Birmingham Development Plan2031

Examination Hearings

Further Written Statement by

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Matter E: Green Belt policy, the Langley Sustainable Urban Extension (SUE) allocation and the Peddimore employment allocation (BDP policies TP10 & GA5-6)

Main issues: Does the Plan comply with national policy in its approach to the Green Belt? Are the Langley SUE and Peddimore employment allocations justified and deliverable? Should other Green Belt and/or major greenfield allocations be made?

Question 2 - Do exceptional circumstances exist which justify an alteration to the Green Belt boundary to accommodate 6,000 new dwellings?

Paragraph 4.4 of the Plan states that "The Office of National Statistics (ONS) projections (2010) indicate that by 2031 Birmingham's population will rise by 150,000 and that this will mean an increase of 80,000 in the number of households." This would equate to an average occupancy of 1.875 persons per household. The latest data from the Office of National Statistics (ONS) (Table H01UK, downloaded from http://www.ons.gov.uk/ons/publications/re-reference-tables.html?edition=tcm%3A77-294273) shows that the average occupancy for Birmingham at the 2011 census was 2.6 people per household.

On the basis of this occupancy, an additional population of 150,000 would only need 57,693 residences. This is 22,307 lower than the total on which the Plan is based. Taking from this the 6,000 new homes that are claimed to be required on land that is currently Green Belt, this leaves a surplus of 16,307 of housing that can be built within existing developed land.

Whilst it is true that there has been a long term decrease in the average occupancy which might suggest a higher number of new households, this change is relatively modest and could not account for the Plan's higher number. The ONS document "Measuring National Well-being - Households and Families, 2012" (Table 1) shows that the average UK occupancy has declined from 3.1 in 1961 to 2.4 2011. However the bulk of this changed happened in the earlier years between 1961 and 1981, and the occupancy was unchanged between 2001 and 2011. To estimate an absolute limit on the possible change in occupancy it is possible to apply a simple linear regression across the data which gives an estimate of approximately 2.0, still much higher than the assumption the Plan has used. This would still be overestimating the potential for the average occupancy to decline (using a simple linear relationship would ultimately lead to an occupancy of less than 1.0 which would be nonsensical, and hence a more complex exponential function would be required which would give a slower rate of decline year on year). Given the stability in household occupancy between 2011 and 2011 it is not unreasonable to assume that this level will be maintained up to 2031.

The assessment should be based upon a reasonable level of average occupancy. The expected 150,000 population stated in paragraph 4.4 should therefore equate not to the stated 80,000 new households but to 58,000 based upon the existing average occupancy of

2.6 persons per household. This therefore removes the need for 22,000 new residences and obviates the need to release any Green Belt land for residential development as this was only required for 6,000 new households (much less than the 22,000 excess) as there is not an exceptional requirement for this land.

Question 3 - Do exceptional circumstances exist which justify an alteration to the Green Belt boundary to provide 80ha of employment land?

No exceptional circumstances exist. Birmingham has numerous former industrial areas that need to be developed, which should be utilised before any Green Belt land is even considered. The council appear only to think in two dimensions, failing to understand that developments can be multi-level and hence accommodate a large gross floor area within a much smaller area of land.

Policy GA6 claims that there will be a “landscaped buffer area” which will “screen longer distance views of the development from the wider Green Belt.” The images below show the landscaping that BCC approved as part of an ASDA store built in 2013 in Barnes Hill, partly on land from Woodgate Valley Country Park: a stagnant pond and trees planted on top of a spoil heap with little top soil. This cannot give anyone confidence in any mitigation measures.

Questions 4a & 6a - Is there adequate justification, including Sustainability Appraisal and assessment of the transport, education, health, drainage, sewerage and other infrastructure implications, for the selection of Green Belt "Area C" to accommodate the Langley SUE/the Peddimore site for employment development?

Incorrect Use of Variable Demand Transport Model

The transport assessment of the Green Belt "Area C" (indeed the transport assessment of the whole plan) is flawed. The analysis of the transport impacts has been based on a fundamental misuse of a Variable Demand Transport Model (PRISM) which will modify forecast transport movements in accordance with forecast travel congestion, delays etc..

