North West Cambridge Retail Transport Study

Final Report

June 2010

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List of Abbreviations

CCC	Cambridgeshire County Council
CCRG	Cambridgeshire County Research Group
CO_2	Carbon dioxide
CSRM	Cambridge Sub-Regional Model
DfT	Department for Transport
GFA	Gross Floor Area (measured in square metres)
NLP	Nathaniel Lichfield and Partners
NWC	North-West Cambridge (consisting of University, NIAB, NIAB Extra and Orchard Park sites)
PCA	Primary Catchment Area (as defined in the SRS)
PCU	Passenger Car Unit
RFA	Retail Floor Area (measured in square metres)
SCA	Secondary Catchment Area (as defined in the SRS)
SCDC	South Cambridgeshire District Council
SOLUTIONS	Sustainability Of Land Use and Transport In Outer Neighbourhoods
SRS	Supplementary Retail Study
TIF	Transport Innovation Fund
TRICS	Trip Rate Information Computer System
WebTAG	Web-based Transport Analysis Guidance

Glossary

Base case	The "starting position" for modelling. In this study, the base year is 2008 and the base case includes everything that had been built by that year (roads, houses, etc.).
CSRM	The Cambridge Sub-Regional Model is a transport and land use interaction model that was originally built for the TIF study according to the latest DfT guidelines. It has a base year of 2006 and forecast years of 2011, 2016, 2021, 2026 and 2031, with the predicted interim/complete states of all developments fed into each forecast year.
Generalised cost	Generalised cost is a combination of travel time and distance, expressed as a monetary cost in pence based on DfT valuations of the cost of time for personal travel as well as fuel and non-fuel elements of travel costs.
Gravity model	In transport modelling, a gravity model provides a means of distributing trips between origins and destinations, based on the 'production potential' of origins, the attractiveness of destinations, and the cost of travelling between the two. As its name suggests, it is based on an analogy with the law of gravity in physics, whereby the gravitational 'pull' of an object decreases with distance from it, and is dependent on the size of the object. In the context of this study, the 'production potential' of origins describes the number of households and their propensity to go shopping in the study area; the attractiveness of destinations is based on the store size; and the cost of travel is expressed in generalised cost (see above).
Major food store	A food store of 2800 m^2 GFA or more.
Minor food store	A food store of less than 2800 m^2 GFA.
Mode share	Mode share describes the proportion of trips travelling by each mode of transport. For example, the car mode share is the proportion of trips that are made by car.
Pass-by trip	A pass-by trip is one that is made en route between two other places. For example, somebody might call in at a supermarket on their way home from work. These trips in themselves do not cause additional traffic to enter the road network (although they may involve a detour).
PCU	Vehicular data from the SATURN models is in Passenger Car Units, 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.
Planned Development Only	This describes the future year scenario when only the development that is currently planned in NWC has been put in place. This is as opposed to the

	Test Scenarios, when additional food store floorspace is included to test the effects of these changes.
SATURN	The SATURN software suite is used for highway modelling. The models include roads, junctions and the traffic that uses them. In assigning vehicles to the highway network, it considers likely routing and takes congestion into account. Additional roads and traffic can be added to the model, and the resulting predicted change in traffic flows can be observed.
Transport Assessment	A Transport Assessment is a required part of the planning process for any commercial development with transport implications. It sets out the existing conditions of the site (including transport/access provision) and considers the impacts of the proposed development. Measures to improve travel in/to/from the proposed development are identified and refined in an iterative process, which may then result in conditions being placed on the planning approval to ensure that these measures are put into place.
TRICS	The TRICS database has been built up over many years, and contains traffic survey information from thousands of sites across the UK. These sites are categorised in detail according to their purpose – including supermarkets, offices, swimming pools, places of worship, etc. Within each purpose category, locations are also categorised (such as town centre, edge of town, rural, etc.) as well as different areas of the country (e.g. London, or the Scottish Highlands). For each site, rates of arrivals and departures are given by hour.
Trip cost distribution	The cost of a trip is calculated in terms of generalised cost (see previous page). The trip cost distribution is a graph that describes the spread of costs in the model. The peak of the graph represents the mode (average) cost, i.e. the most frequently observed trip cost.
Vehicle hours	This is the total number of hours that all vehicles spend travelling in the model.
Vehicle kilometres	This is the total number of kilometres that all vehicles travel in the model.

Executive Summary

Outline

The North West Cambridge Retail Transport Study was commissioned by Cambridgeshire County Council on behalf of Cambridge City Council and South Cambridgeshire District Council in response to emerging developer proposals for a major food store to be located in North West Cambridge (NWC). This study is designed to complement the Supplementary Retail Study (SRS), which has been investigating the potential for retail provision in terms of trading levels and viability, but not from a transport perspective.

The key requirements of the study have been to:

- Understand the transport implications arising from the location of a new major food store in one or more of the local centres, with reference to the wider City and South Cambridgeshire areas;
- Understand the ability of a new major food store in one or more of the main development sites to contain trips within NWC relative to a base of the small supermarkets currently envisaged in each local centre, consistent with current planning policy and;
- Produce a range of transport data outputs for each option including impacts on travel times, distances and carbon emissions.

