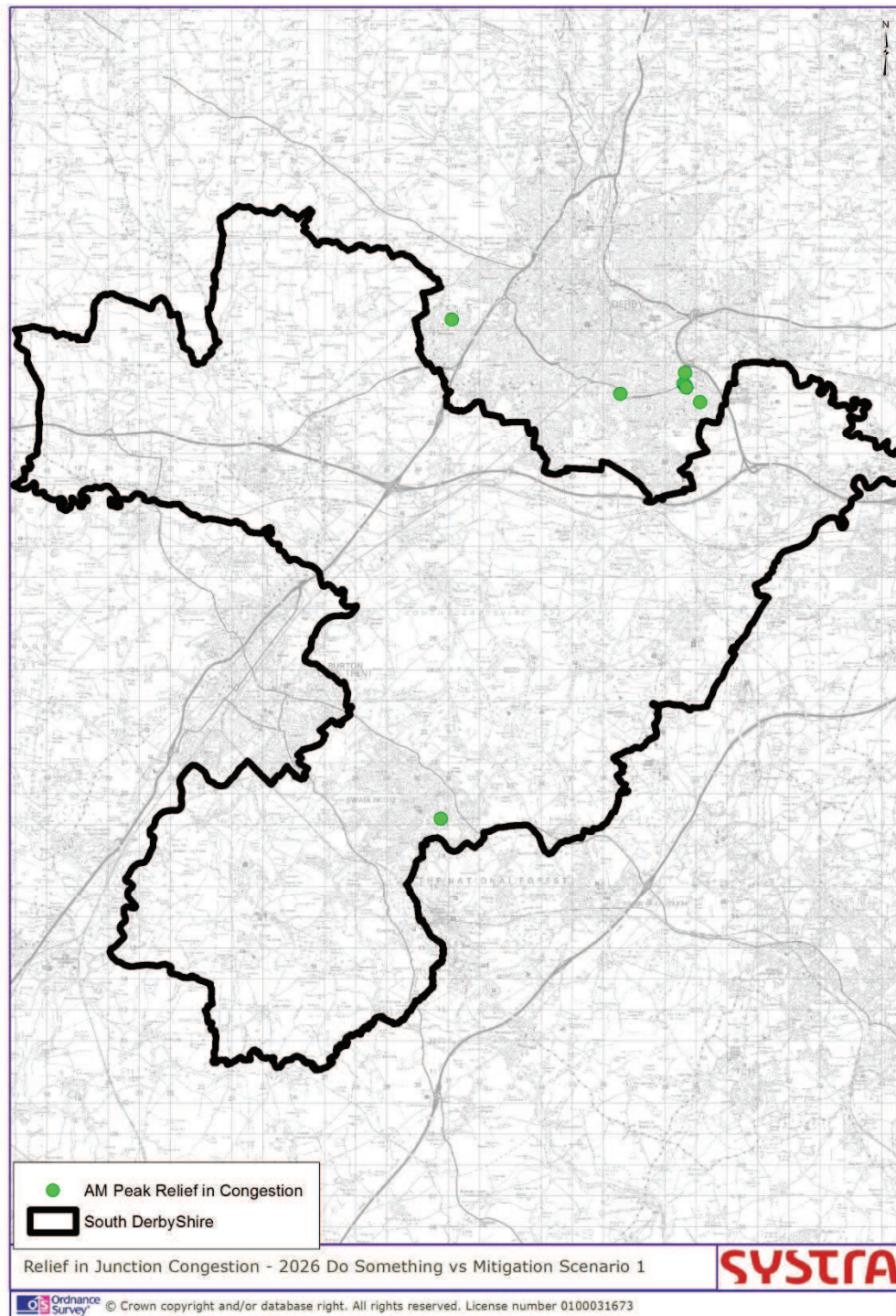




**SYSTRA**

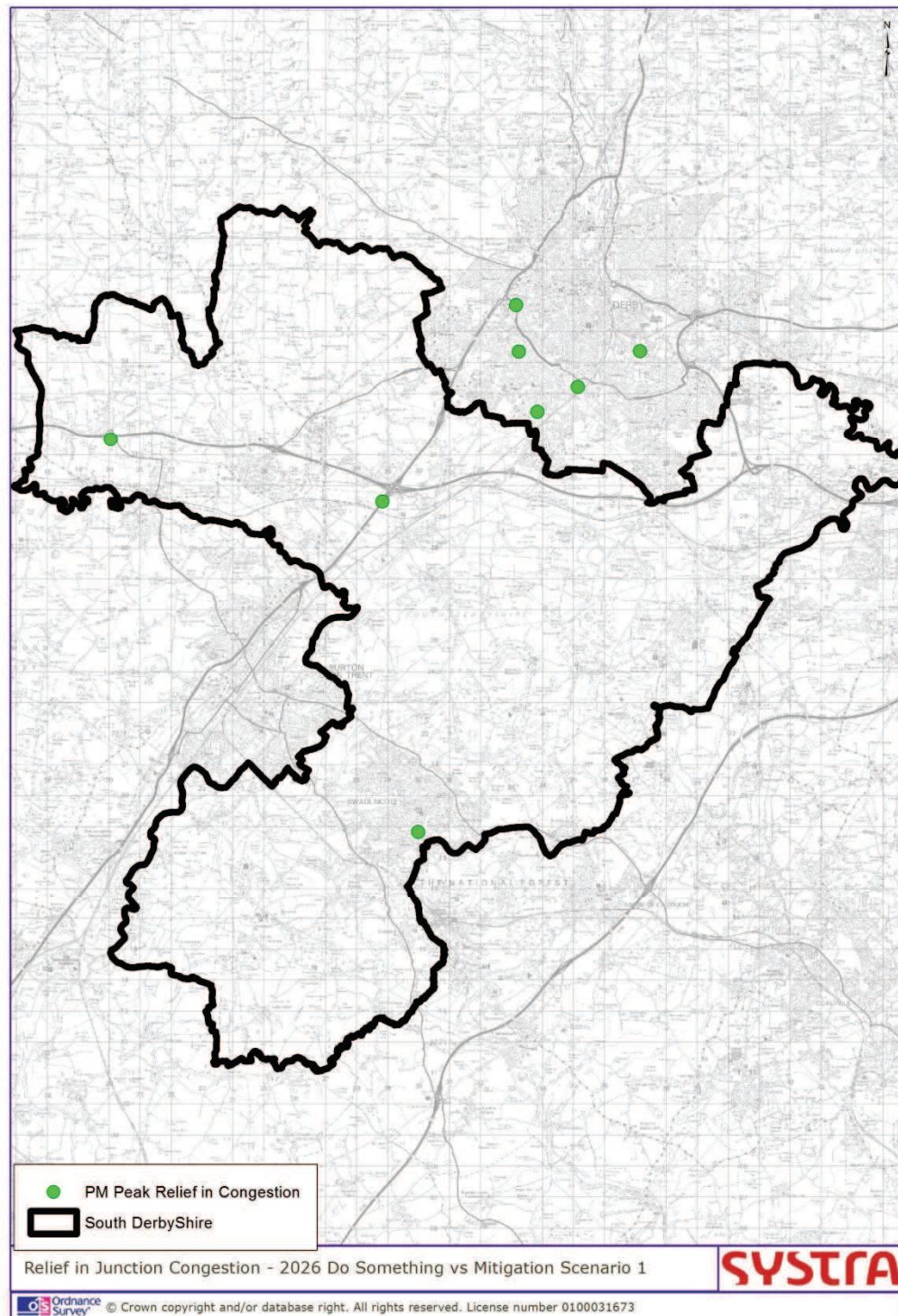
**Figure 31. Relief of Junction Congestion – With Development Scenario vs Non Highway Mitigation Scenario – South Derbyshire - Morning Peak**







**Figure 32. Relief of Junction Congestion – With Development Scenario vs Non Highway Mitigation Scenario – South Derbyshire - Evening Peak**





## Network Indicators

- 6.6.6 The Network Indicators for the Non Highway Mitigation and With Development Scenarios are provided in Tables 18 and 19. This indicates that congestion in Derby City, as indicated by the over-capacity queues indicator, reduces as a result of the Non Highway Mitigation proposals. This reduction is a partial mitigation of 4% in the morning peak and 9% in the evening peak.

The percentage mitigation achieved in terms of average speed is 9% in the AM peak and 11% in the PM peak.

**Table 18. Network Indicators (morning peak) – South Derbyshire**

| INDICATOR                       | MORNING PEAK |           |                                 |                       |
|---------------------------------|--------------|-----------|---------------------------------|-----------------------|
|                                 | REF CASE     | WITH DEV. | NON-HIGHWAY MITIGATION SCENARIO | PERCENTAGE MITIGATION |
| Over Capacity Queues (PCU Hrs)  | 486          | 838       | 824                             | 4%                    |
| Total Travel Time (PCU Hrs)     | 7,631        | 8,903     | 8,760                           | 11%                   |
| Total Travel Distance (PCU kms) | 419,974      | 461,374   | 456,217                         | 12%                   |
| Average Speed (km/hr)           | 55           | 51.8      | 52.1                            | 9%                    |



