M5 Junction 10 Improvements Scheme

Multimodal Study

TR010063 - APP 9.53

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M5 Junction 10 Improvement Scheme

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Multimodal Study

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Technical Note

Project:	M5 Junction 10 Improvements Scheme		
Subject:	Multi-modal Options Review		
Author:	IW	Reviewed by:	TT
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1. Introduction

1.1.1. This technical note presents the findings of a review into the need for the M5 Junction 10 Improvements Scheme in the context of unlocking planned development in the area. To date, options assessment studies for investment at M5 Junction 10 have focused on specifically solving existing and future issues of capacity constraint at this junction on the strategic road network (SRN).

1.1.2. This note builds on the Alternative Modal Solutions study undertaken in 2018 (Appendix A) which concluded that alternative modes alone could not solve the identified problem of current and projected traffic congestion. Since 2018, the development of the current scheme has been pursued as a means of enabling large scale housing growth in northwest Cheltenham and west Cheltenham.

1.1.3. The designation of the scheme as a Nationally Significant Infrastructure Project has led to a requirement to apply for a Development Consent Order (DCO) as a means of obtaining permission for development. The DCO application will be expected to demonstrate that the preferred scheme has been selected as the most appropriate means of meeting scheme objectives following a comprehensive optioneering exercise.

1.1.4. Feedback received during public consultation held at the end of 2020 also highlighted the importance of revisiting the assessment of options, including options for sustainable transport.

1.2. Method

1.2.1. This technical note starts with a review of transport policy and strategy documents for the area, including those that have emerged since the previous study in 2018, setting the context of public transport and active mode schemes likely to progress to completion in the area.

1.2.2. The review of the trip distribution in the area considers the anticipated pattern of trip distribution to and from the development sites in the area before making a comparison between journey options to anticipated destinations by mode. Using TRACC (accessibility software), journey time comparisons between car and public transport have been made for the anticipated trips generated. This aims to assess the extent to which the existing and potential provision of public transport services might be able to cater for demand and highlight the resulting need for highway-based interventions.

1.2.3. It should be noted that this study was initially undertaken in mid-2021, prior to the publication of National Highways' Alternative Modes Assessment (AMA) guidance. While the structure of this technical note is therefore not wholly in line with the AMA guidance, it is felt that the content and analysis that underpins this study is comparable.

2. Existing and proposed transport infrastructure

2.1.1. This section builds on the analysis undertaken in the 2018 study to summarise the existing transport situation in the study area, with a focus on the alternative modes of walking, cycling and bus.

2.2. Walking

2.2.1. As identified in the 2018 study, the proportion of Cheltenham residents (aged 16-74) who reported their mode of travel to work as being walking in the 2011 census is relatively high at almost double that of the national average. However, the quality of existing infrastructure for pedestrians in the study area is lacking in places. In particular the lack of an adequate footpath along the A4019 poses a challenge for anyone wishing to make journeys between junction 10 of the M5 and Cheltenham town centre.

2.2.2. Improvements to connect into the higher quality pedestrian facilities in the northwest of Cheltenham will be necessary to encourage walking to and from the proposed development sites.

2.3. Cycling

2.3.1. Cycling is also a popular mode of transport in Cheltenham where 4.5% journeys to work are made by cycling, compared to 1.9% nationally (2011 Census).

2.3.2. Whilst cycling infrastructure is present around Cheltenham town, the study area in immediate vicinity to the development sites is lacking safe and adequate provision for cyclists, with no cycle lanes along the A4019 and B4634. The Department for Transport's Propensity to Cycle Tool shows that most cycle routes are all short distance trips within Cheltenham, Gloucester and Tewkesbury, hence suggesting that the lack of cycling infrastructure along the A4019 is posing a challenge for anyone wishing to make longer distance journeys, for example between junction 10 and Cheltenham town centre.

2.3.3. Localised improvements to connect the proposed development sites to northwest of Cheltenham via high-quality cycle facilities will be crucial to realise the mode share targets identified for the development sites in Table 2-1.

2.4. Bus

2.4.1. According to the 2011 Census, 3.9% of Cheltenham residents (aged between 16-74 years) catch the bus to work, below the England and Wales average of 4.7%, but above the Gloucestershire average of 2.9%.

2.4.2. Currently approximately 10 buses per hour (both directions) pass the A4019 adjacent to the planned development sites. These buses connect the area to central Cheltenham and Tewkesbury. Currently, there are no direct bus routes to Gloucester meaning that travellers wishing to travel to Gloucester must do so by interchanging in Cheltenham.

2.4.3. There are no existing bus lanes or priority measures along the A4019 meaning that buses will be subject to delays caused by a growth in traffic in the area generated by planned development. Improvements to bus infrastructure, supported by improvements to the capacity of the highway network, will therefore be critical in ensuring sustained or growth in the use of bus services in the area.

2.4.4. Gloucestershire's Bus Service Improvement Plan (BSIP) emphasises the need for the substantial amounts of growth forecast for Gloucestershire to be supported by sustainable infrastructure, especially in the more urban areas of Cheltenham and Gloucester.

Connectivity in and between these areas is already considerably impacted by congestion on parts of the network.

2.5. Planned transport schemes

2.5.1. The following section sets out a review of transport policy and strategy documents for the area to identify existing proposals for sustainable transport schemes in the area and seek to evidence the residual need for an improvements scheme. The transport schemes have been considered in the context of planned growth in the area, including development at Northwest Cheltenham (Elms Park), West Cheltenham (Golden Valley) and safeguarded land northeast of Junction 10.

2.5.2. Table 2-1 presents a summary of the local transport schemes considered within this review, with a focus on the anticipated impacts of the schemes on traffic in the area. The anticipated locations and routes of the schemes are shown in Figure 2-1.

Table 2-1 - Transport scheme summaries

Scheme name	Walking	Cycling	Bus	Rail	Summary	Anticipated impact
Elms Park pedestrian and cycle connections	✓	✓			Provision of new and improved walking and cycling routes and facilities within and to the planned development in northwest Cheltenham.	As a result of the planned improvements associated with the development, the Elms Park Transport Assessment (TA) considers that the proportion of residential employment and non-employment trips undertaken by bicycle will double (to 15% and 7% respectively). A 25% increase in the proportion of trips undertaken on foot is also anticipated (to 18% and 31% in the AM).
Elms Park Park & Ride (P&R) at Uckington			✓		A 250 space Park and Ride facility will be provided within the Transport Hub, which will be complemented by bus priority measures on Tewkesbury Road.	The P&R facility's purpose is to release highway capacity within Cheltenham. It intends to attract patronage from development, both existing and future, that is external to Cheltenham. As such, the effect of the Local Park and Ride is not included in the traffic modelling undertaken for the Elms Park TA.
New and improved bus services from northwest Cheltenham to the town centre and local employment sites.			✓		Service 41/42 (revised service): serving P&R travel to/from the town centre. E (new service): between the residential development and the town centre, linking the P&R site and the town centre and the sixth-form college. H (revised service): extended route between Elms Park, Hesters Way and Benhall for access to Gloucestershire College and GCHQ.	As a result of the planned improvements associated with the development, the Elms Park Transport Assessment (TA) considers that the proportion of residential employment and non-employment trips undertaken by bus will double (to 15% and 20% respectively).
West Cheltenham Transport Improvement Scheme (WCTIS)	✓	✓			The A40 eastbound including Arle Court and Benhall Roundabouts will see walking and cycling improvements. The first phase of the works between Arle Court and M5 J11 are due to be completed by the end of the	At the time that the FBC for this scheme was written, there were no agreed Transport Assessments or trip generations/distribution available for the Northwest or West Cheltenham development sites. Therefore, the

Scheme name	Walking	Cycling	Bus	Rail	Summary	Anticipated impact
					month. The remaining works between Arle Court and Lansdown Rail Bridge which incorporate the £1,6 million cycling and walking improvements which will be completed by the end of the financial year.	scheme was considered not to contribute to enabling of the developments.
West Cheltenham Golden Valley Development pedestrian and cycle connections	✓	✓			New pedestrians and cycle connections will be created with existing routes and paths in neighbouring communities. New pedestrian and cycle connections are expected to be established such as: Cycle access improvements linking Honeybourne Line to A40 Cheltenham Improved connectivity to town centre and other few locations such as Coronation Square, Springbank Community Centre, All Saints Academy, Gloucester College and Hester's Way community centre.	The West Cheltenham Walking and Cycling Improvements business case identifies that Cheltenham has higher walking and cycling rates (83.3% and 18.7% respectively) than the South West average and the England average. Many of these trips are for commuting purposes this will increase as a result of the circa 8,967 homes being built in Cheltenham. It is also considered there is scope to increase the number of people leisure cycling.
West Cheltenham Golden Valley Development Public Transport mitigation			✓		A40 bus priority corridor. Routes are proposed to provide access to town centre via Kingsditch and Springbank, town centre via GCHQ and Coronation Square, a route to Wymans Brook, Swindon Village and Arle Farm, and a route towards Churchdown and Gloucester. The scheme will also include measures to deliver greater bus priority along Princess Elizabeth Way which will help to improve existing and future service provision.	The scheme does not have any publicly accessible transport assessments related to the proposals however it is considered that the public transport improvements would encourage modal shift for both existing and potential future residents towards public transport.
Cycle access improvements linking Honeybourne	✓	✓			Extend Honeybourne Line cycle route to Lansdown Road to improve access to Cheltenham Spa station and improve the existing cycle/footway network.	Whilst funding for the scheme has been secured there is no publicly accessible transport assessment associated with the project. It is considered that the improvement would encourage linked trips to/from the

