HOW DOES SCHEME APPRAISAL PERFORM IN REAL LIFE

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1 INTRODUCTION

The Highways Agency (the Agency) is responsible for improving the strategic highway network (motorways and trunk roads) by delivering road schemes in the Targeted Programme of Improvements (TPI). The Highways Agency evaluates all schemes that have opened as part of the TPI Programme to see if the predicted benefits have actually occurred. This evaluation process is termed Post Opening Project Evaluation (POPE).

During the appraisal stage of schemes, it is usual that modelling techniques are used to predict how many vehicles will use a new road, the relief to other roads in the area and the changes in journey times. These predictions are fundamental in the justification of these schemes, as they directly influence the predictions of economic benefit as well as environmental sub-objectives such as noise and air quality. Accurate modelling is therefore clearly crucial to providing robust data about the impacts of a scheme and its justification.

1.1 Purpose of the Paper

The purpose of this paper is to set POPE in the context of the Evaluation process of road schemes, which started in 1981, and then provide an overview of the schemes considered to date in terms of geographical location and reporting stage. The paper then goes on to report the main results at a National level, drawing conclusions to answer the following questions:

- How accurate are the predictions of traffic changes due to scheme opening?
- Are the modelling techniques affecting the comparisons of traffic volumes;
- Are there any lessons from these evaluations that could be applied to future appraisals?
- Is scheme justification being compromised by the appraisal methods?

POPE as a whole looks at issues wider than just traffic changes, and is about whether the basic aims of the scheme have been achieved. However in this paper we are concentrating on traffic issues, and will attempt to answer these questions above through the review of the evaluations undertaken to date. Two case studies illustrate the issues.
1.2 Background

POPE has developed out of previous systems called Scheme Forecast Monitoring (SFM) and Post Implementation Evaluation Studies (PIES).

SFM involved comparing outturn traffic flows, both at One Year After (OYA) and Five Years After (5YA) opening, with those predicted before the scheme was opened. The procedure, which applied to all schemes, was set out in the Design Manual for Roads and Bridges (DMRB) Volume 12, The Traffic Appraisal Manual (TAM), Section 1 Part 1, Chapter 16. Information was provided on the TAM16.1 and TAM16.2 forms filled in for each scheme. However, SFM was limited as it merely compared observed and predicted flows and did not try to examine the reasons behind the changes, nor look at any other impacts other than traffic volume changes. The locations at which comparisons were made were also limited.

PIES involved undertaking a more in-depth study on 1 or 2 schemes each year to derive the economic as well as traffic outcomes for comparison with those forecast at the time scheme designs were finalised. Although PIES was much more detailed, the evaluation again only concentrated on traffic volume changes and economic benefits (including accident savings), and therefore again the evaluations were limited in scope.

To ensure greater consistency, and to eliminate problems associated with obtaining and collating appraisal and other data needed for robust evaluations, in 2001 SFM and PIES were superseded by a revised procedure known as POPE. POPE applies to all schemes in the TPI. In addition to continuing the programme of one-year and five-year studies, it introduced, for most schemes, a Traffic Impact Study (TIS). This is carried out as soon as possible after opening and is intended to give an initial indication of the impact of the scheme on traffic levels and journey times.

The procedures required for POPE are set out in an Interim Advice Note (IAN) 39/01 published by the Agency in June 2001. The contents replaced the requirements set out in DMRB Volume 12. IAN39/01 can be obtained by using the following link: http://www.standardsforhighways.co.uk/ians/pdfs/ian39.pdf

POPE studies are carried out in conjunction with the relevant local highway authority, who contribute data from their roads and have an input into the reports.

