

GROCERIES MARKET INVESTIGATION

Provisional recommendation on the selection of drive-time software to construct 10-minute drive-time isochrones

Summary

1. The Groceries Report requires the Office of Fair Trading (OFT) to assess local market competition around sites burdened by a restrictive covenant or exclusivity agreement, and around stores that benefit from the covenant or exclusivity arrangement. The local market is defined as being within a 10-minute drive-time of the site or store (10-minute drive-time isochrone).
2. We provisionally recommend that the OFT should use Experian Micromarketer MMG3 software, with Navteq's 'Navstreets' datasets (including ITIS road traffic intelligence) as the underlying road network to construct the 10-minute drive-time isochrones. We set out the reasons for this provisional recommendation below.

Background

3. On 9 May 2006, the OFT, in the exercise of its powers under [section 131](#) of the Enterprise Act 2002 (the Act), referred to the Competition Commission (CC), for investigation and report, the supply of groceries by retailers in the United Kingdom. On 30 April 2008 the CC published a [report](#) on the investigation (the Report), which contained the decision that there were adverse effects on competition (AECs).
4. Where the CC finds that there is an AEC, it has a duty, under the Act, to decide whether action should be taken by the CC, or recommended for others, to remedy, mitigate or prevent the AEC and any detrimental effects on customers resulting from it. The CC must also decide what action should be taken and what is to be remedied,

mitigated or prevented. In taking this decision, the CC, as required by the Act, will seek to achieve as comprehensive a solution as is reasonable and practicable.

5. To address the AEC we have found in relation to highly-concentrated local markets and barriers to entry we decided that large grocery retailers with a strong local market position in a highly-concentrated local market (as identified in the Report) will be required to release any existing restrictive covenants, beyond those identified in this report, in those local markets which may restrict grocery retailing or which have equivalent effect, which the owner of the burdened land has notified to the OFT and which the OFT has said exists in a highly-concentrated local market. This requirement will be contained in the Groceries Market Investigation (Controlled Land [and notification of acquisition of stores]) Order 2009 (the Controlled Land Order).

6. We decided that the OFT will carry out an assessment of local market concentration. We refer to this as the competition test. The nature of the analysis to be performed by the OFT was set out in [Appendix 11.1](#) of the Report.¹ One key aspect of the competition test is the requirement to construct isochrones, which involves measuring drive-times between different stores and between controlled landsites and stores. We said that for consistency and clarity, a standard, readily-available package should be used to construct the isochrones.²

7. Following the publication of the Report, we produced a draft Controlled Land Order that implements the finding of the Report with respect to controlled land and sought the views of large grocery retailers, both in writing and in meetings. During this informal consultation, we asked the large grocery retailers for details of the software packages that they presently use to construct isochrones, and details of the settings they use in the packages. We also commissioned Infotech, IT consultants with

¹Competition test to be applied to controlled landsites.

²See the Report, at paragraph 11.90.

expertise in geographic information systems (GIS), to advise us on aspects of the software packages most commonly used available to construct drive-time isochrones around grocery stores.

8. We have given careful consideration to the parties' submissions on available software packages. This document sets out our provisional recommendation on the appropriate software package to be used when carrying out the competition test and serves as a basis for further consultation.

Geographic information systems

9. There are three components to a system for constructing drive-time isochrones:
 - (i) a geographic information system, which is used to display data and isochrones;
 - (ii) a routing component, which analyses routes and calculates drive-times. These are often written by the software vendor themselves, for example the MapInfo routing component, Drivetime, is written by MapInfo, while in other cases the routing tool is written by a third party, for example, Experian's MicroMarketerG3; and
 - (iii) road network and driving speed data, which provides the data that the GIS and associated routing component use to generate driving routes. Some routing applications use intelligent road networks, so that driving restriction information (including one-way roads and turning restrictions) have been added to the road network. Road speeds differ depending on the time of day of travel, for example, to reflect peak and off-peak times. A number of these road networks have recently started to use real world traffic-related information to model more accurately the road network.

