Tritax Symmetry (Hinckley) Limited

HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

Project reference TR050007

Environmental Statement
Volume 2: Appendices

Appendix 8.1: Transport Assessment [part 8 of 20] PRTM 2.2 Forecast Modelling Brief

Document reference: 6.2.8.1

Revision: 05

November 2022

Planning Act 2008

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

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 Regulation 14

This document forms a part of the Environmental Statement for the Hinckley National Rail Freight Interchange project.

Tritax Symmetry (Hinckley) Limited (TSH) has applied to the Secretary of State for Transport for a Development Consent Order (DCO) for the Hinckley National Rail Freight Interchange (HNRFI).

To help inform the determination of the DCO application, TSH has undertaken an environmental impact assessment (EIA) of its proposals. EIA is a process that aims to improve the environmental design of a development proposal, and to provide the decision maker with sufficient information about the environmental effects of the project to make a decision.

The findings of an EIA are described in a written report known as an Environmental Statement (ES). An ES provides environmental information about the scheme, including a description of the development, its predicted environmental effects and the measures proposed to ameliorate any adverse effects.

Further details about the proposed Hinckley National Rail Freight Interchange are available on the project website:

[redacted]

The DCO application and documents relating to the examination of the proposed development can be viewed on the Planning Inspectorate's National Infrastructure Planning website:

https://infrastructure.planninginspectorate.gov.uk/projects/east-midlands/hinckley-national-rail-freight-interchange/

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Tritax Symmetry Ltd
Hinckley National Rail Freight Interchange

PRTM 2.2 Forecast Modelling Brief

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PRTM 2.2 Forecast Modelling Brief

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October 2021

DOCUMENT ISSUE RECORD

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	NTT2814

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1	23/03/2021	Issued to TWG for comment	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
2	30/03/2021	Issued to Aecom for review	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
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4	23/06/2021	Final for TWG Sign off	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
5	29/10/2021	Revised Final for TWG	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
6	22/11/2021	Revised following LCC feedback	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash

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1. Introduction

1.1 BWB Consulting has been commissioned to provide Transport and Highways input and advice for the DCO submission for the proposed National Rail Freight Interchange at Hinckley, Leicestershire (HNRFI).

1.2 Confirmation from Leicestershire County Council (LCC) that the Pan Regional Transport Model has been recently updated and version 2.2 is now available and signed off by the LCC Network Data Intelligence team (NDI) following a review in June 2021. BWB have been instructed to provide a forecast modelling brief to Leicestershire County Council LCC NDI to understand the costs and timescales associated with any new core modelling for the HNRFI proposals.

1.3 Previous model forecast reports were produced by AECOM, on behalf of LCC NDI and commissioned by the client Tritax Symmetry which were run using PRTM1.0 in 2019 and PRTM 2.2 in June 2021.

1.4 A base year model review was carried out in 2018, PRTM has since been recalibrated. A light-touch review was carried out to report current link flow and journey time validation as an addendum to the original base model review note. This has since been updated in October 2021 following consultation with the Transport Working Group (TWG) to include additional journey time and screenline data to the east of the HNRFI site.

1.5 Since the June 2021 run of the PRTM 2.2, a change to background infrastructure proposals has been announced. This was the removal of the Dodwells/Longshoot widening scheme, identified under National Highways RIS2 projects. This has meant that revised modelling outputs are to be produced based on the new projections and fully agreed base modelling/ trip generation.

1.6 The revised Planning Log version (HINCKLEY NRFI Uncertainty Log Oct 2021 v6 (For Issue) is attached to this brief, following the recent update by planning and highway authorities for consistency. Final sign off of the log and this brief will be sought from the lead Highway Authorities.

2. Development

2.1 Hinckley National Rail Freight Interchange (NRFI) is a proposed B8 (warehousing) employment development and National Rail Freight Terminal located to the north-west of M69 Junction 2, to the east of Hinckley. With a capacity of 850,000 m2 of employment land, this development is expected to generate around 8,000 jobs.

2.2 Proposed Access to the site will be via M69 J2 and an additional arm into the site. As part of the access, new south facing slips (off and on slips) at Junction 2 are proposed to give direct and all movement access onto the Strategic Road Network.

2.3 A distributor road will link Junction 2 of the M69 through the site, crossing the railway and connecting to the B4668 and ultimately the A47. This forms part of the access infrastructure, but also an important additional link in the local highway network around Hinckley.

3. Proposed Access Infrastructure

3.1 The Access Infrastructure proposed includes the following for the purposes of the model and an indicative GA is included in **Appendix A**:

- M69 J2 south facing slips (A two lane northbound offslip and a two-lane southbound on slip);
- Link Road from a new access arm at M69 J2, dual to the railway line and then single carriageway over the railway to the B4668 where a new roundabout would be proposed.
- A sensitivity test to include a fully dualled link road.

4. Traffic Generation, Distribution and Opening/Future Year Assessment

4.1 The Trip generation as per HNRFI-BWB-GEN-XX-RP-TR-0011-P04 Trip Generation addendum has updated the figures in line with clarification on rail freight numbers and interchange. This is as below:

Table 4.1: Proposed Trip Generation Hinckley NRFI (vehicles)

	AM Peak			PM Peak		
Vehicle type	**Arrivals**	**Departures**	**Two-way**	**Arrivals**	**Departures**	**Two-way**
Light Vehicles	899	117	1016	351	922	1273
HGVs	208	219	427	235	259	494
Total	1107	336	1443	586	1181	1767

4.2 The predicted opening year for the development is expected to be early 2026 and therefore the Future year of 2036 remains valid.

4.3 The distribution note TN1 produced by AECOM in 2018 methodology remains valid for the distribution and is proposed to be used for consistency. Table 4 of the TN1 is to be replaced with the Trip generation table 4.1 above. The remaining data and distribution methodology remain unaffected. This will be reshared with TWG for information and formal sign off.

5. Model Scenarios

5.1 The Following Modelling scenarios are required for the opening year and the Future Year.

1. Opening Year 2026

   i. Without Development (WoD)- Do Nothing

   ii. Without Development (WoDWPA) with Proposed Access Infrastructure - Do Minimum

   iii. With Development (WDWPA) with Proposed Access Infrastructure – Do Something

2. Future Year 2036

   i. Without Development (WoD) – Do Nothing

   ii. Without Development (WoDWPA) and with Proposed access infrastructure – Do Minimum

   iii. With Development (WDWPA) with Proposed access infrastructure - Do Something

   iv. Sensitivity test for (iii) above with fully dualled link road.

5.2 A phased development timeline and trip generation will form part of a separate brief.

5.3 It is understood that the PRTM 2.2 model includes Committed Strategic Development and Infrastructure improvements. An updated Uncertainty log following updates in July 2021 and more recently trajectory updates from HBBC and Rugby planning authorities is to be used for the HNRFI forecast model run (Ref: HINCKLEY NRFI Uncertainty Log 2021 v6 (For Issue)) and Final sign off to this log will be sought from the lead highway authorities before the forecast model is run.

5.4 The Narborough Level Crossing is also modelled within PRTM 2.2. Amendments to the network coding has been carried out to reflect the delay experienced. Further journey time analysis has been input to the base model reporting to review the speeds through this part of the network.

5.5 Network Rail (NR) has confirmed that no additional train paths will be available in the AM peak period, one additional path is available in the PM peak heading eastwards, which is open to any train operator to utilise. NR has recently updated the barrier timings and monitoring procedures. Suitable journey time adjustments and coding will be made within the PRTM model to approximate delays here in the forecast modelling. For HNRFI this could 2.5mins for a freight train in the PM peak.

6. Model Outputs

6.1 For the model scenarios requested we would request the following outputs for the AM Peak and PM Peak hour:

- Base Model demand and actual 2016 and the Saturn interpolated flows (2018)
- Origin/Destination select link analysis to and from the development (development traffic disaggregated to lights and HGVs);
- Dissipated development flows into the West Midlands area (past the extent of the link analysis (South of the M6, A46 Coventry, M6 West of Junction 3);
- Forecast demand/actual flows (including HGV flows) for links within the AOI for all scenarios; and
- Plots showing the forecast demand/actual flow and delay change in all scenarios in comparison to Without Development – Do Nothing scenarios.

Confirmation of the Area of Influence in using those links which are forecast with:

- Max VoC in excess of 85% at junctions in any scenario;
- The development causes a VoC change of 5%; and
- There is a flow change of 30 vehicles.

6.2 In addition to the above, the following model outputs are prepared separately in spreadsheet format and shape files for the entire PRTM area forming part of the project deliverables:

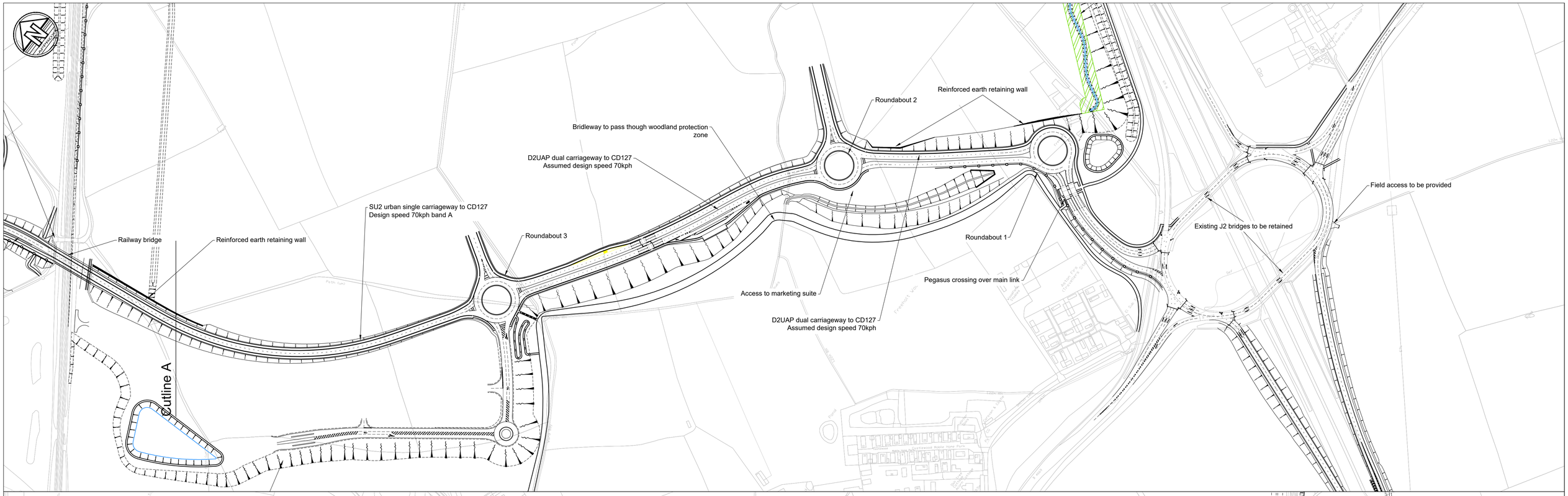
- Maximum turning V over C, delays and queue values for all the scenarios, years and nodes.
- PRTM demand and actual traffic flow data for all modelled scenarios aggregated by Lights, HGV and Total for all modelled scenarios.
- Turning movements for M69 Junction 2 and new link road access junction with the B4668 (Especially with proposed access infrastructure, new arms).
- 24-hour AADT, 18-hour AAWT, 8-hour AAWT (2019, 2026 and 2036 scenarios) volumes and speed data or AM/PM peaks (free flow and actual) for all the scenarios, years and links within the area of influence.

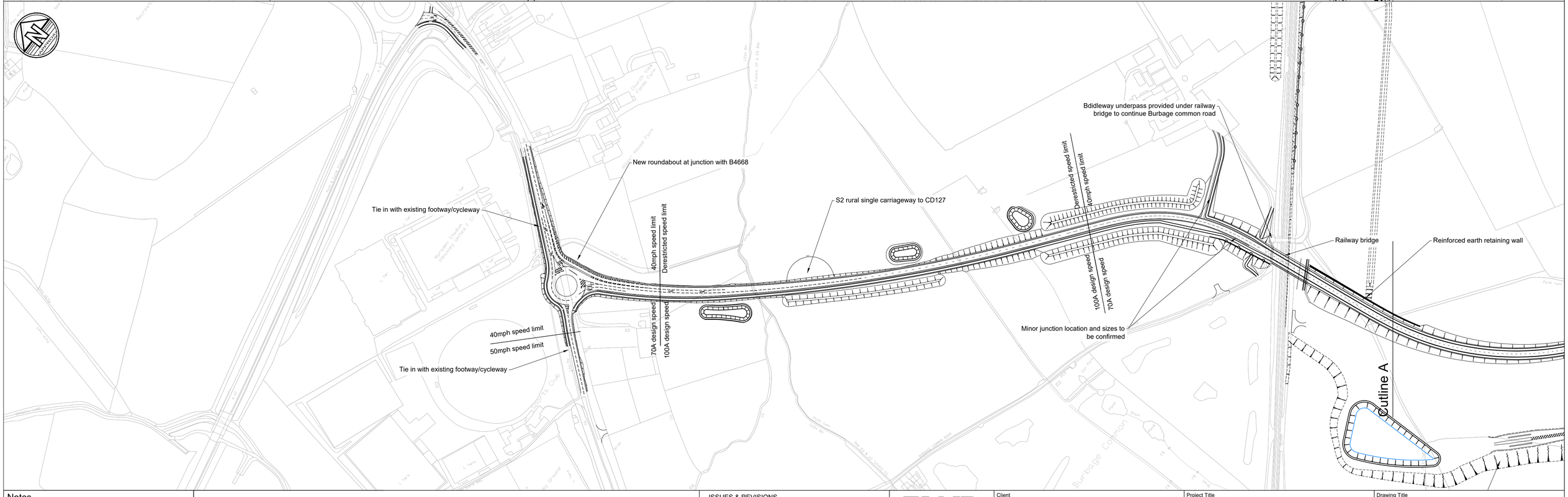
6.3 For the do minimum and do something model runs, a select link analysis for the following links:

- On the northern section of the A47 link road, by direction is needed and
- The B4669 Leicester Road, Sapcote east of the Stanton Lane junction.
- The B4669 Leicester Road, Sapcote west of the Stanton Lane junction.

APPENDICES

APPENDIX A: Proposed Access Infrastructure





Notes

1. Do not scale this drawing. All dimensions must be checked/ verified on site. If in doubt ask.
2. This drawing is to be read in conjunction with all relevant architects, engineers and specialists drawings and specifications.
3. All dimensions in millimetres unless noted otherwise. All levels in metres unless noted otherwise.
4. Any discrepancies noted on site are to be reported to the engineer immediately.

ISSUES & REVISIONS

Rev	Date	Details of issue / revision	Drw	Rev
P01	25.02.21	Issue for Information	DF	SC
P02	04.03.21	Amendments to design speed north of railway	DF	SC
P03	08.03.21	Updated footpath layouts	JG	RL
P04	16.06.21	Updated to suit latest GA	DF	SC
P05	29.10.21	Updated to suit latest GA	DF	SC

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Client: TRITAX SYMMETRY — A TRITAX BIG BOX COMPANY

Project Title: **HINCKLEY RAIL FREIGHT INTERCHANGE**

Drawing Title: **M69-A47 LINK ROAD GENERAL ARRANGEMENT**

Drawn:	D.Fraser	Reviewed:	S.Carter		
BWB Ref:	NTT2814	Date:	25.02.21	Scale@A1:	1:2500

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PRTM 2.1 Model Briefing Report

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1	23/03/2021	Issued to TWG for comment	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
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3	23/04/2021	Issued to Aecom with Infrastructure details	Shirley Dumigan	Vibeeshan Devaharan	Malcolm Ash
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1. Introduction

1.1 BWB Consulting has been commissioned to provide Transport and Highways input and advice for the DCO submission for the proposed National Rail Freight Interchange at Hinckley, Leicestershire (HNRFI).

