Derby HMA Local Plan Appraisal

09/01/2026

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DERBY HMA: TRANSPORT MODELLING

SYSTRA

DERBY HMA LOCAL PLAN APPRAISAL

DERBY HMA: TRANSPORT MODELLING

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EXECUTIVE SUMMARY

This report presents the transport implications of the Derby HMA Local Plan strategy which includes Derby City, South Derbyshire and Amber Valley local authority planning areas.

The East Midlands Gateway Model has been utilised to assess the impacts of the Local Plan developments, a series of active mode and public transport schemes, and associated highway mitigation packages on the local transport networks.

In conjunction with the Derby HMA Transport Working Group, a number of transport model scenarios have been developed for the purposes of assessing the Derby HMA strategy. These are as follows:

2044 Do Minimum No HMA Local Plan - A "Baseline" scenario which includes built infrastructure and developments within the Local Plan Area and committed infrastructure and developments outside local plan area.

2044 With HMA Local Plan Developments (Do Something 1) – Provides an indication of traffic impacts of the Local Plan developments, in the absence of any mitigation.

2044 With HMA Local Plan and Known Mitigation (Do Something 2) – Assessment of the "Known Mitigation" measures including the new A50(T) Junction, South Derby Integrated Transport Link Phase 1, A50(T)/A38(T) Toyota Junction Improvement, and the A38 Derby Junctions Scheme to establish how much these measures mitigate the local plan impacts and identify what extra measures are required.

2044 With HMA Local Plan and Additional Mitigation (Do Something 3a PT and Active Mode Mitigation) – Building on Do Something 2, this scenario assesses the PT and active mode mitigation strategies.

2044 With HMA Local Plan and Additional Mitigation (Do Something 3b Additional Highway Mitigation) – Building on Do Something 3a, this scenario assesses the impact of additional highway mitigation measures.

2044 A38 Grade Separation (Do Something 4) - "Sensitivity Test" to understand how the A38 Junctions scheme (grade separation of the A5111 Kingsway junction, A52 Markeaton junction and A61 Little Eaton junction) affects local plan traffic.

The transport model has provided an indication of the likely impacts of each scenario in terms of changes in traffic flows, junction congestion and key network statistics (travel time, distance, average speed and overall level of congestion) for a 2044 future year. An indication of changes to bus utilisation and mode share at key development sites has also been included to show the impact of the public transport mitigation schemes.

The following table presents the level of mitigation each scenario is expected to achieve. Without any mitigation the local plan strategy results in over a 100% increase in congestion across the HMA area. The full mitigation package mitigates the impact of the local plan strategy by 59%. If the A38 Junctions scheme does not occur, the effectiveness of the mitigation strategy reduces to 32%.

Mitigation Levels by Scenario

SCENARIO	IMPACT (COMPARED TO DO MINIMUM)
2044 With HMA Local Plan Developments (Do Something 1)	Congestion increases by 111%
2044 With HMA Local Plan and Known Mitigation (Do Something 2)	Mitigates the Impact of the Local Plan by 53%
2044 With HMA Local Plan and Additional Mitigation (Do Something 3a PT and Active Mode Mitigation)	Mitigates the Impact of the Local Plan by 53%
2044 With HMA Local Plan and Additional Mitigation (Do Something 3b Additional Highway Mitigation)	Mitigates the Impact of the Local Plan by 59%
2044 A38 Grade Separation (Do Something 4)	Mitigates the Impact of the Local Plan by 32%

1. INTRODUCTION

1.1 Overview

1.1.1 SYSTRA has been commissioned to assess the transport implications of the Derby HMA Local Plan strategy. The Derby HMA area includes Derby City, South Derbyshire and Amber Valley local authority planning areas.

1.1.2 The East Midlands Gateway Model (highway and public transport) has been utilised to assess the impacts of the Local Plan developments, a series of sustainable travel and public transport schemes, and associated mitigation packages on the local transport networks.

1.1.3 The East Midlands Gateway Model (EMGM) is a multimodal transport model built following the guidance in the Department for Transport's (DfT) 'Transport Analysis Guidance' (TAG). The model was fully calibrated and validated in line with TAG guidance in 2018 and has a base year of 2016. It has since been used for a variety of studies, including local plans, development assessments, DfT compliant business cases and regional growth strategies.

1.1.4 To ensure that the EMGM is fit for purpose for the Derby HMA Local Plan assessment, a model validation check has been undertaken. Details of this process is provided in the Derby HMA Model Validation Note[1]. The EMGM achieves good levels of calibration and validation across the Derby HMA area, the local SRN network and the wider model. It is therefore recommended as 'fit for purpose" to assess the impact of the developments and infrastructure of the Derby HMA Local Plan.

1.2 Modelling Scenarios

1.2.1 In conjunction with the Derby HMA Transport Working Group, SYSTRA has developed a number of the transport model scenarios using EMGM for the purposes of assessing the Derby HMA strategy. These are as follows:

- 2044 Do Minimum – Baseline containing committed development only.
- 2044 Do Something 1 – Local Plan development excluding mitigation.
- 2044 Do Something 2 – Scenario 1 and "Known Mitigation" measures.
- 2044 Do Something 3a/3b – Do Something 2 and PT, Active Mode, and Highway Mitigation.
- 2044 A38 Sensitivity Test – removes the A38 Grade Separation to understand implications for the HMA strategy.

1.2.2 The assessment year of 2044 allows for the plan proposals for each of the local authorities to be fully occupied and operational.

[1] TN01 - Derby HMA EMGM Strategic Modelling Validation, May 2025

1.3 Structure of the Report

1.3.1 This report provides details of the methodology and assumptions for each scenario, along with the key transport impacts and overall conclusions. The remainder of the report is structured as follows:

- Chapter 2: Modelling Methodology Overview
- Chapter 3: No HMA Local Plan Developments (Do Minimum)
- Chapter 4: With HMA Local Plan Developments (Do Something 1)
- Chapter 5: With HMA Local Plan and Known Mitigation (Do Something 2)
- Chapter 6: With HMA Local Plan and additional Mitigation (Do Something 3a & 3b)
- Chapter 7: A38 Grade Separation Sensitivity Test
- Chapter 8: Study Conclusions

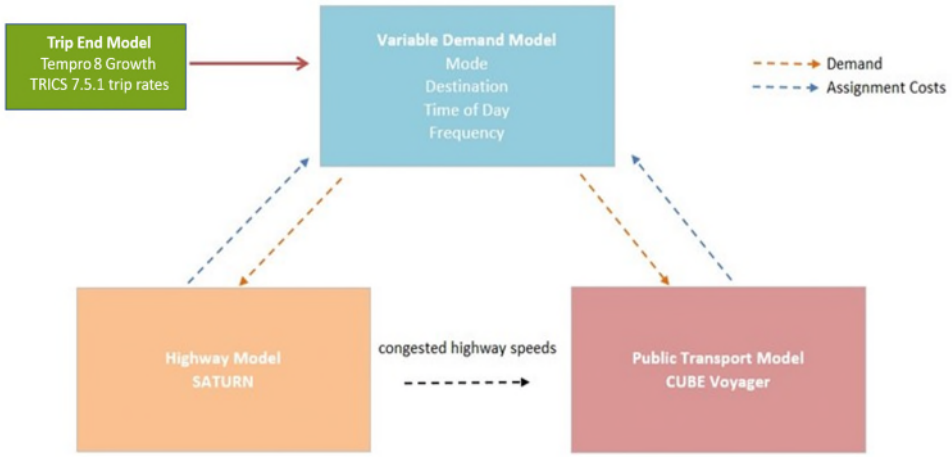
2. MODELLING METHODOLOGY OVERVIEW

2.1 EMGM Overview

2.1.1 The EMGM has been developed as a multimodal transport model built following guidance in the Department for Transport's (DfT) Transport Analysis Guidance (TAG). The EMGM is fully simulated in an area covering Nottingham City, Ashfield, Broxtowe, Erewash, Gedling, Rushcliffe, Derby City, Amber Valley, South Derbyshire, Charnwood, and North-West Leicestershire. All strategic roads, major A, B, and important minor roads are modelled in these areas. The model boundary is shown in Figure 1 of the figures document.

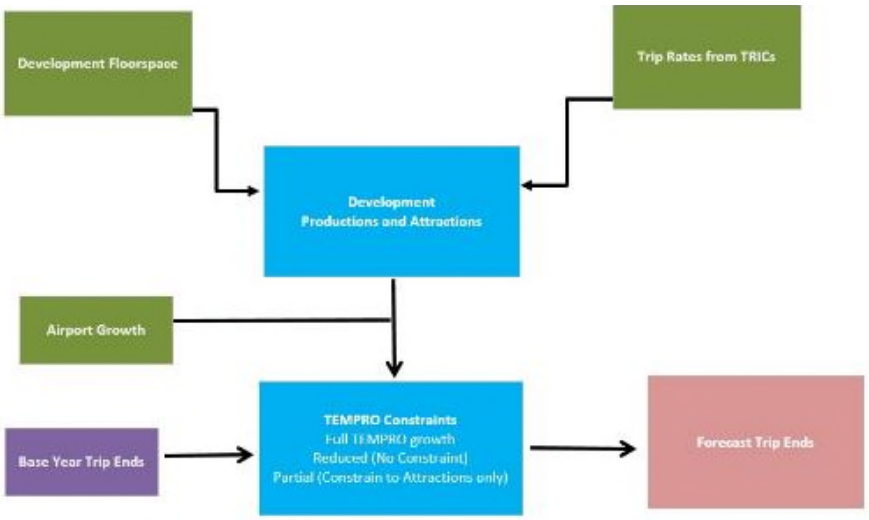
2.1.2 An overview of the structure of the EMGM is shown in below. In summary, the modelling suite is comprised of the following elements:

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



EMGM Technical Structure

2.1.3 Forecast demand is calculated in the Trip End Model, depicted in the graphic below.



Trip End Model Structure

2.1.4 The development trips are calculated from trip rates derived from TRICS and are 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 Trip End Model Presentation Program (TEMPro 8.1) growth forecasts i.e. the EMGM is constrained to TEMPro growth.

2.1.5 Outturn generations for developments which have been entered specifically, closely align with the expected level of generations. Residual TEMPro growth is applied to surrounding wards within each MSOA and constrained at a district level.

2.2 Model Calibration and Validation

2.2.1 The Derby HMA area is fully represented in the EMGM detailed model area, as shown in Figure 2 of the figures document.

2.2.2 The EMGM achieves good levels of calibration and validation across the Derby HMA area, the local SRN network, and the wider model. Details of this process is provided in the Derby HMA Model Validation Note[2], provided in Appendix A of this report.

2.2.3 The model achieves a high level of calibration within the DHMA area, with over 95% of counts meeting the criteria, with particular strong performance of LGV and HGV counts. These statistics exceed the recommended target of 85% stated in TAG guidance.

2.2.4 In the AM and PM peaks over 80% of the validation counts match either the GEH or flow criteria. This is slightly lower than the recommended 85% target specified by TAG, however, it still demonstrates a strong level of model validation given the size of the model, the number of counts within the data set and the complexities of route choice available within the model.

[2] TN01 - Derby HMA EMGM Strategic Modelling Validation, May 2025

2.2.5 Along the SRN over 85% of the validation counts meet either the GEH or flow criteria indicating that the model demonstrates a good level of model validation along the SRN within the HMA area

2.3 Development Trip Rate Assumptions

2.3.1 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. 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 houses (per dwelling)	0.183	0.729	0.912	0.570	0.257	0.827
Residential flat (per flat)	0.074	0.295	0.369	0.231	0.104	0.335
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
College (Nottingham Skills Hub, per pupil)	0.359	0.017	0.376	0.031	0.069	0.100
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

2.4 Model Scenarios

2.4.1 The Transport Model scenarios developed for the HMA appraisal are presented in Table 2 below. There have been agreed with the HMA client team.

2.4.2 Each scenario has been run through the full EMGM suite and so reflects changes to demand associated with infrastructure and development scenarios.

