

Tunbridge Wells Local Plan Modelling

Modal Shift Analysis

Sweco UK Limited 2888385
Project Name Further Modelling Tunbridge Wells Local Plan
Project Number 65209523
Client Tunbridge Wells Borough Council
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Date 09/04/2024
Document Reference tunbridge wells model - modal shift analysis v02.docx

Change list

Ver	Date	Description of the change	Reviewed	Approved by
1	April 2024	Initial draft for client review	DH	LP
2	April 2024	Updates following client review	BH	LP
3				
4				
5				

Table of contents

1	Introduction	3
2	Previous Modelling	4
3	Evidence around Sustainable Transport Changes.....	5
	<i>Paddock Wood Orbital Bus Service</i>	<i>5</i>
	<i>Network Wide Bus Service Upgrades</i>	<i>6</i>
	<i>Cycling.....</i>	<i>7</i>
4	Journey Time Comparisons by Mode.....	9
5	Traffic Generation Impacts of Combined Sustainable Transport Measures	14
6	Schemes for Modal Shift in Modelling Assumptions	15
7	Modal Shift Scenarios	16
8	Modal Shift Impact in Modelling	18
	<i>All Zones with Modal Shift Changes.....</i>	<i>18</i>
	<i>Paddock Wood Analysis.....</i>	<i>19</i>

1 Introduction

This report has been prepared to summarise the Modal Shift evidence base and how it has been applied to the Tunbridge Wells Local Plan Strategic Highway Models. The evidence comes from three core sources:

- Tunbridge Wells Local Plan - Background Note for Revised Strategy: Provisions for sustainable and active travel, especially for major development sites, and the implications for transport modelling. Issued October 23rd 2023 and written by Tunbridge Wells Borough Council.
- TW LP Stage 3 Technical Note: National Highways Response. Issued October 23rd 2023 and written by Sweco.
- Stage 3 Part 1 TN Modal Shift Proposal Final 11.09.2023 Final. Issued 12th September 2023.

Though the core information in this report comes from the three documents identified above, changes to the text has been made to take account of additional comments received from Tunbridge Wells Borough Council (TWBC), Kent County Council (KCC), and National Highways (NH). In addition, further data and clarification has been provided where required to answer outstanding queries.

This Technical Note is structured as follows:

- Summary of modelling undertaken prior to modal shift analysis
- Proposed sustainable transport changes that would underpin assumptions for modal shift, including evidence on expected modal shift impacts
- Methodology to undertake modal shift in model
- Modal shift scenarios
- Impact of modal shift on underlying highway demand in model

2 Previous Modelling

Both Transport Assessments used TEMPro Version 7.2, (being that generally used for strategic transport modelling for local plans) for estimating background traffic growth. For the strategic sites, a 10% reduction in baseline (TRICS) trip rates was applied, in recognition of the scope for internalised and sustainable trips for such developments with ready access to facilities, such as primary school, local centre etc., as well as good provision of walking and cycling routes within them.

In addition, with the agreement KCC and NH, a 10% reduction on car (driver) trips with origins and destinations within an area regarded as a “Sustainable Transport Zone” (STZ) was also applied. This STZ can be roughly defined as the triangular area from Tonbridge – Paddock Wood – Royal Tunbridge Wells (although the 10% reduction was not applied to trips contained within Tonbridge). The justification for this was the strong focus on additional sustainable transport measures proposed as part of the strategic development sites at Tudeley Village and Paddock Wood, as well as those contained in a new ‘Local Cycling and Walking Infrastructure Plan’ (LCWIP). In addition emerging proposals for bus enhancements identified within the Tunbridge Wells Bus Service Feasibility Study and other improvements that will be introduced through the Kent-wide Bus Service Improvement Plan (BSIP) were considered.

3 Evidence around Sustainable Transport Changes

The revised 'Reference Case' does not include an allowance for lower trip rates from the remaining strategic allocation at Paddock Wood and land at East Capel (Policy STR/SS 1). Rather, the potential for internalisation of trips and more trips by sustainable modes within the sites is considered within the 'Mitigation' scenario at Stage 3, drawing on revised proposals for the scale, form and location of development and its transport connections, as well as for other, "external" measures (i.e. beyond those being delivered directly as part of the developments) to facilitate greater modal shares for walking, cycling, bus and train use.

