

M5 Junction 10 Improvements Scheme

Re-routing of traffic during slip road closures

TR010063 - APP 9.82

Rules 8 (k)

Planning Act 2008 Infrastructure Planning (Examination Procedure) Rules 2010



Volume 9
October 2024

Infrastructure Planning Planning Act 2008

The Infrastructure Planning (Examination Procedure) Rules 2010

M5 Junction 10 Improvements Scheme Development Consent Order 202[x]

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Rule Number:	Rule 8 (k)
Planning Inspectorate Scheme Reference	TR010063
Application Document Reference	TR010063/APP/9.82
Author:	M5 Junction 10 Improvements Scheme Project Team

Version	Date	Status of Version
Rev 0	October 2024	Additional Submission ahead of Hearing

Technical Note

Project:	M5 Junction 10 Improvements Scheme		
Subject:	Re-routing of traffic during slip road closures		
Author:	HF	Reviewed by:	TP
Approved Date and time:	09/10/24	Approved by:	LJ
Distribution	Representing:		

1. Introduction

- 1.1.1. The construction of the proposed M5 Junction 10 Improvements Scheme, which consists of upgrading the existing Junction 10, widening part of A4019 and a new link road, requires temporary closure of parts of the highway network. Whilst the M5 and A4019 will remain operational during most of the construction programme, albeit impacted by temporary traffic management measures, the two existing slip roads at Junction 10 will be closed for periods between nine and 15 months, with an overlap of five months when both slip roads will be closed. When the slip roads are closed, sign-posted temporary diversion routes will be put in place.
- 1.1.2. The closure phases of the highway network have been detailed in the Transport Assessment Report (REP4-021). The impacts of these closures were assessed using the GCTM traffic model, which simulated the likely re-routing of traffic based on minimising travel time and reported in the Transport Assessment. That construction phase traffic modelling demonstrated that there are likely to be changes in traffic flows on the road network in the vicinity of the Scheme resulting from both the implementation of traffic management measures, and the M5 J10 slip road closures. The modelling results show that the general magnitude of flow changes on the local road network is unlikely to result in severe traffic impacts.
- 1.1.3. During Issue Specific Hearing 3 (ISH3 – Action Point 15), the Examining Authority requested that an assessment be undertaken of the consideration of route choice for all vehicles affected by slip road closures during construction.
- 1.1.4. This Technical Note provides details of the methodology and results of the exercise undertaken to estimate the impact of all diverted traffic following the two designated diversion routes when the existing M5 J10 slip roads are both closed.

2. Impact on Designated Diversion Routes During Construction

- 2.1.1. The construction of the M5 J10 scheme is scheduled over a 30-month period, which includes four main phases. During this period, different parts of the surrounding highway will be subject to temporary traffic management measures and/or closures.
- 2.1.2. The greatest impact on the highway network over the four construction phases is likely to be during the five-month period when both the existing slip roads at M5 J10 will be closed.
- 2.1.3. During the closure of the M5 J10 slip roads, the following two diversion routes have been designated to accommodate the displaced traffic. These designated diversion routes are described below and shown in Figure 2.1.

- Closure of the northbound on-slip at Junction 10 - traffic will be diverted via the A4019, A38 and A46 to join the northbound M5 at Junction 9.
- Closure of the southbound off-slip at Junction 10 - traffic will be diverted to leave the M5 at Junction 11, and then rerouted back to Junction 10 via the A40, A4013 and the A4019.

