

Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

M69 J1 Modelling Note

Revision: 01

December 2024

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009
Regulation 5(2)(q)

PROJECT NAME	Hinckley National Rail Freight Interchange		
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1. INTRODUCTION

- 1.1 The M69 Junction 1 VISSIM model was submitted to Leicestershire County Council (LCC), Warwickshire County Council (WCC) and National Highways (NH) during the DCO process. Following this, the Secretary of State (SoS) letter was received 10th September 2024 which placed little beneficial weight in favour of making the Order. Additionally, comments within the ExA's response under paragraph 3.3.286-7 which states; 'NH has reviewed the model performance and raised queries regarding the non-standard approach to traffic models. Information was also provided on 6 March 2024 leaving insufficient time to run the necessary modelling scenarios'
- 1.2 Subsequently, NH and their consultant team have continued with the audit process on the M69 Junction 1 VISSIM modelling. This report provides a summary of the modelling outputs and any changes made to the model during the NH audit process to address SoS and ExA concerns.

2. M69 J1 BASE MODEL

- 2.1 During the NH audit process some discrepancies between the models were noted. Furthermore, additional priority rule changes were made in the forecast model to rectify overlapping of vehicles which became more apparent with increased traffic.
- 2.2 **Table 1** provides a summary of all changes made to the VISSIM model.

Table 1: VISSIM Changes

	VISSIM Changes	Reason
Links		
1	Connector 10045 lookup back distance changed to 645m	To ensure traffic from B4109 N utilise the correct lanes and reduce lane change in circulatory
2	Connector 10057 look back distance changed to 650	To ensure traffic from B4109 N/ A5 S utilise the correct lanes and reduce lane change in circulatory
3	Connector 10110 look back distance changed to 650	To ensure traffic from B4109 N/ A5 S utilise the correct lanes and reduce lane change in circulatory
4	Link 10041 offside long lane	Demand higher on B4109 N offside
Reduce Speed Areas (RSA)		
5	Added RSA 54,55,56	Vehicles slow on exit causing block back on circulatory causing delay on B4109 S arm. Video footage reviewed however this does not occur on site, therefore RSA utilised to ensure vehicles exit at a higher speed
Priority Rules (PR)		
1	PR 1,2 and 3 - Increased Minimum Gap Time	Overlapping of Vehicles noted on B4109 NB

2	PR 4 - Increased Minimum Gap Time and Speed (Lane 39-4)	
3	PR 9,10,15,16 reduced Min Clear Distance (Added PR 16-3)	Vehicles unable to egress the junction therefore eased some headways
4	Removed PR 29	Caused unrealistic driving behaviour at junction
5	PR 30 increased max speed	Reduce overlapping of vehicles
6	PR 31 & 32 (added PR32-2) increased max speed and headway	Reduce overlapping of vehicles
7	PR 51,52,53,57,58,60	Added to reduce overlapping of vehicles

2.3 These changes have been incorporated into the VISSIM model and rerun to ensure the model meets the validation requirements. A summary of the morning and evening peak hour journey time comparison is presented in **Table 2** and **3** below.

Table 2: AM JT Validation Summary

	0730-0830				0830-0930				0730-0930			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
A5 SB	259	222	-37	-14%	210	185	-25	-12%	234	203	-31	-13%
A5 NB	227	212	-15	-7%	200	208	8	4%	214	210	-4	-2%
M69 NB	115	126	11	10%	115	126	11	9%	115	126	11	10%
M68 SB	113	129	16	14%	116	128	12	10%	115	129	14	12%
M69 SB Offslip -> A5 NB	137	147	10	7%	125	128	3	2%	131	138	7	5%
M69 SB Offslip -> A5 SB	98	111	14	14%	91	96	5	6%	94	104	10	10%
M69 NB Offslip -> A5 NB	96	109	14	15%	92	89	-3	-4%	94	99	5	6%
M69 NB Offslip -> A5 SB	94	94	1	1%	88	85	-3	-4%	91	89	-1	-2%
B4109 SB -> A5 SB	133	219	86	64%	126	140	14	11%	130	180	50	38%
A5 NB -> B4109 SB	191	168	-23	-12%	163	164	1	1%	177	166	-11	-6%
B4109 NB -> A5 NB	130	142	12	9%	108	112	4	4%	122	127	5	4%
A5 SB -> B4109 SB	182	177	-6	-3%	153	143	-10	-6%	168	160	-8	-5%

