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Forecasting Report – Non-technical Summary

Maidstone VISUM Transport Model

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1 Background

1.1 Introduction

Amey has been commissioned by Kent County Council (KCC) and Maidstone Borough Council (MBC) to provide transport modelling support to assess the traffic impact of Local Plan options for Maidstone District.

The commission involves the use of the existing Maidstone VISUM model which was developed by Jacobs on behalf of KCC and MBC. The model is to be used to assess the impact of the forecast demand for travel by car, commercial vehicle, bus and rail with alternative development and transport infrastructure options.

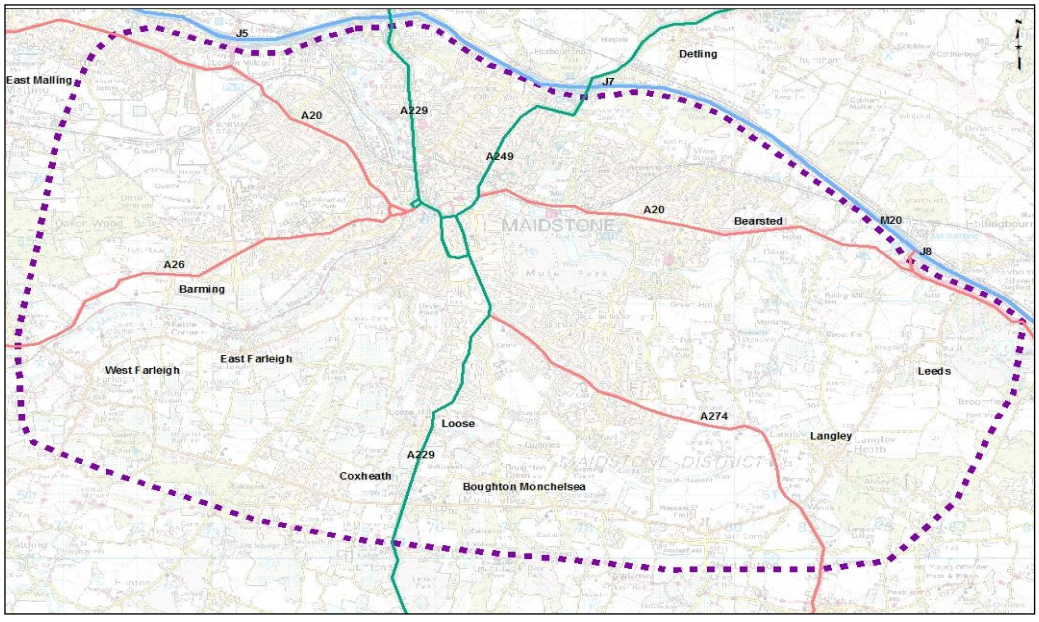
This note is intended to provide a non-technical summary of the model process and headline outputs.

1.2 Existing VISUM Model

The Maidstone VISUM model was originally developed in 2007 to assist in the development of the Local Development Framework (LDF) and to assess the transport impacts of future developments in Maidstone District.

The detailed modelled area encompasses the urban area of Maidstone District and includes the M20 corridor to the north of the town. The wider network, modelled in less detail, extends to include all the major approaches to the town.

Figure 1.1: Detailed Model Area Plan



1.3 2014 Model

Due to the age of the existing base model the first step was to develop an updated version to represent a 2014 baseline and to provide a reasonable reflection of the travel pattern in and through the town. In summary the following updates were made to the 2014 model:

- All land use changes between the base year 2007 and 2014;
- All known changes to transport infrastructure, specifically:
  - New signals at the junction of Cripple Street with A229 Loose Road;
  - Access to Sittingbourne Road Park & Ride site including traffic signals;
  - Access to new hospital site adjacent to Newnham Court on Bearsted Road;
  - Updated bus services; and
  - 2007 Bus fares and car parking charges adjusted to reflect current costs.

A high level sense check of the model performance was then carried out using available count and journey time data. Following this review it was considered that the 2014 AM and PM models provide a reasonable representation of the current travel conditions within Maidstone.

