

TECHNICAL NOTE

TOTON

TOTON – REFERENCE CASE REPORT

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1. INTRODUCTION

- 1.1.1 SYSTRA has been commissioned by Mode Transport Planning to assess the impact of three housing sites (Toton North, Toton East and Toton West) in Toton with primary access provided from Stapleford Lane.
- 1.1.2 This Technical Note details the approach taken to develop four future year Reference Case models (2025, 2026, 2028 and 2041) using the East Midlands Gateway Model (EMGM). It outlines the key modelling assumptions, key infrastructure schemes and land use assumptions to forecast from the 2016 base model to the 2025, 2026, 2028 and 2041 Reference Case years. It also details the outputs from the Reference Case modelling.

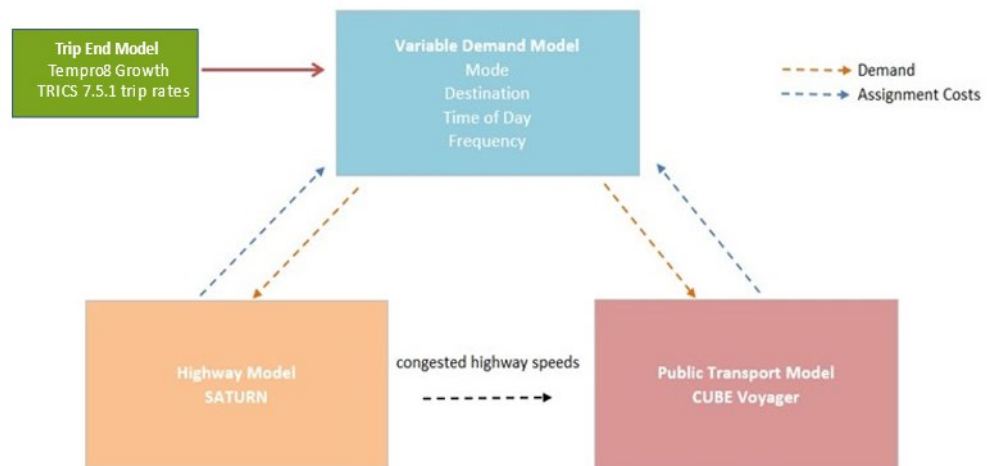
2. FORECASTING METHODOLOGY

2.1 Structure of the East Midlands Gateway Model (EMGM)

2.1.1 The EMGM was developed as a multimodal transport model built following guidance in the Department for Transport's (DfT) Transport Analysis Guidance (TAG). An overview of the structure of the EMGM is shown in Figure 1. In summary, the modelling suite is comprised of the following elements:

- SATURN Highway Model;
- CUBE Voyager Public Transport Model;
- CUBE Variable Demand Model including destination, mode choice, trip frequency and time of day responses; and,
- TRICS based Trip End Model.

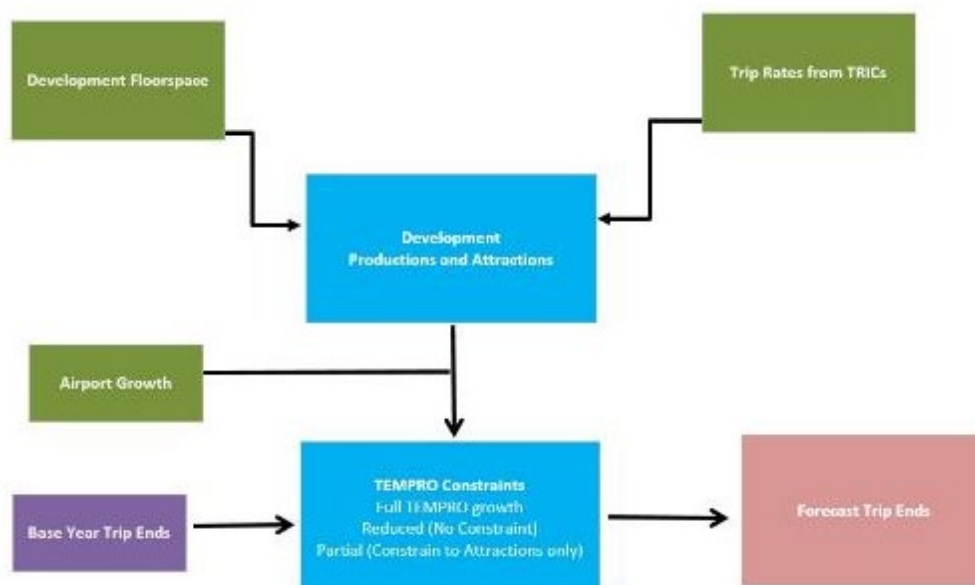
Figure 1. EMGM Technical Structure



2.2 Forecast Demand and the Trip End Model

2.2.1 Forecast demand is calculated in the Trip End Model, the structure of which is shown in Figure 2.

Figure 2. Trip End Model Structure



- 2.2.2 The number of development trips is calculated from trip rates contained within TRICS software and applied to floorspace or the number of dwellings proposed at each development. The development trips are added to the base matrices and then background growth is applied to the matrix in a way that ensures that the outturn growth matches TEMPro 8 growth forecasts i.e. the EMGM is constrained to TEMPro growth.
- 2.2.3 Outturn generations for developments which have been entered specifically will closely align the expected level of generations. Residual TEMPro growth is applied to surrounding wards within each MSOA and constrained at a district level.
- 2.2.4 East Midlands Airport growth provided by the airport is applied as a development zone to ensure that the growth in passengers and freight predicted by the airport is achieved within the model.
- 2.2.5 Trip rates have been extracted from TRICS 7.5.1 for different types of land-use and segmented by mode and time period. The final person trip rates applied in the trip end model are shown in Table 1. These have been previously agreed with the Local Authorities and National Highways for the development of previous EMGM Reference Cases.

Table 1. EMGM Person Trips Rates

	AM PEAK (08:00 – 09:00)			PM PEAK (17:00 – 18:00)		
	ARRIVAL	DEPARTURE	TOTAL	ARRIVAL	DEPARTURE	TOTAL
Residential 250> (per dwelling)	0.183	0.729	0.912	0.570	0.257	0.827
B1 Employment (per 100sqm)	1.631	0.115	1.746	0.102	1.479	1.581
B2 Employment (per 100sqm)	0.388	0.145	0.533	0.081	0.375	0.456
B8 Employment (per 100sqm)	0.087	0.023	0.110	0.011	0.042	0.090
Primary Education (per 100sqm)	7.193	1.613	8.806	0.311	0.658	0.969
Secondary Education (per 100sqm)	2.341	0.256	2.597	0.066	0.634	0.700
Food Retail (per 100sqm)	3.518	2.624	6.142	6.558	6.887	13.445
Non-Food Retail (per 100sqm)	0.287	0.069	0.356	0.253	0.206	0.459
Café/Restaurant/Bar (per 100sqm)	0.000	0.000	0.000	6.256	2.874	9.130
Health Centre (Clinic) (per 100sqm)	1.952	0.355	2.307	0.124	0.805	0.929

3. TOTON REFERENCE CASES

3.1 Introduction

- 3.1.1 This chapter details the developments and infrastructure schemes that will be included in the 2025, 2026, 2028 and 2041 Reference Cases unless stated otherwise. Build out rates are based upon best available knowledge, as provided by each Planning Authority.

3.2 Infrastructure Schemes

Committed Infrastructure Schemes

- 3.2.1 Table 2 to Table 5 detail the committed infrastructure schemes that will be included in each of the Reference Cases. These schemes are either already constructed or are committed schemes expected to be operational by 2041. Schemes are presented by the responsible authority.

Table 2. National Highways Committed Infrastructure Schemes

NATIONAL HIGHWAYS SCHEMES	2025	2026	2028	2041
A52 Nottingham junction improvements at the following junctions: Bingham Road, Stragglethorpe Road, Silverdale roundabout and Gamston roundabout	Y	Y	Y	Y
Grade Separation of A38 junctions with A61, A52 and A5111	N	N	N	Y
EM SRFI mitigation at M1 J24/24a (built)	Y	Y	Y	Y
A52 Nottingham Junctions Improvement Scheme (Nottingham Knight and Wheatcroft)	N	N	N	Y
Improvements to M1 J22 (associated with Bardon Grange development)	Y	Y	Y	Y
A453 Mill Hill roundabout and Crusader roundabout improvement schemes as conditioned to the consented Clifton South SUE development (planning reference 14/01417/OUT)	Y	Y	Y	Y
Smart Motorways schemes implemented along M1 J23a to J25 (built)	Y	Y	Y	Y
M1 J20 signalisation to support the Lutterworth East development	Y	Y	Y	Y
A46/A6 junction improvements to support North Birstall development	Y	Y	Y	Y
M1 J26/A610 slip road improvements	Y	Y	Y	Y
M1 J28 junction improvement scheme	N	N	N	Y
M1 J27 junction improvement scheme	N	N	N	Y
A514/A50 junction slip lanes	Y	Y	Y	Y
Signalisation of southbound A38(T) arm at A38 Kingsway/A5111	Y	Y	Y	Y

