The Camden (Torrington Place to Tavistock Place) (Prescribed Routes, Waiting and Loading Restrictions and Loading Places) Traffic Order [2017]

David Carter

PROOF OF EVIDENCE
FOR PUBLIC INQUIRY COMMENCING ON 10th OCTOBER 2017

Planning Inspector Reference: DPI/X5210/17/8
London Borough of Camden Reference: SC/2017/04

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1. INTRODUCTION

1.1. Qualifications and Experience

1.1.1. My name is David Carter. I am a transport planner and economist and have 30 years' experience in the planning and forecasting for transport schemes with a specialism in forecasting and appraising the impacts of transport schemes and strategies, including the application of economic analysis to transport issues. I hold an Honours degree from The University of Aston in Birmingham in Transport Operation and Planning. I hold the Transport Planning Professional qualification and am a Fellow of the Chartered Institute of Logistics and Transport, having been a Member since 1990.

1.1.2. My work has included the demand and revenue forecasting for a range of transport interventions, taking many through economic and financial appraisals and through to scheme delivery, including working on ex-post evaluation studies. My involvement in transport schemes in London includes leading three of the large Opportunity Area Planning Framework Transport Studies for White City, Earls Court and Croydon, as well as early forecasting for a number of key rail investments on the capital through the London Transportation Studies.

1.1.3. In addition to work on specific schemes, I have also been involved in assisting the UK government in transport strategy development and appraisal, including drafting parts of the Guidance on the Methodology for Multi-Modal Studies undertaken by the UK Government, producing the first version of the Guidance on Public Transport Scheme Appraisal, in developing guidance on the Evaluation of Major Public Transport schemes and drafting the Social and Distributional Impact guidance for the WebTAG transport appraisal guidance. I was also a key part of the delivery team researching and amending the Transport and Works Act Order planning processes.

1.1.4. I am a Market Director at SYSTRA Limited. I am responsible for the Modelling and Appraisal market within London, the South East and wider Southern England, including business opportunities and contract delivery for work on transport strategy development, modelling and appraisal of major scheme investments, new bypass roads and highway junction improvements. Founded originally in 1968, as MVA, and recently merging with the former JMP transport consultancy business, SYSTRA Limited is a specialist transport consultancy with skills encompassing a wide range of disciplines including engineering, mathematics, operations research, planning, social sciences and statistics, specialising in transport strategies, demand forecasting, economic and wider appraisals and rail and road engineering design.

1.2. Background

1.2.1 SYSTRA was commissioned by the London Borough of Camden (the Council) in April 2016 to provide transport modelling input into investigating improvement options along the Torrington Place / Tavistock Place corridor (referred to here as the Corridor), relating to the Trial that was implemented in November 2015.

1.2.2. The Trial introduced one way operation eastbound along the Corridor between the junctions with Gower Street and Judd Street, converting the existing bidirectional cycle

track into a westbound track and introducing an eastbound cycle lane along the southern kerbside of the Corridor.

1.2.3. The traffic modelling exercise assessed the possible impacts on redistribution of motor traffic when the Trial interventions are combined with other local committed and planned schemes in the surrounding area, and for alternative variants to the Trial, including withdrawal of the Trial.

1.2.4. Transport for London (TfL) have been involved throughout this process and have agreed the method adopted for the assessment and confirmed that the traffic model is fit for purpose.

1.3. Structure of Evidence

1.3.1. My evidence covering Traffic Forecasting is primarily intended to support the evidence provided by both Louise McBride in her Proof of Evidence and Simi Shah in her Proof.

1.3.2. Louise McBride will set out:

- the background to the Trial traffic scheme including Trial objectives;
- the national, regional and local transport policies and guidance, and legislation that underpins the design and implementation of the Trial traffic scheme;
- the merits of the scheme;
- the issues in relation to the Trial affecting groups of people with protected characteristics; and
- the consultation and engagement carried out in relation to the Trial, including consideration of comments received during the consultation and engagement.

1.3.3. Simi Shah's evidence will consider:

- the alternative options considered in reaching the adopted option, Trial layout;
- Safety issues, including the reasons behind remedial safety works at certain junctions; and
- alternative options put forward by objectors to the Trial layout.

1.3.4. My evidence on Traffic Forecasting will specifically link to the discussion of scheme merits presented by Louise McBride and the alternative options outlined by Simi Shah.

1.3.5. My evidence will be structured to cover:

- Section 2 (**Background**) provides an introduction to the traffic modelling and forecasting work undertaken since spring 2016 following the introduction of the Trial, principally in response to issues raised during scheme consultation and in relation to this Inquiry;
- Section 3 (**Rationale for Modelling Traffic Impacts**) identifying the need to consider the traffic impacts of nearby schemes on the Trial and surrounding area and to consider the impacts of alternative options;
- Section 4 (**Torrington Place / Tavistock Place Traffic Model Forecasts**) sets out details of the traffic forecasts to demonstrate the expected performance of the Trial when other nearby changes to the road and cycle network are potentially delivered or the performance of variants to the Trial as developed by the scheme promoter and/or suggested by others, including objectors to the current Trial;

- Section 5 **(Issues Arising from Objectors' Statements of Case)** which either responds directly to issues arising or provides cross-references to other sections of my Proof; and
- Section 6 (**Conclusions**) where I draw out my conclusions from the modelling exercise and how I believe this supports the case for the Traffic Order being considered through this inquiry.

1.3.6. In providing my evidence, I will refer to the underlying modelling tools and model acceptance and approvals procedures adopted by Transport for London. These issues are considered in detail by Tony Dichev through his Proof of Evidence.

1.3.7. In so far as specific objections raised in relation to my evidence are concerned, these will be considered either through the general text below or through specific responses where appropriate. In all cases objectors' submissions will be referenced using the agreed inquiry document coding structure.

1.3.8. As this Proof of Evidence exceeds 1500 words, it is accompanied by a summary document which will be presented orally to the inquiry.

Declaration

1.3.9. This statement is true to the best of my knowledge and belief. I can confirm that the views expressed are my true and professional opinion.

2. BACKGROUND

2.1. Torrington Place to Tavistock Square Trial

2.1.1 As described in the 'Scheme Merits' section of Louise McBride's Proof, the Trial was introduced to address a number of issues primarily to safely accommodate the growing number of cyclists using the Corridor by rebalancing the amount of road space allocated to motor vehicles, cyclists and pedestrians and to make the Corridor much safer by removing as many conflicts as possible between motor vehicles, cyclists and pedestrians and to create a less traffic dominated environment.

2.1.2. The Trial also provided an opportunity to reduce traffic volumes using the Corridor, in part by encouraging through traffic using the local road network to relocate to the strategic network. The Trial was also given an impetus provided by the approval of the West End Project and the wider aspirations to improve traffic conditions and road safety and deliver improved wider public transport, cyclist and pedestrian benefits.

2.2. Traffic Modelling

2.2.1. SYSTRA was commissioned by the Council in April 2016 to provide transport modelling input into investigating improvement options along the Corridor, relating to the Trial that was implemented in November 2015 and was designed to improve conditions for pedestrians and cyclists.

2.2.2. The current traffic modelling exercise assessed the possible impacts on redistribution of motor traffic when the Trial interventions are combined with future committed and planned schemes in the surrounding area.

2.2.3. Transport for London (TfL) has been involved throughout this process and has agreed the method adopted for the assessment and confirmed that the traffic model is fit for purpose.

2.2.4. The modelling exercise included updating the existing ONE (Operational Network Evaluation) Model 2016 Future Base within the study area to reflect the existing highway layout and improve the local flow calibration (i.e. goodness of fit between observed and modelled traffic flows). Subsequent to this, a number of options were tested in order to gauge the potential impact on the highway network flows or alternatives to the Trial and how the Trial would be expected to interact with the wider highway network changes proposed to be delivered over the coming years.

