

# Evaluation report

## Smart lighting bicycle infrastructure City of Zwolle

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## Short description

At the outskirts of the city of Zwolle, the area Hessenpoort has been under construction the previous years and still is at the current moment. The Hessenpoort includes a business park and industry companies. Part of the development of this area concerns the construction of bicycle infrastructure. A new lighting system had to be placed on the cycle paths. Since the terrain is within a green zone, the lighting may disturb the ecosystem and the animals living there. Lighting is notwithstanding a crucial element to create a safe route for the cyclists. Therefore, smart lighting technology has been installed: the light goes on when a cyclist arrives and goes off when after a while. When nobody is passing the light stays off.

FIGURE 1: THE NEW CYCLE INFRASTRUCTURE AT THE HESSENPOORT

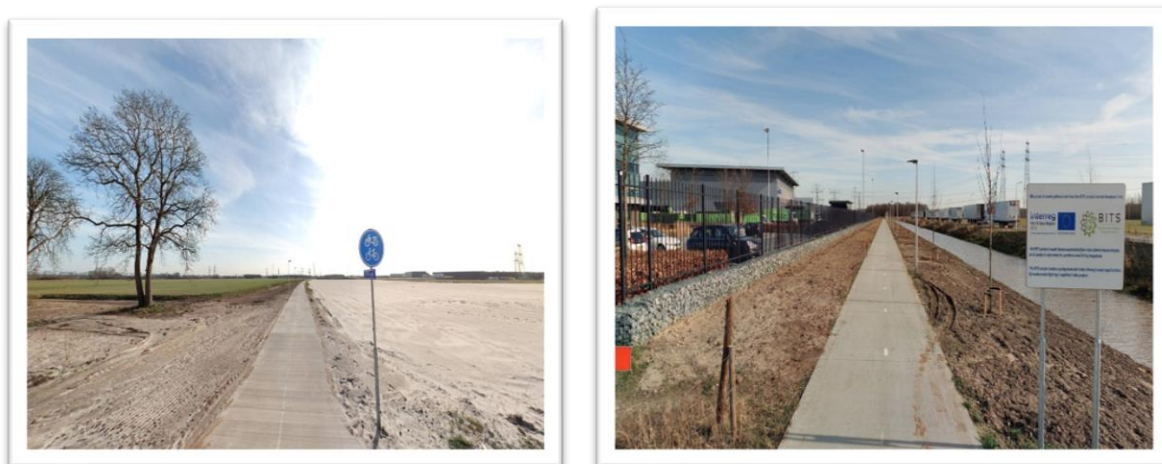
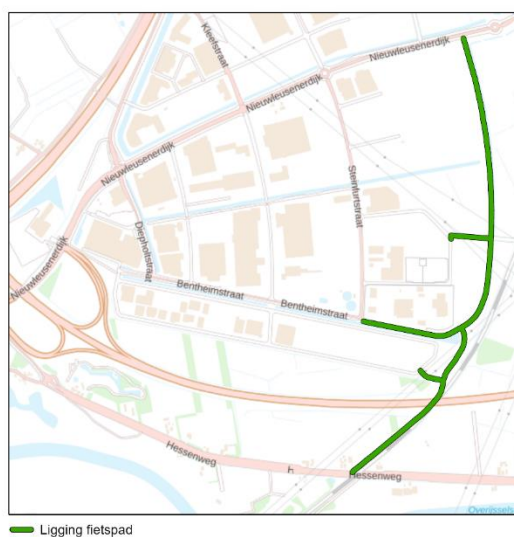


FIGURE 2: THE LOCATION OF THE CYCLE PATH AT THE HESSENPOORT



## Type of ITS

Smart lighting

## Timeline

In September and November 2020 the smart lighting was installed on the cycle path. The first months some difficulties were experienced, such as lights going on too late when fast cyclists were passing by or lights switching on due to the animals that are living at the Hessenpoort. After some months, the problems were solved and the system functioned as it should. In February 2022 a survey was distributed among the companies in the Hessenpoort area

## Hypothesis

The expectation is that people living or working in the area of Hessenpoort will start using the bicycle due to the presence of the smart lighting bicycle infrastructure. However, since it is a new cycle path, no pre-measurements can be done.

## Data sources

- Survey data collected among employees in the companies in the surrounding of the cycle path
- Report of a meeting with the project managers about the evaluation of the pilot

## Analysis

### Report of the pilot

A questionnaire was sent to the **companies in the business park** in the area of the Hessenpoort. The different companies diffused the questionnaire among their employees possible concerned in using the cycle path with the smart lighting at the Hessenpoort. The questionnaire was sent out in February 2022 and followed with a reminder in March 2022. Overall, 72 respondents started the survey. 56% of the respondents was a male and 44% a female. One respondent answered 'other' when asked about gender. 38 respondents (or 55% of the respondents answering this question) never uses the cycle path never and thus had to end the survey after indicating not being concerned with the questionnaire. Another 5 respondents had to end the survey after the fourth question since they don't use the cycle path when it's dark and 9 respondents stopped the survey without completing for reasons we ignore. Overall, there are 20 completed surveys. It is difficult to discuss issues as representativeness since we do not have information about the population. However, we read the results at indications on the impact of the pilot at the Hessenpoort. The respondents inform us about the appreciation of the smart lighting infrastructure and the feelings of (un)safety when using the cycling path.