2 Forecast Model Scenarios

2.1 Model Scenarios

Three forecast scenarios have been assessed for the year 2031 which represents the end of the Local Plan period. The forecast scenarios tested have been labelled as below:

- 2031 Do Minimum (DM) - committed transport schemes only;
- 2031 Do Something 1 (DS1) - package of highway capacity improvements incl. Leeds/Langley bypass;
- 2031 Do Something 2 (DS2) - package of transport measure incl. both highway capacity and sustainable travel improvements;

2.2 Model Inputs

Forecast Development Data

All of the 2031 forecast model scenarios developed and summarised within this report include the same development assumptions based on forecast housing, employment and retail land-use data provided by MBC, as set out in **Error! Reference source not ound.** below.

Table 2-1 – Forecast Development Quantum

Development Type	Forecast Development 2014 - 2031
Houses	17,381 units
Employment land	151,000 m^2
Retail use	12,100 m^2

Transport Interventions

A summary of the various transport interventions incorporated into each of the forecast model scenarios is provided in Table 2-2 below.

Table 2-2: Summary of Transport Interventions

	Transport Improvement	Description	2031 DM	2031 DS1	2031 DS2
1	Bridges Gyratory	New northbound link to bypass the gyratory	Yes	Yes	Yes
2	A20 / Coldharbour Lane Junction	Junction Capacity and signals – no change to M20 J5		Yes	Yes
3	A249 / Bearsted Rd roundabout	Junction improvements		Yes	Yes
4	Bearsted Rd / New Cut junction	Junction improvements		Yes	Yes
5	Dual carriageway between A249 and New Cut junctions	Increased capacity and junction arrangement		Yes	Yes
6	A20 Ashford Road / Willington Street	Junction capacity and signals arrangement		Yes	Yes
7	A229 / A274 Wheatsheaf Junction	Close exit to Cranbourne Avenue		Yes	Yes
8	A274 / Willington Street Junctions	Junction capacity improvements		Yes	Yes
9	A274 / Wallis Avenue Junction	Junction capacity improvements		Yes	Yes
10	A26 Fountain Lane Junction	Changes to accommodate right turn vehicles within the junction		Yes	Yes
11	Leeds Langley Relief Road	New route linking the A274 and the A20 and including improvements to the A274. Single carriageway with roundabouts at each end and replacing the 5 Wents junction. Existing B2163 closed south of Horseshoes Lane		Yes	
12	PR Fare	£3.00 Park and Ride cost in the P&R mode choice process			Yes
13	New PR service from Linton corner	New service with 15 minute frequency assumed			Yes
14	Existing PR bus services	15 minute frequency assumed for existing PR			Yes
15	M20 Junction 7 improvement	Signals on M20 eastbound approach and A249 approaches to the roundabout			Yes

	Transport Improvement	Description	2031 DM	2031 DS1	2031 DS2
16	New Cut / A20 left turn slip	Junction expansion (for bus priority provision which is not modelled)			Yes
17	Hermitage Lane pedestrian signals	New pedestrian signals near vehicle access to Barming Station			Yes
18	New link between Gore Court Rd and Bicknor Wood	New link with priority junctions assumed at each end			Yes
19	Widening of Gore Court Road	Increased capacity on Gore Court Rd			Yes
20	Car parking charges	50% increase in parking charges applied			Yes
21	Notcutts shuttle bus	New shuttle bus route from Notcutts to the bus station with 20 minute frequency			Yes
22	Bus services	Bus services on main radial routes increased to 7 minute frequencies			Yes
23	Car sharing	Increase in car sharing by 5%.			Yes
24	Romney Place bus lane	Bus only lane from Lower Stone Street to Romney Place			Yes
25	Walking and cycling mode share	Reduction in home based car trips within the Maidstone urban area			Yes
26	Circular bus route to hospital	Linking town centre, Hermitage Lane, hospital, Howard Drive and London Rd			Yes

3 Forecast Scenario Outputs

3.1 Travel Demand

Travel demand represents the total number of person movements within the modelled area. The travel demand is mainly influenced by land-use (e.g. development growth); however, it can also be affected by proposed transport interventions. For example, as the transport model does not directly assess walking and cycling modes, proposed measures to increase walking/cycling mode shares are represented by a reduction in the overall trips by car.

