

## **Birmingham Development Plan – Public Inquiry**

### **Response to Matters Raised by Dr Paul Hoad, Matter I, Thurs 20 November 2014**

#### **1 Matters Raised**

Dr Hoad raised a number of matters orally under Matter I on Thursday 20<sup>th</sup> November 2014 which were subsequently confirmed in writing in a note submitted on Saturday 22<sup>nd</sup> November 2014. The matters relate to two reports, as follows:

1. Birmingham Development Plan, Transport Modelling Assessment: Hybrid Model Output, May, 2014 Birmingham City Council / Mott MacDonald (referred to in his note as “HMO”).
2. PRISM Forecasting Report, September 2014, PRISM Management Group/Mott MacDonald (referred to in his note as “PFR”).

A number of matters are raised in the note, but our summary of main matters and corresponding supporting matters is as follows:

- A. The forecast trip generation and external network distribution of Langley trips has been underestimated, therefore underestimating the predicted traffic impact of this development.
  - a. The Hybrid Model does not include all trips listed in Table 4-17 of report TA29.
    - i. The assumptions in TA29 relating to internal trips within Langley are unrealistic.
  - b. The Hybrid Model factors down Green Belt Development peak hour trips to correspond to PRISM’s average peak hour representation.
  - c. The Hybrid Model converts people trips to vehicle trips by applying mode shares taken from the Development Case demand model but applying them to a Reference Case network, thereby deriving the mode shift benefits of the proposed supporting public transport measures but not reflecting the corresponding network capacity impacts such measures would introduce.
  - d. The lack of a public transport crowding function and future fare increase function in the PRISM model is likely to lead to a future overestimation of public transport use and underestimation of car trips with relation to the Green Belt Development.
- B. The four junction assessments described in reports TA23 to TA28 underestimate Green Belt Development impact as they are based on PRISM average peak hour flows rather than on peak hour flows.
- C. The list of proposed infrastructure improvements in Appendix E of TA8 is insufficient evidence that the adverse impacts of the Green Belt Development will be rendered sustainable.

## 2 Matter A

### 2.1 Overall Response

Dr Hoad's note presents a number of reasons why he believes that the impact of Green Belt Development (GBD) traffic on the surrounding transport network has been underestimated in the Hybrid Model. Our summary response is that actually the reverse is so: the Hybrid Model uses an overestimate of the Green Belt Development traffic on the surrounding transport network.

Dr Hoad correctly notes that the GBD car trips represented in the Hybrid Model are derived from a number of input steps as follows:

- a. Estimate of person trip generation to and from the GBD;
- b. Factor to convert peak hour trips to PRISM average hour trips;
- c. Forecast car driver mode share of trips; and
- d. Assumption on proportion of trips which are wholly internal or partly external to GBD.

The way the Hybrid Model processes the first three of the above inputs is described in Sections 2.6 and 2.7 of the HMO report, and further detail on these inputs is presented in the following subsections below that deal with the relevant sub-matters raised in Dr Hoad's note.

Of most relevance to this overall response, however, is the fourth input listed above, as the Hybrid Model assumes that all car driver trips generated by the GBD and presented in Table 2.6 of the HMO report are *external* trips. In other words, all trips starting in the GBD end outside it and vice versa. In terms of GBD impact on the surrounding transport network, this results in a robust and worst-case assumption.

Table 6-13 of report TA29 details the external trip generation for the GBD (i.e. for Langley and Peddimore combined) by mode, as predicted by the PJA Travel Demand Model (TDM). The car driver trip totals in this table are therefore the equivalent of the trips listed in Table 2.6 of the HMO report. For ease of comparison, the data from both these tables is combined in the following table (the flows from Table 6-13 have been broken down by Arrivals and Departures as specified by PJA for the purpose of this response):

**Table 2.1 Comparison of GBD external car trips, as predicted by PJA TDM and as modelled by PRISM Hybrid Model**

Data Source	AM			PM		
	Arr	Dep	Total	Arr	Dep	Total
PJA TDM	1614	1714	3328	1370	1815	3185
PRISM Hybrid Model	1734	1967	3701	2126	2159	4285
<b>Difference</b>	<b>+120</b>	<b>+253</b>	<b>+373</b>	<b>+756</b>	<b>+344</b>	<b>+1100</b>

Source: Table 6-13 of TA29 report and Table 2.6 of HMO report

In all cases, this table shows that the Hybrid Model simulates more GBD related car trips on the surrounding network during weekday peak hours than predicted by the PJA TDM. We therefore conclude that the Hybrid Model presents a robust assessment of GBD impact on surrounding highway infrastructure.