2.4.3 Key model outputs for highway and public transport have been provided for the AM (8am-9am) and PM (5pm-6pm) peak hours.

Table 2. Derby HMA Modelling Scenarios

SCENARIO	PURPOSE
2044 Do Minimum No HMA Local Plan	Produce "Baseline" scenario which includes: • Built infrastructure and developments within the Local Plan Area • Committed infrastructure and developments outside local plan area
2044 With HMA Local Plan Developments (Do Something 1)	Indication of traffic impacts of the Local Plan developments, in the absence of mitigation
2044 With HMA Local Plan and Known Mitigation (Do Something 2)	Test the impact of "Known" Mitigation" measures including the new A50(T) Junction, South Derby Integrated Transport Link Phase 1, A50(T)/A38(T) Toyota Junction Improvement. How much does the existing mitigation go towards mitigating the local plan impacts? What else needs to be done?
2044 With HMA Local Plan and Additional Mitigation (Do Something 3a PT and Active Mode Mitigation)	Testing of PT and active mode mitigation strategies – how much do strategies help to mitigate the impact of the Local Plan development?
2044 With HMA Local Plan and Additional Mitigation (Do Something 3b Additional Highway Mitigation)	Testing additional highway mitigation measures
2044 A38 Grade Separation (Do Something 4)	"Sensitivity Test" to understand how the A38 Junctions scheme (grade separation of the A5111 Kingsway junction, A52 Markeaton junction and A61 Little Eaton junction) affects local plan traffic

2.4.4 The assessment year of 2044 allows for the plan proposals for each of the local authorities to be fully occupied and operational. A West of Derby highway connection is being tested separately to assess its effects on the wider highway network. Such a scheme would not form part of currently emerging Local Plans, but its potential impacts are being modelled to help inform future decision making. As such it does not form part of this report.

3. NO HMA DEVELOPMENT (DO MINIMUM)

3.1 Overview

3.1.1 This chapter provides key outputs and analysis relating to the Do Minimum (DM) scenario. All figures are provided in the supplementary Figures Document.

3.2 HMA Infrastructure Assumptions

3.2.1 Table 3 details the infrastructure schemes within the HMA area that are included in the Do Minimum scenario. Where these schemes are either already constructed or are committed and expected to be operational by 2044, they form part of the Do Minimum.

3.2.2 Schemes which are classed as "known mitigation" measures will be included in the Do Something 2 scenario. These omitted schemes include:

- New A50 junction and South Derby Integrated Transport Link Phase 1.
- Wragley Way.
- Junction Improvements associated with Boulton Moor development.
- A38 Derby Junctions Scheme (grade separation of the A5111 Kingsway junction, A52 Markeaton junction and A61 Little Eaton junction).
- M1 J28 Junction Improvement Scheme.
- A50/A38 Toyota Improvements,

3.2.3 Appendix B provides a list of infrastructure schemes which are outside of the HMA area. These are consistent with the Do Minimum scenario.

Table 3. Infrastructure Schemes

SCHEME	TYPE	DO MINIMUM
Highway Proposals associated with the East Midlands Gateway development adjacent to M1 J24 (built)	LA	✓
M1 widening between J23a and 25	NH	✓
A52 Wyvern Transport Improvement Scheme (built)	LA	✓
Rolls Royce Victory Road Realignment (built)	LA	✓
Junction Improvements at Blue Peter Roundabout and London Road (built)	LA	✓
Walton Bypass (under construction)	LA	✓
Stenson Road/A5111 associated with Stenson Fields development	LA	✓
Woodville to Swadlincote Regeneration Route	LA	✓
NO2 Scheme	LA	✓
Pentagon Island bus priority	LA	✓
M1 J27 Junction Improvement Scheme	NH	✓
Kirk Hallam Relief Road	LA	✓
Smartparc Highway Improvements	LA	✓
Merrill Way Signal Junction Improvement	LA	✓
A514/A50 junction slip lanes	LA	✓
Signalisation of southbound A38(T) arm at A38 Kingsway/A5111	LA	✓
Improvement schemes associated with Transforming Cities	LA	✓
Junction 24 and J23a improvements associated with EMAGIC2	LA/NH	✓

3.3 Development Assumptions

3.3.1 Within the HMA area, the Do Minimum Scenario includes developments that have been completed, or partially completed, by 2024. It includes the specific modelled developments which are over 180 houses (or those that are of an equivalent size in terms of trip generation for non-residential developments). Where developments are significantly lower than this quantum they have been clustered together based on location and access arrangements.

3.3.2 The information contained in TEMPRO is based on adopted local plans. As the purpose of this study is to model the updated Derby HMA Local Plan, the 2044 Do Minimum scenario has not been constrained to 2044 TEMPro data within the area of the Derby HMA Local Plan. Instead, the 2044 Do Minimum scenario has been constrained to 2024 TEMPro levels within South Derbyshire, Derby City and Amber Valley Local Authorities. Outside these areas TEMPro 2044 constraint has been applied.

3.3.3 Appendix B present the developments in Amber Valley, Derby City and South Derbyshire alongside information on the quantum and which scenario they are included in. A plan of the developments is also provided in Figure 3 of the supplementary Figures Document.

3.3.4 Outside the HMA area, the Do Minimum and Do Something include all committed and allocated housing and employment developments. A list of non-HMA developments is included within Appendix B. It has been assumed that all developments will be fully built out by 2044 and therefore the quantum provided represents the fully built out development. In these areas, growth has been constrained to TEMpro 2044 levels in all scenarios.

3.3.5 Development at the Ratcliffe and East Midlands Airport Freeport sites are included in the HMA modelling along with partial mitigation packages at Junction 24 (northbound slip lane between J24 and the A50) and Junction 23a. There is still a degree of uncertainty remaining around the proposed Freeport site proposals and mitigation outside the HMA, however, the improvements at both locations are likely to impact the strategic routing of traffic through the HMA area and were therefore important to consider for the HMA modelling.

3.4 Growth in the Model

3.4.1 Table 4 below outlines the growth in 12-hour person demand between the 2016 base and the 2044 Do Minimum for the AM and PM peaks, and a comparison against the TEMPRO 8.1 productions and attractions. There is a 6% growth in demand between 2016 and 2044 in Derby City and a 9% increase across South Derbyshire and Amber Valley. This is in line with 2024 TEMPRO growth. The growth in the rest of the model (excluding external areas) is 16% which is line with the full 2044 TEMPRO growth.

Table 4. Growth in VDM Demand

PEAK	2044 DO MINIMUM	TEMPRO 2024	TEMPRO 2044
Derby City	6%	6%	12%
South Derbyshire and Amber Valley	9%	11%	19%
Rest of Model	18%	-	16%

3.4.2 Table 5 below outlines the growth in highway trips between the 2016 base and the 2044 Do Minimum for the AM and PM peaks. During the morning peak there is a 14% growth in demand between 2016 and 2044 in Derby City and a 16% increase across the whole HMA area. In the evening peak there is a 12% increase in Derby and 14% increase across the whole HMA area.

Table 5. Growth in VDM Demand

PEAK	DERBY	HMA	FULL MODEL
AM PEAK	14%	16%	24%
PM PEAK	12%	14%	22%

3.5 Key Highway Outputs

Flow Change

3.5.1 Figures 4 and 5 present the traffic flows in the 2044 DM scenario. By 2044 significant traffic flows are expected along key SRN routes including the A38, A50, M1. In addition, there are significant flows on key regional routes such as the A511, A444, A52 and A6.

3.5.2 Within Derby City, radial routes and key local roads through Sinfin, Pride Park and Kingsway are forecast to experience a significant level of traffic (in excess of 1,500 pcus two-way). In Amber Valley there is noticeable use of the A610, A6, A6007 and A608, and in South Derbyshire the plots indicate significant traffic flows along the A511, A514 and A444, along Main Street/Hartshorne Road and through Swadlincote.

Junction Congestion

3.5.3 Figures 6 and 7 show the junctions which are forecast to have a maximum V/C ratio (%) of 75% or higher in the 2044 DM scenario. The yellow dots indicate junctions which are approaching the 85% threshold. The red dots represent junctions with a V/C over 85% but under 100% and are therefore considered congested and brown dots show junctions severely congested with a V/C of 100% of more.

3.5.4 By 2044, an increased number of junctions across the HMA area experience congestion due to traffic growth. The locations of these junctions are in line with roads which experience increases in traffic flow.

3.5.5 A series of junctions within Derby City are approaching, or at congestion by 2044. These are largely within the city centre and along key radial routes including the A6, the Ring Road and the A52. Within Amber Valley there is noticeable congestion forecast along the A6 and A610 and local congestion at several junctions within Heanor.

3.5.6 In South Derbyshire congestion is expected to occur along the A5111 through Swadlincote, within Melbourne village and at junctions leading to the A50/A514 junction and the A38/A50 Toyota interchange.

3.5.7 Along the SRN, congestion is evident along the A38, the A50 and M1. It should be noted that the Do Minimum scenario does not include the new A50 junction or the A38 improvements which both have a significant impact on congestion and flows within the Derby HMA area.

3.6 Conclusions

3.6.1 Traffic demand within the HMA area is forecast to increase by around 15% between 2016 and 2044, and by around 23% across the full model area. This causes significant increases in traffic flow across the road network with resultant increases in congestion at a number of key local and strategic junctions across the HMA area.

3.6.2 The Do Minimum scenario does not include the new A50 junction or the A38 Junctions scheme (grade separation of the A5111 Kingsway junction, A52 Markeaton junction and A61 Little Eaton junction) which both have a significant impact on congestion and flows within the Derby HMA area.

4. WITH HMA LOCAL PLAN DEVELOPMENTS (DO SOMETHING 1)

4.1 Overview

4.1.1 This chapter provides key outputs and analysis relating to the Do Something 1 (DS) scenario, which includes the Derby HMA Local Plan developments. This scenario is compared to the No Local Plan (Do Minimum) scenario. All figures are provided in the supplementary Figures Document. Appendix C provides labelled, focussed plots for each local authority.

4.2 Derby HMA Developments and Trip Generations

4.2.1 Tables 6, 7 and 8 present the developments in Amber Valley, Derby City and South Derbyshire that are included in the Do Something Scenario. A number of these sites have also been included within the Do Minimum with lower 2024 HMA development levels. In these instances, the Do Something Scenario includes the full build out of the development.

4.2.2 In the absence of more detailed information, representation of The East Midlands Freeport Strategic Rail Freight Interchange (INF3) has been modelled using assumptions for the previous East Midlands Intermodal Park proposals as a proxy.