1.3 Outline of POPE

At each key decision stage through the planning process road schemes are subject to a rigorous appraisal process to provide a justification for the project’s continued development. The schemes that opened between 1998 and 2003 were largely appraised in the early to mid 1990s and therefore pre-date the 1998 approach entitled the New Approach to Appraisal (NATA).
Despite this aged dataset, most schemes did have an Appraisal Summary Table (AST), which records the degree to which the five Central Government objectives for Transport (environment, safety, economy, accessibility and integration) have been achieved. These were created for the 1997 roads review. The contents of the AST (and where necessary its more detailed supporting documentation) allow judgements to be made about the overall 'value for money' of the scheme.

The purpose of POPE at present is to compare traffic volumes, journey times and accident data following implementation with those predicted during scheme preparation. Outturn construction costs are also compared with the previous estimates. POPE is mandatory for all schemes in the TPI and generally carried out at One Year After (OYA) and 5-Years After (5YA) opening.

In terms of the Government’s five objectives, at the one year stage POPE is primarily concerned with evaluating Safety and Economy objectives for schemes. Environment, accessibility and integration impacts tend to emerge over the longer term and are generally addressed five years after opening. However, a selected number of schemes at the one year stage have looked in more detail at the environmental impacts, piloting a methodology called POPE-E. In the new POPE contract starting next month’ POPE-E will be extended to all schemes, but at present, as the sample of schemes is small, the results are not covered in this paper.

As part of the POPE evaluation, an Evaluation Summary Table (EST) is produced which mirrors the appearance of the AST, but gives outturn rather than predicted impacts.

We now have a sample of over 20 schemes of different types and it is clear that a range of outcomes is being shown.
2 THE SAMPLE SCHEMES

The TPI schemes evaluated to date using POPE cover a wide geographical area and are at various stages of reporting as shown in Figure 1 and summarised in Table 1.

Figure 2.1: Geographical Coverage of TPI Schemes
Table 2.1: Scheme Type of Sample

<table>
<thead>
<tr>
<th>Scheme Type</th>
<th>Number of Schemes</th>
<th>Scheme Opening Years</th>
<th>Traffic Impact Assessment (TIS)</th>
<th>One Year After (OYA)</th>
<th>Two Years After (2YA)</th>
<th>Five Years After (5YA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass</td>
<td>18</td>
<td>1995 - 2005</td>
<td>16</td>
<td>10</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Junction Improvement</td>
<td>3</td>
<td>2003/2004</td>
<td>1</td>
<td>2</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Online</td>
<td>5</td>
<td>2003</td>
<td>3</td>
<td>4</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Toll</td>
<td>1</td>
<td>2003</td>
<td>1</td>
<td>1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Totals</td>
<td>27</td>
<td>---</td>
<td>21</td>
<td>17</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

These schemes would have been appraised between 1988 and the late 1990s and hence a wide range of modelling techniques and practices would have been used. In summary, the main approaches for the appraisal of these schemes were:

- Traffic Growth assessed using National Roads Traffic Forecasts derived from the late 1980s (NRTF89);
- High Growth usually preferred; and
- Fixed Trip COBA assessment of economic benefits;

DfT appraisal Guidance has evolved considerably since these schemes were appraised. However, the dataset of schemes does enable us to:

- Look at the evaluation of schemes at the National level, assessing how well forecasts compare with outcomes;
- Provide feedback on the appraisal techniques used at the time, and indicate how recent changes are providing scope for improvement; and
- Recommend how the accuracy of predictions might be improved.

However, there are limitations to the current scope of the exercise, in that to date the evaluations have concentrated on traffic volume impacts and whether the benefits claimed for Safety and Economy have been achieved. In addition, most schemes are at the ‘One Year After’ Stage and trends can take longer to settle down.
3 RESULTS OF POPE EVALUATIONS

This paper outlines results of the evaluations to date, including two case studies. The comparisons presented are:

- Predicted and Observed Traffic Flows
- Economic Indicators - Link Transit Benefits
- Accident Savings
- Scheme Costs
- Partial Benefit to Cost Ratios against Economic and Safety Objectives

The findings of these are discussed below.

