

The upgrade of the Rhijnspoor electricity substation

Information pack - September 2024



Introduction

The Rhijnspoor electricity substation is being upgraded. Liander, the network operator, and the Municipality of Amsterdam are organising an information meeting on this topic, which will be held on 2 October 2024. In this document we tell you about the plans.

Neighbourhood survey by Bureau Bewonerszaken

We think it is important that we find out what the key issues are for people in the local area and inform you properly about the upgrade of the substation. In October you will therefore have the opportunity to participate in a neighbourhood survey. This will be conducted by Bureau Bewonerszaken on Liander's behalf. Bureau Bewonerszaken is an independent party with no interests linked to the upgrade of the substation.

After the information meeting on Wednesday 2 October local residents will receive an invitation to complete the online questionnaire. Bureau Bewonerszaken will also be present at the information meeting and you may come across them in the area in the course of October.

More information and contact details

You will find more information about this project at www.liander.nl/rhijnspoor. If you have any questions, you can ask them during the information meeting on 2 October 2024 or can send an email to rhijnspoor@liander.nl.

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1. Why does the electricity substation need to be upgraded?

More electricity for East Amsterdam

The Rhijnspoor electricity substation supplies electricity to a large part of East Amsterdam. This substation is now outdated and will no longer be able to supply enough electricity in the future. That is why Liander is building a completely new substation, with installations capable of supplying more electricity, on the site of the existing substation.

Joint effort

Rhijnspoor is not the only substation that we will be working on. Over the next ten years we will be carrying out work on the electricity grid right across the city. Thirty new substations will be built and 13 existing ones will be upgraded or expanded. The Rhijnspoor electricity substation is one of those. In the city we will also need 2,600 new transformer stations to distribute electricity around Amsterdam, as well as hundreds of kilometres of cable to link everything together.

This is a challenge that the Municipality of Amsterdam, network operators TenneT and Liander, and the Port of Amsterdam have set out in the Amsterdam Electricity Supply Development Framework 2035 (Ontwikkelingskader Elektriciteitsvoorziening Amsterdam 2035 – EVA). You can read more about the approach being taken to make Amsterdam's electricity supply fit for the future at www.amsterdam.nl/stroom.

Amsterdam (detailkaart)

Toekomstige situatie



Locations of electricity substations, as presented in the Amsterdam Electricity Supply Development Framework 2035, adopted on 8 March 2022.

Questions & answers

What is the problem with our electricity grid?

We are consuming and supplying more and more (renewable) electricity. This is putting pressure on the Dutch electricity grid. So much so that at peak times there is no space left on it. This is referred to as congestion. In areas affected by congestion, businesses are unable to take the steps needed to become more sustainable and new businesses and residential districts cannot be connected to the grid. Congestion also increases the risk of power outages. That is why we need to expand our grid.

What is the situation in Amsterdam?

The city is growing, which means more homes and businesses. Society is also rapidly becoming more digital. At the moment, many Amsterdam residents still use gas for cooking and heating. In the future more and more people will switch over to electricity to cook their food and heat their homes. What's more, fewer and fewer cars and other modes of transport will run on petrol or diesel and will instead be powered by electricity. In recent years demand for electricity has been rising so sharply that large parts of Amsterdam are being affected by congestion. And by 2050 we expect our electricity consumption to be as much as three to four times higher than it is today. To cope with this growth, Amsterdam's electricity grid will need to be twice its current size. For that reason, Liander, the network operator, and the Municipality of Amsterdam are working together to strengthen the city's grid. This will take until at least 2035.

Where is the electricity supplied?

The area to which a substation supplies electricity is called the supply area. Rhijnspoor's supply area can be seen in the image below. The electricity comes from the Hoogte Kadijk substation in the Centrum district. This substation also supplies electricity to the Uilenburg and Frederiksplein substations.

Amsterdam Centrum Oost

Huidige situatie

Voedingsgebied van OS Rhijnspoor



The current supply area of Rhijnspoor electricity substation.

In the future the supply area will be smaller (see image on the following page), as more substations will be built in the city. The electricity will also come from a different place: in the future the Rhijnspoor substation will be supplied by the Zeeburgereiland substation.

