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Winchester Station Quarter
Parking Access Review

Final Report

July 2015

Contents

Summary

Introduction

This technical review has been prepared to further explore parking survey data that was collected in February /March 2015. Of particular focus are the potential implications of relocating parking supply (and demand) from north of the City Road junction to the south.

Additional analysis of likely parking requirements for potential new development has also been undertaken.

Parking survey analysis – demand distribution

Recently collected survey data indicates that approximately a third of all weekday parking demand comes from the north via either Andover Road or Worthy Lane. Approximately 14% of demand comes from the east via the city centre; the remaining demand (just over 50%) is spread across a number of southern/western corridors including Stockbridge Road, Romsey Road and St Cross Road.

Optimum parking balance

An improved spatial layout of parking supply to meet the prevailing distribution of demand suggests that the loss of some parking north of the City Road junction and its replacement to the south would better meet overall parking demand by journey origin.

Parking demand by car park

Currently nearly half of car park access/egress trips pass through the station quarter area. Irrespective of any changes to the overall distribution of parking supply in the station quarter area, changes to driver car park choice, ie a 'drive to' a rather than 'drive through' approach, should be encouraged and promoted to assist with reducing highway network flows.

Future parking supply

Overall it may be expected that consolidating some of the current parking supply at Gladstone Street could lead a modest drop in peak hour and all-day movements passing through the study area.

City Road junction flows

The potential reallocation of some parking supply to Gladstone Street could be expected to lead to an overall reduction in flow at the City Road junction of between -1% and -2% depending on time period.

Wider area network flows

The Sussex St gyratory has been assessed at a high level for flow changes resulting from parking supply relocation. The largest flow increases are in the AM peak and are associated with access traffic from the north of the city to an enlarged Gladstone St car park.

Development parking requirement

Three different approaches have been used to estimate possible parking requirements for a range of new development land uses. The scale of possible office development means that parking provision for this land use is particularly important. In general, applying prevailing Hampshire/Winchester standards appears reasonable and robust.

Conclusions

The high level assessment of parking supply relocation suggests that highway network impacts may be modest and acceptable. Better managing driver car park choice could greatly assist with minimising vehicle flows generated by car parking activity.

Parking survey analysis – demand distribution

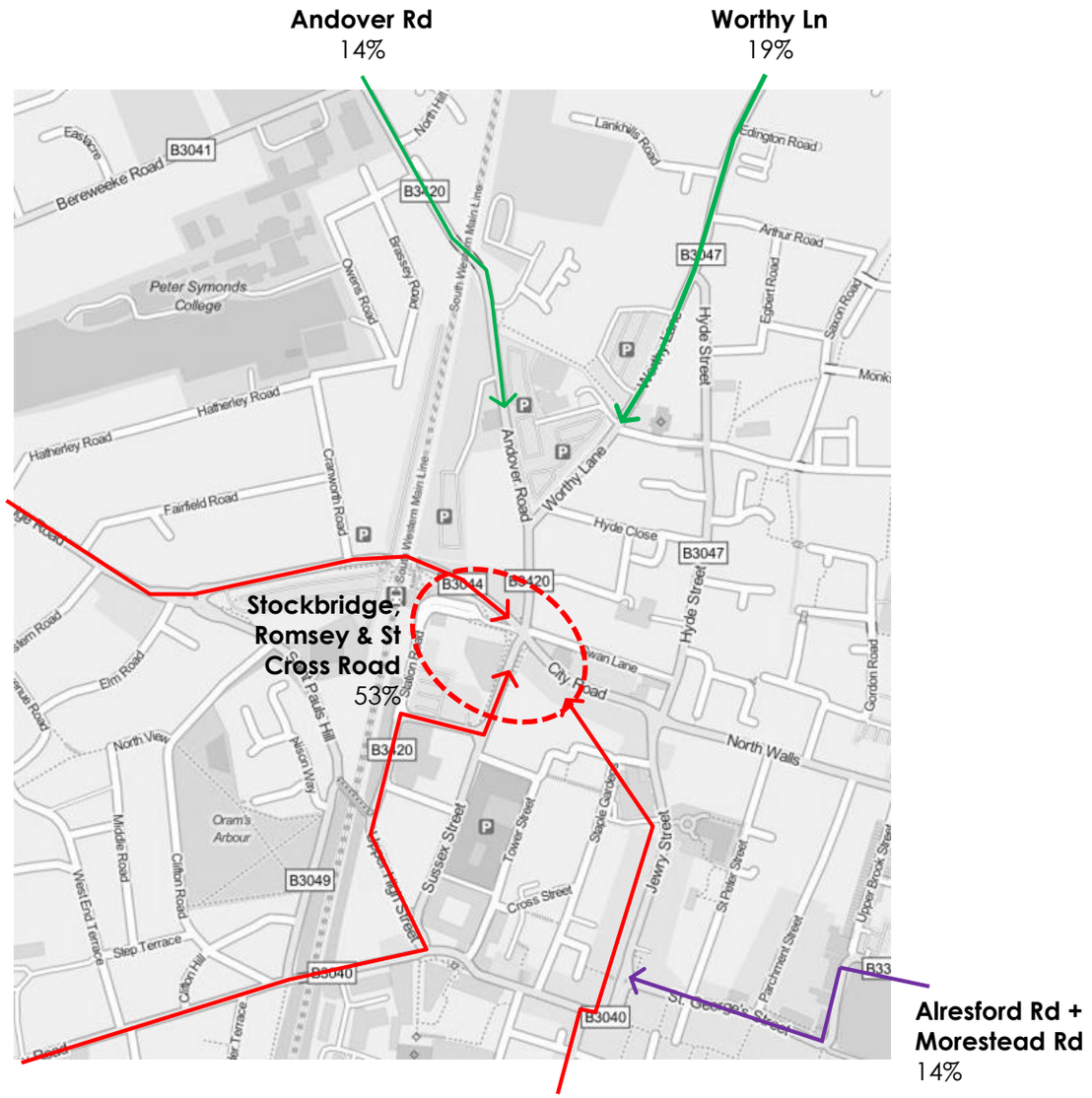
Summary

Based on detailed interview data collected in February/March 2015, the balance of parking demand in the station quarter area has been calculated by arrival direction/corridor. This is based on drivers' stated journey origins weighted by total entry flows at each car park.

The survey data indicates that approximately a third of weekday parking demand comes from the north via either Andover Road or Worthy Lane. Approximately 14% of demand comes from the east via the city centre; the remaining demand (just over 50%) is spread across a number of southern/western corridors including Stockbridge Road, Romsey Road and St Cross Road.

Saturday survey data indicates that approximately 40% of parking demand comes from the north via either Andover Road or Worthy Lane with the remaining 60% spread across the other corridors.

Surveyed weekday parking demand



Alternative routes

For the majority of interview responses there was a clearly preferable route between the stated journey origin and car park destination. There are some instances where alternative routeings were possible, such as:

- from the north / M3 (eg Basingstoke) via either Andover Rd or Easton Ln
- from the north to the station west car park via Andover Rd or Stockbridge Rd (Bereweeke Rd)
- from the west (eg Alresford) via Worthy Rd or the city centre
- from the north-west (eg Salisbury) via Andover Rd or Stockbridge Rd)

The impact of these alternative routes is that there is a degree of uncertainty over the balance of parking demand (particularly north and south of the City Road junction). The next page outlines a theoretical 'gravity modelling' approach that aims to test the reliability of the survey data and routeings.

Gravity model – demand distribution

Gravity modelling

A simple gravity model has been developed to provide an indicative, theoretical check of the surveyed parking demand.

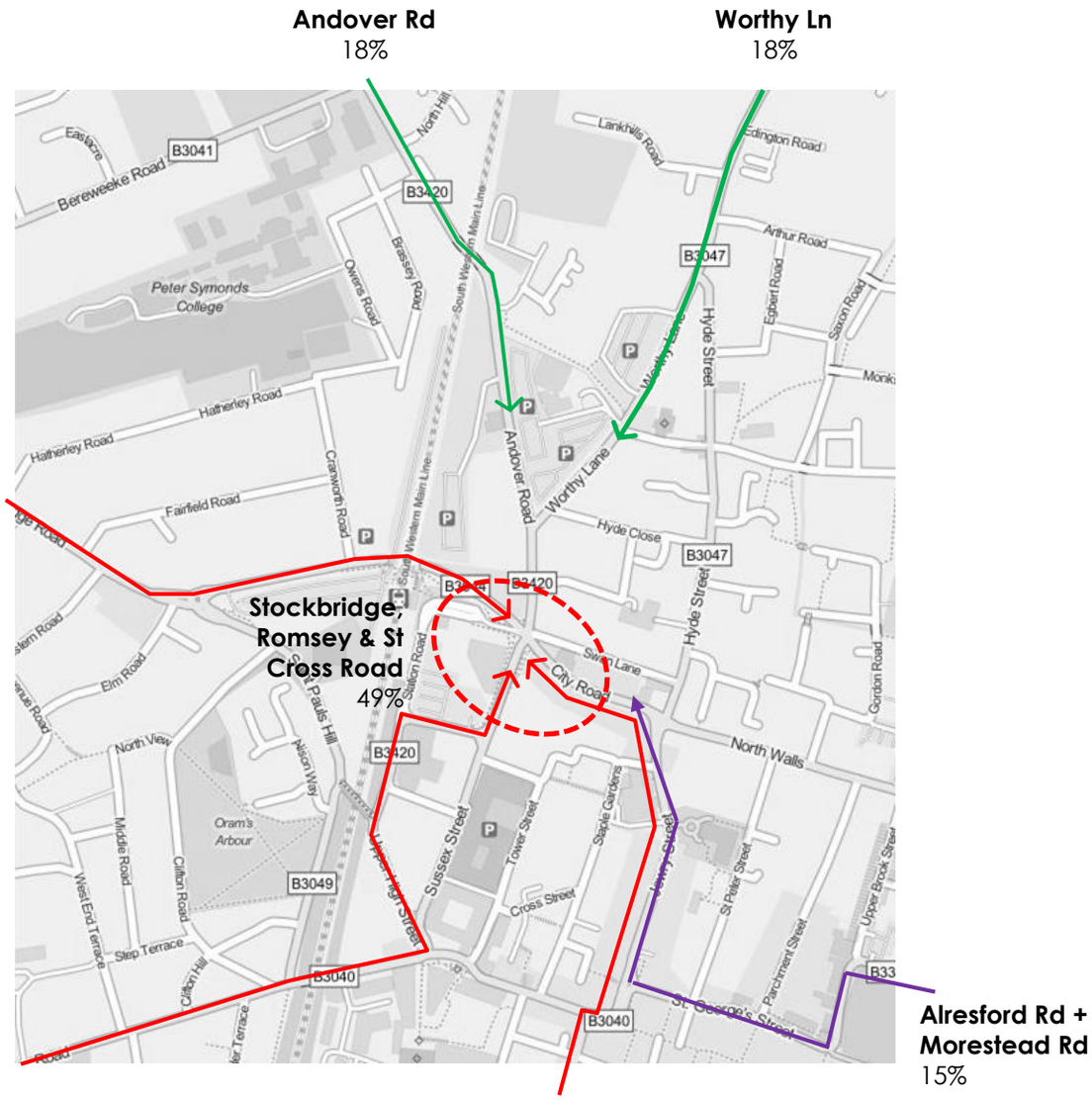
The population (P) of all local authority districts surrounding Winchester were combined with an estimated travel time to Winchester (D) to give an estimate of each district's relative attractiveness based on a P/D^2 relationship.