## **2.2 Matter A.a**

Dr Hoad notes that Table 2.3 of the HMO report includes all Peddimore trips listed in Table 4-17 of report TA29 and all Langley residential trips, but none of the non-residential Langley trips. The suggestion is that this means the Hybrid Model has under-represented trips generated by the proposed Langley development.

Table 2.3 of the HMO report only includes trips which will be new to the local and surrounding transport network. The employment uses at Peddimore and residential uses at Langley are assumed to generate new trips to the network as these uses are required to help accommodate forecast employment and population growth within Birmingham. The other uses proposed for Langley, however, will not generate new trips: they will be served either by the new Langley residential trips or by existing trips which are transferred from outside Langley. In either case, these trip volumes are therefore represented in the Hybrid Model, as can be seen in Table 2.1 above. Langley trips were distributed in the Hybrid Model according to the distribution used in the Development Case model described in report TA06.

## **2.3 Matter A.a.i**

Dr Hoad suggests that the assumptions in report TA29 regarding the internalisation of trips within the Langley development are unrealistic. Table 4-17 provides the forecasts for the potential trip generations of all uses on the site, excluding discounts for internal trip making. The row entitled 'Langley-Residential' is taken directly from Table 4-12, which shows that the journey purpose of all home based trips, including Home – Education, are included. As noted above, the Hybrid Model has carried all trips generated by the residential uses, but without reference to internalisation which is a robust position to assess the impact of the GBD in a strategic manner.

Having derived a common demand baseline for both PRISM and the more localised model, TA29 seeks to identify the potential for internalisation using a census based gravity model, and considers journey purpose split and modal split using the National Travel Survey, Census and surveys contained in TRICS.

In relation to Home based education trips, a gravity model was used to consider the attractiveness of all schools in the area, including those provided on site. The measure of attractiveness was the number of places available in schools, forecast to 2031. It is known that there is currently no reserve capacity in existing schools and any scope for potential expansion is likely to be taken up in meeting demand arising from existing residential areas as pupil numbers are currently experiencing both growth through birth rates and from net migration of a generally younger population into the City [Ref: Birmingham Education Sufficiency Requirements]. It is unreasonable to assume that this situation will suddenly change with the development of the Green Belt. Therefore the 'attractiveness'

of other schools has to be set to zero. This calculation leads to the conclusion that all home based education trips are internal.

However, it is recognised that some parents will wish their child to attend other schools, such as private education or faith schools. This could generate a need to travel off-site. There are a number of problems with measuring this:

1. The proportion of home to education journeys made as an external trip is likely to be low;
2. There is insufficient evidence to identify exactly where these pupils might study;
3. Many pupils of private education travel by private charter, and state educated pupils by contracted services, if not by public transport;
4. Some pupils that travel further afield to attend school may be dependent upon parents or carers who might start or end their journey outside the peak hour and/or make the journey as part of a linked trip (i.e. the trip was going to happen anyway).

Therefore, in the scale of demand presented by the development, these trips are not material and it is not reasonable to consider this in any further detail at the plan making stage.

Dr Hoad makes the point that retail and other land uses provided on site might not be good enough to attract local shoppers, and that therefore external trips could be produced. A standard gravity model was used, which forecast that a convenience store on site and the ASDA at Minworth would draw most of the demand from the estate. This was considered to be a reasonable outcome, as trips to other retail facilities in the peak hours, further afield, are likely to be made as part of a linked trip.

Dr Hoad also makes the point that the retail and other land uses might be too attractive and could attract external shoppers. Report TA29, and specifically Table 4-17, reports the potential travel demand created by the ancillary uses of schools, shops and other smaller uses. To be clear, there are no stated proposals to create a high trip generating new local centre that will draw trade from Sutton Coldfield Town Centre or other major retail centres. There are also no proposals to provide additional school places within the SUE for demand from existing residential areas.

So, for the purposes of the assessment it is assumed that other than residential and employment uses, the known land uses are entirely ancillary to the residential development. Ancillary land uses do not generate demand of their own accord: the demand is created by people and specifically here the new residential development. It is entirely reasonable, then, to make the assumption that these facilities will meet the demand of the new residential areas and it is also reasonable to assume that any demand from the existing residential areas is accommodated by existing facilities.