The CC requirements for a software package

10. Paragraph 11.90 of the Report specified that for consistency and clarity, a standard, readily-available software package should be used to construct the isochrones.³ A key benefit of specifying the package is that the isochrones constructed by the OFT could be easily reproduced by other parties. We examined whether different software and data packages could produce identical drive-time results. We considered that if different software and data packages produced different results, it would assist the OFT if we recommended which package and data combination should be used to construct drive-time isochrones. This would help ensure that third parties could accurately predict the results of the competition test.

11. We therefore sought to identify which software package(s) we should recommend that the OFT use, together with any settings that need be specified and how site and store locations should be specified.

Software packages currently used

12. There are two main drive-time packages that the large grocery retailers and the OFT use:
 - (i) MapInfo Drive time, which can be used with either a more detailed road network data (Teleatlas) or less detailed road network data (Meridian);⁴ and
 - (ii) Experian MicroMarketer MMG3, which can be used with Navteq road network data and can include ITIS road traffic intelligence.⁵

³Note that although this was in the section that discussed the competition test to be established in the planning system the OFT would use the same software system for the competition test to be applied for controlled land.

⁴A road network is mapped as a combination of nodes and segments (or links). Nodes are points representing the start and end of a road segment. These often occur at road junctions, where one or more roads meet. Segments (or links) interconnect the nodes. TeleAtlas has 3.5 metre nodes and 4.4 metre segments compared with Meridian, which has 0.9 metre nodes and 1.25 metre segments. In comparison Navteq has 5.8 metre nodes and 2.9 metre segments.

⁵ITIS uses satellite navigation results for freight vehicles and mobile phone information to derive actual travel speeds over the UK road network.

13. MapInfo Drive time is used for locations in the UK by Marks and Spencer, Morrisons, Sainsbury's and Waitrose. It is also currently used by the OFT. In each case the software is used with mapping software supplied by MapInfo called Streetline, which is based on the less detailed Meridian maps.
14. Experian Micromarketer MMG3 is used by Morrisons (with Navteq mapping data), Asda and [redacted] (both with ITIS road speed data).
15. In the UK, Tesco predominantly uses a bespoke version of a package called [redacted].^{6,7} In addition to MapInfo, Sainsbury's also uses a CACI system and a custom-built model based on software provided by MapInfo.

Retailer comments on the software packages

16. Asda recommended that the OFT should use the Experian Micromarketer software with ITIS road speed data. It considered that the ITIS road speed data was more accurate because each road was allocated a road speed that reflected observed local conditions and which thus represented consumer behaviour and store accessibility in a more realistic way than a system which used estimated road speeds. Asda also said that, although the sample vehicles tended to be commercial vehicles, it believed that this perceived disadvantage was greatly outweighed by the fact that the ITIS data reflected actual local road conditions and therefore better reflected reality. Asda also said that the software it used produced true isochrones, ie it did not snap forwards or backwards to the next or previous node at the end of the isochrone (it stops exactly on the drive-time) and produces a true boundary (ie it

⁶Tesco said that it had employed specialist consultants to enhance the routing software, and had updated and refined the mapping data, initially based on the [redacted] package, over a number of years (including by adding new roads).

⁷Tesco told us that it also used [redacted].

does not snap to particular geographic areas such as output areas or 1km grid squares).⁸

17. [X] also considered that the combination of the Experian Micromarketer software and ITIS road speeds gave the most accurate representation of drive-times. [X] told us that each road segment was assigned a speed based on observations from satellite navigation equipment. It believed that this produced the most accurate drive-times possible as they were based on actual evidence, and this produced more accurate drive-times than any solution based on general road speeds for categories of roads. As a consequence there was no requirement for deviations from default driving speeds or junction delay settings.
18. However, Marks and Spencer said that MapInfo drive-times were accurate and robust. Waitrose said that we should specify MapInfo, since it understood that MapInfo was used by the majority of retailers, the system was well understood and was readily available off the shelf.
19. Morrisons told us that it used both MapInfo Drivetime and Experian Micromarketer⁹ and had no strong preference for one software package over another. It suggested that the results of any mapping exercise should be treated with caution to ensure consistency with known facts about the local area. Sainsbury's said that it was difficult to measure which system was the closest to reality and, from time to time, each was likely to produce an unrealistic outcome.
20. Tesco said that it had deep reservations about the entire principle of using a mechanistic test to draw any meaningful conclusions about market power or the

⁸Note our analysis did not show the way the package calculated drive-times at the start and end of the journey was more accurate (see paragraph 34-36 below).

