



eHUBS implementation report Nijmegen- Arnhem

DELIVERABLE 5.1

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Summary sheet

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Project partners

Organisation	Abbreviation	Country
Gemeente Amsterdam	AMS	The Netherlands
Promotion of Operation Links with Integrated Services aisbl (POLIS)	POLIS	Belgium
Taxistop asbl	Taxi	Belgium
Autodelen.net	Auton	Belgium
Bayern Innovativ GmbH	BI	Germany
Cargoroo	CA	The Netherlands
URBEE (E-bike network Amsterdam BV)	URBEE	The Netherlands
Gemeente Nijmegen	NIJ	The Netherlands
Transport for the Greater Manchester	TfGM	Great Britain
Stad Leuven	LEU	Belgium
TU Delft	TUD	The Netherlands
University of Newcastle upon Tyne	UN	Great Britain
Ville de Dreux	DR	France
Stadt Kempten (Allgäu)	Kemp	Germany
Universiteit Antwerpen	UAntwerp	Belgium
Mpact vzw	Taxi2	Belgium
Mobipunt vzw	Mobipunt	Belgium
Electricity Supply Board	ESB	Ireland
The Highlands and Islands Transport Partnership	HITRANS	Great Britain
Service Public de Wallonie Mobilité et Infrastructures, Autorité Organisatrice du Transport	SPW MI, AOT	Belgium

Document history

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1. Introduction

The planning of eHUBS in Nijmegen and Arnhem is described in deliverables 2.1 and 4.1, the method of eHUBS selection and the operational plan. In this deliverable the end result of the planned eHUBS is described. The plan describes for each eHUB the location, the available vehicles and the infrastructural amenities that have been realized.

1.1 Mobility service providers

In total, five mobility service providers have offered their vehicles at the eHUBS in Nijmegen and Arnhem. Consortium partners Cargoroo and Urbee were the first to be included, along with shared e-car provider Amber. Additionally, in the first year of the product, a local hotel offered a shared electric car through the eHUBS project in cooperation with the shared mobility platform GoodMoovs. Finally, Deelfiets Nederland has been added to the project in 2022.

1.2 Infrastructure

In terms of infrastructure, Cargoroo required the smallest amount of amenities at the hub. Due to the use of a battery-swap system for the cargobikes, the only required infrastructure is a small pole to be able to lock the bikes to. For the electric shared cars the first goal was to use the existing charging infrastructure as much as possible. Based on the data from nearby car charging infrastructure, we determined whether there was enough available charging space or whether new charging ports needed to be created. A central charging hub was also created from which charged vehicles could be distributed throughout the city to the other eHUBS. For the shared e-bikes, charging facilities required a lot more work. In the case of Urbee, this led to the choice of switching to a battery-swap system. For Deelfiets Nederland, this meant quite



Figure 1: wireless charging e-bikes

some delays in the placement of bikes at the eHUBS as finalizing all necessary equipment for the charging infrastructure to function properly and safely was an intensive process.

In Arnhem the charging infrastructure at the four eHub locations was provided both through the public lighting (grid connections of lamp posts, which always have one connection available with constant power of 6 Amps) and connections to private facilities (office buildings). The last pilot on this subject was a connection to public lighting at the central station in Arnhem to power a induction charging facility for e-bikes (called Tiler).

2. eHUBS locations

In this section each eHUB location will be shortly described, including a schematic layout of the hub and a listing of the facilities present.

2.1 eHUB Stationsplein

The location Stationsplein is one of the most central locations in Nijmegen, directly in front of the main train station. Placing the electric shared cars here was more difficult because of the lack of available parking in the direct vicinity. However, a zone was created in the area around the hub where the Amber shared cars could be collected and dropped off. For the Cargobike and the electric bikes facilities were placed as visible in the diagram below.

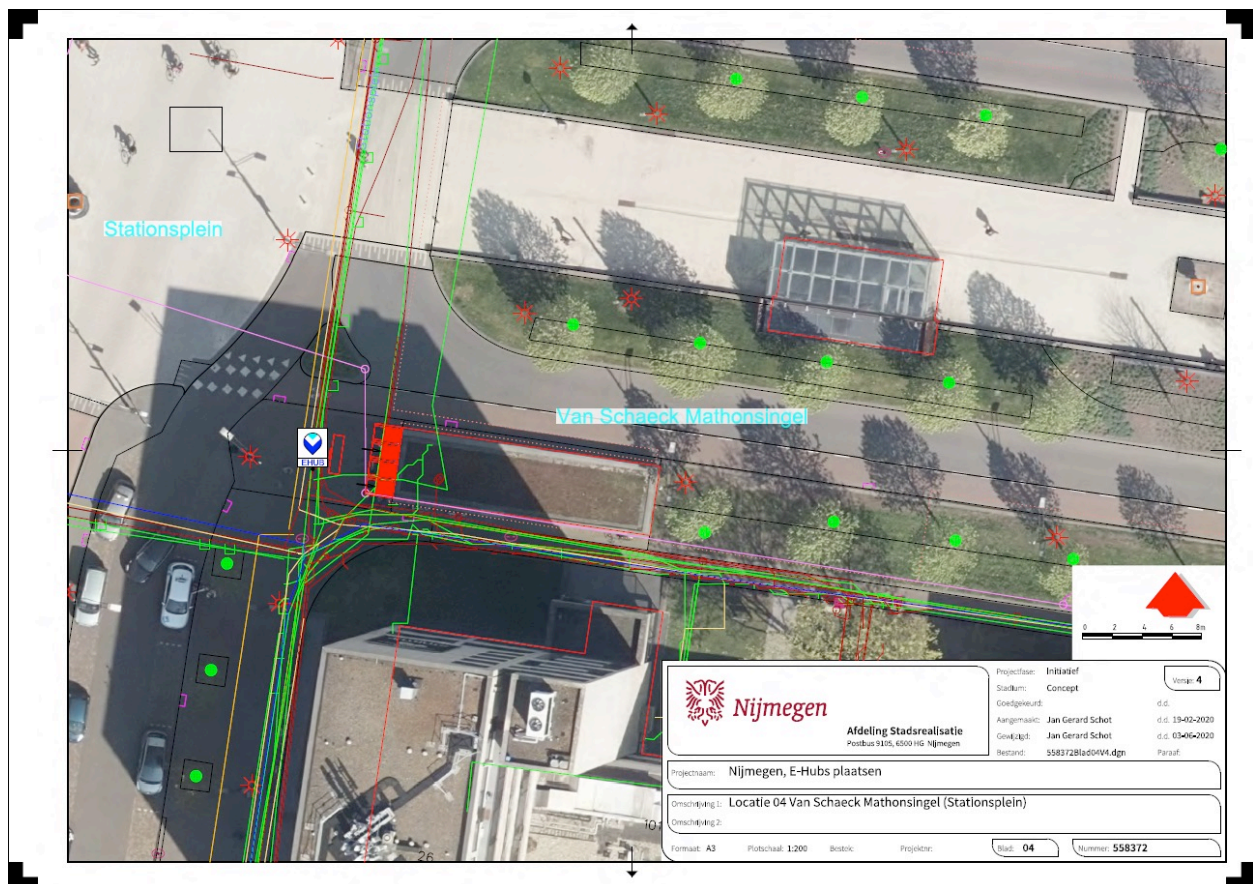


Figure 2: eHUB Stationsplein

2.2 eHUB Handelskade

The eHUB at the Handelskade is the most extensive eHUB as this is also designed as a charging hub for electric cars from which other eHUBS with less available charging facilities can be serviced. This is possible due to the on-demand system utilized by shared car provider Amber. Due to physical constraints the location of the Amber cars and the shared bikes and cargobikes are on different sides of the road.

