Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Hinckley NRFI A47 Link Road Roundabout North of M69 J2 Capacity Asssessment

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19th February 2024

Planning Act 2008

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

[Check previous iteration of document to see text required here]

PROJECT NAME	**Hinckley National Rail Freight Interchange**		
DOCUMENT NUMBER	HNRFI-BWB-GEN-XX-RP-TR-0041	BWB REF	NTT 2814
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APPROVED	Shirley Dumigan	DATE	19/02/2024

1. INTRODUCTION

1.1 BWB Consulting Ltd (BWB) has been commissioned by Tritax Symmetry (Hinckley) Ltd to provide highways and transport advice to support the DCO submission for the proposed National Rail Freight Interchange at Hinckley, Leicestershire (HNRFI).

1.2 The scheme includes a new link road between the B4668 and M69 Junction 2 roundabout which provides two vehicular points of access into the site. Along the A47 link road, three roundabouts are proposed, two of which provide access into the development. A summary of the junction assessments of the two site access junctions as well as Toucan and Pegasus crossing points was detailed in Document Reference 18.4.2, Applicants Comments on Local Impact Reports (Appendix B Link Road Capacity Assessment), REP2-073

1.3 The other proposed roundabout on the A47 Link Road located north of M69 Junction 2 is currently showing as a two-arm roundabout on the current illustrative masterplan which is unopposed therefore this had not been previously modelled. However, LCC have requested a capacity assessment of this junction to be undertaken should a third arm be proposed in the future to accommodate an internal access road.

Figure 1. Illustrative Masterplan

1.4 This technical note provides a summary of the junction assessment for this roundabout located north of M69 J2 on the proposed A47 Link Road.

2. TRAFFIC MODELLING

ASSESSMENT METHODOLOGY

2.1 The traffic impact of the internal site access junctions has been assessed using TRL industry-standard modelling software JUNCTIONS 10.

2.2 JUNCTIONS 10 models return results in Ratio to Flow Capacity (RFC) and queueing in each 15-minute time segment, measured in the number of passenger car units (PCUs).

2.3 RFC values between 0.00 and 0.85 indicate satisfactory operating conditions, values of between 0.85 and 1.00 represent variable operation (i.e. queues building at the junction resulting in increased vehicle delay moving through the junction). RFC values in excess of 1.00 represent overloaded conditions.

2.4 Initial modelling of the two internal site access roundabouts had been undertaken with the assumption of a 50/50 split of the B8 warehousing trips between the two roundabouts that show the internal access roads on the illustrative masterplan. To provide a worst-case assessment of the roundabout located north of M69 J2, 50% of the B8 development traffic has been assigned to this roundabout and tested also. Replicating the flows set out for the roundabout referenced as the "southern roundabout" (18.4.2, Applicants Comments on Local Impact Reports (Appendix B Link Road Capacity Assessment), REP2-073) have been used to model the forecast scenarios.

MODELLING RESULTS

2.5 A summary of the junction assessments at the roundabout west of M69 J2 has been presented in **Table 1**, a copy of the outputs are presented in **Appendix 1**.

Table 1: Internal Northern Access Roundabout J10 RFC Output

	AM		PM	
	RFC	**Queue**	**RFC**	**Queue**
Site Access	0.24	0.3	0.55	1.2
A47 Link Road south	0.75	2.9	0.72	2.5
A47 Link Road north	0.64	1.8	0.48	0.9

2.6 **Table 1** illustrates that the roundabout northwest of M69 J2 will operate within capacity in the 2036 modelling scenarios with minimal queues, therefore it is considered that the proposed internal site access junctions will satisfactorily cater for future demand and not have any effect on M69 J2 or indeed impact either the proposed Pegasus or Toucan crossings.

3. SUMMARY & CONCLUSION

3.1 BWB Consulting Ltd (BWB) has been commissioned by Tritax Symmetry (Hinckley) Ltd to provide highways and transport advice to support the DCO submission for the proposed National Rail Freight Interchange at Hinckley, Leicestershire (HNRFI).