⁹Morrisons property department uses MapInfo Drivetime and the Customer Insights group uses Experian Micromarketer.

implications of the existence of concentrated areas.¹⁰ Tesco believed that, whatever software system was selected, the crucial factor in delivering appropriate outcomes was that appropriate assumptions were chosen. Moreover, the assumptions would need to be tailored for the specific software package. [REDACTED]^{11,12} Tesco noted that the OFT and many local planning authorities (LPAs) used a MapInfo-based system and suggested that an alternative system such as MapInfo should be specified for all retailers to use. However, as a fallback, Tesco believed that the CC should not rule out each retailer being able to continue to use its existing system. Tesco said that this would be consistent with the approach currently used by the OFT when assessing mergers and acquisitions and would require minimal additional investment or disruption to current practices.

21. Tesco and Sainsbury's expressed some reservations over the use of ITIS road speeds. Sainsbury's said that it had no experience of using ITIS data but that it was an emerging technology, and commented that much of the driving speed data was based on commercial vehicles. Sainsbury's was not confident about the robustness of its results on minor and residential roads, and its variability during peak/off-peak periods and major roadworks. Tesco told us that ITIS data did not cover Northern Ireland and so we would not obtain a consistent analysis across the UK. Tesco was also unclear how the construction of new roads in the future, upgrades to existing roads and updates would be treated.

¹⁰Tesco said that the comments in its response were without prejudice to the proceedings before the Competition Appeal Tribunal (CAT) that were underway at the time.

¹¹[REDACTED]

¹²[REDACTED]

Retailer comments on the settings that should be used in the software packages

22. All the large grocery retailers¹³ except Tesco told us that they used the default settings in the packages. Retailers that specified the time of day¹⁴ at which drive-times should be calculated said that non-peak times of day should be used because this was generally when people shopped for groceries.
23. Tesco told us that the assumptions to be fed into the software package were of critical importance in generating appropriate outcomes. As an example, Tesco said that road speeds could make a significant difference to drive-times, together with junction delays and the impact of restricted access roads (such as one-way systems). Tesco said that the settings it used were tailored to its own bespoke road network and therefore might not be suitable for other networks. Tesco told us that it used [X] road classes in its bespoke system and [X] zones (ranging from central urban to rural) with speeds for each combination. Further adjustments were made for London. Further delays were assumed for junctions, roundabouts, traffic lights and give-way signs by category of road (including whether the travel was on the major or minor road) and zone.
24. Another set of factors that Tesco said was important was specifying where and how stores were connected to the road network. Tesco said that an incorrect assumption about the physical point at which store could be accessed could mean estimated drive-times were wrong by several minutes.¹⁵ Sainsbury's told us that its system measured drive-times from where the access road to the store met the road network. For an undeveloped site, Asda tended to use the nearest existing node as a start point, particularly if the actual start point was some distance from the road network.

¹³The OFT also told us it used default settings.

¹⁴Asda, [X], Tesco.

¹⁵Note that the way the drive-time system connected to the road network and the treatment of junction delays and drive-times is discussed in detail in [Annex 1](#) and paragraphs 33–36 below.

Asda said that this ensured a more realistic isochrone. Tesco said that for an undeveloped site it would be appropriate to define the site entrance at strategic points round the site where access could reasonably be achieved. Any neighbouring store within a 10-minute drive-time of any of the potential access points should be included in the isochrone.