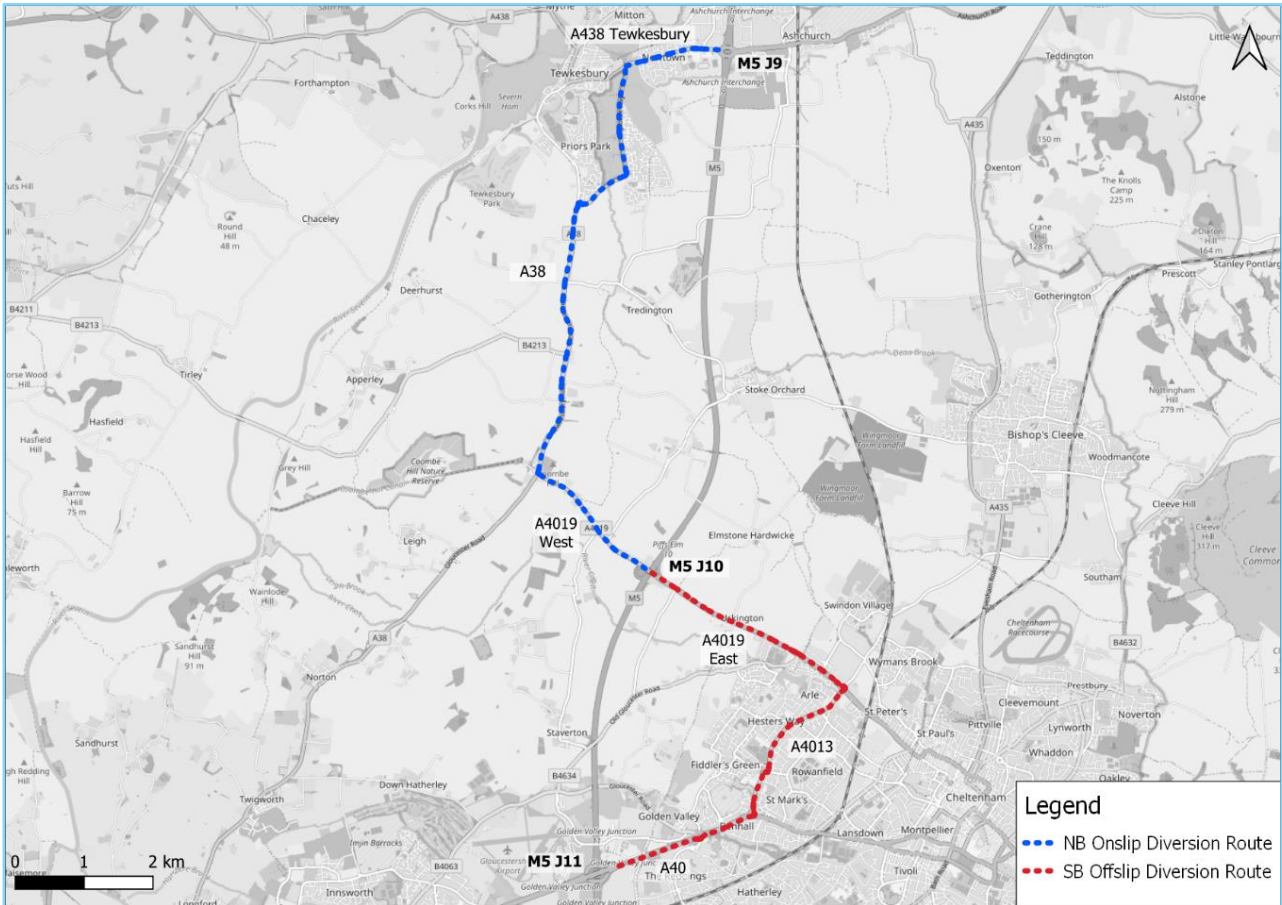


Figure 2.1- M5 J10 Designated Diversion Routes

- 2.1.4. The potential impact of additional traffic on the diversion route reported in this note is based on concurrent closure of both M5 J10 slip roads, which represents the greatest impact on the highway network over the construction programme.
- 2.1.5. For this exercise, a methodology has been devised which consists of the following steps:
- Extract the flows using each of the slip roads at M5 J10 from the 2024 GCTM Do-Minimum models (without the slip road closures) for all three modelled time periods.
 - Extract traffic flows along the two diversion routes from the 2024 GCTM Do-Minimum model (without closure of the slip roads) across the three modelled time periods.
 - Take 100% of the traffic flows using the slip roads and add these to the traffic flows on the applicable diversion routes to determine the impact on the link flows along the diversion routes.
- 2.1.6. The assumption, that 100% of the traffic using the slip roads that will be closed will follow the sign-posted diversion route, is considered an absolute worst-case scenario. This is because many drivers now use satnavs set or are familiar with the local road network as the junction only has north-facing slip roads and half the journey will inevitably involve local road elements. Thus, drivers are aware of alternatives to the signposted routes and consequently, it is likely that many

drivers will not follow the sign-posted diversion routes when it does not offer the most advantageous route for them. In addition, traffic congestion caused by the construction of the Scheme is also likely to result in some suppression of demand, with some people choosing not to make their journeys or re-time their journeys.

- 2.1.7. Table 2.1 shows the total two-way traffic flows along the major sections of the two diversion routes across the three modelled periods as well as at 24-hour level. This incorporates two scenarios namely “without” and “with” the 100% of the traffic from the two slip roads when both slip roads at M5 J10 remain closed during construction. Table 2-1 also includes comparison of the additional traffic resulting from closure of the slip roads on the diversion routes against the headroom i.e. the additional traffic that can be accommodated before acceptable noise levels are exceeded for the modelled periods and 24-hour level.

