



OFFICE OF  
RAIL AND ROAD

# Quality Assurance of Smart Motorways Fourth-Year Progress Report

13 March 2025



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# Executive summary

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In December 2023, the Department for Transport (DfT) commissioned the Office of Rail and Road to carry out a quality assurance review of the data and evidence in National Highways' [Smart Motorways Stocktake Fourth-Year Progress Report](#). The scope of our review was based on questions set by DfT in its [commissioning letter](#).

The *Fourth-Year Progress Report* presents several types of evidence relating to smart motorway safety. These include:

- High-level statistics, using the latest (2022) road casualty data that were published by DfT in September 2023, to compare safety outcomes across different types of road;
- A “before versus after” assessment, which compares five years’ worth of safety data before and up to five years’ worth of data after a smart motorway scheme opens that can be used to determine the impact of individual schemes on safety; and
- Survey results on road users’ feelings of confidence on smart motorways.

The scope of our work considered additional analysis and changes from previous smart motorway progress reports. Our review considered the relevance and clarity of the analysis in the *Fourth-Year Progress Report* and whether National Highways has continued to follow its analytical assurance processes.

We completed our review over a four-week period in February and March 2024. We found that:

- Where new data and analysis are included in the *Fourth-Year Progress Report* this is relevant to the wider report and the conclusions drawn are appropriate.
- There are relatively few methodological changes compared to last year’s report. Where National Highways has made changes, these are appropriate and are explained by the company in its latest report.
- National Highways has continued to follow appropriate analytical assurance processes to ensure the reliability of its analysis.



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- National Highways should continue to review how it can robustly apply more sophisticated statistical methods to support it in making firmer conclusions about smart motorway safety.

National Highways has made some changes to its analytical approach, in line with recommendations from our earlier reviews, but it has made little progress with overcoming the more significant analytical challenges we identified. Further development of its approach could enable the company to provide greater confidence in the extent to which the data show that smart motorways have improved safety.

# 1. The scope of our review

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- 1.1 In December 2023, the Department for Transport (DfT) commissioned The Office of Rail and Road (ORR) to carry out a quality assurance review of the data and evidence in National Highways' [Smart Motorways Stocktake Fourth-Year Progress Report](#) (referred to as the *Fourth-Year Progress Report*).
- 1.2 This report describes the scope of our review, how we carried it out and our conclusions. The [commissioning letter](#) setting out the scope of our work is available on our website.
- 1.3 This builds on similar assurance work that we undertook in each of the past three years. In 2021 we published our first review, [ORR Quality Assurance of All Lane Running Motorway Data](#) (all lane running motorways are a type of smart motorways in which the hard shoulder is converted into a permanent running lane). In 2022 we published a review of National Highways' [Second-Year Progress Report](#).
- 1.4 In 2023, our review covered two reports published by National Highways relating to safety on smart motorways. These were: the [Third-Year Progress Report](#), which gave a high-level comparison of safety outcomes on different road types; and the [Smart Motorways Scheme Safety Before Versus After Assessment](#) (referred to as the *Before-After Assessment*), which presented analysis of scheme-level safety data before and after roads were converted to smart motorway. The *Fourth-Year Progress Report* combines updated analysis and evidence from both these sources in a single report.
- 1.5 The scope of our review this year is based on the following questions:
  - (a) Are additional sections to the *Fourth-Year Progress Report* analysis relevant and are the conclusions drawn appropriate?
  - (b) Has National Highways continued to follow its analytical assurance processes?
  - (c) Have key methodology considerations and changes to the analysis (if any) been communicated clearly and transparently in the *Fourth-Year Progress Report*?
- 1.6 We completed our review in around four weeks. We received an initial set of documents from National Highways on 7 February 2024, which included a draft

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version of the *Fourth-Year Progress Report*, underlying data tables, and analytical assurance statements. We provided our initial comments and findings to DfT and National Highways on 6 March 2024.

- 1.7 The operation and effectiveness of safety systems on smart motorways is not within scope of this review. We continue to hold National Highways to account for performance in this area separately. In December 2023 we reported on this in our [Annual Assessment of Safety on the Strategic Road Network](#). We will provide an update on this work in our next annual safety report which is planned for publication by the end of March 2025.

## 2. Our approach

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- 2.1 Our work was structured around the questions set out by DfT in its commissioning letter of December 2023.
- 2.2 National Highways provided us with a draft version of its *Fourth-Year Progress Report* to review, as well as the underlying data, tables and charts, and information relating to its analytical assurance processes.
- 2.3 As set out in the scope, we did not revisit areas of investigation where we have previously concluded that we are content with National Highways' approach and its processes are unchanged. However, we undertook spot-checks of key figures to provide us with further assurance.
- 2.4 We had regular contact with the relevant teams at National Highways, who provided materials to support our review, and responded to our questions and comments. We would like to thank them for their open approach to our review.