The weekday AM and PM peak travel demand within each of the forecast scenarios is summarised in Table 3-1 below.

Table 3-1: Summary of Total Travel Demand (Person Trips)

Person Trips	2014	2031 DM	2031 DS1	2031 DS2
AM Peak	50300	58600	58600	56600
% difference from 2014		17%	17%	12%
% difference from 2031 DM			0%	-4%
PM Peak	44900	52800	52800	50800
% difference from 2014		18%	18%	13%
% difference from 2031 DM			0%	-4%

The 2031 Do Minimum models indicate an increase of 17- 18% in person trips compared with the 2014 AM and PM peaks respectively. The total person trips remain the same for the 2031 DM and 2031 DS1 models.

The 2031 DS2 models incorporate changes to assumptions around the walking and cycling mode share. Consequently the travel demand in person trips is reduced by approximately 4% compared with the 2031 DM and 2031 DS1.

The travel demand on the network can also be represented in terms of the total number of vehicle trips on the network. This is summarised in Table 3-2 below.

Table 3-2: Summary of Total Travel Demand (Vehicle Trips)

Vehicle Trips	2014	2031 DM	2031 DS1	2031 DS2
AM Peak	35500	41500	41600	37700
% difference from 2014		17%	17%	6%
% difference from 2031 DM			<1%	-9%
PM Peak	32,000	38000	38100	34800
% difference from 2014		19%	19%	9%
% difference from 2031 DM			<1%	-8%

The 2031 Do Minimum models indicate an increase of 17- 19% in vehicle trips compared with the 2014 AM and PM peaks respectively. This amounts to approximately 6,000 additional vehicle trips on the highway network.

Highway changes incorporated into the 2031 DS1 models attract a small number of trips from public transport resulting in increase of <1% in the total vehicle trips compared with the 2031 DM models. This is also reflected in a slight change in the mode share (Table 3-3).

The transport interventions included in the 2031 DS2 model are focussed on public transport provisions together with car parking policy etc. The net impact of the reduced person trips and transport interventions is a much smaller increase in vehicle demand from 2014 of 6-9% (2200-2800 vehicles) in the AM and PM peaks respectively, significantly lower than for 2031 DS1. This again is reflected in a decrease in the mode share for cars and an increase in trips by public transport.

Table 3-3: Summary of Modal Splits

Mode	AM Peak			PM Peak		
	2031 DM	2031 DS1	2031 DS2	2031 DM	2031 DS1	2031 DS2
Cars (all purposes)	81%	82%	75%	84%	84%	79%
Bus	11%	10%	15%	8%	8%	11%
Rail	8%	8%	10%	8%	8%	10%

3.2 Network Performance

Data has been extracted from the models to provide an overall measure of the network performance for each scenario. The criteria used to gauge the efficiency of the highway network are:

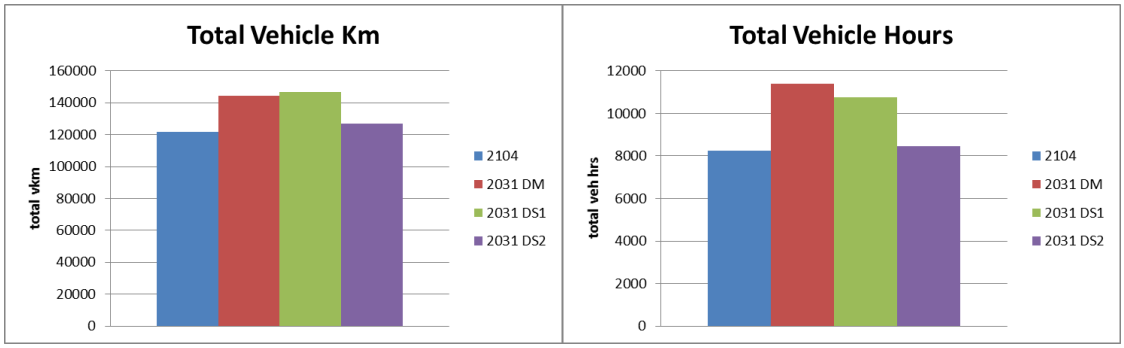
- Total travel distance;
- Total travel time.

