Maidstone Local Plan Review

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Maidstone Local Plan Review

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Executive Summary

TO INCLUDE IN FINAL REPORT

1. Introduction

1.1 Background

Maidstone Borough Council (MBC) and Kent County Council (KCC) are undertaking a Local Plan Review (LPR) for the borough to address the latest Government standard methodology for calculating authorities' future housing numbers and extend the Plan period to at least 2037.

The current Maidstone Borough Local Plan was adopted in 2017 and provides for the housing, employment and retail development needed for the period 2011-2031. The annual housing requirement will increase from the current Local Plan figure of 883 homes/year up to 1,236 homes/year from 2022.

MBC / KCC have asked Jacobs to provide consultancy support in the consideration of reasonable alternative options for meeting housing and other development needs. This includes evidence gathering on the transport and air quality implications of the emerging draft LPR options. Whilst there are no mandated air quality Clean Air Zones (CAZ) within the area, there are Air Quality Management Areas (AQMAs) and a will within the local authority for any LPR options to consider the implications for air quality.

While MBC / KCC have advised that the preferred methodology would use the emerging Kent-wide transport model to underpin the eventual evidence base, this is still being developed and is unavailable for testing until Autumn 2020 at the earliest. The overall methodology will therefore include two stages involving early assessment of different spatial alternatives in preparation for more detailed assessment in the Kent-wide transport model.

This piece of work will form the initial stages of work (Stage 1) that have been progressed in advance of the model, to establish a baseline and identify the high-level impacts and opportunities of potential development sites to refine the process prior to full testing. This has combined a bespoke spreadsheet application with existing transport modelling tools, available data, review of key reports, and stakeholder engagement to undertake initial "soft-testing" and explore potential transport challenges and issues.

Subject to the outcomes of Stage 1, and availability of the Kent-wide transport model, Stage 2 will then involve more detailed transport modelling to refine the spatial strategy options, air quality modelling assessments, and inform the mitigation/ intervention package required to deliver sustainable growth in the borough.

1.2 Scope of Works

The overarching project objectives of both Stages 1 and 2 are:

1) Assess the quality and capacity of transport infrastructure across the borough and its ability to meet forecast demands.
2) Assess the cumulative impacts of the LPR development options on the borough's transport network.
3) Identify proposals and potential measures to mitigate the impacts of development to inform the infrastructure requirements associated with the LPR. This should include, but is not limited to:
   a) Identification of the potential barriers to the utilisation of sustainable transport across the borough.
   b) Identification of potential measures to enable and achieve higher levels of sustainable transport choice across the borough.
   c) Identification of potential intervention measures on the transport network.
   d) Review the outputs of measures included in a revised Integrated Transport Strategy.
   e) Identification of high-level costings of the proposed / identified potential mitigation measures and interventions.
4) Assess the cumulative air quality impacts of the LPR development options on the Maidstone Air Quality Management Area (AQMA), on any adjacent areas at risk of exceedances, any areas at risk on National

Compliance with the EU Limit values, and on relevant AQMAs and National Compliance issue areas in neighbouring authorities.

5) Set out proposals to avoid or mitigate unacceptable risks from air pollution.

As agreed with MBC / KCC, a series of initial Stage 1 tasks has been undertaken in the first half of 2020 to lay the ground work for Stage 2 and to fulfill the overarching objectives. Stage 1 tasks are summarised in **Table 1** below.

Table 1: Stage 1 Task Breakdown

Stage 1 Tasks	Summary Description
A	**Review of the existing 2018 Maidstone VISUM Traffic Model –** review and potential 'light-touch' amendments of the 2018 VISUM model and accompanying documentation, in advance of Kent-wide model, to inform initial testing
B	**Transport Baseline Review -** comprehensive review is required to understand the transport baseline including delivery of sites and schemes since the adopted 2017 Local Plan, data gaps and potential challenges
C	**Initial Site Options 'Soft-testing' –** combination of high-level distribution and assignment information from 2018 VISUM model with LPR development trip generation spreadsheet to 'Soft Test' the likely order of magnitude of traffic impacts on key parts of the network
D	**Initial Air Quality Review –** Review of key documents such as the Low Emission Strategy, Annual Status Report, 2017 Adopted Local Plan, monitoring data, AQMAs, DEFRA data, and relevant 1C data. Initial desk top review of previous air quality work, baseline condition and high-level assessment of likely impacts of LPR options on air quality.
E	**Early Sifting of Transport Opportunities and Challenges –** provide technical support to MBC / KCC at stakeholder workshops, the identification of a long list of transport challenges and opportunities and sifting of schemes to inform an updated Integrated Transport Strategy (ITS)
F	**Baseline Review and Initial Options Technical Note -** collating the findings of Tasks 1A-1D and make recommendations for next steps and Stage 2 assessments

2. Transport Baseline Review

2.1 Introduction

Maidstone's transport network has come under increasing strain in recent years, principally due to the configuration of its road and rail networks alongside the growing demand for travel. While the need for alternative transport options to the car is becoming more significant, the geography of the borough means that sustainable travel choices are a more feasible option for particular locations and journeys than others.

This topic has been further explored through a review of the most up to date available information and data, in order to gain a full understanding of the current transport situation, existing challenges and opportunities, and identify any potential gaps to inform future data collection needs. The key findings are presented throughout this section.

2.2 Existing Transport Network

This section provides a summary of the existing transport networks in the borough including highways, public transport, walking and cycling.

Highways

Major Corridors

The town of Maidstone is principally a radial settlement and bisected by the River Medway through its centre. The M20 Motorway is 2km to the north of the town leading west to the M25 and east towards the Channel crossings at Folkestone and Dover. The following key radial corridors link Maidstone Town Centre with the Strategic Road Network (SRN), the surrounding borough and beyond:

- A229 – this corridor stems from Maidstone Town Centre and intersects Staplehurst, Linton and Loose, serving towns, neighbourhoods and villages to the south of the borough. It also stems northbound intersecting Ringlestone, Blue Bell Hill and Rochester, and provides direct access to the M20 and M2 for travel to and from areas across and beyond Kent;
- A26 – this corridor connects Maidstone Town Centre to the west of Maidstone, intersecting local areas such as Barming (for Maidstone Hospital) and external towns such as Tonbridge;
- A274 – this corridor stems from the Maidstone urban area towards the south east of the borough, and serves areas including Langley and Headcorn;
- A20 – this corridor extends west to east across the borough via the Town Centre, serving areas such as Larkfield and Leybourne to the west of Maidstone Town Centre, and areas such as Harrietsham, Lenham and Charing to the east. The route also provides a direct connection to the M20 at junction 6 to the west and junction 8 to the east; and
- A249 – this corridor stems from Maidstone Town Centre northeast out of the borough, connecting to the M20 at junction 7, the M2, and thereafter as far as the Isle of Sheppey.

Highway Network Demand

Figure 1 and

Figure 2 show typical traffic congestion levels along the main corridors that feed into and out of Maidstone during peak periods of travel.

Across both morning and evening peaks, high levels of congestion are visible on all key routes into Maidstone Town Centre, particularly at signalised junctions. Single-carriageways make up a large proportion of the corridors towards the south, west, east and northeast of the town centre, albeit there are sections of dual carriageway along the A229 in the urban centre. The greatest levels of traffic congestion (shown as red and dark red vehicle speeds) typically occur within a 3km radius, with a focus on the A20, A229 and A249 in the AM peak, with a predominant focus on the A229 in the PM peak.

Figure 1: Traffic Congestion in Maidstone: Morning Peak (typical conditions, Monday, 08:30)[1]

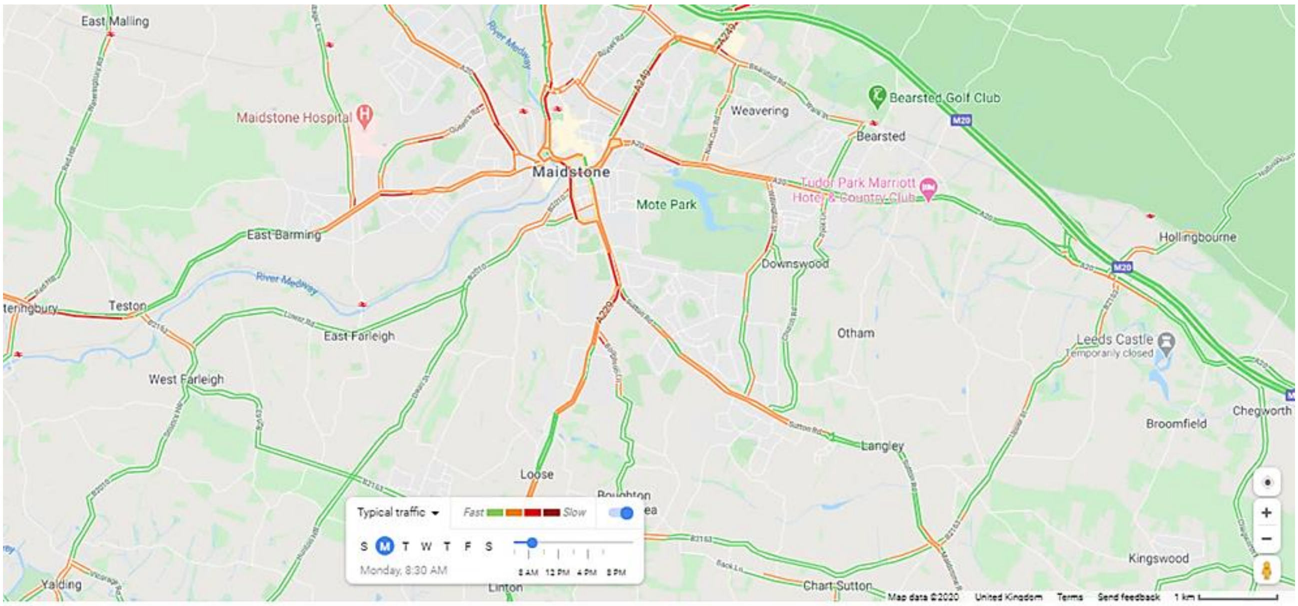
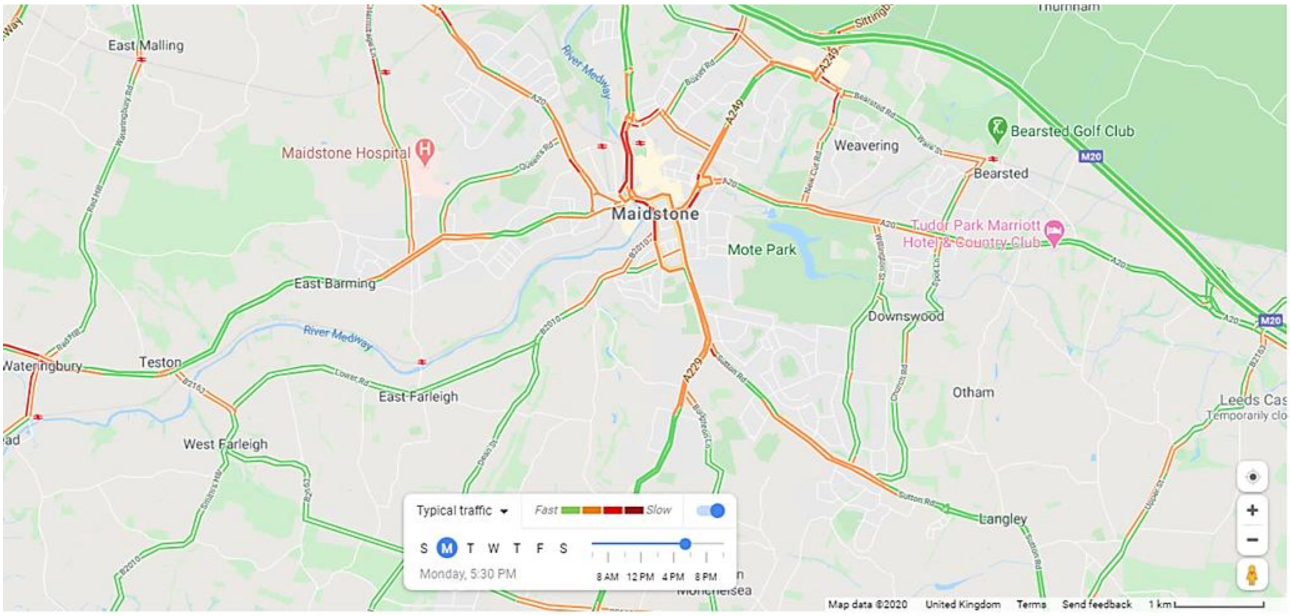


Figure 2: Traffic Congestion in Maidstone: Evening Peak (typical conditions, Monday, 17:30)[2]



[1] https://www.google.com/maps/@51.2587141,0.4695856,12z/data=!5m1!1e1

[2] https://www.google.com/maps/@51.2587141,0.4695856,12z/data=!5m1!1e1

Bus

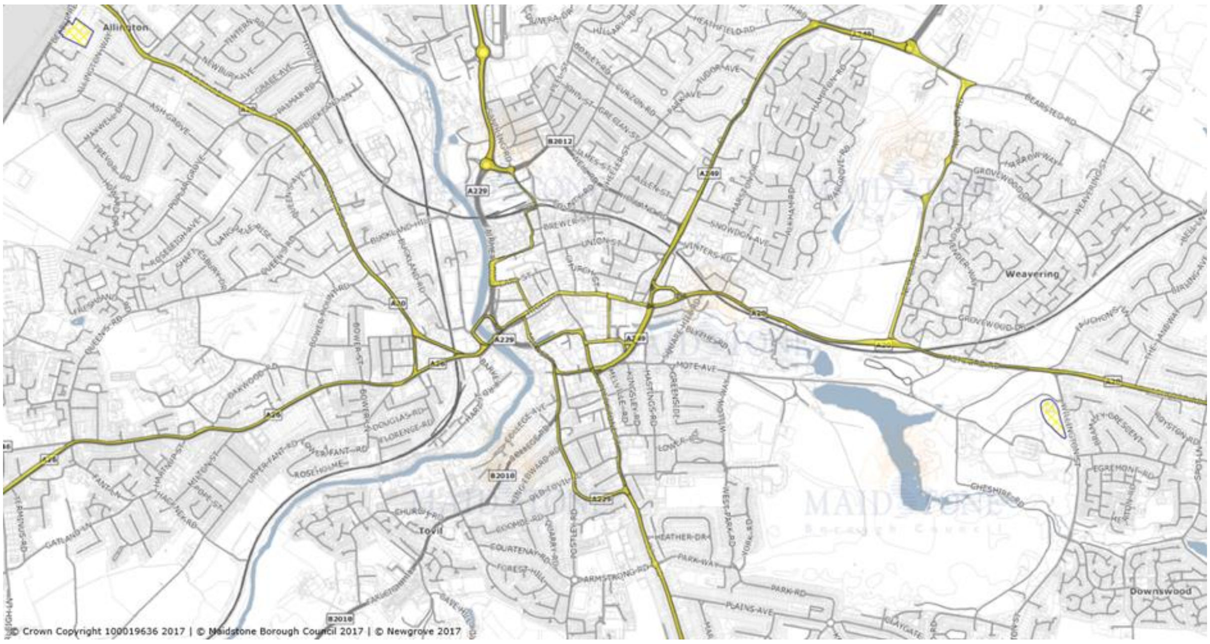
Park and Ride

Maidstone currently has 2 Park and Ride sites:

- London Road Park and Ride provides a 4-stop service from Allington to Maidstone Town Centre. The first of these stops is located parallel to Maidstone West train station (A1), and thereafter are within Maidstone Town Centre (B, E1 and G); and
- Similarly, Willington Street Park and Ride provides a 4-stop service into Maidstone Town Centre, serving Maidstone West train station (Stop U) and Maidstone Town Centre (Stops T, L1 and K1).

Both services serve Maidstone Town Centre 3 times an hour during weekday peak periods (every 20 minutes), and thereafter 2-3 times an hour during the interpeak period. Both these Park and Ride car park sites and associated bus routes into the town centre are shown in **Figure 3**.

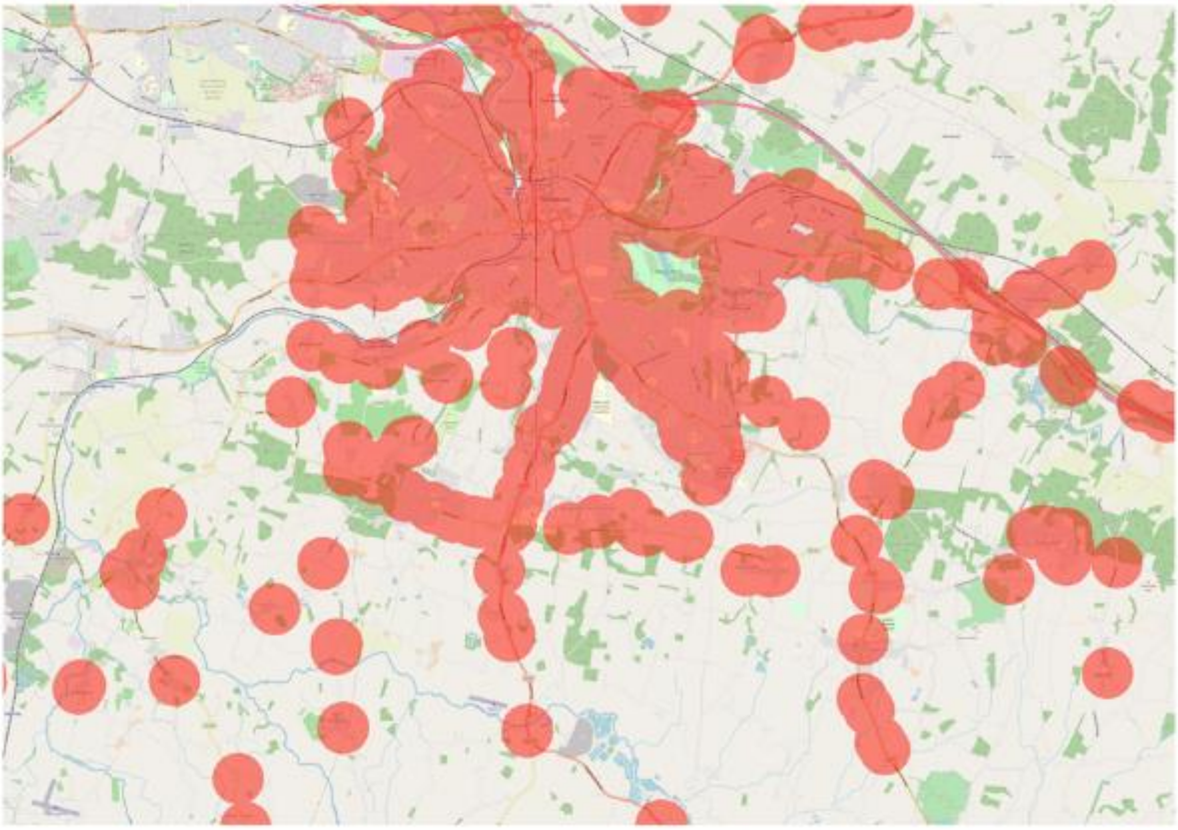
Figure 3: Park and Ride Sites and Routes in Maidstone



Bus Service Access

Figure 4 displays the location of bus stops across Maidstone in the context of a 400m catchment area, which is considered a reasonable distance people are willing to walk to a bus stop.

Figure 4: Access to Bus Services in Maidstone Based on a 400m Catchment Area



Based on this assessment, the following areas are not considered to have adequate direct access to a bus service:

- North of Coxheath – Forstal Lane is also excluded, being a quiet residential street with detached and semi-detached homes;
- Otham, a small village in west Maidstone;
- Areas of:
  - Parkwood (west of)
  - Allington (northeast of)
  - Weavering (northeast of)
  - Bearsted – cul-de-sacs of Mount Lane and Whiteheads Lane.

Bus Service Frequency

Table 2 provides details of the frequency of bus services in Maidstone based on the available timetables provided by Arriva.

Table 2: Summary of Bus Frequencies (Arriva Bus)[3]

Route Number	Route Details	Services / Hour		
		Peak	Inter Peak	Off Peak
X1/X2	Kings Hill to Maidstone KINGS HILL CONNECT via West Malling Station	2 to 3	1 to 2	2
H1	London Road Park and Ride to Maidstone Hospital Non-stop via Hermitage Lane	2	3	2
334	Sheerness to Maidstone via Minster, Iwade, Bobbing, Sittingbourne and Chestnut Street	1	1	1
333	Sittingbourne to Faversham via Bapchild, Teynham and Ospringe	1	1	1
155	Chatham to Maidstone via Rochester, Borstal, Wouldham, Peters Village, Burham, Eccles, Aylesford and Ringlestone	0.5	0.5	0.5
101	SAPPHIRE - Gillingham to Maidstone via Brompton, Chatham and Davis Estate	1 to 2	1	1
82	Maidstone Town Centre to Park Wood via Sutton Road and Sutton Woods	1 to 2	1 to 2	1
72	Maidstone to Kings Hill via Allington, Larkfield, Clare Park and West Malling	0.5	0.5	0.5
71	Maidstone to Snodland (71) or Leybourne Park (71A) via Allington, Larkfield and Lunsford Park	1 to 2	1	1 to 2
59	Maidstone to Grafty Green via Loose, Boughton Monchelsea, Chart Sutton, Kingswood and Ulcombe	<0.5 to 0.5	<0.5 to 1	0
12	Maidstone to Tenterden via Langley, Sutton Valence, Headcorn and Biddenden	0.5 to 1	0.5 to 1	0.5 to 1
11	Maidstone to Bearsted via Ashford Road and The Landway	<0.5	<0.5	<0.5
9	Maidstone Town Centre to Grove Green via Vinters Park	0.5 to 1	0.5 to 1	0
8	Maidstone Hospital to Maidstone Town Centre via Barming Heath, Beverley Road and Fant	<0.5	<0.5	0
6	Tunbridge Wells to Maidstone via Pembury, Paddock Wood, East Peckham, Nettlestead, Wateringbury, Teston and Barming	0.5 to 1	1	<0.5 to 0.5
5 (1)	Maidstone to Linton Corner via Loose Road and Loose	<0.5 to 2	<0.5 to 2	<0.5 to 2
5 (2)	Maidstone to Sandhurst via Loose, Staplehurst, Cranbrook and Hawkhurst	0.5	<0.5 to 0.5	<0.5
4	Maidstone Town Centre to Downswood via Ashford Road and Madginford	0.5 to 1	0.5	0
3	Maidstone Town Centre to Maidstone Hospital via Tonbridge Road	2	2	1

[3] https://www.arrivabus.co.uk/kent-and-surrey/places/maidstone/

Of the 20 bus services listed above, the X1/X2, H1 and 3 routes provide the highest frequency. Routes X1/X2 provide an express service to the West Malling / Kings Hill area from Maidstone, which is suitable for commuter trips to these employment areas located outside the borough. Route H1 provides a non-stop service also suitable for commuter and local trips to the Maidstone Hospital from the London Road Park and Ride site, while route 3 directly serves neighbourhoods south of A26 Tonbridge Road to access Maidstone Town Centre and Maidstone Hospital. Services with the lowest frequency appear to provide either shorter services via local neighbourhoods, towns and villages outside of the town centre, or longer journeys into the town centre via smaller villages and towns, often providing a less direct route (usually where these are not serviced by rail connections).

