Greater Exeter Mitigation Modelling Scenario 2

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SUBJECT:	Greater Exeter Mitigation Modelling		
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INTRODUCTION

The Greater Exeter strategic modelling work has been carried out to understand the cumulative and individual impacts of the emerging Local Plans from Teignbridge District Council (TDC), Exeter City Council (ECC), Mid Devon District Council (MDDC) and East Devon District Council (EDDC) upon the highway network within the Greater Exeter area. Details of the strategic modelling work are reported in the '*Greater Exeter Model Update'* report (final version dated October 2023) and '*Greater Exeter Further Modelling*' report (November 2024), both prepared by WSP. The *'Greater Exeter Local Plan Developments: Strategic Modelling Report'* (dated September 2023) was prepared by Devon County Council (DCC). This reported on the initial findings from the strategic modelling work and proposes a series of mitigations which are intended to reduce vehicular traffic and the impact of Local Plan developments on the highway network. The modelling of these mitigation proposals was reported in the '*Greater Exeter Mitigation Modelling*' report (dated November 2024).

Following the outcomes of the Scenario 1 modelling exercise, WSP were commissioned to develop a range of further transport interventions, beyond those identified in the '*Greater Exeter Local Plan Developments: Strategic Modelling Report',* to identify further potential mitigation measures that would be needed to support the delivery of the aforementioned Local Plans. Full details of these interventions are reported in the '*Greater Exeter Transport Study – Scenario 2 Supplementary Report'* (first draft, dated November 2024). This technical note details the methodology and results from the Scenario 2 mitigation modelling exercise reported in the Scenario 2 supplementary report .

METHODOLOGY

A series of adjustments have been made to the demand matrices in order to incorporate modal shift associated with the proposed mitigation interventions. The methodologies behind Scenario 2 adjustments are detailed within this section, with brief coverage from Scenario 1. All of the Scenario 2 modelling follows the same principles as Scenario 1. Scenario 2 adjustments have been applied to the '2040 Scenario 1' forecast scenario to create a new '2040 Scenario 2' forecast scenario for the AM and PM peak hours to examine the cumulative impact of all mitigation measures that have been proposed.

Summary of Scenario 1 Mitigations

Scenario 1 examined the impact of Scenario 1 mitigations, detailed within Table 1 along with the relevant trip reduction. Scenario 1 mitigations include proposals that are included within existing committed infrastructure plans, such as Local Cycling and Walking Infrastructure Plans (LCWIPs) and Bus Service Improvement Plans (BSIPs). Further details on the Scenario 1 mitigations and the associated trip reductions can be found in the '*Greater Exeter Mitigation Modelling Results v8 Final'* report, dated December 2024.

Table 1 – Mitigation application order for Scenario 1

Mitigation	AM peak car reduction	PM peak car reduction
1 – Exeter and East Devon LCWIP	319	271
2 – Okehampton railway station	126	125
3 – Cullompton railway station	147	104
4 – Marsh Barton railway station	193	140
5 – BSIP-Central	31	18
6 – BSIP-Eastern	32	18
7 – BSIP-Northern	10	6
8 – BSIP-Western	58	33
9 – Markham Village Park & Change	0 (100 rerouted)	0 (100 rerouted)
10 – Peamore & West Exe Park & Change	0 (169 rerouted)	0 (169 rerouted)
11 – East Devon New Community Northern Park & Change	0 (157 rerouted)	0 (157 rerouted)
12 – East Devon New Community Southern Park & Change	0 (157 rerouted)	0 (157 rerouted)
Total	916	715

Scenario 1 mitigations did not fully mitigate against the impact of anticipated Local Plan traffic. Therefore, a further set of interventions, known as Scenario 2 interventions, were put forward by WSP and are reported in the *Scenario 2 Supplementary Report*. This work is currently ongoing, but this technical note reports on the impact of implementing all of those mitigations.

The following additional mitigation proposals have been modelled for Scenario 2:

- Active Mode Travel Schemes - Cycling schemes
- Rail – improved frequency for select rail routes
- Bus – bus priority schemes, new bus services
- Mobility Hubs

Active travel schemes

Active travel interventions include a wide range of walking and cycling improvements across the city, including a new active travel bridge over the M5, with further details of locations below. An estimate of the increase in daily cycling trips due to the active travel schemes was estimated using the Active Travel Fund 4 (ATF4) Uplifts Tool developed by Active Travel England. The inputs required for this tool are the type of infrastructure, scheme cost (in 2023 prices), the local authority, and the difference between the scheme cost and a cost benchmark provided by the tool (in terms of £ per km of scheme).

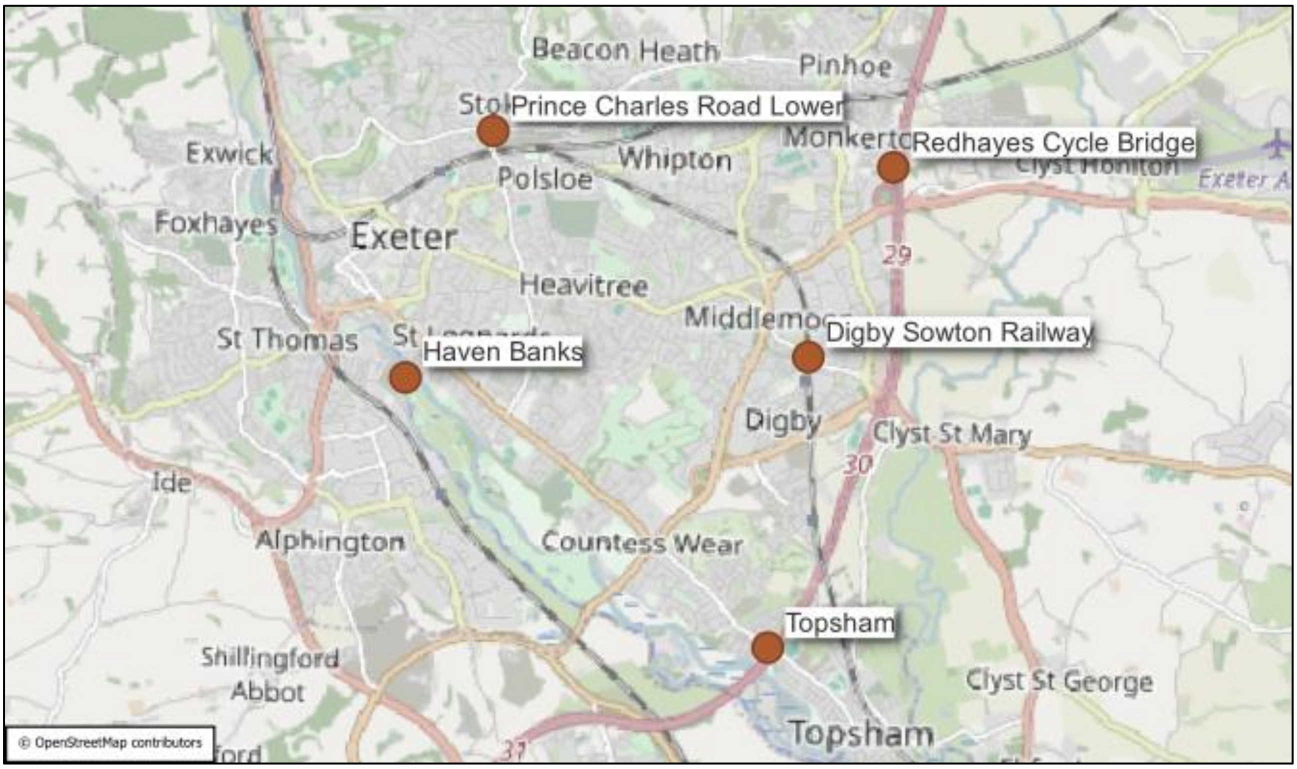
As no cost estimates were available when calculating this reduction, it was assumed that the scheme costs would match the benchmark costs included within the ATF Uplifts Tool. The M5 overbridge scheme was set to the infrastructure type 'Flagship cycling links', where the benchmark cost was £3,500,000. The remaining schemes were classified as 'Area-wide cycling network' with a total length of approximately 55 km. Based on these inputs, the tool calculated a daily increase of 10,711 cycling trips, with Exeter's intrinsic cycling potential classified as "High".

Data for 2023 from five cycle counts in Exeter (Topsham, Redhayes Cycle Bridge, Prince Charles Road Lower, Haven Banks, Digby Sowton Railway) were used to calculate the proportion of daily weekday cycle trips taken in the AM peak (8am to 9am) and the PM peak (5pm to 6pm), as shown in Table 2. These count locations are shown in Figure 1.

Table 2 – Proportion of daily weekday trips

Site	AM peak as % of daily trips	PM peak as % of daily trips
Topsham	11.59%	10.24%
Redhayes Cycle Bridge	9.57%	11.17%
Prince Charles Road Lower	14.65%	8.59%
Haven Banks	11.36%	11.15%
Digby Sowton Railway	15.79%	12.28%
Average	**12.6%**	**10.7%**

Figure 1 - Exeter cycle counts



The stages and data sources which were used to convert daily cycle trip increases to peak hour car trip reductions are shown in Table 3. The approach used to calculate the trip reductions is consistent with the modelling work that undertaken to assess the impact of Scenario 1 mitigations.

Table 3 – Active Mode Schemes Car Trip Reduction

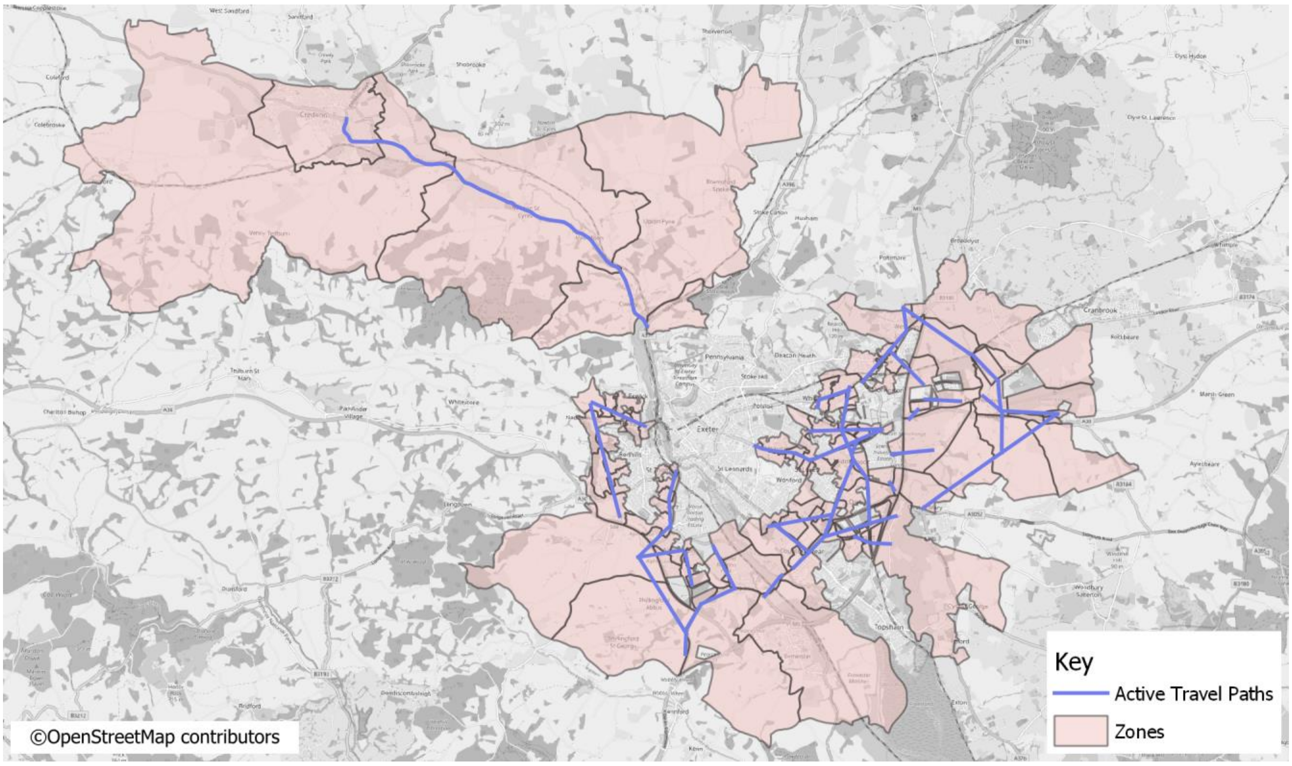
Active Mode Schemes	AM	PM	Source
Daily cycle trip increase	10,711		ATF4 Uplifts Tool
Proportion of daily trips in peak hour	12.6%	10.7%	Exeter cycle count data
Peak hour cycle trip increase	1,349	1,145	
Car diversion factor	30%		TAG Data Book A5.4.7 (excluding rail)
Car person trip decrease	400	339	
Average car occupancy[1]	1.39		(Occupancy by purpose) TAG Data Book A1.3.3, average weekday (Cycling purpose split) TEMPro 8.1, Core 2040 Exeter AM+PM

[1] Car occupancy is dependent upon trip purpose, whereby proportions of trips by purpose ('work', 'commuting' or 'other') varies by the new mode that car trips are switching to.

Car trip decrease	287	243	

The trip reductions from Table 1 were applied to the SATURN zones highlighted in Figure 2, as these zones were identified as being intersected by the active mode schemes. The car trip reductions were then applied to the AM and PM peak hour matrices by applying a factor to reduce car trips between the selected zones by the car trip decrease for each time period, as shown in Table 3.

Figure 2 – Active Travel Zone Selection



Rail services

Rail interventions include service frequency improvements on the East Devon Branch Line, Tarka Line, and Avocet Line. For each rail service, a corresponding reduction in car trips has been calculated by applying a car diversion factor to the expected growth in rail passengers. Crediton station was used as a proxy for the growth in rail passengers as a result of a service frequency increase, as the reopening of Okehampton station in November 2021 and an increase in service frequency in May 2022 effectively gave Crediton half-hourly services into Exeter. Table 4 compares the 2021/22 and 2022/23 passengers across all Devon stations and Crediton station alone, which shows that Crediton passenger numbers grew by 58% compared against 21% across all Devon stations. The difference in growth (37%) is assumed to be due to the frequency improvement, and this has been used as a proxy for passenger growth for the Scenario 2 rail frequency improvement schemes.

Table 4 – Crediton passenger uplift from frequency change

ORR Total Passengers	All Devon stations	Crediton station
2021/22	5,900,644	42,252
2022/23	7,133,022	66,596
Percentage change	21%	58%

Crediton change above Devon-wide change	37%

Table 5 summarises the calculation of the car trip reductions from each service frequency increase. The average car occupancies differ to that of other modes due to the rail purpose split factor.

Table 5 – Rail service car trip reduction

	East Devon Branch Line	Tarka Line	Avocet Line	Source
Total 2022/23 annual trips (2-way)	361,264	388,330	252,400	Trips between Exeter stations and non-Exeter stations on line, Office of Road and Rail origin and destination matrix 2022/23
2022-2040 background growth factor	1.338	1.338	1.338	Population growth and average GDP per person growth, May 2024 TAG Data Book
Total 2040 annual trips (2-way)	486,056	522,472	339,587	
Annualisation factor	300	300	300	Factor used by station forecasts in Scenario 1
Daily trips (2-way)	1,620	1,742	1,132	
Frequency uplift %	37%	37%	37%	Table 4
Frequency uplift	595	640	416	
2011 JtW proportion of car users	67%	66%	36%	2011 Census data
2040 daily car users removed	401	423	151	
Average car occupancy	1.26	1.26	1.26	(Occupancy by purpose) TAG Data Book A1.3.3, average weekday (Rail purpose split) TEMPro 8.1, Core 2040 Exeter AM+PM
2040 daily cars removed	318	335	120	
AM/PM peak proportion of daily trips	16% / 12%	16% / 12%	16% / 12%	MOIRA Dec 2019 Honiton station boardings and drop-offs (AM 7-8 and PM 17-18)
AM peak cars removed	50	52	19	
PM peak cars removed	39	42	15	

The zones to apply the trip reductions to were selected by generating walking isochrones for stations within Exeter and car isochrones for stations outside Exeter. Zones within a 20 minute walk of the Exeter stations were selected plus zones within a 5 minute drive of the stations outside Exeter. Figure 3 to Figure 5 shows the locations of the selected zones for each rail service. The car trip reductions presented in Table 5 were then applied to the AM and PM peak hour matrices by applying a factor to reduce car trips between the impacted zones.

