SILVERTOWN TUNNEL

RSI Data and Matrix Development

October 2016

MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

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Internal Code: *ST150030-PLN-ZZZ-ZZ-TEN-ZZ-0810*

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Rev.	Date	Approved By	Signature	Description
0	10/10/2016	David Rowe (TfL Lead Sponsor)	[redacted]	Preparation for DCO Examination

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1. INTRODUCTION

- This note has been written in response to queries regarding the Roadside Interview (RSI) data collected as part of the Silvertown Tunnel scheme planning and its use in the River Crossings Highway Assignment Model (RXHAM) development. It is intended to provide greater clarity on the data which has informed the modelling process and their influence on the modelling outcome. The following topics will be considered:
    - RSI data collection
    - Matrix development process
    - Additional validation check – mobile phone data

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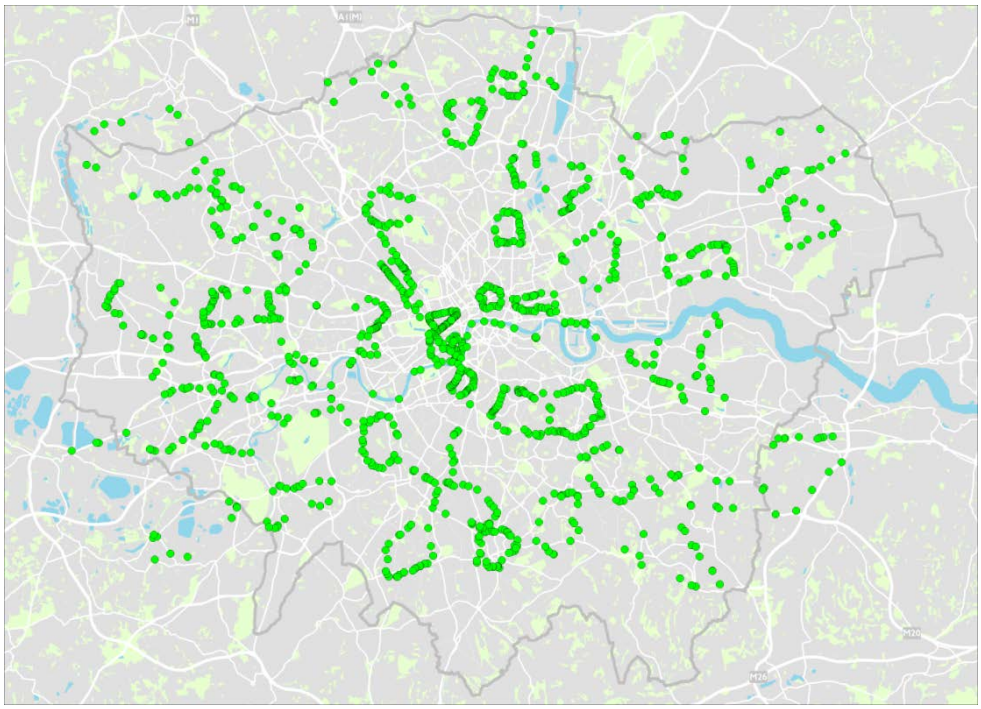
2. RSI DATA COLLECTION

- TfL undertook an extensive multi-million pound programme of RSI data collection between 2008 and 2010. This was the largest programme of surveys since the London Area Transport Survey (LATS) in 2001 and RSIs took place at over 1,500 locations across London as shown in Figure 1 below. Surveys were undertaken with drivers of cars, light goods vehicles (LGVs) and heavy goods vehicles (HGVs). The purpose of the surveys was to gain an understanding of the origins and destinations of road users along with collecting other useful information such as trip purpose.

Figure 1 – RSI Locations



- The surveys included an RSI at the northbound approach to the Blackwall Tunnel on Tuesday 1 July 2008 with over 700 cars surveyed between 06:00 and 19:30. The location of the RSI was on the A102 immediately after the offslip for the A2203 Blackwall Lane (see Figure 2 below) and is considered fit for the purpose of informing the model development regarding trip patterns in the area.