Table 3: PM JT Validation Summary

	1630-1730				1730-1830				1630-1830			
	Obs	Model	Diff	%	Obs	Model	Diff	%	Obs	Model	Diff	%
A5 SB	198	198	0	0%	194	181	-13	-6%	196	190	-6	-3%
A5 NB	233	207	-26	-11%	191	205	14	7%	212	206	-6	-3%
M69 NB	114	128	14	12%	112	127	15	14%	113	128	15	13%
M68 SB	113	126	13	12%	112	126	14	13%	112	126	14	12%
M69 SB Offslip -> A5 NB	119	121	2	2%	134	116	-18	-13%	126	119	-8	-6%
M69 SB Offslip -> A5 SB	81	88	7	9%	89	85	-4	-5%	85	86	1	2%
M69 NB Offslip -> A5 NB	86	81	-5	-6%	97	78	-20	-20%	92	79	-12	-13%
M69 NB Offslip -> A5 SB	86	91	5	6%	96	88	-8	-8%	91	90	-1	-1%
B4109 SB -> A5 SB	120	138	18	15%	123	132	9	7%	121	135	14	12%
A5 NB -> B4109 SB	95	102	7	7%	101	96	-5	-5%	98	99	1	1%
B4109 NB -> A5 NB	107	112	5	5%	115	107	-8	-7%	110	110	-1	-1%

A5 SB -> B4109 SB	143	148	6	4%	129	137	8	6%	136	143	7	5%
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2.4 A summary of the validation is presented in **Table 4** below.

Table 4: Journey Time Validation Summary

	AM			PM		
	Peak Hr 1	Peak Hr 2	0730-0930	Peak Hr 1	Peak Hr 2	1630-1830
Routes Validating	11	12	11	12	11	12
Total Routes	12	12	12	12	12	12
Validation Summary	92%	100%	92%	100%	92%	100%

2.5 **Table 4** illustrates that over 85% of the journey times validate within 15% therefore it is considered the model is fit for purpose for future year assessment.

3. M69 J1 FORECAST MODELLING

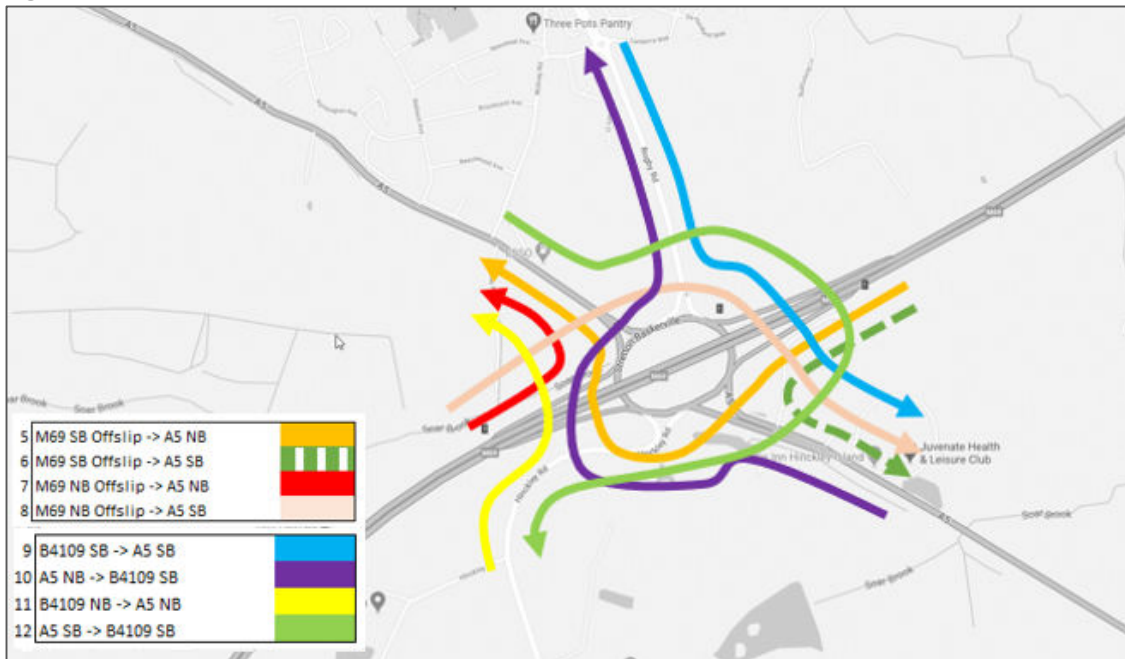
Vehicle Journey Time Comparison

3.1 A total of 12 journey time routes have been assessed in each of the forecast modelling scenarios. These are illustrated in **Figure 3.1** and **Figure 3.2**.