4.2.3 The development sites are shown graphically below, and in Figure 3 of the figures document.

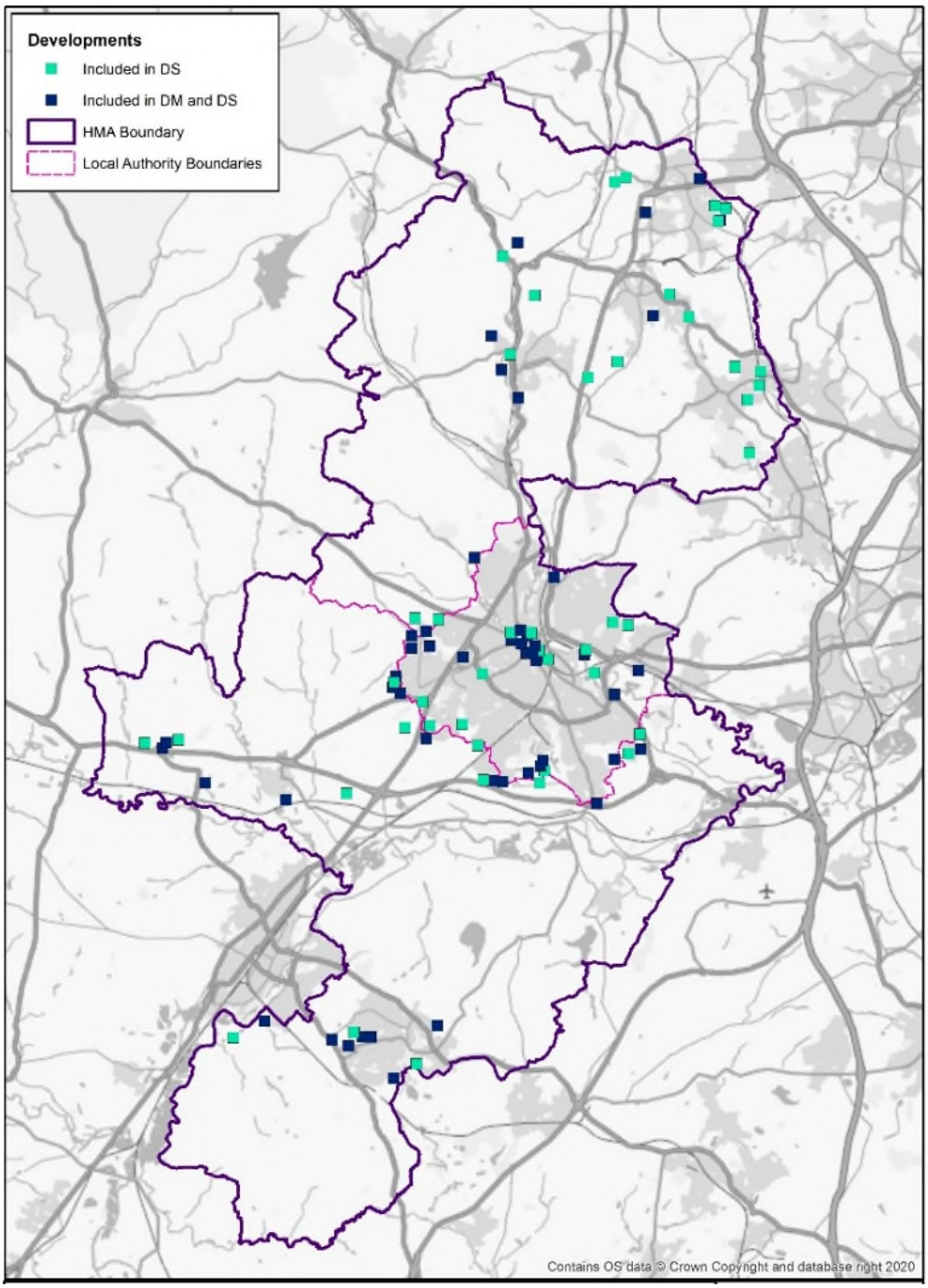

Developments
Included in DS
Included in DM and DS
HMA Boundary
Local Authority Boundaries
Contains OS data © Crown Copyright and database right 2020

Table 6. Developments within Amber Valley

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024	DO MINIMUM	DO SOMETHING
AV_1	Phase 1 Radbourne Lane, Mackworth	Amber Valley	510		510		✓	✓
AV_2	Phase 2 Radbourne Lane, Mackworth	Amber Valley	551					✓
AV_3	Land S of Mansfield Road/N of A38, Alfreton	Amber Valley	323		289		✓	✓
AV_4	Coppice Farm, Peasehill Road, Ripley	Amber Valley	400		278		✓	✓
AV_5	Lily Street Farm, Derby Road, Swanwick	Amber Valley	600	48,500	106		✓	✓
AV_6	Kedleston Road, Quarndon	Amber Valley	400		240		✓	✓
AV_7	Shipley Lakeside, Shipley	Amber Valley	302		133		✓	✓
AV_8	Shipley Lakeside, Shipley (additional residential plots)	Amber Valley	136					✓
AV_9	Nether Farm, Birchwood Lane, Somercotes	Amber Valley	198					✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024	DO MINIMUM	DO SOMETHING
AV_10	Land off Somercotes Hill, Somercotes	Amber Valley	180		41		✓	✓
AV_11	Newlands/Loscoe Fields	Amber Valley	500					✓
AV_12	Nottingham Road, Ripley	Amber Valley	167					✓
AV_13	Land off Brun Lane, Mackworth	Amber Valley	2000					✓
AV_14	Land off Aldreds Lane, Heanor	Amber Valley	180					✓
AV_15	Alderwasley Mills, Ambergate	Amber Valley	140					✓
AV_16	North & East Mill, Belper	Amber Valley	117	2,428				✓
AV_17	Land N of Derby Road, Denby (Cinderhill)	Amber Valley	300	131,300				✓
AV_18	Land NW of Denby Hall Business Park, Denby	Amber Valley		56,000				✓
AV_19	Birchwood Business Park, Somercotes	Amber Valley		20,000				✓
AV_20	Amber Valley Rugby Club, Lower Somercotes	Amber Valley	250					✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024	DO MINIMUM	DO SOMETHING
AV_21	Land adjacent Alfreton Golf Club	Amber Valley	240					✓
AV_22	Land off Chesterfield Road, Alfreton	Amber Valley	177					✓
AV_23	Land off Amber Drive, Langley Mill	Amber Valley	119					✓
AV_24	Bridge Street, Langley Mill	Amber Valley	109					✓
AV_25	Firs Works, Spanker Lane, Nether Heage	Amber Valley	160					✓
AV_26	Former French Horn Inn, Codnor*	Amber Valley		1,331				✓
AV_27	Bullbridge Hill, Ambergate	Amber Valley	148		117		✓	✓
AV_28	Belper Lane, Hilltop, Belper	Amber Valley	118		37		✓	✓
AV_29	Derwent Street, Belper	Amber Valley	114		93		✓	✓
AV_30	Derwentside Industrial Park, Derby Road, Belper	Amber Valley	156		94		✓	✓
WARD1	Aldercar and Langley Mill	Amber Valley	406	30,000				✓
WARD2	Alfreton	Amber Valley	406	30,000				✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024	DO MINIMUM	DO SOMETHING
WARD3	Belper	Amber Valley	406	30,000				✓
WARD4	Codnor	Amber Valley	406	30,000				✓
WARD5	Heanor and Loscoe	Amber Valley	406	30,000				✓
WARD6	Mackworth*	Amber Valley	406	30,000				✓
WARD7	Riddings (unparished)	Amber Valley	406	30,000				✓
WARD8	Ripley	Amber Valley	406	30,000				✓
WARD9	Somercotes	Amber Valley	406	30,000				✓
WARD10	Swanwick	Amber Valley	406	30,000				✓

Table 7. Developments within Derby City

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
DCiC_1	Rykneld Road (Heatherton Extn)	Derby City	800					✓
DCiC_2	Hackwood Farm	Derby City	410		410		✓	✓
DCiC_3	Nightingale Works	Derby City	400		224		✓	✓
DCiC_4	Castleward	Derby City	582		137		✓	✓
DCiC_5	Friar Gate Goods Yard	Derby City	280	7,000	157		✓	✓
DCiC_6	Wragley Way (DCC)	Derby City	180		180		✓	✓
DCiC_7	Boulton Moor/Snelsmoor Grange	Derby City	800		155		✓	✓
DCiC_8	Chaddesden Sidings (Derwent Triangle)	Derby City		56,811		42,608	✓	✓
DCiC_9	Derby Royal Infirmary	Derby City	796		655		✓	✓
DCiC_10	SmartParc (old Celanese Site)	Derby City		209,000		83,600	✓	✓
DCiC_11	Raynesway/Derby Commercial Park	Derby City		131,271		131,271	✓	✓
DCiC_12	Onslow Road	Derby City	203		203		✓	✓
DCiC_13	Manor/Kingsway Hospitals	Derby City	468		468		✓	✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
DCiC_14	Cultural Heart	Derby City	186		117		✓	✓
DCiC_15	Pheonix Street (part of Wider City Centre)	Derby City	202					✓
DCiC_16	Babington Lane (part of Wider City Centre)	Derby City	308		108		✓	✓
DCiC_17	Chellaston Business Park/Infinity Park	Derby City		171,093		59,883	✓	✓
DCiC_18	Brook Farm Chaddesden	Derby City	214					✓
DCiC_19	Breadsall, Hilltop	Derby City	250		250		✓	✓
DCiC_20	Agard Street (part of Wider City Centre)	Derby City	142					✓
DCiC_21	Rolls Royce Raynesway	Derby City		68,133				✓
DCiC_22	Infinity Park Extension (South of Sinfin Moor Lane)	Derby City		50,000				✓
DCiC_23	Chaddesden Sidings (West)	Derby City		26,000				✓
DCiC_24	Railway Station Gateway	Derby City	500					✓
DCiC_25	The Hollow, Mickleover	Derby City	150					✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
DCiC_26	Moorway Lane, Littleover	Derby City	375					✓
DCiC_27	Royal Hill Farm	Derby City	90					✓
DCiC_28	Manor/Kingsway New Allocation	Derby City	130					✓
DCiC_29	Derby Riverside (emerging city centre allocation)	Derby City	400					✓
DCiC_30	North Castleward	Derby City	400					✓
DCiC_31	Becketwell (part of the Wider City Centre)	Derby City	409	19,039	259	11,995	✓	✓
DCiC_32	Eagle Quarter	Derby City	400					✓
DCiC_33	Northern Gateway	Derby City	200					✓
DCiC_34	Bradshaw Way Retail Park	Derby City	400					✓
DCiC_35	City Wide	Derby City	200					✓
DCiC_36	Non-Strategic Housing Allocation Allowance	Derby City	1,800					✓
DCiC_37	Housing Windfall Allowance	Derby City	800					✓
DCiC_38	Innovation Centre (IHub)	Derby City		4,551		4,551	✓	✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
DCiC_39	Project Ivory	Derby City		17,803		17,803	✓	✓

Table 8. Developments within South Derbyshire

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
SDDC_1	Wragley Way (SDDC) phase 1	S Derbyshire	94		64		✓	✓
SDDC_2	Wragley Way (SDDC) phase 2	S Derbyshire	1,850	2,350				✓
SDDC_3	Boulton Moor Phase 1	S Derbyshire	1,157	3,440	863		✓	✓
SDDC_4	Boulton Moor Phase 2	S Derbyshire	550					✓
SDDC_5	Boulton Moor Phase 3	S Derbyshire	250					✓
SDDC_6	Land at Hackwood Farm	S Derbyshire	290		248		✓	✓
SDDC_7	Primula Way	S Derbyshire	500					✓
SDDC_8	Chellaston Fields	S Derbyshire	450	2,042	450	2,042	✓	✓
SDDC_9	Land West of Mickleover Phase 1 (Newhouse Farm)	S Derbyshire	288		288		✓	✓
SDDC_10	Land West of Mickleover Phase 2	S Derbyshire	252		252		✓	✓
SDDC_11	Land West of Mickleover Phase 3a	S Derbyshire	317		271		✓	✓
SDDC_12	Land West of Mickleover Phase 3b	S Derbyshire	783	2,050				✓
SDDC_13	Broomy Farm	S Derbyshire	589		376		✓	✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
SDDC_14	Land NE of Hatton	S Derbyshire	385		258		✓	✓
SDDC_15	North of William Nadin Way Site A	S Derbyshire	68				✓	✓
SDDC_16	North of William Nadin Way Site B	S Derbyshire	132		132			✓
SDDC_17	North of William Nadin Way Site C	S Derbyshire	400		297			✓
SDDC_18	Tetron Point	S Derbyshire		12,723		3,777	✓	✓
SDDC_19	Church Street, Church Gresley	S Derbyshire	306		38			✓
SDDC_20	Land off the Mease, Hilton	S Derbyshire	494	21,999	482			✓
SDDC_21	Woodville Regeneration Area	S Derbyshire	300	16,850				✓
SDDC_22	Land North of Dove Valley Business Park	S Derbyshire		102,212		27,812	✓	✓
SDDC_23	Dove Valley Business Park	S Derbyshire		53,355		18,164	✓	✓
SDDC_24	Highfield Farm	S Derbyshire	1,064	1,012	1064	1,012	✓	✓
SDDC_25	Drakelow Power Station	S Derbyshire	2,239	12,000	532		✓	✓
SDDC_26	Infinity Garden Village, Including Lowes Farm (STRA1)	S Derbyshire	2,000	281,999				✓

REF.	DEVELOPMENT NAME	LOCAL AUTHORITY	FULL BUILD OUT HOMES BY 2044	FULL BUILD OUT EMPLOYMENT BY 2044 (SQM)	BUILD OUT HOMES BY 2024	BUILD OUT EMPLOYMENT BY 2024 (SQM)	DO MINIMUM	DO SOMETHING
SDDC_27	Land South of Mickleover (STRA2) (total allocation 2500)	S Derbyshire	2,500	62,000				✓
SDDC_28	Former Drakelow Power Station (STRA3)	S Derbyshire		271,998				✓
SDDC_29	East Midlands Freeport Strategic Rail Freight Interchange (INF3)	S Derbyshire		692,000				✓
SDDC_30	William Nadin Way Site D	S Derbyshire	150					✓
SDDC_31	Land East of Dove Valley Business Park	S Derbyshire		53,518				✓
SDDC_32	ATL, Woodyard Lane, Foston	S Derbyshire		15,565				✓
SDDC_33	Brun Lane, Mackworth	S Derbyshire	250					✓

4.2.4 The 2044 With HMA Local Plan (Do Something 1) scenario has been constrained to full 2044 TEMPro across the whole model, including South Derbyshire, Derby City and Amber Valley Local Authorities.