A summary of the network performance in the Maidstone urban area within each of the modelled scenarios is shown in Table 3-4 and illustrated in Figure 3.1 for the AM peak only.

Table 3-4: Summary of Network Performance

	AM Peak			PM Peak		
	2031 DM	2031 DS1	2031 DS2	2031 DM	2031 DS1	2031 DS2
Travel distance (veh km)	144500	146700	126900	137500	140200	125700
% diff from 2014	18%	20%	4%	21%	24%	11%
Travel time (veh hrs)	11400	10800	8500	10000	9500	8100
% diff from 2014	38%	30%	3%	42%	35%	15%

Figure 3.1: Summary of Network Performance (AM Peak)



Higher values for the total travel distance within the forecast models reflect the increase in vehicles on the network and may also indicate that vehicles are taking longer routes to reach their destination, avoiding more congested shorter routes.

The reduced total travel time for 2031 DS1 compared to the 2031 DM reflects the benefits of the provision of the Leeds Langley Bypass which offers a faster route option. However the total travel distance is only marginally changed as traffic may opt to travel further but quicker on the new route.

The 2031 DS2 model has a reduced total vehicle travel distance and vehicle travel time compared with the 2031 DS1. This is the net impact of a reduction in travel demand, due to assumptions around walking and cycling, and an increase in travel by public transport in response to changes to car parking costs and increased bus services.

3.3 Link Flows

A selection of representative link flows have been extracted from the models to provide a comparison of the level of traffic flows on the main arterial routes in/out of Maidstone. The comparisons are shown in Figure 3.2 and Figure 3.3.

Figure 3.2: Comparison of Link Flows – AM Peak (Two-way)

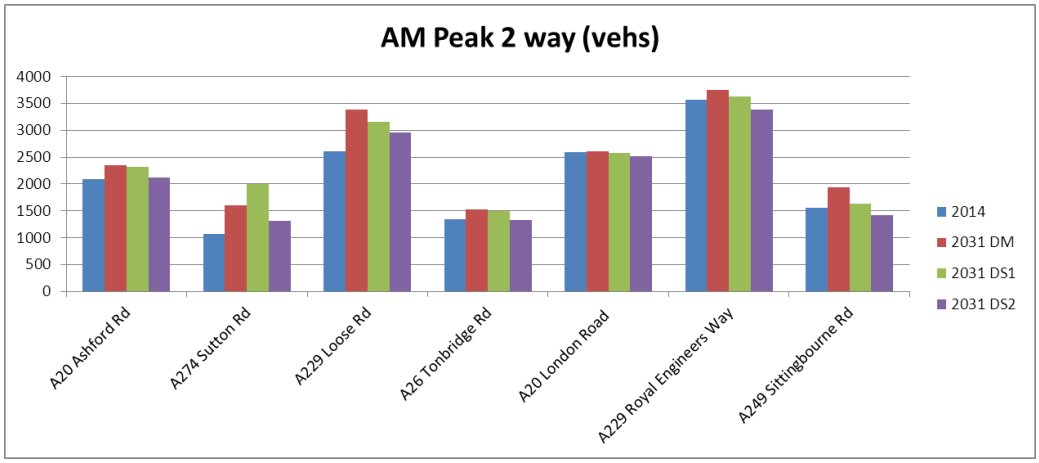
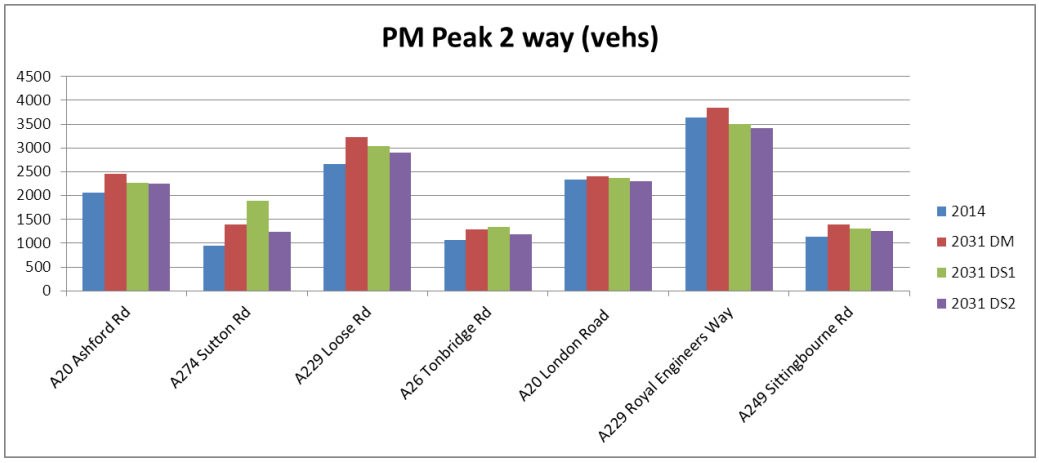


