Comments by Dr P Hoad on:
"Transport Modelling Assessment: Hybrid Model Output", May, 2014; and "PRIISM Forecasting Report", September 2014

Introduction

This document is a review of two documents which were not originally part of the published Birmingham Development Plan (BDP) Evidence base but which have become available during the progress of the Birmingham Development Plan Public Examination. These two documents are:

- Birmingham Development Plan, Transport Modelling Assessment: Hybrid Model Output, May, 2014 Birmingham City Council/Mott MacDonald (referred henceforth in this document as the "HMO[1]". This document was provided by Birmingham City Council as a consequence of a Freedom of Information request to Birmingham City Council (ref FOI11592F); and
- PRIISM Forecasting Report, September 2014, Prism Management Group/Mott MacDonald (referred henceforth in this document as "PFR"). This document is referenced in the HMO and was provided by Birmingham City Council through the BDP Public Examination Programme Officer.

During the20th November 2014 session of the BDP Public Examination, Birmingham City Council and their consultants confirmed that the HMO covered a key stage in the development traffic forecasts for the BDP, corresponding to "Stage 3a" as set out in Table 1.1 of the "Transport Evidence Base: Scoping and Methodology Report September 2012, Birmingham City Council/Mott MacDonald" (TA4).

[1] At the time of writing, the two new documents have not been assigned an official reference code and so have been abbreviated for brevity. Reference to other documents include their relevant reference code e.g. TA6.

Table 1.1: Proposed study stages

Study Stage	Label	Description
Stage 1	Scoping	Establishing and agreeing key study parameters from the outset (ie this report)
Stage 2	Establishing Context	Building up the full picture of relevant policy, plans and programmes which set the context for being able to assess the Birmingham Development Plan's future impacts
Stage 3a	Strategic Modelling	Assessing area-wide future impacts through strategic modelling
Stage 3b	Junction Modelling	Local area modelling of specific junctions and development of mitigation measures
Stage 4	Infrastructure Delivery	Considerations of design, cost, funding and delivery of required new infrastructure
Stage 5	EIP Assistance	Expert witness support to the Council at the Planning Inquiry

Source: Birmingham Development Plan, Transport Evidence Base: Scoping and Methodology Report, September 2012, Birmingham City Council/Mott MacDonald [TA4 page 1]

As a result this document therefore partly superseded the "Transport Modelling Assessment, Initial Output Report January 2014 Birmingham City Council (TA6), with the Hybrid Model Report forecasts replacing the traffic forecasts in TA6, but not affecting the base year forecasts.

The council also confirmed that the results of the "Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates" (TA29) fed into the HMO and that in turn the output from the HMO fed into the various junction assessments carried out for the BDP, namely:

- Minworth Roundabout – Option Development and Appraisal Report, June 2014, Birmingham City Council/Aecom (TA23);
- Tyburn Roundabout – Option Development and Appraisal Report, June 2014, Birmingham City Council/Aecom (TA24);
- Peddimore Access Modelling, June 2014, Birmingham City Council/Aecom (TA25);
- Peddimore Access Modelling – Access Option 2, June 2014, Birmingham City Council/Aecom (TA26);
- 2031 M42J9 Model Assessment, May 2014, JMP (TA28)

During the session of 20/11/14 I provided a verbal description of weaknesses that I had identified with the approach described in the HMO and how these weaknesses would affect the assessment of the proposed development of Peddimore and Langley. The purpose of this report is to set down these points formally in writing to ensure a full understanding of the matters raised.

It should be noted that the HMO was received on 10th November 2014 and the PFR was received on 19th November 2014 and hence only a limited review and cross checking of these documents (particularly the latter) was possible.

Partial carry-over of traffic demands

The HMO details how the PRISM model has been adapted to provide future year forecasts based upon calculations detailed in the "Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates" [TA29].

Table 4-17 of TA29 provides the summary of the 2031 forecast Arrivals and Departures calculated based upon the proposed land use. The corresponding table in the HMO is Table 2.3.

Table 4-17: Summary Trip Generation for the Green Belt Development

Use	AM Peak			PM Peak		
	Arrivals	Departures	Total	Arrivals	Departures	Total
Peddimore Employment	2,018	458	2,477	297	1,739	2,035
Langley - Residential	1,280	4,373	5,654	3,397	2,242	5,640
Langley - Education	3,701	525	4,226	77	179	256
Langley - Retail	29	21	50	54	55	109
Langley --Other	572	459	1,031	786	720	1,506

Source: Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates [TA29 page 33]

Table 2.3: Total peak hour person-trips to/from the GBD from the PJA TDM

Person Trips	08:00-09:00	17:00-18:00
Peddimore Arrivals	2018	297
Peddimore Departures	458	1739
Langley Arrivals	1280	3397
Langley Departures	4373	2244
Total Arrivals	**3298**	**3694**
Total Departures	**4831**	**3983**

Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 7

As can be seen the figures reproduced above, for Peddimore there is a match between the two documents (e.g. 2,018 arrivals in the AM peak in both cases). However, there is a mismatch between

the two documents for Langley, as only the figures for "Residential[2]" trips from Langley have been carried forward from TA29 to the HMO (e.g. 1,280 arrivals in the AM peak).

For ease of reference the two figures are compared below in a common format. As can be seen there is a significant decrease in the total trips, especially in the AM peak. No explanation is given for the difference between the two sets of figures.

Data from TA29				
	AM		PM	
	Arr	Dep	Arr	Dep
Peddimore Employment	2,018	458	297	1,739
Langley Residential	1,280	4,373	3,397	2,242
Langley Education	3,701	525	77	179
Langley Retail	29	21	54	55
Langley Other	572	459	786	720
Total One-way	7,600	5,836	4,611	4,935
Total Two-way	13,436		9,546	
Data from HMO				
	AM		PM	
	Arr	Dep	Arr	Dep
Peddimore	2,018	458	297	1,739
Langley	1,280	4,373	3,397	2,244
Total One-way	3,298	4,831	3,694	3,983
Total Two-way	8,129		7,677	
HMO traffic as proportion of TA29 (One-way)	43%	83%	80%	81%
HMO traffic as proportion of TA29 (Two-way)	61%		80%	

Some explanation of this difference might be gained from how TA29 dealt with the distribution of the forecast trips. Table 5-9 of TA29 set out the distribution of trips according to various areas (of varying size), and included purely internal trips as a separate category ("Internal to site").

