Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL
RAIL FREIGHT INTERCHANGE

_____

**The Hinckley National Rail Freight Interchange
Development Consent Order**

Project reference TR050007

Written Statement of Oral Case ISH3 [Appendix C - Air Quality at Narborough Crossing Note]

Document reference: 18.7.3

Revision: 1

14 November 2023
_____

Planning Act 2008

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

BWB
A **CAF** GROUP COMPANY

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE (HNRFI)

AIR QUALITY TECHNICAL NOTE – NARBOROUGH CROSSING

Project	Hinckley National Rail Freight Interchange		
Document Number	HNRFI-BWB-VUT-ZZ-RP-G-0002_TN	BWB Ref	NTT2814
Author	A. Van de Sande MSc BSc (Hons) MIAQM MIEnvSc	Status	Issue
Checked	C. Meddings MSc BSc (Hons) CSci MIAQM MIEnvSc	Revision	V1.0
Approved	C. Meddings MSc BSc (Hons) CSci MIAQM MIEnvSc	Date	14/11/2023

Introduction

This air quality technical note was prepared to assess the impact of barrier down time at Narborough Level Crossing with regards to air quality.

Methodology

The methodology used in this technical note is consistent with that utilised for the air quality assessment, as detailed in ES Chapter 9 – Air Quality (document reference: APP-118).

For the purposes of this technical note, the following scenarios were modelled:

- Scenario 1: 2026 Opening Year, without HNRFI; and
- Scenario 2: 2026 Opening Year, with HNRFI.

In accordance with ES Chapter 9 – Air Quality (document reference: APP-118), the 2026 Opening Year was utilised in the assessment as this is the earliest year in which certain elements of the Main HNRFI Site may become operational. Whilst this is the earliest year that operations may commence on the Main HNRFI Site, it is considered to represent a conservative scenario assuming the entire HNRFI is operational in the earliest possible year, where road traffic emissions and background concentrations are higher than later years. The operational phase Opening Year therefore represents a robust and conservative scenario.

Study Area

The study area used for the purposes of this technical note covers roads within the vicinity of Narborough Level Crossing. The modelled road network is shown in **Appendix A.**

Queue Lengths

Queue length for both without the HNRFI and with HNRFI were provided by the project Transport Consultants, BWB Consulting, as provided in **Table 1** below. These are presented as Passenger Car Units (PCUs).

Please note that the Narborough Crossing air dispersion model was undertaken using a previous version of the queue length data. Following additional validation of the transport work, the queue lengths were decreased and therefore the data presented in **Table 1** presents a conservative assessment.

Table 1: Queue Lengths (PCUs)

Time Period	Southbound			Northbound		
	Without HNRFI	With HNRFI	Difference	Without HNRFI	With HNRFI	Difference
06:00-07:00	6	5	-1	6	6	0
07:00-08:00	33	29	-4	42	38	-4
08:00-09:00	43	45	2	91	102	11
09:00-10:00	20	17	-3	23	22	-1
10:00-11:00	25	22	-3	29	28	-1
11:00-12:00	20	18	-2	24	23	-1
12:00-13:00	25	22	-3	30	29	-1
13:00-14:00	22	19	-3	26	25	-1
14:00-15:00	28	25	-3	34	32	-2
14:30-16:00	34	44	**10**	41	58	**17**
16:00-17:00	**57**	**55**	-2	**74**	**78**	4
17:00-18:00	54	46	-8	56	49	-7
19:00-20:00	14	14	0	16	18	2
20:00-21:00	9	9	0	10	11	1
21:00-22:00	12	10	-2	13	13	0
22:00-23:00	4	3	-1	4	4	0

Table 1 shows that the time period 14:30 – 16:00 shows the largest increase in queue length, an increase of 10 PCUs southbound and an increase of 17 PCUs northbound. The time period 16:00-17:00 shows the largest queue length, both northbound and southbound, both with and without HNRFI. To provide a conservative and robust assessment, a constant queue length was modelled in the air quality assessment. The largest queue length was utilised in the 'without HNRFI' scenario (16:00-17:00). To determine the 'with HNRFI' queue length, the largest increase in queue length (14:30-16:00) was added to the 'without HNRFI' queue length.