**Table 19. Network Indicators (evening peak) – South Derbyshire**

| INDICATOR                       | EVENING PEAK |           |                                 |                       |
|---------------------------------|--------------|-----------|---------------------------------|-----------------------|
|                                 | REF CASE     | WITH DEV. | NON-HIGHWAY MITIGATION SCENARIO | PERCENTAGE MITIGATION |
| Over Capacity Queues (PCU Hrs)  | 500          | 815       | 788                             | 9%                    |
| Total Travel Time (PCU Hrs)     | 7,593        | 8,918     | 8,788                           | 10%                   |
| Total Travel Distance (PCU kms) | 418,818      | 460,159   | 456,594                         | 9%                    |
| Average Speed (km/hr)           | 55.2         | 51.6      | 52                              | 11%                   |



## 7. MODELLING OUTPUTS – FULL MITIGATION PACKAGE

### 7.1 Introduction

- 7.1.1 This chapter presents the outputs from the With Development Scenario compared with the Full Mitigation Scenario. The Chapter is split into the modelling results for the Fully Modelled Area, Amber Valley, Derby City and South Derbyshire.
- 7.1.2 The forecast impacts of the 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** – identifies changes in key network indicators.

### 7.2 Network Indicators

- 7.2.1 Network-wide 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.



## 7.3 Modelling Results – Full Derby HMA Area

### Flow Difference

- 7.3.1 Figures 33 and 34 show the flow difference between the 'With Development' (No Mitigation) and Highway 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 Highway Mitigation Scenario, whilst green lines indicate roads which are forecast to experience a decrease in traffic.
- 7.3.2 Reduction in traffic is forecast along the following routes in the Morning Peak as a result of the Highway Mitigation measures:
- A444 between the A514 and Acresford;
  - A50 Eastbound between A38 and A514;
  - A50 Westbound between M1 and A514;
  - A6 Alvaston Bypass;
  - A38 between Ypass and A516;
  - A6 through Belper; and
  - A610 between A38 and Heanor.
- 7.3.3 Reduction in traffic is forecast along the following strategic routes in the Evening Peak as a result of the Highway Mitigation measures:
- A50;
  - A38 between A50 and Rykneld Road;
  - A6 between Derby and Belper;
  - A6008 between Derby and Smalley;
  - A38 between B6179 and A610; and
  - A610 between A38 and Heanor.
- 7.3.4 However, Increases are also forecast along the Strategic Road Network, in particular along the:
- A52 to the east of Derby;
  - A6 to the north of Derby;
  - A5132 Twyford Road;
  - South Derby Integrated Transport Link;
  - A514 through Swadlincote; and
  - A38 to the west of Derby.
- 7.3.5 Across the Full Derby HMA Area there are some significant changes in flow as a result of the proposed highway mitigation strategies.
- 7.3.6 Reductions along the A50 in both peak hours are caused by a redistribution of traffic to the T12, South Derby Integrated Transport Link and the A5132. There is also a small impact on the A38 traffic to the south west of Derby as a result of the South Derby Integrated Transport Link and the improvements at the A50/A514 Junction.
- 7.3.7 In the Highway Mitigation Scenario the majority of Swadlincote is relieved of traffic. This is due to traffic re-routing associated with the Woodville Regeneration Route and the A511 through Swadlincote as well as the impacts of the Non-Highway Mitigation strategy.