The most likely access route into Winchester from each district was determined using route-planning software and travel demand from each district was aggregated to six main corridors, consistent with the 2015 survey data. Demand from Winchester itself has been assumed to be relatively equally split across all directions and corridors.

Overall there is a good match between the observed and theoretical parking demands suggesting that the 2015 survey data is representative and robust and suitable for use in assessing the impact of shifts in car parking supply and demand.

Corridor	Weekday survey data	Gravity model data
Andover Road	14%	18%
Worthy Lane	19%	18%
Total North	**33%**	**36%**
Alresford Road + Morestead Road	14%	15%
Stockbridge Road, Romsey Road + St Cross Road	53%	49%
Total South	**67%**	**64%**

Predicted gravity model parking demand



Optimum parking distribution

Existing off-street and on-street parking supply

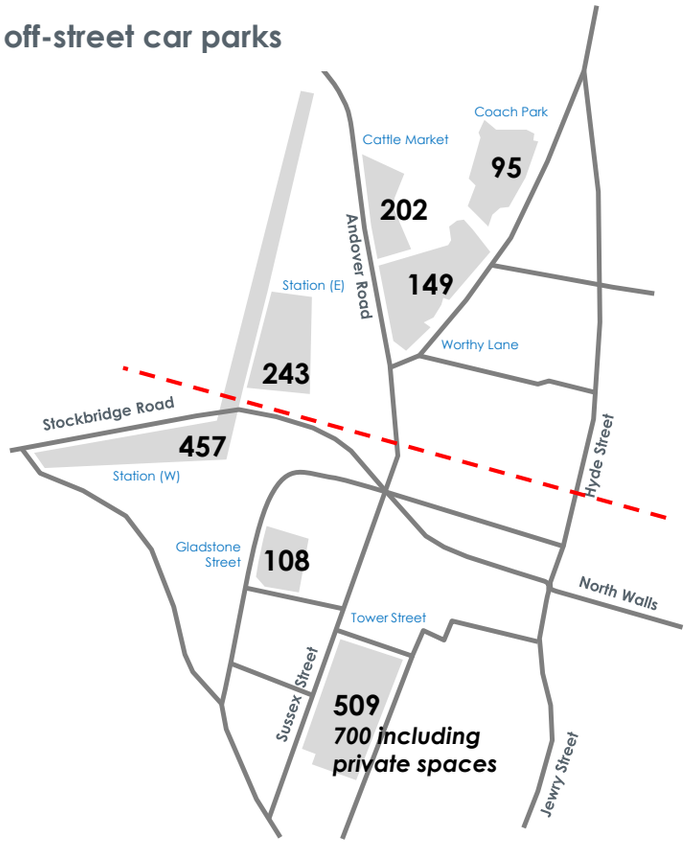
The current parking supply across the station quarter area is 1,763 spaces:

- Coach Park, 95 spaces
- Cattle Market, 202 spaces
- Worthy Lane, 149 spaces
- Station (East of rail line), 243 spaces
- Station (West of rail line), 457 spaces
- Gladstone Street, 108 spaces
- Tower Street, 509 spaces (additional 191 private spaces)

There are also 59 on-street pay and display spaces (including shared use) in the study area. This represents c.3% of the total station quarter public parking supply; it has been discounted in the subsequent analysis as changes to the off-street supply will have a substantially greater impact.

Separate analysis of on-street residential parking utilisation is presented

Location of off-street car parks



Existing parking balance

The current parking supply split either side of the City Road junction is:

- North = 689 spaces, equivalent to 39%
- South = 1,074 spaces, equivalent to 61%

Excluding the rail station car parks gives a supply of 1,063 spaces with a north/south split as follows:

- North = 446 spaces, equivalent to 42%
- South = 617 spaces, equivalent to 58%

Optimum parking balance

Based on current behaviour and the observed parking demand split of 33% north : 67% south, the implied optimum parking balance would be:

- North = 582 spaces, a change of -107 on existing
- South = 1181 spaces, a change of +107 on existing

Excluding the rail station car parks gives an implied optimum balance of:

- North = 351 spaces, a change of -95 on existing
- South = 712 spaces, a change of +95 on existing

This optimum parking balance suggests that the loss of some parking north of the City Road junction and its replacement to the south would better meet overall parking demand by journey origin.

Parking demand by car park

Parking demand by location

With the exception of Gladstone St and Station East to a certain degree, the data collected at each car park gives a reasonably consistent spatial pattern of parking demand, independent of car park location.

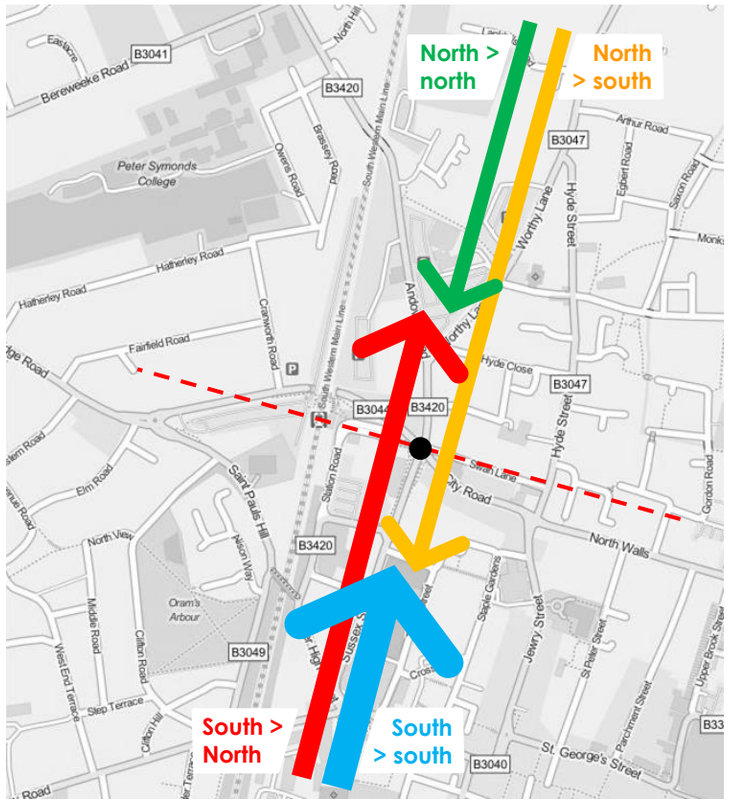
Car park	North demand %	South demand %
Cattle Market	41%	59%
Coach Park	36%	64%
Worthy Lane	43%	57%
Station East	51%	49%
Gladstone St	18%	82%
Tower St	29%	71%
Weighted total	**33%**	**67%**

However this generally equal balance of demand across car parks means that there a substantial number of movements being made from the north to 'southern' car parks and also from the south to 'northern' car parks (north and south relative to the City Road junction). This is shown in the schematic figure opposite.

Peak hour and all-day flows for each of these four movements are shown in the table opposite and reveal a similar pattern whereby just over half of car park access trips are 'contained' within the original direction of travel. Trips that are 'non-contained', ie passing across the City Road junction, amount to several hundred in the AM peak and several thousand across the day.

Irrespective of any changes to the overall distribution of parking supply in the station quarter area, changes to driver car park choice, ie a 'drive to' a rather than 'drive through' approach, should be encouraged and promoted to assist with reducing highway network flows.

