Kingston Town Centre Movement Strategy

Final Report

November 2014

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Prepared for:

Royal Borough of Kingston upon Thames

Prepared by:

Steer Davies Gleave
28-32 Upper Ground
London SE1 9PD

+44 (0)20 7910 5000
www.steerdaviesgleave.com

steer davies gleave

Executive Summary

Background

Steer Davies Gleave has undertaken a movement study of Kingston Town Centre (KTC) on behalf of the Royal Borough of Kingston upon Thames (RBK). The main aim of the study is to produce a Strategy document which provides an overarching vision for movement in KTC, balancing future movement demands whilst creating significant place-making opportunities to enhance the quality of the KTC environment and thereby support growth. RBK is taking a proactive approach to growth and development in KTC, and it is envisaged a number of significant development sites will be realised by the year 2031; the study has taken into account the demand generated by this development and proposes transport measures to respond to this.

The study considers provisions for all relevant modes of transport within the town centre, including off-street car parking provisions, in order to explore strategic options for change and provide a technical evidence base to support decision-making and investment. In this regard, the study supports Core Strategy objectives, and will also directly inform a planned revision of the K+20 Kingston Town Centre Area Action Plan (AAP), adopted 2008.

This report presents the strategy as developed in Stage 2 of the study. It follows on from Stage 1 which comprised baseline analysis to identify issues and opportunities related to movement and parking in KTC.

Development context

There are a significant number of development sites across KTC at various stages in the planning pipeline, and a number of other sites that are identified in the extant AAP for potential development. The development context is rapidly evolving and during the preparation of this strategy the scale and nature of development on specific sites has changed. To help shape opportunities RBK is preparing development briefs for two key areas: North Kingston, and Eden Quarter. Preparation of this strategy has taken account of current thinking for both of these areas, and also informed work on the development briefs.

North Kingston

A first stage development brief was prepared and adopted by RBK in November 2013. A second stage brief is currently being prepared which will refine development requirements. Key changes related to movement within this brief include:

- Closure of Kingsgate Road to traffic, and creation of a new cycling and walking link along this alignment.
- New left-hand turn from Sopwith Way to Richmond Road.
- New left-hand turn from Sury Basin to Seven Kings Way for access to the gas-holder development site (access only).

Eden Quarter

GVA and Allies & Morrison Urban Practitioners have been commissioned to prepare a development brief for the Eden Quarter area. Among other sites this includes the Eden Walk Shopping Centre, the Cattle Market Car Park, and the Ashdown Road car park. Work on this is ongoing.

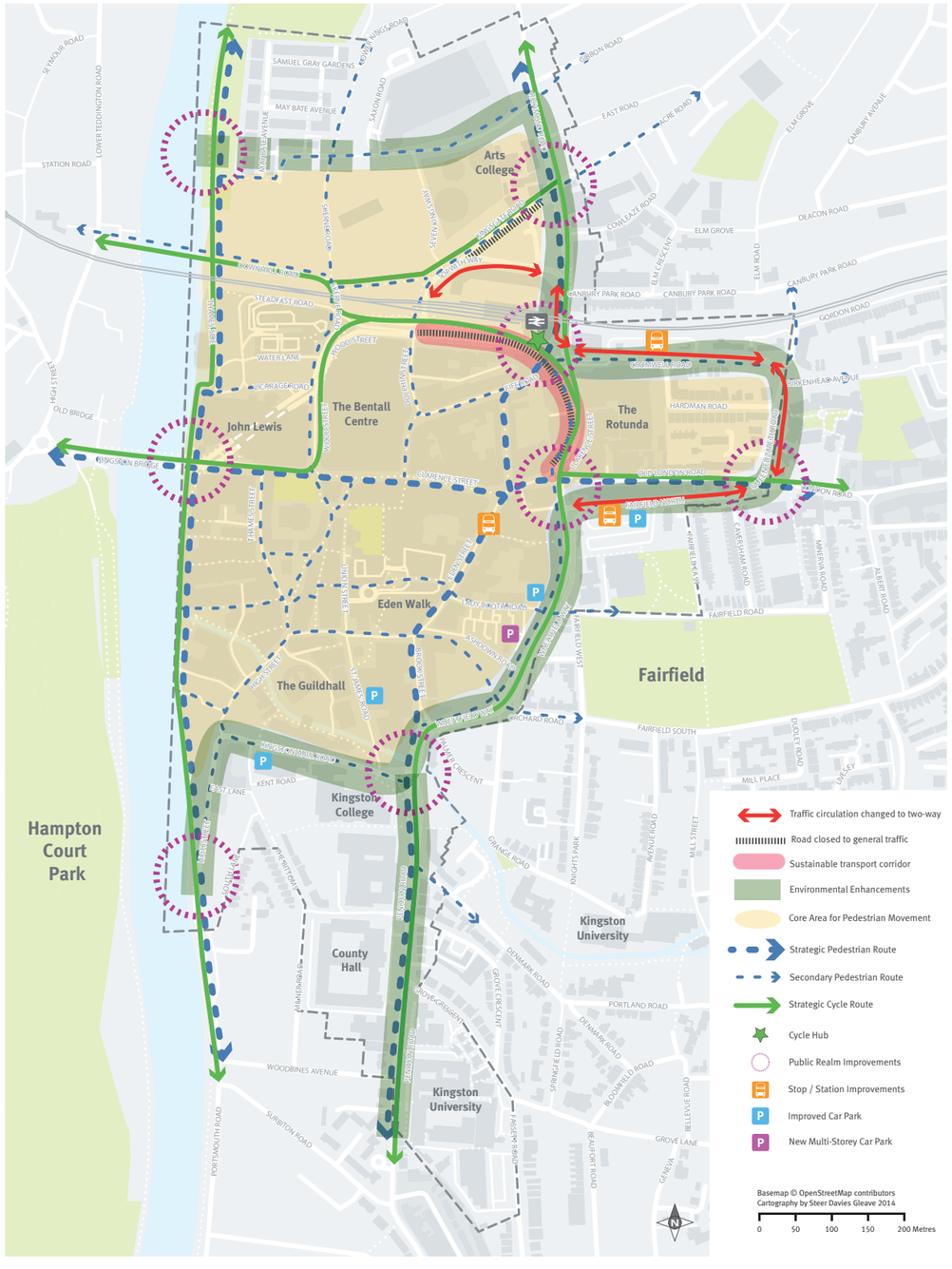
Vision for movement

The strategy is based around a high level vision for movement. This sets overarching design principles that shape the detail of transport measures and highways options presented. The vision is:

A balanced transport network that supports the Kingston experience by maintaining the town centre as a high-quality and attractive place, facilitating town centre development opportunities, and supporting a local economy that is diverse, vital and competitive. It delivers improved opportunities for walking, cycling and public transport to encourage movement by these modes whilst also facilitating access by private vehicles.

This is illustrated in the diagram to the right. The core components of the vision are:

- Removal of traffic from Wood Street and Clarence Street to create sustainable transport corridor for walking and cycling, along with substantial new areas of public realm and development opportunities in association with Crossrail 2
- Enhanced walkability across an expanded area of KTC
- High quality pedestrian corridors on key routes



Vision for Movement

- Walkable grid of pedestrian connections; improved crossings on relief road; and linkages to surrounds
- Green boulevard design treatment for relief road
- Mini-Holland cycling proposals
- Gateway public realm enhancements
- Improved facilities for bus operations and improved public transport passenger experience

This vision diagram shows one possible future highway layout (Scenario 6), which is one out of eight highways scenarios that were considered (as described further below). It is the highways scenario that consists of the most comprehensive changes to the current road network, and it has been included in the diagram as it offers the potential to make the most significant positive contribution to KTC in terms of place-making out of all the scenarios. The key feature of this scenario is closing the Wood Street / Clarence Street section of the gyratory to general traffic, transforming it into a sustainable transport corridor. The remaining parts of the gyratory would be converted to two-way working (Sopwith Way / Richmond Road south / Cromwell Road / Queen Elizabeth Way / Fairfield North).

However, the significant change presented by this highways scenario inherently means that there are several challenges that will need to be addressed, in particular the need to enhance accessibility to KTC by public transport, walking and cycling. It therefore represents a long-term vision, and is likely to be dependent on the implementation of Crossrail 2. Significant feasibility, design and consultation work would need to be undertaken in the intervening years if this scenario was to be pursued. In addition, it should be noted however that whilst Scenario 6 aligns most closely with the overall vision, the vision is not dependant on any particular highways scenario.

In addition, the vision is supported by a hierarchy of street types with associated design principles. The hierarchy sets key design parameters for an improved future network of streets and links in the study area. It applies a coordinated and coherent approach in support of wider place-making objectives. This is intended as a starting point for further elaboration in later studies, ultimately leading to a design guide for street improvement and public space projects within KTC.

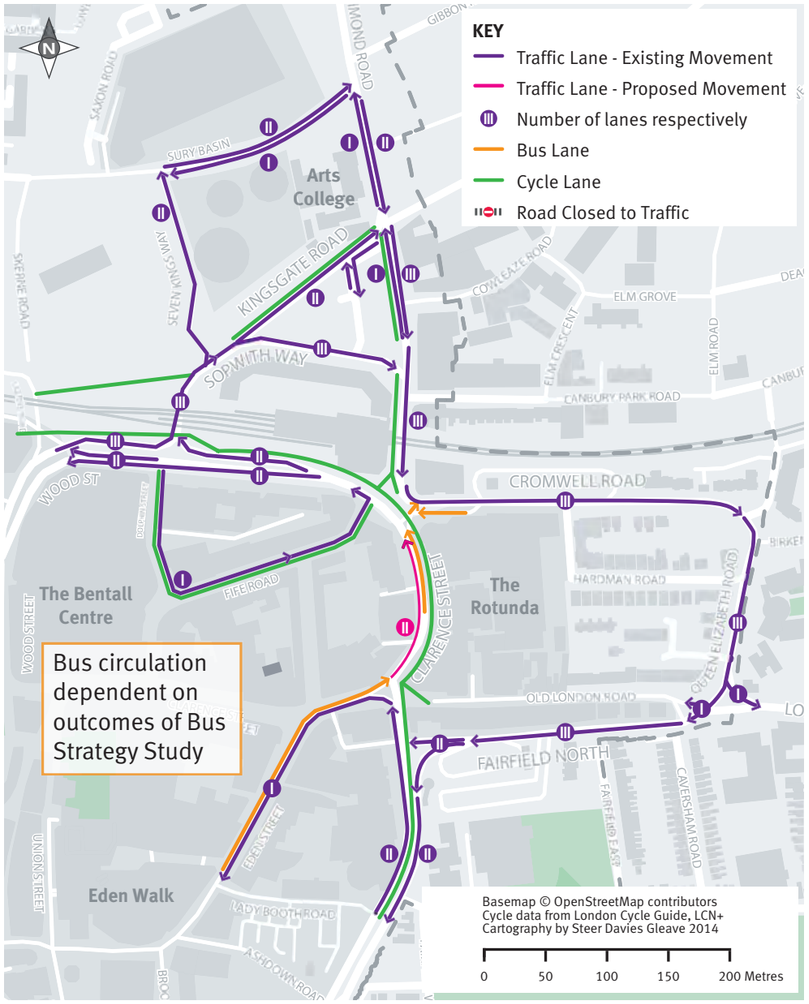
Highways scenario development

A wide range of possible highways scenarios was considered, ranging from relatively minor interventions through to options involving comprehensive changes. A longlist of eight scenarios was initially developed and subject to a technical highways review and a high-level multi-criteria evaluation. These were then sifted to a shortlist of three scenarios (nos. 1, 3 and 8) which were examined further. Consideration was given to the key benefits arising from each scenario, as well as the challenges associated with each scenario and how these could potentially be overcome. Traffic models were also used to identify how the scenarios would affect traffic capacity, and the implications that this could have. At a later stage a fourth scenario (no. 6) was then considered. Due to the late addition of Scenario 6 to the shortlist it has not been tested in the traffic models. The traffic impacts for this scenario have been estimated relative to the modelled impacts of Scenario 8.

The intention of the shortlist was to explore varying degrees of change, including comprehensive changes to highways working such as closing parts of the gyratory, or introducing two-way working. This process is described further in Chapter 6. The diagrams on the right illustrate the four shortlisted scenarios 1, 3, 8 and 6. They are deliberately presented in this order to reflect the increasing level of intervention proposed, from least to most extensive change.

Following on from the diagrams is a summary table summarising impacts of each scenario, the main benefits, challenges, and measures required to mitigate challenges. The scenarios with more comprehensive changes (nos. 6 and 8) present more significant challenges, however they also present the most significant benefits for KTC overall.

Highways Scenario 1: Mini-Holland proposals and strategic enhancements

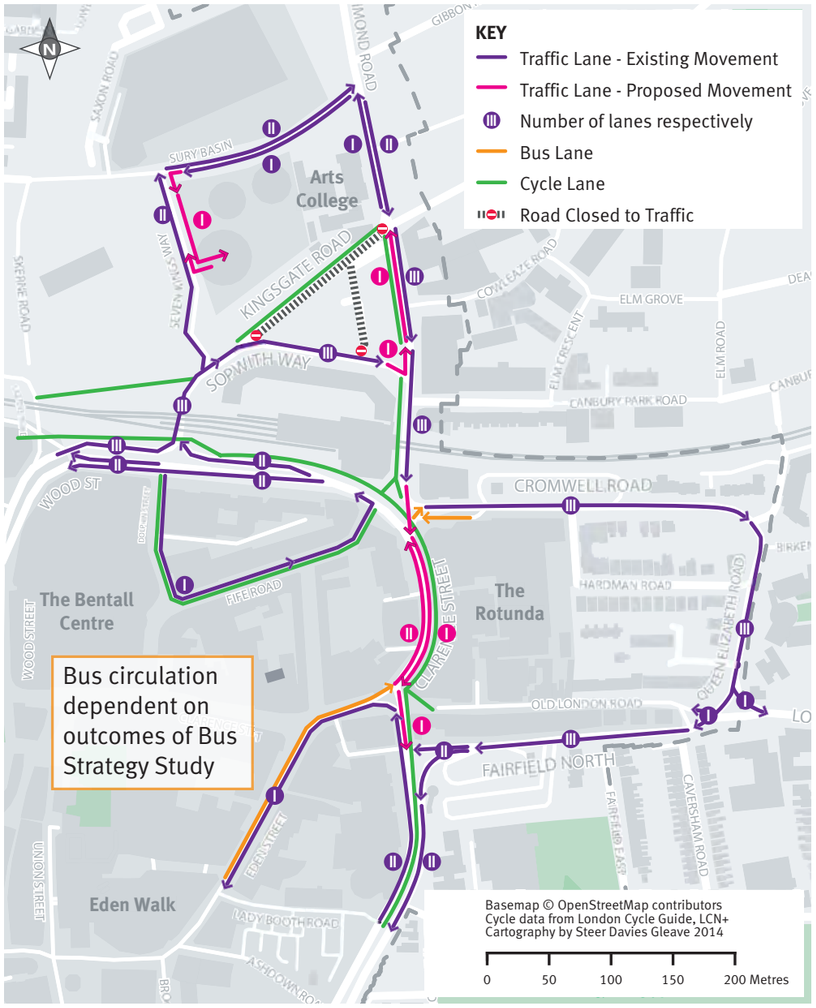


This scenario involves relatively few changes to the town centre road network. Its key features are:

- Retain the overall configuration of the existing gyratory system
- Implement Wheatfield Way/ Station Plaza mini-Holland schemes
- Number of lanes on Clarence Street reduced from three to two
- No changes to the North Kingston road network

This scenario has few challenges and would be relatively straightforward to implement. A key benefit that would arise from this scenario is significantly improved connectivity and safety for cyclists through the provision of dedicated facilities as part of the mini-Holland schemes. This scenario also offer the opportunity to enhance the urban realm, particularly in front of the railway station, which is a key gateway to KTC.

Highways Scenario 3: Clarence Street two-way

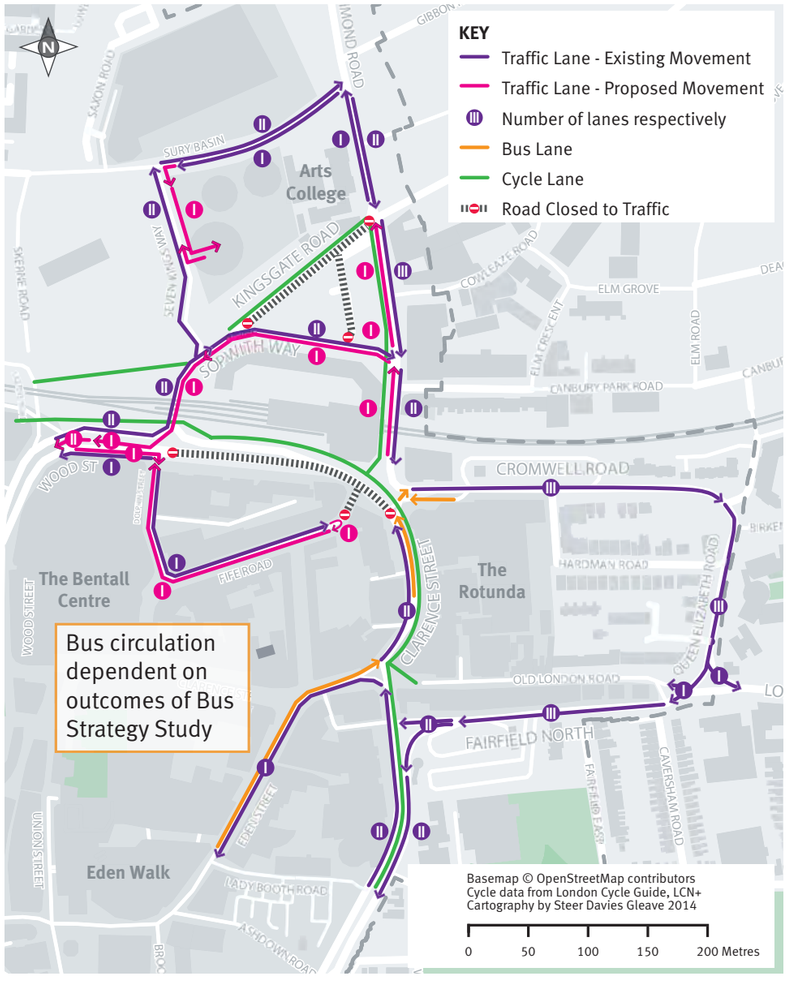


This scenario involves a moderate level of changes to the town centre highway network, consisting of the following key features:

- Clarence Street opened to southbound traffic from Richmond Rd
- Implement Wheatfield Way/ Station Plaza mini-Holland schemes
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

Converting Clarence Street to two-way working has the potential to change the nature of this road segment from a high-speed gyratory to a low-speed urban street, thereby reducing severance. Providing a more direct route for southbound vehicles also has the potential to reduce vehicle-kilometres travelled, although there will also be increased junction complexity (which could restrict traffic capacity).

Highways Scenario 8: Wood Street sustainable transport corridor

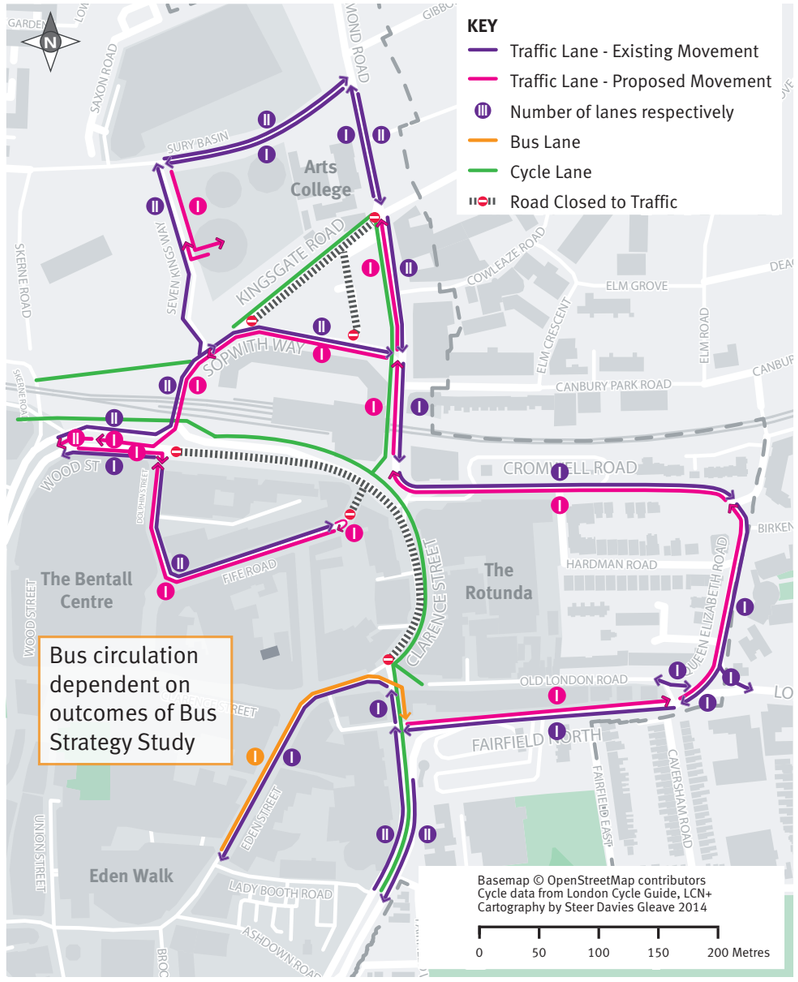


This scenario entails significant changes to the highway network, which include the following:

- Prohibit general traffic from the Wood Street section of the gyratory, turning this section into a sustainable transport corridor for pedestrians and cycles (potentially also buses)
- Convert the Sopwith Way section of the existing one-way gyratory system to two-way operation
- Implement Wheatfield Way/ Station Plaza mini-Holland schemes
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

This scenario has the potential to facilitate very significant benefits for KTC. It does this by greatly reducing the severance caused by Wood Street, helping integrate the railway station area to the core of the town centre. This provides and opportunity to significantly improve the public realm at this key gateway, make KTC a more attractive environment, and providing development opportunities. There are a number of challenges, primarily related to reduced traffic capacity and implementation issues (such as the potential need for highway widening along Sopwith Way and altering railway structures). As such, the success of this scenario relies on significantly enhancing accessibility to KTC by non-car modes, and particularly the realisation of Crossrail 2.

Highways Scenario 6: Clarence Street and Wood Street sustainable transport corridor



This scenario offers significant changes to the KTC highways network, including the following:

- Prohibit general traffic from the Wood Street / Clarence Street section of the gyratory, turning this section into a sustainable transport corridor for cycles and pedestrians (potentially also buses)
- Convert the remaining sections of the existing one-way gyratory system to two-way operation
- Implement Wheatfield Way/ Station Plaza mini-Holland schemes
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

This scenario presents the most comprehensive change considered. It has the potential to make a very significant positive contribution to improving the KTC environment and facilitate further economic development, it is however the most challenging and complex scenario to implement, and is dependent on the implementation of Crossrail 2. Further work would be required to assess its technical feasibility (including impacts on traffic), and how implementation could be undertaken in tandem with Crossrail 2 in Kingston. Crossrail 2 has the potential to help address some of the key challenges, for instance widening of the underpasses under the railway bridges may be able to be achieved as part of other Crossrail 2 rail infrastructure upgrade works.

Summary of overall impacts of four highways scenarios

Impact category	Specific area	Highways Scenario 1 Mini-Holland & strategic KTC enhancements	Highways Scenario 3 Clarence Street two-way	Highways Scenario 8 Wood Street sustainable transport corridor	Highways Scenario 6 Clarence Street and Wood Street sustainable transport corridor
Movement and transport	Walking	+	+	+ +	+ + +
	Cycling	+ +	+ +	+ +	+ + +
	Buses	o	o	–	– –
	Traffic capacity and vehicular access	o	–	– –	– – –
Feasibility, risk, and cost	Technically feasible deliverable	+ +	+	– –	– – –
	Level of risk	Low	Moderate	High	High
	Cost	£	££	££££	£££££
Environment and climate change	Emissions and air pollution	+	o	–	– –
Social and community	Public realm	+	+	+ +	+ + +
	Connectivity	+	+	+ +	+ + +
Economic development	Release of land for development	o	o	+ +	+ + +
	Access supports economic viability	+	+ +	+	+
Safety and security	Road safety	+	+	+ +	+ + +
	Personal security	+	+	+ +	+ + +
Key benefits		• Mini-Holland scheme improves cycling • Pedestrian environment in KTC enhanced, particularly in front of the railway station	• Reduction in traffic in KTC of about 5% of through trips (200 vehicles) • Two-way low speed operation of Clarence Street reduces perception of severance	• Greatly reduces severance, improves access to rail station, and expands core KTC area to the north • Major opportunities for improved public realm and meeting place-making objectives • Improves walking / cycling connectivity and permeability • Development opportunities created around railway station by release of highways land	• Greatly reduces severance, improves access to rail station, and expands core KTC area to the north and east • Major opportunities for improved public realm and meeting place-making objectives • Improves walking / cycling connectivity and permeability • Development opportunities created around railway station by release of highways land
Key challenges		• Displacement of through trips elsewhere in borough because reduced capacity and delays on Clarence Street / Wood Street attract drivers to alternative routes • Reduced resilience to major incidents in highway network	• Displacement of through trips elsewhere in borough because delays on KTC road network lead to alternative routes becoming more attractive to drivers • Increased complexity at junctions affected by the new two-way section of Clarence Street	• Displacement of through trips elsewhere in borough because severe delays on KTC road network make alternative routes attractive to drivers. Vehicle trips to/ from KTC also affected by delays. Displaced traffic may increase pressure on routes in wider area • Bus delays may occur increasing passenger travel times. • Access by non-car modes will need to be improved to ensure visitors can access KTC easily • Engineering requirements will need to examined; e.g. the two road underpasses beneath the railway line may need widening	• Displacement of through trips elsewhere in borough because severe delays on KTC road network make alternative routes attractive to drivers. Vehicle trips to/ from KTC also affected by delays. Displaced traffic may increase pressure on alternative routes in wider area • Bus delays may occur increasing passenger travel times. • Access by non-car modes will need to be improved to ensure visitors can access KTC easily • Engineering requirements will need to examined; e.g. road underpasses beneath the railway line may need widening, and two-way working around gyratory may result in land-take

Key mitigating measures to address challenges		• Mode shift required of roughly 500-1000 of 8000 peak hour vehicle trips (total of both through trips and town centre trips) to maintain a highway network that operates within practical capacity through:
		  • Mini-Holland schemes to encourage more cycling
		  • Continued improvement of bus services including capacity enhancements
		  • Supporting measures such as travel planning and promotion
			• To achieve a highway network that operates within practical capacity, roughly 500 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. Mode shift through:
			  • Mini-Holland schemes to encourage more cycling
			  • Continued improvement of bus services including capacity enhancements
			  • Supporting measures such as travel planning and promotion
			• Optimise junction operation for road users
				• To achieve a highway network that operates within practical capacity, roughly 1000–1500 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. High level of mode shift through:
				  • Implementation of Crossrail 2
				  • Enhanced bus capacity (priority measures; improved access to bus stations; stands/ stops increased)
				  • Mini-Holland and complementary Quietways
				  • Comprehensive walking network improvements
					• To achieve a highway network that operates within practical capacity, roughly 2000 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. Very high level of mode shift through:
					  • Implementation of Crossrail 2
					  • Enhanced bus capacity (priority measures; improved access to bus stations; stands/ stops increased)
					  • Mini-Holland and complementary Quietways
					  • Comprehensive walking network improvements

+ + + high benefit + + moderate benefit + small benefit o generally neutral – some detriment – – moderate detriment – – – high detriment

Next steps - highways scenarios

The KTC Movement Strategy provides an overall vision for movement for KTC, which seeks to balance future movement demands with aspirations to improve KTC as a place, enhancing the town centre environment, enabling growth and attracting new development. The various highways scenarios presented are just one component of the strategy but some of these present significant change and require further detailed investigation.

Scenario 1 is already being further developed through the mini-Holland work and as such the particular technical challenges this option presents will be tested in coming months. The levels of change in scenarios 3, 6 and 8 present more significant challenges to be overcome, however scenarios 6 and 8 in particular also present significant opportunities. Further work should be done to explore how these scenarios could be implemented to realise these opportunities.

Ultimately, scenario 6 or a variant thereof offers the greatest benefits to the long-term improvement of KTC, subject to securing the necessary investment and support. Major initiatives such as this inevitably require significant interventions and change. Scenario 6 is the most ambitious highways option, however the existing highways boundaries provide limited scope to implement such a scheme and a more thorough investigation of the potential land acquisition implications is required.

It is recommended that further studies are undertaken to investigate both scenario 6 and 8 in more detail and determine if such significant changes to the highways environment are achievable, and how the challenges identified in this study can be resolved. Studies should cover the following:

- Develop scenarios 6 and 8 to outline design;
- Review timescales for implementation to understand how these might fit with other KTC development and Crossrail 2;
- Undertake detailed engineering assessment to review deliverability and feasibility, including technical surveys to investigate particular constraints such as the railway underpasses;
- Assess land requirements including need for potential land acquisition and identify how this might be achieved;
- Liaise with key stakeholders such as Network Rail, TfL, major landowners etc. to understand their views and identify how options might relate to any other works being considered (e.g. Crossrail 2);
- Prepare an outline implementation plan;
- Prepare cost estimates for capital works;
- Identify potential funding opportunities;
- Undertake detailed highways modelling to review impacts at a local level.

Further work must relate to other work being undertaken in the KTC area to take advantage of complementaries and ensure an integrated design solution. In particular this should include:

- The development briefs for the Eden Quarter and North Kingston areas;
- The emerging framework for public realm improvements in Kingston;
- The planning framework for the Kingston station area to be developed in association with the GLA.

Wider strategy measures

A key part of the KTC Movement Strategy is a comprehensive suite of measures that are intended to promote KTC as a high quality place, easily accessible by a variety of means. Measures include both physical infrastructure improvements and non-physical supporting measures aimed at the different users of the town centre (e.g. residents, workers, visitors, business owners/ operators), including travel demand management.

The measures have been developed with reference to the various planned and potential development opportunities including the North Kingston and Eden Quarter opportunity areas, and are intended to support the realisation of these sites. They are also designed to take advantage of development to provide specific pieces of new infrastructure such as, for example, new pedestrian routes, public realm, or cycling connections.

Measures are categorised into those that can be implemented in the relative short term, and those which till require further investigation and will take longer to implement. The table on the following pages sets out the short term physical measures proposed in the strategy.

Proposed measure	Description	Objectives	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
PEDESTRIAN				
Extension of wayfinding signage across KTC and other key arrival points	The Legible London wayfinding system has recently been introduced to KTC but essentially only covers the current retail core. This should be extended to include North Kingston, southern areas of KTC along Penrhyn Road, and around Surbiton Station. Audits of existing signage and removal of redundant signage at the same time would support the roll-out.	• To aid legibility and navigation in the wider KTC area and reduce the psychological barriers to walking. • To increase walking mode share for short trips. • To encourage visitors and residents to explore further afield within KTC.	£	Short
Interpretative signage and augmented reality	A suite of high quality interpretative signing supplemented with augmented reality (e.g. through a bespoke app or website) marking places of interest (e.g. sites of historical importance, landmarks, views), and providing information about them. For example this could be used to promote general areas like the Thames riverside, or inform about specific features such as the Coronation Stone.	• To encourage visitors to explore the town centre more widely • To inform and explain • To promote / reinforce a Kingston town centre identity	£	Short
Design guidance for streets and spaces	Prepare comprehensive design guidance for different streets and spaces in KTC to guide and coordinate development and regeneration initiatives. This should be based on street types as presented earlier in this report.	• To guide provision of a coherent, high quality public realm.	£	Short
Pedestrian crossing improvements on relief road	Upgrade / provide new pedestrian crossings as illustrated in the pedestrian network map to generally reduce the barrier effect of the road by better aligning with desire lines and providing more direct crossing movements.	• To reduce physical barriers to walking. • To increase walking mode share for short trips.	££	Short
CYCLING				
Expand provision of cycle parking	Existing cycle parking in KTC is very well used, and at certain locations reaches capacity. Additional cycle parking should be provided to address this issue, and also in anticipation of increased demand due to future developments.	• Provide adequate cycle parking in convenient locations	££	Short
Provide cycle hire facilities	Investigate options for providing cycle hire outlet in KTC. This should tie in with existing cycle hire outlets in surrounding areas, to provide a higher level of flexibility. In the longer term, advocate for extension of Barclays Cycle Hire scheme to Kingston.	• Encourage cycling by those coming to KTC without a bike	££	Short to medium
Implement mini-Holland schemes	Kingston's successful mini-Holland bid has secured £30m in funding for a number of schemes to provide a step-change in provision for cycling in the borough. A number of these schemes will directly affect KTC, and these include: • Kingston station cycle hub + Kingston station plaza • Wheatfield Way Greenway • Riverside Boardway • Various 'network schemes' providing linkages from KTC to other parts of the borough	• Step change for cycling throughout RB Kingston, including in KTC	££££	Short to medium
PUBLIC TRANSPORT				
General				
Provide integrated public transport information	Provide enhanced information on public transport services in KTC, using signs that include a combination of static and real-time displays that integrate information for all modes. This should help to highlight the good availability of services into the evening. An pertinent example is the recently installed 'Smart Column' at Ealing Broadway, which is included as a case study (see chapter 6)	• Enhance user-friendliness and awareness of public transport services in KTC	£	Short
Rail				
Access to Kingston station from the north	During most of the day, there is only one access to Kingston station, which is from the south. As development occurs in North Kingston, examine options for providing a permanent second access to the north. This may involve allowing full-time access from the existing door at the northern end of the corridor underneath the platforms. (In the longer term, there may be the opportunity to significantly enhance access to and from the station as part of Crossrail 2.)	• Facilitate more direct access to the station from North Kingston	££	Short to medium
Provide a Park and Rail site	Investigate stations with a direct service to Kingston that may be suitable for a Park and Rail service. Such a site would focus on intercepting trips from Surrey. Ideally, a station would have: • Good access to the road network from Surrey • Existing parking that is underutilised	• Reduce level of car traffic in KTC • Reduce pressure on car parking in KTC	££	Short to medium
Bus				
Continue to provide bus countdown displays	Bus countdown displays provide real-time information for all bus users (including those without access to a smartphone), and provide confidence that a bus is on its way. As such, advocate for the provision of bus countdown displays at all stops in KTC.	• Improve information provision for bus users	££	Short

Proposed measure	Description	Objectives	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
Provide improved bus links to Surrey	Trips to and from Surrey are more likely to be made by car, in part due to relatively poor public transport links. Improving bus services to Surrey (in terms of frequency and span of service) and promoting them will help to encourage increased bus use.	• Provide an attractive alternative for trips to and from Surrey	Advocacy: £ Implementation: ££	Advocacy: short Implementation: short to medium
Provide improved orbital bus links	As there are no direct rail links from Kingston to many parts of London, it is important that a high quality bus service be provided to encourage travel by bus. This may be achieved through actions such as improving bus frequency and ensuring that routes provide direct links. In particular, route X26 provides a relatively quick link to Heathrow and Croydon, and could be enhanced	• Provide good bus links to other parts of London	££	Short to medium
Enhance legibility of bus link to Surbiton	Due to its position on a main line, Surbiton is served by faster train services compared to Kingston station. This corridor is served by different routes that stop at different bus stops; as such, trying to locate the next bus can be confusing. There are a number of actions that could be taken to improve the legibility and user-friendliness of this link: • Buses between Surbiton and Kingston to stop at common stops • Enhanced signage • Publicity and marketing to improve awareness of this link	• Increase awareness of option to access KTC via Surbiton station	££	Short
Provide a Park and Ride service	A seasonal park and ride service currently operates from Chessington, however usage has apparently dropped. Examine the continued viability of this site, and investigate possible alternative sites (including for a permanent site). This should take into account the trip origins for both shoppers, employees and other visitors.	• Reduce level of car traffic in KTC • Reduce pressure on car parking in KTC	£££	Short to medium
HIGHWAYS				
Implement 20mph speed limit throughout KTC	Some roads within KTC are already covered by a 20mph limit. Investigate how this can be extended to the remainder of the town centre, in conjunction with other measures (such as redesign – see next measure) to reduce the perceived 'racetrack' environment on the relief road.	• Moderate vehicle speeds to a level appropriate for a town centre environment	£	Short to medium
Audit and rationalise directional signage for drivers	Review directional signage, taking into account the needs of both through traffic and town centre traffic. This review should specifically consider freight and car park signage systems to ensure that information provision is provided at the right places in order for drivers to make timely decisions and reduce unnecessary traffic circulation around the town.	• Reduce sign clutter • Improve legibility for drivers • Reduce unnecessary vehicle circulation	££	Short to medium
PARKING				
Enhance existing signage	Existing static signage directing drivers to car parks should be reviewed and enhanced where warranted. Existing VMS signs that are not functioning correctly could also be repaired, but given the limited efficacy of the system it is unlikely that significant investment in the system is justified.	• Enhance awareness of the car parking options around the town centre. • Balance usage of car parks around the town centre.	£	Short
Enhance environment of existing car parks	A number of car parks currently have poor environmental quality, which may discourage people from using them. For example, this applies to the St James Road and Fairfield car parks. Relevant measures will depend on the specific car park, but may involve upgrading equipment, lighting, finishes, access control, etc.	• Enhance perceptions of safety. • Improve experience for visitors to KTC. • Encourage more even usage of car parks.	£££ (£3k–£6k per space depending on scope of works)	Short to medium
FREIGHT				
Promote click and collect	The provision of click and collect services in the town centre at retail outlets in the town centre provides customers with the convenience of shopping online, whilst still drawing them into the town centre to collect their purchases. The availability of click and collect should be promoted to customers. Some supporting measures may be required, such as the provision of loading bays, to allow customers to collect large items with their own vehicles.	• Encourage the use of click and collect services, thereby driving increased footfall	£	Short to medium
Implement a Freight Consolidation Centre	Investigate the viability of a Freight Consolidation Centre for KTC, and implement a pilot. An example that may be useful as a case study is the Regent Street Retail Consolidation Centre, which was launched in July 2009 to service shops in Regent Street. It is now used by one-third of shops on Regent Street, and now uses an electric freight vehicle. It has resulted in reductions in traffic levels and mileage, and improved air quality. The use of clearly branded vehicles has been important in increasing awareness of the scheme.	• Reduce the number of freight vehicle movements • Improve air quality	££ (some seed funding may be required, although aim is to be self-funding)	Short to medium

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

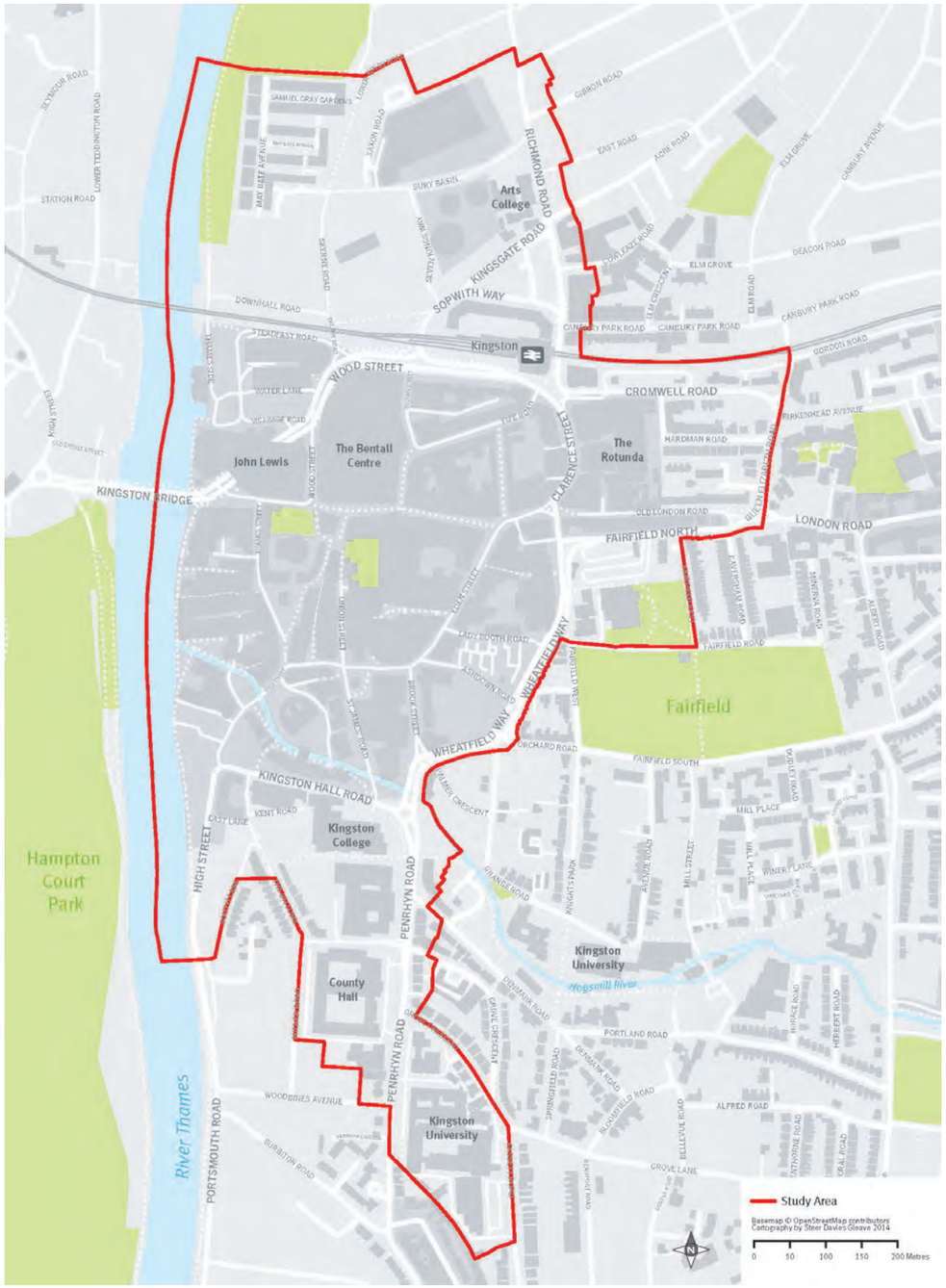


Figure 1.1 Study area

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Introduction

Background

Steer Davies Gleave has undertaken a movement study of Kingston Town Centre (KTC) on behalf of the Royal Borough of Kingston upon Thames (RBK). The main aim of the study is to produce a Strategy document which provides an overarching vision for movement in KTC with suggested improvements to accommodate future transport demand. RBK is taking a proactive approach to growth and development in KTC, and it is envisaged a number of significant development sites will be realised by the year 2031; the study seeks to understand the demand generated by this development and propose transport measures to respond to this.

The study considers provisions for all relevant modes of transport within the town centre, including off-street car parking provisions, in order to explore strategic options for change and provide a technical evidence base to support decision-making and investment. In this regard, the study supports Core Strategy objectives, and will also directly inform a planned revision of the K+20 Kingston Town Centre Area Action Plan (AAP), adopted 2008.

Figure 1.1 illustrates the extents of the area being considered within this study. This corresponds with the AAP boundary.

This draft report presents the strategy as developed in Stage 2 of the study. It follows on from Stage 1 which comprised baseline analysis to identify issues and opportunities related to movement and parking in KTC. In addition there is a separate highways modelling report which sets out detail of the modelling process.

Report structure

Subsequent to this introduction this report is set out as follows:

- Chapter 2 summarises issues and opportunities identified in stage 1.
- Chapter 3 presents the vision, objectives and street design principles
- Chapter 4 discusses future travel patterns and mode shift.
- Chapter 5 presents strategy measures by mode.
- Chapter 6 summarises the development and testing of highways scenarios.
- Chapter 7 presents case studies of selected measures.

“Cycling has increased substantially in Kingston Town Centre in the last ten years”

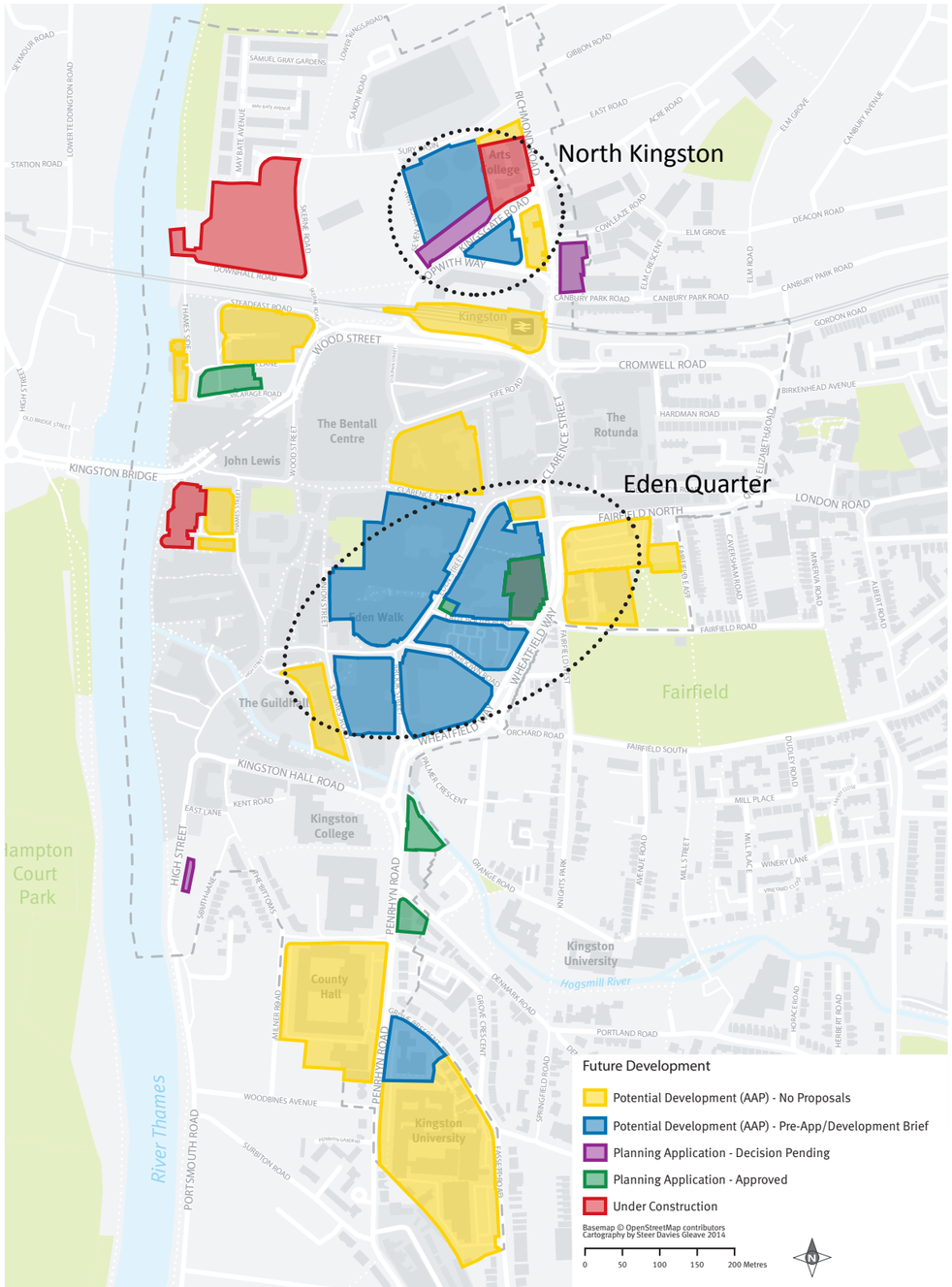


Figure 2.1 Future development map

2

Summary of baseline information

The following summarises key baseline information including: an overview of the development context within which this study has been completed; and key issues and opportunities identified in Stage 1 Baseline Analysis and stakeholder discussions.

Development context

There are a significant number of development sites across KTC at various stages in the planning pipeline, and a number of other sites that are identified in the extant AAP for potential development. Figure 2.1 illustrates the location of these sites and their status as identified during the Stage 1 Baseline Analysis work through discussion with RBK officers.