The three development sites that make up NWC are known as the University site, the NIAB site (consisting of NIAB 1 and NIAB Extra) and Orchard Park. The proposals are that by the time the sites are fully developed in 2021 there may be a need for either a single large store of approximately 5,500 m^2 Gross Floor Area (GFA) located on one of these sites, or alternatively two smaller stores of approximately 3,000 m^2 GFA on two of the three sites. The purpose of this study has been to investigate the traffic impacts arising from food store provision in NWC in a number of different scenarios as summarised in the table below.

Scenario	University	NIAB	Orchard Park
Planned Development Only	Current Policy Provision Only	Current Policy Provision Only	Current Policy Provision Only
Test 1	5,500 m^2 store	Current Policy Provision Only	Current Policy Provision Only
Test 2	Current Policy Provision Only	5,500 m^2 store	Current Policy Provision Only
Test 3	Current Policy Provision Only	Current Policy Provision Only	5,500 m^2 store
Test 4	3,000 m^2 store	3,000 m^2 store	Current Policy Provision Only
Test 5	3,000 m^2 store	Current Policy Provision Only	3,000 m^2 store
Test 6	Current Policy Provision Only	3,000 m^2 store	3,000 m^2 store

In undertaking this work, a wide range of indicators have been considered including the ability of a store in NWC to source a large proportion of its custom from the immediate vicinity; the car and non-car mode shares of trips to a new store; the carbon impacts of a new store both locally and across the wider

Cambridge City and South Cambridgeshire areas; and the impacts on traffic delays at junctions in the area surrounding NWC.

Key Findings

At a wide geographical area (covering Cambridge City and South Cambridgeshire), the inclusion of additional new food store(s) in NWC results in an overall reduction in traffic impacts as indicated by carbon dioxide emissions and distance travelled. However, at a more localised level (NWC and its immediate surroundings), the traffic impacts are slightly worse; this is because the provision of a new store in NWC draws in traffic from the surrounding area causing an increase in delays and emissions as it converges on the new store, but in doing so it reduces travel distances and delays for many more wider trips and thus overall trip lengths and carbon impacts are reduced.

In terms of travel time and travel distance, stores in any of the locations are more accessible than the existing stores, and the introduction of one or more new stores leads to a bigger reduction in average travel times and distances across the whole modelled area. An analysis of the impacts on key junctions in the local area shows that the access points to each site are put under greater stress as a result of a new store and more detailed junction design work will be required to determine whether these impacts can be satisfactory mitigated.

The proposed mix and density of land use at each site is a key determinant in the relative performance of each test scenario; the University site has the highest density of proposed dwellings (owing in part to the provision of student accommodation), which enables a store on this site to have the lowest car mode share in comparison to the other scenarios tested. However, the non-car mode shares of trips to any of the proposed new stores in NWC are at least as high as those to the best existing stores (in terms of highest non-car mode shares), indicating high levels of walking and cycling trips to the proposed new stores. The test scenarios all measure the impacts of additional retail provision over and above the policy baseline, which varies across the different sites; however the University site has the smallest proportionate increase in retail provision and this contributes in a large part to tests with a store on the University site performing better.

Provision of a major new food store in NWC also allows a large proportion of food shopping trips to be internalised; the new store locations are all able to draw a high proportion of their custom from the local area, which contributes towards the higher share of non-car modes. New stores in any of the proposed locations also have the potential for intercepting “pass-by trips”, i.e. traffic which would have been travelling along Madingley Road, Huntingdon Road or Histon Road and which could link a shopping trip to another journey purpose. The stores located nearer to Huntingdon Road will tend to benefit most from this effect.

The analysis also shows that the test scenarios with two smaller stores perform better than those scenarios which consider a single larger store; stores on two sites achieve better mode share for non-car modes, attract their custom from a smaller area of influence and are able to provide a ‘local’ facility to a greater number of dwellings.

When considered from the perspective of a wider geographical area, the analysis of an additional major food store in North West Cambridge indicates that the scenario with two smaller stores on the University and NIAB sites performs better in transport terms, given the data gathered in the SRS. This is because the new stores are well located to maximise non-car mode shares, attract their custom from a smaller area of influence and are best placed to attract pass-by trips from Huntingdon Road.

Basis of Analysis

The transport modelling work has been carried out in the context of existing planning policy and the SRS, ensuring consistency with both and by using robust, validated models.

A bespoke retail gravity model was created for the purpose of this study, taking its input data from sources that have been used in the SRS and ensuring consistency with previous work. This model considers the

relative size and accessibility (in terms of travel distance and travel time) of existing convenience retail supermarkets and each proposed store, in order to determine the shopping trips that take place under each test scenario. The model was calibrated and validated against observed data from the SRS, prior to forecasting to 2021 assumptions (which include the addition of a major new food store in Northstowe).

Mode shares for major food shopping trips in Cambridge have been sourced from the SOLUTIONS study (a five year research programme which surveyed actual shopping trips in Cambridge), which provides a mode share for shopping trips according to shopping trip distances. The car-based shopping trips were then assigned to the road network in Cambridgeshire using the County Council's sub-regional land use and transportation model (known as CSRM), which has been constructed to latest DfT standards and guidelines for transport modelling. The 2021 forecasts of this model includes the full policy baseline land use assumptions for NWC, along with other background assumptions such as the A14 upgrade, major new developments such as Northstowe and other committed pipeline and expected developments. This provided a robust context for the traffic impacts of these retail tests to be assessed, and enabled the carbon impacts to be analysed taking into account road speeds and delays as well as the distance travelled.

