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SCOTTISH TRUNK ROAD INFRASTRUCTURE PROJECT EVALUATION

3YA Evaluation Report for A9(T) Helmsdale Phase 2

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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
DMRB	Design Manual for Roads and Bridges
ES	Environmental Statement
NPV	Net Present Value
NRTF	National Road Traffic Forecasts
RSA	Road Safety Audit
S2	Single 2-Lane Carriageway
STAG	Scottish Transport Appraisal Guidance

SUMMARY OF IMPACTS

1 SUMMARY OF IMPACTS

This section provides a short summary of the key elements contained within this Three Year After Evaluation report of the A9(T) Helmsdale Phase 2 project.

1.1 Operational Indicators – How is the project operating?

The project has had no significant impact on traffic volumes within the vicinity of the improvement. Given the project incorporates a largely off-line single carriageway improvement over 2.1 kilometres in a predominantly rural setting, this is as expected.

The project is operating safely in the first three years of operation, with only two slight accidents occurring within the vicinity of the project. Transport Scotland has not yet received a copy of the Stage 5 Road Safety Audit report for this project. The Stage 4 Road Safety Audit, however, which examined the accidents occurring in the period one year after opening, concluded that the safety record over the length of the project had improved significantly following opening and given the nature of accidents occurring, there was no common factor or trends that could be attributed to the design or layout of the project.

1.2 Process Indicators – How well was the project implemented?

Process Indicators provide evaluation across the key elements of project cost, programme and process.

Construction of the project commenced in August 2007 and the project was opened to traffic in August 2008. The out-turn cost of the project was around £0.3m (8%) greater than predicted at the time of assessment. This compares to £0.1m (2%) lower at the 1YA Evaluation. The change may in part, be due to minor alterations to the works specification, including revisions to the design of retaining walls at certain locations. It should be noted, however, that the predicted costs used within the cost comparison are derived from the costs estimated at the project's pre-tender stage. As such, variations in actual and predicted project cost comparisons can occur due to issues identified during the tendering process.

The mitigation which was included within the Environmental Statement has been implemented on site, is in good condition and is operating as expected. The only alteration (to replace a wall with an embankment) was deemed more appropriate given the setting.

Transport Scotland has not yet received a copy of the Stage 5 Road Safety Audit report for this project.

1.3 Forecasting – How accurate were predictions?

Traffic flows on the A9(T) in the vicinity of the project are broadly in-line with those that have been forecast. Predicted flows are between approximately 1% and 7% greater than the observed flow under low and high traffic forecast scenarios respectively, which is well within accepted limits.

As noted in Section 1.2, the cost of construction of the project was greater than predicted during the appraisal by approximately £0.3m (8%).

1.4 Objectives – Is the project on track to meet its objectives?

The project's objectives, in relation to the operation of the project, focussed on the improvement of road safety and improving the through movement of traffic on the A9(T). The nature of the project (a largely off-line single carriageway upgrade, removing the poor vertical and horizontal geometry associated with the bypassed section of the A9(T)) has improved journey times and safety at this location of the A9(T).

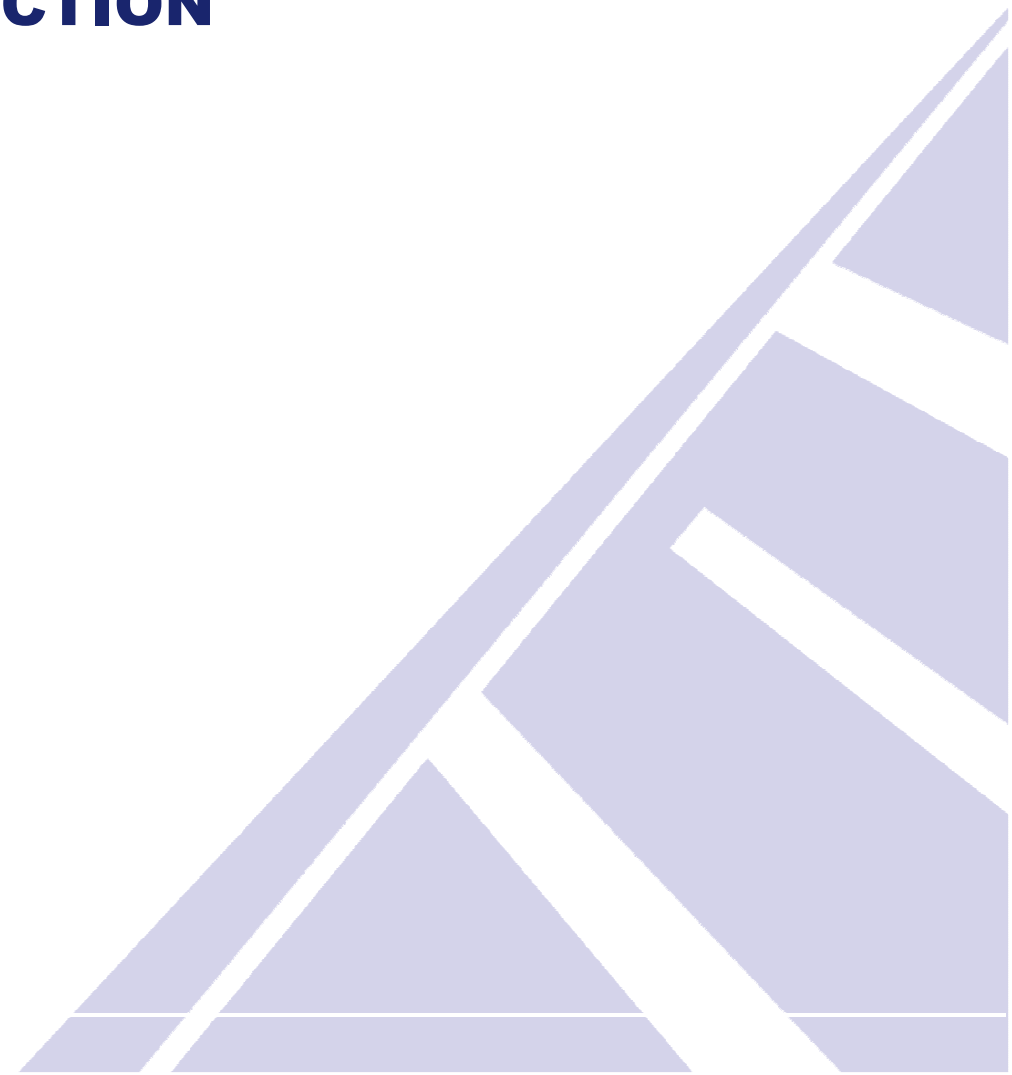
The project is operating safely in the first three years of operation with only two slight accidents occurring within the vicinity of the project. The Stage 4 Road Safety Audit, which examined the accidents occurring in the period one year after opening, concluded that the safety record over the length of the project had improved significantly following opening and, given the singular nature of the accident which occurred during this period which involved a solo cyclist, there was no common factor or trends. The Stage 5 RSA will comment upon the accident which occurred following the first year after opening. Transport Scotland has not yet received a copy of the Stage 5 Road Safety Audit report for this project.