1.2 Following confirmation from Leicestershire County Council (LCC) that the Pan Regional Transport Model has been recently updated and version 2.1 is now available and signed off by the LCC Network Data Intelligence team (NDI) at the beginning of December 2020, BWB have been instructed to provide a modelling brief to Leicestershire County Council LCC NDI to understand the costs and timescales associated with any new core modelling for the HNRFI proposals.

1.3 Previous model forecast reports were produced by AECOM, on behalf of LCC NDI and commissioned by the client Tritax Symmetry which were run using PRTM1.0 in 2019. A base year model review was carried out in 2018, PRTM has since been recalibrated. A light-touch review will be needed to report current link flow and journey time validation as an addendum to the original base review note.

1.4 Aecom held an Inception meeting on March was held on the 5th of March with BWB and members of the Transport Working Group. At the meeting Aecom ran through the base year model and performance from PRTM2.1 and a discussion was had on data assumptions and next steps to review the planning data and infrastructure logs.

1.5 Planning Data for each authority was issued to the respective authority members of the TWG and all data issued to Highways England due to confidentiality reasons requested from LCC NDI.

2. Development

2.1 Hinckley National Rail Freight Interchange (NRFI) is a proposed B8 (warehousing) employment development and National Rail Freight Terminal located to the north-west of M69 Junction 2, to the east of Hinckley. With a capacity of 850,000 m2 of employment land, this development is expected to generate around 8,000 jobs.

2.2 Proposed Access to the site will be via M69 J2 and an additional arm into the site. As part of the access, new south facing slips (off and on slips) at Junction 2 are proposed to give direct and all movement access onto the Strategic Road Network.

2.3 A distributor road will link Junction 2 of the M69 through the site, crossing the railway and connecting to the B4668 and ultimately the A47. Link is primarily intended to mitigate the background traffic movements due to the introduction of the south facing slips.

3. Proposed Access Infrastructure

3.1 Therefore, the Access Infrastructure proposed now includes the following for the purposes of the model:

- M69 J2 south facing slips (A two lane northbound offslip and a single lane southbound on slip);
- Link Road from a new access arm at M69 J2 (dual to the railway line and then single carriageway over the railway to the B4668 where a new roundabout would be proposed. Indicative GA is included in **Appendix A.**

4. Traffic Generation, Distribution and Opening/Future Year Assessment

4.1 The Trip generation previously included within the PRTM1.0, which came from Hydrock Technical Note 004 (BIM Ref: 07700-HYD-XX-XX-RP-TP-1003-P08-S4) which used data from a number of RFI sites and Baker Rose/WSP reports on the Freight profile is still reasonable to use. However minor amendments as per HNRFI-BWB-GEN-XX-RP-TR-0011 Trip Generation addendum have updated the figures slightly in line with clarification on rail freight numbers and interchange. This is as below:

Table 4.1: Proposed Trip Generation Hinckley NRFI (vehicles)

	AM Peak			PM Peak		
Vehicle type	**Arrivals**	**Departures**	**Two-way**	**Arrivals**	**Departures**	**Two-way**
Light Vehicles	899	117	1016	351	922	1273
HGVs	208	219	427	235	259	494
Total	1107	336	1443	586	1181	1767

4.2 The predicted opening year for the development is expected to be early 2026 and therefore the Future year of 2036 remains valid.

4.3 The distribution note TN1 produced by AECOM in 2018 remains valid for the distribution and is proposed to be used for consistency. This has been reshared with TWG for information and is attached in **Appendix B**.

5. Model Scenarios

5.1 The Following Modelling scenarios are required for the opening year and the Future Year.

1. Opening Year 2026

- Without Development (WoD)
- Without Development (WoDWPA) with Proposed Access Infrastructure
- With Development (WDWPA) with Proposed Access Infrastructure

2. Future Year 2036

- Without Development (WoD)
- Without Development (WoDWPA) and with Proposed access infrastructure
- With Development (WDWPA) with Proposed access infrastructure

5.2 It is understood that the PRTM 2.1 model includes Committed Strategic Development and Infrastructure improvements were provided in spreadsheet form from LCC NDI and shared with the respective planning and infrastructure teams on 02/03/21. A final review following feedback from the respective authorities, was undertaken with Aecom and NDI. Then a summary of actions taken was provided in an email to the TWG before the model was run, which is included in **Appendix C**.

5.3 It is also understood that the Narborough Level Crossing is also modelled within PRTM 2.1 with a speed reduction applied. However, we will be seeking to undertake a review of the rail freight impact at Narborough and then model the crossing if required. This will also include changes made by network rail on the barrier timings and the associated development at the station when more detailed information is available and confirmed from the rail team.

6. Model Outputs

6.1 For the model scenarios requested we would request the following outputs for the AM Peak and PM Peak hour:

- Distribution of development demand i.e. number of employee and freight trips to / from each model zone disaggregated to lights and HGVs;
- Schematic forecast flows (including HGV flows) for links within the AOI for all scenario's;
- Plots showing the forecast demand/actual flow and delay change in all scenarios in comparison to Without Development scenarios.
- Confirmation of the Area of Influence in using those links which are forecast with:
- VoC is in excess of 85% in any scenario;
- The development causes a VoC change of 5%; and
- There is a flow change of 30 vehicles.
- With the inclusion of the proposed development in the 2036 forecast;
- Plots showing the routeing of traffic (including HGV traffic) to / from the proposed development in 2026 and 2036 for the with and without development scenarios and

- Details of the forecast flows and volume-capacity ratios within the development AOI

6.2 In addition to the above, the following model outputs are prepared separately in spreadsheet format forming part of the project deliverables:

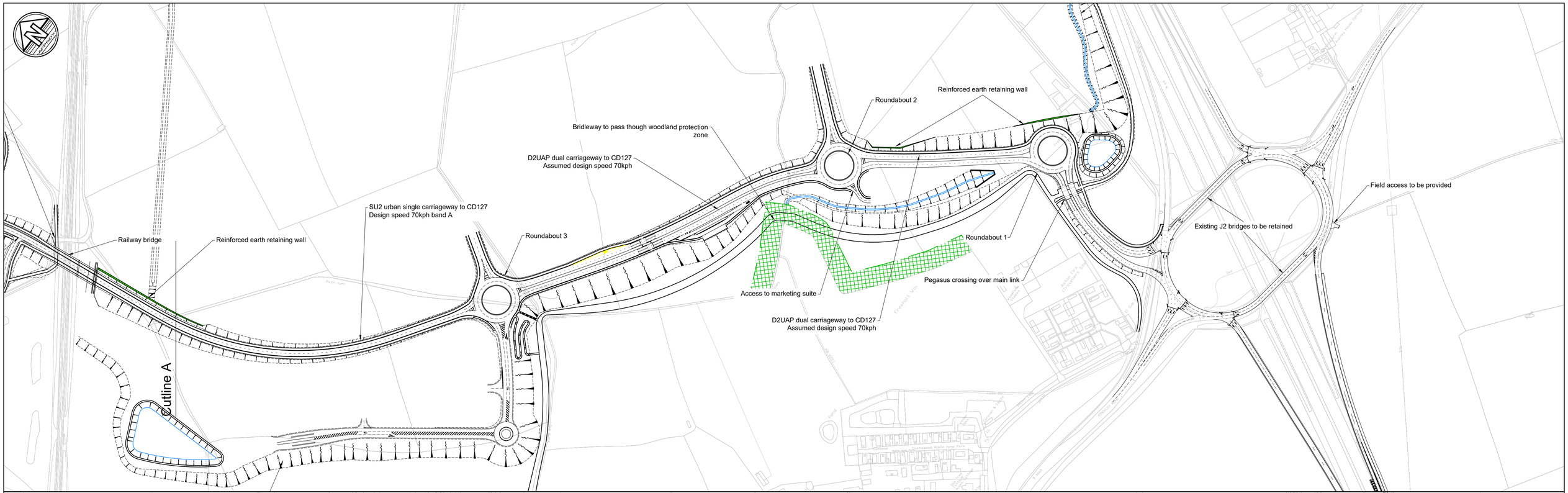
- V over C values for all the scenarios, years and nodes
- PRTM traffic flow data for all modelled scenarios aggregated by Lights, HGV and Total for all modelled scenarios
- Turning movements for M69 Junction 2 (Especially with proposed access infrastructure, new arms etc i.e Furnessing is not possible)
- 24-hour AADT and 18-hour AAWT volumes for all the scenarios, years and links within the area of influence.

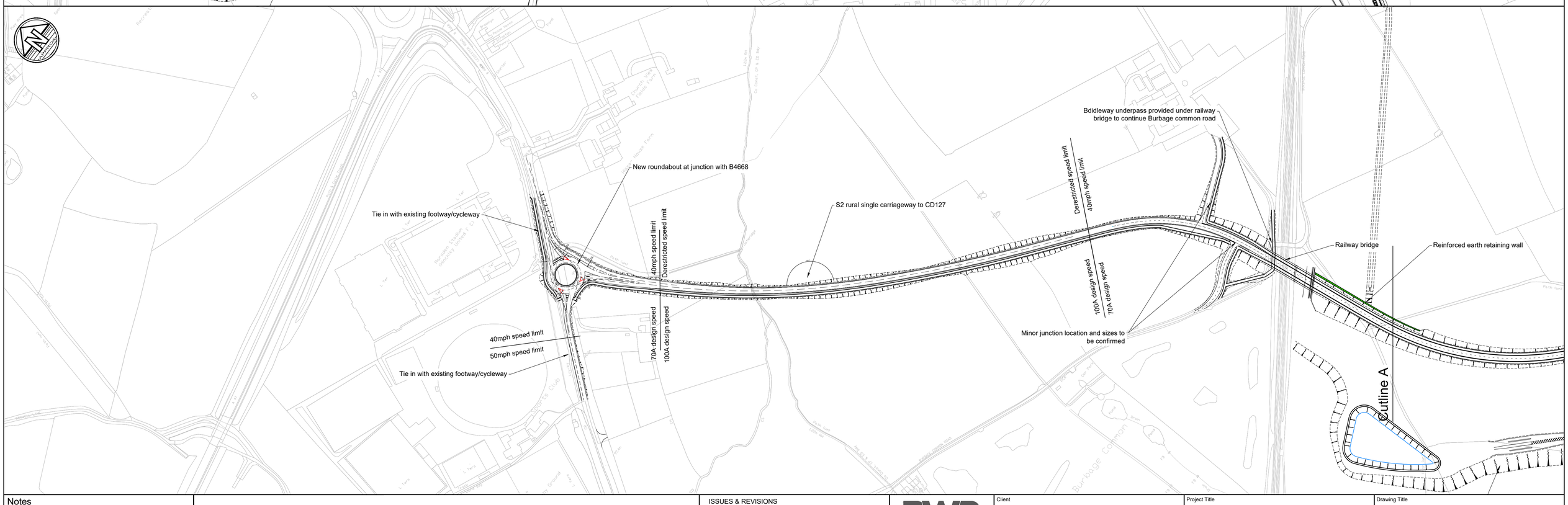
6.3 Forecast Demand Distribution – Methodology and Figures showing the Gravity models outputs for the development demand distribution and raw data for GIS input for each Development scenario modelled for each peak hour and in each direction for both the employee and freight, producing the NRFI employee demand distribution and freight demand distribution.

6.4 Post 'with development' model runs, a select link analysis on the northern section of the link road, by direction is needed. Difference flow plots comparing the single and dualled link road scenario. This includes turning flows for the A47/link road roundabout and M69 J2 junction.

APPENDICES

APPENDIX A: Link Road Layout





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P04	16.06.21	Updated to suit latest GA	DF	SC

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Client: TRITAX SYMMETRY
A TRITAX BIG BOX COMPANY

Project Title: **HINCKLEY RAIL FREIGHT INTERCHANGE**

Drawing Title: **M69-A47 LINK ROAD GENERAL ARRANGEMENT**

Drawn:	D.Fraser	Reviewed:	S.Carter		
BWB Ref:	NTT2814	Date:	25.02.21	Scale@A1:	1:2500

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Rev: **P04**

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APPENDIX B: TN1 Distribution Note

AECOM

PRTM

Hinckley National Rail Freight Interchange Strategic Modelling:
Development Trip Distribution

Quality Information

Prepared by	Checked by	Approved by
Stefanos Psarras	Arwa Sayegh	Reza Tolouei
Senior Consultant	Senior Consultant	Associate Director

Revision History

Revision	Revision date	Details	Authorised	Name	Position
v1.1	2018-12-10	Internal draft for comments	Yes	Reza Tolouei	Associate Director
v1.2	2018-12-10	Revised following comments from LCC	Yes	Reza Tolouei	Associate Director
V2.0	2018-12-10	Revised planning data used to update trip distribution	Yes	Reza Tolouei	Associate Director
V2.1	2018-12-10	Revised to respond to LCC comments	Yes	Reza Tolouei	Associate Director

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Section 1 – Overview

1.1 Introduction

1.1.1 Hinckley National Rail Freight Interchange (NRFI) is a proposed B8 (warehousing) employment development located to the north-west of M69 Junction 2, to the east of Hinckley. With a capacity of 850,000 m^2 of employment land, this development is expected to generate around 11,000 jobs. Its connection to the highway network via the M69 Junction 2 will require a reconfiguration of this junction to accommodate an additional arm, in addition to the reduction of the M69 northbound arm to two lanes in the vicinity of the junction with the introduction of lane-drop and lane-gain merges. Figure 1 provides an indication of the location of the proposed NRFI.

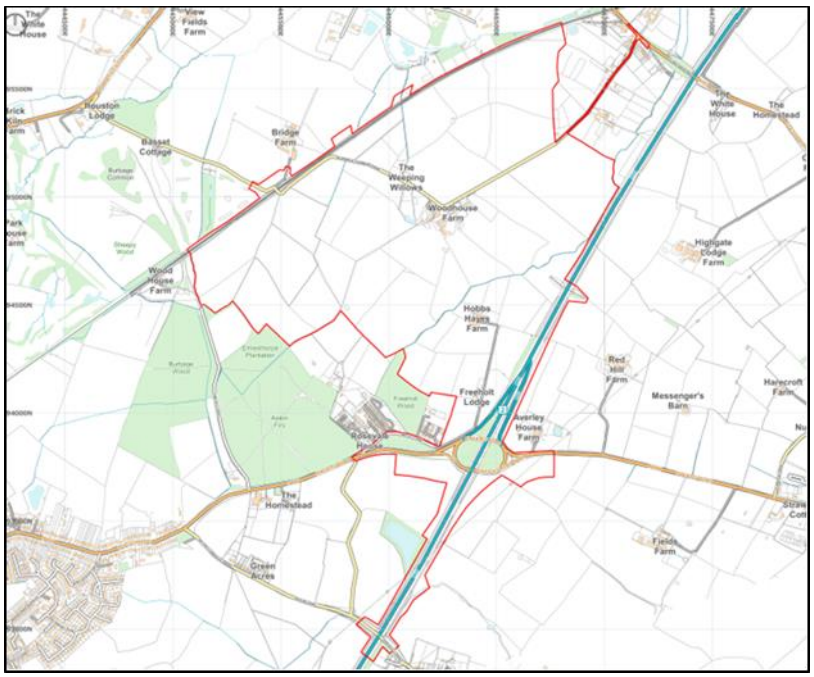


Figure 1: Indicative location of the proposed NRFI

1.1.2 Assumptions regarding the amount of traffic generated by the proposed development, and the distribution of this traffic, are required to produce the "with development" scenario. More specifically, origin-destination (OD) trip matrices are required by the highway model, to be assigned onto the network, for all future year "with development" scenarios; these will need to include trips generated by the proposed development, in addition to the forecast OD trips not related to the development.

1.2 Report Structure

1.2.1 The purpose of this note is to present the methodology, assumptions and results of the NRFI employee and freight distribution needed to develop the development-related OD trip matrices, both for employee and freight trips, to and from the proposed development.

