

Lot 3 - Safety

Office of Rail and Road

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CONFIDENTIAL REPORT

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EXECUTIVE SUMMARY

Scope and context

The Office of Rail and Road (ORR) independently monitors National Highways' management of the strategic road network (SRN) – the motorways and main A roads in England. As part of its role, the ORR advises the government on the appropriate level of funding and performance requirements for future road periods. The ORR conducts a review of National Highways' draft Strategic Business Plan (dSBP) and provides advice to the Secretary of State on the extent to which the proposed requirements for Road Investment Strategy (RIS) 3 are challenging and deliverable within the financial resources to be provided. This is known as the Efficiency Review.

The Department for Transport is yet to finalise the draft RIS. However, to ensure that planning for RIS3 continues to progress, the Department instructed National Highways to prepare an interim version of its draft SBP based on an agreed set of assumptions and requirements and invited the ORR to review those plans. This report sets out the findings of a review of the interim draft SBP. For brevity, in the remainder of this report we refer to the interim submission as the 'dSBP'.

CEPA was commissioned to support the ORR in its Efficiency Review, and this report sets out CEPA's views on National Highways' safety plans. ORR asked us to assess whether it has used the most suitable and up-to-date information and methods to develop its plans for RIS3. We were asked to assess the robustness of those plans through every stage from formation to costing and timing, including consideration of risk and to have regard to National Highways' track record to help assess the deliverability of the RIS3 safety plans.

In undertaking this exercise, we were asked to scrutinise the logic, process and evidence underpinning the safety improvement plans put forward by National Highways. In doing so, we have sought to answer a set of questions set by ORR and responded to (in RAG ratings) within each section of this report.

The dSBP has been developed before a formal RIS3 performance requirement for safety has been set, which presents some difficulties in planning. This report has been prepared on the basis of the information provided to us through requests for information and a review of the dSBP as well as discussions held with National Highways, and their comments on an earlier draft. We have noted a number of inconsistencies and potential inaccuracies in the material, perhaps reflecting its current state of development. These are flagged within the report for follow up by ORR.

Preparation for RIS3

National Highways expects to retain its current performance indicators in RIS3. The KPI with a target is to:

- reduce the number of people killed or seriously injured on the SRN which is a targeted KPI in RIS2. For RIS3 National Highways suggests a lower target for 2030 than the 2025 target, which it does not expect to achieve. It has asked that the performance measure is refocused on activity that it can control i.e. that it be monitored on actions it undertakes rather than the safety outcomes it achieves.

PIs without targets are to:

- reduce the total number of people killed or injured on the SRN.
- reduce the number of non-motorised and motorcycle users killed or injured on the SRN.
- reduce the accident frequency rate for National Highways & National Highways supply chain staff; and
- improve a metric which combines the % of traffic using iRAP 3-star or above rated roads and the flow-weighted decimal star rating.

There is a projected £575m in National Highways' budget for safety improvement split between a number of expenditure streams and excluding any safety spending embedded within major projects, OMR etc. The £575m includes £200m for the Small Schemes where congestion is also an important aim. This budget is currently

proposed to be back end loaded with only a small proportion of expenditure planned for the first year of RIS3. Details of proposed expenditure and its focus are set out below:

Table 1: *Summary of detailed expenditure on safety*

Stream	Amount	Effect
National Programmes	£275m	A number of corridors where treatments will improve the IRAP decimal star rating and attend to specific safety risks. A pilot is asserted to validate the approach. A full list of 18 proposed schemes is available, and work on a reserve list if any of those might underperform or be difficult to implement. Schemes appear to be substitutable with similar benefits per pound spend. Costing uses the standard internal cost estimator.
Designated funds	£100m	The amount is purely budgetary and has no scope attached, beyond four headings with no specified budget. It is asserted that such a sum can achieve substantial safety benefit. A benefit is estimated based on some general principles of what likely can be achieved with such a sum, based on theory and experience. Pilot schemes are in progress, under RIS2 Designated Funds, to attempt to validate the approach. The estimate of safety benefit is based on average rates assessed on a sample of RIS2 schemes.
Small schemes	£200m	Small schemes are focused on congestion and safety. There is some indication that more schemes will be focused on congestion although all schemes should have some safety benefit. An estimate of the safety benefit is extrapolated from scheme longlisting material.
OMR	Not specified	No safety-related scope or outcome described. OMR is primarily focused on other purposes, but in principle there can be expenditure of safety relevance.
Major schemes	Not specified	We have been provided with an estimate of the safety benefit of major schemes. But this has not been taken account of in the dSBP because it is uncertain. Complications arise because major schemes can have substantial effects on traffic allocation and growth, and some safety benefits can occur on local roads.
Digital and technology	Not specified	No safety related scope or outcome identified, but in principle there can be much expenditure of relevance.
Corporate services	Not specified	No safety related scope or outcome identified, but in principle there can be much expenditure of relevance.

Source: *dSBP Section A Safety and CEPA analysis.*

For this expenditure, National Highways currently predicts no improvement in its targeted KPI by 2030 relative to its forecast outcome in 2025 of 1828 KSI, because it forecasts the effects of its actions will be offset by the effect of traffic growth.

National Highways commissioned two formative pieces of research from TRL.

- **TRL report Road to Zero Harm – Phase 1.** This report sets out an overall safety improvement strategy up to 2050; a large part is potential actions by third parties.
- **TRL report Road to Zero Harm – RIS3 Impact Assessment.** The report assesses the impact of a set of actions specified to it by National Highways as “currently planned” for RIS3.¹ TRL assesses that the “currently planned” activities would achieve a 9% reduction in KSI, resulting in a 51% reduction from the 2005-2009 baseline. Applied to National Highways forecast of KSI in 2030 without measures, and the 2022 rebasing of the 2005-2009 baseline, it would achieve a 45% reduction from the baseline, not achieving the 2025 target.

¹ TRL (2023), Client Project Report CPR4073, Road to Zero Harm – RIS3 Impact Assessment, V2.

These reports provide an assessment of the safety scope described as “currently planned” for RIS3. Many of the non-engineering actions TRL calls “currently planned” are not reflected in the dSBP and supporting documentation, for example in areas like corporate services where we are yet to receive any clear information on safety scope and cost. National Highways own assessment of the engineering actions are much more modest than TRL’s. National Highways has indicated that there might be scope for enhancing the schemes in the National Programme to achieve an outcome closer to TRL’s estimate. National Highways plans also include other engineering actions among small schemes and major schemes with likely safety benefits.

National Highways has indicated in some places it will undertake further pilot testing of actions before committing to them on a wider scale. National Highways approach to both the Safety National Programme and Designated Funds is back-end loaded, resulting in a hiatus of activity that could be costly. Given the extensive work already carried out, and many measures already being in extensive use, it should be possible to identify “lower regret” schemes to keep the pipeline going, rather than risk this hiatus in delivery.

National Highways has identified that different expenditure streams deliver differing levels of safety performance improvement per pound spent, which suggest that there may be better ways to allocate funds between expenditure lines.

Findings and conclusion

Our findings are set out in RAG tables of plan maturity at the end of each report section. The maturity ratings are described, in brief, as follows:

- **Red** – little evidence of analysis on what should be done
- **Amber** – evidence of useful analysis on what should be done, but little evidence of a plan to deliver it
- **Green** – evidence of both useful analysis on what should be done, and a useful plan to deliver it

At this stage many of the answers to the questions that ORR asked us to consider are amber or red. This is because National Highways safety plans are at an early stage of development.

Our overall conclusion is that the dSBP itself and the supplementary information provided during the course of the review, do not provide strong evidence that National Highways is using a well developed and thought through framework to assess what it seeks to achieve in terms of safety performance and how it will allocate the funds made available to it. At this stage links between expenditure and KPI performance are particularly hard to understand given that National Highways’ estimates of improvement are considerably less than those assessed by TRL, its expert adviser suggesting in our view that they may be too low. We have had some indication that the estimates may not reflect the final scope of schemes.

National Highways cost estimates currently lack definition:

- The range of costs provided for one sample scheme we were shown in the National Programmes was implausibly wide, although another showed firm costs. If the former were replicated, we would be concerned that the programme could not be delivered within the overall funding envelope.
- Despite many years of experience, and a current pipeline with some substantial overlap with the future purposes of the Safety Designated Fund, that fund lacks a pipeline of proposed projects, or an intention to put in place a pipeline in time, to keep the spending rate going. The estimate of safety impact has been extrapolated from the similar schemes in RIS2.
- In respect of small schemes it is currently hard to ascertain the purpose and aim of this funding which covers both safety and congestion and its impacts. There is no clear plan for small scheme safety interventions within the dSBP. We could not ascertain from the lists provided which schemes have a material safety benefit. Estimates of safety impact have been extrapolated.
- National Highways’ wider works e.g. its programme of major projects and OMR, will deliver some safety benefits, perhaps they will be material in some cases. These impacts are not discussed or quantified.

National Highways has stated that safety is its highest priority, but the plan currently fails to demonstrate this clearly. The KPI target being proposed is unambitious and inconsistent with the priority given to improving safety on the network.

Preparation of the RIS is time limited and so we have sought to highlight areas where we consider ORR should challenge National Highways and areas where we believe that better information exists to facilitate the development of a more robust plan.

1. INTRODUCTION

The Office of Rail and Road (ORR) independently monitors National Highways' management of the strategic road network (SRN) – the motorways and main A roads in England. As part of its role, the ORR advises the government on the appropriate level of funding and performance requirements for future road periods. The ORR conducts a review of National Highways' draft Strategic Business Plan (dSBP) and provides advice to the Secretary of State on the extent to which the proposed requirements for Road Investment Strategy (RIS) 3 are challenging and deliverable within the financial resources to be provided. This is known as the Efficiency Review.

The Department for Transport is yet to finalise the draft RIS. However, to ensure that planning for RIS3 continues to progress, the Department instructed National Highways to prepare an interim version of its draft SBP based on an agreed set of assumptions and requirements and invited the ORR to review those plans. This report sets out the findings of a review of the interim draft SBP. For brevity, in the remainder of this report we refer to the interim submission as the 'dSBP'.

CEPA was commissioned to support the ORR in its Efficiency Review, and this report sets out CEPA's views on National Highways' safety plans. National Highways states in the dSBP that "Safety is our highest priority".² This relates not only to road users and other members of the public who interact with its roads – a major category of casualties – but also its employees and its contractors.

National Highways has one KPI related to safety, the number of people killed and seriously injured per year (KSI) on its roads. This includes road accidents, but not worksite accidents. In RIS2 (2020-2025), the target for this is a 50% reduction relative to a 2005-2009 baseline to be achieved by 2025. The baseline in practice is adjusted annually to reflect that present day reporting of KSI uses different methods from the past, and this means that comparisons between present day and older data requires adjustment. In ORR's *First Annual Assessment of Safety Performance on the Strategic Road Network* (December 2022), reporting on 2021, the 2005-2009 adjusted baseline is given as 3,206 ("2021 baseline"), so that the target for 2025 would be 1,603.³ In ORR's *Second Annual Assessment of Safety Performance on the Strategic Road Network* (December 2023), reporting on 2022, the 2005-2009 adjusted baseline is now given as 3,136 ("2022 baseline"), so that the target for 2025 would be 1,568.⁴ The baseline may be further adjusted. But as the baseline comes down, so do measured KSI, as a result of the measurement change, which does not reflect any change in road safety. Much of the research that National Highways has procured for the dSBP presents estimates relative to the 2021 baseline, as the 2022 baseline was not available until late in 2023.

ORR (2022) showed that the level of KSI in 2021 on the Strategic Road Network (SRN), was 1,857, and so had fallen by 42.1% relative to the 2021 baseline. ORR, at that point, assessed National Highways as in line to meet the target. A year later ORR (2023) reported that in 2022 the KSI on the SRN had increased to 1,944. This represented a 38% reduction relative to the 2022 baseline. It assessed National Highways as no longer in line to meet its target. A large part of the increase is due to the continued recovery in traffic after the Covid pandemic, and so outside of National Highways' control. It would require a return to the relatively rapid levels of reduction in KSI per veh-km seen for example during 2007-2013, when easier gains were available, for the 50% target to be achieved by 2025. National Highways currently forecasts an outcome for 2025 of 1828,⁵ a 41.7% reduction relative to the 2022 baseline.

National Highways additionally has four performance indications (PIs) for which targets are not intended to be set:

- The total number of people killed or injured on the SRN.
- The number of non-motorised and motorcycle users killed or injured on the SRN.

² dSBP Section A – Safety, para 1.1.2

³ ORR (2022), *First Annual Assessment of safety performance on the strategic road network*, 15 December 2022.

⁴ ORR (2023), *Second Annual Assessment of safety performance on the strategic road network*, 18 December 2023.

⁵ para 1.1.5, dSBP Update 2 April 2024

- Accident frequency rate for National Highways & National Highways supply chain staff.
- A metric which combines the % of traffic using iRAP 3-star or above rated roads and the flow-weighted decimal star rating.

1.1. WHAT WERE WE ASKED TO DO?

We were asked to consider National Highways' safety plans, and assess whether it has used the most suitable and up-to-date information and methods to develop its plans for RIS3. We were asked to assess the robustness of those plans through every stage from formation to costing and timing, including consideration of risk and to have regard to National Highways' track record to help assess the deliverability of the RIS3 safety plans. We recognise that National Highways has produced these plans in advance of the DfT setting formal requirements for RIS3 in relation to safety.

In undertaking this exercise, we were asked to scrutinise the logic, process and evidence underpinning the safety improvement plans put forward by National Highways. In doing so, we have tried answer a range of questions that include:

- Has National Highways identified and considered the full range of levers at its disposal?
- Is there a coherent logic to how National Highways has included and prioritised actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?
- Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?
- Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?
- Has National Highways considered the underlying trends in safety, as well as potential headwinds and tailwinds that may influence its performance against the KSI target?
- Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?

1.2. METHODOLOGY

We examined National Highways' dSBP and supporting documentation and where practicable developed case studies of individual areas of spending, to assess if the principles set out in the higher level documentation in practice follow through to specific areas of expenditure.

