

# **Exploration of differences between flow-weighted and un-weighted vehicle speed estimates for local authority managed 'A' roads**

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## Introduction

1. This paper looks at the differences between the flow-weighted and un-weighted vehicle speed statistics for local authority managed 'A' roads and explores some of the reasons behind these through a number of examples.
2. The new flow-weighted statistics differ from the un-weighted estimates in that the speeds recorded on busy roads are more important to the overall flow-weighted figures than those on quieter roads. For the un-weighted figures, each mile of 'A' road – no matter how much traffic uses it – counts the same in the overall estimates. In addition, a minor difference is that roundabouts are excluded from the flow-weighted measure but are included in the un-weighted estimates.
3. In general, the flow-weighted speed estimates are likely to be faster than their un-weighted equivalents in those local authorities where their fastest moving roads are also their busiest, while the flow-weighted estimates will be slower in areas whose busiest roads are some of their slowest.

#### Assessment of differences between flow-weighted and un-weighted speed estimates

4. The published data show that, on average, the flow-weighted speed estimates for locally managed 'A' roads in 2009/10 are between 1.5 and 2 miles per hour (mph) slower than the un-weighted estimates.
5. However, these differences vary markedly at a regional level with 6 of the 9 regions in England reporting speeds at least 1.5 mph slower under the flow-weighted measure but with the East and South East regions showing no real difference and London alone in showing faster flow-weighted speeds (2.6 mph). This is shown in the table below:

Figure 1: Flow-weighted and un-weighted speed estimates by region, 2009/10

| Region                   | Flow-weighted speed estimate, 2009/10 (mph) | Un-weighted speed estimate, 2009/10 (mph) | Difference (mph) |
|--------------------------|---|---|------------------|
| North East               | 28.4  | 30.2                                      | -1.8             |
| North West               | 22.6  | 24.3                                      | -1.7             |
| Yorkshire and the Humber | 25.1  | 27.7                                      | -2.6             |
| East Midlands            | 28.9  | 31.7                                      | -2.8             |
| West Midlands            | 25.7  | 28.1                                      | -2.4             |
| East of England          | 30.1  | 30.2                                      | -0.2             |
| London                   | 16.5  | 13.9                                      | 2.6              |
| South East               | 27.3  | 27.7                                      | -0.4             |
| South West               | 28.7  | 31.3                                      | -2.7             |
| <b>All England</b>       | <b>25.0</b>                                 | <b>26.8</b>                               | <b>-1.8</b>      |

6. In addition, when these statistics are further broken down to local authority level a greater variation of differences occur. Flow-weighted speed estimates are at least 1 mph slower than the un-weighted estimates in 35 authorities but are at least 1 mph faster in 62 authorities.
7. The 20 local authorities with the largest increases and decreases in speed under the flow-weighted measure in 2009/10 are shown in the tables overleaf.

Figure 2: Local authorities with greatest negative difference between flow-weighted and un-weighted speed estimates, 2009/10

| Local Authority         | Flow-weighted speed estimate, 2009/10 (mph) | Un-weighted speed estimate, 2009/10 (mph) | Difference (mph) |
|-------------------------|---|---|------------------|
| Herefordshire           | 33.5  | 37.7                                      | -4.1             |
| Cumbria                 | 31.0  | 34.7                                      | -3.7             |
| Doncaster               | 25.6  | 29.1                                      | -3.5             |
| Gloucestershire         | 29.3  | 32.8                                      | -3.5             |
| Darlington              | 27.3  | 30.8                                      | -3.5             |
| Norfolk                 | 31.2  | 34.4                                      | -3.3             |
| Isle of Wight           | 23.8  | 27.1                                      | -3.2             |
| Devon                   | 32.0  | 34.4                                      | -2.4             |
| Northumberland          | 35.8  | 38.2                                      | -2.4             |
| Kirklees                | 20.6  | 22.9                                      | -2.3             |
| North Yorkshire         | 34.0  | 36.2                                      | -2.2             |
| Wiltshire               | 31.9  | 34.1                                      | -2.1             |
| Warwickshire            | 29.7  | 31.8                                      | -2.1             |
| Nottinghamshire         | 29.0  | 31.0                                      | -2.0             |
| Lincolnshire            | 35.6  | 37.6                                      | -2.0             |
| Oldham                  | 19.3  | 21.1                                      | -1.9             |
| North East Lincolnshire | 25.0  | 26.8                                      | -1.8             |
| Suffolk                 | 30.8  | 32.4                                      | -1.6             |
| Calderdale              | 21.0  | 22.6                                      | -1.6             |
| Staffordshire           | 28.6  | 30.2                                      | -1.6             |

