



Figure 14. Flow Difference – Reference Case vs With Development Scenario – South Derbyshire – Evening Peak

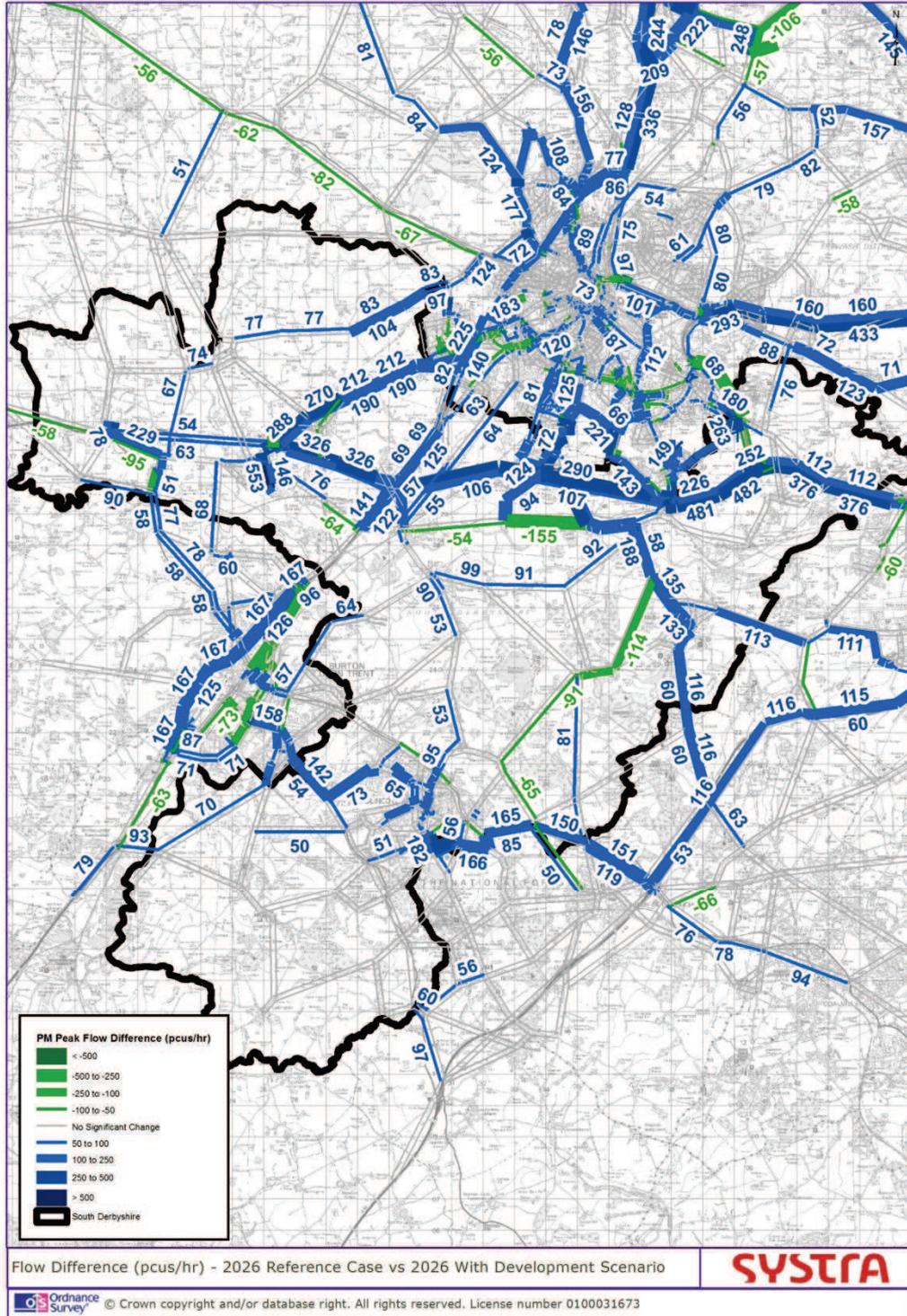




Figure 15. Increase in Junction Congestion – Reference Case vs With Development Scenario – South Derbyshire – Morning Peak