It is accepted that if a new shop or post office is more convenient to an existing resident that they will use it and that existing facilities might be convenient to residents of the new development. However, these trips are typically made over very short distances, and are less likely to be made by private car except as part of a longer journey. These land uses are therefore less likely to affect important local routes such as Whitehouse Common Lane or strategic routes such as the A38.

In conclusion, the Hybrid Model has taken the travel demand from the major trip generators within the GBD site and, without considering internalisation, has undertaken a robust test of off-site traffic impacts. Furthermore, the conclusions made by PJA regarding internalisation are justified and reasonable.

## 2.4 Matter A.b

Dr Hoad notes that the Hybrid Model simulates an average peak hour. Section 2.6 of the HMO report describes how factors were applied to the GBD trip rates from report TA29 to convert from peak hour trips to average peak hour trips. For the AM and PM, these factors result in a reduction of GBD trips in the Hybrid Model by about 30% and 7% respectively.

The above quoted factors were derived from the 2012 National Travel Survey (NTS) and are therefore average factors across the UK for all trips by all modes on a weekday. It is accepted, however, that this source is not necessarily fully reflective of the travel patterns of the GBD or wider Birmingham area. We have therefore consulted three sets of traffic counts from the PRISM model which were taken on roads around the GBD area. These counts are located as follows:

- A38 Sutton Coldfield Bypass
- B4148 Walmley Road
- A38 Kingsbury Road (between Tyburn Island and Minworth Island)

The following table shows the average peak hour flow as a proportion of the peak hour flow in both the AM and PM periods for each of these counts and across all three as an average.

**Table 2.2 Average peak hour flow proportion of peak hour flow**

Count	AM	PM
A38 Sutton Coldfield Bypass	89%	89%
B4148 Walmley Road	85%	100%
A38 Kingsbury Road	95%	94%
<b>Average</b>	<b>90%</b>	<b>95%</b>

This table confirms that average peak hour flows in the GBD area are close to peak hour flows and, in the case of the AM period, significantly closer than reflected by the NTS factor. The PRISM flows used in the junction design work for the junctions discussed below under Matter B are therefore within 5-10% of the busiest peak hours.

It is accepted that this also means the AM average hour conversion factor applied to the GBD trips in the Hybrid Model is not fully representative of local conditions and resulted in an over-reduction of total trips in that stage of the calculation. However, this was more than compensated in the end

result by the representation of external trips described in Section 2.1 above which resulted in overall external GBD trips being in excess of that predicted by the PJA TDM.

## **2.5 Matter A.c**

Dr Hoad understands from Section 2.7 of the HMO report that the car driver mode shares presented in Table 2.5 of that section are derived from the Development Case demand model of report TA6 being applied to the Reference Case network of the same report.

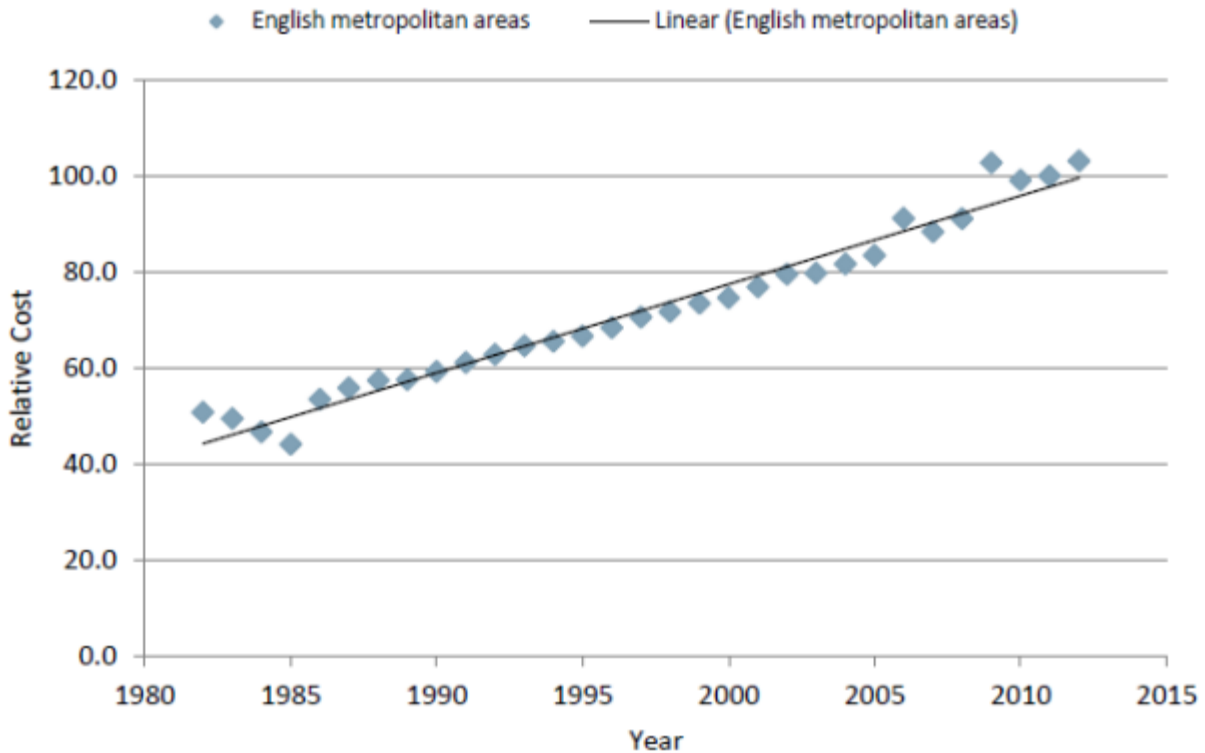
For clarity, the car driver mode shares in Table 2.5 are actually taken from the Development Case demand model applied to the Development Case network, as described in report TA6, so are applicable to the situation whereby the GBD is implemented together with the supporting schemes listed in Table 4.2 of that report.