The PRISM model should have been used in a careful and planned manner. Firstly it should have been used to provide the future year baseline traffic levels. Once this future baseline was established the next stage would be to add the new development traffic into the model. This would be created by determining the overall number of trips by user class, via Tempro for example, or even using the PRISM model to derive the number of trips. These trips would then be distributed according to the existing travel patterns, which could be copied from the PRISM model. (It should be noted that although this does make use of the PRISM model this is entirely different to simply running the PRISM model with the new development included. The method discussed uses specific elements of the model and retains the established travel patterns whereas using the model in full will simply scramble the data together preventing any true analysis being carried out.)

Having established both "without" and "with" development models in this manner, it would be possible to identify where the new development traffic has significantly increased travel costs and hence where mitigation action needs to be taken. Measures could then be identified to allow for these problems to be mitigated. (The design work for such measures should be based upon these calculated flows "with" the development.) This would therefore ensure the

planned transport infrastructure would be able to sustain the travel patterns which would exist without the development, together with the new travel patterns for the new development.

PRISM would then have an important role in the assessing the impact of the measures. The addition of new infrastructure into the transport network would itself be expected to introduce some degree of generated traffic. Having run the model with the previously derived fixed matrices but now with the new infrastructure, PRISM would be run in its variable demand role, again with the new infrastructure. A comparison of the two should show in increase in trips where additional capacity has been provided. Firstly this will test if the mitigation measures are satisfactory, a failure in the proposals being indicated by a decrease in trips (either through a particular segment of the network, or between particular model zones) as the model suppresses trips due to the increased travel costs. Otherwise this should demonstrate an increase in trips as might be expected in any assessment of new transport infrastructure. A large increase might indicate that a scheme has been over designed. Also this provides for all the proposed measures to be tested together.

To demonstrate the importance of this approach, take the following hypothetical example. An existing junction arm has capacity of 1,000 vehicles per hour (vph). In the future design year (but without the new development) it is forecast to have 900 vph travelling on it. When adding the additional new development traffic 500 vph are expected to enter the junction on this arm, giving a total of 1,400 vph which is of course in excess of the capacity. Therefore it is reasonable to conclude we would need to add more capacity to this junction (to something above 1,400 vph).

If it was a case of just rerunning the variable demand model after adding the development planning data into the model, the road capacity will act as a constraint upon the new matrix of trips. So we might well expect to come back to roughly the same traffic levels as before, say 950 vph. Of this total we may have roughly 500 vph of development traffic but the other trips (i.e. “existing travellers”) would have been reduced. This is not due to traffic changing their route (e.g. changing from going from A to B via C, to going from A to B via D) but changing their travel pattern (e.g. changing from going from A to B to going from A to E) due to the increased travel costs. In effect the model would have assumed that people get fed up with the congestion and so move house/workplace (not a situation which should be considered to be acceptable).

As can be seen from this example, the use of the variable demand model hides issues that should be addressed. What seems to be no problem is indeed a problem that is hidden by assuming the situation is so bad that people are forced to move house or their workplace.

A variation of this hypothetical example would be where after adding the development and running the variable demand suppresses some but not all of the excess traffic, to give a total of 1,050 vph. This of course would identify that the junction needs to be improved but when it came to redesigning the new junction it would be based on this much reduced total of 1,050 vph not the 1,400 vph as established above (i.e. being designed on the assumption that some of the existing trips can be ignored by forcing them to change their origin or destination).

The way in which the variable demand process has been misused would also be apparent with the introduction of a bus lane on the A38. In modelling terms it is easy to remove one lane of highway capacity to replace it with a bus lane because the matrix of trips will be easily distorted to fit the new network. This does not mean, as BCC would hope that it does (without any evidence to support it), that the model will simply change car trips that go along the A38 into bus trips along the A38. This would only happen if the only element of the variable demand model in operation was the mode split, but all elements are in operation (including trip distribution). Given the known hierarchy of choices, where travellers are more inclined to change their travel pattern than their mode of travel, it is more likely that the model will find the resultant congestion too much so it will assume that people will move house or jobs. For the bus lane to have any credibility BCC would need to publish the forecast travel patterns along the A38, to demonstrate that the bus lane can sustain the existing movements.