4.2.5 Outside the HMA area, all committed and allocated housing and employment growth is consistent with the Do Minimum scenario. A list of non-HMA developments is included within Appendix B.

4.2.6 The total expected person trips for the HMA development schemes area are shown in Table 9 and Table 10 below. The additional development that is predicted to be built by 2044 generates 32,649 additional person trips in the morning peak hour and 28,920 trips in the evening peak hour across the three local authorities.

Table 9. Expected Person Trips by Local Authority – AM Peak

	DO MINMUM ALREADY CONSTRUCTED		DO SOMETHING LOCAL PLAN DEVELOPMENTS	
	IN	OUT	IN	OUT
Amber Valley	355	1,413	2,168	6,364
Derby City	2,310	3,190	4,565	7,670
South Derbyshire	1,268	4,187	10,320	14,285
Totals	3,933	8,790	17,053	28,319

Table 10. Expected Person Trips by Local Authority – PM Peak

	DO MINMUM ALREADY CONSTRUCTED		DO SOMETHING LOCAL PLAN DEVELOPMENTS	
	IN	OUT	IN	OUT
Amber Valley	1,105	498	4,961	2,669
Derby City	2,443	2,399	5,892	4,949
South Derbyshire	3,267	1,667	10,972	10,856
Totals	6,815	4,564	21,825	18,474

4.3 Growth in the Model

4.3.1 Table 11 below outlines the growth in highway trips between the 2016 base and the 2044 with Local Plan (Do Something 1) scenario for the AM and PM peaks. During the morning peak there is a 28% growth in demand between 2016 and 2044 in Derby City and a 31% increase across the whole HMA area. In the evening peak there is a 24% increase in Derby and 27% increase across the whole HMA area.

Table 11. Growth in VDM Demand

PEAK	DERBY	HMA	FULL MODEL
AM PEAK	28%	31%	29%
PM PEAK	24%	27%	26%

4.4 Distribution of Development Trips

4.4.1 The distribution of development traffic is shown in Figures 8 and 9 of the supplementary figures document. The HMA traffic uses a variety of local and strategic roads across the HMA area. The largest impact is concentrated on roads within and on the boundary of Derby City where several of the larger HMA sites are located, including Brun Lane, Infinity Garden Village and Mickleover. In Amber Valley and the southern areas of South Derbyshire the distribution of trips is more widespread and limited to a fewer number of roads.

4.5 Key Highway Outputs

Flow Change

4.5.1 Figures 10 and 11 present the change in traffic flows between the DM and DS scenarios, with red representing an increase in traffic flow, and green representing a reduction in traffic flow.

4.5.2 Increases in flows generally mirror the locations of the HMA development sites and are consistent with the development distributions shown in Figures 8 and 9.

4.5.3 Overall, there is a general increase in traffic flow across the majority of the HMA Boundary, however, the largest impact is concentrated within and on the boundary of Derby City where several of the larger HMA sites are located, including Brun Lane, Infinity Garden Village and Mickleover. These sites cause a significant increase in traffic along the A52, A516, A50 and A38. The flow change plots indicate that some development traffic struggles to reach the wider network, especially around Infinity Garden Village where traffic passes through already congested A514/A50 junction, or along local roads north of the site through Sinfin and Chellaston. There is forecast to be an increase in traffic along the A5132 through Willington as an alternative route to the A50 which is already at capacity by 2044.

4.5.4 The Mickleover and EMIP developments are forecast to have a significant impact on traffic flows on the local road network and SRN especially on the A38 and A50 corridors. The plots indicate increases in traffic along the A38 and A50 in both peak hours. In the absence of the grade separation of A38 junctions and EMIP mitigation, the existing infrastructure struggles to accommodate the extra traffic and some non-development traffic moves away from the A38 corridor onto local routes (through Willington) and more longer distance routes (the M1 and A515).

4.5.5 Two-way flows along the A516 increase significantly as a result of the extra HMA development traffic and avoidance of the A50/A38 junction by non-development traffic.

4.5.6 Traffic flow changes in Amber Valley and the southern areas of South Derbyshire are more modest reflecting the lower development levels, and dispersed locations of development sites, however the plots show an increase through Walton on Trent in both peaks resulting from the large development at the former Drakelow Power Station.

Junction Congestion

4.5.7 Figures 12 and 13 show the junctions which are forecast to have a significant change to their V/C ratio (%) in the 2044 DS scenario compared to the DM scenario. The yellow dots indicate junctions which are expected to show an increase in V/C of more than 5% but less than 10%, representing junctions that are noticeably impacted by the changes to the network between the two scenarios. The orange dots indicate junctions which are expected to show an increase in V/C between 10% and 20%%, representing junctions that are majorly impacted by the changes to the network between the two scenarios. Red dots indicate junctions where V/C increase by more than 20%.

4.5.8 The extra traffic generated by the HMA developments cause congestion increases at a number of junctions across the HMA area, with junctions within Derby City being the most significantly affected. The location of junctions affected is closely linked to the development distribution plots and the flow change plots discussed earlier in this chapter.

4.5.9 Of particular note is the increase in congestion along the A516, the A38 at Findern Roundabout and the A50/A38 interchange due to the Mickleover and EMIP developments. There are also congestion increases along the A5132 Twyford Road as traffic seeks to avoid the A50/A38 interchange.

4.5.10 Local junctions through Sinfin, along the A514 and Chellaston Road which are all affected by traffic associated with the Boulton Moor and Infinity Garden Village developments.

4.5.11 Congestion changes in Amber Valley are more modest reflecting the lower development levels, and dispersed locations of development sites, however the plots show increases along the A610 and in Heanor.

4.5.12 Figures 14 and 15 show the junctions which are forecast to have a maximum V/C ratio (%) of 75% or higher in the 2044 DS scenario. The yellow dots indicate junctions which are approaching the 85% threshold. The red dots represent junctions with a V/C over 85% but under 100% and are therefore considered congested and brown dots show junctions severely congested with a V/C of 100% of more.

Network Statistics

4.6 Network Statistics

4.6.1 Network statistics provide a way of gauging the overall impact from the addition of trips associated with the development sites. An explanation of the key indicators is as follows:

- Congestion / Over Capacity Queues – reflect the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase, a growing number of junctions reach capacity, and the time spent queuing at junctions can increase.
- Total Travel Time – across the highway network in PCU hours.
- Total Travel Distance – across the highway network in PCU kilometres; and
- Average Speed – expressed as kilometres per hour, averaged for all traffic. Increased traffic levels lead to greater delays, potentially resulting in a lower average travel speed.

4.6.2 Network statistics for the AOI are provided in Table 12 and Table 13.

Table 12. Network Statistics – AM Peak

INDICATOR	Do Minimum	Do Something 1	Change (%)
Over capacity Queues (PCU hrs) / Congestion	1,708	3,604	111%
Total Travel Time (PCU hrs)	27,995	33,554	20%
Total Travel Distance (PCU kms)	1,029,183	1,120,244	9%
Average Speed km/hr	37	33	-9%

Table 13. Network Statistics – PM Peak

INDICATOR	Do Minimum	Do Something 1	Change (%)
Overcapacity Queues (PCU hrs) / Congestion	2,254	4,744	110%
Total Travel Time (PCU hrs)	28,751	34,121	19%
Total Travel Distance (PCU kms)	1,018,996	1,089,585	7%
Average Speed km/hr	35	32	-10%

4.6.3 In both peaks, there is a significant increase in congestion across the HMA area (denoted by the overcapacity queues statistic) as a result of the Local Plan proposals, with accompanying increases in total travel time and total travel distance. Congestion in both peaks is more than doubled as a result of the Derby HMA development traffic. The resultant effect is average speeds reduce due to increased congestion.

4.7 Conclusions

4.7.1 Overall, there is a general increase in traffic flow across the majority of the HMA area, as a result of the Local Plan developments however, the largest impact is concentrated within and on the boundary of Derby City. Traffic flow changes in Amber Valley and the southern areas of South Derbyshire are more modest reflecting the lower development levels, and dispersed locations of development sites.

4.7.2 There is a significant increase in traffic along the A52, A516, A50 and A38 but some development traffic struggles to reach the wider network as local roads struggle to accommodate the development traffic. This is particularly evident around the Infinity Garden Village and EMIP areas.

4.7.3 In the absence of the known mitigation improvement schemes (the grade separation of A38 junctions, A38/A50 EMIP mitigation and new A50 junction), the existing infrastructure struggles to accommodate the extra HMA traffic and as a result some non-development traffic moves away from key routes such as the A38 and A50 onto alternative, less suitable roads.

4.7.4 The extra traffic generated by the HMA developments cause congestion increases at a number of junctions across the Derby HMA area, with junctions within Derby City being the most significantly affected.

4.7.5 Network statistics indicate a significant increase in congestion across the Derby HMA area with the Local Plan developments included, with accompanying increases in total travel time and total travel distance.

5. LOCAL PLAN WITH KNOWN MITIGATION (DO SOMETHING 2)

5.1 Overview

5.1.1 This chapter provides key outputs and analysis relating to the Do Something 2 (DS2) scenario, which includes all the Derby HMA Local Plan developments and a series of Known Mitigation schemes that were not included in the Do Minimum scenario. All figures are provided in the supplementary Figures Document. Appendix C provides labelled, focussed plots for each local authority.

5.2 Know Mitigation Infrastructure

5.2.1 Table 14 details the additional infrastructure schemes that are included in the DS2 scenario. None of these schemes have been included in the Do Minimum scenario.

Table 14. Known Mitigation Infrastructure Schemes (DS2)

SCHEME	STATUS
New A50 junction and South Derby Integrated Transport Link Phase 1	Partially funded currently going Final Business Case submission for remaining funding
Wragley Way	Approved development mitigation proposals to be delivered by the Wragley Way Developer
Junction Improvements associated with Boulton Moor development	Approved development mitigation proposals to be delivered by the Boulton Moor Developer
A38 Junctions scheme (grade separation of the A5111 Kingsway junction, A52 Markeaton junction and A61 Little Eaton junction)	Funding Allocated subject to updated final Business Case submission
M1 J28 Junction Improvement Scheme	Scheme identified as part of wider Local Plans and Midlands Connect but not yet committed.
A50/A38 Toyota Improvements (EMIP Improvements)	Former developer Proposal associated with the East Midland Intermodal Park development

5.3 Key Highway Outputs

Flow Change

5.3.1 Figures 16 and 17 present the change in traffic flows between the HMA Local Plan no mitigation (DS1) and HMA Local Plan with Known Mitigation (DS2) scenarios to show the impact of the Known Mitigation schemes on the highway network with the HMA Local Plan developments. Figures 20 and 21 present the change in traffic flows between the No HMA Local Plan (DM) and Local Plan with Known Mitigation (DS2) scenarios, to show the impact of the Local Plan and Infrastructure schemes combined. Red lines represent an increase in traffic flow, and green represent a reduction in traffic flow.