1.2.2 The technical note is structured as below:

- Section 2 sets out the methodology, input assumptions and modelling results of the NRFI employee trips development;
- Section 3 presents the modelling approach and results followed to develop the NRFI freight trips;
- Section 4 provides a summary of the approach and some concluding remarks.

1.2.3 It is important to note that the modelling exercise reported here is based on updated planning data assumptions. It should be noted that planning authorities provide latest planning data to inform recent update of PRTM.

Section 2 – Employee Trips

2.1 Development Trip Rates

2.1.1 It is assumed that cars will be used by the employees to commute to and from the development. Peak hour trip rates of light vehicles have been provided by the client based on experience elsewhere with similar types of site.

2.1.2 Table 1 shows these estimates in the form of light vehicle trips arriving at and departing from the development in AM Peak and PM Peak hours. It should be noted that light vehicles are assumed to be used for commuting trips.

Table 1: Proposed peak hour employee vehicle trips

Vehicle Type	Time of Day	Arrivals	Departures	Total Trips
Light Vehicles	AM Peak	899	117	1016
	PM Peak	351	922	1273

2.2 Trip Distribution Methodology

2.2.1 The followed modelling approach estimates the trip distribution of employees using a bespoke gravity model, calibrated to trip length distributions derived from JTW data from a comparable development.

2.2.2 Census Journey to Work (JTW) data for the existing Magna Park (west of Lutterworth) and Daventry International Rail Freight Terminal (DIRFT) sites have been analysed to produce a 'proxy' Trip Length Distribution (TLD) for employees. This has been used to calibrate a gravity model to generate a distribution of trips related to the proposed Hinckley NRFI. It should be noted that whilst the above provides an indicative TLD for future NRFI employee trips, the exact TLD also depends on where the sites are located in relation to the population centres and urban areas. Therefore, the TLDs are used in aggregate distance bands for calibration, allowing for variation in TLD within distance bands imposed by the relative location of population centres.

2.2.3 It is of particular importance, given the size of the site, to ensure that number of employees living in any given area is plausible. For instance, despite its proximity, Hinckley is unlikely to serve more than a relatively small proportion of the estimated 11,000 jobs, due to Hinckley's existing working population of around 25,000. We should also take into account the number of employees living in the employment catchment area with suitable skills for the NRFI development.

2.2.4 The gravity model, which has been calibrated to satisfy the trip-ends constraints along with the assumptions on the distribution of working population, is shown below:

$$T_i = \frac{1}{\sum_i P_i \; f(a, C_i)} P_i \; f(\boldsymbol{a}, C_i) \; D; \; \sum_i T_i = D$$

where:

- T_i is the matrix of trips between production (home) zone i and the development;
- C_i is the cost of travel between production i and the development;
- P_i is the total 'working' population (to be defined) at zone i;
- D is the total number of trips ending in the development; and
- f is the deterrence function, for which the parameter vector $\boldsymbol{a}$ needs to be estimated.

2.2.5 Based on prior experience of calibrating gravity models for different purposes and given its flexibility, a lognormal density function has been used as deterrence function in the gravity model. It tends to give better description of travel pattern of individuals in comparison with other functional forms such as the Tanner function.

2.2.6 Past experience supported by evidence from the literature[1] suggests that this functional form generally fits the observed data better than tanner functions, especially where a wide range of travel distances are considered. The log-normal density function has the following form:

$$f(C_{ij}) = \frac{1}{C_{ij}.\sigma.\sqrt{2\pi}}.e^{\frac{-(\ln C_{ij}-\mu)^2}{2\sigma^2}},$$

where σ and μ are parameters to be estimated (respectively, standard deviation and mean of the log-normal distribution).

2.3 Input Assumptions

2.3.1 The following inputs were used for the calibration of the gravity model:

- observed trip length distribution;
- total number of employee trips attracted to the NRFI development;
- an estimate of distance between different zone pairs; and
- an estimate of 'in-scope' working population by zone.

Employee Trip-ends

2.3.2 Table 1 provides the total number of assumed trips attracted to the development for each time period. These trips are used as trip-end constraints in the gravity model.

Trip Length Distribution and Distance Matrix

2.3.3 As discussed before, trip length distribution from JTW data for the existing Magna Park and DIRFT sites was used as a proxy to represent the future trip length distribution of NRFI employees. This was used to calibrate the parameters of the gravity model, allowing for some variation from the target TLD to meet the relative distribution of population centres with respect to the location of the site, as discussed earlier.

2.3.4 The JTW data are available at Mid Super Output Area (MSOA) level. Figure 2 shows MSOA boundaries and PRTM zone boundaries (only for two zones) in the vicinity of the DIRFT and Magna Park sites. Figure 2 shows that while there are PRTM zones defined that reasonably represent these two sites, the MSOAs that contain these two sites are much larger, and include a number of other land-uses as well. Therefore, in order to isolate commuting trips attracted by these two sites from other employment locations, the employment data and population data at PRTM zone level have been used to disaggregate the trip destination and trip origin of JTW data, respectively, from MSOAs to PRTM zones.

[1] Alternative Gravity Modelling Approaches for Trip Matrix Synthesis. Feldman, O., Foero-Martinez, Jose, Coombe, D., European Transport Conference. 2012.

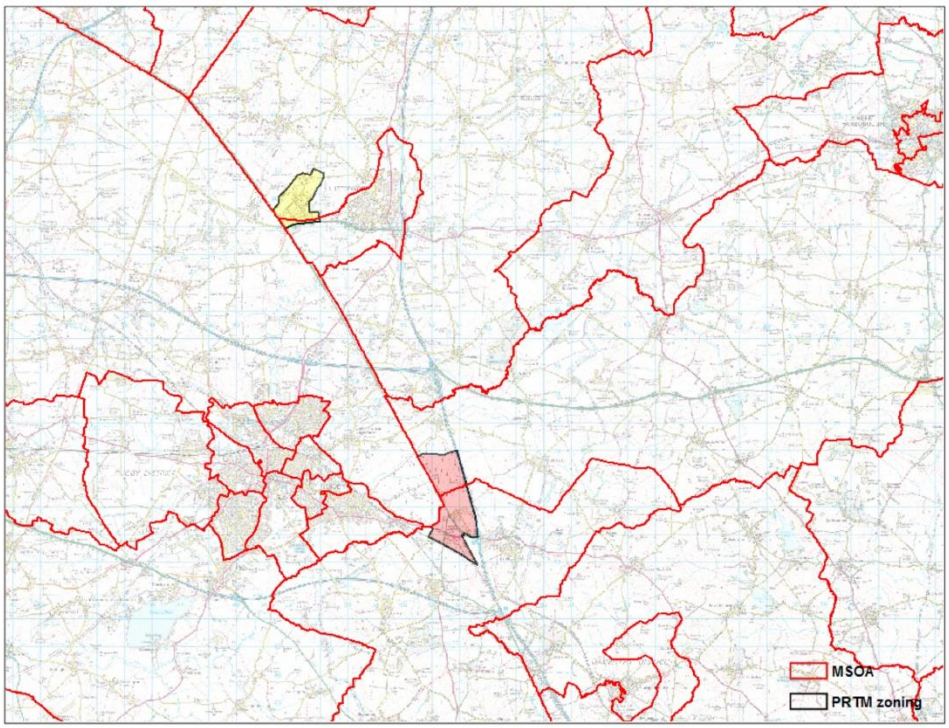


Figure 2: MSOA Boundaries and PRTM Zone Boundaries for DIRFT and Magna Park

2.3.5 Following the disaggregation process, the skimmed distance matrices from the PRTM highway assignment model for the future years 2026 and 2036 were used for commuting trips attracted by the future Hinckley NRFI.

2.3.6 According to the JTW data, the number of employees with their usual work place in Magna Park and DIRFT in 2011 are 2091 and 471, respectively. Given the small number of employee trips for DIRFT, data for these two sites were combined to develop a single 'representative' trip length distribution; this is shown in Figure 3. The data suggest that the average car trip length is about 32 km, significantly longer than a typical commuting trip in Leicestershire, which could be explained by the location of both DIRFT and Magna Park.

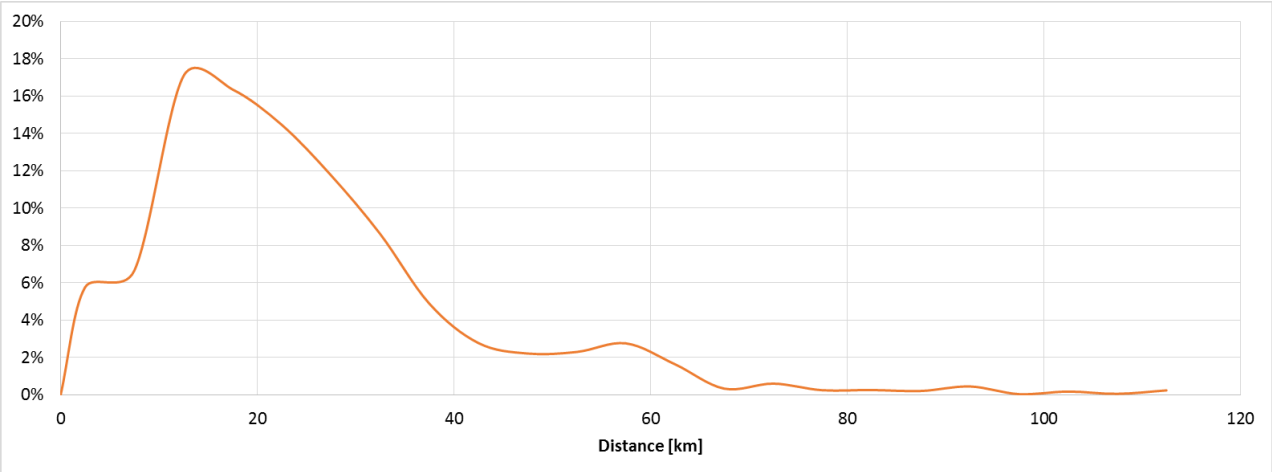


Figure 3: Trip Length Distribution of Commuting Trips Attracted to Magna Park and DIRFT: 2011 Census JTW data

Zonal 'In-scope' Population

2.3.7 As described earlier, an estimate of total number of people living in each zone who have the suitable skills to potentially be working in a future NRFI has been used in the gravity model; this is referred to as 'in-scope' population for the purpose of this technical note. These are used as weights in the gravity mode process, resulting in more trips from zones with higher working population with a similar travel distance to the proposed development.

2.3.8 Table 2 shows the person type categories defined within the National Trip End Model (NTEM). These are consistent with the PRTM planning, providing the possibility to split the zonal population by these categories. The last column in this table identifies where the category is included in the definition of NRFI 'in-scope' working population for the purpose of gravity model calibration.

Table 2: NTEM Person Type Categories

NTEM Person Type	Definition	'In-scope' Working Population
PT01	Children (0 to 15)	No
PT02	males in full time employment (16 to 64)	Yes
PT03	males in part time employment (16 to 64)	Yes
PT04	male students (16 to 64)	No
PT05	male not employed / students (16 to 64) - Unemployed plus other Inactive	Yes
PT06	male 65+	No
PT07	females in full time employment (16 to 64)	Yes
PT08	females in part time employment (16 to 64)	Yes
PT09	female students (16 to 64)	No
PT10	female not employed / students (16 to 64) - Unemployed plus other Inactive	Yes
PT11	female 65+	No

2.3.9 From the NTEM categories selected as 'in-scope' population (as shown in Table 2), there are still certain socio-demographic groups who are unlikely to have the suitable skills for the NRFI development. In particular, higher skilled or professional workers are less likely to work in the NRFI and therefore were excluded from the 'in-scope' working population. To do so, Census socio-demographic classifiers were used to further disaggregate the above groups and exclude such population segments from the 'in-scope' population for this application.

2.3.10 Table 3 shows occupational categories which have been used to exclude the higher skilled or professional workers for the 'in-scope' working population.

Table 3: Census Occupational Categories

Code	Occupational Categories	'In-scope' Working Population
MA/FA	Sex: Males/Females; Occupation: All categories: Occupation; measures: Value	No
M1/F1	Sex: Males/Females; Occupation: 1. Managers, directors and senior officials; measures: Value	No
M2/F2	Sex: Males/Females; Occupation: 2. Professional occupations; measures: Value	No
M3/F3	Sex: Males/Females; Occupation: 3. Associate professional and technical occupations; measures: Value	No
M4/F4	Sex: Males/Females; Occupation: 4. Administrative and secretarial occupations; measures: Value	Yes
M5/F5	Sex: Males/Females; Occupation: 5. Skilled trades occupations; measures: Value	Yes
M6/F6	Sex: Males/Females; Occupation: 6. Caring, leisure and other service occupations; measures: Value	Yes
M7/F7	Sex: Males/Females; Occupation: 7. Sales and customer service occupations; measures: Value	Yes
M8/F8	Sex: Males/Females; Occupation: 8. Process plant and machine operatives; measures: Value	Yes
M9/F9	Sex: Males/Females; Occupation: 9. Elementary occupations; measures: Value	Yes

2.4 Modelling Results

2.4.1 The gravity models were run for each peak hour (AM and PM), each future year (2026, 2026 for 20% of total demand, 2031 for 80% of total demand and 2036), and each direction (from and to the NRFI Development), producing the NRFI employee demand. TLD results of the calibrated model are shown in Figure 4, Figure 5, Figure 6 and Figure 7, when compared against the TLD targets from the JTW. As explained before, because of the zonal weights introduced to the gravity model, there are variations in the modelled TLDs based on the population centres and urban areas.

2.4.2 As it is observed from the figures below, the peaks in the TLDs are the main urban areas, which are relatively close to the NRFI development. Hence, as expected and highlighted in the figures, Hinckley, Leicester, Coventry and Birmingham are the main urban areas which are more likely to attract NRFI employees.

2.4.3 It should be noted that since the inputs and targets are consistent by time period and future year, a similar fit is achieved for the future year 2031 and the partial demand of 2026.

