Broadmarsh Redevelopment **03/03/2015**

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2016 TURNING POINT SOUTH SCHEME ASSESSMENT



Nottingham City Council

SYSTRA

BROADMARSH REDEVELOPMENT

2016 TURNING POINT SOUTH SCHEME ASSESSMENT

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1. INTRODUCTION

1.1 Study Background

1.1.1 SYSTRA Ltd was commissioned by Nottingham City Council to assess the strategic impact of the Turning Point South scheme using the Greater Nottingham Transport Model.

1.1.2 The Turning Point South scheme is one element of the larger Southside Transport Strategy and provides the highway and public transport infrastructure changes necessary to redevelop the Broadmarsh area which a key priority of the City Council. The package of highway and public transport measures are designed to complement the redevelopment proposals for the Broadmarsh area.

1.1.3 Full details of the Turning Point South Scheme are provided in Chapter 2, however central to the proposals is the closure of Collin Street to provide major pedestrian and public realm enhancements. Canal Street would be transformed into a two-way bus and taxi route with displaced highway traffic expected to move onto the southern relief route. Major highway works at several affected junctions are proposed and reallocation of bus stops and services from Collin Street onto Canal Street would occur. The proposals also include the recently approved Nottingham Skills Hub and the creation of a new NET stop on Middle Hill.

1.1.4 This report focuses on the strategic highway and public transport impact of the Turning Point South Scheme in terms of changes to traffic flows, junction congestion, journey times and car park usage.

1.2 Overview of GNTM

1.2.1 The GNTM is a multi-modal model covering the Nottingham HMA area. The model represents the City of Nottingham and covers the southern areas of Nottinghamshire, and northern parts of Nottinghamshire up to, and including Hucknall. It also extends into East Derbyshire and covers Erewash.

1.2.2 The GNTM has the following principal characteristics:

- 2008 Base Year;
- Development distributions and growth founded on a TRIC's based trip end model and internal gravity model;
- Cube Variable Demand Model which includes destination and mode choice demand responses only;
- SATURN highway model; and,
- Cube Voyager Public Transport Model.

1.2.3 GNTM is a dynamic model and has the capability of reflecting the direct and indirect impact of developments and highway infrastructure schemes. It can take account of changes which affect mode share, such as NET Phase II, and changes which affect traffic routing within Nottingham, such as the A453 widening.

1.3 Modelling Methodology

1.3.1 The assessment of Turning Point South scheme was undertaken in four stages. The initial stage of the study (Stage 1) involved creating a 2016 Reference Case which represented current assumptions on 2016 land use and infrastructure schemes. The contents of the Reference Case were agreed with Nottingham City and detailed in the SYSTRA note *'TN01 - Development of 2016 Reference Case v1.1'* (August 2014).

1.3.2 Stage 2 of the study involved creating a 2016 'With Scheme' scenario which contained the full Turning Point South proposals, including the traffic generations associated with the Nottingham Skills Hub. As the proposals incorporate a new NET station, the Greater Nottingham Transport Model was run in its entirety to generate public transport impacts. The assumptions included in this scenario were agreed with the client team at a meeting on the 26th November 2014.

1.3.3 The strategic traffic flows from Stage 2 were provided to BWB for inputs into the detailed modelling. This allowed the 'With Scheme' proposals to be refined and tested in an additional highway-only modelling iteration during Stage 3. This stage was divided into two parts; Stage 3a examined the changes to the design of several key junctions whilst Stage 3b assessed the impact of a revised Maid Marian Way (Arndale) car park access strategy and amendments to the exit points from the Eastcroft depot. Stage 3 outputs are discussed in Chapters 5 and 6.

1.3.4 Stage 4 was a highway only sensitivity test assessing the strategic impacts of the Turning Point South and Connecting Eastside Phase II schemes. The scenario was based on Stage 3a. The strategic traffic flows from Stage 4 were provided to BWB for inputs into the detailed modelling. This allowed the Connecting Eastside proposals to be refined and tested in an additional highway-only modelling iteration during Stage 5.

1.3.5 The purpose of the Stage 6 sensitivity test was to review how Nottingham City Centre car parks are modelled in GNTM and, where necessary, adjust the model so that it better represents actual car park use characteristics. An overview of the Stage 6 test, along with model outputs, is presented in Chapter 9.

1.3.6 The following time periods are reported in this report:

- Morning Peak (08:00 - 09:00); and,
- Evening Peak (17:00 – 18:00).

1.4 Structure of Report

1.4.1 The remainder of this report is structured in the following way:

- Chapter 2: Scheme Overview
- Chapter 3: Stage 2 - Impacts on Highway Network
- Chapter 4: Stage 2 - Impact on Public Transport
- Chapter 5: Stage 3a Modelling Iteration
- Chapter 6: Stage 3b Modelling Iteration
- Chapter 7: Stage 4 Connecting Eastside Sensitivity Testing
- Chapter 8: Stage 5 Refined Connecting Eastside Sensitivity Test
- Chapter 9: Stage 6 Car Park Sensitivity Test
- Chapter 10: Conclusions

2. SCHEME OVERVIEW

2.1 Introduction

2.1.1 This chapter provides an overview of the Turning Point South proposals modelled in Stage 2. It provides details of the elements included in the strategic modelling. Plans of proposed changes are included in Appendix A.

2.2 Proposed Highway Arrangements

2.2.1 Key highway elements of the Turning Point South scheme are:

- Closure of Collin Street from Maid Marian Way to Middle Hill to enable full pedestrianisation;
- Canal Street restricted to buses and taxis only between Maid Marian Way and Middle Hill (two-way bus and taxi travel permitted);
- Maid Marian Way realignment to provide an improved alternative route between Maid Marian Way and the Southern Relief Route for through traffic, including an all movement junction with Canal Street;
- Canal Street/Carrington Street Junction simplification;
- Canal Street/Middle Hill all movements junction;
- Relocation of Broadmarsh Car Park access/egress relocated to Middle Hill; and,
- Upgrade of London Road/Queen's Road and Queen's Drive/Waterway Street West junctions along the Southern Relief Route.

2.3 Proposed Public Transport Arrangements

2.3.1 Key public transport elements of the Turning Point South scheme include:

- Re-routing of public transport services currently using Collin Street onto Canal Street. Services affected include:
  - Navy Line;
  - Green Line;
  - Turquoise Line;
  - Citylink 1 and Citylink 2;
  - Rushcliffe Greens;
  - Indigo/I4; and,
  - Cotgrave, Keyworth and Ruddington Connections.
- New Nottingham Express Transit (NET) Station adjacent to Middle Hill served by 16 trams per hour in each direction.

2.4 Nottingham College Hub Assumptions

2.4.1 The Stage 2 scenario also includes the new Nottingham Skills Hub which has recently been awarded funding and is planned to be constructed on land next to Canal Street and Middle Hill.

2.4.2 The new site is expected to generate an additional 1,426 students and is expected to be built by 2016. The person and vehicle generations associated with the Skills Hub have been derived using TRIC's trip rates and are presented in Table 1. TRICs outputs are contained in Appendix B.

Table 1. Nottingham Skills Hub – Traffic Generations

	AM		PM	
	In	Out	In	Out
Person Generations	512	24	44	98
Highway Generations	402	19	32	66
Public Transport Mode Share	24%		32%	

2.4.3 The Skills Hub is not part of the Reference Case and is only included in the modelling for Stages 2, 3 and 4.

3. STAGE 2 IMPACT ON HIGHWAY NETWORK

3.1 Overview

3.1.1 This section presents the strategic highway impact of the Turning Point South scheme. Outputs have been compared against the 2016 Reference Case, which includes all known committed developments and infrastructure schemes expected to be in place by 2016.

3.1.2 This section provides a summary of:

- Changes in highway trips going to and through Nottingham City Centre;
- Changes in traffic flows;
- Changes in junction congestion (as indicated by Volume/Capacity Ratio);
- Impact on car journey times; and,
- Changes in use of Broadmarsh and Maid Marian Way (Arndale) Car Parks.

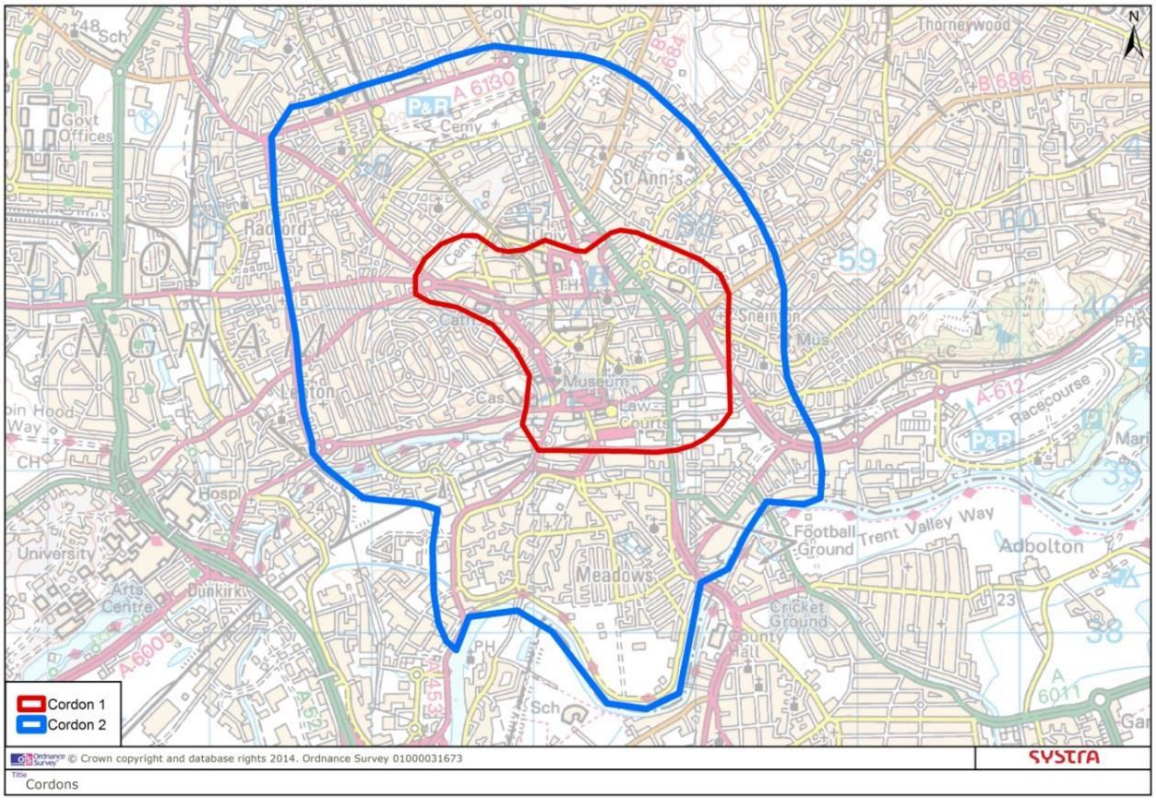
3.2 Highway Trips

3.2.1 A fundamental part of the Turning Point South scheme is the removal of east/west traffic movements through the Broadmarsh area. A change of this magnitude is likely to have significant impacts on the total number of vehicles passing through the city. Table 2 presents the highway trips going into and through the city centre in both the Reference Case and Stage 2 With Scheme scenarios. These have been generated by producing two cordons of the SATURN highway model; one covering purely the city centre (Cordon 1) and one which includes the city centre and peripheral areas (Cordon 2). The cordon areas are shown in Figure 1.

Table 2. Cordoned Highway Trips (vehicles)

	MORNING PEAK			EVENING PEAK		
	Ref	Stage 2	Change	Ref	Stage 2	Change
Cordon 1	13,888	13,297	-591	14,090	13,568	-521
Cordon 2	22,781	22,718	-63	23,875	23,635	-240

Figure 1. Cordon Extents



3.2.2 Table 2 shows that there is a significant reduction in traffic passing through Cordon 1 in both peak hours. This reduction reflects the fewer route options which exist with the proposed scheme in place. Cordon 2, which covers a wider area, also shows a reduction in vehicles.

3.2.3 Since GNTM is a dynamic model it is capable of modelling changes to routing, mode and destination choice. The majority of traffic moving away from Canal Street and Collin Street find alternative routes within the extent of Cordon 2. The small reduction in traffic passing through Cordon 2 indicates that some vehicles divert onto longer routes outside Cordon 2 or change their destination. Total highway trips across the full modelled area remain relatively constant between the scenarios, suggesting there is no significant shift from highway to public transport.

3.3 Traffic Flows

3.3.1 Figure 2 and Figure 3 present the impact of the Turning Point South scheme on traffic flows. Increases in flow are represented by red lines whilst reductions in flow are shown as blue lines.

3.3.2 The Southern Relief Route is forecast to become the primary alternative route for traffic travelling west-east (or east-west) across the city. However, not all displaced traffic can use this road due to congestion and capacity issues at the London Road/Queens Road junction and Wilford Road/Waterway Street West junction in both peaks. A number of alternative roads to the south of this, through West Bridgford in particular, are forecast to experience increases in traffic as a result of this congestion at the London Road/Queens Road junction.

3.3.3 In both peaks, there is forecast to be increases in traffic through the Meadows, despite the convoluted route and presence of traffic restraints. This is due to the capacity constraints at junctions either end of the Southern Relief Route. This capacity issue will be examined in further detail during Stage 3a however further traffic management through the Meadows may be required to deter routing through the area.

3.3.4 For traffic travelling to or from the north, the closure of Collin Street results in traffic moving away from Maid Marian Way and onto several alternative roads in the northern and eastern parts of the city centre.

3.3.5 In both peaks, the Turning Point South scheme is forecast to result in a significant reduction in traffic flow along the following roads:

- Castle Boulevard;
- Canal Street (east of Middle Hill junction);
- Maid Marian Way; and,
- Middle Hill (north of Collin Street).

and an increase in traffic along the following routes:

- Southern Relief Route (Queens Road and Queens Drive);
- Castle Bridge Road;
- Gregory Boulvard;
- A6008; and,
- Forest Road.

3.3.6 An increase in traffic is also shown eastbound along Canal Street in both peaks. This is an increase in bus traffic and reflects the reallocation of this road to a bus only route which permits bus travel in both directions.

3.3.7 Appendix C contains Reference Case and Stage 2 traffic flows, along with the changes in flows, at a number of key points in the vicinity of Broadmarsh. This can be useful for quantifying the impact of the scheme in terms of traffic flow changes.

Figure 2. Change in Traffic Flow Reference v Stage 2 – Morning Peak

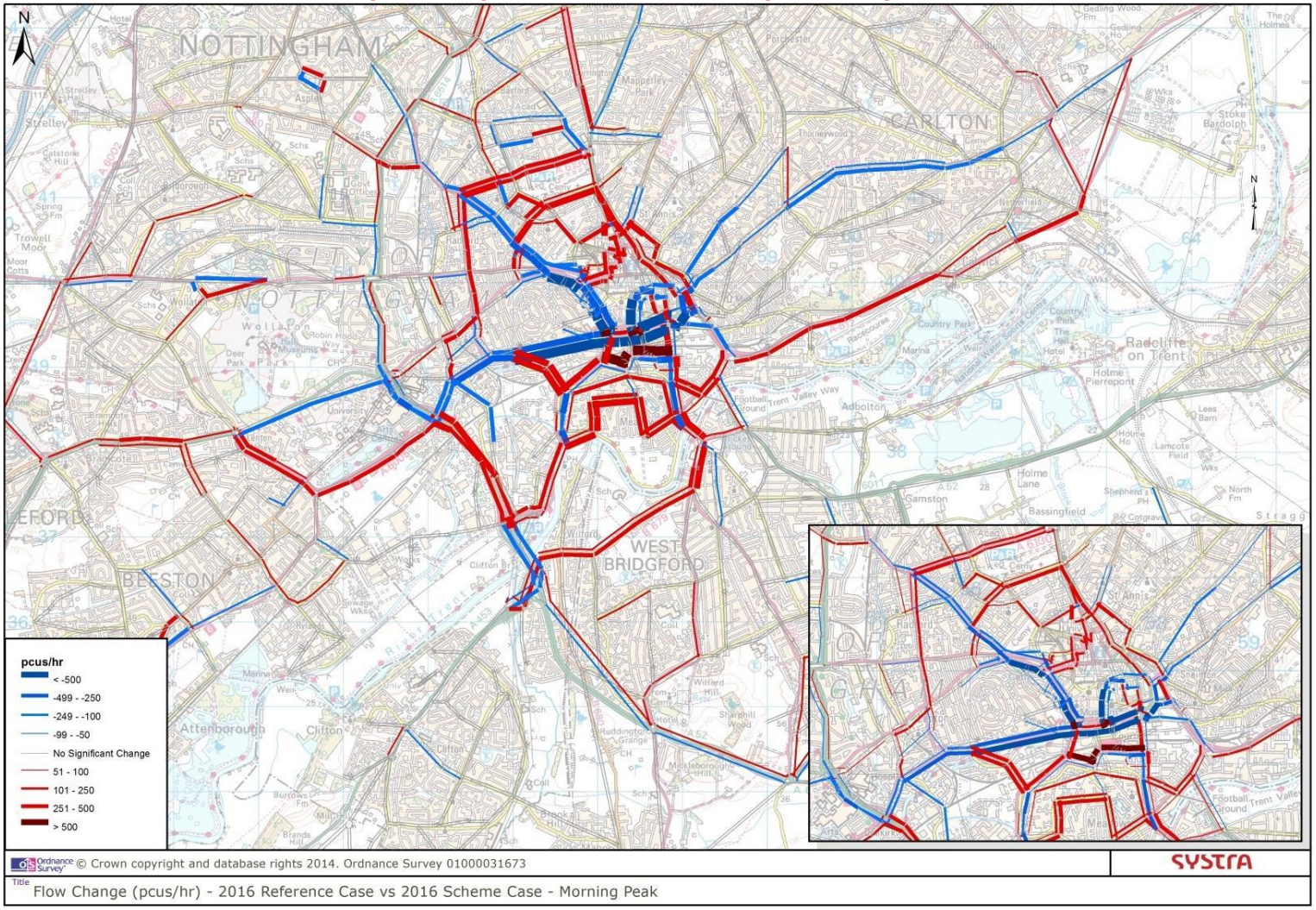
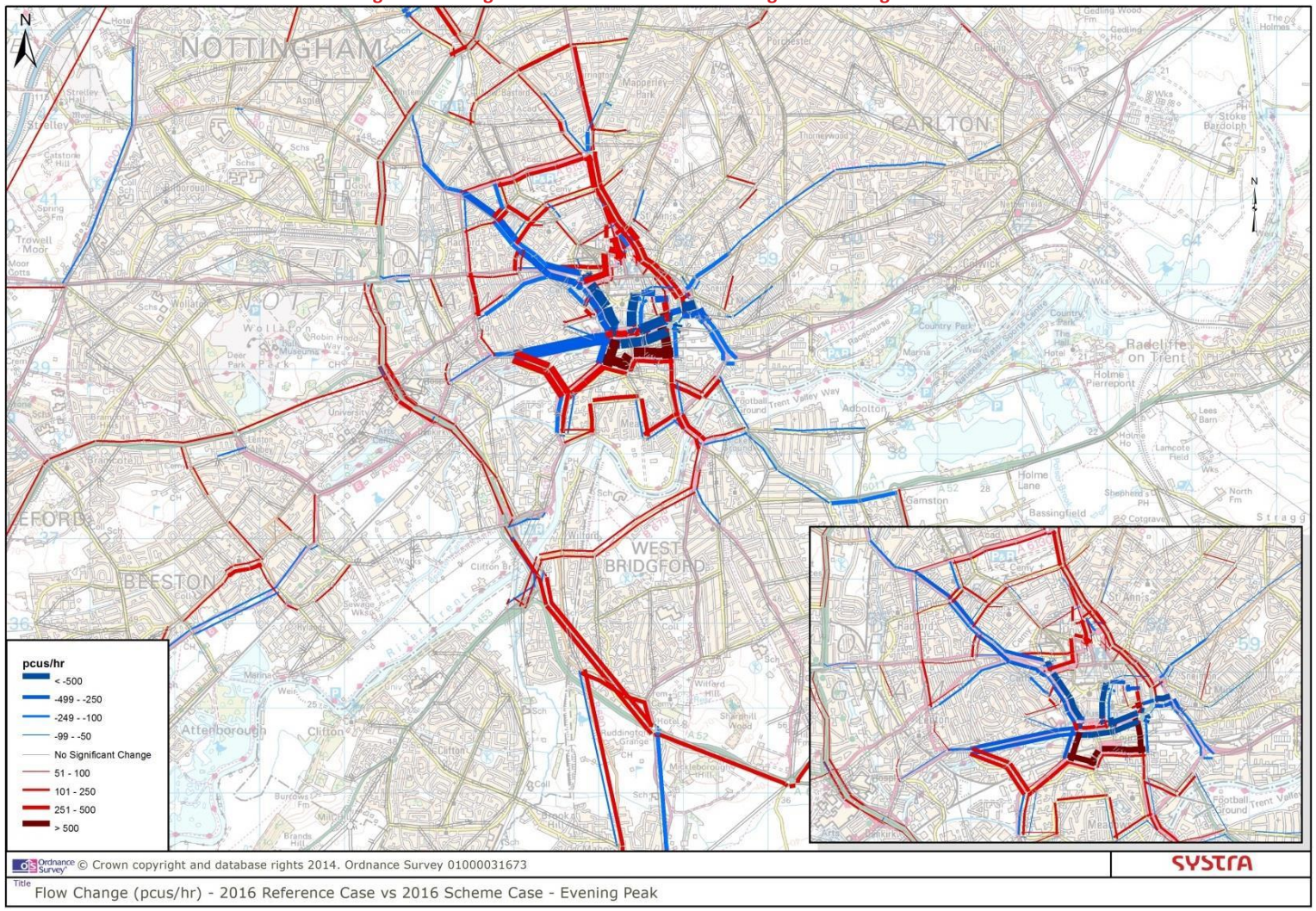


Figure 3. Change in Traffic Flow Reference v Stage 2 – Evening Peak



3.4 Junction Congestion

3.4.1 Junction congestion is measured by determining the ratio of the volume of traffic using a junction, to the capacity of traffic that can be accommodated by the junction. A Volume to Capacity (V/C) percentage of 85% is considered to be the threshold at which the junction is approaching its effective operational capacity, therefore increasing the likelihood of operational problems including congestion and associated delays and queues. A V/C percentage of 100% indicates that the junction is operating above its theoretical maximum capacity.

3.4.2 The following plots (Figure 4 and Figure 5) present the changes in V/C at junctions on the highway network. The plots show changes in congestion at junctions which are already congested in the Reference Case and also at junctions which are pushed over 85% V/C due to the scheme. Therefore, junctions with V/C ratio of greater than 85% have not necessarily been caused by the proposed scheme - existing capacity constraints at these points could be the source of these problems. The V/C ratio for each junction presents the turning movement with the highest V/C value at that particular junction.

3.4.3 Several key junctions near to Broadmarsh are forecast to experience an increase in congestion with the scheme in place. These include:

- Wilford Road/Queens Drive/Waterway St West;
- Queens Drive/Castle Bridge Road;
- Clastle Bridge Road/Castle Boulevard;
- Wilford Street/Castle Boulevard;
- London Road/Queens Road; and,
- London Road/Crocus Street.

3.4.4 A number of junctions further afield are also likely to experience increases in congestion due to re-routing of traffic. These include:

- Gregory Boulvard/A60;
- Shakespere Street/ North Church Street;
- Alfreton Road/Boden Street;
- Forest Road West/Burns Street;
- Loughborough Road/Wilford Lane/Melton Road; and,
- London Road/Arkwright Street.

3.4.5 Reductions in congestion are forecast on some routes which experience a reduction in traffic flow. Notable reductions occur along the following roads:

- Maid Marian Way; and,
- Manvers Street.

Figure 4. Change in Junction Congestion Reference v Stage 2 – Morning Peak

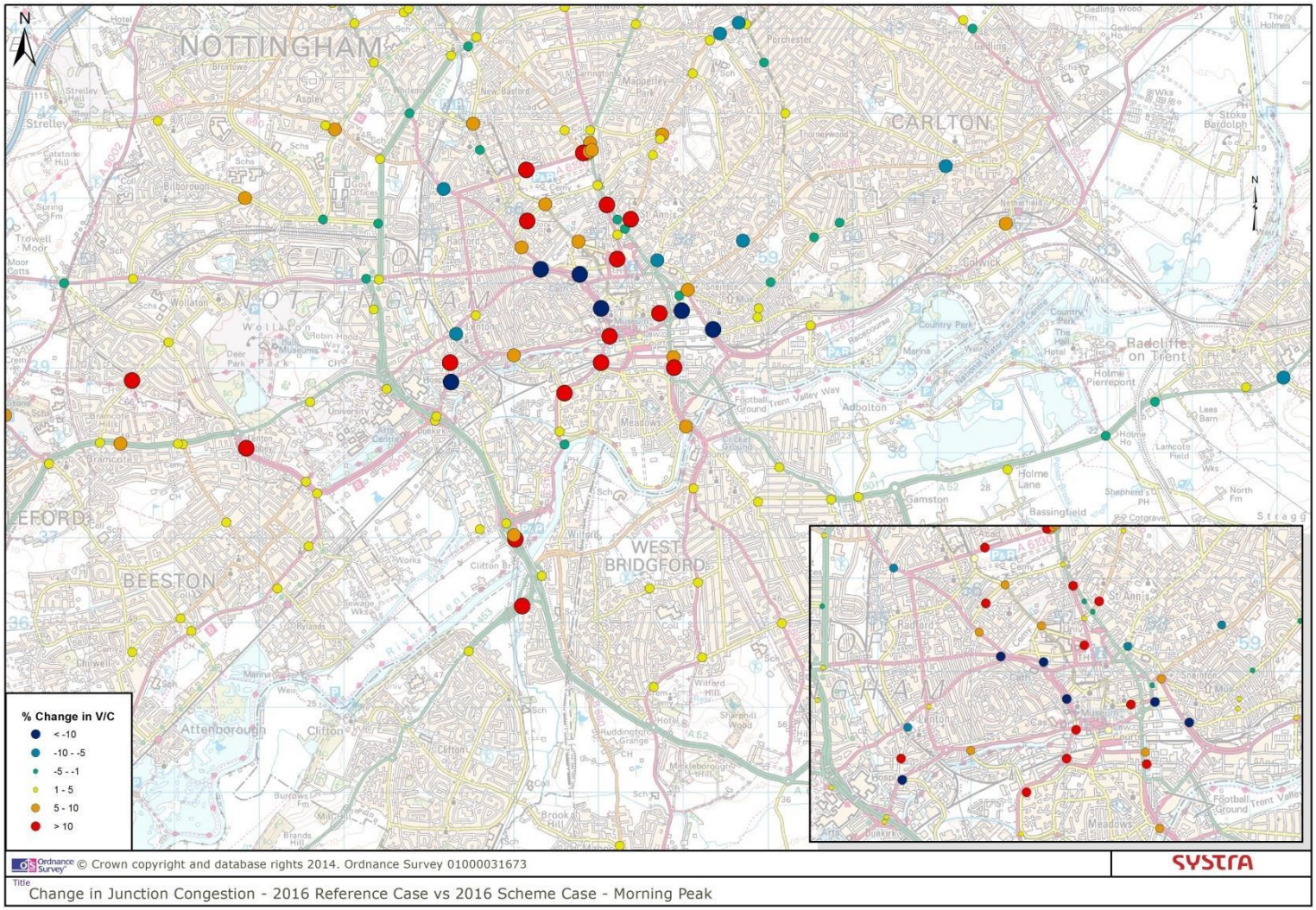
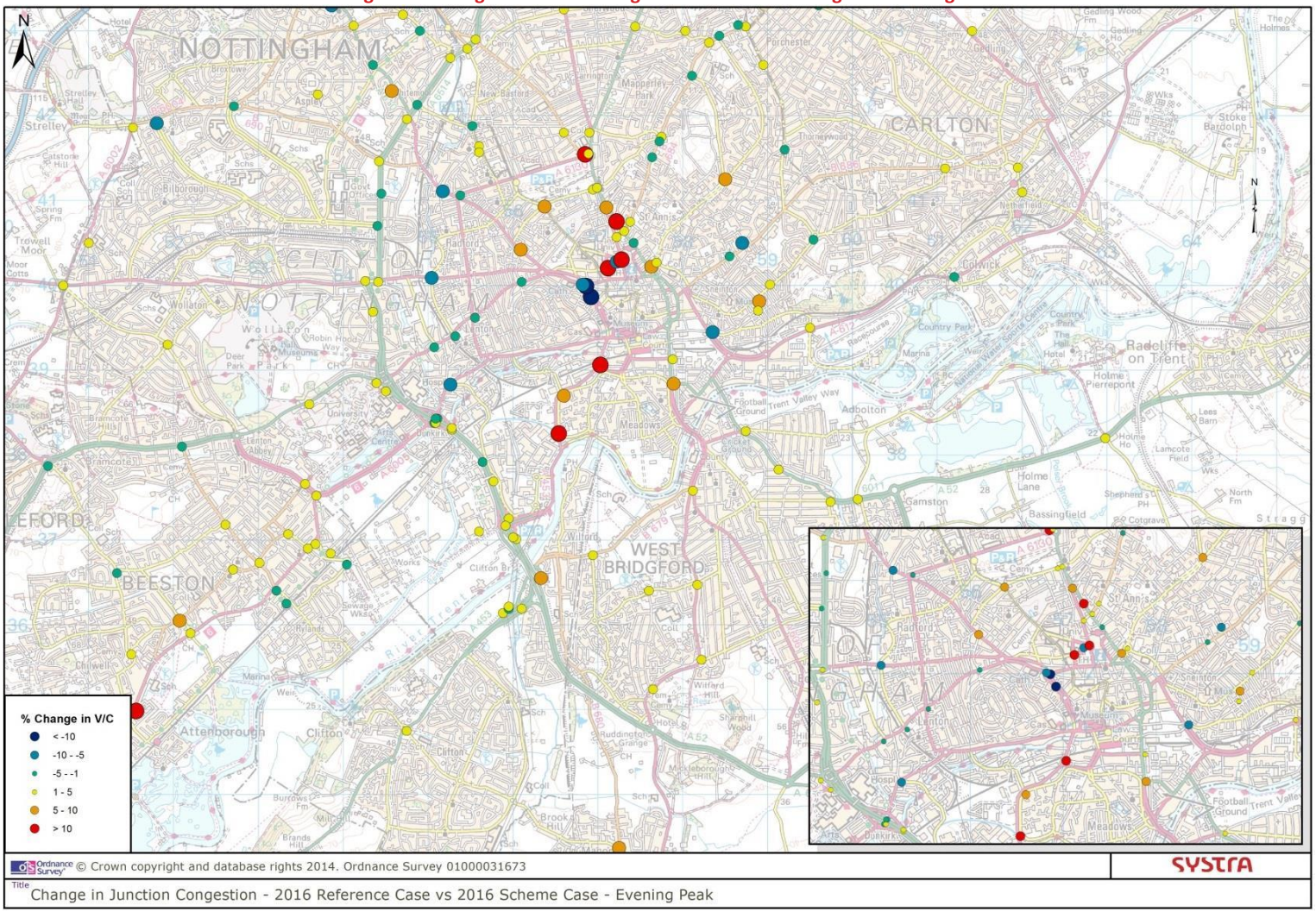


Figure 5. Change in Junction Congestion Reference v Stage 2 – Evening Peak



3.5 Car Journey Times

3.5.1 The flow change and congestion impacts have shown that the scheme causes a significant rerouting of traffic away from the Broadmarsh area and results in changes to congestion at several junctions. Both increases in travel distance (caused by longer routings) and increases in travel time (driven by increases in distance and delays) affect overall car journey times. Calculating the change in journey times is a useful indicator in quantifying the impacts of the scheme.

3.5.2 This section provides changes in car journey times for a selection of routes into/out of and through Nottingham City Centre. Table 3 provides the changes in car journey times, expressed in minutes, between the Reference Case and Stage 2 With Scheme scenario.

Table 3. Change in Car Journey Times (minutes) – Stage 2

ROUTE ID	FROM	TO	MORNING	EVENING
1	Gedling	City Centre	0.3	-0.1
	City Centre	Gedling	0.2	0.0
2	Beeston	City Centre	0.0	-0.9
	City Centre	Beeston	0.0	0.9
3	Aspley	City Centre	-0.5	0.2
	City Centre	Aspley	0.0	-0.2
4	Arnold	City Centre	1.2	0.7
	City Centre	Arnold	0.0	0.8
5	West Bridgford	City Centre	0.3	0.2
	City Centre	West Bridgford	-0.2	-0.2
6	Clifton	City Centre	0.5	0.1
	City Centre	Clifton	0.3	0.6
7	Gedling	Beeston	3.7	2.0
	Beeston	Gedling	3.2	3.2
8	Aspley	Colwick	2.3	2.7
	Colwick	Aspley	3.3	1.0
9	West Bridgford	Arnold	0.3	-0.3
	Arnold	West Bridgford	0.3	0.8

3.5.3 Significant changes in journey times (greater than 1 minute) are forecast to occur between Gedling and Beeston and Aspley and Colwick. This corresponds directly to the closure of Collin Street and Canal Street and the consequent re-routing either along the Southern Relief Route or along roads to the north of the city. Traffic which reroutes through the northern part of the city cause congestion along the A60. This secondary effect of the scheme impacts journey times between Arnold and the Nottingham City Centre.

3.5.4 Table 3 also shows that journey times along West Bridgford and Clifton routes are affected due to the additional traffic drawn onto London Road and Queens Drive and the associated junction congestion this causes.

3.6 Car Park Usage

3.6.1 The use of Broadmarsh and Maid Marian Way (Arndale) car parks are likely to be significantly affected by the Turning Point South scheme. The following section describes the changes to the car park access points and summarises the impact in terms of the change in vehicles and distribution of traffic using the car parks.

3.6.2 The Broadmarsh car park is currently accessed via Collin Street. The Maid Marian Way (Arndale) car park is accessed via Maid Marian Way. The Turning Point South scheme moves the access to Broadmarsh onto Middle Hill. The strategic modelling assumes this junction will be signalised. The Maid Marian Way (Arndale) car park access remains on Maid Marian Way, but is only accessed via a right-in, right-out priority junction. Access to the car park is not permitted from Grayfriar Gate, ie. it is not accessible to traffic from the north. All other access is permitted.