5.3.2 Whilst increases in traffic flow can often result in additional congestion, the level of congestion is also determined by junction capacity and therefore flow increases do not always lead to associated increases in congestion.

5.3.3 Between the DS1 and DS2 scenarios, the model indicates a significant increase in traffic along the A38 and reduction along the M1 as a result of the Known Mitigation schemes. This is due to the additional capacity released by the A38 Grade Separation schemes and the EMIP improvements at the A50/A38 Toyota junction.

5.3.4 The new A50 junction and associated infrastructure leads changes to routings in South Derby, with traffic previously using local roads moving onto the new infrastructure. The new junction also improves the accessibility for traffic to and from South Derbyshire, which increases flows along a small number of roads south of the A50 through Swarkestone. Traffic in most other areas remains unchanged or shows minor changes.

5.3.5 Between the DM and DS2 scenarios, there is a general increase in traffic flow across the majority of the HMA area, generally as a result of the Local Plan developments, concentrated largely along major roads (A50, A38, A5132, A516). Whilst there is a general increase in traffic along the length of the A38, the section between the A38/A50 junction and Findern Roundabout shows limited change, suggesting that despite the A38 grade separation improvements, there is still reassignment of non-development traffic away from this section of road due to local HMA development-related congestion.

Junction Congestion

5.3.6 Figures 18 and 19 show the junctions which are forecast to have a significant change to their congestion levels (V/C ratio (%)) in the 2044 DS2 scenario compared to the DS1 scenario, while Figures 22 and 23 show the junctions which are forecast to have a significant change to their V/C ratio (%) in the 2044 DS2 scenario compared to the DM scenario. The yellow, orange, and red dots indicate junctions which are expected to show an increase in V/C between the two scenarios. The blue dots indicate junctions which are expected to see an improvement in congestion between the two scenarios.

5.3.7 Compared to the DS scenario, the known mitigation has a significant impact on reducing congestion at several local junctions within Derby City. The plots show that some routes leading to the A38 experience an increase in congestion (A516 for example), which is likely

due to more traffic using these roads to access the A38. Congestion remains at Findern roundabout, the A38/A50 junction and along the A516.

5.3.8 Compared to the Do Minimum scenario, there is an improvement in congestion within Derby City at local junctions around Infinity Garden Village. However, significant congestion remains on the western side of the city in the AM peak along the A516 and A38 at Findern Roundabout. In the PM peak, congestion remains along the A50 and A52 Ashbourne Road. Congestion in most other areas of the HMA remains unchanged or shows minor changes.

5.3.9 Figures 24 and 25 show the junctions which are forecast to have a maximum V/C ratio (%) of 75% or higher in the 2044 DS2 scenario and are therefore identified as congested. The yellow dots indicate junctions which are approaching the 85% threshold. The red dots represent junctions with a V/C over 85% but under 100% and are therefore considered congested and brown dots show junctions severely congested with a V/C of 100% of more.

Network Statistics

5.4 Network Statistics

5.4.1 Network statistics provide a way of gauging the overall impact from the addition of trips associated with the development sites. An explanation of the key indicators is as follows:

- Congestion / Over Capacity Queues – reflect the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase, a growing number of junctions reach capacity, and the time spent queuing at junctions can increase.
- Total Travel Time – across the highway network in PCU hours.
- Total Travel Distance – across the highway network in PCU kilometres; and
- Average Speed – expressed as kilometres per hour, averaged for all traffic. Increased traffic levels lead to greater delays, potentially resulting in a lower average travel speed.

5.4.2 Network statistics for the AOI are provided in Table 15 and Table 16.

Table 15. Network Statistics – AM Peak

INDICATOR	DM	DS1	DS2	Change (%) DM v DS1	Change (%) DM v DS2
Over capacity Queues (PCU hrs) / Congestion	1,708	3,604	2,612	111%	53%
Total Travel Time (PCU hrs)	27,995	33,554	32,854	20%	17%
Total Travel Distance (PCU kms)	1,029,183	1,120,244	1,155,119	9%	12%
Average Speed km/hr	37	33	35	-9%	-4%

Table 16. Network Statistics – PM Peak

INDICATOR	DM	DS1	DS2	Change (%) DM v DS1	Change (%) DM v DS2
Overcapacity Queues (PCU hrs) / Congestion	2,254	4,744	3,438	110%	53%
Total Travel Time (PCU hrs)	28,751	34,121	33,361	19%	16%
Total Travel Distance (PCU kms)	1,018,996	1,089,585	1,140,662	7%	12%
Average Speed km/hr	35	32	34	-10%	-3%

5.4.3 In both peaks, the Known Mitigation improvements improve congestion across the HMA area, mitigating the impacts of the HMA strategy by 52% in the AM peak and 54% in the PM peak.

5.5 Conclusions

5.5.1 This scenario provides key outputs and analysis relating to the Do Something 2 (DS2) scenario, which includes all the Derby HMA Local Plan developments and a series of Known Mitigation schemes that were not included in the Do Minimum scenario.

5.5.2 The identified Known Mitigation schemes are expected to significantly influence route choice and congestion across the network, improving accessibility to development sites at Infinity Garden Village, EMIP and Boulton Moor. The schemes will also influence longer distance routings by improve accessibility of the A38, A50 and M1 on the SRN.

5.5.3 Flow change plots indicate the schemes cause a significant increase in traffic along the A38 and reduction along the M1. This is due to the additional capacity released by the grade separation of A38 junctions at A5111 Kingsway, A52 Markeaton and A61 Little Eaton and the improvements to the A38/A50 Toyota junction. The new A50 junction and associated infrastructure leads changes to routings in South Derby, with traffic previously using local roads moving onto the new infrastructure.

5.5.4 The Known Mitigation schemes have a significant impact on reducing congestion at several local junctions within Derby City, but congestion remains at the A38 Findern roundabout, the A38/A50 junction and along the A516. Some local roads leading to the A38 also experience an increase in congestion as traffic routes to use the improved A38.

5.5.5 In both peaks, the Known Mitigation schemes improve congestion across the Derby HMA area, mitigating the impacts of the HMA strategy by 52% in the AM peak and 54% in the PM peak.

5.5.6 Despite the improvements caused by the Known Mitigation, the modelling indicates further improvements will be required to fully mitigate the impacts of the Derby HMA strategy, particularly on the southwestern boundary of Derby City where a number of large-scale developments are located.

6. HMA LOCAL PLAN WITH ADDITIONAL MITIGATION (DO SOMETHING 3)

6.1 Overview

6.1.1 This chapter provides an overview of the proposed public transport, active mode and highway mitigation additional to that identified under the Do Something 2 scenario and summarises the key outputs and analysis. All figures are provided in the supplementary Figures Document. Appendix C provides labelled, focussed plots for each local authority.

6.1.2 The mitigation has been undertaken, and reported on, in two stages as follows:

- Scenario 3a – Active Mode and Public Transport Mitigation.
- Scenario 3b - Active Mode, Public Transport and additional Highway Mitigation.

6.2 Public Transport and Active Mode Strategy (Scenario 3a)

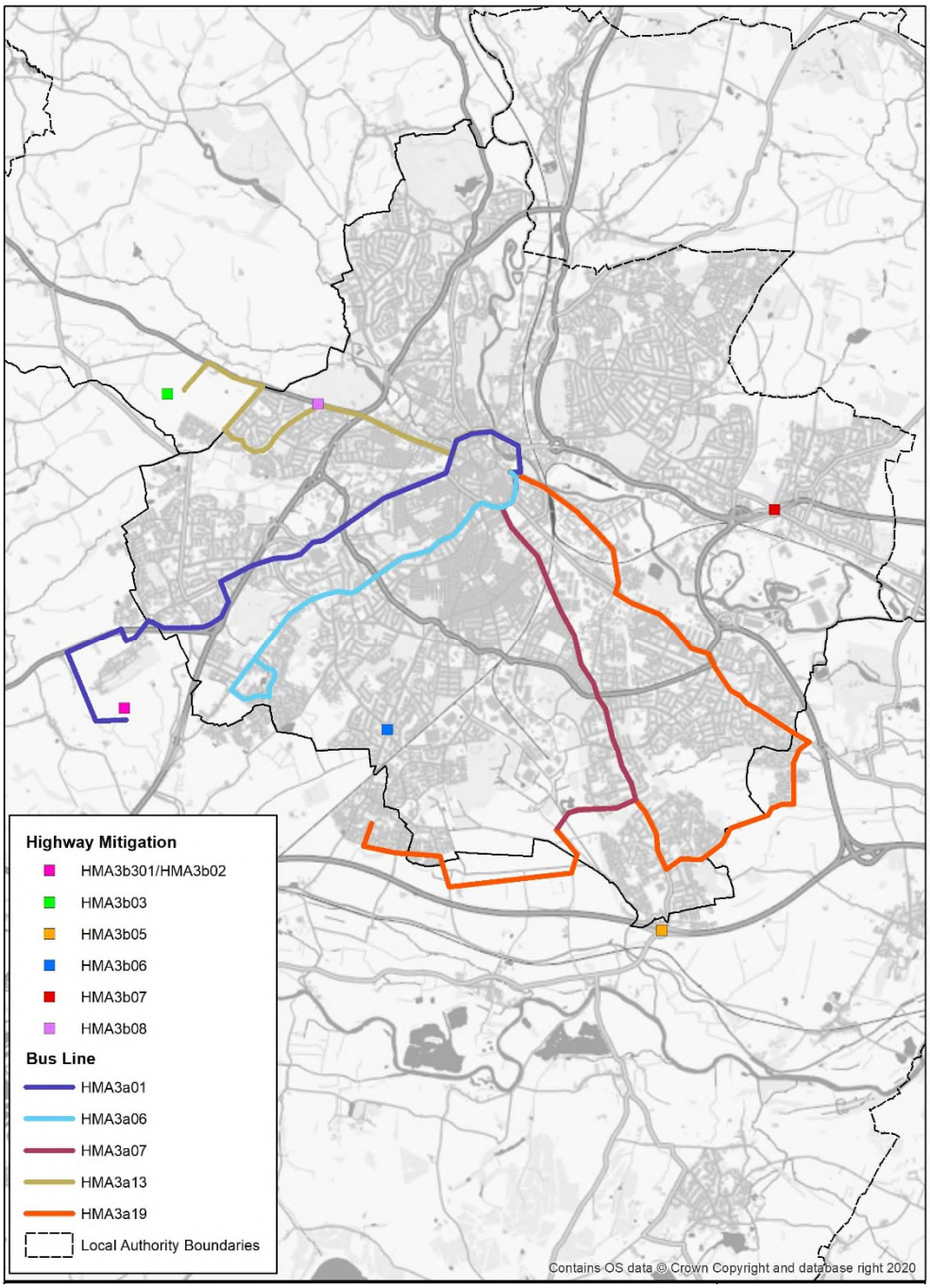
6.2.1 Table 17 provides a summary pf the public transport and active mode mitigation which has been tested in this scenario. These measures have been agreed with the HMA group prior to the transport modelling.