2.2.5. Details of the underlying ONE model are provided by Tony Dichev through his Proof of Evidence. I provide further details of how the model has been developed in the local area to assess the impacts of the Trial and its interactions with nearby schemes, or alternatives to the Trial, in section 5 of this Proof of Evidence.

3. RATIONALE FOR MODELLING TRAFFIC IMPACTS

3.1. Trial delivery and Traffic Modelling

3.1.1. The delivery of the Trial has resulted in a number of traffic and wider transport-related impacts. These can now be observed with changes in traveller behaviours, including car driver diversions and re-routeings. With the Trial in operation for over 18 months re-routeings arising from the Trial will have become established, and knowledge of alternative routes for through traffic through the local area will have been re-stablished.

3.1.2. During this period, other changes in the background traffic levels on both local roads and the strategic road network will have been driven by a wider range of factors, such as the progress with other transport interventions, a series of temporary road works, development activity and a general 'churn' in road network usage linked to trip 'generators' and 'attractors'.

Traffic Modelling – the Trial and other network interventions

3.1.3. The Trial is one of a number of interventions delivered by the Council and/or TfL in recent years in the Bloomsbury area. There are a number of other proposals for modifications to the transport network that may also be delivered in the short- to medium-term that could impact on the performance of the Trial.

3.1.4. The rationale for undertaking traffic modelling of these proposed interventions is to examine the interactions between the schemes and to ensure that the cumulative impacts on the road network and traffic circulation remain acceptable when balanced with the delivery of wider objectives such as pedestrian and cyclist facilities and others uses of road space, such as for urban realm improvements.

3.1.5. Traffic modelling work has considered the following interventions:

Assumed to be in place in the all 'scenario' models

- West End Project (WEP) - this scheme has been approved, with contracts expected to be let shortly and construction expected to start in early 2018;
- Brunswick Square – this scheme, configured to improve walking and cycling routes from King's Cross towards Bloomsbury is at an advanced stage of development, and although not yet fully committed, it was agreed with TfL that scenario testing using the local calibration model should include the scheme. Sensitivity tests have been undertaken to confirm Trial (and reverse Trial) performance without the Brunswick Square scheme implementation; and
- King's Cross junctions improvements at the Pancras Road/Midland Road and Pancras Road/Camley Street/Goods Way junctions - this scheme is committed, though is not yet in place.

Considered alongside the Trial to model interactions

- Judd Street closure; and
- not implementing the Brunswick Square proposal.

Not considered in the modelling work at present

- Proposed King's Cross Gyratory scheme - the status and design options for this potential scheme are not clear, and as such no preferred option has been identified

and modelled at this point. However, it is noted that Michael Gwinnell (representation ID2-10/1) has suggested that the Trial should be tested with this scheme.

Traffic Modelling - alternative options for the Trial

3.1.6. This Inquiry is concerning the proposed Permanent Traffic Order for the Trial, and therefore one outcome from the process could be revoking the order thereby removing the Trial. Whilst this would return the Corridor to two-way operation, by the time this could happen the West End Project is likely to be either under construction or in place. Therefore, removal of the Trial will not return traffic routeings and flows back to their pre-Trial position. Traffic modelling can therefore be used to provide an indication of the potential impacts of returning the Corridor to two-way operation for both road vehicles and cyclists.

3.1.7. Similarly, traffic modelling can be used to consider the relative performance of other Trial options, and specifically those put forward by a number of the objectors to the current Trial. The modelling work can then be used to broadly compare the different diversionary routes and traffic volume arising from changing the direction of the Trial and introducing a short section of two-way road layout.

3.1.8. Three principal alternative options have therefore been considered using the locally calibrated ONE model:

- 'Removal' of the Trial;
- 'Reverse' Trial; and
- 'Two-Way' option permitting some westbound traffic movements.

Local Junction Modelling

3.1.9. The traffic model used to consider other interventions alongside the Trial, as well as alternatives to the Trial, provides indications of expected traffic re-routeings around the local network and to/from the strategic road network. At a finer local level, more detailed junction models can be used to examine, for example, potential operating performance of junctions, pedestrian signal phasings and design and safety issues.

3.1.10. SYSTRA, on behalf of the Council, has developed a number of detailed junction models to consider fine-tuning junction arrangements along the Corridor, for example to improve junction safety by introducing separate stages in the signal sequencing to allow cyclists to clear junctions in advance of left turning road vehicles.

3.1.11. These models have been considered and accepted by TfL as part of their LinSig Model Auditing Process (LMAP) demonstrating that the models are appropriate to be used as basis for detailed junction modelling testing, in either refining the Trial or considering any alternatives. However, as noted in Section 5 below, no further work has been undertaken using these detailed models for the Corridor.

4. TRAFFIC MODEL FORECASTS

4.1. ONE Model Network Update

4.1.1. Tony Dichev, in his Proof of Evidence provides a review of the underlying ONE model used in London for assessing the strategic and more local traffic impacts of changes to the road network, especially those involving new highway links, significant network management changes and more modest interventions, such as the Trial. The model is developed and owned by Transport for London, and for application in relation to the Trial, has been operated by SYSTRA staff.

4.1.2. The model covers all of central London (and beyond) and has been developed using the VISUM software package to allow the network impacts of potential schemes to be assessed across the central London area. It uses actual traffic data from a number of locations including traffic volumes and origin-destination information. It is a tool used to provide an assessment at a high level of how traffic might behave and what routes drivers might be expected to take, should a change to the road network be introduced.

4.1.3. The existing ONE Model 2016 Future Base has been used as a starting point for the development of a local model reflective of current site conditions. The current model contains the Trial as well as other schemes which are not currently on site and have thus been removed from the model network and the layout defined as per existing site conditions. Through discussions with TfL, these schemes have been identified as:

- Baker Street Two-Way project; and
- Cycle Superhighway 11.

4.1.4. The model does, however, assume that the West End Project (WEP) is in place as this scheme has received approval, with contracts expected to be exchanged shortly, and with construction expected to start in early 2018. Therefore, the results will differ somewhat from what is apparent on the street as part of the Trial.

4.1.5. The committed King's Cross junctions improvements at the Pancras Road/Midland Road and Pancras Road/Camley Street/Goods Way junctions are included in the Base model and the scheme models, although these improvements have not yet been delivered. Note that the potential King's Cross Gyratory scheme has not been modelled; the status and design options for this scheme are not clear and it is not yet committed.

4.1.6. The following analysis presents summaries of the updates to the ONE Model 2016 Future Base and the results from the various options testing undertaken, including comparative analysis to help understand the impact of the various scheme proposals.

4.2. 2016 Local Calibration Model

Local Calibration

4.2.1. For assessing the traffic diversion impacts of the Trial alongside other proposed network interventions and alternatives to the Trial, SYSTRA adapted the underlying ONE model and developed further in the area local to the Trial. This procedure is a standard approach intended to improve the model performance in the local area of interest.

4.2.2. Local calibration involves a detailed review of traffic flows alongside a technique known as matrix estimation that can be used to adjust travel patterns to improve the representation of local traffic movements, balancing both the origin and demand patterns with traffic flows.

4.2.3 The underlying ONE model included representations of the Baker Street Two-Way project and Cycle Superhighway 11. Subsequent to the removal of these schemes, the flows from this updated 2016 model were compared against the 2016 observed flows using the GEH criteria (see para. 4.2.6 below). The observed traffic flow data was collected during May 2016 for a number of links throughout the area using Automatic Traffic Counters (ATCs).

4.2.4 The principal measures to gauge the adequacy of the model are through comparisons of modelled flows with surveyed traffic flows. The guidelines contain two different measures that can be used to compare modelled and observed traffic flows:

- Direct comparisons of flows
- A measure of variance using the 'GEH statistic', a form of the Chi-squared statistic explained further below.

4.2.5 According to the standards specified in the Design Manual for Roads and Bridges (DMRB) Volume 12a Part 1 'Traffic Appraisal in Urban Areas', the criteria outlined in Table 1 need to be met for the model to be deemed to be acceptable for use.

Table 1. DMRB Calibration/Validation Criteria

CRITERIA AND MEASURES	ACCEPTABILITY GUIDELINES
GEH statistics: individual flows: GEH<5	>85% of cases
GEH statistics: screenlines: GEH<4	All (or nearly all) screenlines
Individual flows within 100 vph for flows < 700vph[1] Individual flows within 15% for flows <700-2700vph Individual flows within 400 vph for flows > 2700vph	>85% of cases
Total screenline flows to be within 5%	All (or nearly all) screenlines
Journey times within 15% (or 1 minute, if higher)	>85% of cases

Notes: [1] vph – vehicles per hour

4.2.6 As well as making a direct comparison of the flows, the GEH statistic (a form of the Chi-squared statistic) is used to compare two values and weights the difference according to the average of the two flows.

4.2.7 The weighting is not linear but takes the form of a square root function (where M = Modelled Flow, and C = Observed Flow):

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

4.2.8 The lower the GEH value, the better the fit between observed and modelled flows, with a GEH value of less than 5 considered a good and sufficient fit between modelled and observed traffic flows.

4.2.9 It should be noted that WebTAG unit M3.1 states in paragraph 3.2.7 that '*…comparisons that meet either the GEH or the flow criteria should be deemed satisfactory*'.

4.2.10 Table 2 and 3 provide a summary of the flow calibration statistics, with these being displayed in Figures 1 and 2 identifying links that have a GEH value of less than 5 or meet the DMRB flow criteria.

Table 2. 2016 Local Calibration Model – Flow Comparisons – AM Peak

AM Peak Period	GEH Car	GEH LGV	GEH HGV	GEH Total	DMRB FLOWS	DMRB FLOWS OR GEH<5
Number of links	96	96	95	96	96	96
% links with GEH <5	91%	95%	93%	83%		90%
% links with GEH <8	96%	98%	100%	94%		95%
Individual link flows					89%	

Table 3. 2016 Local Calibration Model – Flow Comparisons – PM Peak

PM Peak Period	GEH Car	GEH LGV	GEH HGV	GEH Total	DMRB FLOWS	DMRB FLOWS OR GEH<5
Number of links	96	96	95	96	96	96
% links with GEH <5	94%	98%	98%	90%		96%
% links with GEH <8	97%	98%	99%	97%		98%
Individual link flows					96%	

Figure 1. 2016 Local Calibration Model - GEH and DMRB Indicators – AM peak hour

Figure 2. 2016 Local Calibration Model – GEH and DMRB Indicators – PM peak hour

4.2.11. Tables 2 and 3, identify that, for the local calibration model, there is a strong match between the observed data and the model with 90% or over of links in both time periods having a GEH of less than 5 or meeting the DMRB flow criteria. This suggests that the model is well calibrated in the local area.

4.2.12. At a more detailed level, in the AM peak period, the data underpinning Figure 1 indicates that of the 26 links adjacent to or on the Corridor, four do not have a GEH of less than 5 or do not meet the DMRB flow criteria. Two of these four links are the southbound 'outbound' links from the Corridor junctions at Woburn Place and Bedford Way where the flows do not meet the GEH criteria themselves. However, as these are 'outbound' links from the Tavistock Place junction, these are perhaps less important to the modal functionality than were they to be 'inbound' links to the junction on the Corridor route.

4.2.13. Therefore, at a finer level of detail with 85% of individual links meeting one or both criteria suggests that the model meets the standards locally, even if the AM peak at first glance the calibration does not look as strong as PM peak period model.

4.2.14. In the PM peak period, shown in Figure 2, the model calibration is strong overall and within the Corridor, with 92% of individual links adjacent to or on the Corridor having a GEH of less than 5 or meet the DMRB flow criteria. It is acknowledged that the flows on two of the non-calibrating links are the approaches at the ends of the scheme (Gower Street southbound north of Torrington Place, and Regent Square westbound approaching Tavistock Place/Judd Street) but emphasis should be placed on the good results along the Corridor itself.

4.2.15. Whilst further improvements in the model calibration could be possible, including validating against independent traffic counts and journey time routes, in my opinion this would not be proportionate for this application of the model and given the existing level of calibration. It is also my opinion that the 2016 Local Calibration Model is, therefore, fit for the purpose of examining how the Trial will work alongside other local road network interventions, the potential traffic diversion impacts of alternatives to the Trial, and for considering the removal of Trial in the situation where the West End Project and Brunswick Square proposals have been delivered.

4.3. Local Junction Modelling

4.3.1. Whilst the ONE model can provide potential traffic re-routeing impacts, sometimes it is necessary to develop local area modelling at a more detailed junction level that can be used to consider in detail capacity issues on individual links and junctions, the interaction between them with a greater level of accuracy and to develop detailed junction layout designs, including lane widths and signal timing.

4.3.2. For the Corridor such models were developed by SYSTRA Ltd, on behalf of the Council, using the LinSig package for the signalised junctions along the Trial corridor. These models were set up to provide the basis for testing detailed junction layouts and traffic signal phasings.

4.3.3. The 'base' LinSig models have been assessed by TfL and approved through their LinSig Model Auditing Process up to Stage 3 (LMAP3) demonstrating that the calibrated base models have been accepted by TfL's Road Space Management Outcomes Delivery team for all periods. To date, the LinSig models have not been used to test any potential changes in junction specifications arising from the Trial or any alternatives.

4.3.4. Similarly, no work has been undertaken to date in setting up or applying any other established local junction models for considering the potential performance of other junctions where the higher level traffic model predicts modest or significant changes in traffic flows as a result of the removal of the Trial or the alternatives to the Trial, including for example Torrington Place/Gower Street junction or the Endsleigh Gardens/Gordon Street/Euston Road junctions.

4.3.5. As noted in the following section responding to Objectors' Statements of Cases, John Russell, on behalf of Imperial London Hotels Limited, has been developing similar models in parallel. Following a meeting between John Russell, the Council, SYSTRA and TfL of 4/9/17 and circulation of the SYSTRA report 'Existing Validated LinSig Model Region 52', agreement has been reached on most of the report with one technical issue concerning the degree of saturation (of traffic flows) at Woburn Place being the only outstanding difference of opinions with respect to these detailed models.

4.4. Traffic Forecasts – the Trial and other network Interventions

4.4.1. The traffic impacts of a number of interventions have been considered using the locally calibrated ONE model to examine interactions and cumulative impacts of the Trial with:

- the Judd Street closure proposals; and
- with Brunswick Square proposal not implemented.

4.4.2. In all cases, modelling has been undertaken assuming the West End Project is in place as considered in Section 3 above.

Judd Street Closure

Specification

4.4.3. The 'Judd Street closure' Trial specification includes:

- Closure of Judd Street in both directions between Euston Road and Bidborough Street. Note that at present northbound traffic from Judd Street can only turn left into Euston Road; southbound movements are possible from Euston Road in both directions and from Midland Road.

Forecasts and Outline Commentary

4.4.4. The potential closure of Judd Street to through traffic, both northbound and southbound is expected to result in changes in routeing for local residents and those travellers to the area. Those travellers accessing the local area from Euston Road and the north would be required to reroute on local roads, including onto the Corridor (with the Trial operating eastbound only) or onto Sidmouth Street (with the Reverse Trial option).

4.4.5. Effectively, the routeings into the local area are made on north-south roads from Euston Road, via Upper Woburn Place/Tavistock Square and Gordon Street on the Trial eastbound, or via the King's Cross gyratory, King's Cross Road, Acton Street and Sidmouth Street. In the case of the Trial operating eastbound, the Judd Street closure would be expected to add between 100 and 200 Passenger Car Units equivalents (PCUs) to the eastbound flow (as well as some similar impacts on Bernard Street to the south). In the

Reverse Trial, there are also similar impacts, but limited to local access to the Corridor around Marchmont Street.