Although BCC's consultants have undertaken numerous junctions assessments (which were not available during the Public Consultation phase) to look at affected junctions (e.g. Minworth Roundabout) these are based upon output from the PRISM model and are hence based on flawed information and hence are of no value.

The way PRISM will suppress traffic demands helps to explain how easily solutions can apparently be found to all the additional development traffic. Although BCC presents a long list of schemes none of these are any more than "tweaking" junction designs (the one exception is the creation of a bus lane along the A38 where this actually drastically reduces road capacity). The junctions being dealt with such as Minworth roundabout are already suffering major problems, if it was easy to solve this then it would have been done already. Also, the proposed schemes need to deal with the existing problem plus the additional traffic so would need substantial improvements (effectively requiring at least a new road corridor).

This inevitable under-designing of junction improvements has also been compounded by failing to take into account the impact of improving one junction on subsequent junctions downstream. For example, in the report "Minworth Roundabout – Option Development and Appraisal Report" it is identified that very large queues (of the order of 200 vehicles) build up on the A38 north of Minworth. The roundabout is therefore acting as a throttle on traffic flows. Improving this junction will remove this throttle point, releasing more traffic downstream. This increase should have been taken into account in subsequent analysis, yet in the report "Tyburn Roundabout – Option Development and Appraisal Report" no actual allowance has been made.

Lack of Reliable Transport Model

The validity of the junction assessments are also undermined by the lack of reliability of the PRISM model itself. As explained in Table 3.1 of BCC's "Transport Modelling Assessment Initial Output Report", the key indicator of reliability of the model is that 85% of tested links have to pass certain acceptability criteria. These criteria, defined by the DfT, are set out in DMRB Volume 12 Section 2 Part 1, and WebTAG[1] Unit M3.1. As BCC's report shows (tables 3.2 & 3.3), the model does not pass these criteria and hence cannot be relied upon.

[1] WebTAG is the guidance that the Department for transport has set out covering the requirements for a transport study. As the guidance states: "Projects or studies that require government approval are expected to

It is also important to note that the defined criteria should be used to measure the validation links, as it is usually the case that the calibration links would have a pass rate well above the required 85% level. Calibration links are those links which are manipulated to match against known flows, whereas validation links are only checked against a known count once this manipulation is completed, and hence would have a lower chance of matching the flow.

A simple way of understanding this is to consider the problem of trying to match a representative line to a set of data on a graph. Firstly the data is divided into two groups, the majority of the data being used for the calibration and the remaining minority used for the validation. The calibration data is plotted on the graph and then a line is drawn that most closely matches the data. Then finally the validation data is added to the graph and an examination is made between the calibrated line and the validation data. Not unnaturally we would expect the calibration data to be much closer to the line than the validation data, as it is the former that the line has been adjusted to. Taking this further, the model can be subject to numerous and extensive changes as part of the calibration process, which is comparable to allowing the line of best fit in the graph not to be restricted to a straight line but quite curved in order to match as many points as possible. As a consequence, the fact that even the calibration pass rate is below the required standard for the validation (and lower than the validation pass rate) shows a fundamental flaw in the model.

Similarly, the model has failed to achieve the acceptability levels for the modelled journey times. Table 3.4 shows the journey times for the AM and PM are below the 85% acceptability level (the PM is particularly poor). Whether this is calibration or validation is unclear.

The report has also failed to report another key test of the model's reliability. WebTAG Unit M3.1 (Table 5) sets out a test that is required to be undertaken to effect of matrix estimation (a process inevitably required to calibrate a model). Such a test has not been reported and hence it must be considered to have failed the test and consequently there is a further reason why the model should not be considered reliable.

Overall Conclusion for Matter E

Firstly it is clear that the need for 6,000 new houses on land currently designated as Green Belt has only come about by using an average household occupancy that is too low which has over-inflated the housing needs by the order of 22,000 additional households. The result of this is that the proposed 6,000 houses on the Green Belt are not required and there is no exceptional case to be made for reducing the Green Belt.

