

Figure 3.14 – Test 5 Shopping Destinations, Local Area

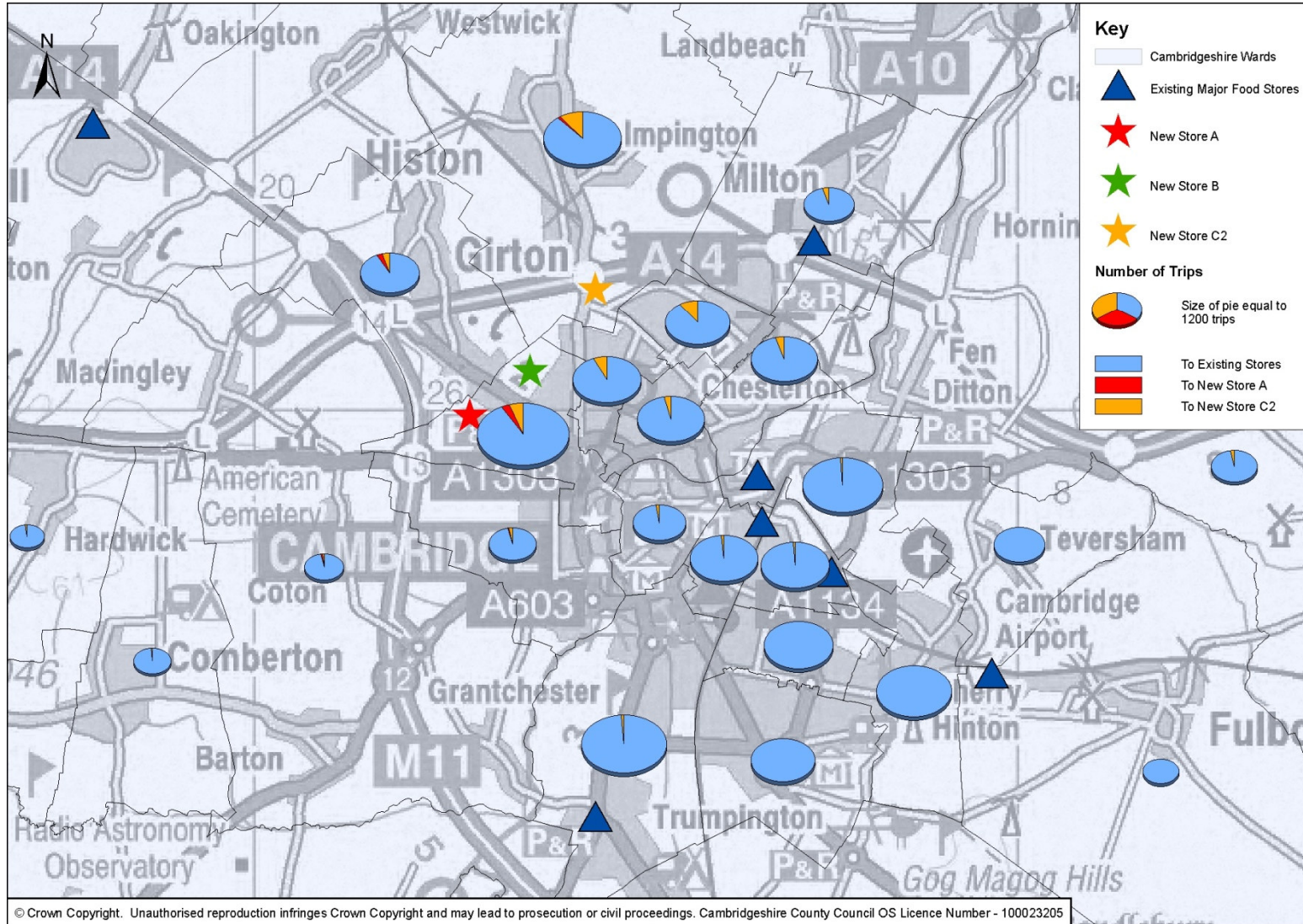