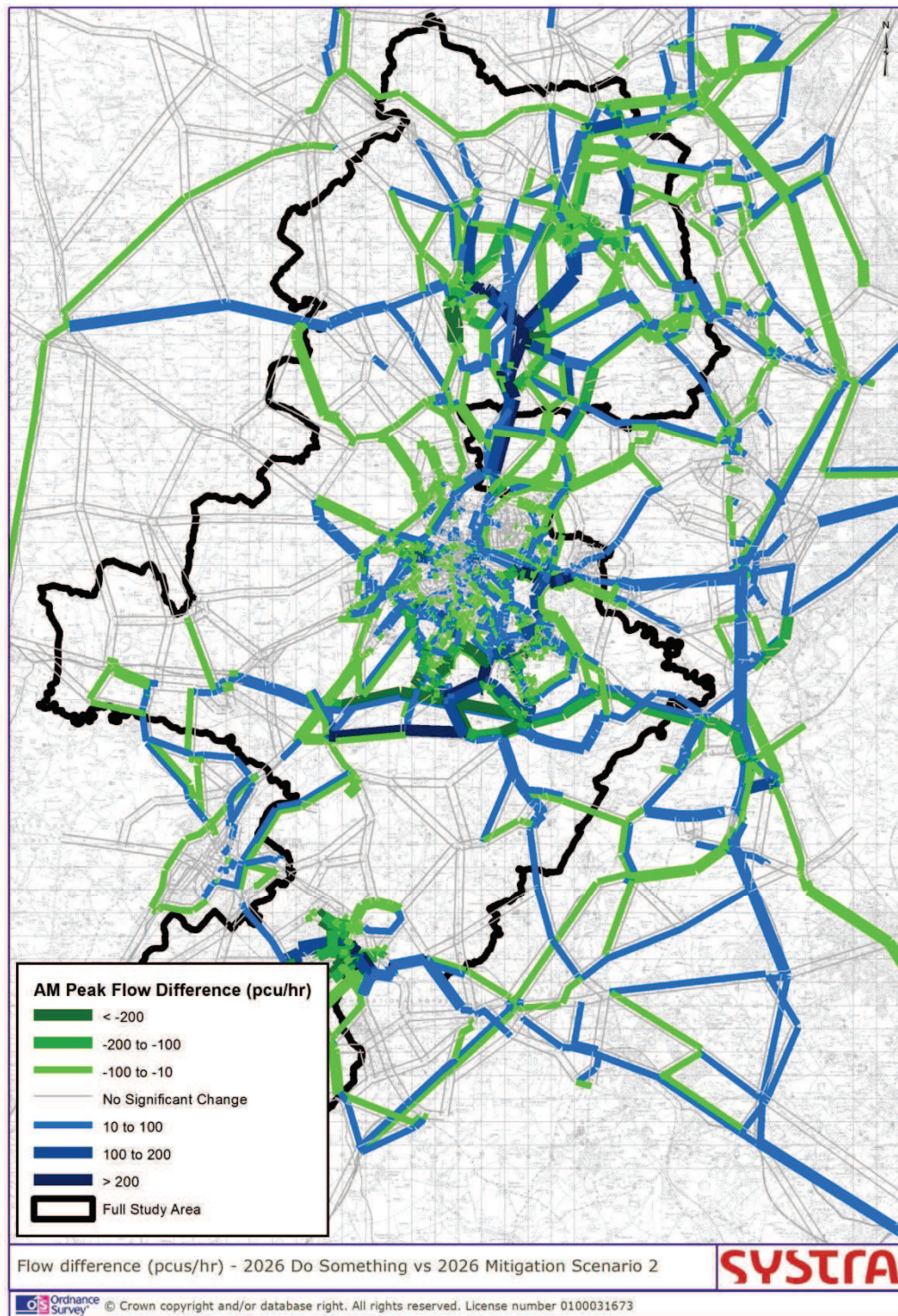
- 7.3.8 As a result of the Coxbench junction improvements, there is a redistribution of traffic away from the A6 and surrounding roads to the north of Derby and around Belper to the A38 and the B6179.
- 7.3.9 There is a significant increase in traffic along the A52 to the east of Derby as a result of improvements at the Wyvern. This improvement combined with the improvements at Coxbench have drawn traffic to the Derby Ring Road and reduced flows around Pride Park.

#### Junction Congestion

- 7.3.10 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 Highway Mitigation Scenario. The reduction in V/C ratio is presented for such junctions and are colour coded in green.
- 7.3.11 Figures 35 and 36 show the forecast reduction in junction congestion between the With Development and Highway Mitigation scenarios for the morning and evening peak hours respectively.
- 7.3.12 The majority of junctions relieved of congestion as a result of the Highway Mitigation are within Derby City, primarily in the central, eastern 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 Highway Mitigation Scenario.
- 7.3.13 There are only a few junctions relieved of congestion identified in the southern part of the HMA, primarily within Swadlincote.
- 7.3.14 In the north of the area there is predicted to be some significant relief in junction congestion in in Ripley, Alfreton and Heanor.