Scheme name	Walking	Cycling	Bus	Rail	Summary	Anticipated impact
Line to A40 Cheltenham						station and discourage people from single occupancy vehicle trips.
Elm Bridge Transport Scheme (A40 Bus Priority Bus Corridor)			✓		Bus priority measures on the approach to Arle Court Roundabout.	The dedicated lane is expected to improve journey time predictability for the 2 million bus passengers who use the 94 bus route and the users of the 511 Park and Ride.
Central Severn Vale LCWIP Walking Corridor	✓	✓			The LCWIP sets out walking improvements are proposed for west of the railway station however the exact changes are not detailed.	The west of Cheltenham improvements focuses on connecting the railway station to areas of existing employment and areas of substantial growth to encourage modal shift.
Central Severn Vale LCWIP Cycling Corridor	✓	✓			The LCWIP sets out cycling improvements proposed for Cheltenham including: Advanced stop lined, 20mph signage and adjusted kerbs and resurfaced paths along Orchard Way between Princess Elizabeth Way and Gloucester Road Raised Tiger crossing on Millbrook Street/ Honeybourne Way Raised mini roundabout, 20mph traffic calming, cycle lanes on Swindon Road.	These improvements aim to reduce the number of trips made by car and increase those by walking and cycling. It is hoped by making walking and cycling routes more direct and safer it will encourage modal shift.
Cheltenham Spa Railway Station enhancements				✓	The short-term proposals are for investment in facilities, increase car parking, improve concourse, improve bus interchange, improve cycle access & facilities and install lifts.	This scheme does not contribute towards enabling the developments but may contribute to modal shift towards rail use as an alternative to single occupancy vehicle use.
Arle Court Transport Hub			✓		Proposals include a multi-storey car park, surface level parking a short-term drop-off and pick-up area as well as:	This scheme is not considered to directly contribute towards enabling the developments but may contribute to modal shift towards bus use as an alternative to single occupancy vehicle use.

Scheme name	Walking	Cycling	Bus	Rail	Summary	Anticipated impact
					An increase in capacity of bicycle and scooter parking, opportunities for bicycle and e-scooter hire and improved connections to the existing walking and cycling network. Increased number of local bus services and opportunities for long distance coach travel. Electric vehicle charging spaces. Improvements to passenger facilities.	
Cycle access improvements for A40/B4063 Corridor between Cheltenham and Gloucester		✓			B4063 Gloucester to Cheltenham Cycle Improvements Scheme. Aim is to be a continuous cycle route for cyclists making cycling more appealing. The route will run for approximately 10km (6 miles), the proposed scheme runs between Arle Court roundabout to the west of Cheltenham to London Road (junction Black Dog way) Gloucester via Staverton, Churchdown and Longlevens.	It is thought this scheme will help to get people out of their cars, reducing the amount of traffic in the area as cycling will become a more attractive mode.
Gloucestershire Mass Rapid Transit			✓	✓	The need for greater connectivity between Cheltenham and Gloucester was identified in the Gloucestershire 2050 vision. The concept of introducing a mass transit system in central Gloucestershire was then introduced in the draft Gloucestershire's Industrial Strategy (2019) and further developed in the recently adopted LTP (2020- 2041) which also identified a potential mass public transport area. Gloucestershire's Bus Service Improvement Plan (BSIP) has also identified mass transit as a key opportunity.	The concept of a mass rapid transit scheme for Central Gloucestershire is currently at the feasibility study stage meaning that detailed anticipated impacts are not yet known. However, the aims include facilitating a large scale modal shift to public transport in Gloucestershire city regions and supporting growth ambitions. Although the developments will aim to be future-proofed for future mass transit schemes, it is highly unlikely that any mass transit scheme will be implemented in time to initially unlock the proposed developments in north and northwest Cheltenham. However, the M5 Junction 10 Improvements Scheme could be complementary to a future scheme through

Scheme name	Walking	Cycling	Bus	Rail	Summary	Anticipated impact
						improving journey times for any non-segregated on-road of a mass transit system.
Gloucestershire Demand Responsive Transit			✓		The BSIP is seeking funding to expand two demand responsive transit (DRT) schemes being piloted across two areas of Gloucestershire. Pilot area 1 is the south Forest of Dean, where 95% of the population live in a rural environment and project will provide increased accessibility covering an area approximately 260km^2 from the A40 to the north of the area to the B4228 to the west. It will provide two vehicles. Pilot area 2 is north east Cotswolds. The Cotswolds is the largest of the 46 Areas of Outstanding Natural Beauty (AONB) in the UK. The north east Cotswolds pilot will cover an area approximately 360km^2 with the A40 acting as the southern extent. The project will provide two vehicles.	The full extent of the ambition for improving rural mobility is dependent on receiving the full level of funding request for the BSIP. Whether an expanded scheme will have an impact on the residents of the north and northwest development sites is therefore unknown but given that the scheme is targeted on improving connectivity for rural areas, it is deemed unlikely that any impact will be significant.

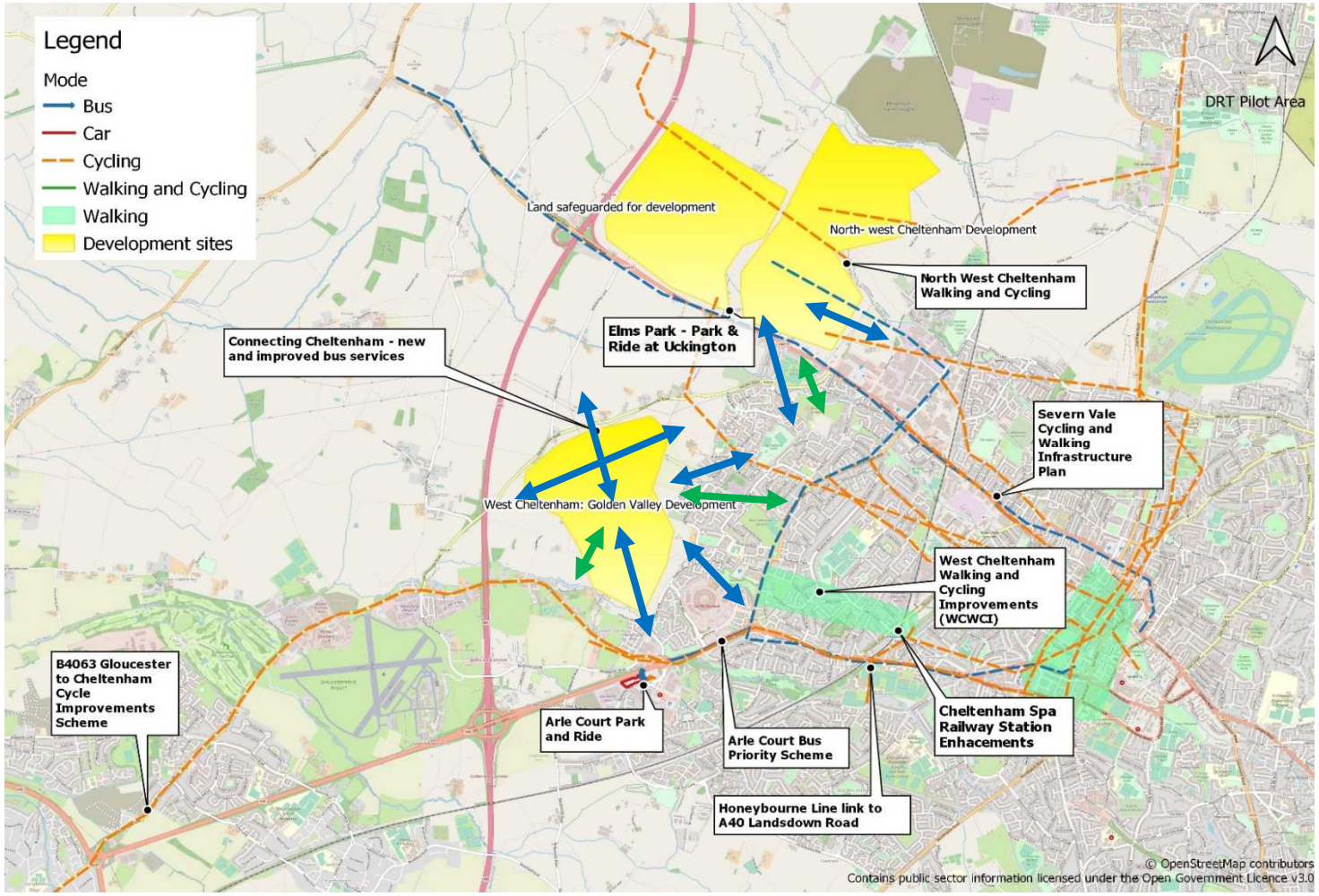

Figure 2-1 - Anticipated locations and routes of proposed schemes

2.6. Summary of findings

2.6.1. As outlined in Table 2-1, while all of the sustainable transport schemes being progressed in the area aim to enable mode shift away from reliance on private vehicles, it is not anticipated that any will be able to fully accommodate the increased traffic expected in the area. In fact, very few of the planned schemes purport to pick up even a proportion of the generated trips in the area. The planned schemes that refer most directly to the planned development in the area are those associated with the Elms Park and Golden Valley developments.

