Air Quality on England's Strategic Road Network: Annual Evaluation Report 2021

Analysis of Potential Non-Compliance with Limit Values for Nitrogen Dioxide

December 2022

national highways

Contents

Executive summary

At National Highways, we want to do all we can to look after the wellbeing of our customers – everyone who uses our roads and those who live or work near them. That includes making a difference when it comes to air quality.

The government is responsible for assessing national compliance with legal limits for air pollution. The government created the Pollution Climate Mapping (PCM) model to predict concentrations of pollutants for this purpose. Predominantly the PCM model has identified exceedances of nitrogen dioxide (NO_2) and this is supported by local air quality monitoring.

The PCM model has identified exceedances of the annual mean NO_2 limit value along sections of roads, known as PCM links, including the motorway and trunk road network and local roads. Road authorities, such as National Highways and local authorities, are then commissioned to carry out more detailed examination of air quality for those roads they are responsible for where there are identified exceedances of the limit value

To date, National Highways has been commissioned to assess air quality along 129 sections of the Strategic Road Network (SRN); covered by three separate commissions. The work has involved deploying new air quality monitoring and undertaking air quality modelling to better understand the air quality alongside each of the 129 sections of the SRN. Where exceedances of the annual mean NO_2 limit value have been identified, National Highways have evaluated a range of measures to help improve air quality in the shortest possible time.

As part of the assessment process each link is reviewed annually, and the findings reported in an annual evaluation report. This is to establish the status of each link against the annual mean NO_2 limit value and to determine whether the previously assessed outcome is still valid. Since the completion of each commission, various updates have occurred which may have resulted in a change to the compliance status of each link. These updates include for example, changes to the PCM model network, updated monitoring data and new planning applications which may impact on individual sections of the SRN.

This annual evaluation report provides a summary of the latest compliance status against the annual mean NO_2 limit value for all 129 sections of the SRN that have been assessed by National Highways to date. This report also provides an update on the progress of measures that have been implemented to help deliver limit value compliance in the shortest timescales possible.

The key findings of this report are:

- 61 of the 129 SRN PCM links to date have no change to the previously assessed outcome, either above or below the limit value
- 46 of the 129 SRN PCM links are dependent on new monitoring data from sites installed in 2022 to confirm whether they are above or below the limit value
- 20 of 129 SRN PCM links need to be reassessed. This is either because of changes to individual sections of roads included in the PCM network and / or new monitored evidence of exceedances of the limit value since the completion of the original assessment
- 2 of the 129 SRN PCM links are now below the limit value following completion of this report, informed by new air quality monitoring or updates to air quality modelling

The overall compliance status for the 129 links following completion of this Annual Evaluation Report has been set out in the table below. The previously assessed outcome has been included within the table for reference.

	Number of links	
SRN PCM Link Status	**Following Completion of Commissions 1-3**	**Following Annual Evaluation Report 2021**
Comes into compliance in 2020 / 2021	12	12
Above the limit value	33	31
Between 36-39.9µg/m^3	12	12
Less than 36µg/m^3	47	49
No Qualifying Features	25	25
Total	**129**	**129**

Lockdown restrictions implemented during 2020 and 2021 in response to the Covid 19 pandemic, significantly reduced traffic flows primarily in 2020 and changed journey patterns during both years. This in turn led to much lower measured annual mean NO_2 concentrations in both years, compared to pre-pandemic conditions.

This has impacted National Highways' ability to use traffic and air quality data collected during 2020 and 2021 as it was not representative of pre-pandemic conditions with emerging evidence in the latter part of 2021 and into 2022 showing a return of traffic flows to pre-pandemic levels. Any reductions in pollutant concentrations throughout 2020 and 2021 are likely to increase again as traffic returns to pre-pandemic levels. As a result, within this annual evaluation report, National Highways has used 2019 monitoring data as the most recent year not affected by the Covid 19 pandemic to help inform the limit value status of individual road links.

Ideally the evaluation would be informed by air quality monitoring data collected for the same year as the one being investigated. However, due to lockdown restrictions this wasn't possible for 2020 and 2021. In summer 2022, National Highways has deployed new air quality monitoring sites alongside 56 sections of our network, which corresponds to those sections of the network that were assessed to be above the annual mean NO_2 legal limit value, as well as those parts of the network within 10% of legal limit value. This new monitoring data will form part of the evidence presented in next year's Annual Evaluation Report on limit value compliance status.