3.2 LCC requested the modelling of the A47 Link Road two arm roundabout west of M69 J2 to test the operation of the junction should a third arm be proposed in the future to accommodate an internal access road.

3.3 An assessment of the junction was undertaken utilising Junctions 10 which illustrated that it would operate well within capacity with minimal queues and does not affect either crossing or M69 J2.

Appendices

Appendix 1: Northern Roundabout J10 Output

Junctions 10

ARCADY 10 - Roundabout Module

Version: 10.1.1.1905

Filename: Internal Junction W of M69 J2.j10
Path: C:\Users\Charlie.Cresswell\Documents\For Vibi\Hinckley\Junction Models
Report generation date: 19/02/2024 11:29:14

»2036 (50%), AM
»2036 (50%), PM

Summary of junction performance

	AM					PM				
	Set ID	Queue (PCU)	Delay (s)	RFC	LOS	Set ID	Queue (PCU)	Delay (s)	RFC	LOS
	2036 (50%)									
1 - Site Access	D1	0.3	3.72	0.24	A	D2	1.2	5.68	0.55	A
2 - A47 Link Road South		2.9	5.67	0.75	A		2.5	5.30	0.72	A
3 - A47 Link Road North		1.8	4.36	0.64	A		0.9	2.80	0.48	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	Internal Roundabout 2
Location	Hinckley
Site number	
Date	19/09/2023
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	BWB\Charlie.Cresswell
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	PCU	PCU	perHour	s	-Min	perMin

Analysis Options

Calculate Queue Percentiles	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
		0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2036 (50%)	AM	ONE HOUR	07:45	09:15	15
D2	2036 (50%)	PM	ONE HOUR	16:45	18:15	15

Analysis Set Details

ID	Network flow scaling factor (%)
A1	100.000

2036 (50%), AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	4.97	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	4.97	A

Arms

Arms

Arm	Name	Description	No give-way line
1	Site Access		
2	A47 Link Road South		
3	A47 Link Road North		

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Entry only	Exit only
1 - Site Access	5.30	8.50	11.2	20.0	60.0	35.0		
2 - A47 Link Road South	7.30	9.00	6.5	20.0	60.0	27.9		
3 - A47 Link Road North	7.30	9.00	17.5	20.0	60.0	17.6		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1 - Site Access	0.618	2076
2 - A47 Link Road South	0.700	2511
3 - A47 Link Road North	0.745	2717

The slope and intercept shown above include any corrections and adjustments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D1	2036 (50%)	AM	ONE HOUR	07:45	09:15	15

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Site Access		✓	270	100.000
2 - A47 Link Road South		✓	1690	100.000
3 - A47 Link Road North		✓	1360	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1 - Site Access	2 - A47 Link Road South	3 - A47 Link Road North
From	1 - Site Access	0	250	20
	2 - A47 Link Road South	482	0	1208
	3 - A47 Link Road North	166	1194	0

Vehicle Mix

Heavy Vehicle %

		To		
		1 - Site Access	2 - A47 Link Road South	3 - A47 Link Road North
From	1 - Site Access	0	0	0
	2 - A47 Link Road South	0	0	0
	3 - A47 Link Road North	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Site Access	0.24	3.72	0.3	A
2 - A47 Link Road South	0.75	5.67	2.9	A
3 - A47 Link Road North	0.64	4.36	1.8	A

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	203	896	1522	0.134	203	0.2	2.726	A
2 - A47 Link Road South	1272	15	2500	0.509	1268	1.0	2.912	A
3 - A47 Link Road North	1024	362	2448	0.418	1021	0.7	2.517	A

08:00 - 08:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	243	1072	1414	0.172	243	0.2	3.074	A
2 - A47 Link Road South	1519	18	2498	0.608	1517	1.5	3.661	A
3 - A47 Link Road North	1223	433	2395	0.510	1221	1.0	3.064	A

08:15 - 08:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	297	1312	1265	0.235	297	0.3	3.714	A
2 - A47 Link Road South	1861	22	2496	0.746	1855	2.9	5.577	A
3 - A47 Link Road North	1497	529	2323	0.645	1494	1.8	4.327	A