NATIONAL HIGHWAYS SCHEMES	2025	2026	2028	2041
EMIP Development Mitigation	N	N	N	Y
M1 widening between J23a and 25	Y	Y	Y	Y

Table 3. Nottingham City and Nottinghamshire Committed Infrastructure Schemes

NOTTINGHAM CITY AND NOTTINGHAMSHIRE SCHEMES	2025	2026	2028	2041
Turning Point South	Y	Y	Y	Y
Gedling Access Road (built)	Y	Y	Y	Y
Boots Link Road (built)	Y	Y	Y	Y
A614 / A6097 MRN junction scheme package (6 junctions)	N	N	N	Y
A60 Larch Farm crossroads improvement, Ravenshead	Y	Y	Y	Y
A612 Colwick Loop Road bus priority linked to southern growth corridor	N	N	N	Y
Northern, Southern, Central and Western bus priority growth corridors as part of Transforming Cities Fund	N	N	N	Y

Table 4. Derby City and Derbyshire Committed Infrastructure Schemes

DERBY CITY OR DERBYSHIRE SCHEMES	2025	2026	2028	2041
Highway Proposals associated with the East Midlands Gateway development adjacent to M1 J24 (built)	Y	Y	Y	Y
Stenson Road/A5111 associated with Stenson Fields development	Y	Y	Y	Y
Radbourne Lane development mitigation	N	N	N	Y
Schemes associated with South Derbyshire Core Strategy (south of A50)	N	N	N	Y
A52 Wyvern Transport Improvement Scheme (built)	Y	Y	Y	Y
NO2 Scheme	Y	Y	Y	Y
Rolls Royce Victory Road Realignment (built)	Y	Y	Y	Y
New A50 junction and associated South Derby Growth Zone link road	N	N	N	Y
Pentagon Island bus priority	N	N	N	Y
Junction Improvements at Blue Peter Roundabout and London Road (built)	Y	Y	Y	Y
Junction Improvements associated with Boulton Moor development	N	N	N	Y

DERBY CITY OR DERBYSHIRE SCHEMES	2025	2026	2028	2041
Walton Bypass (under construction)	Y	Y	Y	Y
Woodville to Swadlincote Regeneration Route	N	N	N	Y
Wragley Way Development Mitigation	N	N	N	Y
Smartparc Highway Improvements	N	N	N	Y
Merrill Way Signal Junction Improvement	N	N	N	Y
Improvement schemes associated with Transforming Cities	N	N	N	Y

Table 5. Leicestershire Committed Infrastructure Schemes

LEICESTERSHIRE SCHEMES	2025	2026	2028	2041
Bardon vehicular link and improvements to A42 junction 13 (associated with Bardon Grange)	N	N	N	Y
Link Road between A512 and A6 north and improvements to M1 J23 (associated with Garendon)	N	N	N	Y
Castle Donnington Western Relief Road linking Back Lane with Hill Top	Y	Y	Y	Y
Signalisation of the A50/A46 roundabout (associated with Ashton Green and Glenfield Park)	Y	Y	Y	Y
Signalisation of the A46/Ansty Lane roundabout (associated with Ashton Green)	Y	Y	Y	Y
Kegworth Bypass (built)	Y	Y	Y	Y

Infrastructure Schemes Without Funding Commitment

3.2.2 Table 6 to Table 8 detail all proposed infrastructure schemes that will be included in the Reference Case that are associated with Local Plans within the wider modelled area.

Table 6. Nottingham City or Nottinghamshire Proposed Infrastructure Schemes

NOTTINGHAM CITY AND NOTTINGHAMSHIRE SCHEME	2025	2026	2028	2041
Ashfield transport enhancements associated with Local Plan	N	N	N	Y

Table 7. Derby City or Derbyshire Proposed Infrastructure Schemes

DERBY CITY OR DERBYSHIRE SCHEME	2025	2026	2028	2041
Kirk Hallam Relief Road	N	N	N	Y

DERBY CITY OR DERBYSHIRE SCHEME	2025	2026	2028	2041
Amber Valley transport enhancements associated with Local Plan	N	N	N	Y
Erewash transport enhancements associated with Local Plan	N	N	N	Y

Table 8. Leicestershire Proposed Infrastructure Schemes

LEICESTERSHIRE SCHEMES	2025	2026	2028	2041
Main road via East Thurmaston from Barkby Thorpe Lane to King Street and Hamilton Lane	N	N	N	Y
Link to Sandhills Avenue	N	N	N	Y
Link road from North East Leicester SUE	N	N	N	Y
Capacity enhancements at A607 Barkby Thorpe Lane and Troon way / Barkby Road roundabouts	N	N	N	Y

3.3 Committed Developments

- 3.3.1 A number of proposed developments are expected to be completed or under development between 2016 and 2041.
- 3.3.2 *TN02 Toton - Reference Case Assumptions* contains a summary of the developments that are over 180 dwellings (or equivalent generations for non-residential developments) that have been specifically modelled for the Reference Cases.
- 3.3.3 The Reference Cases have been based on the predicted levels of development assumed to be occupied and includes key transport infrastructure changes.
- 3.3.4 As well as site specific assumptions, the following have been included:
- Application of the generic TEMPro 8 growth assumptions between 2016 and 2025, 2026, 2028 and 2041 at a ward/district level within the simulated modelled area and at a regional level outside the simulation area; and
 - East Midlands Airport growth to 2025, 2026, 2028 and 2041.

3.4 East Midlands Airport Growth

- 3.4.1 SYSTRA has obtained information on passenger, employee and freight growth through the airport as well as any proposals for the expansion of ancillary development in and around the site for East Midlands Airport.
- 3.4.2 Table 9 provides detailed growth predictions for trips associated with the airport zones based on information provided by the airport. These zones have been constrained to TEMPro growth assumptions.

Table 9. East Midlands Airport (Total Person Trips)

TIME PERIOD	AIRPORT SITE	2025 TRIP GENERATION		2026 TRIP GENERATION		2028 TRIP GENERATION		2041 TRIP GENERATION	
		IN	OUT	IN	OUT	IN	OUT	IN	OUT
AM Peak (0800-0900)	Main Airport (central)	1578	635	1652	658	1802	705	2771	1012
	DHL Freight (Western)	735	156	760	164	180	809	1132	282
	Pegasus	656	147	656	147	656	147	656	147
Interpeak (av. 1100-1400)	Main Airport (central)	776	783	805	813	873	861	1226	1260
	DHL Freight (Western)	196	223	205	233	224	252	346	382
	Pegasus	148	183	148	183	148	183	148	183
PM Peak (1700-1800)	Main Airport (central)	606	1387	630	1452	679	1582	996	2428
	DHL Freight (Western)	199	679	207	701	223	744	329	1026
	Pegasus	167	526	167	526	167	526	167	526

4. REFERENCE CASE OUTPUTS

4.1 Highway Trip Growth

4.1.1 Table 10 to Table 13 outline the growth in highway trips between the 2016 base and the 2025, 2026, 2028 and 2044 Reference Cases for the AM and PM peaks.

Table 10. Growth in 2025 Highway Trips (pcus/hr)

PEAK	2016 BASE YEAR	2025 REFERENCE	% CHANGE FROM BY
AM Peak	330,216	369,437	11.9%
PM Peak	331,329	365,405	10.3%

Table 11. Growth in 2026 Highway Trips (pcus/hr)

PEAK	2016 BASE YEAR	2026 REFERENCE	% CHANGE FROM BY
AM Peak	330,216	382,132	15.7%
PM Peak	331,329	380,588	14.9%

Table 12. Growth in 2028 Highway Trips (pcus/hr)

PEAK	2016 BASE YEAR	2028 REFERENCE	% CHANGE FROM BY
AM Peak	330,216	386,762	17.1%
PM Peak	331,329	382,381	15.4%

Table 13. Growth in 2041 Highway Trips (pcus/hr)

PEAK	2016 BASE YEAR	2041 REFERENCE	% CHANGE FROM BY
AM Peak	330,216	415,689	25.9%
PM Peak	331,329	409,346	23.5%

4.2 Junction Congestion

4.2.1 Junction congestion is measured by determining the ratio of the volume of traffic to the capacity of traffic that can be accommodated by a junction. A Volume to Capacity (V/C) percentage of 85% is considered to be the threshold at which the junction is approaching its effective operational capacity, therefore increasing the likelihood of operational problems including congestion and associated delays and queues. A V/C percentage of 100% indicates that the junction is operating above its theoretical maximum capacity.

4.2.2 Figure 3 shows that in the 2025 AM peak there are a significant number of congested junctions in the AOI area. On the Strategic Road Network (SRN), there is congestion at junctions on the A52 corridor, particularly where it meets the M1 at Junction 25. Outside of the SRN there is also congestion on Toton Lane.