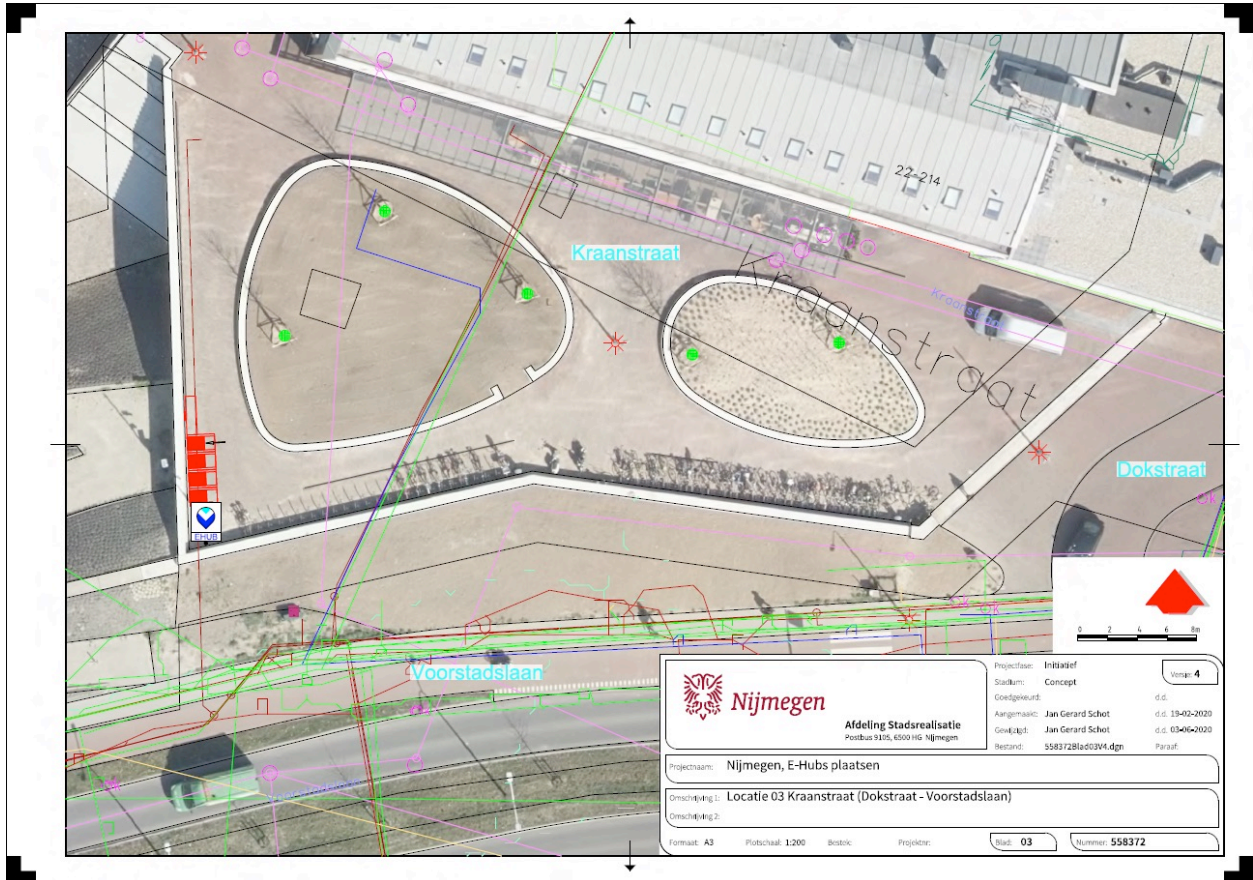


Figure 3: eHUB Handelskade

2.3 eHUB Hertogstraat

The eHUB location on the Hertogstraat is the only location within the city center. Charging infrastructure is available for the shared cars, as well as a location for the cargobike. The Urbee bikes were placed at this location, but the eHUB was unsuitable for the bike shed used by Deelfiets Nederland. Efforts are still being taken to find an alternative facility to allow for shared bikes at this location with the new Deelfiets Nederland partner.