1. Introduction

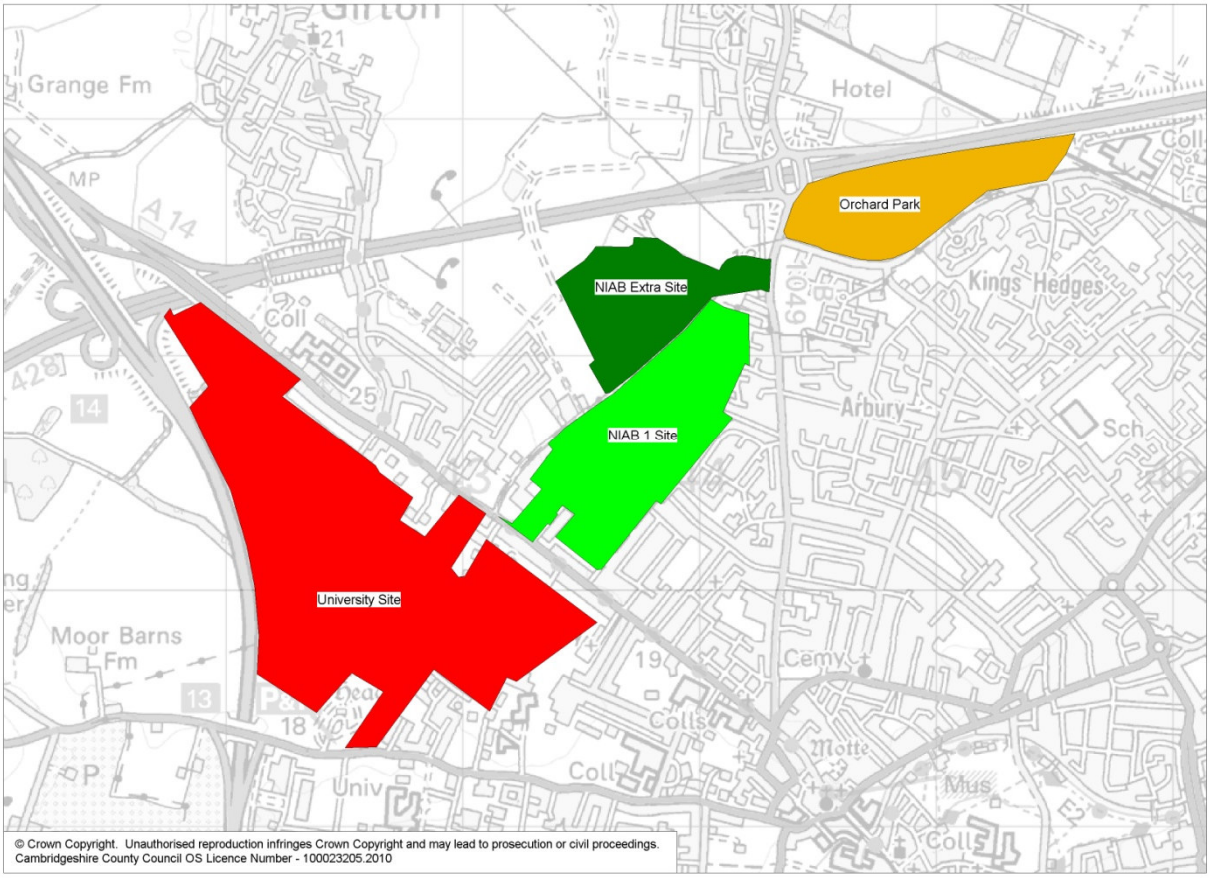
Background

1.1 Several large-scale developments are planned for the north-west quadrant of Cambridge, bringing thousands of homes and jobs to the area. The development of the North West quadrant of Cambridge is supported by planning policy as contained in:

- Cambridge Local Plan (2006) (policies saved in July 2009) – Policy 9/3 (Development in the Urban Extensions) and in relation to the NIAB site Policy 9/8 (Land between Huntingdon Road and Histon Road);
- South Cambridgeshire Local Development Framework – Core Strategy 2007 and Site Specific Policies Development Plan Document (DPD); and
- North West Cambridge Area Action Plan (2009), which covers the University Site.

1.2 North West Cambridge (NWC) is composed of developments at three main sites: the University site (between Madingley Road and Huntingdon Road), NIAB (between Huntingdon Road and Histon Road on the NIAB 1 and NIAB Extra sites) and Orchard Park (immediately east of Histon Road and south of the A14). These locations are shown in Figure 1.1.

Figure 1.1 – Development Site Locations



1.3 The nature and extent of development planned at each location is as follows:

- **The University Site** – a mixed-use development providing a new University quarter. This will provide approximately 3,000 dwellings with a priority on providing for University needs and approximately 2,000 units of student accommodation. There will also be academic facilities and associate research and development, and a local centre.
- **NIAB 1** – a new urban extension including housing and community facilities. The current plan is for 1,780 dwellings and a local centre including a primary school.
- **NIAB Extra** – this is allocated in the South Cambridgeshire District Council (SCDC) Site Specific Policies DPD. This will be a sustainable housing led urban extension of Cambridge, integrating with NIAB 1 and providing approximately 1,100 dwellings. A secondary school to serve the whole North West quadrant and a primary school will be provided within the development. An appropriate level of services, facilities and infrastructure will be provided either on the site or elsewhere in NW Cambridge, including local shopping and community facilities. It is likely that the local centre on the NIAB 1 site will be expanded to accommodate some of these facilities.
- **Orchard Park** – a permitted mixed use development of 900 dwellings with a local centre. A third of the housing is affordable and over half of the dwellings are now occupied. The SCDC Site Specific DPD provides for the change of some of the commercial parcels of land to residential which would result in approximately an additional 220 dwellings.

