Three Rivers and Watford LDF

Technical Note 5: Infrastructure Sensitivity Tests

Technical note

December 2011

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1 Task 5: Infrastructure Sensitivity Tests

Introduction

1.1 The 2026 model network includes proposals for both the Health Campus Link and Colonial Way Extension.

- Health Campus Link
  - Connecting Dalton Way to the Health Campus site via Wiggenhall Road
  - Left-in/left-out junction provided at Dalton Way (one-way operation)
  - New signalised junction with Wiggenhall Road (use of the link road restricted to Health Campus trips)
- Colonial Way Extension
  - Connecting Colonial Way from its junction with Imperial Way to St Albans Rd
  - All moves signalised junction with St Albans Road
  - New rear entrance to Watford Junction Station car parks, forming a new signalised junction with Colonial Way Extension

1.2 The schematic location of each scheme is shown in Figures 1.1 and 1.2.

FIGURE 1.1 HEALTH CAMPUS LINK

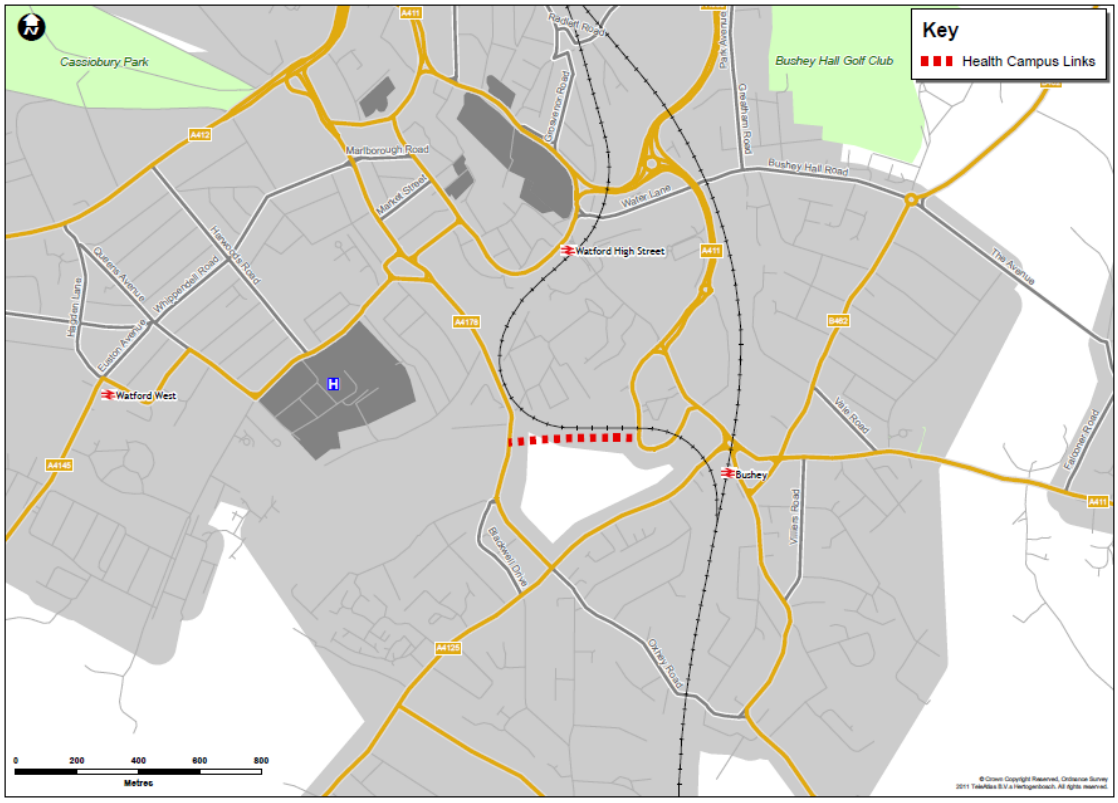
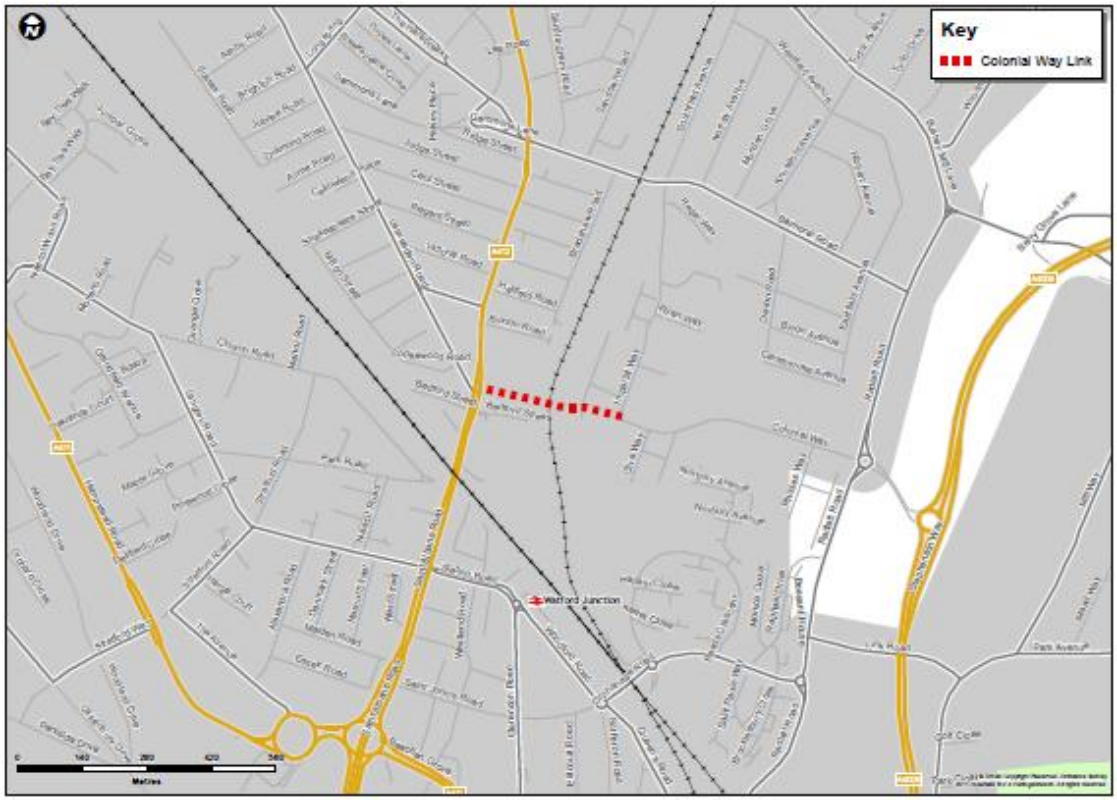


FIGURE 1.2 COLONIAL WAY LINK



1.3 There remain doubts over the delivery of each scheme and, as such, two separate sensitivity tests have been undertaken; one without the Health Campus Link and one without the Colonial Way Extension. A combined test excluding both schemes has not been carried out given the minimal interaction between each scheme.

1.4 In simple terms, for each test, we assess how many trips use the link, who those people are, where they go if the link was not available and whether the re-assignment is likely to cause additional problems elsewhere on the network.

Health Campus Link

1.5 The Health Campus Link (HCL) test assumes the section between Wiggenhall Road and Dalton Way is not constructed, yet a new signal controlled access junction with Wiggenhall Road is still provided.

