Appendix 12.2
Microsimulation Assessment Report

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Proposed Data Centre, Naas, County Kildare **04/10/2023**

Reference number 2232-SYS-XX-XX-RP-D-0003

MICROSIMULATION ASSESSMENT REPORT & FINDINGS

SYSTRA

NAAS DATA CENTRE

MICROSIMULATION ASSESSMENT REPORT

IDENTIFICATION TABLE	
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Version	Name		Position	Date	Modifications
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	Approved by	A Archer	Director	04/10/2023	

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1. INTRODUCTION

1.1 Overview

1.1.1 SYSTRA Ltd (SYSTRA) has been appointed by Herbata Ltd to provide transportation consultancy services in relation to a proposed data centre located in Naas, County Kildare. The proposed data centre is located to the west of the town of Naas, with the site bound by the M7 to its east, the M7 Business Park to the south, the R409 to the north and agricultural land to the west.

1.1.2 Access to the data centre will be taken from the R409, from the northern boundary of the site. The location of the site is indicated by Figure 1-1.

1.1.3 In conjunction with the Transport Assessment (SYSTRA Report **2232-SYS-XX-XX-RP-D-0001**), SYSTRA has developed a microsimulation model of the local and national network around the NAAS area to assess the impact of proposed data centre.

1.1.4 This report outlines the development of the microsimulation model and the assessment results of base year and forecast year.

1.1.5 The area considered for modelling to assess the new development is as shown the figure 1-1 below.

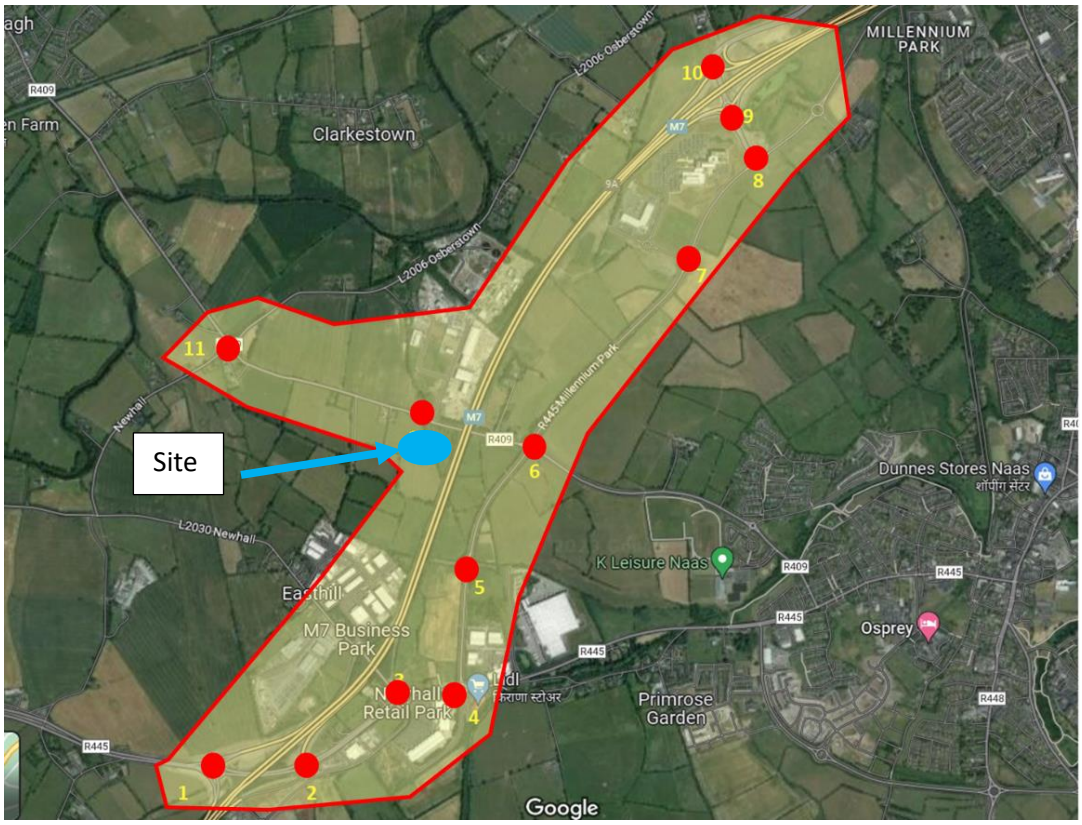


Figure 1-1: Area of Scope

1.1.6 The extent of the VISSIM model has been agreed with Kildare County Council (KCC). In total 12 major junctions were identified for modelling. The M7 mainline was also modelled as the part of the exercise.

1.2 Modelling Software

1.2.1 The traffic model has been developed using VISSIM microsimulation software (version 2022-07). VISSIM allows for the 'linked' modelling of multiple junctions which will allow them to be modelled simultaneously, to capture the impact of upstream and downstream flows on the network and explicitly modelling the effects of queueing. In addition, VISSIM allows the impact of individual driver behaviour characteristics on a network operation and junction performance to be modelled in detail.

1.3 Report Structure

1.3.1 The report is divided into the following chapters:

- Section 2 Data Collection;
- Section 3 Model Development, Calibration and Validation;
- Section 4 Modelling Results;
- Section 5 Further Mitigation; and
- Section 6 Summary & Conclusion.

2. DATA COLLECTION

2.1 Overview

2.1.1 The development and calibration of the VISSIM model required traffic data from several sources to ensure that the model accurately replicated the base year traffic volumes, patterns and network operation. This chapter will outline the data gathered as part of the model development.

2.2 Traffic Surveys

2.2.1 Data from a number of surveys was collected as part of the Local Area Model (LAM) process which was used to inform the VISSIM model development. A summary of the traffic data used in the microsimulation model is shown graphically in Figure 2.1 below and is as follows:

- 12 Junction Turning Counts (JTCs) undertaken for one weekday on 28th March 2023;
- Journey Time Surveys undertaken along the M7, R409 and R445 Millennium Park during peak hours on one weekday on 28th March 2023; and
- ATC surveys at six locations across the study area to record vehicle speeds. The ATC surveys recorded data between 24th and 30th March 2023.