1 Introduction

1.1 Purpose

1.1.1 The purpose of this annual evaluation report is to set out the compliance position, i.e. whether for each of the 129 SRN PCM links investigated by National Highways, they are above or below the annual mean NO_2 limit value of 40µg/m^3 at the end of 2021. There are no reported exceedances of any other limit values, for example particulate matter, alongside the SRN. Where the term limit value is used this refers solely to annual mean NO_2 limit value, unless specific reference is made to potential exceedance of the 1-hour mean NO_2 limit value.

1.1.2 National Highways has previously assessed 129 SRN PCM links[1] to determine if they are above or below the limit value. For those SRN PCM links identified as exceeding the limit value, National Highways has identified the likely year the limit value would be met and if there are any measures that could delivered and would achieve limit value compliance in a shorter timescale.

1.1.3 To help inform the reported compliance position at the end of 2021, a range of data sets (see Evaluation Process Section 2,) have been reviewed. This annual evaluation report will conclude whether:

- The compliance position is as previously assessed by National Highways; or
- The limit value status may change, and the SRN PCM link needs to be reassessed.

1.2 Overview of the evaluation process

1.2.1 To inform this annual evaluation report a range of information e.g. air quality monitoring data, changes to the PCM model, and local developments have been reviewed.

1.2.2 Lockdown restrictions implemented during 2020 and 2021 in response to the Covid 19 pandemic, significantly reduced traffic flows primarily in 2020 and changed journey patterns during both years. This in turn led to much lower measured annual mean NO_2 concentrations in both years, compared to pre-pandemic conditions. This has impacted National Highways ability to use traffic and air quality data collected during 2020 and 2021 as it was not representative of normal conditions.

1 https://nationalhighways.co.uk/our-work/environment/air-quality-and-noise/air-quality/air-quality-reports/

1.2.3 This evaluation process also considers any updates to the approach to air quality modelling and the effectiveness of any measures currently operational.

1.3 Assessed SRN PCM Link status at the end of 2021

1.3.1 Prior to the completion of this Annual Evaluation Report, the status of each of the 129 SRN PCM links is summarised as follows:

- 12 SRN PCM links were reported as coming into compliance in 2020 / 2021
- 33 SRN PCM links have been assessed to exceed the annual mean NO_2 limit value of 40µg/m³ (excluding the impacts of lockdown restrictions)
- 12 SRN PCM links have been modelled at between 36 and 39µg/m³ (10% of the annual mean NO_2 limit value)
- 47 SRN PCM links are compliant with the annual mean NO_2 limit value and have modelled annual mean NO_2 concentrations of less than 36µg/m³
- 25 SRN PCM links have been removed from the process due to no qualifying features, such as houses or footpaths within 15m of the PCM link.

1.3.2 For all links that have been commissioned, this report will confirm the status of each link and determine whether the current limit value compliance position remains valid or further work is now required to reassess an individual SRN PCM link.

1.3.3 It is known from air quality monitoring across the UK and alongside the SRN in 2020 there was a substantial reduction in measured NO_2 concentrations. This was attributed to the large reduction in traffic volumes on the UK road network as a consequence of the various lockdown restrictions in this year. This meant at the end of 2020 most parts of the country, including the SRN, were below the annual mean NO_2 limit value.

1.3.4 Lockdown restrictions in various forms continued into the early part of 2021 which again impacted on traffic volumes and consequently measured NO_2 concentrations. However, all lockdown restrictions were lifted by late Spring 2021 and traffic volumes have returned to near pre-pandemic levels by the end of the year.

1.3.5 Whilst sections of the network were temporarily below the limit value in 2020, increases in NO_2 concentrations associated with increases in traffic flows since Spring 2021 means they are now likely to exceed again. New monitoring sites have been deployed in 2022 and will be used to inform the limit value status of individual links previously assessed to be above or close to the limit value.

1.4 Air quality measures

1.4.1 Where an individual section of SRN has identified an exceedance of the limit value, then National Highways systematically reviews a range of possible measures available to them. The outcome of this review concludes if it is possible or not, to introduce one of more of the measures to help bring forward the date the limit value would be achieved, compared to without any measures.