1.6 At the access junction, the same stage timings as before are used. Given that the HCL approach operated within the same stage as departures from the development site, this is a reasonable assumption.

1.7 HCL has been modelled to provide direct access to and from the main elements of the Health Campus site; the hospital itself, hotel and offices. The residential elements are modelled as separate entities with access from Cardiff Road. With reference to Technical Note 2: Future Year Model Development, the total trips assigned to the Health Campus development are repeated in Table 1.1 below.

TABLE 1.1 HEALTH CAMPUS DEVELOPMENT TRIP ASSUMPTIONS

Dev size & units	Specific Development	Generated Trips			
		AM in	AM out	PM in	PM out
74,000 sqm	Hospital	923	216	183	553
5,005 sqm	Restaurant	0	0	106	83
14,715 sqm	Hotel	53	65	64	37
18,780 sqm	Offices	281	34	28	234
85 units	Residential	7	21	17	9
419 units	Residential	34	96	90	46

1.8 As such, we are able to identify not only how much hospital traffic is forecast to use HCL, but also what that forecast is as a percentage of all demand to and from the non-residential parts of the development. This is summarised in Table 1.2.

1.9 As shown, around 24% of all trips to and from this specific part of the Health Campus development in the AM peak are expected to use HCL, rising to 29% in the PM peak.

1.10 The total number of trips on HCL in 2026 is forecast to be around 380-390 in each of the morning and evening peak hours.

TABLE 1.2 HEALTH CAMPUS LINK - FORECAST FLOW (2026)

Time period	Direction	Forecast HCL flow	Specific development demand	HCL%
AM Peak	IN	253	1281	20%
	OUT	128	326	37%
	TOTAL	381	1607	24%
PM Peak	IN	108	399	27%
	OUT	281	917	31%
	TOTAL	389	1316	29%

1.11 To try and establish ‘who’ is forecast to use HCL, the following select link plots have been taken from the SATURN model. Separate plots are presented for each of the morning and evening peaks. These plots reflect the routes that traffic to and from the development are assigned within this latest version of the highway model and taking account of general network conditions. Although overall origins and destination proportions are carried forward from previous analysis of the Health Campus proposals, we acknowledge that forecast conditions on the network in

2026 may influence the choice of route taken and these might not necessarily reflect the most desired route. For example, Figure 1.3 demonstrates that while almost half of all trips to the main part of the development originate from the direction of Stephensons Way, and that many are expected to route via the Health Campus Link, there is a significant split in routes with over half predicted to assign via more central routes and to approach the new Wiggenhall Road junction from the north.

FIGURE 1.3 MORNING PEAK – DISTRIBUTION OF TRIPS TO THE SITE

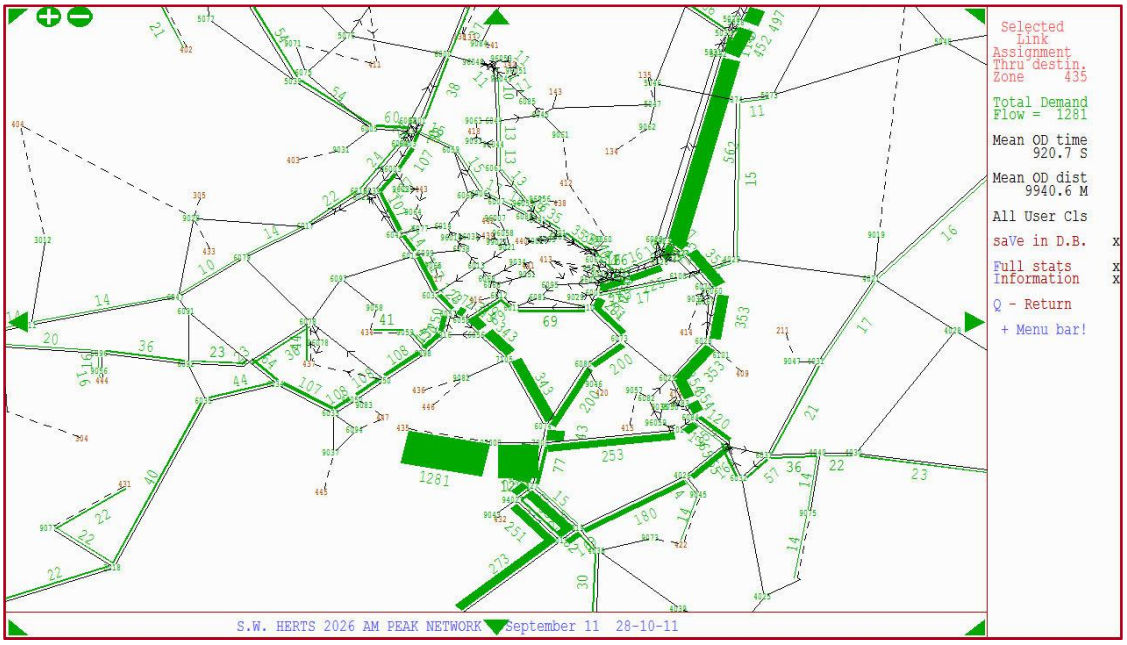
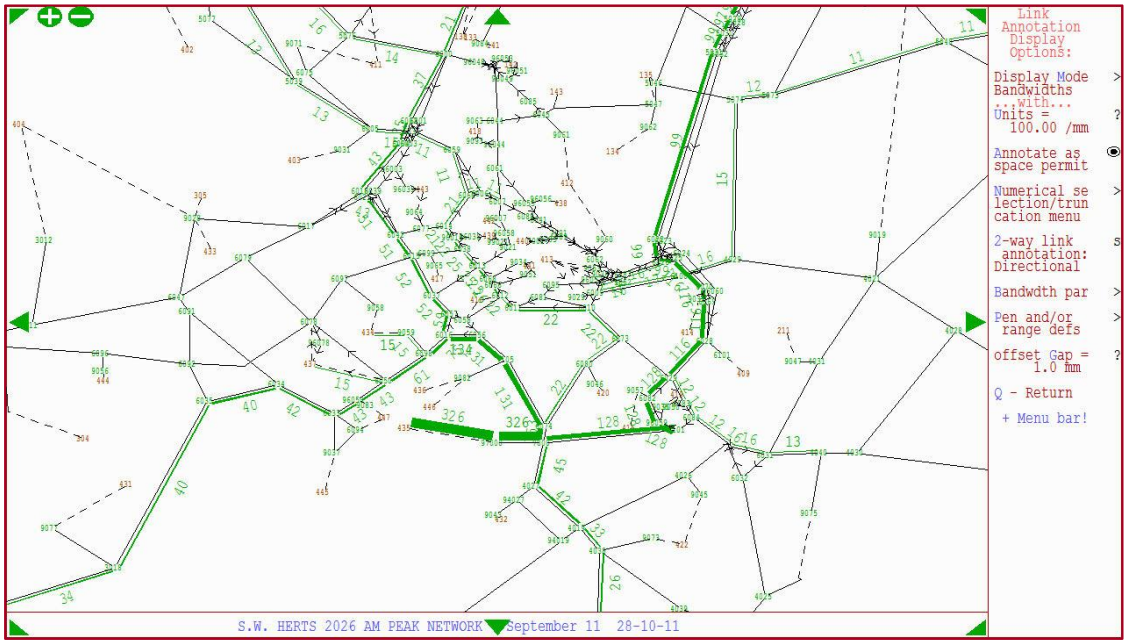


FIGURE 1.4 MORNING PEAK - DISTRIBUTION OF TRIPS FROM THE SITE



1.12 In the morning peak, the Health Campus Link is used predominantly to provide a connection to Stephensons Way both to and from the site.