3.6.3 Table 4 presents the predicted changes in car park vehicle usage between the Reference Case and Stage 2 With Scheme scenario. The table also includes changes at Fletcher Gate, Lace Market and the Victoria Centre.

Table 4. Change in Car Park Use (vehicles) – Stage 2

CAR PARK	DIRECTION	MORNING	INTER-PEAK	EVENING
Broadmarsh	In	192	99	-2
	Out	-24	21	100
Maid Marian Way (Arndale)	In	40	41	82
	Out	77	81	78
Fletcher Gate	In	-119	-65	-105
	Out	-77	-134	-38
Lace Market/Stoney Street	In	20	4	35
	Out	-16	-5	8
Victoria Centre	In	-1	1	-26
	Out	46	-35	-34

3.6.4 Table 4 indicates that Turning Point South scheme increases the use of Broadmarsh and Maid Marian Way (Arndale) car parks in all peak hours but Fletcher Gate experiences a significant reduction in usage. This is because the Broadmarsh car park captures the vehicles previously using Fletcher Gate as, under Turning Point South improvements, vehicles must pass past Broadmarsh before reaching Fletcher Gate.

3.6.5 In addition to the increase in the overall numbers of vehicles using Broadmarsh and Maid Marian Way (Arndale) car parks, the distribution of vehicles using Broadmarsh alters significantly as a result of Turning Point South. The closure of Collin Street and Canal Street changes the accessibility of the car parks and turns Broadmarsh into car park serving east, south and north Nottingham. The Maid Marian Way (Arndale) into a car park distribution remains the same.

3.6.6 Figure 6 and Figure 7 graphically represent these changes to catchment areas for the Morning Peak. The distribution of vehicles in the Reference Case is shown on the left of the plans in blue, whilst the distribution of vehicles using the car parks in the With Scheme scenario is shown on the right of the plans in red. Figures showing the change in distribution for the Inter-Peak and Evening Peak are provided in Appendix D.

Figure 6. Broadmarsh Car Park Distribution

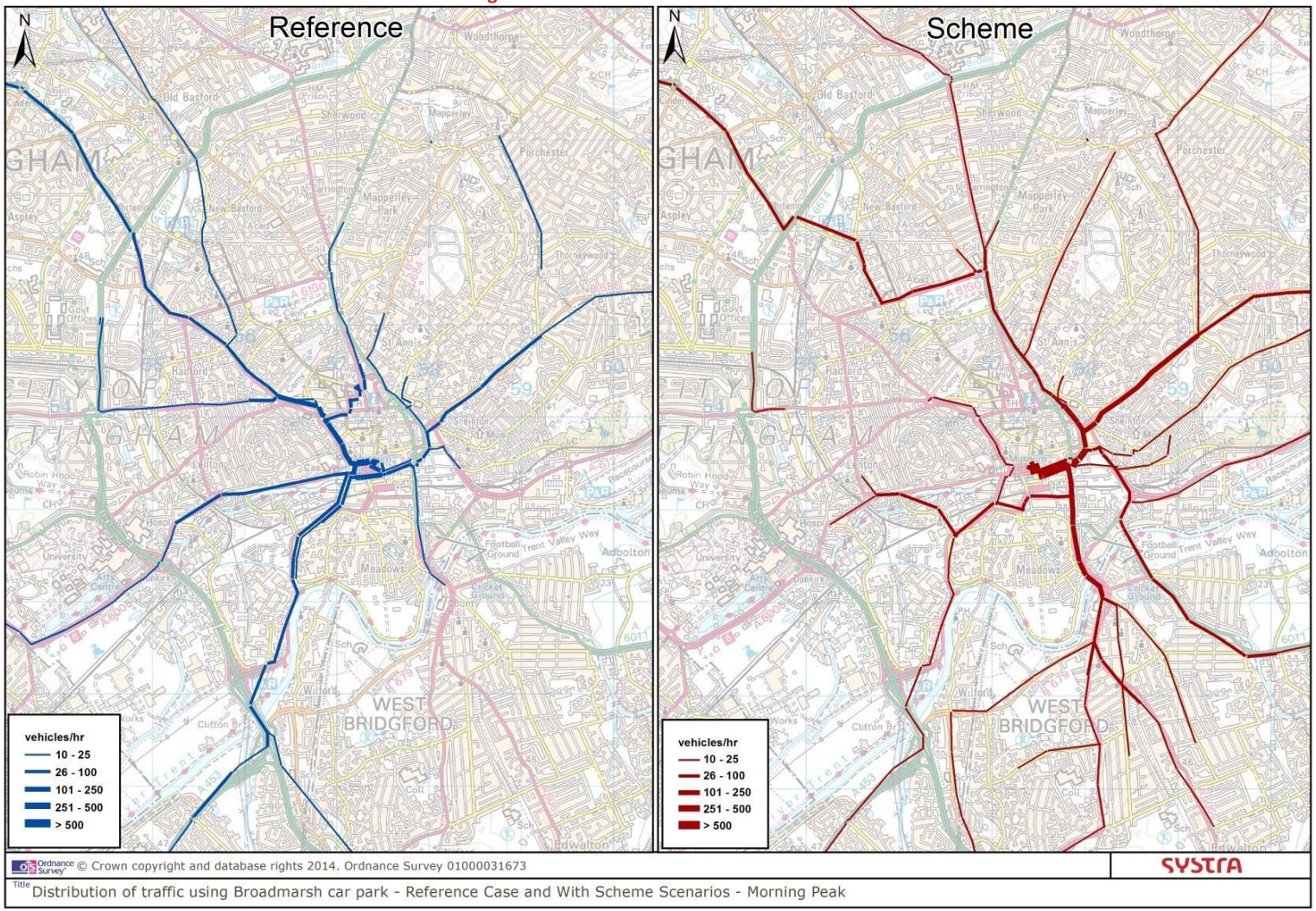
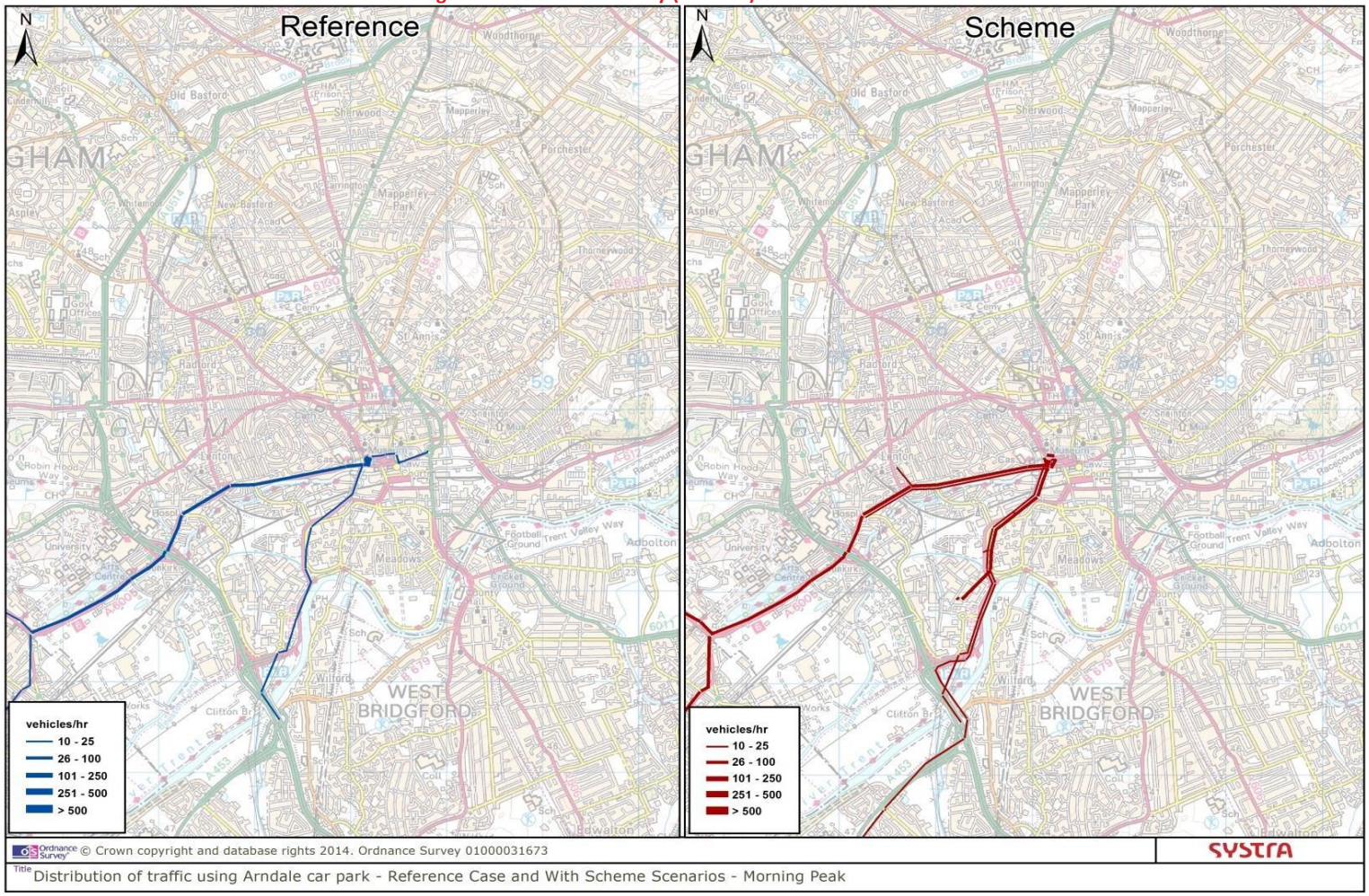


Figure 7. Maid Marian Way (Arndale) Car Park Distribution



3.7 Summary of Highway Impacts

3.7.1 The Turning Point South Scheme has a significant impact on the strategic transport network and is forecast to result in a reduction of traffic passing through the city centre.

3.7.2 The southern relief route is forecast to become the primary alternative route for traffic travelling west-east (or east-west) across the city however the junction congestion plans show that traffic volume exceeds capacity at the Wilford Road/Queens Drive/Waterway St West junction and London Road/Queens Road junction. The consequent delays and queues at these locations result in increased car journey times and the use of a number of alternative, residential roads through the Meadows and West Bridgford.

3.7.3 For traffic travelling to or from the north, the closure of Collin Street results in traffic moving away from Maid Marian Way and onto a combination of several alternative roads in the northern and eastern parts of the city centre. This has an impact on congestion at several junctions in the north of the city and has a slight adverse effect on car journey times.

3.7.4 The use of Broadmarsh and Maid Marian Way (Arndale) car parks increase as a result of Turning Point South, and the catchment area of the Broadmarsh car park significantly alters from the Reference Case due to the improved accessibility from East Nottingham. The distribution of traffic using the Maid Marian Way (Arndale) car park does not change significantly, but it is forecast to capture some vehicles previously using the Broadmarsh car park.

4. STAGE 2 IMPACT ON PUBLIC TRANSPORT

4.1 Overview

4.1.1 Turning Point South is likely to affect public transport trips entering and exiting the city centre. The exact impact Turning Point South has on public transport routing and patronage is difficult to determine in this strategic modelling as the With Scheme scenario considers a number of significant inter related changes including variations to bus routing patterns, the new NET stop and the additional person trips associated with Nottingham Skills Hub. The inclusion of all the changes in one scenario makes the effect of each individual change difficult to determine.

4.1.2 This purpose of this section is to present the strategic public transport overview of the Turning Point South scheme. The outputs reflect the cumulative impact of the highway changes, new NET stop, bus route changes and Nottingham Skills Hub. The following elements have been examined:

- changes in city centre public transport demand
- the impact of the new NET stop situated outside the new Nottingham Skills Hub
- public transport journey times for bus services affected by the closure of Collin Street.

4.2 Public Transport Demand

4.2.1 There is no significant change in the numbers of people accessing the city via all public transport modes (Bus, NET, Rail). In the morning peak, public transport person trips into Nottingham City Centre increase by 120 trips. In the evening peak total public transport trips out of Nottingham City Centre increases by 41 persons. This increase in trips is likely to be largely due to the additional generations associated with the Nottingham Skills Hub but may also reflect a slight modal shift from highway to public transport.

4.3 Changes to NET Patronage

4.3.1 The Turning Point South proposals allow for a new NET station adjacent to the new Nottingham Skills Hub. The new stop would be accessible by all NET services running through the city centre by 2016 (16 services per hour in each direction).

4.3.2 The predicted change persons arriving and departing each city centre station is shown in Table 5. The predicted persons using the new NET station is forecast to be approximately 900 in both peaks. However, the overall change in people using NET within the City only increases by approximately 200. This suggests that the NET stop at the Hub would primarily act as an alternative option for existing NET users and would extract patronage from other stops across the city. The additional patronage on NET is likely to be associated with the Nottingham Skills Hub and the transference of some bus trips to NET driven by localised increases in highway congestion and bus journey times.

Table 5. Change in NET patronage

NET STOP	MORNING PEAK			EVENING PEAK		
	ENTER	EXIT	TWO-WAY	ENTER	EXIT	TWO-WAY
Station	-36	-284	-321	-198	-157	-355
Hub	145	762	907	746	148	894
Lace Market	-27	-24	-51	-53	-34	-87
Market Square	-7	-313	-319	-225	-21	-247
Overall Change in City Centre NET persons	75	141	217	270	-64	206

4.4 Changes to Bus Journey Times

4.4.1 The closure of Collin Street results in a reallocation of buses onto the parallel Canal Street. Indicative routing and stopping patterns have been provided by Nottingham City Council and have been coded into the public transport model. Table 6 presents the change in end to end in-vehicle journey times of a selection of key bus services affected by the closure of Collin Street.

4.4.2 The transformation of Canal Street into a bus only road provides a more direct bus route for many outbound services going to south Nottingham via Carrington Street. This consequently reduces journey times for these services (eg. Navy, Green, CityLink 1, Cotgrave Connection) by around 1 minute. However the transference of services from Collin Street to Canal Street increases journey times for the Turquoise services.

4.4.3 Additional traffic and congestion on Queens Drive is predicted to affect the journey times for the Citylink 1 service whilst the Indigo service is likely to be affected by congestion at the Wilford Street/Castle Boulevard junction.

Table 6. Changes to Bus Journey Times

ROUTE	DIRECTION	CHANGE IN JOURNEY TIME (MINUTES)
Navy (Service 4)	Into City	-0.6
	Out of City	-0.5
Green (Service 6)	Into City	-0.2
	Out of City	-1.4
Turquoise (Service 78)	Into City	0.2
	Out of City	2.4
CityLink 1	Into City	1.4
	Out of City	-1.5
Indigo	Into City	0.2
	Out of City	2.4
Cotgrave Connection	Into City	-0.3
	Out of City	-0.4

4.5 Summary of Public Transport Impact

4.5.1 The exact impact Turning Point South has on public transport routing and patronage is difficult to determine in this strategic modelling as the With Scheme scenario considers a number of significant inter related changes including variations to bus routing patterns, the new NET stop and the additional person trips associated with Nottingham Skills Hub. The inclusion of all the changes in one scenario makes the effect of each individual change difficult to determine.

4.5.2 Overall public transport demand into and out of the city does not change significantly. The new Skills Hub NET stop largely extracts patronage from other City Centre net stops. There is an overall increase of 200 persons using NET and this increase is linked to the new trips associated with the Skills Hub and transference of trips from bus to NET.

4.5.3 There are some changes to bus journey times, however the closure of the gyratory and opening of Canal Street to buses in both directions provide a more direct route for many services. The most negatively affected services are likely to be those grouped into the Turquoise route, which must adopt a slightly longer route via Canal Street.

5. STAGE 3A: REVISIONS TO STAGE 2 MODELLING

5.1 Background

5.1.1 The Stage 2 assessment highlighted the initial strategic traffic impacts of the Turning Point South Scheme. A number of issues were identified during this initial modelling:

- Traffic on Southern Relief Road not at an optimal level due to congestion at junctions either end of the route (Queens Road/London Road and Wilford Road/Waterway Strreet West);
- Undesirable rat-running through the Meadows partly due to congestion along Southern Relief Road; and,
- Significant reduction in traffic along Maid Marian Way and increases in traffic through northern parts of the Nottingham City.

5.1.2 The Stage 3 modelling was subsequently undertaken to test a number of changes to the detailed junction design in light of the Stage 2 modelling. These changes were proposed by BWB in consultation with Nottingham City. The revised scheme drawings are contained in Appendix E. The modelling has been separated into two stages;

- Stage 3a – Highway only test assessing changes to junction design.
- Stage 3b – Highway only test assessing Stage 3a and changes to access of Maid Marian Way (Arndale) Car Park and Eastcroft depot.

5.1.3 This chapter summarises the main highway impacts of Stage 3a.

5.2 Stage 3a Overview

5.2.1 The Stage 3a modelling incorporates the following changes to the Stage 2 With Scheme scenario:

- Maid Marian Way junction – 2 left turn lanes into Wilford St and 1 right turn lane from Wilford St onto Castle Boulevard. The aim of this is to relieve congestion at the Wilford Street/Castle Boulevard junction by providing additional capacity to the southbound movement.
- Southern Relief Route - Queens Rd/London Rd junction – Stage 2 changes removed so layout consistent with Reference Case.
- All other identified junctions – only change have been to update signal timings to reflect BwB stages and cycle times if necessary.

5.3 Stage 3a Impact on Highway Trips

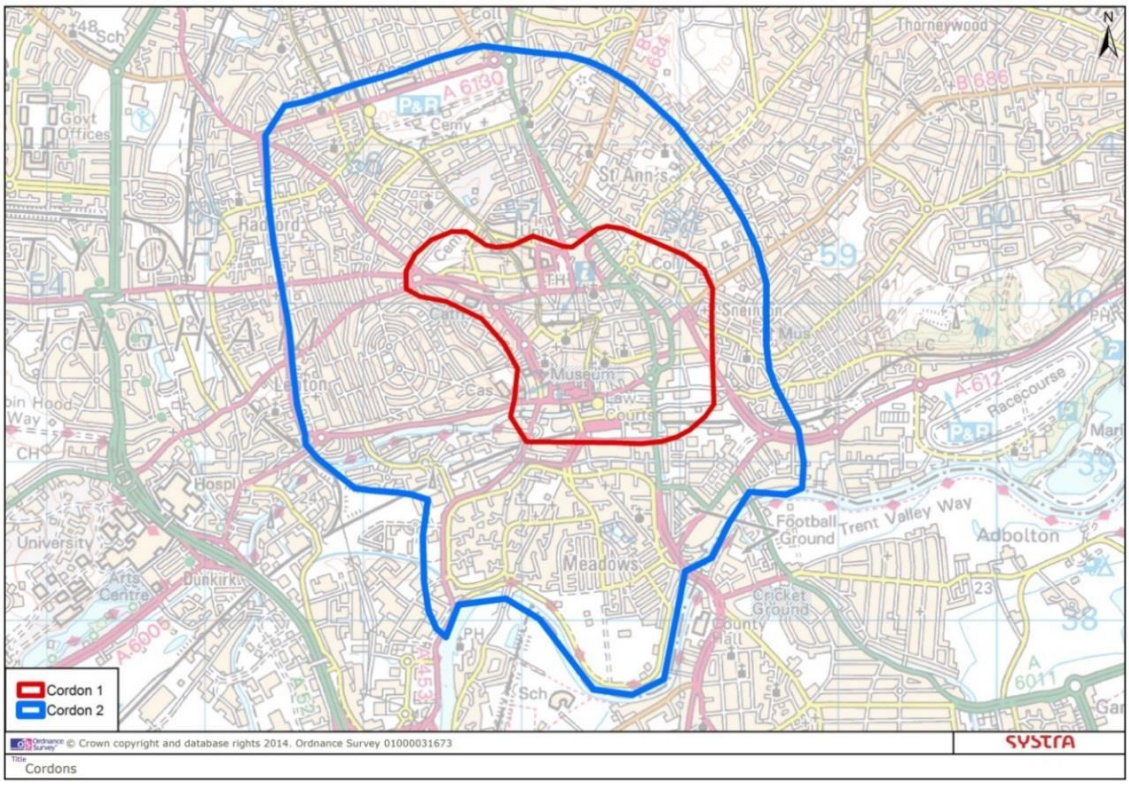
5.3.1 A fundamental part of the Turning Point South scheme is the removal of east/west traffic movements through the Broadmarsh area. A change of this magnitude is likely to have significant impacts on the total number of vehicles passing through the city. Table 7 presents the highway trips going into and through the city centre in the Reference Case, Stage 2 and Stage 3a scenarios. These have been generated by producing two cordons of the SATURN highway model; one covering purely the city centre (Cordon 1) and one which

includes the city centre and peripheral areas (Cordon 2). The cordon areas are shown in **Error! Reference source not found.**.

Table 7. Cordoned Highway Trips (vehicles)

	REF	STAGE 2	CHANGE (TO REF)	STAGE 3A	CHANGE (TO REF)
MORNING PEAK					
Cordon 1	13,888	13,297	-591	13,757	-132
Cordon 2	22,781	22,718	-63	22,719	-62
EVENING PEAK					
Cordon 1	14,090	13,568	-521	14,022	-68
Cordon 2	23,875	23,635	-240	23,730	-146

Figure 8. Cordon Extents



5.3.2 Table 7 shows that the number of highway trips in Cordon 1 in Stage 3a is similar to the Reference Case, and is significantly higher than the Stage 2 scenario. This indicates that the improvements made to the junctions in Stage 3a assist in drawing traffic back into the city centre. The change to the Maid Marian junction has provided additional capacity for southbound traffic and in doing so has led to traffic moving back onto Maid Marian Way.

5.3.3 There is little change in traffic flows in Cordon 2. This is because the cordon encompasses the majority of predicted alternative traffic routes identified in Stage 2. Although routings within the cordon have been affected the number of vehicles going to and through the cordon remains similar.

5.4 Comparison to Stage 2

Traffic Flows

5.4.1 Figure 9 and Figure 10 provide the change in traffic flows between Stage 2 and Stage 3a for the morning and evening peaks respectively. This shows only the impact of the changes to junction design.

5.4.2 Traffic using The Southern Relief Route is forecast increase as a result of the changes at Queens Road/London Road. In the morning peak this results in less rat-running through the Meadows and through West Bridgford compared to Stage 2.

5.4.3 In both peaks, there is forecast to be an increase in traffic along Maid Marian Way. This is due additional capacity released as a result of improving the Wilford Street/Castle Boulevard junction. The improvements allow more traffic to pass through the junction. This in turn alters local traffic routings and encourages more traffic back onto Maid Marian Way.

5.4.4 Appendix C contains Reference Case, Stage 2 and Stage 3 traffic flows, along with the changes in flows, at a number of key points in the vicinity of Broadmarsh. This can be useful for quantifying the impact of the scheme in terms of traffic flow changes.

Figure 9. Change Traffic Flow Stage 2 v Stage 3a – Morning Peak

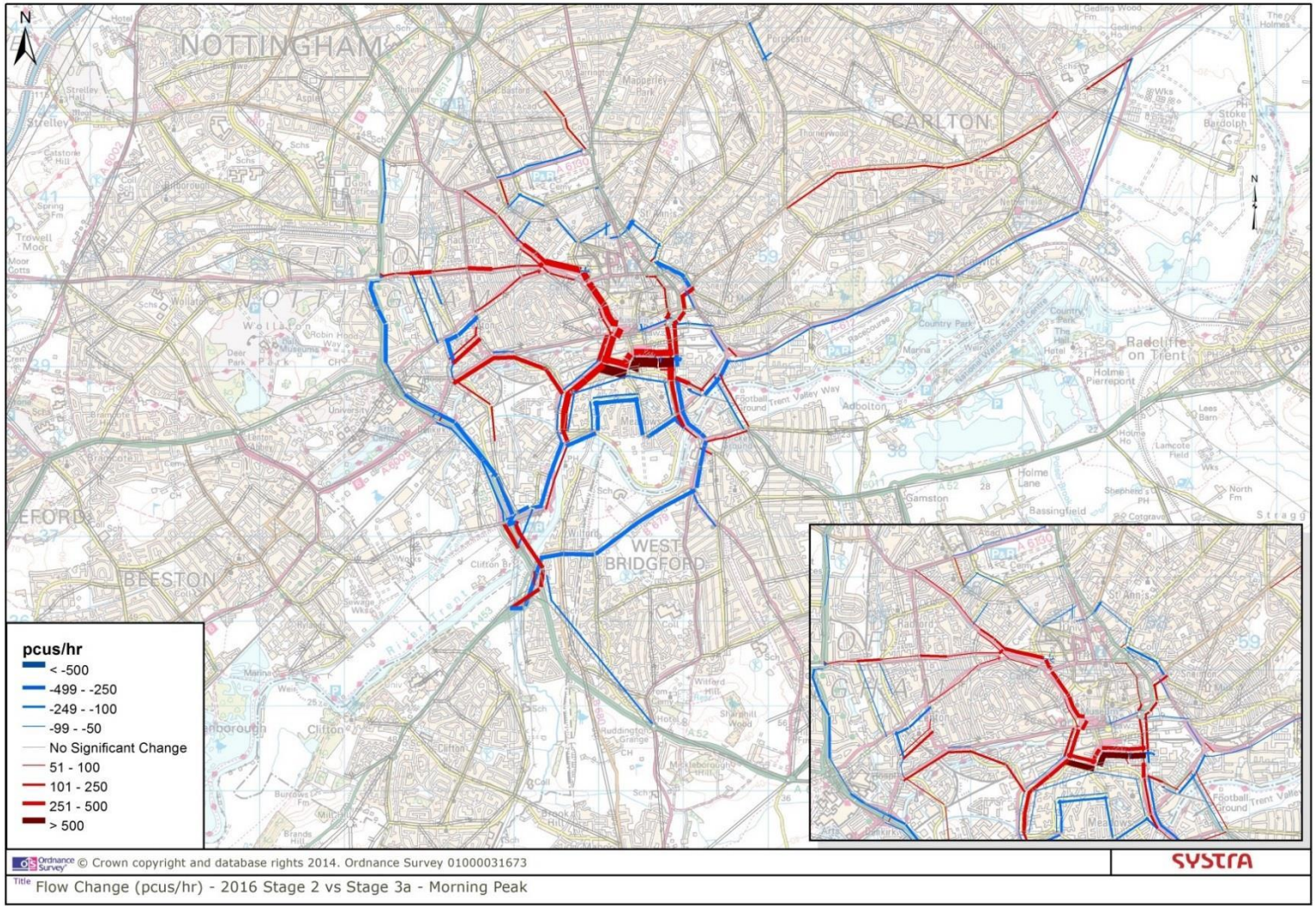
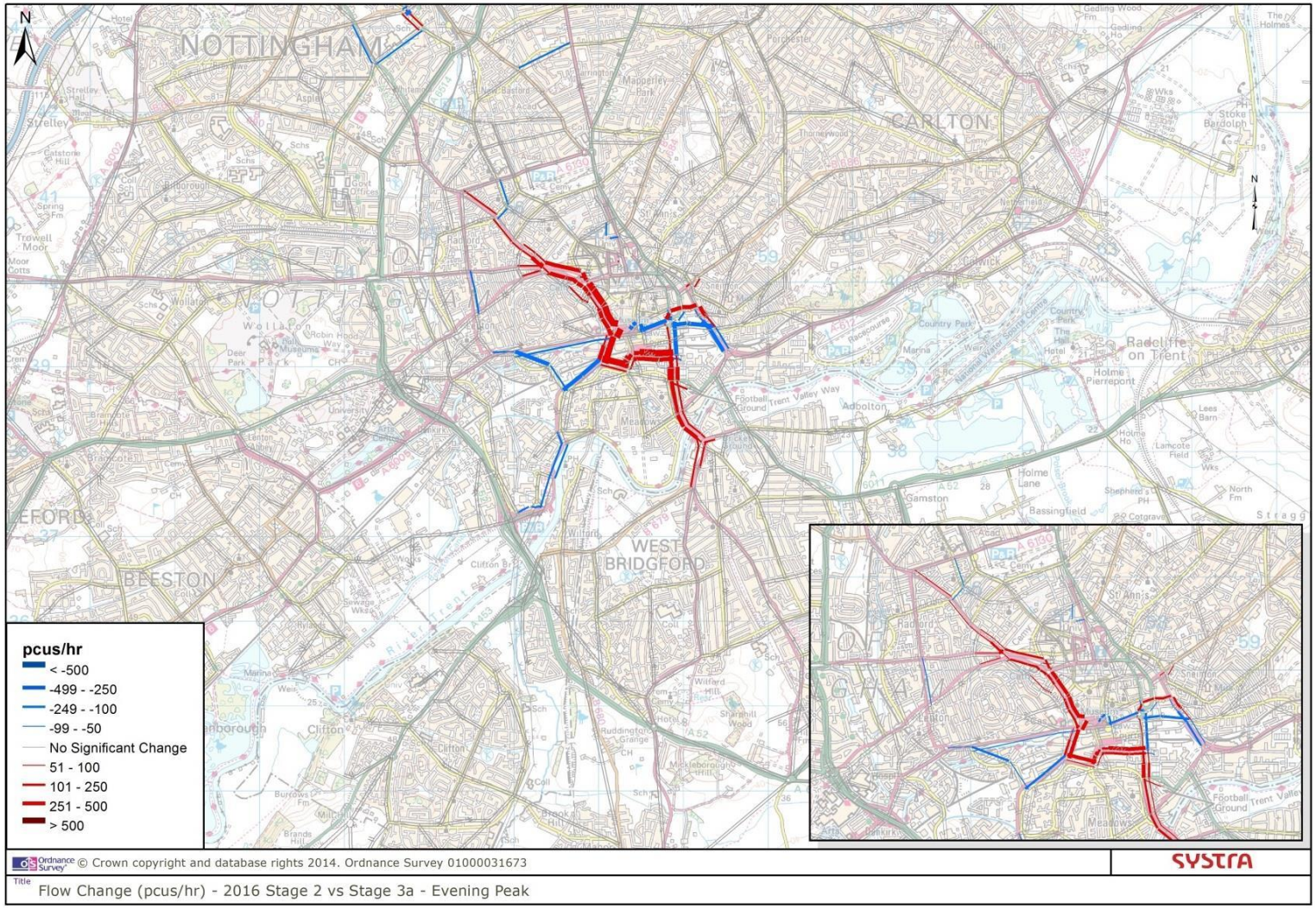


Figure 10. Change in Traffic Flow Stage 2 v Stage 3a – Evening Peak



Junction Congestion

5.4.5 Junction congestion is measured by determining the ratio of the volume of traffic using a junction, to the capacity of traffic that can be accommodated by the junction. A Volume to Capacity (V/C) percentage of 85% is considered to be the threshold at which the junction is approaching its effective operational capacity, therefore increasing the likelihood of operational problems including congestion and associated delays and queues. A V/C percentage of 100% indicates that the junction is operating above its theoretical maximum capacity.

5.4.6 Figure 11 and Figure 12 illustrate the impact of the Stage 3a changes on junction congestion. These plots show the change in congestion at junctions which are over capacity in Stage 2. Both positive and negative changes in junction V/C are shown. The Stage 3a changes are forecast to have few direct impacts on junction congestion.

5.4.7 Congestion at the Queens Road/London Road junction decreases in both peaks however the junction remains congested with V/C levels exceeding 100%. The improvements enhance capacity for certain movements at this location and particularly improve the accessibility of the Southern Relief Road. The resultant changes to traffic signal settings makes the junction a less attractive exit for the Eastcroft depot.

5.4.8 In the evening peak, there are small increases in V/C along Maid Marian Way as a consequence of drawing traffic back on to this road.