2. Site of Rhijnspoor electricity substation

The Rhijnspoor electricity substation was built in 1952 and stands between Deymanstraat, the probation service offices on Wibautstraat, homes on Leeuwenhoekstraat and Eerste Boerhaavestraat (see map).

Amsterdam Centrum Oost

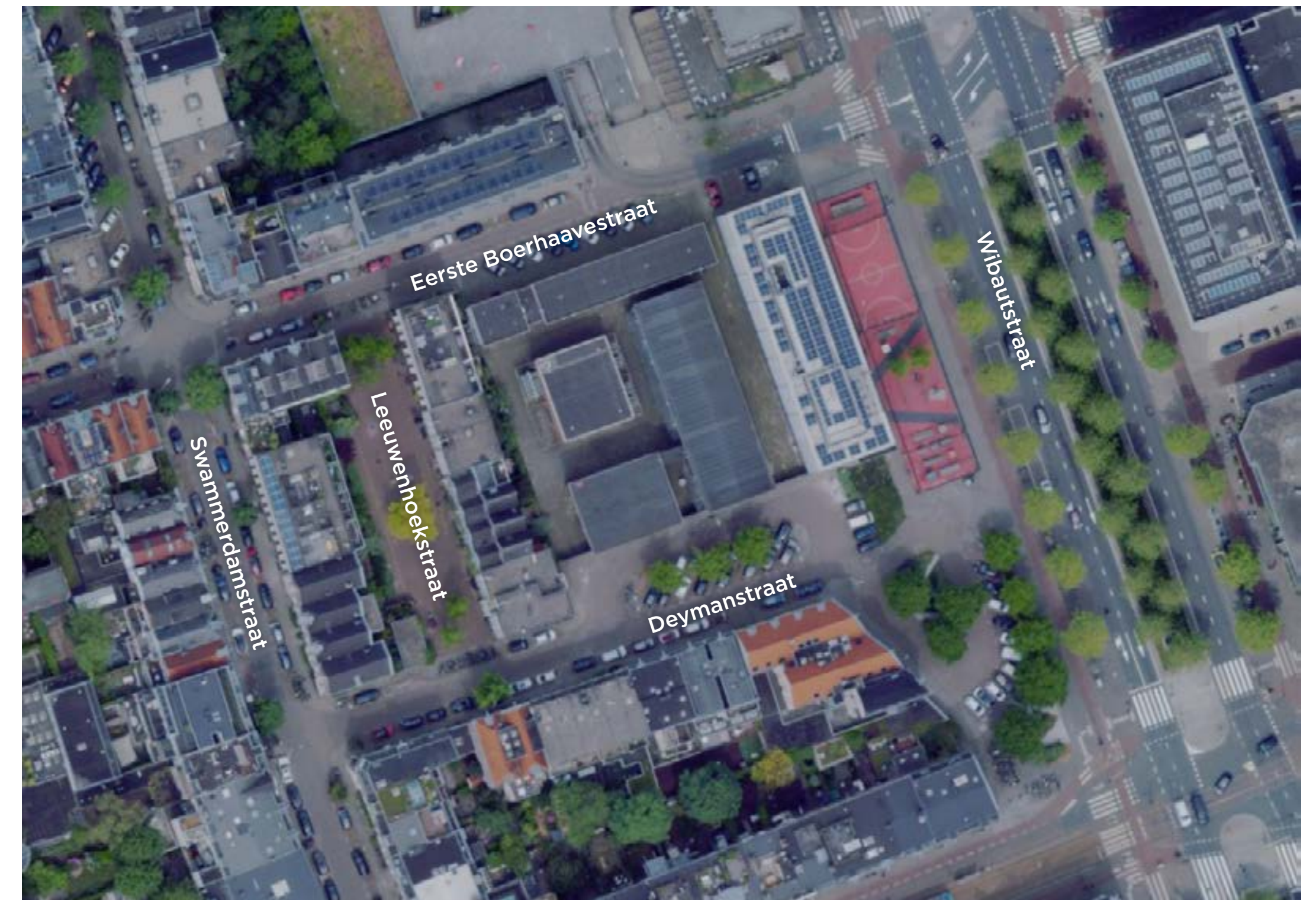
Toekomstige situatie

Voedingsgebied van OS Rhijnspoor



The electricity is supplied to:

- Approximately 44,000 small-consumer connections, such as homes and small businesses
- Approximately 405 large-consumer connections, such as large businesses
- Various facilities in public spaces, such as street lighting and charging points



For the Municipality, the need to upgrade the substation was seen as an opportunity to assess its location. The Municipality commissioned a study to determine whether there were other possible sites for the substation. The Municipal Executive then weighed up the options, based on wishes regarding the use of space, the costs, the associated inconvenience and safety-related aspects. The Municipal Executive has concluded that the current location is also the best site for the new substation.

