

## Memo

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Project Name: A15–N322 NRM Study  
Project Number: 368654  
Reference Number: SWNL0253742  
Date: 11/12/2019

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### 1 Introduction

The province of Gelderland is considering a future expansion of the N322 between Druten and junction Ewijk. So far, Sweco has determined the effects of the road expansion in a dynamic model, that was scoped to the area from junction Echteld to junction Ewijk<sup>1</sup>. Here it was found that the expansion of the road will lead to a shift in route choice between Echteld and Ewijk: an increasing amount of vehicles will travel via the southern route (N323/N322) rather than the northern route (A15/A50). However, it is yet unknown whether other route choice changes will occur outside the scope of the dynamic model.

Therefore, the Province of Gelderland has asked Sweco to conduct a NRM study to determine the impact of this change on the traffic volumes on the surrounding road network. The aim of this project is to give a complete view of the changes in traffic demand as a result of the expansion of the N322. First of all to verify the shift in route choice between Echteld and Ewijk, but also to determine any additional changes in the traffic demand on the surrounding road network.

### 2 Method

In this study, the traffic intensities of two scenarios are compared:

- **Base scenario 2030High (NRM2019 Oost)**; in which only infrastructural changes are included that are yet part of established policies, such as the ViA15 project.
- **Variant 2030High including the expansion of the N322 between Druten and junction Ewijk**; which equals the base scenario plus the road expansion.

The intensities of the first scenario (the base scenario) are distracted from the 'NRM Oost basisprognoses 2019'.

To determine the intensities of the second scenario, a new NRM 2030High run is conducted in which the extra lane between Druten and Ewijk is added. In line with the NRM guidelines, this run is conducted using the GrowthModel methodology. As an effect, traffic demand in the area will differ from the first scenario not only because of route choice effects, but also because of mobility pattern changes (traveling within rush hour, modal shift towards car etc.), which influences the amount and departure times of trips between relations of which the travel time (cost) has changed.

In order to run the second scenario (the Variant with adapted infrastructure) via the GrowthModel methodology, first a reproduction of the base year model should be run. Hence, during this study two NRM simulations have been run:

- 1) The *NRM Oost 2014* model to reproduce the results of the base year and check that the reproduction run gives the same results as the delivered run.
- 2) The *NRM Oost 2030H* (High scenario) including the extra lane between Druten and Ewijk. This run is compared to the base scenario for 2030H.

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<sup>1</sup> Projectnummer 362709, referentienummer SWNL0227391. Uw referentie 168487.

### 3 Results

In the following sections the results of the NRM runs will be shown in form of intensity plots and difference plots. Only results for the morning peak (07:00-09:00) are shown in the report, full day results can be found on separate plots provided as an appendix to this memo. All results assume an average working day.

#### 3.1 Reproduction Run 2014

The reproduction run of the base year gave the same results as the delivered results for the base year and it can therefore be concluded that the NRM model is running correctly. The results from NRM (2014) have also been compared with the morning peak counts in the south eastern direction from 2017, that were also used for the dynamic study. The counts are around 15-20% higher than the NRM results. Apart from the intensities, also the relative intensities among the A15 and the N323 are compared. Here it is found that the NRM results match the split that is found in the counts of 2017 in the eastern direction.

As can be seen in Figure 1, the traffic demand in the morning peak on the N322 between Druten and Ewijk equals approximately 2500 vehicles per two hours in the direction of Ewijk. In the opposite direction there are around 1700 vehicles in the morning peak. The intensities for the 2-hour morning peak around A15 and N322 are shown in figure 1, whereas a larger plot of the area is provided in a separate PDF.