In common with other work that we have completed as part of ORR's advice to inform the development of RIS3, we found that the dSBP to be at a relatively early stage of development. For example, in many areas the scope of action to achieve safety benefits has limited or no specification. There are some estimates of the impact of the expenditure on safety outcomes, but not in all spending areas, and some of the estimates are not based on a clear scope.

We have assigned a maturity rating to areas of the plan for safety which relates to the specific six questions asked by ORR and, in the case of specific spending areas, the maturity of the plans in relation to that area of expenditure.

1.2.1. Main sources of information

Our main sources of information are reports provided by National Highways, and meetings with National Highways staff where they presented some of its programme and its Safety Forecast Model to us. National Highways typically provided a written presentation of the material in each meeting.

We have set out the documents we have examined in a bibliography (Appendix D). The dSBP itself is a major source of information. Two TRL reports commissioned by National Highways, are also an important part of the thinking underpinning the safety programme, but National Highways has asked that these reports are not quoted or referred to in public materials – they are however included in this draft report.

We sent requests for information (RFIs) to National Highways where there was only partial information in the dSBP and reviewed the responses to the RFIs. Within these we asked questions about each area of expenditure that contributes to the safety objective, including requesting details of specific projects to use as potential case studies. We have been provided with replies to these questions and, in some cases, details of specific proposed schemes.

1.3. STRUCTURE OF THIS REPORT

The remainder of this report is structured as follows:

- **Section 2** considers National Highways' overall safety plan, its higher level planning and how the more detailed programmes contribute to it.
- **Sections 3 and 4** examine the two main specific safety programmes, the Safety National Programme and the Safety Designated Fund.
- **Section 5** considers other expenditure with safety benefits, which is embedded within wider programmes and areas of expenditure that have objectives which extend beyond safety.
- **Appendices A and B** present two case studies of proposed RIS3 schemes, a corridor scheme on the A36 from the Safety National Programme, and a locational scheme M62 Junction 26 from the Small Schemes.
- **Appendix C** examines in more detail National Highways' Safety Forecast Model
- **Appendix D** lists the materials we reviewed in preparing this report.

2. OVERALL SAFETY PLAN

2.1. CONTEXT

A target for the safety KPI for RIS3 has not yet been set. The TRL Impact Report considers a “suggested 60% reduction for RIS3” in KSI relative to the 2005-2009 baseline level by 2030, i.e. to achieve a reduction to 1,282 KSI per year, using the 2021 baseline.⁶ This would be, in effect, be a 20% reduction in KSIs relative to the target at the end of 2025 of a 50% reduction relative to the 2005-2009 level. Or a 30% reduction relative to National Highways’ current forecast outcome for 2025 of 1,828.

In its dSBP Update of 2 April 2024, National Highways has suggested that in view of the likely level of KSIs in 2025, it would be more realistic for the 2030 target to maintain the 2025 final level, i.e.1,828, a 43% reduction relative to the 2022 baseline. This is for three main reasons:

- Traffic growth drives the number of KSIs up, and is largely outside of National Highways’ control.
- There has been a long-run rate of reduction of KSIs per vehicle-km. Whilst National Highways’ actions contribute to this, a large part is unrelated to its actions, but instead originates in vehicle standards and other factors outside of National Highways’ remit.
- National Highways’ forecasts that the impact of its proposed measures, given the level of funding, is only just sufficient to counteract the effect on KSIs of the increase in traffic and external factors from 2025 to 2030, as predicted by National Highways’ model for 2030.

National Highways has suggested it should be specifically monitored on its delivery of those measures that it controls which seek to reduce KSIs and the specific effectiveness of those measures, rather than at the higher level by the present KPI, which is substantially influenced by activity that is substantially out of its control.

In the following subsections, we examine the framework that National Highways has established to achieve its target, or potential target, for the safety KPI. We look in particular at the following four questions.

- Has National Highways identified and considered the full range of levers at its disposal?
- Is there a coherent logic to how National Highways has included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?
- Has National Highways considered the underlying trends in safety, as well as potential headwinds and tailwinds that may influence its performance against the KSI target?
- Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?

Some of these questions are also relevant to the examination of National Highways’ more specific plans for individual spending streams such as the National Programmes and Designated Funds. There, we will seek to answer those questions specifically in relation to those programmes, whereas here we will be seeking to answer those questions at a higher level, in the context of its more over-arching high level approach to achieving safety targets.

⁶ See for example the “Impact Report”, TRL (2023), *Client Project Report CPR4073: Road to Zero Harm - RIS3 Impact Assessment*.

2.2. A FRAMEWORK FOR OVERALL SAFETY PLANNING

Given the level of priority that National Highways assigns to safety we would expect to see evidence of a decision process in the SBP, and for it to readily provide further detail in supporting documents. An example of such a decision process is presented below:

- Identifying the potential measures at its disposal for improving safety performance.
- Identifying the amount by which an increase in expenditure on a particular type of measure can increase performance of the safety KPI for these measures.
 - This should also identify typical additional impacts, and hence overall typical value for money of these individual measures.
 - It should also identify the quantity of the measure it could be relevant to apply, for example the extent of the network it could be applied to, and how effectiveness of the measure falls away with extension.
- An estimation process for assessing the performance impact of a safety programme, and for forecasting the baseline safety performance before applying any measures, to produce an overall performance estimate for a programme.
- A decision process for deciding how much of National Highways' overall budget should be devoted to safety measures, in comparison to other destinations of National Highways expenditures.
- A decision process for splitting National Highways' safety budget between different streams of expenditure within the overall programme.
- A decision process for selecting individual schemes, measures and actions within each expenditure stream.

In practice, National Highways may negotiate its funding and the application of its funds with its sponsor department, overriding the outcome of such decision processes. Such negotiations would be better informed if the processes were nevertheless carried through.

We now set out to explore the extent to which National Highways has succeeded in creating and implementing such a framework.

2.2.1. Identifying measures at its disposal and cost trade-offs

National Highways employed TRL to produce a study⁷ ("RTZH") which sets out the range of measures available to it. The report considers all possible measures, including those that lie outside National Highways' direct power to influence. The report covers a set of measures that would be implemented over the period from now to 2050, and with a total cost consistent with the funding that might potentially be available over such an extended period. Over a shorter period such as RIS3, we would anticipate a selection should be made consistent with available funds. The report provides information on costing and effectiveness to facilitate that selection.

Table 2 sets out the complete list of prioritised measures, i.e., those which are considered worthwhile from the RTZH report. We have indicated which measures appear to us to be substantially within National Highways' direct ability to deliver (in blue). Other measures that are not in its direct control, it might in principle have some varying level of indirect and/or limited influence, for example through stakeholder engagement.

⁷ TRL (2022), CPR4050 : *Road to Zero Harm: Phase 1 Report – Evidence Review, Initial Stakeholder Consultation, and Modelling of Combined Benefits*.

Table 2: Full list of prioritised measures from the TRL (2022) study (RTZH)

Safe roads	Safe vehicles	Safe speeds	Safe users	Post-crash care
NH COULD INFLUENCE <ul style="list-style-type: none"> • iRAP full programme (BCR>1) • Roadside barriers (BCR1+) • Roadside barriers (BCR3+) • Roadside barriers (BCR6+) • Replace unsafe 'ramped' barrier ends with P4 terminals on roads with speed limit 50mph or more • Centreline rumble strips on single carriageway roads • Central median barrier (1+1) and central median (no duplication) and (2+1) with barrier • Central hatching • Shoulder rumble strips • Protect wooden boundary fences with safety barriers • Install motorcyclist protection system at high-risk locations • Install queue protection 	OTHER MEASURES <ul style="list-style-type: none"> • Driver drowsiness and attention warning (DDAW) • Advanced driver distraction warning (ADDW) • Intelligent speed assistance (ISA) • Emergency lane keeping system (ELKS) • Level 4 automated vehicles • Blind spot assist • Improvements to automated emergency braking (AEB) regulations for large vehicles • Alcolocks for reoffenders 	NH COULD INFLUENCE <ul style="list-style-type: none"> • Variable management speed limits (VSML) OTHER MEASURES <ul style="list-style-type: none"> • Improve compliance with speed limits – average speed cameras • Reduce national speed limit on single carriageway roads to 50mph • Change motorway (and/or dual carriageways) national speed limit to 60mph 	NH COULD INFLUENCE <ul style="list-style-type: none"> • Campaigns on the importance of speed limits • Campaigns to highlight the risks of distracted driving • Campaigns covering the importance of addressing vehicle warning lights, assessing tyre condition, and maintaining a roadworthy vehicle • Awareness campaign/guidance on implementation/enforcement from governing bodies on HSE's 'Driving at work..' guidance • Promote guidance and increased driver training on maintaining the roadworthiness of LGVs/HGVs/vans with operators • Removing unduly distracting safety information messages from variable message signs (VMS) • Detection of handheld device use • Detection of seat belt compliance • Drink-drive checkpoints OTHER MEASURES <ul style="list-style-type: none"> • Hazard perception training for HGV drivers • Stronger licencing improvements to reduce risk for 	NH COULD INFLUENCE <ul style="list-style-type: none"> • Train all National Highways staff on the actions they should take if they encounter a collision • Introduce a programme of continuous improvement focused on road design/maintenance etc. to record and act on lessons learned from collisions • Increase the medical skillset of traffic officers OTHER MEASURES <ul style="list-style-type: none"> • Route casualties to hospitals with appropriate levels of capability • Change the manner in which the FSR approach the extrication of trapped casualties • Increase the standards of bystander first aid and the willingness of bystanders to intervene • Continue the development of eCall as communication technology changes • Introduce mandatory eCall for motorcycles

Safe roads	Safe vehicles	Safe speeds	Safe users	Post-crash care
(MIDAS) on more roads			young and inexperienced drivers <ul style="list-style-type: none"> Changing legal blood alcohol limit while driving from 80mg/100ml to 50mg 	

Source: TRL (2022), CPR4050: Road to Zero Harm: Phase 1 Report – Evidence Review, Initial Stakeholder Consultation, and Modelling of Combined Benefits.

The report estimates the effectiveness of various measures, including their value for money. It only considers value for money from safety benefits, and not from any other costs or benefits which may occur as a result of the intervention. See, for example, Table 3 which classifies quantities of road by the BCR would result from introducing a central barrier of a given standard. It is evident from tables of this nature that the VfM of individual measures has been closely studied by locality. But these are high level estimates, and further detailed studies would be required before intervention, including assessment of other costs and benefits.

Table 3: Effectiveness of a central median barrier

BCR threshold	Length (km)	Estimated cost (£M)	FSI saved per year	Total FSIs on section in before per year	Present value of safety benefits (£M)	BCR	% FSI saving on sections	% of all annual KSIs (2017-19) (unadj)	Start year	End year
1+ (3+, 6+)	310	£111.3M	62	132	£375.3M	3.4	47%	3.2%	3	9
3+ (6+)	170	£37.7M	43	88	£261.5M	6.9	49%	2.2%	3	6
6+	73	£14.9M	28	54	£169.6M	11.4	52%	1.5%	3	4

Source: TRL (2022), CPR4050: Road to Zero Harm: Phase 1 Report – Evidence Review, Initial Stakeholder Consultation, and Modelling of Combined Benefits.

These materials appear to provide National Highways with high level information, enabling prioritisation at an averaged and approximate level, that acts as a useful starting point from which to build a detailed costed safety programme, with a high level of indication that it will be the most effective.

National Highways has developed several funding streams for safety work, as we set out in Table 4. The National Programmes, an important part of National Highways’ safety programme is well developed using these methods at the moment. As we set out in the following chapter, half of the corridor programme has been investigated in detail, and there are candidates with partial investigation for the other half.

Table 4: Funding streams for safety work

Stream	Amount	Effect
Safety National Programmes	£275m	For corridors where treatments will improve the iRAP and attend to specific safety risks. The document separates out £25m for a different purpose, but National Highways have indicated that is no longer the case and the full £275m is for corridor treatments.
Designated Funds, Safety section	£100m	An amount provided and specified by DfT for safety actions not funded by other streams. The actions are divided into four purposes, but we have not been provided with any information on how the funding is split between those four purposes.
Small schemes	£200m	Localised schemes, often developed with local stakeholders, for congestion and safety improvements, often with effect on both. We have

Stream	Amount	Effect
		not been told if there is any intended prioritisation or division of the funding for the two outcomes.
Embedded funding (additional to Small Schemes)	Not specified	This is not an explicit funding stream. We use it to refer to actions within other spending streams of either intended or incidental safety benefit, and which could therefore be identified as safety-related spending.

Source: dSBP Section A Safety and CEPA analysis.

Although National Highways has investigated the measures at its disposal, and the associated cost and VfM trade-offs, it is seeking to improve the evidence through pilot schemes which more directly assess the effectiveness of such measures. But safety schemes take time to demonstrate how effective they are, due to the low rate of accidents on any given stretch of road. So evidence on this will continue to improve for quite some time as data comes in and further early schemes are implemented. The implementation of some measures may require amendments to standards and other administrative instruments, and knowledge transfer to become embedded in working methods.

National Highways has pointed to this limited amount of pilot study evidence as a reason for the incompleteness of its safety programmes. They are waiting for results of pilots to use as an evidence base to firm up the programme for the RIS, especially in spending areas outside the National Programmes. This is also National Highways' reason for the back-end-loaded profile of spending for these programmes.

In our view, pilot testing more novel or less established method has value, but it is likely that some of the activities identified by TRL represent no 'regrets type' choices. For example, iRAP improvements are measures that are already designed into roads elsewhere in the network, tried and tested standards already in much use in the network and subject to much study, including specifically on the National Highways network, and National Highways has already implemented a pilot scheme. Whilst further certainty of cost and impact can be gained with further experience, it should therefore be possible to select lower-risk schemes for earlier implementation on the basis of present knowledge. National Highways has had an extended period of time to choose safety measures to implement during RIS1 and RIS2, and this experience, notably on schemes within the Designated Funds, should inform the choices that it makes now and enable some continuity from the RIS2 Designated Funds programme into RIS3. RTZH, and the other studies cited in RTZH, have improved the evidence available to National Highways. Early implementation of the types of measures identified in RTZH will further improve the evidence over time. Accordingly we consider that there is a case to do more now and take the benefit of earlier improvement in the potential number of KSIs by selecting low-regret elements for early implementation, and using targeted pilot schemes to test actions that can be implemented later in RIS3.

