

# M4 Bus Lane

## The Analysis of the Impact of the Suspension of the M4 Bus Lane

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### *Traffic Behaviour*

- The analysis suggests that little has changed with regards to driver behaviour with the suspension of the M4 Bus Lane between Junction 3 and Junction 2.
- The average headways on Lanes 1 and 2 are similar for both weekdays and weekends both before and after.
- The headway on Lane 3 has changed as expected with the lane open for all traffic but the headway is consistently longer than in Lanes 1 and 2, especially during the inter-peak period.

### *Traffic on A4*

- There has been little change in the traffic flow on the A4 Great West Road following the suspension of the bus lane. Journey times on the A4 are similar before and after.
- There is no evidence that the suspension of the bus lane is affecting traffic on the A4.
- Both with and without the bus lane in operation, journey times via the M4 are substantially lower than via the A4 and unlikely to result in diversion to the A4.

### *Air Quality Impact*

Nitrogen dioxide (NO<sub>2</sub>) concentrations at receptors in close proximity to the M4 are modelled to be higher with the suspension of the M4 Bus Lane. It is considered that this is as a result of several factors.

- a) The M4 Bus Lane displaced a proportion of the HDVs (i.e. buses and coaches) away from the inside lane, to the outside lane (i.e. the M4 Bus Lane). Without the M4 Bus Lane, HDVs are restricted to the two innermost lanes, closer to sensitive receptors adjacent to the M4.
- b) The average speeds on the section of the M4 adjacent to the receptors are higher in 2011 after suspension of the M4 Bus Lane.
- c) Traffic levels in 2011 are higher than in 2010, which contributes to increased NO<sub>2</sub> concentrations.

### *Noise Assessment*

Noise levels between Junction 3 and Junction 2 of the M4 are predicted to be higher as a result of the M4 Bus Lane suspension. The change in noise levels ( $LA_{10, 18 \text{ hour}}$ ) for the daytime would be considered to be 'minor adverse' and for night-time ( $L_{\text{night}}$ ) would also be 'minor adverse'.

### *Safety*

Prior to the suspension of the M4 Bus Lane there were 41 personal injury accidents over a three year period, with six of these resulting in serious injury. Over the one year period since the suspension of the M4 Bus Lane there have been three personal injury accidents between Junction 3 and Junction 2, all slight in nature.

## **Conclusion**

Flows have increased on the eastbound M4 in the last year, but despite this, journey times are now quicker overall following the suspension of the M4 Bus Lane. Journey times for buses and taxis have increased, but this has been outweighed by gains for other road users. In addition, journey times for all vehicles are slightly higher between Junctions 3 and 2 during the busiest



period (the morning peak), but this is again outweighed by benefits in between Junctions 4b and 3 and also between Junctions 3 and 2 over the rest of the day (including the evening peak).

The section upstream of the bus lane (Junction 4b to 3) is now less affected by congestion, as shockwaves no longer tail back beyond Junction 3. The merge area at the start of the M4 elevated section continues to be a source of congestion.

When the M4 Bus Lane and associated changes were introduced in 1999, analysis showed that there was a time saving for both buses and cars during peak periods, and a small time saving overall. In the intervening years, there have been changes to the traffic patterns on the M4. Daily flows into London have decreased by 4000 vehicles, and there are now substantially fewer buses and taxis than there were in 1999. The 1999 changes provided a benefit during periods of congestion, both for cars (by reducing the effect of the bottleneck where three lanes reduce to two at the start of the elevated section and the changes to the exit slip at Junction 3) and for buses and taxis (by allowing them to bypass some of the congestion). Because of the changes to traffic patterns, congestion is now less frequent and less severe than it was in 1999, and the removal of the bus lane has allowed the section to operate as a "typical" motorway, with Lane 3 used for overtaking. This has reduced journey times over most of the day.