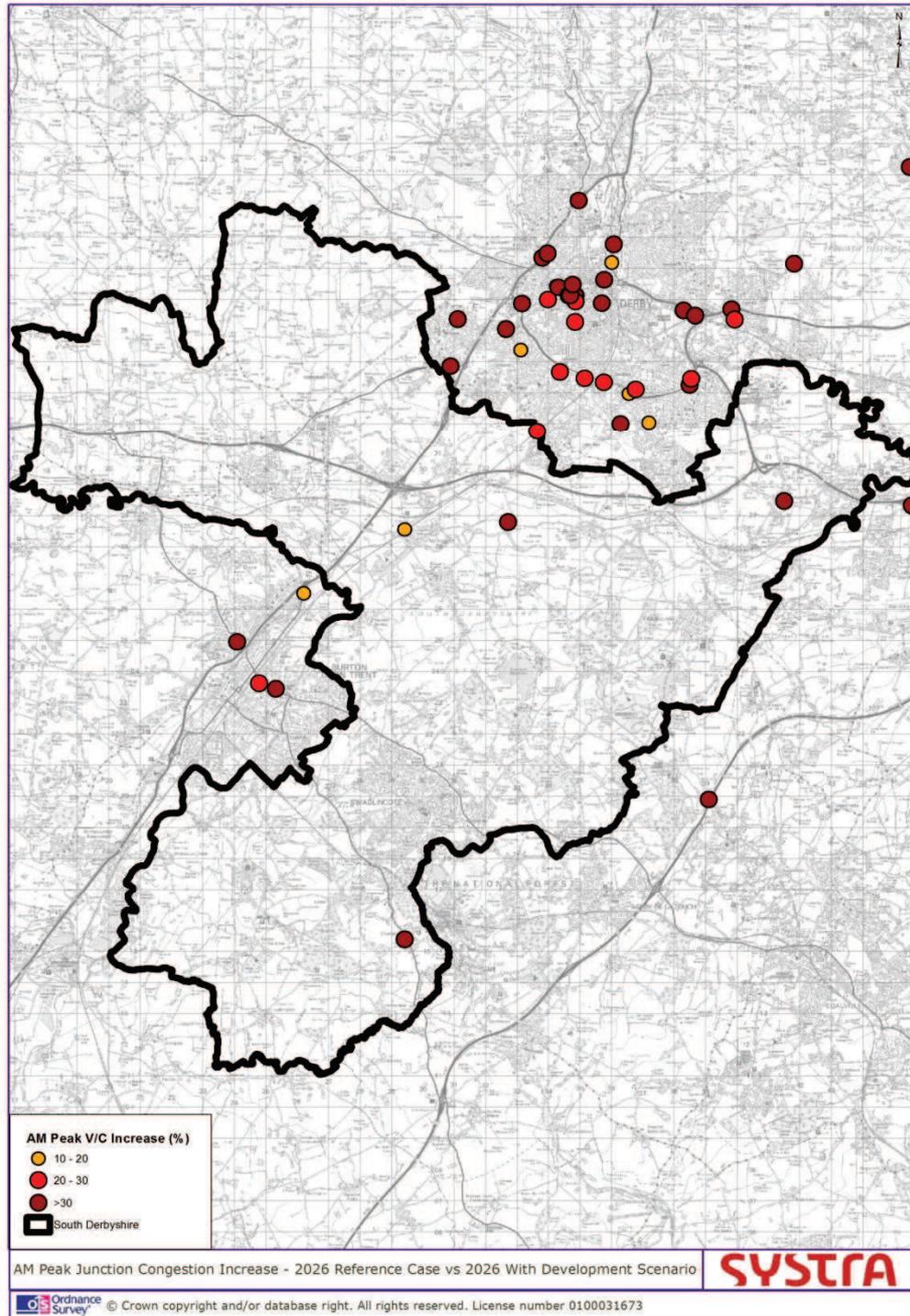
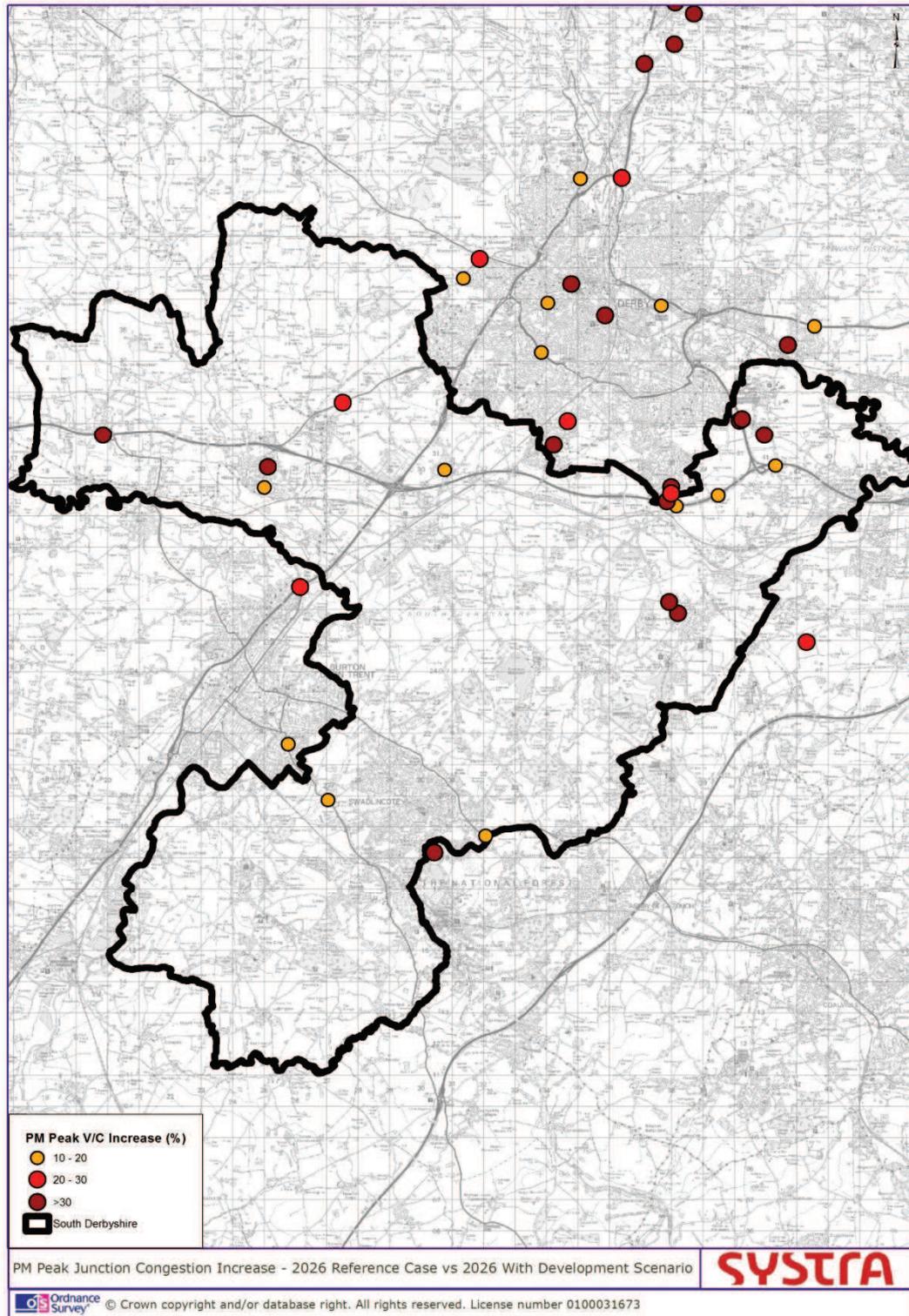