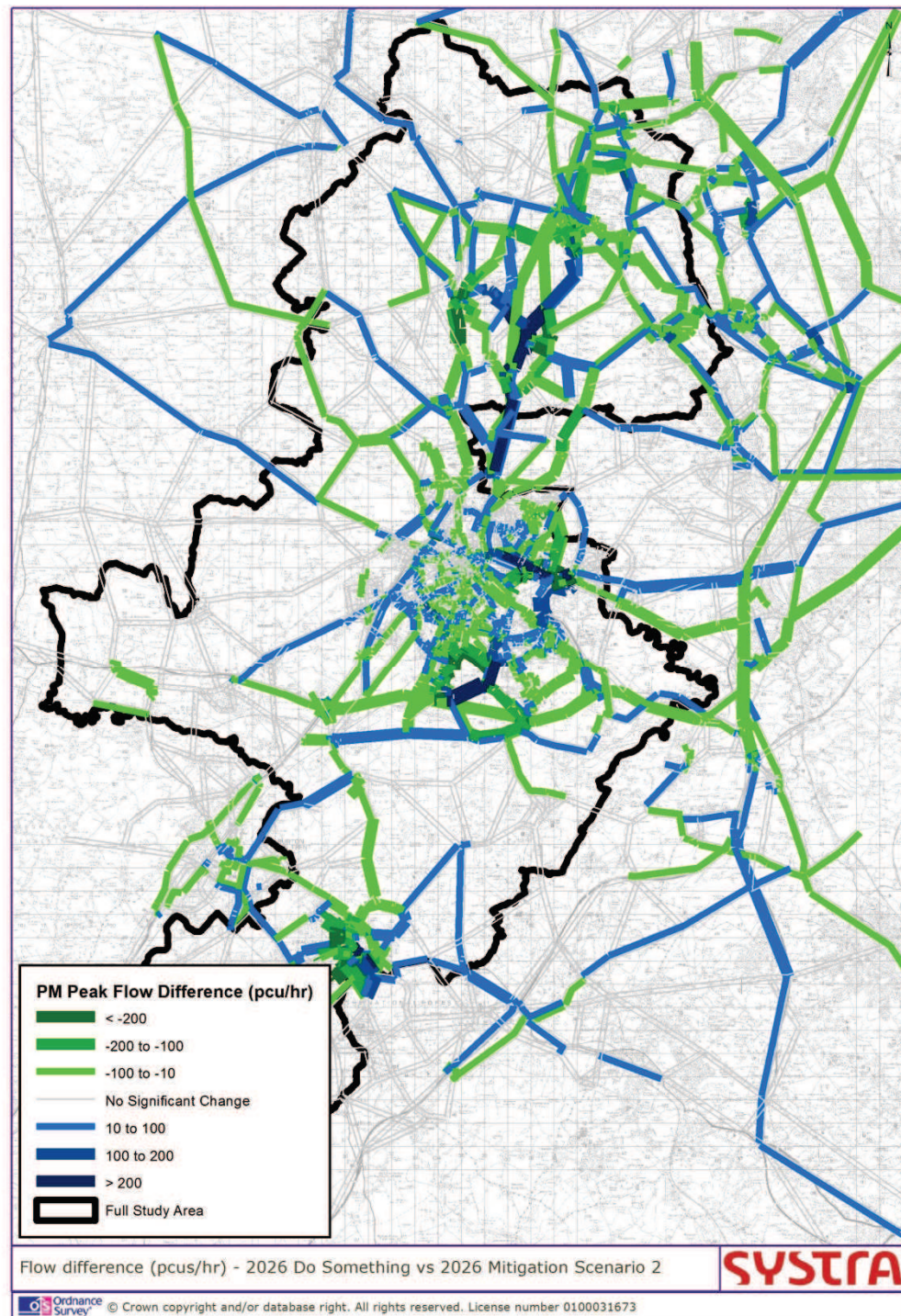
**Figure 33. Flow Difference – With Development Scenario vs Highway Mitigation Scenario – Morning Peak**