Figure 3.15 – Test 6 Shopping Destinations, Wide Area

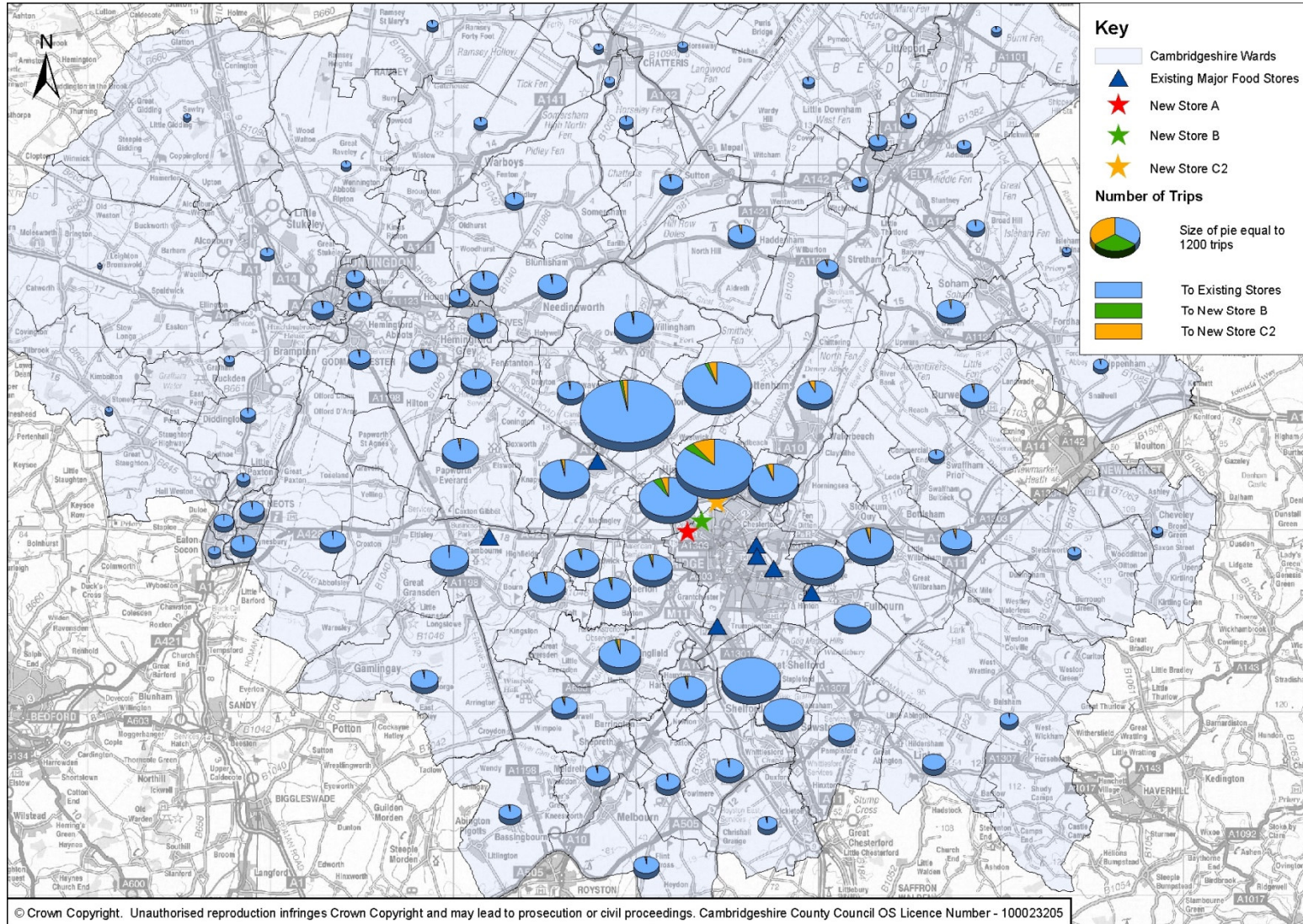
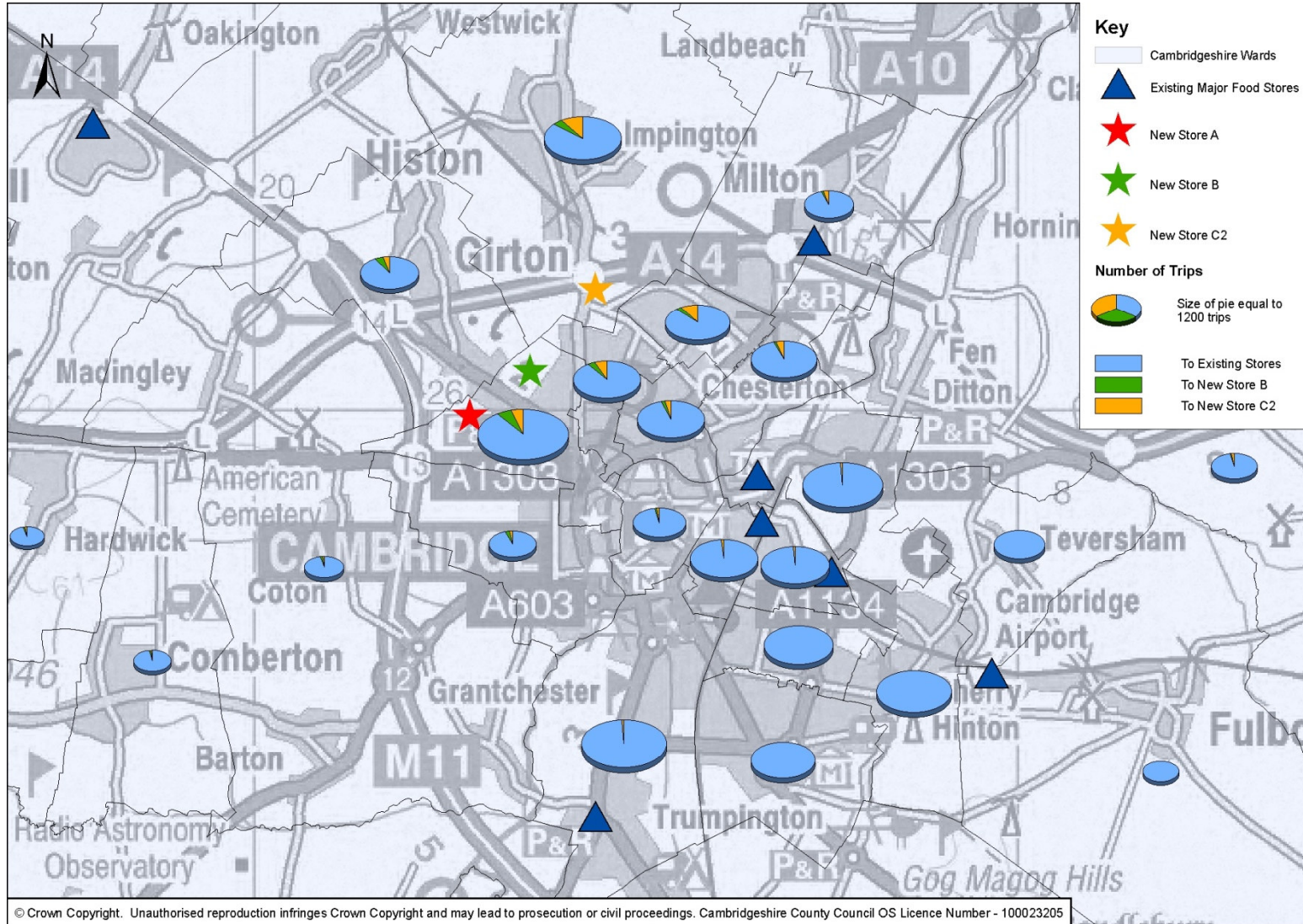


