Modelling for Cambridge South West Park & Ride

The overall modelling methodology uses data that is volumes of traffic from a specific day and time such as ANPR and counts of actual traffic seen making turns or travelling along the roads (known as traffic counts), the Cambridge Sub-Regional Model (CSRM) for strategic movements and a Microsimulation model to look at the operation of specific local junctions.

Cambridge Sub-Regional Model

1. The Cambridge Sub-Regional Model (CSRM) is a highway model that uses current and future data to look at the wider movement of trips around Cambridge and the surrounding area. It is used to show the effect of transport schemes, e.g. a new Park & Ride site, and the effect of housing and employment developments on traffic conditions usually experienced. It uses the relationship between the additional traffic due to these developments and the amount of traffic the roads can cope with to send traffic via the best available route, in a representative average peak hour (AM 08:00-09:00 and PM 17:00-18:00).

Microsimulation Model

2. A micro-simulation model of M11 Junction 11, Trumpington Park & Ride and covering the area in Figure 1 was built. This model uses the 'inputs' of both existing traffic counts and the CSRM in order to provide a more detailed understanding of the operation of specific junctions. It shows the movement of traffic around the immediate area in more detail and the interaction between them i.e. where queuing affects adjacent junctions. Models have been built for the AM peak period (07:00-10:00) and PM peak period (16:00-19:00).
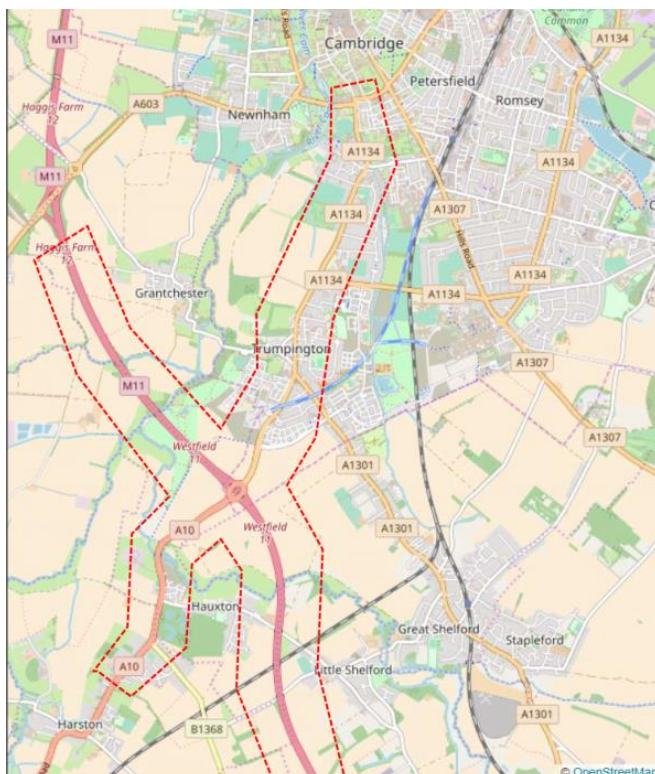

Figure 1 – Location and extent of VISSIM model

The model was built from traffic counts at 20 junctions within the area shown in Figure 1 carried out on Tuesday 20th March 2018, which was a term-time weekday and was a 'neutral' day when traffic flows could be expected to be normal, for instance, not a weekend. These counts were then balanced to account for minor discrepancies in the observed traffic flows between adjacent junctions. For example, if 300 vehicles were recorded leaving one junction heading north, the model anticipates 300 vehicles to arrive at the next junction. However, the count may have recorded 295 (maybe because of private entries/exits between junctions), so the flows were adjusted to match.

Although the surveys cover only one day, the model was run 16 times with a number of random factors affecting behaviours including vehicle start times, waiting times etc. The results of these 16 runs were then averaged to give results for the peak period on an overall 'neutral' day. The model was checked against data not used to build the model (independent data) along main road routes, which was taken from TrafficMaster data for an average weekday in March. In accordance with modelling best practice, for each route the modelled journey time was compared to the independent data, and was considered acceptable if they were within 15% of each other, or one minute if this is less.