1.5 Costs to Government – Is the project delivering value for money?

Based on the evaluation of value for money at the time of the project's 3YA Evaluation, the Net Present Value (NPV) of £2.27 and Benefit to Cost Ratio (BCR) of 1.65 for the project are likely to be less than predicted at the time of assessment. This reflects higher than predicted construction costs which will impact on the project's value for money.

In combination with other projects previously implemented on the A9(T), such as the junction improvements at Ballinluig and Bankfoot, the extension of the dual carriageway at Crubenmore and the strategic dualling programme of the route currently being progressed by Transport Scotland, the Helmsdale project can be expected to positively contribute towards providing improvements in road safety and journey times and, more generally, benefits to transport users and will help encourage economic development within northern Scotland and beyond.

INTRODUCTION



2 INTRODUCTION

2.1 Background to Project Evaluation

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

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

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

The evaluation of trunk road projects is evolving as Transport Scotland improves its process and reporting to reflect the principles of monitoring and evaluation set out in the Scottish Transport Appraisal Guidance (STAG).

STAG advocates evaluation against indicators and targets derived for the Transport Planning Objectives originally set for the project, STAG criteria (Environment, Safety, Economy, Integration and Accessibility & Social Inclusion) and relevant policy directives, the aim of which is to identify:

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

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

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

2.2 Evaluation Reporting

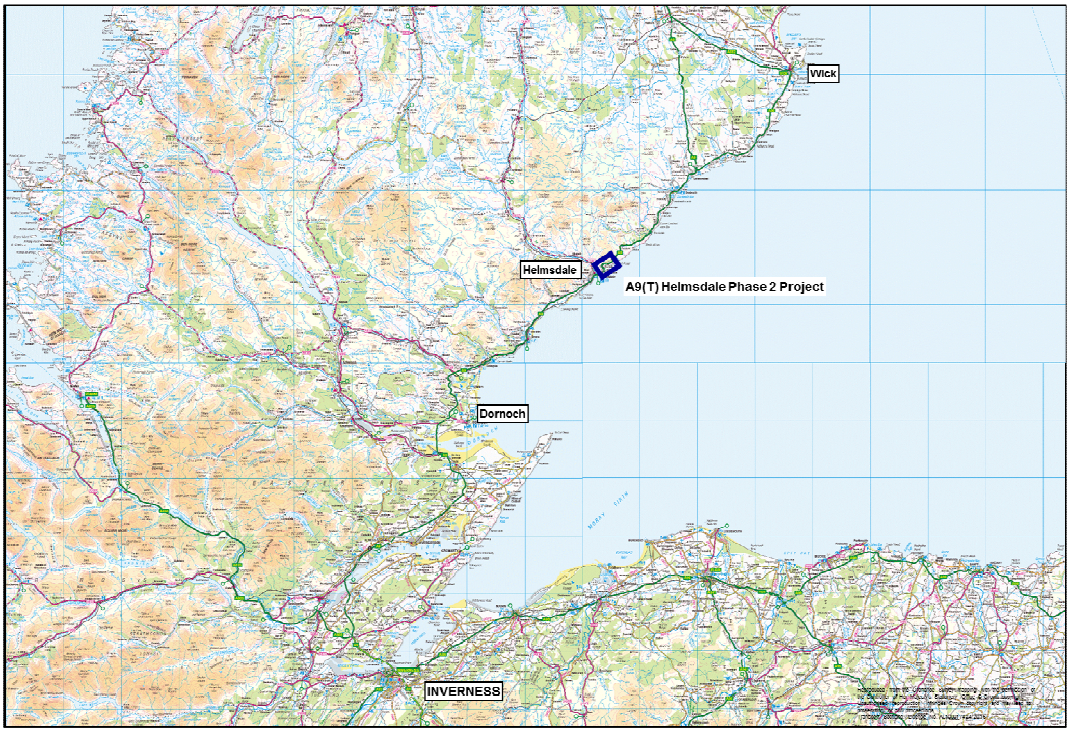
As recommended in STRIPE, this report constitutes a Detailed Evaluation Report at the Three Year After (3YA) Stage. It is a standalone report on the A9(T) Helmsdale Phase 2 Project. This project fits the criteria for evaluation at this stage, as it cost over £5m and has previously been evaluated at the One Year After (1YA) Stage. Table 2.1 summarises the characteristics of the project. The location of the project is presented in Figure 2.1.

Table 2.1: Project Summary Details

Route	Project Name	Standard	Length (km)	Open to Traffic
A9(T)	Helmsdale Phase 2	S2 & CL	2.4	August 08

Key: S2 Single 2-Lane Carriageway
CL Climbing Lane

Figure 2.1: Project Location Plan



2.3 Previous Evaluations

A 1YA Evaluation was carried out for the A9(T) Helmsdale Phase 2 project and findings reported within the *Evaluation Report for Trunk Road Projects Opened between April 2007 and March 2009* report, dated January 2013.

The key findings from the 1YA Evaluation report were as follows:

Operational Indicators

Comparison Between Pre and Post Opening Traffic Flows

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

Comparison Between Predicted and Actual Traffic Flows

The comparison between predicted and actual AADT flows indicated that the predicted 2009 flow was approximately 9% and 5% lower than the observed 2009 flow under low and high traffic forecast scenarios respectively.

Change in Travel Times

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

Environment

The review of mitigation measures implemented for the project confirmed that the measures committed within the Environmental Statement (ES) were in place. The only significant deviation from the requirements of the ES was the decision not to include a retaining wall opposite the Navidale House Hotel. Instead a grass embankment was constructed which was deemed more appropriate given the setting of the wider project as it includes many grass embankments along its length.

Safety

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

Economy

The comparison of predicted and actual traffic flows indicated that the predicted 2009 flow was up to 9% lower than the observed 2009 flow on the A9(T), which may have resulted in an under estimation of the road user benefits of the project.