3.1 Predicted and Observed Traffic Flows

Predicted and observed traffic flows have been considered for each scheme at three levels, namely:

- Corridor Level – taking into account existing route flows and any new scheme flows
- Old Road Flow – Where a bypass scheme is constructed this is the predicted and observed flows on the bypassed route;
- New Road Flow – This is the predicted and observed flows on the bypass route.

Figure 3.1

Predicted corridor flows are generally evenly distributed about the observed. However, only 29% of predicted flows are within 10% of observed.
For the bypassed route, or ‘Old’ road, 50% of old road predicted flows are within 10% of observed and 57% of predicted flows are below observed.
Flow predictions on the bypass routes are variable compared to observed, with an even split of over and underpredictions. However, 56% of predicted bypass flows have greater than 25% difference from observed AADT. We have highlighted three of the schemes. Flows at A34 Newbury are significantly under-predicted, due a range of reasons described later. However, there are a number of schemes where the predicted flow is higher than that observed. At A6 Alvaston, the model did not predict the balance of traffic between the old road and bypass, even though the traffic in the corridor is about right, and at A6 Clapham, the model predicted traffic growth much higher than has actually occurred.

There are several potential causes for the differences between predicted and outturn flows. A review of the probable causes involved with each scheme has been made, and the following table shows the percentage of schemes for which each cause is the most likely reason for the disparity at scheme opening year.
Table 3.1

<table>
<thead>
<tr>
<th>Under Predictions</th>
<th>Potential Cause</th>
<th>Over Predictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>background growth</td>
<td>24%</td>
</tr>
<tr>
<td>18%</td>
<td>Inaccurate estimate of rerouting</td>
<td>0%</td>
</tr>
<tr>
<td>12%</td>
<td>Possible Induced Traffic issues</td>
<td>0%</td>
</tr>
<tr>
<td>35%</td>
<td>Size of model not wide enough (Strategic Rerouting)</td>
<td>0%</td>
</tr>
<tr>
<td>6%</td>
<td>Local movement Modelling Issues</td>
<td>6%</td>
</tr>
<tr>
<td>0%</td>
<td>Phasing of Other Modelled Schemes Delayed</td>
<td>6%</td>
</tr>
</tbody>
</table>

The long distance rerouting of trips into the study corridor has the highest potential impact on the underestimation of flows, with 35% of schemes affected. This highlights the need for close investigation at model definition stage to identify potential responses to the scheme.

The over prediction of background growth is the second dominant factor in inaccuracy between predicted and observed traffic flows in the opening year. Consideration of the assessment years for these schemes highlights that NRTF 89 traffic growth factors, now identified to have been over optimistic in terms of forecast growth, were predominately used for these evaluations.

In order to highlight some of these issues, the following two case studies have been considered

**Case Study 1 – A34 Newbury Bypass**

The A34(T) Newbury Bypass scheme (the Bypass) was opened by the Highways Agency (the Agency) on 17 November 1998. A POPE evaluation was undertaken based on data Five Year After opening to identify the outturn impacts of the scheme compared to those proposed at the appraisal, undertaken in early and mid 1990s.

A review of the before opening, one year after opening and predicted post opening daily traffic flows is shown in Figure 3.5 below.
This identifies the following:

- Significant traffic growth (+50-60%) between the before and after situation;
- Significant reduction in traffic flow levels through Newbury on the A34 (-20% and -48%)
- Predicted flows on the old bypassed A34 are comparable with observed levels post opening of the scheme;
- The predicted traffic volumes on the bypass are significantly below observed levels (-35% and -47%).

Further analysis of this growth between the Before and After situation, showed that there was a ‘step’ change in traffic volumes in the corridor immediately after scheme opening and that since then, growth has been more in line with regional estimates. Figure 3.6 below shows this clear ‘step change’ in the first year after opening across the narrow corridor of the Bypass and old road in Newbury.
Since 1999, the year immediately after opening, growth in the A34 corridor in the five years to 2003 has been around 11% compared with a ‘expected’ regional rate for Berkshire of 9%.