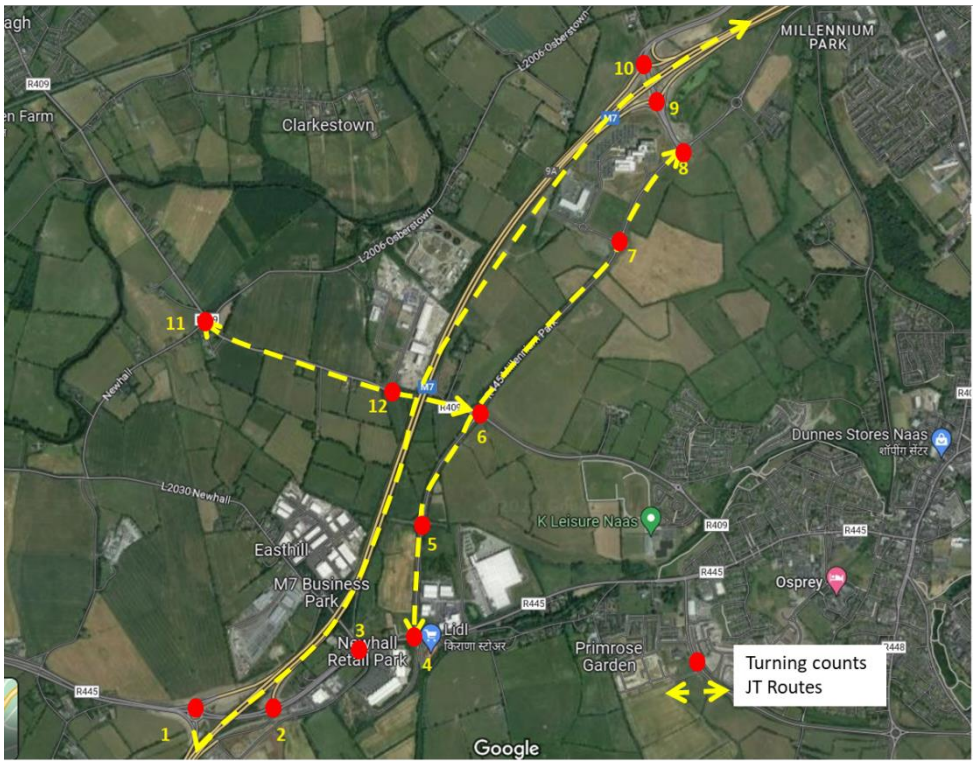


Figure 2-1 Available Data within Model Extents

3. MODEL DEVELOPMENT, CALIBRATION AND VALIDATION

3.1 Overview

3.1.1 This section of the report describes the development, calibration and validation of the VISSIM model. The models have been developed in line with the guidelines set out in the TII Project Appraisal Guidelines (PAG) Unit 5.2: Construction of Traffic Models.

3.2 Network Development

3.2.1 The model was constructed to include the following junctions:

- Sallins Bypass/ M7 Slip Road Roundabout;
- R445 Millennium Park/M7 Slip Road Roundabout;
- Sallins Road /R445 Millennium Park Roundabout;
- R445 Millennium Park/Irish Volvo dealer access Roundabout;
- R445 Millennium Park /R409 Roundabout;
- R445 Millennium/Unnamed Road Roundabout:
- Newbridge Road Roundabout;
- Bundle of Sticks Roundabout;
- R445/M7 Slip Road Roundabout;
- R445/M7 Slip Road Roundabout;
- R445/Osberstown Business Park entry Junction and
- R409/Newhall Junction.

3.2.2 The full model extents is illustrated by Figure 3.1 which shows the VISSIM base year model.

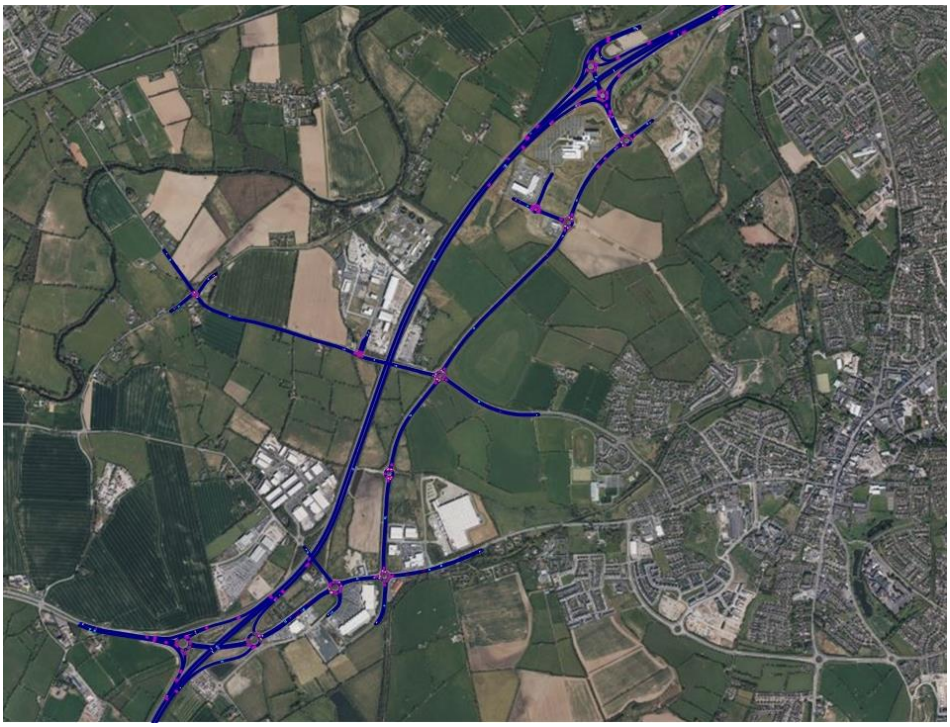


Figure 3-1 VISSIM Microsimulation Model Extents

3.3 Model Specification

3.3.1 AM and PM peak hour models were built for the study area. Each modelled hour covered a 90 minuted period, consisting of a 15 minute pre-peak, a peak hour, and a 15 min cooling-down period. Calibration, validation and all model outputs are produced from the peak hour.

3.3.2 The hourly routes were built, for light vehicles (cars, motorcycles and LGVs) and heavy vehicles (OGV1 and OGV2). The peak hours modelled were 07:30 to 08:30 and 16:15 to 17:15. The pre-peak time periods were required to pre-load the network with sufficient traffic volumes to reflect observed conditions. The post peak is required to allow vehicles to clear the model so that full outputs can be extracted and presented.