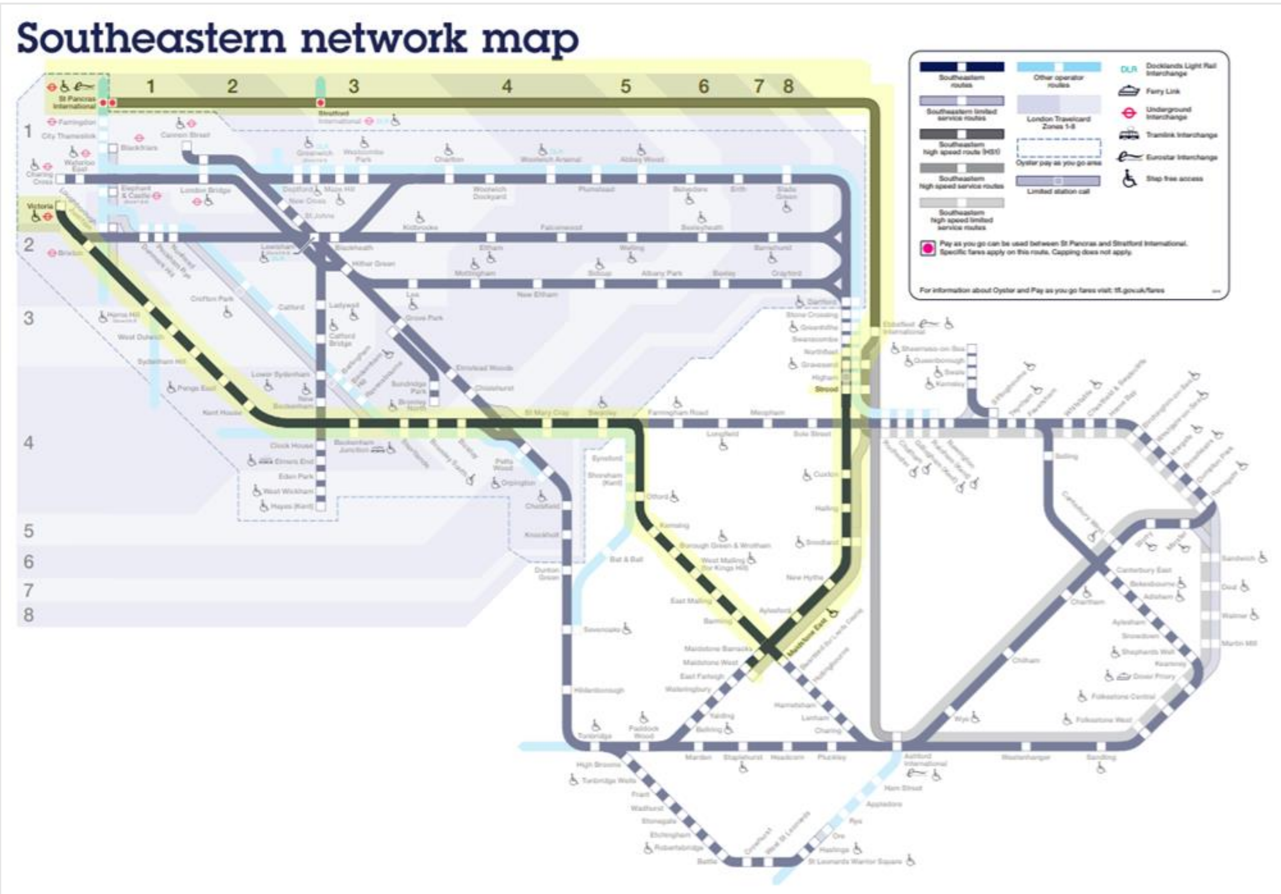
Rail

Rail Network

Southeastern operate the train services that call at the three stations located in Maidstone. Maidstone East and Maidstone West are the main stations located in close proximity to Maidstone Town Centre, whilst Maidstone Barracks is 1 stop north of Maidstone West on the same line.

Figure 5 details the network map for Southeastern, highlighting Maidstone East, Maidstone West and the two services providing access to central London; Victoria and St Pancras international.

Figure 5: Southeastern Rail Network Map (Routes to London Highlighted in Yellow)



Rail Service Frequency[4]

The service from Maidstone East to London Victoria is the main commuter line into London from the borough, with the journey taking approximately 1 hour and 9 minutes, stopping at around 10 locations on the route. There are up to 3 services an hour in the AM peak from Maidstone to London, offering 9 services in total across the morning period (from 6am to 10am). This is reversed in the PM peak, with up to 3 services in the PM peak from London to Maidstone, offering 8 services in total across the evening period (from 4pm to 7pm). In the interpeak and off peak (evening period) only 2 services an hour are provided in both directions.

Connection services to London can also be picked up from Strood Station (from Maidstone West) which offers a high speed 4-stop service, taking approximately 36 minutes, to London St Pancras International. Similar to service frequencies into London Victoria, there are up to 3 services an hour in the AM peak from Strood to London, offering 11 services in total across the morning period (from 6am to 10am), with 9 connecting services across the AM peak from Maidstone to Strood, via the Medway Valley Line. Again, this is reversed in the PM peak, with up to 3 services in the PM peak from London to Strood, offering 7 services in total across the evening period (from 4pm to 7pm), with 9 connecting services across the PM peak from Strood to Maidstone. In the interpeak and off peak (evening period) only 2 services an hour are provided in both directions.

There are also regular connections to Ashford International from Maidstone East, providing a service every 30 minutes in the peak periods, taking approximately 34 minutes. Further connections to Dartford are also provided from Maidstone West via Strood, with two services an hour in the peak periods, taking approximately 1 hour and 20 minutes.

Other key services include a direct connection between Maidstone West and Tonbridge, although the frequencies for the return trip from Tonbridge to Maidstone are low, with only 1 service in each of the four periods across the day (AM peak, inter peak, PM peak and off peak). A direct connection serves the line between Maidstone East and East Malling, taking approximately 8 minutes (2 stops) and West Malling, taking approximately 10 minutes (3 stops).

It should be noted that there is no direct service between Maidstone and Tunbridge Wells, which requires passengers to change at Tonbridge when travelling from Maidstone. Similarly, there are no direct train services to Chatham (requiring a change at Strood), Sevenoaks (requiring a change at Otford), and Swale (requiring changes at Strood) which adds to journey time, making travel by car a more attractive option.

In the south of the borough, Southeastern provides half-hourly services to London Charing Cross and Canon Street via Sevenoaks, and to Sandwich, via Dover Priory and Ashford International, from Headcorn, Staplehurst and Marden Stations.

Walking and Cycling

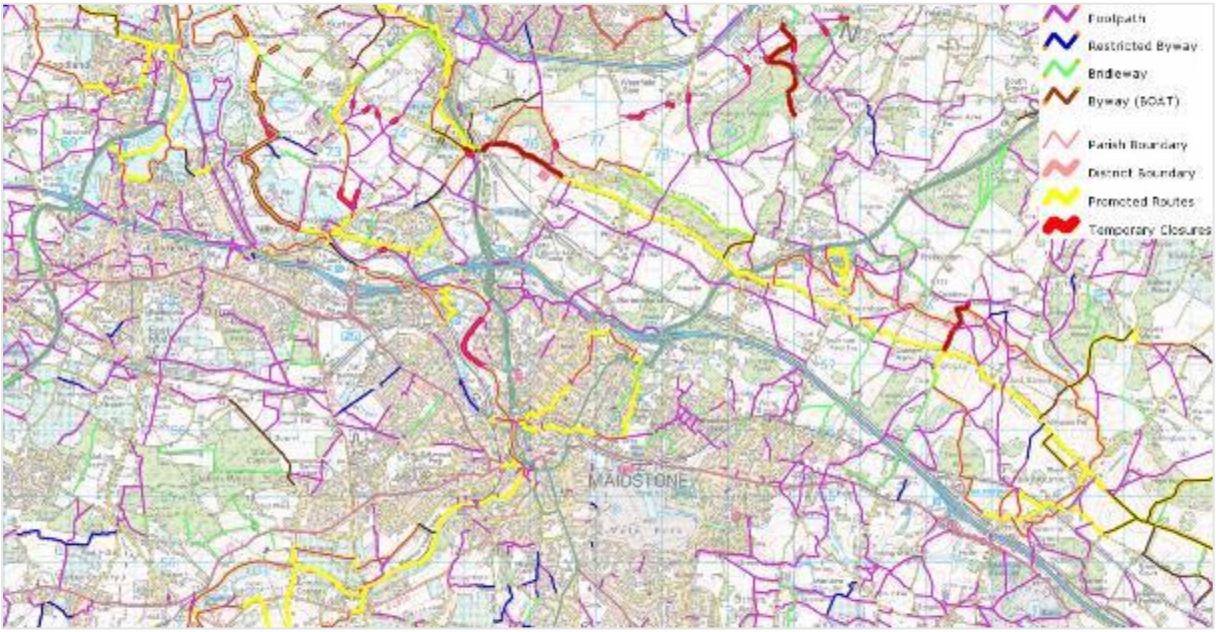
Walking

Figure 6 and **Figure 7**[5] illustrate the available Public Right of Way (PRoW) routes across the borough, as taken from the online KCC PRoW map. In the north of the borough (**Figure 6**), there is an extensive network of walking routes across the urban area, connecting to the town centre, and are primarily made up of footpaths, promoted routes and restricted byways. Acknowledging these routes are not convenient at all times of the day, particularly at night and in the winter, the routes provide reasonable connectivity for undertaking short trips between destinations, or as part of a longer journey when travelling in and around the urban area of the borough on foot.

[4] https://www.networkrail.co.uk/running-the-railway/the-timetable/

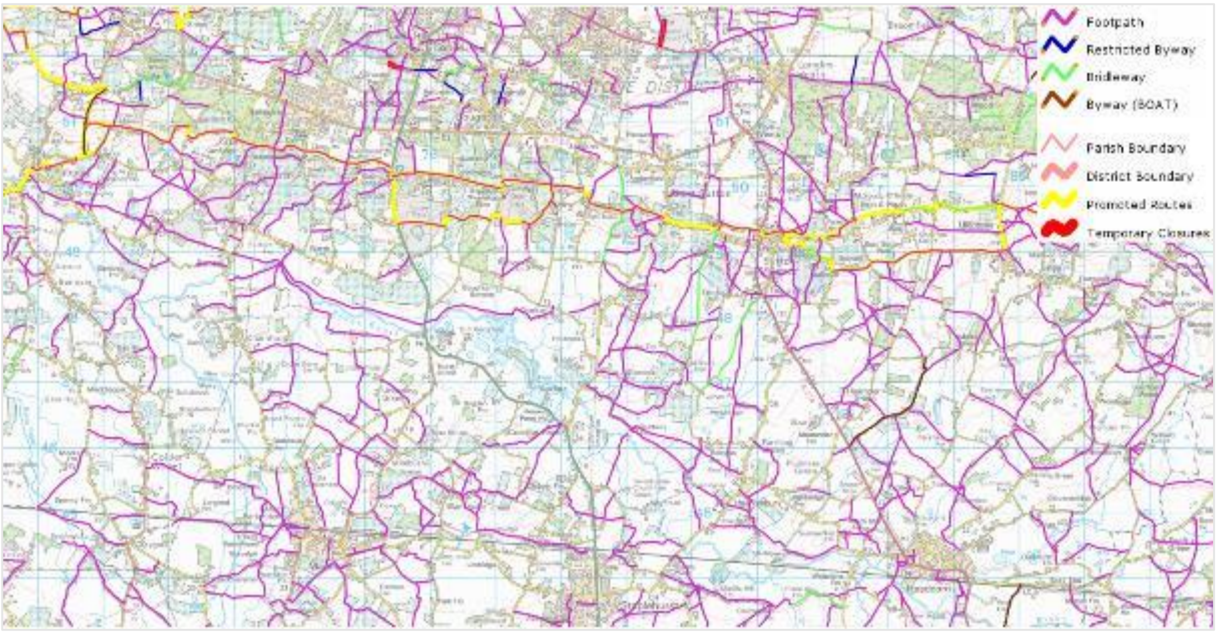
[5] https://webapps.kent.gov.uk/countrysideaccesscams/standardmap.aspx

Figure 6: Walking Routes in Maldstone – North of the Borough



In the south of the borough (**Figure 7**), there are also numerous walking routes available, mostly comprising of footpaths with a small number of promoted routes and bridleways. These appear to have good connections to the north of the borough and between smaller villages located in the south, providing options for sustainable travel on foot.

Figure 7: Walking Routes in Maidstone – South of the Borough



In addition, MBC have put together a pack containing eight different recreational walking routes around Maidstone, to explore the local area, as well as working alongside the Medway Valley Countryside Partnership to put together three walks that run along the river, as shown below:

- Walk 1 - Maidstone Town Centre (6 miles, 2.5 hours)
- Walk 2 - Oakwood (5.25 miles, 2 hours)
- Walk 3 - Sandling (4.5 miles, 2 hours)

- Walk 4 - Penenden Heath (4.5 miles, 2 hours)
- Walk 5 - Bearsted (4.5 miles, 2 hours)
- Walk 6 - Otham (4.5 miles, 2 hours)
- Walk 7 - Loose (5 miles, 2 hours)
- Walk 8 - Mote Park (3.75 miles, 1.5 hours)
- Teston River Walk (3 miles, 1.5 hours)
- West Farleigh River Walk (3.5 miles, 1.5 hours)
- Yalding - Nettlestead River Walk (6 miles, 2.5 hours)

These routes connect several locations and serve a range of destinations to provide visitors and residents with recreational routes to explore Maidstone and its cultural attractions, rather than providing a direct and simple route. These offer varying distances from 3 to 6 miles in length and provide information such as how to get there, suggested rest points, terrain and local amenities along available along the route.

Cycling

As shown in **Figure 8**[6], local cycle routes provide connections from Maidstone Town Centre to the south (Tovil), west (East Farleigh, Teston), north (Allington) and east (Downswood, Leeds, Kingswood) of the borough. However, there are large areas of the borough outside of the immediate Maidstone urban area, that are not served by any cycle connections, particularly in the more rural areas located to the south of the borough.

Regional routes (as part of the national cycle network) provide more strategic connections from Maidstone, as shown in **Figure 9** below[7]. Regional route 17 provides connections to the north via Bluebell Hill and into Rochester/Strood, and along the south east of the borough, parallel to the M20 into Ashford. Regional route 19 provides cycle paths between Allington and Eclipse Park via Maidstone Town Centre.

[6] https://www.opencyclemap.org/
[7] https://www.opencyclemap.org/

Figure 8: Local Cycle Routes – Maidstone Town Centre

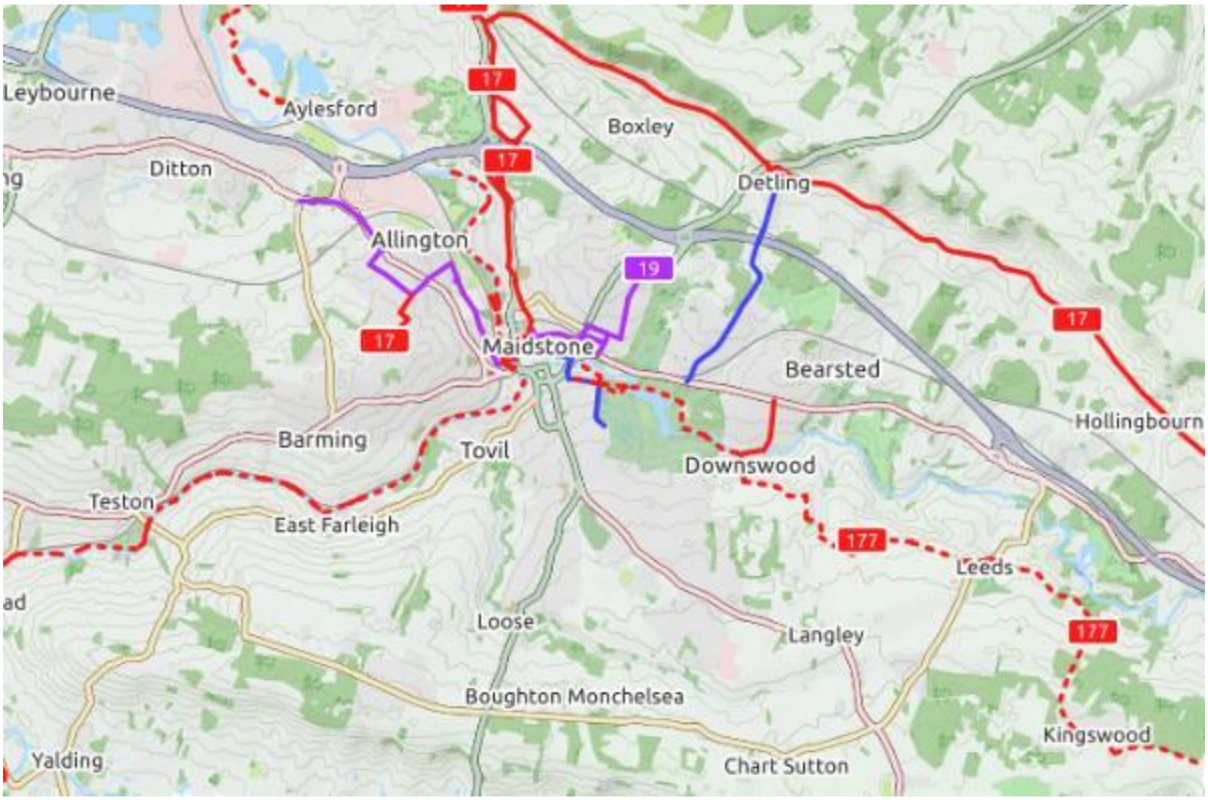
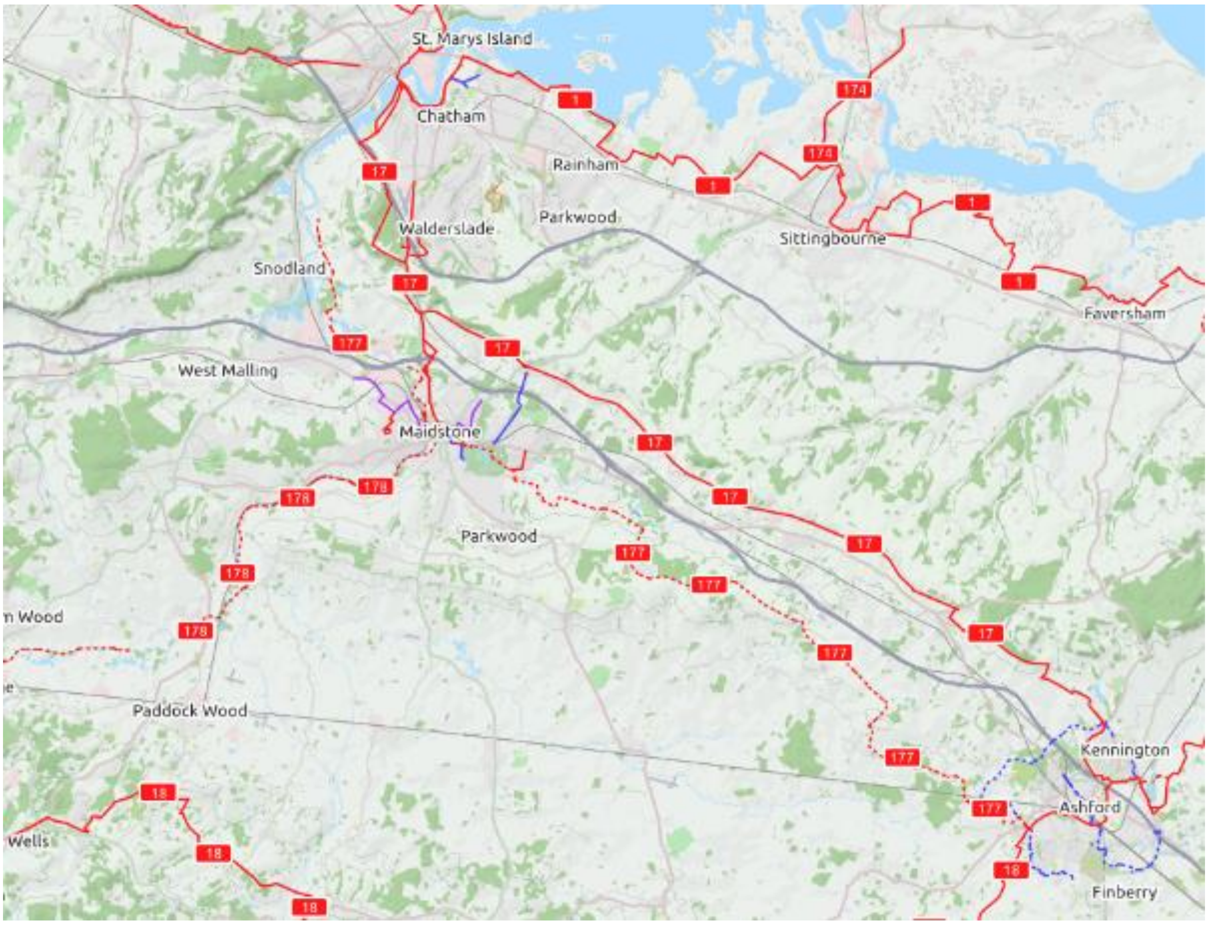


Figure 9: Local Cycle Routes – Maidstone Borough



2.3 Transport Network Challenges

This section provides a summary of the main transport network challenges in the borough including highways, bus, rail, and walking and cycling.

Highways

Maidstone has very high levels of car ownership and usage. The 2011 Census shows that 84% of households in the borough have at least 1 car, compared with 80% across Kent and 74% in England. Schools with very large catchment areas also result in high car use for the "school run". A small number of key junctions are heavily relied upon, and this is most evident on the congested A229 and A274 corridors in the south and south east of Maidstone, and on the A20 corridor to the north west of Maidstone.

Several main roads (A26, A20, A229 and A249) converge within the town centre, and provide onward connectivity to four nearby junctions with the M20. The constrained nature of the town centre has contributed to peak period congestion and the designation of the central and wider urban area as an Air Quality Management Area (AQMA). While a scheme to relieve congestion at the Bridges Gyratory was recently implemented in 2017, continued traffic growth on other parts of the network is expected to result in severe worsening delays for road users. The gyratory system also provides a significant barrier of movement for other modes in and around the town centre, reinforced by the volume of traffic and increased speeds generally often encouraged by single direction traffic.

In peak periods, parts of the road network operate at or near capacity and, especially to the south of the borough, with residents finding it difficult to access the services they need due to the lack of transport options available to them. This congestion has been caused by current road traffic volumes outgrowing its capacity as a consequence of the reliance placed on the private car, alongside population and job growth in the wider area.