In terms of journey times, the analysis shows that there is a small net saving in journey time/person as a result of suspending the M4 Bus Lane for all trips along the M4 between Junction 4b and Junction 2 and also for all trips only between Junction 3 and Junction 2. These journey times are also more reliable. It is recognised that the journey time impact on people travelling by buses and taxis is negative (with more bus passengers being affected than taxi passengers), but these impacts are more than outweighed by the overall benefits to all of those travelling by car, LGV and HGV.

Despite this traffic increase and more buses travelling closer to the nearside verge of the motorway, the impact on air quality and road traffic noise is minimal.

Since the M4 Bus Lane was suspended, there has been a reduction in the number of personal injury accidents between Junction 3 and Junction 2.

Overall, there has been a journey time benefit from the suspension of the bus lane and generally improved journey time reliability. The new design appears to be at least as safe as the previous layout, and although there has been a small increase in noise and emissions, this is mostly attributable to higher flows and higher speeds.



## 9 Environmental Impacts

### 9.1 Air Quality

An assessment of the air quality impacts of the suspension of the M4 Bus Lane has been carried out by reviewing nitrogen dioxide (NO<sub>2</sub>) concentrations at nearby sensitive receptors. These are reported on in the Air Quality Study, (Report Number 0001-UA003263-NHR-04-M4). A summary of the methodology and results are shown within this section.

The study area, which covered Norwood Green, North Hyde and Heston, was selected as it includes the residential properties which border the M4 where the M4 Bus Lane was.

The assessment was undertaken using the atmospheric dispersion modelling package ADMS-Roads, developed by Cambridge Environmental Research Consultants Ltd (CERC), to predict NO<sub>2</sub> concentrations at sensitive receptor locations for the before and after suspension of the M4 Bus Lane situation based on the physical monitoring undertaken.

The London Borough of Hounslow (LBH) has declared an AQMA for NO<sub>2</sub> for the whole borough, which includes the site of the M4 Bus Lane. LBH currently operates an extensive network of continuous and diffusion tube monitoring sites. However, there are few monitoring sites in close proximity to the M4 within the study area, therefore additional NO<sub>2</sub> diffusion tube monitoring was undertaken at locations close to the M4 to enable model verification.

The same traffic data for 2010 (with the M4 Bus Lane) and 2011 (without the M4 Bus Lane) has been obtained from actual traffic counts available from the Motorway Incident Detection and Automatic Signalling (MIDAS) loop detectors, as reported in previous chapters, and contains traffic flows for each lane of the M4 carriageway. Traffic data has been provided for the section of the M4 within the study area only, and did not include local roads. This is considered sufficient to assess the impacts of the M4 Bus Lane as the lane's suspension has not impacted on traffic flows on the local road network.

The change in NO<sub>2</sub> concentrations as a result of the M4 Bus Lane are presented in Table 9.1.

**Table 9.1: Changes in NO<sub>2</sub> Concentrations at Receptor Locations as a Result of the M4 Bus Lane**

Receptor	Location	Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )		
		With M4 Bus Lane	Without M4 Bus Lane	Difference
R1	Residential property off Osterley Lane	37.4	37.9	0.5
R2	Residential property on Oxford Avenue	50.0	51.3	1.3
R3	Residential property on Winchester Avenue	48.4	49.0	0.6



Receptor	Location	Annual Mean NO <sub>2</sub> (µg/m <sup>3</sup> )		
		With M4 Bus Lane	Without M4 Bus Lane	Difference
R4	Residential property on The Alders	46.0	47.1	1.1
R5	Residential property on Grange Close	57.1	58.8	1.7
R6	Residential property on Heston Grange	49.3	49.9	0.6

As can be seen in Table 9.1 NO<sub>2</sub> concentrations at receptors in close proximity to the M4 are predicted to be higher with the suspension of the M4 Bus Lane. It is considered that this is as a result of several factors.