Cost to Government

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

Value for Money

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

Achievement of Objectives

The initial indications noted within the 1YA Evaluation Report suggested that each of the project's objectives may be achieved.

DETAIL OF EVALUATION

3 PROJECT EVALUATION

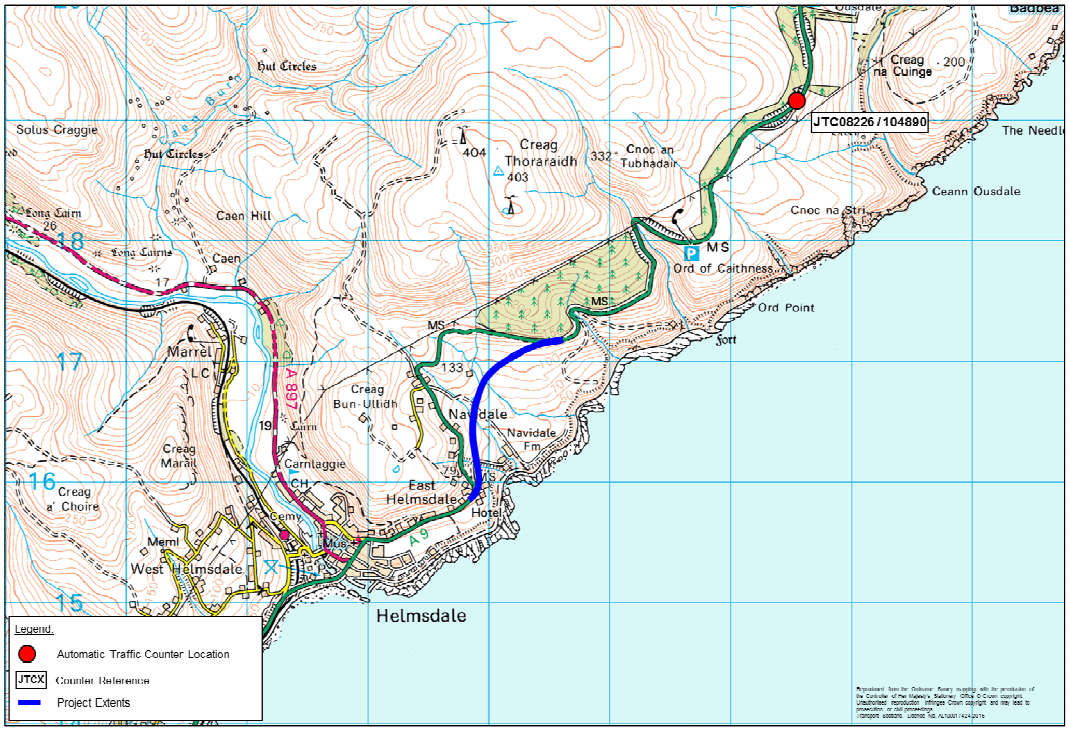
3.1 Introduction

Project Description

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 project was officially opened to traffic on 21st August 2008. This 3YA evaluation considers the impact of the Phase 2 project. The general location of the project is shown in Figure 3.1.

Figure 3.1: Project General Location Plan



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.

3.2 Evaluation Methodology

As set out in Section 2.1, this Three Year After report presents the results of a Three Year Evaluation (3YA) of the A9(T) Helmsdale Phase 2 project, focusing on:

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

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

This 3YA evaluation has been informed by the analysis of survey data supported by a site visit carried out in August 2014. External stakeholder views were invited. Feedback was received from a variety of respondents, which is presented within the report.

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

3.3 The operation of the project and process evaluation

Network Traffic

In terms of project operation, the evaluation includes the consideration of pre and post opening comparison of operational indicators, which focuses on network traffic indicators including traffic volumes and travel times. The findings emerging from this comparison are presented in the following section.

Traffic Volumes

The Automatic Traffic Counters (ATC) located within the study area are as follows:

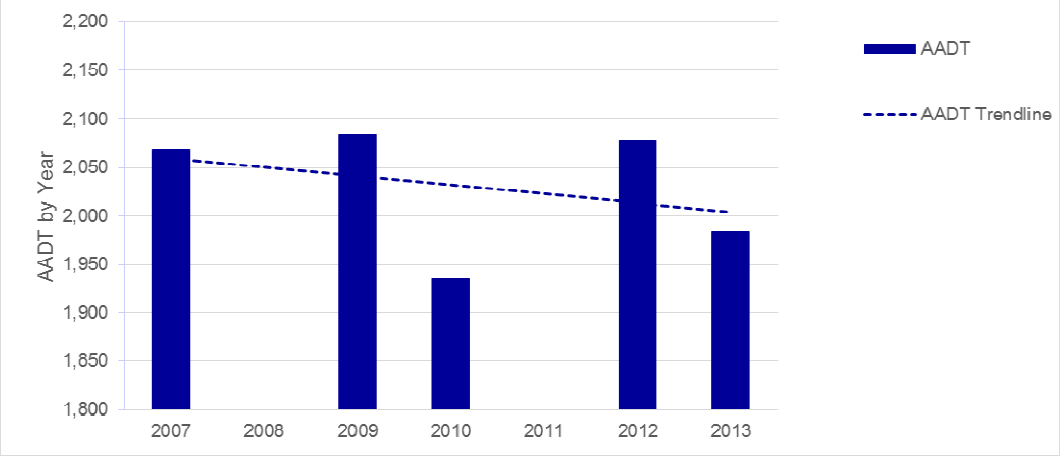
- JTC08226/104890 A9 at Berriedale

The location of the ATC used to record traffic flows within the study area is shown in Figure 3.1.

Comparison Between Pre and Post Opening Traffic Flows

The Annual Average Daily Traffic (AADT) flows pre and post project opening on the A9(T) route within the vicinity of the project are presented in Figure 3.2. The percentage of Heavy Goods Vehicles (HGVs) are not available as classified traffic data by vehicle type is not available from the ATC within the vicinity of the project.

Figure 3.2: Long Term ATC Data



Notes: No data available for 2008 and 2011. Incomplete data for 2012 and 2013 – available data for neutral month (May) used.

The ***1YA Evaluation*** indicated 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%.

A comparison between pre and post opening traffic volumes on the A9(T) within the vicinity of the project indicates that traffic flows in 2013 have reduced marginally by around 100 vpd (approximately 5%) compared with 2009 flow levels and analysis of the long-term trend in annual traffic flows suggest that the volume of traffic on this section of the A9(T) has been broadly stable for a number of years.