Figure 3.16 – Test 6 Shopping Destinations, Local Area



Summary of the Gravity Model Forecasts

- 3.29 The forecasts from the Gravity Model give an indication of the performance of each Test across Cambridgeshire with respect to:
- The ability of a new store in each of the main development sites to contain trips within NWC relative to a Planned Development Only scenario with no extra provision; and
 - The likely changes in travel patterns arising from the location of a major new store across the wider City and South Cambridgeshire area.
- 3.30 Whilst it should be remembered that these forecasts do not take account of the affects of route choice, junction delays and general congestion on the highway network (which is assessed in the next chapter), the following analysis has been undertaken:
- The mode share of shopping trips to all existing and new stores in each test has been considered, showing that stores in NWC would be able to achieve lower car mode shares than many existing stores in the catchment area therefore supporting a move away from heavy car reliance;
 - The changes in the generalised cost of shopping trips across the county brought about by each Test scenario have been monitored, suggesting that the trips to the new stores are lower in cost than for the overall average and that, as a whole, the cost of trips across the Gravity Model catchment area decreases when a new store is opened;
 - The levels of abstraction from the existing stores have been analysed, showing that new stores in NWC abstract a proportion of their trips away from each of the existing stores, with the closer stores being affected the most;
 - The proportion of trips to each store that originate from within the SRS Primary Catchment Area and from within NWC have been calculated, indicating that a good degree of internalisation can be achieved in each Test; and
 - A series of maps have been produced, showing the relative number of shopping trips from each Ward in the model (recognising that the whole of Cambridgeshire is not served by the modelled stores alone, but that the observed data indicated a large geographical catchment area), and showing the proportion of these trips that patronise the new store(s) in NWC in each Test.
- 3.31 The density of dwellings per hectare on each of the development sites has a large part to play in the success of each potential store location (as measured against the criteria discussed above); a higher number of dwellings in close proximity to a store will reduce the reliance on cars (as the SOLUTIONS study has shown that main food shopping trips can use non-car modes for short distances), reduce the average cost of travel (in terms of time, distance and monetary cost), and increase the potential for a store to source its custom locally.

4. Cambridge Sub-Regional Model Forecasts

Introduction

- 4.1 This chapter provides more detailed transport related information extracted from the 2021 SATURN highway model forecasts for each of the test scenarios based on changes to highway travel patterns as informed by the gravity model. It includes information on:
- Changes in the levels of carbon emission, aggregate travel distances and time by time period and an annualised forecast for 2021;
 - Expected changes in delay at a range of key junctions across the NWC and wider Cambridge city area resulting in each of the tests by time of day; and
 - An analysis of the comparative potential for diversion of pass by trips across each of the scenarios.
- 4.2 These results are presented in terms of car trips in the AM Peak, Inter Peak and PM Peak modelled hours in CSRМ (which are 08:00-09:00, 14:00-15:00 and 17:00-18:00 respectively). Annualised 12-hour data has been provided, which has been derived from a combination of the three modelled peak hours, using annualisation factors originating from the Cambridge Road Side Interview surveys undertaken during the development of the CSRМ SATURN models. These factors are consistent with other work that has been carried out using the CSRМ (for example, the Cambridgeshire TIF bid).
- 4.3 Vehicular data from the SATURN models is in Passenger Car Units (PCUs), rather than pure vehicles. For example, an HGV is counted as 2.3 PCUs, while a car is 1 PCU. This is due to the way the SATURN model represents the additional road space required by larger vehicles on the network.