2.6.2. The Elms Park transport assessment[1] identifies approximately 5,400 two-way residential person trips anticipated in the AM and 4,900 two-way residential person trips in the PM. In the AM peak, 48% of employment related residential trips will be made by car, motorbike or taxi and 30% of non-employment related trips will be made by these modes. In the PM peak these proportions are 48% and 38% respectively. On top of this, car trips also make up the majority in terms of proportion of employment trips. Overall,

2.6.3. The West Cheltenham Golden Valley Development does not have any specific modal share forecasts. However, the development is expected to provide 1,100 new homes and 45ha of mixed-use land, this is expected to generate a significant number of trips, both residential and employment. It is considered that the walking and cycling improvements and public transport improvements would encourage some level of modal shift for proposed future trips and existing trips by making sustainable modes more convenient.

2.6.4. In conclusion, despite the interventions and their anticipated impacts set out in Table 2-1, there are still a considerable number of car trips expected to be generated by the new developments that will need to be accommodated through other means.

2.6.5. The next section reviews the anticipated distribution of the generated trips and assesses the suitability of a range of intervention types.

3. Forecast travel patterns

3.1.1. Figure 3-1 shows the model zones used to derive an understanding of where trips to and from the development sites are to be expected. The centroids of these zones have been used to represent origins and destinations (ODs) of the trips. The red dots represent the accesses to the development sites close to Junction 10: Golden Valley, Elms Park and the safeguarded land site.

[1] Elms Park Transport Assessment, August 2016

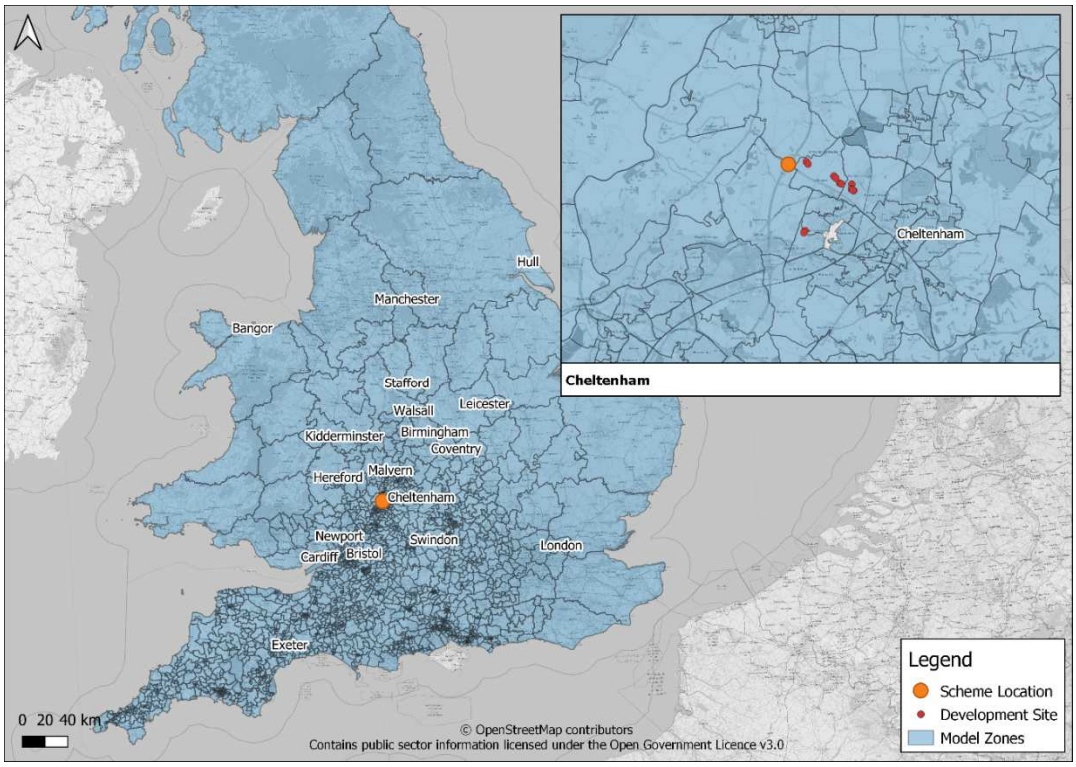

Figure 3-1 - Highway model zones for M5 Junction 10 Improvements Scheme

3.1.2. Figure 3-2 and Figure 3-2 - Journeys originating from the development sites during an AM peak hour

3.1.3. display the straight-line links for all journeys which originate or terminate at the development sites. The figures show the number of modelled vehicle trips which are expected per average AM peak hour between origin and destination points. There are around 4,500 vehicles expected to depart or arrive at the development sites in an average AM peak hour. It is estimated that 34% of these trips will pass through M5 Junction 10 or the new link road, equating to approximately 1,500 vehicles per hour.

3.1.4. The figures show that there are expected to be a wide distribution origins and destinations for trips accessing the proposed developments. There is a maximum of 38 vehicles per hour during the AM peak which travel between one origin destination pairing, highlighting the dispersed nature of the 4,500 vehicle trips per hour across each of the OD pairs.

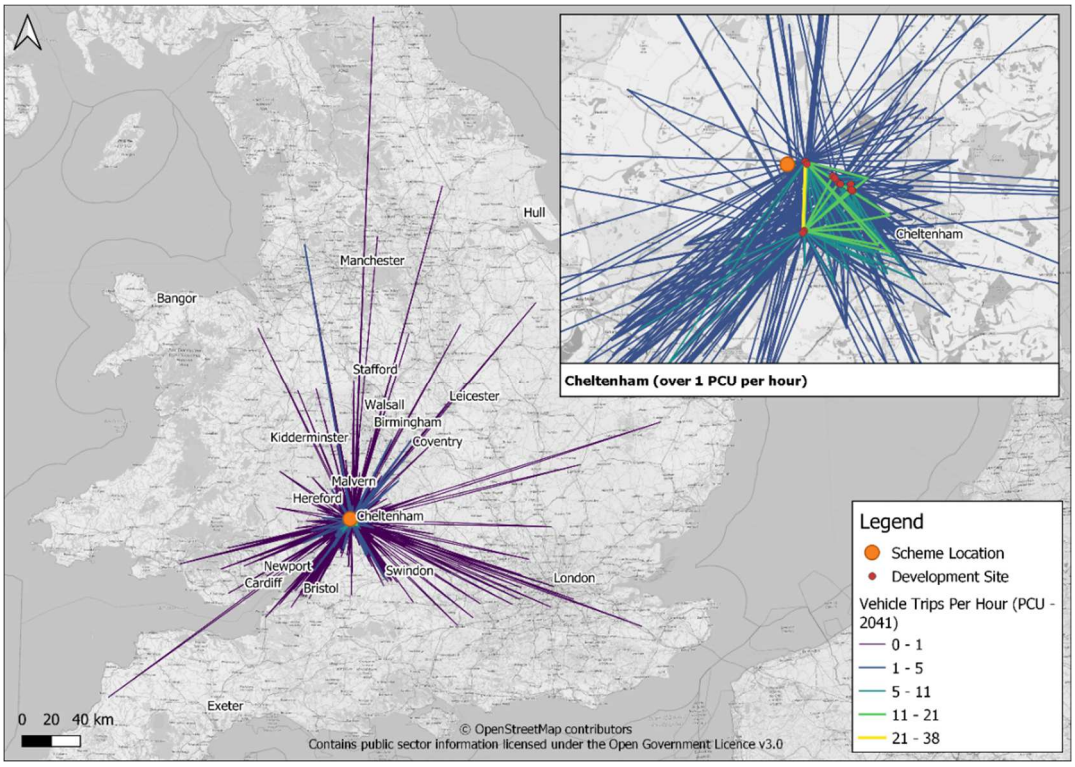

Figure 3-2 - Journeys originating from the development sites during an AM peak hour

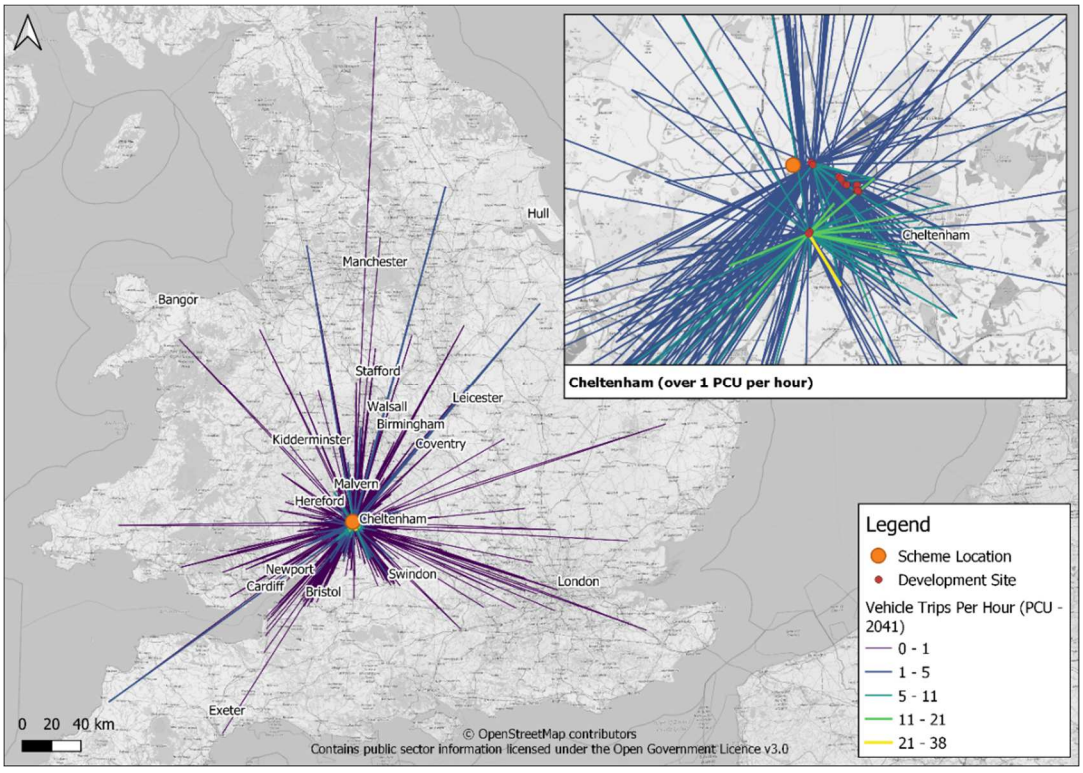

Figure 3-3 - Journeys travelling to the development sites during an AM peak hour

3.2. Review of trip distribution in the area

3.2.1. TRACC 2.0 software has been used to develop an understanding of the public transport journey times between the origins and destinations of the trips to and from the development