Figure 11. Change in Junction Congestion Stage 2 v Stage 3a – Morning Peak

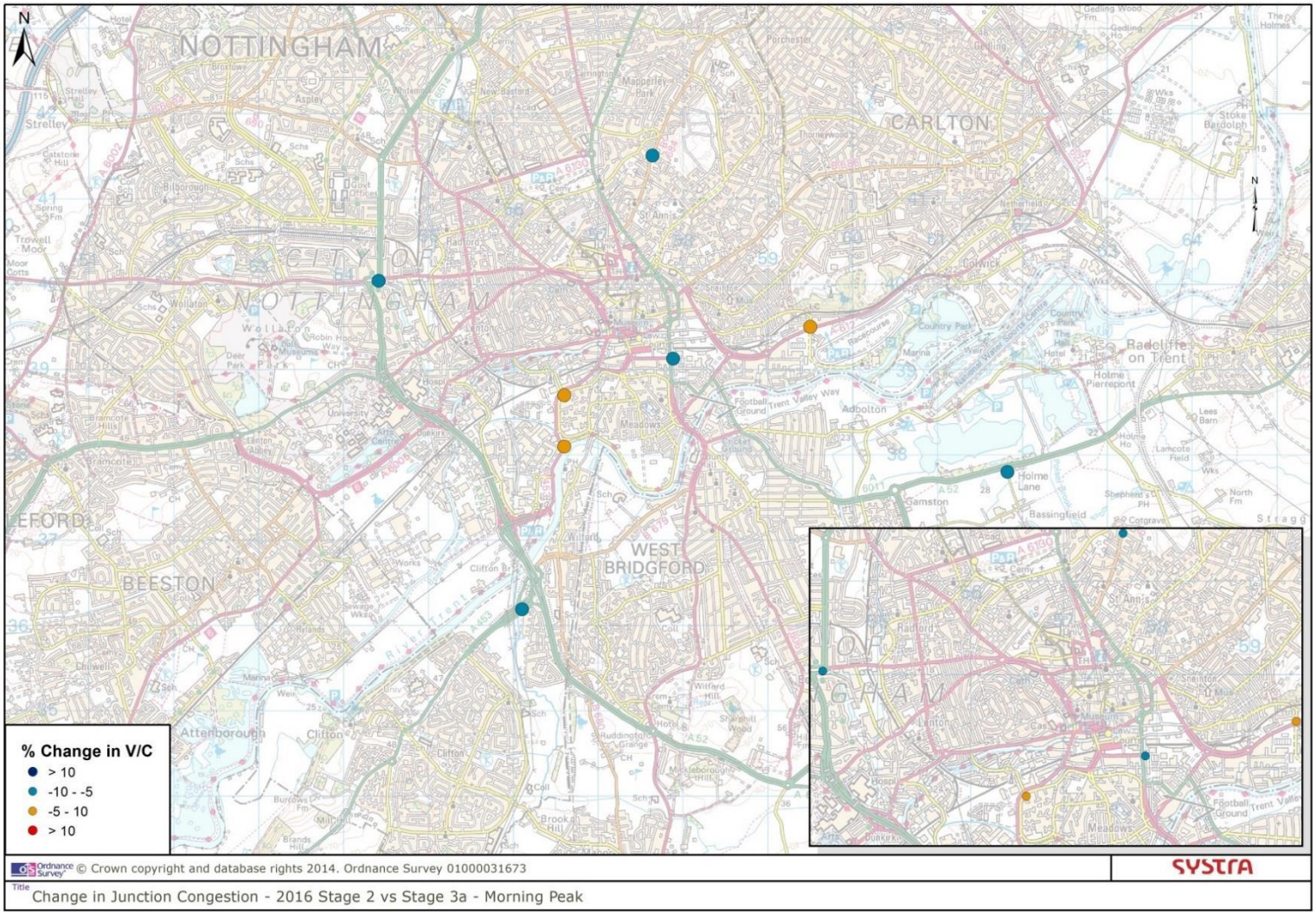
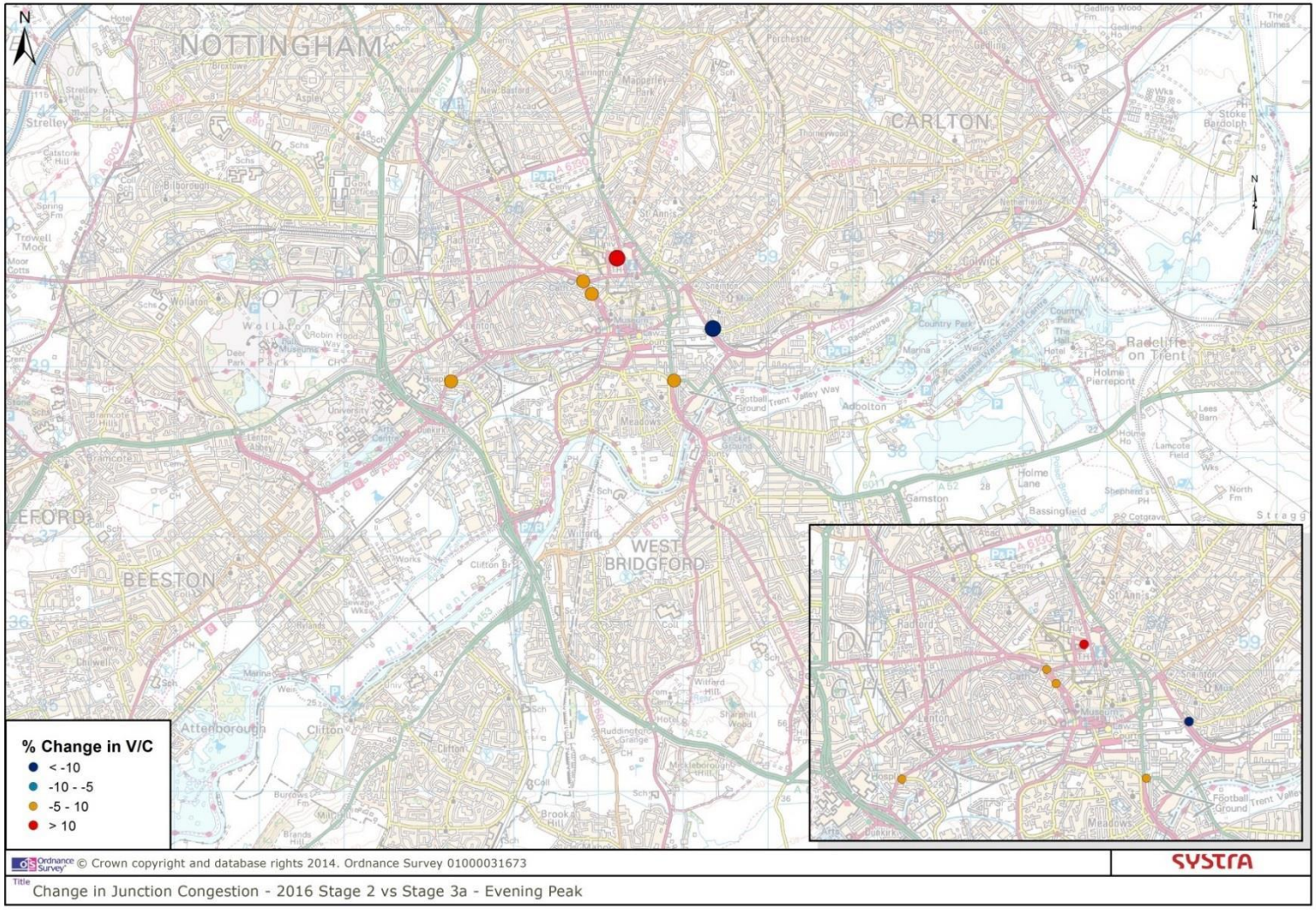


Figure 12. Change in Junction Congestion Stage 2 v Stage 3a – Evening Peak



5.5 Comparison to the Reference Case

Traffic Flows

5.5.1 Figure 13 and Figure 14 provide traffic flow changes between Stage 3a and the Reference Case. These plots show the impact of the whole updated Turning Point South scheme.

5.5.2 The Southern Relief Route is forecast to become the primary alternative route for traffic travelling west-east (or east-west) across the city. The majority of displaced traffic now uses this road as capacity at the London Road/Queens Road junction and the Waterway Street West junction is relieved in both peaks. However, the Stage 3a improvements do not eliminate rat-running of traffic and alternative roads to the south of the Southern Relief Route, through Meadows in particular, are still forecast to experience increases in traffic. This indicates that further traffic management through the Meadows may be required to deter routing through the area.

5.5.3 The improvements to the Wilford Street/Castle Boulevard junction draw southbound traffic back onto Maid Marian Way. Overall Stage 3a southbound traffic levels along the road are similar to the Reference Case, and higher than in Stage 2. This is the main reason for the increase in Cordon 1 traffic levels between Stage 2 and Stage 3a.

5.5.4 In both peaks, the Turning Point South scheme is forecast to result in a significant reduction in traffic flow along the following roads:

- Castle Boulevard;
- Canal Street (east of Middle Hill junction);
- Maid Marian Way northbound; and,
- Middle Hill (north of Collin Street).

and an increase in traffic along the following routes:

- Southern Relief Route (Queens Road and Queens Drive);
- Castle Bridge Road;
- Gregory Boulvard;
- A6008; and,
- Forest Road.

5.5.5 An increase in traffic is also shown eastbound along Canal Street in both peaks. This is an increase in bus traffic and reflects the reallocation of this road to a bus only route which permits bus travel in both directions.

5.5.6 Appendix C contains traffic flows for each scenario, along with the changes in flows, at a number of key points in the vicinity of Broadmarsh. This can be useful for quantifying the impact of the scheme in terms of traffic flow changes.

Figure 13. Change in Traffic Flows Reference Case v Stage 3a –Morning Peak

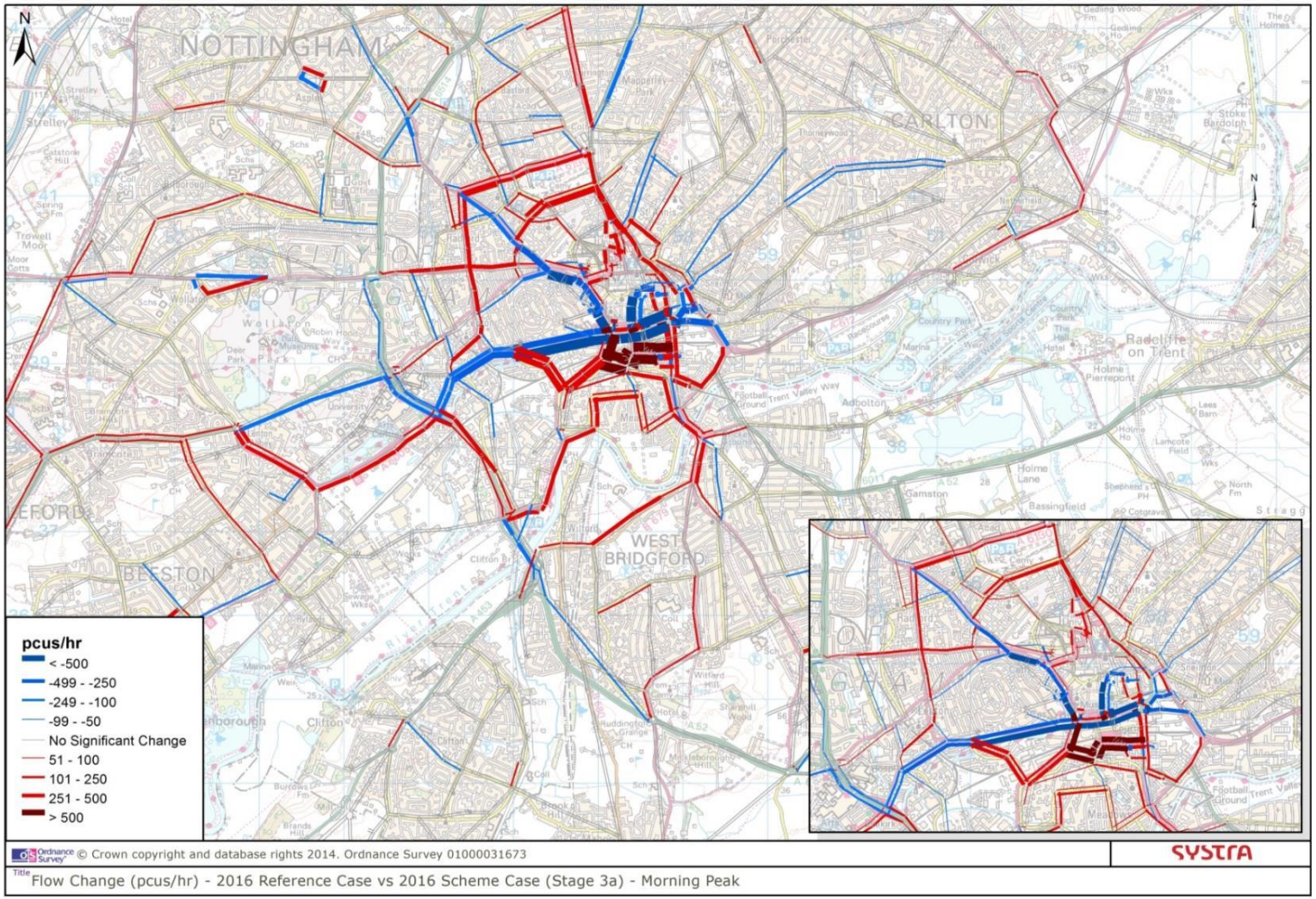
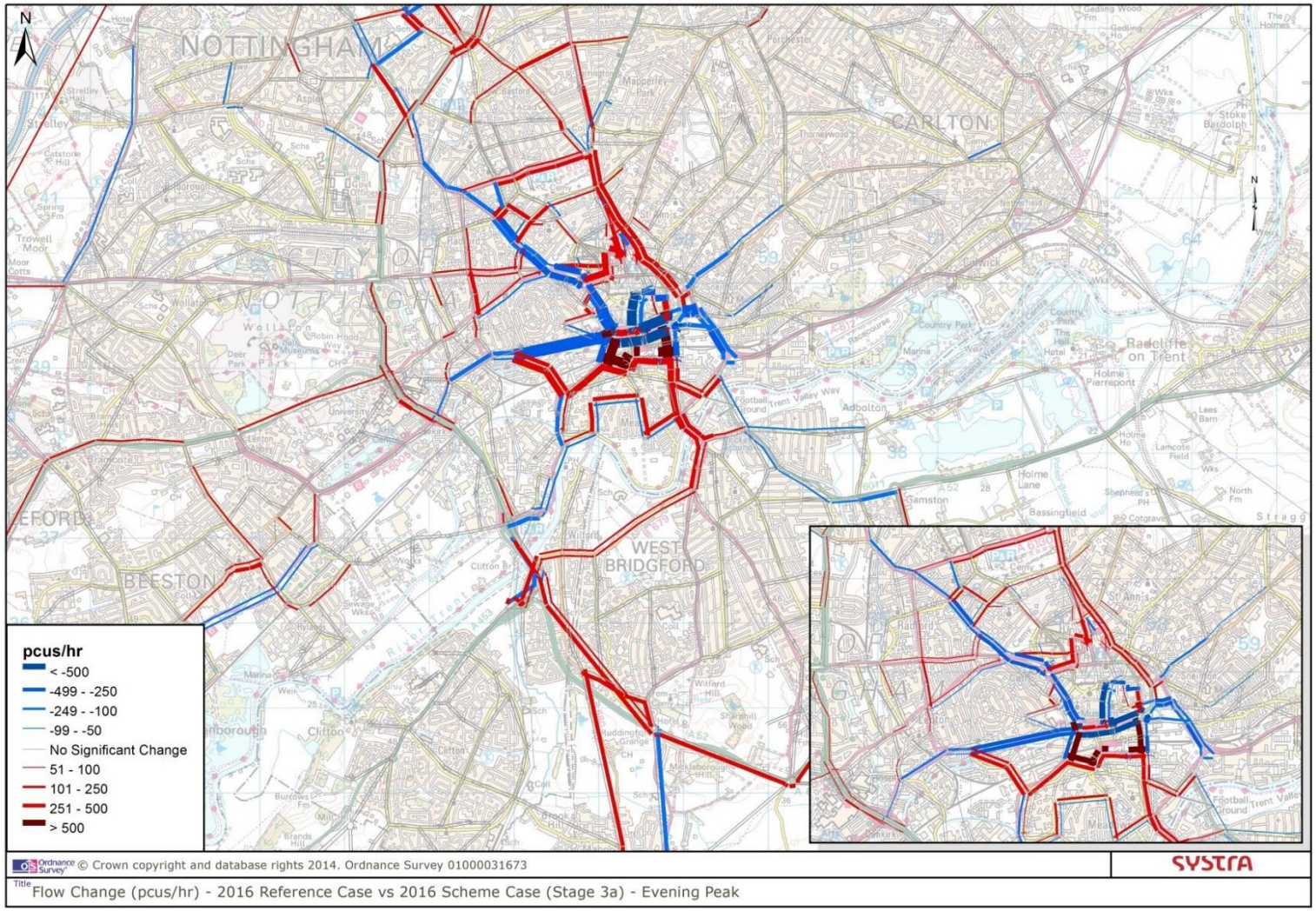


Figure 14. Change in Traffic Flows Reference Case v Stage 3a –Evening Peak



Junction Congestion

5.5.7 Figure 15 and Figure 16 present the changes in V/C at junctions on the highway network. The plots show changes in congestion at junctions which are congested in the Reference Case. The V/C ratio for each junction presents the turning movement with the highest V/C value at that particular junction.

5.5.8 Several key junctions near to Broadmarsh are forecast to experience an increase in congestion even with the revised scheme in place. These include:

- Wilford Road/Queens Drive/Waterway St West;
- Queens Drive/Castle Bridge Road;
- London Road/Crocus Street; and,
- Queens Road/Summer Leys Lane.

5.5.9 Increases in congestion are also shown at Crocus Street and Summer Leys Lane. These increases occur due to the increased volume of traffic using Queens Road and London Road which reduce the opportunities for traffic from these side roads to get out of the junction consequently increasing delay.

5.5.10 A number of junctions further afield are also likely to experience increases in congestion due to re-routing of traffic. These include:

- Gregory Boulvard/A60;
- Shakespeare Street/ North Church Street; and,
- Alfreton Road/Boden Street.

Figure 15. Change in Junction Congestion Reference Case v Stage 3a – Morning Peak

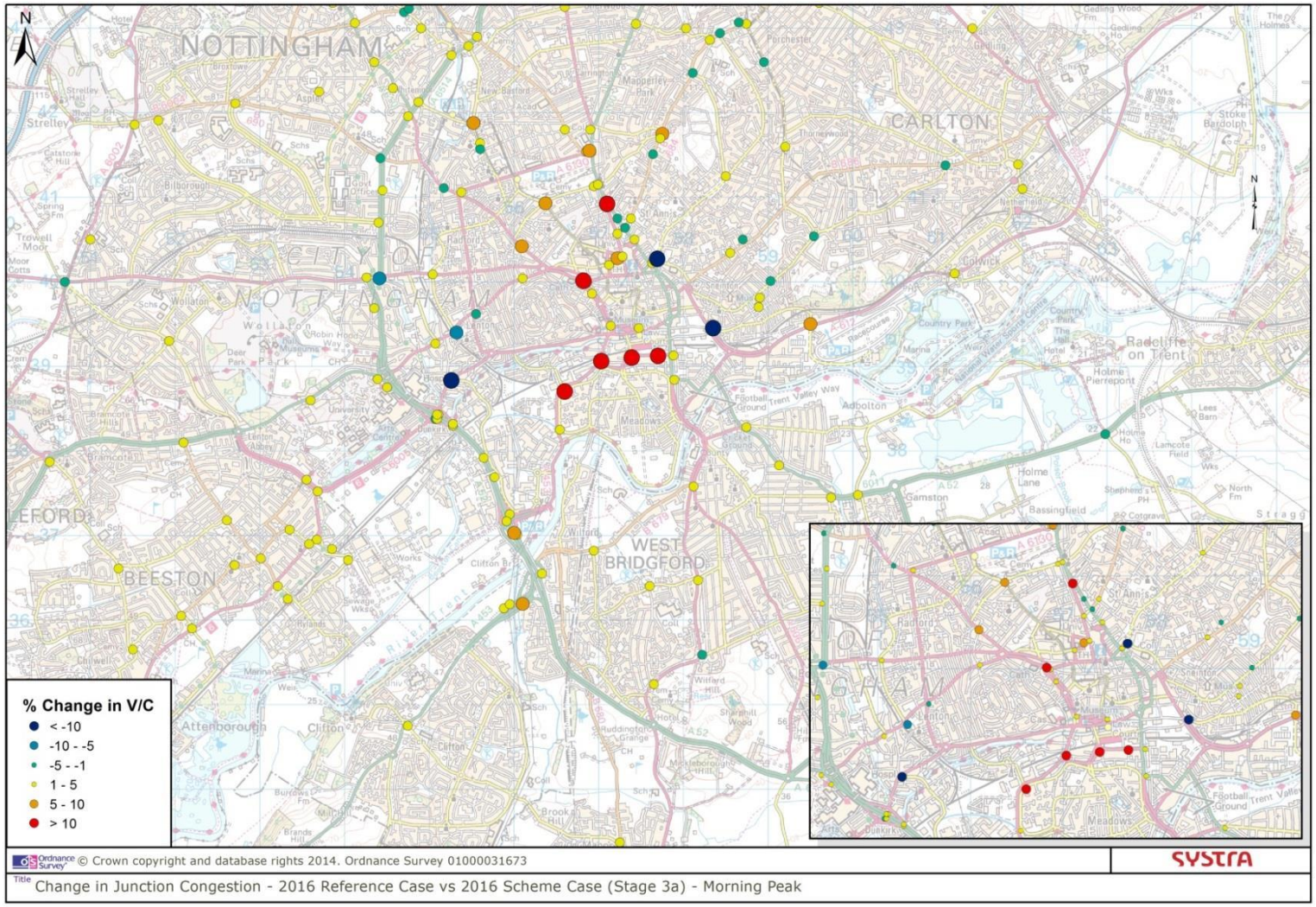
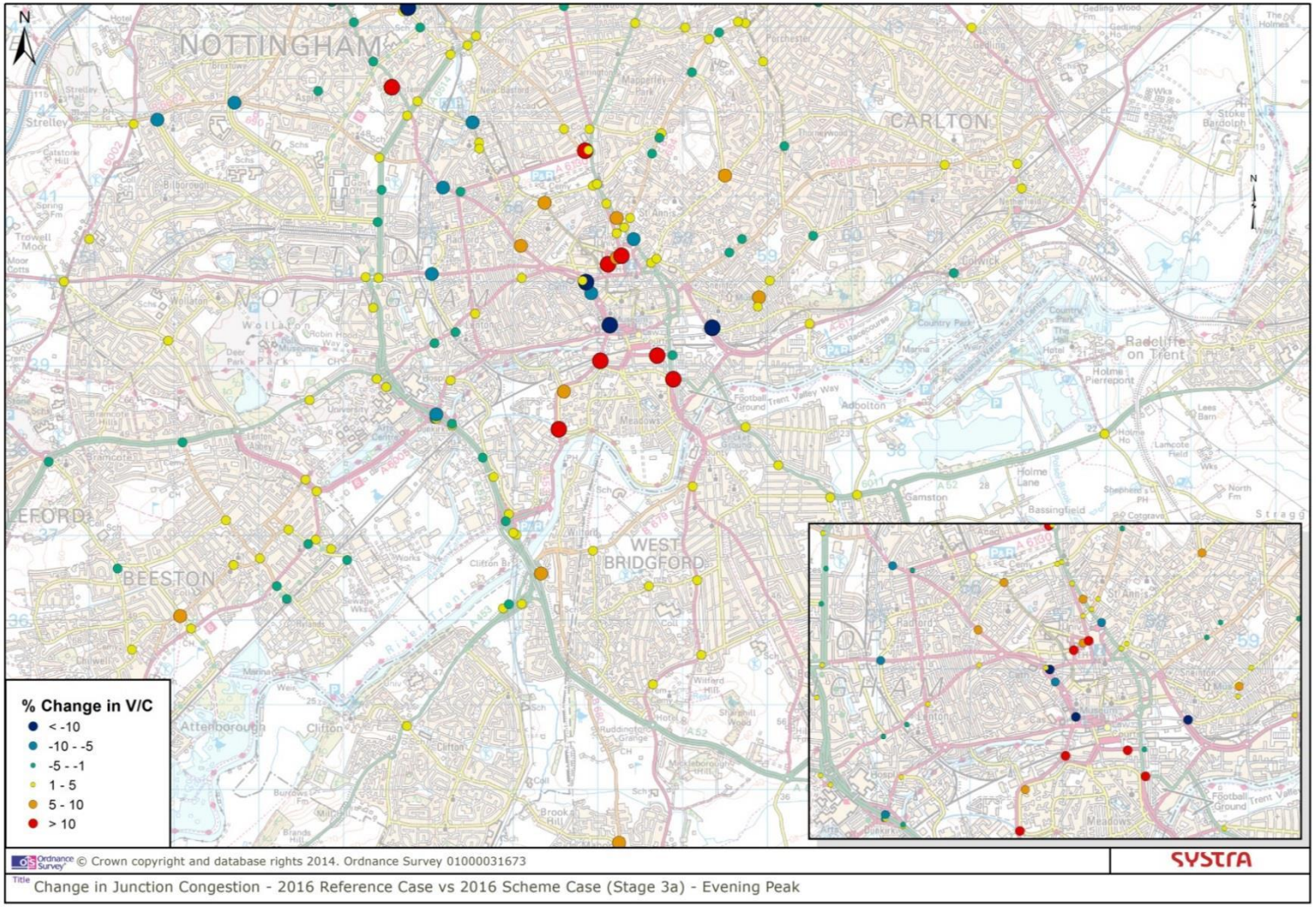


Figure 16. Change in Junction Congestion Reference Case v Stage 3a – Evening Peak



5.6 Car Journey Times

5.6.1 The flow change and congestion impacts have shown that the scheme causes rerouting of traffic in the Broadmarsh area and results in changes to congestion at several junctions. Both increases in travel distance (caused by longer routings) and increases in travel time (driven by increases in distance and delays) affect overall car journey times. Calculating the change in journey times is a useful indicator in quantifying the impacts of the scheme.

5.6.2 This section provides changes in car journey times for a selection of routes into/out of and through Nottingham City Centre. Table 8 provides the changes in car journey times, expressed in minutes, between the Reference Case, Stage 2 and Stage 3a scenarios.

5.6.3 In general, Stage 3a has little effect on car journey times. However, the improvements made to capacity along the Southern Relief Road do reduce delays and congestion along this route and allow traffic to move more easily through these junctions. Consequently, journey times between Gedling and Beeston and Aspley and Colwick experience smaller journey time increases, when compared to the Reference Case, than the Stage 2 'With Scheme' scenario.

Table 8. Change in Car Journey Times (minutes) – Stage 3a

ROUTE ID	FROM	TO	MORNING		EVENING	
			REF V STAGE 2	REF V STAGE 3A	REF V STAGE 2	REF V STAGE 3A
1	Gedling	City Centre	0.3	0.5	-0.1	-0.1
	City Centre	Gedling	0.2	0.2	0.0	0.0
2	Beeston	City Centre	0.0	0.8	-0.9	-0.3
	City Centre	Beeston	0.0	0.1	0.9	0.8
3	Aspley	City Centre	-0.5	-0.4	0.2	0.1
	City Centre	Aspley	0.0	-0.2	-0.2	-0.1
4	Arnold	City Centre	1.2	1.0	0.7	0.6
	City Centre	Arnold	0.0	-0.3	0.8	-0.3
5	West Bridgford	City Centre	0.3	0.0	0.2	-0.5
	City Centre	West Bridgford	-0.2	0.4	-0.2	0.1
6	Clifton	City Centre	0.5	0.2	0.1	-0.2
	City Centre	Clifton	0.3	-0.1	0.6	0.3
7	Gedling	Beeston	3.7	2.1	2.0	1.3
	Beeston	Gedling	3.2	3.0	3.2	3.0
8	Aspley	Colwick	2.3	1.1	2.7	2.7
	Colwick	Aspley	3.3	1.6	1.0	0.4
9	West Bridgford	Arnold	0.3	-0.6	-0.3	-1.1
	Arnold	West Bridgford	0.3	1.2	0.8	0.5

5.7 Car Park Usage

5.7.1 The use of Broadmarsh and Maid Marian Way (Arndale) car parks are forecast to be significantly affected by the Turning Point South scheme. The following section summarises the change in car park usage between the Reference Case, Stage 2 and Stage 3a scenarios.

5.7.2 The access arrangements to the Broadmarsh and Maid Marian Way (Arndale) car parks remain consistent with Stage 2 modelling. The Turning Point South scheme moves the access to Broadmarsh onto Middle Hill. The strategic modelling assumes this junction will be signalised. The Maid Marian Way (Arndale) car park access remains on Maid Marian Way, but is only accessed via a right-in, right-out priority junction. Access to the car park is not

permitted from Grayfriar Gate, ie. it is not accessible to traffic from the north. All other access is permitted.

5.7.3 Table 9 presents the predicted changes in car park vehicle usage between the Reference Case and the Stage 2 and Stage 3a scenarios. The table also includes changes at Fletcher Gate, Lace Market and the Victoria Centre. This table indicates that Stage 3a has little change on the numbers of vehicles using each city centre car park.

Table 9. Change in Car Park Use (vehicles) – Stage 3a

CAR PARK	DIRECTION	MORNING		INTER		EVENING	
		REF V STAGE 2	REF V STAGE 3A	REF V STAGE 2	REF V STAGE 3A	REF V STAGE 2	REF V STAGE 3A
Broadmarsh	In	192	167	99	94	-2	-6
	Out	-24	-39	21	4	100	-28
Maid Marian Way (Arndale)	In	40	37	41	34	82	73
	Out	77	89	81	89	78	49
Fletcher Gate	In	-119	-134	-65	-65	-105	-105
	Out	-77	-96	-134	-117	-38	-61
Lace Market/Stoney Street	In	20	36	4	10	35	21
	Out	-16	-19	-5	-5	8	7
Victoria Centre	In	-1	16	1	1	-26	-13
	Out	46	33	-35	-36	-34	-33

5.8 Stage 3a Summary

5.8.1 The changes tested during Stage 3a have a number of impacts on the traffic routings across the Broadmarsh area.

5.8.2 Changes to the layout of the London Road/Queens Road junction improve the accessibility of the Southern Relief Road , reducing the delays at junctions, improving journey times and encouraging more traffic to use the route compared to Stage 2. However, despite the increased capacity congestion at this location remains high and V/C for turning movements continue to exceed 100%.

5.8.3 Providing two southbound left turn lanes from Castle Boulevard on to Wilford Street is forecast to reduce delays and congestion at this junction and encourage traffic to use Maid Marian Way.

5.8.4 The changes have minimal impact on the car park usage across the city centre.

6. STAGE 3B: REVISIONS TO STAGE 2 MODELLING

6.1 Overview

6.1.1 The Stage 3 modelling was undertaken to test a series of refinements to the detailed highway junction design in light of the Stage 2 modelling. These changes were proposed by BwB in consultation with Nottingham City. The modelling has been separated into two stages;

- Stage 3a – Highway only scenario testing changes to junction design
- Stage 3b – Highway only scenario testing Stage 3a changes and also changes to access of Maid Marian Way (Arndale) Car Park and Eastcroft depot.

6.1.2 This chapter provides more detail on the changes included with Stage 3b and summarises the main highway impacts.

6.2 Stage 3b

6.2.1 The Stage 3b modelling is an extension of the Stage 3a modelling and incorporates the following changes to the Stage 2 With Scheme scenario:

- Maid Marian Way junction – 2 left turn lanes into Wilford St and 1 right turn lane from Wilford St onto Castle Boulevard. The aim of this is to relieve congestion at the Wilford Street/Castle Boulevard junction by providing additional capacity to the southbound movement.
- Southern Relief Route - Queens Rd/London Rd junction – changes removed. Junction to operate as per Reference Case.
- All other identified junctions – only change have been to update signal timings to reflect BwB stages and cycle times if necessary.
- Changes to access of Maid Marian Way (Arndale) Car Park to allow an additional entry from Greyfriars Street for traffic coming from the north. All other access/egress remains the same.
- Reconfiguration of access/egress of Eastcroft depot. Exit via Queens Road/London Road junction is removed. All traffic leaving the site must do so via Incinerator Road and County Road.

6.3 Highway Impacts of Stage 3b modelling

6.3.1 The changes to the Maid Marian Way (Arndale) Car Park and Eastcroft depot make no significant impact on traffic flows, junction congestion or car journey times compared to Stage 3a. The pattern of flow change and congestion compared to Stage 2 modelling, and also to the Reference Case, do not change and overall conclusions do not significantly alter.

Alterations to Eastcroft depot

6.3.2 Stage 3b assesses the impact of a revised access/egress arrangement for Eastcroft depot. The exit via Queens Road/London Road junction is removed from the modelling resulting in all traffic leaving the site via Incinerator Road and County Road. This allows additional

capacity at the Queens Road/London Road junction, particularly for traffic approaching from London Road north.

6.3.3 The changes as part of 3b do not have a significant impact on the movements of depot traffic because the alterations to the Queens Road/London Road junction made during Stage 3a already make this exit less attractive for depot traffic. The Stage 3a changes improve the accessibility of the Southern Relief Route and allow more time for these major movements. This impacts the movements from the depot and reduces the number of vehicles using this exit.

6.3.4 The improved capacity given to traffic approaching from London Road north does, however, attract a small number of additional vehicles through the junction (less than 20).

Changes to Maid Marian Way (Arndale) Car Park

6.3.5 Stage 3b allows traffic from the north to access Maid Marian Way (Arndale) Car Park from Greyfriars Street. All other access/egress arrangements to the car park remain the same. Despite allowing traffic to access the car park from the north only a few additional vehicles are predicted to use the car park, as Table 10 shows. This is due to the location of the car park at the southern side of the city; traffic travelling from the north have opportunities to access a number of alternative city centre car parks before reaching the Maid Marian Way (Arndale).

Table 10. Change in Car Park Use (vehicles) – Stage 3b

CAR PARK	DIRECTION	MORNING			INTER-PEAK			EVENING		
		REF V STAGE 2	REF V STAGE 3A	REF V STAGE 3B	REF V STAGE 2	REF V STAGE 3A	REF V STAGE 3B	REF V STAGE 2	REF V STAGE 3A	REF V STAGE 3B
Broadmarsh	In	192	167	164	99	94	94	-2	-6	-6
	Out	-24	-39	-39	21	4	5	100	-28	-23
Maid Marian Way (Arndale)	In	40	37	41	41	34	34	82	73	76
	Out	77	89	88	81	89	88	78	49	47
Fletcher Gate	In	-119	-134	-134	-65	-65	-65	-105	-105	-105
	Out	-77	-96	-94	-134	-117	-117	-38	-61	-61
Lace Market/Stoney Street	In	20	36	35	4	10	11	35	21	20
	Out	-16	-19	-17	-5	-5	-5	8	7	7
Victoria Centre	In	-1	16	18	1	1	1	-26	-13	-15
	Out	46	33	32	-35	-36	-37	-34	-33	-38

7. STAGE 4: SENSITIVITY TESTING

7.1 Overview

7.1.1 The Stage 4 was a highway only sensitivity test assesses the strategic impacts of the Turning Point South and Connecting Eastside Phase II schemes. The Turning Point South scheme is based on final junction designs tested in Stage 3a.

7.1.2 This chapter provides an overview of the Connecting Eastside scheme and the impact on highway trips, flow patterns and junction congestion compared to both Stage 3a and the Reference Case. The change in car journey times and car park usage are also presented in this chapter.

7.2 Connecting Eastside

7.2.1 The Connecting Eastside proposals would allow two-way traffic to travel along Lower Parliament Street between Southwell Road and London Road. This would change the use of Bellar Gate, Belward Street and Cranbrook Street by prioritising bus, cycle and pedestrian movements, although local traffic will still be permitted to use the roads in order to access eastern parts of Nottingham City.

7.2.2 The proposals include the transformation of Pennyfoot Street into a one-way street permitting eastbound traffic only. The road linking Lower Parliament Street and Bellar Gate is also removed and the reconfiguration of the London Road/Canal Street roundabout places restrictions on the right turning traffic from Canal Street onto London Road.

7.2.3 These proposals have been incorporated into the Stage 3a highway networks based on plan ADF/0140/001 Rev E (June 2008). No other changes have been made to the Stage 3a highway networks.

