Figure 4.1 – Cambridge Urban Area Definition

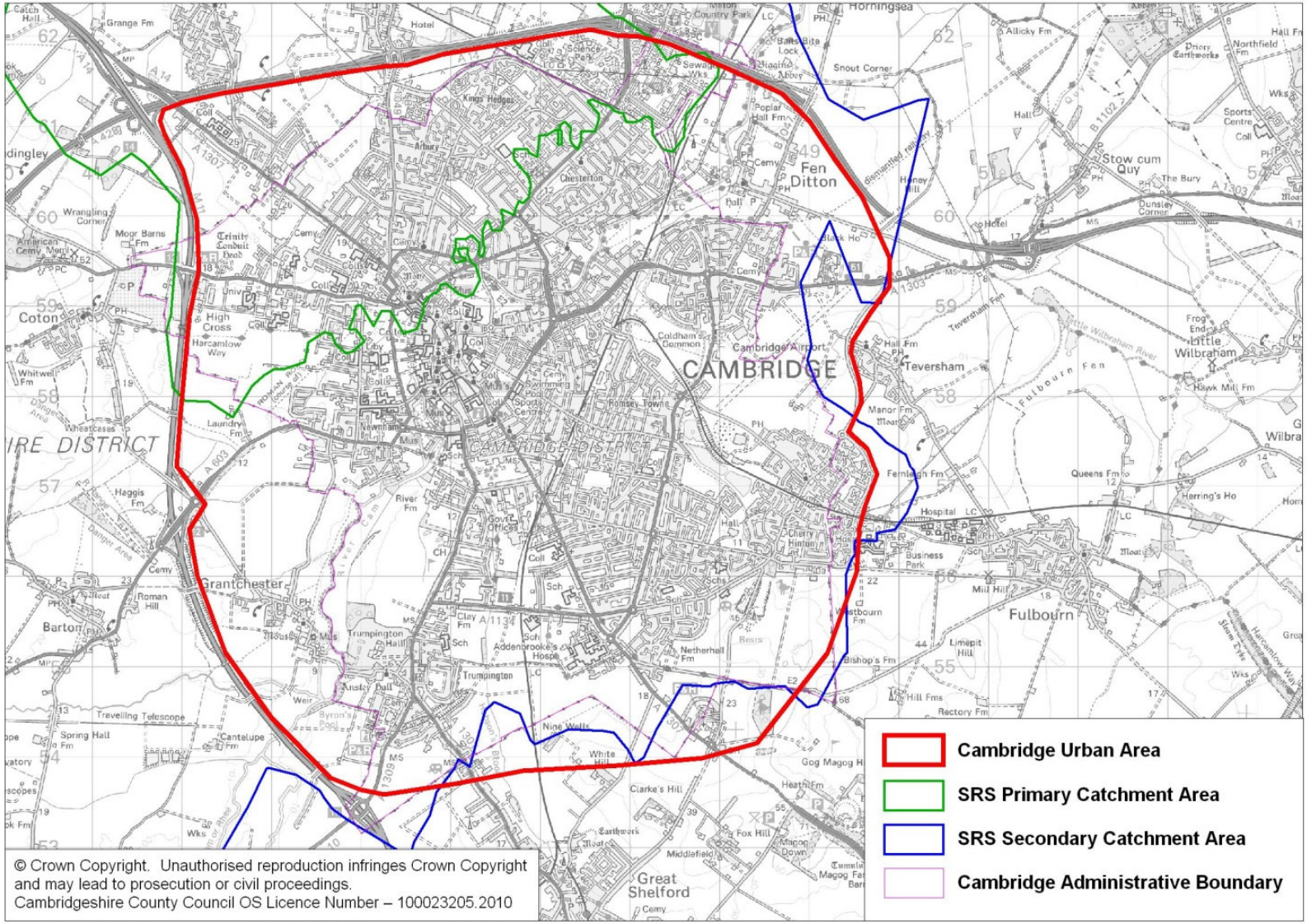


Table 4.1 – SATURN Model Statistics for SRS Primary Catchment Area (all vehicle trips)