Site study for the substation

An alternative site would have to meet the following requirements:

- This site must fall within the substation's supply area and lie within a 1 km radius of the current substation
- It must have a surface area of at least 42 x 37 metres
- The site must not fall within the so-called 'Main Green Structure' (the reserved green space) of the Municipality of Amsterdam

The Municipality commissioned RHDHV, an independent engineering consultancy, to investigate whether there were sites that met these requirements. Its study highlighted the following possible sites:

- The playground on Tabithaplein
- The car park on Platanenweg
- Wibautpark

[RHDHV's study report can be found here](#)
(available in Dutch only).



Site decision by the Municipality

At all three sites an electricity substation would have a detrimental impact on public functions, such as a playground and sports area, parking spaces and public green space. This would be undesirable and is contrary to municipal policy. In addition, relocating the substation would cause considerable inconvenience for a larger part of the city and would result in extra costs, as it would also be necessary to reroute all the underground electricity cables to the new site. Consequently, the existing site is considered the best option for the new substation.

On 17 July 2024 the councillor responsible for Sustainability therefore announced that the Municipality would cooperate with the expansion/replacement of the substation at the existing site at Deymanstraat 5. You can find this announcement [here](#).

Questions & answers

Why are no alternative sites being investigated outside the supply area?

The area to which a substation supplies electricity is called the supply area. Substations are always built in the supply area. This is mainly so that the distance to the end user can be minimised, allowing the cable connections to be kept as short as possible. The benefits of this are that:

- as little electricity as possible is lost during transport. This therefore helps to create an efficient and reliable grid with a lower risk of outages.
- we save costs. This helps keep the grid affordable.
- we save space underground, which is in short supply.

3. What will we be doing?

Can an electricity substation be built underground?

Building underground is not an option for Liander. As a network operator, Liander is responsible for delivering a reliable, affordable and safe electricity grid. Building underground does not help us achieve this for the following reasons:

- If a transformer breaks down, we need to be able to access the location quickly to replace it. Building underground makes this more difficult.
- Building underground is much more expensive.
- There is always a risk that underground buildings will be flooded by groundwater or rainwater. This would be particularly dangerous in the case of a substation.

Liander is building a completely new substation on the site of the existing one. In the image below the white blocks show how the new substation will be positioned on the site.



Features of the new substation

- The existing substation will be demolished. Only the building on Eerste Boerhaavestraat will be retained.
- The new substation will run perpendicular to Deymanstraat.
- The new substation will consist of two sections:
 - a transformer building, which will be a maximum of 33 metres long, 12 metres wide and 16 metres high
 - a switch building, which will be a maximum of 33 metres long, 11 metres wide and 12.5 metres high
- The site will be enclosed by a fence to ensure safety.

Underground cable connections

An electricity substation is connected to the rest of the grid via underground cables. A cable connection will be laid from Zeeburgereiland to Rhijnspoor. It is not yet known how this cable will be routed. Cables will also need to be laid and upgraded around the substation. It may also be necessary to carry out work on other underground utilities, such as gas and water pipes. Wherever possible, we will try to combine this kind of work with that of other parties and coordinate with them so that streets only have to be dug up once.

Appearance of the new substation

We do not yet know what the exterior of the building will look like. This will be designed by an architect. We can, however, tell you which steps we will go through to come up with a design.

Steps in the design process

- During the information meeting on Wednesday 2 October 2024 you will be able to talk to the architect and say what you think is important with regard to the appearance of the substation.
- In October you will also be able to take part in the neighbourhood survey by Bureau Bewonerszaken. As part of this survey you can also let us know any wishes you may have relating to the design of the building and the fence. You will receive an invitation to participate.
- The architect will then set to work on designing the electricity substation. The design will have to comply with Liander's wishes and requirements. In addition, the architect will take the rules and policy of the Municipality into account.
- If the architect has produced sketches that comply with the rules of the Municipality and Liander, we will present them to local residents, explaining which wishes have and have not been incorporated into the design. This will depend, amongst other things, on Liander's technical and safety requirements, the wishes of other local residents and the costs involved.
- The final design will be submitted to the Environmental Quality Committee (COK, also known as the Building Aesthetics Committee) for approval. If the COK issues a positive opinion, the design will be finalised.