The queue lengths utilised in the air quality model are shown in **Table 2** below. The lengths are shown as both PCUs and metres (m). As provided by the transport consultants, a conversion factor of 5.75m per PCU was applied to determine the length of queues as metres.

Table 2: Queue Lengths used in Model

	Southbound			Northbound		
	Without HNRFI	With HNRFI	Difference	Without HNRFI	With HNRFI	Difference
Queue Length (PCU)	57	67	10	74	91	17
Queue Length (m)	328	385	58	426	523	98

Barrier Down Time

Average barrier down times, for without the HNRFI and with HNRFI scenarios were provided by the project Transport Consultants, BWB Consulting, as provided in **Table 3** below.

Table 3: Average Barrier Down Time (seconds)

From	To	Avg. Downtime (s) without HNRFI	Avg. Downtime (s) With HNRFI
06:00:00	07:00:00	188	182
07:00:00	08:00:00	320	320

08:00:00	09:00:00	283	283
09:00:00	10:00:00	173	173
10:00:00	11:00:00	214	414
11:00:00	12:00:00	173	173
12:00:00	13:00:00	203	206
13:00:00	14:00:00	215	215
14:00:00	15:00:00	195	195
15:00:00	16:00:00	228	228
16:00:00	17:00:00	210	210
17:00:00	18:00:00	203	203
18:00:00	19:00:00	215	215
19:00:00	20:00:00	186	223
20:00:00	21:00:00	159	164
21:00:00	22:00:00	230	230
22:00:00	23:00:00	261	261
23:00:00	00:00:00	225	225

The queue lengths detailed in **Table 2** above are assumed to be present 24 hours a day, 365 days a year. This is to provide a conservative and robust assessment as the actual queueing will be only be present for the length of time shown in **Table 3.**

Receptors

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at the identified existing receptor locations for the assessment scenarios. Human receptor locations were chosen to represent locations adjacent to the queueing associated with Narborough level crossing. Details and locations are shown in **Table 4** below and **Appendix A.** Receptor heights were modelled at 1.5m to represent the average breathing height. Schools were modelled at 0.8m at St George's Nursery School to represent the lower breathing height of children.

Table 4: Modelled Receptor Locations

Receptor ID	X	Y	Address	Height (m)
1	454052	297355	Receptor along Station Road	1.5
2	454067	297370	Receptor along Station Road	1.5
3	454033	297411	Receptor along Station Road	1.5
4	454044	297427	Receptor along Leicester Road	1.5
5	454036	297434	Receptor along Leicester Road	1.5
6	454209	297563	Receptor along Leicester Road	1.5
7	454262	297606	Receptor along Leicester Road	1.5
8	454311	297712	St George's Nursery School grounds	0.8
9	454298	297640	Limes Medical Centre	1.5
10	454252	297620	Receptor along Leicester Road	1.5
11	453969	297421	Receptor along Coventry Road	1.5
12	453778	297393	Receptor along Coventry Road	1.5
13	453731	297382	Receptor along Coventry Road	1.5
14	453702	297384	Receptor along Coventry Road	1.5
15	454147	297143	Receptor along Riverside Way	1.5

Receptor ID	X	Y	Address	Height (m)
16	454128	297112	Receptor along Cosby Road	1.5
17	454539	297102	Receptor along Riverside Way	1.5
18	454203	296940	Receptor along Cosby Road	1.5
19	454272	296894	Receptor along Cosby Road	1.5
20	454249	296921	Receptor along Cosby Road	1.5
21	454420	297129	Receptor along Riverside Way	1.5
22	454297	297709	St George's Nursery School	0.8

Impact Assessment

Concentrations of NO_2, PM_{10} and $PM_{2.5}$ were predicted at identified existing receptor locations to consider the impact of the barrier down time at Narborough Level Crossing as part of the conservative and robust assessment undertaken. Predicted pollutant concentrations are detailed in **Table 5**, **Table 6** and **Table 7** for NO_2, PM_{10} and $PM_{2.5}$ respectively together with the 'without HNRFI' concentrations for comparison purposes. The predicted change in pollutant concentrations resulting from development-generated traffic, and the associated impact are also provided.

