highways england

National Pinch Point Programme

One Year After Evaluation
Meta-Analysis

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Foreword

The evaluation of the Pinch Point Programme gives us the opportunity to learn lessons which will help us improve the way we identify, appraise and deliver small-scale enhancements, which are so vital to our network.

Over the past decade, we have built a strong evidence base which demonstrates why this type of investment is critical for relieving localised congestion and tackling safety hotspots. For instance, we know from investment in Local Network Management Schemes[1] that the average outturn benefit-cost ratio was £16 to every £1 invested, representing very high value for money.

The Pinch Point Programme was designed to be different. Back in 2011, this Programme was about exploring the contribution that small scale road investment could make to supporting economic growth, as well as continuing to improve congestion and safety outcomes. These continue to be important outcomes for how we manage the Strategic Road Network, but what we have learnt from the Pinch Point Programme is that it is not always possible to expect a single small scheme to deliver benefits across these three objectives at the same time (for instance, introducing speed restrictions to improve safety will inevitably increase journey times). Our current approach to investing in these areas is through more discrete and focused funds, such as the Growth and Housing Fund, the Safety and Congestion Relief Fund, and designated funding for safety schemes within the Cycling, Safety and Integration Fund.

I am pleased to see that some schemes have been successful in reducing congestion during the busiest periods for our road users and made roads safer.

The findings from this Pinch Point evaluation shows us that the programme delivery context is really important in delivering successful outcomes. Setting clear objectives, strong governance, robust appraisal, and selecting the right schemes which are designed to optimise benefits for all road users are all critical success factors. There were a number of core elements that could have been done better, and I am pleased that, across the Company, we have been investing in enhancing these areas:

Proportionate appraisal - We recognise and value this, and since the formation of Highways England, we have focused on building our in-house analytical capabilities, transformed our approach to assuring the Value for Money of our investment decisions and strengthened the management of our Capital Portfolio and approach to Benefits Management. The evaluation has identified a number of areas where the approach to appraisal was not fit for purpose (especially by only focusing on congested periods) and as a result we will be launching new appraisal guidance for small schemes in early 2019. This will provide a useful guide to promoters and the Highways England assurers of small schemes. It will set out the key methods that could be used for small scheme appraisal as well as the potential pitfalls of certain approaches building upon this evaluation.

[1] Based on analysis across 717 evaluated schemes in the 12th Annual Report

Optimising benefits across the 24 hour period – The evaluation has shown that across a 24 hour period we are not sustaining the journey time benefits we generate during peak periods, and predominantly this has been a consequence of 24 hour signalisation. As a company, we are considering a range of options to optimise journey times across a 24 hour period, such as using adaptive traffic control technologies (like SCOOT and MOVA[2]) which are responsive to the traffic conditions.

Programme Governance – The cost escalation observed within the evaluation has shown that some of the core programme governance was insufficient for managing and documenting change control. As a Company we have invested in enhancing our financial controls, resourcing early stage feasibility assessments and building stronger pipelines of potential schemes for future programmes. Moving to five year investment cycles gives us greater funding certainty to develop and deliver stronger programmes.

Supporting Economic Growth – Recognising that it has been too early to fully assess these impacts in this evaluation, some key messages have been presented in relation to how potential growth areas were identified and appraised. Since the first Roads Investment Strategy, we have set out our approach for how we will maximise the economic impact of the Strategic Road Network, within the **Road to Growth** and we have launched the Growth and Housing Fund. A key part of this has been enhancing the appraisal approach and delivering collaboratively with local stakeholders to ensure the investments made are relevant and impactful.

Nick Harris
Executive Director, Operations

[2] Split Cycle Offset Optimisation Technique (SCOOT) and Microprocessor Optimised Vehicle Actuation (MOVA).

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Pinch Point Programme One Year After Evaluation - Executive Summary

Programme overview

The Pinch Point Programme was established in 2011, as a collection of schemes to be delivered on the Strategic Road Network by Highways Agency, who was responsible for operating, maintaining and improving. Since 2015 this responsibility was transferred to a new entity, called Highways England. £317m was made available for the Pinch Point Programme, which specifically aimed to invest in small-scale schemes (generally costing up to £10m) which **stimulated growth in the local economy, relieved congestion and/or improved safety**. The resulting 119 Pinch Point schemes were implemented by March 2016. Types of schemes funded through the programme included CCTV technology schemes, junction improvements, signalisation, slip road widening and signage.

Evaluation Sample

54 of the 119 Pinch Point schemes have had One Year After (OYA) Post Opening Project Evaluations (POPE) completed. The sample covers a spread of schemes delivered geographically and across a range of scheme types and investment levels. However, the sample did not include the technology schemes (which were considered not possible to evaluate at OYA). Based on the sample design, it has not been possible to confidently generalise from this analysis across the entire programme, but the findings from this Meta Report have been used to help identify themes and emerging trends across the schemes evaluated.

Evaluation method

During the OYA evaluation key metrics have been monitored and site visits conducted to examine what short-term changes had occurred since the schemes opened, compared with pre-scheme levels. Whilst this evaluation covered a range of objectives (including outturn costs, safety, journey times and reliability, as well as, some indicative evidence in relation to stimulating economic growth) it was too early to fully assess all of the impacts of the schemes and draw conclusive evidence about their Value for Money. It is considered that the outturn impacts on key objectives such as stimulating economic growth and safety required a longer timeframe to before the scale of effect can be observed.

Scheme objectives

Schemes tended on average to have two strategic objectives, these were predominantly to deliver journey times (43%) and safety benefits (35%). The remaining (22%) of objectives related to supporting of economic growth or enhancing the design standards of the existing network. At this early stage, the evaluation has indicated that for over half of these objectives (58%) there was evidence of schemes having a beneficial effect. Not all the objectives are measurable at the OYA stage, especially the

economic growth objectives. The evaluation has explored the core programme objectives in more detail and the high-level findings are presented below.

Journey Time Benefits

Reducing congestion during the busiest periods of the day, or on severely delayed routes, was a specific objective for the vast majority (88%) of schemes within the sample, and there is evidence of success in achieving this with schemes producing in total £5.1m of benefit during the AM and PM peak periods, as these were the periods of the week with highest flows, but they also produced net dis-benefits of over £5.6m in non-peak periods of the week.

The nature of the programme, meant that schemes sought to rebalance delay and the evaluation findings have identified a displacement effect, whereby the journey time benefits experienced by road users during peak times have been offset by slower journeys during off peak periods which in turn has reduced the net benefit of schemes over a 24 hour period across the sample. Predominantly, this was caused by schemes which introduced signalisation (44% of the total sample) and led to small scale journey time dis-benefits for a number of off-peak road users which, when aggregated across a 24 hour period, led to adverse impacts for journey times overall in the opening year. These were not projected in the scheme's appraisals.

A similar finding was observed for Journey Time Reliability Benefits. Across the sample, there were improvements in journey time reliability seen in the AM and PM peak period and over three quarters of the schemes in the sample (77%) had improved the journey times for their worst journeys. On average this meant that the slowest journeys experienced had improved by one and a half minutes which is 20% faster than pre-scheme. However, these benefits were not observed across the whole 24 hour period.

Safety Benefits

On average, the first year of the evaluation found that schemes reduced collisions by 1.2. This equated to a total benefit of £5.3m, averaging £99,000 per scheme in the first year. For schemes which had a specific safety objective, the average return per scheme was £128,000[3]. The severity of collisions (slight, serious or fatal) decreased across the sample, with evidence that schemes which aimed to reduce speed limits or introduced signalisation were effective at reducing the severity of collisions.

Across the sample, when accounting for outliers, around three quarters of the projected first year safety benefits were achieved, and the evaluation had not observed any systematic bias in appraisal for over or under claiming safety benefits. Whilst monitoring safety impacts is important once a scheme has opened, repeated measurement is required over a period of three to five years to confidently determine the impact of a scheme.

[3] This average figure is exclusive of four outlier schemes (page 35 provides more detail)

Economic Growth Benefits

A core objective of the programme was to contribute to stimulating economic growth. These related to supporting:

- Jobs
- Housing
- Local Economic Growth Areas
- Gateways

One year is not a sufficient time period to observe whether or not these benefits have been realised. However, given that this focus was a relatively new requirement for small road schemes, the evaluation has generated a number of important learning points in relation to the process of identifying and appraising the potential benefits which are in relation to:

The selection of growth sites – The evaluation has really demonstrated the importance of ensuring that a sound causal logic existed between the scheme and the intended beneficiary. It found that proximity was not always a useful proxy for the scheme having a relevant impact on a particular growth site.

Defining the scale of impact – There were instances where the estimation of economic growth benefits of the scheme conflated the potential economic growth benefits with the existing road performance. The latter was weighted highly but this was not necessarily a good determinant of successfully delivering the anticipated economic growth impacts.

Standardising assessment of potential impacts – A pro-forma was designed specifically for the assessment of economic growth benefits across the Programme. The evaluation has identified that this was open to interpretation and tighter prescription would have helped to reduce the impacts of the points above.

Environmental and Social Impacts

As with some of the other objectives, it was not possible to fully assess these impacts in a OYA evaluation as a longer timeframe is required for the impacts to fully measurable. Like with the Economic Growth objective, there was still potential to learn lessons in relation to the appraisal of these impacts.

The evaluation found that more schemes had potential environmental and social impacts than were identified during the appraisal. For some schemes this meant that potential benefits (e.g. to journey quality) were underestimated, but for a number of these objectives the risk was that the schemes were not fully reviewing the potential impacts and in particular those relating to Landscape and Biodiversity. Often the outturn impacts were considered to be neutral, but the evaluation did find cases where unanticipated minor adverse impacts had been observed.

The OYA assessment of Physical Activity and Severance impacts, identified the following considerations as potential enablers to optimising these benefits:

The importance of consulting with the local community during the design phases of the scheme;

- Understanding the needs of the end user; and
- Ensuring facilities were connected to the existing network to support end to end journeys.

Evaluating Value for Money

In order to confidently assess Value for Money a range of monetised and non-monetised impacts are required to be considered. At the OYA point in the evaluation cycle, it was too early to draw conclusions about the outturn Value for Money of the evaluated schemes, as some impacts were not sufficiently mature to be measurable. However, the analysis of the first year findings has provided an indication of the direction of travel and an opportunity to learn lessons for future programmes.

Measuring the outturn scheme costs was important for informing any potential Value for Money assessment. The evaluation found that on average schemes costs just under a third higher than predicted within the appraisal. However, the majority (60%) of the projected scheme costs were based on early design stage assessments rather than at the more mature stage of the scheme design when the final **commitment of works** was being agreed. Therefore, these costs would have been most likely to change during scheme design stages, and this explains a large part of the variance. The evaluation highlighted the importance of continuing to update the appraisal assumptions during the project development stages, as well as, ensuring that appropriate feasibility timeframes were built into the early stages of programme development.

Lessons Learnt

Defining success – This programme had a broader focus than more established small capital roads investment programmes, and the evaluation has identified that the success criteria for schemes were not always clear. Pinch Points were promoted based on a target to improve safety, reduce congestion or stimulate economic growth. However, despite only needing to deliver one of the three objectives, they were appraised on all three. This has meant that some schemes had been designed to benefit one objective more than another, and these effects have been observed in the monitoring data, however this was not reflected in the appraisal projections.

Assessing and optimising benefits – The evaluation has drawn out some important lessons for the proportionate appraisal of small schemes. In particular, it has highlighted the need to appraise journey time impacts over a 24 hour period and ensuring that potential environmental and social impacts are adequately considered. In particular, it has raised some important questions about the role of signalisation, the value of peak and off-peak impacts and how balancing delay was appraised. The evaluation has also provided an opportunity to review and refine the approach to appraising the economic growth impacts (outlined above) which, at the time, was based on a bespoke methodology.

Maintaining the business case across the scheme lifecycle – The evaluation used the available appraisal information to baseline scheme costs and impacts in order to define the measures of success. For this programme, a high proportion was based on early stage assessments before the scheme design had been fully developed. Inevitably, this has led to variation between what was projected and what was delivered. Therefore, a key lesson was to ensure that scheme assessments were reviewed at critical stages in the lifecycle and when subject to design changes, and that this information has been maintained within appropriate knowledge management structures.

1. Introduction

1.1. What was the Pinch Point Programme?

The Pinch Point Programme was announced in the Chancellor's Autumn Statement of November 2011. The Government made funding available for small-scale infrastructure and technology schemes to be delivered on the Strategic Road Network (SRN) specifically looking to "…**stimulate growth in the local economy and relieve congestion and/or improve safety".** In total, £317m was made available for Pinch Point schemes with delivery planned between the financial years 2012/13 and 2014/15.

In April 2013 the Highways Agency[4] announced that 123 schemes were to be granted funding through the Pinch Point Programme. Following some refinement during the feasibility stage[5], the final programme consisted of 119 schemes. By end of 2014/15, 100 schemes were open for traffic with 19 remaining in the programme in 15/16.

1.2. What is the purpose of this report?

This report presents the combined results from a sample of 54 Pinch Point schemes in order to systematically identify common themes emerging across the sample to enable conclusions to be drawn and important lessons to be identified.

The findings are based on the monitoring of key metrics before, and OYA, the opening of each scheme. Typically, robust assessments of outcomes and impacts take a longer time period to observe so this study has provided an initial assessment to help assess whether the programme is on track to deliver the expected benefits.

1.3. How has the Pinch Point Programme been evaluated?

1.3.1. Evaluation approach

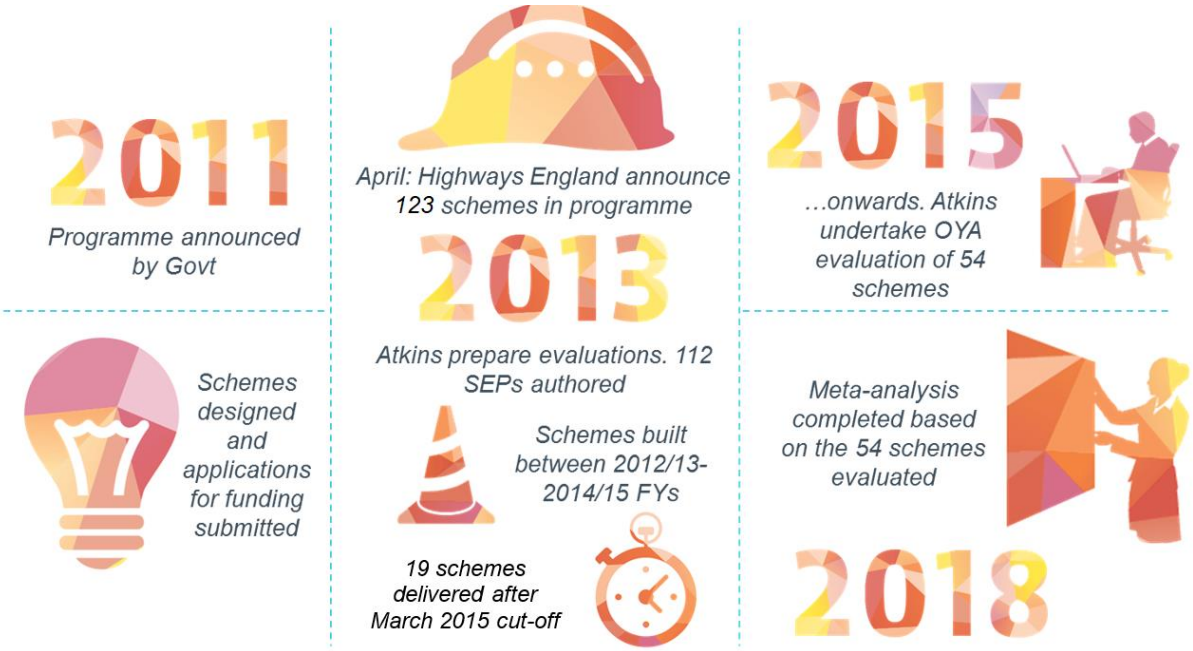
Impact evaluation is the process of assessing how a scheme has performed after it has been opened to traffic. The Post Opening Project Evaluation (POPE) undertaken on the Strategic Road Network has traditionally taken the form of comparing the observed outcomes and impacts with those forecasted to occur in the appraisal in order to understand what was actually delivered, what the associated outcomes were, and to learn how appraisal and decision making could be improved in the future.

POPE of the Pinch Point Programme was commissioned in October 2013 and undertaken by Atkins Global using a similar methodology to the POPE of Local Network Management Schemes (LNMS) with additional methodological reviews conducted for assessing wider economic impacts and evaluating technology schemes. Typically, LNMS were monitored at OYA opening to assess the short-term effects of the schemes and Five Years After (FYA) opening to measure the medium-term impacts. The Pinch Point programme evaluation has been designed using a similar approach and assesses changes in:

[4] Note that the Highways Agency became Highways England in April 2015
[5] A small number of schemes were merged or removed from the programme to be replaced with alternative options.

- Journey times
- Journey time reliability
- Personal injury collisions
- Relevance of sites to support wider economic impacts
- Environmental
- Social impacts

This report presents the findings from the OYA assessment. This means that not all of the potential impacts of the schemes were measurable at this stage of the evaluation. In particular, technology schemes were not evaluated at OYA as their impacts were deemed to require longer timeframes to be observed and the evaluation provided indicative assessment of impacts such as wider economic growth and safety. Further detail on the evaluation methodology is provided in Appendix D.



1.3.2. Evaluation sample

The evaluation findings presented in this report have been derived from a sample of schemes within the programme, covering just under half (46% or 54 schemes) of the total number of schemes implemented.

Therefore, the evaluation did not comprehensively reflect all of the schemes funded through the programme. Significantly, it did not include any of the technology schemes (as OYA was deemed to be too early for measuring impact) and was more reflective of schemes which were completed within the early phases of the programme, as well as, those which faced significant stakeholder interest. Therefore, we cannot confidently generalise from this evidence across the entire programme. However, the sample does provide a broad coverage across the regions, scheme types (for non-technology schemes) and scale of investment.

The meta-analysis incorporated results from OYA evaluations which provided an indicative picture of scheme performance due to the short amount of time they covered. Some outcomes require longer timeframes to be realised and measured and it is for this reason that housing and employment growth were not considered at the OYA stage. And the results for landscape and safety have been deemed only to provide an initial steer on whether schemes are on track to deliver the intended impacts[6]. These evaluation findings therefore show the direction of travel but do not tell us the full story and further monitoring will be required to track benefits over time. Understanding the full range of impacts (including non-monetised impacts) is considered to be important for assessing overall value for money.

The exact breakdown of the schemes evaluated and the cost of the evaluated schemes in each area is outlined in Table 1-1. For reference the table also shows the total number of Pinch Point schemes in the whole programme. The columns to the right show the number of schemes which had specific objectives relating to safety and/or journey times. Highways England geographical areas during the Pinch Point Programme are shown on the diagram in **Error! Reference source not found.**Figure 1-1 (overleaf).

Table 1-1 Schemes sampled for evaluation by Highways England operational area[7]

Area	Region	Total Schemes	Evaluated Schemes	Total OYA Outturn Cost	Safety Objective	Journey Time Objective
1	South West	6	4	£28.3m	2	4
2	South West	9	2	£2.4m	0	2
3	South East	9	6	£31.8m	3	6
4	South East	2	2	£1.5m	0	2
6	East	6	4	£5.4m	4	2
7	Midlands	10	4	£18.1m	2	4
8	East	13	4	£37.2m	4	3
9	Midlands	21	13	£40.5m	11	11
10	North West	22	3	£18.6m	1	3
12	North East	9	6	£23.5m	5	6
13	North West	8	4	£24.1m	4	3
14	North East	4	2	£15.3m	2	2
TOTAL		119	54			

[6] This study allows initial analysis of aggregated safety outcomes in order to detect trends in safety impacts across the sample, which on an individual scheme-level are difficult to measure accurately. This is due to the confounding effect of the random nature of collisions over a short period of time. Aggregation of the results from a range of schemes reduces the effect which can mask real change.
[7] See Appendix C for details of Highways England's Operational Areas

Figure 1-1 shows the exact geographical location of each of the 54 evaluated schemes. It was not possible to proportionately sample the schemes by geography or investment type; however the map shows that the evaluation programme did achieve broad coverage across each region.