sites using the 2041 modelled traffic forecast. The origin-destination pairs have been derived using the centroids of the model zones (Figure 3-1), with the centroids snapped to the nearest A or B road to avoid trips being missed due to being offset from the public transport network. As displayed in Figure 3-1, the development sites have 12 zones for which journeys can travel to and from, representing the accesses to the different sections of each development.

3.2.2. The public transport journey times provided by TRACC have been used to compare estimated journey times with the modelled journey times expected for private vehicles. The January 2020 public transport network has been used as the modelled timetable to exclude any anomalies which may occur as a result of reduced frequencies of services during the COVID-19 pandemic. It is important to note that TRACC does not account for frequency of bus services but selects the fastest end to end journey time available during the specified period – thus some fast but infrequent services may not be suitable to complete some of the modelled journeys.

3.3. Journey time comparison

3.3.1. This section contains analysis of the comparison between private vehicles and public transport journey times for all flows which have equal to or more than 0.5 vehicle trips per average AM peak hour. The analysis has provided journey times for ODs which are less than 100km travel distance and where the public transport network could be accessed within 2km. Additionally, the maximum interchange distance between modes for connecting services was set at 800m. The latter two values are default public transport accessibility values defined in the TRACC accessibility software.

3.3.2. This returned a possible journey using public transport for 94% of OD pairs, and for 90% of OD these pairs which pass through the M5 Junction 10 Improvements Scheme – this means that 6% of total trips are unable to be completed using public transport.

3.3.3. Table 3-1 displays the journey times for the OD pairs studied. It outlines that 40% of trips would take between 30 and 60 minutes to complete by public transport and that 14% would take over 60 minutes to complete. These findings echo the distribution patterns shown in Figure 3-2 and Figure 3-3, highlighting that the minority of trips are localised in nature.

3.3.4. Regarding trips passing through M5 Junction 10 and along the new link road, only 9% of trips could be completed in under 30 minutes by public transport. 45% of trips could be completed within 30-60 minutes on public transport, with 46% taking longer than 60 minutes.

Table 3-1 - Public transport journey time summary

Journey Time by Public Transport (Minutes)	All ODs				ODs Expected to Use M5 J10 and link road	
	Number of ODs	Percentage of ODs (%)	Number of Trips (PCU)	Percentage of Trips (%)	Percentage of ODs (%)	Percentage of Trips (%)
<30	516	32	1579	47	10	9
30 - 60	705	44	1347	40	43	45
60 - 90	225	14	292	9	27	26
90 +	146	9	166	5	20	20

3.3.5. Despite the high proportion of journeys which can be completed within 30-60 minutes by public transport, Table 3-2 shows public transport to private vehicle journey time ratios and demonstrates that the journey times offered by public transport are considerably longer than the comparative journey times when using private modes. For example, 24% of trips would experience journey times four or more times longer than if they were to travel via a private mode when considering all movements from the dependent developments, with only 15% of trips achievable by public transport in less than double the time taken using private modes.

3.3.6. When considering the journeys expected to use M5 Junction 10 and / or the link road, 45% of the expected trips would experience a journey time at least four times longer than by travelling by car, with only 23% able to complete their journey in less than double the time taken using private modes.

Table 3-2 - Public transport journey time ratios

Public Transport to Private Vehicle Journey Time Ratio	All ODs				ODs Expected to Use M5 J10 and link road	
	Number of ODs	Percentage of ODs (%)	Number of Trips (PCU)	Percentage of Trips (%)	Percentage of ODs (%)	Percentage of Trips (%)
Under 2	191	12	524	15	28	23
2 to 3	620	39	1246	37	17	17
3 to 4	443	28	768	23	15	16
4 and above	331	21	815	24	39	45

3.3.7. Table 3-3 shows the number of transfers required to complete each of the trips studied. The table highlights that 52% of trips would be able to complete their journey without interchanging, with only 11% of trips required to change mode twice or more.

3.3.8. When reviewing those OD pairs expected to travel through M5 Junction 10 or along the new link road, it is expected that 35% of trips would require two or more changes when using public transport, with only 26% being able to complete their journey without interchanging.

Table 3-3 - Number of transfers for public transport trips

Number of Transfers	All ODs		ODs Expected to Use M5 J10 and link road	
	Number of Trips	Percentage of Trips (%)	Number of Trips	Percentage of Trips (%)
0	1840	52	210	26
1	1273	36	316	39
2 or more	421	12	279	35

3.4. Summary of findings

3.4.1. Figure 3-2 and Figure 3-3 display a highly dispersed network of demand both to and from the dependent developments within Cheltenham. This highly dispersed nature of trips is likely to produce significant challenges in terms of providing an alternative public transport or active modes solution to the forecast increase in demand between origin and destination points. For those private vehicle trips leaving the dependant developments it is expected that 54% of these journeys would take longer than 30 minutes, with 5% being longer than 90 minutes. Of these journeys, the majority would be considerably longer when using public transport as opposed to a private vehicle, with only 15% of trips being able to be completed within less than double the equivalent time taken using a private vehicle. This is likely to partially be a function of the number of interchanges required to reach the destination, as highlighted in Table 3-3, which suggests that 48% of journeys would require at least one interchange, with 52% being direct, with the latter perhaps representing a large proportion of local trips.

3.4.2. When linking these results to the improvements associated with the M5 Junction 10 Improvements Scheme, it is estimated that 34% of these additional trips could use the junction. These trips are often longer in distance, therefore will have greater disparities in journey times than those which are within the local area. This is supported by Table 3-1 to

Table 3-3 which display that over 46% of trips using M5 Junction 10 and / or the link road would take longer than 60 minutes, with 78% of public transport journey times being at least double the equivalent time taken using private modes. This is partially explained by the number of interchanges required, with 35% of those using M5 Junction 10 expected to require 2 or more interchanges if using public transport instead of a private vehicle. This therefore highlights the importance of the M5 Junction 10 Improvements Scheme in unlocking these developments in Cheltenham.

4. Conclusion

4.1.1. As identified through this study, several proposals for new and improved public transport services and active schemes are to be implemented in the area to support the developments planned in north and northwest Cheltenham. Furthermore, the M5 Junction 10 Improvements Scheme includes a range of improvements aimed to supplement the other proposed walking, cycling and bus-based improvements (Figure 4-1).

Figure 4-1 - M5J10 Scheme Plan

4.2. Walking

4.2.1. The scheme proposes improvements to walking infrastructure along the by introducing a segregated footpath along the northern side of the A4019 and across Junction 10. A segregated cycle track and footway is also being introduced along the proposed Link Road. Further to this, safe crossing facilities are proposed along A4019 which will allow access to the development sites, and on B4634.

4.2.2. These improvements, combined with the other improvements outlined Table 2-1, may cater for the already high pedestrian demand and make journeys by foot safer and more attractive. This could in turn result in modal shift to walking, especially for short distance journeys made by local residents to retail facilities, such as Gallagher Retail Park.

4.2.3. However, with the average distance for a one-way trip forecast from the proposed development sites being 10km and 11km (outbound and inbound respectively), it is highly unlikely that improvements to pedestrian facilities alone will be able to address the forecast transport issues.

4.3. Cycling

4.3.1. The proposed provision of segregated cycleway along the A4019, new link road and crossing the M5, coupled with other improvements around Cheltenham as outlined in Table 2-1, has the potential to increase the safety of cycle journeys and therefore increase their attractiveness.

4.3.2. However, with the average cycle trip length being 5.6km (National Travel Survey 2016), it is again unlikely that a sufficient share of the forecast trips from the development sites will be moved from car to bike, and therefore improvements to highway capacity or alternative means are necessary to meet future demand.

4.4. Bus

4.4.1. The proposed improvements to Junction 10 and A4019 will have a positive impact on journey times for buses, as they would for general traffic. The main location where future delays that may impact bus flows has been identified is eastbound into Cheltenham along the A4019. Therefore, measures to provide bus priority, such as extended bus lanes or bus gates, will be considered within the scope of the M5 Junction 10 Improvements Scheme. These scheme-related improvements, coupled with the proposed Park & Ride site at Elms Park / Uckington will play some role in reducing reliance on private cars in the area.

4.4.2. However, the volume, distance and dispersed origin and destinations of trips anticipated to be generated by the developments will present significant challenges in terms of accommodating all new trips via bus. This, coupled with uncompetitive journey times offered by public transport options, means that there will be a large residual number of trips generated by the new developments that can feasibly only be accommodated through highways-based solutions.