The development context is rapidly evolving and during the preparation of this strategy the proposed scale and nature of development on specific sites has changed. To help shape opportunities RBK is preparing development briefs for two key areas: North Kingston, and Eden Quarter (highlighted on Figure 2.1). Preparation of the movement strategy has taken account of current thinking for both of these areas, and also informed work on the development briefs.

North Kingston

A first stage development brief was prepared and adopted by RBK in November 2013. A second stage brief is currently being prepared which will refine development requirements. Key changes related to movement within this brief include:

- Closure of Kingsgate Road to traffic, and creation of a new cycling and walking link along this alignment.
- New left-hand turn from Sopwith Way to Richmond Road.
- New left-hand turn from Sury Basin to Seven Kings Way for access to the gas-holder development site (access only).

Eden Quarter

GVA and Allies & Morrison Urban Practitioners have been jointly commissioned to prepare a development brief for the Eden Quarter area. Among other sites this includes the Eden Walk Shopping Centre, the Cattle Market Car Park, and the Ashdown Road car park. Work on this is ongoing.

Key movement issues and opportunities

Highways

- The gyratory operates to effectively distribute traffic, however the one-way system exacerbates traffic dominance and speed, and it is not resilient to disturbances caused by collisions, breakdowns or queuing for car parks.
- Traffic levels within KTC have declined over the last 10 years by around 9% , although this varies somewhat by each approach road (excluding roads with major roadworks shows a reduction of around 6%). Similar reductions in traffic levels have occurred across the Borough and London.
- Kingston Bridge is the busiest approach road with 30% of both entering and exiting traffic (39,000 vehicles) and other traffic spread relatively evenly across the other approaches.
- Although traffic levels are lower at the weekend the number of vehicles staying in the town centre peaks at around 5000.
- 134 collisions were recorded over three years; 119 slight and 15 serious, and none fatal. Half involved cyclists and/or pedestrians. Clusters occur at certain junctions, but are most concentrated on Eden Street. Many of these collisions involve pedestrians and a number are classified as serious.

Buses

- The bus network in the town centre comprises 34 routes with peak hour frequencies of between two and eight buses per hour depending on route. However the road layout limits routes through KTC and results in very high numbers of buses per hour on the gyratory, and also on Eden Street.
- Levels of bus usage are particularly high at Fairfield station, stops near John Lewis, and stops on Eden Street. Taken collectively, the stops on Eden Street are by far the busiest in both AM and PM periods. The high numbers of pedestrians crossing Eden Street away from formal crossing provisions conflicts with bus movements and collisions occur.
- Data from TfL shows that there was a 65% increase in bus passenger demand across the Borough between 1999/00 and 2012/13, and a 44% increase in bus mileage.
- Bus capacity is an issue with many at or near full loading on arrival in KTC in the AM peak period.
- Most stops operate at capacity in terms of vehicle space, limiting the scope to increase frequencies or provide additional services. Standing space is also at capacity both at stations and on-street.

Rail

- Usage of Kingston Station is growing, with passengers entering/exiting rising by 4% between 2011/12 and 2012/13, however there are issues of: infrequent services on the Kingston Loop line towards Twickenham and Richmond; overcrowding on services between Kingston and Waterloo in both directions during peak hours; and queuing and congestion at ticket gates.
- The option for Crossrail 2 stopping at Kingston is currently being investigated by TfL as part of the 'regional option'. This would enhance the frequency and capacity of the train line to Waterloo; free up capacity on existing rail lines to enhance service frequency from Kingston; and connect Kingston directly to the West End. However these improvements, if taken forward, are unlikely to be in place before the 2030s.

Parking

- Almost all of the parking spaces available to the public are in off-street car parks, with approximately 6300 spaces available during the day. Over 4000 spaces remain available until 22.30hrs, 2700 are available after 22.30hrs, and over 1200 are available 24 hours a day. Parking charges generally apply, which vary between different car parks.
- The ownership and management of off-street car parking in KTC is fragmented, between the council, private car park operators and retailers.
- The car parks in KTC are predominantly used for shorter stays of up to two or three hours, particularly on weekends. On weekdays, there is also some all-day parking.
- The existing level of parking is sufficient to cater for demand in an average week (although there is a large seasonal spike in demand leading up to Christmas). Demand is highest on Saturdays, when occupancy peaks at just over 5000 vehicles, equating to about three quarters of available spaces. However, car parks in the town centre are utilised unevenly, with the John Lewis and The Bentall Centre car parks reaching capacity on Saturdays leading to queuing at entrances.
- Parking charges do not appear to greatly influence car park choice, with respondents to a previous survey primarily taking into account 'closeness of the car park to destination' and 'habit' (64% and 31% of respondents respectively), over and above 'price' (9% of respondents) and 'short queues/knowledge of available spaces' (8%).

Taxis and private hire

- Taxis are generally well provided for with ranks located across the town centre and near to key destinations. Increasing demand means there is a desire for additional rank space at key locations such as Clarence Street.
- Increased night time economy means there is a desire to increase number of night time ranks.
- Development may result in demand for additional taxi ranks.

Cycling

- Cycling has increased substantially in KTC in the last ten years as demonstrated by a 50% increase in flows on Kingston Bridge, however mode share overall is still only between 4 and 6% overall. Within KTC the relief road presents a barrier to cycle access, and some cycle routes are not as direct as is desirable; these issues are addressed in RBK's Mini-Holland bid.
- Cycle parking facilities are well used and there is a desire to increase the number of secure parking spaces.

Walking and pedestrian environment

- Certain pedestrian links, most notably around the relief road, offer a poor quality environment and should be prioritised for upgrading. This should include measures to reduce the barrier effect of this road, encouraging people to walk from surrounding areas into KTC, which is compact and highly walkable.
- Legibility is hindered at key gateway locations due to limited views of landmarks and features to help orientation, and lack of clear wayfinding information. This is particularly notable at orientation points such as outside Kingston Station and at other gateways to KTC.

Travel Demand Management (TDM)

- Current and future TDM in Kingston is focussed on employee travel plan networks; support for school travel planning; cyclist training for schools and businesses; smarter travel events to encourage active travel; and provision of residential and on-street cycle parking. TDM measures are not intensive nor extensive enough at present to affect significant change.

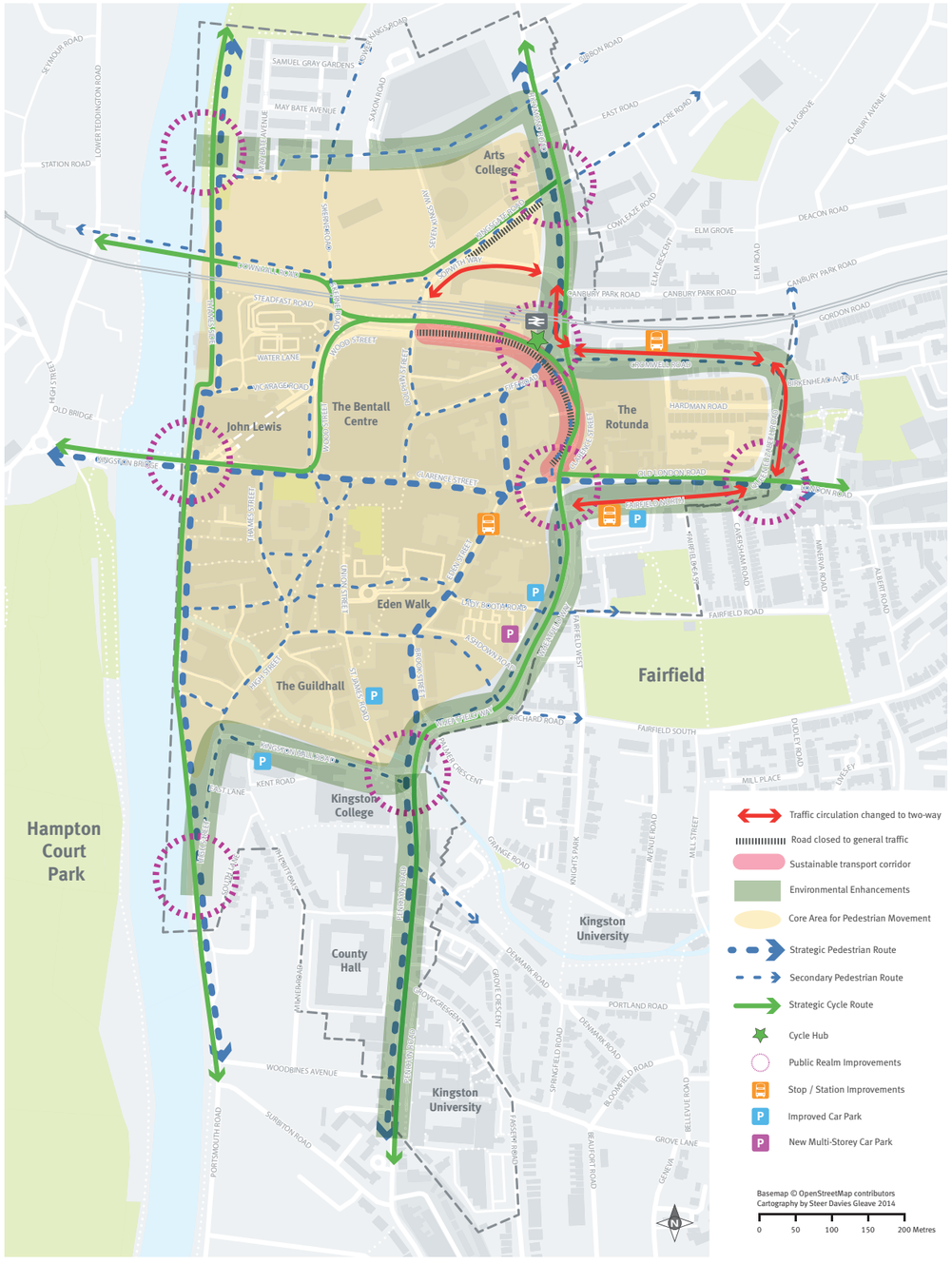


Figure 3.1 Vision for Movement

3

Vision and objectives

The strategy is based around a high level vision for movement. This sets overarching design principles that shape the detail of transport measures and highways scenarios presented in subsequent chapters. The vision is:

A balanced transport network that supports the Kingston experience by maintaining the town centre as a high-quality and attractive place, facilitating town centre development opportunities, and supporting a local economy that is diverse, vital and competitive. It delivers improved opportunities for walking, cycling and public transport to encourage movement by these modes whilst also facilitating access by private vehicles.

The vision is based around a significant change to traffic circulation, closing off part of the existing gyratory to traffic (Clarence Street and Wood Street) and changing the remaining parts of the gyratory to two-way working (Sopwith Way / Richmond Road south / Cromwell Road / Queen Elizabeth Way / Fairfield North). This change is the most significant of various highways scenarios that have been developed explore changes to how the road network operates. Chapter 6 explains the development of the highways scenarios and potential impacts of each.

The core components of the vision are:

- Removal of traffic from Wood Street and Clarence Street to create sustainable transport corridor for walking and cycling, along with substantial new areas of public realm and development opportunities in association with Crossrail 2
- Enhanced walkability across an expanded area of KTC
- High quality pedestrian corridors on key routes
- Walkable grid of pedestrian connections; improved crossings on relief road; and linkages to surrounds
- Green boulevard design treatment for relief road
- Mini-Holland cycling proposals
- Gateway public realm enhancements
- Improved facilities for bus operations and improved public transport passenger experience

Supporting the vision is a proposed hierarchy of street types with associated design principles, which are set out overleaf.

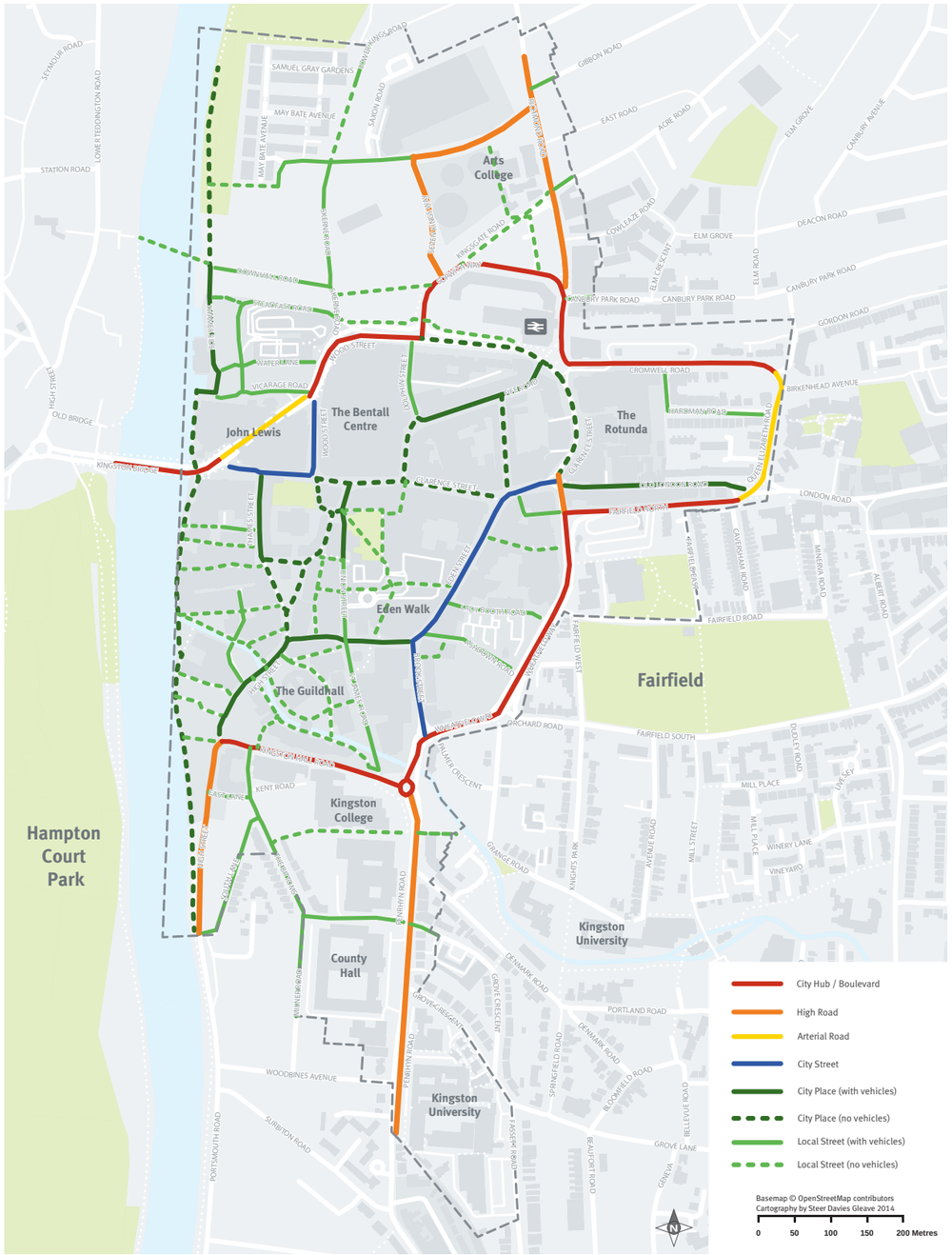


Figure 3.2 Proposed Street Hierarchy

Street types and design principles

A street hierarchy has been prepared to support the vision for movement. The hierarchy sets design parameters for improvement of streets and links in the study area. It applies a coordinated and coherent approach in support of wider place-making objectives.

Figure 3.2 illustrates the proposed categories for links and link segments by the year 2031. This is based on the Roads Task Force (RTF) movement and place matrix as illustrated in Figure 3.3. The starting point for the application of this matrix to KTC was the RTF case study of KTC which proposed designation as a 'city hub / boulevard' status (it is assumed that this designation applies to the relief road only rather than all links within KTC). Not all categories within the RTF matrix are thought to be applicable to the future KTC. Six categories of the nine are used as highlighted in Figure 3.3, however two categories are further subdivided to reflect the fact that some links do or do not allow vehicle movement.

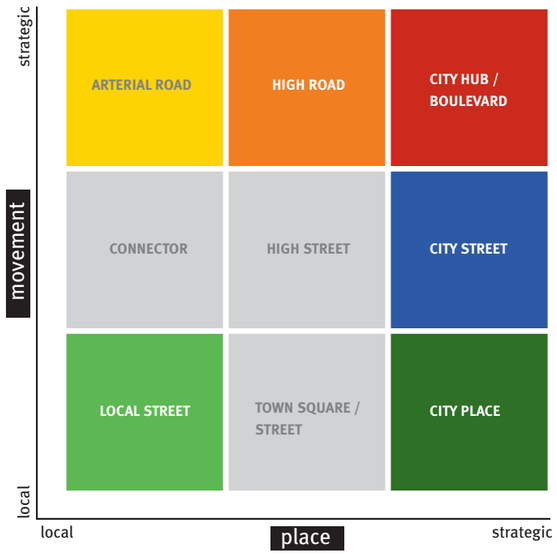


Figure 3.3 RTF Movement and Place Matrix

The table opposite sets out the role, priorities and broad design principles for each of the link types. This is intended as a starting point for further elaboration in later studies, ultimately leading to a street design guide to shape street improvement and public space projects within KTC.

The principles are broadly intended to be applicable regardless of other strategy measures. For instance, Chapter 6 presents various potential changes to the relief road. Broadly speaking any of these scenarios will be able to be developed in accordance with design principles given for the relief road links. The exceptions to this are:

- Clarence Street / Wood Street - this street segment is categorised as 'city place' based on the closure of this segment to traffic, and making it a pedestrian and cycle route.
- Some links such as Eden Street, Ashdown Road and Lady Booth Road may vary once work has been completed on reviewing bus options for the Eden Quarter (see Chapter 5 for more information). Depending on the outcome of this work it may be possible, for example, to downgrade the northern and eastern part of Eden Street from a 'city street' to a 'city place'.

	City Hub / Boulevard	High Road	Arterial Road
Role	Strategic connection and KTC gateway route	Strategic connection and major urban street	Strategic connection
Significance	Metropolitan	Borough	Town Centre
Key modes	Private motor vehicle / bus / goods vehicles / cycle / walk	Private motor vehicle / bus / goods vehicles / cycle / walk	Private motor vehicle / bus / goods vehicles
Key objective	Significantly improve quality of place whilst maintaining essential function as multi-modal transport corridor	Upgrade quality of place whilst maintaining essential function as multi-modal transport corridor	Maintain essential function for vehicular traffic and provide good level of functional quality for walking and cycling
Priorities	• Formal boulevard-style streetscape that reinforces town centre identity • Medium - high volume traffic, but relatively low speed • Freight to/from KTC • Primary means of car park access • Bus movement • Segregated cycle provisions (mini-Hollands) • Regular at-grade pedestrian crossings on desire lines	• Streetscape enhancements • Medium volume traffic • General traffic access to/from KTC • Information on car parking ahead of entering KTC • Bus movement • Segregated cycle provisions wherever possible • Regular at-grade pedestrian crossings on desire lines	• Medium - high volume traffic, but relatively low speed • Freight to/from KTC • Primary means of car park access • Bus movement • Functional quality pedestrian environment
Design principles	• Urban road with mixed frontage activity. • Coherent and continuous formal tree planting and high quality contemporary decorative lighting columns • Comprehensive decluttering and rationalisation of signage and street clutter • Landmark features at KTC gateway areas (sculptural features, vertical markers, feature lighting etc.) • High quality, consistent footway materials in keeping with an overall design palette for KTC • Special carriageway surfacing at gateways • Preferred width of footways 3m, and minimum clear width 2.5m • Segregated cycle lanes where road is part of cycle network (mini-Hollands) • No car parking on-street • No direct property access • Junctions treated as urban crossroads or squares, pedestrian crossings aligned direct as possible, free from guard railing.	• Urban road with mostly active frontages • Street trees planted where possible and continuous high quality contemporary lighting columns • Review street clutter and declutter selected locations • Good quality surfacing materials used in footway • Special surfacing used in carriageway at gateway locations • Preferred width of footways 3m, and minimum clear width 2.5m • Full or light segregation of cycle lanes where road is part of cycle network • On-street parking/ loading limited to short-stay only • Limited direct vehicle access to properties • Straight across pedestrian crossing facilities free from guard railing	• Urban road with no / limited frontage activity • Highways standard streetscape • Consistent level of basic functional quality for pedestrian movement • Minimum clear width of footways 2.5m • No cycle provisions • No car parking on-street • Limited direct vehicle access to properties • Pedestrian crossings on desire lines

Maid Marian Way, Nottingham

Ring Road, Ashford

Walworth Road, London

High Street Kensington, London

Euston Circus (visualisation of proposals, from: https://consultations.tfl.gov.uk/streets/euston-circus/supporting_documents/TfL_EustonCircus_web.pdf)

Stratford High Street, London

	City Street	City Place (with vehicles)	City Place (walk and / or cycle only)
Role	Town centre access	Main public space	Main public space
Significance	Metropolitan	Metropolitan	Metropolitan
Key modes	Bus / taxi / cycle / walk	Walk / cycle / goods vehicles	Walk / walk & cycle
Key objective	Maintain / provide a mixed priority low speed environment that also provides a high quality of place	Maintain / provide a high quality and locally distinctive place with restricted vehicle access for servicing	Maintain / provide a high quality and locally distinctive place for walking / walking and cycling
Priorities	• High quality streetscape • Low – medium volume of traffic but slow speed • High volume of pedestrian movement • Bus and taxi movement • Freight and servicing access • Car park access • Local cycling access	• High quality, distinctive urban design approach • Vehicle access restricted to limited times of the day • Very high volume of pedestrian movement • Cycle movement (selected links only)	• High quality, distinctive urban design approach • Very high volume of pedestrian movement • Cycle movement (selected links only)
Design principles	• Town centre street with high level of frontage activity • High quality surfacing materials, street furniture (seating, bins, cycle stands), and decorative lighting in keeping with an overall design palette for KTC • Planting where sufficient space • Comprehensive decluttering and rationalisation of signage and street clutter • Special surfacing used in carriageway to enhance streetscape and promote ease of pedestrian movement • Excellent pedestrian spaces (as wide as possible, minimum 3m clear width, 4m preferable) • On-street parking/ loading limited to short-stay only • Limited direct vehicle access to properties • Frequent pedestrian crossings where needed, in a mix of formal and courtesy crossings	• Shared surface space to give priority to pedestrians • Special design treatments including high quality surfacing materials, street furniture (seating, bins, cycle stands), and decorative lighting • Architectural, landscape or art features • Small trees or other planting where sufficient space • Excellent pedestrian spaces (as wide as possible, minimum 3m clear width, 4m preferable) • No parking / loading outside clearly defined designated zones and times	• Special design treatments including high quality surfacing materials, street furniture (seating, bins, cycle stands), and decorative lighting • Architectural, landscape or art features • Small trees or other planting where sufficient space

Rye Lane, Peckham, London


High Street, Hornchurch


New Road, Brighton


Market Street, Plymouth

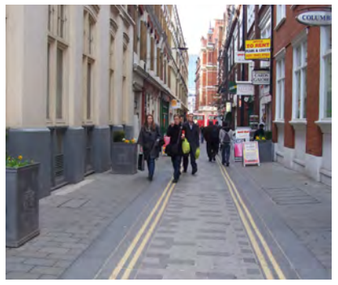

Market Place, Kingston upon Thames


Granary Square, King's Cross, London

	Local Street (with vehicles)	Local Street (walk and / or cycle only)
Role	Local access	Local access
Significance	Town Centre	Town Centre
Key modes	Private motor vehicle / walk / cycle	Walk / walk & cycle
Key objective	Maintain / provide consistently good functional quality for walking and cycling, along with local vehicle access	Maintain / provide consistently good functional quality for walking / walking and cycling
Priorities	• Functional quality • Low volume and slow speed of traffic • Medium volume of pedestrian movement • Local cycling access (selected links only) • Obstruction-free routes • Personal safety and security	• Functional quality • Medium volume of pedestrian movement • Local cycling access (selected links only) • Obstruction-free routes • Personal safety and security
Design principles	• Good functional quality of surfacing materials, street furniture (seating, bins, cycle stands), and lighting. • Use limited palette of consistent materials in keeping with design palette for KTC • On-street • Ensure consistent lighting provision • Minimum clear footway width of 2.5m	• Walk and cycle links designed as shared spaces • Good functional quality of surfacing materials, street furniture (seating, bins, cycle stands), and lighting. • Use limited palette of consistent materials in keeping with design palette for KTC • Ensure consistent lighting provision; in narrow links attach lighting to buildings • Maintain clear pedestrian zone / clear width of 2.5m minimum • Clear pedestrian sightlines / forward visibility

Cyrus Street, Islington, London

Upton, Northamptonshire



Shared space route, City of London

Pedestrian link, Kingston upon Thames


rmation
assistance
Bus information
Toilets
Accessible Bus stop
No rollerskating
No skateboarding
METRO
Please take one
Levels of traffic have been declining and the use of other modes has been increasing

4

Travel patterns and future trends

Introduction

Plans for KTC anticipate a number of new developments over coming years, particular in the Eden Quarter and North Kingston development areas. Whilst plans for some of these developments are well advanced, the exact nature of others is uncertain. Regardless of the precise scale and nature of development that is ultimately implemented, it is clear that it will result in a significant increase in demand for travel to KTC. It is therefore important to consider how the transport network can facilitate this growth in the town centre, allowing more people to visit KTC and thus supporting its vibrancy and continued economic competitiveness.

A high-level analysis (based on approximate development quanta and typical trip generation rates) indicates that new developments could generate in the order of 35,000 additional two-way trips each day. This growth will need to be accommodated by the transport network, which is subject to a number of constraints. In particular, the road network is currently close to or at capacity, and would not be able to accommodate a large increase in vehicular trips. It would be difficult to increase road capacity, both within the town centre and on the roads approaching it, due to the built-up nature of the urban environment. Furthermore increasing road capacity is not necessarily desirable as capacity enhancements tend to draw in more traffic.

In order for transport not to constrain the town centre, non-car modes will have an increasingly vital role to play. This applies to both trips generated by new developments (where the aim should be to encourage new trips to be made by non-car modes) and existing trips to the town centre (where attractive and practical alternatives should be provided to driving for existing car users).

Ultimately, the strategy should not favour certain modes over others, but rather should provide a balanced transport network that enables efficient access to the town centre, thus facilitating growth and securing local vitality.

Future trends

An understanding of existing travel patterns must be the starting point for any discussion of future travel patterns. Unfortunately, comprehensive information covering all trip purposes is not available. However the London Travel Demand Survey (LTDS) is the most useful source, although it only includes households within London. The graph below shows the proportion of town centre trips made by each mode, disaggregated by trip distance.

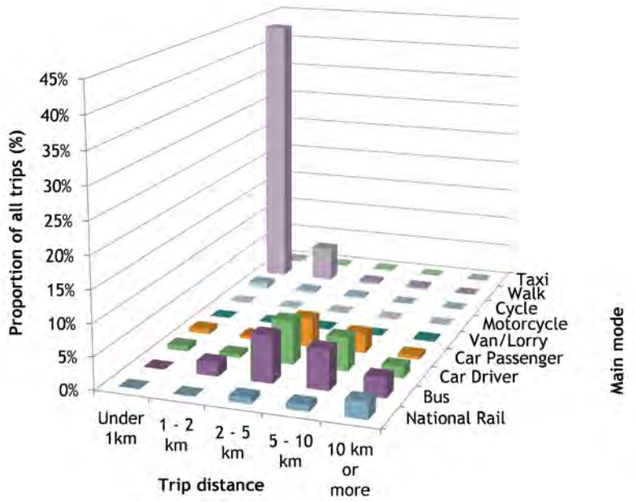


Figure 4.1 Proportion of all town centre trips by distance and main mode

Source: LTDS [excludes people from outside London], includes trips made across all days of the week. The high number of short walking trips is due to the LTDS methodology, which means that short walking trips between different parts of KTC are counted.

The table opposite discusses each mode in turn, with the existing situation and constraints for each examined, followed by future targets to aim for and the measures and factors that have a bearing on these targets.

The overall situation at present is that whilst levels of traffic have been declining, the use of other modes has been growing strongly. Given the context described above, continuation of this trend is important to achieving the aspirations for the town centre, given the potential for a significant increase in trips due to new developments. As noted in the table, there will need to be a reduction in the proportion of trips made by car, and an increase for other modes. In particular, one aim will be to achieve a large increase in cycling (albeit from a relatively low base), which will be facilitated by the implementation of the mini-Holland programme. This is not intended to be a radical change, as to a certain extent it is simply a continuation of current trends (both in Kingston and more widely across London), where traffic is generally declining and the use of other modes is increasing.

In order to examine whether this mode shift is achievable, it would be to ideal to examine mode share trends for comparable town centres. Unfortunately, this information is difficult to obtain. However, data is available for travel demand across London. The graph below shows changes in travel demand across a 15 years period between 1997 and 2012, and it can be seen that an overall increase in travel demand of almost 20% has been disproportionately been borne by increases in public transport use and cycling. Whilst it is clear that KTC differs in many regards from other parts of London, this data demonstrates that noticeable modes shifts are possible and do occur over long periods.

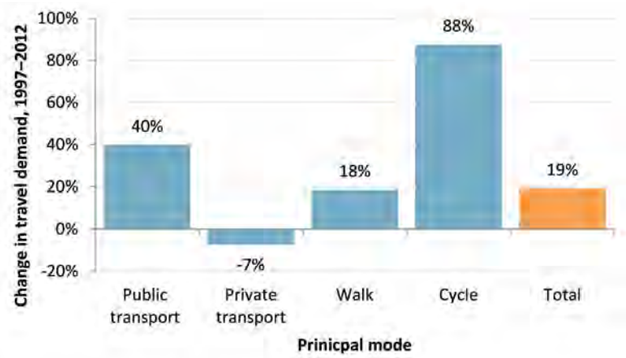


Figure 4.2 Change in travel demand between 1997 and 2012

Source: Travel in London Report 6, 2013

Data and monitoring

There is a lack of comprehensive information on existing travel patterns for the town centre. It would be useful to implement a programme to monitor travel patterns, to properly understand baseline existing travel patterns and enable future mode share targets to be quantified. Ongoing monitoring should then be conducted on a regular basis, to assess progress towards meeting the targets. Such a monitoring programme should be coordinated with the monitoring that will be undertaken as part of the mini-Holland programme. In addition, this should also be coordinated with the monitoring of Travel Plans, where the opportunity to obtain funding from developers for Travel Plan monitoring could be exploited.

Mode	Existing situation	Existing constraints	Other future forecasts	Summary of relevant measures	Future impacts / trends	2031 target
Rail	The number of passengers using Kingston station is growing, and increased by 4% between 2011/12 and 2012/13.	• The speed of rail services to Kingston station is comparatively slow, for example relative to Surbiton station • The frequency of train services is limited by capacity constraints • The existing layout of the station means that it becomes congested at times, for example at the gateline	-	• Crossrail 2 • Improved rail services in the interim (before Crossrail 2) *See Chapter 6 for full list of rail measures*	Before Crossrail 2 is implemented, existing constraints means that whilst there is the potential for further growth in rail usage, it is unlikely to be significant. Once Crossrail 2 is implemented, then this will unlock the potential for larger increases in rail usage.	↑ (before Crossrail 2) ↑↑ (after Crossrail 2)
Bus	Bus usage in the borough is growing strongly, increasing by 65% between 1999/00 and 2012/13. Considering the ten year period between 2003/04 and 2012/13 shows that bus usage has increased by 37%. Between 1999/00 and 2012/13 there was an increase of 44% in terms of miles operated by buses in the borough.	• Congestion on the road network, resulting in slow and unreliable journey times • Difficulty of providing more stopping and standing space in the town centre to facilitate more efficient operations	-	• Improved bus services to KTC, facilitated by measures that improve the efficiency of bus operations in KTC • Improved bus links to Surrey *See Chapter 6 for full list of bus measures*	For areas without rail links to KTC, buses provide the only public transport option. Improvement to services would encourage and enable more people to travel by bus.	↑
Private vehicles	Traffic levels in KTC have generally been declining, with a decrease of about 9% between 2003 and 2013. This is consistent with both borough-wide and London-wide trends.	• The nature of the town centre means that it is difficult to increase road capacity • Congestion (particularly on weekends) caused by car park queues • Lack of resilience due to one-way system	-	• A number of highways options have been developed, and three of these have been shortlisted *See Chapter 4 for further details on the highways options, and Chapter 6 for full list of highways and traffic measures*	Given space constraints, the highway scenarios examined all reduce highway capacity in order to achieve the overall vision of making the town centre a vibrant and attractive place. As such, there will need to be greater reliance on non-car modes in order to facilitate future growth.	↓
Cycles	The level of cycling has been growing in Kingston. Between 2003 and 2013, the number of cyclists using Kingston Bridge has increased by over 50%.	• Whilst there are a large number of cycle routes, the relief road presents a barrier to cycle access, and some cycle routes are not as direct as is desirable • General shortage of cycle parking in the town centre as the current facilities are well used	The mini-Holland programme aims to increase the borough-wide mode share of cycling from 4.7% in 2011, to 10%–15% in 2026.	• Implementation of mini-Holland schemes • Expansion of cycle parking *See Chapter 6 for full list of cycle measures*	The mini-Holland programme will transform the environment for cycling and living in both KTC and across the borough. Based on the mini-Holland targets, the aim should be to double or triple the cycle mode share. Based on existing mode shares, the greatest potential appears to be for trips to KTC that are 2–5km in length.	↑↑ / ↑↑↑
Walk	Whilst exact figures are unavailable, there is already a high level of walking in the town centre, particularly in its pedestrianised core. Various schemes to improve the walking environment have already been implemented, such improvements to Castle Street.	• Environmental quality is poor on some links, particularly on the relief road • The relief road and railway cause severance for pedestrians between KTC and its neighbouring areas • Legibility is hindered at various locations	-	• Improvements to urban realm • Enhanced pedestrian connectivity (including upgraded crossings) • Improved signage and legibility *See Chapter 6 for full list of pedestrian measures*	The proposed measures will encourage more walking by expanding the pedestrianised core, and improving pedestrian connections to surrounding areas. Whilst the vast majority of short trips are already made on foot, there is potential for further growth in walking for trips between 1–2km in length. In addition, growth in the number of residents in the town centre will also facilitate growth in walking.	↑

	Indicative magnitude of change
↑↑↑	Mode share more than triples
↑↑	Mode share increase between double and triple
↑	Mode share increase by up to double
↓	Mode share decrease by up to half

“Measures include physical infrastructure and non-physical supporting measures”

5

Strategy measures

Overview

This chapter describes in detail the specific components of the vision for movement and the various supporting measures. A balanced set of measures is proposed that seeks to promote KTC as a high quality place, easily accessible by a variety of means. Measures include both physical infrastructure improvements and non-physical supporting measures aimed at the different users of the town centre (e.g. residents, workers, visitors, business owners/ operators), including travel demand management measures.

The measures have been developed with reference to the various planned and potential development opportunities (as summarised in Chapter 2) including the North Kingston and Eden Quarter opportunity areas. The exact nature of various sites is still uncertain, however it is likely that a substantial portion of development in KTC will be residential. The introduction of more residential uses in KTC will change current travel patterns.

The measures are intended to support the realisation of these sites and respond to demand generated. They are also designed to take advantage of development to provide specific pieces of new infrastructure such as, for example, new pedestrian routes, public realm, or cycling connections.

Furthermore, measures have been developed with the need to maintain the competitiveness of KTC in relation to other town centres in mind. The intention of the measures is to support KTC as a vital place for living, shopping, working, playing, learning and visiting.

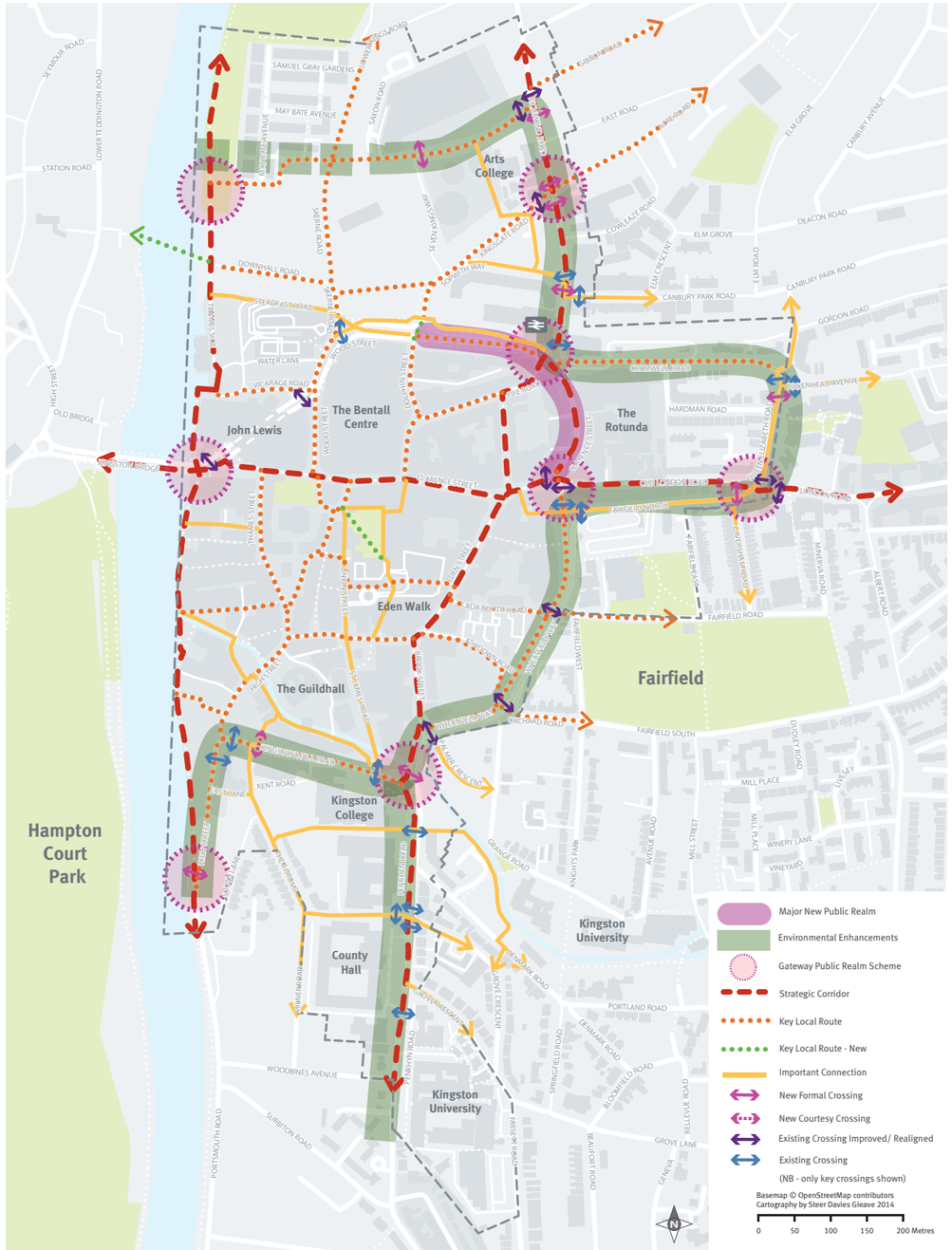


Figure 5.1 Proposed Pedestrian Network

Pedestrian network

The vision for movement seeks to promote KTC as a highly walkable area, with measures that:

- Help instil a culture of walking within Kingston
- Promote the expanded town centre core as highly connected and walkable
- Encourage exploration of the wider KTC area and beyond
- Enable people to spend time in and enjoy public spaces within KTC
- Provide inclusive access

A strategic network of pedestrian routes has been identified and is illustrated in the diagram overleaf. This proposes three tiers of walking routes

- Key corridors – core strategic routes which provide direct routes for people walking to / from key destinations, and also provide main walking routes to areas north, south, east and west. The routes which attract the highest level of footfall.
- Key routes – Important local routes for people moving mainly within the town centre, and to adjoining neighbourhoods. Routes which attract a significant level of footfall.
- Important links – Other routes which provide connections through areas. Routes which attract a moderate level of footfall

It is proposed that these routes are promoted through environmental improvements (surfacing, street furniture, and lighting improvements) and wayfinding. Environmental enhancements should be focused on those sections of the routes identified scoring low on the quality assessment undertaken in Stage 1 of the study (see analysis diagram below), and prioritised in order of 'very poor', 'poor', and 'average'.

The strategy identifies locations for new or improved crossings. This includes new crossings on junction arms that currently do not have a crossing, to provide a crossing on each arm wherever possible, and also improve existing crossings to better align with desire lines and provide straight across movements wherever possible.

Complementary public realm improvements are proposed for Wood Street and Clarence Street where they are proposed to be closed, and at KTC gateway locations. In addition a "green ring" boulevard-style route to define the expanded town centre core.

Proposed measures

The table opposite sets out a number of measures related to pedestrians which are recommended for Kingston and which supplement the strategy diagram. These can be delivered independently of each other, or packaged together as appropriate. These have been recommended on the basis of our understanding of the Kingston context and issues identified in Stage 1 of this study.

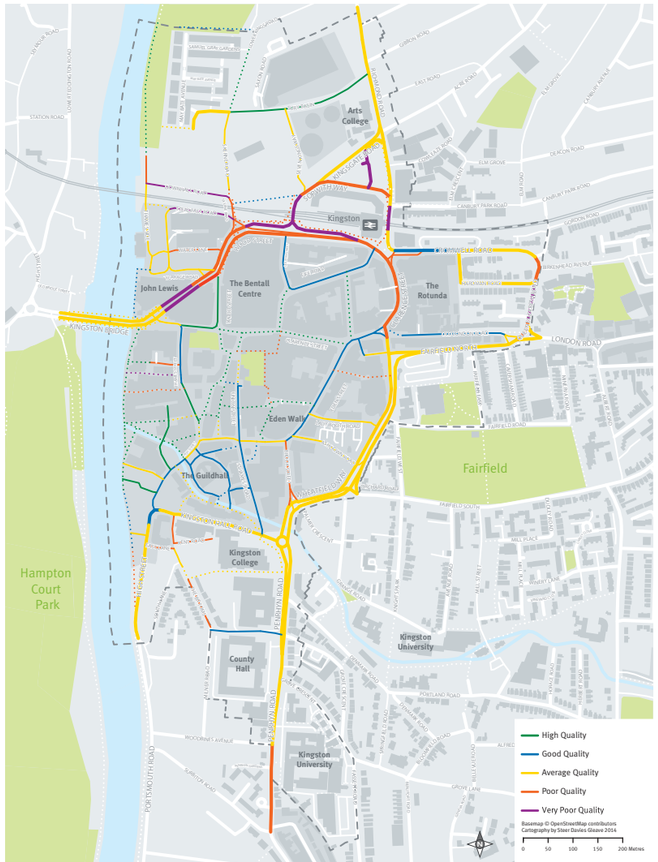


Figure 5.2 Pedestrian Environment Quality - existing

Proposed measure	Description	Objectives	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Extension of wayfinding signage across KTC and other key arrival points	The Legible London wayfinding system has recently been introduced to KTC but essentially only covers the current retail core. This should be extended to include North Kingston, southern areas of KTC along Penrhyn Road, and around Surbiton Station. Audits of existing signage and removal of redundant signage at the same time would support the roll-out.	• To aid legibility and navigation in the wider KTC area and reduce the psychological barriers to walking. • To increase walking mode share for short trips. • To encourage visitors and residents to explore further afield within KTC.	£	Short
Interpretative signage and augmented reality	A suite of high quality interpretative signing supplemented with augmented reality (e.g. through a bespoke app or website) marking places of interest (e.g. sites of historical importance, landmarks, views), and providing information about them. For example this could be used to promote general areas like the Thames riverside, or inform about specific features such as the Coronation Stone.	• To encourage visitors to explore the town centre more widely • To inform and explain • To promote / reinforce a Kingston town centre identity	£	Short
Design guidance for streets and spaces	Prepare comprehensive design guidance for different streets and spaces in KTC to guide and coordinate development and regeneration initiatives. This should be based on street types as presented earlier in this report.	• To guide provision of a coherent, high quality public realm.	£	Short
Pedestrian crossing improvements on relief road	Upgrade / provide new pedestrian crossings as illustrated in the pedestrian network map to generally reduce the barrier effect of the road by better aligning with desire lines and providing more direct crossing movements.	• To reduce physical barriers to walking. • To increase walking mode share for short trips.	££	Short
FUTURE MEASURES				
Upgrade pedestrian links to consistent standard	Ensure all links that are graded average or lower are upgraded to a consistent level of functional and environmental quality, in line with the design guidance above. This should include surfacing, lighting, decluttering, removal of obstructions, pavement widening etc.	• To reduce physical barriers to walking. • To increase walking mode share for short trips. • To promote safety and personal security.	£££	Medium to long
Pedestrian connections through development areas	Provide new or improved pedestrian connections through development areas • North Kingston: new pedestrian and cycle link via linear park along alignment of Kingsgate Road, and a north-south link through the area as proposed in development brief • Ashdown Road site: new pedestrian link south-east from Eden Street to Wheatfield Way to align with improved crossing here • Eden Walk: improved pedestrian links through shopping centre through to Clarence Street and Union Street	• To improve permeability and connectivity • To increase walking mode share for short trips. • To encourage visitors and residents to explore further afield within KTC.	££	Medium
New pedestrian and cycle bridge	New pedestrian and cycle bridge across the Thames located north of Kingston Bridge as per the mini-Hollands proposals	• To reduce physical barriers to walking. • To increase walking mode share for short trips.	££££	Medium
Station plaza	Provide major new area of landmark public space outside Kingston Station: • In the short-term this should be based on the proposals in the mini-Hollands work to improve the existing space. • In the long-term consider providing a large station plaza in conjunction with redevelopment of the station and buildings on the south side of Wood Street, e.g. by rafting over the road at platform level. This option is only likely to be feasible if Crossrail 2 goes ahead. See case study example at end of this report.	• To provide an attractive welcome for visitors. • To provide additional useable areas of public realm. • To aid orientation.	Mini-Hollands option: ££ Crossrail 2 option: ££££	Mini-Hollands option: medium Crossrail 2 option: long
Gateway public realm improvements	Redesign gateway spaces as squares to provide significant new areas of public realm. See pedestrian network plan for locations.	• To provide an attractive welcome for visitors. • To provide additional useable areas of public realm. • To aid orientation.	Per gateway: £££	Medium
"Green Ring" landscape treatment	Design and implement a series of landscape interventions around the perimeter of the town centre to create a 'green ring'. This could include: maintaining existing street tree planting; providing additional street trees; providing pocket green spaces at key locations (in addition to gateway public realm improvements).	• To provide an attractive landscape. • To provide additional useable areas of public realm. • To improve the amenity of key sections of the relief road. • To promote biodiversity • To improve air quality	£££	Medium to long

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

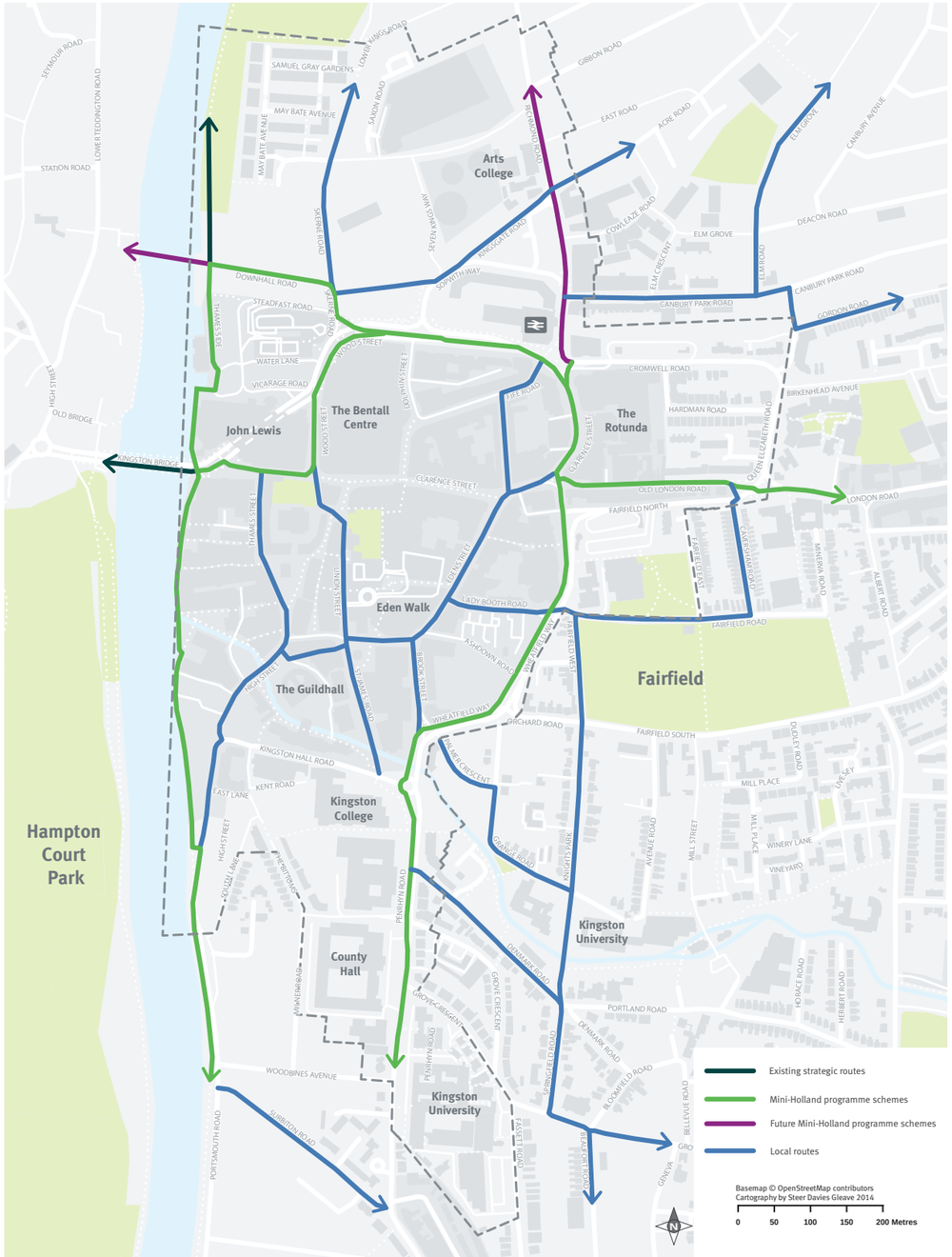


Figure 5.3 Pedestrian Cycle Network

Cycle network

Given planned future growth in KTC, cycling will need to play an increasingly important role in the town centre's transport network. This is because it helps to make more efficient use of the limited road space that is available, whilst also having benefits in terms of sustainability and health.