Paddock Wood Orbital Bus Service

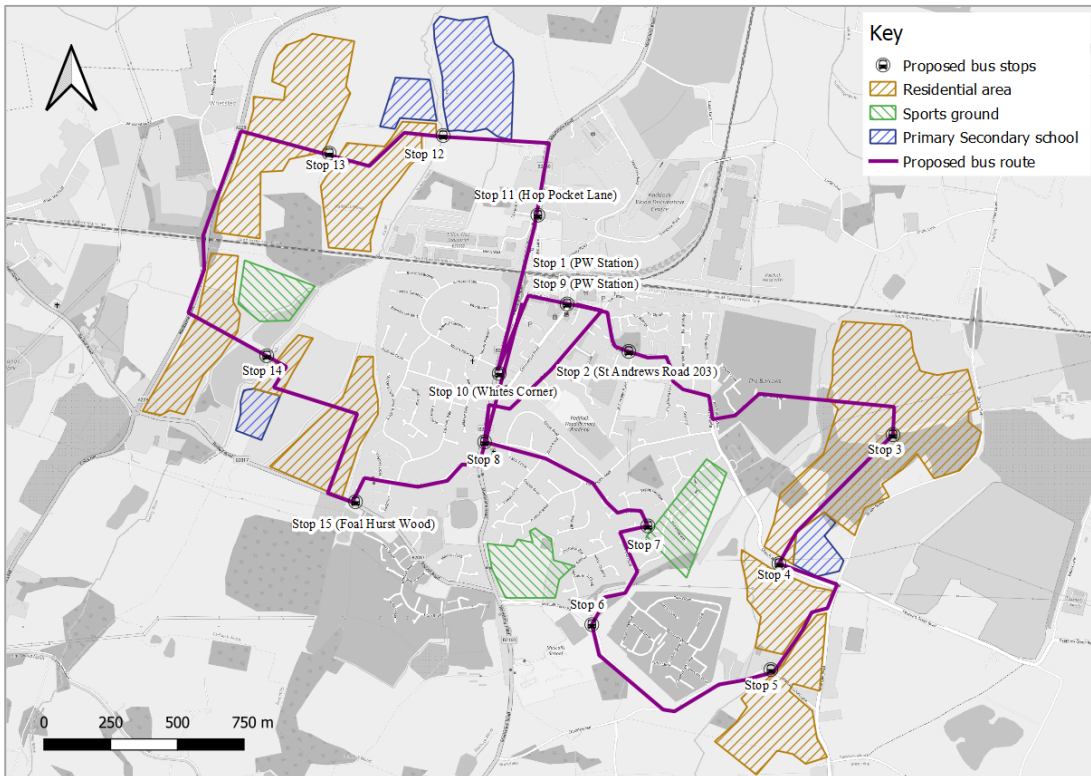
It is of particular note that the revised Local Plan spatial strategy will facilitate the "internalisation" of more trips within Paddock Wood by virtue of:

- a) Meeting the need for the additional secondary school places in the town itself, rather than on the edge of a new settlement at Tudeley Village.
- b) Providing new primary schools in both the east and west of the town.
- c) Demonstrably providing for balanced residential and employment growth, such that there will be a requisite quantum, types and timing of jobs to meet the needs of the growing workforce.
- d) Making more use, through enhancements, of existing community facilities, especially sport and recreation facilities, to increase their sustainability.
- e) Giving careful consideration to the connectivity of proposed residential developments to local facilities, services and jobs, as well as being designed around use of sustainable modes.

A town bus service is proposed to be run, potentially as a figure of 8 that begins at Paddock Wood Railway Station and passes through the Maidstone Road twice. The bus will then return to Paddock Wood Station after going through the West side of Paddock Wood. With a 20-minute headway, this would only require one bus. Costs are largely dependent upon the hours of operation, but a 7am – 7pm service is expected to be most effective.

The envisaged route for the proposed Paddock Wood town bus service is shown in **Figure 1** below:

Figure 1: Proposed Paddock Wood Town Bus Service Route

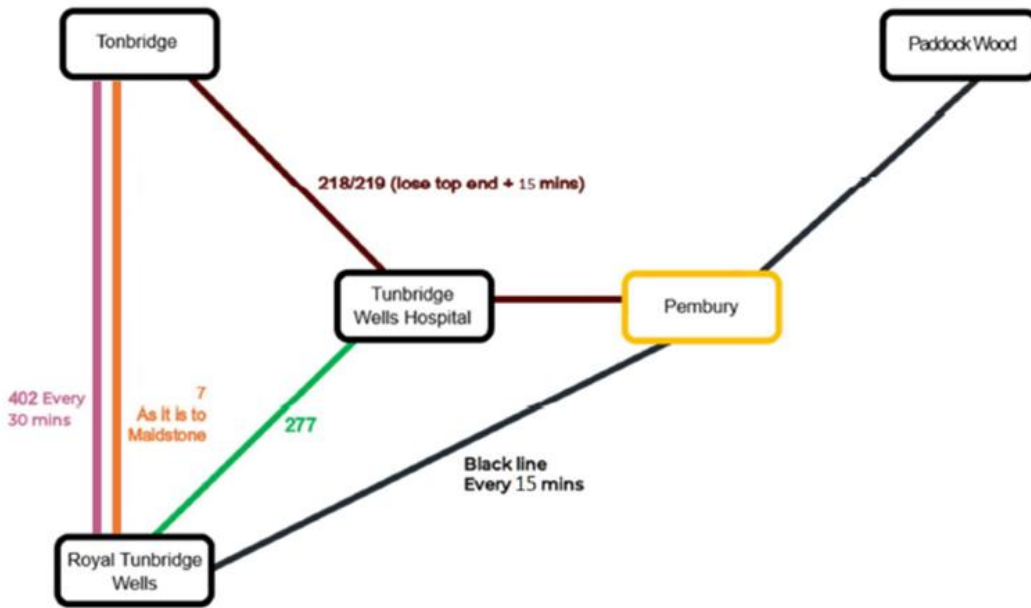


Source: Figure 7 “Proposed town bus route for Paddock Wood” from ‘Tunbridge Wells Local Plan - Background Note for Revised Strategy: Provisions for sustainable and active travel’

Network Wide Bus Service Upgrades

A number of route/service improvement options across Tunbridge Wells borough have been assessed by Consultants WSP. Taking a, perhaps conservative, 5% modal share, the only network option that is shown as requiring a potentially affordable level of subsidy is shown in **Figure 2** below. (NB: This is on the basis that the level of subsidy from development at Paddock Wood previously factored into the viability assessment for bus service improvements was £3m, so any subsidy requirement more than this has been discounted.)