25. Tesco suggested that if a one-way system meant a location was within a 10-minute drive-time in one direction but not the other (most likely because of one-way systems), the location should be considered to be within a 10-minute isochrone.

Infotech analysis of software packages

26. We commissioned Infotech, IT consultants with expertise in GIS to assist us in selecting the software package.
27. At the project initiation stage Infotech and the CC highlighted a number of software and data sources to be considered, where possible, for the evaluation study. Given the off-the-shelf software packages mainly used by the large grocery retailers and the OFT, the following software and data systems were evaluated by Infotech:¹⁶
 - (i) Experian MicroMarketer MMG3 and Navteq (with ITIS drive-times) roads data;
 - (ii) MapInfo Drivetime and TeleAtlas roads data; and
 - (iii) MapInfo Drivetime and Meridian roads data.
28. Tests were performed on urban and rural locations to compare and evaluate the systems.¹⁷
29. The evaluation performed by Infotech considered: (i) transparency and flexibility; (ii) cost; (iii) coverage; (iv) connection of sites to the road network; (v) detail of road

¹⁶Note: Infotech found that it was not possible to combine MapInfo and the ITIS road speed data without modifying the software.

¹⁷Frome, Harpurhey, Slough and South-East London were used in the evaluation.

data; (vi) direction of travel; and (vii) similarities between Mapinfo and Experian Micromarketer. Our provisional conclusions follow.

Transparency and flexibility

30. Generally the Experian Micromarketer package is less transparent (for example, the route taken when a point-to-point drive-time is calculated is not displayed in Experian Micromarketer, but it is in MapInfo).
31. Generally MapInfo is the more flexible package because it allows greater user interaction. With Experian Micromarketer, there is less ability for the operator to specify how the package should operate. However, there are benefits to this if the methodology in the package is basically sound, since it supports the brightline nature of the test.

Cost

32. The Experian Micromarketer package with ITIS road speed data costs around £[redacted] for a three-year licence. However, this includes Experian's value-added demographic data. Removing this data from the package could bring a three-year licence down to circa £[redacted]. A second licence is 60 per cent of the cost, with a third licence at 40 per cent.¹⁸ The MapInfo package (with Teleatlas) costs between £[redacted] a year for the non-editable version and £[redacted] a year for the editable version.

Coverage

33. The Navteq/ITIS and Teleatlas road data covers all of the UK, whereas Meridian data does not. However, the ITIS drive-times data does not cover Northern Ireland (in Northern Ireland the driving speeds revert to a road-classification-based system).

¹⁸We were told by Asda that a bureau evaluation (ie an evaluation on line) could also be performed at a cost of around £[redacted].

Connection of sites to the road network

34. When constructing drive-time isochrones in MapInfo, the start node (where the specified start location joins the road network) can be manually selected by the user, with MapInfo displaying all nodes in the area and travel time between the start location specified and the start node is then assumed to be in a straight line at an 'off-network' travel speed. Alternatively, MapInfo can automatically select what it considers the most appropriate starting node. Conversely Experian Micromarketer automatically takes the nearest node in all cases and assumes the journey starts at that point (ie no off-network travel time is assumed). Experian does not routinely provide clients with a layer depicting available nodes but has made it clear to us that this option can easily be provided at no extra cost.

35. There are also differences at the end point when constructing drive-time isochrones. When MapInfo reaches the final node it can reach within the drive-time specified (eg if the drive-time to the final node is 9 minutes 48 seconds there is additional drive-time of 12 seconds left) the remainder of the isochrone is constructed on the basis of the speed of the road segment at the final node. Experian Micromarketer assumes the remaining drive-time is taken up by travelling at an off-network travel speed.

36. For both MapInfo and Experian Micromarketer, the methodology used for the calculation of travel times between two points is slightly different to that used for the construction of isochrones. MapInfo does not allow the user to select the starting node, rather it gives the user a choice of the programme either connecting to the nearest node, or to the nearest segment. MapInfo includes further time for travel from the last node to the actual site with the driving speed for the last part of the journey assumed to be at the off-network travel speed. Experian Micromarketer assumes the site is reached when the node closest to the site is reached.