1.4.2 Our overarching approach to evaluating the suitability of different measures follows the source-pathway-receptor conceptual model:

- **Source:** Are there measures we can take to reduce emissions at source? Potential solutions increase the introduction of 60mph speed limits, local traffic management plans, the promotion of electric vans on specific routes and providing support to the delivery of Clean Air Zones
- **Pathway:** Can we stop or reduce the amount of pollution getting from the traffic to local residents and/or pedestrians? This includes air quality barriers (9m high), and the use of tunnels and/or bypasses to divert traffic away from local roads
- **Receptor:** Are there measures we can take to stop or reduce pollution once it has arrived at the receptor? This range of measures includes relocating footpaths or cycleways away from the roadside. As a very last resort, if no other viable alternatives are available, these measures could include demolishing a very small number of properties (no more than 5).

1.4.3 Where one or more measure(s) have been identified as viable, they are delivered onto the SRN to affect an improvement in air quality. Viable measures have the following characteristics:

- Underpinned by credible and robust evidence
- The feasibility study confirms they can be delivered safely on a specific section of the SRN
- The measure would bring forward compliance by at least one year earlier than without the measure

1.4.4 Air quality monitoring is also deployed alongside these sections of the SRN to measure the effectiveness of any measure and to inform the date the limit value has been met and subsequently, the measure can be removed.

1.4.5 If for any link, after completing our evaluation of all measures available to National Highways, it is concluded that none of the available measures could be delivered on that section of the SRN, they are classified as having no viable measures. All links evaluated as having no viable measures are notified to DfT and JAQU for their approval.

1.4.6 National Highways is continuing to progress research into new and emerging ideas, that may open new measures in the future. Where a new measure meets the characteristics to be considered viable, then all sections of the SRN assessed to be above the limit value are reassessed. This will determine if the new measure would help bring forward limit value compliance by at least one year earlier compared to the current situation.

2 Evaluation process

2.1 Overview

2.1.1 The evaluation process covers two key areas of work:

i. Is there a change to any of the reported compliance position for each of the 129 SRN links assessed to date?

ii. How effective have the measures been at supporting improvements in air quality?

2.2 Limit value compliance

2.2.1 To inform the evaluation process for this Annual Evaluation Report, National Highways has considered the following data sets:

- Air quality monitoring data
- Air Quality Management Area (AQMA) status
- Changes to the PCM model
- New developments
- Traffic data
- Updates to air quality modelling techniques
- Updates to vehicle emission factors.

2.2.2 A proportionate approach has been adopted to the evaluation process for the 129 SRN PCM links commissioned to date as set out in Table 2.1.

Table 2.1 Summary of the Data Sets Used in the Evaluation

Data Sets	Compliance Status Category				
	Predicted to come into compliance in 2020 / 21	Above the Limit Value	Within 10% of the LV (36-39.9µg/m³)	Below the LV <36µg/m³	No Qualifying Features
Air quality monitoring	✔	✔	✔	✔	
AQMA status	✔	✔			
Changes to the PCM model	✔	✔	✔	✔	✔
New developments Receptors	✔	✔	✔	✔	✔
New developments Induced traffic	✔	✔	✔		
Traffic data	✔	✔			
Air quality modelling techniques	✔	✔			
Updates to vehicle emission factors	✔	✔	✔		

Air quality monitoring

2.2.3 In 2022 National Highways commissioned new air quality monitoring using diffusion tubes to measure annual mean NO_2 concentrations alongside all 57 SRN PCM links identified with a modelled annual mean NO_2 concentration of more than 36µg/m³ in 2020[2]. Details on the new monitoring sites are presented in Appendix B.

2.2.4 Diffusion tubes, used to measure NO_2, have been installed alongside 56 out of the 57 SRN PCM links. It has not been possible to install air quality monitoring alongside the M11 (SRN PCM link 70206), as there was no existing infrastructure to install the diffusion tubes. It was not practical nor safe to install new poles to mount the diffusion tubes due to an existing gas pipeline in the local area.

2.2.5 In addition to the diffusion tubes, National Highways has also installed a new automatic air quality station alongside the M5, Oldbury in the West Midlands (SRN PCM link: 46015). This will measure NO_2 concentrations from the elevated section of the M5 on local residential properties located under and close to this section of the motorway.

2 2020 has been used as the reported baseline position to JAQU, based on the modelling work completed to date. To note, none of the traffic and air quality modelling work previously submitted included the impact of the Covid 19 pandemic, as the traffic modelling used in the assessment including future year projections was created prior to the introduction of Covid 19 lockdown restrictions in 2020 and 2021.