Figure 1-1 Locations of evaluated schemes

1.3.3. Report Structure

This report contains sections looking at each of the key areas that have been evaluated: the programme objectives, relieving congestion, improving safety, stimulating economic growth, environmental and social impacts. This is finalised with a discussion about assessing Value for Money. At the end of each section is a case study of an individual scheme. There are seven case studies in total, each providing insight into the complex and varied picture of the outcomes observed for a particular scheme, and the trade-offs encountered when delivering the programme's aims. Finally, the report concludes with a summary of lessons learnt which includes recommendations for future appraisal, programme design and evaluation work.

M1 Junction 21/M69 Improvements
CASE STUDY A
£1m first year journey time benefits

The scheme: The M1 Junction 21 involved capacity improvements to the M1 off-slip, circulatory carriage and M69 exit from the junction, in addition to signal and lighting improvements.

Journey time impacts: The scheme has proven to deliver near to **£1m** of journey time benefits in the opening year (which is a return of nearly half the investment made) and has therefore been successful in reducing congestion. There were also minor safety benefits – although this was not a core objective for the scheme. Based on the first year benefits, the scheme was considered likely to generate high value for money.

Economic growth impacts: The scheme was positioned within 5km of a potential development - as identified in a large masterplan (the New Lubbesthorpe area). Whilst this had been anticipated in the business case for the scheme due to its proximity, the evaluation identified that there was no direct access from the scheme to the growth area, and traffic for the growth area would have to route around Leicester to access the site.

This was an example of a scheme which was on track to deliver its core objective of reducing congestion, but the design of the scheme was not seen to be successful for delivering the intended economic growth benefits.

2. Delivering Against Objectives

The broad objectives of the Pinch Point Programme were stated as looking to promote schemes that stimulated growth in the local economy, relieved congestion and/or improved safety. However, each individual scheme also had specific scheme objectives. This section aims to understand how schemes in the Pinch Point Programme were appraised, as this had an impact on the availability of data to carry out the evaluation. Details of the appraisal process for the Pinch Point programme are presented along with an assessment of how the evaluated schemes performed against their key objectives.

2.1. How were the Pinch Point schemes appraised?

Appraisal is the name given to the process of forecasting what the impacts of a scheme will be if constructed. By its nature it is an estimating process, and there are detailed guidelines and many examples of best practice to learn from when doing such forecasting. There are also frameworks such as WebTAG, which guide the appraiser to think about all the potential implications of a scheme.

Not all programmes of schemes are appraised in the same way (due to types of schemes, size - geographic or economic - of scheme etc.), and so this section provides some context as to the method of appraisal that was undertaken for the Pinch Point Programme. The schemes considered in this report were generally small scale schemes (mostly under £10m investment) and so were subject to a proportionate level of appraisal. This is important, as the depth of analysis in a scheme appraisal will often restrict the scope of POPE analysis of said scheme. For example, if no pre-scheme measurement or forecast was made during the appraisal, it can be difficult to interpret the observed outcomes.

The Pinch Point Programme funding decisions relied on the following appraisal information being completed for each scheme:

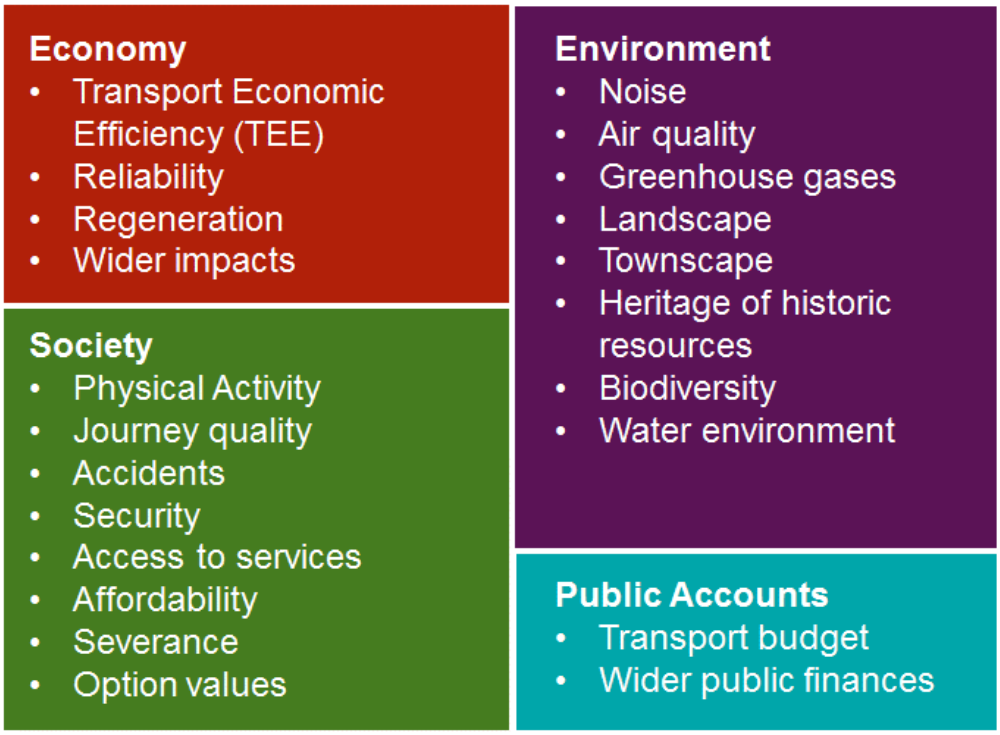
- **General Pinch Point scheme** – A Project Appraisal Report (PAR) and a Policy Pro Forma
- **Technology scheme** – A Technology Scheme Appraisal Report (TSAR) only

The technology schemes were deemed unevaluable at OYA as their impacts were deemed too small to measure. As such, the report does not discuss TSARs.

2.1.1. PAR Appraisal

The PAR has been used for over ten years, typically for smaller scale investment schemes. It provides a single document outlining what is being constructed, the cost and monetised benefits, and the likely impacts against the Department for Transport's WebTAG objectives. A PAR may or may not be supported by more detailed technical documents which outline the detailed calculations of figures if these have been undertaken. WebTAG provides a framework for ensuring all aspects of a scheme's impact are assessed and guidance on how to undertake this assessment. The

WebTAG objectives are a series of objectives that can be affected by transport schemes and these are listed as follows:



The level of appraisal detail required from a PAR was determined by the cost of the scheme, and how far advanced through the planning process the scheme was when it was being completed. The PAR was completed by the scheme proposer (regional teams and their supply chain - Area Support Contractors (ASCs) or Managing Agent Contractors (MACs)), and may have required sign off by the TAME (Traffic Appraisal, Modelling and Economics) group depending on the scheme's value and/or the Environmental Group depending on the scheme's likely environmental impact.

PARs range from simple to complex, the difference being the amount of information provided. The simplest is a **Foundation PAR** which will outline what a scheme proposed to be, how much it is likely to cost and what its likely safety or journey time impacts are expected to be. The most complex is a **Standard** PARs which can provide a score against all WebTAG objectives and be supported by documents providing detailed calculations or models demonstrating how forecast values have been derived. The PAR will make first year forecasts and extrapolate these to scheme life forecasts and an overall benefit cost ratio (BCR).

The PAR for a scheme will usually be revised and updated as a scheme progresses from feasibility through to detailed design stages. Conception Stage PAR is developed at the start of feasibility stage, with more detail required up to a Commitment of Works Expenditure Stage PAR which should be produced just prior to the start of scheme construction. For all schemes costing over £100k (almost all the schemes in the Pinch Point Programme) a Commitment to Works Expenditure Stage PAR should have been completed.

2.1.2. Policy Pro Forma

The policy pro forma was specifically designed to support the appraisal of the Pinch Point Programme. It provided a framework for the Pinch Point Programme of schemes to be appraised against four policy objectives; supporting housing growth, supporting employment growth, supporting gateways (i.e. ports or airports) and supporting local economic growth. Each Pinch Point scheme, with the exception of the technology schemes, had a policy pro forma completed.

The pro forma asked the following of the scheme promoter:

Housing and employment growth: To identify any housing and employment sites that would be supported by the scheme being proposed. This was to include estimates for the number of houses or jobs at the sites. The status of the development in the planning process was used as a proxy for the certainty that the development would go ahead. Promoters were encouraged to consider developments within 5km of the scheme and then to add to this any further developments that were considered likely to be affected from further afield. These factors (number of jobs/houses and status) were fed into a scoring metric to give an overall score against the policy objective.

Supporting Economic Growth: The promoter was to ascertain the significance of any economic growth areas that would likely be affected by the scheme. Highest significance was attributed to designated Enterprise Zones[8], then designated growth[9] and finally growth areas with no designation. The promoter was also to calculate the 'magnitude of impact' that the scheme would have on the economic growth area. This was determined by considering the volume over capacity[10] for the scheme extent, with road links operating above capacity given higher status than those operating below capacity. The designation of growth area and the status of the scheme link fed into a scoring metric to give an overall score against this policy objective.

Supporting Gateways: The gateway policy objective was much like the supporting economic growth objective. The only difference is that the economic significance of the gateway replaces the designation of the growth area. Economic significance of a gateway is determined by the passenger numbers or tonnes of freight passing through the port/airport in question. There were three levels of significance defined; Major International Hubs, Key National Gateways and Locally Significant Gateways. As before, the economic significance and the status of the scheme link were fed into a scoring metric to determine the overall score against the policy objective.

Further detail and analysis of the policy appraisal and methodology is provided in Section 5 of this report, including recommendations and best practice from this new area of appraisal. For more information on the pro-forma appraisal guidance see the document **Pinch Point Programme User Scoring Guidance** (March 2012) which outlines the appraisal approach.

[8] http://enterprisezones.communities.gov.uk
[9] Designated area is one defined in a national or local policy document as part of a growth strategy
[10] A standard measure of flow divided by design capacity which gives a measure of stress on a route

2.2. How have the evaluated schemes performed against their key objectives?

The schemes put forward for Pinch Point Programme funding did not explicitly have to outline their core objectives. Rather, as outlined above they all underwent a WebTAG appraisal and policy appraisal (with the exception of technology schemes), and so did not have to specifically say which of the programme objectives of stimulating growth in the economy, relieving congestion or improving safety each was seeking funding to deliver.

To provide some clarity about scheme purpose in the evaluation process, the evaluation team assigned one or more objectives to each scheme based on a qualitative assessment of the scheme descriptions provided in the PAR appraisal and policy pro forma documents. Each provided the opportunity to specify expected outcomes, and these were used as scheme specific objectives in each evaluation and scored as either 'succeeding', 'not succeeding' or 'not being evaluated at this time'. These objectives were then broadly categorised into 'safety objectives', 'journey time objectives' and 'other objectives' to allow a meta-analysis on how the sample as a whole has performed.

2.2.1. What were the objectives?

While the objectives were broadly categorised as 'safety', 'journey time' or 'other', it is worth giving some consideration as to what the specific objectives were.

For safety, these tended to be "**reduce collisions***"* though there were a few that were more specific such as "**reduce the number and severity**" or "**reduce accidents, particularly those involving vehicles skidding**".

For journey time impacts, the objectives were often slightly more specific. While there were a number of generic objectives like **reduce journey times**, **reduce congestion** or **improve reliability**, some were more specific such as **reduce congestion during the AM and PM peaks** or specified movements that would benefit.

The other objectives tended to either relate to the policy impacts, discussed earlier in this report (e.g. **support job creation**, **improve access to the airport** and **support local development),** or design standards (e.g. upgrading road layouts to meet DMRB standards.). **improve on-slip layouts to be compliant with DMRB standards**, **enable HGVs to enter the roundabout safely** or **ensure capacity of slip roads is not exceeded**.

2.2.2. How did the objectives score?

Table 2-1 outlines the objectives and scores attributed to the 54 evaluated schemes to date. It demonstrates that across the 54 OYA evaluations there were 114 objectives in total, meaning that on average, a scheme had two objectives (the range was one to five).

Table 2-1 Performance against objectives (OYA)

	Number of objectives	Met	Not Met	Not Assessed
All Objectives	114	58%	39%	3%
Safety Objectives	40	65%	35%	0%
Journey Time Objectives	49	53%	47%	0%
Other Objectives	25	56%	32%	12%

In terms of performance against objectives, 58% of objectives were scored as being met at OYA (i.e. if it was aiming to save collisions, any reduction in collisions observed would be scored as meeting this objective, even if this was below the forecast reduction). This appears to be higher for safety objectives than journey time or other objectives, with journey time objectives performing the least favourably.

The analysis shows that the safety objective was met 65% of the time, though at OYA it is too early to confidently state this is a true reflection of the number of met objectives. This is because collisions are stochastic events by nature. The FYA evaluations and meta-analysis will provide much more clarity on individual scheme safety outcomes.

Wider economic objectives were the most likely not to be assessed, due to some schemes having objectives relating to specific housing or employment developments that cannot be considered until at least FYA (as the delivery timescale for housing and employment for Pinch Point schemes was set as 2020). Some of the other objectives which were essentially design related objectives (e.g. upgrade a slip road to DMRB standards) were achieved simply by implementing the scheme in line with design. These are included in the ‘met’ percentage of 56%.

M27 Junction 5 Congestion Study
CASE STUDY B

BCR 0.7, £486k first year safety benefit, -£257k first year congestion dis-benefit

The scheme: The M27 Junction 5 scheme is on the junction that connects the M27 to Southampton Airport. The scheme involves widening three of the main approaches to the junction including a free flow lane from the airport to the M27, and providing additional traffic signals at the junction.

The impact of signals: Signalisation schemes have been repeatedly found to give both beneficial and adverse impacts at schemes, with the scheme success on congestion riding on how the benefits and dis-benefits balance. Typically, we have found this to be a balance between some arms that benefit and some that have adverse impacts (based on balance of green time) and some time periods that benefit and some that are adverse (based on traffic volume). This scheme is no different and shows benefits in the PM peak and for movements from the Airport. However, all other periods and movements have overall adverse impacts. There is a need for appraisal to reflect the balance of impacts involved with signals in future appraisals.

Need to define success: The success of the scheme is currently not possible to conclude. In terms of journey time savings the adverse impacts outweigh the benefits. However, for stimulating economic growth for the airport, the scheme has delivered significant benefits for this arm, allowing easier access/egress to/from the airport. Further, there is a substantial reduction in collisions of 4.8 in the opening year which is much better than predicted. The scheme is therefore difficult to categorise as successful or not successful, largely because the purpose and definition of success was not defined. It is therefore considered appropriate for future schemes to define how success will be measured when appraising.

3. Relieving Congestion

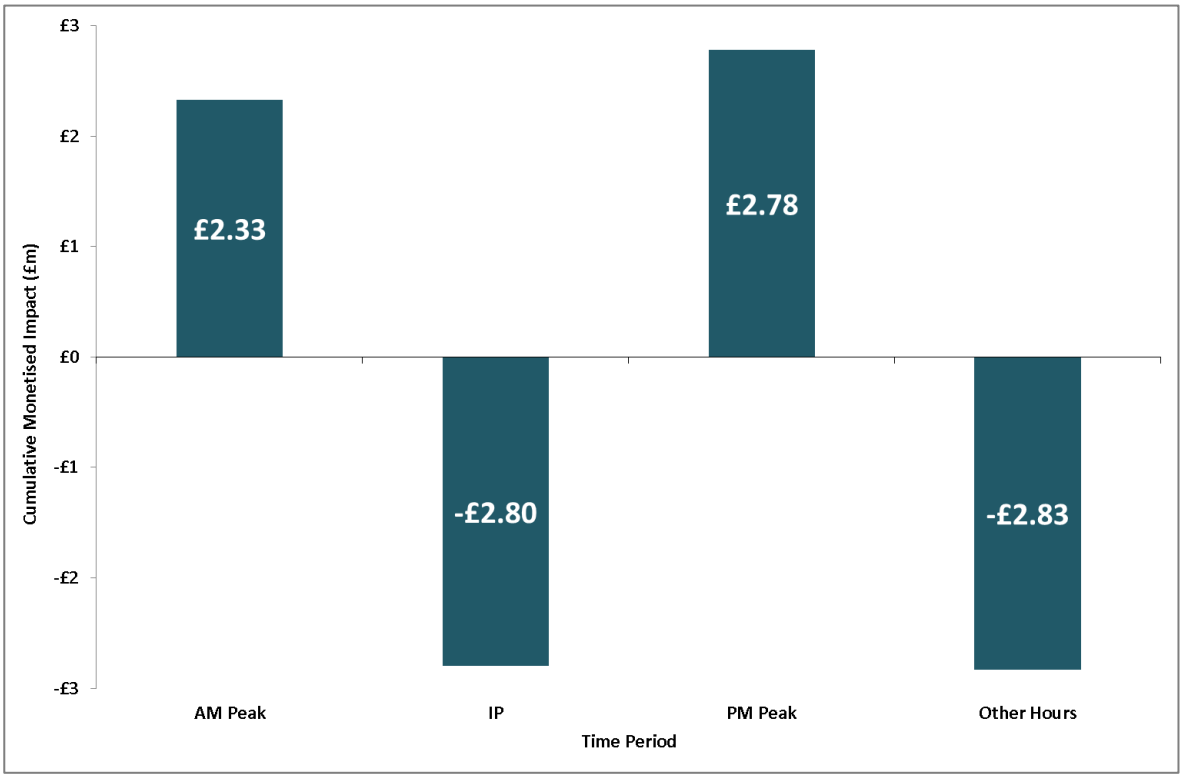
Congestion relief was one of three core objectives of the Pinch Point Programme when it was announced by the UK Government in 2011. For the purposes of the evaluation it has been measured by tracking changes in average journey times and by changes in reliability. This section looks at the key findings on journey times and reliability across the 54 OYA evaluated Pinch Point schemes in the sample.

3.1. What impact did the schemes have on journey times?

The majority of schemes (89%) had an objective to relieve congestion during specific time periods or on specific parts of the network. To a great extent, these benefits have been realised, however the schemes have also generated dis-benefits at other time periods (or for other parts of the network) which have outweighed these benefits. The nature of the programme meant that schemes sought to rebalance delay and the evaluation findings have identified a displacement effect, whereby the journey time benefits experienced by road users during peak times have been offset by slower journeys during off peak periods which in turn has reduced the net benefit of schemes across the sample.

Error! Reference source not found. Figure 3-1 shows the total monetised impact of the sample in each of the core time periods. As a whole, the sample produced net journey time benefits in excess of £5.1m during in AM and PM peaks (the periods of the week with highest flows) but it also produced net dis-benefits of over £5.6m in off-peak periods of the week. So, while the schemes within the sample were successful at reducing journey times in the most congested periods as intended, generally, they created more delays in the less congested periods.