Secondly, as a result of all the errors and weaknesses in the methodologies used, it can only be concluded that the traffic assessment for the development of Green Belt land is worthless and the planned network improvements significantly underestimate what would actually be required. This therefore means that there is insufficient justification on traffic grounds alone, for the selection of Green Belt "Area C" to accommodate either what has been termed the "Langley SUE" or the Peddimore development.

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make use of this guidance in a manner appropriate for that project or study. For projects or studies that do not require government approval, TAG should serve as a best practice guide."

The plan is therefore:

1. **not positively prepared** as it has not objectively assessed development and infrastructure requirements and will be unable to achieve sustainable development;
2. **not justified** as it has not derived an appropriate strategy nor considered reasonable alternatives, based on proportionate evidence;
3. **not effective** as the plan will not be deliverable due to the over provision of housing and under designing of infrastructure which will also impact neighbouring authorities; and
4. **not consistent** with national policy as it does not follow policies and procedures set out by DfT or data from ONS.

Appendices:

Tables from Birmingham Development Plan, Transport Modelling Assessment Initial Output Report, Birmingham City Council January 2014.

Table 3.1: Acceptability guidelines for link flow criteria

Criteria	Description of criteria	Acceptability Guideline
1	GEH <5 for individual flows	>85% of cases
2	Individual flows less than 350 vehicles/hour for counts with flows less than 250 vehicles/hour	>85% of cases
	Individual flows within 100 vehicles/hour of counts for flows less than 700 vehicles/hour	>85% of cases
	Individual flows within 15% of counts for flows from 700 to 2700 vehicles/hour	>85% of cases
	Individual flows within 400 vehicles/hour of counts for flows more than 2,700 vehicles/hour	>85% of cases

Table 3.2: Calibration link results

Time Period	Counts	Pass	Pass (%)
AM	1846	1548	84%
PM	1848	1508	82%

Table 3.3: Validation link results

Time Period	Counts	Pass	Pass (%)
AM	875	707	81%
PM	875	706	81%

Table 3.4: Acceptability guidelines for journey time criteria

Description of criteria	Acceptability Guideline
Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher)	>85% of cases

Table 3.5: Journey time validation results

Peak Hour	No of Routes	No of Passes	Pass %
AM	54	44	81%
PM	54	36	67%

Table from Design Manual for Roads and Bridges, Volume 12 Traffic Appraisal of Roads Schemes, Section 2 Traffic Appraisal Advice, Part 1 Traffic Appraisal in Urban Areas.

Table 4.2: Assignment Validation: Acceptability Guidelines

Criteria and Measures	Acceptability Guideline
Assigned Hourly flows * compared with observed flows	
1. Individual flows within 15% for flows 700 - 2,700 vph	)
2. Individual flows within 100 vph for flows < 700 vph	) > 85% of cases
3. Individual flows within 400 vph for flows > 2,700 vph	)
4. Total screenline flows (normally > 5 links) to be within 5%	All (or nearly all) screenlines
5. GEH statistic: i) individual flows : GEH < 5	> 85% of cases
ii) screenline (+) totals: GEH < 4	All (or nearly all) screenlines
Notes + Screenlines containing high flow routes such as Motorways should be presented both including and excluding such routes * links or turning movements (but see Paragraph 4.4.37).	
Modelled journey times compared with observed times	
6. Times within 15% (or 1 minute, if higher)	> 85% of routes

Tables from TAG Unit M3.1, Highway Assignment Modelling, January 2014 Department for Transport

Table 2 Link Flow and Turning Movement Validation Criteria and Acceptability Guidelines

Criteria	Description of Criteria	Acceptability Guideline
1	Individual flows within 100 veh/h of counts for flows less than 700 veh/h	> 85% of cases
	Individual flows within 15% of counts for flows from 700 to 2,700 veh/h	> 85% of cases
	Individual flows within 400 veh/h of counts for flows more than 2,700 veh/h	> 85% of cases
2	GEH < 5 for individual flows	> 85% of cases

Table 3 Journey Time Validation Criterion and Acceptability Guideline

Criteria	Acceptability Guideline
Modelled times along routes should be within 15% of surveyed times (or 1 minute, if higher than 15%)	> 85% of routes

Table 5 Significance of Matrix Estimation Changes	
Measure	Significance Criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R^2 in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R^2 in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%