1.13 As shown below, a very similar pattern is predicted for the PM peak.

FIGURE 1.5 EVENING PEAK - DISTRIBUTION OF TRIPS TO THE SITE

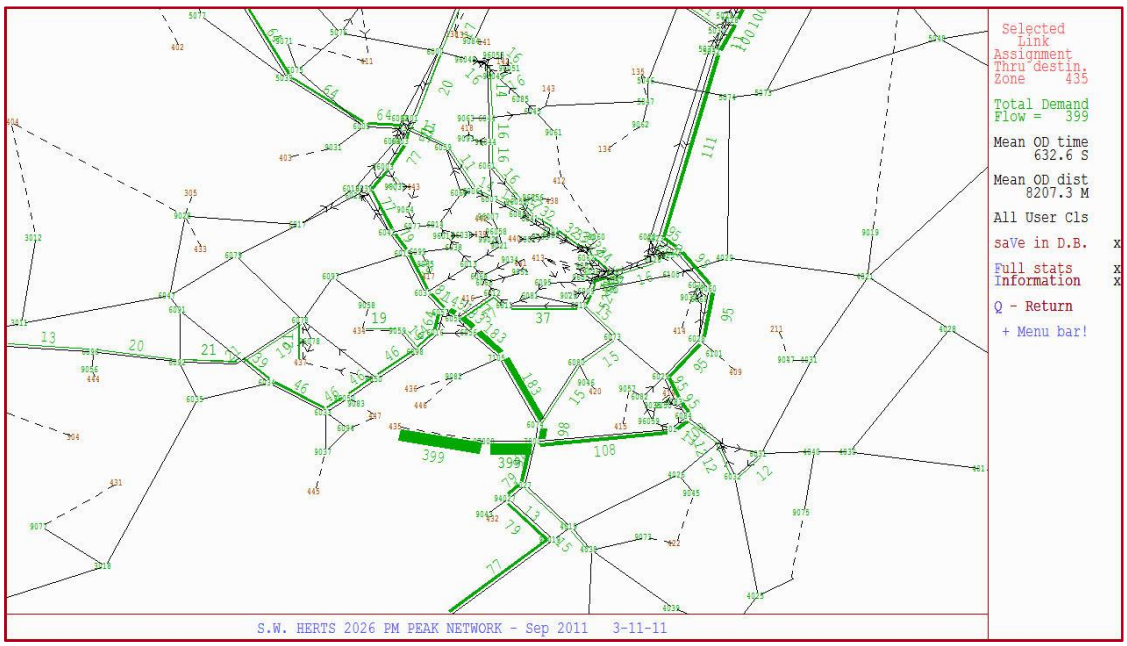
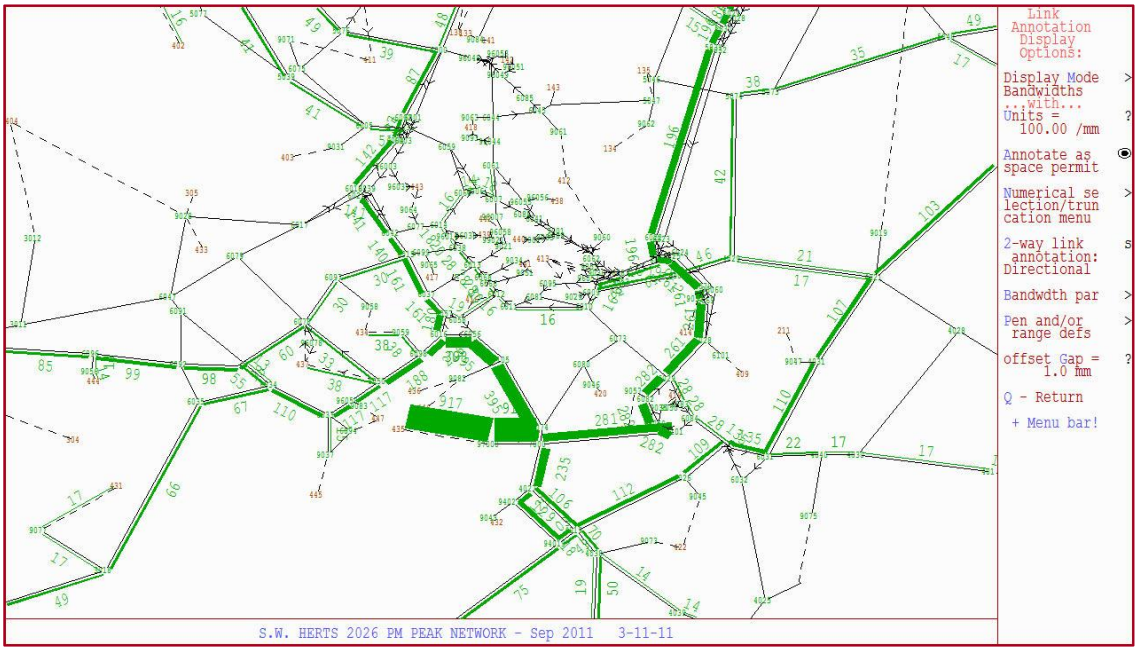


FIGURE 1.6 EVENING PEAK – DISTRIBUTION OF TRIPS FROM THE SITE



1.14 To assess which routes the traffic would re-assign to if HCL was not available, similar select plots have been produced without HCL. Figures 1.7 and 1.8 provide the results for the AM peak, with corresponding PM peak results shown in Figures 1.10 and 1.11.