Parking movements – north/south demand/supply



Demand > Supply	AM peak Inbound (8-9am)	PM peak Outbound (5-6pm)	12-hour two-way (7-7pm)
North > north	117	105	1119
South > south	260	176	2288
Total contained	**377**	**280**	**3407**
North > south	145	91	1145
South > north	154	140	1481
Total non-contained	**299**	**231**	**2626**
% contained	56%	55%	56%
% non-contained	44%	45%	44%

Future parking supply reallocation

Future changes to parking supply

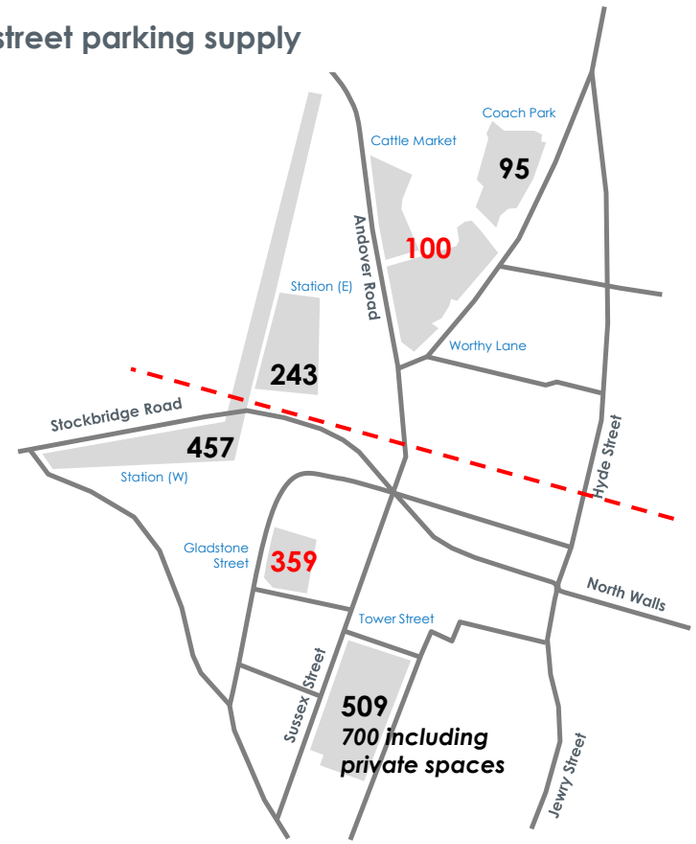
Future development proposals have been tested that include the following changes to parking supply:

- loss of some public parking at Cattlemarket and Worthy Lane – 100 public spaces retained in one/both sites
- provision of some private parking on these sites to support new development
- a new multi-storey car park on the current Gladstone St car park site – providing both public and private spaces

Reallocating parking spaces from Cattlemarket and Worthy Lane to Gladstone St will lead to a shift in the balance of north/south supply and demand. Assuming no change to the relative attractiveness of each car park (ie a space lost at Cattlemarket and reprovided at Gladstone St will be used by the same person) the net impact shown in the bottom rows in red.

Overall it could be expected that consolidating some of the current parking supply at Gladstone Street could lead a modest increase in 'contained' peak hour and all-day movements. This is primarily due to reducing the volume of south>north movements.

Tested off-street parking supply



Demand > supply	AM peak Inbound (8-9am)	PM peak Outbound (5-6pm)	12-hour two-way (7-7pm)
North > north	65	60	760
South > south	328	235	2763
Total contained	**394**	**295**	**3523**
North > south	197	136	1504
South > north	86	81	1006
Total non-contained	**283**	**218**	**2510**
Change in total contained	+16 *+4%*	+14 *+5%*	+116 *+3%*
Change in total non-contained	-16	-14	-116

Future parking demand reallocation – sensitivity test

Sensitivity Test

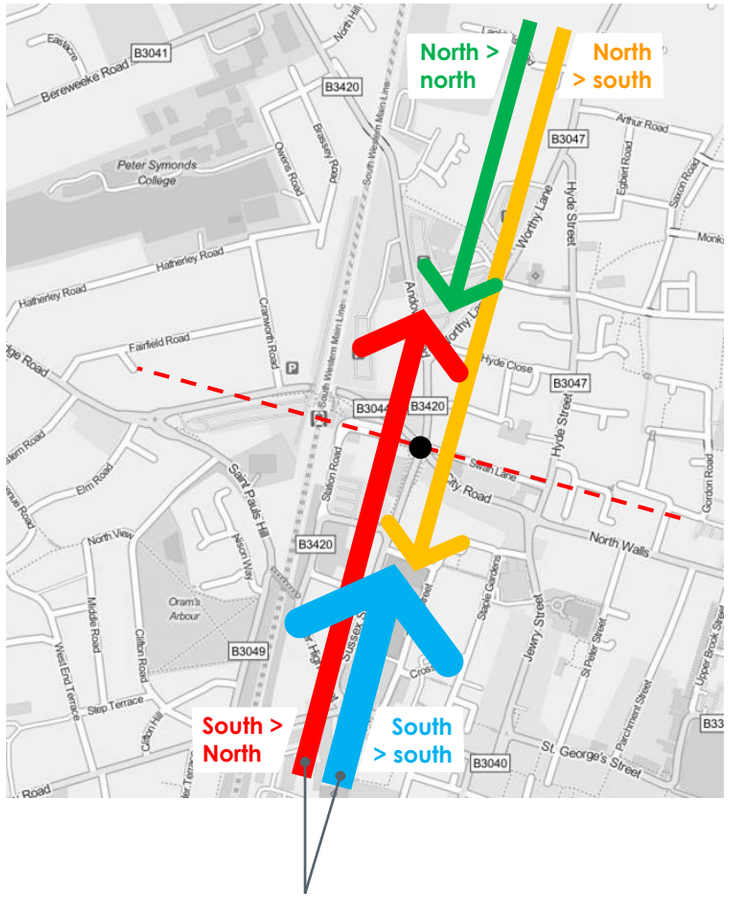
Assuming no change to the distribution of parking supply, a sensitivity test has been undertaken which removes all non-contained trips. Whilst this is unlikely to be achieved in practice it gives a useful insight into the magnitude of traffic flows that currently arise from car park access/egress.

Overall it is clear that the scale of change resulting from relocating parking supply (+/- 116 movements per day; see page 8) is still very modest compared to the overall number of non-contained trips (+/- 2636 movements per day); over twenty times as much.

Demand > supply	AM peak Inbound (8-9am)	PM peak Outbound (5-6pm)	12-hour two-way (7-7pm)
North > north	263	196	2264
South > south	414	316	3769
Total contained	**677**	**512**	**6033**
North > south	0	0	0
South > north	0	0	0
Total non-contained	**0**	**0**	**0**
Change in total contained	+300	+232	+2636
Change in total non-contained	-300	-232	-2636

Page 27 in the appendix contains more detail on the sensitivity test assumptions.

Parking movements sensitivity test



10% of south > north demand switched to south > south

City Road junction flows

Base data

Existing traffic flow data (vehicles and pedestrians) has been collated for the City Road junction. The data was collected in January 2014. Summary flow diagrams for the AM peak, PM peak and 12-hour all day total are included in the Appendix at the end of this report.

Relocated parking supply (northern > southern)

	AM peak (8-9am)	PM peak (5-6pm)	12-hour (7-7pm)
Observed junction flow			
North > south	761	610	6575
South > north	424	419	4785
Combined	1185	1029	11360
Change in car park movements due to supply relocation			
North > south	+46	-53	-16
South > north	-64	+36	-100
Combined	-18	-16	-116
Net change			
North > south	+6%	-9%	0%
South > north	-15%	+9%	-2%
Combined	-2%	-2%	-1%

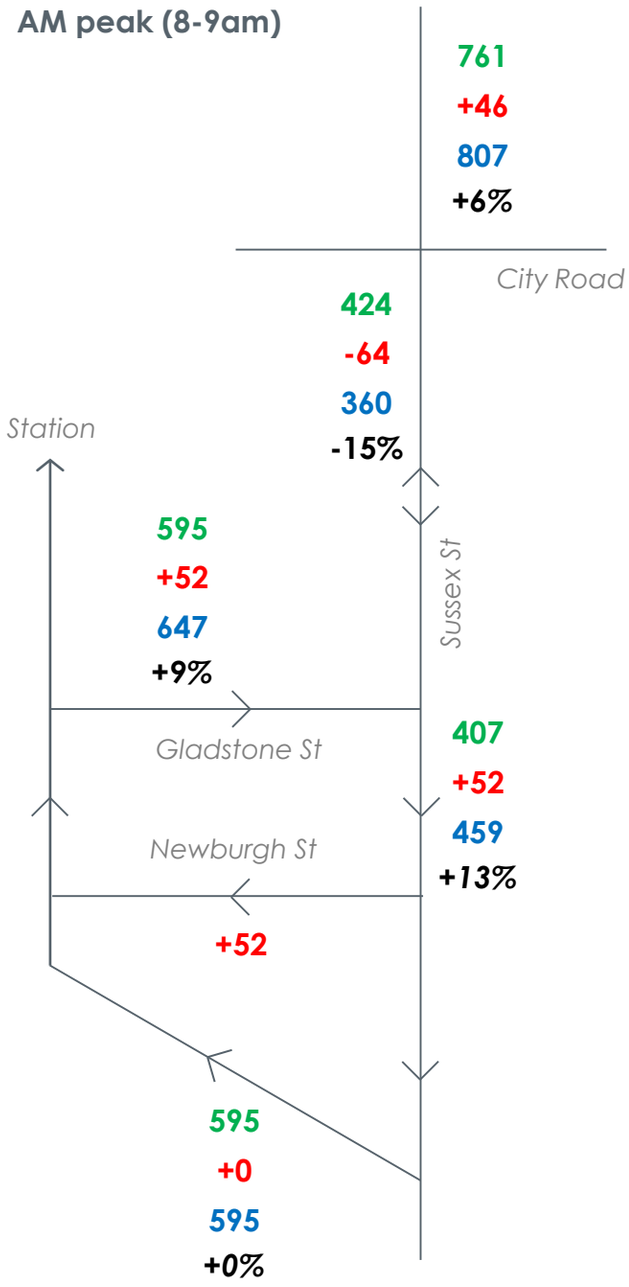
Based on the assumed future development proposals, the reallocation of parking supply could lead to an overall reduction in flow at the City Road junction of between -1% and -2% depending on time period. However this overall reduction is made up of an increase in north>south movement and a decrease in south>north movement.