	Planned Development Only	Percentage Change over Planned Development Only					
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
AM Peak 2021							
CO_2 Emissions – kilograms	13,909	100.12%	100.10%	100.10%	100.12%	100.05%	100.08%
Vehicle Kilometres	146,655	100.06%	100.03%	100.17%	100.01%	100.09%	100.02%
Vehicle Hours	3,148	100.41%	100.29%	99.91%	100.35%	99.89%	100.21%
Inter Peak 2021							
CO_2 Emissions – kilograms	10,935	100.30%	100.35%	100.52%	100.14%	100.22%	100.30%
Vehicle Kilometres	120,670	100.08%	100.20%	100.41%	100.01%	100.14%	100.22%
Vehicle Hours	2,088	100.91%	101.08%	100.92%	100.31%	100.46%	100.53%
PM Peak 2021							
CO_2 Emissions – kilograms	14,597	100.35%	100.32%	100.05%	99.88%	100.24%	100.33%
Vehicle Kilometres	148,991	100.04%	99.98%	100.33%	100.02%	100.11%	100.10%
Vehicle Hours	3,614	100.75%	101.27%	100.88%	100.84%	100.59%	100.79%
Annualised 12-hour 2021							
CO_2 Emissions – kilograms	36,110,536	100.28%	100.30%	100.31%	100.06%	100.19%	100.27%
Vehicle Kilometres	386,948,552	100.07%	100.11%	100.34%	100.01%	100.12%	100.15%
Vehicle Hours	7,696,321	100.76%	100.98%	100.71%	100.49%	100.39%	100.55%
Annualised 12-hour 2021 (actual differences)							
CO_2 Emissions – kilograms	-	102,184	106,864	112,600	22,090	70,145	96,328
Vehicle Kilometres	-	264,437	435,071	1,332,922	51,231	478,711	583,445
Vehicle Hours	-	58,702	75,793	54,564	37,469	29,970	42,254

Table 4.2 – SATURN Model Statistics for SRS Secondary Catchment Area (all vehicle trips)

	Planned Development Only	Percentage Change over Planned Development Only					
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
AM Peak 2021							
CO_2 Emissions – kilograms	50,500	100.10%	100.14%	100.07%	100.07%	100.09%	100.05%
Vehicle Kilometres	513,157	100.01%	100.01%	100.03%	99.98%	100.03%	99.99%
Vehicle Hours	11,038	99.92%	100.04%	100.07%	99.95%	99.83%	99.87%
Inter Peak 2021							
CO_2 Emissions – kilograms	39,389	99.94%	99.91%	99.96%	99.92%	99.93%	99.91%
Vehicle Kilometres	417,051	99.92%	99.91%	99.97%	99.91%	99.93%	99.92%
Vehicle Hours	7,517	100.02%	100.01%	99.98%	99.88%	99.91%	99.90%
PM Peak 2021							
CO_2 Emissions – kilograms	52,397	99.96%	99.79%	99.93%	99.80%	99.97%	100.06%
Vehicle Kilometres	529,655	99.93%	99.84%	100.00%	99.96%	99.96%	99.92%
Vehicle Hours	12,133	100.05%	100.12%	100.08%	100.11%	100.07%	100.06%
Annualised 12-hour 2021							
CO_2 Emissions – kilograms	130,140,008	99.97%	99.92%	99.97%	99.91%	99.97%	99.98%
Vehicle Kilometres	1,350,420,131	99.94%	99.91%	99.99%	99.94%	99.96%	99.93%
Vehicle Hours	26,964,552	100.01%	100.05%	100.03%	99.97%	99.95%	99.95%
Annualised 12-hour 2021 (actual differences)							
CO_2 Emissions – kilograms	-	-35,229	-100,270	-35,056	-113,125	-39,684	-27,607
Vehicle Kilometres	-	-852,523	-1,187,142	-139,894	-817,648	-573,784	-893,316
Vehicle Hours	-	2,180	14,035	8,586	-9,186	-14,445	-14,598