Figure 2 - Blackwall RSI Location

- The full set of data collected from car drivers is considered robust, having being collected in accordance with contemporary Government guidance (DMRB Volume 5 Section 1 TA 11/81). The RSI data has been used in the development of all the highway models that TfL currently owns (LGV and HGV sample rates were low and were therefore not included in model development). In addition to the specific application to the Silvertown Tunnel project, these models have been used to underpin the modelling and appraisal for around 200 different schemes and applications in London including developer proposed schemes that TfL has approved. The models are permitted to be used by accredited consultants only in line with bespoke guidance. They undergo continual improvement based on feedback from regular consultant forums and particular applications.

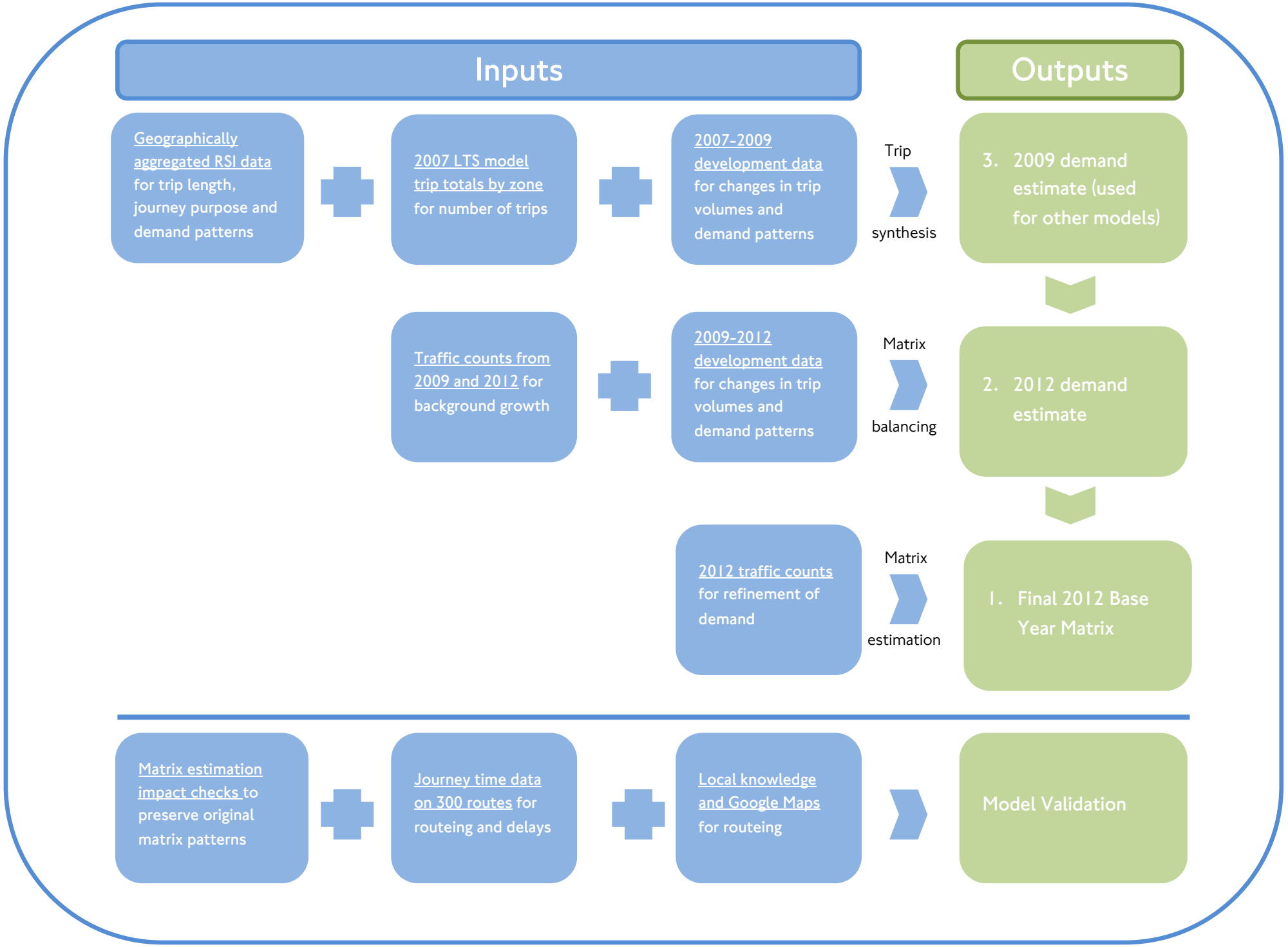
3. MATRIX DEVELOPMENT PROCESS

- The diagram on the next page shows the steps taken to create the matrix for the RXHAM model used to assess the effects of the Silvertown Tunnel scheme. This process was overseen by expert advisors and is explained in detail in the RXHAM model development report.

- The diagram shows that the data from the RSI programme, including the Blackwall Tunnel survey, were used along with a number of different data sources to inform the development of the matrix. The RSI data provides important information relating to trip length distribution, journey purpose and demand patterns. Other data sources and trip synthesis[1]contribute to the refinement of the matrix to achieve an acceptable validation and minimise the impact of matrix estimation (documented and included in the independent audit). In particular, background traffic growth and developments introduced after the surveys have been included in this refinement. As a result any changes in land-use that might have affected trip patterns between the date of the RSI and the base year validation have been incorporated in the model.

- The final 2012 base year matrix was then validated against independent data sources. As shown in the diagram, these data sources consist of journey time data and routeing information. The validation stage also included checks of the impact of matrix estimation on the original matrix patterns to ensure that this was kept to a minimum.

[1] Process which distributes trips between origins and destinations and accounts for movements which were not captured in the surveys


Inputs
Outputs
Geographically aggregated RSI data for trip length, journey purpose and demand patterns
2007 LTS model trip totals by zone for number of trips
2007-2009 development data for changes in trip volumes and demand patterns
Trip synthesis
3. 2009 demand estimate (used for other models)
Traffic counts from 2009 and 2012 for background growth
2009-2012 development data for changes in trip volumes and demand patterns