Figure 16. Increase in Junction Congestion – Reference Case vs With Development Scenario – South Derbyshire – Evening Peak





5. MITIGATION SCENARIOS

5.1 Introduction

- 5.1.1 This chapter summarises the strategic mitigation measures associated with the Core Strategy developments. More localised mitigation that may be identified during the detailed planning process for the individual applications have not been modelled at this stage.
- 5.1.2 The mitigation testing has been undertaken in an incremental way. The first mitigation scenario included all non-highway mitigation schemes. These included smarter choices for travel and public transport improvements. The second mitigation scenario included the full mitigation package (non-highway and highway measures combined).
- 5.1.3 This methodology was adopted to ascertain the level of mitigation achieved through non-highway measures before the highway measures are implemented.

5.2 Non-Highway Mitigation

- 5.2.1 The Non-Highway Mitigation Scenario includes Smarter Choices and Public Transport mitigation only.
- 5.2.2 The Smarter Choices mitigation includes the implementation of travel plans, promotion of sustainable travel modes and improvements to cycle and pedestrian infrastructure, both within and external to the site, aimed at promoting the use of non-car modes for local movements.
- 5.2.3 These were modelled through a reduction in walk times to local facilities and Public Transport routes to encourage a transfer to Public Transport (PT) and slow modes, together with a general reduction in overall highway demand associated with each development to take account of reductions in the need to travel.
- 5.2.4 Public Transport mitigation includes improvements to bus services which have been directly modelled in terms of increased service frequencies and the provision of new services directly accessing the development sites.
- 5.2.5 The following schemes have been included in the non-highway mitigation scenario:
- Enhancement of the pedestrian and cycle network and transport interchange improvements;
 - New bus services for Wragley Way, Highfields Farm and Hackwood Farm sites;
 - a park and ride bus service for Boulton Moor;
 - 30 minutes bus service for the Chellaston Fields site as an extension to the existing 61 Holmleigh Way service; and
 - Osmaston Road and London Road improvements for public transport.



5.3 Highway Mitigation

5.3.1 The Full Mitigation Scenario included non-highway as well as highway schemes to mitigate the impacts of the Core Strategy. The following highway measures were included in this scenario:

Amber Valley

- Provision of a roundabout junction at the Kilburn Toll Bar and improvements to Coxbench junction in association with development on the Land North of Denby.

South Derbyshire

- Woodville Regeneration Route; and
- Broomy Farm Link Road.

Derby City

- Boulton Moor Park and Ride and corridor improvements with a 15 minute bus service frequency;
- Phase 1 of the South Derby Integrated Transport Link from Stenson Road to meet with the T12 Link Road at Infinity Park;
- Improvements to the A50/A514 junction. This included signalisation of the A50 eastbound off-slip accompanied by widening and signalisation of the A514 north; and
- A52 improvements at the Wyvern.