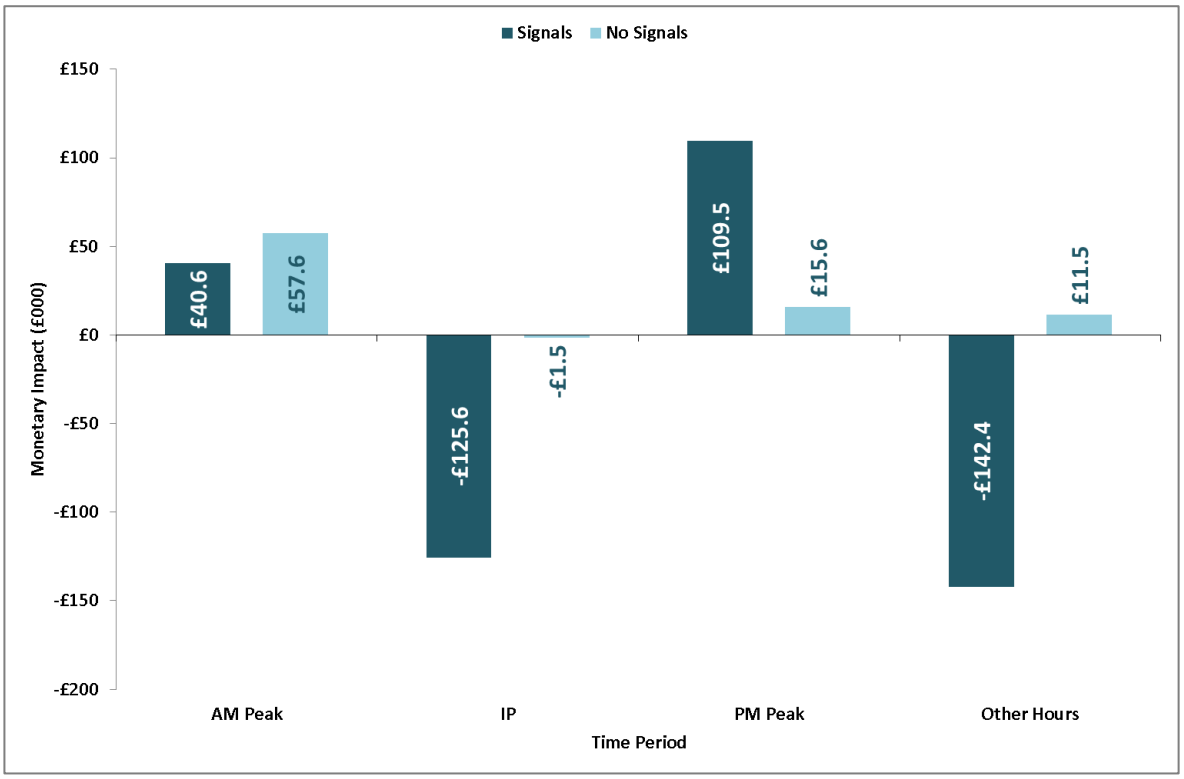
Figure 3-1 Cumulative first year journey time impact by time period (Base: 54 schemes)



A large proportion of the sample (44%) incorporated the introduction of upgrades to signals in their design. These schemes were found to be effective at reducing congestion during peak periods, but they also introduced adverse effects on traffic flow in other time periods. A421 Black Cat provides a good illustration of this effect and shows a PM peak journey time benefit of £832k and an inter-peak dis-benefit of £314k.

Figure 3-2 which shows the adverse impacts in off-peak periods are entirely due to signalisation schemes.

Figure 3-2 Temporal split of journey time impacts, by presence of signals (average per each scheme which introduced new signals) (Base: 54 schemes)



3.2. Are journeys becoming more reliable?

Journey time reliability is considered in two different ways; Incident Related Variability (IRV) and Day to Day Variability (DDV). The first metric relates to the resilience of the road network to incidents and the second relates to how resilient the road network is to the natural demand changes from day to day. Unfortunately, it is very difficult to effectively measure either of these types of reliability with confidence as it is difficult to separate one from the other. As such, this evaluation considers both together as a broad reliability metric.

The evaluation utilised two methods for assessing reliability. The first measured the changes in the quickest, the typical and the slowest journey times – **flow weighted reliability percentiles**. The second measured the changes made to the slowest 5% of journeys – **Planning Time Index (PTI).**

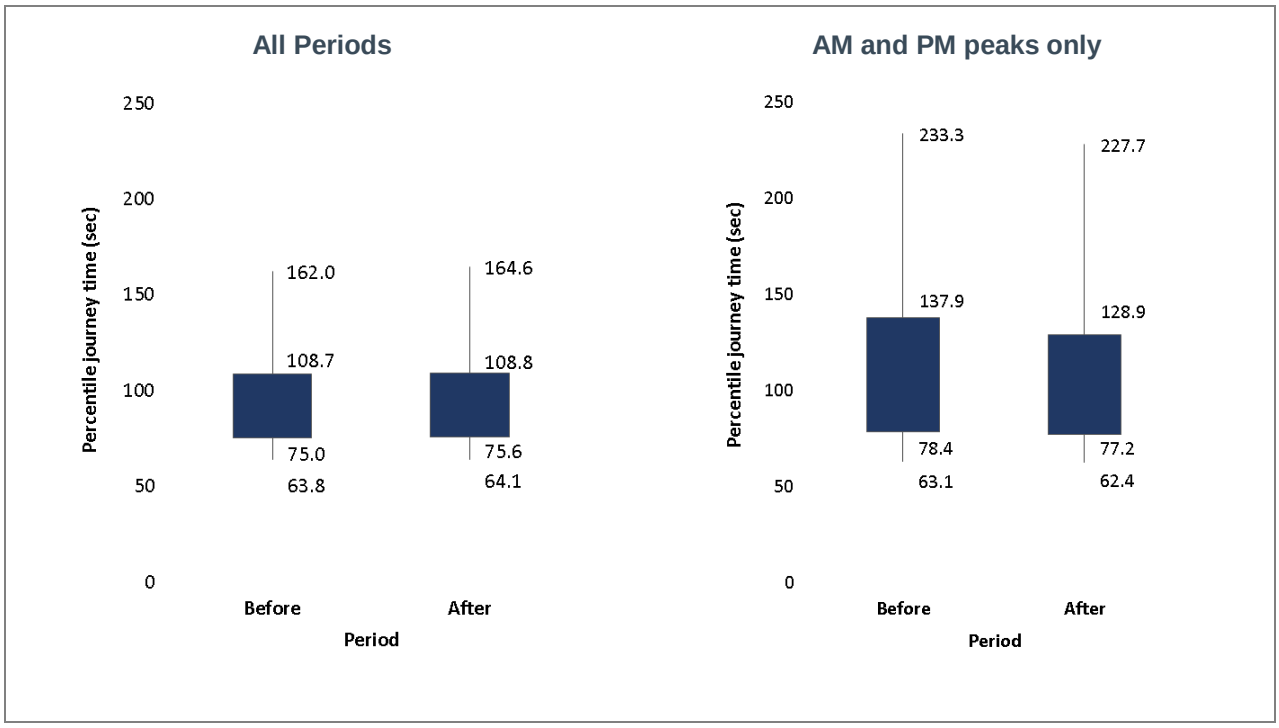


Figure 3-3 Evaluated schemes flow weighted reliability percentiles (Base: 54 schemes)

Figure 3-3 shows that overall, at OYA, the sample of schemes has had little impact on journey time reliability when **all time periods** are considered. Indeed, there are slight indications of a worsening of reliability. However, if the **AM and PM peak** periods are solely considered the sample has improved journey time reliability, with the spread of peak time journeys observed after schemes had opened less than the spread of those observed before. Furthermore, the difference between the fastest and slowest journeys observed before is greater than that observed after. What is noticeable is that this variation is being reduced by the implementation of the schemes and those using the roads during the most congested periods of the day are experiencing a slight improvement in the time it takes to travel through the scheme.

However, it appears that like the findings of the journey time analysis earlier, peak period benefits have been offset by off peak dis-benefits. And again, it is considered that these results are strongly influenced by schemes involving signals, which made up a large proportion of the sample. It should be noted that signals have historically been found to have these effects[11].

To better understand the spread of reliability impacts within the sample, further analysis was undertaken.

[11] A similar analysis was undertaken on schemes with outliers removed, but the results were very similar to those presented here

Table 3-2 shows the number of schemes that were found to increase or reduce reliability for both the typical journey (the 50th percentile journey times) and for the worst journeys (95th percentile journey times). This analysis is based on all journey times.

Table 3-2 Number of schemes which affected each percentile (Base: 52 schemes)

	The top 5% of slowest journeys	Typical journey time (50% of journeys)
Reliability increased	25	27
Reliability decreased	28	27

Table 3-3 shows the flow weighted PTI scores for the 52 schemes that it was possible to undertake PTI analysis on. The table shows that, prior to introduction of the schemes within the sample, the worst-case movement/journey had an average PTI of 4.8. This meant that it took nearly 5 times as long to traverse the scheme during the most congested periods than it did during free flow conditions. The results indicate that the schemes within the sample have improved matters, with the average PTI now reduced to 3.6.

Over two thirds of the schemes in the sample (77%) have effectively improved their single worst journeys, while for the remainder the worst reliability movement/period has worsened. This could either be a consequence of the scheme generally not working, not working for that specific movement or period or fundamentally not being designed to target an improvement for that movement.

Table 3-3 Worst movement/period flow weighted PTI before vs after (Base: 52 schemes)

	Overnight mean (sec)	Worst Period (sec)	PTI
Before	94.4	448.9	4.8
After	96.6	352.3	3.6

Table 3-3 Worst movement/period flow weighted PTI before vs after (Safety Objective, Base: 38 schemes)

	Overnight mean (sec)	Worst Period (sec)	PTI
Before	88.0	476.1	5.4
After	90.5	394.8	4.4

Table 3-4 Worst movement/period flow weighted PTI before vs after (Congestion Objective, Base: 38 schemes)

	Overnight mean (sec)	Worst Period (sec)	PTI
Before	94.5	461.5	4.9
After	96.5	355.5	3.7

Table 3-5 Number of schemes with a better/worse PTI

	Number of schemes
PTI Better	40
PTI Worse	12

This further validates the findings discussed earlier in this section: that the schemes in the sample have been successful in reducing congestion and improving reliability for the worst periods and worst movements at schemes locations, as intended, but, overall the benefits derived have outweighed the dis-benefits produced in other periods or movements. If the worst performing periods and movements were deemed the "pinch points" on the SRN then on these narrow terms the sample has successfully delivered. The issue however, is that these benefits have often come at the cost of a broader adverse impact.

3.3. What is the first year return on investment for journey times?

Aggregating the sample's first year observed impacts on journey times show an opening year dis-benefit of -£888k, equivalent to each scheme having an average dis-benefit of -£16k. The results are marginally more positive at the level of re-projected scheme life, at around a £0.5m journey time benefit per scheme[12]. However, this increases to an opening year benefit of £4.2m when outliers are removed (see Table 3-6).

Table 3-6 Outturn monetised journey time impacts

	Number of schemes	First Year JT saving		Scheme life JT saving	
		Total	Per scheme	Total	Per scheme
Full sample	54	-£888k	-£16k	£27.4m	£0.5m
Schemes with Congestion objective	48	£2.4m	£50k	£104.2m	£2.2m
Full sample excluding outliers	51	£4.9m	£95k	£213.1m	£4.2m

[12] Note it is possible for the first year impacts to be negative yet the scheme life to be positive if the scheme life differs between a successful and unsuccessful scheme. Equally, scheme life benefits are estimated by capitalising opening year impacts, and it is possible for positive schemes to have higher capitalisation than negative schemes thus explaining the contrasting first year and scheme life impact observed.

Table 3-7 Schemes identified as journey time outliers (all adverse)

Scheme	Outlier[13]	Cause
A5-A49 Preston Boats	Major	The scheme introduced signals on the roundabout between the A5 and A49. The A5 through movement and A5 east to A49 movement have very high flows, but now these are held back by signals, causing large journey time dis-benefits which far outweighed the benefits the scheme brought to minor flow movements.
M6 Junction 23	Minor	The scheme widened the central section of this hamburger roundabout, and now moves the majority of traffic through the centre of the junction, beyond the capacity of the central road. As such there are large dis-benefits to all movements through the hamburger.
A1 Southoe Safety Cameras	Minor	This speed camera and speed limit reduction scheme did forecast a journey time dis-benefit but the dis-benefit was heavily underestimated. As the speed limit was reduced over a long distance (over 1.8 miles) there was a substantial change to journey times. However, in terms of safety impacts this was a positive scheme due to the large reduction in collisions on this route.

3.4. How accurate were the journey time forecasts?

The evaluation has found that the sample's outturn journey times are not in line with the predictions made during appraisal. Figure 3-4 demonstrates that the forecasts were overly optimistic and generally only considered that the impact of schemes would be positive for journey times. This finding is supported by Figure 3-5 which compares first year benefit profiles. The analysis leads to the conclusion that the ultimate cause of the discrepancies was not the outliers or the scheme objectives but the omission to capture all of journey time impacts within the forecasts.

Further analysis revealed that 20 schemes had opening year monetised journey time benefits in excess of £1m of those which was forecast. Figure 3-6 shows the distribution of the accuracy of journey time benefits in opening year. The greatest first year benefit observed was £1.2m, yet 16 schemes forecast benefits in excess of £1.2m in the opening year, with the highest forecast to be over £7m. This leads to the conclusion that a number of the benefit forecasts within the sample were unrealistic. It is recommended that further controls and checks on realism of forecasts be implemented in future.

[13] Minor outliers are those which fall within one and a half interquartile range below the 25th percentile or above the 75th percentile. Major outliers are three interquartile ranges below the 25th percentile or above the 75th percentile.

Figure 3-4 Predicted and outturn opening year journey time impact (Base: 54 schemes)

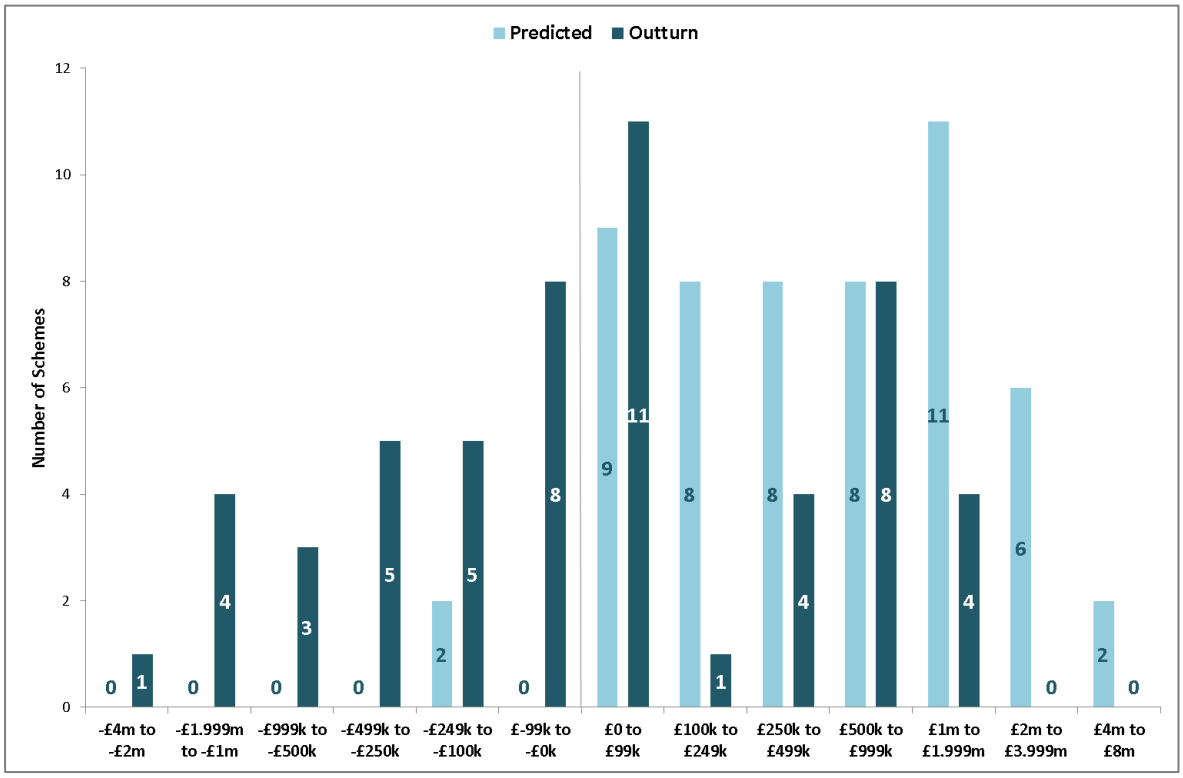


Figure 3-3 Predicted and outturn first year journey time impacts average per scheme

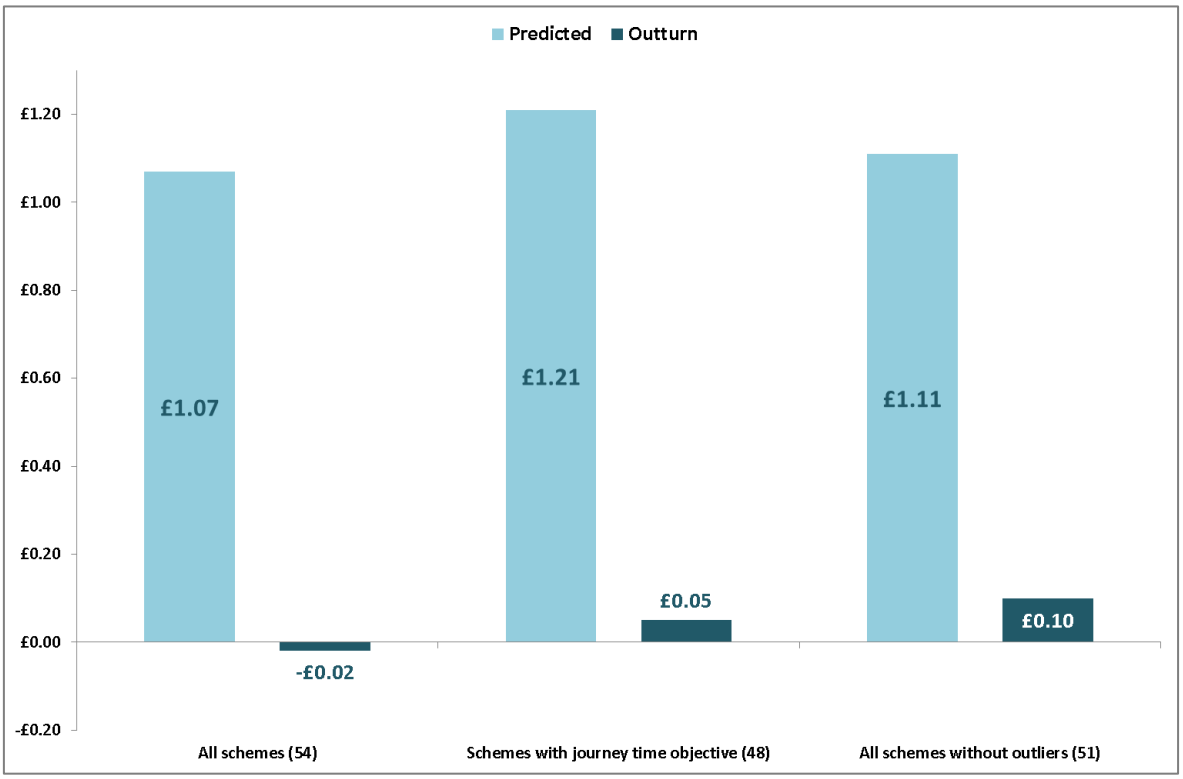
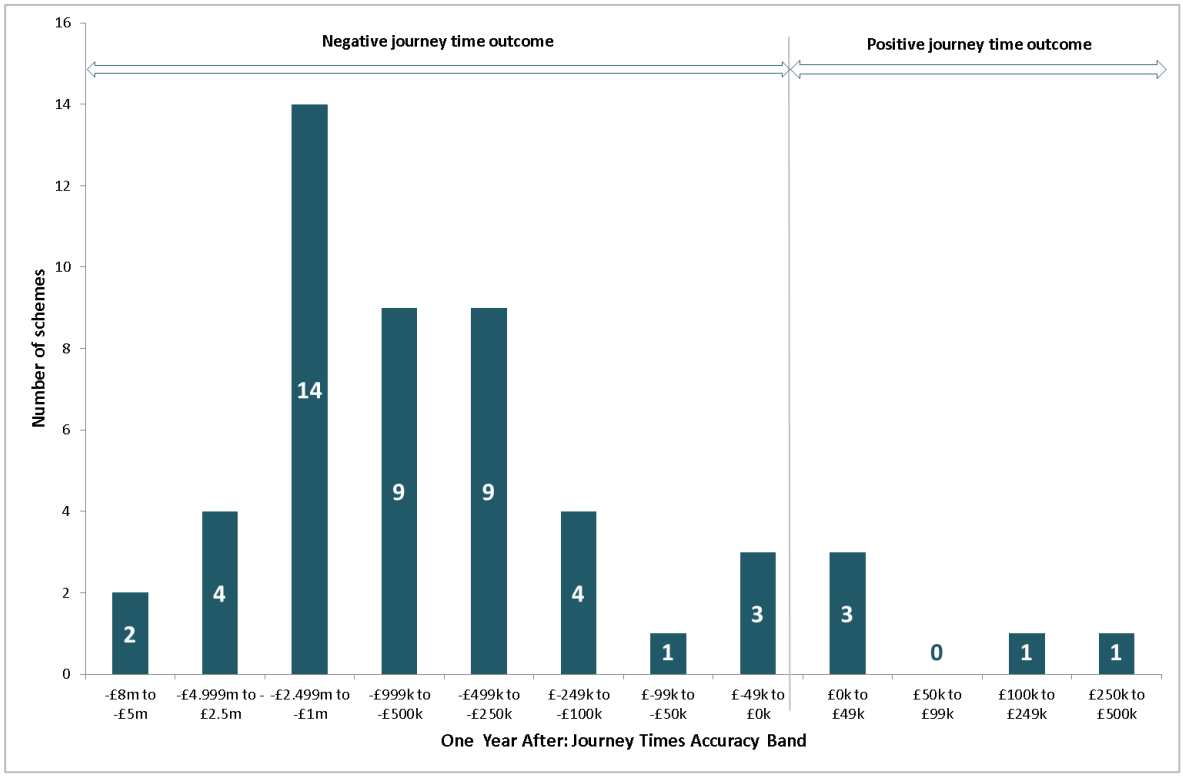