2.2.6 Where automatic air quality monitoring data is available alongside the SRN PCM links from National Highways' National Air Quality Monitoring Network (NAQMN) this has been used to inform this evaluation process.

2.2.7 National Highways has collected the most recent monitoring data from local authority air quality reports corresponding to the relevant SRN PCM link to inform this Annual Evaluation Report. The monitoring data is provided in Appendix B.

2.2.8 It is preferable to install air quality monitoring at the point of the nearest qualifying feature or at least within 15m of the edge of the road, in line with the reporting requirements for limit value compliance. However, it is not always possible to do so due to a lack of existing infrastructure to attach diffusion tubes to, or health and safety considerations mean it is not safe to enter a particular area to install air quality monitoring.

2.2.9 There are occasions when air quality monitoring sites have been installed in close proximity to the SRN but more than the 15m from the road. This is because this is the nearest location where a diffusion tube can be attached, for example a lamppost.

2.2.10 Defra have published a tool to enable indicative concentrations to be calculated for monitoring sites that are located further away from the road to a point nearer the road. Defra's 'NO_2 fall off with distance from roads calculator (v4.2)' has been used to adjust monitoring data located usually more than 15m from the road to calculate indicative annual mean NO_2 concentrations at the location of the nearer qualifying feature. This is to inform likely risk to the limit value being met or not. Appendix G sets out the details of all the distance corrected monitoring data used to inform this Annual Evaluation Report.

Air Quality Management Area status

2.2.11 National Highways has reviewed the latest local authority Local Air Quality Management reports corresponding to the relevant SRN PCM link to see if there has been a change in the status of an AQMA.

2.2.12 The declaration of a new AQMA, or extension to an existing AQMA which encompasses all or part of a SRN PCM link, would indicate an increased risk to limit value compliance as they indicate areas of poor air quality. The revocation or reduction of an existing AQMA would indicate a reduction in the risk to limit value compliance.

2.2.13 The review undertaken for this Annual Evaluation Report found there had been no changes to the status of AQMAs alongside any of the SRN PCM links. Consequently, AQMA status has not been used to inform our understanding of limit value compliance for the SRN PCM links considered in this report.

Changes to the PCM Model

2.2.14 The PCM model is regularly updated (approximately every 1 – 2 years) and includes updated NO_2 concentrations as well as revisions to the PCM road network. The assessments completed for the earlier commissions (Commission No.1 and No.2) were both informed by the 2015 reference year PCM model.

2.2.15 Since the completion of the assessments for Commissions No. 1 and No. 2, Defra has published two more updates of the PCM model, with the latest version using 2018 as a reference year. The evaluation process considers whether there are any spatial changes to the PCM link road network in the latest version of the PCM model (2018 reference year) compared to the version of the model at the time of Commissions No.1 and No. 2 (2015 reference year). The assessment work completed for the latest commission (Commission No.3) was based on the 2018 reference year PCM model and no changes were required.

2.2.16 The purpose of this part of the evaluation is to establish whether changes to the PCM network would:

- Introduce new or nearer qualifying features not previously assessed
- Remove previously assessed qualifying features
- Make no changes to the previous assessment.

2.2.17 Where there have been changes to the PCM network for Commissions No.1 or No.2 these are set out in Appendix C for each SRN PCM link that has changed. Where there are no changes to the PCM network for an individual SRN PCM link, then it is not included in Appendix C.

New developments

2.2.18 All local authorities for the relevant SRN PCM link have been contacted to establish if any developments have occurred alongside the SRN PCM link i.e. introduced or removed a qualifying feature, such as houses.

2.2.19 Additionally, local authorities have also been approached to see if there are any new large-scale developments either on the SRN PCM link or elsewhere which could lead to changes in traffic flows along the SRN PCM link.

2.2.20 This report has considered if new developments, for example new housing, commercial, industrial or transport infrastructure projects, could possibly alter previously assessed limit value compliance status, i.e. from below the limit value to above, or delay the date of limit value compliance. This could be as a consequence of the new development leading to an increase in traffic along sections of the SRN and/or introducing new qualifying features close to the road which require assessing.

2.2.21 Information on new developments alongside or close to each of the SRN PCM links is set out in Appendix D. The impact of any new development needs to be evaluated in further detail to establish if they would materially affect the limit value compliance date, link-by-link.