Table 17. Public Transport and Active Mode Mitigation Strategy

SCHEME ID	SCHEME	FURTHER DESCRIPTION
HMA3b01	Bus service to serve land west of Staker Lane	New service providing 3 service per hour between development and city centre
HMA3b02	Extensive network of connected routes within development	Links to HMA3b03 and b04
HMA3b03	Strategic cycle link improvement	Segregated route on Brierfield Way
HMA3b04	Strategic cycle link improvement	The Hollow to Pastures Hill
HMA3b05	Strategic cycle link improvement	Rykneld Road from Tutbury Avenue to Hillsway
HMA3b06	Bus service to serve sites on Rykneld Road	Extension of Harlequin Service to provide three buses per hour
HMA3b07	Extension of Number 2 bus through Infinity Garden Village	Provide minimum bus frequency of 3 buses per hour or DRT
HMA3b08	Strategic cycle link improvement	Provide segregated cycle route from Grampian Way to Outer Ring Road

SCHEME ID	SCHEME	FURTHER DESCRIPTION
HMA3b09	Extensive network of connected routes within development	Links to Sinfin Lane Route 66, Route 6 north and south and SDiTL
HMA3b10	Burton Road Bus Priority Improvements	Signal hurry call facilities and potentially physical measure
HMA3b11	Hospital Gyratory Integrated Transport Improvement from Chain Lane to Manor Road Junction	Signal and minor capacity improvements to reduce corridor delays, providing priority for buses and provide a step change in active travel routes.
HMA3b12	Mick Mack Strategic Cycle Route	Provide segregated cycle route from Station Road to Friar Gate
HMA3b13	Strategic cycle link improvement	Link through Mackworth from Radbourne Lane to A52 Prince Charles Avenue
HMA3b14	New bus service to serve Hackwood Farm and Brun Lane	New bus service with a minimum frequency of 3 buses per hour
HMA3b15	Active travel and bus priority improvement scheme at A514/A5111 Spider Island	
HMA3b16	Segregated cycle improvement on Outer Ring Road from London Road to Uttoxeter Road	
HMA3b17	Extensive network of connected routes within development	Part of SDiTL but also to DCC's Trent and Mersey Canal Route
HMA3b18	Replacement of Caxton Street Footbridge	Replacement of bridge that would provide a new cycle link
HMA3b19	Bus Service connecting Infinity Park to City Centre via Boulton Moor and Pride Park	3 buses per hour

6.2.2 The figure below provides an illustration of the bus service improvements.



6.2.3 The bus improvements have been coded into the public transport model and the model run in full to ensure any modal shift between highway and public transport is captured. Bus priority has been included in at targeted locations through a combination of short bus lanes and minor signal adjustments in the highway model.

6.2.4 In areas where walk and cycle mitigation measures have been identified, short journeys (less than 5km) with an origin or destination within 1km of the cycle corridors have been identified and highway demand between these origin-destination pairs reduced by 10% to mimic the likely transference of trips from highway to active mode measures. The impact of these measures is relatively small in a strategic model.

6.3 Key Public Transport Impacts

Bus Service Utilisation

6.3.1 The public transport enhancements have a positive impact on bus demand, especially in areas which are currently underserved by public transport and easily accessible by car.

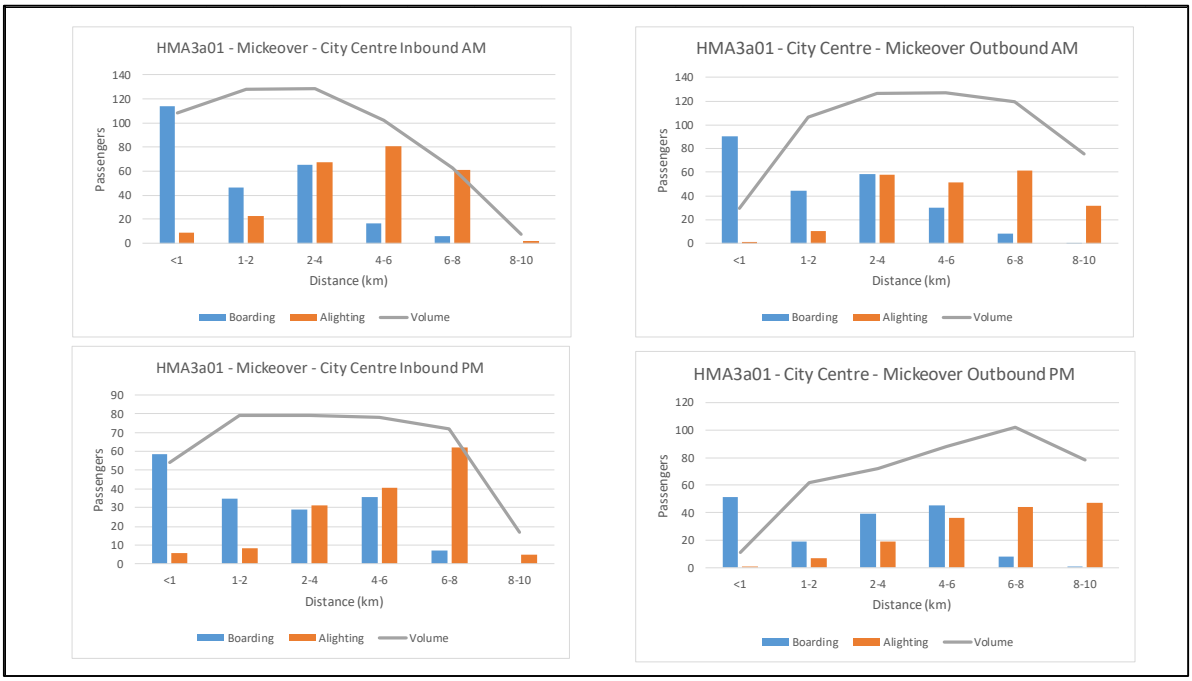
6.3.2 Table 18 summarises the change in passenger volumes on each service between the DS2 scenario and DS3a scenario. The changes to the existing services (Harlequin and Arriva 2) results in increases in bus passengers on both services. The new services are well used in both peak hours by a mix of HMA development trips and non-development trips.

Table 18. Maximum Bus Passengers DS2 v DS3

SCHEMEID	DESCRIPTION	AM	PM
HMA3a01	CC-Mickleover	129	79
	Mickleover-CC	127	102
HMA3a06	Harlequin Derby - Heatherton	19	19
	Harlequin Heatherton - Derby	42	4
HMA3a07	Arriva 2 Derby - Swadlincote	12	-2
	Arriva 2 Swadlincote - Derby	19	14
HMA3a14	Brun-Hackworth	51	29
	Hackworth-Brun	41	31
HMA3a19	CC-PP-BM-IGV-S	75	155
	S-IGV-BM-PP-CC	105	84

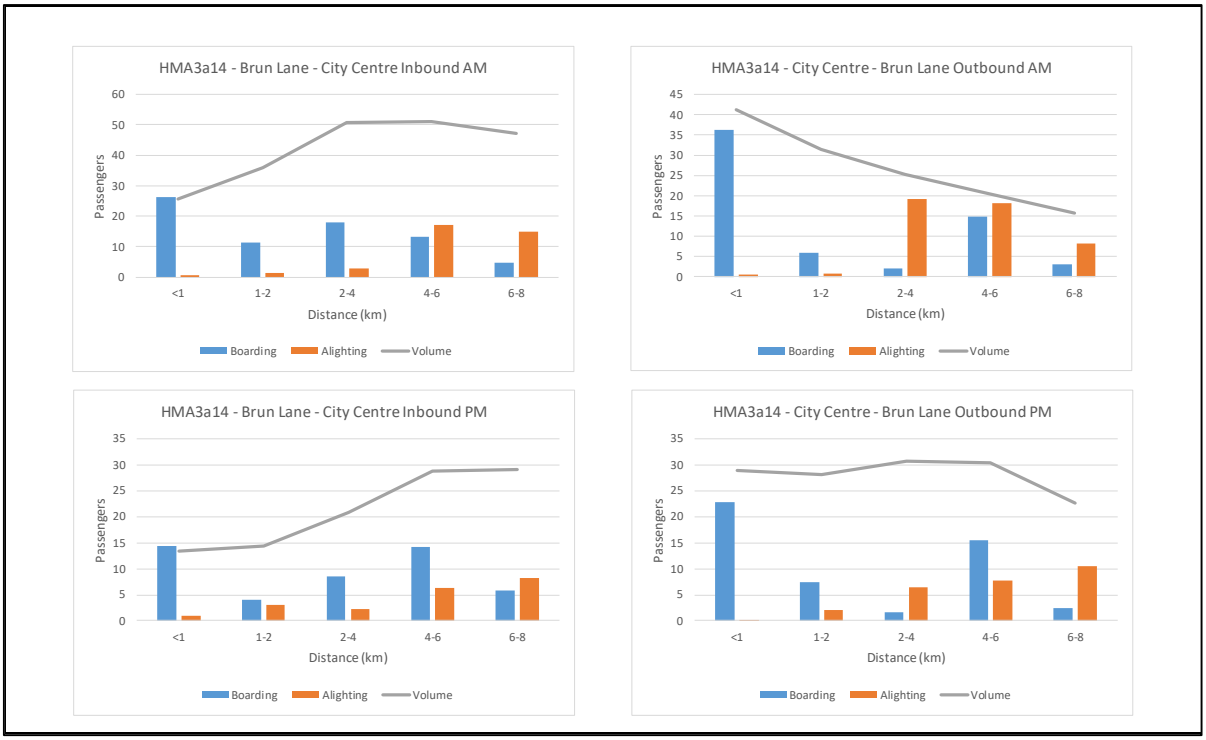
6.3.3 The figures below show the passenger boarding and alightings for the new services added as part of the mitigation package. On the Staker Lane service (HMA3a01), approximately 110 passengers board the service at Mickleover in the morning peak, and 50 passengers alight in the evening. The service is also used by other passengers along the route, with notable boarding and alighting occurring at Manor Kingsway hospital.

HMA3a01 – New service between Staker Lane and City Centre



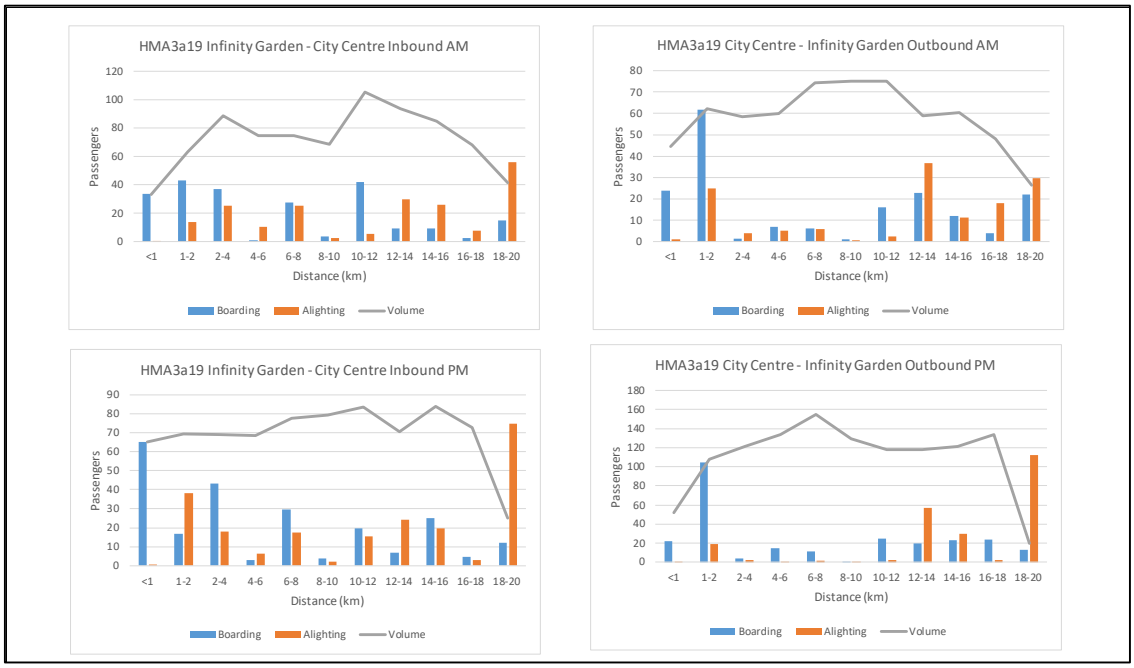
6.3.4 The Brun Lane (HMA3a14) service provides a connection from areas west of the A52 to the city centre via the A52. The overall usage of the service is lower than the Mickleover connection, with only approximately 35 passengers boarding the service at Brun Lane in the morning peak, and 10 passengers alighting in the evening.