Parking

There is a significant amount of car parking provision with the town centre with 17 MBC operated car parks, and at least a further six private car parks. Overall there are estimated to be in excess of 4,000 spaces within the town centre. The initial analysis of recent occupancy counts at these car parks indicates that they have a maximum peak-period occupancy of 70%. This would appear to demonstrate that there is no significant constraint on parking supply and availability within the town centre.

Only a very small proportion of parking available in Maidstone is under direct council control. As a consequence, it is difficult to apply a uniform parking policy when the vast majority of spaces are under private ownership. The car park tariffs are relatively low for a major town in the south with a 3-hour parking cost of £1.80 and an all-day parking cost of £4.50.

Several constraints have been identified with regards to Maidstone's Park and Ride network which may hinder its uptake. Limited access points onto the highway network result in increased traffic congestion and in turn, delays and driver frustration from both Park and Ride passengers and other highway users. Several sites also have limited facilities for customers waiting for a bus, with an old bus shelter, an information display, limited seating, and are often vandalised.

Generally, parking in the town centre consists of small allocations of spaces (50 or less), which fill up quickly and create additional circulatory traffic with vehicles searching for alternative spaces, often causing queues and blocking back onto the roads in the surrounding areas.

Public Transport

Public transport in Maidstone was only used by 11% of its commuters, according to the 2011 Census. While Maidstone East railway station offers a direct railway service into London Victoria, the borough's 6 railway stations have relatively poor inter-urban connections with regards to providing direct and regular services to a number of adjacent towns within Kent, making rail a poor choice of commuter travel outside of London. The stations also have poor connectivity with the bus station for interchanging.

The borough's bus network is focused on mainly serving Maidstone's town centre and Maidstone Hospital. Outer suburban and rural communities are neglected from access to convenient and frequent bus services. The limited bus priority measures in the town centre also means that buses offer inadequate time-saving advantages compared to other modes of travel, in particular the private car. Park and Ride to the east and west of the town centre provide alternatives to completing the entire journey by car, however, limited bus priority in the urban area reduces the convenience of these services.

Walking and Cycling

The 2011 Census travel to work data found that, despite 12% of journeys to work being undertaken by foot, only 1% of journeys to work were undertaken by bike.

The Bridges Gyratory is subject to high volumes of traffic and causes severance to walking and cycling activity for those wishing to travel into Maidstone Town Centre via active modes. Along these roads, infrastructure provision is poor for cyclists to the east of the town centre and poor for pedestrians to the south of the town centre. Accessibility to walking is hindered by the lack of dropped kerbing and tactile paving and the narrow widths of pavements, and lack of suitable crossing facilities along the busy gyratory roads.

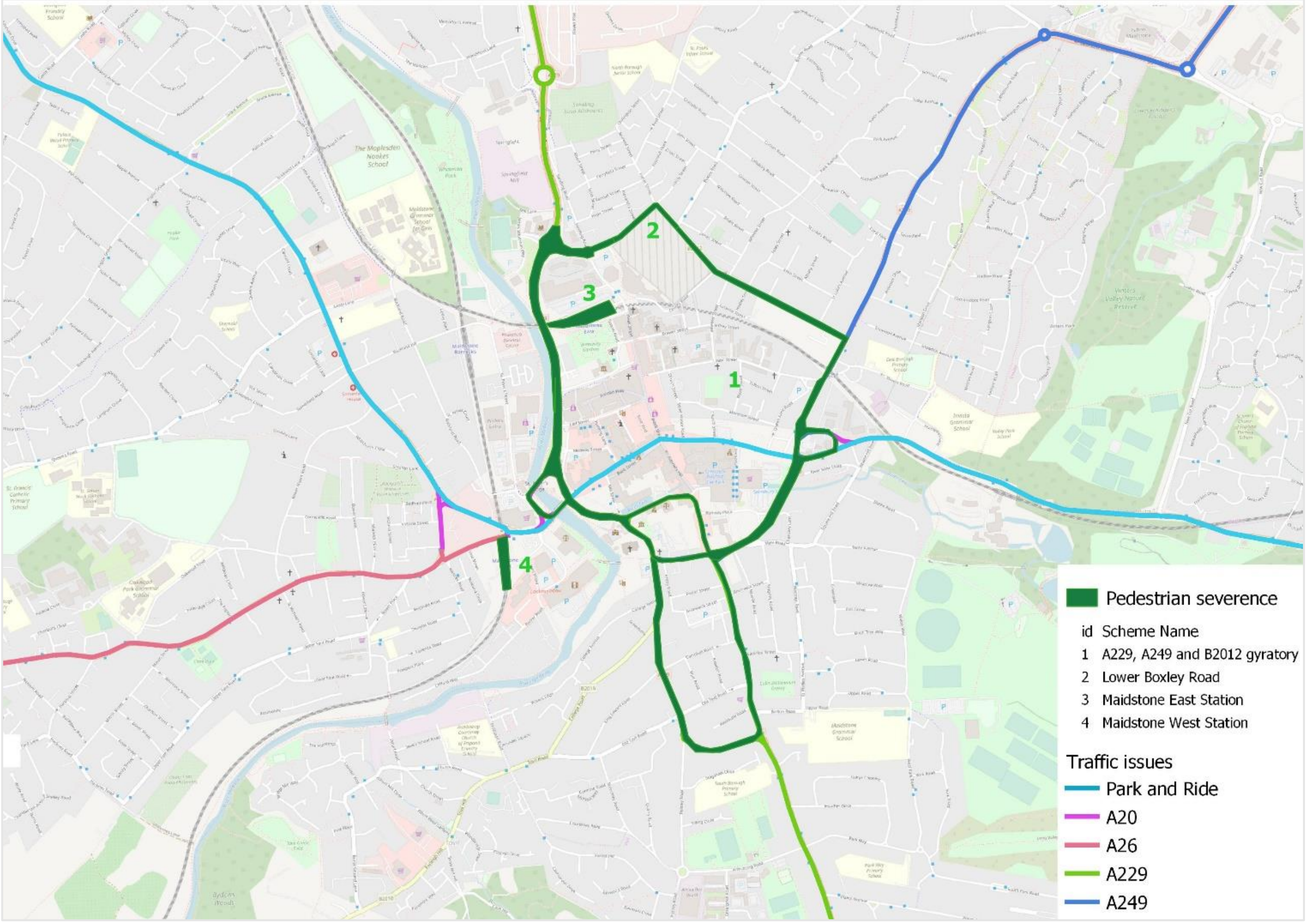
Lower Boxley Road also experiences poor provision for both pedestrians and cyclists. Existing subways provide unreliable access due to flood risks, as well as having limited attractiveness and accessibility (such as gradient changes for wheelchair users) for those wishing to access education, employment and leisure areas within the centre.

Limited lighting and surveillance limit the perceptions of safety, whilst existing bicycle stands are limited to few locations, namely Maidstone's East and West railway stations – this lack of secure cycle parking in key areas (such as retail areas in the town centre) deters individuals from being able to cycle to their destinations. Cycling routes are largely on-carriageway which reduces the safety of cyclists, whilst cycle routes into the town centre lack directness.

Identified Hotspots

Some of the key challenges detailed above are illustrated in **Figure 10**, showing the 'hotspot' areas across the network, with regards to severance (walking and cycling), traffic congestion, parking pressures, and associated Park and Ride network issues. This highlights the resulting impacts on safe and sustainable travel in and around Maidstone.

Figure 10: Hotspots on the Local Network



2.4 Identified Transport Schemes

On reviewing the borough's existing transport network and key challenges, the following schemes have been previously identified as part of the transport evidence base for the current Local Plan and subsequent studies.

Delivered Solutions and Committed Aspirations

The following solutions are identified in the 'status' column as either delivered or committed (i.e. schemes already implemented, or schemes not yet implemented but committed for development).

Table 3 presents the schemes for sustainable transport choices and details the improvements these schemes aim to provide, while **Table 4** presents the schemes on the highway network and details the improvements these schemes aim to provide.

Table 3: Delivered Solutions and Committed Aspirations for Sustainable Modes of Transport

Scheme	Description	Status	Improvements
Public Realm			
Maidstone Town Centre Public Realm Improvements: Phase 1 and Phase 2	Enhancements along the High Street, creating Jubilee Square at the upper end of the High Street, and Remembrance Square at the lower end towards the River Medway	Completed, June 2012 and May 2013	• Reduce premises void/vacancy rates • Increase land and property values • Increase footfall • Generate additional expenditure

			• Create jobs and employment opportunities
Maidstone Town Centre Public Realm Improvements: Phase 3	Enhancements along Week Street from Maidstone East Station to Fremlin Walk, and the length of Gabriel's Hill from Jubilee Square to Lower Stone Street	Completed, 2019	• To raise the standard of the town centre to attract investors • To improve the overall image of the town centre
Walking and Cycling			
Kent sustainable interventions supporting growth programme (£3m LGF funding)	Provision of crossing facilities, enhancing footways, cycle lanes, bus lanes and smarter choices initiatives	2015-2018 phase completed 2019-2021 phase ongoing, March 2021 target	To encourage a modal switch to sustainable modes though a variety of smaller localised schemes
Sustainable access to education and employment (£1m LGF funding)	Upgrading Public Rights of Way, including public footpath and cycling routes in Maidstone and other parts of Kent (across 4 boroughs)	Unknown, due for completion in Spring 2017	Upgrades to enhance and promote access to employment and education via walking and cycling
Rail			
Rail station Improvements	Improved facilities for passengers at Staplehurst Rail Station	Completed new car park, opened in 2018, 300 spaces	To encourage modal switch from car to rail, and in turn, reduce pressure on the congested road network. To aid accessibility for pedestrians and cyclists to use the station
West Kent Local Sustainable Transport Fund	LGF have provided £4.9m of funding to KCC to promote use of alternatives to private car, with cost including improvements to Maidstone East Station	Not completed (construction, July 2020, completion target, March 2021)	To increase the attractiveness of sustainable modes and encourage modal shift, in turn, reducing pressure on the congested road network
Medway Valley	Enhancing Medway Valley rail services between Maidstone and Tunbridge Wells (via Tonbridge)	Delayed, expected completion December 2019	To encourage cross-district growth by enhancing connectivity across towns within Kent
Thameslink Railway	Proposed Thameslink extension from 2018 between Maidstone East and City of London	Delayed	To restore links between Maidstone and central London, allowing interchange with North Kent Line to meet commuting demands
High Speed Rail, Thameslink Railway	High speed rail services between Maidstone West and St Pancras	Delayed, new franchise taking over in April 2020, despite being reported as "already delivered" in LTP4	To ease the pressure of growth within the South East, whereby 1 in 6 new commuter trips in Kent will be travelling into London
Bus			
A274 capacity improvements	Capacity improvements on the A274 Sutton Road between the junctions of Wallis Avenue and Loose Road, incorporating bus prioritization measures from the Willington Street junction to the Wheatsheaf junction, together with bus infrastructure improvements	Outline design work completed. Expected completion 2021	To increase capacity at the junction – particularly in the AM peak which experiences high levels of congestion. Bus prioritisation will increase the connectivity between outer-Maidstone and Maidstone town centre
Kent Connected	Journey planner and information hub, Smartcard for cashless bus travel	Completed, 2017	To allow users to make informed travel choices and have a convenient means of paying for bus travel

Table 4: Delivered Solutions and Committed Aspirations on the Highway Network

Scheme	Description	Status	Improvements
Highways			
Maidstone Bridges Gyratory	The construction of two additional northbound lanes on the eastern side of River Medway	Completed, March 2017	This provides an increase in overall junction capacity of approximately 15%, an overall reduction in delay of approximately 25% in both the AM and PM peak hour periods, and a reduction in average maximum queue lengths of approximately 15% in the AM and 20% in the PM peak periods.
SEMSL, also referred to as Leeds Langley Relief Road	Provision of single carriageway link (60mph speed limit) from the A274 northwards to M20 Junction 8	Although the SEMSL is referred to in the Local Plan, it is not required to mitigate the impact of development during the Local Plan period. MBC is willing to work with KCC to progress this scheme once sufficient evidence has been assembled to prove it is viable	Assumed average journey time saving of 5 minutes for SEMSL users and 2 minutes for non-SEMSL users.
Bearsted and New Cut roundabout capacity improvements	Capacity improvements and signalisation of Bearsted roundabout and capacity improvements New Cut roundabout, with provision of a new signal pedestrian crossing and combined foot/cycle way between these two junctions	Committed with planning permission	Identified capacity improvements with reduced delays and queueing.
M20 Junction 7	Traffic signalisation of the M20 J7 roundabout, widening of the coast bound off slip and creation of a new signal-controlled pedestrian route through the junction	Committed with planning permission	Identified capacity improvements with reduced delays and queueing.
Dualling between Bearsted and New Cut roundabout	Upgrading of Bearsted Road to a dual carriageway between Bearsted roundabout and New Cut roundabout	Detailed design prepared as part of planning application	Increase capacity through additional carriageway and revised junction arrangements.
Willington Road and Wallis Avenue capacity improvements	Improvement to capacity at the junctions of Willington Road and Wallis Avenue with Sutton Road.	Outline design developed and provisional re-allocation of £1.3m of LGF monies approved, detailed design work now underway with construction anticipated late 2016	
A229/A274	Improvements to capacity at the A229/A274 Wheatsheaf Junction	Outline design developed	Identified capacity improvements with reduced delays and queueing.
M20 Junction 5	Works to improve the functionality of the strategic road network, including traffic signalisation at the roundabout and localised widening of slip roads and circulatory carriageway	Committed with planning permission	Identified capacity improvements with reduced delays and queueing.
Capacity improvements at junction of	Capacity improvements at the junction of Hermitage Lane and London Road, and widening of the	Outline design developed	To alleviate pressure from development in north western Maidstone.

Hermitage Lane and London Road	A20 between the Hermitage Lane and Mills Road junction		
20/20 Roundabout	Capacity improvements	Further work required to develop scheme	To alleviate pressure from development in north western Maidstone.

Wider Aspirations: Borough-Wide

This section sets out the schemes that have been tested or proposed, but not yet committed for development at a borough-wide level.

Highways

The ITS expresses MBC's aspiration to develop Maidstone's Intelligent Transport Systems and the proactive sharing of real-time traffic and transport information with road users to manage congestion. It aims to facilitate and promote the expansion of the County Hall Car-Club service to meet any identified increase in highway demand on an annual basis. Utilisation of Zipcar amongst KCC staff has been well received, and the recent acquisition of electric vehicles has proven popular. KCC are looking to procure additional contract services to enhance this scheme in due course.

In previous testing with the 2018 Maidstone VISUM model, for the future year of 2031, a range of interventions were assessed with regards to Maidstone's future demand, as follows:

- 2031 – committed transport schemes only (DM);
- 2031 - package of highway capacity improvements, including Leeds/Langley bypass (DS1); and
- 2031 - package of transport measure incl. both highway capacity and sustainable travel improvements, exc. excluding Leeds/Langley Bypass (DS2).

The Leeds Langley Relief Road (LLRR) was modelled as a new route linking the A274 and the A20 and including improvements to the A274. It is a proposed single carriageway with roundabouts at each end, replacing the 5 Wents junction, as well as causing the closure of the existing B2163 to the south of Horseshoes Lane.

The model showed a17-19% increase in vehicle trips (AM and PM peak) from 2014 for both the 2031 DM/DS1 scenarios, accounting for approximately 6,000 additional vehicles on the network in each peak period. For the DS2 scenario, a 6-8% increase in vehicle trips was identified (AM and PM peak), significantly lower than for DS1, with transport interventions focused on public transport provisions and car parking policies.

The results indicated that the DM scenario would result in a significant increase in traffic flows in both the AM and PM peaks on the main routes in/out of the town compared with current traffic levels.

Both the DS scenarios indicated a reduction in traffic flows on selected links compared to the DM scenario, with the DS2 scenario (modelling reduced vehicle demand) generally demonstrating a lower level of traffic when compared with the DS1 scenario. Both DS scenarios would also show a decrease in peak hour travel times on the main routes in/out of Maidstone when compared with the DM scenario.

The DS1 scenario has the most impact on travel times on routes to the east and south of the town (assumed to be a result of the LLRR), and while the DS2 scenario had significantly lower demand and generally lower travel times, some routes have increased slightly in travel time, based on the change in travel patterns around the town.

Focusing on the LLRR, this scenario (DS1) illustrates a small increase in total travel distance but a reduction in total travel time, suggesting a more efficient use of the network as a whole. The increase in travel distance is the outcome of vehicles having the option of a longer but faster route. Whilst the model outputs indicate some benefits to the southeast of the town near to the proposed Leeds/Langley bypass, the impact of the scheme alone cannot be separated from the rest of the highway package. This scheme therefore, will need to be considered in terms of deliverability and a more detailed appraisal of the potential benefits that may be attributed to it.

In support of this, the current Local Plan makes clear there remains a need to revise and apply future housing requirements as part of further testing, as well as the need to confirm support for the construction of this proposed Leeds Langley Relief Road.

Parking

There is an ambition to optimise long stay parking charges, to extract maximum value from parking charges whilst controlling demand, through a 50% increase in long stay charges by 2031. This also feeds into looking at improving parking enforcement on highways to reduce the impact of obstruction on bus reliability.

Public Transport

Analysis has been undertaken with regards to the Park and Ride town centre car parking issues and opportunities. It includes a discussion of trip generation, Park and Ride infrastructure issues and opportunities and town centre parking appraisal. Eight potential Park and Ride sites were identified for assessment, including the three existing sites. Nine bus priority measures were also considered to improve journey time and reliability from the park and ride sites to the town centre. A combination of these Park and Ride sites and bus priority measures were collated to test three different scenarios, including the existing situation, a radial route-based Park and Ride strategy, and a Park and Ride spine to concentrate Park and Ride activity in a clearly defined route through the town centre. Findings identified that retaining three sites under the existing situation would not be viable in the long term unless aligned to market growth (either through more effective interaction with town centre parking policies or through cost reduction measures). The radial route-based Park and Ride strategy was identified as only being feasible if alternative and lower operational cost approaches were to be considered, due to the spreading of demand over a wider number of sites. The Park and Ride spine route identified that a concentrated corridor for improvement better focuses Park and Ride demand, and is amenable to the development of effective bus priority measures, although is capital intensive.

The Infrastructure Delivery Plan (IDP) 2016 identifies the need for measures to support and enhance the use of Staplehurst Rail Station, including increasing the frequency of the buses that serve the station along the A229 corridor, which can provide an interchange for public transport users. These supporting measures can also be applied to other rural areas including Eyhorne, Headcorn, Coxheath and Yalding, and progress on development sites will need to be carefully monitored, in order to capture accurate levels of demand within the Maidstone VISUM transport model in these rural service centres.

As well as increasing the frequency of existing bus routes that serve the town centre to at least every 7 minutes, the council seek to procure bus services with limited stops into Maidstone town centre and its railway stations during morning and evening peaks via radial routes. This would serve areas including the south of Maidstone via the A229 and A274, and the Newham Park Area. Whilst these peak period services would be provided commercially, socially necessary services would be subsidised by KCC to serve places of education, employment, healthcare or essential grocery shopping. These aim to fill the gaps in provision during later evenings, weekends and particular schools and rural communities.

Enhanced information systems, waiting facilities and general access are sought along the bus and hackney carriage corridors in an effort to make the mode more attractive along Park and ride Routes and radial routes into the town centre.

The ITS outlines the need for access improvements to rail transport for those walking and cycling, and with special mobility requirements. Maidstone are seeking to lobby the restoration of direct services to the City of London and central London areas, namely London Bridge and London Cannon Street, alongside more localised aims to seek the potential for more stops at Tovil, Teston and Allington stations. Consideration has also been given to maximise interchange capabilities by enhancing the facilities for buses at Maidstone East and Maidstone West railway stations alike with the interchange enhancements proposed at Staplehurst railway station.

Walking and Cycling

A number of proposed walking and cycling interventions are discussed in the boroughs Walking & Cycling Strategy report. The timescale for delivery is broken down into the short term (up to 5 years), medium term (5-10 years), and long term (over 10 years). This can be used to inform a range of scenarios to model and test in an existing traffic network, where schemes involve a reconfiguration of road layouts, including junctions, controlled crossing facilities and street closures.

The Sustrans Walking and Cycling Assessment of Maidstone (2018)[8] provides a high-level breakdown of the types of walking and cycling interventions required within Maidstone, looking at four proposed options (route A to D) as outlined below:

- Route A: town centre – includes measures to enhance walking provision through footway widening and decluttering, improved crossing facilities on gyratory and minor local improvements. Cycling interventions are generally a balance of reduced motor vehicle permeability and increased cycling access.
- Route B: Wat Tyler Way to Sutton Road - part of the southeast corridor proposed in Maidstone. Sets out measures to enhance walking provision, addressing the need to widen footways, improve crossing provision, reallocate priorities through continuous footways and enhancing the public realm through reallocating and redesigning spaces. Cycling interventions address the needs of segregated cycling provision, speed reductions for motorists and changes in junction priorities.
- Route C: Mote Park to South East via Church Road - these enhancements address the barriers associated with the crossing capacity on Willington Street and the suitability of Church Road for cyclists. The introduction of low lighting would also benefit both pedestrians and cyclists.
- Route D: Sustrans identified a need for an additional cycle route to serve cycling access to homes, schools and other destinations to Oakwood Park, Maidstone Hospital and new development sites. The existing lack of alignment for the route means that MBC should evaluate which of the four proposed options should be considered.

The ITS also outlines general actions to improve walking for pedestrians, including accessibility, pedestrianisation, safety improvements, walk-to-school initiatives and wayfinding infrastructure. It also addresses the need to develop cycle routes (some of which will require changes to road capacity) for continued maintenance of cycling routes, and the roll out of initiatives to promote cycling among the public in the borough. Other issues such as improving cycling security, monitoring cycle use (through cycle counters at key locations), updating public maps, and the need to standardise walking and cycling requirements for future planning applications are also highlighted.

Wider Aspirations: Location Specific

This section sets out the wider aspirations (schemes that have been tested or proposed, but not yet committed for development) that have been identified for specific locations within the borough.

A number of site-specific studies have been undertaken across the borough to understand where the highway network is either approaching or exceeding capacity during AM / PM peak periods, and thus identifying likely areas with significant traffic congestion and delay.

M20 Junction Improvements

An assessment carried out in 2016 aimed to understand the potential impact of all proposed Local Plan development on the highway network, examining junction capacity analysis along the M20, Junctions 5 to 8. This considered the relevant developments for Maidstone, Tonbridge and Malling, and Swale, and were assessed as both consented only, and consented plus non-consented (i.e. all development).

[8] http://www.maidstone.gov.uk/__data/assets/pdf_file/0010/198370/Maidstone-Walking-and-Cycling-Assessment.pdf

Modelling results identified Junctions 5, 6 and 7 to be over capacity in all scenarios. Whilst the ratio of flow to capacity (RFC) values didn't increase much between consented only and all development, both queues and delays increased significantly with the additional non-consented development. Junction 8 performed significantly better than the other three junctions, operating within capacity at existing, and over capacity on the A20 South only in the AM peak for all future scenarios, and within capacity for all PM peaks.