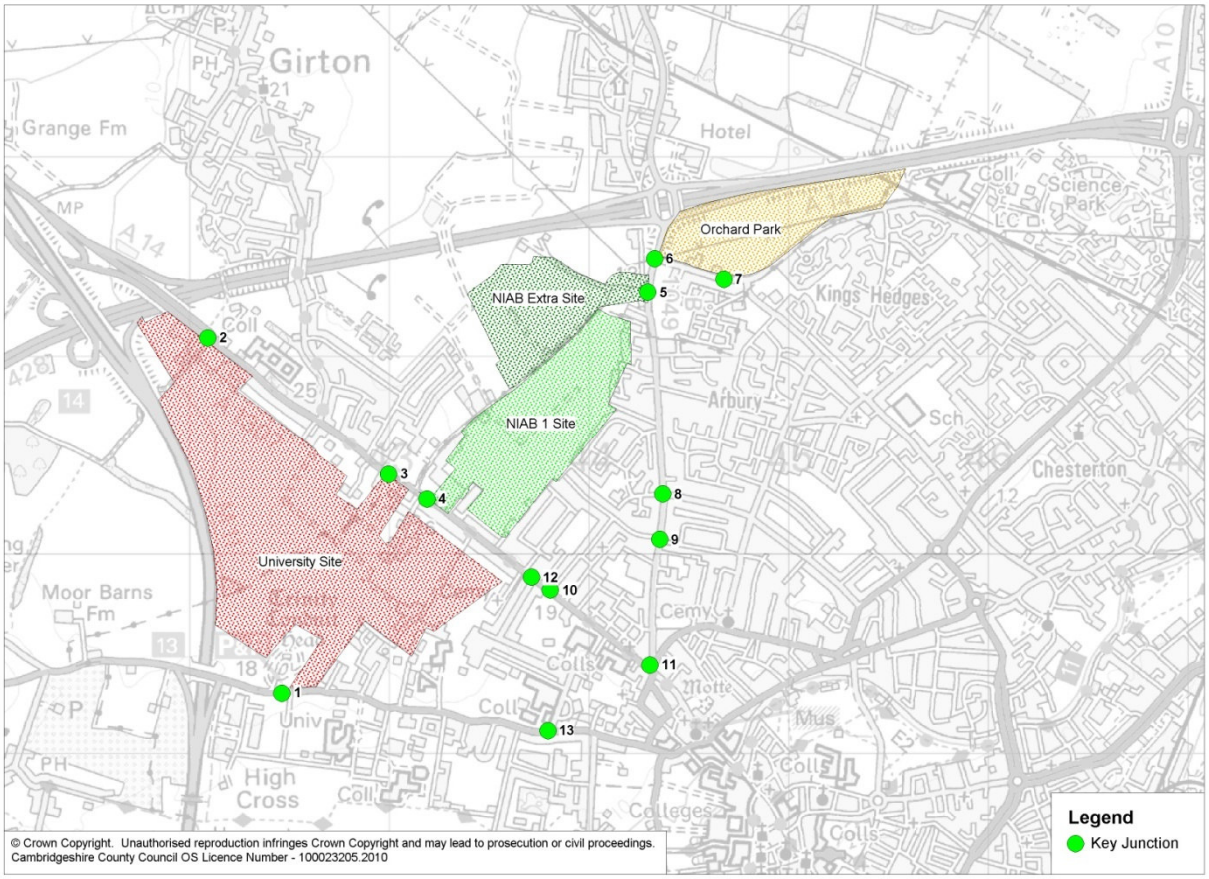
Table 4.3 – SATURN Model Statistics for Cambridge Urban Area (all vehicle trips)

	Planned Development Only	Percentage Change over Planned Development Only					
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
AM Peak 2021							
CO_2 Emissions – kilograms	14,014	99.88%	100.13%	100.23%	100.01%	99.88%	99.95%
Vehicle Kilometres	118,180	99.97%	100.02%	100.07%	99.99%	100.06%	100.06%
Vehicle Hours	4,751	99.87%	100.11%	100.04%	100.08%	99.61%	99.82%
Inter Peak 2021							
CO_2 Emissions – kilograms	8,962	99.77%	99.88%	99.86%	99.71%	99.72%	99.82%
Vehicle Kilometres	86,402	99.77%	100.03%	100.02%	99.78%	99.84%	99.93%
Vehicle Hours	2,953	100.02%	100.15%	99.90%	99.73%	99.75%	99.85%
PM Peak 2021							
CO_2 Emissions – kilograms	15,024	100.52%	100.16%	100.34%	100.16%	100.14%	100.26%
Vehicle Kilometres	120,308	99.88%	100.03%	100.27%	99.95%	100.00%	100.07%
Vehicle Hours	5,542	100.21%	100.54%	100.37%	100.34%	100.23%	100.38%
Annualised 12-hour 2021							
CO_2 Emissions – kilograms	32,940,541	100.03%	100.02%	100.09%	99.91%	99.88%	99.99%
Vehicle Kilometres	292,693,094	99.84%	100.03%	100.10%	99.87%	99.93%	100.00%
Vehicle Hours	11,321,441	100.05%	100.27%	100.09%	100.00%	99.88%	100.02%
Annualised 12-hour 2021 (actual differences)							
CO_2 Emissions – kilograms	-	8,543	6,196	28,063	-30,149	-38,114	-4,241
Vehicle Kilometres	-	-465,190	91,922	281,349	-380,592	-214,100	-12,966
Vehicle Hours	-	5,850	30,964	9,737	389	-13,340	2,779

Performance of Key Junctions

4.12 The total traffic delays (in seconds) at a selection of key junctions in the NWC area were monitored across all of the modelled scenarios. The locations of these key junctions are shown in Figure 4.2 with each number referencing the data presented in tables on the following pages.

Figure 4.2 – Key Junction Locations



4.13 Table 4.4 to Table 4.6 below present the delays per vehicle at each junction in each scenario for the AM Peak, Inter Peak and PM Peak hours. Numbers that are highlighted red indicate at least a 10% worsening than in the Planned Development Only scenario – this suggests a significantly negative impact on that junction. The delays shown in these tables are the average delay affecting each vehicle that passes through the junction.