Figure 3 – Selected zones for East Devon Branch Line

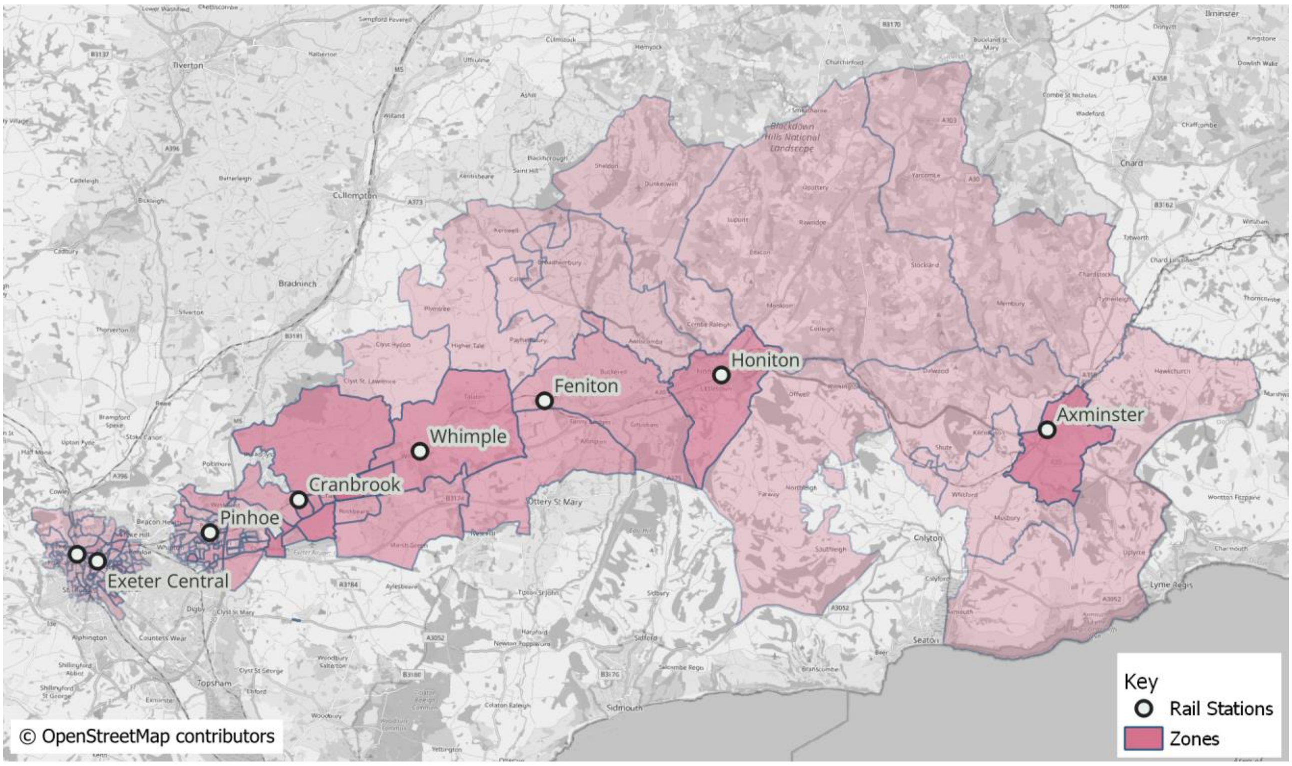


Figure 4 – Selected zones for Tarka Line

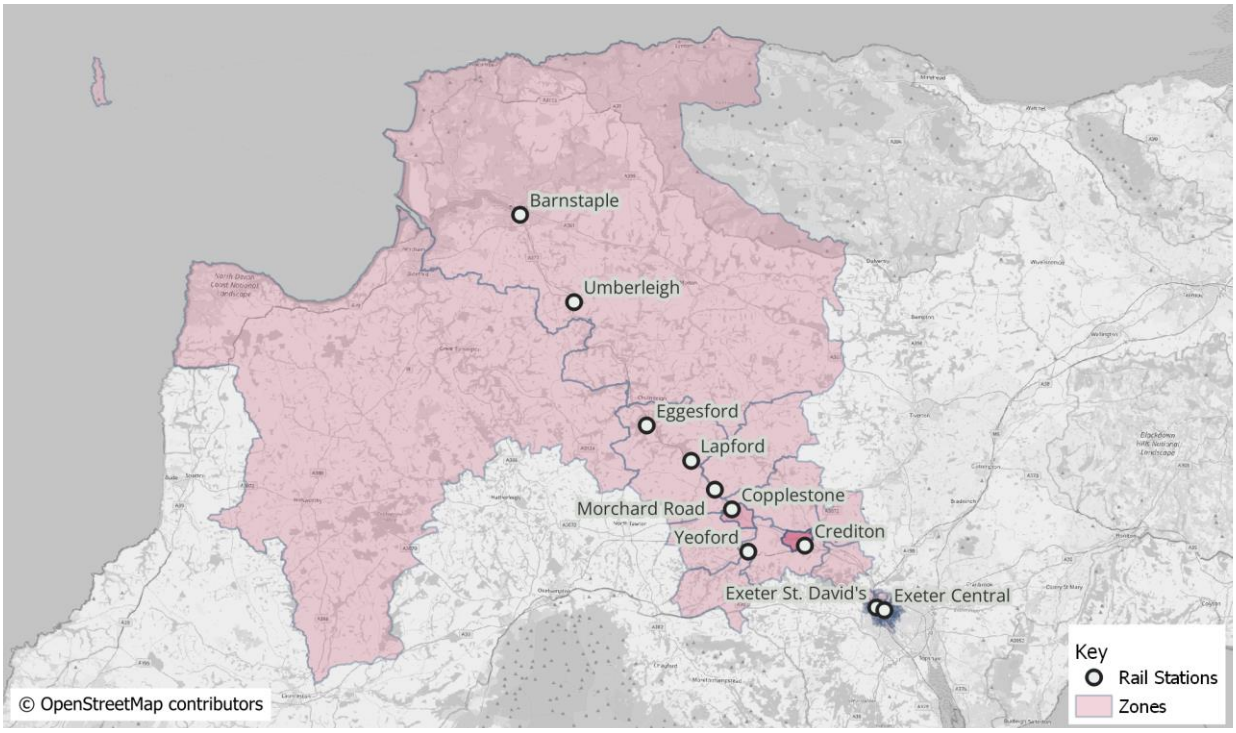
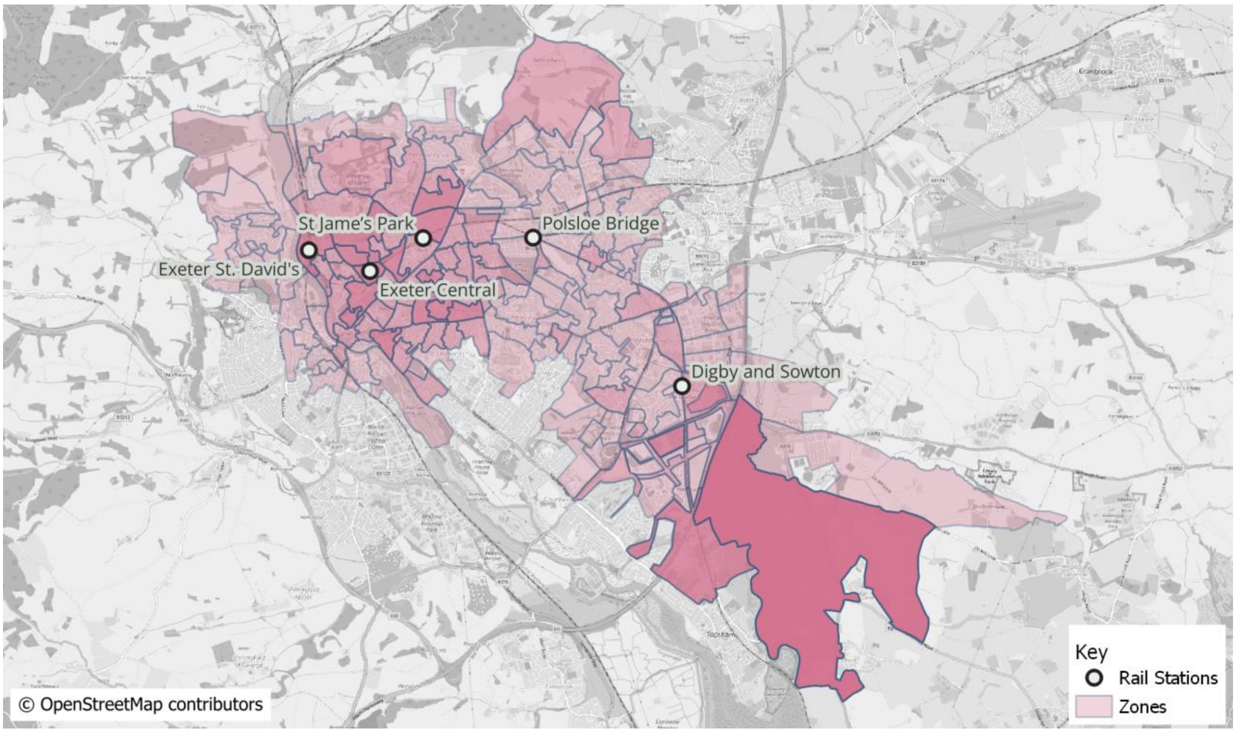


Figure 5 – Selected zones for Avocet Line



Bus priority

Bus priority interventions include the provision of new or improved bus priority infrastructure across the city centre, the locations of which are shown in Figure 6. The peak hour journey time improvements across the bus priority schemes were assumed to be equal to the average percentage improvement of the Scenario 1 bus priority schemes, which was 24%. The journey time saving percentages can be related to a percentage increase in bus passengers by using a bus in-vehicle-time (IVT) elasticity. A study carried out by RAND Europe and Systra on behalf of the Department for Transport[2] states that DfT guidance recommends a bus IVT value of -0.58.

The baseline number of daily bus passengers using bus routes impacted by the priority schemes was estimated by mapping the bus routes and assessing the 2011 Census journey-to-work bus passenger movements along each route. Movements within and between Exeter and non-Exeter locations were considered separately. The Census movements were factored up to account for non-commute purposes, based on the bus purpose splits in TAG Data Book Table A1.3.16. The proportion of passengers travelling in the peak hours was estimated using NTS Table 0502b (2022, all purposes). Average car occupancies differ to other modes due to the bus purpose split factor.

A summary of the car trip reduction calculations for all priority schemes is shown in Table 6.

Table 6 – Bus priority car trip reduction

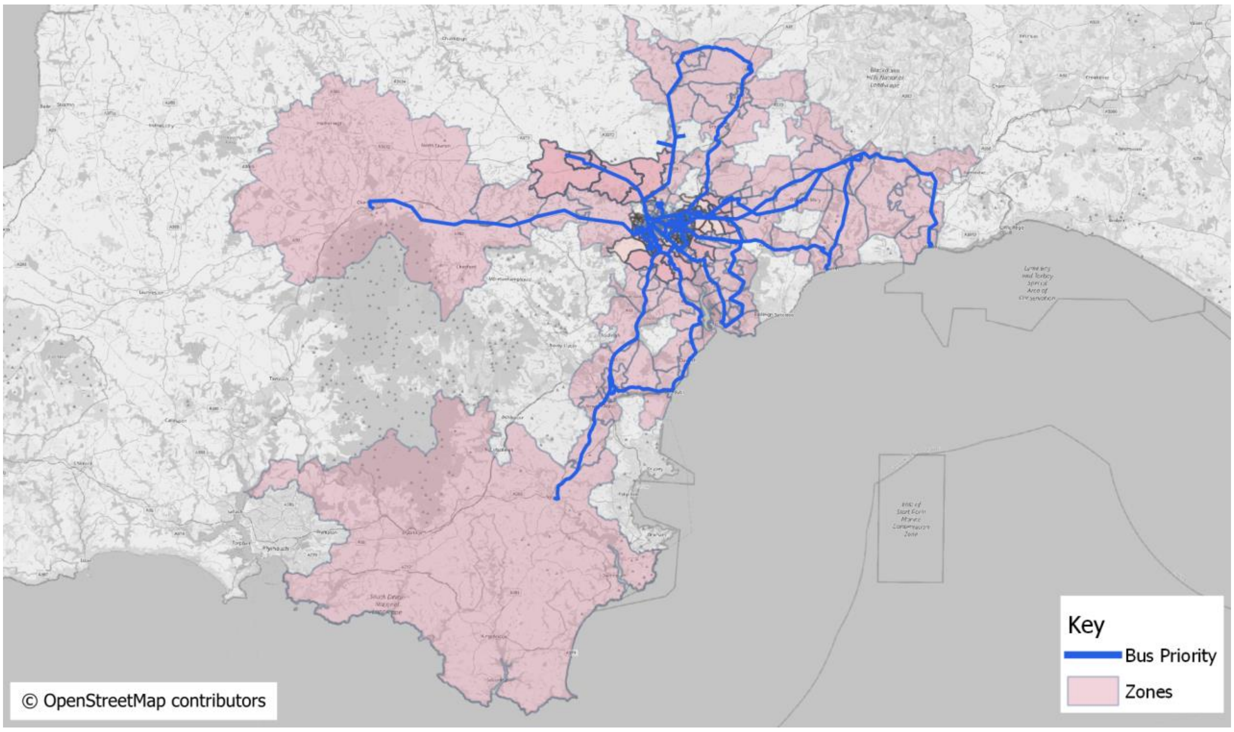
	Exeter-to-Exeter	Exeter-to/from-Non-Exeter and Non-Exeter-to-Non-Exeter	Source
Baseline daily bus passengers	19,283	5,108	2011 Census journey to work NTS 0502b

[2] Dunkerly et al (2018) 'Bus fare and journey time elasticities and diversion factors for all modes', chapter 6.6

Journey time savings	24%	24%	Average of DCC BSIP journey time savings
Bus IVT elasticity	-0.58	-0.58	DfT study[2]
Bus passenger increase	2,684	845	
Diversion factor	33%	33%	TAG Data Book A5.4.6 (Urban conurbation, no rail)
Car user decrease	875	275	
Average car occupancy	1.49	1.49	Occupancy by purpose, TAG Data Book A1.3.3 (average weekday) Bus purpose split, TEMPro 8.1, Core 2040 Exeter AM+PM
Daily car reduction	587	185	
AM/PM peak proportion of daily trips	14% / 8%	14% / 8%	NTS 0502b, 2022 all purposes
AM peak car reduction	80	25	
PM peak car reduction	46	14	

The zones to apply the car trip reductions to were selected by mapping the bus routes using each corridor and selecting zones within 400m (i.e. a 5-minute walk) of the bus routes. This selection was manually adjusted to remove zones that only had a small overlap with the 400m buffer. Figure 6 shows the zone selection for the bus priority schemes.

Figure 6 – Bus priority zone selection



Bus services

NEW BUS SERVICES

Scenario 2 mitigations include the introduction of new bus services across Greater Exeter. These cover the following services:

- Cullompton to/from Sowton;
- Cranbrook to/from Matford;
- Cranbrook to/from Sowton;
- EDNC to/from Central Exeter;
- EDNC to/from Matford; and
- Internal EDNC service.

The extent of these reductions on car trip generation were estimated by comparing the 2011 census journey to work bus modal splits between Cullompton/Cranbrook and Sowton/Matford with Cullompton/Cranbrook and Exeter City Centre, where there are existing direct bus services. The difference in bus modal split between the existing and new bus services was used to calculate a corresponding percentage reduction in car trips between the respective service terminals. As the EDNC has no existing trips or bus services, Cranbrook bus mode splits were used as a proxy to apply a trip reduction of 16% for trips between EDNC-Matford and EDNC- Exeter City Centre.