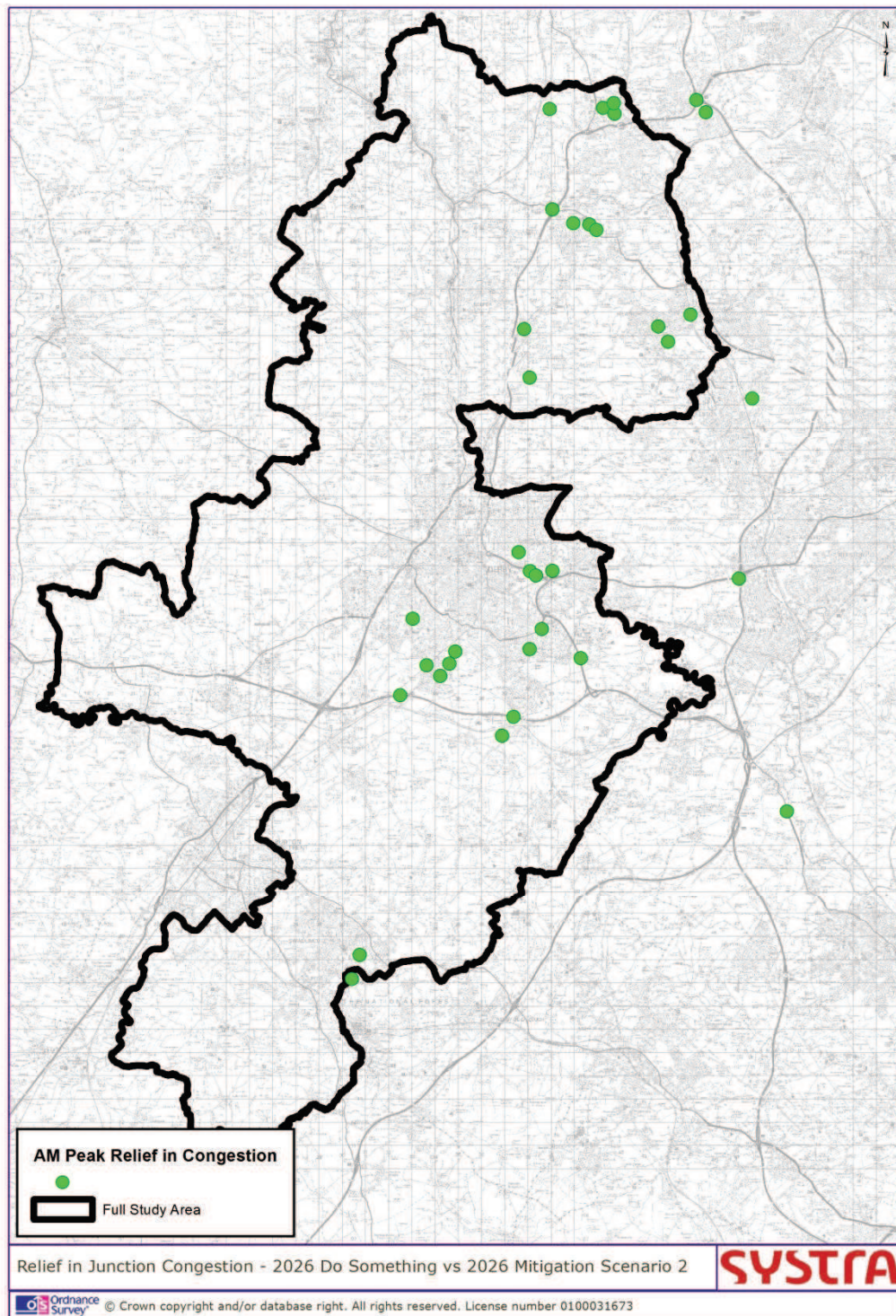
**Figure 34. Flow Difference – With Development Scenario vs Highway Mitigation Scenario – Evening Peak**