[2] In TA29 the process by which these figures are derived initially refer to these "Residential trips" as "Journey to work" trips.

Table 5-9: Proportion of External Trip Distribution at Langley

Zone	Likelihood		
	Journeys to Work	Journeys to Education	Journeys to Retail
Internal to Site	0%	100%	45%
Interior 1	0%	0%	1%
Interior 2	5%	0%	54%
Interior 3	3%	0%	0%
Interior 4	8%	0%	0%
Interior 5	0%	0%	0%
Interior 6	1%	0%	0%
Interior 7	0%	0%	0%
Intermediate I	4%	0%	0%
Intermediate II	1%	0%	0%
Intermediate III	1%	0%	0%
Intermediate IV	1%	0%	0%
Intermediate V	2%	0%	0%
Intermediate VI	1%	0%	0%
Intermediate VII	8%	0%	0%
Intermediate VIII	24%	0%	0%
Exterior B	1%	0%	0%
Exterior C	6%	0%	0%
Exterior D	4%	0%	0%
Exterior E	3%	0%	0%
Exterior F	3%	0%	0%
Exterior G	6%	0%	0%
Exterior H	5%	0%	0%
Peddimore	10.96%	0%	0%
Total	**100% (0% Internal)**	**100% (all internal)**	**100% (45% internal)**

Source: Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates [TA29, page 59]

As can be seen from this table, TA29 assumed that all Education trips would be confined within the Langley area. Hence it might be argued that these trips should have been excluded from the HMO. However, the simplistic idea that just because primary and secondary schools are to be built within the Langley area these will capture all Education trips in Langley is incorrect. For example this ignores the likelihood of the following:

- that some secondary pupils will be traveling from Langley to the local selective schools, Bishop Vesey and Sutton Coldfield Grammar School for Girls, or to King Edward's schools in Birmingham;
- that some pupils will be traveling from Langley to the most popular Sixth Form location in Sutton Coldfield, Arthur Terry School in Four Oaks or other Sixth form choices;
- that some pupils will be traveling from Langley to denominational schools, for example the Abbey Primary School in Erdington the Bishop Walsh school in Wylde Green;
- that some pupils will be traveling from Langley to any of the different secondary schools in and around Sutton Coldfield due to the varied specialisations available; or

- that some pupils will be travelling in from outside Langley, as schools in Sutton Coldfield are generally well thought of.

Hence the Educational trips should have been considered in more detail and some proportion of these included in the trips that travel in to and out of the Langley area. School trips are a notorious source of congestion, traffic levels in school holiday periods are markedly different from "normal" traffic levels and so their total exclusion form the model is a major flaw.

Whereas TA29 assumed no Education trips would extend outside the confines of the Langley area, it did assume the other types of trips would do. Table 5-9 of TA29 shows that it was assumed that 55% of retail trips would travel outside the Langley area. Yet none of these trips have been carried forward to the Hybrid model.

Also of note is that Table 5-9 TA29 does not appear to discriminate between the direction of trips, for example whether it is a trip starting at a house in Langley going to a shop in Wylde Green, or a trip starting at a house in Wylde Green going to a shop in Langley. These distributions are hardly going to be the same (and there would have been value in the HMO reviewing this in the light of available evidence from the Prism model). It may well be that the Langley development would benefit from a good retail centre to improve its sustainable credentials but if it is good enough to attract the local residents (against strong competition such as the Asda next to Minworth roundabout as well as other local shopping areas) then it would be good enough to attract external shoppers.

Table 5-9 of TA29 gives no distribution for "Langley – Other" trips but presumably a significant proportion of these would travel in from or out to the area outside the Langley area.

So overall it can be seen that a very large number of trips have simply disappeared from the assessment. Rather than being a sustainable development this seems more like a ghetto, with the inhabitants barred from leaving the area coupled with restrictions to keep other people out. Certainly it would be hardly be likely that promotional material for new homes would advertise the fact that new residents are expected to confine their travel so much to within the Langley site.

In addition the traffic distribution used in TA29 does not appear to have considered the difference between trips heading "inbound" and those heading "outbound". Whilst this is effectively

superseded by the HMO it would have been valuable for the HMO to have produced more information on the resultant distribution of trips, much as TA29 did, in order to properly inform the BDP (and ensure the process is realistic).

Peak hour/Peak period

Having taken forward only part of the total number of trips originally calculated in TA29, these were then converted from peak hours values into peak periods for compatibility with the PRISM model. These conversion factors are shown in section 2.6 of the HMO and are significant, particularly for the AM peak where the hourly flow for the peak period is only 70% of the hourly flow in the peak hour.

2.6 Trip Rates

The PJA TDM uses survey data collected from the TRICS database to calculate average trip rates for the land uses intended at the GBD[2]. These trip rates are then applied to each land use to estimate the following total person trips in the peak hours:

Table 2.3: Total peak hour person-trips to/from the GBD from the PJA TDM

Person Trips	08:00-09:00	17:00-18:00
Peddimore Arrivals	2018	297
Peddimore Departures	458	1739
Langley Arrivals	1280	3397
Langley Departures	4373	2244
Total Arrivals	**3298**	**3694**
Total Departures	**4831**	**3983**

Using NTS[3] 2012 table NTS0501, we can estimate the following factors to convert from peak hour to average hour within the peaks as required for PRISM:

- AM peak hour to average hour: 0.7017
- PM peak hour to average hour: 0.9317

Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 7

The use in the PRISM model of the average flow over the whole peak period rather than the average over the peak hour is important, not because there any intrinsic error, but as this would need to have been taken into account when PRISM flows were used for detailed junction analysis (or any other use). Yet when the flows have been used such as in the assessment of the Peddimore Access no detailed explanation has been given to confirm that the data has been properly processed, merely a statement that, as in "Peddimore Access Modelling, June 2014, Birmingham City Council/Aecom" (TA25) for example, "PJA have provided 2031 flows in vehicles".