Table 2.1 – Two-way traffic flows on diversion routes

Diversion Route Section	Two Way Traffic Flows Without the Diverted Traffic on the Diversion Routes (Vehicles)				Two Way Traffic Flows Including the Diverted Traffic on the Diversion Routes (Vehicles)				Difference in Two Way Traffic (Vehicles)				Traffic Level Threshold for Exceeding Minor Noise Impact (Two Way - Vehicles)				Traffic Level Threshold for Exceeding Moderate Noise Impact (Two Way - Vehicles)			
	AM Peak	Inter Peak	PM Peak	24Hr Traffic	AM Peak	Inter Peak	PM Peak	24Hr Traffic	AM Peak	Inter Peak	PM Peak	24Hr Traffic	AM Peak	Inter Peak	PM Peak	Daily Traffic	AM Peak	Inter Peak	PM Peak	24Hr Traffic
Closure of Northbound on Slip																				
A4019 West of M5 J10	738	621	776	8824	1092	1005	1463	14616	354	384	687	5792	185	155	194	2206	738	621	776	8824
A38	958	758	964	11008	1312	1142	1651	16800	354	384	687	5792	240	190	241	2752	958	758	964	11008
A438 Tewkesbury	1097	1049	1308	14418	1451	1433	1995	20210	354	384	687	5792	274	262	327	3605	1097	1049	1308	14418
Closure of Southbound Off Slip																				
A40 East of M5 J11	4923	3534	4638	53243	5810	4082	5118	61129	887	548	480	7886	1231	884	1160	13311	4923	3534	4638	53243
A4013 Princess Elizabeth Way	2144	1761	1458	22810	3031	2309	1938	30696	887	548	480	7886	536	440	365	5703	2144	1761	1458	22810
A4019 East of M5 J10	1661	1398	1665	19601	2548	1946	2145	27487	887	548	480	7886	415	350	416	4900	1661	1398	1665	19601

Note – 24 Hr Traffic represents Annual Average Daily Traffic (AADT)

Comparison of Traffic Flows Along Diversion Routes

- 2.1.8. The potential changes in traffic flows presented in Table 2.1 represent the maximum impact scenario when both existing slip roads at M5 J10 will be closed for a five-month period during construction of the M5 J10 scheme
- 2.1.9. Under this scenario and with 100% of the slip road traffic assigned to the designated diversion routes, the closure of the M5 J10 northbound on slip road could potentially lead to increases between 355 and 690 vehicles along the designated diversion route on closure of the northbound on-slip road (A4019, A38 and A438) across the three modelled periods and approximately 5800 vehicles at 24-hour level.
- 2.1.10. The closure of southbound off-slip road as shown in Table 2.1 could potentially result in increases between 480 and 890 vehicles along the designated diversion route (A40, A4013 and A4019) across the three modelled periods and approximately 7885 vehicles at 24-hour level.
- 2.1.11. In addition to the points made in paragraph 2.1.6 that it is highly unlikely that all traffic diverted from the slip road would follow the diversion routes, it should also be noted that the additional traffic using the diversion routes is likely to lead to a displacement of traffic to alternative routes. This would result in the cumulative total traffic using the diversion routes being less than that presented in Table 2.1 above.

Impact on Noise Levels Along Diversion Routes

- 2.1.12. In accordance with DMRB LA 111 methodology, BNL calculations were used to determine the likelihood of a significant effect on the road network from construction traffic, including the cars commuting to the site. The Do Minimum opening year (DMOY) traffic data, as well as the absolute worst case traffic scenario, were used to determine the diversion traffic 'headroom'. The headroom is the maximum number of additional vehicles that could use each part of the traffic diversion route before exceeding the threshold for a moderate magnitude of impact.
- 2.1.13. In accordance with the Design Manual for Roads and Bridges (DMRB) LA111 'Noise and Vibration', the threshold for a minor, but not significant, impact is 1.0 dB above the Do Minimum levels. A moderate impact is reported when the change is 3.0 dB to 4.9 dB above the Do Minimum levels, with a major impact being 5.0 dB or above. Both moderate and major increases in noise are considered to be a potential significant effect. A significant effect is however only reported where the number of days or nights with a moderate or major increase in noise exceeds 10 in any 15 consecutive days or 40 days in 6 consecutive months.
- 2.1.14. Table 2-1 demonstrates that there is the potential for the additional vehicles to exceed the threshold for a minor impact on the diversion route, apart from the A40, in all time periods; however, a minor change in noise is not considered to be significant. There is no time period where the additional diversion vehicles would lead to a moderate impact.

Conclusion

- 2.1.15. Based on the results of the assessment reported in this note, it can be concluded that in the unlikely event that all of the diverted traffic from closure of the M5 J10 slip roads were to follow the diversion routes, which represent an absolute worst case scenario, such an increase in traffic is well below the threshold for a moderate increase in noise and therefore is not expected to lead to a significant change in noise.

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