Comparison Between Predicted and Actual Traffic Flows

The latest flow comparisons for the project are based on AADT flows from 2013 as this was the latest traffic data available from Transport Scotland's traffic counters within the vicinity of the project.

As part of the project's appraisal, National Road Traffic Forecasts (NRTF) low and high traffic 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 2013 were derived by factoring the 2007 opening year flows used in the economic assessment with NRTF low and high growth factors. A summary of the actual and predicted traffic data is shown in Table 3.1.

Table 3.1: Traffic Analysis Summary

ATC Ref	Actual AADT*	Predicted AADT		% Difference (Predicted – Actual) / Actual	
		Low	High	Low	High
A9(T) at Berriedale					
104890	1,984	1,993	2,124	0.5%	7.1%

* 2013 flows (latest ATC data available)

The comparison between predicted and actual AADT flows in Table 3.1 indicates that the predicted 2013 flow was between approximately 1% and 7% greater than the observed 2013 flow under low and high traffic forecast scenarios respectively. The ***1YA Evaluation*** indicated that the predicted 2009 flow (derived by interpolating between the modelled assessment year traffic flows) was 9% and 5% lower than the observed 2009 flow under low and high traffic forecast scenarios respectively.

The apparent variation in the traffic growth trend noted in the 1YA and 3YA evaluations is as a direct result of the observed traffic flows recorded in 2013 being somewhat lower than the observed traffic flows in 2009 (by approximately 100 vpd), coupled with the forecast NRTF traffic growth over the same four year period, which was in the order of between approximately 100 vpd and 140 vpd under the low and high traffic forecast scenarios respectively.

Traffic Volumes: Key Findings

Observed traffic flows are between approximately 1% and 7% higher than forecast flows. This is well within accepted limits.

A comparison between the 1YA and 3YA evaluation shows increasing variation between forecast and predicted traffic flows. Account should however be taken of the low volume of traffic on this section of the A9(T) and, as such, any

percentage increase or decrease in actual and predicted traffic flow comparisons are unlikely to be significant in terms of the absolute change in the numbers of vehicles. The magnitude of the variation is unlikely to significantly impact on the overall economic performance of the project which is discussed further in Section 3.6.

Travel Times

Change in Travel Times

The ***1YA Evaluation*** indicated that, as the project extended the climbing lane and resulted in a 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.

Stakeholder feedback

One respondent noted that *"the improvement has been beneficial in terms of reducing tailbacks behind slow moving vehicles by providing an additional, safe opportunity to overtake".*

The respondent also observed that "*journey time benefits by the new road have been offset by the construction of the roundabout at the southern end of the scheme and the extension of the 30mph zone from the edge of Helmsdale Village to a point north of said roundabout*". It was suggested that "*the 30mph zone to Helmsdale Village is unnecessary, since that section of the road is in an open country with few pedestrians; and therefore a higher speed limit (e.g. 40mph) would be more suitable*".

"the improvement has been beneficial in terms of reducing tailbacks behind slow moving vehicles by providing an additional, safe opportunity to overtake"

"journey time benefits by the new road have been offset by the construction of the roundabout at the southern end of the scheme and the extension of the 30mph zone from the edge of Helmsdale Village to a point north of said roundabout"

"the 30mph zone to Helmsdale Village is unnecessary, since that section of the road is in an open country with few pedestrians; and therefore a higher speed limit (e.g. 40mph) would be more suitable"

Travel Times: Key Findings

The reduction in distance of approximately 1 kilometre as a result of the project can be expected to have had a positive impact on journey times. It was noted from the stakeholder feedback received that the provision of improved overtaking opportunities will have facilitated the overtaking of slower moving vehicles thus contributing to an overall improvement in journey times across the upgraded section of the A9(T).

It was also observed in the feedback received, however, that any improvement in journey times may have been off-set by the introduction of the roundabout at the southern end of the project and the extension of the 30mph zone from Helmsdale Village to the roundabout.

3.4 Environment

The following section provides a summary of the assessment of environmental mitigation measures proposed for the A9(T) Helmsdale Phase 2 project. A full report is provided in Appendix A.

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 (ES) and the findings of the project's 1YA Evaluation completed in May 2010 were reviewed (see Section 2.3). As part of the 3YA Evaluation, a site visit was carried out in August 2014, to confirm the implementation and condition of the environmental mitigation measures and review any comments raised in the 1YA Evaluation about the environmental mitigation.

The ES for the project proposed mitigation measures to address impacts including:

- Ecology and nature conservation;
- Landscape;
- Pedestrians, cyclists and community effects;

- Land use; and
- Water quality and drainage.

Findings

Overall, the project fits well within the existing landscape and integrates effectively with the Helmsdale Phase 1 project. Planting carried out has established successfully, although some grass verges that had been allowed to regenerate naturally contain ruderal vegetation such as dock and nettles. There is a mixture of broad leaved and pine trees along the boundaries of the Navidale House Hotel which are also growing well and provide screening for the hotel.

The requirement for some management of the planted woodland / scrub was noted. There are some areas where trees planted have grown sufficiently that tree guards should be removed. This is most apparent around the culvert at Navidale Burn. The trees in this area also need to be significantly thinned out.

The otter ledge and fish pass within the culvert at Navidale Burn were found to be in good condition, although there were no obvious signs of the ledge being in use by otters.

Where the old A9 has been scarified and soiled it has become vegetated and integrates well with the existing landscape. The remainder of the old road has been retained to serve as a footpath and cycleway, including a picnic area and interpretation board at the boundary with the Phase 1 scheme extent. There is an opportunity to improve the drainage and visual amenity at the picnic area.

Environment: Key Findings

The landscape mitigation has helped to ensure that the project is in keeping with the wider landscape and the Phase 1 design. The planting is establishing well, although there are areas where some trees guards need to be removed and where trees need to be thinned out to ensure the biodiversity and landscape measures are effective.

The otter ledge and fish pass within the culvert at Navidale Burn were found to be in good condition. Parts of the old A9 now serve as new habitat or a footpath and cycleway. If appropriate, there is an opportunity to improve the drainage and visual amenity of the cycleway and scenic picnic area at the boundary of the Phase 1 project, by removing the old road markings and studs and improving the drainage.

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

3.5 Safety

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

The locations and severities of accidents occurring within the vicinity of the project three years before and three years after project completion are shown in Figure 3.3a and Figure 3.3b.