FIGURE 1.7 AM PEAK – TO THE SITE – NO HEALTH CAMPUS LINK ROAD

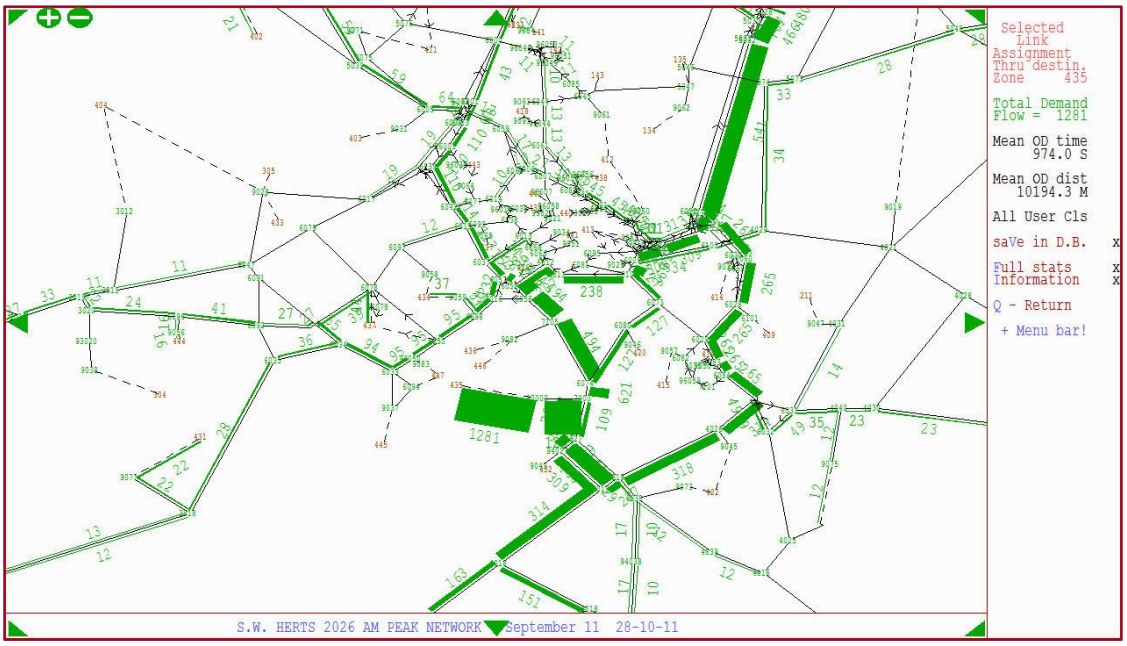
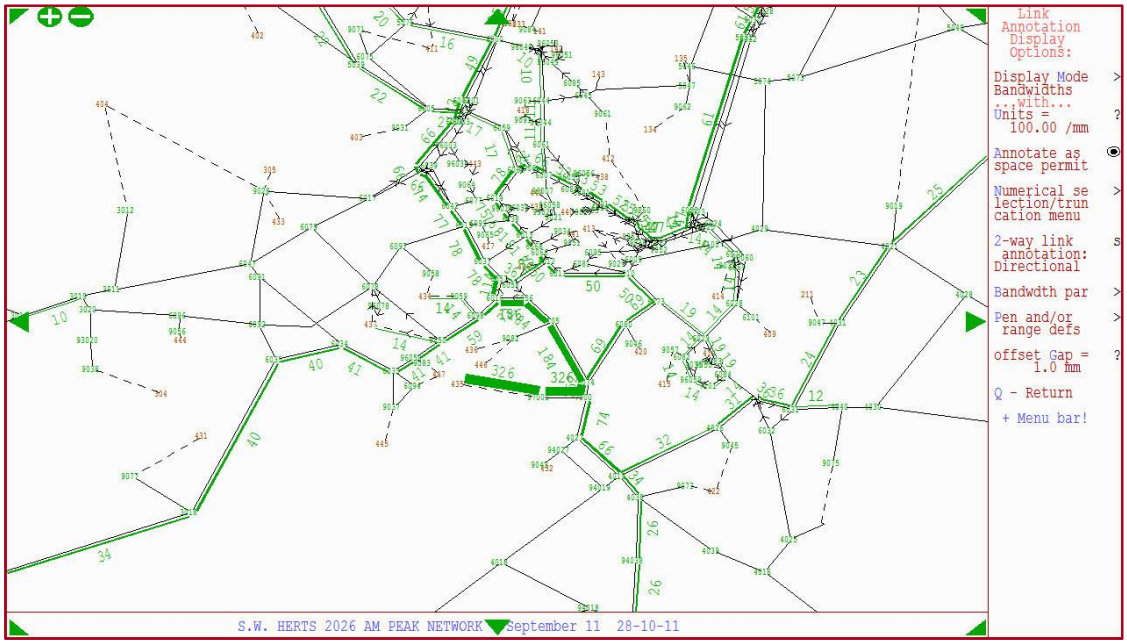


FIGURE 1.8 AM PEAK – FROM THE SITE – NO HEALTH CAMPUS LINK ROAD



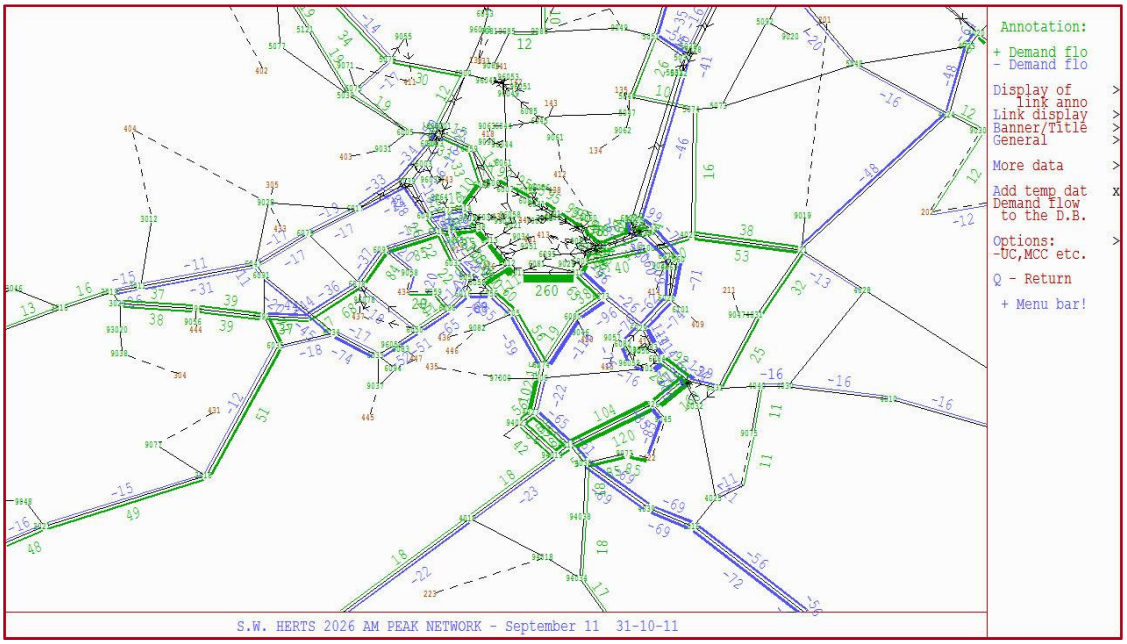
1.15 The main impact in the morning peak is naturally shown inbound towards the Health Campus where flows are highest. Between Stephensons Way and the site, we see more than 100 additional trips diverted to Eastbury Road, creating even greater stress at the Deacons Hill junction. We also see increased pressure for the route via the southern section of the Town Centre Loop Road, accessing the site via Hornets Gyratory and Wiggenhall Road.

1.16 Away from the site, there are fewer trips to divert. We see around 30 trips diverted to Eastbury Road and Aldenham Road, as an alternative to using Stephensons Way. We also see around 50m more heading north on Wiggenhall Road and through the Hornets Gyratory.

1.17 Although the model predicts negligible impact in terms of queues and delays in the AM peak as a result of not providing the Health Campus Link, it is worth noting that the junction of Eastbury Road/Deacons Hill is already identified as a junction where mitigation might be required to accommodate future LDF demand. Any further demand for this junction would need to be included in further assessment work.

1.18 With respect to the Hornets Gyratory, this is already a slow part of the network and without the link would be expected to handle over 200 more two-way trips. The model accommodates this by additional rerouting of westbound traffic from the town centre away from Vicarage Road and instead on to Whippendell Road. This re-distributional effect is demonstrated in Figure 1.7 below.

FIGURE 1.9 AM PEAK – DIFFERENCE IN DEMAND FLOWS – NO HCL



1.19 A similar comparison has been made for the PM peak. Into the site we see all the HCL trips diverted to the southern part of the Town Centre Loop Road, Hornets and Wiggenhall Road.