Questions & answers

Could the position of the substation be rotated?

Yes, the position of the building could be rotated. We have examined a number of different variants for the position of the new substation. It would be possible to construct the building parallel to Deymanstraat. This is not the preferred variant of the project team, as the substation would then be closer to the homes on Leeuwenhoekstraat, which would mean that these homes would then fall within the substation's electromagnetic field (EMF). This would not be desirable. You can read more about EMFs in chapter 4.



Rejected variant: substation parallel to Deymanstraat.

Will the substation continue to supply electricity during the renovation?

Yes, the substation will be demolished and rebuilt in phases, which means it will be able to carry on supplying electricity as normal.

How much electricity will the new substation supply?

To prepare the Rhijnspoor substation for the future, we will be:

- Upgrading it, so that less electricity is lost
- Increasing its capacity, so that it can supply more electricity

Upgrading

The Rhijnspoor substation is currently a 50/10 kilovolt (kV) substation. This means that:

- the electricity entering the substation has a voltage of 50,000 volts. This electricity comes from the Hoogte Kadijk substation in the Centrum district.
- The transformers in the substation convert the voltage from 50,000 volts to 10,000 volts.
- The electricity leaving the substation is distributed to businesses and transformer stations in the local area.

The new substation will be a 150/10 kV substation. This means that the electricity entering the substation will have a higher voltage and will be converted to 10 kV in a single step. This will make the grid smarter. After all, a lot of electricity is lost when converting from one voltage to another. These are known as grid losses.

At present, the electricity is converted in two steps: first from 150 kV to 50 kV (at the Hoogte Kadijk substation) and then from 50 kV to 10 kV (at the Rhijnspoor substation). If the electricity is converted from 150 kV to 10 kV in a single step, we will reduce the grid losses.

Increasing capacity

The new substation will contain electrical installations capable of supplying more electricity. At the moment, the Rhijnspoor substation has three transformers, each with a capacity of 32 MVA (megavolt amperes). The total capacity is therefore 96 MVA. Two transformers are on at all times.

The third transformer serves as a backup in case a fault occurs. The available capacity is therefore 64 MVA.

These three transformers will be replaced with three new ones, each with a capacity of 53 MVA. Again, only two of these will be active at a time. The available capacity will therefore be 106 MVA, which means that the substation will be able to supply more electricity.

What are the roles of Liander and the Municipality?

The Rhijnspoor substation is the property of the network operator Liander. Liander is drawing up the plans for the upgrade of the substation together with the Municipality of Amsterdam. The Municipality has decided that the substation will remain on its current site and will also ensure that everything is done in accordance with the laws and regulations. Liander has responsibility for upgrading a substation and will contract out certain tasks. An architect will be chosen to design the exterior of the substation, for example, and Liander will engage contractors to carry out the work.

Could the substation be made smaller?

The dimensions of the substation will be determined by the space needed for the technical installations and the acoustic insulation. The dimensions we are providing at present are maximum dimensions. It is possible that the buildings will be slightly smaller.

- Transformer building, which will be a maximum of 33 metres long, 12 metres wide and 16 metres high
- Switch building, which will be a maximum of 33 metres long, 11 metres wide and 12.5 metres high

Why will the building on Eerste Boerhaavestraat be retained?

The building on Eerste Boerhaavestraat will be retained so that it can be used to house temporary electrical installations if we need to modify the substation in the future.

Why does there need to be a fence around the site?

A fence is needed around the site to ensure the safety of local residents, to protect the installations against vandalism and to ensure that the building is accessible in the event of faults. The fence around the substation will also be designed by the architect.

4. Electromagnetic fields (EMFs)

Electromagnetic fields (EMFs) are created wherever electricity flows. They are generated by domestic appliances, such as vacuum cleaners and kettles, but also by electricity substations. People who live close to a substation sometimes wonder what impact this could have on their health.