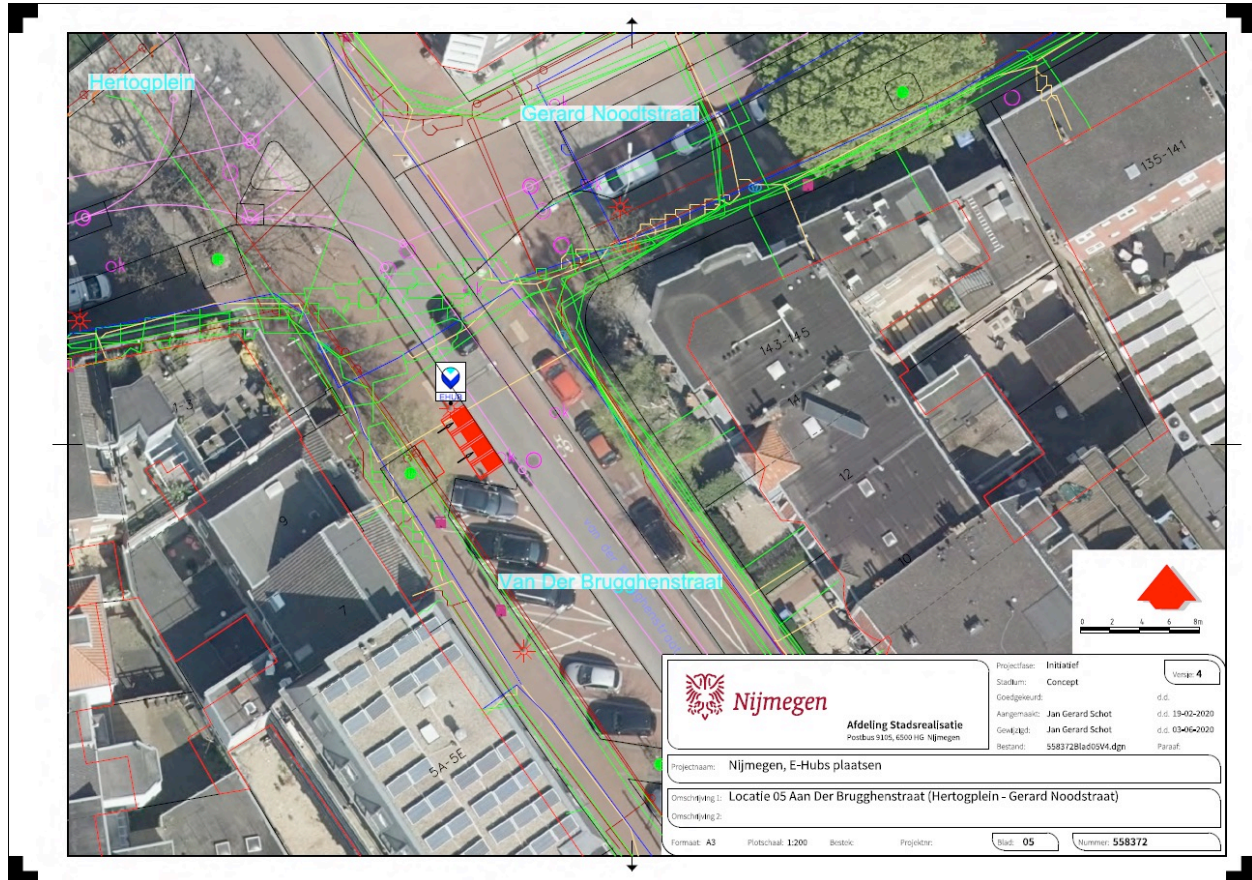


Figure 4: eHUB Hertogstraat

2.4 eHUB Hengstdal

The eHUB in Hengstdal is located in a neighborhood where a strong adaptation of shared mobility was expected. The location is in a central location in the neighborhood in the direct vicinity of a small shopping center. Cargobikes, shared electric bikes and shared cars were all placed at this location, with an extra charging facility placed to provide ample charging opportunities.

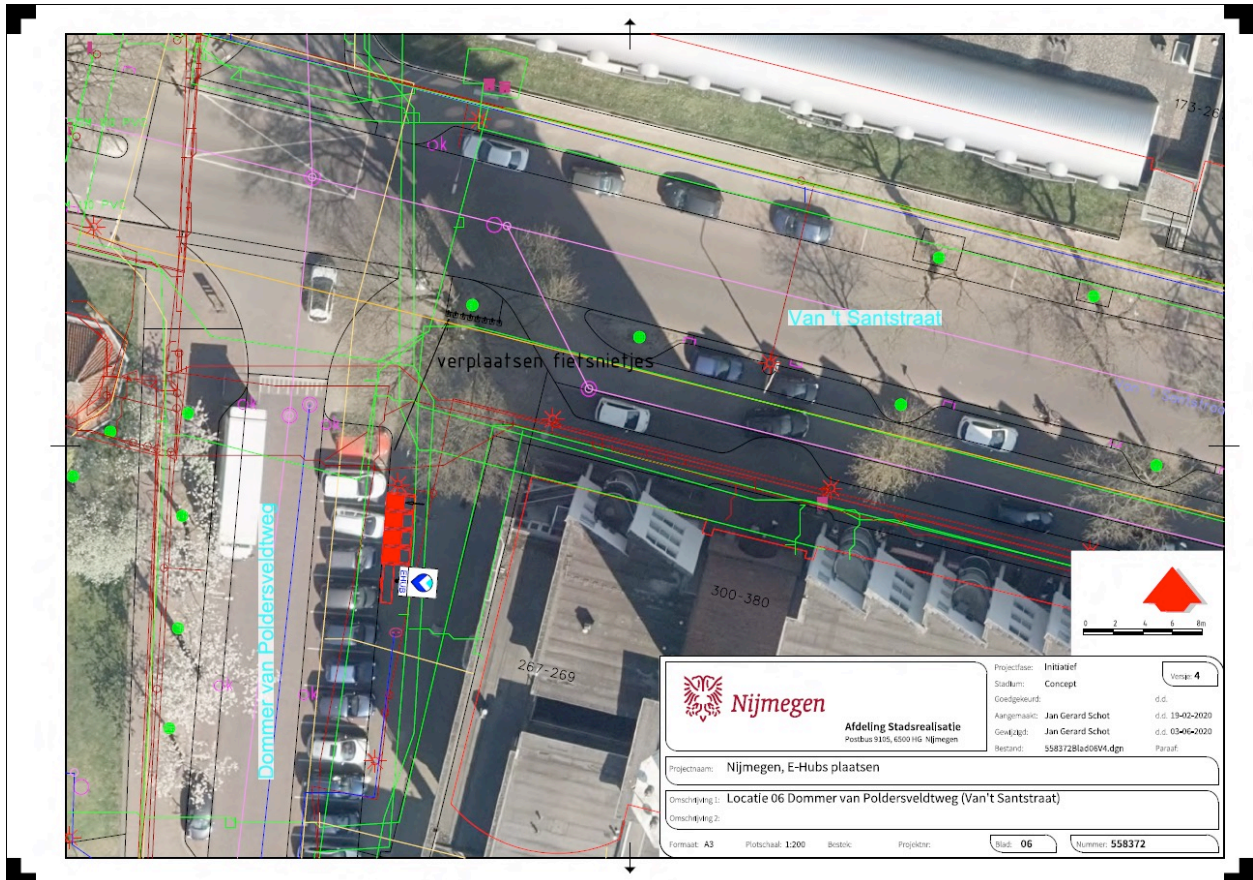


Figure 5: eHUB Hengstdal

2.5 eHUB De Klif

The eHUB De Klif in the neighborhood of Oosterhout is one of two eHUBS in the north part of Nijmegen. Cars, bikes and a cargobike were all made available at this location.