3.3.3 The VISSIM model has been developed to the specifications shown in Table 3-1:

Table 3-1:Model Specification

Parameter	Specification
Base Year	2023
Modelling Time Periods	AM (07:15 – 08:45) & PM (16:00 – 17:30)
Peak Hour Evaluation Period	AM (07:30 – 08:30) & PM (16:15 – 17:15)
Warm Up Period	15 min before peak hour
Vehicle Types	Lights (Cars and LGVs), HGVs (OGV1/OGV2)
VISSIM Version	2022.00.07

3.4 Vehicle Classification

3.4.1 VISSIM uses individual vehicle models that are grouped into vehicle types, which are then subsequently grouped into vehicle classes. Vehicle classes for Car, LGV, HGV and Bus were used within the model.

3.5 Model Assignment

3.5.1 Traffic was assigned to the VISSIM network using the 'Static assignment' feature. Vehicles were loaded onto the network in the form of a matrix that was specific to a vehicle type and 1 hour time period.

3.6 Driving Behaviour Parameters

3.6.1 VISSIM has a default set of driving behaviour parameters that are used when building the model network. They contain various parameters which impact the car following, lane change and vehicular reactions to traffic signals. The behaviours are associated to different link types so all vehicles travelling along a specific link display the same driving behaviour properties.

3.6.2 When developing the network, the driving behaviour / link types used throughout the model were:

- Urban (motorised) – All non-motorway links;
- Motorway Merge – M7 merging areas; and

- Motorway Diverge – M7 diverge areas.

3.6.3 The Motorway and Urban driving behaviours are the default VISSIM behaviours, whilst the Merge and Diverge behaviours are amended versions of the Motorway link type, with variations to safety reduction and lane change parameters to better reflect the behaviour of merging / diverging vehicles.

3.7 Priority Control

3.7.1 Priority rules are used to model give way parameters for roundabouts and priority junctions. They have been placed at all give-way locations within the model.

3.8 Random Seed Criteria

3.8.1 The stochastic nature of micro-simulation models means that by simply changing the random seed number, the sampling of values from specified distributions is changed and this will create different model results. VISSIM uses random seeds to vary traffic conditions, including the pattern in which vehicles are released into the network. This is designed to represent daily variations between traffic conditions. Without this variation, the model would not reflect the variability that exists in actual traffic conditions.

3.8.2 The model was run for 10 random seeds to be consistent with industry guidance and for the purpose of the assessment, the results are representative of random seeds between 42 and 51 (increased by 1 increments each run).

3.9 Model Calibration

3.9.1 The base year models have been calibrated based on link flows in accordance with the criteria set out in the TII Project Appraisal Guidelines (PAG) Unit 5.2: 'Construction of Traffic Models'. The PAG specify permissible differences between observed and modelled link flows. There are two calibration criteria set out in PAG for link calibration, individual flow calibration and Geoff Havers (GEH) Statistics. A summary of the calibration criteria is shown in Table 3.2.

Table 3-2 PAG Link Calibration Criteria

Criteria	Acceptability Guideline
Individual flows with GEH < 5	More than 85% of cases

3.10 Link Calibration

3.10.1 The difference between modelled and observed link flows was compared for all vehicles with respect to the criteria outlined in Table 3.2. A summary of the calibration results is presented in Tables 3.3-3.4 for the AM and PM Peak hour.

Table 3-3 AM Peak Hour Link Calibration Summary

Junction	Description	Model	Count	GEH
	Sallins Bypass SB to Sallins Bypass SB	0	0	0.00

Site 1-M7 NB off slip/Sallins Bypass	Sallins Bypass SB to Sallins Bypass NB	604	609	0.20
	Sallins Bypass SB to M7 NB on slip	79	78	0.11
	M7 NB off slip to Sallins Bypass SB	671	592	3.14
	M7 NB off slip to Sallins Bypass NB	313	271	2.46
	M7 NB off slip to M7 NB on slip	0	0	0.00
	Sallins Bypass NB to Sallins Bypass SB	203	206	0.21
	Sallins Bypass NB to Sallins Bypass NB	0	0	0.00
	Sallins Bypass NB to M7 NB on slip	140	144	0.34
Site 2-M7 SB off slip/ Sallins Bypass	Sallins Bypass SB to Sallins Bypass SB	0	0	0.00
	Sallins Bypass SB to M7 SB on slip	444	427	0.81
	Sallins Bypass SB to Sallins Bypass NB	467	441	1.22
	Sallins Bypass NB to Sallins Bypass SB	282	280	0.12
	Sallins Bypass NB to M7 SB on slip	136	132	0.35
	M7 SB off slip to Sallins Bypass SB	64	66	0.25
	M7 SB off slip to M7 SB on slip	1	2	0.82
	M7 SB off slip to Sallins Bypass NB	171	171	0.00
Site 3-R445/Roundabout Link Rd.	Roundabout Link Rd. to Roundabout Link Rd.	1	1	0.00
	Roundabout Link Rd. to R445(SW)	355	347	0.43
	Roundabout Link Rd. to R445(NE)	277	260	1.04
	R445(SW) to Roundabout Link Rd.	281	280	0.06
	R445(SW) to R445(SW)	11	10	0.31
	R445(SW) B to R445(NE) C	312	317	0.28
	R445(NE) to Roundabout Link Rd.	139	136	0.26
	R445(NE) to R445(SW)	222	229	0.47
Site 4-R445 Millennium Park/Millennium Park Access	R445 (N) to R445 (N)	1	1	0.00
	R445 (N) to Millennium Park Access	161	157	0.32
	R445 (N) to R445(S)	417	404	0.64
	Millennium Park Access to R445 (N)	70	72	0.24
	Millennium Park Access to Millennium Park Access	0	0	0.00
	Millennium Park Access to R445(S)	24	22	0.42
	R445(S) to R445 (N)	536	547	0.47
	R445(S) to Millennium Park Access	94	100	0.61
Site 5-R445/R409	R445(N) to R445(N)	0	0	0.00
	R445(N) to R409(W)	114	110	0.38
	R445(N) to R445(S)	120	115	0.46
	R445(N) to R409(E)	200	196	0.28
	R409(W) to R445(N)	224	228	0.27
	R409(W) to R409(W)	1	1	0.00
	R409(W) to R445(S)	54	55	0.14
	R409(W) to R409(E)	220	227	0.47
	R445(S) to R445(N)	108	119	1.03
	R445(S) to R409(W)	23	28	0.99
	R445(S) to R445(S)	0	0	0.00
	R445(S) to R409(E)	6	7	0.39
	R409(E) to R445(N)	311	310	0.06
	R409(E) to R409(W)	77	79	0.23
	R409(E) to R445(S)	27	29	0.38
	R409(E) to R409(E)	0	0	0.00
	Industrial Estate Access to R409(W)	3	2	0.63