Hence, since the opening of the Bypass, traffic growth in the corridor was significantly above the national rate in the year immediately after the bypass opened but has since reverted to growth rates similar to ‘expected regional and national rates. A sudden change in traffic volumes immediately after the opening of a new scheme preceded by a lower growth rate growth indicates that the principal demand response to the bypass has been re-assignment.

The evaluation of the differences between predicted and actual traffic volumes after scheme opening revealed that the Newbury model only considered a relatively close network around the study area, as shown in yellow in Figure 3.7 below. This area did not enable more strategic routing choices, including A33 and A338 between the South Coast and the Midlands to be assessed. This strategic rerouting has been identified as the key reason for the underestimate of movements through the Newbury Bypass.
Figure 3.7 compares the traffic growth on 2 screen lines which cross the A34. It shows that between 1997 and 2003, which covers the period when the bypass opened, traffic on the southern screen line has grown in line with regional rates but on the screen line of roads going through Newbury, growth has been. The potential reasons why the Newbury screen line has had higher growth are:

- Local redistribution from minor roads not included in the screenline analysis;
- Low levels of Induced traffic in the town; and
- Land use changes within Newbury which were not envisaged at the time of Appraisal including the re allocation of Vodafone offices to a site north of the town and the changes to Greenham Common.

The key response, however, has been identified to be the strategic rerouting of traffic which could not be considered as part of the original assessment due to the size of the scheme model.

**Case Study 2 – A650 Bingley Relief Road**

The A650 Bingley Relief Road opened to traffic on the 22 December 2003, and involved dualling of a previously congested single-carriageway road.

A review of the before, one year after and predicted daily traffic flows is shown in Figure 3.8 below.
3.2 Economic Indicators

The assessment of predicted and observed link transit time savings in the scheme opening year has identified that the majority of bypass schemes assessed underestimated the potential benefits. This equates to around a 47% underestimate of vehicle hour savings in the opening year.

The comparison of before and after flows demonstrates that the scheme provides significant relief (-45%) to the existing A650. Consideration of the predicted flows suggests that the scheme assessment over-predicted flow on the bypass by 6000 vehicles (+20%) and under-predicted on the old route by 2000 vehicles (15%).

Further assessment of the differences showed that the predicted traffic volumes assumed a number of other road schemes in the corridor would be in place by 2003. However, these other schemes have not opened, and hence the model re-assigned traffic into this corridor by more than has actually occurred.

In addition to this, the under-prediction through the town is due in part to rerouting from minor local roads back onto the old A650 resulting from the reduced delays on the main route through the town.
3.3 Journey Times Benefits

Despite these differences, it is interesting to see if these have led to a bias in the economic benefits predicted for the sample of schemes. The 30 year economic link transit benefits from the sample of schemes have been reviewed by putting the outturn traffic figures into the economic analysis. This has identified the following benefits (in £m).

**Figure 3.9**

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Predicted</th>
<th>Outturn</th>
<th>% Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass</td>
<td>544</td>
<td>631</td>
<td>+16%</td>
</tr>
<tr>
<td>Junction</td>
<td>19</td>
<td>11</td>
<td>-44%</td>
</tr>
<tr>
<td>Online</td>
<td>125</td>
<td>104</td>
<td>-17%</td>
</tr>
<tr>
<td>Total</td>
<td>687</td>
<td>745</td>
<td>+8%</td>
</tr>
</tbody>
</table>

These results demonstrate that overall, bypass schemes under predict the link transit benefits compared to observed with total benefits 16% higher than predicted. Junction and online schemes show an overestimate of 44% and 17% respectively.

Overall across all schemes the total link transit savings in the opening year are observed to be 8% higher than predicted, highlighting overall 'value for money' in terms of link transit savings. The individual results also show a close comparison, suggesting that the economic benefits are not compromised by the shortcomings in traffic volume predictions.
3.4 Safety

The POPE assessment compares the observed accident savings with those predicted in the original assessment. For the One Year After reviews, the observed pre opening accidents occurring over a three year period, and the single year post opening observations are used. It is noted, however, that WEBTAG guidance states that at least 3 years of accident data should be used to derive statistically significant averages. Due to the nature of the POPE study, this is not always available and hence the results should be viewed in this light.