4.5. Summary

4.5.1. The walking, cycling and public transport related improvements being brought forward in the area and as part of the M5 Junction 10 Improvements Scheme will have a positive impact on influencing travel behaviour change in the area. However, in terms of unlocking the scale of development planned for the area, there is a residual need for improvements to the highway network including at M5 Junction 10.

4.5.2. Given the role of M5 Junction 10 as a means of these trips dispersing onto the network, improvements to the junction and the surrounding highway network, in combination with a package of alternative measures, is considered a necessary mitigation for unlocking the dependent developments to the west of Cheltenham.

Appendix A. 2018 Report

Alternative Modal Solutions

M5 Junction 10 and adjoining Cyber Park Access Road

Document control

Document information

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Author	Rebecca Kent
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Distribution	
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0.2	23.01.2018	Draft Version 2	Rebecca Kent

Reviewer list (consultation/concurrence)

Name	Yes	No	N/A	Role
	☐	☐	☒	Safety
	☐	☐	☒	Engineering and Standards Environmental Group
	☒	☐	☐	Regional Environmental Advisor
	☒	☐	☐	Transport Planning Group
	☒	☐	☐	Integrated Project team

Document sign-off

Name	Signature	Title	Date of issue	Version
Nick Woollett	[redacted]	Associate Director	25.01.2018	0.2

Contents

1.0 Introduction

1.1 Purpose

This note reviews alternative modal options to car travel within the M5 Junction 10 study area (Map 1), to mitigate current and projected traffic congestion related to the planned development in northern and western Cheltenham.

This note has been prepared in line with the guidance set out in TPG Advice Note 2 v.1.0, 'National Networks – National Policy Statement: Assessment of Alternative Modal Options. At PCF Stage 0 the initial test is to answer the question "Could an alternative modal intervention solve the identified problem?" If the answer to this question is positive, then a further level 2 test is required to assess the level of impact required by a modal test to relieve the problem to the same degree as a highway intervention (which would relieve 75% of the problem for the first 15 years).

The alternative modes being analysed are:

- Walking and cycling;
- Bus;
- Park & Ride;
- Rail; and
- Parking.

Map 1: Proposed study areas for the M5 Junction 10 scheme

According to the 2011 Census, 38.2% of Cheltenham residents (aged between 16-74 years) drive a car or van to work. This is above the England and Wales average of 37.1%, but below the Gloucestershire average of 44.7%.

In addition, 3.3% of Cheltenham residents travel as a passenger in a car or van to work; the same as the England and Wales average but below the Gloucestershire average of 3.5%. Overall these numbers show that over one third of people travelling to work in Cheltenham do so in a single-occupancy vehicle.

The Joint Core Strategy (JCS) (adopted on the 11th December 2017) is a partnership publication between Gloucester City Council, Cheltenham Borough Council, and Tewkesbury

Borough Council, and sets out how the area will develop during the period up to 2031. While the JCS includes a number of significant highway improvements (including the M5 Junction 10 upgrade scheme), it also includes a number of alternative modal improvements intended to benefit the area covered by the JCS. These improvements are listed in Table 4-1.

Table 4-1 : Alternative modal solutions included in the JCS

Mode	Scheme description
Cycling	• Completing gaps in existing cycle networks within the Cheltenham and Gloucester urban areas and ensuring linkages into new strategic development sites – comprising a package of small cycle improvements • Improved cycle parking – at key destinations • Cheltenham to Bishops Cleeve Cycle Path
Passenger Transport	• Improved rail service frequency / stopping pattern for passenger services at Ashchurch railway station – ensuring an hourly service • Improved frequency and review bus service coverage of 41/42 and review of existing services • Improved bus service frequency on Gloucester – Cheltenham Service Route 97/ 98 via Churchdown • Mode Shift Points – built into local centres across the JCS area to provide local park and ride (including cycle park) facilities. Enhanced public transport facilities – upgraded bus stop at local community destinations which provide bike parking / RTPI / car parking – encouraging modal shift onto bus for part of the journey
Thinktravel	• School Travel Planning – Support for schools to encourage modal shift • Personalised Travel Planning – For new developments – tailored support to inform travel choices before established travel behaviour is established • Business Travel Planning – Support for employers to encourage modal shift • Bike training for children and adults through the travel plan process • Improved cycle information / route finding – Improved signage and promotional materials within the JCS area

2.0 Walking and Cycling

2.1 Walking

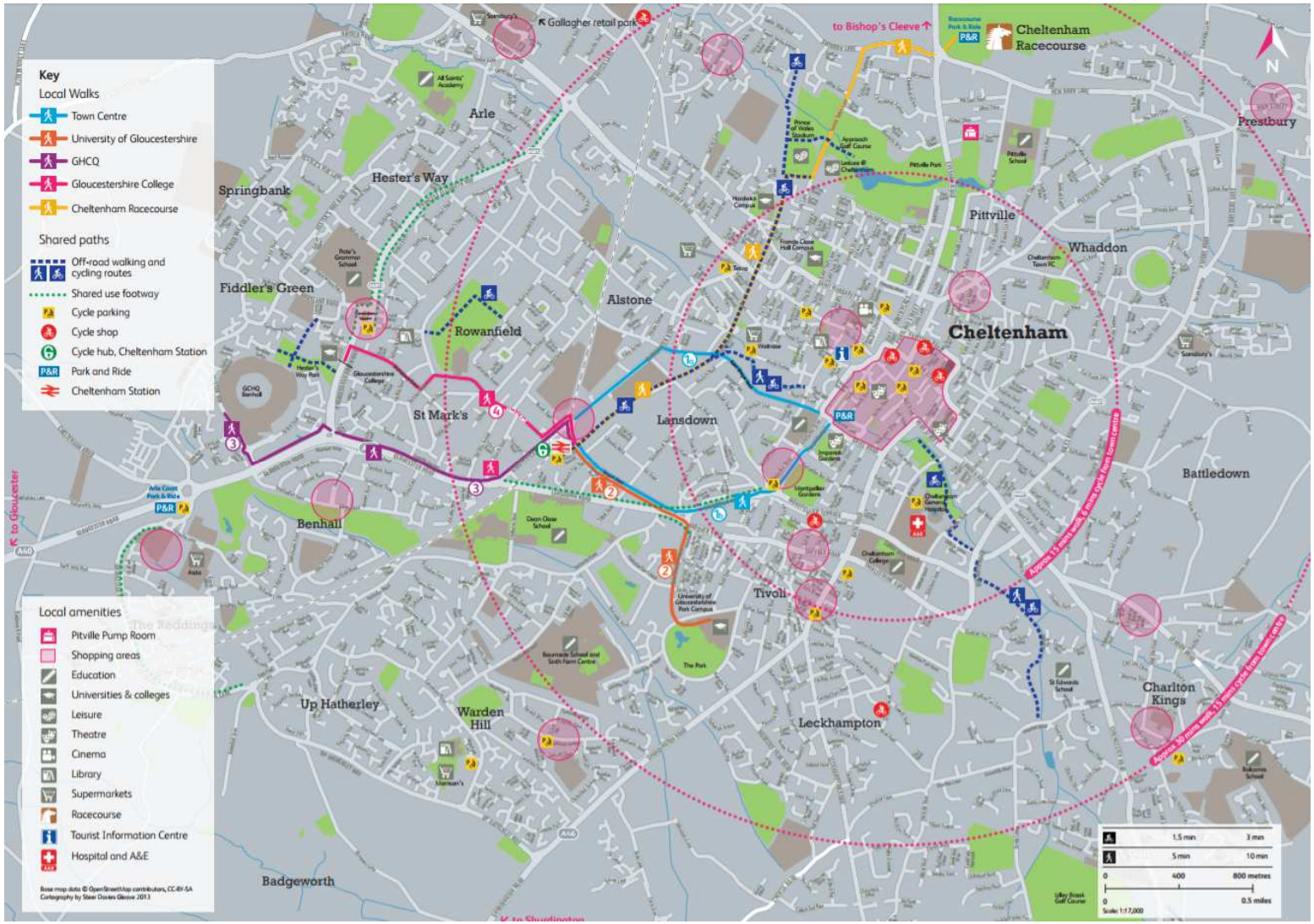
Cheltenham has a high proportion of people who walk to work. According to the 2011 Census, 12.6% of Cheltenham residents (aged between 16-74 years) walk to work, nearly twice that of the England and Wales average of 6.9%, and above the Gloucestershire average of 8.2%.

Generally most of the major roads around the key employment, health, education, and leisure sites in Cheltenham have footpaths. However, the standard of footpath varies significantly. The A4019, which runs from M5 Junction 10 to Cheltenham, does have a footpath which at times is a deteriorating, narrow path through grass beside the carriageway. An exception is

the A40 which runs from Gloucester, via M5 Junction 11, to the roundabout at Arle Court Park & Ride (Cheltenham), where it meets the B4063. There is no footpath along this road.

Map 2 shows a number of different walking routes within Cheltenham to employment, education and leisure destinations from the centre of town and the Cheltenham train station. The time it takes to walk and cycle is also shown on the map.

Map 2: Walking routes to employment and leisure services in Cheltenham



2.2 Cycling

Cheltenham also has a relatively high proportion of people who cycle to work, and many cyclists use the road network rather than designated cycle routes. According to the 2011 Census, 4.5% of Cheltenham residents (aged between 16-74 years) cycle to work, more than twice that of the England and Wales average of 1.9%, and nearly twice that of the Gloucestershire average of 2.6%.