**Figure 35. Relief of Junction Congestion – With Development Scenario vs Highway Mitigation Scenario – Morning Peak**

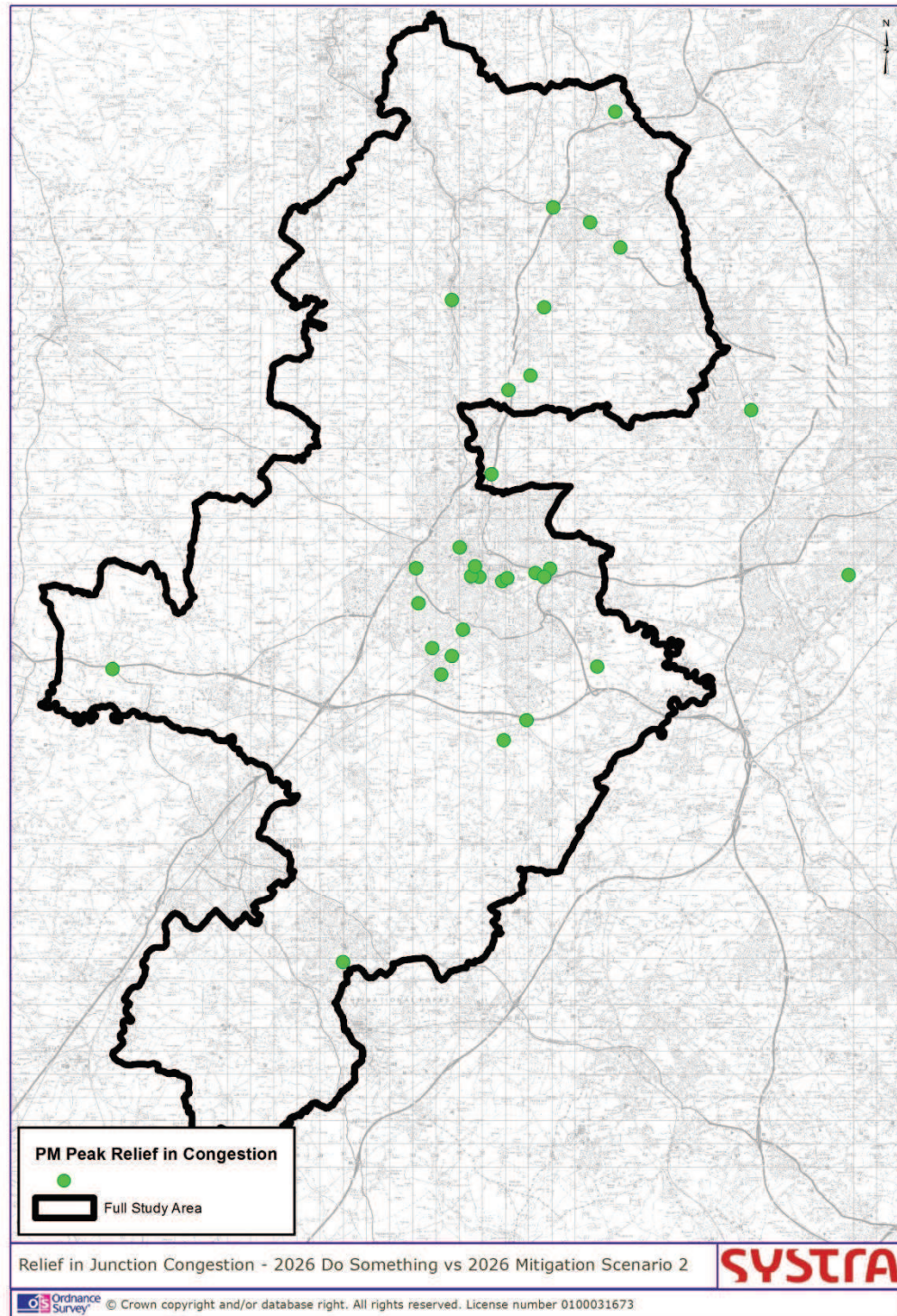






**SYSTRA**

**Figure 36. Relief of Junction Congestion – With Development Scenario vs Highway Mitigation Scenario – Evening Peak**







## Network Indicators

- 7.3.15 The Network Indicators for the Highway Mitigation and With Development Scenarios are provided in Tables 20 and 21. This indicates that congestion in the area, as indicated by the over-capacity queues indicator, reduces as a result of the Highway Mitigation which translates into a level of mitigation of around 22% in the morning peak and 23% in the evening peak.
- 7.3.16 The reduction of over-capacity queues results in an increase of average speed of around 1% across both peaks; a mitigation of 30% in the morning peak and 50% in the evening peak.
- 7.3.17 Within the HMA area, the highway mitigation strategy produces a marginally higher level of mitigation than the non-highway mitigation strategy for over capacity queues, total travel time, total travel distance and average speed.

**Table 20. Network Indicators (morning peak) – Full Derby HMA Area**

| INDICATOR                       | MORNING PEAK |           |                          |                       |
|---------------------------------|--------------|-----------|--------------------------|-----------------------|
|                                 | REF CASE     | WITH DEV. | FULL MITIGATION SCENARIO | PERCENTAGE MITIGATION |
| Over Capacity Queues (PCU Hrs)  | 1,110        | 2,111     | 1,889                    | 22%                   |
| Total Travel Time (PCU Hrs)     | 25,572       | 29,313    | 28,816                   | 13%                   |
| Total Travel Distance (PCU kms) | 1,131,643    | 1,228,587 | 1,228,220                | 0%                    |
| Average Speed (km/hr)           | 44           | 42        | 42                       | 30%                   |



**Table 21. Network Indicators (evening peak) – Full Derby HMA Area**

| INDICATOR                       | EVENING PEAK |           |                          |                       |
|---------------------------------|--------------|-----------|--------------------------|-----------------------|
|                                 | REF CASE     | WITH DEV. | FULL MITIGATION SCENARIO | PERCENTAGE MITIGATION |
| Over Capacity Queues (PCU Hrs)  | 1,137        | 2,008     | 1,806                    | 23%                   |
| Total Travel Time (PCU Hrs)     | 25,546       | 29,280    | 29,071                   | 6%                    |
| Total Travel Distance (PCU kms) | 1,130,334    | 1,232,880 | 1,255,428                | -22%                  |
| Average Speed (km/hr)           | 44           | 42        | 43                       | 50%                   |

## 7.4 Modelling Results – Amber Valley

### Flow Difference

- 7.4.1 Figures 37 and 38 show the flow difference between the ‘With Development’ (No Mitigation) and Highway 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 Highway Mitigation Scenario, whilst green lines indicate roads which are forecast to experience a decrease in traffic.
- 7.4.2 Reduction in traffic is forecast along the following routes in Amber Valley as a result of the 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).
- 7.4.3 However, Increases are also forecast in Amber Valley, in particular along the:
- A38 (Morning Peak); and
  - B6016 through Riddings (Both peaks).
- 7.4.4 Within Amber Valley there are flow reductions across the whole area with significant reductions in Belper and Swanwick.
- 7.4.5 There are also some flow increases along routes such as the A38 and some minor routes across the area but these are relatively small.