The assessment of predicted and observed accident savings is highlighted below.

**Figure 3.10**

![Graph showing predicted vs. outturn accidents saved in opening year.](image)

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Predicted</th>
<th>Outturn</th>
<th>% Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bypass</td>
<td>183</td>
<td>110</td>
<td>-40%</td>
</tr>
<tr>
<td>Junction</td>
<td>10</td>
<td>9</td>
<td>-10%</td>
</tr>
<tr>
<td>Online</td>
<td>29</td>
<td>34</td>
<td>+17%</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>153</td>
<td>-31%</td>
</tr>
</tbody>
</table>

These results show that there is a trend to over-predict accident savings particularly for the bypass schemes (-40%). However, a closer review of these schemes has identified that this under-prediction of accidents with the scheme is due, in part, to the under prediction of corridor flows due to longer distance re-assignment from alternative routes. Since accident savings on these other
routes are not included in the analysis, the outturn savings may be more than reported above.

It is noted that most schemes still provide accident savings but, as discussed above, it is too early to draw any major conclusions until the majority of schemes reach the 5YA stage as accident trends develop over time.

3.5 Scheme Costs

The predicted scheme costs have been reviewed against the true outturn costs. These results are presented in Figure 3.11 below.

**Figure 3.11**

Outturn scheme costs for the Newbury Bypass were significantly higher than those predicted. This was largely due to unforeseen protest costs associated with this scheme. As a consequence, for the purpose of this paper, the cost comparison has excluded the A34 Newbury.

The comparison of predicted and outturn costs has identified the following:

- 21% of scheme costs were within 10% of final construction costs;
- 58% of schemes costs were over predicted;
- 42% of schemes were underpredicted;
- Overall scheme costs were overpredicted by 12%

Current WEBTAG guidance now states that RISK and OPTIMISM BIAS should be considered in calculating predicted scheme costs. This will further
reduce the potential for error and enhance the overall accuracy of the forecasts. This may also reduce the potential for costs such as those associated with protestors to be omitted in future assessments as these should form part of the RISK analysis.

It is interesting to note that, in general, the predicted costs are higher than outturn costs, and even if A34 Newbury is included, overall predicted costs remain very similar to outturn costs. It will be interesting to review future cost comparisons now that risk and optimism bias are included as standard.

3.6 Overall Conclusions

This paper has detailed some results of the POPE evaluation for a number of schemes in the TPI Programme. These evaluations have helped to answer the four questions as detailed below:

How Accurate are the predictions?

The assessment of POPE schemes has highlighted the following:

- Only 29% of predicted Corridor flows (new and old road combined) are within 10% of observed levels at scheme opening, clearly showing that the range of difference is large;
- However, from the sample, there is no systematic bias, i.e. there is equal under-prediction of traffic volumes on the new road as there is over-prediction;
- On the new road itself, over 56% of bypass schemes were predicting flows with an error of greater than 25% of observed, clearly showing significant concern, and there is a range of reasons for this. However, again, there is an equal number of schemes under-predicting as over-predicting;
- A much closer comparison between observed and predicted traffic volumes are being shown on the old or bypassed route, where 50% of predicted scheme opening year flows on the bypassed routes are within 10% of observed. Nearly 60% of the old roads are under-predicted for a range of reasons.

These results suggest that, for the schemes assessed as part of POPE, there are significant differences between observed and predicted traffic volumes. There is no systemic under- or over- prediction, and the reasons for these differences vary between schemes. Long-distance reassignment from routes outside the modelled is considered to be a major cause on a significant number of schemes.

Are the Modelling Techniques affecting the Comparisons?