Figure 3.3a: 3 Years Before Opening Personal Injury Accident Numbers

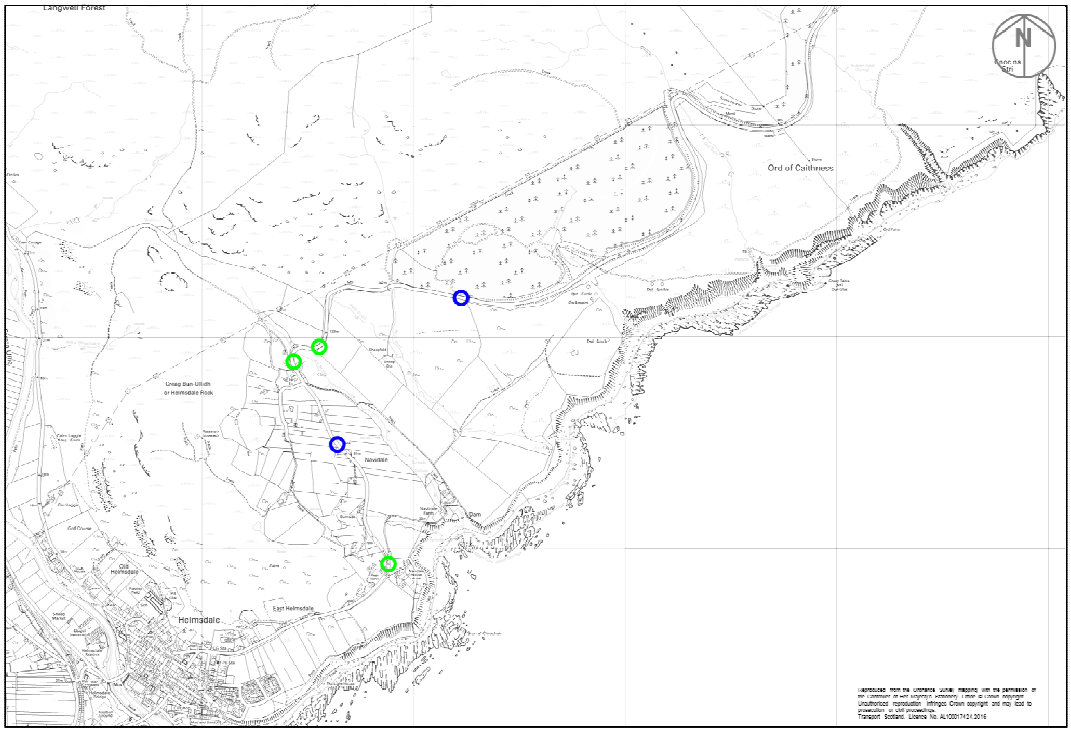
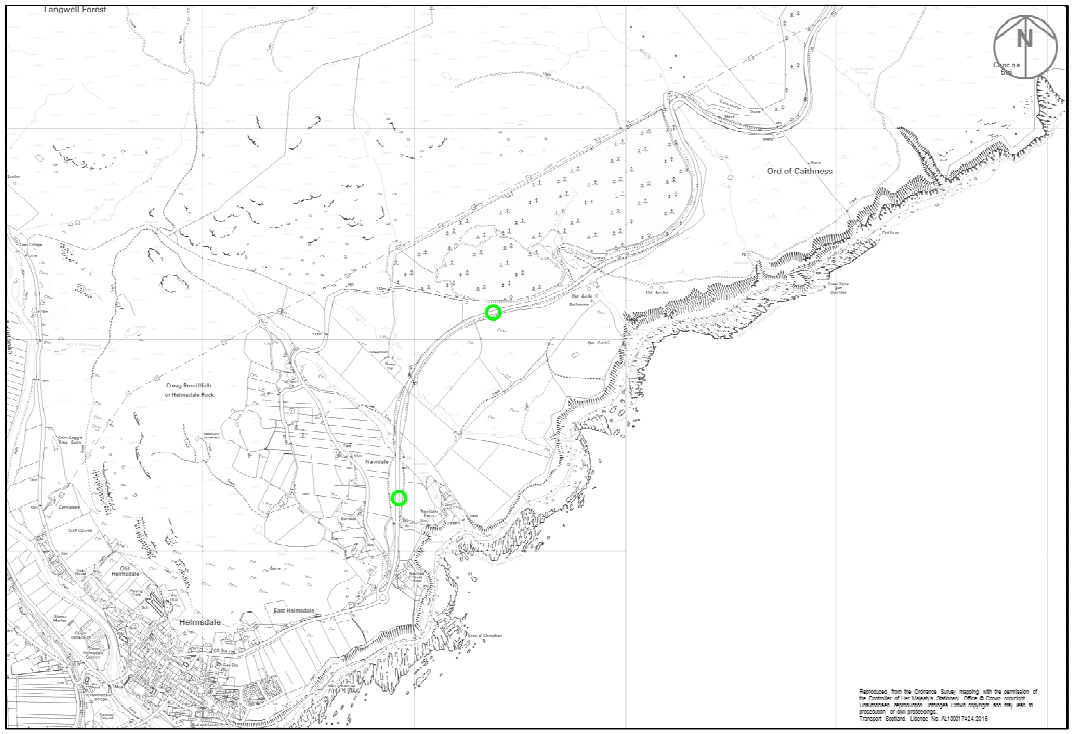


Figure 3.3b: 3 Years After Opening Personal Injury Accident Numbers



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

Table 3.2: 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
Total	0	0	1	1
3 Years After				
A9(T)	0	0	2	2
Bypassed Sections	0	0	0	0
Total	0	0	2	2

As can be seen from Table 3.2, two personal injury accidents (two slight) occurred in the three year period following the opening of the project in comparison to five personal injury accidents (two serious, three slight) in the three years before opening.

Road Safety Audits

The RSA process has been followed, with Stage 1, 2, 3, and 4 Audits carried out. The Stage 4 Audit was carried out in November 2010 and confirmed that only one personal injury accident (slight) occurred during the period one year after project opening and involved a cyclist travelling southbound on a downhill section. The report concluded that the safety record over the length of the project had improved significantly following the opening of the project and given the singular nature of the accident involving a single cyclist, there was no common factor or trends. It should be noted that Transport Scotland has not yet received a copy of the Stage 5 RSA report for this project.

Stakeholder feedback

One respondent indicated that "*there has, as far as anyone can determine or advise…, been no negative feedback to the scheme*" and the project "*is indeed an improvement on what was there before*". Another response indicated that the project "*has made the journey on that stretch of road safer on what was previously, sometimes a dangerous route for those drivers who didn't know the road*".