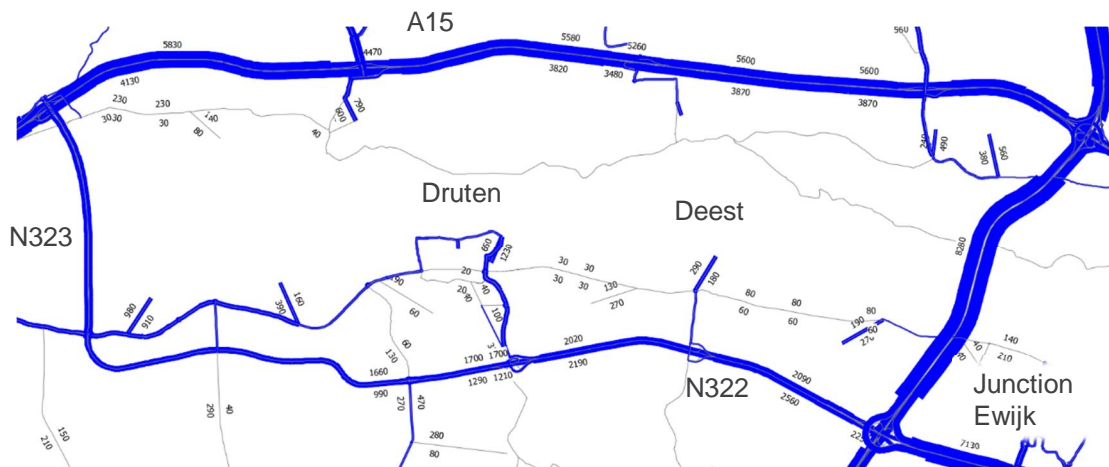


Figure 1 Intensities (vehicles per 2 hours) for the morning peak in 2014. Full image is provided in a separate PDF.

#### 3.2 2030H Scenario with extra lane on N322

The 2030H scenario where an extra lane has been added on the N322 between Druten and Ewijk (in the direction of Ewijk) shows intensities of up to 3000 vehicles in the morning peak. In the direction of Druten the intensity remains almost the same as in 2014 with around 1850 vehicles per 2 hours.

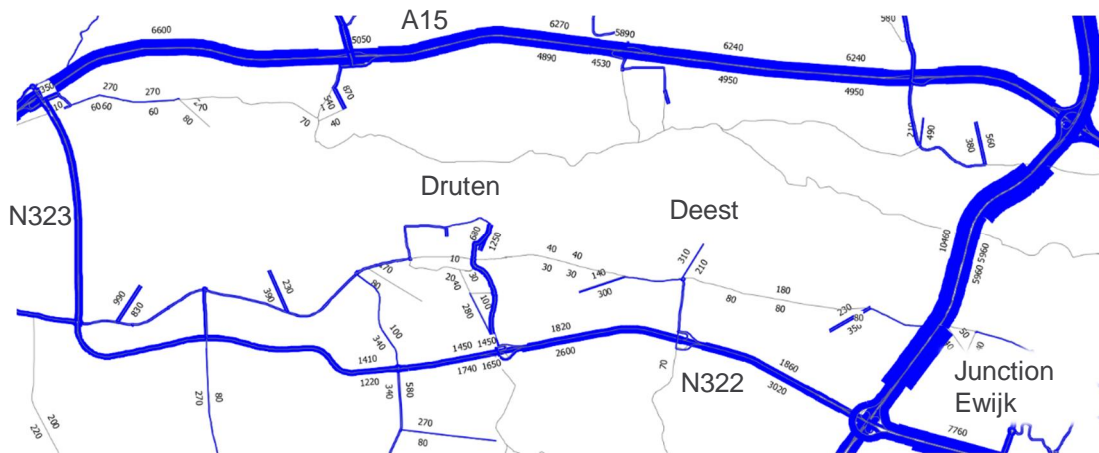


Figure 2 Intensities (vehicles per 2 hours) for the morning peak for the 2030H scenario including the extra lane between Druten and Ewijk. Full image is provided in a separate PDF.

## 4 Analysis

In order to determine the impact of the extra lane on the amount of traffic on N322 and the surrounding roads, the traffic intensities of the variant are compared with the intensities of the 2030H base model. The intensities of the 2030H base model are part of the ‘NRM basisprognoses’ as delivered by Rijkswaterstaat and therefore not run separately.