There are many reasons for the differences in observed and predicted traffic volumes and economic/safety benefits.
Over – prediction

One particular issue identified from many scheme evaluations is related to traffic growth used in the appraisal. These growth forecasts were taken from the National Road Traffic Forecasts 89 (NRTF89), and invariably high growth has been quoted in the predictions. However, comparing these forecasts of traffic growth with what actually occurred between 1988 and 1996 showed that:

- NRTF89 Light Vehicle High Growth 1988 – 1996 = 33%
- Observed Light Vehicle Growth 1988 – 1996 = 18.0%

This demonstrates the potential for significant errors between modelled and observed flow levels for scheme opening years. We have examined what the predictions were for the ‘Do Minimum’ case, ie is the situation without any improvement, and we have noticed from this that the growth is over-estimated in many cases, and seems to be the main cause of over-prediction of traffic volumes.

Another reason identified for over-prediction is the modelling of other road schemes and land uses. For example, the predictions for the A650 Bingley Relief Road assumed that a number of other roads schemes in the corridor would be implemented and hence the model re-assigned traffic from many other routes into the A650 corridor. These schemes have not come to fruition, leading to over predicted flows. Although some re-assignment has been observed, it has not occurred to the extent shown in the model.

Under – prediction

There a number of reasons identified for modelled under-prediction, and in our assessment, most are due to not taking sufficient account of strategic and local re-assignment. Some of the more significant schemes that have opened, such as M6 Toll, A34 Newbury, and A43 Silverstone improvements, have had quite significant re-assignment from a wide number of other roads. In the early 1990s most scheme models were relatively limited in area. Thus wider re-assignment was not modelled, and so traffic volumes on the new road are under-predicted.

In addition the models did not include all the local minor urban or ‘c’ roads. Large zone sizes and the lack of inclusion of intra-zonal movements in the predicted flows meant that local re-assignment from these roads was not predicted. However some changes in traffic volumes on the minor roads have been observed.

The other reasons for under-prediction include non-modelling of land use changes that have taken place. The Five-Year After assessment at A34 Newbury Bypass clearly shows that land use changes can have an impact on traffic volumes both on the bypass and old road, and hence re-iterates the
issue that Local Authorities have a role to play in determining traffic growth in the urban areas.

In our evaluations, newly generated trips (or induced traffic) has not been significant in most schemes. However, one scheme (A1033 Hedon Road dualling in Hull) has led to generated traffic, as the previously single carriageway, congested approach into Hull from the East has been improved, and there seems to be a genuine increase in traffic accessing Hull from this corridor. The extent to which this additional traffic can be attributed to completely new trips and how much to other responses, such as redistribution or mode change, has not been analysed.

Clearly, therefore, the modelling techniques used in the appraisal of these schemes has led to differences in traffic volumes. The main reason for over-prediction was the growth forecasts used in the appraisal, and the main reason for the under-prediction is the model size and level of detail being inappropriate to pick up all the impacts of schemes.

If these factors had been reflected in the scheme forecasts, it is likely that the traffic volume comparisons would have been closer, but it does not seem likely that different decisions would have been made.

Are there any lessons from these evaluations that should be applied to future appraisals?

Traffic volume differences between observed and predicted have clearly been identified, and the lessons learnt need to be fed back to ensure appraisal is improved.

However, all of the schemes evaluated to date were appraised several years ago, and the appraisal methods have subsequently changed. Hence many of the lessons that could be learnt from the current POPE assessment have already been revised as part of the DfT’s continued programme to improve the appraisal process.