Table 7 - Bus mode split uplift for Cullompton and Cranbrook

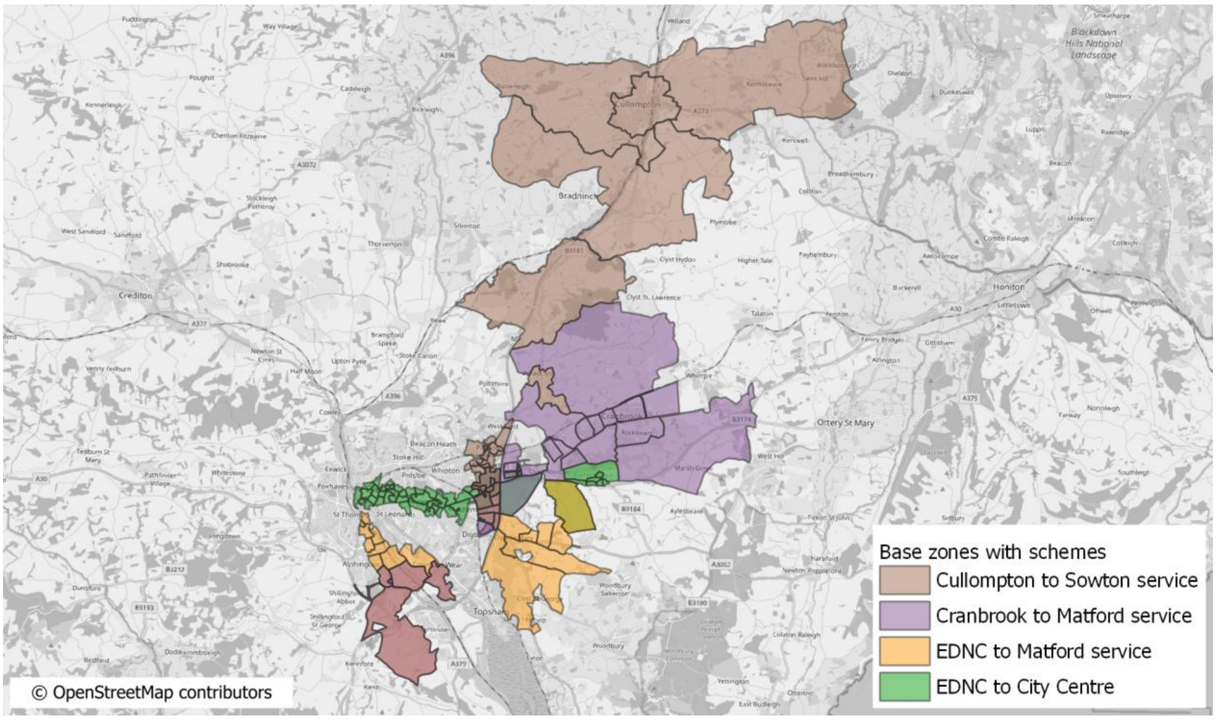
MSOA	Current bus mode splits			Trip reduction applied due to new bus service
	Existing Service	New Service		
	To/from central Exeter (Exeter 008)	To/from Matford (Exeter 014)	To/from Sowton (Exeter 011)	
Cullompton (Mid Devon 007)	31%		2%	29% (AM: -42 trips PM – 35 Trips)
Cranbrook (East Devon 006)	16%	8%		8% (AM: -28 trips PM – 28 Trips)

Table 8 – Bus mode split uplift for EDNC

	To/from central Exeter (Exeter 008)	**To/from Matford (Exeter 014)**	**To/from North/South**
EDNC	16%* (AM: -34 trips PM -31 Trips)	16%* (AM: -18 trips PM -15 Trips)	5% (AM: -76 trips PM - 75 Trips)
*Uses Cranbrook splits to apply a 16% reduction to EDNC- Exeter trips			

The zones to apply the percentage car trip reductions to were selected by mapping the new bus service routes and selecting zones within 400m (i.e. a 5-minute walk) of the bus routes. This selection was manually adjusted to remove zones that only had a small overlap with the 400m buffer. Figure 7 shows the zone selection for the new bus service schemes, with some overlapping. For the new bus service covering EDNC only, all car trips to and from EDNC were reduced.

Figure 7 – Zone selection for new bus service schemes



In the case of the new internal bus service covering the EDNC, it was assumed that this service would increase the number of internalised trips within the area. To account for this a further 5% reduction in car trip generation within the EDNC was applied.

CREDITON-EXETER SERVICES

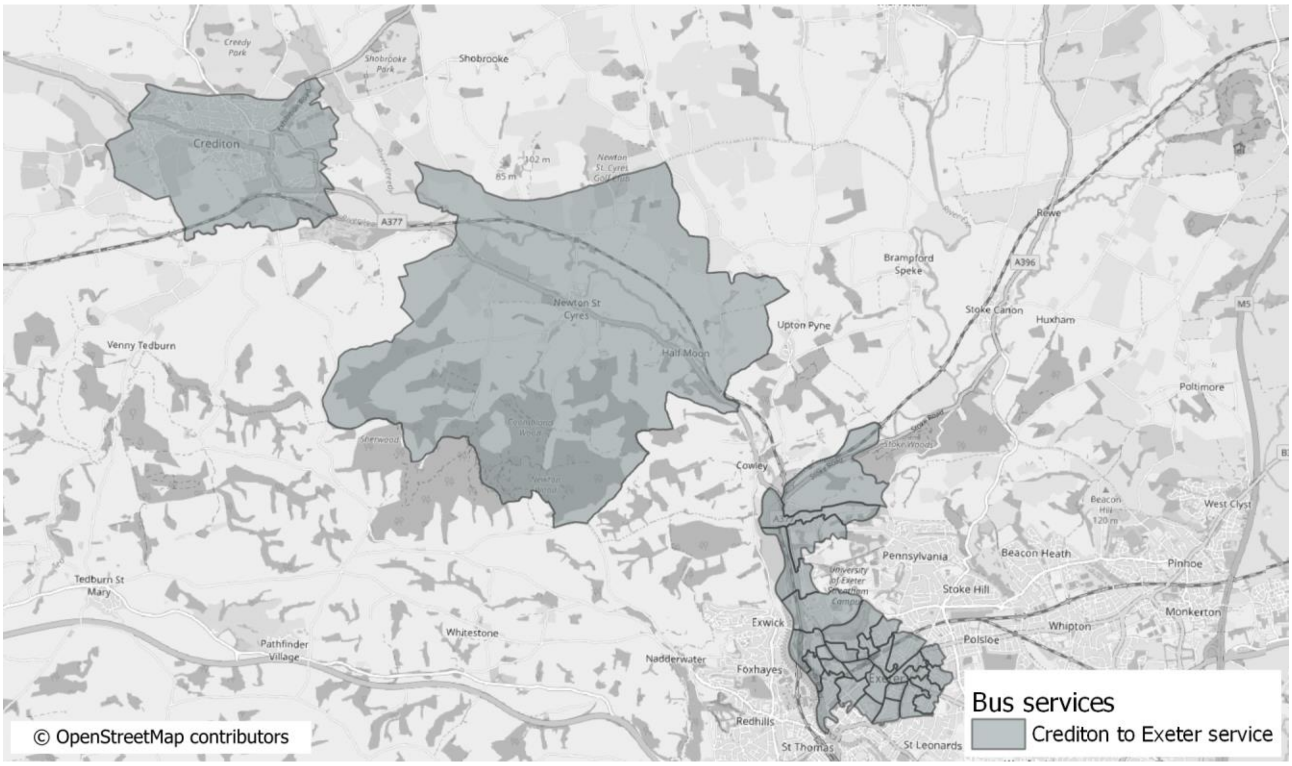
The car trip reduction due to the frequency increase of the Crediton-to-Exeter bus services was calculated using a similar methodology to the bus priority measures, but assuming a doubling of bus passengers in line with the service frequency doubling from every 30 minutes to every 15 minutes. Table 9 summarises the calculation of the car trip reductions for the Crediton-Exeter bus service frequency increase.

Table 9 – Crediton-to-Exeter bus service frequency increase car reduction

	Crediton-to-Exeter	Source
Baseline daily bus passengers	528	2011 Census journey to work NTS 0502b
Service frequency increase	100%	
Bus passenger increase	528	
Diversion factor	33%	TAG Data Book A5.4.6 (Urban conurbation, no rail)
Car user decrease	260	
Average car occupancy	1.49	Occupancy by purpose, TAG Data Book A1.3.3 (average weekday) Bus purpose split, TEMPro 8.1, Core 2040 Exeter AM+PM
Daily car reduction	174	
AM/PM peak proportion of daily trips	14% / 8%	NTS 0502b, 2022 all purposes
AM peak car reduction	24	
PM peak car reduction	14	

The zones to apply the percentage car trip reductions to were selected by mapping the Crediton-to-Exeter service route and selecting zones within 400m (i.e. a 5-minute walk) of the route. This selection was manually adjusted to remove zones that only had a small overlap with the 400m buffer. Figure 8 shows the zone selection for the Crediton-to-Exeter bus frequency increase.

Figure 8 – Zone selection for Crediton to Exeter bus services



Mobility Hubs

There is currently limited evidence regarding the extent to which mobility hubs encourage mode shift. For the purpose of the Scenario 2 modelling, it has been assumed that the mobility hubs will act as a multiplier for the other modelled mitigation schemes. That is, the hubs will help encourage people to use the new active travel infrastructure, bus services and rail services. As the likely locations for potential mobility hubs or the facilities that will be provided is currently unknown, for the purposes of traffic modelling a conservative approach has been taken whereby a 1% reduction in car trips with an origin and/or destination has been applied to account for additional mode shift.

Combining Mitigation Impacts

In Scenario 2 mitigations, the first mitigations to be applied were the bus priority schemes, and the output matrix was then used as the input matrix for applying the bus service schemes. The other mitigations were applied in the same fashion. Table 10 shows the order in which mitigations were applied and how many cars were removed in AM and PM time periods. Where the reduction was based directly on a percentage of existing trips, the percentage is shown in brackets after the car reduction value. These are percentages of trips making the selected movements.

Table 10 – Mitigation application order for Scenario 2

Mitigation	AM peak car reduction	PM peak car reduction
1 – Bus priority	105	60
2 – Bus service – Cranbrook to Matford	28 (8.7%)	28 (8.7%)
3 – Bus service – Crediton to Exeter	24	14
4 – Bus service – Cullompton to Sowton	42 (29.6%)	35 (29.6%)
5 – Bus service – EDNC to Matford	18 (16.0%)	15 (16.0%)

Mitigation	AM peak car reduction	PM peak car reduction
6 – Bus service – EDNC north/south	76 (5.0%)	75 (5.0%)
7 – Bus service – EDNC City Centre	34 (16.0%)	31 (16.0%)
8 – Active travel schemes	287	243
9 – Rail – Avocet Line	19	15
10 – Rail – East Devon Branch Line	50	39
11 – Rail – Tarka Line	52	42
12 – Mobility hubs	244 (1.0%)	237 (1.0%)
Total	979	834

MODEL RESULTS

Flows

Figure 9 to Figure 12 show the demand and actual flow changes of 2040 Scenario 2 compared to 2040 Scenario 1 for both AM and PM peaks. The demand flow shows all assigned PCU flow (where traffic intends to travel) while actual flow presents the PCU flow on each link after accounting for flow metering (where capacity issues prevent the full demand flow from passing a particular link or turn). As there are several over-capacity junctions in 2040 Scenario 1, the demand flow may be reduced by the Scenario 2 mitigations without changing the actual flow. At the same time, trip reductions and network alterations will change the distribution, and some links may increase in flow.

Concept schemes at the A376 / A3052 Clyst St Mary roundabout and the A30 Airport junction were modelled in Scenario 2 to improve the capacity at these locations and provide mitigation from the impact of traffic associated with the forthcoming Local Plans within the Greater Exeter region. These concept schemes are not committed and should be reviewed by Devon County Council alongside the site promoter and are not responsibility of National Highways. Modelling these concept schemes changed the link structure within the SATURN modelled network and therefore show large differences at these locations. Figure 13 to Figure 20 shows a side-by-side comparison of flows in the Scenario 1 and Scenario 2 around these areas, and present the network differences at the two junctions where NH scheme is proposed to be implemented. Annotated versions of these plots, alongside comparisons of Scenario 2 to the 2030 year, are included in Appendix A.

Figure 9 - Demand Flow Changes AM (Green = Increase, Blue = Decrease)

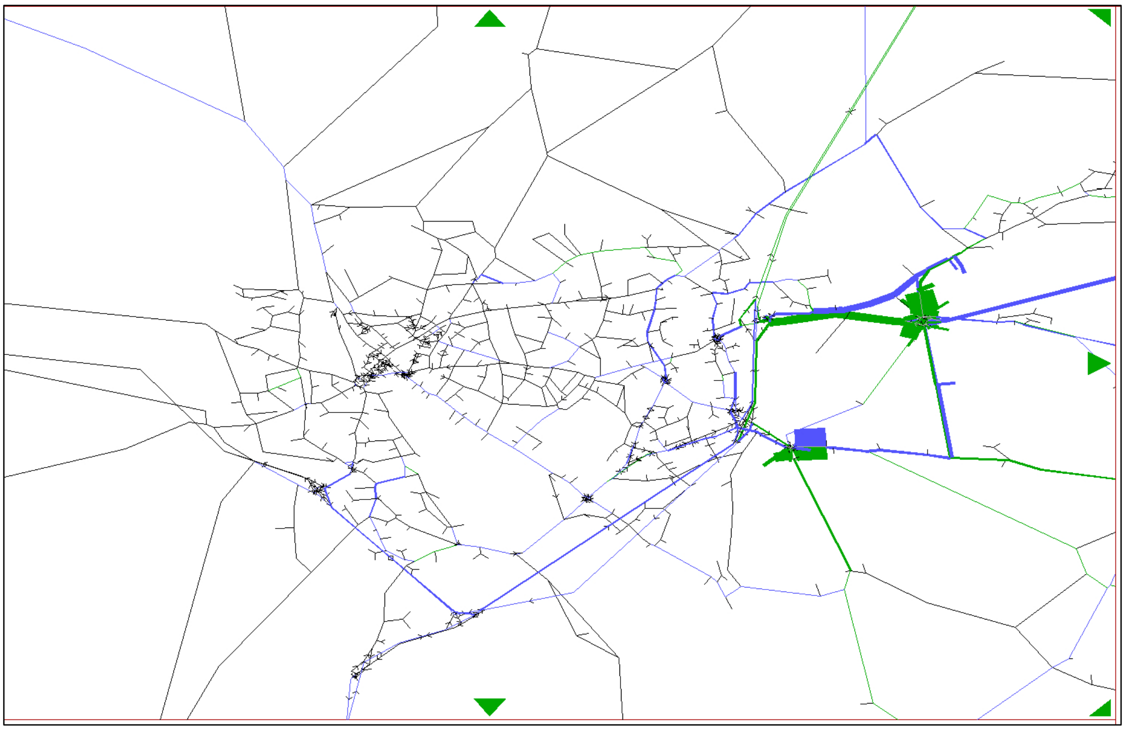


Figure 10 - Actual Flow Changes AM (Green = Increase, Blue = Decrease)

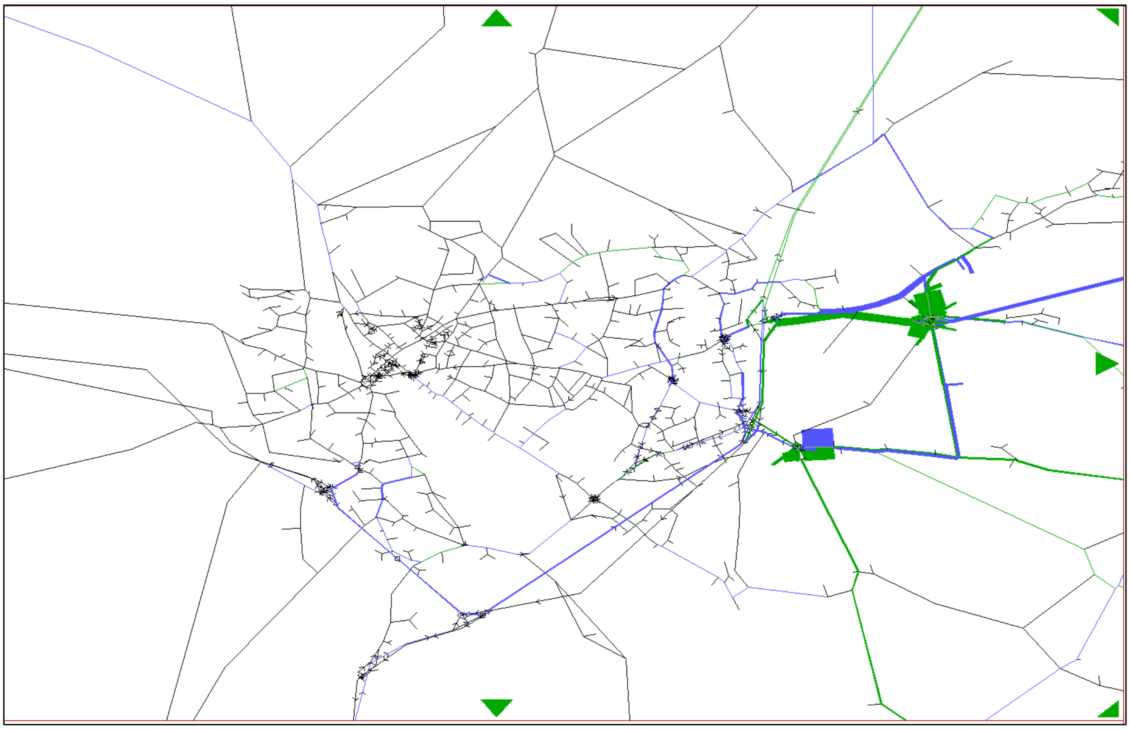


Figure 11 - Demand Flow Changes PM (Green = Increase, Blue = Decrease)