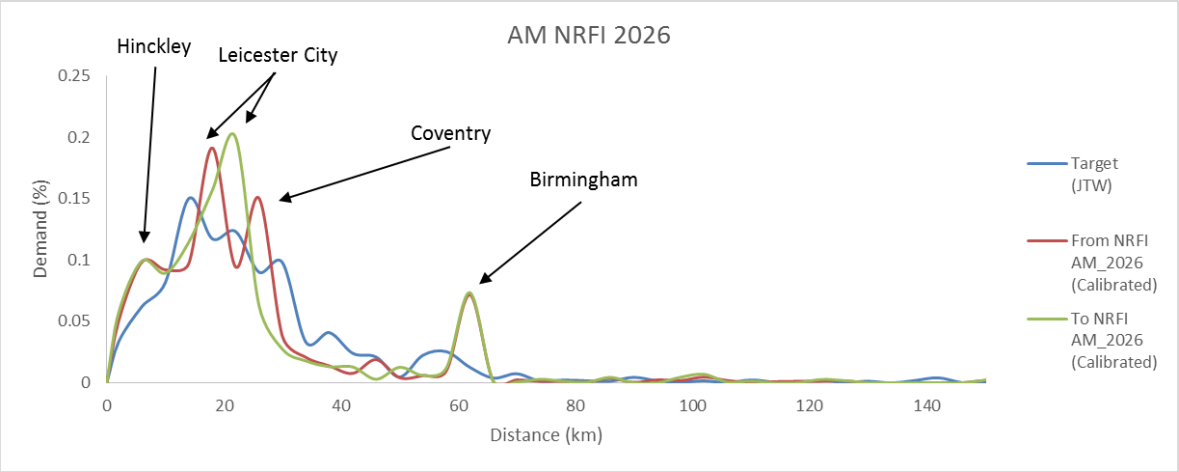


Figure 4: Observed vs modelled TLDs: Commuting Trips to and from NRFI in 2026 AM Peak

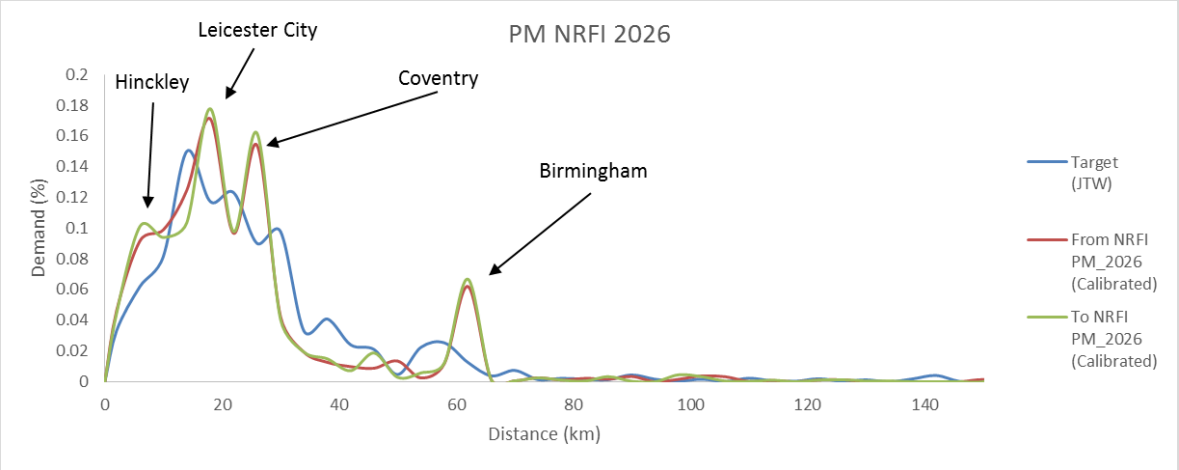


Figure 5: Observed vs modelled TLDs: Commuting Trips to and from NRFI in 2026 PM Peak

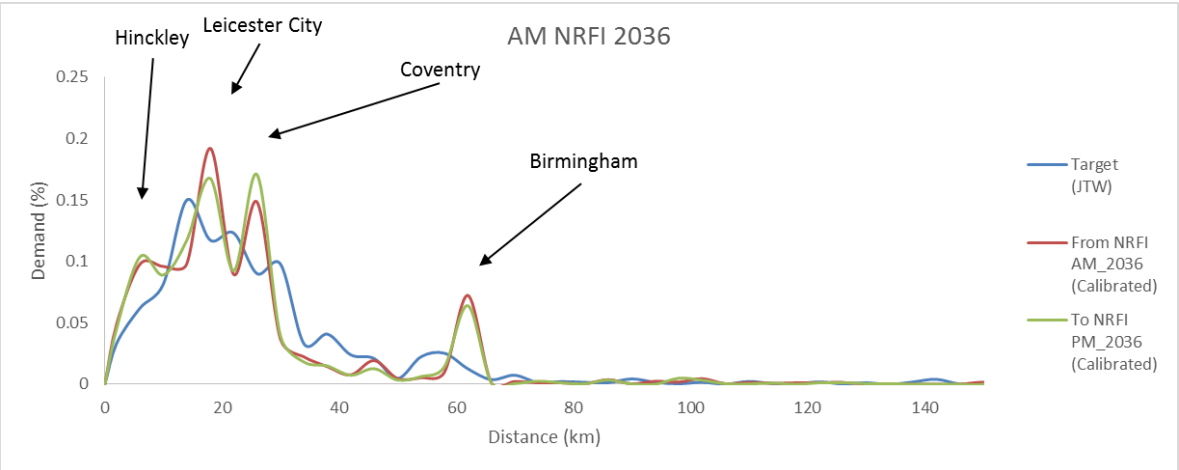


Figure 6: Observed vs modelled TLDs: Commuting Trips to and from NRFI in 2036 AM Peak

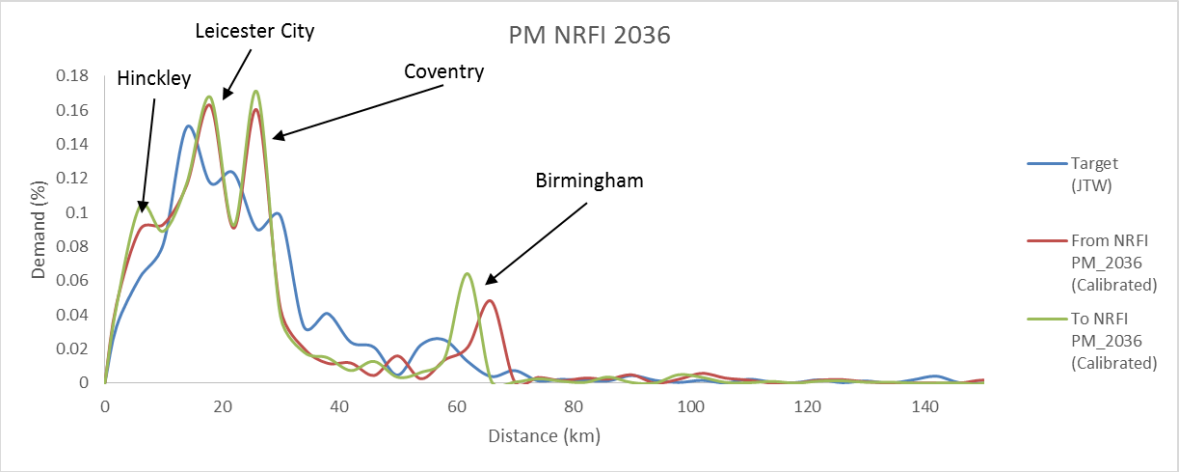
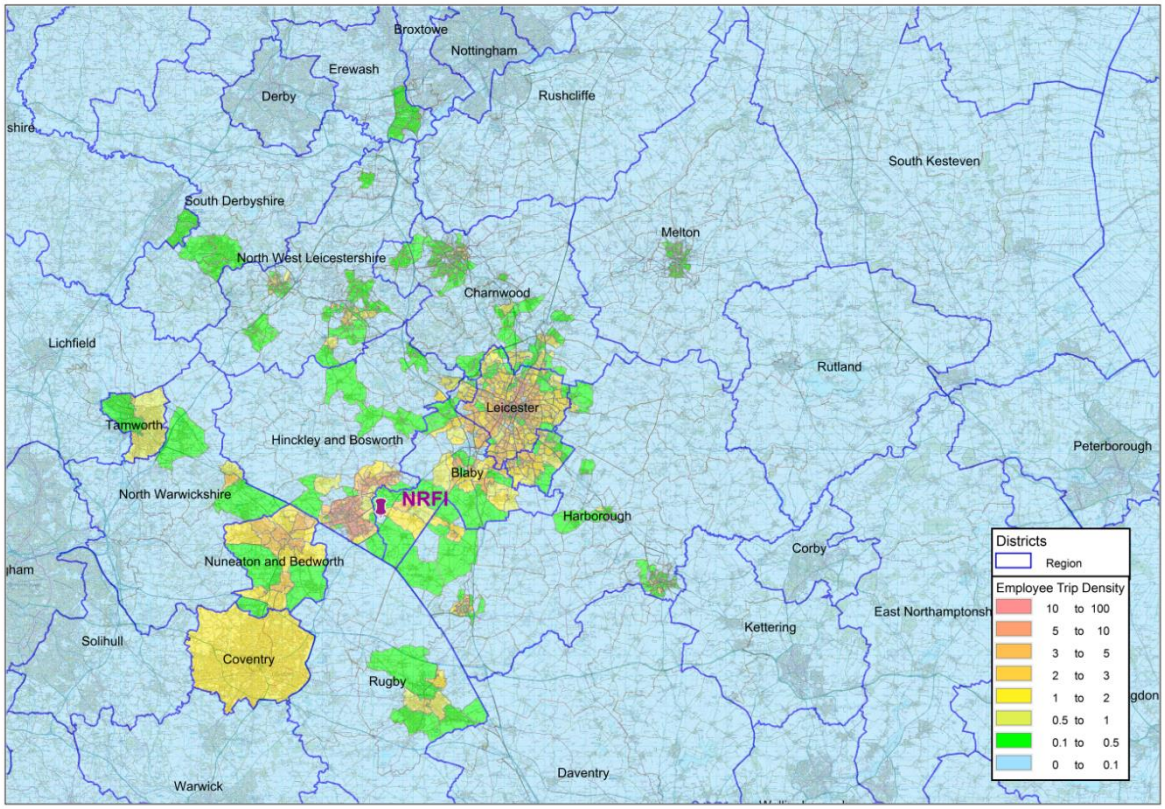


Figure 7: Observed vs modelled TLDs: Commuting Trips to and from NRFI in 2036 PM Peak

2.4.4 Figure 8 and Figure 9 depict distribution of trip densities (trips per zone area) for the "To NRFI" AM Peak trips and "From NRFI" PM Peak trips, respectively, for year 2026. The neighbouring urban centres have darker colours since these are the areas which attract most of the NRFI employees. The same conclusions can be drawn from Figure 10 and Figure 11, showing results for year 2036.



Map contains Ordnance Survey data © Crown copyright and database right 2018

Figure 8: Modelled NRFI Employee Trips to NRFI in 2026 AM Peak

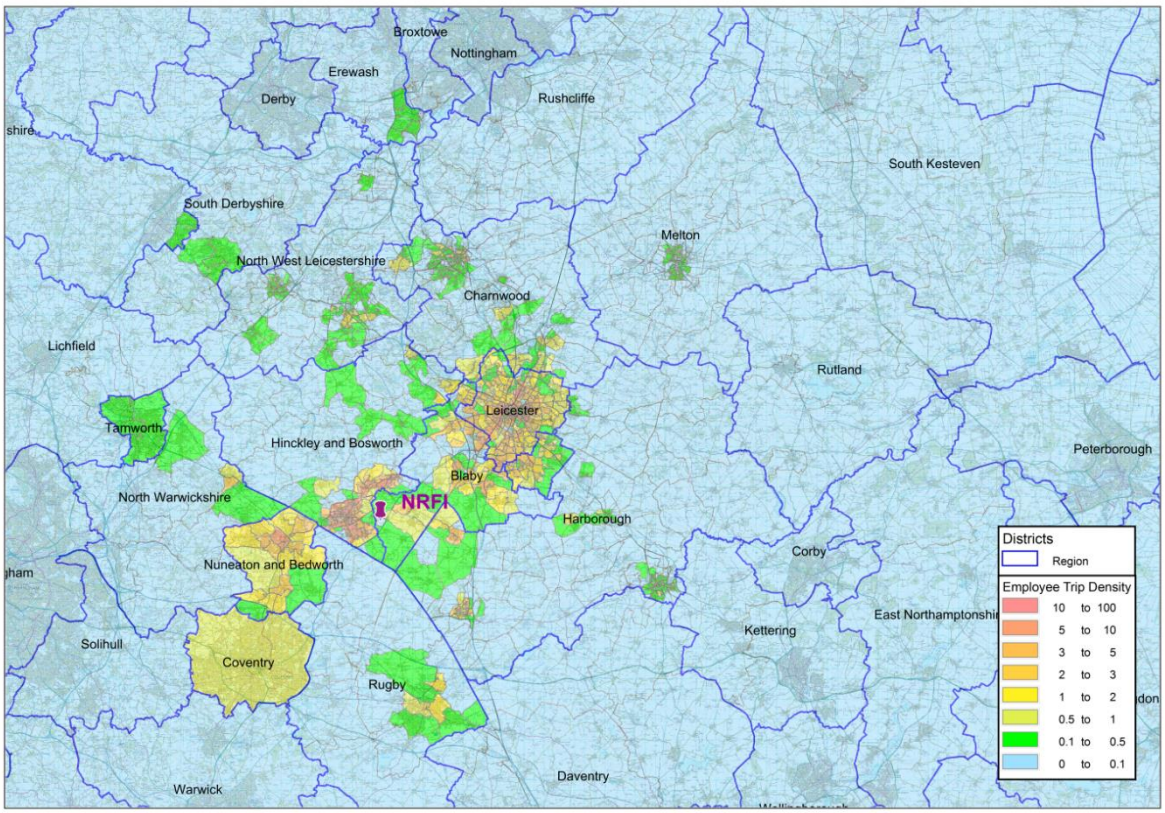


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Figure 9: Modelled NRFI Employee Trips from NRFI in 2026 PM Peak

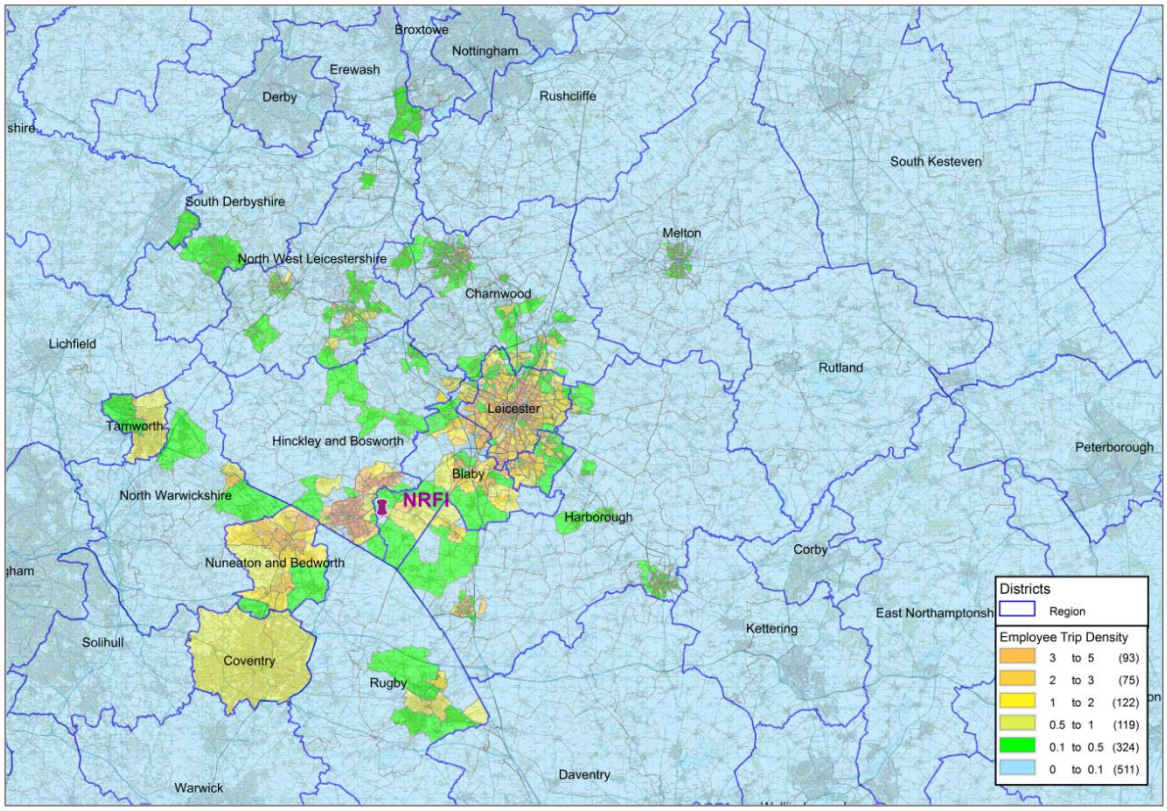

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Figure 10: Modelled NRFI Employee Trips to NRFI in 2036 AM Peak