Detail of road data

37. Using MapInfo with the less detailed Meridian data compared with the more detailed TeleAtlas data made a significant difference to the size of the isochrone. However, the differences in road speed assumptions between the two packages meant that the reasons for the differences could not be accurately assessed.

Direction of travel

38. For both applications, it was apparent that routes between the same two points in one direction were often significantly different from the results obtained when running the routes in reverse. The main reasons for this difference are related to different road restrictions and road speeds between the two directions.

Similarities between MapInfo and Experian Micromarketer

39. The results indicate that there are a number of settings/options which can be replicated between Experian Micromarketer and MapInfo. However, there are significant differences in factors such as the road network itself, junction delays and road-speed categorizations. This resulted in inconsistent isochrones and point-to-point drive-times between the two software packages.
40. When comparing the isochrones and point-to-point drive-times between Experian Micromarketer and MapInfo we noted that MapInfo generated significantly faster routes and larger isochrones in urban (city centre) locations, while Experian Micromarketer created faster routes and larger isochrones in rural areas or locations with a higher number of major roads.
41. The most important variable is the underlying road network being used. While starting locations, 'offroad' speeds and some other settings can be replicated

between two or more applications, the small difference that these variables make are outweighed by the larger impact individual road speeds have.

42. Even if the variables and options are replicated between MapInfo and Experian Micromarketer, the different road networks used mean the results between the two packages can vary considerably, especially in city centre locations.

Overall evaluation

43. We consider that, while the road networks within MapInfo have been modelled to some extent to try and reflect 'known' journey times, the road speeds within the Experian Micromarketer NavStreets road network, using ITIS traffic data, are likely to be more representative of real world drive-times. A major factor appears to be that MapInfo's default setting does not contain junction delays.
44. As a routing application, MapInfo is able more accurately to construct a route from the designated start point to the designated end point; however, the assumptions added on to the TeleAtlas road network currently available within MapInfo appear less suitable for our purposes than those in the Experian Micromarketer ITIS NavStreets road network. The road speeds within MapInfo can be altered by manually amending the associated Matrix table. However, using ITIS NavStreets data with the Experian package means that, overall, more realistic road speeds, containing more realistic waiting times and delays along roads, can be used.
45. Overall, the combination of Experian Micromarketer with ITIS Navstreets data appears a preferable combination for our requirements compared with MapInfo using TeleAtlas data.

Provisional recommendation

Selection of package

46. We recognize the concerns expressed by Sainsbury's and Tesco about the use of ITIS data. However, Tesco has told us of the large number of variables concerning driving speeds by type of road and zone, together with assumptions for different types of junctions such as roundabouts and traffic lights reflecting the type of road, the zone and right of way. It appears to us that specifying and keeping this information up to date would be a burdensome task that would fall on the OFT and could also undermine the effectiveness of our remedy by making the results of the competition test more difficult to predict. We also note Tesco's comments that a number of the assumptions it uses are tailored to its own bespoke road network and may not be suitable for other networks. While recognizing that ITIS data is largely based on commercial vehicles, we believe that there are key advantages with a system that appears reasonably to reflect actual traffic flows without having to specify a large number of area-specific assumptions.

47. The Infotech evaluation supports the use of Experian Micromarketer, with the Navstreets road network and using ITIS traffic data as the standard, readily available drive-time package. Therefore in order to generate the 10-minute drive-time isochrones, we have provisionally decided to recommend that the OFT use Experian Micromarketer MMG3 software, with Navteq's Navstreets datasets (including ITIS road traffic intelligence) as the underlying road network. Since the ITIS road data does not cover Northern Ireland the Navstreets dataset will be used for Northern Ireland evaluations. Default settings should be used in the software package, however, Experian will provide a version of the Northern Ireland Navstreets dataset with traffic restrictions such as one-way roads (which are not included in the base Navstreets dataset) and this version of the data should be used. Since the Northern

Ireland data will not include the ITIS observed traffic dataset we recognize that some flexibility by the OFT in interpreting the Northern Ireland isochrones may be required.