National Highways has also procured a further report from TRL⁸ (the "Impact Report"). The report "focuses specifically on identifying the impact of planned activities on the number of killed and serious injuries (KSIs) by the end of the third road investment period (RIS3)".⁹ It seeks to "understand whether National Highways is making progress towards its KSI elimination ambition, and is likely to achieve its anticipated RIS3 KSI reduction target."¹⁰ The RIS3 KSI reduction target has not yet been set, but the report refers to "a suggested 60% reduction for RIS3", as mentioned earlier. An earlier version of the report, which we were initially supplied with, further set out an additional programme of actions beyond the "planned activities", more nearly to meet the "suggested" 60% reduction.¹¹

TRL assesses the impact of the "currently planned" activities for RIS3, separated into engineering and non-engineering activities, as set out in the table below. We have also set out an alternative version of the table, following that, which rebases TRL's presentation to National Highways forecast of the 2025 starting point, and the

⁸ TRL (2023), *Client Project Report CPR4073: Road to Zero Harm - RIS3 Impact Assessment V2*.

⁹ TRL (2023), paragraph 1.1.

¹⁰ TRL (2023), paragraph 1.3.

¹¹ TRL (2023), *Client Project Report CPR4073: Road to Zero Harm - RIS3 Impact Assessment V1*.

2022 rebasing of the 2005-2009 baseline. The total is a reduction in KSI/yr of 9.0% to 9.2% from the current level of KSI, whatever that might be. The variation represents two scenarios which in practice do not differ significantly. TRL uses a lower prediction of the starting point in 2025 than do National Highways, and we discuss that point later.

Table 5: TRL’s estimates of KSI saved reproduced from the Impact Report

Activity	Estimated % annual KSI savings	Estimated remaining KSIs in 2030 (estimated starting point of 1,728)	Estimated % change from the 2005-09 baseline (3,206)
Business as usual starting point	n/a	1,728	46.1%
Scenario 1	4.3%	1,654	48.5%
Scenario 1 and non-engineering activities	9.0%	1,572	51.0%
Scenario 2	4.5%	1,650	48.6%
Scenario 2 and non-engineering activities	9.2%	1,569	51.1%

Source: TRL (2023), Table 13. The percentage reductions in the lefthand column are measured relative to the present level of KSI, whatever that might be. The nominal levels are calculated by applying those percentages to TRL’s estimated 2025 starting level. The %age reductions in the righthand column are measured relative to the 2021 version of the 2005-2009 baseline of 3,206. Footnote 4 to the table reads “Average reduction of ‘highly deliverable options’ within SOBCs”. Footnote 5 to the table reads “Average reduction for all the other remaining options within SOBCs”.

Table 6: TRL’s estimates of KSI saved, rebased by CEPA for National Highway’s estimated 2025 starting point and the 2022 recalibration of the 2005-2009 baseline

Activity	Estimated annual KSI savings (KSI/yr)	Remaining KSIs in 2030 rebased to National Highways’ estimated starting point of 1,914	Estimated % change from the 2005-2009 baseline, 2022 rebasing, 3,136
Business as usual starting point	n/a	1,914	39.0%
Scenario 1	4.3%	1,832	41.6%
Scenario 1 and non-engineering activities	9.0%	1,742	44.5%
Scenario 2	4.5%	1,828	41.7%
Scenario 2 and non-engineering activities	9.2%	1,738	44.6%

Source: CEPA calculations using TRL and National Highways data. The origin of the 1,914 BAU starting point is set out later.

If we accept National Highways forecast of 1,828 for 2025 and its business-as-usual forecast of 1,914 for 2030 (described in more detail below), then the table above shows the effect of the “currently planned” programme as communicated in the Impact Report for RIS3. We see that, by chance, Scenario 2 engineering measures without the non-engineering activities, also gives an estimate of 1,828.

The “currently planned” programme of engineering measures comprises 18 corridor schemes, essentially the Safety National Programmes as drafted at that point. The two scenarios are for a lesser or larger scale of works in each scheme, but the difference is modest. The Impact Report made individual estimates for about half the schemes, and projected the rest on the basis of achieving the same safety benefit per pound spent.

In addition to these 18 schemes, the “currently planned” programme also includes a range of non-engineering measures. The non-engineering measures appear to represent items that might be included within Designated Funds and what we call have called embedded funding – OMR, central corporate expenditure, etc.

National Highways’ dSBP appears to include all of the “currently planned” engineering measures accounted for by TRL as “currently planned”. But the dSBP also includes additional engineering measures:

- One stream in the Designated Fund (amount allocated to that stream not specified) is for engineering measures to address high accident locations.
- The Small Schemes are for works to address safety and congestion works, and we have been told that all Small Schemes will have some safety benefit. but how it will be divided is not specified.
- Some of the Major Schemes also have safety benefits.

Thus we conclude that the dSBP should have safety benefits from “engineering measures” that are additional to the safety impact of the “currently planned” engineering measures as estimated in the Impact Report.

The Impact Report also indicates a range of “non-engineering” works that are described as “currently planned”, and we would understand from the nature of the report that those are measures that National Highways has instructed to TRL to include as “currently planned” for RIS3. The Designated Fund includes funding for some items like this, but far from all of them. Other items might be included in other spending streams, for some safety activities are included in other spending streams such as OMR, communications, etc. But they are not specified or costed in the dSBP. So we cannot actually see from the dSBP whether that plan proposes to carry out all of the non-engineering activities, or equivalent, described as “currently planned” in the Impact Report.

It might be difficult to calculate an amount of spending on safety when it occurs within a spending stream or through actions that have multiple benefits. It appears that National Highways intends to create an allocation of some form because there are placeholders for presenting the amount of money spent on safety, as opposed to other objectives, it in the dSBP. For example, the sample schemes we have been shown for the Small Schemes cover both safety and congestion benefits. In principle it might be possible to allocate this spending between congestion and safety by a number of methodologies. There is little precedent on best practice on how to do this, since splitting the cost of a scheme between two or more separate objectives, to determine how much is being spent on each, is not a common requirement in regulatory situations in the UK. So we cannot point to a specific method that has been accepted elsewhere. There are however a number of ways it might be done. For example, where a small schemes project delivers both congestion and safety benefits, an allocation could be created by equalising the value for money across the two KPIs.

2.2.2. Outcome modelling

A few years ago, National Highways created a Safety Outcome Model (SOM) for RIS2. It was based upon the assumption that without any safety measures or safety-relevant changes in the traffic safety environment, either by National Highways or external parties, then the rate of KSI per veh-km would tend to remain constant. It then sought to forecast the future safety outcome by taking explicit account of the change in traffic on the network, and explicitly identified measures taken by National Highways, and explicitly identified changes in and other changes in the traffic safety environment due to external effects.

This approach requires explicit identification and measurement of National Highways’ measures and parameters to quantify their effect on the safety outcome. It requires a way of measuring relevant external effects and quantifying their effect on the safety outcome. The model also requires recalibration for the evolution in the KSI measure, for the same reason the 2005-2009 baseline is adjusted. These are not easy tasks. With best efforts there will remain a divergence in the actual safety outcome and the forecast of the model. Some of this will be due to inevitable uncertainty around the data inputs to the model, and some of it due to additional effects not in the model because they are hard to identify or measure.

In the course of this study, National Highways has described to us its development of a new Safety Outcome Model, which, in different documents, is variously referred to as the Safety Forecast Model (SFM) (as in the quotation

immediately below) or the SOM. To avoid confusion, we refer to the newer model as the SFM and the older model as the SOM. In practice, the SFM, at least at this point, estimates a safety baseline rather than an outcome, as it does include the explicit modelling of the impacts of safety measures, neither those selected by National Highways nor those by external parties. Rather those must be separately estimated.

In its dSBP Update of 2 April 2024, National Highways writes that

The Safety Forecast Model (SFM) predicts that without action, KSIs will increase 4.7% over Road Period 3. Based on an assumed 2025 outturn of 1,828, a 4.7% increase gives a forecast of 1,914 KSIs on the SRN in 2030.

It is not clear what level of traffic growth that is based on. We understand that the SFM does require an explicit input of a traffic growth level, rather than making a forecast of it. It would make sense to make transparent what level of traffic growth has been input to come to this forecast of 1,828. It may also be relevant to consider alternative scenarios with different levels of traffic growth, and compare, for example, with government and other notable forecasts. But there are other difficulties with using the safety model forecasts, in that it does not use any information about likely developments in vehicle safety.

The Impact Report, following analysis in RTZH, makes a lower prediction for the baseline:

The combined effect of these four voluntary vehicle safety measures and 'business as usual' activities results in an estimated 2030 KSI number of 1,728.

As RTZH documents, this prediction was made using the SOM. It is not transparent what level of traffic growth this is based on. It would be helpful if this was made transparent, as it might account for a large part of the difference between the National Highways prediction and TRL's. Since the prediction was made using the SOM, it was able explicitly to take account of external effects, which are modelled by the SOM. TRL has evidently predicted the introduction or extension of the four specific vehicle safety measures it has documented there. But it does not identify what impact those measures had on the starting point. separate what is due to traffic growth, or how much the baseline has been reduced for expected vehicle developments. Evidently there might be other external changes of materiality in addition to the four TRL took account of, and the TRL estimate of how those things develop might prove incorrect.

The National Highways prediction of 1,914 for 2030, without measures, does not take any explicit account of any such external effects, as the SFM does not explicitly model external effects. There may be, implicitly, some kind of time trend, but as it is a machine-learning model, it is rather hard to say what it might be doing. If in practice there are known developments in vehicle safety which will roll out in a reasonably predictable way, it might be better to take explicit account of them, rather than use the prediction of a model which does not take account of explicit information about such things.

For the purposes of target setting, it is necessary to compare these distinctive forecasts at the same level of traffic growth, and explicitly consider what adjustments are reasonable for known external effects. This would make it possible to distinguish the implicit effect of vehicle developments and perhaps understand whether the Impact Report is suggesting a faster or slower rate of casualty rate reduction due to such measures than has been recently observed. We therefore suggest that ORR requests National Highways to undertake this exercise as part of the ongoing discussions about target setting.

As for the impact of measures in RIS3, National Highways writes in its dSBP Update of 2 April 2024¹² that its measures will reduce KSIs per year in 2030 from 1,914 to 1,828, i.e, a reduction of 86. It also writes:

- *The investment in National Programmes, Designated Funds and Small Schemes is forecast to save between 62 and 66 KSIs during Road Period 3. This mean that outturn based on this investment would be between 1,848 to 1,852 KSIs in 2030, an increase of around 20 KSIs against the 2025 out-turn.¹³*

¹² dSBP Update of 2 April 2024, para 1.1.5.

¹³ dSBP Update of 2 April 2024, para 1.1.6.

This seems to imply that National Highways intends to deliver a further reduction of 20-24 KSI, on top of the 62-66 it mentions in that paragraph for those three spending streams, to achieve the 86. The breakdown of KSI per year savings that it sets out there is reproduced in Table 7. As that shows, the three expenditure streams mentioned in the above quote only account for 32 to 36 KSI per year of the 62 to 66 mentioned in the quote above, and the additional 20-24 to take it to 86 are not specifically accounted for. National Highways has provided us with some additional information on Major Schemes, suggesting a saving of 28 KSI/yr, but with caveats about the reliability of that figure. In sum, it is not clear to us how National Highways has come to the estimate of a saving of 86 KSI/yr.

Table 7: Breakdown of KSI savings by expenditure stream

Expenditure stream	KSI savings per year by 2030
National Programmes	16 to 18
Designated Funds	About 10
Small Schemes	6 to 8
Subtotal of above	62 to 66 (30 not accounted for)
Major Schemes	Not easily disaggregated
Information and behaviour campaigns	Not easily quantified
Total of all measures	86 (additional 20 to 24 not accounted for)

Source: Collated from National Highways dSBP Update 2 April 2024, para 1.1.6. CEPA comments in italics.

The figure of 86 appears low in comparison to the gains predicted in the Impact Report. In the Impact Report, the Safety National Schemes alone is quantified as providing a safety benefit of 82-86 KSI/yr (relative to National Highways 1914 starting point). We appreciate that the Impact Report did not study the schemes in such detail as National Highways has subsequently been able to, but a question remains as to why the quantum of benefit for the National Schemes is so different. The two specific examples we have been sent, (see section 3.17) although a small sample, suggest, on average, a larger impact per scheme than implied by National Highways present estimate.

Further, the Impact Report set out a programme of non-engineering measures, which was described as “currently planned” for RIS3, and was estimated by TRL as delivering a 90 KSI/yr benefit (relative to the National Highways starting point). It remains unclear to us which of these measures National Highways in fact intends to implement, as they are not specified in any plan, nor in information requests from ORR specifically asking to clarify it.

The Impact Report suggests that there is a potential for the engineering measures National Highways is planning to deliver to achieve more than it estimates, and National Highways is planning to deliver more engineering measures of safety relevance than those in the Impact Report. The Impact Report also suggests the potential to achieve much more through the non-engineering part of activities it asked TRL to assess as part of its “currently planned” activities for RIS3.

There is a suggestion that National Highways feels obliged to continue with test schemes to assess whether in fact such actions do deliver the quantum of improvement the Impact Report suggests. National Highways implies that it will be more certain what is the effective scope of action and what it can deliver. But there are also costs in varying expenditure and activity from year to year and delaying expenditure on safety. There is an issue of balancing what is the present level of uncertainty in such schemes, the costs of demobilising and mobilising teams that are carrying out a stream of work, and delaying the benefits of safety programmes.