Matrix balancing
2. 2012 demand estimate
2012 traffic counts for refinement of demand
Matrix estimation
1. Final 2012 Base Year Matrix
Matrix estimation impact checks to preserve original matrix patterns
Journey time data on 300 routes for routeing and delays
Local knowledge and Google Maps for routeing
Model Validation

- The forecast years for the Silvertown modelling work are 2021, 2031 and 2041. It is important to note that between the base year and the forecast years trip patterns are expected to change further. Further planned development and schemes have been included in the forecast year models to represent these changes where these were considered near certain or more than likely to be delivered, ensuring that the most likely scenario is used for the Silvertown Tunnel testing. The RSI is therefore only one element in establishing the pattern of cross river movements in the forecast year.

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4. ADDITIONAL VALIDANTION CHECK – MOBILE PHONE DATA

- As mentioned previously, the RXHAM model has been calibrated using observed traffic flows and validated against independent datasets which confirm that journey times and routeing are well represented. This gives reassurance that the various datasets (including the RSI data) that have been used in the matrix development have been combined to produce a model which is reliable and fit for purpose.

- To provide further reassurance of the reliability of trip patterns represented by the model, TfL commissioned Telefonica to analyse mobile phone data to help understand the trip patterns of Blackwall Tunnel users. This data captures aggregated and anonymised movements derived from the interaction of mobile phones with mast locations. This is then further analysed to derive routeing and mode of travel. The data was collected for the northbound and southbound directions on weekdays in the last two weeks of March and April 2015 between the hours of 07:00 and 19:00 and was split into HGV, bus and ‘other road’ (car, LGV and taxi) classes.

- This data has been analysed for the purposes of validating origins and destinations and trip length distributions of trips using the Blackwall Tunnel and this is the first time it is being shared. TfL is investing in developing this method of collecting information about trip patterns but it should be recognised that across the industry this approach is relatively new and therefore, while providing a useful comparison, should not be relied upon in isolation of the wider set of data that has informed the development of RXHAM.

4.1 Blackwall Tunnel Origins and Destinations

- The figures below show the borough origin and destination proportions of trips using Blackwall Tunnel northbound in the AM Peak and southbound in the PM peak, as calculated from the mobile phone data and subsequently represented in the RXHAM base year model, enabling the two to be compared.