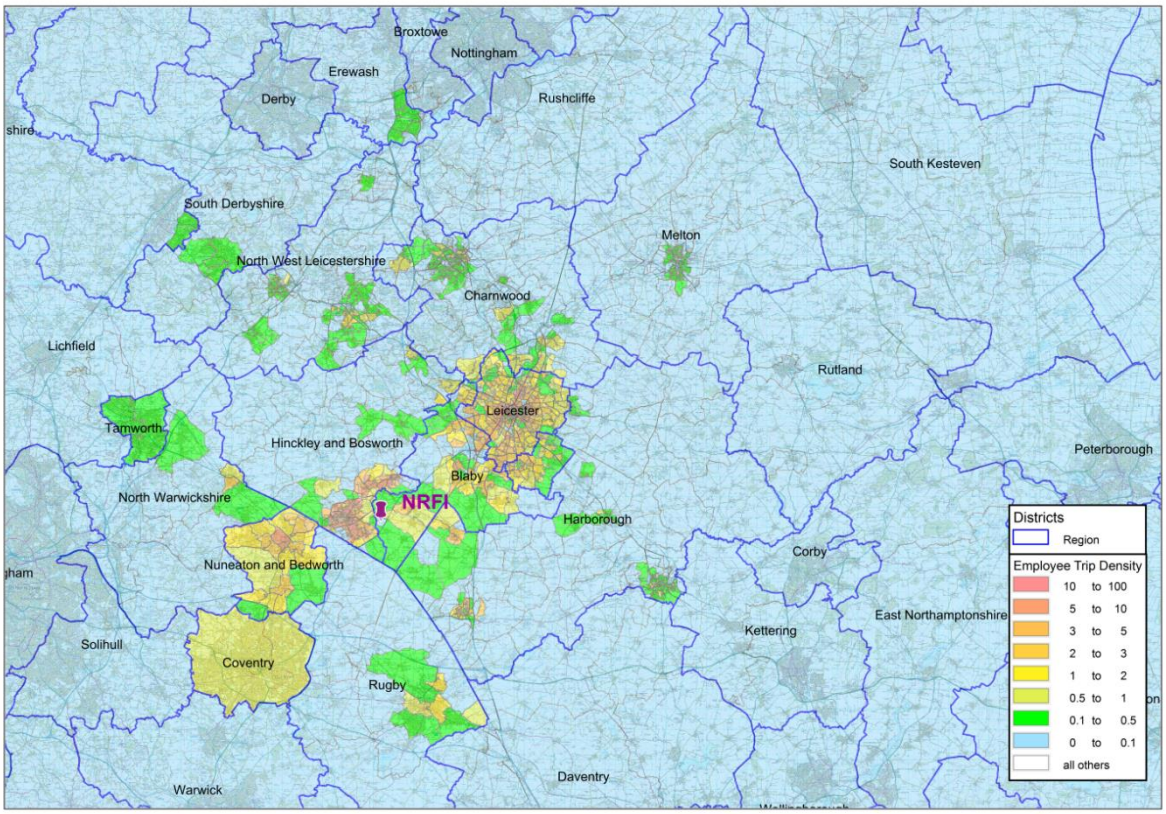

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Figure 11: Modelled NRFI Employee Trips from NRFI in 2036 PM Peak

Section 3 – Freight Trips

3.1 Development Trip Rates

3.1.1 Similar to the employee trips in Section 2.1, it is assumed that Heavy Goods Vehicles (HGVs) will be used for the movement of goods to and from the proposed NRFI. Provisional peak hour trip rates of HGVs have been provided based on experience elsewhere with similar types of site.

3.1.2 Table 4 shows these estimates in the form of HGV trips arriving at and departing from the development in AM Peak and PM Peak hours.

Table 4: Proposed Peak Hour HGV Trips

Vehicle Type	Time of Day	Arrivals	Departures	Total Trips
HGVs	AM Peak	199	210	409
	PM Peak	223	246	469

3.2 Trip Distribution Methodology

3.2.1 Hinckley is located within the so-called "Golden Triangle", where many of the UK's National Distribution Centres (NDCs) are located, with access to over 90% of the UK population within 4 hours' drive. Apart from the NDCs, this area also includes a number of Regional Distribution Centres (RDCs).

3.2.2 Both NDCs and RDCs receive, hold, and redistribute goods to the next level within their supply chain. Typically, NDCs are larger in scale than RDCs, and hold goods for a longer period of time. Therefore dwell times are shorter at RDCs and they are normally associated with retailers.

3.2.3 The proposed Hinckley NRFI is planned to be a multi-purpose goods interchange and distribution facility. Following delivery of cargo from the major cargo terminals (e.g. Southampton, Liverpool, and Humber Estuary) by rail, goods are expected to be transported to a range of logistic and distribution centres for further distribution, or directly to retail outlets by road. The flow diagram shown in Figure 12 reflects the expected distribution strategy to be adopted by the future NRFI.

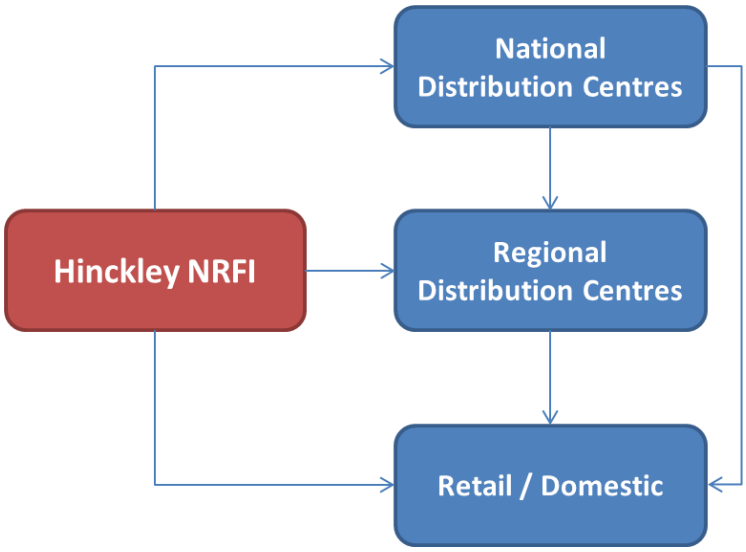


Figure 12: Expected Distribution of Freight from the Proposed NRFI within the Supply Chain

3.2.4 Goods are expected to be transported by road into a range of both NDCs and RDCs, as well as directly to the end users. The proportion of goods transported to each of these is likely to depend on type of goods and commodities. For example, goods which are seasonal (such as outdoor/garden equipment, summer clothing etc.) and those which are non-time sensitive and/or have long lead-times (e.g. toys, electricals etc.) generally go direct to NDCs, for storage ahead of demand or as buffer-stock etc.

3.2.5 The land-use data, described later, only enabled distinguishing distribution centres into small and large centres (rather than RDCs and NDCs), these have been assumed to reflect the activity for regional and national distribution centres, respectively.

3.2.6 Since there is no data source available on the distribution of road freight demand associated with the NRFI or any existing Rail Freight Interchange of a similar nature, a model is estimated to provide the distribution of HGV demand. This model requires a number of inputs, either in the form of observed data or assumptions and hypotheses on expected trip pattern.

3.2.7 Figure 13 illustrates the approach followed to develop the HGV trip matrices. Similar to employee trips, gravity models have been calibrated to generate the distribution and allocate trips to and from the NRFI to their origins and destinations.

3.2.8 As discussed above, goods are expected to be transported to NDCs, RDCs, and end-users; the share of these is expected to be related to type of goods and the freight commodities. In absence of any data or information, these have been established based on assumptions made on the mix of commodities. Observed trip length distributions by commodity have been also used to calibrate the gravity models.

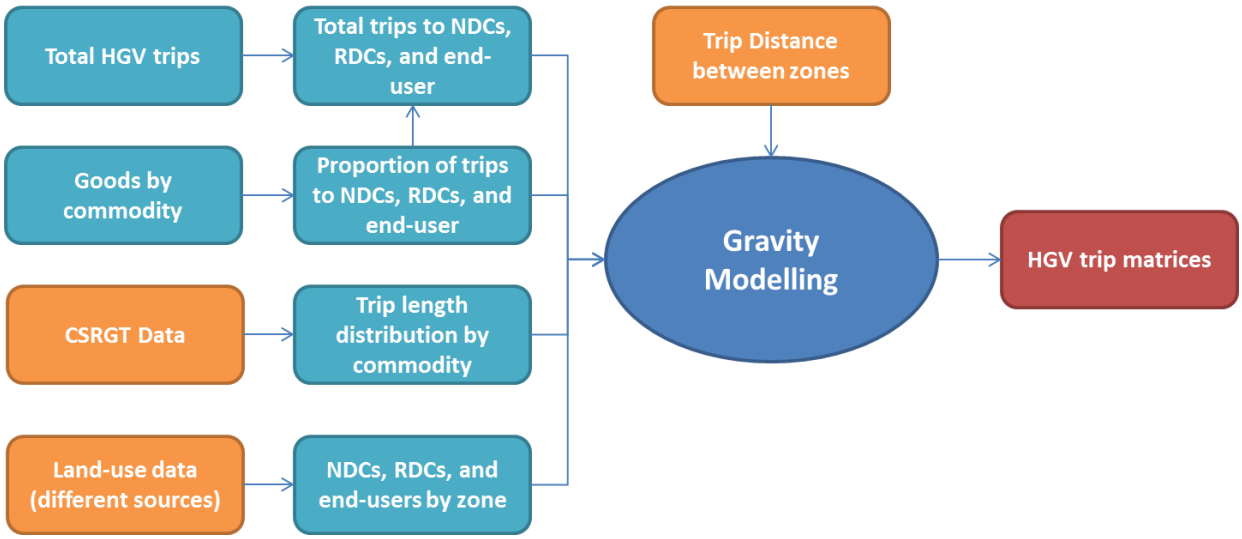


Figure 13: Proposed Overall Approach to Developing NRFI HGV Matrices

3.2.9 The model form is similar to that described in Section 2.2.4 for employee trips, with few differences, as described below:

$$T_i = \frac{1}{\sum_i P_i \; f(a, C_i)} P_i \; f(\boldsymbol{a}, C_i) \; D; \; \sum_i T_i = D$$

where:

- T_i is the matrix of trips between the development and any given zone i;
- C_i is the distance of travel between the development and zone i;
- P_i is the relative weight for freight activity at zone i;
- D is the total number of HGV trips to / from the development; and
- f is the deterrence function, for which the parameter vector $\boldsymbol{a}$ will be estimated.

3.2.10 As described in section 2.2.5, lognormal density functions are used as deterrence functions in the model above.

3.2.11 The assumptions made for freight trips to or from the NRFI are different to employee trips. Separate matrices are developed based on different distribution types (see Figure 12) where goods are transported to and from the NRFI. In particular, matrices have been developed for:

- The NDC / Large Distribution Centres,
- RDC / Small-Medium Distribution Centres, and
- Retail / Domestic Centres.

3.3 Input Assumptions

3.3.1 The inputs, which have been used to calibrate the gravity models, are:

- total number of HGV trips to and from the NRFI development;
- observed trip length distributions;
- an estimate of distance between different zone pairs; and
- zonal weights, reflecting relative freight activity.

HGV Trip-ends

3.3.2 Table 4 provides the total number of assumed HGV trips attracted to the development for each time period. As mentioned earlier, three set of HGV matrices have been built taking into account different type of land-use where goods are transported to and from the NRFI. Therefore, the total HGV demand is split into the following three NRFI freight movement categories:

- Retail / Domestic freight-related movements to and from the NRFI;
- RDC / Small-Medium Distribution Centres freight demand to and from the NRFI; and
- NDC / Large Distribution Centres freight NRFI-related demand.

3.3.3 The total HGV demand has been split into the above categories based on assumptions on mix of commodities likely to be transported to any of these categories, and their trip length distribution. Data from the Continuing Survey of Road Goods Transport Great Britain (CSRGT GB), provided by the Department for Transport (DfT), have been used to build trips length distribution associated to each of these three movements; this process is described below.

3.3.4 Table 5 shows CSRGT grossed HGV trips that start or end in Leicestershire by commodity type and distance band for the year 2012-2016. From the commodity types described in the CSRGT data, the following commodities were discarded, as they are unlikely to be associated with the NRFI:

- Coal and lignite;
- Coke and refined petroleum products;
- Unidentifiable goods;
- Other goods not elsewhere classified;
- Groupage;
- Waste related products; and
- Household and office removals and other non-market goods.

3.3.5 Trips related to the remaining commodity types in Table 5, assumed to be associated with the NRFI, were split into the three NRFI freight movement categories, based on the following set of assumptions:

- There is little or no information available about the relationship between freight commodities and their detailed supply chain; in particular, the proportion of different commodities transported to different distribution or retail centres, and their travel distances;
- It is assumed that sensitive and seasonal goods are more likely to be transported to and from the Retail / Domestic facilities;
- It is expected that goods which are seasonal (such as outdoor/garden equipment, summer clothing etc.) and those which are non-time sensitive and/or have long lead-times (e.g. toys, electricals etc.) generally go direct to NDCs, for storage ahead of demand.
- It is expected that goods which are time sensitive and/or have short lead-times (e.g. perishable groceries) generally go direct to RDCs (for fast turn-around and onward distribution to store).
- NDCs are typically larger in size than RDCs, but they are much fewer in numbers. Distances travelled to NDCs are therefore expected to be longer than those travelled to RDCs and retail centres.

Table 5: Observed Trip Length Distribution of HGVs in Leicestershire (Source: CSRGT)

Commodity	< 25 km	25-50 km	50-100 km	100-150 km	150-200 km	200-300 km	> 300 km
Empty running (no goods lifted)	3,151	2,938	3,589	1,520	1,173	906	105
Agricultural products	82	77	202	226	168	127	:
Coal and lignite	:	77	:	:	:	:	:
Metal ore and other mining and quarrying	374	455	519	260	81	89	73
Food products	496	622	1,266	808	1,075	823	292
Textiles and textile products; leather and leather products	:	39	86	119	145	177	58
Wood products	216	151	278	196	187	251	72
Coke and refined petroleum products	:	:	78	:	:	37	:
Chemical products	70	84	173	121	120	133	47
Glass, cement and other non-metallic mineral products	595	380	441	230	123	163	66
Metal products	95	102	176	65	67	76	61
Machinery and equipment	66	138	207	135	98	138	53
Transport equipment	66	264	140	71	136	93	48
Furniture and other manufactured goods	63	56	107	87	92	113	80
Waste related products	467	413	390	156	68	82	:
Mail and parcels	58	128	218	112	141	119	59
Empty containers, pallets and other packaging	218	221	297	135	125	166	:
Household and office removals and other non-market goods	170	134	140	47	41	45	:
Groupage	309	254	551	327	378	455	220
Unidentifiable goods	:	48	128	:	93	114	:
Other goods not elsewhere classified	:	:	:	:	:	:	:

3.3.6 Using the above assumptions, and in lack of any other data or information, assumptions were made to allocate different proportion of trips by commodity type and distance band to different NRFI freight movement categories. Table 6, Table 7, and Table 8 show the proportion of trips in each commodity type and distance band travelling to the Retail / Domestic Centres, RDC / Small-Medium Distribution Centres, and NDC / Large Distribution Centres, respectively.