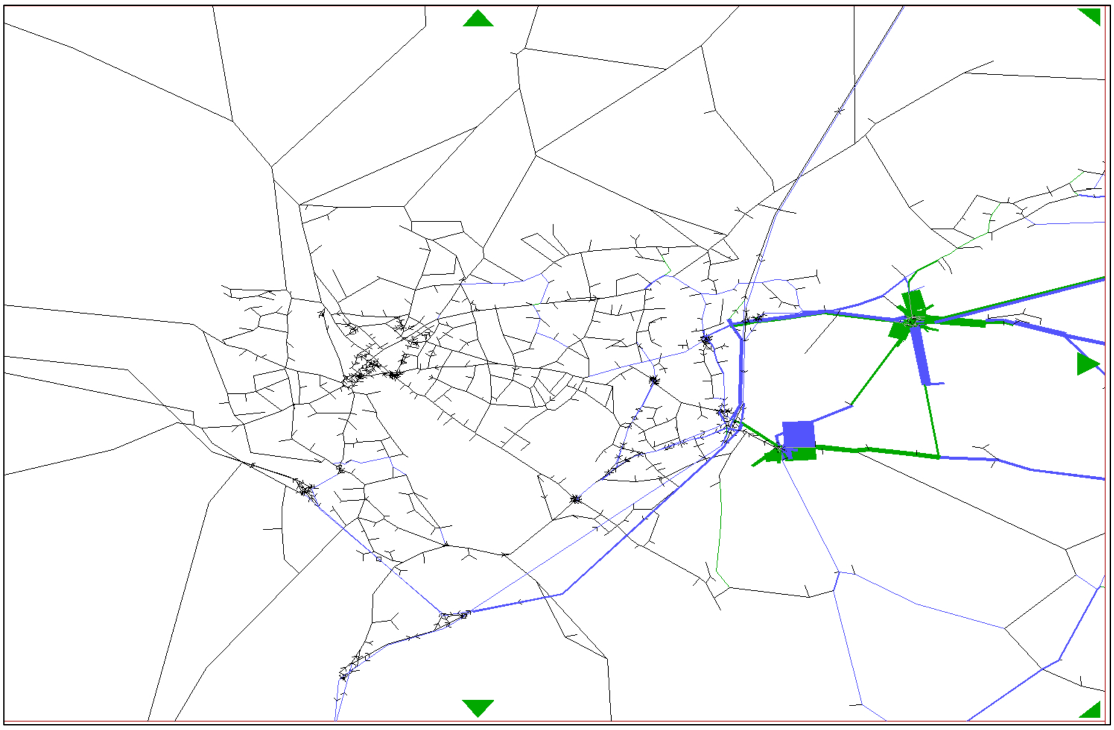


Figure 12 - Actual Flow Changes PM (Green = Increase, Blue = Decrease)

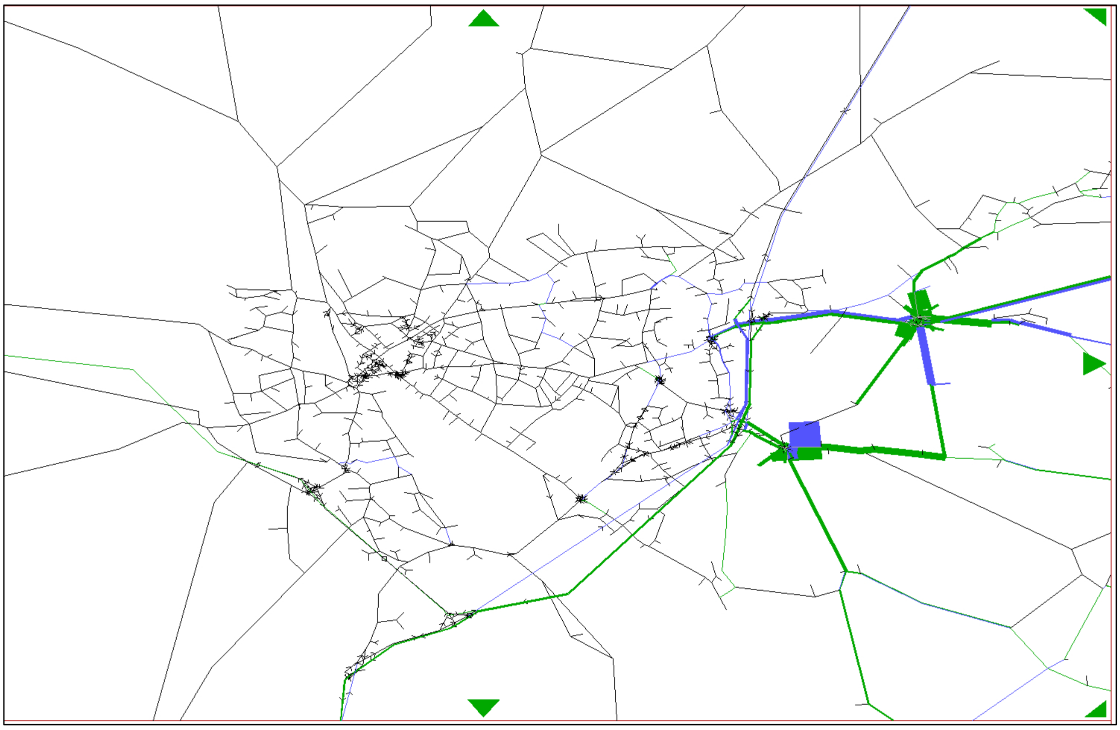


Figure 13 - Demand flow AM for Scenario 1 (J29, J30 & EDNC focus area)

Figure 14 - Demand flow AM for Scenario 2 (J29, J30 & EDNC focus area)

Figure 15 - Demand flow PM for Scenario 1 (J29, J30 & EDNC focus area)

Figure 16 - Demand flow PM for Scenario 2 (J29, J30 & EDNC focus area)

Figure 17 - Actual flow AM for Scenario 1 (J29, J30 & EDNC focus area)

Figure 18 - Actual flow AM for Scenario 2 (J29, J30 & EDNC focus area)

Figure 19 - Actual flow PM for Scenario 1 (J29, J30 & EDNC focus area)

Figure 20 - Actual flow PM for Scenario 2 (J29, J30 & EDNC focus area)

A30 & SOUTHWEST EXETER

The A30 and Southwest Exeter trips are affected by multiple Scenario 2 mitigations including Bus Priority reductions, Cranbrook to Matford bus services, EDNC to Matford bus services, Cycling schemes & Rail Line schemes. The application of these mitigations has produced demand flow reductions in both AM and PM peak periods in the Southwest Exeter area. While the AM peak sees an actual flow decrease in this area, the PM modelled time period presents an increase in actual flows along the A30. This is due to the falling demand across the A30/A377, which looks considerably less in the PM peak than seen in the AM peak. The changing demand movements across the junction increased actual flow across the A30 mainline in the PM peak. However the increase in demand in relatively small (38 passenger car units[3]), which can be as a result of model reassignment and is of a magnitude that could reasonably be attributed to daily variation in traffic flows.

M5 J31

Trips across M5 Junction 31 are affected by Cycling and Bus Priority schemes leading to demand flow reductions in both AM and PM peak periods. Similar to Southwest Exeter, the AM peak sees an actual flow decrease in this area, whilst the PM peak presents an increase in actual flows along the M5 mainline. In PM, only the A38 mainline WB right turn movement at J31 shows capacity of over 95%. Whereas, in AM the A38 EB ahead movement at J31 is at capacity at two nodes making the flows to decrease in this area.

M5 J29 & M5 J30

The area local to M5 Junction 29 and 30 is subject to a plethora of mitigations in Scenario 2, including bus priority schemes, new Cranbrook to Matford and Cullompton to Sowton bus services, new EDNC bus services, cycling schemes, mobility hubs and increased rail service frequencies on the Avocet & East Devon rail lines. All of these contribute to a reduction in traffic demand. The Scenario 2 traffic flows in this area are also influenced by the interventions undertaken at A30/Airport roundabout and Clyst St Mary’s roundabout. The implementation of these schemes has created an increase in flow in both AM and PM peak periods. The actual and demand flows on the M5 mainline between Junction 31 and 30 is reduced northbound in both time periods. The southbound actual flow in PM shows an increase due to the flows being directed from Clyst St Mary’s roundabout.

Volume over Capacity (V/C)

Figure 21 and Figure 23 show the maximum junction V/C percentages for 2040 Scenario 2 for both AM and PM peaks respectively. These plots only display worst turn V/Cs greater than 95% which are considered near to or over capacity. Figure 22 and Figure 24 show the instances where worst turn V/C percentages near the 95% threshold vary between 2040 Scenario 1 and 2040 Scenario 2 for AM and PM peaks respectively. Figure 25 and Figure 26 show the instances where worst turn V/C percentages near the 95% threshold vary between 2030 and 2040 Scenario 2 for the AM and PM peaks respectively.

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[3] See Figure 33 in Appendix

Figure 21 - Worst Turn V/C – Scenario 2 AM

Figure 22 - Worst Turn V/C Change AM (Scenario 2- Scenario 1)

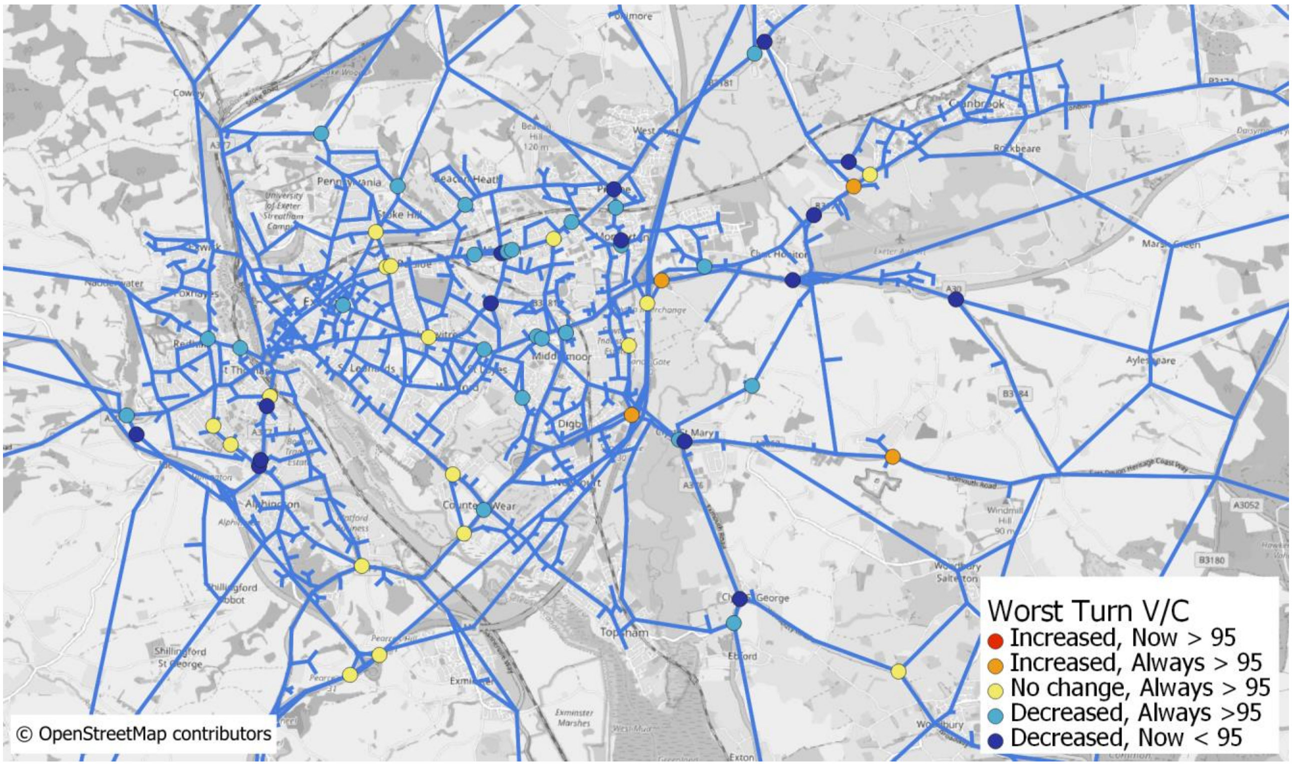


Figure 23 - Worst Turn V/C – Scenario 2 PM

Figure 24 - Worst Turn V/C Change PM (Scenario 2- Scenario 1)

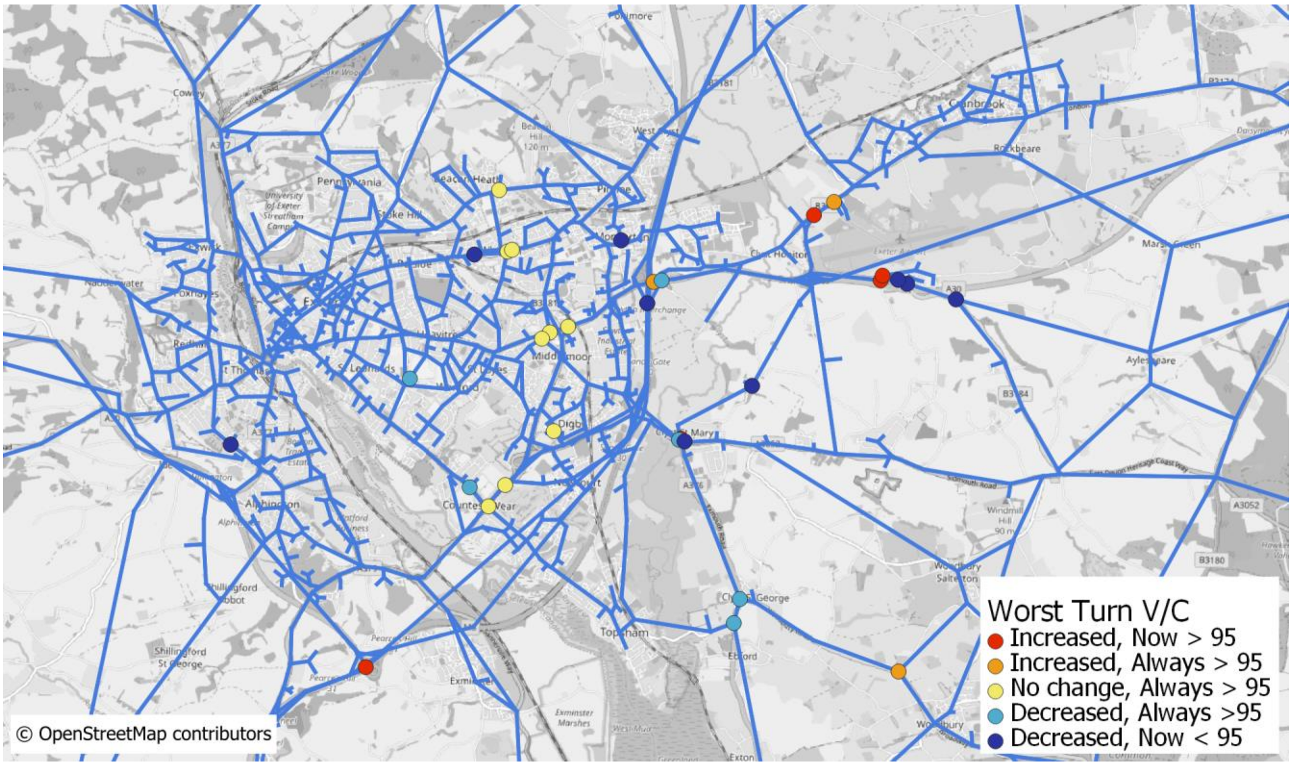


Figure 25 – Worst Turn V/C Change AM (2040 Scenario 2- 2030)