Brunswick Square Reinstatement

Specification

4.4.6. The 'Brunswick Square Reinstatement' specification assumes that the proposed changes in the access arrangements for vehicle and cycles in Brunswick Square are not put in place, so that traffic routeing options in this local area remain unchanged from the current situation.

Forecasts and Outline Commentary

4.4.7. The Brunswick Square proposals are expected to take northbound traffic off Hunter Street when these are introduced, as the through route from Guilford Street onto Hunter Street/Judd Street is severed.

4.4.8. The forecast traffic impacts of not progressing with the Brunswick Square proposals are primarily limited to re-introducing the north/westbound traffic routeing from Guilford Street onto Hunter Street and Judd Street that would otherwise have routed via Grays Inn Road and Euston Road. Any impacts are not perceptible changes on traffic flows on the Trial in its current form operating eastbound only, and I would not expect any impacts on the Reverse Trial as westbound routeings onto the Corridor are maintained via Sidmouth Street, although modelling work has not been undertaken to confirm this view.

4.5. Traffic Modelling - alternative options for the Trial

4.5.1. The traffic impacts of three principal alternative options have been considered using the locally validated ONE model:

- 'Removal' of the Trial, with road vehicle traffic permitted in both the eastbound and westbound directions between Judd Street and Gower Street.
- 'Reverse' Trial, with road vehicle traffic permitted in the westbound direction between Judd Street and Gower Street, but with eastbound traffic movements associated with the current Trial no longer permitted; and
- A 'Two-Way' option varying the current Trial by permitting westbound traffic movements for all vehicles between Woburn Place and Gordon Square, but otherwise retaining only eastbound movements between Gower Street and Judd Street as in the current Trial.

4.5.2. In all cases, modelling has been undertaken assuming the West End Project and the Brunswick Square proposals are in place as considered in Section 3 above.

Removal of the Trial

Specification

4.5.3. The removal of the Trial provides for a return to the network of westbound traffic along the Corridor. As with all modelling using the 2016 Local Calibration Model, the West End Project is included in the model run as this scheme is most likely to be under construction by the time the Trial could be removed were the Temporary Traffic Order revoked.

4.5.4. The 'Removal' of the Trial specification includes:

- Reinstating westbound road vehicle traffic throughout the Corridor between Judd Street and Gower Street;
- Maintaining eastbound road vehicle traffic throughout the Corridor between Gower Street and Judd Street;
- Reinstatement of turning movements and restrictions associated with the Trial introduction;
- Reinstatement of the dedicated left-hand turning lane, otherwise referred to as a 'flare', at the Woburn Place and Bedford Way approaches to the Corridor;
- Maintenance of the westbound Torrington Place link between Gower Street and Tottenham Court Road; and
- (introduced through the West End Project) northbound turning movement from Torrington Place to Gower Street.

4.5.5. In modelling the removal of the Trial, highway capacities have been reset to those in the Corridor before implementation of the Trial, implicitly assuming the road space allocated to other users of the Corridor remains unchanged in overall cycle lane/footway widths. In practice this could be delivered either by reinstating the 'pre-Trial' bi-directional cycle lane arrangements or adopting alternative arrangements with two narrow with-flow cycle lanes. The latter could require a little more road width to be taken from the main carriageway, but I do not consider these options as being material in forecasting the traffic diversion impacts.

Forecasts

4.5.6. The changes in traffic flows are illustrated in Figures 3 and 4 showing the changes in the morning AM peak hour (0800-0900) and evening PM peak hour (1700-1800) respectively. The traffic flows are expressed in Passenger Car Units equivalents (PCUs) in bandwidth groupings; following TfL guidance we are not able to present absolute values, although to illustrate the impacts of traffic diversions absolute flows are not required1. Flows changes of less than 50 PCUs (increases or decreases) are not shown.

4.5.7. Flow changes are presented relative to the current Trial (permitting eastbound traffic only) with the West End Project and the Brunswick Square changes included in both the Trial and Removal of the Trial scenarios.

[1]TfL expect us to use flow ranges and bandwidths, rather than absolute flows, for consistency with TfL practice on other scheme assessments, in part not to leave an impression of spurious accuracy within the model

Outline Commentary

4.5.8. The forecast traffic diversions arising from the removal of the Trial are shown in Figure 3 for the AM peak period, and Figure 4 for the PM peak. Here, I draw out the key changes in forecast traffic flows.

4.5.9. As noted earlier, the forecasts include the West End Project and Brunswick Square proposals so the modelled traffic diversions will not replicate any observed changes arising from the implementation of the Trial in late 2015. However, I believe that the forecast changes look sensible in the light of the network changes arising from the West End Project.

4.5.10. Key traffic flow changes:

- A return of westbound traffic to the Corridor broadly as per the pre-Trial, but with some influence of the West End Project in routeings
- Increases in traffic flows on Gower Street, both turning on to the Corridor and from the Corridor
- Diversion of westbound traffic away from Grays Inn Road and Euston Road (parts of the Strategic Road Network (SRN) and Transport for London Road Network (TLRN) respectively) to the Corridor
- Broad doubling of overall traffic flows in the Corridor when operating two-way compared to the current one-way Trial
- Reduced traffic flows north/westbound on Endsleigh Street and Endsleigh Gardens as north/westbound traffic can route from Woburn Place and Bedford Way along the re-opened westbound Tavistock Place carriageway via Gordon Street or Gower Street (northbound) to access Euston Road, Euston Station and further north/west.
- Smaller changes in flows arising from local access onto the Corridor or use of other secondary alternatives routes away from the Corridor
- Traffic re-routeing in the PM peak follows a similar pattern to the AM peak but with slightly larger changes apparent on a number of north/west – south/east routes.

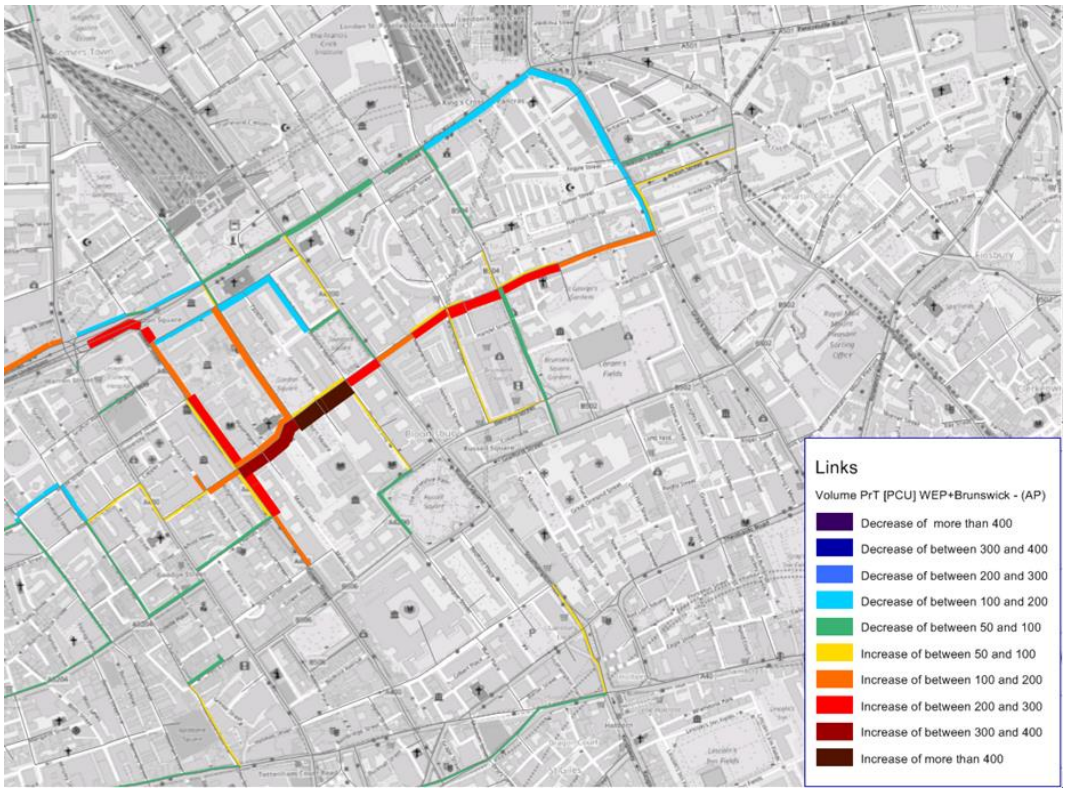

Figure 3. Impact of Removal of the Trial – AM peak hour
West End Project and Brunswick Square schemes in place

