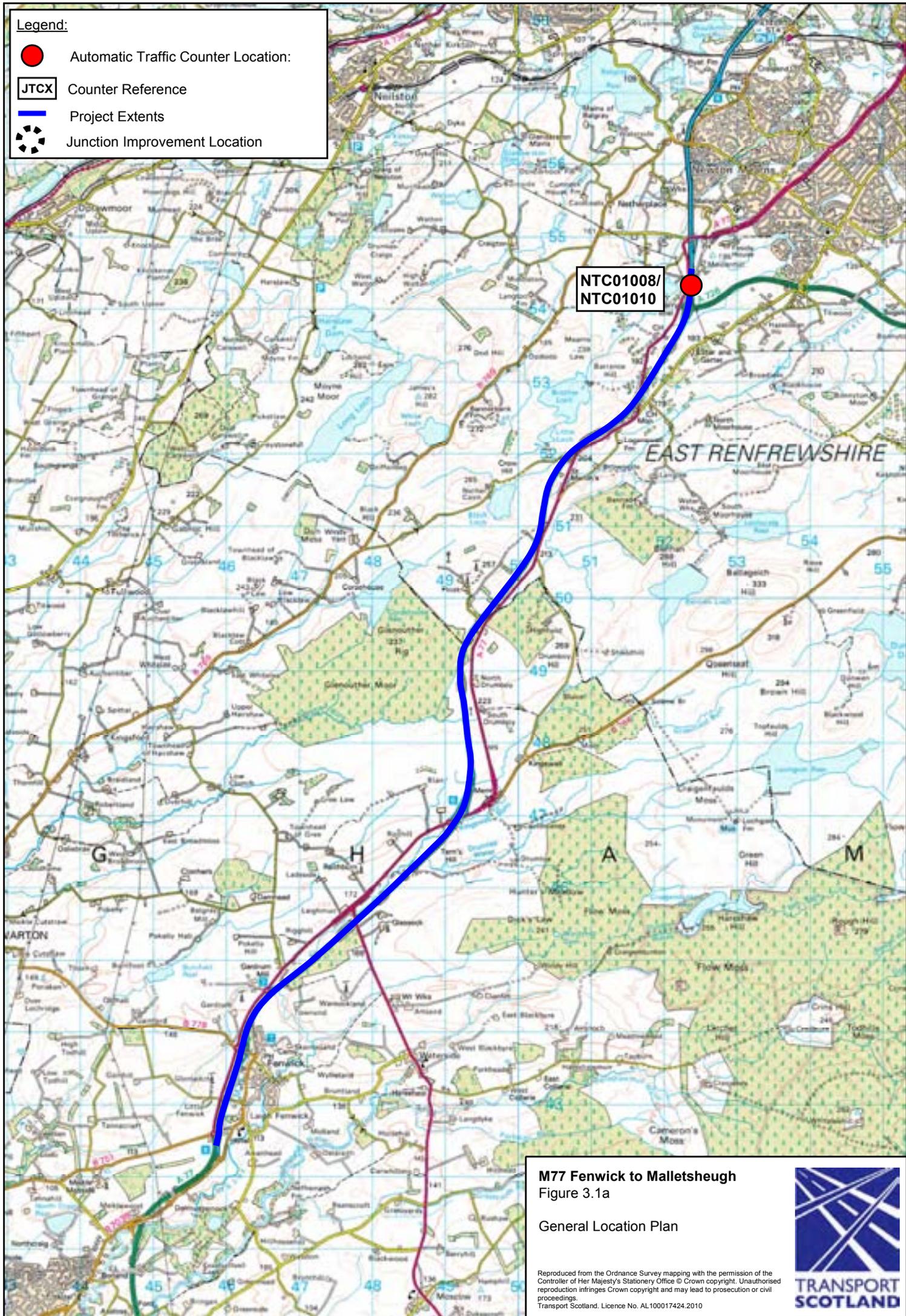
* 2006 flows (first full year of ATC data available)

Assessment of Carriageway Standard Provided

An assessment of the appropriateness of the carriageway standard provided according to TA 46/97, which applied at the time of the project design, is shown in Table 3.1b. This assessment is based on the observed opening year traffic flow.

Legend:

- Automatic Traffic Counter Location:
- JTCX Counter Reference
- Project Extents
- ⊗ Junction Improvement Location



M77 Fenwick to Malletsheugh
Figure 3.1a

General Location Plan

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Table 3.1b: M77 Fenwick to Malletsheugh – Assessment of Carriageway Standard (TD 46/97)

Opening Year AADT*	Implied Standard	Standard Built
29,602	Dual 2-Lane Motorway	Dual 2-Lane Motorway

* 2006 flows (first full year of ATC data available)

Cost Data

As the M77 Fenwick to Malletsheugh project was taken forward as a Private Finance Initiative project, which includes the Glasgow Southern Orbital project and associated maintenance over a number of years, actual construction cost information is not available.

Accident Data

The locations and severities of accidents occurring within the vicinity of the M77 Fenwick to Malletsheugh project 3 years before, 1 year after and 3 years after project completion are shown in Figures 3.1b to 3.1f.

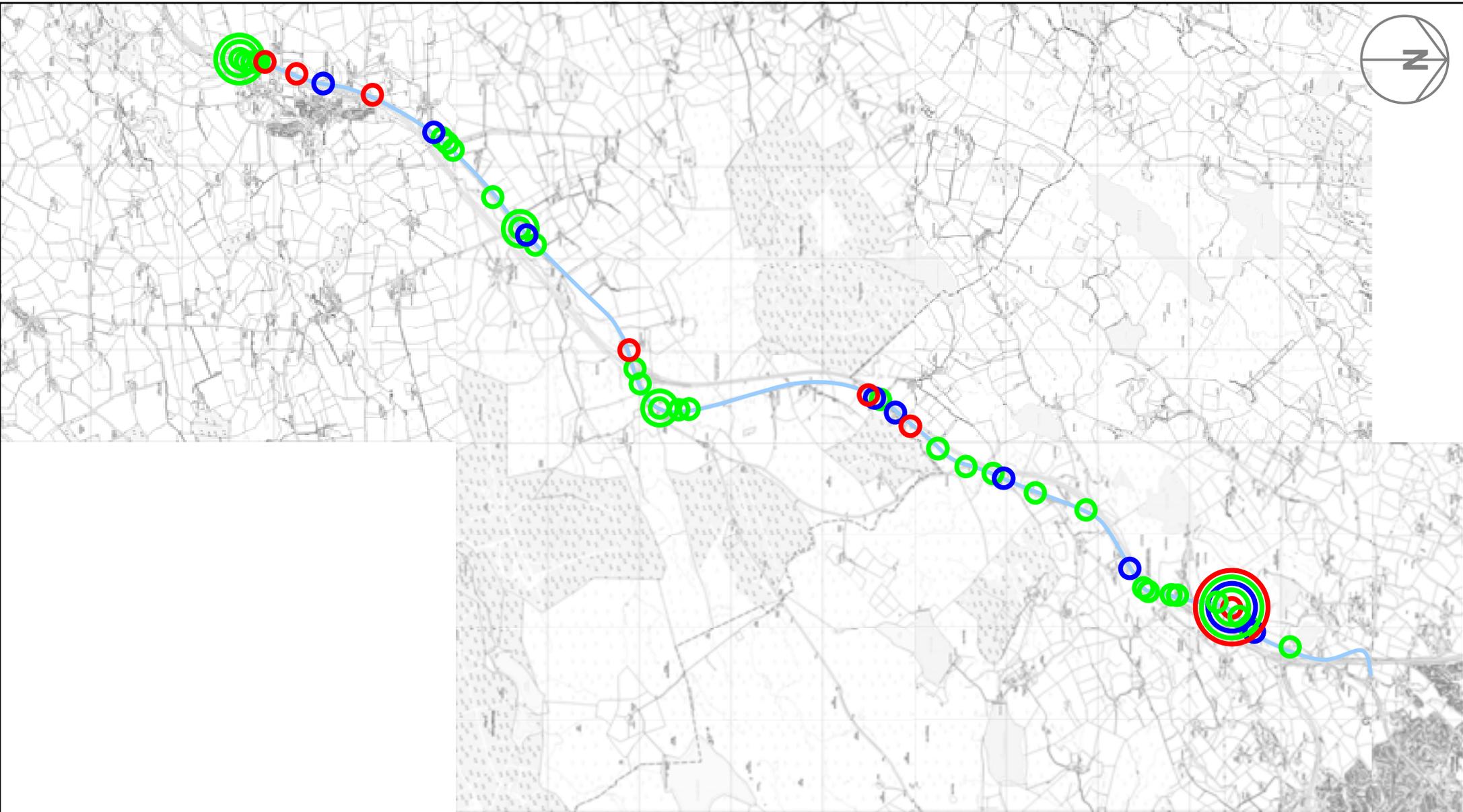
A summary of the accident data is shown in Table 3.1c.

Table 3.1c: M77 Fenwick to Malletsheugh – Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before				
A77	8	9	35	52
1 Year After				
M77	0	0	4	4
A77	1	0	5	6
Total	1	0	9	10
3 Years After				
M77	0	1	24	25
A77	2	1	11	14
Total	2	2	35	39

As can be seen from Table 3.1c, ten accidents (one fatal and nine slight) occurred in the 1 year period following the opening of the project in comparison to fifty-two accidents (eight fatal, nine serious and thirty-five slight) in the 3 years before opening, suggesting an improvement in road safety.

The fatal accident that occurred in the 1 year period following the opening of the project involved the fatality of a cyclist on the bypassed section of the A77. Transport Scotland has, however, not yet received a copy of the Stage 4 RSA report for this project and, therefore, it is not possible to comment further on the accidents that occurred in the 1 year period after opening.



Legend:

- Fatal
- Serious
- Slight (Minor)

M77 Fenwick to Malletsheugh
Figure 3.1b

3 Years Before Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)

M77 Fenwick to Malletsheugh
Figure 3.1c

1 Year After Opening Accidents
Occurring on M77

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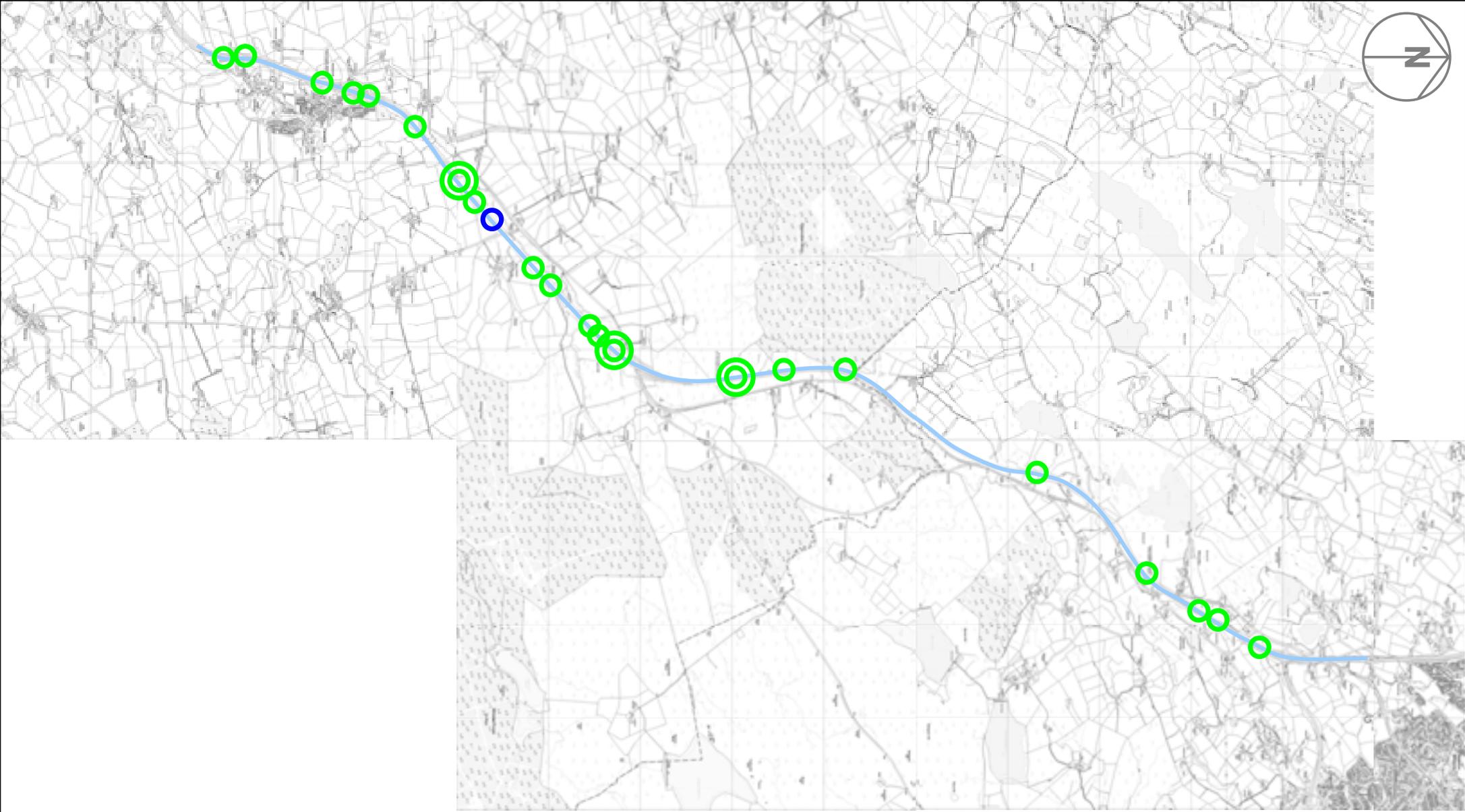
-  Fatal
-  Serious
-  Slight (Minor)