Kingston was recently successful in obtaining over £30 million in funding through the Mayor of London's mini-Hollands programme, which will enable a step-change in provision for cyclists in Kingston. The programme includes a number of schemes within KTC, as well as significant enhancements to links between KTC and other parts of the borough. There will need to be a high degree of coordination between the mini-Holland schemes and the other measures proposed in this strategy, in order to manage their interdependencies and ensure that benefits can be maximised.

As noted on the map, cycle routes in KTC have been categorised into two groups based on their function. At the top level, strategic routes provide direct links between key origins and destinations. Where these schemes are on-road, they generally follow main roads, and it is desirable to provide some degree of segregation between cyclists and other traffic. The mini-Holland programme includes a number of schemes that will either enhance existing strategic cycle routes, or fill in gaps in the current network. In addition to these, there are also mini-Holland schemes that are currently unfunded, but may potentially be implemented in the future.

Complementing these strategic routes will be a network of local routes. The purpose of these is to provide connections to cyclists' final destinations, as well as catering for those who prefer to cycle in a quieter and less busy environment. These routes typically run along streets with less traffic and lower speed, and have less segregation. Upgrades to these routes may take place through a separate quietways programme.

In addition to utility cycling that is undertaken primarily for transport purposes, there is already a significant amount of leisure cycling undertaken in the town centre. As such, the cycling measures will also work to encourage increased leisure cycling in KTC, which builds on and increases awareness of its attractive setting by the Thames. KTC is also a key waypoint for leisure cyclists heading between the Thames and Richmond Park. This type of cycling also contributes to economic activity, as leisure cyclists pause in the town centre for refreshments and discretionary spending.

Figure 5.4 Mini-Holland Concepts, Artist's Impression - Subject to change

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Expand provision of cycle parking	Existing cycle parking in KTC is very well used, and at certain locations reaches capacity. Additional cycle parking should be provided to address this issue, and also in anticipation of increased demand due to future developments.	• Provide adequate cycle parking in convenient locations	££	Short
Provide cycle hire facilities	Investigate options for providing cycle hire outlet in KTC. This should tie in with existing cycle hire outlets in surrounding areas, to provide a higher level of flexibility. In the longer term, advocate for extension of Barclays Cycle Hire scheme to Kingston.	• Encourage cycling by those coming to KTC without a bike	££	Short to medium
Implement mini-Holland schemes	Kingston's successful mini-Holland bid has secured £30m in funding for a number of schemes to provide a step-change in provision for cycling in the borough. A number of these schemes will directly affect KTC, and these include: • Kingston station cycle hub + Kingston station plaza • Wheatfield Way Greenway • Riverside Boardway • Various 'network schemes' providing linkages from KTC to other parts of the borough	• Step change for cycling throughout RB Kingston, including in KTC	££££	Short to medium
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Various measures to improve cycle security	Cycle theft is a concern in KTC. This issue should be tackled through a multi-pronged approach, which may include actions such as the following: • Improving surveillance of cycle parking locations • Educating cyclists on how to reduce the risk of theft • Working with the police to disrupt those seeking to steal cycles	• Reduce theft of cycles	£	Ongoing
Update cycle route mapping	Kingston's cycle map should be kept up-to-date as new links and connections are provided. In addition, the map should be colour coded so that cyclists can identify routes that are consistent with their confidence level.	• Provide useful information to cyclists to enable them to plan appropriate routes	£	Ongoing

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Public Transport

Bus network

Buses will continue to play an extremely important role in KTC in the future. The vision for movement recognises the need to provide improved bus facilities both in terms of operations and passenger experience. In particular measures are sought that:

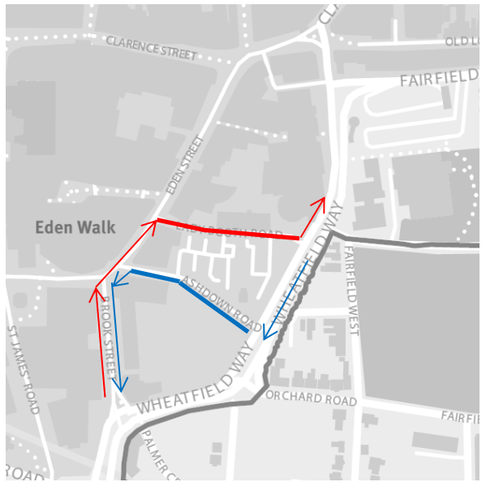
- Accommodate increased passenger demand by growing service capacity. TfL London Buses suggest planning for a growth in demand of between 10-15%.
- Accordingly, provide additional stopping space for buses to cater for growth in vehicle numbers.
- Address the high number of collisions involving buses on Eden Street.
- Improve passenger waiting environments at stops across the town centre.

As part of the development of the movement strategy a number of means have been explored to address the above considerations. Particular attention has been given to the Eden Street bus stops, examining ways to either improve the bus stop arrangements and the passenger environment on Eden Street, or relocate some or all of these bus stops elsewhere within the Eden Quarter. Discussions have been held with TfL London Buses around the potential for relocation of Eden Street bus stops. Schematic concepts exploring where these bus stops might be located within the Eden Quarter are presented to the right. It should be noted that these ideas are presented as early concepts only; each has various advantages and disadvantages and at this stage no single concept has been selected to take forward. Furthermore this is not an exhaustive set of options; additional ideas for the Eden Quarter area are likely to be developed in the near future, in discussion with TfL London Buses and taking into account concurrent work on the Eden Quarter Development Brief.

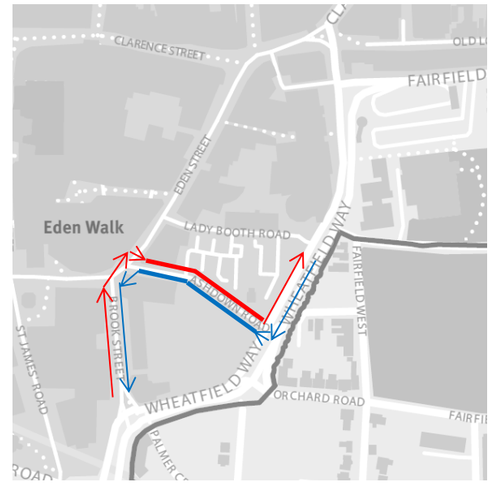
Rail network

In the long term, Crossrail 2 has the potential to significantly enhance rail services to Kingston, providing direct links to various parts of central London en route to north London, therefore boosting rail accessibility to KTC. In addition, the implementation of Crossrail 2 may unlock an opportunity for a comprehensive redevelopment of Kingston station. However, planning for this project is still at an early stage, and as a results the impacts this project would have on Kingston are uncertain. As such, it is important for the council to engage with TfL as planning for Crossrail 2 progresses, to ensure that benefits to KTC are maximised.

In the meantime, various constraints that are outside the council's control mean that a significant improvement in rail services is unlikely. Nevertheless, a number of measures (as outlined in the table) are aimed at achieving some smaller improvements.

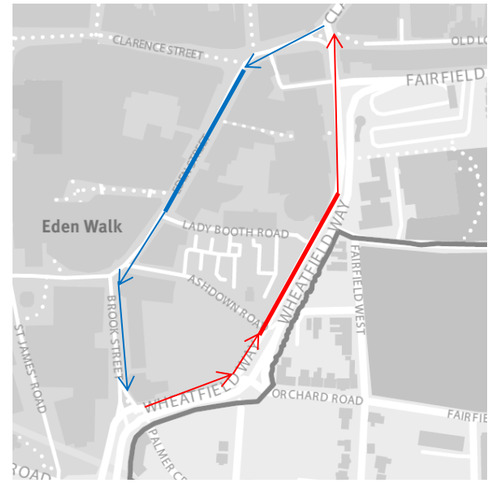


Southbound buses stopping on Ashdown Road, northbound buses stopping on Lady Booth Road



Southbound and nourthbound buses stopping on Ashdown Road

Southbound and nourthbound buses stopping on Wheatfield Way



Southbound buses stopping on Eden Street, northbound buses stopping on Wheatfield Way

Figure 5.5 First Thoughts on Potential Bus Options - Subject to further investigation and change

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
General				
Provide integrated public transport information	Provide enhanced information on public transport services in KTC, using signs that include a combination of static and real-time displays that integrate information for all modes. This should help to highlight the good availability of services into the evening. An pertinent example is the recently installed 'Smart Column' at Ealing Broadway, which is included as a case study (see chapter 6)	• Enhance user-friendliness and awareness of public transport services in KTC	£	Short
Rail				
Access to Kingston station from the north	During most of the day, there is only one access to Kingston station, which is from the south. As development occurs in North Kingston, examine options for providing a permanent second access to the north. This may involve allowing full-time access from the existing door at the northern end of the corridor underneath the platforms. (In the longer term, there may be the opportunity to significantly enhance access to and from the station as part of Crossrail 2.)	• Facilitate more direct access to the station from North Kingston	££	Short to medium
Provide a Park and Rail site	Investigate stations with a direct service to Kingston that may be suitable for a Park and Rail service. Such a site would focus on intercepting trips from Surrey. Ideally, a station would have: • Good access to the road network from Surrey • Existing parking that is underutilised	• Reduce level of car traffic in KTC • Reduce pressure on car parking in KTC	££	Short to medium
Bus				
Continue to provide bus countdown displays	Bus countdown displays provide real-time information for all bus users (including those without access to a smartphone), and provide confidence that a bus is on its way. As such, advocate for the provision of bus countdown displays at all stops in KTC.	• Improve information provision for bus users	££	Short
Provide improved bus links to Surrey	Trips to and from Surrey are more likely to be made by car, in part due to relatively poor public transport links. Improving bus services to Surrey (in terms of frequency and span of service) and promoting them will help to encourage increased bus use.	• Provide an attractive alternative for trips to and from Surrey	Advocacy: £ Implementation: ££	Advocacy: short Implementation: short to medium
Provide improved orbital bus links	As there are no direct rail links from Kingston to many parts of London, it is important that a high quality bus service be provided to encourage travel by bus. This may be achieved through actions such as improving bus frequency and ensuring that routes provide direct links. In particular, route X26 provides a relatively quick link to Heathrow and Croydon, and could be enhanced	• Provide good bus links to other parts of London	££	Short to medium
Enhance legibility of bus link to Surbiton	Due to its position on a main line, Surbiton is served by faster train services compared to Kingston station. This corridor is served by different routes that stop at different bus stops; as such, trying to locate the next bus can be confusing. There are a number of actions that could be taken to improve the legibility and user-friendliness of this link: • Buses between Surbiton and Kingston to stop at common stops • Enhanced signage • Publicity and marketing to improve awareness of this link	• Increase awareness of option to access KTC via Surbiton station	££	Short
Provide a Park and Ride service	A seasonal park and rise service currently operates from Chessington, however usage has apparently dropped. Examine the continued viability of this site, and investigate possible alternative sites (including for a permanent site). This should take into account the trip origins for both shoppers, employees and other visitors.	• Reduce level of car traffic in KTC • Reduce pressure on car parking in KTC	£££	Short to medium

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Bus				
Night bus provision	Review level of night bus provision as the KTC night time economy grows, and advocate for increased provision as necessary.	• Provide late night transport options in KTC	££	Ongoing
Protect and enhance bus network	Given the relatively poor rail links to KTC, bus services form a key part of the town centre's transport links. As such, the town centre's bus network should be protected, and enhanced where possible. This may include actions such as: • Taking into account bus impacts as part of any schemes that are under consideration • Identifying factors that cause delays and/or unreliability to buses, and mitigating them (such as by using bus lanes) • Identifying opportunities to expand stopping and layover space (both in KTC and alternative locations), in order to improve the efficiency of existing bus services and enable expansion to take place [see separate discussion of bus options]	• Facilitate access to KTC by bus	££	Ongoing
FUTURE MEASURES				
Rail				
Advocate for Crossrail 2	Continue to advocate for implementation of the Crossrail 2 regional option. Remain engaged as this scheme is developed to ensure that benefits to Kingston are maximised.	• Improve links from Kingston to central and north London	Advocacy: £ Implementation: ££££	Advocacy: short to medium Implementation: long
Advocate for improved rail services to Kingston	Continue to advocate for improvements to Kingston's rail service that can be implemented prior to Crossrail 2. Improvements may be difficult to implement due to capacity constraints (rolling stock capacity, track capacity and terminal capacity at Waterloo), but there may be scope for improvements during off-peak hours. Bringing more former international platforms at Waterloo back into use may unlock spare capacity that could indirectly be used for Kingston services. Some enhancements that could be advocated for include: • Speed: investigate possible options for running express train services to and from Kingston • Capacity: capacity is being increased through the introduction of 10-car trains; as such, advocate for these trains to be used for all services throughout the week • Frequency: improved train frequencies, particularly during off-peak times and on weekends	• Improve links from Kingston to central London	Advocacy: £ Implementation: £££	Advocacy: short Implementation: short to medium

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Highways and Traffic

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Implement 20mph speed limit throughout KTC	Some roads within KTC are already covered by a 20mph limit. Investigate how this can be extended to the remainder of the town centre, in conjunction with other measures (such as redesign – see next measure) to reduce the perceived 'racetrack' environment on the relief road.	• Moderate vehicle speeds to a level appropriate for a town centre environment	£	Short to medium
Audit and rationalise directional signage for drivers	Review directional signage, taking into account the needs of both through traffic and town centre traffic. This review should specifically consider freight and car park signage systems to ensure that information provision is provided at the right places in order for drivers to make timely decisions and reduce unnecessary traffic circulation around the town.	• Reduce sign clutter • Improve legibility for drivers • Reduce unnecessary vehicle circulation	££	Short to medium
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Implement measures to improve road safety	Many of the other proposed measures will help to improve road safety, such as by moderating vehicles speeds or reducing conflicts between different road users. In addition recorded collision data should be reviewed on an ongoing basis, to identify changes to trends and collision hotspots.	• Improve road safety for all road users	Varies	Ongoing
Implement measures to improve network resilience	Even small disturbances can cause queues that rapidly propagate across the network. As such, contingency plans to minimise the effects of such occurrences should be reviewed on a regular basis, and updated in line with any lessons learnt from actual incidents and also with any changes to the road network.	• Improve the resilience of the road network in KTC to disruption	£	Ongoing
Implement measures to increase the use of electric vehicles	There are already a number of electric vehicle charging points in KTC. The council should monitor their use, and expand the network as necessary. The opportunity should be taken to ensure that charging points are provided in any new car parks that are built. The council could also lead by example, and switch to electric vehicles in its own fleet as the technology matures. Incentives could also be provided to encourage the uptake of electric vehicles. This could include discounts on fees (such as for parking permits or parking fees) for electric vehicles.	• Encourage and facilitate the use of electric vehicles • Reduce tailpipe emissions and improve local air quality	£	Ongoing
Car clubs	There are already a number of car club bays in KTC. More should be provided as demand increases, and also to stimulate demand. The possibility of bringing point-to-point car clubs (where a car can be picked up in one location and returned to another) to KTC should also be explored.	• Moderate levels of car ownership • More efficient use of kerbside space	£	Ongoing
Monitor air quality	Install an air quality monitoring station in KTC, to provide objective information on air quality trends.	• Obtain objective information on air quality in KTC	££	Ongoing
OTHER FUTURE MEASURES				
Redesign roads to reflect town centre context	See the 'Street Types' section of this chapter which sets out design principles for different street types.	• Create a road environment that discourages fast speeds • Create better 'place' • Improve pedestrian and cycle networks	££££	Medium to long

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Figure 5.6 Parking Measures

Parking

Introduction

The availability of convenient, good quality and appropriately priced parking is essential to the continued success of any town centre. In KTC there is currently an imbalance between the parking demand and the offer. Whilst in a typical week the overall level of parking provision is adequate, shoppers and other visitors tend to gravitate towards the car parks that are closest to their chosen destination (in particular the John Lewis and Bentall car parks). Using pricing in isolation to try and influence demand is a blunt tool and is unlikely to be effective. Motorists will often queue for a space rather than parking in a cheaper alternative facility where there is space available and walking a short distance to their destination.

More broadly, it is It is clear that the future car parking system will need to align with and support the overarching aspirations for the town centre. This means that it will need to respond to future developments as they come forward, as well as any changes to the transport network. There are currently a number of unknowns around these two areas. The table overleaf lists some suggested short-term and long-term measures, whilst the accompanying text discusses some particularly pertinent issues in greater detail.

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££/ £££££)*	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Enhance existing signage *See accompanying text for further discussion*	Existing static signage directing drivers to car parks should be reviewed and enhanced where warranted. Existing VMS signs that are not functioning correctly could also be repaired, but given the limited efficacy of the system it is unlikely that significant investment in the system is justified.	• Enhance awareness of the car parking options around the town centre. • Balance usage of car parks around the town centre.	£	Short
Enhance environment of existing car parks	A number of car parks currently have poor environmental quality, which may discourage people from using them. For example, this applies to the St James Road and Fairfield car parks. Relevant measures will depend on the specific car park, but may involve upgrading equipment, lighting, finishes, access control, etc.	• Enhance perceptions of safety. • Improve experience for visitors to KTC. • Encourage more even usage of car parks.	£££ (£3k–£6k per space depending on scope of works)	Short to medium
Provide seasonal park and ride site	A seasonal park and rise service currently operates from Chessington, however usage has apparently dropped. Examine the continued viability of this site, and investigate possible alternative sites. This should take into account the trip origins for both shoppers, employees and other visitors.	• Minimise the negative impact of seasonal peaks in demand on the town centre road network.	£££	Short to medium
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Provide adequate disabled parking in appropriate locations	The level of usage of disabled car parking spaces should be monitored, with additional spaces provided as necessary. In addition, as new developments are implemented, the level of provision of disabled parking should be checked to ensure that it is appropriate.	• Facilitate access to KTC for disabled persons travelling by private vehicle, especially for those that have particular difficulties using other modes of transport.	£	Ongoing
Adequate late night car parking	Monitor usage of car parking late at night, and ensure that adequate provision in appropriate locations is being made available.	• Provide adequate car parking to support the night time economy.	£	Ongoing
Maintain existing level of parking provision *See accompanying text for further discussion*	Maintain the existing level of approximately 6300 publicly available off-street car parking spaces in KTC. Where existing car parking spaces will be lost as a result of development, the aim should be to replace the spaces lost, rather than to increase or decrease parking supply.	• Cater for people wishing to access KTC by car, whilst minimising negative impacts on the road network and other town centre users.	££££	Ongoing
FUTURE MEASURES				
Enter into partnership arrangements with other car park operators *See accompanying text for further discussion*	Engage with operators regularly or create strategic partnerships to help deliver improvements that are beneficial to all.	• Improve quality of KTC car parks and make parking an integrated part of the KTC retail offer.	£££	Medium
Provision of real time information via smartphone and in-car systems	Over the next few years in-car internet based systems will become widely available, and will provide better information and interactivity between motorists and parking operations. They will provide real time information on the occupancy of parking bays and will direct motorists to available spaces. They will enhance the customer experience, making it easier to implement 'intelligent' parking charges and possible to integrate parking into the town centre offer.	• Enhance awareness of the car parking options around the town centre. • Balance usage of car parks around the town centre.	££	Medium to long
Relocate parking away from the heart of the town centre	In order to facilitate the enhancement of the public realm and pedestrian connectivity in the core of the town centre, car parking (except for disabled car parking) should be relocated away from the core of the town centre. This is primarily applicable to the existing Eden Walk and Neville House car parks. Any relocation is unlikely to occur in isolation, but rather the opportunity should be taken to carry out this measure as part of the implementation of developments that affect these car parks.	• Reduce intrusion into the core of the town centre from vehicles entering and exiting car parks.	££££	Medium to long
Consolidate existing car parks	Existing smaller car parks, particularly those in the southern portion of the town centre, should be consolidated into larger car parks. This should improve driver awareness of the various options available.	• Simplify choices for drivers seeking a car parking space in the town centre.	££££	Medium to long

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Discussion of specific issues

Future level of car parking provision

In order to inform what an appropriate level of parking provision in KTC might be in the future, the first step is to understand the possible level of future demand.

As discussed elsewhere, there are a number of potentially significant redevelopments and new developments that may be brought forward in the coming years, which will have impacts on the number of car trips to KTC. Whilst the exact nature of this development is uncertain, we have used the information available to us to estimate the impact that these developments may have on car parking demand. This has been done for both a typical weekday and average Saturday, with the results shown in the table below.

Day type	Daily car trips (two-way)	Daily car trips (two-way), excluding residential and hotel	Maximum car parking accumulation, excluding residential and hotel	Existing number of vacant car parking spaces at point of peak accumulation
Weekdays	3 300	2 300	640	*2 000*
Saturdays	3 300	2 300	550	*1 800*

Note: Given that the land uses and size of proposed developments are not certain, the figures in this table are based on information available at this time and typical trip generation rates for each land use. As such, these figures are only intended to give a rough indication of the future level of car parking demand, and are subject to change.

The results of this analysis show that the peak car parking demand generated by future developments should be amply accommodated by the existing number of vacant car parking spaces that are available, whilst maintaining an appropriate buffer of vacant spaces to limit any queuing or unnecessary circulation that may otherwise occur.

As a starting point it is recommended that the overall level of public car parking in KTC be held constant at approximately 6300 spaces. This should be sufficient to cater for demand across a typical week, whilst the seasonal spike in demand leading up to Christmas could be addressesd via provision of park and ride. If appreciable mode shift away from car access can be achieved, then it may be possible to review this level of parking.

Future developments in KTC are particularly concentrated in the North Kingston and Eden Quarter Major Opportunity areas, and as such may have an impact on the existing car parking spaces in those areas, as listed in the table below. The aim should be to replace any spaces lost (on a one-to-one basis) as part of developments that are implemented.

North Kingston		Eden Quarter	
Car park name	Spaces	Car park name	Spaces
Canbury Place (Council)	106	Eden Walk (Q Park)	700
		Cattlemarket surface & basement (Council)	569
		St James Road (NCP)	376
		Fairfield (NCP)	328
		Ashdown Road (Council)	168
		Ashdown Road (Smart Parking)	92
		Brook Street (Smart Parking)	68
		Neville House (Council)	30
Total	106	Total	2 331

Note: This list includes all car parks within the two Major Opportunity Areas, each of which may or may not be directly affected by future developments.

Rebalancing demand

The ultimate solution to rebalancing car parking demand in KTC would be to develop an alternative pole of attraction in the south of the town centre. The existing car parking in the south could then be replaced and/or refurbished as part of the redevelopment and the pattern of demand and offer would be rebalanced. This could be achieved through redevelopment in the Eden Quarter, as discussed below.

In the interim the Council could enhance existing signage, including the VMS system, to give motorists better and more comprehensive information on space availability in the KTC car parks as they approach the town centre. Again, this is discussed further below.

Alternatively, it may be better and more cost effective to look at other ways of guiding motorists. In the first place the Council should review and improve the fixed highway signage to alternative car parks on the approaches and within KTC. Over the next few years in-car internet based systems will become widely available and displace smart phones and other devices that motorists currently use while they are driving. These systems and services will provide better information and interactivity between motorists, their vehicles and parking operations. They will provide real time or near real-time information on the occupancy of parking bays in car parks and on-street and will direct motorists to available spaces. They will enhance the customer experience making it easier to implement 'intelligent' parking charges and possible to integrate parking into the retail leisure offer with loyalty schemes, discounted special offers linked to certain retailers, etc.

Eden Quarter

The potential for major redevelopments in the Eden Quarter present a number of opportunities from a car parking perspective, such as to:

- Rebalance the town centre, by providing a major destination in the south
- Shift car parking from the pedestrian core of the town centre towards its edge
- Consolidate a number of existing car parks into one or more new off-street car parks, that have high-quality environments, convenient pedestrian access and well-planned access to the wider road network

A key issue when planning any new car parks is that appropriate access to the road network is provided. Whilst easy access needs to be provided to Wheatfield Way (which is the primary road corridor in that portion of the town centre), direct access to it would be undesirable. Rather, it is likely that the most appropriate arrangement would be to place the car park entries and exits onto one of the side streets leading from Wheatfield Way, such as Lady Booth Road.

Signage

The effectiveness of a VMS or any parking guidance system upon influencing driver behaviour varies for each system according to the base position and the issues faced at each location such as the quality of existing highway signage, potential duration of queues and the location, accessibility and quality of alternative car park locations. In KTC where alternative car parks are perceived to be materially less convenient for shopping than the John Lewis and Bentall car parks then an informed motorist is highly likely to ignore the message and continue to queue. As an example of this behaviour, we are aware of a particular instance in Cardiff where a private car park operator regularly deployed staff to a queue outside a shopping centre car park offering vouchers for cheaper parking at its nearby facility. Despite the fact that the alternative car park was only a couple of minutes' walk away and a cheaper tariff was offered, virtually no drivers left the queue. The 2004 Kingston Parking Study helps to explain this behaviour as respondents stated that location influence their parking decision materially more than factors such as car park queue length or price. However new or infrequent visitors are more likely to have regard to message signs and will be more easily influenced. As such, it may be worth enhancing the existing static signage and VMS systems, but not investing heavily in a new VMS system.

Using pricing to influence demand

Pricing is one of the tools that can be used to balance demand across car parks but as noted above the effect is very limited. Motorists visiting car parks for retail purposes are more likely to be influenced by location rather than price. This was borne out by the responses to the 2004 Kingston Parking Study, where only 9% of respondents quoted price as a major factor in their choice of car park. Notwithstanding this, there is likely to be a level at which prices would begin to have more of an influence on car park choice. However, this is unlike to prove practical, given that most car parks are not controlled by the council, with retailers in particular likely to be reluctant to raise prices for fear of deterring potential customers.

Technology moving forward is likely to impact prices as the availability of live traffic information and car park occupancy linked to mobile phone and in car technology will allow the adoption of dynamic parking prices where parking charges vary according to use of the highway and car park infrastructure. Such systems in the future would allow KTC to measure the real impact of pricing upon motorists' behaviour.

Refurbishing car parks to increase usage and visitor experience

A poor car parking environment may impact occupancy, particularly if the car park is not in a prime location and users perceive that they or their cars are not safe. In KTC, the improvement of the poorer car parks would improve the visitor experience and occupancy levels although it is unlikely to materially impact the congestion issues at the main shopper car parks.

As an example of a successful refurbishment project, in 2010 Brighton and Hove City Council implemented refurbishment schemes for two of its car parks that were over 40 years and required extensive modernisation. Despite the inevitable disruption caused by the works, revenue in the two car parks increased significantly (70% in one). The project received favourable media coverage despite a tariff increase that helped finance the works.

Partnership arrangements

In KTC the management control of car parks is spread over a number of operators. This will impact the Council's ability to implement universal traffic management policies and to introduce measures to improve services for car borne residents and visitors. For example pricing strategies may be undermined, the other car park operators may not co-operate with future VMS systems, and visitors will continue to be faced with an array of different payment and enforcement systems. It is likely that various parties will have different priorities which may not align. For example, a private operator's aspiration to optimise revenue per space may be at odds with a policy of promoting the use of other modes.

These policy and strategic risks could be minimised by engaging with operators regularly or creating strategic partnerships to help deliver improvements that are beneficial to all, such as joint promotions or procurement alliances to allow all parties to benefit from economies of scale and consistent service delivery, or implementing a common payment system for all car parks linking into a loyalty scheme with local businesses. Without the necessary critical mass this type of scheme is unlikely to be delivered effectively. For new car parks, KTC should use the planning process to require the agreement of Management Plans that cover pricing, opening hours, etc.

The Council may also consider entering into formal partnership arrangements such as a joint venture or an independent management company to optimise their ability to deliver strategic priorities. This may mean that the Council loses some management control. Other models such as management contracts, leasing arrangements have also been successfully used by other local authorities to improve revenue and the standard and efficiency of their car park estates.

As the Council operates car parks in competition with private operators it must ensure that its actions or discussions are not construed as anti-competitive in breach of relevant competition laws and regulations.

Freight

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Promote click and collect	The provision of click and collect services in the town centre at retail outlets in the town centre provides customers with the convenience of shopping online, whilst still drawing them into the town centre to collect their purchases. The availability of click and collect should be promoted to customers. Some supporting measures may be required, such as the provision of loading bays, to allow customers to collect large items with their own vehicles.	• Encourage the use of click and collect services, thereby driving increased footfall	£	Short to medium
Implement a Freight Consolidation Centre	Investigate the viability of a Freight Consolidation Centre for KTC, and implement a pilot. An example that may be useful as a case study is the Regent Street Retail Consolidation Centre, which was launched in July 2009 to service shops in Regent Street. It is now used by one-third of shops on Regent Street, and now uses an electric freight vehicle. It has resulted in reductions in traffic levels and mileage, and improved air quality. The use of clearly branded vehicles has been important in increasing awareness of the scheme.	• Reduce the number of freight vehicle movements • Improve air quality	££ (some seed funding may be required, although aim is to be self-funding)	Short to medium
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Ensure adequate off-street loading facilities for new developments	Through the planning process, ensure that sufficient off-street loading facilities are provided for new developments. This is in line with the off-street loading facilities that have already been provided for some developments in KTC, such as the Bentall Centre and John Lewis / Waitrose.	• Minimise the impact of freight vehicles on the road network • Reduce visual intrusion of freight vehicles	££	Ongoing
Ensure adequate provision for on-street loading	For loading that cannot take place off-street, ensure that sufficient loading bays are provided in appropriate locations. Innovative approaches, such as footway loading bays that can only be used when pedestrian flows are low, should be explored.	• Manage impacts of on-street loading on the operation of the road network	££	Ongoing

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Taxis, Private Hire and River Services

Proposed measure	Description	Objective	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES				
Promote river services	Promote the use of river services to KTC, through measures including publicity and improved signage.	• Improve awareness of river services serving Kingston	£	Short
Enhance provision of river service	At present, river services to Kingston only operate during the warmer months. Investigate feasibility of providing a river service throughout the year. It would also be desirable to operate services more frequently and increase hours of operation, if this could be justified by demand.	• Expand the market for river services by operating more trips	££	Short to medium
MEASURES TO FORM PART OF KINGSTON'S CORE / ONGOING ACTIVITIES				
Expanded / new taxi ranks	Provide taxi ranks with adequate capacity in appropriate locations, that will be reviewed as new developments are completed and demand changes. In particular, this will need to take into account possible future increases in night time activity.	• Provide a convenient taxi service • Provide a safe transport option during evenings and nights • Manage impacts of over-ranking on other road users	£	Ongoing
Provision of PHV booths	Review provision of PHV booths on an ongoing basis, in light of any new developments and increases in evening and night time activity.	• Provide a convenient PHV service, including during evenings and at night	£	Ongoing

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Travel Demand Management

Proposed measure	Description	Objectives	Success Criteria	Examples	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
IMMEDIATE / SHORT TERM MEASURES						
Development of Kingston TDM brand	Development of a strong, Kingston-specific travel demand management 'brand' for application across a range of TDM type activities.	(i) To unify travel demand management activities taking place, demonstrating the breadth and number of activities and raising the collective profile of the programme. (ii) To raise public awareness of various activities and understanding of the objectives of the wider programme.	Public awareness of the brand and purpose of programme.	Hounslow Travel Active and Smarter Travel Sutton are early examples of TDM brands. Whilst they are not particularly individual to Hounslow or Sutton, they were effective in presenting a unified project to the public.	£	Short for brand development phase.
Kingston commuter challenge	A workplace-based commuter challenge typically runs for a 4-6 week period. Businesses within a specific geographical location (for example, within a large organisation, a town or city) are encouraged to enter the challenge and ask their employees to try a more sustainable mode of transport for their commute. Businesses compete against each other, with trips logged by employees earning points in the challenge. Winning individual participants and organisations are rewarded with prizes to recognise their efforts. Challenges can focus on one mode (e.g. cycling) or they can promote all modes other than single-occupancy car travel.	(i) To encourage employees to try a different mode of travel to work, and to encourage them to continue with any changes to their usual commute after the challenge. (ii) To recognise and reward commuters who already make good travel choices. (iii) To get people talking about their travel choices and to question usual behaviours (e.g. 'Why don't I cycle more often?'). (iv) To gather mode split data from the participants and to develop a contact database of people interested in active travel modes.	(i) Number of individual participants and number of organisations signed-up and actively participating in the challenge. (ii) Number of participants changing their travel behaviour for the challenge. (iii) Number of participants continuing with their change following the challenge.	The West of England partnership (including the cities of Bristol and Bath) has run a multi-modal commuter challenge for a number of years. In 2013, 110 businesses and 1,500 took part. The three-month follow-up survey revealed that 80% of participants who made a positive change to their travel during the challenge were still continuing with that change. Cycle challenges have been run by Transport for London on previous occasions (the last city-wide challenge was in 2011).	£	Short – though could become an annu event.
Events programme	A year-round calendar of events to take place in Kingston town centre to promote active travel and better travel choices. The events calendar would comprise a mix of high-profile events such as a car free day, a festival of cycling, and less extensive 'consolidation' events such as Dr Bike days.	(i) To promote improvements and changes to the local infrastructure, and to help instil a positive culture of walking and cycling. (ii) To communicate the behaviour change message to the public, and to occasional visitors to Kingston town centre. (iii) To encourage shoppers, employees and commuters using the town centre to think about the opportunities they have for walking and cycling.	(i) Number of events taking place, and event attendance. (ii) Follow-up activities undertaken as a result of events, e.g. the number of sign-ups to cycling schemes.	RBKC already have an established programme of events; the suggestion is to develop this programme and supplement it with a limited number of high-profile events. Lambeth Council ran a successful car free day on one of their residential streets in September 2013.	£	Short for individual events. Successful events should be repeated annually.

* Broadly, costs ranges as below:

£	Up to £100K
££	£100K - £500K
£££	£500K - £1 million
££££	£1 million - £5 million
£££££	Over £5 million

Proposed measure	Description	Objectives	Success Criteria	Examples	Cost (£/ ££ /£££ /££££)	Delivery timeframe (short/ medium/ long)
FUTURE MEASURES						
Site specific travel advice for businesses	Individual, tailored support on travel planning to businesses and major employers in the town centre and the immediate surrounds on travel. RBKC, or its appointed consultants, would engage with businesses to offer support in the creation of a site specific action plan to help them increase the range of travel options available to their staff, customers and visitors, to promote the use of active travel modes, and reduce reliance on the car).	(i) To help businesses develop concise, action-focused travel plans for their site. (ii) To support participating businesses with a range of site specific actions to improve travel options. (iii) To help businesses think critically about how they manage travel to and from their site.	(i) Number of action plans for major employers developed and number of quick-win measures taken forward by businesses within first year. (ii) Number of measures / initiatives implemented thereafter. (iii) Mode shift among staff, customers and visitors of participating businesses.	The most high-profile, extensive example of a site specific travel advice programme was that delivered as part of the London 2012 Travel Advice for Business (TAB) programme. The TAB programme engaged with major employers in areas of London at high-risk of travel disruption during the Olympic and Paralympic Games. The employers were assisted with the development of action plans to help them identify different travel options for their staff, helping them to ensure business continuity risks were managed. Business travel advice programmes are also taking place as part of LSTF activities in Thurrock and Redditch.	££	Medium term set-up. Free RBKC / consultancy support should be offered the basis that the participating busines commits to long term delivery of the tr plan developed.
Town centre sustainable travel / travel demand management business network	Creation of a Sustainable Travel Business Network for businesses based in Kingston town centre and the immediate surrounds. Businesses would work together to identify a vision and aims, and the Council would lend advice and support as appropriate. The overall aim is to bring businesses together and find ways in which they can work together to encourage better travel choices among their staff, customers and visitors.	(i) To encourage businesses to identity shared goals in relation to travel demand management and the town centre environment, and to share the efforts required to achieve those goals. (ii) To foster positive cultures to active travel modes within participating businesses. (iii) To build a self-sustaining network that will work together for common benefit.	(i) Number of businesses actively engaged with network, and membership levels year on year. (ii) Number of network-developed initiatives implemented. (iii) Mode shift among staff, customers and visitors of network members. (iv) Level of buy-in and engagement from participants / network led by business members.	Business travel networks are known to be active in Milton Keynes and Leicestershire. The Milton Keynes project is understood to be in the initial stages of set-up, but the Leicestershire project reports that 48 employers are now members of the network, representing a total of 6,535 staff across the Coalville and Loughborough areas.	££	Medium term set-up and long term delivery. The network will have greates impact if there is genuine business buy and leadership from within the networ RBKC's level of involvement should red following the set-up phase.
Personalised travel planning for residents	A team of trained travel advisors would deliver personalised travel planning for residents in Kingston. A separate segmentation exercise would show which residential areas would yield the best results (had the greatest propensity to make changes to their travel behaviour). Residents would be visited by a travel advisor to talk about their existing travel habits and to identify ways in which they could make changes – for their benefit – to their regular journeys, whether to work, to school, or to the shops.	(i) To increase awareness of the different travel choices available to residents. (ii) To reduce single occupancy car journeys. (ii) To encourage mode shift to walking and cycling, public transport or car sharing.	(i) Number of residents actively engaged in the programme (e.g. requesting information about travel) as a proportion of total households visited. (ii) Reduction in single occupancy car journey trips among the target group.	Personalised travel planning has taken place in many towns and cities throughout the UK over the last 10-15 years. Programmes are currently taking place in Birmingham, Portsmouth, Thurrock and Cambridgeshire, to name but a few. Forms of residential travel planning have taken place in London in Sutton and in Haringey. Our previous projects have delivered up to a 10% reduction in single occupancy car use among the target population.	££	Medium.

“A balanced transport network that supports the Kingston experience”

6

Highways scenario development

Introduction

Previous chapters have outlined the overall vision and objectives for the Kingston town centre (including a street hierarchy), this chapter examines scenarios for the highway network that will facilitate the achievement of this vision. Essentially, these highway scenarios explore how a future highway network in the town centre might be configured that is aligned with the town centre vision, whilst taking into account the ongoing importance of movement and access. As a core part of the study, the highway scenarios specifically examine the potential for:

- Redistributing road space to benefit cyclists and pedestrians, and to bring the rail station 'back' into the town centre; and
- Re-introducing two-way sections on the relief road to reduce motor vehicle dominance.

Longlist of scenarios

A longlist of seven different highway scenarios was initially developed based on a range of possible interventions. The intention of the scenarios was to explore varying degrees of change, including comprehensive changes to highways working such as closing parts of the gyratory, or introducing two-way working. A workshop was then held with RBK officers to discuss the seven scenarios. Subsequent to this workshop an eighth scenario was suggested by RBK officers based on discussions with Councillors, and this was added to the longlist.

A summary of the eight scenarios is provided in the table below, whilst full descriptions are included in the technical note included in Appendix A. This note also includes details of a high-level technical review that was undertaken for each of the scenarios from a highways perspective.

A broader multi-criteria evaluation matrix was also completed, to understand the relative impacts of the scenarios across a wide range of different themes. These themes were developed in conjunction with RBK officers, and are based on the themes contained in RBK's Local Implementation Plan (LIP). This evaluation matrix is also included in Appendix A.

Table 4.1 Long list of scenarios

Scenario number	Name	Key features
1	Mini-Holland proposals and strategic enhancements	• Retain the overall configuration of the existing gyratory system • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • No changes to the North Kingston road network
2	Eden Street Bus Station	• New bus facility in the Eden Quarter, to replace the Eden Street bus stops; Fairfield bus station; and Brook Street bus stops and stands
3	Clarence Street two-way	• Clarence Street opened to southbound traffic from Richmond Road • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)
4	Wood Street & Clarence Street two-way	• Convert the Wood Street / Clarence Street section of the gyratory to two-way working • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)
5	Network-wide conversion to two-way operation	• Convert the entirety of the existing one-way gyratory system to two-way operation • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)
6	Clarence Street and Wood Street sustainable transport corridor	• Prohibit general traffic from the Wood Street / Clarence Street section of the gyratory, turning this section into a sustainable transport corridor • Convert the remaining sections of the existing one-way gyratory system to two-way operation • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)
7	Right-turn reintroduced from Richmond Road into Wood Street	• Reintroduce the right-turn from Richmond Road (southbound) to Wood Street (westbound) outside the station (apart from this the overall configuration of the existing gyratory system remains unchanged) • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)
8	Wood Street sustainable transport corridor	• Prohibit general traffic from the Wood Street section of the gyratory, turning this section into a sustainable transport corridor • Convert the Sopwith Way section of the existing one-way gyratory system to two-way operation • Implement the Wheatfield Way and Station Plaza mini-Holland proposals • Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

Shortlisted scenarios

Discussions were held with RBK officers to identify a shortlist of three scenarios to be tested further. This outcome was that Scenario 1, Scenario 3 and Scenario 8 were shortlisted by RBK officers for further testing. This selection was based on the outcomes of the technical highways review and a desire to test a range of different interventions, from moderate to comprehensive, and gauge the relative impact of each. It is important to note that each scenario was intended to demonstrate the impacts of a high level intervention rather than test a fully worked up design, and that subsequent studies would be needed to consider details of operations and work a preferred scenario up into a full design option.

The three shortlisted scenarios may be suited for implementation across different time horizons, however they are not intended to be regarded as a sequence of stages to be implemented one after the other.

Traffic modelling

Traffic modelling has been undertaken in order to understand the relative impacts that the shortlisted scenarios may have on the operation of the road network. This section highlights the key findings of this modelling, whilst full details are provided in the separate scenarios modelling report. Two tiers of modelling were undertaken, to understand both wider road network impacts, as well as how the road network in KTC might operate. It should be noted that given the strategic and long-term time frame of this study, the modelling undertaken has been high level in nature. The purpose of this modelling has been to understand the relative performance of each scenario, and it is important to bear in mind that results are indicative only.

As expected, the results of the modelling (which indicate possible traffic displacement and some increases in junction degrees of saturation) reflect the nature of the shortlisted scenarios, which all reduce the capacity of the road system in the town centre (to differing degrees) in order to achieve the wider vision for KTC. The key modelling findings for each specific scenario are listed in the summary tables on the following pages.

The results obtained provide insights into the relative performance of each scenario, and also highlight issues that will need to be focussed on as part of further design and development work. It is clear that in traffic terms, some of the shortlisted scenarios will be more challenging to implement than others, with different scenarios suited to different implementation timeframes. Implementation timeframes will need to consider the changing nature of the town centre over the coming years, and align with the implementation of various planned/ potential developments in KTC.

Additional scenario

Following a request from RBK officers arising from further discussions, Scenario 6 has been added as a fourth shortlisted scenario. Whilst this scenario involves some very significant changes to the town centre highway network (which inevitably creates a number of challenges to be overcome), it also has the potential to enable some very significant benefits for KTC. Due to the late addition of Scenario 6 to the shortlist, it has not been tested in the traffic models; as such, the traffic impacts for this scenario have been estimated relative to the impacts of Scenario 8 (which has been modelled).

The impacts of each of scenarios 1, 3, 8 and 6 are presented in this order over the following pages. This order reflects the increasing level of intervention proposed, from least change to most comprehensive change.

Highways Scenario 1: Mini-Holland proposals and strategic enhancements

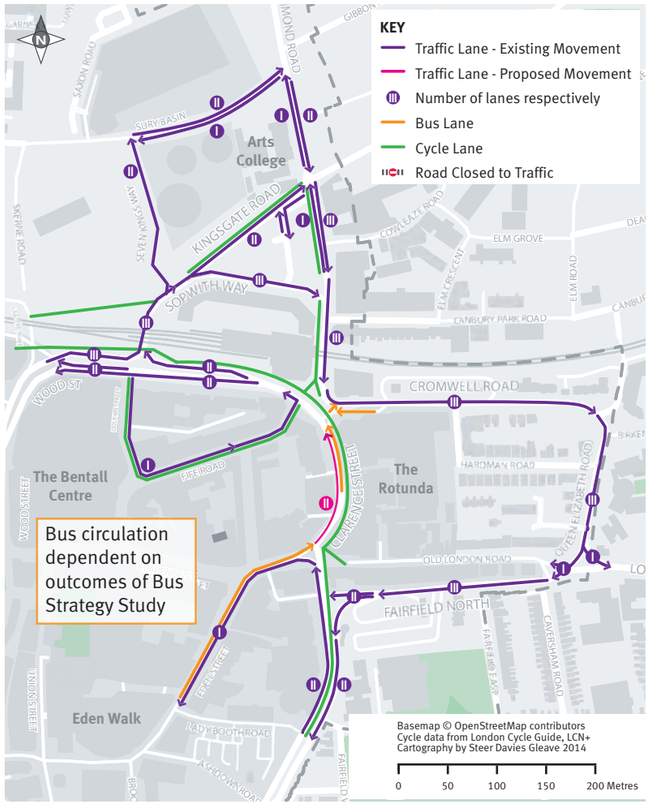


Figure 4.1 Highways Scenario 1

This scenario involves relatively few changes to the town centre road network. Its key features are:

- Retain the overall configuration of the existing gyratory system
- Implement the Wheatfield Way and Station Plaza mini-Holland proposals
- Number of lanes on Clarence Street reduced from three to two
- No changes to the North Kingston road network

This scenario has few challenges and would be relatively straightforward to implement. A key benefit that would arise from this scenario is significantly improved connectivity and safety for cyclists through the provision of dedicated facilities as part of the mini-Holland schemes. This scenario also offer the opportunity to enhance the urban realm, particularly in front of the railway station, which is a key gateway to KTC.