Additional demand on the northern Andover Road approach in the AM and PM peaks is equivalent to a 6% / 9% increase respectively; this has the potential to exacerbate existing pressure on the junction unless compensatory capacity gains can be achieved with the reduction in south>north demand (AM) and north>south demand (PM).

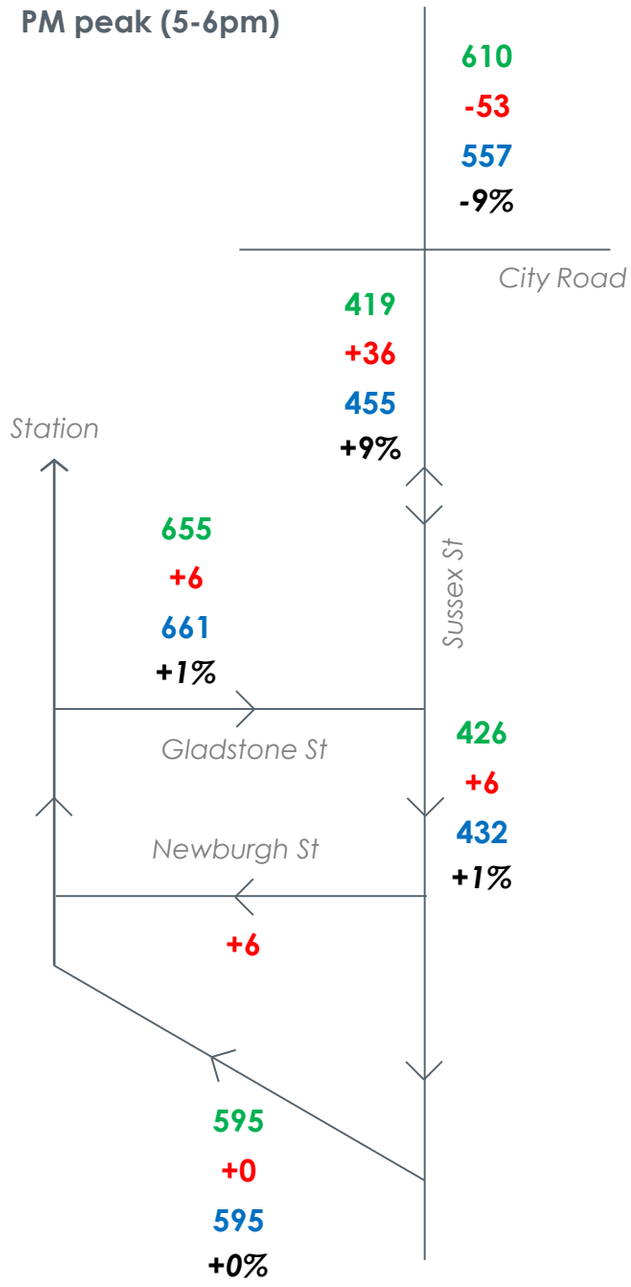
Wider network flows

123	Observed flow	678	Future flow
+45	Net change due to supply changes	+9%	% change

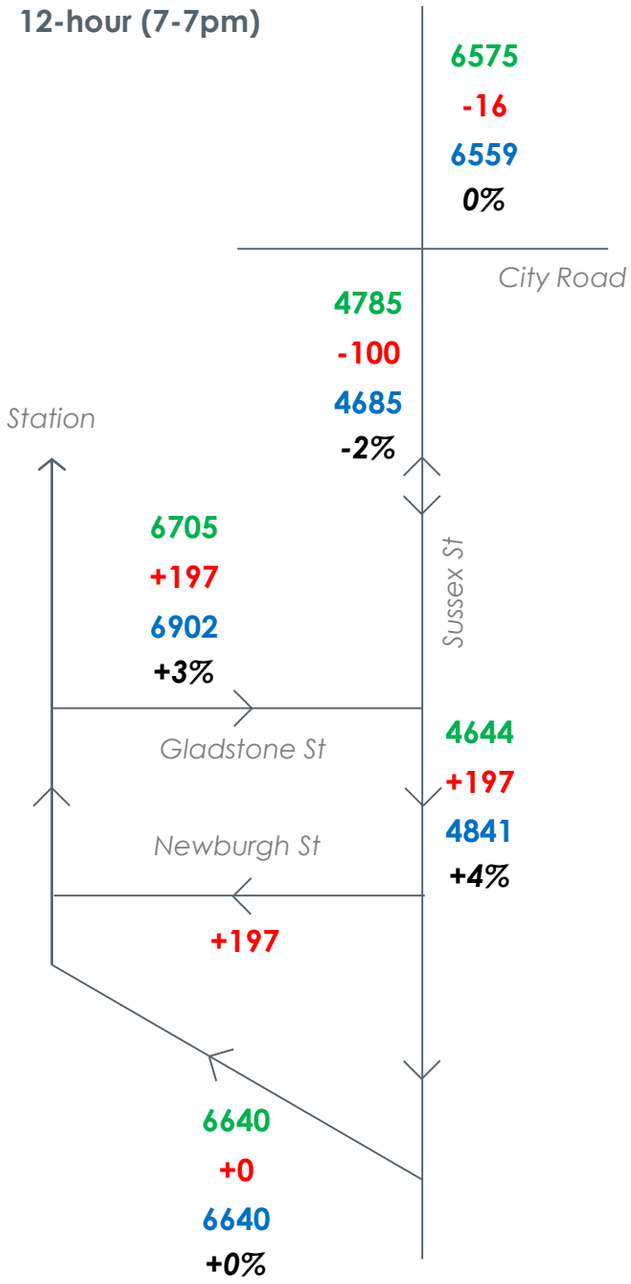
AM peak (8-9am)



PM peak (5-6pm)



12-hour (7-7pm)



Data sources

In addition to the City Road junction, existing traffic flow data has been obtained from HCC for Sussex St, Upper High Street and Gladstone St. Data for Sussex St and Upper High St was taken from recent (April 2015) week-long ATC counters; data for Gladstone St was taken from a single day in November 2008. For the purposes of this high-level assessment, 2008 data is deemed adequate.

Wider network flows - commentary

AM network flows

The highest network flow in the immediate station quarter area is the Andover Road approach to the City Road junction. The potential relocation and consolidation of parking to south of the junction is likely to lead to increased pressure on this approach.

With the exception of Sussex St northbound, additional traffic flow is generated on other links in the area. The increases are typically modest, in the order of +50 vehicles per hour, leading to a maximum of c.650 vehicles per hour on Gladstone St which has two lanes eastbound.

PM network flows

In general, flow changes in the PM peak are more modest that the AM. There is a loss of c.50 vehicles on the Andover Road approach to the City Road junction and generally small increases in flow to Sussex St, Newburgh St and Gladstone St. Generally these increases will be within expected weekly variations in traffic flows.

In principle, the overall the scale of impact of relocating parking appears to be minor in the PM peak and should not necessarily require mitigation.

12-hour network flows

Across the day, there is a mixed pattern of localised flow increases and decreases. The City Road junction experiences an overall drop in demand (consistent with fewer trips being made from the south to northern car parks) whilst conversely there is a modest increase in flows on Gladstone St and Sussex St.

The shift of parking supply to the south of the City Road junction means that there is an increase in demand to both Gladstone St and Tower St car parks from the north. The quickest access/egress route is via the residential Newburgh St which may have an additional c.200 vehicles using it over the 12 hour day.

Car park management

Overview

As highlighted on previous pages any changes in traffic flows resulting from relocating parking supply will be very modest compared to the overall number of 'non-contained' car park access/egress trips passing through the station quarter area.

With c.2,500 car park access/egress trips passing through the City Road there is scope (as shown in the sensitivity test on page 9) to reduce highway network flows through improved car park management. This is independent of any other potential changes to parking supply.

Winchester District Car Parking Strategy 2014-18

At the heart of the Winchester's current parking strategy is the principle that there should be sufficient car parking spaces in appropriate locations. The principle of consolidation is favoured as it ensures that car parking is provided efficiently in better designed car parks in more appropriate locations.

Efficient traffic and parking management is highlighted as being essential to ensure that wider environmental, social and economic objectives are met and it is recognised that this will require a level of investment in parking and traffic management. Furthermore, the strategy indicates that pricing of car parking and promotion needs to be 'intelligent' and be used as a tool to encourage use of the most appropriate parking for different purposes / needs.

Parking management measures

Below are a range of headline management measures that could be investigated and implemented to improve driver behaviour and car park choice:

- Continued **promotion of sustainable travel modes**, such as through Travel Plans associated with new development, with a focus on reducing the demand for long-stay parking
- Improvements should be made to the **marketing, promotion and signing of car parks** to encourage use of the most suitable car parks for specific purposes – including improved availability of real-time information that is available through various digital and conventional sources
- Existing car parking **tariffs should be reviewed and adjusted** to offer choice to drivers but also encourage the use of car parks with the least impact on air quality – in particular the promotion of Park and Ride that intercepts trips before they enter central Winchester
- Linked to the measure above, adopt a dynamic and flexible approach that seeks to **increase longer-stay parking charges** over time to a level that makes public transport price-competitive for journeys to work and **cap shorter-stay parking charges** at a level that maintains the attractiveness of the city's retail and tourism offer
- When new car parks are planned, ensure that they are **constructed to a high quality** in order to maximise their attractiveness to existing and new customers – and as with other WCC car parks ensure the ParkMark® standards are met

Accident analysis

Data has been supplied by Hampshire County Council for all recorded accidents between 2010-15 in the station quarter area (extract shown right; appendix contains more detail).