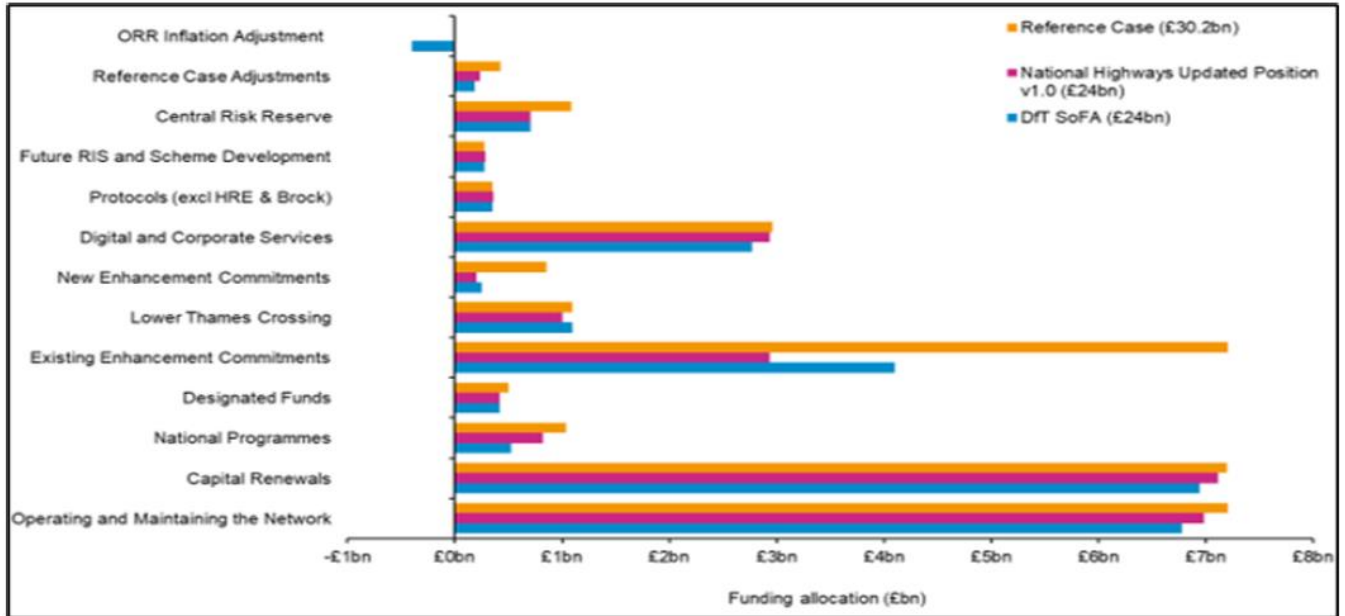
We have set out a more detailed discussion of National Highways’ Safety Forecast Model in Appendix C.

2.3. DECISION PROCESS FOR ALLOCATING BUDGET AT CORPORATE LEVEL

The information provided by National Highways includes no evidence of a decision process on budget development for safety versus other activities. In Section C of the dSBP it is apparent that National Highways has altered its spending allocations as available has changed, and in particular the largest part of the safety programme, the National Programmes, has been reduced proportionately more than other activities that it must undertake. National

Highways suggests that this is likely to improve the value for money of its spending. But there is no discussion of the underlying rationale for spending allocation at different budget levels. It is not clear why national programmes, and within that the safety national programme, has been so substantially reduced.

Figure 1: Proposed RIS3 investment by funding line, current prices



Source: National Highways (2024), Draft Strategic Business Plan - Section C: Investment Plan Analysis.

Whilst there is some implication, though no clear statement, that value for money criteria might have been the origin of the adjustments, other evidence e.g. TRL’s work, suggests that in general the safety-relevant parts of the expenditure have as good or better value for money than any line other than OMR as set out in Table 8 below:

Table 8: Summary of Value for Money of RIS3 by funding line

RIS3 Funding Line	£m	% of funding	Anticipated VfM / Range
Operations & Maintenance	6,567	27%	High- Very High
Capital Renewals	6,942	29%	
Existing Enhancements	3,935	16%	Low-Medium*
New Enhancements	50	0%	TBC
LTC (Development)	1,091	5%	Low
Small Enhancements	250	1%	Medium-Very High**
National Programmes Safety	275	1%	Medium-Very High**
National Programmes Environment	250	1%	Medium
Designated Funds	420	2%	Medium-Very High**
Digital and Corporate Services	2,768	12%	Economically Postive (73%)*** Unknown (27%)
Protocols Excl, (HRE & Brock)	355	1%	Unknown***
Historic Real Estate	107	0%	Unknown***
Operation Brock	26	0%	Poor-High
Central Risk Reserve	703	3%	Unknown
Further RIS and Scheme Development	281	1%	Medium-Very High
Total	24,000	100%	High

Source: National Highways (2024), Draft Strategic Business Plan - Section C: Investment Plan Analysis.

Notes: * Existing Enhancement Schemes vary in their VfM assessment – on average we expect our extended scheme list in the “Do Minimum” Scenario to result in Low VfM, whilst a “BAU” scenario results in Medium VfM assessment.

** The projects funded through these swimlanes vary in VfM. On average they are expected to offer High/Very High VfM and we have a VfM framework in place, alongside VfM escalation procedures, to help ensure that we seek to achieve at least Medium VfM with our investments.

***Digital and corporate services are core to our business. VfM is expected through their enablement of our wider functions and will be ensured through producing business cases to support final spend decisions on better evidence.

In the dSBP update of 2 April 2024, National Highways forecasts only a modest performance improvement as a result of delivering its safety programme, such that it expects to fall well short of the 2025 target by 2030. National Highways has argued that the 2030 target should reflect this forecast. If there were a conscious trade-off taking place between expenditure in other areas, and safety, given its high priority, we consider it would tend to have increased the proportion of the budget allocated to the safety programme, given such a large shortfall from DfT’s suggested target. We understand that the total budget means that National Highways forecasts it will fall short on several of its KPIs. But the shortfall on the safety KPI is large, and if it is National Highways’ highest priority KPI, that would tend to suggest reallocating budget towards that KPI instead National Highways has suggested the target should be reduced consistent with its present programme and performance forecast.

A large part of that forecast underperformance is related to the issue that KSIs are strongly correlated to the traffic level, and the traffic level is substantially outside National Highways’ control. We acknowledge that. But the forecast impact of the measures National Highways is proposing to deliver for the budget is very low. It is unclear why this is the case when the Impact Report that National Highways has itself procured from acknowledged experts has quantified larger impacts, not only for the engineering measures, but also for a programme of non-engineering interventions. We have been unable to discover how much of that non-engineering programme costs, to what extent there is funding for such measures in the appropriate areas of budgets, and the detailed reasons for the large differences in assessment between National Highways and the advice of its chosen expert advisors.

2.4. DECISION PROCESS FOR ALLOCATING BUDGET BETWEEN SAFETY SPENDING STREAMS

National Highways has presented budgets for spending as set out in Table 4 above. There are placeholders in its dSBP to include a quantification where there is no figure in that table. In the specific case of the Small Schemes, there is a budget, but it is for congestion and safety combined, and there is no separation between the two aims.¹⁴ So National Highways does not appear to know at this stage how much it is proposing to spend on safety, and it is unclear how it has divided budget between funding streams.

Section C of the dSBP notes the KSI reductions per £1m of spending by different categories of expenditure, as shown in Figure 2 below. We have been told there is no well-defined scope for many of those expenditure streams, but the reporting of this figure suggests that National Highways does have a good general idea of the impact of the type of safety spending it intends for the different funding streams. It would appear to suggest a reallocation of funds towards the type of activities that National Highways intends for the Designated Funds.

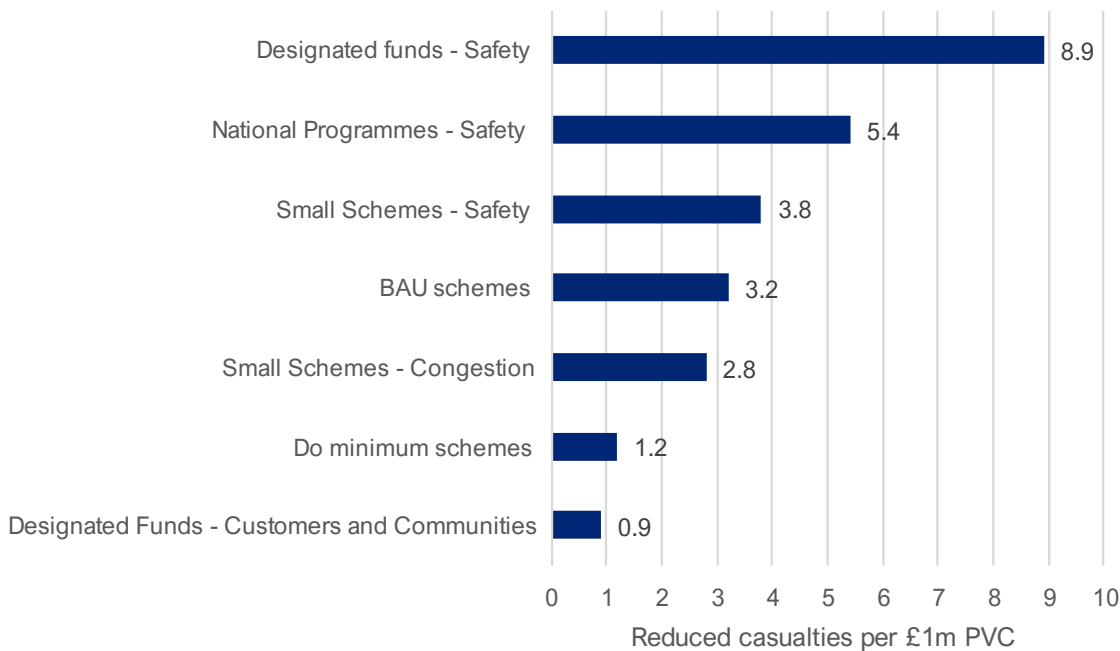
We have been informed¹⁵ that the total KSIs in Figure 2 relate to a time period of 60 years. So to produce a KSI/yr figure using these quantities, they have to be divided by 60. Also, the amount of money is the PVC of the expenditure, not the cash amount. If the PVC is about two thirds of the cash amount, then the quantities in Figure 2 are consistent with the amounts in the first three lines of Table 7 above. National Highways have indicated that the amounts in Figure 2 were assessed by considering samples of schemes within each category. This may be actual delivered schemes in RIS2, such as for Designated Funds, or forecast of proposed schemes, such as for National Programmes and Small Schemes.

It may be the case that the prioritisation of spending might differ from that solely resulting from an analysis of safety impacts, i.e. when other desirable impacts such as congestion relief are taken into account. But it is unclear how National Highways has prioritised expenditure. The Impact Report, consistent with Figure 2, tends to suggest that National Highways could in principle achieve material improvements in its safety KPI by reallocating spending towards activities selected for their safety impact. But in part this arises because of a material difference between the level of impact forecast in the Impact Report and National Highways' scheme assessments for potential future schemes. It is also unclear to what extent National Highways intends to implement the non-engineering schemes in the Impact Report, and what impact it is assuming for them.

¹⁴ In response to ORR Query 127, we were told that the Small Scheme programme is largely still under development, and the two sample schemes shared with us appear to have congestion as their primary objective.

¹⁵ RFI 237 and 238.

Figure 2: KSI reductions per £1m of PVC



Source: National Highways (2024), Draft Strategic Business Plan - Section C: Investment Plan Analysis.

Similar issues apply at a corporate level. If it is the case that certain parts of the programme might be disappointing in their performance relative to others, an explicit decision procedure would suggest moving the money to where it achieves a higher effect per unit expenditure. We see no evidence of a decision process on how to divide available funding into different kinds of expenditure, so as most effectively to maximise performance against the target, in what National Highways has presented to date.

2.5. CONCLUSIONS

We set out below our high level conclusions on whether an appropriate framework for decision-making exists. We make out assessments of the maturity of National Highways’ approach using a RAG rating. The RAG ratings that we have given for each area are necessarily a broad-brush view of a potentially complex situation. Our aim has been that the RAG rating would typically represent the following criteria:

- **Red** – Area is not addressed, or is poorly explained or justified AND is material for the area in question.
- **Amber** – Area is addressed in part, but there are shortcomings in the analysis or evidence provided to demonstrate deliverability or efficiency.
- **Green** – Area is sufficiently addressed AND evidence or analysis provided gives confidence in deliverability or efficiency.

Table 9: RAG rating summary of National Highways’ framework for decision making

Issue	Maturity RAG	Comment
Identifying the potential measures at its disposal for improving safety performance	Green	The RTZH acts as a foundational piece of work that rationally identifies the measures available to National Highways to improve safety performance.
Identifying the trade-off between cost and impact	Amber	The RTZH sets out such a trade-off. But in practice such measures are relatively little tested on the National Highways network, and National Highways believes it is important to

Issue	Maturity RAG	Comment
on performance for these measures		carry out pilot projects to test the practical effectiveness, which will indeed contribute to more effective spending in future. But there appears to be sufficiently good basis in what is already done for making decisions on early spending, even if it might be refined later.
An estimation process for assessing the performance impact of a safety programme, and for forecasting the baseline safety performance before applying any measures, to produce an overall performance estimate for a programme	Amber	The SFM is a model for assessing the baseline, but it lacks transparency. What is needed for a funding discussion and a spending programme decision is a model that separately assesses the effect of measures applied by National Highways (past and future), traffic growth, and external effects. It is unclear to what extent National Highways' "business as usual" prediction for 2030 takes account of external effects.
A decision process for deciding how much of National Highways' overall budget should be devoted to safety measures, in comparison to other destinations of NH expenditures	Red	We have no evidence of such a process, and response to changes in budget belies the lack of such a process. National Highways appear to have the materials necessary to create such a process.
A decision process for splitting National Highways' safety budget between different streams of expenditure within the overall programme	Red	We have no evidence of such a process, and lack of response to materials on effectiveness of spending by funding stream belies the lack of such a process. National Highways appear to have the materials necessary to create such a process.
A decision process for selecting individual schemes, measures and actions within each expenditure stream	Amber	This is considered in the later parts of this report. There we see evidence of such a process in National Programmes, which is a major part of the safety programme. But there is little evidence of it in other areas of expenditure.