## **2.6 Matter A.d**

Dr Hoad correctly identifies that the public transport assignment model does not reflect real changes in fares, as set out in Section 5.2 of the Draft Forecasting Report. The assumption ignores any future differential fare changes between each of the PT modes available in the West Midlands: bus, metro and train, which in any case are difficult to forecast. It has (as Dr Hoad correctly identifies) little or no impact on the mode share for public transport overall; only on the distribution between public transport sub-modes. For the Peddimore and Langley sites, bus is by far the dominant mode available.

The mode choice model, however, where the share of public transport is determined, *does* reflect expected real fare increases based on an analysis of the past trend in fares. This is described in Figure 2.1 (repeated below) and the accompanying text on pages 3 and 4 of the Forecasting Report, leading to the model assumption of real fare increases of 38% in 2031.

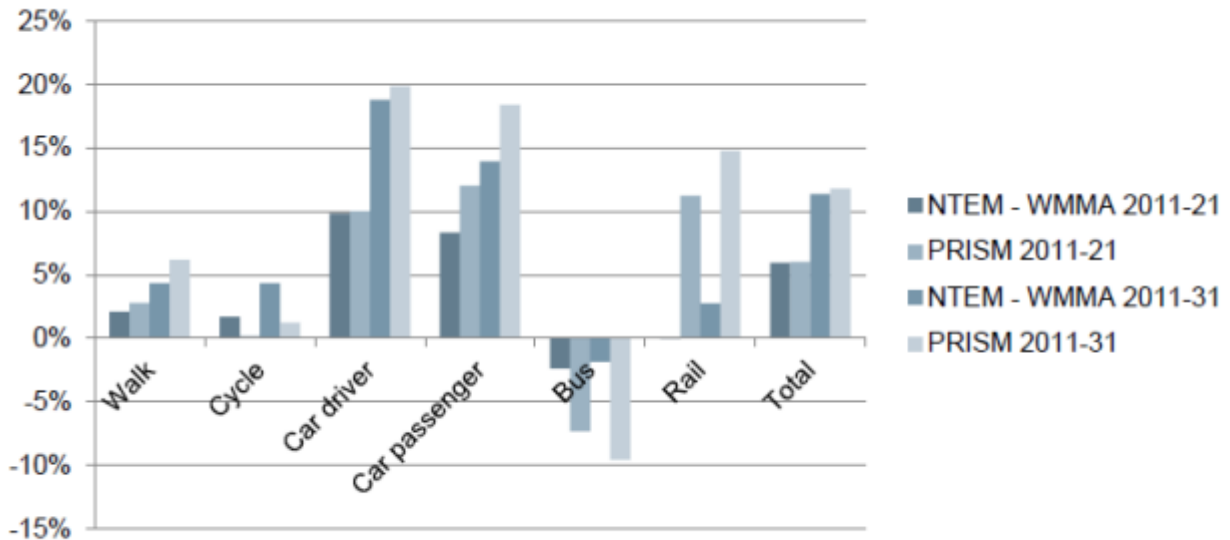
Figure 2.1: DfT bus fare indices for English metropolitan areas and the linear relationship derived