4.14 The AM Peak shows very few junctions getting significantly worse, although Test 2 does cause delays at both entrances/exits to the NIAB site. In the Inter Peak hour, there is an increase of 10% or more in delays at the relevant site entrances/exits for all scenarios except Test 4. In the PM Peak, which has a much greater share of shopping trips than the AM Peak and when the network was already more congested than the Inter Peak, the significantly increased delays are more widespread, affecting junctions other than those directly related to the development sites, in all Tests except 4.

4.15 As expected, junctions at the access points to the development sites come under stress when a major food store is located on the site. This effect is greater in tests with a single large major food store than those with two smaller major food stores. These junction designs will therefore need considering in detail when Transport Assessments are developed for the sites.

4.16 However, some junctions not directly related to the development sites are also affected by the inclusion of major food stores in some of the tests. For example, the Histon Road / Gilbert Road

junction (labelled 8 in Figure 4.2) comes under significant additional stress in tests 2, 3, 5 and 6. Issues at existing junctions within the surrounding area would therefore also require further investigation in Transport Assessments for the developments.

4.17 It is also noted that the Planned Development Only model is already showing relatively large delays at the development site entrances/exits, due in part to the fact that these junction designs are only preliminary and will need to be refined. Comparison against the CSRM Base Year model suggests that other key junctions (apart from the three development site entrances/exits) are not adversely affected by the NWC developments in the Planned Development Only scenario.

4.18 Further modelling on the junctions should be carried out using specialist junction modelling software: these figures from SATURN are broadly indicative of the scale of any issues, but should not be used as the basis for junction design.

Table 4.4 – AM Peak Delays at Key Junctions (Seconds per PCU)

ID	Junction	Planned Development Only	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
1	Madingley Road / University site entrance	57.5	56.7	57.4	57.3	57.1	57.3	57.4
2	Huntingdon Road / northern University site entrance	43.6	44.5	36.7	38.5	43.5	39.1	42.5
3	Huntingdon Road / southern University site entrance	84.9	87.2	79.4	80.4	85.2	80.4	82.5
4	Huntingdon Road / NIAB entrance	41.3	42.1	51.4	36.8	46.3	38.9	44.2
5	Histon Road / NIAB entrance	87.4	87.0	99.3	83.0	91.0	84.9	91.3
6	Histon Road / Kings Hedges Road	29.0	28.8	28.9	29.3	28.7	29.1	29.4
7	Kings Hedges Road / Orchard Park entrance	2.6	2.6	2.6	2.8	2.6	2.7	2.7
8	Histon Road / Gilbert Road	29.7	30.6	29.6	29.6	29.8	30.0	29.8
9	Histon Road / Windsor Road	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10	Huntingdon Road / Oxford Road	2.9	3.0	2.9	2.9	2.9	2.9	2.9
11	Huntingdon Road / Histon Road / Victoria Road	78.9	78.4	78.2	78.5	77.8	78.5	78.4
12	Huntingdon Road / Storey's Way	3.8	3.8	3.8	3.8	3.8	3.8	3.7
13	Madingley Road / Storey's Way	3.6	3.5	3.6	3.6	3.7	3.6	3.6

Table 4.5 – Inter Peak Delays at Key Junctions (Seconds per PCU)

ID	Junction	Planned Development Only	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
1	Madingley Road / University site entrance	32.5	44.0	33.6	33.0	34.2	33.1	32.9
2	Huntingdon Road / northern University site entrance	17.6	19.3	17.1	17.4	17.5	17.5	17.0
3	Huntingdon Road / southern University site entrance	20.8	27.1	22.2	21.8	22.4	22.2	22.1
4	Huntingdon Road / NIAB entrance	2.5	2.6	3.1	2.5	2.7	2.5	2.7
5	Histon Road / NIAB entrance	27.3	27.1	33.9	28.7	29.6	27.4	29.9
6	Histon Road / Kings Hedges Road	24.1	24.1	24.4	25.7	24.1	24.9	25.0
7	Kings Hedges Road / Orchard Park entrance	1.6	1.6	1.5	2.0	1.6	1.8	1.8
8	Histon Road / Gilbert Road	16.5	16.9	16.4	17.0	16.5	16.8	16.7
9	Histon Road / Windsor Road	1.8	1.9	1.8	1.9	1.9	1.9	1.9
10	Huntingdon Road / Oxford Road	2.3	2.4	2.3	2.4	2.3	2.3	2.3
11	Huntingdon Road / Histon Road / Victoria Road	64.4	65.3	65.0	64.8	65.2	65.2	64.9
12	Huntingdon Road / Storey's Way	2.7	2.8	2.9	2.8	2.8	2.8	2.8
13	Madingley Road / Storey's Way	2.0	2.1	2.1	2.0	2.1	2.0	2.1

Table 4.6 – PM Peak Delays at Key Junctions (Seconds per PCU)