Figure 3.3: Comparison of Link Flows – PM Peak (Two-way)



The above graphs indicate that the 2031 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 of the 2031 Do Something scenarios modelled indicate a reduction in traffic flows on the selected links compared to the 2031 DM model. The 2031 DS2 scenario with the reduced vehicle demand generally demonstrates a lower level of traffic when compared with the 2031 DS1 scenario.

3.4 Travel Times

The travel times on the radial routes provide an indication of the performance of different parts of the network. Travel times on the key radial routes have been extracted for each of the models, for the AM and PM peaks. The routes selected are shown in Figure 3.4 and the journey times are summarised in Figure 3.5 - Figure 3.8.

Figure 3.4: Journey Time Route Locations Plan

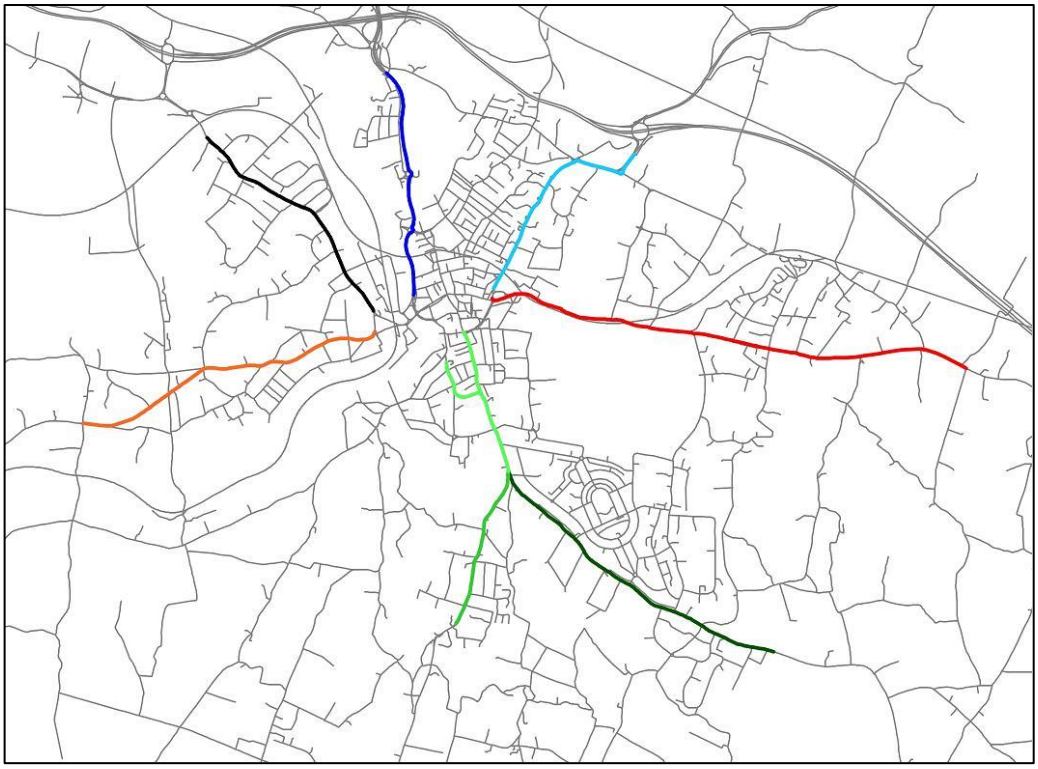


Figure 3.5: Comparison of Journey Times - AM Peak Inbound

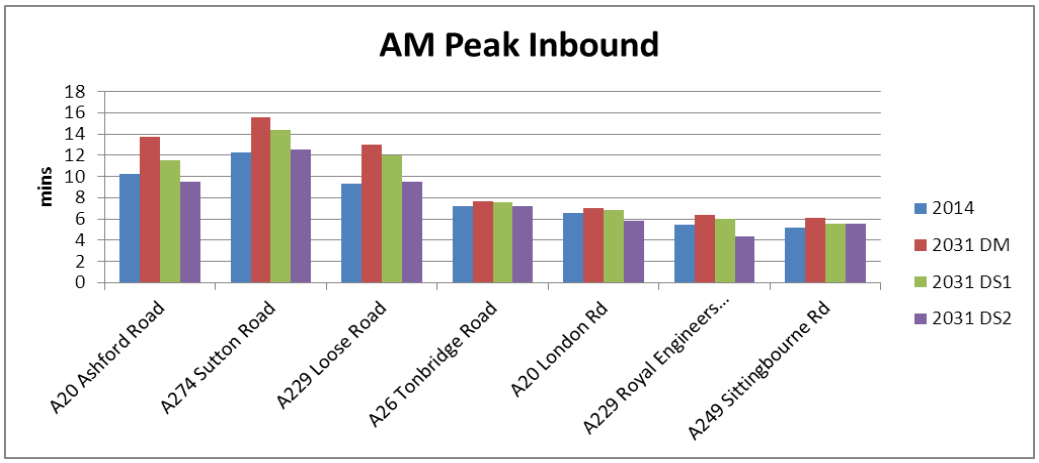


Figure 3.6: Comparison of Journey Times - AM Peak Outbound