### 4.1 Comparison with 2030 High Base Model

In table 1 an overview of the changes between the base model and the scenario can be found. The changes are shown as both absolute and relative numbers. Figure 4 and 5 also show the differences in absolute and relative numbers respectively.



Figure 3 Overview of locations for table 1.

Road	Abs. change [veh/2h]		Rel. change [%]	
	07:00-09:00	24H	07:00-09:00	24H
1 - N322 Druten-Deest	370	1680	+16	+12
1 - N322 Deest-Druten	130	340	+7	+2
2 - N322 Deest-Ewijk	430	1760	+16	+11
2 - N322 Ewijk-Deest	130	350	+7	+2
3 - N323 towards south	110	830	+6	+6
3 - N323 towards north	-110	-200	-5	-2
4 - A15 Ochten-Dodewaard	-200	-610	-4	-2
4 - A15 Dodewaard-Ochten	-30	-30	-1	-1
5 - A50 Valburg-Ewijk	-130	-460	-2	-1
5 - A50 Ewijk-Valburg	50	140	0	0
6 - N322 Rossum towards south	40	20	+2	0
6 - N322 Rossum towards north	-30	-20	-4	-1
7 - N329 towards south	-30	-100	-8	-4
7 - N329 towards north	50	260	+9	+8
8 - Veesteeg towards south	-30	-30	-10	-4
8 - Veesteeg towards north	50	50	+127	+23

**Table 1** Overview of both relative and absolute changes in traffic demand between the base model and the scenario. The numbering correspond with the locations shown in figure 3.

The results show a significant increase in traffic where the road has been expanded. For the morning peak the increase will be approximately 16% in the direction of Ewijk. An increase of around 7% can also be seen in the opposite direction.

We identify that the growth of traffic in eastern direction on the N322 is a result of the following effects:

- The lane expansion makes the traffic that took a detour (via Prins Willem Alexanderbrug) return because of the added capacity and therefore lowered travel time (route choice effect).
- The lane expansion makes it also more attractive for people in the Druten/Leeuwen region to take a trip by car in rush hour to Arnhem/Nijmegen and therefore the traffic demand on this section increases (mobility pattern changes).

The growth of traffic in western direction on the N322 could be explained by the following effects:

- More commuting traffic between Arnhem/Nijmegen and Druten/Leeuwen (etc), mainly because the travel time back home in the evening peak will be lower as an effect of the extra lane on the N322.
- Additionally, as written above there is a route shift from traffic from the regions around Druten and Leeuwen towards junction Valburg, which lead to traffic reduction on the bridge (the reduction in northern direction on the Prins Willem Alexanderbrug) during the morning peak. This reduction may give traffic travelling from Ewijk to Echteld, prefer the route via the N322/N323 rather than the A50/A15.

As a consequence of more traffic travelling towards the east on N322, a decrease in traffic can also be found on the A15 and A50 towards south. Traffic coming from the south does not seem to be affected much by the change to the network. From the N329 there is an increase in traffic travelling northbound of around 50 vehicles per two hours in the morning peak.

The difference for N322 around Rossum towards the north is 30 vehicles per two hours less in the peak period. A possible explanation for this reduction in traffic intensities, could be that traffic originating from the area around Kerkdriel chooses to go via A2 and A15 instead. From Veesteeg an extra 50 vehicles per two hours can be expected which equals a significant relative change of +127%, however, in absolute numbers this is still low. Given the capacities of N322 and Veesteeg, no bottlenecks are expected as a result of these increases in traffic.