1.4 Local centres are planned for the main three sites – these will include an element of food store provision, but developer proposals have emerged for a major food store at one or more of the sites. A Supplementary Retail Study (SRS)[1] has been jointly commissioned by Cambridge City Council and South Cambridgeshire District Council (the Districts),in order to provide a more detailed retail planning evidence base for North West Cambridge to inform a view on the potential emerging proposals for food store development at one or more of the three proposed Local Centres. The SRS indicates that that all three locations have merit, with University and NIAB ranked similarly and Orchard Park ranked a close third. However, an assessment of the transport implications of the proposals was also needed to help inform the client team in making a judgement about the relative merits for locating one or more new convenience stores on one or more of these sites (if at all).

This Study

1.5 The purpose of this Retail Transport Study is to assess the transport and carbon implications arising from the inclusion of a major new convenience provision in NWC over and above existing allocations in policy as well as the case for no increase in provision (known as the Planned Development Only scenario). It has been commissioned by Cambridgeshire County Council (CCC) on behalf of the Districts.

1.6 The key requirements of the study are to:

- Understand the transport implications arising from the location of a new major food store in one or more of the local centres, with reference to the wider City and South Cambridgeshire area;
- Understand the ability of a new major food store in one or more of the main development sites to contain trips within NWC relative to a base of the small supermarkets currently envisaged in each local centre, consistent with planning policy and;
- Produce a range of transport data outputs for each option including impacts on travel times, distances and carbon emissions.

[1] North West Cambridge Supplementary Retail Study, Nathaniel Lichfield and Partners (NLP), February 2010

1.7 An important aspect of this study is that it should complement the SRS: for this reason, as far as has been possible, information from the SRS has been used as an input to this study. Data has been provided from the SRS by Nathaniel Lichfield and Partners (NLP) and The Cambridge Sub-Regional Retail Study 2008 undertaken by GVA Grimley This study has been carried out in conjunction with the client team and has benefited from inputs from the Officers of all three clients as well as direct contact with NLP.

1.8 The base year of this study is 2008, to tie in with the GVA Grimley interview data. The forecast year for this work is 2021; this was determined by the client team as the most appropriate forecasting horizon by which time all planned development at the sites was assumed to be complete. Details of the seven modelled scenarios (plus the base) which were provided by the client team can be found in Appendix A, including the number and average density of dwellings on each development site and the sizes of the proposed food stores in each scenario.

1.9 It is beyond the scope of this study to consider the phasing of any developments, or how any delays in other schemes (such as the A14 improvements) would impact on the forecast situation. However, phasing is discussed and considered in the "Further Work" section at the end of this report.

Structure of the Report

1.10 Following the Introduction, this report is structured as follows:

- Chapter 2 – Technical Approach – outlines the need for a Gravity Model, the construction and calibration of the Base Year Gravity Model and the forecasting to produce a detailed transport analysis;
- Chapter 3 – Gravity Model Forecasts – analyses the outputs from the Gravity Model across the whole study area and begins to build up a picture of which scenarios perform better than others;
- Chapter 4 – Cambridge Sub-Regional Model Forecasts – looks at the detailed transport outputs and draws together further analysis of the strengths and weaknesses of the different scenarios from a transport point of view; and
- Chapter 5 – Summary and Findings – collates the evidence from both the Gravity Model and the Cambridge Sub-Regional Model (CSRM), and considers how the different Tests perform against key planning objectives for development of the NWC quadrant.

1.11 In addition, Appendix A contains the detailed inputs to the forecasting information as provided by the clients.

2. Technical Approach

Introduction

2.1 This chapter discusses the availability of existing traffic and land use models and their suitability and limitations in relation to the transport modelling requirements for this study as the basis for developing a bespoke retail gravity model. It then sets out the basis of developing the Gravity Model and provides more details about the inputs and processes involved in using this model.

Applicability of Existing Models

2.2 The developers of each site have undertaken broad transport assessments of their developments as a whole, but there is insufficient detail in this modelling to allow full investigation of the retail options, and the modelling for the different developments has not been carried out in a consistent manner. Although transport modelling would be carried out for individual proposals (e.g. food stores, hotels, etc.) at each of the sites, this would be on a case-by-case basis and as such would not provide for a comparison to be made between the options being considered in the SRS and this study.

2.3 Strategic modelling was carried out by Atkins on behalf of CCC for input into the planning policy documents. Whilst this was useful in assessing the overall potential for development in the NWC area, it does not contain enough detail for this study. It has also been superseded by more recent and more detailed strategic modelling, described below (see paragraph 2.5).

2.4 The analysis that was carried out for the SRS was from a retail perspective, rather than a transport perspective: it was for this reason that a separate transport study was commissioned.