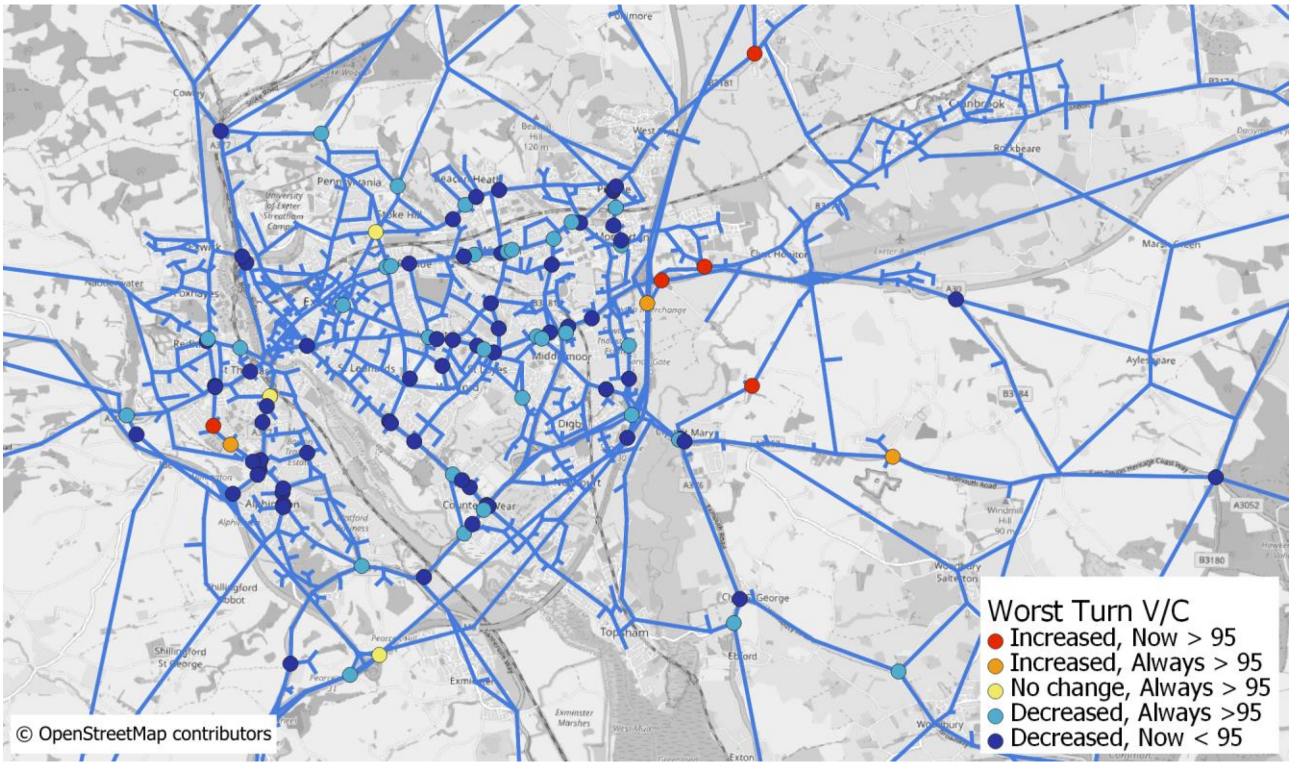
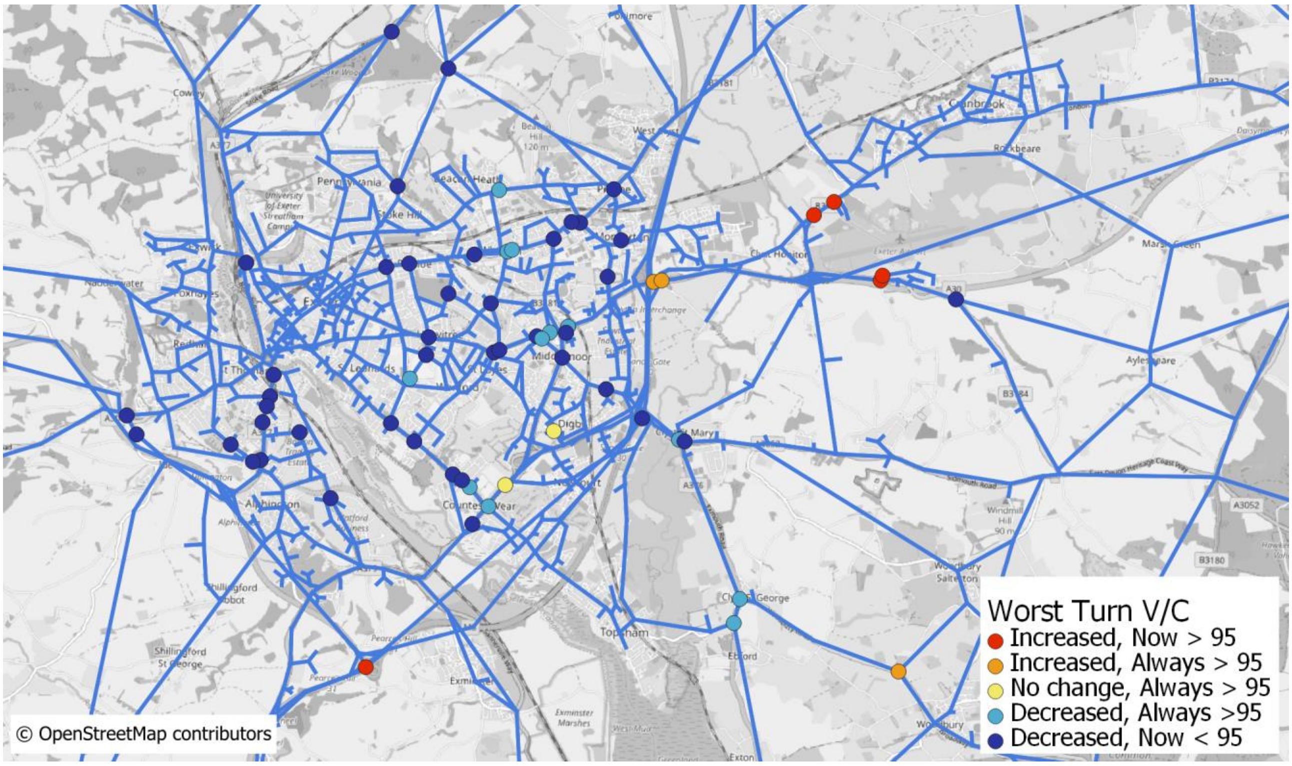


Figure 26 – Worst Turn V/C Change PM (2040 Scenario 2- 2030)



A30 & SOUTH WEST EXETER

In the AM Peak with the mitigations, the forecasts indicate several worst turn V/Cs are reduced from over 95% in Scenario 1 to below this threshold around southwest Exeter after the implementation of the Scenario 2 mitigations. These include an A30 southbound mainline and two along the A377 east of the Ide roundabout. There is very little change in V/Cs larger than 95% in southwest Exeter between Scenarios 1 and 2 in the PM peak, where initially there was a single node with a V/C larger than 95% in Scenario 1. The implementation of the Scenario 2 mitigations has reduced the V/C at this node to less than the 95% threshold. The operation of Ide roundabout has been investigated in a separate piece of microsimulation modelling work *(Ide Roundabout Traffic Impact Assessment*, March 2024).

M5 J31

In the AM peak with Scenario 2 mitigations, two nodes at M5 Junction 31 are shown to remain above the 95% V/C threshold. One of these locations is the A38 eastbound, where the mainline drops from three to two lanes. In the PM peak, the A38 mainline WB right turn movement at M5 Junction 31 now shows V/C over 95 in Scenario 2 that was not present in Scenario 1. This could be due to the increase in M5 mainline southbound flow towards junction 31 presented in Figure 12.

M5 J29, M5 J30, A30 AIRPORT JUNCTION & CLYST ST MARY ROUNDABOUT

The changes in large V/C nodes around M5 J29 and M5 J30 between scenarios is relatively small. In the AM peak, nodes at M5 Junction 30 and Junction 29 are forecast to remain over capacity with the Scenario 2 mitigations in place. At M5 Junction 29, the northbound diverge lane is shown to have V/C greater than 95%. The A30 signalised junctions just east of the M5 Junction 29 overbridge, forecasts a worst turn V/C greater than 95% in the PM peak and near capacity in the AM peak.

Introduction of the Scenario 2 scheme mitigations at A30 Airport & Clyst St Mary roundabout have released the traffic in both the time periods. A general capacity improvement is seen in this area across both time periods, with multiple nodes worst turn V/C dropping below the 95% threshold, particularly east of the A30 Airport junction. Exceptions to this are seen at the nodes west of the airport in the PM peak period and the eastbound movement from Frog Lane at the Clyst St Mary roundabout. At the Clyst St Mary roundabout, worst turn V/Cs on the west approaches to the roundabout are shown to be larger than 95% in both AM and PM peaks.

There is an existing National Highways VISSIM model that covers M5 Junction 29, Junction 30, the A30 Airport junction and the Clyst St Mary roundabout. Operational modelling using this model is currently being undertaken by National Highways to better understand the impact of residual Local Plan development traffic upon these junctions.

OTHER JUNCTIONS

In the 2040 Scenario 2, the Bridge Road approach to Countess Wear roundabout is forecast to be over capacity in the AM peak. In the PM peak the Rydon Lane approach arm is forecast to be over capacity. To the southwest of Countess Wear, the Bridge Road approach arm of the Bridge Road/A379 roundabout is forecast to be over capacity in the AM peak. Both the Countess Wear and Bridge Road/A379 roundabouts form part of an alternative route to cross the River Exe other than the M5, and delays on these junctions may cause more traffic to reroute onto the M5.

Although other junctions are forecast to be over capacity in the 2040 Scenario 2, in some cases these are access junctions for development sites and therefore the requirements for the access junctions would be investigated in Transport Assessments for the relevant sites. In other cases, the high V/Cs can be due to limitations of the SATURN model (e.g. locations where not all roads are represented, or locations which were not validated in the base model).

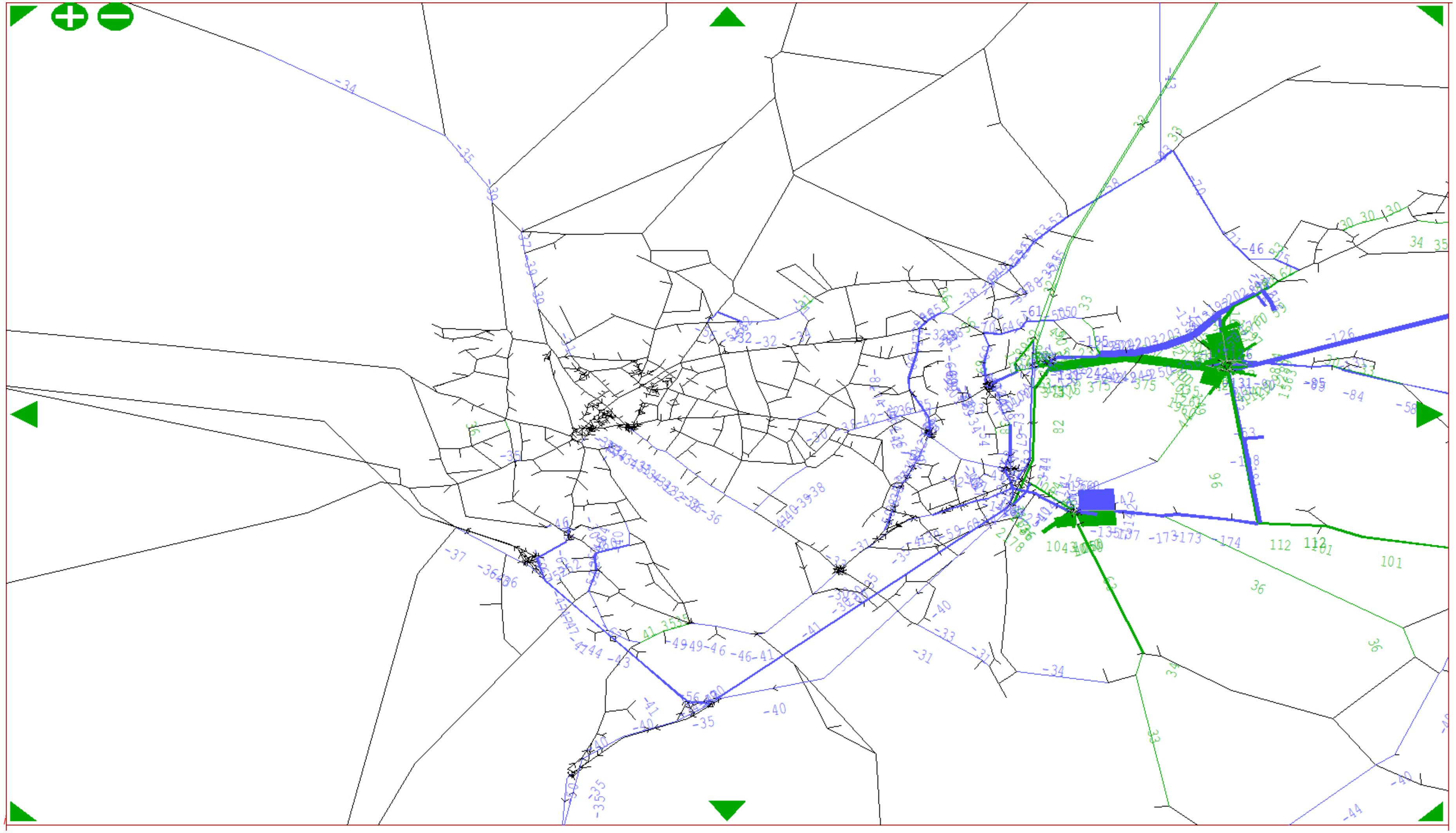
CONCLUSION

A modelling exercise was conducted to evaluate the effectiveness of proposed mitigation measures in the Greater Exeter area. These measures comprised active travel initiatives, bus priority schemes, new bus services, increased rail service frequency, and mobility hubs. Car trip reductions were calculated for each mitigation measure, and the affected zones were identified. The 2040 Scenario 1 matrices were adjusted to reflect the impact of each mitigation measure and subsequently reassigned to create the 2040 Scenario 2. The 2040 Scenario 2 forecast indicated flow reductions throughout Exeter, with the most significant reductions occurring near M5 J29, M5 J30, and the East Devon area. Several junctions on the eastern side of Exeter, around J29 and J30, remain over capacity. These include movements at J29 and J30, as well as at the Clyst St Mary roundabout and the A30 airport roundabout.

While the strategic modelling forecasts offer insights into potential capacity issues at various junctions, operational modelling is necessary to more accurately assess the performance of these junctions under future traffic conditions. National Highways possesses an existing VISSIM model that includes M5 J29, J30, the A30 Airport junction, and the Clyst St Mary roundabout. National Highways is using this model to assess the performance of the Strategic Road Network, utilizing traffic flow data from the 2040 Scenario 2 forecasts. This will give a clearer indication of the future impact of traffic associated with the emerging Local Plans.

Appendix A

Figure 27 - Demand Flow Changes AM (2040 scenario2 - 2040 scenario 1)[4]



Note: Concept schemes at the A376 / A3052 Clyst St Mary roundabout and the A30 Airport junction were modelled in Scenario 2 to improve the capacity at these locations and provide mitigation from the impact of traffic associated with the forthcoming Local Plans within the Greater Exeter region. These concept schemes are not committed and should be reviewed by Devon County Council alongside the site promoter and are not responsibility of National Highways. Modelling these concept schemes changed the link structure within the SATURN modelled network and therefore show large differences at these locations.

[4] Green = Increase in flow. Blue = Decrease in flow.

Figure 28 Demand Flow Changes AM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2040 scenario 1)

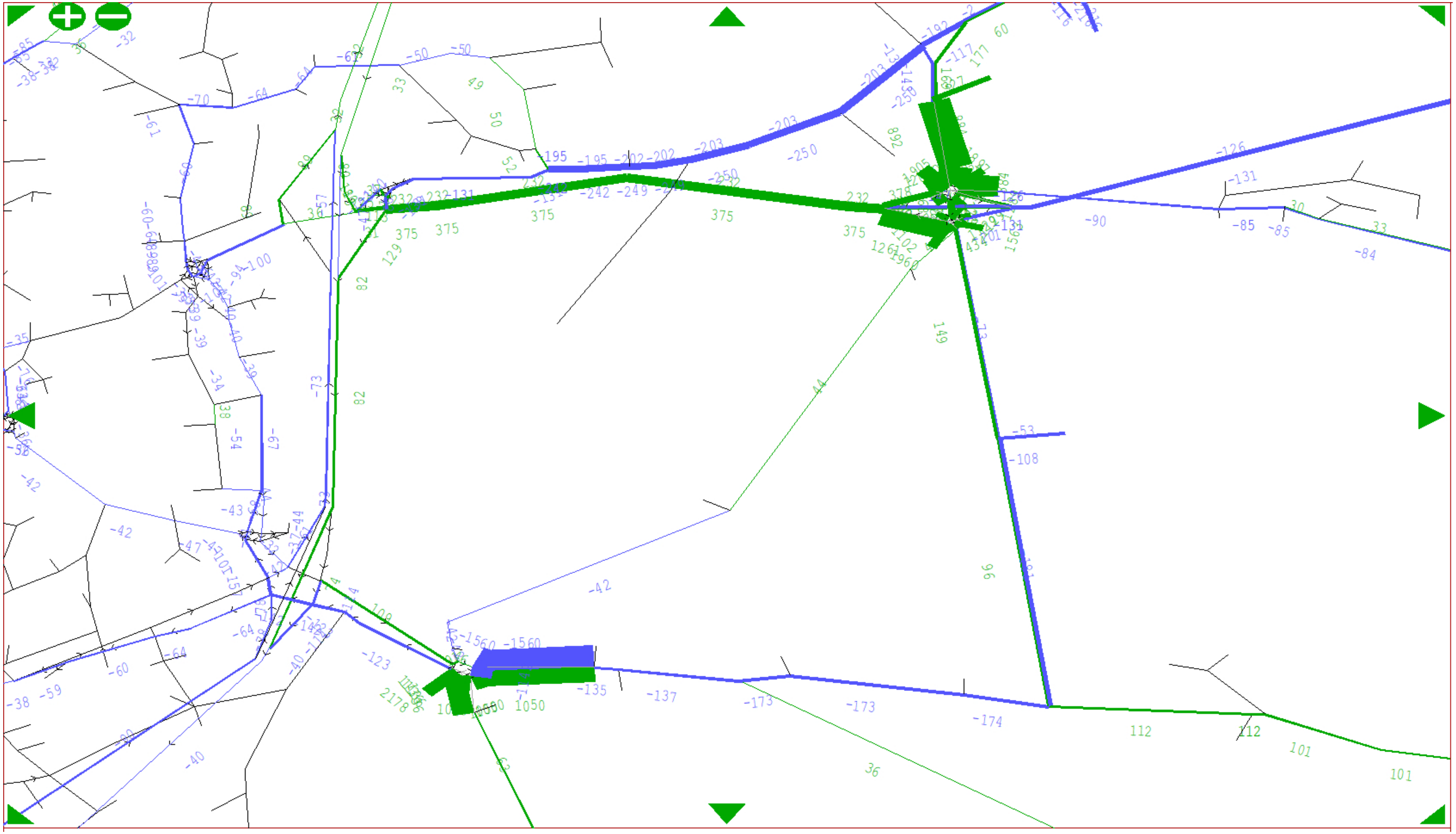


Figure 29 – Actual Flow Changes AM (2040 scenario2 - 2040 scenario 1)