Figure 3-4 Distribution of scheme first year journey time accuracy (Base: 51 schemes)



3.5. What are the key lessons learnt from evaluation relating to congestion benefits?

Combining the reliability findings with the average journey time evidence presented in this section provides a consistent narrative. Schemes have been effective at reducing journey times in peak periods, and improving reliability in peak periods. They have also been effective at targeting the worst performing movements prior to the scheme (see PTI findings). However, the evidence indicated that improving the peaks has for some schemes created delays during the off peaks, and that improving the worst performing movements has reduced times for previously better performing movements.

In summary, the core findings from this section are that:

- The importance of scheme appraisal assessing all of the benefits and dis-benefits across all of the journey time periods not just the peak periods
- Scheme design needs to better consider how to manage and mitigate dis-benefits
- Consideration should be given to the impacts of signalisation as part of future scheme designs. One option could be to implement part-time signals to allow the best running in both congested and uncongested periods, subject to the signals having no adverse impact on safety and pedestrians.
- Appraisal needs to find a way to account for both the winners and losers of small schemes delivered under tight timeframes. Very few interventions are universally

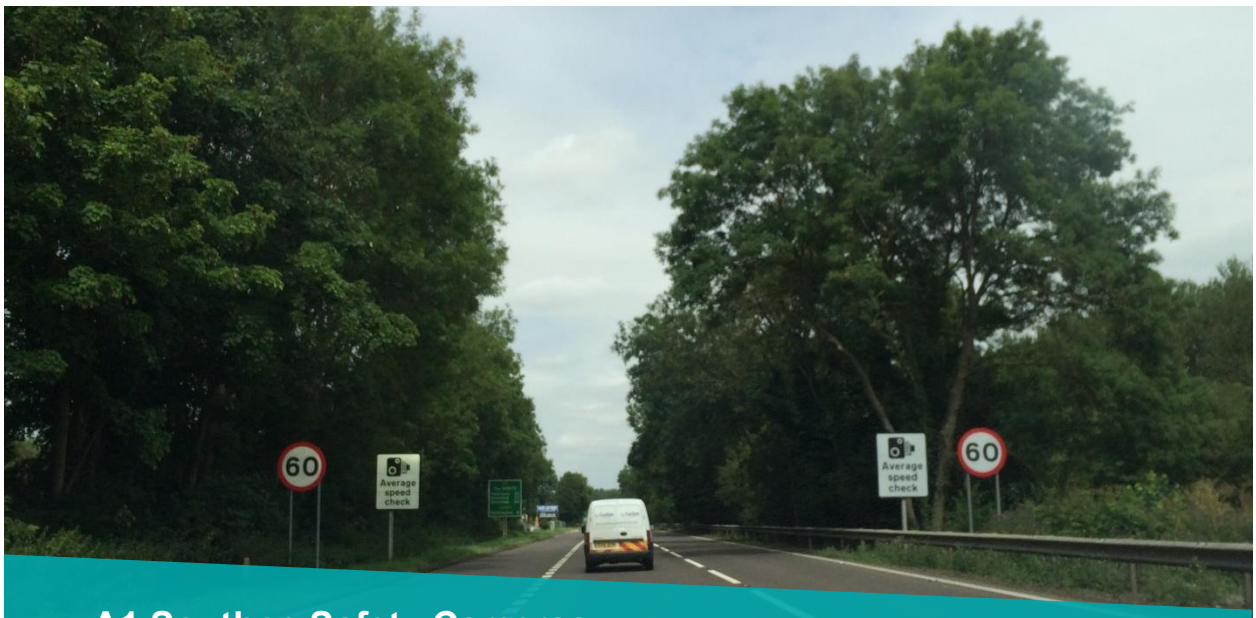
positive, and it has been clearly demonstrated that the programme results are a balance of positives and negatives and so this needs to be reflected in appraisal.
- Looking ahead, it may be useful for Highways England to provide guidance or lead a conversation on how success should be measured for small investment schemes in terms of journey time impact. For small schemes the outcomes are likely to be a rebalancing of delay, and so consideration is required on what desirable outcome is. If peak period benefits are deemed a priority then consideration could be made into the use of different values of time for different periods of the day.

3.6. What are the key lessons learnt from evaluation relating to congestion appraisal?

Combining the reliability findings with the average journey time evidence presented in this section provides a consistent narrative. Schemes have been effective at reducing journey times in peak periods, and improving reliability in peak periods. They have also been effective at targeting the worst performing movements prior to the scheme (see PTI findings). However, the evidence indicated that improving the peaks has for some schemes created delays during the off peaks, and that improving the worst performing movements has reduced times for previously better performing movements.

In summary, the core findings from this section are that:

- The appraisal needs to consider the impact across all 168 hours of the week, not just the 10-30 peak hours in a week. Design needs to better consider how to mitigate the downsides while maintaining the upsides.
- Appraisal needs to find a way to account for both the winners and losers of small schemes delivered under tight timeframes. Very few interventions are universally positive, and it has been clearly demonstrated that the programme results are a balance of positives and negatives and so this needs to be reflected in appraisal.
- Looking ahead, it may be useful for Highways England to provide guidance or lead a conversation on how success should be measured for small investment schemes in terms of journey time impact. For small schemes the outcomes are likely to be a rebalancing of delay, and so consideration is required on what desirable outcome is. If peak period benefits are deemed a priority then consideration could be made into the use of different values of time for different periods of the day.



A1 Southoe Safety Cameras
CASE STUDY C

£10.2m scheme life safety benefits, number of KSIs reduced by 2 per year

The scheme: The A1 Southoe Safety Cameras scheme involved the implementation of a 60mph speed limit and the installation of average speed cameras between Southoe and Buckden in Cambridgeshire. The scheme appraisal considered the collision impacts, journey time dis-benefits and economic growth impacts associated with the scheme.

The scheme: The A1 Southoe Safety Cameras scheme involved the implementation of a 60mph speed limit and the installation of average speed cameras between Southoe and Buckden in Cambridgeshire.

Success for safety: This scheme successfully reduced average speeds, saved a substantial number of collisions and reduced the accident severity (number of KSIs). Speed limit reduction schemes have repeatedly been shown to be the most effective for safety benefits (see results from Local Network Management Scheme evaluations). This scheme resulted in a first year reduction of seven collisions per annum and early findings indicated a reduction in accident severity (no fatal or serious collisions were observed in the first year after opening). The evaluation found evidence of that the speed limit compliance had improved, with a greater proportion of vehicles adhering to the new 60mph speed limit than the previous 70mph limit.

Journey time dis-benefits: inevitably reducing speeds increases journey times and thus creates a balancing act between safety benefits and journey time dis-benefits. The appraisal substantially underestimated the adverse impact of the speed limit change and in fact this scheme was an outlier for journey times.

4. Improving Safety

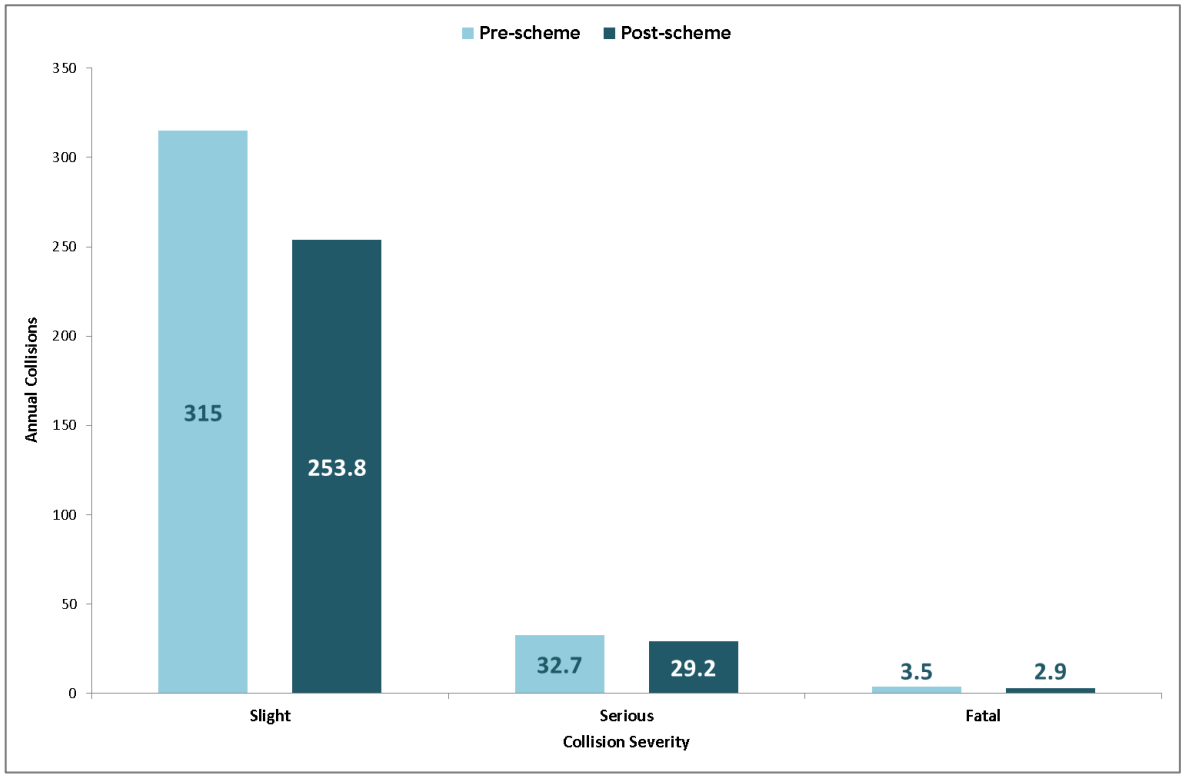
A core objective of the Pinch Point Programme was to improve safety for users of the network and 70% of schemes within the evaluation sample had specific safety objectives. This section looks at whether this aim has been achieved at the OYA opening stage. It should be noted that safety impacts need to be tracked for periods of more than a year, therefore this evidence only provides an indication of the direction of travel (see Appendix D: Methodology).

4.1. What impact did the evaluated sample of Pinch Point schemes have on collisions in the opening year?

All 54 of the evaluated Pinch Point schemes were assessed to determine the outturn results relating to collisions.

Across all 54 schemes evaluated, schemes saved on average 1.2 collisions in the opening year. To provide context, previous analyses of small scheme programmes have found an average opening year benefit of 1.8 collisions per annum. The severity of collisions has shown signs of decreasing across the sample of 54 schemes (see Figure 4-1). The annual rate of fatal collisions, whilst relatively low to begin with, indicated a 17% reduction (from 3.5 to 2.9). There has also been approximately an 11% decrease in the annual rate of serious collisions and nearly 20% reduction in slight collisions. However, these findings should be treated with caution as a longer time series is needed to offer a more robust comparison between the pre and post scheme trends and the analysis has not accounted for any changes in background trends which may have also impacted on the observed reduction in collisions numbers and severity.

Figure 4-1 Aggregated annual scheme collision rate by severity



Source: DfT STATS19 accident reporting. Average annual pre-scheme collision rates compared with one year post-scheme rates aggregated across 54 Pinch Point Schemes in evaluation sample.

These findings directly align to one of Highways England's strategic outcomes and Key Performance Indicators (as outlined in the Business Plan) to reduce the number of Killed or Seriously Injured (KSI) on the strategic road network (see Case Study C).

4.2. What were the first year monetised impacts?

The aggregated and average safety effects observed across the evaluation sample have been monetised in Table 4-1. It shows the outturn collision savings, both observed at OYA scheme opening and, based on this data, re-projected across the scheme life. The findings are presented based on a full sample; a sub-sample of schemes which had stated safety objectives; and, a sub-sample of schemes with four outlier[14] schemes removed.

Table 4-1 Outturn safety impacts

	Number of schemes	First Year collision saving		Estimated scheme life collision saving	
		Total	Per scheme	Total	Per scheme
Full Sample	54	£5.3m	£99k	£173.2m	£3.2m
Full Sample *(excluding 4 indentified safety outliers)*	50	£6.1m	£122k	£221.7m	£4.4m
Schemes with a Safety objective	38	£3.6m	£94k	£108.9m	£2.9m
Schemes with a Safety objective *(excluding 4 identified safety outliers)*	34	£4.3m	£128k	£157.4m	£4.6m

Across all scenarios the safety analysis indicates that the schemes have in general had a positive impact on safety. When focusing on the 38 schemes with a specific safety objective, the total first year collision saving is lower compared to all 54 schemes in the sample (-33%). This suggests that some schemes which did not have safety as a key objective may have also experienced large collision savings even though improving safety was not a core objective of the scheme. Likewise, there may have been some schemes with a specific safety objective, which did not perform as well as expected.

All of the schemes were reviewed and two major and two minor outlier schemes identified (see Table 4-2). All of these schemes had specific safety objectives. Removal of outliers resulted in the total first year monetary saving increasing to £6.1m (compared to £5.3m with the outliers included). This translated to a higher average first year saving per scheme at £122k which is only slightly higher for schemes with safety objectives (£128k scheme average). The data indicates that the outliers skewed the results making them less favourable.

[14] As with the Congestion analysis, a number of schemes produced extreme results which potentially could have influenced the overall results of the entire sample. It was therefore deemed useful to assess the impact of these schemes.

Table 4-2 Schemes identified as safety outliers

Scheme	Outlier	Cause
A120 Galleys Corner	Major	**Adverse.** A capacity improvement scheme, comprising of widening approach arms and the circulatory carriageway, along with the introduction of new lane markings and signing. However, there was a large increase in the collision rate, and analysis found that road markings and signs were giving potentially conflicting advice on lane usage and location of a roundabout exit. These issues have since been addressed by Highways England. Further monitoring is required to understand the safety change since these additional measures have been implemented.
A34/M40 Junction 9 Wendlebury	Major	**Adverse.** This scheme involved a number of capacity improvements, including widening of approaches, signalisation and improvements to road markings, signing and lighting. However, there was a substantial increase in collisions since opening which was considered to be due to the layout on the A34 approach. The scheme has since been modified by Highways England and require further monitoring.
A12 Hughes Corner	Minor	**Beneficial.** The scheme introduced average speed cameras to control speeding and consequently reduce collisions. Evidence indicates the scheme has had a large beneficial impact on safety, with the collision rate falling from 13.2 per annum pre-scheme to 2.8 per annum post-scheme - based on the first year data. A longer time series is needed to determine whether this effect has been sustained.
A50/A500 Sideway	Minor	**Beneficial.** Revisions were made to the circulatory roundabout markings and signalisation of a free flow link lane. Prior to the scheme implementation, the majority of vehicles accessed the A50 east bound carriageway via the free flow link regardless of which lane they required for their onward journey. This was instigating accidents caused by vehicles changing lanes and merging with traffic from the circulatory. Post-scheme implementation the scheme measures have reduced the requirement for vehicles to merge/ diverge. The collision saving exceeded the predicted saving made in the PAR (saving of 9 collisions compared to the prediction of 6.5) resulting in the scheme performing better than expected. As above, a longer time series is needed to determine whether this effect has been sustained.

4.3. How accurate were collision saving forecasts?

While reductions in collision rates, collision severity and positive monetary impacts were observed across the sample of 54 evaluated schemes, it is also important to understand how these outturn results compared to the predicted safety impact.

Figure 4-2 presents the predicted and outturn opening year safety impact. Whist the evaluation observed a positive outturn figure; it was 46% lower than the predicted impact of £182k. For context, previous small scheme programme evaluations have shown outturn results which tended to on average to be slightly better than those forecast. However, with the outliers removed, the results for safety prediction accuracy was much improved. The outturn figures were still lower than predicted but now represented 76% of the forecast figures.

When analysis focussed on the 38 schemes with a specific safety objective, forecast accuracy was found to be worse with benefits predicted to be £222k whilst the observed impact was found to be £94k (58%). However, when looking at the schemes without the four identified safety outliers, benefits were predicted to be £195.4m and the observed impact was £127.8m (35%).

Potentially this result could have been due either to over-estimation of schemes' success in appraisal or to under-performance of schemes. In reality the analysis found that the effect was largely caused by the two major outlier schemes where dramatic increases in collisions in the opening year were observed (see Table 5-3).