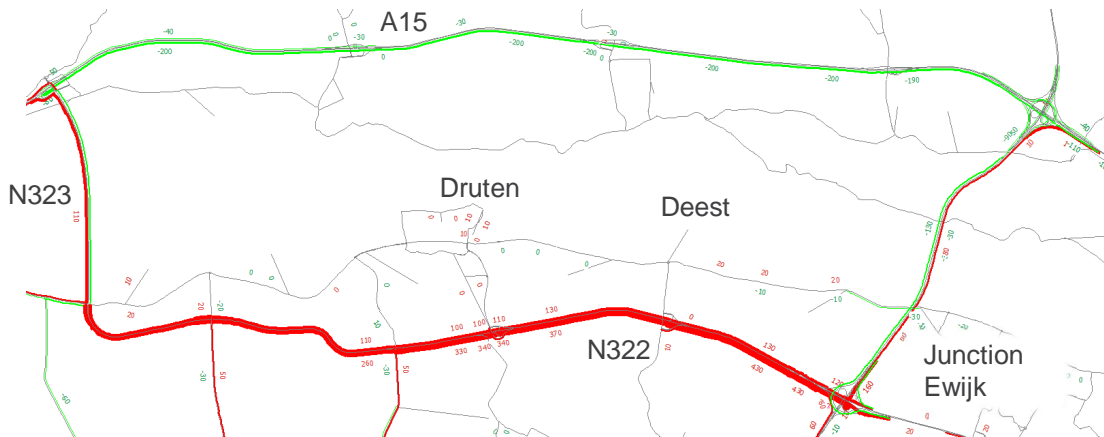


Figure 4 Differences between 2030 basis model and scenario given in absolute numbers (veh/2H) for the morning peak. Full image is also provided in a separate PDF.

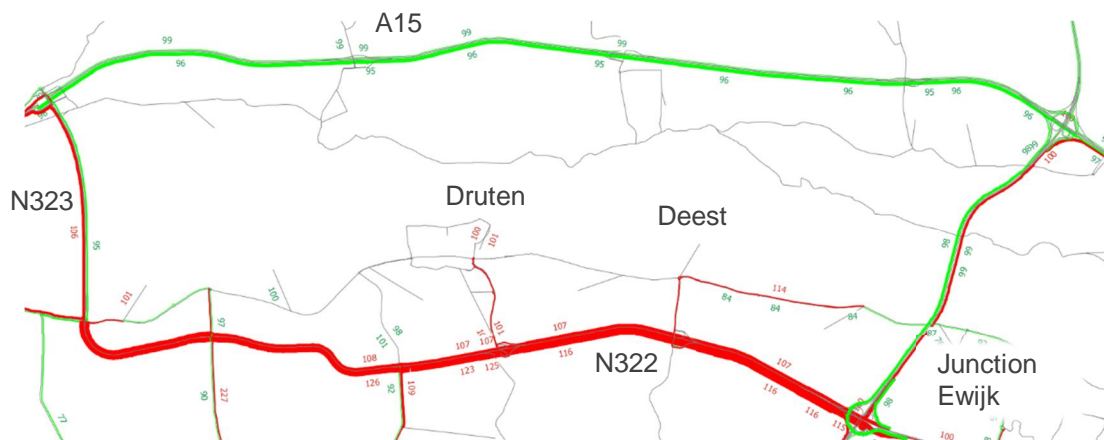


Figure 5 Differences between 2030 basis model and scenario shown as relative differences for the morning peak. Full image is also provided in a separate PDF.

It is noted that difference plots only provide information on the direction of the change in traffic volume. Which percentage of it is because of route choice and/or changes in mobility patterns has not been researched. Conducting selected link runs or re-assignments will provide this insight, but are outside the scope of this study.

## 5 Conclusion

To conclude, the extra lane between Druten and junction Ewijk does attract extra traffic towards the N322. In line with the earlier dynamic model<sup>2</sup>, the static results show a shift of traffic from the A15/A50 route towards the N322 route. Other effects of the expansion of the N322 include the growth of traffic on Veesteeg and N329, both in northern direction towards the N322. Last, the results show a slight decrease of traffic from the direction of Wamel towards the crossing with the N323/N322. Given the capacities of the roads, no new bottlenecks are expected as a result of the expansion of the N322 between Druten and Ewijk.

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<sup>2</sup> Projectnummer 362709, reference number: SWNL0227391. Your reference: 168487.

## Colophon

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