M77 Fenwick to Malletsheugh
Figure 3.1d

1 Year After Opening Accidents
Occurring on Bypassed A77

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Legend:

- Fatal
- Serious
- Slight (Minor)

M77 Fenwick to Malletsheugh
Figure 3.1e

3 Years After Opening Accidents
Occurring on M77

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)

M77 Fenwick to Malletsheugh
Figure 3.1f

3 Years After Opening Accidents
Occurring on Bypassed A77

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Table 3.1c also shows that thirty-nine accidents (two fatal, two serious and thirty-five slight) occurred in the 3 year period following the opening of the project, which continues to suggest an improvement in road safety within the vicinity of the project. Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project and it is not possible to comment on the accidents that occurred in the 3 year period after opening.

Environmental Mitigation Measures

The environmental mitigation measures originally proposed for the M77 Fenwick to Malletsheugh project were obtained from the project's Environmental Statement.

A review of the environmental mitigation measures was carried out in April 2009 to establish whether or not the proposed mitigation measures had been implemented.

The review of mitigation confirmed that many of the elements presented within the Environmental Statement were in place. Whilst there were some elements not evident on site, most of these related to proposed off-site screen planting that require separate arrangements with the relevant landowners.

There were limited areas where the mitigation proposals did not exactly match the layout shown in the Environmental Statement, such as the location of trees and the extent of hedge planting, however, this may be due to minor vertical and/or horizontal adjustments to the road design implemented by the contractors' team during the construction phase.

Overall, it was considered during the review that the objectives of the environmental mitigation measures, as contained in the Environmental Statement, had been achieved and that variations had not resulted in a material detrimental impact on the general integration of the project into its surroundings.

3.2 A80 Auchenkilns Junction Improvement

Project Description

Operation of the new A80 road interchange at Auchenkilns, on the outskirts of Glasgow, began on 21st November 2005.

The Auchenkilns Roundabout was replaced with a grade separated interchange, comprising a new bridge over the A80, four new slip roads and the realignment of the B8048 and A73. The general location of the project is shown in Figure 3.2a.

Traffic Data

The ATC used for the traffic assessment of this project was located on the A80 to the north-east of Auchenkilns (SRTDb site JTC00265). The location of the ATC is shown in Figure 3.2a.

The opening year flow comparisons for the A80 Auchenkilns Junction Improvement project are based on AADT flows from 2006 as this was the first full year of traffic data available from the ATCs.

Predicted traffic flows for 2006 were obtained by factoring the 2005 flows used in the TREVAL/PTEVAL assessment with NRTF(97) factors.

A summary of the observed traffic data and the predicted traffic data based on NRTF(97) is shown in Table 3.2a below.

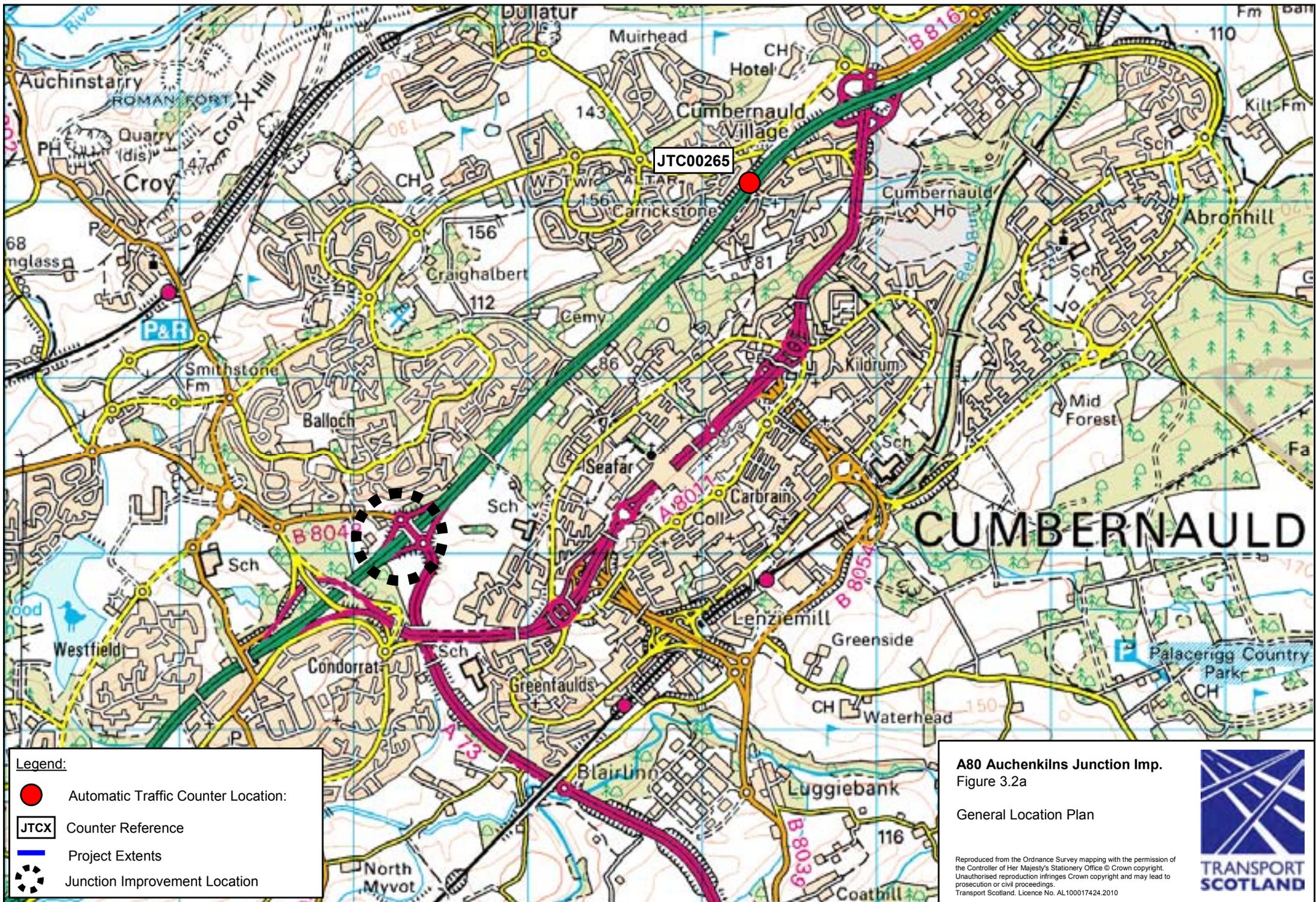
**Table 3.2a: A80 Auchenkilns Junction Improvement – Traffic Analysis Summary
NRTF(97)**

Model Base Year	Opening Year	ATC AADT*	Predicted AADT			% Difference (Predicted – ATC) / ATC		
			LOW	60/40	HIGH	LOW	60/40	HIGH
2005	2005	63,330	79,053	79,253	79,552	24.8%	25.1%	25.6%

*2006 flows (first full year of ATC data available)

Assessment of Carriageway Standard Provided

As the A80 Auchenkilns Junction Improvement project primarily involved the construction of a new grade separated interchange as opposed to a new section of carriageway, no assessment of the carriageway standard provided has been undertaken.



Legend:

- Automatic Traffic Counter Location:
- JTCX Counter Reference
- █ Project Extents
- Junction Improvement Location

A80 Auchenkilns Junction Imp.
 Figure 3.2a

General Location Plan

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Cost Data

The out-turn and estimated project costs are shown in Table 3.2b.

Table 3.2b: A80 Auchenkilns Junction Improvement – Project Cost Summary

	Out-turn Cost		Estimated Cost		Difference (Out-turn – Est)
	@ Jan 10	Mid-98 Prices in 1998 at 6% Discount	Jan 03 Prices	Mid-98 Prices in 1998 at 6% Discount	Mid-98 Prices in 1998 at 6% Discount
Total	£23,651,356	£14,502,652	£22,289,350	£14,356,675	£145,977 (1%)

Accident Data

The locations and severities of accidents occurring within the vicinity of the A80 Auchenkilns Junction Improvement project 3 years before, 1 year after and 3 years after project completion are shown in Figures 3.2b, 3.2c and 3.2d respectively.

A summary of the accident data is shown in Table 3.2c.

Table 3.2c: A80 Auchenkilns Junction Improvement – Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before	0	1	17	18
1 Year After	0	1	1	2
3 Years After	0	3	5	8

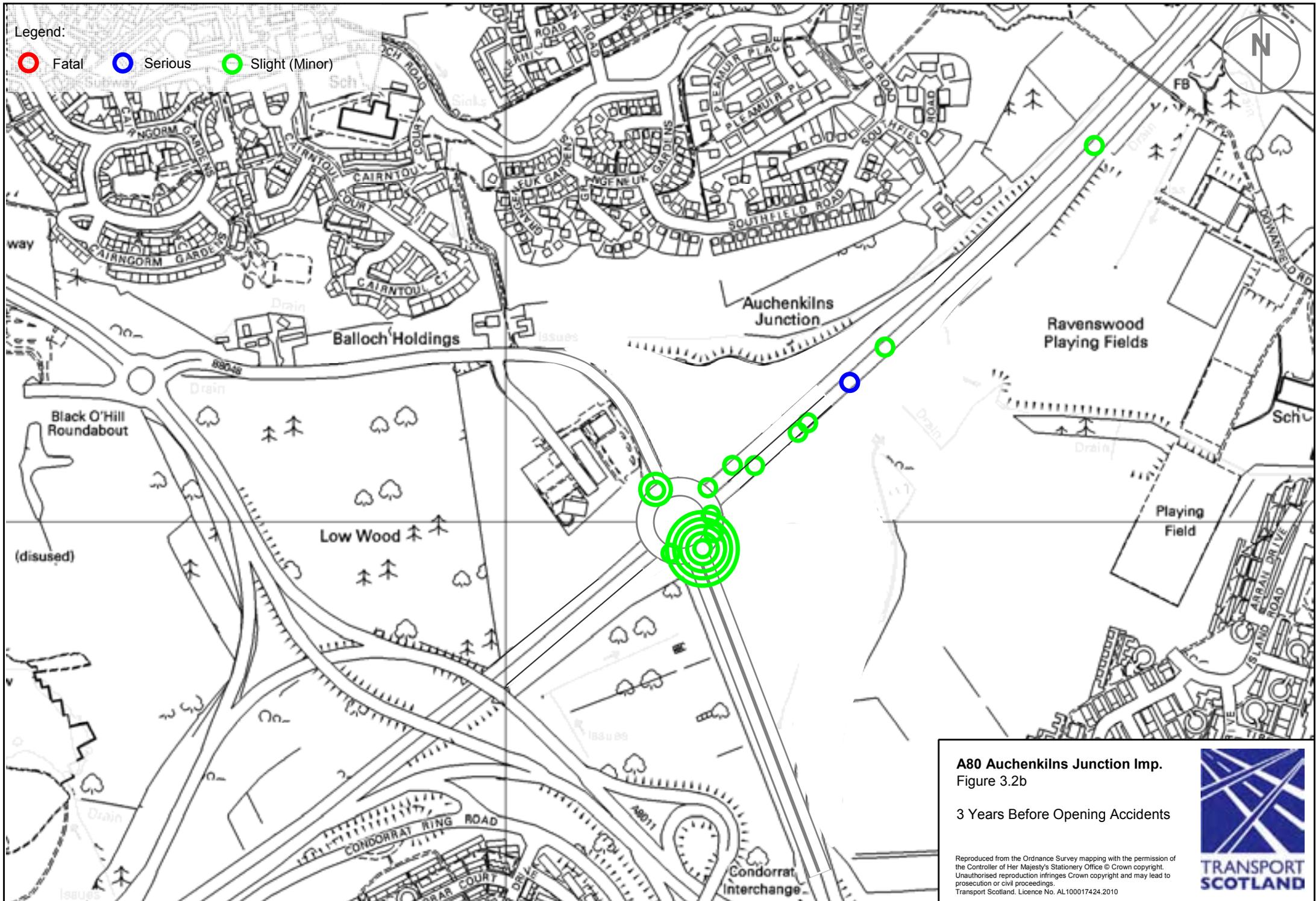
As can be seen in Table 3.2c, two accidents (one serious and one slight) occurred within the vicinity of the improved junction in the 1 year period following the opening of the project in comparison to eighteen accidents (one serious and seventeen slight) in the 3 years before opening, suggesting an improvement in road safety.