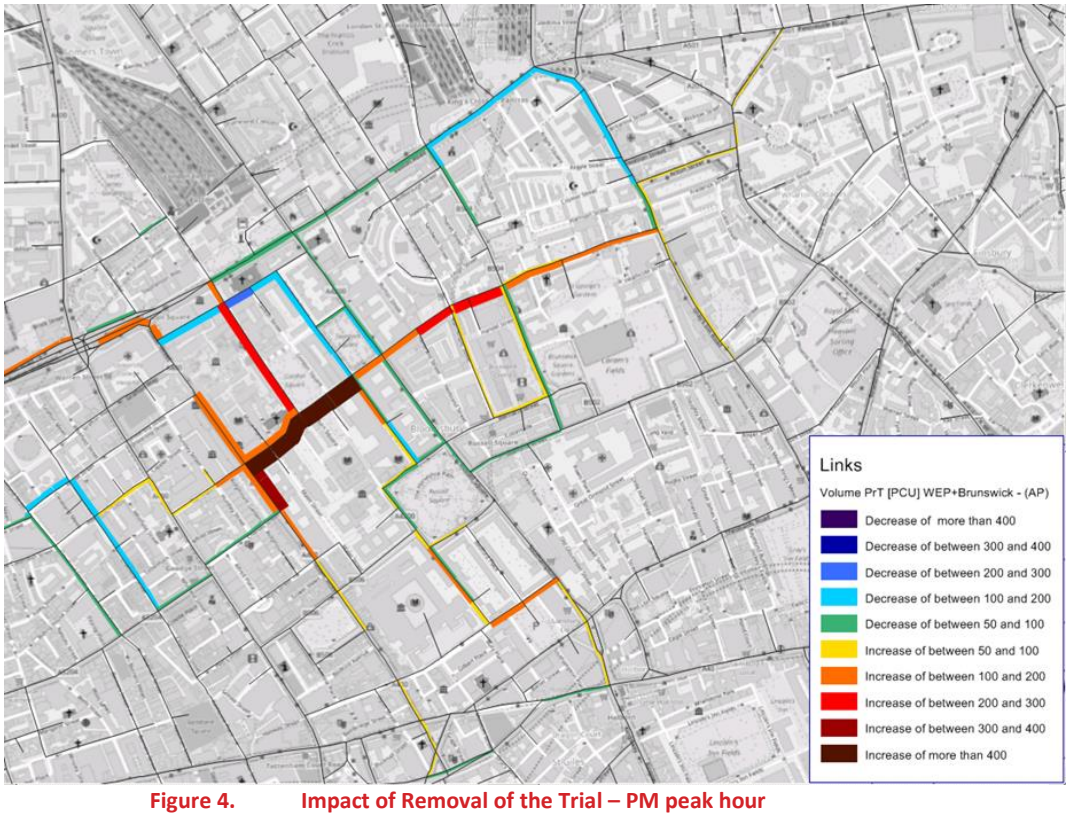

Figure 4. Impact of Removal of the Trial – PM peak hour
West End Project and Brunswick Square schemes in place

Reverse Trial

Specification

4.5.11. By permitting westbound road traffic vehicle movements between Judd Street and Gower Street, rather than eastbound movements as in the current Trial, traffic distributes differently around the local road network and on the strategic Euston Road and Grays Inn Road routes.

4.5.12. The Reverse Trial specification includes:

- Road vehicle traffic permitted in the westbound direction along the Corridor between Judd Street and Gower Street
- Eastbound road vehicle traffic not permitted between Gower Street and Judd Street
- Reinstatement of traffic signals and turning movements/restrictions associated with the westbound 'pre-Trial' situation;
- Reinstatement of the dedicated left-hand turning lane, otherwise referred to a 'flares' at the Woburn Place and Bedford Way approaches to the Corridor;
- Maintenance of the westbound Torrington Place link between Gower Street and Tottenham Court Road; and
- (introduced through the West End Project) northbound turning movement from Torrington Place to Gower Street.

Forecasts

4.5.13. The changes in traffic flows are illustrated in Figure 5 and 6 present the changes in the morning AM peak hour (0800-0900) and evening PM peak hour (1700-1800). The traffic flows are expressed in Passenger Car Units equivalents (PCUs) in bandwidth groupings with the scale and colours used in Figures 5 and 6 being the same as those presented in Figures 3 and 4.

Outline Commentary

4.5.14. The forecast traffic diversions arising from the reversal of the Trial are shown in Figure 5 for the AM peak period, and Figure 6 for the PM peak. Here, I draw out the key changes in forecast traffic flows.

4.5.15. As noted earlier, the forecasts include the West End Project and Brunswick Square proposals so the modelled traffic diversions will not replicate any observed changes arising from the implementation of the Trial in late 2015. As for the removal of the Trial alternative, I believe that the forecast changes look sensible in the light of the network changes arising from the West End Project.

4.5.16. Key traffic flow changes:

- A switch in use of the Corridor from eastbound to westbound, with, in general, a larger increase in westbound flow (from zero) compared to the reduction in eastbound (to zero). This reflects on the higher westbound flows observed before the introduction of the Trial

- Diversion of westbound traffic away from Grays Inn Road and Euston Road (parts of the SRN and TLRN respectively) to the Corridor
- More modest increases in flows eastbound through alternative routes to the Corridor, including Russell Square and Bernard Street
- Additional traffic eastbound on Endsleigh Gardens/Endsleigh Street that would otherwise use the Corridor to access Bedford Way and the south/east can no longer use Gordon Street/Gordon Square
- This would be in part offset by reductions in westbound traffic that can now use the Corridor and turn northbound onto Gordon Street rather than routeing via Endsleigh Street/Endsleigh Gardens, leading to a net increase in traffic volumes on Endsleigh Street/Endsleigh Gardens
- Changes in the direction of flow on a number of local roads, including for example, Gordon Street (as above) and Hunter Street
- Increases in traffic flow in Byng Place and Torrington Place on the westbound approaches to Gower Street
- Traffic re-routeing in the PM peak follows a similar pattern to the AM peak but with slightly larger changes apparent on a number of local eastbound diversionary routes, including Montague Place and Russell Square

4.5.17. Sensitivity tests based on this option, but without reinstating the Woburn Place and Bedford Way northbound 'flares', suggest that the 'flares' themselves increase the attractiveness of Corridor routeing. The effects of reinstating the 'flares' are primarily in offering a slightly more attractive routeing via Guilford Street and Woburn Place, relative to alternatives via Grays Inn Road and Euston.