Site 6-Industrial Estate Access	Industrial Estate Access to R409(E)	15	15	0.00
	R409(W) to Industrial Estate Access	13	13	0.00
	R409(W) to R409(E)	500	511	0.49
	R409(E) to Industrial Estate Access	42	40	0.31
	R409(E) to R409(W)	172	173	0.08
Site 7-R209/Newhall	R409(NW) to Newhall	101	100	0.10
	R409(NW) to R409(SE)	500	428	3.34
	R409(NW) to L2006 Osberstown	18	17	0.24
	Newhall to R409(NW)	59	62	0.39
	Newhall to R409(SE)	87	85	0.22
	Newhall to L2006 Osberstown	45	45	0.00
	R409(SE) to R409(NW)	172	138	2.73
	R409(SE) to Newhall	31	32	0.18
	R409(SE) to L2006 Osberstown	4	6	0.89
	L2006 Osberstown to R409(NW)	4	4	0.00
	L2006 Osberstown to Newhall	30	31	0.18
	L2006 Osberstown D to R409(SE)	10	10	0.00
Site 8-R445 Millennium Park /Unused Arm	R445(N) to R445(N)	0	1	1.41
	R445(N) to R445(S)	199	200	0.07
	R445(S) to R445(N)	140	152	0.99
	R445(S) to R445(S)	0	0	0.00
Site 9-R445 Millennium Park /Commercial Centre Access	R445(N) to R445(N)	0	0	0.00
	R445(N) to R445(W)	98	94	0.41
	R445(N) to Commercial Centre Access	20	19	0.23
	R445(N) to R445(E)	80	77	0.34
	R445(W) to R445(N)	91	93	0.21
	R445(W) to R445(W)	1	1	0.00
	R445(W) to Commercial Centre Access	64	65	0.12
	R445(W) to R445(E)	633	643	0.40
	Commercial Centre Access to R445(N)	11	13	0.58
	Commercial Centre Access to R445(W)	34	32	0.35
	Commercial Centre Access to Commercial Centre Access	0	0	0.00
	Commercial Centre Access to R445(E)	31	31	0.00
	R445(E) to R445(N)	39	41	0.32
	R445(E) to R445(W)	509	508	0.04
	R445(E) to Commercial Centre Access	40	41	0.16
	R445(E) to R445(E)	2	2	0.00
Site 10-R445/Jigginstown Rd.	Roundabout Link Rd. to R445(SW)	82	80	0.22
	Roundabout Link Rd. to Jigginstown Rd.(S)	13	13	0.00
	Roundabout Link Rd. to R445(E)	172	178	0.45
	R445(SW) to Roundabout Link Rd.	228	225	0.20
	R445(SW) to R445(SW)	1	1	0.00
	R445(SW) to Jigginstown Rd.(S)	30	31	0.18
	R445(SW) to R445(E)	612	616	0.16
	Jigginstown Rd.(S) to Roundabout Link Rd.	11	12	0.29
	Jigginstown Rd.(S) to R445(SW)	10	11	0.31
	Jigginstown Rd.(S) to R445(E)	12	11	0.29
	R445(E) to Roundabout Link Rd.	121	125	0.36

	R445(E) to R445(SW)	484	482	0.09
	R445(E) to Jigginstown Rd.(S)	29	28	0.19
	R445(E) to R445(E)	2	2	0.00
Site 11-M7SB/R445	M7 SB off slip to R445(W)	393	413	1.00
	M7 SB off slip to M7 SB on slip	4	3	0.53
	M7 SB off slip to R445(E)	157	165	0.63
	R445(W) to R445(W)	0	0	0.00
	R445(W) to M7 SB on slip	84	83	0.11
	R445(W) to R445(E)	731	737	0.22
	R445(E) to R445(W)	304	303	0.06
	R445(E) to M7 SB on slip	268	271	0.18
	R445(E) to R445(E)	0	1	1.41
Site 12-M7NB/R445	R445(W) to M7 NB off slip	543	553	0.43
	R445(W) to R445(W)	0	2	2.00
	R445(W) to R445(E)	348	331	0.92
	M7 NB on slip to M7 NB off slip	0	0	0.00
	M7 NB on slip to R445(W)	288	295	0.41
	M7 NB on slip to R445(E)	474	493	0.86
	R445(E) to M7 NB off slip	56	58	0.26
	R445(E) to R445(W)	635	653	0.71
	R445(E) to R445(E)	0	0	0.00

Table 3-4 PM Peak Hour Link Calibration Summary

Junction	Description	Model	Count	GEH
Site 1-M7 NB off slip/Sallins Bypass	Sallins Bypass SB to Sallins Bypass SB	0	0	0.00
	Sallins Bypass SB to Sallins Bypass NB	624	630	0.24
	Sallins Bypass SB to M7 NB on slip	91	88	0.32
	M7 NB off slip to Sallins Bypass SB	498	387	5.28
	M7 NB off slip to Sallins Bypass NB	178	120	4.75
	M7 NB off slip to M7 NB on slip	1	1	0.00
	Sallins Bypass NB to Sallins Bypass SB	402	409	0.35
	Sallins Bypass NB to Sallins Bypass NB	0	0	0.00
	Sallins Bypass NB to M7 NB on slip	192	199	0.50
Site 2-M7 SB off slip/Sallins Bypass	Sallins Bypass SB to Sallins Bypass SB	0	0	0.00
	Sallins Bypass SB to M7 SB on slip	476	487	0.50
	Sallins Bypass SB to Sallins Bypass NB	271	266	0.31
	Sallins Bypass NB to Sallins Bypass SB	407	411	0.20
	Sallins Bypass NB to M7 SB on slip	292	290	0.12
	M7 SB off slip to Sallins Bypass SB	188	194	0.43
	M7 SB off slip to M7 SB on slip	3	4	0.53
	M7 SB off slip to Sallins Bypass NB	327	336	0.49
Site 3-R445/Roundabout Link Rd.	Roundabout Link Rd. to Roundabout Link Rd.	0	0	0.00
	Roundabout Link Rd. to R445(SW)	443	460	0.80
	Roundabout Link Rd. to R445(NE)	153	152	0.08
	R445(SW) to Roundabout Link Rd.	388	392	0.20
	R445(SW) to R445(SW)	11	12	0.29
	R445(SW) B to R445(NE) C	290	287	0.18
	R445(NE) to Roundabout Link Rd.	313	310	0.17
	R445(NE) to R445(SW)	460	463	0.14
Site 4-R445 Millennium Park/Millennium Park Access	R445 (N) to R445 (N)	5	5	0.00
	R445 (N) to Millennium Park Access	105	105	0.00
	R445 (N) to R445(S)	800	816	0.56
	Millennium Park Access to R445 (N)	188	187	0.07
	Millennium Park Access to Millennium Park Access	0	0	0.00
	Millennium Park Access to R445(S)	105	108	0.29
	R445(S) to R445 (N)	498	493	0.22
	R445(S) to Millennium Park Access	51	52	0.14
Site 5-R445/R409	R445(N) to R445(N)	1	1	0.00
	R445(N) to R409(W)	305	312	0.40
	R445(N) to R445(S)	196	200	0.28
	R445(N) to R409(E)	397	409	0.60
	R409(W) to R445(N)	126	121	0.45
	R409(W) to R409(W)	0	0	0.00
	R409(W) to R445(S)	41	41	0.00
	R409(W) to R409(E)	107	106	0.10
	R445(S) to R445(N)	186	192	0.44
	R445(S) to R409(W)	40	44	0.62
	R445(S) to R445(S)	9	9	0.00
	R445(S) to R409(E)	24	28	0.78
	R409(E) to R445(N)	235	240	0.32