To test suitable mitigation at the junctions, previous mitigation schemes were considered, with measures comprising a mixture of the following improvements:

- Increased lanes marked up on circulatory carriageway;
- Signalisation of arms;
- Lane allocation and improved road markings and signs;
- Hatching removed to accommodate increased flare lengths; and
- Entry widths and increased lane storage.

The 'with mitigation' results illustrated that in all but one case (a single arm at Junction 6 south, albeit with significantly reduced queueing in comparison to the existing layout), the improvement scheme with all development flows performs better than the existing layout consented only development flows. It is therefore considered that the improvements proposed sufficiently mitigate any impacts that the non-consented developments contained in the Local Plan may have on the four motorway junctions.

In tandem with the junction assessments, analysis was undertaken for each motorway mainline merge and diverge slip road. It was established that changes in the layout would not be required to solely accommodate all development, but flows should be monitored in the future to ascertain whether a change in layout would be needed.

A274 Sutton Road Corridor Improvements

In 2016 a study was undertaken to assess the potential for bus priority measures on sections of the A229 and A274, in order to ease the existing congestion experienced in the morning and evening peak periods, as well as intermittent queueing throughout the day.

The A229 Loose Road experiences high levels of congestion particularly for inbound traffic travelling towards the town centre, with blocking back occurring often due to the weight of traffic on the bridges gyratory. Outbound traffic also experiences congestion to both the Armstrong Road/Park Way junction and to the Wheatsheaf junction. The A274 provides access to a number of development frontages (including a mixture of leisure, retail, employment and housing types) and experiences traffic congestion inbound in the morning peak and, to a lesser extent, at other times of the day, which is largely caused by a lack of traffic capacity at the signalised junctions.

Assessments for new developments proposed along the corridor concluded mitigation measures were required for the key junctions and emphasised the need for public transport improvements. The bus priority measures objective is to provide effective journey time savings for buses, and to provide an attractive alternative option to the car, resulting in a transfer of some trips from private car to bus. Options were considered with regards to the observed issues and impacts of local growth on the corridor, whilst factoring in disruptions to utility equipment, vehicle demand and pedestrian movements and supporting crossing facilities.

A total of eight schemes were tested and recommended for the future year 2031 and comprised a mixture of new bus lanes and associated bus pre-signals, junction improvements, and extensions and improvements to existing bus lanes (including widening). It is recommended that an implementation strategy is followed when building these schemes, to work with the local bus companies and monitor bus journey times over different sections of the route in order to determine the priorities for implementation. The supporting junction modelling undertaken demonstrates that junction capacity for general traffic is not reduced by the recommended bus priority measures while providing significant journey time benefits for buses.

Key Junction Improvements - A20 / A229

Other locations recognised as a congestion hotspot within the borough are key junctions located along the A20 and A229 strategic routes, which feed from Maidstone Town Centre out towards the connecting motorway junctions on the M20.

In 2015 an outline design was requested for a new segregated left turn lane, for vehicles travelling from the west to the north on the A20 Coldharbour Roundabout, in order to relieve significant congestion experienced in the AM and PM peaks. The options were explored, with consideration given to relative costs, traffic controllability (through the use of traffic signals) and safety implications. These considerations included a review of:

- Extending an existing traffic deflection island and increasing areas of hatching;
- Lane designations on approach to the segregated left turn lane;
- Swept path analyses;
- Compliance with the Design Manual for Roads and Bridges;
- Lighting;
- Utilities; and
- Changing the number of lanes approaching and on the roundabout.

It was proposed that a segregated left turn lane with a physical island should be considered for detailed design. However, the review of the impact on the operation of the existing traffic signals was not included within the study.

Two separate assessments were undertaken in 2016 for junctions located on the A229, Royal Engineers Road / Invicta Barracks Access and Loose Road / Boughton Lane. Both studies were undertaken to assess the projected traffic increases and capacity issues (from a combination of background growth and planned development) on the local highway network for the future year of 2031. With both junctions showing to operate near or over capacity in their tested base years from previous studies, it was evident that further capacity assessments would be required at these locations as and when planned developments were proposed, with the likely need for junction mitigation measures. As expected, junction results for both locations indicated they would operate further over capacity in 2031 (before and after the addition of planned development traffic), experiencing excessive queuing and significant congestion.

For the A229 Royal Engineers Road junction, only two improvement layouts were considered, testing option 1 the provision of additional lanes on approach arms, and option 2, part signalisation of the roundabout. Initial results showed a further deterioration of junction performance for option 1 in comparison to the existing layout, while option 2 allowed the junction to perform within capacity in 2031, with queuing reduced to below the baseline levels. Therefore, the part-signalisation layout would mitigate not only the impacts of development traffic but also that of background growth.

For the A229 Loose Road junction, one improvement scheme with minor alterations (provision of a left turn flare into Boughton Lane) two signalised options and two mini roundabout options were tested, with the aim to find a solution within the existing highway boundary. The only option shown to mitigate the impact of the increase in traffic was the second signalised option. This was achieved by providing a secondary stop line on the A229, which allowed for the side roads to receive green time simultaneously, thereby affording more green time to the main A229 movements.

Rural Service Centres (RSCs)

Junction capacity assessments were undertaken for four rural service centres to the south and east of Maidstone Centre. While each RSC is offset in a remote location, most are connected to the main urban area, with strategic corridors routed through the centre of each of the respective villages. It is expected that with a high proportion of trips already using these borough routes to travel between these remote locations and the wider area, any additional demand added to this limited network is likely to have a significant impact on any constrained sections of the existing highway network. This analysis therefore aimed to provide an understanding of the area specific impacts on each remote location, as a result of additional development traffic for the future year of 2031 on the surrounding local highway network.

Lenham

Assessments undertaken in Lenham tested the impact of a range of additional development traffic, (including approved, pending, allocated and aspirational development proposals) for six key junctions along and directly adjacent to the A20, which comprises the main strategic corridor in the vicinity of Lenham Village and connects directly into Maidstone Town Centre. Initial analysis showed that all junctions would operate within capacity in the future year of 2031, with the exclusion of the 'broad location' development, which proposed 1,500 dwellings split roughly 50-50 between the east and west of the village, in the period following 2026. With the inclusion of this site, three of the six junctions are shown to operate over capacity, requiring mitigation measures to accommodate these additional development traffic flows.

Two alternative distribution options were initially tested, reallocating the proposed 1,500 dwellings disproportionality, with a 30-70 split between the east and west of the village (option 1), and vice versa (option 2). However, modelling results did not present any substantial junction improvements, and so a range of mitigation options were also considered. The two junctions located on the edge of the village showed a signalised junction improvement could accommodate both potential redistribution options, while the central junction located between the A20 and the High Street was shown to be highly constrained, and required for development to be located to the west of the junction as much as possible (therefore, two layout improvements were only able to accommodate redistribution option 1).

Headcorn

Assessments undertaken in Headcorn tested the collective impacts of a number of proposed residential developments (circa 425 dwellings) as based on the draft Local Plan, for five junctions along and directly adjacent to the A274, which comprises the main strategic corridor in the vicinity of Headcorn Village and connects directly into Maidstone Town Centre. Modelling results identified all junctions would operate within capacity for the future year of 2031 with all development, without any queuing or capacity concerns. However, it was noted that possible investigation on historical collision data may be beneficial to determine whether signalising the crossroads or providing segregated right turn lanes would improve safety.

Coxheath

Assessments undertaken in Coxheath tested the collective impacts of a number of proposed residential developments (circa 1,085 dwellings) as based on the draft local plan, for two junctions along, and directly adjacent, to the A229 (including Linton Crossroads) comprising of the main strategic corridor in the vicinity of Coxheath Village and connecting directly into Maidstone Town Centre. Modelling results showed Linton Crossroads was operating near capacity in the base (2014) and over-capacity in the future year of 2031 (both with and without all development), while the other junction would operate within capacity for the future year of 2031 with all development, without any queuing or capacity concerns.

An initial concept layout design with improvements to Linton Crossroads was produced, aimed to achieve the required 'within capacity' solution and covered 3rd party land adding extra lanes on three of the four arms at the junction. While this initial design was based on the findings of the junction capacity assessment, it was advised that a revised solution would have to be developed avoiding any 3rd party land, aiming at "nil detriment" when comparing '2031 base' with '2031 base with development' scenarios, and so was revised accordingly. It was amended to maintain as many of the existing features of the junction (particularly the staggered pedestrian crossing across the northern arm of the junction), and as much capacity as possible as detailed in the initial design while restricting the buildout to avoid any 3rd party land. This was then tested with residential travel plan measures assumed at the development sites, with a reduction of 10% considered achievable with the implementation of these SMART measures. Modelling results showed the revised layout with reduced development flows not only mitigates the impact from development traffic but also accommodates future background traffic growth with all arms operating significantly within capacity.

Staplehurst

Assessments undertaken in Staplehurst tested the collective impacts of a number of proposed residential developments (circa 880 dwellings) as based on the draft local plan, for two junctions along and directly adjacent to the A229 (including Cuckhold's Corner) approximately 9 km south from the Linton Crossroads in Coxheath. This comprises the main strategic corridor in the vicinity of Staplehurst Village and connects directly into Maidstone Town Centre. Modelling results showed Cuckhold's Corner was operating near capacity in the base (2014) and over-capacity in the future year of 2031 (both with and without all development), similar to Linton Crossroads in Coxheath. The A229 at the junction with Station Approach / Market Street was shown to operate within capacity in the base (2014) and future base, but over capacity in the future year with development. Although this junction is expected to experience queues and delays, these dissipate within the peak hour, and are only present at the worst performing 15 minutes within the peak hour. Nonetheless, this still exceeds the design threshold, and drivers may make inappropriate manoeuvres to exit the junction. Signalising this junction however, would control traffic flows on all arms and regulate movements if necessary.

An initial concept layout design with improvements to Cuckhold's Corner was produced, under the same approach taken for Linton Crossroads in Coxheath. To achieve the required 'within capacity' solution (based on the findings of the junction capacity assessment) 3rd party land is used to add extra flare lengths on two arms and increased road width on one arm at the junction. A revised solution was sought avoiding 3rd party land, aiming at "nil detriment" when comparing '2031 base' with '2031 base with development' scenarios. However, due to the highway land constraints, it was not considered feasible to achieve a design resulting in 'nil detriment' as flare lengths could not be further increased to the required distances. This was then tested with development flows reduced by 20%, as a result of strong residential travel planning measures and further supporting initiatives aiming at strengthening sustainable travel behaviour, including peak spreading (while not as sustainable as modal shift, it does allow a more efficient use of highway capacity). Whilst the modelling results showed the mitigation in form of the improved junction layout does not quite achieve a 'nil detriment' solution, the remaining impacts of the development traffic (with 20% reduction) in terms of additional queueing, the measure most easily perceived by road users, are relatively small and cannot be considered severe.

Table 6 overleaf summarises the wider aspiration schemes proposed for the highway network and undertakes a high-level assessment to identify if any of these local improvements provide significant spare capacity (operating under 100% or 1.00), in line with the 2031 horizon year of the current Local Plan. This is illustrated as the junction's level of service (LoS) as classified in **Table 5** below.

Table 5: Junction Level of Service (LoS) Classifications

LoS	Description	V/C ratio
A	Uncongested operation	Less than 0.60
B	Very light congestion	0.60 to 0.69
C	Light congestion	0.70 to 0.79
D	Significant congestion on critical approaches	0.80 to 0.89
E	Severe congestion with long-standing queues on some critical approaches	0.90 to 0.99
F	Total breakdown	1.00 and greater

While junctions shown to perform under 100% or 1.00 (LoS A to E), are considered to operate within capacity, junctions operating with a LoS of D or E are considered to be approaching capacity, whereby noticeable congestion and queuing on critical approaches begins to build, causing significant constraints on the highway network.

Table 6: Wider Aspirations - Future Year Capacities on the Highway Network

Scheme	Description	2031 LoS AM	2031 LoS PM
M20 Junction Improvements			
M20 Junction 5	With the additional Local Plan development tested on the existing layout in 2031, the M20 West and M20 East arms exceed their capacity (1.01 RFC) in the AM peak, while the M20 West and A20 South exceed capacity (1.01 RFC), as the M20 East approaches capacity (0.95 RFC) in the PM peak. Tested under the improved layout (applying signal control to the M20 and A20 arms) the DoS is within capacity for all four arms for the AM peak (maximum of 88.9% DoS on M20 East and 96.2% DoS in the PM peak on M20 West approaching capacity).	D	E
M20 Junction 6 North	For the northern section of this dumbbell roundabout (Cobtree), the connecting arm to the south (A229) exceeds capacity on the existing layout in the base 2031 (1.07 RFC in the PM peak), and further exceeds capacity with the additional Local Plan development (1.08 RFC in the PM peak). Tested under the improved layout (applying signal control to the A229 South) the junction shows an improvement with all arms operating within capacity, with the A229 South approaching capacity (maximum of 86.0% DoS in the AM peak and 89.5% DoS in the PM peak).	D	D
M20 Junction 6 South	For the southern section of this dumbbell roundabout (Running Horse) on the existing layout with the additional Local Plan development. the connecting arm to the north (A229), the M20 West and Forstal Road all exceed capacity (all just over 1.00 RFC) in the AM peak. Tested under the improved layout (while this was tested with signalisation it was considered mitigation would work better applying extended storage and number of lanes at approaches) the junction presents similar RFC values over capacity (maximum of 1.02 RFC in the AM peak and 1.00 in the PM peak), however, the queuing is significantly reduced for all arms in both the AM peak and PM peak (excluding Forstal Road arm in the AM peak).	F	F
M20 Junction 7	The junction is already exceeding capacity in the AM peak and PM peak (maximum of 1.11 RFC in the PM on the A249 South) on the existing layout in the base 2031, and further exceeds capacity with the additional Local Plan development (1.19 RFC in the PM peak on the A249 South). Tested under the improved layout (applying signal control to the three affected arms) the junction shows to operate within capacity for all four arms in both the AM peak (maximum of 88.9% DoS approaching capacity on the M20 East) and PM peak (maximum of 99.0% DoS approaching capacity on the M20 West).	D	E
M20 Junction 8	The junction is already exceeding and approaching capacity in the AM peak and PM peak respectively on the A20 Link Road South only (1.07 RFC in the AM peak and 0.97 RFC in the PM peak) on the existing layout in the base 2031, and further reduces capacity with the additional Local Plan development (1.10 RFC in the AM peak and 0.99 RFC in the PM peak). Tested under the improved layout (applying signal control to the three affected southern arm) the junction shows to operate within capacity in both peaks (maximum of 89.8% DoS in the AM peak and 85.4% DoS in the PM peak, both approaching capacity). A further scenario was also tested on top of the improved layout, adjusting flows to account for the proposed South East Maidstone Strategic Link (SEMSL) which shows to further reduce capacity, operating 91.9% DoS in the AM peak, and 89.0% DoS in the PM peak, still performing slightly better than the existing layout, but worse than without the link included.	D (excluding the SEMSL) E	D (excluding the SEMSL) D
A274 Sutton Road Corridor Improvements			
A274	This corridor already experiences a degree of congestion, particularly in the morning and evening weekday peak periods but queues can occur at other times. The congestion affects all traffic, including the existing bus services on the corridor.	N/A - no modelling undertaken	

	Proposals along this corridor for the future year of 2031 will ensure the bus journeys are not delayed, giving journey times close to those experienced in free-flowing conditions. Compared to general traffic journey times, which are expected to increase significantly due to the growth of traffic, the bus will become a very attractive mode of transport for trips toward Maidstone Town Centre. Further strategic traffic modelling undertaken alongside this on behalf of MBC and KCC indicates that the implementation of MBC's Integrated Transport Strategy, within which the proposed bus priority on Sutton Road is an important part, will lead to reduced traffic flows and journey times in the study corridor.		
Key Junction Improvements - A20 / A229			
A20 Coldharbour Roundabout	While no junction modelling was undertaken, two options to improve the A20 Coldharbour roundabout were explored, option A, a segregated left turn lane with a non-physical island and option B, a segregated left turn lane with a physical island which were both considered to provide a viable soliton for the provision of a segregated left turn lane at this junction. The additional benefits that could be provided with option B (namely a reduced likelihood of sideswipe collisions and the opportunity to retain the traffic signals at the roundabout) meant this was therefore the recommended option to be taken forward to the detailed design stage, providing that the departures from DMRB are considered acceptable. This is expected to improve the traffic flow from A20 London Road (from Aylesford) to Coldharbour Lane (to M20) by allowing vehicles travelling eastbound to make an unhindered movement towards the northbound carriageway of Coldharbour Lane (towards junction 5 of the M20).	N/A- no modelling undertaken	
A229 Royal Engineers Road Junction	The junction is already exceeding capacity on the A229 North in the AM peak and A229 South in the PM peak (1.15 RFC and 1.08 RFC respectively), for the existing layout in the base 2031, and further exceeds capacity with the additional Local Plan development of 1,500 dwellings (1.20 RFC and 1.19 RFC respectively). This also results in the A229 North operating at capacity also in the PM peak (1.00 RFC). With mitigation (part signalisation), the junction is shown to operate within capacity in both the AM peak and PM peak, with all DoS values remaining below 90% (maximum of 76.0% DoS in the AM peak on the A229 North, and 86.9% DoS in the PM peak on the A229 South) and insignificant increases in queuing compared to the base 2031.	C	D
A229 Loose Road Junction	In the base 2031, all arms exceed capacity (excluding the A229 South) in the AM peak and exceed capacity on the A229 North (104.5% DoS), with Boughton Lane and Cripple Street approaching capacity in the PM peak. The A229 South is within capacity during both morning and evening peaks (75.8% DoS and 76.6% DoS respectively). Junction flaring on the A229 North was tested but showed to put further pressure on the junction, and so two signalisation options were considered, the first including a staggered pedestrian crossing and the second including a secondary stop line on the A229. For the first option, the A229 North and South arms both exceed capacity in the AM peak (101.2% DoS and 101.5% DoS) with all arms exceeding capacity in the PM peak. For the second option, all arms are shown to operate within capacity in the AM peak, with the A229 North and Boughton Lane exceeding capacity in the PM peak, with DoS values of 101.2% and 102.2% respectively.	F	F
RSC - Lenham			
Pilgrim's Way / Ashford Road (A20) N & S / Ham Lane	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, prior to the Lenham broad location of 1,500 dwellings. With the addition of this broad location development, the junction is shown to exceed capacity in the PM peak, particularly along the A2O South, operating at 1.15 RFC. The remaining arms also show to have excessive queuing. Redistribution of the broad location was also tested across the village (majority of sites to the west for option 1 and the majority of site to the east for option 2), however, the junction continued to operate over capacity. This was tested further with mitigation and shown to perform within capacity with signalisation and additional lanes for both distribution options, showing a DoS of below 90% on all arms in both the AM peak and PM peak (maximum of 84.0% in the AM peak and 0.80% in the PM peak).	D	D

Ashford Road (A20) N & S / Maidstone Road	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, including the Lenham broad location of 1,500 dwellings, with all arms operating with RFC values remaining below 0.85 (maximum of 0.80 RFC in the AM peak and 0.68 RFC in the PM peak).	D	B
Ham Lane N & S / Old Ham Lane	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, including the Lenham broad location of 1,500 dwellings, with all arms operating with RFC values remaining below 0.85 (maximum of 0.02 RFC in the AM peak and 0.20 RFC in the PM peak).	A	A
Faversham Road / Old Ashford Road / High Street / Maidstone Road	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, prior to the Lenham broad location of 1,500 dwellings. With the addition of this broad location development, the junction is shown to exceed capacity in both the AM peak and PM peak, particularly along Old Ashford Road operating at 2.04 RFC and 1.49 RFC respectively. Redistribution of the broad location was also tested across the village (majority of sites to the west for option 1 and the majority of site to the east for option 2), however, the junction continued to operate over capacity. This was tested further with mitigation and shown to perform within capacity as a mini-roundabout under option1 (maximum of 0.77 RFC in the AM peak and 0.78 RFC in the PM peak) or as a signalised junction under option 2 (maximum DoS of 65.5% in the AM peak and 60.8% in the PM peak).	B	B
Ashford Road (A20) E & W / Old Ashford Road	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, prior to the Lenham broad location of 1,500 dwellings. With the addition of this broad location development, the junction is shown to exceed and approach capacity in the AM peak and PM peak, particularly along Old Ashford Road operating at 1.21 RFC and 0.97 RFC respectively. Redistribution of the broad location was also tested across the village (majority of sites to the west for option 1 and the majority of site to the east for option 2), however, the junction continued to operate over capacity. This was tested further with mitigation and shown to perform within capacity as a roundabout for both distribution options (maximum of 0.75 RFC in the AM peak and 0.62 RFC in the PM peak) or as a signalised junction for both distribution options (although this performed slightly worse than the roundabout).	C	B
Faversham Road N & S / Ashford Road (A20) E &W	This junction is shown to operate within desirable capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development, including the Lenham broad location of 1,500 dwellings, with all arms operating with RFC values remaining below 0.85 (maximum of 0.79 RFC in the AM peak and 0.50 RFC in the PM peak). It is however, shown to experience significant time delay on Faversham Road North and South (minor arms). This is due to vehicles giving way to high flows on the main road along the A20 Ashford Road. It is however considered that overall the junction performance is acceptable, with all arms operating within capacity.	C	A
RSC - Headcorn			
Moat Road / North Street (A274) / Kings Road / Mill Bank (A274)	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development. The highest RFC is shown on Kings Road operating at 0.63 RFC in the AM peak and 0.45 RFC in the PM peak.	B	A
Kings Road / Ulcombe Road / Lenham Road / Forge Lane	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development. The highest RFC is shown on Kings Road operating at 0.35 RFC in the AM peak and 0.39 RFC in the PM peak.	A	A
Oak Lane E & W / Grigg Lane	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development. The highest RFC is shown on Grigg Lane in the AM and Oak Lane East in the PM peak, operating at 0.25 RFC in the AM peak and 0.20 RFC in the PM peak.	A	A

Station Road (A274) E & W / Station Approach	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development. The highest RFC is shown on Station Road West in the AM peak and Station Approach in the PM peak, operating at 0.24 RFC in the AM peak and 0.27 RFC in the PM peak.	A	A
Wheeler Street (A274) E & W / Oak Lane	This junction is shown to operate within capacity on all arms in both the AM and PM peaks without mitigation, with the additional Local Plan development. The highest RFC is shown on Oak Lane, operating at 0.49 RFC in the AM peak and 0.54 RFC in the PM peak.	A	A
RSC - Coxheath			
Stocketts Lane / Heath Road (B2163) E & W / Westerhill Road	This junction is shown to operate within capacity on all arms in both the AM peak and PM peak without mitigation, with the additional Local Plan development. The highest RFC is shown on Westerhill Road, operating at 0.57 RFC in the AM peak and 0.58 RFC in the PM peak.	A	A
Linton Road Crossroads – Linton Road / Linton Hill (A229) N & S / Heath Road (B2163) E & W	With the junction predicted to exceed capacity in 2031 prior to the additional Local Plan development, mitigation measures to improve to the existing layout were proposed. Junction modelling with mitigation shows the junction would operate within capacity in both the base and design scenarios, in the AM peak and PM peak, with all arms showing a DoS of below 90% on all arms. Nonetheless, the initial concept design identified these improvements could only be achieved by amending the junction using 3rd party land. Therefore, revised junction layout was required, in order to avoid 3rd party land and aiming for “nil detriment” when comparing ‘2031 base’ with ‘2031 base with development’ scenarios. Modelling results showed the revised layout not only mitigates the impact from development traffic but also accommodates future background traffic growth with all arms operating with additional capacity compared to the future base (maximum of 83.1% DoS in the AM peak, and 86.9% DoS in the PM peak, both on the A229 Linton Road).	D	D
RSC - Staplehurst			
Station Road (A229) N & S / Station Approach / Market Street	The junction shows to operate within capacity in the AM peak (maximum of 0.65 RFC on Station Approach) and just over capacity in the PM peak (maximum of 1.01 RFC also on Station Approach) in 2031 with the additional Local Plan development, prior to any mitigation. Nonetheless, the junction modelling shows that queuing and delays would dissipate within 15 minutes of the peak delay. However, given this arm still exceeds capacity, an alternative junction form (such as a signalised junction) could be considered, to control traffic on all arms. This junction is shown to operate within capacity on all other arms in the PM peak and on all arms in the AM peak without mitigation.	B	F
Cuckholds Corner – Station Road (A229) / Headcorn Road / High Street (A229) / Marden Road	With the junction predicted to exceed capacity in 2031 prior to the additional Local Plan development, mitigation measures to improve to the existing layout were proposed. Junction modelling with mitigation shows the junction would operate within capacity both with and without the additional Local Plan development, in the AM peak and PM peak, with all arms showing a DoS of below 90% on all arms. Nonetheless, the initial concept design identified these improvements could only be achieved by amending the junction using 3rd party land. Therefore, revised junction layout was required, in order to avoid 3rd party land and aiming for “nil detriment” when comparing ‘2031 base’ with ‘2031 base with development’ scenarios. The modelling results showed the mitigation in form of the improved junction layout does not quite achieve a ‘nil detriment’ solution, operating with a maximum of 105.9% DoS in the AM peak and 109.6% DoS in the PM peak, both on Headcorn Road. However, the remaining impacts of the development traffic (with an applied a 20% reduction for robust travel planning measures) in terms of additional queueing, are relatively small and cannot be considered severe.	F	F

This information detailed in **Table 6** above, is also presented in **Figure 11** and **Figure 12** below (for the AM peak and PM peak respectively), illustrating the future capacity of key junctions (as LoS) across the borough in 2031, if mitigation were to be provided as outlined above. Junctions included in **Table 6** above which are shown to operate within capacity in 2031, requiring no mitigation, have not been included in **Figure 11** and **Figure 12** , and are considered to have adequate capacity to accommodate some future traffic growth.