2.5 CCC has in its possession a transport and land use interaction model, which was built according to the latest DfT guidelines for the Transport Innovation Fund (TIF) bid and the A14 improvement scheme. This is known as the Cambridge Sub-Regional Model (CSRM). The transport highway network element of this model was built by Atkins using the SATURN software suite, while the land use element was constructed using bespoke software developed by WSP. The transport and land-use elements feed information back to each other and transport forecast outputs are available at five year intervals from 2006 (the base year) to 2031 inclusive. The basic road structure of the NWC developments as indicated in the planning policies and masterplans is included within the transport element of the model, with a 20mph speed limit for internal site roads in the NIAB and University sites. However, since the model encompasses much of Cambridgeshire, the representation of the NWC quadrant in land use terms is much less detailed. Consequently, there are several issues with using CSRM on its own for the purposes of this study:

- The development plots in NWC are in different CSRM transport zones but the model structure offers limited scope for modelling internalisation of trips within developments;
- The CSRM cannot readily model the effects of the precise location of stores within a transport zone;
- The CSRM land use zones are larger aggregations of the transport zones, and therefore allow even less precise location of developments within the model; and
- The CSRM also does not distinguish food shopping trips in isolation; these are encompassed within a general retail trip making function which includes non-food shopping trips. As a result, the number of shopping trips in the CSRM 2021 Planned Development Only scenario[2] in this study could be lower than would be expected if these developments were considered

[2] The Planned Development Only scenario describes the situation in 2021 as is currently envisaged in planning policy. See paragraph 3.2 for further details on the scenarios being tested in this study.

in isolation. This may mean that the localised base line levels of congestion may not be fully reflected and this would impact on the absolute results from the Test scenarios. Whilst acknowledging this, the performance of each Test *relative to each other and to the Planned Development Only scenario* is still valid for comparative purposes, and this limitation has been borne in mind during the analysis of results.

2.6 For these reasons, as well as a need to make best use of the SRS analysis and GVA Grimley survey data in this transport study, it was necessary to construct a bespoke retail Gravity Model which would be informed by both the wider predictions of land use and transport interaction from the CSRM, but which could in turn more accurately inform an assessment of the highway implications arising from the inclusion of a major new convenience store using the SATURN highway networks developed for CSRM. The following sections provide a more detailed explanation about the construction of the retail Gravity Model and how it interacts with CSRM.

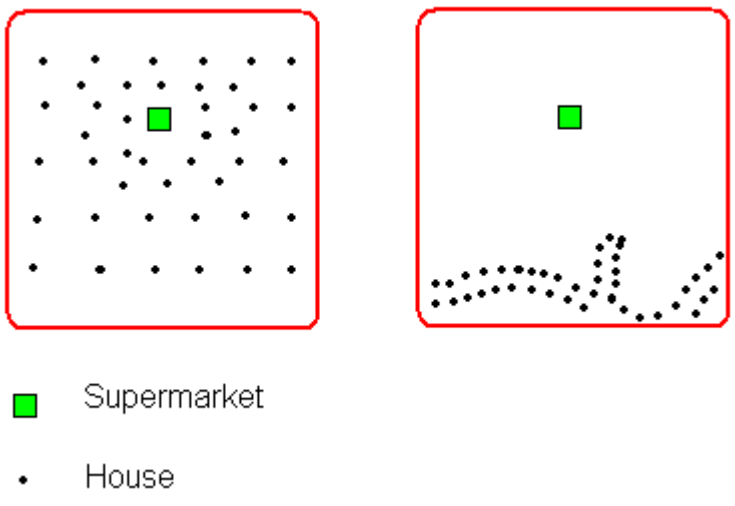
Gravity Model

2.7 As discussed in the previous section, none of the existing transportation models fulfils the requirements of this retail study. For this reason, a bespoke Gravity Model has been created, drawing information from the SRS and the CSRM wherever possible in order to create a consistent modelling base whilst also being able to provide outputs at the level of detail required by this study.

2.8 In transport modelling, a gravity model provides a means of distributing trips between origins and destinations, based on the 'production potential' of origins, the attractiveness of destinations, and the cost of travelling between the two. As its name suggests, it is based on an analogy with the law of gravity in physics, whereby the gravitational 'pull' of an object decreases with distance from it, and is dependent on the size of the object. In the context of this study, the 'production potential' of origins describes the number of households and their propensity to go shopping in the study area; the attractiveness of destinations is based on the store size; and the cost of travel is determined by a combination of the time and distance between the origin and destination.

2.9 The Gravity Model is built at an 'Address Point' level, giving a fine level of detail and enabling the model to differentiate between different store locations within the same development, and to represent the actual locations of dwellings in relation to stores. So, for example, if the red box in the diagrams below represents a CSRM zone, the two situations will be treated differently by the Gravity Model, whereas they would have been assumed to be the same in the CSRM. This finer level of detail allows the behaviour of the local trips to be more accurately assessed including the representation of mode choice.