	R409(E) to R409(W)	256	250	0.38
	R409(E) to R445(S)	31	33	0.35
	R409(E) to R409(E)	0	0	0.00
Site 6-Industrial Estate Access	Industrial Estate Access to R409(W)	15	15	0.00
	Industrial Estate Access to R409(E)	44	43	0.15
	R409(W) to Industrial Estate Access	5	4	0.47
	R409(W) to R409(E)	230	224	0.40
	R409(E) to Industrial Estate Access	17	19	0.47
	R409(E) to R409(W)	583	586	0.12
Site 7-R209/Newhall	R409(NW) to Newhall	53	54	0.14
	R409(NW) to R409(SE)	230	174	3.94
	R409(NW) to L2006 Osberstown	14	13	0.27
	Newhall to R409(NW)	127	128	0.09
	Newhall to R409(SE)	46	44	0.30
	Newhall to L2006 Osberstown	37	38	0.16
	R409(SE) to R409(NW)	583	464	5.20
	R409(SE) to Newhall	121	122	0.09
	R409(SE) to L2006 Osberstown	8	9	0.34
	L2006 Osberstown to R409(NW)	17	18	0.24
	L2006 Osberstown to Newhall	37	37	0.00
	L2006 Osberstown D to R409(SE)	12	12	0.00
Site 8-R445 Millennium Park /Unused Arm	R445(N) to R445(N)	0	1	1.41
	R445(N) to R445(S)	275	282	0.42
	R445(S) to R445(N)	264	272	0.49
	R445(S) to R445(S)	0	1	1.41
Site 9-R445 Millennium Park /Commercial Centre Access	R445(N) to R445(N)	0	0	0.00
	R445(N) to R445(W)	127	134	0.61
	R445(N) to Commercial Centre Access	80	83	0.33
	R445(N) to R445(E)	66	67	0.12
	R445(W) to R445(N)	127	131	0.35
	R445(W) to R445(W)	1	1	0.00
	R445(W) to Commercial Centre Access	137	139	0.17
	R445(W) to R445(E)	537	546	0.39
	Commercial Centre Access to R445(N)	79	79	0.00
	Commercial Centre Access to R445(W)	187	185	0.15
	Commercial Centre Access to Commercial CentreAccess	3	2	0.63
	Commercial Centre Access to R445(E)	98	101	0.30
	R445(E) to R445(N)	59	62	0.39
	R445(E) to R445(W)	652	639	0.51
	R445(E) to Commercial Centre Access	106	107	0.10
	R445(E) to R445(E)	0	0	0.00
Site 10-R445/Jigginstown Rd.	Roundabout Link Rd. to R445(SW)	186	188	0.15
	Roundabout Link Rd. to Jigginstown Rd.(S)	9	9	0.00
	Roundabout Link Rd. to R445(E)	158	166	0.63
	R445(SW) to Roundabout Link Rd.	242	238	0.26
	R445(SW) to R445(SW)	1	2	0.82
	R445(SW) to Jigginstown Rd.(S)	23	25	0.41
	R445(SW) to R445(E)	635	646	0.43
	Jigginstown Rd.(S) to Roundabout Link Rd.	18	19	0.23

	Jigginstown Rd.(S) to R445(SW)	34	36	0.34
	Jigginstown Rd.(S) to R445(E)	16	13	0.79
	R445(E) to Roundabout Link Rd.	197	201	0.28
	R445(E) to R445(SW)	751	749	0.07
	R445(E) to Jigginstown Rd.(S)	15	14	0.26
	R445(E) to R445(E)	1	1	0.00
Site 11-M7SB/R445	M7 SB off slip to R445(W)	386	390	0.20
	M7 SB off slip to M7 SB on slip	0	0	0.00
	M7 SB off slip to R445(E)	290	289	0.06
	R445(W) to R445(W)	0	0	0.00
	R445(W) to M7 SB on slip	263	262	0.06
	R445(W) to R445(E)	616	617	0.04
	R445(E) to R445(W)	427	440	0.62
	R445(E) to M7 SB on slip	512	535	1.01
	R445(E) to R445(E)	0	3	2.45
Site 12-M7NB/R445	R445(W) to M7 NB off slip	484	486	0.09
	R445(W) to R445(W)	0	5	3.16
	R445(W) to R445(E)	629	622	0.28
	M7 NB on slip to M7 NB off slip	0	3	2.45
	M7 NB on slip to R445(W)	140	144	0.34
	M7 NB on slip to R445(E)	256	257	0.06
	R445(E) to M7 NB off slip	152	155	0.24
	R445(E) to R445(W)	657	667	0.39
	R445(E) to R445(E)	0	3	2.45

3.10.2 Tables 3-3 (AM peak) and 3-4 (PM Peak) demonstrate that 100% of the link flows achieve a GEH of less than 5.

3.11 Model Validation

3.11.1 The models have been validated against Journey Times observed on site. The validation criteria for Journey Times is outlined in PAG Unit 5.2: 'Construction of Traffic Models' and is summarised below in Table 3.5.