Figure 3 - Blackwall Tunnel borough origin and destination proportions northbound in the AM Peak – comparison of the RXHAM base model against mobile phone data

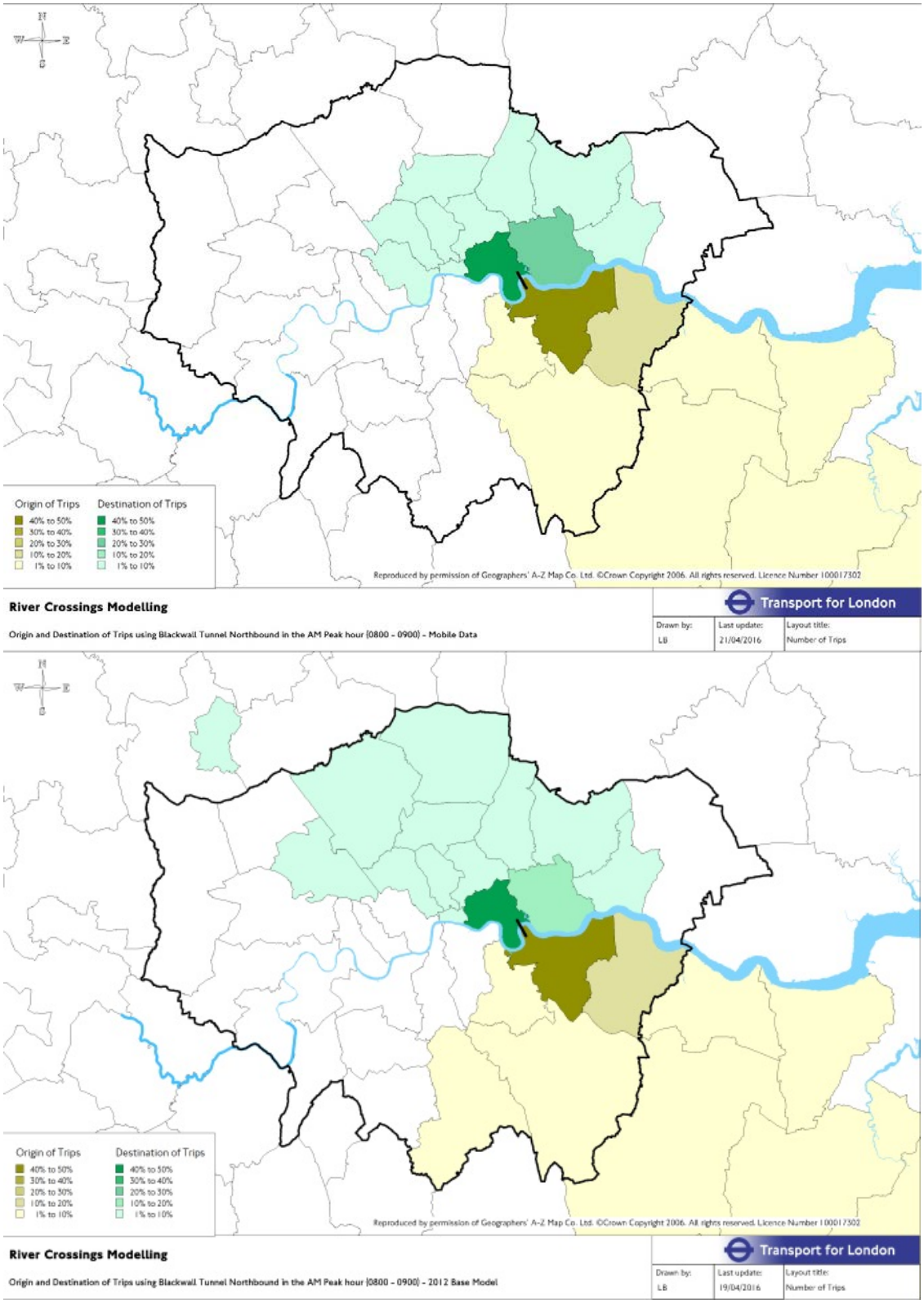