08:30 - 08:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	297	1315	1264	0.235	297	0.3	3.723	A
2 - A47 Link Road South	1861	22	2496	0.746	1861	2.9	5.666	A
3 - A47 Link Road North	1497	531	2322	0.645	1497	1.8	4.364	A

08:45 - 09:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	243	1076	1411	0.172	243	0.2	3.082	A
2 - A47 Link Road South	1519	18	2498	0.608	1525	1.6	3.719	A
3 - A47 Link Road North	1223	435	2394	0.511	1226	1.1	3.089	A

09:00 - 09:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	203	900	1520	0.134	203	0.2	2.734	A
2 - A47 Link Road South	1272	15	2500	0.509	1274	1.0	2.940	A
3 - A47 Link Road North	1024	363	2447	0.418	1025	0.7	2.534	A

2036 (50%), PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3	4.58	A

Junction Network

Driving side	Lighting	Network delay (s)	Network LOS
Left	Normal/unknown	4.58	A

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)
D2	2036 (50%)	PM	ONE HOUR	16:45	18:15	15

Demand overview (Traffic)

Arm	Linked arm	Use O-D data	Average Demand (PCU/hr)	Scaling Factor (%)
1 - Site Access		✓	700	100.000
2 - A47 Link Road South		✓	1577	100.000
3 - A47 Link Road North		✓	1082	100.000

Origin-Destination Data

Demand (PCU/hr)

		To		
		1 - Site Access	2 - A47 Link Road South	3 - A47 Link Road North
From	1 - Site Access	0	575	125
	2 - A47 Link Road South	296	0	1281
	3 - A47 Link Road North	94	988	0

Vehicle Mix

Heavy Vehicle %

		To		
		1 - Site Access	2 - A47 Link Road South	3 - A47 Link Road North
From	1 - Site Access	0	0	0
	2 - A47 Link Road South	0	0	0
	3 - A47 Link Road North	0	0	0

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (PCU)	Max LOS
1 - Site Access	0.55	5.68	1.2	A
2 - A47 Link Road South	0.72	5.30	2.5	A
3 - A47 Link Road North	0.48	2.80	0.9	A

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	527	742	1617	0.326	525	0.5	3.290	A
2 - A47 Link Road South	1187	94	2445	0.486	1183	0.9	2.845	A
3 - A47 Link Road North	815	222	2552	0.319	813	0.5	2.068	A

17:00 - 17:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	629	888	1528	0.412	628	0.7	4.001	A
2 - A47 Link Road South	1418	112	2432	0.583	1416	1.4	3.535	A
3 - A47 Link Road North	973	266	2519	0.386	972	0.6	2.325	A

17:15 - 17:30

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	771	1087	1405	0.549	769	1.2	5.643	A
2 - A47 Link Road South	1736	137	2415	0.719	1732	2.5	5.236	A
3 - A47 Link Road North	1191	325	2475	0.481	1190	0.9	2.798	A

17:30 - 17:45

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	771	1088	1404	0.549	771	1.2	5.684	A
2 - A47 Link Road South	1736	138	2415	0.719	1736	2.5	5.304	A
3 - A47 Link Road North	1191	326	2475	0.481	1191	0.9	2.804	A

17:45 - 18:00

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	629	889	1527	0.412	631	0.7	4.031	A
2 - A47 Link Road South	1418	113	2432	0.583	1422	1.4	3.579	A
3 - A47 Link Road North	973	267	2519	0.386	974	0.6	2.331	A

18:00 - 18:15

Arm	Total Demand (PCU/hr)	Circulating flow (PCU/hr)	Capacity (PCU/hr)	RFC	Throughput (PCU/hr)	End queue (PCU)	Delay (s)	Unsignalised level of service
1 - Site Access	527	744	1616	0.326	528	0.5	3.312	A
2 - A47 Link Road South	1187	94	2445	0.486	1189	0.9	2.870	A
3 - A47 Link Road North	815	223	2551	0.319	815	0.5	2.074	A