2.6 Scenario 3: : Access via Roundabout to A38

Scenario 3 includes the Peddimore development with an at-grade four arm roundabout on the A38. This scenario assumes that the Peddimore development is accessed via two arms from a roundabout and the remaining two arms are connected to the A38. PJA have provided 2031 flows (in vehicles) and also HGV percentages for development traffic. AECOM have calculated the flows in PCUs based on the Zones utilised in the TRANSYT model and these are shown in **Figure 5** below. Network results are presented in **Appendix E**.

Source: Peddimore Access Modelling, June 2014, Birmingham City Council/Aecom [TA25, page 10]

In section 4.2 of TA24, Aecom refer to having received flows in "average hour models" which is ambiguous. There is some circumstantial evidence though. The report identified (the fourth paragraph of section 4.2) that the 2031 forecast flows were in some cases lower than the observed 2009 flows and notably this is for the AM peak when there is a 30% difference between the two potential flows, and so this mismatch between peak hour and peak period flows could be the reason for this (the effect is most marked in the AM peak, and it is for this peak that the problem has been identified. Also in this analysis it is stated that the percentage of HGVs had to be assumed, showing that insufficient information was passed to Aecom, suggestive of a poor level of communication between the different parties working for the council.

4.2 2031 Future Year Flows

Mott MacDonald on behalf of BCC have provided 2031 future year flows based on the strategic PRSIM model which was developed in support of the BDP. Mott MacDonald have advised that the flows are based on the 2031 'Development Case' PRISM forecasts (i.e. including the greenbelt development). Actual Vehicle Flows have been provided for the AM and PM average hour models. AECOM have not checked the PRISM model flows and have used them as provided by Mott Mac Donald.

DMRB (Volume 12, Section 1, Part 1, TAM) discusses the use of strategic model flows for junction design. It recommends that the turning movements used to develop junction designs should not be taken directly from outputs from the traffic model. Further detail on the approach to be taken on this matter is provided in Sections 13.5 and 13.6 of the DMRB. Furthermore, TA 23/81 (Junctions and Accesses: determination of size of roundabouts and major/minor junctions) also cautions against the use of model output directly and refers the user to TAM.

AECOM have therefore reviewed the flows provided from the PRISM model directly for future year assessment and compared them against the 2009 flows. All detailed calculations are provided in **Appendix D.**

The comparison has shown that the flows from the model for some of the movements are lower than the 2009 existing flows. For example, flows from Chester Road S to Chester Road N are reduced by around 250 pcus in the AM peak and similarly flows from Chester Road N to Chester Road S are reduced by around 200pcus.

PRISM is a strategic model and it considers alternative trip routes between origin and destination points. Therefore we have considered that in the strategic model it is likely that this traffic will have been assigned via the B4148 as this is the shortest and least congested route. However AECOM do not consider this to be realistic, therefore we have developed two sets of flows for assessment.

Flow Test 1

In the first flow test, AECOM have used maintained the same volume of traffic at the junction as forecast by PRISM, but have made adjustments based on the following assumptions:

- The turning proportions will remain similar to the 2009 flows and we have derived the 2031 future year flows by adjusting the PRISM flows using 2009 turning proportions.
- For modelling purposes it has been assumed that the HGV percentages for the future year are the same as in the base year.
- 2031 future year flows have been calculated in PCUs so that the results from the existing network can be compared against the preferred option identified in the further section of this report.

Source: Tyburn Roundabout – Option Development and Appraisal Report, April 2014, Birmingham City Council/Aecom [TA24, page 19]

This therefore compounds any concerns about the output from the Prism model (Hybrid or not) when used in any of the detailed junction assessments. This particular problem would be easier to detect (and avoid) if forecast figures were available for key links which could be cross checked against flows used in individual junction assessments.

Conversion from person trips to vehicle trips

The next step described in the HMO is to convert from person trips into Highway trips. This is done by applying the mode split proportion for Car drivers to the total person trips. The factors are set out in Table 2.5 of the HMO

Table 2.5: Proportion of Total Person Trips by Arrival/Departure and Time Period that are Car Driver by Purpose

Mode / Purpose	AM Departures	AM Arrivals	PM Departures	PM Arrivals
Car Driver / Business	5.0%	5.1%	3.4%	5.6%
Car Driver / Other	53.0%	69.8%	54.8%	56.2%
Car Driver Total	**58.0%**	**74.9%**	**58.2%**	**61.8%**

Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 8

Section 2.7 HMO states that the factors were derived from the "Transport Modelling Assessment Initial Output Report, January 2014, Birmingham City Council/Mott MacDonald" (TA6). Table 4.2 of TA6 sets out the assumptions that were included in the PRISM model including extensive public transport infrastructure (the proposed "SPRINT" service) including the addition of bus gate and bus lanes to derive the "Development Case" mode split.

2.7 Purpose, Mode, and Time Period Proportions

The PRISM travel demand model has been chosen as the appropriate source to distribute the trip totals in Table 2.4. The model runs used to support the **Initial Output Report** have been selected because many of the improvements since then have been to the network models rather than to the demand model. The following table presents the percentage of total person arrivals or departures in each time period to the GBD zone that are made by car drivers for the purposes of business and other-purposes (including commuting):

Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald. page 7

For the Development Case, the Do Minimum network is the same as in the Reference Case but with the addition of schemes (highway and PT) deemed necessary to facilitate the Green Belt proposals. Full details of these additional schemes are provided in Section 7 of the Stage 2 report and the highway schemes are listed in Table 4.2 below. However, it is noted that this is a provisional list of schemes proposed for the purpose of this exercise and could be subject to change with further scenario testing and development.