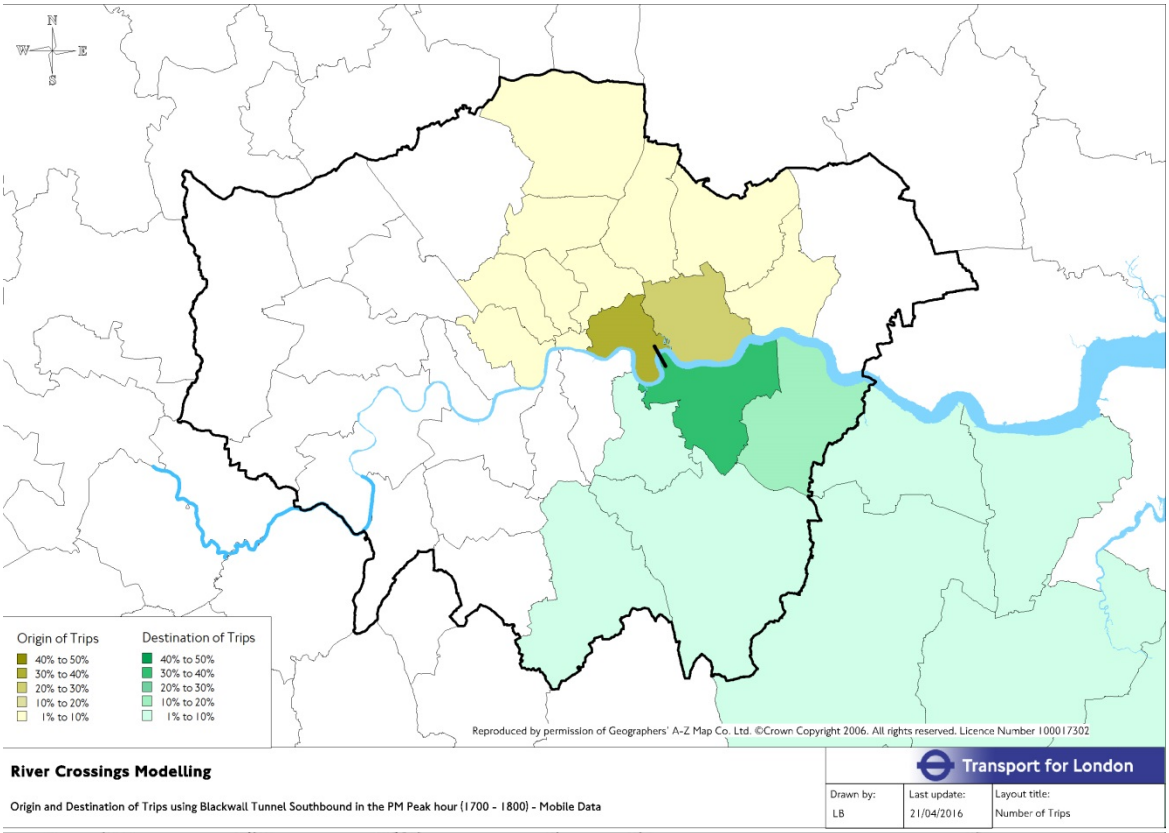
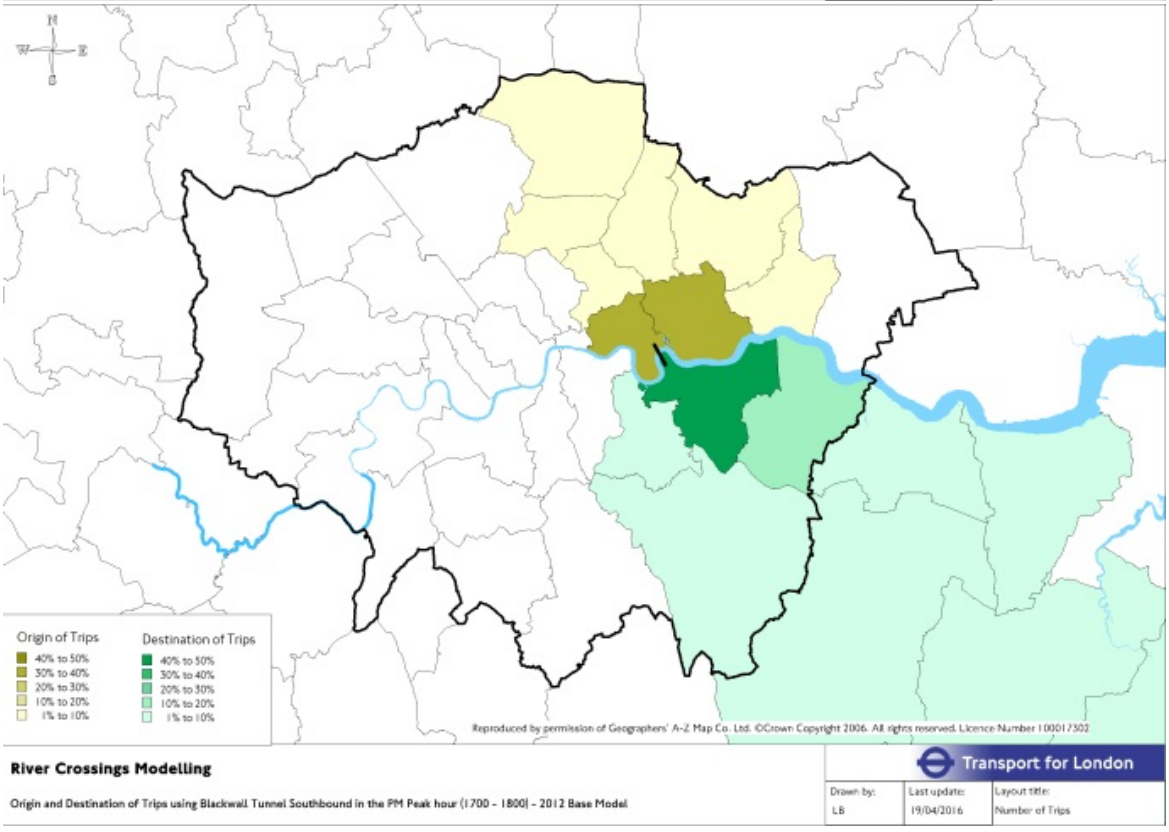