Serious injuries

Three serious injuries were recorded in the station quarter area:

1. a motorcyclist crashed at the junction of Gladstone St and Station Rd – no other vehicles/road users were involved
2. a motorcyclist and a car collided at the junction of Andover Rd and Worthy Lane – the car was pulling out into Andover Rd as the motorcyclist was filtering through queuing traffic
3. a pedestrian and a car collided at the junction of Stockbridge Rd and Andover Rd – this was due to the pedestrian being taken ill and encroaching into the road

Slight injuries

Accidents resulting in slight injuries show a clear pattern with few incidents recorded on Sussex St, Gladstone St and Station Rd but a noticeable cluster at the City Rd junction and along Andover Rd.

These accidents show no discernible pattern – they include a mixture of pedestrian, cyclist and car collisions due to a combination of inattention when turning, poor lane etiquette, rear ending at red lights and pedestrians entering the road without looking.

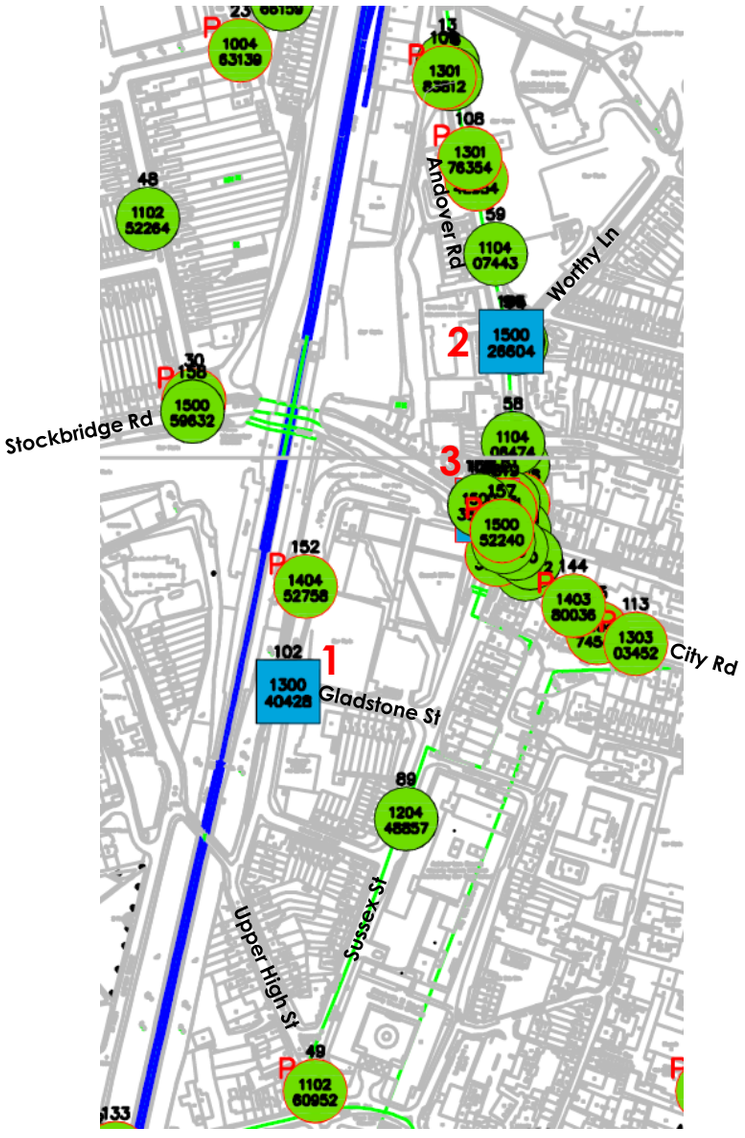
Pedestrian/cyclist injuries

The distribution of pedestrian/cyclist injuries is consistent with the overall pattern of accidents – the City Rd junction is a clear hotspot. The trend is for pedestrians being inattentive and/or drunk and being struck by passing vehicles.

Conclusions

The cluster of accidents at the City Road junction would benefit from further detailed analysis to assess whether there are specific design and/or management interventions that could be implemented. Other streets (eg Sussex St, Gladstone St) do not appear to have obvious major safety problems. However, as and when new developments come forward, any changes to highway conditions will need to be assessed in detail through the Road Safety Audit process.

Location of all recorded accidents between 2010-15



Future parking demand – different approaches

Overview

Potential new development in the station quarter area is likely to generate its own new parking requirements. Depending on land use this could be either private spaces, public spaces or a combination of both.

Estimating likely parking requirements is important in developing a future scenario for parking supply and demand and to ensure there is sufficient supply to meet operational requirements.

Future development

Development proposals prepared by Tibbalds in 2014 included the following development mix:

- 120 residential units
- 14,251m^2 B1 office
- 459m^2 food retail
- 577 m^2 café

It is anticipated that residential parking provision will be met solely through private parking spaces. The B1 office use will have some private provision with any remaining demand being met with publicly available provision. Parking related to the café and food retail land uses would use public spaces.

Estimating parking requirements

For additional robustness, three approaches have been used to estimate parking requirements:

- using the TRICS trip generation database to identify comparable sites and extract maximum parking accumulation data
- using prevailing WCC/HCC parking standards by land use
- Applying a 'first principles' approach based on residential car ownership, office space norms, etc.

Summaries of each of the three approaches are provided on subsequent pages with a final combined summary

Future parking demand – TRICS

TRICS

Vehicle trip rates have been extracted from the TRICS database for each land use. Sites were carefully selected to ensure that they will as comparable as possible with the station quarter. The vehicle trip rate information was then analysed to calculate the maximum daily parking accumulation based on the conventional formula of: *vehicles entering in 15-minute period – vehicles exiting in 15-minute period + number of vehicles from preceding period*

Each of the maximum parking accumulations were expressed either per 100m^2 of development or residential unit; the station quarter development quantums were then used to scale the numbers to expected parking totals.

Residential land use

For residential development the balance of vehicle movements is out of a site in the morning and into the site in the evening. This means that the calculated accumulated profile gives negative values. The largest negative value has been used as a proxy for the number of residential vehicles. This is assuming that every vehicle in the development is used on a daily basis. Whilst this is unlikely to be the case it will give a general estimate of residential parking requirements, particularly relative to the other land uses.

Land Use	Maximum parking accumulation	Quantum	Maximum vehicles parked	% of total
Office	3.656 / 100m^2	14,251	521	87%
Residential	-0.485 / unit	120	58	10%
Food retail (small supermarket / convenience store)	3.656 / 100m^2	459	14	2%
Café	1.150 / 100m^2	577	7	1%
Total			**600**	**100%**

Commentary

There is a substantial bias towards B1 office which, using TRICS data, suggests over 500 parking spaces could be required. This dwarfs all the other land uses. It is likely that the TRICS data has been derived from car-centric developments that, whilst recently surveyed, were planned and constructed in environments and planning contexts where restraint on parking was limited. As such, the scale of implied required provision should be regarded as an absolute maximum and unlikely to be appropriate in this context.

Future parking demand – standards

Winchester / Hampshire Parking Standards

Residential parking standards have been taken from the WCC Residential Parking Standards SPD. Policy 7 of the SPD states that "*[in the city centre] car parking may be provided to a lower standard than elsewhere in the district*" and hence minimum standards have been used. Hampshire parking standards have been used for other land uses.

The parking provision for the office land use is assumed to be 1/100m^2 based on prevailing HCC standards; however the active use of Travel Planning methods should be employed to ensure lower parking utilisation in practice.

The location of the café and food retail means their customer bases are likely to be heavily linked to the rail station, bus stops and local office development. Whilst the theoretical standards are shown, fewer spaces, possibly none, are likely to be more appropriate.

Land Use	'Accessible' parking standard	Quantum	Maximum parking spaces	% of total
Office	1 space per 100m^2	14,251	143	54%
Residential	Between 0.5 and 1.5 per unit; 0.5 spaces per bedroom	120	70	27%
Food retail (small supermarket / convenience store)	1.5 spaces per 28m^2	459	25	9%
Café (dining area assumed to be 1/3 of total floor area)	1 space per 7.5m^2 dining area	577	26	10%
Total			**264**	**100%**
Total (excluding cafe and food retail)			**213**	

Commentary

Compared to the TRICS values there is a substantial reduction in parking with less than half the spaces being required with the prevailing standards. This appears to be much more in line with an accessible central city location. There is also a better balance a parking requirement across all land uses.

However it should be noted that it is possible that car travel by residents, employees and visitors could exceed the stated standards leading to overspill parking pressure on the existing parking supply. As such, the scale of implied required provision above may be regarded as a minimum.

Future parking demand – first principles

First principles

The final assessment of future parking demand is based on a set of assumptions that, by working up from first principles, enables an alternative assessment to be made that in part better reflects local conditions and travel behaviour. Additional information is included at the end of the report.

Residential

2011 census data was used to find the number of vehicles owned per household in central Winchester. Allowing for multiple car households the average number of cars per dwelling is 0.906.