Table 4.2 Summary of impacts of Scenario 1

Theme	Key benefits	Potential challenges	Possible mitigation measures to address challenges

Movement and transport	• Model results indicate a reduction in traffic in KTC of about of about 10% of through trips (400 vehicles) in the AM peak hour (however with significant implications as noted to the right); there is a negligible change in the PM peak hour
	• Mini-Holland schemes improves cycling conditions
	• Pedestrian environment in KTC enhanced, particularly in front of the railway station
		• Displacement of through trips in the AM peak because increased delays on KTC road network lead to alternative routes becoming more attractive to drivers; this is caused by reduced capacity on the Clarence Street / Wood Street corridor where the number of traffic lanes is reduced from three to two
		• Possible delays to buses, especially those using Wood Street / Clarence Street
		• Reduced resilience to major incidents in highway network
			• To achieve a highway network that operates within practical capacity, in each peak hour it is estimated that roughly 500–1000 out of 8000 vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes
			• Mode shift required to maintain / enhance accessibility to KTC, particularly relying on:
			  • Implementation of mini-Holland schemes to encourage more cycling
			  • Continued improvement of bus services including capacity enhancements
			  • Supporting measures such as travel planning and promotion

Feasibility and risk	• Technically feasible and requires only minimal changes to the road network	• No major disbenefits anticipated	• N/A
Environment and climate change	• Some reduction in emissions through mode shift to walking and cycling	• Reduction in road capacity may cause an increase in congestion	• Supporting measures to encourage mode shift to as outlined above
Social and community	• Improved urban realm, particularly in front of the railway station • Improved connectivity across Wheatfield Way	• No major disbenefits anticipated	• N/A
Economic development	• Improved pedestrian and cyclist access to the town centre	• No major disbenefits anticipated	• N/A
Safety and security	• Improved road safety, especially for cyclists through the provision of dedicated facilities	• No major disbenefits anticipated	• N/A

Highways Scenario 3: Clarence Street two-way

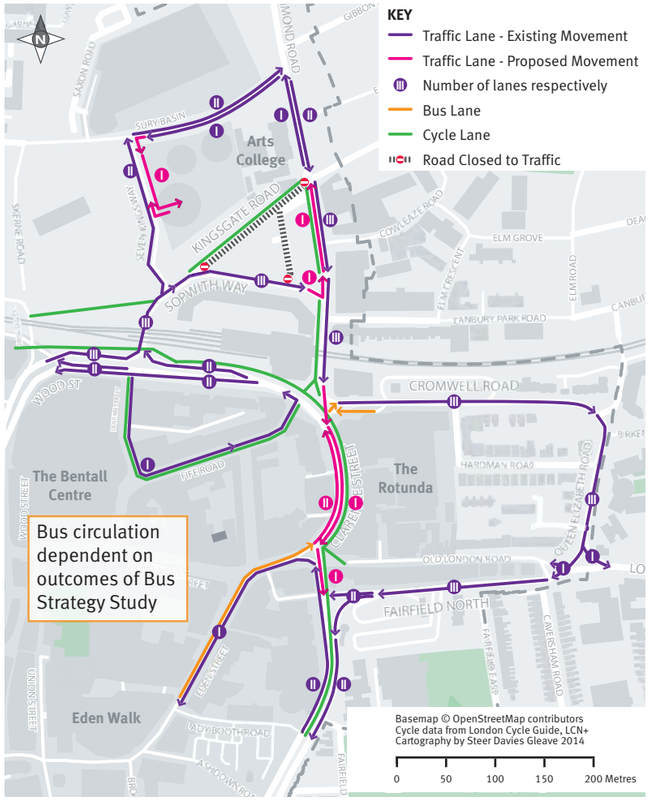


Figure 4.2 Highways Scenario 3

This scenario involves a moderate level of changes to the town centre highway network, consisting of the following key features:

- Clarence Street opened to southbound traffic from Richmond Rd
- Implement the Wheatfield Way and Station Plaza mini-Holland proposals
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

Converting Clarence Street to two-way working has the potential to change the nature of this road segment from a high-speed gyratory to a low-speed urban street, thereby reducing severance. Providing a more direct route for southbound vehicles also has the potential to reduce vehicle-kilometres travelled, although there will also be increased junction complexity (which could restrict traffic capacity)

Table 4.3 Summary of impacts of Scenario 3

Theme	Key benefits	Potential challenges	Possible mitigation measures to address challenges

Movement and transport	• Model results indicate that in each peak hour, there will be a reduction in traffic in KTC of about 5% of through trips (200 vehicles) (however note implications to the right)
	• Revised North Kingston road network layout caters satisfactorily for traffic flows
	• Mini-Holland scheme improves cycling conditions
	• Pedestrian environment in KTC enhanced, particularly in front of the railway station
		• Displacement of through trips because increased delays on KTC road network lead to alternative routes becoming more attractive to drivers; this is primarily caused by increased junction complexity due to the new two-way working on Clarence Street
		• Possible delays to buses, especially those using Clarence Street
		• Reduced resilience to major incidents in highway network
		• Limited highways space along Clarence Street potentially restricts footway space
			• To achieve a highway network that operates within practical capacity, in each peak hour it is estimated that roughly 500 out of 8000 vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes
			• Mode shift required to maintain / enhance accessibility to KTC, particularly relying on:
			  • Implementation of mini-Holland schemes to encourage more cycling
			  • Continued improvement of bus services including capacity enhancements
			  • Supporting measures such as travel planning and promotion

Feasibility and risk	• Technically feasible and requires only minimal changes to the road network	• Increased complexity at junctions affected by the new two-way section of Clarence Street	• Operation of junctions to be carefully considered during design work, to ensure an appropriate balance is struck between the needs of various road users
Environment and climate change	• Some reduction in emissions through mode shift to walking and cycling • Reduction in vehicle kilometres travelled due to more direct north to south route through KTC	• Reduction in road capacity may cause an increase in congestion	• Supporting measures to encourage mode shift to as outlined above
Social and community	• Improved urban realm, particularly in front of the railway station • Improved connectivity across Wheatfield Way • Reduced perception of severance along section of Clarence Street converted to two-way, due to calmer traffic	• No major disbenefits anticipated	• N/A
Economic development	• Improved pedestrian and cyclist access to the town centre • More direct vehicle access into the south of KTC from the north	• No major disbenefits anticipated	• N/A
Safety and security	• Improved road safety, especially for cyclists through the provision of dedicated facilities, and by calming effect of two-way working on Clarence Street	• No major disbenefits anticipated	• N/A

Highways Scenario 8: Wood Street sustainable transport corridor

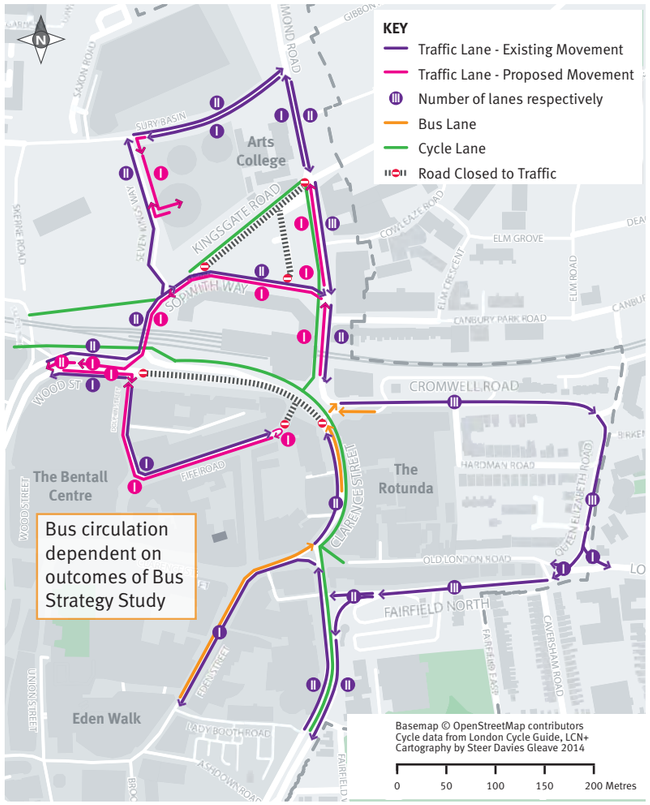


Figure 4.3 Highways Scenario 8

This scenario entails significant changes to the highway network, which include the following:

- Prohibit general traffic from the Wood Street section of the gyratory, turning this section into a sustainable transport corridor for pedestrians and cycles (potentially also allowing buses)
- Convert the Sopwith Way section of the existing one-way gyratory system to two-way operation
- Implement the Wheatfield Way and Station Plaza mini-Holland proposals
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

Table 4.4 Summary of impacts of Scenario 8

Theme	Key benefits	Potential challenges	Possible mitigation measures to address challenges

Movement and transport	• Reduction in traffic in KTC estimated at 20–30% of through trips (1000 vehicles) in each peak hour (however with significant implications as noted to the right)
	• Mini-Holland schemes improves cycling conditions
	• Pedestrian environment in KTC greatly enhanced by closure of Clarence Street and Wood Street
	• Significantly improved pedestrian connectivity between the railway station and the core of KTC
		• Displacement of through trips because significant delays on KTC road network (for almost all movements) make alternative routes are more attractive to drivers. Vehicle trips to and from KTC therefore also affected by these increased delays
		• Delays to buses increase travel times for passengers. More buses may be needed to maintain frequencies
		• Delays may discourage some people from visiting KTC if access by other modes not convenient
		• Displaced traffic may increase pressure on other roads, potentially including 'rat-runs' within the Borough, as well as alternative routes in wider area (e.g. the A3 or Hampton Court Bridge)
		• No resilience to major incidents in highway network
			• This scenario has not been modelled, however the impact would be larger than for Scenario 3, given that both Wood Street and Clarence Street are closed, and that two-way working on the remaining sections of the gyratory results in increased complexity at many junctions
			• To achieve a highway network that operates within practical capacity, in each peak hour approximately 2000 out of 8000 vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes
			• Very high level of mode shift required to maintain / enhance accessibility to KTC, relying on:
			  • Implementation of Crossrail 2
			  • Enhanced bus capacity, e.g. priority measures; improved access to bus stations; improved stand/ stop capacity. In addition potential to allow buses to use the sustainable transport corridor along Wood Street/ Clarence Street.
			  • Mini-Holland schemes implemented, along with complementary Quietways
			  • Walking improved by closure of Clarence Street and Wood Street, though connectivity elsewhere will need improvement

Feasibility and risk	• Technically feasible (however with significant considerations as noted to the right)	• Most challenging of all scenarios to engineer due to very significant changes required to the road network • Two-way working around gyratory may result in land-take, depending on number of lanes • Package of measures may be unacceptable politically and to the local community • High cost and high risk	• Footprint dependent on design adopted. Technically possible for two-way working with single traffic lane in each direction in the existing highway boundary, however land acquisition may be needed for further traffic lanes to maintain traffic capacity, or footway widening. Most critical at Richmond Road at railway bridge (where widening would be very challenging), Cromwell Road, and Queen Elizabeth Road (other roads may be affected) • Delivery dependent on implementation of Crossrail 2 • Implementation will need to be carefully managed to maintain an acceptable level of local highway network capacity, including during construction
Environment and climate change	• New areas of public realm in Clarence Street/ Wood Street offer opportunity for tree planting and landscape	• Reduction in road capacity causes significant increase in congestion and associated impact on CO_2 emissions, air pollution and air quality	• A very high level of mode shift required to be achieved to offset air quality impacts associated with congestion
Social and community	• Greatly reduces severance in busy part of KTC; improves access to rail station and to Old London Road shopping • Offers major opportunities for improved public realm and greatly contributes to KTC place-making objectives • Improves walking and cycling connectivity and permeability	• Cromwell Road/ Queen Elizabeth Road/ Fairfield North will need to accommodate a high volume of traffic and will continue to sever communities to the east of KTC	• Two-way working on Cromwell Road/ Queen Elizabeth Road/ Fairfield North may require additional traffic lanes, resulting in the creation of a dual-carriageway. This should be avoided if at all possible
Economic development	• Development opportunities created around railway station by release of highways land • Closure of Clarence Street and Wood Street helps expand the core KTC area • Economic growth supported by making KTC a more attractive place for businesses and visitors	• Road closures reduce access for goods vehicles and people accessing KTC by car	• The amount of development value released around the station will need to be reviewed against cost of highways and public realm improvements
Safety and security	• Removes conflicts between pedestrians and vehicles on Clarence Street and Wood Street • Two-way working on gyratory moderates vehicle speeds • Personal security benefits from improved KTC environment along Clarence Street and Wood Street	• No major disbenefits anticipated	• Safety and security will need to be considered in more detail during design process

This scenario has the potential to facilitate some very significant benefits for KTC. It does this by greatly reducing the severance caused by Wood Street, which currently creates a barrier between the railway station and the core of the town centre. By removing general traffic from Wood Street, there is the opportunity to significantly improve the public realm at this key gateway, make KTC a more attractive environment for businesses and visitors, and release potential development opportunities.

There are a number of challenges arising from this scenario, primarily related to reduced traffic capacity and implementation issues (such as the potential need for highway widening along Sopwith Way and altering railway structures). As such, the success of this scenario relies on significantly enhancing accessibility to KTC by non-car modes, and particularly the realisation of Crossrail 2.

Highways Scenario 6: Clarence Street and Wood Street sustainable transport corridor

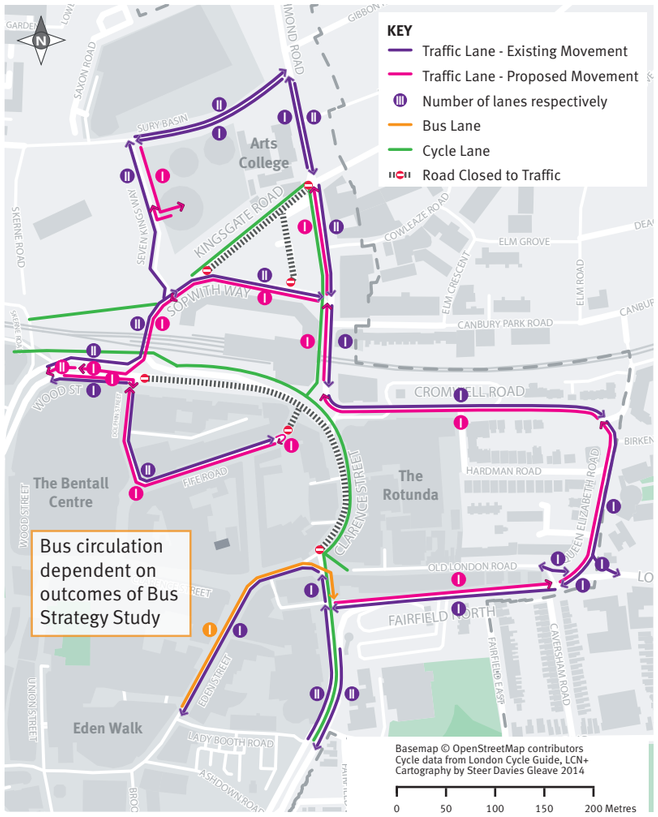


Figure 4.4 Highways Scenario 6

This scenario offers significant changes to the KTC highways network, including the following main features:

- Prohibit general traffic from the Wood Street / Clarence Street section of the gyratory, turning this section into a sustainable transport corridor for cycles and pedestrians (potentially also allowing buses)
- Convert the remaining sections of the existing one-way gyratory system to two-way operation
- Implement the Wheatfield Way and Station Plaza mini-Holland proposals
- Implement the package of North Kingston road network changes (closure of Kingsgate Road; main route towards north formed by an upgraded Seven Kings Way and Sury Basin; new left turn from Sopwith Way into Richmond Road)

Table 4.5 Summary of impacts of Scenario 6

Theme	Key benefits	Potential challenges	Possible mitigation measures to address challenges

Movement and transport	• Reduction in traffic in KTC estimated at 20–30% of through trips (1000 vehicles) in each peak hour (however with significant implications as noted to the right)
	• Mini-Hollands scheme improves cycling conditions
	• Pedestrian environment in KTC greatly enhanced by closure of Clarence Street and Wood Street
	• Significantly improved pedestrian connectivity between the railway station and the core of KTC
		• Displacement of through trips because significant delays on KTC road network (for almost all movements) make alternative routes are more attractive to drivers. Vehicle trips to and from KTC therefore also affected by these increased delays
		• Delays to buses increase travel times for passengers. More buses may be needed to maintain frequencies
		• Delays may discourage some people from visiting KTC if access by other modes not convenient
		• Displaced traffic may increase pressure on other roads, potentially including 'rat-runs' within the Borough, as well as alternative routes in wider area (e.g. the A3 or Hampton Court Bridge)
		• No resilience to major incidents in highway network
			• This scenario has not been modelled, however the impact would be larger than for Scenario 3, given that both Wood Street and Clarence Street are closed, and that two-way working on the remaining sections of the gyratory results in increased complexity at many junctions
			• To achieve a highway network that operates within practical capacity, in each peak hour approximately 2000 out of 8000 vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes
			• Very high level of mode shift required to maintain / enhance accessibility to KTC, relying on:
			  • Implementation of Crossrail 2
			  • Enhanced bus capacity, e.g. priority measures; improved access to bus stations; improved stand/ stop capacity. In addition potential to allow buses to use the sustainable transport corridor along Wood Street/ Clarence Street.
			  • Mini-Holland schemes implemented, along with complementary Quietways
			  • Walking improved by closure of Clarence Street and Wood Street, though connectivity elsewhere will need improvement

Feasibility and risk	• Technically feasible (however with significant considerations as noted to the right)	• Most challenging of all scenarios to engineer due to very significant changes required to the road network • Two-way working around gyratory may result in land-take, depending on number of lanes • Package of measures may be unacceptable politically and to the local community • High cost and high risk	• Footprint dependent on design adopted. Technically possible for two-way working with single traffic lane in each direction in the existing highway boundary, however land acquisition may be needed for further traffic lanes to maintain traffic capacity, or footway widening. Most critical at Richmond Road at railway bridge (where widening would be very challenging), Cromwell Road, and Queen Elizabeth Road (other roads may be affected) • Delivery dependent on implementation of Crossrail 2 • Implementation will need to be carefully managed to maintain an acceptable level of local highway network capacity, including during construction
Environment and climate change	• New areas of public realm in Clarence Street/ Wood Street offer opportunity for tree planting and landscape	• Reduction in road capacity causes significant increase in congestion and associated impact on CO_2 emissions, air pollution and air quality	• A very high level of mode shift required to be achieved to offset air quality impacts associated with congestion
Social and community	• Greatly reduces severance in busy part of KTC; improves access to rail station and to Old London Road shopping • Offers major opportunities for improved public realm and greatly contributes to KTC place-making objectives • Improves walking and cycling connectivity and permeability	• Cromwell Road/ Queen Elizabeth Road/ Fairfield North will need to accommodate a high volume of traffic and will continue to sever communities to the east of KTC	• Two-way working on Cromwell Road/ Queen Elizabeth Road/ Fairfield North may require additional traffic lanes, resulting in the creation of a dual-carriageway. This should be avoided if at all possible
Economic development	• Development opportunities created around railway station by release of highways land • Closure of Clarence Street and Wood Street helps expand the core KTC area • Economic growth supported by making KTC a more attractive place for businesses and visitors	• Road closures reduce access for goods vehicles and people accessing KTC by car	• The amount of development value released around the station will need to be reviewed against cost of highways and public realm improvements
Safety and security	• Removes conflicts between pedestrians and vehicles on Clarence Street and Wood Street • Two-way working on gyratory moderates vehicle speeds • Personal security benefits from improved KTC environment along Clarence Street and Wood Street	• No major disbenefits anticipated	• Safety and security will need to be considered in more detail during design process

This is the most significant scenario in terms of interventions. It has the potential to make a very significant positive contribution to improving the KTC environment and facilitating further economic development. It is however the most challenging and complex scenario to implement, and is dependent on the implementation of Crossrail 2. Further work would be required to assess its technical feasibility (including impacts on traffic), and how implementation could be undertaken in tandem with Crossrail 2 in Kingston. Crossrail 2 has the potential to help address some of the key challenges, for instance widening of the underpasses under the railway bridges may be able to be achieved as part of other Crossrail 2 rail infrastructure upgrade works.

Although a significant change for Kingston, other radical schemes demonstrate challenges can be overcome. An example is the scheme to pedestrianise the northern side of Trafalgar Square. Whilst the context differs from Kingston, the overall scheme concept is similar, as it involved pedestrianising one side of a one-way system, and converting the remaining sides to two-way operation. Analysis showed that the previous one-way system had a capacity of approximately 7000 passenger car units (PCUs) per hour, whilst the post-scheme layout achieved a capacity of about 3700–3900 PCUs per hour. A range of mitigation measures was used that extended far beyond the scheme itself in order to encourage traffic to use other routes and successfully reduce traffic demand around the square itself.

Table 4.6 Summary of overall impacts of highways scenarios

Impact category	Specific area	Highways Scenario 1 Mini-Holland & strategic KTC enhancements	Highways Scenario 3 Clarence Street two-way	Highways Scenario 8 Wood Street sustainable transport corridor	Highways Scenario 6 Clarence Street and Wood Street sustainable transport corridor
Movement and transport	Walking	+	+	+ +	+ + +
	Cycling	+ +	+ +	+ +	+ + +
	Buses	o	o	–	– –
	Traffic capacity and vehicular access	o	–	– –	– – –
Feasibility, risk, and cost	Technically feasible deliverable	+ +	+	– –	– – –
	Level of risk	Low	Moderate	High	High
	Cost	£	££	££££	£££££
Environment and climate change	Emissions and air pollution	+	o	–	– –
Social and community	Public realm	+	+	+ +	+ + +
	Connectivity	+	+	+ +	+ + +
Economic development	Release of land for development	o	o	+ +	+ + +
	Access supports economic viability	+	+ +	+	+
Safety and security	Road safety	+	+	+ +	+ + +
	Personal security	+	+	+ +	+ + +
Key benefits		• Mini-Holland scheme improves cycling • Pedestrian environment in KTC enhanced, particularly in front of the railway station	• Reduction in traffic in KTC of about 5% of through trips (200 vehicles) • Two-way low speed operation of Clarence Street reduces perception of severance	• Greatly reduces severance, improves access to rail station, and expands core KTC area to the north • Major opportunities for improved public realm and meeting place-making objectives • Improves walking / cycling connectivity and permeability • Development opportunities created around railway station by release of highways land	• Greatly reduces severance, improves access to rail station, and expands core KTC area to the north and east • Major opportunities for improved public realm and meeting place-making objectives • Improves walking / cycling connectivity and permeability • Development opportunities created around railway station by release of highways land
Key challenges		• Displacement of through trips elsewhere in borough because reduced capacity and delays on Clarence Street / Wood Street attract drivers to alternative routes • Reduced resilience to major incidents in highway network	• Displacement of through trips elsewhere in borough because delays on KTC road network lead to alternative routes becoming more attractive to drivers • Increased complexity at junctions affected by the new two-way section of Clarence Street	• Displacement of through trips elsewhere in borough because severe delays on KTC road network make alternative routes attractive to drivers. Vehicle trips to/ from KTC also affected by delays. Displaced traffic may increase pressure on routes in wider area • Bus delays may occur increasing passenger travel times. • Access by non-car modes will need to be improved to ensure visitors can access KTC easily • Engineering requirements will need to examined; e.g. the two road underpasses beneath the railway line may need widening	• Displacement of through trips elsewhere in borough because severe delays on KTC road network make alternative routes attractive to drivers. Vehicle trips to/ from KTC also affected by delays. Displaced traffic may increase pressure on alternative routes in wider area • Bus delays may occur increasing passenger travel times. • Access by non-car modes will need to be improved to ensure visitors can access KTC easily • Engineering requirements will need to examined; e.g. road underpasses beneath the railway line may need widening, and two-way working around gyratory may result in land-take

Key mitigating measures to address challenges		• Mode shift required of roughly 500-1000 of 8000 peak hour vehicle trips (total of both through trips and town centre trips) to maintain a highway network that operates within practical capacity through:
		  • Mini-Holland schemes to encourage more cycling
		  • Continued improvement of bus services including capacity enhancements
		  • Supporting measures such as travel planning and promotion
			• To achieve a highway network that operates within practical capacity, roughly 500 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. Mode shift through:
			  • Mini-Holland schemes to encourage more cycling
			  • Continued improvement of bus services including capacity enhancements
			  • Supporting measures such as travel planning and promotion
			• Optimise junction operation for road users
				• To achieve a highway network that operates within practical capacity, roughly 1000–1500 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. High level of mode shift through:
				  • Implementation of Crossrail 2
				  • Enhanced bus capacity (priority measures; improved access to bus stations; stands/ stops increased)
				  • Mini-Holland and complementary Quietways
				  • Comprehensive walking network improvements
					• To achieve a highway network that operates within practical capacity, roughly 2000 out of 8000 peak hour vehicle trips (total of both through trips and town centre trips) will need to use alternative routes or shift to other modes. Very high level of mode shift through:
					  • Implementation of Crossrail 2
					  • Enhanced bus capacity (priority measures; improved access to bus stations; stands/ stops increased)
					  • Mini-Holland and complementary Quietways
					  • Comprehensive walking network improvements

+ + + high benefit + + moderate benefit + small benefit o generally neutral – some detriment – – moderate detriment – – – high detriment


HEADMASTERS
COTSWOLD
Sutton
213
ART
LET'S FILL THIS
Pizza

7

Case-Studies

This chapter describes example case studies from elsewhere to inform understanding of some of the specific measures proposed in the previous chapter. This includes:

- Interpretative Signage
- Personalised Travel Planning
- Smart Column
- Outsourcing Car Parking Portfolio
- Station Plaza

love thames

Case study: Interpretative signage

Overview

The conceptual examples presented here is a suite of high quality interpretative signing to raise the visibility of locations on and along the Thames — enabling an engaging and meaningful visitor experience. The designs focus on Kingston's waterfront but could also function as a framework to underpin a roll-out across the town centre to promote heritage sites and other points of interest.

Interpretation is about engaging with people, starting a conversation between the user and the place. This design invites people to uncover stories about the Thames riverside in ways that create intrigue, foster learning and inspire exploration for all – young and old, visitors and locals – to create a narrative that reveals an area's past and explores its future.

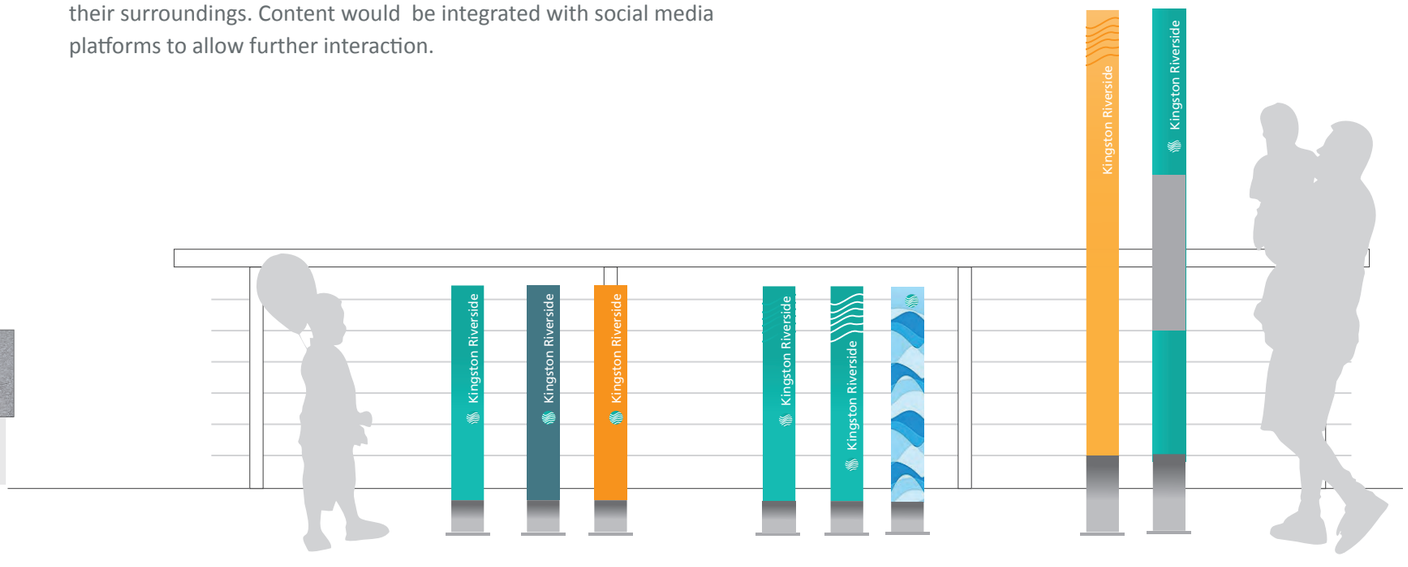
Stories would be told through a suite of digital and physical elements installed alongside the river to create a narrative of place. Selected interventions would be used in adjacent areas to visually mark and promote the nearby presence of the river, and reconnect people to it. Augmented reality would be activated at trigger points embedded in on-site media enabling users to explore their surroundings. Content would be integrated with social media platforms to allow further interaction.

The system will provide a broad spectrum of interpretive content. Anecdotal snapshots will highlight interesting personal experiences, and more factual accounts will provide details on history, architecture and the environment.

Objectives

Objectives of this project would be to:

- Promote wider awareness of places, history and heritage in KTC;
- Encourage people to spend more time exploring the area;
- Promote a Kingston brand and visual identity.



Case study: Personalised Travel Planning

Overview

Transport for London (TfL) undertook a personalised travel planning (PTP) project in the New Malden and North Kingston area of the Royal Borough of Kingston upon Thames during the summer months of 2006. The project set out to contact all 23,000 households in the identified areas and provide residents with (i) information about local travel choices, and (ii) incentives to use modes other than the private car. All households were approached via visits to the home, preceded by a postcard which briefly described the project aims and notified them that they should expect a visit.

Steer Davies Gleave was commissioned to provide support and advice to Transport for London in the delivery of this project, primarily in the following areas:

- Recruitment and employment of the PTP Travel Advisor team;
- Training of the PTP Travel Advisor team;
- Provision of a database to manage the request for and delivery of household information; and
- Support to the project team throughout the contact period.

Objectives

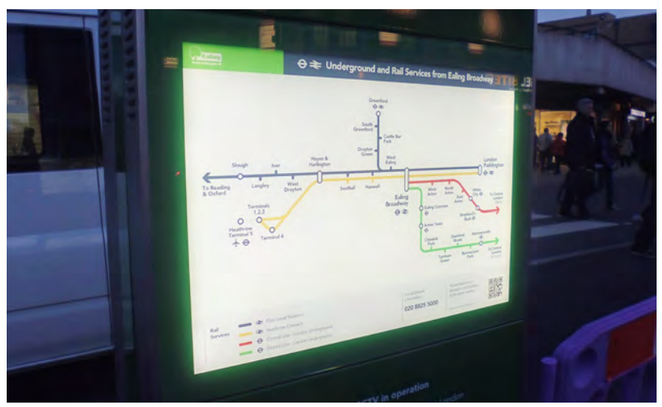
The objectives of the project were to:

- Provide tailored assistance with travel decisions to residents in New Malden and North Kingston areas;
- Promote a change to more sustainable travel options;
- Reduce congestion and delay on the road network in target areas;

Outcomes

Evidence collated from a number of PTP programmes of varying scope and scale suggests that, on average, a PTP programme results in a 7-15% reduction in car driver trips among target populations in urban areas.

- The trials taking place in Kingston, Sutton and Haringey in 2006/07 collectively reported at least 16 per cent of respondents using public transport more often and 24 per cent walking and cycling more as a result of the conversation they had with a Travel Advisor on the doorstep;
- 25,811 households in the target areas were visited, and 5,990 ‘participated’ (took a resource);
- More than 30,000 items of information were requested by participating households, with the most popular resources being the London Rural Thames Leisure Guide, the Kingston Public Transport Leaflet, and a Kingston Cycling Map.



Case study: Smart column

Overview

Ealing Broadway station is a complex, multi-modal interchange which experiences large numbers of passengers transferring between rail/London Underground and local buses which stop at over thirteen stands in the area surrounding the station.

To improve the interchange experience, Steer Davies Gleave designed and implemented a real real-time transport information column to communicate next bus departures and real time departures and service quality for rail and tube.

The column has two integrated high-definition screens that display easy to understand bus and tube digital information derived from Transport for London's open data feeds and National Rail Enquires live information service.

The column also includes static mapping. A local area map shows all local bus stop locations and a network map highlights key rail lines running through Ealing Broadway. The maps are illuminated and printed on vinyl for ease of updating.

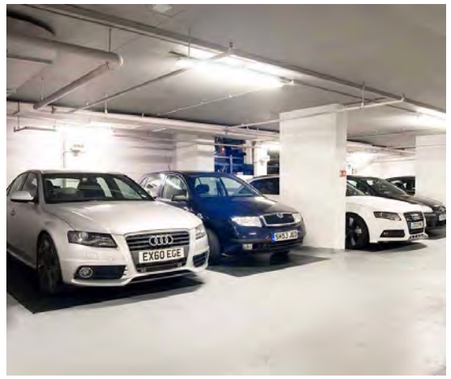
Objectives

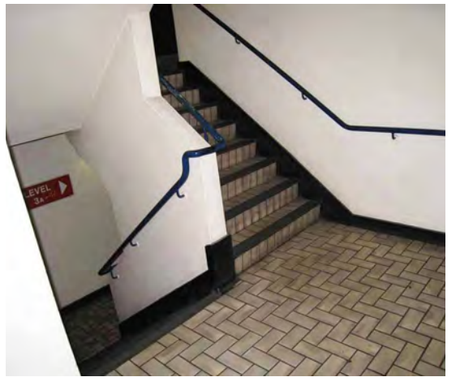
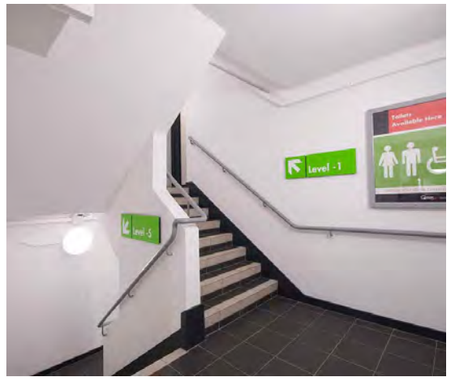
The objectives of the project were to:

> Inform and promote sustainable travel choices;
> Provide an attractive and robust street furniture item.

Outcomes

Ealing Broadway's Smart Column provides a new benchmark in real time transport information. Observations indicate that the column is being well used.

Before and after images of car park improvements

Case study: Outsourcing car park portfolio

Overview

Westminster City Council's portfolio of 14 car parks (4000 spaces) was operated under a management contract. The Council retained responsibility for commercial aspects including pricing and maintenance. The car parks were more than 40 years old. Significant investment was required to modernize them in order to optimize the value of the portfolio and safeguard an important annual revenue stream.

The Council appointed Parking Matters to help them evaluate their options (ex. leasing or selling) and implement the chosen strategy. We advised that a leasing option would be most beneficial and conducted a soft marketing exercise to confirm interest from potential bidders.

Together with property consultants Knight Frank, Parking Matters carried out an RFP for 25 year leases on a full repairing and insuring basis, including proposals for initial investment to upgrade the facilities.

The bid (not subject to OJEU) yielded 300 expressions of interest from around the world and 11 proposals. The field was narrowed to a short list of 4 from which Q-Park was selected as preferred bidder.

Objectives

- Transfer commercial risk to the specialist operator
- Secure investment to upgrade the car parks
- Optimise the Council's revenue from the car parks

Outcomes

- The Council has increased its annual net revenue by £2 million with a guaranteed inflation-proofed minimum revenue for the next 25 years
- Q-Park has invested £10 million to improve the quality of the facilities
- Council is no longer liable for commercial and maintenance responsibilities.

Case study: Station plaza

Overview

The conceptual examples presented here explore the possibility of better integrating Kingston rail station into the wider KTC environment, in a situation where downgrading or closure of Wood Street outside the station as set out in highways scenario 3 (see chapter 4) could not be achieved.

This could be achieved in two possible ways. The first option (top sketch) proposes the station building and land south of the station platforms are redeveloped, along with buildings on the south side of Wood street in order to provide a large station plaza rafting across Wood Street from platform level. This would be framed by and integrated with new buildings (shown in pink on the concept plan). Pedestrian connections to ground level could be provided in several possible locations such as: the corner of Fife Road/ Wood Street; mid-block along Fife Road (via an existing vehicle access point); mid-block on Dolphin Street (via an existing service yard); on Wood Street west side.

A second option (bottom sketch) also proposes redevelopment of the station building, but more limited redevelopment of areas to the south of the station platforms and on the south side of Wood Street in order to provide a wide pedestrian bridge rafting across Wood Street at platform level. This would be integrated with new buildings adjacent to the station (shown in pink on the concept plan). Pedestrian connections to ground level could be provided at the corner of Fife Road/ Wood Street;

Both of these scenarios are considered to only be feasible if Crossrail 2 takes place, thereby facilitating the redevelopment of the existing station building, and providing the stimulus for redevelopment of the wider station area.

Further investigation would be required to examine physical constraints, engineering requirements, construction costs, and financial viability.

Objectives

The objectives of this project would be to:

- Improve pedestrian access across Wood Street;
- Better integrate the rail station into KTC;
- Promote new development opportunities;
- Provide an attractive new public space.

A1

Appendix

The following are included as technical appendices to support the strategy:

- Scenario evaluation matrix
- Technical note on highways options
- Highways modelling report

Kingston Town Centre Movement Strategy: Scenario Evaluation Matrix

This matrix provides a broad qualitative evaluation of the anticipated performance of the seven scenarios developed for KTC against a variety of criteria. The following should be noted:

- All scenarios assume that the highways changes are implemented in conjunction with wider town centre improvements, and the impacts have been evaluated on this basis. Please see the Vision for Movement diagram in the main report for details of these wider improvements.

- Scenario 2 (an Eden Quarter Bus Station) is considered as a standalone measure that could be incorporated into any of the other scenarios, and as such evaluated separately to the other scenarios (see bottom row of matrix).

	Environment and climate change	Traffic and transport								Safety and security			Social / community					Economic development			Feasibility / risk		
Objective	Reduce CO2 emissions and air pollution from road based transport	Increase walking, cycling and public transport usage for all trip types	Continue downward trend in traffic levels	Avoid increasing peak congestion on KTC road network	Ensure vehicle speeds on relief road are commensurate with town centre environment	Encourage better spread of car park usage	Continue to improve bus services in the town centre	Improve passenger access to bus services	Maintain provisions for taxis and goods vehicles in line with demand	Reduce number of collisions resulting in serious injuries for pedestrians and cyclists	Reduce crime and fear of crime whilst in the public realm and on public transport	Provide transport networks that are safe for cyclists and pedestrians of all ages and abilities	Remove barriers to movement and enhance accessibility to KTC for all people	Improve the quality of the KTC public realm	Improve pedestrian and cycling permeability and connectivity through KTC	Reduce impacts of noise and vibration from transport	Contribute to health and wellbeing	Support delivery of development opportunities	Support economic viability by improving accessibility	Maintain adequate access for goods vehicles	Package of measures is technically feasible and deliverable	Package of measures is acceptable politically and to the local community	Package of measures is acceptable in terms of risk
Criteria	Volume CO2. Volume of key air pollutants.	Walking, cycling and PT trip mode shares	Volume of traffic entering KTC	Journey time reliability	Average vehicle speed	Average peak parking occupancy	Bus journey times	Bus stop locations and waiting environment	No. locations / amount of kerbside space	No. of KSI pedestrians and cyclists	No. crimes reported Survey of perception of crime	Assessment of safety and convenience	Presence of design features to encourage inclusive access	Qualitiative assessment of urban realm	Qualitative assessment of network connectivity	Noise and vibration levels	Mode share of people walking and cycling	Facilitates release of land for development	Qualitative assessment of multi-modal accessibility	Qualitative assessment of goods vehicle movement	Qualitative assessment of feasibility	Qualitative assessment of acceptability and deliverability	Qualitative assessment of risks
	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	-3 to +3	Low / Medium / High
Scenario 1 Existing Network with mH proposals and NKDA Av1	1 Mode shift through improvements to walking and cycling environment	2 Mode shift through improvements to walking and cycling environment, plus enhancements to existing PT facilities	2 Mode shift through walking, cycling and PT improvements helps reduce traffic volumes	0 No significant change, small increase in congestion may be offset by mode shift	0 No significant change	-1 Making Eden Street bus only affects access to Fairfield car park. Restricting access on Brook Street affects access to Eden Walk car park.	0 No significant change - no operational changes expected.	1 General improvements to bus stop environment	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	1 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic, however risk of collisions still high in Eden Street	1 Improvements to public realm and bus waiting environment enhances perceived security	2 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic	1 Improved town centre environment, including improvements to crossings	1 Improvements to town centre public realm	1 Improvements to walking and cycling environment in town centre generally	0 Little overall impact	1 Mode shift through improvements to walking and cycling environment	0 No impact	1 Improved pedestrian and cycle access	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	3 Technically feasible and deliverable, only requires minor changes to highway network	2	Low
Scenario 3 Clarence Street 2-way	0 Mode shift through improvements to walking and cycling environment. Reduced vehicle kms for some car trips. Offset by some increase in congestion which may exacerbate emissions	2 Mode shift through improvements to walking and cycling environment, plus enhancements to existing PT facilities	2 Mode shift through walking, cycling and PT improvements helps reduce traffic volumes	-1 Small increase in congestion due to localised increased junction complexity and reduction in no. NB lanes on Clarence St	0 No significant change	0 Changes to traffic circulation improve access to car parks in southern KTC generally, however Eden Street changes affect access to Fairfield car park, and restricting access on Brook Street affects access to Eden Walk car park.	0 No significant change - no operational changes expected.	1 General improvements to bus stop environment	-1 Clarence Street taxi rank removed to enable Clarence Street two way working.	1 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic, however risk of collisions still high in Eden Street	2 Improvements to public realm and bus waiting environment enhances perceived security	1 Positive impact through improvements to walking and cycling environment but lifting restrictions on vehicular access in some town centre locations could increase potential for user conflict, esp. cyclists	1 Improved town centre environment, including improvements to crossings. 2-way working helps tame traffic and reduce perception of severance.	1 Improvements to town centre public realm	0 Improvements to walking and cycling environment in town centre but spatial constraints mean two way working could reduce pedestrian and cycle space.	0 Overall impact neutral - two-way sections may have decrease in noise and vibration due to moderated vehicle speeds, although may be offset by increases in traffic (such as north to west)	1 Mode shift through improvements to walking and cycling environment	0 No impact	2 Improved pedestrian and cycle access. Two-way working allows for some additional choice of vehicle movements and access to car parks.	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	1 Technically feasible and deliverable and only requires minor changes to highway network, however spatial constraints on around railway bridge may be challenging	1	Medium
Scenario 4 Wood Street & Clarence Street 2-way	-1 Some increase in congestion and associated impact on CO2 emissions, air pollution and air quality	2 Mode shift through improvements to walking and cycling environment, plus enhancements to existing PT facilities	2 Mode shift through walking, cycling and PT improvements helps reduce traffic volumes	-1 Small increase in congestion due to localised increased junction complexity and reduction in no. NB lanes on Clarence St	0 No significant change	0 Changes to traffic circulation improve access to car parks in southern KTC generally, however Eden Street changes affect access to Fairfield car park, and restricting access on Brook Street affects access to Eden Walk car park.	0 No significant change - no operational changes expected.	1 General improvements to bus stop environment	-1 Clarence Street taxi rank removed to enable Clarence Street two way working	1 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic, however risk of collisions still high in Eden Street	2 Improvements to public realm and bus waiting environment enhances perceived security	1 Positive impact through improvements to walking and cycling environment but lifting restrictions on vehicular access in some town centre locations could increase potential for user conflict, esp. cyclists	2 Improved town centre environment, including improvements to crossings. 2-way working helps tame traffic and reduce perception of severance.	1 Improvements to town centre public realm	0 Improvements to walking and cycling environment in town centre but spatial constraints mean two way working could reduce pedestrian and cycle space.	0 Overall impact neutral - two-way sections may have decrease in noise and vibration due to moderated vehicle speeds, although may be offset by increases in traffic (such as north to west)	1 Mode shift through improvements to walking and cycling environment	0 No impact	2 Improved pedestrian and cycle access. Two-way working allows for some additional choice of vehicle movements and access to car parks.	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	2 Technically feasible and deliverable, some challenges associated with TM during implementation	0	Medium
Scenario 5 Network-wide conversion to 2-way operation	1 Mode shift through improvements to walking and cycling environment. Reduced vehicle kms for some car trips, however increased congestion due to loss of road space may exacerabate emissions.	2 Mode shift through improvements to walking and cycling environment, plus enhancements to existing PT facilities	2 Mode shift through walking, cycling and PT improvements helps reduce traffic volumes	-2 Increase in congestion due to increase in network-wide junction complexity and impact of pedestrian crossing facilities due to conversion to two-way operation.	3 Two-way operation likely to calm traffic speeds	1 Improved access to southern car parks through two way gyratory working. However Eden Street changes affect access to Fairfield car park, and restricting access on Brook Street affects access to Eden Walk car	1 Potential to significantly change bus network to reduce operational miles, however some delays may occur due to traffic congestion.	1 General improvements to bus stop environment	-1 Clarence Street taxi rank removed to enable Clarence Street two way working	1 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic, however risk of collisions still high in Eden Street	2 Improvements to public realm and bus waiting environment enhances perceived security	0 Positive impact through improvements to walking and cycling environment but lifting restrictions on vehicular access in some town centre locations could increase potential for user conflict, esp. cyclists	2 Improved town centre environment, including improvements to crossings. 2-way working helps tame traffic and reduce perception of severance.	1 Improvements to town centre public realm	0 Improvements to walking and cycling environment in town centre but spatial constraints mean two way working could reduce pedestrian and cycle space.	1 Potential decrease in noise and vibration on two-way sections due to moderated vehicle speeds and dispersion of traffic across routes	1 Mode shift through improvements to walking and cycling environment	0 No impact	3 Improved pedestrian and cycle access. Two-way working allows for greater choice of movements and access to car parks.	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	1 Technically feasible and deliverable, implementation will need to be carefully managed to maintain local network capacity, and some spatial constraints (e.g. railway bridge)	-1	Medium-High
Scenario 6 Clarence Street and Wood Street closed to traffic, remainder of network converted to 2-way operation	-2 Significant increase in congestion and associated impact on CO2 emissions, air pollution and air quality	3 Mode shift through improvements to walking and cycling environment plus enhancement to existing bus facilities and better integration of the rail station.	3 Mode shift through improvements to walking and cycling environment plus enhanced bus facilities and better integration of the rail station all help reduce traffic volumes.	-3 Significant increase in congestion due to increase in network-wide junction complexity and impact of pedestrian crossing facilities due to conversion to two-way operation.	3 Two-way operation likely to calm traffic speeds	1 Improved access to southern car parks through two way working on some roads. However Eden Street changes affect access to Fairfield car park, and restricting access on Brook Street affects access to Eden Walk car park.	-1 Buses will need to be re-routed around outside of KTC resulting in longer journey times, plus potentially delays due to congestion	-1 Bus stops on Wood Street are relocated	-3 Clarence Street taxi rank removed to enable Clarence Street two way working. Potential impact on taxi rank at Wood Street (station) also.	3 Strong positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic	3 Substantial improvements to public realm includes Clarence/ Wood Street and enhances perceived security. Also improved bus environments	2 Positive impact through improvements to walking and cycling environment and removal of traffic from Clarence Street	3 Improved town centre environment, enhanced bus stops, and improved access between town centre and station	3 Substantial improvements to public realm includes Clarence/ Wood Street	3 Improvements to walking and cycling environment in town centre and closure of Wood Street and Clarence Street to vehicular traffic	2 Decrease in noise and vibration of sections of Wood Street and Clarence Street that are restricted to traffic; potential decrease on two-way sections due to moderated vehicle speeds	1 Mode shift through improvements to walking and cycling environment	3 Enables release of land adjacent to railway station (south side) for development	0 Improved pedestrian and cycle access, however significantly reduced highways access to key part of town centre.	-2 Reduced access for properties on Clarence Street and Wood Street	-3 Technically feasible and deliverable, however some significant spatial constraints to address if acceptable highways capacity to be maintained. Implementation will need to be carefully managed to maintain local network capacity	-2	High
Scenario 7 Right-turn reintroduced from Richmond Road into Wood Street	0 Mode shift through improvements to walking and cycling environment. Queuing on Richmond Rd exacerbates CO2 emissions, air pollution and air quality	1 Mode shift through improvements to walking and cycling environment plus enhancements to bus facilities, however access to the rail station is hindered.	-1 Mode shift through improvements to walking and cycling environment, however reinstatement of RH turn from Richmond Road attracts more traffic.	-1 Reduction in route lengths for N-W movements outweighed by likely increase in traffic attracted to the local network	0 No significant change	-2 Reinstatement of RH turn from Richmond Road exacerbates demand for John Lewis/ Bentall Centre car parks.	0 No significant change - no operational changes expected.	1 General improvements to bus stop environment	-1 Reinstatement of RH turn from Richmond Road requires removal of taxi rank on Wood Steet.	-2 Negative impacts due to increased conflicts at new RT likely to outweigh positive impact through improvements to walking and cycling environment	-1 Improvements to public realm across town centre help enhance perception of security, however rail station environment (key gateway to KTC) is negatively affected.	0 Positive impact through improvements to walking and cycling environment but RH turn increases potential for user conflict	0 Positive impact through improvements to walking and cycling environment but RH turn exacerbates separation of town centre from rail station	-2 Significant reduction in public realm area and quality at key gateway to the town centre	-1 RH turn impacts negatively on pedestrian and cycle movement	-1 Potential increase if facilitation of north to west movement attracts additional traffic	1 Mode shift through improvements to walking and cycling environment	0 No impact	0 Improved pedestrian and cycle access, however access to/from station affected by RH turn.	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	3 Technically feasible and deliverable, only requires minor changes to highway network	1	Medium
Scenario 8 Wood Street closed to traffic, Sopwith Way converted to 2-way operation	-2 Significant increase in congestion and associated impact on CO2 emissions, air pollution and air quality	2 Mode shift through improvements to walking and cycling environment plus enhancement to existing bus facilities and better integration of the rail station.	3 Mode shift through improvements to walking and cycling environment plus enhanced bus facilities and better integration of the rail station all help reduce traffic volumes.	-3 Significant increase in congestion due to increase in junction complexity at jtn Richmond Rd/ Sopwith Way.	2 Two-way operation on Sopwith Way likely to calm traffic speeds at this location	1 Longer route from south to northern car parks could cnourage better use of southern car parks.	-2 Buses will need to be re-routed away from Wood Street resulting in longer journey times, plus potentially delays due to congestion	-1 Bus stops on Wood Street are relocated	-1 Reinstatement of RH turn from Richmond Road requires removal of taxi rank on Wood Steet.	3 Strong positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic	3 Substantial improvements to public realm on Wood Street enhances perceived security. Also improved bus environments	2 Positive impact through improvements to walking and cycling environment and removal of traffic from Wood Street	3 Improved town centre environment, enhanced bus stops, and improved access between town centre and station	2 Substantial improvements to public realm including Wood Street	2 Improvements to walking and cycling environment in town centre and closure of Wood Street to vehicular traffic	1 Decrease in noise and vibration on Wood Street by removal of traffic and potential decrease on two-way Sopwith Way/ Richmond Road south due to moderated vehicle speeds, however offset by increase in	1 Mode shift through improvements to walking and cycling environment	3 Enables release of land adjacent to railway station (south side) for development	1 Improved pedestrian and cycle access however some reduction in highways access	0 Wood Street closed however access to properties still enabled via Dolphin/Fife	-2 Technically feasible and deliverable, however some challenging spatial constraints to be resolved. Implementation will need to be carefully managed to maintain local network capacity	-1	High
Scenario 2 Eden Street Bus Station	1 Mode shift through improvements to walking and cycling environment	2 Mode shift through improvements to walking and cycling environment plus new bus facility.	2 Mode shift through walking, cycling and PT improvements helps reduce traffic volumes	0 No significant change	0 No significant change	-1 Changes to Eden Street affect access to Fairfield car park. Restricting access on Brook Street affects access to Eden Walk car park.	3 New bus facility provides more stopping / standing space	2 New bus facility further from existing town centre core, but better located to serve revitalised Eden Quarter area of town centre.	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	3 Positive impact through improvements to walking and cycling environment and removal of buses from Eden Street	2 Improvements to public realm enhances perceived security. New bus station provides safer bus passenger environment.	2 Positive impact through improvements to walking and cycling environment and restricted access for vehicular traffic	2 Improved town centre environment and new Eden Quarter bus facility better serve town centre demand for bus services	2 Improvements to town centre public realm	2 Improvements to walking and cycling environment in town centre, plus removal of buses from Eden Street improves this link for peds and cycles	0 Little overall impact, although may be localised changes due to bus re-routing as a results of new bus station	1 Mode shift through improvements to walking and cycling environment		2 Improved pedestrian and cycle access. Eden Quarter bus facility offers improved bus access to town centre	0 No change (however will need to ensure restricted access streets allow for loading at certain times)	2 Technically feasible and deliverable, some challenges associated with over-site bus station development	1	Medium

Highways review: scenarios 1 to 7

1.1 This note considers the implications of highways scenarios developed for Kingston Town Centre area as part of the Kingston Town Centre Movement Study. The intention of this analysis is to inform selection of three scenarios to model as part of Stage 2 of the study. Note that diagrams of the scenarios are indicative only, intended to inform discussion and selection of scenarios for further investigation. Scenarios have been developed based on broad consideration of highways changes that might be technically feasible, however no design work has been undertaken and therefore land requirements and engineering constraints will need to be considered in more detail in subsequent studies.