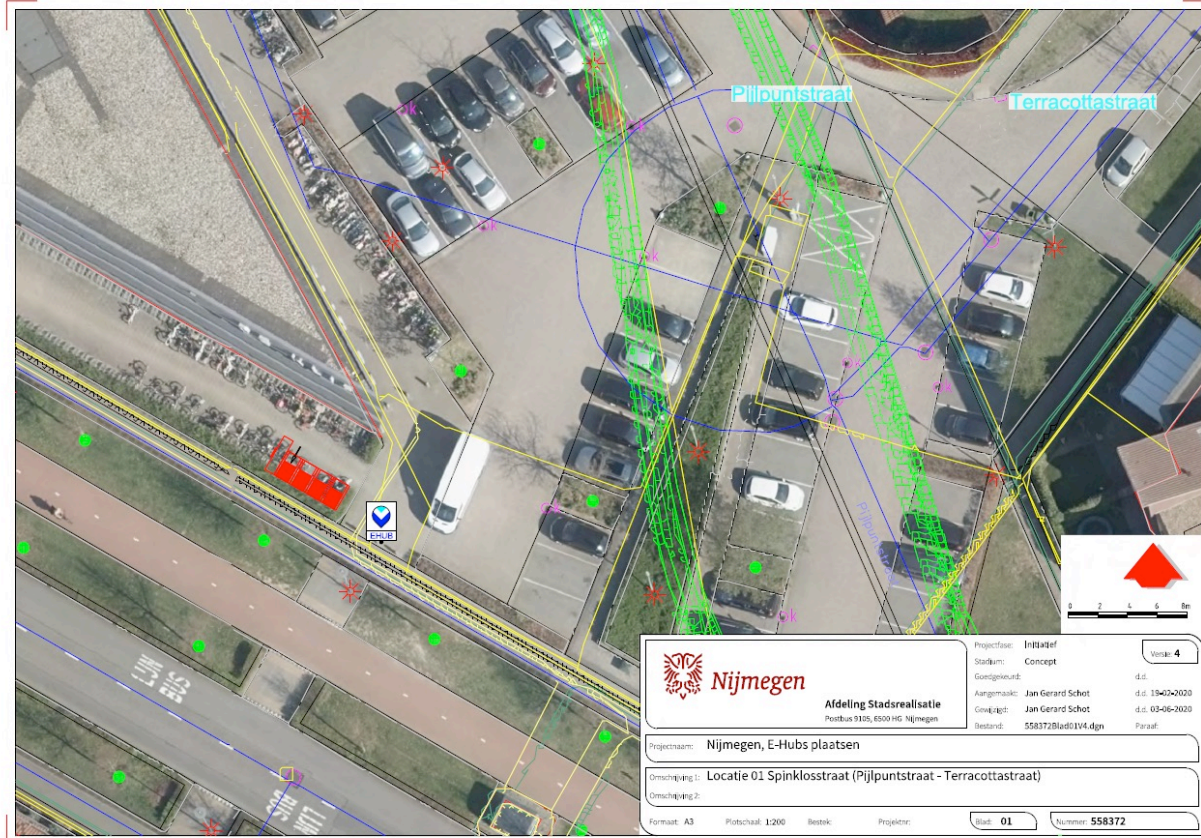


Figure 6: eHUB De Klif

2.6 eHUB het Eikpunt

The eHUB at het Eikpunt is the second eHUB on the north side of the city. This location is in close proximity to a sustainable living housing project. This eHUB location was chosen partly because of a local initiative to stimulate shared mobility. A cargobike, electric bikes and shared cars were all placed at this location.

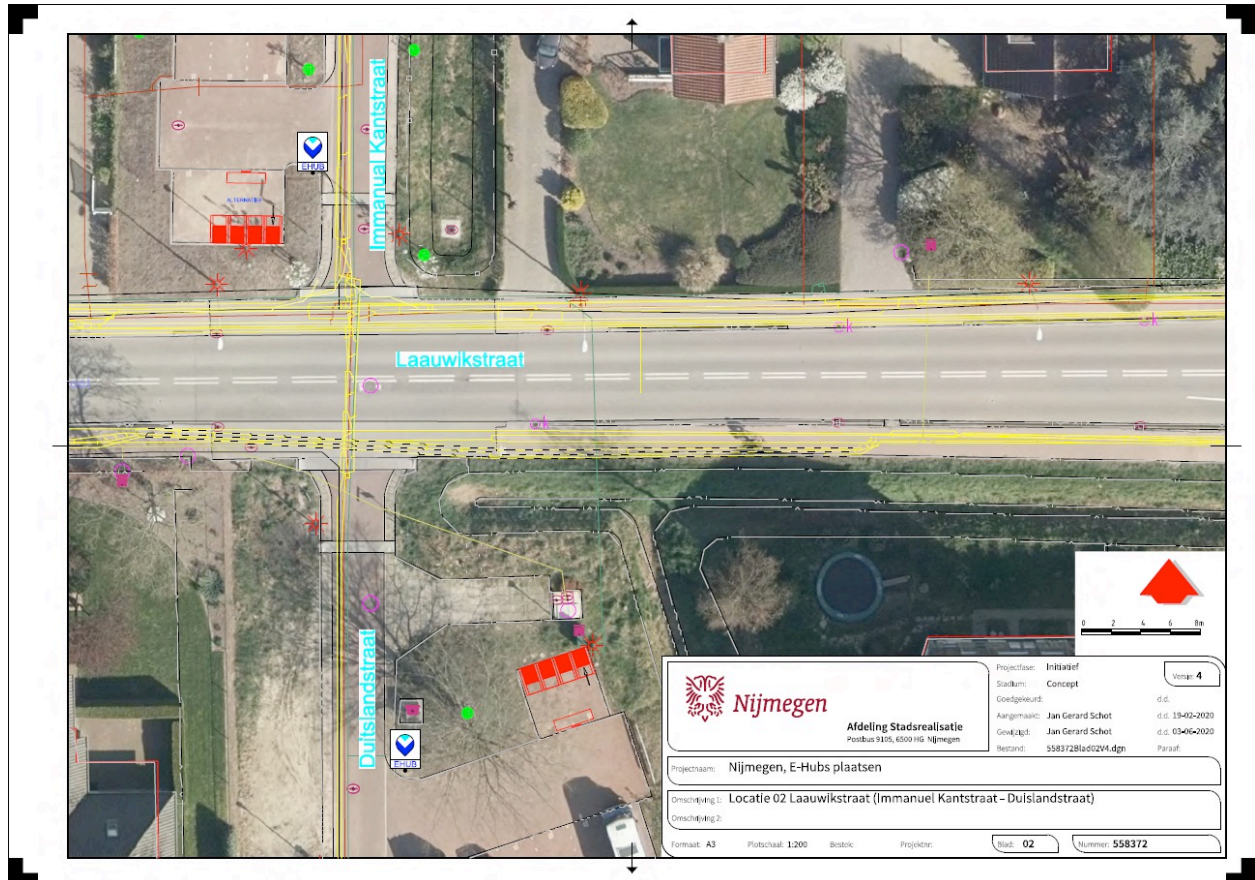


Figure 7: eHub Eikpunt

2.7 eHUB Heyendaal

The eHUB on the Heyendaal Campus is located on the university campus next to the university medical center. This eHUB functions both as a hub for students, visitors and employees of the university, university of applied sciences and university medical center, and as a hub for people living in the surrounding neighborhoods. The eHUB is equipped with a Cargoroo cargobike and electric bikes. It wasn't possible to place charging infrastructure at this hub due to the lack of available parking, but because of the close vicinity of an Amber hub at the university of applied sciences the hub was serviced by electric cars.