ID	Junction	Planned Development Only	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
1	Madingley Road / University site entrance	46.2	48.2	48.2	48.4	48.2	48.3	48.1
2	Huntingdon Road / northern University site entrance	22.4	29.0	21.9	23.0	23.1	23.1	22.0
3	Huntingdon Road / southern University site entrance	81.9	99.0	77.4	81.3	87.0	89.7	80.4
4	Huntingdon Road / NIAB entrance	8.3	8.3	31.0	9.6	16.0	9.5	15.2
5	Histon Road / NIAB entrance	51.4	51.3	68.7	52.1	56.0	53.9	56.4
6	Histon Road / Kings Hedges Road	23.4	23.6	24.9	26.6	23.4	25.2	25.6
7	Kings Hedges Road / Orchard Park entrance	1.6	1.6	1.6	2.1	1.6	1.9	1.8
8	Histon Road / Gilbert Road	39.7	40.2	43.6	46.7	39.6	44.4	44.4
9	Histon Road / Windsor Road	2.2	2.2	2.1	2.2	2.2	2.2	2.2
10	Huntingdon Road / Oxford Road	4.3	5.1	4.5	5.3	4.5	5.1	4.7
11	Huntingdon Road / Histon Road / Victoria Road	64.7	65.4	65.5	64.7	64.6	65.2	64.1
12	Huntingdon Road / Storey's Way	9.1	9.6	9.6	9.3	9.7	8.7	9.2
13	Madingley Road / Storey's Way	2.8	2.7	2.9	2.8	2.8	2.8	2.8

Analysis of Pass-By Trips

4.19 The potential for each new store to attract pass-by trips has been investigated by considering the volume of traffic in the CSRM Planned Development Only SATURN model using the radial route(s) closest to the store, and the length of the detour required to visit a new store. The traffic volumes are shown in Table 4.7, and the distance from each store to the radial routes is shown in Table 4.8 (as measured from maps provided in the policy documents and masterplans). This information has then been used to rank the stores in terms of 'pass-by potential', by looking at each store in turn and weighting the annualised 12-hour two-way flow on the relevant radials according to the distance of the store from that route. For tests with two stores, the pass-by potential of these two stores was combined. The results of this exercise are shown in Table 4.9.

4.20 Unsurprisingly, the Tests that include stores in two locations have greater pass-by potential than single stores, since the total amount of traffic passing the two sites is always greater than the amount passing a single site.

4.21 The radial route with the highest flow is Huntingdon Road: this road is also closest to store locations A and B. Histon Road has the next highest radial flow, but the driving distance to any of the stores is much higher from this route (see Table 4.8). Madingley Road, whilst having the lowest flow, provides more convenient access to Store A than Histon Road does to any location. These factors lead to the rankings provided in Table 4.9, suggesting that Test 4 provides the solution with the highest potential for intercepting pass-by trips.

Table 4.7 – Two-Way PCU Flows on Radial Routes in Planned Development Only Model

Radial Route	AM Peak	Inter Peak	PM Peak	Annualised 12-hour
Madingley Road	1388	966	1808	3,620,584
Huntingdon Road	2158	1685	2306	4,574,298
Histon Road	2366	1540	2092	4,170,036

Table 4.8 – Approximate Road Distance from Stores to Adjacent Radial Routes

Radial Route	Store A	Store B	Store C2
Madingley Road	625m	-	-
Huntingdon Road	610m	510m	-
Histon Road	-	1240m	850m

Table 4.9 – Pass-By Potential of Stores

Test Scenario	Store Location(s)	Pass-By Potential Ranking
Test 1	A	4
Test 2	B	5
Test 3	C2	6
Test 4	A and B	1
Test 5	A and C2	2
Test 6	B and C2	3

4.22 This pass-by analysis has not been able to consider the visibility of a store from the main road since there is no data to support any hypothesis. However, if this could be incorporated then the pass-by potential of store location C2 (Orchard Park) would improve, since this location is likely to be the only one easily visible from a radial route. This would warrant further investigation if other evidence also supports a major food store on this site.

Summary of the CSRM Forecasts

4.23 In summary, the CSRM forecast outputs have been used to:

- Assess the transport impacts of these various tests in terms of the changes to travel time, distance and CO_2 emissions across the SRS Primary and Secondary Catchment Areas, showing that the inclusion of a new store is beneficial at the wider catchment area level although it does cause localised disbenefits within the NWC area;
- Analyse the effects of each Test on the performance of a selection of key junctions in the immediate vicinity and further afield, showing that the impacts are mostly small with a few exceptions which would certainly warrant further investigation if a new major store were to be built in NWC; and
- Compare the potential of each store location to maximise pass-by trips and thus reduce its vehicular impact, by considering the predicted traffic volumes along the radial routes passing close to each store.