Table 3-5 PAG Journey Time Calibration Criteria

Type	Validation Criteria	Acceptability Guideline
Journey Times	Times within 15% or 1 minute if higher	More than 85% of cases

3.12 Journey time Validation

3.12.1 Journey times were extracted from the model and compared against the 4 routes shown previously in Figure 3.2. For the model to be validated, 85% of the modelled journey times must be within 15% of the observed or 1 minute if higher. Figure 3.2 below shows the Journey

3.12.2 Time Routes that were validated along with the various sections. Tables 3.6 – 3.7 present the results of the journey times comparison for both peaks. The results indicate that all routes within the model meet TII journey time validation criteria for both time periods.

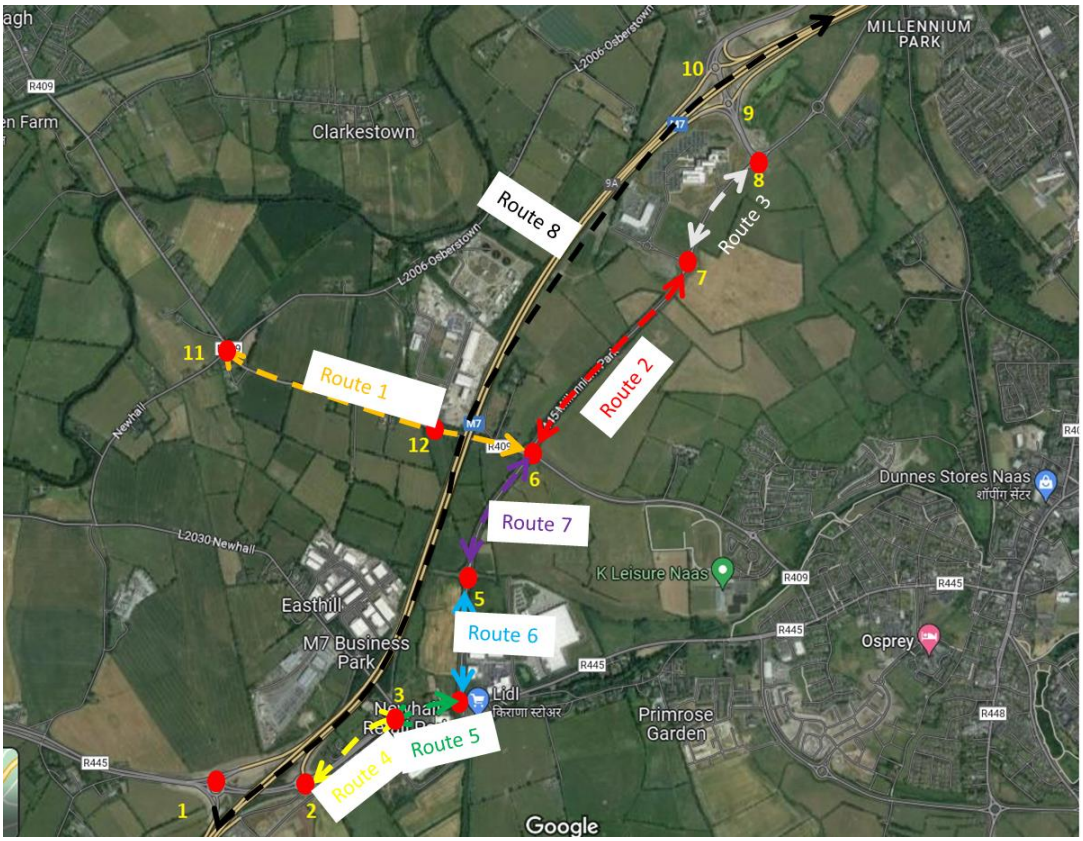


Figure 3-2 Journey Time Routes and Sections

Table 3-6 AM Peak Hour Journey Time Validation

Route	Observed	Modelled	% Difference
Route 1 EB	98	101	2.6%
Route 2 EB	67	71	6.0%
Route 3 EB	37	41	12.0%
Route 3 WB	38	38	0.8%
Route 2 WB	68	69	1.2%
Rout 1 WB	91	90	0.9%
Route 4 EB	39	38	1.5%
Route 5 EB	26	29	10.7%
Route 6 EB	42	42	0.7%
Route 7 EB	100	87	13.0%
Route 7 WB	44	47	6.6%
Route 6 WB	46	44	3.5%
Route 5 WB	22	19	12.8%
Route 4 WB	71	61	13.7%
Route 8 SB	124	119	3.8%
Route 8 NB	130	119	8.7%

Table 3-7 Weekday Network Peak Journey Time Validation

Route	Observed	Modelled	% Difference
Route 1 EB	86	85	0.9%
Route 2 EB	67	69	2.4%
Route 3 EB	37	42	14.8%
Route 3 WB	38	42	10.6%
Route 2 WB	71	75	6.3%
Rout 1 WB	84	93	10.3%
Route 4 EB	39	34	12.9%
Route 5 EB	33	32	2.6%
Route 6 EB	40	44	9.4%
Route 7 EB	99	111	11.8%
Route 7 WB	42	47	11.8%
Route 6 WB	42	45	7.4%
Route 5 WB	24	23	5.0%
Route 4 WB	74	84	13.7%
Route 8 SB	129	124	4.1%
Route 8 NB	121	118	2.7%

3.12.3 The journey time validation results demonstrate that 100% of modelled journey times validate to the observed journey times in both the AM and PM peak and therefore, accord with all PAG criteria.