HMA3a014 – New service between Staker Lane and City Centre



6.3.5 The new, orbital service between Infinity Garden Village and the City Centre (HMA3a19) is well utilised in both peaks. The service provides an important connection between the mixed land use development at Infinity Garden Village and the residential Boulton Moor. It also provides connections between these development areas and Pride Park, the Railway station and the City Centre.

HMA3a19 – New service Infinity Garden Village and City Centre via Boulton Moor and Pride Park



Mode Share

6.3.6 The enhancements to public transport improve the mode share for several key HMA developments. The change in mode share at the most impacted sites are presented in the table below.

Table 19. Development Mode Shares

DEVELOPMENT	AUTHORITY	MODE SHARE DS3	CHANGE FROM DS2
Wragley Way Phase 1	South Derbyshire	10.4%	1.0%
Wragley Way Phase 2	South Derbyshire	10.3%	1.0%
Land West of Mickleover Phase 1	South Derbyshire	3.6%	1.4%
Infinity Garden Village	South Derbyshire	5.5%	1.7%
Land South of Mickleover	South Derbyshire	3.5%	3.5%
Chellaston Business Park/Infinity Park	Derby City	6.3%	2.6%

DEVELOPMENT	AUTHORITY	MODE SHARE DS3	CHANGE FROM DS2
Infinity Park Extension	Derby City	9.6%	5.7%
Innovation Centre	Derby City	6.5%	2.6%
Project Ivory	Derby City	6.0%	2.7%

Active Mode Impacts

6.3.7 The impact of the active mode and bus priority interventions on the highway network is illustrated by the network statistics presented in Tables 20 and 21. Whilst active mode improvements will encourage some journeys to move away from car, the impact is generally small and there is a largely neutral impact on highway flows and congestion.

Table 20. Network Statistics – AM Peak

INDICATOR	DM	DS	DS2	DS3a	DM v DS	DM v DS2	DM v DS3a
Over Capacity Queues	1,708	3,604	2,612	2,593	111%	53%	52%
Travel Time (PCU hrs)	27,995	33,554	32,854	32,892	20%	17%	17%
Travel Distance (PCU kms)	1,029,183	1,120,244	1,155,119	1,156,201	9%	12%	12%
Av Speed km/hr	37	33	35	35	-9%	-4%	-4%

Table 21. Network Statistics – PM Peak

INDICATOR	DM	DS	DS2	DS3a	DM v DS	DM v DS2	DM v DS3a
Over Capacity Queues	2,254	4,744	3,438	3,456	110%	53%	53%
Travel Time (PCU hrs)	28,751	34,121	33,361	33,380	19%	16%	16%
Travel Distance (PCU kms)	1,018,996	1,089,585	1,140,662	1,140,690	7%	12%	12%
Av Speed km/hr	35	32	34	34	-10%	-3%	-3%

6.4 Scenario 3a: Public Transport and Active Mode Conclusions

6.4.1 This scenario provides an overview of the proposed public transport and active mode strategy.

6.4.2 The public transport enhancements encourage a greater number of passengers to use public transport in both peaks, especially from the larger strategic sites on the edge of Derby where public transport mode share is significantly positively impacted. Active mode improvements will encourage some journeys to move away from car; however, the impact is generally small and consequently has a relatively neutral impact on highway flows and congestion.

6.4.3 Whilst the public transport improvements are positive, the modelling indicates further mitigation measures, in the form of highway schemes, will be required to help mitigate the overall impact of the HMA strategy. These highway intervention schemes are additional to those identified under Scenario 2 and are considered under Scenario 3b.

6.5 Highway Mitigation Strategy (Scenario 3b)

6.5.1 Table 22 provides a summary of the highway mitigation which has been tested in this scenario. These locations are also shown graphically in section 6.2.

Table 22. Public Transport and Active Mode Mitigation Strategy

SCHEME ID	SCHEME	FURTHER DESCRIPTION
HMA3a01	Link providing connectivity between the A516 and the A38 Findern Roundabout junction	Local Distributor Road providing optimal route choice and access for and linkages for public transport and active travel modes.
HMA3a02	Realignment of Staker Lane through proposed strategic	Providing a link to modern standards and stopping up existing route, perhaps providing cycle link

SCHEME ID	SCHEME	FURTHER DESCRIPTION
	development on land south of Mickleover	
HMA3a03	Link through proposed cross-boundary strategic development at Brun Lane	Local Distributor Road providing optimal route choice and access for and linkages for public transport and active travel modes. Could form part of potential West Mickleover Integrated Transport Link.
HMA3a05	Signalisation of A50(T)/A514 Bonnie Prince Charlie Junction	
HMA3a06	Improvements to Blagreaves Avenue Signal Junction	left turn only lanes both directions between Blagreaves Avenue and Goodsmoor Road
HMA3a07	Spondon Interchange Signalisation	Provides better control and allows for bus rapid call through the junction
HMA3a08	Signalisation of Prince Charles Avenue/A52 Junction	The scheme improves safety and provides cycle and pedestrian crossing facilities.

6.5.2 The highway mitigation measures have been added to the highway networks and run through the full EMG model to capture any changes in mode, route and destination choice. This scenario also includes all the active mode and bus related mitigation within scenario DS3a.

6.6 Key Highway Mitigation Outputs

Flow Change

6.6.1 Figures 26 and 27 present the change in traffic flows between the Local Plan with Known Mitigation (DS2) and Local Plan with additional Highway Mitigation (DS3b) scenarios to show the impact of the entire HMA mitigation package, including active and bus mitigation on the highway network. Figures 30 and 31 present the change in traffic flows between the No HMA Local Plan (DM) and Local Plan with Highway Mitigation (DS3b) scenarios, to show the impact of the Local Plan and Infrastructure schemes combined. Red lines represent an increase in traffic flow, and green represent a reduction in traffic flow.

6.6.2 The modelling indicate that the mitigation schemes result in changes in flows around three key areas, Infinity Garden Village, Mickleover, and Mackworth. The mitigation package also influences traffic flows along the strategic road network, particularly the A38 and the A52.

6.6.3 In the area around Infinity Garden Village, the signalisation of the A514/A50 junction results in route changes for local traffic and makes the surrounding development sites more accessible. This allows some previously supressed trips to access the network. In the morning peak, the signalisation of the A514/A50 roundabout causes a slight increase in delay to traffic and traffic switches to use the new A50 junction as an alternative. This leads to a small increase in traffic using the A5132 south of the A50. In the evening peak, the signalisation significantly improves the journey times through the junction and encourages traffic to pass through the junction and also to use Infinity Park Way.

6.6.4 In Mickleover, the link between the A516 and A38 improves the accessibility of the site to the wider network providing the opportunity for development traffic to avoid the Findern roundabout. The road is primarily used as a development access road and helps mitigate the impact of the proposed strategic development on land to the South of Mickleover. Development traffic uses a combination of the A516 and A38 to access the wider highway network, which causes reductions in flow on local roads through Mickleover including the Hollow, Staker Lane, Haven Bulk Lane, Brierfield Way and Etwall Road.

6.6.5 Despite the A516 connection, the A38 is still used as the primary route to access the proposed strategic development site to the South of Mickleover. Furthermore, the improved accessibility of the development allows some previously suppressed demand to access the highway network at the A38 junction. This causes an increase in traffic along the A38 of around 150 pcus two-way in each peak.

6.6.6 At Brun Lane, the link through the proposed cross-boundary strategic development site encourages traffic to use an alternative route to the A52 and consequently there are small increases in traffic along local roads to the south of the site including Station Road. The signalisation of Prince Charles Avenue/A52 junction leads to an increase in delay for traffic using the A52 and causes traffic to avoid the junction using Markeaton Road instead. This road experiences an increase in traffic in both peaks, of around 100-150 pcus.

6.6.7 Between the DM and DS3b scenarios, there is a general increase in traffic flow across the majority of the HMA area, generally as a result of the Local Plan developments, concentrated largely along major roads (A50, A38, A5132, A516) although there a reduction in flows along some parts of the highway network within Derby City. There is a general increase in traffic along the length of the A38, including the section between the A38/A50 junction and Findern Roundabout.

Junction Congestion

6.6.8 Figures 28 and 29 show the junctions which are forecast to have a significant change to their congestion (V/C ratio (%)) in the 2044 Local Plan with additional highway mitigation (DS3b) scenario compared to the Local Plan with Known Mitigation (DS2) scenario, while Figures 32 and 33 show the junctions which are forecast to have a significant change to their V/C ratio (%) in the 2044 DS3b scenario compared to the No HMA Local Plan (DM) scenario. The yellow, orange, and red dots indicate junctions which are expected to show an increase in V/C between the two scenarios. The blue dots indicate junctions which are expected to see an improvement in congestion between the two scenarios.

6.6.9 Compared to the DS2 scenario, the highway mitigation has an impact on reducing congestion at several local junctions within or on the edge of Derby City. This includes the A514, the A514/A50 junction, the A38 and the A516 and local roads through Mickleover. Junctions along the A52 also experience a reduction in congestion. Despite a small improvement, congestion remains at the Prince Charles Avenue/A52 junction despite the signalisation scheme which contributes to use of Markeaton Lane/Kedleston Road as an alternative route to the A38.

6.6.10 Compared to the Do Minimum scenario, significant congestion remains in the city in the AM peak along the A516 and A38 at Findern Roundabout as a result of the HMA Local Plan developments. In the PM peak, congestion remains along the A50 and A52 Ashbourne Road. Congestion in most other areas of the HMA remains unchanged or shows minor changes.

Network Statistics

6.7 Network Statistics

6.7.1 Network statistics provide a way of gauging the overall impact from the addition of trips associated with the development sites. An explanation of the key indicators is as follows:

- Congestion / Over Capacity Queues – reflect the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase, a growing number of junctions reach capacity, and the time spent queuing at junctions can increase.
- Total Travel Time – across the highway network in PCU hours.
- Total Travel Distance – across the highway network in PCU kilometres; and
- Average Speed – expressed as kilometres per hour, averaged for all traffic. Increased traffic levels lead to greater delays, potentially resulting in a lower average travel speed.

6.7.2 Network statistics for the AOI are provided in Table 23 and Table 24. In both peaks, the mitigation package improves congestion across the HMA area, mitigating the impacts of the HMA strategy by 59% in the AM peak and 54% in the PM peak.

Table 23. Network Statistics – AM Peak

INDICATOR	DM	DS	DS2	DS3a	DS3b	DM v DS	DM v DS2	DM v DS3a	DM v DS3b
OverCapacity Queues	1,708	3,604	2,612	2,593	2,480	111%	53%	52%	45%
Travel Time (PCU hrs)	27,995	33,554	32,854	32,892	32,892	20%	17%	17%	17%
Travel Distance (PCU kms)	1,029,183	1,120,244	1,155,119	1,156,201	1,168,754	9%	12%	12%	14%
Av Speed km/hr	37	33	35	35	35	-9%	-4%	-4%	-5%

Table 24. Network Statistics – PM Peak

INDICATOR	DM	DS	DS2	DS3a	DS3b	DM v DS	DM v DS2	DM v DS3a	DM v DS3b
OverCapacity Queues	2,254	4,744	3,438	3,456	3,396	110%	53%	53%	51%
Travel Time (PCU hrs)	28,751	34,121	33,361	33,380	33,806	19%	16%	16%	18%
Travel Distance (PCU kms)	1,018,996	1,089,585	1,140,662	1,140,690	1,154,058	7%	12%	12%	13%
Av Speed km/hr	35	32	34	34	34	-10%	-3%	-3%	-4%

6.8 Scenario 3b: Additional Highway Mitigation Conclusion

6.8.1 The modelling indicate that the highway mitigation schemes result in changes in flows around three primary areas: Infinity Garden Village, Mickleover, and Mackworth. The mitigation package also influences traffic flows along the strategic road network, particularly the A38 where flows increase as the mitigation package makes some developments more accessible to the wider network, allowing some previously supressed trips to access to the A38.

6.8.2 The highway mitigation improvements provide localised improvements to Mickleover, Infinity Garden and Mackworth. It has an impact on reducing congestion at several local junctions within Derby City. This includes the A514, the A514/A50 junction, the A38 and the A516 and local roads through Mickleover. Junctions along the A52 also experience a reduction in congestion.