Summary Statistics

- 4.4 Carbon dioxide emissions, vehicle kilometres and vehicle hours have been extracted from the CSRМ SATURN models for the Planned Development Only scenario and each Test, to enable comparisons to be made between the overall traffic impacts of each store location. Table 4.1 gives these statistics for all SATURN links within the SRS Primary Catchment Area; Table 4.2 covers the SRS Secondary Catchment Area. (See Figure 2.4 for the locations of these catchment area boundaries.) Table 4.3 gives the same statistics for the “Cambridge Urban Area”, which is defined as Cambridge City plus the parts of South Cambridgeshire within the A14/M11 envelope (see Figure 4.1).
- 4.5 The carbon dioxide emissions were calculated by SATURN, taking into account the distance travelled along each road, the average cruise speed along that road, the time spent idling in queues at junctions, the number of times each vehicle comes to a full stop and then accelerates relatively quickly (e.g. pulling away from a junction), the number of times each vehicle stops and starts while moving along a queue, and the traffic volumes. Vehicle kilometres and vehicle hours refer to the total distance travelled by all vehicles on all roads in the model and the total time spent travelling, respectively.
- 4.6 These tables show that the percentage differences between each Test and the Planned Development Only scenario are very small. This suggests that the overall traffic impacts of stores in the different locations would be broadly similar and that these differences are not significant across the modelled area. However, if these results are annualised, the differences in absolute

terms between the Tests and the Planned Development Only scenario are more meaningful and show how, over a longer period of time, each of the scenarios compare with each other.

- 4.7 Within the SRS Secondary Catchment Area, the impacts are smaller and mostly beneficial relative to the Planned Development Only scenario. At a more local level, in the SRS Primary Catchment Area, the test scenarios mostly have a detrimental effect. In the Cambridge Urban Area, the effects vary between time periods and tests, but again the percentage changes are very small (less than 1%). In absolute terms, at an annualised 12-hour level, the benefits to the SRS Secondary Catchment Area are more clearly visible, although the disbenefits to the SRS Primary Catchment Area are much larger. Again, the Cambridge Urban Area shows more variation between the tests, with benefits generally for the two-store tests (4, 5 and 6) and disbenefits for the single store tests (1, 2 and 3).
- 4.8 This suggests that while the new store(s) reduce the number of shopping trips leaving the NWC area, there is an increase in the total number of shopping trips in the area due to the greater number of additional trips now attracted to the new store(s). Thus the residents of NWC do not need to drive as much, but the new store(s) attract more trips into the area. The overall number of trips in the SRS Secondary Catchment area is maintained at almost the same level in each Test as the Planned Development Only scenario, but these trips become shorter and/or faster, which is beneficial overall at this wider level. Within the Cambridge Urban area, overall benefits can again be seen in tests 4, 5 and 6, with the CO₂ and Vehicle Kilometres both reducing in these three tests (see Table 4.3).
- 4.9 In the SRS Primary Catchment Area, the Inter Peak and PM Peak generally show the greatest percentage increases in Vehicle Hours, which suggests that these periods experience a greater increase in congestion in NWC than the AM Peak. This is supported further by the delays at key junctions, particularly in the PM Peak (see analysis in the following section). This is due to the additional shopping trips in the SRS Primary Catchment Area, as described above.
- 4.10 The benefits in the wider SRS Secondary Catchment Area are due to the reduction in trips leaving NWC to do their shopping elsewhere. The impacts on the Cambridge Urban Area are generally positive in tests 4, 5 and 6 but negative in tests 1, 2 and 3; this is because the smaller stores have a smaller catchment area and higher non-car mode share, so they do not draw in as many trips from other parts of Cambridge and reduce car use in NWC.
- 4.11 In terms of the annualised absolute impacts of each test, Test 4 gives rise to the smallest changes in CO₂ emissions and vehicle kilometres in the SRS Primary Catchment area, and leads to the greatest decrease the CO₂ emissions in the SRS Secondary Catchment area. In the Cambridge Urban Area, Test 5 performs better in terms of reduction in CO₂ emissions and vehicle hours.