5. Summary and Findings

5.1 The results given in Chapters 3 and 4 presented the impacts of each Test scenario from different perspectives, using both results extracted directly from the Gravity Model and those analysed using the CSRM SATURN model. This Chapter draws together those results and also analyses them from a qualitative point of view.

Summary

Travel Distance and CO_2 emissions

5.2 In terms of the average trip generalised costs, the trend is that all the Tests perform better than the Planned Development Only situation. This suggests that any major food store situated in NWC would overall have a beneficial effect over the whole of the Gravity Model catchment area. The CO_2 emissions across the SRS Secondary Catchment Area decrease in every Test scenario, particularly Tests 2 and 4.

5.3 In the SRS Primary Catchment Area, the CO_2 emissions increase in all Tests, with the smallest increase in Test 4. However, there are clear benefits to the residents of NWC in providing a larger store (or stores) than the Planned Development Only situation. The average trip costs to the NWC store(s) are lower than the Planned Development Only average cost. The non-car mode shares achieved, especially by store location A (the University site), are better than the Planned Development Only scenario because a large proportion of trips to the new stores originate from the local area.

5.4 It is worth bearing in mind when considering these results that the calibrated Gravity Model is known to underestimate the number of low-cost trips in the Base Year, and therefore this will have been carried through to the Future Year scenarios meaning that in practice, each test should perform slightly better than forecast.

Key Junctions

5.5 Delays at some of the key junctions are increased, but never by more than 25 seconds. In tests with two stores (Tests 4, 5 and 6), the increase in delay is never more than 8 seconds at any key junction. Impacts are more profound and widespread in the PM peak, however, reflecting the typical spread of main shopping trips throughout a day.

5.6 These impacts on key junctions (both those that form accesses to the development sites and existing junctions in the nearby area) will require further investigation as part of the Transport Assessments for the developments, with any mitigating measures to be funded by the developers.

Mode Share and Potential for Pass By and Linked Trips

5.7 Splitting the retail provision over two sites (Tests 4, 5 and 6) improves the potential for non-car journeys to be made. It also increases the amount of traffic passing close to the stores, thus improving the pass-by potential of these Test scenarios and reducing the vehicular impact of a major new food store.

5.8 In terms of mode share and pass-by potential, Test 4 (store locations A and B in combination) performs the best. If a single store is to be provided, then Test 1 (store location A) gives the best results.

Other

5.9 This modelling has not been able to take account of any brand loyalty or personal choice, since no empirical survey data on shopper preferences in the GVA Grimley survey is available. However, it

is noted that a potential advantage in providing two smaller stores (as in Tests 4, 5 or 6), rather than a single larger store, would be that more choice in brand could be made available.

5.10 It is also noted that the Planned Development Only situation includes a varying degree of retail provision at each location, with a much larger amount at the University site than at Orchard Park. Therefore, for example, the impact of a 5500 m^2 GFA store at the University site is dampened (as it represents an increase of only 3000 m^2 GFA) relative to the Orchard Park site (an increase of 4542 m^2 GFA). Table A.10 shows the increase in food store provision over the Planned Development Only scenario in each Test.

Qualitative Discussion

5.11 The Districts have developed a number of objectives[8] for NWC to guide development of planning policy and decision making. Principal amongst these (for this transport study) are the following objectives:

- 3. To minimise carbon dioxide emissions and to make the best use of energy and other natural resources, by being an exemplar of sustainable living.
- 6. To maximise walking, cycling and public transport use and to achieve a modal split of no more than 40% of trips to work by car (excluding car passengers).
- 10. To create sustainable communities with an appropriate provision of shopping and services in appropriate locations, to serve the new and existing population, and reduce the need to travel overall, particularly by car.

5.12 An assessment of the tests in terms of how they perform with respect to these objectives is provided in Table 5.1 below. For each of the three objectives, each Test is ranked on a 5-point scale from -2 to +2, where -2 is a strong negative effect, 0 is neutral, and +2 is a strong positive effect. This provides the basis for understanding in a wider sense, how each of the tests delivers against the outcomes demanded for NWC by the Districts.

Table 5.1 – Analysis of Tests by Key NWC Transport Objectives

Scenario	3. Minimise CO_2	6. Maximise non-car mode share	10. Reduce need to travel by car (internalisation)
Planned Development Only	0	0	0
Test 1	+1	+2	+2
Test 2	+2	+1	+2
Test 3	+1	+1	+1
Test 4	+2	+2	+2
Test 5	+1	+2	+2
Test 6	+1	+1	+1

5.13 This assessment ranks Test 4 first place according to these three objectives, across the SRS Secondary Catchment Area. Other indicators have also broadly supported Test 4, re-enforcing this conclusion. This table also contains no adverse impacts, which shows that, against these three objectives, all of the Test scenarios are an improvement over the Planned Development Only scenario.

