

Derivation of drive-times and fascia count methodology

1. The purpose of this appendix is to describe how the drive-times used in our analyses have been derived. In addition, we set out the methodology used to analyse the extent to which the UK population has a choice between different grocery retailers.

Deriving the site-to-output area and site-to-site drive-time matrix

2. Each site in our database has a geographic point, as does each output area—known as the centroid.¹ The Output Area (OA) centroid is a population-weighted point inside the boundary of the OA that indicates the concentration of residents. For each site, we estimate the time it takes to drive between the site and each other OA and site up to a maximum of 90 minutes' drive-time. See Annex 1 for the drive-time methodology and road speed assumptions used in estimating the drive-times.²
3. The resulting matrix is then reversed and separate 'OA-to-site' and 'site-to-site' drive-time matrices derived. To create manageable datasets, both matrices were subjected to further refinement:
 - (a) *OA to site*. Drive-times for all sites within 20 minutes of each OA were included. Further, if there were not 30 grocery stores with a net sales area greater than 280 sq metres within this 20-minute isochrone, the isochrone was then expanded until the number of included stores was equal to 30, or until 90 minutes was reached. Drive-times for all OA-site pairs within that wider isochrone were included. The resulting matrix produced a drive-time file with 23.3 million unique OA-site pairs.

¹Sites include both grocery stores and land interests. We use a combination of postcodes and grid references taken from the parties' responses to various questions of the main party questionnaire and further follow-up questions to identify a geographic point for each site.

²CACI Ltd undertook this work on behalf of the CC.

(b) *Site to site*. For each site, drive-times were included for all sites within a 20-minute drive-time. The resulting matrix produced a file with 1.4 million unique site-to-site drive-times.

Counting fascia by drive-time

4. Using the OA-to-site drive-time file, CACI Ltd undertook an analysis of fascia choice. The first step was to only retain those grocery stores which were trading as at July 2006 and had a net sales area greater than 1,400 sq metres. Table 1 shows the resulting number of stores, by fascia, included in the analysis.

TABLE 1 **Number of stores, by fascia, included in the fascia choice analysis**

<i>Fascia</i>	<i>Number of stores</i>
ASDA	302
CGL and regional Co-ops	85
M&S	41
Morrisons	357
Sainsbury's	400
Somerfield	73
Tesco	534
Waitrose	105
Other*	<u>15</u>
Total	1,912

Source: CC analysis of MPQ responses

*Other includes stores belonging to: Booths, Proudfoot, Kwik Save, Spar and Nisa Today's.

5. The file was then split into two using an urban/rural classification of output areas³ before being analysed as follows:

(a) Each OA was tested at each minute's drive-time to ascertain the number of fascia available.

(b) Each OA was given a cumulative flag to show the presence of different fascias at each drive-time. For example, an OA's first encounter of a store may be a Tesco at 3 minutes, another Tesco at 6 minutes, a Morrisons at 7 minutes and a Co-Op

³Each OA is classified as being either Rural or Urban. This classification is from the Department of Communities and Local Government (DCLG). OAs are described as urban or rural depending on whether the majority of the population falls inside a settlement of population 10,000 or more. The settlement is usually the urban sprawl defined by the ordnance survey. The full methodology can be found here: www.statistics.gov.uk/geography/downloads/Methodology_Report.pdf.

at 9 minutes. Hence, the OA has access to one fascia at 6 minutes, two different fascias at 7 minutes and three different fascias at 9 minutes, even though there are four stores.

(c) The population of the OA is then used as an input to calculate the population proportion that has access to at least three fascias at the 9-minute mark (this is cumulative and so will contribute to the 10-minute, 11-minute etc).⁴

6. This process is repeated for each OA, for each minute up to a maximum of 30 minutes.

⁴CACI 2006 population projections.

