Lincolnshire County Council

NORTH HYKEHAM RELIEF ROAD

Appendix L – Traffic Impact Assessment

70038233
SEPTEMBER 2018

CONFIDENTIAL

Lincolnshire County **Council**

NORTH HYKEHAM RELIEF ROAD

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1 INTRODUCTION

1.1 TRAFFIC MODEL OVERVIEW

The 2018 Greater Lincoln Transport Model (GLTM) has been used to inform the traffic and economic assessment for North Hykeham Relief Road (NHRR). It was constructed as a strategic model covering Greater Lincoln and as a multi-model transport model capable of assessing the impacts of future changes in journey patterns in the region. This traffic assessment specifically utilises the Greater Lincoln Highway Assignment Model (GLHAM) of the GLTM (see Figure 1)

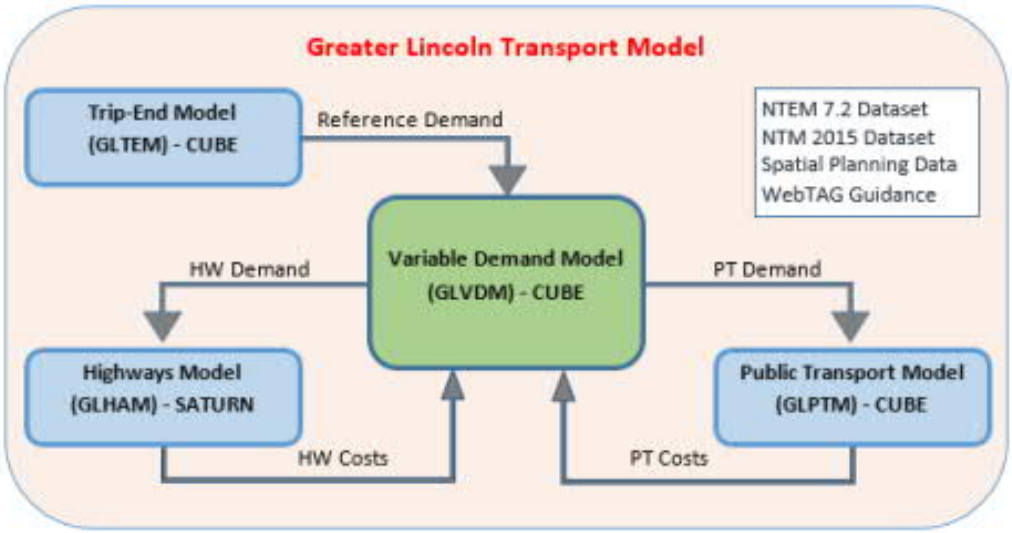


Figure 1 – GLTM structure

1.2 MODELLED SCENARIOS

As stated within the NHRR Option Assessment Report (OAR) the South West Quadrant (SWQ) is dependent on the delivery of part of the NHRR to provide access to the site. Two scenarios have been modelled which include a core scenario which does not include the development of the SWQ and another which includes the SWQ.

In addition, for both scenarios, a controlled forecast to NTEM/TEMPRO and an uncontrolled scenario have been modelled. In accordance to webTAG M4 the core scenario growth should be constrained to only realistic and plausible development. Consequently, this report will only present the controlled growth scenario.

A fixed matrix has been utilised to initially assess the impact of each option, in this scenario demand does not change as a result of providing new infrastructure. A Variable Demand Model (VDM) has also been used to assess the option performance. The VDM methodology is in line with existing business case practice and better reflects human behaviour with demand changing to reflect the provision of new transport infrastructure. The scheme options that have been assessed are summarised in Table 1 and Figure 2 and both the fixed and VDM assignments outputs are reported in this document.

The assessment years utilised for the growth scenarios are:

- Opening year 2026; and
- Design year 2036.

Table 1 – Options Assessed

Option	Alignment	Standard
Do Something Option A (DSA)	Alignment 1 - link between the A46 and the Lincoln Eastern Bypass (LEB) creating a continuous orbital route around the city	A single carriageway.
Do Something Option B (DSB)		Single carriageway with junction capacity upgrades.
Do Something Option C (DSC)		Dual carriageway.
Do Something Option D (DSD)	Alignment 2 – link between A46 and South Hykeham Road. While this alignment would support the development of the South West Quadrant SUE, the route would not connect to the LEB, and therefore leave a gap in a potential orbital route.	Single carriageway
Do Something Option E (DSE)		Dual carriageway.
Do Something Option F (DSF)	Alignment 3 – link between the A46 and Brant Road to enable the development of the South West Quadrant SUE, and should create highway capacity in South Hykeham.	Single carriageway.
Do Something Option G (DSG)		Dual carriageway.

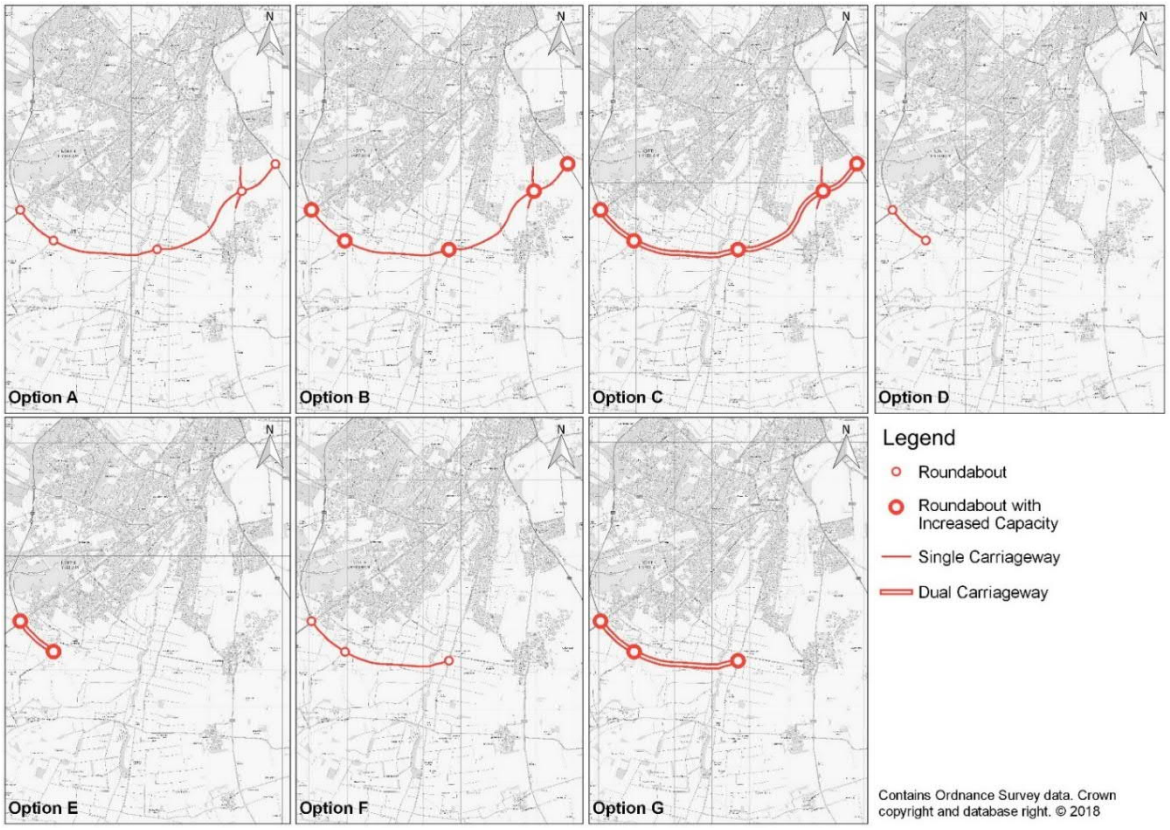


Figure 2 – Assessed Options

In accordance to TAG guidance a 'Do Minimum' (DM) scenario has also been modelled which is used as a baseline to compare against the Do Something' (DS) conditions. The DM scenario represents the existing network and any committed highway scheme which includes the LEB.

A summary of the modelled scenarios presented within this report has been presented within Table 2.

Table 2 – Modelled outputs

Growth	Model type	Inclusion of SWQ?	Options	Year
Controlled	Fixed matrix	No (Core Scenario)	DM; DSA; DSB; DSC; DSD; DSE; DSF; & DSG.	2026 & 2036
		Yes	DM; DSA; DSB; DSC; DSD; DSE; DSF; & DSG.	2026 & 2036
	Variable demand	No (Core Scenario)	DM; DSA; DSB; & DSC	2026 & 2036

Please note an uncontrolled scenario has also been modelled but will not be presented within this report

1.3 CONTENTS OF REPORT

The remainder of this report is structured as follows:

- Travel demand on:
  - NHRR
  - Selective screenlines
  - Orbital and key route network
- Network performance including:
  - Congestion
  - Vehicle speed
  - Travel time analysis
  - Network resilience
- Impact of SWQ
- Fixed model summary
- Variable demand model
- Conclusion

2 TRAVEL DEMAND

This section looks at travel demand for 2026 and 2036 on:

- NHRR;
- Selective screenlines; and
- Orbital routes.

2.1 NORTH HYKEHAM RELIEF ROAD

Appendix A shows the traffic flow on NHRR for the opening year 2026 and design year 2036 and Figure 3 illustrates these on a map.

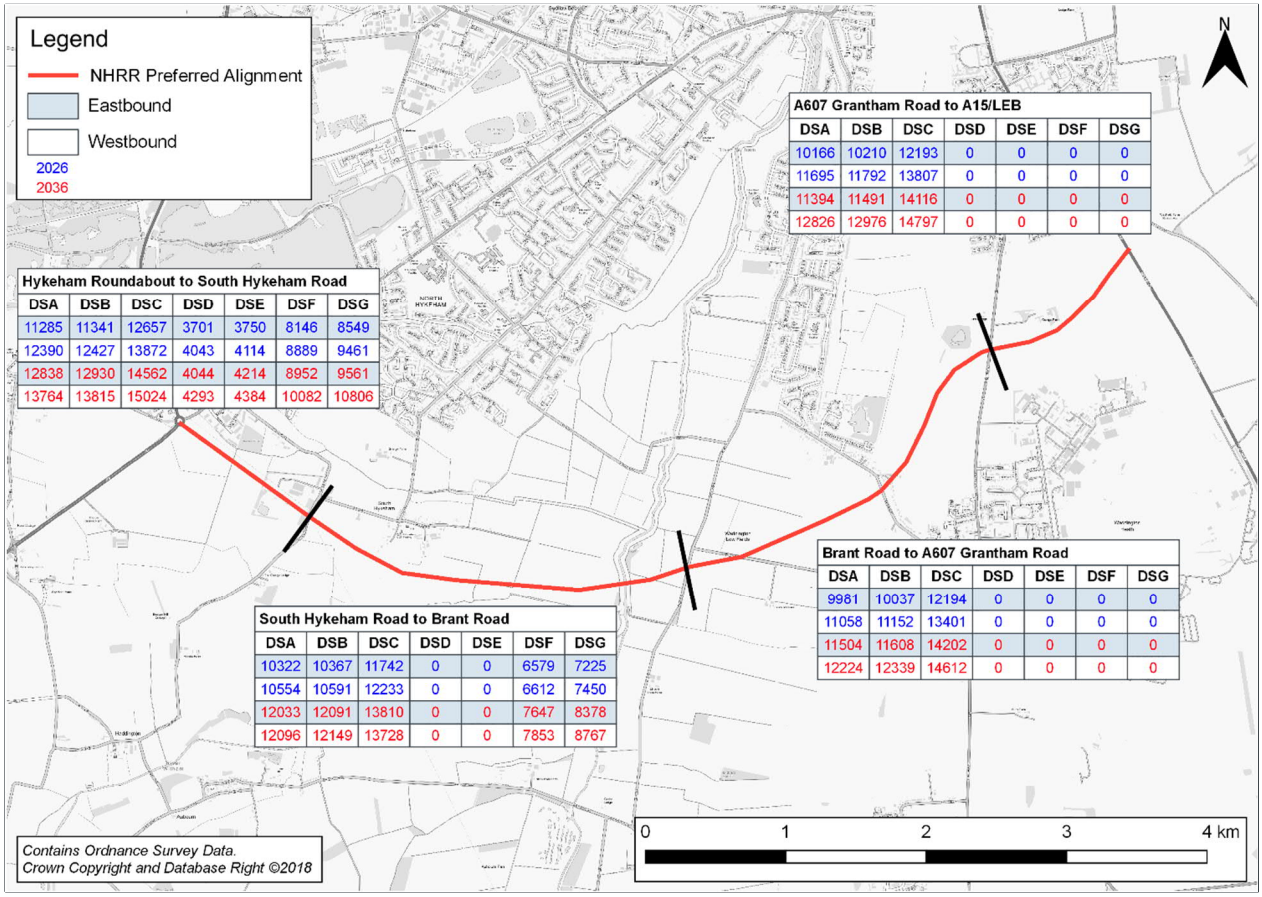


Figure 3 – Flow change on the NHRR

Key points include:

- Alignment 1 shows the highest demand with option C (dual carriageway) showing a slightly higher demand than the single carriageway equivalent (options A & B);
- Options A and B show very similar demand;
- Between Hykeham roundabout and South Hykeham Road options D & E (alignment 2) show approximately a quarter of the demand of options A to C (alignment 1) and less than half of options F and G (alignment 3);

- Option G (dual carriageway) shows a slightly higher demand when compared to the single carriageway equivalent (option F); and
- Between Hykeham Roundabout and Brant Road there is 30% less demand for options F & G (alignment 3) compared to options A to C (alignment 1). This highlights that, as expected, demand on the NHRR is significantly more when it forms a complete orbital route linking on to the LEB (alignment 1).

Table 3 presents the 2-way traffic flows for 2026 and 2036.

Table 3 – 2-way NHRR flow ranges

Section	Year	Demand						
		Alignment 1			Alignment 2		Alignment 3	
		DSA	DSB	DSC	DSD	DSE	DSF	DSG
Hykeham roundabout to South Hykeham Road	2026	23,675	23,768	26,529	7,744	7,864	17,035	18,010
	2036	26,602	26,745	29,586	8,337	8,598	19,034	20,367
South Hykeham Road to Brant Road	2026	20,876	20,958	23,975	_	_	13,191	14,675
	2036	24,129	24,240	27,535	_	_	15,500	17,145
Brant Road to A607 Grantham Road	2026	21,039	21,189	25,595	_	_	_	_
	2036	23,728	23,947	28,814	_	_	_	_
A607 Grantham Road to A15/LEB	2026	21,861	22,002	26,000	_	_	_	_
	2036	24,220	24,467	28,913	_	_	_	_

Table 4 provides guidance on the opening year traffic flows as presented within the Design Manual for Roads & Bridges (DMRB) guidance note TA 46/97 – Assessment of Road Schemes Traffic Flow Ranges.

Table 4 – Opening year flow ranges

Carriageway Standard*	Opening Year AADF	
	Minimum	Maximum
Single 7.3m (S2)	13,000	
Wide Single 10m (WS2)	6,000	21,000
Dual 2 Lane All Purpose (D2AP)	11,000	39,000
Dual 3 Lane All Purpose (D3AP)	23,000	54,000
Dual 2 Lane Motorway (D2M)	Up to 41,000	
Dual 3 Lane Motorway (D3M)	25,000	67,000
Dual 4 Lane Motorway (D4M)	52,000	90,000

**DMRB Volume 5 Section 1 TA 46/97 Assessment of Road Schemes Traffic Flow Ranges for Use in the Assessment of New Rural Roads*

When comparing the 2-way forecast flows against DMRB guidance (Table 4) the following points can be made:

- Traffic flows on an orbital route between the A46 and LEB (options A to C) are consistent with those acceptable for a dual 2 lane all-purpose carriageway (D2AP);
- Traffic flows for an alignment between the A46 and South Hykeham Road (options D to E) are consistent with those acceptable for a single 7.m (S2) or a wide single 10m (WS2); and
- Traffic flows for an alignment between the A46 and Brant Road (options F & G) are consistent with those acceptable for a wide single 10 (WS2) or dual 2-lane all-purpose carriageway (D2AP).

2.2 SCREENLINE ANALYSIS

This section reviews the forecast traffic flow traffic flow changes across a number of key screenlines. It looks at north south routes as the scheme will link into a number of radial routes and also east west movements across Lincoln as the NHRR provides an east-west route to the south of Lincoln. It also looks at screenlines on the local road network to the south of Lincoln as the NHRR will impact on local traffic movement in this area.

2.2.1 NORTH SOUTH SCREENLINE

Lincoln is crossed in an east-west direction by the River Witham and the Fossdyke Navigation; these form a convenient and natural north-south divide which have been used to measure changes to north-south traffic movements. For the purposes of this evaluation north-south traffic flows have been assessed crossing the screenline points highlighted within the map below. This includes a screenline on the A46 orbital route; three within the city centre; and one on the LEB.

Appendix B tabulates the results showing the forecast Annual Average Daily Flow (AADF) for the Core Scenario for both the opening year (2026) and design year (2036). Figure 4 presents a visual representation of the results and the screenline and Table 5 summarises the changes relative to the DM.

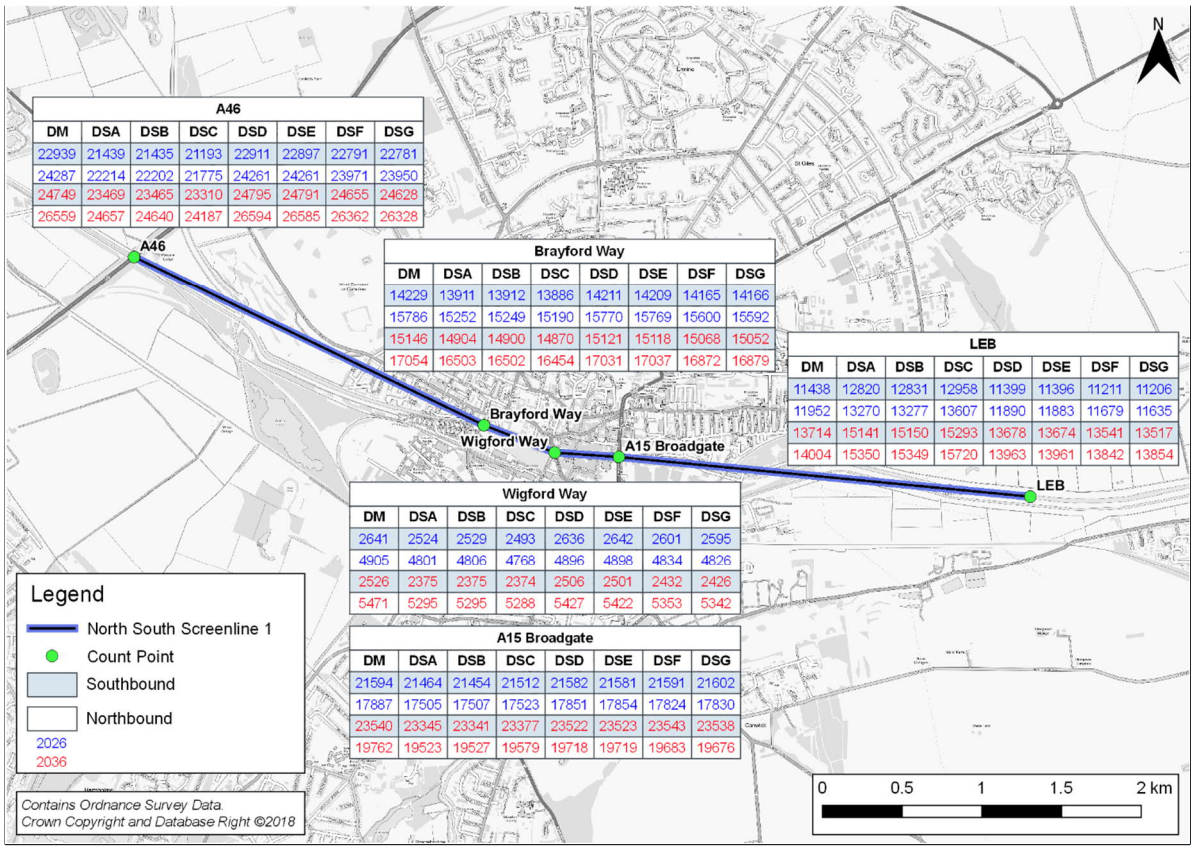


Figure 4 – AADF for north south screenline (2026 & 2036)

Table 5 – AADF change compared to the DM

Location	Year	DM	Alignment 1			Alignment 2		Alignment 3	
			DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46 Southbound	2026	22939	-1500 (-6.5%)	-1504 (-6.6%)	-1746 (-7.6%)	-28 (-0.1%)	-42 (-0.2%)	-148 (-0.6%)	-158 (-0.7%)
	2036	24749	-1280 (-5.2%)	-1284 (-5.2%)	-1439 (-5.8%)	46 (0.2%)	42 (0.2%)	-94 (-0.4%)	-121 (-0.5%)
A46 Northbound	2026	24287	-2073 (-8.5%)	-2085 (-8.6%)	-2512 (-10.3%)	-26 (-0.1%)	-26 (-0.1%)	-316 (-1.3%)	-337 (-1.4%)
	2036	26559	-1902 (-7.2%)	-1919 (-7.2%)	-2372 (-8.9%)	35 (0.1%)	26 (0.1%)	-197 (-0.7%)	-231 (-0.9%)
LEB Southbound	2026	11438	1382 (12.1%)	1393 (12.2%)	1520 (13.3%)	-39 (-0.3%)	-42 (-0.4%)	-227 (-2%)	-232 (-2%)
	2036	13714	1427 (10.4%)	1436 (10.5%)	1579 (11.5%)	-36 (-0.3%)	-40 (-0.3%)	-173 (-1.3%)	-197 (-1.4%)
LEB Northbound	2026	11952	1318 (11%)	1325 (11%)	1,65 (13.8%)	-62 (-0.5%)	-69 (-0.6%)	-273 (-2.3%)	-317 (-2.7%)
	2036	14004	1346 (9.6%)	1345 (9.6%)	1716 (12.3%)	-41 (-0.3%)	-43 (-0.3%)	-162 (-1.2%)	-150 (-1.1%)
Brayford Way Southbound	2026	14229	-318 (-2.2%)	-317 (-2.2%)	-343 (-2.4%)	-18 (-0.1%)	-20 (-0.1%)	-64 (-0.4%)	-63 (-0.4%)
	2036	15146	-242 (-1.6%)	-246 (-1.6%)	-276 (-1.8%)	-25 (-0.2%)	-28 (-0.2%)	-78 (-0.5%)	-94 (-0.6%)
Brayford Way Northbound	2026	15786	-534 (-3.4%)	-537 (-3.4%)	-596 (-3.8%)	-16 (-0.1%)	-17 (-0.1%)	-186 (-1.2%)	-194 (-1.2%)
	2036	17054	-551 (-3.2%)	-552 (-3.2%)	-600 (-3.5%)	-23 (-0.1%)	-17 (-0.1%)	-182 (-1.1%)	-175 (-1%)
Wigford Way Southbound	2026	2641	-117 (-4.4%)	-112 (-4.2%)	-148 (-5.6%)	-5 (-0.2%)	1 (0.0%)	-40 (-1.5%)	-46 (-1.7%)
	2036	2526	-151 (-6%)	-151 (-6%)	-152 (-6%)	-20 (-0.8%)	-25 (-1%)	-94 (-3.7%)	-100 (-4%)
Wigford Way Northbound	2026	4905	-104 (-2.1%)	-99 (-2.0%)	-137 (-2.8%)	-9 (-0.2%)	-7 (-0.1%)	-71 (-1.4%)	-79 (-1.6%)
	2036	5471	-176 (-3.2%)	-176 (-3.2%)	-183 (-3.3%)	-44 (-0.8%)	-49 (-0.9%)	-118 (-2.2%)	-129 (-2.4%)
A15 Broadgate Southbound	2026	21594	-130 (-0.6%)	-140 (-0.6%)	-82 (-0.4%)	-12 (-0.1%)	-13 (-0.1%)	-3 (0.0%)	8 (0.0%)
	2036	23540	-195 (-0.8%)	-199 (-0.8%)	-163 (-0.7%)	-18 (-0.1%)	-17 (-0.1%)	3 (0%)	-2 (0%)
A15 Broadgate Northbound	2026	17887	-382 (-2.1%)	-380 (-2.1%)	-364 (-2.0%)	-36 (-0.2%)	-33 (-0.2%)	-63 (-0.4%)	-57 (-0.3%)
	2036	19762	-239 (-1.2%)	-235 (-1.2%)	-183 (-0.9%)	-44 (-0.2%)	-43 (-0.2%)	-79 (-0.4%)	-86 (-0.4%)

From analysis and comparison of the forecast flows across the north-south screenline generated by each of the options, the following points can be made:

A46

- Options D and E (Alignment 2 – partial bypass) and options F and G (Alignment 3 – partial bypass) have a minimal impact on traffic reduction on the A46.
- Option C (Alignment 1 – full bypass; dual carriageway) delivers the greatest forecast reduction in traffic on the A46 – over 10% reduction in traffic on the northbound carriageway in 2026.

Lincoln Eastern Bypass

- All alignment 1 options (A, B, and C) lead to a forecast increase in traffic on LEB, with the greatest impact made by Option C, indicating that a full bypass will transfer traffic from the A46 via NHRR onto LEB.
- The partial bypass options D to G deliver a forecast traffic reduction on LEB.

City Centre

- The largest reduction in north-south traffic through the city centre is delivered by the full bypass options.
- The changes in city centre flows along the screenline are modest, with the best performing Option C achieving a 6% reduction in north-south city centre traffic.
- Options D to G have a minimal impact on traffic reduction in the city centre.

Overall the analysis shows that NHRR provides the greatest benefits in terms of traffic reduction and transfer onto more appropriate routes elsewhere on the network when delivered as a dual carriageway bypass linking the A46 and LEB (Option C).

2.2.2 EAST WEST SCREENLINE

An east west screenline has been utilised to assess the change in forecast traffic flows travelling across Lincoln. Figure 5 and Table 6 provide a summary of the forecast traffic flows and Appendix B provides further details.

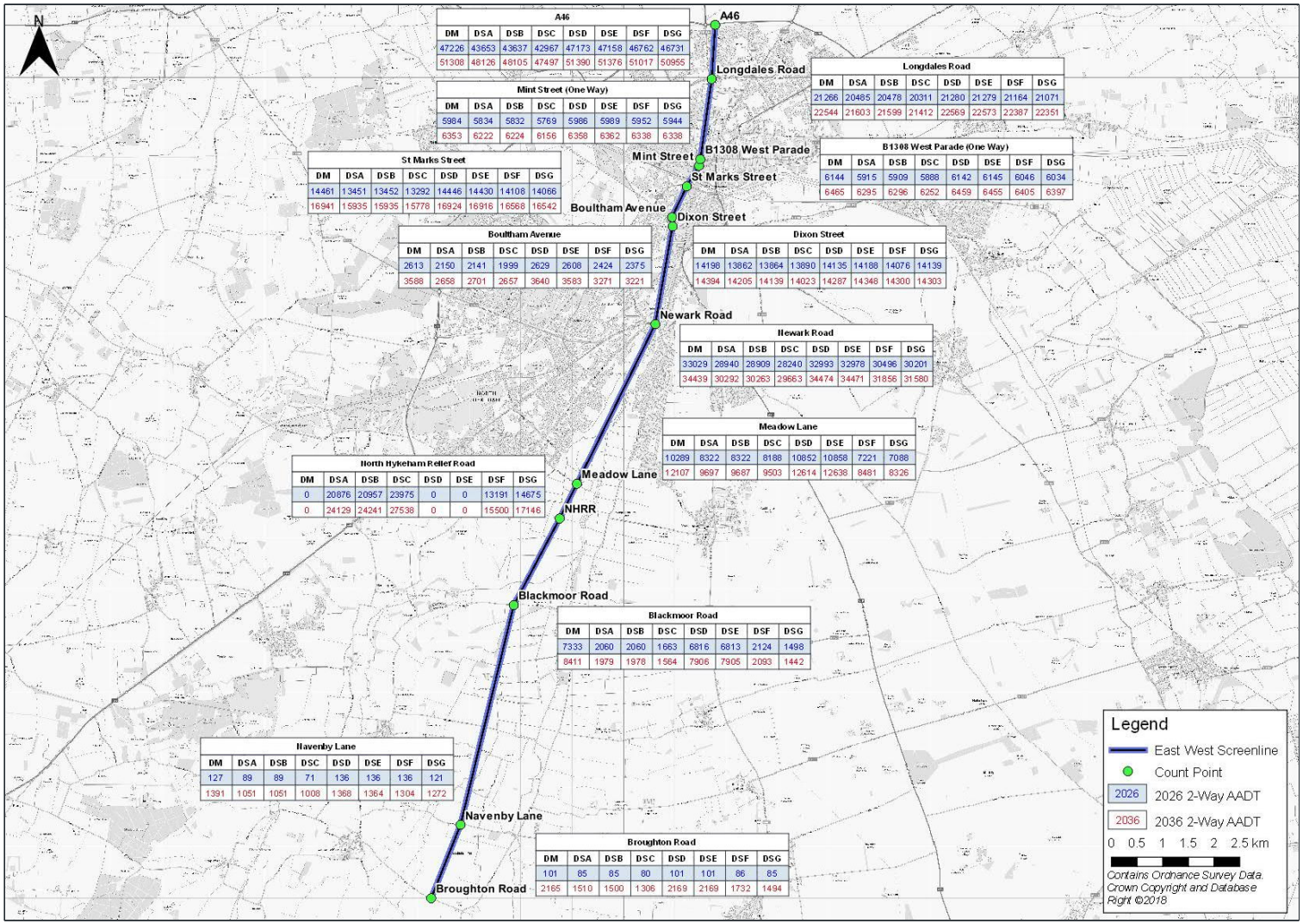


Figure 5 – AADF for east west screenline (2026 & 2036)

Table 6 – AADF change, 2-way flows

Location	Year	DM	Alignment 1			Alignment 2		Alignment 3	
			DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46	2026	47,226	-3,573 (-7.6%)	-3,589 (-7.6%)	-4,258 (-9%)	-54 (0.1%)	-68 (0.1%)	-464 (-1%)	-495 (-1%)
	2036	51,308	-3,182 (-6.2%)	-3,203 (-6.2%)	-3,812 (-7.4%)	81 (0.2%)	67 (0.1%)	-292 (-0.6%)	-353 (-0.7%)
Longdales Road	2026	21,266	-780 (-3.7%)	-789 (-3.7%)	-955 (-4.5%)	14 (0.1%)	13 (0.1%)	-102 (-0.5%)	-195 (-0.9%)
	2036	22,544	-941 (-4.2%)	-945 (-4.2%)	-1,132 (-5%)	25 (0.1%)	28 (0.1%)	-157 (-0.7%)	-194 (-0.9%)
B1308 West Parade	2026	6,144 (One way)	-229 (-3.7%)	-235 (-3.8%)	-256 (-4.2%)	-2 (0%)	1 (0%)	-98 (-1.6%)	-110 (-1.8%)
	2036	6,465 (One way)	-170 (-2.6%)	-169 (-2.6%)	-213 (-3.3%)	-6 (-0.1%)	-10 (-0.2%)	-60 (-0.9%)	-68 (1%)
Mint Street	2026	5,984 (One way)	-150 (-2.5%)	-152 (-2.5%)	-215 (-3.6%)	2 (0%)	2 (0.1%)	-32 (-0.5%)	-40 (-0.7%)
	2036	6,353 (One way)	-131 (-2.1%)	-129 (-2%)	-197 (-3.1%)	5 (0.1%)	8 (0.1%)	-16 (-0.2%)	-16 (-0.2%)
St.Marks Street	2026	14,460	-1,008 (-7%)	-1,007 (-7%)	-1,168 (-8.1%)	-14 (-0.1%)	-30 (-0.2%)	-353 (-2.4%)	-394 (-2.7%)
	2036	16,941	-1,006 (-5.9%)	-1,005 (-5.9%)	-1,163 (-6.9%)	-16 (-0.1%)	-24 (-0.1%)	-372 (-2.2%)	-399 (-2.4%)
Boultham Avenue	2026	2,613	-463 (-17.7%)	-472 (-18.1%)	-614 (-23.5%)	16 (0.6%)	-5 (-0.2%)	-189 (-7.2%)	-238 (-9.1%)
	2036	3,588	-930 (-25.9%)	-887 (-24.7%)	-931 (-25.9%)	52 (1.4%)	-5 (-0.1%)	-317 (-8.8%)	-367 (-10.2%)
Dixon Street	2026	14,198	-336 (-2.4%)	-334 (-2.4%)	-308 (-2.2%)	-63 (0.4%)	-10 (0.1%)	-122 (-0.9%)	-58 (0.4%)
	2036	14,394	-189 (-1.2%)	-255 (-1.8%)	-371 (-2.6%)	-107 (-0.7%)	-46 (-0.3%)	-94 (-0.7%)	-91 (-0.6%)
Newark Road	2026	33,029	-4,089 (-12.4%)	-4,120 (-12.5%)	-4,789 (-14.5%)	-36 (-0.1%)	-51 (-0.2%)	-2,534 (-7.7%)	-2,827 (-8.6%)
	2036	34,439	-4,147 (-12%)	-4,176 (-12.1%)	-4,776 (-13.9%)	35 (0.1%)	32 (0.1%)	-2,583 (-7.5%)	-2,859 (-8.3%)
Meadow Lane	2026	10,289	-1,966 (-19.1%)	-1,968 (-19.1%)	-2,101 (-20.4%)	563 (5.5%)	569 (5.5%)	-3,068 (-29.8%)	-3,201 (-31.1%)
	2036	12,107	-2,411 (-19.9%)	-2,420 (-20%)	-2,604 (-21.5%)	507 (4.2%)	531 (4.4%)	-3,627 (-30%)	-3,781 (-31.2%)
NHRR	2026	N/A	20,876	20,958	23,975	0	0	13,191	14,675
	2036	N/A	24,129	24,241	27,538	0	0	15,500	17,146
	2026	7,333	-5,273	-5,272	-5,671	-516	-520	-5,209	-5,835

Blackmoor Road			(-71.9%)	(-71.9%)	(-77.3%)	(-7%)	(-7.1%)	(-71%)	(-80%)
	2036	8,411	-6,432 (-76.5%)	-6,433 (-76.5%)	-6,847 (-81.4%)	-505 (-6%)	-506 (-6%)	-6,318 (-75.1%)	-6,969 (-82.9%)
Navenby Lane	2026	127	-38 (-29.8%)	-38 (-29.9%)	-55 (-43.6%)	9 (7.5%)	9 (7.4%)	10 (7.7%)	-6 (-4.6%)
	2036	1,391	-340 (-24.4%)	-340 (-24.4%)	-382 (-27.5%)	-23 (-1.6%)	-27 (-1.9%)	-86 (-6.2%)	-118 (-8.5%)
Broughton Lane	2026	101	-15 (-15.2%)	-15 (-15.2%)	-21 (-20.7%)	0 (0%)	0 (0%)	-15 (-15%)	-16 (-15.6%)
	2036	2,165	-656 (-30.3%)	-665 (-30.7%)	-859 (-39.7%)	4 (0.2%)	3 (0.1%)	-434 (-20%)	-671 (-31%)

The analysis shows the following:

A46

- Options A to C result in the most significant decreases on the traffic on the A46.
- Options D to G have a minimal impact on reducing traffic on the A46.

Newark Road

- Alignment 1 has the most significant impact in transferring traffic off the Newark Road radial route with Option C (dual carriageway) performing the best. The northern section of Newark Road is the location of an east west river crossing over the River Witham.
- Options D and E (alignment 2) do not provide an additional east west river crossing and as a result, demand remains the same on Newark Road.

City Centre

- Options A to C have the most significant impact transferring east west traffic onto more appropriate routes away from the city centre with Options C (dual carriageway) being the most effective.

The local road network (Longdales Road; Broughton Lane; Navenby Lane; Blackmoor Road; and Meadow Lane)

- Change in demand at Longdales Road for options D to G is minimal. Options A to C have some positive impact, albeit only a 4% decrease.
- Alignments 1 (Options A, B, and C) and 3 (Options F and G) perform well in transferring traffic off Meadow Lane with Options F and G performing best.
- The full orbital route (Alignment 1) has the most significant impact in reducing traffic off Broughton Lane, Navenby Lane and Blackmoor Road with the dual carriageway option (option C) having the most significant impact.

Overall the results show that Option C provides the greatest potential benefits on terms of transfer of traffic onto more appropriate routes, reducing the amount of traffic crossing the urban area of Lincoln in an east-west direction; along the A46 orbital route; and the demand on local road network to the south of Lincoln. Traffic is instead transferred onto the NHRR and the LEB.

2.2.3 LOCAL ROAD NETWORK AND A46 SW SCREENLINE

A screenline on the local road network to the south of Lincoln has been used to assess the impact the options have on the local road network. Figure 6 and Table 7 provide an overview of the changes in forecast traffic flows following the introduction of the scheme.

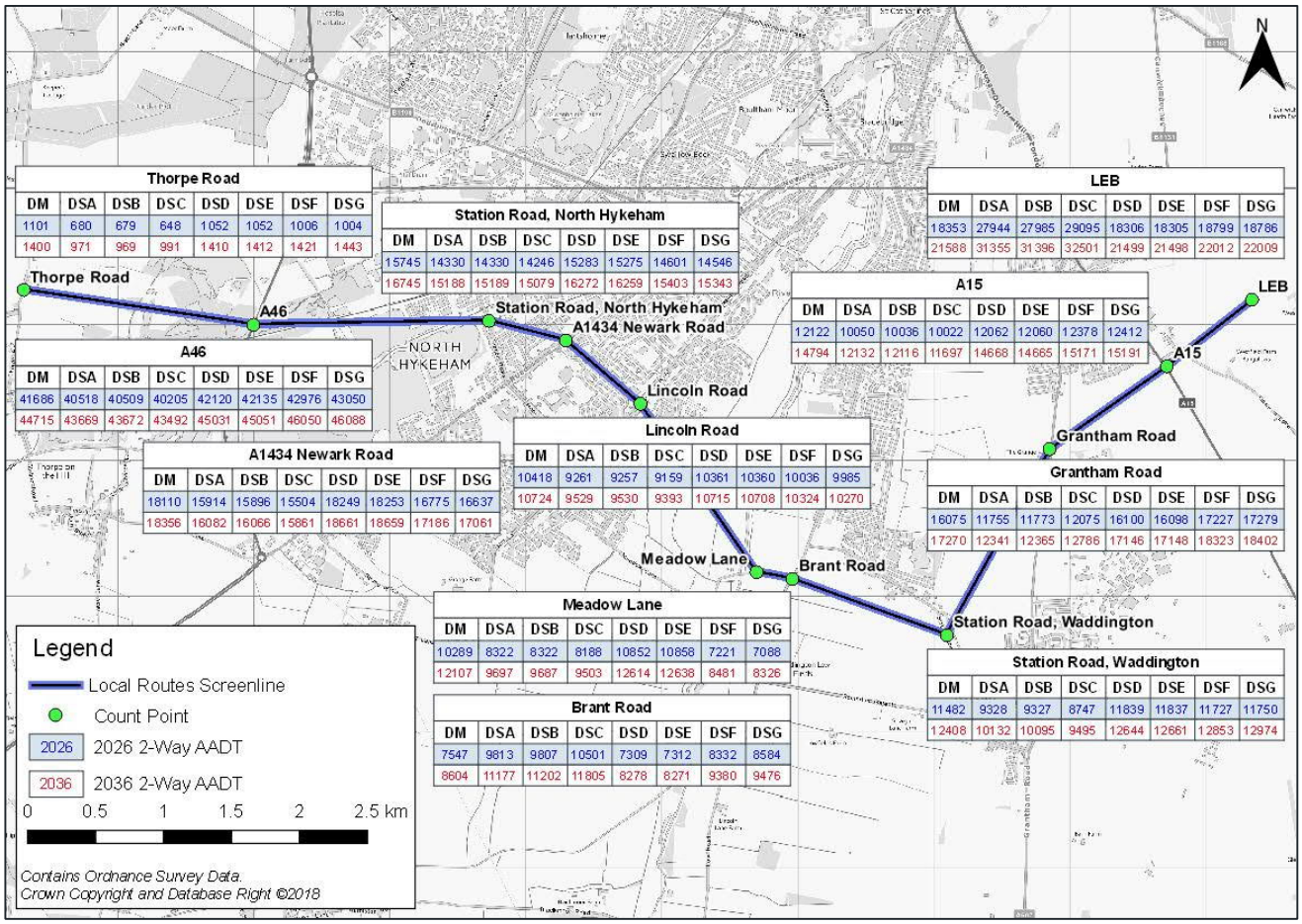


Figure 6 – AADF for screenline (2026 & 2036)

Table 7 – AADF change 2 way (2026)

Location	Year	DM	Alignment 1			Alignment 2		Alignment 3	
			DSA	DSB	DSC	DSD	DSE	DSF	DSG
Thorpe Road	2026	1,101	-421 (-38%)	-422 (-38%)	-453 (-41%)	-50 (-5%)	-49 (-4%)	-96 (-9%)	-97 (-9%)
	2036	1,400	-429 (-31%)	-431 (-31%)	-409 (-29%)	9 (1%)	12 (1%)	21 (1%)	43 (3%)
A46	2026	41,686	-1,168 (-3%)	-1,177 (-3%)	-1,481 (-4%)	434 (1%)	449 (1%)	1,290 (3%)	1,364 (3%)
	2036	44,715	-1,046 (-2%)	-1,042 (-2%)	-1,222 (-3%)	316 (1%)	336 (1%)	1,336 (3%)	1,373 (3%)
Station Road, North Hykeham	2026	15,746	-1,416 (-9%)	-1,416 (-9%)	-1,499 (-10%)	-464 (-3%)	-471 (-3%)	-1,145 (-7%)	-1,201 (-8%)
	2036	16,745	-1,557 (-9%)	-1,557 (-9%)	-1,666 (-10%)	-473 (-3%)	-487 (-3%)	-1,342 (-8%)	-1,403 (-9%)
A1434 Newark Road	2026	18,110	-2,197 (-12%)	-2,214 (-12%)	-2,606 (-14%)	140 (1%)	143 (1%)	-1,335 (-7%)	-1,473 (-8%)
	2036	18,356	-2,274 (-12%)	-2,290 (-13%)	-2,495 (-14%)	305 (2%)	303 (2%)	-1,169 (-6%)	-1,295 (-7%)
Lincoln Road	2026	10,418	-1,137 (-11%)	-1,162 (-11%)	-1,259 (-12%)	-57 (-1%)	-58 (-1%)	-382 (-4%)	-633 (-6%)
	2036	10,724	-1,195 (-11%)	-1,194 (-11%)	-1,331 (-12%)	-9 (0%)	-16 (0%)	-400 (-4%)	-454 (-4%)
Meadow Lane	2026	10,289	-1,966 (-19%)	-1,968 (-19%)	-2,101 (-20%)	563 (5%)	569 (6%)	-3,068 (-30%)	-3,201 (-31%)
	2036	12,107	-2,411 (-20%)	-2,450 (-20%)	-2,604 (-22%)	507 (4%)	531 (4%)	-3,627 (-30%)	-3,781 (-31%)
Brant Road	2026	7,547	2,266 (30%)	2,260 (30%)	2,953 (39%)	-238 (-3%)	-235 (-3%)	785 (10%)	1,038 (14%)
	2036	8,604	2,573 (30%)	2,599 (30%)	3,202 (37%)	-325 (-3%)	-333 (-4%)	776 (9%)	873 (10%)
Station Road, Waddington	2026	11,482	-2,155 (-19%)	-2,155 (-19%)	-2,735 (-24%)	357 (3%)	355 (3%)	245 (2%)	267 (2%)
	2036	12,408	-2,275 (-18%)	-2,313 (-19%)	-2,913 (-24%)	236 (2%)	253 (2%)	445 (4%)	566 (5%)
Grantham Road	2026	16,075	-4,320 (-27%)	-4,302 (-27%)	-4,000 (-25%)	25 (0%)	23 (0%)	1,152 (7%)	1,204 (8%)
	2036	17,270	-4,929 (-29%)	-4,906 (-28%)	-4,484 (-26%)	-124 (-1%)	-122 (-1%)	1,053 (6%)	1,132 (7%)

A15	2026	12,122	-2,072 (-17%)	-2,086 (-17%)	-2,100 (-17%)	-60 (-1%)	-62 (-1%)	257 (2%)	290 (2%)
	2036	14,794	-2,662 (-18%)	-2,679 (-18%)	-3,097 (-21%)	-126 (-1%)	-129 (-1%)	376 (3%)	397 (3%)
LEB	2026	18,553	9,591 (52%)	9,632 (53%)	10,742 (59%)	-47 (0%)	-48 (0%)	446 (2%)	433 (2%)
	2036	21,588	9,767 (45%)	9,808 (45%)	10,913 (50%)	-89 (0%)	-90 (0%)	424 (2%)	422 (2%)

Analysis of the forecast difference in flows across the local road network shows that:

- Alignment 1 is the most effective overall in reducing traffic flows on the local road network with Option C providing the most significant benefits on Thorpe Road, Newark Road, and across Waddington.
- Alignment 3 (Options F and G) provides the most significant benefits to Meadow Lane with a ~30% reduction in traffic compared to DM, closely followed by option C with a ~20% reduction in traffic compared to DM.
- Option C results in an increase in traffic on Brant Road, which could be attributed to a demand to access NHRR at its junction with Brant Road.

In summary the NHRR alignment linking the A46 to the LEB (alignment 1) show the largest impact on traffic with option C (dual carriageway) showing the most significant impact. This includes transferring the most amount of traffic off the A46 and on to the LEB/NHRR and is reflected by a decrease in demand on the A46 and the largest increase on the LEB/NHRR compared to other options.

Furthermore, there is a slight positive impact on reducing north south demand through the city centre and a significant impact in reducing east west demand crossing the city centre and the wider Lincoln urban area. Significant reduction in demand is also present on the local road network to the south of Lincoln. However, there is an increase in demand on Brant Road which is most likely due to traffic wishing to access the NHRR.

2.3 ORBITAL ROUTE

This section looks at the impact the Core Scenario options have on the AADF on the orbital route network. Appendix C presents a table showing the results for both 2026 and 2036. Figure 7 and Table 8 below present the forecast change in AADF on the existing orbital route for each intervention option compared against the DM forecast flows.

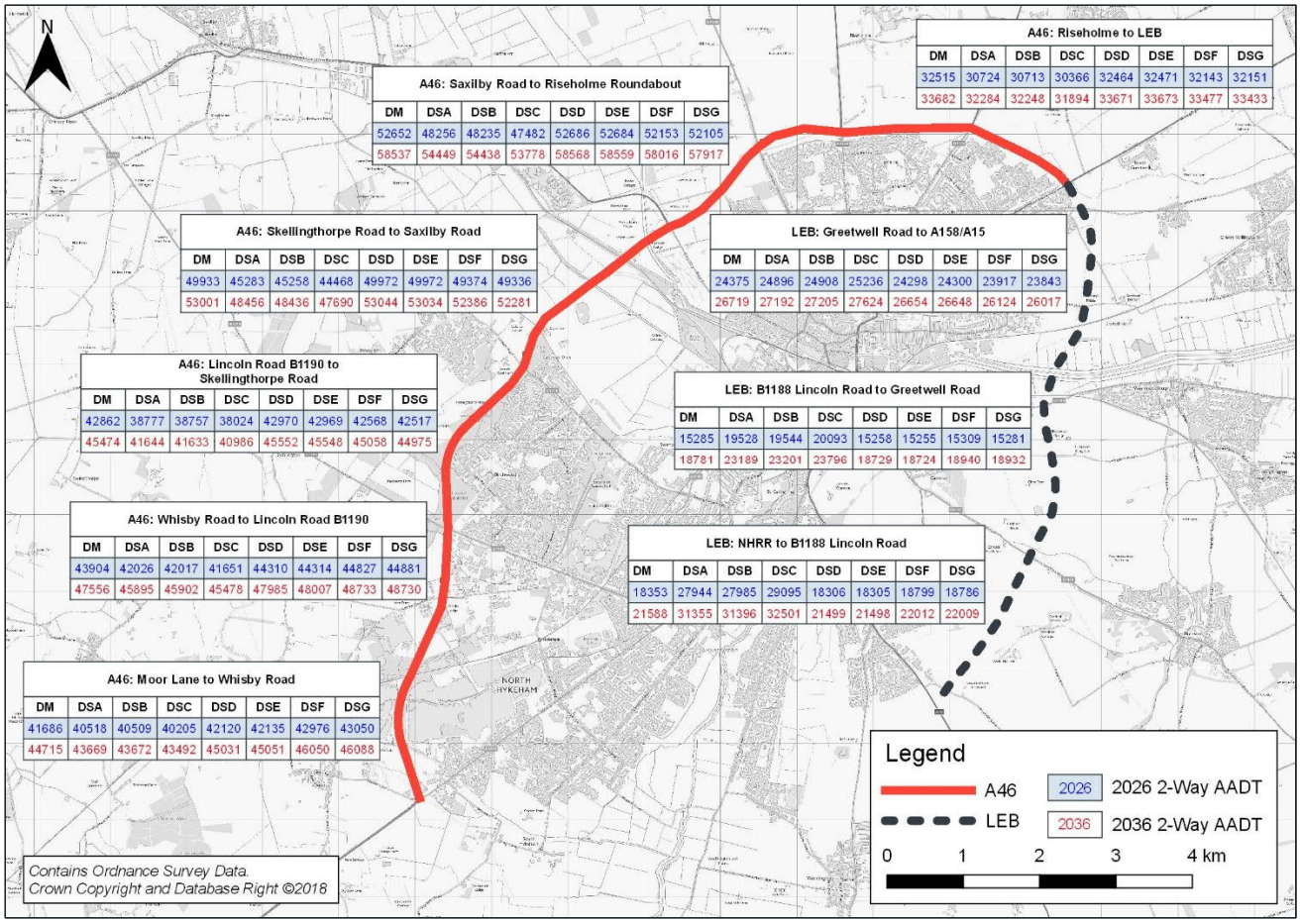


Figure 7 – AADF on orbital routes 2026 & 2036

The analysis shows that:

- Alignment 1 has a large reduction in traffic on the A46 with the dual carriageway option (option C) having the largest impact in this respect.
- Alignment 2 (options D and E) show demand has increased overall on the A46.
- Alignment 3 (options F & G) show a large increase in demand on the southern section of the A46 to Lincoln Road B1190 and a decrease on the rest of the A46.
- On the LEB alignment 1 shows the largest increase in demand with the dual carriageway option (option C) showing the largest increase.
- For options D to G there is minimal impact on demand on the LEB.

Table 8 – AADF change vs DM

Section	Year	DM	Alignment 1			Alignment 2		Alignment 3	
			DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46: Moor Lane to Whisby Road	2026	41,686	-1,168 (-2.8%)	-1,157 (-2.8%)	-1,481 (-3.6%)	434 (1%)	449 (1.1%)	1,290 (3.1%)	1,364 (3.3%)
	2036	44,715	-1,046 (-2.3%)	-1,042 (-2.3%)	-1,222 (-2.7%)	316 (0.7%)	336 (0.8%)	1,336 (3%)	1,373 (3.1%)
A46: Whisby Road to Lincoln Road B1190	2026	43,904	-1,879 (-4.3%)	-1,888 (-4.3%)	-2,253 (-5.1%)	405 (0.9%)	409 (0.9%)	922 (2.1%)	977 (2.2%)
	2036	47,556	-1,661 (-3.5%)	-1,654 (-3.5%)	-2,079 (-4.4%)	429 (0.9%)	451 (0.9%)	1,177 (2.5%)	1,173 (2.5%)
A46: Lincoln B1190 to Skellingthorpe Road	2026	42,862	-4,085 (-9.5%)	-4,104 (-9.6%)	-4,838 (-11.3%)	107 (0.2%)	107 (0.2%)	-295 (-0.7%)	-344 (-0.8%)
	2036	45,474	-3,830 (-8.4%)	-3,841 (-8.4%)	-4,488 (-9.9%)	78 (0.2%)	74 (0.2%)	-416 (-0.9%)	-499 (-1.1%)
A46: Skellingthorpe Road to Saxilby Road	2026	49,933	-4,650 (-9.3%)	-4,675 (-9.4%)	-5,465 (-10.9%)	38 (0.1%)	39 (0.1%)	-559 (-1.1%)	-597 (-1.2%)
	2036	53,001	-4,545 (-8.6%)	-4,565 (-8.6%)	-5,311 (-10%)	43 (0.1%)	33 (0.1%)	-615 (-1.2%)	-720 (-1.4%)
A46: Saxilby Road to Riseholme	2026	52,652	-4,396 (-8.3%)	-4,417 (-8.4%)	-5,171 (-9.8%)	34 (0.1%)	32 (0.1%)	-529 (-1%)	-546 (-1%)
	2036	58,537	-4,088 (-7%)	-4,098 (-7%)	-4,759 (-8.1%)	32 (0.1%)	22 (0%)	-520 (-0.9%)	-619 (-1.1%)
A46: Riseholme to LEB	2026	32,515	-1,789 (-5.5%)	-1,801 (-5.5%)	-2,147 (-6.6%)	-50 (-0.2%)	-44 (-0.1%)	-371 (-1.1%)	-364 (-1.1%)
	2036	33,682	-1,398 (-4.2%)	-1,434 (-4.3%)	-1,787 (-5.3%)	-11 (0%)	-9 (0%)	-205 (-0.6%)	-249 (-0.7%)
LEB: Greetwell Road to A158/A15	2026	24,375	520 (2.1%)	533 (2.1%)	861 (3.5%)	-77 (-0.3%)	-74 (-0.3%)	-458 (-1.9%)	-533 (-2.2%)
	2036	26,719	473 (1.8%)	486 (1.8%)	905 (3.4%)	-66 (-0.2%)	-71 (-0.3%)	-596 (-2.2%)	-702 (-2.6%)
LEB: B1188 Lincoln Road to Greetwell Road	2026	15,285	4,242 (27.8%)	4,258 (27.9%)	4,807 (31.4%)	-28 (-0.2%)	-30 (-0.2%)	23 (0.2%)	-5 (0%)
	2036	18,781	4,408 (23.5%)	4,420 (23.5%)	5,015 (26.7%)	-52 (-0.3%)	-57 (-0.3%)	159 (0.8%)	151 (0.8%)
LEB: NHRR to B1188 Lincoln Road	2026	18,353	9,592 (52.3%)	9,632 (52.5%)	10,743 (58.5%)	-47 (-0.3%)	-47 (-0.3%)	446 (2.4%)	433 (2.4%)
	2036	21,588	9,767 (45.2%)	9,808 (45.4%)	10,913 (50.6%)	-89 (-0.4%)	-90 (-0.4%)	424 (2%)	422 (2%)

2.4 LOCAL ROAD NETWORK

Appendix D shows the AADF on the local road network to the south of Lincoln for all the options both in the opening year (2026) and design year (2036). Figure 8 shows the 2026 AADF for all options on a map and Table 9 highlights the percentage change in demand compared to the DM scenario.

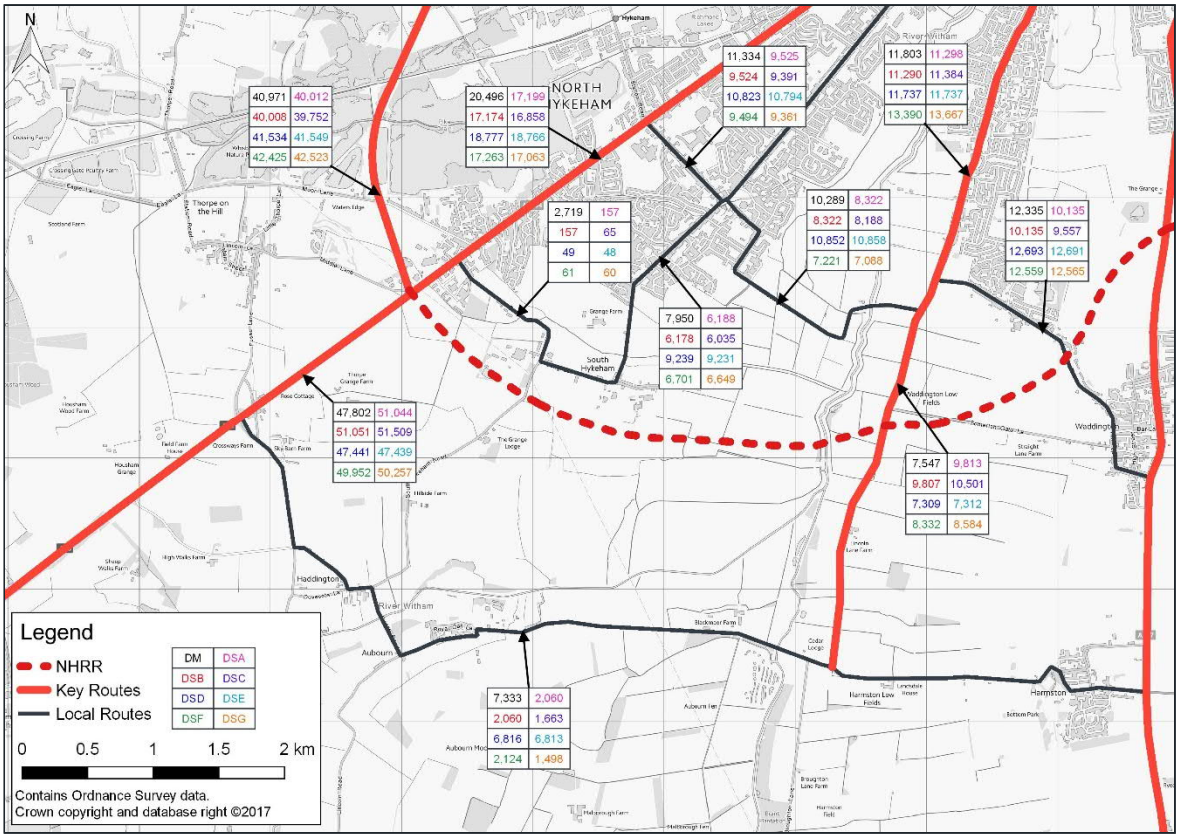


Figure 8 – Local Road Network AADF 2026 Comparison

Table 9 – Local Road Network AADF Comparison, 2026 and 2036

Ref	Location	Year	DM	Alignment 1			Alignment 2		Alignment 3	
				DSA	DSB	DSC	DSD	DSE	DSF	DSG
1	A46 Ring Road	2026	40,971	-959 (-2.3%)	-963 (-2.4%)	-1219 (-3%)	563 (1.4%)	578 (1.4%)	1454 (3.5%)	1552 (3.8%)
		2036	44,093	-879 (-2%)	-876 (-2%)	-1047 (-2.4%)	370 (0.8%)	390 (0.9%)	1469 (3.3%)	1510 (3.4%)
2	A46 South	2026	47,802	3242 (6.8%)	3249 (6.8%)	3707 (7.8%)	-361 (-0.8%)	-363 (-0.8%)	2150 (4.5%)	2455 (5.1%)
		2036	51,640	4545 (8.8%)	4565 (8.8%)	5161 (10%)	-277 (-0.5%)	-259 (-0.5%)	2737 (5.3%)	3089 (6%)
3	A1434 Newark Road	2026	20,496	-3297 (-16.1%)	-3322 (-16.2%)	-3638 (-17.7%)	-1719 (-8.4%)	-1731 (-8.4%)	-3233 (-15.8%)	-3433 (-16.7%)
		2036	20,201	-2436 (-12.1%)	-2453 (-12.1%)	-2723 (-13.5%)	-931 (-4.6%)	-1027 (-5.1%)	-2352 (-11.6%)	-2573 (-12.7%)
4	Boundary Lane	2026	2,719	-2562 (-94.2%)	-2561 (-94.2%)	-2653 (-97.6%)	-2669 (-98.2%)	-2671 (-98.2%)	-2658 (-97.8%)	-2658 (-97.8%)
		2036	3,934	-3603 (-91.6%)	-3627 (-92.2%)	-3612 (-91.8%)	-3879 (-98.6%)	-3881 (-98.7%)	-3845 (-97.7%)	-3876 (-98.5%)
5	Moor Lane	2026	11,334	-1809 (-16%)	-1810 (-16%)	-1944 (-17.1%)	-512 (-4.5%)	-540 (-4.8%)	-1841 (-16.2%)	-1973 (-17.4%)
		2036	14,398	-4460 (-31%)	-4476 (-31.1%)	-4698 (-32.6%)	-3049 (-21.2%)	-3087 (-21.4%)	-4471 (-31.1%)	-4595 (-31.9%)
6	Mill Lane	2026	7,950	-1762 (-22.2%)	-1772 (-22.3%)	-1915 (-24.1%)	1289 (16.2%)	1281 (16.1%)	-1249 (-15.7%)	-1301 (-16.4%)
		2036	9,115	-2776 (-30.5%)	-2779 (-30.5%)	-2912 (-31.9%)	486 (5.3%)	491 (5.4%)	-2248 (-24.7%)	-2316 (-25.4%)
7	Meadow Lane	2026	10,289	-1967 (-19.1%)	-1967 (-19.1%)	-2101 (-20.4%)	563 (5.5%)	569 (5.5%)	-3068 (-29.8%)	-3201 (-31.1%)
		2036	18,634	-8937 (-48%)	-8947 (-48%)	-9131 (-49%)	-6020 (-32.3%)	-5996 (-32.2%)	-10153 (-54.5%)	-10308 (-55.3%)
8	Brant Road north	2026	11,803	-504 (-4.3%)	-513 (-4.3%)	-418 (-3.5%)	-66 (-0.6%)	-66 (-0.6%)	1588 (13.5%)	1865 (15.8%)
		2036	12,669	136 (1.1%)	129 (1%)	154 (1.2%)	239 (1.9%)	233 (1.8%)	2126 (16.8%)	2334 (18.4%)
9	Brant Road south	2026	7,547	2266 (30%)	2260 (29.9%)	2954 (39.1%)	-238 (-3.2%)	-235 (-3.1%)	785 (10.4%)	1037 (13.7%)
		2036	11,248	-71 (-0.6%)	-46 (-0.4%)	557 (5%)	-2970 (-26.4%)	-2977 (-26.5%)	-1868 (-16.6%)	-1772 (-15.8%)
10	Station Road	2026	12,335	-2200 (-17.8%)	-2201 (-17.8%)	-2778 (-22.5%)	358 (2.9%)	356 (2.9%)	223 (1.8%)	230 (1.9%)
		2036	16,104	-4732 (-29.4%)	-4769 (-29.6%)	-5350 (-33.2%)	-2250 (-14%)	-2233 (-13.9%)	-2033 (-12.6%)	-1927 (-12%)
11	Blackmoor Road / Harmston Road	2026	7,333	-5273 (-71.9%)	-5273 (-71.9%)	-5671 (-77.3%)	-517 (-7%)	-520 (-7.1%)	-5209 (-71%)	-5835 (-79.6%)
		2036	9,972	-7993 (-80.2%)	-7994 (-80.2%)	-8408 (-84.3%)	-2066 (-20.7%)	-2067 (-20.7%)	-7879 (-79%)	-8530 (-85.5%)

Analysis of the forecast AADF flows across the local roads network shows that;

- Alignment 1, and to a lesser extent Alignment 3, result in an increase in traffic on the A46 south of Pennell's Roundabout and on Brant Road South, both of which provide access to the NHRR.
- All options reduce traffic on Newark Road, with option C having the most significant impact.
- Alignment 3 generates a significant increase in demand at Brant Road North.

There is an increase in demand on A46 south of Hykeham roundabout and the southern section of Brant Road as vehicles access the NHRR for alignments 1 and 3 and this increase in demand is particularly high for alignment 1 (options A to C). In general alignments 1 and 3 reduce east west demand on the local highway network with alignment 1 (options A to C) being more effective. Overall option C is the most effective in reducing traffic demand on the local road network for east west movement.

2.5 TRAVEL DEMAND SUMMARY

Alignment 1 (options A to C) result in the most significant traffic flow changes when compared to the DM; key points include:

- A link from the A46 through to the A15 results in modest decrease in north-south traffic through the city centre;
- It results in a significant impact in reducing east west demand across the city centre and the wider Lincoln area compared to other options, with option C being the most effective;
- It results in a significant decrease in demand on the northern sections of the A46 with option C showing the largest decrease. This decrease corresponds with a large increase in demand on the NHRR and LEB as traffic re-routes off the A46 on to the NHRR/LEB route;
- An increase in demand can be found on the A46 south of Newark Road as traffic accesses the NHRR;
- There is a general decrease in demand on radial routes to the south of Lincoln between the city centre and north of NHRR (e.g. option C sees a 17.2% decrease on Lincoln Road and 11.6% decrease on Newark Road);
- There is a decrease in demand on the local road network to the south of Lincoln for east west movement as traffic transfers on to the NHRR. This decrease is significant and as high as 98% on Boundary Lane for option C; and
- Traffic demand forecast is consistent with those acceptable for a dual 2 lane all-purpose carriageway.

Key points for alignment 2 (options D and E) include:

- Shows a minimal impact on demand on the network compared to the DM scenario;
- Shows some reduction in demand for east west traffic on the local road network to the south of Lincoln particularly on Boundary Lane which sees a 98.2% decrease; and
- Traffic demand forecast is consistent with those acceptable for a single 7.3m (S2) or a wide single 10m (WS2)

Key points for alignment 3 (options F and G) include:

- Shows a large increase in demand on the southern section of the A46 to Lincoln Road B1190 and a decrease on the rest of the A46;
- Very small decrease in demand on the LEB:
- Marginal decrease in north south demand through Lincoln city centre;
- Shows a small decrease in east west traffic demand travelling through the city centre;
- There is a decrease in demand on the local road network to the south of Lincoln for east west movement as traffic transfers on to the NHRR. This decrease is significant in places with Boundary Lane showing a decrease of 97% in demand;
- An increase in demand can be found on the A46 south of Newark Road and Low Road as traffic accesses the NHRR; and
- Traffic demand forecast is consistent with those acceptable for a wide single 10m (WS2) or a dual 2 lane all-purpose carriageway.

3 NETWORK PERFORMANCE

The previous chapter looked at the impact the scheme has on travel demand. This chapter looks at the impact this demand has on the performance of the network. Specifically, it examines:

- Average vehicle speeds; and
- Travel time on selective routes.

3.1 LINK SPEED ANALYSIS

Average speeds give an indication of how well traffic moves on the network. A summary of the average link speed for the different time periods is presented in Table 10.

Table 10 – Average speed (kph)

Year	Period	NHRR included?	DM	Alignment 1			Alignment 2		Alignment 3	
				Option A	Option B	Option C	Option D	Option E	Option F	Option G
2026	AM	Yes	46.8	48.8	48.8	49.2	47.0	47.0	47.4	47.5
		No	46.8	48.2	48.2	48.3	46.9	46.9	47.1	47.2
	IP	Yes	48.1	49.7	49.7	50.1	48.2	48.2	48.6	48.7
		No	48.1	49.1	49.1	49.2	48.1	48.1	48.4	48.4
	PM	Yes	46.7	48.5	48.5	48.8	46.9	46.9	47.2	47.2
		No	46.7	47.9	47.9	47.9	46.8	46.8	46.9	46.9
2036	AM	Yes	44.7	46.7	46.7	47.0	44.9	44.9	45.4	45.5
		No	44.7	46.1	46.2	46.2	44.8	44.8	45.1	45.1
	IP	Yes	47.0	48.8	48.8	49.2	47.0	47.0	47.5	47.6
		No	47.0	48.2	48.2	48.3	47.0	46.9	47.3	47.3
	PM	Yes	45.2	46.9	46.9	47.2	45.3	45.3	45.7	45.7
		No	45.2	46.3	46.3	46.4	45.3	45.3	45.4	45.4

As can be seen the average speed on the network increases for alignment 1 for all time periods with the largest increase being for the dual carriageway option (option C). This demonstrates that the network is operating more efficiently through the implementation of this alignment. For options D to G this increase is minimal for certain time periods indicating that they are not as effective as alignment 1 in improving the efficiency of the network.

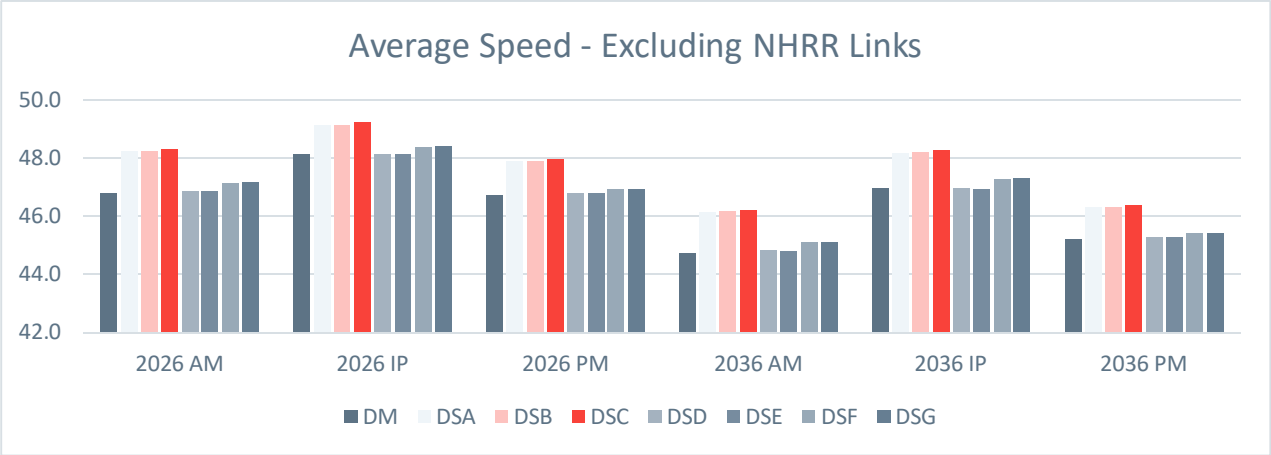


Figure 9 – Average speed kph (excluding NHRR links)

Figure 12**Error! Reference source not found.** shows that options A to C have an increase in average speed when excluding the NHRR from the calculations. When considering the capacity of the network has not increased (with the exception of the introduction of NHRR) the increased efficiency of the network manifesting itself as an increase in average speed is down to a decrease in demand on certain routes. This decrease in demand is a result of traffic transferring onto the NHRR / LEB. The location of where this demand has decreased (resulting in an increase in average speed) has been addressed in previous sections of this report.

Alignment 1 (options A to C) shows the largest increase in average speed on the network with option C showing the highest.

3.2 JOURNEY TIME

This section assesses the impact the options have on journey time and is split into:

- Specific routes; and
- Zones.

3.2.1 SPECIFIC ROUTES

The journey time on a number of key routes has been assessed and these routes are highlighted within Figure 13. Table 11 shows the average journey time of both directions, for the dual carriageway option of the three different alignments in the AM Peak (2026). The single carriageway options haven not been shown as they show very similar results as their dual carriageway equivalent.

Table 11 – Average journey time for both directions (2026)

Route	AM Peak			
	DM	DSC	DSE	DSG
Route 1: A46 A158	37:48	35:35	37:50	38:01
Route 2: LEB	22:00	23:17	21:57	21:55
Route 3: A607 Grantham Road	28:59	28:43	28:56	28:56
Route 4: A1434 Newark Road	40:33	36:50	39:36	38:35

Route	AM Peak			
	DM	DSC	DSE	DSG
Route 5: Brant Road	31:11	30:00	31:12	32:03
Route 6: A57 Saxilby Road	18:26	17:49	18:25	18:14
Route 7: A15 Riseholme	23:16	22:34	23:16	23:03

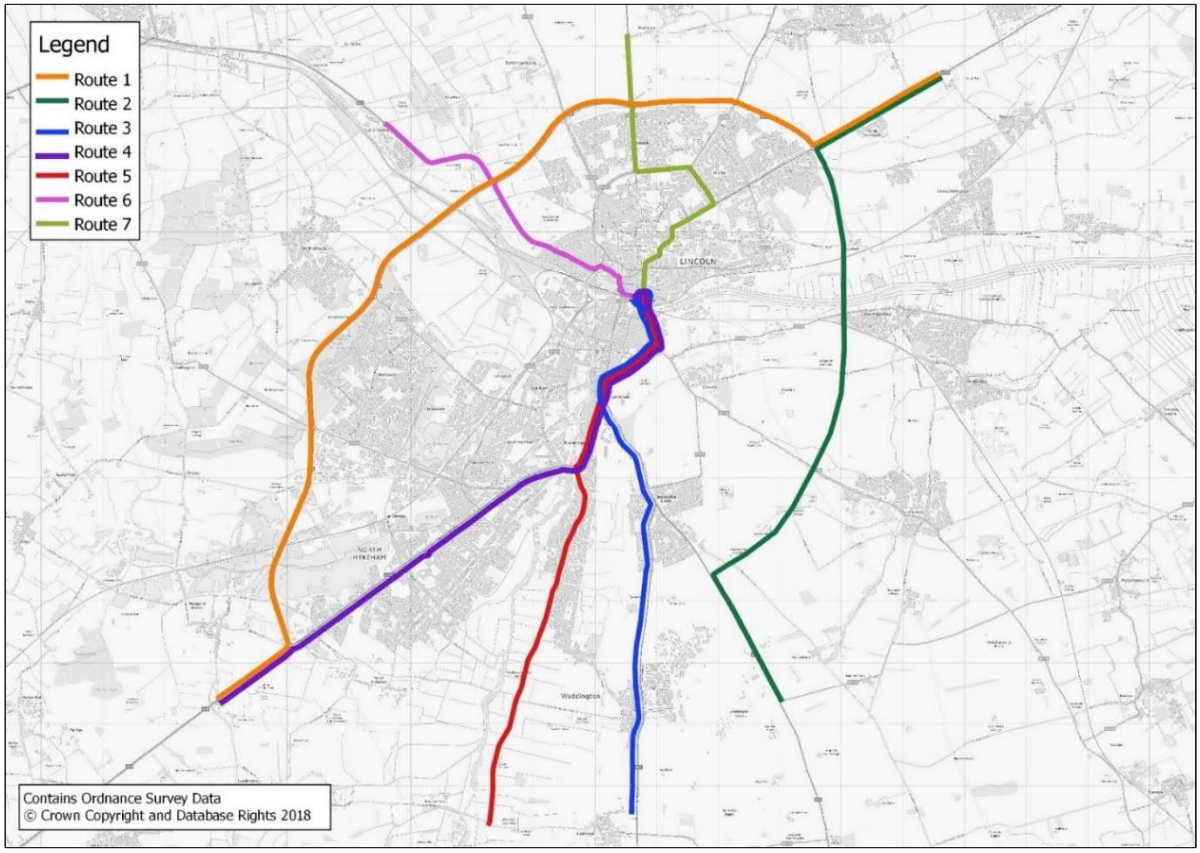


Figure 10 – Routes utilised for journey time assessment

Key points include:

- Option C (alignment 1) is the only alignment to see a decrease in travel time on route 1 (A46/A158) which is due to traffic transferring off this route on to NHRR/LEB. This is reflected by an increase in journey time on route 2 (LEB);
- There is very little impact on route 3 (A607 Grantham Road) regardless on which alignment is implemented;
- Route 4 (A1434 Newark Road) shows the largest decrease in journey time for option C (alignment 1). This is partly due to journeys which previously crossed Lincoln via the city centre route on the A1434 Newark Road now using the NHRR/LEB route;
- Option C (alignment 1) shows a marginal improvement in journey time for routes 5, 6 & 7 while options E and G (alignment 2 and 3) have minimal impact.

3.2.2 ZONES

Journey time data has been analysed for selected origin destination (OD) pairs to capture the impact the options have on journey time between OD pairs.

In total 8 OD pairs have been assessed which represent strategic and local journeys travelling through and across Lincoln. These OD pairs include:

- Strategic journeys:
  - Welton to Lincoln
  - Sleaford to Lincoln
  - Collingham to Horncastle
- Local journeys:
  - Saxilby to Lincoln
  - Skellingthorpe to Branston
  - Thorpe on the Hill to Bracebridge Heath
  - Thorpe on the Hill to North Greetwell
  - North Greetwell to Bracebridge Heath

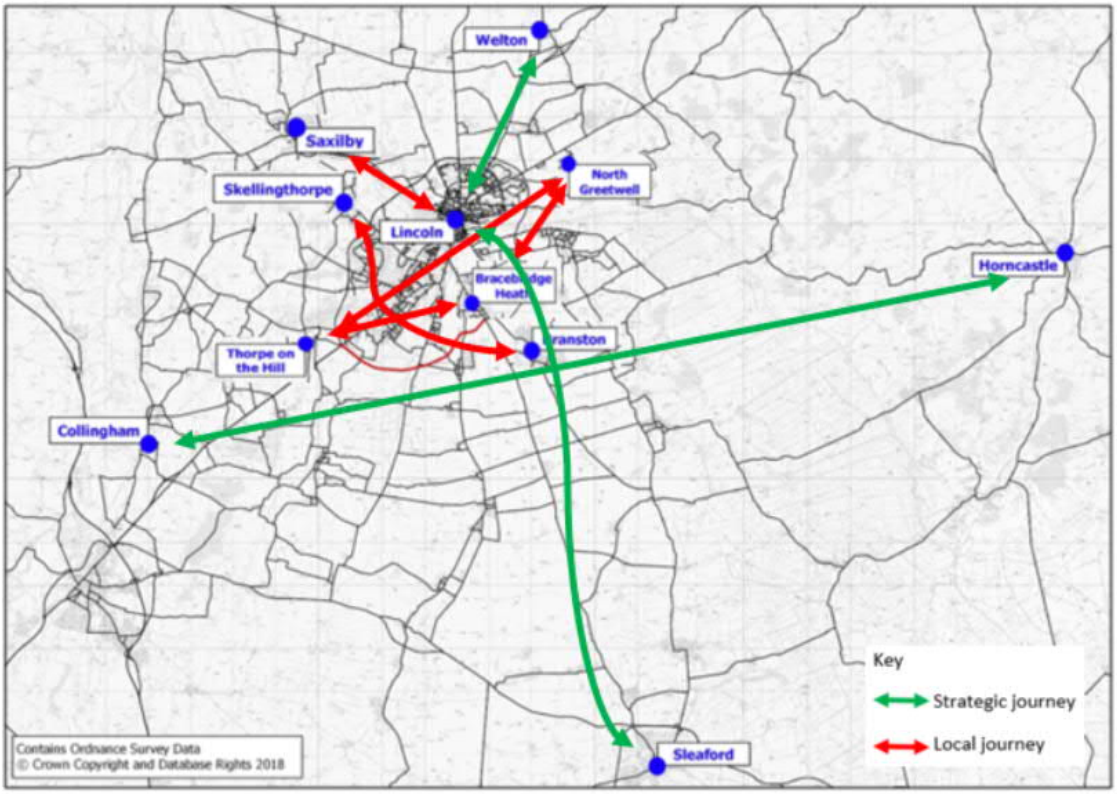


Figure 11 – OD pairs

The results presented are for Option A (single carriageway A46 to A15), Option C (dual carriageway A46 to A15) and Option G (dual carriageway from A46 to Brant Road) for the 2026 AM Peak. The remaining options have not been reported as they either have a very similar impact to those listed above or a minimal impact.

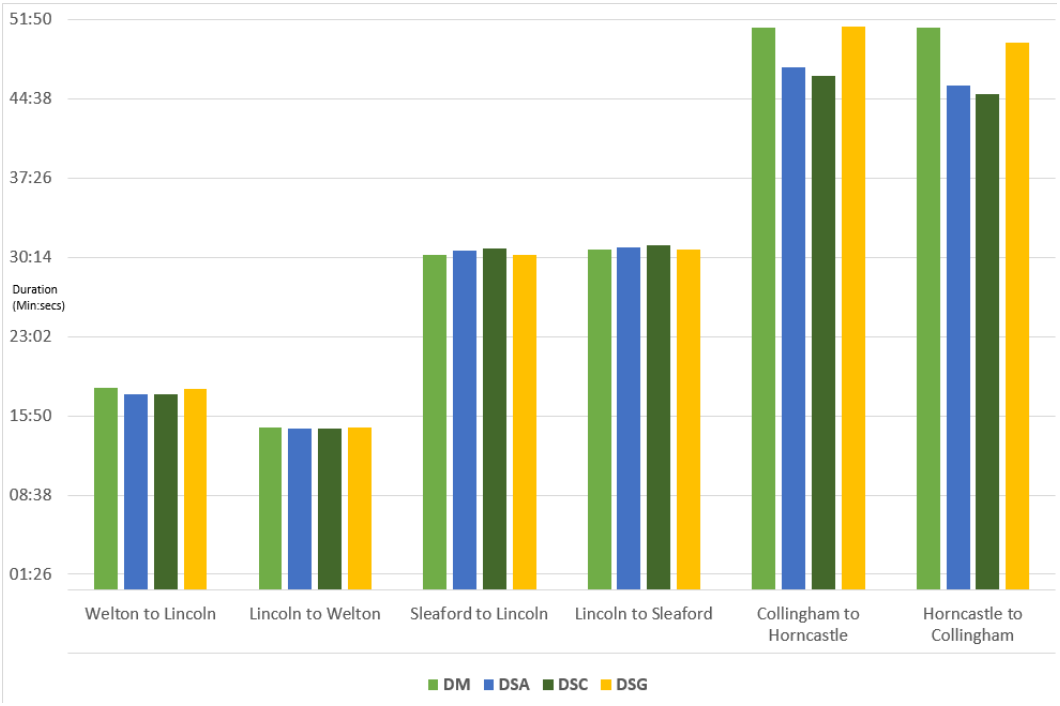


Figure 12 shows the duration of the journey for strategic routes. It shows that option G has very little impact on strategic journeys. It also shows that option C has the most positive impact on reducing journey time for the strategic route travelling east west across the south of Lincoln between Collingham and Horncastle. For journeys between the Sleaford and Lincoln and Welton to Lincoln which both travel in a north south direction no options have a significant impact in reducing journey time.

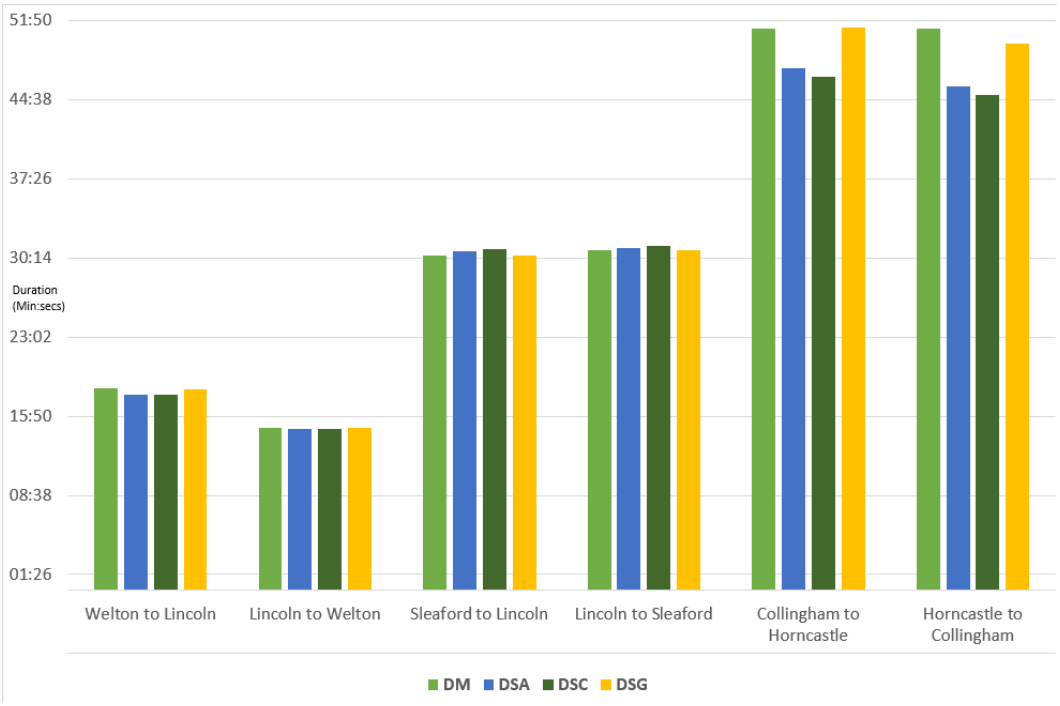


Figure 12 – Strategic route, AM Peak 2026

Figure 16 shows the duration of the journey for the selective local routes. It shows a similar trend as the strategic routes in that the largest journey time savings are for option C where journeys cross Lincoln in an east west or south west / north east direction.

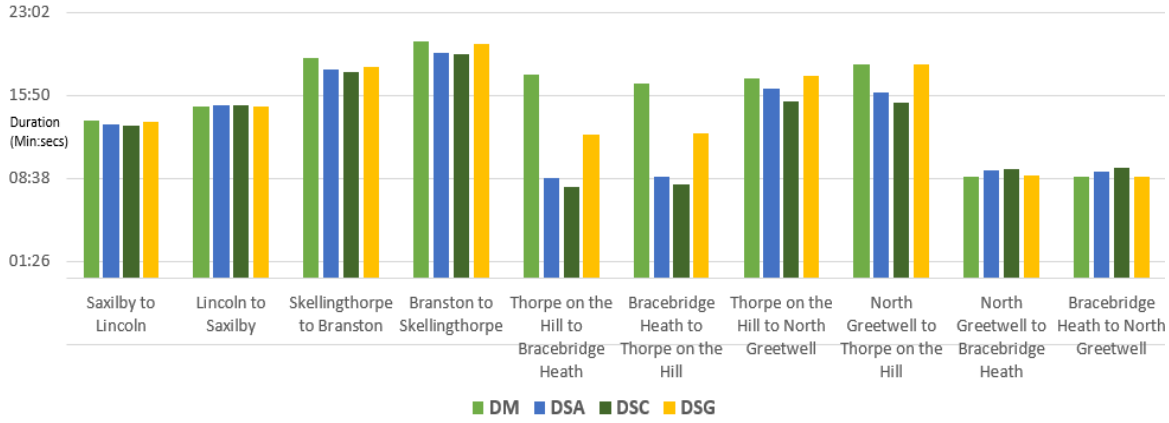


Figure 13 – Local route, AM Peak 2026

The largest journey time savings are for the full alignment of NHRR for journeys crossing Lincoln in an east west or north east/south west direction.

3.3 NETWORK RESILIENCE

Network resilience has been tested by modelling a scenario of a road closure on the A46 between Moor Lane and Whisby Road. This is to understand the route taken by users if there is a closure on this section of the A46. However, it must be noted that the outputs assume that all drivers have perfect knowledge in the fact that they know the optimum route to take when an incident occurs. In real life transport users do not have perfect knowledge and if a signed diversion route is in operation users will most likely take this route.

Only option C which provides a suitable test example for alignment 1 has been modelled. This is because alignments 2 and 3 are primarily to enable development of the SWQ and do not provide enough of an alternative route to create additional network resilience.

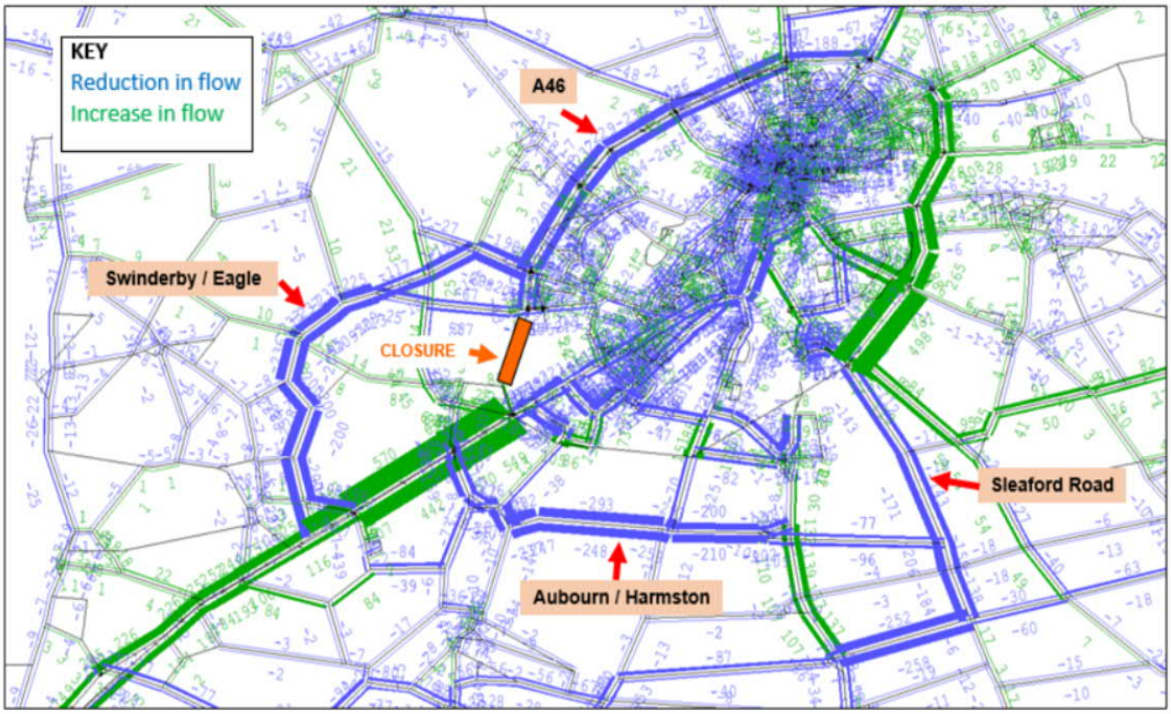


Figure 14 – A46 closure – DSC versus DM (2026 AM)

Figure 17 shows the impact of implementing option C against a DM scenario. It shows that the NHRR relieves rural routes through or near to villages west (Swinderby / Eagle) and south (Aubourn / Harmston) of Lincoln. There is also an increase in demand on the LEB which results in a large increase in delay.

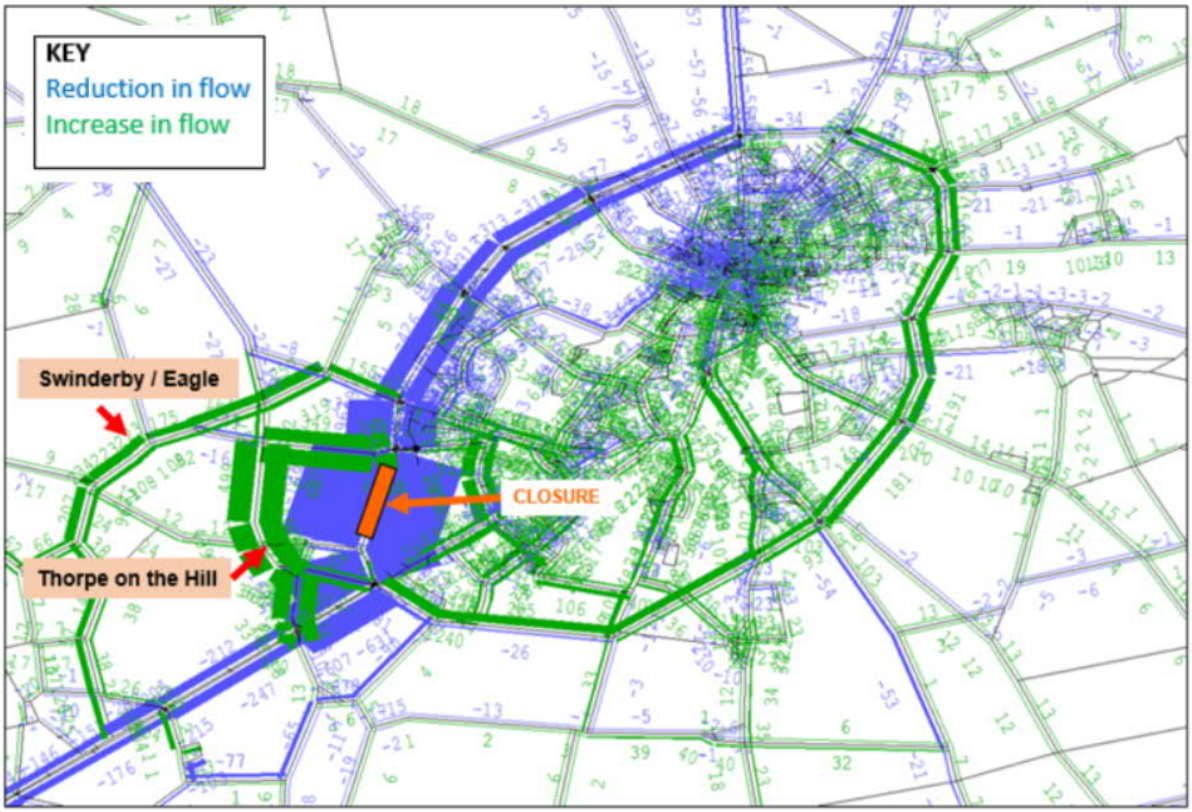


Figure 15 – Option C A46 closure vs normal operation (2026 AM)

Figure 15 shows the output for a road closure on the A46 against normal operation for option C (2026 AM Peak). It shows that when a road closure is in operation there is an increase in flow on the NHRR and the LEB and decrease on the A46. In an eastbound direction this increase in flow is between 20-25% and 10-20% respectively. The output also shows an increase in demand using the rural routes through or near to Thorpe on the Hill and Swinderby / Eagle. This is due to traffic which originates on the eastern side of Lincoln and travelling in a north south direction staying on the eastern side of Lincoln and travelling via the A46 as the distance and time taken is shorter (see Table 12).

Table 12 – Route details

Route	Time (mins)	Distance (km)
Thorpe on the Hill / A46	19.3	18.8
LSB / LEB	21.5	24.3
Difference	2.3	5.5
% Difference	12%	29%

When there is a closure on the A46 between Fog Lane and Whisby Road and the NHRR is in operation, there is a decrease in demand on the A46 and increase on the NHRR/LEB route. There is also an increase on the rural routes close to Thorpe on the Hill and Swinderby / Eagle and is due to traffic originating on the eastern side of Lincoln and wishing to travel north south direction as travelling across Lincoln (via NHRR/LEB) takes longer.

3.4 NETWORK PERFORMANCE SUMMARY

Link speed & journey time:

- Alignment 1 (options A to C) show the largest increase in average speed on the network with options C showing the highest;
- The largest journey time savings are found predominantly for journeys crossing Lincoln in an east west or north east/south west direction for alignment 1 (options A to C); and
- When the A46 between Fog Lane and Whisby Road is closed demand increases on the NHRR/LEB. However, journeys which originate in the east of Lincoln and travel north south continue to take A46 as travelling across Lincoln (NHRR/LEB) takes longer.

4 IMPACT OF SWQ

In order to assess the impact of the SWQ this section compares a scenario with the SWQ against one without. It also highlights if the network has enough capacity to accommodate the additional demand generated by the SWQ. This comparison is limited to the south of Lincoln as the largest impact on demand on the highway network will be in the vicinity of the SWQ. It is anticipated this impact will dissipate with distance from the development. This section looks at AADF at the following locations:

- The local road network to the south of Lincoln;
- Orbital route to the south of Lincoln (A46 between Newark Road and Whisby Road; and NHRR).

The local road network

Table 13 shows the difference in AADF between a scenario with the SWQ and one without on the local road network to the south of Lincoln.

Table 13 – SWQ vs no SWQ, 2-way AADF change (2026)

Section		Alignment 1			Alignment 2		Alignment 3	
	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46 Ring Road / Hykeham roundabout	-32 (-0.1%)	431 (1.1%)	435 (1.1%)	419 (1.1%)	522 (1.3%)	522 (1.3%)	469 (1.1%)	457 (1.1%)
A46 South / Hykeham roundabout	1,544 (3.2%)	29 (0.1%)	30 (0.1%)	40 (0.1%)	1,263 (2.7%)	1,255 (2.6%)	-30 (-0.1%)	-48 (-0.1%)
A1434 Newark Road	-2,577 (-12.6%)	-482 (-2.8%)	-463 (-2.7%)	-559 (-3.3%)	-999 (-5.3%)	-980 (-5.2%)	-513 (-3.0%)	-519 (-3.0%)
Boundary Lane	4,966 (183%)	701 (447%)	708 (451%)	726 (1,118%)	1,216 (2,482%)	1,213 (2,528%)	718 (1,177%)	716 (1,193%)
Moor Lane	-570 (-5%)	-339 (-3.6%)	-340 (-3.6%)	-367 (-3.9%)	-579 (-5.3%)	-569 (-5.3%)	-275 (-2.9%)	-292 (-3.1%)
Mill Lane	-1,611 (-20.3%)	-538 (-8.7%)	-538 (-8.7%)	-505 (-8.4%)	-2,807 (-30.4%)	-2,803 (-30.4%)	-599 (-8.9%)	-603 (-9.1%)
Meadow Lane	2,152 (20.9%)	51 (0.6%)	46 (0.5%)	-9 (-0.1%)	1,764 (16.3%)	1,766 (16.3%)	67 (0.9%)	-43 (-0.6%)
Brant Road north	119 (1%)	97 (0.9%)	93 (0.8%)	91 (0.8%)	120 (1%)	121 (1%)	32 (0.2%)	120 (0.9%)
Brant Road south	39 (0.5%)	-254 (-2.6%)	-251 (-2.6%)	-242 (-2.3%)	-217 (-3.0%)	-212 (-2.9%)	-216 (-2.6%)	-30 (-0.3%)
Station Road	1,043 (8.5%)	-52 (-0.5%)	-53 (-0.5%)	-54 (-0.6%)	883 (7%)	876 (6.9%)	-52 (-0.4%)	-83 (-0.7%)
Blackmoor Road / Harmston Road	-1,731 (-23.6%)	-43 (-2.1%)	-41 (-2.0%)	-22 (-1.3%)	-1,340 (-19.7%)	-1,335 (-19.6%)	-32 (-1.5%)	-16 (-1.1%)

In terms of north south movement Table 13 shows that the radial routes of A46 south of Hykeham roundabout / A1343 Newark Road and Brant Road south / Brant Road North which provide access on to the NHRR have only a small impact on demand for alignments 1 and 3 when compared to the no SWQ scenario.

In terms of east west movement there is a large increase in demand on Boundary Lane for all options varying from a 451% increase for option B to a 2,528% increase for option E. Both roads are classed as single carriageway and in accordance with the Design Manual for Road & Bridges (DMRB) guidance note TA 46/97 they fall within the maximum AADF range. The maximum range for a single carriageway (S2) is up to 13,000 and Table 14 highlights that only Station Road for the DM and alignment 2 exceeds this range.

Table 14 – AADF with the inclusion of SWQ 2026

Section		Alignment 1			Alignment 2		Alignment 3	
	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Boundary Lane	7,685	858	865	791	1,265	1,261	779	776
Moor Lane	10,764	9,186	9,184	9,024	10,244	10,225	9,219	9,069
Mill Lane	6,339	5,650	5,640	5,530	6,432	6,428	6,102	6,046
Meadow Lane	12,441	8,373	8,368	8,179	12,616	12,624	7,288	7,045
Brant Road north	11,922	11,395	11,383	11,475	11,857	11,858	13,422	13,787
Brant Road south	7,586	9,559	9,556	10,259	7,092	7,100	8,116	8,554
Station Road	***13,378***	10,083	10,082	9,503	***13,576***	***13,567***	12,507	12,482
Blackmoor Road / Harmston Road	5,602	2,017	2,019	1,641	5,476	5,478	2,092	1,482

Table15 shows the difference in AADF between a scenario with the SWQ and one without on the orbital route to the south of Lincoln. It highlights that there is a slight increase in demand on all routes for options A, B, C, F and G. For option D and E there is a substantial increase on the small section of the NHRR provided as a part of the proposal.

Table 15 - SWQ vs no SWQ, 2-way AADF change (2026)

Section		Alignment 1			Alignment 2		Alignment 3	
	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46 Moor Lane to Whisby Road	-24 (-0.1%)	424 (1%)	412 (1%)	427 (1.1%)	523 (1.2%)	523 (1.2%)	457 (1.1%)	447 (1%)
NHRR Hykeham roundabout to South Hykeham Road	_	917 (3.9%)	904 (3.8%)	864 (3.3%)	2,676 (34.6%)	2,630 (33.4%)	895 (5.3%)	983 (5.5%)
NNRR South Hykeham Road to Brant Road	_	295 (1.4%)	284 (1.4%)	428 (1.8%)	_	_	-15 (-0.1%)	163 (-0.1%)
NHRR Brant Road to A607 Grantham Road	_	196 (0.9%)	194 (0.9%)	285 (1.1%)	_	_	_	_
NHRR A607 Grantham Road to A15/LEB	_	98 (0.4%)	96 (0.4%)	227 (0.9%)	_	_	_	_

The SWQ has the largest impact on Boundary Lane with a significant increase in demand regardless of which option is chosen. This increase in demand varies from 451% for option B to an increase of 2,528% for option E. In accordance to DMRB guidance the outputs show that only Station Road exceeds recommended AADF in the DM scenario and is exacerbated with alignment 2. A notable increase in demand is also found on the NHRR between Hykeham rounadabout and South Hykeham Road with this increase being substantial for options D and E.

5 VDM ANALYSIS

The following sections follow on from the fixed model assessment to present the traffic impact using the VDM outputs for the single carriageway, single carriageway with future proofing and dual carriageway options for the full length between the A46 and A15. The options assessed include:

- Do something option A – a single carriageway link between the A46 and the LEB creating a continuous orbital route around the city;
- Do something option B – single carriageway with junction capacity upgrades between the A46 and the LEB creating a continuous orbital route around the city; and
- Do something option C – dual carriageway link between the A46 and the LEB creating a continuous orbital route around the city.

5.1 SCHEME FLOWS

The NHRR AADF flows are summarised in the table below. They show that:

- Traffic flows for the single carriageway option are forecast to range from approximately 22,000 to 25,000 in the opening year (2026) and 24,500 to 27,000 in 2036;
- Traffic flows along the Future Proofed option are similar to the standard single carriageway in both the opening and future years; and
- Traffic flows on the dual carriageway option are forecast to range from 27,000 to 29,000 in the opening year and 30,000 to 32,000 in 2036.

Table 16 – Opening and 2036 traffic flow ranges

Section	Direction	Actual Flows					
		2026 AADF			2036 AADF		
		Single	Single + FP	Dual	Single	Single + FP	Dual
Section 1 - Pennell's Roundabout to South Hykeham Road	2-Way	25,000	25,000	29,000	27,000	27,000	31,000
Section 2 - South Hykeham Road to Brant Road	2-Way	23,000	23,000	27,000	26,000	26,000	31,000
Section 3 - Brant Road to A607 Grantham Road	2-Way	23,000	23,000	28,000	25,000	25,000	32,000
Section 4 A607 Grantham Road to A15 / LEB	2-Way	22,000	23,000	27,000	24,000	25,000	30,000

5.2 DESIGN STANDARDS

Opening year traffic flows have been compared to the appropriate recommended standards for highway links set out in Design Manual for Roads & Bridges (DMRB) guidance note TA 46/97 - Assessment of Road Schemes Traffic Flow Ranges.

The guidance identifies the carriageway standard options relating to opening year flow ranges for use as starting points in the design and economic assessment of new rural trunk road links. They provide an indication of the carriageway standards that are most likely to the economically and operationally acceptable.

The table below shows that the forecast opening year traffic flows for the NHRR (presented in the table above) are consistent with those acceptable for a dual 2 lane all-purpose carriageway.

Table 17 – Opening years traffic flows

Carriageway Standard*	Opening Year AADF	
	Minimum	Maximum
Single 7.3m (S2)	13,000	
Wide Single 10m (WS2)	6,000	21,000
Dual 2 Lane All Purpose (D2AP)	11,000	39,000
Dual 3 Lane All Purpose (D3AP)	23,000	54,000
Dual 2 Lane Motorway (D2M)	Up to 41,000	
Dual 3 Lane Motorway (D3M)	25,000	67,000
Dual 4 Lane Motorway (D4M)	52,000	90,000

**DMRB Volume 5 Section 1 TA 46/97 Assessment of Road Schemes Traffic Flow Ranges for Use in the Assessment of New Rural Roads*

5.3 NHRR OPTION PERFORMANCE

The tables below set out the journey times and average speeds of each option during the modelled AM and PM peak periods in both 2026 and 2036. These show that:

- The journey times along the dual carriageway option are over a minute quicker than the single carriageway and future proofed options in the peak periods both in 2026 and 2036; and
- The average speeds are also forecast to be significantly quicker (approximately 10mph) in the dual carriageway option.

Table 18 - AM Peak Period Transit Times and Average Speed

AM	Route Transit Times (mm:ss)						Average Speed (mph)					
	2026			2036			2026			2036		
	Single	FP	Dual	Single	FP	Dual	Single	FP	Dual	Single	FP	Dual
EB	06:33	06:29	05:28	06:47	06:40	05:32	45.5	45.9	54.5	43.9	44.7	53.8
WB	06:38	06:36	05:27	06:44	06:40	05:28	44.9	45.2	54.7	44.2	44.7	54.5

Table 19 - PM Peak Period Transit Times and Average Speed

PM	Route Transit Times (mm:ss)						Average Speed (mph)					
	2026			2036			2026			2036		
	Single	FP	Dual	Single	FP	Dual	Single	FP	Dual	Single	FP	Dual
EB	06:31	06:29	05:26	06:47	06:43	05:29	45.7	45.9	54.9	43.9	44.4	54.3
WB	06:35	06:29	05:28	06:40	06:34	05:29	45.3	46.0	54.5	44.7	45.3	54.4

The following table presents a Congestion Reference Flow (CRF) analysis for the links on the NHRR for both the single carriageway options[1] and the dual carriageway option, for both 2026 and 2036. The table shows that for both carriageway standards, in both modelled years, the links of the NHRR will be operating below the level (the CRF) at which congestion will start to occur.

Table 20 - Congestion Reference Flow Analysis

Carriageway Standard	Year	Section 1	Section 2	Section 3	Section 4
		A46 to South Hykeham Road	South Hykeham Road to Brant Road	Brant Road to Grantham Road	Grantham Road to A15
Single	2026	73%	64%	64%	62%
	2036	79%	71%	67%	66%
Dual	2026	28%	25%	28%	25%
	2036	31%	28%	30%	25%

However, there are some significant caveats to this analysis:

- Junctions usually start to become congested before the highway links, therefore, if built to single carriageway standard, the junctions may start to operate close to capacity in 2036.
- The design year for the scheme will be 2041 and with further development and background growth the AADF will be closer to the CRF than in 2036.
- The South West Quadrant development has not been included in the modelling as it is to be part of the wider economic 'dependent development' test. This development is likely to increase AADF by up to 7% by 2036 on Section 1 with smaller increases in the other sections. This will increase overall AADF closer to the capacity of Section 1 by 2036.
- Whilst the modelling has taken account of the allocations up to the end of the plan period in 2036, not all currently planned development will be delivered by that year. For example, the South-East Quadrant is programmed to deliver 3,500 new homes by the end of the plan period with a further 2,500 homes to be delivered in later years. It is therefore foreseeable that the NHRR will need to

[1] The link capacities of the single carriageway and future proofed single carriageway options will be the same

cater for higher levels of development than currently modelled and the road will be getting closer to capacity with these further developments included.

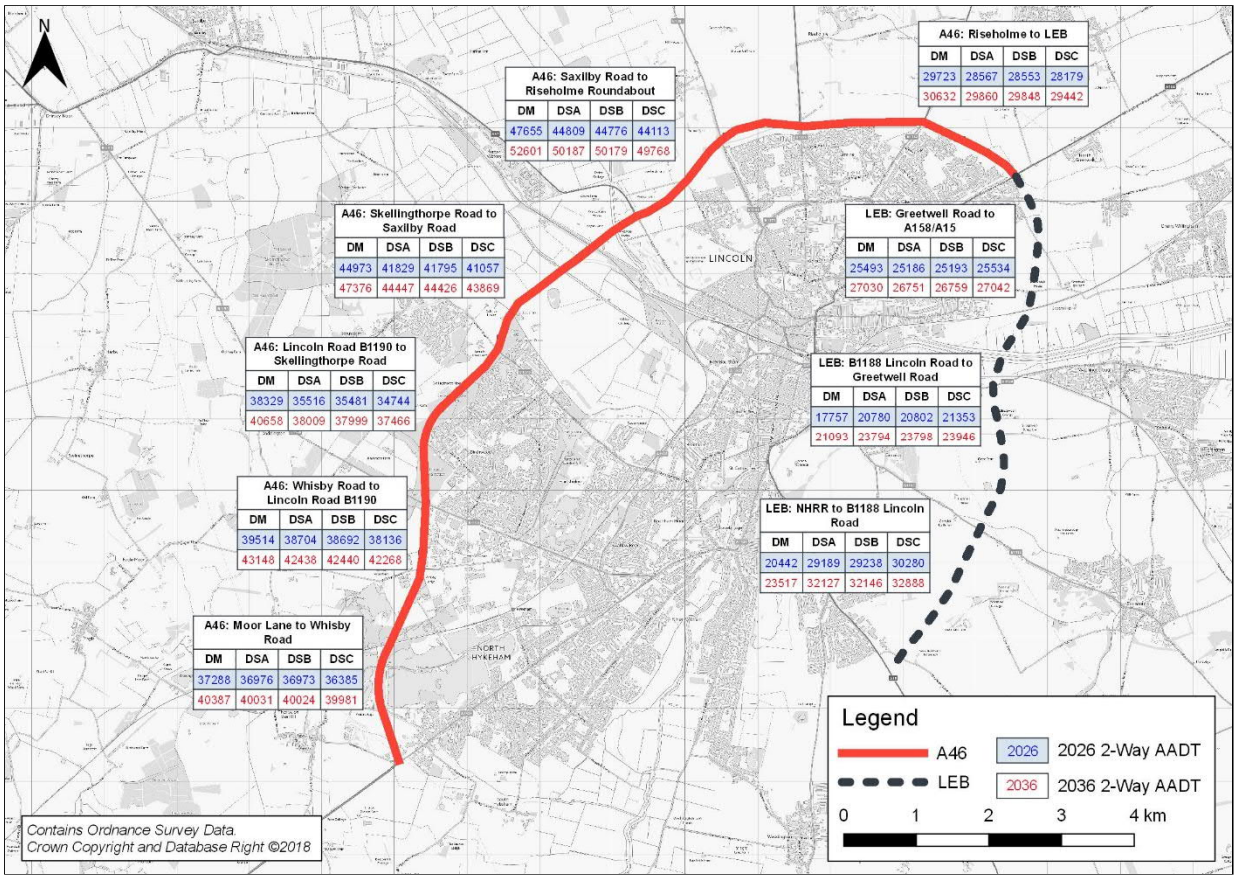
All of the above caveats indicate that the single carriageway links, particularly at the western end of the NHRR, may operate close to capacity by the end of the plan period or at the design year whilst the dual carriageway option should remain well within capacity.

5.4 STRATEGIC ROAD NETWORK

The impact of each of the NHRR options on the strategic and major road network has been assessed and show:

- The dual carriageway option is forecast to provide the greatest level of traffic relief on the A46 when compared to the Do-Minimum situation in both 2026 and 2036. This is more pronounced on the northern sections of the existing relief road on the sections between Skellingthorpe Road and Riseholme Road.
- The dual carriageway option is also forecast to result in more traffic reassigning to use the eastern bypass with the southern section to the B1188 Lincoln Road expected to see the most significant increases.

Figure 16 - Forecast AADF on A46 & LEB in 2026 & 2036*



**DSA – Single Carriageway, DSB – Single Carriageway + Future Proofing, DSC – Dual Carriageway*

The following table presents the relative change in traffic flows on key strategic links across the three modelled time periods in 2036. The table again shows that the dual carriageway provides the greatest traffic relief to the A46 but diverts more traffic onto the eastern bypass. However, overall, the impact of NHRR is significantly higher in the inter-peak period, which covers the hours between 10am to 4pm.

Table 21 - Percentage Difference in Two-way Peak Hour Flow 2036

	AM Peak			Inter-Peak			PM Peak		
	DSA	DSB	DSC	DSA	DSB	DSC	DSA	DSB	DSC
A46: Moor Lane to Whisby Road	1.6%	1.6%	2.1%	-2.5%	-2.5%	-2.2%	-0.3%	-0.4%	-1.9%
A46: Whisby Road to Lincoln Road B1190	0.2%	0.2%	-0.3%	-4.1%	-4.1%	-4.0%	1.1%	1.0%	-0.2%
A46: Lincoln B1190 to Skellingthorpe Road	-3.5%	-3.6%	-4.9%	-9.8%	-9.9%	-11.3%	-3.2%	-3.2%	-4.3%
A46: Skellingthorpe Road to Saxilby Road	-3.8%	-3.9%	-5.0%	-9.0%	-9.0%	-10.2%	-3.3%	-3.4%	-4.6%
A46: Saxilby Road to Riseholme	-2.3%	-2.3%	-3.0%	-7.2%	-7.2%	-8.2%	-2.0%	-2.0%	-2.6%
A46: Riseholme to LEB	-2.7%	-2.7%	-3.6%	-3.6%	-3.6%	-5.1%	-0.4%	-0.4%	-2.0%
LEB: Greetwell Road to A158/A15	0.0%	0.0%	1.0%	-1.4%	-1.4%	-0.6%	-1.5%	-1.3%	0.3%
LEB: B1188 Lincoln Road to Greetwell Road	13.2%	13.2%	14.6%	15.9%	15.9%	17.7%	7.1%	7.1%	5.2%
LEB: NHRR to B1188 Lincoln Road	35.5%	35.7%	37.7%	37.7%	37.8%	41.7%	35.7%	35.6%	38.5%

**DSA – Single Carriageway, DSB – Single Carriageway + Future Proofing, DSC – Dual Carriageway*

5.5 LOCAL ROAD NETWORK

In addition to the impact on the strategic road network the impact on the local road network has also been assessed. The tables below show the impact across an east west screen line (Table 26) which captures the impact through the centre of Lincoln and a southwest screenline (Table 27) which captures the changes across routes in the south west of the city.

- All three options will provide significant traffic relief across a number of routes both within central Lincoln and in the south of the city;
- It demonstrates that the NHRR scheme is expected to result in an improvement in conditions across a wide area and along several routes. It shows that, unlike the eastern bypass which is primarily expected to lead to an improvement conditions in central Lincoln, the NHRR is not limited to resolving a single issue. Instead the benefits can be seen across a wider area and it helps to deal with a number of challenges – including east west connectivity, increasing network capacity to support growth, improving network resilience as well as dealing with localised congestion and rat running;

- The greatest level of relief is seen in the south of the city through the Hykeham area and along the rural routes to the south of Lincoln;
- The dual carriageway option provides the greatest level of relief although for many routes this is a marginal difference.

Table 22 - Traffic flow changes East West Screen Line 2026 Opening Year & 2036

Location	Direction	2026				2036			
		DM AADF	Traffic Flow Change			DM AADF	Traffic Flow Change		
			Single	Single + FP	Dual		Single	Single + FP	Dual
A46	2-Way	42,159	-2,207	-2,230	-2,669	45,673	-1,894	-1,885	-2,278
			(-5.2%)	(-5.3)	(-6.3)		(-4.1%)	(-4.1%)	(-5.0%)
Longdales Road	2-Way	20,795	-619	-615	-771	21,327	-521	-523	-656
			(-3.0)	(-3.0)	(-6.3%)		(-2.4%)	(-2.4%)	(-3.0%)
B1308 West Parade	One-Way	5,923	-188	-184	-222	6,117	-129	-123	-171
			(-3.2%)	(-3.1%)	(-3.8%)		(-2.1%)	(-2.0%)	(-2.8%)
Mint Street	One-way	5,732	-103	-106	-155	6,023	-65	-67	-144
			(-1.8%)	(-1.8%)	(-2.7%)		(-1.1%)	(-1.1%)	(-2.4%)
St.Marks Street	2-Way	13,181	-874	-883	-1,013	15,227	-674	-720	-899
			(-6.6%)	(-6.7%)	(-7.7%)		(-4.4%)	(-4.7%)	(-5.9%)
Boultham Avenue	2-Way	2,321	-707	-726	-792	3,050	-810	-981	-1,259
			(-30.5%)	(-31.3%)	(-34.1%)		(-26.6%)	(-32.2%)	(-41.3%)
Dixon Street	2-Way	13,545	-80	-48	-150	13,569	-112	113	301
			(-0.6%)	(-0.4%)	(-1.1%)		(-0.8)	(0.8)	(2.2%)
Newark Road	2-Way	31,244	-3,530	-3,560	-4,102	32,489	-3,408	-3,466	-4,026
			(-11.3%)	(-11.4%)	(-13.1%)		(-10.5%)	(-10.7%)	(-12.4%)
Meadow Lane	2-Way	9,940	-1,638	-1,635	-1,755	11,761	-1,997	-1,986	-2,185
			(-16.5%)	(-16.5%)	(-17.7%)		(-17.0%)	(-16.9%)	(-18.6%)
NHRR	2-Way		22,864	22,981	27,187	-	25,936	26,084	31,125
Blackmoor Road	2-Way	7,257	-5,130	-5,130	-5,575	8,50	-6,409	-6,405	-6,903
			(-70.7%)	(-70.7%)	(-76.8%)		(-75.4%)	(-75.3%)	(-81.2%)
Navenby Lane	2-Way	1,528	-309	-312	-413	1,178	-228	-227	-260
			(-20.2)	(-20.4)	(-27.0)		(-19.3)	(-19.2)	(-22.1)
Broughton Lane	2-Way	1,338	-274	-273	-399	2,310	-520	-521	-947
			(-20.5)	(-20.4)	(-29.8)		(-22.5)	(-22.6)	(-41.0)

Table 23 - Traffic flow changes Southwest Screen Line 2026 Opening Year & 2036

Location	Direction	2026				2036			
		DM (AADF)	Traffic Flow Change			DM (AADF)	Traffic Flow Change		
			Single	Single + FP	Dual		Single	Single + FP	Dual
Thorpe Road	2-Way	1,123	-409	-418	-211	1,364	-188	-191	-176
			(-36.4%)	(-37.3%)	(-18.7%)		(-13.7%)	(-14.0%)	(-12.9%)
A46 (between Pennell's Rdbt and Whisby Road)	2-Way	37,288	-312	-315	-903	40,386	-355	-362	-405
			(-0.8%)	(-0.8%)	(-2.4%)		(-0.9%)	(-0.9%)	(-1.0%)
Station Road, North Hykeham	2-Way	14,898	-1,318	-1,322	-1,412	15,857	-1,425	-1,415	-1,518
			(-8.8%)	(-8.9%)	(-9.5%)		(-9.0%)	(-8.9%)	(-9.6%)
A1434 Newark Road	2-Way	17,007	-1,892	-1,901	-2,150	17,291	-1,812	-1,869	-2,170
			(-11.1%)	(-11.2%)	(-12.6%)		(-10.5%)	(-10.8%)	(-12.6%)
Lincoln Road	2-Way	10,446	-1,128	-1,131	-1,264	10,770	-1,149	-1,164	-1,262
			(-10.8%)	(-10.8%)	(-12.1%)		(-10.7%)	(-10.8%)	(-11.7%)
Meadow Lane	2-Way	9,940	-1,638	-1,635	-1,755	11,761	-1,997	-1,986	-2,185
			(-16.5%)	(-16.5%)	(-17.7%)		(-17.0%)	(-16.9%)	(-18.6%)
Brant Road (approach to NHRR)	2-Way	7,469	2,822	2,831	3,305	8,669	2,856	2,902	3,386
			37.8%	37.9%	44.3%		32.9%	33.5%	39.1%
Station Road, Waddington	2-Way	11,014	-1,948	-1,955	-2,419	11,889	-1,848	-1,884	-2,132
			(-17.7%)	(-17.8%)	(-22.0%)		(-15.5%)	(-15.8%)	(-17.9%)
A607 Grantham Road	2-Way	16,082	-3,546	-3,510	-2,794	17,468	-4,096	-4,035	-3,557
			(-22.0)	(-21.8)	(-17.4)		(-23.4)	(-23.1)	(-20.4)
Sleaford Road (formerly A15)	2-Way	12,398	-2,195	-2,204	-2,468	15,006	-2,913	-2,930	-4,279
			(-17.7)	(-17.8)	(-19.9)		(-19.4)	(-19.5)	(-28.5)
A15 LEB	2-Way	20,442	8,747	8,795	9,838	23,517	8,610	8,629	9,371
			42.8	43.0	48.1		36.6	36.7	39.8

5.6 VDM ASSESSMENT SUMMARY

The VDM assessment confirms that the dual carriageway (option C) is the best performing option. Key points include:

- Traffic flows are higher for the dual carriageway option;
- Traffic flows on the NHRR are consistent with those acceptable to a dual 2 lane all-purpose carriageway;
- Average speed and journey times along the NHRR are quicker for the dual carriageway option;
- Dual carriageway provides the greatest level of traffic relief on the A46;
- Dual carriageway is forecast to reassign more traffic on to the LEB compared to the single carriageway options; and
- The dual carriageway provides the greatest level of relief on the local road network within central Lincoln; east west movement across the city; and local roads to the south of Lincoln where rat running occurs – although on some routes this improvement can be considered marginal.

6 CONCLUSION

This assessment has used the 2018 GLTM to assess the traffic impacts of NHRR. Seven different highway interventions were considered in addition to a reference 'Do Minimum' case, which only includes the existing highway network and any committed infrastructure schemes. An opening year of 2026 and a design year of 2036 was modelled. The options modelled include:

- Alignment 1: these options include a full NHRR link between the A46 and the LEB, creating a contiguous orbital route around the city. The 3 infrastructure options are:
    - **Do Something Option A (DSA):** *Single carriageway*
    - **Do Something Option B (DSB):** *Single carriageway + junction capacity upgrades*;
    - **Do Something Option C (DSC):** *Dual carriageway*;
- Alignment 2: link between the A46 and South Hykeham Road. While this link would support the development of the South West Quadrant SUE, the route would not connect to the LEB, and therefore leave a gap in a potential orbital route. The two infrastructure options are:
    - **Do Something Option D (DSD):** *Single carriageway (A46 to South Hykeham Road)*;
    - **Do Something Option E (DSE***): Dual carriageway (A46 to South Hykeham Road)*;
- Alignment 3: links the A46 with Brant Road; this option would enable the development of the South West Quadrant SUE, and should create highway capacity in South Hykeham. The two infrastructure options are:
    - **Do Something Option F (DSF):** *Single carriageway (A46 to Brant Road;)*
    - **Do Something Option G (DSG):** *Dual carriageway (A46 to Brant Road)*.

A fixed matrix was initially utilised to assess all seven options, this helped to identify that the shorter options would have a limited traffic impact across the wider network and would not achieve the key objectives. The VDM was also used to assess the three options that would link the A46 to the A15. The key points from the traffic impact assessment are as follows:

Single Carriageway

- The single carriageway option will deliver the scheme objectives. It will improve the east west connectivity in the south of Lincoln, help to reduce traffic levels on local urban and rural roads, support the delivery of the Sustainable Urban Extensions and help improve the resilience of the orbital and key route network through and around Lincoln;
- It will provide significant traffic relief across a number of local routes both within central Lincoln and in the south of the city;
- However, the forecast flows on the single carriageway exceed the opening year flow range for a single carriageway as defined by DMRB; and
- This identifies that a dual carriageway standard is likely to be more economically and operationally acceptable. Congestion Reference Flow analysis also indicates that some sections of a single carriageway scheme may be operating close to capacity at the end of the plan period in 2036 or at the design year in 2041.

Single Carriageway + Future Proofing

- The single carriageway with future proofing option is expected to have a similar level of performance to the standard single carriageway and it will deliver the scheme objectives;

- It will provide similar level of traffic relief to the standard single carriageway across a number of local routes both within central Lincoln and in the south of the city; and
- The forecast flows on the scheme are again similar to single carriageway and exceed the opening year flow range for a single carriageway as defined by DMRB.

Dual Carriageway

- All three carriageway standard options of the full route deliver the scheme objectives, however, due the greater capacity of the dual carriageway option, it is likely to do so more robustly;
- An analysis of opening year daily traffic flows compared to DMRB guidance for carriageway standards indicates that a dual carriageway standard is most likely to be economically and operationally acceptable;
- The dual carriageway option is forecast to provide the highest level of traffic relief on the A46 when compared to the Do-Minimum situation in both 2026 and 2036. This is more pronounced on the northern sections of the existing relief road; and
- The dual carriageway option is also forecast to result in more traffic reassigning to use the eastern bypass with the southern section to the B1188 Lincoln Road expected to see the most significant increases

.

APPENDIX A

NHRR AADF 2026

Location	Direction	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Hykeham roundabout to South Hykeham Road	EB	11,285	11,341	12,657	3,701	3,750	8,146	8,549
	WB	12,390	12,427	13,872	4,043	4,114	8,889	9,461
	2-Way	23,675	23,768	26,529	7,744	7,864	17,035	18,010
South Hykeham Road to Brant Road	EB	10,322	10,367	11,742	_	_	6,579	7,225
	WB	10,554	10,591	12,233	_	_	6,612	7,450
	2-Way	20,876	20,958	23,975	_	_	13,191	14,675
Brant Road to A607 Grantham Road exit	EB	9,981	10,037	12,194	_	_	_	_
	WB	11,058	11,152	13,401	_	_	_	_
	2-Way	21,039	21,189	25,595	_	_	_	_
A607 Grantham Road to A15/LEB	EB	10,166	10,210	12,193	_	_	_	_
	WB	11,695	11,792	13,807	_	_	_	_
	2-Way	21,861	22,002	26,000	_	_	_	_

NHRR AADF 2036

Location	Direction	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Hykeham roundabout to South Hykeham Road	EB	12,838	12,930	14,562	4,044	4,214	8,952	9,561
	WB	13,764	13,815	15,024	4,293	4,384	10,082	10,806
	2-Way	**26,602**	**26,745**	**29,586**	**8,337**	**8,598**	**19,034**	**20,367**
South Hykeham Road to Brant Road	EB	12,033	12,091	13,810	_	_	7,647	8,378
	WB	12,096	12,149	13,728	_	_	7,853	8,767
	2-Way	**24,129**	**24,240**	**27,535**	_	_	**15,500**	**17,145**
Brant Road to A607 Grantham Road exit	EB	11,504	11,608	14,202	_	_	_	_
	WB	12,224	12,339	14,612	_	_	_	_
	2-Way	**23,728**	**23,947**	**28,814**	_	_	_	_
A607 Grantham Road to A15/LEB	EB	11,394	11,491	14,116	_	_	_	_
	WB	12,826	12,976	14,797	_	_	_	_
	2-Way	**24,220**	**24,467**	**28,913**	_	_	_	_

APPENDIX B

North south Screenline, AADF Core Scenario (2026)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46	SB	22,939	21,439	21,435	21,193	22,911	22,897	22,791	22,781
	NB	24,287	22,214	22,202	21,775	24,261	24,261	23,971	23,950
	2-Way	**47,226**	**43,653**	**43,637**	**42,967**	**47,173**	**47,158**	**46,762**	**46,731**
Brayford Way	SB	14,229	13,911	13,912	13,886	14,211	14,209	14,165	14,166
	NB	15,786	15,252	15,249	15,190	15,770	15,769	15,600	15,592
	2-Way	**30,015**	**29,163**	**29,161**	**29,076**	**29,982**	**29,978**	**29,765**	**29,758**
Wigford Way	SB	2,641	2,524	2,529	2,493	2,636	2,642	2,601	2,595
	NB	4,905	4,801	4,806	4,768	4,896	4,898	4,834	4,826
	2-Way	**7,545**	**7,326**	**7,335**	**7,261**	**7,533**	**7,541**	**7,435**	**7,421**
A15 Broadgate	SB	21,594	21,464	21,454	21,512	21,582	21,581	21,591	21,602
	NB	17,887	17,505	17,507	17,523	17,851	17,854	17,824	17,830
	2-Way	**39,480**	**38,970**	**38,961**	**39,036**	**39,433**	**39,434**	**39,415**	**39,432**
LEB	SB	11,438	12,820	12,831	12,958	11,399	11,396	11,211	11,206

	NB	11,952	13,270	13,277	13,607	11,890	11,883	11,679	11,635
	2-Way	**23,390**	**26,091**	**26,109**	**26,565**	**23,289**	**23,279**	**22,890**	**22,842**

North south Screenline, AADF Core Scenario (2036)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46	SB	24,749	23,469	23,465	23,310	24,795	24,791	24,655	24,628
	NB	26,559	24,657	24,640	24,187	26,594	26,585	26,362	26,328
	2-Way	51,308	48,126	48,105	47,497	51,390	51,376	51,017	50,955
Brayford Way	SB	15,146	14,904	14,900	14,870	15,121	15,118	15,068	15,052
	NB	17,054	16,503	16,502	16,454	17,031	17,037	16,872	16,879
	2-Way	32,200	31,407	31,402	31,324	32,152	32,155	31,940	31,931
Wigford Way	SB	2,526	2,375	2,375	2,374	2,506	2,501	2,432	2,426
	NB	5,471	5,295	5,295	5,288	5,427	5,422	5,353	5,342
	2-Way	7,996	7,670	7,670	7,662	7,933	7,923	7,786	7,768
A15 Broadgate	SB	23,540	23,345	23,341	23,377	23,522	23,523	23,543	23,538
	NB	19,762	19,523	19,527	19,579	19,718	19,719	19,683	19,676

	2-Way	43,302	42,868	42,869	42,956	43,240	43,242	43,226	43,215
LEB	SB	13,714	15,141	15,150	15,293	13,678	13,674	13,541	13,517
	NB	14,004	15,350	15,349	15,720	13,963	13,961	13,842	13,854
	2-Way	27,718	30,490	30,499	31,012	27,641	27,635	27,383	27,371

East west Screenline, AADF Core Scenario (2026)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Blackmoor Road	EB	3,930	1,047	1,048	934	3,662	3,661	1,106	807
	WB	3,403	1,013	1,013	728	3,155	3,152	1,018	691
	2-Way	7,333	2,060	2,060	1,663	6,816	6,813	2,124	1,498
LEB	EB	0	10,322	10,367	11,742	0	0	6,579	7,225
	WB	0	10,554	10,591	12,233	0	0	6,612	7,450
	2-Way	0	20,876	20,957	23,975	0	0	13,191	14,675
Meadow Lane	EB	4,985	3,864	3,862	3,801	5,308	5,310	3,356	3,293
	WB	5,304	4,459	4,459	4,387	5,544	5,548	3,865	3,795
	2-Way	10,289	8,322	8,322	8,188	10,852	10,858	7,221	7,088

Newark Road	EB	14,586	12,806	12,789	12,505	14,533	14,518	13,557	13,404
	WB	18,443	16,134	16,120	15,735	18,460	18,460	16,938	16,798
	2-Way	33,029	28,940	28,909	28,240	32,993	32,978	30,496	30,201
B1360A Dixon Street	EB	6,209	6,269	6,278	6,368	6,156	6,206	6,221	6,288
	WB	7,989	7,593	7,586	7,522	7,979	7,982	7,855	7,852
	2-Way	14,198	13,862	13,864	13,890	14,135	14,188	14,076	14,139
Boultham Avenue	EB	1,726	1,361	1,352	1,230	1,740	1,719	1,572	1,520
	WB	887	789	789	769	889	889	852	855
	2-Way	2,613	2,150	2,141	1,999	2,629	2,608	2,424	2,375
St Marks Street	EB	8,440	7,890	7,891	7,801	8,428	8,414	8,242	8,212
	WB	6,020	5,562	5,562	5,491	6,018	6,016	5,865	5,854
	2-Way	14,461	13,451	13,452	13,292	14,446	14,430	14,108	14,066
Mint street	NEB	5,984	5,834	5,832	5,769	5,986	5,989	5,952	5,944
	1-Way	5,984	5,834	5,832	5,769	5,986	5,989	5,952	5,944
B1308 West Parade	NWB	6,144	5,915	5,909	5,888	6,142	6,145	6,046	6,034
	1-Way	6,144	5,915	5,909	5,888	6,142	6,145	6,046	6,034

Longdales Road	EB	11,022	10,856	10,852	10,767	11,023	11,024	10,990	10,981
	WB	10,244	9,630	9,625	9,544	10,257	10,255	10,174	10,090
	2-Way	21,266	20,485	20,478	20,311	21,280	21,279	21,164	21,071
A46	EB	24,287	22,214	22,202	21,775	24,261	24,261	23,971	23,950
	WB	22,939	21,439	21,435	21,193	22,911	22,897	22,791	22,781
	2-Way	47,226	43,653	43,637	42,967	47,173	47,158	46,762	46,731

East west Screenline, AADF Core Scenario (2036)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Blackmoor Road	EB	4,400	1,011	1,009	899	4,157	4,155	1,075	775
	WB	4,011	968	969	665	3,750	3,750	1,018	667
	2-Way	8,411	1,979	1,978	1,564	7,906	7,905	2,093	1,442
LEB	EB	0	12,033	12,091	13,810	0	0	7,647	8,378
	WB	0	12,096	12,149	13,728	0	0	7,853	8,767
	2-Way	0	24,129	24,241	27,538	0	0	15,500	17,146
Meadow Lane	EB	6,026	4,588	4,580	4,468	6,304	6,319	4,020	3,946
	WB	6,082	5,109	5,107	5,035	6,310	6,319	4,461	4,381
	2-Way	12,107	9,697	9,687	9,503	12,614	12,638	8,481	8,326
Newark Road	EB	15,263	13,394	13,376	13,073	15,241	15,235	14,282	14,122
	WB	19,176	16,898	16,887	16,590	19,233	19,236	17,574	17,457
	2-Way	34,439	30,292	30,263	29,663	34,474	34,471	31,856	31,580
B1360A Dixon Street	EB	5,789	6,189	6,129	6,079	5,671	5,729	5,869	5,889
	WB	8,605	8,016	8,010	7,944	8,616	8,620	8,431	8,414

	2-Way	14,394	14,205	14,139	14,023	14,287	14,348	14,300	14,303
Boultham Avenue	EB	2,472	1,647	1,691	1,663	2,519	2,468	2,194	2,149
	WB	1,116	1,010	1,010	994	1,121	1,115	1,076	1,072
	2-Way	3,588	2,658	2,701	2,657	3,640	3,583	3,271	3,221
St Marks Street	EB	9,959	9,486	9,491	9,397	9,952	9,948	9,761	9,749
	WB	6,981	6,449	6,445	6,381	6,973	6,968	6,808	6,793
	2-Way	16,941	15,935	15,935	15,778	16,924	16,916	16,568	16,542
Mint street	NEB	6,353	6,222	6,224	6,156	6,358	6,362	6,338	6,338
	1-Way	6,353	6,222	6,224	6,156	6,358	6,362	6,338	6,338
B1308 West Parade	NWB	6,465	6,295	6,296	6,252	6,459	6,455	6,405	6,397
	1-Way	6,465	6,295	6,296	6,252	6,459	6,455	6,405	6,397
Longdales Road	EB	11,532	11,281	11,281	11,179	11,542	11,541	11,486	11,475
	WB	11,012	10,322	10,318	10,233	11,027	11,032	10,901	10,875
	2-Way	22,544	21,603	21,599	21,412	22,569	22,573	22,387	22,351
A46	EB	26,559	24,657	24,640	24,187	26,594	26,585	26,362	26,328
	WB	24,749	23,469	23,465	23,310	24,795	24,791	24,655	24,628

	2-Way	51,308	48,126	48,105	47,497	51,390	51,376	51,017	50,955

North south Screenline 2, AADF Core Scenario (2026)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Thorpe Road	SB	565	313	313	302	528	529	433	437
	NB	536	367	366	346	523	523	572	567
	2-Way	1,101	680	679	648	1,052	1,052	1,006	1,004
A46	SB	21,047	20,457	20,455	20,324	21,279	21,284	21,679	21,693
	NB	20,639	20,061	20,054	19,881	20,841	20,851	21,297	21,357
	2-Way	41,686	40,518	40,509	40,205	42,120	42,135	42,976	43,050
Station Road	SB	8,313	7,711	7,709	7,672	8,117	8,116	7,860	7,828
	NB	7,433	6,619	6,621	6,575	7,165	7,159	6,741	6,717
	2-Way	15,745	14,330	14,330	14,246	15,283	15,275	14,601	14,546
A1434 Newark Road	SB	8,664	7,526	7,520	7,325	8,751	8,752	7,921	7,872
	NB	9,446	8,387	8,376	8,179	9,499	9,501	8,854	8,765
	2-Way	18,110	15,914	15,896	15,504	18,249	18,253	16,775	16,637

Lincoln Road	SB	5,116	4,395	4,390	4,326	5,115	5,112	4,892	4,867
	NB	5,302	4,866	4,866	4,833	5,246	5,248	5,144	5,118
	2-Way	10,418	9,261	9,257	9,159	10,361	10,360	10,036	9,985
Meadow Lane	SB	4,985	3,864	3,862	3,801	5,308	5,310	3,356	3,293
	NB	5,304	4,459	4,459	4,387	5,544	5,548	3,865	3,795
	2-Way	10,289	8,322	8,322	8,188	10,852	10,858	7,221	7,088
Brant Road	SB	3,371	4,657	4,653	4,850	3,244	3,251	4,179	4,331
	NB	4,176	5,156	5,154	5,650	4,065	4,061	4,153	4,254
	2-Way	7,547	9,813	9,807	10,501	7,309	7,312	8,332	8,584
Station Road	SB	5,424	4,151	4,150	3,994	5,671	5,664	5,432	5,436
	NB	6,058	5,176	5,177	4,753	6,168	6,173	6,295	6,313
	2-Way	11,482	9,328	9,327	8,747	11,839	11,837	11,727	11,750

North south Screenline 2, AADF Core Scenario (2036)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Thorpe Road	SB	780	563	563	595	798	801	753	759
	NB	621	408	406	396	612	611	669	684
	2-Way	1,400	971	969	991	1,410	1,412	1,421	1,443
A46	SB	22,758	22,024	22,024	22,031	22,805	22,817	23,155	23,165
	NB	21,957	21,645	21,648	21,461	22,226	22,234	22,895	22,922
	2-Way	44,715	43,669	43,672	43,492	45,031	45,051	46,050	46,088
Station Road	SB	8,677	8,090	8,088	8,033	8,555	8,550	8,219	8,182
	NB	8,068	7,098	7,100	7,046	7,717	7,708	7,184	7,160
	2-Way	16,745	15,188	15,189	15,079	16,272	16,259	15,403	15,343
A1434 Newark Road	SB	8,797	7,643	7,640	7,554	9,001	9,000	8,155	8,113
	NB	9,559	8,439	8,427	8,307	9,659	9,660	9,032	8,948
	2-Way	18,356	16,082	16,066	15,861	18,661	18,659	17,186	17,061
Lincoln Road	SB	5,372	4,668	4,666	4,565	5,411	5,403	5,115	5,106
	NB	5,352	4,861	4,863	4,827	5,303	5,304	5,209	5,164

	2-Way	10,724	9,529	9,530	9,393	10,715	10,708	10,324	10,270
Meadow Lane	SB	6,026	4,588	4,580	4,468	6,304	6,319	4,020	3,946
	NB	6,082	5,109	5,107	5,035	6,310	6,319	4,461	4,381
	2-Way	12,107	9,697	9,687	9,503	12,614	12,638	8,481	8,326
Brant Road	SB	3,984	5,246	5,259	5,422	3,762	3,763	4,543	4,681
	NB	4,620	5,931	5,944	6,383	4,517	4,508	4,836	4,796
	2-Way	8,604	11,177	11,202	11,805	8,278	8,271	9,380	9,476
Station Road	SB	6,058	4,735	4,714	4,522	6,253	6,259	6,332	6,290
	NB	6,350	5,397	5,381	4,972	6,391	6,402	6,521	6,684
	2-Way	12,408	10,132	10,095	9,495	12,644	12,661	12,853	12,974

Local road network and A46 SW screenline, AADF Core Scenario (2026)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Blackmoor Road	EB	3,930	1,047	1,048	934	3,662	3,661	1,106	807
	WB	3,403	1,013	1,013	728	3,155	3,152	1,018	691
	2-Way	7,333	2,060	2,060	1,663	6,816	6,813	2,124	1,498
LEB	EB	0	10,322	10,367	11,742	0	0	6,579	7,225
	WB	0	10,554	10,591	12,233	0	0	6,612	7,450
	2-Way	0	20,876	20,957	23,975	0	0	13,191	14,675
Meadow Lane	EB	4,985	3,864	3,862	3,801	5,308	5,310	3,356	3,293
	WB	5,304	4,459	4,459	4,387	5,544	5,548	3,865	3,795
	2-Way	10,289	8,322	8,322	8,188	10,852	10,858	7,221	7,088
Newark Road	EB	14,586	12,806	12,789	12,505	14,533	14,518	13,557	13,404
	WB	18,443	16,134	16,120	15,735	18,460	18,460	16,938	16,798
	2-Way	33,029	28,940	28,909	28,240	32,993	32,978	30,496	30,201
B1360A Dixon Street	EB	6,209	6,269	6,278	6,368	6,156	6,206	6,221	6,288
	WB	7,989	7,593	7,586	7,522	7,979	7,982	7,855	7,852

	2-Way	14,198	13,862	13,864	13,890	14,135	14,188	14,076	14,139
Boultham Avenue	EB	1,726	1,361	1,352	1,230	1,740	1,719	1,572	1,520
	WB	887	789	789	769	889	889	852	855
	2-Way	2,613	2,150	2,141	1,999	2,629	2,608	2,424	2,375
St Marks Street	EB	8,440	7,890	7,891	7,801	8,428	8,414	8,242	8,212
	WB	6,020	5,562	5,562	5,491	6,018	6,016	5,865	5,854
	2-Way	14,461	13,451	13,452	13,292	14,446	14,430	14,108	14,066
Mint street	NEB	5,984	5,834	5,832	5,769	5,986	5,989	5,952	5,944
	1-Way	5,984	5,834	5,832	5,769	5,986	5,989	5,952	5,944
B1308 West Parade	NWB	6,144	5,915	5,909	5,888	6,142	6,145	6,046	6,034
	1-Way	6,144	5,915	5,909	5,888	6,142	6,145	6,046	6,034
Longdales Road	EB	11,022	10,856	10,852	10,767	11,023	11,024	10,990	10,981
	WB	10,244	9,630	9,625	9,544	10,257	10,255	10,174	10,090
	2-Way	21,266	20,485	20,478	20,311	21,280	21,279	21,164	21,071
A46	EB	24,287	22,214	22,202	21,775	24,261	24,261	23,971	23,950
	WB	22,939	21,439	21,435	21,193	22,911	22,897	22,791	22,781

	2-Way	47,226	43,653	43,637	42,967	47,173	47,158	46,762	46,731

Local road network and A46 SW screenline, AADF Core Scenario (2036)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
Blackmoor Road	EB	4,400	1,011	1,009	899	4,157	4,155	1,075	775
	WB	4,011	968	969	665	3,750	3,750	1,018	667
	2-Way	8,411	1,979	1,978	1,564	7,906	7,905	2,093	1,442
LEB	EB	0	12,033	12,091	13,810	0	0	7,647	8,378
	WB	0	12,096	12,149	13,728	0	0	7,853	8,767
	2-Way	0	24,129	24,241	27,538	0	0	15,500	17,146
Meadow Lane	EB	6,026	4,588	4,580	4,468	6,304	6,319	4,020	3,946
	WB	6,082	5,109	5,107	5,035	6,310	6,319	4,461	4,381
	2-Way	12,107	9,697	9,687	9,503	12,614	12,638	8,481	8,326
Newark Road	EB	15,263	13,394	13,376	13,073	15,241	15,235	14,282	14,122
	WB	19,176	16,898	16,887	16,590	19,233	19,236	17,574	17,457
	2-Way	34,439	30,292	30,263	29,663	34,474	34,471	31,856	31,580

B1360A Dixon Street	EB	5,789	6,189	6,129	6,079	5,671	5,729	5,869	5,889
	WB	8,605	8,016	8,010	7,944	8,616	8,620	8,431	8,414
	2-Way	14,394	14,205	14,139	14,023	14,287	14,348	14,300	14,303
Boultham Avenue	EB	2,472	1,647	1,691	1,663	2,519	2,468	2,194	2,149
	WB	1,116	1,010	1,010	994	1,121	1,115	1,076	1,072
	2-Way	3,588	2,658	2,701	2,657	3,640	3,583	3,271	3,221
St Marks Street	EB	9,959	9,486	9,491	9,397	9,952	9,948	9,761	9,749
	WB	6,981	6,449	6,445	6,381	6,973	6,968	6,808	6,793
	2-Way	16,941	15,935	15,935	15,778	16,924	16,916	16,568	16,542
Mint street	NEB	6,353	6,222	6,224	6,156	6,358	6,362	6,338	6,338
	1-Way	6,353	6,222	6,224	6,156	6,358	6,362	6,338	6,338
B1308 West Parade	NWB	6,465	6,295	6,296	6,252	6,459	6,455	6,405	6,397
	1-Way	6,465	6,295	6,296	6,252	6,459	6,455	6,405	6,397
Longdales Road	EB	11,532	11,281	11,281	11,179	11,542	11,541	11,486	11,475
	WB	11,012	10,322	10,318	10,233	11,027	11,032	10,901	10,875
	2-Way	22,544	21,603	21,599	21,412	22,569	22,573	22,387	22,351

A46	EB	26,559	24,657	24,640	24,187	26,594	26,585	26,362	26,328
	WB	24,749	23,469	23,465	23,310	24,795	24,791	24,655	24,628
	2-Way	51,308	48,126	48,105	47,497	51,390	51,376	51,017	50,955

APPENDIX C

A46 & LEB orbital route, AADF, Core Scenario (2026)

Route	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46: Moor Lane to Whisby Road	NB	20,639	20,061	20,054	19,881	20,841	20,851	21,297	21,357
	SB	21,047	20,457	20,455	20,324	21,279	21,284	21,679	21,693
A46: Whisby Road to Lincoln Road B1190	NB	21,844	20,856	20,853	20,648	22,007	22,010	22,229	22,279
	SB	22,061	21,170	21,164	21,004	22,303	22,304	22,598	22,603
A46: Lincoln Road to Skellingthorpe Road	EB	21,297	19,209	19,198	18,784	21,334	21,336	21,093	21,067
	WB	21,565	19,568	19,560	19,240	21,635	21,633	21,474	21,451
A46: Skellingthorpe Road to Saxilby Road	NB	25,165	22,940	22,924	22,499	25,170	25,173	24,871	24,862
	SB	24,768	22,343	22,334	21,969	24,801	24,799	24,503	24,474
A46: Saxilby Road to Riseholme roundabout	NB	26,585	24,450	24,436	24,026	26,596	26,596	26,342	26,331
	SB	26,067	23,806	23,799	23,455	26,090	26,088	25,811	25,775
A46: Riseholme to LEB	EB	18,218	16,508	16,495	16,137	18,196	18,196	17,926	17,901
	WB	14,296	14,217	14,218	14,230	14,268	14,274	14,217	14,249
LEB: Greetwell Road to A158/A15	NB	11,514	11,720	11,729	11,987	11,466	11,468	11,258	11,204
	SB	12,861	13,175	13,179	13,249	12,832	12,833	12,659	12,638

LEB: B1188 Lincoln Road to Greetwell Road	NB	7,849	9,793	9,802	10,185	7,827	7,824	7,832	7,805
	SB	7,437	9,735	9,742	9,908	7,431	7,432	7,477	7,476
LEB: NHRR to B1188 Lincoln Road	NB	9,463	13,725	13,740	14,277	9,440	9,439	9,736	9,719
	SB	8,890	14,220	14,245	14,819	8,866	8,867	9,063	9,067

A46 & LEB orbital route, AADF, Core Scenario (2036)

Route	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46: Moor Lane to Whisby Road	NB	25,239	21,645	21,648	21,461	22,226	22,234	22,895	22,922
	SB	23,626	22,024	22,024	22,031	22,805	22,817	23,155	23,165
A46: Whisby Road to Lincoln Road B1190	NB	23,407	22,702	22,711	22,418	23,694	23,707	24,151	24,173
	SB	28,530	23,193	23,191	23,060	24,291	24,300	24,582	24,557
A46: Whisby Road to Skellingthorpe Road	EB	22,065	20,569	20,565	20,127	22,533	22,528	22,305	22,276
	WB	26,711	21,075	21,068	20,859	23,018	23,019	22,753	22,699
A46: Skellingthorpe Road to Saxilby Road	NB	27,153	24,439	24,432	23,958	26,518	26,509	26,262	26,233
	SB	28,484	24,017	24,004	23,732	26,526	26,525	26,123	26,049
A46: Saxilby Road to Riseholme roundabout	NB	31,921	27,462	27,458	27,045	29,340	29,332	29,140	29,106
	SB	29,941	26,987	26,980	26,732	29,229	29,227	28,876	28,812

A46: Riseholme to LEB	EB	20,493	17,957	17,946	17,582	19,070	19,073	18,923	18,883
	WB	17,356	14,327	14,302	14,312	14,601	14,600	14,554	14,550
LEB: Greetwell Road to A158/A15	NB	13,823	13,003	13,003	13,308	12,734	12,729	12,461	12,429
	SB	14,885	14,189	14,203	14,316	13,920	13,919	13,663	13,588
LEB: B1188 Lincoln Road to Greetwell Road	NB	11,522	11,588	11,594	12,027	9,549	9,545	9,665	9,686
	SB	9,171	11,600	11,607	11,769	9,180	9,179	9,276	9,246
LEB: NHRR to B1188 Lincoln Road	NB	12,387	15,398	15,409	16,024	11,066	11,066	11,392	11,409
	SB	10,832	15,957	15,987	16,477	10,433	10,432	10,620	10,600

Radial routes, 2 way AADF, Core Scenario (2026)

Route	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A15 outside of RR	23,047	24,055	24,049	23,999	23,074	23,070	23,218	23,162
A158 outside of RR	21,045	19,952	19,955	19,958	21,012	21,010	20,874	20,865
Riseholme Road	15,464	16,088	16,091	16,122	15,469	15,474	15,537	15,637
Bunkers Hill	15,046	14,861	14,864	14,877	15,061	15,055	15,043	15,015
Longdale Road	20,795	20,169	20,162	19,993	20,807	20,809	20,738	20,649
Greetwell Road outside RR	8,645	8,855	8,856	8,879	8,637	8,640	8,626	8,630
Greetwell Road inside RR	18,450	19,125	19,123	19,197	18,460	18,460	18,478	18,481
A57 Saxilby Road between Broxhome Lane and Woodcock Lane	16,494	16,366	16,364	16,282	16,478	16,474	16,371	16,349
A57 Saxilby Road between carholme roundabout and Grandstand Centre	15,942	16,107	16,107	16,066	15,988	15,994	15,832	15,813
A57 Carholme Road, between Depot Street and B199	18,734	18,535	18,529	18,421	18,731	18,735	18,564	18,558
Lincoln Road, between Waterloo Lane and Oaktree house	8,935	8,901	8,899	8,880	8,918	8,918	8,861	8,852
B1378 Skellington Road	9,233	9,016	9,016	8,999	9,202	9,199	8,947	8,932
B1003 Tritton Road	18,787	18,013	18,008	17,925	18,744	18,750	18,709	18,722
B1188 Lincoln Road	13,195	13,250	13,248	13,182	13,196	13,195	13,195	13,167

B1188 Canwick Road	22,213	23,757	23,774	24,107	22,187	22,187	22,075	22,071
A15 Sleaford Road	18,979	16,840	16,900	18,470	18,914	18,906	18,507	18,441
A15, Davy's Lane-Grantham Road	7,557	6,846	6,843	6,726	7,524	7,524	7,211	7,204
A15 London Road, between b1131 and Cross o'cliff Close	16,390	14,577	14,590	14,657	16,351	16,351	15,669	15,654
A607, between Kennedy road and St Johns Road	10,459	9,303	9,314	9,554	10,492	10,491	10,761	10,754
A607 Lincoln Road	13,047	10,770	10,771	10,806	13,070	13,068	14,264	14,317
Low Road	6,821	8,319	8,263	6,480	6,392	6,382	9,348	8,984
Brant Road	16,819	14,979	14,968	14,874	16,733	16,734	17,803	18,007
A46 outside of RR	47,571	50,931	50,935	51,389	47,295	47,292	49,834	50,140
A1434 Newark Road	19,141	17,221	17,206	16,925	19,006	19,028	17,801	17,671
B1190 Lincoln Road	10,686	11,462	11,476	11,669	10,730	10,727	11,011	11,067
Doddington Road	16,745	17,632	17,630	17,759	16,831	16,828	17,225	17,278
Newark Road between Victoria Street / Clayton Road	29,116	24,483	24,444	23,846	29,112	29,108	28,715	28,725

Radial routes, 2-way AADF, Core Scenario (2036)

Route	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A15 outside of RR	22,634	24,648	24,663	24,903	22,597	22,610	22,746	22,776
A158 outside of RR	21,271	20,374	20,372	20,404	21,269	21,261	21,149	21,102
Riseholme Road	16,757	17,217	17,204	17,310	16,761	16,761	16,753	16,808
Bunkers Hill	16,603	16,772	16,784	16,811	16,590	16,597	16,560	16,561
Longdale Road	22,086	21,338	21,333	21,166	22,096	22,098	21,951	21,926
Greetwell Road outside RR	9,477	9,865	9,868	9,881	9,466	9,466	9,479	9,483
Greetwell Road inside RR	20,708	21,129	21,137	21,215	20,712	20,709	20,758	20,766
A57 Saxilby Road between Broxhome Lane and Woodcock Lane	16,991	17,055	17,057	17,024	16,984	16,984	16,934	16,935
A57 Saxilby Road between carholme roundabout and Grandstand Centre	16,932	17,611	17,615	17,660	16,858	16,854	16,833	16,845
A57 Carholme Road, between Depot Street and B199	19,275	19,465	19,464	19,398	19,167	19,170	19,073	19,081
Lincoln Road, between Waterloo Lane and Oaktree house	10,172	10,097	10,096	10,087	10,141	10,140	10,088	10,081
B1378 Skellington Road	10,514	10,330	10,329	10,320	10,464	10,461	10,185	10,169
B1003 Tritton Road	20,187	19,202	19,199	19,073	20,198	20,173	20,094	20,080
B1188 Lincoln Road	13,644	13,677	13,676	13,633	13,602	13,602	13,622	13,612

B1188 Canwick Road	27,061	28,229	28,242	28,442	27,042	27,045	26,957	26,946
A15 Sleaford Road	21,816	19,365	19,425	21,063	21,730	21,731	21,362	21,320
A15, Davy's Lane-Grantham Road	8,987	8,539	8,527	8,316	8,920	8,920	8,698	8,678
A15 London Road, between b1131 and Cross o'cliff Close	19,224	18,027	18,027	17,929	19,233	19,233	18,680	18,647
A607, between Kennedy road and St Johns Road	10,933	10,160	10,179	10,328	10,858	10,863	11,040	11,044
A607 Lincoln Road	14,067	10,987	11,038	11,104	13,936	13,939	15,169	15,251
Low Road	7,479	8,956	8,882	6,984	6,992	6,978	10,455	10,200
Brant Road	18,136	16,368	16,356	16,198	18,068	18,062	19,253	19,372
A46 outside of RR	51,318	55,783	55,798	56,382	50,954	50,875	53,813	54,262
A1434 Newark Road	19,194	17,541	17,539	17,390	19,293	19,338	18,134	18,048
B1190 Lincoln Road	11,786	12,528	12,537	12,687	11,770	11,769	12,069	12,101
Doddington Road	18,007	19,079	19,082	19,216	18,144	18,156	18,734	18,783
Newark Road between Victoria Street / Clayton Road	30,751	26,294	26,261	25,588	30,789	30,784	30,748	30,762

APPENDIX D

Local Road Network, AADF (2026)

Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46 Ring Road / Hykeham Roundabout	NB	20,363	19,884	19,883	19,749	20,604	20,613	21,074	21,146
	SB	20,608	20,128	20,125	20,004	20,930	20,936	21,352	21,378
	2-Way	40,971	40,012	40,008	39,752	41,534	41,549	42,425	42,523
A46 South / Hykeham Roundabout	NB	24,360	25,607	25,615	25,739	23,980	23,965	25,247	25,323
	SB	23,442	25,438	25,436	25,770	23,462	23,474	24,705	24,934
	2-Way	47,802	51,044	51,051	51,509	47,441	47,439	49,952	50,257
A1434 Newark Road	NB	10,516	8,827	8,814	8,636	9,409	9,399	8,775	8,665
	SB	9,980	8,372	8,360	8,222	9,368	9,367	8,488	8,398
	2-Way	20,496	17,199	17,174	16,858	18,777	18,766	17,263	17,063
Boundary Lane	EB	1,189	61	61	32	24	22	32	32
	WB	1,529	96	96	33	26	26	28	28
	2-Way	2,719	157	157	65	49	48	61	60
Moor Lane	EB	5,034	4,230	4,230	4,188	4,793	4,785	4,202	4,149

	WB	6,300	5,295	5,295	5,202	6,030	6,010	5,292	5,212
	2-Way	11,334	9,525	9,524	9,391	10,823	10,794	9,494	9,361
Mill Lane	NB	4,095	3,163	3,160	3,093	4,721	4,703	3,346	3,318
	SB	3,855	3,025	3,018	2,943	4,518	4,527	3,355	3,332
	2-Way	7,950	6,188	6,178	6,035	9,239	9,231	6,701	6,649
Meadow Lane	EB	4,985	3,864	3,862	3,801	5,308	5,310	3,356	3,293
	WB	5,304	4,459	4,459	4,387	5,544	5,548	3,865	3,795
	2-Way	10,289	8,322	8,322	8,188	10,852	10,858	7,221	7,088
Brant Road North	NB	6,172	5,824	5,821	5,890	6,120	6,120	6,570	6,693
	SB	5,630	5,474	5,468	5,495	5,617	5,617	6,820	6,974
	2-Way	11,803	11,298	11,290	11,384	11,737	11,737	13,390	13,667
Brant Road South	NB	4,176	5,156	5,154	5,650	4,065	4,061	4,153	4,254
	SB	3,371	4,657	4,653	4,850	3,244	3,251	4,179	4,331
	2-Way	7,547	9,813	9,807	10,501	7,309	7,312	8,332	8,584
Station Road	EB	5,976	4,679	4,678	4,524	6,223	6,216	5,973	5,968
	WB	6,360	5,456	5,457	5,033	6,470	6,476	6,586	6,597

	2-Way	12,335	10,135	10,135	9,557	12,693	12,691	12,559	12,565
Blackmoor Road / Harmston Road	EB	3,930	1,047	1,048	934	3,662	3,661	1,106	807
	WB	3,403	1,013	1,013	728	3,155	3,152	1,018	691
	2-Way	7,333	2,060	2,060	1,663	6,816	6,813	2,124	1,498
NHRR	EB	#N/A	10,322	10,367	11,742	#N/A	#N/A	6,579	7,225
	WB	#N/A	10,554	10,591	12,233	#N/A	#N/A	6,612	7,450
	2-Way	#N/A	20,876	20,957	23,975	#N/A	#N/A	13,191	14,675

Local Road Network, AADF (2036)

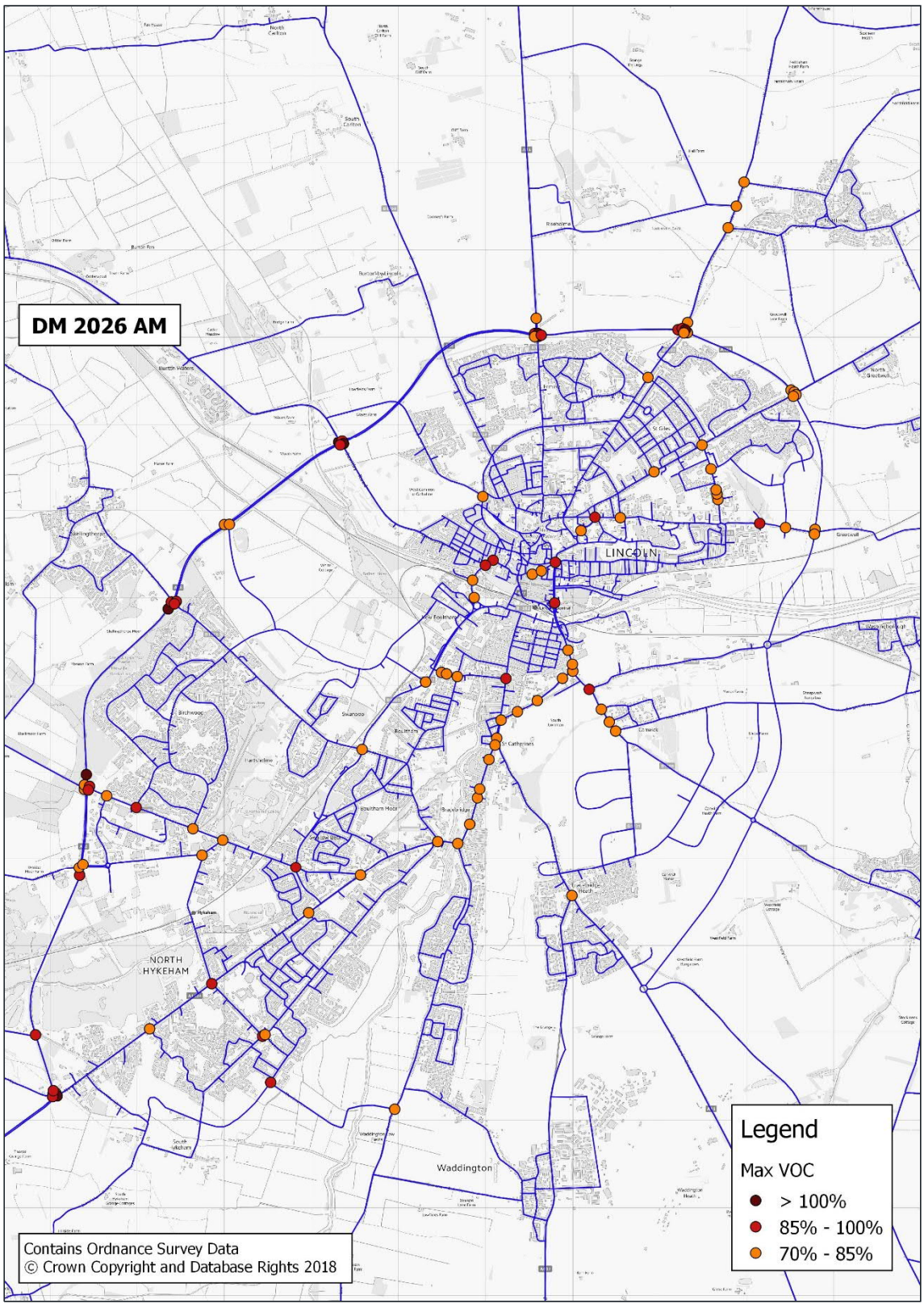
Location	Direction	DM	DSA	DSB	DSC	DSD	DSE	DSF	DSG
A46 Ring Road / Hykeham Roundabout	NB	22,316	21,457	21,461	21,280	21,964	21,973	22,688	22,717
	SB	21,777	21,757	21,756	21,765	22,498	22,510	22,874	22,886
	2-Way	44,093	43,214	43,217	43,046	44,463	44,483	45,562	45,603
A46 South / Hykeham Roundabout	NB	26,180	28,119	28,130	28,439	25,881	25,887	27,221	27,306
	SB	25,461	28,065	28,074	28,362	25,483	25,495	27,156	27,423
	2-Way	51,640	56,185	56,205	56,801	51,363	51,381	54,377	54,729
A1434 Newark Road	NB	10,277	9,101	9,087	8,930	9,732	9,645	9,105	8,937
	SB	9,924	8,664	8,661	8,548	9,538	9,529	8,744	8,691
	2-Way	20,201	17,765	17,748	17,478	19,270	19,174	17,849	17,628
Boundary Lane	EB	1,793	97	70	31	30	28	30	30
	WB	2,141	234	237	291	25	25	58	27
	2-Way	3,934	331	307	322	55	53	89	58
Moor Lane	EB	4,902	4,414	4,405	4,312	5,032	5,023	4,382	4,330
	WB	9,496	5,524	5,517	5,389	6,318	6,288	5,545	5,473

	2-Way	14,398	9,938	9,922	9,700	11,349	11,311	9,927	9,803
Mill Lane	NB	5,280	3,196	3,195	3,118	4,947	4,940	3,445	3,398
	SB	3,834	3,143	3,141	3,084	4,654	4,666	3,422	3,402
	2-Way	9,115	6,339	6,336	6,203	9,601	9,606	6,867	6,799
Meadow Lane	EB	8,036	4,588	4,580	4,468	6,304	6,319	4,020	3,946
	WB	10,598	5,109	5,107	5,035	6,310	6,319	4,461	4,381
	2-Way	18,634	9,697	9,687	9,503	12,614	12,638	8,481	8,326
Brant Road North	NB	5,385	6,537	6,533	6,555	6,619	6,617	7,140	7,260
	SB	7,283	6,268	6,265	6,268	6,290	6,285	7,655	7,742
	2-Way	12,669	12,805	12,798	12,823	12,908	12,902	14,795	15,003
Brant Road South	NB	6,019	5,931	5,944	6,383	4,517	4,508	4,836	4,796
	SB	5,228	5,246	5,259	5,422	3,762	3,763	4,543	4,681
	2-Way	11,248	11,177	11,202	11,805	8,278	8,271	9,380	9,476
Station Road	EB	8,190	5,473	5,453	5,271	6,977	6,983	7,059	7,009
	WB	7,913	5,898	5,883	5,484	6,877	6,889	7,012	7,167
	2-Way	16,104	11,372	11,335	10,754	13,854	13,871	14,071	14,177

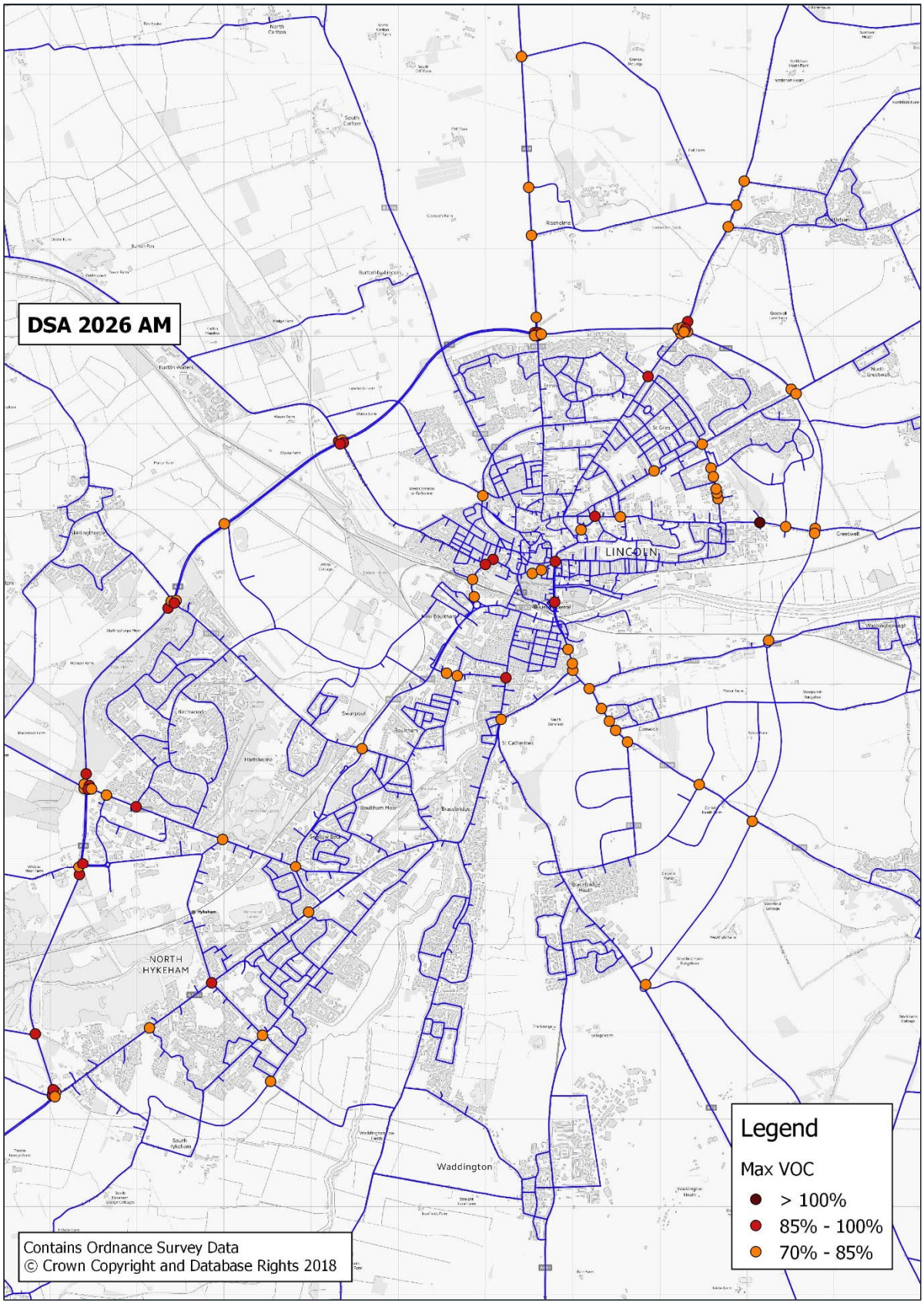
Blackmoor Road / Harmston Road	EB	4,693	1,011	1,009	899	4,157	4,155	1,075	775
	WB	5,279	968	969	665	3,750	3,750	1,018	667
	2-Way	9,972	1,979	1,978	1,564	7,906	7,905	2,093	1,442
NHRR	EB	#N/A	12,033	12,091	13,810	#N/A	#N/A	7,647	8,378
	WB	#N/A	12,096	12,149	13,728	#N/A	#N/A	7,853	8,767
	2-Way	#N/A	24,129	24,241	27,538	#N/A	#N/A	15,500	17,146

APPENDIX E

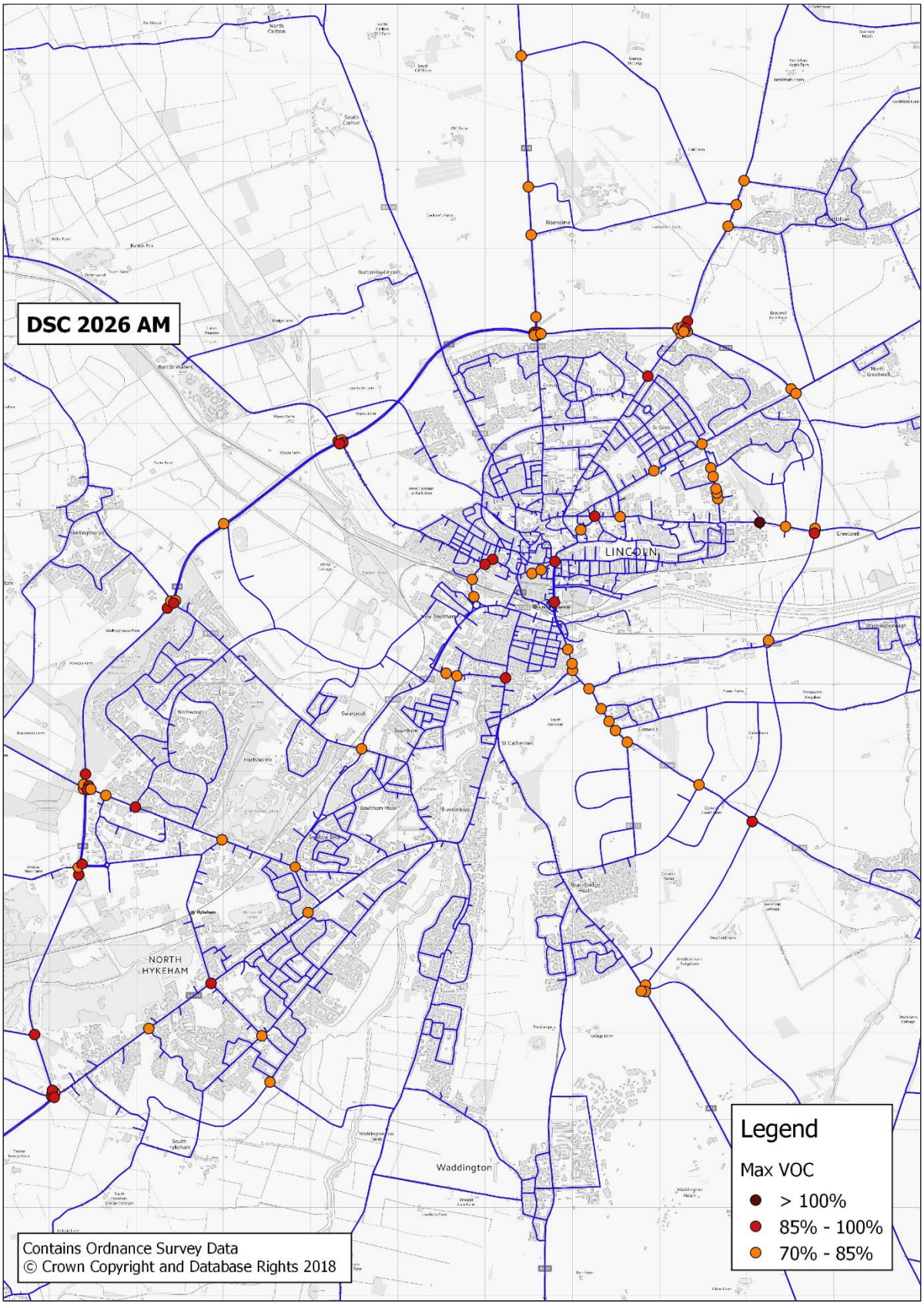
Junction congestion 2026 AM, DM



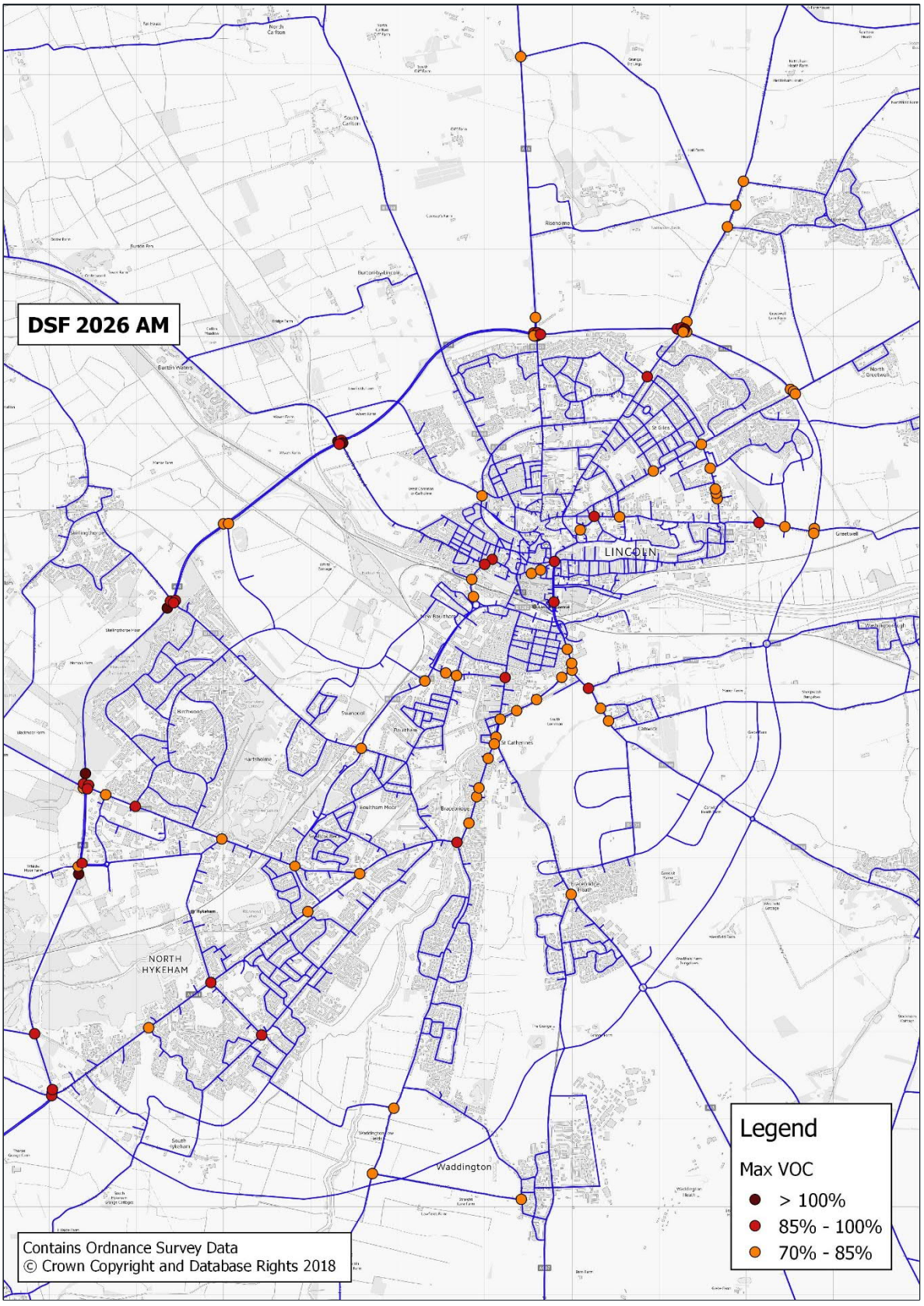
Junction congestion 2026 AM, Option A



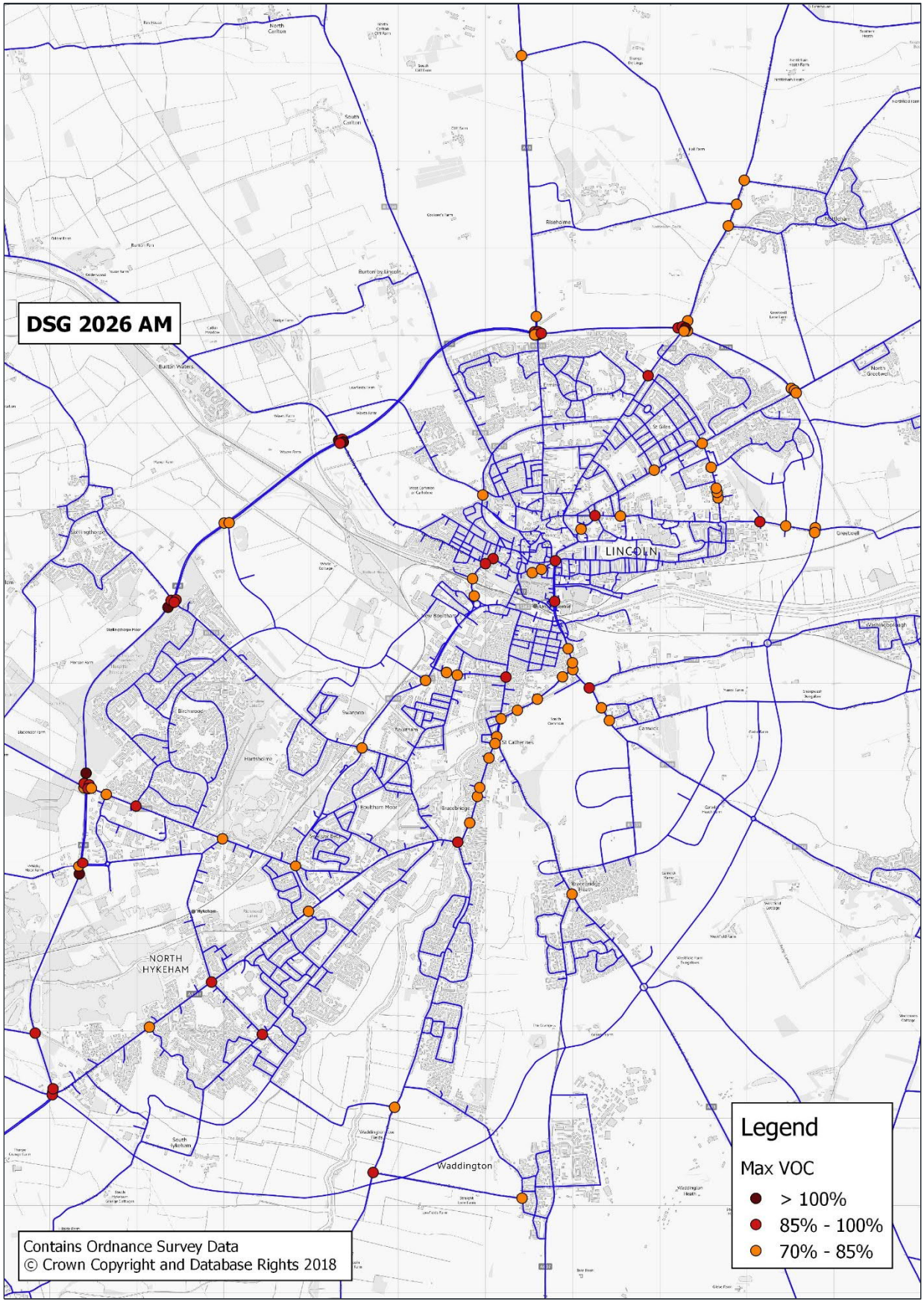
Junction congestion 2026 AM, Option C



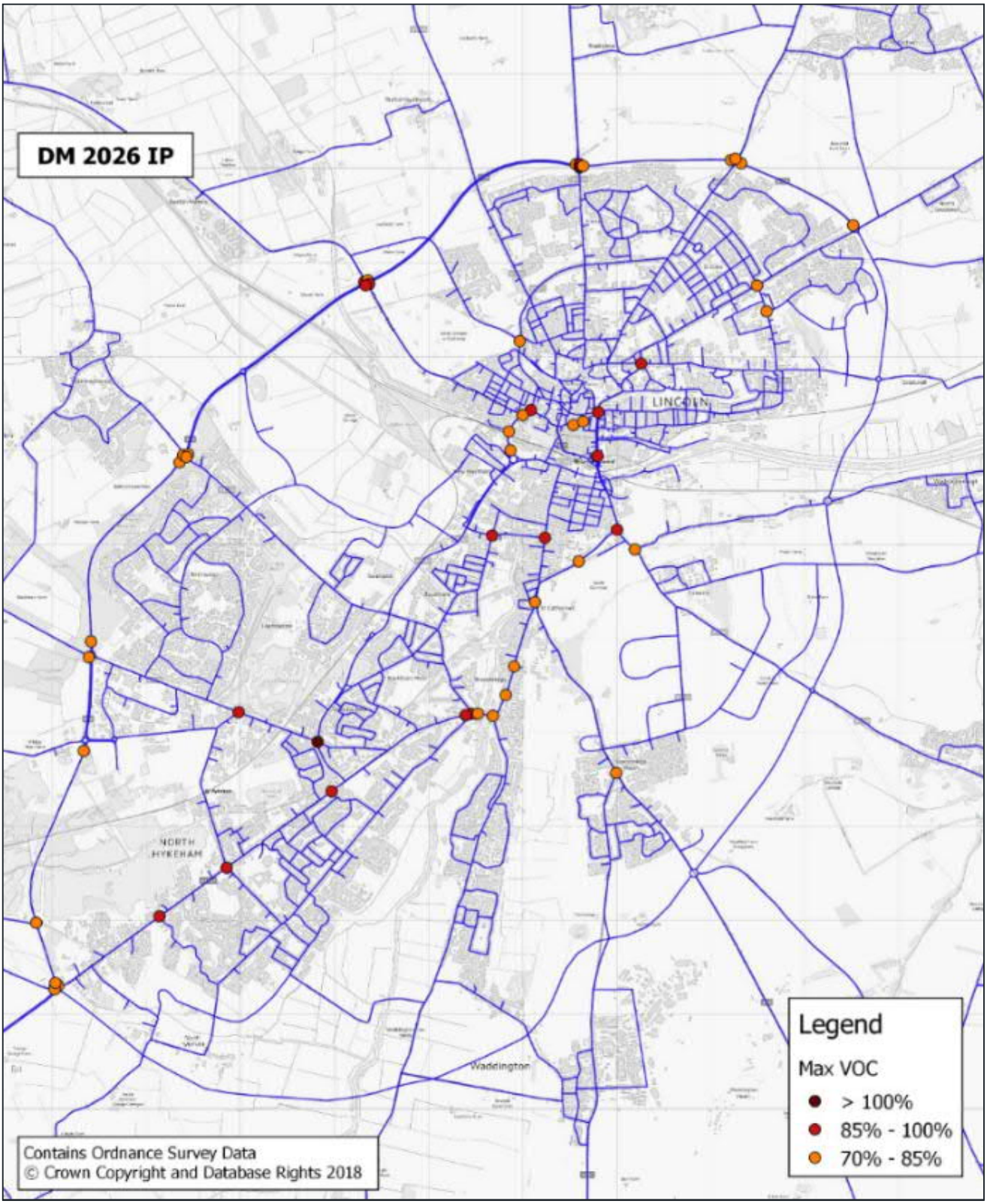
Junction congestion 2026 AM, Option F



Junction congestion 2026 AM, Option G



Junction congestion 2026 IP, DM



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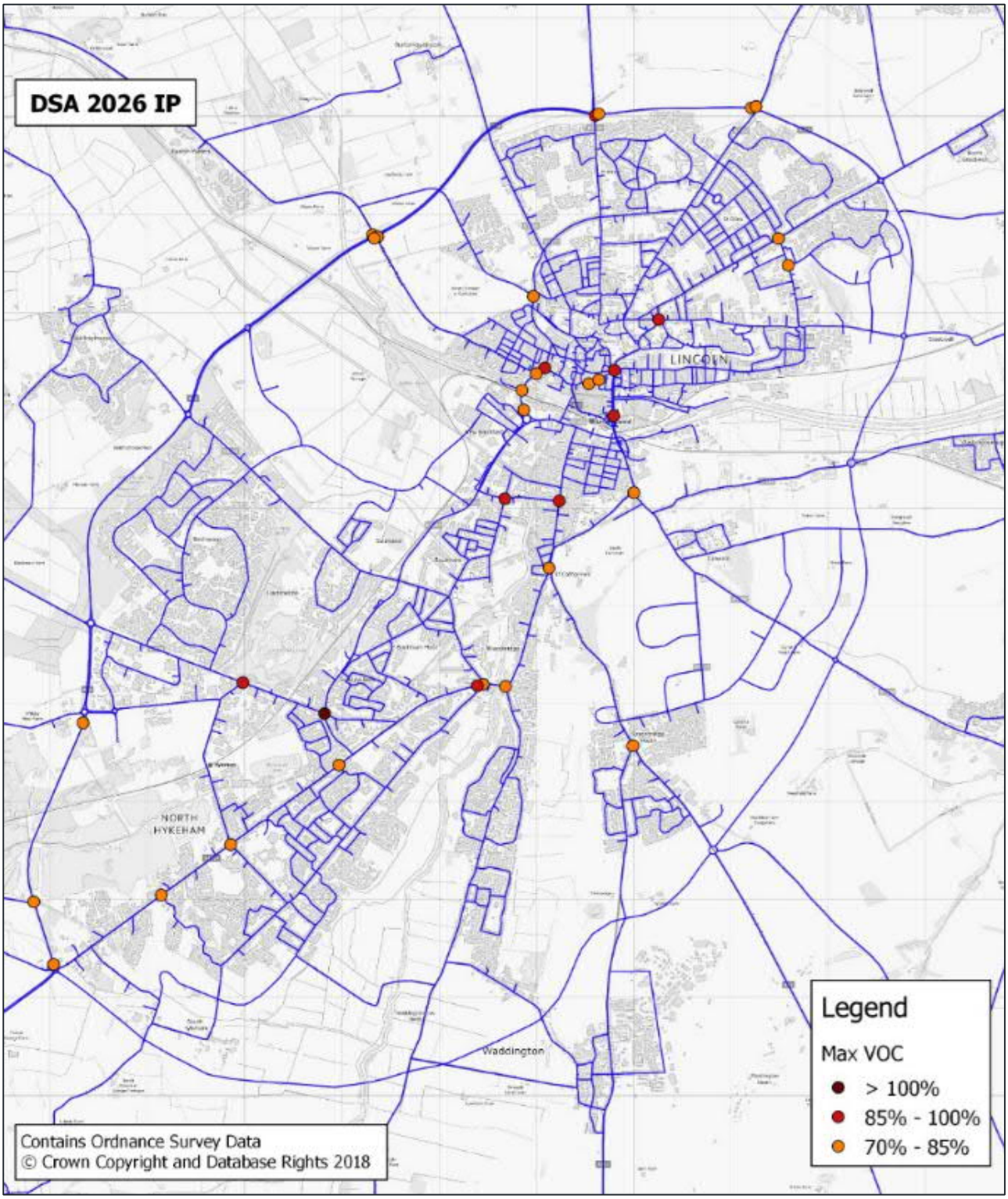

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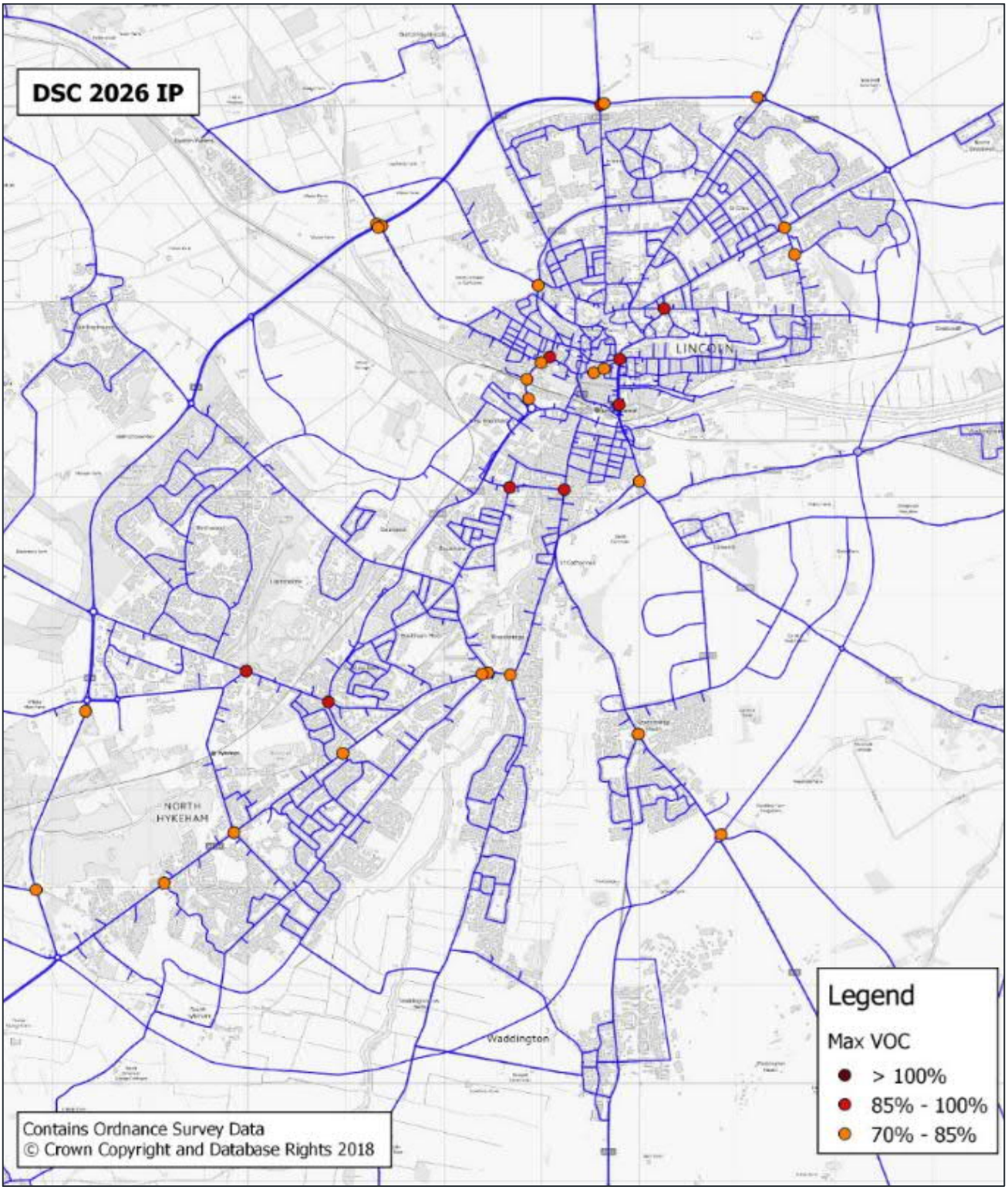

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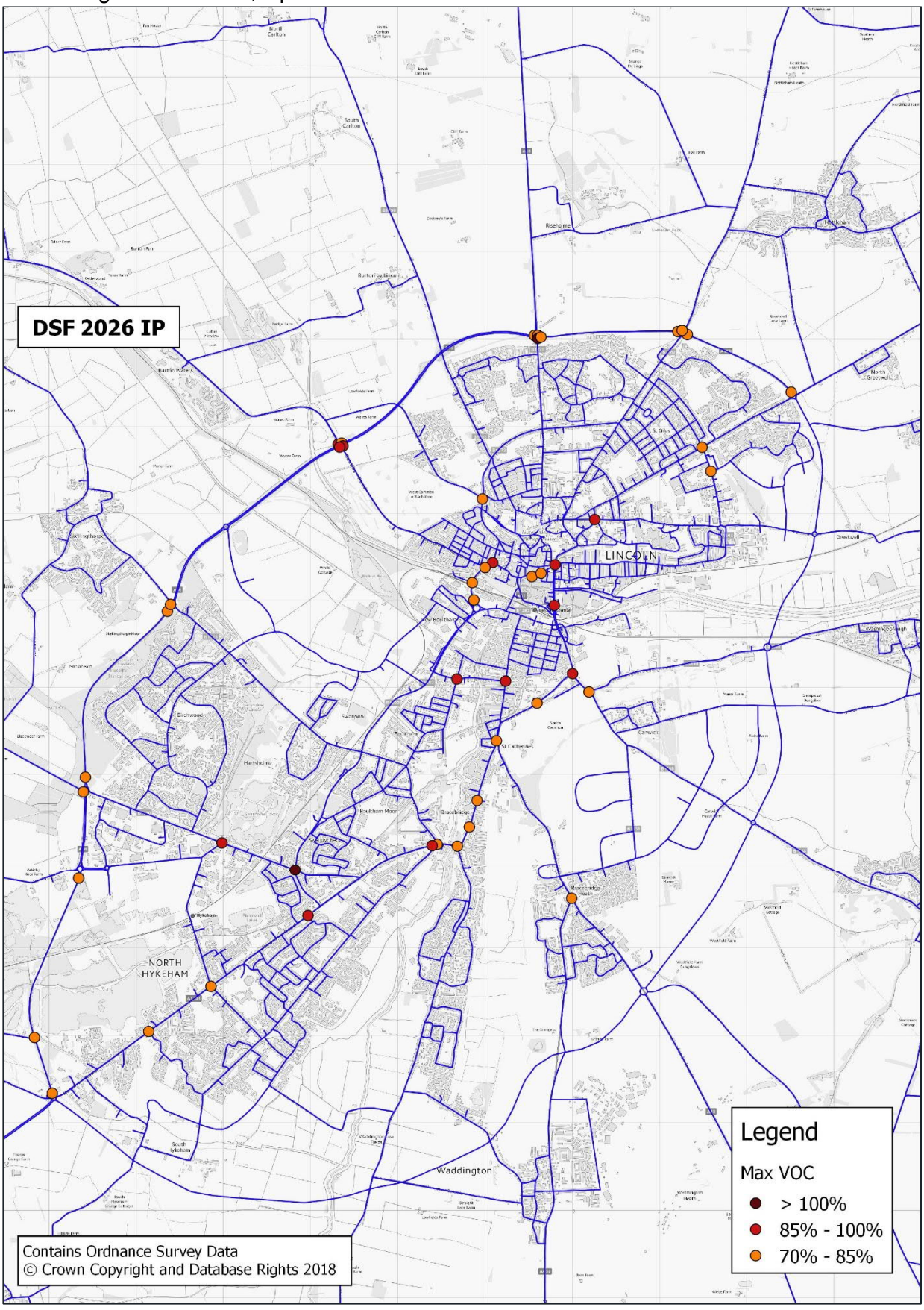
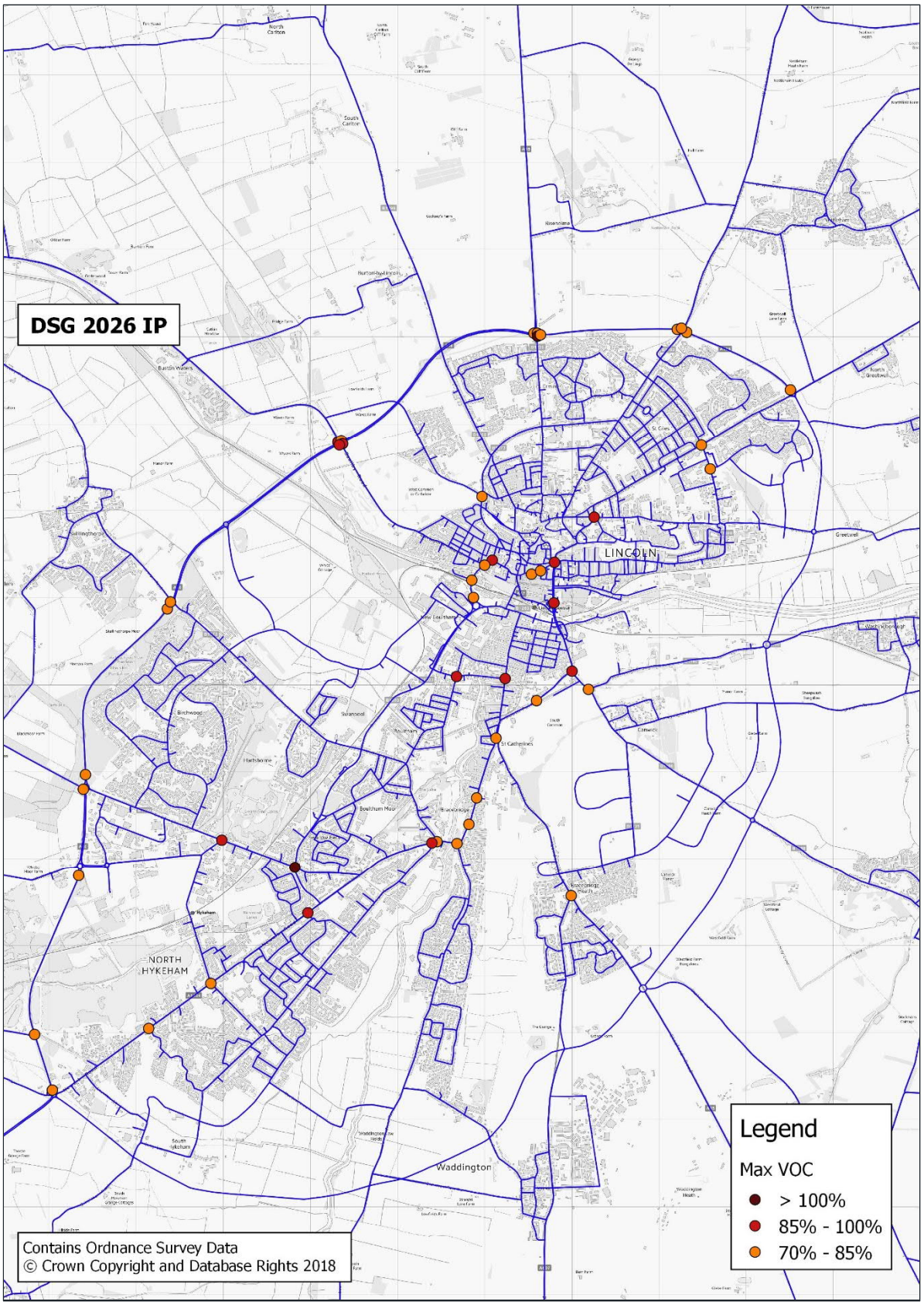
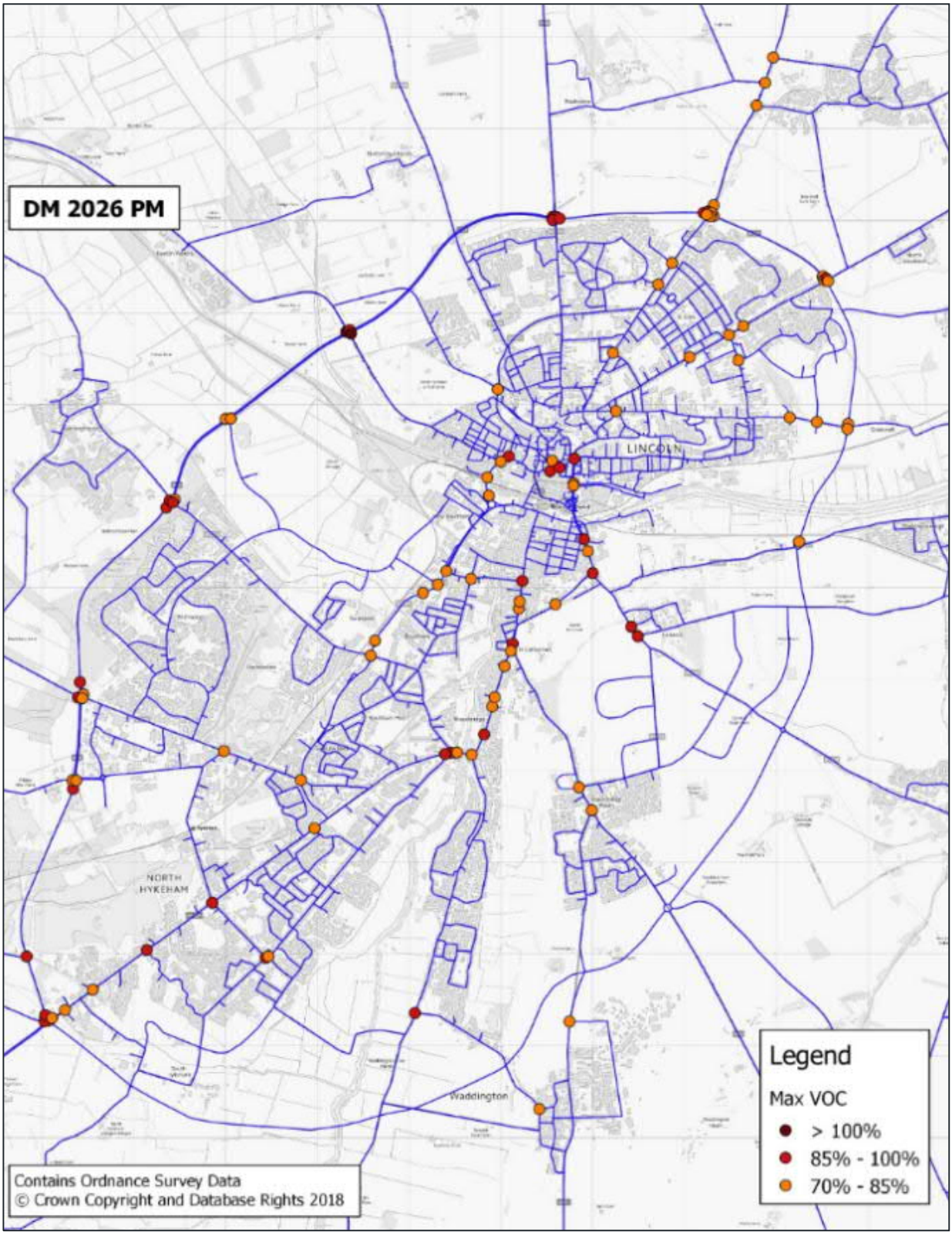


Junction congestion 2026 IP, Option G



Junction congestion 2026 PM Peak, Do Minimum



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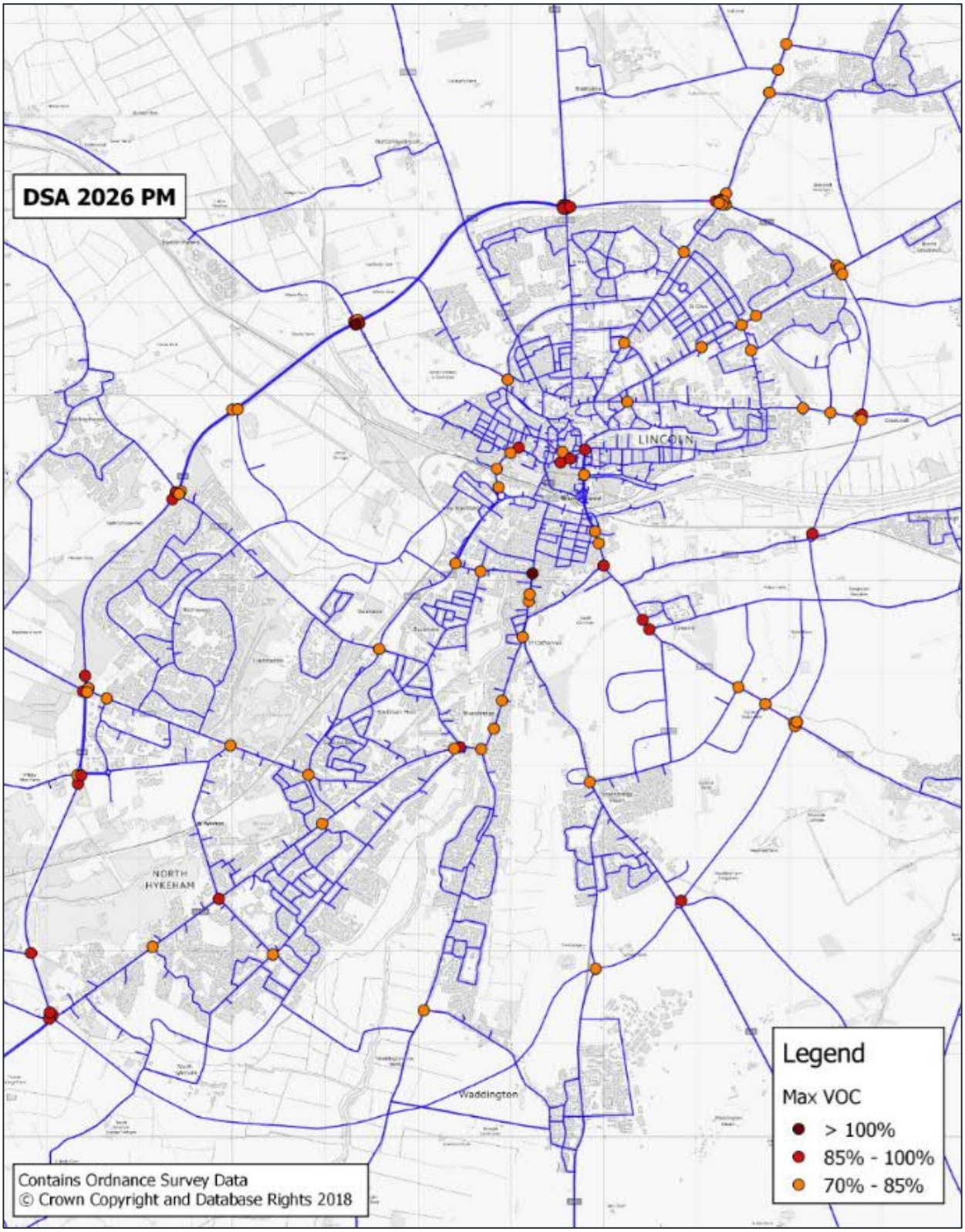
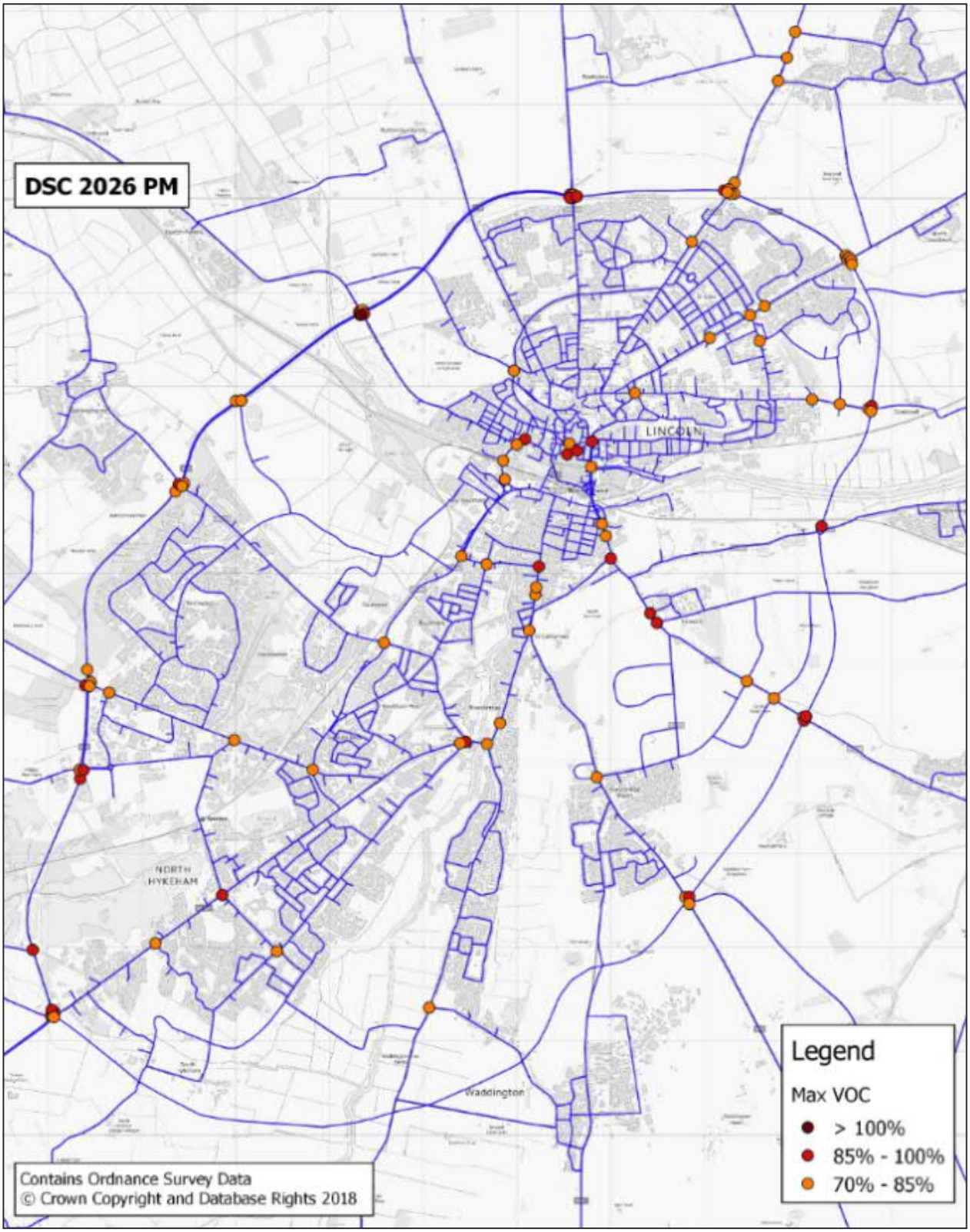
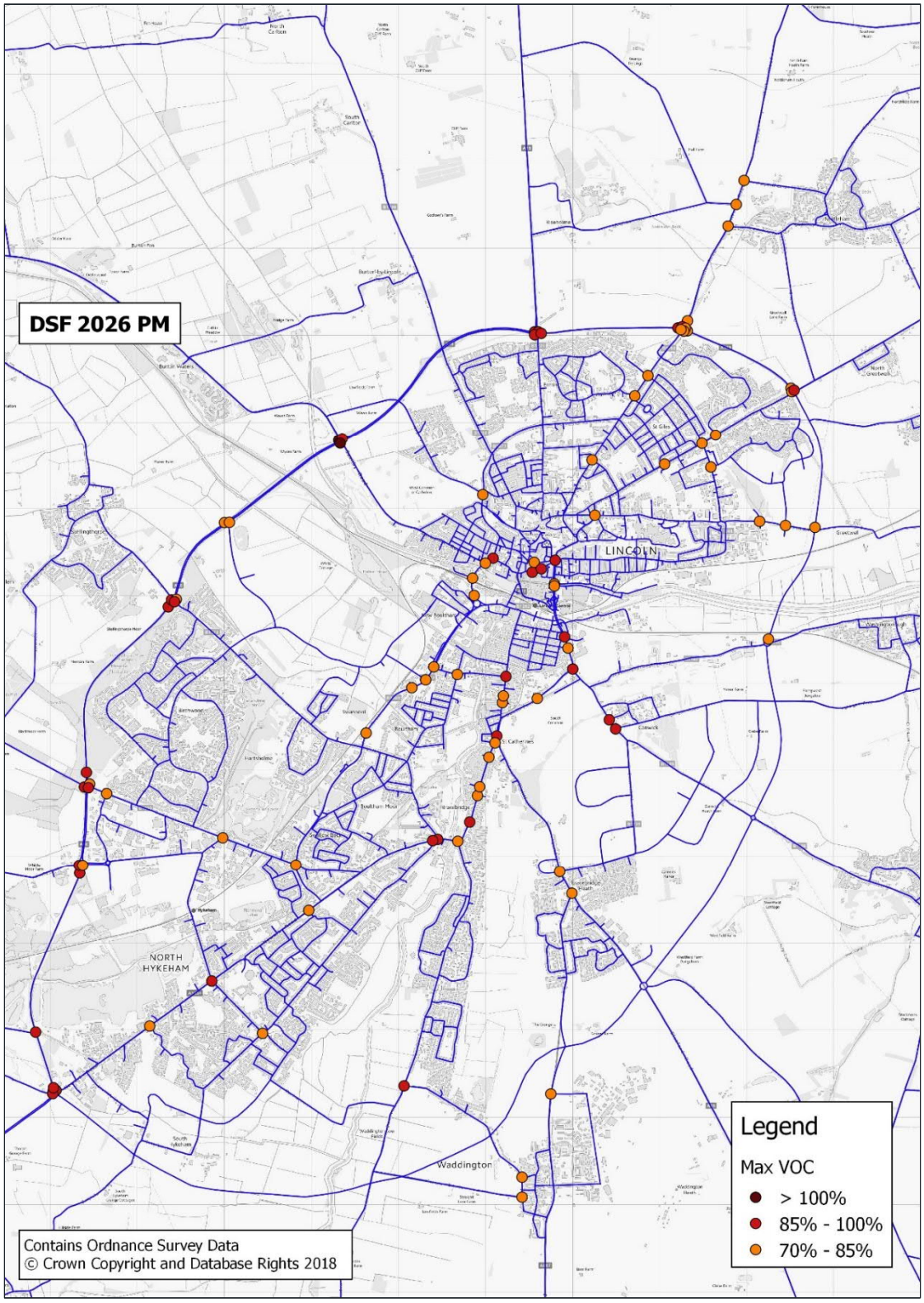


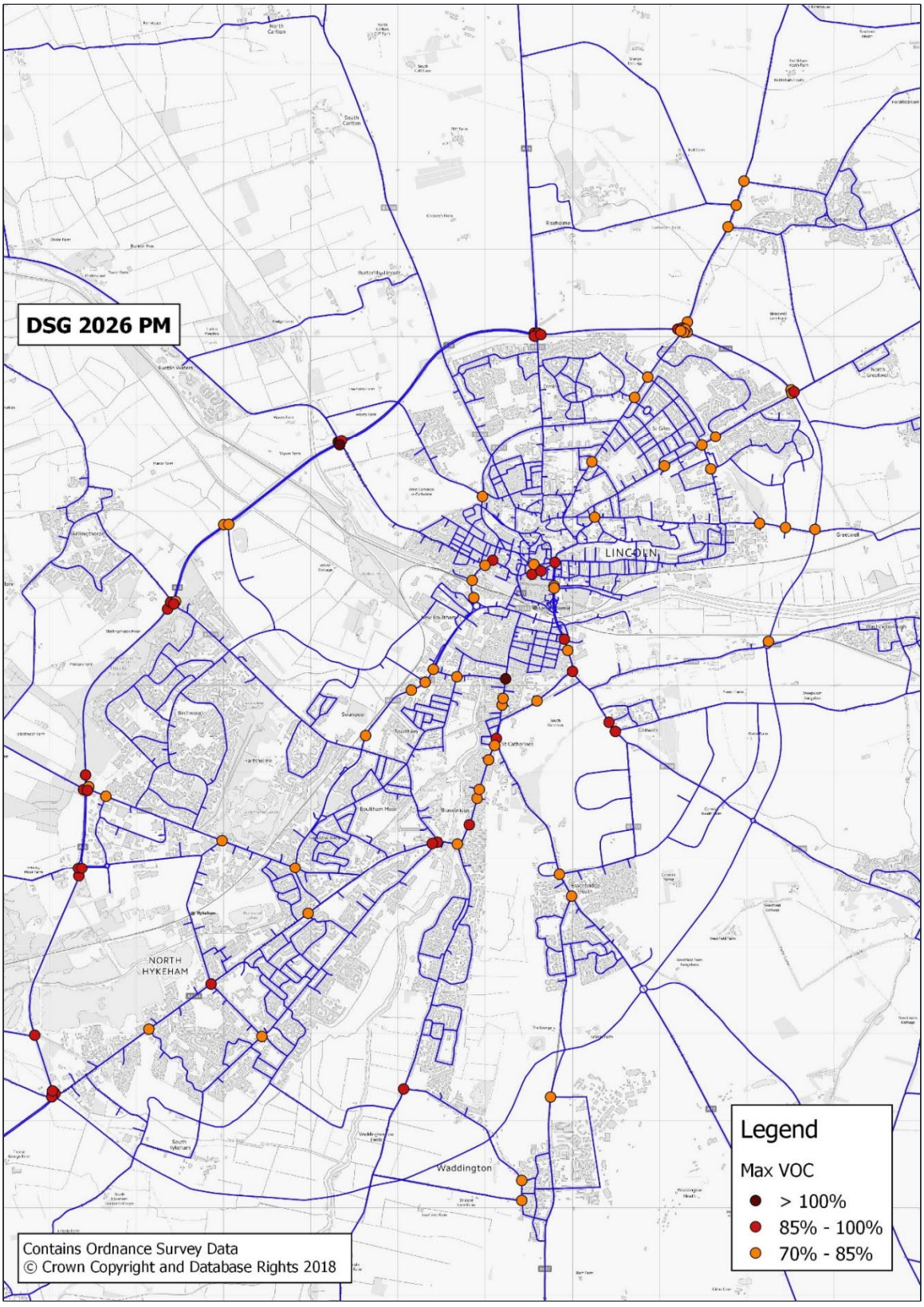
Junction congestion 2026 PM Peak, Option C



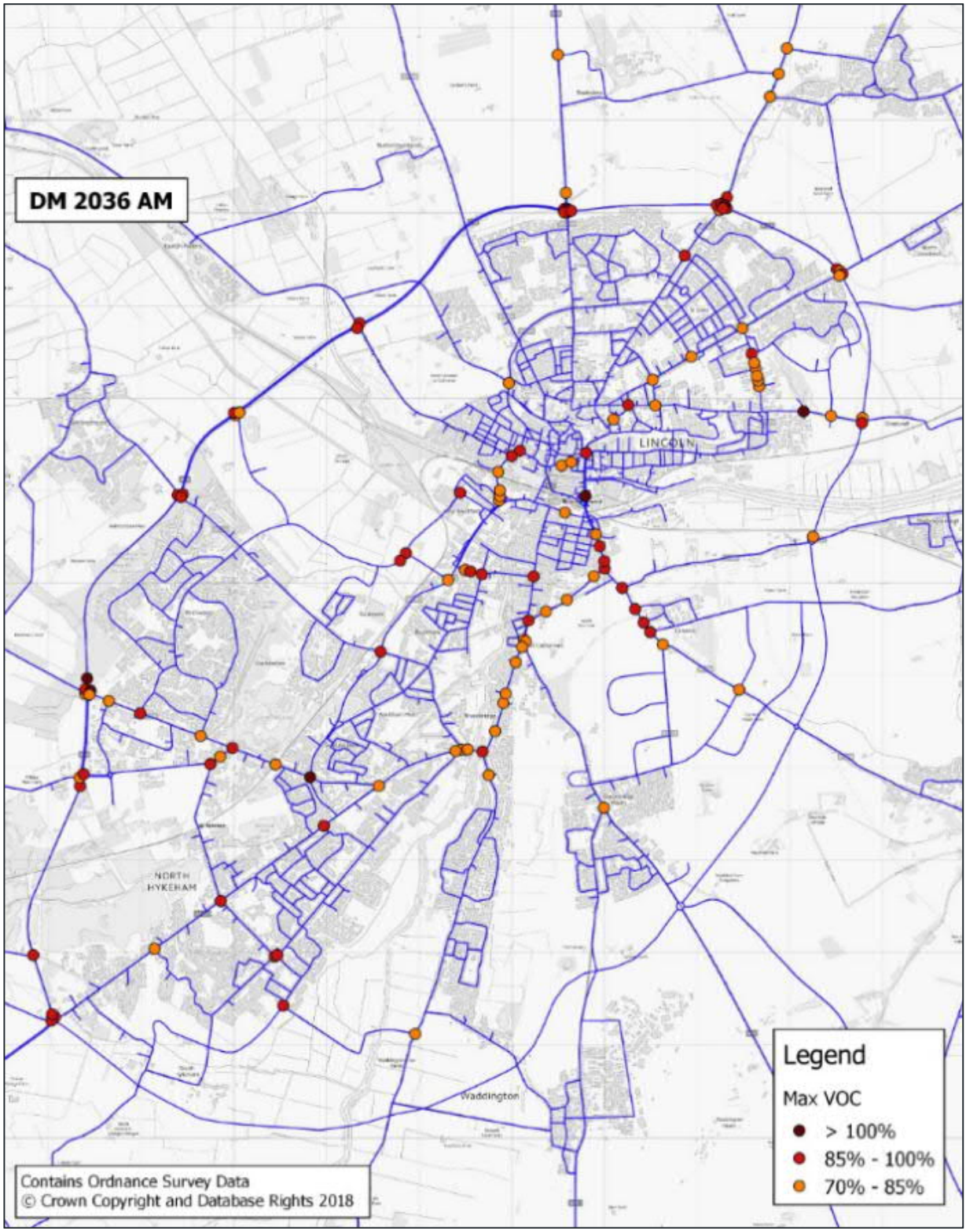
Junction congestion 2026 PM Peak, Option F



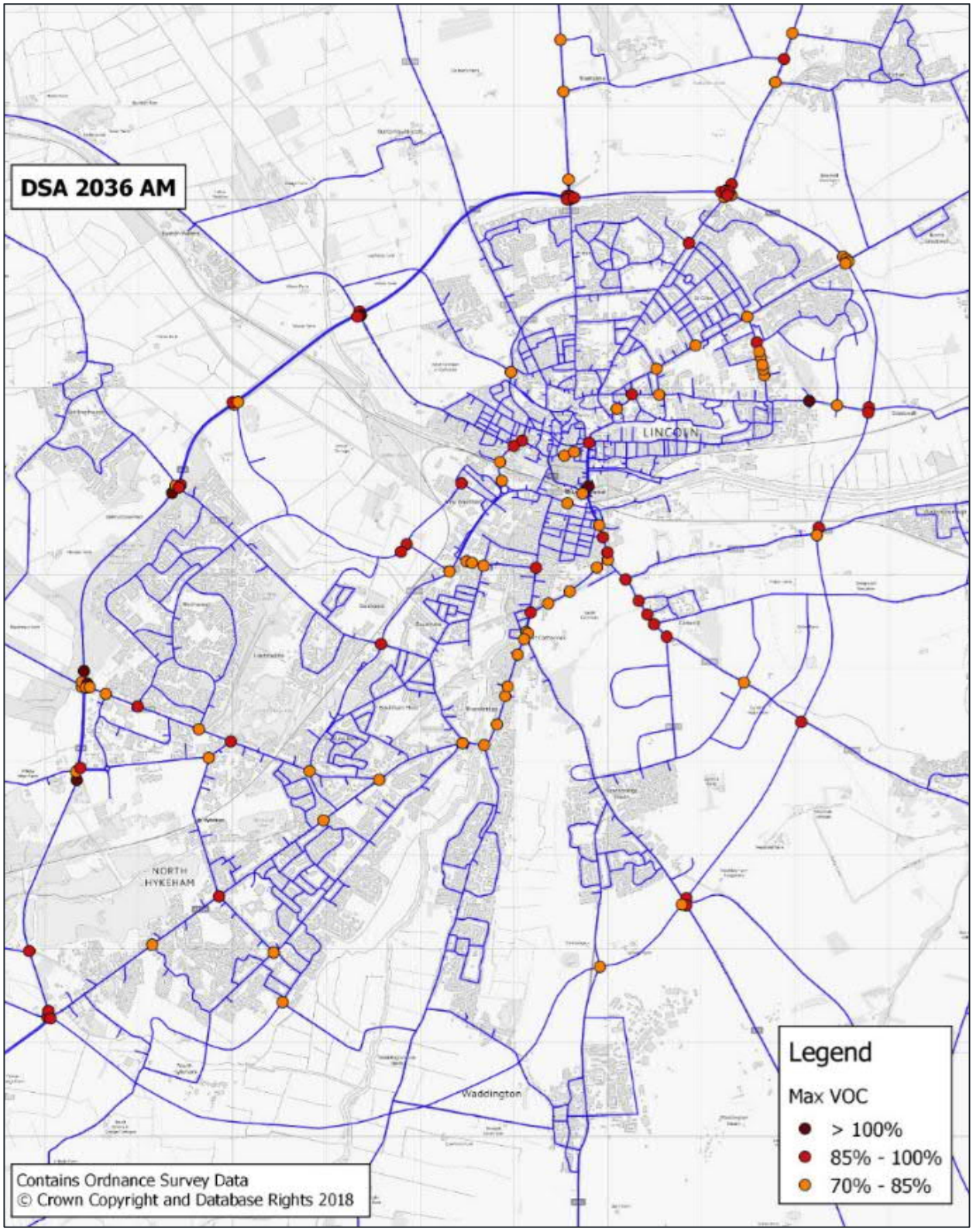
Junction congestion 2026 PM Peak, Option G



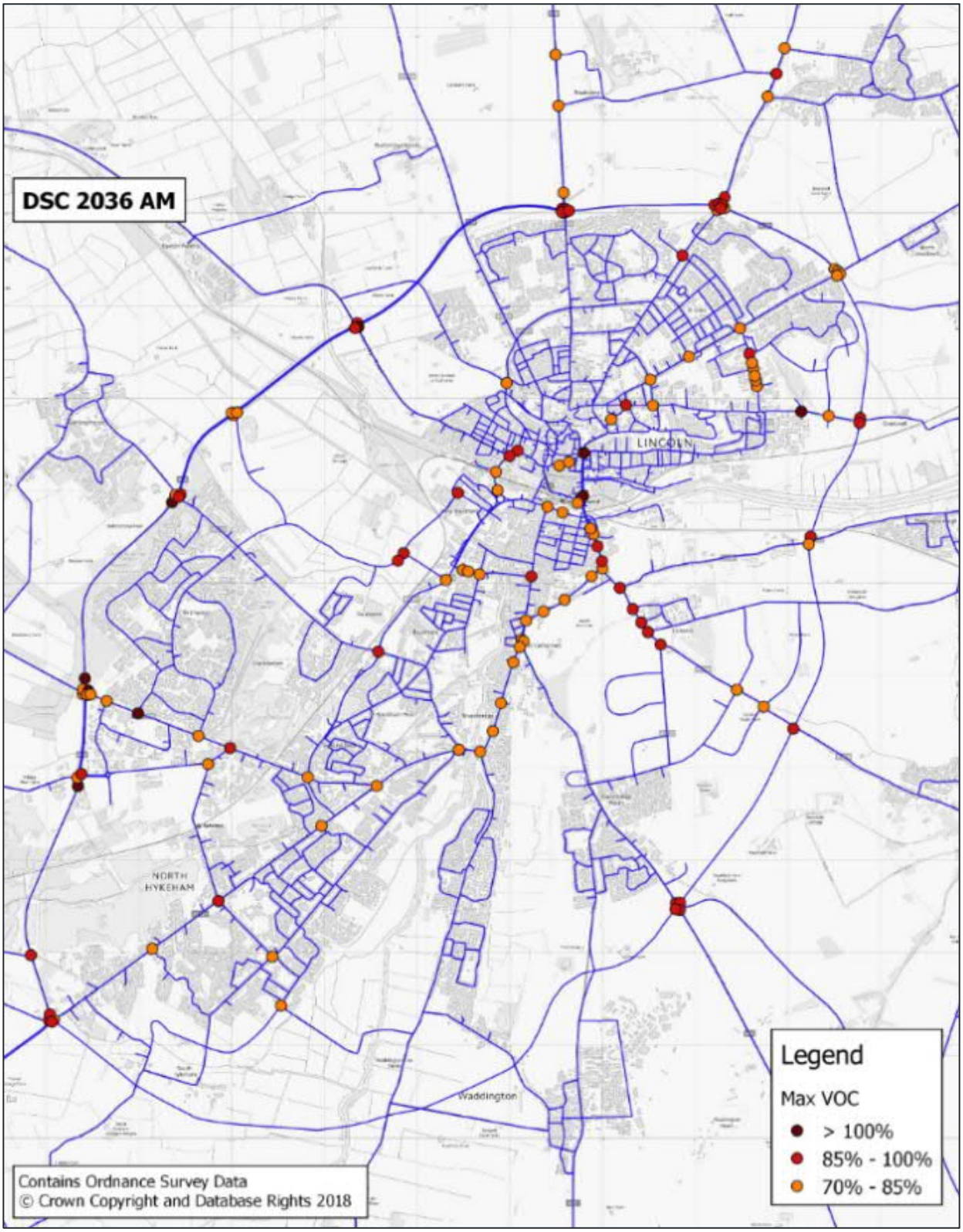
Junction congestion 2036 AM Peak, Do Minimum



Junction congestion 2036 AM Peak, Option A



Junction congestion 2036 AM Peak, Option C



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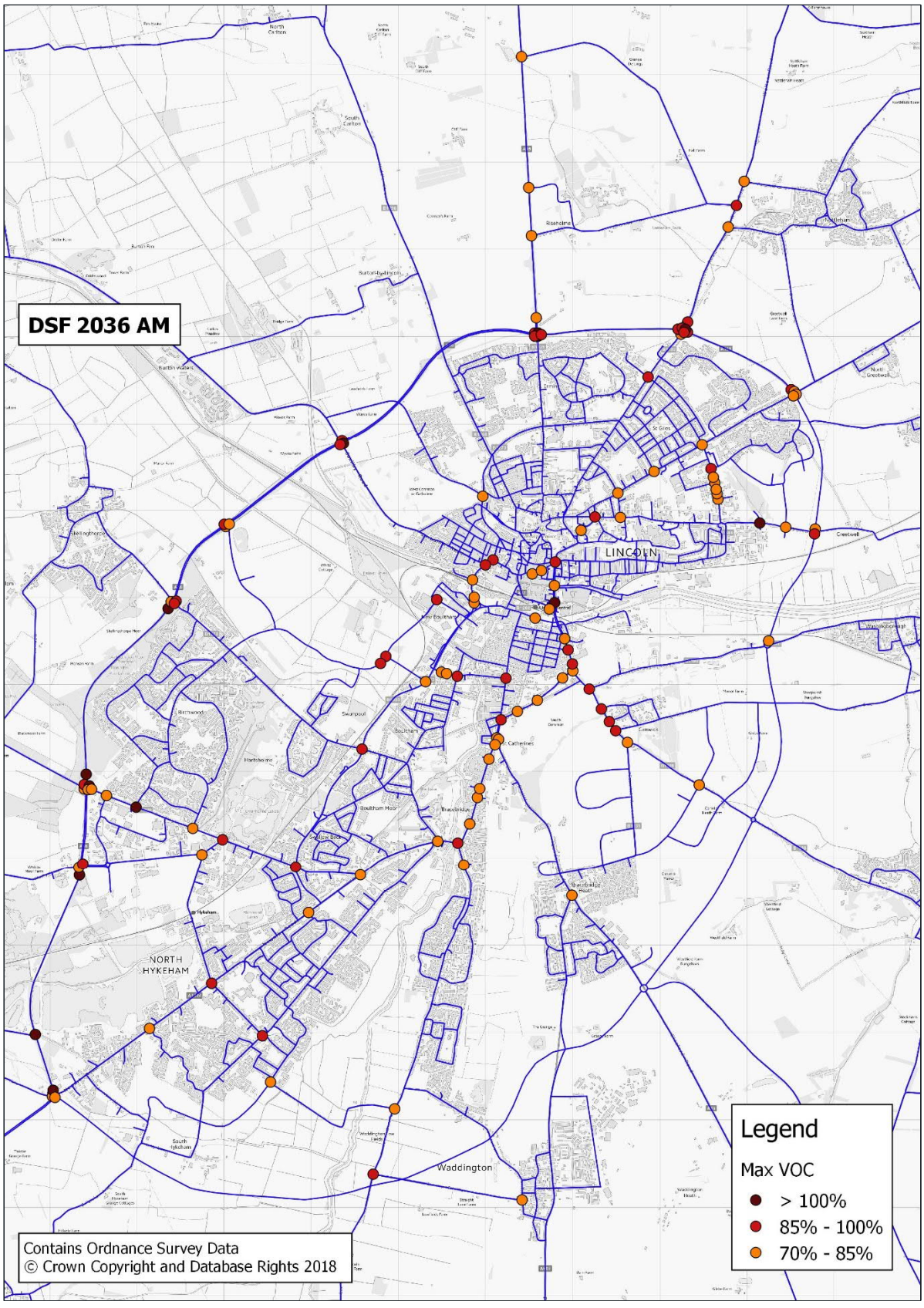
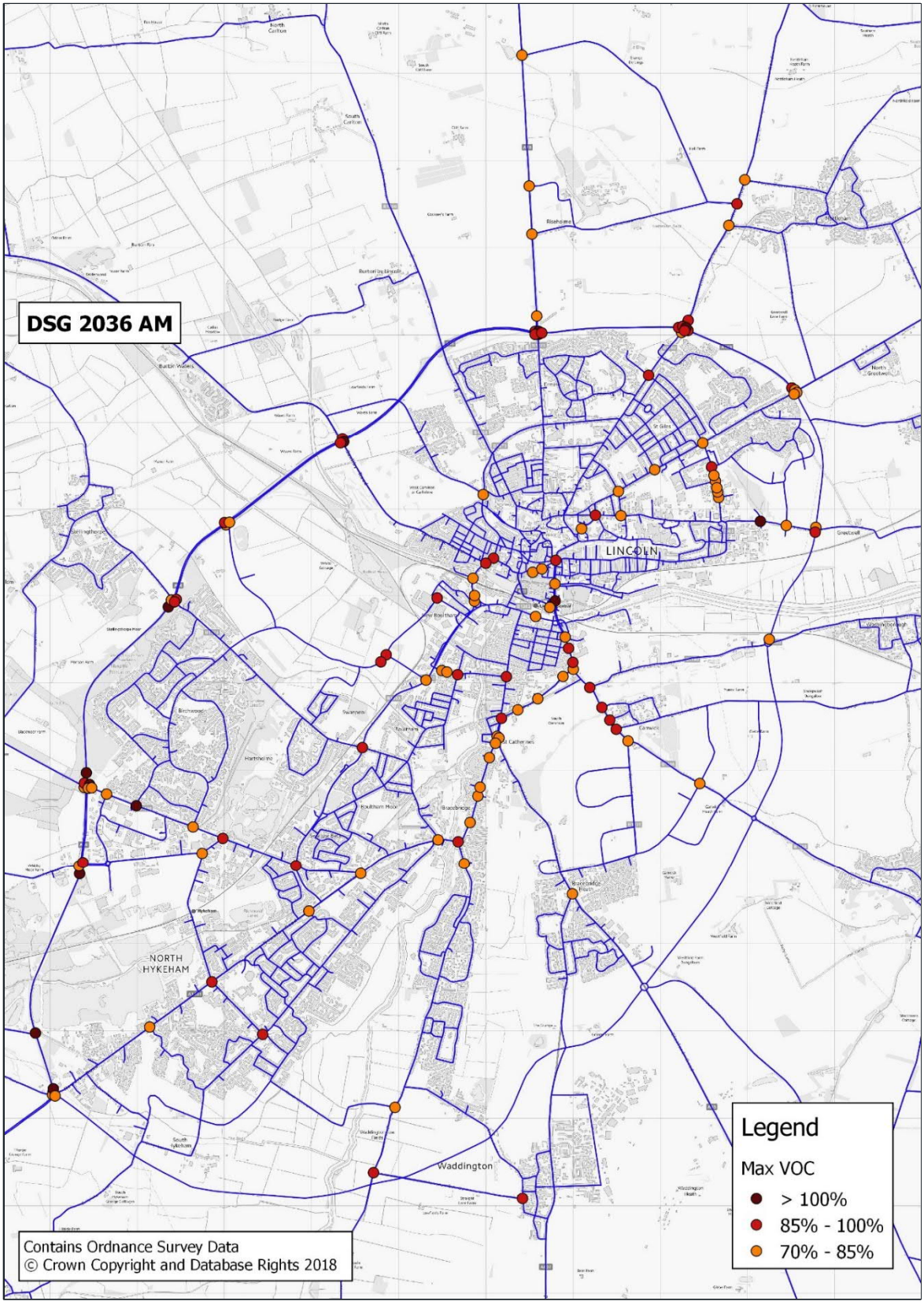
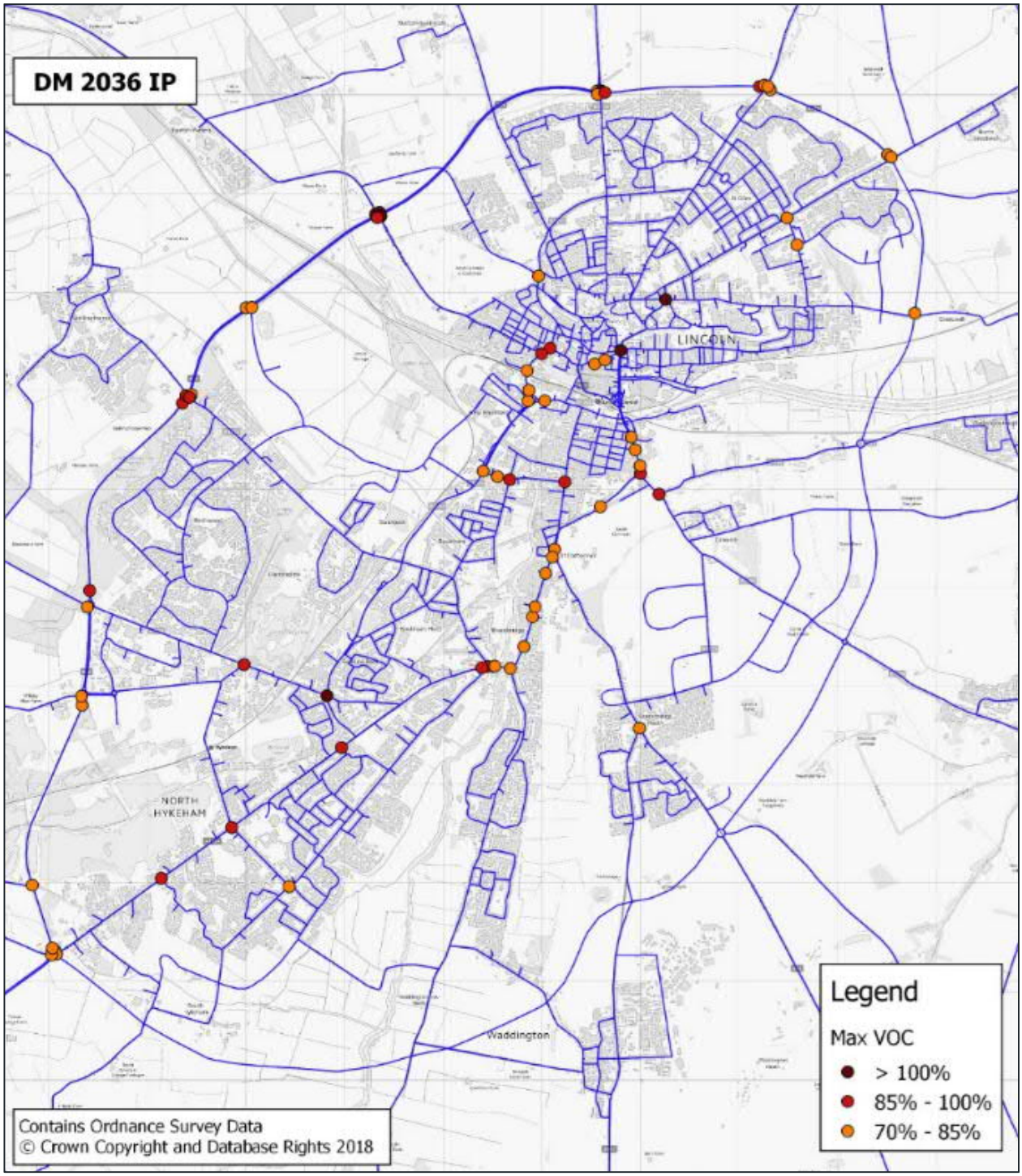


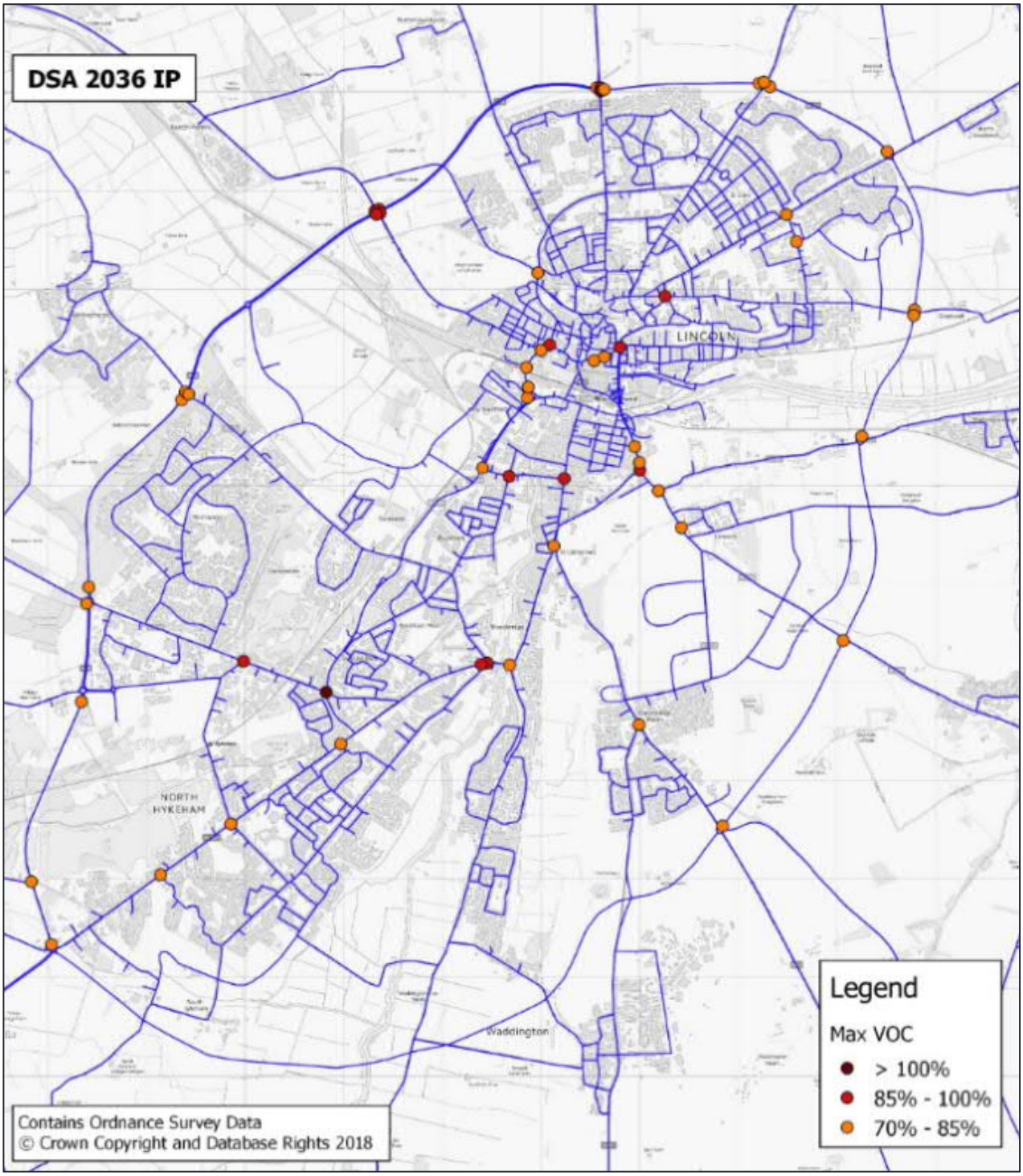
Junction congestion 2036 AM Peak, Option G



Junction congestion 2036 IP, Do Minimum



Junction congestion 2036 IP, Option A



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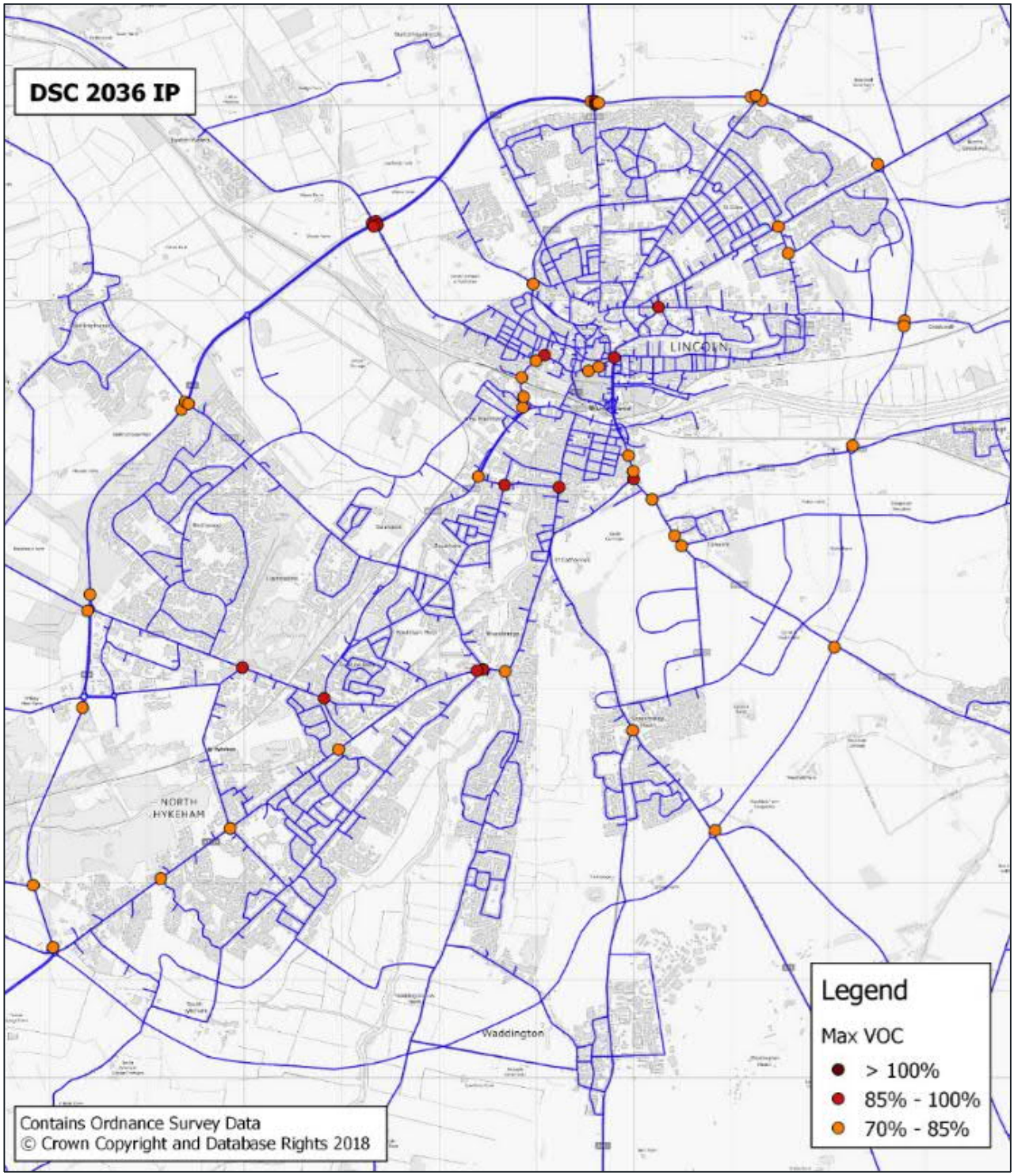

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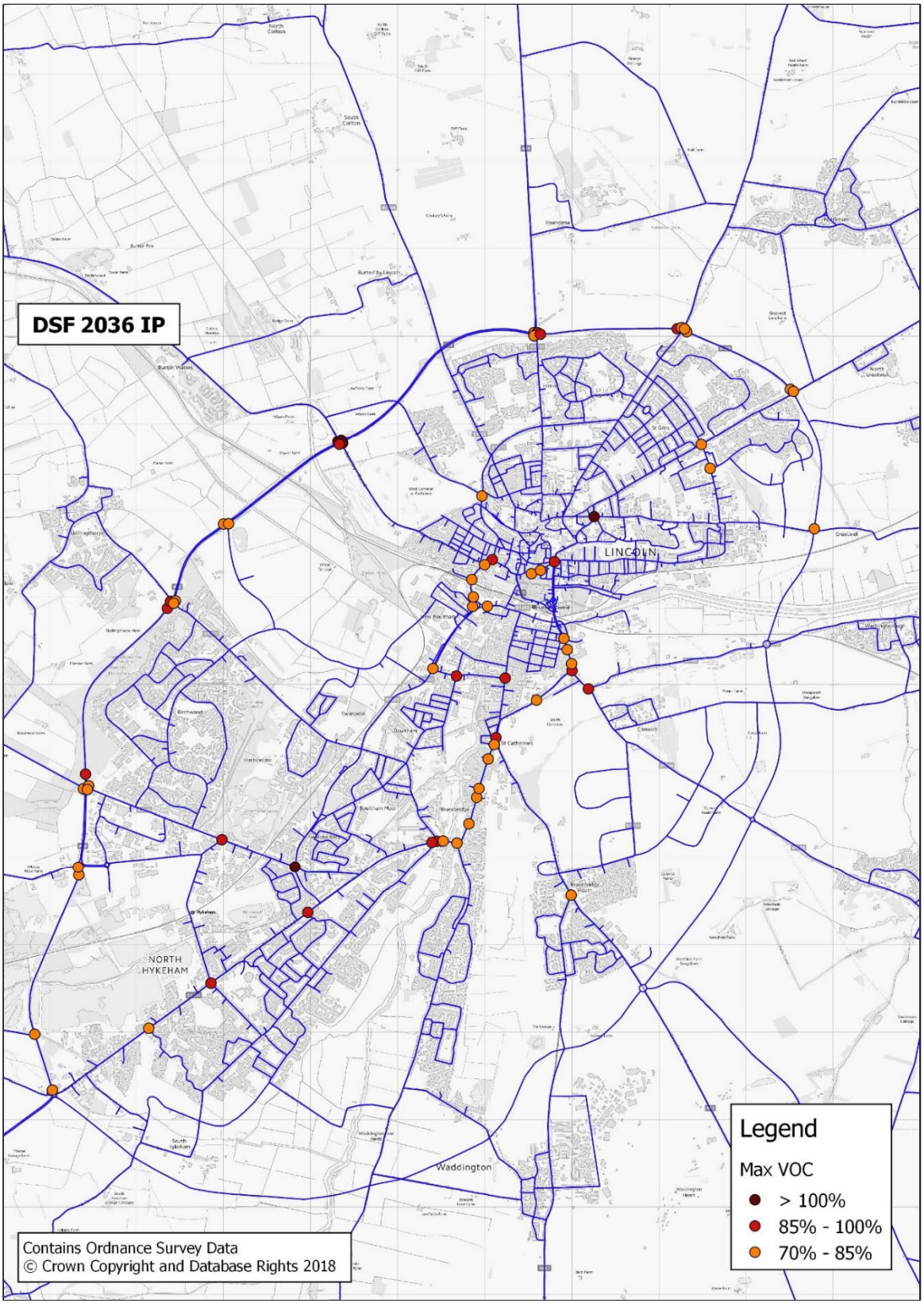

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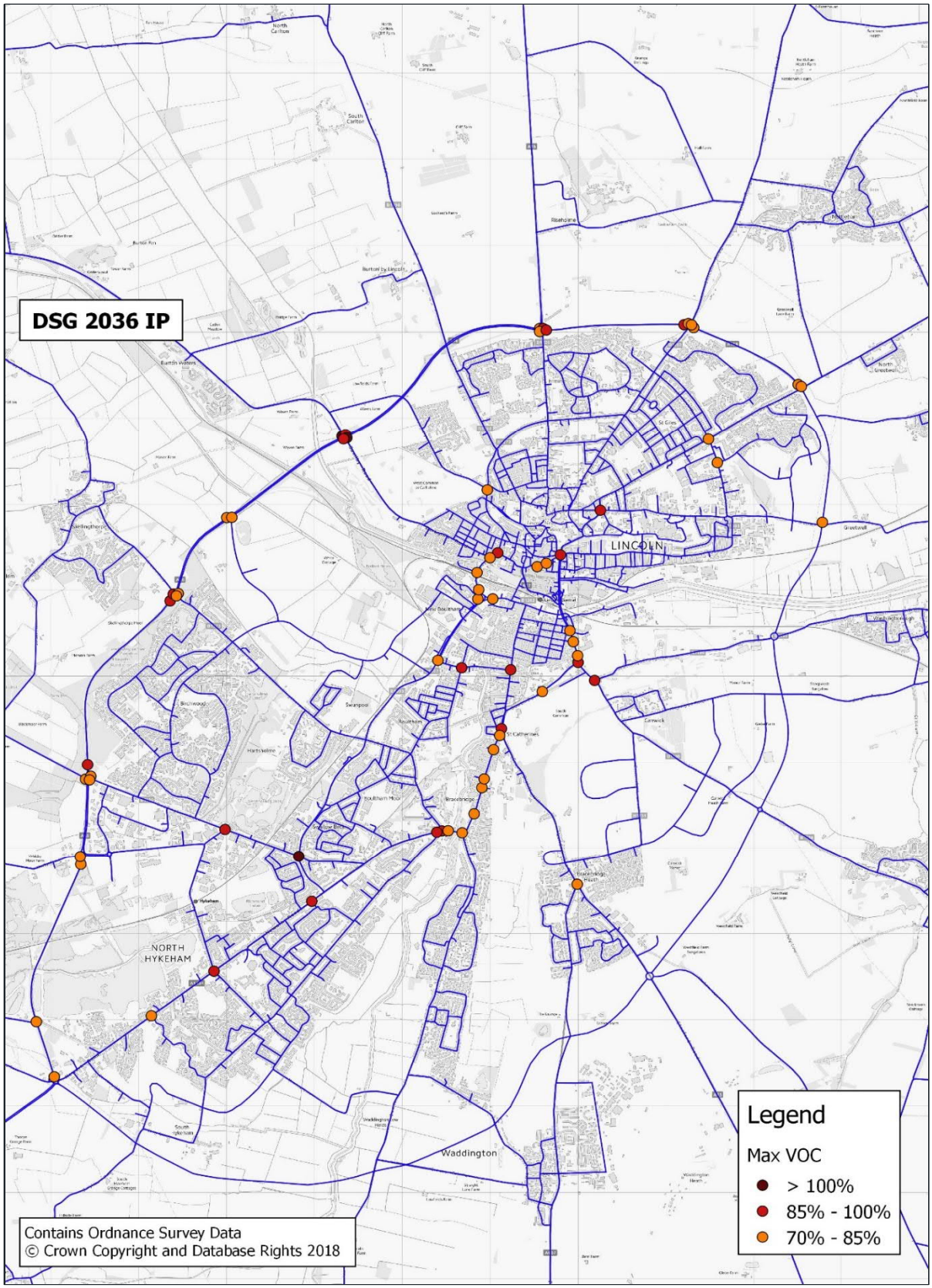
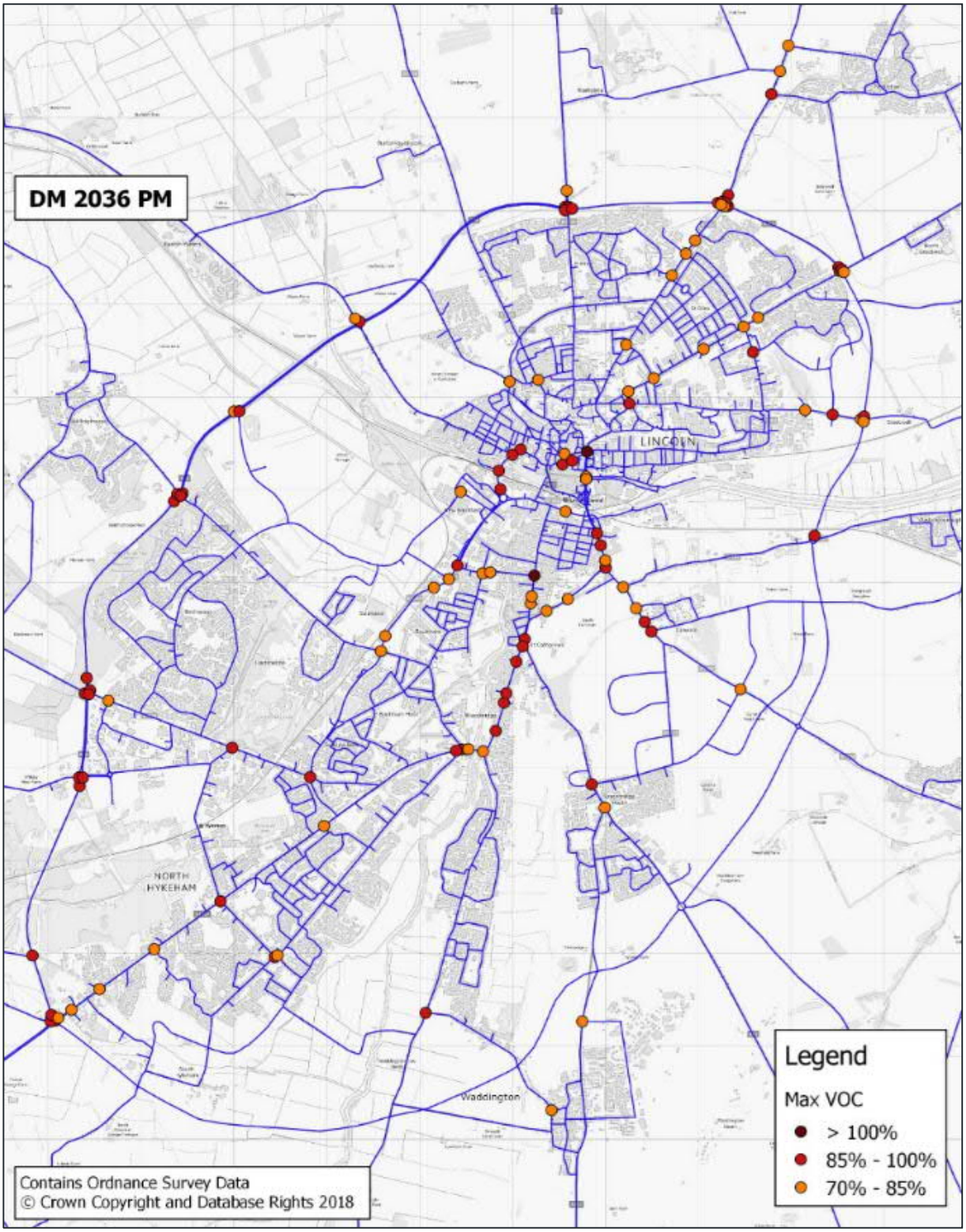
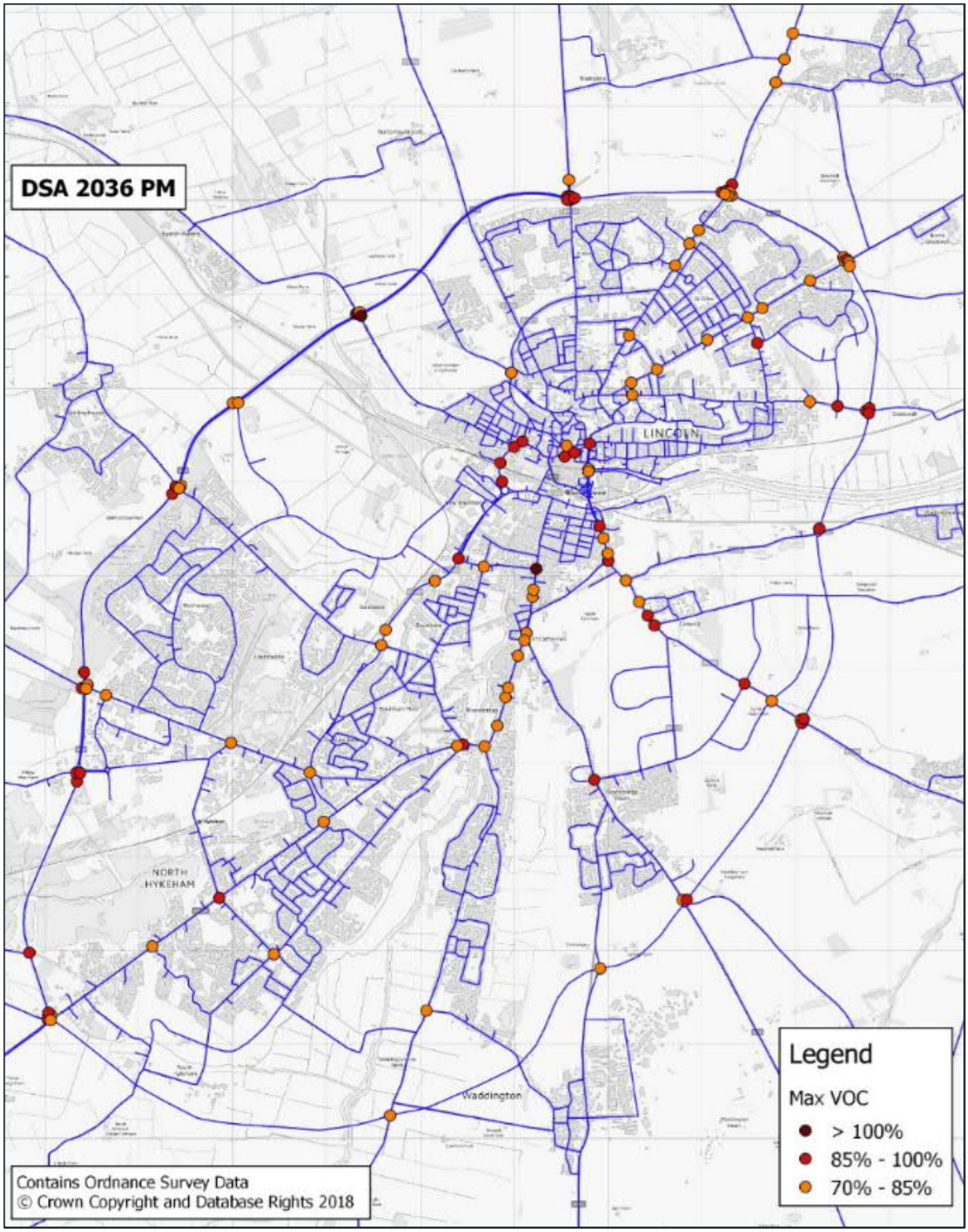


Junction congestion 2036 PM Peak, Do Minimum



Junction congestion 2036 PM Peak, Option A



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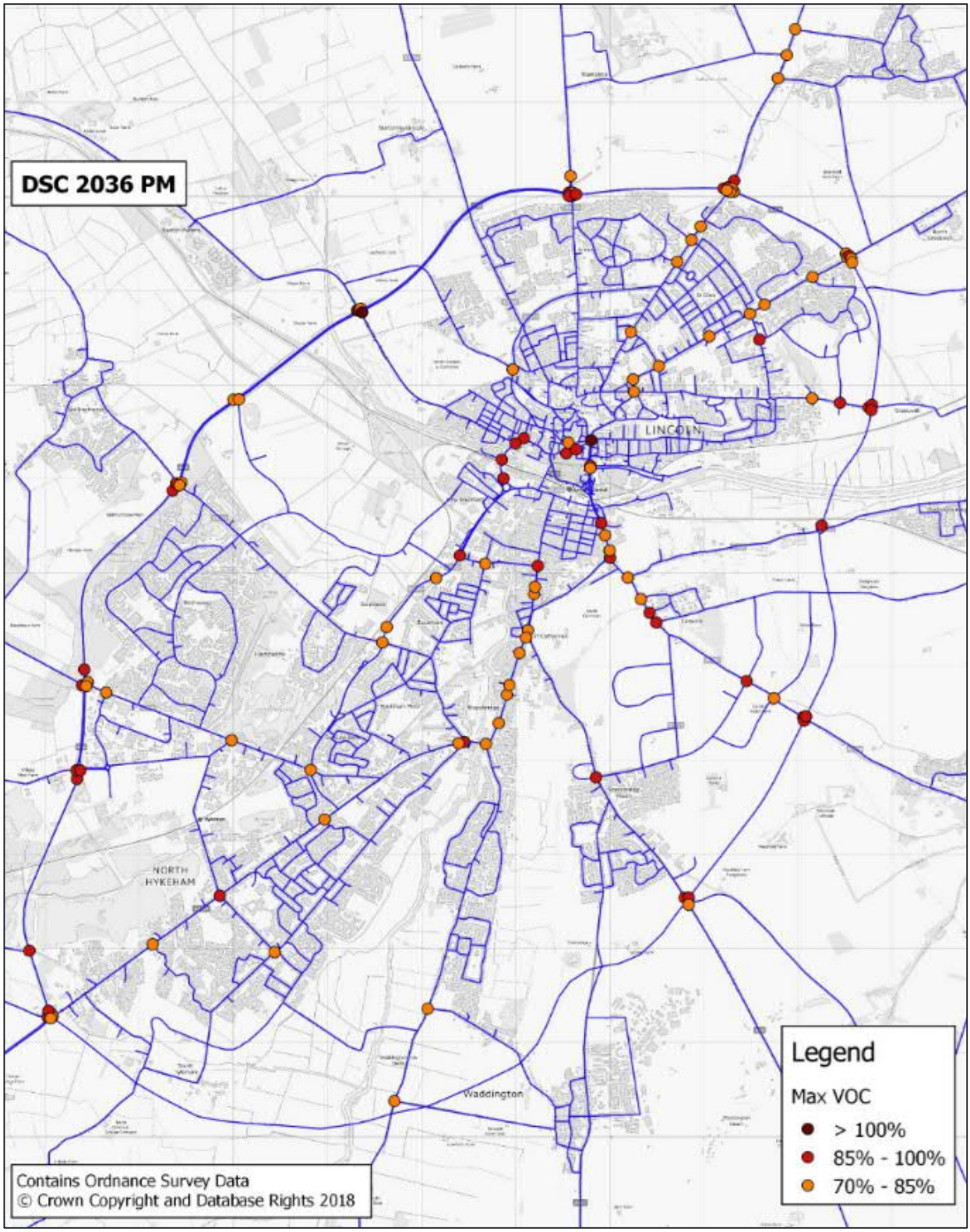

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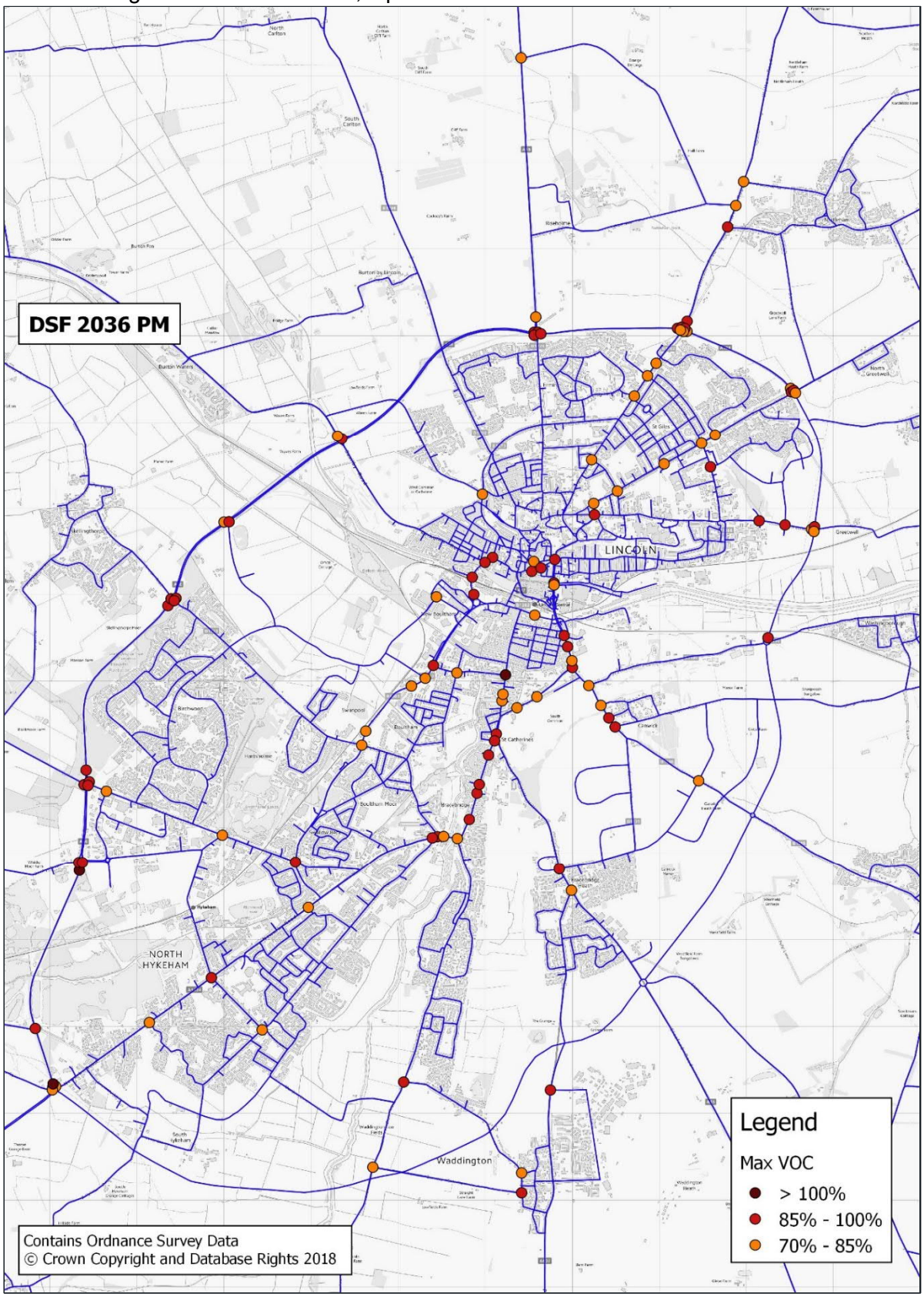

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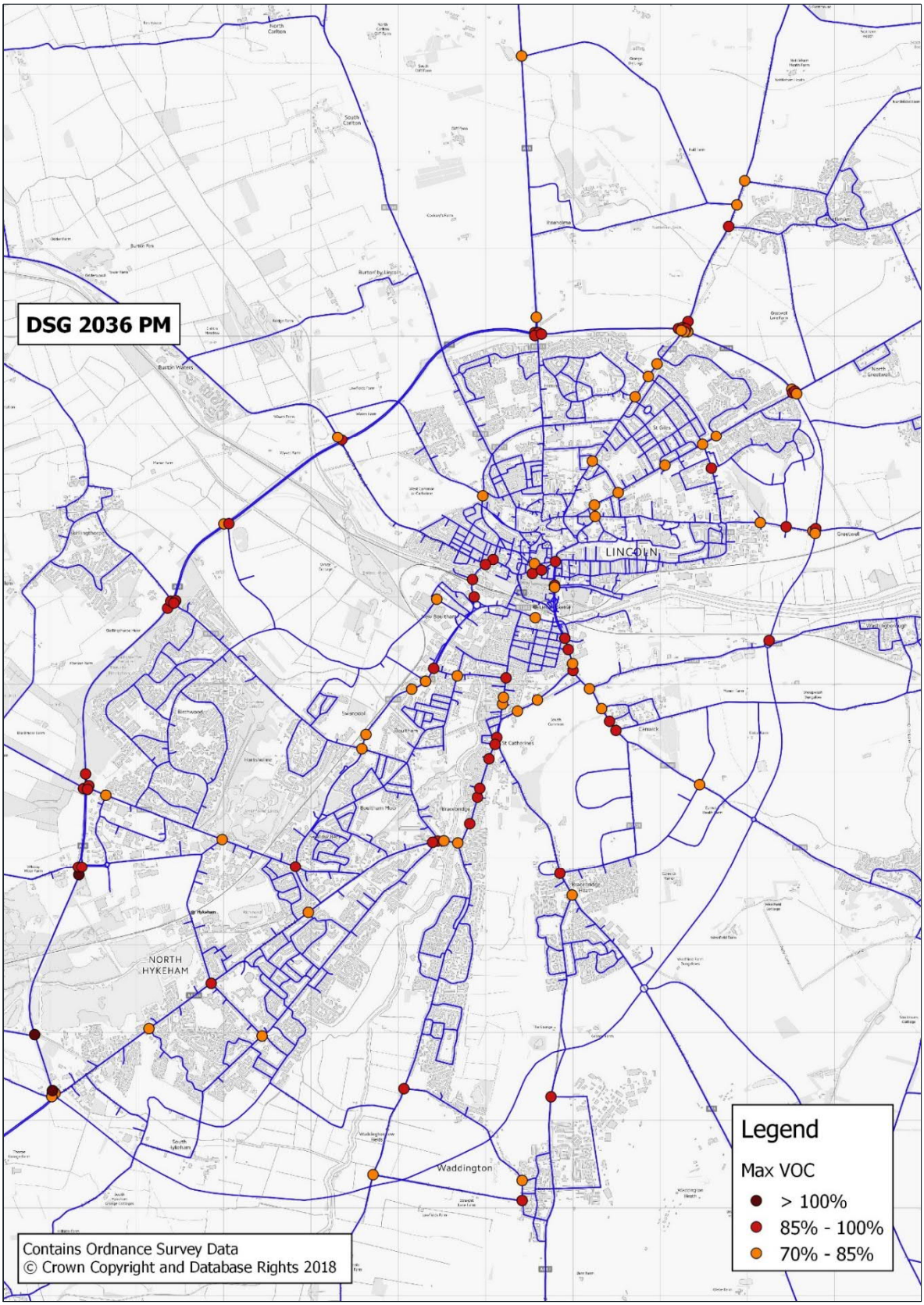

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