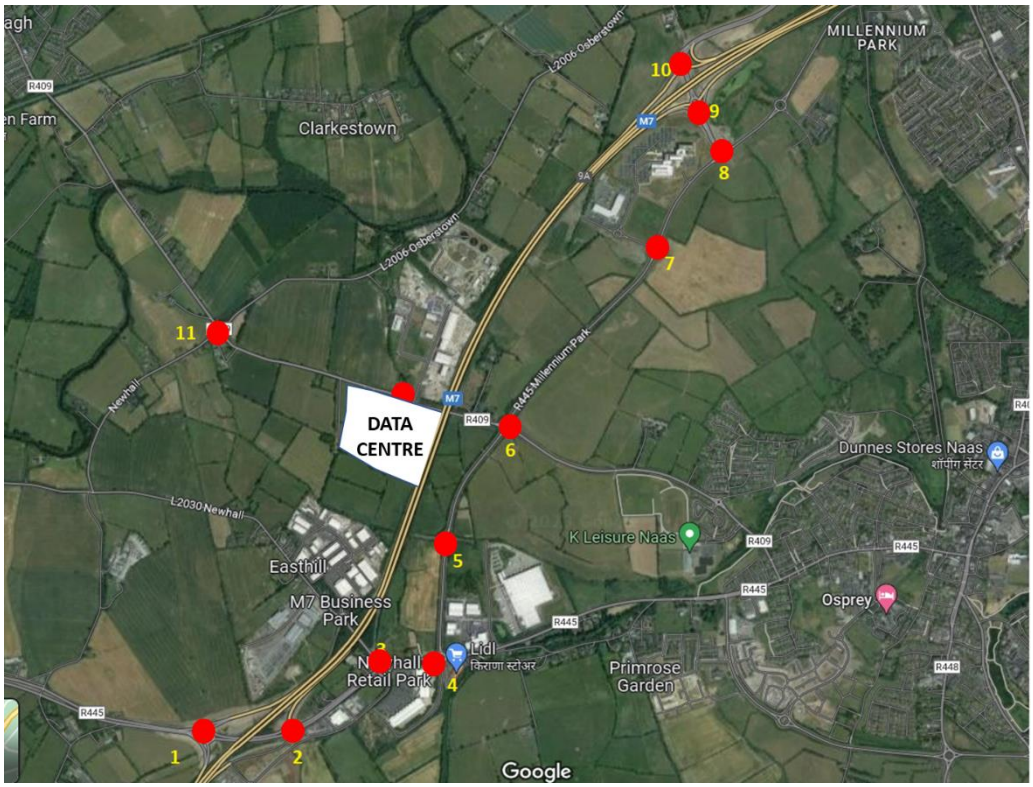
4. MODELLING RESULTS

4.1 Overview

4.1.1 This chapter of the report gives an overview of the modelling results for the new data centre proposals. Fore ease of reference, the location of the data centre in the context of the modelled network is indicated in Figure 4-1.

- An entry and exit has been added on to the R409. Due to the addition of the new lane there is a introduction of a new 3 arm priority junction;
- As per the Naas data centre TA, it is estimated that 52 inbound (entry) trips in the AM - 4 from the west and 52 from the east - and 52 outbound trips in the PM - 4 to the west and 52 to the east. This is indicated by Table 4-1 (extracted from the Transport Assessment (SYSTRA Report **2232-SYS-XX-XX-RP-D-0001**); and
- As agreed with KCC, we have modelled a single forecast year of 2030, This is for the 2030 base and 2030 base plus data centre development.

Figure 4-1: Proposed Data Centre Location



4.2 2030 Forecast Year

4.2.1 As agreed with KCC, the 2030 forecast year takes into consideration the future aspirations of the Naas Sallins Transport Strategy. In order to model the 2030 future year scenario, the base traffic volumes have been uplifted by 20% on the local roads and 23% for the M7 mainline through traffic. These factors have been applied to the AM and PM peak periods, and were derived from the models for the Naas Sallins Transport Strategy.

4.3 Data Centre Peak Hour Traffic Generation

4.3.1 Table 4-1 indicates the AM and PM peak hour traffic generation. This has been extracted from the supporting TA and derived from a first principles approach.

Table 4-1 Data Centre AM & PM Traffic Generation

	AM PEAK PERIOD			PM PEAK PERIOD		
Category	Arrival	Departure	Total	Arrival	Departure	Total
Engineering Support	12	-	12	-	12	12
Technical Support	10	-	10	-	10	10
Administration Staff	12	-	12	-	12	12
Landlord Management	8	-	8	-	8	8
Landlord Engineering Support	10	-	10	-	10	10
Landlord Security	4	-	4	-	4	4
TOTALS	56	-	56	-	56	56

4.4 Network Statistics Comparison

4.4.1 Tables 4-2 and 4-3 provide a comparison of the network statistics for the entire modelled network for the weekday AM and PM time periods. This is based on the forecast year of 2030, with and without development related traffic from the proposed data centre.

Table 4-2 AM Peak Comparison of Network Statistics

	2023 Base	2030 Base	2030 Base with Development	Diff.
Average delay (s)	25.3	46.9	47.0	0.1
Total delay (hr)	79.9	175.3	176.2	0.9
Average stopped delay (s)	1.6	6.4	6.6	0.2
Average network speed (mph)	47.8	42.9	42.8	0
Total Vehicles	10623	12387	12416	29
Latent Demand (Veh)	0	183	189	6

4.4.2 As Table 4-2 clearly demonstrates, the proposed data centre will have a negligible impact on the modelled network during the AM peak period, with minimal increases for each of the measured statistics, in comparison to the 2030 base.

Table 4-3 PM Peak Comparison of Network Statistics

	2023 Base	2030 Base	2030 Base with Development	Diff.
Average delay (s)	31.6	56.3	57.1	0.8
Total delay (hrs)	124.1	261.5	266.2	4.7
Average stopped delay (s)	2.5	9.1	9.2	0.1
Average network speed (mph)	46.3	41.6	41.4	0
Total Vehicles	13215	15475	15549	74
Latent Demand (veh)	0	379	381	2

4.4.3 Similar to the AM period, Table 4-3 clearly demonstrates, the proposed data centre will have a negligible impact on the modelled network during the PM peak period, with minimal increases for each of the measured statistics, in comparison to the 2030 base.