Figure 2.1 – Illustration of Different Housing Distributions

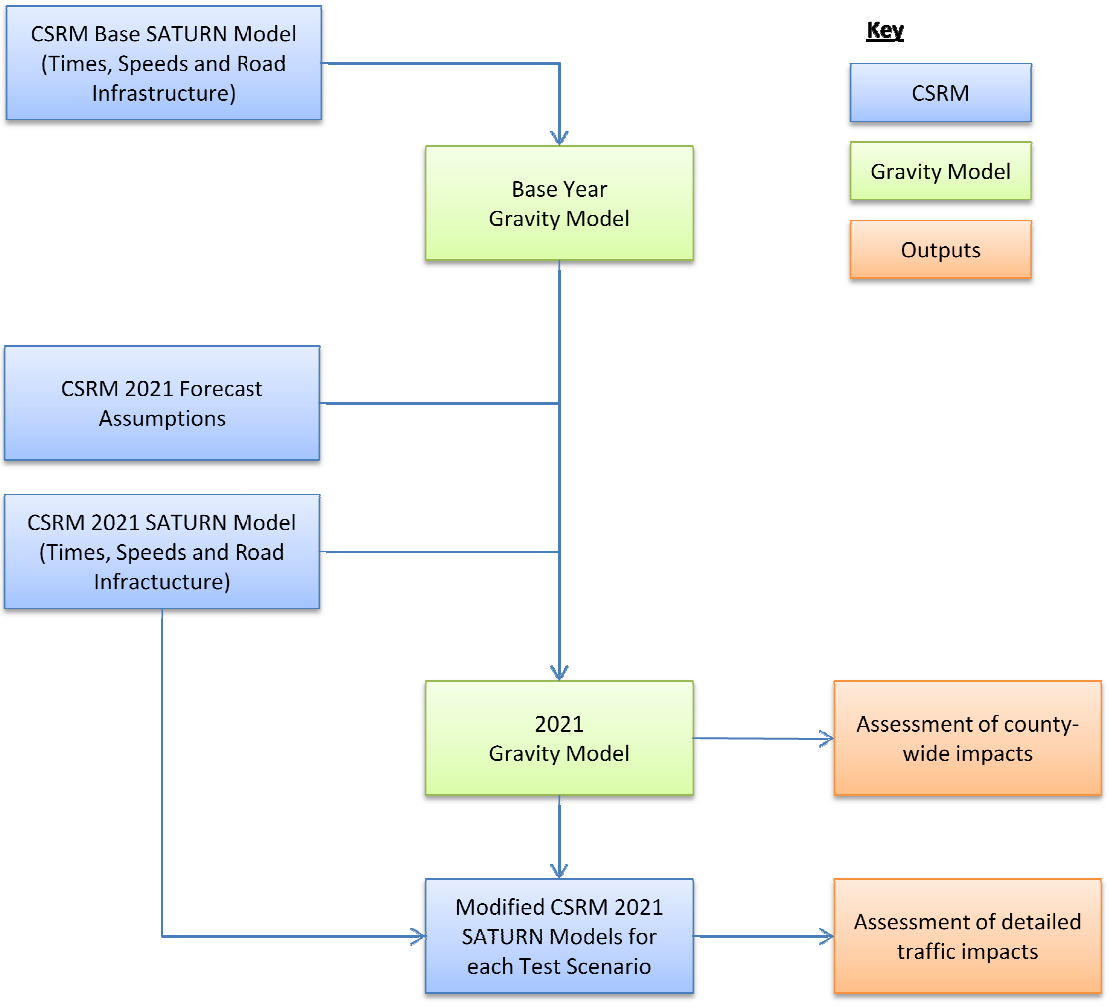


2.10 The Gravity Model was created and calibrated for the GVA Grimley survey base year (2008), and includes trips to all major food stores that the SRS determined to service the NWC area. (This list of stores can be found in paragraph 2.17.) The resulting catchment area of the Gravity Model can be found in Figure 2.4. Future year (2021) forecasts have been created by adding to the Gravity Model forecast dwellings across the whole study area and the new major food stores that are proposed to serve NWC under six scenarios.

2.11 In addition to the changes to the Gravity Model for the future year, inputs have been taken from the CSRM 2021 forecasts (including changes to the road network, growth in general traffic levels and major developments in other areas of the Cambridge Sub Region). For the purpose of this study, the CSRM forecasts have been updated by WSP on behalf of the client team to reflect the most up-to-date position with respect to the expected committed pipeline of developments in NWC. This includes information about dwellings, key worker accommodation, student accommodation, education (school pupils and employment of staff), research floorspace, retail floorspace and commercial floorspace. The details of this update (inputs and results) have been presented separately by WSP in their technical note "TN001 CSRM Updates for NW Cambridge ISSUED Rev 1.pdf", issued on 9th April 2010.

2.12 The detailed modelling outputs from the Gravity Model were then fed back into the 2021 CSRM (updated to reflect the latest development and infrastructure assumptions in NWC) in order to assess the wider traffic and carbon impacts of each scenario. The interactions between the CSRM and the Gravity Model, both in the base year and in the future year are illustrated in Figure 2.2.

Figure 2.2 – Flow Diagram showing CSRM and Gravity Model Interaction



Inputs and Assumptions

2.13 Table 2.1 lists the data that was gathered together for input into the Gravity Model, along with its source, any limitations noted and compatibility with the SRS and CSRM.