Figure 3: Local authorities with greatest positive difference between flow-weighted and un-weighted speed estimates, 2009/10

| Local Authority      | Flow-weighted speed estimate, 2009/10 (mph) | Un-weighted speed estimate, 2009/10 (mph) | Difference (mph) |
|----------------------|---|---|------------------|
| Thurrock             | 38.7  | 29.0                                      | 9.7              |
| Newham               | 23.8  | 16.4                                      | 7.4              |
| Waltham Forest       | 21.5  | 14.9                                      | 6.6              |
| Kingston upon Thames | 22.6  | 16.8                                      | 5.8              |
| Peterborough         | 36.0  | 30.3                                      | 5.7              |
| Bournemouth          | 24.7  | 19.0                                      | 5.7              |
| Knowsley             | 29.8  | 24.6                                      | 5.2              |
| Redbridge            | 21.4  | 16.4                                      | 5.1              |
| Hillingdon           | 24.3  | 19.2                                      | 5.0              |
| Bexley               | 24.1  | 19.1                                      | 5.0              |
| Middlesbrough        | 26.4  | 21.6                                      | 4.8              |
| Ealing               | 18.2  | 13.8                                      | 4.4              |
| Havering             | 24.3  | 20.1                                      | 4.2              |
| Coventry             | 25.6  | 21.9                                      | 3.7              |
| Sunderland           | 29.3  | 26.1                                      | 3.2              |
| Tower Hamlets        | 16.2  | 13.2                                      | 3.0              |
| Medway               | 23.6  | 20.6                                      | 3.0              |
| North Tyneside       | 25.8  | 23.0                                      | 2.8              |
| Enfield              | 18.2  | 15.5                                      | 2.7              |
| Plymouth             | 21.1  | 18.4                                      | 2.6              |

8. It is evident from these tables that the authorities gaining the most through the use of the flow-weighted measure are mostly urban in nature while those with slower estimates are more rural. This chimes with the findings at regional level where London was the only area whose speed estimate became faster when traffic flow was taken into account and, of course, London is the only region whose constituent boroughs can all be classified as urban.
9. The findings for the more rural authorities are not particularly surprising. In general, these areas tend to consist of many miles of fast moving rural 'A' roads but, when traffic flow is considered, the smaller - but much busier and slower moving - 'A' roads near town or regional centres take on more importance and bring the overall estimate down.
10. The reasons behind the increased speed in the more urban authorities, and London in particular, are not as obvious. However, when the networks in these areas are examined in more detail, it's clear that many of these authorities have sections of large, relatively fast moving, dual-carriageway under their control in addition to the many smaller 'A' roads in and around town centres.
11. Under the un-weighted figures, the speeds on these dual carriageways would not have a significant bearing on the overall estimate for the authority but, once traffic flow is accounted for, these roads take on far greater relevance and serve to increase the average speed.
12. In order to show this more clearly, a detailed example of the speeds and flows across the locally controlled 'A' road network in Herefordshire and Thurrock, the 2 areas with the largest positive and negative difference are shown overleaf:



Figure 6: Morning peak speeds on local authority controlled 'A' roads in Thurrock, 2009/10 (green=fast, red=slow)