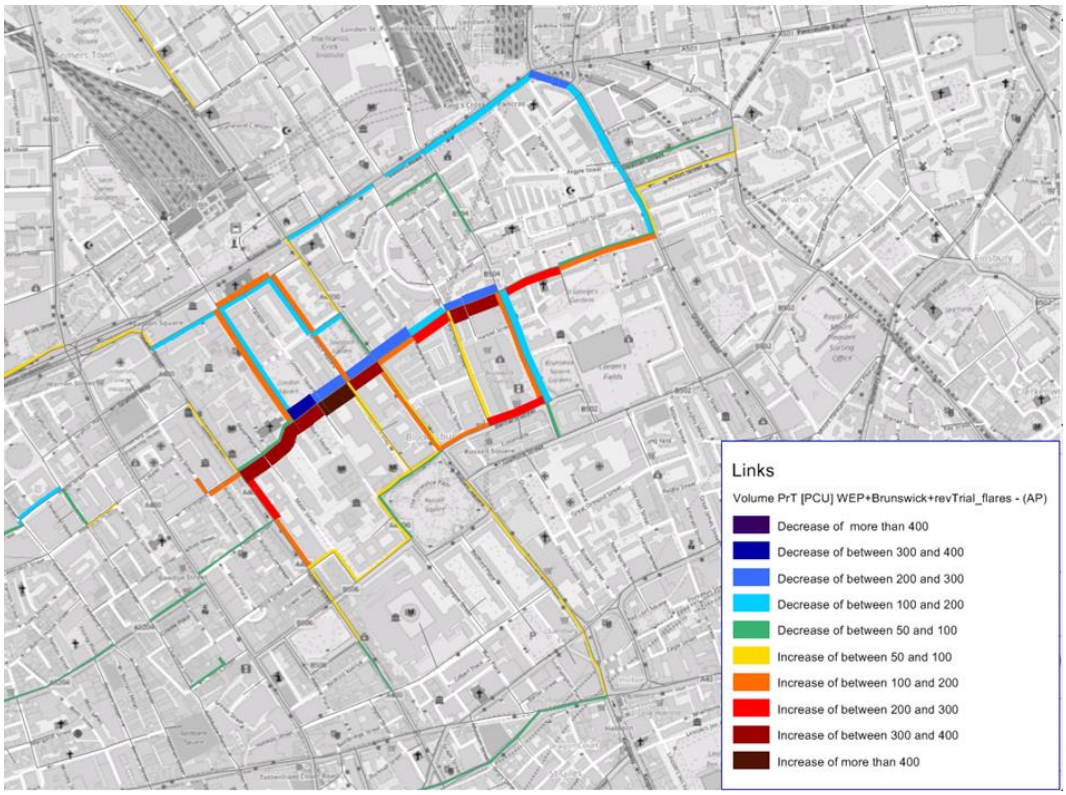

Figure 5. Impact of Reverse Trial (with 'flares') – AM peak hour
West End Project and Brunswick Square scheme in place

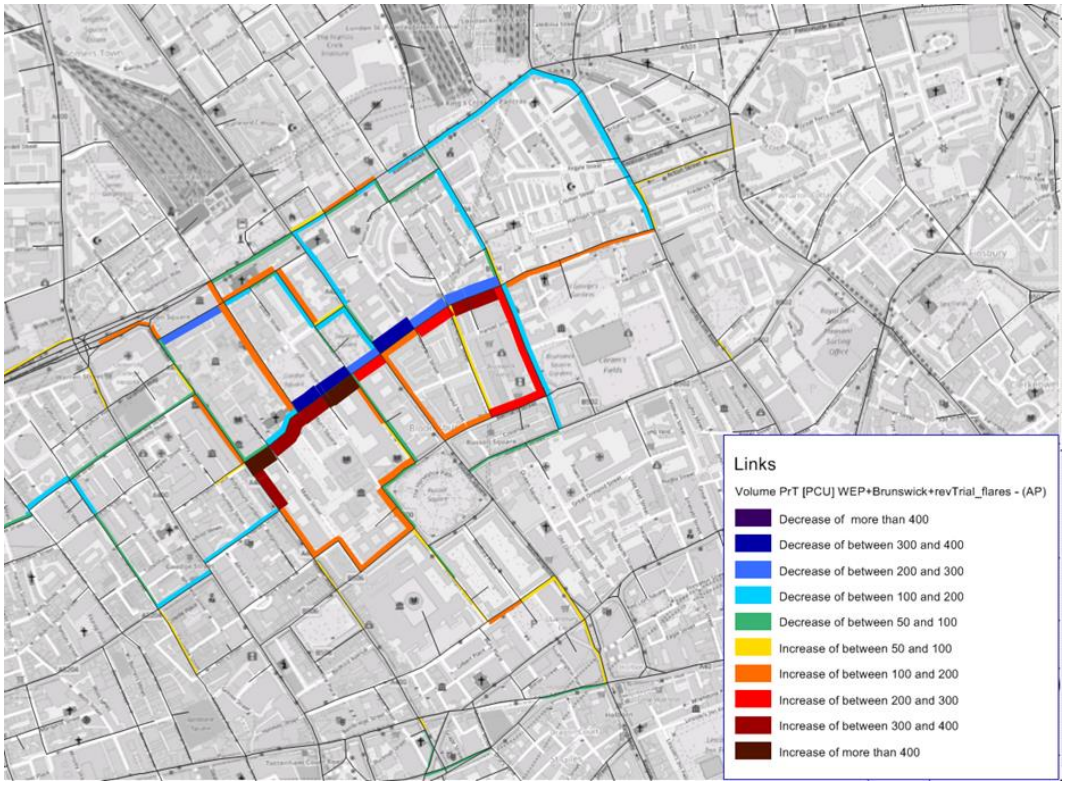

Figure 6. Impact of Reverse Trial (with 'flares') – PM peak hour
West End Project and Brunswick Square scheme in place

Two-Way option

4.5.18. The Two-Way option retains the current eastbound traffic movements between Gower Street and Judd Street, but also permits traffic to travel westbound along Tavistock Place between Woburn Place and Gordon Square.

4.5.19. The Two-Way option specification includes:

- Road vehicle traffic permitted as current in the eastbound direction along the Corridor between Gower Street and Judd Street;
- Westbound road vehicle traffic permitted between Woburn Place and Gordon Square with access from Woburn Place northbound and Bedford Way northbound via reinstated left-hand turns (available before the Trial). Note that access to Tavistock Place between Woburn Place and Gordon Square from Tavistock Square southbound has not been possible for a long period of time;
- Reinstatement of the 'flares' at the Woburn Place and Bedford Way approaches to the Corridor; and
- Maintenance of the westbound Torrington Place link between Gower Street and Tottenham Court Road (though this link cannot be used as through westbound route from the Corridor in this option).

Forecasts

4.5.20. The changes in traffic flows are illustrated in Figure 7 and 8 present the changes in the morning AM peak hour (0800-0900) and evening PM peak hour (1700-1800). The traffic flows are expressed in Passenger Car Units equivalents (PCUs) in bandwidth groupings with the scale and colours used in Figures 7 and 8 being the same as those presented in Figures 3 to 6.

Outline Commentary

4.5.21. The forecast traffic diversions arising from the Two-Way option are shown in Figure 7 for the AM peak period, and Figure 8 for the PM peak. Here, I draw out the key changes in forecast traffic flows.

4.5.22. As noted earlier, the forecasts include the West End Project and Brunswick Square proposals, although for this option these interventions appear to have little impact on the forecast flow changes.

4.5.23. Key traffic flow changes:

- Reinstating a westbound route in the Corridor between Woburn Place and Gordon Square provides for some redistribution of traffic back onto the local routes used before the introduction of the Trial, with traffic flow increases westbound on the Corridor, primarily between Bedford Way and Gordon Square and on Gordon Street, but in part offset by reductions in traffic flows on Endsleigh Street and Endsleigh Gardens.