Traffic Data

2.2.22 National Highways' WebTRIS traffic data has been reviewed to see if there are any notable changes (increases or decreases in traffic flows) when compared to the traffic data used to support the assessment of each individual SRN PCM link.

2.2.23 Due to the impact of Covid 19 lockdown restrictions in place during 2020 and early 2021, it has not been possible to robustly determine if there had been substantive changes in traffic flows, likely to affect the reported compliance date. 2022 traffic data, the first calendar year without any lockdown Covid 19 restrictions, will be reviewed in 2023 as part of next year's Annual Evaluation Report.

Air quality modelling techniques

2.2.24 Air quality models and the approach to assessing impacts continues to evolve. National Highways commissioned a number of air quality innovation research projects over the last few years. One of the research projects looked at the effects of elevated roads on pollution levels at nearby receptors e.g. houses, footpaths. The work concluded that elevated roads lead to lower ground level concentrations when compared to the traditional approach of modelling all roads and receptors at the same level.

2.2.25 The research project led to the development of new modelling techniques to assess and describe air quality impacts from elevated roads. National Highways has reviewed all their SRN PCM links that are currently above the limit value to see if any of them would be classified as an elevated road. Where an individual SRN PCM link meets this criterion, this link would be re-modelled using the new elevated roads tool, and the subsequent modelled results reviewed to determine if there would be change to the previously reported compliance status.

2.2.26 Five SRN PCM links have been identified as having elevated features, either along the full length of the PCM link or along part of the link. The modelling approach is set out in Appendix E.

Vehicle Emissions Factors

2.2.27 Defra periodically updates the emission factor toolkit (EFT), which is a database of vehicle emissions factors used to calculate vehicle emissions for given traffic flows, speeds etc. Work completed for Commission No. 1 used EFT version 9 whereas Commissions No. 2 and No. 3 used EFT v10. Since completion of all the assessment work Defra have published EFT v11 and is the same as EFT v10 up to 2030. EFT v11 also provides emissions between 2030 and 2050, although these are not used within this assessment as traffic data is not available post 2026.

2.2.28 To evaluate the potential impacts of the different versions of EFT for vehicle emissions, a series of representative traffic flows for urban roads (flows between 10,000 and 50,000 vehicles) and motorways (flows between 60,000 and 150,000 vehicles) have been entered into EFT v9, v10 and v11. The NOx emissions have been calculated for 2017, 2020, 2023 and 2026 (Appendix F) which correspond to the years previously modelled in all three commissions.

2.2.29 A comparison of NOx emissions from all three versions of EFT have been compared for the representative traffic scenarios. NOx emissions in later years (2023 and 2026) are slightly lower in EFT v10 and v11 compared to EFT v9. However, there were no substantive changes in NOx emissions between the three versions of EFT that would be significant enough to change the limit value compliance date.

2.3 Measures

2.3.1 National Highways has undertaken an extensive programme of air quality research, and based on the outcomes of this research have identified the following measures that may be able to support delivery of compliance in the shortest timescales possible:

- 60mph speed limits
- 9m tall air quality barriers
- Local traffic management interventions
- Closure of public access routes
- Electric van grant scheme.

2.3.2 Prior to implementing any of the above measures, they are subject to feasibility studies to determine whether they could be delivered on an individual section of the SRN and the level of air quality improvement they would make in that locality. Not all measures are deliverable in all locations.

2.3.3 National Highways continues to investigate and test new and innovative technologies alongside the SRN to evaluate whether they could provide viable reductions in roadside NO_2 concentrations. Current work includes evaluation of new filtration technologies, but until such time as the research is complete this cannot be considered as an effective measure.

2.4 Deployed measures and evaluation

2.4.1 Currently National Highways has applied a 60mph speed limit trials to five sections of the SRN:

- M1 junctions 34 to 33, Rotherham
- M6 junctions 6 to 7, Witton
- M602 junctions 1 to 3, Eccles
- M5 junction 1 to 2, Oldbury
- M4 junctions 3 to 4 westbound only, Hillingdon

2.4.2 As part of the delivery and evaluation of the 60mph speed limit trials, National Highways has deployed air quality monitoring equipment, where it is possible and safe to do so, alongside the various sections of the SRN with the speed limit.

2.4.3 Work is currently ongoing to investigate the changes in traffic flows and speeds during the periods of the trial. This investigation will inform National Highways as to the effectiveness of the 60mph speed limit to help attain limit value compliance in the shortest timescales possible.