"there has, as far as anyone can determine or advise…, been no negative feedback to the scheme"

the project "is indeed an improvement on what was there before".

the project "has made the journey on that stretch of road safer on what was previously, sometimes a dangerous route for those drivers who didn't know the road".

Safety: Key Findings

An assessment of the one and three year post opening personal injury accidents suggests that the project is operating safely and has resulted in an improvement on road safety. The Stage 5 RSA was not available at the time of the 3YA Evaluation. The performance and operation of the project should continue to be monitored until such time that a Stage 5 RSA has been carried out.

3.6 Economy

Transport Economic Efficiency

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

Comparison Between Predicted and Actual Traffic Flows

The comparison undertaken at the ***1YA Evaluation*** stage indicated that the predicted 2009 flow was up to approximately 9% lower than the observed 2009 flow on the A9(T), which may have resulted in an under estimation of the road user benefits of the project. The latest comparison between predicted and actual traffic flows indicates that the predicted 2013 flow was up to approximately 7% greater than the observed 2013 flow on the A9(T).

The apparent variation in the traffic growth trend noted in the 1YA and 3YA evaluations is as a direct result of the observed traffic flows recorded in 2013 being somewhat lower than the observed traffic flows in 2009 (by approximately 100 vpd), coupled with the forecast NRTF traffic growth over the same four year period, which was in the order of between approximately 100 vpd and 140 vpd under the low and high traffic forecast scenarios respectively. Consideration should be given, however, to the low volume of traffic on this section of the A9(T) and any percentage increase or decrease in actual and predicted traffic flow comparisons are unlikely to be significant in terms of the absolute change in the numbers of vehicles. As such, the difference between predicted and actual AADT flows suggests that the predicted road user benefits are likely to be broadly accurate.

Economy: Key Findings

The magnitude of the difference between predicted and actual AADT flows, in absolute terms, suggests that the predicted road user benefits are likely to be broadly accurate.

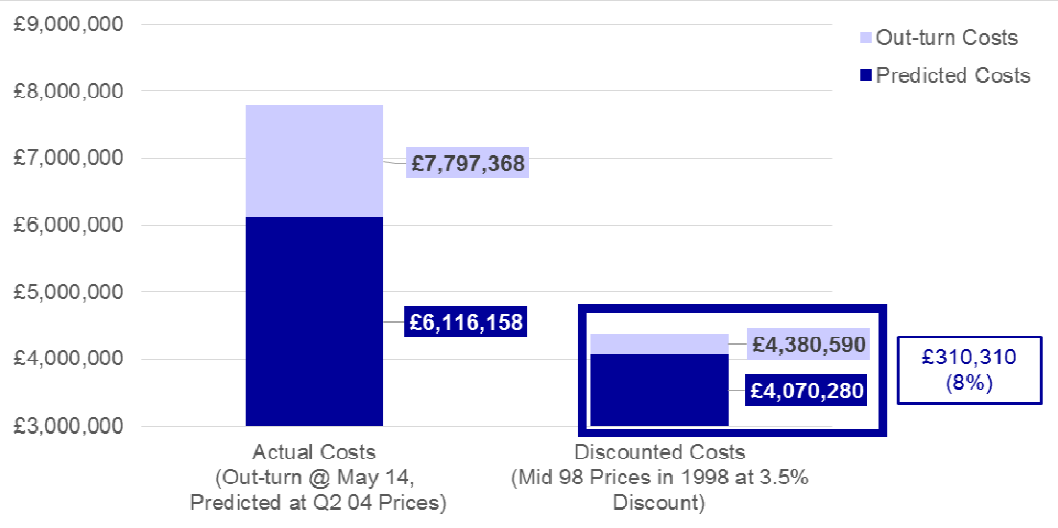
3.7 Cost to Government

Investment Costs

Comparison Between Predicted and Out-turn Costs

The out-turn and predicted project costs are shown in Figure 3.4.

Figure 3.4: Project Cost Summary



The latest comparison indicates that the current out-turn costs for the project are slightly greater than the out-turn costs at the time of the ***1YA Evaluation***. This may in part, be due to minor alterations to the works specification, including revisions to the design of retaining walls at certain locations. The current out-turn costs are approximately £0.3m (8%) greater than was predicted at the time of assessment. This compares to £0.1m (2%) lower at the 1YA Evaluation. It should be noted, however, that the predicted costs used within the cost comparison are derived from the costs estimated at the project's pre-tender stage. As such, variations in actual and predicted project cost comparisons can occur due to issues identified during the tendering process.

Cost to Government: Key Findings

The out-turn cost of the project was approximately £0.3m (8%) greater than predicted at the time of the assessment. This compares to £0.1m (2%) lower at the 1YA Evaluation and the difference may, in part, be attributed to minor alterations to the works specification, including revisions to the design of retaining walls at certain locations.

3.8 Value for Money

Initial Indications

The economic appraisal results for the 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. The comparisons undertaken at the ***1YA Evaluation*** stage indicated that the benefits are likely to have been under estimated and the cost marginally lower than predicted, suggesting that the NPV and BCR of the project is likely to be greater than predicted.

Based on the latest comparisons of traffic flows and costs presented in Sections 3.3 and 3.7 respectively, which suggest that the benefits are likely to be broadly accurate and the cost 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 difference between predicted and actual AADT flows suggests that the economic benefits of the project can be considered to be broadly accurate. The cost of the project is approximately £0.3m (8%) greater than was predicted at the time of assessment. This is slightly greater than at the 1YA evaluation stage.

The NPV and BCR are expected to be less than forecast as a result of the variation in investment costs. Whilst 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.

3.9 Progress Towards Achieving Objectives

As specific indicators to measure the performance of the project against its objectives have not been developed, consideration of whether the project has achieved its objectives is based on the pre opening data available, supplemented by post opening data collected as part of the evaluation.

Indications

A summary of the performance of the project against its objectives is presented in Table 3.3.