Table 4.2: List of highway schemes added to the 2021 and 2031 Development Case Do Minimum network

Scheme Name	Description
Fox Hollies Road / Webster Way	Introduction of SPRINT infrastructure and improvements to Webster Way junction with Fox Hollies Road
Peddimore Island	Development access off A38 Sutton Coldfield bypass
Minworth Island	Capacity improvements to roundabout
Castle Vale bus link	Bus link between A38 and Manby Road
A38 Junction with Bromford Road	Introduction of SPRINT infrastructure
Bagot Arms – Chester Road	Introduction of SPRINT infrastructure
Eachelhurst Road / Walmley Ash	Introduction of SPRINT infrastructure, including improvements to Walmley Ash junction with Eachelhurst Road and new bridge across railway
Site Road Infrastructure	Internal development site distributor links

Source: Transport Modelling Assessment Initial Output Report, January 2014, Birmingham City Council/Mott MacDonald [TA6], page 15

However the HMO gives no indication that the "with Development case" forecasts had any network changes applied to the Reference case network (in effect the only difference between the two modelled scenarios is in the demand matrix). The forecasts therefore have assumed the benefits of additional public transport improvements which reduce the amount of traffic generated, but at the same time have not included the reduction in road capacity for other road users implicit in these public transport improvements (e.g. bus gates, bus lanes). The resultant forecasts are therefore unrealistic and based on a scenario that is not simply unrealistic but actually impossible to achieve.

As a cross-check TA29 Figures 6-29 & 6-30 give the values of 56% and 63% as aspirational targets for the proportion of car trips (i.e. the upper limit), assuming significant public transport measures were put in place. These aspirational figures are consistent with the model split assumed in the HMO, confirming that this report has assumed that such infrastructure would be in place. (If this was not the case then this indicates that the reference forecasts were over-optimistic about low car use to begin with, which would be a problem in itself.)

As a further cross-check, Table 6-3 of TA29 shows that actual car use is Walmley in actually much higher, with Car Drivers representing 74% of all trips for journeys to work (which is should be representative of what we might expect for Langley). It should also be noted that 1% of trips apparently travel by Rail, despite there being no rail service in Walmley. Such trips might be "Park and Ride" trips (a category not included in the analysis of TA29), as the Cross City line has a number of such sites in Sutton Coldfield which would still generate car trips in the local area.

Tables 6-29 and 6-30 of TA29 do not show any Park and Ride share. These trips might be hidden in the "Public Transport" category implying an even higher number of cars should have been forecast. Further details of Park and Ride forecast usage would help clarify the picture.

6.4 Modal Shift

6.4.1 The number of public transport users, particularly at Langley, is lower than desired. A modal shift can be aspired to in order to increase the number of sustainable travel options and decrease the number of car users.

6.4.2 Through various measures, including improvements to public transport, pedestrian and cycle networks, and highway infrastructure, a modal shift can be encouraged so that sustainable travel both at the Green Belt development, and in the wider area, is more desirable.

6.4.3 In a separate study undertaken by PJA – "Green Belt Development Movement Infrastructure Plan[21]" – an investigation was carried out into the realistic aspirations for encouraging a modal shift in the local area. It is anticipated that the following modal splits are achievable:

Figure 6-29: Revised Modal Share Target for Peddimore

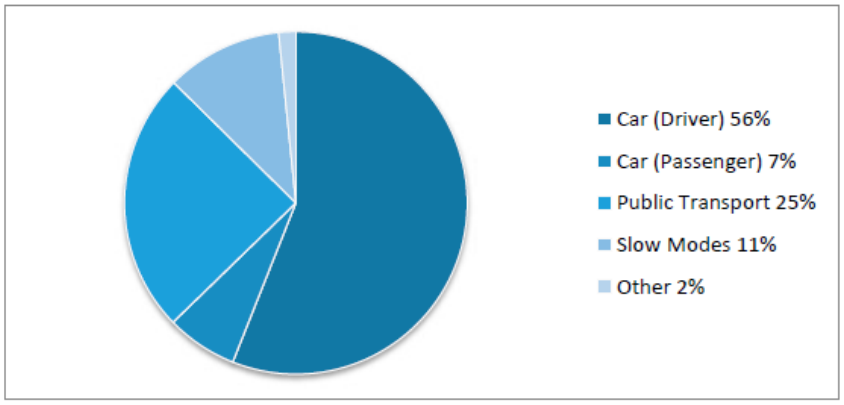
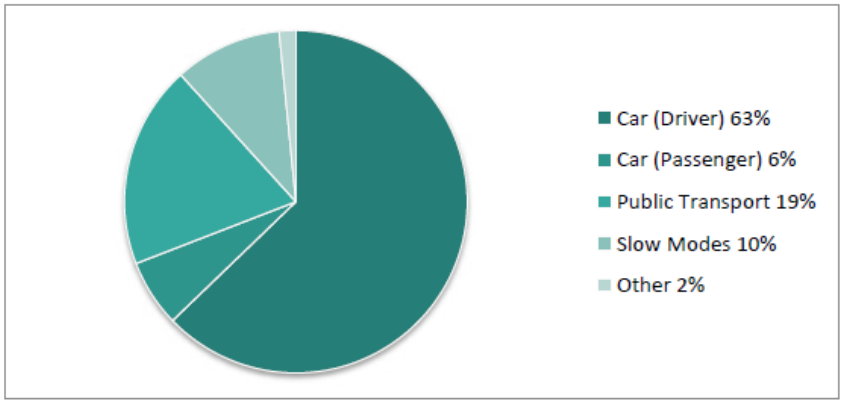


Figure 6-30: Revised Modal Share Target for Langley



Source: Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates [TA29, page 116]

Table 6-3: Walmley: Journey to Work Mode Split

Mode	Split
Rail/Underground	1%
Bus/Coach	11%
Car Driver	74%
Car Passenger	6%
Cycle	1%
Walk	5%

Source: Green Belt Development Travel Demand Report, June 2014, Birmingham City Council/Phil Jones Associates [TA29, page 72]

Importance of modelling adverse impacts

Section 3.1 of the "Green Belt Development Movement Infrastructure Plan, January 2014, Birmingham City Council/Phil Jones Associates" (TA7) makes it clear that it is not merely sufficient for a Sustainable Development, as the Langley site is claimed to be, to have good connections but that it should not adversely impact on existing travel. This is important not just as a matter of principle but as critical issue with regards the protection of Green belt.

3 Overview of the Emerging Transport Strategy

3.1 Key Principles

3.1.1 To be sustainable, the development needs to be supported by a transport network that accommodates the trips it generates, both within and outside the site. The provision of good connectivity is necessary for a development to attract and retain residents, and therefore become a vibrant neighbourhood. In this way, the travel demands and network effects of the development are mitigated. Similarly for the employment development to attract and retain business occupiers there has to be adequate accessibility for the workforce, and provision for the movement of materials and products.