4.2.3 In Figure 4, the 2025 PM peak shows a similar picture, with slightly more congestion on the A52 east of Toton.

Figure 3. 2025 Reference Case – AM Junction Congestion V/C%

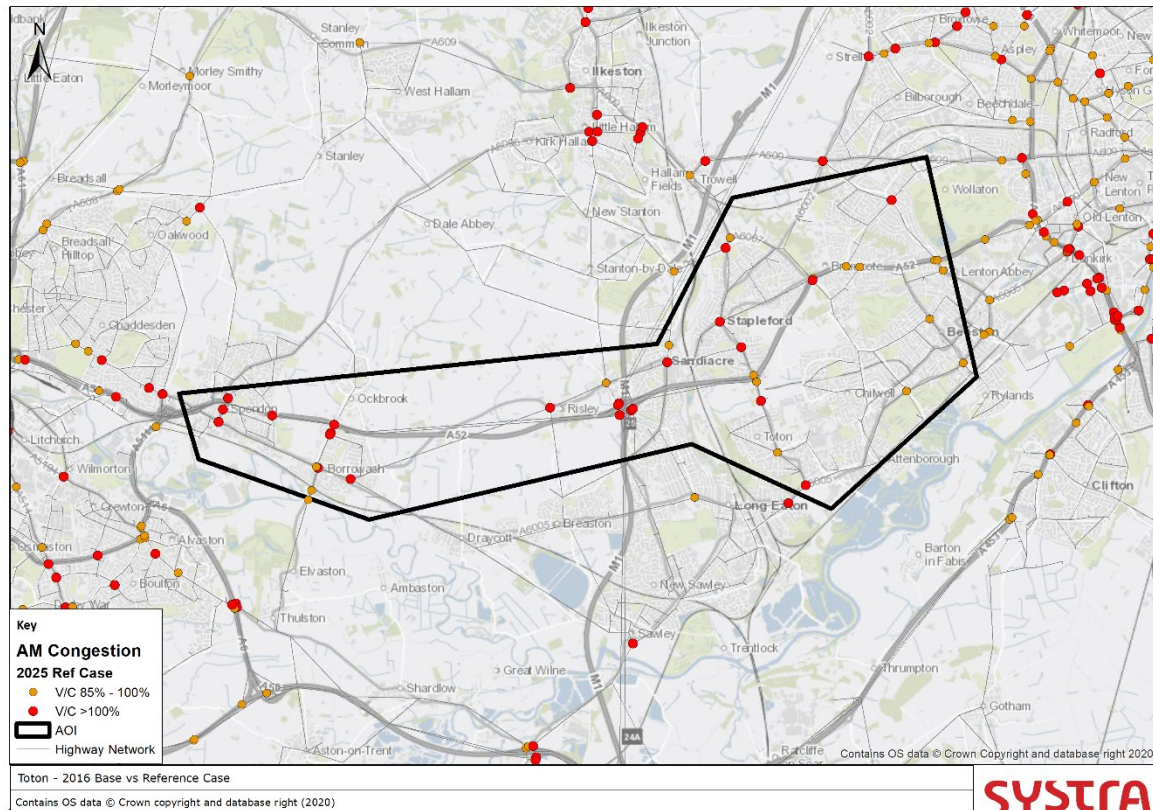
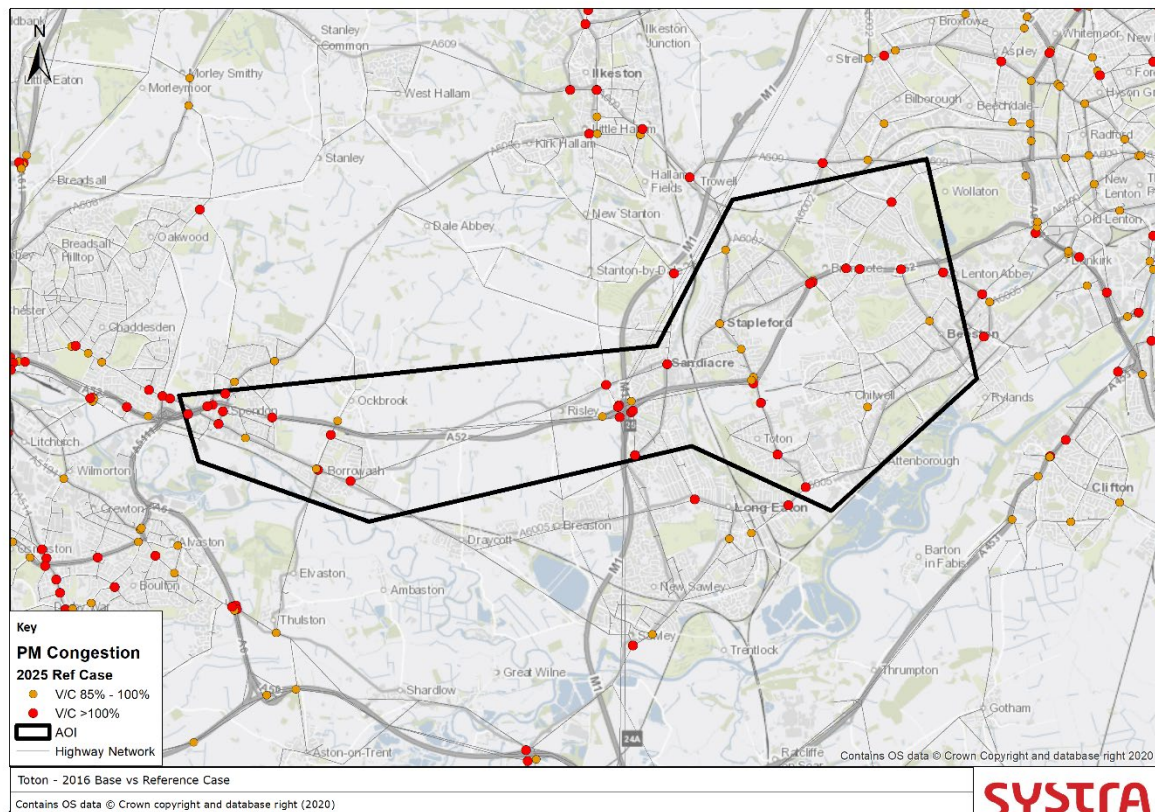


Figure 4. 2025 Reference Case – PM Junction Congestion V/C%



4.2.4 Figure 5 shows that in the 2026 AM peak there are a significant number of congested junctions in the wider area around the proposed development. On the Strategic Road Network (SRN), there is congestion at M1 Junction 25 and congestion on the A52, including to/from Derby. As noted in 2025, there is also congestion on Toton Lane.