6. MODELLING OUTPUTS – NON-HIGHWAY MITIGATION

6.1 Introduction

6.1.1 This chapter compares the model outputs from Non-Highway Mitigation Scenario with the With Development Scenario. The Chapter is split into the modelling results for the Full Derby HMA Area, Amber Valley, Derby City and South Derbyshire.

6.1.2 The forecast impacts of the Non-Highway Mitigation Scenario are reported using the following key performance indicators:

- **Flow Difference** – identifying the combined effect of the mitigation and reassignment traffic on the local networks;
- **Junction Congestion** – identifying junctions forecast to be relieved of congestion with the mitigation in place; and,
- **Network Indicators** – identifying changes in key network indicators.

6.2 Network Indicators

6.2.1 Network Indicators provide a way of gauging the overall impact of the predicted changes in trips associated with the mitigation across the whole of the modelled simulation area. A brief explanation of key indicators is provided below:

- **Over Capacity Queues** - Time spent queuing at junctions that are over capacity. As traffic levels increase we expect to see a growing number of junctions reaching capacity and the time spent queuing at these over-capacity junctions increasing.
- **Total Travel Time** – Total travel time across the highway network simulation area expressed in pcu hours.
- **Total Travel Distance** – Total distance travelled across the highway network simulation area expressed in pcu kilometres.
- **Average Speed** - Expressed as kilometres per hour for all traffic within the highway model simulation area for each peak period. Increased traffic levels lead to more delays resulting in lower average speeds.



6.3 Modelling Results – Full Derby HMA Area

Flow Difference

6.3.1 Figures 17 and 18 show the flow difference between the Non-Highway Mitigation and the 'With Development' (No Mitigation) scenarios for the morning and evening peak hours respectively. Blue lines indicate roads which are forecast to experience an increase in traffic between the With Development Scenario and the Non Highway Mitigation Scenario, whilst green lines indicate roads which are forecast to experience a decrease in traffic.

6.3.2 A reduction in traffic is forecast along the following routes as a result of the Non Highway Mitigation measures:

- A6 (Both peaks);
- A38 to the South West of Derby (Both peaks);
- A52 (Morning Peak);
- A516 (Morning Peak);
- A5132 (Morning Peak); and
- A50 Evening Peak.

6.3.3 However, increases are also forecast along the Strategic Road Network, in particular along the:

- A50 (Morning Peak);
- A38 to the North of Derby (Morning Peak);
- A38 in Burton upon Trent (Evening Peak); and
- A38 to the West of Derby (Evening Peak).

6.3.4 Within Derby there are significant flow reductions across the whole City and along radial routes such as the A52 and A516. Moreover, the most obvious reductions in traffic are seen to the south of the City reflecting the concentration of mitigation strategies for development to the south of the City.

6.3.5 To the south of the area the major flow impacts are within Swadlincote and also in Burton on Trent.

6.3.6 To the north of the area the flows in Belper and Ripley reduce significantly as do the flows on routes through Heanor and along the western sections of the A610.

Junction Congestion

6.3.7 A junction is considered to become relieved of congestion when the With Development Scenario V/C ratio is more than 85% and due to mitigation it decreases to below 85% in the Non-Highway Mitigation Scenario. The reduction in V/C ratio is presented for such junctions and are colour coded in green.

6.3.8 Figures 19 and 20 show the forecast reduction in junction congestion between the With Development and Non-Highway Mitigation scenarios for the morning and evening peak hours respectively.



- 6.3.9 The majority of junctions relieved of congestion as a result of the Non Highway Mitigation are within Derby City, primarily in the central and southern parts of the City where a significant proportion of the residential developments are located. This shows that the areas most affected by congestion caused by developments in the With Development Scenario are being relieved of congestion in the Non Highway Mitigation Scenario.
- 6.3.10 There are only a few junctions relieved of congestion identified in the southern part of the HMA, primarily within Swadlincote.
- 6.3.11 Within Amber Valley, there is predicted to be some significant relief in junction congestion in Ripley and Alfreton.



Figure 17. Flow Difference – With Development Scenario vs Non Highway Mitigation Scenario – Morning Peak