Future highways changes

Mini-Holland proposals

1.2 At the time of undertaking this study the mini-Hollands (mH) programme included the addition of two-way cycle infrastructure on Wheatfield Way (between College Roundabout and Richmond Road) and an expansion of Kingston Station plaza which will reduce the number of available lanes from three to two; these changes are shown and described in greater detail below.

Wheatfield Way

1.3 These proposals will remove a northbound traffic lane to provide a central two-way cycle facility starting at the median strip opposite Fairfield Road, through the junctions with Fairfield North and Clarence Street, and then up to Wood Street. These are as shown in the RB Kingston plans below.

1.4 The Wheatfield Way proposals will reduce junction capacity at Fairfield North and Clarence Street due to a reduction in the number of approach lanes. Changes to the Richmond Road / Cromwell Road / Wheatfield Way / Wood Street junction will be needed to accommodate the new cycle infrastructure; this will also have a negative impact on operation and capacity.

1.5 The southbound approach to the College Roundabout will be reconfigured by moving the existing bus lane over and providing a two-way cycle facility which will link into the existing cycle crossings at Brook Street and also immediately south of the roundabout. These proposals are unlikely to have any impact on other traffic as they are created in addition to the existing lane structure.

Kingston Station Plaza

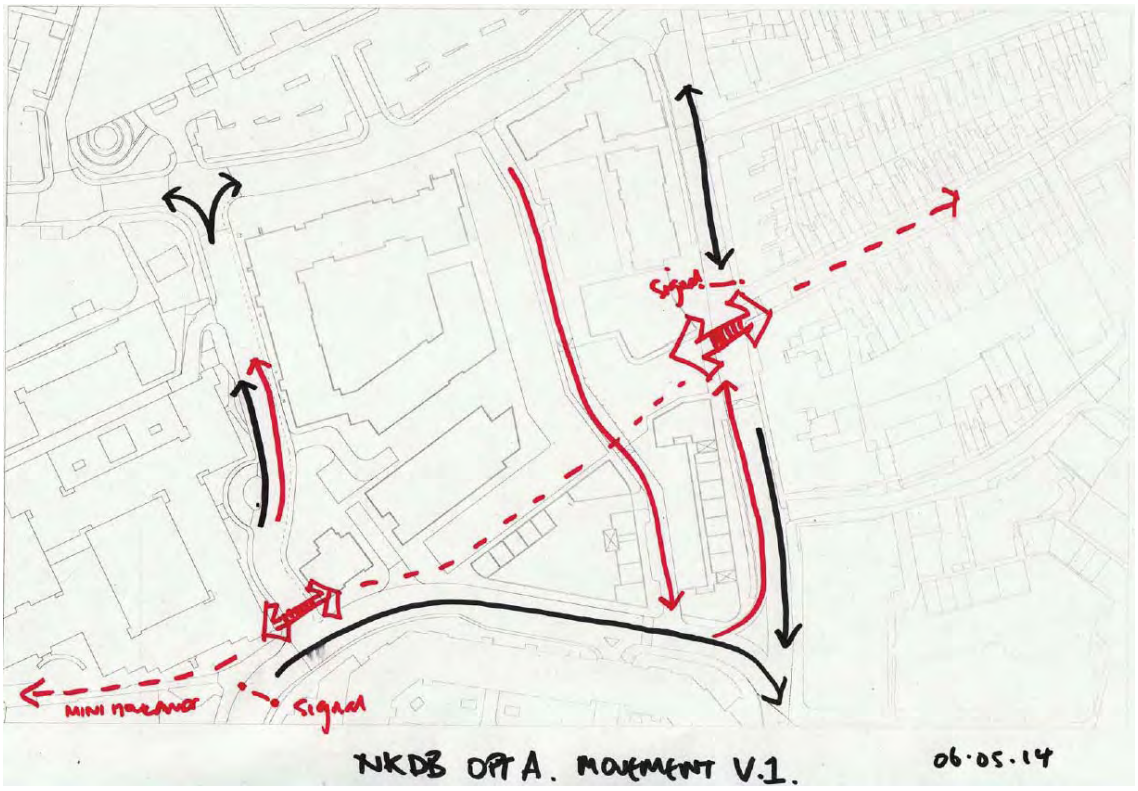
1.6 These proposals will remove a westbound traffic lane opposite the station entrance to increase the forecourt area for pedestrians and introduce a two-way cycle facility, which will link to Richmond Road and Wheatfield Way to the east) and parallels the rail tracks to the west. This will help to reduce the severance caused by the existing wide carriageway outside the station. The impact of these proposals will have negligible impact assuming that they are introduced in conjunction with the Wheatfield Way scheme described previously. This is due to an associated reduction in traffic flows entering this area (i.e. the two lane approach will have started further south and this will effectively see a continuation of a similar cross-section outside the station).

North Kingston Development Area

1.7 At the time at which the following highways scenarios were developed a number of permutations of highways within the North Kingston Development Area (NKDA) were also being considered. NKDA will see the closure of Kingsgate Road and introduce a new 'Central Spine Road' through the development site. RB Kingston considered two main options with three variations for each to achieve this change, which will change the operation of Seven Kings Way:

- A - Seven Kings Way will remain a through route but the direction of flow available varies, and
- B - Seven Kings Way will be closed at the southern end with access to the residential properties on the western side only available from the north and include a turnaround facility.

1.8 These different permutations informed the development of various scenarios set out below; some were identified which would perform better with particular NKDA arrangements. Ultimately however a decision was taken that the preferred NKDA option was option A, as illustrated below. The preferred NKDA option also includes a left-hand turn from Sopwith Way to Richmond Road. This is assumed to apply in all of the scenarios below, however it should be noted that different NKDA circulation arrangements (e.g. southbound or two-way working on Seven Kings Way) may help the overall KTC network perform better in some scenarios.



Key Assumptions

1.9 Existing traffic flows are maintained, irrespective of any change associated with mH and the North Kingston Development Area proposals, and/or background changes between 2014 and 2031.

1.10 Any latent demand that may be suppressed by the existing network has also been excluded (i.e. RB Kingston indicated that when the right-turn from Richmond Road was available to allow traffic to turn into Wood Street and past the station, this movement was made by 700 vehicles per hour (approx.). This level of traffic is not currently making the movement since the facility was removed to improve safety.).

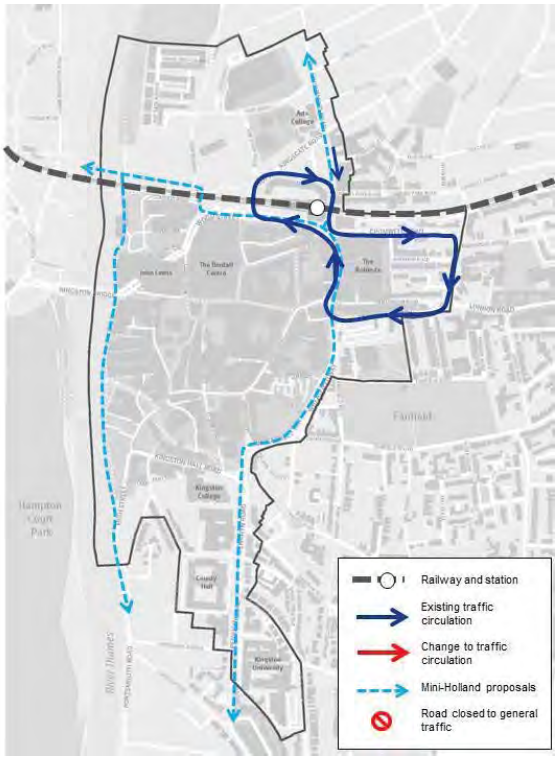
1.11 Carriageway widening at the expense of existing footway space has been restricted unless it is deemed strictly necessary to make a scenario 'workable'. Locations where this is necessary have been explicitly identified.

Scenario 1

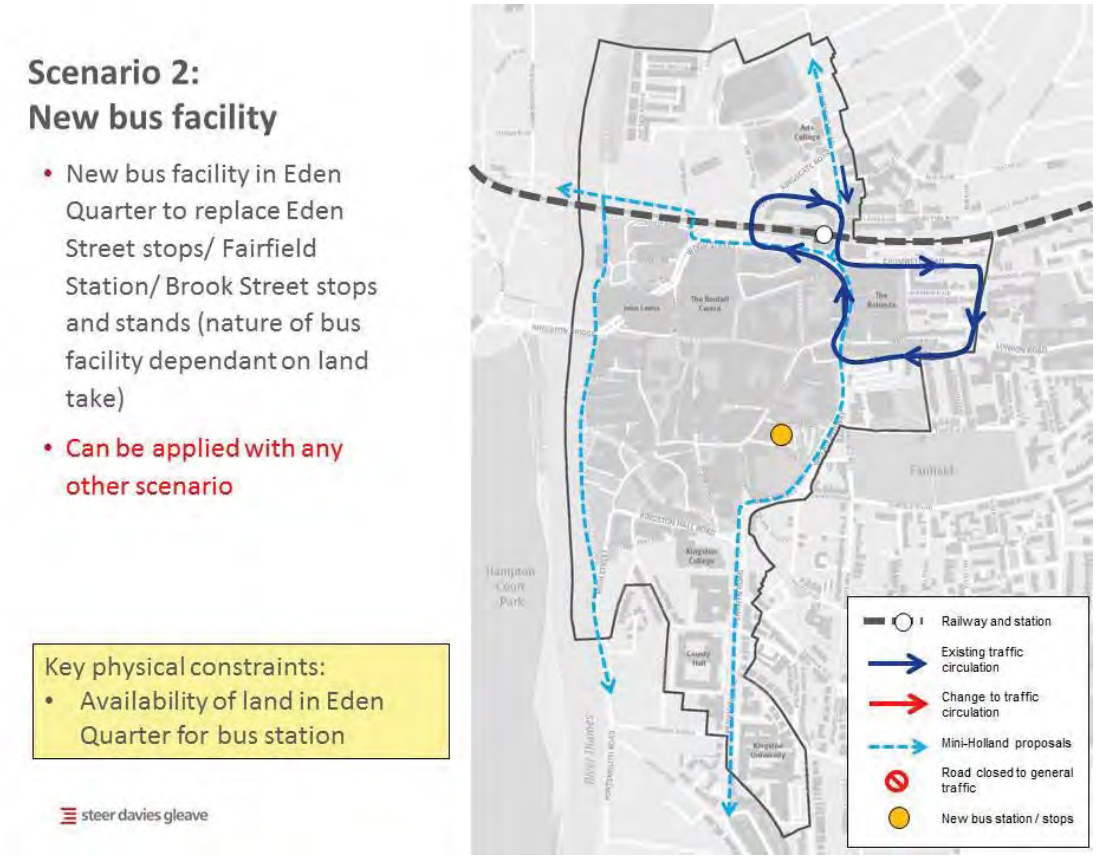
Scenario 1: Mini-Hollands & strategic enhancements

- Pedestrian and public realm enhancements as per vision diagram
- No change to traffic circulation
- Expansion of motor-vehicle restricted area (e.g. through restricted access hours, or design as pedestrian priority/ shared space)
- Mini-Holland proposals
- Eden Street bus stop environment improved

steer davies gleave



Scenario 2



'Eden Street' Bus Station

1.12 Changes and impacts are as per Scenario 1 but with the addition of a new bus station that would occupy part of the site between Lady Booth Road and Ashdown Road (for example). Ideally this would lead to all (or possibly the majority) of routes being re-routed from Eden Street (between Clarence Street and Brook Street) to use a parallel north-south route along Wheatfield Way. Based on analysis undertaken by London Buses, the approximate footprint for the new bus station would take most of the block between Lady Booth Road and Ashdown Road.

1.13 There are clearly numerous routing variations available but the assumption made below are intuitively workable and would minimise the need to significantly change services.

1.14 For buses from the south, access into the bus station is likely to be made by turning left turn into Ashdown Road while buses exiting the bus station would re-join Wheatfield Way from Lady Booth Road (or possibly Ashdown Road depending on the bus station configuration).

1.15 For buses from the north, access could be made using the existing right-turn facility to turn into Ashdown Road, while buses exiting the bus station would resume their existing routes via the Brook Street / Eden Street roundabout.

1.16 The addition of buses to Wheatfield Way (from Eden Street) may change how traffic moves through the various junctions on this link however as the network flows will be similar to the

existing scenario it should be possible to broadly re-balance movements without leading to a significant negative impact.

1.17 Additional sub-options that may be considered include: If necessary the Ashdown Road / Wheatfield Way junction may need to be signalised to enable buses to turn right into Ashdown Road; however it should be possible to minimise the impact of turning buses by close coordinating the operation of this new set of signals with the Orchard Road / Wheatfield Way junction.

1.18 The larger block bounded by Ashdown Street, Wheatfield Way and Brook Street could be used for a similar purpose and use a similar arrangement to allow access to/from the bus station.

1.19 **'Wheatfield Way' Bus Station** - If the development site is not able to accommodate a new bus station for whatever reason, then it may be possible to provide a 'Boulevard' facility that allows buses to stop on either side of Wheatfield Way. This has not been explored in detail but would seem feasible. The main issue for such a scheme would be probably poor the visibility of the interchange and distance from the core of the town centre. There may also be some impact on traffic using Wheatfield Way when compared with the existing layout.

1.20 **mini-Hollands –** An Eden Street bus station is unlikely to need any specific changes when considering the mH proposals, however a bus facility on Wheatfield Way may be more difficult to marry together.

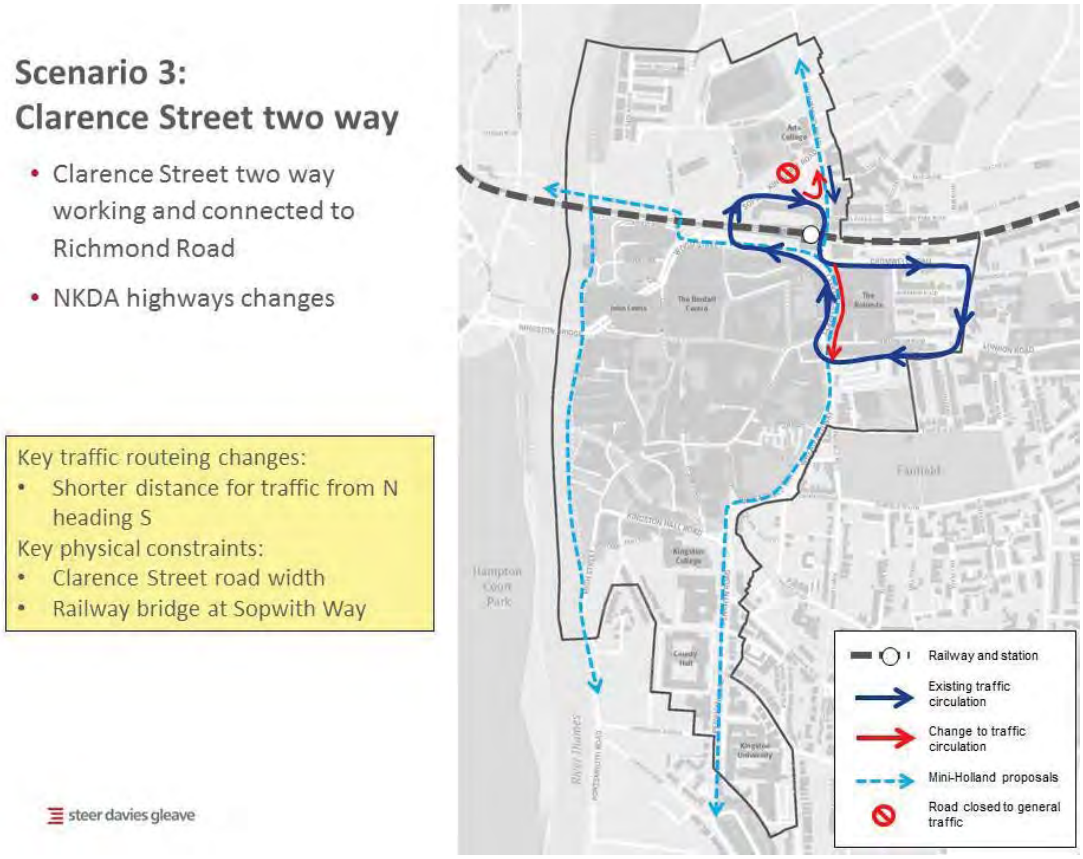
Pros

- Should address collision / safety issues currently experienced in Eden Street
- Opportunity to provide high quality facility with improved bus-to-bus interchange as all services will be located in one place
- Arguably neutral impact of congestion through network
- Unaffected by potential changes in NKDA

Cons

- Interchange with town centre reduced as stops will be located further from the core centre
- The inclusion of a sufficiently large bus station would make redevelopment of this site less attractive

Scenario 3



1.21 Scenario 3 focusses on introducing a north-south connection between Richmond Road and Wheatfield Way; this will require the conversion of Clarence Street to two-way operation.

1.22 The section of Wheatfield Way between Fairfield North and Clarence Street is currently laid out with 3 northbound lanes, but to accommodate the two-way cycle link (mH proposals) and provide one lane southbound, it would be necessary to **widen the carriageway** in this section; this could probably be achieved without significant impact on the existing effective footway width by slightly realigning Wheatfield Way and by removing the existing raised planter on the eastern side of Wheatfield Way (shown inset above).

1.23 The final layout of this section would need to be determined using design and modelling iterations but Scenario 3 could be laid out to provide 2 lanes northbound, one lane southbound and segregated cycle lanes in each direction (the existing off-side bus lane may need to be removed to maintain capacity through this link).

1.24 Although there is a large area of carriageway space to manage the different traffic and pedestrians at the intersections at either end of this revised section, there are likely to be increases in delay due to corresponding increases in junction complexity and possibly the number of stages of traffic signal operation when compared with the existing scenario. Assuming overall flows remain fairly constant across the network then for this scenario there will also be more traffic entering the link as traffic from the southbound is introduced while northbound traffic cannot be re-routed.

1.25 In **NKDA** options which allow traffic to take a shorter north to west route (e.g. by making Seven Kings Way two-way or reversing the one-way flow) will work better with Scenario 3. This is due to the reduction in circulatory traffic that currently has to use the gyratory to make this movement including the affected section of Clarence Street under Scenario 3.

1.26 '**Eden Street Bus Station'**: As the Scenario 3 proposals would impact on the operation of the Clarence Street / Wheatfield Way junction then the proposed re-routing of bus services to use a new bus station would have some interaction. However the feasibility and results of these scenarios are probably independent of each other and if they are workable then the bus station could be included / excluded as necessary.

1.27 **mini-Hollands** – It may be necessary to modify the mH proposals to ensure the alignment of the segregated facilities through Clarence Street are feasible but this should be achievable. Likewise, accommodating the station forecourt improvements may also be impacted by the need to allow more traffic to use this area.

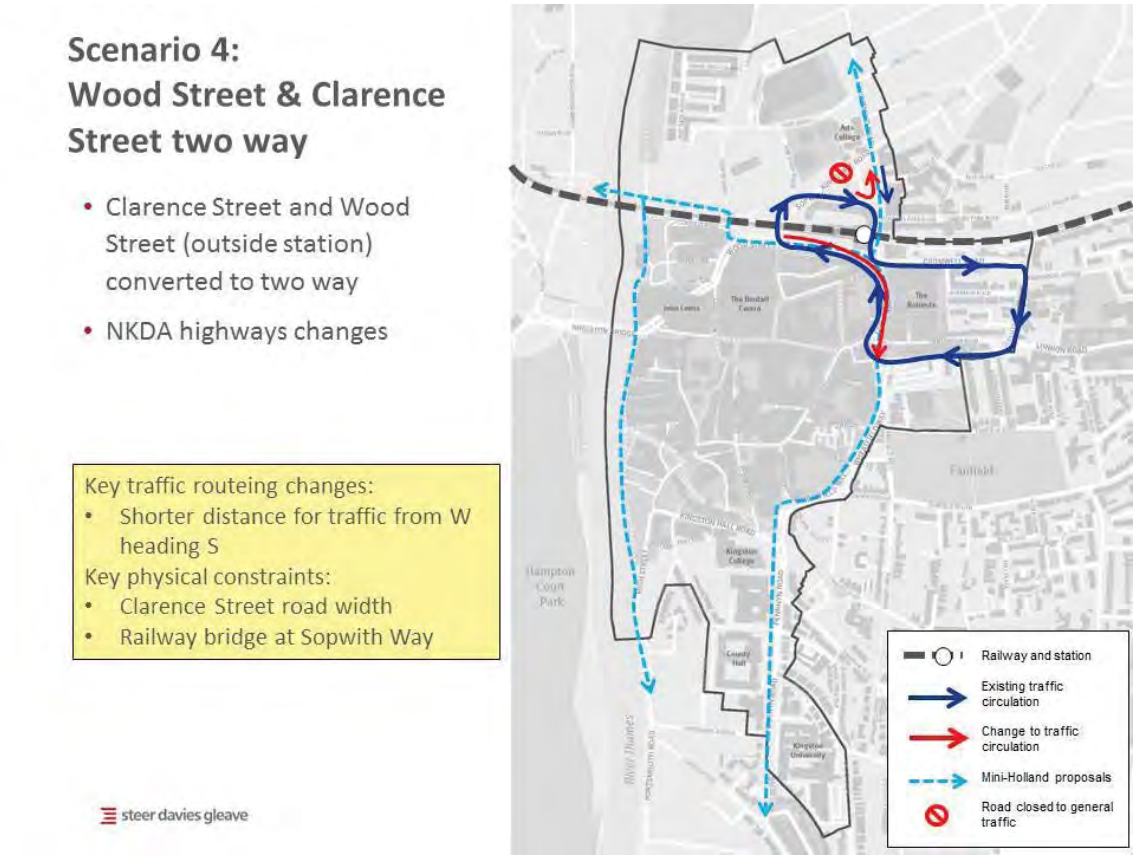
Pros

- More direct southbound movement with reduced route length from Richmond Road to Wheatfield Way. This is estimated to benefit approximately 500 vehicles in each peak period.

Cons

- Increased junction complexity at Richmond Road / Wood Street.
- Reduced northbound capacity from Wheatfield Way with no alternative routing available for this heavy movement.

Scenario 4



1.28 Scenario 4 would see a variation which would allow traffic from the western side of town to pass in front of the station and then continue south on Clarence Street before heading south on Wheatfield Way. It differs from Scenario 3 at the Richmond Road junction as it does not permit southbound traffic to access Clarence Street at this point.

1.29 Based on the modelled flows, the amount of traffic currently making this movement is relatively low but it would again be necessary to widen the carriageway in Clarence Street; this could be achieved as described under Scenario 3.

1.30 As with Scenario 3, **NKDA** options which allow traffic to use a new, shorter north to west route will work better with Scenario 3 than those that do not. This is due to the reduction in circulatory traffic that currently has to use the gyratory to make this movement.

1.31 **'Eden Street Bus Station'**: The feasibility and results of these scenarios are probably independent of each other and if they are workable then the bus station could be included / excluded as necessary.

1.32 **mini-Hollands** – It may be necessary to modify the mH proposals to ensure the alignment of the segregated facilities through Clarence Street are feasible but this should be achievable. It would also be more difficult to accommodate the improve station forecourt with additional traffic using Wood Street.

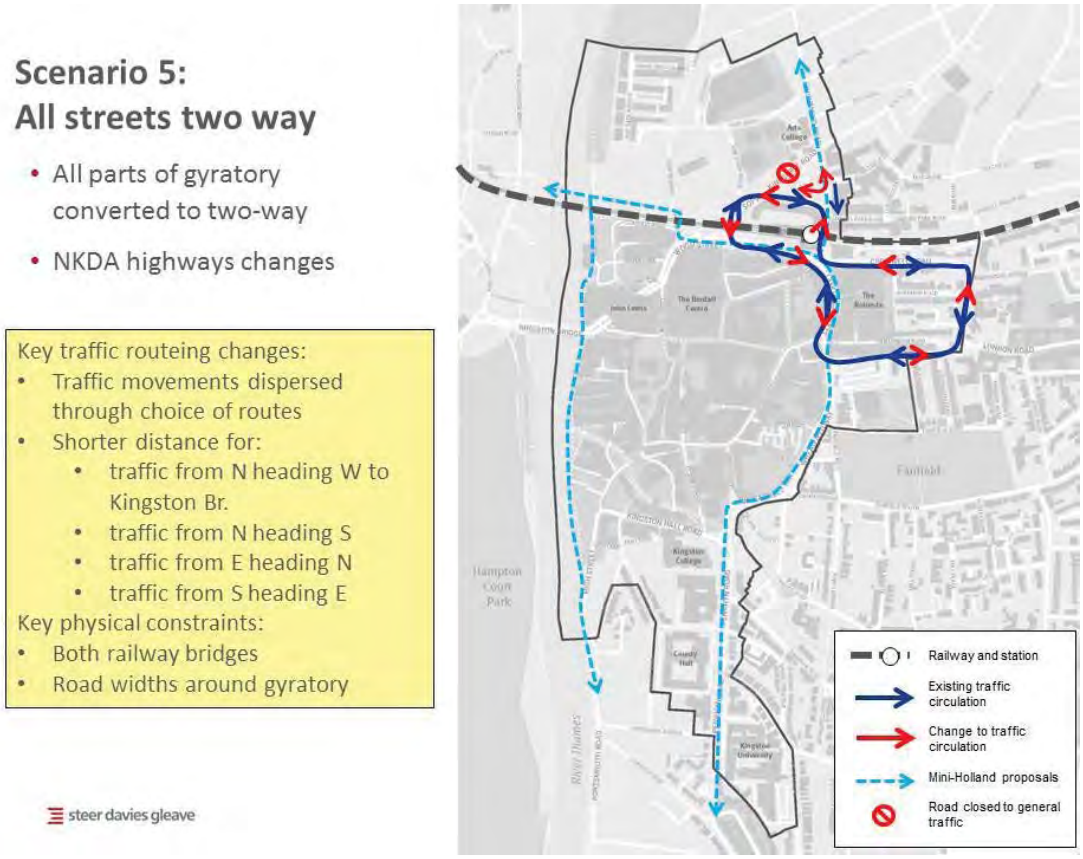
Pros

- More direct west to south movement with reduced route length past the station towards Wheatfield Way.

Cons

- Number of vehicles benefitting from reduced route length is low (estimated at approximately 130 vehicles) and is unlikely to outweigh total disbenefits to other traffic
- Increased junction complexity and delay at Sopwith Way / Wood Street.
- Reduced northbound capacity from Wheatfield Way with no alternative routing available for this movement

Scenario 5



1.33 Scenario 5 would see the gyratory converted to allow two-way flows on Sopwith Way, Richmond Road, Cromwell Road, Queen Elizabeth Road, Fairfield North, Clarence Street and Wood Street. This option does not include a link through the centre at Wood Street / Cromwell Road (other than potentially retaining the existing bus facility at this point).

1.34 Conversion to two-working will unlock more intuitive and direct routing for most traffic movements. However, without providing a link between Richmond Road / Clarence Street (which is very unlikely to be feasible), north-south traffic must still use the circuitous existing routes.

1.35 Traffic speeds are likely to be reduced and in turn the perception of severance would be reduced.

1.36 The exact make up of traffic management techniques would need to be considered but these could include the use of signalised, priority-controlled intersections (such as roundabouts where space permits) or even shared space. The feasibility and benefits of each would need to be explored on a site-by-site basis but a general principle traffic signals would enable the use of controlled pedestrian at intersections at the potential expense of traffic while less formal methods of control would smooth traffic flows.

1.37 Signalised junctions will be more complex throughout and may lead to increased congestion (TfL anecdotally expect traffic levels to reduce by 20% to make similar schemes work). Two-

way traffic schemes may lead to a reduction of the quality of pedestrian crossing facilities as a result of the need to accommodate a greater range of swept paths and traffic movements

1.38 **NKDA** – In terms of traffic flow, retaining a more simplistic network such as a one-way system would probably work 'better' (while retaining the previously described ranking) as the junctions would be less complex. However the most legible network would allow two-way flows

1.39 '**Eden Street Bus Station'**: The feasibility and results of these scenarios are again probably independent of each other and if they are workable then the bus station could be included / excluded as necessary.

1.40 **mini-Hollands** – The mH proposals would be more difficult to introduce alongside two-way operation as the narrow carriageway in places would have a greater impact on the width available for segregated facilities.

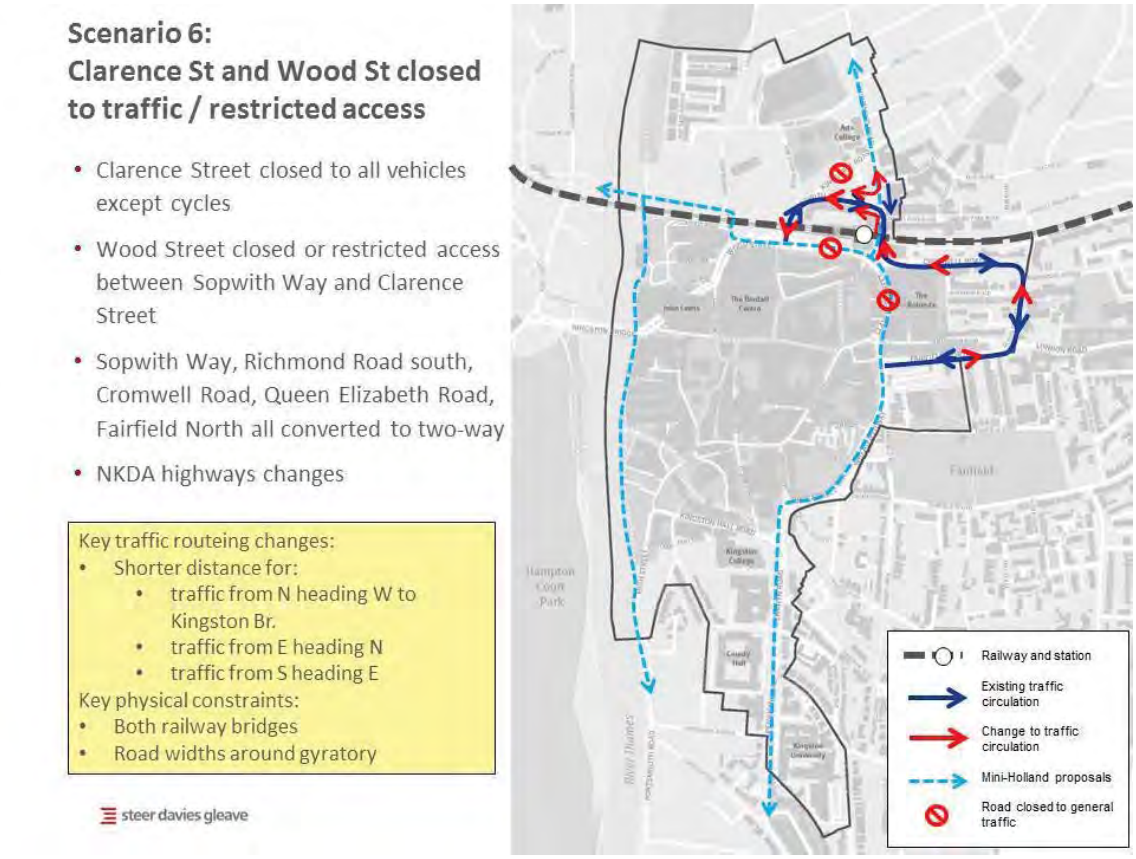
Pros

- More intuitive and direct routing for most movements
- Likely reduction in traffic speeds and perception of severance

Cons

- Signalised junctions will be more complex throughout and may lead to increased traffic congestion
- Two-way traffic schemes may lead to a reduction of the quality of pedestrian crossing facilities
- Carriageway width is restricted along links such as Queen Elizabeth Road, without carriageway widening there may be congestion around network pinch points

Scenario 6



1.41 Scenario 6 is similar to Scenario 5 but with Clarence Street closed to all traffic except cycles. Sopwith Way, Richmond Road, Cromwell Road, Queen Elizabeth Road, Fairfield North and Wood Street all become two-way as shown.

1.42 The key benefit for Scenario 6 is the change in spatial use for Clarence Street, however from a traffic operation perspective it will be worse than Scenario 5 as routings will at best be the same as existing but in many cases worse. Traffic speeds and the associated perception of severance are likely to reduce.

1.43 Again a range of traffic management techniques could be used as previously described and each would have their pros and cons.

1.44 **NKDA** – As per Scenario 5.

1.45 '**Eden Street Bus Station'**: The feasibility and results of these scenarios are again probably independent of each other and if they are workable then the bus station could be included / excluded as necessary.

1.46 **mini-Hollands** – The feasibility of the mH proposals would vary by link, closing Wood Street and Clarence Street would allow for the introduction of high quality facilities from the south but links from other directions would likely be more problematic.

Pros

- Ability to introduce high quality pedestrian and cycling facilities in the Wood Street / Clarence Street area.
- Likely reduction in traffic speeds and perception of severance

Cons

- Increased traffic congestion
- Potential reduction in quality of pedestrian and cycling facilities where traffic is retained
- Carriageway width is restricted along links such as Queen Elizabeth Road, without carriageway widening there will be congestion around network pinch points
- Increased journey lengths for traffic coming from the south and travelling around the gyratory.

Scenario 7

Scenario 7:
Right hand turn at station

- Right hand turn from Richmond Road to Wood Street introduced outside station

Key traffic routeing changes:
- Shorter distance for traffic from N heading W to Kingston Br.

Key physical constraints:
- Railway bridge at Richmond Road

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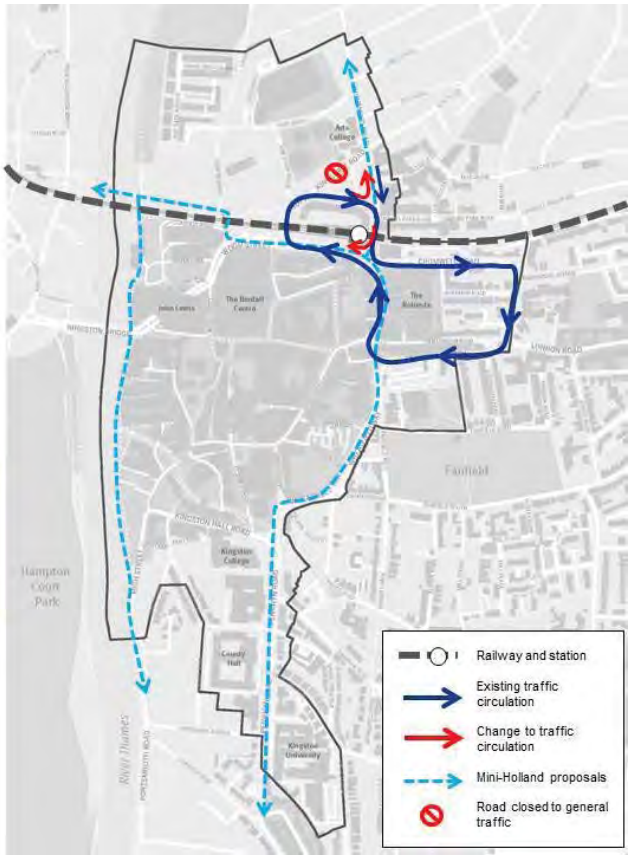


1.47 Scenario 7 would see the existing network retained but with the introduction of a right-turn from Richmond Road into Wood Street. From a design perspective this is clearly feasible as it could be introduced in a similar fashion to the layout that was previously removed. However, information supplied by RB Kingston suggest that heavy pedestrian flows, the necessary reduction in footway space immediately outside the station and an increase number of movements required to cross the road would be very difficult, if not impossible, to design out. Therefore similar safety issues may be expected if such a scheme were re-introduced.

1.48 An increase in rat-running traffic could also be expected to return to levels experienced before the old scheme's removal. High volumes of traffic are likely to lead to queues of traffic that may also lock up the one-way system around the station; this was again a feature of the area when the right-turn was previously in operation.

1.49 **NKDA** Assuming that the right-turn would not attract further traffic still, the inclusion of this movement the NKDA area (e.g. via Sury Basin and Seven Kings Way) via would reduce the amount of traffic needing to use the right-turn and therefore may make the option slightly more attractive.

1.50 '**Eden Street Bus Station'**: The bus station and right-turn facility are likely to be independent of each other.

1.51 **mini-Hollands** – The mH proposals, and particularly the station forecourt proposals, would need to be significantly modified to enable the introduction of segregated facilities.

Pros

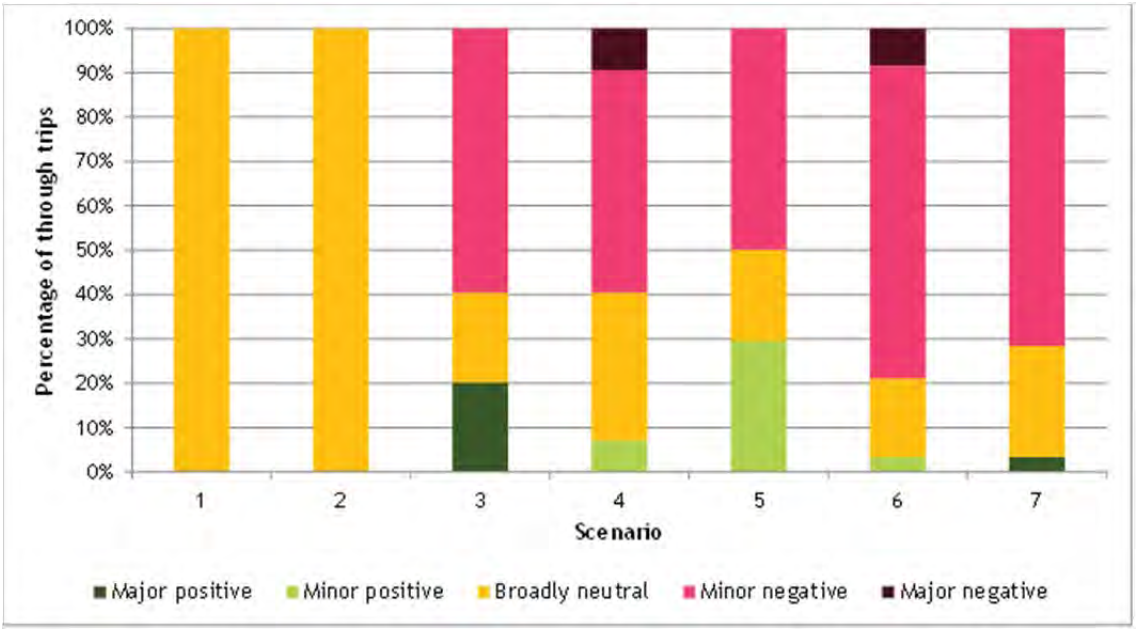
- More direct route for traffic moving from north to west

Cons

- Likely to attract additional 'rat-running' traffic onto the network from Northwest wishing to cross Kingston Bridge
- Additional delay at Richmond Road / Wood Street / Clarence Street junction due to increase in junction complexity
- Concerns over safety based on previous layout
- Difficult to marry with mH Proposals

Scenarios Summary

1.52 Each of the scenarios has a range of impacts on different links and intersections included within the network. In addition we have conducted an initial desktop assessment of the likely impacts on traffic. This was done on a qualitative basis, in line with the assumptions outlined at the beginning of this note. For each scenario, we have estimated the proportion of traffic that will be affected positively, negatively or at a broadly neutral level. The results of this assessment would need to be refined following further design work and modelling, but give a useful indication of the relative performance of each scenario in traffic terms. These results are shown in the graph below.



1.53 Based on our analysis, the following list ranks the proposals in approximate order in terms of the likely increase in congestion if the proposals were to be introduced (assuming traffic flows are similar or unless as described above).

- **Scenario 1** - Limited impact on the network (selection of 1Av1 or 1Bv1 to be determined in conjunction with developers and/or public consultation).
- ***Scenario 2*** *– Limited impact on the network, can be considered as relatively independent of changes to traffic network associated with other Scenarios.*
- **Scenario 3** – Benefits for southbound traffic, some negatives for other users.
- **Scenario 5** – Potential benefits for most users if congestion can be managed (assumes 20% reduction in network flows, mainly from the removal of non-local, through traffic).
- **Scenario 7** – Benefits for north to west movements but with concerns over safety and increase in traffic volumes attracted to the network (and potentially surrounding local streets to the northwest).
- **Scenario 4** – Only provides benefits for a limited number of users when compared with disbenefits to other users.
- **Scenario 6** – Significant dis-benefits for most users with only limited gains. Reduction in flows required to make this option feasible are likely to be difficult to achieve.

Recommendation

1.54 It is recommended that Scenarios 1, 3 & 5 are taken forward for further analysis.

1.55 Scenario 2 may need to be re-considered if a developer is willing to include a large enough bus station within their proposals.

Highways review: scenario 8

1.56 Following on from the review of the seven highways scenarios and in consultation with RBK officers a further scenario was developed. This is discussed below.

Scenario 8

Scenario 8: Wood Street closed and Sopwith Way two way

- Wood Street closed to all vehicles except cycles
- Sopwith Way and Richmond Road south converted to two-way
- NKDA highways changes

Key traffic routeing changes:
- Shorter distance for:
  - traffic from N heading W to Kingston Br.
  - traffic from E heading N
  - traffic from S heading N

Key physical constraints:
- Both railway bridges

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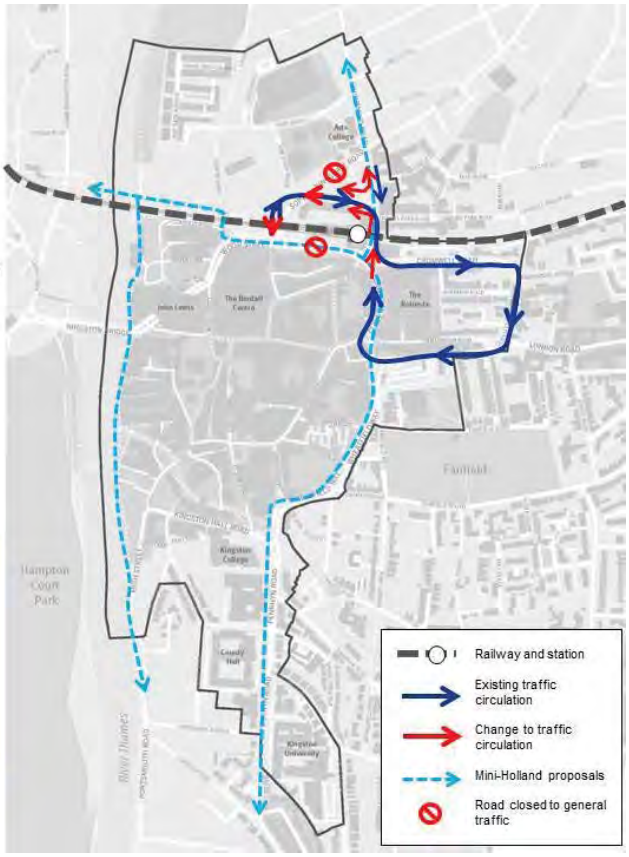

1.57 Scenario 8 is based on the closure of Wood Street to traffic outside the station. All traffic coming from the south and east would re-route from Clarence Street and continue north through a revised Cromwell Road / Clarence Street junction before passing beneath the rail bridge and heading north on Richmond Road or west behind the station.