We set out our conclusions on the high level questions we set at the start of the chapter in the following table, using the same RAG maturity ratings.

Table 10: RAG rating summary of National Highways' plans compared to the high level questions

Issue	RAG	Comment
Has National Highways identified and considered the full range of levers at its disposal?	Green	The RTZH report achieves that.
Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has	Red	There are some elements of prioritisation, but in key areas prioritisation is absent. We see no evidence of a decision process for deciding how much to spend on safety as opposed to other objectives, nor on how to divide its safety budget into streams. National Highways appears to be unhappy with the available evidence in some areas and

Issue	RAG	Comment
National Highways made best use of available evidence in doing so?		rather than using the best available evidence for now and improving it later, is choosing to delay making decisions until it has improved the evidence.
Has National Highways considered the underlying trends in safety, as well as potential headwinds and tailwinds that may influence its performance against the KSI target?	Amber	The SFM is an explicit attempt to do so in a statistical way, and RTZH sets out the external safety environment in an explicit way. But the SFM does so in a non-transparent way, and predicts the future rather than using information about the future from RTZH.
Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?	Red	National Highways has presented estimates of the impact of some of its safety actions. But it is unclear how it has done it, it does not appear to cover the entire programme, and is inconsistent with the estimates in the Impact Report.

3. SAFETY NATIONAL PROGRAMME

The Safety National Programmes presents a £275m budget for a set of schemes focusing on safety improvements on non-motorway roads within National Highways' network, mostly single carriageway A-roads. Although this is shown as broken down into two pots of £250m and £25m in the dSBP,¹⁶ National Highways has clarified to us that it comprises a single pot of £275m for the corridor schemes as set out there.

National Highways' 2020 Road Safety Performance Overview (July 2022) notes that the KSI rate per vehicle-km is approximately five times on its single-carriageway A roads than on its other roads. A substantial fraction of the total KSIs on National Highways' network occur on these roads. The research in the RTZH appears to indicate that some relatively modest in price upgrades are capable of reducing the casualty rate on these roads by a useful amount, at a much lower spend per KSI reduced than on motorways and similar. We consider it plausible that a programme of improvements on these roads may make a material reduction in the safety KPI for relatively modest expenditure. Both RTZH and the Impact Report bear this out.

National Highways has presented documentation for its National Programmes to us listing 18 corridor schemes. National Highways presentations to us indicated that as of early 2024 it had carried out relatively detailed studies for nine, and will study a further nine, and also prepare some reserve schemes. The wording in the dSBP Update of 2 April 2024 suggests that 18 schemes will be delivered. National Highways are developing a number of reserve schemes which may be substituted if any of the 18 may be underperforming. For example, where there are other works proposed for the same location, it makes sense to carry them out at the same time to reduce delay. We have been told that there are suitable candidate reserve schemes which would appear to have a similar safety performance and value for money.

The dSBP update of April 2024 suggests that the 18 schemes will produce a KSI saving per year of 16 to 18. We have been told¹⁷ that this was computed on the basis of the KSI saving from the first 7 schemes that have been studied in relative detail, and then extrapolating for the full 18 schemes. National Highways have told us¹⁸ that the figure of 16 to 18 reflects "core" scheme benefits, which does not include the benefits of any speed management, where guidance is being developed. It is unclear if and how the benefits of such anticipated speed management is included in National Highways' projections of performance discussed in the previous chapter.

In the remainder of this section we consider the following questions.

- Has National Highways identified and considered the full range of levers at its disposal?
- Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?
- Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?
- Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?
- Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?

3.1. ROUTE TREATMENT SCHEMES

National Highways is proposing to undertake a programme of route treatments as part of its Safety National Programme in RIS3. The programme documentation identifies a candidate list of interventions along 18 route

¹⁶ National Highways (2024), *Draft Strategic Business Plan - Section C: Investment Plan Analysis*.

¹⁷ RFI 236.

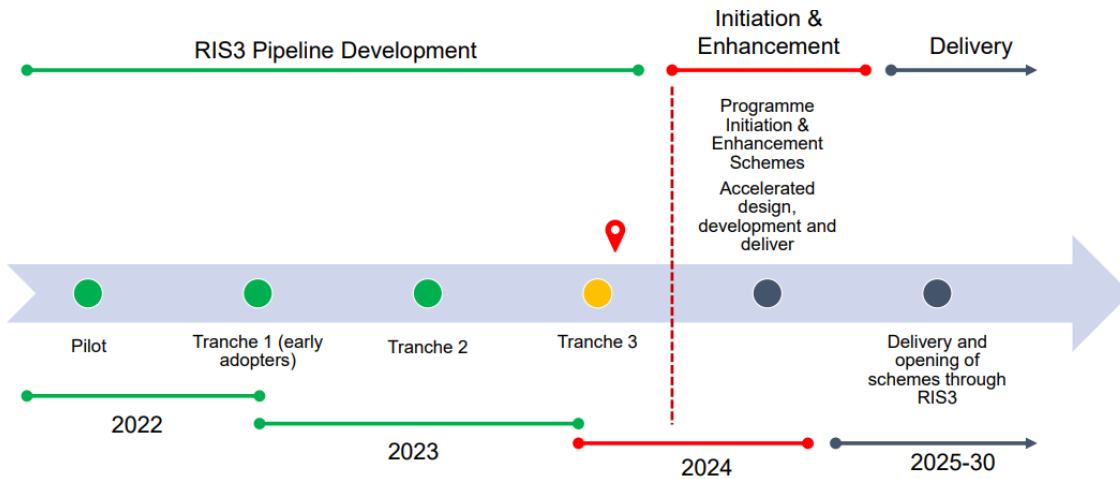
¹⁸ From comment on an earlier draft of this report.

corridors with poor safety performance determined by a high collective risk and high individual risk.¹⁹ The route treatment schemes have been allocated £250m of the total funding for the Safety National Programme (£275m).

The schemes are typically made up of a number of small interventions, such as crash barriers, vegetation clearing, improvements to signs, road markings, junction improvements and cycle crossings.²⁰ Given the small scale of the planned interventions, the schemes are suitable for delivery by regional operations teams.²¹

National Highways is currently developing a pipeline for the programme, with the development of nine schemes completed and the rest being finalised, as shown in Figure 3 below.²²

Figure 3: Timeline for Route Treatment schemes



Source: National Highways (2024), National Programmes – Safety, slides provided by National Highways.

3.1.1. Pilot scheme

National Highways has carried out a pilot scheme on the A595 (southern section) between Broughton-in-Furness and Calder Bridge. The outcomes of this pilot scheme have assisted in the prediction of the likely benefits of future schemes. Whilst the pilot scheme in principle improves our certainty of the performance of these schemes, in practice it remains relatively uncertain, as reflected in the wide error margins reported for corridor schemes in the Impact Report. This is due to:

- The pilot scheme is recent and KSI per year are low, so it will take time for statistical trends to be observed.
- The pilot scheme uses location specific measures and other schemes might use a different distribution of measures.
- The Impact Report is a relatively high level report, studying the corridors in much less detail than the studies mentioned below.

But in principle the pilot scheme has demonstrated the value and feasibility of these schemes to achieve useful safety benefits.

3.1.2. Scheme selection

National Highways has selected schemes for the route treatment programme based on crash density (collective risk), the International Road Assessment Programme (iRAP) star rating, potential value for money, and the need for a regional balance in the portfolio.²³ The iRAP star ratings reflect individual risk based on the features and

¹⁹ National Highways (2024), Draft Strategic Business Plan - Section A: National Programmes.

²⁰ National Highways (2024), Draft Strategic Business Plan - Section A: National Programmes.

²¹ National Highways (2024), National Programmes – Safety, slides provided by National Highways.

²² National Highways (2024), National Programmes – Safety, slides provided by National Highways.

²³ NH (2022), Study Group 4 Corridor Selection Approach: Technical Note.

characteristics of the road and tend to correlate with historic crash rates.^{24,25} iRAP assigns a rating between one and five, with highest risk roads being 1-star rated.²⁶

National Highways has begun scheme selection by identifying routes with the highest risks, based on crash density and the iRAP rating, which “results in a selection of corridors that have a high potential for casualty reduction (as indicated by the high crash density) along with high potential for upgrade (low star rating)”.²⁷ Other factors are also relevant in the selection.

- **Tranche 1 schemes** are identified as high-priority routes due having the poorest safety performance, i.e., less than 3-star iRAP rating and a ‘medium’ or a ‘medium-high’ crash density.²⁸
- **Tranche 2 schemes** have a ‘low-medium’ crash density and crash rate (typically 1-2 star iRAP rating).²⁹

National Highways has also undertaken a qualitative assessment to achieve regional balance and to ensure the list does not contain routes which overlap with other RIS2 schemes.³⁰ Regional Operations teams have been included in the development process for all schemes to ensure deliverability.³¹

Regarding value for money, seven schemes have been appraised at time of writing, with most classified as high or very high value for money. The threshold for funding schemes is medium value for money.³²

National Highways has noted that the scheme selection is not final; some corridors may be removed if the benefits are not high enough. In that case, National Highways has two schemes in a reserve list and some of the corridors in the current list may be extended. In addition, National Highways pointed out that it is difficult to achieve a good iRAP rating for a dual carriageway – single carriageway corridors are more likely to end up on the programme.³³

3.1.3. Cost estimation

Early-stage cost estimates have been produced for the schemes, using the following assumptions:

- The schemes will be delivered by the Operations Directorate’s regional teams and follow a shortened delivery process.
- Item rates from the Scheme Delivery Framework (SDF) and the Strategic Estimating Model are used for direct works costs based on the pilot scheme (A595). Indirect costs are applied as a percentage of the direct works.
- Pre-construction costs are based on stage duration.
- Land costs are based on the works and location.
- A risk allowance of 30% of the base estimate has been applied. However, scheme specific risks and uncertainties (for carbon reduction and use of white diesel) lead to the risk allowance to exceed 30% for all early-stage estimates. Optimism bias is assumed to be within the risk allowance.³⁴

Per scheme costs depend on the length of the corridor but are typically expected to be less than £20m.³⁵

²⁴ TRL (2022), *CPR4050 Road to Zero Harm: Phase 1 Report – Evidence Review, Initial Stakeholder Consultation, and Modelling of Combined Benefits*.

²⁵ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

²⁶ National Highways (2024), *Draft Strategic Business Plan - Section A: National Programmes*, p. 27.

²⁷ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

²⁸ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

²⁹ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

³⁰ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

³¹ National Highways (2024), *Draft Strategic Business Plan - Section A: National Programmes*.

³² National Highways (2024), *Draft Strategic Business Plan - Section A: National Programmes*.

³³ Meeting with NH.

³⁴ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

³⁵ National Highways (2024), *National Programmes – Safety*, slides provided by National Highways.

The A36 scheme covered in the case study (Appendix A) shows a very wide range of costs, with a factor of more than six between maximum (P97.5) and minimum (P2.5) cost. We would not expect the costing for schemes of this size to be studied at the level of detail for major schemes, given the relatively modest costs. But we would expect that many of the costs would be well known to National Highways and that, as a result, the range on the estimate would not be so wide. It may be that the extensive vegetation clearance requirement is contributing to the large cost variation in this case, as it may be unknown to the costing whether that is mowing grass or felling trees. That would also have a knock-on effect on traffic management, which is typically a large part of the cost of smaller schemes. This may be an unfortunate example, but it suggests that there may be some concerns over costing of the schemes. National Highways have told us that budgeting for the programme is based on P70 costs, and they expect there to be sufficient funds for the programme including risk allocation.³⁶ We suggest that ORR monitors these schemes closely to ensure that reasonable estimates are used within the national programmes budget.

3.1.4. Expected outcomes

National Highways has aimed to select a set of interventions for each corridor, modelled within the iRAP's Route Review Tool, which is part of the ViDA software platform, to estimate the resulting improvement in the star rating and reduction in KSIs.³⁷ The tool allows users to choose a particular section of the SRN, and the software suggests safety improvements (called countermeasures) that could be used to improve safety on the chosen section. The software also provides an estimate of the cost of the interventions and the expected impact on FSIs.³⁸ National Highways has then used engineering judgement to evaluate suitability of the interventions in terms of their ability to resolve the identified risks and deliverability in the location. National Highways has also considered the potential to enforce or lower speed where the interventions could not address the issues.³⁹

In addition, National Highways has considered opportunities for delivering additional benefits beyond safety and journey time, including addressing existing issues such as drainage, opportunities to enhance public transport and wider benefits to communities and environment.⁴⁰

Outcomes have been analysed for nine corridors (expected outcomes below in Table 11) and is ongoing for the remaining corridors.⁴¹

³⁶ Comment on an earlier draft of this report.

³⁷ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*

³⁸ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Combined Modelling and Appraisal Report*.

³⁹ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁴⁰ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁴¹ National Highways (2024), *Draft Strategic Business Plan - Section A: National Programmes*.

Table 11: Expected outcomes for the first nine Route Treatment schemes

Summary of treatment types and outcomes for initial nine studies	
Treatment types	
Safer road sides	70km
Areas of improved road markings	379
Areas of roadside cleared of overgrown vegetation	368
New warning signs	182
Upgrades to pedestrian crossings	44
Junction improvements	17
Predicted outcome on the SRN	
Lives saved	57
Fatal and serious injury savings	435
Total casualties avoided	2,688
Average BCR	4.14 – Very high VfM

Source: National Highways (2024), Draft Strategic Business Plan - Section A: National Programmes.