Figure 4-2 Predicted and outturn opening year safety impact (scheme average)

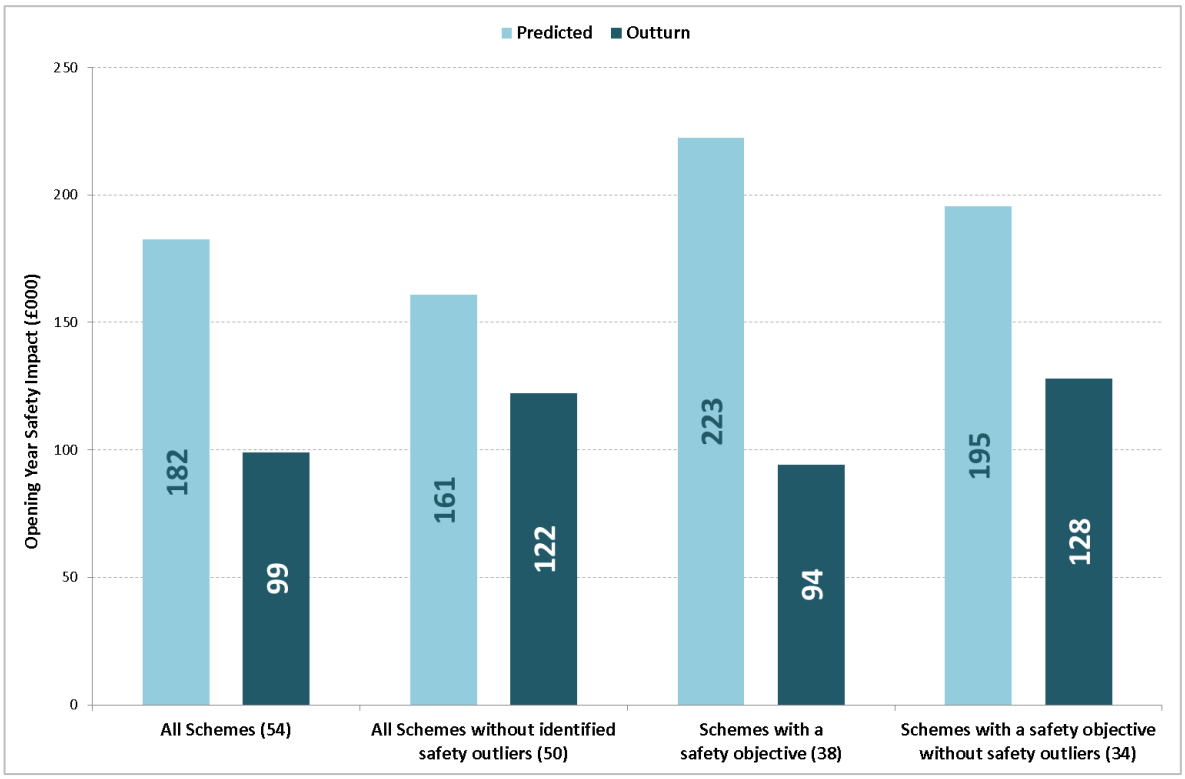


Figure 4-3 illustrates the spread of predicted and outturn opening year safety impact across discrete monetary bands. From this it can be seen that whilst most schemes were predicted to produce opening year safety benefits of up to £250k (43 schemes), in reality less than half (20 schemes) produced benefits of this scale.

Also, it was found that 20 schemes produced opening year safety dis-benefits, with the two major safety outlier schemes producing opening year safety dis-benefits greater than £1m.

That said, while just 11 schemes were predicted to produce opening year safety benefits greater than £250k, the analysis found that 14 schemes produced opening year safety benefits greater that £250k.

Figure 4-3 Predicted and outturn opening year safety impact frequency plot

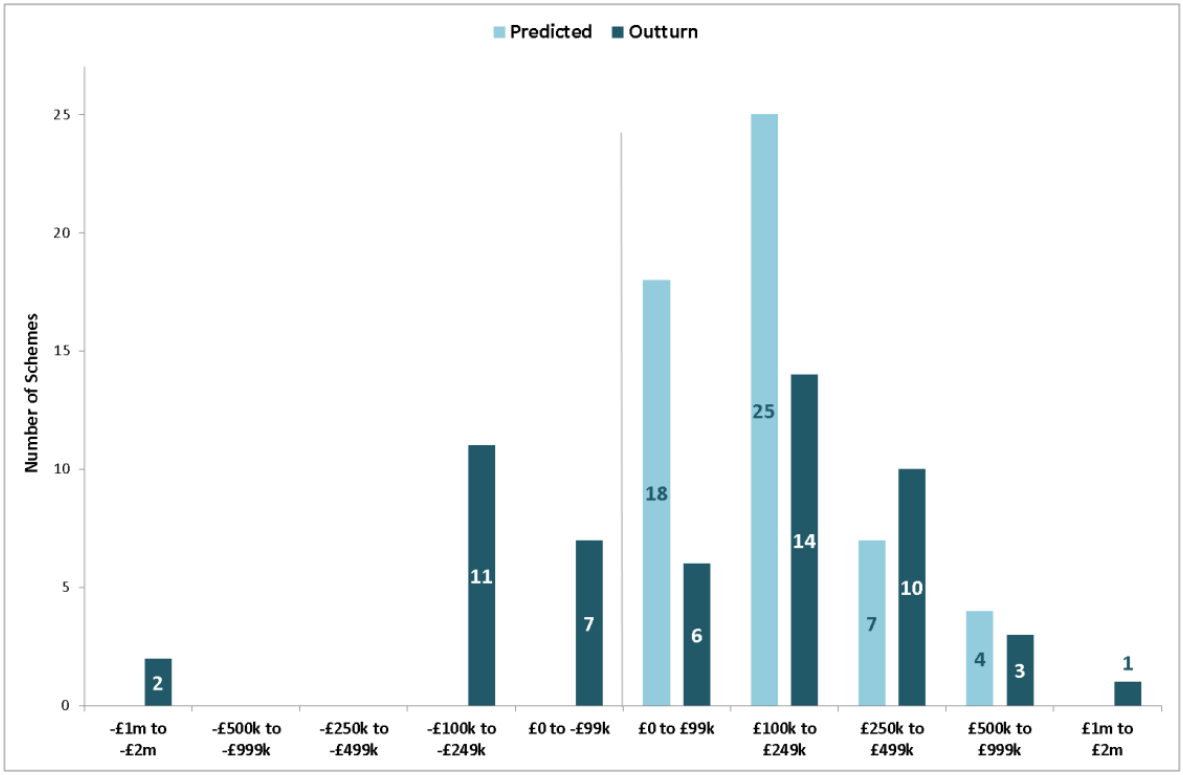
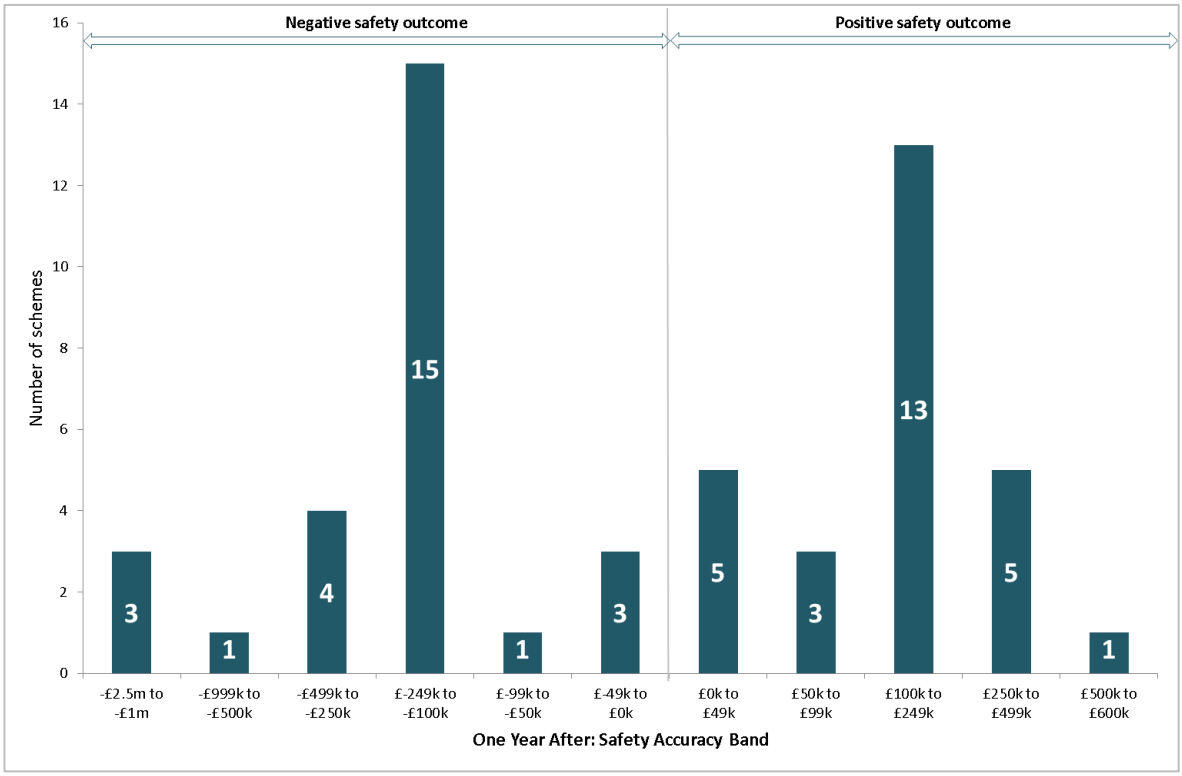


Figure 4-4. This chart (overleaf) demonstrates that roughly an equal proportion of schemes are under/over performing when compared to forecast. Therefore, there is no evidence of a systematic bias to over or under appraise. With the inherent randomness of collisions being hard to forecast over a one year evaluation window, these results were in line with what would be expected over a programme of schemes.

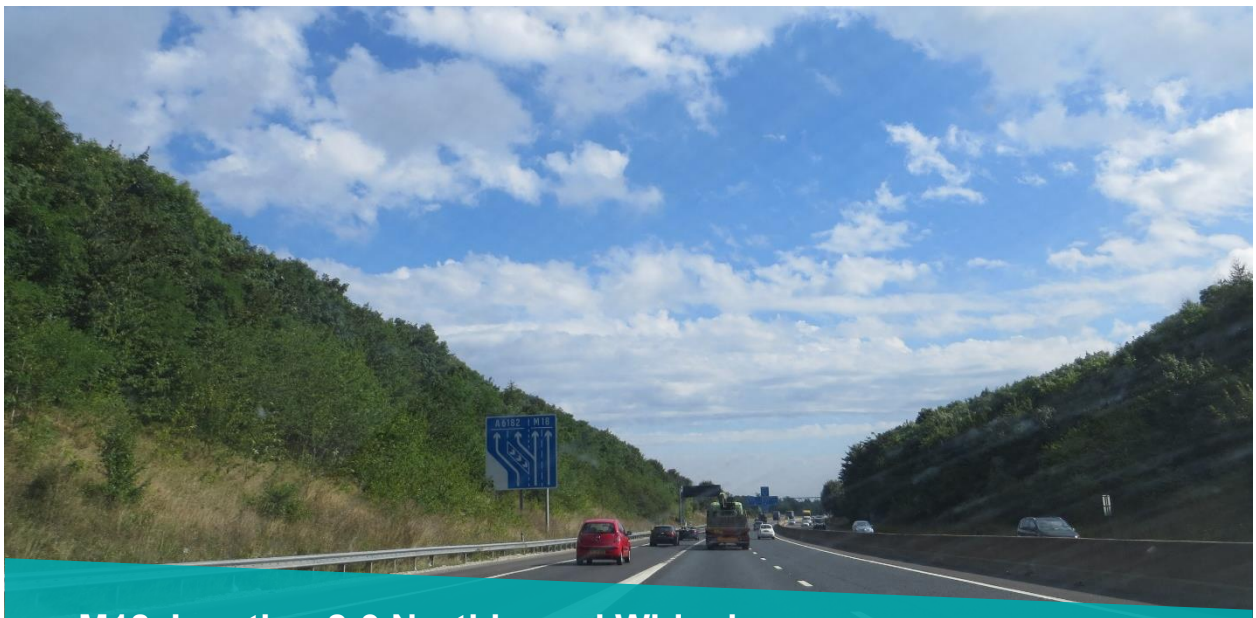
Figure 4-4 Difference between predicted and outturn opening year safety impacts



4.4. What are the key lessons for safety appraisal?

The sample's safety benefits were found to be much less than predicted at OYA, Further analysis found that two major outlier schemes had a large impact on this finding. Remedial measures have since been implemented to improve safety on these schemes. It is recommended that further analysis be conducted on the two schemes that had unintended safety outcomes to check that the remedial measures carried out have rectified the problems.

A trend of over-prediction of safety benefits has been previously been observed in other programme-level evaluations and the meta-analysis here confirms this trend. The results suggest that a conservative approach be adopted in future to improve accuracy for safety. However, evaluations at FYA will provide a more robust view on whether safety outcomes have been met as the random nature of collisions will have less of an impact over the longer timeframe.



M18 Junction 2-3 Northbound Widening
CASE STUDY D

The scheme: Widened this section of motorway from two to three lanes, with a lane gain and lane drop arrangement at junctions two and three respectively. The scheme was required to support a new link road (named the A6182 Great Yorkshire Way) from south Doncaster through to Doncaster Sheffield Airport. This was expected to generate substantial development, and therefore increased traffic demand, in the area.

Supporting Economic Growth: This was a forward-thinking scheme that aimed to support economic growth around Sheffield and Doncaster and provide a direct route to the airport that was previously hard to access. At the time of the evaluation, the new link road had strong economic growth potential by creating access to the largest inland port in the country, substantial development and job creation. If this potential is realised the route will generate additional traffic along the M18, and thus this Pinch Point Scheme has provided resilience to this future traffic growth.

The evaluation team found no pre-existing safety or journey time issues along this route, and so the first year after evaluation does not show any specific benefits from adding capacity to the northbound carriageway as it was too early to measure increased traffic volumes generated from the developments. The purpose of the scheme was to future proof the section of carriageway in preparation for the opening of the A6182 Great Yorkshire way, which the scheme has successfully delivered. The A6182 Great Yorkshire Way was completed in June 2018.

At the OYA stage the evaluators have concluded that the scheme has the potential to support economic growth but this will take time to before the benefits can be measured. This case study demonstrated the importance of having clear scheme objectives to ensure success can be accurately measured.

5. Economic Growth Impacts

The Pinch Point Programme had a specific objective to support economic growth and schemes were assessed against four key economic growth indicators during the funding application process.

These were:

A bespoke methodology and policy appraisal pro forma was developed to support the assessment across the Programme and all schemes (except technology schemes) were appraised using this, as well as, the standard WebTAG appraisal approach for Congestion and Safety benefits.

Whilst it is too early to assess economic growth impacts of the schemes, the evaluation has identified some lessons for the future appraisal of these types of impacts. The methodology to assess economic growth impacts was designed to be quite broad, given the wide ranging nature of the ways in which the schemes could support economic growth. It gave scheme promoters the opportunity to provide evidence in support of their schemes. However, the evaluation has identified substantial variation in the interpretation of the guidance and the following lessons have been learnt to enhance the way these impacts are assessed in future.

The four main learning points were:

- Selection of growth sites;
- Defining the scheme's impact on growth;
- Defining the scheme's purpose; and,
- Balancing flexibility with consistency

5.1. Selection of growth sites

For schemes seeking to support economic growth via **housing or job creation**, the methodology specified that:

> *"Scheme promoters should consider developments within an initial* **threshold of 5km from the scheme. Note that this does not preclude developments beyond 5km. Scheme promoters should include developments beyond this threshold if evidence of the impact on the** *scheme of the development can be demonstrated".*

This was interpreted in a number of different ways across the sample. Some schemes adopted a proportional approach, i.e. identifying those medium or large-scale developments of new houses and employment sites which would have had a tangible impact on the local economy, or where the scheme had a key role for access or egress, regardless of distance from the scheme. However, other schemes interpreted the guidance as listing any sites within the 5km radius of the scheme, irrespective of whether the scheme had any real effect in accessing the development (see Case Study A, page 16). Therefore, in some cases there was a conflation between the proximity of the scheme to development sites and the relevance the scheme had for these sites.

As with housing and job creation, one of the main assessment issues with schemes supporting gateways and local economic growth was the identification of the growth areas. For schemes supporting gateways, the assessment methodology specified these are ports or airports and that local economic growth zones must be either local enterprise zones or designated growth areas[15]. However, it did not specify how they should be selected in relation to the scheme. In fact, the methodology only gave guidance on how to assess the **economic significance** of the gateway/local economic growth area and the **magnitude of impact**. It therefore left the selection of appropriate growth areas to the discretion of the scheme promoter.

The evaluation found that because of this lack of specificity there was large variability in the logic underpinning choices across the sample. For example, some schemes in the sample included enterprise zones that fed directly onto scheme junctions (see Case Study B), whereas the links promoted by other schemes were less tangible, for example, it was found that one scheme claimed to benefit an airport which was over 140km away. The breadth of the growth area definition encompassed area-wide initiatives, however given, the Pinch Point schemes were relatively small-scale interventions (the majority far under £10m spend) and so it was unrealistic to presume that such schemes were to have impacts over broad areas (see Case Study G). A key lesson is to focus future schemes on targeted economic growth improvements where there is a clear rationale behind how they will have an impact.

A consultation exercise was undertaken during evaluation to understand how local planning teams factored in the Pinch Point schemes into their planning decisions. It found that most believed the schemes had little or no impact on their planning decision, while a number reported that they were not even aware of the Programme and this indicated that some scheme promoters had not been actively communicating with local planning teams to optimise economic growth benefits.

5.2. Defining the scheme's impact

The evaluation reviewed the assessment criteria for appraising scheme impact on economic growth and identified key gaps in the detail and coverage of the methodology and the ability to attribute the impacts back to the schemes.

Firstly, for schemes impacting on local housing developments and job creation, the methodologies required the scheme promoters to consider the **location and scale of**

[15] Economic growth areas extended to anywhere with **local designation** which included strategic sites in a **Local Development Framework (LDF); Area Action Plan (AAP) (adopted or proposed);** or, **Masterplan.**

developments that would be affected by the scheme, and their status in the planning process. However, there was no requirement to assess the scale of impact that a scheme was specifically expected to have (which may have been the cause for some of the inconsistency with the selection of growth sites discussed above). For example, there would have been a more tangible link in cases when a development generated traffic which loaded directly onto a scheme junction thereby the expectation would have been that the development had a large dependence on the performance of the junction, whereas a development many kilometres away would have been less affected.

Secondly, recognising that it would have been challenging to **isolate impacts**, there were cases of capturing benefits which were more likely to have been created by the existing road network, rather than the improvement generated by the scheme specifically. For example, there were a number of schemes on motorway junctions that claimed that they would have an impact on economic drivers at substantial sites downstream on the mainline carriageway. There was a general misunderstanding that while the mainline may carry substantial traffic to the economic driver and so the road as a whole is relevant, the junction improvement scheme will only benefit those joining or leaving the carriageway who are accessing the economic driver; only a fraction of those on the mainline.

Thirdly, for **gateways and local economic growth**, the scheme promoters generated a **performance impact assessment** as a proxy for 'magnitude of impact'. To achieve this, a pre-scheme assessment was made on the performance of the sections of the road network where schemes were being proposed (based on metrics such as volume over capacity or average speeds). Schemes were then weighted based on this assessment of performance. The methodology was deemed effective at measuring whether a scheme was being placed on a poorly performing section of road, but did not provide an assessment of the impact the scheme would have on supporting economic growth.

5.3. Defining the scheme's purpose and success criteria

The application of the appraisal pro-forma for stimulating economic growth had an impact on the way in which projects were defined. The original definition for the programme – to promote congestion relief, improve safety **or** stimulate growth in the economy – became conflated and schemes were ultimately assessed based on their impacts across all three areas. This has resulted in a lack of clarity about the core objectives of schemes and an unclear definition of success for the programme. The evaluation has identified examples of optimism bias in the scheme appraisal and the outturn evaluation findings have not delivered the scale of benefits previously anticipated.