TS has not yet received a copy of the Stage 4 RSA report for this project and, therefore, it is not possible to provide any additional information on the accidents that occurred in the 1 year period after opening.

Table 3.2c also shows that eight accidents (three serious and five slight) occurred in the 3 year period following the opening of the project. While this continues to suggest an improvement in overall road safety within the vicinity of the project, there appears to have been a slight increase in the severity of accidents occurring at this location. Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project and it is not possible to comment on the accidents that occurred in the 3 year period after opening.

Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A80 Auchenkilns Junction Imp.
Figure 3.2b

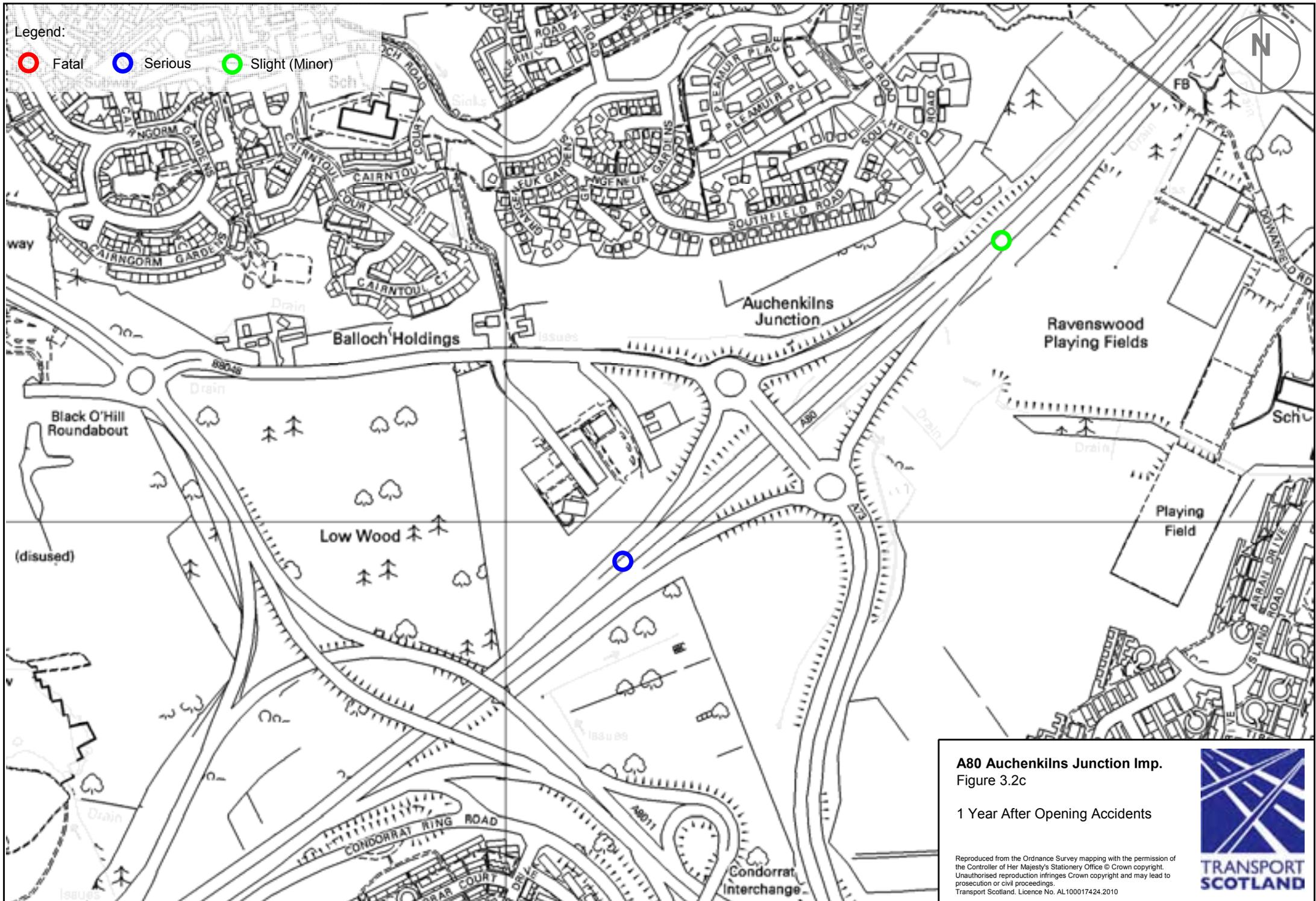
3 Years Before Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A80 Auchenkilns Junction Imp.
Figure 3.2c

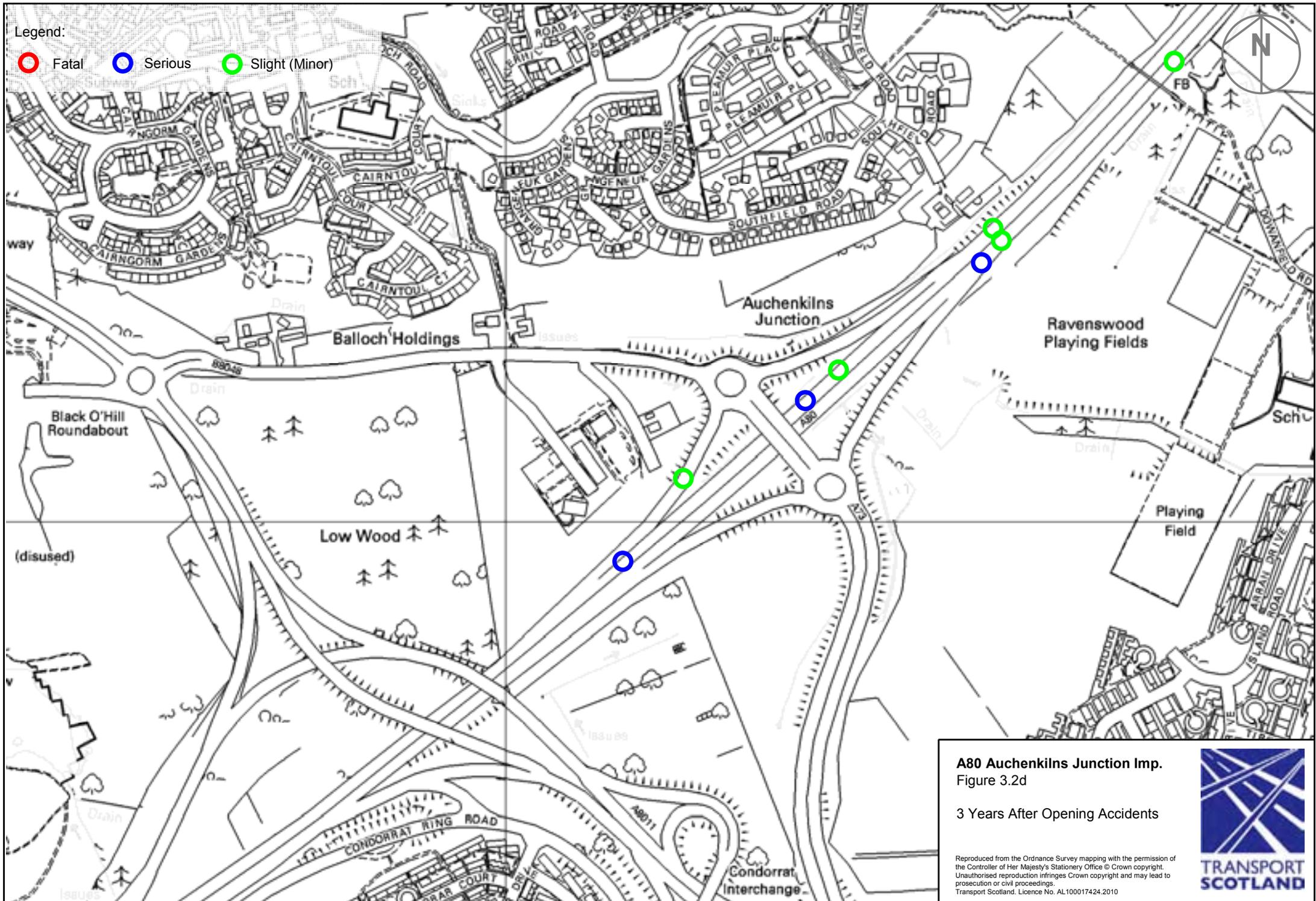
1 Year After Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A80 Auchenkilns Junction Imp.
Figure 3.2d

3 Years After Opening Accidents

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3.3 A96 Coachford

Project Description

As part of a series of improvements along the A96 corridor between Aberdeen and Inverness, a new climbing lane section at Coachford, to the south-east of Keith, was opened to traffic in November 2005.

The Coachford project involved the provision of 1.23 kilometres of single carriageway with climbing lane. The general location of the project is shown in Figure 3.3a.

Traffic Data

The ATC used for the traffic assessment of this project was located on the A96 to the south-east of Keith (SRTDb Ref. ATC02035). The location of the ATC is shown in Figure 3.3a.

The opening year flow comparisons for the A96 Coachford project are based on AADT flows from 2006 as this was the first full year of traffic data available from the ATC.

Predicted traffic flows for 2006 were obtained by factoring the 1998 base year flows used in the NESA assessment with NRTF(97) factors.

A summary of the observed traffic data and the predicted traffic data based on NRTF(97) is shown in Table 3.3a below.

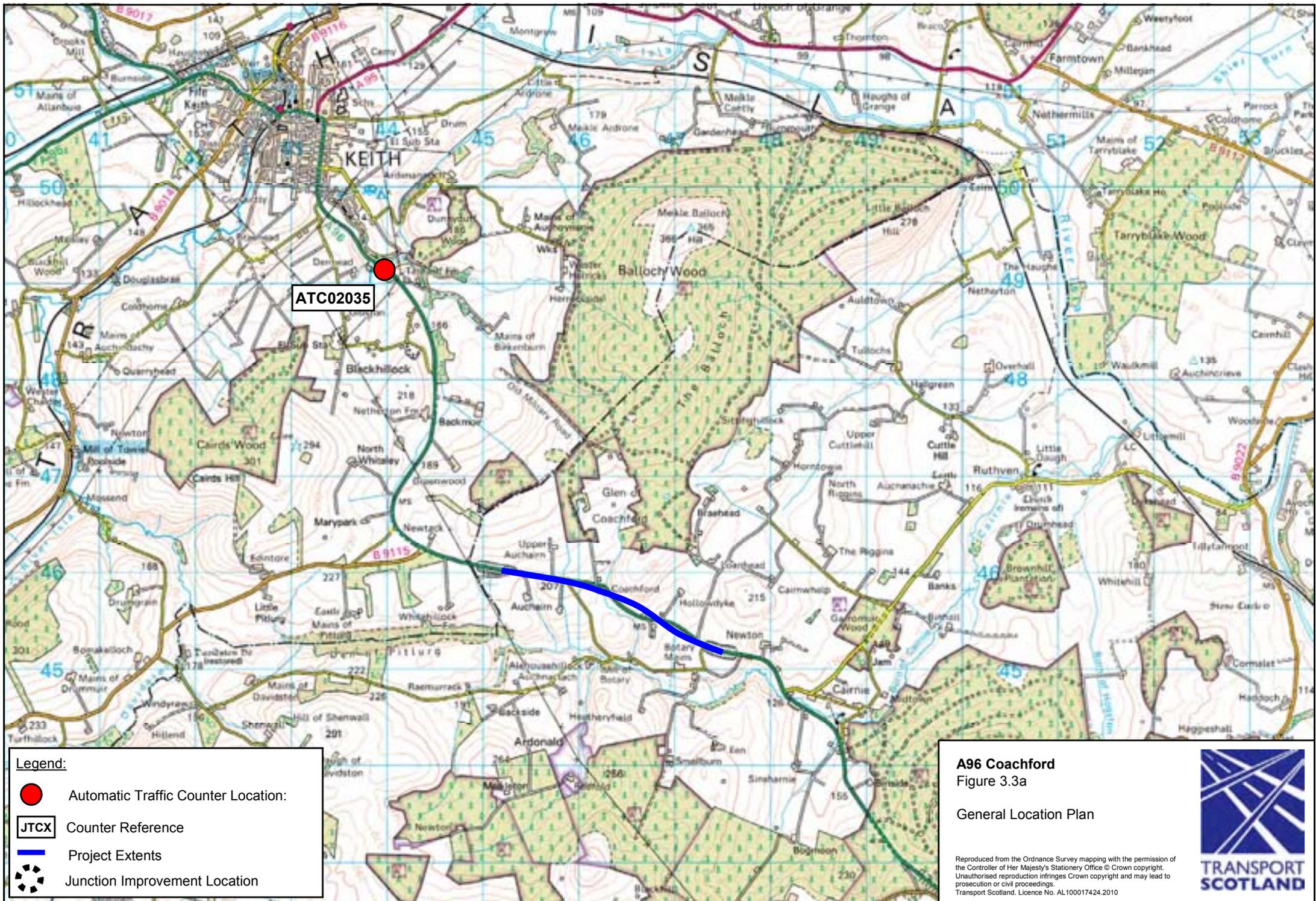
Table 3.3a: A96 Coachford – Traffic Analysis Summary NRTF(97)