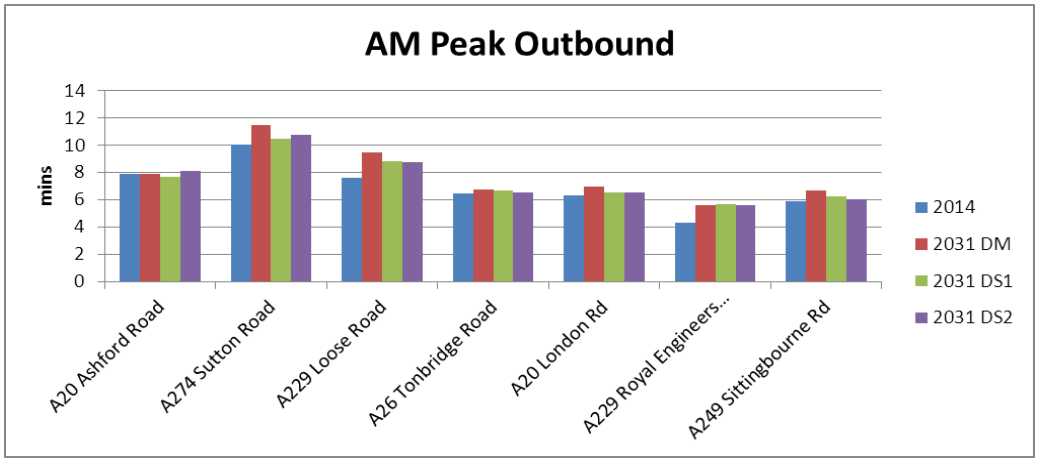


Figure 3.7: Comparison of Journey Times - PM Peak Inbound

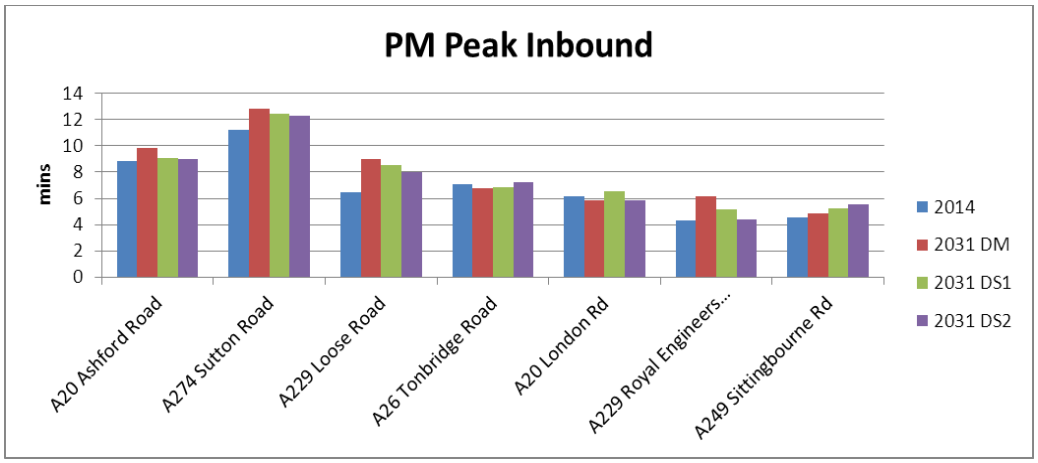
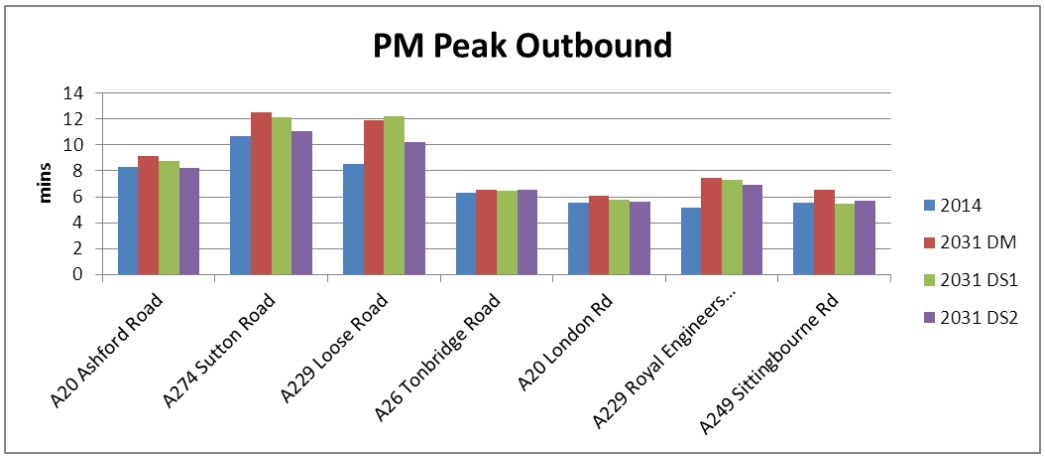


Figure 3.8: Comparison of Journey Times - PM Peak Outbound



The above graphs indicate a general pattern whereby both the 2031 DS1 and 2031 DS2 scenarios would observe a decrease in peak hour travel times on the main routes in/out of Maidstone when compared with the 2031 DM scenario.

The 2031 DS1 model has the most impact on travel times on routes to the east and south of the town. The 2031 DS2 model has a significantly lower demand than the 2031 DS1 model and generally shows a reduction in travel time compared with the 2031 DS1 scenario. However some routes show a slightly increased travel time which is a reflection of a change in travel patterns around the town.

3.5 Summary

The network is currently operating under stress during peak periods and movement on some of the key radial routes is constrained. The 2031 DM scenario presents a worst case scenario with the minimum intervention in terms of mitigating transport improvements envisaged. Although this situation is not expected to arise it provides a benchmark against which to gauge alternative scenarios.

Trips are assigned within the model to the shortest and quickest routes. As the pressures on the system change with the introduction of different measures, the route options for each trip changes and consequently the travel patterns around the town shift.

The outcome of a series of different interventions included in the do something models may not be immediately apparent from link flows or travel times on particular roads, as trips are assigned to alternative routes in response to delays. The individual link flows and indicative travel times therefore only provide part of the picture for the highway model. They should be weighed alongside wider network performance indicators and the level of demand assigned.