2.4.4 There are three other existing speed limits introduced for reasons other than air quality but may provide air quality benefits to these sections of the SRN.

2.4.5 Maps of the links with measures are presented in Appendix I.

Measures in development

2.4.6 Work is nearing completion for the deployment of variable message signs on the M6 Jn15 and A50 Stoke-on-Trent to help encourage heavy goods vehicles (HGVs) to stay on the M6 and reduce the impacts alongside SRN PCM links located on the A500. The air quality assessment showed that encouraging those HGVs who travelled along the A500 as a through journey only onto the M6 would reduce NO_2 concentrations by approximately 1 -2 µg/m^3 depending on the number of HGVs that stay on the M6 in preference to the A500.

2.4.7 Additionally, National Highways has identified a suitable location for a new cycle collection point, meaning that the existing cycle lane that runs alongside the A282, Thurrock can be closed. This will bring this section of the SRN into immediate compliance as there will no longer be a qualifying feature within 15m of the PCM link.

2.4.8 Work is ongoing to assess the viability of a 9m high barrier alongside the A3 in Guildford. Additionally, National Highways is working with Guildford Borough Council and Surrey County Council on the Electric Town & Cities Initiative (ETCI) to promote the early conversion of 1,000 diesel and petrol vans to an electric equivalent.

3 Updated position

3.1 Limit value compliance

3.1.1 Based on the review of each SRN PCM link, Table 3.1 summarises overall status of all SRN PCM links included in all commissions as previously reported to JAQU and the latest position following this review.

Table 3.1 Reported limit value compliance position

SRN PCM Link Status	Number of links								
	Commissions 1-3	Completion of the 2021 Annual Evaluation Report							
	As previously assessed	No change to previously assessed compliance status	Higher than previously assessed		Lower than previously assessed		Link to be reassessed	Monitoring to confirm	Summary
			Above Limit Value	Below Limit Value	Above Limit Value	Below Limit Value			
Comes into compliance in 2020 / 2021	12	0	0	0	0	0	1	11	12
Above the limit value	33	1	0	0	0	2	2	28	31
Between 36-39.9µg/m^3	12	3	0	0	0	0	2	7	12
Less than 36µg/m^3	47	33	0	0	0	0	14	0	49 (b)
No Qualifying Features	25	24(a)	0	0	0	0	1	0	25 (c)
Total	**129**	**61**	**0**	**0**	**0**	**1**	**20**	**45**	**129**

Notes:
(a) Includes PCM link 60026 A50 Stoke, which has now been withdrawn from the National Highways commission as JAQU have confirmed this PCM link is under the ownership of the local authority
(b) Now includes SRN PCM link 70206 and 28776 which following the updated modelling using the elevated roads tool, now do not exceed
(c) Whilst qualifying features have now been identified for SRN PCM link 47964, until this link has been reassessed it is not possible to determine the limit value status of this link

3.1.2 Following completion of the Annual Evaluation Report, 23 links have changed their status or need to be reassessed from previously assessed position. Appendix A summarises the findings for each of the 129 SRN PCM links included in this Evaluation Report on a link-by-link basis.

3.2 Summary of analysis

Comes into compliance in 2020 / 2021

3.2.1 The impact of the Covid 19 pandemic significantly impact air quality measurements in 2020 and 2021, through a series of lockdown restriction across England. This means that the monitoring data is not useable to determine whether these links came into compliance and continues to stay below the limit value. Therefore, it has not been possible to confirm is these SRN PCM links have come into compliance or not.

3.2.2 Over the summer of 2022, National Highways deployed new air quality monitoring alongside all 12 SRN PCM links (Appendix B). The new monitoring will be used to inform whether limit value has been met or not for these links.

3.2.3 The review has identified 1 of the 12 links needs to be reassessed. There have been substantive changes to the PCM network for SRN PCM link 48331 which now includes the slip roads. The addition of the slip roads for this SRN PCM link introduces new qualifying features which need to be reassessed.

Above the limit value

3.2.4 For 28 of the 33 SRN PCM links reported to be above the limit value and with reported compliance date beyond 2021, the new air quality monitoring deployed by National Highways in 2022 is required to inform the limit value status for these sections of the SRN. In addition to the diffusion tubes, National Highways has also installed a new automatic air quality station alongside the M5, Oldbury in the West Midlands (SRN PCM link: 46015). This will measure NO_2 concentrations from the elevated section of the M5 on local residential properties located under and close to this section of the motorway.