Figure 3.1 Journey Time Routes (1)



Figure 3.2: Journey Time Routes (2)



3.2 A summary of the journey time comparison have been presented in **Table 5**.

Table 5: M69 J1 2036 Journey Time Summary (s)

		AM			PM		
		WoD	WD	Diff.	WoD	WD	Diff.
0730-0830/1630-1730	Route 1	555	530	-25	230	217	-13
	Route 2	219	209	-10	436	447	12
	Route 3	125	125	0	214	128	-87
	Route 4	128	129	1	124	126	2
	Route 5	278	270	-8	278	276	-2
	Route 6	177	178	1	166	168	2
	Route 7	187	202	15	275	186	-89
	Route 8	187	202	15	275	186	-89
	Route 9	171	225	54	148	171	23
	Route 10	183	177	-6	408	413	5
	Route 11	254	196	-58	222	232	9
	Route 12	571	548	-23	246	233	-13
0830-0930/1730-1830	Route 1	413	433	20	188	202	14
	Route 2	208	206	-2	436	439	4
	Route 3	124	125	0	301	127	-174
	Route 4	128	130	2	124	126	2
	Route 5	261	258	-3	262	268	5
	Route 6	167	168	1	156	164	7
	Route 7	174	186	12	345	175	-171
	Route 8	174	186	12	345	175	-171
	Route 9	145	170	25	137	160	23
	Route 10	175	171	-3	403	403	1
	Route 11	201	183	-17	200	211	10
	Route 12	427	449	22	202	218	15

3.3 Table 5 indicates that in the 2036 AM forecast modelling scenario, the "With Development" (WD) scenario improves the overall operation of the junction compared

to the "Without Development" (WoD) scenario. Journey time differences between the scenarios are minimal, generally within ± 30 seconds, which is considered to be within daily variations of traffic. An increase of 54 seconds on Route 9 (B4109 SB to A5 SB) during the 07:30-08:30 time period is attributed to predicted increases in circulatory movements based on the PRTM model. In contrast, Route 11 (B4109 NB to A5 NB) experiences a 58 second reduction in journey time, largely due to the decrease in traffic on the M69 NB slip road as a result of the provision of south-facing slip roads at M69 Junction 2. This allows for additional green time for other routes.

- 3.4 A review of the PM peak modelling scenarios indicates that the WD scenario also shows that, similar to the AM period, journey time variations between WoD and WD are generally within ± 30 seconds, falling within typical daily fluctuations. However, significant improvements are observed on specific routes which includes Route 3 (M69 NB), 7 (M69 NB – A5 NB), 8 (M69 NB – A5 SB). This is as a result of reduced M69 NB traffic as a result of the provision of south-facing slip roads at M69 Junction 2.
- 3.5 Further to the above, the modelling review highlighted that the A5 southbound movement (Route 1) during the morning peak hour and the A5 northbound movement (Route 2) in the evening peak hour are particularly congested in both the 2036 'Without Development' (WoD) and 'With Development' (WD) scenarios compared to the base model. A review of PRTM traffic flows suggests that this congestion may be due to increased circulatory movements adjacent to the A5 southbound approach in the morning and the A5 northbound approach in the evening, which reduces the available green signal time for these routes. However, it should be noted that the proposed development has minimal impact on these specific routes, and the observed issues are primarily a result of background traffic growth projected by the PRTM.

Network Performance

- 3.6 Overall network performance statistics are used to assess the operational assessment of one modelled scenario to another. Key statistics used to provide a comparison between modelled scenarios are as follows:
- Average Delay - measure of the Total Delay / (Number of vehicles in the network + number of vehicles that have arrived).
 - Average network speed - measure of the Total distance / Total Travel time.
 - Vehicles Arrived - measure of the number of vehicles that have entered the network and reached their destination.
 - Latent Demand is a measure of the number of vehicles that are unable to enter the network.
- 3.7 A comparison of the Network Performance is presented in **Table 6** and **7**.
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Table 6: M69 J1 Network Performance AM

		Avg Delay (s)	Avg Speed (kph)	Veh Arrived	Latent Demand
0730-0830	2036 WoD	97	31	8783	209
	2036 WD	96	31	9017	172
0830-0930	2036 WoD	80	33	7742	116
	2036 WD	82	33	7959	97

Table 7: M69 J1 Network Performance PM (s)

		Avg Delay (s)	Avg Speed (kph)	Veh Arrived	Latent Demand
1630-1730	2036 WoD	116	29	9603	414
	2036 WD	72	35	9847	201
1730-1830	2036 WoD	159	24	8882	666
	2036 WD	69	36	9044	278

3.8 **Table 6** shows a reduction of one second in average network delay between 07:30-08:30, followed by an increase of two seconds between 08:30-09:30. However, a comparison of network statistics indicates no change in average speed, whilst the number of vehicles arriving at the junction increases. The latent demand during the morning peak hour period is attributed to the A5 southbound which is reduced in the WD scenario. This suggests an overall improvement in junction operation compared to the WoD scenario

3.9

3.10 **Table 7** indicates that the WD scenario provides a reduction in average delay, increase in average speed whilst accommodating additional traffic. This indicates a significant betterment when compared to the WoD scenario. Furthermore, a reduction in latent demand is also noted on A5 NB movement which is as a result of reduction in flows predicted by PRTM between WoD and WD scenarios.