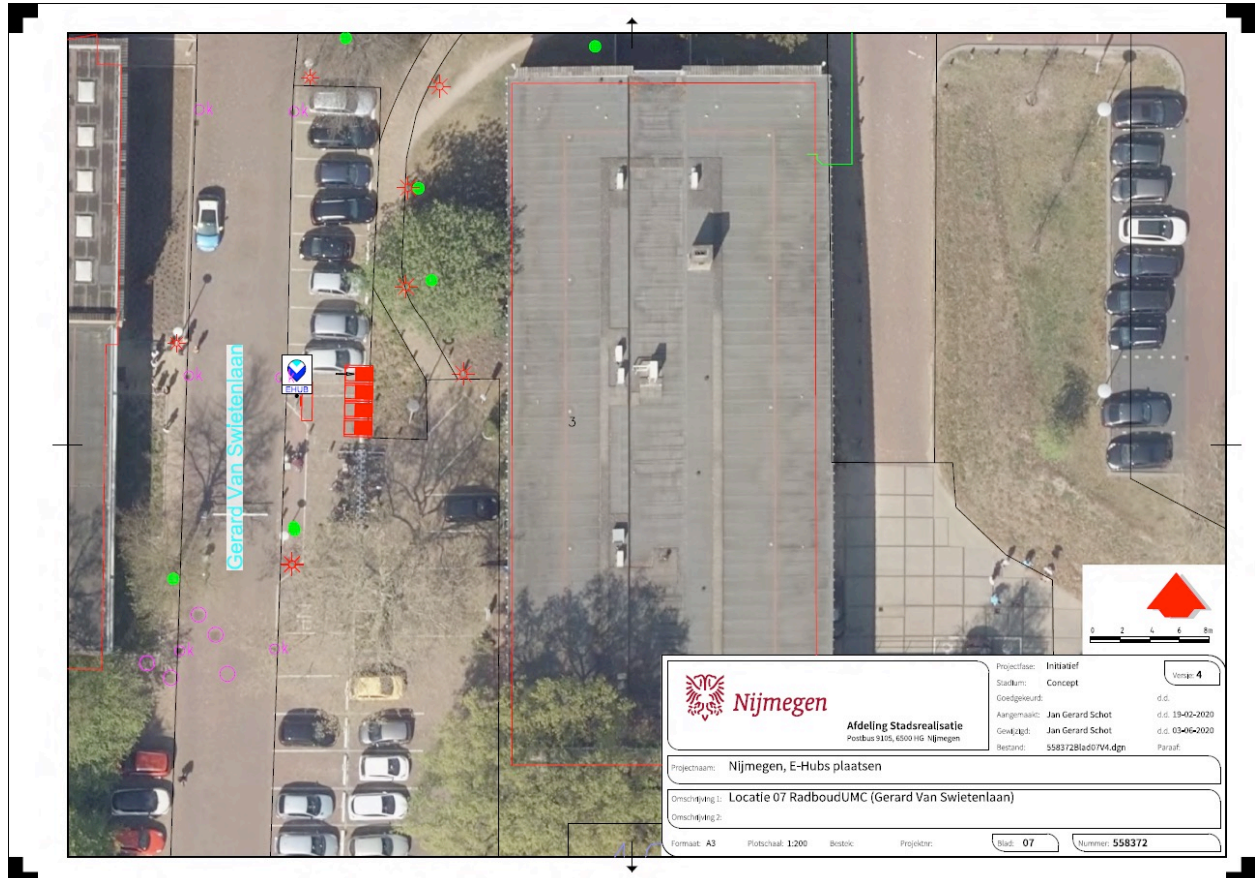


Figure 8: eHUB Heyendaal

2.8 eHUB Hatert

The eHUB in Hatert is located next to the neighborhood shopping center. It is therefore quite visible for people in the neighborhood who will often visit this area. The location of the eHUB was discussed with the local entrepreneurs. The eHUB is equipped with a cargobike, electric bikes and electric cars with charging facilities. In contrast to expectations, this eHUB has proved very well used, whereas the demographics of the surrounding area did not immediately suggest that this would be the case.

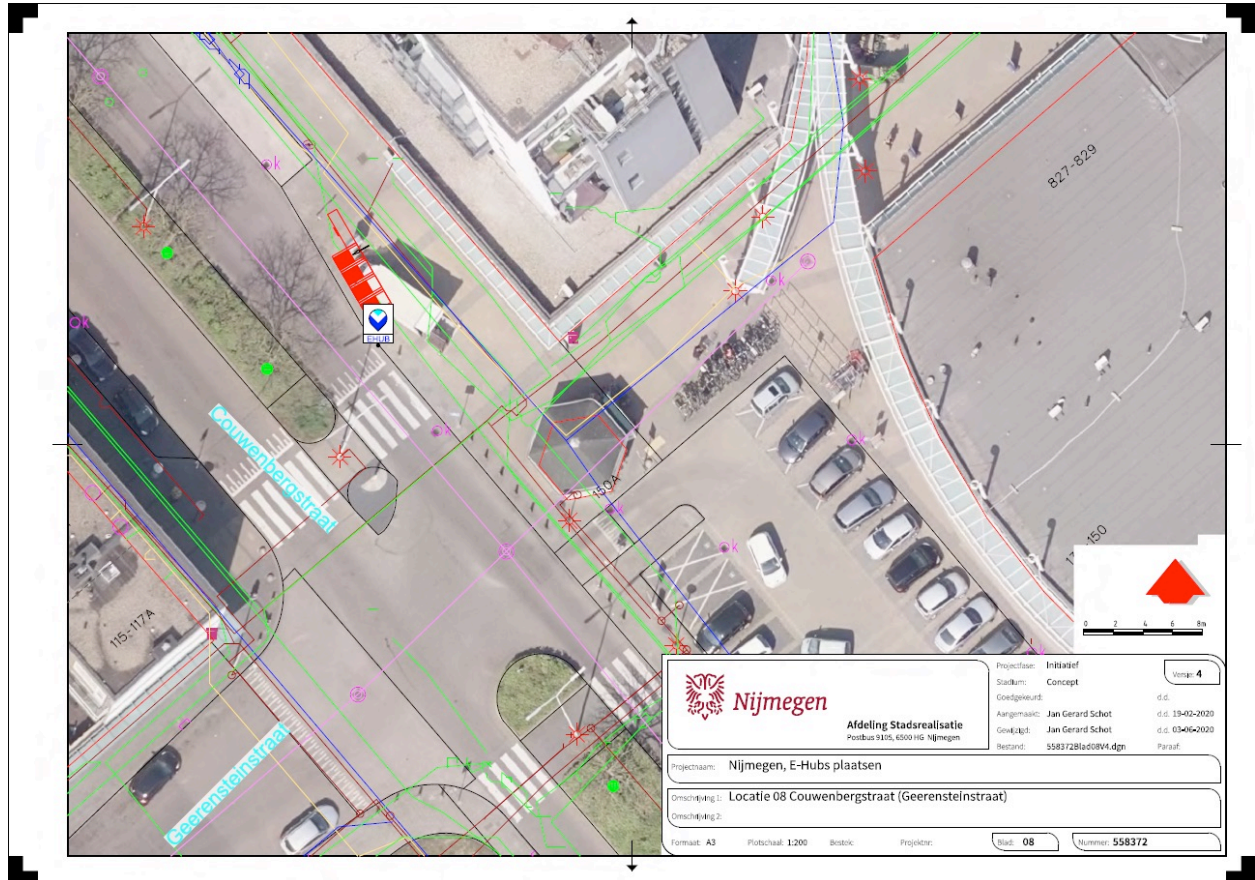


Figure 9: eHUB Hatert

2.9 eHUB Zwanenveld

The eHUB Zwanenveld originally had electric bikes and a cargobike. Unfortunately, the location has dealt with quite a few issues in relation to theft and vandalism. This has led to the removal and lack of replacement of the electric bikes. There is still a cargobike available. Offering shared cars in this location was not deemed feasible by the shared electric car provider, Amber, so the further availability of shared vehicles at this location is limited.