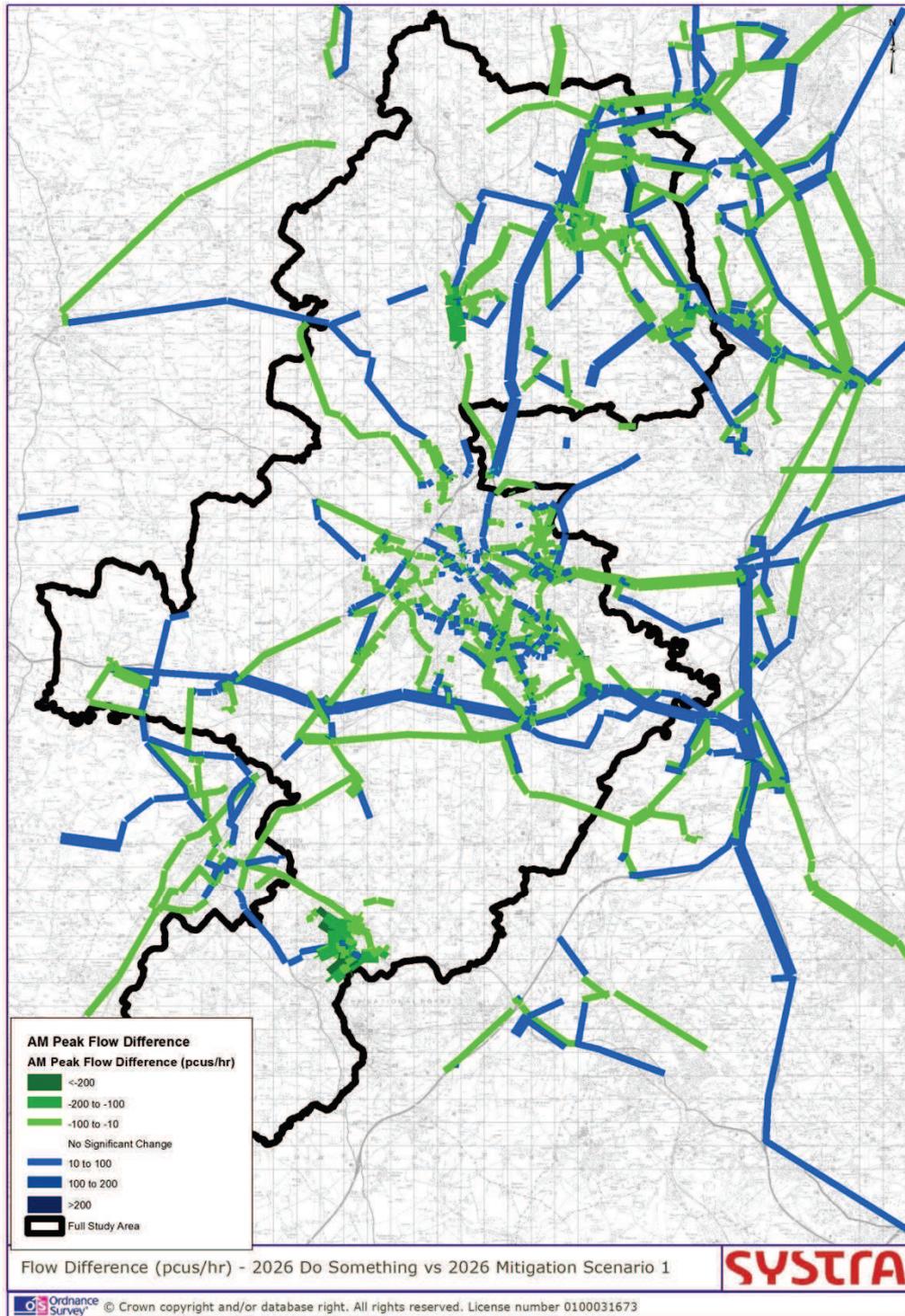




Figure 18. Flow Difference – With Development Scenario vs Non Highway Mitigation Scenario – Evening Peak