The latest DfT’s WEETAG site provides up to date appraisal guidance. Much of the guidance was not available at the time of the POPE scheme assessments. Some of the more important revisions are detailed below:-

- Revised Growth Forecasts (TEMPRO V5, NRTF97)
- Variable Demand Modelling Advice (VADMA)
- Mode Choice Modelling Assessments
- Scheme Cost evaluation (Risk and Optimism Bias)
- Revised accident rates over time

The adoption of these techniques will further enhance the accuracy of predictions and their influence will be observed and reviewed as part of future POPE assessments.
The POPE evaluations have also identified other potential lessons to be learnt and may be applied to further enhance scheme assessment. These include:

- **Model Sizes** – Demonstrated to affect accuracy where wider re-routing of movements is not considered. A close review is perhaps required early in the appraisal process to determine in common sense terms all of the likely impacts to ensure all potential responses are covered. This refinement of the model must also be considered against the cost increases associated with a larger model.

- **Local re-assignment of trips** – The potential for re-assignment of movements within the corridor have been shown to have affected differences between observed and predicted, and have been due to inappropriate zoning system, or the non-modelling of minor roads.

- Hence, a two-tiered modelling approach may be the ‘best’ method of maximising accuracy, such that a simplified, strategic model is used to take strategic model re-assignment into account, and a more detailed, local corridor model to assess the impact of local movement changes. However, the cost-effectiveness of this approach should be carefully assessed.

- **A more detailed investigation** of the environmental, integration and accessibility impacts is being undertaken in order to provide feedback and advice on the ‘success’ of appraising these issues. This has also been recommended by a DfT-commissioned report concerned with evaluation and will form part of future POPE evaluations.

- **The impacts of induced traffic and release of suppressed traffic** was only explicitly considered in the appraisal of one scheme evaluated through POPE. This was because the schemes either pre-dated the requirement to consider induced traffic or the potential of the scheme to induce traffic was assessed as limited. More recent VADMA guidance, will require induced traffic to be explicitly modelled for the majority of schemes. It will be interesting to isolate these impacts in future evaluations. The impacts of induced traffic seem small from the evaluations to date, but this can only be confirmed for schemes where it is possible to monitor flows on every road on a screenline, however minor.

- **Where future parallel and complementary schemes** have been accounted for in the forecasts, the POPE evaluations have identified issues when these schemes have not been opened in the timescales assumed. This can have significant impacts on the potential benefits of a scheme. Potential sensitivity testing, considering the ‘likelihood’ of these complimentary schemes and their impacts on overall viability, should be undertaken in future.

Finally, it is important to ensure that HA project managers and consultants act upon the lessons learnt through POPE. This will inform decisions on both general and scheme specific issues and aid in ensuring that best practice is maintained.
Is the appraisal of road schemes being compromised by the appraisal methods?

Historic appraisal methods have given rise to issues regarding the accuracy of forecast against outturn evaluations. However, the evaluation of economic benefits has shown that the schemes still provide ‘Value for Money’, in that the difference between predicted and outturn economic benefits are within 10%.

The difference between forecast and outturn economic impact varies by scheme type, but from the largest sample (Bypass schemes), the difference is around 15%, hence suggesting that the appraisal of the Economy objective is not compromised by any inaccuracies in the traffic forecasts.

The bypass schemes are shown to demonstrate an over-prediction of accident savings. However, accident saving should be considered after five-years, not one, and so caution should be taken in coming to any conclusions.

This paper has concentrated on the impacts of schemes in terms of traffic volume predictions, and economy/safety impacts. In future, the use of POPE-E on all schemes will widen the evaluation to all the NATA criteria.
4 SUMMARY AND FUTURE

It is clear from the evaluations of road schemes in the TPI programme that the appraisal undertaken at the time led to differences in the predicted and outturn flows.

However, there was no systematic bias in either under-prediction or over-prediction, and there were a number of reasons for the differences. These differences are understood, and it is reassuring that the improvements in the appraisal process already promulgated by DfT should improve the quality of appraisals.

However, the evaluations have shown that is up to the promoters to consider carefully all of the expected impacts of a scheme, and determine the best modelling approach to take account of strategic and local re-assignment, which seems to be the dominant response to the schemes evaluated.

Despite the differences in traffic volumes and the impact on economic and safety benefits, it is unlikely that the differences would have affected decisions.