Figure 2: Proposed Inter-urban bus service improvements



Option 5a changes to services from baseline network

Service	Changes
222, 277, 208A, 6X	Remain unchanged
218/219	Retained frequency at twice an hour. Does not serve local loop in Tonbridge
Black	New service between Tonbridge, Royal Tunbridge Wells, Pembury, and Paddock Wood

Source: Figure 8 “Proposed Inter-urban bus service improvements” from ‘Tunbridge Wells Local Plan - Background Note for Revised Strategy: Provisions for sustainable and active travel’

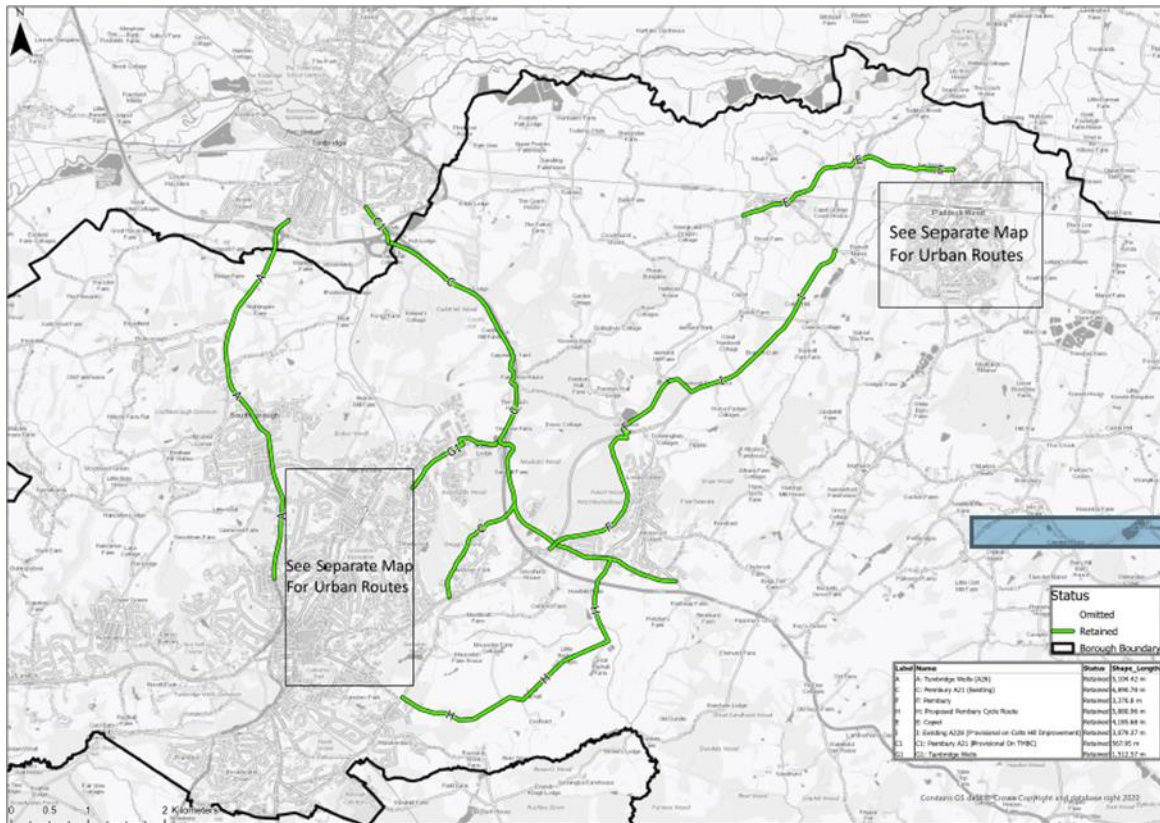
Critically, this Option will considerably increase the frequency of the service on the Royal Tunbridge Wells (RTW) – Pembury – Paddock Wood corridor from one/hour to one/15 minutes. This would mean that there is a service with “Bus Rapid Transport” characteristics from RTW, to both Tonbridge and Paddock Wood.

Cycling

The [Phase 2](#) Local Cycling and Walking Infrastructure Plan (LCWIP) presented options for new inter-urban cycle routes between RTW, Tonbridge and Paddock Wood, in part to improve the sustainability of the previously proposed Tudeley Village development. These proposals have been reviewed by TWBC for the revised Local Plan development strategy.

The revised inter-urban cycle network is shown on **Figure 3** below.

Figure 3: Existing and Proposed Inter-urban Cycle Route



Source- Figure 9 “Existing and proposed inter-urban cycle routes” from ‘Tunbridge Wells Local Plan - Background Note for Revised Strategy: Provisions for sustainable and active travel’.

It can be seen that cycle routes focused on Tudeley Village are no longer being promoted, although the link between Paddock Wood and Five Oak Green is retained. Also, links from RTW to Pembury, which will directly connect to the allocated Pembury housing sites, and from the north (potentially utilising the A228 as part of a Colts Hill Bypass/Improvement) are also retained. Improved routes from the existing A21 cycle route into Tonbridge town centre are still envisaged, subject to further discussions with KCC and TMBC.