FIGURE 1.10 PM PEAK – TO THE SITE – NO HEALTH CAMPUS LINK ROAD

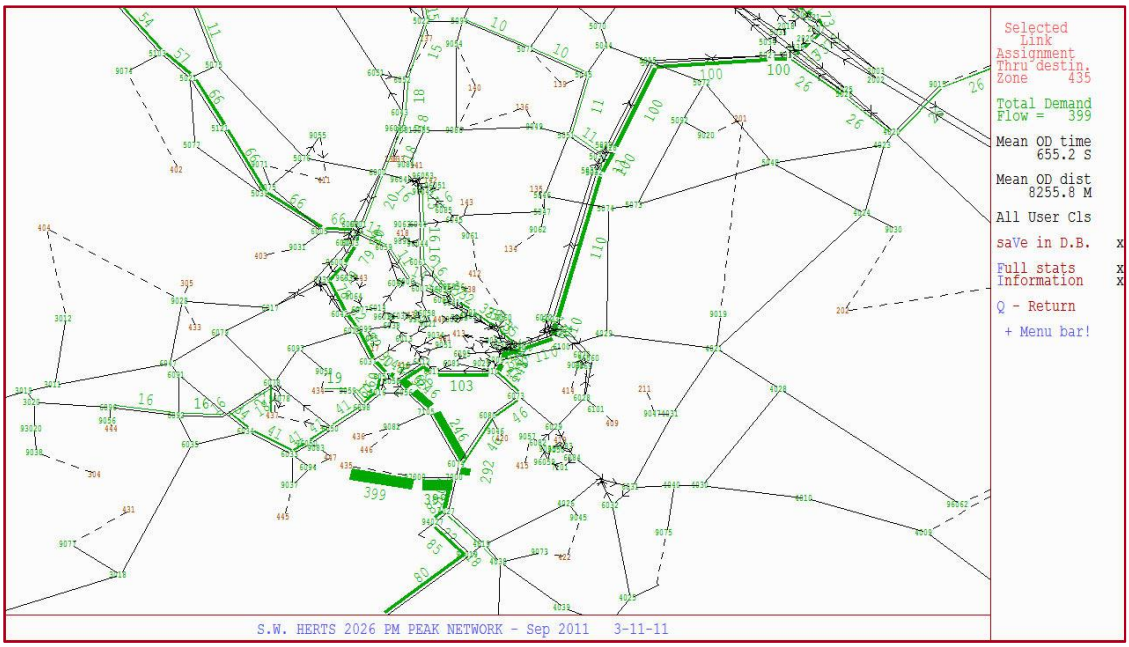


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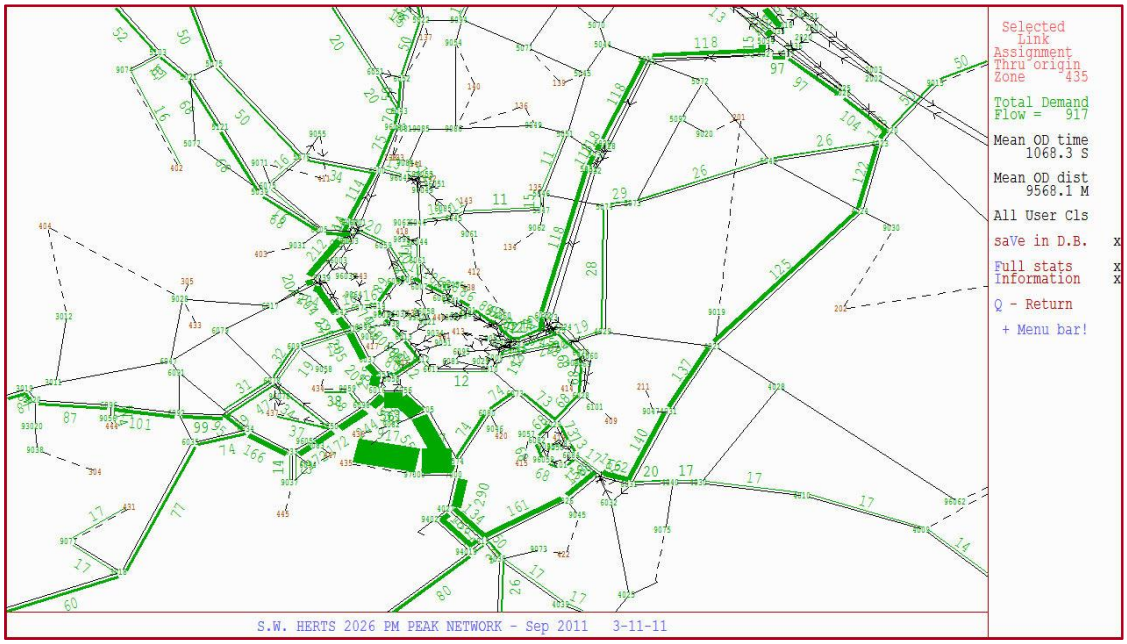
FIGURE 1.11 PM PEAK – FROM THE SITE – NO HEALTH CAMPUS LINK ROAD



1.20 Outbound from the Health Campus we see similar results as the AM peak, in that we predict rerouting via Eastbury Road and Aldenham Road. However, we also see an increase of around 150 trips northbound through Hornets Gyratory and on to Cassio Way, towards St Albans Road. Both these result in the effect of having around 80 fewer trips leaving the site via Stephensons Way.

1.21 A further peculiar result in the PM peak is that we see around 75 trips leaving the site via Lammas Road/Watford Field Road to access Lower High Street. From there, the trips continue around the Dalton Way gyratory (the right turn is not permitted) before heading off to Stephensons Way. While this might be an unlikely route in reality, it is understandable why the model might assign traffic this way, given the amount of traffic on alternative routes.

Health Campus Link Sensitivity – Conclusions

1.22 We expect to see around 380-390 two-way trips on the Health Campus Link in 2026, all travelling to and from the proposed Health Campus development. The Link is mainly used as the route between the development and Stephensons Way, although the modelling acknowledges that network conditions in 2026 will affect route choice and, particularly in the AM peak, the new link road is not always the assigned route.

1.23 The 'no-Link' test removes the connection between Wiggenhall Road and Dalton Way, but retains the access into the Health Campus site off Wiggenhall Road.

1.24 Although the model predicts negligible impact in terms of queues and delays in either peak as a result of not providing the Health Campus Link, it is worth noting that additional traffic would be routed either via the Eastbury Road/Deacons Hill junction or via the Town Centre and Hornets Gyratory. In particular, the junction of Eastbury Road/Deacons Hill is already identified as a junction where mitigation

might be required to accommodate future LDF demand. Any further demand for this junction would need to be included in further assessment work and it might reasonable to assume that the developers of the Health Campus would assist in the identification of appropriate mitigation at this location.

Colonial Way Extension

1.25 The Colonial Way Extension not only provides a connection through from Colonial Way to St Albans Road (at Penn Road), but also supports the redevelopment of Watford Junction Station by providing a new access to the new development areas from the rear of the station.

1.26 The Colonial Way Extension (CWE) sensitivity test assumes that rear access to station development will continue to be provided via Penn Road but that the new section across the railway is not constructed. Direct access to the development from the eastern part of Colonial Way will not, therefore, be possible.

1.27 There is an assumption that the total demand for the rail station and the new development can be accommodated and that there has been no limit on the number of parking spaces modelled.

1.28 With reference to Technical Note 2: Future Year Model Development, the total trips assigned to the Watford Junction Station development are repeated in Table 1.3 below.