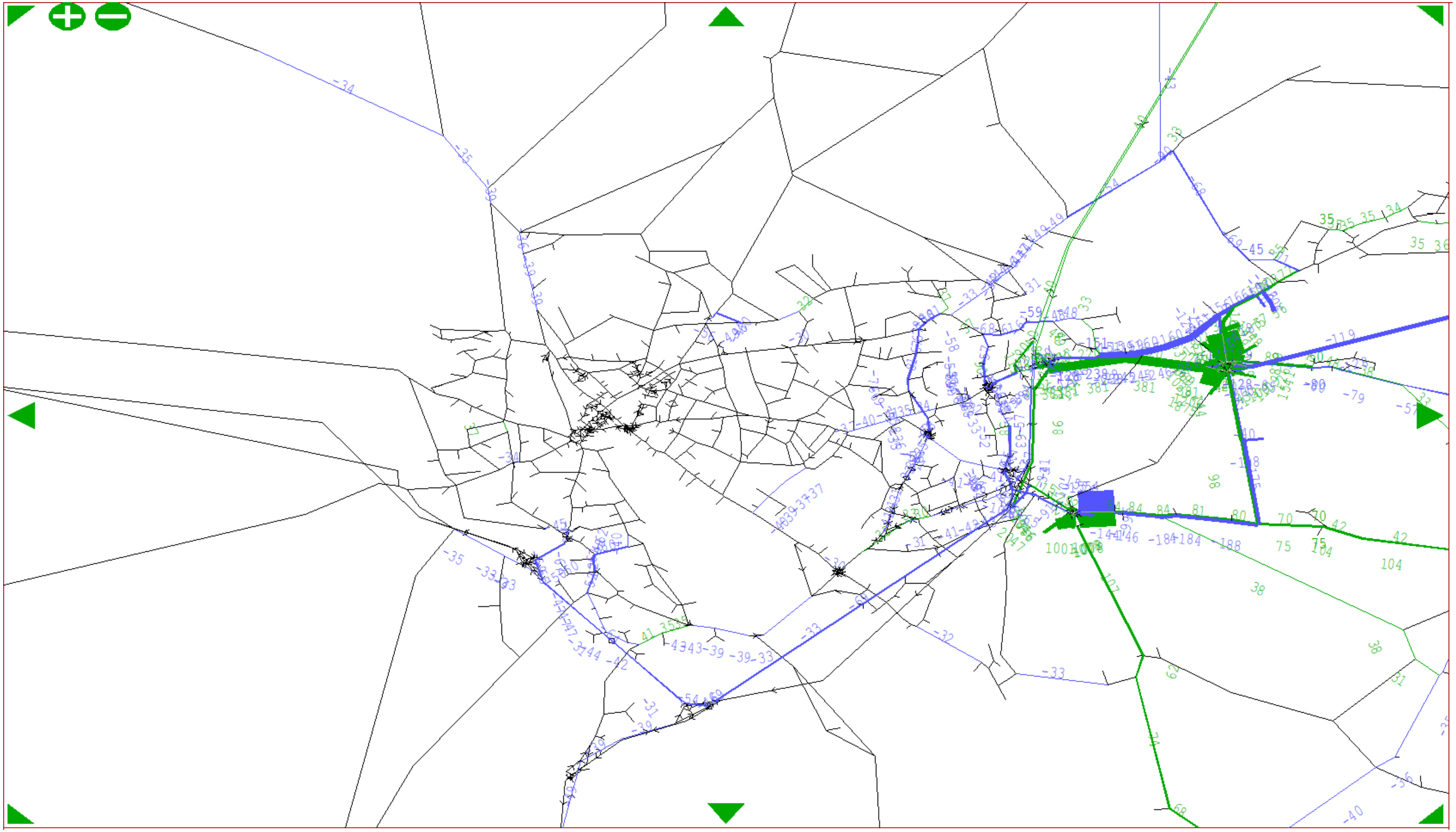


Figure 30 Actual Flow Changes AM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2040 scenario 1)

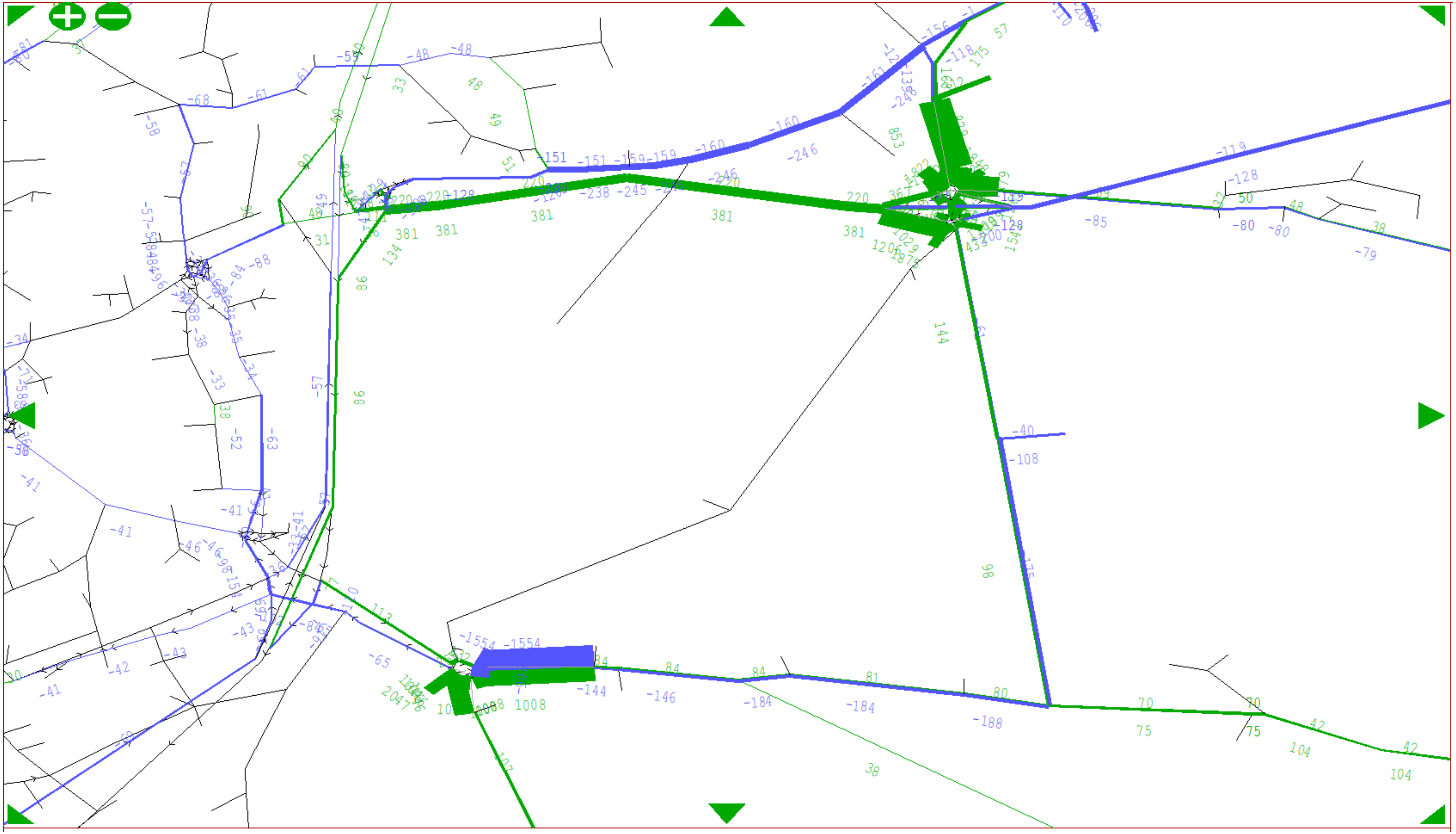


Figure 31 – Demand Flow Changes PM (2040 scenario2 - 2040 scenario 1)

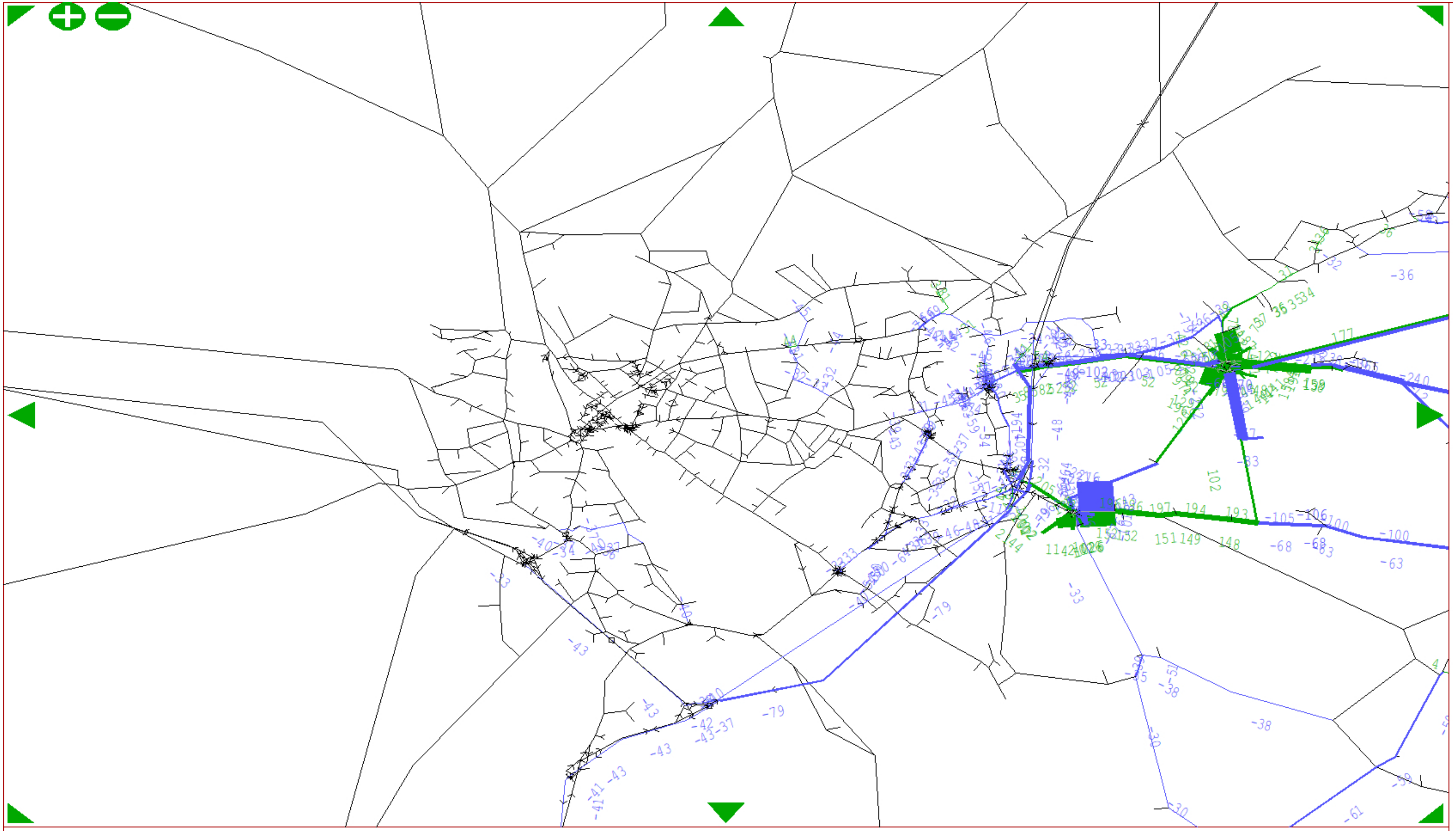


Figure 32 Demand Flow Changes PM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2040 scenario 1)

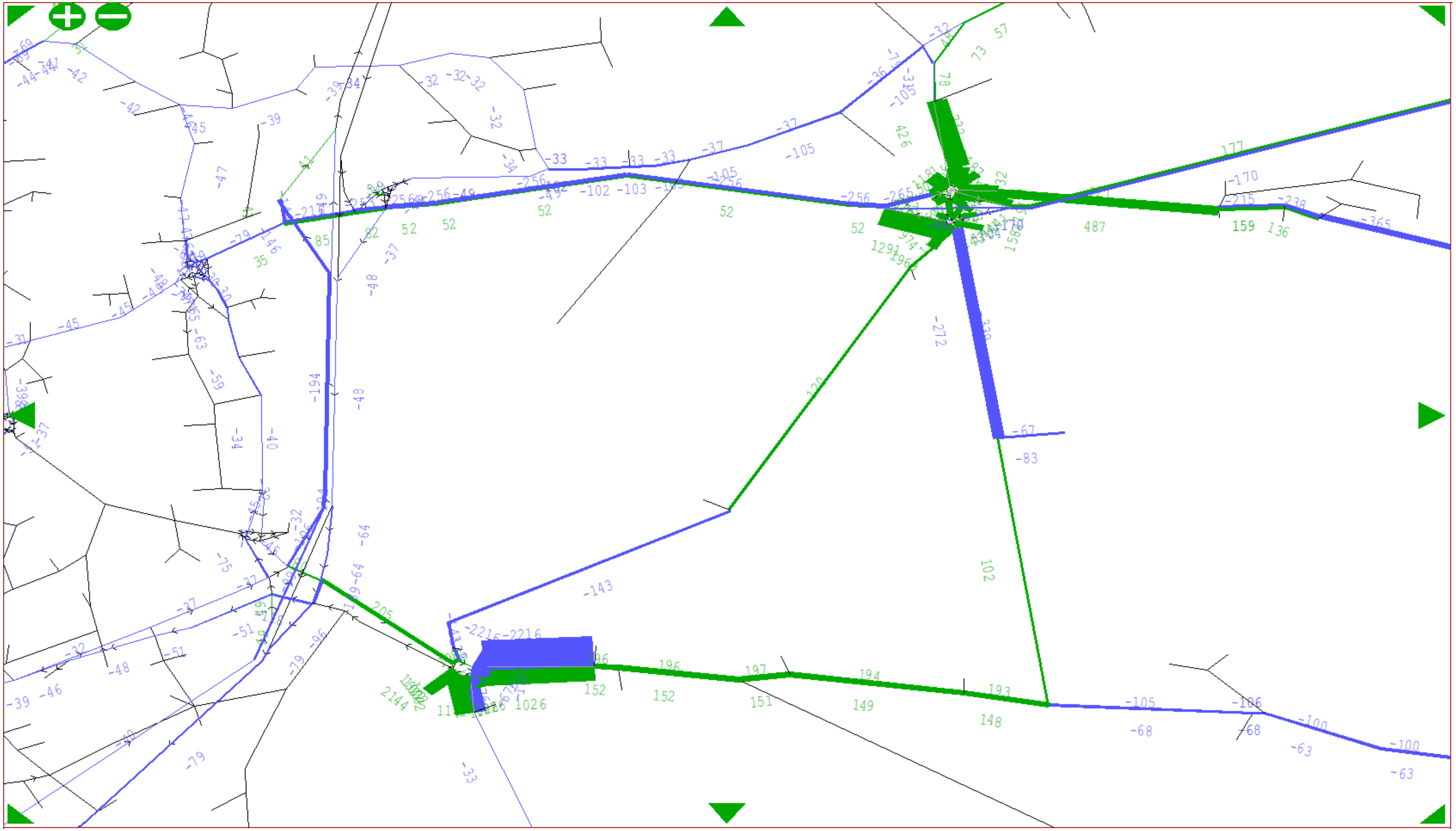


Figure 33 – Actual Flow Changes PM (2040 scenario2 - 2040 scenario 1)