In summary, the sustainable transport schemes to attract people from their cars are a mix between proposed Local Plan developer funded schemes and wider area Bus Service Improvement Plan (BSIP) and Local Cycling and Walking Infrastructure Plan (LCWIP) schemes. From the information provided to Sweco to date, the key schemes related to modal shift that influence modal shift in highway modelling are:

- New ‘turn up and go’ local bus service for Paddock Wood (PW). (developer funded)
- New ‘turn up and go’ bus service between Paddock Wood, Pembury and Royal Tunbridge Wells (RTW) (developer funded)
- Enhanced cycling facilities between Paddock Wood, Pembury and Royal Tunbridge Wells (developer funded)
- Enhanced cycling facilities on the A26 between Tonbridge and Royal Tunbridge Wells (council funded)
- LCWIP schemes for Paddock Wood and Royal Tunbridge Wells town centres (developer contributions / Active Travel England funded)

4 Journey Time Comparisons by Mode

To demonstrate the viability of switching to sustainable modes, journey time analysis comparing alternative modes has been undertaken using the approach detailed below.

The analysis focused on trips between:

- Paddock Wood and Tunbridge Wells town centres
- Paddock Wood and Tonbridge town centres

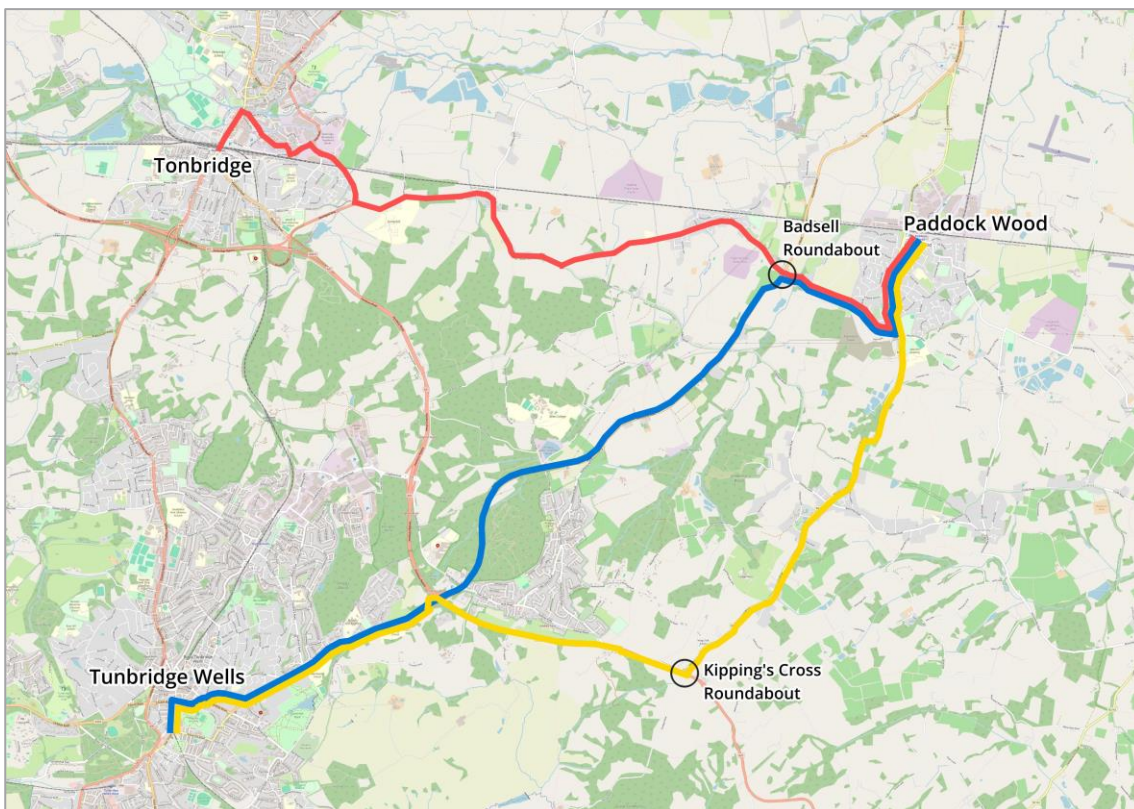
Journey times for four modes of transport were compared; car, bus, cycling, and train.

For car, journey times were extracted from the model for the following scenarios:

- 2038 Reference Case (RC) – includes developments deemed as committed
- 2038 Local Plan Core (LP) – as per RC + Local Plan development
- 2038 Local Plan Modal Shift (LPMS) scenario – as per LP + sustainable transport interventions
- 2038 Local Plan Highway Mitigation (LPHM) – as per LPMS + highway interventions aimed at mitigating Local Plan impact.