[8] NWC Options Report

Findings

5.14 Overall, in terms of transport impacts, this modelling suggests that two stores of 3000 m^2 GFA provided on the University and NIAB sites would serve the residents of NWC better than a single 5500 m^2 store or no major food store at all. However, any store provision will draw in some extra traffic to the area, which will have an impact on the carbon emissions and junction delays nearby.

5.15 At the level of the Cambridge Urban Area, the differences between the two-store tests (Tests 4, 5, and 6) and the single store tests (Tests 1, 2 and 3) are more distinguishable: in CO_2 terms, the two-store tests are beneficial whereas the single store tests give disbenefits. This is caused by the higher non-car mode shares achieved by two smaller stores, which itself is due partly to the dual location being 'local' to a greater number of dwellings, and partly due to the reduced overall catchment area because smaller stores have a smaller 'gravitational pull'.

5.16 In terms of the three key objectives (CO_2, mode share and internalisation), Test 4 performs better than the other tests in comparison to the Planned Development Only Scenario. This Test also has the greatest potential for intercepting pass-by trips and has the least impact on the performance of key junctions in the area (which will also reduce the likelihood of localised junction 'hotspots' of emissions where queues build up).

5.17 Of the three tests with two smaller major food stores rather than one larger one, the order of preference appears to be: Test 4, Test 5, Test 6. However, as indicated in paragraph 5.10 and Table A.10, out of these three tests Test 4 has the least additional food store floorspace and Test 6 has the most, and this is a key determinant in why Test 4 has the least impact in transport terms over the Planned Development Only scenario. In addition to this, Test 4 also has the largest amount of population close to the stores (due in part to the student accommodation on the University site).

5.18 The Planned Development Only scenario provides no major food stores in NWC. This has disadvantages for the local residents, in causing them to travel further for their shopping, but has other advantages since the Test scenarios all lead to some increases in carbon emissions within the SRS Primary Catchment Area. At a wider level, extra food store provision in NWC is generally beneficial to residents of Cambridge City and South Cambridgeshire.

5.19 Finally, the SRS carried out by NLP prior to this study concludes that one superstore or two large supermarkets are the most appropriate form of main food store provision within the planned local centres to meet the food store needs of North West Cambridge at 2021. The study reached its conclusions by assessing the qualitative and quantitative need for additional convenience retail provision and did not take into account other factors such as transport impacts when considering the nature and scale of food store provision required. This study has shown that two smaller stores are preferable in terms of their comparative transport impacts. It should be noted that these findings are based on the data inputs and assumptions outlined in Chapter 2 of this Report and that issues such as brand loyalty and personal shopping preferences will have an impact on the transport impacts of a new food store in NWC but it is not possible to include these more subjective determinants in transport modelling.

Further Work

Phasing

5.20 This study has considered the impacts of major food stores against a backdrop of the final situation of the developments, in 2021. This therefore assumes that all dwellings and other infrastructure (including that unrelated to NWC) are complete when a major food store is added. If, in reality, a major food store were to be opened earlier than 2021, then there could be further

transport implications. These would need investigating as part of the Transport Assessment for any specific proposals.

5.21 The dwellings density around each store has been shown to impact upon that store's mode shares and average trip costs – i.e. Test 4 showed lower average trip costs and lower car mode shares for the new stores because they were located on the University and NIAB sites, accessible by a higher number of people than any of the other tests. If a new store were to be opened before the dwellings were complete, then it is possible that it could draw in trade from a wider catchment area, (and thus the average cost and car mode share for travel to that store would be higher). However, there would likely be a reduced level of trip generation until at least the remainder of the dwellings were in place which may off-set this.

5.22 The CSRM 2021 models include other developments and infrastructure around the County, as well as NWC. These may also be in different stages of development in the years leading up to 2021 and this could further impact upon the performance of the Test scenarios in earlier years. For example, the A14 improvements are assumed to be in place by 2021 and would significantly impact upon the cost of travel to Bar Hill Tesco Extra, but if they were not in place then the results of the Test scenarios would be different (as Bar Hill Tesco Extra would be a less attractive alternative).

5.23 Any planning application for a major food store on these development sites would therefore need to consider the implications of phasing in its Transport Assessment. This could involve further modelling work, as required.

Junction Designs

5.24 As was noted previously in this report, the designs of access junctions to and from the three development sites have not yet been finalised and those included in the modelling are only early proposals. This study has shown that some of the site access junction designs would require improvement before a major food store could be included – these issues would need to be considered in the Transport Assessments for those sites. These junctions also experience significant delays in the Planned Development Only scenario, and require further assessment whether or not a major food store is to be added.