4.2.5 In Figure 6, the 2026 PM peak shows a similar picture, with congestion on the same routes.

Figure 5. 2026 Reference Case – AM Junction Congestion V/C%

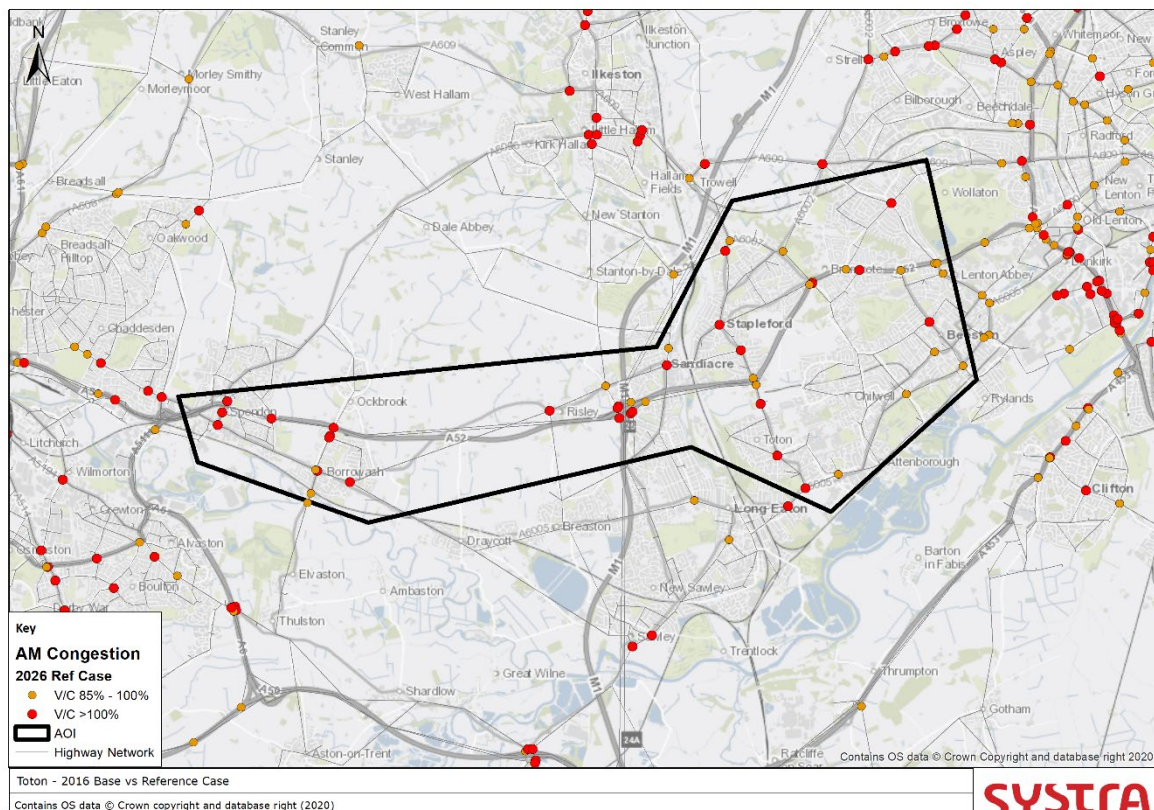
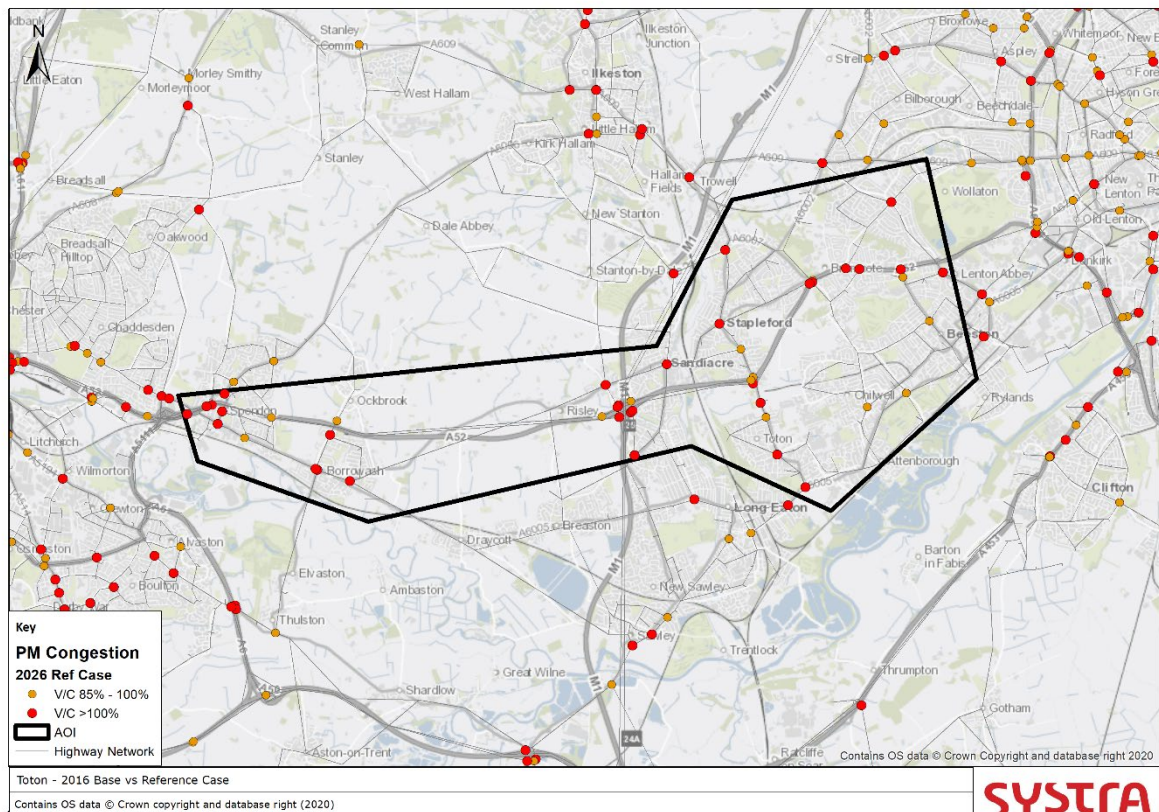


Figure 6. 2026 Reference Case – PM Junction Congestion V/C%



- 4.2.6 Figure 7 shows that in the 2028 AM peak that there are many congested junctions within the AOI. On the SRN, this includes junctions on the A52 and M1 J25. There are also many congested junctions on Toton Lane.
- 4.2.7 In Figure 8 2028 PM peak shows a similar picture, with congestion on the same routes. .

Figure 7. 2028 Reference Case – AM Junction Congestion V/C%

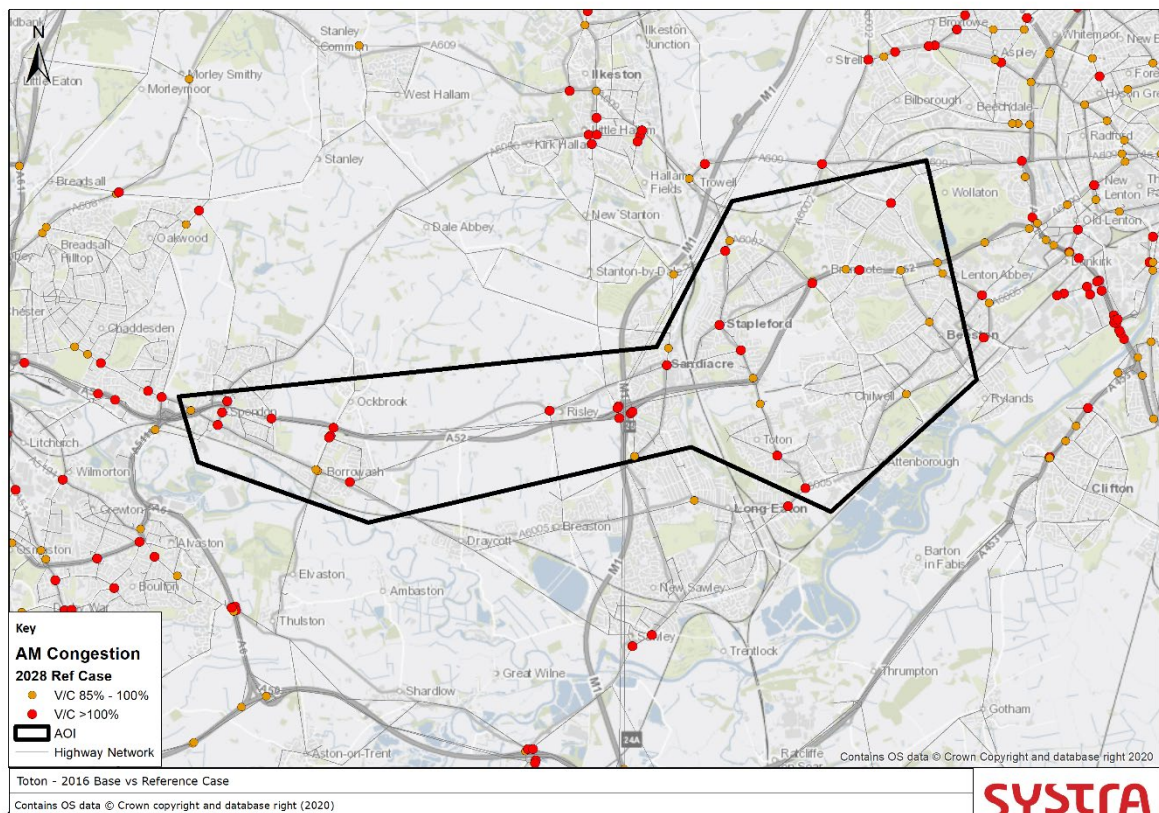
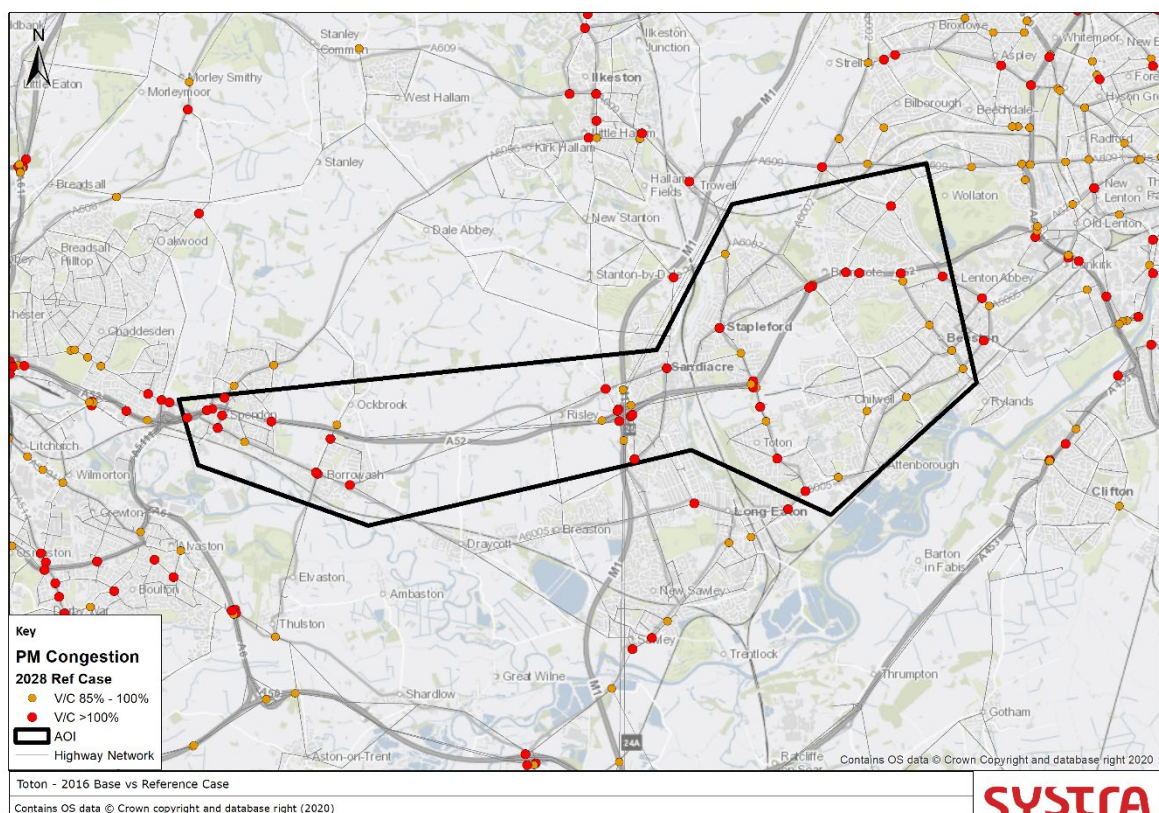