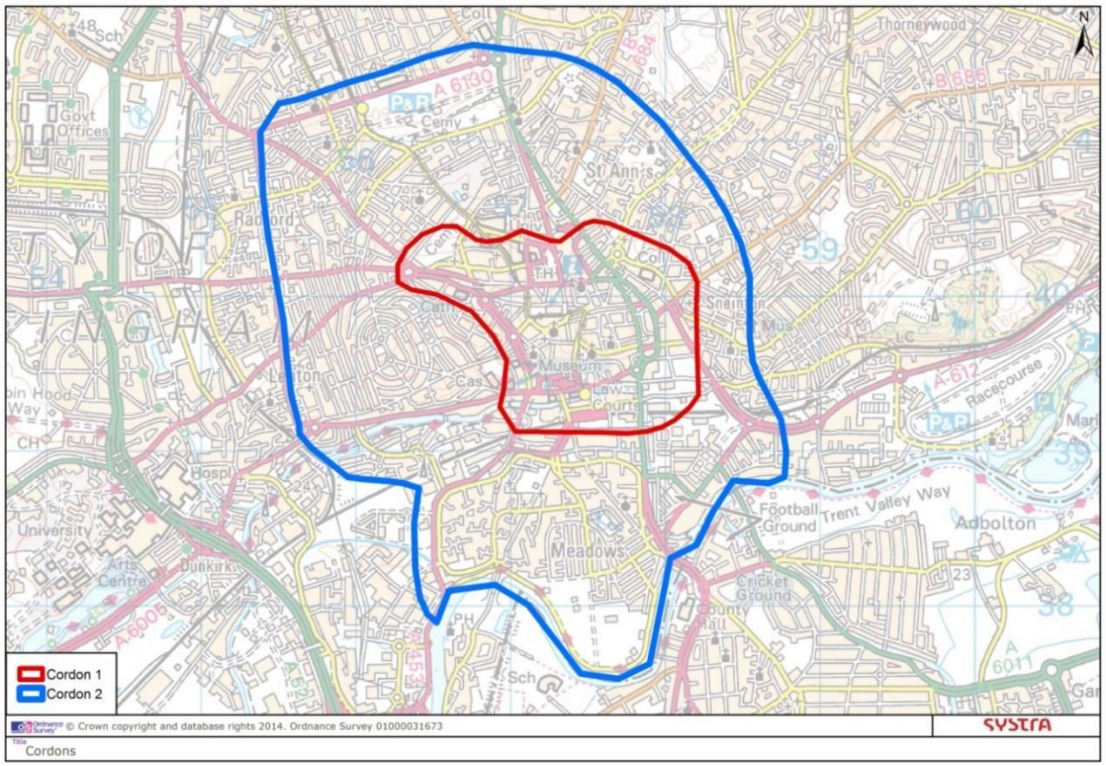
7.3 Impact on Highway Trips

7.3.1 Table 11 presents the highway trips going into and through the city centre in the Reference Case, Stage 3a and Stage 4 scenarios. These have been generated by producing two cordons of the SATURN highway model; one covering purely the city centre (Cordon 1) and one which includes the city centre and peripheral areas (Cordon 2). The cordon areas are shown in **Error! Reference source not found.**.

Table 11. Cordoned Highway Trips (vehicles)

	REF	STAGE 3A	CHANGE (TO REF)	STAGE 4	CHANGE (TO REF)
MORNING PEAK					
Cordon 1	13,888	13,757	-132	13,599	-289
Cordon 2	22,781	22,719	-62	22,731	-49
EVENING PEAK					
Cordon 1	14,090	14,022	-68	13,595	-495
Cordon 2	23,875	23,730	-146	23,693	-182

Figure 17. Cordon Extents



7.3.2 Table 11 shows that whilst the number of highway trips in Cordon 2 in Stage 4 is similar to the Stage 3a and the Reference Case, Cordon 1 trips are significantly lower than Stage 3a and the Reference Case. This indicates that the Connecting Eastside proposals cause changes to traffic in the immediate city area. The closure of Pennyfoot Street to westbound traffic is a significant change driving this reduction as it results in fewer opportunities for traffic to access London Road and consequently causes wider reassignment of traffic within the Cordon 2 extent.

7.4 Comparison to Stage 3A

Traffic Flows

7.4.1 Figures 18 and 19 present the change in traffic flows between the Stage 3a and Stage 4 scenarios. These figures illustrate that Connecting Eastside is forecast to have a significant impact on traffic movements in the eastern part of Nottingham City.

7.4.2 In both peak hours there a reassignment of northbound traffic away from Bellar Gate onto Lower Parliament Street. Lower Parliament Street becomes the main northbound route whilst Bellar Gate becomes predominantly a local route for accessing eastern parts of the city.

7.4.3 The closure of Pennyfoot street to westbound traffic is forecast to cause a reduction in southbound traffic along Lower Parliament Street and London Road and an associated increase in traffic on alternative routes though West Bridgford, particularly along Meadow Lane and County Road. The majority of this traffic is then forecast to use London Road to access the Southern Relief Road. Increases in traffic are also forecast along Bath Street to the north of Pennyfoot Street due to the reduced opportunity to access Lower Parliament Street.

7.4.4 The Connecting Eastside arrangements make it difficult for Canal Street traffic to turn right onto London Road. Whereas traffic is currently able to circulate around the roundabout, the revised road layout removes this movement resulting in traffic having to travel further via Fisher Gate to access London Road south and a further reduction in traffic along Canal Street.

7.4.5 Similarly, Connecting Eastside removes the ability for traffic travelling south along Lower Parliament Street to cross onto the Bellar Gate carriageway which consequently forces traffic to use the Canal Street/London Road junction instead.

7.4.6 There is forecast to be a reduction in traffic travelling northbound along London Road due to capacity constraints and delays at either end of Fisher Gate which increases the travel time for traffic going to Sneinton and areas beyond. This causes some traffic to reroute through West Bridgford to reach east Nottingham.

Congestion

7.4.7 The changes do not have a significant impact on the congestion compared to Stage 3a.

Figure 18. Change in Traffic Flow Stage 3a v Stage 4 – Morning Peak

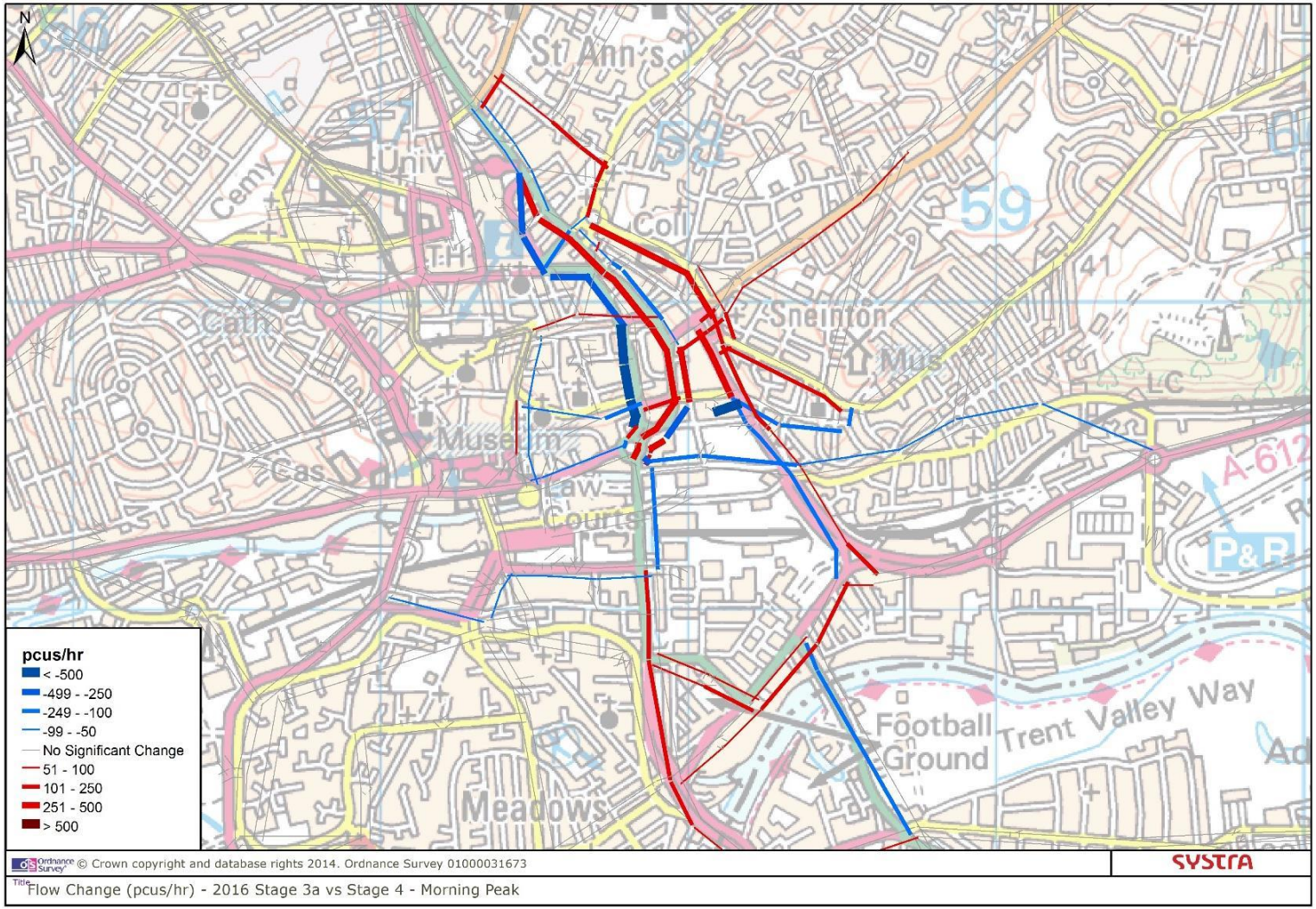
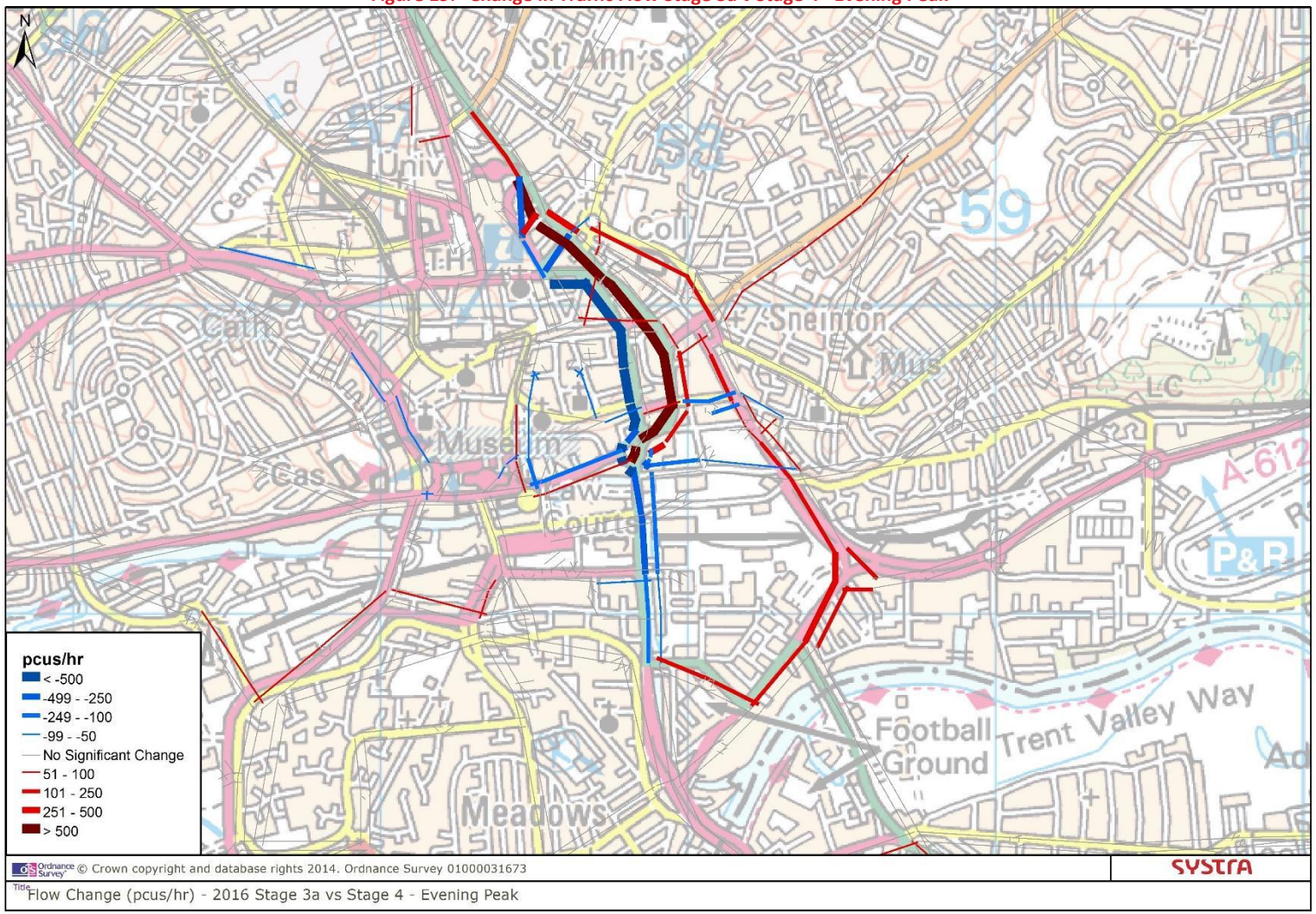


Figure 19. Change in Traffic Flow Stage 3a v Stage 4 –Evening Peak



7.5 Comparison to the Reference Case

Traffic Flows

7.5.1 Figure 20 and Figure 21 provide traffic flow changes between Stage 4 and the Reference Case. These plots show the impact of the whole updated Turning Point South scheme with the Connecting Eastside Improvements.

7.5.2 In general, the Connecting Eastside proposals do not significantly alter the main highway impacts generated by the Turning Point South Scheme. The addition of the Connecting Eastside improvements provide an enhanced route option for traffic travelling across the city.

7.5.3 The Southern Relief Route is forecast to become the primary alternative route for traffic travelling west-east (or east-west) across the city. Rat-running of traffic is still expected to occur on alternative roads to the south of the Southern Relief Route, through Meadows in particular. This indicates that further traffic management through the Meadows may be required to deter routing through the area.

7.5.4 Flows along Meadows Lane in West Bridgford increase in both directions due to the change in routes caused by the restrictions caused by Connecting Eastside.

7.5.5 In both peaks, there is forecast to be a significant reduction in traffic flow along the following roads:

- Castle Boulevard;
- Canal Street (east of Middle Hill junction);
- Bellar Gate;
- Maid Marian Way northbound; and,
- Middle Hill (north of Collin Street).

7.5.6 There is also an increase in traffic along the following routes:

- Southern Relief Route (Queens Road and Queens Drive);
- Meadows Lane;
- Bath Street;
- Manvers Street (north of Pennyfoot Street);
- Castle Bridge Road;
- Gregory Boulvard;
- A6008; and,
- Forest Road.

7.5.7 An increase in traffic is also shown eastbound along Canal Street in both peaks. This is an increase in bus traffic and reflects the reallocation of this road to a bus only route which permits bus travel in both directions.

7.5.8 Appendix C contains traffic flows for each scenario, along with the changes in flows, at a number of key points in the vicinity of Broadmarsh. This can be useful for quantifying the impact of the scheme in terms of traffic flow changes.

Figure 20. Change in Traffic Flow Reference Case v Stage 4 – Morning Peak

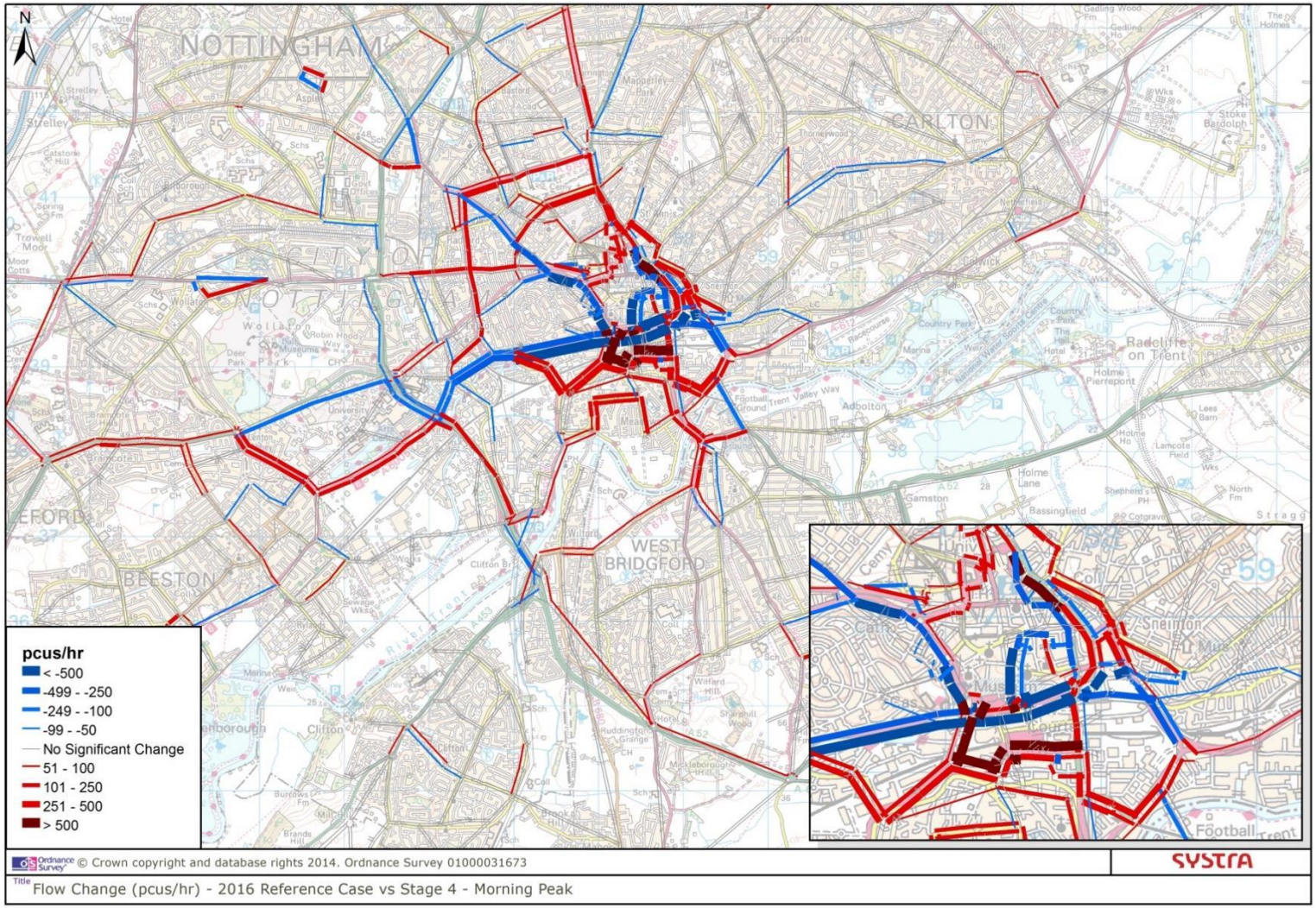
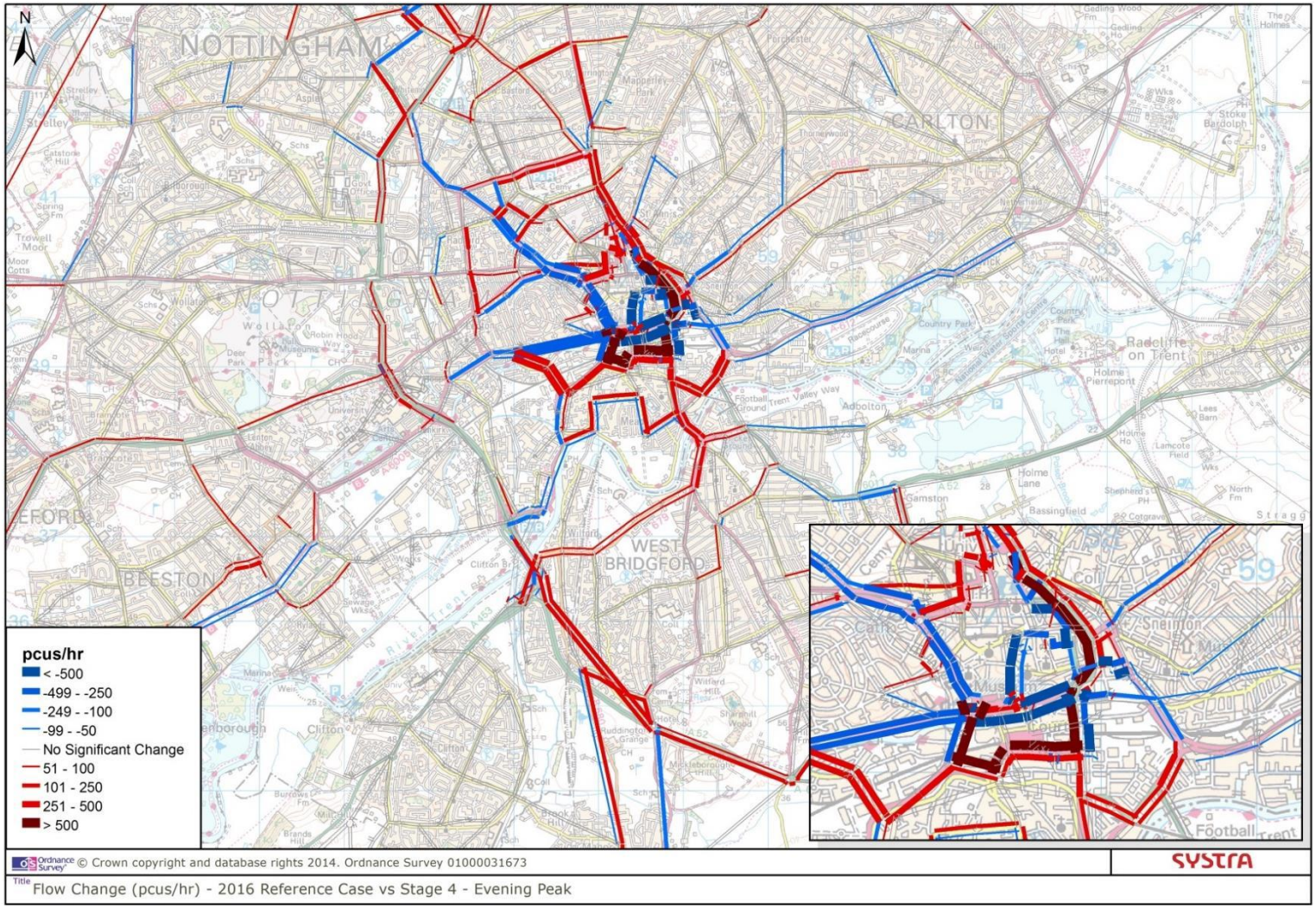


Figure 21. Change in Traffic Flow Reference Case v Stage 4 – Evening Peak



Junction Congestion

7.5.9 Figure 22 and Figure 23 present the changes in V/C at junctions on the highway network. The plots show changes in congestion at junctions which are congested in the Reference Case. The V/C ratio for each junction presents the turning movement with the highest V/C value at that particular junction.

7.5.10 Several key junctions near to Broadmarsh are forecast to experience an increase in congestion with Turning Point South and Connecting Eastside Schemes. These include:

- Wilford Road/Queens Drive/Waterway St West;
- Queens Drive/Castle Bridge Road;
- Canal Street/London Road;
- Hollowstone/Fisher Gate;
- London Road/Crocus Street; and,
- Queens Road/Summer Leys Lane.

7.5.11 The increases in congestion at the junctions of Canal Street/London Road and Hollowstone/Fisher Gate are due to the removal of the roundabout (and consequently ability to right turn into London Road) and also the removal of the link between Lower Parliament Street and London Road. Both of these increase junction congestion as well as increasing overall travel distance and time for affected vehicles.

7.5.12 Increases in congestion are forecast to occur for traffic on side roads leading to the Southern Relief Route and at the Crocus Street/London Road junction. These increases occur due to the increased volume of traffic using Queens Road and London Road which reduce the opportunities for traffic from these side roads to get out of the junction consequently increasing delay.

7.5.13 A number of junctions further afield are also likely to experience increases in congestion due to re-routing of traffic. These include:

- Gregory Boulvard/A60;
- A612 Manvers Street/Southwell Street;
- Eyre Street/Sneinton Road;
- Shakespeare Street/ North Church Street; and,
- Alfreton Road/Boden Street.

Figure 22. Change in Junction Congestion Reference Case v Stage 4 – Morning Peak

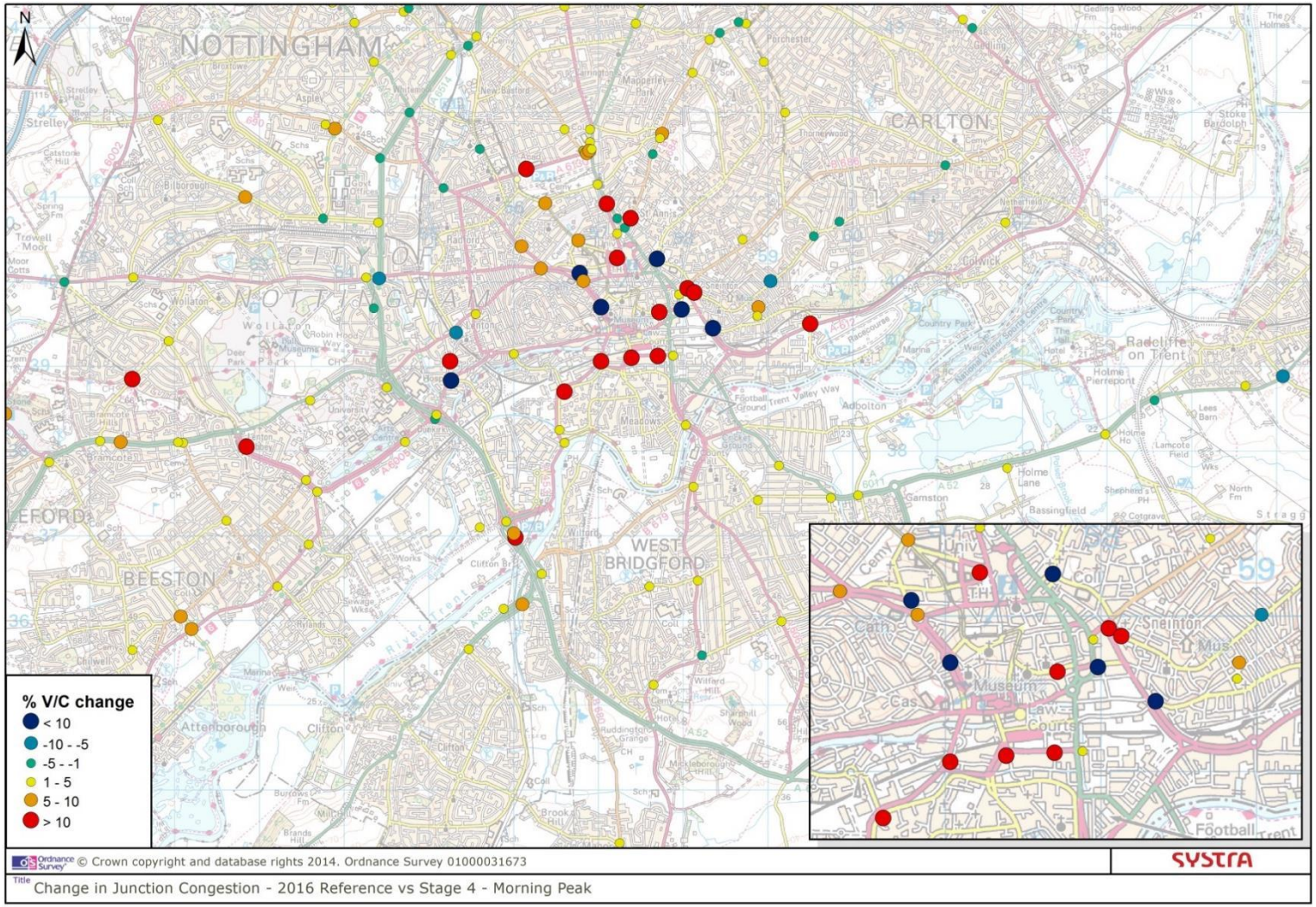
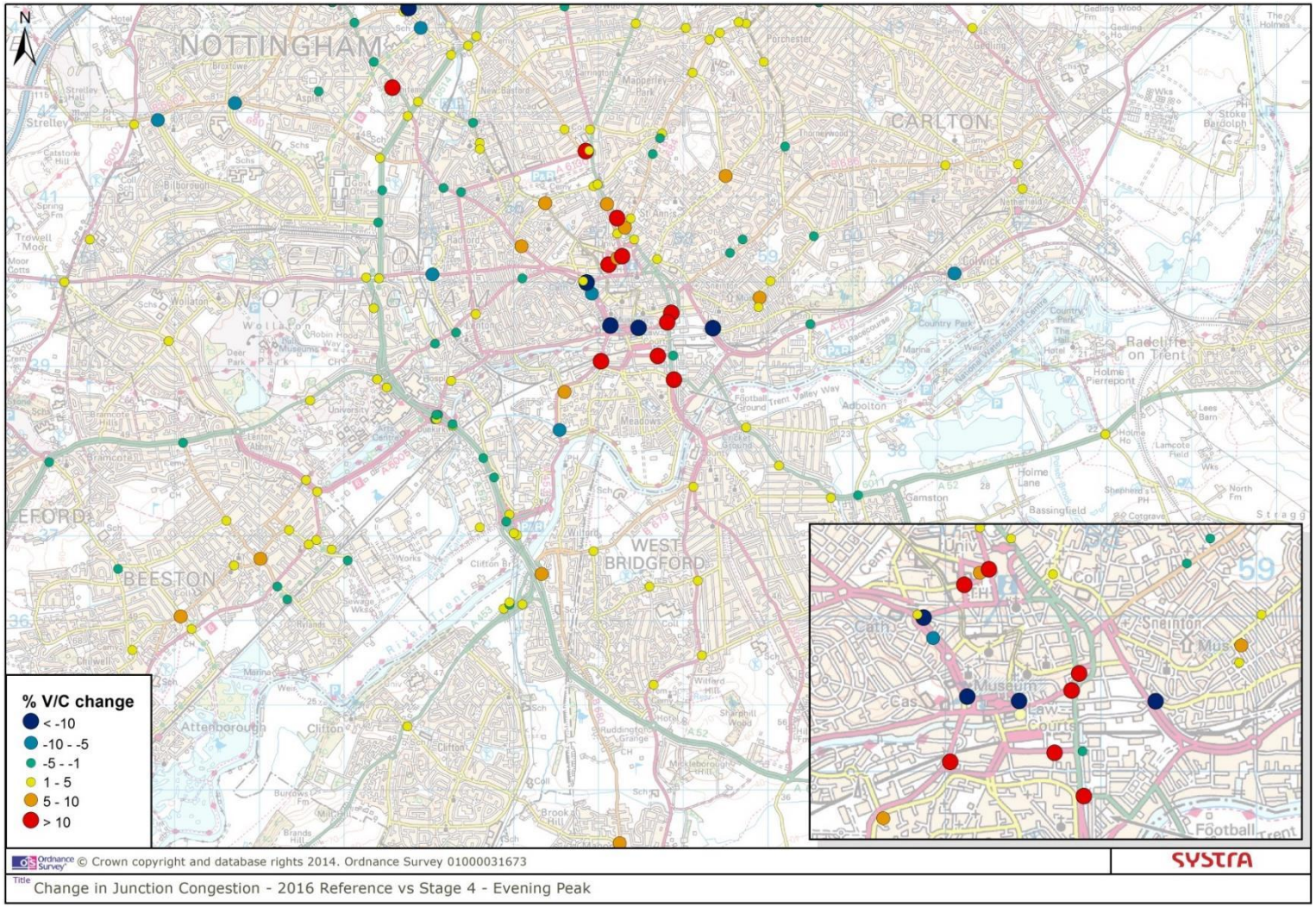


Figure 23. Change in Junction Congestion Reference Case v Stage 4 – Evening Peak



7.6 Car Journey Times

7.6.1 Both increases in travel distance (caused by longer routings) and increases in travel time (driven by increases in distance and delays) affect overall car journey times. Calculating the change in journey times is a useful indicator in quantifying the impacts of the scheme.

7.6.2 This section provides changes in car journey times for a selection of routes into/out of and through Nottingham City Centre. Table 8 12 provides the changes in car journey times, expressed in minutes, between the Reference Case, Stage 3a and Stage 4 scenarios.

7.6.3 In general, Stage 4 has little effect on the majority of car journey times presented in Table 12. The Connecting Eastside changes improve connectivity for through traffic between Arnold and West Bridgford which improves delays and congestion along this route and allow traffic to move more easily. Journey times between the City and West Bridgford increase due to the inability to turn right from Canal Street and the resultant increase in travel distance and congestion identified at the Fisher Gate/Hollowstone junction.

Table 12. Change in Car Journey Times (minutes) – Stage 4

ROUTE ID	FROM	TO	MORNING		EVENING	
			REF V STAGE 3A	REF V STAGE 4	REF V STAGE 3A	REF V STAGE 4
1	Gedling	City Centre	0.5	0.7	-0.1	1.2
	City Centre	Gedling	0.2	-0.1	0.0	0.3
2	Beeston	City Centre	0.8	0.6	-0.3	-0.4
	City Centre	Beeston	0.1	0.1	0.8	1.0
3	Aspley	City Centre	-0.4	-0.4	0.1	0.1
	City Centre	Aspley	-0.2	-0.2	-0.1	-0.2
4	Arnold	City Centre	1.0	0.4	0.6	0.5
	City Centre	Arnold	-0.3	-0.1	-0.3	0.4
5	West Bridgford	City Centre	0.0	-0.1	-0.5	-0.5
	City Centre	West Bridgford	0.4	1.1	0.1	1.3
6	Clifton	City Centre	0.2	0.1	-0.2	0.0
	City Centre	Clifton	-0.1	0.1	0.3	0.4
7	Gedling	Beeston	2.1	2.1	1.3	1.6
	Beeston	Gedling	3.0	3.2	3.0	3.6
8	Aspley	Colwick	1.1	1.7	2.7	2.0
	Colwick	Aspley	1.6	2.0	0.4	0.6
9	West Bridgford	Arnold	-0.6	-0.8	-1.1	-0.2
	Arnold	West Bridgford	1.2	0.7	0.5	0.4

7.7 Car Park Usage

7.7.1 The following section summarises the change in car park usage between the Reference Case, Stage 3a and Stage 4 scenarios.