4.5 Journey Time Comparison

4.5.1 Travel times were extracted from both peak periods for all of the routes shown below in Figure 4.2 below.

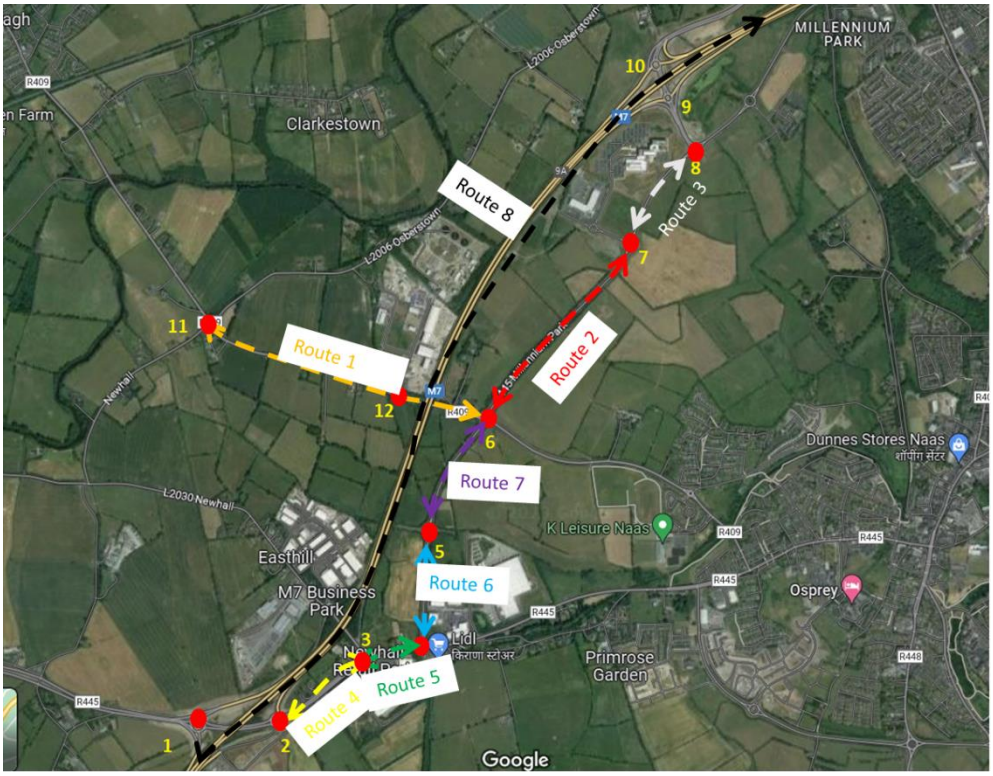


Figure 4-2 Journey Time Routes for Comparison

4.5.2 Tables 4-4 and 4-5 provide a comparison of the journey times for eight routes indicated by Figure 4-2. This is for the weekday AM and PM time periods, for the forecast year of 2030, and with and without development related traffic from the proposed data centre.

Table 4-4 AM Peak Journey Time Comparison

Route	2030 Base (s)	2030 Base with Development (s)	Difference (s)
Route 1 EB	131.6	146.2	14.5
Route 2 EB	74.2	74.1	-0.1
Route 3 EB	41.9	41.8	0.0
Route 3 WB	39.1	39.2	0.1
Route 2 WB	70.7	70.8	0.1
Rout 1 WB	91.6	97.3	5.7
Route 4 EB	78.6	82.0	3.4
Route 5 EB	39.9	40.2	0.3
Route 6 EB	42.6	42.6	0.0
Route 7 EB	88.9	89.3	0.3
Route 7 WB	46.8	46.9	0.1
Route 6 WB	44.8	45.3	0.4
Route 5 WB	19.3	19.4	0.1
Route 4 WB	63.9	63.9	0.0
Route 8 SB	120.9	121.3	0.4
Route 8 NB	121.3	121.2	-0.1

4.5.3 Overall, Table 4-4 indicates that the additional traffic generated by the proposed data centre during the weekday AM period will result in a negligible increase in journey times, along each route within the modelled area. It is noted that Route 1 (eastbound) will see an increase of approximately 15 seconds. SYSTRA would note that this route on the R409, where the development will be accessed from, is approximately 1.3km in length. As such an additional 15 seconds would not have a perceivable impact to drivers.

Table 4-5 PM Peak Journey Time Comparison

Route	2030 Base (s)	2030 Base with Development (s)	Difference (s)
Route 1 EB	88.8	104.5	15.7
Route 2 EB	69.9	69.9	-0.1
Route 3 EB	43.1	43.1	0.0
Route 3 WB	48.2	47.9	-0.3
Route 2 WB	83.0	83.6	0.5
Rout 1 WB	95.4	102.9	7.5
Route 4 EB	106.1	110.0	3.9
Route 5 EB	60.9	62.2	1.2
Route 6 EB	44.0	44.1	0.1
Route 7 EB	125.0	125.3	0.3
Route 7 WB	47.1	47.1	0.0
Route 6 WB	45.9	45.6	-0.3
Route 5 WB	22.4	22.7	0.4
Route 4 WB	110.8	111.6	0.8
Route 8 SB	129.4	130.4	1.0
Route 8 NB	118.9	118.9	0.0

4.5.4 As with the AM period, Table 4-5 indicates that the additional traffic generated by the proposed data centre during the weekday PM period will result in a minor increase in journey times, along each route within the modelled area. Similar to the AM period, Route 1

(eastbound) will see an increase of approximately 16 seconds, but over a distance of approximately 1.3km, drivers are would not notice this increase in journey time.

4.6 Summary of Modelling Results

4.6.1 Having carried out a robust and comprehensive modelling exercise, the results of the VISSIM models clearly indicate that the proposed development will not have a detrimental impact to the operation of the local and strategic road network. This includes Junctions 9A and 10 of the M7.

4.6.2 A copy of the VISSIM modelling files can be provided on request.

5. SUMMARY AND CONCLUSION

5.1 Summary

5.1.1 SYSTRA Ltd has been appointed to provide transportation consultancy services in relation to a proposed data centre located in Naas, County Kildare. The proposed data centre is located to the west of the town of Naas, with the site bound by the M7 to its east, the M7 Business Park to the south, the R409 to the north and agricultural land to the west.

5.1.2 In conjunction with the Transport Assessment (SYSTRA Report **2232-SYS-XX-XX-RP-D-0001**), SYSTRA has developed a microsimulation model of the local and national network around the NAAS area to assess the impact of proposed data centre.

5.1.3 The development and calibration of the VISSIM model required traffic data from several sources to ensure that the model accurately replicated the base year traffic volumes, patterns and network operation. The model was developed in line with the guidelines set out in the TII Project Appraisal Guidelines (PAG) Unit 5.2: Construction of Traffic Models and meets all of the calibration and validation criteria.

5.1.1 The travel characteristics for the data centre have been calculated from a first principles approach, based on staff numbers and shift patterns, anticipated visitor numbers and Census data. Growth factors to calculate the forecast future year of 2030 have been agreed with KCC to reflect the growth aspirations of Naas Transport Strategy. These equate to 20% for through traffic on the M7 and 23% on the local roads.

5.2 Overall Conclusion

5.2.1 In order to comprehensively model the traffic impact from the proposed data centre, SYSTRA has developed a VISSIM microsimulation model of the adjacent road network. This includes Junctions 9A and 10 of the M7, the M7 itself between these junctions, the R409 and the R445 that runs parallel to the M7, between the aforementioned two junctions.

5.2.2 The results of the analysis indicate that the proposed data centre will have a negligible impact on the modelled road network, including Junctions 9A and 10 of the M7. SYSTRA would therefore conclude that no off-site works are required to mitigate the development's impact.

SYSTRA provides advice on transport, to central, regional and local government, agencies, developers, operators and financiers.

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