3.1.2 Sustainability also requires that the movement generated by the new development does not significantly affect movement within existing neighbourhoods. It is important that these existing activities are sustained, and that the new development offers an enhancement to, rather than a detraction from, the economic prosperity and the quality of life in the area.

Source: Green Belt Development Movement Infrastructure Plan, January 2014, Birmingham City Council/Phil Jones Associates [TA7, page 13]

Section 14 of the National Planning Policy Framework, March 2012, Department for Communities and Local Government identifies that there is a presumption in favour of sustainable development. However it is easy to misread this as a presumption in favour of development because it can be

presumed that a development is sustainable. Instead it should be seen as a presumption in favour of a development if, and only if, it can be proved to be sustainable (which would require rigorously derived proof).

> 14. At the heart of the National Planning Policy Framework is a **presumption in favour of sustainable development**, which should be seen as a golden thread running through both plan-making and decision-taking.

Source: National Planning Policy Framework, March 2012, Department for Communities and Local Government [page 4]

Despite TA7 identifying the need for a development to be considered sustainable only if it does not significantly affect existing travel movements, this concern does not appear to have been taken into account in the assessment of the traffic impacts of either Langley or Peddimore (it should be noted that although only Langley has been labelled explicitly as "Sustainable", the Peddimore site would equally need to prove its sustainable credentials in order to claim a presumption in favour of development on Green Belt). Perhaps the only indication of this is the way the traffic figures in the HMO seem to have been processed in order to reduce the likely impact (e.g. the absence of all but residential trips travelling outside Langley) having made an automatic presumption of sustainability rather than actually assessing the matter in an objective manner.

As has been discussed above, in producing the "with development" forecasts the HMO has applied the development trips as an additional demand on to the Reference case network. As a consequence the forecast only show the negative impacts of the additional traffic (which is bad enough) but does not show the adverse impacts of the Public Transport measures such as bus gates and bus lanes which would adversely impact on the highway network. Although well intentioned, the negative impact of these measures should still be taken into account (regardless of how far away from the site this occurs) if any claim is to be made on sustainability. The council may believe that the traffic benefits of these improvements would offset the negative impact (for example by reducing the traffic flow by moving people onto buses) but this needs to be proved not merely assumed.

Additional adverse impacts

Figures 3.9 and 3.10 of the HMO presents plots of the differences in traffic flows between the Reference and Development cases, with red lines indicating where traffic is forecast to increase and green lines where it forecast to decrease (and the width of each line being in proportion to the scale of the change).

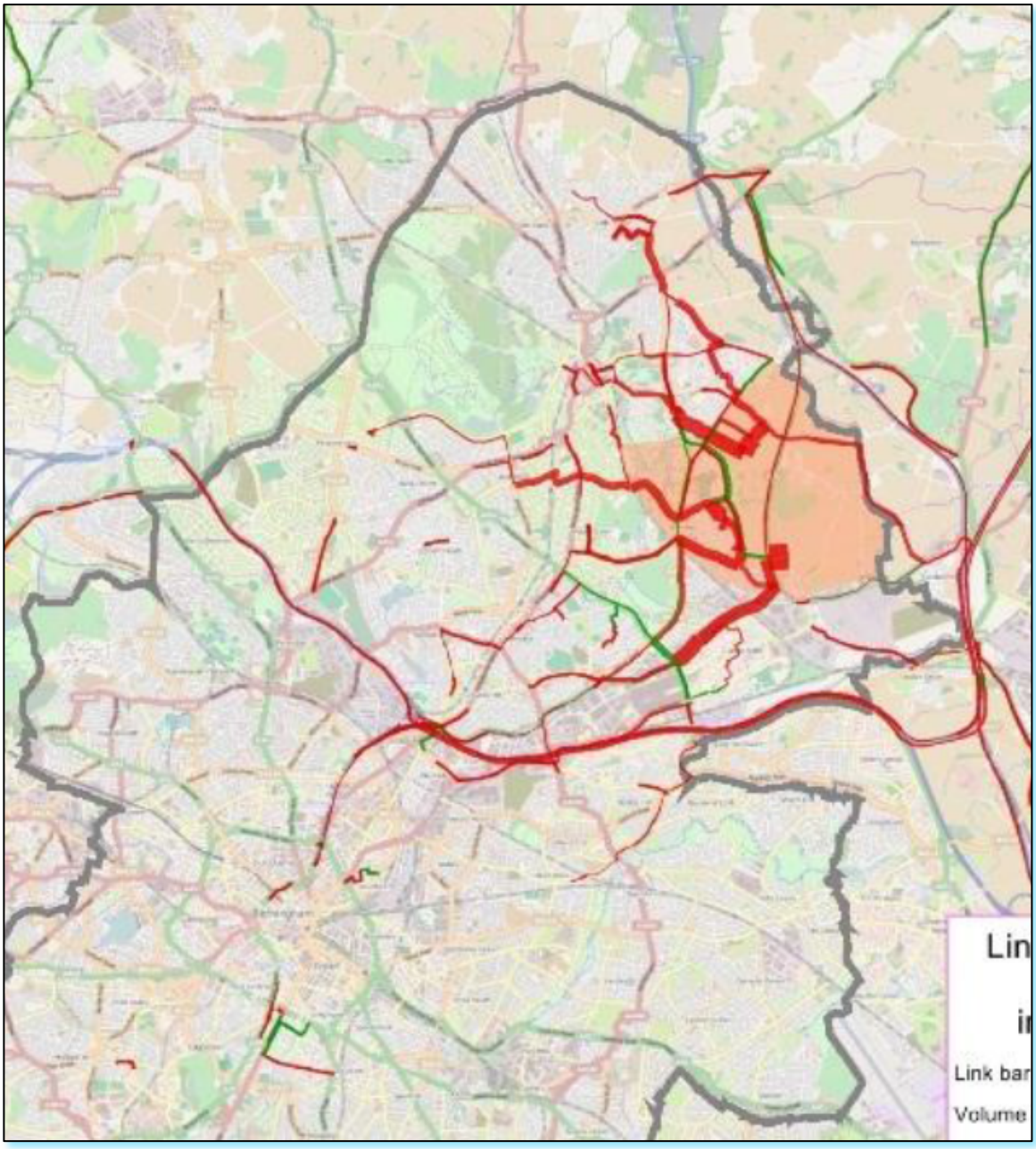
These plots confirm the fact that the model does not show any reduction in traffic along the line of the proposed “Sprint” bus service (which would be expected with the associated loss in capacity and increased delays for cars on this route). In addition these plots show important links near the Langley site where there is forecast to be a significant decrease in flows.