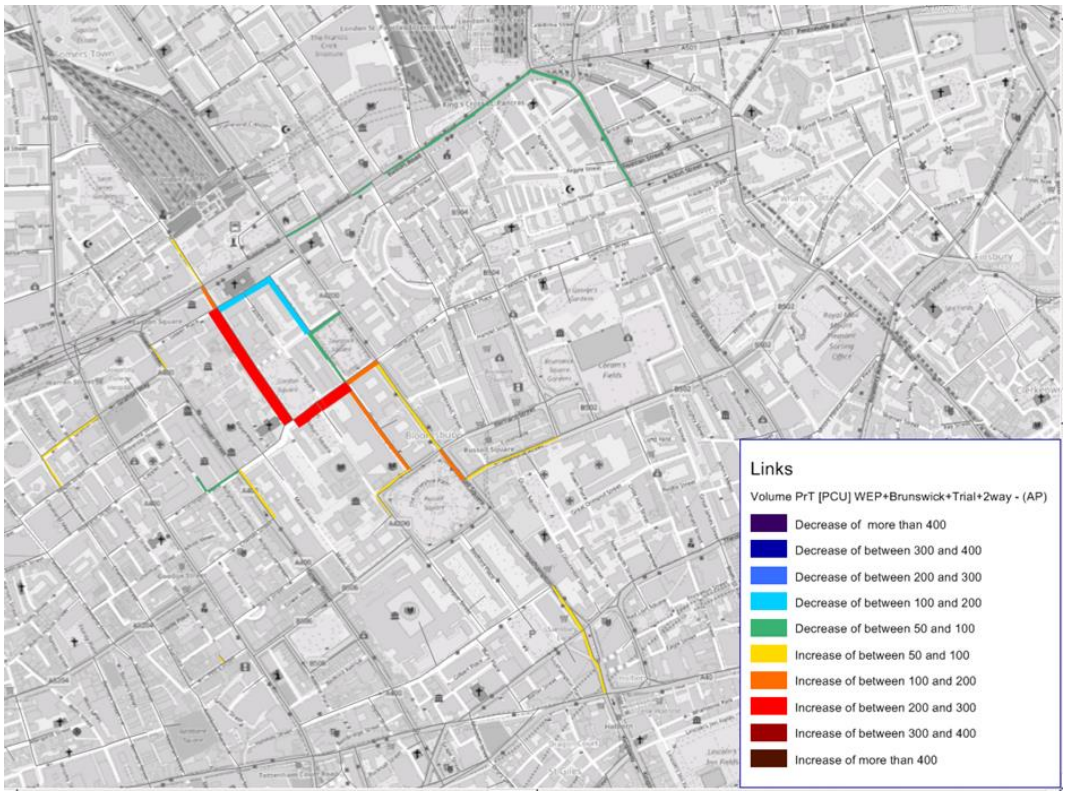

Figure 7. Impact of Two-Way Section between Woburn Plan & Bedford Square – AM peak hour West End Project and Brunswick Square scheme in place

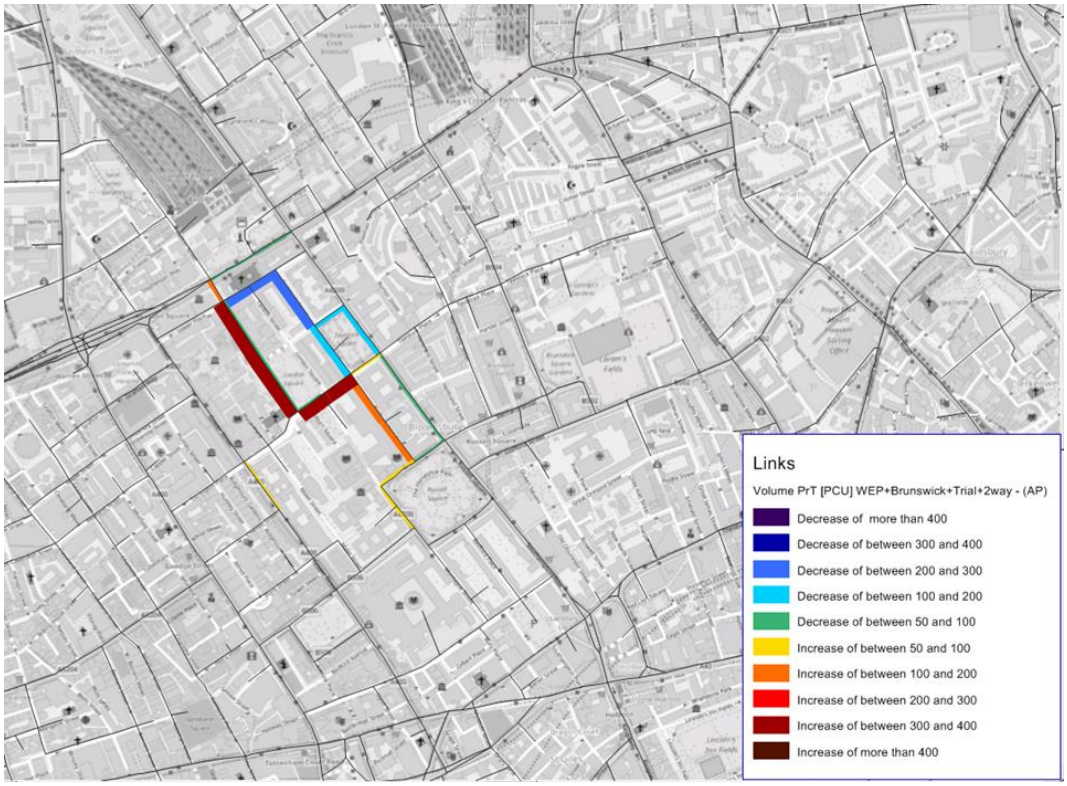

Figure 8. Impact of Two-Way Section between Woburn Plan & Bedford Square – PM peak hour West End Project and Brunswick Square scheme in place

5. ISSUES ARISING FROM STATEMENTS OF CASE

5.1. Issues Arising from Statements of Case

5.1.1. For this Proof, issues arising from the Statements of Case submitted by objectors and supporters are being considered. Therefore, in this section I have reviewed the Statements of Case and provide an initial assessment of the issues arising in relation to the transport modelling, either responding directly to issues arising here, or by providing cross-reference to other sections of my Proof.

5.1.2. It should be noted that the issues raised in the Statement of Case from Imperial London Hotels Limited (via either Farrers or John Russell of Motion transport consultants) are wide ranging and very detailed in nature and it has not been possible in the time available to consider these fully here.

5.2. Statement of Cases – Traffic Modelling Issues

5.2.1. Issues arising from the Statements of Case relating to the traffic modelling have been considered below on case-by-case basis using the ordering of submissions allocated by Pauline Butcher, the Inquiry Programme Officer.

ID2 – 1/1 Guilford Court Residents

5.2.2. Objector. A range of issues linked to, but not directly questions, traffic modelling have been raised, including delays, congestion and air quality. These issues, are dealt with in Louise McBride's Proof and Simi Shah's Proof. Section 4 of this Proof identifies the potential changes in traffic flows from the various alternatives to the current Trial, pointing towards potential impacts of delays, congestion and air quality.

ID2 –2 not used

ID2 – 3/1 - Camden Cycling Campaign, including London Cycling Campaign

5.2.3. Supporter. No issues arising in relation to traffic modelling.

ID2 – 4/1 – Unite the Union

5.2.4. Objector. Unite provide an extensive narrative on congestion in London, in the Tottenham Court Road area, and in relation to the West End Project. In relation to traffic modelling, Unite question the validity of the ONE model in general; this is addressed in Tony Dichev's Proof. The union suggest that the Trial is reversed; forecasts of the changes in traffic flows arising from this alternative are provided in section 4.5 of this Proof and illustrated in Figures 5 and 6.

ID2 –5/1 – University of London

5.2.5. Supporter. No issues arising in relation to traffic modelling.

ID2 – 6/1 – Living Streets Camden

5.2.6. Supporter. No issues arising in relation to traffic modelling.

ID2 – 7/1 – National Union of Rail, Maritime Transport Workers Taxi Branch (RMT)

5.2.7. Objector. Key issue linked to traffic modelling is in relation to journey time impacts. Modelled journey time changes have not been considered in detail in the current forecasting work as outlined in section 4.2.10.