Office

Prevailing space norms for office use suggest every full-time equivalent employee (FTE) requires 12m^2 of floor space. Converting to gross floor areas, allowing for not all staff being on site at the same time, and assuming a 60% car mode share gives an estimated office parking requirement of 2.67 spaces per 100m^2.

Food retail and cafe

As highlighted on the previous page, the location of the café and food retail means their customer bases are likely to be heavily linked to the rail station, existing and future city centre development and nearby residential areas. Because of the local catchment, the likelihood of linked purpose (ie commute + food retail, shopping + cafe) trips and low car use, a nominal number of spaces have been proposed.

Land Use	First principles rate	Quantum	Parking requirement	% of total
Office	2.67 spaces per 100m^2	14,251	380	77%
Residential	0.906 per unit	120	109	22%
Food retail (small supermarket / convenience store)	0.5 spaces per 100m^2	459	3	<1%
Café	0.5 spaces per 100m^2	577	3	<1%
Total			**495**	**100%**

Commentary

The results for this first principles approach sit mid-way between TRICS and accessible parking standards. The office use generates the majority of the parking requirement as there could be c.1,000 staff employed in the proposed floor space. Assuming higher space norms of 18m^2/FTE (rather than 12m^2/FTE) leads to a reduction in office parking demand of 130 spaces down to c.360 spaces across all land uses.

Future parking demand – comparison

Three approaches

The results of the three different approaches used to estimate possible parking requirements by land use are summarised below left. Parking requirements based on assumed development quantums on the Cattlemarket and Carfax sites are summarised below right.

Land Use	TRICS	First principles	Standards	Composite	Public / private
Office	521	380	143	261	Mix
Residential	58 min.	109	70	70	Private
Food retail (small supermarket / convenience store)	14	2	25	2	Public
Café	7	3	26	3	Public
Total	**600**	**494**	**262**	**336**	

Site	TRICS	First principles	Standards	Composite
Cattlemarket *50% residential* *60% office*	342	282	120	192
Carfax *50% residential* *40% office* *100% retail* *100% café*	257	212	142	144
Total	**600**	**494**	**262**	**336**

Residential

There is a reasonably tight spread of values for residential parking need. The standards based approach represents a considered, established position on which to estimate private parking need and is deemed an appropriate mechanism for determining the quantum of required private parking.

Food retail and cafe

It is reasonable to assume that the café and food retail uses will have a local, predominantly walking, catchment. Trips to both of these land uses are likely to be linked with other purposes meaning that very low car use is likely to be the norm. A nominal number of spaces have been proposed for disabled use serving the immediate station area.

Office

Office use is likely to generate the majority of the overall development parking requirement as there could be c.1,000 staff employed in the proposed floor space. In principle, the prevailing 'accessible location' parking standard of 1 space per 100m^2 could be reasonably applied although as previously highlighted there is a risk of overspill parking from additional car trips. A level of provision mid-way between the first principles and standards-based approaches could be reasonable compromise. Active travel planning for the proposed office developments should be promoted and encouraged to ensure that employee car parking demand is minimised.

Residential parking implications

Current on-street parking supply

In the wider station quarter area there are 155 on-street parking spaces made up of the following types:

- 89 resident spaces
- 7 pay and display spaces
- 52 shared use (resident / pay and display) spaces
- 7 other spaces (disabled, short stay rail station parking)

There is also approximately 1.5km of single yellow lining (equivalent to c.300 spaces) that can be typically used for loading during the day and for general use in the early morning and late evening.

Existing parking activity

On-street parking activity data was collected in February/March 2015 – a headline summary is provided below.

	Weekday			Saturday		
	Resident only	Shared use	Single yellow	Resident only	Shared use	Single yellow
Total spaces	89	52	298	89	52	298
Average utilisation	72%	81%	4%	76%	72%	3%
Minimum utilisation	64%	73%	2%	71%	65%	1%
Maximum utilisation	81%	88%	10%	80%	79%	5%
Minimum spare capacity	17	6	268	18	11	284

Weekday

- Resident parking demand is at its maximum in the early morning, drops to an afternoon minimum and then rises in the early evening
- Shared use utilisation drops from an early AM peak, rises during the working day, drops during the late afternoon and then rises in the evening – this appears to be consistent with use both by residents outside of the working day and local workers/visitors during the day
- Parking on single yellow lines is at its highest at the start and end of the day suggesting use by residents. At 7.30pm the average utilisation is at 10% whereas at 6am it is only 4% - this suggests evening use by visitors etc
- Overall, there is spare capacity in resident parking provision and there is no clear evidence of extensive single yellow line use. Based on this the prevailing level of provision appears to be reasonable. This suggests that a similar level of provision for future development would be appropriate.