Key lessons from this evaluation has been the importance of transparency around scheme benefits, and importantly, dis-benefits; the setting of clear programme and project objectives and the ability to define success criteria for projects delivering against multiple objectives.

5.4. Balancing flexibility with consistency

Many of the appraisal issues described in this section have focused on areas where the appraisal guidance was not prescriptive, and thus allowed a level of interpretation, or flexibility, to be adopted within the case for a scheme.

Having observed substantial variation in the quality of policy proformas, the evaluation team have recommended that any guidance of a similar nature in future would need to be tightened, or subject to significant moderation to ensure all schemes are in line with the spirit of the appraisal approach.

5.5. What impact was observed on Gateways and Local Economic Growth Areas?

Across the evaluation sample the schemes were appraised to impact on **30 Gateways** and **60 Local Economic Growth (LEG) Areas**. Within these 90 distinct growth locations, some were named by more than one scheme (for example Birmingham International Airport was the most commonly named and was included in seven appraisals). Appendix B lists the gateways and local economic growth areas by name, and shows the number of occurrences of each in the appraisal. Whilst it was too early to fully assess the impacts on these areas, it was possible to undertake preliminary analysis for established Gateways and LEG Areas. The evaluation centred on establishing the relevance of each scheme to the named LEG areas and Gateways (grouped into **None**, **Low**, **Medium** and **High** relevance which reflected the relationship between scheme and growth area/gateway based on the number of vehicles estimated to be travelling between the two locations per day) and an indication of effect on the journey time and reliability of the key movements to and from the LEG Area/Gateway.

5.6. To what extent have schemes supported Gateways?

- The evaluation evidence collected at the OYA period supported the theory that small-scale schemes designed to tackle pinch points in the network can aid the flow of traffic around critical gateways, if they are located close to the gateway.
- However, the evaluation has also shown that when assessing the potential impacts on Gateways, the ability to claim a causal effect of the scheme on the Gateway reduced the greater the distance the scheme was to the impact area. Therefore, the effect area has proven to be not as wide as anticipated during the initial programme design. The evaluation found that 11 schemes had no relevant effect on the specified Gateway.
- Two in five of the Gateways, which were originally identified during the appraisal, were related to schemes which had a limited measurable effect area near the Gateway. Being able to isolate and attribute the effect of a small scheme investment to changes in journeys to a busy Gateway, supported by a number of other routes, was always going to be challenging, as this evaluation has demonstrated. It seems that highly targeted investment to support Gateways will deliver the most likely benefit.

Of the one in five Gateways which were impacted by highly relevant schemes, half of these received a beneficial impact. For a quarter the impact was neutral, and a similar proportion experienced adverse impacts. It is important to note that this is based on a

small sample of schemes and therefore it is not considered reliable to generalise from these figures across the whole programme.

5.7. To what extent have schemes supported Local Economic Growth Areas?

- Across the sample, schemes were twice as likely to support LEG Areas than Gateways and tended to score higher in terms of relevance – only three schemes were considered not relevant to the specified LEG Areas.
- Two in five LEG Areas were impacted by highly relevant schemes and this implies that there was better targeting of these areas than for Gateways.
- Focusing specifically on the 71% of cases where a medium – high relevance was observed, around half of these Areas (49%) experienced positive journey time benefits. These sites are mostly clustered in the East Midlands and Yorkshire areas.
- In contrast, just over a third of highly relevant LEG Areas were at risk of experiencing adverse impacts on journey times. This was a particular concern for Areas in the West Midlands

Figure 5-1 shows the geographical distribution of Gateways while

Figure 5-2 shows the geographical distribution of LEG Areas. In each figure the colour of the marker indicates relevance. It is important to note that several Gateways and LEG areas were used in more than one scheme (for example, Birmingham Airport was identified as an impacted Gateway for seven of the schemes evaluated). As such the maximum relevance (i.e. the maximum positive scores) achieved for each of the Gateways and LEG areas was used for this analysis. Note that Figure 5-1 does not show any sites as scoring none. This means that at least one scheme evaluation showed there to be some relevance for each site, despite other evaluations potentially having deemed there to be none. Both figures show that the growth areas considered relevant to the evaluated schemes span the length and breadth of the country.

Figure 5-1 Gateways scored in terms of relevance

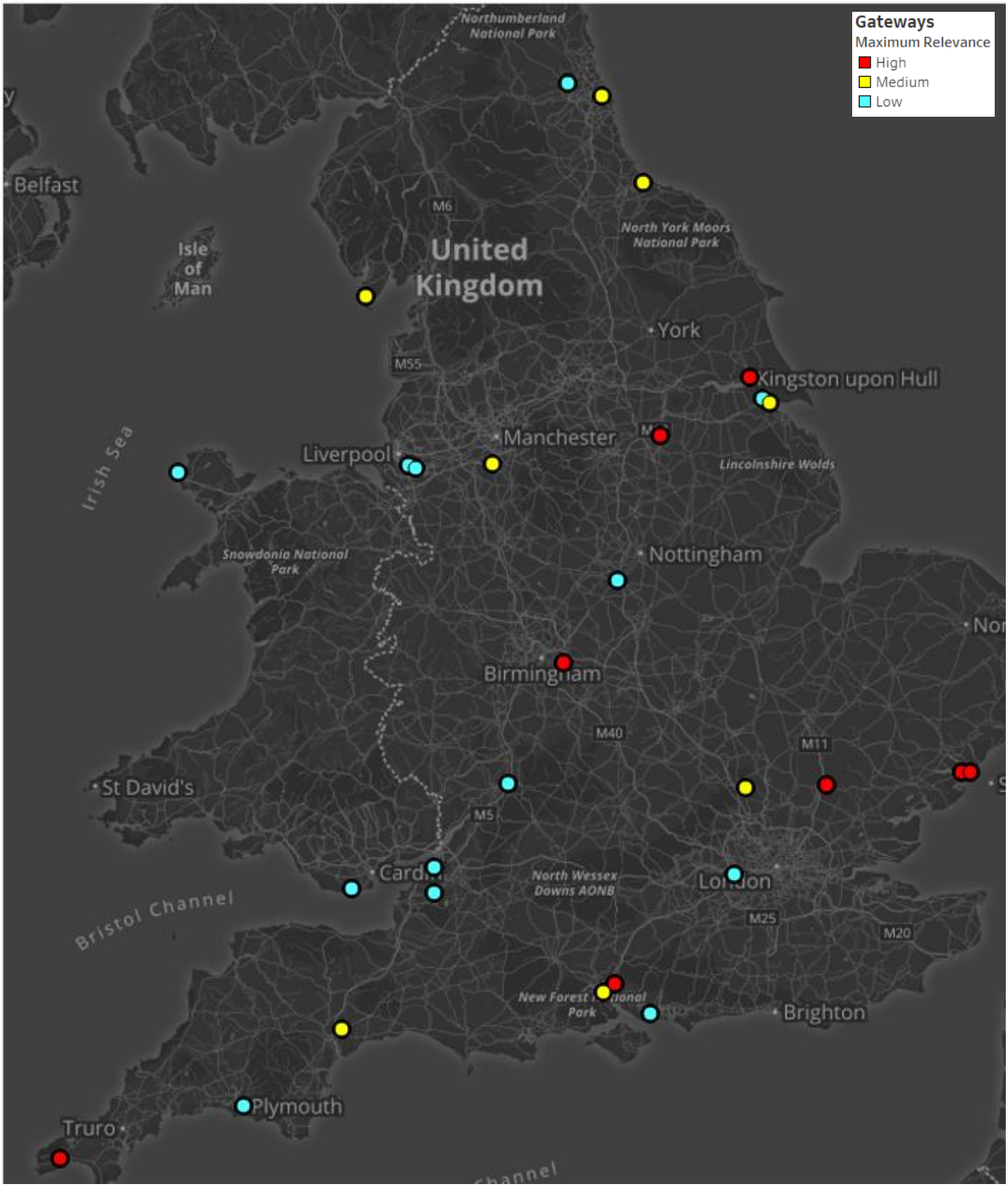
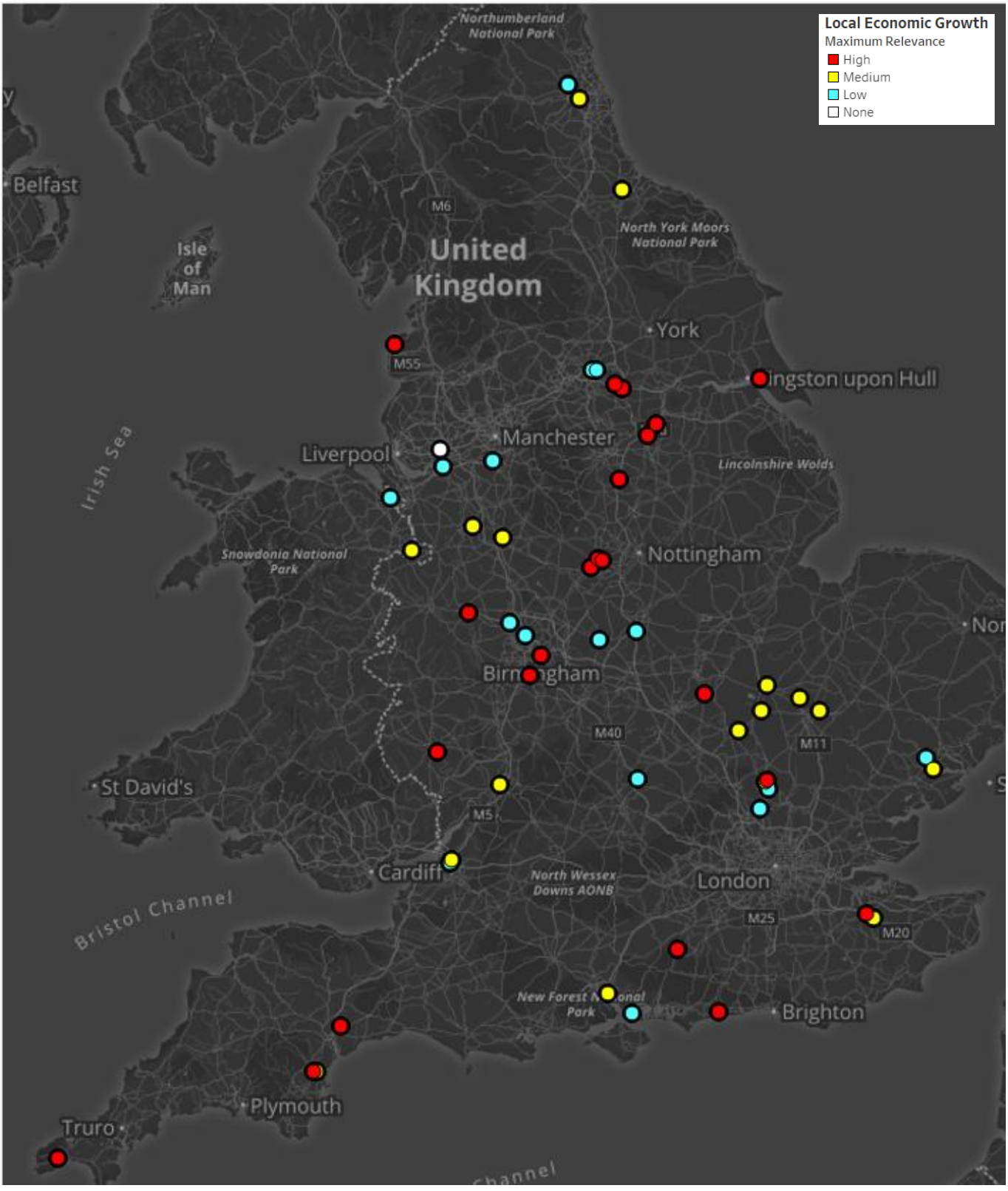


Figure 5-2 LEG areas scored in terms of relevance



A38 Drumbridges Roundabout
CASE STUDY E
Assessing Social Impacts – Severance and Physical Activity

The scheme: The scheme sought to generate capacity improvements, signals and a new pedestrian footbridge over the A38 near Newton Abbot.

Potential benefits to Non-Motorised Users: The A38 Drumbridges Roundabout scheme involved a pedestrian, cyclist and equestrian bridge to connect Newton Abbot to the residential and industrial estates the other side of the A38, to overcome access and severance issues.

The evaluation team were able to find longer term monitoring data from Devon County Council which was able to demonstrate that 10 cyclists per day typically used the junction. The new bridge crossed the A38 mainline, but still required walkers, cyclists and horse riders to cross the slip roads with a controlled crossing on the off-slip and an uncontrolled drop kerb on the on-slip. Once over the bridge to the north, the trip to the residential and industrial estates is convoluted, despite being nearby in proximity.

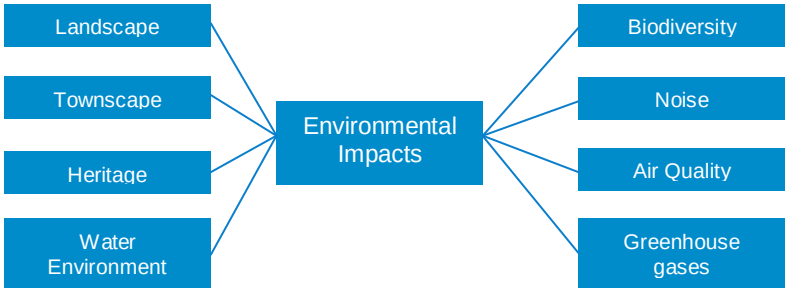
There are a number of key learnings from this scheme. The new facility is good, but demonstrates key design issues and considerations for future appraisals:

- The facility is to a high standard, but is only as strong as its weakest point; an uncontrolled crossing on the busy A38 on-slip
- The facility does effectively repair severance, yet the onward journey to the residential and industrial estates is needlessly complicated and may be a deterrent to use
- Data existed for the appraisal of this scheme from the local authority. Scheme promoters should be encouraged to evidence the need for such schemes, especially for such high cost elements as bridges

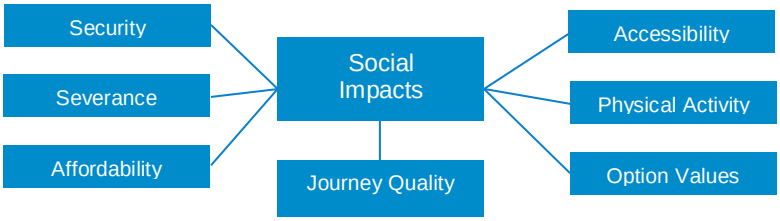
6. Environmental and Social Impacts

In addition to the core aims of the Pinch Points Programme of stimulating economic growth, relieving congestion and improving safety; schemes had to demonstrate consideration across all potential impacts, as set out in DfT's WebTAG appraisal guidance. This included assessing potential environmental and social impacts[16] which contributed to an overall Value for Money assessment. For small-scale investments, such as schemes within the Pinch Point Programme, this assessment was proportionate to the size and complexity of the scheme.

Environmental impacts included:



Social impacts included:



The evaluation approach included a review of potential scheme impacts, site visits to the schemes and stakeholder consultation. The focus of at the first year post opening period, was on the outputs delivered by the schemes and whether they had the potential to realise the intended benefits/mitigate dis-benefits, rather than directly measuring the impacts.

This chapter reviews the evidence about how these types of impacts were appraised and lessons learnt for future programme appraisals, before providing a more detailed assessment of how schemes were performing in relation to these objectives.

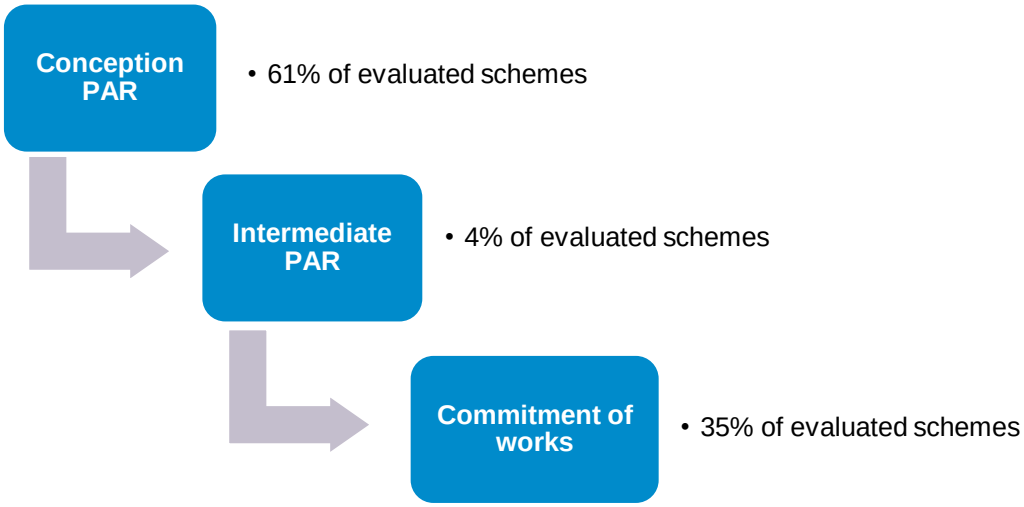
[16] Accidents are also considered as social impacts within WebTAG – the impacts on accidents have been discussed in Chapter 4 of this report

6.1. Appraising Environmental and Social impacts

Project Appraisal Reports (PARs) had worksheets to allow assessments of each of the WebTAG objectives. At the conception stage of scheme development a Foundation PAR was required which covered potential reliability, journey times and accident impacts. For schemes, which were projected to cost more than £100k, a standard PAR was required to be completed – which covered a broader range of impacts before schemes proceeded to Commitment of Works Expenditure stage.

However for the majority of schemes, the evaluators were provided with only conception PARs, despite only one of these schemes being categorised as under £100k.

Figure 6-1 Schemes by PAR status



This has meant that not all the objectives were subjected to a thorough assessment. The evaluation undertook its own assessment of the potential scheme impacts and identified the following to be typically under-appraised:

- Journey Quality
- Noise
- Air Quality
- Landscape
- Biodiversity

A key recommendation has been to enhance the assurance process for small scheme appraisal to review and challenge the assumptions behind assessing key impacts as **not applicable** for future schemes. This is to ensure that all potential scheme benefits and dis-benefits are assessed and effectively managed.

Journey Quality Impacts: 46 schemes had appraised this as '*not applicable'* whereas the evaluation identified that this impact was applicable to most of the schemes (49) and in most (42) cases generated a benefit.

6.2. Environmental Impacts of Pinch Point Schemes

6.2.1. Landscape

The Pinch Point schemes were generally small-scale improvements to the road network and not wholescale changes to the landscape. As such, the evaluation of landscape impacts focussed on whether the new measures introduced as part of a scheme represented a marked change to the types of measures in place before (see Case Study G). Fundamentally the question was often **did they affect the character of the area or have visual impacts for nearby receptors?**

Landscape impacts were assessed in 42 of the outturn evaluations, and in general it was found that schemes in the sample had had **neutral** impacts (64%). However there were 15 instances of schemes having **adverse** impacts.

6.2.2. Biodiversity

After Journey Quality, Biodiversity was the most under-assessed of the objectives during appraisal. The PARs included 19 Biodiversity assessments (i.e. assessed rather than marked as **not applicable**) whereas during evaluation it was considered that there was reason to consider the impact on ecology for 46 schemes within the sample. Half of these schemes were deemed to have adverse impacts. This was the objective which had the most adverse impacts identified during the evaluation. Case Study F provides an example of best practice which was followed and how this ensured the appropriate mitigation measures were implemented.