Model Base Year	Opening Year	ATC AADT*	Predicted AADT			% Difference (Predicted – ATC) / ATC		
			LOW	60/40	HIGH	LOW	60/40	HIGH
1998	2005	6,844	5,982	6,219	6,575	-12.6%	-9.1%	-3.9%

*2006 flows (first full year of ATC data available)

Assessment of Carriageway Standard Provided

An assessment of the appropriateness of the carriageway standard provided according to TA 46/97, which applied at the time of the project design, is shown in Table 3.3b. This assessment is based on the observed opening year traffic flow.



ATC02035

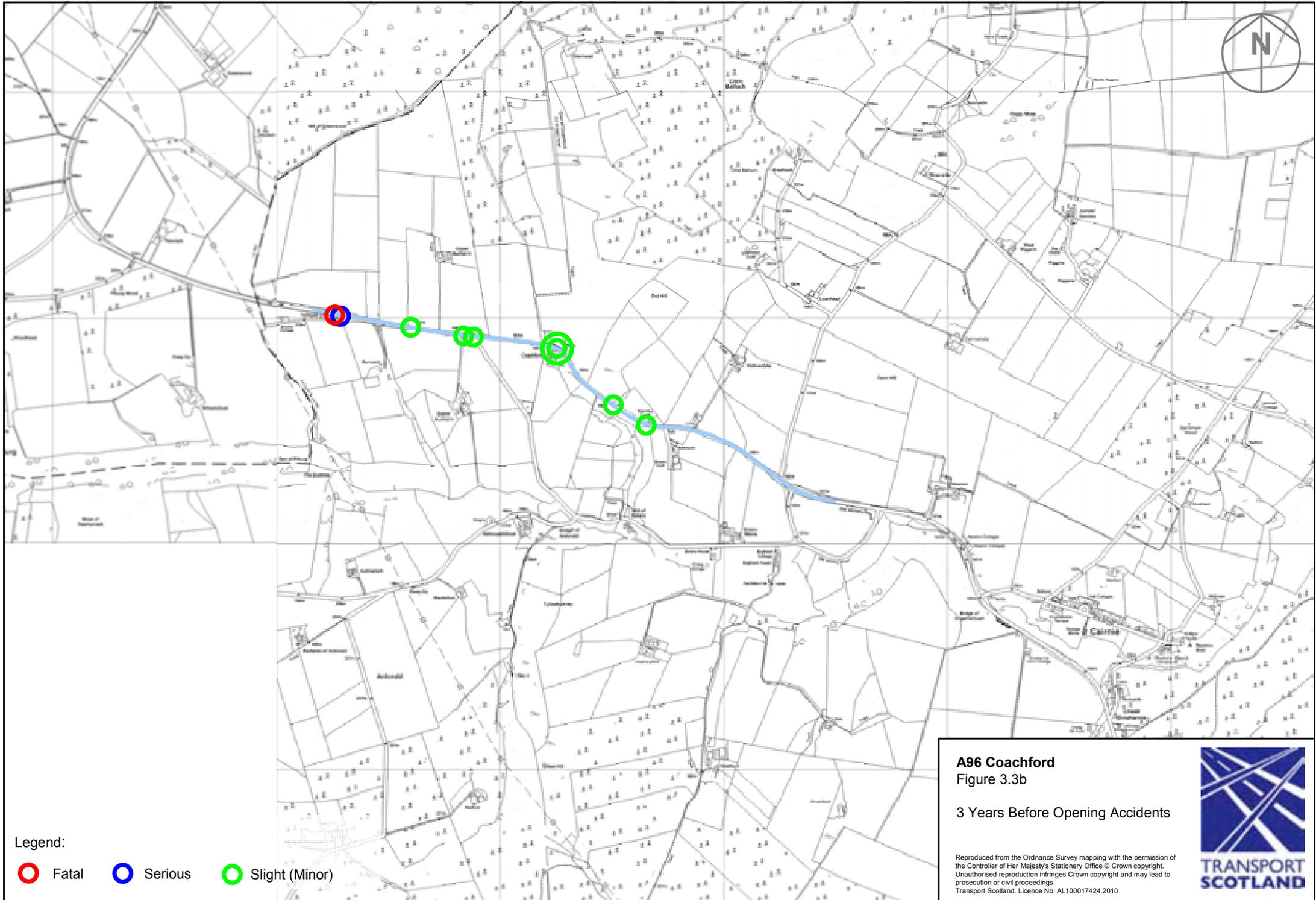
Legend:

-  Automatic Traffic Counter Location:
-  Counter Reference
-  Project Extents
-  Junction Improvement Location

A96 Coachford
Figure 3.3a
General Location Plan

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Legend:

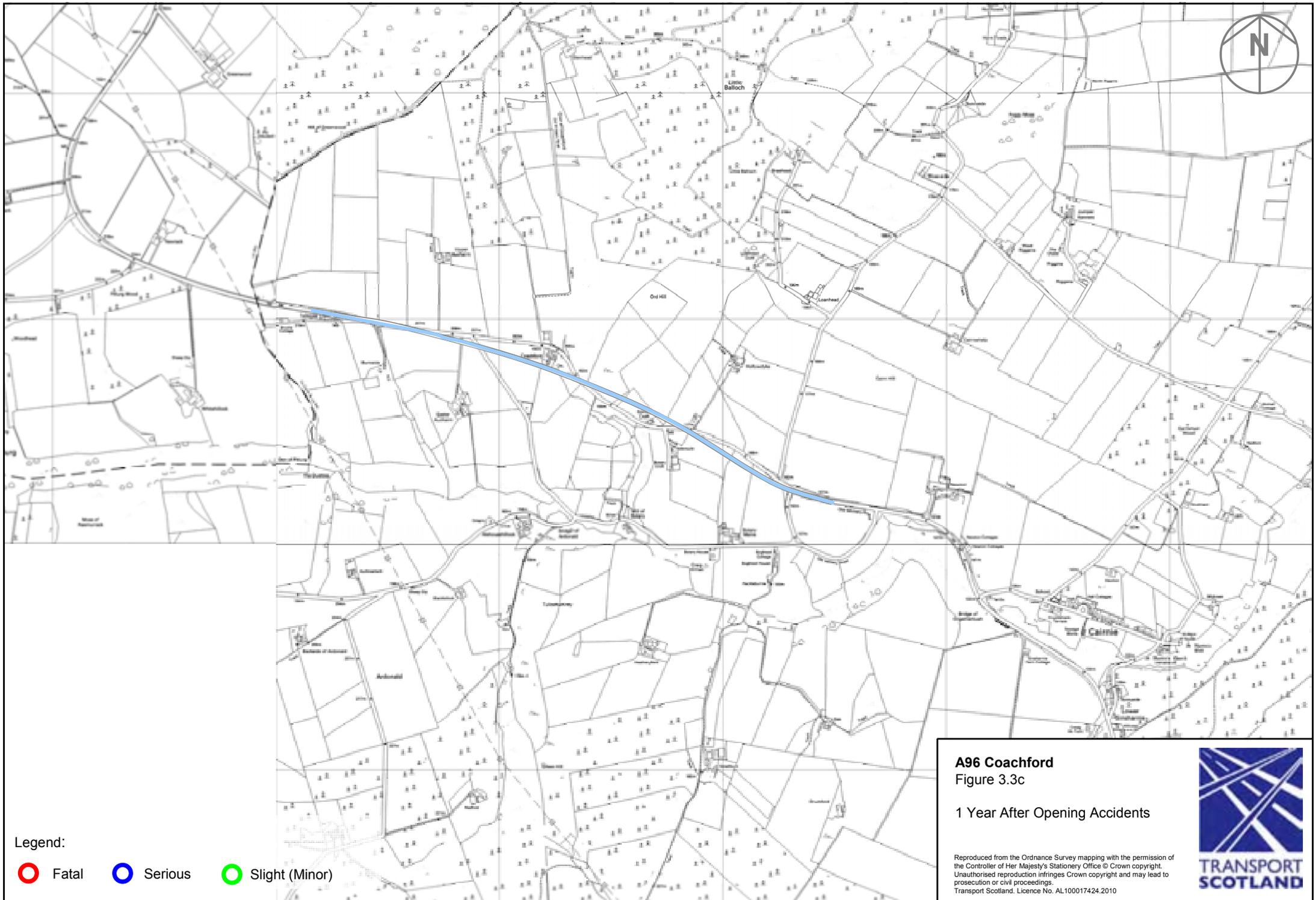
-  Fatal
-  Serious
-  Slight (Minor)

A96 Coachford
Figure 3.3b

3 Years Before Opening Accidents

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Legend:

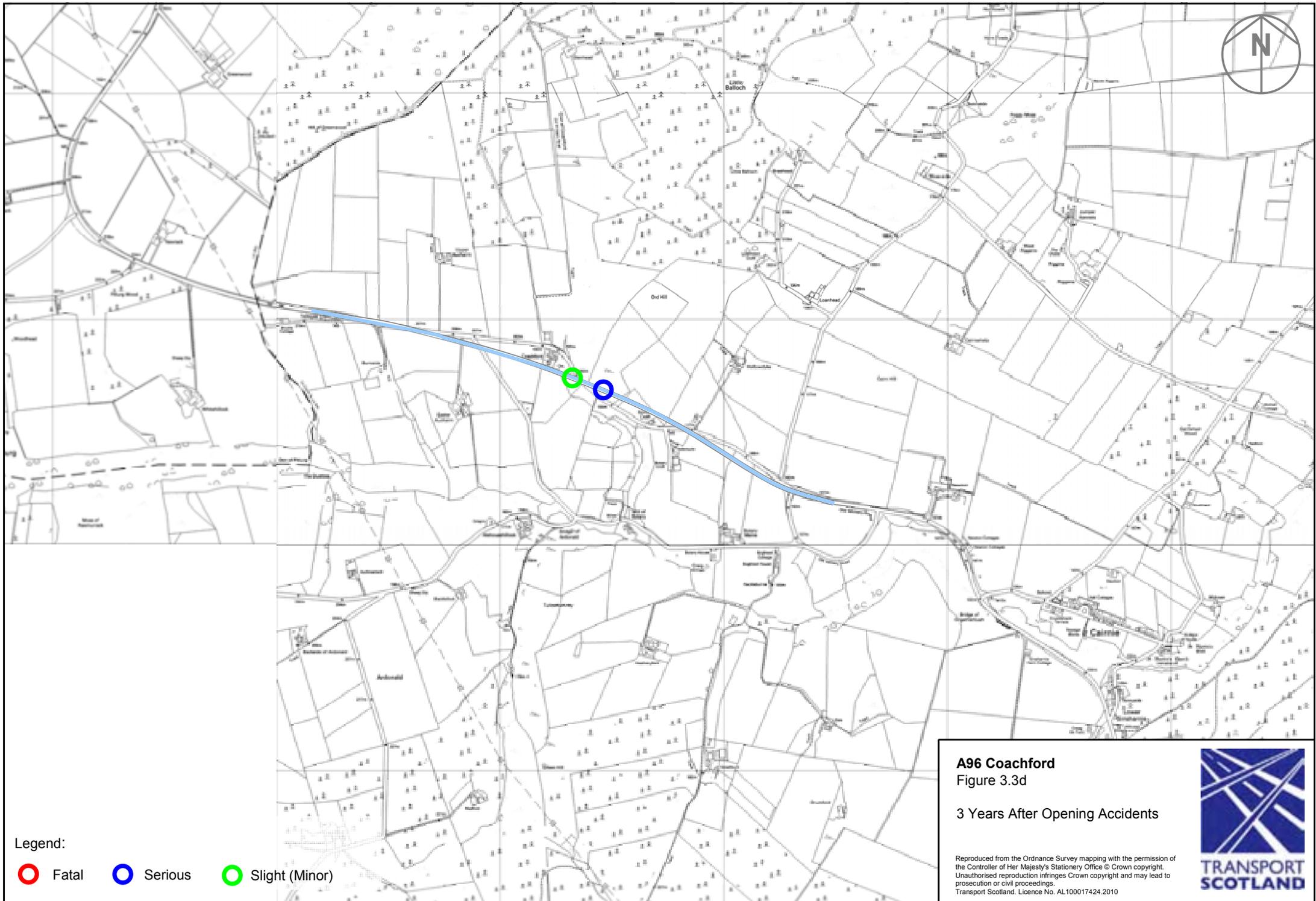
- Fatal
- Serious
- Slight (Minor)