Figure 11: Junction Capacities 2031 With Mitigation - AM Peak

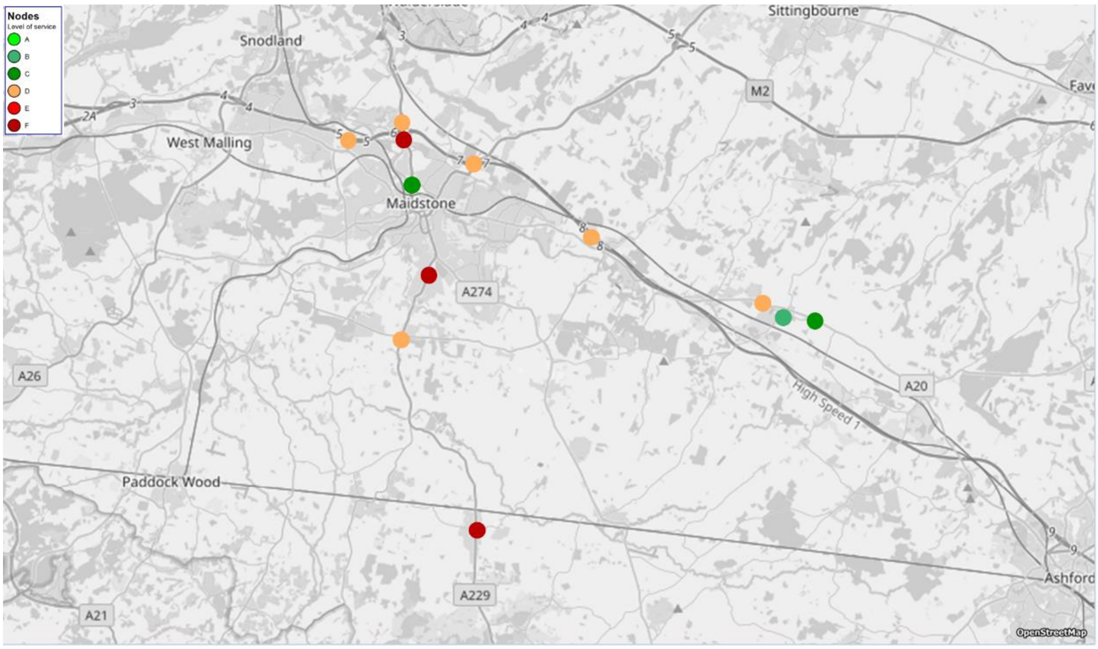
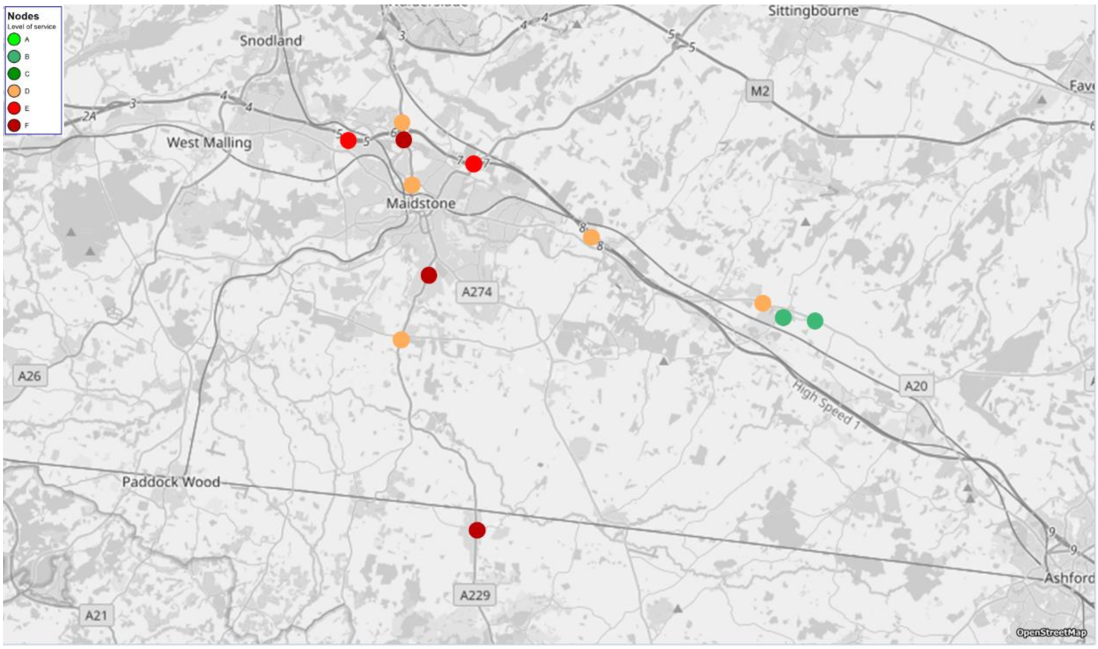


Figure 12: Junction Capacities 2031 With Mitigation - PM Peak



The AM peak operates generally with more spare capacity at key junctions in comparison to the PM peak, particularly in the Maidstone urban area and along the M20 to the north of the town. While some junctions are able to be fully mitigated (particularly in the Lenham RSC) operating with a LoS of A-C, others are still showing to operate with limited spare capacity, or over capacity, even with proposed mitigation (LoS D-F). Other junctions located in Lenham, Headcorn, Coxheath and Staplehurst are shown to operate with spare capacity in the future without requiring any mitigation or capacity improvements (as detailed in in **Table 6**). This overview provides an indicative representation of the key constraints on the future network and highlights the spatial arrangement of likely hotspots.

2.5 Road Safety

Collison Data

Overview

Road collision statistics recorded in Maidstone over the latest five-year period available have been provided for October 2014 to September 2019 and are summarised in **Table 7** below.

The breakdown shows a total of 2,298 incidents were recorded in the borough over the five-year period, with slight incidents accounting for 83%, serious accounting for 16% and fatal accounting for 1% of all incidents. While the annual number of incidents have remained relatively similar over the five-year period, the data shows a gradual decline in the total number of incidents from 2014 across the five-year period, reducing from 484 to 422.

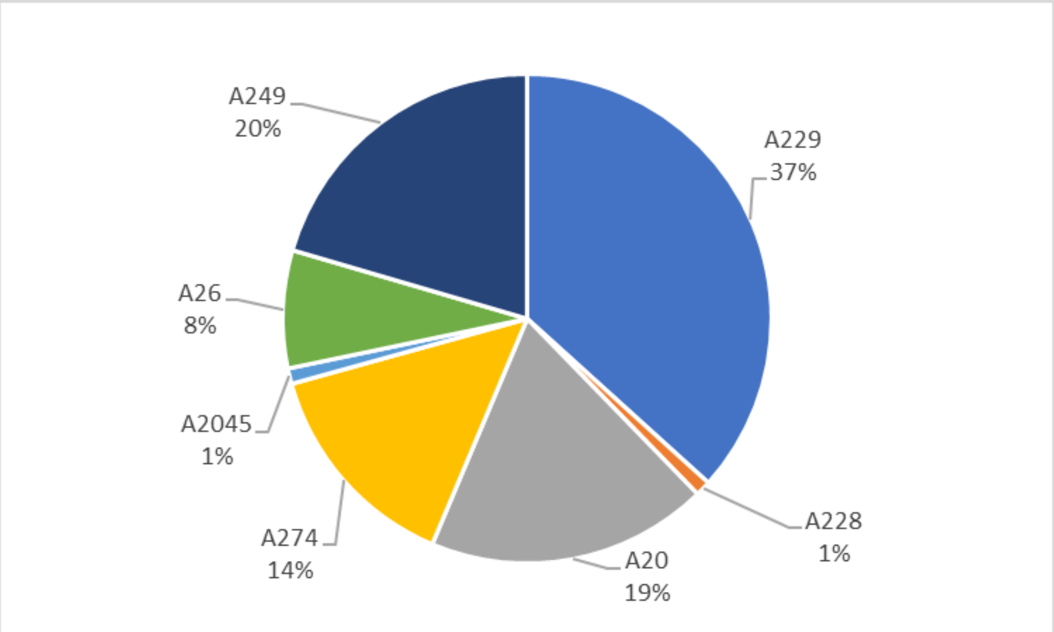
Table 7: Collision Data 2015-2019 Summary

Collison Data	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	Total
Slight	436	378	377	381	342	1914
Serious	43	91	84	69	74	361
Fatal	5	4	1	7	6	23
Total	484	473	462	457	422	2298

Road Type and Location

Of all collisions recorded over the five-year period, almost half were located on A-roads within the borough (47%) the most frequent being the A229 accounting for 37% of all A-road located incidents (as shown in **Figure 13**). Following this, approximately 20% of all A-road incidents were located on the A249 and 19% on the A20, with 14% on the A274, and 8% on the A26, all noted as key radial routes connecting to the town centre.

Figure 13: Proportion of Collisions on A-roads in the Borough (2015-2019)



The remaining 2% were located on the A2045 and the A228 (1% each) both located on the northern and western edge of the borough respectively. A total of 33% of collisions were located on minor or unclassified roads, with the remaining 20% split equally between B-roads and motorway roads (M2 and M20) at 10% each.

In line with the above, 64% of all collisions were located on a single carriageway road, 21% on dual carriageway roads, while only 6% were located at junctions and 5% on one-way streets. The remaining 3% were made up of incidents on slip roads (2%) and unknown locations (1%).

Contributary Factors

The three most frequent contributing factors were classified as 'driver/rider error or reaction', accounting for 41% of all incidents, recorded as 'failed to look properly', 'failed to judge other persons path or speed', and 'poor turn or manoeuvre' (as 25%, 8% and 8% respectively). This was followed by a contributing factor classified as 'road environment' identifying the cause of collision from a slippery road due to wet weather, accounting for 6% of incidents. A further 5% of incidents were also classified within the 'driver/rider error or reaction', with the incident occurring due to loss of control.

Overall, this identifies the 'driver/rider error or reaction' category to account for 46% of all incidents, with just over half (51%) of all incidents accounted for across five different contributary factor descriptions. The remaining 49% of incidents equated to 3% or less for each contributary factor allocated and were identified across 60 additional contributary factor descriptions.

Cluster Sites

Overview

Cluster site identification is an automated process within key Accident, which uses the cluster site analysis tool on the information held in the Stats 19 database (as provided by Kent Police). This searches for locations with a minimum number of incidents; both within a defined search area, and with a defined distance between incidents. If needed, the search area increases as the centroid point is repositioned and new incidents are detected, until all incidents within the defined parameters have been detected.

Across the three-year period between 2016 and 2018, a total of 207 incidents were recorded at 24 cluster sites in Maidstone, as detailed in **Table 8** below, classified by location (rural or urban). Compared to 2016, these cluster sites in Maidstone experienced a decline in incidents by 26.7% in 2017, although this then increased by 15.5% in the following year, in 2018.

Table 8: Summary of Cluster Locations in Maidstone by Urban/Rural Classification

Cluster Locations	2016	2017	2018	Total
Total Incidents	76	60	71	207
Urban	64	41	52	157
Urban (%)	84%	68%	73%	76%
Rural	12	19	19	50
Rural (%)	16%	32%	27%	24%

Despite the decrease in overall incidents identified at cluster sites between 2016 and 2017, and a significant reduction in incidents at cluster sites in urban areas, there was still an increase of incidents at cluster sites in rural areas (by an additional 7 incidents). This number of incidents at cluster sites in rural areas was also sustained into the following year in 2018, with an additional 11 incidents in urban areas (albeit still 12 less incidents in urban areas in 2016). While there is year to year variation, it is clear that a much higher number of incidents occur at cluster sites in urban areas, just over three times more than in rural areas, across the three-year period.

Location

Of these 24 cluster sites, the four sites with the highest total number of incidents (and the greatest site area accordingly) are detailed in **Table 9** below.

Table 9: Cluster Sites with Highest Total Number of Incidents

Location	Urban/ Rural	Diam (m)	Year 1 (2016)	Year 2 (2017)	Year 3 (2018)	Total
A229 Bishops Way	Urban	324	14	14	15	43
A229 Running Horse Roundabout J/W Forstal Road	Urban	245	12	4	9	25
A229 Bishops Way J/W A229 Palace Ave	Urban	166	5	1	6	12
A229 Loose Road J/W Armstrong Road	Urban	150	3	2	5	10

As shown above, all incidents are located along the A229 within the urban area, identifying incidents across a search area at least three times larger than the initial minimum user defined 50m diameter. The cluster site located on Bishops Way highlights a significant hotspot area in terms of collision, identifying 14 to 15 incidents per year within a 324m area.

Of all cluster sites, an additional 2 are located on the A229 (total of 7 sites) with 5 sites located on the A249, 4 sites located on the A20,1 site each located on the A274 and B2163, and 6 sites on minor/unclassified roads. This is illustrated in the heat map provided in **Figure 14** below, showing a concentration of incidents within the urban area across the three-year period.

Figure 14: Cluster Site Locations in Maidstone 2016 - 2018

2.6 Census Data and Travel Patterns

Background Demographics

Maidstone's estimated population in 2012 was 157,300 and was identified as the largest district in Kent with 10.6% of the county's population. Its population has grown faster than the average for Kent and England, increasing by 17,000 between 2002 and 2012. At the same time, the population was shown to be an ageing population with the proportion of resident's aged 65 and over above the national average. These trends are set to continue with future population growth for Maidstone forecast to be above the Kent and national level to 2021. Both the working age (16- 74) and retirement age (65+) population are expected to increase more in Maidstone than overall in Kent.

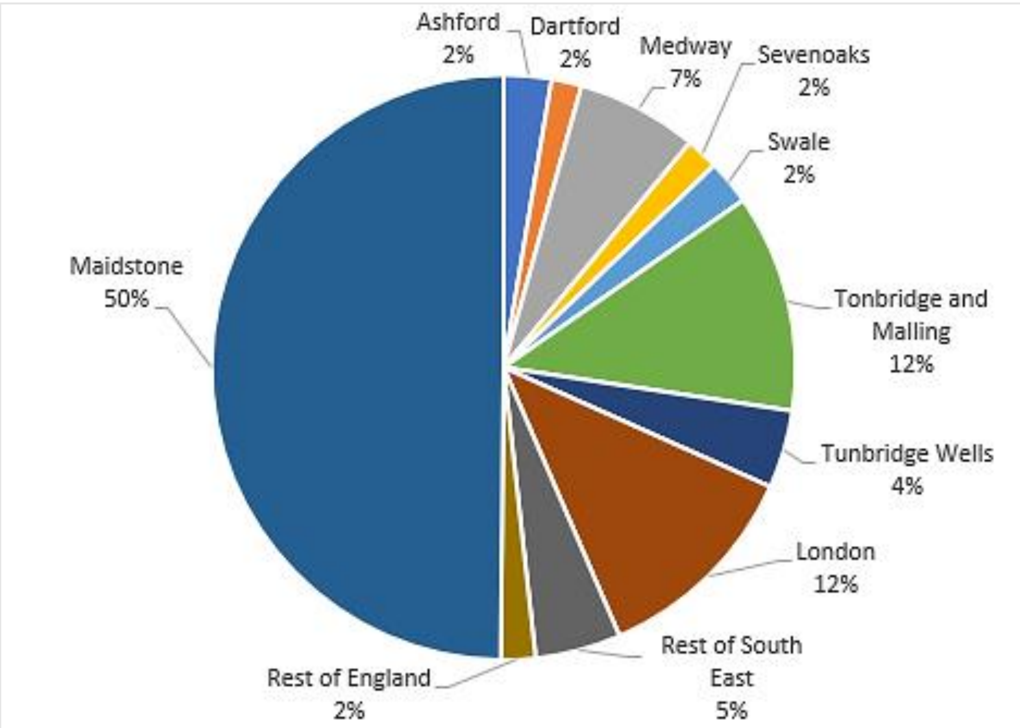
Journey to Work Trips

An estimated 76.8% of Maidstone's 157,300 residents were reported to be in employment in 2012, above the national and regional averages by 5.1% and 4.2%. While resident travel to work journeys are split roughly in half with 50% of trips remaining within the borough (internal trips) and 50% of trips to workplace locations outside the borough (external trips), Maidstone has become less important as a place of work for residents over the last decade, with the percentage living and working in the borough falling from 60% to 50% between 2001 and 2011.

Trip Distribution

As mentioned above, and as illustrated in **Figure 15** below, according to the 2011 census data, Maidstone has a notable retention rate of travel to work trips, with 50% of all travel to work trips remaining within the borough (internal trips). For other travel to work trips outside the borough (external trips) 12% travel to Tonbridge and Malling, and 12% travel to London, while 7% travel to Medway and 4% to Tunbridge Wells. The remaining trips are proportioned at around 2% each travelling to Ashford, Dartford, Sevenoaks and Swale. There are also an additional 5% of trips travelling to work within the South East outside the locations noted above, and an additional 2% of trips to work located further afield, outside the South East of England.

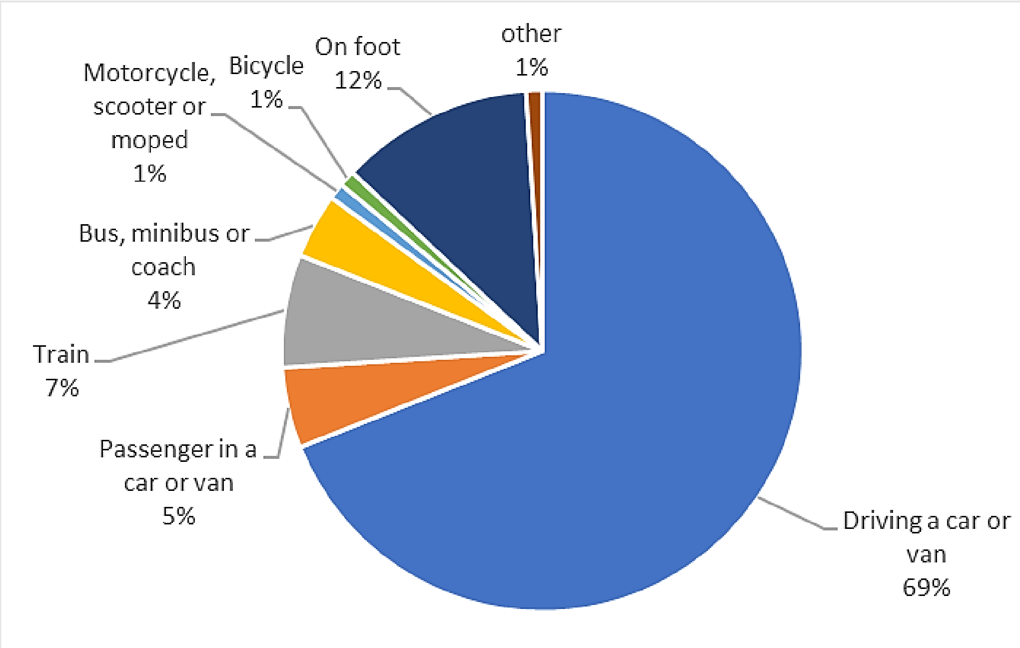
Figure 15: Live in Maidstone and Travel to Work Trip Distribution, 2011



Mode Share

As shown in **Figure 16**, car drivers and passengers are the dominant mode share for Maidstone residents' journeys to work, with a combined total of 74%. This is followed by 12% of all journeys being made by foot, 7% by train and 4% by bus minibus or coach. Only a total of 1% of all journeys are made by bike and 1% by motorcycles.

Figure 16: Travel to Work by Modal Share from Residents in Maidstone



As can be seen in **Table 10**, the mode share in Maidstone largely aligns with the mode share for Kent and the South East, which all have a higher proportion of car users in comparison to London and England.

Table 10: Modal Share of Key Modes within Each Listed Region

	Maidstone	Kent	London	South East	England
Car	74%	70%	31%	70%	65%
Train	7%	10%	14%	8%	6%
Bus	4%	4%	15%	5%	8%
Foot	12%	12%	9%	12%	11%
Bike	1%	2%	4%	3%	3%
Other	2%	2%	26%	2%	6%

Car Ownership

As shown in Table 11 below, Maidstone has a higher proportion of vehicle ownership per household in comparison to Kent, London, the South East and England, in particular with 2+ vehicles per household.