### Relevance of analysis and conclusions

- 2.5 Our review of the *Fourth-Year Progress Report* focused on additional analysis and conclusions that did not form part of last year's *Third-Year Progress Report* and the *Before-After Assessment*. We considered the relevance of new analysis within the context of the wider report and whether the conclusions were supported by the underlying data and evidence.

### Clear and transparent communication of methodology

- 2.6 Again, our review of the *Fourth-Year Progress Report* focused on any changes to the methodological and analytical approach compared to previous year's reports. The approach taken by National Highways to the *Fourth-Year Progress Report* was broadly similar to that of its previous reports so there were relatively few changes to consider. Where there were changes to the approach in the latest report, we reviewed these, including how changes were communicated, and provided comments and feedback to National Highways.

### National Highways' assurance process

- 2.7 Our review of the *Second-Year Progress Report* (published in 2022) identified that National Highways had demonstrated a strong application of the cross-

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government [Aqua Book](#) on assurance and followed National Highways' analytical assurance framework.

- 2.8 National Highways provided us with analytical assurance statements and other documents that set out the analytical processes it followed in relation to the *Fourth-Year Progress Report*. We reviewed these documents to assess whether the company had continued to follow the analytical assurance processes it had demonstrated last year.



## 3. Findings

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3.1 The scope of our quality assurance work was based around the list of questions specified by DfT in its commissioning letter of December 2023. Our findings against each question are set out below.

### **Are additional sections to the Fourth-Year Progress Report analysis relevant and are the conclusions drawn appropriate?**

3.2 Additional sections in the *Fourth-Year Progress Report* include:

- (a) new comparisons of European motorway casualty data;
- (b) expanded analysis relating to road user confidence and contributory factors to fatal and serious incidents; and
- (c) data relating to operational technology on smart motorways.

3.3 As part of our review we provided comments and suggested improvements on the presentation of some data and conclusions that were addressed by National Highways. However, these were relatively minor and, did not change the conclusions drawn. Overall, we consider that the evidence in the report is relevant, and the conclusions drawn are appropriate.

### **Has National Highways continued to follow its analytical assurance processes?**

3.4 We are content that National Highways continued to follow appropriate analytical assurance processes in producing its *Fourth-Year Progress Report*. Our previous reviews have found that National Highways' Analytical Assurance framework is a strong application of the cross-government Aqua Book on assurance.

3.5 This year, we reviewed the company's latest analytical assurance statements, which provided us with evidence that it continues to follow the same processes. The company responded to our feedback during the review and provided us with more detail and evidence on its processes on request.

### **Have key methodology considerations and changes to the analysis been communicated clearly and transparently in the Fourth-Year Progress Report?**

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- 3.6 The main methodological changes in the fourth-year progress report relate to calculation of the counterfactual, and the approach to statistical testing in the before-after analysis. These changes bring the methods in-line with those used elsewhere, including in National Highways' post opening project evaluation (POPE) evaluations and the statistical testing of the high-level statistics for smart motorway safety.
- 3.7 In early drafts of its report, National Highways included little detail on these changes or their impact on the results and conclusions. We reviewed additional material on the detail, basis for and impact of the changes, with a particular focus on the counterfactual estimation, to ensure they were appropriate. We provided feedback on how the changes, and their impact, should be clearly communicated. In response to our comments, the company has included additional information on the changes, and their impact on the results, in its report.
- 3.8 In last year's report we noted that, to support more definitive conclusions, it is important that National Highways further develops its approach to before-after analysis. While the company has changed its approach, as set out in 3.6, it has made little progress with overcoming the more significant analytical challenges we identified. This includes how to aggregate the analysis to "scheme type" and broaden it from personal injury collision numbers to other safety metrics. Developing its approach in this area could enable National Highways to provide greater confidence in the extent to which the data show that smart motorways have improved safety. It is important that the company continues to develop a robust approach to tackle these analytical challenges in future analysis.

## 4. Conclusion

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4.1 In summary, we conclude that:

- (a) Where new data and analysis are included in the *Fourth-Year Progress Report* this is relevant to the wider report and the conclusions drawn are appropriate.
- (b) There are relatively few methodological changes compared to last year's report. Where National Highways has made changes, these are appropriate and are explained.
- (c) National Highways has continued to follow appropriate analytical assurance processes to ensure the reliability of its analysis.
- (d) National Highways should continue to review how it can robustly apply more sophisticated statistical methods to support it in making firmer conclusions about smart motorway safety.

4.2 National Highways has made some changes to its analytical approach, in line with recommendations from our earlier reviews, but it has made little progress with overcoming the more significant analytical challenges we identified. Further development of its approach could enable the company to provide greater confidence in the extent to which the data show that smart motorways have improved safety.



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