Table 3.3: Progress Towards Achieving Objectives

Objective	Commentary	Progress
Improve safety on the A9(T).	Two serious and three slight accidents occurred prior to the opening of the project in comparison to two personal injury accidents (slight) occuring in the three year period following the opening of the project. This suggests the project has had a positive improvement on road safety. Stakeholder feedback received suggested that there had been no negative feedback relating to the project and that it is perceived that road safety has improved following opening of the project.	+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 project (and, therefore, actual changes in vehicle speeds and journey times cannot 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. Stakeholder feedback received suggested that while the introduction of the roundabout and extension of the 30mph section on the A9(T) to the north of Helmsdale may have had a negative impact on journey times, the project as a whole has improved journey times with the provision of overtaking opportunities facilitating overtaking of slower moving vehicles.	+ve
Minimise environmental impact.	No significant adverse environmental impacts were identified during the site visit. The change noted from the requirements of the ES of replacing a retaining wall opposite the Navidale House Hotel with a grass embankment was deemed more appropriate given the setting and the many grass embankments along its length, and would help to integrate the project in the wider landscape.	+ve

Objective	Commentary	Progress
	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.	
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
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.	The project can generally be considered to be maintainable and operable.	+ve

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

3.10 Evaluation Summary

The evaluation of the A9(T) Helmsdale Phase 2 improvement indicates the project is considered to have had a positive impact on journey times and road safety on this section of the A9(T). An assessment of the 3 year post opening personal injury accidents and a review of the Stage 4 RSA suggests that the project is operating safely.

While the value for money of the project is likely to be less than anticipated, it is important however to view the project in combination with other projects implemented on the A9(T), such as the junction improvements at Ballinluig and Bankfoot, the extension of the dual carriageway at Crubenmore and the strategic dualling programme of the route currently being progressed by Transport Scotland. The project is an integral part of upgrades on this strategic corridor and, overall, it is positively contributing to improving the operation of the route and improving journey times to and within the north of Scotland.

Appendix A: Environment

A ENVIRONMENT

This section provides details of the 3-year after evaluation undertaken for the Environment criterion in the Scottish Trunk Road Infrastructure Project Evaluations (STRIPE).

A.1 INTRODUCTION

Background

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

This report presents the findings of the 3YA environmental review for the A9(T) Helmsdale Phase 2. The project has previously been subject to a 'One Year After Opening Evaluation' (1YA) environmental review. The findings of the 1YA environmental reviews were reported in:

- Project Evaluation Environmental Mitigation Review August 2010, Report to Transport Scotland, Halcrow Group Ltd 2010.

Environmental Review Purpose and Methodology

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

Environmental Review Methodology

The methodology used for the 3YA environmental review selected relevant aspects of the STRIPE[1] 'Three Years After' methodology that comprised:

- A review of the project objectives, Environmental Statement (ES) and 1YA environmental mitigation review to identify the likely key issues to be evaluated during the 3YA review and any questions remaining from the 1YA reviews.
- A site visit – to give an overview of the mitigation implemented and to focus observations on any issues raised by the 1YA reviews rather

[1] Transport Scotland Scottish Trunk Road Infrastructure Project Evaluation (STRIPE). Final Guidance August 2013.

than to repeat a visit to every feature that was confirmed as being present and in good condition in the One Year After reviews.

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

Structure of the Report

The project objectives (including any specific environmental objectives) are provided, followed by the list of likely key environmental issues that were identified during the desk study and any questions raised by the 1YA reviews. The 3YA observations on these key issues identified in the desk study are commented upon, followed by a table of all of the mitigation proposed with details of the 3YA observations and the associated 1YA observations to aid comparison.

A summary of recommendations regarding further studies or suggestions for improving the effectiveness of the environmental mitigation is provided.

A.2 ENVIRONMENTAL FINDINGS

Project Objectives

The Helmsdale Phase 2 project comprised improvements which 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 project sought to improve road safety and through movement of traffic on the A9(T) at Helmsdale, while minimising the environmental impact.

Key Issues to be Reviewed

The key issues identified during the desk study are summarised below.

- Landscape/planting,
- Retaining wall / embankment,
- Mammal passes.

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

A.3 THREE-YEAR AFTER REVIEW FINDINGS

Key issues from the desk-study

The 1YA evaluation inspection confirmed the majority of environmental mitigation measures were implemented as per the Environmental Statement (ES). The only significant deviation from the requirements of the ES was the decision not to include a retaining wall opposite the Navidale House Hotel. Instead a grass embankment was constructed which was deemed more appropriate given the setting of the wider project as it includes many grass embankments along its length.

Overall, the project fits well within the existing landscape and integrates effectively with the Helmsdale Phase 1 scheme. Planting carried out has established successfully (Figures 1 to 3). The mixture of broad leaved and pine trees planted by the hotel helps to screen the road (see Figure 1). There are also areas of natural regeneration, though these have areas of ruderal vegetation, such as nettle and dock (see Figure 4).

***Figure 1*: Planting outside Navidale House Hotel**

Figure 2: Planting around Navidale Burn

Figure 3: Grass verges and junction of cemetery road

Figure 4: Natural regeneration on embankment with areas of dock and nettles

There are some areas where the planted trees have grown sufficiently that the tree guards should be removed, see Figure 5. This is most apparent around the culvert at Navidale Burn. Additionally the trees here also need to be thinned out considerably, see Figure 6 and Figure 7.

Figure 5: Tree guards need removed

Figure 6: Planting to be thinned out

Figure 7: Planting to be thinned out

The culvert at Navidale Burn is very deep, making it difficult to inspect the entrances particularly on the east side of the carriageway, however the otter ledges could be viewed from the west side of the carriageway and appeared to be unobstructed (Figure 8). There were no obvious signs of use by otters at the time of the visit. It was also clear that the fish pass installed in the culvert was flowing, see Figure 8.

Figure 8: Culvert with otter ledges and fish pass

Where the old A9 has been scarified and soiled, the grass and scrub habitats have established well, helping it to integrate well with the existing landscape and road verges. The remainder of the old road has been retained to serve as a footpath and cycleway, including a picnic area and interpretation board about the cultural heritage interest in the area at the boundary with the Phase 1 project extent. Given the path is signed and the picnic area overlooks a view to the coast, see Figure 9, it would have been preferable to remove the old road markings and studs which have been left in situ and detract from the surrounding natural environment, see Figure 10. It was also noted at the time of the visit that the cycleway was affected by surface water and debris from nearby forestry operations.

Figure 9: Sign indicating amenity area constructed from old A9

Figure 10: Remnant road markings and road studs from old A9 left in situ at picnic area viewpoint

Any new issues identified

As noted, tree guards require removal and planting to be thinned appropriately in areas. Also, there is an opportunity to improve the drainage and visual amenity at the picnic area at the boundary with the Phase 1 scheme.

Observed traffic flows are between approximately 1% and 7% higher than forecast flows and therefore the environmental assessment's forecast that noise and local air quality would not be significant issues were appropriate.