National Highways commissioned the Impact Report from TRL, which estimates the safety benefits of all relevant “currently planned” activities for RIS3, including the route treatment schemes.⁴² This suggests an impact of 82-86 KSI/yr saved from the National Programmes. This is based on a higher level assessment that the subsequent work National Highways has carried out. National Highways has also implemented a pilot scheme which might improve its evidence base, on the A595 (southern section).⁴³

In the dSBP Update of 2 April 2024, National Highways suggests that the National Programmes might deliver a reduction in KSI per year by 2030 of 16 to 18. We have been told this is calculated by extrapolation from calculations such as shown in Figure 4 above. This shows an estimate of 435 total KSI saved for 9 corridors. As these schemes are assessed over 60 years, this is equivalent to 7.25 KSI/yr. We observe that the two sample schemes we have been shown, the A36 and the A595 (north) appear to state that they will save 2 and 0.9 KSI per year respectively, which is a large proportion of 7.25 for just 2 schemes. The A595 (north) analysis also shows an uncosted Scenario 2 with 4 KSI per year saved. These numbers appear more consistent with the estimates in the TRL report. As we noted above, the estimates for the National Programmes which National Highways is currently presenting may exclude the effect of additional measures such as speed management.

3.1.5. Key risks

In the dSBP, the following risks relating to the Safety National Programme are outlined:⁴⁴

- **Meeting Carbon Reduction targets:** The challenge to meet the target is not yet known, as baselines for carbon have not been set.
- **Inflation and rising costs of materials:** An assumption of SoW of April 2028 with a 12-month construction duration has been used in cost estimation.
- **Focus on Operations, Maintenance and Renewals:** The SoFA set out by Treasury shows a shift in spending towards maintenance, particularly Asset Renewals, which means lower capacity to deliver the wider portfolio.

⁴² National Highways (2024), Draft Strategic Business Plan - Section A: National Programmes.

⁴³ TRL (2023), Client Project Report CPR4073: Road to Zero Harm - RIS3 Impact Assessment.

⁴⁴ National Highways (2024), Draft Strategic Business Plan - Section A: National Programmes, p. 33.

The programme of route treatments is considered to have low risks to deliverability by National Highways.⁴⁵

3.1.6. Programming

The year by year spend shows a back end loaded profile of expenditure, with only a small spend in Year 1 of the RIS. This suggests that, despite the detailed studies, and the pilot scheme, National Highways is not ready to deliver these schemes from the beginning of the RIS.

Table 12: Spend profile for National Programmes

	25/26	26/27	27/28	28/29	29/30	Total
Safety	5	25	75	100	70	275

Source: dSBP Financial Model, as quoted in meeting notes for RIS3 Safety – National Programmes and Designated Funds ORR dSBP Briefing Feb 2024.

3.1.7. Case study

We were provided with two sample schemes as potential case study material – the A36 and the A595 (northern section, north of Calder Bridge) and chose to study the A36.

We find this clearly sets out and justifies safety benefits of two scenarios, which respectively are estimated to reduce KSI per year by 2.0 and 2.5. Since the additional cost of the second scenario is large, the first scenario was chosen. If the average scheme delivered a saving of 2.0 KSI per year, then the Safety National Programmes would exceed its forecast impact.

This particular case study raised a concern about costing. A range of costs is indicated in each scenario, and the higher cost estimate (P2.5) is, in each case, more than six times the lower cost estimate (P97.5). There is no indication of why there is such large uncertainty in costs. In the lesser scenario, a large part of the works are vegetation clearance, and uncertainty over the vegetation to be cleared and on-going maintenance might be a cause of large cost uncertainty. But the additional works in the larger scenario are more typical engineering works whose costs should be better known, although there is some land take required.

The details of A595 (north) we were also provided show firm costs estimates. At under £6m this scheme would be less than half the cost of an average scheme if £250m is to deliver 18 schemes. The KSI per year saved is estimated at 0.9 for Scenario 1 and 4.0 for Scenario 2. But Scenario 1 is used as the basis for costing. The first is consistent with the average impact per scheme, but Scenario 2 presents the possibility of achieving much more, although we do not know at what cost.

As one of the two schemes we have been shown has such large uncertainty over cost, and the second is considerably less costly than the average, we are concerned about the reliability of the estimates that National Highways includes in its dSBP. As mentioned above, National Highways is using the P70 cost to cost the programme, and is confident it is deliverable within the overall budget. The higher estimates may relate to the additional measures, which are not currently included in National Highways’ modest estimates of the overall KSI/yr performance of the programme, which appears to suggest a potential large up-side to the performance if these additional measures can be delivered within the programme budget.

3.2. CONCLUSIONS

We set out the questions we asked above, and propose maturity ratings in relation to the questions below.

Table 13: RAG rating summary of National Highways’ plans for the Safety National Programme

Issue	Maturity RAG	Comment
Has National Highways identified and considered	Green	National Highways has commissioned research and made considerably detailed studies of the potential measures that

⁴⁵ National Highways (2024), *National Programmes – Safety*, slides provided by National Highways.

Issue	Maturity RAG	Comment
the full range of levers at its disposal?		can be applied to these types of schemes to improve safety performance.
Is there a coherent logic to how National Highways has included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?	Green	The studies for the individual corridors consider in great detail which actions will provide value for money and which will not, and achieve improvement in safety. A pilot study has improved the evidence, but the quality of evidence will improve. Whilst the programme is not fully studied, and National Highways retains options, around about half of the programme appears settled now, and other parts are being developed. What might be proposed for the IRAP countermeasures part of the budget is not described.
Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?	Amber	National Highways has costed the more fully developed schemes using its internal knowledge of the costs of these actions. As these are smaller schemes, it is not costed in the level of detail of larger schemes. There is some evidence of wide ranges of costs, possibly where uncertainty over local conditions affects the costing.
Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?	Amber	The individual schemes, where these are fully worked up, present plausible estimates, although possibly without an appropriate range of uncertainty, and at a low end in comparison to the range shown in the Impact Report. The estimate of 16 to 18 KSI reduced per year by 2030 is unambitious. We have been told there are additional benefits available that are not included in this figure.
Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?	Amber	The back end loading and small spend in year 1 suggests that National Highways is not ready to deliver these schemes, and still needs to build its capability to deliver schemes of this type in the quantity in the programme.

Our overall maturity assessment for the Safety National Programme is as follows.

Stream	Amount	Maturity RAG	Effect
Safety National Programme	£275m	Amber	18 corridor schemes where treatments will improve the IRAP and attend to specific safety risks, and a further £25m whose scope is undefined. A pilot is asserted to validate the approach. 9 are well studied with detailed scope and costing, and 9 are identified for detailed study. But there is scope for substituting alternative corridors. Costing uses the standard internal cost estimator. We have not been shown an evidenced and plausible estimate of the effect of the schemes in terms of KSI per year by 2030.

4. SAFETY DESIGNATED FUND

The Safety Designated Fund presents a £100m budget for additional actions. RTZH distinguishes engineering and non-engineering actions, and actions funded by the Safety Designated Fund fall into the latter category, but this is not really an accurate distinction as in practice engineering actions are included.

The £100m budget has been specified by government, and so its size is not at the discretion of National Highways. But it is National Highways' task to identify the most effective use of the funding.

In this section we consider the following questions, specifically in relation to the DF.

- Has National Highways identified and considered the full range of levers at its disposal?
- Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?
- Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?
- Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?
- Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?

4.1. ASSESSMENT

The dSBP specifies that the Safety Designated Fund will concentrate on the following types of action, albeit that we have been provided with no specified or suggested division of the budget between them.⁴⁶

⁴⁶ Suicide reduction is of social value, and we would expect stakeholders would approve of funds being applied in this way. But the form of suicides that spending can practically seek to reduce (e.g., jumping from bridges) are not included as part of the KSI measure. So spending on suicide reduction will not contribute materially to the safety KPI, except to the small extent there may occasionally be secondary casualties. It may have a larger effect on delay measures. It is understandable why it has been included in the safety Safety Designated Fund, but doing so gives the appearance of part of the funding being used for a purpose that does not improve safety performance. There may be a better place within the budgets for these actions.

Figure 4: Themes for the Safety Designated Fund



Source: National Highways⁴⁷

The dSBP sets out that the £100m will be spent with a back end loaded profile, with three times the spending in later years than the first year. National Highways tells us that this is because it is now spending the remaining part of the RIS2 designated fund in a more scientific way. It will need to see the results of that to be able to decide how it should best spend the fund for RIS3. Some spending may be reactive to later findings. National Highways is apparently unwilling or unable to maintain a pipeline of spending into RIS3 on the basis of what it is currently spending. This raises questions about deliverability, given the impending hiatus in delivery of actions.

Table 14: Spend profile for the Safety Designated Funds

	25/26	26/27	27/28	28/29	29/30	Total
Safety	9	14	22	26	30	100

Source: dSBP Financial Model, as quoted in meeting notes for RIS3 Safety – National Programmes and Designated Funds ORR dSBP Briefing Feb 2024.

The Impact Report assesses the “non-engineering” programme of spending within the “currently planned” activities for RIS3. It assesses this will deliver an improvement of about 90 KSI/yr. This includes items which could be funded by the Safety Designated Fund. But we have no confirmation from National Highways what it intends to deliver of the programme set out in the report, or which funding streams those items will be delivered through.

We have little further information. National Highways has a section relating to the Safety Designated Fund within the dSBP. It sets out how in RIS2, there was a joint safety and congestion fund of £140m. National Highways has not assessed there what contribution this is likely to make to improving the KPIs within RIS2 for either safety or congestion.

National Highways tells us that it cannot specify its RIS3 programme until it has completed assessment of actions it is currently taking within RIS2. We therefore asked it to tell us what it is doing in the later part of RIS2 and what kind of effect it expects this to have, so that we might understand what it estimates the actions in the later part of RIS2

⁴⁷ National Highways (2024), RIS3 Safety – National Programmes and Designated Funds ORR dSBP Briefing February 2024

might achieve. We have been given no more than a list of schemes, whose general character appears, from their titles, to be similar in scope to the types of schemes in the figure above. But it provides none of the detail that would enable us to assess the impact and cost, or compare it with the Impact Report.

The dSBP Update of 2 April 2024 suggests that the Safety Designated Fund will achieve an improvement in KSI of about 10 per year by 2030. We have been provided with a quantified assessment as to what is estimated it might achieve essentially in the form of the following summary statement, “the average safety scheme was expected to prevent 8.9 KSI casualties per £m of PVC”.⁴⁸ We are informed this is based on studying 42 schemes funded by Designated Funds in RIS2.⁴⁹ We have set out in Section 2.2.2 above that this appears to be consistent with the estimate of 10 KSI per year.

In summary the estimate of “about 10” per year by 2030 in the dSBP Update of 2 April 2024 appears lacking in ambition.

4.2. CONCLUSIONS

We set out maturity assessments in relation to the principal questions we asked.

Table 15: RAG rating summary of National Highways’ plans for the Designated Funds

Issue	Maturity RAG	Comment
Has National Highways identified and considered the full range of levers at its disposal?	Green	Through its work in RIS2 and the RTZH and Impact Reports, National Highways appears to have identified and considered the full range of levers at its disposal.
Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?	Red	National Highways has no detailed scope for the DF, except by mentioning four broad categories of expenditure. National Highways proposes to determine a scope later on the basis of results of actions in the later part of RIS2.
Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?	Red	National Highways has no scope for the DF that it has costed, only a budget figure. National Highways proposes to determine a scope later on the basis of results of actions in the later part of RIS2.
Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?	Red	The estimate of “about 10” KSI saved per year is unevicenced. It appears inconsistent with evidence we have been given, and could be a misprint.
Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?	Red	There is no programme as such at the moment. The back end loading and small spend in year 1 suggests that National Highways is not ready to clarify and deliver these actions from the start of RIS3. As such, it presents a hiatus in the pipeline of projects between the completion of RIS2 DF scope and initiation of the

⁴⁸ NH response to Query Reference 126.

⁴⁹ RFI 238.

Issue	Maturity RAG	Comment
		RIS3 scope. That hiatus is concerning for the damage it might do in terms of the delivery capability.

Overall maturity assessment:

Stream	Amount	Maturity RAG	Effect
Designated funds	£100m	Red	The amount is purely budgetary and has no scope attached. It is asserted in general that such a sum can achieve substantial safety benefit, but the estimate presented is unevidenced and inconsistent with other evidence we have been shown. Pilot actions are in progress, under RIS2 DF, to attempt to validate the approach. But there will be a hiatus between the completion of these actions and RIS3.

5. EMBEDDED FUNDING

Safety benefits will be delivered by actions which are embedded within and funded by other spending areas which are not explicitly or solely for safety. National Highways has identified £200m for Small Schemes, which encompasses both safety and congestion. Individual small schemes may have both safety and congestion outcomes targeted, and typically will impact both but in varying proportions. For example, as shown in Figure 2, National Highways indicates that it expects Small Schemes focused on congestion to deliver a reduction of 2.8 KSI per £m spent over 60 years, in comparison to 3.8 for Small Schemes focused on safety.

Further actions with safety benefits will take place within the Major Schemes, OMR, Corporate and Digital & Technology spending streams.

We consider the following questions in relation to these spending streams.

- Has National Highways identified and considered the full range of levers at its disposal?
- Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?
- Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?
- Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?
- Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?

5.1. ASSESSMENT

5.1.1. Small Schemes

National Highways has told us that the scope of Small Schemes “is still in development and a finalised list of candidate locations is yet to be confirmed.”⁵⁰ A selection process for shortlisting and evaluating candidate small schemes is well underway.⁵¹ But we have no details of these, aside from two proposed schemes, the A1M Junction 62 and M62 Junction 26, where we have been given considerable detail.

We provide a case study on the M62 Junction 26 in Appendix B. We chose a case study on this scheme because it had richer safety information than was the case for the other scheme. National Highways suggested to us in a meeting that Small Schemes in part aim to address the concerns of local stakeholders, and these concerns are not always exactly aligned with National Highways’ performance measures, albeit that National Highways tells us that schemes do not present an acceptable business case unless they provide sufficient performance benefit.

We were not able to assess the safety benefits of the M62 Junction 26 scheme due to limited information around the benefits and the failure to indicate the units they are provided in. We do not find an assessment of safety benefit in terms of the KPI measure because the saving of 0.6 per year probably refers to 0.6 collisions of average severity, which therefore includes ‘slight’ severity collisions. The safety benefit is assessed as a sum of money in the first year, which, by reference to TAG rates, indicates that it is the equivalent of about 0.3 serious injuries. Since the safety benefit is less than 10% of the congestion benefit, it appears that this particular scheme is mainly about the congestion benefit.