As Dr Hoad notes, crowding is also not included in the public transport assignment model. In this respect, we follow WebTAG 3.11.2, para 6.4.4: *The introduction of crowding has significant practical problems for PT assignment, namely the need for assignment to be an iterative procedure with a consequent impact on run times, the need to achieve convergence, and the need to calibrate overcrowding curves. For these reasons crowding should only be modelled where it is likely to have a significant effect on traveller behaviour or where an effect on crowding is one of the objectives of the scheme.*

Crowding is not currently a problem on buses in the West Midlands; as the forecast mode share for bus in PRISM (as well as in the National Trip End Model NTEM) is expected to be reduced (see Figure 2.10 of the Forecasting Report – repeated below), we don't consider a representation of crowding to be required in the model. Finally, operator responses to combat overcrowding, such as the provision of more or larger buses, cannot be reflected in a strategic model.

Figure 2.10: Total trips in the West Midlands



Source: Mott MacDonald

### 3 Matter B

Dr Hoad notes that, as the Hybrid Model is an average peak hour model, resulting output flows should be converted to peak hour flows before being used as inputs to the detailed assessment and design of individual junctions.

As he also notes, four junctions were considered in detail as part of the BDP evidence base process and these assessments are described in reports TA23 to TA28. The four junctions are:

- Minworth Roundabout
- Tyburn Roundabout
- Peddimore Access
- M42 Junction 9

The matter raised is not relevant to the assessment and design of Minworth Roundabout and Peddimore Access. Because of the strategic significance of these two junctions in enabling the GBD development, designs for both formed an input to the PRISM modelling process and were therefore assessed before PRISM output was available. The assessments were based on a combination of observed counts, future growth factors and the application of forecast development flows, described in reports TA33 and TA25.

Designs for M42 Junction 9 and Tyburn Roundabout were based on Development Case flow output from the Hybrid Model, with such outputs critically reviewed and agreed with the Highways Agency over an 18 month period of collaborative working. Further scrutiny was provided in terms of assumptions by both Staffordshire and Warwickshire County Councils.



As noted in Section 4.2 of report TA24, DMRB (Volume 12, Section 1, Part 1, TAM) does not recommend that future year flows are taken directly from a strategic traffic model but rather that the strategic model forecast traffic growth is applied instead to observed traffic counts. This principle has been applied for both the above junction assessments and designs.

Page 2 of Report TA28 describes how the M42 J9 2031 Do Minimum (ie Reference Case) model was based on existing observed counts factored up based on growth forecasts from taken from the PRISM Reference Case model. A growth level of 12.5% and 11.9% was forecast for this junction in the AM and PM periods respectively. Development flows taken from the PJA TDM were then applied to derive the Do Something (i.e. Development Case) model.

Section 4.2 of Report TA24 describes how the Tyburn Roundabout future year model was based on 2009 observed turning proportions applied to the total flow volume through this junction forecast by the Development Case PRISM model. Appendix D shows that this results in a growth forecast of 16% and 37% over 2009 levels in the AM and PM periods respectively. The note in this report about the PRISM flows being up to 30% lower than 2009 flows on certain arms of the junction therefore refers to a difference in turning proportions between PRISM and the observed count, rather than an issue with overall flows being lower.

Overall, therefore, it is concluded that the above four junction assessments have been carried out appropriately and robustly, in line with Government guidance and making best use of local data and the strategic PRISM model.

## **4 Matter C**

Dr Hoad contends that insufficient detail has been carried out on the assessment of local junctions and proposals for mitigating infrastructure works.

The City Council are content that the PRISM Model is sufficient for this exercise; indeed this is exactly what the tool is developed for. This model, combined with local knowledge of each junction was sufficient to make judgements regarding the scale of improvements required, which might at the lowest level include alterations to signal phasing or controller infrastructure upgrade, and at the highest level significant infrastructure including adding space to a junction to increase capacity. Any further analysis would require detail that is more appropriate for later stages of the planning process, where individual turning movements, pedestrian facilities, signal controllers and traffic phases, utilities, highway boundary plans, street lighting and signage are usually handled.

## **5 Summary**

In summary, and in response to the main matters set out above in Section 1, we conclude that:

- A. The impact of GBD trips has been robustly represented on the external transport network in the Hybrid Model

- B. Output from the PRISM models, including Hybrid Model, has been appropriately and robustly applied for the purpose of local junction assessment and design
- C. The level and scope of junction assessment and estimates regarding associated mitigating works are appropriate for informing the making of a strategic plan

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