1.58 The key benefit will be an improvement arrival experience when leaving the rail station and from a Feasibility perspective this arrangement shares a number of similarities with Scenario 6. From a traffic operation perspective it will be similar in terms of routing and any impacts will be largely associated with changes to the operation and complexity of how westbound movements from Sopwith Way are fed back into Wood (west of the station).

1.59 **NKDA** – Assumed as per Scenario 5.

1.60 '**Eden Street Bus Station'**: The feasibility and results of this scenario are independent of any changes to bus routes associated with proposals for an '**Eden Street Bus Station' which could** be included / excluded as necessary.

1.61 **mini-Hollands** – Closing Wood Street and Clarence Street would allow for the introduction of high quality facilities, maintaining the gyratory is also likely to make the introduction of the other mH proposals easier as there will be less competition for space from opposing general traffic movements.

Pros

- Ability to introduce high quality pedestrian and cycling facilities outside the station.
- More direct route for traffic moving from south to north
- Some likely reduction in traffic speeds and perception of severance
- Relatively easy to marry with mH Proposals

Cons

- Additional delay at Richmond Road / Wood Street / Clarence Street junction due to increase in junction complexity
- Small increase in journey lengths for traffic coming from the south and travelling around the gyratory.

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Kingston Town Centre Movement Strategy

Scenarios modelling report
August 2014

Royal Borough of Kingston upon Thames

Our ref: 22653101

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Prepared by:

Steer Davies Gleave
28-32 Upper Ground
London SE1 9PD

+44 (0)20 7910 5000
www.steerdaviesgleave.com

Prepared for:

Royal Borough of Kingston upon Thames
Guildhall 2
High Street
Kingston upon Thames
KT1 1EU

Contents

Figures

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Executive summary

This report describes the high-level traffic modelling undertaken to compare the three shortlisted highways scenarios under consideration as part of the Kingston Town Centre (KTC) Movement Strategy. Given the strategic nature of the study, a two tiered modelling approach has been adopted. Highway assignment modelling has been undertaken using TfL's SoLHAM model to determine traffic reassignment and trip patterns on a wider scale; whilst operational modelling has been completed using TRANSYT to examine more localised impacts.

This modelling encompasses weekday AM and PM peak hours and builds upon the baseline modelling previously completed. This included a 2031 future baseline model, against which the three scenarios have been compared. The key findings for the three scenarios are:

- **Scenario 1: Strategic enhancements** This scenario reduces the number of lanes along the Clarence Street / Wood Street section of the relief road from three lanes to two. This becomes a critical section of the network, which operates very close to its theoretical capacity and results in a moderate level of displacement of through vehicle trips in the AM peak hour (although negligible displacement occurs in the PM peak hour). Whilst the modelling predicts that this scenario will operate within its theoretical capacity, the reduction in the number of traffic lanes will have a negative impact on network resilience.
- **Scenario 3: Clarence Street two way** In order to allow a direct southbound movement, the section of Clarence Street between Cromwell Road and Fairfield North becomes two-way. This adds complexity to various junctions along this new two-way section, which then operate at or over capacity. This results in some through trips in both peak periods being displaced. In contrast, the revised North Kingston layout associated with this scenario operates satisfactorily. Overall, whilst the modelling indicates that there are localised issues with junction capacity, there is the potential for this scenario to function satisfactorily if further design and development work was undertaken to refine junction layouts.
- **Scenario 8: Wood Street closed, Sopwith Way two way** This scenario has the most significant impact on road network capacity, as it involves the closure of Wood Street in front of the station causing a significant increase in traffic north of the station. The Sopwith Way Corridor becomes critical, particularly at its junction with Richmond Road. There is a high level of through trip displacement in both the AM and PM peak hours due to reduced junction capacity, which may impact alternative routes. Whilst the current design of this scenario results in various operational issues, it may be possible to resolve these in the longer term, both through further design work and significant mode shift.

In short, the modelling results reflect the nature of the shortlisted scenarios, which reduce the capacity of the road system in the town centre (to differing degrees) in order to achieve the wider vision for KTC. The built-up nature of the town centre limits available space for transport infrastructure, which means that trade-offs need to be made between competing objectives and modes. This reduction in capacity may displace vehicle trips away from KTC. Due to the nature of the traffic models, the results suggest that only through trips would be affected, but in practice the demand for vehicle trips to the town centre would also be supressed.

The results obtained provide insights into the relative performance of each scenario, and also highlight issues that will need to be focussed on as part of further modelling, design and development work. It is clear that in traffic terms, some of the shortlisted scenarios will be more challenging to implement than others. This therefore suggests that a phased approach may be sensible, with different scenarios suited to different implementation timeframes. Interfaces with the bus options being considered will also need to be taken into account.

1 Introduction

1.1 Steer Davies Gleave (SDG) has previously completed both 2009 base year and 2031 future baseline traffic models for the Kingston town centre (KTC), as part of our wider work on the Kingston Town Centre Movement Strategy. This baseline modelling, along with the overall modelling methodology being employed on this study, is outlined in the *Baseline modelling report*.

1.2 Following on from this, modelling has been undertaken to test three highways scenarios for the town centre that have been shortlisted:

- Scenario 1: Strategic enhancements
- Scenario 3: Clarence Street two way
- Scenario 8: Wood Street closed, Sopwith Way two way

1.3 This report describes the scenarios modelling that has been undertaken, and supplements the key findings that are reported on in the main *Kingston Town Centre Movement Strategy* document. Following this introduction, the report consists of the following chapters:

- Chapter 2: Scenarios and methodology
- Chapter 3: Highway assignment assessment
- Chapter 4: Operational modelling assessment
- Chapter 5: Conclusions

1.4 As detailed further in Chapter 2, the traffic modelling described in this report has been undertaken at a level commensurate with the strategic nature of this study. As such, the results presented are not necessarily suitable for detailed traffic analysis, but rather are intended to provide an indicative insight into the relative performance of each scenario, along with the critical issues associated with each. This means more detailed traffic modelling would be necessary should any of the scenarios described here be taken forward.

2 Scenarios and methodology

Scenarios to be tested

2.1 Following consideration of a wide range of options, three shortlisted scenarios were identified for further testing. These are summarised below, and full details may be found in the main *Kingston Town Centre Movement Strategy* document.

Scenario 1: Strategic enhancements

2.2 A diagram showing Scenario 1 is included in Figure 2.1 below. The following are the key features:

- Retention of the existing gyratory
- Implementation of mini-Holland Wheatfield Way and Station Plaza proposals

2.3 The main impact that this scenario will have on the operation of the highway network is to reduce the number of lanes along the Clarence Street / Wood Street section of the relief road (between Fairfield North and where Wood Street diverges into two) from three lanes to two. As such, this becomes a critical section of the network. In addition, there are some associated upstream reductions in the number of lanes on Fairfield North and Wheatfield Way approaches to this section, also from three lanes to two.

Scenario 3: Clarence Street two way

2.4 Scenario 3 is shown in Figure 2.2 below, and includes the following key features:

- Clarence Street opened up to southbound traffic from Richmond Road
- Implementation of mini-Holland Wheatfield Way and Station Plaza proposals
- Closure of Kingsgate Road (as per North Kingston Development Brief proposal)
- New left turn from Sopwith Way into Richmond Road (as per North Kingston Development Brief proposal)

2.5 In North Kingston, this scenario essentially diverts northbound traffic heading towards Richmond Road (A307) onto Seven Kings Way and Sury Basin. The new left turn from Sopwith Way onto Richmond Road (A307) is provided mainly to provide a backup to the Seven Kings Way / Sury Basin route.

2.6 The other main impact of this scenario, is to provide a more direct route for southbound traffic coming from either Kingston Bridge (A308) or Richmond Road (A307), via the new southbound section of Clarence Street. However, this new two-way section of road has the disadvantage of increasing the complexity of the signalised junctions along it.

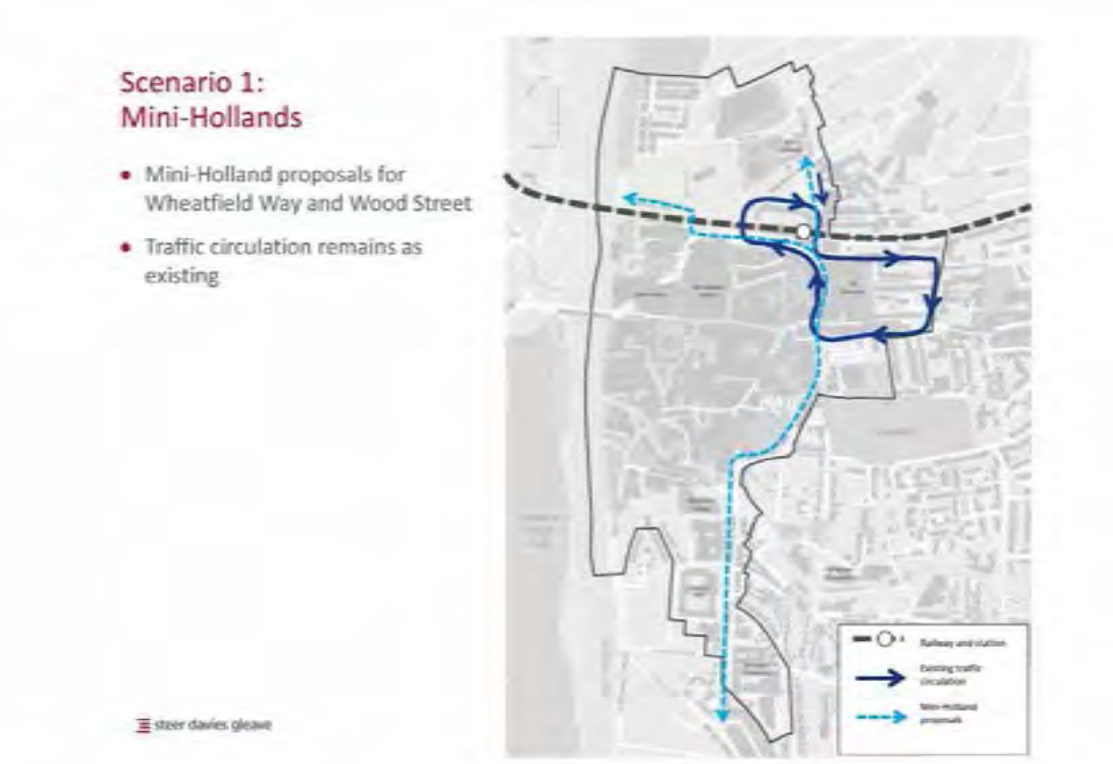
Scenario 8: Wood Street closed, Sopwith Way two way

2.7 This scenario is shown in Figure 2.3 below, and its key features are as follows:

- Wood Street closed to traffic between junction with Sopwith Way and Clarence Street
- Northbound traffic on Clarence Street connects to Richmond Road
- Sopwith Way made two-way working
- Closure of Kingsgate Road (as per North Kingston Development Brief proposal)
- New left hand turn from Sopwith Way into Richmond Road (as per North Kingston Development Brief proposal)
- New left-hand turn introduced from Richmond Road into Sopwith Way

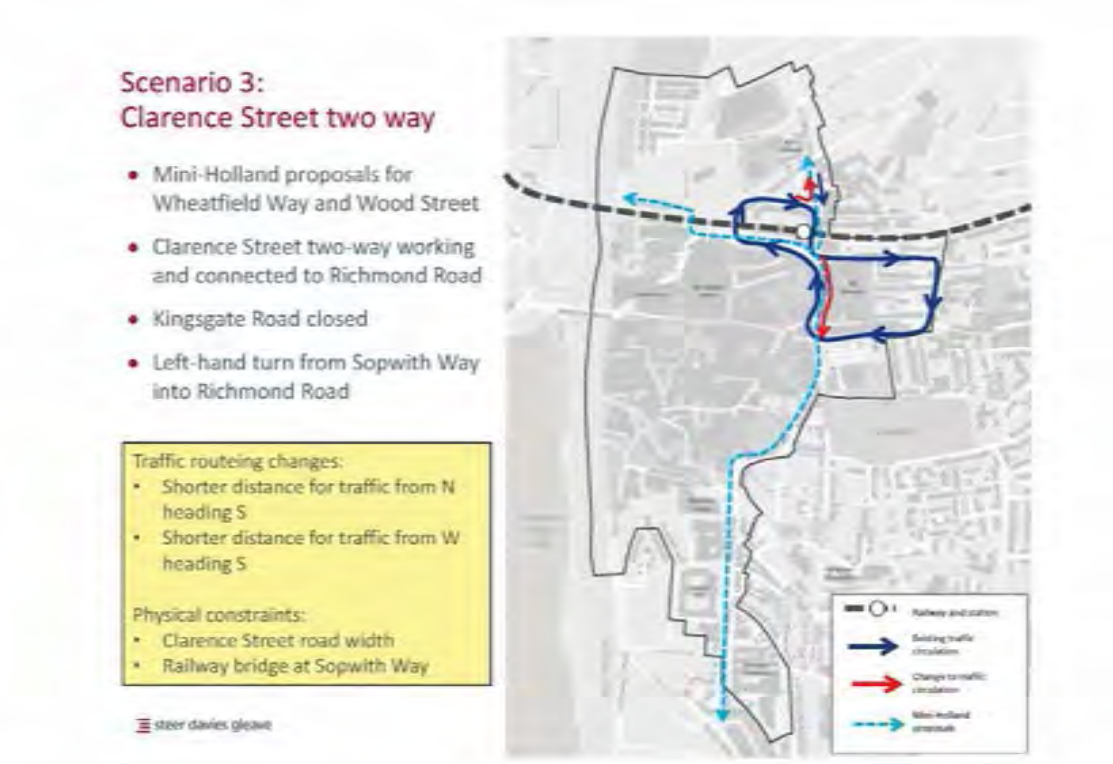
2.8 This scenario has the greatest effect on the road network out of the three considered. The closure of Wood Street means that all of this traffic is diverted north of the railway line. This significantly increases the amount of traffic passing under the railway line at the two underpasses at either end of the station, as well as along Sopwith Way. In particular, the number of conflicting movements at the Sopwith Way / Richmond Road junction increases its complexity.

Figure 2.1 Scenario 1 diagram



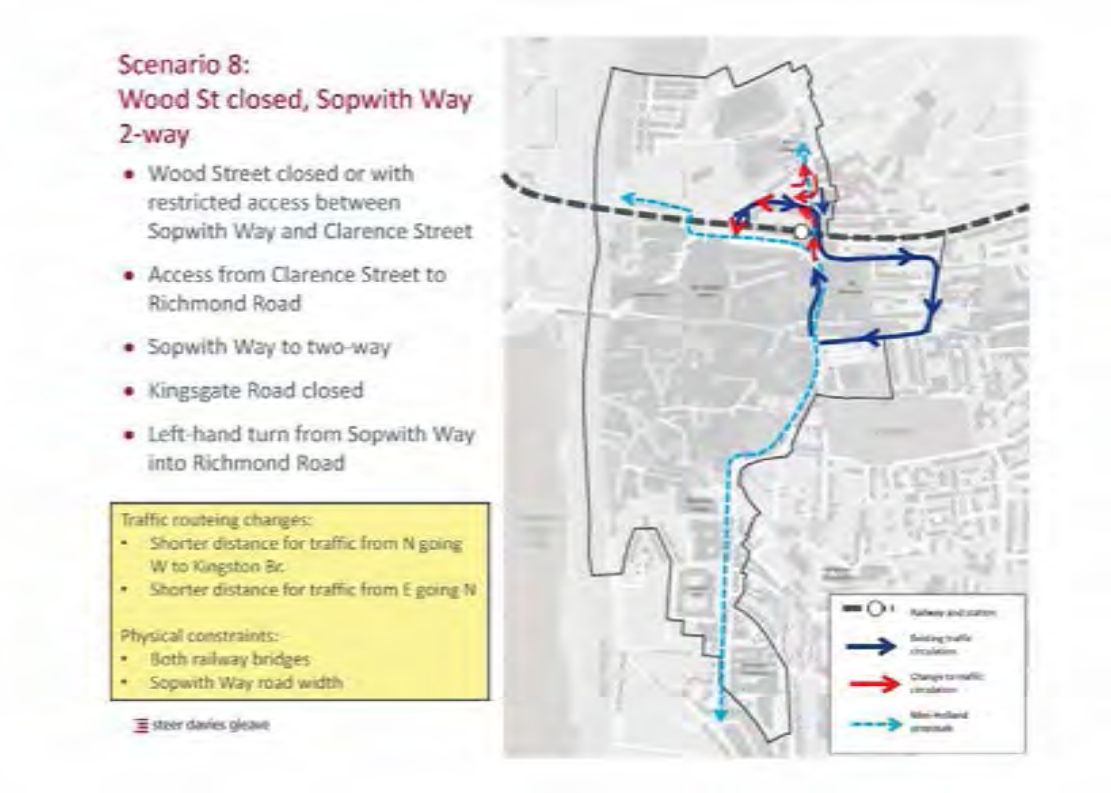
Note: diagram to be updated once updated diagram from the main strategy document is available

Figure 2.2 Scenario 3 diagram



Note: diagram to be updated once updated diagram from the main strategy document is available

Figure 2.3 Scenario 8 diagram



Note: diagram to be updated once updated diagram from the main strategy document is available

Methodology

2.9 The full traffic modelling methodology for this study is described in the *Baseline modelling report*. In summary, due to the strategic nature of the study and the scale of some of the proposed changes to the road network a two tiered modelling approach has been adopted:

- **Highway assignment modelling** This uses TfL's SoLHAM model (which uses the SATURN software package) to determine wider area traffic reassignment and trip patterns in and around the Town Centre.
- **Operational modelling** This uses TRANSYT to determine at the junction level impacts of proposed changes to the road network.

2.10 Three sets of models have been developed:

- **2009 base year** These models reflect existing conditions.
- **2031 future baseline** These models include future traffic flows for the year 2031 under the existing Kingston town centre road network layout. These form the baseline for comparison with the scenarios models.
- **2031 future scenarios** These models include future traffic flows for the year 2031, with the layout of the road network modified to reflect the three shortlisted scenarios. This report primarily discusses these models.

2.11 It should be emphasised that this modelling has been undertaken at a level commensurate with the strategic nature of the study. Whilst we have used reasonable endeavours to ensure that the 2009 base year models reflect real-world conditions, it was not within the scope of this project to carry out a full calibration and validation exercise. Further, there is always inherent uncertainty regarding predictions of future traffic levels, which must be taken into account when looking at the results of future traffic models. As such, the results presented here are not suitable for carrying out any detailed analysis of the traffic network in the town centre. More detailed traffic modelling would need to be undertaken if any of the scenarios were to be progressed further.

2.12 A summary of the steps followed to undertake the 2031 future scenarios modelling for each of the three shortlisted scenarios:

- Update the 2031 future baseline SoLHAM model to reflect the scenario under consideration
- Extract a cordon origin-destination (OD) matrix from SoLHAM for use in TRANSYT
- Update the 2031 future baseline TRANSYT model to reflect the scenario under consideration
- Input the cordon OD matrix in TRANSYT to be used for the operational modelling
- In TRANSYT, review the traffic signal operations at the junctions affected by the proposals, and update staging and phasing arrangements as necessary
- Run the TRANSYT model, allowing the program to optimise signal timings

2.13 The shortlisted scenarios will also have an impact on bus operations. At this point, there are various options for buses in the town centre that are currently being considered, and the effect that the scenarios would have on buses is clearly dependent on which bus option is taken forward. As such, for the purposes of the scenario modelling the existing operation of buses in the town centre has been retained, except where road network reconfiguration (such as road closure) necessitates the rerouting of certain bus services.

3 Highway assignment assessment

3.1 The three shortlisted scenarios were tested in the SoLHAM model to assess the wider network impacts of the proposed changes associated with these scenarios. This is of particular interest, as all of the scenarios involve changes that will have a significant impact on the road network. In general, these changes result in a reduction in the overall traffic capacity of the network in the town centre, a trade-off which has been made in order to achieve the wider vision for KTC. As such, the highway assignment modelling provides an indication of what impact this may have on traffic patterns, such as whether this reduced capacity in KTC may result in drivers choosing alternative routes that avoid Kingston.

3.2 For each of the scenarios, the 2031 future baseline model that was previously developed was used as a base, and the appropriate network and traffic signal control changes were coded in order to create three 2031 scenario models.

3.3 It should be noted that SoLHAM uses fixed OD matrices. As such, it assumes that there are a predetermined number of vehicle trips that are made between various origin and destination pairs, which are then assigned onto routes through the highway network. It does not model vehicle trips that may 'disappear' from the peak periods, due to mode shift, peak spreading (i.e. users changing the time of their trip to avoid congestion), or choice of an alternative destination.

3.4 It should be noted that the SoLHAM model includes a number of minor roads that also provide access to the town centre. For the purposes of the results presented in this chapter, these minor road flows have been added to the nearest major road.

Overall results

3.5 Before looking at the results for each scenario in more detail, this section compares the overall results that have been obtained across all three scenarios. This section includes an analysis of through trips and town centre trips, which are defined as follows:

- Through trips: these are trips that do not have an origin or destination in Kingston Town Centre, and are simply passing through. As such, both the origin and destination for these trips are in zones external to the town centre. Within the SoLHAM model these trips can be displaced onto alternative routes away from the town centre.

- Town centre trips: these are trips that have an origin or destination in the town centre. Due to the fixed OD matrix in SoLHAM, these trips cannot be displaced away from the town centre in the model.

3.6 Overall results are shown in Figure 3.1 and Figure 3.2 below.

Figure 3.1 Vehicle trips in KTC, AM peak hour

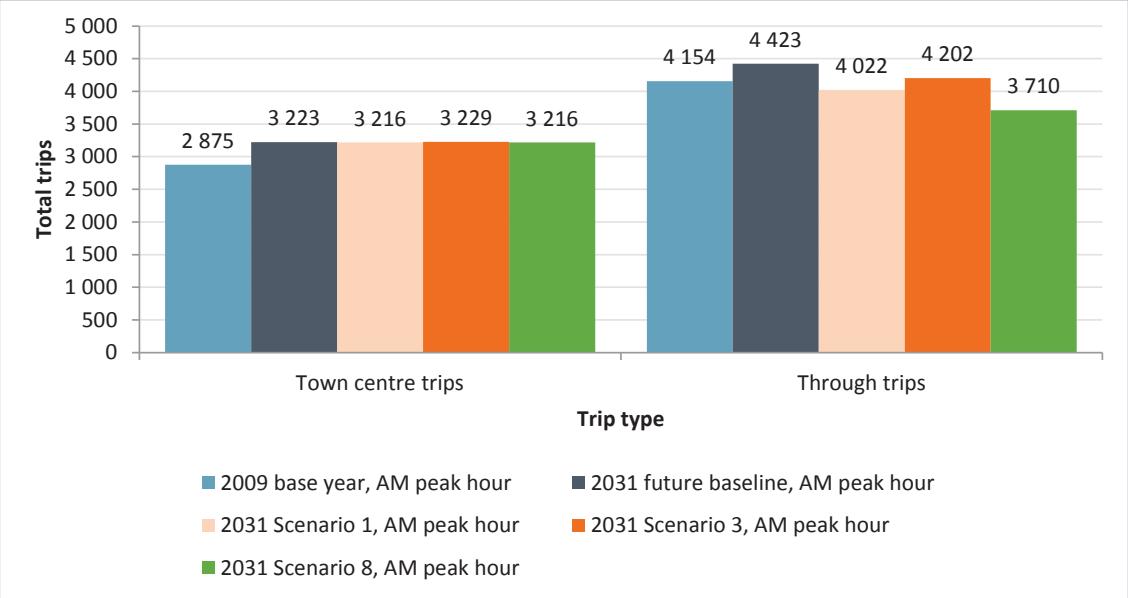
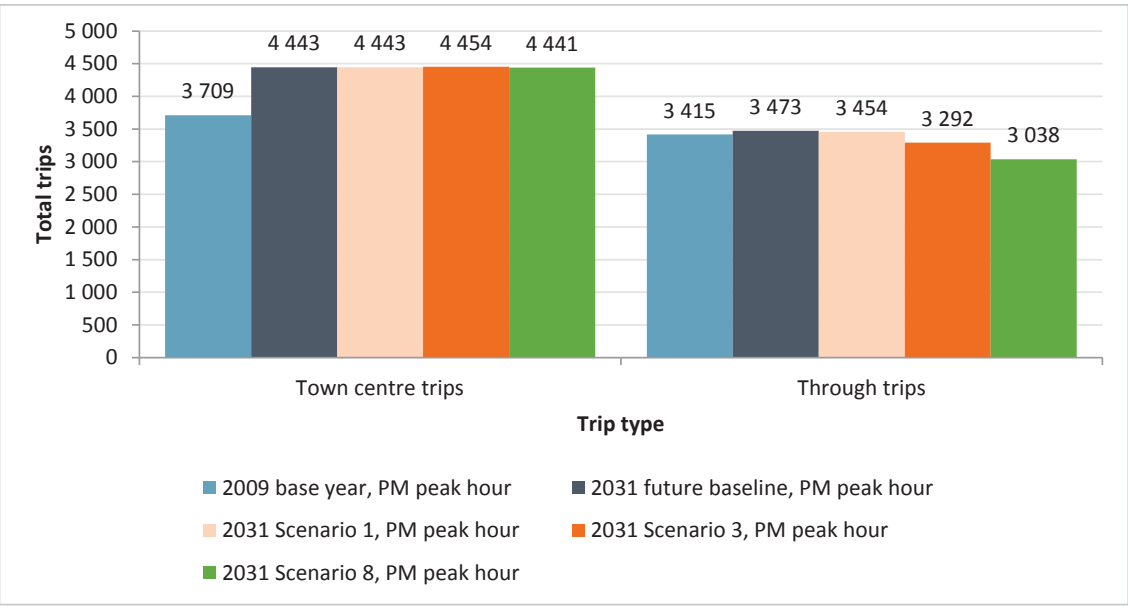


Figure 3.2 Vehicle trips in KTC, PM peak hour



3.7 As expected, given the fixed OD matrices used in SoLHAM, the number of town centre trips remains essentially unchanged between the 2031 future baseline and each scenario. This is the case for both the AM peak hour and PM peak hour.

3.8 The trips that do change are through trips, as some of these can be assigned to alternative routes that avoid KTC. The magnitude of the change for each of the scenarios gives an indication of its impact on the overall capacity of the town centre road network.

3.9 The overall results for each scenario are as follows:

- Scenario 1: In the AM peak hour, about 400 through trips are displaced, which equates to about 10% of through trips. In the PM peak hour, there is a negligible change in the number of through trips.
- Scenario 3: In both the AM and PM peak hours, the number of displaced through trips is about 200. This equates to approximately 5% of through trips.
- Scenario 8: In the AM peak, approximately 700 through trips are displaced (15%), whilst about 400 trips are displaced in the PM peak (13%).

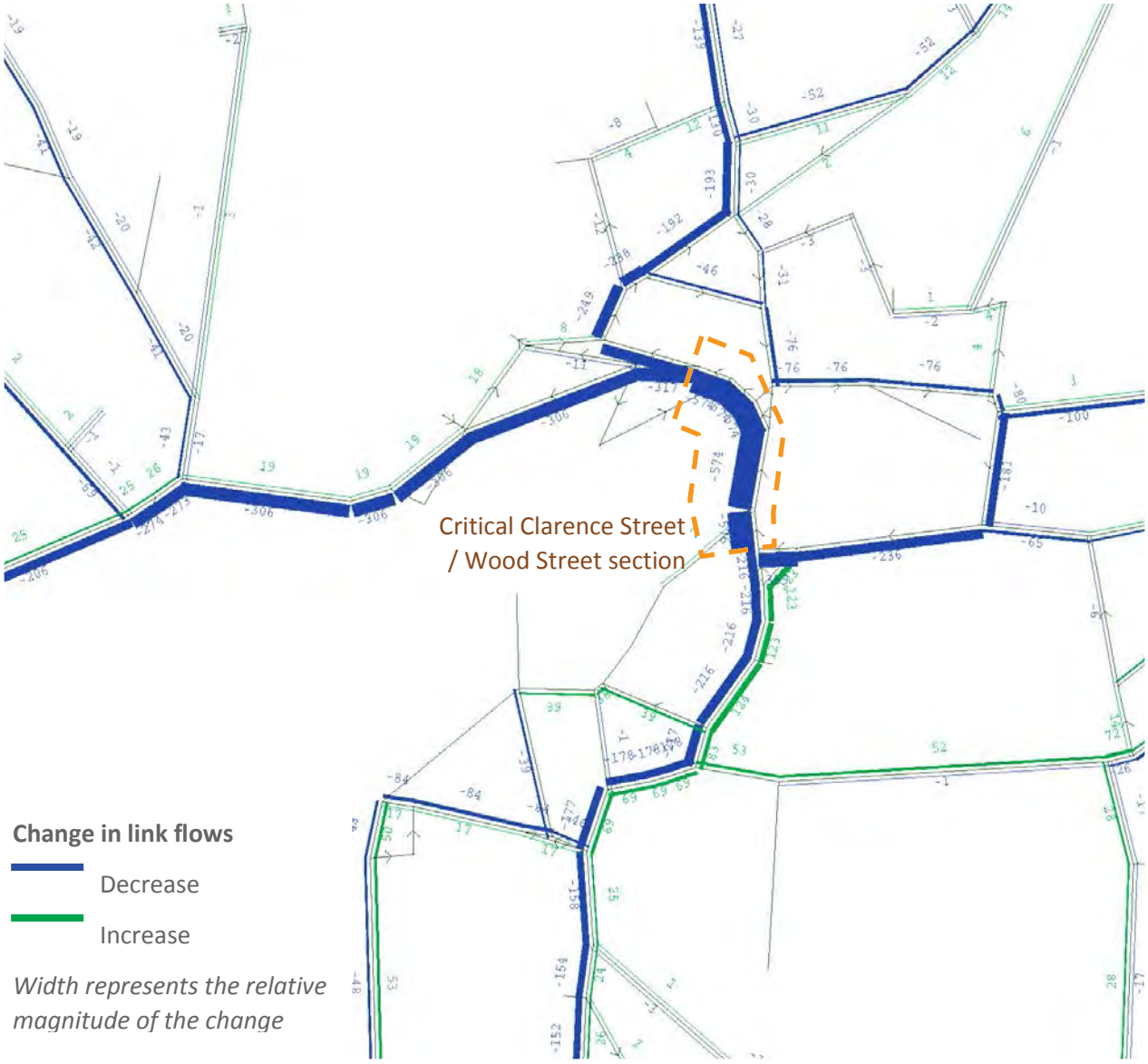
3.10 It can therefore be seen that Scenario 8 has the most impact on the network, whilst Scenario 3 has the least impact in the AM peak hour and Scenario 1 has a relatively negligible impact in the PM peak hour. This is not surprising given the nature of each scenario, and a more detailed discussion of the modelling results for each is contained in the following sections.

Scenario 1: Strategic enhancements

AM peak hour

3.11 Figure 3.3 below shows the predicted changes in link flows between the 2031 future baseline model and the 2031 Scenario 1 model in the AM peak hour.

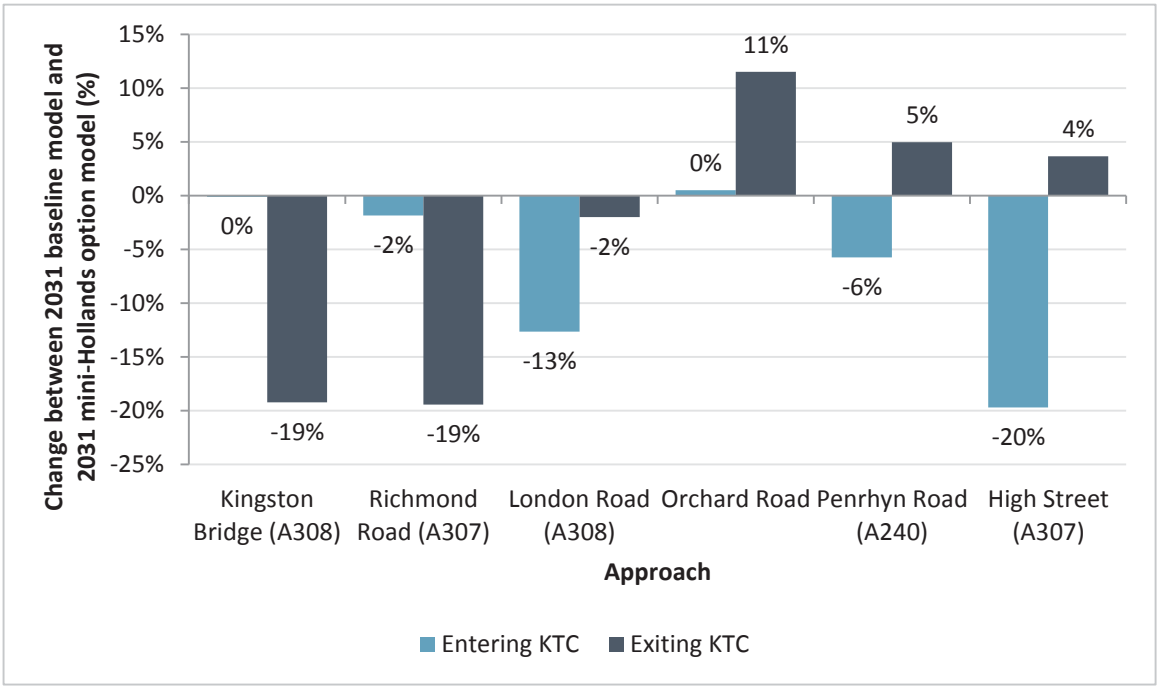
Figure 3.3 Changes in link flows between the 2031 future baseline model and 2031 Scenario 1 model, AM peak hour



3.12 In can be seen that along the critical Clarence Street / Wood Street section of the network, flows reduce by approximately 570 vehicles. This is a reduction of about 20% compared to the 2031 future baseline AM peak model. Upstream of this section, about half of this reduction is accounted for by a reduction from the Fairfield North approach, with the other half from the Wheatfield Way approach. Downstream of this section, there is a reduction in flow of just over 300 vehicles crossing Kingston Bridge westbound, with the remainder of the reduction occurring on Sopwith Way heading north under the railway. This displacement of traffic is due to the model taking into account the delays and queuing in KTC caused by the reduction in capacity along Clarence Street / Wood Street.

3.13 The impact on traffic entering and exiting KTC via each of the main approaches is shown in Figure 3.4 below. It is primarily traffic heading west towards Kingston Bridge (A308) or north towards Richmond Road (A307) that is affected, with flows heading in both of these directions decreasing by almost 20%. Traffic flows entering KTC from London Road (A308), High Street (A307) and to a lesser extent Penrhyn Road (A240) show notable decreases. There is also a large increase (in percentage terms) of traffic exiting the KTC via Orchard Road; this may be due to northbound traffic using this as an alternative route in order to avoid the critical Clarence Street / Wood Street section. The individual movement that shows the largest decrease in absolute terms is from London Road (A308) heading westbound towards Kingston Bridge (A308), which has a decrease of about 270 vehicles, or 30%.

Figure 3.4 Changes in flows between the 2031 future baseline model and 2031 Scenario 1 model for each main approach to the KTC, AM peak hour



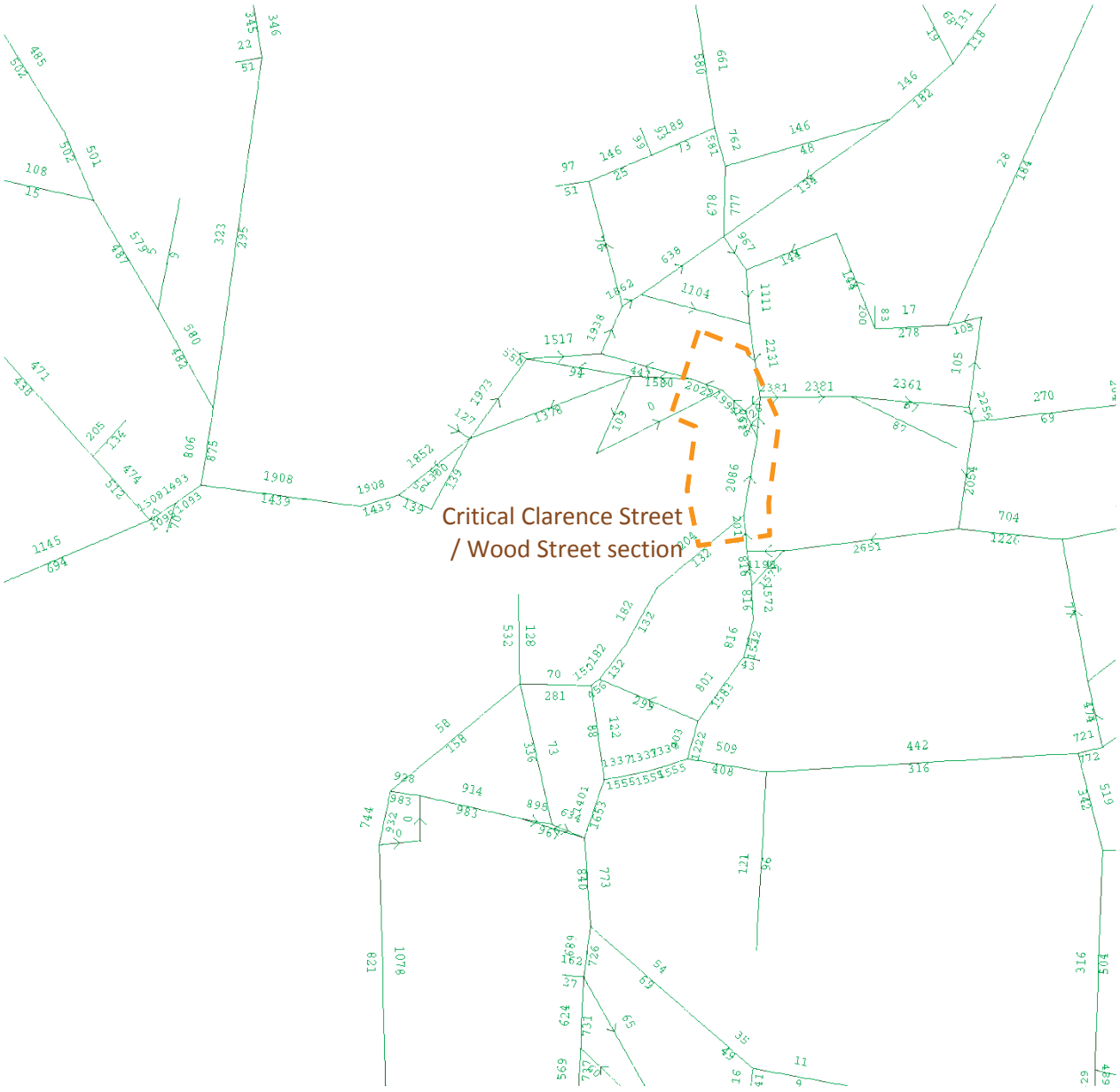
3.14 In order to investigate where this traffic has been displaced to, a plot showing the difference in flows over a wider area is shown in Figure 3.5 below.

Figure 3.5 Changes in link flows between the 2031 future baseline model and 2031 Scenario 1 model, AM peak hour, wider area

3.15 It is evident that some of the traffic displaced is predicted to use routes that pass around Kingston, in particular the A3. However, the increases in flows on any individual alternative route are quite moderate, and are less than 100 vehicles. As such, in general it appears that traffic displaced from KTC is not heavily concentrated along any particular alternative routes; rather, displaced traffic is dispersed thinly across the wider highway network.

3.16 Predicted link flows from the 2031 Scenario 1 AM peak hour model are given in Figure 3.6 below. Along the critical Clarence Street / Wood Street section, the model is predicting flows of approximately 2000 vehicles per hour. This gives an indication of the capacity of this critical section as modelled in SoLHAM.

Figure 3.6 Link flows in the 2031 Scenario 1 model, AM peak hour



PM peak hour

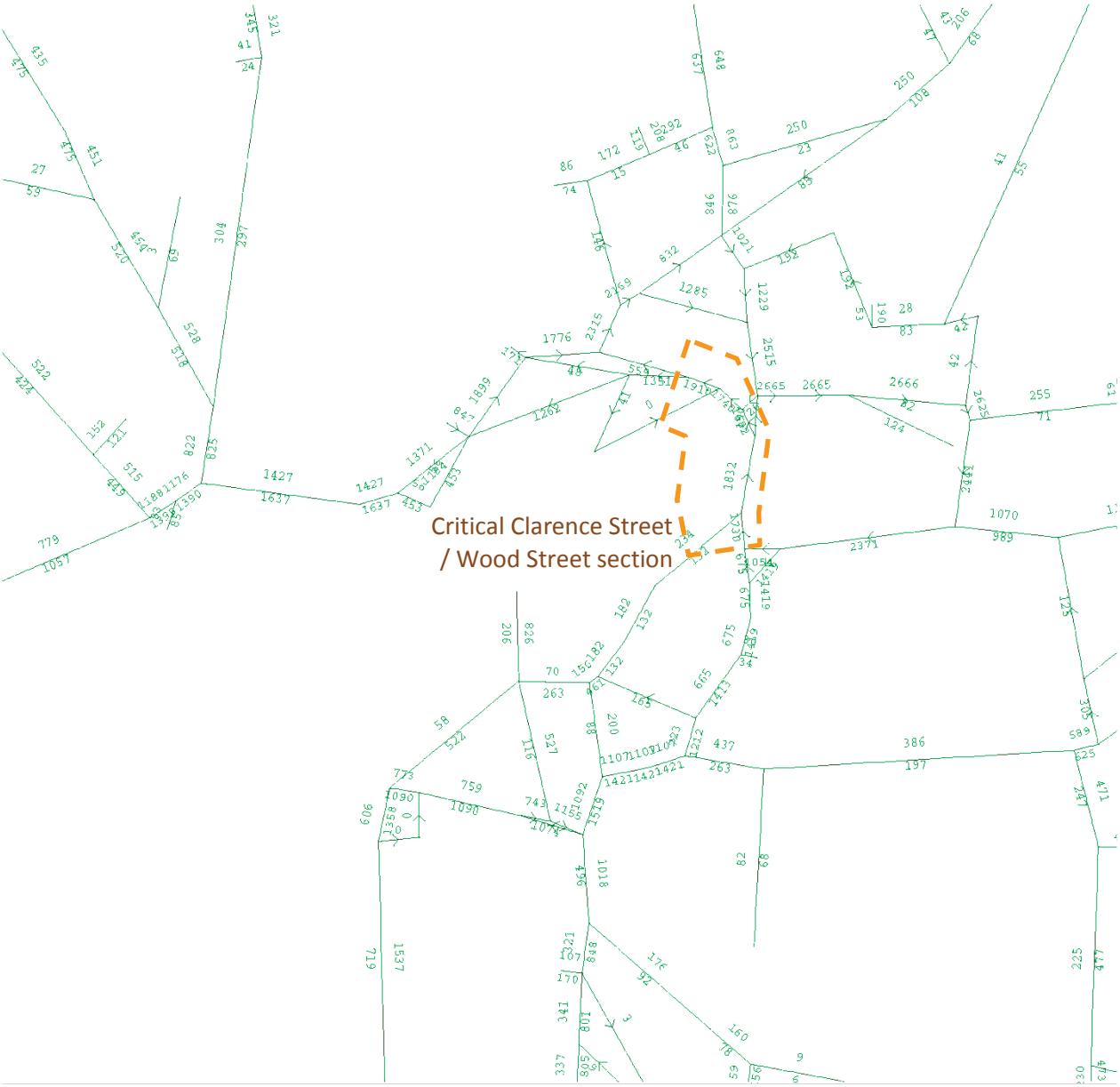
3.17 Figure 3.7 below shows predicted changes in link flows between the 2031 future baseline model and the 2031 Scenario 1 model in the PM peak hour.

Figure 3.7 Changes in link flows between the 2031 future baseline model and 2031 Scenario 1 model, PM peak hour

3.18 From this diagram, it can be seen that in contrast to the AM peak hour, the SoLHAM model predicts a relatively low level of traffic reassignment away from KTC in the PM peak hour. This is because the link flows along the critical Clarence Street / Wood Street section are much lower in the 2031 future baseline PM peak hour model compared to the AM peak hour model. The PM peak demand for this link is close to the 2000 vehicles per hour capacity available, and hence does not require reassignment of excess traffic demand.

3.19 Predicted link flows in the PM peak hour from the 2031 Scenario 1 model are shown in Figure 3.8 below. Given the road network capacity provided in KTC by Scenario 1 is largely sufficient to accommodate the forecast flows, these link flows are quite similar to those predicted in the 2031 future baseline model.