TABLE 1.3 WATFORD JUNCTION DEVELOPMENT TRIP ASSUMPTIONS

Dev size & units	Specific Development	Generated Trips			
		AM in	AM out	PM in	PM out
1,200 dwg	Residential 350 Phase 1&2 850 Phase 3&4	204	487	451	272
23,525 sqm	Offices 4,645 Phase 1&2 15,580 Phase 3&4	344	40	32	287
300 bed	Hotel	27	34	29	25

1.29 The total number of trips forecast to make use of the new bridge in 2026 is around 1000 two-way in the morning peak, and slightly more than 800 in the evening peak. The difference between the two peaks is partly due to the additional morning peak use of the link for access to/from the railway station, as summarised in Table 1.4 below.

TABLE 1.4 COLONIAL WAY EXTENSION – FORECAST FLOW (2026)

Time period	Direction	Forecast CWE flow	Demand to/from Railway Station	Station%%
AM Peak	Eastbound	260	42	16%
	Westbound	739	345	47%
	Two-way	999	387	39%
PM Peak	Eastbound	317	73	23%
	Westbound	520	40	8%
	Two-way	837	113	14%

1.30 As before, the following select link plots have been taken from the SATURN model to establish 'who' is forecast to use CWE. Separate plots are presented for each of the morning and evening peaks. Unlike HCL, Colonial Way Extension is used by general traffic and, as such, the plots show traffic patterns using the new link by direction.