The existing cycling lanes and paths are shown on Figure A-1.

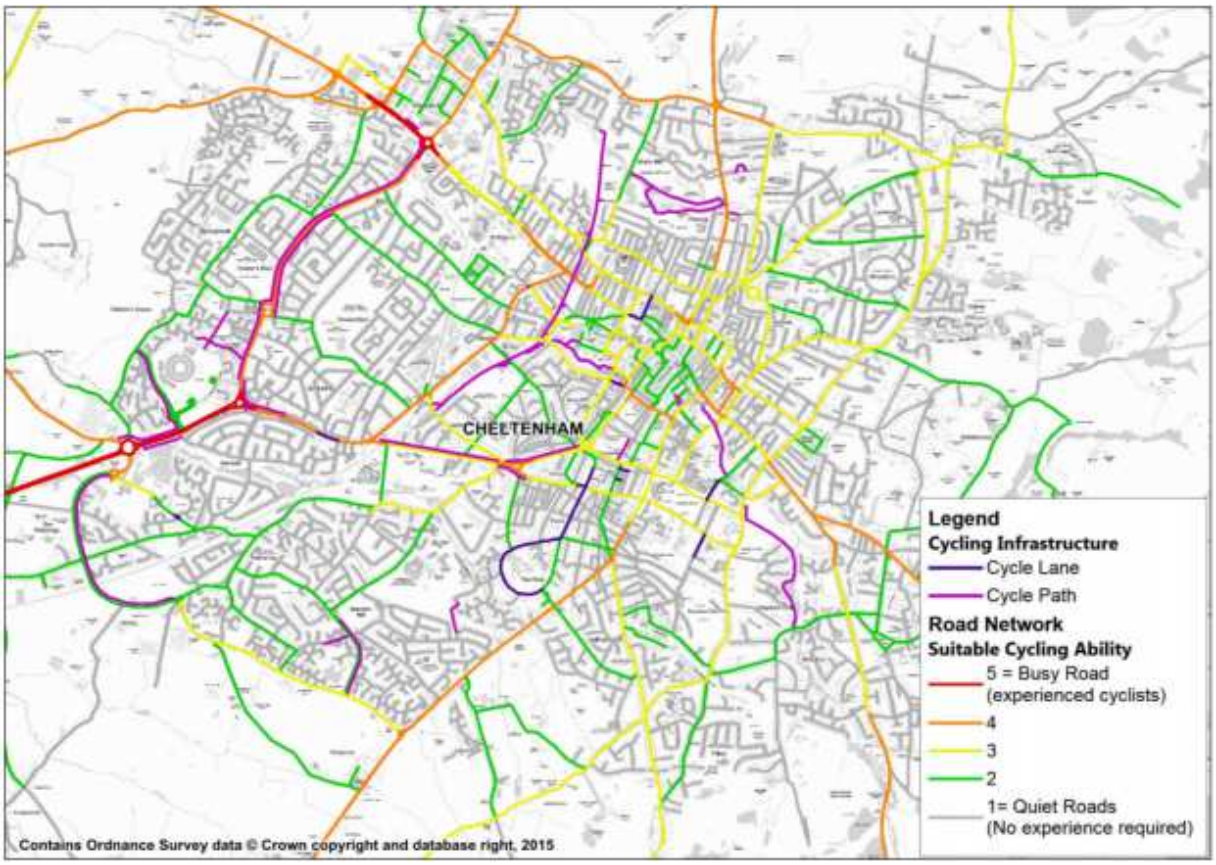


Figure A-1 - Cheltenham cycle paths and lanes

One of the key JCS strategic objectives is "Promoting sustainable transport". It aims to reduce the need to travel and the reliance on the car by:

- Improving opportunities for public transport, walking and cycling by making routes more convenient, safe and attractive;
- Improving existing, and providing new, frequent public transport links and safe walking and cycling routes in all new developments;
- Improving access to services in rural and urban areas through new development, improved integrated transport links and supporting local and community led transport initiatives in the Local Transport Plan throughout the JCS area; and
- Promoting bus priority on key public transport corridors identified in the Local Transport Plan throughout the JCS area.

The Department for Transport's Propensity to Cycle Tool[2] has been used to look at existing active mode trips and the potential to shift. This tool allows a high level calculation of the impact of increasing levels of cycling provision could have on commuting cycle trips.

Error! Reference source not found. Figure A-2 shows that the most used cycle routes are all short distance trips within Cheltenham, Gloucester and Tewkesbury, rather than longer distance trips like those which use the M5. This means that any change from car trips to cycle trips would likely reduce congestion in these urban areas, but would be unlikely to impact flows on the M5 directly. However, reducing congestion in these areas could contribute to reducing the levels of traffic on the local road network around the M5 junctions.

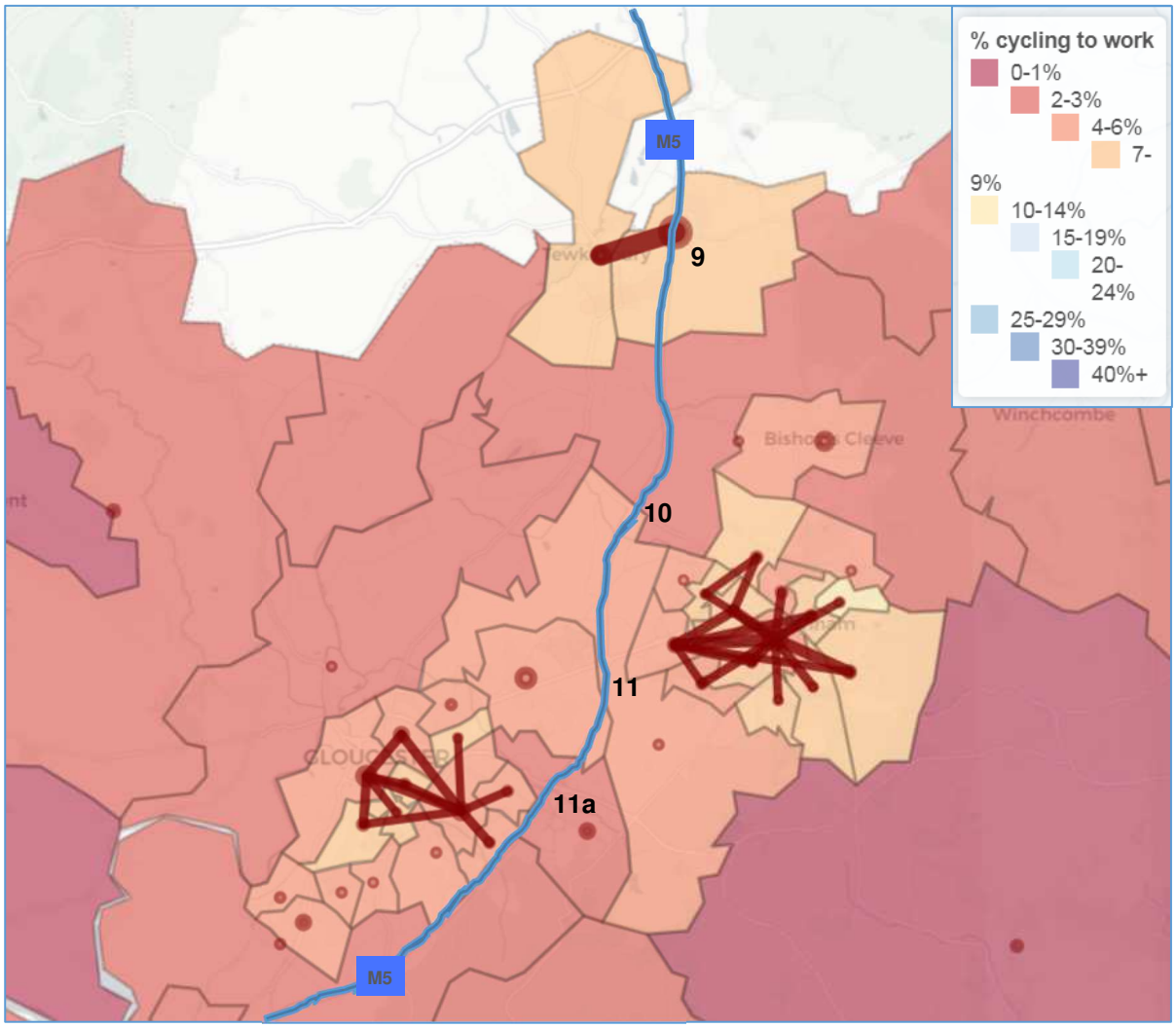


Figure A-2 - The top cycled routes in Cheltenham, Gloucester and Tewkesbury

Table 4-2 was produced using the Propensity to Cycle Tool to give a high level idea of the possible increase in the number of travel to work trips given two possible scenarios for cycling infrastructure improvement.

The 'Government Total' value reflects the current Government target of doubling cycling activity by 2025, while the 'Go Dutch' option which represents a significant investment in cycling infrastructure.

[2] Propensity to Cycle Tool

Table 4-2: Current and possible travel to work trip totals in Gloucester, Cheltenham and Tewkesbury

District	Total Travel to Work Cycling Trips in Scenario			Total Increase in Cycling Trips in Scenario	
	2011 Total	Government Target	'Go Dutch'	Government Target	'Go Dutch' Increase
Cheltenham	3,835	6,209	14,693	2,374	10,858
Gloucester	3,050	5,691	15,628	2,641	12,578
Tewkesbury	1,786	3,078	7,439	1,292	5,653

Proposed improvements to the cycle network in the region are included in the JCS (Table 4-1), however in order to see the level of increase predicted in the 'Go Dutch' scenario in Table 4-2, it would be necessary to make large scale investments in cycle infrastructure across each of the three urban areas.