7.7.2 The access arrangements to the Broadmarsh and Maid Marian Way (Arndale) car parks remain consistent between the Stage 4 and Stage 3a modelling. The Turning Point South scheme moves the access to Broadmarsh onto Middle Hill. The strategic modelling assumes this junction will be signalised. The Maid Marian Way (Arndale) car park access remains on Maid Marian Way, but is only accessed via a right-in, right-out priority junction. Access to

the car park is not permitted from Grayfriar Gate, ie. it is not accessible to traffic from the north. All other access is permitted.

7.7.3 Table 13 presents the predicted changes in car park vehicle usage between the Reference Case and the Stage 3a and Stage 4 scenarios. The table also includes changes at Fletcher Gate, Lace Market and the Victoria Centre.

7.7.4 The addition of the Connecting Eastside scheme is forecast to makes the Broadmarsh and Fletcher Gate car parks less attractive, compared to the Reference Case, particularly in the evening peak. This is because vehicles leaving the car park have no direct route to London Road South and must divert via Fisher Gate which increases travel time and distance compared to both the Reference Case and Stage 3a.

Table 13. Change in Car Park Use (vehicles) – Stage 4

CAR PARK	DIRECTION	MORNING		INTER		EVENING	
		REF V STAGE 3A	REF V STAGE 4	REF V STAGE 3A	REF V STAGE 4	REF V STAGE 3A	REF V STAGE 4
Broadmarsh	In	167	131	94	81	-6	2
	Out	-39	-44	4	-44	-28	-106
Maid Marian Way (Arndale)	In	37	39	34	38	73	71
	Out	89	96	89	147	49	91
Fletcher Gate	In	-134	-135	-65	-65	-105	-97
	Out	-96	-94	-117	-156	-61	-131
Lace Market/Stoney Street	In	36	-12	10	-12	21	-32
	Out	-19	-20	-5	-11	7	49
Victoria Centre	In	16	10	1	-43	-13	1
	Out	33	1	-36	-36	-33	-33

7.8 Stage 4 Summary

7.8.1 The strategic modelling indicates that Connecting Eastside is not forecast to fundamentally change the main impacts of the Turning Point South Scheme. However, the scheme does cause rerouting of traffic in the eastern parts of the City.

7.8.2 The biggest impact of the Connecting Eastside scheme is the change in roles of Lower Parliament Street and Bellar Gate. The former becomes the main northbound route on the eastern side of the city whilst the latter becomes a local route. A significant reduction along Bellar Gate is therefore forecast to occur.

7.8.3 The closure of Pennyfoot Street to westbound traffic causes a wider reassignment impact. Traffic wishing to access London Road and the Southern Relief Road are forecast to use roads through West Bridgford, particularly Meadows Lane, whilst traffic wanting to access northern parts of the city are forecast to use Bath Street. Both consequently experience and increase in traffic.

7.8.4 The removal of the right turn from Canal Street onto London Road South increases travel time and distance for this traffic performing this movement as they are divert along Fisher Gate instead. In addition, the removal of the link between Lower Parliament Street and London Road forces traffic encourages traffic to use the reconfigured London Road/Canal Street junction and hence increases journey times for affected traffic.

8. STAGE 5: SENSITIVITY TESTING

8.1 Overview

8.1.1 The Stage 4 Connecting Eastside sensitivity test concluded that the scheme is not forecast to fundamentally change the main impacts of the Turning Point South Scheme however it does, in current form, cause rerouting of traffic in the eastern parts of the City. The Connecting Eastside scheme was therefore refined and tested once more in the Stage 5 modelling.

8.1.2 The main changes from the Stage 4 modelling include:

- Reinstatement of a right tum between London Road and Lower Parliament Street at the London Road/Canal Street gyratory. This permits the right turn movement from Canal Street to London Road and aims to reduce the amount of traffic using Fishergate.
- Conversion of Fishergate from a one-way street into a two-way street. One lane in each direction.
- Conversion of Pennyfoot Street from a one-way street into a two-way street.
- Poplar Street/Evelyn Street becomes a through route linking Lower Parliament Street and Manvers Street. No right turn from Manvers Street into Evelyn Street.
- Changes to the permitted movements at the Fishergate/Pennyfoot Street junction.

8.1.3 This chapter summarises the impacts the Stage 5 adjustments have made on the local traffic routings compared to Stage 4.

8.2 Impact on Highway Trips

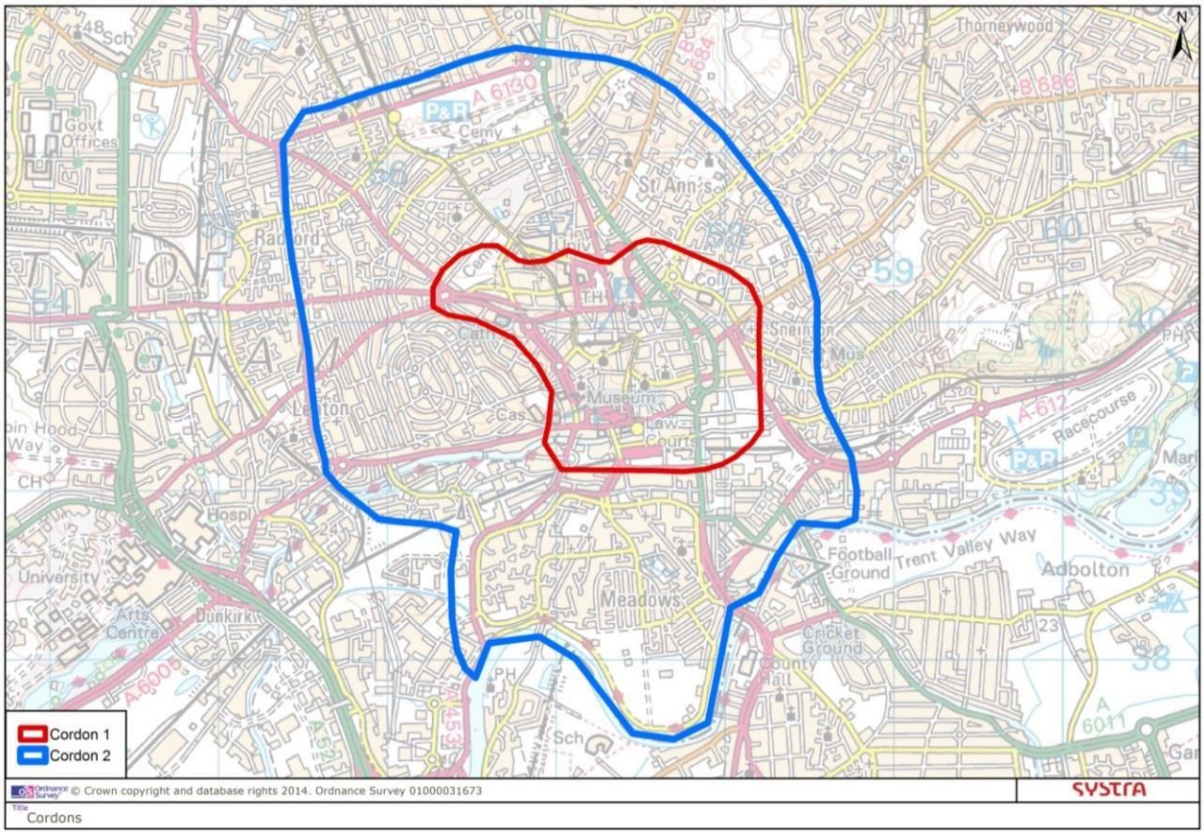
8.2.1 Table 14 presents the highway trips going into and through the city centre in the Reference Case, Stage 3a, Stage 4 and Stage 5. These have been generated by producing two cordons of the SATURN highway model; one covering purely the city centre (Cordon 1) and one which includes the city centre and peripheral areas (Cordon 2). The cordon areas are shown in Figure 24.

8.2.2 In both peak hours the Stage 5 changes encourage traffic back into the central area of Cordon 1 compared to Stage 4, although traffic in both cordons remain below Reference Case levels indicating that the combined impact of the Turning Point South scheme and Connecting Eastside proposals is a reduction in traffic levels in the city centre.

Table 14. Cordoned Highway Trips (Vehicles)

	REF	STAGE 3A	CHANGE (TO REF)	STAGE 4	CHANGE (TO REF)	STAGE 5	CHANGE (TO REF)
Morning Peak							
Cordon 1	13,888	13,757	-132	13,599	-289	13,678	-211
Cordon 2	22,781	22,719	-62	22,731	-49	22,703	-78
Evening Peak							
Cordon 1	14,090	14,022	-68	13,595	-495	13,852	-238
Cordon 2	23,875	23,730	-146	23,693	-182	23,625	-251

Figure 24. Cordon Extents



8.1 Comparison to Stage 4

Traffic Flows

8.1.1 Figure 25 and Figure 26 provide traffic flow changes between Stage 4 and Stage 5. These illustrations show the impact of Stage 5 changes only.

8.1.2 The addition of the right turn movement from Canal Street to London Road encourages this movement in both peak hours and leads to a reduction in traffic along Fisher Gate and London Road to the north of the junction.

8.1.3 Compared to Stage 4, the changes to Pennyfoot Street and Poplar Street provide traffic with an alternative route to southern parts of the city and encourages traffic travelling into the central area from east Nottingham to use these routes. In the morning peak approximately 200 pcus are forecast to use Poplar Street and 340 pcus are forecast to use Pennyfoot Street. In the evening peak Poplar Street attracts approximately 400 pcus but there is a reduction along Pennyfoot Street as traffic previously using this road switches to Poplar Street.

8.1.4 The use of Pennyfoot Street and Poplar Street discussed above is expected to reduce traffic flow along A612 Manvers Street and Southwell Road by approximately 300 pcus in the morning peak and 170 pcus in the evening peak.

8.1.5 Changes to other areas of the network are minimal indicating the Stage 5 changes are not expected to have significant wider rerouting effects.

Congestion

8.1.6 The changes do not have a significant impact on the congestion compared to Stage 4.

Figure 25. Change in Traffic Flow Stage 4 v Stage 5 – Morning Peak

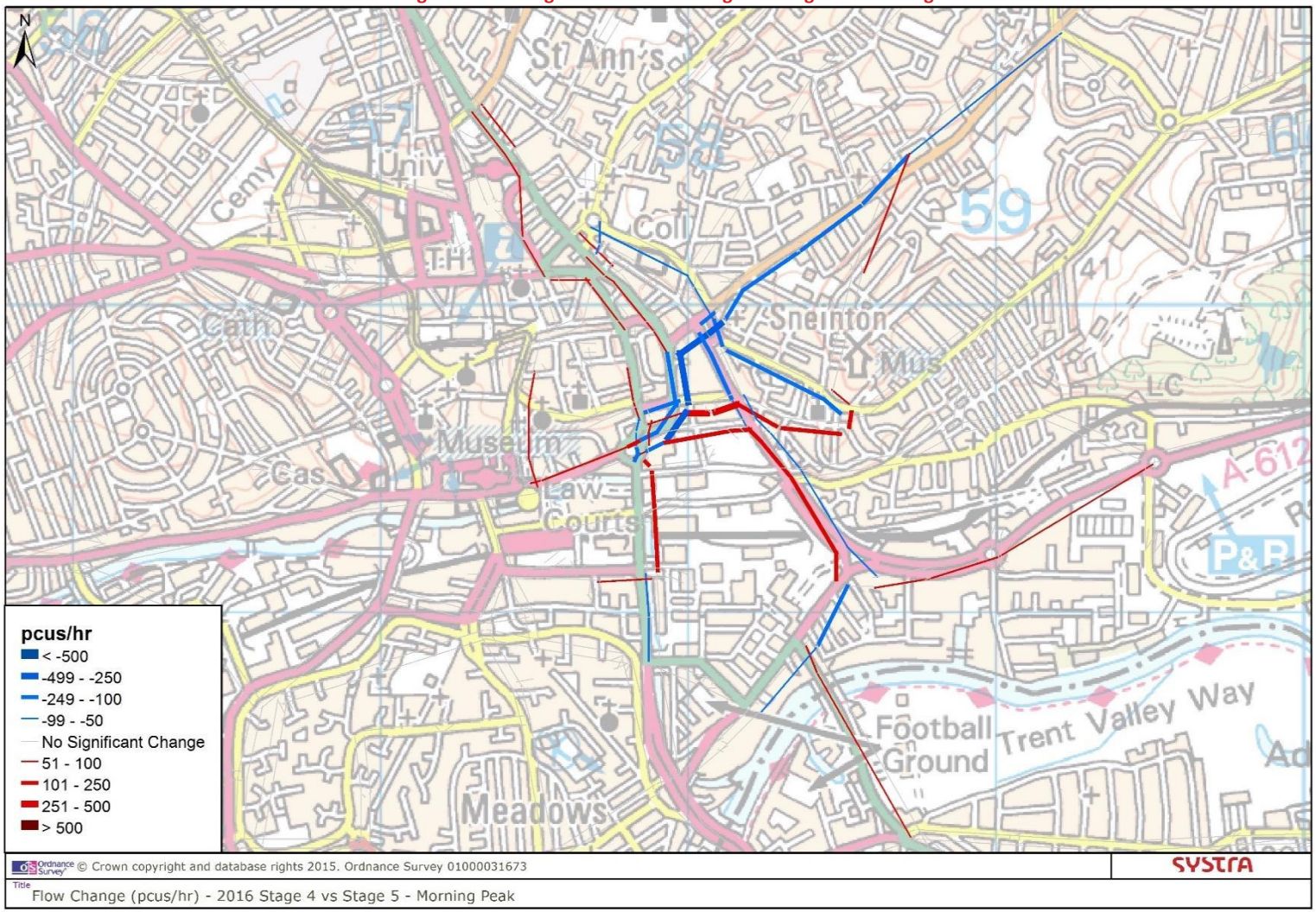
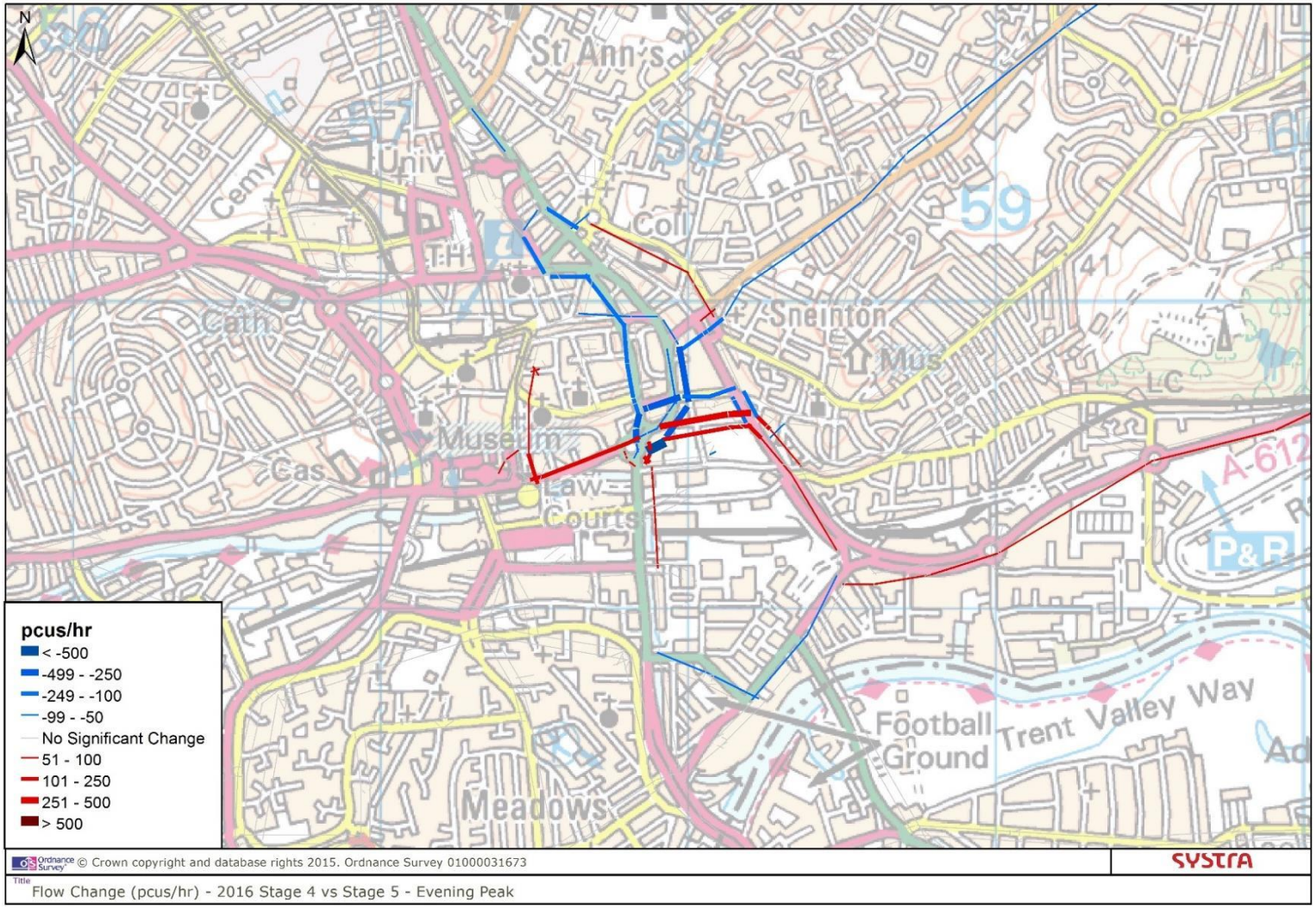


Figure 26. Change in Traffic Flow Stage 4 v Stage 5 – Evening Peak



8.2 Car Journey Times

8.2.1 Both increases in travel distance (caused by longer routings) and increases in travel time (driven by increases in distance and delays) affect overall car journey times. Calculating the change in journey times is a useful indicator in quantifying the impacts of the scheme.

8.2.2 This section provides changes in car journey times for a selection of routes into/out of and through Nottingham City Centre. Table 15 provides the changes in car journey times, expressed in minutes, between the Reference Case, Stage 3a, Stage 4 and Stage 5 scenarios.

8.2.3 In general, Stage 5 has little effect on the majority of car journey times presented in Table 15. The changes to the configuration of Connecting Eastside are forecast to improve the journey times between the City and West Bridgford as reinstatement of the right turn from Canal Street results in a more direct route for this journey. Journey times from Gedling and Arnold to the City expected to worsen slightly due to the additional set of signals implemented on London Road to allow right turn from Canal Street to London Road South which stops the free flow of traffic.

Table 15. Change in Car Journey Times (minutes) – Stage 5

ROUTE ID	FROM	TO	MORNING			EVENING		
			REF V STAGE 3A	REF V STAGE 4	REF V STAGE 5	REF V STAGE 3A	REF V STAGE 4	REF V STAGE 5
1	Gedling	City Centre	0.5	0.7	1.3	-0.1	1.2	2.1
	City Centre	Gedling	0.2	-0.1	0.4	0.0	0.3	0.0
2	Beeston	City Centre	0.8	0.6	0.6	-0.3	-0.4	-0.4
	City Centre	Beeston	0.1	0.1	0.1	0.8	1.0	1.2
3	Aspley	City Centre	-0.4	-0.4	-0.4	0.1	0.1	0.2
	City Centre	Aspley	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1
4	Arnold	City Centre	1.0	0.4	0.6	0.6	0.5	0.4
	City Centre	Arnold	-0.3	-0.1	-0.1	-0.3	0.4	-0.1
5	West Bridgford	City Centre	0.0	-0.1	-0.1	-0.5	-0.5	-0.1
	City Centre	West Bridgford	0.4	1.1	0.6	0.1	1.3	0.2
6	Clifton	City Centre	0.2	0.1	0.1	-0.2	0.0	0.2
	City Centre	Clifton	-0.1	0.1	-0.1	0.3	0.4	0.5
7	Gedling	Beeston	2.1	2.1	2.0	1.3	1.6	2.0
	Beeston	Gedling	3.0	3.2	3.3	3.0	3.6	3.7
8	Aspley	Colwick	1.1	1.7	1.7	2.7	2.0	2.0
	Colwick	Aspley	1.6	2.0	1.6	0.4	0.6	0.5
9	West Bridgford	Arnold	-0.6	-0.8	-0.7	-1.1	-0.2	-0.4
	Arnold	West Bridgford	1.2	0.7	0.6	0.5	0.4	0.5

8.3 Car Park Usage

8.3.1 The following section summarises the change in car park usage between the Reference Case, Stage 3a, Stage 4 and Stage 5 scenarios. The figures in Table 16 illustrate the change in car park usage (vehicles) compared to the Reference Case.

8.3.2 The changes to the Connecting Eastside scheme do not significantly alter the general trends experienced in Stage 4. In the evening peak however the Stage 5 changes encourage a greater use of Broadmarsh, Fletcher Gate and Lace Market. Changes for these car parks are more comparable to those from Stage 3a. The use of car parks will be examined in further detail in Stage 6.

Table 16. Change in Car Park Use (vehicles) – Stage 5

CAR PARK	DIRECTION	MORNING			INTER			EVENING		
		REF V STAGE 3A	REF V STAGE 4	REF V STAGE 5	REF V STAGE 3A	REF V STAGE 4	REF V STAGE 5	REF V STAGE 3A	REF V STAGE 4	REF V STAGE 5
Broadmarsh	In	167	131	128	94	81	78	-6	2	9
	Out	-39	-44	-39	4	-44	-6	-28	-106	-47
Maid Marian Way (Arndale)	In	37	39	37	34	38	40	73	71	75
	Out	89	96	86	89	147	99	49	91	70
Fletcher Gate	In	-134	-135	-135	-65	-65	-63	-105	-97	-79
	Out	-96	-94	-68	-117	-156	-77	-61	-131	-53
Lace Market/Stoney Street	In	36	-12	-18	10	-12	-10	21	-32	-63
	Out	-19	-20	-27	-5	-11	-40	7	49	7
Victoria Centre	In	16	10	7	1	-43	-41	-13	1	2
	Out	33	1	2	-36	-36	-3	-33	-33	76

8.4 Stage 5 Summary

8.4.1 Although the Stage 4 strategic modelling indicates that Connecting Eastside is not forecast to fundamentally change the main impacts of the Turning Point South Scheme, it is expected to cause rerouting of traffic in the eastern parts of the City. Stage 5 of the strategic modelling has focussed on assessing the impact of the refined Connecting Eastside highway infrastructure proposals. The impact of these changes are localised, affecting only routings in the immediate area.

8.4.2 In particular, the changes to Pennyfoot Street and Poplar Street provide traffic with an alternative route to southern parts of the city and encourage traffic travelling into the central area from east Nottingham to use these routes. This causes a reduction in traffic using Southwell Road.

8.4.3 The reinstatement of a right turn at the London Road gyratory for Canal Street traffic turning south on to London Road encourages traffic back onto this route and relieves traffic levels and congestion along Fisher Gate. This more direct route also positively affects journey times on routes between West Bridgford and the City.

9. STAGE 6: CAR PARK SENSITIVITY TEST

9.1 Overview

9.1.1 The purpose of the Stage 6 sensitivity test was to review how Nottingham City Centre car parks are modelled in GNTM and, where necessary, adjust the model so that it better represents actual car park use characteristics.

9.1.2 For each city centre car park, the review identified the car park pricing strategy, availability of season tickets and opening hours. This was combined with local knowledge to determine whether the car park was short stay, long stay or mixed use. It is assumed that short stay car parks are primarily used by shopping and leisure trips. Long stay car parks are assumed to be used by commuters. Mixed car parks are assumed to be used by a shopping, leisure and commuting trips. Table 17 provides an overview of the car park review.

Table 17. Car Park Type

CAR PARK	GNTM TYPE	REVISED TYPE
Broadmarsh Car Park	Mixed	Mixed
Maid Marian Way Car Park (Arndale)	Mixed	Long Stay
Fletcher Gate (Lace Market)	Mixed	Mixed
Stoney St (Lace Market)	Mixed	Long Stay
Victoria Centre	Mixed	Short Stay
St James's Street	Mixed	Mixed
Mount Street	Mixed	Short Stay
Upper Parliament Street	Mixed	Short Stay
Curzon Street	Mixed	Mixed
Nottingham Arena	Mixed	Mixed
Sneiton Square	Mixed	Mixed
Trinity Square	Mixed	Mixed
Crowne Plaza/ Royal	Mixed	Long Stay
Nottingham Railway Station	Mixed	Long Stay
Queens Bridge Road	Mixed	Long Stay
Nottingham Castle Car Park	Mixed	Mixed

9.1.3 In the GNTM all car parks were originally classified as mixed use. The review highlighted a total of 8 mixed usage car parks within the city and for these it was considered that GNTM already provided a suitable representation of these car parks. The remaining 8 car parks were adjusted in the Stage 6 modelling, restricting commuting vehicles from some car parks and retail/leisure vehicles from others. Employers business trips were allowed to park in all car parks.

9.1.4 In addition to a review of public and private car parks, the Stage 6 sensitivity test removed the car parking provision at the new Nottingham Skills Hub thereby forcing vehicles to use nearby car parks or switch mode to bus, NET or rail.

9.2 Impact on Skills Hub Mode Share

9.2.1 The removal of car parking provision at the Skills Hub increases public transport mode share at the site by 4% in the morning peak. There is no change in the evening peak. Table 18 provides a summary of the predicted number of highway vehicles and public transport mode share for the Skills Hub site. The figures in brackets are the Stage 2 reported figures and have been included for comparison purposes.

Table 18. Skills Hub generations

	AM		PM	
	IN	OUT	IN	OUT
Person Generations	512	24	44	98
Highway Vehicles	382 (402)	18 (19)	32 (32)	66 (66)
Public Transport Mode Share	28% (24%)		32% (32%)	

9.3 Impact on Highway Trips

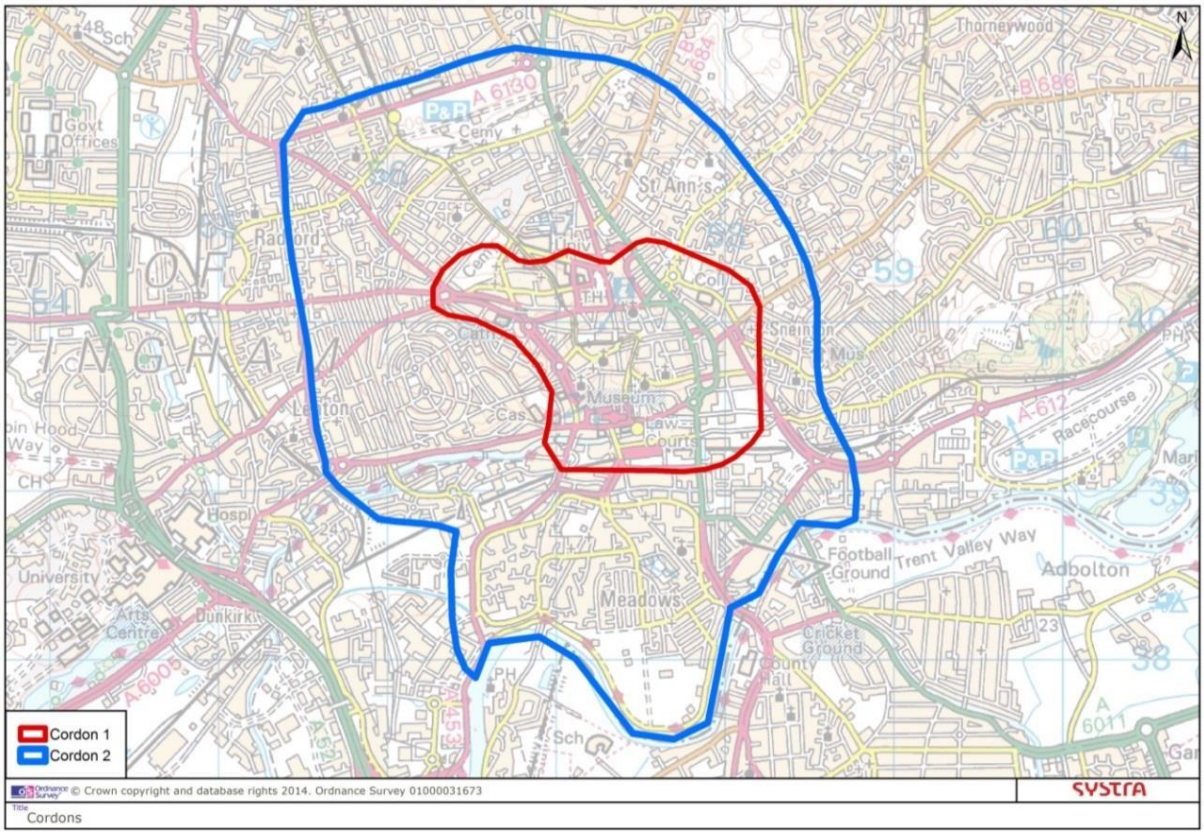
9.3.1 Table 19 presents the highway trips going into and through the city centre in the Reference Case, Stage 3a, Stage 5 and Stage 6. These have been generated by producing two cordons of the SATURN highway model; one covering purely the city centre (Cordon 1) and one which includes the city centre and peripheral areas (Cordon 2). The cordon areas are shown in Figure 27.

9.3.2 The Stage 6 changes have little significant effect on the traffic passing through each cordon, indicating the adjustments to car parks have not considerably altered traffic routings or modes within the city.

Table 19. Cordoned Highway Trips (Vehicles)

	REF	STAGE 3A	CHANGE (TO REF)	STAGE 5	CHANGE (TO REF)	STAGE 6	CHANGE (TO REF)
Morning Peak							
Cordon 1	13,888	13,757	-132	13,678	-211	13,679	-209
Cordon 2	22,781	22,719	-62	22,703	-78	22,673	-108
Evening Peak							
Cordon 1	14,090	14,022	-68	13,852	-238	13,768	-322
Cordon 2	23,875	23,730	-146	23,625	-251	23,593	-283

Figure 27. Cordon Extents



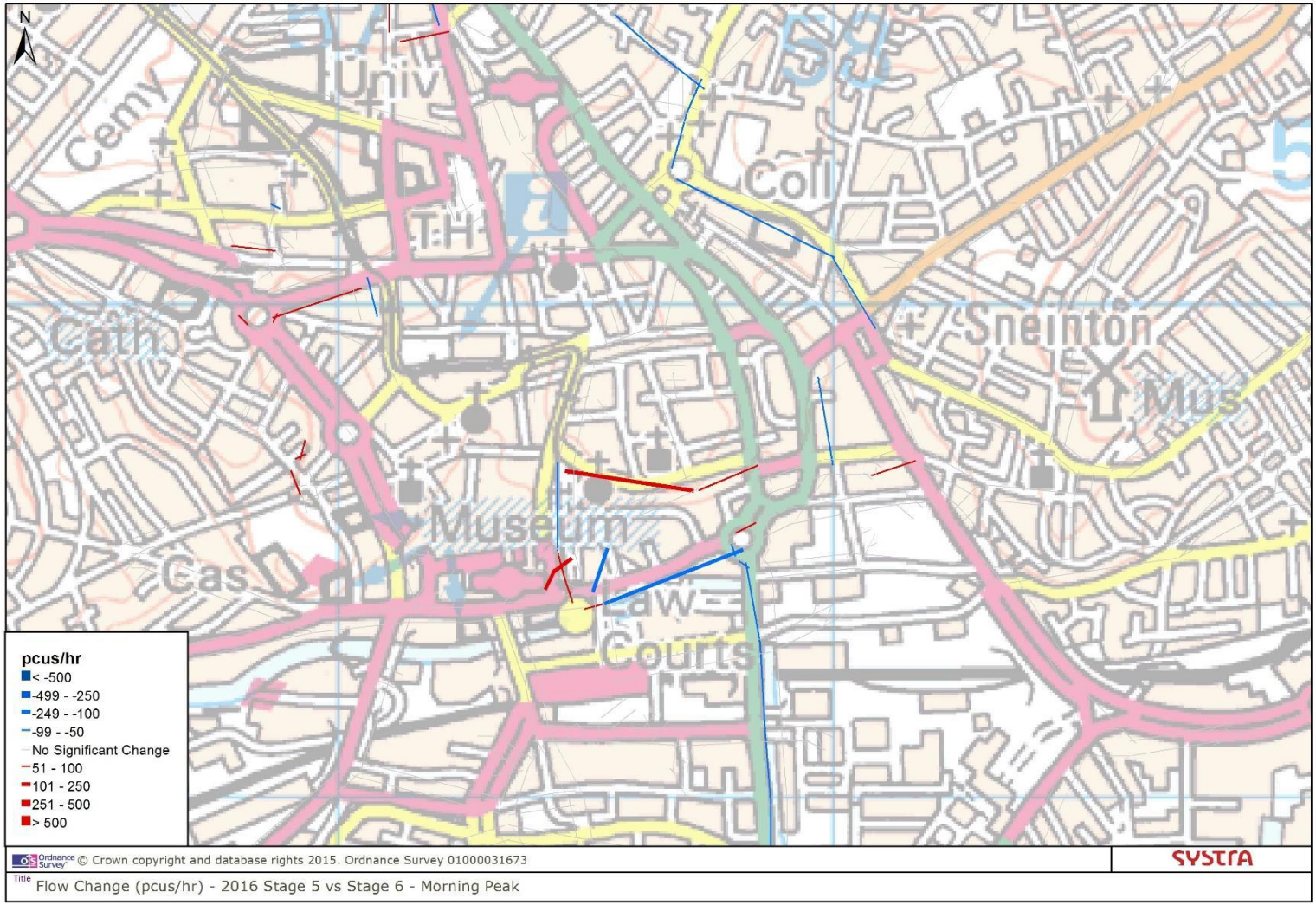
9.4 Comparison to Stage 5

9.4.1 The adjustments to the car parks are not forecast to have a significant effect on the traffic flows or congestion at junctions. Figure 28 illustrates the predicted impact compared to the Stage 5 in the morning peak. There is no identifiable impact in the evening peak.