6.2.3. Other environmental impacts

Whilst under-represented within the appraisal, the evaluation found that schemes with Noise and Air Quality impacts had generally neutral effects (around 90% for both objectives).

Impacts on Greenhouse Gases, Townscape, Heritage and Water Environment were less likely to have been identified during the evaluation as the other environmental objectives. Generally, there was greater alignment with the appraisal for these objectives, with the outturn assessment being slightly more positive.

6.3. Social Impacts of Pinch Point Schemes

6.3.1. Journey Quality

Journey quality was the most frequently evaluated of the Social Impacts, mainly because it was related to Congestion and Safety, and so was affected by changes to the road environment.

The beneficial scores were due to the provision of clearer information across a high proportion of the evaluated sample. The improvements to signage and road markings were deemed to result in greater driver confidence and reduced fear of collisions. In addition, many of the schemes involved signalisation which removed conflict points and thus potentially reduced fear of accidents. Any **adverse** scores were typically due to increased delays caused by some schemes, which it has been assumed to potentially increase driver frustration.

In conclusion, the evaluation of the meta-sample found that 'journey quality' was often overlooked during appraisal, which meant that the benefits observed (see Case Study G) could not be properly captured and proactively managed. It is recommended that journey quality be considered more fully in future appraisals.

6.3.2. Security

The types of measures which were present in Pinch Point Programme that had the capacity to impact on security, were changes to lighting and CCTV. Security was only assessed four times, with three beneficial and one neutral score attributed. If lighting or CCTV is provided, coverage extended, maintained or improved, then security can be considered to have also improved for motorised and non-motorised users of the assets.

6.3.3. Severance and Physical Activity Impacts

Severance related to the highway network's ability to act as a barrier, for example severing communities from services. It tended to relate to the ability to easily navigate from one place to another, typically by non-motorised means, due to the presence of the road network. A number of schemes within the sample introduced measures which necessitated the assessment of severance impacts. Typically, this involved crossing facilities, either at grade crossings, bridges or underpasses.

Only eight schemes in the sample were appraised for severance impacts (15%). However, 11 schemes (20%) were evaluated under this objective, with nine beneficial and two neutral outcomes reported.

Physical activity related to the road network's ability to support people undertaking physical activities (e.g. cycling, walking or running) of over 30 minutes in duration. Six schemes had physical activity evaluations, with three scored as **beneficial** and three as **neutral**.

Some lessons learnt for future severance/physical activity appraisals and evaluations from the findings of the Pinch Point schemes were:

- **Value local consultation** – The evaluation demonstrated the value of consulting with local walking/cycling groups or parish councils when designing a scheme to ensure that the measures delivered have the potential to meet the requirements of the customers for the facilities. During one evaluation, consultation with a parish council made it clear that they had not been consulted on the changes introduced by a scheme and were not clear on the justification for it.

- **Benefits Optimisation** - There were a small number of schemes within the evaluated sample where new uncontrolled facilities were provided for crossings, but which, during post-scheme site visits, were considered to be unsafe by the evaluation team. The new facilities may have been of a good standard, but the context and usability of these measures should have also factored into the appraisal scores (see Case Study E). Additionally, it was found that some schemes provided upgraded and safer facilities but that these facilities required longer distances to be travelled, which may not have met the needs of the route user.

- **Ensuring facilities were connected to the existing network** - Some schemes were forecast to provide benefits to physical activity based on the provision of cycle lanes or new walking facilities. To score the impact on physical activity at evaluation it was deemed important to consider how these new facilities linked to existing facilities. If a new cycle facility was provided but only connected the scheme to an unsafe/exposed area of the network it was unlikely to be successful in promoting physical activity if a smooth transition to the rest of the network was not provided. (See Case Study E).

- **Ensure the need for facilities is properly evidenced** - None of the schemes assessed for physical activity undertook any pre-scheme monitoring or community consultation to inform assessments about the potential beneficiaries or volume of usage. This type of evidence would have provided clarity on the scale of demand from the scheme.

M40 Junction 9 Wendlebury
CASE STUDY F
Assessing Biodiversity Impacts

The scheme: The scheme involved signalisation, widening, lane designation and signing changes, the removal of a free flow lane and signing/marking changes; this package of measures was aiming to reduce collisions and improve journey times.

Biodiversity: The scheme appraisal was an example of good practice in terms of a biodiversity assessment. The biodiversity sheet of the PAR was completed in full with multiple areas of sensitivity noted and addressed, which provided confidence that effective screening had been conducted.

For areas where this screening had indicated potential risk, further studies and evidence were provided in a Record of Determination, outlining what work was intended to be undertaken on the soft estate, the assessments undertaken supporting this, and the actions that were required to ensure confidence that ecology impact would be minimal.

The above screening and supporting evidence was an example of good practice in the programme, and provided confidence during the evaluation that the right processes had been followed and provided an assessment framework for the evaluation to check.

Overall it is considered that the baseline assessments were undertaken to a suitable standard and were likely to have provided an accurate assessment of the scheme. Assuming that the proposed mitigation measures highlighted within the Record of Determination were implemented during construction it is considered that the scheme is reasonably unlikely to have had a negative impact upon protected species or habitats due to the habitats present within the site and the assessments undertaken.

7. Value for Money Assessment

7.1. Assessing the return on investment of Pinch Point Schemes

At this point in the evaluation, the OYA assessment provides an indication of the progress the schemes have made in delivering their benefits but it is too early to draw firm conclusions about the efficacy of the programme as a number of the anticipated impacts required a longer timeframe to be realised, in particular safety and wider economic impacts which were core objectives for the programme and important for assessing the overall Value for Money.

7.1.1. Cost Estimation of Pinch Point Schemes

Comparing outturn and projected costs, the evaluation has identified that scheme costs were typically higher than anticipated. The average cost of a scheme in the sample was calculated as £4.6m, growing to £4.8m over the scheme life. This represented a 29% increase on the anticipated average cost.

A key factor of this has been the need for the evaluation to baseline projected costs based predominantly on information from **Conception** PARs[17], (as noted earlier in figure 6.1. this was just over 60% of the sample). This means that the majority of the cost estimates provided for the evaluation were not based on updated – and more accurate - assumptions generated as the scheme design matured. In fact, a number of the schemes evaluated were found be different to what was described in the PAR and, so it was likely that the costs in the appraisal were not always reflective of what was built.

It would therefore be considered better practice for all schemes to have been required to provide a C**ommitment of Works Expenditure** PAR as a scheme matured and went through the change control process. Schemes which were initially anticipated to require a higher level of investment were more likely to have this. Figure 7-1 illustrates the differences in costs by PAR status.

Figure 7-1 Scheme costs by PAR status

PARs	Number of schemes	Predicted cost (Av)	Outturn cost (Av)	Difference
Conception	33	£2.78m	£3.86m	39%
Intermediate	2	£3.65m	£3.00m	-18%
Commitment of Works	19	£4.70m	£5.98m	27%

The evaluators did not formally investigate the reasons behind the cost escalations with members of the programme team.

[17] The above data is based on the information provided to the evaluation team, however, it is possible that there were additional, newer PARs authored that were not available during the evaluation period.

7.2. What was the performance spread of evaluated schemes?

All road schemes are unique and there is no such thing as an 'average' scheme. Even the same measures introduced in two different places are not the same as road schemes can only be interpreted in the context of their environment. This section looks at spread of performance and whether the results of the sample could be explained by systematic bias in appraisal.

Table 7-2 shows the number of occasions where the scheme outturn cost or benefit was higher or lower than that forecast. Results heavily skewed in one direction could indicate systematic bias in the appraisal method. If no bias is found, the accuracy of the forecasts might still be poor but these be expected to be equally likely to over or underestimate the outturn result.

Table 7-2 Scheme life accuracy of forecasts based on first year assessments

Scheme Life	Outturn Higher	Outturn Lower
Cost	38	16
Safety Benefits	26	27
Journey Time Benefits	7	46

The table shows that PARs for schemes in the sample were more likely to under forecast the costs and to over forecast journey time benefits, while they were equally likely to either over or under forecast the safety benefits. The reasons that could explain the accuracy observed for each objective are explored below.

Safety - The accuracy of safety forecasts for the sample was found to be evenly split between over and under forecasts indicating that there was no systematic bias in forecasts after the first year. However, for some schemes it was too early to conclude whether the scheme had delivered the intended safety impacts.

Journey times - The journey time accuracy of the sample was found to be heavily biased towards over forecasting for the reasons discussed in Chapter 3.

Costs – The sample was more likely to have higher outturn costs than lower, but as noted above this reflects the cost information provided to the evaluators as a baseline.

A55/A483 IMPROVEMENTS
CASE STUDY G

The scheme: The evaluation scope covered the capacity improvements on three junctions to the south of Chester, and a technology scheme (CCTV renewal) at the A55 Junction. The scheme included new signals at the junctions, new signs, small amounts widening with land take, improvements to crossing facilities and conversion of a roundabout to a signalised T junction.

Journey time and safety impacts: The scheme was found to have made substantial journey time benefits during the OYA evaluation as a result of capacity improvements and planning a more joined up manner for the three junctions to operate.

Landscape: The landscape evaluation was complex given the range of measures introduced and the pre-scheme environment (which contained large signage, high lighting columns and grade separated junctions). Taking these factors into account, the evaluation considered the scheme generated slight adverse impacts on the Landscape.

Journey Quality: moderate beneficial

Economic Growth appraisal a distraction: The scheme appraisal also argued that the scheme would benefit the Daresbury Enterprise zone (28km away), the Deeside Enterprise zone (11km away) and the Liverpool John Lennon Airport (20km away). It was found that very few trips travel through the junction to these growth areas; the scheme is fundamentally a successful congestion relief scheme. The appraisal methodology required the scheme to go through a policy appraisal, and while the findings are non-negative they are tenuous in relevance due to the loose connection between the scheme and the growth areas under consideration. It is therefore considered that the need for a policy assessment undermined the case for a successful congestion relief scheme.

8. Lessons learnt and recommendations

8.1. What overall conclusions can we make about the Pinch Point Programme?

This evaluation exercise has proven to be valuable in helping Highways England learn about the effectiveness of the Pinch Point Programme. It has generated lessons learnt for the programme and more broadly for other types of small-scheme investment. The delivery context for the Pinch Point Programme was different to previous small-scheme investment programmes in terms of its pace, scope and level of ambition.

8.1.1. Journey Time Benefits

The sample of OYA evaluation findings have not shown the level of benefit expected from the programme. In particular, schemes have had mixed journey time impacts, with benefits being observed in the peak periods but these have not been sustained during the non-peak periods and led to a net dis-benefit over a 24 hour period. Reasons for this relate back to the appraisal and design stages of scheme development:

- *Overstating the congestion problem:* a number of schemes forecast higher reductions in delay than existed. This may have been a result of appraising based on worst day performance rather than average performance.
- *Signalisation schemes balancing benefits and dis-benefits:* The evaluations have clearly shown that signals have had a balancing effect on journey times between periods and specific scheme movements. Many schemes were appraised on peak period benefits/benefits to some movements without capturing the adverse impacts to other movements or periods.
- *Under appreciation of the downsides of schemes:* Particularly for junction schemes, there are few measures that can be introduced that are entirely positive but these dis-benefits were not always reflected in the appraisals.
- *Appraisal quality assurance:* There were cases where errors were identified in the appraisal assumptions by the evaluation team.

8.1.2. Safety Benefits

While safety results were positive for the evaluated schemes, they represented just 54% of predicted safety benefits. There were two schemes that had unintended safety outcomes (large worsening due to flaws in design) and which were being resolved by Highways England at the time of the evaluation. With these removed from the sample, 75% of the predicted benefits were achieved.

8.1.3. Wider Economic Benefits

At this stage of the evaluation the focus was on assessing whether the schemes had the potential to contribute to stimulating economic growth rather than measuring impact. These related to supporting Jobs, Housing, Local Economic Growth Areas and Gateways. The assessment identified a number of areas where scheme delivery may have an impact on future performance.

- **The selection of growth sites** which would be relevant for the scheme to influence - It was found that proximity was not always the most effective measure of relevance.
- **Defining the scale of impact** – There were instances where the estimation of economic growth benefits of the scheme conflated the potential economic growth benefits with the existing road performance. The latter was weighted highly but this was not necessarily a good determinant of successfully delivering the anticipated economic growth impacts.
- **Standardising assessment of potential impacts** – A pro-forma was designed specifically for the assessment of economic growth benefits across the Programme. The evaluation has identified that this was open to interpretation and tighter prescription would have helped to reduce the impacts of the points above.
- *Working with local planning team* – The evaluation found that this was an area which could have been strengthened and in some cases the role of the scheme in supporting planning applications was not considered to be as significant by the local planning team.

8.1.4. Scheme Costs

Costs were on average a third higher than predicted. It was not possible to identify the exact reason, but there is a lack of evidence to suggest Commitment of Works PARs (updated appraisals just before scheme construction) were produced, schemes being delivered that differed from that appraised and/or optimism bias in costs may all have been determining factors.

8.1.5. Environmental and social impacts

Biodiversity appraisals were uncommon despite many schemes warranting at least a low-level assessment of the status and demonstrating the reason for a neutral score. A screening exercise was the lowest requirement when any measures are on the soft estate.

Physical activity and severance evaluations demonstrated the need to think about end-to-end journeys and how measures linked into existing facilities. Landscape and noise had occasional some minor adverse impacts, with most other objectives being unaffected.

Finally, there is a key learning regarding the robust and effective challenge of objectives being marked as “not applicable”. The evidence shows that there are a number of objectives marked as “not applicable” despite there being reason to at least undertake screening. Many of these, if undertaken, will show neutral impacts but they will demonstrate that due care has been granted and processes followed.

8.2. What lessons can be learnt for other small scale investment programmes?

There are three areas where key lessons have been learnt from the evaluation these are:

Defining success – The Pinch Point schemes were promoted based on a target to improve safety, reduce congestion or stimulate economic growth. However, despite

only needing to deliver one of the three objectives, they were appraised on all three. This has meant that some schemes had been designed to benefit one objective more than another, and these effects have been observed in the monitoring data, however this was not reflected in the appraisal projections.

Recommendation: To support the future design of multi-faceted programmes, schemes should be allocated funding based on their core focus, or the key determinant of success for each scheme should be specified with a clear understanding about how the scheme contributes to the overarching programme benefits.

Assessing and optimising benefits – The evaluation has drawn out some important lessons for the proportionate appraisal of small schemes.

Recommendations:

- To ensure scheme appraisal of journey time impacts cover a 24 hour period;
- The approach to appraising and promoting signalisation schemes needs to reflect the full impacts to ensure the right schemes are promoted, and where schemes create dis-benefits the option of part-time signalisation should be considered;
- All potential environmental and social impacts are adequately considered during scheme appraisal and delivery;
- Opportunities for joined up working between Highways England and local authority planning teams are undertaken effectively to make sure targeted improvements open up economic growth;
- Options for further benefits optimisation on underperforming pinch point schemes are considered, in the way that remedial measures were undertaken for two schemes which did not deliver the level of safety benefits required, and that any further monitoring work is conducted to ensure these measures have resolved the issues;

Maintaining the business case across the scheme lifecycle – A key lesson was to ensure that scheme assessments were reviewed at critical stages in the lifecycle and when subject to design changes, and that this information has been maintained within appropriate knowledge management structures.

Recommendation: Scheme appraisals are completed for all stages of the development lifecycle (especially at the commitment of works stage) and change control decisions are made within appropriate governance processes which will consider the impact on scheme affordability and value for money.

Appendix A: List of evaluated schemes at One Year After

Table A-1 Schemes evaluated and OYA results

Name	Area	Region	Safety Objective	Congestion Objective	Actual Opening	First Year Metrics					Mean Journey Time (before, seconds)	Mean Journey Time (after, seconds)
						Costs (£m)	Safety (£m)	Journey Time (£m)	Aggregated Safety & Journey Time (£m)	FYRR		
A1 Southoe Safety Cameras	8	East	Y	N	28 Mar '14	1.09	0.69	-1.74	-1.05	-96%	127.0	145.5
Merged Wansford	6	East	Y	Y	09 Sep '15	1.17	0.17	-0.09	0.09	7%	33.9	34.9
A120 Galleys Corner	6	East	Y	Y	27 Mar '14	0.30	-1.20	0.03	-1.17	-384%	89.3	88.8
A421 Black Cat	8	East	Y	Y	02 Jul '15	6.94	-0.11	0.50	0.39	6%	97.5	92.2
A14 EB J31-32 and A14 WB J32-31	8	East	Y	Y	01 Apr '15	25.63	0.10	0.92	1.02	4%	93.6	88.2
A1 J6 Hard Shoulder Running	8	East	Y	Y	04 Nov '15	3.49	0.20	-0.99	-0.79	-23%	180.7	193.4
A12 South-Hughes Corner	6	East	Y	N	24 Aug '15	1.52	1.14	0.00	1.14	75%	N/A	N/A
A12 South Kelvedon	6	East	Y	N	24 Aug '15	2.44	-0.16	-1.01	-1.17	-48%	265.7	277.2
A45-A509 Wilby Way	7	Midlands	N	Y	16 Oct '14	5.29	0.15	1.15	1.30	25%	82.0	69.0
A49/A4103 Starting Gate Roundabout	9	Midlands	Y	Y	06 Dec '13	0.30	-0.12	0.02	-0.10	-34%	52.2	51.8
A50/A500 Sideway	9	Midlands	Y	N	20 Jun '14	1.25	0.98	-0.30	0.68	54%	78.9	82.4
M5 Junction 2	9	Midlands	Y	Y	11 Sep '13	2.42	-0.10	0.71	0.61	25%	76.6	63.9
M5 J4	9	Midlands	Y	Y	31 Mar '15	16.05	-0.07	-0.02	-0.09	-1%	74.6	75.0
M6 J9 MOVA Upgrade	9	Midlands	Y	Y	14 Jun '13	0.63	-0.07	-0.18	-0.25	-40%	76.1	79.8
M42 J9 Operational Review	9	Midlands	Y	Y	31 Jan '14	1.09	0.25	-0.54	-0.29	-27%	99.4	104.5
Emstrey Roundabout	9	Midlands	Y	Y	05 Feb '15	5.38	-0.09	0.20	0.11	2%	64.9	61.7
A38 Markeaton	7	Midlands	Y	Y	25 Jan '15	5.27	0.61	0.35	0.96	18%	72.3	69.2
A5-A49 Preston Boats	9	Midlands	N	Y	11 Mar '15	4.91	0.06	-2.54	-2.48	-50%	73.4	78.9
M54 J5 Forge Roundabout	9	Midlands	N	Y	18 Mar '14	2.24	-0.04	-0.55	-0.59	-26%	55.2	63.3
M1 J21/M69 Leicester	7	Midlands	N	Y	02 Dec '13	2.22	0.02	0.94	0.96	44%	139.2	130.9
A38 Little Eaton Roundabout	7	Midlands	Y	Y	08 Aug '14	5.30	0.44	1.25	1.69	32%	75.3	63.6
A5 Wall Island	9	Midlands	Y	Y	12 Sep '14	3.82	0.49	0.90	1.40	37%	102.1	92.2
A5 Churncote Roundabout	9	Midlands	Y	Y	29 Mar '14	1.53	0.15	0.04	0.18	12%	41.3	39.8
A5 Edgebold Roundabout	9	Midlands	Y	N	31 Jan '14	0.60	0.29	-0.03	0.26	44%	39.7	40.1
A49/A465 Belmont Road	9	Midlands	Y	Y	05 Jul '13	0.34	0.23	-0.18	0.05	15%	111.4	115.4