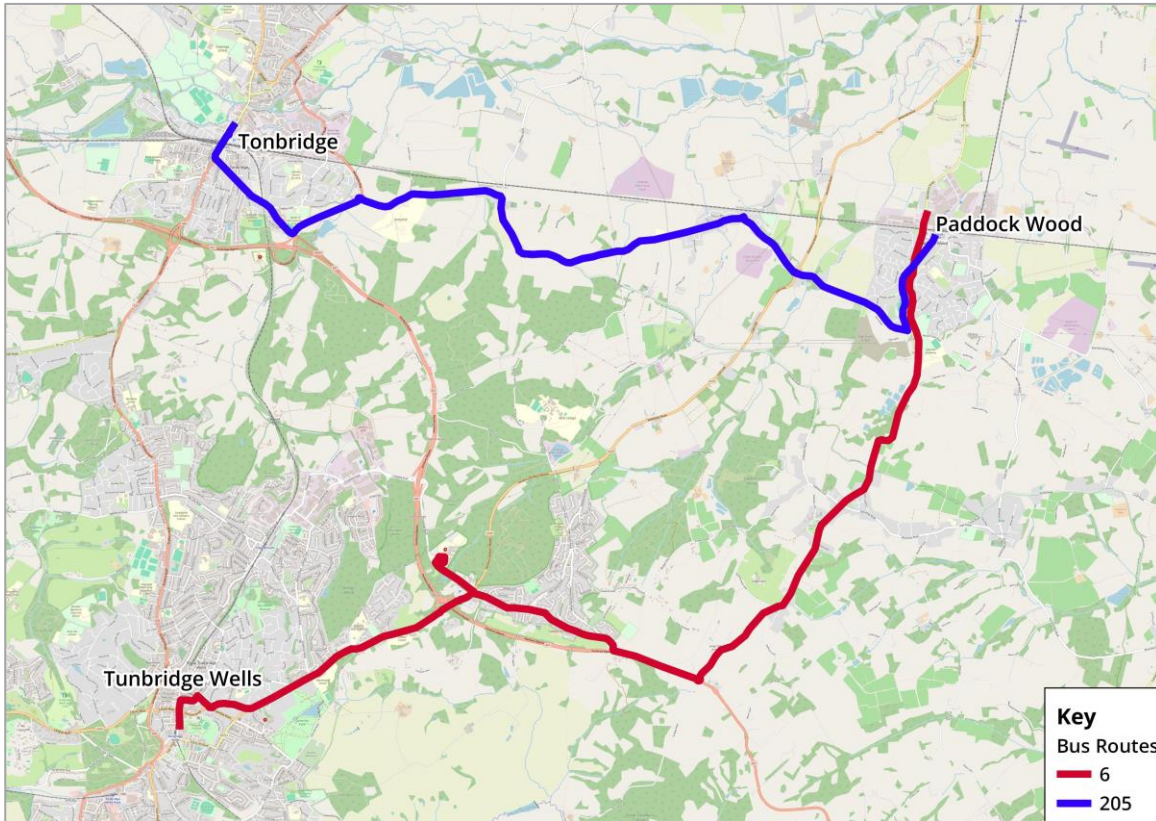
The routes for which journey times were extracted are illustrated in Figure 4. Two routes were analysed for trips between Paddock Wood and Tunbridge Wells; one route follows the B2160 via Kipping's Cross and the other the A228 via Badsell Roundabout.

Figure 4: Car Journey Time Analysis Routes



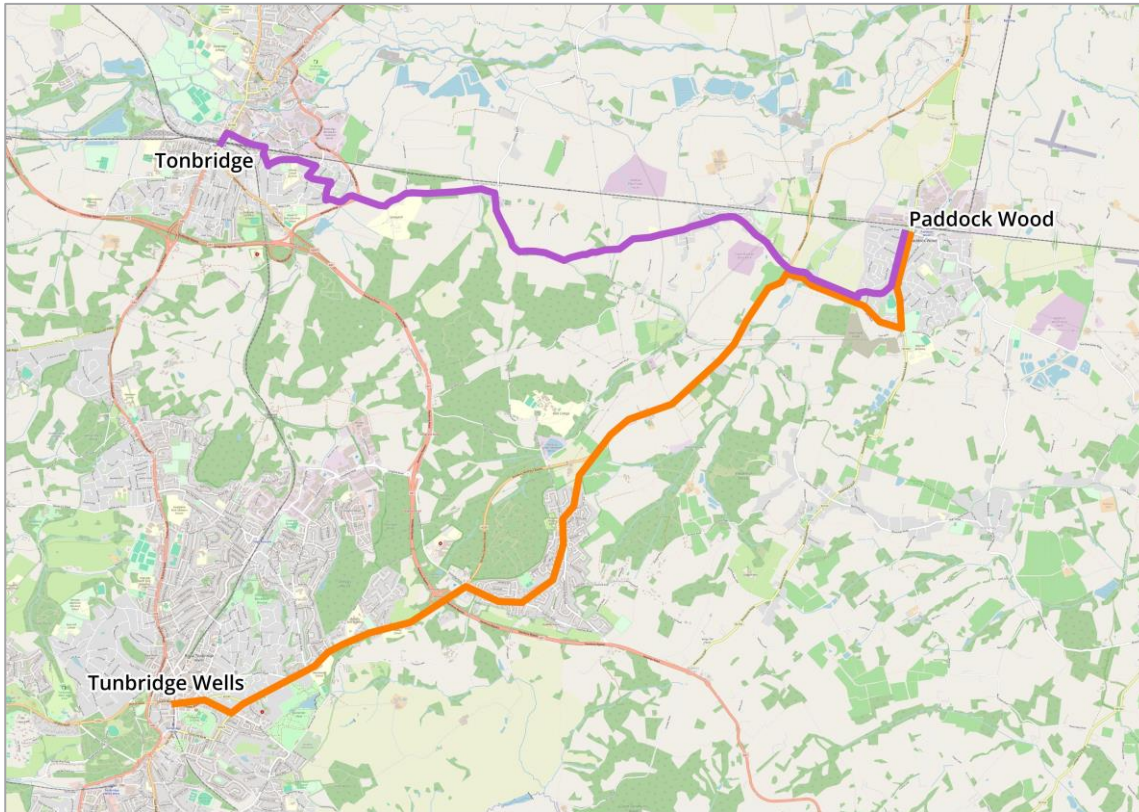
Bus journey times were also extracted from the model, specifically focusing on the number 6 and number 205 bus service routes (shown above in **Figure 5**). For the number 6 it should be noted that the route diverts into Tunbridge Wells Hospital which adds to the overall journey time. To improve accuracy, additional time was included to account for the bus stopping times, based on a high-level assumption that the dwell time at every bus stop along each route is 20 seconds.