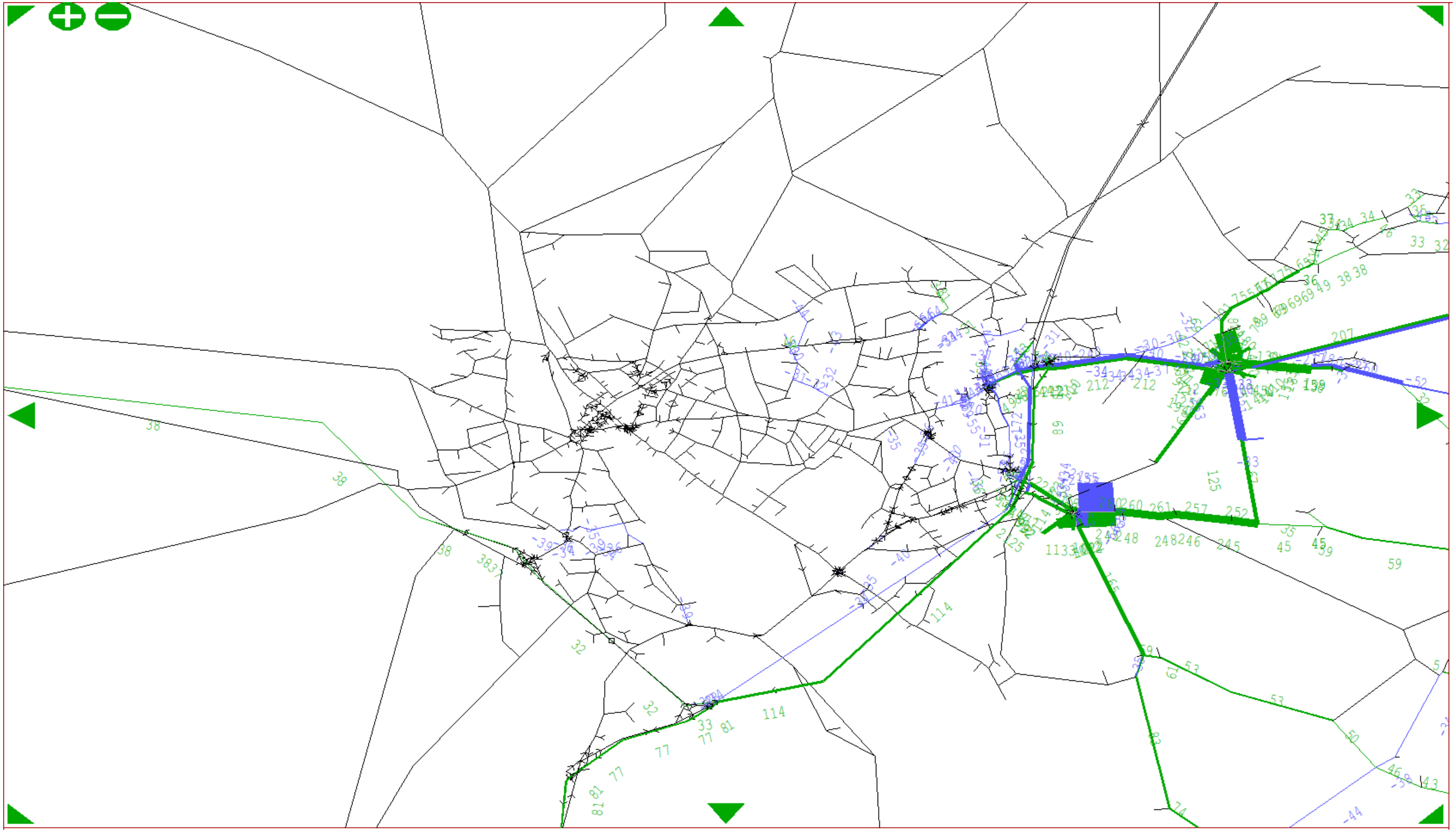


Figure 34 Actual Flow Changes PM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2040 scenario 1)

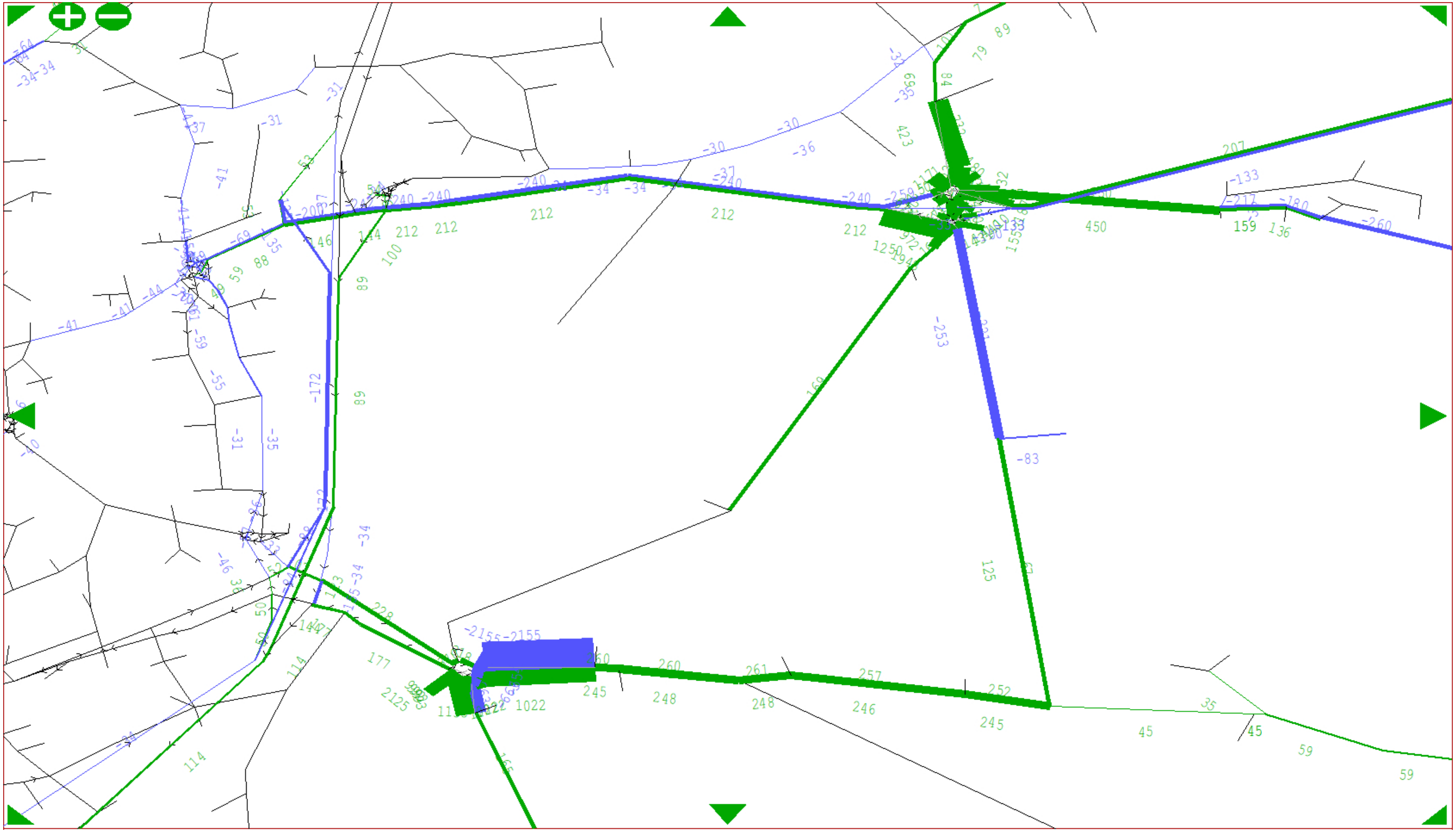


Figure 35 - Demand Flow Changes AM (2040 scenario2 - 2030)

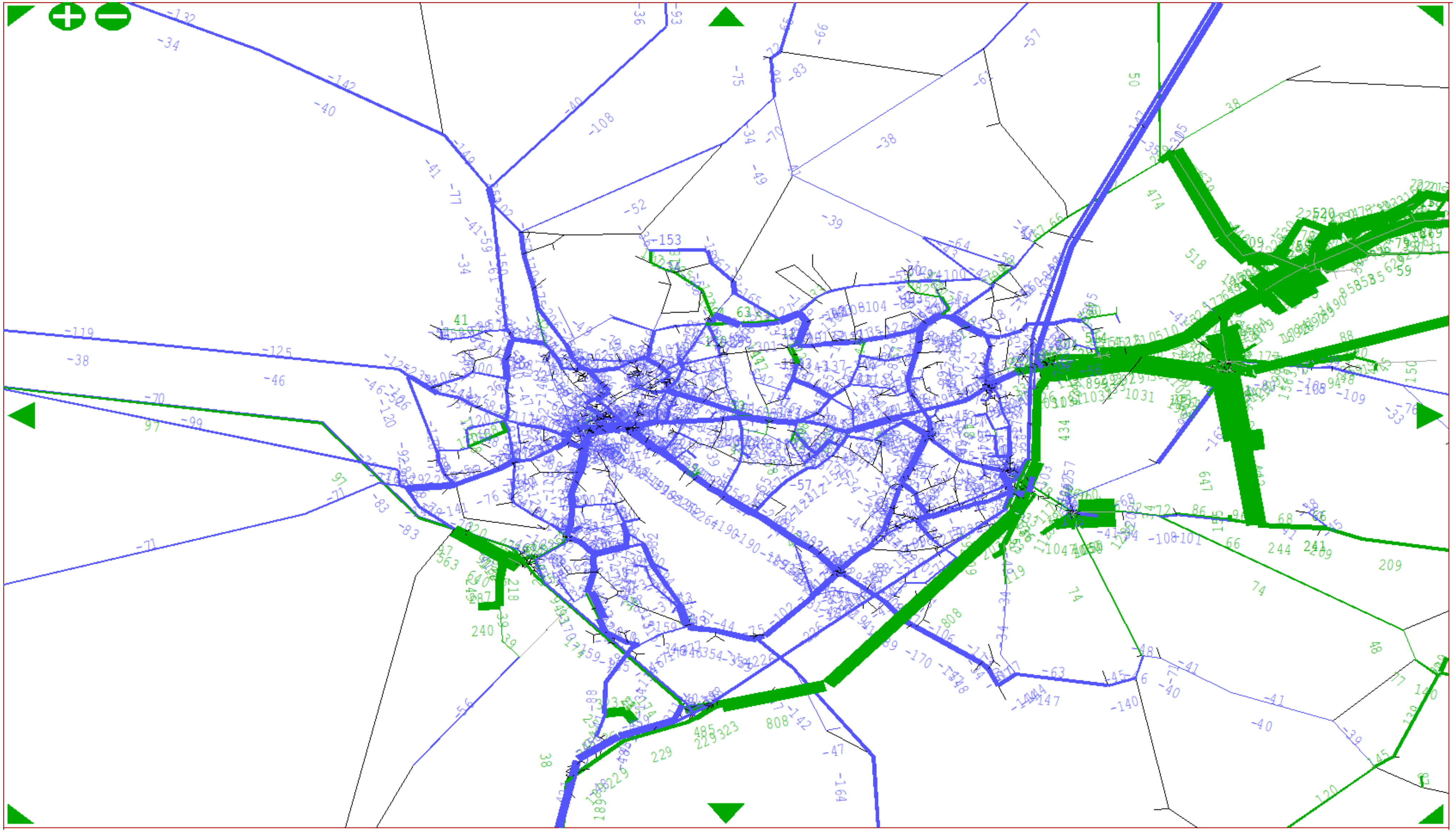


Figure 36 Demand Flow Changes AM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2030)

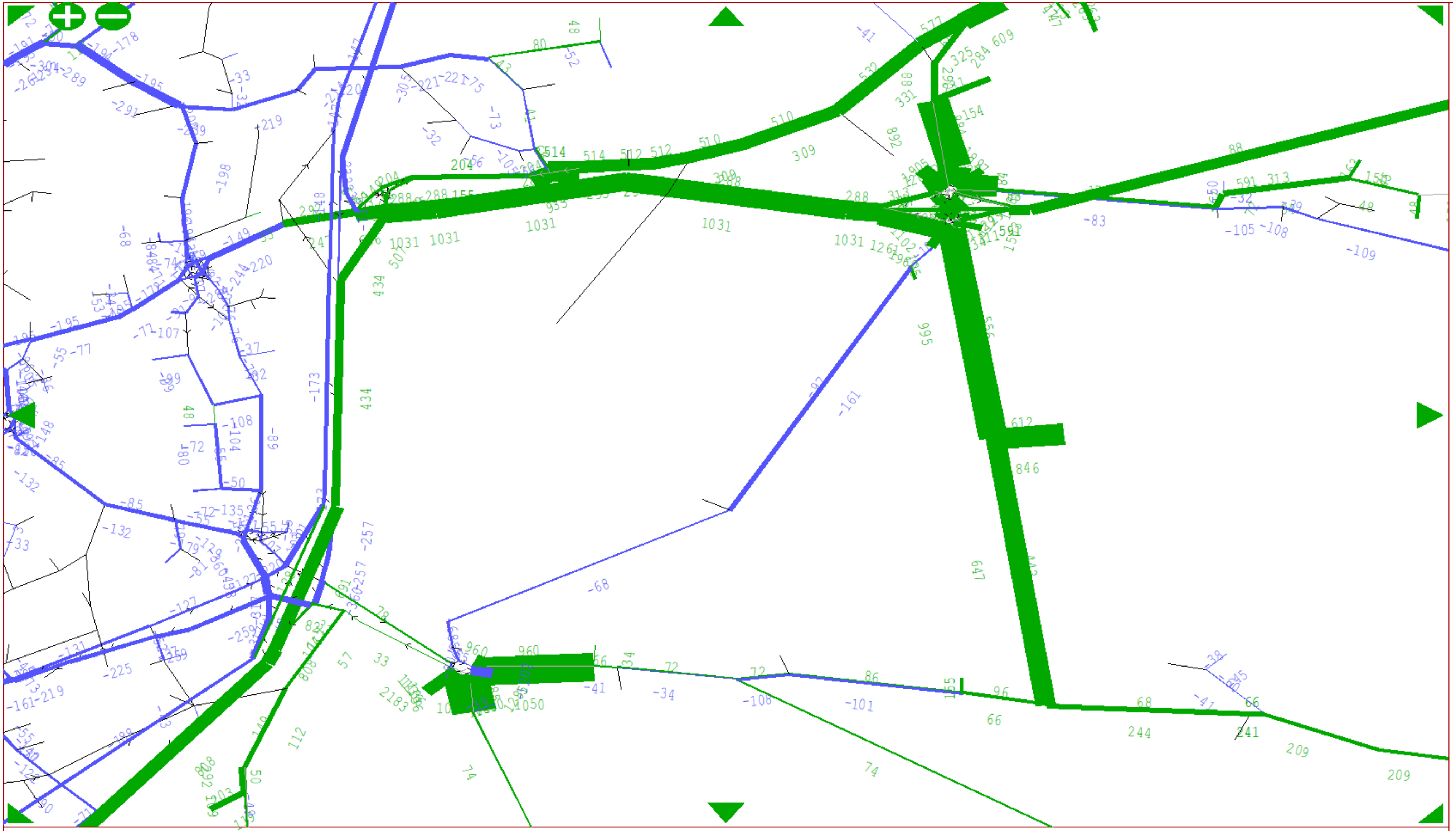


Figure 37 – Actual Flow Changes AM (2040 scenario2 - 2030)

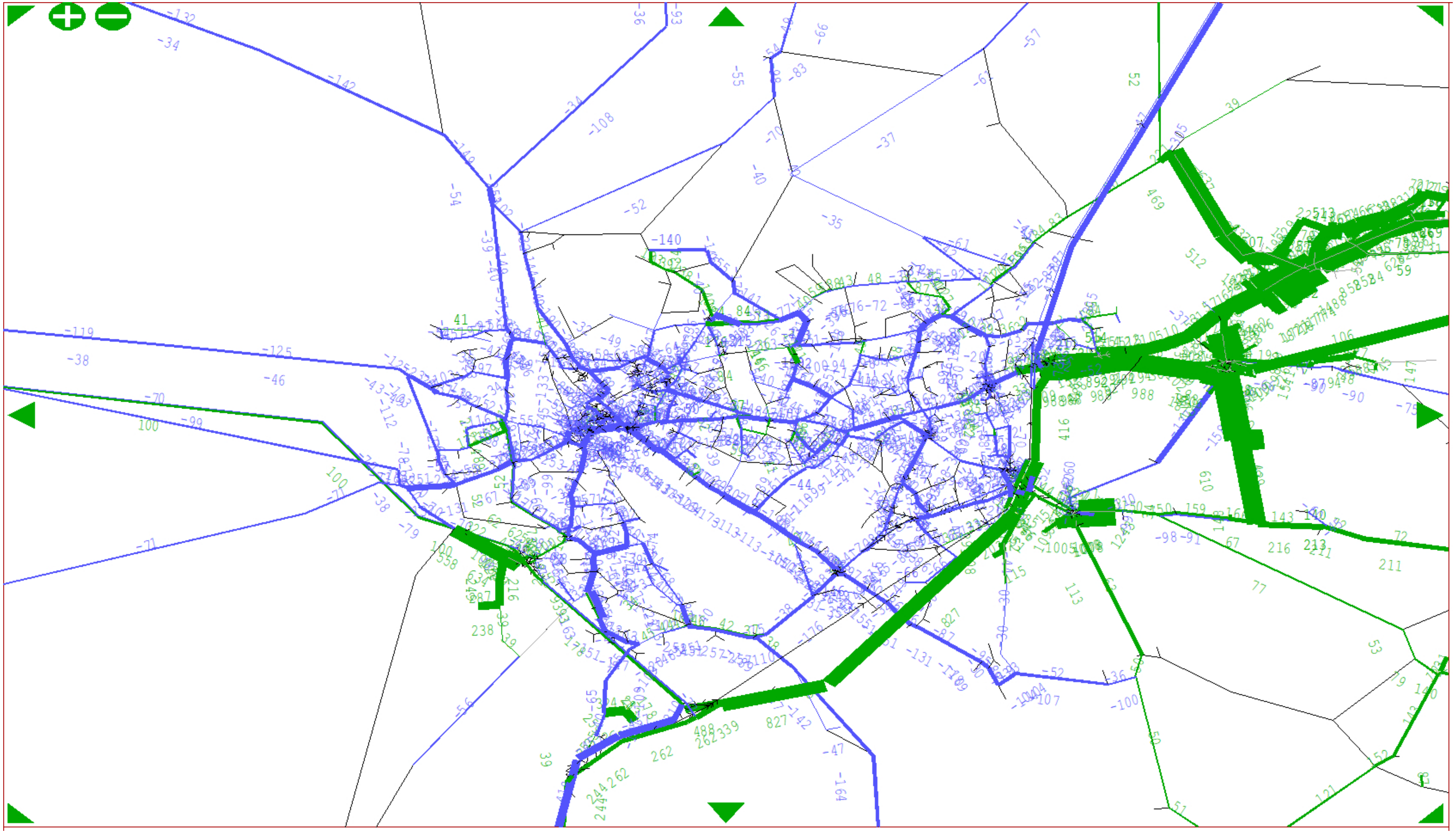


Figure 38 Actual Flow Changes AM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2030)