4 Concluding Comments

2031 Do Minimum

The 2031 DM provides a worst case scenario, giving an indication of the potential impact of the forecast development quantum on a largely unchanged network, apart from the Bridges Gyratory which is included in all the forecast models. The Bridges Gyratory scheme will provide some benefit for movements through the town from south to north.

In reality the 2031 Do minimum is an unlikely scenario as highway and public transport provision would be expected to evolve alongside development over time. It does, however, provide a useful benchmark against which to gauge the impact of alternative scenarios. In the absence of proactive measures to attract trips to sustainable modes an additional 6,000 vehicle trips will need to be accommodated on the highway network by 2031.

With no intervention other than the Bridge Gyratory improvement scheme the 2031 DM scenario demonstrates that there would be a significant increase in travel time and travel distance over current conditions. The increase in total travel time is a response to the additional demand on the network which generates more delay. The additional traffic and the diversion of traffic on longer routes around the town to avoid congestion contribute to the increase in the network total travel distance. The outputs suggest a significant increase in congestion and delay on the urban highway network when compared with 2014 baseline conditions.

2031 Do Something 1

The 2031 DS1 model is essentially a highway based scenario with the same forecast total travel demand as the 2031 DM model. This model is focussed largely on highway improvements at key junctions across the town and also on the provision of a Leeds/Langley bypass to the southeast of Maidstone. This scheme accounts for approximately 4km of a new major road, various link roads and a number of new junctions.

Compared to the 2031 DM model the 2031 DS1 model shows 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 net result of an element of traffic having the option of a longer but faster route. The knock-on effect of this will be the release of some capacity and the reassignment of an element of traffic that was diverting around the town in the 2031 DM, back to a shorter route through the town.

This scenario has limited impact on the mode of travel chosen.

Whilst the 2031 DS1 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.

2031 DS2

The 2031 DS2 model includes a number of highway improvements across the town as well as a package of improvements to public transport, a new Park & Ride site at Linton Corner, increased parking charges and some fundamental changes to assumptions around car occupancy and the proportion of trips by walking or cycling modes.

The Maidstone model is essentially a highway based model which does not include walking and cycling modes of travel. Consequently the very broad assumptions proposed for growth around walking and cycling mode share have been reflected in the model by a simple reduction in home based car trips within the detailed modelled area.

The reduced trip demand, together with the attraction of trips to public transport, is reflected in a reduced number of vehicles on the network and consequently in a more moderate impact on the total travel time and travel distance compared with the 2031 DM and 2031 DS1.

Despite the more constrained demand, there are parts of the network where traffic flows and travel times increase.

Issues to be Considered

The 2031 DM model indicates that the network will have to cater for some 6,000 additional vehicle movements during the peak periods by 2031. In the absence of a specific package of transport interventions to manage this forecast demand there will be a significant increase in travel time and travel distance across the network.

Although the 2031 DS1 and DS2 models have some features in common, they present different approaches to the management of potential problems generated by the forecast development in and around Maidstone, as indicated in the 2031 DM model. Neither of the scenarios modelled may actually be achievable in reality, but they demonstrate the possibilities of different strategies.

The highways based transport strategy (2031 DS1) includes a major new extension to the network in the form of a Leeds/Langley bypass. This scenario caters for a similar number of vehicles on the network to the 2031 DM and has an increase in the vehicle distance but operates more efficiently in terms of travel time.

The 2031 DS2 scenario is based on a constrained trip generation (allowing for increased walking and cycling) and significant incentives for public transport. As a consequence this scenario handles a lower forecast traffic demand reflected in the lower travel distance and travel time outputs across the network.

It is important to note, however, that the model results should be regarded as indicative only as both of the 2031 Do Something scenarios modelled have some level of uncertainty regarding their achievability. These are summarised below:

- The key element of the 2031 DS1 model, in the form of the Leeds/Langley bypass, will need to be considered in terms of deliverability and a more detailed appraisal of the potential benefits that may be attributed to it.
- The aspirations for sustainable mode share and public transport provision included in the 2031 DS2 model are very ambitious and will need to be supported by a sense check on what is practical and achievable. In particular, the levels of mode shift from car to walking and cycling and also the increased level of car occupancy which have been pre-determined within the model will need to be sense checked against comparable case studies to ensure they are reasonable assumptions.