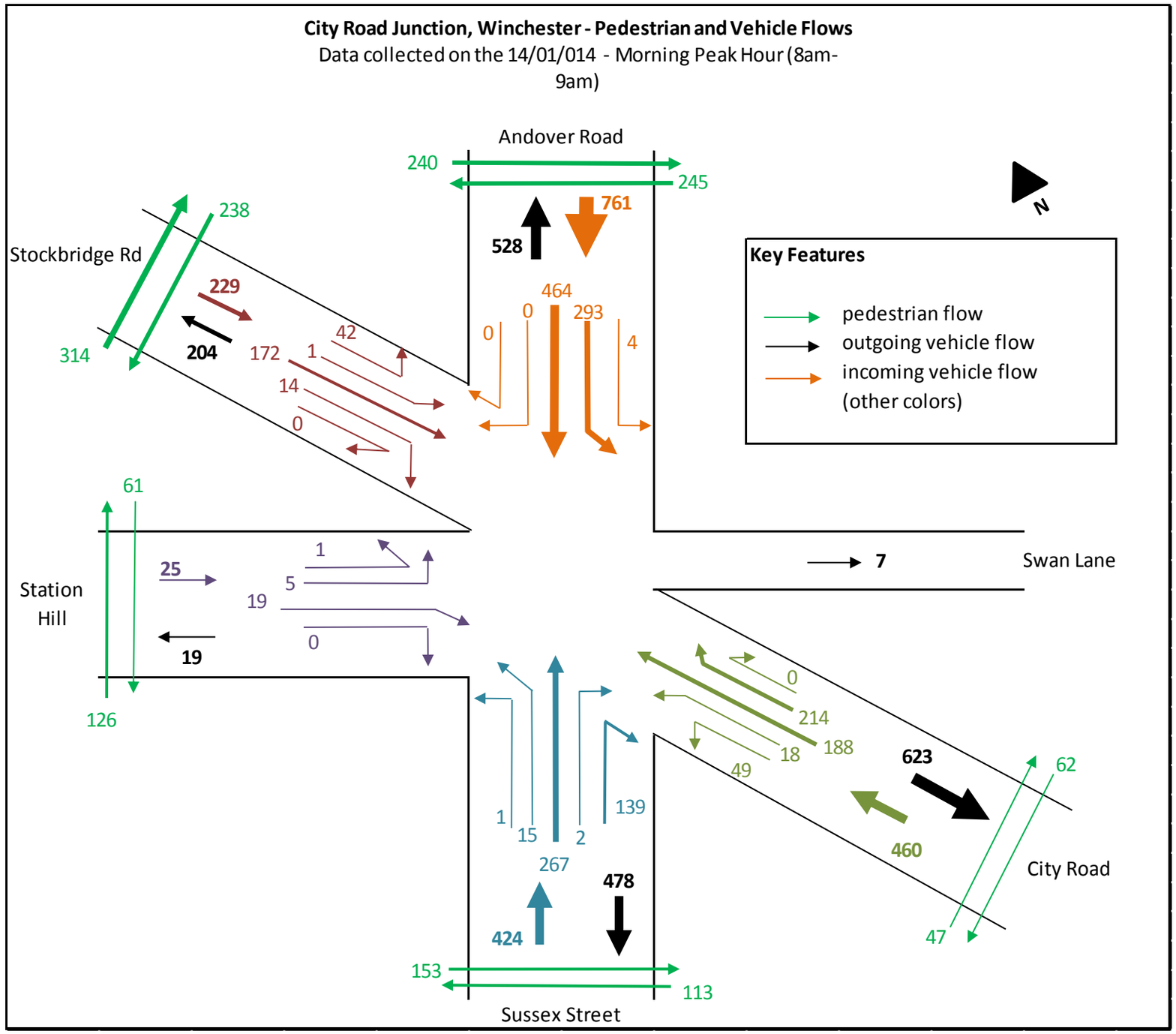
APPENDIX

City Road junction diagrams

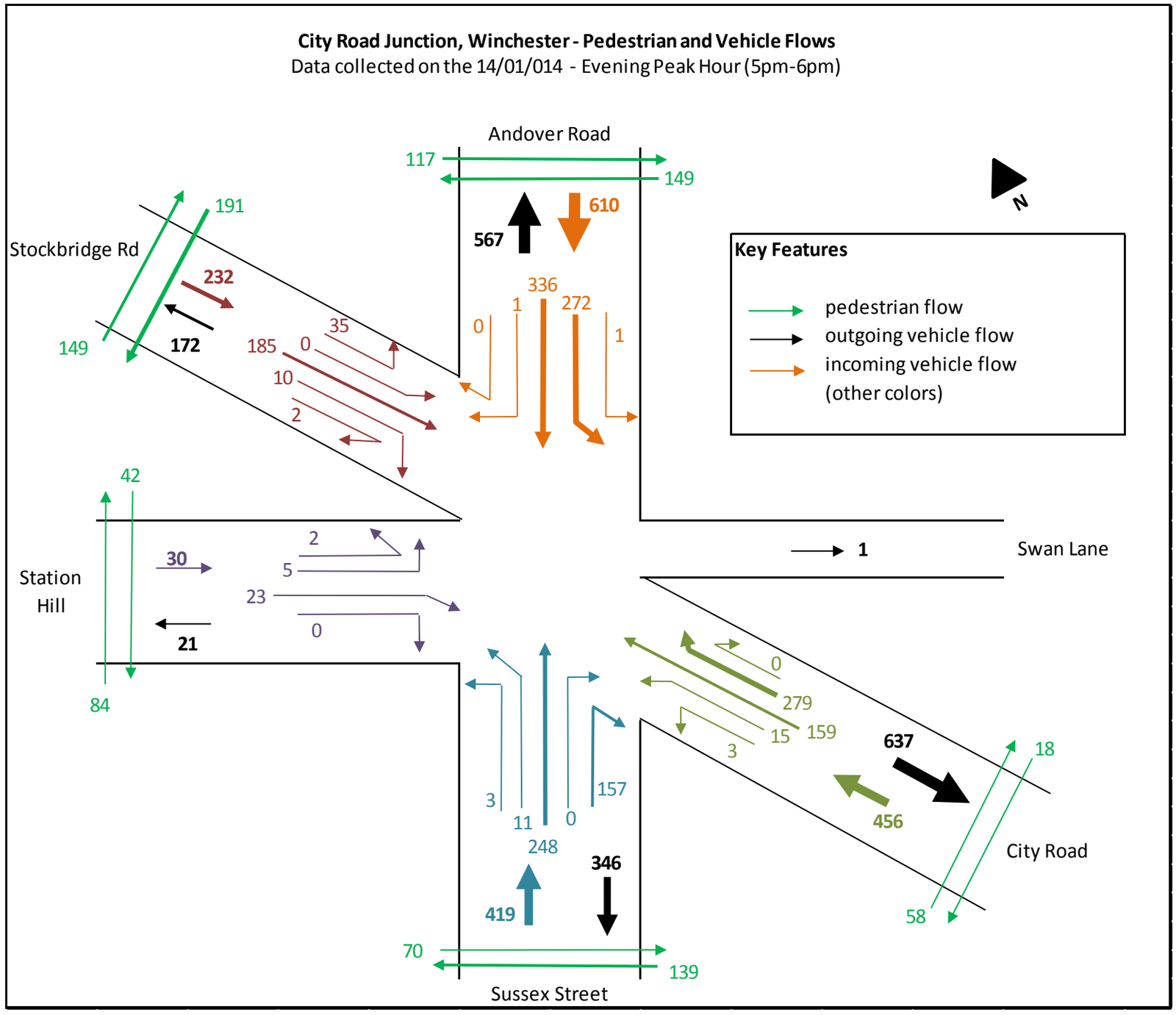
Wider network analysis model

HCC accident plots

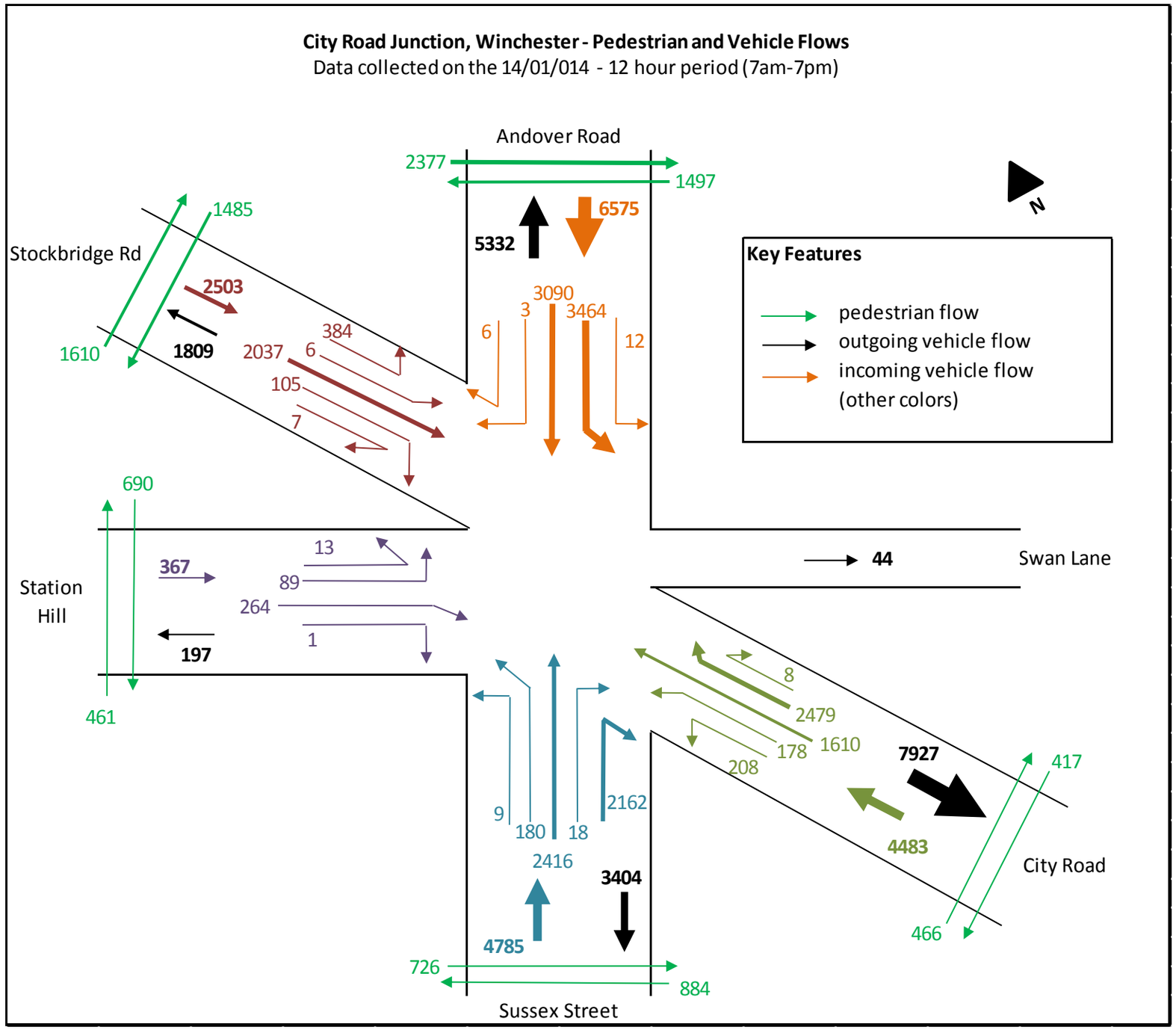
City Road flow diagram – AM peak (8-9pm)



City Road flow diagram – PM peak (5-6pm)



City Road flow diagram – 12-hour (7-7pm)



Wider area flow diagram – existing no change

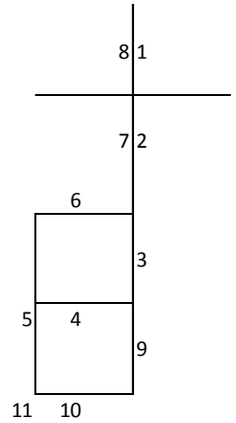
	FROM THE SOUTH											
	Coach Car Park		Cattle Market		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	38	33	35	4	51	4	30	13	240	14	20	6
5:00pm-6:00pm	20	39	8	36	4	41	9	24	47	144	21	32
12 hours (7am-7pm)	222	239	219	174	152	127	171	178	929	820	276	264

TOTAL Entry	
154	260
42	69
764	1204

	FROM THE NORTH											
	Coach Car Park		Cattle Market		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	21	18	26	3	39	3	31	13	141	9	4	1
5:00pm-6:00pm	11	22	6	27	3	31	10	25	28	84	5	7
12 hours (7am-7pm)	125	134	162	128	117	97	174	182	545	481	60	58

TOTAL Entry	
117	145
30	32
577	606

	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
NN In												117	30	577
NTowerIn	1	1	1									141	28	545
NGladIn	1	1	1	1	1	1						4	5	60
STowerIn												240	47	929
SGladIn					1	1				1	1	20	21	276
SN In					1	1	1	1		1	1	154	42	764
NN Out												38	105	542
NTowerOut				1	1	1	1	1				9	84	481
NGladOut							1	1				1	7	58
STowerOut			1						1			14	144	820
SGladOut			1						1			6	32	264
SN Out	1	1	1						1			54	140	717
AM	199	199	219	13	187	187	164	164	74	174	174			
PM	173	173	348	89	152	152	133	133	316	63	63			
12hr	1323	1323	2407	542	1581	1581	1303	1303	1801	1039	1039			



CHANGE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM														
PM														
12hr														

BASE FLOW	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	761	478	407	595	-	595	424	528	528	528	528			
PM	610	346	426	595	-	655	419	567	567	567	567			
12hr	6575	3404	4644	6640	-	6705	4785	5332	5332	5332	5332			
FUTURE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	761	478	407	595	-	595	424	528	528	528	528			
PM	610	346	426	595	-	655	419	567	567	567	567			
12hr	6575	3404	4644	6640	-	6705	4785	5332	5332	5332	5332			

% diff	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%			
PM	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%			
12hr	0%	0%	0%	0%	-	0%	0%	0%	0%	0%	0%			

Wider area flow diagram – car park supply relocation

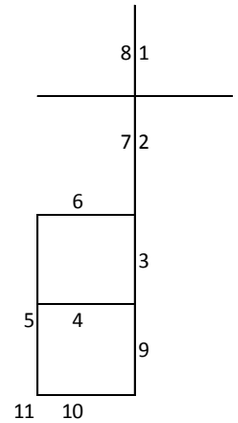
	FROM THE SOUTH											
	Coach Car Park		New North		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	38	33	18	2			30	13	240	14	88	12
5:00pm-6:00pm	20	39	4	18			9	24	47	144	30	91
12 hours (7am-7pm)	222	239	110	87			171	178	929	820	537	478