A96 Coachford
Figure 3.3c

1 Year After Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)

A96 Coachford
Figure 3.3d

3 Years After Opening Accidents

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TRUNK ROAD PROJECT EVALUATION

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Table 3.3b: A96 Coachford – Assessment of Carriageway Standard (TD 46/97)

Opening Year AADT*	Implied Standard	Standard Built
6,844	Single / Wide Single 2-Lane	Climbing Lane

*2006 flows (first full year of ATC data available)

Cost Data

The out-turn and estimated project costs are shown in Table 3.3c.

Table 3.3c: A96 Coachford – Project Cost Summary

	Out-turn Cost		Estimated Cost		Difference (Out-turn – Est)
	@ Jan 10	Mid-98 Prices in 1998 at 3.5% Discount	May 04 Prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£6,527,043	£4,440,309	£8,375,000	£5,625,731	-£1,185,422 (-21%)

Accident Data

The locations and severities of accidents occurring within the vicinity of the A96 Coachford project 3 years before, 1 year after and 3 years after project completion are shown in Figures 3.3b, 3.3c and 3.3d respectively. A summary of the accident data is shown in Table 3.3d.

Table 3.3d: A96 Coachford – Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before	1	1	7	9
1 Year After	0	0	0	0
3 Years After	0	1	1	2

As can be seen in Table 3.3d, no accidents have occurred in the 1 year period following the opening of the project in comparison to nine accidents (one fatal, one serious and seven slight) in the 3 years before opening, suggesting an improvement in road safety. Transport Scotland has not yet received a copy of the Stage 4 RSA report for this project.

Table 3.3d also shows that two accidents (one serious and one slight) occurred in the 3 year period following the opening of the project, which continues to suggest an improvement in road safety. Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project and it is not possible to comment on the accidents that occurred in the 3 year period after opening.

3.4 A90 Glendoick Interchange

Project Description

As part of a series of improvements along the A90 corridor between Perth and Dundee, a new grade separated interchange at Glendoick was opened to traffic on 21st December 2006.

The new interchange replaced the existing at-grade priority junction, which provided access to Glendoick Garden Centre to the north.

The A90 Glendoick Interchange project involved the provision of a new grade separated interchange and associated accommodation works as well as the closure of several central reserve gaps (at Glencarse Road, Ross Road, Pitlowie Road, High Carse Road, Muiredge Road, Pittroddie Road and Inchcoonans Road). The general location of the project is shown in Figure 3.4a.

Traffic Data

The ATC used for the traffic assessment of this project was located on the A90, east of the Glencarse grade separated junction (SRTDb Ref. JTC00065). The location of the ATC is shown in Figure 3.4a.

The opening year flow comparisons for the A90 Glendoick Interchange project is based on AADT flows from 2007 as this was the first full year of traffic data available from the ATC.

Predicted traffic flows for 2007 were obtained by factoring the 2001 base year flows used in the NESA accident assessment with NRTF(97) factors.

A summary of the observed traffic data and the predicted traffic data based on NRTF(97) is shown in Table 3.4a below.

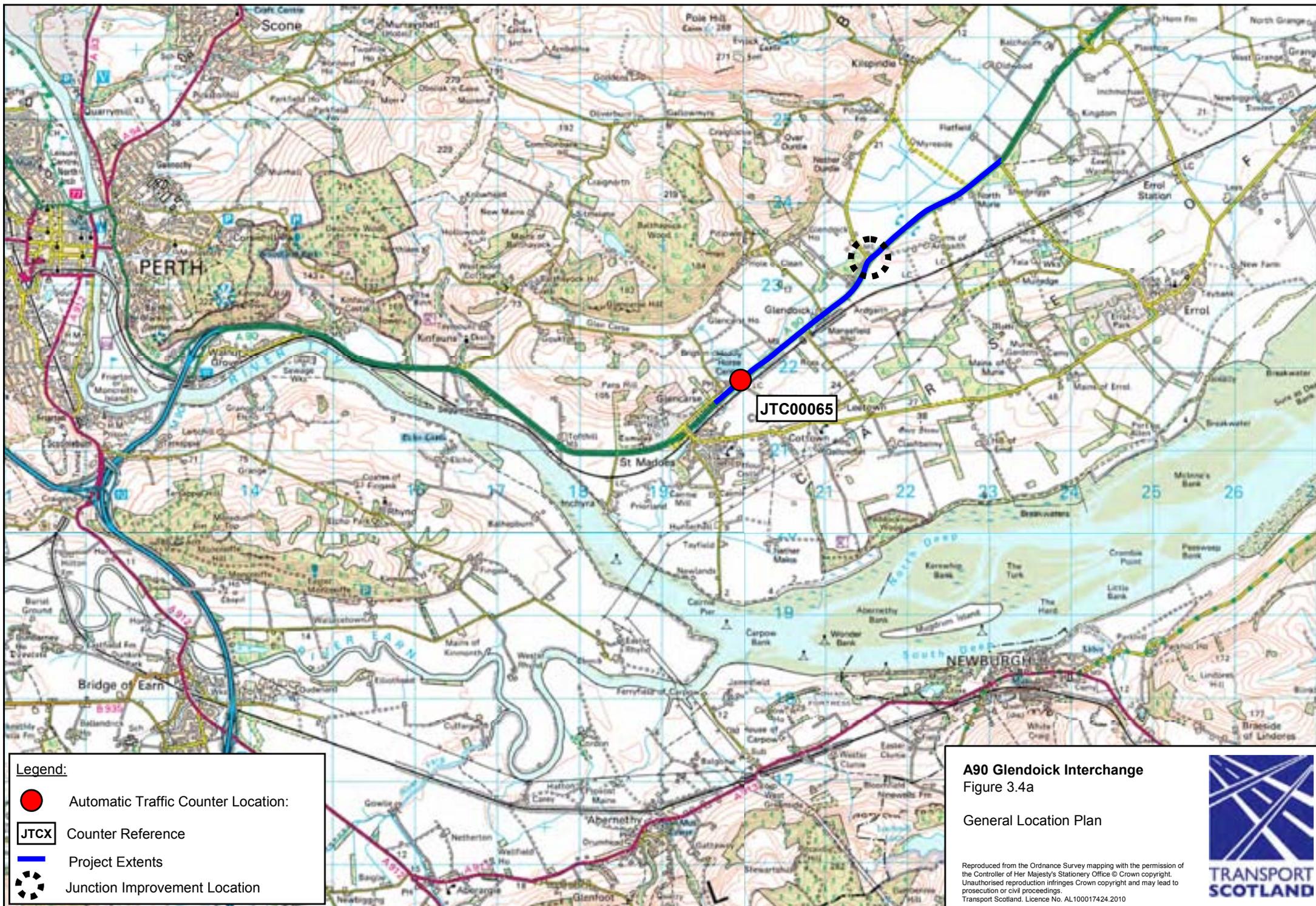
Table 3.4a: A90 Glendoick Interchange – Traffic Analysis Summary NRTF(97)

Model Base Year	Opening Year	ATC AADT*	Predicted AADT			% Difference (Predicted – ATC) / ATC		
			LOW	60/40	HIGH	LOW	60/40	HIGH
2001	2006	34,359	29,053	29,502	30,175	-15.4%	-14.1%	-12.2%

* 2007 flows (first full year of ATC data available)

Assessment of Carriageway Standard Provided

As the A90 Glendoick Interchange project involved the construction of a new grade separated junction, as opposed to a new section of carriageway, no assessment of the carriageway standard provided has been undertaken.



Legend:

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

A90 Glendoick Interchange
 Figure 3.4a

General Location Plan

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TRUNK ROAD **PROJECT EVALUATION**

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Cost Data

As the out-turn project cost for the A90 Glendoick Interchange is not held on its own and instead has been combined with the out-turn cost for the A90 Kinfauns Interchange project, the estimated project costs used in the respective pre-tender economic assessments have also been combined.

The combined out-turn and estimated project costs are presented in Section 3.5.

Accident Data

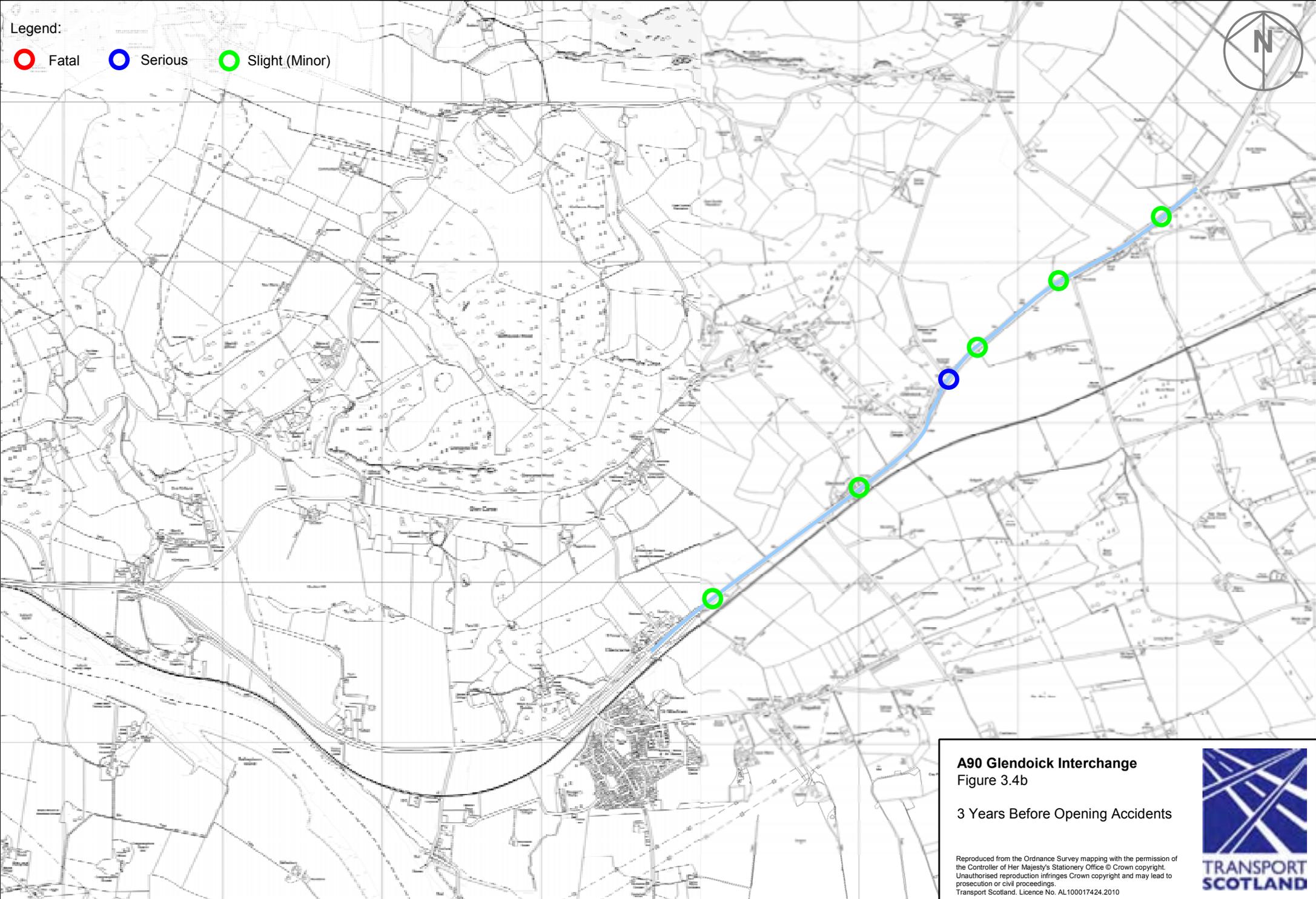
The locations and severities of accidents occurring within the vicinity of the A90 Glendoick Interchange project 3 years before, 1 year after and 3 years after project completion are shown in Figures 3.4b, 3.4c and 3.4d respectively. A summary of the accident data is shown in Table 3.4b.