- The M4 Bus Lane displaced a proportion of the total Heavy Duty Vehicles (HDV i.e. buses and coaches) away from the inside lane, to the outside lane (i.e. the M4 Bus Lane), however, without the M4 Bus Lane, all HDVs are restricted to the two innermost lanes, which are closer to sensitive receptors adjacent to the M4.
- The traffic data indicates that the average speeds on the section of the M4 adjacent to the receptors are higher in 2011 without the M4 Bus Lane in operation. This would also have contributed to an increase in NO<sub>2</sub> concentrations at receptor locations in close proximity to the M4.
- There has been an increase in traffic using this section of the M4 between 2010 and 2011, which contributes to increased NO<sub>2</sub> concentrations.

## 9.2 Noise

Using available traffic data, a basic noise level has been predicted for two scenarios (i.e. with and without the M4 Bus Lane) following the calculation methods in the 'Calculation of Road Traffic Noise' (CRTN). The Calculation of Road Traffic Noise (CRTN) is the standard UK procedure for defining measurement and calculation methods for assessing road traffic noise. The change in noise level has been used to establish the need for a more detailed noise assessment in accordance with Design Manual for Roads and Bridges (DMRB) as reported on in the Noise Impact Study (Report Number 0002-UA003263-NHR-01-M4).

Traffic data has been provided for the section of the M4 within the study corridor. This is considered sufficient to assess the impacts of the M4 Bus Lane as the lane's suspension has not impacted on traffic flows on the local road network.

A basic noise level has been calculated for each hour (LA<sub>10, 1 hour</sub>) for the With M4 Bus Lane Scenario (2010) and Without M4 Bus Lane Scenario (2011) using the calculation methodology set out in CRTN. A correction has been applied for percentage HDVs and traffic speeds. The LA<sub>10, 18 hour</sub> has also been calculated for both scenarios by obtaining the arithmetic average of the LA<sub>10, 1 hour</sub> levels.

Noise levels between Junction 3 and Junction 2 of the M4 are predicted to be higher as a result of the M4 Bus Lane's suspension. The increase in noise level has been assessed in terms of the DMRB classification for magnitude of impacts when



- The headway on Lane 3 has changed as expected with the lane open for all traffic but the headway is consistently longer than in Lanes 1 and 2, especially during the inter-peak period.

#### 11.11 *Traffic on A4*

- There has been little change in the traffic flow on the A4 Great West Road following the suspension of the bus lane. Journey times on the A4 are similar before and after.
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#### 11.12 *Air Quality Impact*

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- b) The average speeds on the section of the M4 adjacent to the receptors are higher in 2011 after suspension of the M4 Bus Lane.
- c) Traffic levels in 2011 are higher than in 2010, which contributes to increased NO<sub>2</sub> concentrations.

#### 11.13 *Noise Assessment*

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#### 11.14 *Safety*

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Highways Agency  
M4 Bus Lane  
Air Quality Study





<b>M4 BUS LANE AIR QUALITY STUDY</b>		Heston (in blue) as limited Diffuser tube locations Receptor locations Traffic count locations	
<b>STUDY AREA</b> DIFFUSER TUBE LOCATIONS RECEPTOR LOCATIONS TRAFFIC COUNT LOCATIONS		<b>FIGURE - STUDY AREA</b> DIFFUSER TUBE LOCATIONS RECEPTOR LOCATIONS	
Date: 15/01/2024 Drawn: J. Smith Checked: A. Jones Scale: 1:1000	Client: HIG HIGHWAYS AGENCY Project: M4 BUS LANE AIR QUALITY STUDY Title: DIFFUSER TUBE LOCATIONS Author: J. Smith Date: 15/01/2024 Scale: 1:1000	Plot No: 001 Plot Area: UA003263 Scale: 1:1000 Date: 15/01/2024	Plot No: 001 Plot Area: UA003263 Scale: 1:1000 Date: 15/01/2024



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