Table 2.1 – Input Data

Source	Description	Compatibility / Limitations
Ordnance Survey Address Points	The locations of all address points in Cambridgeshire	This provides a fine level of detail that can be aggregated for compatibility with both the SRS and CSRM.
2001 National Census, Table UV62	Households per ward, by car availability	Ward-level data is compatible with the CSRM and other forecasting data.
Cambridgeshire County Research Group (CCRG)	Population growth factors from 2001 to 2008, by ward	Ward-level data is compatible with the CSRM and other forecasting data.
GVA Grimley Household Survey interview data	Shopping pattern data: part of home postcode (e.g. CBx x), and usual destination for (i) main shopping and (ii) small-scale 'top-up' shopping	This very coarse data is not directly compatible with Ward boundaries or the CSRM, but has been converted to the Address Point level to give a 'smoothed' estimate of home addresses which can then be aggregated to Ward or CSRM level. **It should be noted that** this data has very low sample sizes[3], and that the survey does not reveal the shopping trip origin, or the frequency of main and top up shopping trips.
SRS (NLP)	Sizes of stores in m^2 GFA (except where unknown, when net has been converted to gross floor area based on a 65% net: gross ratio).	The list of stores included in the Gravity Model has been selected to ensure compatibility with the SRS.
TRICS database	Person trip rates for different categories of store	The categories of store have been taken from the SRS to maintain compatibility.
CSRM SATURN models	Time and distance values between each origin and destination for base and future years, along with corresponding generalised cost parameters	Perceived travel costs (in terms of Generalised Cost – see paragraph 2.21) in the Gravity Model maintain compatibility with the CSRM by using these inputs.
SOLUTIONS study[4]	Modal split information	For trips under 4.4 km in length, the modal split has been derived from the information provided; for trips longer than this, the car share has been assumed to stabilise at 98%.

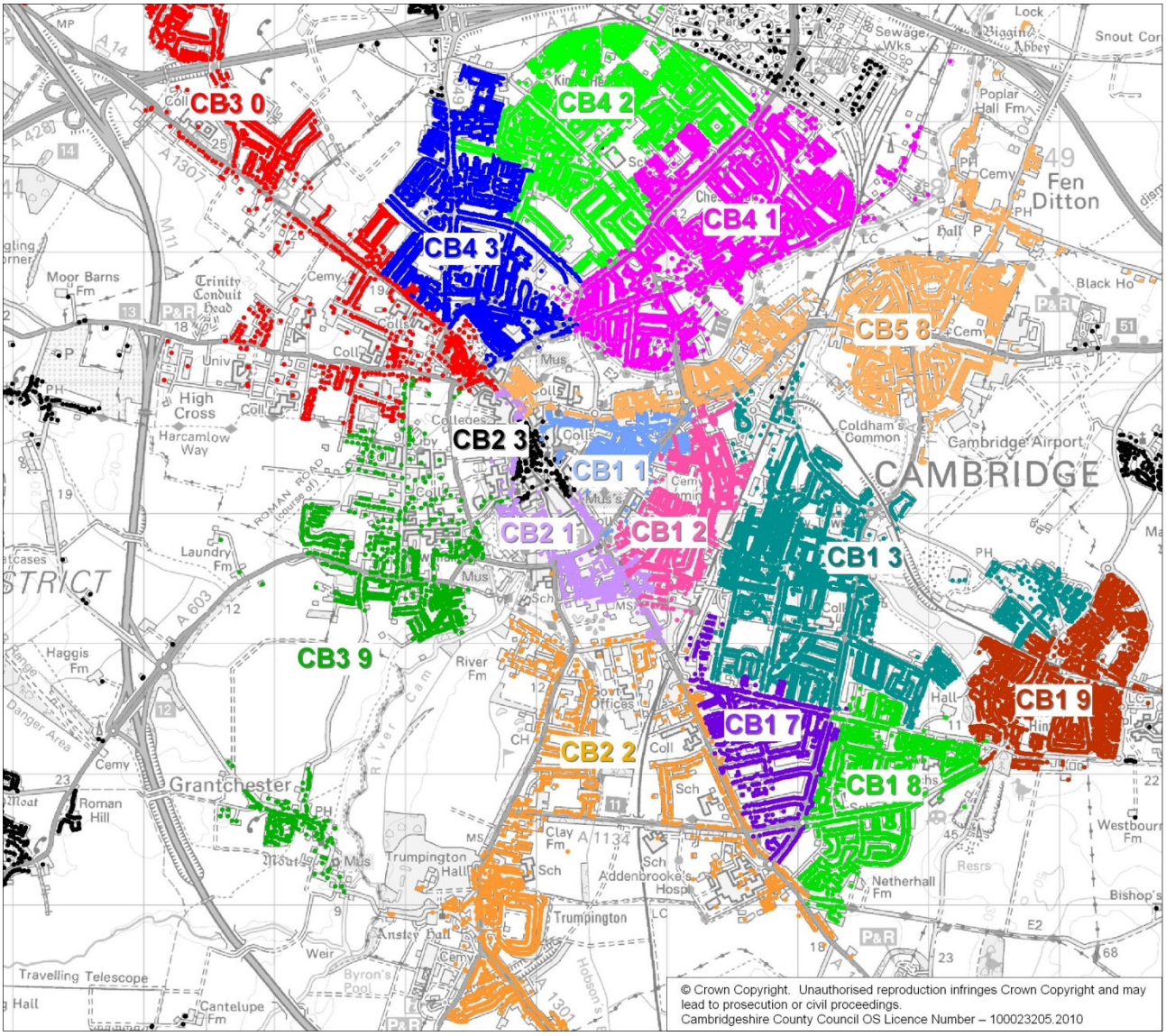
[3] The sample size of interviews to minor food stores within the SRS Primary Catchment Area was 42 in total, of which 32 originated within the SRS Secondary Catchment Area (with some of the remaining 10 interviews being from as far afield as Milton Keynes and Bury St Edmunds). The sample size of interviews to the major food stores that service NWC was 425, which reduced to 412 when the most extreme results were discarded. See paragraph 2.18 for details of these catchment areas.