Figure 3.8 Link flows in the 2031 Scenario 1 model, PM peak hour

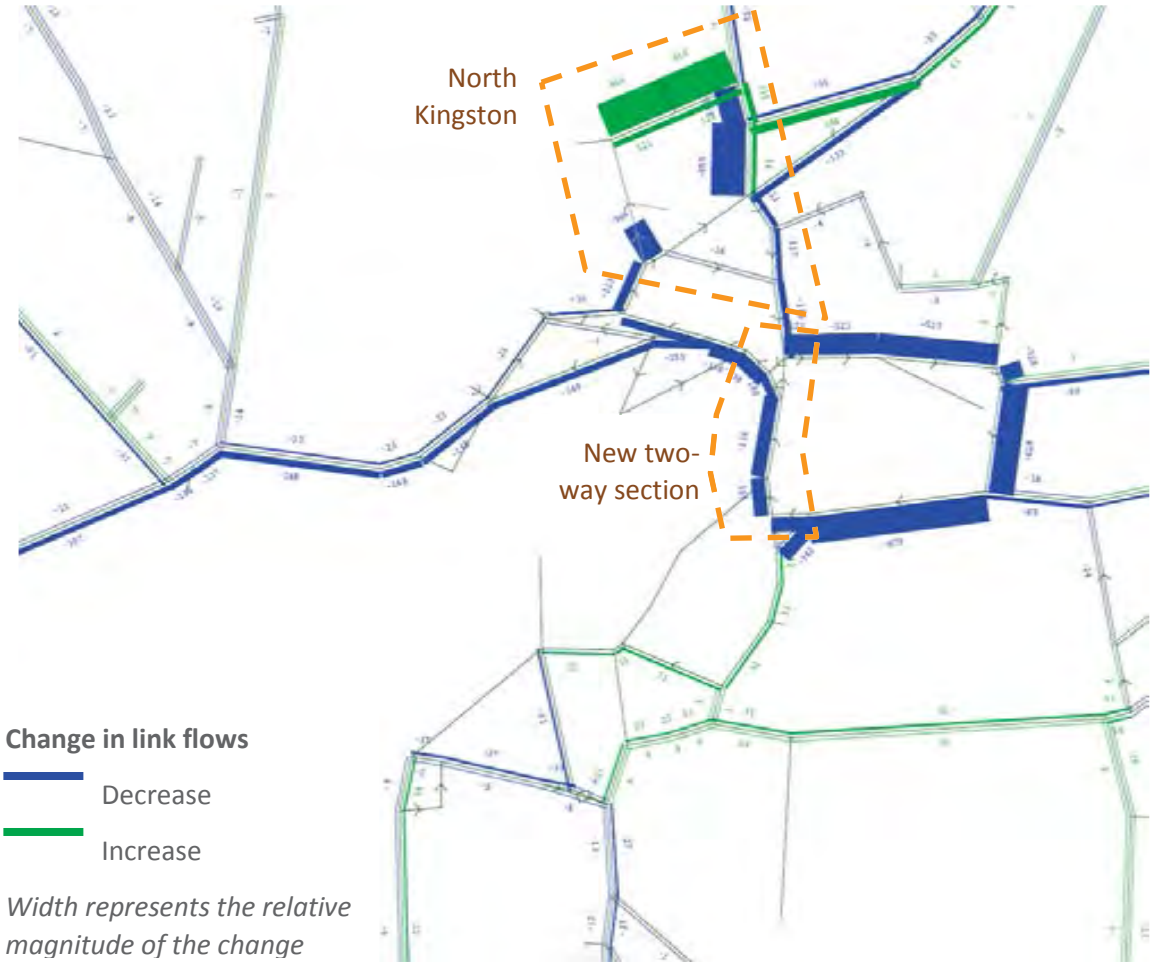


Scenario 3: Clarence Street two way

AM peak hour

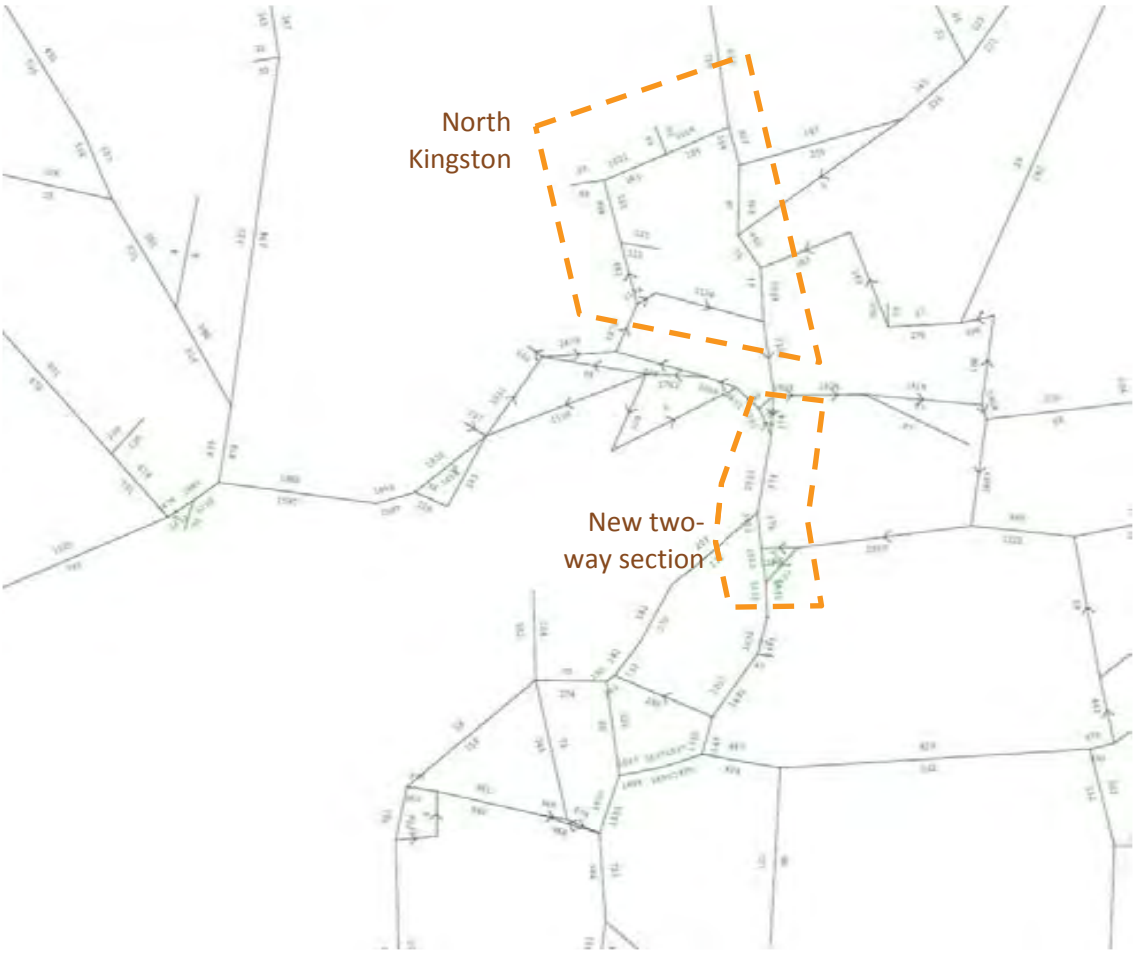
3.20 Figure 3.9 below shows the predicted changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model for the AM peak hour. This plot should be interpreted with care, as changes in flows are only shown for links that are essentially identical between the baseline and Scenario 3 models; it does not shows changes in flows on links that have had their configuration changed significantly. As such, it should be looked at in conjunction with Figure 3.10 below, which shows links flows from the 2031 Scenario 3 model.

Figure 3.9 Changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model, AM peak hour



Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

Figure 3.10 Link flows in the 2031 Scenario 3 model, AM peak hour



3.21 As expected, there are some significant changes in flows in the North Kingston area due to the reconfiguration of the road network. This means that vehicles which formerly used Kingsgate Road to access Richmond Road northbound now instead use Seven Kings Ways and Sury Basin. This accounts for most of the large decrease in flow on Richmond Road northbound between Kingsgate Road and Sury Basin, and the corresponding increase in flow on Sury Basin eastbound.

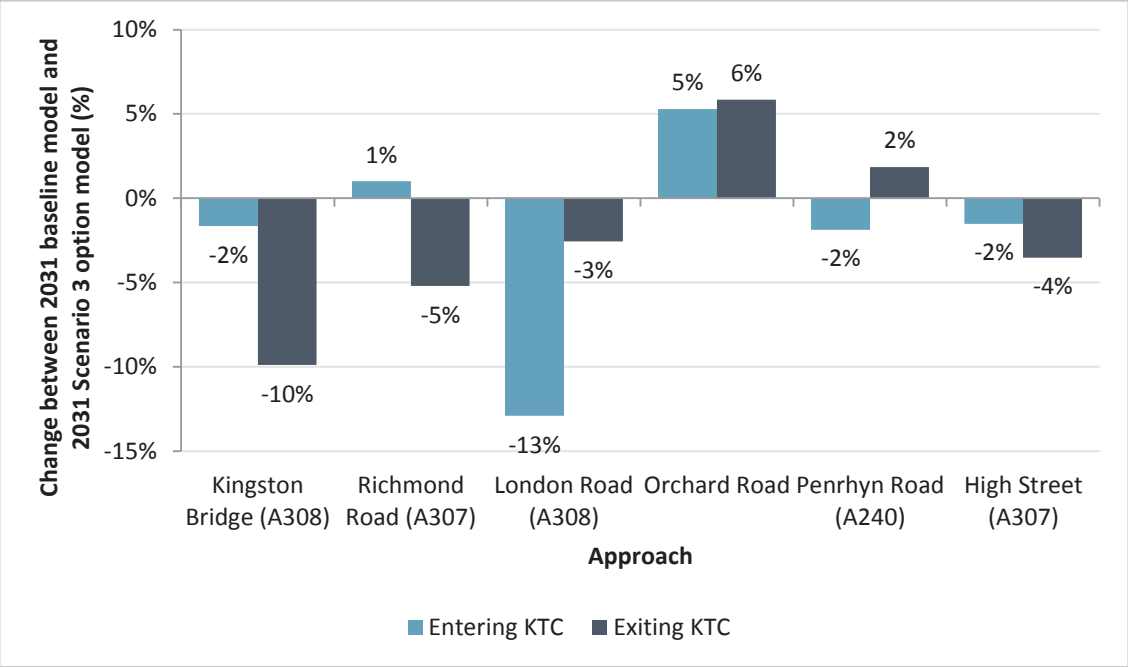
3.22 The other main change to the road network in Scenario 3 is that vehicles coming from Richmond Road can now continue southbound onto Clarence Street (which now becomes two-way). The flow on this new southbound section of Clarence Street is about 370 vehicles. This rerouting of southbound traffic accounts for some of the decrease in flows around the Cromwell Road / Queen Elizabeth Road / Fairfield North clockwise loop.

3.23 Apart from these changes in flows directly arising from particular features of this scenario, the overall impact is that traffic levels in the town centre generally fall (relative to the 2031 future baseline model). In total, there is a reduction in the number of through trips of about 200 vehicles.

3.24 The impact that Scenario 3 has on traffic entering and exiting KTC via each of the main approaches is shown in Figure 3.11 below. The two most significant changes in percentage terms are the 13% reduction in traffic entering the town centre from London Road (A308), and a fall of 10% in traffic exiting via Kingston Bridge (A308). The bulk of these changes are due to a sharp drop in westbound trips through the town centre, from London Road (A308) to

Kingston Bridge (A308). This is caused by less capacity along this route, where the number of lanes has been reduced from three to two and additional conflicts with the new southbound movement along Clarence Street increase junction delays. The third biggest change is a 5% fall in traffic exiting via Richmond Road (A307). This occurs for the same reasons as above. The changes for other approach entries and exits are less significant, being under 5%. The exception to this is that there is a 5–6% increase in traffic using Orchard Road, however this is less significant considering the low absolute number of vehicles using this approach to KTC.

Figure 3.11 Changes in flows between the 2031 future baseline model and 2031 Scenario 3 model for each main approach to KTC, AM peak hour



3.25 Figure 3.12 below shows the difference in flows over a wider area, which is useful in examining the alternative routes that are used by traffic displaced from KTC. As with Scenario 1, it can be seen that this displaced traffic is diffused over a large number of routes across the wider network. In general, changes in flows on alternative routes are less than 100 vehicles. The exception to this is an increase of over 100 vehicles using Park Road northbound (as highlighted in orange). Whilst this may not eventuate in practice, this result indicates that there is a risk of increased traffic volumes on minor roads seeking to avoid the main roads leading to the town centre.

Figure 3.12 Changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model, AM peak hour, wider area

Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

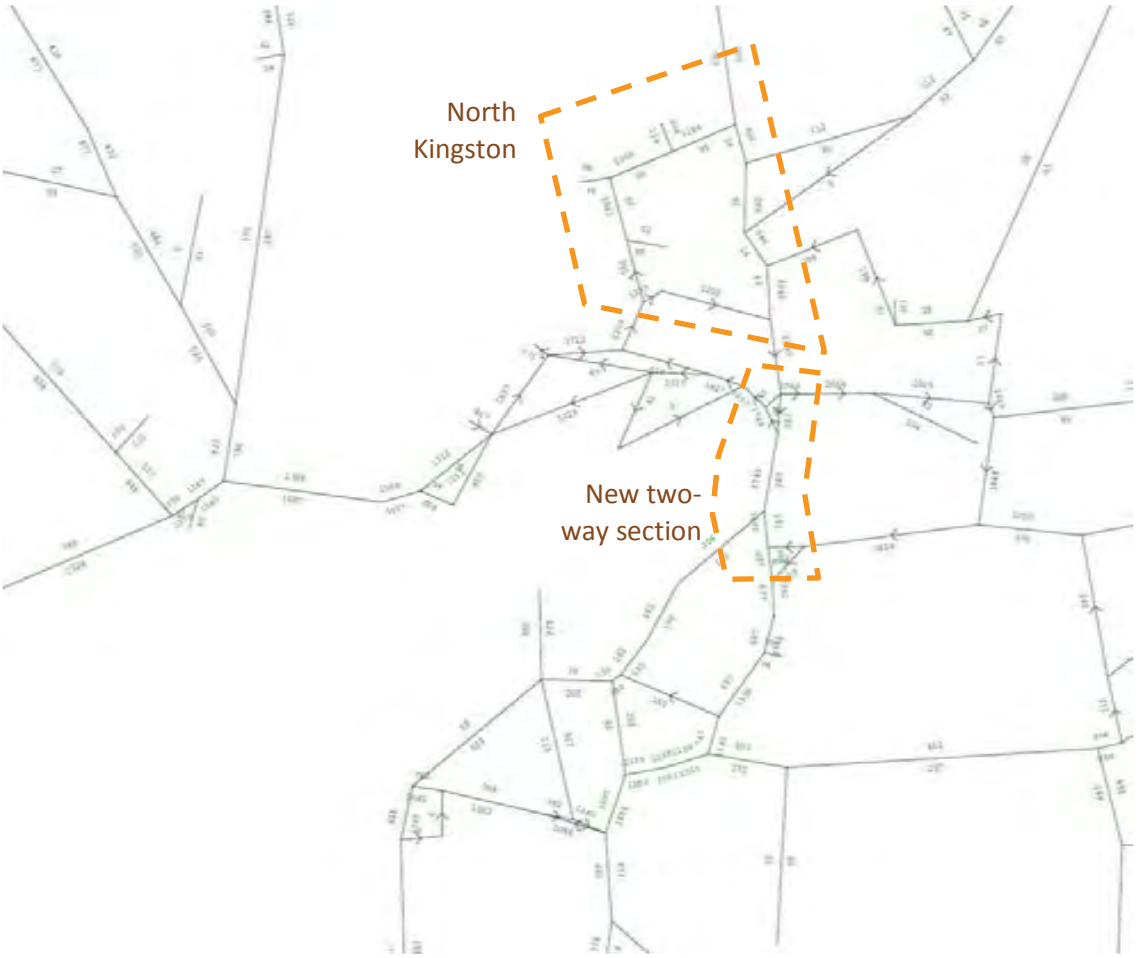
PM peak hour

3.26 Predicted changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model for the PM peak hour are shown in Figure 3.13 below. As with the AM peak hour, this plot does not show links that have had their configuration significantly changed; as such, this plot should be interpreted in conjunction with Figure 3.14 below, which shows the absolute flow on each link.

Figure 3.13 Changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model, PM peak hour

Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

Figure 3.14 Link flows in the 2031 Scenario 3 model, PM peak hour



3.27 As with the AM peak hour results, there are some notable changes in flows in the North Kingston area due to the reconfiguration of the road network there, which results in northbound traffic using Severn Kings Way and Sury Basin rather than Kingsgate Road.

3.28 There are about 380 vehicles using the new southbound route along Clarence Street, which accounts for some of the reduction in vehicles using the Cromwell Road / Queen Elizabeth Road / Fairfield North clockwise loop.

3.29 In aggregate, the overall impact in the PM peak hour is the displacement of about 5% of through trips, which equate to approximately 200 trips. This is similar to the overall result for the AM peak hour.

3.30 Figure 3.15 below shows the impacts for traffic entering and exiting KTC via each of the main approaches. It can be seen that in percentage terms, most of the changes are small, being less than 5%. The main exceptions to this are an 8% drop in traffic entering from Richmond Road (A307) and a 5% fall in traffic exiting via London Road (A308).

Figure 3.15 Changes in flows between the 2031 future baseline model and 2031 Scenario 3 model for each main approach to KTC, PM peak hour

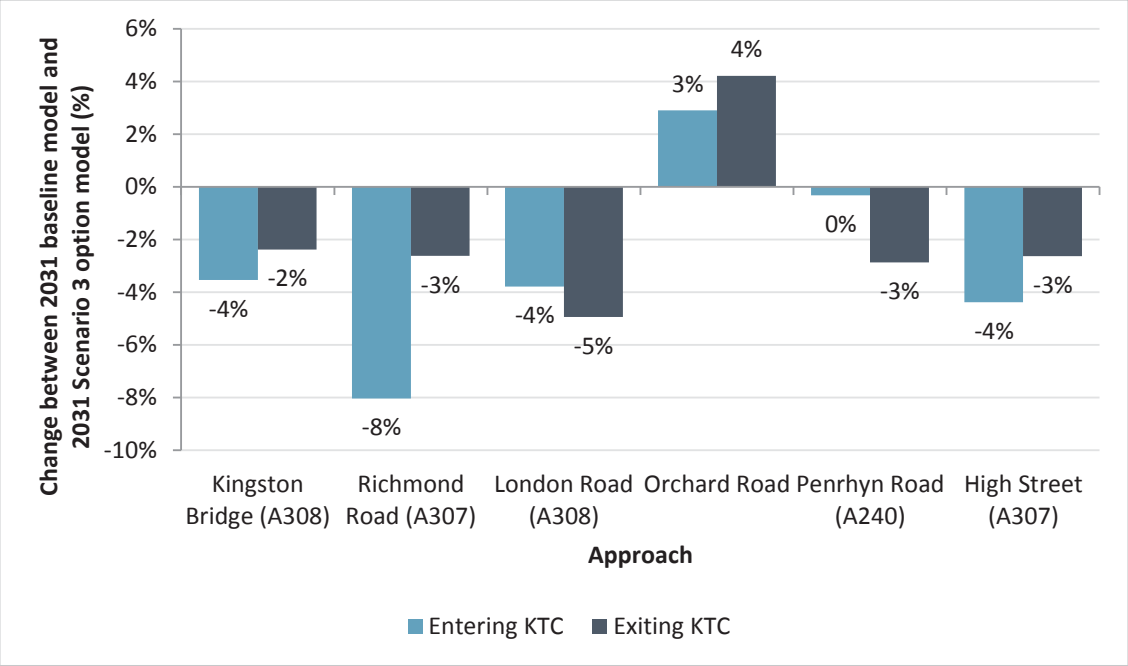
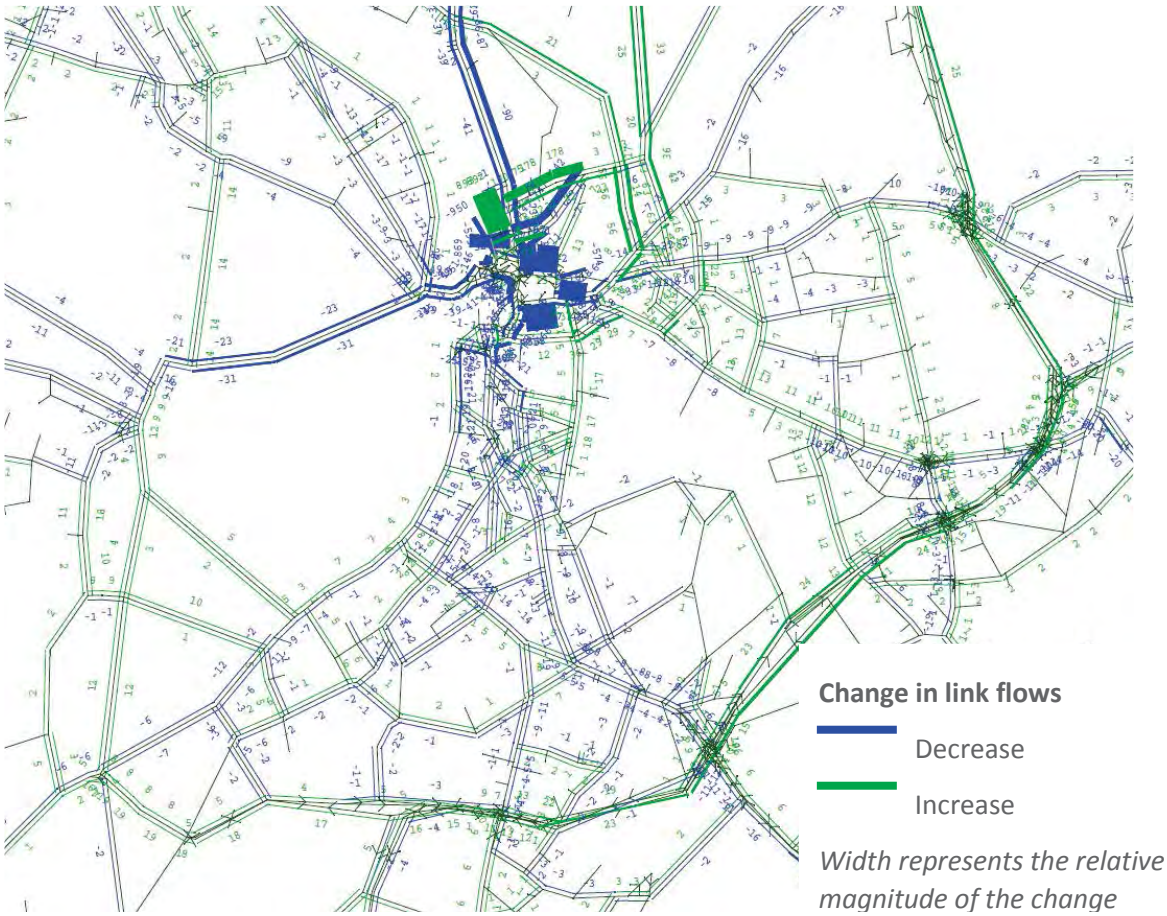


Figure 3.16 Changes in link flows between the 2031 future baseline model and 2031 Scenario 3 model, PM peak hour, wider area



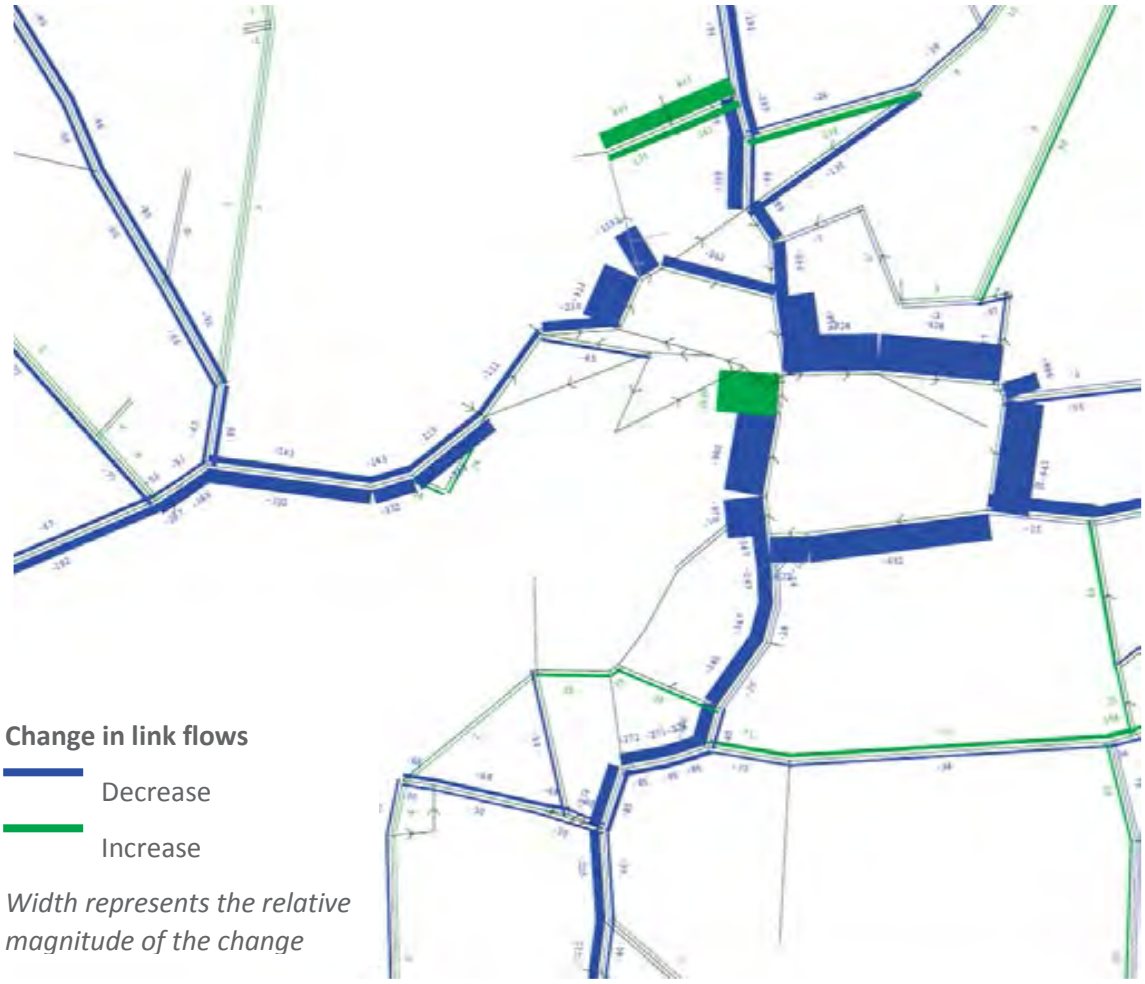
Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

Scenario 8: Wood Street closed, Sopwith Way two way

AM peak hour

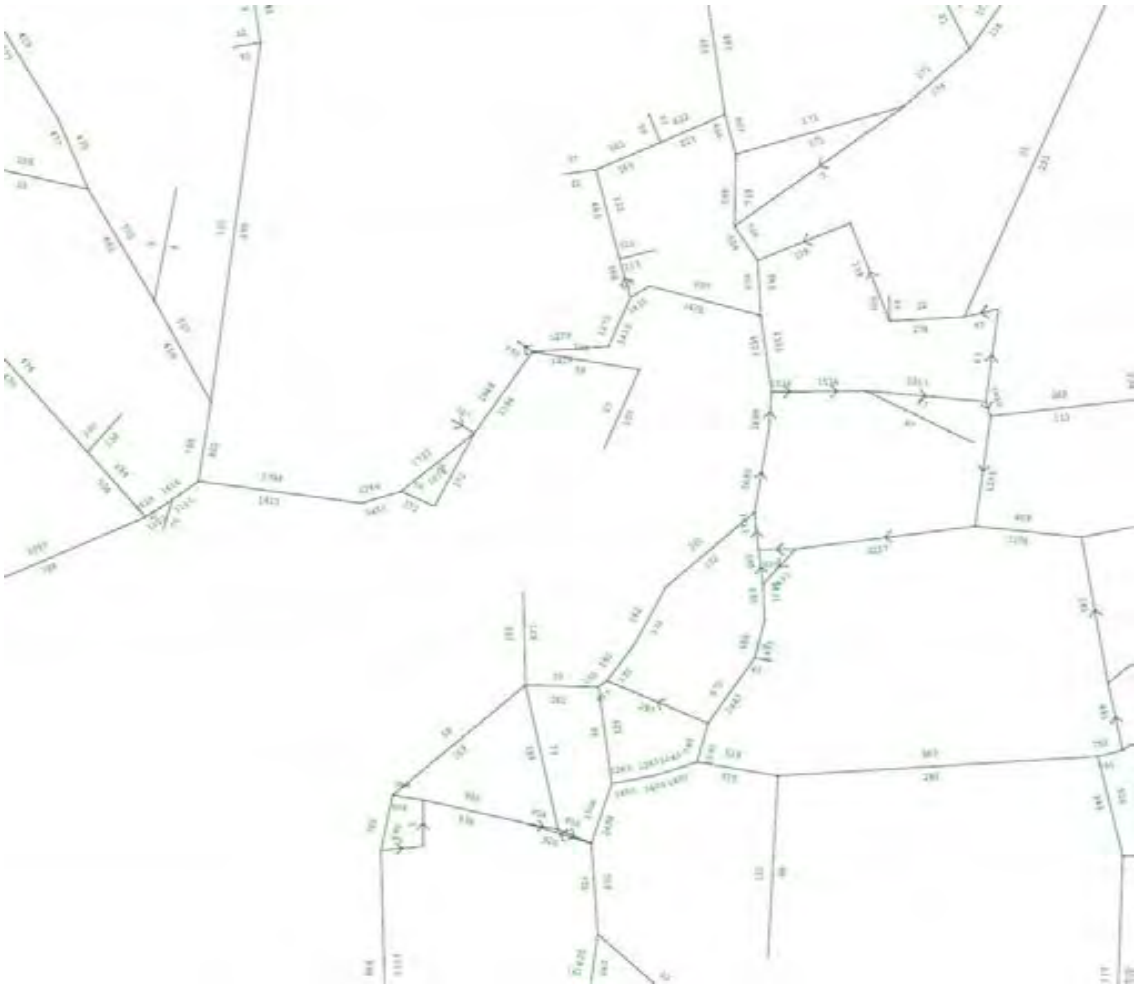
3.31 Predicted changes in link flows between the 2031 future baseline model and 2031 Scenario 8 model for the AM peak hour are shown in Figure 3.17 below. As with Scenario 3, this plot does not show links that have had their configuration significantly changed; as such, this plot should be interpreted in conjunction with Figure 3.18 below, which shows the absolute flow on each link.

Figure 3.17 Changes in link flows between the 2031 future baseline model and 2031 Scenario 8 model, AM peak hour



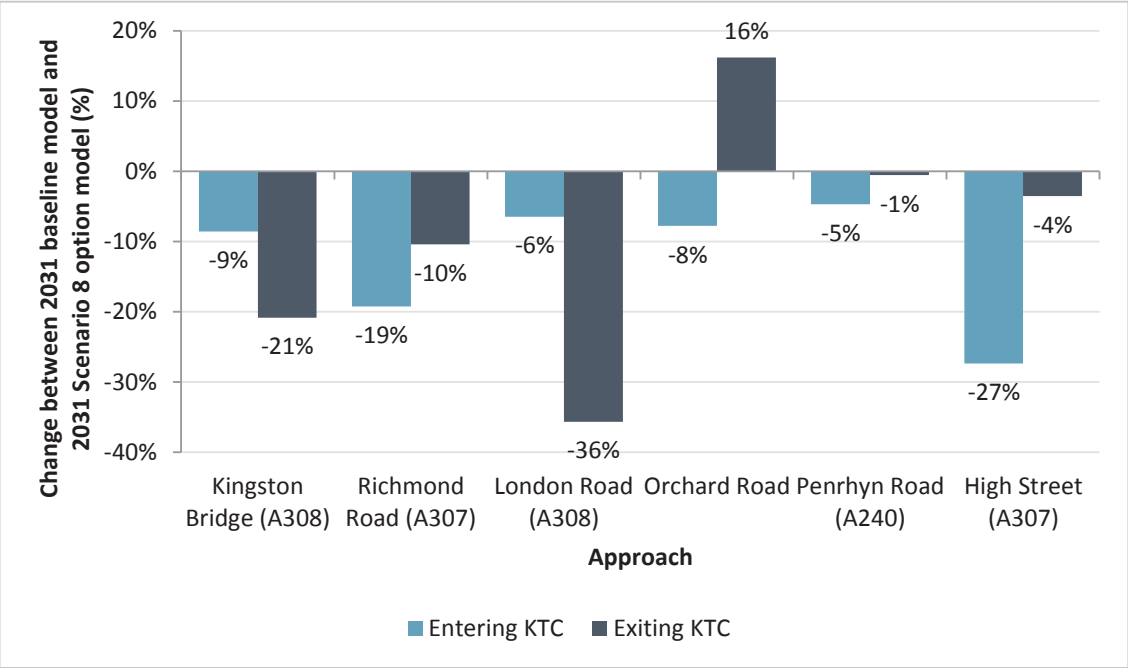
Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

Figure 3.18 Link flows in the 2031 Scenario 8 model, AM peak hour



3.32 Sharp drops in traffic across almost all of the main approaches to the town centre occur as a result of the reduced capacity and corresponding reduction in through traffic. These reductions are shown in Figure 3.19 below. An exception to this is that the flow of traffic exiting the town centre via Orchard Road increases. This is likely to be due to traffic heading towards London Road (A308) using Orchard Road as an alternative route, in order to avoid congestion further north in the town centre. The individual movement that has the biggest absolute decrease is the westbound movement between London Road (A308) and Kingston Bridge (A308).

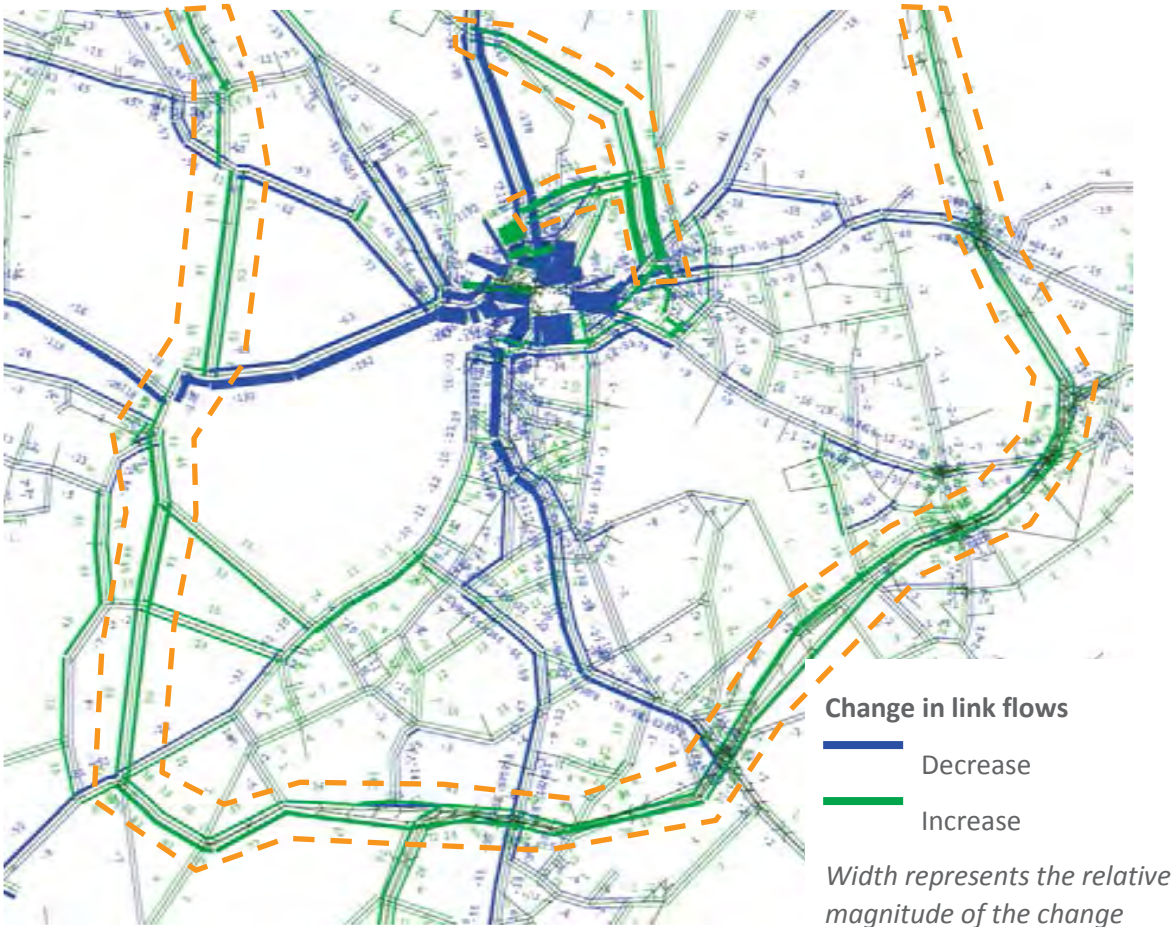
Figure 3.19 Changes in flows between the 2031 future baseline model and 2031 Scenario 8 model for each main approach to KTC, AM peak hour



3.33 The wider changes in traffic flow associated with displacement of traffic for Scenario 8, as predicted by SoLHAM, are shown in Figure 3.20 below. It can be seen that due to the high level of traffic displaced from KTC, there are noticeable increases in flows on various alternative routes, as indicated by the green bars. These increases are particularly significant (with an increase in one-way flows of greater than 100 vehicles) along certain segments of the following corridors, which have been highlighted in orange on the plot:

- A wide arc around the east, south and west of Kingston, formed by the A3 and A309 roads, including Chestnut Avenue through Bushy Park
- A number of minor roads to the north-west of KTC, including the Tudor Drive / Park Road corridor, and Kings Road

Figure 3.20 Changes in link flows between the 2031 future baseline model and 2031 Scenario 8 model, AM peak hour, wider area



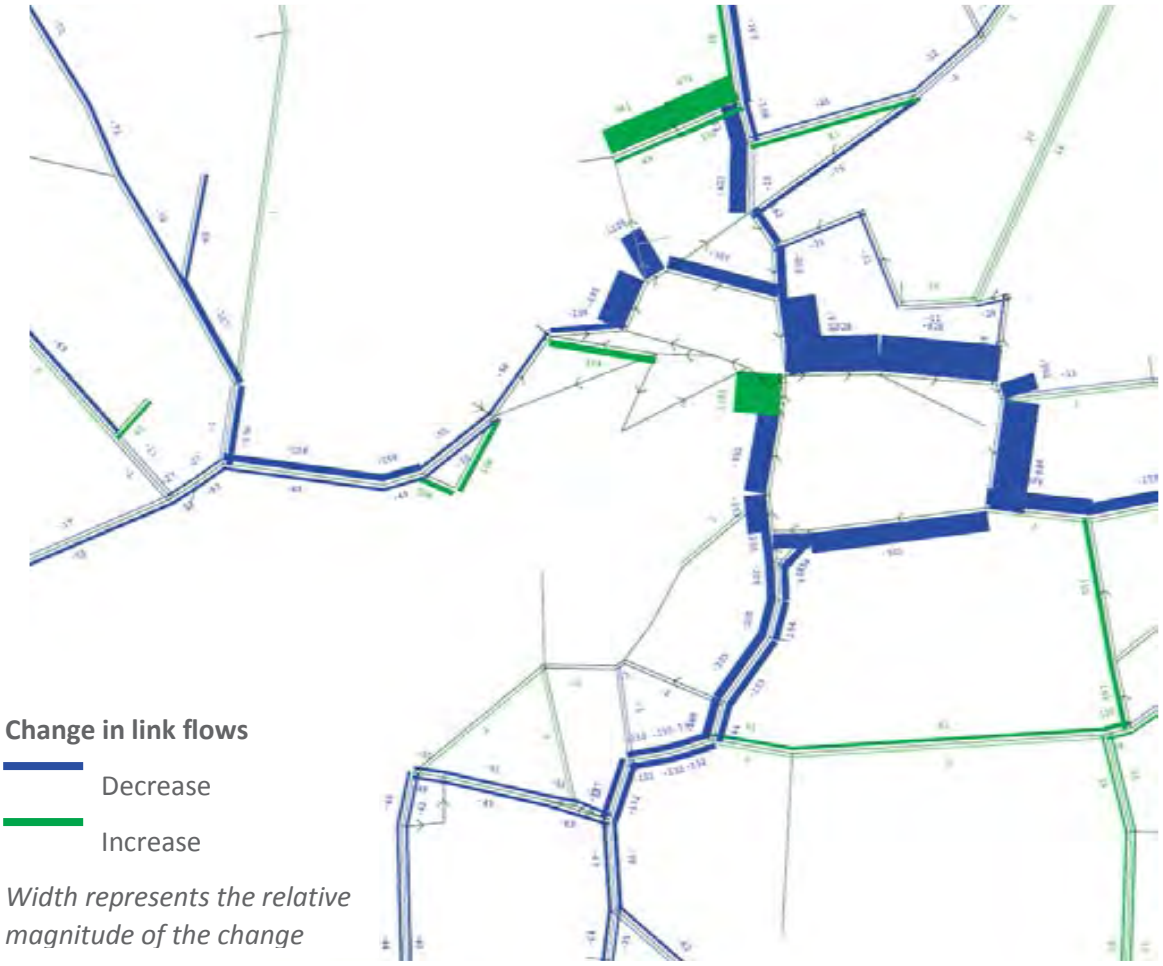
Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

PM peak hour

3.34 Figure 3.21 below shows changes in link flow for Scenario 8 in the PM peak hour. As previously noted, this plot does not show changes for links that have had their configuration changed significantly; as such, this plot should be read in conjunction with Figure 3.22 below, which shows absolute link flows for this scenario.

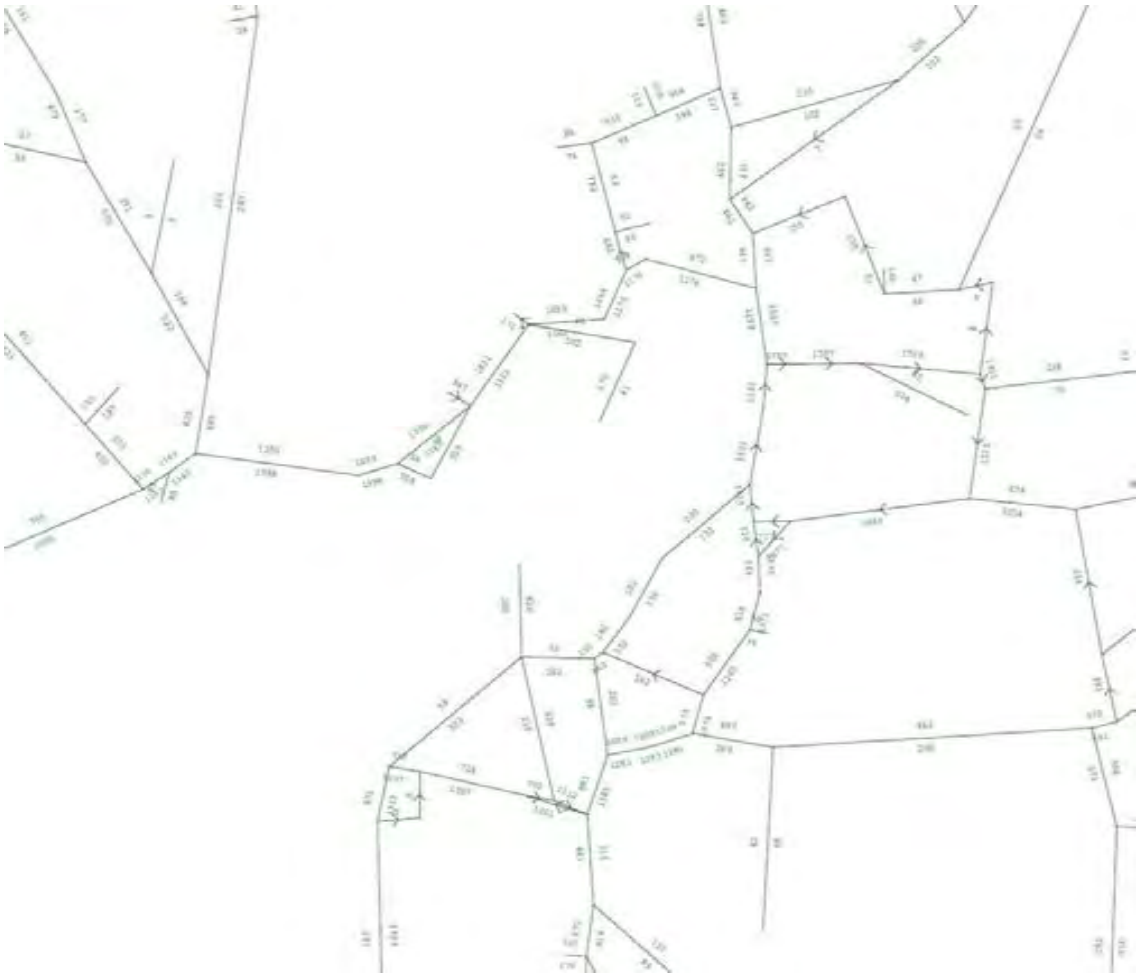
3.35 As with the AM peak, the overall results suggest that this scenario will have a significant impact, leading to a high level of displacement of traffic away from the town centre, which is reflected in the decreases in flows on many links.

Figure 3.21 Changes in link flows between the 2031 future baseline model and 2031 Scenario 8 model, PM peak hour



Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

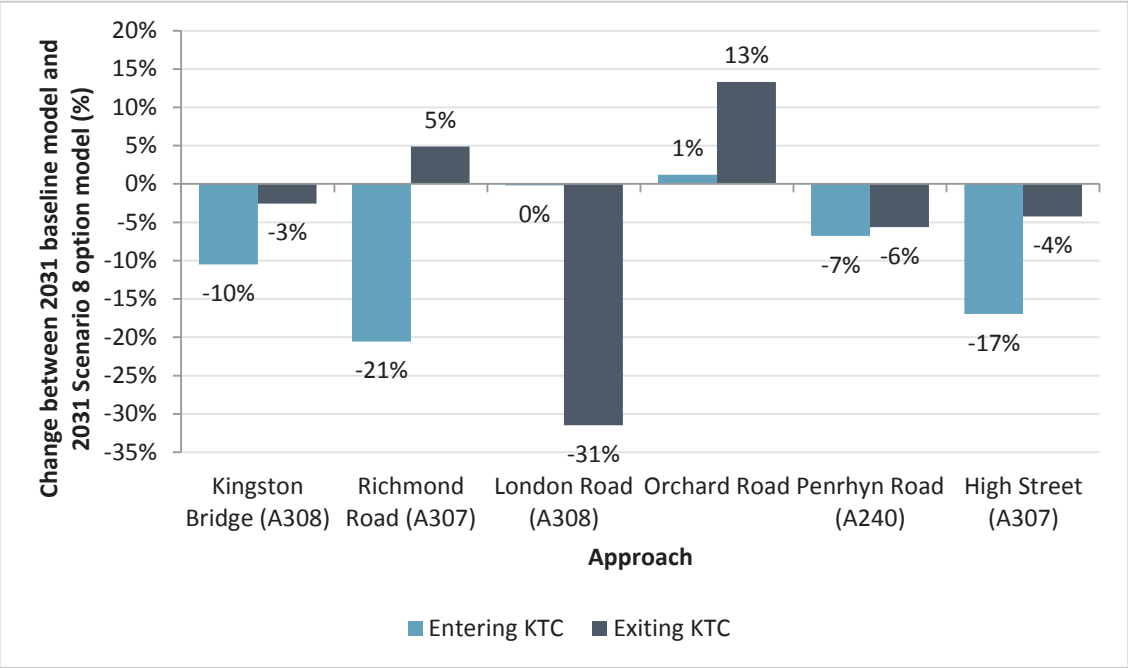
Figure 3.22 Link flows in the 2031 Scenario 8 model, PM peak hour



3.36 This overall significant level of traffic displacement away from the town centre is reflected in the changes in flows on individual approaches, as shown in Figure 3.23 below.

3.37 An exception to this is Orchard Road, where there is a noticeable increase (in percentage terms) in traffic exiting the town centre via this route. It is likely this is due to traffic using Orchard Road as an alternative route to London Road (A308). This is largely due to an increase in through traffic from Kingston Bridge (A308) travelling to the east using Richmond Road (A307) and rat-running through back streets to avoid congestion in the town centre.

Figure 3.23 Changes in flows between the 2031 future baseline model and 2031 Scenario 8 model for each main approach to KTC, PM peak hour



3.38 Given the significant level of traffic displaced from the town centre, there are some noticeable increases on certain alternative routes, as shown in Figure 3.24 below.

3.39 There are a number of corridors where there are particularly significant increases in flows (which are highlighted in orange on the plot):

- A wide arc around the east, south and west of Kingston, formed by the A3 and A309 roads
- A number of roads to the north-east of KTC, including the Tudor Drive / Park Drive corridor, Kings Road and Queens Road

Figure 3.24 Changes in link flows between the 2031 future baseline model and 2031 Scenario 8 model, PM peak hour, wider area

Note: Changes in flows are not shown for some links, where major changes have been made between the baseline and scenario models

4 Operational modelling assessment

Introduction

4.1 This chapter describes the operational modelling that was undertaken using TRANSYT 15. For each of the three scenarios, the AM and PM peak hour matrices from the SoLHAM strategic model assignment were used to develop operational models in TRANSYT 15. Next, using the 2031 future baseline TRANSYT models as a starting point, the modelled network was modified to reflect the changes proposed in each scenario. This included modifying the junction layouts, including traffic signal staging and phasing arrangements as required. The OD matrices from SoLHAM were then input into TRANSYT.

4.2 The models were run with signal optimisation enabled, to allow TRANSYT to choose optimal signal timings for each scenario, taking into account their associated road layouts and traffic volumes. Following review of the optimised signal timings derived by TRANSYT, it was evident that the optimisation process was not functioning correctly. Given this issue, suitable signal timings were achieved through a manual optimisation process.