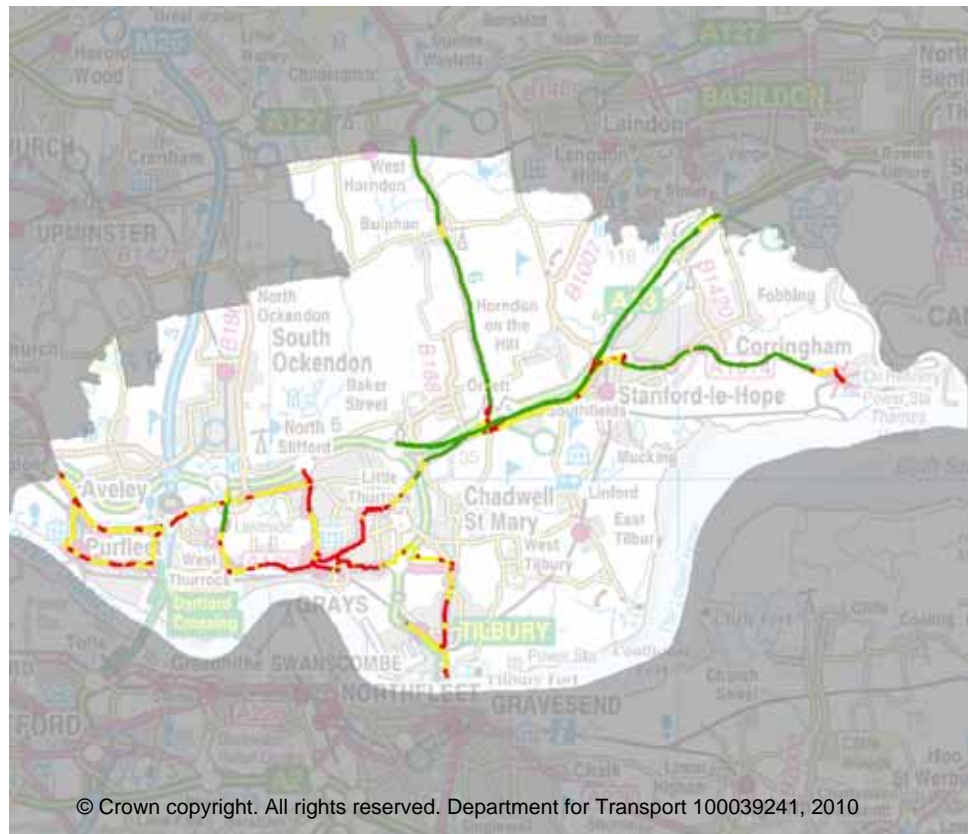
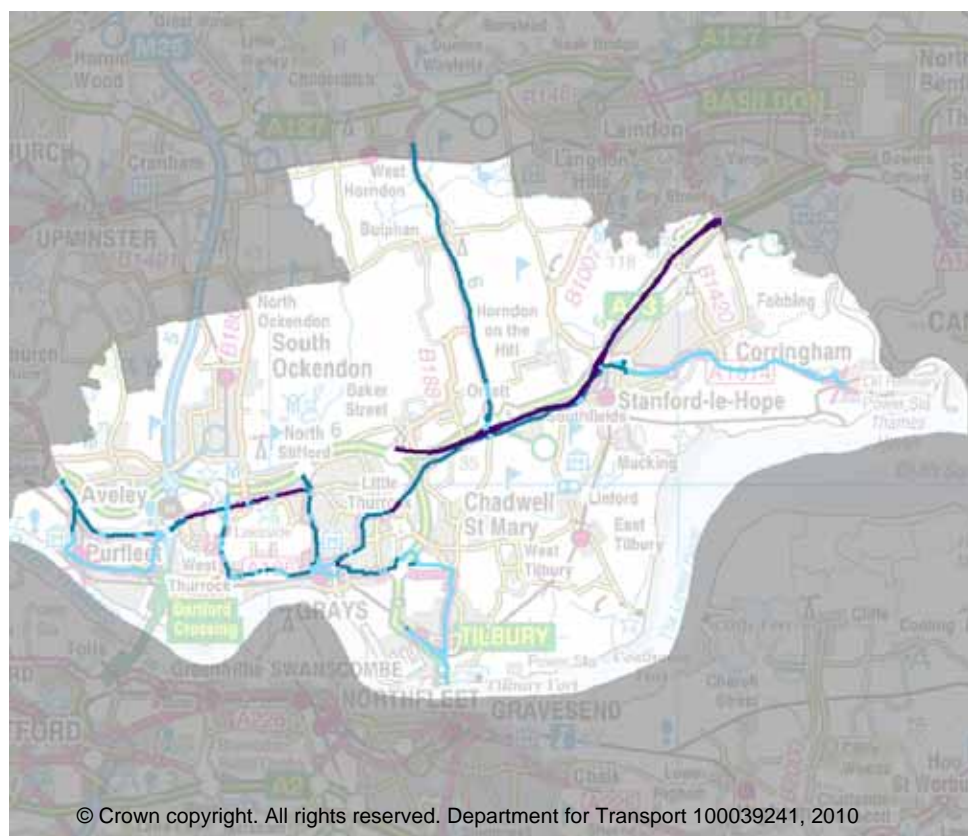


Figure 7: Morning peak flows on local authority controlled 'A' roads in Thurrock, 2009/10 (light blue=low flow, dark blue=heavy flow)



13. As can be seen from figure 4, most of Herefordshire's 'A' roads are fairly free-flowing during the morning peak.
14. However, there are a number of pockets of slower moving roads around town centres, in particular Hereford, Leominster and Ledbury. As these roads also appear to carry the most traffic – see figure 5 – these slower roads are given more weight in the flow-weighted measure and, therefore, the overall speed estimate for Herefordshire falls.
15. Thurrock's locally managed 'A' road network shows a contrasting picture.
16. Speeds are relatively slow on roads around Purfleet, Tilbury and Lakeside shopping centre to the west of the authority but the traffic moves much faster to the east on the A13, A1014 and A128. However, it's clear from figure 7 that the A13 carries by far the greatest traffic flow in the authority so the faster speeds on this road are given more weight under the new measure and the overall estimate for Thurrock increases.

### Conclusions

17. On average, flow-weighted estimates of the morning peak speed on locally managed 'A' roads are slower than their un-weighted equivalents by between 1.5 and 2 mph.
18. However, somewhat conversely, a larger number of local authorities gain an increase in speed of at least 1 mph under the flow-weighted estimates than suffer a decrease in speed of a similar magnitude.
19. This could in part be explained by the apparent urban/rural split in the findings, with speed estimates for the more urban authorities tending to increase once traffic flow is taken into account while estimates for larger rural areas tend to decrease.
20. In summary, however, in taking proper account of traffic flow, the new estimates should offer an improvement over the un-weighted figures and better reflect the actual conditions experienced by road users across the network.