Figure 8. 2028 Reference Case – PM Junction Congestion V/C%



- 4.2.8 Figure 9 shows that in the 2041 AM peak that there is congestion at most junctions on the A52 within the AOI area. This includes the major interchanges at M1 J25, Bardills and Bramcote roundabouts which are above capacity ($>100\%$ V/C) on at least one part of the junction. There are also many junctions on Toton Lane that are above capacity or approaching capacity (between 85% and 100% V/C).
- 4.2.9 In Figure 10 the 2041 PM peak, there is congestion at most junctions on the A52 within the AOI area. This includes the major interchanges identified in the AM peak. Toton Lane also has a number of junctions that are above or approaching capacity in the PM peak.

Figure 9. 2041 Reference Case – AM Junction Congestion V/C%

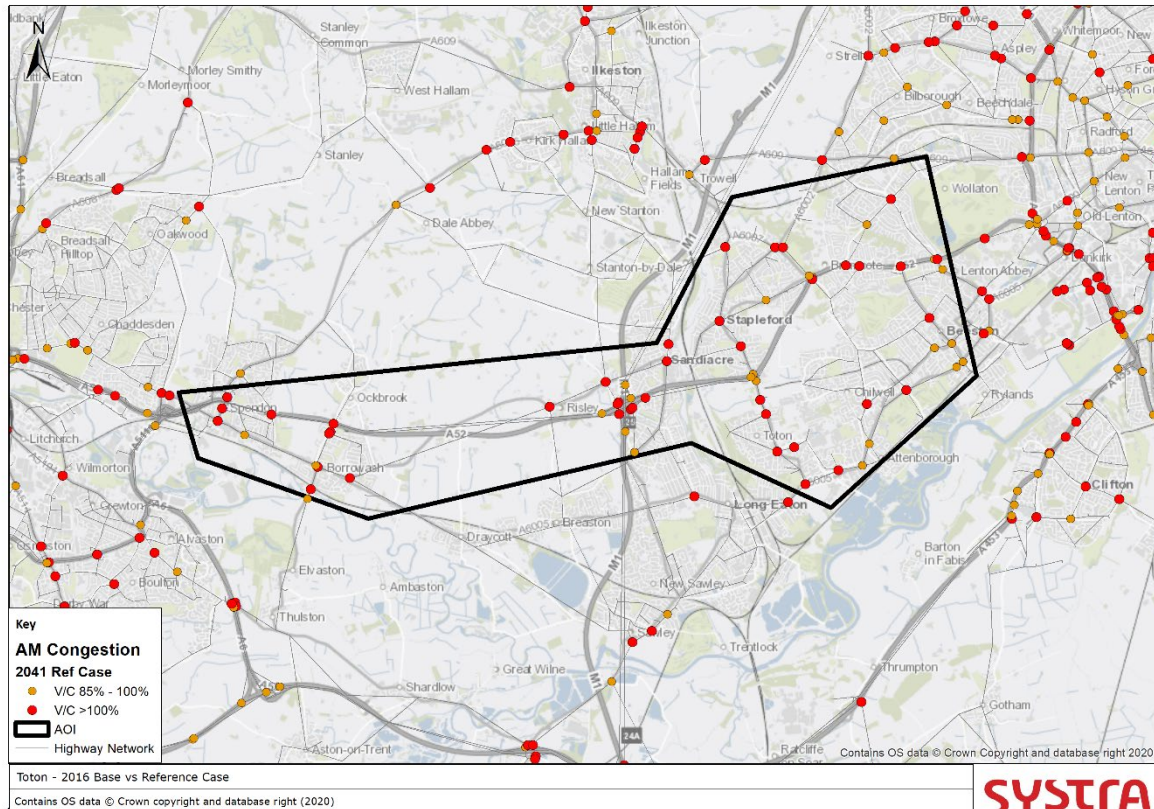
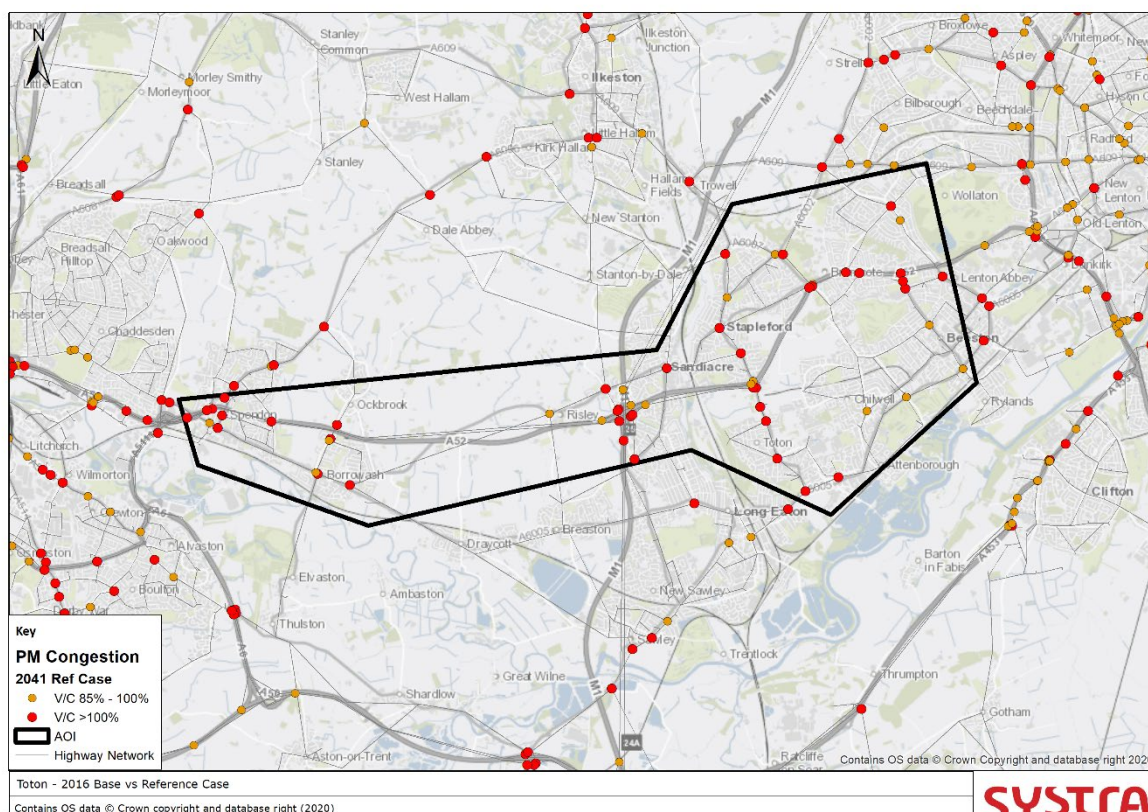


Figure 10. 2041 Reference Case – PM Junction Congestion V/C%



4.3 Flow Change

- 4.3.1 Figure 11 shows the 2025 AM flow change compared to the 2016 base model. Figure 12 shows similar information for the 2025 PM peak. Red lines represent roads which experience a net increase in traffic whilst green lines represent roads which experience a net reduction in traffic.
- 4.3.2 Figure 13 and Figure 14 show the 2026 AM and PM flow change compared to the 2016 base model.
- 4.3.3 Figure 15 and Figure 16 show the 2028 AM and PM flow change compared to the 2016 base model.
- 4.3.4 Figure 17 and Figure 18 show the 2041 AM and PM flow change compared to the 2016 base model.
- 4.3.5 In the 2025, 2026 and 2028 AM peak and PM peak there is an increase in traffic throughout the model and AOI. In the 2041 year there is significantly more demand in the model resulting in an increase in flows on most routes in comparison to the base model.
- 4.3.6 There are links in the network that show a decrease in flows in all years, this is generally on minor roads. This reduction in flow is likely due to redistribution rather than absolute demand decline.
- 4.3.7 In the PM peak of 2028, there is no change to overall flow on the A52 Westbound between Bardills Roundabout and M1 J25. This is because there is an increase in traffic from the Chetwynd development using Toton Lane causing other traffic that would have used Toton Lane to access the A52 Westbound to instead change route along the A6005 Nottingham Road to travel towards Derby or the A50.
- 4.3.8 In both peaks of 2041 there is a reduction in flow on Derby Road, Nottingham Road and Acorn Way in Derby, this is caused by the Erewash transport enhancements associated

with the Erewash Local Plan, which include the signalisation of the Nottingham Road, Derby Road, Acorn Way and Raynesway junction.