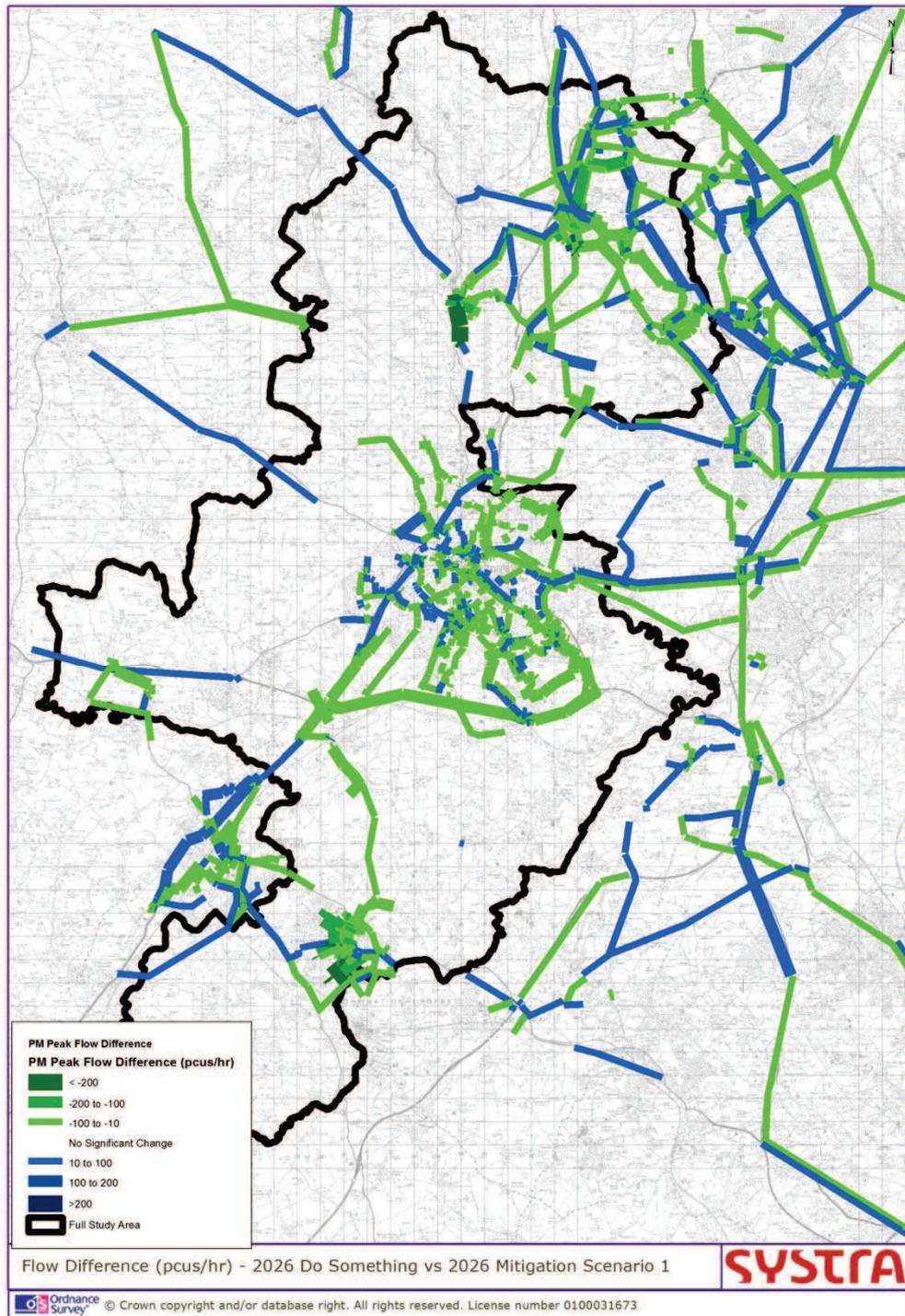




Figure 19. Relief of Junction Congestion – With Development Scenario vs Non Highway Mitigation Scenario – Morning Peak