Table 6: Proportion of NRFI Trips Assumed to be Associated with Movements to Retail / Domestic Centres

Commodity	< 25 km	25-50 km	50-100 km	100-150 km	150-200 km	200-300 km	> 300 km
Metal ore and other mining and quarrying	0%	0%	5%	5%	2%	2%	1%
Glass, cement and other non-metallic mineral products	0%	0%	5%	5%	2%	2%	1%
Empty containers, pallets and other packaging	0%	0%	5%	5%	2%	2%	1%
Transport equipment	0%	0%	5%	5%	2%	2%	1%
Agricultural products	80%	80%	5%	5%	2%	2%	1%
Metal products	0%	0%	5%	5%	2%	2%	1%
Wood products	0%	0%	5%	5%	2%	2%	1%
Machinery and equipment	0%	0%	5%	5%	2%	2%	1%
Mail and parcels	80%	80%	5%	5%	2%	2%	1%
Food products	80%	80%	5%	5%	2%	2%	1%
Chemical products	0%	0%	5%	5%	2%	2%	1%
Furniture and other manufactured goods	80%	0%	5%	5%	2%	2%	1%
Textiles and textile products; leather and leather products	80%	0%	5%	5%	2%	2%	1%
Empty running (no goods lifted)	80%	80%	5%	5%	2%	2%	1%

Table 7: Proportion of NRFI Trips Assumed to be Associated with Movements to RDC / Small-Medium Distribution Centres

Commodity	< 25 km	25-50 km	50-100 km	100-150 km	150-200 km	200-300 km	> 300 km
Metal ore and other mining and quarrying	80%	80%	15%	15%	15%	15%	15%
Glass, cement and other non-metallic mineral products	80%	80%	15%	15%	15%	15%	15%
Empty containers, pallets and other packaging	80%	80%	15%	15%	15%	15%	15%
Transport equipment	80%	80%	15%	15%	15%	15%	15%
Agricultural products	10%	10%	80%	80%	80%	80%	80%
Metal products	80%	80%	15%	15%	15%	15%	15%
Wood products	80%	80%	15%	15%	15%	15%	15%
Machinery and equipment	80%	80%	15%	15%	15%	15%	15%
Mail and parcels	10%	10%	80%	80%	80%	80%	80%
Food products	10%	10%	80%	80%	80%	80%	80%
Chemical products	80%	80%	15%	15%	15%	15%	15%
Furniture and other manufactured goods	10%	80%	80%	15%	15%	15%	15%
Textiles and textile products; leather and leather products	10%	80%	80%	15%	15%	15%	15%
Empty running (no goods lifted)	10%	10%	80%	80%	15%	15%	15%

Table 8: Proportion of NRFI Trips Assumed to be Associated with Movements to NDC / Large Distribution Centres

Commodity	< 25 km	25-50 km	50-100 km	100-150 km	150-200 km	200-300 km	> 300 km
Metal ore and other mining and quarrying	20%	20%	80%	80%	83%	83%	84%
Glass, cement and other non-metallic mineral products	20%	20%	80%	80%	83%	83%	84%
Empty containers, pallets and other packaging	20%	20%	80%	80%	83%	83%	84%
Transport equipment	20%	20%	80%	80%	83%	83%	84%
Agricultural products	10%	10%	15%	15%	18%	18%	19%
Metal products	20%	20%	80%	80%	83%	83%	84%
Wood products	20%	20%	80%	80%	83%	83%	84%
Machinery and equipment	20%	20%	80%	80%	83%	83%	84%
Mail and parcels	10%	10%	15%	15%	18%	18%	19%
Food products	10%	10%	15%	15%	18%	18%	19%
Chemical products	20%	20%	80%	80%	83%	83%	84%
Furniture and other manufactured goods	10%	20%	15%	80%	83%	83%	84%
Textiles and textile products; leather and leather products	10%	20%	15%	80%	83%	83%	84%
Empty running (no goods lifted)	10%	10%	15%	15%	83%	83%	84%

3.3.7 The proportions reported in the above tables were used to split total HGV trips into different freight movement categories. Table 9 presents the split of HGV trips between different categories.

Table 9: Proportion of Trips Associated with Different NRFI Freight Movement Categories

	Retail / Domestic Centres	RDC / Small-Medium Centres	NDC / Large Centres
Proportion of Trips	22%	44%	34%

Target Trip Length Distributions and Distance Matrix

3.3.8 Proportions in Table 6, Table 7 and Table 8 were applied to the CSRGT data presented in Table 5 to develop three distinct trip length distributions: these have been used as target TLDs in the calibration process of the gravity models. Figure 14 shows the TLDs for movements associated with the Retail / Domestic Centres, RDC / Small-Medium Centres, and NDC / Large Centres.

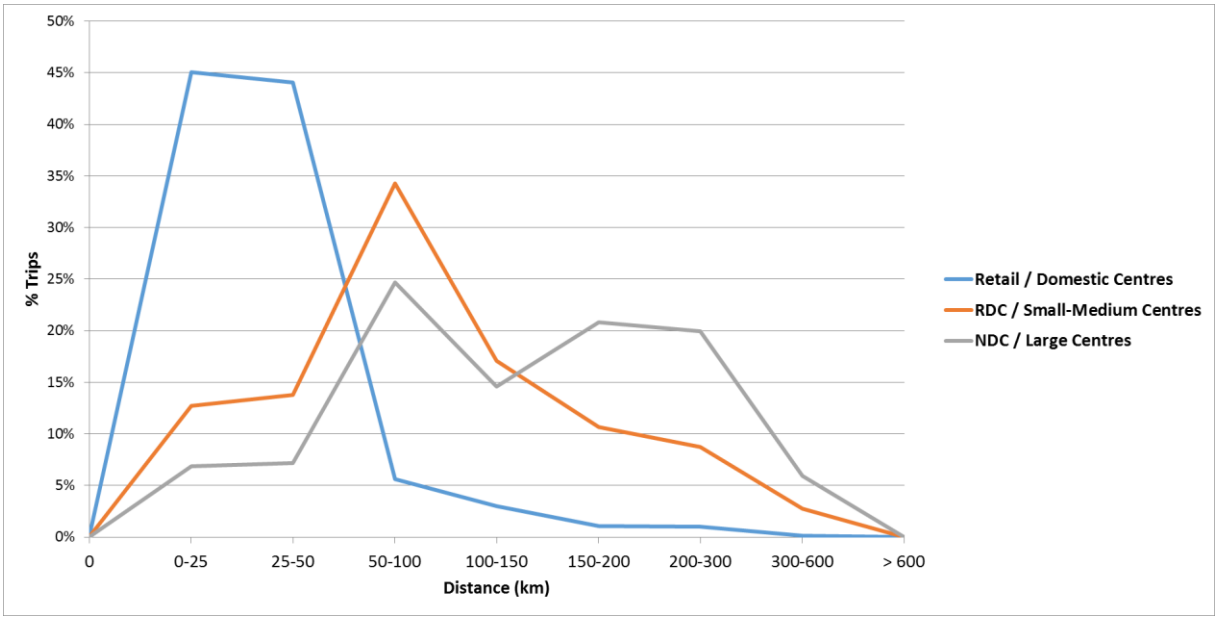


Figure 14: Target TLDs for each NRFI Freight Movement Category

3.3.9 As discussed in section 2.3.3, these TLDs were used for the calibration process of the gravity models of the NRFI HGV trips. However, the model allows for variation from the target TLD to meet the relative distribution of zonal weights with respect to the freight activity.

3.3.10 To represent the costs in the deterrence functions of the gravity models, skimmed distance matrices from the PRTM highway assignment model for the future years 2026, 2031 and 2036 have been used.

Zonal Weights

3.3.11 In the gravity models described in section 3.2.9, weights by zone are defined for each freight movement category. The weights reflect the relative freight activity in each zone (both for internal and external ones); these are expected to be slightly different for future years 2026, 2031 and 2036. For this purpose, two different data sources have been used and merged; employment data, and the Valuation Office Agency (VOA) data.

3.3.12 VOA data is available for Leicester and Leicestershire (excluding the external zones) and provides information on non-domestic properties. The data includes the site address, property description (i.e. land-use), total area, and total rateable value. The land-use information related to freight activities such as warehouses are identifiable.

3.3.13 Table 10 presents the employment data, their description along with the column which indicates whether the employment data are likely to be linked with freight-related activity. From the employment freight-related data, all are attributed to the Retail / Domestic Centres apart from the category of "Industry, Construction and Transport", which has been linked to the RDC / Small-Medium Distributions Centres and the NDC / Large Distribution Centres.

Table 10: Employment Categories within the Planning Data

Code	Description	Attributed to Freight Activity
E01	All Jobs	No
E02	Households	No
E03	Primary & Secondary schools	No
E04	Higher Education	No
E05	Adult education	No
E06	Hotels, camp sites etc	Yes
E07	Retail trade	Yes
E08	Health / Medical	No
E09	Services (business, other, postal/courier) & equipment rental	Yes
E10	Industry, construction and transport	Yes
E11	Restaurants and bars	Yes
E12	Recreation and sport	No
E13	Agriculture and fishing	No
E14	Business	Yes
E15	Holiday accommodation and second residences	No

3.3.14 The categories selected to reflect freight activity will include specific businesses which are not freight related, but the planning data does not include detailed information about sub categories within these.

3.3.15 VOA data were therefore used in the process to identify and exclude specific land-uses within the selected categories which are unlikely to be associated with freight activity. The criteria used for this purpose was based on floor space; any facility with an area less than 100 m^2 in each zone was considered not related to freight activity, and excluded from the list of freight-related land-uses.

3.3.16 VOA data was also used in order to differentiate the employment data related to the NDC / Large Distribution Centres from the total "warehousing" employment data. Any property with an area greater than 1000 m^2 in the VOA category of "Warehouse / Factory / Storage / Workshop / Depot" was assumed to be associated with NDC / Large Distribution Centres. In the case where such properties within a zone do not exist, a zone is assigned a weight for RDC only.

3.3.17 The three NRFI freight movement categories were linked with the employment and VOA data as shown in Table 11.

Table 11: Correspondence between Employment and VOA Categories

Employment category	VOA category	NRFI Category
Hotels, camp sites etc.	Hotel	Retail / Domestic
Retail trade	Retail - warehouse	
Services (business, other, postal/courier) & equipment rental	Retail - warehouse	
Restaurants and bars	Restaurants and bars	
Business	Retail	
Industry, construction and transport Services (business, other, postal/courier) & equipment rental	Warehouse/Factory /Storage/Workshop/ Depot	NDC/RDC

3.4 Modelling Results

3.4.1 The gravity models were run by peak hour (AM and PM), year (2026, 2026 for 20% of total demand, 2031 for 80% of total demand and 2036), and direction (From and To NRFI Development). The models produced the NRFI HGV zonal trips separately for the Retail / Domestic Centres, RDC / Small-Medium Distribution Centres, and NDC / Large Distribution Centres. Summing the trips of the three distribution types provide total HGV trips to and from Hinckley NRFI.

3.4.2 TLD results of the calibrated models are plotted in Figure 15, Figure 16 and Figure 17, and compared against the TLD targets from CSRGT data for Retail / Domestic Centres, RDC and NDC respectively. Results, presented for the future year 2026, show a reasonably good fit with the observed data. Figure 18 show the overall modelled HGV trip length distribution and how it is compared with the CSRGT data.

3.4.3 It should be noted that the peak in the band of 150-200 km is mainly explained by the Large Distribution Centres freight-related movements (Figure 17). These are trips related to London, as freight-related traffic to and from the NRFI is expected to be sourced from London.

3.4.4 It should be noted that since the inputs and targets are consistent by time period and future year, a similar fit is achieved for the all directions and future years.