Table 11: Car Ownership Percentages in Maidstone and Other Areas

No. of Vehicles Per Household	Maidstone	Kent	London	South East	England
No car or van	16.1%	20%	41.6%	18.6%	25.8%
1 car or van in household	40.6%	42.7%	40.5%	41.7	42.2%
2+ cars or vans in household	43.2%	37.3%	17.8%	39.7%	31.2%
Vehicle ownership	83.8%	80%	58.3%	81.4%	73.4%

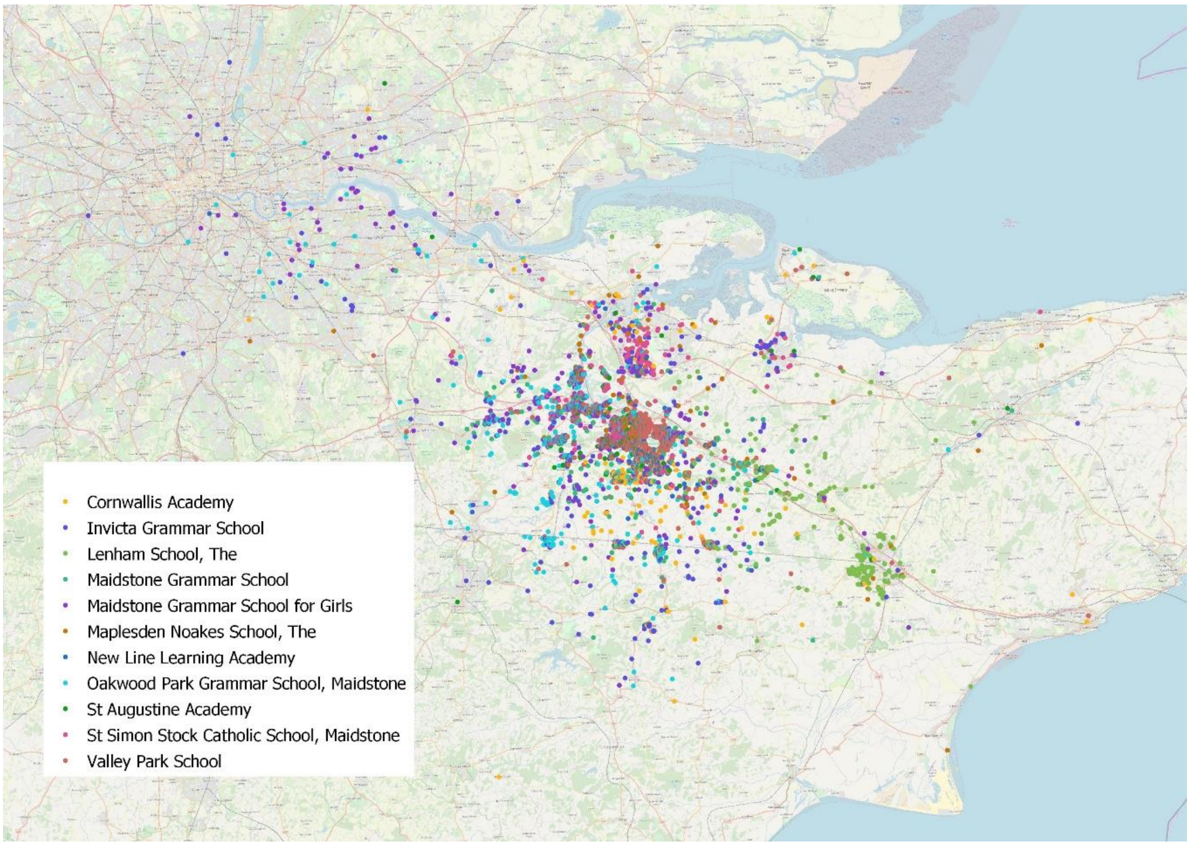
Vehicle ownership in Maidstone is more than 10% higher than the average across England and aligns with the high proportion of travel to work trips undertaken by private car by residents living in the borough (74%).

Journey to School Trips

Trip Distribution

As shown in **Figure 17**, Secondary Schools (including sixth form) located in Maidstone cover a wide catchment area, with a noticeable number of school trips originating from outside the borough. The map shows large clusters of trips originating from Ashford, Sittingbourne and Medway, for particular schools including The Lenham School, Invicta Grammar School and St Simon Stock Catholic School. There are also trips originating significantly further out of the county, drawing in trips from London and the South East, albeit these appear small in number.

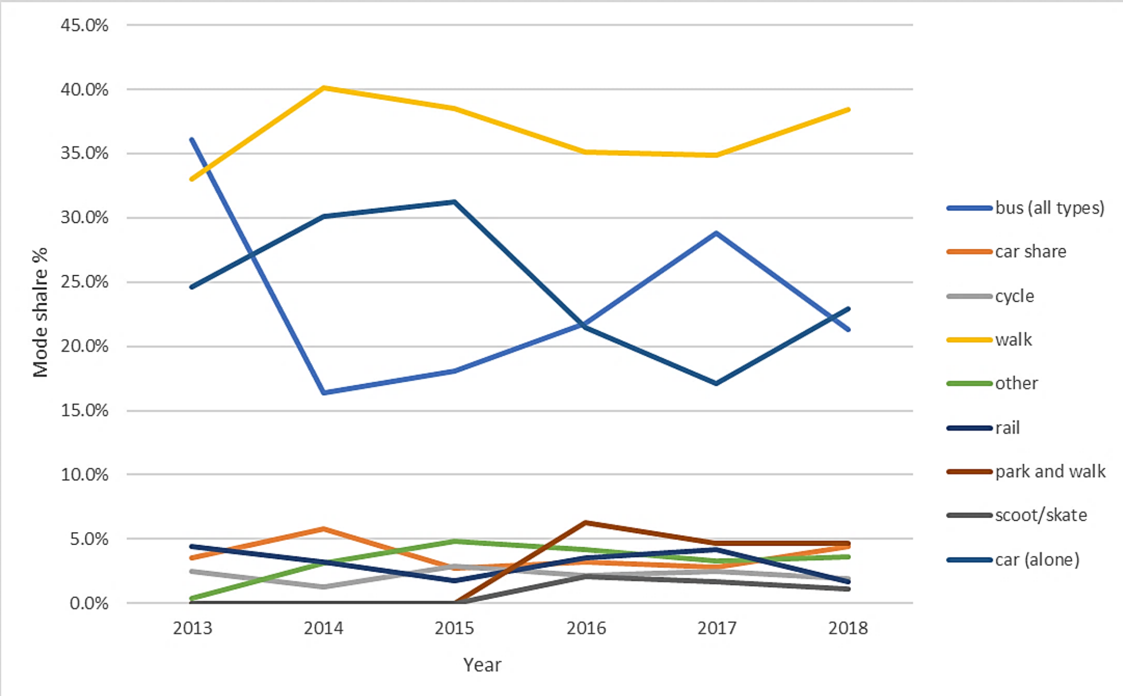
Figure 17: Secondary School Catchment Area in Maidstone



Mode Share

As shown in **Figure 18**, walking is the most predominant mode of travel to all schools located in Maidstone. This has been consistently high over the last five years (up to 2018) and makes up approximately one third of all travel to schools. Bus and car (alone) are the next most frequent modes of travel to school, although these have fluctuated significantly over the latest five-year period, showing a rise in bus travel as car travel decreases in the last few years (both accounting for approximately 20% of trips each in 2018). All other modes of travel account for less than 5% each and show a continuous low modal split over the five-year period.

Figure 18: Travel Modes to All Schools in Maidstone



As shown in **Figure 19** and **Figure 20**, in 2018 walking is the main mode of travel to both primary and secondary schools (both around 40%). For primary schools this was followed by private car travel (single student travel with a parent) while for secondary schools this was followed by bus (both around 35%). It is clear that travel by private car is significantly higher for trips to primary schools in comparison to secondary schools, with a combined car mode share of 42% for trips to primary school (car driving alone and shared) whilst this was only 16% for trips to secondary schools. In turn, bus trips to primary school were significantly lower than trips to secondary school, with only 1% of trips to primary schools by bus, compared to 35% for secondary schools. Primary schools also had a higher uptake of park and walk trips (11%) while this only accounted for 1% in secondary schools. All other modes were considerably low, in particular cycle trips only accounted for 3% for primary schools and 1% for secondary schools.

Figure 19: Mode Split for Primary Schools in Maidstone in 2018

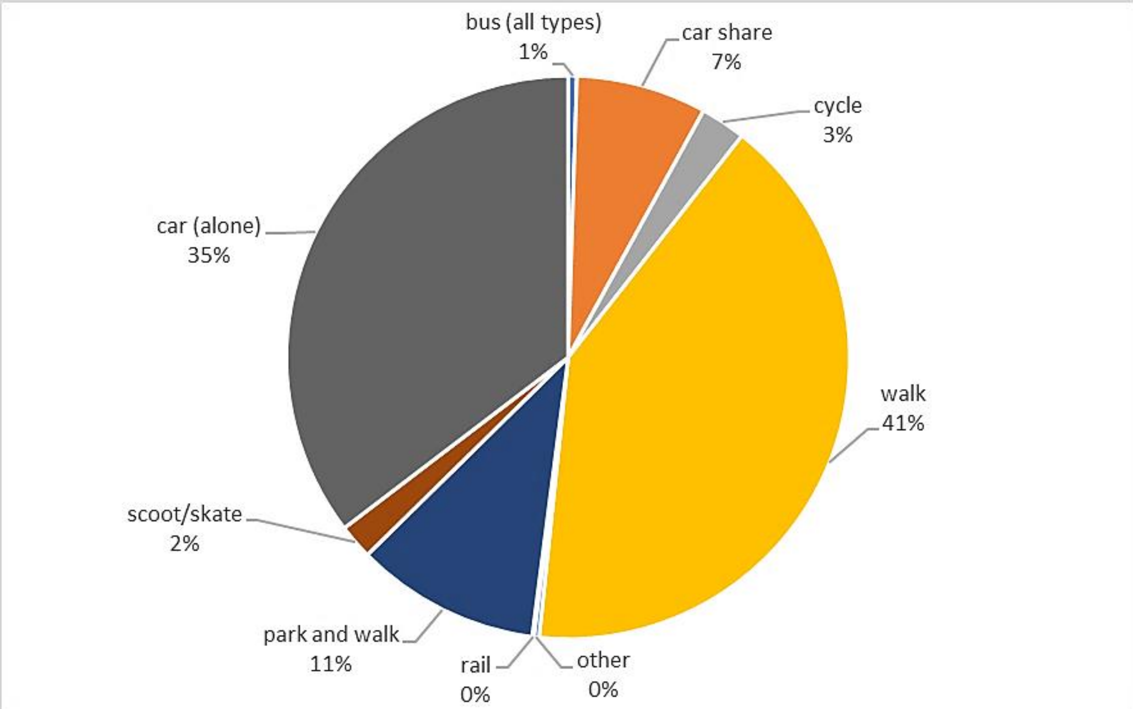
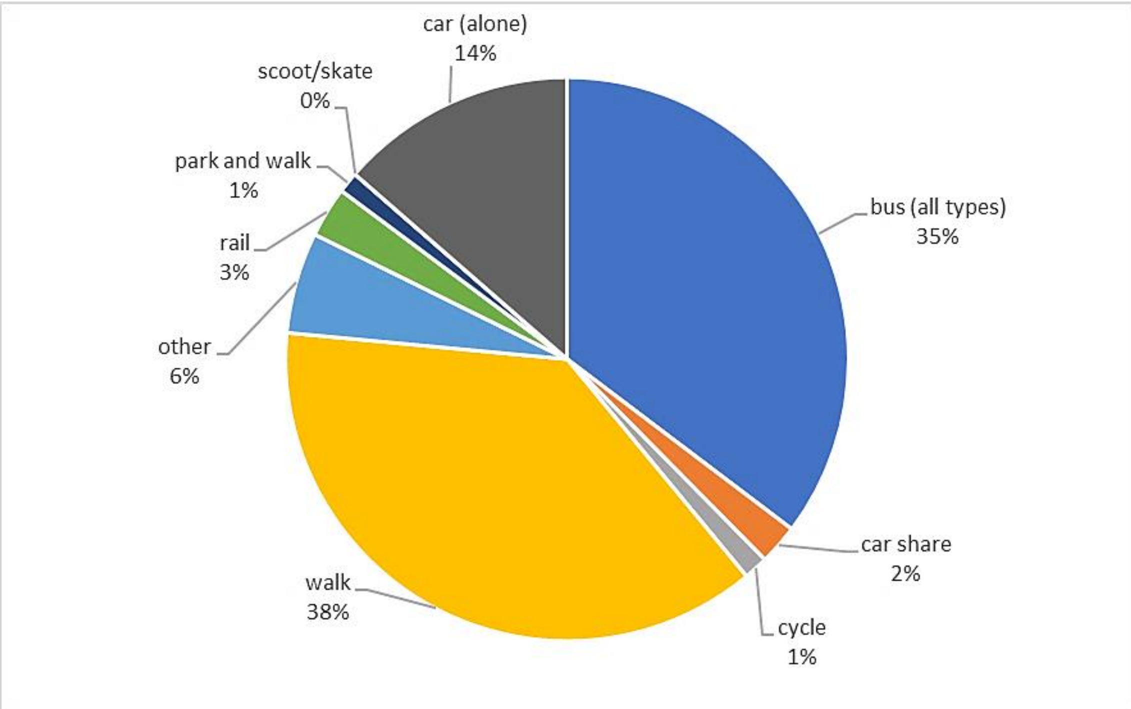


Figure 20: Mode Split for Secondary Schools in Maidstone in 2018



3. Initial Development Options 'Soft-Testing'

3.1 Overview

A spreadsheet model has been developed to undertake initial 'soft-testing' only and obtain an understanding of the likely order of magnitude of traffic impacts from the various development options, and potential for modal shift. The outputs available from the spreadsheet model have been informed using static network assignment data from the existing Maidstone VISUM Transport Model, to illustrate the following:

- Cumulative traffic impacts on the road network mapped against known congestion or safety 'hot spots' and / or any areas where there could be potential for spare capacity;
- Traffic impacts in the context of Annual Average Daily Traffic (AADT) flows and percentage Heavy Duty Vehicles (HDVs) on key road links in designated AQMAs and other air quality sensitive locations; and
- High level potential for modal shift on key corridors from the implementation of sustainable transport measures (including sustainable transport network enhancements or improvements, promotion of modal shift, mitigation measure schemes and community internalisation).

It should be noted that the spreadsheet model has not been developed to undertake detailed capacity testing and junction analysis. The primary function is to provide a flexible and adaptable tool to run the likely traffic generation of different spatial options on the borough network and provide an initial 'risk assessment' of where future capacity issues are likely to occur. This is limited to high-level link flows, which will allow recommendations to be made for next steps and Stage 2 assessments using the Kent-wide transport model. Stage 2 will involve more detailed transport modelling to refine the spatial strategy options, air quality modelling assessments, and define the mitigation/intervention package required to deliver sustainable growth in the borough.

3.1.1 2018 VISUM Model Review

As included in **Appendix A**, a short 'Model Audit Technical Note' has been produced, concluding the model's suitability to inform this stage and identifying any limitations or weaknesses that should be taken in to account when applying data for use in the Stage 1 Baseline Review and 'Soft-Testing'.

3.1.2 Spreadsheet Model Development

The existing Maidstone VISUM Transport Model has been used to understand likely distribution and assignment patterns of new development's traffic on the network. These outputs have been combined with trip generation information for all potential LPR development sites to create an adaptable spreadsheet application. This has formed the main tool for undertaking the initial 'soft-testing' of spatial options to understand the likely order of magnitude of traffic impacts on key parts of the network.

The spreadsheet model has a front page that contains a long list of site proposals that can be readily toggled 'on' and 'off' to test different development scenarios. Trip generation is calculated at middle super output area (MSOA) level based on the type, size and location of the selected developments.

TRICS version 7.6.4 was used to obtain the relevant trip rates for residential, employment and retail development land use types. Suitable trip rates were identified through a review and comparison process against NOMIS census to work data for employment sites, and the Amey Forecasting Report: Maidstone VISUM Transport Model (CO04300370/003 Revision 01) August 2016 for residential and retail sites. This was considered a robust approach (given the limited recent survey data and low number of sites within the South East as currently available in the TRICS database) and allowed trip rates to be selected in line with the existing travel patterns in the local area. No further adjustments were applied to the trip rates in order to assume a reasonable worst-case baseline.

The employment split was based on the findings shown in the GVA report - Qualitative Employment Site Assessment Maidstone Borough Council (Final Report September 2014), which set out the employment land forecast for office, industrial and warehouse employment types. These proportions were then applied to the employment split, allocating 15% of employment sites as office, 25% as industrial and 60% as warehouse, for all sites outside the town centre (which was allocated 100% office).

It was agreed the density threshold to be used for housing sites would be 40 dwellings per hectare (dph) – sites equal or below this were allocated as houses, and sites over this were allocated as flats.

Assessment of the town centre retail sites identified these to be predominately small in size (such as small coffee shops or kiosks) and with a reduced retail element proposed overall. It is expected these sites will not provide any significant impact on the highway network, or at least no additional vehicle trips at a minimum, and so where applicable, these trips have been discounted.

The model applies the same trip distribution matrix extracted from the Maidstone VISUM model reference scenario for 2031 to distribute the generated trips between origin and destinations at MSOA level.

Development trips are allocated to the network using static route assignment calculated from the VISUM Maidstone model network, based on a single representative zone for each MSOA. The representative VISUM zones for each MSOA were selected based on the population-weighted centroids of the MSOAs. Unlike the Maidstone VISUM transport model, the spreadsheet tool does not include functionality to vary the trip assignment to take into account variation in demand or capacity constraints.

The impact of development traffic on the network links is assessed by adding the development only generated trips to 2031 background traffic volumes (in line with the last year of the current Local Plan) extracted from the Maidstone VISUM transport model and comparing against the network link capacities also extracted from the Maidstone VISUM transport model. The combined outputs are then exported for analysis and mapping in GIS to highlight the location and magnitude of traffic impacts.

3.2 Development Options

3.2.1 Main Reasonable Alternatives (RAs)

The spreadsheet modelling initially focuses on testing three main spatial options or 'Reasonable Alternatives' (RAs) as defined by MBC and set out below:

- RA1 – Local Plan continued;
- RA1a – excluding all of Maidstone urban area; and
- RA2a – Garden Settlement sites.

The three RAs were specifically defined to test three distinct spatial options, with RA1 designed to test the impact of the continued existing pattern of growth in the current Local Plan, which includes sites located in the Maidstone urban area, countryside and RSCs and larger village sites (excluding any Garden Settlement sites).

RA1a was defined to include the Garden Settlement sites, alongside all RSCs and larger village sites, but excludes all Maidstone urban area sites. This option therefore includes a high number of dispersed site locations, often situated around the periphery of the borough with lower levels of accessibility.

RA2a was defined to include the Garden Settlement sites and also all Maidstone urban area sites, with the remainder of sites made up of a smaller proportion of RSCs and larger village sites than the other options. These three initial RAs have all been set out in line with the additional housing needs in order to meet the total capacity requirements for the current Local Plan future year of 2031 (an approximate increase by around 9,000 residential units).

3.2.2 Air Quality Assessments

As noted above, the change in traffic flows have also been assessed with regards to air quality impacts across the borough. Traffic flows have been converted into Annual Average Daily Traffic (AADT) flows and percentage HDVs on key road links in designated AQMAs and other air quality sensitive locations have been identified. This assessment provides a comparison between the baseline conditions and the three main RAs, set out in the 'Air Quality Assessment Technical Note' as attached in **Appendix B**.

3.2.3 Further Scenario Tests

These three main RAs were then further tested with minor adjustments to identify the impact of:

a) initial public transport mitigation measures and higher proportions of trip internalisation applied to the Garden Settlement sites as a starting point for sustainable transport (noting that more ambitious sustainable travel options would need to be delivered and assessed for these sites in particular); and

b) the full build out of each of the sites (and maximum capacity for the Garden Settlement Sites), up to the following Local Plan period future year of 2047 (approximate increase by around 12,000 residential units) – acknowledging, and as a future proofing exercise, that these sites will commence towards the end of the LPR period and would need to expand into the next LPR period.

In summary the main spreadsheet model tests undertaken include:

- **Three Main RAs: Current LPR Period (2037)**
  - RA1 – Local Plan continued
  - RA1a – excluding all of Maidstone urban area
  - RA2a – Garden Settlement sites
- **Garden Settlement Site Initial Sustainable Travel Measures: Current LPR Period (2037)**
  - RA1a – excluding all of Maidstone urban area
  - RA2a – Garden Settlement sites
  (RA1 was not required given no Garden Settlement sites are included)
- **Full Build Out: Future LPR Period (2047)**
  - RA1 – Local Plan continued
  - RA1a – excluding all of Maidstone urban area
  - RA2a – Garden Settlement sites

The inputs for each of these modelled tests are provided in more detail in the section below.

3.3 Model Inputs and Methodologies

3.3.1 Background Traffic Growth

For the current Local Plan Period (2031) TEMPro version 7.2 was used to apply a growth factor to the 2018 flows provided within the existing VISUM model, up to the year 2031, in line with the last year of the current Local Plan. The factors identified included all Local Plan development growth as set out in the current Local Plan, alongside the expected background traffic growth in the area.

The figures provided in TEMPro were assessed and compared against the housing trajectory forecasts provided in the current Local Plan. Upon review, it was considered the figures provided in TEMPro for the future year 2032 better aligned with what was forecast in the current Local Plan (given the figures shown in TEMPro for the future year 2031 were much lower than those identified in the Local Plan) and was therefore considered a more robust and suitable approach to apply the TEMPro factors using the 2032 as a reasonably proxy.

TEMPro was further investigated to identify the growth factors for the 'beyond LPR' period up to 2047, however, the data showed low-level changes expected in traffic flows over the long term 15-year period with less than 8%

growth with forecasted Local Plan development included and less than 2% growth for skeleton (non-development related) background traffic only. It was therefore not considered necessary to provide this uplift in the background traffic flows, given the limited impact this is expected to have on the background flows year on year, particularly in comparison to the expected impact from the full build development traffic flows.

3.3.2 Three Main RAs Test: Current LPR Period (2037)

The inputs for the three main RAs are detailed in **Table 12**.