In the AM peak it can be seen that Thimble End Road is forecast to have a significant decrease in traffic, as does the section of Walmley Ash Road between Webster Way and the A38 Minworth Roundabout. In each case, both ends of the road is intersected by a significant increase in flow associated with the Langley development. In the PM peak the same problem is found on Walmley Road north of Fox Hollies Road, and also on the A38 north of Minworth Roundabout. This indicates that the increased flow due to the development is forcing pre-existing traffic movements away from these roads. The development is therefore having a significant adverse impact on the existing road network and travel movements.

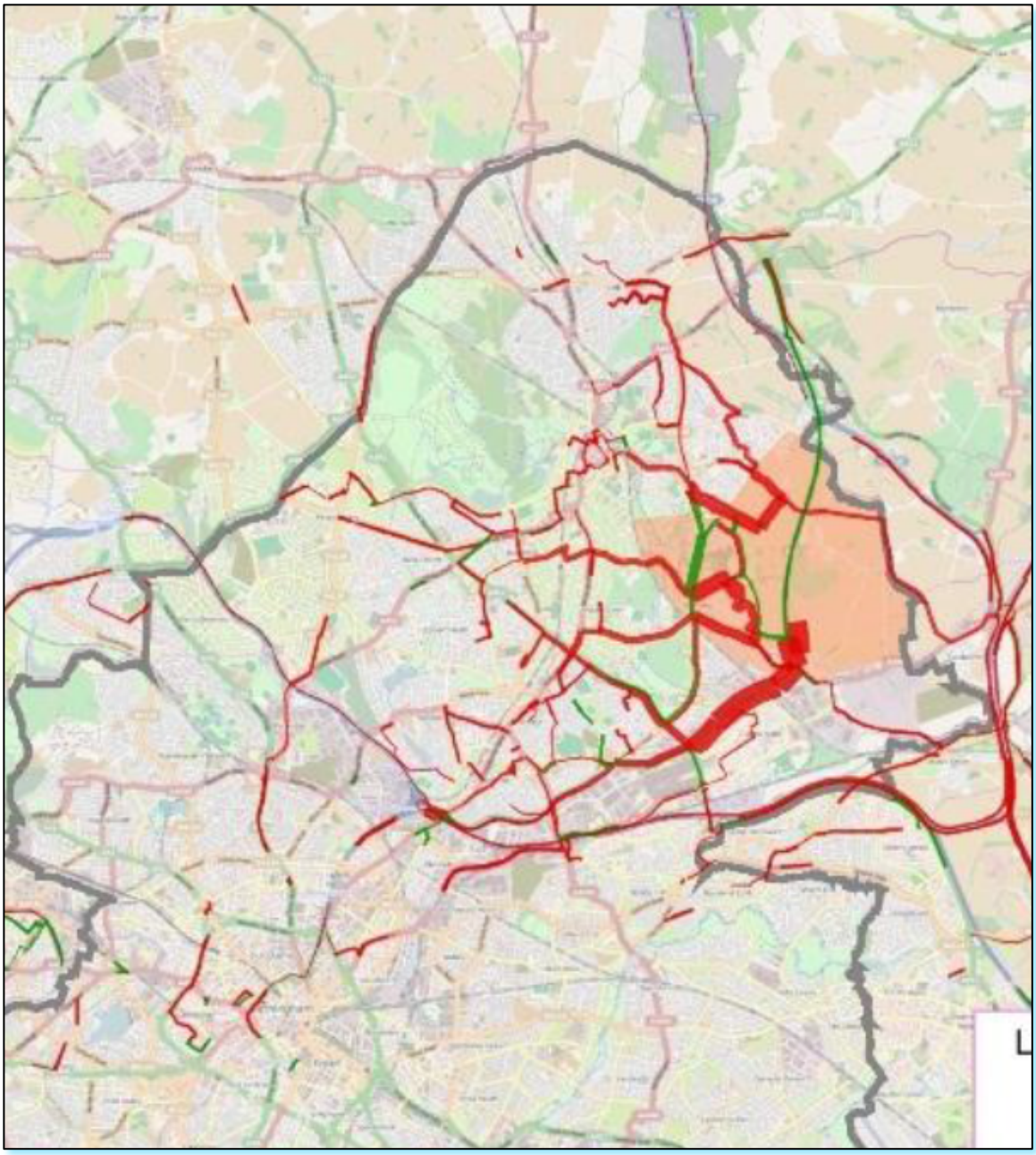
Similarly Figures 3.13 and 3.14 of the HMO, which show changes in speed with the development, also show widespread adverse impacts. These would require not just the odd junction improvement but significant increases in road capacity (or more simply, more roads).

Although a long list of schemes has been produced in Appendix E of the “Birmingham Development Plan Transport and Infrastructure Evidence Base and Strategy, June 2014, Birmingham City Council” only four schemes have been tested (albeit with forecast traffic data that is likely to be an underestimation, as detailed above). Again it seems to be a case of presumptions being made, namely that an “off the shelf “ solution (each scheme has an associated cost but comparison of these shows the same values repeated showing these are just generic costs without any adjustment for individual conditions) will be enough to deal with any problems without actually doing any relevant analysis. This is hardly a valid approach.