9.4.2 The impact across the city as a whole is minimal. However, there is forecast to be a transference of traffic away from Canal Street and onto High Pavement. This is caused by the Hub traffic passing through the Middle Hill/Canal Street junction and entering Broadmarsh car park. The additional vehicles results in a slight increase in congestion for the right turn at this junction, and in doing so encourages some traffic destined for the core of the city centre to route via High Pavement.

9.4.3 The switching of routes between Canal Street and High Pavement signifies that the operation of the Middle Hill/Canal Street junction is critical in determining route choice into to the city centre, and indicates that - on a strategic level - minor changes to congestion at this location can result in wider routing impacts.

Figure 28. Change in Traffic Flow Stage 5 v Stage 6 – Morning Peak



9.5 Car Journey Times

9.5.1 Both increases in travel distance (caused by longer routings) and increases in travel time (driven by increases in distance and delays) affect overall car journey times. Calculating the change in journey times is a useful indicator in quantifying the impacts of the scheme.

9.5.2 This section provides changes in car journey times for a selection of routes into/out of and through Nottingham City Centre. Table 20 provides the changes in car journey times, expressed in minutes, between the Reference Case, Stage 3a, Stage 5 and Stage 6 scenarios.

9.5.3 The changes illustrated in Table 20 suggest that, for the majority of journey time routes, the adjustments to car parks are not forecast to have a significant impact. The adjustments to the car parks which commuting vehicles are allowed to use leads to a shift in vehicles from the northern car parks (Upper Parliament Street and Victoria Centre) to car parks in the south and east of the city (Maid Marian Way and Lace Market). The additional distance incurred to access these alternative car parks increases journey times from Beeston, Arnold and Aspley.

Table 20. Change in Car Journey Times (minutes) – Stage 6

ROUTE ID	FROM	TO	MORNING			EVENING		
			REF V STAGE 3A	REF V STAGE 5	REF V STAGE 6	REF V STAGE 3A	REF V STAGE 5	REF V STAGE 6
1	Gedling	City Centre	0.5	1.3	1.0	-0.1	2.1	2.0
	City Centre	Gedling	0.2	0.4	0.3	0.0	0.0	0.0
2	Beeston	City Centre	0.8	0.6	0.7	-0.3	-0.4	-0.5
	City Centre	Beeston	0.1	0.1	0.4	0.8	1.2	3.2
3	Aspley	City Centre	-0.4	-0.4	-0.3	0.1	0.2	0.2
	City Centre	Aspley	-0.2	-0.2	1.5	-0.1	-0.1	2.0
4	Arnold	City Centre	1.0	0.6	1.5	0.6	0.4	1.3
	City Centre	Arnold	-0.3	-0.1	0.9	-0.3	-0.1	2.3
5	West Bridgford	City Centre	0.0	-0.1	0.1	-0.5	-0.1	-0.3
	City Centre	West Bridgford	0.4	0.6	0.5	0.1	0.2	0.1
6	Clifton	City Centre	0.2	0.1	0.2	-0.2	0.2	0.1
	City Centre	Clifton	-0.1	-0.1	0.0	0.3	0.5	0.9
7	Gedling	Beeston	2.1	2.0	2.2	1.3	2.0	2.3
	Beeston	Gedling	3.0	3.3	3.4	3.0	3.7	4.2
8	Aspley	Colwick	1.1	1.7	1.8	2.7	2.0	2.7
	Colwick	Aspley	1.6	1.6	1.9	0.4	0.5	0.6
9	West Bridgford	Arnold	-0.6	-0.7	-0.5	-1.1	-0.4	0.0
	Arnold	West Bridgford	1.2	0.6	1.0	0.5	0.5	0.6

9.6 Car Park Usage

9.6.1 The following section summarises the change in car park usage between the Reference Case, Stage 3a, Stage 5 and Stage 6 scenarios. The figures in Table 21 illustrate the change in car park usage (vehicles) compared to the Reference Case.

Table 21. Change in Car Park Use (vehicles) – Stage 6

CAR PARK	DIRECTION	MORNING			INTER			EVENING		
		Ref v Stage 3a	Ref v Stage 5	Ref v Stage 6	Ref v Stage 3a	Ref v Stage 5	Ref v Stage 6	Ref v Stage 3a	Ref v Stage 5	Ref v Stage 6
Broadmarsh	In	167	128	277	94	78	73	-6	9	36
	Out	-39	-39	-36	4	-6	26	-28	-47	-6
Maid Marian Way (Arndale)	In	37	37	10	34	40	55	73	75	-19
	Out	89	86	55	89	99	8	49	70	12
Fletcher Gate	In	-134	-135	-111	-65	-63	9	-105	-79	-28
	Out	-96	-68	-70	-117	-77	-52	-61	-53	-36
Lace Market/Stoney Street	In	36	-18	-39	10	-10	-98	21	-63	-123
	Out	-19	-27	-30	-5	-40	-73	7	7	-3
Victoria Centre	In	16	7	-8	1	-41	-10	-13	2	-20
	Out	33	2	-54	-36	-3	-63	-33	76	-125

9.6.2 The impact of the car park adjustments vary by peak hour. In the morning peak, there is a noticeable increase forecast at Broadmarsh due to the additional Hub traffic which uses this car park. In the evening peak there is a significant reduction in vehicles using Maid Marian Way (Arndale) car park and Lace Market/Stoney Street car park which is a consequence of restricting shopping and leisure purposes at this location. In both peaks the Victoria Centre also experiences a reduction in use due to the restriction of commuting vehicles from this predominantly retail car park.

9.7 Stage 6 Summary

9.7.1 The Stage 6 sensitivity test has focussed on the representation of Nottingham City Centre car parks in GNTM. The access to eight car parks have been adjusted and car parking provision at the new Nottingham Skills Hub removed thereby forcing vehicles to use nearby car parks or switch mode to bus, NET or rail.

9.7.2 The impact of the changes are localised with no significant changes experienced outside the city centre. The additional Hub traffic passing through the Middle Hill/Canal Street junction and entering Broadmarsh car park causes a transfer of traffic from Canal Street onto High Pavement in the morning peak. This switching of routes indicates that the operation of the Middle Hill/Canal Street junction is critical in determining route choice into to the city centre.

9.7.3 The adjustments to the car parks leads to a shift in commuting vehicles from the northern car parks (Upper Parliament Street and Victoria Centre) to car parks in the south and east of the city (Maid Marian Way and Lace Market). The additional distance incurred to access these alternative car parks increases journey times from Beeston, Arnold and Aspley.

9.7.4 In terms of changes to car park usage, there is a noticeable increase forecast at Broadmarsh due to the additional Hub traffic which uses this car park. The Victoria Centre experiences a reduction in use, due to the restriction of commuting vehicles from this predominantly retail car park. In the evening peak there is a significant reduction in vehicles using Maid Marian Way (Arndale) car park and Lace Market/Stoney Street car park which is a consequence of restricting shopping and leisure purposes at this location.

10. CONCLUSIONS

10.1.1 The Turning Point South scheme is one element of the larger Southside Transport Strategy and provides the highway and public transport infrastructure changes necessary to redevelop the Broadmarsh area which a key priority of the City Council. The package of highway and public transport measures are designed to complement the redevelopment proposals for the Broadmarsh area.

10.1.2 This study has assessed the Turning Point South Scheme in detail using the strategic Greater Nottingham Transport Model. Subsequent sensitivity tests have examined the combined impact of Turning Point South and Connecting Eastside and has led to revised designs for the Connecting Eastside highway improvements.

10.1.3 The assessment of Turning Point South scheme was undertaken in a number of stages. A summary is provided below, along with more detailed conclusions of each stage.

- **Stage 2** created a 2016 'With Scheme' scenario which contained the full Turning Point South proposals, including the traffic generations associated with the Nottingham Skills Hub.
- **Stage 3** refined the 2016 'With Scheme' scenario. This stage was divided into two parts; Stage 3a examined the changes to the design of several key junctions whilst Stage 3b assessed the impact of a revised Maid Marian Way (Arndale) car park access strategy and amendments to the exit points from the Eastcroft depot.
- **Stage 4** Sensitivity Test assessed the strategic impacts of the Turning Point South and Connecting Eastside Phase II schemes.
- **Stage 5** Sensitivity Test refined the Connecting Eastside scheme
  Stage 6 Sensitivity Test reviewed the coding of Nottingham City Centre car parks in GNTM and, where necessary, adjusted the model so that it better represented actual car park use characteristics. Access points to eight car parks were adjusted and car parking provision at the new Nottingham Skills Hub was removed thereby forcing vehicles to use nearby car parks or switch to an alternative mode.

Conclusions from Stages 2 and 3

10.1.4 The Turning Point South Scheme is forecast to have a significant impact on the strategic transport network and is forecast to result in a reduction of traffic passing through the city centre.

10.1.5 The southern relief route is forecast to become the primary alternative route for traffic travelling west-east (or east-west) across the city. However the Stage 2 modelling indicates that delays and queues at the Wilford Road/Queens Drive/Waterway St West junction and London Road/Queens Road junction results in increased car journey times and the use of a number of alternative, residential roads through the Meadows and West Bridgford.

10.1.6 This has been addressed in Stage 3a through changes to the layout of the London Road/Queens Road junction. This leads to an improvement in the accessibility of the Southern Relief Road and encourages more traffic to use the route rather than routes

through the Meadows. However, despite the increased capacity, congestion at this location is forecast to remain high with V/C ratios for turning movements expected to exceed 100%.

10.1.7 For traffic travelling to or from the north, the closure of Collin Street is forecast to result in traffic moving away from Maid Marian Way and onto a combination of several alternative roads in the northern and eastern parts of the city centre. The refinements to the scheme in Stage 3a (two southbound left turn lanes from Castle Boulevard on to Wilford Street) reduce delays and congestion at the Castle Boulevard/Wilford Street junction and in doing so encourage more traffic to use Maid Marian Way and consequently reduce traffic on routes in the north and east.

10.1.8 The use of Broadmarsh and Maid Marian Way (Arndale) car parks is expected to increase as a result of Turning Point South, and the catchment area of the Broadmarsh car park significantly alters from the Reference Case due to the improved accessibility from East Nottingham. The distribution of traffic using the Maid Marian Way (Arndale) car park does not change significantly, but it is forecast to capture some vehicles previously using the Broadmarsh car park.

10.1.9 Overall public transport demand into and out of the city does not change significantly. The new Skills Hub NET stop largely extracts patronage from other City Centre net stops. There is an overall increase of 200 persons using NET and this increase is linked to the new trips associated with the Skills Hub and transference of trips from bus to NET.

Conclusions from Stages 4 and 5

10.1.10 The strategic modelling indicates that Connecting Eastside is not forecast to fundamentally change the main impacts of the Turning Point South Scheme. The scheme is however expected to cause rerouting of traffic in the eastern parts of the City.

10.1.11 The biggest impact of the Connecting Eastside scheme is the change in roles of Lower Parliament Street and Bellar Gate. The former becomes the main northbound route on the eastern side of the city whilst the latter becomes a local route. A significant reduction along Bellar Gate is therefore forecast to occur.

10.1.12 Changes to Pennyfoot Street and Poplar Street provide traffic with an alternative route to southern parts of the city and encourage traffic travelling into the central area from east Nottingham to use these routes. This causes a reduction in traffic using Southwell Road.

10.1.13 Stage 5 refinements to the initial Connecting Eastside designs reinstate a right turn at the London Road gyratory for Canal Street traffic turning south on to London Road. This adjustment prompts traffic to move back onto this route which relieves traffic levels and congestion along Fisher Gate. This more direct route also positively affects journey times on routes between West Bridgford and the City.

Conclusions from Stage 6

10.1.14 The access to eight car parks were adjusted to better represent likely travel behaviour. Car parking provision at the new Nottingham Skills Hub was removed thereby forcing vehicles to use nearby car parks or switch mode to bus, NET or rail.

10.1.15 The impact of the changes are localised with no significant change experienced outside the city centre. The additional Hub traffic passing through the Middle Hill/Canal Street junction and entering Broadmarsh car park causes a transfer of traffic from Canal Street onto High Pavement in the morning peak. This switching of routes indicates that the operation of the Middle Hill/Canal Street junction is critical in determining route choice into to the city centre.

10.1.16 The adjustments to the car parks leads to a shift in commuting vehicles from the northern car parks (Upper Parliament Street and Victoria Centre) to car parks in the south and east of the city (Maid Marian Way and Lace Market). The additional distance incurred to access these alternative car parks increases journey times from Beeston, Arnold and Aspley.

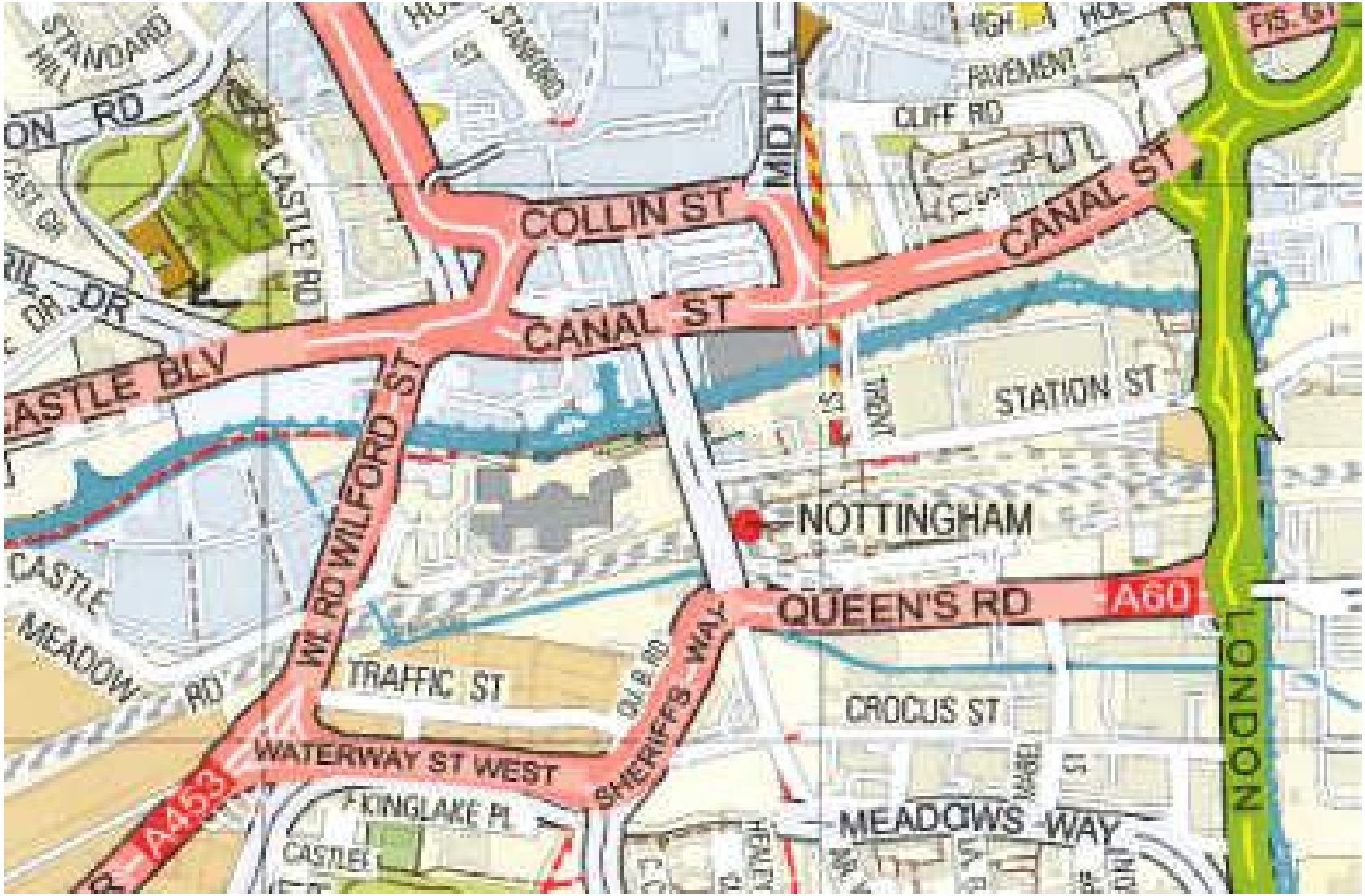
10.1.17 In terms of changes to car park usage, there is a noticeable increase forecast at Broadmarsh due to the additional Hub traffic which uses this car park. The Victoria Centre experiences a reduction in use, due to the restriction of commuting vehicles from this predominantly shoppers car park. In the evening peak there is a significant reduction in vehicles using Maid Marian Way (Arndale) car park and Lace Market/Stoney Street car park which is a consequence of restricting shopping and leisure purposes at this location.

Report Appendix A – Stage 2 Scheme Plans

Broadmarsh Gyratory Phase A Scheme Details
September 30th 2014

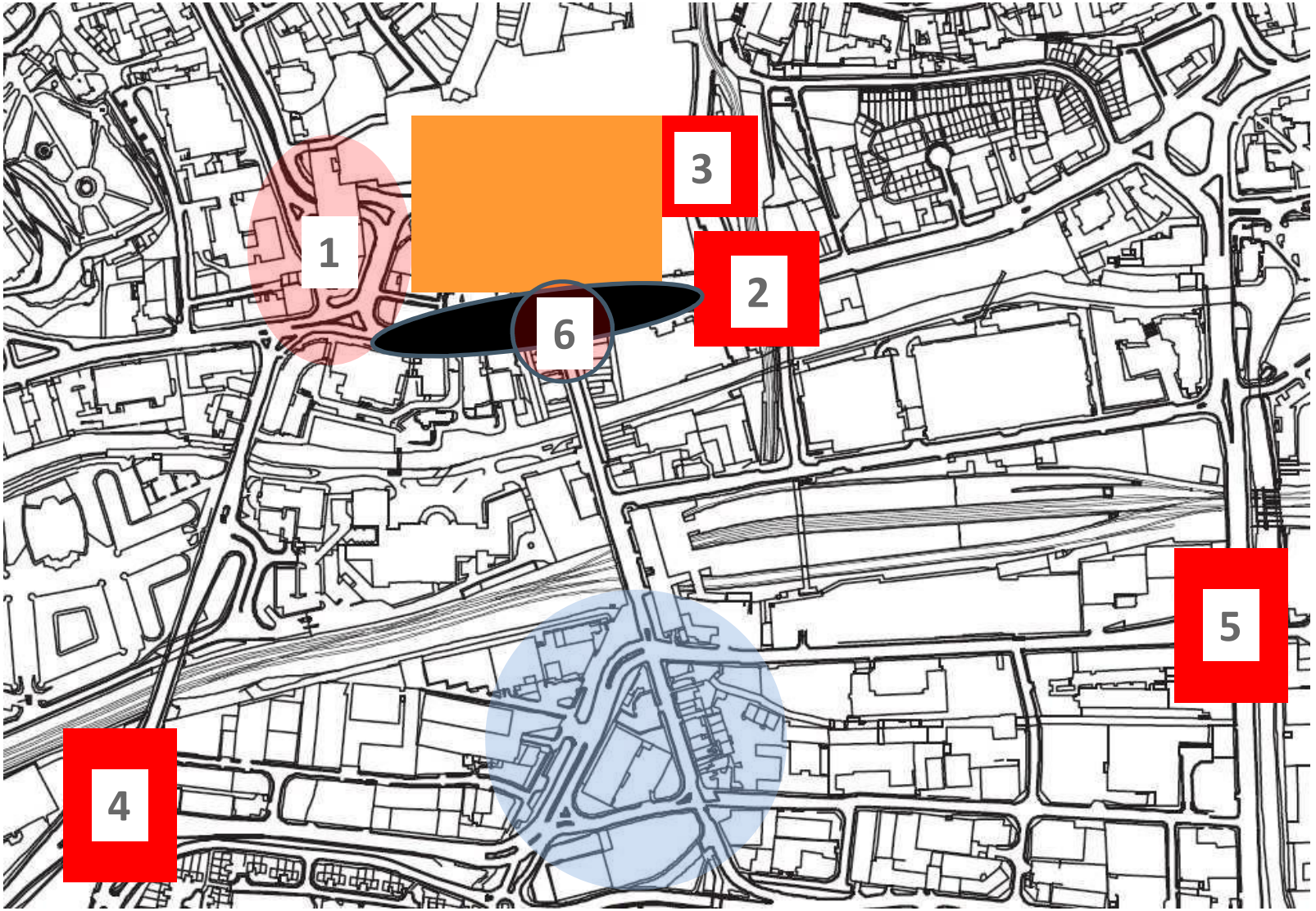
Agreed scheme to be modelled with GNTM under Stage 2 of the SYSTRA commission at meeting held on the 26th September 2014

Broadmarsh Scheme Area



SYSTRA

Broadmarsh Scheme Overview



Pedestrianised

Junctions Revised

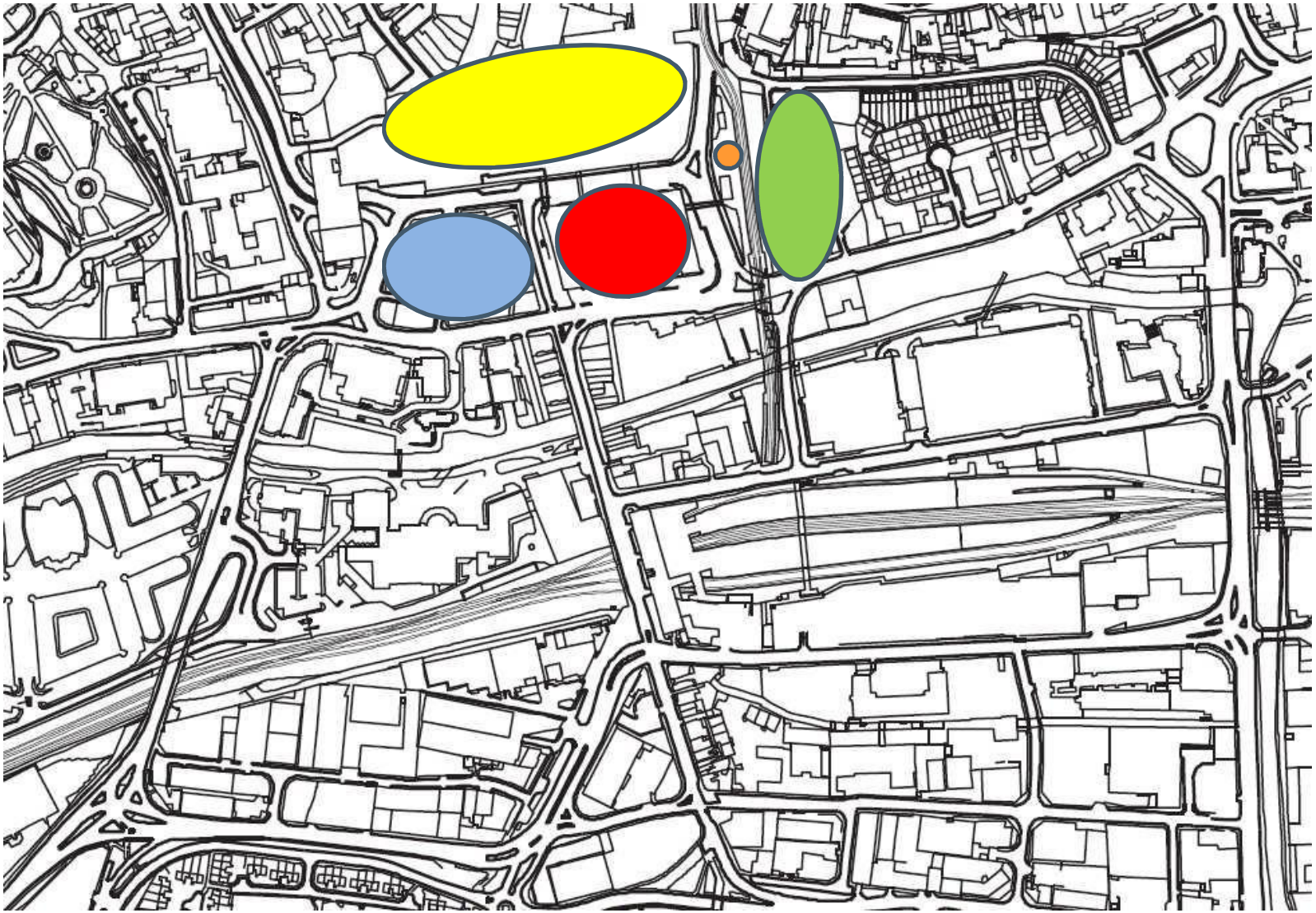
Bus Only & revised bus stop layout

Layout to change as part of NET

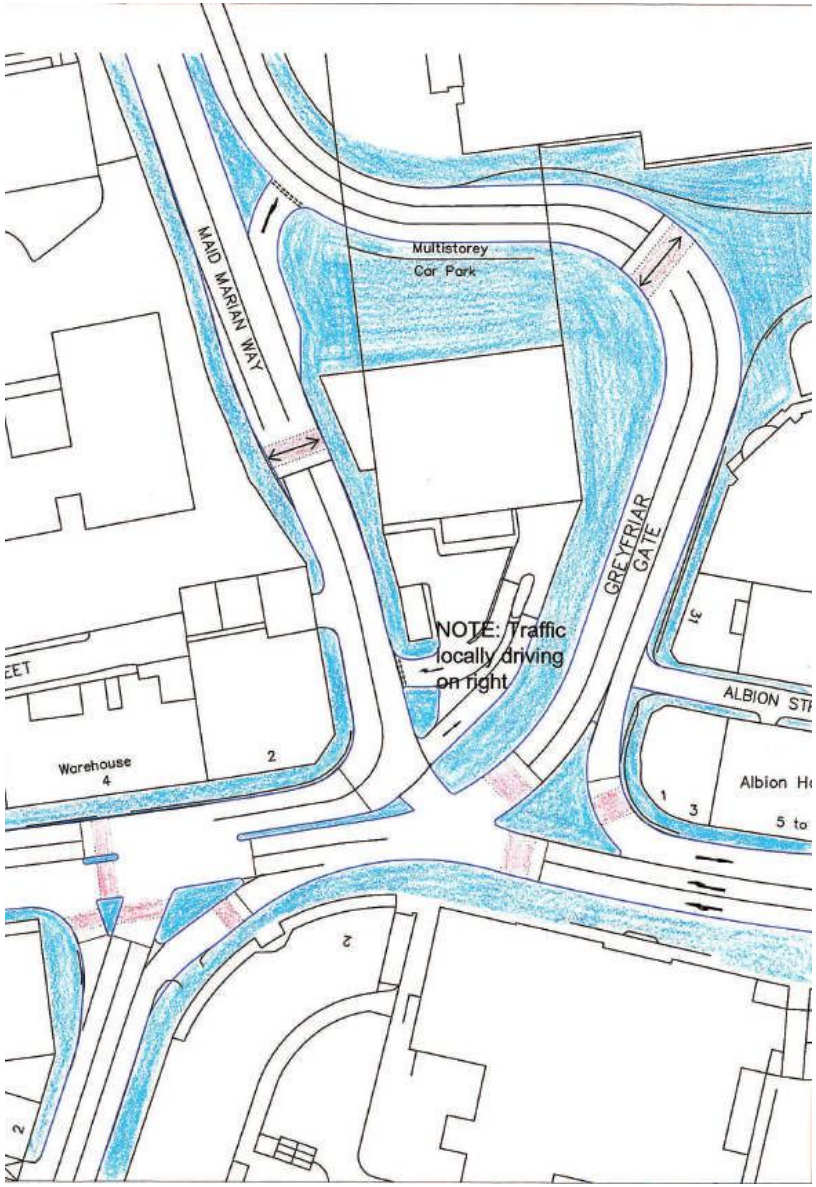
Note: junctions not highlighted will remain as existing

SYSTRA

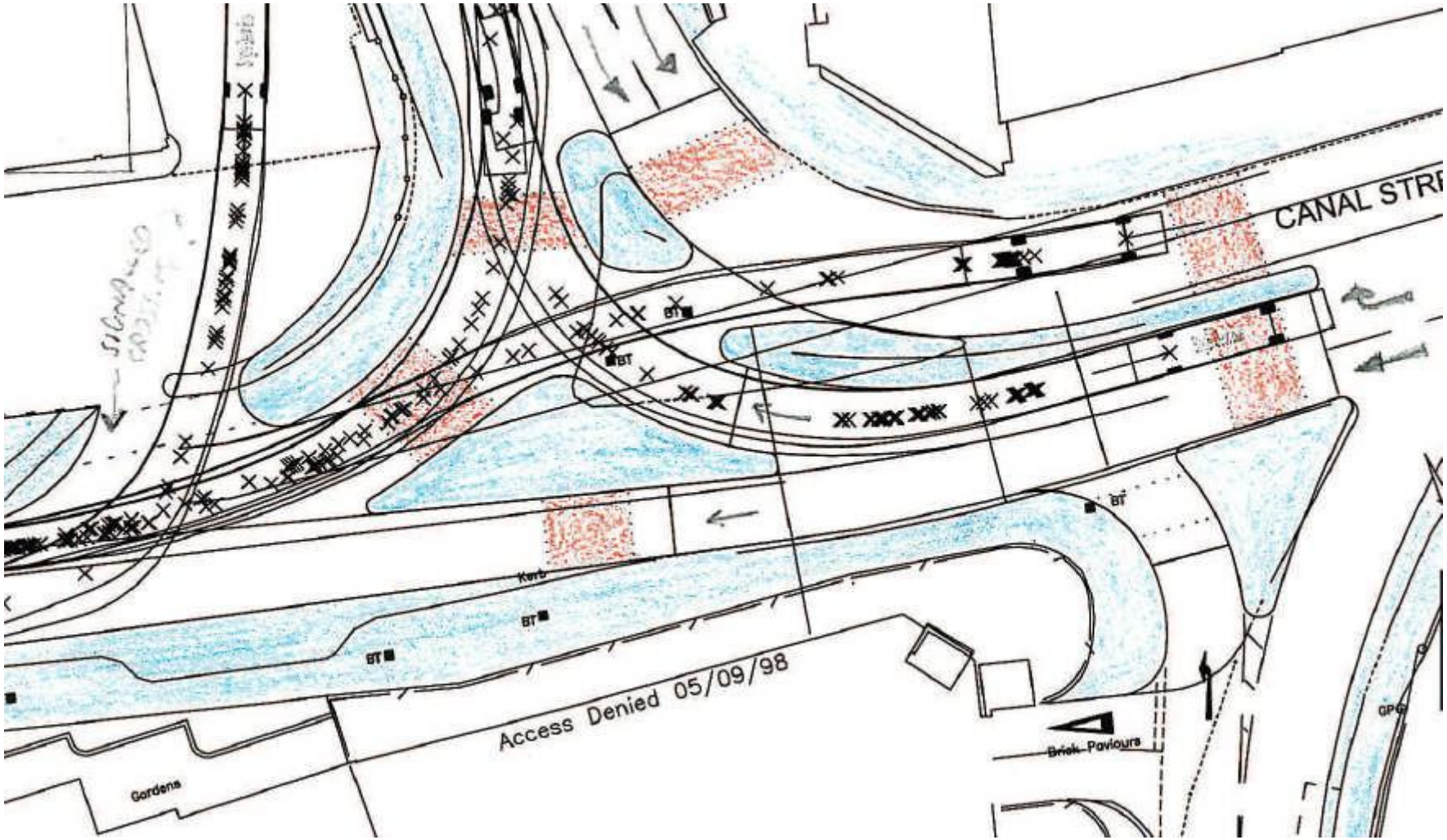
Non Scheme Transport and Land Use changes