Table 5: Predicted Annual Mean NO_2 Concentrations and Development Impact at Receptor Locations

Receptor	Predicted NO_2 Concentration ($\mu g.m^{-3}$)				
	2024 Opening Year Without HNRFI ($\mu g.m^{-3}$)	2024 Opening Year With HNRFI ($\mu g.m^{-3}$)	Concentration Change* ($\mu g.m^{-3}$)	Change in Concentration Relative to Air Quality Assessment Level (%)	Impact
R1	13.2	13.7	+0.5	1	Negligible
R2	14.1	14.6	+0.5	1	Negligible
R3	14.7	15.1	+0.4	1	Negligible
R4	14.6	15.1	+0.5	1	Negligible
R5	14.0	14.5	+0.5	1	Negligible
R6	14.2	15.5	+1.4	3	Negligible
R7	13.1	15.9	+2.8	7	Slight
R8	13.0	15.6	+2.7	7	Slight
R9	12.7	14.7	+2.0	5	Negligible
R10	12.9	15.0	+2.2	5	Negligible
R11	11.9	12.1	+0.2	1	Negligible
R12	11.3	11.8	+0.6	1	Negligible
R13	10.8	11.3	+0.5	1	Negligible
R14	10.8	11.3	+0.5	1	Negligible
R15	13.0	13.4	+0.4	1	Negligible
R16	13.4	13.7	+0.4	1	Negligible
R17	12.5	13.4	+1.0	2	Negligible
R18	10.1	10.7	+0.6	2	Negligible
R19	9.5	9.9	+0.4	1	Negligible
R20	9.9	10.5	+0.6	1	Negligible
R21	9.4	10.2	+0.8	2	Negligible
R22	9.2	11.3	+2.1	5	Negligible

Table 6: Predicted Annual Mean PM₁₀ Concentrations and Development Impact at Receptor Locations

Receptor	Predicted PM$_{10}$ Concentration (µg.m⁻³)				Impact
	2024 Opening Year Without HNRFI (µg.m⁻³)	2024 Opening Year With HNRFI (µg.m⁻³)	Concentration Change* (µg.m⁻³)	Change in Concentration Relative to Air Quality Assessment Level (%)	
R1	15.6	15.6	0.0	0	Negligible
R2	15.8	15.8	0.0	0	Negligible
R3	15.9	15.9	0.0	0	Negligible
R4	15.9	15.9	0.0	0	Negligible
R5	15.7	15.8	0.0	0	Negligible
R6	15.7	15.7	0.0	0	Negligible
R7	15.7	15.7	0.0	0	Negligible
R8	15.6	15.7	0.0	0	Negligible
R9	15.5	15.6	0.0	0	Negligible
R10	15.6	15.6	0.0	0	Negligible
R11	13.2	13.1	0.0	0	Negligible
R12	13.0	13.0	0.0	0	Negligible
R13	12.9	12.9	0.0	0	Negligible
R14	13.0	13.0	0.0	0	Negligible
R15	15.5	15.5	0.0	0	Negligible
R16	15.6	15.6	0.0	0	Negligible
R17	15.5	15.5	0.0	0	Negligible
R18	14.1	14.1	0.0	0	Negligible
R19	13.9	13.9	0.0	0	Negligible
R20	14.0	14.0	0.0	0	Negligible
R21	15.4	15.4	0.0	0	Negligible
R22	15.5	15.5	0.0	0	Negligible

Table 7: Predicted Annual Mean PM$_{2.5}$ Concentrations and Development Impact at Receptor Locations