Figure 4 - Blackwall Tunnel borough origin and destination proportions southbound in the PM Peak – comparison of the RXHAM base model against mobile phone data





- For the AM Peak northbound the predominant origin borough (accounting for between 40-50% of all trips through the Blackwall Tunnel in the mobile phone data and 30-40% in the base year model) is RB Greenwich, followed by LB Bexley. The main destination in both cases is LB Tower Hamlets (around 40-50% of trips) followed by LB Newham.

- In the PM Peak southbound the pattern is similar, with the model appearing to contain a slightly higher proportion of trips starting or ending in the boroughs immediately adjacent to the Blackwall Tunnel than the mobile data suggests. In general these plots show that the model's representation of strategic trip patterns matches well with the mobile phone data. The differences in trip patterns are consistent with the level of variation which can be expected between datasets when collecting this type of data.

4.2 Blackwall Tunnel Trip Length Distributions

- The following figures compare the mobile phone data trip length distribution against the model base year trip length distribution.

Figure 5 - Blackwall Tunnel trip length distribution northbound in the AM Peak – comparison of the RXHAM base model against mobile phone data

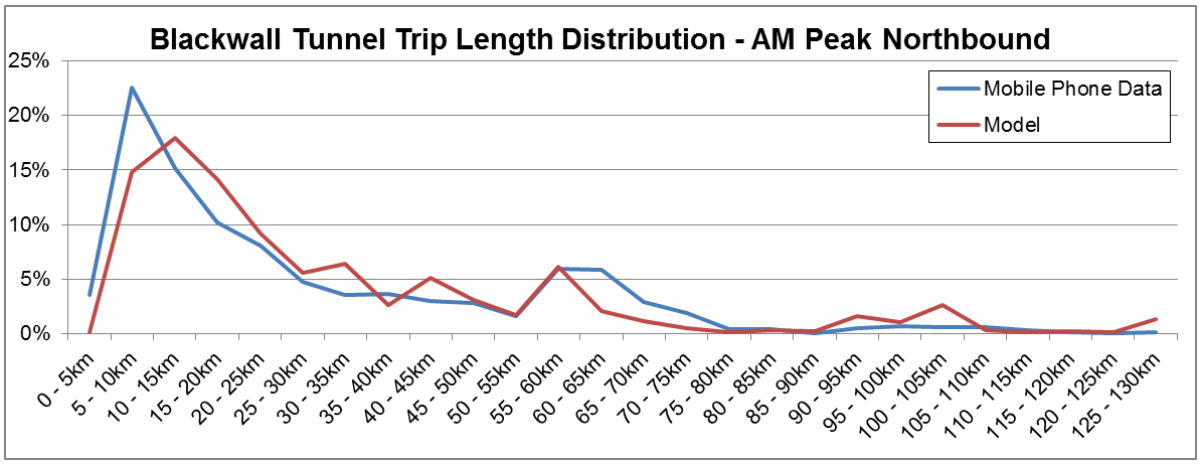
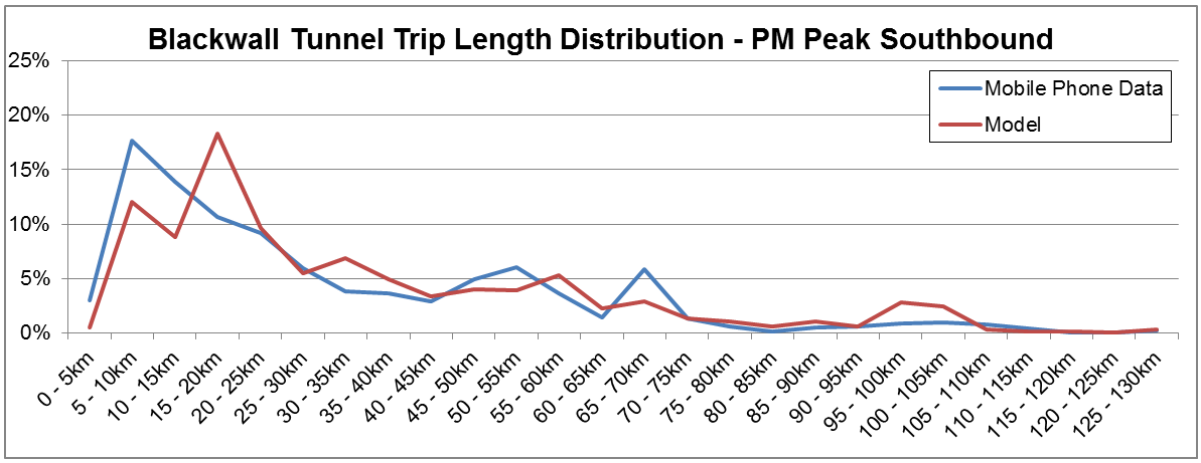


Figure 6 - Blackwall Tunnel trip length distribution southbound in the PM Peak – comparison of the RXHAM base model against mobile phone data



- The plots show that the model generally validates well against the mobile phone data. In the northbound direction the model has fewer trips in the 5-10km range compared to the mobile data with more trips in the 10-20km range. In the southbound direction there again appear to be more medium distance trips rather than short distance trips in the model compared to the mobile phone data.

- Apart from these differences, the model follows a similar pattern of trip length to the mobile phone data and there is no evidence that the model significantly overstates the proportion of Blackwall Tunnel trips which start closer to the tunnel. The differences identified are in line with statistical variation expected when comparing datasets of this nature.

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5. SUMMARY AND CONCLUSIONS

- In summary, the conclusions of this note are as follows:
- TfL's modelling and appraisal is underpinned by data collected in a large Government compliant programme of RSI surveys
- In the development of RXHAM, this RSI data was one element in the trip matrix development process which has been used successfully in many applications, and has been validated and independently audited with no concerns raised regarding the approach
- An additional bespoke validation exercise comparing model trip patterns against recently collected mobile phone data for Blackwall Tunnel users further confirms that the base model represents current trip patterns well at the strategic level, with no evidence of a significant bias towards trips originating closer to the tunnel