Of all the respondents indicating they use the cycle path, almost half uses it (almost) daily, 26% uses it once a week, 13% a few times in a month and 16% only very rarely. People mainly use the cycle path because it is the shortest route, some respondents also use it because it is the most enjoyable route. Only a few respondents also use it because it is the safest route.

A large majority of the respondents also use the cycle path when it's dark. The respondents that are not using the cycle path when dark, predominantly don't avoid the path because of feelings of unsafety. Only

one single respondent argues not using the path because of safety issues. The overall feeling of safety when it's dark is 7,3 on a scale to 10, with a score of 10 corresponding with a very safe feeling. Based on these data we conclude that cyclists do feel rather safe on the cycle path.

A next question we address concerns whether we can argue a link between the feelings of safety and the smart lighting system that has been installed. A large majority of respondents indicate that they did not notice the smart lighting system. No respondent says to feel safer with the smart lighting system compared to continuous lighting. 86% of the respondents doesn't experience a difference between both systems and 14% of the respondents feels less safe compared to a cycle path with continuous lighting. The answers of the respondents are not supporting the presence of a link between smart lighting and feelings of safety. However the good thing is that the system only among a small minority increases feelings of unsafety.

The same can be said for the link between the smart lighting and appreciation of the overall comfort of the cycle path. The overall cycle comfort is high, on average 8,1 on a scale to 10; while the comfort concerning lighting is a bit lower, on average 7,2 on a scale to 10. However only for 10% of the respondents the increased cycle comfort can be attributed to the smart lighting, for 70% of the respondents no difference was noticed with continuous lighting. For 20% the cycle comfort even decreased. Three respondents in this last category explained why their cycle comfort decreased and this is because the lighting is not set up properly. They argue the lighting goes on too early or (most often) too late.

Although we only had 20 completed surveys, we can conclude based on the survey among employees in the neighbourhood that cyclists feel rather safe on the cycle path, but that only for 10% of the respondent's cycle comfort increased due to the smart lighting. Most cyclists experience no difference in cycle comfort (70%) and in safety feeling (86%) compared with continuous light. 14% of the respondents (n=3) feels less safe compared with continuous lighting. Looking at gender differences, although only a small number of answers is available, we can conclude that men are more critical against the operation of the system (e.g. less cycle comfort due to insufficient working of the lighting), while women feel more unsafe on the cycle path compared to men.

## Report of the experiences of project managers

- What problems and barriers have you encountered? What barriers have you encountered?  
The European regulations are difficult to combine with an existing project in terms of tendering. There are different purchasing procedures that are difficult to align with each other. As a result, a longer period than estimated is needed to establish the pilot.
- Has the pilot achieved its goal? Yes, in the sense that it actually created more comfort for the cyclists. No, because it is difficult to see more clearly whether more use is made of the cycle path as a result is the pilot. The expectation is that this is not significantly the case.
- What recommendations do you make to others? You have to clearly define the pilot, especially when there is a combination of different interventions. That makes it easier to measure its impact. You should equally make sure that you have a clear 0-measurement so that results are more convincing and can be compared with research results later on.

## Conclusions

The hypothesis that people will start to cycle more because of the smart lighting system cannot be confirmed. We do not have data on the number of cyclists before or after the intervention. We therefore cannot confirm whether this pilot reached the BITS-objectives. However, we do have some data on the feelings of safety and comfort after the intervention took place. These feelings did not become more positive after the intervention. The smart lighting infrastructure does not add to feelings of safety and comfort as compared to a situation of continuous lighting. We can conclude that the intervention does not encourage the people to use their bike more often and cycle more regularly on the new path at the Hessenpoort. However, we can also conclude that the pilot did not withhold people using the cycle path and this is excellent news. Smart light shows not to add to feelings of unsafety and lack of comfort while at the same time it prevents that the ecosystem and especially the animals living at the Hessenpoort are not disrupted. Moreover, smart lighting, although more expensive as compared to continuous lighting, saves energy in the long run and therefore could be seen by this detour to supporting an ecological transition and decrease of CO<sub>2</sub> in the future.

## Lessons Learned

A lesson learned concerns the data collection. When a project wants to claim an increase in cyclists because of an intervention, it should do a pre- and post-measurement of the number of cyclists. However, feelings of safety and comfort can be used as a proxy to estimate whether an intervention can encourage or on the other hand discourage using a particular cycling path. These proxies can be used to choose between two (or more) alternative cycling infrastructures. The survey results show that the smart, more expensive, but less energy consuming lighting infrastructure appears to include no obvious disadvantages regarding safety and comfort as compared to a less ecological continuous lighting system. Based on these data we would therefore support the choice of the smart lighting system at the Hessenpoort (as compared to a continuous one). Apart from being the more ecological choice, it equally holds the advantage of not disturbing the animals and the ecosystem.

When organizing a survey among users of cycle infrastructure make sure to respect the rules of statistical representation. If you want to claim results are not due to chance, make sure you have an idea of the population of which you want to take a sample, of the response rate you need to aim at and identify possible biases that could have occurred. In the case of the pilot here, the sampling design is not convincingly constructed and therefore the results are rather indications than data on which you can trust a rock-solid evaluation.