48. We recommend that the software should be updated annually, which we understand is the normal time period for Experian to release any available updates to the software and road datasets.
49. We also recommend that the OFT should periodically review the decision on the software and data to be used to take account of any significant changes in the packages available or other factors, such as cost.

Use of the package

50. Some variables need to be specified in order to ensure that any user will reach the same result.
51. With regard to using peak or off-peak travel times, the retailers that commented on this point said that daytime off-peak travel times should be used to calculate the drive-times, and we agree with this suggestion.
52. With regard to direction of travel, we agree with Tesco that drive-times should be calculated in both directions to take account of direction-specific factors such as one-way systems. We recommend that drive-times are therefore calculated between sites and surrounding stores to identify which stores are within a 10-minute drive-time of the site. Drive-times would also be calculated in the other direction (ie from the surrounding store to the site). If a store is within a 10-minute drive-time of the site in either direction it would be assumed to be within the isochrone.¹⁹ The same

¹⁹This allows for factors such as one-way streets which may change the drive-time depending on direction of travel.

approach would be used when constructing isochrones around a store to assess concentration around the store.

53. The Infotech analysis agrees with retailer comments that specifying the start location is important. In the case of an existing store or a developed site, we recommend that the start point for the drive-time calculation should be the point where the site accesses the road network.²⁰ The location of the end point should also be the point where the store or site accesses the road network. In the case of an undeveloped site, where there is more than one realistic potential entrance or exit, we recommend that the drive-time should be calculated from each of the potential entrances or exits. If a store is within a 10-minute drive-time of any of the potential entrances or exits (in either direction) it would be assumed to be within the isochrone.
54. [Annex 1](#) shows a draft of the specification of the test.

²⁰Where there is an access road to the site or store, the site entrance should be taken as the point where the access road reaches the road network. Where there are different entrances and exits to the site or store the direction of travel should be taken into account to decide which to use.

Recommendation for specification of the test

Selection and operation of software package for determining 10-minute drive-time isochrones

1. The test referred to in Schedule 4 of the Controlled Land Order requires the OFT to construct a 10-minute drive-time isochrone around the site burdened by the Restrictive Covenant or on which grocery retailing is restricted by an Exclusive Arrangement (in either case 'the site').
2. In order to generate the 10-minute drive-time isochrones the OFT will use Experian Drive time MMG3 software, with Navteq's Navstreets datasets (including ITIS road traffic intelligence) as the underlying road network. Default settings will be used in the software package. For Northern Ireland, which is not covered by the ITIS data, Navstreets alone will be used as the underlying road network. Experian will provide a version of Navstreets for Northern Ireland with traffic restrictions and this version of the data should be used.
3. The software will be updated annually as Experian makes its usual annual update to the software and road datasets.
4. Off-peak travel drive-times will be used to calculate the drive-times.
5. Drive-times will be calculated between the site and surrounding stores to identify which stores are within a 10-minute drive-time of the site. Drive-times will also be calculated in the other direction (ie from the surrounding store to the site). If a store is within a 10-minute drive-time of the site in either direction it will be assumed to be within the isochrone.¹

¹This allows for factors such as one-way streets which may change the drive-time depending on direction of travel.

6. In the case of an existing store or a developed site the start point for the drive-time calculation should be the point where the site accesses the road network.² The location of the end point should also be the point where the store or site accesses the road network. In the case of an undeveloped site, where there is more than one realistic potential entrance or exit, the drive-time will be calculated from each of the potential entrances or exits. If a store is within a 10-minute drive-time of any of the potential entrances or exits it will be assumed to be within the isochrone.

²Where there is an access road to the site or store, the site entrance should be taken as the point where the access road reaches the road network. Where there are different entrances and exits to the site or store the direction of travel should be taken into account to decide which to use.