⁵⁰ ORR Query Reference 127.

⁵¹ Comments in response to an earlier draft of this report.

It appears that these two sample schemes provided to us have primarily been selected on grounds of congestion benefits. Safety benefits could also be material in other schemes, given the average rates of safety benefits indicated in Figure 2, which we quoted above, which suggests that, on average, congestion-focused schemes give safety benefits not much less than safety-focused schemes, albeit that seems not to be the case for the sample scheme we examined above.

National Highways used information from the long-listing materials for the small schemes to assess average safety performance per pound spent. “14 of the selected schemes had a primary measure of addressing Safety and 19 had a primary measure of addressing Congestion. The Safety projects were expected to prevent an average of 5 KSIs over the RIS3 period and the Congestion projects an average of 3 KSIs saved over the RIS3 period (2025-2030).”⁵² An average rate for each category per £ PVC was estimated by taking the KSI saved over the 60 year appraisal period and dividing by 60.

Overall, National Highways does not yet appear to have assessed in detail the safety KPI benefit of small schemes, nor considered the extent to which it could focus on safety benefits in such schemes. The safety benefit impact of Small Schemes per £m shown in Figure 2 is low, and it would appear that more effective ways of spending safety money are available. National Highways does not appear have assessed how expenditure should be traded off between congestion benefits and safety benefits. It is therefore unclear what proportion of the budget is allocated for safety as opposed to congestion improvement.

In the dSBP Update of 2 April 2024, National Highways presents the KPI benefit of the Small Scheme to be 6 to 8 KSI per year, based on the average rates in Figure 2. National Highways has explained that the 16-18 figure estimated on the same basis for the National Programmes is only “core” benefits and substantial further benefits may in practice be available if the scheme is enhanced to obtain further safety benefits, such as through speed management measures. We are unaware if there is potential for enhancing the safety benefits of these schemes. The case study of the National Programmes corridor type schemes suggests that just two or three corridor schemes could provide safety benefits on this scale, at much more modest cost than the Small Schemes.

5.1.2. Other embedded expenditure

Other expenditure schemes can potentially deliver material safety benefits. We have been provided with material that implies an estimate of 28 KSI/yr that might be saved collectively by the Major Schemes.⁵³ We have been warned that estimating the safety effect of major schemes is confounded because of the major effect on traffic over the wider road network such schemes can have, and casualty savings may occur to some degree on local roads. This can have a confounding effect, and this is the reason this figure has not been explicitly taken into account in predicting the safety performance.

The Impact Report mentions various “non-engineering measures” of substantial impact from the “currently planned” activities of RIS3, that could in principle fall within these spending streams, and also partly within the DF, with substantial benefit for the safety KPI, and that is apart from the Major Schemes which are likely to also have some safety benefit. National Highways has not indicated which measures in the Impact Report it intends to implement.

In the dSBP update, there is an implication of 20-24 KSI per year savings by 2030 from measures in these expenditure schemes (see Table 5 above). This is unevicenced, and there is no specification of what actions it might come from. There is an implication that some of this reduction will come from the Major Schemes. In view of the scope for KSI reductions by non-engineering measures quantified in the Impact Report, such a figure appears to be unambitious.

⁵² RFI 237.

⁵³ RFI 239. The spreadsheet gives an estimate of the number of casualties saved over the 60-year appraisal period, in three categories. We have added together the killed and seriously injured and divided by 60 to come to 28. This appears to be the same calculation method National Highways has used to obtain similar figures.

5.2. CONCLUSIONS

We set out maturity assessments in relation to the principal questions we asked.

Table 16: RAG rating summary of National Highways' plans for embedded funding

Issue	Maturity RAG	Comment
Has National Highways identified and considered the full range of levers at its disposal?	Amber	National Highways has commissioned research into the levers it might apply at a high level. But we see little evidence of it assessing what levers it might apply within the embedded funding.
Is there a coherent logic to how National Highways have included and prioritised those actions within its safety improvement plans? Has National Highways made best use of available evidence in doing so?	Red	National Highways has not set out any scope for this, except by exhibiting a couple of Small Schemes under development. National Highways proposes to determine more completely a scope for Small Schemes later, but has not set out what priority it is giving to safety within that, nor what kind of safety measures it might fund. In other embedded streams, we have no evidence at all.
Has National Highways appropriately costed the actions that it has proposed (and those that it has rejected)?	Red	National Highways has costed the two sample Small Schemes using its standard costing methods, but this would require an allocation to assess how much is being spent for the safety benefits. In other streams, we have no evidence at all.
Has National Highways developed plausible estimates of the impact on safety of the actions that it has proposed (and those that it has rejected)?	Red	The implicit estimate of 20 to 24 KSI saved per year by 2030 (see Table 5) is unevidenced. In view of the inconsistencies in the presentation, it might even be inadvertent.
Has National Highways considered and reflected the resources required (including time) to deliver the actions identified?	Red	We have no evidence.

The overall maturity assessment is presented in Table 17 below.

Table 17: RAG ratings for the overall maturity assessment of National Highways' plans for embedded funding.

Stream	Amount	Maturity RAG	Effect
Small Schemes	£200m (for safety and congestion)	Red	These schemes have both safety and congestion aims, and we have no indication of the level of priority being given to safety within this funding stream. The programme is still largely under development and the safety benefit proposed is unevidenced.
OMR	Not specified	Red	No safety-related scope or outcome described, but in principle there can be much expenditure of relevance. Collectively some material safety benefit is implied for OMR and the following three categories together. But the overall quantification of it at 20 to 24 per year by 2030 is unevidenced and might be inadvertent.
Major schemes	Not specified	Red	No safety related scope or outcome described. There is a suggestion that it will have some effect.

Stream	Amount	Maturity RAG	Effect
Digital and technology	Not specified	Red	No safety related scope or outcome identified, despite clear implications that actions within this stream will be applied.
Corporate services	Not specified	Red	No safety related scope or outcome identified, despite clear implications that actions within this stream will be applied.

Appendix A CASE STUDY - A36

Key findings

- Interventions seem to mostly be about vegetation clearing and relocating signs etc. Both the cost estimate and expected FSI reduction are high considering the planned interventions.
- Given that the cost estimates are early stage, there is a wide range of estimates.
- The proposed interventions seem to be somewhat different from the ViDA recommendations, for which we have not found an explanation.

The A36 scheme is a 29-mile section on the route from Bath to Deptford (A36/A303 junction).^{54,55} National Highways has selected schemes for the route treatment programme based on crash density (collective risk), the International Road Assessment Programme (iRAP) star rating, potential Value for Money (VfM), and the need for a regional balance in the portfolio.⁵⁶ The iRAP star ratings reflect individual risk based on the features and characteristics of the road and tend to correlate with historic crash rates.^{57,58} iRAP assigns a rating between one and five, with highest risk roads being 1-star rated.⁵⁹ We discuss this in more detail in section 3.2.

As a Tranche 1 scheme (see section 3.2), development for it has been finalised and construction is expected to start in May 2026 and take 12 months.⁶⁰ The corridor is mostly single carriageway, with only a short section of dual carriageway, and rural in nature meaning that interventions will be applied consistently over long sections.^{61,62}

Table 18: Summary of the A36 scheme

A36 – summary	
Length (km)	44-km section of a 68-km route ⁶³
Baseline iRAP star rating	Predominantly 1-star with 2-star sections as well as a short 3-star section ⁶⁴
Baseline crash density	Low-medium risk ⁶⁵
Value for Money	High ⁶⁶
Total fatal and serious injuries (FSI) 2017-2019	30 ⁶⁷

⁵⁴ National Highways (2024), *National Programmes – Safety*, slides provided by National Highways.

⁵⁵ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁵⁶ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

⁵⁷ TRL (2022), *Draft Project Report RPN: Road to Zero Harm: Phase 1 Report – Evidence Review, Initial Stakeholder Consultation, and Modelling of Combined Benefits*.

⁵⁸ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

⁵⁹ National Highways (2024), *Draft Strategic Business Plan - Section A: National Programmes*, p. 27.

⁶⁰ National Highways (2023), *Strategic Estimating Model – Estimate Release Form*.

⁶¹ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁶² NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

⁶³ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

⁶⁴ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁶⁵ NH (2022), *Study Group 4 Corridor Selection Approach: Technical Note*.

⁶⁶ National Highways (2024), *National Programmes – Safety*, slides provided by National Highways.

⁶⁷ National Highways (2023), *A36 to Deptford: SG4 – Route Optimisation: Combined Modelling and Appraisal Report*.

A36 – summary

(Re)baseline FSIs per annum⁶⁸	12.5 ⁶⁹
Expected FSI reduction	18% ⁷⁰

There are two scenarios of potential improvements considered for the A36:

- **Scenario 1:** a series of route-wide, easily deliverable solutions, such as wide centrelines, vegetation clearance, crossing improvements, signage improvements, Vehicle Restraint System and raised rib edge lines.
- **Scenario 2** contains all Scenario 1 improvements and junction/access upgrades at 18 locations, which have been assumed to require some land-take.⁷¹

Figure 5 below provides an illustration of interventions to be applied along the A36.

Figure 5: Example of interventions applied along the A36



<p>① 800m of driver and passenger side road safety barrier</p>	<p>④ Junction intervention – improved stop sign and pavement marking</p>	<p>⑦ 2 locations identified for pedestrian crossing upgrades</p>
<p>② 2 miles of wide centre line markings for median separation</p>	<p>⑤ Vegetation clearance to improve access visibility at 4 locations</p>	<p>⑧ Rationalise field access to minimise conflict points</p>
<p>③ 10 road safety barrier terminal upgrades ▲</p>	<p>⑥ 3 locations of curve delineation at poor quality bend (signage, speed management signs and 'slow' pavement markings)</p>	

Source: National Highways (2024), National Programmes – Safety, slides provided by National Highways.

A.1. COST ESTIMATION

The early-stage cost estimates seen in Table 19 have been inflated to outturn costs using National Highways projected construction related inflation. We understand, from communication with National Highways, that the cost range is P2.5 to P97.5 and evaluation is carried out at P70. The cost range between the low and the high end is about a factor of 6, which seems implausibly large. It suggests that the cost estimator has carried out only a remote desk costing. Scenario 1 is largely vegetation removal, which might have a wide range of unit costs depending upon the type and location of vegetation to be removed. Scenario 2 involves some land take, and that might have a

⁶⁸ The iRAP data used for the baseline statistics is from March 2020. The re-baseline expected FSIs per annum are based on updating the iRAP data to reflect any renewals and upgrades done since the data was collected, as well as RIS2 committed schemes. The overall star rating for the corridor remained the same. Source: National Highways (2023), *A36 to Deptford: SG4 Route Optimisation: Strategic Outline Business Case*.

⁶⁹ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

⁷⁰ National Highways (2024), *National Programmes – Safety*, slides provided by National Highways.

⁷¹ National Highways (2023), *A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case*.

wide range of costs. It suggests that there has been no site visit, and the cost estimator has made little effort to discover further local information to clarify the nature of the tasks required.

Table 19: The range of early-stage cost estimates for A36

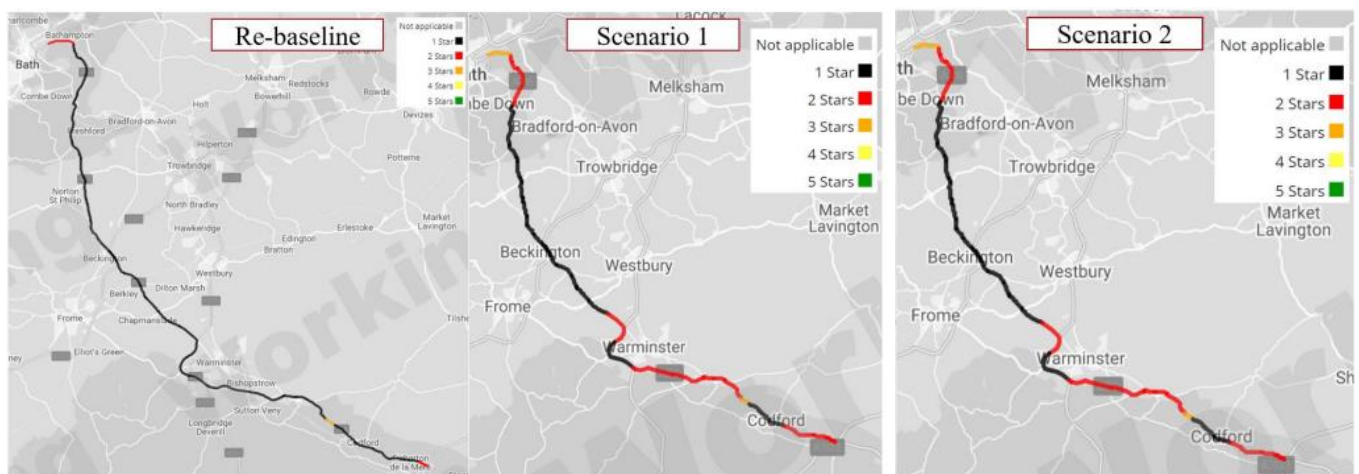
A36 Costs (£000s)	Range of estimates		
	Minimum	Most likely	Maximum
Scenario 1	£2,863	£7,174	£19,514
Scenario 2	£9,020	£22,588	£60,461

Source: National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

A.2. OUTCOMES

National Highways has evaluated outcomes for both scenarios proposed for the A36 scheme. As seen in Figure 6 below, both scenarios are estimated to lead to a reduction in the number of 1-star sections in the corridor. However, the star rating proportions along the route remain similar between the two scenarios. National Highways notes that the ViDA model might not be able to reflect nodal upgrades, i.e., junctions and accesses. Expected FSIs per annum were reduced to 10.5 in scenario 1 and 10 in scenario 2.⁷²

Figure 6: The expected improvement in iRAP star ratings for both scenarios



Source: National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

National Highways has undertaken a Cost Benefit Analysis (CBA) for both scenarios. The safety benefits⁷³ were monetised using the 'Road Safety Impacts' tool from the Department for Transport.⁷⁴ National Highways notes that some impacts have not been included due to the early stage of the analysis, including environmental impacts and delays during construction. However, the biggest uncertainty is around costs, with potential for downward pressure on the benefit cost ratio.⁷⁵

The estimated benefits and costs are in the Table 20 below. Based on the high VfM for the scenarios, National Highways has recommended both scenarios to be taken to further development.⁷⁶ The maximum cost in each

⁷² National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

⁷³ For the A36, walking and cycling benefits or journey time benefits are not expected and thus not appraised. Journey reliability benefits were assessed and used in sensitivity analysis, but not included in the benefit cost ratio.