ID2 –8 not used

ID2 –9/1 – Imperial London Hotels Limited (ILHL)

5.2.8. Objector. Imperial London Hotels Limited (ILHL), through their transport consultant John Russell, Technical Director of Motion transport consultants, have raised a significant number of issues directly relating to the traffic modelling undertaken by SYSTRA on behalf of the Council, The issues and concerns build on a series of technical exchanges between Motion, the Council, TfL and SYSTRA including an on-going dialogue that to an extent has become delayed due to inquiry processes. The wide ranging and very detailed issues raised in the Statement of Case from ILHL have meant that it has not been possible, in the time available, to consider these issues fully here, although discussion can continue.

ID2 – 10/1 – Michael Gwinnell

5.2.9. Objector. Key issues for Mr Gwinnell linked to traffic issues include congestion and air quality, and prohibited turning movements. These issues, including Mr Gwinnell's concern over the lack of a (local) alternative westbound route to the (strategic) Transport for London Road Network and Strategic Road Network routes, is dealt with in Louise McBride's Proof and Simi Shah's Proof respectively).

5.2.10. Mr Gwinnell would like to consider the impact of the Trial working in the westbound direction only, including modelling the potential impacts. Details of a 'reverse' Trial, including suggestion by ILHL of reinstating the Woburn Place 'flares', are provided in section 4.5 of this Proof and illustrated in Figures 5 and 6.

5.2.11. Also, Mr Gwinnell is interested in the forecast impacts of the proposed King's Cross Gyratory scheme on the Trial operation. This is referenced in section 3.1.6 above, noting that the status and design options for this scheme are not clear, and that modelling of a preferred option has not been undertaken to date.

ID2 –11/1 – James Murray

5.2.12. Objector. James Murray identifes issues of congestion in the Corridor and on all east-west and north south routes, together with a suggestion of a shared space scheme. No issues arising in relation to traffic modelling although alternatives to the scheme are considered in section 4.5 of this Proof.

ID2 –12/1 – Tamar House RTM Company Ltd, 13 Tavistock Place Freehold Ltd and Residents of 11 Tavistock Place

5.2.13. Objector. No issues arising in relation to traffic modelling.

ID2 – 13 not used

ID2 –14/1 Licensed Taxi Drivers' Association

5.2.14. Objector. The LTDA identify increases in congestion as a key issue, including negative impacts on hospital access. There are no specific issues arising in relation to traffic modelling, although the case is made for assessing the Bloomsbury area as a whole in transport terms, and the need to assess HS2 Construction works, especially on Endsleigh Gardens (a key taxi assess route into Euston Station). These issues are primarily dealt with by Louise McBride in her Proof including identifying (a separate) consideration of improvements in taxi access to Euston station that would reduce the emphasis on routeings via Endsleigh Gardens. Issues over accident and collision data are addressed in Simi Shah's Proof.

ID2 –15/1 – Friends of Tavistock Square

5.2.15. Objector. The Friends of Tavistock Square specifically raise issues about traffic modelling, including the modellling not being suitable and the need for a wider study to be undertaken. Details of the suitability of the 2016 Local Calibration Model are reported in this Proof, including the development and calibration of the local model and its application in testing a number of alternatives to the current Trial, including the removal of the Trial that the Friends of Tavistock Square advocate, specifically in section 4.5 of this Proof and illustrated in Figures 3 and 4.

ID2 – 16/1 - Gordon Mansions Residents Association

5.2.16. Supporter. No issues arising in relation to traffic modelling.

ID2 –17/1 - Confederation of Passenger Transport

5.2.17. Objector. No issues arising in relation to transport modelling.

ID2 –18/1 – BRAG - Bloomsbury Residents' Action Group

5.2.18. Objector. BRAG identify a wide range of issues in their Statement of Case, including consultation, scheme objectives, congestion, journey times and delays, longer vehicle routes, air quality, and alternatives. These issues are dealt with in the other Proofs of Evidence. In respect of traffic modelling there are no specific issues identified, although issues of displaced traffic under various alternatives to the Trial are addressed specifically in section 4.5 of this Proof and illustrated in Figures 3 to 8, including withdrawal of the scheme, the reverse Trial and a section of two-way traffic operation on the Corridor between Woburn Place and Bedford Square.

ID2 – 19 not used

ID2 –20/1 - 54 Russell Square Residents Assn / Commissioners of Russell Square

5.2.19. Objector. No specific issues arising in relation to transport modelling, although the Residents Association would prefer the westbound direction to the Corridor to be reinstated as this is the only westbound route between Euston Road and Centre Point/New Oxford Street. The removal of the Trial and the reverse Trial alternatives are consdered in section 4.5 of this Proof and illustrated in Figures 3, 4, 5 and 6. Engineering and design issues, including signal timings and north-south priorities at Woburn Place and Bedford, raised by the Residents Association, are considered in Simi Shah's Proof.

ID2 - 21/1- University College London (UCL)

5.2.20. Supporter. No issues arising in relation to transport modelling.

ID2 –22/1 - Dr Evelyn Abberton and Professor Adrian Fourcin

5.2.21. Objector. Dr Evelyn Abberton and Professor Adrian Fourcin raise issues of pedestrian safety and emergency services access, covered in Simi Shah's Proof. Traffic displacement issues, especially impacts Endsleigh Street/Endsleigh Gardens/West side of Tavistock Square are considered in this Proof in section 4.5 including the relative impacts of the alternative to the Trial, including removal and reversal.

ID2 – 23/1 – Transport for London

5.2.22. Supporter. No issues arising in relation to transport modelling.

ID2 – 24/1 – Bloomsbury Conservation Area Advisory Committee

5.2.23. Objector. No issues arising in relation to transport modelling.

6. CONCLUSIONS

6.1.1. Traffic modelling has been undertaken to primarily consider alternatives to the Trial, including the removal of Trial, reversing the direction of the Trial and a further two-way working option over part of the Trial.

6.1.2. The modelling work is founded on TfL's established ONE (Operational Network Evaluation) Model, with a local calibration undertaken in the local area around the Corridor. The calibration exercise has developed a model that performs well against the established Design Manual for Roads and Bridges criteria, as required by TfL.

6.1.3. Whilst further improvements in the model calibration could be possible, including validating against independent traffic counts and journey time routes, in my opinion this would not be proportionate for this application of the model and given the existing level of calibration.

6.1.4. Based on the strength of the local calibration, and that the forecast traffic diversions forecast by the model in application look sensible in both routeing and relative volumes, it is my opinion that the 2016 Local Calibration Model is fit for the purpose of examining how the Trial will work alongside other local road network interventions, the potential traffic diversion impacts of alternatives to the Trial, and for considering the removal of the Trial.

6.1.5. **Removal of Trial**: The traffic diversions forecast by the model point to traffic returning to the Corridor from alternative routes in the case of the removal of Trial, with reduced vehicle flows on the strategic Grays Inn Road and Euston Road routes, but also reduced flows in the Endsleigh Street and Endsleigh Gardens as westbound traffic can access Euston Road and Euston Station via Gordon Street, with consequential increases in flows on Gordon Street.

6.1.6. **Reverse Trial**: Reversing the direction of the Trial provides some similar diversion impacts to the removal of the Trial in the westbound direction, with reduced traffic flows on Grays Inn Road and Euston Road, with eastbound traffic flows in the Corridor are displaced onto other routes. Overall traffic flows in the Corridor increase a little reflecting the slightly higher pre-Trial westbound flows than eastbound. Net traffic flows increase a little on Endsleigh Gardens and Endsleigh Street as eastbound traffic can no longer route via Gordon Street and the Corridor.

6.1.7. **Two-Way option**: This option provides for local traffic diversions, principally by providing an access from the south and east to Euston Road and Euston Station via Gordon Street rather than via Endsleigh Street and Endsleigh Gardens.

6.1.8. Overall, I consider that the traffic modelling is fit for purpose, and provides a sensible assessment of the traffic diversions likely to arise from alternatives to the Trial. The modelling suggests that there are a number of different impacts arising, largely local in nature, and with some routes seeing increases in flows, others reductions, but overall the current Trial has less traffic on local roads than the alternatives.

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