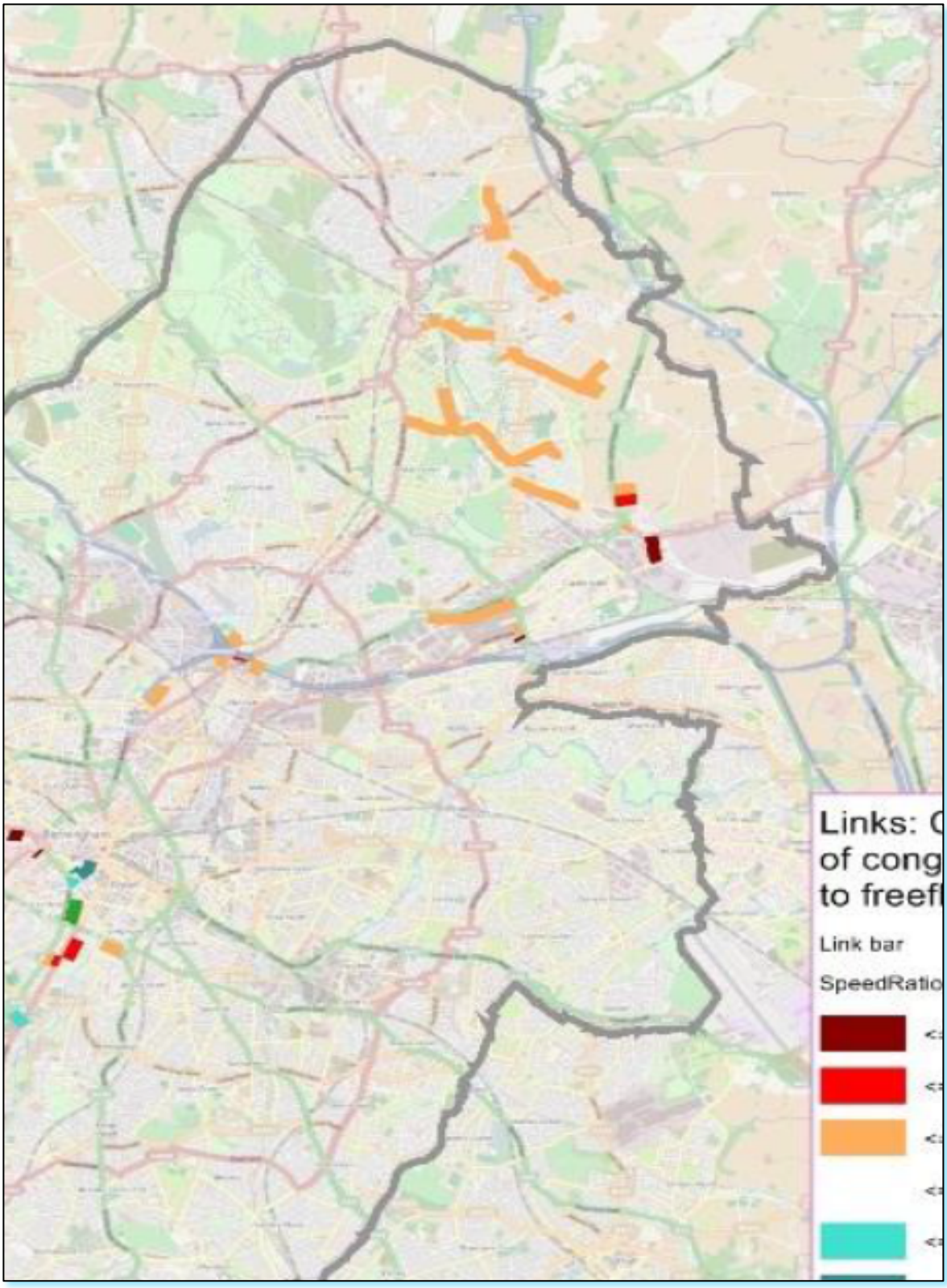
Whilst it can be seen that the task of carrying out a full assessment of all the roads and junctions identified as requiring improvement would be significant and costly, and for which the council may be unwilling to undertake, this task is inherent in the decision that the council has taken in deciding to place significant development on the Green Belt and is the necessary price it must pay. If the council does not want to undertake this work they have merely to downgrade the scale of the development to something that is more manageable.



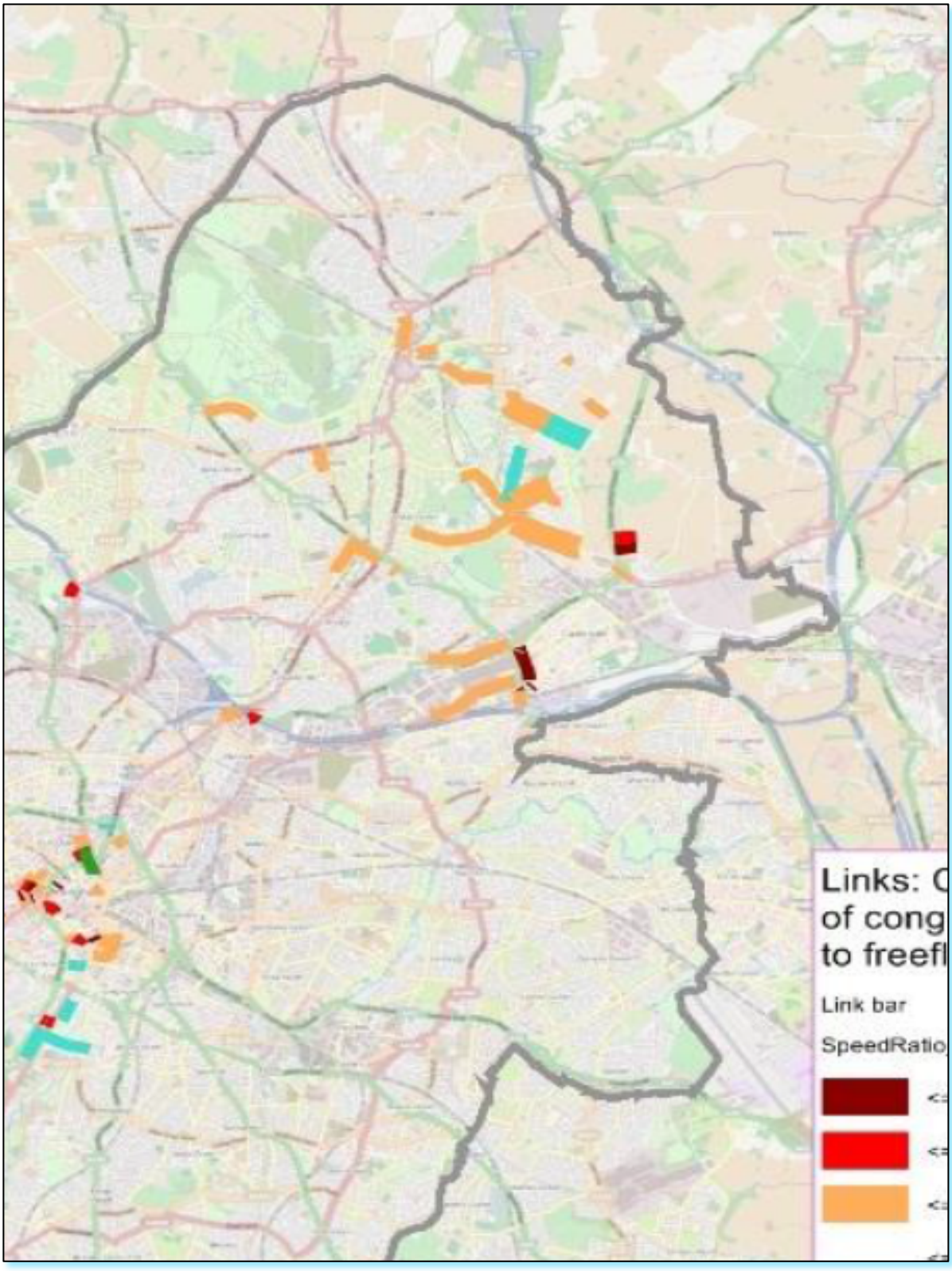
Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 21



Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 22



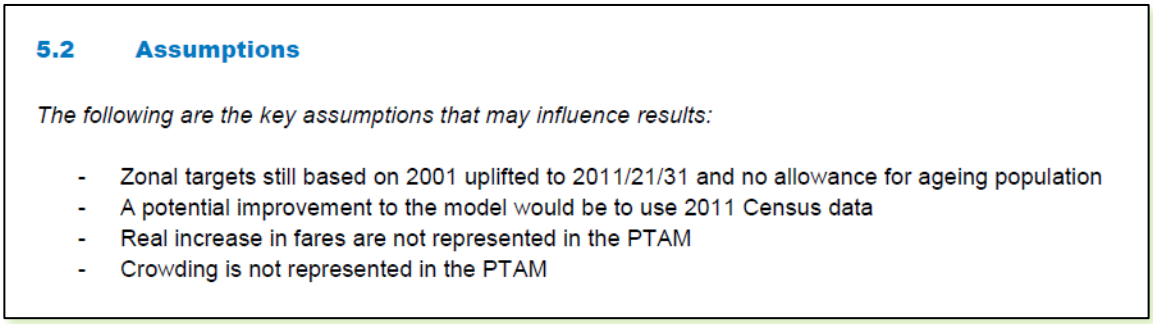
Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 25



Source: Transport Modelling Assessment: Hybrid Model Output May 2014 Birmingham City Council/Mott MacDonald, page 26

Weaknesses in PRISM Forecasting

At the very end of the PFR, comments have been made on key assumptions that may influence its forecasts. Of the four, the last is likely to have significance to the use of the Prism model in the context of the BDP and the HMO, namely that "Crowding is not represented in the PTAM" (presumably referring to the Public Transport Assignment Model).



5.2 Assumptions

The following are the key assumptions that may influence results:

- Zonal targets still based on 2001 uplifted to 2011/21/31 and no allowance for ageing population
- A potential improvement to the model would be to use 2011 Census data
- Real increase in fares are not represented in the PTAM
- Crowding is not represented in the PTAM

Source: PRIISM Forecasting Report, September 2014, Prism Management Group/Mott MacDonald

The inclusion of Crowding in a public transport model is important to reflect the capacity of such services and the decreasing attractiveness as a service fills up (for example someone is more likely to make use of a bus that is practically empty with lots of free seats compared to one that is almost full with limited standing room available) and this acts as an important balancing factor on public transport use (much in the same way that as roads fill up with more and more traffic, the speeds decrease making them less attractive). The absence of the Crowding function is therefore a potential major weakness in the model, likely to lead to over optimistic public transport forecasts. Attempts to produce a major modal shift to public transport may produce higher public transport shares because the critical restraint has been left out (unlike cars which slow down as the road gets more congested, PT services would be assumed to run at fixed speeds regardless of their use.

It is recognised that the caveat in the PFR would appear to refer specifically to the PT assignment model rather than the demand model. It is just possible that Crowding is applied in the Demand Model and therefore the calculation of the mode split, although this seems highly unlikely as this would presumably require the levels of Crowding to be determined by the PT Assignment Model. No other reference is made to Crowding in the PFR so the point is left in doubt. Even so, even if the correct mode share was determined the routing would be likely to be affected, with passengers using routes that are over-capacity when they ought to be on an alternative route, which in turn ought to be affecting the level of Crowding on that route and so on. At the very least this would make the reliability of PT forecasts on parallel routes very uncertain although, as discussed above,

the likelihood is that there is a great problem of too many trips forecast to be on Public Transport and hence the highway network would have a lower level of forecast traffic than it ought to have.

In addition to the absence of Crowing in the PTAM, it is also stated that "Real increase in fares are not represented in the PTAM". In this instance reference is made in 2.1.4 to the use of a Real Fare Increase in the Demand Model. Hence this should not affect the share that public transport should get (which it would if it was absent from the Demand Model process). Given fares across all PT options increase at the same rate then presumably this error may well balance out amongst different options, so no clear systematic error seems evident. Even so, the city council should provide more information on why the absence of a realistic modelling of fares should not affect the reliability of the model in the context of the BDP.

2.1.4 Real Fare Increases

Public transport fares are an input to the PRISM Demand Model in the form of origin-destination matrices extracted from the PTAM. Since the fares extracted are still in 2011 prices, a factor is applied to reflect the real increase in fares between 2011 and the future year.

Source: PRIISM Forecasting Report, September 2014, Prism Management Group/Mott MacDonald

Paul Hoad 21/11/14