3.2.5 This monitoring data is expected to be available in 2023 and will be published as part of next year's Annual Evaluation Report.

3.2.6 SRN PCM link 89200 (A1, Gateshead) is reported as having no change to the previously reported status. To date National Highways has been unable to safely deploy air quality monitoring either in back gardens of the properties abutting the A1 or in alternative representative location alongside the A1. There is no evidence to support or contradict the previous air quality modelling. National Highways have re-engaged with the local authority to see if it is possible to install air quality monitoring in the back gardens of the properties alongside the A1.

3.2.7 Evidence for 2 of the 33 SRN PCM links suggests that limit value compliance has now already been met. Remodelling of SRN PCM links 70206 (M11) and 28776 (A1) has been undertaken using the new elevated roads tool. The outcomes of the air quality modelling using the new elevated roads tool is now less than 40µg/m^3 at the nearest qualifying feature (Appendix E).

3.2.8 The review has identified that 2 of the 33 links above the limit value need to be reassessed. For 2 of the SRN PCM links 70230 (M6) and 74768 (M32) there has been substantive changes to the PCM network, meaning the qualifying feature previously assessed is no longer covered by the updated PCM network, and a new receptor needs to be identified.

3.2.9 Where it has been possible to introduce measures on specific SRN PCM links, work has progressed to either undertake the feasibility studies or deploy the measures. No new measures have been identified for the 33 SRN PCM links above the limit value at the completion of this evaluation report, but research is ongoing to explore and develop new ideas that may be applicable in the future.

Reported Annual Mean NO_2 concentrations between 36-39.9µg/m^3

3.2.10 The review identified that SRN PCM links 73920 (M5) and 18061 (A38) will need to be reassessed because of a changes to these links in the PCM model. The change to the PCM network means the section of the SRN previously assessed is no longer alongside the previously identified receptor (see PCM link 73920 in Appendix C). The initial review has confirmed there is a footpath within 15m of the M5 and the nearest point of this footpath to the motorway will be identified and assessed for this SRN PCM link.

3.2.11 The review identified that 3 of the 12 SRN PCM links have been identified as having no change to the previously reported compliance status. For the remaining 7 SRN PCM links, new air quality monitoring deployed in 2022 is required to confirm if the NO_2 concentrations remain below the limit value.

Reported Annual Mean NO_2 concentrations are less than 36µg/m³

3.2.12 The review completed for this Annual Evaluation Report found no evidence to contradict the previously reported findings, and the limit value is still met at 33 of the 47 SRN PCM links. For 3 of these links, changes to the PCM network mean there are now no qualifying features within 15m of the revised SRN PCM link.

3.2.13 For the remaining 14 SRN PCM links in this category, new work is required to reassess the links. This is due to a combination of:

- Recent monitoring data located on lampposts within 15m of the road with measured annual mean NO_2 concentrations above 40µg/m³ (2 SRN PCM links)
- Changes to the PCM network, introducing new qualifying features that need to be reassessed (4 SRN PCM links); or
- The distance corrected monitored results indicates that the indicative concentrations at the qualifying feature could be above the limit value (8 SRN PCM links).

No Qualifying Features

3.2.14 For the vast majority of the SRN PCM links previously identified as having no qualifying features within 15m of the road there is no change. However, updates to the PCM network means that for SRN PCM link 47964 (A56) there are now qualifying features within 15m of the road and the limit value status needs to be reassessed.

No Viable Measures

3.2.15 As part of the evaluation, those SRN PCM links classed either as coming into compliance in 2020/2021 or above the limit value have been reviewed to see whether there are any changes to links previously identified as having no viable measures. The findings of the evaluation for those links with no viable measures are presented in Table 3.2, and maps of the links included within Appendix I.

Table 3.2 Number of SRN PCM Links with No Viable Measures at the end of Commissions 1 and 2

SRN PCM Link Status	Number of links	
	As previously assessed in Commissions 1 and 2	Completion of the 2021 Annual Evaluation Report
Comes into compliance in 2020 / 2021	5	5
Above the limit value	12	11
Total	**17**	**16**

3.2.16 Following the completion of the Annual Evaluation Report, one of the SRN PCM links previously identified as above the limit value and having no viable measures has been reassessed. The outcome of the updated assessment has confirmed that SRN PCM link 70206 (M11) as an elevated road, and the subsequent air quality modelling has modelled NO_2 concentrations below the limit value.