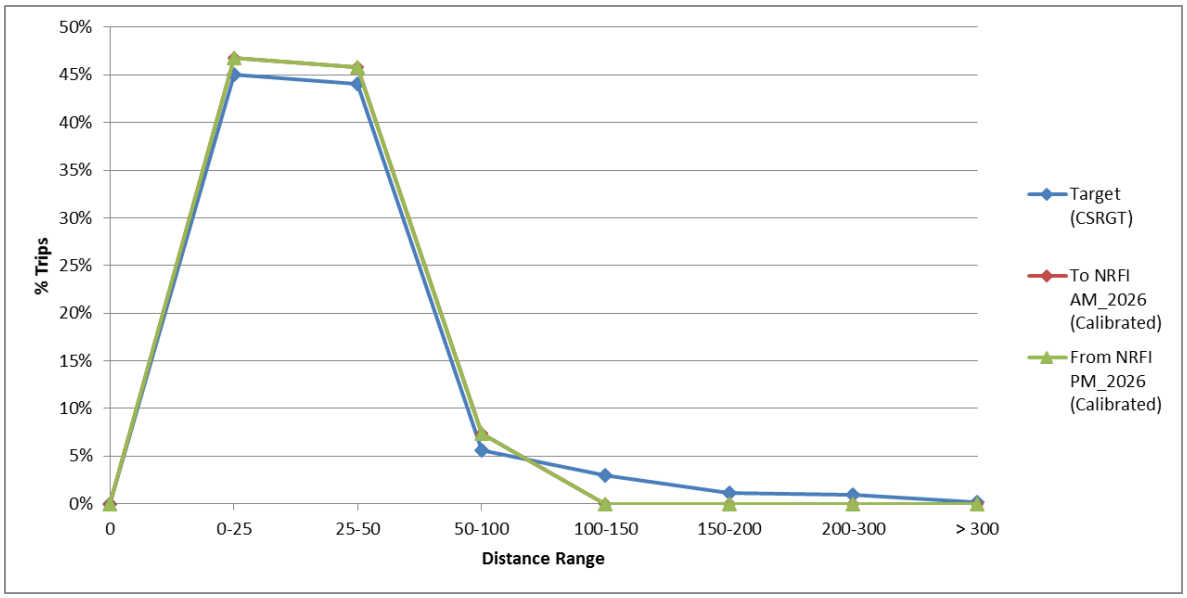


Figure 15: Observed vs Modelled TLDs: Retail Centres

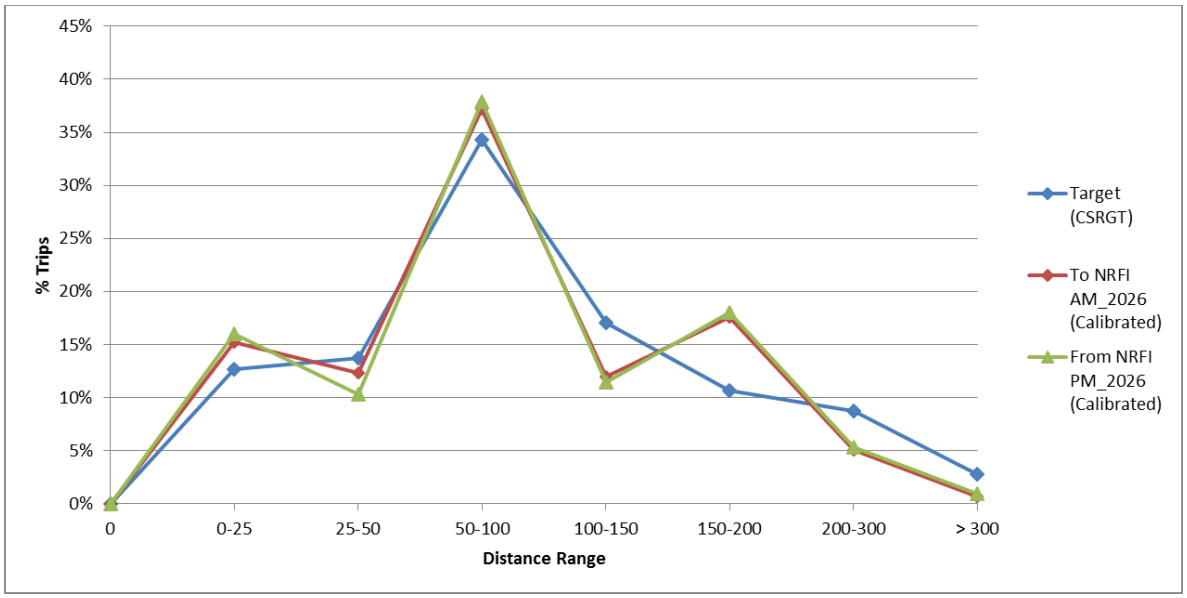


Figure 16: Observed vs Modelled TLDs: RDC / Small-Medium Distribution Centres

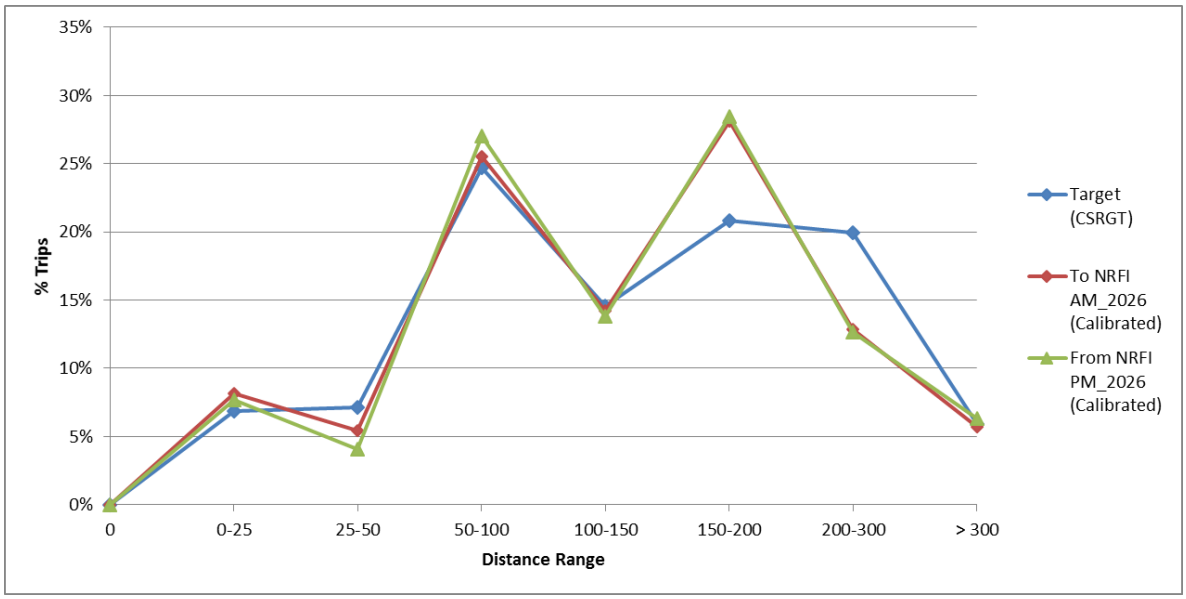


Figure 17: Observed vs Modelled TLDs: NDC / Large Distribution Centres

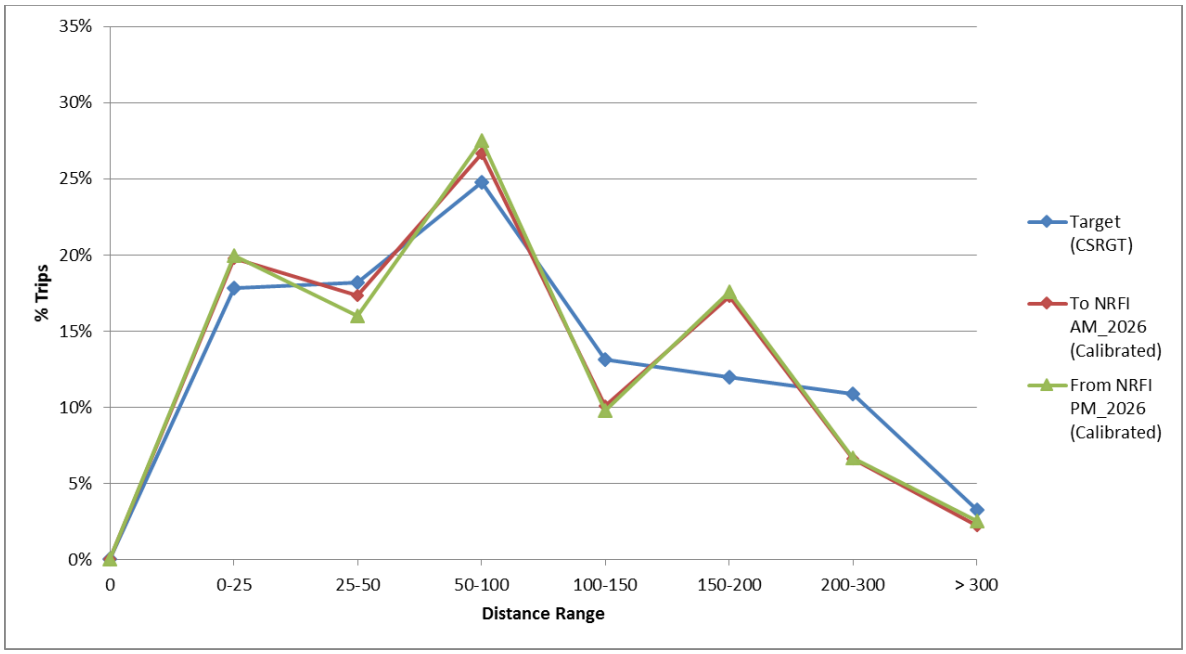
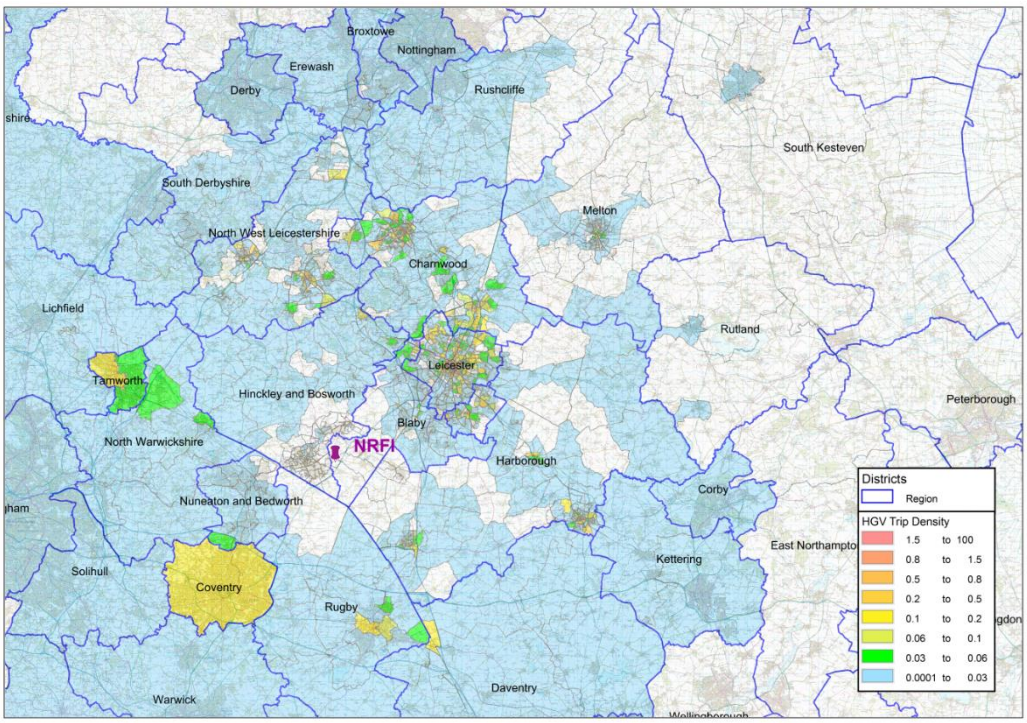


Figure 18: Observed vs Modelled TLDs: All HGV Movements

3.4.5 Figure 19 and Figure 20 show modelled HGV trip distribution, presented as trip density (i.e. number of trips per zone area), for "To NRFI" AM Peak and "From NRFI" PM Peak, respectively, for the Retail Centres. The figures show that the neighbouring urban centres attract most of the Retail-related HGV trips. Interestingly, there aren't many trips to/from Hinckley. This is because according to the planning data, there is limited retail-related freight activity in Hinckley.



Map contains Ordnance Survey data © Crown copyright and database right 2018

Figure 19: Modelled HGV Trips to NRFI in AM Peak: Retail Centres

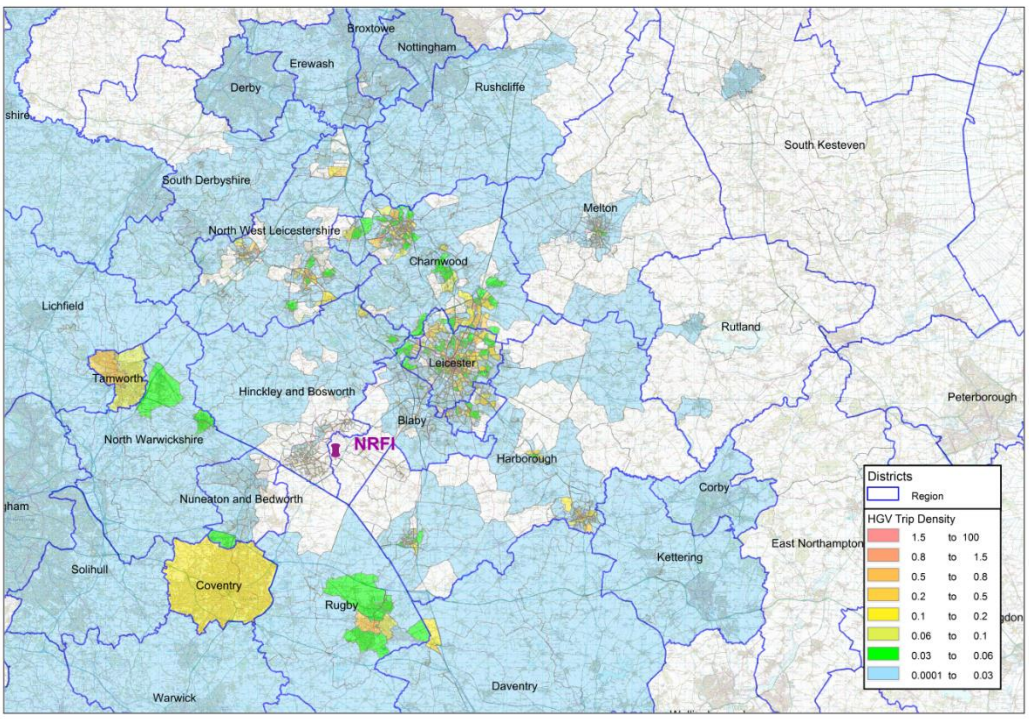


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Figure 20: Modelled HGV Trips from NRFI in PM Peak: Retail Centres

3.4.6 Figure 21 and Figure 22 present similar results for the RDC / Small-Medium Distribution Centres for the future year 2026. In the figures, Magna Park and DIRFT are marked, reflecting the fact that the model results in a noticeable number of HGV trips between these and the NRFI.

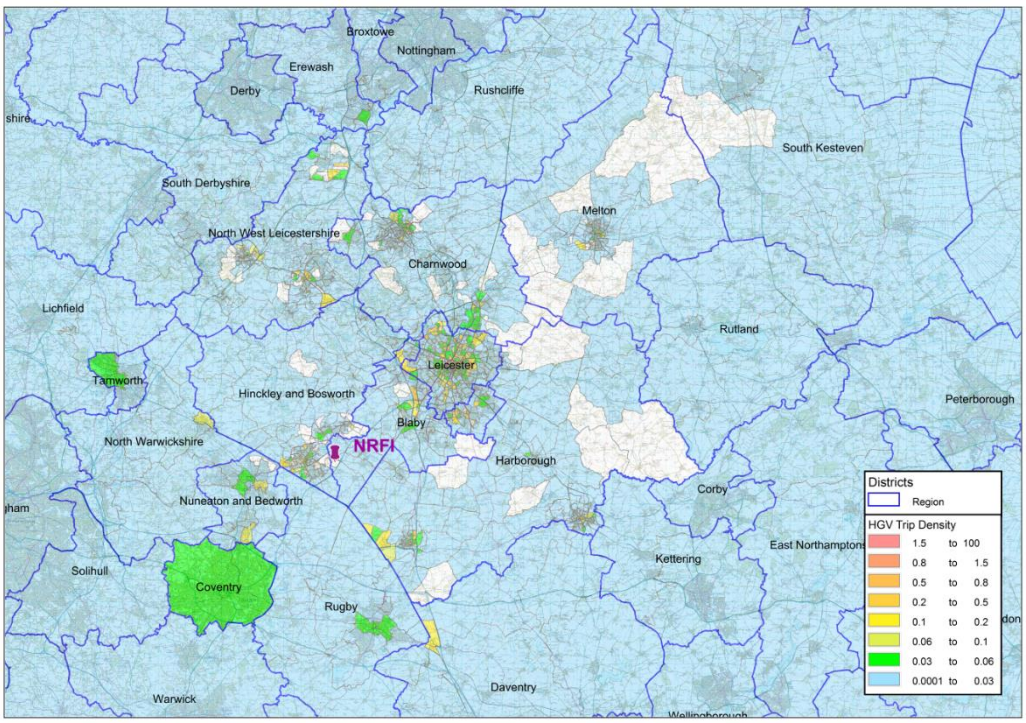

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Figure 21: Modelled HGV Trips to NRFI AM Peak: RDC / Small-Medium Distribution Centres

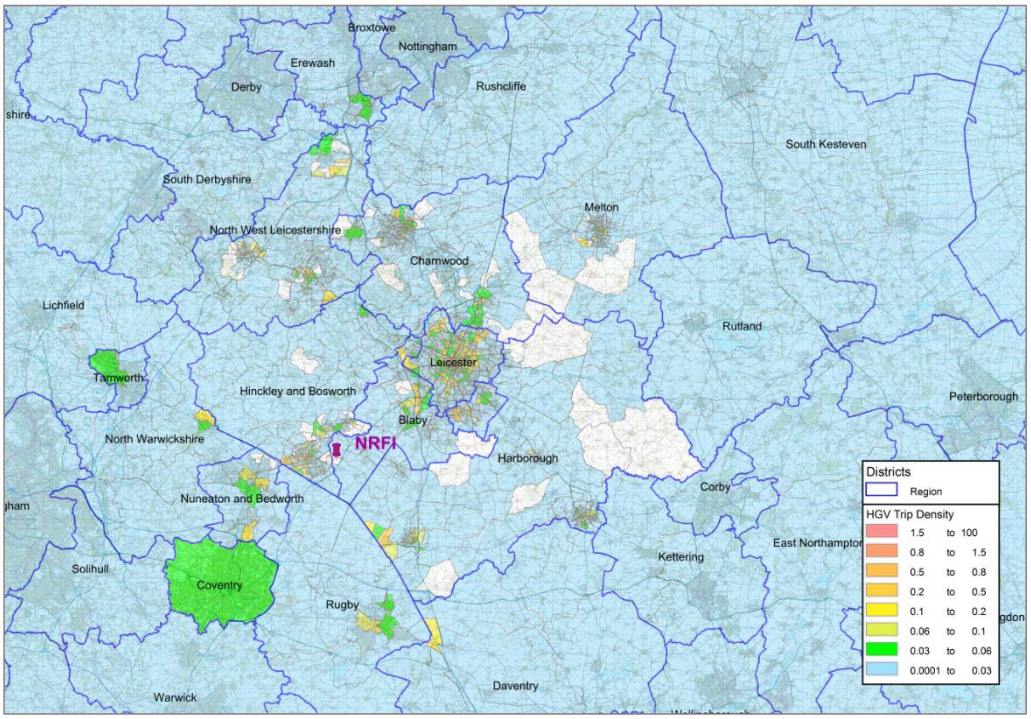

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Figure 22: Modelled HGV Trips from NRFI in PM Peak: RDC / Small-Medium Distribution Centres

3.4.7 Figure 23 and Figure 24 show the results for NDC / Large Distribution Centres. As expected, trips between NRFI and locations where there are large distribution centres and freight activity, such as DIRFT and Magna Park, are noticeable.