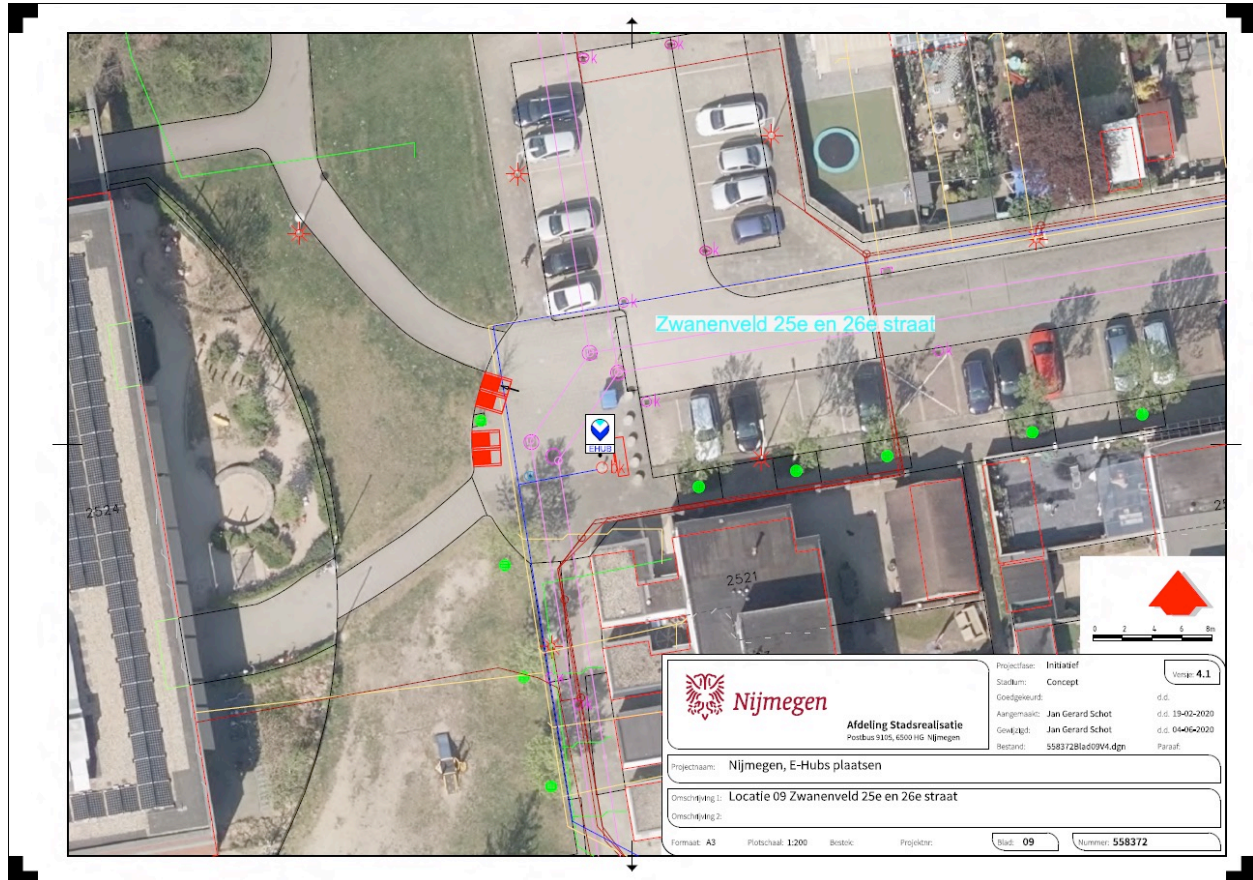


Figure 10: eHUB Zwanenveld

2.10 eHUB Lindenholt

The eHUB in Lindenholt is located near the small shopping center in the Horstacker. Electric bikes and a cargobike were originally placed at this location. After Urbee stopped their services, no electric bikes remained, and due to issues with theft and vandalism and due to relatively low user numbers no new electric bikes from Deelfiets Nederland were placed in this location. Offering shared cars in this location was not deemed feasible by the shared electric car provider, Amber, so the further availability of shared vehicles at this location is limited.

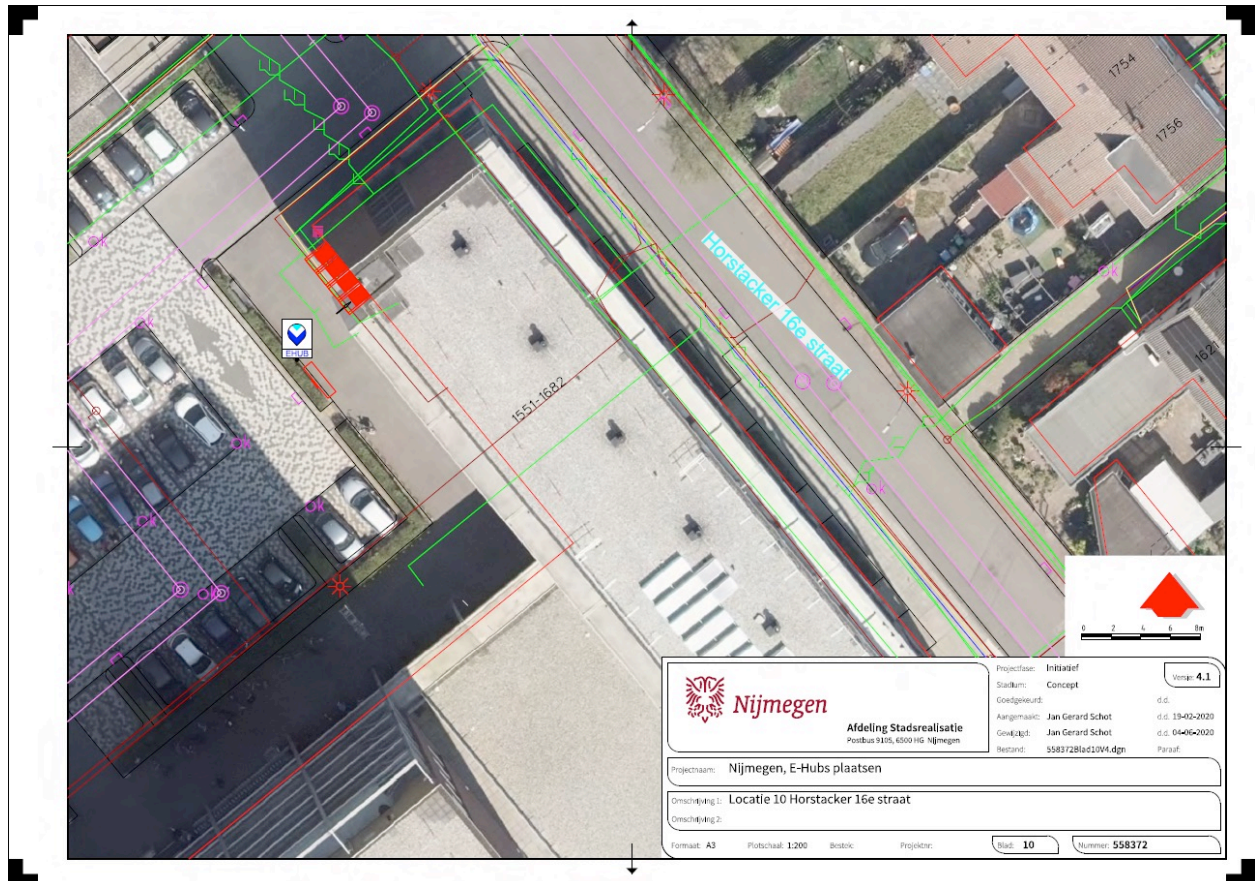


Figure 11: eHUB Lindenholt

2.11 eHUB Arnhem 1: Railway station Arnhem-Zuid

The railway station Arnhem-Zuid is a transfer location from train to bus or bike. Also this area is densely populated. For this reason we decided that next to the e-bikes from Urbee (at the start) we would also introduce a cargobike at this location. Also a spot for two Amber cars was planned, but never realized. Just like on other locations the Urbee bikes were replaced by Deelfiets Nederland bikes for the same reasons.