FIGURE 1.12 MORNING PEAK – DISTRIBUTION OF TRIPS USING CWE - EASTBOUND

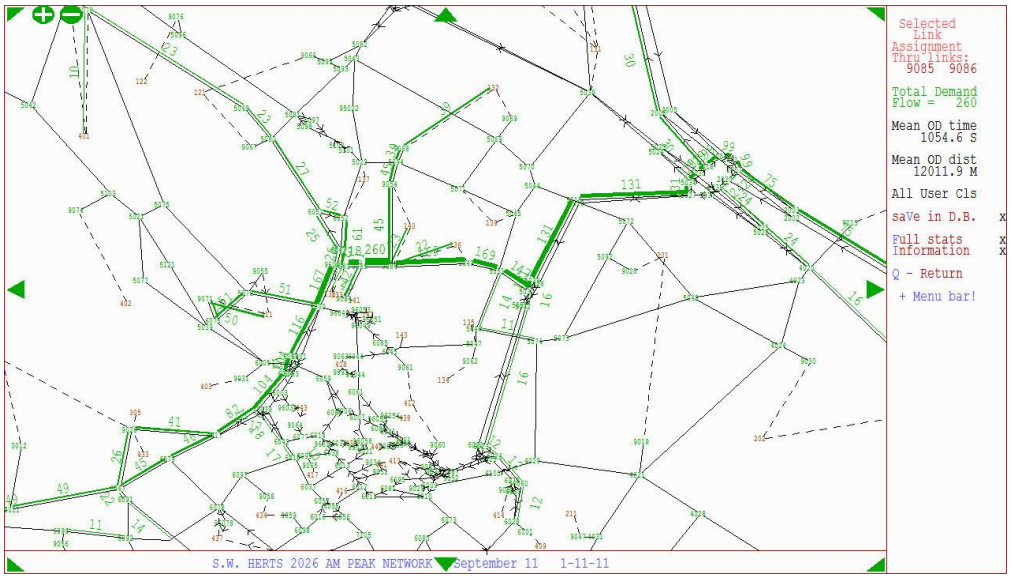


FIGURE 1.13 MORNING PEAK – DISTRIBUTION OF TRIPS USING CWE - WESTBOUND

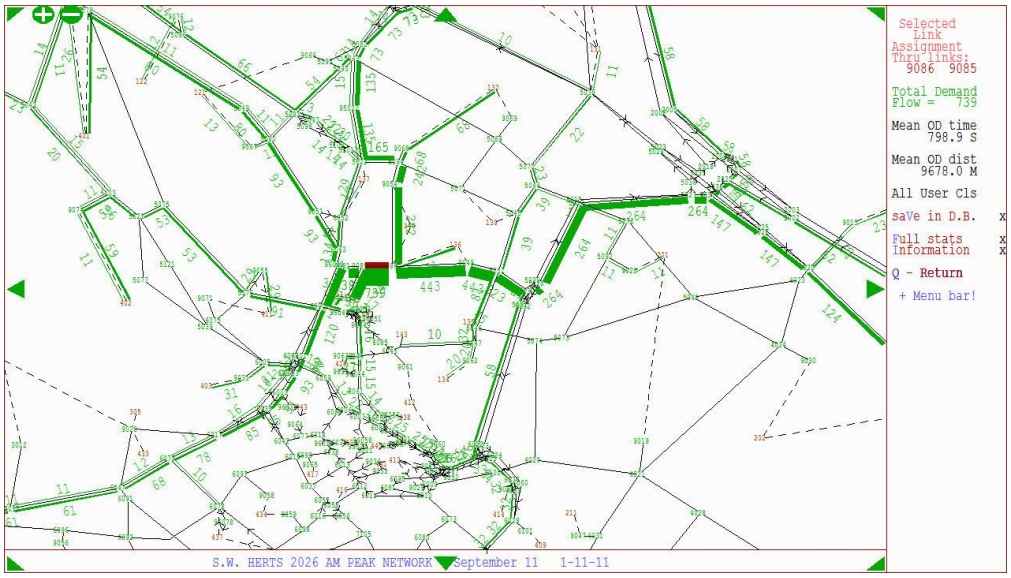


FIGURE 1.14 EVENING PEAK – DISTRIBUTION OF TRIPS USING CWE - EASTBOUND

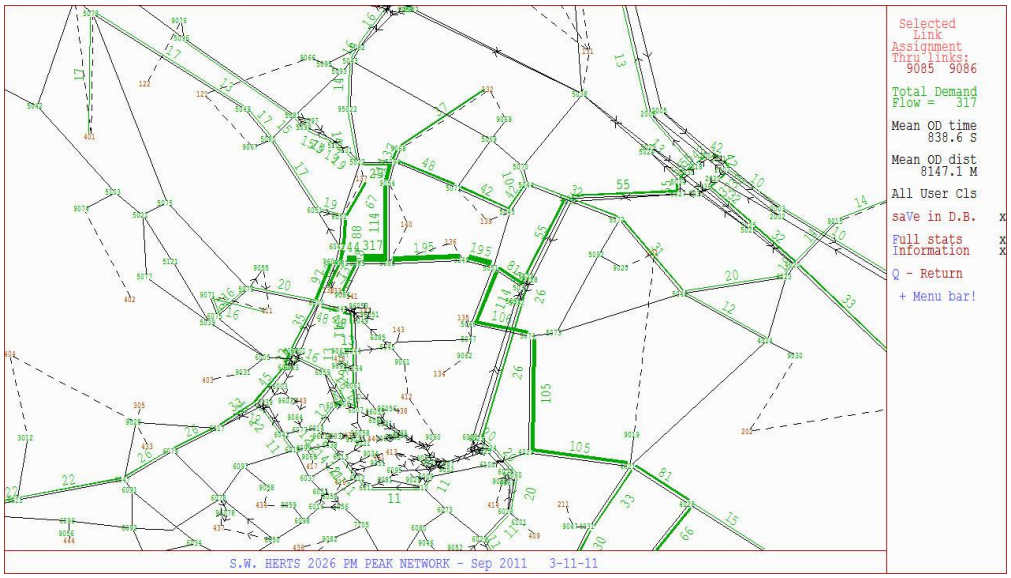
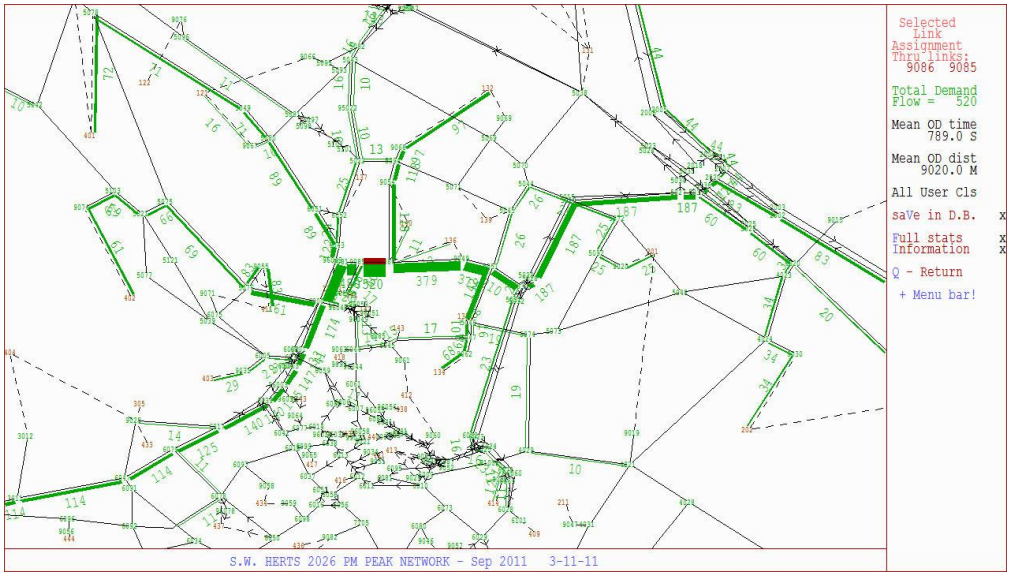


FIGURE 1.15 EVENING PEAK – DISTRIBUTION OF TRIPS USING CWE - WESTBOUND



1.31 Although similar distributions between the two peaks and by direction, there are subtle differences between each.

1.32 Eastbound, morning peak demand is mainly between St Albans Road (south) and the M1, but CWE also provides more direct access to Imperial Way. In the evening peak, the eastbound origins appear more localised, with fewer trips destined for the M1 but greater demand towards both Imperial Way and to the south-east side of the town, via Radlett Road.

1.33 Morning peak westbound demand is similar to eastbound only more so. Also, as discussed above, there is a significant proportion of westbound demand heading for Watford Junction railway station. In the evening peak, westbound distribution is more of a mirror of AM eastbound patterns, with the key demand between M1 Junction 5 and West Watford.

1.34 To assess which routes the traffic would re-assign to if CWE was not available, similar select plots have been produced without CWE. Figure 1.16 provides the results for the AM peak, with corresponding PM peak results shown in Figure 1.17.

FIGURE 1.16 AM PEAK – DIFFERENCE IN DEMAND FLOWS – NO CWE

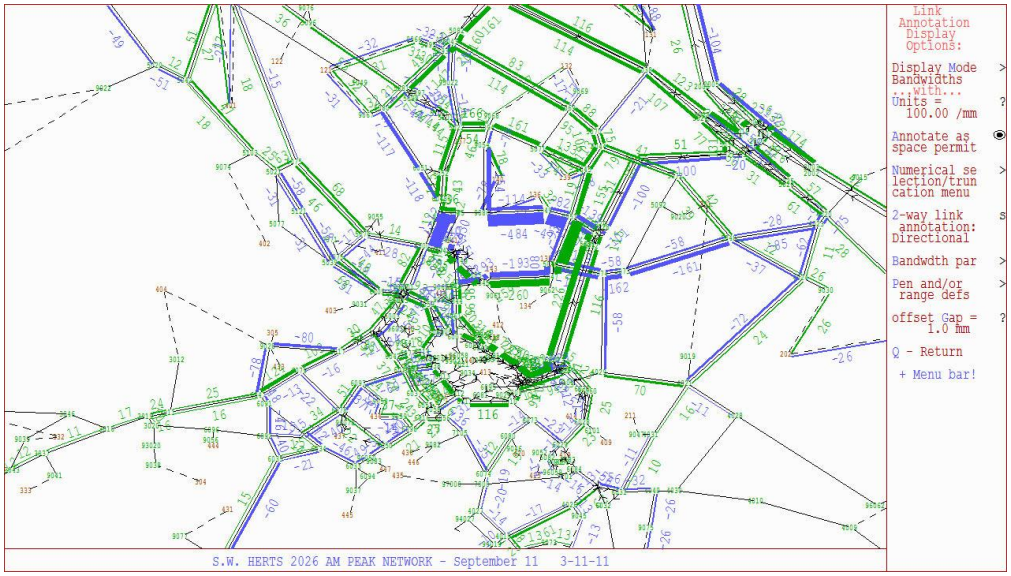
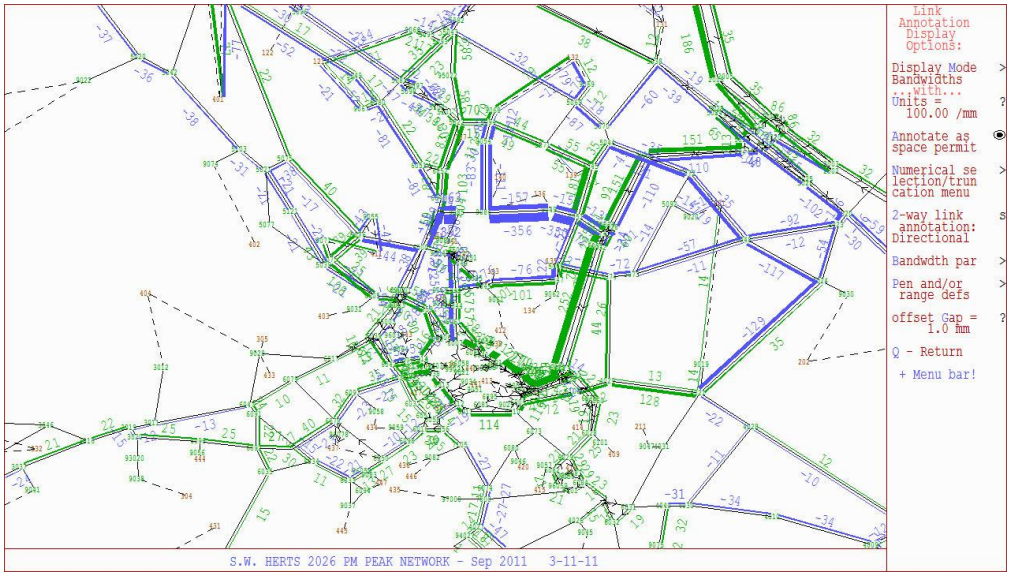


FIGURE 1.17 PM PEAK – DIFFERENCE IN DEMAND FLOWS – NO CWE



1.35 In the morning peak, the difference in demand flows shows a mixed picture of both those routes that can be readily identified with the closed link, and other changes where relocated traffic has a knock on impact on those previously using affected links.