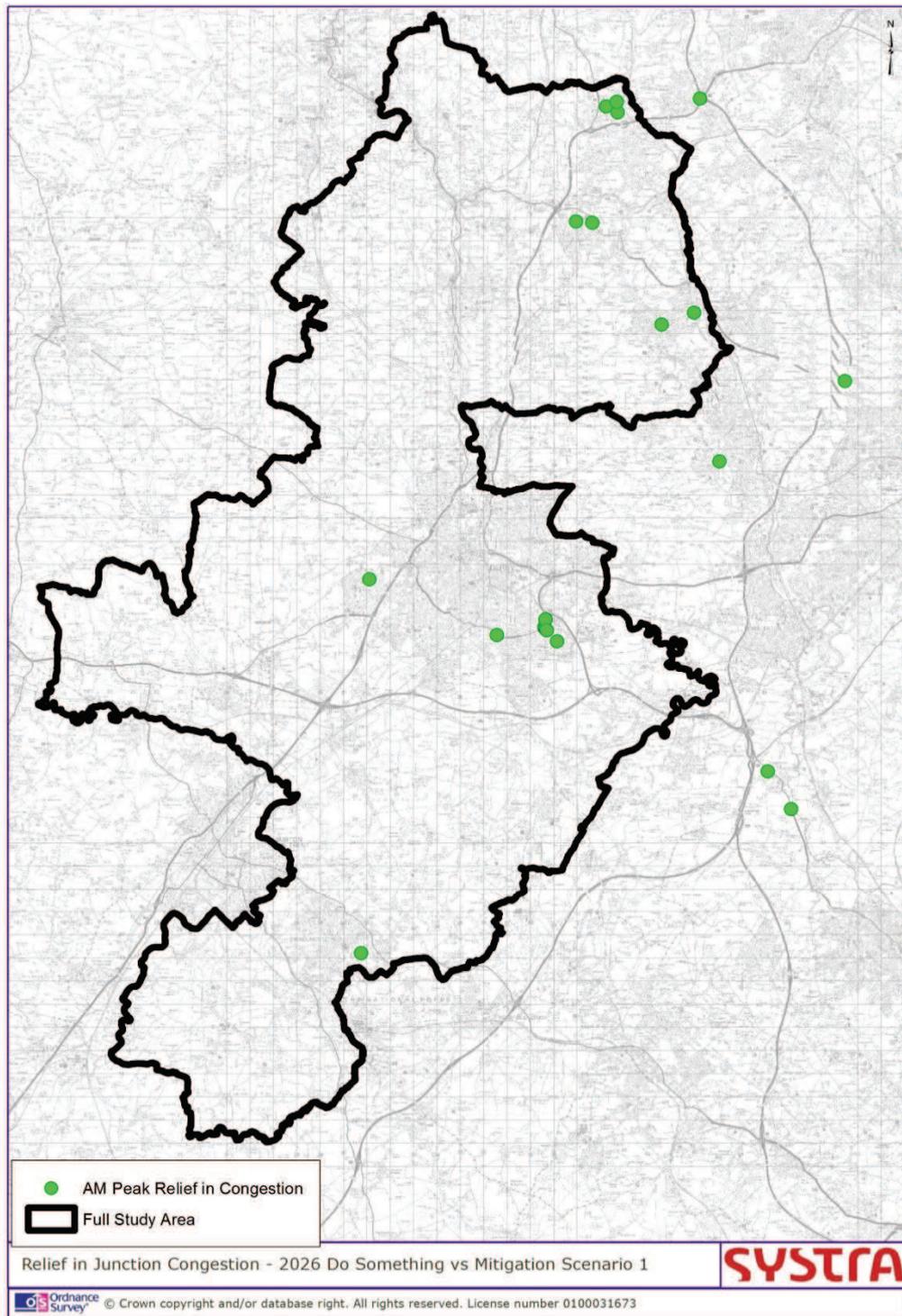
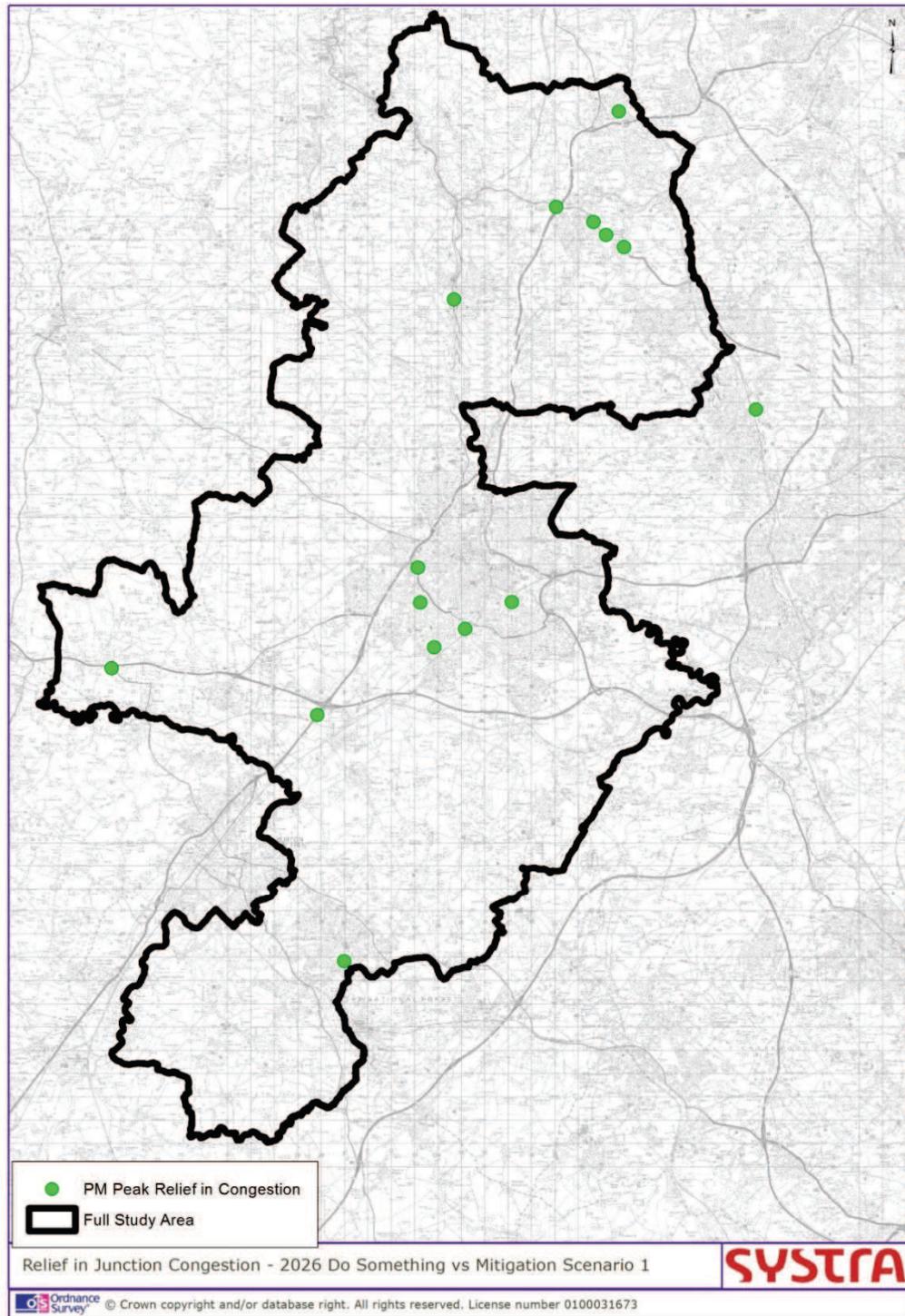