Queue Comparison

3.11 A comparison of the average and maximum queue outputs are presented for the forecast modelling scenarios in **Table 8** and **9** respectively

Table 8: M69 J1 Average Queue Comparison AM & PM (PCU)

		AM			PM		
		WoD	WD	Diff.	WoD	WD	Diff.
0730-0830	A5 SB	237	229	-8	27	9	-18

	B4109 SB	26	40	14	5	7	2
	M69 WB	4	8	4	4	7	3
	A5 NB	8	7	-1	105	109	4
	B4109 NB	9	5	-4	4	6	2
	M69 EB	6	5	-1	33	5	-28
0830-0930/1730-1830	A5 SB	229	230	1	5	8	3
	B4109 SB	8	11	3	3	5	2
	M69 WB	3	6	3	3	6	3
	A5 NB	7	6	-1	106	108	2
	B4109 NB	3	3	0	2	4	2
	M69 EB	4	4	0	55	4	-51

Table 9: M69 J1 Maximum Queue Comparison AM & PM (PCU)

		AM			PM		
		WoD	WD	Diff.	WoD	WD	Diff.
0730-0830/1630-1730	A5 SB	262	262	0	90	36	-54
	B4109 SB	74	80	6	17	18	1
	M69 WB	13	22	9	12	20	8
	A5 NB	19	19	0	133	133	0
	B4109 NB	17	16	-1	10	14	4
	M69 EB	16	16	0	66	16	-50
0830-0930/1730-1830	A5 SB	263	262	-1	34	49	15
	B4109 SB	40	49	9	13	17	4
	M69 WB	11	19	8	11	20	9
	A5 NB	17	18	1	133	133	0
	B4109 NB	13	12	-1	9	12	3
	M69 EB	15	13	-2	65	16	-49

- 3.12 **Table 8** and **9** illustrates that there are minimal increases in queues noted between the WoD and WD scenario, whilst the WD indicates a significant reduction in queues on M69 eastbound approach.
- 3.13 The table below illustrates the distance to the next nearby junction from each approach of M69 Junction 1 and a comparison of maximum queues observed in the WD scenario.

Table 10: Maximum Queue to Nearby Junctions

A5 SB	Logix Rd/Sketchley Lane/A5 Roundabout	339	262	49
B4109 SB	B4109/Three Pots Road/Canberra Way Roundabout	109	80	18
M69 WB	M69 WB Diverge	57	22	20
A5 NB	A5/ DPD Roundabout	243	19	133
B4109 NB	B4109/Hinckley Road Junction	90	16	14

M69 EB	M69 EB Diverge	66	16	16
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- 3.14 **Table 10** demonstrates that, in the 2036 scenario, the maximum queues do not exceed the storage capacity up to the nearby major junction. It is worth noting that the A5 southbound/Wolvey Road junction is located approximately 65 PCU lengths from the A5 SB approach which is affected in both the WoD and WD scenarios.
- 3.15 However, a review of the queues on Wolvey Road in the modelling shows a queue of 26 PCUs in the WoD scenario, which reduces to 21 PCUs in the WD scenario. Consequently, it is considered that the WD scenario does not have any significant impact on M69 Junction 1 or the surrounding junctions.

4. SUMMARY & CONCLUSION

- 4.1 The Secretary of State (SoS) letter was received 10th September 2024 which placed little beneficial weight on Junction 1 in favour of making the Order however stated that due to the lack of agreement with NH, the applicant's position could not be verified.
- 4.2 The M69 Junction 1 model was re-submitted to National Highways for audit which requested some alterations to the modelling. The changes were made to the base and forecast model and rerun for output.
- 4.3 The modelling indicated that the proposed south facing slip roads at M69 J2 reduces the M69 northbound offslip movement thereby freeing up green time for other approaches. This in turn indicates that the junction operates generally better than the WoD scenario.
- 4.4 Based on the above it is considered no mitigation is necessary at M69 J1.