Table 12: Three Main RA Development Options

Location	No. of Sites	Units RA1	Units RA1a	Units RA2a
Maidstone Urban Area				
Maidstone Town Centre	12	1,096	0	1,096
Maidstone Urban Area	14	729	0	729
South of Maidstone Urban Area	2	532	0	532
South West of Maidstone Urban Area	4	595	0	595
South East of Maidstone Urban Area	2	301	0	301
Total	**34**	**3,253**	**0**	**3,253**
Countryside				
Total	**25**	**1,503**	**0**	**0**
Rural Service Centres and Larger Villages				
Marden	2	45	45	0
Staplehurst	13	995	995	332
Headcorn	8	684	684	335
Lenham	11	1,462	1,462	0
Harrietsham	4	319	319	319
Boughton Monchelsea	2	70	70	70
Coxheath	7	542	542	135
Eyhorne Street (Hollingbourne)	1	11	11	11
Sutton Valance	7	599	599	98
Yalding	2	177	177	160
Total	**56**	**4,904**	**4,904**	**1,460**
Garden Settlements				
North of the M2 / Lidsing	2	0	1,000	1,000
Heathlands	1	0	1,400	1,400
North of Marden	2	0	1,300	1,300
Leeds Langley	18	0	800	800
Total	**23**	**0**	**4,500**	**4,500**
Total Potential Capacity		**9,660**	**9,404**	**9,213**

3.3.3 Garden Settlement Site Initial Sustainable Travel Measures Test: Current LPR Period (2037)

The following high-level mitigation measures have been applied to the Garden Settlement sites only:

- Active travel and short trips/community internalisation; and
- Sustainable transport network enhancements/improvements.

It should be noted that alongside this review, Stantec and MBC are undertaking a separate evaluation to assess and challenge the suitability of the transport proposals of the Garden Settlement sites. The outcomes of this work were not available at the time of writing and will be reported separately by Stantec.

It was confirmed that the Leeds Langley Garden Settlement site will now be taken forward as a 'broad location' rather than as a Garden Settlement site, and these initial measures have not been applied to this development (only to the three remaining Garden Settlement sites only). Nonetheless, the impact of the Leeds Langley Relief Road (LLRR) which provides the proposed mitigation measure set out for this broad location has been reviewed. This is based on high-level qualitative analysis based on previous findings made available by MBC and does not constitute full modelling of the scheme nor a recommendation of suitability as a mitigation measure.

The initial Garden Settlement site measures have been included on the basis that the required supporting infrastructure and mix of development uses will be provided in order to encourage such modal shift from the highway network, via local walking and cycling routes for active travel and short trips, and suitable bus and rail services for longer and / or commuter trips. Based on a high-level conservative approach, the following adjustments have been made in the spreadsheet model as follows:

- An initial 10% internalisation factor has been applied to the three Garden Settlement sites residential trips to capture active modes/short trips to local services provided in the Garden Settlement sites, and encouragement for live/work/teleworking **– this will rely on the delivery of a mix of land uses at each site and provide jobs and services to engender live / work to reduce the need to travel**;
- A further 10% reduction of trips was then applied to the three Garden Settlement sites along selected key routes likely to benefit from suitable public transport improvements, e.g. bus rapid transit (BRT) or high-quality frequent bus, to capture reasonable modal shift from private vehicles to public transport along the following corridors (noting that no reduction has been made to trips elsewhere on the network):

  - North of Lidsing: A229 between the Maidstone town centre and M2

  - Heathlands: A20 between Maidstone town centre and Ashford; and

  - North of Marden: A229 between Maidstone town centre and the south of the borough.

The total trip reductions applied as part of the Garden Settlement site measures are shown in **Table 13** and Table 14 for the AM peak and PM peak respectively. **Table 13: Trip Reductions**

Table 13: Trip Reductions AM Peak

	North of the M2 / Lidsing	Heathlands	North of Marden
10% internalisation – trip reduction	42	59	55
10% key route adjustments – trip reduction	55	96	65
Total trip reductions	**97**	**155**	**120**
Total trips prior to GS site measures	590	1022	709
Total trips following GS site measures	**493**	**867**	**589**

Table 14: Trip Reductions PM Peak

	North of the M2 / Lidsing	Heathlands	North of Marden
10% internalisation – trip reduction	44	62	57
10% key route adjustments – trip reduction	58	103	69
Total trip reductions	**102**	**165**	**126**
Total trips prior to GS site measures	625	1088	750
Total trips following GS site measures	**523**	**923**	**624**

These figures indicate, with a reasonable assumption of 10% of all trips to become internalised as services and amenities become accessible within the sites themselves, approximately 40-60 trips will be reduced per peak period at each Garden Settlement site, shifting from vehicle trips to internalised walking and cycling trips within the site and surrounding areas. These figures indicate the minimum levels of demand for walking and cycle trips, that would need to be supported by suitable active travel infrastructure within each of the Garden Settlement sites.

The total trip reductions for key route adjustments show a slightly greater variance between sites, with approximately 50-60 vehicle trip reductions per peak for the North of the M2 / Lidsing site (via the A229 North), approximately 100 vehicle trip reductions per peak for the Heathlands site (via the A20 East), and approximately 60-70 vehicle trip reductions per peak for the North of Marden site (via the A229 South). These figures indicate the minimum levels of demand for public transport trips, that would need to be supported by suitable bus and rail travel infrastructure, accessible from each of the Garden Settlement sites.

Overall, these initial measures reduce the total private vehicle trips on the wider highway network from the three Garden Settlement sites by approximately 375 vehicles in the AM peak and 390 vehicles in the PM peak.

3.3.4 Full Build Out Test: Future LPR Period (2047)

The additional development numbers for the full build out tests for the future year of 2047, to be added on top of the three main RA 2037 development numbers, are shown in **Table 15** below.

Table 15: Additional Development - Full Build Out 2047

Location	No. of Sites	Units RA1	Units RA1a	Units RA2a
Maidstone Urban Area				
Maidstone Town Centre	12	1,402	0	1,402
Maidstone Urban Area	14	933	0	933
South of Maidstone Urban Area	2	681	0	681
South West of Maidstone Urban Area	4	761	0	761
South East of Maidstone Urban Area	2	385	0	385
Total	**34**	**4,162**	**0**	**4,162**
Countryside				
Total	**25**	**1,923**	**0**	**0**
Rural Service Centres and Larger Villages				
Marden	2	58	58	0
Staplehurst	13	1,273	1,273	425
Headcorn	8	857	857	429
Lenham	11	1,871	1,871	0
Harrietsham	4	408	408	408
Boughton Monchelsea	2	90	90	90
Coxheath	7	693	693	173
Eyhorne Street (Hollingbourne)	1	14	14	14
Sutton Valance	7	766	766	125
Yalding	2	226	226	205
Total	**56**	**6,275**	**6,275**	**1,868**
Garden Settlements				
North of the M2 / Lidsing	2	0	990	990
Heathlands	1	0	2,000	2,000
North of Marden	2	0	564	564
Leeds Langley	18	0	2,000	2,000
Total	**23**	**0**	**5,554**	**5,554**
Total Potential Capacity		**12,360**	**11,829**	**11,584**

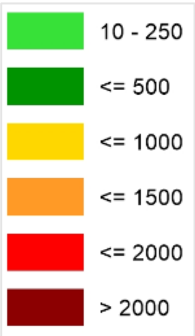
3.4 Model Outputs and Key Findings

The array of maps shown in this section present the two-way total link flows across the borough for each of the tests run, as listed above.

The varying levels of vehicular demand across the network are presented across six different colour bands, as listed in the key shown in **Figure 21** below. Any links that don't appear to be represented by a colour band are either not included within the network modelled or are not considered necessary to be included in the assessment, with vehicular demand of less than 10 vehicles in each peak period (across the 1-hour period per peak).

While the maps included in this section below present only the key findings from the assessments undertaken, a full 'Library of Maps' is included in **Appendix C** for more detailed outputs.

Figure 21: Traffic Flow Categories (Number of Vehicles)



3.4.1 Background Traffic Growth (2031)

Figure 22 and **Figure 23** on the following page present the background flows for the future year of 2031 in the AM and PM peaks respectively. This aligns with the end year of the current Local Plan and assumes the build out of all current Local Plan development.

Figure 22: Background Flows 2031 AM

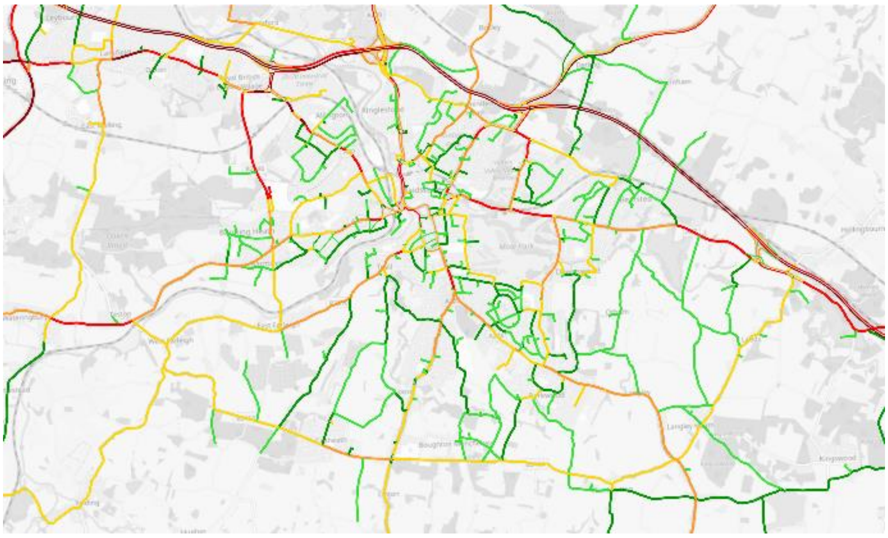


Figure 23: Background Flows 2031 PM

In both peak periods, the M20, A20 and the A249 have the highest traffic flows, as well as, the B2246 that routes between M20 junction 5 and East Barming via Maidstone Hospital. These links are shown to have traffic demand levels in the region of 1,500 + flows (or in the case of the M20 2,000+ flows) per peak period. There are also a number of sections along key links closer within the town centre that present high traffic flows, more noticeably in the PM peak along the A229 and at the Maidstone Bridges Gyratory, with a similar level of demand. The A26 to the west and A274 to the south are also shown to have relatively high flows in comparison to the wider network area, with approximately 1,000 vehicles per peak period. A large number of links also demonstrate a moderate level of traffic demand across the network, with routes such as the B2163 via Coxheath, the A228, B2010 into the town centre via Tovil and Bearsted Road illustrating a demand of 500 to 1,000 vehicles per peak period. Nonetheless, a number of the more local roads indicate a significantly lower level of vehicular demand, with 500 or less vehicles travelling around the residential areas in the peak periods.

3.4.2 Three Main RAs Findings: Current LPR Period (2037)

Traffic Flows

The AM peak development only traffic flows for each of the three main RAs (RA1, RA1a and RA2a) are shown below in **Figure 24**, **Figure 25** and **Figure 26** respectively.

In scenario RA1, following the same pattern of growth as the current Local Plan, the greatest impact is shown along a section of the A229 south within the town centre, and at the Maidstone Bridges Gyratory, as well as to the south of Langley Heath in the south east of the borough. There is also a similar level of impact shown at the approach to the M20 Junction 8 via the A20. These areas are shown to have a demand of around 500 to 1,000 vehicles in the peak hour, while other links demonstrate a much lower level of demand across the wider network.

A similar pattern of traffic demand is also shown for the Garden Settlements scenario (RA2a) although the impact along the A229 south is shown to have an additional impact further southbound towards Loose, potentially with the demand of the Garden Settlement site to the north of Marden.

In the 'no Maidstone' scenario (RA1a), which incorporates a much more dispersed pattern of growth outside the urban area (across the RSCs, Larger Villages and Garden Settlement sites) a similar level of impact is shown with regards to levels of demand, but across a greater number of key links within the borough. The greatest impacts are shown between Langley Heath in the south east, and the north of the town centre, routed via the B2163 and A20 onto the M20 at junction 8 and travelling westbound towards junction 7. While this scenario has a slightly lower impact on the town centre routes, it is demonstrating a more significant impact on the key radial routes from the outer areas of the borough into the town centre, most likely due to the number of sites located in the more rural areas of the borough.

The PM peak traffic flows for each of the three main RAs (RA1, RA1a and RA2a) are shown in **Figure 27**, **Figure 28** and **Figure 29** respectively.

The maps present a similar level of traffic demand as those shown in the AM peak period, but across a slightly wider area on the network. For RA1, the main impacts on the A229 south extend slightly further southbound towards Loose, while Ra2a shows further impacts across the A274 and the B2163 around Langley Heath and between junction 7 and 8 on the M20. For RA1a, impacts within the town centre are now apparent, along the A20 to the east of the borough (just south of Bearsted), and along A274 and A229 extending beyond Linton (just north of Staplehurst) from the south into the town centre and at the Maidstone Bridges gyratory.

Figure 24: Development Flows RA1- AM

Figure 25: Development Flows – RA1a - AM

Figure 26: Development Flows – RA2a - AM

Figure 27: Development Flows – RA1 - PM

Figure 28: Development Flows – RA1a - PM

Figure 29: Development Flows – RA2a - PM

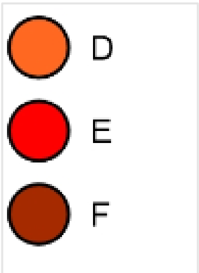
Junction Stress

The AM peak traffic flows for each of the three main RAs (RA1, RA1a and RA2a) with the 2031 junction stress levels are shown below in **Figure 31**, **Figure 32** and **Figure 33** respectively. This shows where the additional development traffic is expected to impact at the key junctions that already show capacity stress on the existing network in the future year of 2031.

The PM peak traffic flows for each of the three main RAs (RA1, RA1a and RA2a) with the 2031 junction stress levels are shown below in **Figure 34**, **Figure 35** and **Figure 36** respectively.

The classifications used to define junction stress align with the LoS categories and associated descriptions provided in **Table 5** above, and are shown on the maps using the different colour bands as listed in the key shown in **Figure 30** below.

Figure 30: LoS Categories



For all three scenarios in the AM and PM peaks, the maps show a total of nine main junctions located within the Maidstone urban area which appear to operate under strain with regards to spare capacity in the future year of 2031. While there are no junctions that appear to operate with a LoS of F, junctions operating with a LoS of D or E are considered to be approaching capacity, whereby noticeable congestion and queuing on critical approaches begins to build, causing significant constraints on the highway network.

A high-level observation identifies the two junctions towards the south of the borough, at the junction of the A229/A274 and the Linton Crossroads to experience the most significant impacts in terms of network constraints and additional pressure on the network as a result of the development flows.

While the junction of the A229/A274 is showing to operate with a LoS of D, this is assigned some of the highest flow volumes on the network from the development scenarios (up to 1,000 vehicles per peak hour). For the Linton Crossroads, while this is generally assigned a lower volume of vehicles (up to 500 vehicles per peak hour, or up to 1,000 vehicles for RA1a in the PM peak) it is already operating with a LoS of E and therefore any additional traffic flows are likely to cause further congestion issues, delays and queueing on this section of the network.

Figure 31: Background Junction Stress 2031 with Development Flows – RA1 – AM

Figure 32: Background Junction Stress 2031 with Development Flows – RA1a – AM

Figure 33: Background Junction Stress 2031 with Development Flows – RA2a – AM

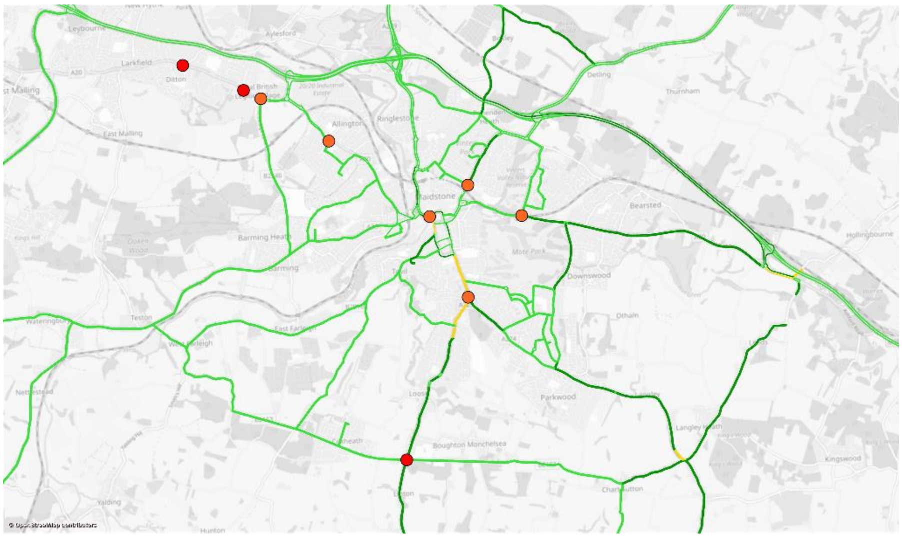


Figure 34: Background Junction Stress 2031 with Development Flows – RA1 – PM

Figure 35: Background Junction Stress 2031 with Development Flows – RA1a – PM

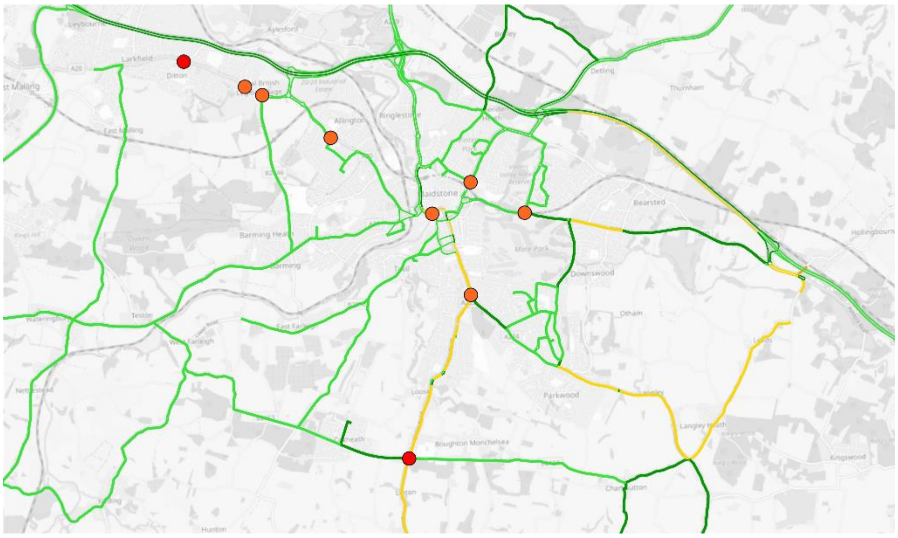


Figure 36: Background Junction Stress 2031 with Development Flows – RA2a – PM

Summary

In summary, RA1 has a slightly higher impact in the town centre and to the west of the borough, while the two RAs with the Garden Settlement sites (RA1a and RA2a) have a greater impact to the east and south of the borough, along the A20, A274 and A229. RA1a has the highest impact on the wider network, given the reliance on more dispersed sites across the borough to provide the required level of growth, mainly in the RSCs and larger villages, as a result of excluding all Maidstone urban area sites.

3.4.3 Garden Settlement Site Initial Sustainable Travel Measures Findings: Current LPR Period (2037)

Traffic Flows

The peak hour traffic flows for each of the RAs with Garden Settlement sites (RA1a and RA2a) are shown below in **Figure 37** and **Figure 38** for the AM peak, and **Figure 39** and **Figure 40** for the PM peak.

Figure 37: Development Flows – RA1a - AM

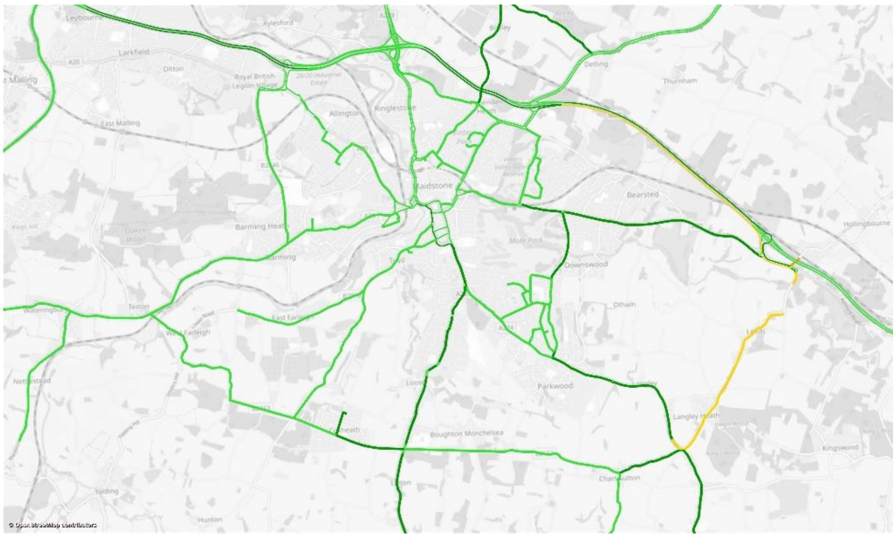


Figure 38: Development Flows – RA2a - AM

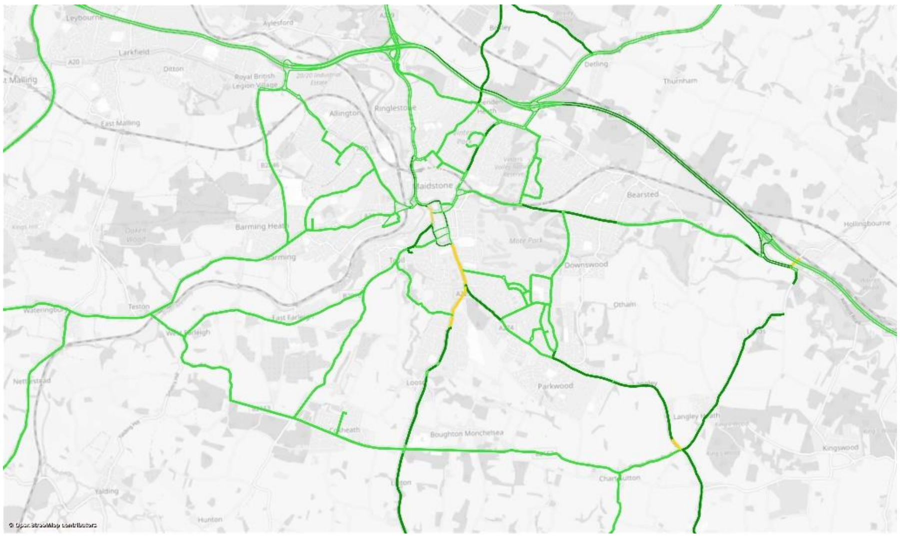


Figure 39: Development Flows – RA1a - PM

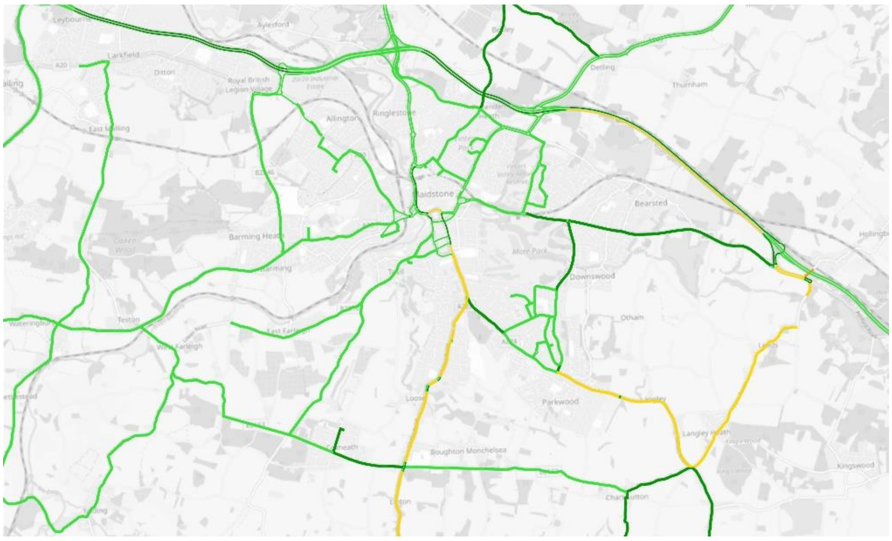
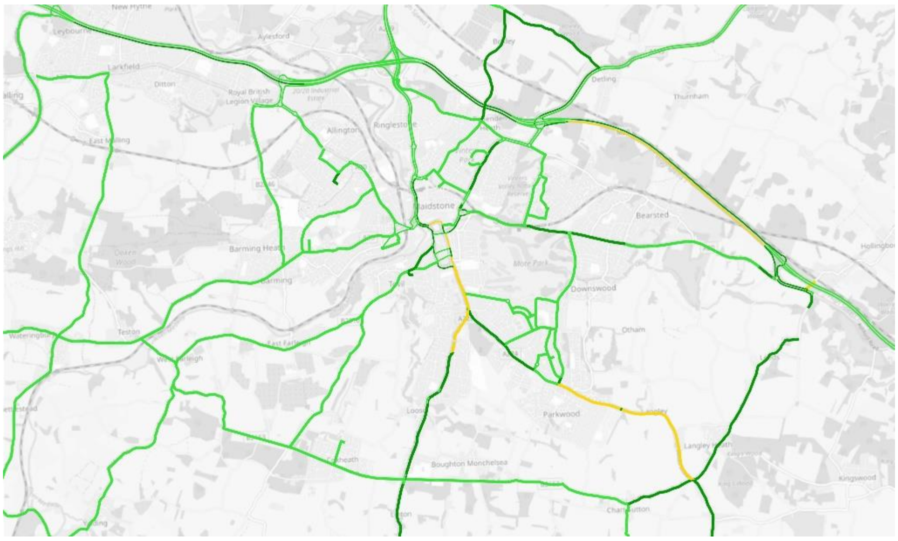


Figure 40: Development Flows – RA2a - PM



As show in the maps above, there is a very limited change in traffic flows on the highway network from the Garden Settlement Site measures. In the AM peak, RA1a appears to show no noticeable change in traffic flow categories, while RA2a shows only minor reductions in traffic flows on the A20 to the south of junction 8 of the M20, reducing from approximately 500-1000 vehicles (yellow) to 250-500 vehicles (dark green).