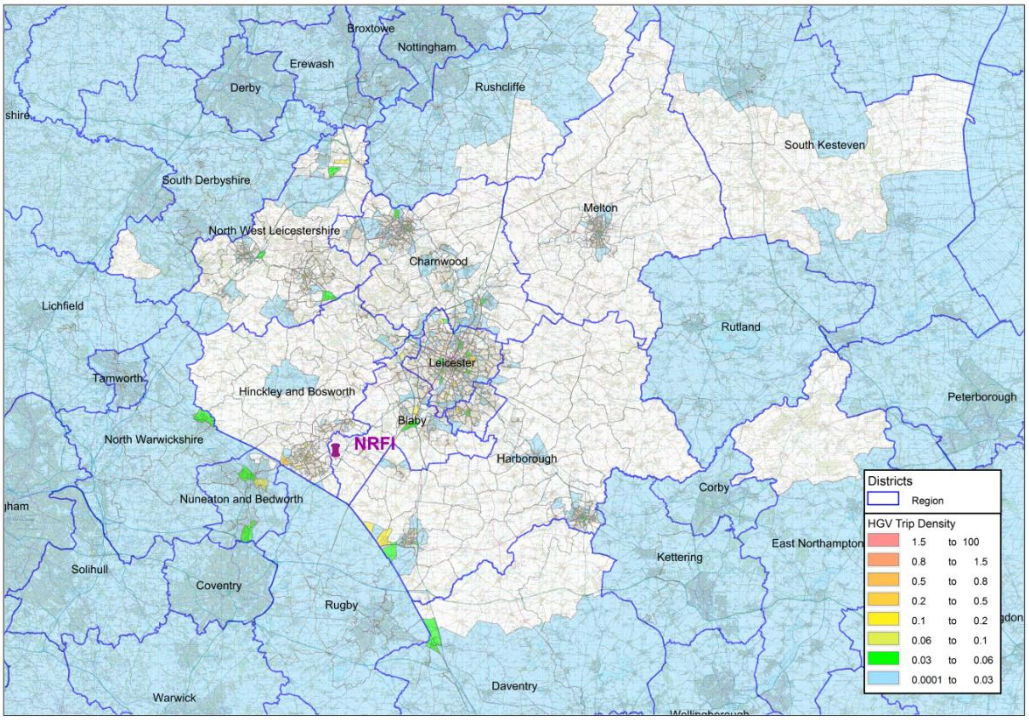

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Figure 23: Modelled HGV Trips to NRFI in AM Peak: NDC / Large Distribution Centres

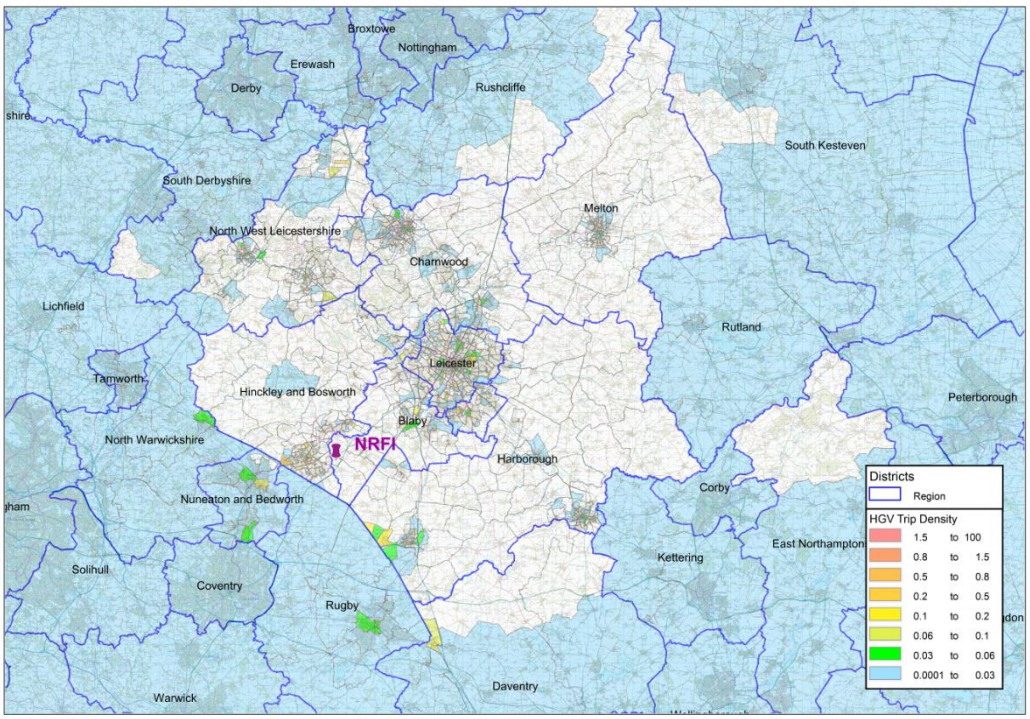

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Figure 24: Modelled HGV Trips from NRFI in PM Peak: NDC / Large Distribution Centres

3.4.8 Finally, Figure 25 and Figure 26 illustrate trip distribution to and from the future Hinckley NRFI for all freight movements. These are sum of modelled trip distributions for the three movement categories, the results of which are presented earlier.

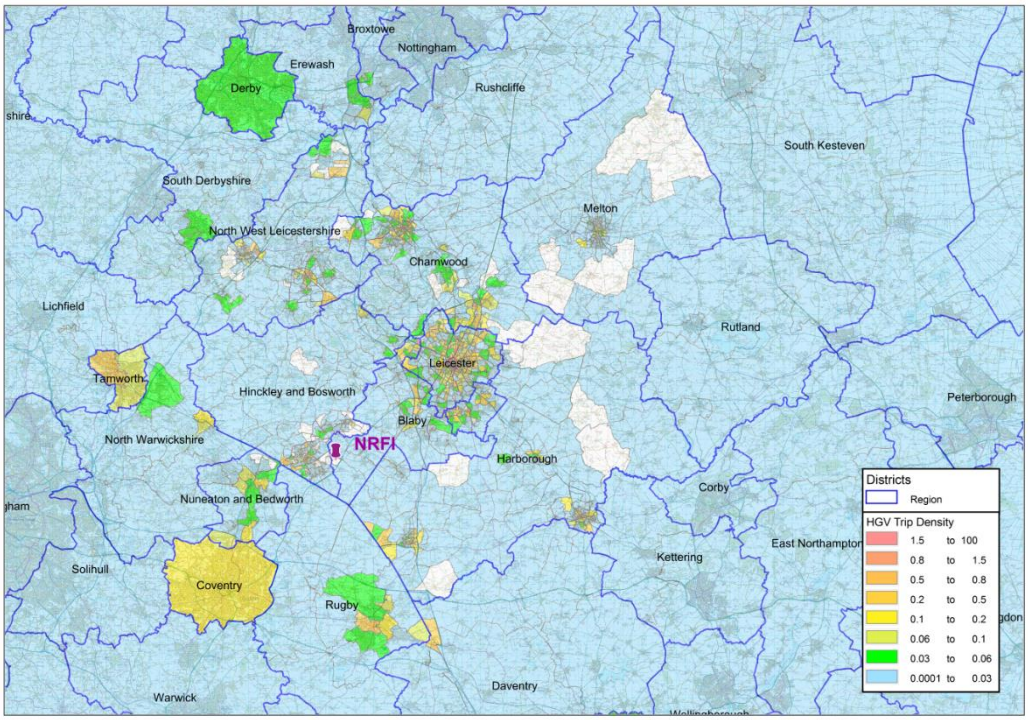

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Figure 25: Modelled HGV Trips to NRFI in AM Peak: All Freight Movements

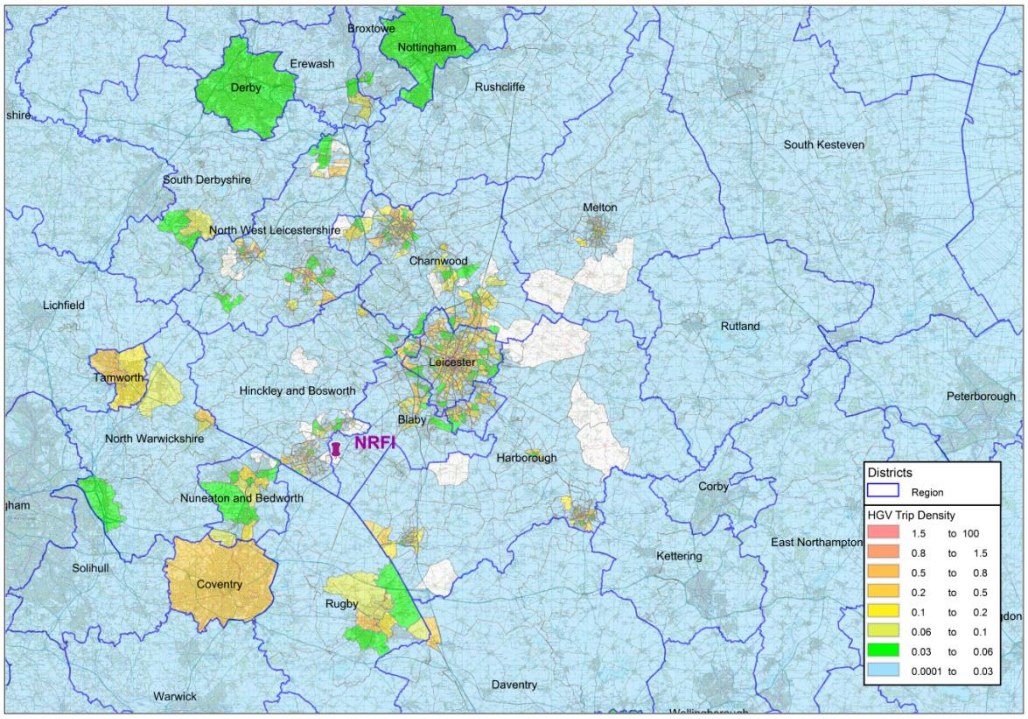

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Figure 26: Modelled HGV Trips from NRFI in PM Peak: All Freight Movements

Section 4 Summary and Conclusions

4.1.1 Assumptions regarding the amount of traffic generated by the proposed development, and the distribution of this traffic, are required to produce the "with development" scenario. Trip distributions were modelled separately for employee and freight trips.

4.1.2 For employee trips, a bespoke gravity model, calibrated to trip length distributions derived from the JTW data from a comparable development, was used. A combination of PRTM planning data and 2011 Census information were used to prepare an estimate of total number of people living in each zone who have the suitable skills to potentially be working in a future NRFI. These were used as trip-end constraints, resulting in a trip distribution which reflected both expected trip length distribution and number of future potential employees per zone.

4.1.3 For freight trips, three different land-use categories for movements of goods were considered: retail / domestic, regional distribution centres, and national distribution centres. In lack of any data, assumptions were made on type of freight commodities associated with each of these categories, depending on trip lengths. These, together with HGV trips length distribution derived from the CSRGT data, were used to build 'target' trip length distributions for each freight movement category.

4.1.4 A combination of PRTM planning data and VOA data were used to prepare zonal weights, represented as number of jobs associated with each of the above land-use categories. These, and target TLDs, were used to build separate gravity models for each freight movement.

4.1.5 The modelled distribution results in freight trips between the NRFI and zones which contain any of the three freight-related land-use categories. Within the same distance range, zones with greater number of jobs corresponding to these land-uses attract a higher proportion of NRFI freight trips.

4.1.6 Overall, the modelling results for both employees and freight show a plausible distribution of trips, with more trips attracted by zones which include greater potential employees or freight activity, and overall trip length distribution is consistent with the expected distribution based on independent observed data.

4.1.7 However, it is important to note that the model outputs are subject to uncertainty and error, partly related to the nature of gravity modelling, and partly related to uncertainties in the input data and assumptions. In particular, the modelled distributions depend on:

- the accuracy level of PRTM zonal planning data;
- how representative target trip length distributions are; and
- assumptions made on the relationship between freight commodities and movement of goods to / from the NRFI.

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APPENDIX C: Planning & Infrastructure Data Confirmation Email

Shirley Dumigan

From: Shirley Dumigan
Sent: 22 April 2021 17:44
To: Abigail Finch; Alex Reynolds; Anthea Anderson; Atholl Noon; Chi Zhang; David Abbott; Harry Horsley; Helen Nightingale; James Edwards; James Edwards (WCC); Joanne Archer; Karen Watkins; Louise Hryniw; Malcolm Ash; Matthew Wilby; Neil Coleman; Nick Dauncey; Parmjit Lall; patrick brooks; Paul Tebbitt; Rebecca Henson; Richard BEest; Sara Lepidi; Seddon, John ; Shirley Dumigan ([redacted]@bwbconsulting.com); Simm, Ben; Sinead Turnbull; Sonny Tolofari; Thomas, Richard ; Transport.HNRFI; Wong, Eri
Cc: Tom Baker; Richard BEest; patrick brooks; Morrow, Jonathan; Dazeley, Mark J; Atkinson, Imogen; Laura Good
Subject: Hinckley NRFI PRTM2.1 Core Base Modelling

Importance: High

Good afternoon all,

Thank you for your input and comments on the Planning assumptions and Infrastructure logs for the NRFI Core Base Model,

I can confirm that the following actions are being undertaken this week/now to allow the model to be run this weekend following your feedback and our review meeting with NDI and Aecom last Friday.

Nuneaton and Bedworth
The PRTM core scenario base planning data review has now reviewed the published (April 2020) Trajectories for NBBC and taken on board the build out rates for HSG1 (broken down for each development) but totalled over two zones for Land north of Nuneaton (ID 3007 & 3008), HSG 9 and 10 (Golf Drive and Eastboro Way), plus the totals in the period for the other strategic allocation sites with the forecast total build outs for the supply period against the derived traffic growth which remains comparable overall. The information previously supplied by NBBC did not have a build out trajectory, but total allocation numbers were reflected.

The land off Weddington Road is within the updated Trajectory and is included for within the above.

Rugby
For the RBBC area a similar check of the data provided previously by RBBC has been undertaken with the published housing Trajectories and the land supply position which includes for Rugby Radio Station (Houlton), Gateway Rugby (Eden Park), Coton Park East etc.

This review has spotted that the Rugby Radio station total has increased from 2490 to 3104 dwellings and this is being updated, this was over two lanes (as data was split when received originally from RBBC.

Hinckley and Bosworth
Thank you for the information and queries previously raised for the Barwell SUE model run earlier this year. NDI/Aecom have advised that the information provided by HBBC has been taken into account. As Stantec previously advised, whilst the majority of the sites are of a scale that would not require a transport assessment and/or coded separately into the model, we can confirm that the sites advised by HBBC are effectively accounted for through the background traffic growth that is applied to the 2014 Base Year Model by LCC Modelling / AECOM via TEMPRo-derived traffic growth to derive the 2026 and 2036 Core Models.

Following the review NDI/Aecom are now updating the Barwell SUE from the numbers previously provided to 2500 and 1530 for the Earl Shilton SUE.

Griffin Park refused and associated infrastructure removed as not certain, Peckleton Lane allocation to remain but infrastructure at Dans Lane and Desford Crossroads improvement schemes uncertain.

NWBC and Coventry
We can confirm that the NWBC Local Plan allocations are included within the Warwickshire data and for Coventry the derived growth has been used as it sits outside the core area.

Blaby
Hazleton Homes application (137dws) not to be included at this time, not consented. Leaving the 750 homes on the overall allocation site (kirby Muxloe)at this time, however Desford Crossroads improvement scheme to be removed/uncertain as funding not confirmed.

Harborough
Lutterworth East, is still awaiting S106 sign off, so the infrastructure included is not confirmed/certain therefore the proposed S278 scheme at M1 J21 and M1 J20, Frank Whittle Roundabout are uncertain. The access proposals that include the spine road and the M1 bridge remain linked with the allocated policy plans. Gibbett Hill, Magna Park scheme to remain in the model with larger/wider scheme associated with Lutterworth East assumed to be uncertain.

To include the full signalisation of the B581 Staggered junction (Broughton Road/Coventry Road), which aligns with the allocation and recent consent for the employment site in Broughton Astley (Harborough Ref: 19/00856_OUT).

Leicester City
Leicester Connect infrastructure and behavioural changes are on two separate timelines within the model as confirmed.
Leicester Train Station redevelopment employment trajectory being updated.

SRN (Infra)
Model will exclude the M1 J19 -23a smart motorway scheme as per RIS2.
A46/A6 improvements are included for North of Birstall access.
RIS2 Longshoot/Dodswells scheme included
Please see Lutterworth East assumptions for J20, J21 and Gibbett Hill schemes to be removed/uncertain.

I trust the above is as you expect and addresses all the points raised and discussed.

Kind Regards

Shirley Dumigan BSc FCIHT MSoRSA MTPS
Director | Transport & Infrastructure Planning

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