2.3 Walking and Cycling Summary

At present there isn't a connective cycle path network in and around Cheltenham. Cycling between residential areas and major employment centres requires cyclists to travel with vehicles on major roads and carriageways, which is likely to deter less confident cyclists.

As part of the planned developments in northern and western Cheltenham, localised walking and cycling provision may be included as part of construction and new businesses may incorporate travel plans into their new employment centres. The scale of these however, is not known at this stage.

On its own, even with improved infrastructure, walking and cycling will not realise a big enough modal shift to significantly improve the current and projected congestion at M5 Junctions 10 and 11, or on the major roads within Cheltenham.

3.0 Bus

According to the 2011 Census, 3.9% of Cheltenham residents (aged between 16-74 years) catch the bus to work, below the England and Wales' average of 4.7%, but above the Gloucestershire average of 2.9%.

There are a currently a number of bus routes which link Cheltenham, Gloucester and Tewkesbury, as well as routes within Gloucester and Cheltenham. Table 4-3 summarises the bus timetable of each of the routes shown in Figure 4-2. Buses run between Cheltenham and Tewkesbury, and Cheltenham and Gloucester, at roughly 15-20 minute intervals throughout most of the day. Bus fares cost between £3.30 and £5.70 depending on the ticket type, and rail fares cost between £4.70 and £7.80 depending on the start and end station and ticket type.

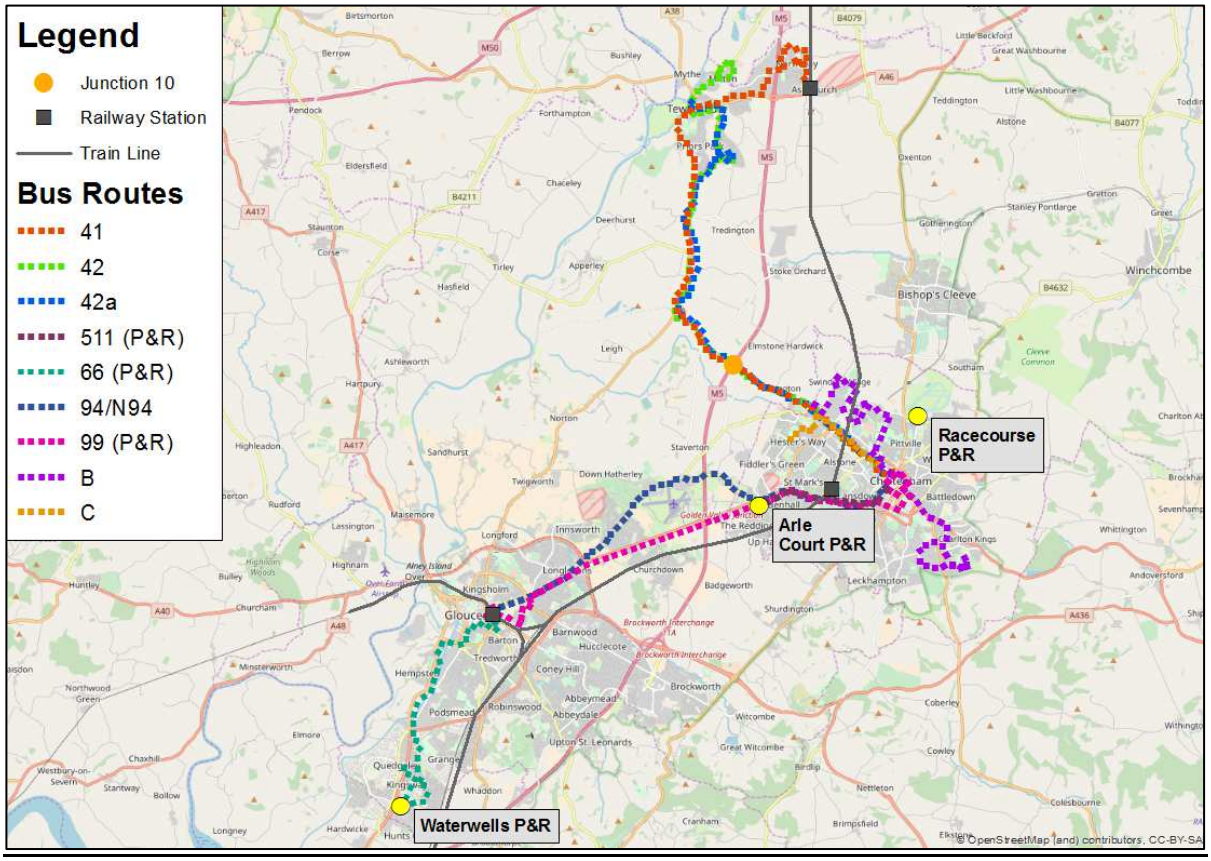
At the time of the 2011 Census, 250 travel to work trips were made from Tewkesbury to Cheltenham by bus daily, with 70 trips made in the reverse direction. These totals account for roughly 17% and 5% of all travel to work trips between these locations. 850 travel to work trips were made from Gloucester to Cheltenham by bus, with 500 trips made in the reverse direction.

Table 4-3: Cheltenham bus and rail route frequency, journey time and ticket prices

Bus						
Service No.	**Route**	**Frequency**			**Journey Time**	**Ticket Price**
		Mon – Fri	**Sat**	**Sun**		
41	Cheltenham ● Tewkesbury ● Northway	Schooldays: 15-20 mins (5-24) School holidays; 15-20 mins (5-21), 30 mins (21-24)	30 mins (6-7); 10-15 mins (7-19); 20-30 mins (19-24)	70 mins (6-8, 21-22); 20 mins (8-10); 15 mins (10-17); 20 mins (17-18); 30 mins (18-21)	Cheltenham to Tewkesbury 25-35 minutes	Single £3.30, Return £5.70
42/42A	Cheltenham ● Wheatpieces ● Tewkesbury ● Mitton/Priors Park	30 mins (6-19)	30 mins (7-19)	60 mins (9-17)	Cheltenham to Tewkesbury 30-35 minutes	Single £3.30, Return £5.70
511 (P&R)	Arle Court Park and Ride ● Promenade	12 mins (7-19),	10 mins (8-18)	No Service	Arle Court to Promenade 12 minutes	Single £2.50, Return £3.50
66 (P&R)	Gloucester ● Waterwells P&R ● Stroud	15 mins (6-17); 20 mins (18-19); 1 hour (20-23)	15 mins (6-17); 20 mins (18-79); 1 hour (20-23)	1 hour (9-18)	Gloucester to Waterwells P&R 27 mins	Single £2.10, Return £2.80
94/N94	Cheltenham ● Gloucester	15-20 mins (5-7, 17-22); 10 mins (7-8, 9-17); 15-30 mins (8-9); 30 mins (22-24)	30 mins (6-7, 23-24); 10-15 mins (7-20); 20 mins (20-23)	60 mins (6-8, 21-22); 20 mins (8-10, 17-18); 15 mins (10-17); 30 mins (18-21)	Cheltenham to Gloucester 30-40 minutes	Single £3.30, Return £5.70, Cheltenham & Gloucester Dayrider Plus £5
99 (P&R)	Cheltenham Clarence Parade ● Cheltenham General Hospital ● Arle Court Park and Ride ● Gloucestershire Royal Hospital ● Gloucester Bus Station	30 mins (6-19)	No Service	No Service	Cheltenham Clarence Parade to Gloucester Bus Station 45 minutes	
B	Charlton Kings ● Six Ways ● Town Centre ● Wymans Brook ● Swindon Village ● Arle Farm	30 mins (6-18); 60 mins (18-23)	30 mins (9-18); 60 mins (18-23)	60 mins (10-18)	Cheltenham High Street to Swindon Village 20 mins; Swindon Village to Cheltenham High Street 20 minutes	Single £2.10, Cheltenham Dayrider £3.70, Cheltenham & Gloucester Dayrider Plus £5

Bus						
Service No.	**Route**	**Frequency**			**Journey Time**	**Ticket Price**
		Mon – Fri	**Sat**	**Sun**		
C	Cheltenham High Street ● Kingsditch ● Springbank	15-20 mins (6-19); 30 mins (19-23)	60 mins (6-8); 15-20 minutes (8-19); 30 minutes (19-23)	60 mins (8-10, 17-18); 20 mins (10-17);	Circuit, 30-50 minutes	Single £2.10, Cheltenham Dayrider £3.70, Cheltenham & Gloucester Dayrider Plus £5.00

Figure 4-2: Key public transport routes in the area around M5 Junction 10



3.1 Bus Summary

Introducing a high quality, regular, direct bus service with a shorter journey time between Cheltenham and Tewkesbury, via the M5, could encourage some car users who commute between the two locations to modal shift to bus. This would remove some trips using Junction 10 at peak times, reducing congestion on the M5 and in Cheltenham. Without additional bus priority measures within the urban areas, bus journey times are unlikely to compete favourably with car journey times.