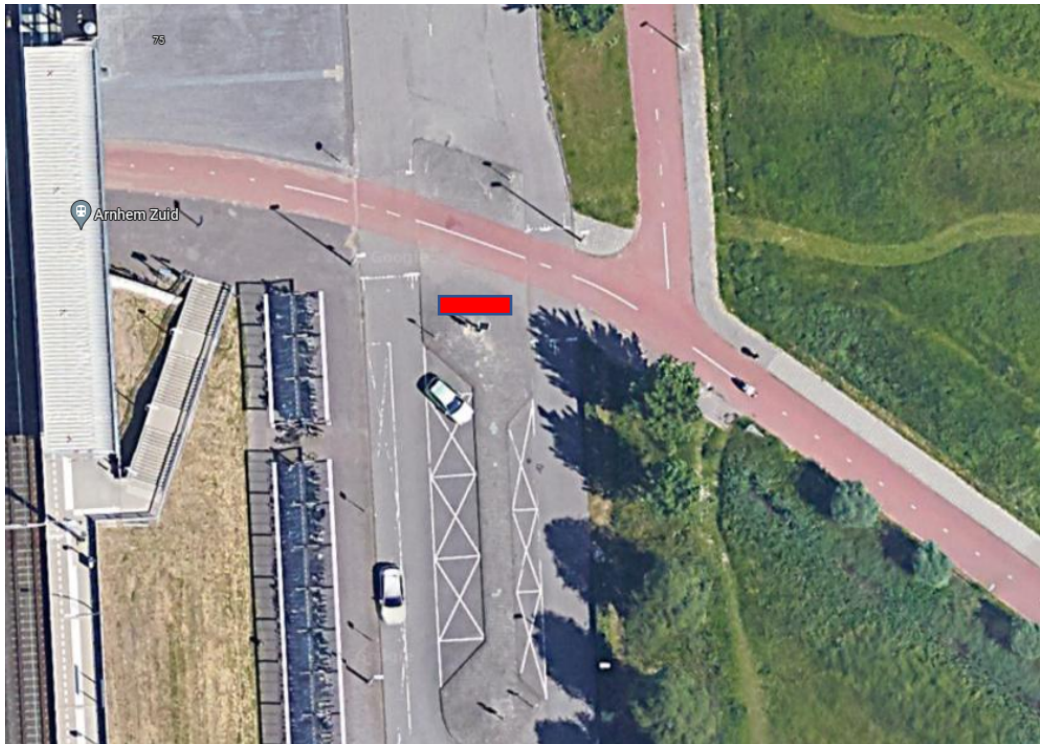


Figure 12: eHub Arnhem-Zuid

2.12 eHUB Arnhem 2: Railway station Arnhem Centraal

The area around the main railway station of Arnhem is very busy, so there was limited space to introduce an eHub. Therefore we have chosen, together with the providers, to place the hub at the north side of the station (not the main entrance, but a very regularly used back entrance). Here, we could find space and this location has the additional advantage that this is the main route to attractions to the north of the city (Burgers Zoo, Open Air Museum, Nationaal Park Hoge Veluwe with Kröller Muller museum). Potentially this could be a very well used hub. At this location we started out with 8 Urbee bikes, one Cargoroo bike and two Amber cars. Later on the Urbee bikes were removed and just lately replaced by Bondi bikes with the already mentioned wireless charging tiles.

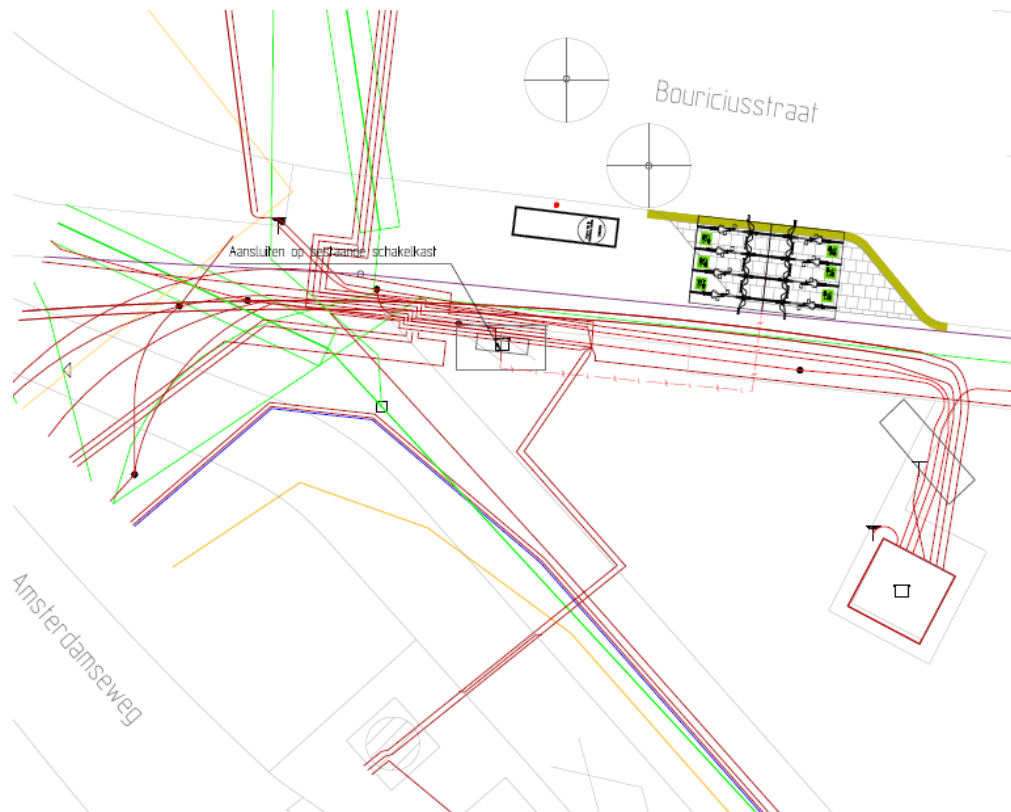


Figure 13: eHub Arnhem Centraal

2.13 eHUB Arnhem 3: Gelredome

The Gelredome is the football stadium in Arnhem, but also a Transferium: a place to park your car and use other transportation to go to the inner city of Arnhem (bus mainly). On this location it did not make sense to either introduce Amber cars or cargobikes. So here only e-bikes were stationed. The exact location on the transferium was a challenge: placing the bikes on the same level as the parked cars would pose problems for bike users to find the right way to the city centre. Placing the bikes on a higher level, close to the cycling route would make it easy to find the way to the city, but would be harder to spot from the parked cars. Eventually we have chosen the second option, combining it with clear route markers to the bikes. Her, the Urbee bikes were replaced by Bondi bikes (not with wireless charging....but battery swapping instead).