Receptor	Predicted PM$_{2.5}$ Concentration (µg.m^{-3})				Impact
	2024 Opening Year Without HNRFI (µg.m^{-3})	2024 Opening Year With HNRFI (µg.m^{-3})	Concentration Change* (µg.m^{-3})	Change in Concentration Relative to Air Quality Assessment Level (%)	
R1	9.5	9.5	0.0	0	Negligible
R2	9.6	9.6	0.0	0	Negligible
R3	9.7	9.7	0.0	0	Negligible
R4	9.7	9.7	0.0	0	Negligible
R5	9.6	9.6	0.0	0	Negligible
R6	9.5	9.5	0.0	0	Negligible
R7	9.5	9.6	0.0	0	Negligible
R8	9.5	9.5	0.0	0	Negligible
R9	9.4	9.5	0.0	0	Negligible
R10	9.5	9.5	0.0	0	Negligible
R11	8.4	8.4	0.0	0	Negligible
R12	8.4	8.4	0.0	0	Negligible
R13	8.3	8.3	0.0	0	Negligible
R14	8.3	8.3	0.0	0	Negligible
R15	9.4	9.4	0.0	0	Negligible
R16	9.5	9.5	0.0	0	Negligible
R17	9.4	9.4	0.0	0	Negligible
R18	8.6	8.6	0.0	0	Negligible
R19	8.5	8.5	0.0	0	Negligible
R20	8.6	8.6	0.0	0	Negligible
R21	9.4	9.4	0.0	0	Negligible
R22	9.4	9.5	0.0	0	Negligible

Predicted concentrations of NO$_2$ and PM$_{10}$ are below the current annual mean air quality objectives of 40µg.m^{-3} at all modelled receptor locations. PM$_{2.5}$ concentrations are below the current annual mean air quality objective of 20µg.m^{-3}. In addition, PM$_{2.5}$ concentrations are predicted to be below the 2028 interim target of 12µg.m^{-3} and the 2040 future objective of 10µg.m^{-3}.

In accordance with Institute of Air Quality Management (IAQM) and Environmental Protection UK (EPUK) guidance[1], the predicted impact is predicted to be 'negligible' at all receptor locations for NO$_2$, PM$_{10}$ and PM$_{2.5}$, except for receptor 7 and 8, where a 'slight' impact is predicted for NO$_2$. In accordance with guidance[1], 'negligible' and 'slight' impacts are predicted to be 'not significant'.

---

[1] Institute of Air Quality Management and Environmental Protection UK (2017) Land-Use Planning and Development Control: Planning for Air Quality

Summary

A highly conservative and robust air dispersion modelling assessment was undertaken to consider any impacts on local air quality associated with barrier down time at Narborough Crossing.

Predicted pollutant concentrations, considering the barrier down time at Narborough Level Crossing are predicted to be below the current relevant air quality objectives and the 2028 interim and 204 future air quality objectives for $PM_{2.5}$. In accordance with IAQM/EPUK guidance[1], impacts are predicted to be 'negligible' at all receptors, except receptor 7 and 8 where 'slight' impacts are predicted for NO_2. In accordance with guidance, 'negligible' and 'slight' impacts are considered to be 'not significant'.

A conservative and robust assessment was undertaken as follows:

- The largest predicted hourly queue length was applied across the modelling assessment, where in reality, smaller queue lengths will be observed throughout the day as shown in **Table 1**.
- The queue period was applied for 24 hours a day, 365 days a year, where in reality, queueing will only be experienced for the periods of time as detailed in **Table 2.**
- An assessment year of 2026 was utilised, assuming all operational phase HNRFI traffic is on the road network, where in reality, a smaller proportion of this traffic will be utilising the road network in 2026. Emission factors and background concentrations are expected to decrease in future years as vehicle technologies improve.

It is therefore considered modelled pollutant concentrations are likely to be lower than those presented in this technical note, and the impact of the barrier down time at Narborough Level Crossing is 'not significant' with regards to local air quality.

Appendices

Appendix A: Modelled Roads and Receptors

Figure 1: Modelled Roads and Receptor Locations

Drawn by: AVS
Date: 13/11/2023