Table 3.4b: A90 Glendoick Interchange – Accident Data Summary

Period	Fatal	Serious	Slight	Total Accidents
3 Years Before	0	1	5	6
1 Year After	0	0	0	0
3 Years After	0	3	3	6

As can be seen in Table 3.4b, no accidents occurred within the vicinity of the improved junction in the 1 year period following the opening of the project in comparison to six accidents (one serious and five slight) in the 3 years before opening, suggesting an improvement in road safety.

Table 3.4b also shows that six accidents (three serious and three slight) occurred in the 3 year period following the opening of the project. Whilst this seems to suggest that there has been little change in overall road safety, there appears to have been a slight increase in the severity of accidents occurring at this location. Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project and it is not possible to comment on the accidents that occurred in the 3 year period after opening.



Legend:

- Fatal
- Serious
- Slight (Minor)



A90 Glendoick Interchange
Figure 3.4b

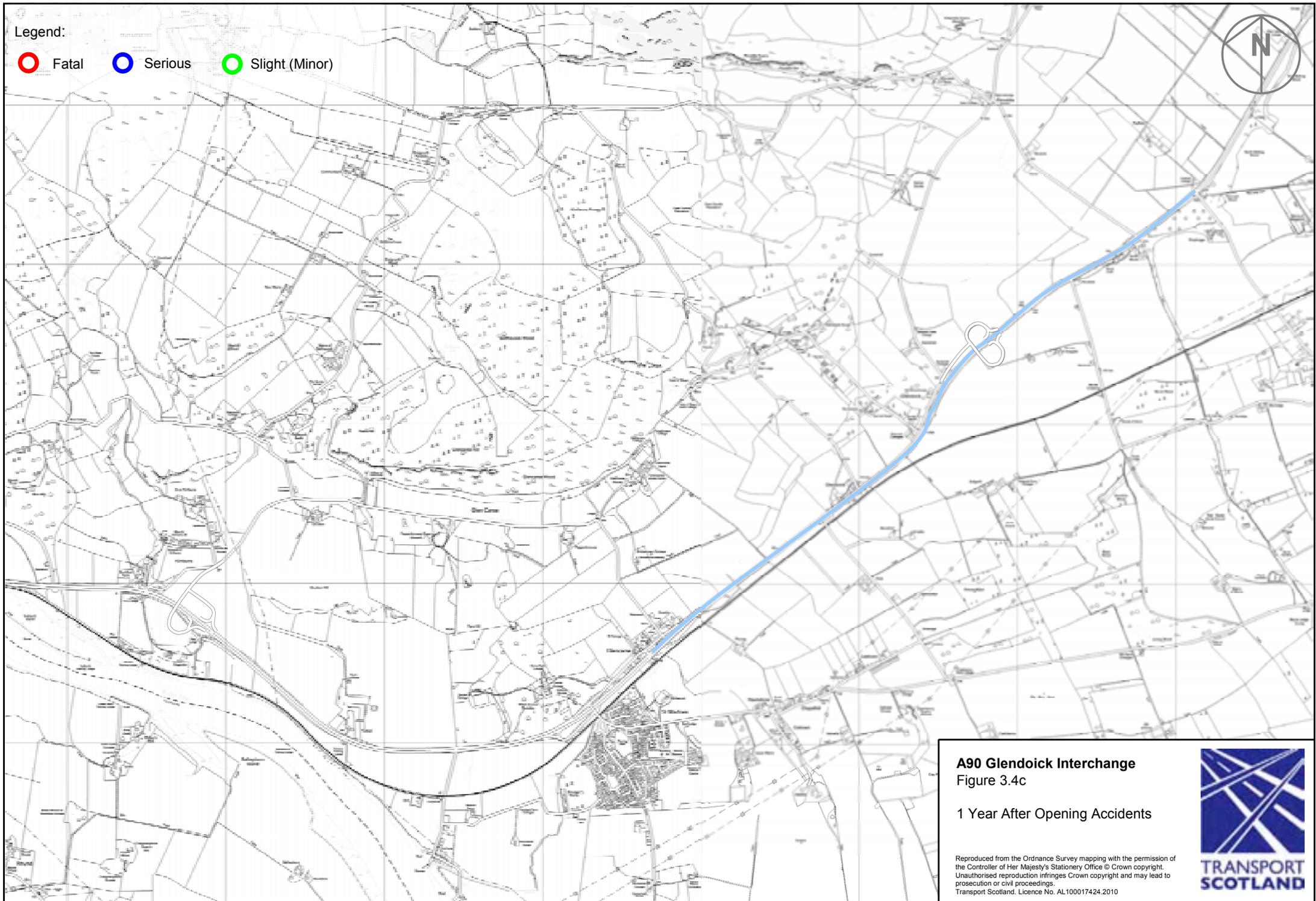
3 Years Before Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A90 Glendoick Interchange
Figure 3.4c

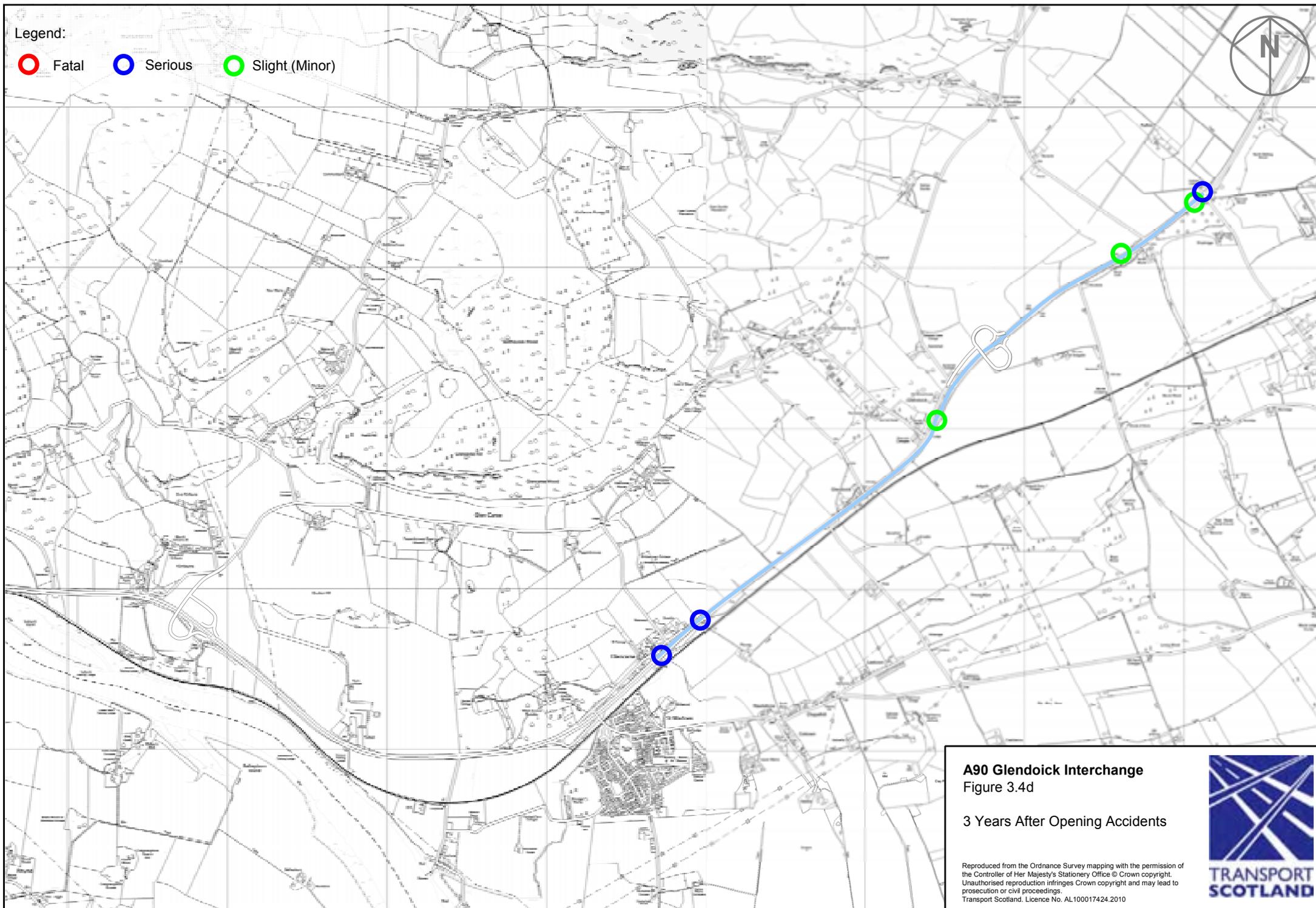
1 Year After Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A90 Glendoick Interchange
Figure 3.4d

3 Years After Opening Accidents

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3.5 A90 Kinfauns Interchange

Project Description

As part of a series of improvements along the A90 corridor between Perth and Dundee, a new grade separated interchange at Kinfauns was opened to traffic on 14th February 2007.

The new interchange replaced the existing at-grade priority junction, which provided access to Kinfauns Village to the north and West Saggieden to the south.

The A90 Kinfauns Interchange project involved the provision of a new grade separated interchange and associated accommodation works as well as the closure of central reserve gaps (at Saggieden (East) and Tofthill Farm). The general location of the project is shown in Figure 3.5a.

Traffic Data

The ATC used for the traffic assessment of this project was located on the A90, east of the Glencarse grade separated junction (SRTDb Ref. JTC00065). The location of the ATC is shown in Figure 3.5a.

The opening year flow comparisons for the A90 Kinfauns Interchange project is based on AADT flows from 2008 as this was the first full year of traffic data available from the ATC.

Predicted traffic flows for 2008 were obtained by factoring the 2001 base year flows used in the NESA accident assessment with NRTF(97) factors.

A summary of the observed traffic data and the predicted traffic data based on NRTF(97) is shown in Table 3.5a below.