5.25 In addition, some of the Test scenarios indicated that existing junctions may also require improvement as a result of the inclusion of a major food store. Transport Assessments for the development sites would therefore need to consider the wider area, as mitigation measures may be required further afield.

Appendix A – Modelled Scenarios

A.1 The Dwelling Scenarios

A.1.1 There are two Future Year dwellings scenarios, arising from the variations in location of dwellings and retail that will occur at Orchard Park if a large store is included at this site. These are as defined in the information passed to Atkins by the Districts: Option 1 has dwellings by the B1049 and a local centre by the A14 (store location C1); Option 2 has dwellings by the A14 and a food store and local centre by the B1049 (store location C2). This reflects a planning permission for a local centre by the A14. However, if a major food store were provided at Orchard Park, it would be located on the corner site with the local centre moving to locate with it.

A.1.2 The total increase in the number of dwellings assumed on each site up to 2021 is given in Table A.1. This information was provided by CCC on behalf of the Districts in a document entitled "NW Cambridge land use figures – for transport work.doc", e-mailed on 4th March 2010. The number of units of student accommodation was received via WSP, as listed in their technical note "TN001 CSRM Updates for NW Cambridge ISSUED.pdf" received on 30th March 2010.

A.1.3 It is noted that some of the dwellings at Orchard Park have already been built, so the modelling work (both the CSRM and the Gravity Model) adds the necessary amount of development to reach this total.

Table A.1 – Dwelling Assumptions

Site	No. of Dwellings	Average dwelling density over whole development site (Dwellings per Hectare)
University	3,000 + 2,405 student accommodation[9]	41
NIAB 1	1,780	35
NIAB Extra	1,100	38
Orchard Park	1,120	35

A.1.4 Assumptions on the locations and spread of the dwellings have also been provided by the Districts; where detailed information was available (for example, the dwellings that have already been built at Orchard Park), this has been used. Elsewhere, dwellings have been located using a uniform distribution according to the specified density. The average densities provided in Table A.1 above are broad indications which have been calculated by dividing the total number of dwellings per development site by the size of the development site. This gives only a broad indication of the dwelling density achieved; the actual densities vary across different parts of the development sites as indicated by the masterplans provided to this study.

A.2 The Retail Scenarios

A.2.1 The tables below describe the store provision on each of the three main sites assumed in each scenario. Store sizes are given in Gross Floor Area (GFA). Table A.10 summarises this information in terms of the amount of extra food store floorspace that is provided in each Test over the Planned Development Only scenario. Note that although the extra trips generated by each food store are calculated on the basis of this additional floorspace, the full size of the store is included within the Gravity Model so that its 'gravitational pull' is representative of its total size. A detailed map showing each development site and the proposed store locations (A, B, C1 and C2) is provided at the end of this appendix.

[9] Since the modelling work for this study was carried out, a discrepancy has been noticed in this data: the correct number of units of student accommodation should have been 2,000. The additional 405 units in the CSRM (referenced in WSP's technical note) are elsewhere in the land use zone, not in NWC. The effects of this error have been considered throughout the commentary in this report.

Table A.2 – NWC Retail Provision in the Base (2008) Scenario

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	0	0	0
Store Location	-	-	-
Orchard Park Dwellings Scenario	Base		

Table A.3 – NWC Additional Retail Provision in Planned Development Only (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	2500	1800	958
Store Location	A	B	C1
Orchard Park Dwellings Scenario	Option 1		

Table A.4 – NWC Additional Retail Provision in Test 1 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	5500	1800	958
Store Location	A	B	C1
Orchard Park Dwellings Scenario	Option 1		

Table A.5 – NWC Additional Retail Provision in Test 2 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	2500	5500	958
Store Location	A	B	C1
Orchard Park Dwellings Scenario	Option 1		

Table A.6 – NWC Additional Retail Provision in Test 3 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	2500	1800	5500
Store Location	A	B	C2
Orchard Park Dwellings Scenario	Option 2		

Table A.7 – NWC Additional Retail Provision in Test 4 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	3000	3000	958
Store Location	A	B	C1
Orchard Park Dwellings Scenario	Option 1		

Table A.8 – NWC Additional Retail Provision in Test 5 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	3000	1800	3000
Store Location	A	B	C2
Orchard Park Dwellings Scenario	Option 2		

Table A.9 – NWC Additional Retail Provision in Test 6 (2021) over Base (2008)

	University	*NIAB*	*Orchard Park*
Store Size (GFA m^2)	2500	3000	3000
Store Location	A	B	C2
Orchard Park Dwellings Scenario	Option 2		

Table A.10 – Net Increase in Food Store Provision over Planned Development Only Scenario

Test Scenario	Additional m^2 GFA
Test 1	3000
Test 2	3700
Test 3	4542
Test 4	1700
Test 5	2542
Test 6	3242

Figure A.1 – Development Map