There is a slightly more visible change in flows in the PM peak, albeit still a small change across the overall highway network. RA1a shows a reduction in traffic flows on a small section of the A20 to the south of Bearsted, while RA2a shows a reduction in traffic flows on the B2163 between the A20 and A274 from Leeds to Langley Heath. These flow reductions in the PM peak both also show a change from approximately 500-1000 vehicles (yellow) to 250-500 vehicles (dark green).

While there are some minor changes shown in the traffic flows at key points of the network as a result of the initial Garden Settlement site measures, this highlights the need for increased modal shift through more ambitious transport improvements in order to achieve a more significant change in traffic flows on the highway network. In line with the Garden Settlement Principles, this will maximise the potential for sustainability at the Garden Settlement sites and ensure they can effectively reduce car dependency and the need to travel.

Impact of the LLRR

Key Findings

Table 16 shows the approximate change in traffic flows as a result of the LLRR, on key links that illustrate an impact across the wider highway network. This looks at the change in flows with the LLRR in the future year of 2031 (Option 1) from the do minimum or DM (the future year of 2031 without the LLRR).

Table 16: Identified Change in Two Way Flows on the Highway Network with the inclusion of the LLRR

		AM			PM		
		DM	Change	%	DM	Change	%
Principal	M20 (J7-J8)	5600	90	1.6%	6500	50	0.8%
	B2163	900	-850	-94%	900	-860	-96%
	A20 (M20J8-Bearsted)	1800	-100	-6%	1620	-35	-2%
	A20 (Willington St-New Cut)	1750	-30	-2%	1850	40	2%
	A249 (M20J7)	2200	-30	-1%	2200	-25	-1%
	A274 (Langley)	1500	120	8%	1400	75	5%
	A274 (Parkwood)	1300	-120	-9%	1250	0	0%
Local	Willington St (Donwswood)	1250	-30	-2%	1600	-75	-5%
	Otham St	400	-70	-18%	450	0	0%
	New Cut Road	1700	-50	-3%	1500	0	0%

The key findings to be drawn from this high-level analysis are as follows:

- The overriding impact of the scheme will transfer all except local Leeds village traffic to the new LLRR;
- The wider impacts are generally minimal with some localised reductions, which are marginally more noticeable in the AM;
- Small amount of reassignment (<100 vehicles) around Langley Heath, Five Wents and Warmlake Villages with some 'winners' and 'losers' but only minor impacts;
- A274 sees a bit of change around Parkwood with traffic that previously cut through Willington/Downswood areas towards the A20 now rerouting east to LLRR;
- A20 sees some minor reduction (100 2-way) around Bearsted mainly in the AM but these benefits reduce the closer you get to Maidstone;
- Only diverts 50-100 new trips to M20 from the Maidstone network between J7-J8;

Based on the previous modelling work undertaken by consultants WSP, it is assumed that at least 90% of trips will be rerouted via the LLRR as tested in the future year of 2031. The same level of change can also be expected for the development trips.

The main impacts from the scheme are local to the immediate area around Leeds and Langley, with a reasonable reduction of trips noted to the south of the LLRR particularly along Chart way Street, and on the minor local roads located to the west of the LLRR (between the scheme and the south eastern edge of Maidstone urban area). While there is also a small reduction of trips noted along the A20 between the LLRR and the town centre, these appear to be less than a 10% change in traffic flow, with the largest noted change in trips on the A20 located in close proximity to the LLRR (with a reduced change in traffic flows on the A20 as you get closer into the town centre).

Overall, it is thought these trip reductions have a negligible impact on the wider highway network, and while the modelling work shows there are minor changes in traffic flows outside the immediate local area, the majority of trips still having their origin and destinations within Maidstone.

Summary

In summary, RA1a has a much higher impact along the B2163 to the east, and the A229 to the south of the borough, with both RAs (RA1a and RA2a) also having a noticeable impact along the M20 between junctions 7 and 8 and the A274 towards the south of the borough. In line with the findings from the initial tests (three main RAs), RA1a continues to have a greater impact on the wider network, showing the same pattern of traffic routed to more dispersed sites across the borough to provide the required level of growth, as a result of excluding all Maidstone urban area sites.

In principle, the Garden Settlement sites should provide the large-scale housing growth required to deliver sustainable options and a stepped change away from car use, if they are developed alongside the required high quality and frequent rapid transit to key destinations. While these sites need to be considered further, there is a need to reduce the focus on car travel and work with more ambitious sustainable objectives, to fully align to the Garden Settlement principles. These findings reiterate the need for more ambitious sustainable measures and can be used as an evidence base for testing further reductions in the next stage of modelling.

3.4.4 Full Build Out Findings: Future LPR Period (2047)

Traffic Flows

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Summary

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3.4.5 Key Links Comparison

Figure 41 shows 15 key links across the borough, identified for more detailed analysis. The relevant flow data for each of the links has been extracted and analysed to identify the main differences between the different RAs and scenarios tested along these key routes. The findings of these assessments are shown in Table 17 to Table 20 below.

Figure 41: Key Links Identified on the Highway Network

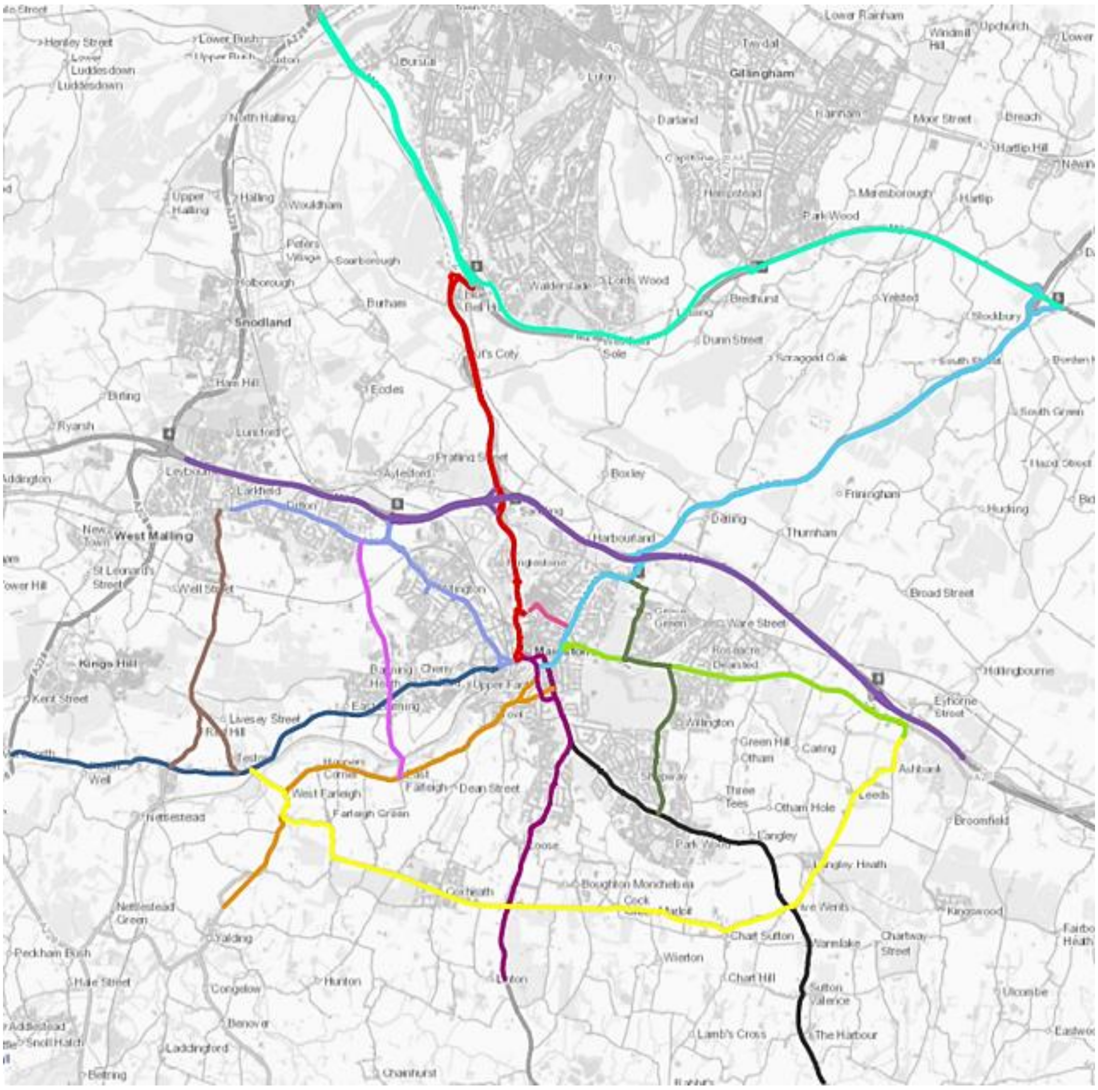

Table 17 and Table 18 illustrate the difference in maximum flows on each of the key links across the highway network (AM and PM peak respectively), comparing the maximum background flows against each of the scenario flows. This analysis highlights the difference in flows across the borough for each of the scenarios and how the adjustments made in the further scenario tests compare against the 3 main RA scenarios initially tested. This has been presented using the same colour bands as the traffic flow maps and uses the same key for the different levels of traffic flow volumes on the network.

As shown below, in both the AM and PM peaks, maximum development flows for the 3 main RAs (with and without mitigation) remain within an additional 500-1,000 two-way vehicles (as shown in yellow) with the highest impact of additional development flows shown along the A20 East, A274, B2163 (noting that much, if not all, of this traffic would reroute to the LLRR) and the A229 South.

While the flows are shown to reduce, as a result of the initial Garden Settlement site mitigation, the comparison shows a limited impact with regards to the overall flow categories, in line with the limited modal shift tested.

The flows show a significant increase in the full build scenario however, and while showing the greatest impact on the same key links as previously mentioned, they are now largely illustrating an increase of an additional 1,000-1,500 two-way vehicles (as show in orange) and up to an additional 2,105 two-way vehicles (as shown in dark red) in RA1a on the A20 East.

Table 17: Comparison of Maximum Flows on Key Links - AM Peak

		MAXIMUM FLOW							
AM Peak: Two-way Flows	Background 2031	3 Main RAs			Initial Mitigation		Full Build		
Link No / RA		RA1	RA1a	RA2a	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	2,550	107	156	131	145	120	239	295	240
2. M20	4,263	423	613	478	564	445	924	1,335	966
3. A229 N	2,160	289	250	286	239	275	635	477	548
4. A249	3,434	271	344	315	322	292	600	697	624
5. New Cut Road to Willington Street	1,886	203	309	301	304	281	434	633	610
6. A20 E	1,946	564	971	647	875	544	1,269	2,105	1,347
7. A274	1,688	572	917	826	902	811	1,263	1,909	1,700
8. B2163	1,480	480	648	505	607	464	1,038	1,349	1,024
9. A229 S	1,688	544	479	601	462	585	1,194	909	1,178
10. B2010/ Old Torvil Road	1,569	507	126	439	121	434	1,142	264	967
11. A26	2,359	430	345	422	331	407	942	712	865
12. B2246	1,569	141	34	54	31	51	322	76	123
13. New Road to The Street	1,246	15	4	4	4	4	33	10	10
14. A20 W	2,848	147	34	119	31	118	326	76	197
15. B2012	1,048	124	134	128	121	127	281	289	276

Table 18: Comparison of Maximum Flows on Key Links - PM Peak

		MAXIMUM FLOW							
PM Peak: Two-way Flows	Background 2031	3 Main RAs			Initial Mitigation		Full Build		
Link No / RA		RA1	RA1a	RA2a	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	3,281	111	176	140	163	127	243	322	239
2. M20	4,443	376	545	566	501	523	804	981	978
3. A229 N	2,332	305	320	319	306	306	667	595	585
4. A249	2,996	356	325	422	303	400	794	598	822
5. New Cut Road to Willington Street	1,949	219	403	374	378	350	455	781	711
6. A20 E	1,949	504	864	635	771	551	1,123	1,883	1,205
7. A274	2,063	745	989	901	975	887	1,622	2,010	1,806
8. B2163	1,443	593	798	620	760	582	1,249	1,613	1,209
9. A229 S	2,063	745	735	812	712	788	1,622	1,370	1,535
10. B2010/ Old Torvil Road	1,485	431	120	407	119	403	969	243	892
11. A26	2,623	590	579	643	551	615	1,296	1,150	1,277
12. B2246	1,551	172	39	63	37	61	392	88	142
13. New Road to The Street	1,252	44	11	13	11	13	101	25	30
14. A20 W	3,030	207	43	150	40	147	401	95	218
15. B2012	1,229	117	102	155	89	151	259	202	312

Table 19 and Table 20 summarise the change in flows as a result of the adjustments made in the further scenario tests, in comparison to the 3 main RA scenarios initially tested (AM and PM peak respectively), and how these changes are proportioned across the key links identified on the highway network.

As shown below, the greatest reduction in flows as a result of the initial mitigation is along the A20 East for both the AM and PM peaks (a reduction of 96 and 103 vehicles in the AM peak, and 93 and 84 vehicles in the PM peak for RA1a and RA2a respectively). A significant increase in flows is shown for the full build scenarios however, with the greatest increase in flows shown along the A20 East and A274 in both the AM and PM peaks. Aline with the above comparisons, RA1a again shows the greatest increase, with an additional 1,134 vehicles in the AM peak and an additional 1,021 vehicles in the PM peak along the A20 East and A274 respectively.

Table 19: Comparison of the Difference in the Change in Flows on Key Links - AM Peak

	CHANGE FROM RESPECTIVE MAIN RA				
AM Peak: Two-way Flows	Initial Mitigation		Full Build		
Link No / RA	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	-11	-11	131	139	108
2. M20	-49	-33	501	722	488
3. A229 N	-11	-11	346	227	262
4. A249	-23	-23	329	353	309
5. New Cut Road to Willington Street	-4	-20	231	324	309
6. A20 E	-96	-103	705	1134	700
7. A274	-15	-15	691	992	874
8. B2163	-41	-41	558	701	519
9. A229 S	-17	-17	650	430	577
10. B2010/ Old Torvil Road	-5	-5	634	138	528
11. A26	-15	-15	512	366	443
12. B2246	-3	-3	181	43	69
13. New Road to The Street	0	0	19	6	5
14. A20 W	-3	-1	180	43	78
15. B2012	-13	-1	157	156	148

Table 20: Comparison of the Difference in the Change in Flows on Key Links - PM Peak

	CHANGE FROM RESPECTIVE MAIN RA				
PM Peak: Two-way Flows	Initial Mitigation		Full Build		
Link No / RA	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	-13	-13	133	145	99
2. M20	-43	-43	428	436	412
3. A229 N	-14	-14	362	275	266
4. A249	-22	-22	437	273	400
5. New Cut Road to Willington Street	-24	-24	236	379	336
6. A20 E	-93	-84	619	1019	570
7. A274	-14	-14	877	1021	905
8. B2163	-37	-37	656	815	589
9. A229 S	-23	-23	877	635	723
10. B2010/ Old Torvil Road	-1	-4	538	123	485
11. A26	-28	-28	706	570	634
12. B2246	-2	-2	220	49	79
13. New Road to The Street	0	0	57	14	17
14. A20 W	-2	-4	194	52	67
15. B2012	-13	-4	143	101	157

Table 21 and Table 22 summarise the percentage change in flows over the 2031 baseline for each of the scenarios tested (AM and PM peak respectively) across the key links identified on the highway network.

In line with the maximum flows, the same key links most impacted by the additional development traffic include the A20 East, A274, B2163 and the A229 South across all scenarios tested.

In the 3 main RAs tested, RA1a generates the greatest increase in flows in comparison to background 2031 flows, again with the highest impact noticed along the A20 East, A274 and the B2163 (with respective increases of 50%, 54% and 44% in the AM peak and 44%, 48% and 55% in the PM peak). Traffic increases of this level, particularly on routes that currently have high traffic flows and periods of congestion, would generally be considered severe and require significant mitigation to reduce the impact and reach an acceptable level of network performance.

While there is a slight reduction in overall percentage change for the initial mitigation scenarios tested, again these only show minor changes, with the greatest reduction shown along the A20 East (reduced by 5% for both RA1a and RA2a in the AM peak and by 4% and 5% for RA1a and RA2a respectively in the PM peak).

The full build scenarios illustrate a more significant increase in flows in comparison to background 2031 flows however, with the greatest increase of 113% in the AM peak along the A274 and 112% in the PM peak along the B2163, both for the RA1a scenario, which generally shows the greatest uplift in comparison to RA1 and RA2a full build scenarios. Future traffic levels are almost doubled on some parts of the network, which reiterates the need for a comprehensive transport mitigation package to facilitate the level of growth proposed.

Table 21: Comparison of the Percentage Change of Flows on Key Links - AM Peak

AM Peak: Two-way Flows	% CHANGE FROM 2031							
	3 Main RAs			Initial Mitigation		Full Build		
Link No / RA	RA1	RA1a	RA2a	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	4%	6%	5%	6%	5%	9%	12%	9%
2. M20	10%	14%	11%	13%	10%	22%	31%	23%
3. A229 N	13%	12%	13%	11%	13%	29%	22%	25%
4. A249	8%	10%	9%	9%	9%	17%	20%	18%
5. New Cut Road to Willington Street	11%	16%	16%	16%	15%	23%	34%	32%
6. A20 E	29%	50%	33%	45%	28%	65%	108%	69%
7. A274	34%	54%	49%	53%	48%	75%	113%	101%
8. B2163	32%	44%	34%	41%	31%	70%	91%	69%
9. A229 S	32%	28%	36%	27%	35%	71%	54%	70%
10. B2010/ Old Torvil Road	32%	8%	28%	8%	28%	73%	17%	62%
11. A26	18%	15%	18%	14%	17%	40%	30%	37%
12. B2246	9%	2%	3%	2%	3%	21%	5%	8%
13. New Road to The Street	1%	0%	0%	0%	0%	3%	1%	1%
14. A20 W	5%	1%	4%	1%	4%	11%	3%	7%
15. B2012	12%	13%	12%	12%	12%	27%	28%	26%

Table 22: Comparison of the Percentage Change of Flows on Key Links - PM Peak

PM Peak: Two-way Flows	% CHANGE FROM 2031							
	3 Main RAs			Initial Mitigation		Full Build		
Link No / RA	RA1	RA1a	RA2a	RA1a	RA2a	RA1	RA1a	RA2a
1. M2	3%	5%	4%	5%	4%	7%	10%	7%
2. M20	8%	12%	13%	11%	12%	18%	22%	22%
3. A229 N	13%	14%	14%	13%	13%	29%	26%	25%
4. A249	12%	11%	14%	10%	13%	26%	20%	27%
5. New Cut Road to Willington Street	11%	21%	19%	19%	18%	23%	40%	36%
6. A20 E	26%	44%	33%	40%	28%	58%	97%	62%
7. A274	36%	48%	44%	47%	43%	79%	97%	88%
8. B2163	41%	55%	43%	53%	40%	87%	112%	84%
9. A229 S	36%	36%	39%	34%	38%	79%	66%	74%
10. B2010/ Old Torvil Road	29%	8%	27%	8%	27%	65%	16%	60%
11. A26	22%	22%	25%	21%	23%	49%	44%	49%
12. B2246	11%	3%	4%	2%	4%	25%	6%	9%
13. New Road to The Street	4%	1%	1%	1%	1%	8%	2%	2%
14. A20 W	7%	1%	5%	1%	5%	13%	3%	7%
15. B2012	9%	8%	13%	7%	12%	21%	16%	25%

3.4.6 Findings Summary

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4. Conclusions and Next Steps

TO INLCUDE IN FINAL REPORT, TIE TOGETHER:

BACKGROUND RESEARCH, RA TEST FINDINGS, OTHER MEMBER UPDATE OUTCOMES AND LEAD INTO STAGE 2 WORK

Appendix A. Model Audit Technical Note

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Appendix B. Air Quality Assessment Technical Note

TO INLCUDE IN FINAL REPORT

Appendix C. Library of Maps

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