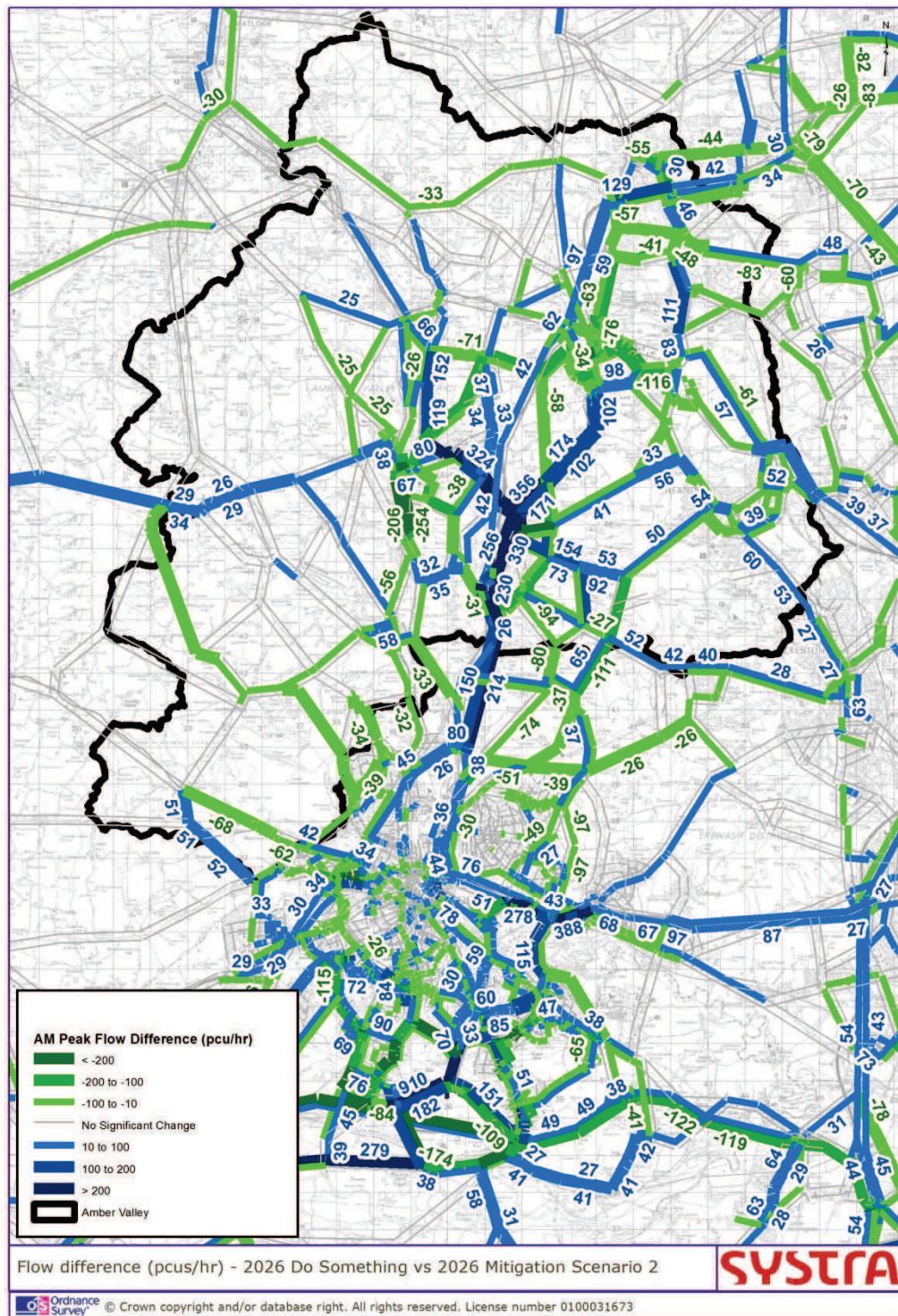
### Junction Congestion

- 7.4.6 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 Highway Mitigation Scenario. The reduction in V/C ratio is presented for such junctions and are colour coded in green.
- 7.4.7 Figures 39 and 40 show the forecast reduction in junction congestion between the With Development and Highway Mitigation scenarios for the morning and evening peak hours respectively.
- 7.4.8 The majority of junctions relieved of congestion as a result of the Highway Mitigation in Amber Valley are found in Ripley, Alferton and Heanor. In Ripley the following junctions are relieved of congestion:
- B6179/Pentrich Road Junction (Morning Peak);
  - A610/B6441 Roundabout (Both peaks); and
  - A610/Codnor Market Place (Evening Peak).
- 7.4.9 In Alferton 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).
- 7.4.10 In Heanor the following junctions are relieved of congestion:
- A608/A6007 Roundabout (Morning Peak);
  - A6007 Ilkeston Road/Breach Road/Sunningdale Avenue Junction (Morning Peak); and
  - A608 Station Road/Milnhay Road Junction (Morning Peak).
- 7.4.11 Compared to the non-highway mitigation scenario, a number of extra junctions are relieved of congestion in the highway mitigation scenario around Coxbench, Horsley and along the B6179. This is a result of the proposed roundabout junction at the Kilburn Toll Bar and improvements to Coxbench junction.





**Figure 37. Flow Difference – With Development Scenario vs Highway Mitigation Scenario – Amber Valley – Morning Peak**







**Figure 38. Flow Difference – With Development Scenario vs Highway Mitigation Scenario – Amber Valley - Evening Peak**