4.3 In addition, the traffic assignment undertaken by TRANSYT in the southern portion of the model, was found to be inconsistent across the various scenarios. Given this is not the main area of interest for the three scenarios under consideration (which primarily affect the portions of the town centre further north) it was not considered to be critical. Should additional scenarios require testing however, this issue with the software would need further investigation.

4.4 Following liaison with TRL (the developers of TRANSYT), it was concluded that these anomalies were caused by software issues and limitations. At the time of writing TRL were in the process of producing an updated version of the software to address these issues.

4.5 As noted previously, the primary purpose of the modelling that has been undertaken is to understand the relative performance of each scenario, as well as the critical issues for each scenario that will need to be investigated. This means that the results of this modelling are not intended for detailed analysis of individual junctions and movements. More detailed traffic modelling would be required should any of the scenarios described here be progressed further.

4.6 The following sections summarise the results for each scenario. For ease, results in this chapter have been colour coded, with comparisons between the 2031 future baseline and each scenario. Areas performing noticeably worse in each scenario are marked red, those performing slightly worse are amber, and junctions where negligible changes are expected to occur are marked green.

Scenario 1: Strategic enhancements

AM peak hour

4.7 Figure 4.1 below summarises changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 1 model for the AM peak hour, whilst Table 4.1 below tabulates these results.

Figure 4.1 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 1 model, AM peak hour

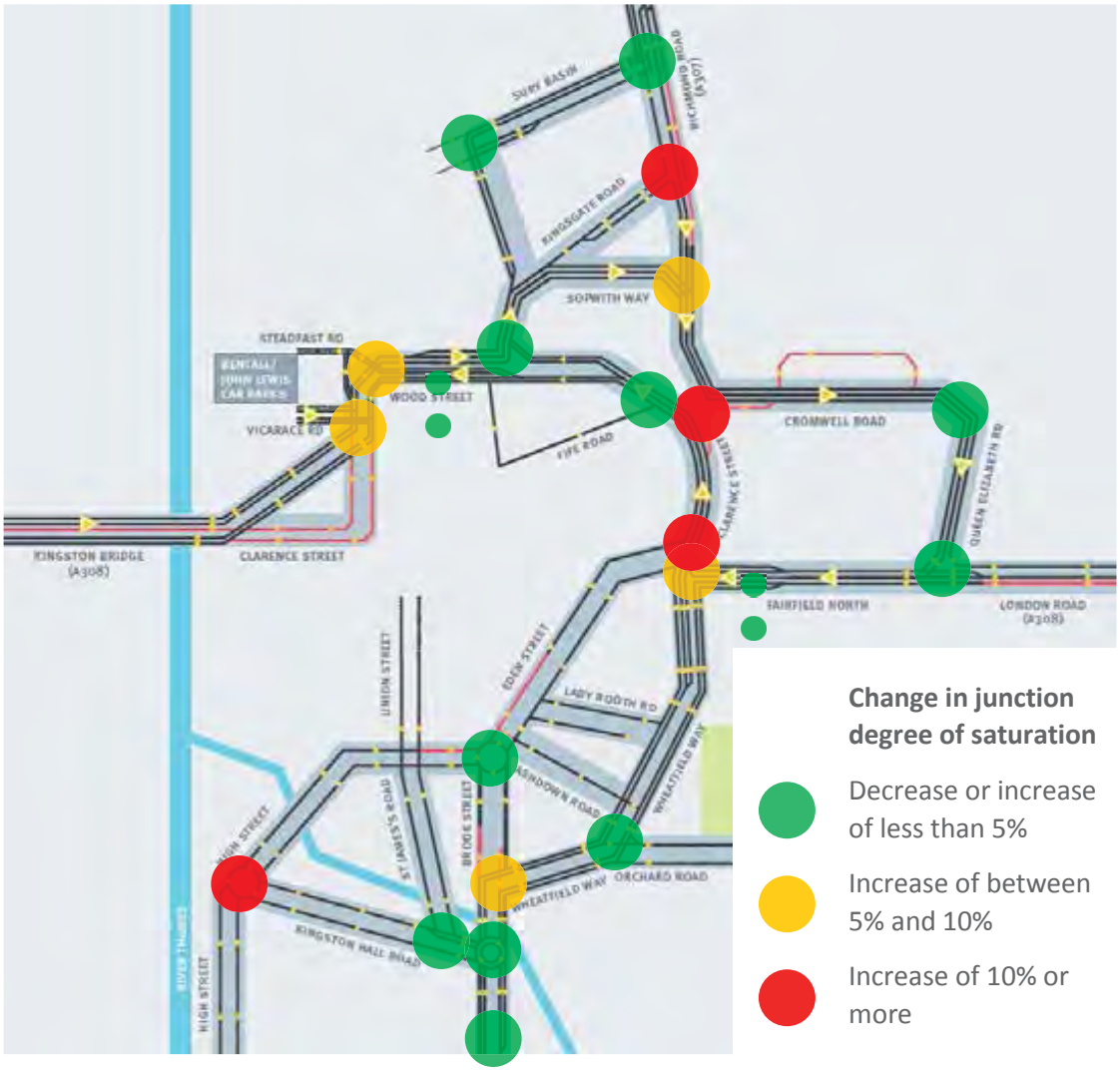


Table 4.1 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 1 model, AM peak hour

Junction	Name	2031 future baseline	Scenario 1	Change
23/063	London Rd / Queen Elizabeth Rd	85	50	-35
23/068	Fairfield Way / Wheatfield Way	82	89	7
23/065	Wheatfield Way / Orchard Rd	82	82	0
23/047	Wheatfield Way / Brook St	65	74	9
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	69	68	-1
23/111	Penrhyn Rd / The Bittoms	80	73	-7
23/053	Kingston Hall Rd / St James's Rd	56	60	4
RAB	High St / Kingston Hall Rd Roundabout	64	99	35
RAB	Eden St / Brook St Roundabout	84	86	2
23/004	Wheatfield Way / Eden St	75	98	23
23/080	Clarence St / Richmond Rd / Cromwell Rd	65	90	25
23/011	Wood St / Fife Rd	58	44	-14
23/071	Wood St / Horse Fair / Vicarage Rd	60	68	8
23/072	Wood St / Car Park Entry	50	58	8
23/074	Wood St East / Wood St West	75	57	-18
23/076	Sopwith Way / Richmond Rd	60	65	5
23/075	Kingsgate Rd / Richmond Rd	54	64	10
23/159	Richmond Rd / Sury Basin	48	33	-15
23/160	Seven Kings Way / Sury Basin	12	16	4
23/062	Queen Elizabeth Rd / Birkenhead Avenue	60	28	-32

4.8 As seen with the SoLHAM assignment, with the Scenario 1 scheme in place, there is a noticeable decrease in traffic around KTC in the AM peak hour, particularly travelling from east to west. This decrease in traffic results in a significant decrease in the degree of saturation at the London Road / Queen Elizabeth Road junction, which reduces from 85% in the 2031 future baseline model to 50% in the Scenario 1 model. This reduction in traffic generally leads to an overall slight improvement or neutral impact on the extremities of the town centre.

4.9 However, junctions along the critical Clarence Street / Wood Street section significantly decrease in capacity with the reduction of lanes from the implementation of the scheme. The Clarence Street / Richmond Road / Cromwell Road junction near Kingston station has jumped significantly from 65% to 90% degree of saturation—a level at which we can expect the junction to operate with noticeable queues and delays occurring. This also has a knock-on effect to the Wheatfield Way / Eden Street junction, which now reaches 98% degree of saturation, and will therefore be deemed overcapacity, with a build-up of queues to be expected here. As these junctions will be operating well above their practical operating capacity, this would lead to unstable network conditions, which may cause queuing and delays to propagate throughout the town centre.

4.10 In the southern portion of the town centre, there are some changes in junction degrees of saturation that are counter intuitive. In particular, the Kingston Hall Road roundabout is shown to be over capacity. These unexpected results can be explained by anomalies in the traffic assignment process within TRANSYT, which appears to be assigning traffic in this area to unrealistically convoluted routes. Nevertheless, whilst this issue is affecting results in the southern portion of the modelled network, the northern portion (which is the area of primary interest in Scenario 1) is not affected.

4.11 Elsewhere, the Kingsgate Road / Richmond Road junction also shows a 10% increase in degree of saturation, however this junction still operates well within capacity.

PM peak hour

4.12 As with the AM peak hour, Figure 4.2 below and Table 4.2 below shows changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 1 model.

Figure 4.2 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 1 model, PM peak hour

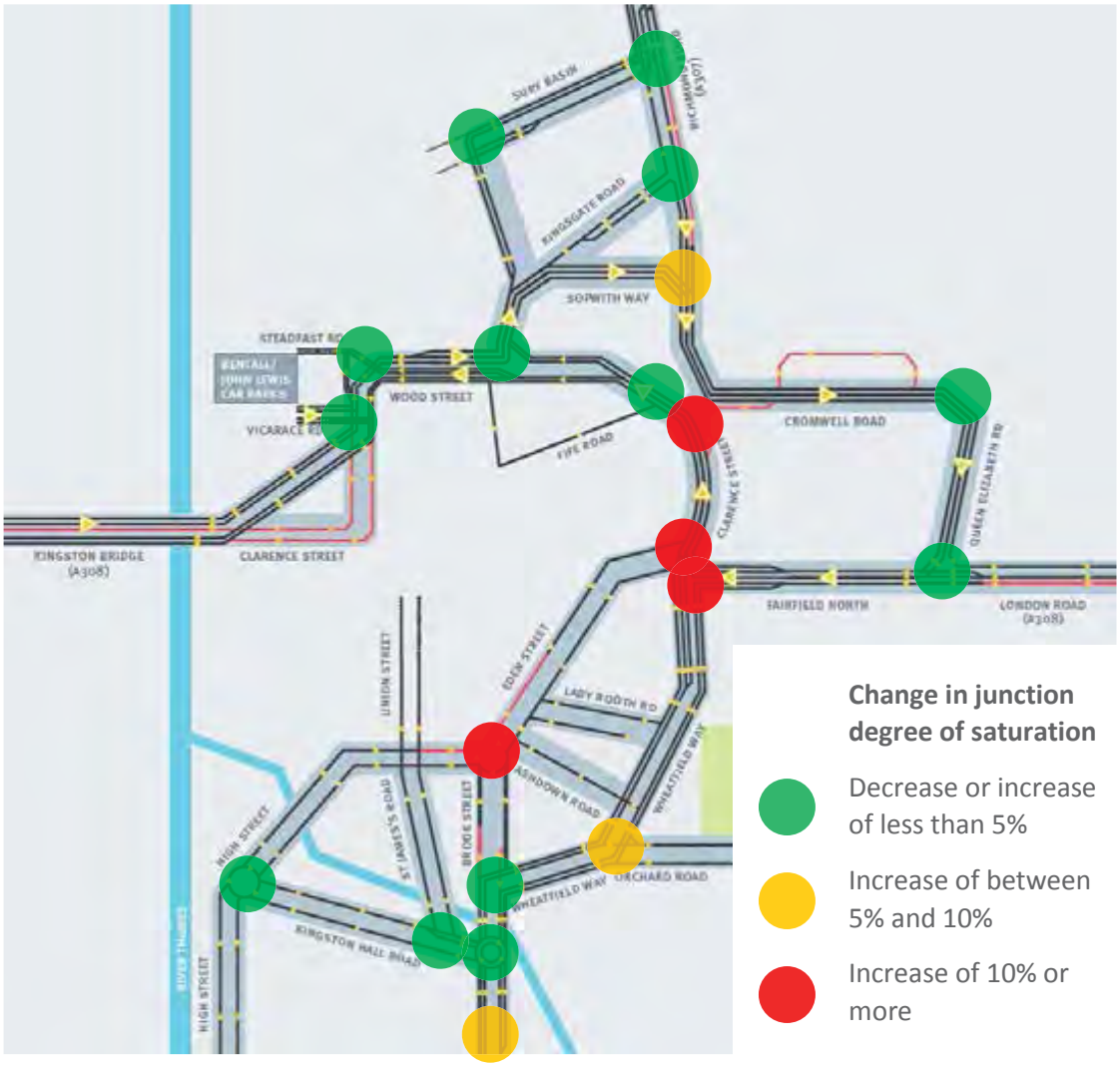


Table 4.2 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 1 model, PM peak hour

Junction	Name	2031 future baseline	Scenario 1	Change
23/063	London Rd / Queen Elizabeth Rd	71	69	-2
23/068	Fairfield Way / Wheatfield Way	54	77	23
23/065	Wheatfield Way / Orchard Rd	69	77	8
23/047	Wheatfield Way / Brook St	97	88	-9
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	86	76	-10
23/111	Penrhyn Rd / The Bittoms	60	66	6
23/053	Kingston Hall Rd / St James's Rd	42	44	2
RAB	High St / Kingston Hall Rd Roundabout	66	67	1
RAB	Eden St / Brook St Roundabout	88	110	22
23/004	Wheatfield Way / Eden St	70	85	15
23/080	Clarence St / Richmond Rd / Cromwell Rd	81	99	18
23/011	Wood St / Fife Rd	74	55	-19
23/071	Wood St / Horse Fair / Vicarage Rd	51	52	1
23/072	Wood St / Car Park Entry	64	59	-5
23/074	Wood St East / Wood St West	56	60	4
23/076	Sopwith Way / Richmond Rd	69	75	6
23/075	Kingsgate Rd / Richmond Rd	65	66	1
23/159	Richmond Rd / Sury Basin	45	43	-2
23/160	Seven Kings Way / Sury Basin	11	12	1
23/062	Queen Elizabeth Rd / Birkenhead Avenue	32	34	2

4.13 In contrast to the AM peak hour, Scenario 1 results in a relatively minor change in traffic assignment in the PM peak hour, which therefore leads to minimal changes in junction operation apart from those directly affected by the scheme. As with the AM peak hour, the lane reductions along the critical Clarence Street / Wood Street section result in significant reductions in general traffic capacity, with the Clarence Street / Richmond Road / Cromwell Road and Wheatfield Way / Eden Street junctions both being pushed close to, or in excess of, capacity. The station junction represents the critical bottleneck in KTC, operating at a 99% degree of saturation. As with the AM peak, such a high degree of saturation means that this junction is predicted to operate well above practical operating capacity, which would lead to highly unstable network conditions. The junction further south at Wheatfield Way / Fairfield North shows a large decrease in capacity due to the removal of a traffic lane, however it still operates within capacity at 77% degree of saturation.

4.14 Elsewhere in the model, the Eden Street roundabout has gone to 110% degree of saturation, and therefore operates in excess of capacity. This can again be explained by a software issue causing anomalies in the TRANSYT assignment process, as described under the AM peak hour results section.

Scenario 3: Clarence Street two way

AM peak hour

4.15 The changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 3 model for the AM peak hour are shown in Figure 4.3 below, whilst Table 4.3 below shows these results in a tabular format.

Figure 4.3 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 3 model, AM peak hour

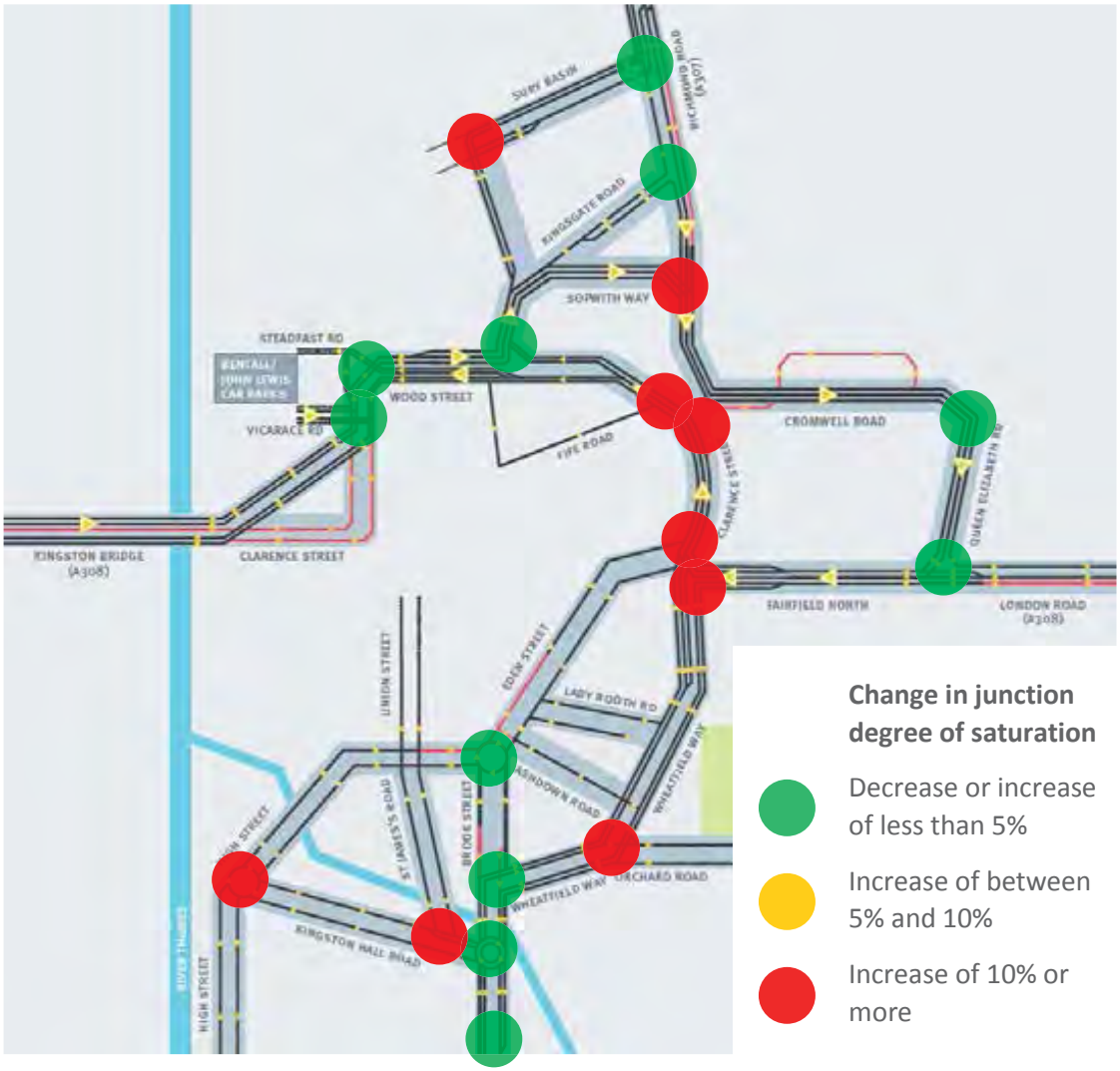


Table 4.3 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 3 model, AM peak hour

Junction	Name	2031 future baseline	Scenario 3	Change
23/063	London Rd / Queen Elizabeth Rd	85	66	-19
23/068	Fairfield Way / Wheatfield Way	82	100	18
23/065	Wheatfield Way / Orchard Rd	82	102	20
23/047	Wheatfield Way / Brook St	65	58	-7
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	69	67	-2
23/111	Penrhyn Rd / The Bittoms	80	76	-4
23/053	Kingston Hall Rd / St James's Rd	56	68	12
RAB	High St / Kingston Hall Rd Roundabout	64	99	35
RAB	Eden St / Brook St Roundabout	84	75	-9
23/004	Wheatfield Way / Eden St	75	104	29
23/080	Clarence St / Richmond Rd / Cromwell Rd	65	80	15
23/011	Wood St / Fife Rd	58	83	25
23/071	Wood St / Horse Fair / Vicarage Rd	60	61	1
23/072	Wood St / Car Park Entry	50	49	-1
23/074	Wood St East / Wood St West	75	51	-24
23/076	Sopwith Way / Richmond Rd	60	90	30
23/075	Kingsgate Rd / Richmond Rd	54	47	-7
23/159	Richmond Rd / Sury Basin	48	64	16
23/160	Seven Kings Way / Sury Basin	12	45	33
23/062	Queen Elizabeth Rd / Birkenhead Avenue	60	27	-33

4.16 The addition of the southbound movement along Clarence Street results in the degrees of saturation of the junction along this section increasing. In particular, the Wheatfield Way / Fairfield North junction becomes oversaturated, with the new southbound arm having a degree of saturation 104% and the westbound arm operating at 100%. On the southbound arm, the results report a mean maximum queue length of 31PCUs, which will result in queuing along this new route.

4.17 The Wheatfield Way / Eden Street junction also operates at above its capacity, with the northbound movement having a degree of saturation of 104%. However, whilst the Clarence Street / Richmond Road / Cromwell Road junction outside the station has an increase degree of saturation, it appears to operate within capacity, with a degree of saturation of 80%.

4.18 In contrast, the two junctions at either end of Queen Elizabeth Road (at London Road and Birkenhead Avenue) become less congested. This is due to southbound traffic diverting on to the new southbound section of Clarence Street, and therefore no longer needing to travel via Queen Elizabeth Road.

4.19 The changes in the North Kingston area as per the development brief proposal operate satisfactorily. Whilst the degrees of saturation at the affected junctions (Seven Kings Way / Sury Basin and Richmond Road / Sury Basin) increase from the future baseline, this is to be expected given the increased volume of traffic using the Seven Kings Way / Sury Basin corridor. In any case, the degrees of saturation at these two junctions remain relatively low, which indicates that they have some spare capacity.

4.20 There are again some fluctuations in degrees of saturation elsewhere in the network, but these are generally at non-critical sections of the network. The exceptions to this are the Wheatfield Way / Orchard Road junction and High Street / Kingston Hall Road roundabout, which have high degrees of saturation. However, in reality most traffic will use the main Wheatfield Way / Kingston Hall Road corridor rather than detouring via side streets, which would most likely result in a lower degree of saturation at these junctions in practice.

PM peak hour

4.21 As with the AM peak, the changes in junction degrees of saturation are shown on Figure 4.4 below, with the results tabulated in Table 4.4 below.

Figure 4.4 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 3 model, PM peak hour

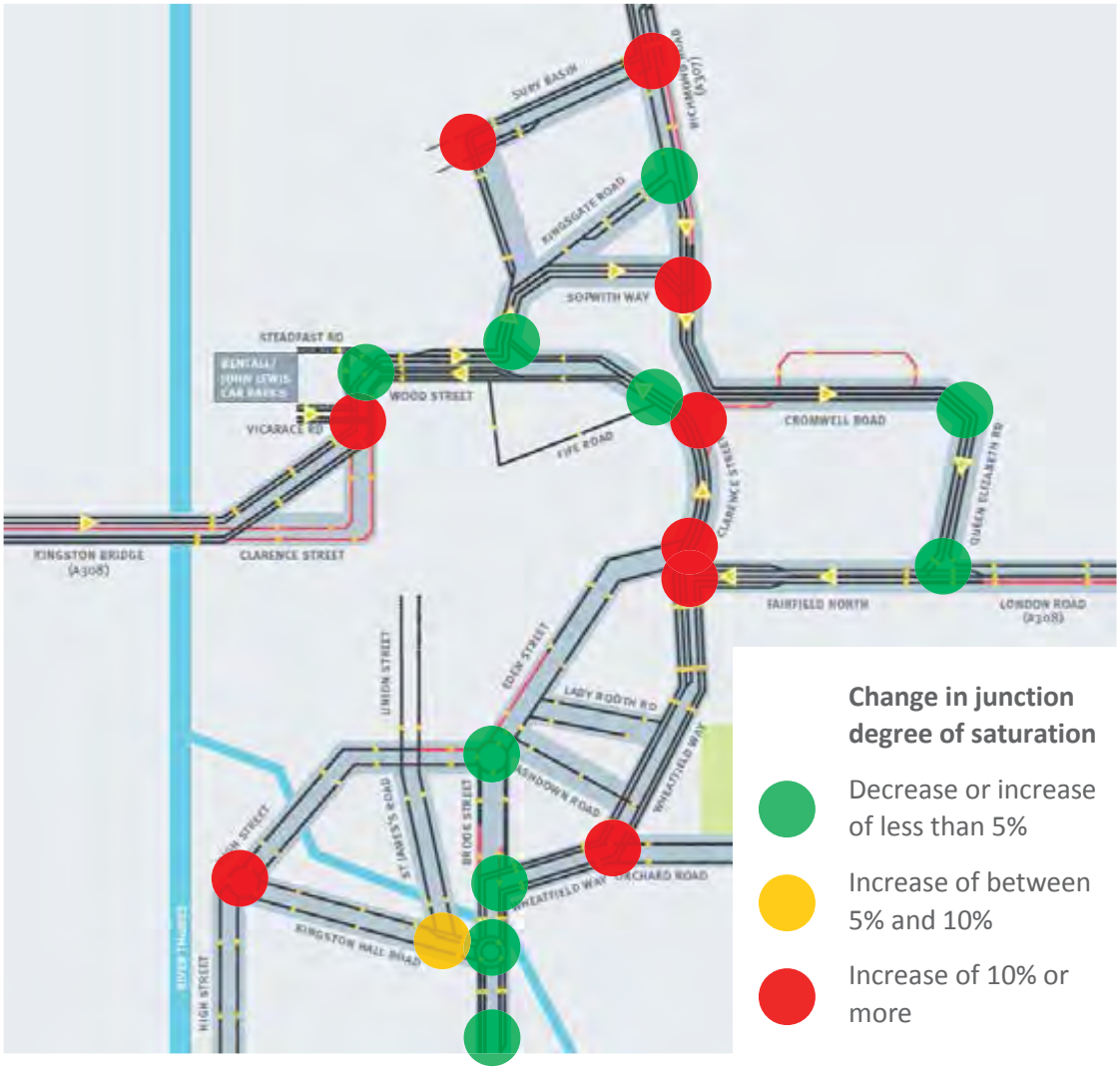


Table 4.4 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 3 model, PM peak hour

Junction	Name	2031 future baseline	Scenario 3	Change
23/063	London Rd / Queen Elizabeth Rd	71	57	-14
23/068	Fairfield Way / Wheatfield Way	54	98	44
23/065	Wheatfield Way / Orchard Rd	69	79	10
23/047	Wheatfield Way / Brook St	97	71	-26
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	86	72	-14
23/111	Penrhyn Rd / The Bittoms	60	59	-1
23/053	Kingston Hall Rd / St James's Rd	42	47	5
RAB	High St / Kingston Hall Rd Roundabout	66	99	33
RAB	Eden St / Brook St Roundabout	88	75	-13
23/004	Wheatfield Way / Eden St	70	104	34
23/080	Clarence St / Richmond Rd / Cromwell Rd	81	91	10
23/011	Wood St / Fife Rd	74	64	-10
23/071	Wood St / Horse Fair / Vicarage Rd	51	82	31
23/072	Wood St / Car Park Entry	64	57	-7
23/074	Wood St East / Wood St West	56	50	-6
23/076	Sopwith Way / Richmond Rd	69	84	15
23/075	Kingsgate Rd / Richmond Rd	65	46	-19
23/159	Richmond Rd / Sury Basin	45	54	9
23/160	Seven Kings Way / Sury Basin	11	36	25
23/062	Queen Elizabeth Rd / Birkenhead Avenue	32	21	-11

4.22 As with the AM peak hour, the new southbound movement along Clarence Street affects the junctions along this section. In particular, at the Wheatfield Way / Fairfield North junction, the new southbound movement operates at its theoretical capacity, with a 98% degree of saturation. The degree of saturation for the Fairfield North arm is also high, at 94%. The southbound movement is particularly likely to cause some queuing back towards Eden Street and possibly towards Kingston station. The degree of saturation at the Wheatfield Way / Eden Street junction also increase to 104%, indicating that it is operating above capacity.

4.23 On the other hand, whilst the degree of saturation for the Clarence Street / Richmond Road / Cromwell Road junction located outside the station increases, it seems to operate within capacity. For general traffic, the northern arm performs worst with a degree of saturation of 82%, with the right turn movement for buses only from the southern arm at 91%.

4.24 Also, as with the AM peak hour, the degrees of saturation for the two signalised junctions at either end of Queen Elizabeth Road decrease, due to southbound traffic using the new route along Clarence Street. Similarly, as with the AM peak hour the changes to the road network in the North Kingston area operate satisfactorily, with junction degrees of saturation at the Seven Kings Way / Sury Basin and Richmond Road / Sury Basin at acceptable levels.

4.25 There are again some fluctuations in degrees of saturation elsewhere in the network, but these are generally at non-critical sections of the network. The exception to this is at the High Street / Kingston Hall Road roundabout, where the model is reporting a high degree of saturation, due to unrealistic traffic assignment. However, in reality most traffic will use the main Wheatfield Way / Kingston Hall Road corridor rather than detouring via Eden Street, which would most likely result in a lower degree of saturation at this roundabout in practice.

Scenario 8: Wood Street closed, Sopwith Way two way

AM peak hour

4.26 The diagram in Figure 4.5 below show the modelled changes in junction degrees of saturation between the 2031 future baseline and 2031 Scenario 8 model in the AM peak hour. These results are also shown in Table 4.5 below.

Figure 4.5 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 8 model, AM peak hour

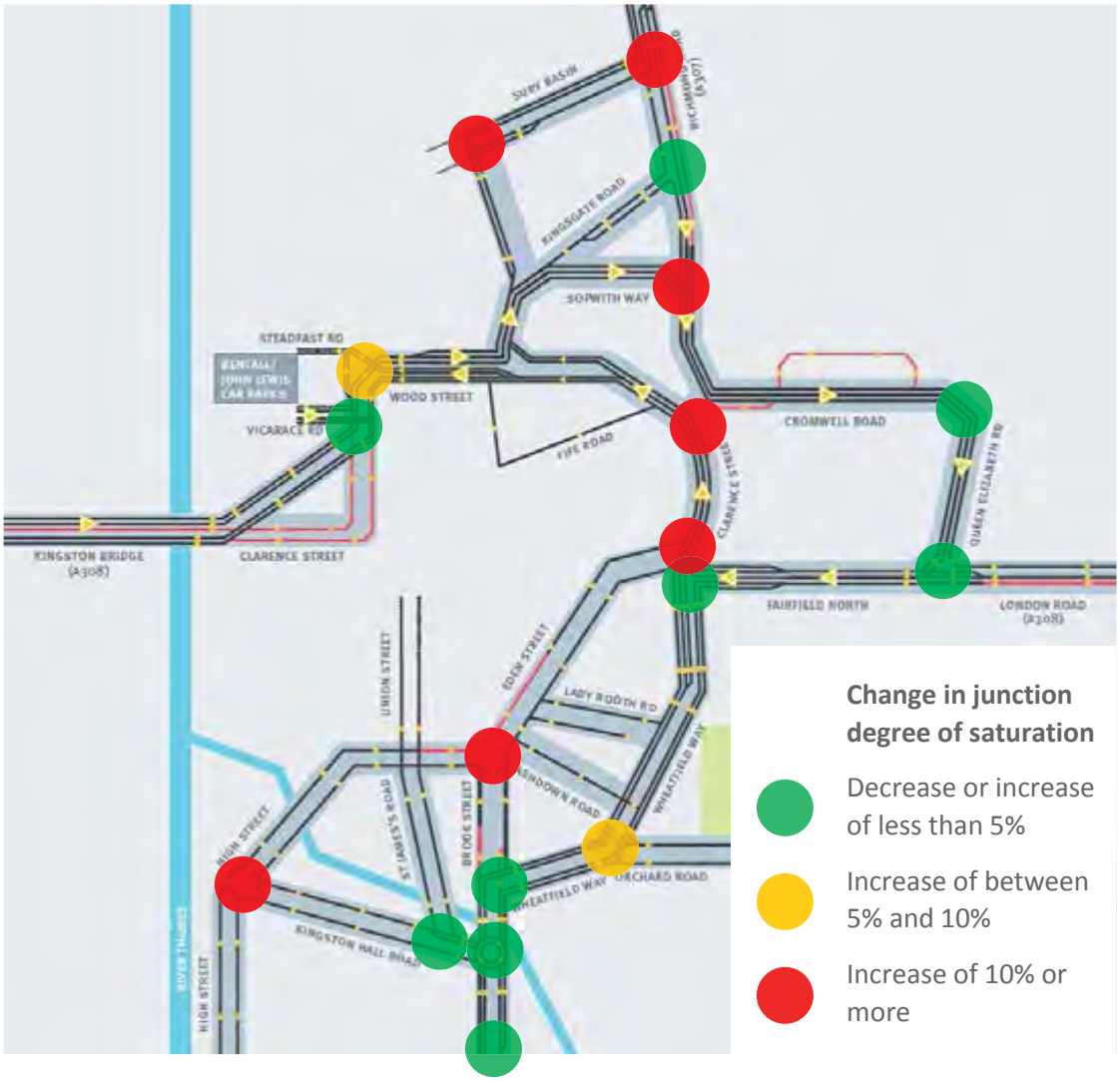


Table 4.5 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 8 model, AM peak hour

Junction	Name	2031 future baseline	Scenario 8	Change
23/063	London Rd / Queen Elizabeth Rd	85	59	-26
23/068	Fairfield Way / Wheatfield Way	82	76	-6
23/065	Wheatfield Way / Orchard Rd	82	87	5
23/047	Wheatfield Way / Brook St	65	56	-9
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	69	54	-15
23/111	Penrhyn Rd / The Bittoms	80	69	-11
23/053	Kingston Hall Rd / St James's Rd	56	55	-1
RAB	High St / Kingston Hall Rd Roundabout	64	81	17
RAB	Eden St / Brook St Roundabout	84	107	23
23/004	Wheatfield Way / Eden St	75	89	14
23/080	Clarence St / Richmond Rd / Cromwell Rd	65	91	26
23/011	Wood St / Fife Rd	58	-	
23/071	Wood St / Horse Fair / Vicarage Rd	60	60	0
23/072	Wood St / Car Park Entry	50	55	5
23/074	Wood St East / Wood St West	75	-	
23/076	Sopwith Way / Richmond Rd	60	142	82
23/075	Kingsgate Rd / Richmond Rd	54	56	2
23/159	Richmond Rd / Sury Basin	48	68	20
23/160	Seven Kings Way / Sury Basin	12	70	58
23/062	Queen Elizabeth Rd / Birkenhead Avenue	60	37	-23

4.27 These results indicate very clearly that the critical junction for this scenario is the Sopwith Way / Richmond Road junction, which has a degree of saturation of 142%. This is due to all arms of this junction becoming two-way, with high flows for various conflicting movements. This extremely high degree of saturation persists even though the SoLHAM modelling has already displaced a significant number of through trips away from KTC. Such a high degree of saturation would result in long delays, and the potential for queues to quickly grow and block back to upstream junctions.

4.28 The new layout for the Clarence Street / Richmond Road / Cromwell Road junction outside the station operates at close to capacity, with a degree of saturation of 91%. The critical movement is the new northbound movement from Clarence Street towards Richmond Road.

4.29 There are varied fluctuations in junction degrees of saturation across the remainder of the network, due to a combination of traffic assignment anomalies and changes in traffic patterns due to the SoLHAM results for this scenario. However, most other junctions are predicted operate well within capacity in any case. The exception to this is the Eden Street / Brook Street roundabout, however this high degree of saturation appears to be caused the a software issue that results in an unrealistic proportion of traffic being assigned via Eden Street. However, in reality most traffic will use the main Wheatfield Way / Kingston Hall Road corridor rather than detouring via Eden Street, which would most likely result in a lower degree of saturation at this roundabout in practice.

4.30 As with Scenario 3, the changes in the North Kingston area appear to operate satisfactorily, with acceptable degrees of saturation at the Seven Kings Way / Sury Basin and Richmond Road / Sury Basin junctions.

PM peak hour

4.31 Figure 4.6 below shows predicted changes in junction degrees of saturation between the 2031 future baseline and the 2031 Scenario 8 models for the PM peak hour, whilst Table 4.6 below tabulates these results.

Figure 4.6 Changes in junction degrees of saturation between the 2031 future baseline model and 2031 Scenario 8 model, PM peak hour

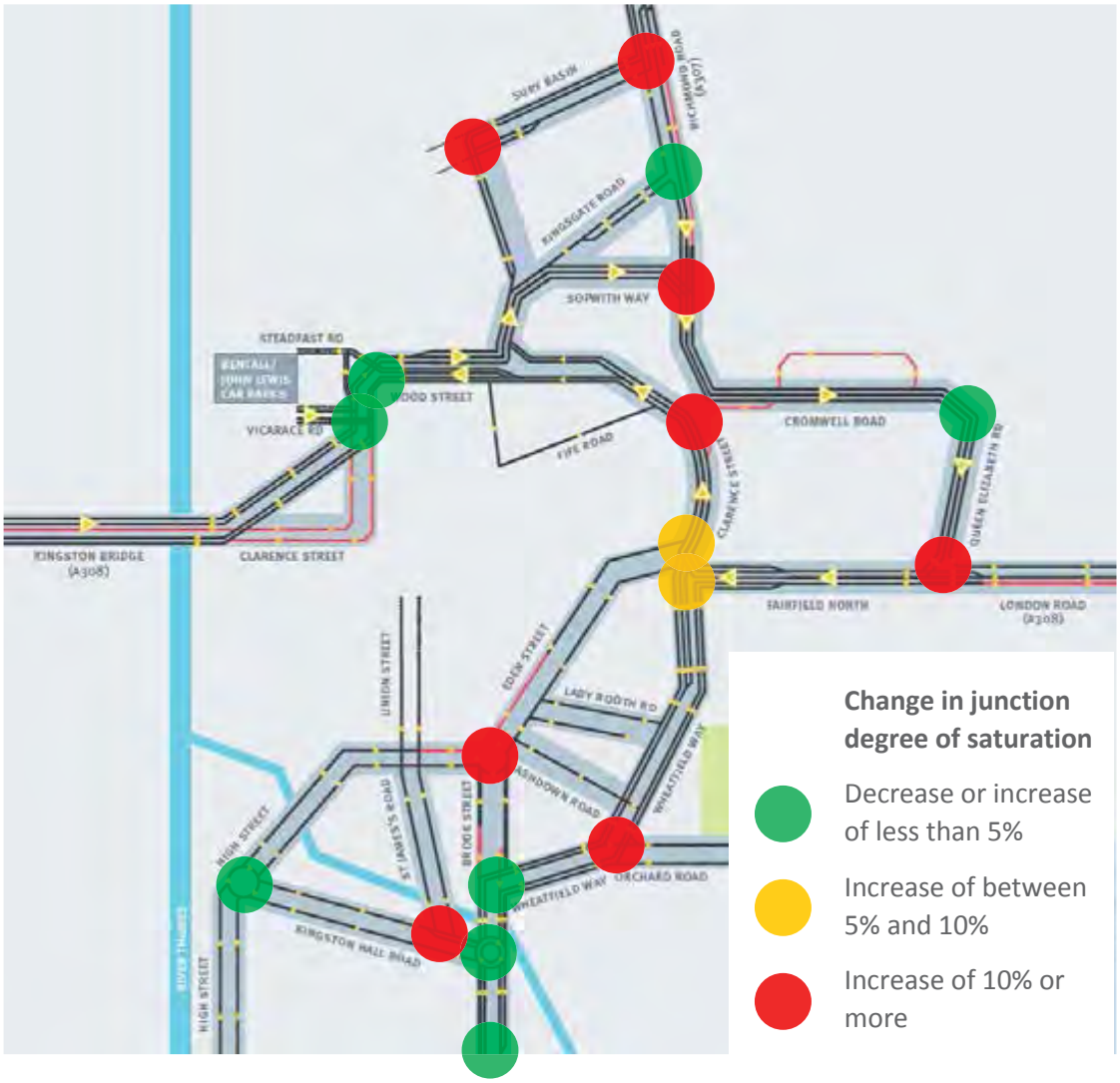


Table 4.6 Junction degree of saturation results for the 2031 future baseline model and 2031 Scenario 8 model, PM peak hour

Junction	Name	2031 future baseline	Scenario 8	Change
23/063	London Rd / Queen Elizabeth Rd	71	86	15
23/068	Fairfield Way / Wheatfield Way	54	58	4
23/065	Wheatfield Way / Orchard Rd	69	86	17
23/047	Wheatfield Way / Brook St	97	64	-33
RAB	Wheatfield Way / Penrhyn Rd / Kingston Hall Rd Roundabout	86	67	-19
23/111	Penrhyn Rd / The Bittoms	60	59	-1
23/053	Kingston Hall Rd / St James's Rd	42	49	7
RAB	High St / Kingston Hall Rd Roundabout	66	54	-12
RAB	Eden St / Brook St Roundabout	88	111	23
23/004	Wheatfield Way / Eden St	70	77	7
23/080	Clarence St / Richmond Rd / Cromwell Rd	81	92	11
23/011	Wood St / Fife Rd	74	-	
23/071	Wood St / Horse Fair / Vicarage Rd	51	50	-1
23/072	Wood St / Car Park Entry	64	66	2
23/074	Wood St East / Wood St West	56	-	
23/076	Sopwith Way / Richmond Rd	69	100	31
23/075	Kingsgate Rd / Richmond Rd	65	52	-13
23/159	Richmond Rd / Sury Basin	45	83	38
23/160	Seven Kings Way / Sury Basin	11	53	42
23/062	Queen Elizabeth Rd / Birkenhead Avenue	32	32	0

4.32 The Sopwith Way / Richmond Road junction operates at its theoretical capacity, with a junction degree of saturation of 100%. This is lower than its degree of saturation for the AM peak hour, as traffic flows at this junction are lower in the PM peak relative to the AM peak. Nevertheless, there are still various conflicting movements with high flows, and such a degree of saturation is likely to result in unstable operation with potentially long queues and delays. The operation of the junction outside the station is similar in the PM peak hour to the AM peak hour, with a junction degree of saturation of 92%.

4.33 As with the AM peak hour, there are varied fluctuations in junction degrees of saturation across the remainder of the network, however, most other junctions are predicted operate well within capacity in any case. The exception to this is again the Eden Street / Brook Street roundabout. In reality (as with the AM peak hour) most traffic will use the main Wheatfield Way / Kingston Hall Road corridor rather than detouring via Eden Street, which would most likely result in a lower degree of saturation at this roundabout in practice.

4.34 Again, the changes to the road network in the North Kingston area associated with the development brief operate satisfactorily, with acceptable degrees of saturation at the Seven Kings Way / Sury Basin and Richmond Road / Sury Basin junctions.

5 Conclusions

5.1 This report has described the scenarios modelling that has been undertaken to compare the three shortlisted scenarios, which follows on from the baseline modelling work that was previously undertaken. The sections below outline the key findings for each scenario.

Scenario 1: Strategic enhancements

5.2 The main impact that this scenario has on the operation of the highway network is to reduce the number of lanes along the Clarence Street / Wood Street section of the relief road (between Fairfield North and where Wood Street diverges into two) from three lanes to two. As such, this becomes a critical section of the network. The modelling results indicate the following:

- There is a moderate level of displacement of through vehicle trips in the AM peak hour. In the PM peak hour, there is a negligible level of displacement.
- The critical section of Clarence Street / Wood Street operates at its theoretical capacity in both peak periods; as such, there is the potential for queueing and delays.
- Some junctions not directly impacted by Scenario 1 benefit from reduced degrees of saturation due to lower traffic levels.

5.3 The overall conclusion is that whilst the modelling predicts that this scenario will operate within its theoretical capacity, the reduction in the number of traffic lanes available may have a negative impact on network stability and resilience.

Scenario 3: Clarence Street two way

5.4 The main feature of this scenario is to provide for southbound movement in the section of Clarence Street between Cromwell Road and Fairfield North by conversion from one-way to two-way. This adds complexity to various junctions, in particular the Richmond Road / Cromwell Road / Clarence Street / Wood Street junction and Wheatfield Way / Fairfield North junction. The following key points have emerged from the modelling:

- There is some trip displacement that occurs in this scenario. For both of the peak periods, a small proportion of through trips are displaced.

- The Fairfield North / Wheatfield Way junction operates at capacity, particularly for the new southbound movements coming from Clarence Street.
- In the AM peak, the Clarence Street / Eden Street junction is over capacity.
- The Richmond Road / Cromwell Road / Clarence Street / Wood Street junction outside the station operates within capacity.
- The revised North Kingston layout (with Seven Kings Way and Sury Basin becoming the main corridor for northbound traffic) operates satisfactorily.

5.5 As such, the modelling indicates there are localised issues with junction capacity for this scenario. However, there is the potential for this scenario to function satisfactorily if further design and development work was undertaken to refine junction layouts.

Scenario 8: Wood Street closed, Sopwith Way two way

5.6 Out of the scenarios tested, this has the most significant impact on road network capacity. This is to be expected, as the closure of Wood Street in front of the station means that there is a significant increase in traffic on Sopwith Way, which requires conversion to two way.

5.7 As such, the modelling results indicate the following:

- There is a high level of through trip displacement in both the AM and PM peak hours due to reduced junction capacity. The movements that show the most significant displacement are those in both directions between Kingston Bridge and London Road.
- The critical section of the network is the Sopwith Way corridor (including the road underpasses at either end of the station), which now becomes two-way.
- The most critical junction is at Sopwith Way / Richmond Road, which operates at well over its capacity due to now catering for conflicting movements with high volumes.
- The Richmond Road / Cromwell Road / Clarence Street / Wood Street junction outside the station is almost at capacity.
- As with Scenario 3, the revised North Kingston layout (with Seven Kings Way and Sury Basin becoming the main corridor for northbound traffic) operates satisfactorily.

5.8 In summary, the modelling indicates that based on the current design of this scenario and the modelling assumptions used, this scenario would have various operational issues, in particular due to chronic capacity issues at the Sopwith Way / Richmond Road junction. The high volume of traffic displaced from the town centre means that there may be significant impacts on alternative routes. However, it may be possible to resolve these in the longer term, both through further design work and if significant mode shift can be achieved.

Overall modelling conclusions

5.9 In short, the modelling results reflect the nature of the shortlisted scenarios, which reduce the capacity of the road system in the town centre (to differing degrees) in order to achieve the wider vision for KTC. The built-up nature of the town centre limits the available space for transport infrastructure, which means that trade-offs need to be made between competing objectives and modes.

5.10 The modelling indicates that this reduction in capacity displaces a noticeable number of vehicle trips away from KTC. Due to the nature of SoLHAM (which uses a fixed OD matrix), the results suggest that only through trips are affected. However, in practice demand for trips to the town centre would also be supressed, as they would also be affected by any reduction in capacity on the town centre's road network.

5.11 Nevertheless, the results obtained provide insights into the relative performance of each scenario, and also highlight issues that will need to be focussed on as part of further design and development work. It is clear that in traffic terms, some of the shortlisted scenarios will be more challenging to implement than others. This therefore suggests that a phased approach may be sensible, with different scenarios suited to different implementation timeframes. In addition, the interface between these scenarios and the bus options for the town centre that are being considered will need to be taken into account, so that the layout of the road network can support efficient bus operations.

Control Sheet

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Originator
David Sutanto

Other Contributors
John Allen

Reviewed by
Alex Roberts

Distribution

Client	Steer Davies Gleave
Nick Greenwood	Project team

Our offices

Bogotá, Colombia
+57 1 322 1470
colombiainfo@sdgworld.net

Bologna, Italy
+39 051 656 9381
italyinfo@sdgworld.net

Boston, USA
+1 (617) 391 2300
usainfo@sdgworld.net

Denver, USA
+1 (303) 416 7226
usainfo@sdgworld.net

Leeds, England
+44 113 389 6400
leedsinfo@sdgworld.net

London, England
+44 20 7910 5000
sdginfo@sdgworld.net

Madrid, Spain
+34 91 541 8696
spaininfo@sdgworld.net

Mexico City, Mexico
+52 (55) 5615 0041
mexicoinfo@sdgworld.net

New York, USA
+1 (617) 391 2300
usainfo@sdgworld.net

Rome, Italy
+39 06 4201 6169
italyinfo@sdgworld.net

San Juan, Puerto Rico
+1 (787) 721 2002
puertoricoinfo@sdgworld.net

Santiago, Chile
+56 2 2757 2600
chileinfo@sdgworld.net

São Paulo, Brazil
+55 (11) 3151 3630
brasilinfo@sdgworld.net

Toronto, Canada
+1 (647) 260 4860
canadainfo@sdgworld.net

Vancouver, Canada
+1 (604) 629 2610
canadainfo@sdgworld.net