Figure 11. 2025 Reference Case vs 2016 Base – AM Flow Change

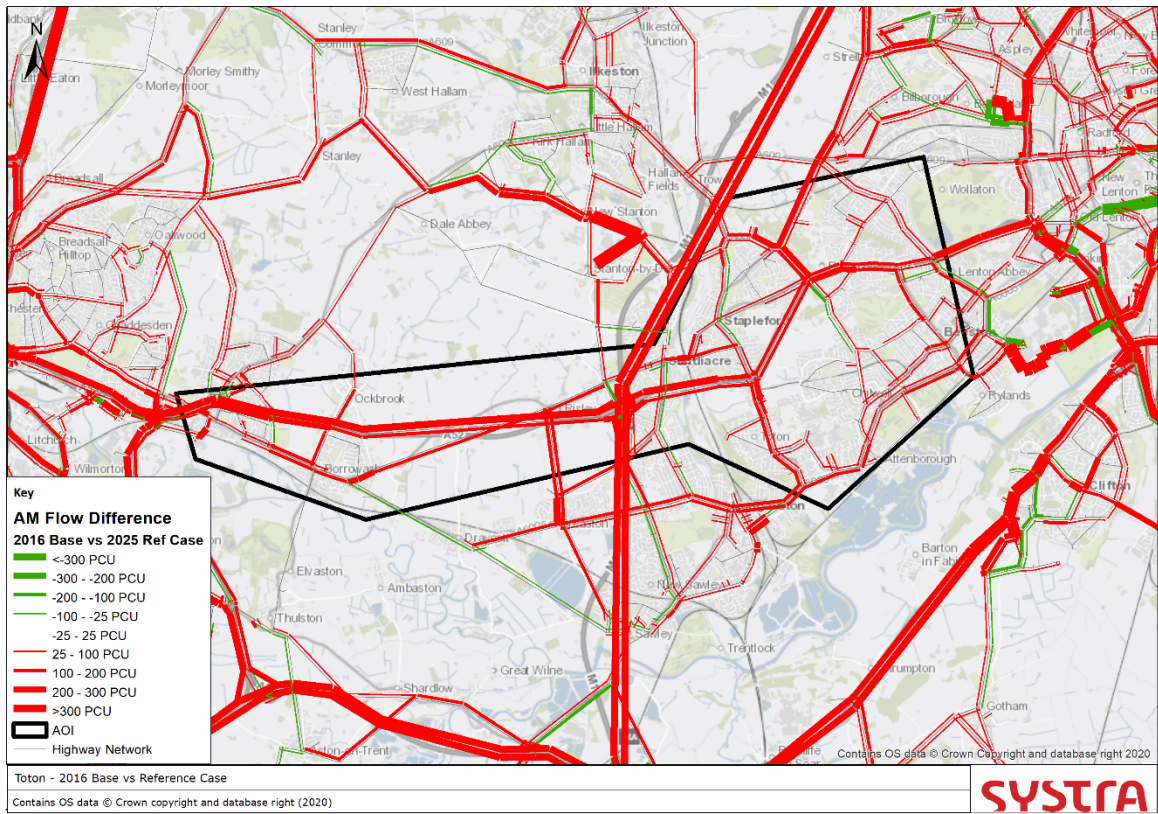


Figure 12. 2025 Reference Case vs 2016 Base – PM Flow Change

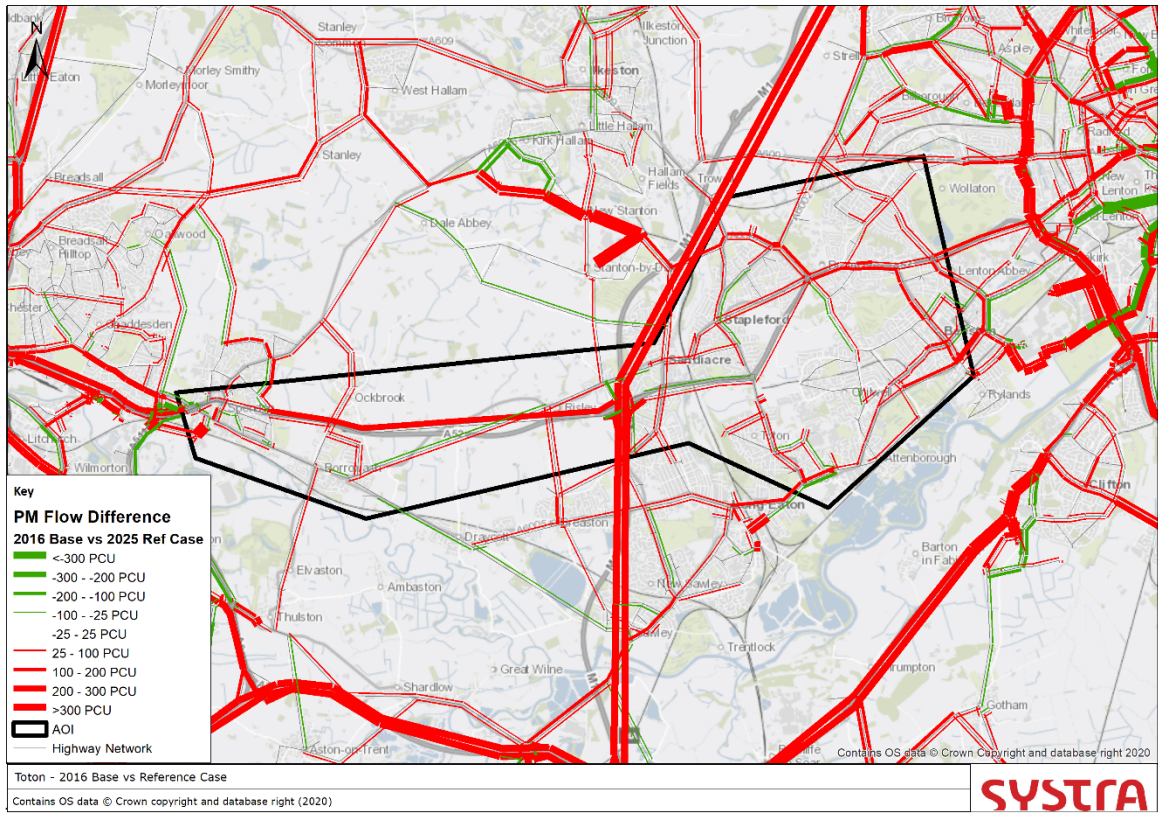


Figure 13. 2026 Reference Case vs 2016 Base – AM Flow Change

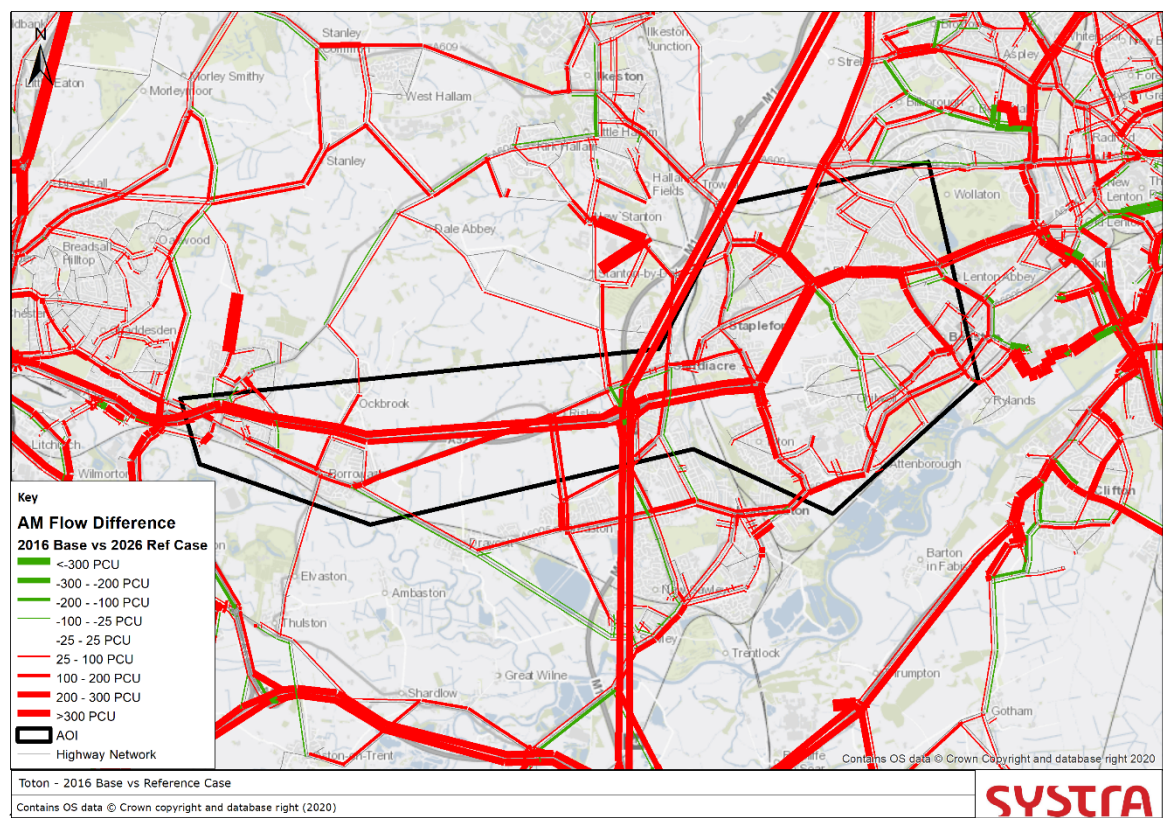


Figure 14. 2026 Reference Case vs 2016 Base – PM Flow Change

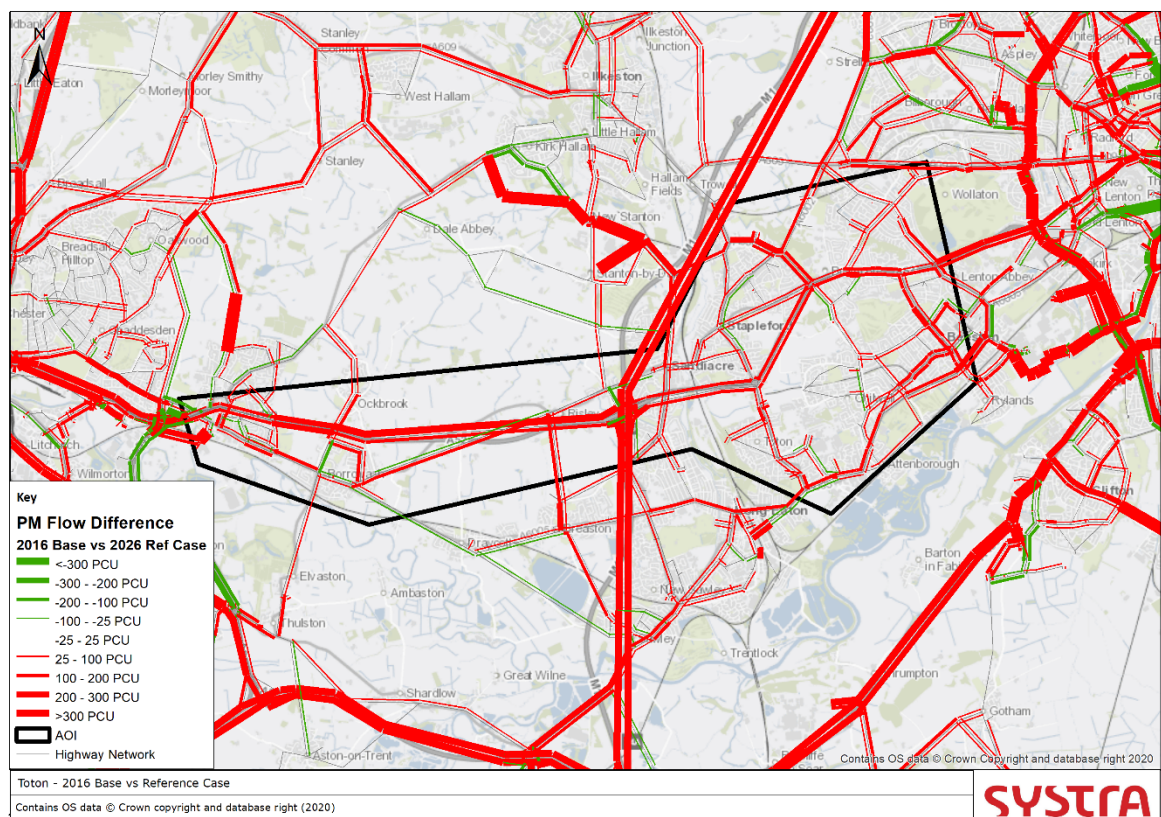


Figure 15. 2028 Reference Case vs 2016 Base – AM Flow Change

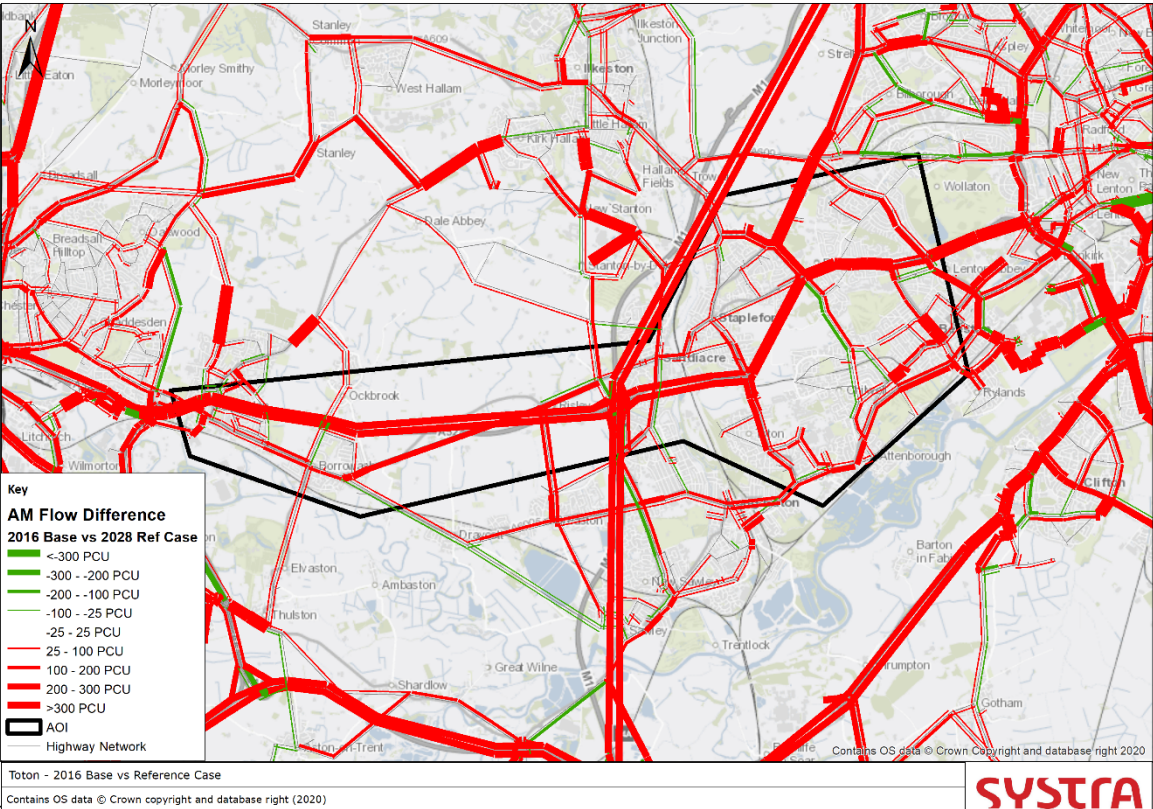


Figure 16. 2028 Reference Case vs 2016 Base – PM Flow Change

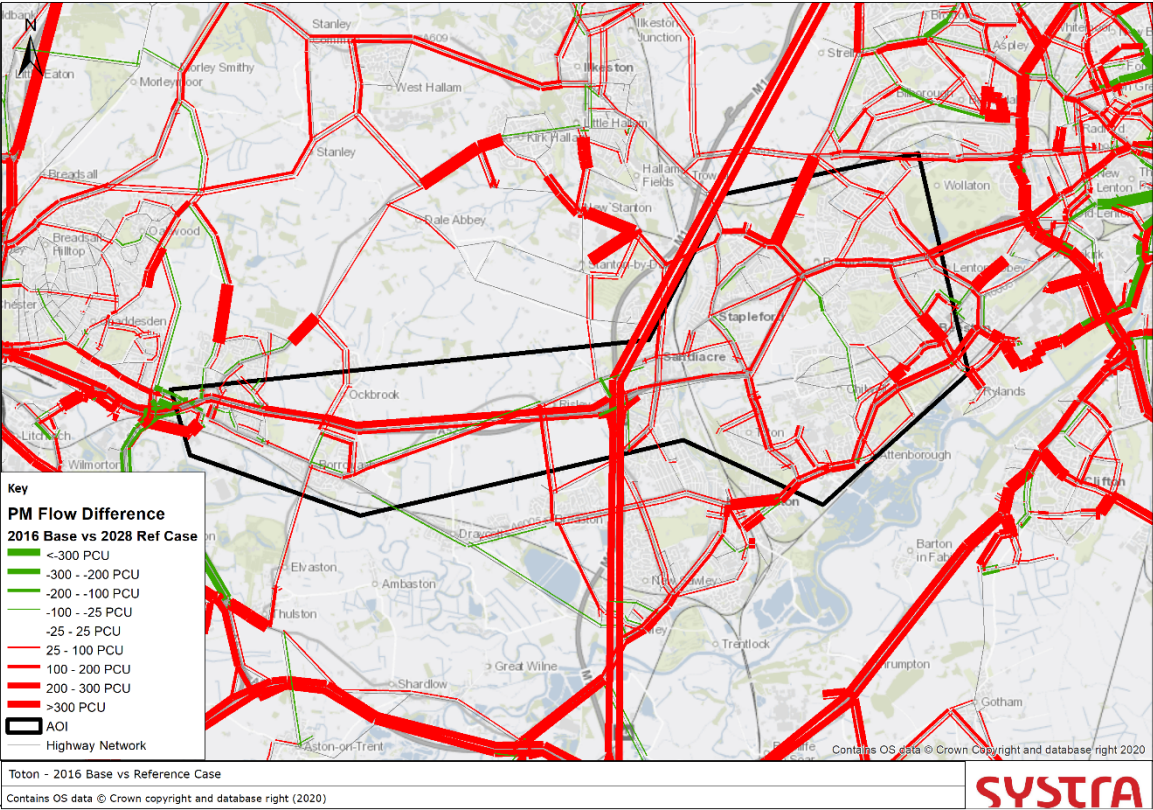


Figure 17. 2041 Reference Case vs 2016 Base – AM Flow Change

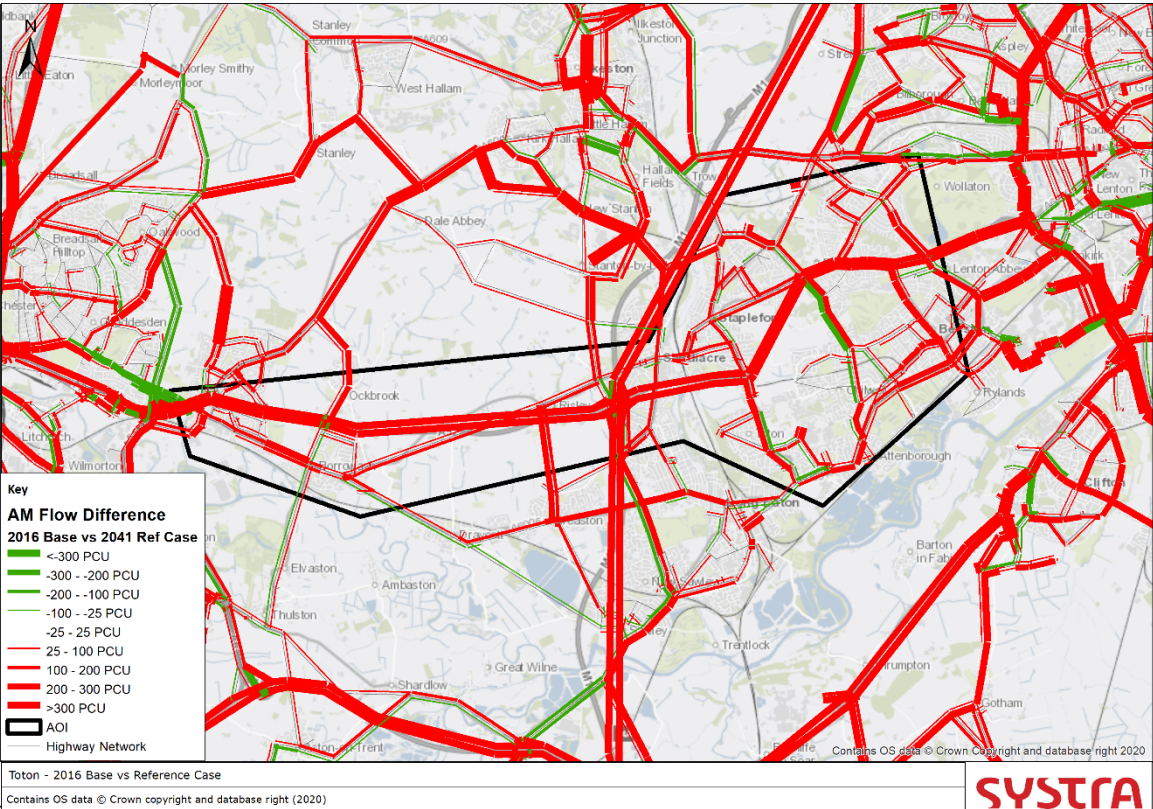
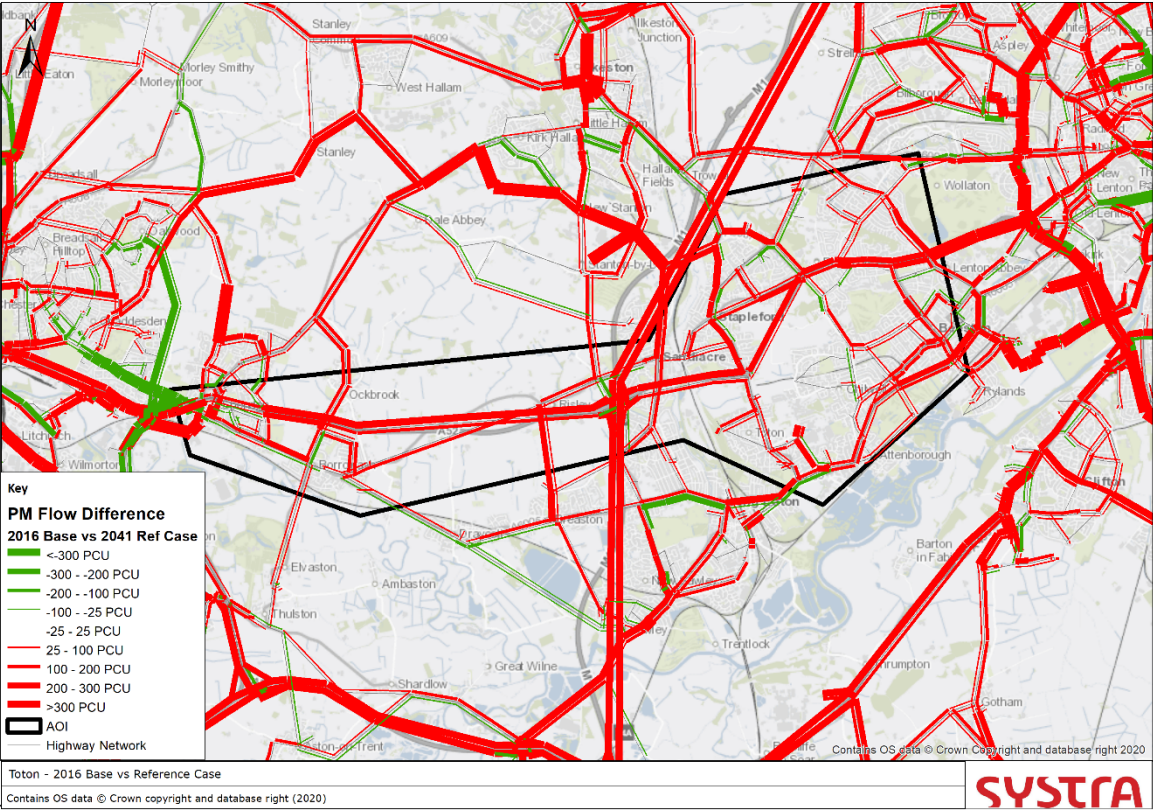


Figure 18. 2041 Reference Case vs 2016 Base – PM Flow Change



5. CONCLUSION