Figure 5: Bus Journey Time Analysis Routes



Cycle journey times were calculated based on the assumption that for the duration of travel, cycling speed is retained at an average of 10 miles per hour. The route length for the journey between Paddock Wood and Tunbridge Wells was based on the proposed infrastructure described in Chapter 3, whilst for the route between Paddock Wood and Tonbridge the length was based on the fastest route provided by Google Maps. The cycle routes for which journey times were extracted are shown in **Figure 6**.

Figure 6: Cycle Journey Time Analysis Routes



Lastly, train journey times were directly obtained from current timetable information.

The results of the journey time analysis are summarised below in **Table 1**. The results can be summarised as follows:

- Bus journey times between Paddock Wood and Royal Tunbridge Wells are in the order of 15 to 20 minutes slower than car journeys. This can be attributed to the diversion into Tunbridge Wells Hospital and the allowance for bus stopping time.
- Bus journey times between Paddock Wood and Tonbridge are approximately 10 minutes slower than car journeys. Again, this can be attributed to the allowance for bus stopping times.
- Train journeys between Paddock Wood and Royal Tunbridge Wells vary by time of time and direction. They are slower than car journeys, which can be attributed to the transfer time at Tonbridge, however, are quicker than bus journeys.
- Train journeys between Paddock Wood and Tonbridge also vary by time of day and direction but are significantly quicker than both car and bus journey times.

Table 1: Journey Time Comparison by Mode (mm:ss)

Mode		Paddock Wood – Royal Tunbridge Wells (via Kipping’s Cross)				Paddock Wood – Royal Tunbridge Wells (via Badsell Roundabout)				Paddock Wood - Tonbridge			
		Northbound		Southbound		Northbound		Southbound		Westbound		Eastbound	
		AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Car	Reference Case	22:19	25:31	24:41	20:23	23:01	27:01	27:29	21:18	21:33	17:25	19:28	22:20
	Local Plan Core	24:08	27:41	26:26	21:24	25:12	30:19	29:19	22:17	24:54	18:36	20:14	27:19
	Local Plan Model Shift	23:15	26:25	25:37	20:41	24:31	29:06	28:33	21:37	24:33	18:20	20:00	26:33
	Local Plan Highway Mitigation	22:28	25:58	24:55	20:04	22:13	26:56	26:14	20:10	21:50	18:06	19:48	24:09
Bus	Reference Case	39:17	43:10	42:44	39:38	-	-	-	-	31:41	28:33	29:14	31:41
	Local Plan Core	41:09	45:54	44:59	41:02	-	-	-	-	35:26	30:12	30:06	35:38
	Local Plan Model Shift	40:13	44:19	44:04	39:54	-	-	-	-	34:53	29:48	29:43	34:39
	Local Plan Highway Mitigation	40:38	46:28	45:24	41:11	-	-	-	-	31:46	29:40	29:28	32:24
Train		26:00 – 38:00								06:00 – 11:00			
Cycle		46:28								39:36			

Whilst car journey times are generally quicker than buses, journey times aren't the only element that contribute to mode choice. It is considered that the following additional considerations will contribute to modal shift to bus:

- Increased frequency of buses as outlined in Chapter 3 will improve the reliability of services between Paddock Wood, Pembury and Royal Tunbridge Wells making buses a more attractive mode choice.
- The increased frequency offers the opportunity to provide express 'limited stop' services between Paddock Wood and Royal Tunbridge Wells. In this situation the bus stop dwell times will be significantly reduced, and bus journey times will be more comparable to car journey times. The proposed capacity improvements on the A228 / Pembury Road corridor, including Colts Hill Bypass, also offers the opportunity for faster bus journeys along this corridor.
- Journey costs by car can often be considerably higher than by bus when taking into account vehicle operating costs (e.g. fuel and insurance) and car parking costs in comparison to bus fares.
- The Paddock Wood Orbital Bus Service, outlined in Chapter 3 will provide an additional connection between the Paddock Wood Local Plan development and the rail station. The journey time analysis presented above demonstrates that the train offers a viable alternative sustainable transport option, most notably for trips to Tonbridge.

5 Traffic Generation Impacts of Combined Sustainable Transport Measures

For the revised strategic proposals for Paddock Wood, including land in east Capel (PWeC), the impact of such measures was previously estimated to equate to a 10% reduction in car trips.

While the revised strategic growth at PWeC is being reduced in scale, the range of internal trips are expected to be at least the same if not more, as the focus on local services and facilities is retained and secondary school needs are now being met within the town. The earlier commitment for a strong network of footpath and cycle routes both within the new developments and connecting them to key destinations is also retained.