6.8.3 Compared to the Do Minimum scenario, significant congestion remains in the city in the AM peak, particularly along the A516 and A38 at Findern Roundabout. In the PM peak, congestion remains along the A50 and A52 Ashbourne Road. Congestion in most other areas of the HMA remains unchanged or shows minor changes.

6.8.4 The full mitigation package (including known mitigation, active mode and public transport measures, and additional highway measures) improves network statistics across the HMA area, mitigating the impacts of the HMA strategy by 59% in the AM peak and 54% in the PM peak.

7. DO SOMETHING 4 – A38 GRADE SEPARATION SCHEME SENSITVITY TEST

7.1 Overview

7.1.1 This chapter provides key outputs and analysis relating to the Do Something 4 (DS4) scenarios. The scenario contains the full HMA strategy and mitigation package described in Chapter 6 (Scenarios 3a and 3b) but excludes the grade separation of A38 junctions at A5111 Kingsway, A52 Markeaton and A61 Little Eaton (the A38 Junction scheme). The rationale for this test is to understand the impact of the HMA strategy and mitigation package on the network should the A38 Grade Separation schemes not be constructed.

7.1.2 All figures are provided in the supplementary Figures Document.

7.2 Key Highway Outputs

Flow Change

7.2.1 Figures 34 and 35 present the change in traffic flows between the DS3b and DS4 scenarios to show the impact of removing the A38 scheme on the mitigation package. Figures 38 and 39 present the change in traffic flows between the DM and DS4 scenarios, to show the impact of the Local Plan and mitigation combined. Red lines represent an increase in traffic flow, and green represent a reduction in traffic flow.

7.2.2 The model indicates that without the A38 scheme, traffic moves away from the A38 corridor onto alternative parallel routes such as the M1, M42 and A515. This is due to the capacity issues along the A38 corridor. There are also route changes on local roads in the west of Derby, as traffic alters routes into the city centre to avoid congestion along the A38. The flow change impact in the AM peak is not as pronounced as the PM peak, partly due to the more congested nature of the network between 8am and 9am, which reduces alternative route options for many journeys. This consequently means there is more traffic unable to access the wider highway network, especially around the western edge of the city.

7.2.3 Between the DM and DS4 scenarios, there is a general increase in traffic flow across the majority of the HMA area, generally as a result of the Local Plan developments, but there is limited increase in traffic along the length of the A38 in both peaks as the road is already approaching or over capacity.

7.2.4 The removal of the A38 scheme reduces the effectiveness of the HMA mitigation strategy. At several HMA sites close to the A38 (in Mickleover and Mackworth, for example), development traffic struggles to access the wider highway network, and traffic that is able to get out of the development sites experience increases in congestion and journey times.

Junction Congestion

7.2.5 Figures 36 and 37 show the junctions which are forecast to have a significant change to their congestion levels (V/C ratio (%)) in the 2044 No A38 grade separation (DS4) scenario compared to the full mitigation (DS3b) scenario, while Figures 40 and 41 show the junctions which are forecast to have a significant change to their V/C ratio (%) in the DS4 scenario compared to the DM scenario. The yellow, orange, and red dots indicate junctions which are expected to show an increase in V/C between the two scenarios. The blue dots indicate junctions which are expected to see an improvement in congestion between the two scenarios.

7.2.6 The removal of the grade separation on the A38 results in increased congestion at the A38 junctions where the grade separation has been removed. The significant reassignment away from the A38 causes a reduction in congestion at other junctions along the A38 compared to the mitigation scenario, but an associated increase in congestion at several routes either side of the A38 as traffic is forced onto less suitable local roads.

7.2.7 Compared to the Do Minimum scenario, the absence of the A38 scheme results in significant increases in congestion at many local junctions across the whole of Derby City, including the Ring Road, the A516 and the A52.

Network Statistics

7.3 Network Statistics

7.3.1 Network statistics provide a way of gauging the overall impact from the addition of trips associated with the development sites. An explanation of the key indicators is as follows:

- Congestion / Over Capacity Queues – reflect the change in overall congestion and is the time spent queuing at junctions that are over capacity. As traffic levels increase, a growing number of junctions reach capacity, and the time spent queuing at junctions can increase.
- Total Travel Time – across the highway network in PCU hours.
- Total Travel Distance – across the highway network in PCU kilometres; and
- Average Speed – expressed as kilometres per hour, averaged for all traffic. Increased traffic levels lead to greater delays, potentially resulting in a lower average travel speed.

7.3.2 Network statistics for the AOI are provided in Table 25 and Table 26. In both peaks, the removal of the A38 Grade Separation scheme makes congestion worse across the HMA area and reduces the effectiveness of the HMA package to 32% in the AM peak and 29% in the PM peak.

Table 25. Network Statistics – AM Peak

INDICATOR	DM	DS	DS2	DS3a	DS3b	DS4	DM v DS	DM v DS2	DM v DS3a	DM v DS3b	DM v DS4
Over Capacity Queues	1,708	3,604	2,612	2,593	2,480	2,991	111%	53%	52%	45%	75%
Travel Time (PCU hrs)	27,995	33,554	32,854	32,892	32,892	32,969	20%	17%	17%	17%	18%
Travel Distance (PCU kms)	1,029,183	1,120,244	1,155,119	1,156,201	1,168,754	1,128,446	9%	12%	12%	14%	10%
Av Speed km/hr	37	33	35	35	35	34	-9%	-4%	-4%	-5%	-7%

Table 26. Network Statistics – PM Peak

INDICATOR	DM	DS	DS2	DS3a	DS3b	DS4	DM v DS	DM v DS2	DM v DS3a	DM v DS3b	DM V DS4
Over Capacity Queues	2,254	4,744	3,438	3,456	3,396	4,033	110%	53%	53%	51%	79%
Travel Time (PCU hrs)	28,751	34,121	33,361	33,380	33,806	33,215	19%	16%	16%	18%	16%
Travel Distance (PCU kms)	1,018,996	1,089,585	1,140,662	1,140,690	1,154,058	1,099,134	7%	12%	12%	13%	8%
Av Speed km/hr	35	32	34	34	34	33	-10%	-3%	-3%	-4%	-6%

7.4 Do Something 4 Conclusions

7.4.1 This scenario contains the full HMA strategy and mitigation package described in Chapter 6 (Scenarios 3a and 3b) but excludes the A38 Grade Separation scheme.

7.4.2 The removal of the A38 Grade Separation scheme is expected to significantly influence route choice and congestion across the network.

7.4.3 Flow change plots indicate that traffic moves away from the A38 corridor onto alternative parallel routes such as the M1, M42 and A515, and also onto local roads in the west of Derby. This causes significant increases to congestion at a wide number of local junctions in Derby City and prevents some development trips from accessing the wider highway network.

7.4.4 The model indicates that without the A38 scheme, the effectiveness of the HMA package is reduced to 32% in the AM peak and 29% in the PM peak.

8. CONCLUSION

8.1.1 The East Midlands Gateway Model (highway and public transport) has been utilised to assess the impacts of the Local Plan developments, a series of sustainable travel and public transport schemes, and associated mitigation packages on the local transport networks.

8.1.2 In conjunction with the Derby HMA Transport Working Group, SYSTRA has developed a number of the transport model scenarios using EMGM for the purposes of assessing the Derby HMA strategy. These are as follows:

- 2044 Do Minimum – Baseline containing committed development only.
- 2044 Do Something 1 – Local Plan development excluding mitigation.
- 2044 Do Something 2 – Scenario 1 and "Known Mitigation" measures.
- 2044 Do Something 3a/3b – Do Something 2 and PT, Active Mode, and additional Highway Mitigation.
- 2044 A38 Sensitivity Test – removes the A38 Grade Separation to understand implications for the HMA strategy.

8.1.3 The additional development that is predicted to be built by 2044 generates 32,649 additional person trips in the morning peak hour and 28,920 trips in the evening peak hour across the three local authorities.

Local Plan Impact (No Mitigation) – Do Something 1

8.1.4 The emerging local plan development proposals results in a general increase in traffic flow across the majority of the HMA area, however, the largest impact is concentrated within and on the boundary of Derby City. Traffic flow changes in Amber Valley and the southern areas of South Derbyshire are more modest reflecting the lower development levels, and dispersed locations of development sites.

8.1.5 There is a significant increase in traffic along the A52, A516, A50 and A38 but some development traffic struggles to reach the wider network as local roads struggle to accommodate the development traffic. This is particularly evident around the Infinity Garden Village and EMIP areas.

8.1.6 In the absence of the known mitigation improvement schemes (including the A38 scheme, the A38/A50 EMIP mitigation and new A50 junction), the existing infrastructure struggles to accommodate the extra HMA traffic and as a result some non-development traffic moves away from key routes such as the A38 and A50 onto alternative, less suitable roads.

8.1.7 The extra traffic generated by the HMA developments cause congestion increases at a number of junctions across the Derby HMA area, with junctions within Derby City being the most significantly affected.

Known Mitigation – Do Something 2

8.1.8 The identified Known Mitigation schemes are expected to significantly influence route choice and congestion across the network, improving accessibility to development sites at Infinity Garden Village, EMIP and Boulton Moor. The schemes will also influence longer distance routings by improving accessibility of the A38, A50 and M1 on the SRN.

8.1.9 Flow change plots indicate the schemes cause a significant increase in traffic along the A38 and reduction along the M1. This is due to the additional capacity released by the A38 Grade Separation scheme and the improvements to the A38/A50 Toyota junction. The new A50 junction and associated infrastructure leads changes to routings in South Derby, with traffic previously using local roads moving onto the new infrastructure.

8.1.10 The Known Mitigation schemes have a significant impact on reducing congestion at several local junctions within Derby City, but congestion remains at the A38 Findern roundabout, the A38/A50 Toyota junction and along the A516. Some local roads leading to the A38 also experience an increase in congestion as traffic routes to use the improved A38.

8.1.11 In both peaks, the Known Mitigation schemes improve congestion across the Derby HMA area, mitigating the impacts of the HMA strategy by 52% in the AM peak and 54% in the PM peak.

Public Transport, Active Mode and Additional Highway Infrastructure Mitigation Package – Do Something 3a and 3b

8.1.12 The public transport enhancements encourage a greater number of passengers to use public transport in both peaks, especially from the larger strategic sites on the edge of Derby where public transport mode share is significantly positively impacted. Active mode improvements are expected to encourage some journeys to move away from car; however, the impact is generally small and consequently there is a relatively neutral impact on highway flows and congestion.

8.1.13 The highway mitigation improvements provide localised improvements to Mickleover, Infinity Garden and Mackworth. They have a significant impact on reducing congestion at several local junctions within or on the edge of Derby City. This includes the A514, the A514/A50 junction, the A38 and the A516 and local roads through Mickleover. Junctions along the A52 also experience a reduction in congestion.

8.1.14 Despite the mitigation package, significant congestion remains across the city in the AM peak, particularly along the A516 and A38 at Findern Roundabout. In the PM peak, congestion remains along the A50 and A52 Ashbourne Road. Congestion in most other areas of the HMA remains unchanged or shows minor changes.

8.1.15 The full mitigation package (active mode, public transport and additional highway measures) improves network statistics across the HMA area, mitigating the impacts of the HMA strategy by 59% in the AM peak and 54% in the PM peak.

A5111 Kingsway, A52 Markeaton and A61 Little Eaton) Sensitivity – Do Something 4

8.1.16 The removal of the A38 Grade Separation scheme is expected to significantly influence route choice and congestion across the network.

8.1.17 Flow change plots indicate that without the A38 improvements, traffic is expected to move away from the A38 corridor onto alternative parallel routes such as the M1, M42 and A515, and also onto a range local roads in the west of Derby. This causes significant increases to congestion at a wide number of local junctions in Derby City and prevents some development trips from accessing the wider highway network.

8.1.18 The model indicates that without the A38 scheme, the effectiveness of the HMA package is reduced to 32% in the AM peak and 29% in the PM peak.

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