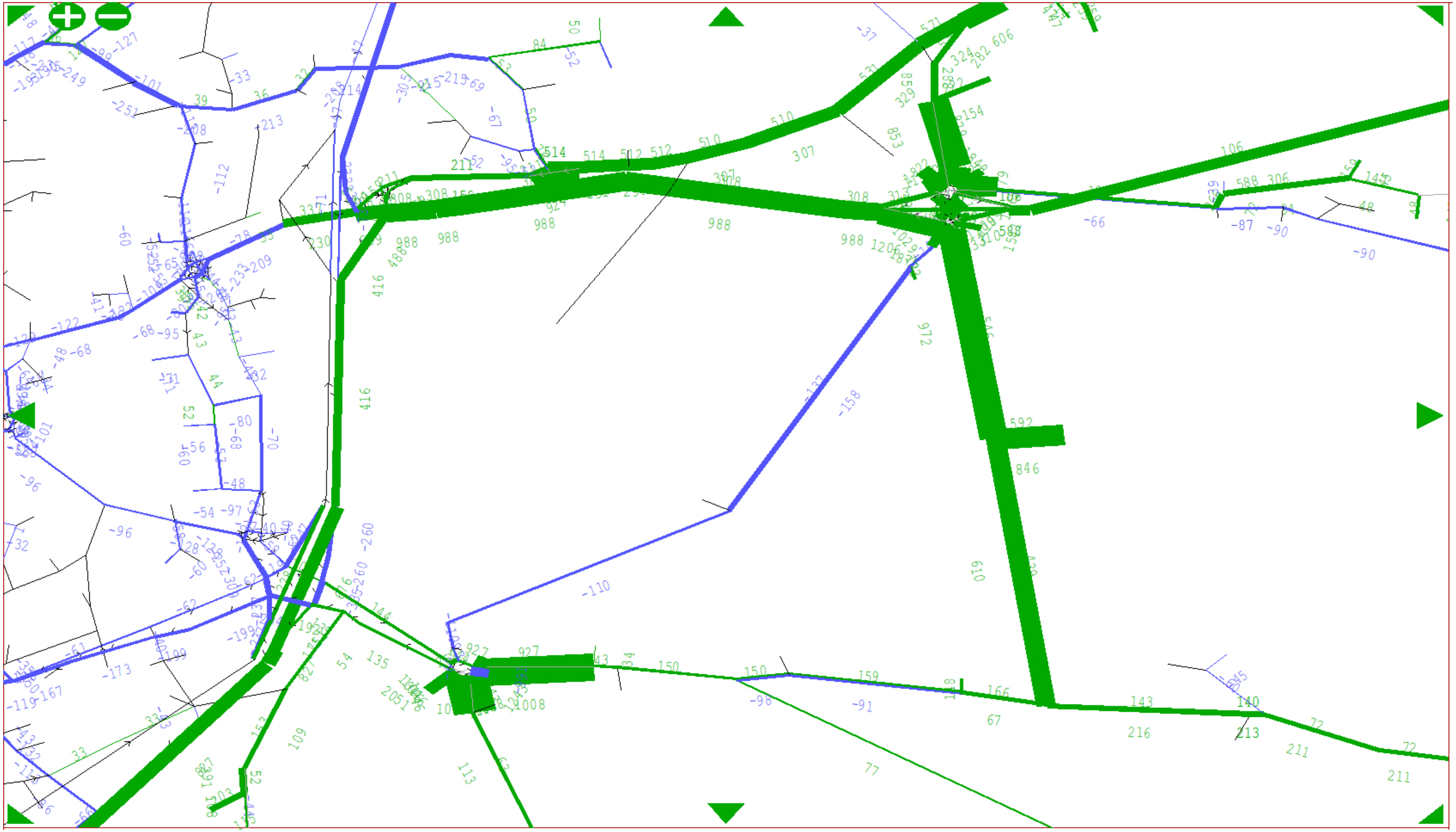


Figure 39 – Demand Flow Changes PM (2040 scenario2 - 2030)

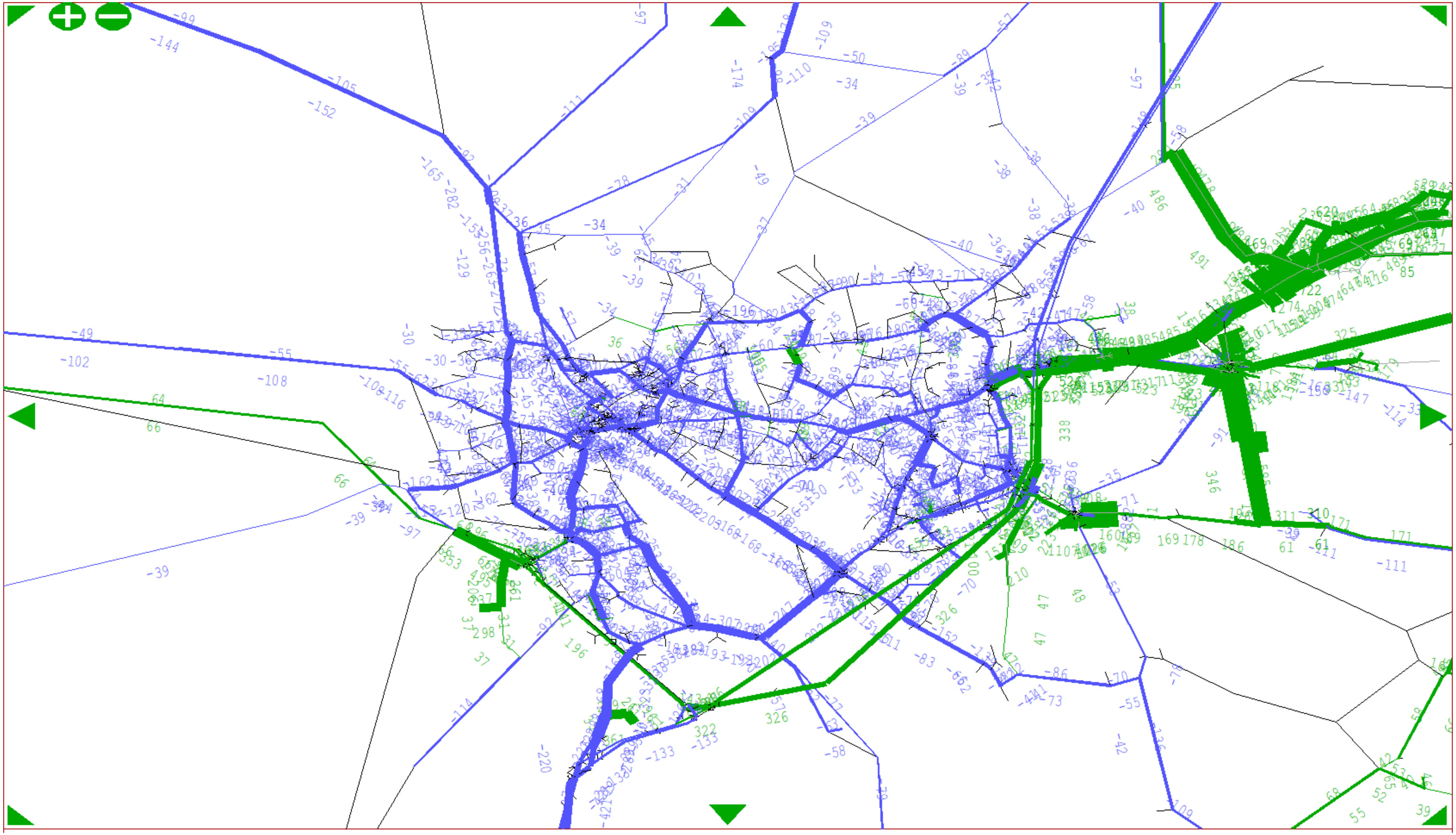


Figure 40 Demand Flow Changes PM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2030)

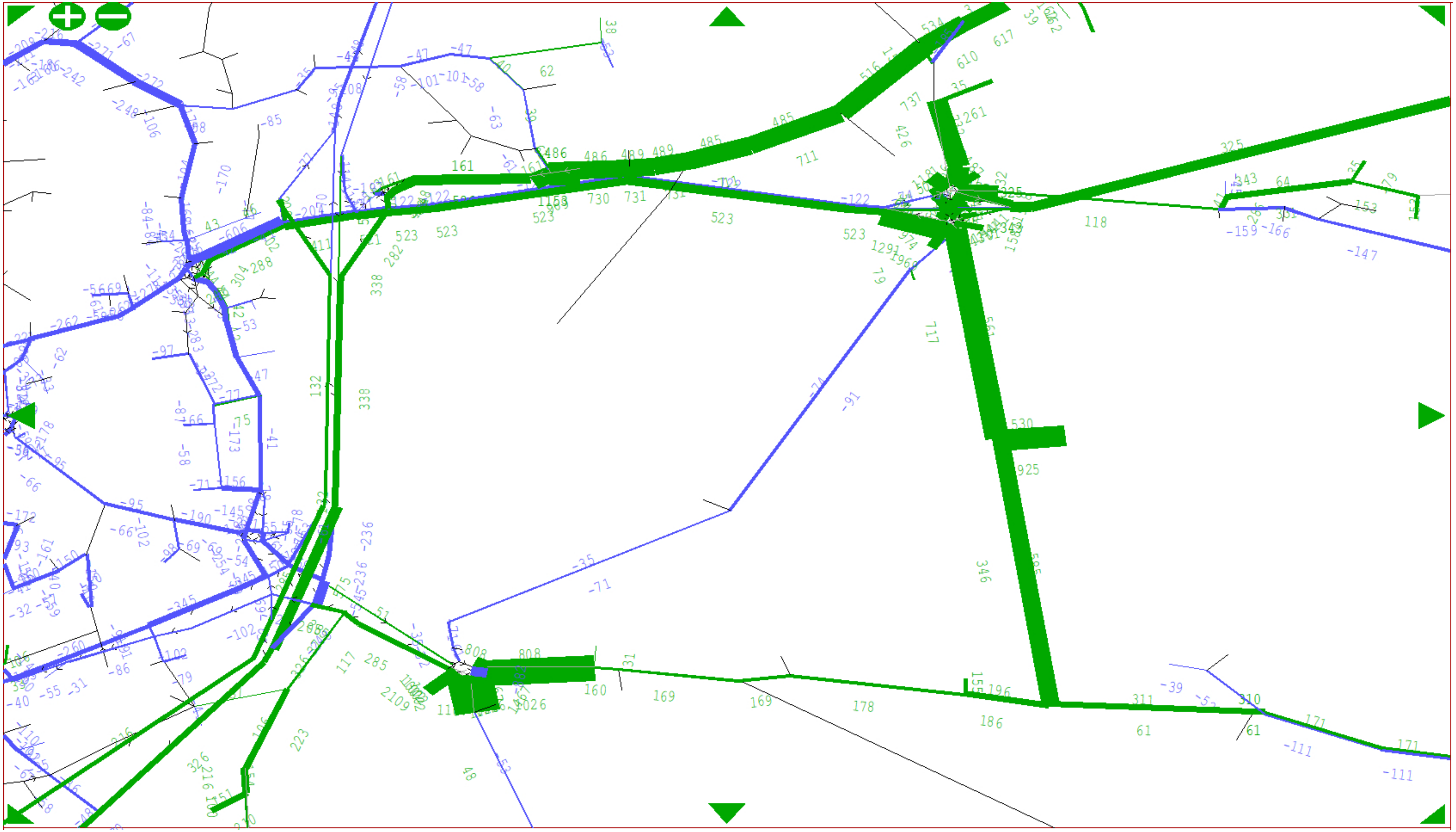


Figure 41 – Actual Flow Changes PM (2040 scenario2 - 2030)

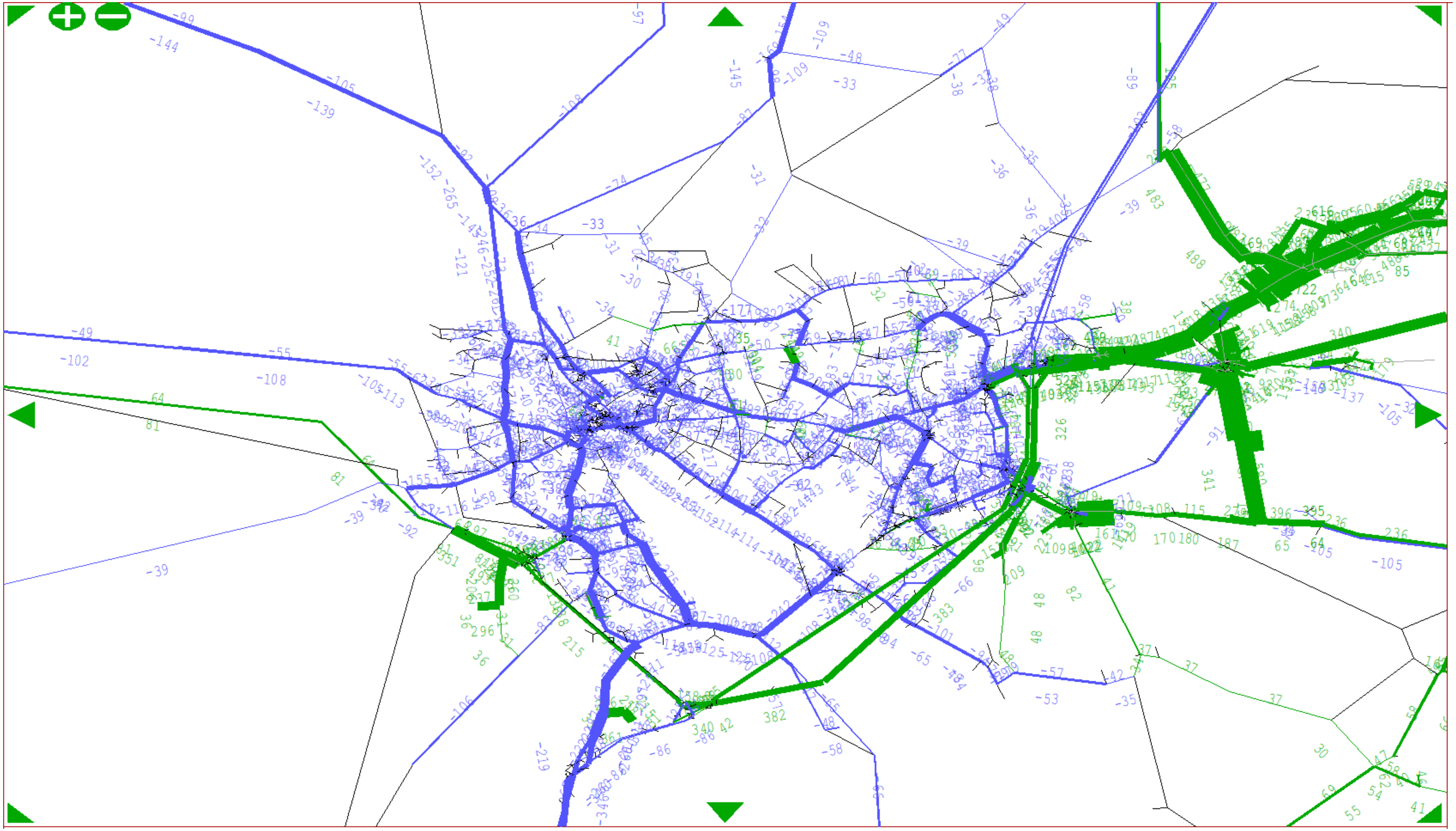


Figure 42 Actual Flow Changes PM- junction J29, J30 & EDNC focus area (2040 scenario2 - 2030)