It should be noted that the planned improvements at Junction 10 could also benefit bus passengers as it provides extra flexibility in planning bus routes, for example the option to use Junction 10 for bus routes accessing Cheltenham from the south. More so, if planned in conjunction with the proposed upgrade of Junction 10, additional bus lanes and priority measures at key Cheltenham and Gloucester locations (particularly on the key routes which connect Junction 10 and Junction 11 to key employment and housing areas), could reduce journey times and make buses a more attractive and convenient option for commuters. However, other factors such as cost, convenience, journey time, timetabling and service reliability will also influence whether a person modal shifts.

The proposed improvements in the JCS include increasing the frequency and reviewing the coverage of the number 41/42 bus which connects Cheltenham and Tewkesbury. A similar service connecting central Cheltenham and Gloucester could encourage some commuters to modal shift from the car to the bus, and could help reduce congestion within Cheltenham and Gloucester, and also at Junction 11.

As part of the planned developments in northern and western Cheltenham, there is the possibility of introducing dedicated bus services linking new housing to existing and new employment developments which could further mitigate the impact at Junctions 10 and 11.

On their own, improving bus services and upgrading/building new infrastructure in unlikely to see a big enough modal shift to significantly improve the current and projected congestion at M5 Junctions 10 and 11, or on the major roads within Cheltenham. As noted above the planned Junction 10 improvements will contribute to the range of bus options available.

4.0 Park & Ride

There are three Park & Ride sites within the study area:

- Arle Court Park & Ride in south west Cheltenham near Junction 11
- Waterwells Park & Ride in Quedgeley, south of Gloucester
- Racecourse Park & Ride at Cheltenham Racecourse in northern Cheltenham

These sites are shown on Figure 4-2.

Expanding the current Park & Ride facilities could provide an opportunity to offer additional services to other key employment sites. Currently there are no Park & Ride facilities to Kingsditch Industrial Estate, GCHQ or Gloucestershire University, which are key employment and education sites in Cheltenham. There is a (free) Park & Ride facility within a 15 minute walk to GCHQ however this is meant for people commuting into town.

Introducing additional Park & Ride facilities (particularly on the eastward side of Gloucestershire) is likely to reduce congestion around Junction 11 and the A40 towards Cheltenham. In addition, a new Park & Ride facility located at a strategic location close to M5 Junction 10 for the planned Cyber Business Park in western Cheltenham, near GCHQ, could mitigate the effects of the planned northern and western developments.

4.1 Park & Ride Summary

Improving Park & Ride facilities at strategic locations near the M5 Junctions 10 and 11 may result in a modal shift which improves the current and projected congestion at M5 Junctions 10 and 11, or on the major roads within Cheltenham.

5.0 Rail

According to the 2011 Census, 1% of Cheltenham residents (aged between 16-74 years) catch the train to work, below the England and Wales average of 3.3%, but above the Gloucestershire average of 0.8%.

Table 4-4 below provides a summary of the current train services in the region. Services are frequent during the AM and PM peak hours between Gloucester and Cheltenham Spa, and hourly throughout the day. Services between Ashchurch for Tewkesbury and Cheltenham Spa are sporadic, with 2 hours between some services throughout the day.

Table 4-4: As summary of the current levels of train service in the study area

Train			
Journey	**Frequency**	**Journey Time**	**Price**
Gloucester – Cheltenham Spa	Between 5 and 60 minutes between trains, with 5-15 minute frequency between 7:00 and 8:00, and 16:00 and 18:00.	10 minutes	Standard Single £4.70; Anytime Day Return £4.80
Cheltenham Spa - Gloucester			
Ashchurch for Tewkesbury – Cheltenham Spa	45 mins (5-7); 2 hrs (7-17, 18-23); 30 mins (17-18);	10 minutes	Anytime single £6.00; Anytime Day Return £7.80

The irregular train service between these stations is likely to be the reason that train trips make up between 0% and 2% of commuter trips between these locations. According to the 2011 Census, fewer than 10 travel to work trips were made from Tewkesbury to Cheltenham, and vice-versa.
Funding has recently been approved for a number of improvements to Cheltenham Spa station, including increasing car parking capacity, creating a safer pedestrian environment, extra bike storage and a more accessible bus interchange.

In conjunction with these improvements, introducing a more regular service between Cheltenham, Tewkesbury and Gloucester during peak times could make train travel a much more attractive option for commuters between these locations. The JCS suggests improving the rail frequency and stopping pattern at Ashchurch for Tewkesbury in conjunction with improving parking facilities, would make the station a more attractive prospect for modal shift.

There may also be an opportunity to extend the car parking facilities at Gloucester and Ashchurch for Tewkesbury stations to encourage a 'Park and Rail' type service. This would be particularly suitable option for Ashchurch for Tewkesbury, given the station's distance from the centre of Tewkesbury.

It may also be necessary to carry out campaigns to increase public awareness of the improved train facilities.

5.1 Rail Summary

Travel to work by rail is the second least used mode to travel to work in Cheltenham, behind the taxi. Given this, even with a large percentage increase in rail trips it is unlikely that significant investment would result in a modal shift which improves the current and projected congestion at M5 Junctions 10 and 11, or on the major roads within Cheltenham.

6.0 Parking

This section looks at the current parking situation at the key employment sites in Cheltenham.

6.1 Cheltenham General Hospital

Parking on-site at Cheltenham General Hospital is very limited. There is also little street parking availability nearby; parking is either banned or by parking permit only on most of the streets in the area. Hospital employees must purchase a permit to park in the staff car park. For those earning less than £31,696 it is free, and for those earning more than that amount, it is 0.55% of their salary. Staff must also pay £1.40 for each day they park on site. There

are designated sections of the car park for essential users (such as night staff), shift workers, car sharers and shift workers.

There are several bus routes which serve Cheltenham Hospital, including the dedicated 99 service, subsidised by the Gloucestershire Hospitals NHS Foundation Trust which connects Gloucester Royal Hospital, Gloucester Bus Station, Arle Court Park and Ride, Cheltenham General Hospital and Cheltenham High Street. This bus runs every 30 minutes between 06:35 and 19:05. Travel on this bus is free for NHS employees, except at the Arle Court park and ride where it costs £1. Bus travel within Cheltenham is also subsidised for NHS staff.

Increasing the cost of parking for non-essential car park users could encourage more hospital staff to switch to alternative modes to travel to work.

6.2 GCHQ

There are significant issues with parking at GCHQ. It has been assumed that parking is free at the site as according to the 2016/17 annual report by the Intelligence and Security Committee of Parliament, the GCHQ 'Doughnut' building car park operates at more than 125% of designed capacity on any given day.

This means that staff park on local residential roads, which is inconvenient for local residents and at times a safety issue. Workers could also be parking unlawfully in the free Arle Court Park & Ride, which is a 15 minute walk to GCHQ. GCHQ does work with Cheltenham Borough Council and Gloucestershire County Council to improve bus services and cycle / pedestrian routes around the town and encourages staff to use public transport, walk or cycle to work.

Introducing a Park & Ride service to the GCHQ site (preferably near to M5 Junction 10), which could also serve the new 'cyber business park' planned to north of GCHQ, would relieve some of this pressure on the GCHQ site, and reduce parking on residential streets. This would also reduce congestion on key routes within Cheltenham.

Plans are currently being designed for a barrier at the entrance to the Arle Court Park & Ride car park to ensure that it is being used by Park & Ride users only. Increasing enforcement measures in the Park & Ride could encourage appropriate use of the facilities; increasing Park & Ride patronage and reducing congestion in Cheltenham. However, to maximise modal shift benefits, additional Park & Ride services would need to run to key employment locations, other than just Cheltenham town centre.

6.3 Industrial Estates and Retail Parks

There are several industrial estates and retail parks in Cheltenham, including Kingsditch Retail Park which is close to Junction 10, and Golden Valley Industrial Estate which is adjacent to the Arle Court Park & Ride. It is assumed that free on-site parking is available to staff and customers, and therefore it is unlikely that a Park & Ride service would be attractive to staff or customers unless it offered a substantial journey time saving.

6.4 Cheltenham Town Centre

In the car parks around Cheltenham town centre, it can cost up to £14 to park for a full day. Season tickets are not available, and the limited on-street parking available is either paid for by parking meter or available only for those with a parking permit. Overall, for those working

in Cheltenham town centre, using alternative modes are already a preferable option. An additional Park & Ride close to M5 Junction 10 could shift some trips which currently use Junction 11 to access Arle Court Park & Ride, relieving congestion in this area. The success of this option would be linked to the improvement of Junction 10 to a full-movements junction; otherwise access would be restricted by the current Junction 10 layout.

7.0 Conclusion

Although a combination of alternative modal options on their own will make an important contribution to relieving congestion within Cheltenham and Gloucester and at the associated junctions on the M5, they will not provide a permanent solution to support the planned development or significantly mitigate the current and predicted transport issues in the region. The investment required is also likely to be significant.

The JCS acknowledge this and recommend that improvements to the walk, cycle, train and bus networks occur as part of a wider package which is focused around a number of major highway schemes. This is due to extensive development planned for Cheltenham and the significant impact this will have on the road network.

Significant modal shift could result if the upgrade of Junction 10 to a full movements junction is done in conjunction with construction of a large Park & Ride facility near the junction, bus service and frequency upgrades in the vicinity and into Cheltenham, and the incorporation of cycling and pedestrian facilities for all new northern and western Cheltenham housing and employment developments. Other initiatives such as Workplace Travel Plans and increased parking costs at places of employment could also be investigated.

The conclusion of this note is that alternative modes alone could not solve the identified problem, and as such a level 2 PCF 0 test has not been undertaken for M5 Junction 10.

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