1.36 There is no surprise that we see significant reduction in demand for Colonial Way and southbound on St Albans Road to the south of the proposed link, where flows are reduced by as much as 430 trips. Equally we would expect to see corresponding increases in flow on Stephensons Way, Radlett Road, Orphanage Road and Woodford Road. Perhaps more interestingly we also see relatively large increase in demand for the Town Centre Loop, with around 250 more trips on the

Beechen Grove section around the north and east of the town, with increases of around 120 on Exchange Road.

1.37 The evening peak also predicts a mixed picture of direct impacts and knock-on effects. Again we expect to see reductions on Colonial Way and St Albans Road, but this time we also see northbound reductions on Clarendon Road of around 125 trips. There are increases in flow on Stephensons Way, Orphanage Road and Woodford Road, although these increases are lower than in the AM peak. Increases on the Town Centre Loop are about the same.

1.38 Differences in model delay are provided in Figures 1.18 and 1.19 for the AM and PM peaks respectively.

1.39 The most significant increases in delay in the morning peak are predicted on exit from the station pick-up/drop-off area onto Woodford Road and on approach to Orphanage Road from the southern part of Radlett Road. Each are a result of increased demand for westbound traffic using this route because CWE is not available. An extra minute's delay on St John's Road is also forecast.

1.40 In the evening peak, we also see increased delay, albeit a smaller increase, on exit from the station on to Woodford Road. In addition, delays are forecast to increase for those exiting Church Street Car Park onto Exchange Road , and also from the area around the Borough Council's offices and the Leisure Centre onto Hempstead Road.

FIGURE 1.18 AM PEAK – DIFFERENCE IN MODEL DELAY – NO CWE

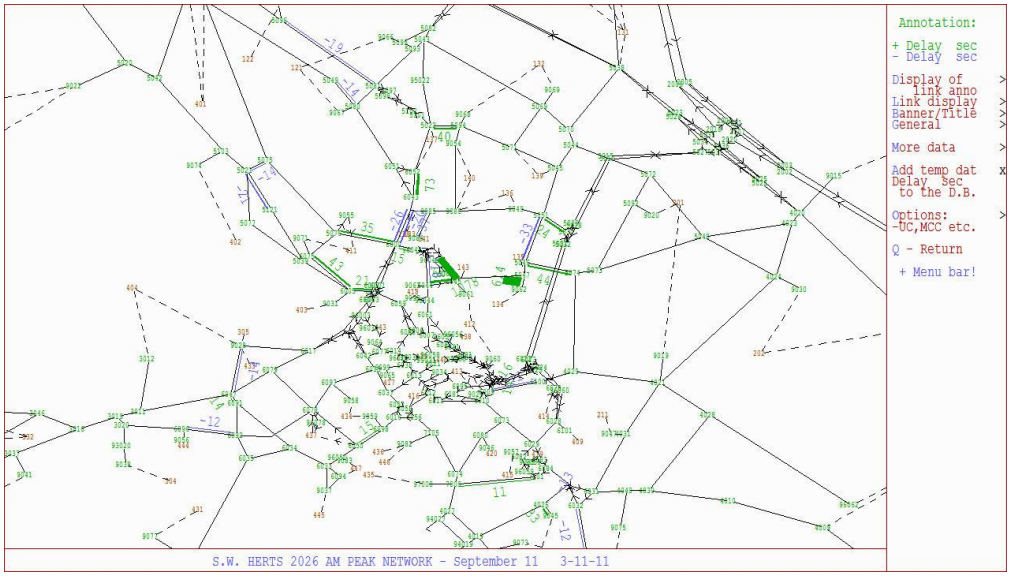
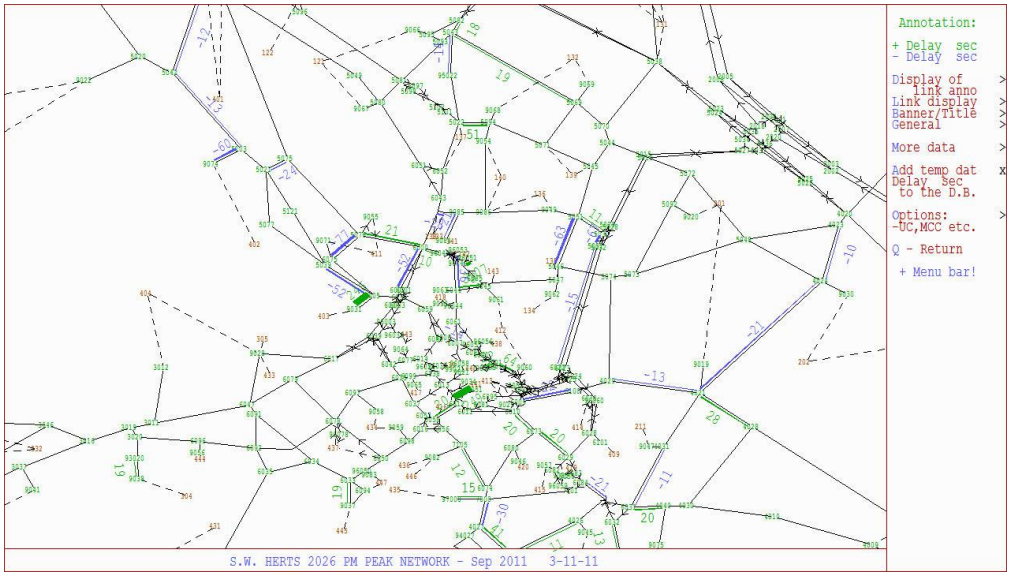


FIGURE 1.19 PM PEAK – DIFFERENCE IN MODEL DELAY – NO CWE



Colonial Way Extension Sensitivity – Conclusions

1.41 We expect to see around 1000 two-way trips in the AM peak and 800 in the PM peak on the Colonial Way Extension in 2026. A significant proportion of users in the AM peak are destined for Watford Junction railway station.

1.42 The Link offers an alternative route for a number of cross-town movements, although a connection between West Watford and Stephensons Way, and the M1, is seen in each time period. The Link is also used as a route to and from Imperial Way, without having to go via Balmoral Road.

1.43 The 'no-Link' test removes the connection between the Imperial Way junction and the rear access to the improved rail station parking facilities. Access to station parking is via an extension of Penn Road.

1.44 Although the model predicts reductions in demand for Colonial Way and a short section of St Albans Road in each peak as a result of not providing the Colonial Way Extension, it is worth noting that additional traffic is likely to divert to Stephensons Way, Orphanage Road and Woodford Road. Increased use of this route is seen to generate queues in both peaks for any user picking-up or dropping-off passengers at the front of the station alongside Woodford Road. In addition, the predicted increase in traffic around the Town Centre Loop is likely to create delays at uncontrolled exits from town centre car parks, an effect seen in the PM peak at the Church Street Car Park.

CONTROL SHEET

Project/Proposal Name	Three Rivers and Watford LDF
Document Title	Technical Note 5: Infrastructure Sensitivity Tests
Client Contract/Project No.	Click here to enter text.
SDG Project/Proposal No.	224042/01

ISSUE HISTORY

Issue No.	Date	Details
1	3 November 2011	Draft
2	December 2011	Final

REVIEW

Originator	Steve Oliver	
Other Contributors		
Review by:	Print	Steve Oliver
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DISTRIBUTION

Client:	Hertfordshire County Council
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