[4] The SOLUTIONS (Sustainability Of Land Use and Transport In Outer Neighbourhoods) study was a five year research project conducted by academics from five universities, which focused on four cities – Cambridge, London, Tyne and Wear and Bristol. It was funded by the Engineering and Physical Research Council (EPSRC) with support from central and local authorities including Cambridgeshire County Council. http://www.suburbansolutions.ac.uk

Source	Description	Compatibility / Limitations
CSRM land-use model	2021 dwelling, by CSRM transport zone	CSRM transport zones are easily converted to wards to provide ward-level forecasting
The Districts	Detailed information about the locations of dwellings and stores proposed in NWC	Information was provided directly by the client team at the finest level of detail currently available, with information about relative densities of different parts of each development to enable estimation of 2021 Address Points

2.14 As indicated in Table 2.1, the GVA Grimley interview data only recorded part of the home postcode for each interview, which does not give a fine level of detail about the origin of shopping trips. Figure 2.3 below shows the Address Points within some of these postcode areas in Cambridge, giving an indication of the coarseness of the data.

Figure 2.3 – Postcode Areas in Cambridge



Details of the Gravity Model

2.15 As indicated above, the Gravity Model draws data from the SRS and feeds back into the CSRM, so compatibility with both models had to be maintained as closely as possible. Although the Gravity Model works at an address point level (which is finer in detail than either the SRS or the CSRM), its data ultimately has to be aggregated to CSRM zones, which are based closely on the ward structure of the county. Also, population estimates and forecasting are available at a ward level. For these reasons, the study area and any other aggregations made in the Gravity Model are based on wards, rather than the coarse postcode areas that were used in the SRS.

2.16 The Gravity Model concentrates on major food stores (greater than 2800m^2 GFA) only. The categorisation of different sizes of store is based on the breakdown used in Map 2: Catchment Area and Foodstores, Appendix 1 of the SRS: namely, Small stores are those up to 1000m^2 Retail Floor Area (RFA) (~1500m^2 GFA); Medium stores are 1000-2500m^2 RFA (~1500-2800m^2 GFA); Large stores are 2500-5000m^2 RFA (~2800-7700m^2 GFA); and Very Large stores are greater than 5000m^2 RFA (~7700m^2 GFA). Small and Medium stores are classified as 'minor'; Large and Very Large are 'major'. There are several reasons for not including minor stores in the Gravity Model:

- The minor stores (both existing and pipeline) are already included in the CSRM: this study needs only to investigate the traffic impact of increasing the size of one or more of these stores, or opening a new store, not the baseline impact of the minor store itself;
- The sample size of the GVA Grimley interview data to the minor stores in the SRS Primary Catchment Area is very small and does not provide a reliable basis for calibrating a Gravity Model of minor stores;
- The GVA Grimley interview data does not include any indication of the frequencies of 'main shop' or 'top-up shop';
- The GVA Grimley interview data gives only part of the home postcode and the shopping destination, not the actual origin of the trip: in practice, many 'top-up' shopping trips are combined with another journey (e.g. on the way home from work) and therefore should not be modelled as a full trip to and from their place of residence;
- The traffic impact of trips to minor stores is expected to be much less than for a major store because they are more dominated by localised trip making which are less reliant on cars and also because they have a greater propensity for 'pass-by' linked trips (the SOLUTIONS study found car mode share for top up shopping in Cambridge to be substantially less than for major food stores); and
- The SRS has already investigated the quantitative and qualitative need for additional main food store provision, so there is no need to repeat this analysis in the transport work.

Base Year Construction

Coverage of the Model

2.17 It was agreed with the client team that the following existing major food stores should be included within the Gravity Model:

- Bar Hill Tesco Extra;
- Milton Tesco;
- Newmarket Road (Cheddars Lane) Tesco;
- Cherry Hinton (Yarrow Road) Tesco;
- Beehive Asda;

- Coldham's Lane Sainsbury's;
- Trumpington Waitrose; and
- Cambourne Morrisons.

2.18 Milton Tesco is on the borderline between the major and minor food store categorisations: it was agreed that this store should be classified as 'major' due to its proximity to NWC and its behaviour as studied in the SRS. It is also relatively unusual for a store of this size to have a petrol station. In addition, Milton Tesco is known to be easily accessible and visible from the A14, but this is not represented in the GVA Grimley observed data since information about 'pass-by' trips cannot be derived from home postcodes.

2.19 The study area of the Gravity Model is defined as the wards from which at least 95% of the trips to these stores originate; this area covers most of Cambridgeshire, excluding 19 wards in the north and one in the south-west and this has been derived directly from the GVA Grimley survey data. This catchment of the Gravity Model is illustrated in Figure 2.4 (with the boundaries of the wards it is made up of), along with the Primary and Secondary Catchment Areas determined by the SRS.

Figure 2.4 – Study Catchment Area