Junction Layouts – Junction 1 Maid Marion Way

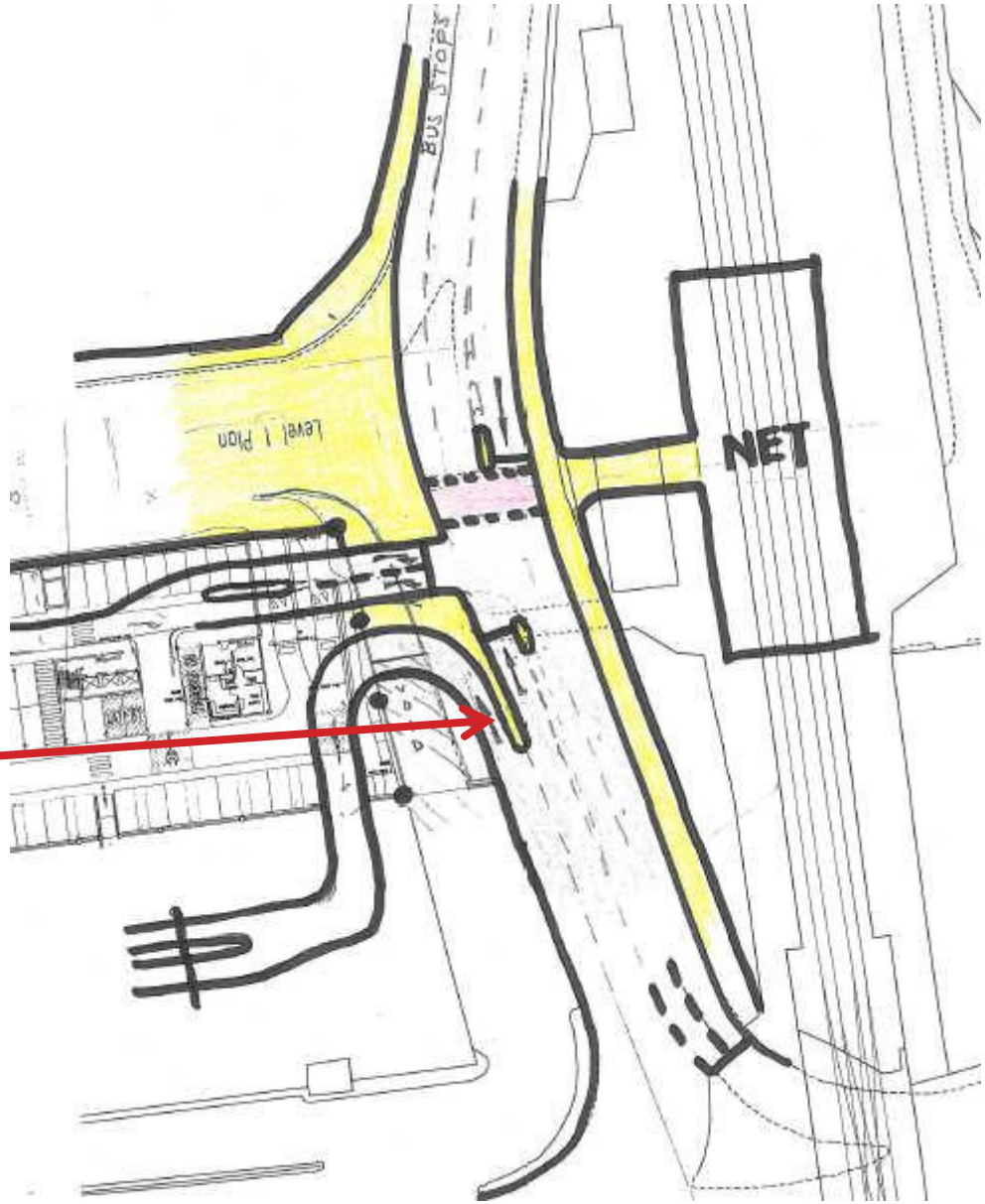


Junction Layouts – Junction 2 Canal St/Middle Hill



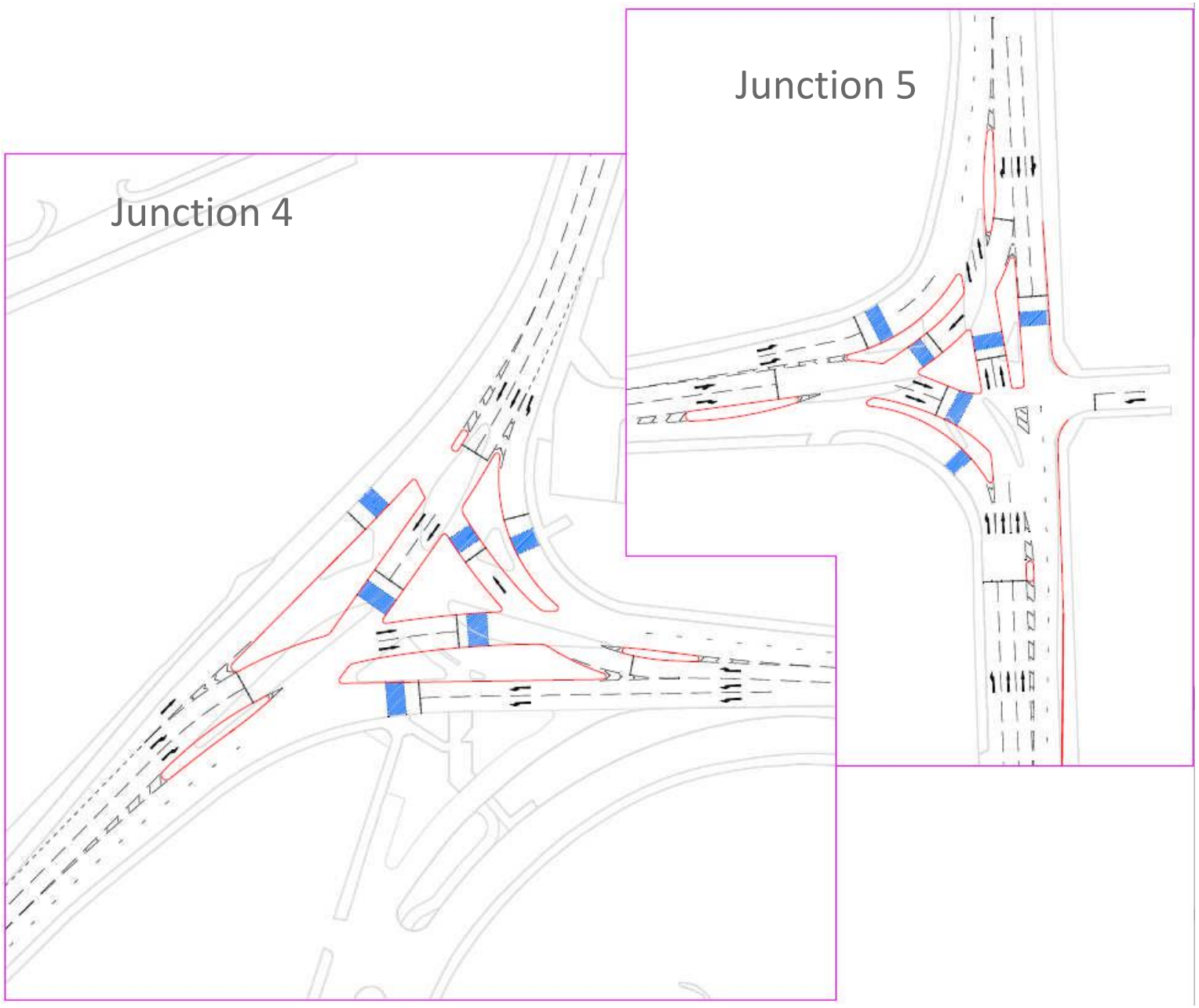
Junction Layouts – Junction 3 Middle Hill/Car Park Access

Revise to a two lane access to car park with external barriers

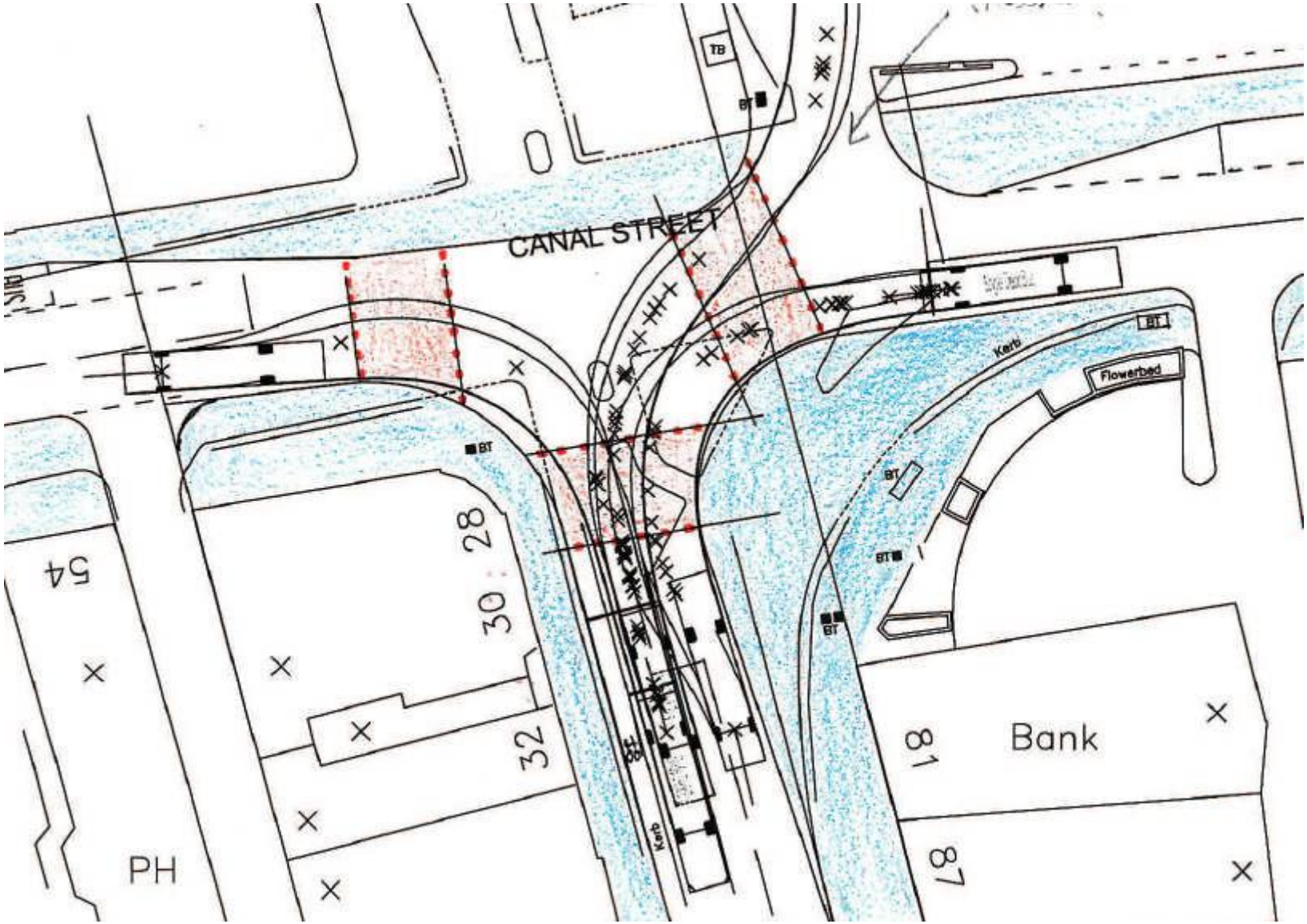


SYSTRA

Junction Layouts – Junction 4/5 Southern Relief Road



Junction Layouts – Junction 6 Canal St/Carrington St



SYSTRA

Report Appendix B – TRICs outputs

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 04 - EDUCATION
Category : C - COLLEGE/UNIVERSITY
MULTI-MODAL TOTAL PEOPLE

Selected regions and areas:

02	SOUTH EAST		
	ES	EAST SUSSEX	1 days
07	YORKSHIRE & NORTH LINCOLNSHIRE		
	WY	WEST YORKSHIRE	1 days
09	NORTH		
	TW	TYNE & WEAR	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Filtering Stage 2 selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter:	Number of students
Actual Range:	1495 to 1750 (units:)
Range Selected by User:	1000 to 2000 (units:)

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/06 to 03/11/11

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Thursday	3 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	3 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre)	2
Edge of Town	1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone	2
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Filtering Stage 3 selection:

Use Class:

D1	3 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

10,001 to 15,000	1 days
15,001 to 20,000	1 days
25,001 to 50,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

100,001 to 125,000	1 days
125,001 to 250,000	2 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	1 days
1.1 to 1.5	2 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Yes	1 days
No	2 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

LIST OF SITES relevant to selection parameters

1	ES-04-C-05	COLLEGE		EAST SUSSEX
	PENLAND ROAD			
	BEXHILL ON SEA			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of students:		1500	
	Survey date: THURSDAY		03/11/11	Survey Type: MANUAL
2	TW-04-C-01	COLLEGE		TYNE & WEAR
	HAWKEY'S LANE			
	CHIRTON			
	NORTH SHIELDS			
	Suburban Area (PPS6 Out of Centre)			
	Residential Zone			
	Total Number of students:		1495	
	Survey date: THURSDAY		04/11/10	Survey Type: MANUAL
3	WY-04-C-01	COLLEGE		WEST YORKSHIRE
	NEW HEY ROAD			
	SALENDINE NOOK			
	HUDDERSFIELD			
	Edge of Town			
	No Sub Category			
	Total Number of students:		1750	
	Survey date: THURSDAY		21/09/06	Survey Type: MANUAL

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 04 - EDUCATION/C - COLLEGE/UNIVERSITY
MULTI-MODAL TOTAL PEOPLE
Calculation factor: 1 STUDEN
Estimated TRIP rate value per 1 STUDEN shown in shaded columns
BOLD print indicates peak (busiest) period

	ARRIVALS				DEPARTURES				TOTALS			
Time Range	No. Days	Ave. STUDEN	Trip Rate	Estimated Trip Rate	No. Days	Ave. STUDEN	Trip Rate	Estimated Trip Rate	No. Days	Ave. STUDEN	Trip Rate	Estimated Trip Rate
00:00 - 01:00												
01:00 - 02:00												
02:00 - 03:00												
03:00 - 04:00												
04:00 - 05:00												
05:00 - 06:00												
06:00 - 07:00												
07:00 - 08:00	3	1582	0.047	0.047	3	1582	0.002	0.002	3	1582	0.049	0.049
08:00 - 09:00	3	1582	0.359	0.359	3	1582	0.017	0.017	3	1582	0.376	0.376
09:00 - 10:00	3	1582	0.123	0.123	3	1582	0.019	0.019	3	1582	0.142	0.142
10:00 - 11:00	3	1582	0.098	0.098	3	1582	0.037	0.037	3	1582	0.135	0.135
11:00 - 12:00	3	1582	0.116	0.116	3	1582	0.126	0.126	3	1582	0.242	0.242
12:00 - 13:00	3	1582	0.087	0.087	3	1582	0.137	0.137	3	1582	0.224	0.224
13:00 - 14:00	3	1582	0.162	0.162	3	1582	0.083	0.083	3	1582	0.245	0.245
14:00 - 15:00	3	1582	0.066	0.066	3	1582	0.151	0.151	3	1582	0.217	0.217
15:00 - 16:00	3	1582	0.045	0.045	3	1582	0.124	0.124	3	1582	0.169	0.169
16:00 - 17:00	3	1582	0.035	0.035	3	1582	0.341	0.341	3	1582	0.376	0.376
17:00 - 18:00	3	1582	0.031	0.031	3	1582	0.069	0.069	3	1582	0.100	0.100
18:00 - 19:00	3	1582	0.102	0.102	3	1582	0.055	0.055	3	1582	0.157	0.157
19:00 - 20:00	2	1623	0.031	0.031	2	1623	0.121	0.121	2	1623	0.152	0.152
20:00 - 21:00	2	1623	0.008	0.008	2	1623	0.034	0.034	2	1623	0.042	0.042
21:00 - 22:00	2	1623	0.001	0.001	2	1623	0.084	0.084	2	1623	0.085	0.085
22:00 - 23:00												
23:00 - 24:00												
Total Rates:			1.311	1.311			1.400	1.400			2.711	2.711

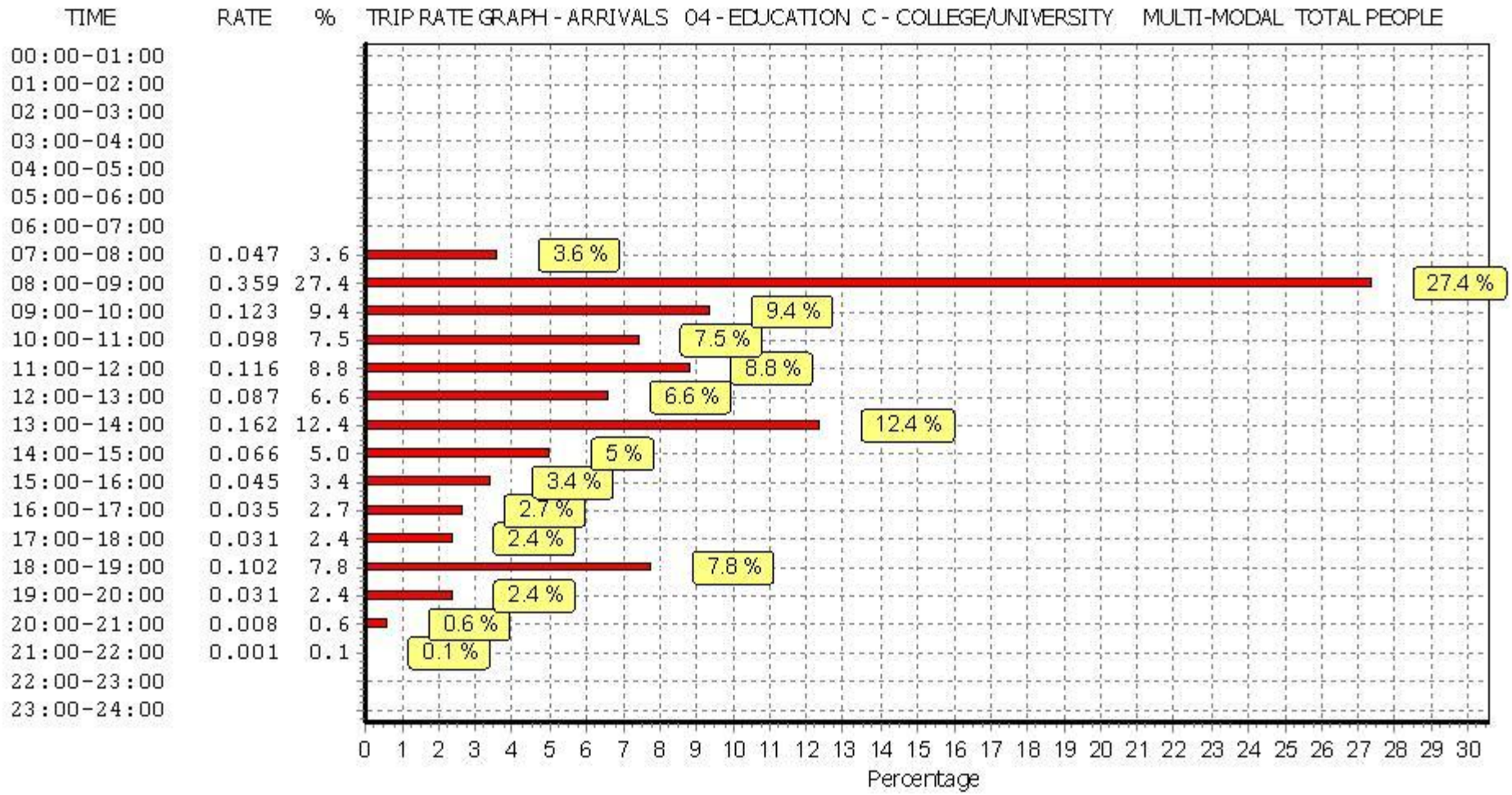
This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.

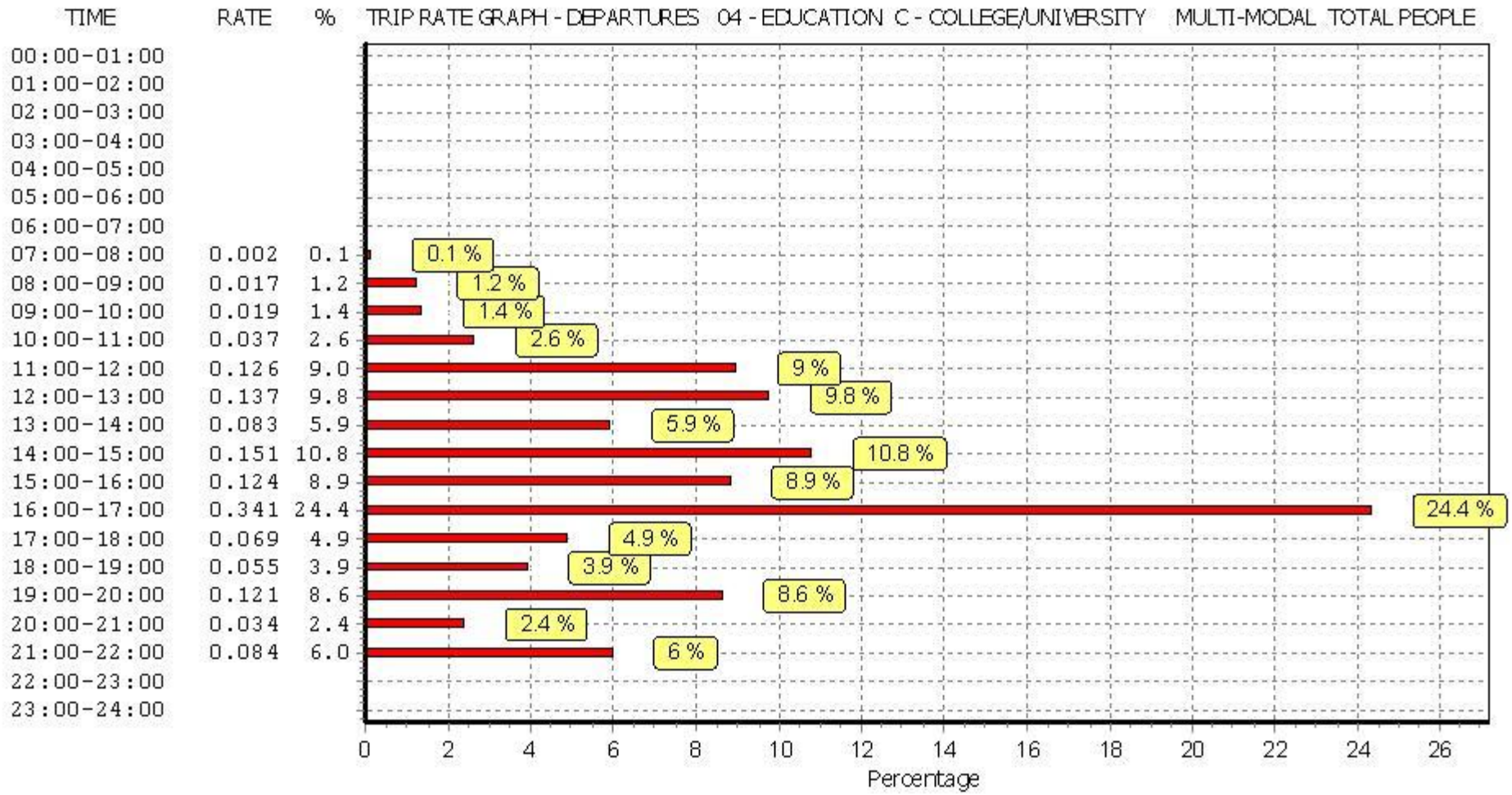
Parameter summary

Trip rate parameter range selected:	1495 - 1750 (units:)
Survey date date range:	01/01/06 - 03/11/11
Number of weekdays (Monday-Friday):	3
Number of Saturdays:	0
Number of Sundays:	0
Surveys manually removed from selection:	1

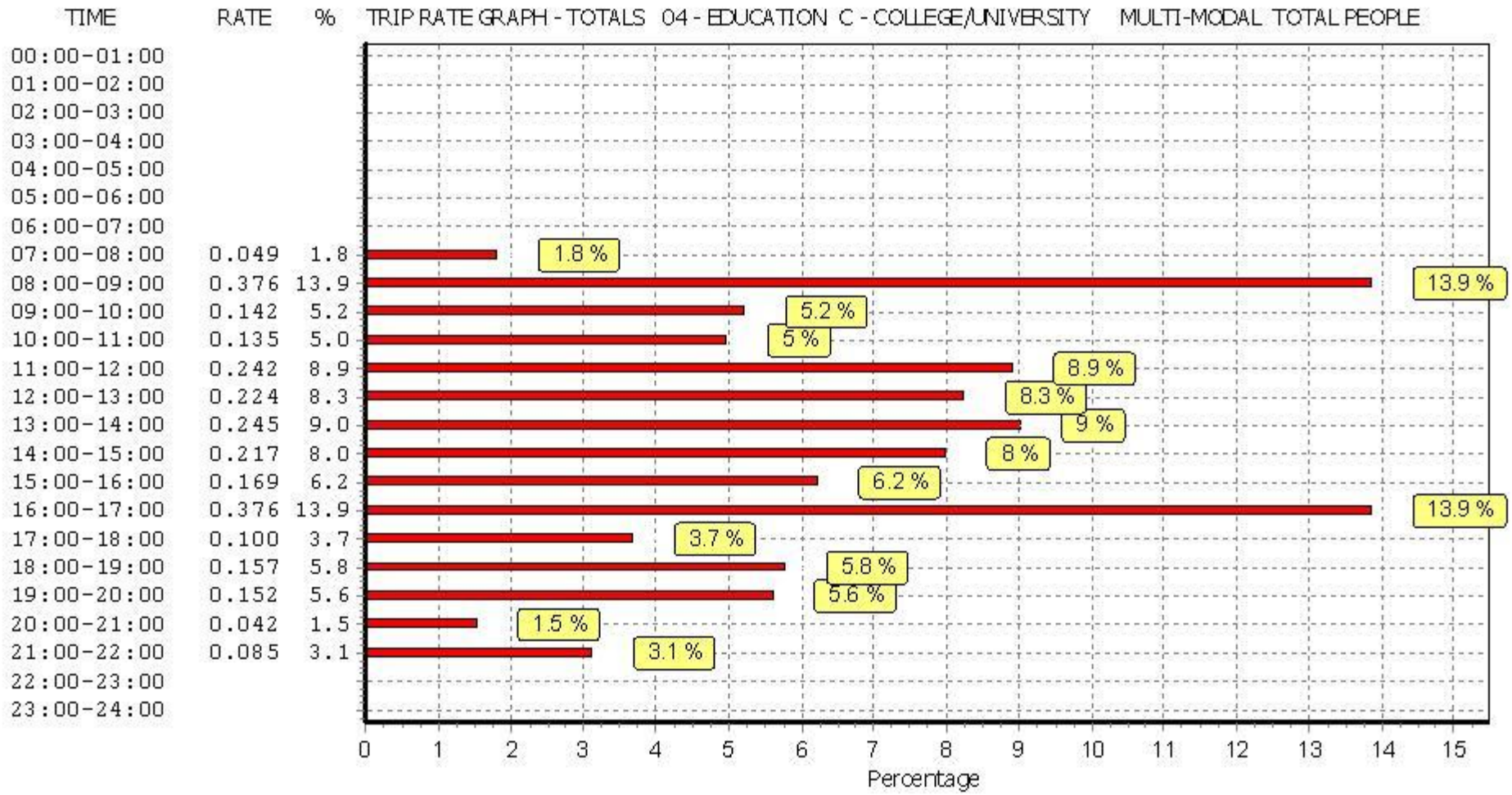
This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.



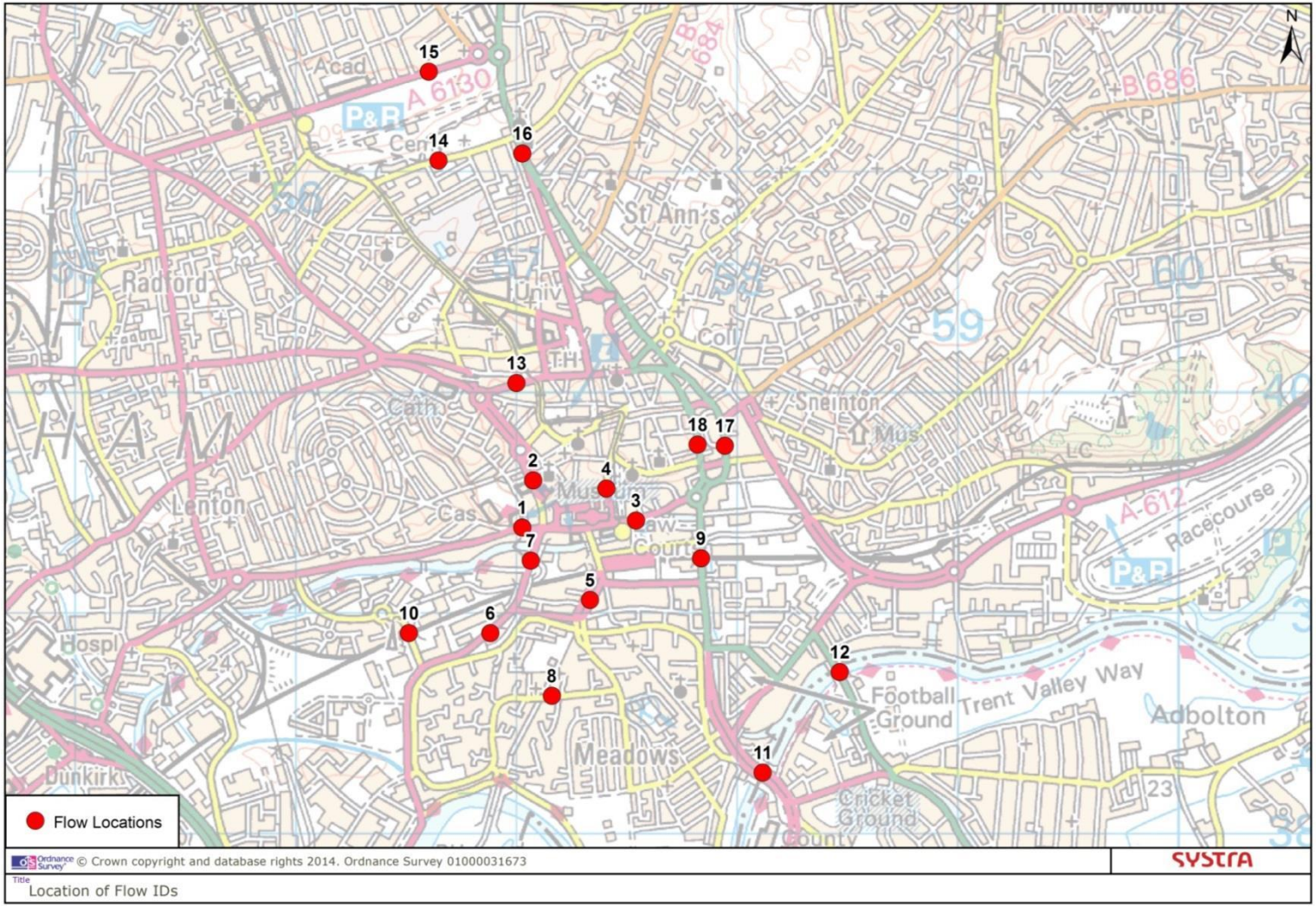
This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

Report Appendix C – Highway Traffic Flows

- Location of Flow Points
- Morning Peak Flow Changes
- Evening Peak Flow Changes

Appendix C: Highway Traffic Flows

Figure 1. Location of Flow Points



Appendix C: Highway Traffic Flows

Table 1. Morning Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
1	Castle Boulevard	East	756	282	264	251	265	263	249
		West	881	87	94	92	90	92	94
2	Maid Marion Way	North	1,597	896	966	965	971	969	993
		South	1,244	895	1,251	1,273	1,247	1,264	1,263
3	Canal Street (east of Middle Hill)	East	1,140	213	161	167	103	173	176
		West	2,193	1,037	1003	1,000	1,038	1,026	872
4	Middle Hill	North	770	193	181	182	255	248	161
		South	266	170	133	139	81	147	146
5	Sheriffs Way	North-East	749	1,462	1,780	1,787	1,752	1,761	1,745
		South-West	1,373	1,292	1,915	1,918	1,858	1,906	1,917
6	Queens Drive	North	1,494	1,746	1,652	1,650	1,637	1,630	1,657
		South	1,633	1,576	2,057	2,058	2,012	2,052	2,066
7	Wilford Street	North	733	686	789	787	790	791	805
		South	531	984	1,363	1,368	1,364	1,373	1,342

Table 1. Morning Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
8	Robin Hood Way	East	200	347	296	295	308	303	309
		West	414	706	572	569	539	530	578
9	London Road	North	1,096	1,484	1,588	1,596	1,595	1,603	1,541
		South	2,204	2,142	2,350	2,430	2,143	2,301	2,343
10	Castle Bridge Road	North-West	757	1,038	1,185	1,190	1,177	1,187	1,179
		South-East	760	1,032	993	990	984	978	980
11	Trent Bridge	North	1,946	2,006	2,077	2,050	2,164	2,117	2,135
		South	1,350	1,641	1,438	1,440	1,457	1,429	1,446
12	Lady Bay Bridge	North	1,059	1,117	1,034	1,054	907	958	946
		South	788	692	757	760	739	741	738
13	Upper Parliament Street	East	393	503	482	471	476	488	478
		West	824	972	937	933	951	952	1005
14	Forest Road	East	589	686	686	685	685	694	685
		West	443	771	724	729	737	742	727

Appendix C: Highway Traffic Flows

Table 1. Morning Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
15	Gregory Boulevard	East	643	779	705	702	692	679	701
		West	837	1,025	1,015	1,012	1,024	1,030	1,010
16	Mansfield Road	North	1,261	1,598	1,551	1,536	1,568	1,590	1,555
		South	1,976	1,940	1,940	1,940	1,935	1,940	1,940
17	Lower Parliament Street	North	-	-	-	-	499	385	369
		South	2,896	2,590	2,719	2,740	3,011	2,533	2,481
18	Bellar Gate	North	394	576	637	653	114	171	138

Table 2. Evening Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
1	Castle Boulevard	East	641	155	183	183	154	161	143
		West	578	222	137	132	141	148	142
2	Maid Marion Way	North	1,074	706	815	822	769	804	848
		South	1,491	835	1,152	1,156	1,100	1,126	1,149
3	Canal Street (east of Middle Hill)	East	1,882	571	413	418	262	402	384
		West	886	191	186	186	250	293	329
4	Middle Hill	North	837	108	108	108	164	199	236
		South	231	104	74	73	0	82	78
5	Sheriffs Way	North-East	1,064	1,824	2,140	2,144	2,195	2,178	2,143
		South-West	757	959	1,050	1,047	1,004	1,044	1,042
6	Queens Drive	North	1,853	1,937	1,804	1,823	1,892	1,870	1,847
		South	948	1,281	1,270	1,264	1,286	1,275	1,264
7	Wilford Street	North	988	614	713	720	668	703	702
		South	303	835	1,237	1,239	1,196	1,197	1,199

Table 2. Evening Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
8	Robin Hood Way	East	238	402	381	369	383	366	374
		West	240	212	183	169	172	166	170
9	London Road	North	1,181	1,948	2,032	2,061	1,711	1,730	1,749
		South	2,311	2,169	2,057	2,106	1,809	1,897	1,902
10	Castle Bridge Road	North-West	740	1,059	1,093	1,107	1,108	1,097	1,093
		South-East	591	904	806	805	873	850	832
11	Trent Bridge	North	1,202	1,253	1,396	1,414	1,370	1,352	1,343
		South	1,988	2,131	2,183	2,194	2,166	2,158	2,167
12	Lady Bay Bridge	North	996	1,043	996	982	1,016	1,019	1,023
		South	1,422	1,362	1,367	1,359	1,374	1,379	1,373
13	Upper Parliament Street	East	374	704	660	661	633	650	641
		West	773	849	868	867	871	854	851
14	Forest Road	East	633	692	682	674	683	672	679
		West	273	342	341	340	341	339	338