Future year modelling

The data in the CSRM model for 2018 was then increased to a forecast year of 2031, using the traffic growth generated from the agreed developments. That growth includes housing developments and business growth at the designated sites. The model includes any transport schemes that have been agreed such as the A14 dualling that will be complete by 2031.

The total movements at J11 grow by approximately 23% (AM peak) with more vehicles from the development areas (a greater share being in the South). A test to see how well the roads cope with additional traffic above the agreed developments has also been run, this was to take into account future measures to reduce traffic in Cambridge City centre.

The CSRM model was then used to make changes to traffic numbers in the Microsimulation model – applied to the checked 2018 year model numbers as differences. This maintains the validity of the turning movements from the counts used in the model for 2018. Changes in the 2031 data, journey times and levels of congestion can then be calculated from the microsimulation model and shown in a visual representation.

Videos comparing the 2018 and 2031 models have been produced as part of the public consultation.

Videos

The 2031 video is presented alongside the 2018 video to enable members of the public to view the modelled differences in traffic anticipated in this area. Levels of congestion are represented visually as a 'heat map' with green/amber/red signifying increasing congestion.

In the 2031 AM peak at 08:30 there is a significant increase in congestion on the A10 south-west of the M11, and on the slip-roads off the M11 at Junction 11. North of the M11 there is a large increase in northbound traffic from Junction 11 which then turns right at the junction of Hauxton Road/Addenbrooke's Road towards the Biomedical Campus – with less traffic continuing up Hauxton Road towards Cambridge city centre.

Glossary

ANPR data – Automatic Number Plate Recognition – these data were collected in 2016. Since the charge for parking was dropped, evidence has been collected showing that the number of people parking at P&R sites has increased by 10% across Cambridge. These data show that the site is currently full by lunch time three or four days a week.
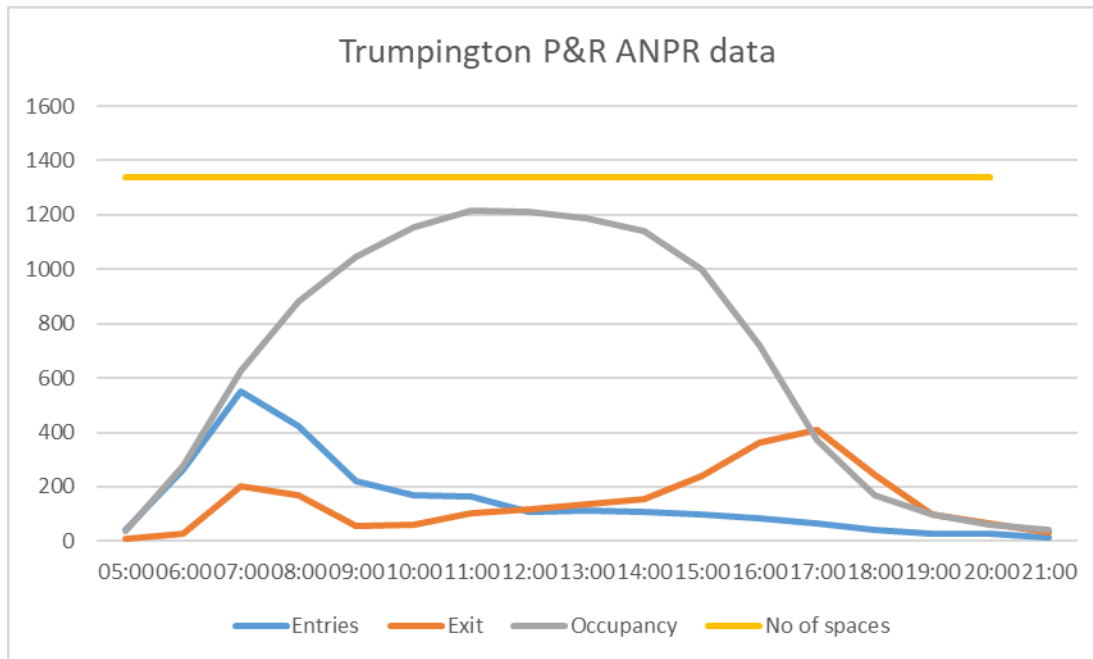
TrafficMaster data – travel times derived from the GPS data of a representative number of vehicles on the network at any one time.