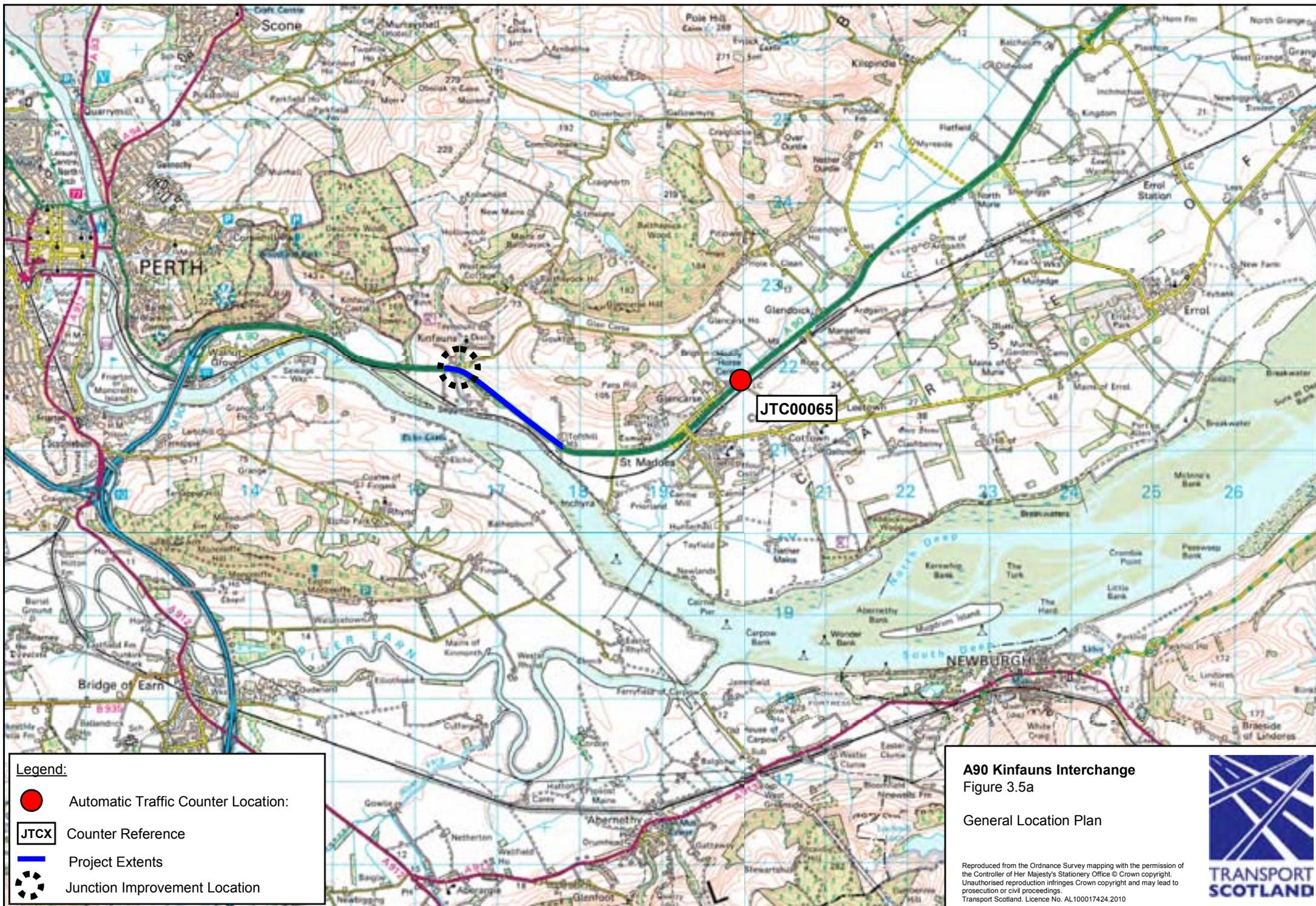
Table 3.5a: A90 Kinfauns Interchange – Traffic Analysis Summary NRTF(97)

Model Base Year	Opening Year	ATC AADT*	Predicted AADT			% Difference (Predicted – ATC) / ATC		
			LOW	60/40	HIGH	LOW	60/40	HIGH
2001	2007	33,495	30,343	30,811	31,514	-9.4%	-8.0%	-5.9%

* 2008 flows (first full year of ATC data available)

Assessment of Carriageway Standard Provided

As the A90 Kinfauns Interchange project involved the construction of a new grade separated junction, as opposed to a new section of carriageway, no assessment of the carriageway standard provided has been undertaken.



Legend:

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

A90 Kinfauns Interchange
 Figure 3.5a
 General Location Plan

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TRUNK ROAD PROJECT EVALUATION

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Cost Data

As the out-turn project cost for the A90 Kinfauns Interchange is not held on its own and instead has been combined with the out-turn cost for the A90 Glendoick Interchange project, the estimated project costs used in the respective pre-tender economic assessments have also been combined (as noted in Section 3.4). The combined out-turn and estimated project costs are shown in Table 3.5b.

Table 3.5b: A90 Glendoick and Kinfauns Interchanges – Project Cost Summary

	Out-turn Cost		Estimated Cost		Difference (Out-turn – Est)
	@ Jan 10	Mid-98 Prices in 1998 at 3.5% Discount	Sep 04 Prices	Mid-98 Prices in 1998 at 3.5% Discount	Mid-98 Prices in 1998 at 3.5% Discount
Total	£18,931,960	£11,829,050	£14,279,000	£9,787,225	£2,041,825 (21%)

Accident Data

The locations and severities of accidents occurring within the vicinity of the A90 Kinfauns Interchange project 3 years before, 1 year after and 3 years after project completion are shown in Figures 3.5b, 3.5c and 3.5d respectively. A summary of the accident data is shown in Table 3.5c.

Table 3.5c: A90 Kinfauns Interchange – Accident Data Summary

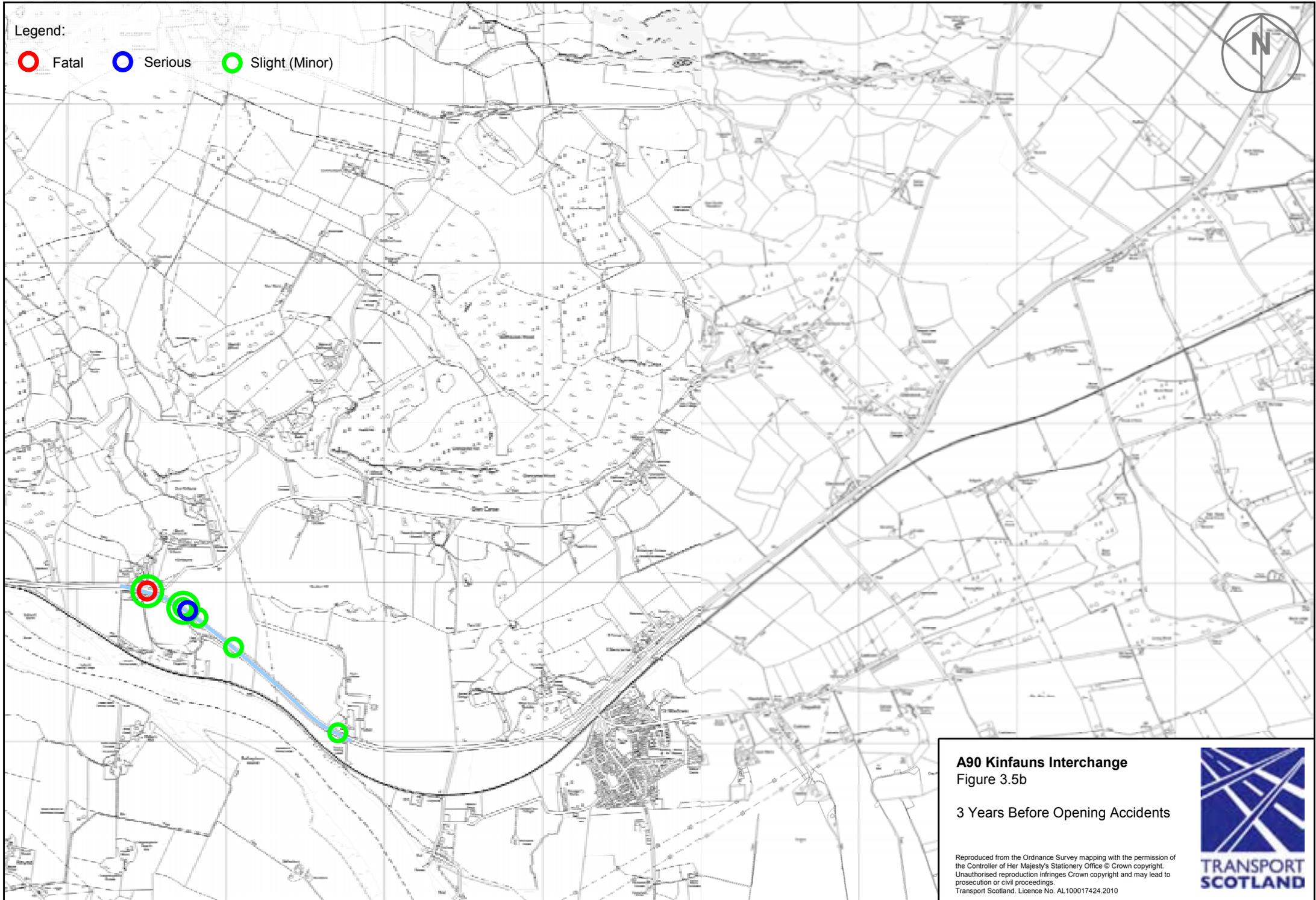
Period	Fatal	Serious	Slight	Total Accidents
3 Years Before	1	1	6	8
1 Year After	0	1	0	1
3 Years After	0	1	2	3

As can be seen in Table 3.5c, one serious accident occurred within the vicinity of the improved junction in the 1 year period following the opening of the project in comparison to eight accidents (one fatal, one serious and six slight) in the 3 years before opening, suggesting an improvement in road safety.

TS has not yet received a copy of the Stage 4 RSA report for this project and, therefore, it is not possible to comment further on the accident that occurred in the 1 year period after opening.

Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A90 Kinfauns Interchange
Figure 3.5b

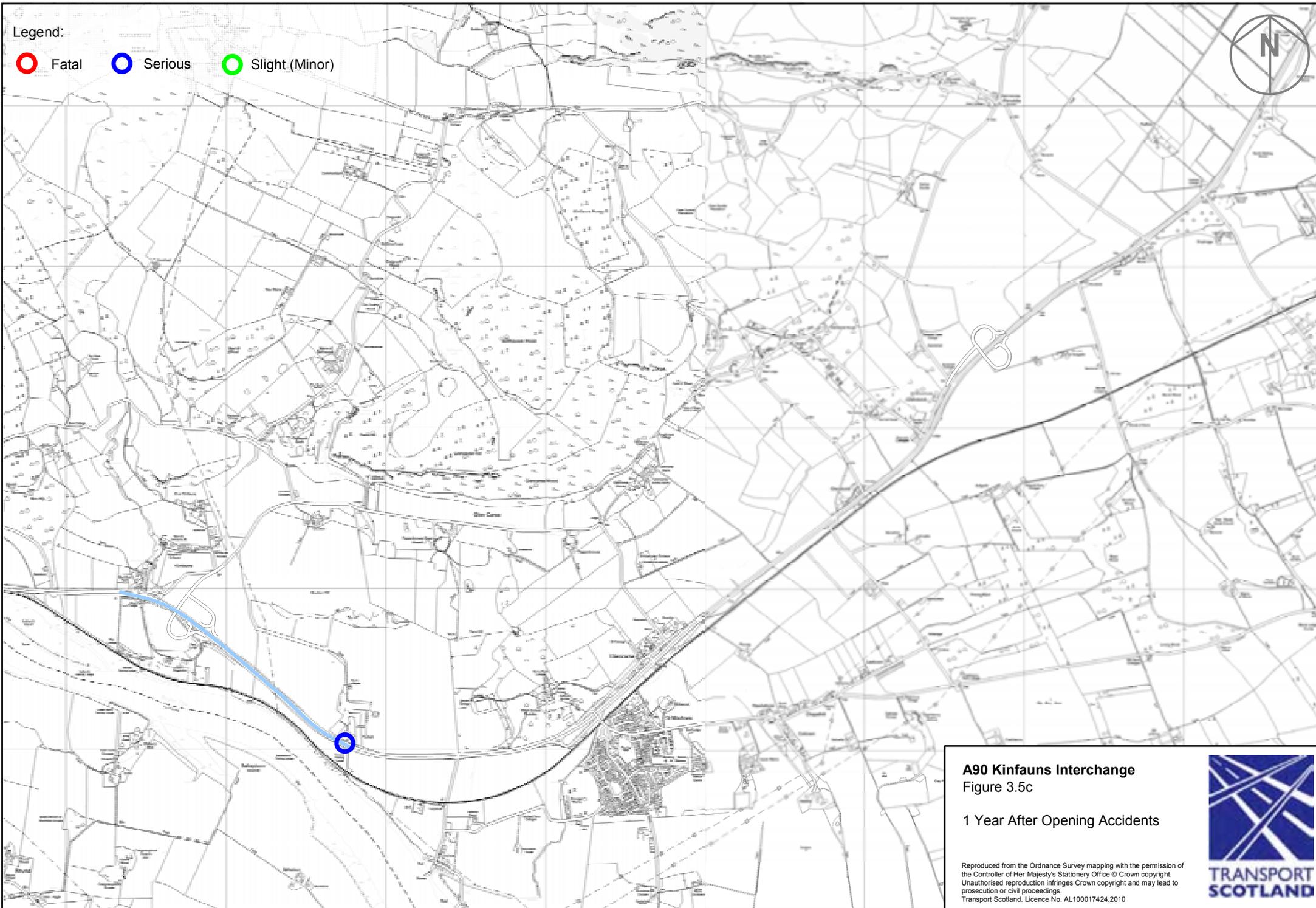
3 Years Before Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A90 Kinfauns Interchange
Figure 3.5c

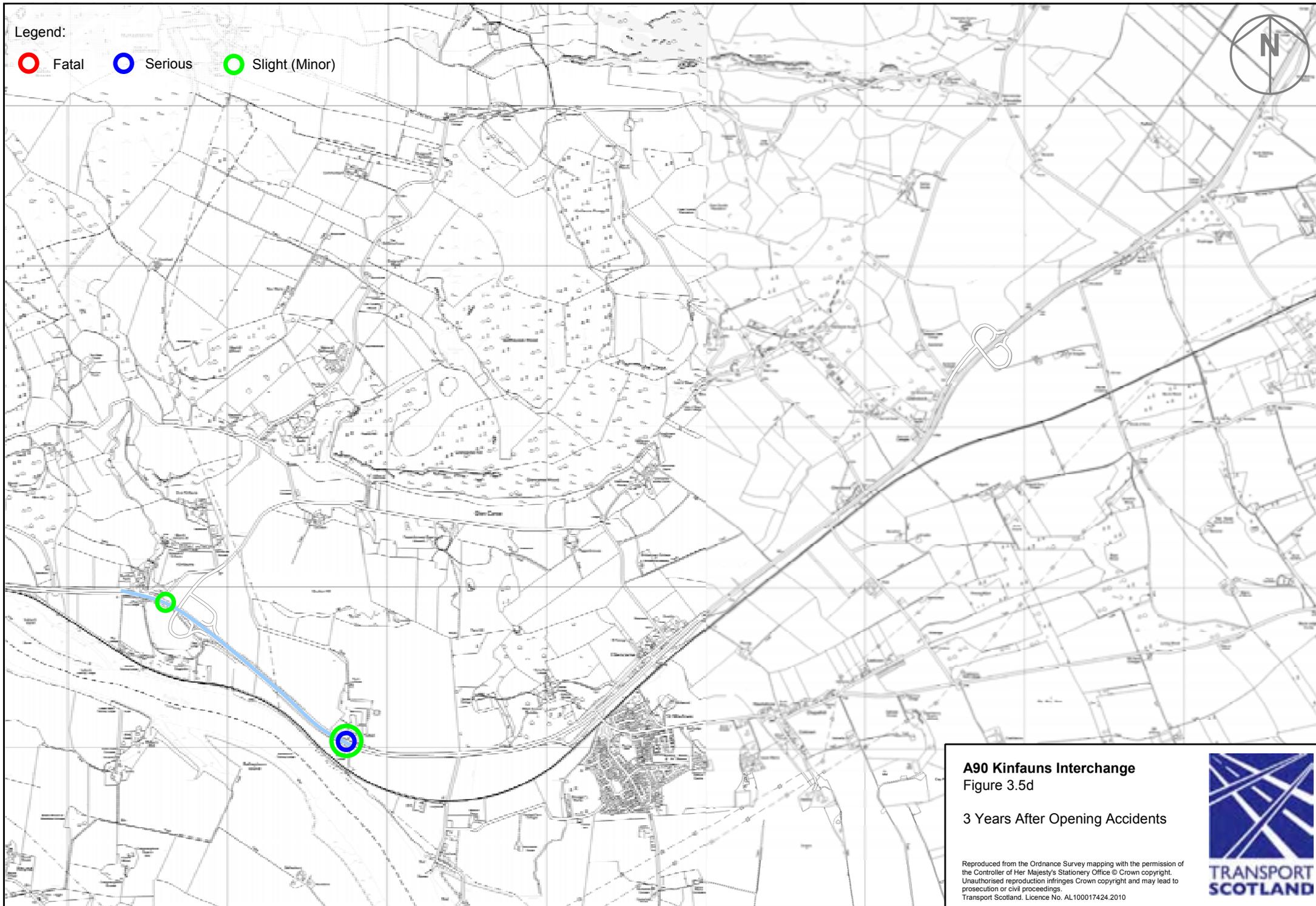
1 Year After Opening Accidents

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Legend:

-  Fatal
-  Serious
-  Slight (Minor)



A90 Kinfauns Interchange
Figure 3.5d

3 Years After Opening Accidents

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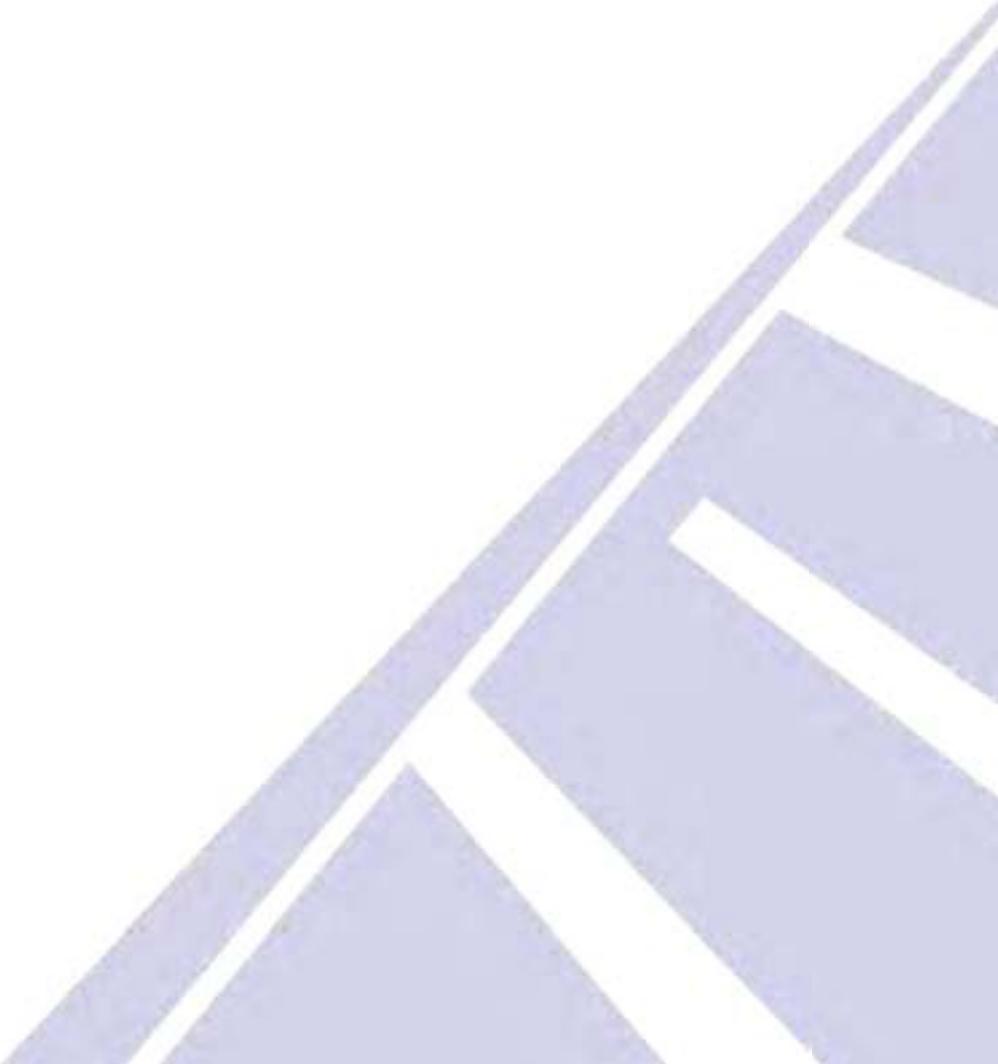


TRUNK ROAD **PROJECT EVALUATION**

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Table 3.5c also shows that three accidents (one serious and two slight) occurred in the 3 year period following the opening of the project, which continues to suggest an improvement in road safety. Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project and it is not possible to comment on the accidents that occurred in the 3 year period after opening.

EVALUATION SUMMARY



4 EVALUATION SUMMARY

4.1 General

The *Evaluation Report for Trunk Road Projects Opened between April 05 and March 07* is the first evaluation report issued by Transport Scotland for projects that the agency took responsibility for following its creation in January 2006.

The following is a summary of the evaluations undertaken.

Traffic Analysis

For those projects where it was possible to carry out a comparison of the forecast opening year flows against the observed opening year flows (or nearest year to opening), the majority of comparisons are reasonably close and nearly all are within the National Audit Office's threshold of +/-20%. This would suggest that the traffic modelling techniques, and the use of NRTF growth forecasts to predict opening year flows for these projects, were generally appropriate.

The one notable exception to this, however, is the A80 Auchenkilns Junction Improvement project.

From Table 3.2a it can be seen that the predicted flows for the A80 Auchenkilns Junction Improvement project are between 25% and 26% higher than the observed opening year flows.

Whilst there can be a number of possible explanations for variations between observed and forecast flows, the reason(s) for the difference is not clear.

Carriageway Standards

Although the implied carriageway standards generally match the standards constructed, the exception within this report is the A96 Coachford project.

For the A96 Coachford project, the carriageway assessment, using TA 46/97, suggests that both the observed and forecast flows warrant either an Single 2-Lane or a Wide Single 2-Lane standard of carriageway.

Although there are no specific flow ranges for the justification of a Climbing Lane given in TA 46/97, the Climbing Lane at Coachford forms part of a series of improvements along the A96 corridor that provide overtaking opportunities to help reduce platooning and to improve journey times and reliability.

Project Costs

Of the three cost comparisons presented in this report, the A90 Glendoick and Kinfauns Interchange projects have a combined actual out-turn cost significantly higher than the estimated cost.

For the A90 Glendoick & Kinfauns Interchange projects, the combined out-turn cost is +21% higher than the estimated cost, which represents an actual overspend of £2,041,825 (expressed in mid 1998 prices and values discounted to 1998 at 3.5%).

Whilst an increase of this magnitude impacts upon the overall economic appraisal of the projects, a review of the pre-tender estimate suggests that the combined projects would continue to represent value for money.

Accidents

For the majority of the projects examined in this report, the accidents recorded in the 3 years after opening are lower than those recorded during the 3 years before opening.

Whilst there has been a general reduction in accident numbers, there appears to have been a slight increase in the severity of accidents on the A80 Auchenkilns Junction Improvement and A90 Glendoick Interchange projects.

A review of the accident data for the A80 Auchenkilns Junction Improvement and A90 Glendoick Interchange projects suggest that the serious accidents that occurred in the 3 year period after opening were not attributable to the design or layout of the projects.

Stage 4 and 5 RSA reports are not currently available for the projects examined in this report. Transport Scotland is currently reviewing the RSA management process to ensure that Stage 4 and 5 reports are available for future projects.

Environmental Mitigation Measures

The environmental mitigation measures contained in the environmental reports produced at the time the M77 Fenwick to Malletsheugh project was originally assessed were examined and compared against the actual measures put in place.

The review of mitigation measures associated with the M77 Fenwick to Malletsheugh project confirmed that the majority of the proposed mitigation measures presented within the Environmental Statement were delivered and that variations had not resulted in a material detrimental impact on the general integration of the project into its surroundings.

There were some mitigation measures that were not evident on site and Transport Scotland is considering how the environmental review process can be improved to provide a better record of the mitigation measures that have been implemented, including details of any agreed variations.

4.2 Key Findings

- Overall, the evaluations undertaken for trunk road projects that opened between April 05 and March 07 indicate that the projects are operating as expected.
- Whilst there appears to be a bias towards the under prediction of traffic flows for projects that opened between April 05 and March 07, forecast flows are (with one exception) within acceptable limits, which suggests that the forecasting techniques used for appraising projects are generally suitable.
- The standards of carriageway constructed are appropriate.
- Although there is some variability between the estimated and out-turn costs for projects, which can be expected, there does not appear to be a bias towards the over or under prediction of project costs.
- There has been a general reduction in accident numbers, although RSA reports for projects that opened between April 05 and March 07 are not currently available.
- A review of the proposed mitigation measures presented within the Environmental Statement for the M77 Fenwick to Malletsheugh project indicates that mitigation measures are generally being delivered.

Further copies of this document are available, on request, in audio and large print formats and in community languages (Urdu; Bengali; Gaelic; Hindi; Punjabi; Cantonese; Arabic; Polish).

اس دستاویز کی مزید کاپیاں آڈیو کیسٹ پر اور بڑے حروف کی چھپائی میں اور کیوٹی کی زبانوں میں طلب کیے جانے پر دستیاب ہیں، برائے مہربانی اس پتے پر رابطہ کریں:

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Gheibhear lethbhreacan a bharrachd ann an cruth ris an èistear, ann an clò mòr agus ann an cànan coimhearsnachd. Cuir fios gu:

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www.transportscotland.gov.uk

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