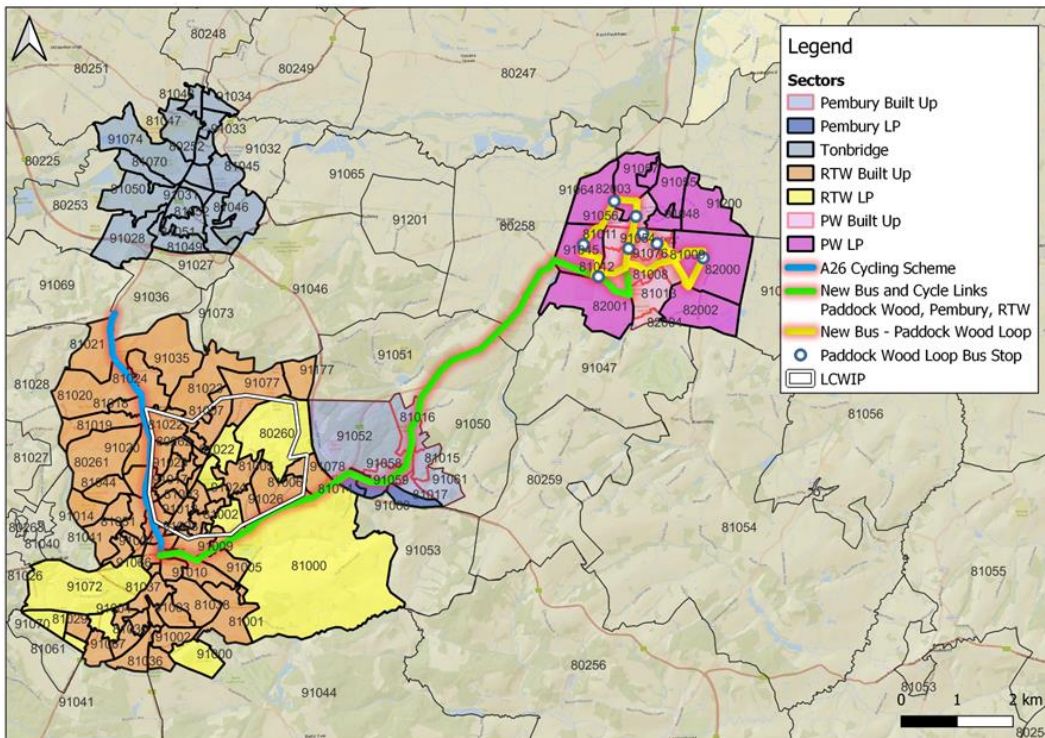
In addition, further work has been done to develop a bus strategy with a new focus on significantly increasing bus use for trips to/from the strategic development areas. In fact, the proposal for a “town bus” can play a key role in promoting modal shift for existing built-up areas as well as the strategic sites, particularly in relation to facilitating rail trips from Paddock Wood.

These measures are expected to generate a degree of modal shift, supplementing that from the other more locally specific measures summarised above.

6 Schemes for Modal Shift in Modelling Assumptions

Figure 7 below is an updated map that shows the location of the sustainable transport improvement schemes relative to the zones that the modal shift assumptions have been applied to. This represents an update to the original map presented in Sweco’s technical note on modal shift assumptions ‘Stage 3 Part 1 TN Modal Shift Proposal Final’, dated 11.09.2023. The updated map provided below highlights the corridors where the schemes identified on Page 4 of the September technical note are situated. The model zones were chosen given their proximity to the proposed sustainable transport interventions.

Figure 7: Modal Zones and Sustainable Transport Interventions



Source: Figure 5.1 – Model Zones with Modal Shift and the Core Sustainable Transport Schemes Driving Modal Shift Change from •TW LP Stage 3 Technical Note: National Highways Response

7 Modal Shift Scenarios

The application of modal shift within the strategic modelling focuses solely on the number of car trips that would be removed from the road network by 2038 as a result of modal shift, rather than the ultimate mode share for each alternative mode of transport. The percentage of car trip reductions set out in **Table 2** below is extracted from work undertaken by TWBC with regard to proposed new bus services and walking and cycling infrastructure in Tunbridge Wells borough in the coming years. The percentage proposed is a cumulative percentage taking account of the following:

- Comprehensive masterplanning approach to the strategic sites that will promote **internalisation of trips** by extensive green corridors as well as local facilities, including shops, sports facilities and (for two or three sectors) schools.
- **Potential for existing longer distance trips to stay local** in the area as a result of Local Plan development, such as the aforementioned strategic sites, and in so doing, using sustainable transport modes instead.
- **Potential for modal shift from car to sustainable transport for wider trips** as a result of new and improved services and infrastructure.

In accordance with the guidance within the Department for Transport (DfT) Circular 1/22 “Strategic road network and the delivery of sustainable development” **Table 2** shows TWBC developed three demand scenarios, currently denoted as Low (L), Medium (M) and High (H).

- **Low (L)** – This scenario focusses on the minimum modal shift that could be expected to be achieved from the proposed sustainable transport interventions, with the **main impact expected from the investment around Paddock Wood**, with additional low level modal shift around Royal Tunbridge Wells and Pembury driven by changes in both bus and cycling infrastructure.
- **Medium (M)** – This scenario identifies a **greater modal shift expected from the sustainable transport schemes primarily within the settlements of Paddock Wood, Pembury and Royal Tunbridge Wells**, which impacts both the proposed allocations and existing built up areas.
- **High (H)** – This scenario assumes high levels of modal shift as a result of the sustainable transport measures being delivered as part of the plan. This is an expectation that **Paddock Wood maximises the number of trips internalised** to the area as well as modal shift from car for trips between wider areas and Paddock Wood. There is also an **expectation of agglomeration of bus, walking, and cycling schemes leading to increased benefits around Royal Tunbridge Wells and Pembury**.

The modal shift percentage reduction has been applied to Origin - Destination pairs in the highway model that correspond to the Origin – Destinations denoted in **Table 2**. The zones selected that constitute each area are as presented in **Figure 7** above.