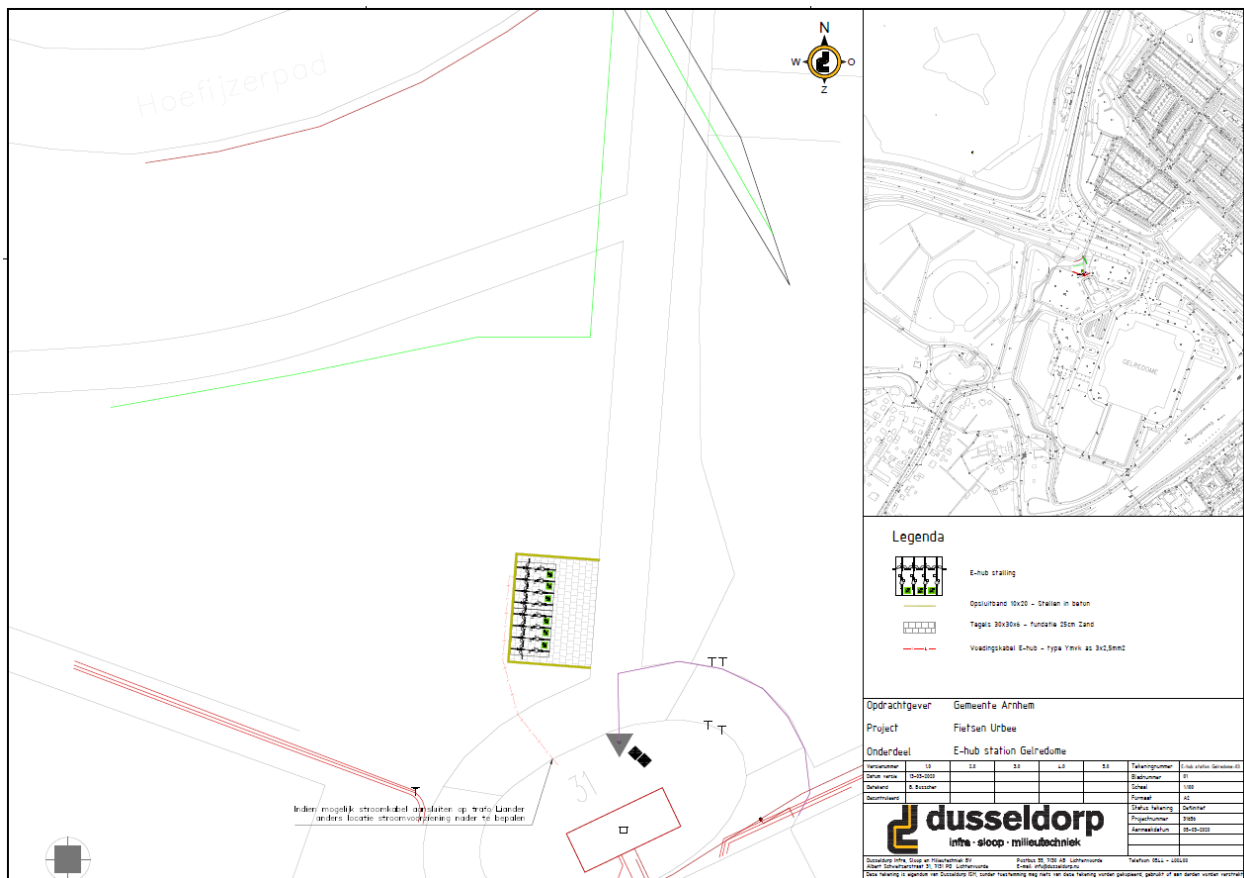


Figure 14: eHub Gelredome

2.14 eHUB Arnhem 4: Gelderse Poort

Business park Gelderspoort is the latest addition to the eHubs in Arnhem. On this location the business representative of all businesses here (sort of Park management) explicitly asked the city of Arnhem to help with introducing shared mobility. For this reason we added this location to the eHubs project. This location is still in development: the Amber cars are already there and were provide with their own charging post. The Deelfiets Nederland bikes are still to be stationed there and will be connected to the nearby office building. This location has a strong link with the railway station Arnhem Zuid and we are aiming at a back to many system between these locations.

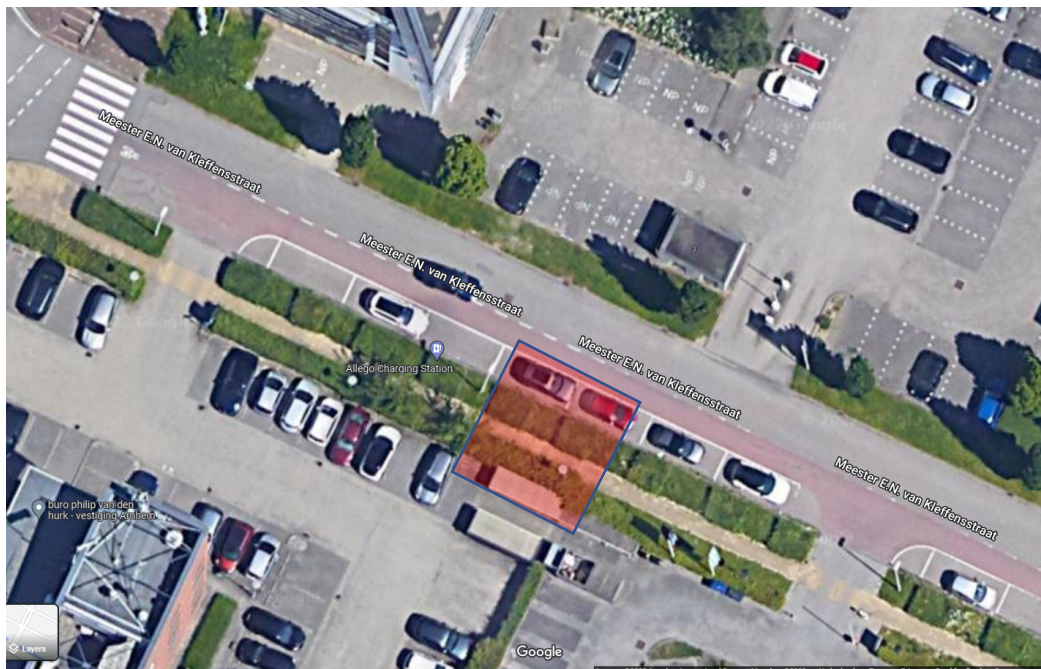


Figure 15: eHub Geldersepoort

3. Cargoroo minihubs

Apart from the formal eHUB locations, Cargoroo offers its shared cargobikes in a number of locations according to the neighborhood model. This was done to test placing cargobikes in a central location at a hub versus placing them in many locations in a smaller area. To do this, in Nijmegen a number of locations were chosen where a pole was placed to which a cargobike could be locked, and street paint was used to show this location as a shared cargobike parking spot. The locations were chosen to create an area in between a number of eHUBS around the city center in which cargobikes were available at short distances from each other. The choice of the exact locations was based mainly on the available public space. In total 12 locations were chosen this way:



Figure 16: Locations Cargoroo mini-hubs Nijmegen

A total of 8 cargobikes were distributed in Arnhem: 2 of those on eHub locations near railway stations. The other 6 bikes in residential areas, mostly in the middle of the neighbourhoods to maximize use.



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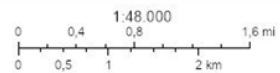


Figure 17: locations Cargoroo bikes Arnhem

The eHUBS Consortium

The consortium of eHUBS consists of 20 partners with multidisciplinary and complementary competencies. This includes European cities, leading universities, networks and electric and shared mobility providers.



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