3.2.17 There were no changes to the remaining 16 SRN PCM links previously identified as having no viable measures. 5 of the 16 are identified as coming into compliance at the beginning of 2021. However, as discussed earlier in this report new air quality monitoring sites deployed in 2022 are required to confirm if these links have come into compliance.

3.2.18 For links included in Commission No. 3, feasibility studies are currently ongoing. Until the feasibility studies have been completed (anticipated no later than March 2023), it is not certain how many of these links would be classified as having no viable measures.

4 Conclusions

The completion of this Annual Evaluation Report identified the following:

- 61 of the 129 SRN PCM links to date have no change to the previously assessed outcome, either above or below the limit value
- 46 of the 129 SRN PCM links are dependent on new monitoring data from sites installed in 2022 to confirm whether they are above or below the limit value
- 20 of 129 SRN PCM links need to be reassessed. This is either because of changes individual sections of roads included in the PCM network and / or new monitored evidence of exceedances of the limit value since the completion of the original assessment
- 2 of the 129 SRN PCM links are now below the limit value following completion of this report, informed by new air quality monitoring or updates to air quality modelling.

The overall compliance status for the 129 links following completion of this Annual Evaluation Report has been set out in Table 4.1. The previously assessed outcome has been included within the table for reference.

Table 4.1 SRN PCM Link compliance status following completion of the Annual Evaluation Report (2021)

SRN PCM Link Status	Number of links	
	Following Completion of Commissions 1-3	Following Annual Evaluation Report 2021
Comes into compliance in 2020 / 2021	12	12
Above the limit value	33	31
Between 36-39.9µg/m^3	12	12
Less than 36µg/m^3	47	49
No Qualifying Features	25	25
Total	**129**	**129**

Glossary

Term	Definition
Air Quality Management Area (AQMA)	An area declared by a local authority which has been determined will exceed the relevant air quality strategy objective.
Air Quality Modelling	The use of a computer model to simulate air quality movements to estimate pollutant concentrations at specified locations
Annual Mean	The average of all hourly concentrations over a calendar year
Automatic Monitor	An instrument that continuously measures pollution from the air ranging from minutes to hours
Commission	The mechanism for the Department for Transport to instruct National Highways to assess the identified list of PCM links on the SRN
Compliance Date	The year the limit value is met i.e. annual mean NO2 concentrations are less than 40.5µg/m3
Developments	Includes new residential, commercial, industrial or transport infrastructure projects
DfT	Department for Transport
Diffusion Tube	A device that passively samples the concentration of one or more gases in the air, commonly used to monitor average pollution levels over a period ranging from days to a month
Elevated Road	A section of road exhibiting elevated road characteristics i.e. the section of the SRN is several metres above the local roads, footpaths and residential properties.
Emissions	A quantified discharge of pollution per unit area per time
Emission Factor Toolkit (EFT)	A database of vehicle emission factors issued by the Department for Environment, Food and Rural Affairs (Defra)
Heavy Goods Vehicles (HGVs)	Any lorry with a gross combination mass of over 3,500kg
Joint Air Quality Unit (JAQU)	The Joint Air Quality Unit (JAQU) is a joint Defra and DfT unit responsible for the delivery of the UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations
Limit Value	Legally binding parameters that must not be exceeded
National Air Quality Monitoring Network (NAQMN)	60 automatic air quality monitoring stations located alongside the SRN in England managed by National Highways
No Viable Measure	A classification applied to a section of the SRN when none of the measures available to National Highways to improve air quality can be delivered on that section of the SRN
Pollutant concentrations	Concentrations of pollutants normally reported as micrograms per cubic metre of air (µg/m3).
Pollution Climate Mapping (PCM) Model	Government's national air quality modelling used to assess and report on compliance with the Air Quality Directive to the European Commission

Term	Definition
Qualifying Feature	Includes residential properties, back gardens, schools, hospitals, care homes, public open spaces, public access within 15m of the edge of the running lane.
Strategic Road Network (SRN)	4,300 miles of motorway and major A-roads in England
WebTRIS	A web-based database of traffic data collected by National Highways on the SRN in England https://webtris.highwaysengland.co.uk/

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