Table 2: Percentage Car Trip Reductions for 2038 Local Plan Strategic Highway Model

Origin	Destination																				
	PW Strategic Sites			PW Rest of Town			Pembury Site Allocations			Pembury Built Up			RTW Site Allocations			RTW Built Up			Tonbridge		
	L	M	H	L	M	H	L	M	H	H	M	L	L	M	H	L	M	H	L	M	H
PW Strategic Sites	10	15	20	10	15	20	5	5	5	5	5	5	5	10	15	5	10	15	5	5	5
PW Rest of Town	5	10	20	5	10	15	5	5	5	5	5	5	5	5	10	5	5	10	5	5	5
Pembury Site Allocations	5	5	5	5	5	5	5	10	10	5	10	10	5	10	10	5	5	10	0	0	5
Pembury Built Up	5	5	5	5	5	5	5	10	10	5	5	5	5	10	10	5	10	10	0	0	5
RTW Site Allocations	5	10	15	5	5	10	5	10	10	5	5	10	5	10	15	5	10	15	5	10	10
RTW Built Up	5	10	15	5	5	10	5	5	10	5	10	10	5	10	15	5	10	10	5	10	10
Tonbridge	5	5	5	5	5	5	0	0	5	0	0	5	5	10	10	5	10	10	5	5	5

8 Modal Shift Impact in Modelling

All Zones with Modal Shift Changes

Initial analysis of the strategic model demand to understand the overall reductions that will result from the modal shift assumptions presented in Section 2 has been undertaken. The analysis has focussed on the reduction in car trips for each of the areas described in Section 3. The results are presented in **Table 3** for the High scenario, **Table 4** for the Medium scenario and **Table 5** for the Low scenario. The results show:

- Overall reduction of car trips in the High scenario in excess of 800 trips in both the AM and PM peak. The equivalent reductions in the Medium and Low scenarios are in the order of 700 and 400 trips respectively.
- The area with the highest reduction in trips is the Tunbridge Wells built up area which reflects the high number of existing trips.

Table 3: Reduction in Car Trips by Area – High Scenario

Area	AM		PM	
	Departures	Arrivals	Departures	Arrivals
Paddock Wood Strategic Sites	71	46	48	77
Paddock Wood Rest of Town	65	49	49	50
Pembury Site Allocations	13	11	22	16
Pembury Built Up	16	23	37	26
Royal Tunbridge Wells Site Allocations	94	63	42	61
Royal Tunbridge Wells Built Up	482	495	557	529
Tonbridge	77	131	88	85
TOTAL	819	819	844	844

Table 4: Reduction in Car Trips by Area – Medium Scenario

Area	AM		PM	
	Departures	Arrivals	Departures	Arrivals
Paddock Wood Strategic Sites	54	31	35	54
Paddock Wood Rest of Town	41	31	30	36
Pembury Site Allocations	8	7	12	9
Pembury Built Up	10	22	35	22
Royal Tunbridge Wells Site Allocations	65	43	29	42
Royal Tunbridge Wells Built Up	446	440	515	496
Tonbridge	75	124	85	82
TOTAL	699	699	741	741

Table 5: Reduction in Car Trips by Area – Low Scenario

Area	AM		PM	
	Departures	Arrivals	Departures	Arrivals
Paddock Wood Strategic Sites	37	18	22	34
Paddock Wood Rest of Town	34	24	23	30
Pembury Site Allocations	5	6	11	8
Pembury Built Up	5	15	21	12
Royal Tunbridge Wells Site Allocations	34	22	16	22
Royal Tunbridge Wells Built Up	229	230	264	256
Tonbridge	52	82	64	58
TOTAL	397	397	421	421

In terms of overall percentage change for zones impacted, the following changes can be observed:

- High Scenario – 5% reduction in car trips travelling within and between Paddock Wood, Pembury, Royal Tunbridge Wells, and Tonbridge
- Medium Scenario - 4% reduction in car trips travelling within and between Paddock Wood, Pembury, Royal Tunbridge Wells, and Tonbridge
- Low Scenario – 2.5% reduction in car trips travelling within and between Paddock Wood, Pembury, Royal Tunbridge Wells, and Tonbridge

The ‘High scenario’ shows a 5% reduction in car trips travelling within and between Paddock Wood, Pembury, Royal Tunbridge Wells, and Tonbridge. This area is almost equivalent the “Sustainable Transport Zone” (STZ) as applied in the previous iteration of highway modelling for Examination in Public (EiP) (save zones in between the built up areas between Paddock Wood, Tonbridge, and Royal Tunbridge Wells which have not been adjusted – see **Error! Reference source not found.** for reference on zones included in the analysis).

Paddock Wood Analysis

Further analysis has been undertaken to understand the overall impact of the above car trip reductions related to the Paddock Wood strategic sites. The reductions are compared against the total car trip generation for these zones as set out in **Table 6**. The overall impact of applying the modal shift on the total car trip generation for the area sees a reduction for Paddock Wood of 9% in the High scenario. The Low and Medium scenarios result in 4% and 6% level of reduction respectively. The High reduction is in line with the previous 10% modal shift assumption for strategic sites as part of the Local Plan.

Table 6: Paddock Wood Strategic Sites Trip Reduction

	AM			PM		
	High	Medium	Low	High	Medium	Low
Total Car Trip Generation	1,369	1,369	1,369	1,376	1,376	1,376
Reduction	118	86	55	124	89	57
Reduction %	8.6%	6.3%	4.0%	9.0%	6.5%	4.1%