Drive-time methodology

1. The principle of a drive-time is to create an isochrone (ie a contour) that defines the maximum limit of that drive-time from a given start point. The contents of the contour (ie OA centroids or sites) are collated and analysed to determine their distance/time from the start point.
2. The drive-times that we use have been derived using a link and node network built from the Navteq backcloth. This work has been undertaken by CACI Ltd on behalf of the CC. Links are equivalent to roads and contain all information regarding the length and class of each road. The nodes are road junctions and include attributes on delay characteristics. From a start point (in this case the location of a site), cross-country speeds taken from the defaults are used along with the crow-flies distance to the nearest two nodes. This defines the time taken from start point to the point(s) of entry to the link and node network. From this point, the length and road type of each link determines the time taken to reach the next node.
3. The assumed speeds have been calibrated using a variety of sources including local knowledge of areas around the country. These speeds and methodology were accepted by the CC in the Safeway inquiry. The road speeds used are what are termed 'normal' in that they do not represent any particular time of day nor any particular day or days of the week. Table 1 shows the speeds that have been used to derive the drive-times used in the CC's analysis.

TABLE 1 Normal road speed assumptions, by road type

<i>Road description</i>	<i>Road speed kmh</i>	<i>Junction delay mins</i>
Motorway (rural)	112	0.00
Motorway (urban)	85	0.00
Motorway (metropolitan)	64	0.20
Dual Carriageway (rural)	90	0.10
Dual Carriageway (urban)	65	0.25
Dual Carriageway (metropolitan)	48	0.75
A Road (rural)	72	0.10
A Road (urban)	48	0.50
A Road (metropolitan)	30	1.00
B/unclassified road (rural)	58	0.10
B/unclassified road (urban)	40	0.50
B/unclassified road (metropolitan)	25	1.00
Ferry	12	15.00
Motorway tunnel (rural)	112	0.10
Motorway tunnel (urban)	85	0.20
Motorway tunnel (metropolitan)	64	0.20
Dual Carriageway tunnel (rural)	90	0.10
Dual Carriageway tunnel (urban)	65	0.25
Dual Carriageway tunnel (metropolitan)	48	0.75
A Road tunnel (rural)	72	0.10
A Road tunnel (urban)	48	0.50
A Road tunnel (metropolitan)	30	1.00
B/unclassified road tunnel (rural)	58	0.10
B/unclassified road tunnel (urban)	40	0.50
B/unclassified road tunnel (metropolitan)	25	1.00
Congested motorway	80	0.15
Toll motorway (rural)	112	2.00
Toll motorway (urban)	85	3.00
Toll motorway (metropolitan)	80	3.00
Toll Dual Carriageway (rural)	100	2.00
Toll Dual Carriageway (urban)	70	3.00
Toll Dual Carriageway (metropolitan)	55	3.00
Toll A Road (rural)	85	3.00
Toll A Road (urban)	55	4.00
Toll A Road (metropolitan)	36	4.00
Toll B/unclassified road (rural)	65	4.00
Toll B/unclassified road (urban)	45	5.00
Toll B/unclassified road (metropolitan)	30	5.00
Motorway under construction	112	0.00
Dual Carriageway under construction	90	0.10
A Road under construction	78	0.10
B/unclassified road under construction	58	0.10
Dual Carriageway in congestion zone	52	0.80
A Road in congestion zone	37	0.80
Dual Carriageway bordering congestion zone	37	1.50
A Road bordering congestion zone	24	1.50

Source: Department for Transport/CACI.

4. Differences with other analyses undertaken by third parties can sometimes be attributed to how road speeds are calibrated and what roads are used. For instance, we are aware that some do not include B/unclassified roads in their networks. For comparison, the tables below show how the speeds differ for ‘off-peak’ and ‘peak time’.

TABLE 2 Off-peak road speed assumptions, by road type

<i>Road description</i>	<i>Road speed kmh</i>	<i>Junction delay mins</i>
Motorway (rural)	112	0.00
Motorway (urban)	94	0.00
Motorway (metropolitan)	70	0.10
Dual Carriageway (rural)	99	0.05
Dual Carriageway (urban)	72	0.13
Dual Carriageway (metropolitan)	48	0.38

Source: Department for Transport/CACI.

TABLE 3 Peak road speed assumptions, by road type

<i>Road description</i>	<i>Road speed kmh</i>	<i>Junction delay mins</i>
Motorway (rural)	84	0.00
Motorway (urban)	64	0.00
Motorway (metropolitan)	38	0.25
Dual Carriageway (rural)	68	0.13
Dual Carriageway (urban)	49	0.31
Dual Carriageway (metropolitan)	29	0.94

Source: Department for Transport/CACI:
