Local Plan Transport Modelling Forecasting Report (T4) Addendum

DATE:	03 October 2019	**CONFIDENTIALITY:**	Confidential
SUBJECT:	Local Plan Transport Modelling Forecasting Report (T4) Addendum		
PROJECT:	Coventry Air Quality	**AUTHOR:**	[redacted]
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INTRODUCTION

WSP were commissioned by Coventry City Council (CCC) to support them with their Local Air Quality Plan submission to the Joint Air Quality Unit (JAQU). WSP's support is focused on providing transport modelling services and outputs to assess the impacts of potential interventions to improve air quality within the City of Coventry. We have provided traffic data from the transport model to feed into air quality modelling being undertaken by Atkins. The transport model which has been used is the strategic transport model, Coventry Area Strategic Model (CASM).

WSP developed the CASM to support CCC Local Plan and Highway England's (HE) M6 Junction 2 to 4 Smart motorway scheme. CASM currently has a base year of 2013 and forecast years of 2021 and 2031 and has been developed further for the purposes of the air quality assessments.

As part of the JAQU Evidence Package there are a range of Transport Modelling Deliverables that have been prepared. These are listed below:

- Local Plan Transport Modelling Tracking Tables (T1)
- Local Plan Transport Model Validation Report (T2)
- Local Plan Transport Modelling Methodology Report (T3)
- Local Plan Transport Model Forecasting Report (T4)

These reports provide more information on the structure of CASM and the background of the development of the model.

This is an Addendum to the Local Plan Transport Model Validation Repot (T4) which presented the results for the following scenarios:

- Do Minimum **(DM):** early measures air quality interventions
- DS2b **(Benchmark CAZ)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures.
- DS13L **(Preferred Option)**: Do Something with early measures and CCC package of interventions
- DS14 **(JAQU Direction)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures and CCC package of interventions.

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This report is structured into the following sections:

- CASM Transport Demand Model (TDM)
- CASM Highway Assignment Model (HAM) Inputs
- 2021 Results
- 2031 Results

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CASM TRANSPORT DEMAND MODEL

Introduction

This section presents the demand / supply convergence results of the TDM model runs.

Demand/Supply Convergence Results

This section outlines the demand/supply convergence results for each of the Do Minimum (DM) and Do Something (DS) scenarios for each of the forecast years. The scenarios which required a TDM model run are the following for both 2021 and 2031:

- DM: Do Minimum with early measures air quality interventions
- DS2b **(Benchmark CAZ)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures.

All scenarios to meet DfT requirement to have a % Gap of lower than 0.2%

2021 DS2b (Benchmark CAZ)

The demand/supply convergence results for the 2021 DS2b scenario are shown in **Table 1** with the Forecasting Model reaching a gap of 0.19% after 9 iterations.

Table 1: 2021 DS 2b Demand/Supply Convergence

Iteration	% Gap
7	0.31
8	0.26
9	**0.19**

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2031 DS2b (Benchmark CAZ)

The demand/supply convergence results for the 2031 DS 2b scenario are shown in **Table 2**; the Forecasting Model reached a gap of 0.16% after 5 iterations.

Table 2: 2031 DS 2b Demand/Supply Convergence

Iteration	% Gap
3	0.23
4	0.24
5	**0.16**

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HAM INPUTS

Introduction

This section outlines HAM inputs for the following DS Scenarios:

- **DS2b (Benchmark CAZ)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures.
- **DS13L (Preferred Option):** Do Something with early measures and CCC package of interventions
- **DS14 (JAQU Direction)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures and CCC package of interventions.

DS2b (CAZ D Benchmark) Scenario

A daily 'toll' charge of £8.00 for cars and LGVs and £50 for HGVs was assumed as a one-way entry charge to links crossing the proposed CAZ cordon shown in . The Coventry CAZ D behaviour response has been based on the Birmingham CAZ D response summarised in **Table 3**.

Note that the only difference is the car pay charge and avoid/ mode shift percentages. This assumes that higher proportions of non-compliant vehicles in Coventry will pay the charge, when compared to Birmingham due to poorer level of service offered by public transport and alternative roads for traffic to divert around the Coventry CAZ D.

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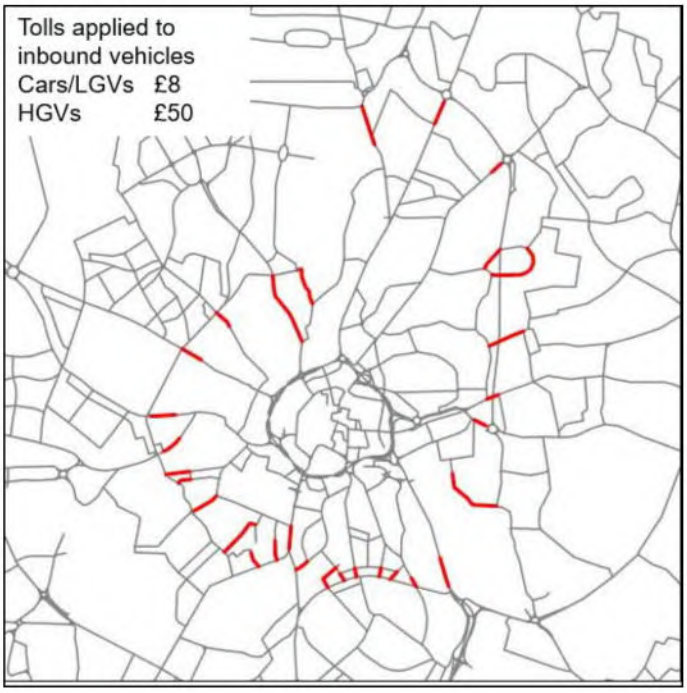

Figure 1: CAZ D Wider Coventry Area

Table 3: Coventry CAZ D Response

Response	Coventry CAZ D			Birmingham CAZ D		
	Car	LGV	HGV	Car	LGV	HGV
Pay Charge	34%	48%	11%	12%	48%	11%
Avoid Zone (Change Route)	20%	27%	27%	16%	27%	27%
Avoid Zone (Change Destination)				6%	0%	0%
Mode Shift				19%	0%	0%
Cancel Trip	14%	0%	0%	14%	0%	0%
Replace Vehicle (Upgrade)	32%	25%	62%	32%	25%	62%

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DS13L (Preferred Option) Scenario

The DS13L scenario comprised the following assumptions:

- Vehicle ban along Holyhead Road 8:00-13:00 inbound 13:00-18:00 outbound
- Closure of Barras Lane to Holyhead Road
- Connecting Coundon Road via Hill Street onto inner ring road junction on slip (left in left out)
- Spon End / Old Allesley Road Signal Optimisation
- Spon End scheme
- Junction 7 improvement Inner Ring Road
- New cycle infrastructure within Coundon area
- Queen Victoria Public Realm Scheme
- HGV band on Foleshill Road and right turn banned from Cash's Lane to Foleshill Road

DS14 (JAQU Direction) Scenario

The DS14 scenario comprised the following assumptions:

- Vehicle ban on peak direction along Holyhead Road
- AM Inbound direction
- PM Outbound direction
- Closure of Barras Lane to Holyhead Road
- Connecting Coundon Road via Hill Street onto inner ring road junction on slip (left in left out)
- Spon End / Old Allesley Road Signal Optimisation
- Spon End scheme
- Junction 7 improvement Inner Ring Road
- A daily 'toll' charge of £8.00 for cars and LGVs and £50 for HGVs was assumed as a one-way entry charge to links crossing CAZ cordon in DS2b as shown in
- New cycle infrastructure within Coundon area
- CAZ D behaviour response based on the Birmingham CAZ D response summarised in Table 9

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2021 HAM RESULTS

Introduction

This section covers the results of the 2021 CASM forecasting the future year scenarios:

- Do Minimum **(DM):** early measures air quality interventions
- DS2b **(Benchmark CAZ)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures.
- DS13L **(Preferred Option)**: Do Something with early measures and CCC package of interventions
- DS14 **(JAQU Direction)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures and CCC package of interventions.

In summary the results which are presented within this chapter are:

- CAZ Behaviour Response
- CASM HAM changes between DM and DS scenarios in:
  - Traffic Flows
  - Vehicle / KMs

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CAZ Behavioural Responses

The number of non-compliant car trips going to zones within the CAZ in the DM, DS 2b and DS 14 (both having similar wider CAZ D charging boundary) were analysed and are presented in **Table 4** to **Table 6**.

Table 4: AM Peak 2021 Non-Compliant Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	2,537	659	3196
DS 2b	565	520	1,085
DS 14	565	520	1,085

Table 5: Inter Peak 2021 Non-Compliant Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	1,540	681	2,221
DS 2b	188	469	657
DS 14	188	469	657

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Table 6: PM Peak 2021 Non-Compliant Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	1,778	715	2,493
DS 2b	324	553	876
DS 14	324	553	876

The tables show that in all time periods the volumes of trips going to zones within the CAZ reduces significantly particularly from those from outside the CAZ when the charging is active. This is to be expected as the cost of the toll is significantly deterring vehicles from entering the area.

Table 7 show the responses that would occur because of a CAZ and those which are occurring within CASM and how they compare to Birmingham CAZ response. This table only presents the movements into the CAZ.

Table 7: 2021 CAZ D Behavioural Responses to City Centre Zones within CAZ D Boundary

Scenario	Time Period	Car CASM Model pay Charge	Birmingham CAZ Pay Charge	Car CASM Model Avoid	Birmingham CAZ Avoid
2021 DS 2b	AM	34%	12%	20%	42%
	IP	32%		24%	
	PM	35%		19%	
	24 AADT	32%		22%	
2021 DS 14	AM	34%		20%	
	IP	32%		24%	
	PM	35%		19%	
	24 AADT	32%		22%	

The table above shows that the CASM model compared to Birmingham CAZ response is that higher proportion of non-compliant vehicles in Coventry will prepare to pay the charge, when compared to Birmingham due to poorer level of service offered by public transport and alternative roads for traffic to divert around the Coventry CAZ.

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CASM HAM Results

INTRODUCTION

The impacts of the TDM were applied to only the non-compliant user classes within the CASM HAMs as the non-compliant vehicles will be the user class which will be affected by the toll charges of the CAZ.

The 2021 CASM HAM results are presented and analysed for the following four scenarios:

- DM
- DS 2b
- DS 13L
- DS 14

These scenarios are compared against each other and the 2013 Base Year model. Comparisons have been made for the following:

- Traffic Flows
- Vehicle Kilometres

AM PEAK TRAFFIC FLOWS

Traffic flows within Coventry City centre and specifically the air quality receptor locations provided to us by the Atkins air quality team have been extracted from the following CASM HAM models for all three time periods to assess how volumes of traffic change in the future:

- 2013 Base Year
- 2021 DM
- 2021 DS 2b
- 2021 DS 13L
- 2021 DS 14

Figure 2 and **Table 8** present the key air quality receptors within Coventry. These locations were provided to WSP by Atkins air quality team. The traffic flow results at each of these locations are presented in **Table 9** to for each of the time periods respectively.

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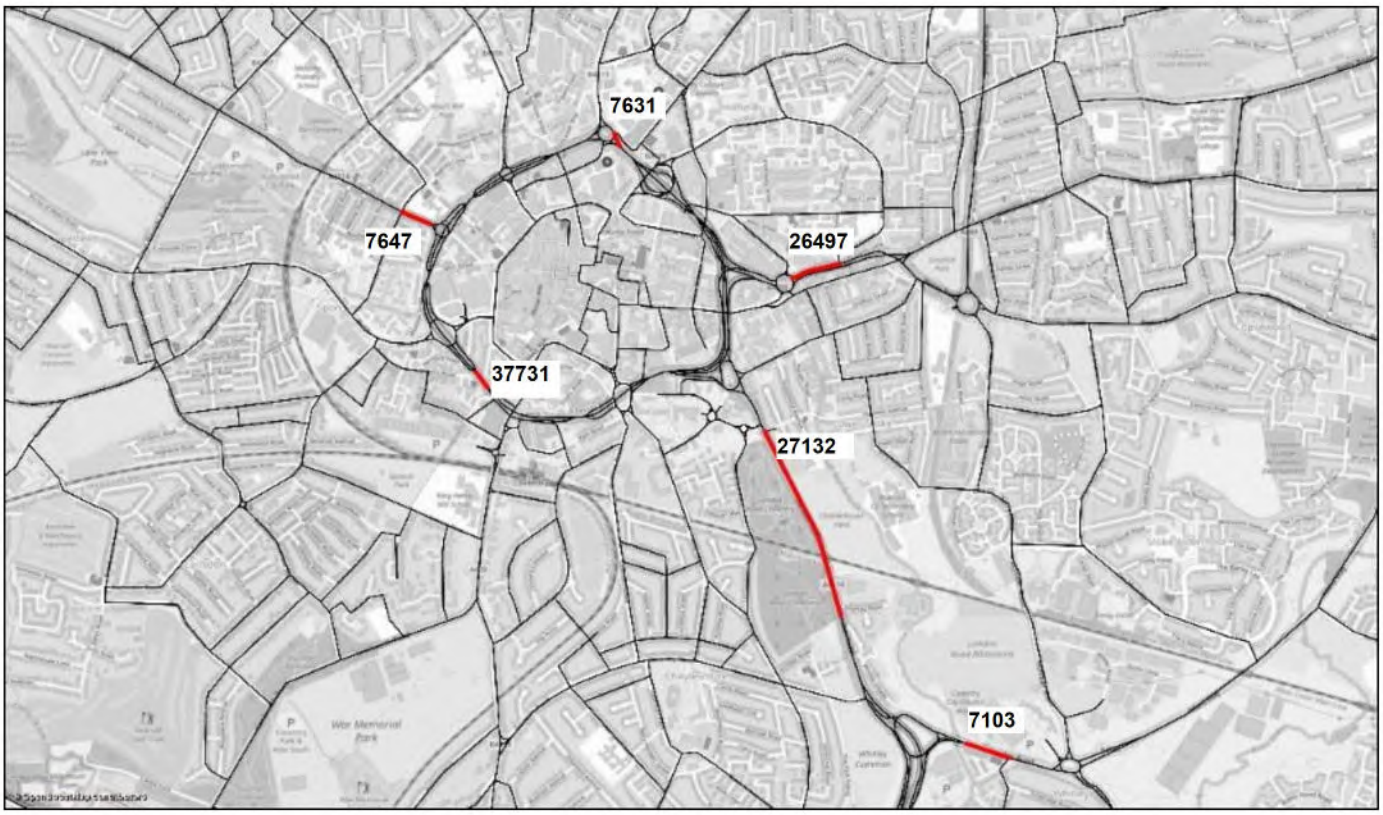

Figure 2: Key Air Quality Receptors

Table 8: Key Air Quality Receptor Road Names

Receptor Number	Road Name
7103	A4082 London Road
7631	A4053 Ringway Swanswell
7647	A4114 Holyhead Road
26497	A4600 Sky Blue Way
27132	A4114 London Road
37731	A4053 Ringway Queens

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Table 9 presents the volumes of traffic in all scenarios for the AM peak for the key air quality receptors.

Table 9: AM Peak 2021 Traffic Flow Analysis

Road ID	2013 BY	2021 DM	2021 DS2b	2021 DS13L	2021 DS14	DM minus 2013	DS2b minus DM	DS13L minus DM	DS14 minus DM	% increase from 2013 to 2021 DM	% increase from 2021 DM to 2021 DS2b	% increase from 2021 DM to 2021 DS13L	% increase from 2021 DM to 2021 DS14
A4082 London Road EB	1477	1150	1156	1160	1168	-327	6	10	18	-22.14%	0.52%	0.87%	1.57%
A4082 London Road WB	1886	2179	2131	2154	2136	293	-48	-25	-43	15.54%	-2.20%	-1.15%	-1.97%
A4053 Ringway Swanswell SB	1980	2570	2441	2425	2516	590	-129	-145	-54	29.80%	-5.02%	-5.64%	-2.10%
A4053 Ringway Swanswell NB	1459	1633	1470	1613	1480	174	-163	-20	-153	11.93%	-9.98%	-1.22%	-9.37%
A4114 Holyhead Road EB	1264	1494	1483	0	0	230	-11	-1494	-1494	18.20%	-0.74%	-100.00%	-100.00%
A4114 Holyhead Road WB	1243	1239	1085	978	905	-4	-154	-261	-334	-0.32%	-12.43%	-21.07%	-26.96%
A4600 Sky Blue Way EB	1938	2038	1920	2036	1938	100	-118	-2	-100	5.16%	-5.79%	-0.10%	-4.91%
A4600 Sky Blue Way WB	1838	1811	1746	1814	1760	-27	-65	3	-51	-1.47%	-3.59%	0.17%	-2.82%
A4114 London Road NB	1687	1682	1678	1695	1641	-5	-4	13	-41	-0.30%	-0.24%	0.77%	-2.44%
A4114 London Road SB	1839	1779	1712	1736	1657	-60	-67	-43	-122	-3.26%	-3.77%	-2.42%	-6.86%
A4053 Ringway Queens NB	2605	2732	2434	2638	2431	127	-298	-94	-301	4.88%	-10.91%	-3.44%	-11.02%
A4053 Ringway Queens SB	2333	2753	2598	2376	2243	420	-155	-377	-510	18.00%	-5.63%	-13.69%	-18.53%

Table 9 shows that generally between 2021 DM and 2013 Base Year there are increases in traffic flow at most locations. DS 2b reduces the traffic in all locations by up to 12%, with the only exception to this being A4082 London Road where these is a very minor increase, 0.5%. Traffic flow reductions in DS 14 are generally very similar to those in DS 2b except at Holyhead Road which is similar to DS13L reduction in traffic on both A4114 Holyhead Road EB and A4053 SB which is a result of the closure of Holyhead Road in the inbound direction during the AM peak.

The following present the changes in traffic flow across Coventry local authority for AM peak for the following scenarios:

- 2021 DS 2b – 2021 DM
- 2021 DS 13L – 2021 DM
- 2021 DS 14 – 2021 DM

The differences are presented showing the differences in both all vehicles and non-compliant vehicles. The red bars refer to a reduction in flow and green an increase.

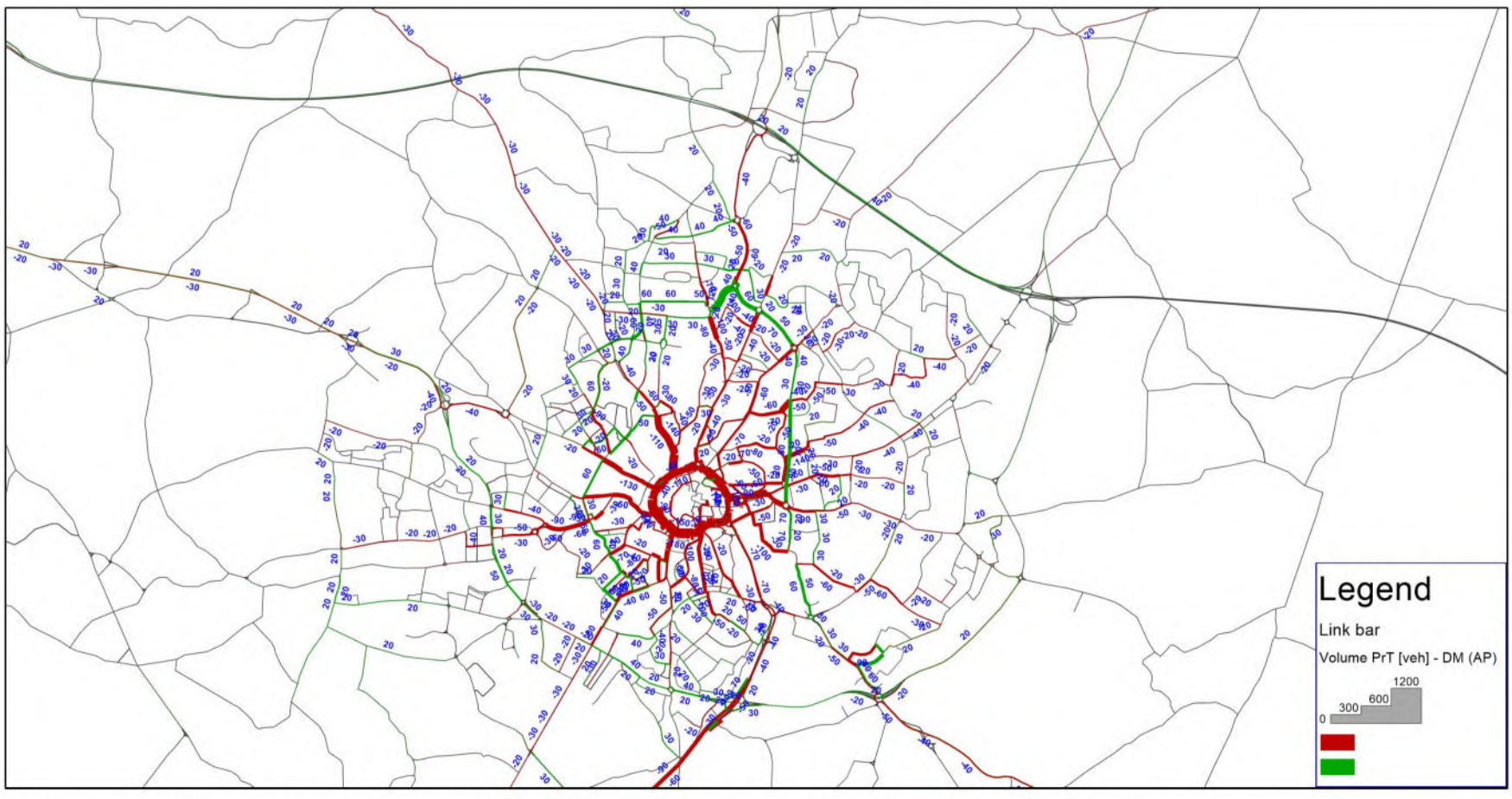

Figure 3: AM peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (All vehicles)

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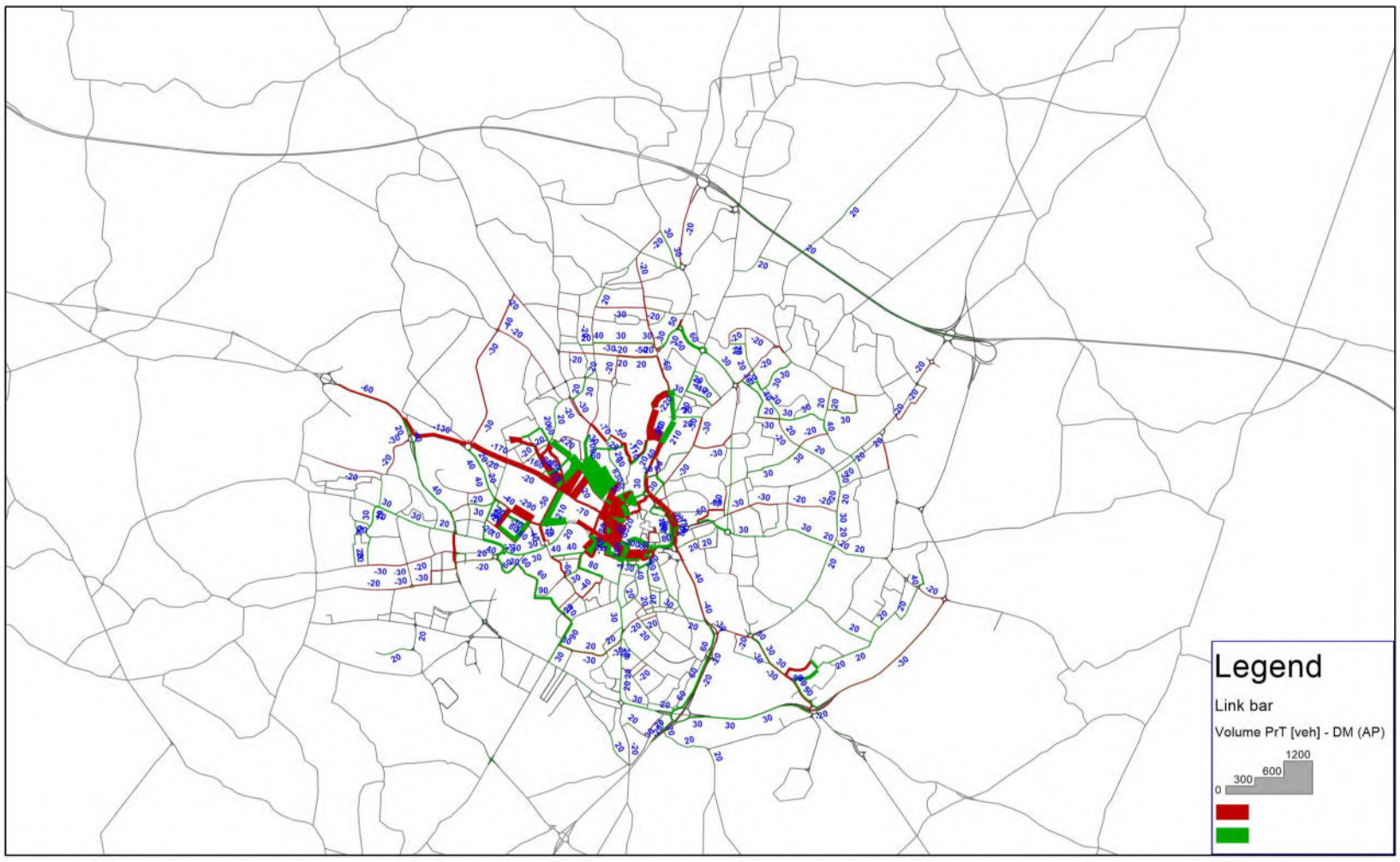

Figure 4: AM peak Flow Differences between 2021 DS CAZ DS 13L and 2021 DM Scenario (All vehicles)

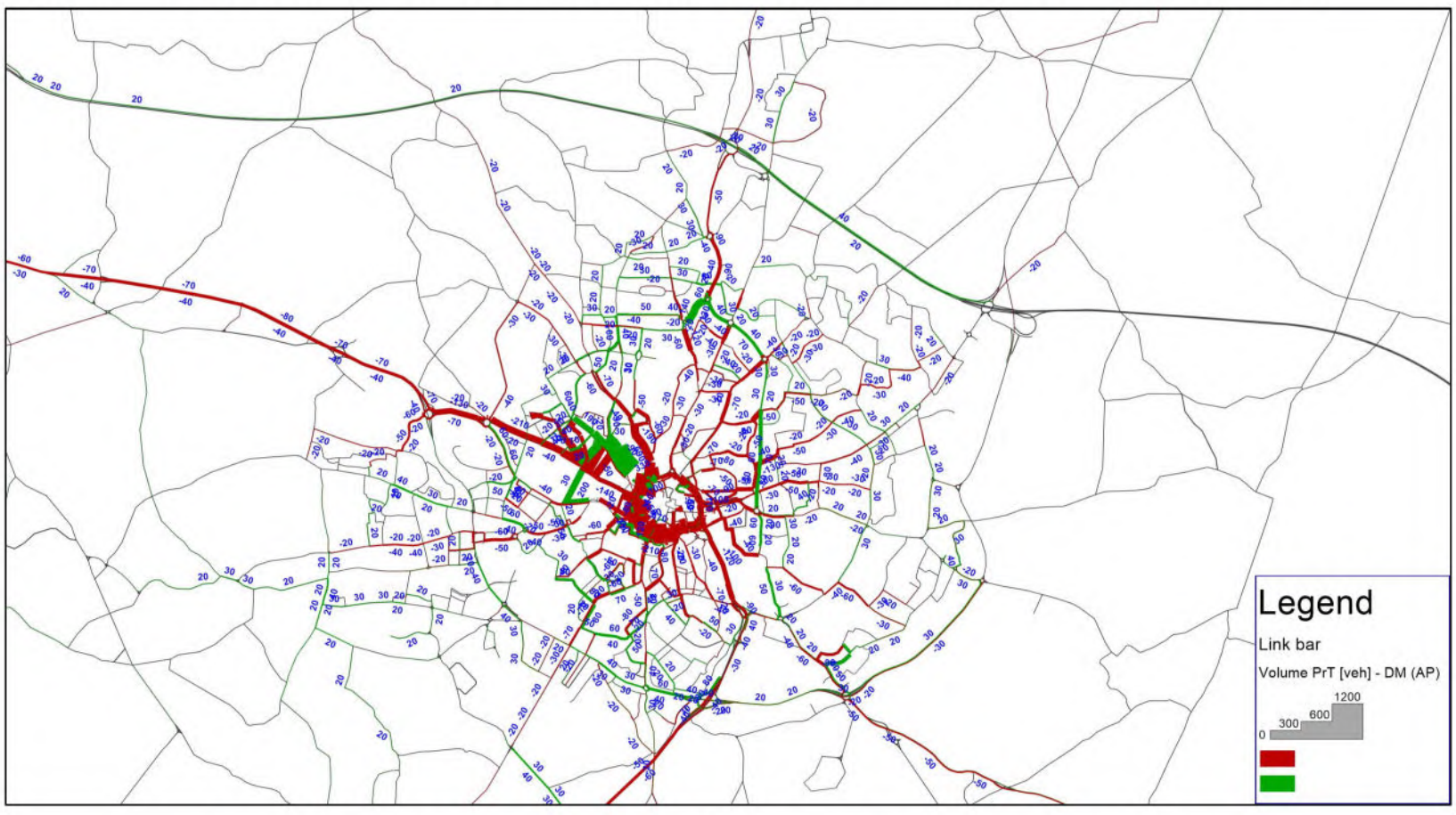

Figure 5: AM peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (All vehicles)

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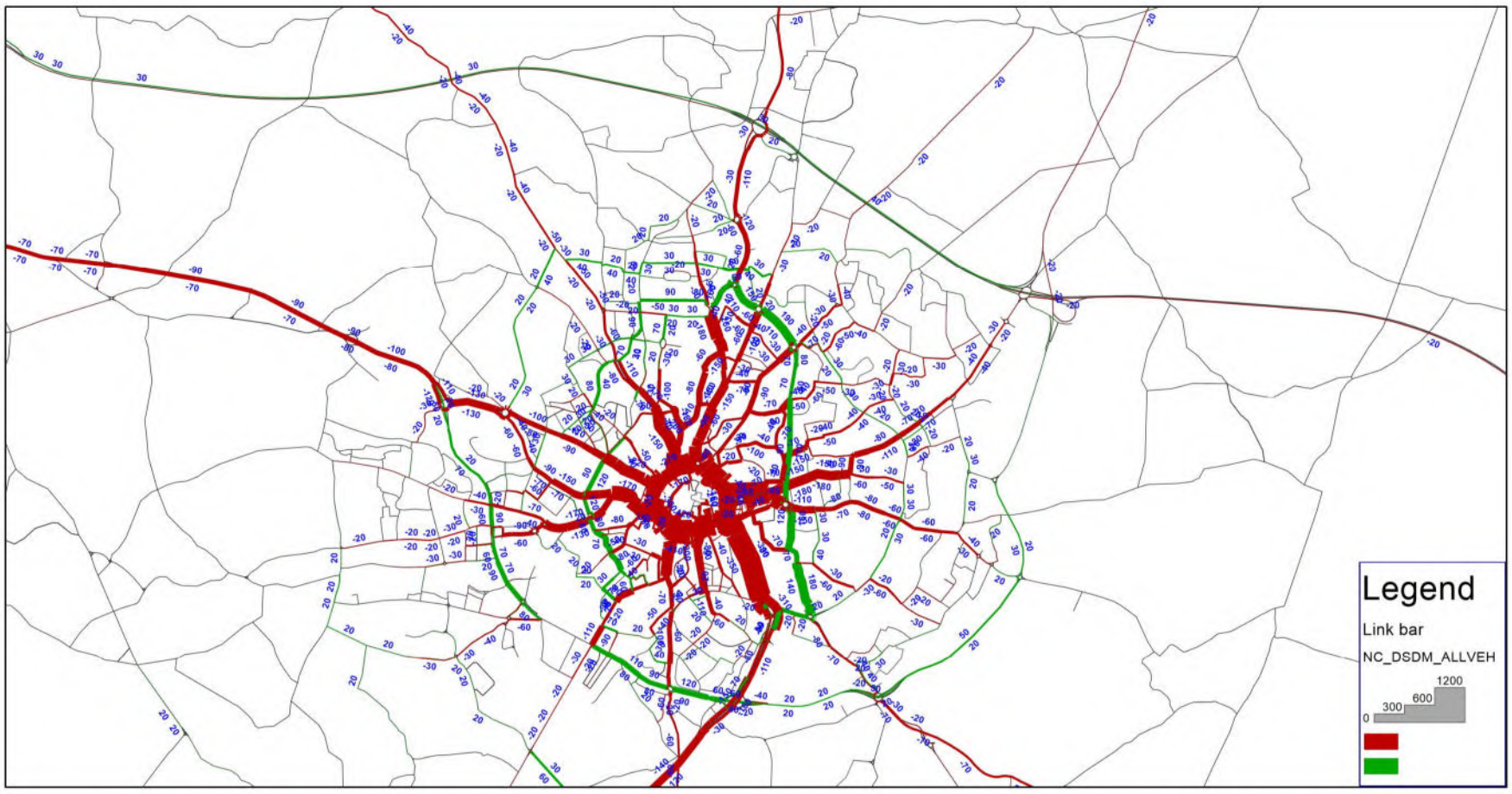

Figure 6: AM peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non- Compliant vehicles)

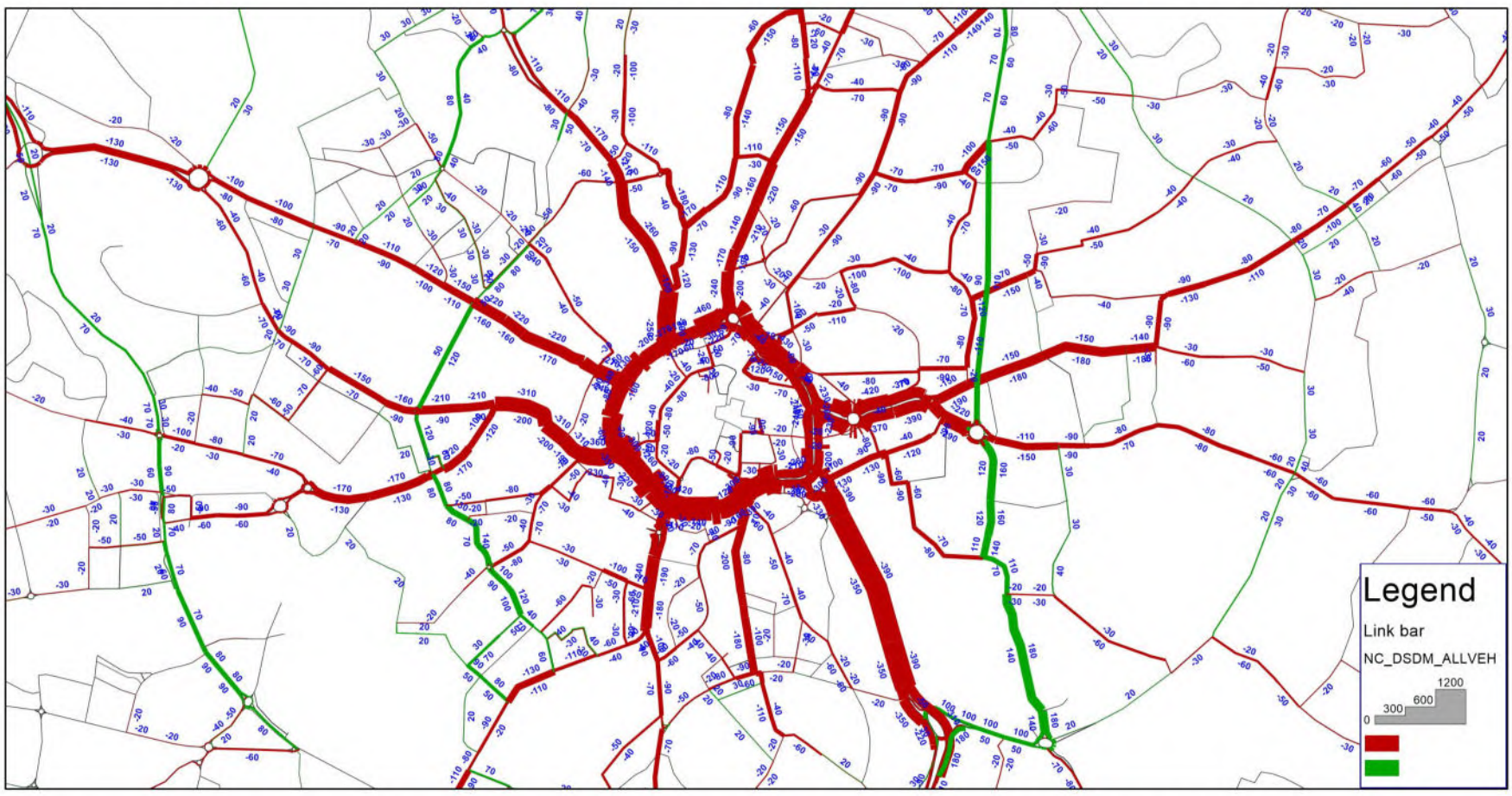

Figure 7: AM peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non- Compliant vehicles) City Centre

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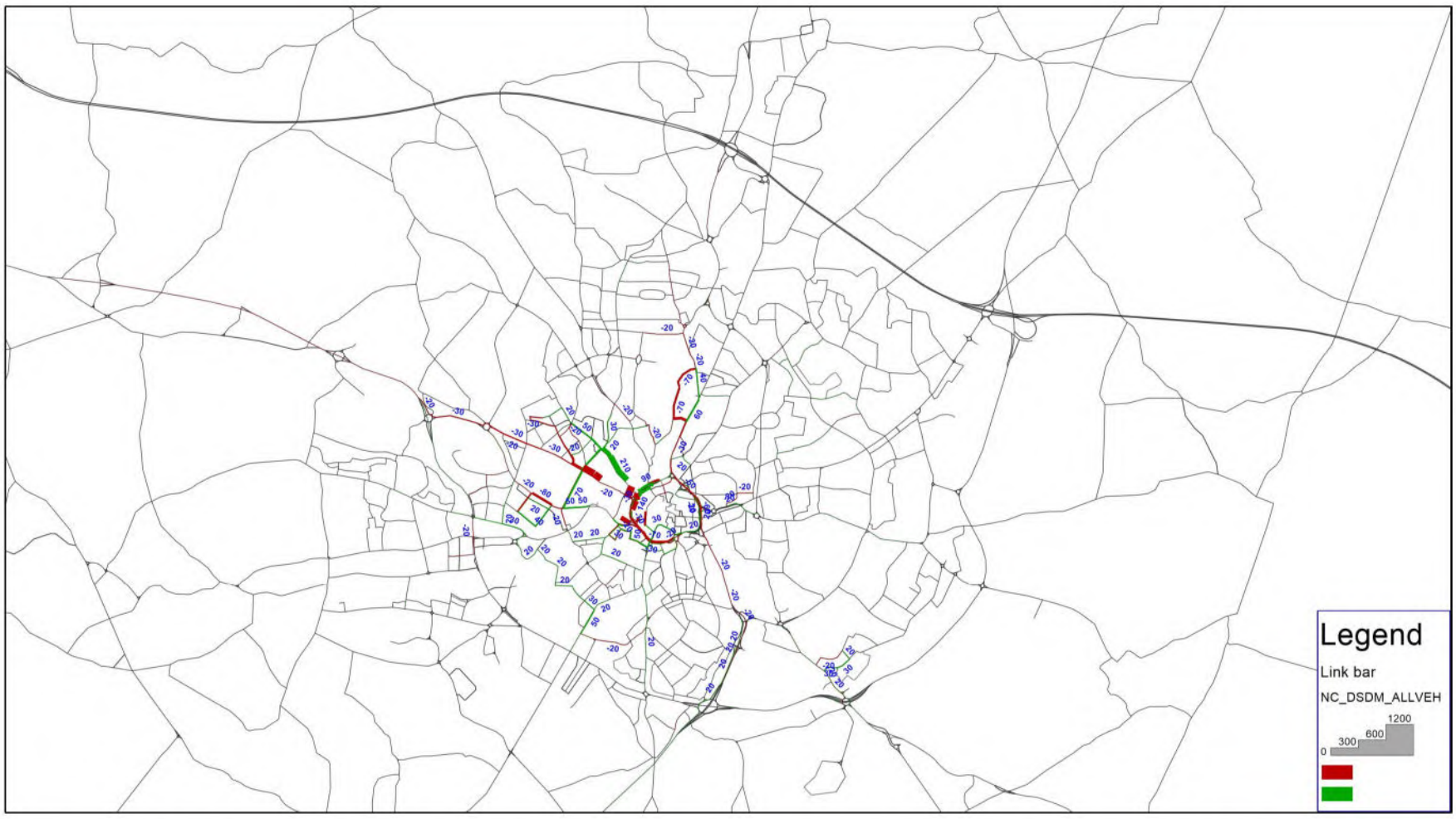

Figure 8: AM peak Flow Differences between 2021 DS 13L and 2021 DM Scenario (Non- Compliant vehicles)

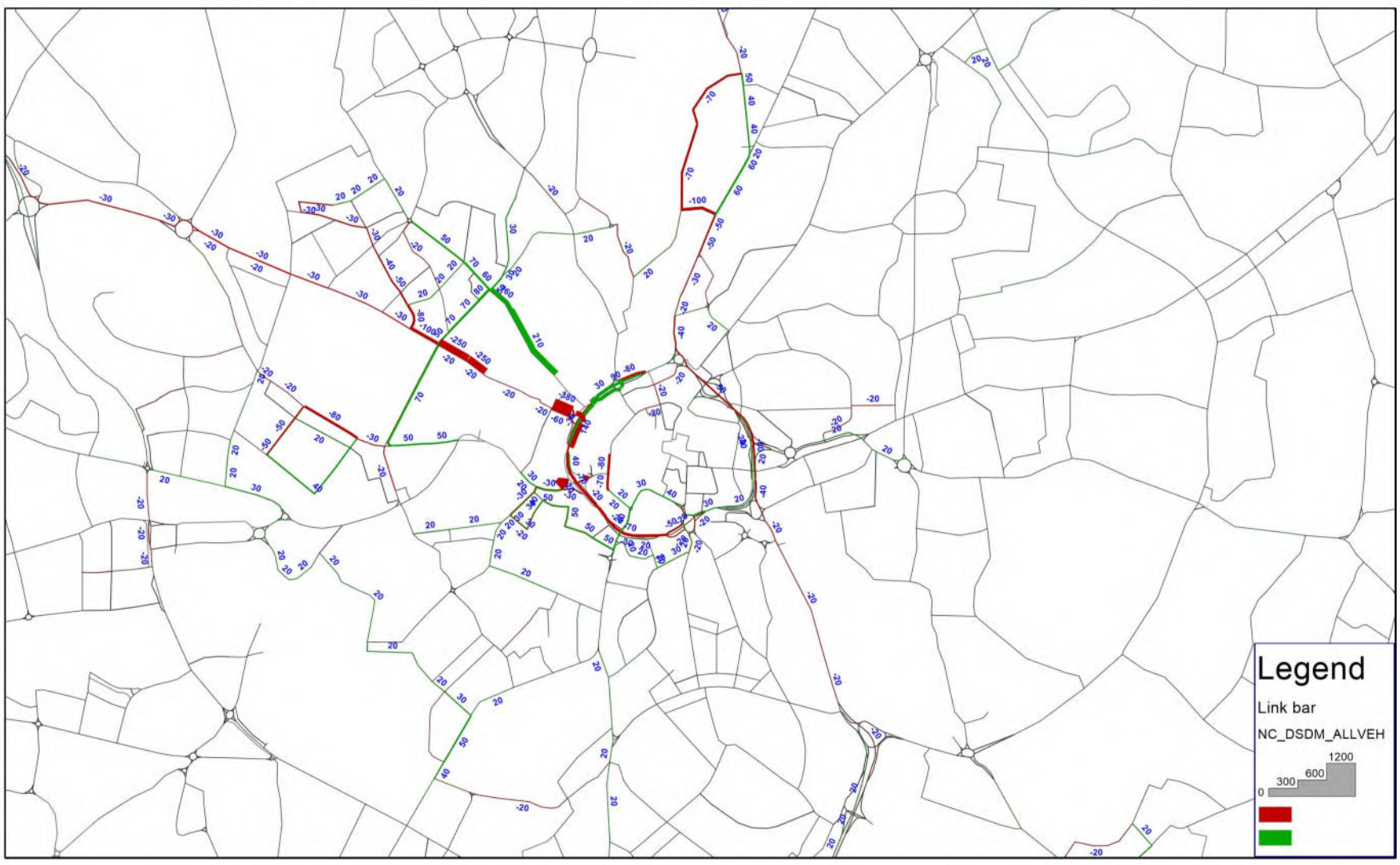

Figure 9: AM peak Flow Differences between 2021 DS 13L and 2021 DM Scenario (Non- Compliant vehicles) City Centre

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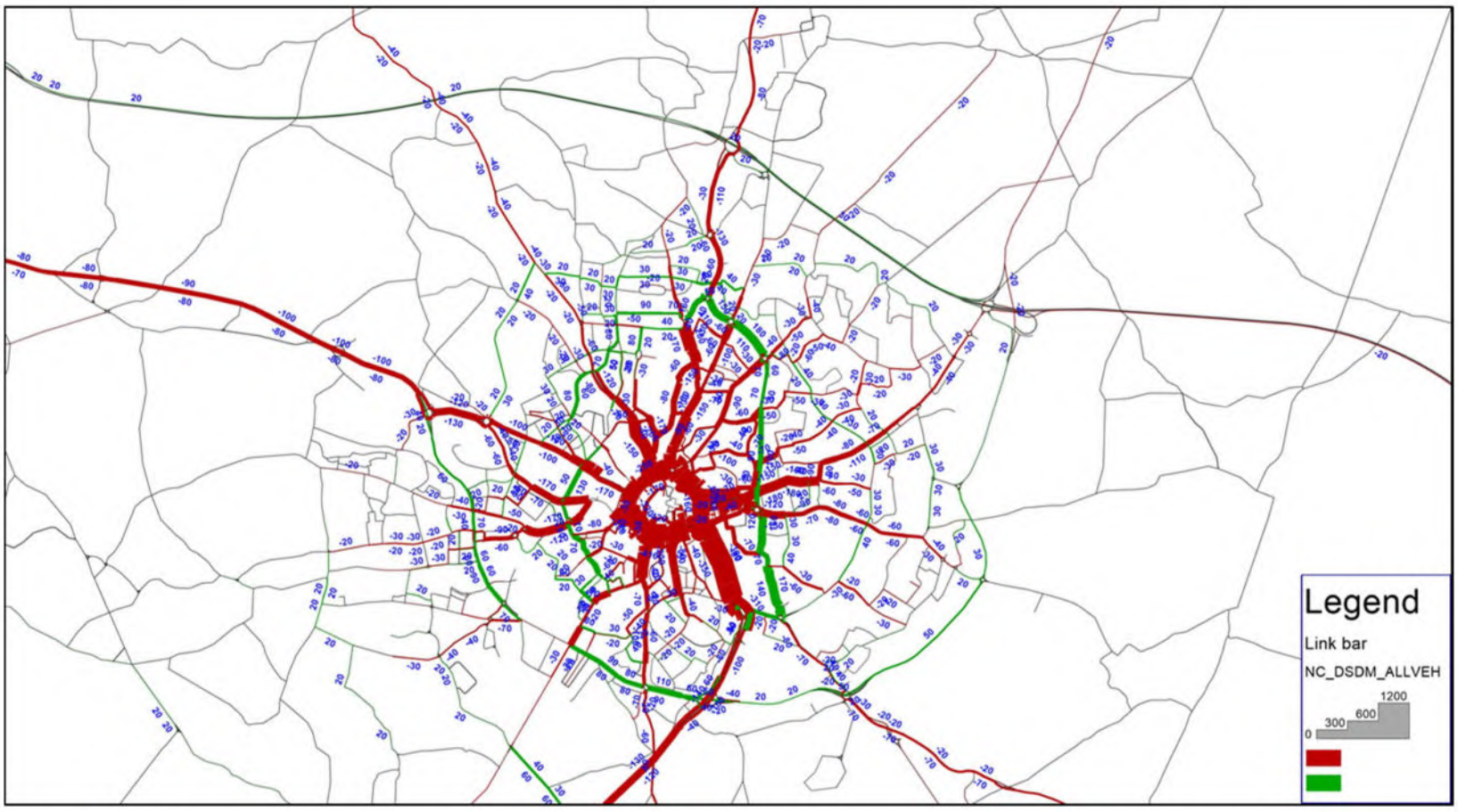

Figure 10: AM peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (Non- Compliant vehicles)

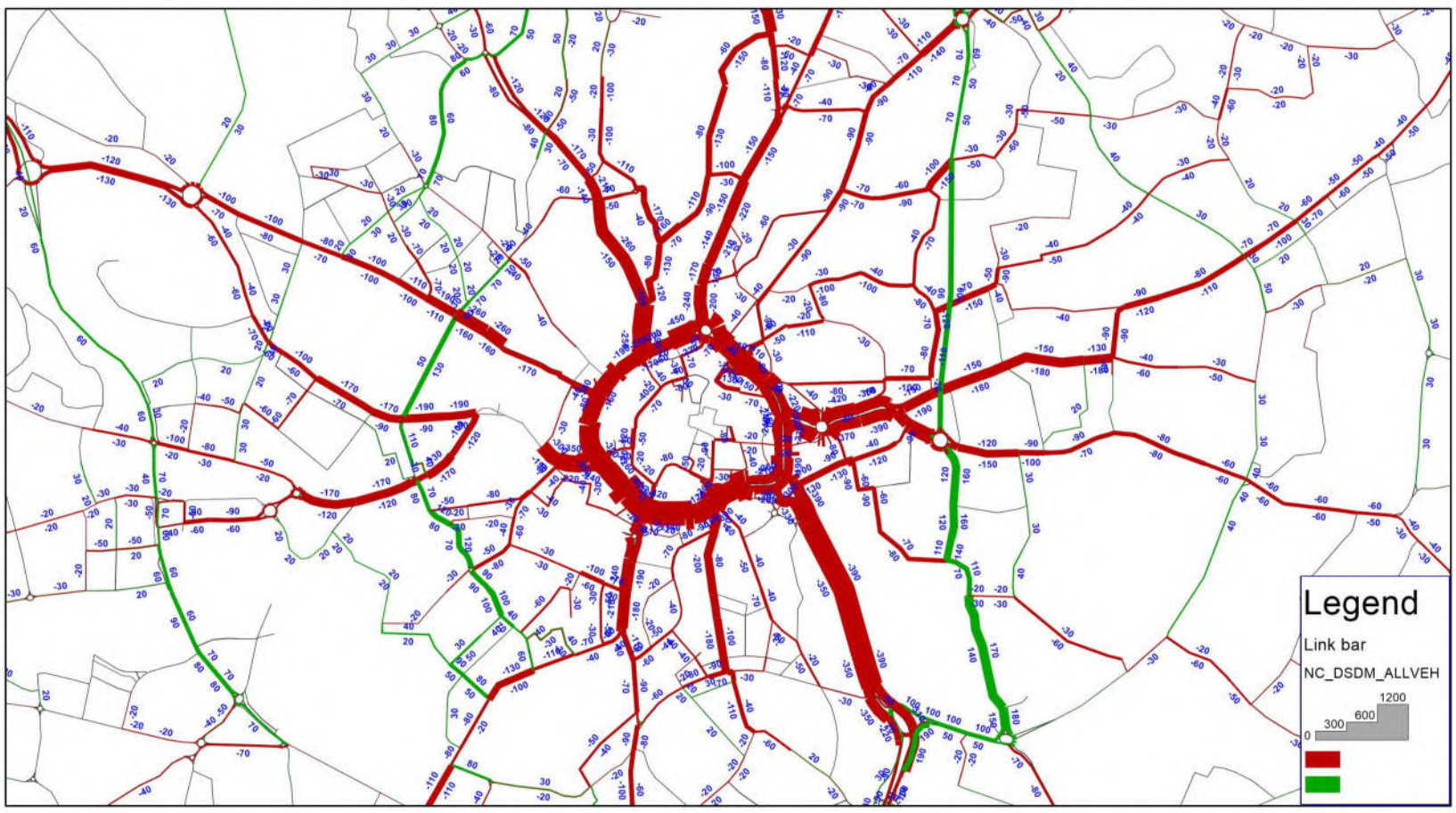

Figure 11: AM peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (Non- Compliant vehicles) City Centre

Figure 6 to **Figure 11** show that changes in all vehicles in DS 2b and DS 14 in non-compliant vehicles are more are focused within the centre of Coventry around the CAZ area, with reductions of vehicles within the CAZ and increases outside the CAZ area. This is to be expected as the CAZ specifically targets non-compliant vehicles. The DS 13L scenario, however, targets non-compliant only at Holyhead Road section together with highway interventions and hence there are only slight reductions as shown in **Figure *8*** and **Figure *9***.

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INTERPEAK TRAFFIC FLOWS

Regarding CCC interventions for scenario DS13L in the Inter Peak, there are two separate tests which ban traffic along Holyhead Road in inbound and outbound direction. These scenarios will be addressed as DS13L HHIB and HHOB respectively. **Table 10** presents the volumes of traffic in all scenarios for the Inter peak for the key air quality receptors only.

Table 10: Inter Peak 2021 Traffic Flow Analysis

Road ID	2013 BY	2021 DM	2021 DS2b	2021 DS13L HHIB	2021 DS13L HHOB	2021 DS14	DM minus 2013	DS2b minus DM	DS13L HHIB minus DM	DS13L HHOB minus DM	DS14 minus DM	% increase from 2013 to 2021 DM	% increase from 2021 DM to 2021 DS2b	% increase from 2021 DM to 2021 DS13L HHIB	% increase from 2021 DM to 2021 DS13L HHOB	% increase from 2021 DM to 2021 DS14
A4082 London Road EB	1233	1337	1281	1323	1349	1278	104	-56	-14	12	-59	8.43%	-4.19%	-1.05%	0.90%	-4.41%
A4082 London Road WB	1302	1460	1454	1466	1463	1456	158	-6	6	3	-4	12.14%	-0.41%	0.41%	0.21%	-0.27%
A4053 Ringway Swanswell SB	1548	1635	1488	1672	1707	1593	87	-147	37	72	-42	5.62%	-8.99%	2.26%	4.40%	-2.57%
A4053 Ringway Swanswell NB	1143	1411	1310	1244	999	1312	268	-101	-167	-412	-99	23.45%	-7.16%	-11.84%	-29.20%	-7.02%
A4114 Holyhead Road EB	1057	1130	1024	0	843	777	73	-106	-1130	-287	-353	6.91%	-9.38%	-100.00%	-25.40%	-31.24%
A4114 Holyhead Road WB	1189	1209	1081	1120	0	1044	20	-128	-89	-1209	-165	1.68%	-10.59%	-7.36%	-100.00%	-13.65%
A4600 Sky Blue Way EB	1392	1558	1457	1522	1558	1469	166	-101	-36	0	-89	11.93%	-6.48%	-2.31%	0.00%	-5.71%
A4600 Sky Blue Way WB	1360	1532	1346	1559	1522	1348	172	-186	27	-10	-184	12.65%	-12.14%	1.76%	-0.65%	-12.01%
A4114 London Road NB	1118	1340	1198	1365	1308	1206	222	-142	25	-32	-134	19.86%	-10.60%	1.87%	-2.39%	-10.00%
A4114 London Road SB	1279	1344	1197	1320	1365	1201	65	-147	-24	21	-143	5.08%	-10.94%	-1.79%	1.56%	-10.64%
A4053 Ringway Queens NB	2050	1823	1597	1995	1995	1650	-227	-226	172	172	-173	-11.07%	-12.40%	9.43%	9.43%	-9.49%
A4053 Ringway Queens SB	1194	2079	1824	1720	1879	1761	885	-255	-359	-200	-318	74.12%	-12.27%	-17.27%	-9.62%	-15.30%

Table 10 shows that generally between 2021 DM and 2013 Base Year there are increases in traffic flow at most locations. There is a significant increase on A4053 Ringway Queens SB as a result of the changes in highway layout in the Friar Gate area with Warwick Road becoming a one-way road. DS CAZ D reduces the traffic in all locations of up to 12%, with the only exception to this being A4082 London Road where these is a very minor increase, 0.41%. In DS13L HHIB and HHOB, there were mostly decreases in traffic when compared to 2021 DM, except one substantial increase of nearly 10% on A4053 Ringway Queens NB. In 2021 DS14, traffic at all location experience reduction up to 31% (Holyhead Road EB).

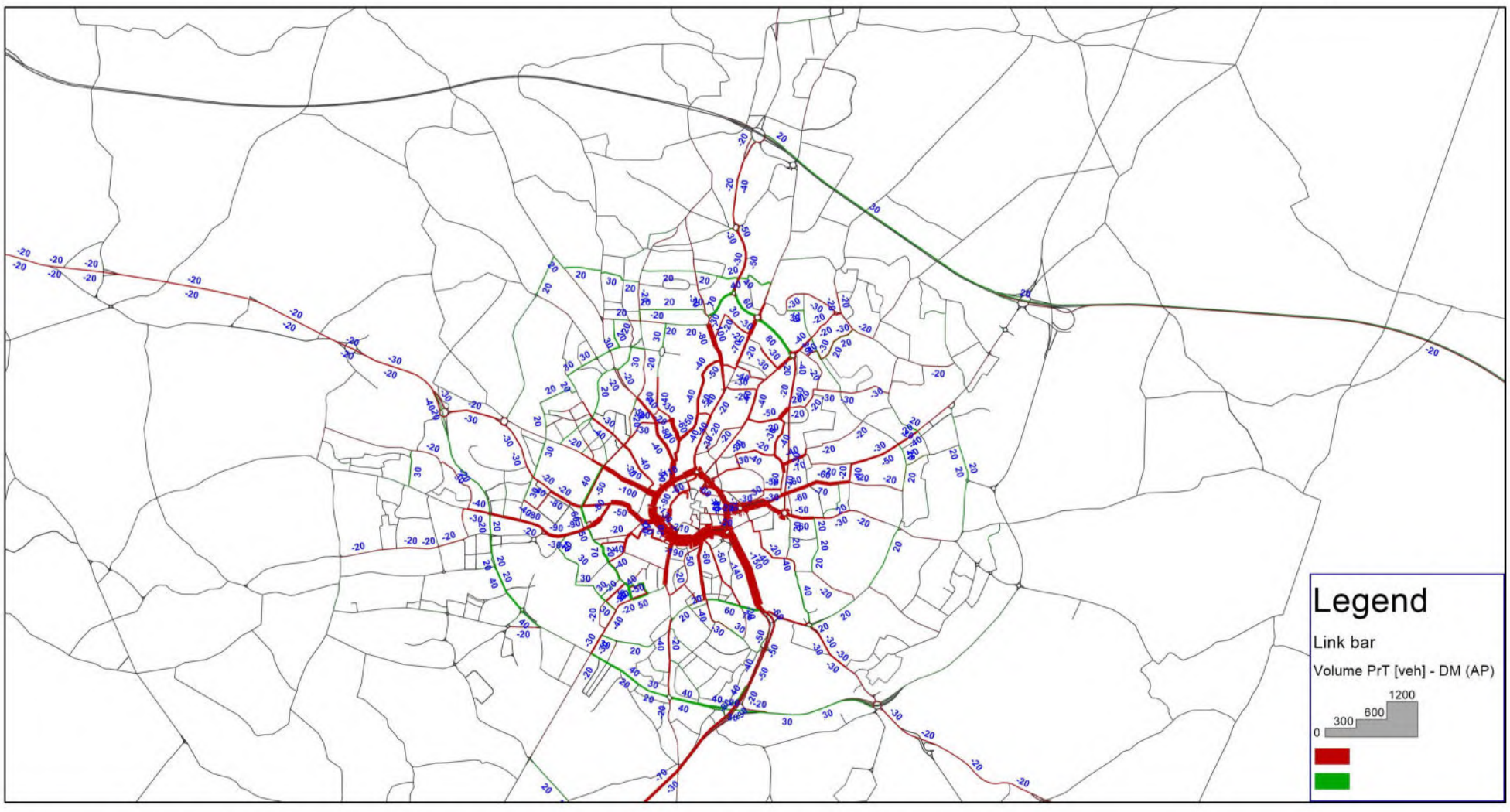

Figure 12: Inter Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (All vehicles)

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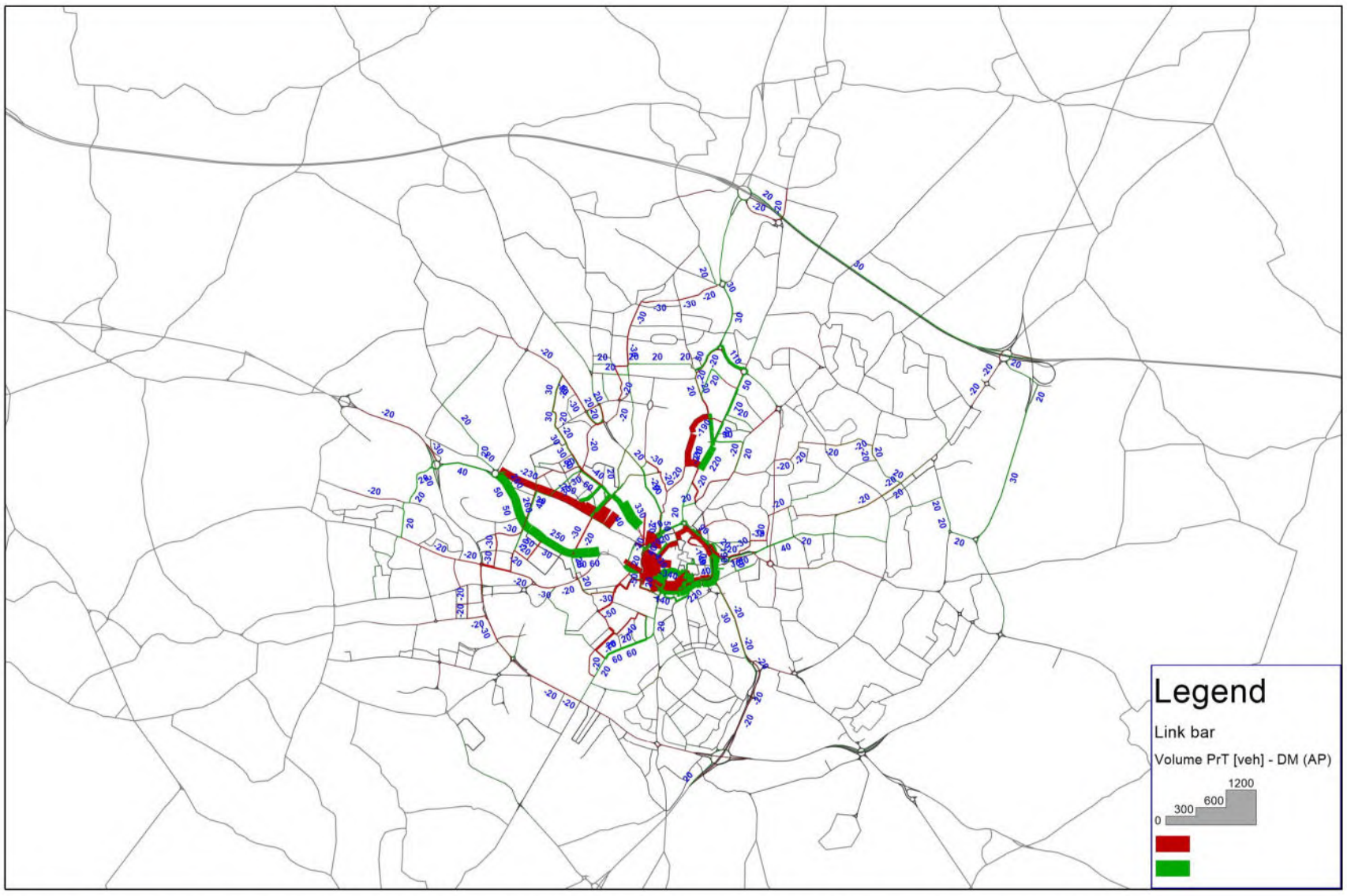

Figure 13: Inter Peak Flow Differences between 2021 DS 13L HHIB and 2021 DM Scenario (All vehicles)

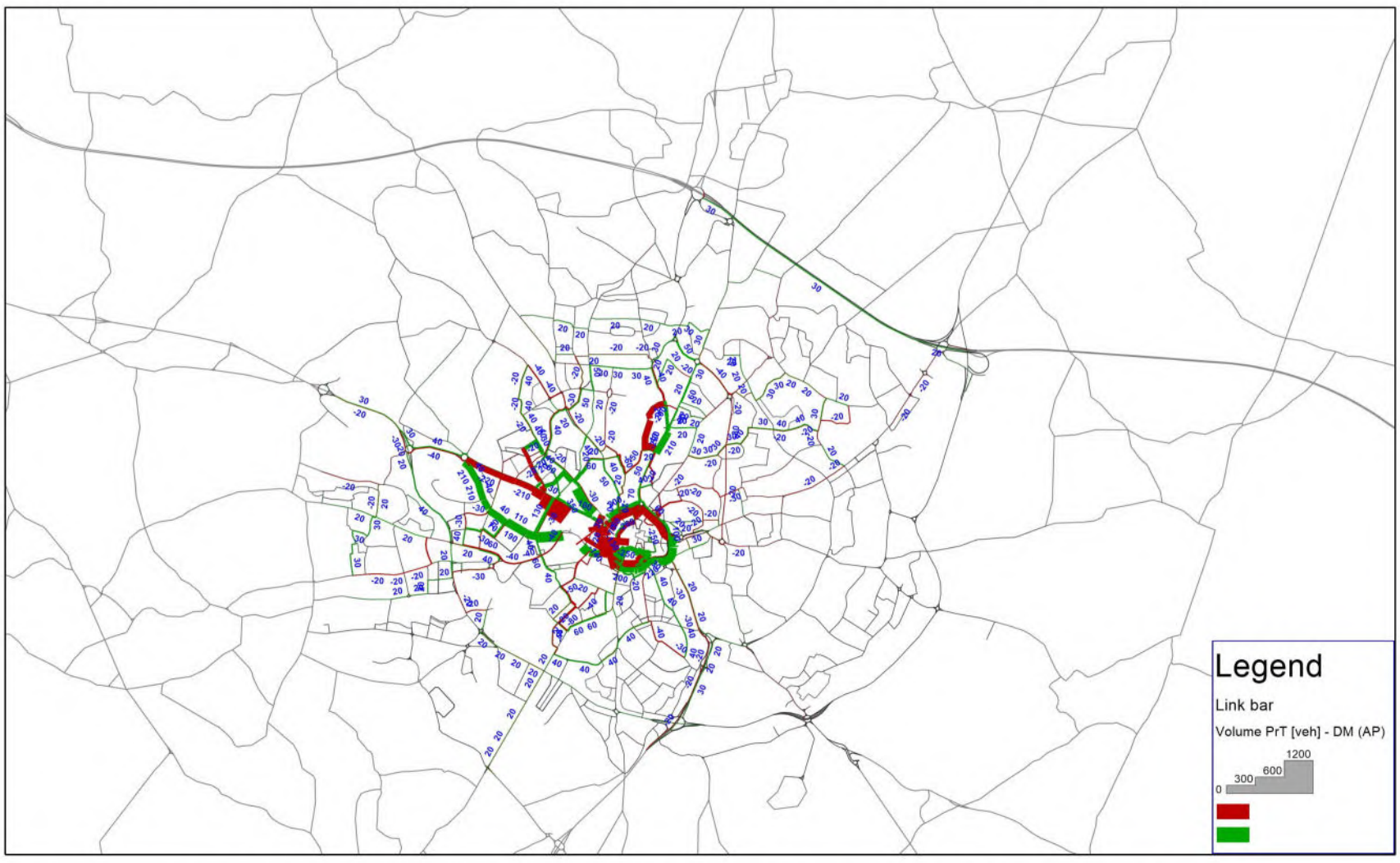

Figure 14: Inter Peak Flow Differences between 2021 DS 13L HHOB and 2021 DM Scenario (All vehicles)

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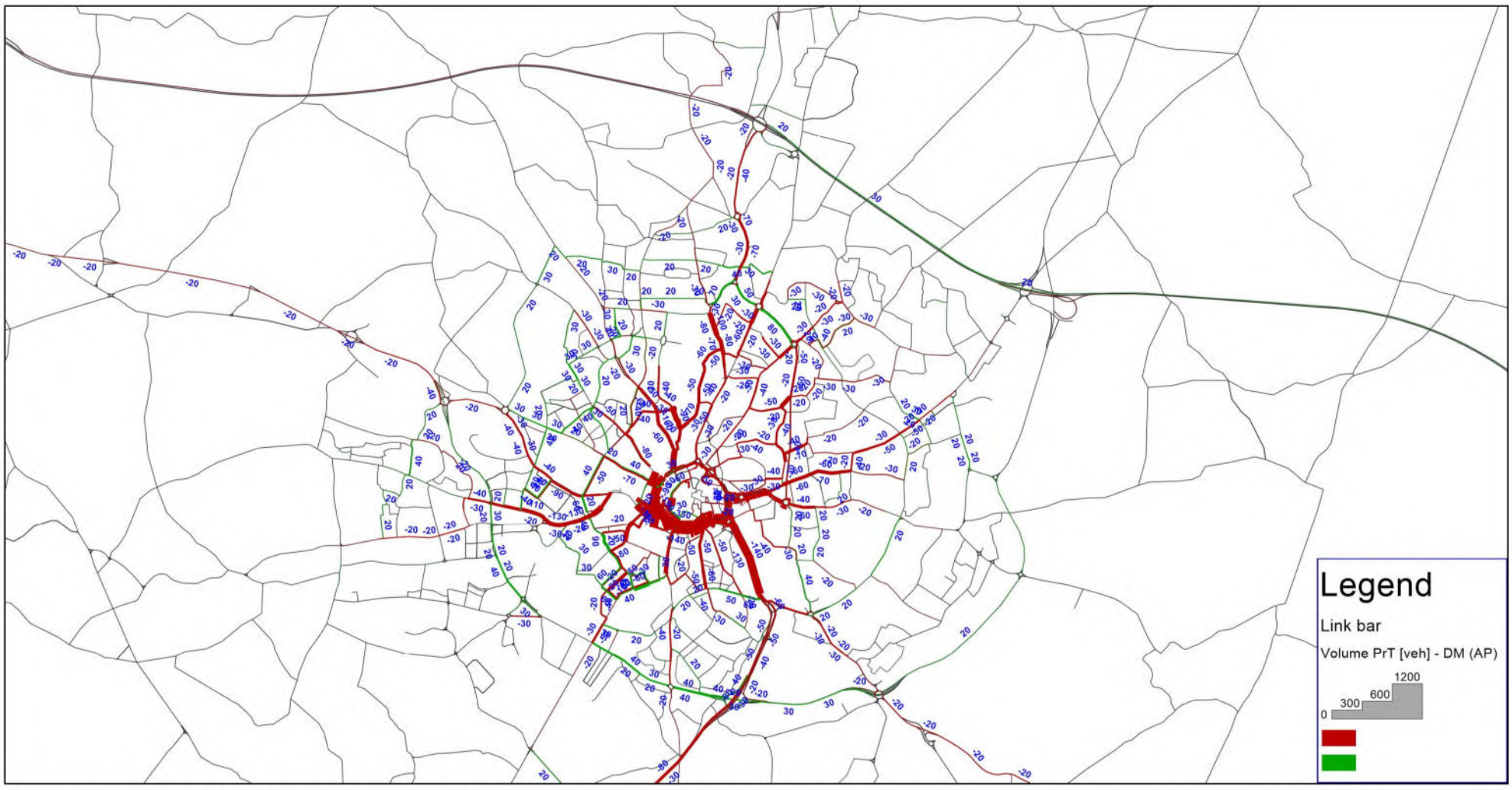

Figure 15: Inter Peak Flow Differences between 2021 DS 14 and 2021 DM (All vehicles)

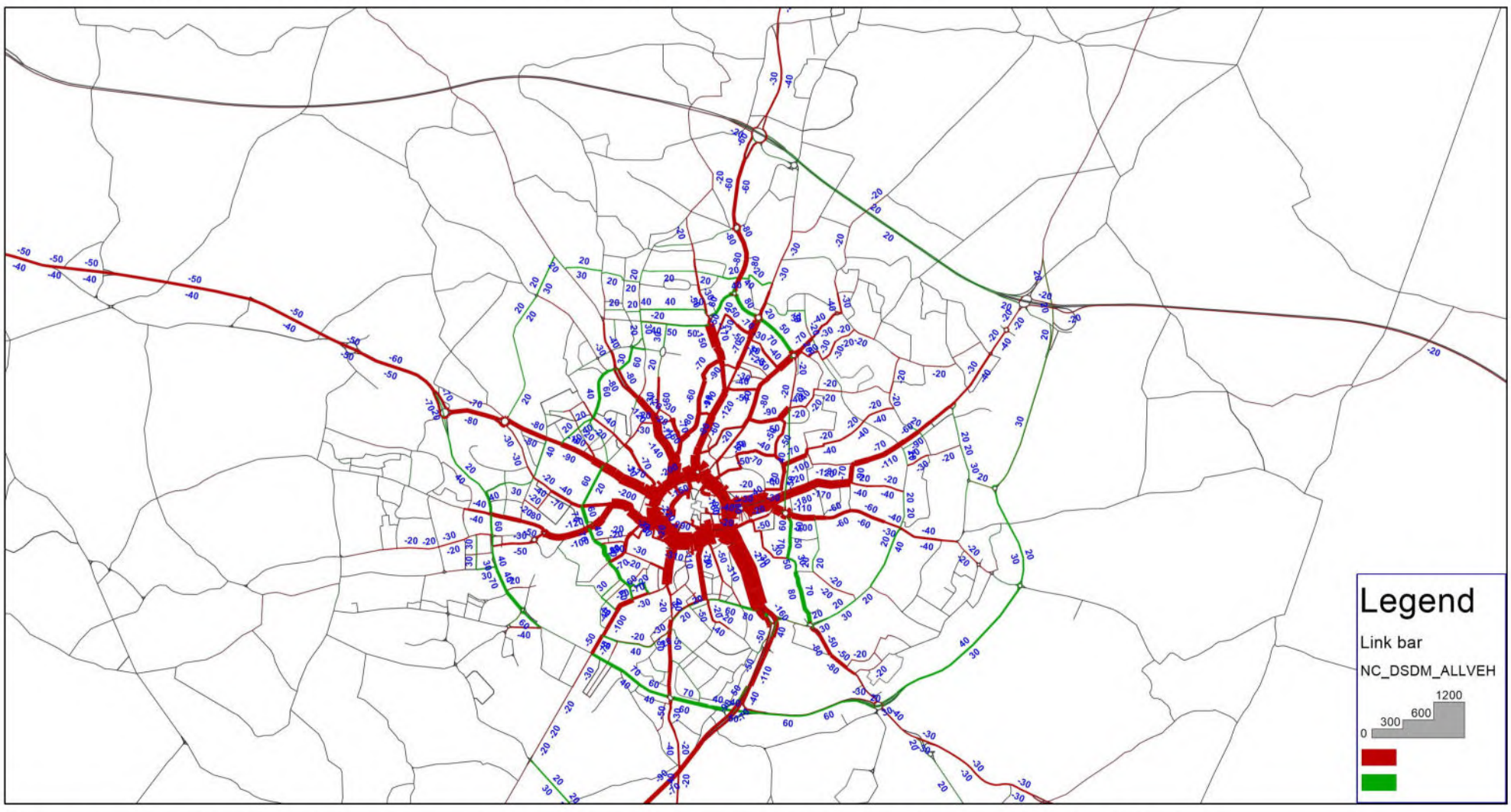

Figure 16: Inter Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non-compliant vehicles)

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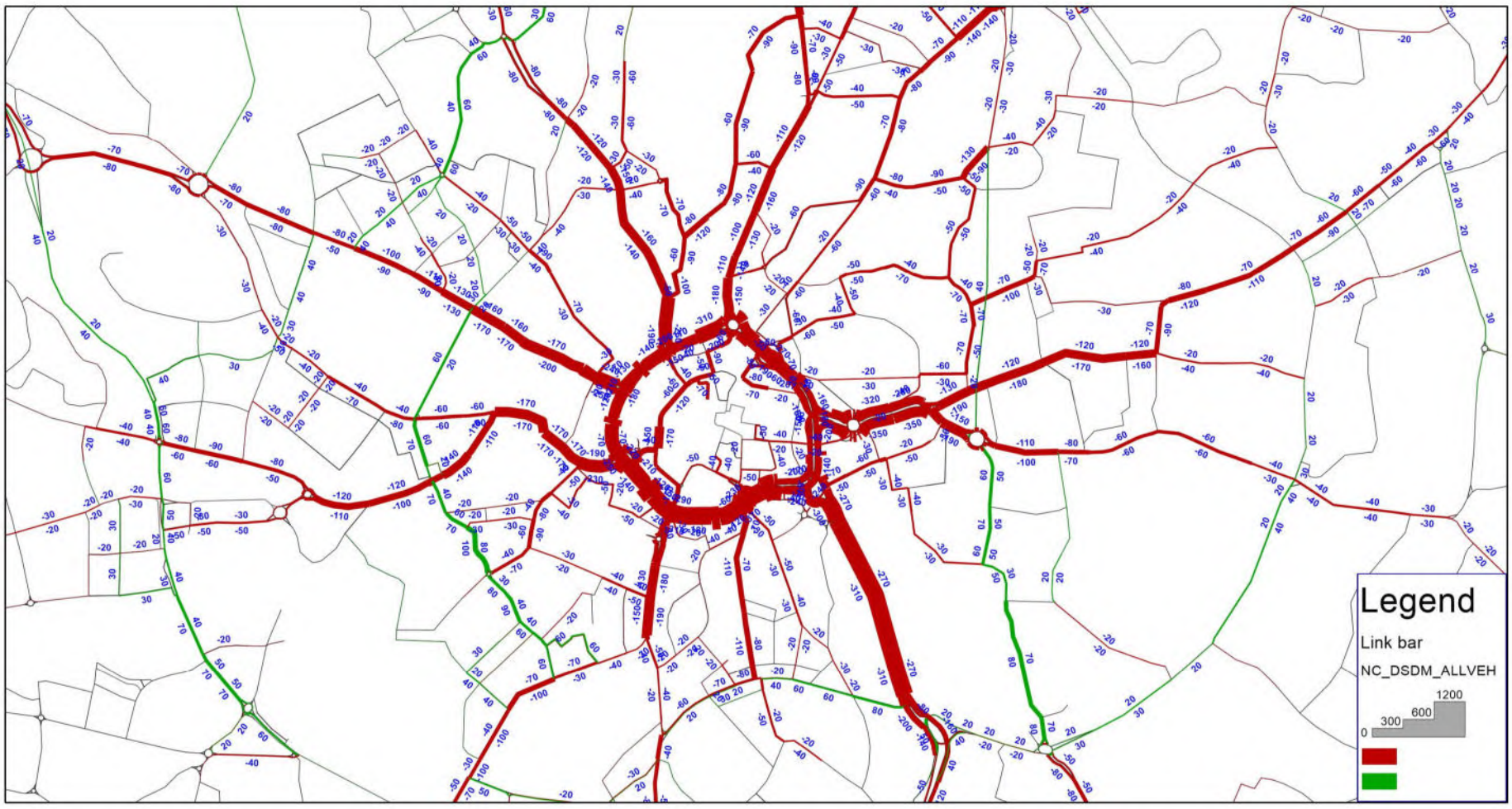

Figure 17: Inter Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non-compliant vehicles) Coventry City Centre

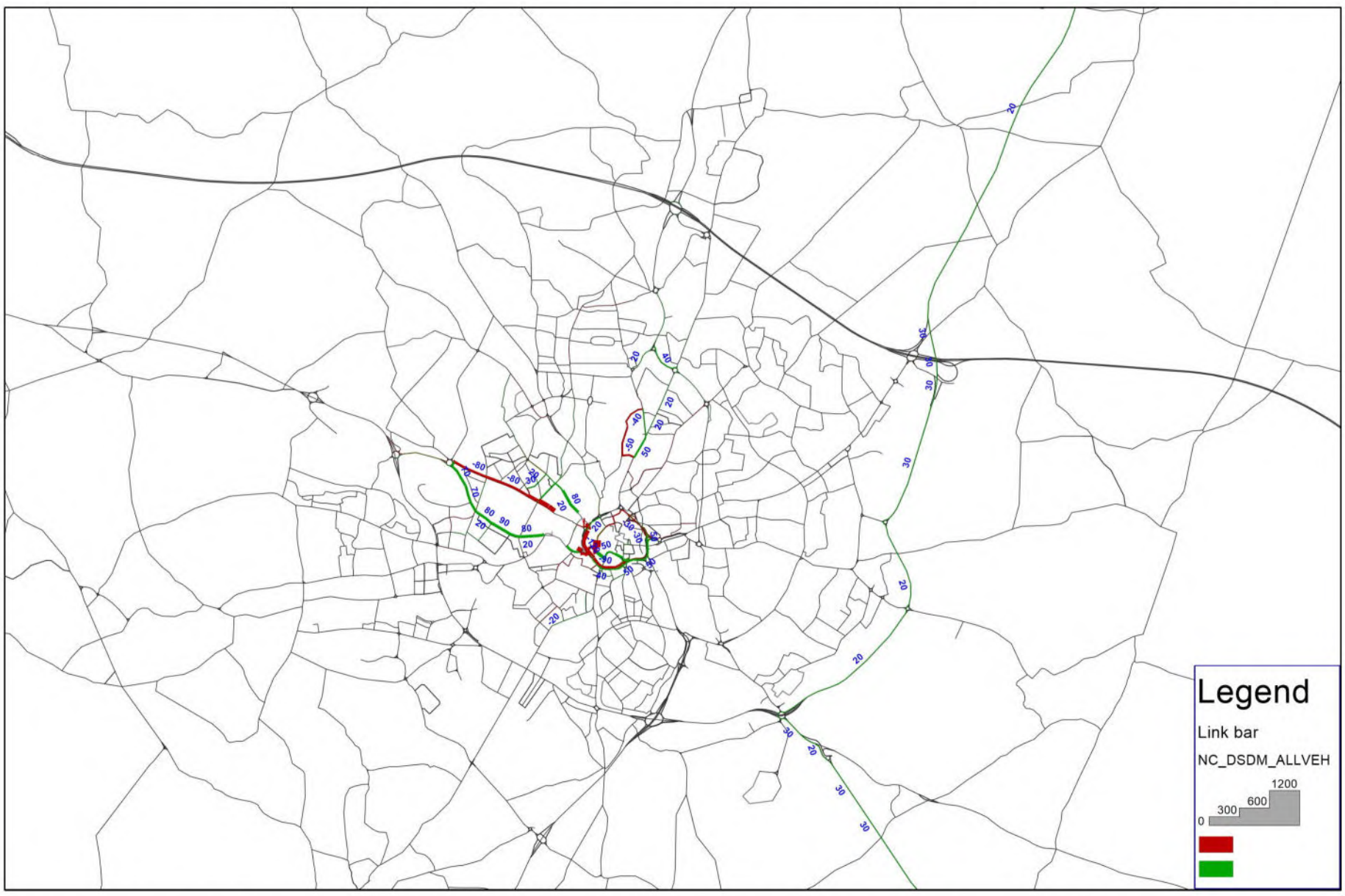

Figure 18: Inter Peak Flow Differences between 2021 DS 13L HHIB and 2021 DM Scenario (Non-compliant vehicles)

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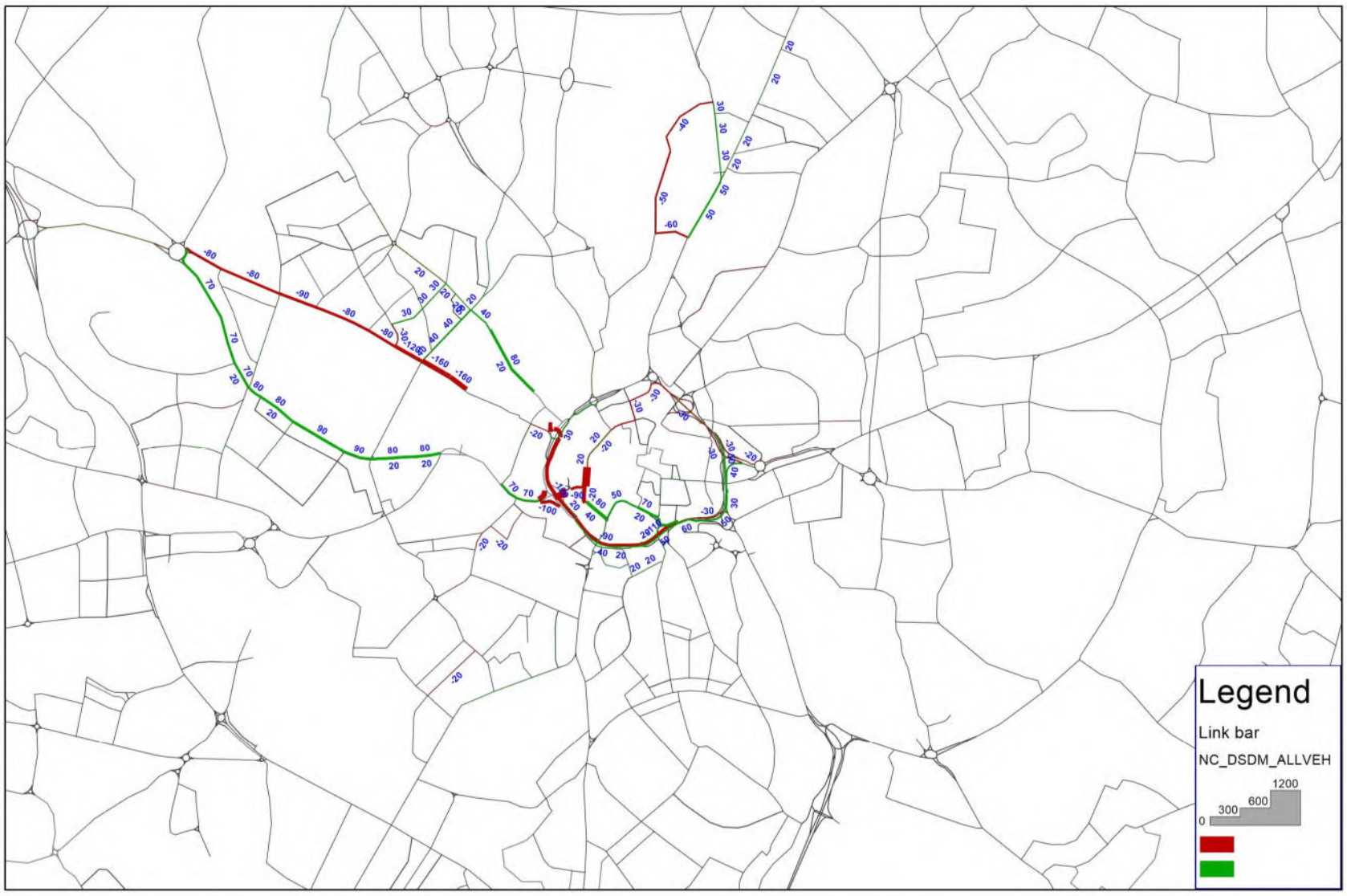

Figure 19: Inter Peak Flow Differences between 2021 DS 13L HHIB and 2021 DM (Non-compliant vehicles) Coventry City Centre

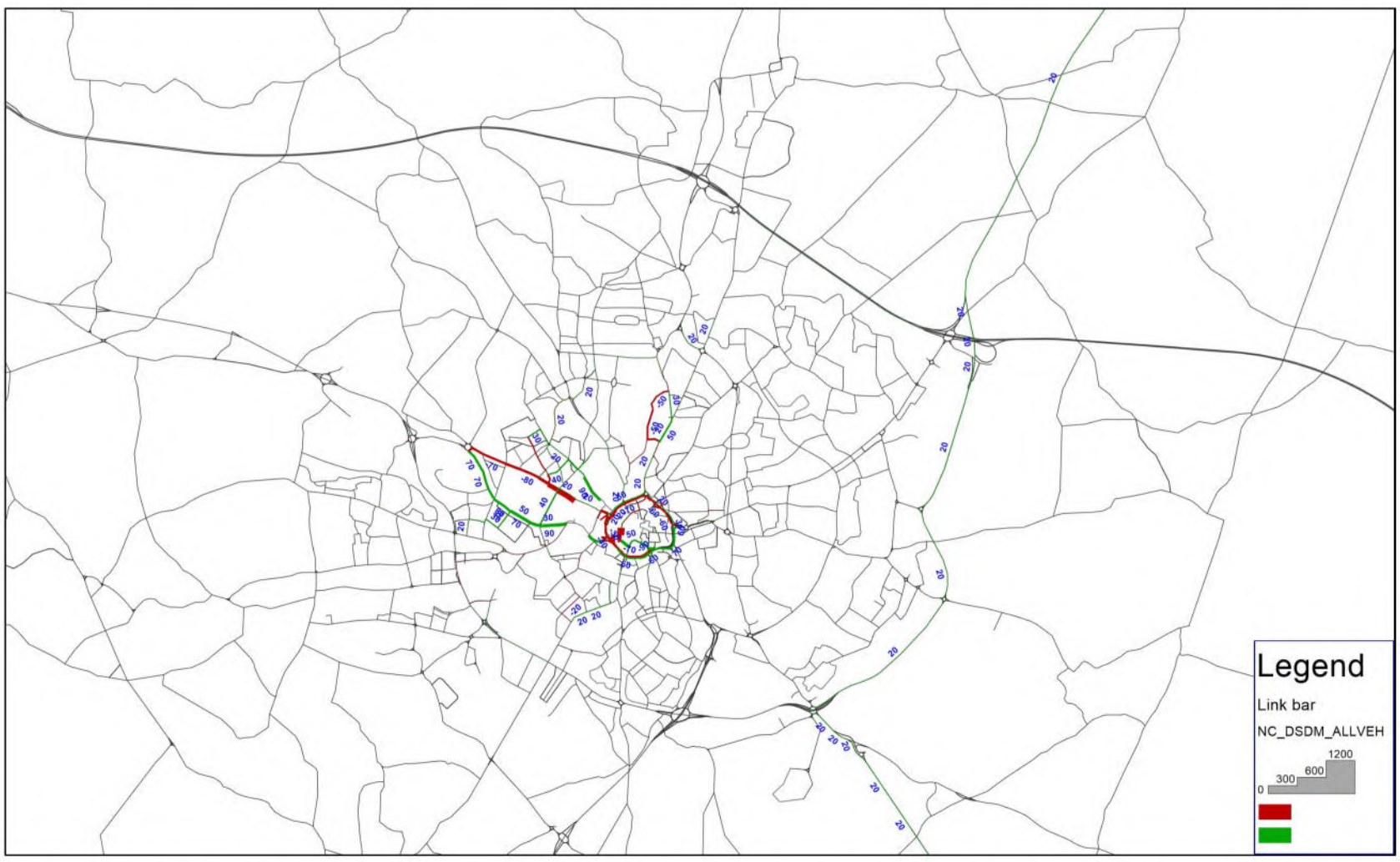

Figure 20: Inter Peak Flow Differences between 2021 DS 13L HHOB and 2021 DM Scenario (Non-compliant vehicles)

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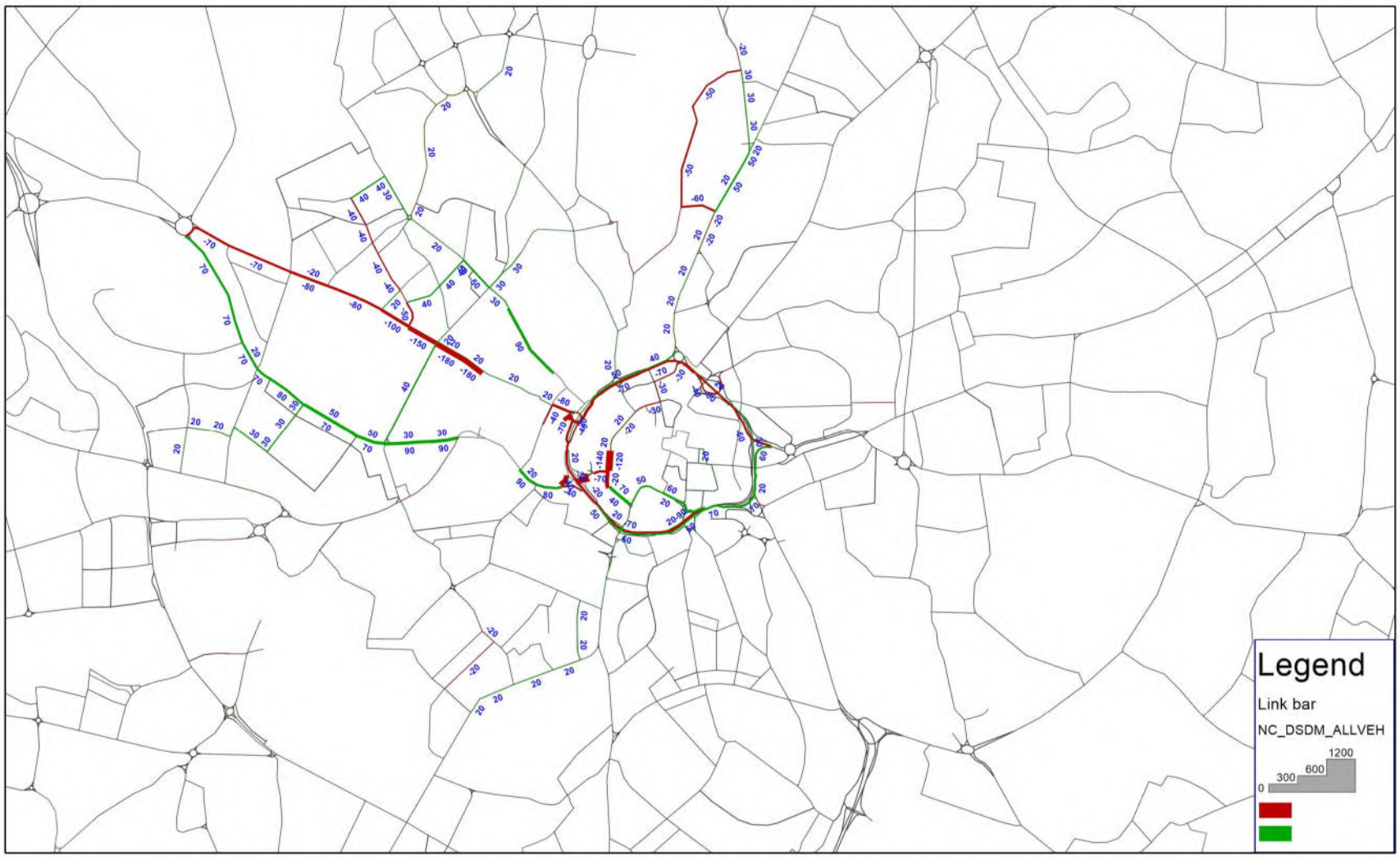

Figure 21: Inter Peak Flow Differences between 2021 DS 13L HHOB and 2021 DM (Non-compliant vehicles) Coventry City Centre

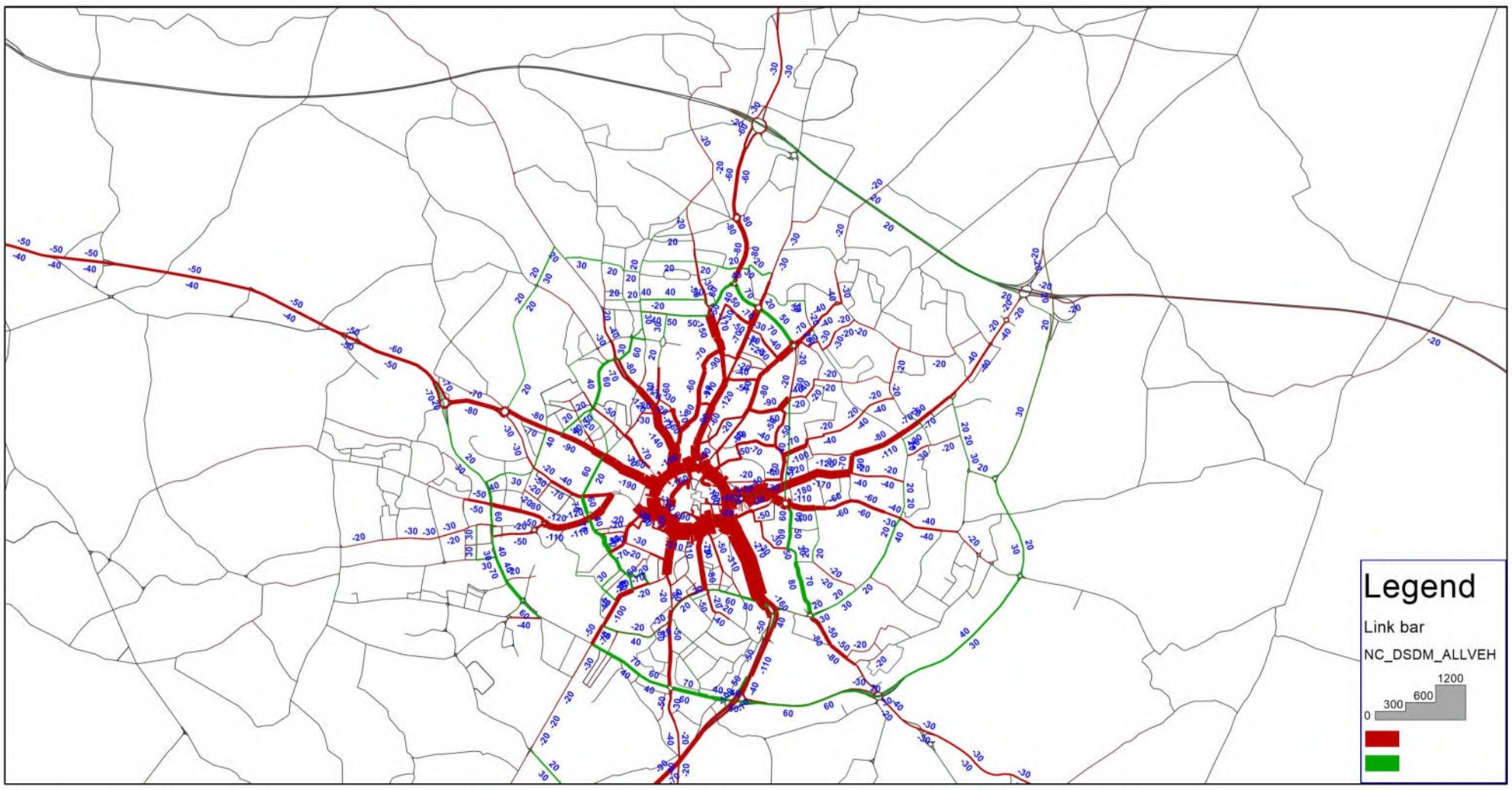

Figure 22: Inter Peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (Non-compliant vehicles)

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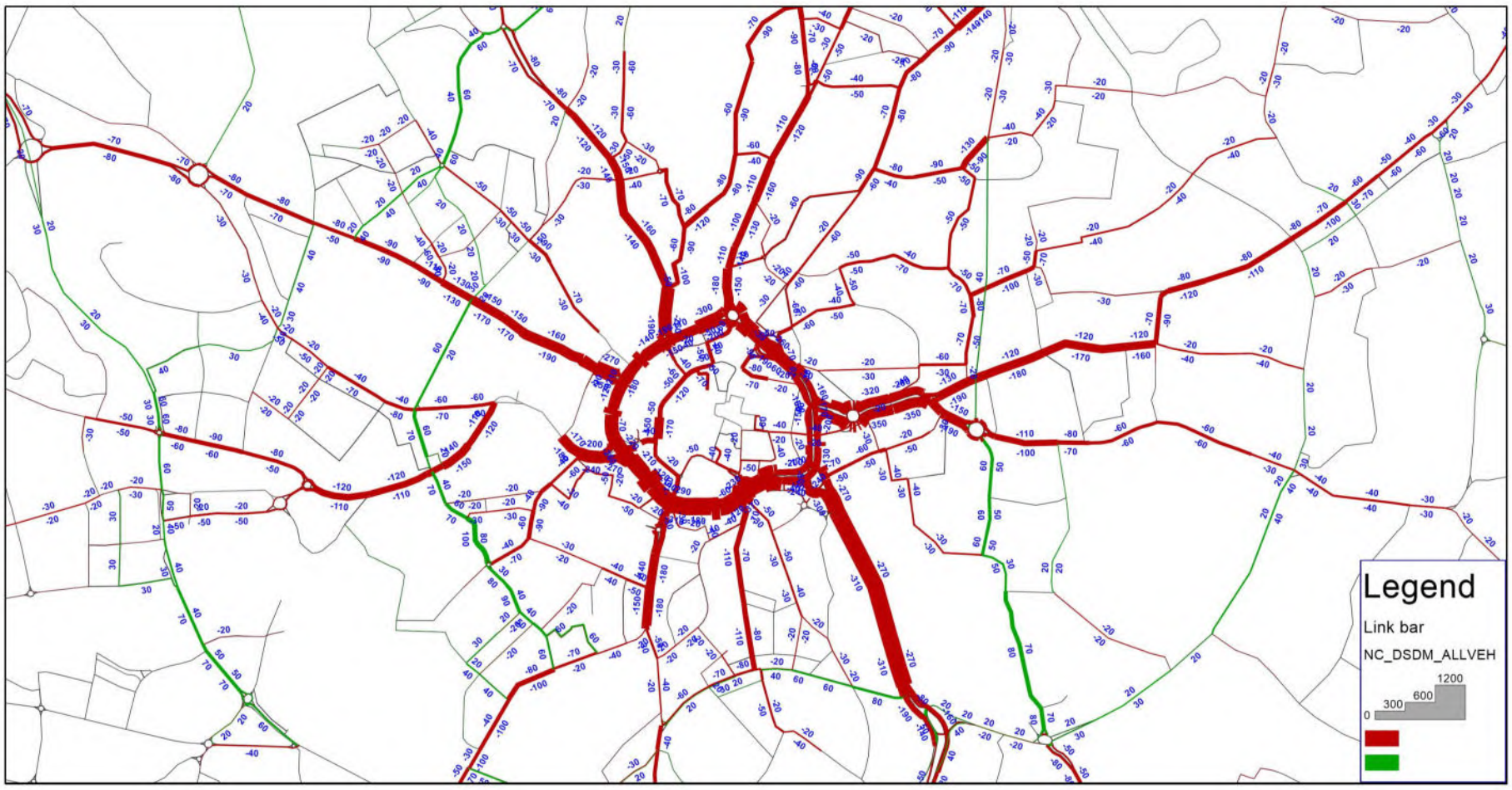

Figure 23: Inter Peak Flow Differences between 2021 DS 14 and 2021 DM (Non-compliant vehicles) Coventry City Centre

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PM PEAK TRAFFIC FLOWS

presents the volumes of traffic in all scenarios for the PM peak for the key air quality receptors only.

Table 11: PM Peak 2021 Traffic Flow Analysis

Road ID	2013 BY	2021 DM	2021 DS2b	2021 DS13L	2021 DS14	DM minus 2013	DS2b minus DM	DS13L minus DM	DS14 minus DM	% increase from 2013 to 2021 DM	% increase from 2021 DM to 2021 DS2b	% increase from 2021 DM to 2021 DS13L	% increase from 2021 DM to 2021 DS14
A4082 London Road EB	1580	1543	1486	1544	1479	-37	-57	1	-64	-2.34%	-3.69%	0.06%	-4.15%
A4082 London Road WB	1872	1728	1736	1714	1733	-144	8	-14	5	-7.69%	0.46%	-0.81%	0.29%
A4053 Ringway Swanswell SB	1800	1940	1859	1910	1914	140	-81	-30	-26	7.78%	-4.18%	-1.55%	-1.34%
A4053 Ringway Swanswell NB	1763	1934	1865	1534	1564	171	-69	-400	-370	9.70%	-3.57%	-20.68%	-19.13%
A4114 Holyhead Road EB	1216	1260	1170	913	818	44	-90	-347	-442	3.62%	-7.14%	-27.54%	-35.08%
A4114 Holyhead Road WB	1741	1766	1670	0	0	25	-96	-1766	-1766	1.44%	-5.44%	-100.00%	-100.00%
A4600 Sky Blue Way EB	2150	2274	2208	2265	2209	124	-66	-9	-65	5.77%	-2.90%	-0.40%	-2.86%
A4600 Sky Blue Way WB	1712	1825	1713	1813	1643	113	-112	-12	-182	6.60%	-6.14%	-0.66%	-9.97%
A4114 London Road NB	1825	1621	1643	1638	1637	-204	22	17	16	-11.18%	1.36%	1.05%	0.99%
A4114 London Road SB	2087	2144	2007	2137	2041	57	-137	-7	-103	2.73%	-6.39%	-0.33%	-4.80%
A4053 Ringway Queens NB	3311	3378	3084	3501	3107	67	-294	123	-271	2.02%	-8.70%	3.64%	-8.02%
A4053 Ringway Queens SB	1603	2664	2293	2637	2373	1061	-371	-27	-291	66.19%	-13.93%	-1.01%	-10.92%

shows that generally between 2021 DM and 2013 Base Year there are increases in traffic flow at most locations. The changes around the Friar Gate area, with Warwick Road becoming one way only increase the volume of traffic on the Coventry ring road, A4053 Ringway Queens. DS 2b reduces the traffic in all locations of up to 14%, with the only exception to this being A4082 London Road where these is a very minor increase, 1.36%. In DS 13L and DS 14, traffic is banned on A4114 Holyhead Road WB during PM peak.

Figure 24: PM Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (All vehicles)

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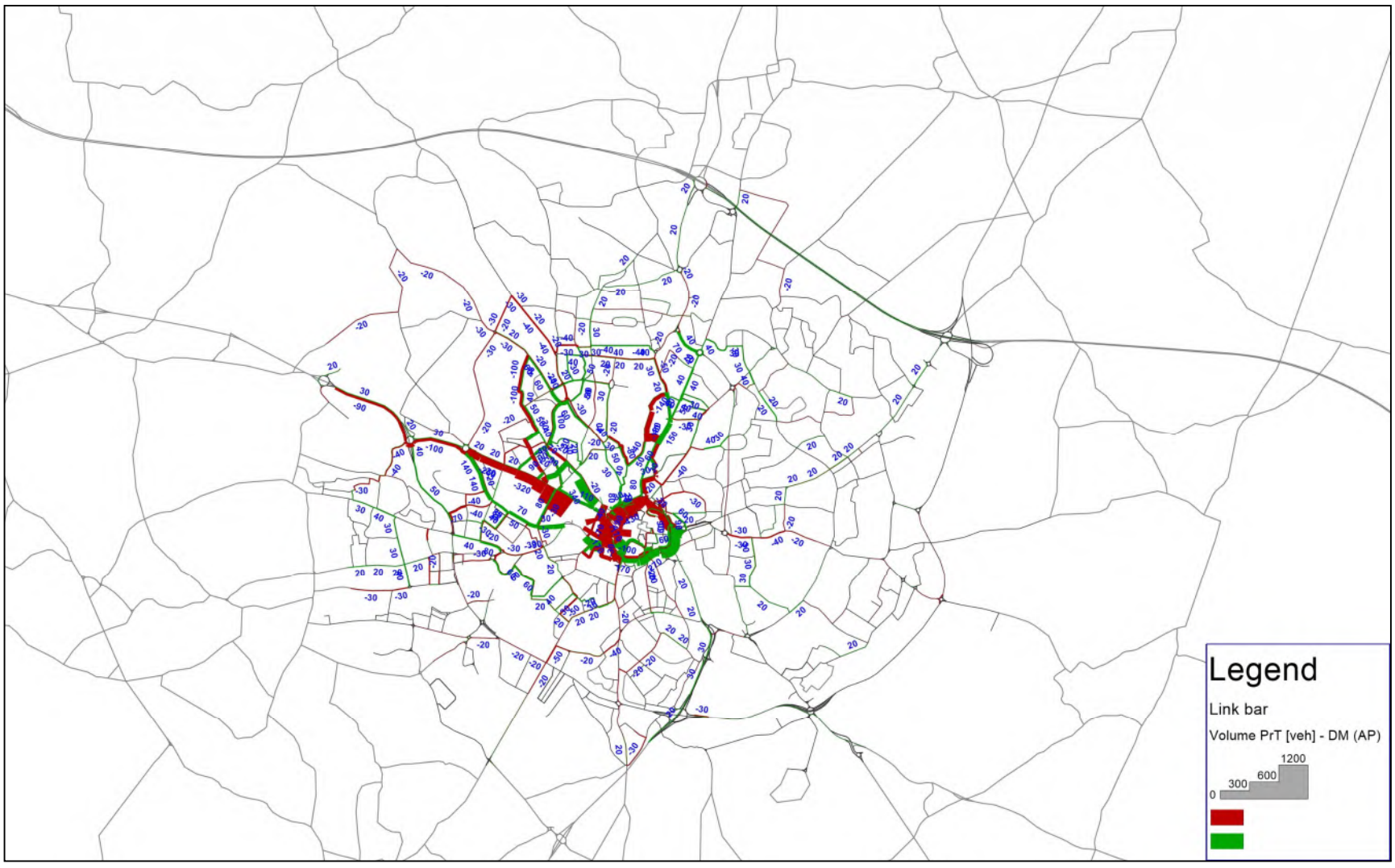

Figure 25: PM Peak Flow Differences between 2021 DS 13L and 2021 DM Scenario (All vehicles)

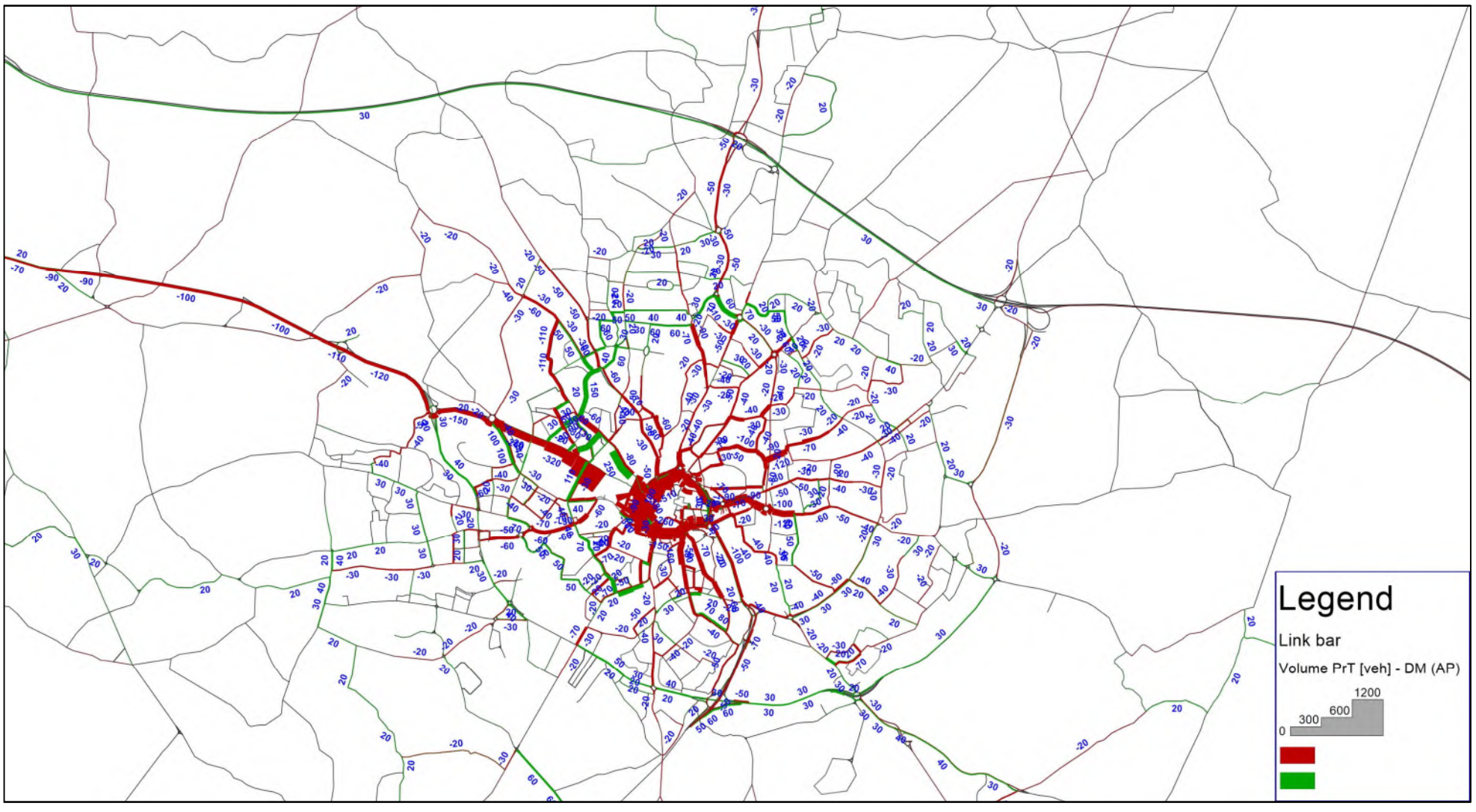

Figure 26: PM Peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (All vehicles)

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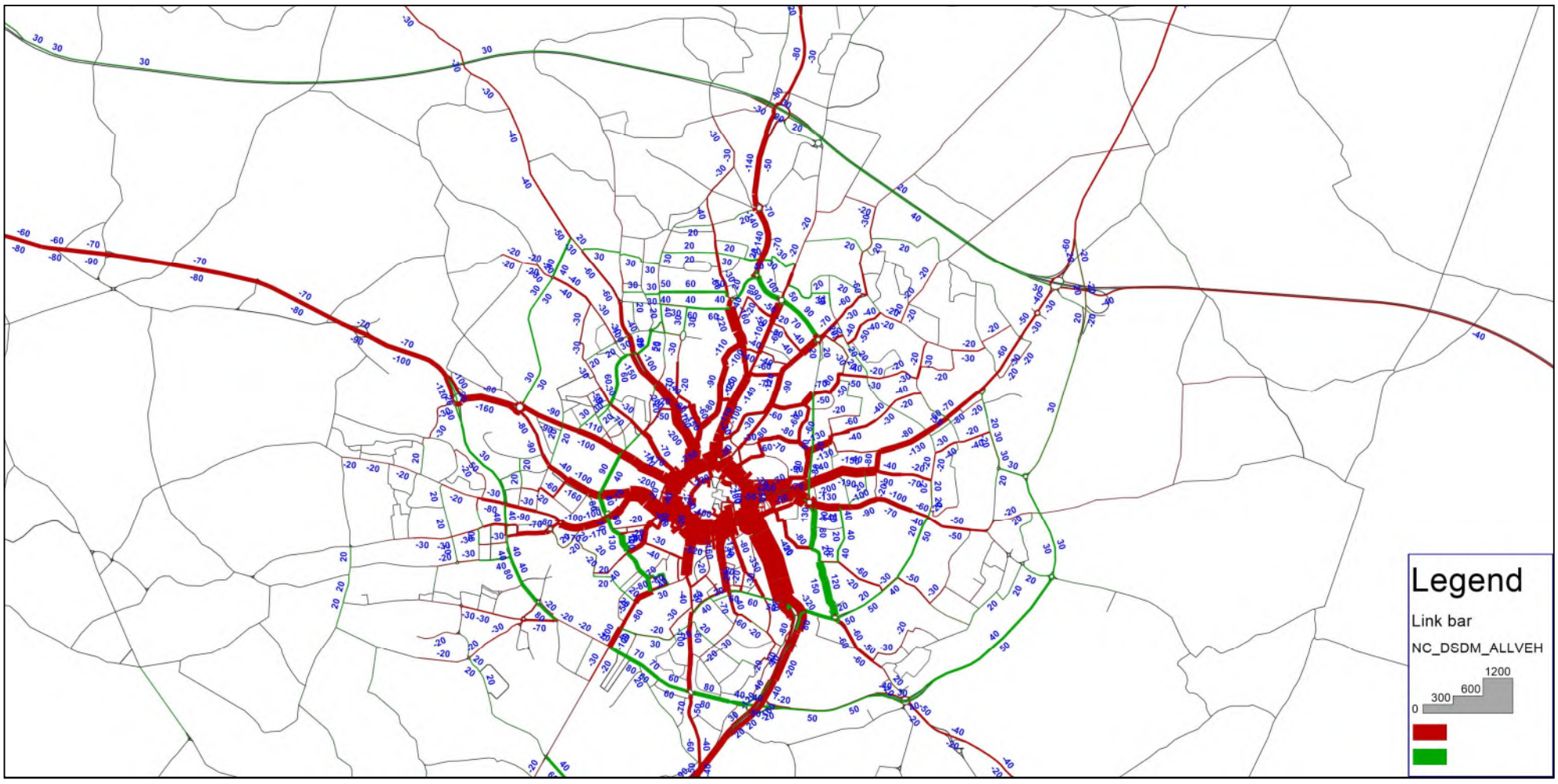

Figure 27: PM Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non-compliant vehicles)

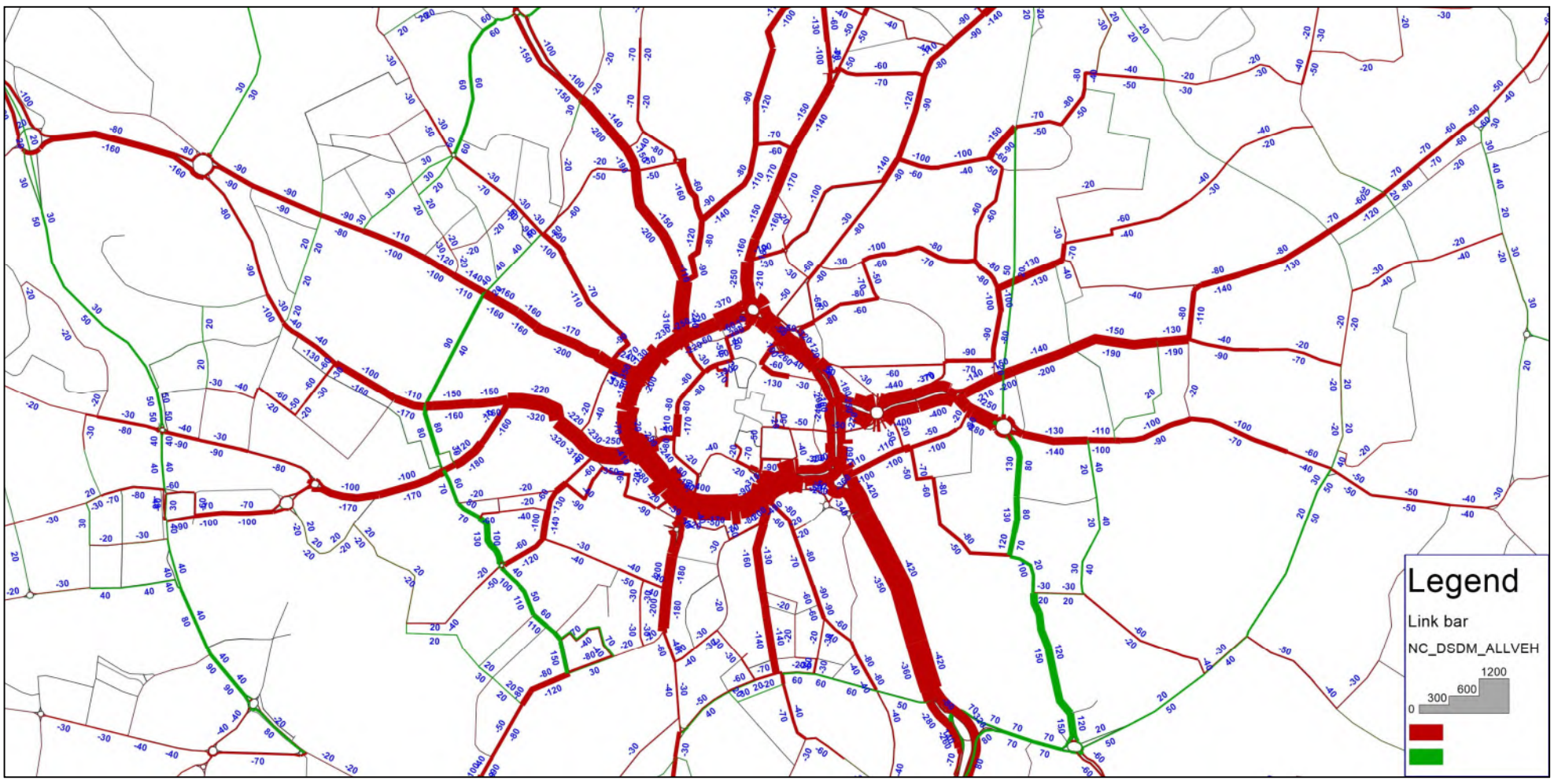

Figure 28: PM Peak Flow Differences between 2021 DS 2b and 2021 DM Scenario (Non-compliant vehicles) Coventry City Centre

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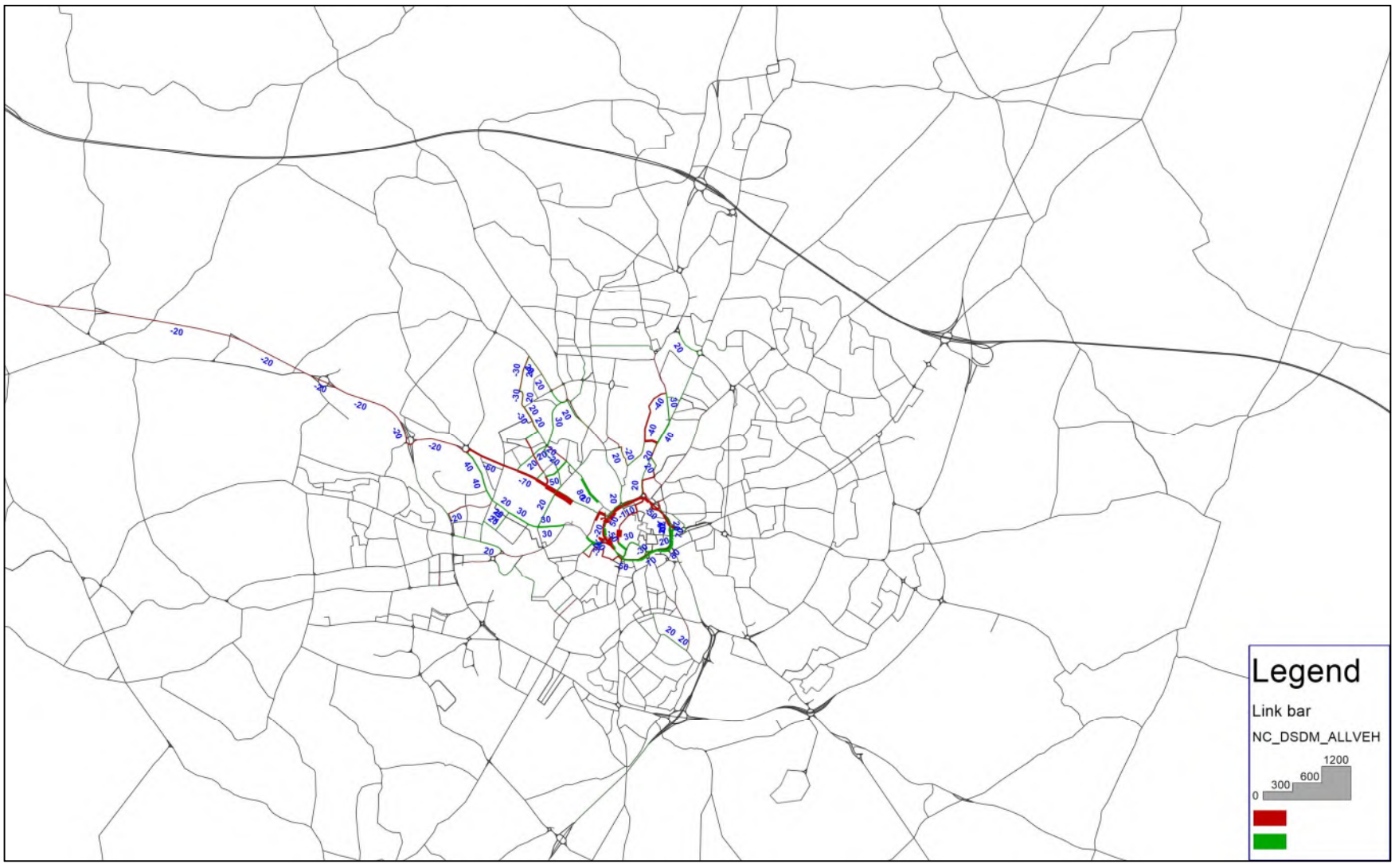

Figure 29: PM Peak Flow Differences between 2021 DS 13L and 2021 DM Scenario (Non-compliant vehicles)

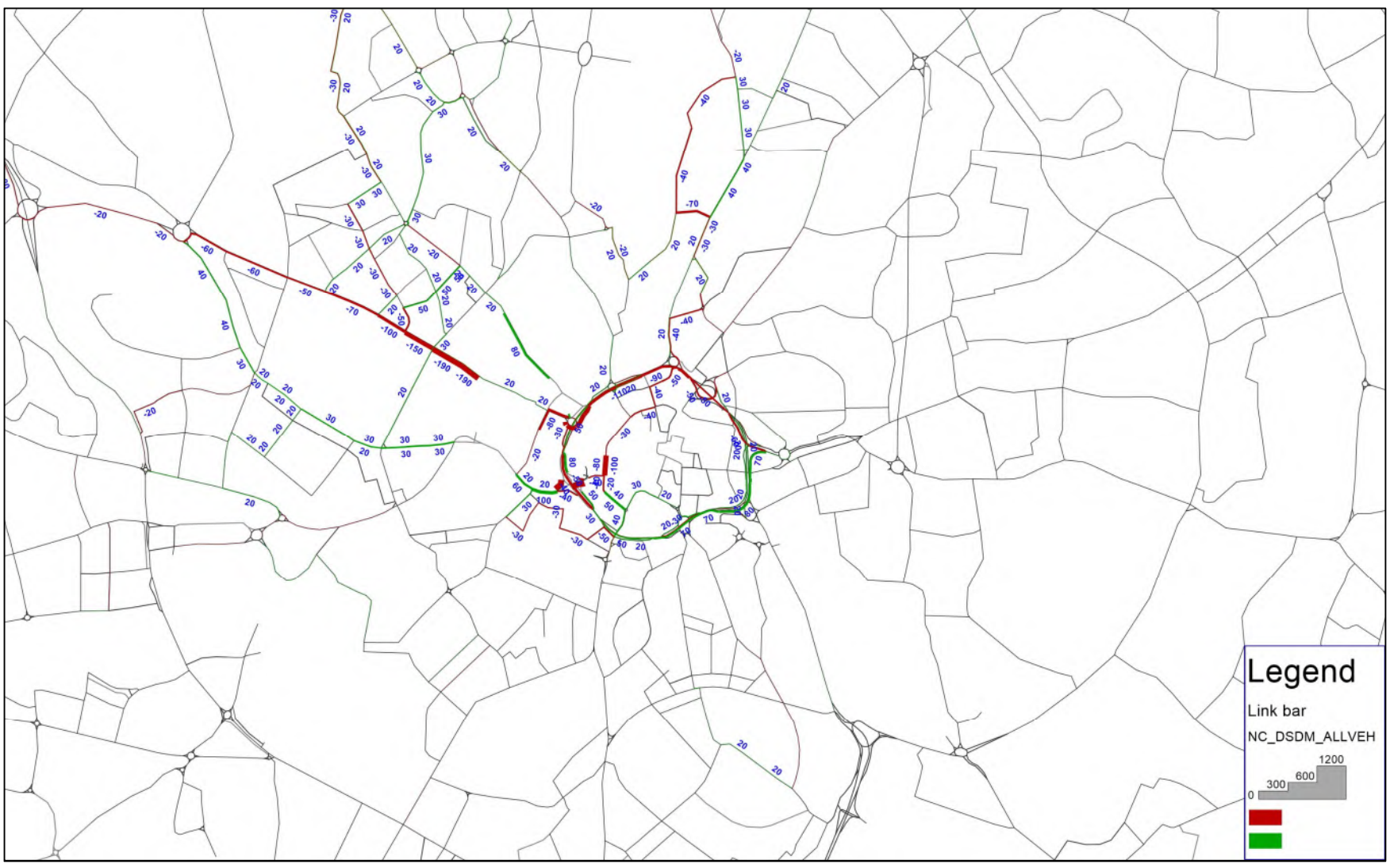

Figure 30: PM Peak Flow Differences between 2021 DS 13L and 2021 DM Scenario (Non-compliant vehicles) Coventry City Centre

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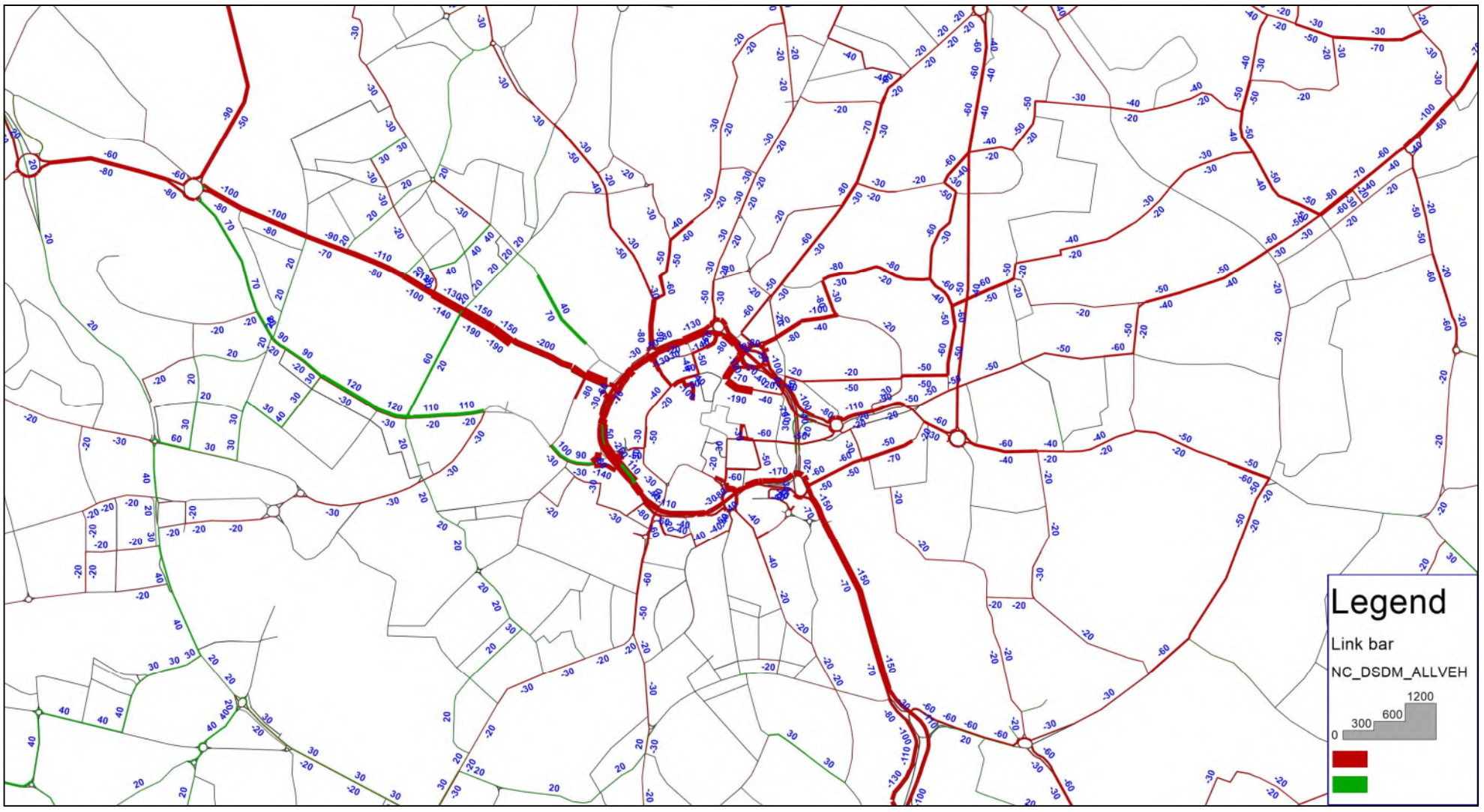

Figure 31: PM Peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (Non-compliant vehicles)

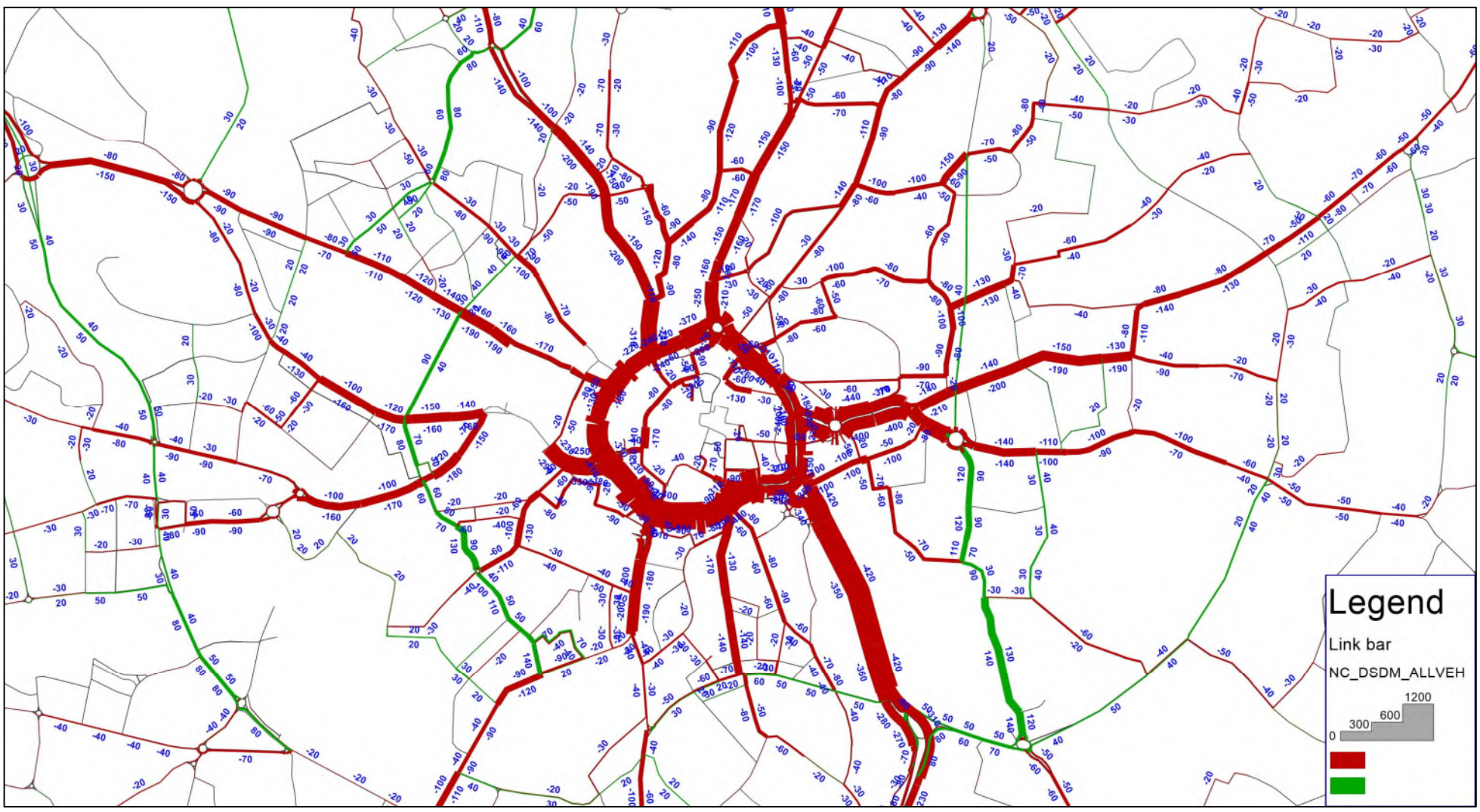

Figure 32: PM Peak Flow Differences between 2021 DS 14 and 2021 DM Scenario (Non-compliant vehicles) Coventry City Centre

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Vehicle / KMs

The traffic vehicle kilometres have been extracted from all the scenarios to understand how they vary because of the air quality interventions. The vehicle kilometres have been extracted from two areas, the wider Coventry area shown in **Figure 33** and the CAZ D area shown in **Figure 34**.

Figure 33: Wider Coventry Area for Veh/KMs

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Figure 34: CAZ D Area for Veh/KMs

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Figure 35 shows the changes in vehicles kilometres in the wider Coventry area.

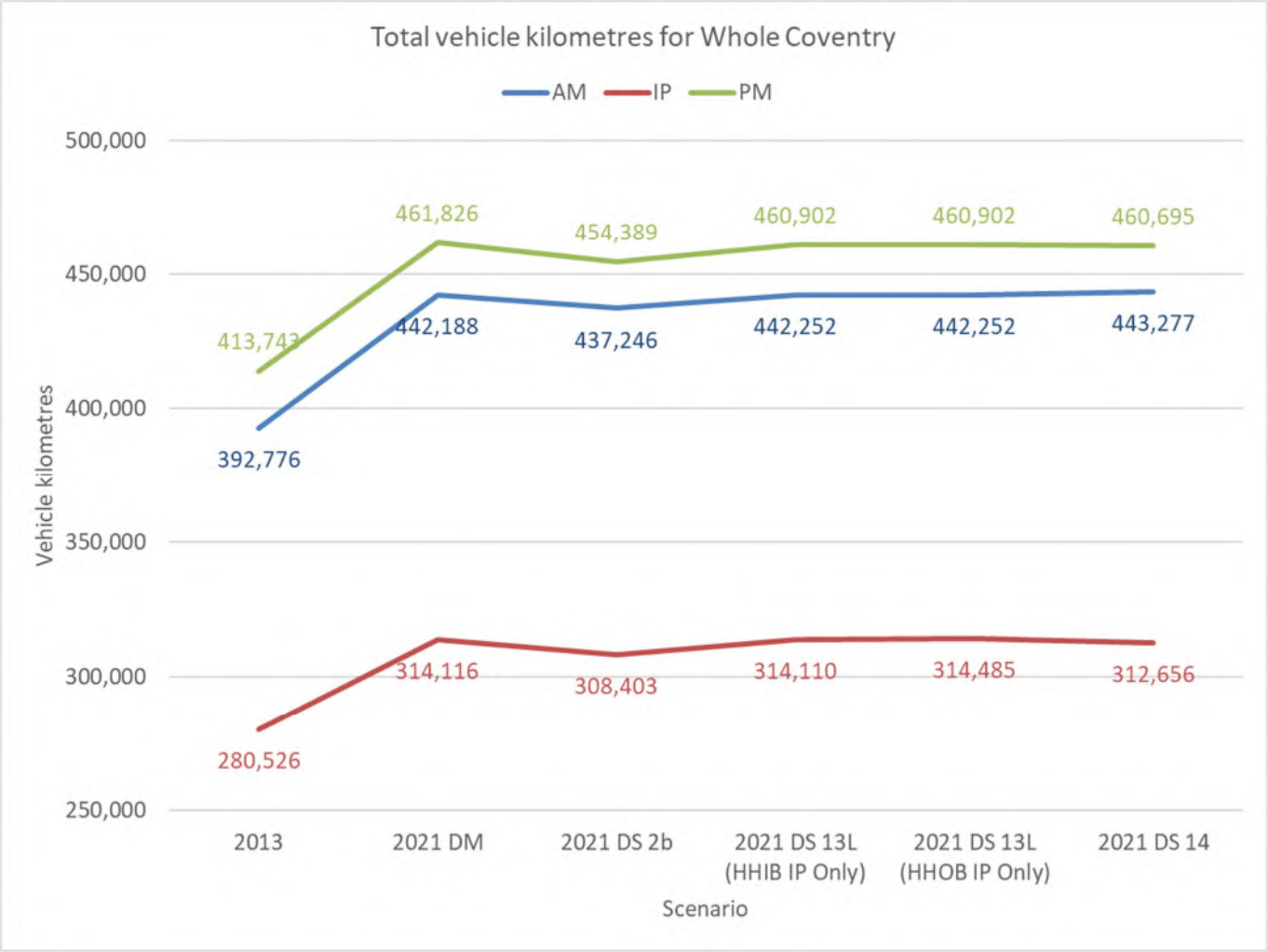

Figure 35: Veh/KMs Changes in Wider Coventry Area

The figure shows that between 2013 and 2021 DM there is an increase in all time periods in veh/kms of between 12-13%. In 2021 DS 2b the vehicle kilometres reduce slightly about 2%. For both DS13 L HHIB and HHOB, the results were similar to the 2021 DM scenario. In the 2021 DS14 scenario the veh/kms reduced by less than 1%.

Figure 36 shows the changes in vehicles kilometres in the CAZ D area, central Coventry.

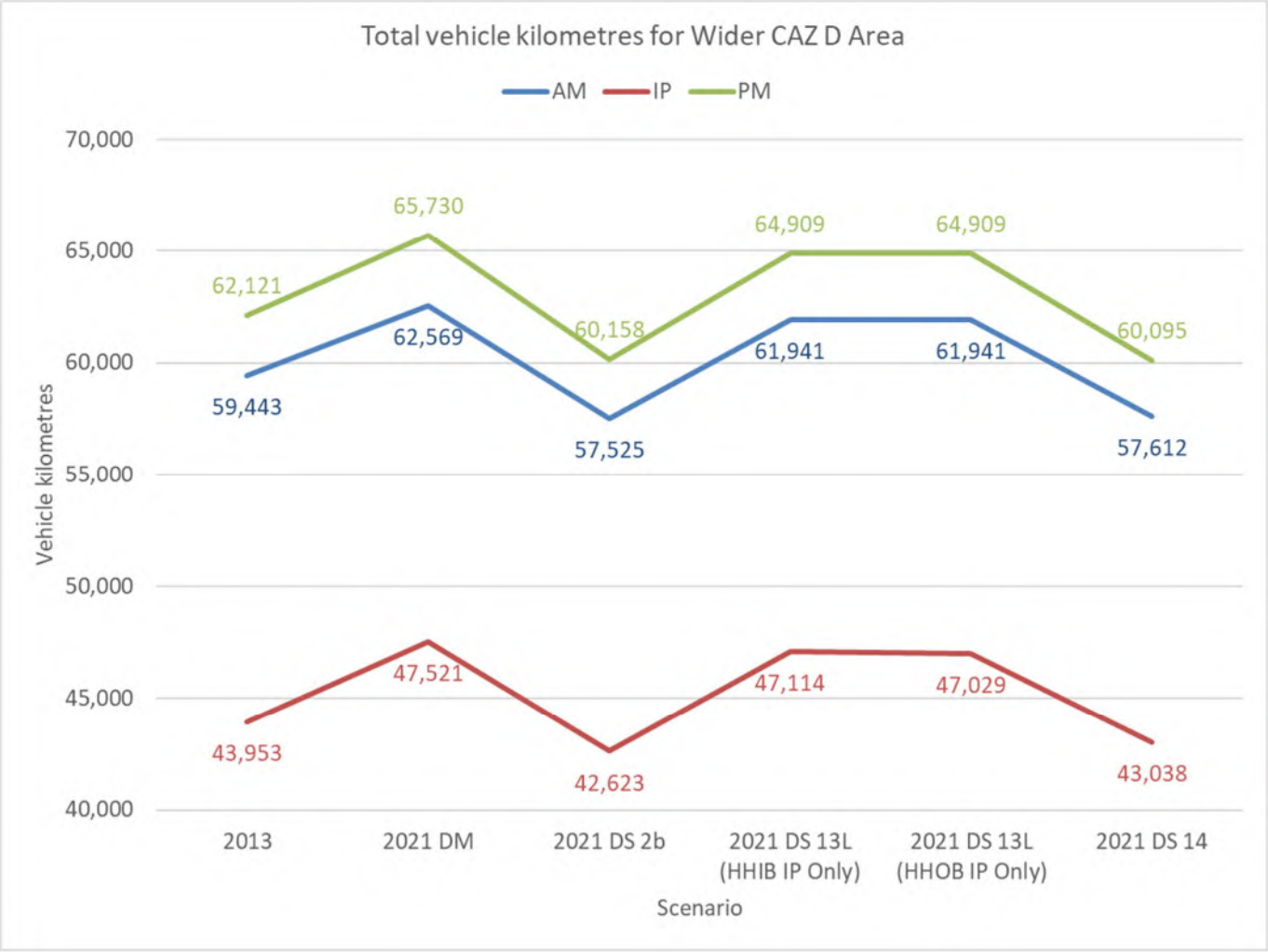

Figure 36: Veh/KMs Changes in CAZ D Area

The figure shows that between 2013 and 2021 DM there is an increase in all time periods in veh/kms of between 5% and 8%. In 2021 DS 2b 2 the vehicle kilometres reduce 8% in the AM and PM peaks and 10% in the Inter Peak due to wider CAZ D charging. Within the 2021 DS 13L scenario the veh/kms reduced slightly by 1% for AM, PM and IP times. In 2021, DS14 scenario which is combination of highway interventions and wider CAZ D charging, the veh/kms reduced between 8% and 9%.

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2031 HAM RESULTS

Introduction

This section covers the results of the 2031 CASM forecasting the future year scenarios:

- Do Minimum **(DM):** early measures air quality interventions
- DS2b **(Benchmark CAZ)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures.
- DS13L **(Preferred Option)**: Do Something with early measures and CCC package of interventions
- DS14 **(JAQU Direction)**: Do Something wider CAZ D (reduced tolls and Birmingham behavioural responses) with early measures and CCC package of interventions.

In summary the results which are presented within this chapter are:

- CAZ Behaviour Response
- CASM HAM changes between DM and DS scenarios in:
  - Traffic Flows
  - Vehicle / KMs

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CAZ Behavioural Responses

The number of non-compliant car trips going to zones within the CAZ in the DM, DS 2b, and DS14 were analysed and are presented in **Table 12** to **Table 15**.

Table 12: AM Peak 2031 Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	136	34	169
DS2b	34	25	60
DS14	34	26	60

Table 13: Inter Peak 2031 Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	83	36	119
DS2b	12	24	36
DS14	12	24	36

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Table 14: PM Peak 2031 Trips to Central Coventry

	Going to Zones in CAZ from outside CAZ	Going to Zones in CAZ from inside CAZ	Total Trips
DM	95	37	132
DS2b	19	27	47
DS14	19	28	47

The tables show that in all time periods the volumes of trips going to zones within the CAZ reduces significantly particularly from those from outside the CAZ when the charging is active. This is to be expected as the cost of the toll is significantly deterring vehicles away from entering the area.

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Table 15 shows the responses that would occur because of a CAZ and those which are occurring within CASM and how they compare to Birmingham CAZ response. This table just present the movements into the CAZ.

Table 15: 2031 CAZ D Behavioural Responses to City Centre Zones within CAZ D Boundary

Scenario	Time Period	Car CASM Model pay Charge	Birmingham CAZ Pay Charge	Car CASM Model Avoid	Birmingham CAZ Avoid
2031 DS 2b	AM	35%	12%	19%	42%
	IP	30%		24%	
	PM	36%		18%	
	24 AADT	33%		21%	
2031 DS 14	AM	35%		19%	
	IP	30%		24%	
	PM	36%		18%	
	24 AADT	33%		21%	

The table above shows that the CASM model compared to Birmingham CAZ response is that higher proportion of non-compliant vehicles in Coventry will prepare to pay the charge, when compared to Birmingham due to poorer level of service offered by public transport and alternative roads for traffic to divert around the Coventry CAZ.

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CASM HAM Results

INTRODUCTION

The impacts of the TDM were applied to only the non-compliant user classes within the CASM HAMs as the non-compliant vehicles will be the user class which will be affected by the toll charges of the CAZ.

The 2031 CASM HAM results are presented and analysed for the following four scenarios:

- DM
- DS 2b
- DS 13L
- DS 14

These scenarios are compared against each other and the 2013 Base Year model. Comparisons have been made for the following:

- Traffic Flows
- Vehicle Kilometres

AM PEAK TRAFFIC FLOWS

Traffic flows within Coventry City centre and specifically the air quality receptor locations provided to us by the Atkins air quality team have been extracted from the following CASM HAM models for all three time periods to assess how volumes of traffic change in the future:

- 2013 Base Year
- 2031 DM
- 2031 DS 2b
- 2031 DS 13L
- 2031 DS 14

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presents the volumes of traffic in all scenarios for the AM peak for the key air quality receptors.

Table 16: AM Peak 2031 Traffic Flow Analysis

Road ID	2013 BY	2031 DM	2031 DS2b	2031 DS13L	2031 DS14	DM minus 2013	DS2b minus DM	DS13L minus DM	DS14 minus DM	% increase from 2013 to 2031 DM	% increase from 2031 DM to 2031 DS2b	% increase from 2031 DM to 2031 DS13L	% increase from 2031 DM to 2031 DS14
A4082 London Road EB	1477	1120	1105	1088	1097	-357	-15	-32	-23	-24.17%	-1.34%	-2.86%	-2.05%
A4082 London Road WB	1886	2242	2249	2221	2233	356	7	-21	-9	18.88%	0.31%	-0.94%	-0.40%
A4053 Ringway Swanswell SB	1980	2514	2522	2373	2562	534	8	-141	48	26.97%	0.32%	-5.61%	1.91%
A4053 Ringway Swanswell NB	1459	1557	1567	1595	1662	98	10	38	105	6.72%	0.64%	2.44%	6.74%
A4114 Holyhead Road EB	1264	1494	1497	0	0	230	3	-1494	-1494	18.20%	0.20%	-100.00%	-100.00%
A4114 Holyhead Road WB	1243	1261	1264	1098	1140	18	3	-163	-121	1.45%	0.24%	-12.93%	-9.60%
A4600 Sky Blue Way EB	1938	1981	1990	1980	2010	43	9	-1	29	2.22%	0.45%	-0.05%	1.46%
A4600 Sky Blue Way WB	1838	1771	1770	1788	1791	-67	-1	17	20	-3.65%	-0.06%	0.96%	1.13%
A4114 London Road NB	1687	1595	1611	1577	1613	-92	16	-18	18	-5.45%	1.00%	-1.13%	1.13%
A4114 London Road SB	1839	1836	1815	1769	1816	-3	-21	-67	-20	-0.16%	-1.14%	-3.65%	-1.09%
A4053 Ringway Queens NB	2605	2833	2840	2511	2618	228	7	-322	-215	8.75%	0.25%	-11.37%	-7.59%
A4053 Ringway Queens SB	2333	2834	2825	2513	2509	501	-9	-321	-325	21.47%	-0.32%	-11.33%	-11.47%

shows that generally between 2031 DM and 2013 Base Year there are increases in traffic flow at most locations. DS 2b reduces the traffic in all locations by up to 1%, with the only exception to this being A4082 London Road where these is a very minor increase of 1%. For DS13L and DS14, there is a significant reduction in traffic on both A4114 Holyhead Road EB and A4053 SB which is a result of the closure of Holyhead Road in the inbound direction during the AM peak. The other roads tend to have reductions in a similar order to the DS CAZ scenarios however in some locations such as A4053 Ringway Queens NB they are not as significant.

Figure 37 to **Figure 45** present the changes in traffic flow across Coventry local authority for AM peak for the following scenarios:

- 2031 DS 2b – 2031 DM
- 2031 DS 13L – 2031 DM
- 2031 DS 14 – 2031 DM

The differences are presented showing the differences in both all vehicles and non-compliant vehicles.

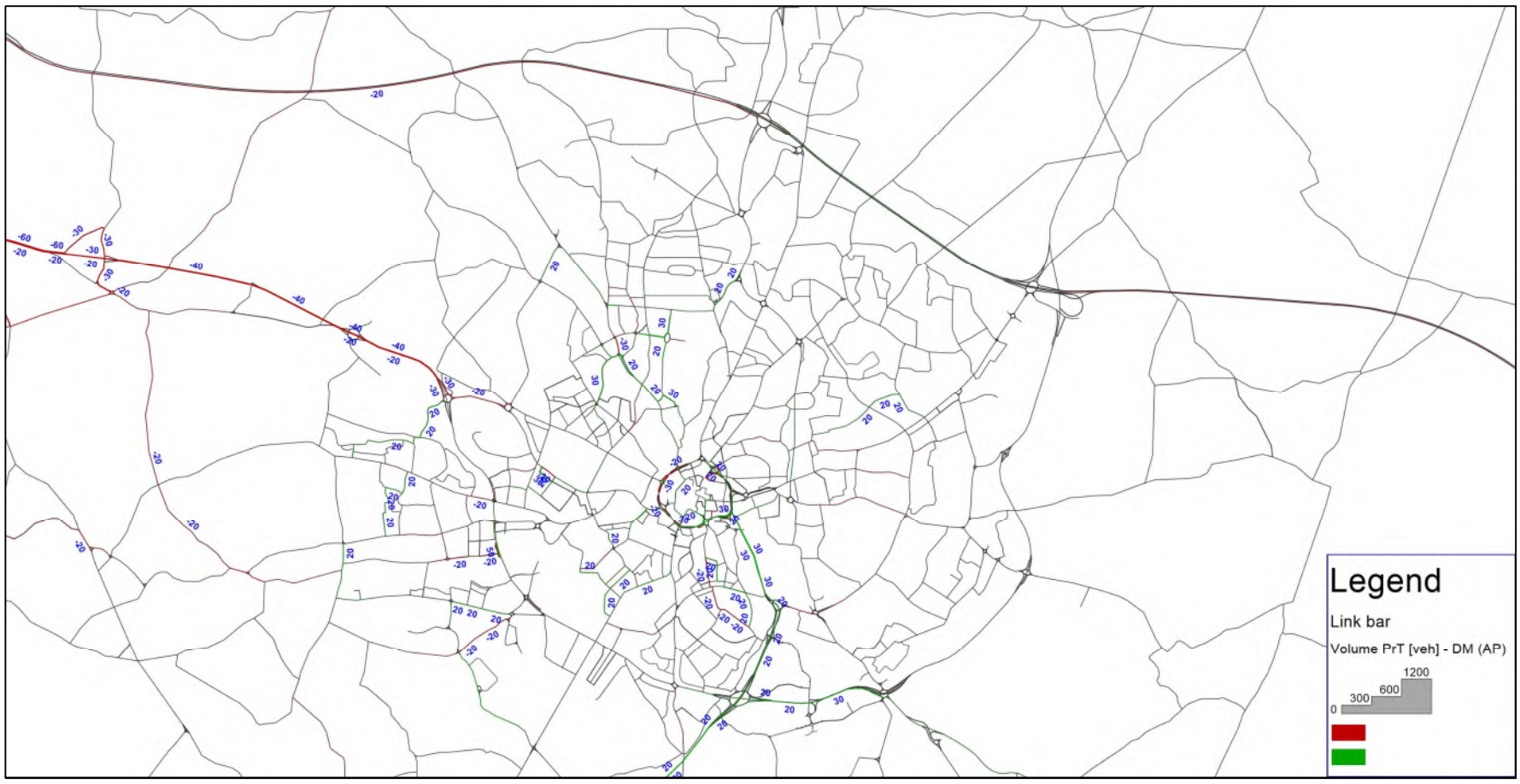

Figure 37: AM peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (All vehicles)

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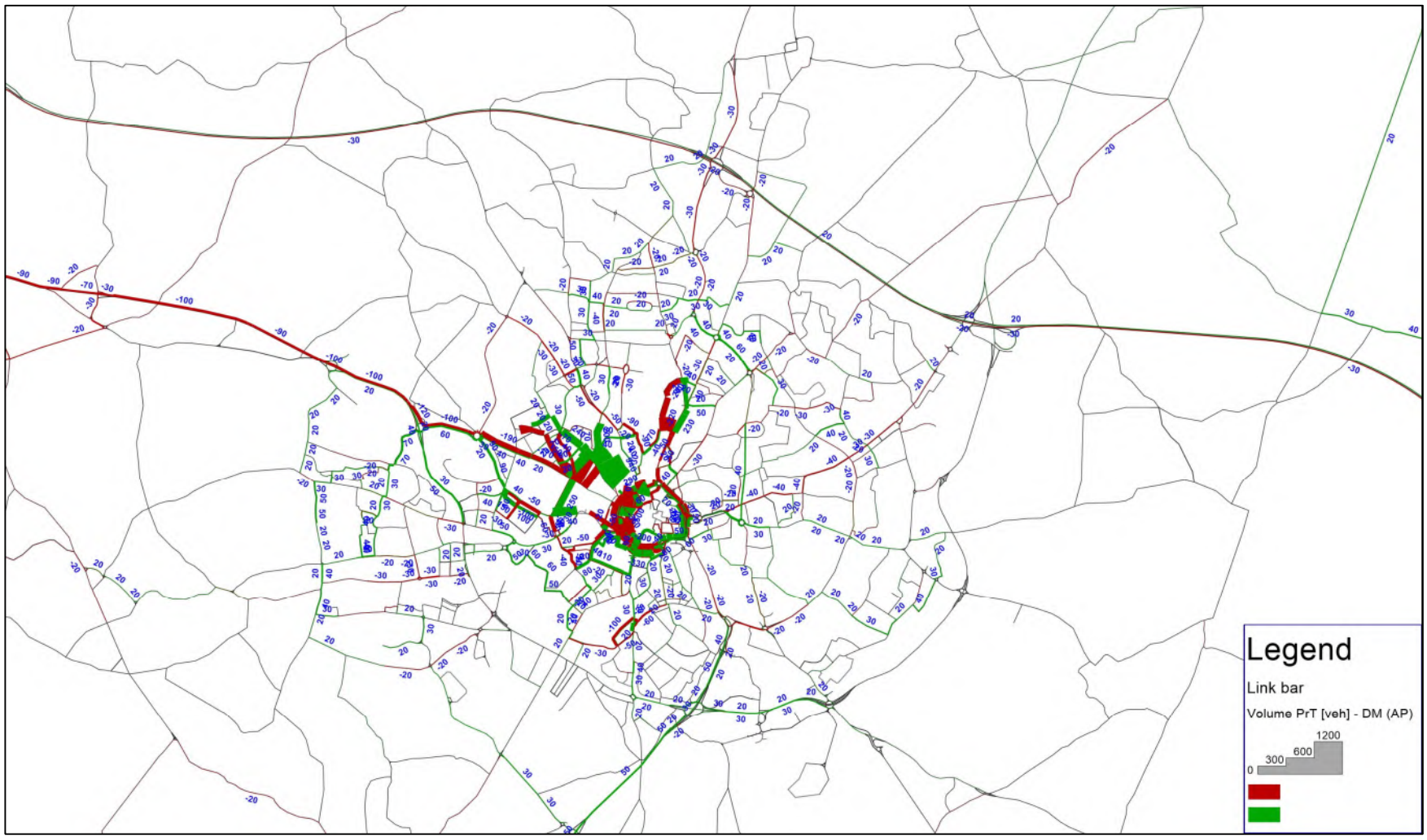

Figure 38: AM peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (All vehicles)

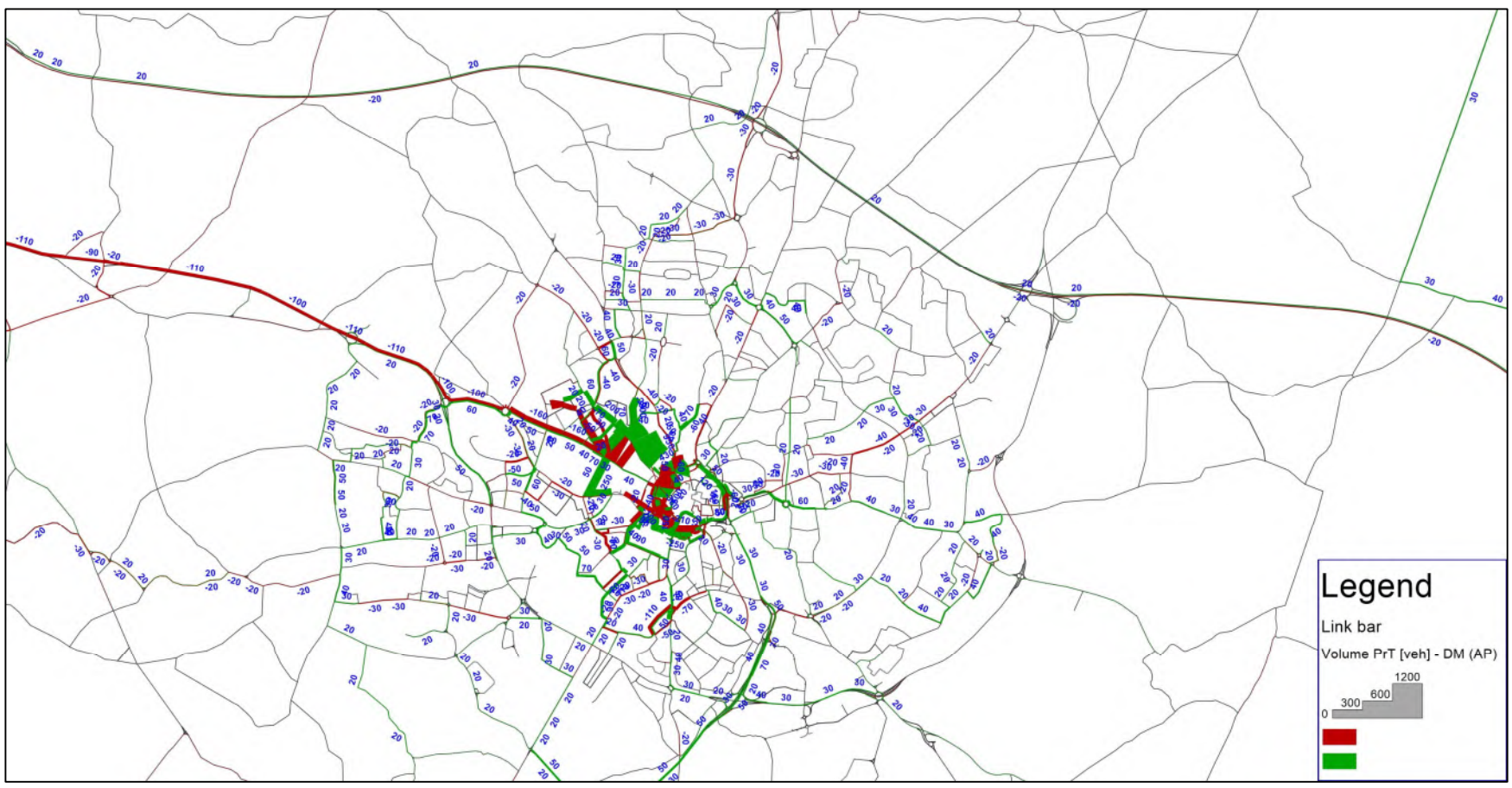

Figure 39: AM peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (All vehicles)

Figure 37 shows that changes in all vehicles in DS 2b focused within the centre of Coventry around the CAZ area, with reductions of vehicles within the CAZ and increases outside the CAZ area. The traffic flow differences patterns are different within the DS 13L scenario where reductions are focused along the Holyhead Road corridor where the inbound route is closed during AM peak, with increases occurring on the parallel routes, Spon End and Radford Road. The impacts in DS14 is a combination of both impacts due to CAZ D (DS2b) and DS13L intervention schemes.

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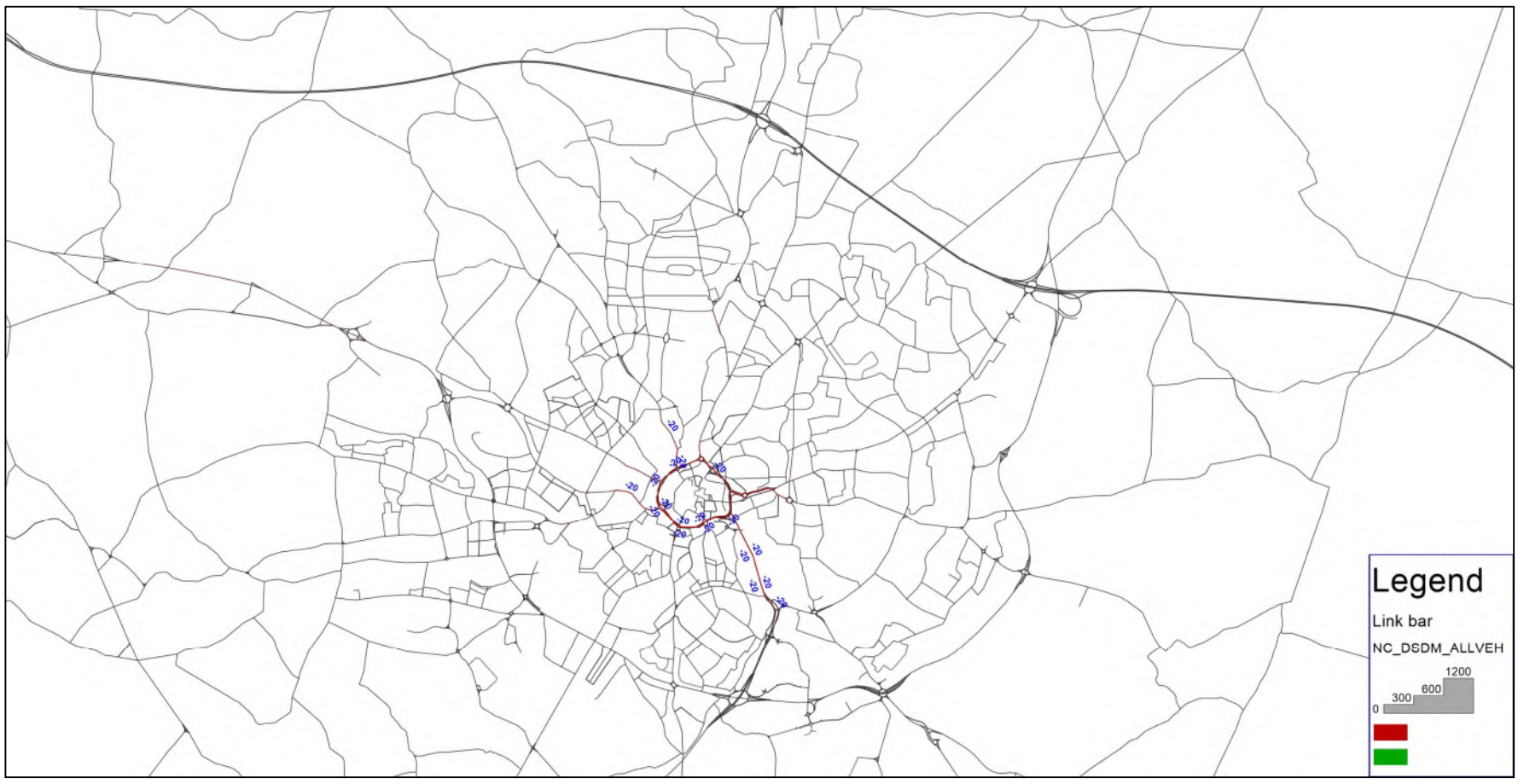

Figure 40: AM peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non- Compliant vehicles)

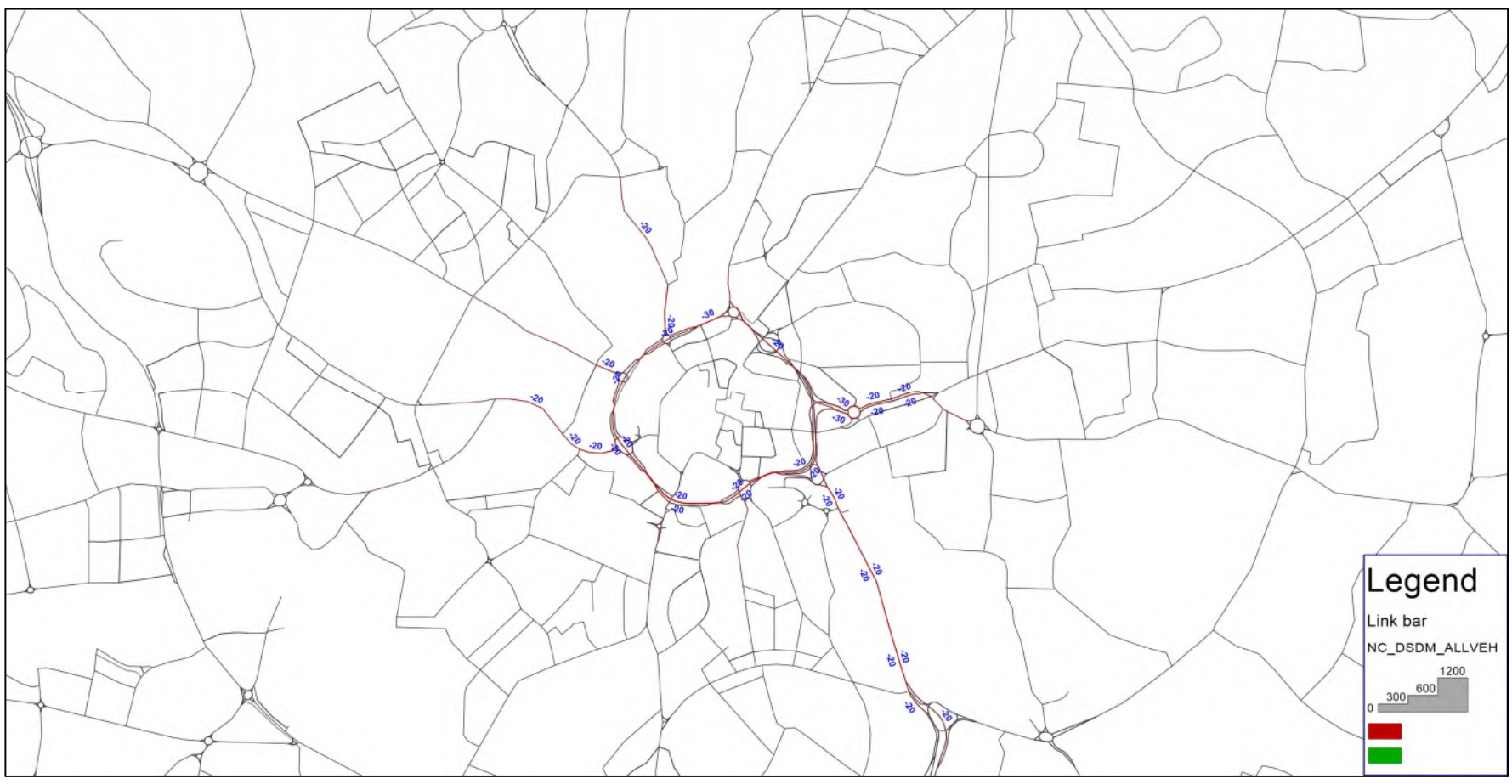

Figure 41: AM peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non- Compliant vehicles) City Centre

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Figure 42: AM peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (Non- Compliant vehicles)

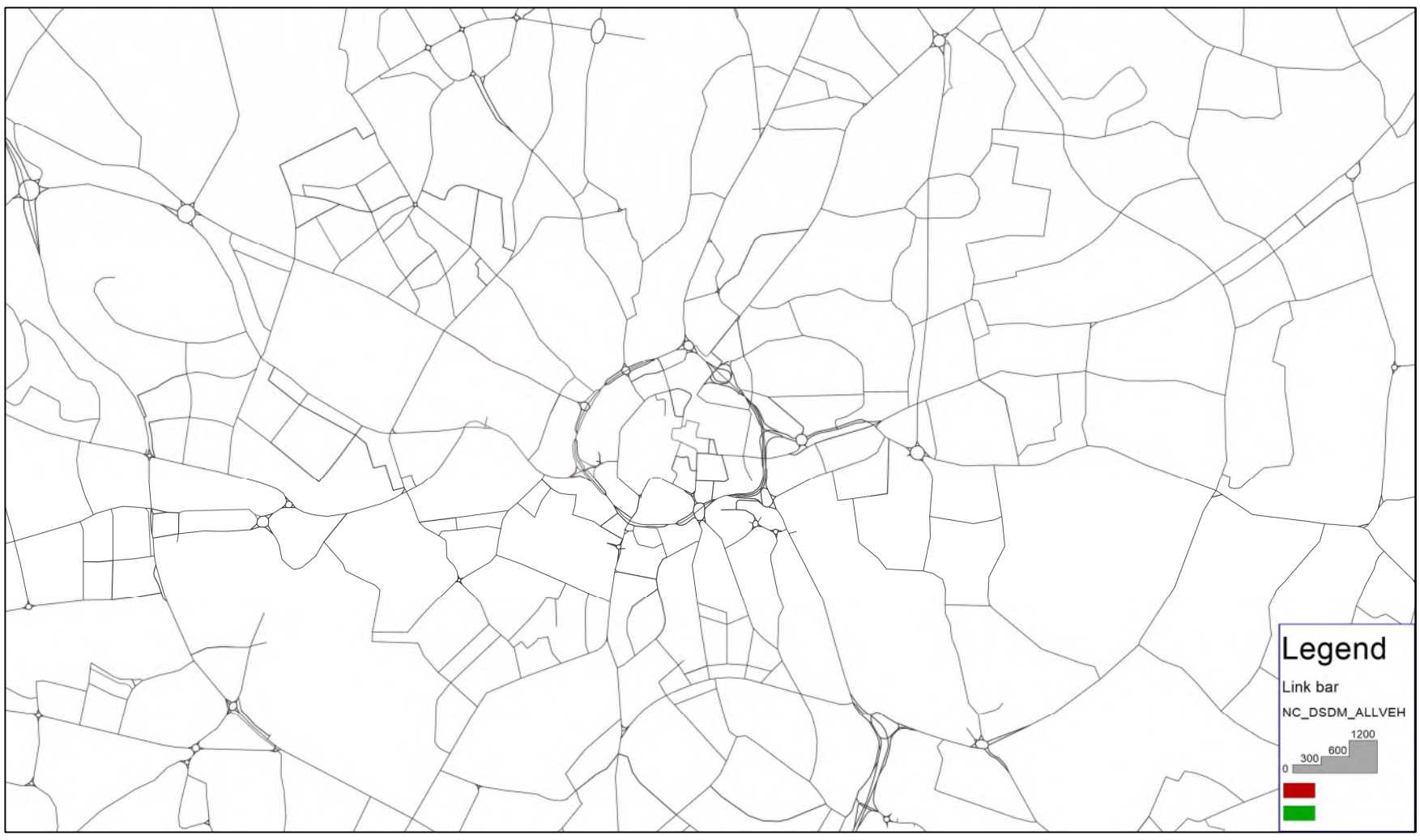

Figure 43: AM peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (Non- Compliant vehicles) City Centre

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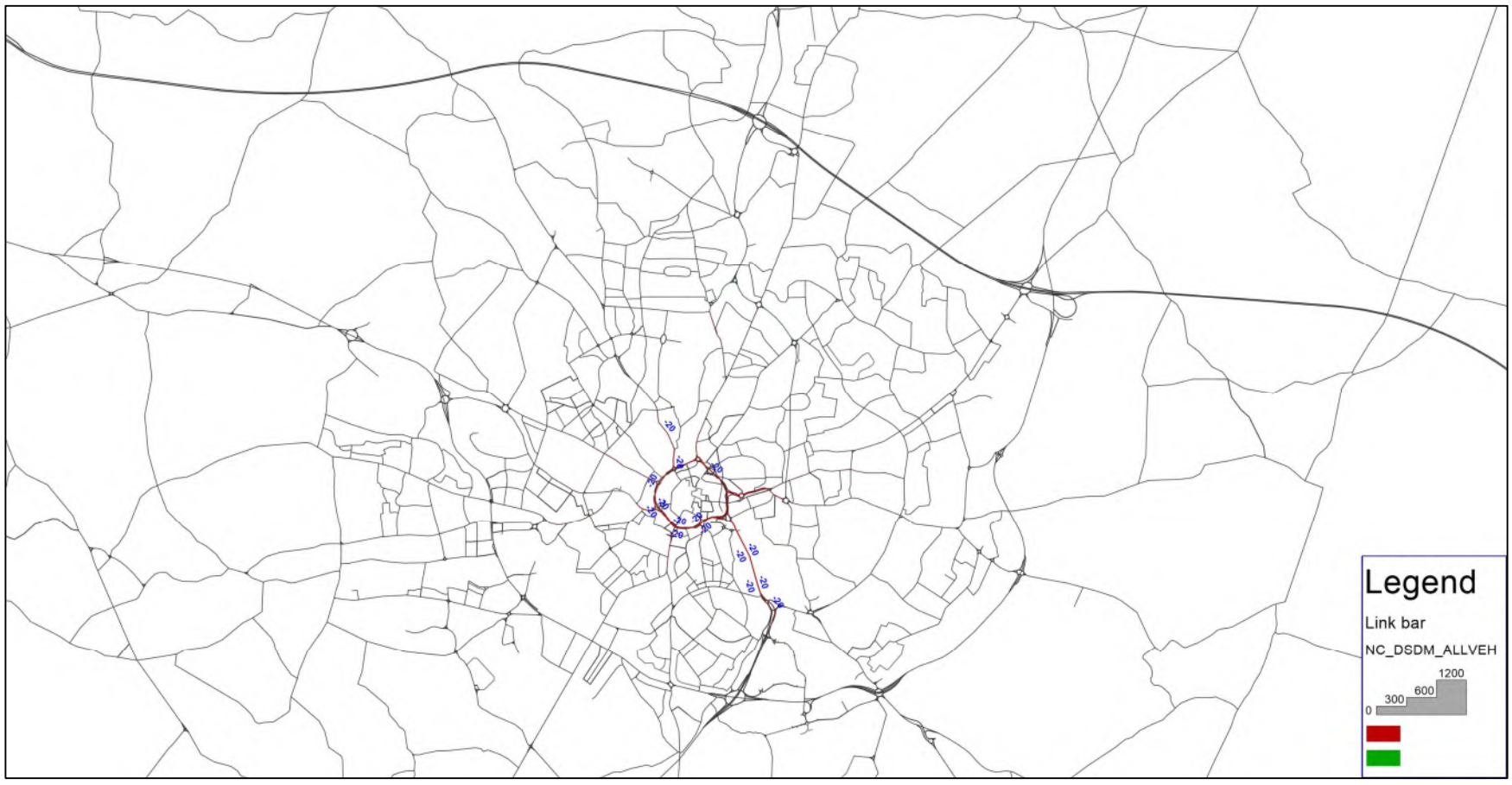

Figure 44: AM peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (Non- Compliant vehicles)

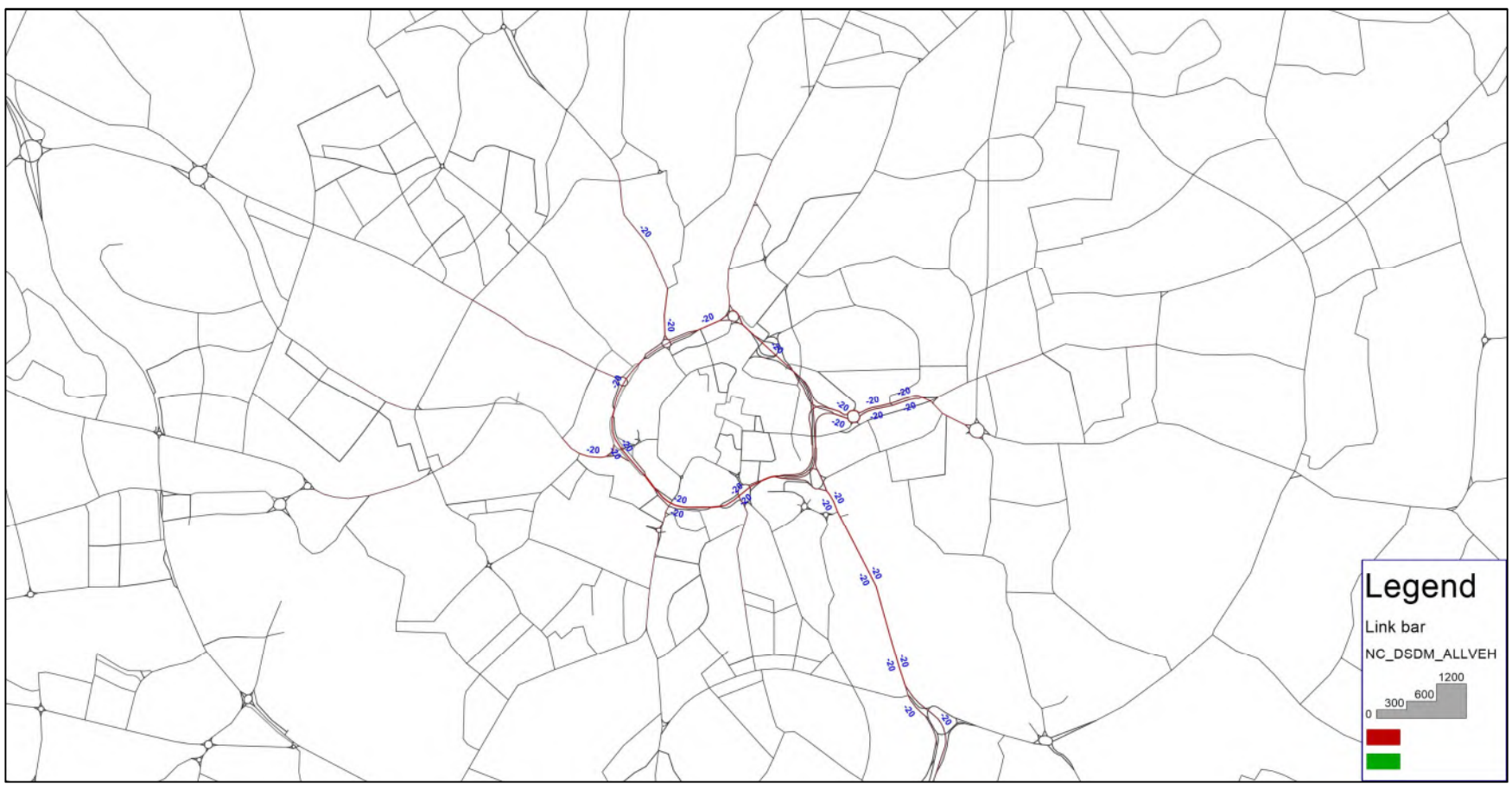

Figure 45: AM peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (Non- Compliant vehicles) City Centre

Figure 40 to **Figure 45** show that changes in all vehicles in non-compliant vehicles are more focused within the centre of Coventry around the CAZ area, with reductions of vehicles within the CAZ and increases outside the CAZ area. From the figures it can be concluded that there is minimal impact due to small proportion of non-compliant vehicles by 2031.

Local Plan Transport Modelling Forecasting Report (T4) Addendum

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INTERPEAK TRAFFIC FLOWS

Regarding CCC interventions for scenario DS13L in the Inter Peak, there are two separate tests which ban traffic along Holyhead Road in inbound and outbound direction. These scenarios will be addressed as DS13L HHIB and HHOB respectively. presents the volumes of traffic in all scenarios for the Inter peak for the key air quality receptors only.

Table 17: Inter Peak 2031 Traffic Flow Analysis

Road ID	2013 BY	2031 DM	2031 DS2b	2031 DS13L HHIB	2031 DS13L HHOB	2031 DS14	DM minus 2013	DS2b minus DM	DS13L HHIB minus DM	DS13L HHOB minus DM	DS14 minus DM	% increase from 2013 to 2031 DM	% increase from 2031 DM to 2031 DS2b	% increase from 2031 DM to 2031 DS13L HHIB	% increase from 2031 DM to 2031 DS13L HHOB	% increase from 2031 DM to 2031 DS14
A4082 London Road EB	1233	1270	1270	1269	1272	1271	37	0	-1	2	1	3.00%	0.00%	-0.08%	0.16%	0.08%
A4082 London Road WB	1302	1532	1518	1519	1513	1515	230	-14	-13	-19	-17	17.67%	-0.91%	-0.85%	-1.24%	-1.11%
A4053 Ringway Swanswell SB	1548	1705	1692	1761	1827	1828	157	-13	56	122	123	10.14%	-0.76%	3.28%	7.16%	7.21%
A4053 Ringway Swanswell NB	1143	1457	1463	1310	1044	1505	314	6	-147	-413	48	27.47%	0.41%	-10.09%	-28.35%	3.29%
A4114 Holyhead Road EB	1057	1164	1163	0	918	936	107	-1	-1164	-246	-228	10.12%	-0.09%	-100.00%	-21.13%	-19.59%
A4114 Holyhead Road WB	1189	1337	1337	1211	0	1266	148	0	-126	-1337	-71	12.45%	0.00%	-9.42%	-100.00%	-5.31%
A4600 Sky Blue Way EB	1392	1538	1523	1504	1564	1560	146	-15	-34	26	22	10.49%	-0.98%	-2.21%	1.69%	1.43%
A4600 Sky Blue Way WB	1360	1472	1471	1496	1459	1487	112	-1	24	-13	15	8.24%	-0.07%	1.63%	-0.88%	1.02%
A4114 London Road NB	1118	1441	1426	1451	1407	1426	323	-15	10	-34	-15	28.89%	-1.04%	0.69%	-2.36%	-1.04%
A4114 London Road SB	1279	1469	1455	1453	1493	1471	190	-14	-16	24	2	14.86%	-0.95%	-1.09%	1.63%	0.14%
A4053 Ringway Queens NB	2050	2006	2001	1997	2040	2003	-44	-5	-9	34	-3	-2.15%	-0.25%	-0.45%	1.69%	-0.15%
A4053 Ringway Queens SB	1194	2161	2153	1841	2030	2215	967	-8	-320	-131	54	80.99%	-0.37%	-14.81%	-6.06%	2.50%

 shows that generally between 2013 Base Year and 2021 DM there are increases in traffic flow at most locations. There is a significant increase on A4053 Ringway Queens SB because of the changes in highway layout in the Friar Gate area with Warwick Road becoming a one-way road. DS2b reduces the traffic in all locations of up to 1%, this reduction is low because in 2031 the number of non-compliant vehicles on the network is low. DS13L HHOB and DS14 reduce traffic by approximately 20% at Holyhead Road in the EB direction, and traffic is banned on that road in the DS13L HHIB scenario. This is mainly due to the charging at the wider CAZ D applied to DS14 together with the highway intervention schemes in both DS13L and DS14.

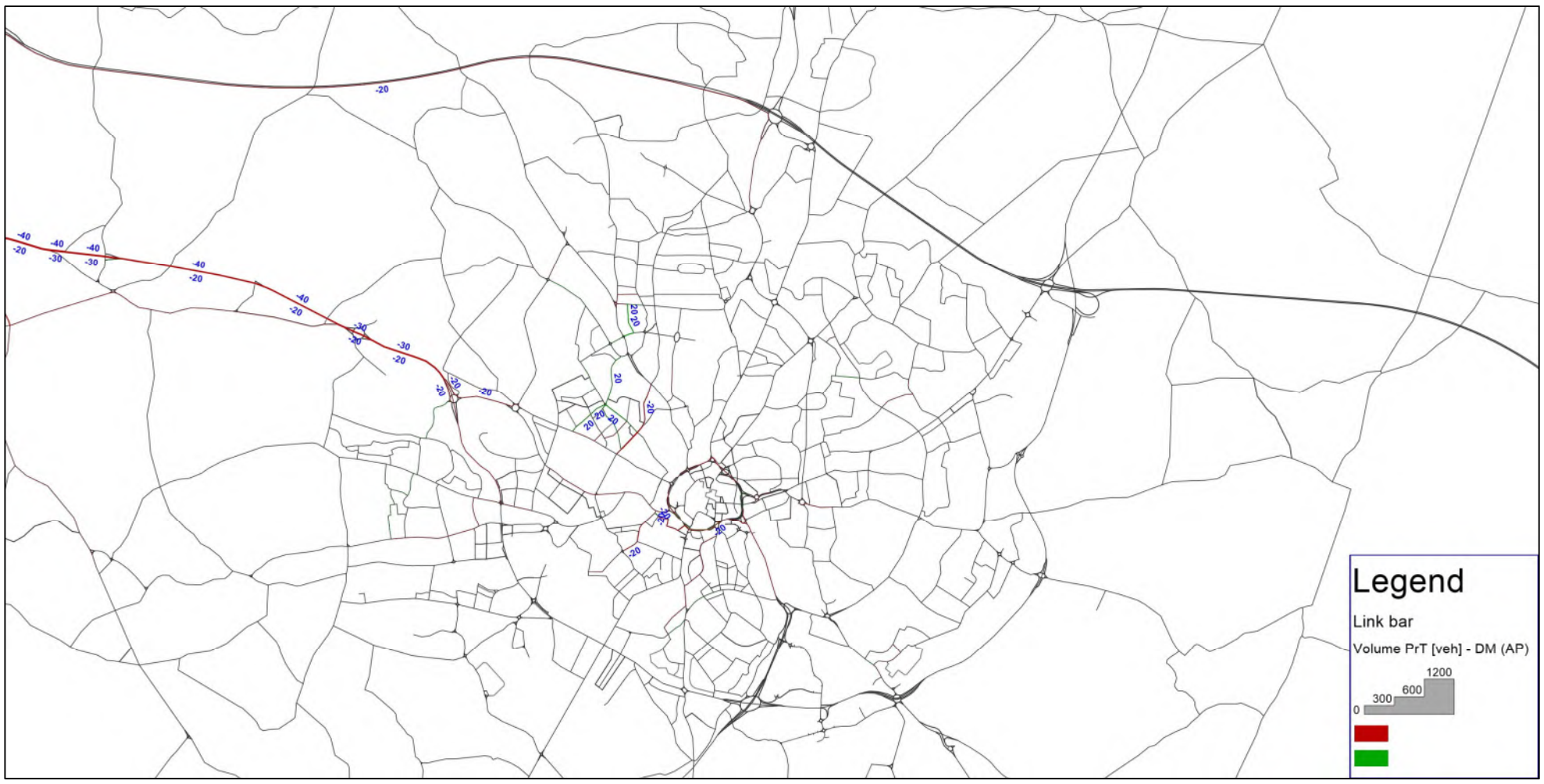

Figure 46: Inter Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (All vehicles)

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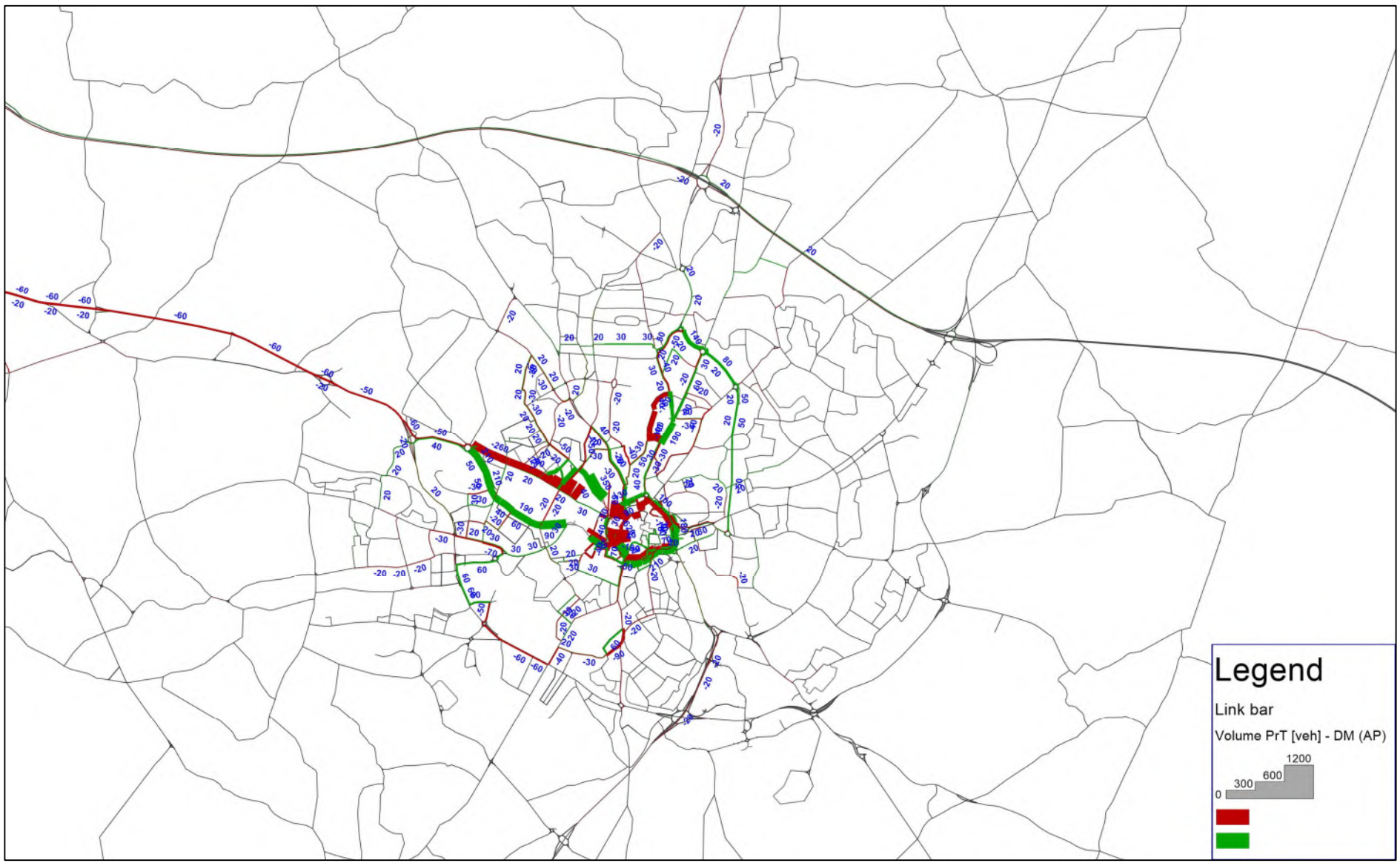

Figure 47: Inter Peak Flow Differences between 2031 DS 13L HHIB and 2031 DM Scenario (All vehicles)

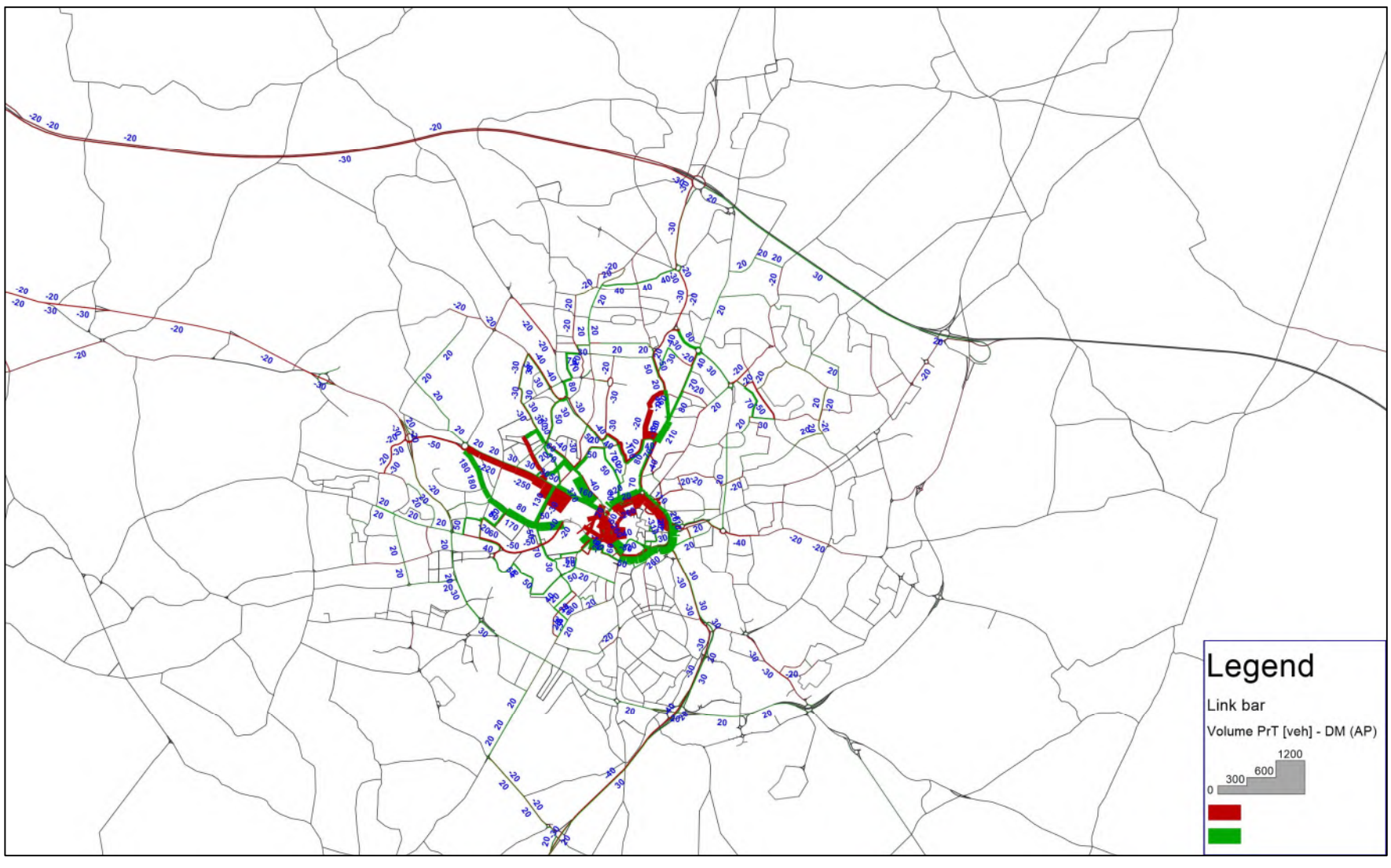

Figure 48: Inter Peak Flow Differences between 2031 DS 13L HHOB and 2031 DM Scenario (All vehicles)

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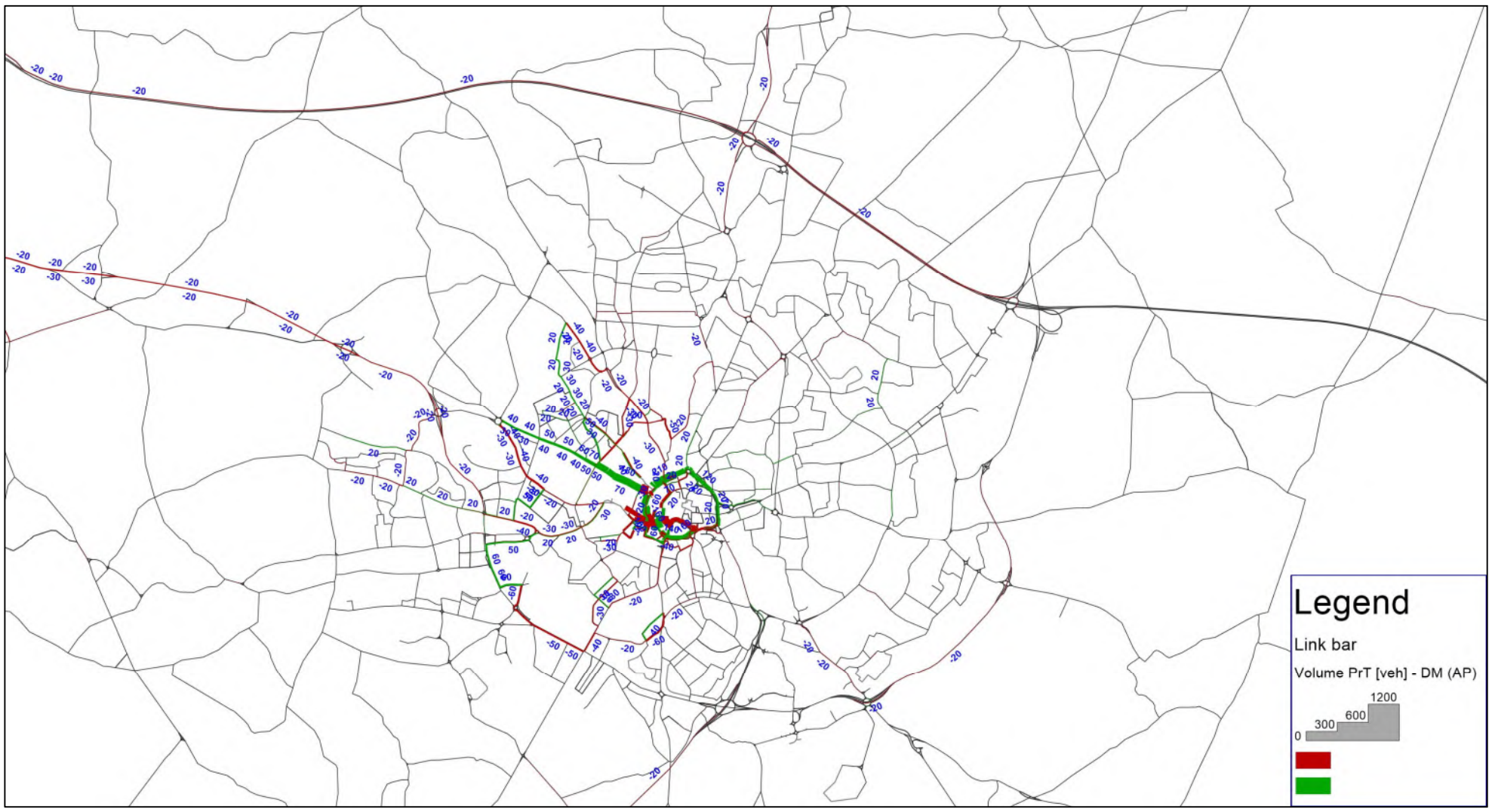

Figure 49: Inter Peak Flow Differences between 2031 DS 14 and 2031 DM (All vehicles)

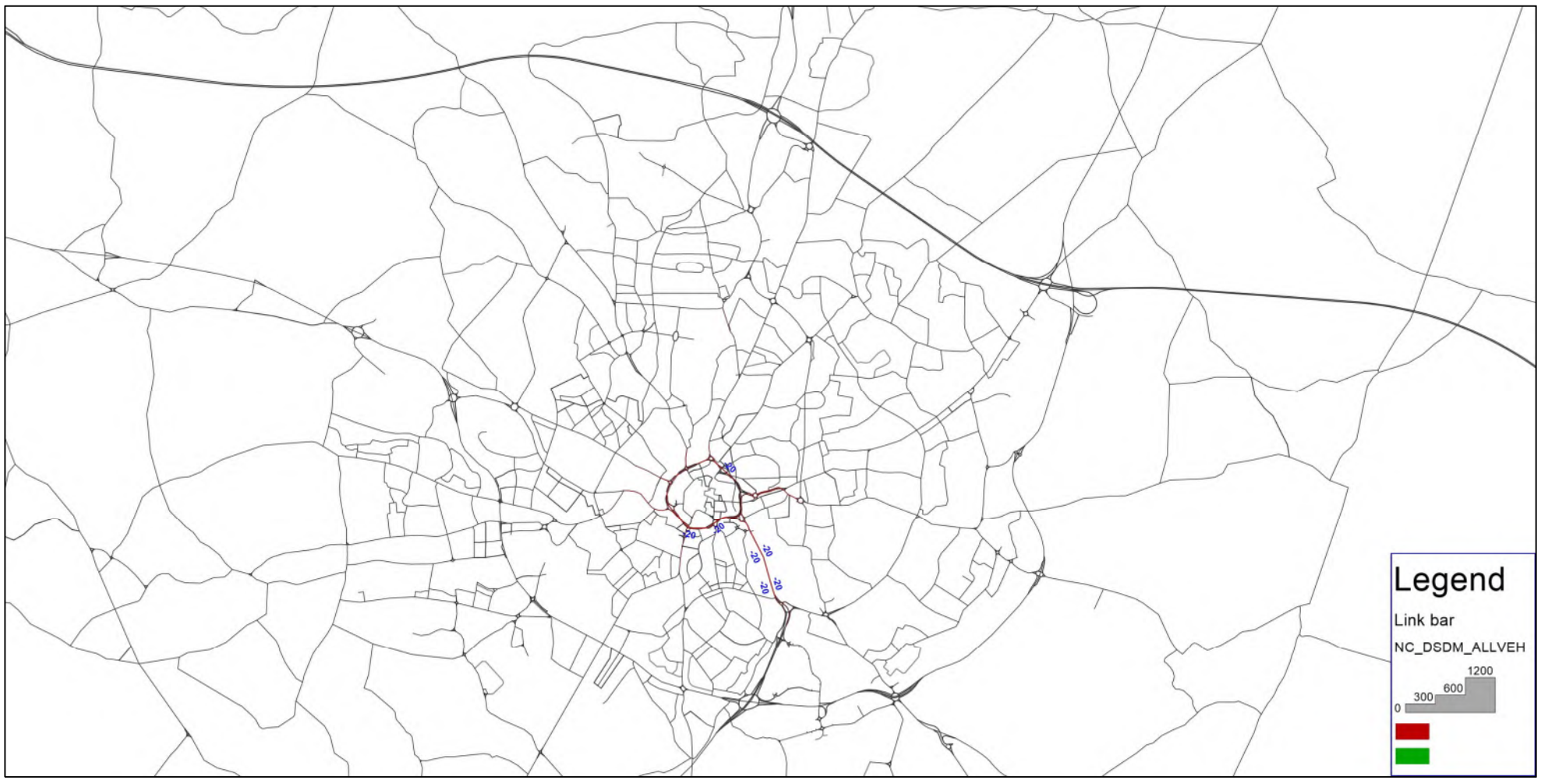

Figure 50: Inter Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non-compliant vehicles)

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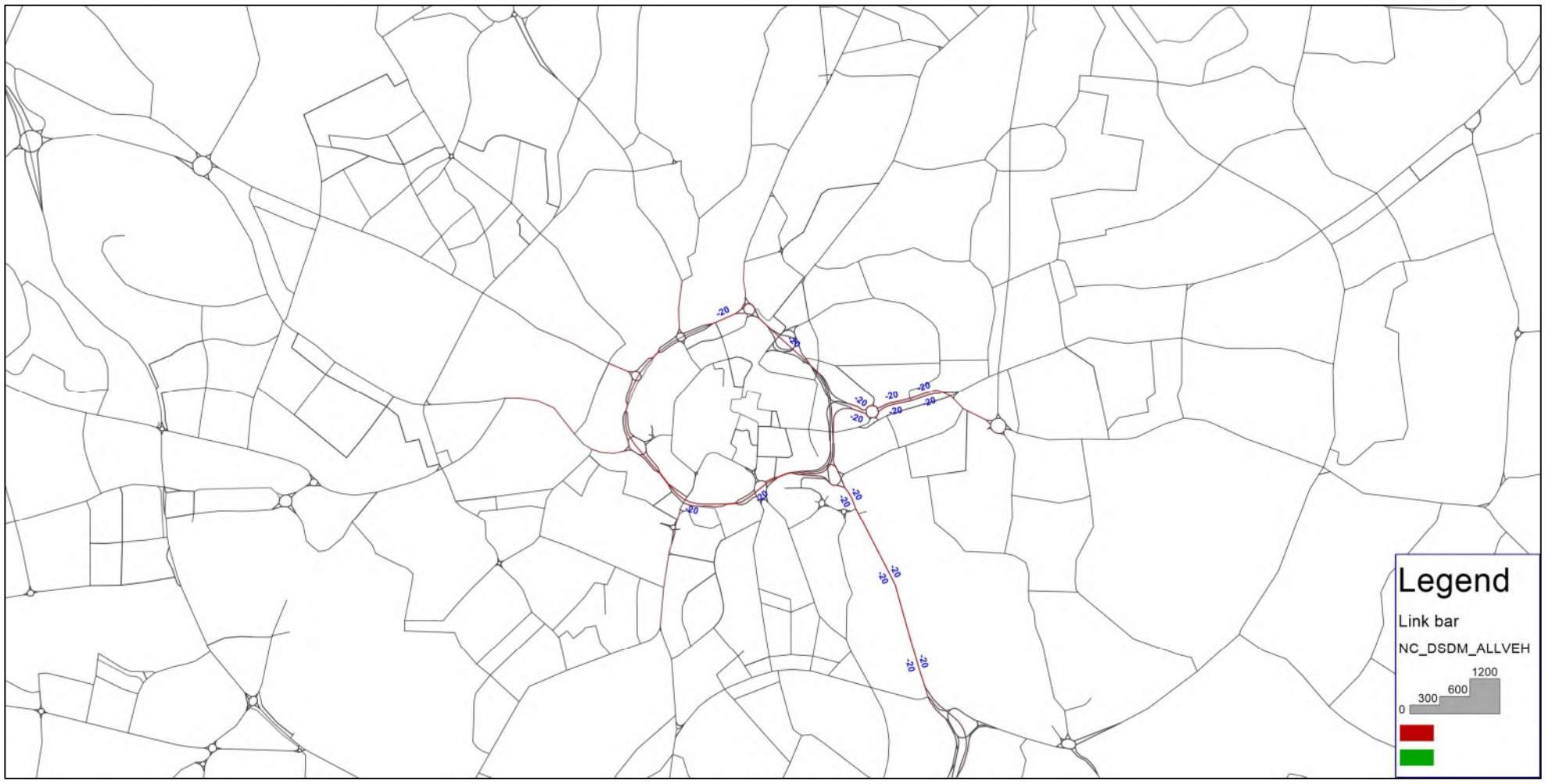

Figure 51: Inter Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non-compliant vehicles) Coventry City Centre

Figure 52: Inter Peak Flow Differences between 2031 DS 13L HHIB and 2031 DM Scenario (Non-compliant vehicles)

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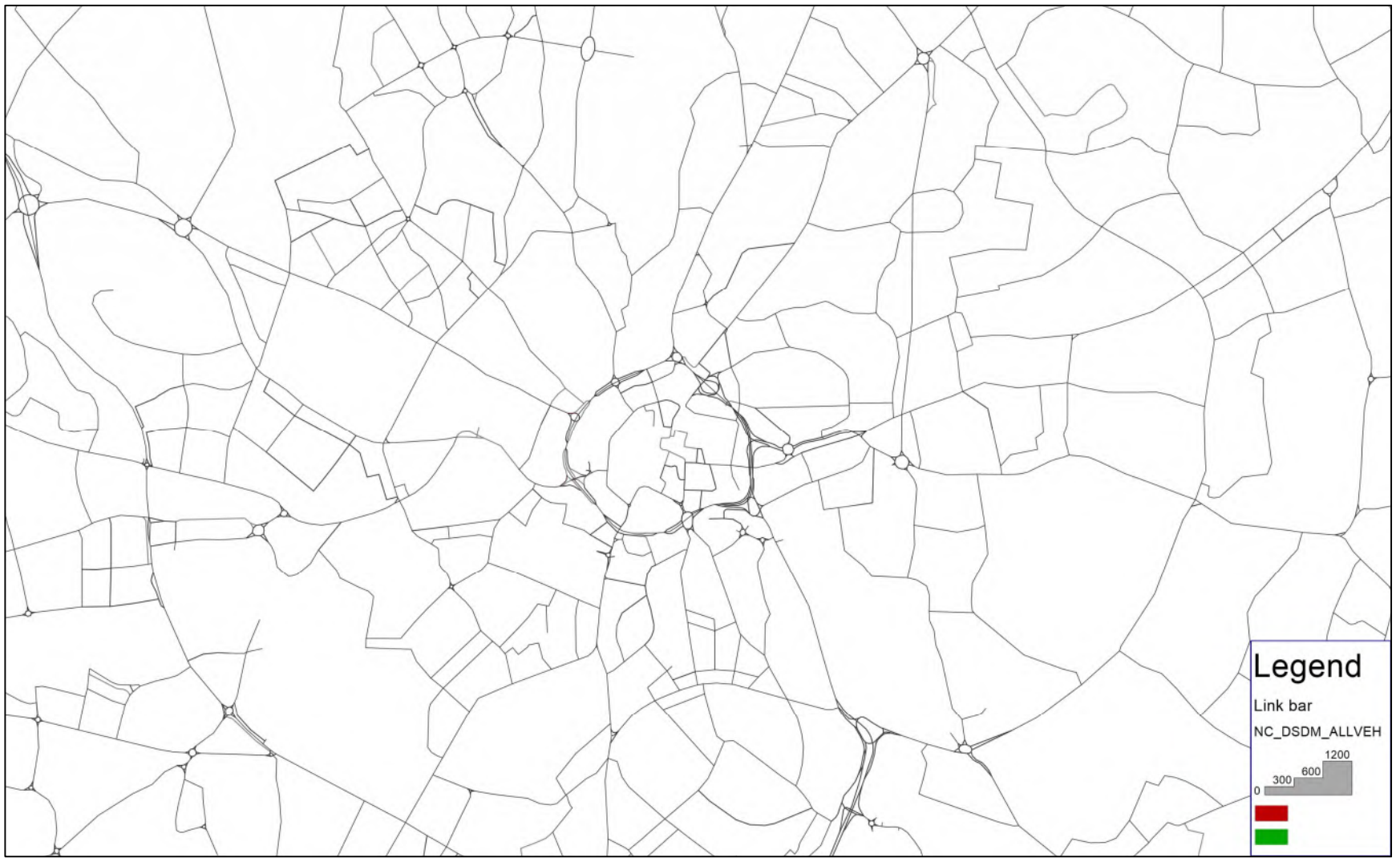

Figure 53: Inter Peak Flow Differences between 2031 DS 13L HHIB and 2031 DM (Non-compliant vehicles) Coventry City Centre

Figure 54: Inter Peak Flow Differences between 2031 DS 13L HHOB and 2031 DM Scenario (Non-compliant vehicles)

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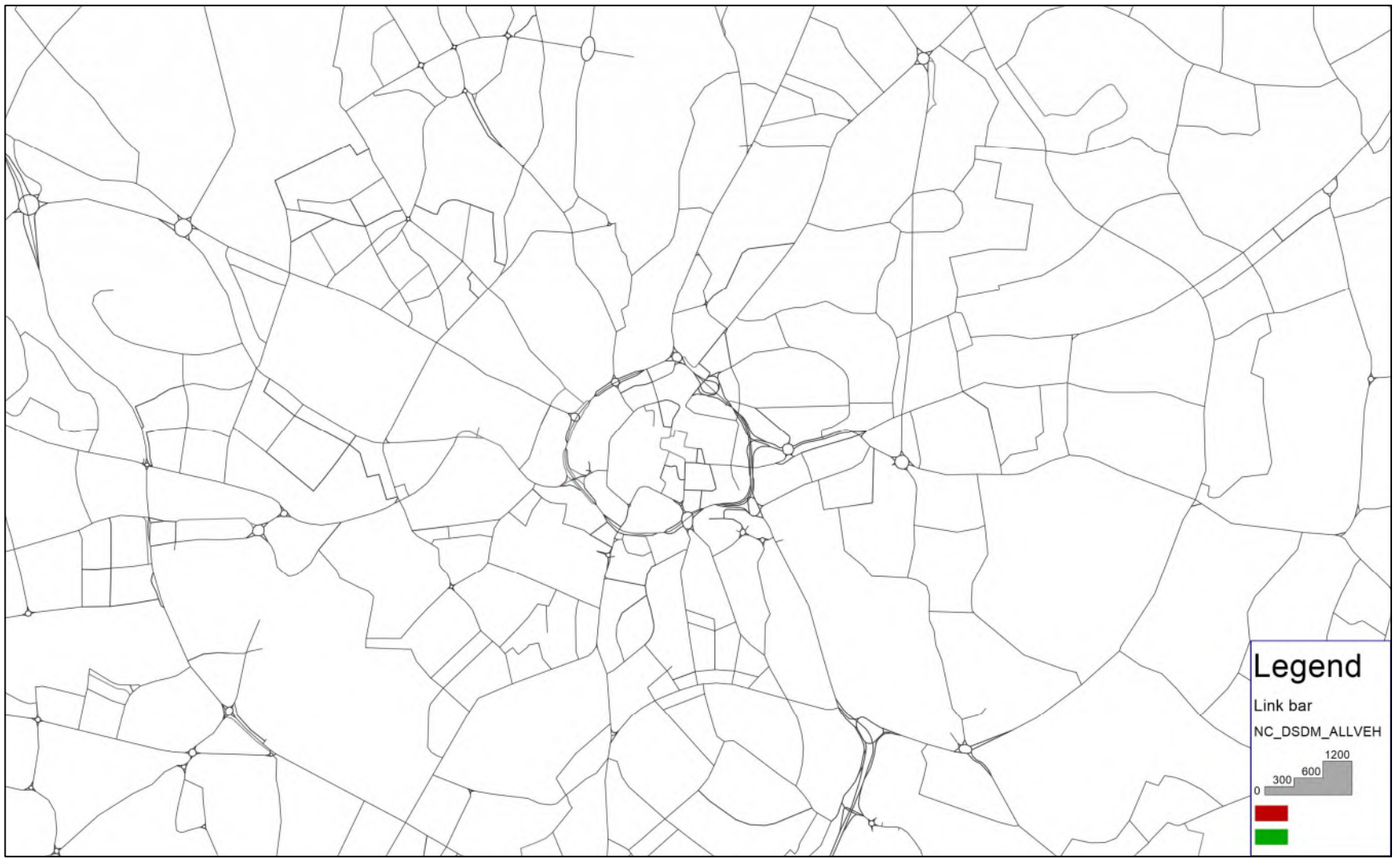

Figure 55: Inter Peak Flow Differences between 2031 DS 13L HHOB and 2031 DM (Non-compliant vehicles) Coventry City Centre

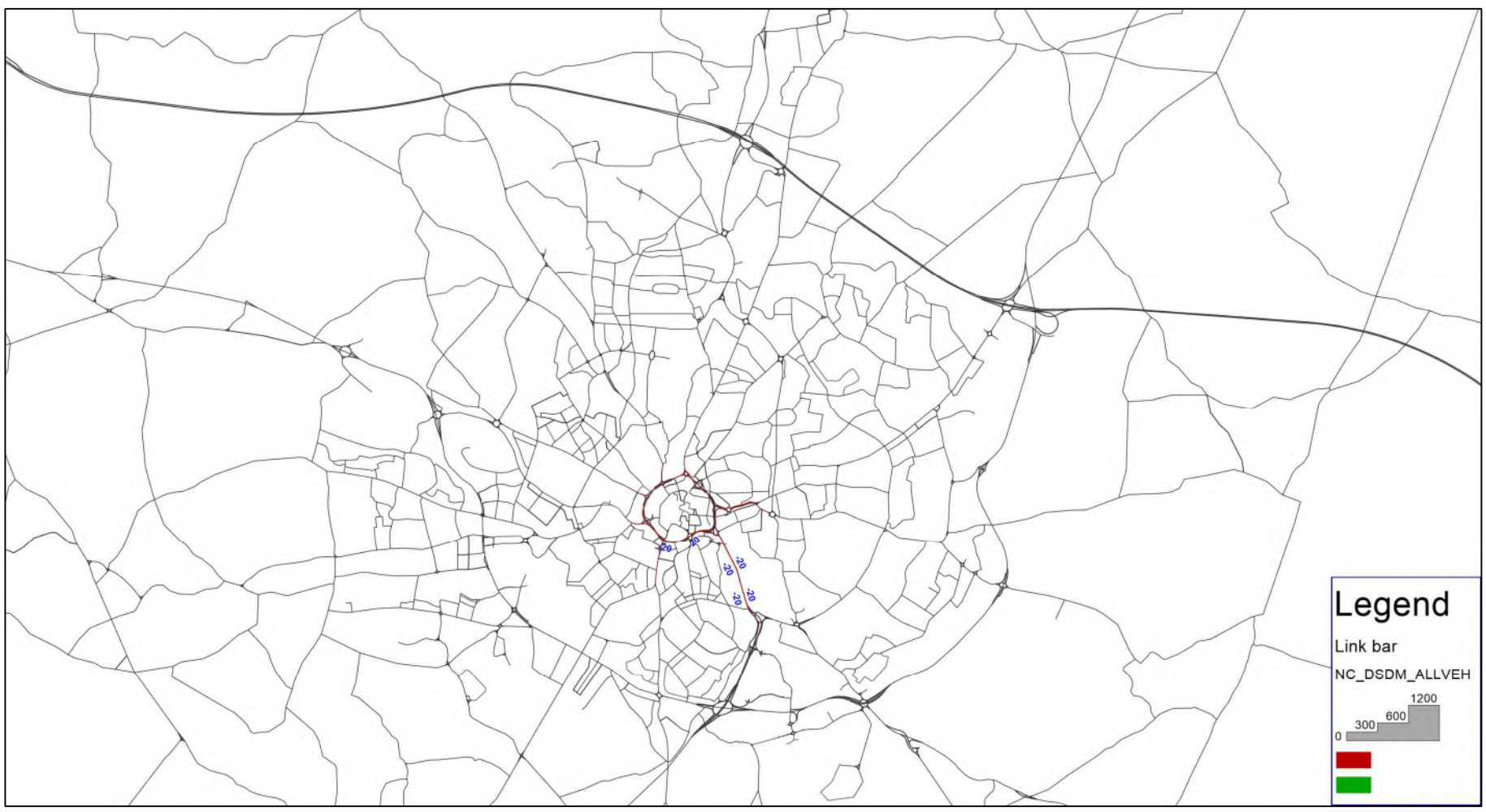

Figure 56: Inter Peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (Non-compliant vehicles)

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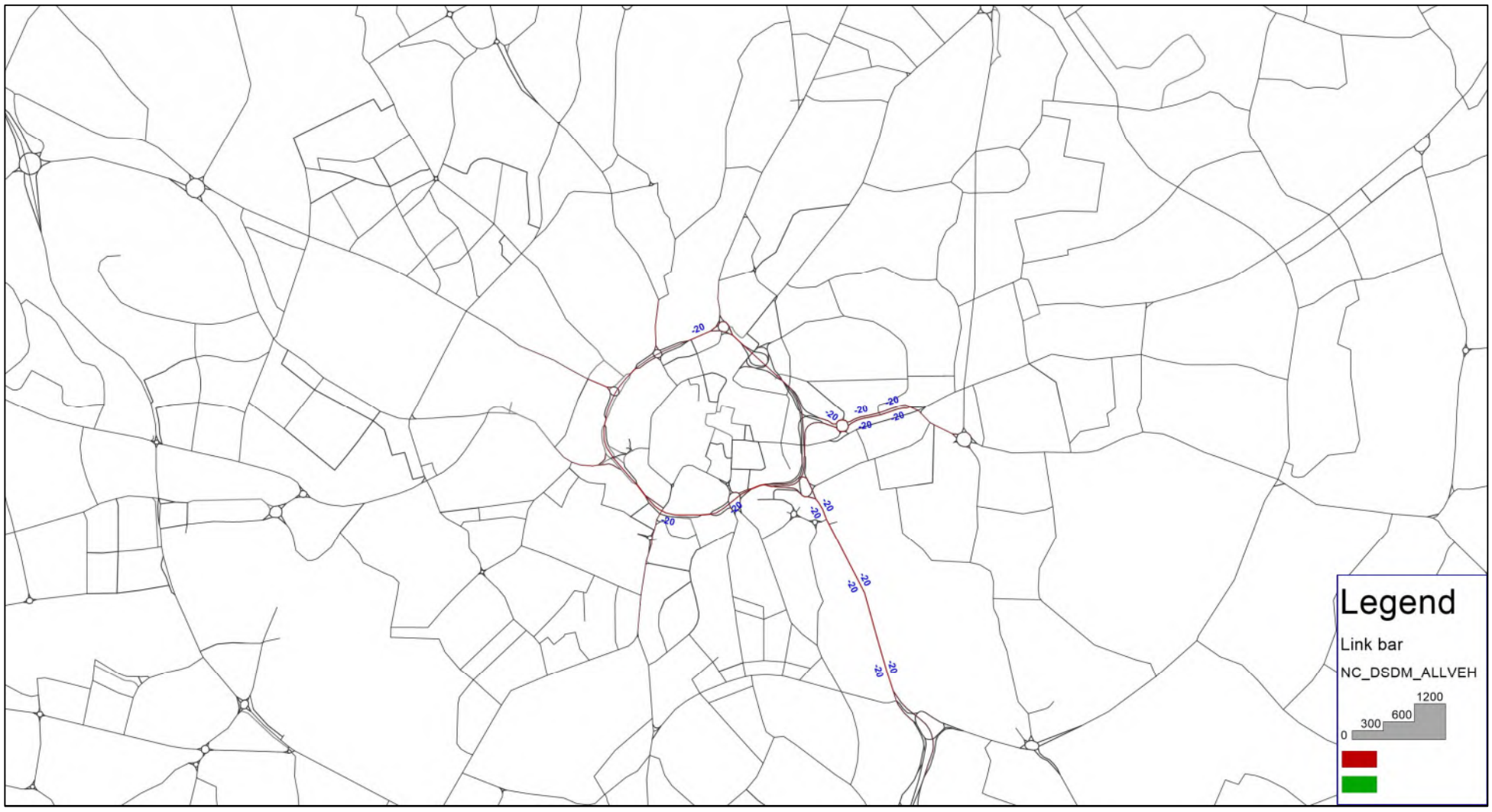

Figure 57: Inter Peak Flow Differences between 2031 DS 14 and 2031 DM (Non-compliant vehicles) Coventry City Centre

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PM PEAK TRAFFIC FLOWS

presents the volumes of traffic in all scenarios for the PM peak for the key air quality receptors only.

Table 18 : PM Peak 2031 Traffic Flow Analysis

Road ID	2013 BY	2031 DM	2031 DS2b	2031 DS13L	2031 DS14	DM minus 2013	DS2b minus DM	DS13L minus DM	DS14 minus DM	% increase from 2013 to 2031 DM	% increase from 2031 DM to 2031 DS2b	% increase from 2031 DM to 2031 DS13L	% increase from 2031 DM to 2031 DS14
A4082 London Road EB	1580	1543	1446	1468	1451	-37	-97	-75	-92	-2.34%	-6.29%	-4.86%	-5.96%
A4082 London Road WB	1872	1728	1769	1760	1773	-144	41	32	45	-7.69%	2.37%	1.85%	2.60%
A4053 Ringway Swanswell SB	1800	1940	2026	1998	2070	140	86	58	130	7.78%	4.43%	2.99%	6.70%
A4053 Ringway Swanswell NB	1763	1934	2001	1518	1732	171	67	-416	-202	9.70%	3.46%	-21.51%	-10.44%
A4114 Holyhead Road EB	1216	1260	1257	921	953	44	-3	-339	-307	3.62%	-0.24%	-26.90%	-24.37%
A4114 Holyhead Road WB	1741	1766	1790	0	0	25	24	-1766	-1766	1.44%	1.36%	-100.00%	-100.00%
A4600 Sky Blue Way EB	2150	2274	2190	2198	2187	124	-84	-76	-87	5.77%	-3.69%	-3.34%	-3.83%
A4600 Sky Blue Way WB	1712	1825	1805	1804	1775	113	-20	-21	-50	6.60%	-1.10%	-1.15%	-2.74%
A4114 London Road NB	1825	1621	1541	1573	1549	-204	-80	-48	-72	-11.18%	-4.94%	-2.96%	-4.44%
A4114 London Road SB	2087	2144	2006	2085	2063	57	-138	-59	-81	2.73%	-6.44%	-2.75%	-3.78%
A4053 Ringway Queens NB	3311	3378	3539	3566	3459	67	161	188	81	2.02%	4.77%	5.57%	2.40%
A4053 Ringway Queens SB	1603	2664	2735	2526	2689	1061	71	-138	25	66.19%	2.67%	-5.18%	0.94%

shows that generally between 2013 Base Year and 2031 Do Minimum there are increases in traffic flow at most locations, in particular A4053 where highway layout changes have increased the flow significantly on the A4053 Ringway Queens SB. DS 2b reduces the traffic in all locations by up to 6%. For DS13L and DS14, traffic on the A4114 Holyhead Road WB is banned during the PM peak, and there was a significant reduction on the A4053 NB as a result of that change. The charging at the wider CAZ D in DS14 is reflected in the reduction on A4114 Holyhead Road EB direction with reduction of 24%.

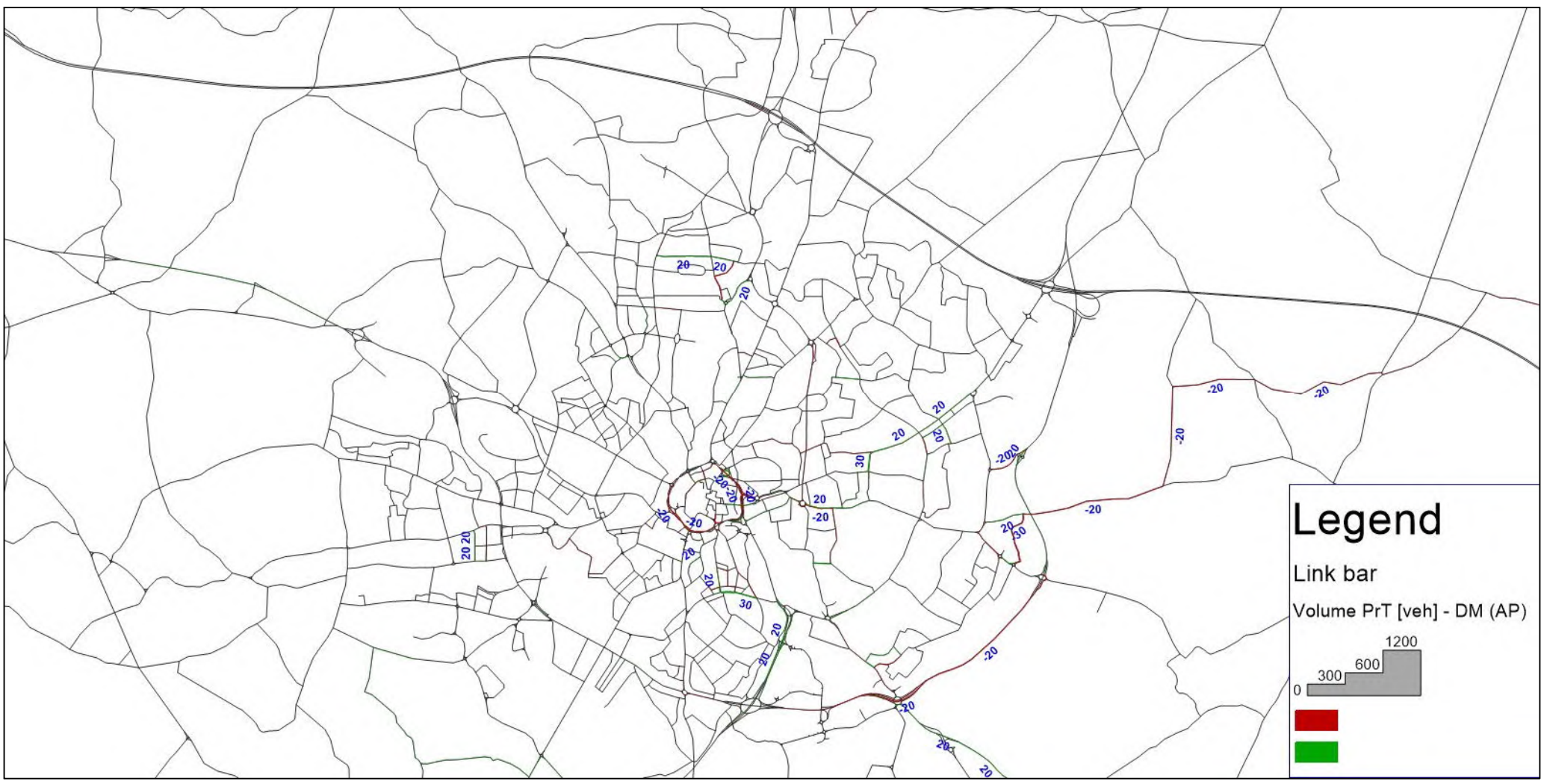

Figure 58: PM Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (All vehicles)

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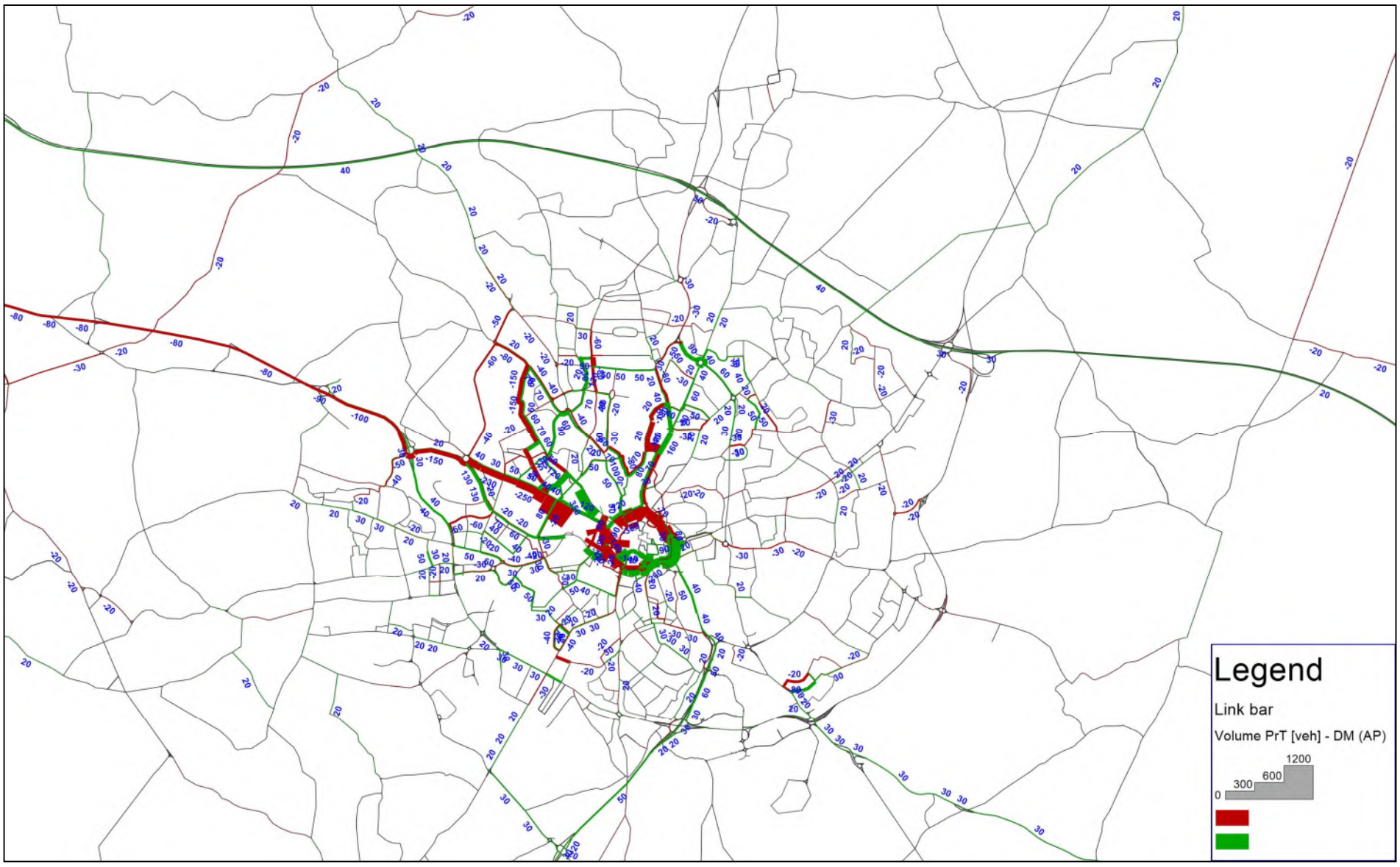

Figure 59: PM Peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (All vehicles)

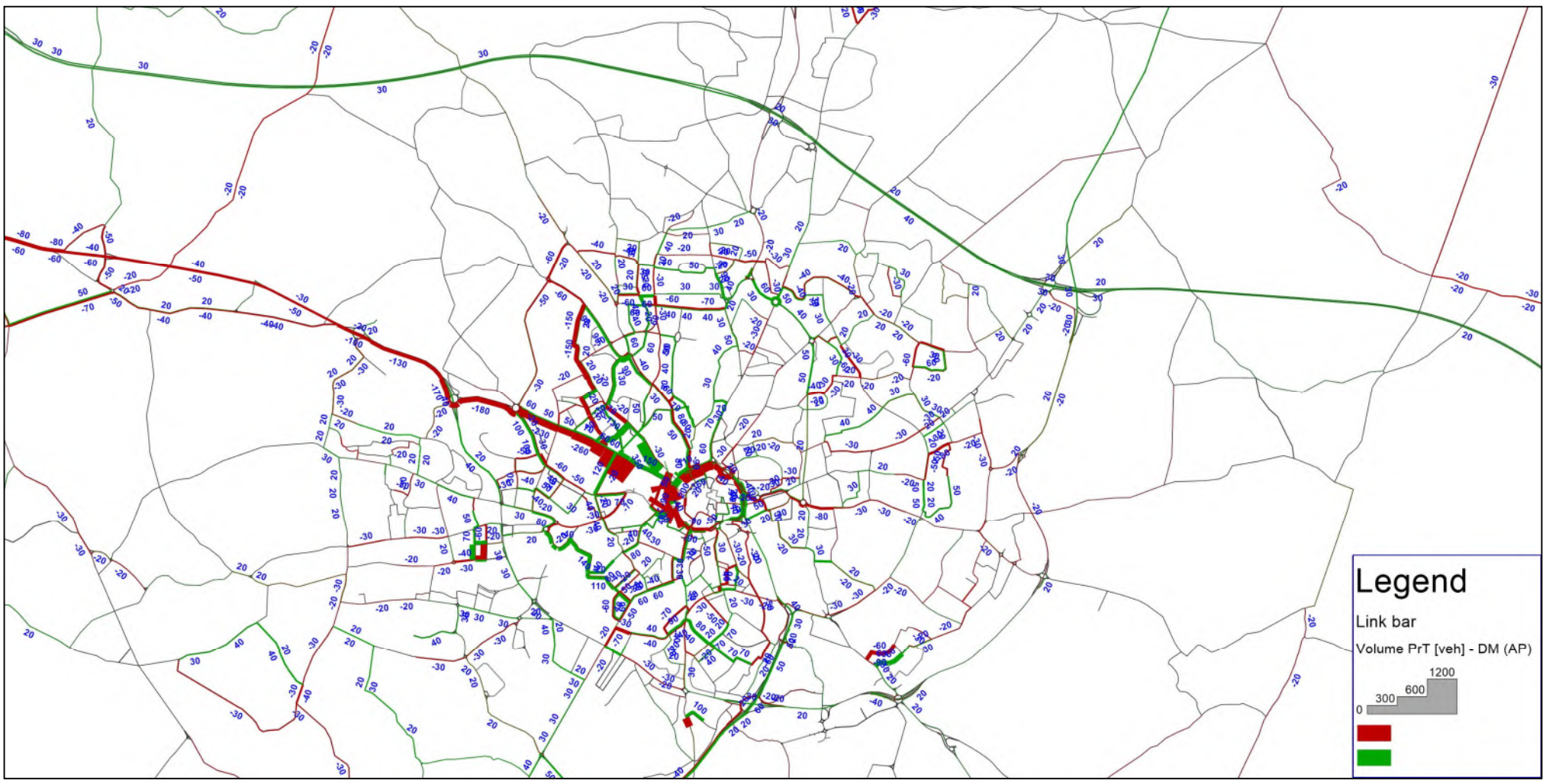

Figure 60: PM Peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (All vehicles)

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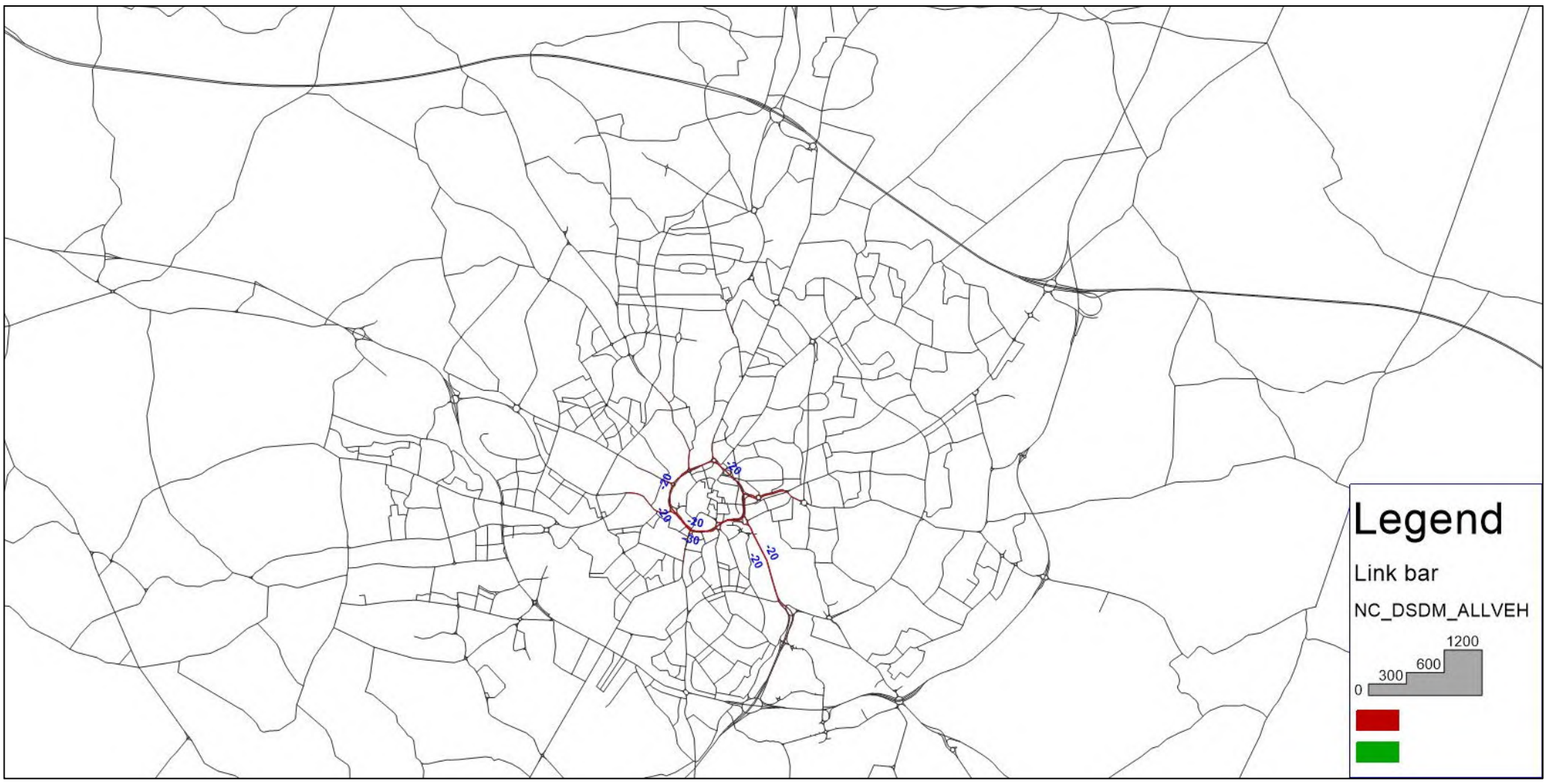

Figure 61: PM Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non-compliant vehicles)

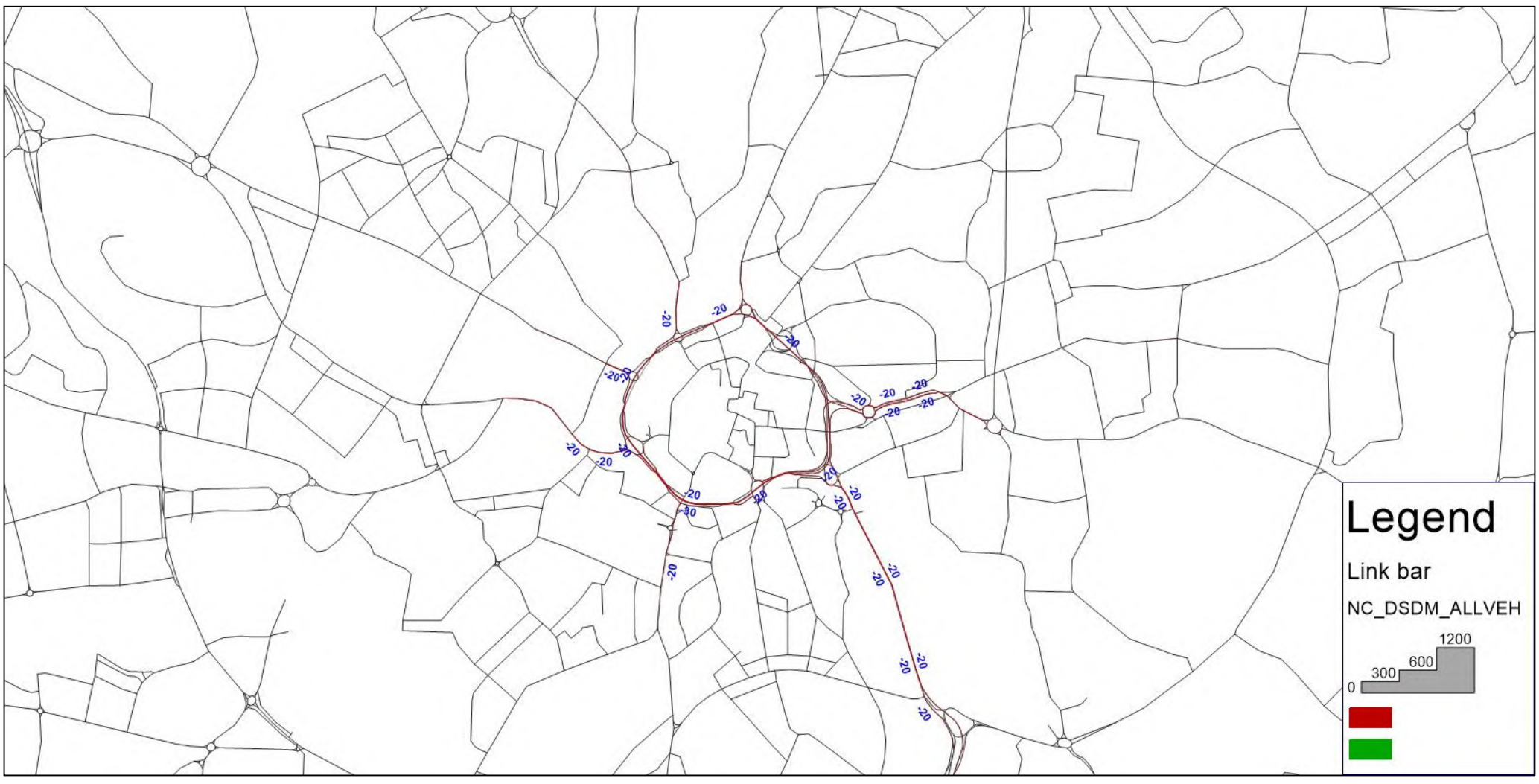

Figure 62: PM Peak Flow Differences between 2031 DS 2b and 2031 DM Scenario (Non-compliant vehicles) Coventry City Centre

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PROJECT:	Coventry Air Quality	**AUTHOR:**	[redacted]
CHECKED:	[redacted]	**APPROVED:**	[redacted]

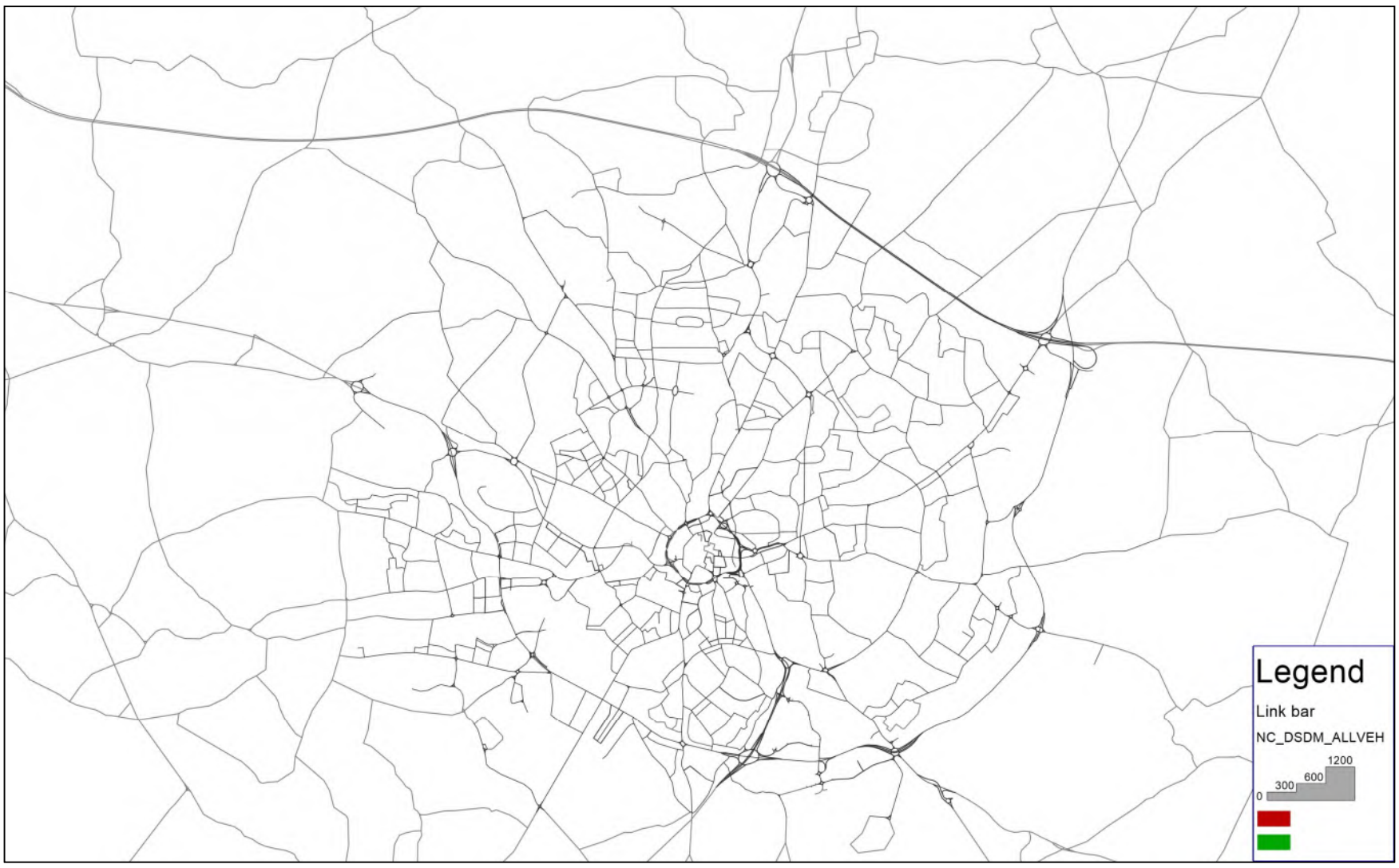

Figure 63: PM Peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (Non-compliant vehicles)

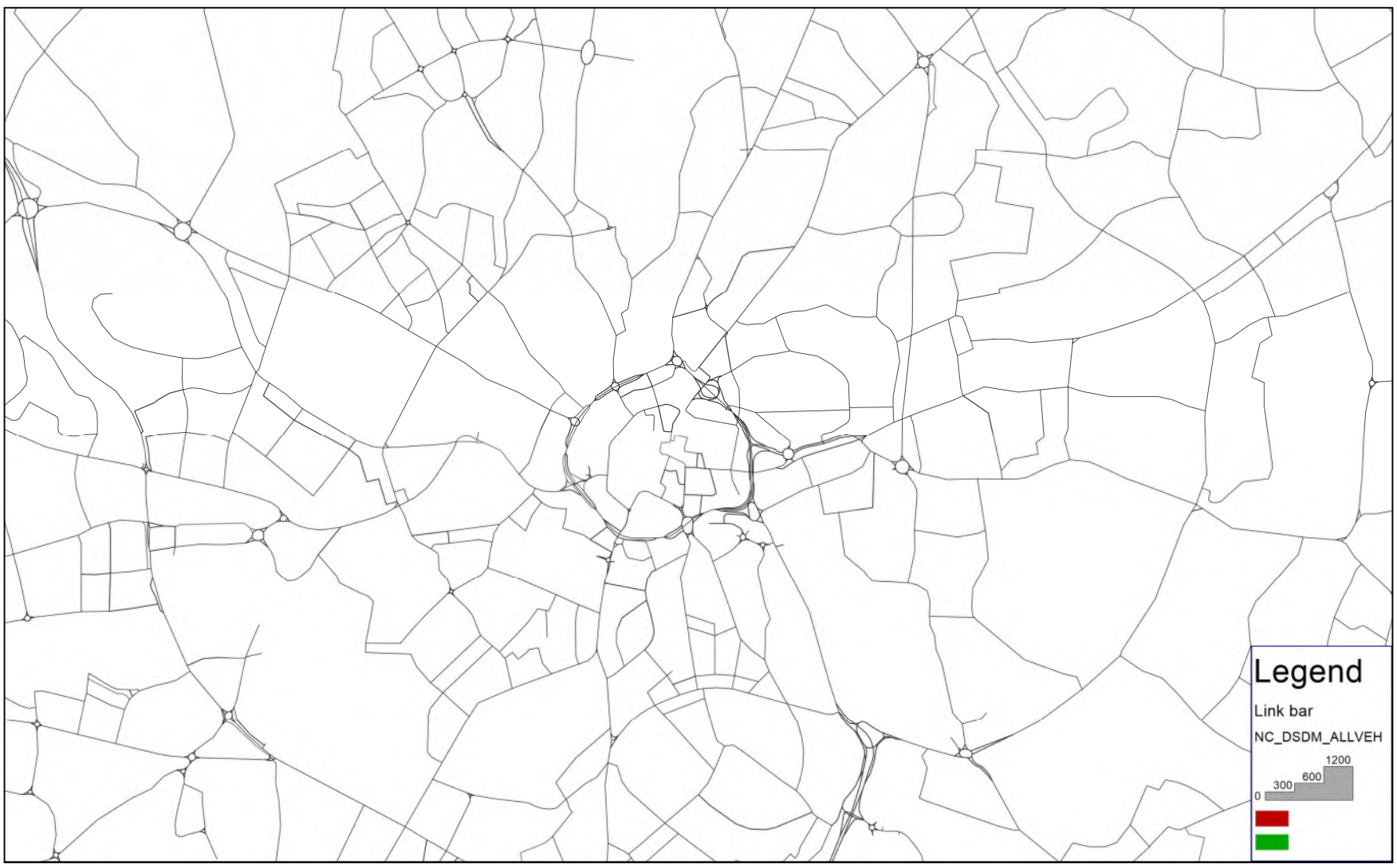

Figure 64: PM Peak Flow Differences between 2031 DS 13L and 2031 DM Scenario (Non-compliant vehicles) Coventry City Centre

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SUBJECT:	Local Plan Transport Modelling Forecasting Report (T4) Addendum		
PROJECT:	Coventry Air Quality	**AUTHOR:**	[redacted]
CHECKED:	[redacted]	**APPROVED:**	[redacted]

Figure 65: PM Peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (Non-compliant vehicles)

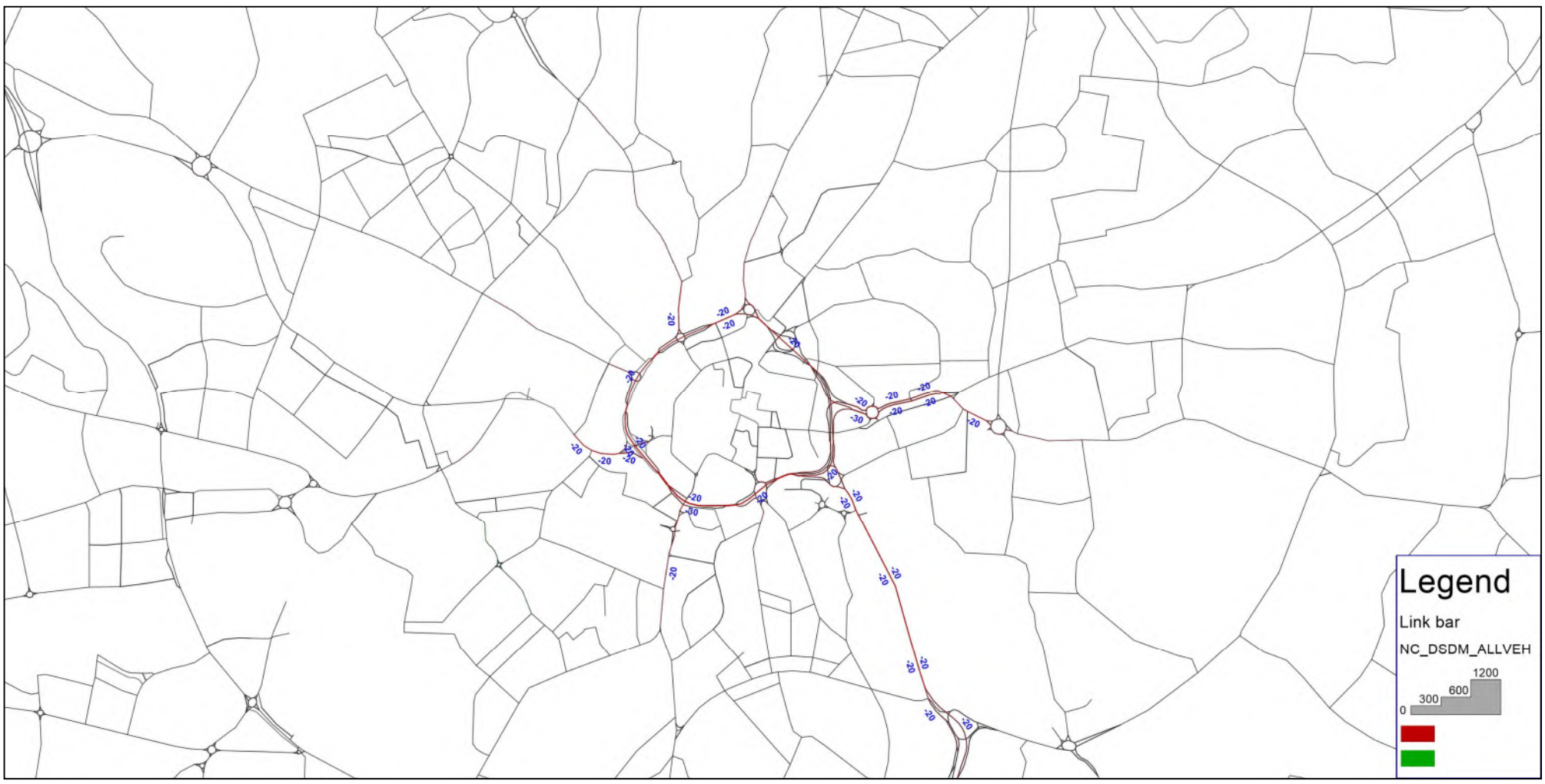

Figure 66: PM Peak Flow Differences between 2031 DS 14 and 2031 DM Scenario (Non-compliant vehicles) Coventry City Centre

DATE:	03 October 2019	**CONFIDENTIALITY:**	Confidential
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CHECKED:	[redacted]	**APPROVED:**	[redacted]

Vehicle / KMs

Figure 35 shows the changes in vehicles kilometres in the wider Coventry area.

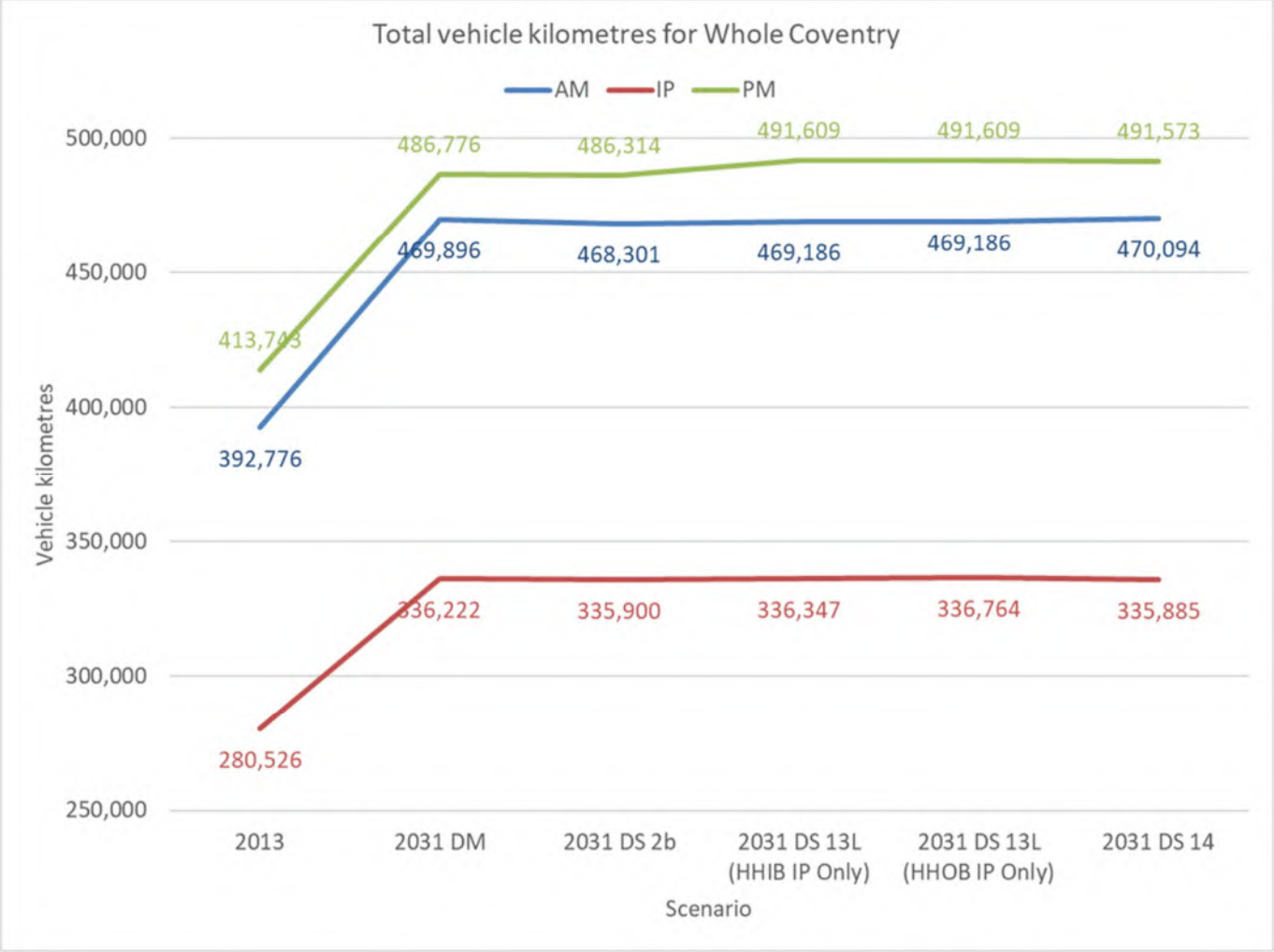

Figure 67: Veh/KMs Changes in Wider Coventry Area

The figure shows that between 2013 and 2031 DM there is an increase in all time periods in veh/kms about 20%. In 2031 DS 2b and DS14 the vehicle kilometres reduce slightly by under 1%. Within the 2031 DS 13L scenario the veh/kms increase in the PM peak by around 1%, in the wider Coventry area to above those experienced in 2031 DM which could be a result of the interventions implemented within this scenario, particularly the closure of Holyhead Road in the outbound direction.

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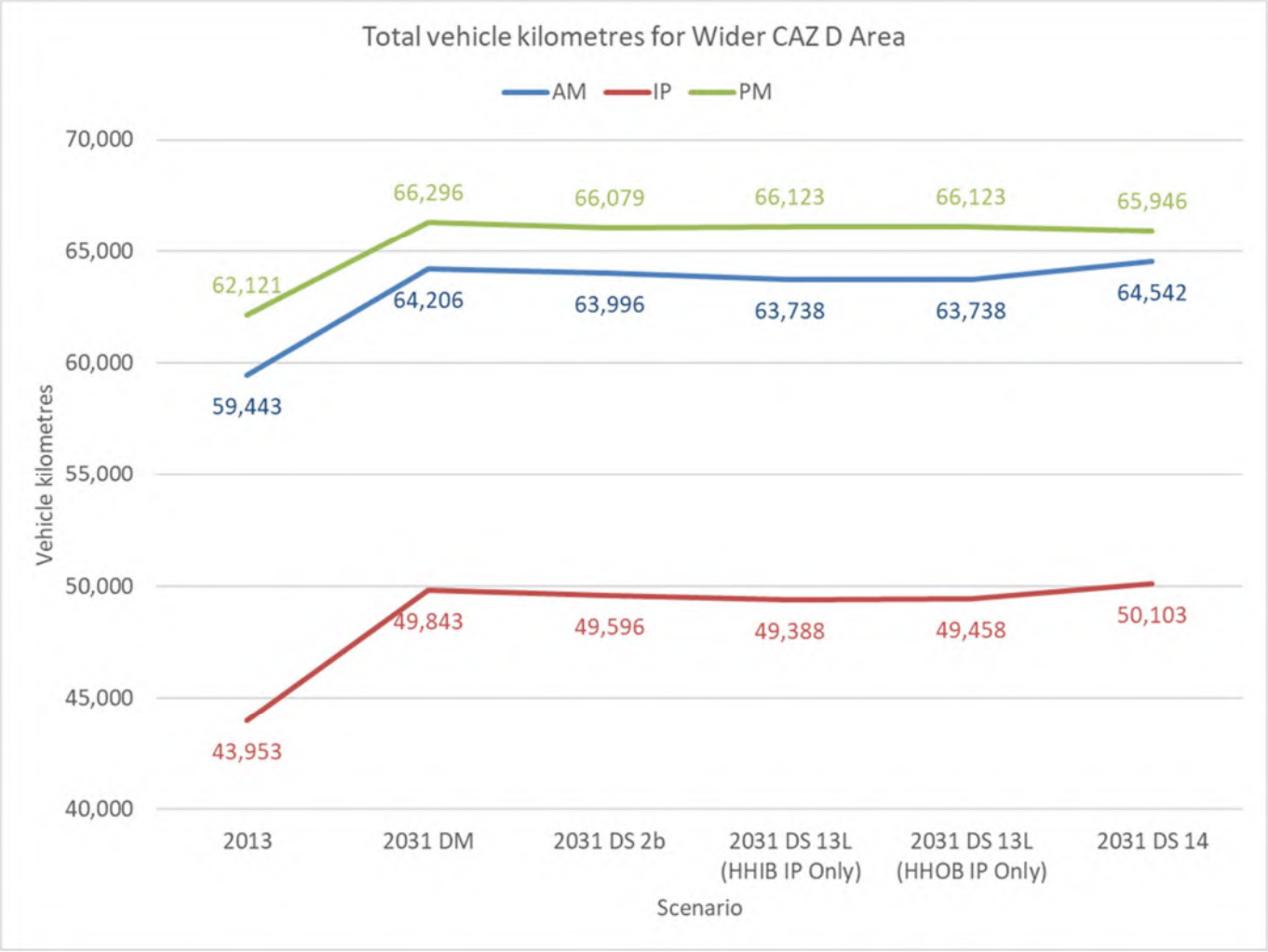

Figure 68: Veh/KMs Changes in CAZ D Area

The figure shows that between 2013 and 2031 DM there is an increase in all time periods in veh/kms of between 7% and 13%. In 2031 DS 2b the vehicle kilometres reduce less by 1% in all peaks. There are no significant impacts in DS13L and DS14 scenarios for all peaks.