Mitigation measures – detailed observations

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

Recommendations

- Where planting is well established and trees are of a sufficient height, tree guards should be removed to allow further growth.
- Consideration should be given to thinning out the planting, especially around the culvert at Navidale Burn.
- Transport Scotland may wish to consider monitoring the use of the mammal underpasses on various schemes to establish the long term effectiveness compared with the expectations set by the environmental impact assessment. For example, this could consist of installing sand boxes at tunnel entrances or motion-operated cameras, reviewing road-kill records and possibly repeating the pre-project mammal surveys within the vicinity of the schemes.

- There is an opportunity to improve the drainage and visual amenity of the cycleway and scenic picnic area at the boundary of the Phase 1 scheme, by removing the old road markings and studs and improving the drainage.

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

Table A2: Implementation of Mitigation Proposed in the Environmental Statement and Observations at 1YA and 3YA Opening

Mitigation Measure Proposed in the ES	***1 YA Comments***	***3 YA Comments***
Ecology and Nature Conservation		
Throughout the length of the scheme Mitigation to involve the avoidance of loss and creation of habitat characteristic of local and adjacent areas on embankments and cuttings. New habitat features include broadleaved woodland, scattered and dense scrub and acid grassland.	New planting including birch and grass species are all establishing well.	Planting continues to establish well.
Navidale Burn To provide a culvert for watercourse under embankment designed in keeping with the landscape and mitigating the severance of habitats and isolation of animal populations adjacent to the scheme.	Otter ledges and fish passes are provided at three locations along the route. The culverts were in very good condition.	The key culvert selected for inspection was located at Navidale Burn, as this was most accessible and safe given poor weather conditions. as It was found to be in good condition.
Landscape		
Throughout the length of the scheme Engineered slopes to be modified to create a natural landform to visually integrate the road and related structures with the existing landform context.	The scheme blends into the landscape well, the planting which has been undertaken ties into the existing woodland and scrub planting very well. In addition the overall scheme fits well into the wider landscape of the area	Planting is establishing well but needs to be thinned out around Navidale Burn.
Various locations Tops of slopes to be allowed to naturally regenerate. Lower cut slopes where rock is exposed to be lined with wire mesh reinforcement, dressed with peat topsoil, seeded and allowed to naturally regenerate.	Vegetation on the slopes is establishing well to the east and west of the scheme with new grass now covering the slopes which are integrating into the wider grass	Planting and natural regeneration establishing well.

Mitigation Measure Proposed in the ES	***1 YA Comments***	***3 YA Comments***
	landscape of the area.	
Navidale House Hotel An area of mixed woodland is to be planted to establish the hotel boundary, screen the view of the road and compensate for the loss of trees lost due to construction	Mixture of broad leaved and pine trees along the boundaries of the hotel. Slopes have been rounded off and this area of the scheme integrates well into the surrounding landscape.	Planting is establishing well.
Avenue trees are to be provided along the new hotel access outwith sightline restrictions and scrub planting on the northeast and east sides of the new roundabout.	Large broadleaved planting has been provided at the boundaries of the hotel and this will integrate well into the existing woodland planting once more established. Scrub planting has also taken place adjacent to the roundabout	Planting is establishing well.
Opposite Navidale House Hotel Scrub species together with hedge to be planted above retaining wall.	Retaining wall has not been constructed. Instead a grass embankment has been constructed – this is deemed to be more appropriate given the setting on the wider scheme which includes many grass embankments along its length.	Grass embankment works well within the wider scheme.
Pedestrians, Cyclists, Equestrians and Community		
Part of the existing A9 carriageway is to be scarified to return to adjacent land use. Part also to be retained as an access track.	The return has been very successful with the old carriageway grubbed up and grassing over where it is not being used as a cycleway/footpath.	Section of carriageway grubbed up, has vegetated over and looks natural. Cycleway/footpath signed.

Mitigation Measure Proposed in the ES	***1 YA Comments***	***3 YA Comments***
East Helmsdale Area for redetermination of public right of passage to pedestrian / cycle use	Signs are also present demarcating the areas for cycle / pedestrian use.	Signs are in place.
Water Quality and Drainage		
Throughout the length of the scheme Filter drains to be provided for the removal and primary treatment of surface runoff from the new carriageway. Gully pots will perform this function at the new roundabout. The design will ensure that the surface runoff is removed and treated in accordance with SUDS and that primary treatment of runoff will take place in filter drains	Mitigation implemented.	Mitigation implemented.

Appendix B: Methodology and Data Sources

B METHODOLOGY AND DATA SOURCES

B.1 OVERVIEW

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

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

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

B.2 NETWORK TRAFFIC INDICATORS

Traffic Volumes

Comparison Between Pre and Post Opening Traffic Flows

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

Comparison Between Predicted and Actual Traffic Flows

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

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

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

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

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

Data Sources	
Predicted Traffic Flows	Obtained/derived from the traffic/economic modelling undertaken to support the pre-tender economic assessment.
Actual Traffic Flows	Obtained from automatic traffic counters in the vicinity of the project/study area.

Travel Times

Change in Travel Times

Based on the evaluation of other projects with a comparable standard of carriageway for which pre and post opening journey time data is available, supported by anecdotal evidence where available.

Comparison Between Pre and Post Opening Travel Times

A comparison between pre and post opening travel times has been carried out for projects where the change in travel times cannot be judged based on other projects of a similar nature for which an evaluation has been undertaken.

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	
Change in Travel Times	Comment on likely impact on mainline travel time in the absence of pre and post opening information
Stakeholder Feedback	Obtained from Highlands and Islands Enterprise

B.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 not been undertaken for the project as no significant impacts on noise and air quality were expected.

B.4 SAFETY

Accidents

Comparison Between Pre and Post Opening Personal Injury Accident Numbers

A comparison of the personal injury accident numbers pre and post opening has been undertaken for all projects to provide 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 the three year period after opening.

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.

Road Safety Audits

Road Safety Audit (RSA) reports have been reviewed for the project, 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 3 years after project opening.

B.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 whether the predicted benefits of the project are likely to be realised.

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

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

B.6 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.

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.

B.7 VALUE FOR MONEY

Initial Indications

Based on the evaluation of economic benefits and project costs outlined in sections 3.6 and 3.8 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 pre-tender economic assessment undertaken during the project's preparation.

B.8 ACHIEVEMENT OF OBJECTIVES

Initial Indications

The evaluation includes an indication of how the project is progressing towards achieving its 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.

Data Sources	
Objectives	Confirmed from reported Environmental Statements or Route Action Plan, where applicable.