Name	Area	Region	Safety Objective	Congestion Objective	Actual Opening	First Year Metrics					Mean Journey Time (before, seconds)	Mean Journey Time (after, seconds)
						Costs (£m)	Safety (£m)	Journey Time (£m)	Aggregated Safety & Journey Time (£m)	FYRR		
A19/A174 Parkway Improvements	3	North East	N	Y	04 Sep '15	11.61	0.38	0.51	0.89	8%	79.0	77.6
A1-A19 Seaton Burn	14	North East	Y	Y	13 Mar '15	9.48	-0.20	-0.02	-0.21	-2%	49.1	49.2
M18 J5	12	North East	Y	Y	31 Mar '15	5.56	0.15	0.00	0.15	3%	61.2	61.8
A1033 Northern Gateway	12	North East	Y	Y	29 Nov '13	0.77	0.16	-0.27	-0.11	-15%	102.3	107.4
M1 J44 Traffic Signals and Widening	12	North East	Y	Y	31 Mar '15	2.58	0.14	-0.25	-0.11	-4%	78.2	84.2
M1 J33 Catcliffe Interchange	12	North East	Y	Y	09 May '14	1.77	-0.02	1.04	1.03	58%	84.1	69.2
M18 J2-3	12	North East	N	Y	31 Mar '15	11.17	0.04	0.00	0.04	0%	45.7	45.9
M62 J32 EB Exit Slip	12	North East	Y	Y	20 Dec '14	1.64	-0.14	0.00	-0.14	-9%	58.4	59.8
M6 J23	14	North West	Y	Y	31 Jul '15	5.84	-0.17	-1.48	-1.65	-28%	129.5	159.6
A585 Bourne Way	13	North West	Y	Y	18 Mar '15	4.09	-0.05	-0.40	-0.45	-11%	94.0	107.3
A585 Windy Harbour	13	North West	Y	Y	11 Nov '15	4.10	-0.17	0.33	0.16	4%	136.8	128.9
M60 J24 Denton	10	North West	Y	Y	30 Oct '15	6.88	0.40	0.58	0.98	14%	125.0	120.2
A55-A483 Improvements	10	North West	N	Y	29 Jun '15	8.34	0.22	1.10	1.33	16%	80.3	76.1
M6 J17 Sandbach	10	North West	N	Y	15 Dec '15	3.39	0.21	-0.21	0.00	0%	56.2	64.1
A590 Greenodd Roundabout	13	North West	Y	N	07 Mar '14	3.78	0.23	-0.22	0.01	0%	26.5	32.3
M6 J32 and M55 J1	13	North West	Y	Y	15 Mar '15	12.16	0.14	-0.05	0.08	1%	102.3	105.9
A34 Easton Lane Signals	3	South East	Y	Y	31 Jan '14	0.88	0.23	0.37	0.60	69%	94.2	90.9
M40 Handycross Rdbt	3	South East	N	Y	03 Jun '14	0.30	0.49	-0.23	0.26	86%	95.3	96.1
A34-M40 J9 Wendlebury	3	South East	Y	Y	04 Sep '15	7.23	-1.69	-1.01	-2.70	-37%	207.7	219.5
M27 J5 Congestion Study	3	South East	Y	Y	30 Sep '15	10.42	0.49	-0.26	0.23	2%	99.9	104.2
M20 J6-7 Congestion	4	South East	N	Y	22 Aug '14	1.49	0.31	0.00	0.31	21%	87.0	91.0
A3 Ham Barn	3	South East	N	Y	17 Sep '14	1.39	0.05	0.05	0.10	7%	53.4	50.6
Ford Roundabout	4	South East	N	Y	21 Jan '14	0.06	-0.02	0.05	0.03	48%	79.7	78.8
A38 Drumbridges	1	South West	Y	Y	10 Dec '15	10.45	0.46	-0.09	0.36	3%	77.4	79.6
A40 Over Roundabout	2	South West	N	Y	30 Jul '15	0.53	0.22	0.31	0.53	100%	51.2	41.4
A30 Newtown Roundabout	1	South West	N	Y	01 Mar '13	0.16	-0.18	-0.02	-0.21	-132%	65.4	66.6
M5 J16 NB Exit Slip Widening	2	South West	N	Y	30 Sep '15	1.91	0.00	-0.06	-0.06	-3%	59.0	59.7
A38 Manadon	1	South West	Y	Y	31 Mar '15	3.47	-0.20	0.00	-0.20	-6%	N/A	N/A
A38/A380 Splatford to Wobbly Wheel	1	South West	N	Y	20 Aug '15	14.21	-0.15	0.50	0.35	2%	74.0	70.0

Appendix B. Gateways and LEG Areas

This appendix provides a list of the gateways and local economic growth areas that were named in appraisal as being the subjects of benefits from the 54 Pinch Point schemes that are in the evaluated schemes. Here a list is provided, along with the number of schemes that named the gateway/local economic growth (LEG) area.

B.1. Gateways

Table B-1 Gateways listed in scheme appraisals

Gateway Name	Schemes in which listed
Barrow Port	1
Birmingham International Airport	7
Bristol Airport	4
Bristol Docks	4
Cardiff Airport	2
Doncaster Sheffield Airport	2
East Midlands Airport	3
Exeter International Airport	1
Felixstowe Port	2
Gloucestershire Airport	1
Harwich International Port	4
Holyhead Port	5
Humber Ports	2
Immingham Port	1
Liverpool John Lennon Airport	1
Liverpool Port	2
London Heathrow Airport	2
London Luton Airport	2
Manchester Airport	4
Newcastle International Airport	1
Penzance Harbour and Port	1
Plymouth Port	1
Port of Felixstowe	1
Port of Hull	1
Port of Tyne	1
Portsmouth International Port	2
Southampton Airport	2
Southampton Port	2
Stansted Airport	1
Teesport Northern Gateway Terminal	1

B.2. Local Economic Growth Areas

Table B-2 LEG areas listed in scheme appraisals

Local Economic Growth (LEG) Area Name	Schemes in which listed
Aire Valley Enterprise Zone	1
Aire Valley Leeds Area Action Plan	1
Alconbury Enterprise Zone	2
Basford East	1
Bedford River Valley Park	1
Bicester Eco Town	1
Birmingham LEZ	4
Black Country Enterprise Zone	1
Bold Forest Park Area Action Plan	1
Brantham Regeneration Area	1
Central Telford	1
Chaddesden Sidings	2
City Centre and Eturia Road Area Action Plan	1
Corridors in the Black Country Core Strategy	1
Daresbury Enterprise Zone	2
Darlaston Enterprise Zone	1
Deeside Enterprise Zone	1
Derby City Centre	2
DN7 major employment site/Unity project	1
Eastern Corridor	1
Exeter and East Devon Growth Point	1
Filton Airfield	1
Fleetwood-Thornton Area Action Plan	2
Glasshoughton	1
Greater Littlehampton	1
Green Port Hull Enterprise Zone and The Humber Estuary Renewable Energy Super Cluster	1
Gunnels Wood Road and GSK	1
Hatfield Business Park	1
Hereford Enterprise Zone	6
Inner Urban Core Action Plan	1
Innsworth Development	1
iPort Development Site	1
Knebworth Innovation Park	1

Local Economic Growth (LEG) Area Name	Schemes in which listed
Lancashire Enterprise Zone	1
Land to the east of St Neots	1
Longbridge AAP	1
Lubbesthorpe Strategic Employment Site	1
M20 Junction 8 Strategic Employment Hub	1
Manchester Airport City Enterprise Zone	3
Mersey Waters	1
MIRA Enterprise Zone	1
Newcastle International Airport Business Park	1
Newton Abbot	1
North Eastern LEP Enterprise Zone	1
Northstowe	1
Notley Enterprise Park	1
Patchway	1
Penzance and Newlyn Framework Plan	1
Prince of Wales, Pontefract	1
Rykneld Road	1
Samlesbury Enterprise Zone	1
Sheffield City Region Enterprise Zone	1
Solent Enterprise Zone	1
Southampton City Centre Masterplan	1
Stevenage Town Centre Regeneration	1
Strategic Medical Hub	1
Tees Valley Enterprise Zone	1
Teignbridge Core Strategy	1
WEAST/Stanton Cross	1
White Hill Bordon Eco Town	1

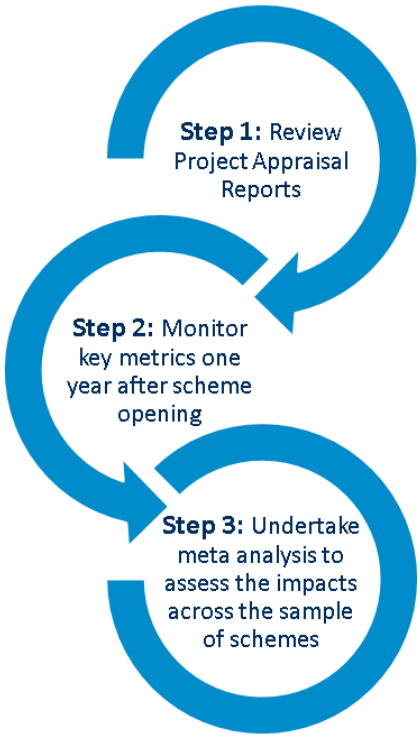
Appendix C. Highways England Area Locations

Appendix D. Methodology

D.1 Introduction

This section outlines the methodology that has been utilised to evaluate each of the schemes[18].

There are three steps in the POPE process;



Step 1: Review Project Appraisal Reports

Each scheme was appraised using a Project Appraisal Report (PAR). These documents, compiled as part of the planning process, contained all the predicted information on the scheme, such as forecast impacts on annual accident rate and journey times. Each PAR was designated a scheme type according to the nature of its intended impact. The PARs were reviewed by the evaluation team and a scheme-specific evaluation plan was produced. This was designed to provide a comparison between the predicted and outturn impacts to assess the degree of accuracy within the appraisal predictions.

[18] The evaluation methodology has remained consistent over the years that POPE has been undertaken, but there have been some subtle improvements where possible to ensure the process continued to use the best available data.

Step 2: Conduct One Year After Evaluation

Supporting data for the scheme's location both before and after the scheme was completed was requested. This included forecast and actual (outturn) information concerning costs, collision numbers by severity, journey times and reliability, as well as, some evidence in relation to encouraging economic growth. When evaluating a scheme, a comparison of the PAR predicted, and outturn impacts was made.

Step 3: Undertake Meta-Analysis

The purpose of this OYA meta-analysis has been to make generalisations about how the sample of schemes were performing overall and to understand the emergent themes in order to learn more about what can be done better in the future. Aggregating these scheme-level findings enabled more confident conclusions to be drawn about the scale of impact from Pinch Point Schemes than was possible from a single scheme assessment.

For example, at an individual scheme-level it had been difficult to accurately assess safety impacts at the OYA stage due to the stochastic nature of collisions. However, when aggregating schemes in meta-analysis, this effect was reduced, and it was possible to learn more about how the evaluated sample has performed in terms of safety within the first year of the scheme. The strength of this assessment will continue to grow over time as more data becomes available.

Furthermore, by learning about common errors or best practice in appraisal across the sample, the meta-analysis provides an opportunity to make recommendations for future appraisal of small schemes.

While this meta-analysis endeavours to reveal insights into how Pinch Point schemes have performed, there are a number of key limitations to be aware of.

Firstly, this meta-analysis has only considered the schemes that were included within the sample. Based on the sample design, it had not been possible to confidently generalise from this analysis across the entire programme, but the findings from the meta-analysis had been used to help identify themes and emerging trends across the schemes evaluated. The evaluation team concluded that it was not possible to apply weightings to the sample because of the specific local contexts each scheme was delivered within. Therefore, the findings within this report only relate to the sample of schemes selected for evaluation.

Secondly, it was not possible to measure the entire anticipated outcomes within the OYA evaluation as some impacts will occur over a longer timeframe. For example, housing and employment growth was not considered at all at the OYA stage. Landscape and safety can only provide an initial steer to indicate whether schemes are on track to deliver the intended impacts as these will take a number of years to be realised.

D.2 Journey Times & Journey Time Reliability

Using satellite navigation data, the evaluation team compared pre-scheme versus post-scheme journey times in order to assess the level of change over time. This was then monetised using the Value of Time figures taken from WebTAG guidance. Both the first year (observed) saving and scheme life (re-forecast) saving was calculated. In addition to the change in journey time per vehicle, journey reliability was also calculated in order to ascertain how much it has changed. The evaluation utilised two methods for assessing reliability. The first measured the changes in the quickest, the typical and the slowest journey times and the second measured the changes made to the slowest 5% of journeys (Planning Time Index (PTI)).

D.3 Measuring Safety Impacts

Using personal injury collision data that derived from DfT's STATS19 accident reporting forms, the evaluators compared trends in the annual number of Personal Injury Collisions to assess the change between pre and post-scheme levels. The evaluations compared five years' worth of pre-scheme data with one year of post-scheme data which was broken down by severity level. The Collision Analysis Areas that were defined were bespoke for each scheme and were based upon information contained within the appraisal documentation.

The outturn change in the number of accidents was monetised using the average value of an accident taken from the Department for Transport's WebTAG guidance. Both the first year (observed) saving and the scheme life (re-forecast) saving was calculated. Due to the short timeframe over which the accident analysis was typically carried out, no single scheme's safety results should be taken as statistically robust, however the combination of results from many different evaluations provides more robust results at a broader level.

D.4 Outliers

One potential cause for the performance of the sample of schemes could have been extreme results produced by outlier schemes in the sample skewing the overall result. For example, there were some schemes where unintended journey time or safety impacts had occurred. As contained within the analysis presented in the report, the identification and removal of outliers from the meta-analysis was undertaken to determine their impact. Schemes were categorised as either outliers in terms of safety or in terms of journey times and identified as either minor or major outliers depending on how many interquartile ranges from the 25th and 75th percentile values their safety or journey time results lay. Three schemes were considered to be adverse journey time outliers (one major and two minor) because of journey time dis-benefits which outweighed the benefits the scheme brought to flow movements. Four schemes were classed as safety outliers (two major beneficial and two minor adverse) as there were both large increases in collisions due to issues around road markings, signage, lighting as well as large reductions (where a longer time series is needed to determine whether this effect has been sustained).

When all minor or major outliers for either safety or journey times were removed from the sample, 47 schemes remained, and analysis was conducted on the remaining

schemes in order to ascertain outturn findings when compared to the total sample of 54.

D.5 Wider Economic Impacts

The evaluation centred on establishing the relevance of each scheme to the named Local Economic Growth (LEG) areas and Gateways. Schemes were grouped into None, Low, Medium and High relevance categories. The categories represented the relationship between scheme and LEG area/Gateway based on the number of vehicles estimated to be travelling between the two locations per day.

The methodology can be summarised as:

- Using Origin-Destination data or qualitative analysis of route choice to consider the likely number of trips that would have to travel through the scheme to access/egress from the Gateway/LEG area. This was used as a proxy indicator for relevance;
- Consultations were undertaken with local stakeholders to confirm the designation and status of the LEG areas and Gateways in terms of their scale and aspirations for growth;
- The analysis of journey time data was used to review changes in times on the specific part of the scheme which was relevant to the Gateway/LEG area.

All evaluated schemes had OYA evaluations of Gateways and Local Economic Growth, and so the findings to date can be analysed in this report. It likely that further detail will be provided at five years after as more information on the impact of the schemes becomes available.

The appraisal process identified promoting housing and employment growth delivered by 2020 as a core objective of the programme of schemes. The evaluation approach considered that it was not possible to measure whether this had been achieved until 2020 and thus proposed that it would be proportionate to only consider the impact during a future five year after evaluation.

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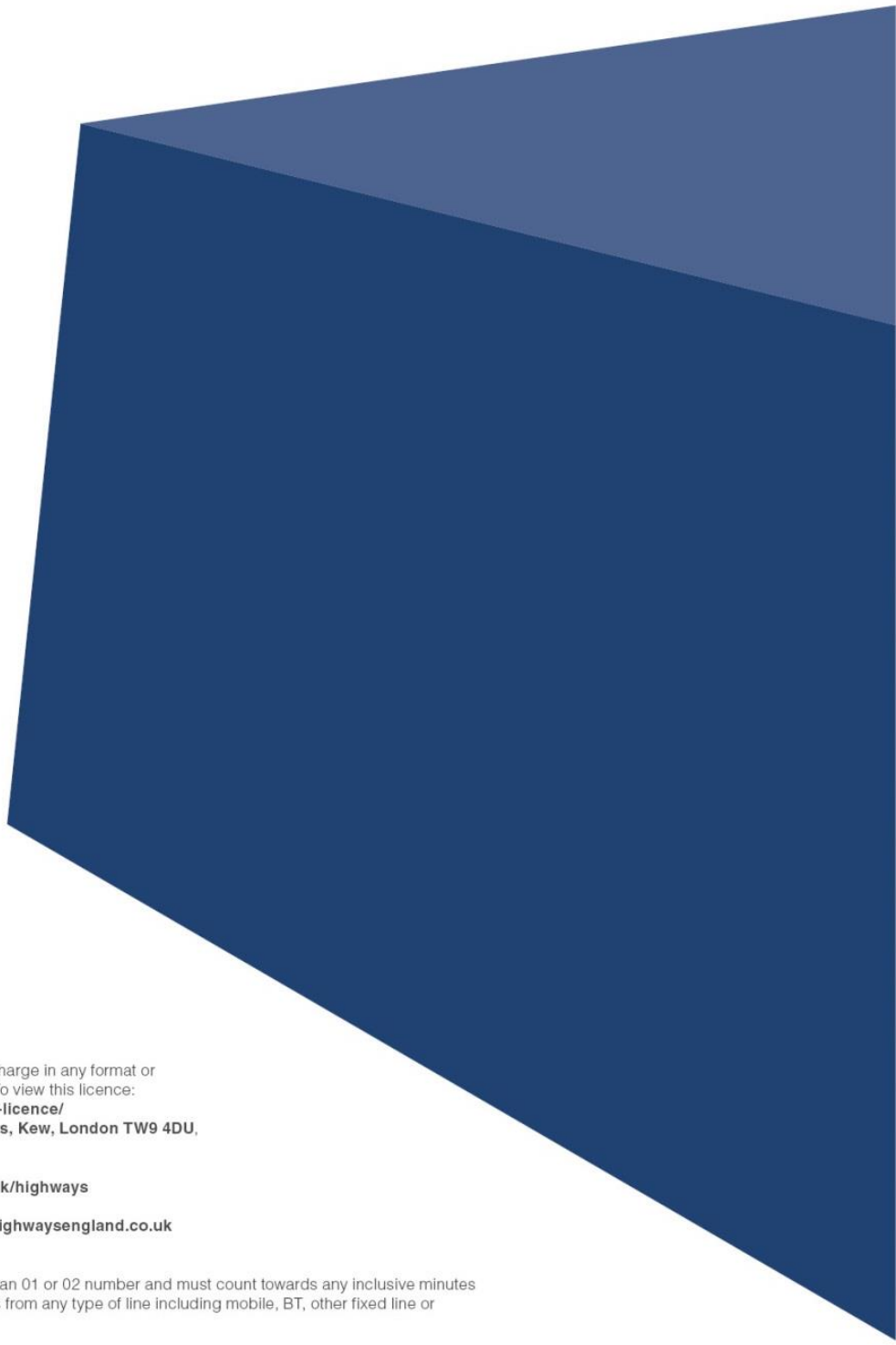

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