⁷⁴ National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

⁷⁵ Cheung, J.Y. (2023), *Interim Value for Money Statement*, National Highways.

⁷⁶ National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

scenario is about three times the “most likely” cost, and so at the high end would reduce the VfM by a factor of 3. The VfM would still be high for Scenario 1, but would be low for Scenario 2.

Table 20: Expected outcomes for the A36 scheme

A36	Scenario 1	Scenario 2
Present Value Cost (PVC) in 2010 prices (£m)	3.54	10.86
Safety benefit over 60 years (£m)	34.77	43.46
Benefit cost ratio	9.84 (very high VfM)	4.00 (very high VfM)
Annul FSI saved	2.00	2.50

Source: National Highways (2023), A36 to Deptford: SG4 - Route Optimisation: Strategic Outline Business Case.

A.3. RISKS

For the A36, there are some constraints that are likely to be resolved, e.g., planned interventions affecting cultural heritages sites, landscapes, environment and road drainage. Biodiversity loss is mentioned as a more critical risk, due to vegetation clearance and construction works.⁷⁷

⁷⁷ National Highways (2023), A36 Bath to Deptford SG4 – Route Optimisation: Stage Overview Assessment Report, 31 July 2023.

Appendix B CASE STUDY – M62 JUNCTION 26

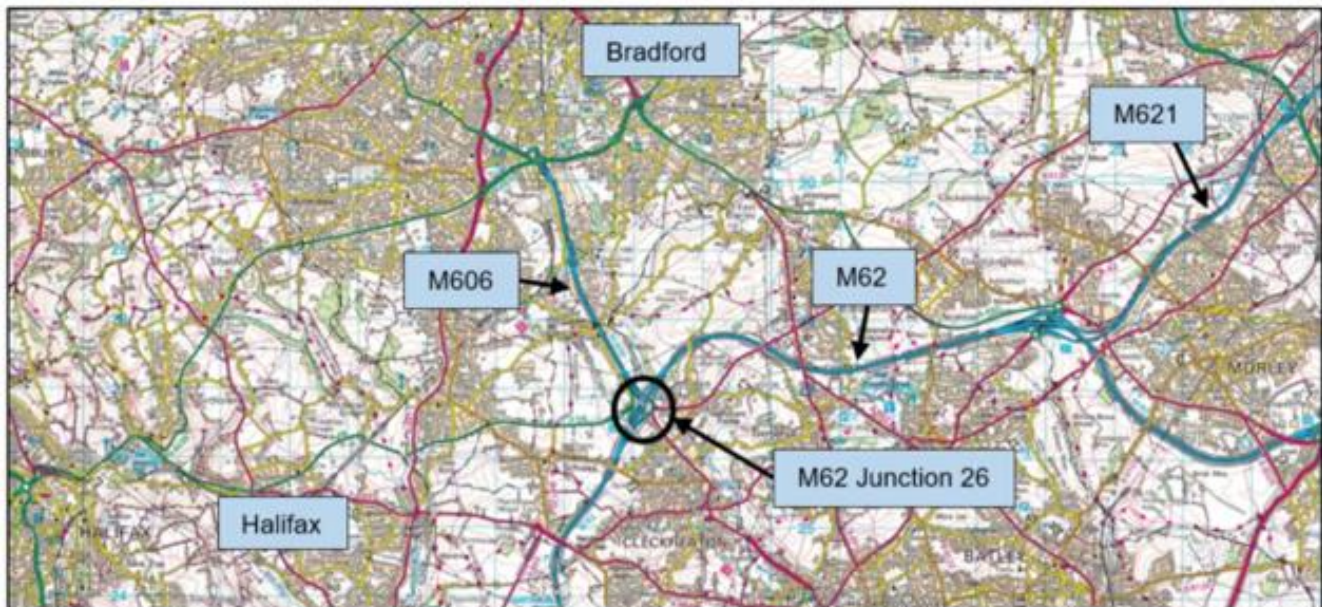
Key findings

National Highways has selected a set of interventions for the M62 Junction 26 which comes with safety benefits from a long list of options where majority of options were not expected to produce safety benefits or even entailed safety issues. The safety benefits from the proposed interventions at the Junction 26 are described as minor by National Highways. It is unclear what the units of the estimated safety benefits are, making it difficult to further evaluate the safety outcomes of the scheme.

The M62 Junction 26 improvement project is part of the programme of Small Schemes at targeted locations, aimed to produce multiple outputs including reduction in congestion and improvements in safety and active travel.⁷⁸ The main issue at Junction 26 is congestion at peak hours despite a widening of the circulatory carriageway in 2017. The location of the M62 Junction 26, South of Bradford in West Yorkshire, can be seen in Figure 7 below.

Construction of the scheme, and its opening, are expected in 2028.⁷⁹ Small Schemes will be delivered through National Highways existing Operations 3D delivery process (Develop, Design, Deliver).⁸⁰

Figure 7: Location of the M62 Junction 26



Source: National Highways (2023), M62 Junction 26: Small Schemes Improvement.

National Highways has compiled data on personal injury collisions (PIC) in the junction from 2016 to 2020. During this time period, 41 PICs occurred with 52 casualties. Half of the PICs (20) were shunt-type collisions.⁸¹ In the dSBP, it is mentioned that Small Schemes are targeted on iRAP one- and two-star routes, however, we do not know the iRAP rating for the section of the Junction 26.⁸²

Table 21: Collisions on the M62 Junction 26, 2016-2020

Year	Accidents			Casualties		
	Slight	Serious	Fatal	Slight	Serious	Fatal

⁷⁸ National Highways (2024), Draft Strategic Business Plan - Section A: Enhancements

⁷⁹ National Highways (2023), M62 Junction 26: Small Schemes Improvement.

⁸⁰ National Highways RFI response.

⁸¹ National Highways (2023), M62 Junction 26: Small Schemes Improvement.

⁸² National Highways (2024), Draft Strategic Business Plan - Section A: Enhancements

Year	Accidents			Casualties		
2016	10	1	0	15	1	0
2017	11	0	0	14	0	0
2018	4	2	0	4	2	0
2019	4	0	0	7	0	0
2020	9	0	0	9	0	0
Total		41			52	

Source: National Highways (2023), M62 Junction 26: Small Schemes Improvement.

B.1. PROPOSED INTERVENTIONS

Proposed interventions at the junction are mostly aimed at addressing congestion and delay. Nine options of interventions have been identified. Only three of these are estimated to come with a reduction in accidents. However, these three options, as can be seen in Table 22 below, are estimated to be significantly more costly to implement, leading to a lower BCR. In all three options, the safety benefits (and likely the higher cost) are derived from the widening of the Westbound exit slip, which is estimated to save three shunt accidents with an estimated accident saving of 0.6 (units are not provided, but we think it refers to 0.6 injury collisions of average severity) and a value of £67,514 in the opening year.⁸³ For comparison, we observe that this sum is roughly one third of the value in the TAG data (2010 prices) of one serious injury reduced.

Table 22: Proposed options for the M62 Junction 26. Options with safety benefits are in bold.

Option	Cost of delay saved per year	Accident reduction	Cost estimate	BCR	Progress to further analysis?
1. Widen Westbound exit slip	£831,608	0.6	£5.6m	5.41	Yes
2. Alteration of road markings on M606 Southbound	£120,033	0	£47k	87.14	Yes
3a. Widen A58 Leeds exit	£178,248	0	£56k	110.92	No
3b. M606 SB road markings and widen A58 Leeds exit	£175,764	0	£95k	63.80	No
4a. Widen A638 Dewsbury exit	£139,795	0	£64k	76.12	No
4b. M606 SB road markings and widen A638 Dewsbury exit	£135,470	0	£103k	45.39	No
5a. Widen A58 Halifax exit	£130,298	0	£80k	56.76	No
5b. M606 SB road markings and widen A58 Halifax exit	£111,554	0	£119k	32.39	No
6. M606 SB road markings and widen the A58 Leeds and Halifax exits	£211,942	0	£143k	51.29	No
7. Widen WB exit, alter M606 SB road markings and widen the A58 Leeds and Halifax exits	£890,369	0.6	£5.8m	5.66	No

⁸³ National Highways (2023), M62 Junction 26: Small Schemes Improvement.

Option	Cost of delay saved per year	Accident reduction	Cost estimate	BCR	Progress to further analysis?
8. Widen Westbound exit and alter M606 Southbound road markings	£904,608	0.6	£5.7m	5.81	Yes
9. Signalise Low Moor	+£37,112	0	£427k	-2.98	No

Source: National Highways (2023), M62 Junction 26: Small Schemes Improvement

Many of the options not taken forward to further analysis come with potential safety issues. National Highways has recommended option 8 to be taken forward (includes the intervention from option 1), which comes with safety benefits. In case that the earthworks that would be required for the widening of the Westbound exit slip would turn out to not be cost effective, option 2 was also taken forward.⁸⁴

B.2. COST ESTIMATION

National Highways has produced a revised cost estimate for option 8, as seen in Table 23 below. The early-stage cost estimates for Small Schemes are based on the strategic estimating model, where risk allocations are based on high-level assumptions.⁸⁵

Table 23: Cost estimates for M62 Junction 26 scheme

M62 Junction 26	Cost
P70 outturn costs without portfolio risk	£10,046,930
P mean in 2019 costs without portfolio risk (as used in SAR)	£8,095,771
Present Value Costs (PVC) P Mean without portfolio risk	£3,584,087

Source: National Highways (2023), M62 Junction 26: Small Schemes Improvement

B.3. OUTCOMES

The cost estimates have also been used to update the expected benefits from the scheme, which are provided in Table 24 below. The Junction 26 is expected to be very high Value for Money.⁸⁶

Table 24: Expected benefits from M62 Junction 26 scheme

M62 Junction 26	Benefits
Present Value Costs (PVC)	£3,584,087
Present Value Benefits (PVB)	£19,146,037
Benefit to Cost Ratio (BCR)	5.3
Value for Money	1.8

Source: National Highways (2023), M62 Junction 26: Small Schemes Improvement

B.4. RISKS

Land outside of highway boundary might be required to allow for the widening at the Junction 26, and it is not yet clear whether this land is owned by National Highways. If the land is not owned by National Highways, the cost

⁸⁴ National Highways (2023), M62 Junction 26: Small Schemes Improvement.

⁸⁵ National Highways RFI response

⁸⁶ National Highways (2024), Draft Strategic Business Plan - Section A: Enhancements

estimates may have to be revised for an alternative option. In addition, potential environmental constraints, which are likely to be mitigated, have been identified in the areas of air quality, landscape, biodiversity and drainage.⁸⁷

⁸⁷ National Highways (2023), *M62 Junction 26: Small Schemes Improvement*.

Appendix C ADDITIONAL DISCUSSION OF NATIONAL HIGHWAYS' SAFETY FORECAST MODEL

A complication in KSI prediction is that there are two factors or stages – accident occurrence, and injury severity resulting for those involved in the accidents. Another important distinction is between the effect of traffic growth and the effect of measures. These can have some interaction, but for practical planning purposes they can be regarded as separate effects, whose separate contributions are capable of quantification.

National Highways has explored a number of models to predict the future baseline. Its selected model is a machine learning (ML) model, which does not separate these two “stages” of the process, nor distinguishes the effect of growth from measures. It does not produce a forecast of the accident rate either, so far as we are aware. In general terms, it appears to comply with modern good practice in ML modelling, with rigorous multi-staged separation of training and testing, to reduce the tendency of ML models to “over-fit” the data.

The main alternative model National Highways tested was a two stage model, with a statistical first (accident rate) stage, and an AI second (severity conversion) stage. This model had similar overall statistical performance. The reason for using a statistical first stage is that in principle, we might expect accidents to have a Poisson distribution. But the statistical stage failed a goodness of fit test for a Poisson distribution, and this was the reason it was rejected. This is an advantage of the transparency this two stage process produced – we can see that there is an important failure. The one-stage AI model lacks the transparency to observe if it fails statistical or physicality tests on factors where we have good knowledge.

An important shortcoming of the model is that it is not applied to any data which might reflect measures, either external measures, or measures applied by National Highways. The Impact Report used the earlier SOM which separates the effect of traffic growth and measures, so it can apply an explicit adjustment for our intelligence about the future trends in car design and the vehicle parc on the road. The ML model may just subsume such factors into something similar to a time trend, but without any transparency to assess whether it is being reasonable in view of what we actually know.

The ML model will similarly subsume into its version of a time trend the general effect of safety measures taken by National Highways in the past. This is especially concerning, because we require a baseline model to remove the effect of that. The impact of such a failure should be assessed by using separate methods to assess what is likely to have been the effect of National Highways' measures over the data period, and taking that into account. Those adjustments should probably be applied before using the ML model, because the lack of transparency of ML forecasts means we cannot see how it has adjusted the forecast for these factors.

We may consider that the forward-looking measures National Highways is now proposing are likely to be much more effective than past measures, so ignoring the problem might be a fair approach in the short run. It might be argued that it is a smaller problem than using methods that enable separation of the effects of traffic growth and measures, because of the greater uncertainty those give. But if so, then these are arguments that should be rehearsed and evidenced. In the longer term, this does not seem to be a sustainable approach, because National Highways does need to be able to identify and account separately for the effect of its measures. So it is not useful to endogenise them within a forecast model, that in effect is trying to second-guess what National Highways might do.

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