- 5.1.1 Toton North, East and West are housing developments in Nottinghamshire, with a combined total of 1455 units.
- 5.1.2 Reference Case year models have been developed to test the proposed Toton sites, based on known developments for 2025, 2026, 2028 and 2041.
- 5.1.3 The Reference Case models have been compared to the 2016 Base Year model in terms of flow and congestion changes that result from the additional background traffic demand.
- 5.1.4 There is a growth in highway trips of between 10.3% and 11.9% between 2016 and 2025. This grows to an increase of 14.9% - 15.7% between 2016 and 2026 and 15.4% - 17.1% between 2016 and 2028 finally increasing by 23.5% - 25.9% between the 2016 and 2041.
- 5.1.5 In all the Reference Cases, there is congestion at junctions on the SRN including the A52 and M1. Away from the SRN there is also congestion at junctions along Toton Lane.
- 5.1.6 In 2041, there are an increased number of junctions that are congested around the proposed development when compared to 2028/2026.
- 5.1.7 Across most links there is an increase in vehicle flow between the 2016 Base and both Reference Case years. This is caused by background growth associated with TEMPRO, as well as committed developments which have been added in future years.
- 5.1.8 There are some limited areas where there is a reduction in flow. This is either caused by known highway schemes implemented in the future year or reassignment due to changes in network conditions (flow, delay, congestion).

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	Hamzah Adam	Assistant Consultant	18/02/2026	
	Checked by	Huw Harrhy	Consultant	25/02/2026	
	Approved by	Helen O'Mara	Associate Director	26/10/2026	
2	Author				
	Checked by				
	Approved by				