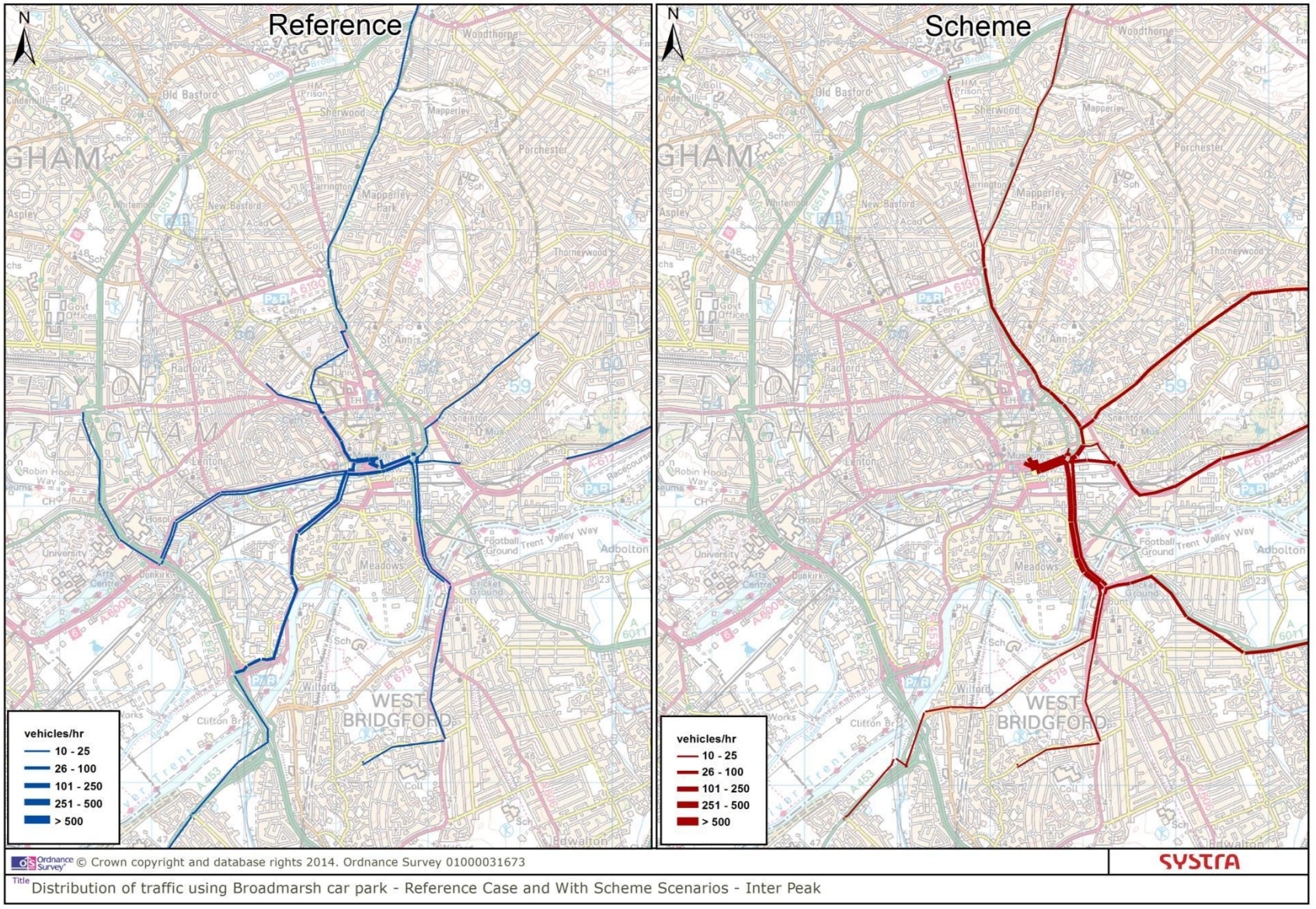
Table 2. Evening Peak Flow Changes

ID	ROAD NAME	DIRECTION	REFERENCE	STAGE 2	STAGE 3A	STAGE 3B	STAGE 4	STAGE 5	STAGE 6
15	Gregory Boulevard	East	547	610	602	614	608	630	605
		West	491	679	656	658	682	679	653
16	Mansfield Road	North	1,190	1,423	1,400	1,402	1,421	1,404	1,394
		South	1,259	1,422	1,381	1,382	1,377	1,385	1,380
17	Lower Parliament Street	North	-	-	-	-	623	535	533
		South	2,014	2,136	2,130	2,128	2,314	2,026	2,000
18	Bellar Gate	North	659	1,116	1,080	1,107	476	363	368

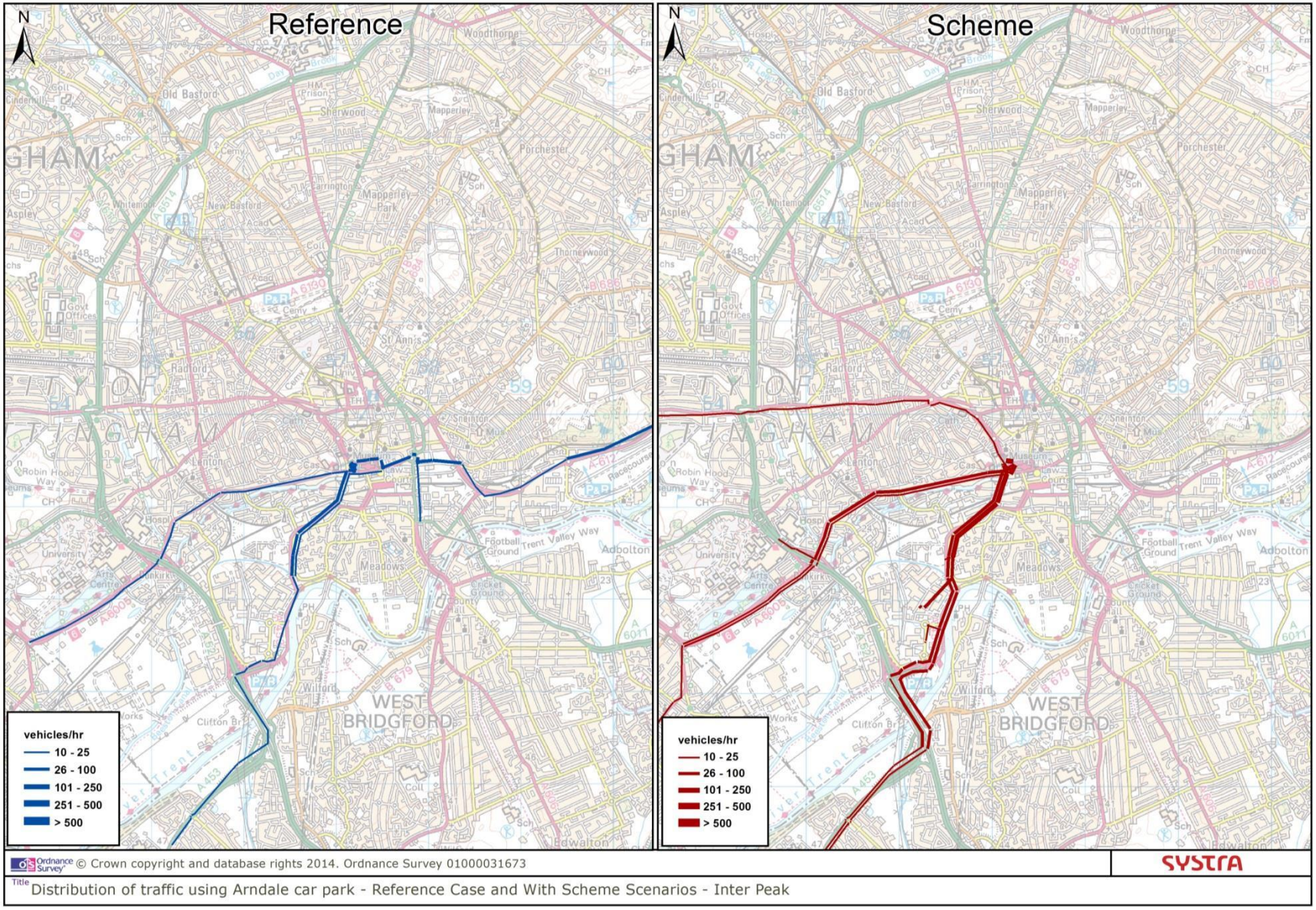
Report Appendix D – Car Park Catchments

- Broadmarsh Car Park – Inter Peak
- Arndale Car Park – Inter Peak
- Broadmarsh Car Park – Evening Peak
- Arndale Car Park – Evening Peak

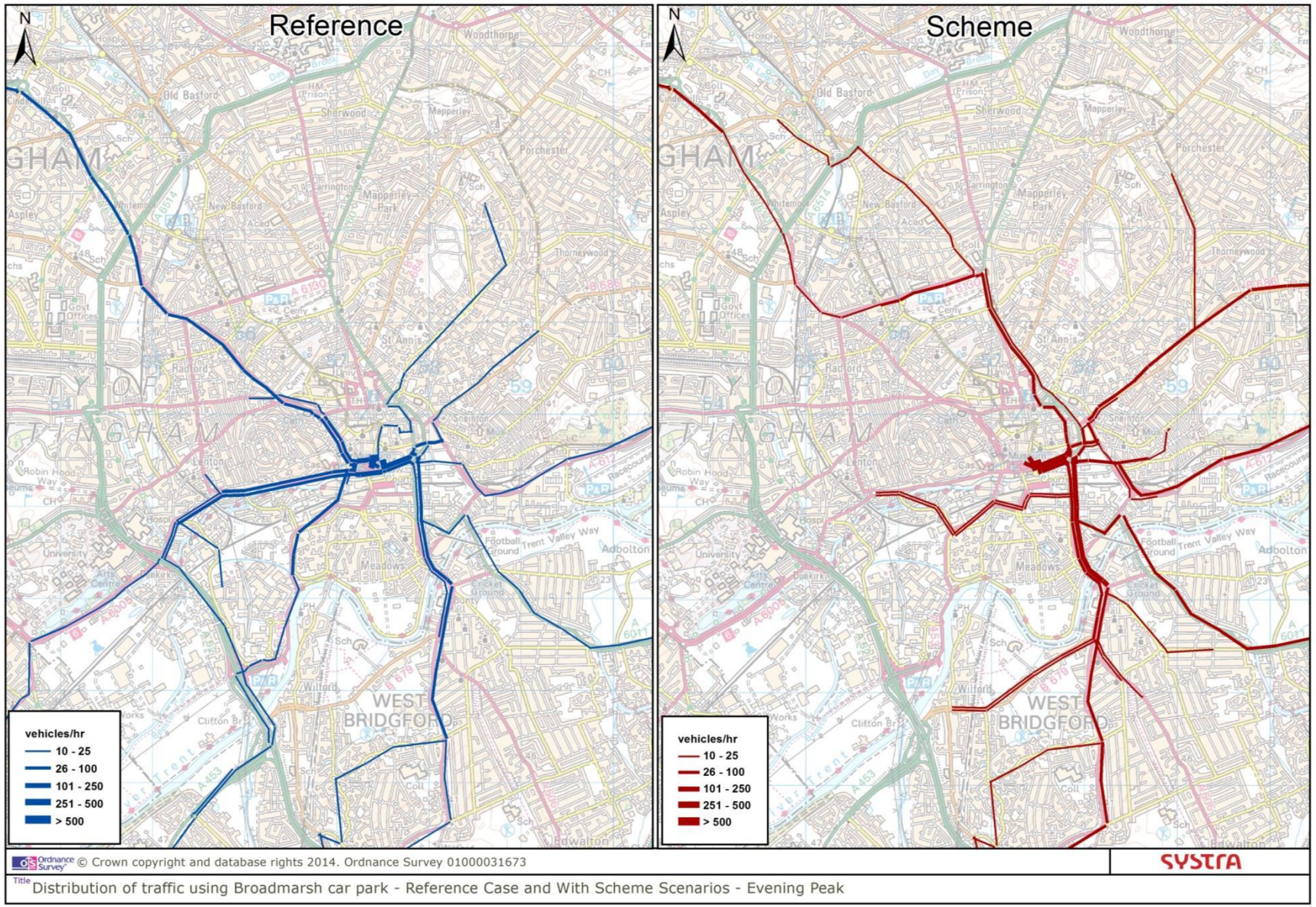
Appendix D: Car Park Catchments



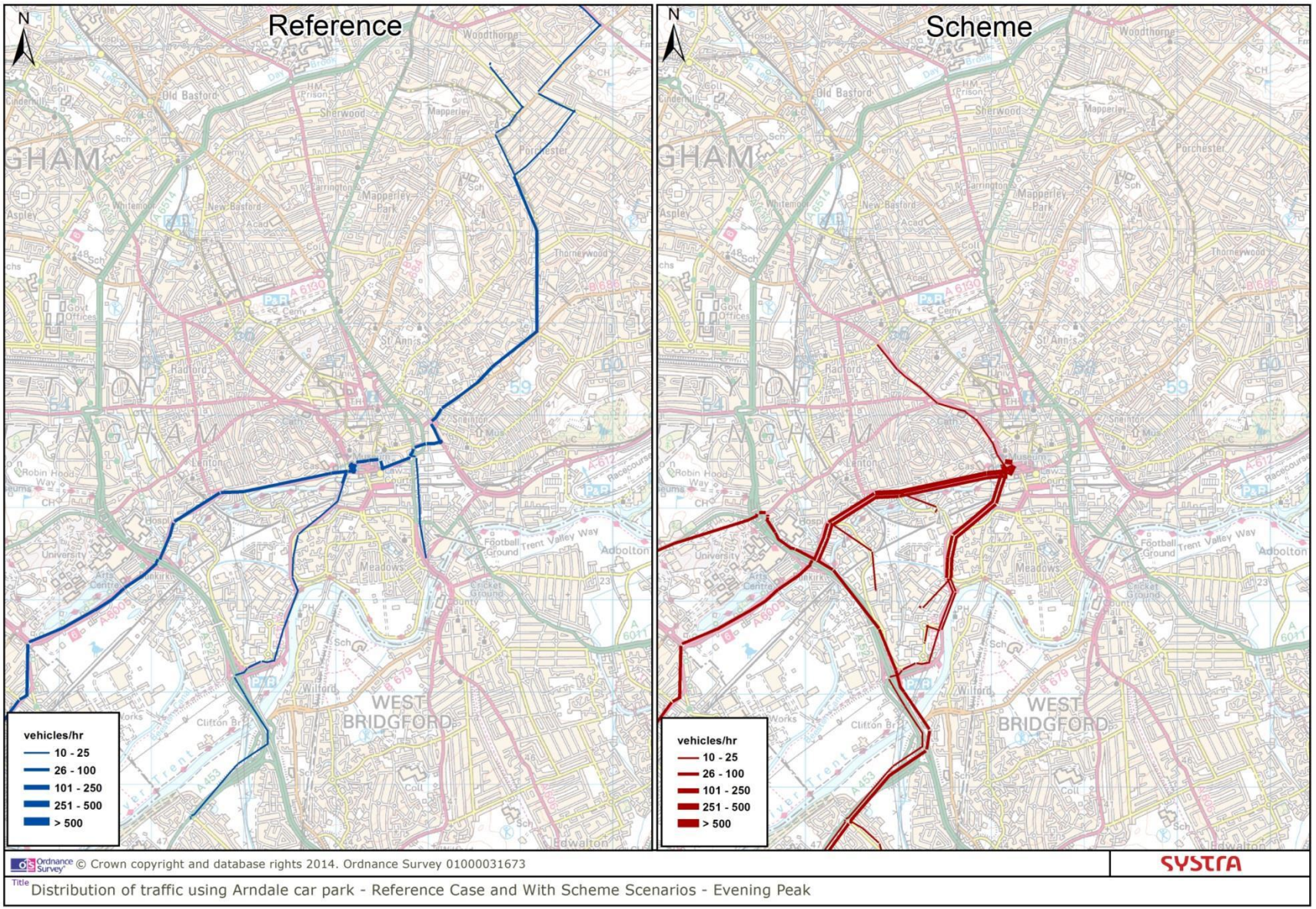
Appendix D: Car Park Catchments



Appendix D: Car Park Catchments

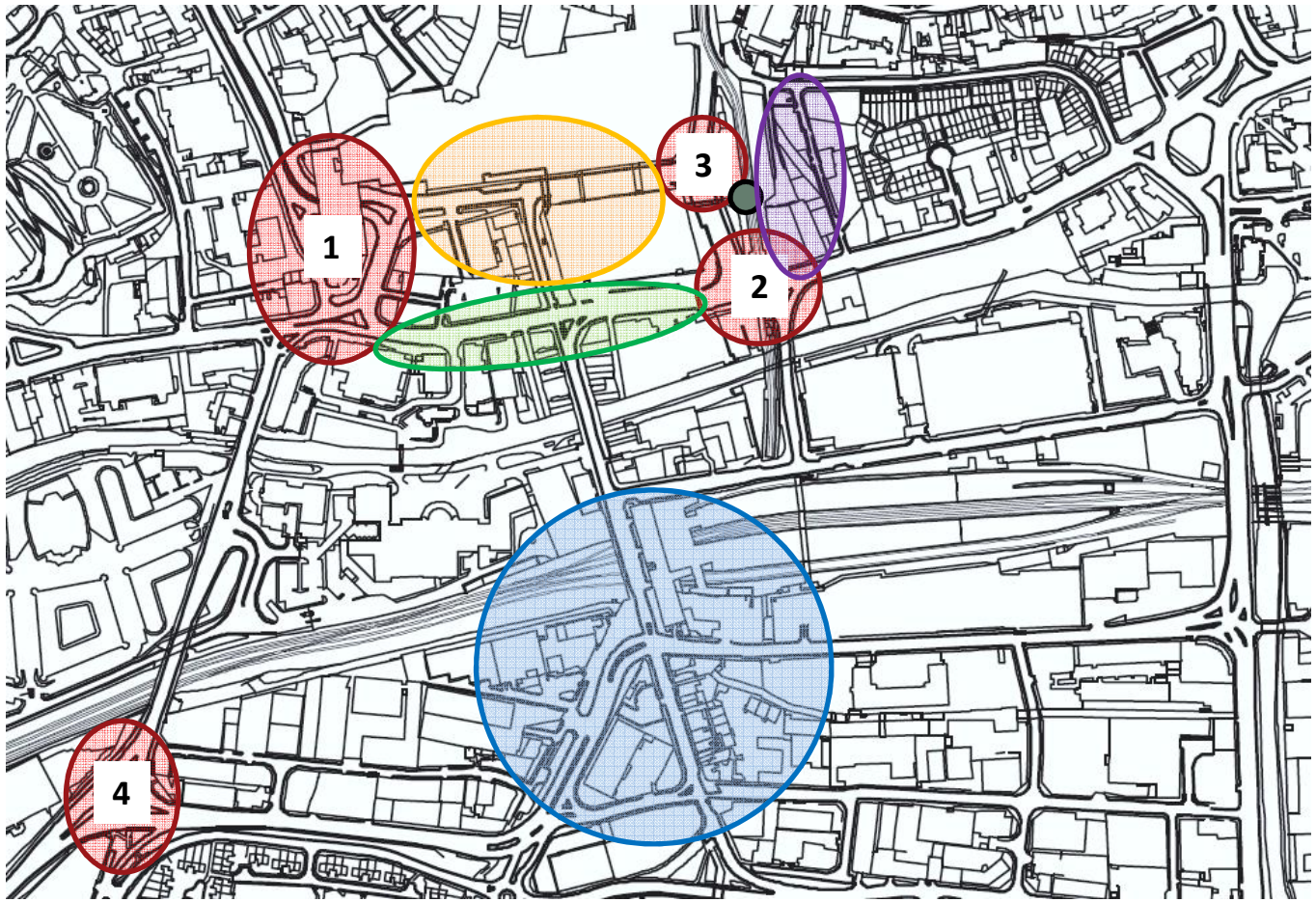


Appendix D: Car Park Catchments



Report Appendix E – Stage 3A Scheme Plans

Broadmarsh Redevelopment and Turning Point South



Pedestrianised

Junctions Revised

Bus Only & revised bus stop layout

Layout to change as part of NET

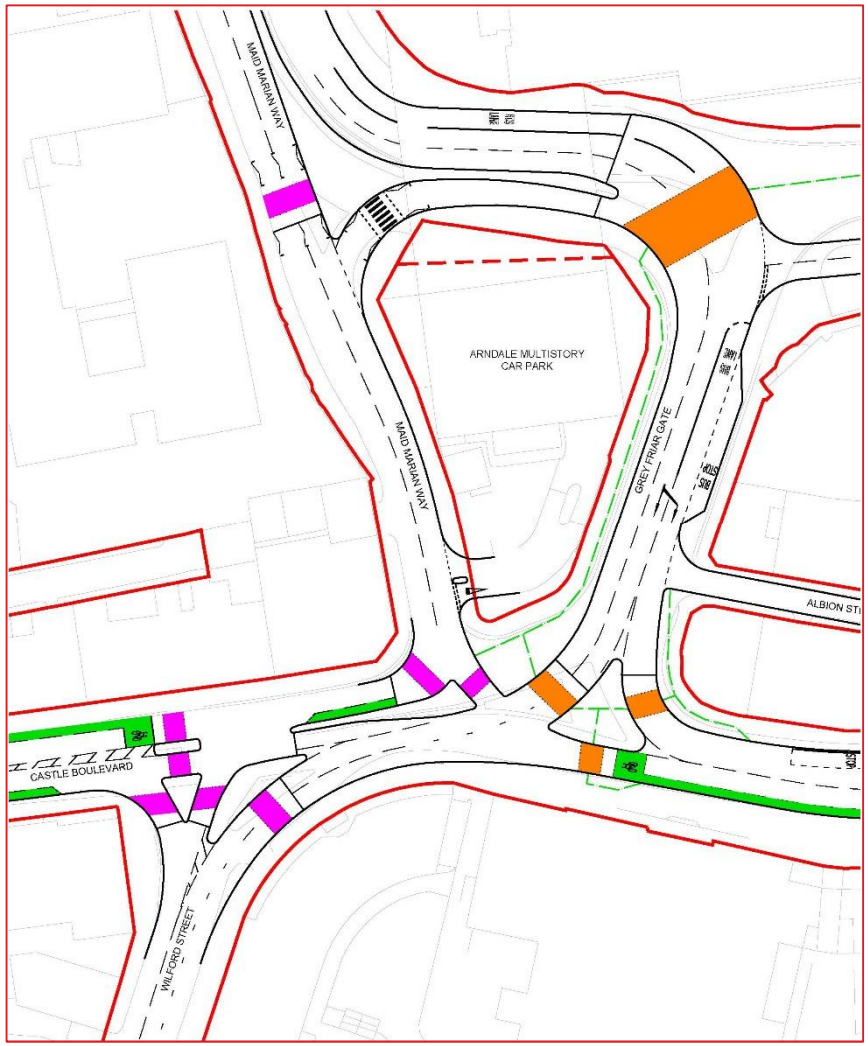
New NET stop

Nottingham Skills Hub

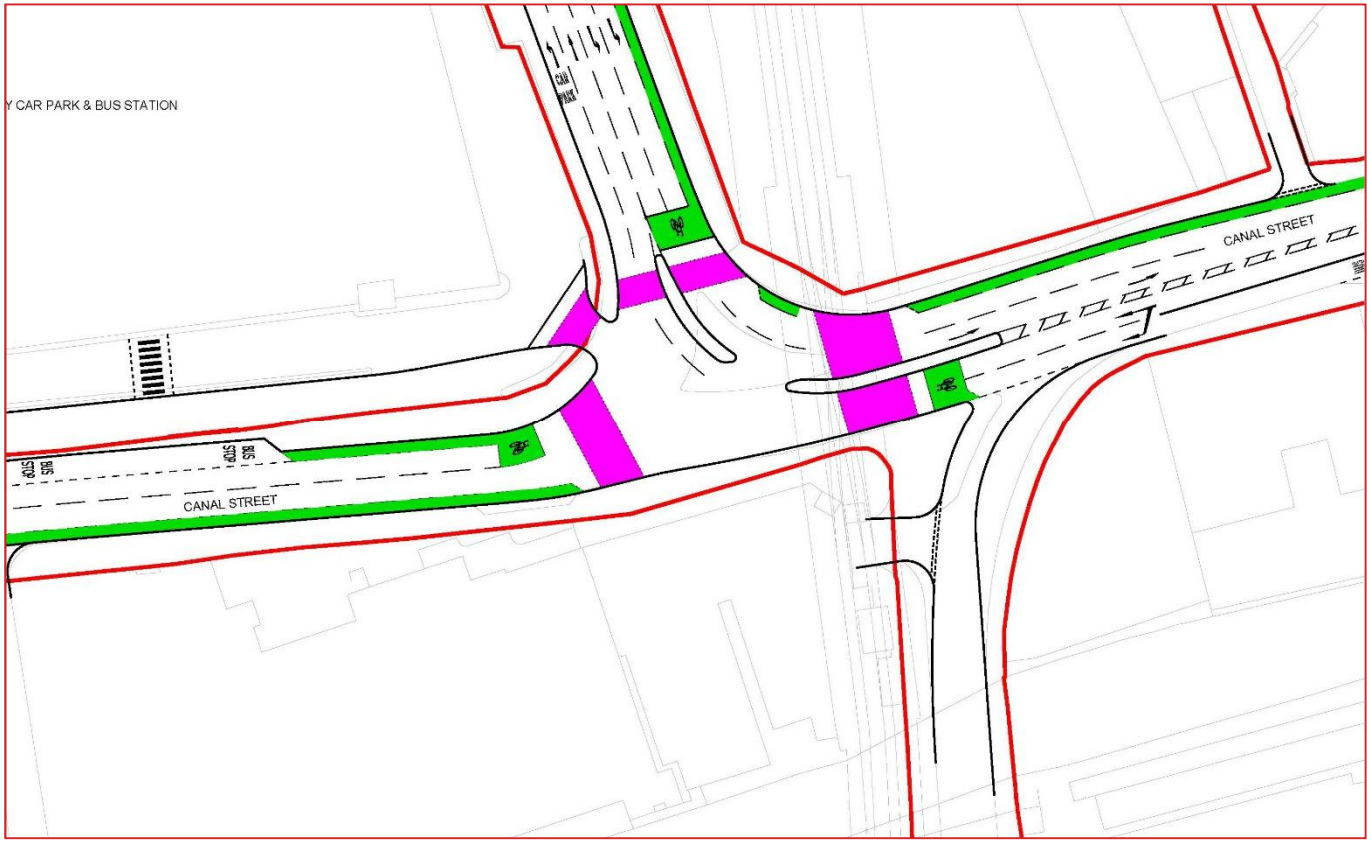
Note: junctions not highlighted will remain as existing

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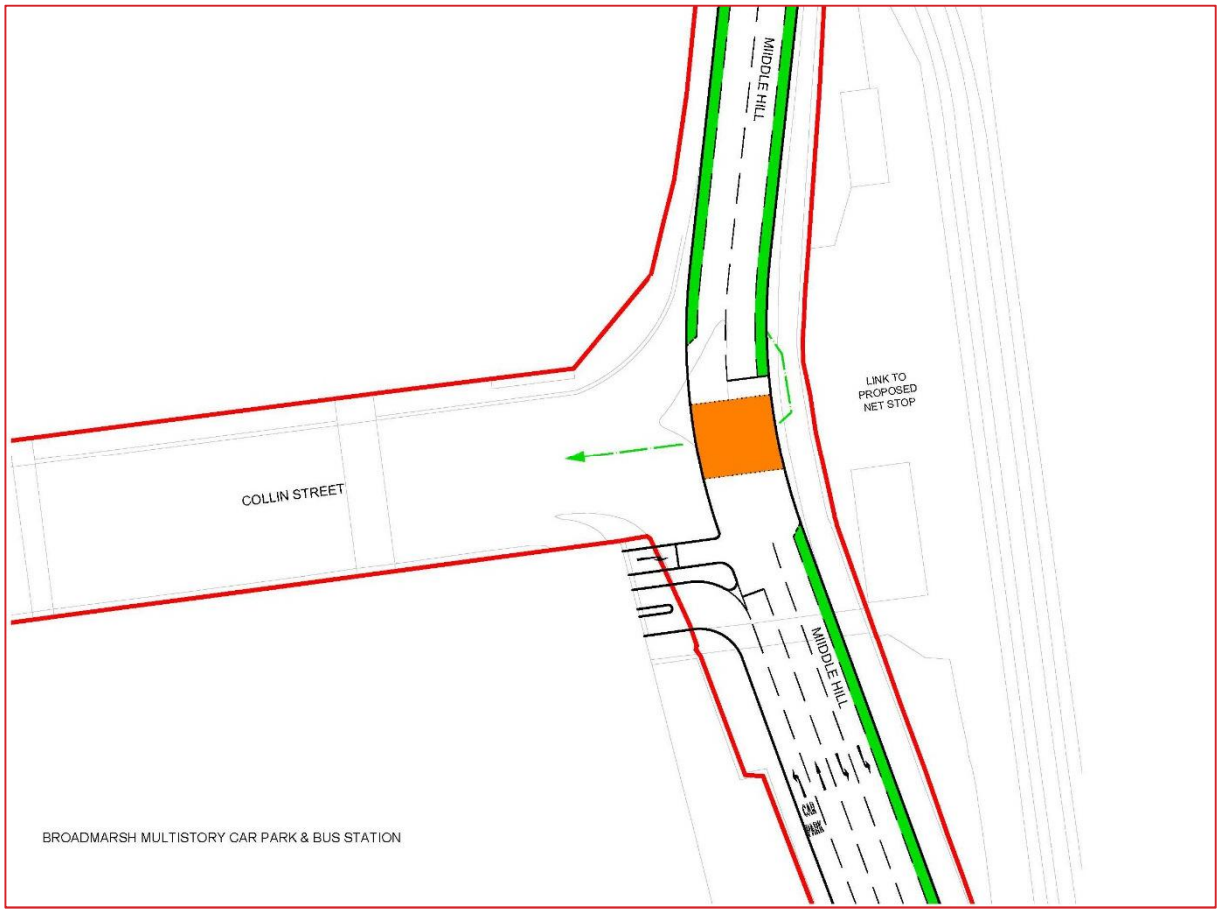
Turning Point South Scheme – Junction 1



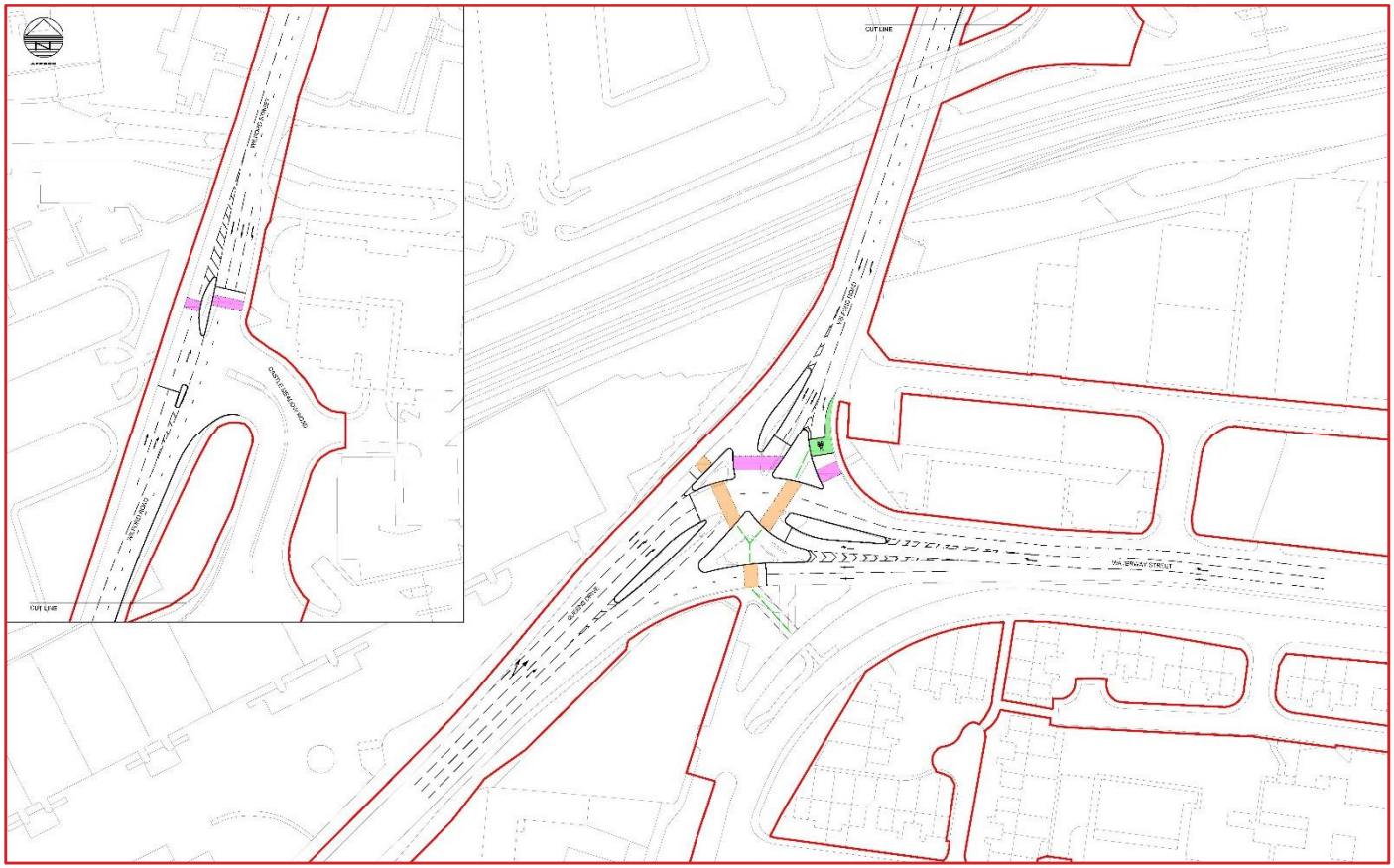
Turning Point South Scheme – Junction 2



Turning Point South Scheme – Junction 3



Turning Point South Scheme – Junction 4



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