Figure 20. Relief of Junction Congestion – With Development Scenario vs Non Highway Mitigation Scenario – Evening Peak





Network Indicators

6.3.12 The Network Indicators for the Non Highway Mitigation and With Development Scenarios are provided in Tables 12 and 13. This indicates that congestion in the area, as indicated by the over-capacity queues indicator, is not mitigated as a result of the Non Highway Mitigation proposals (only around 13% mitigation in both peak hours).

6.3.13 This results in an increase of average speed of around 1% in the morning and evening peaks as a result of the Non Highway Mitigation proposals. However, this still represents mitigation of only 14% in the AM peak and 21% in the PM peak.

Table 12. Network Indicators (morning peak) Full Derby HMA Area

INDICATOR	MORNING PEAK			
	REF CASE	WITH DEV.	NON-HIGHWAY MITIGATION SCENARIO	PERCENTAGE MITIGATION
Over Capacity Queues (PCU Hrs)	1,110	2,111	1,985	13%
Total Travel Time (PCU Hrs)	25,572	29,313	28,846	12%
Total Travel Distance (PCU kms)	1,131,643	1,228,587	1,219,015	9%
Average Speed (km/hr)	44.25	41.91	42.26	14%



Table 13. Network Indicators (evening peak) – Full Derby HMA Area

INDICATOR	EVENING PEAK			
	REF CASE	WITH DEV.	NON-HIGHWAY MITIGATION SCENARIO	PERCENTAGE MITIGATION
Over Capacity Queues (PCU Hrs)	1,137	2,008	1,895	13%
Total Travel Time (PCU Hrs)	25,546	29,280	28,735	15%
Total Travel Distance (PCU kms)	1,130,334	1,232,880	1,222,542	10%
Average Speed (km/hr)	44.25	42.11	42.55	21%



6.4 Modelling Results – Amber Valley

Flow Difference

- 6.4.1 Figures 21 and 22 show the flow difference between the Non-Highway Mitigation and the 'With Development' (No Mitigation) scenarios for the morning and evening peak hours respectively. Blue lines indicate roads which are forecast to experience an increase in traffic between the With Development Scenario and the Non Highway Mitigation Scenario, whilst green lines indicate roads which are forecast to experience a decrease in traffic.
- 6.4.2 Reduction in traffic is forecast along the following routes in Amber Valley as a result of the Non Highway Mitigation measures:
- A6 through Belper (Both peaks);
 - B6179 to the north of Ripley (Both peaks);
 - B6016 between Swanwick and Leabrooks (Both peaks);
 - B6441 through Ripley (Both peaks);
 - A610 through Codnor (Both peaks); and
 - B600 through Alfreton (Both peaks).
- 6.4.3 Within Amber Valley there are flow reductions across the whole area with significant reductions in Belper and Swanwick.
- 6.4.4 However, there are also some flow increases along routes such as the A38 and some minor routes across the area but these are relatively small.

Junction Congestion

- 6.4.5 A junction is considered to become relieved of congestion when the With Development Scenario V/C ratio is more than 85% and due to mitigation it decreases to below 85% in the Non-Highway Mitigation Scenario. The reduction in V/C ratio is presented for such junctions and are colour coded in green.
- 6.4.6 Figures 23 and 24 show the forecast reduction in junction congestion between the With Development and Non-Highway Mitigation scenarios for the morning and evening peak hours respectively.
- 6.4.7 The majority of junctions relieved of congestion as a result of the Non Highway Mitigation in Amber Valley are found in the same areas where there are significant reductions in traffic. For example, in the Morning Peak, the A6/King Street Junction in Belper is relieved of congestion and around Ripley the following junctions are relieved of congestion:
- B6179/Pentrich Road Junction (Morning Peak);
 - A610/B6441 Roundabout (Both peaks);
 - A610/Steam Mill Lane (Evening Peak); and
 - A610/Codnor Market Place (Evening Peak).
- 6.4.8 In Alfreton the following junctions are relieved of congestion:
- B6019 High Street/Cressy Road/Rodger's Lane Junction (Morning Peak);
 - B6019 Mansfield Road/Meadow Lane Junction (Morning Peak); and
 - B600 Nottingham Road/Preston Avenue Junction (Both peaks).



Figure 21. Flow Difference – With Development Scenario vs Non Highway Mitigation Scenario – Amber Valley – Morning Peak