TOTAL Entry	
86	328
33	77
502	1466

	FROM THE NORTH											
	Coach Car Park		New North		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	21	18	13	1			31	13	141	9	56	6
5:00pm-6:00pm	11	22	3	13			10	25	28	84	11	52
12 hours (7am-7pm)	125	134	81	64			174	182	545	481	258	219

TOTAL Entry	
65	197
24	39
380	803

	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
NN In												65	24	380
NTowerIn	1	1	1									141	28	545
NGladIn	1	1	1	1	1	1						56	11	258
STowerIn												240	47	929
SGladIn					1	1				1	1	88	30	537
SN In					1	1	1	1		1	1	86	33	502
NN Out												33	60	380
NTowerOut				1	1	1	1	1				9	84	481
NGladOut							1	1				6	52	219
STowerOut			1						1			14	144	820
SGladOut			1						1			12	91	478
SN Out	1	1	1						1			47	81	504
AM	245	245	272	65	239	239	100	100	74	174	174			
PM	120	120	355	95	158	158	169	169	316	63	63			
12hr	1307	1307	2604	739	1779	1779	1203	1203	1801	1039	1039			



CHANGE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	46	46	52	52	52	52	-64	-64	0	0	0			
PM	-53	-53	6	6	6	6	36	36	0	0	0			
12hr	-16	-16	197	197	197	197	-100	-100	0	0	0			

BASE FLOW	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	761	478	407	595	-	595	424	528	528	528	528			
PM	610	346	426	595	-	655	419	567	567	567	567			
12hr	6575	3404	4644	6640	-	6705	4785	5332	5332	5332	5332			
FUTURE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	807	524	459	647	-	647	360	464	528	528	528			
PM	557	293	432	601	-	661	455	603	567	567	567			
12hr	6559	3388	4841	6837	-	6902	4685	5232	5332	5332	5332			

% diff	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	6%	10%	13%	9%	-	9%	-15%	-12%	0%	0%	0%			
PM	-9%	-15%	1%	1%	-	1%	9%	6%	0%	0%	0%			
12hr	0%	0%	4%	3%	-	3%	-2%	-2%	0%	0%	0%			

Wider area flow diagram – 'drive to' sensitivity test

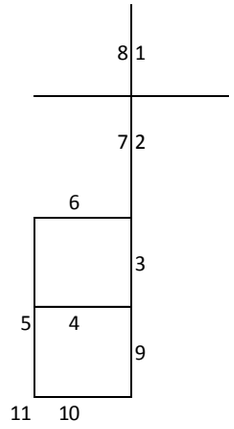
	FROM THE SOUTH											
	Coach Car Park		Cattle Market		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	38	33	35	4	51	4	30	13	240	14	20	6
5:00pm-6:00pm	20	39	8	36	4	41	9	24	47	144	21	32
12 hours (7am-7pm)	222	239	219	174	152	127	171	178	929	820	276	264

TOTAL Entry	
154	260
42	69
764	1204

	FROM THE NORTH											
	Coach Car Park		Cattle Market		Worthy Lane		Station East		Tower Street		Gladstone	
Time	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
8:00am-9:00am	21	18	26	3	39	3	31	13	141	9	4	1
5:00pm-6:00pm	11	22	6	27	3	31	10	25	28	84	5	7
12 hours (7am-7pm)	125	134	162	128	117	97	174	182	545	481	60	58

TOTAL Entry	
117	145
30	32
577	606

	1	2	3	4	5	6	7	8	9	10	11	AM	PM	14hr
NN In												263	62	1183
NTowerIn	1	1	1									0	0	0
NGladIn	1	1	1	1	1	1						0	0	0
STowerIn												317	68	1311
SGladIn					1	1				1	1	97	42	657
SN In					1	1	1	1		1	1	0	0	0
NN Out												48	196	1081
NTowerOut				1	1	1	1	1				0	0	0
NGladOut							1	1				0	0	0
STowerOut			1						1			41	214	1178
SGladOut			1						1			33	102	623
SN Out	1	1	1						1			0	0	0
AM	0	0	74	0	97	97	0	0	74	97	97			
PM	0	0	316	0	42	42	0	0	316	42	42			
12hr	0	0	1801	0	657	657	0	0	1801	657	657			

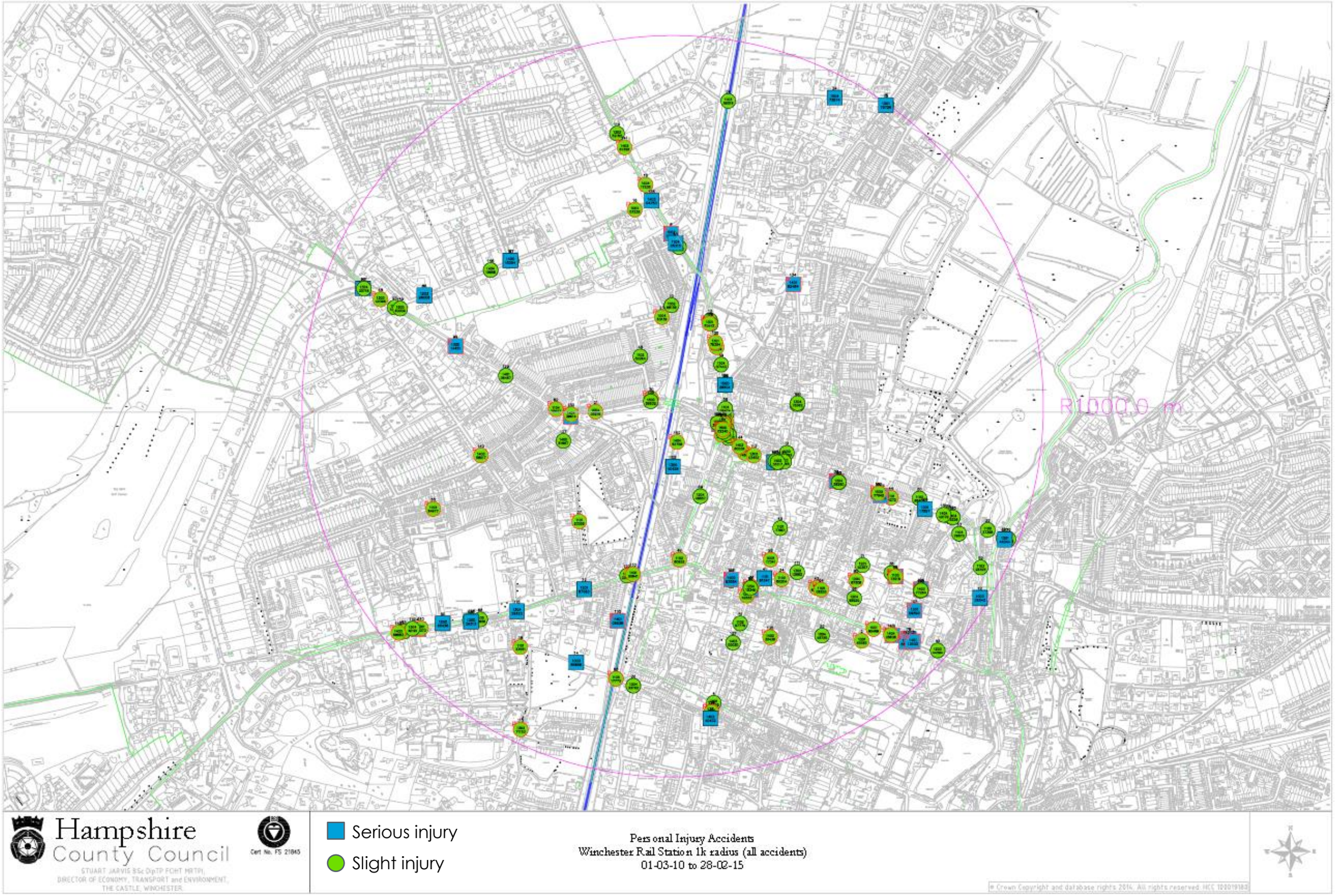


CHANGE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	-199	-199	-145	-13	-90	-90	-164	-164	0	-77	-77			
PM	-173	-173	-32	-89	-110	-110	-133	-133	0	-21	-21			
12hr	-1323	-1323	-606	-542	-924	-924	-1303	-1303	0	-382	-382			

BASE FLOW	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	761	478	407	595	-	595	424	528	528	528	528			
PM	610	346	426	595	-	655	419	567	567	567	567			
12hr	6575	3404	4644	6640	-	6705	4785	5332	5332	5332	5332			
FUTURE	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	562	279	262	582	-	505	260	364	528	451	451			
PM	437	173	394	506	-	545	286	434	567	546	546			
12hr	5252	2081	4038	6098	-	5781	3482	4029	5332	4950	4950			

% diff	1	2	3	4	5	6	7	8	9	10	11	AM	PM	12hr
AM	-26%	-42%	-36%	-2%	-	-15%	-39%	-31%	0%	-15%	-15%			
PM	-28%	-50%	-8%	-15%	-	-17%	-32%	-23%	0%	-4%	-4%			
12hr	-20%	-39%	-13%	-8%	-	-14%	-27%	-24%	0%	-7%	-7%			

HCC accidents plot – all road users



HCC accidents plot – pedestrians only

HCC accidents plot – cyclists only

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