Research has shown that people who live near overhead high-voltage power lines more often develop the rare disease leukaemia. This may be due to the magnetic field, although this is not known for certain.

Policy of the Municipality of Amsterdam

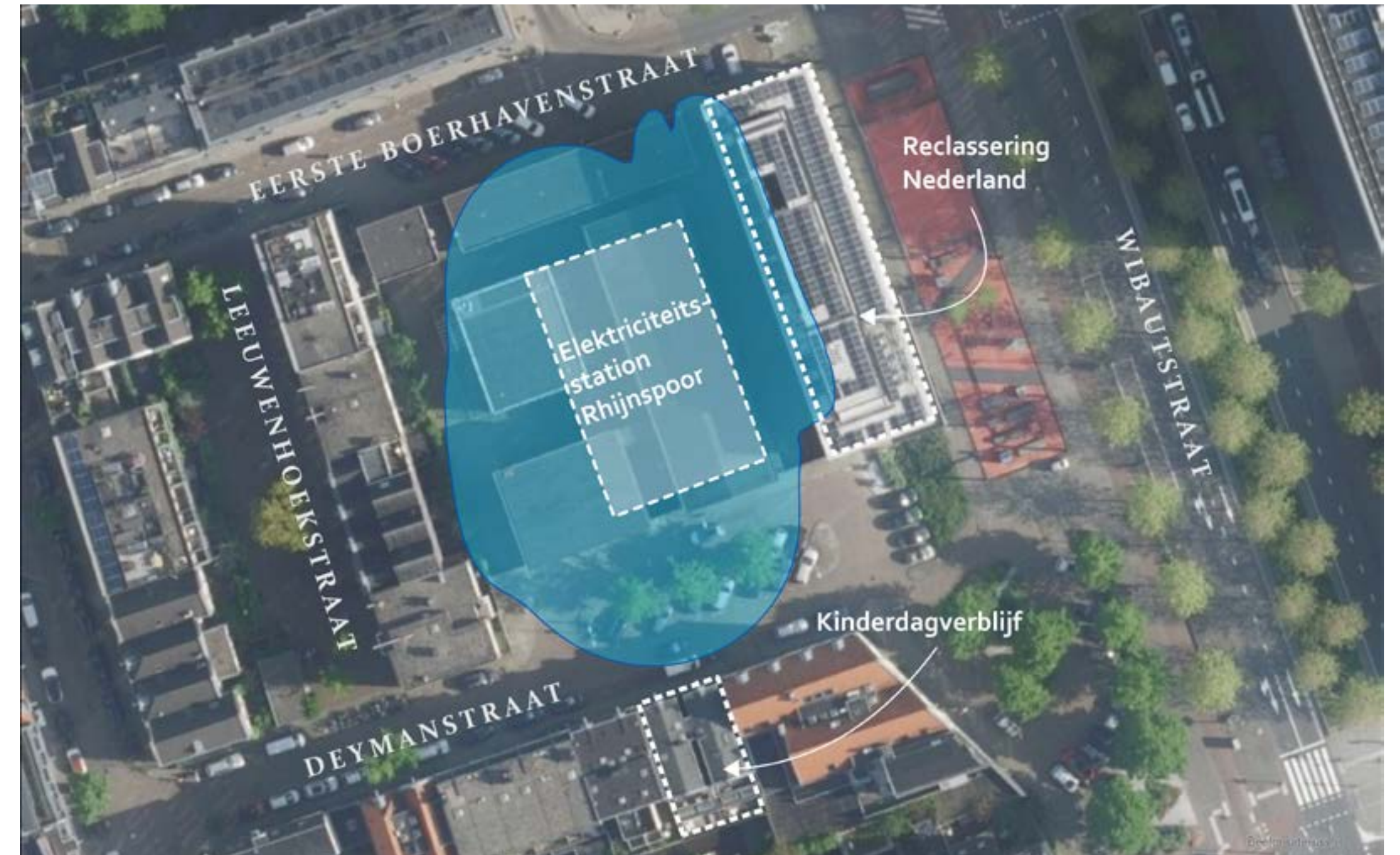
The strength of a magnetic field is expressed in microtesla. The Municipal Health Service (GGD) advises that, as far as reasonably possible, people should avoid spending long periods of time (approx. 14 to 18 hours per day on average over a year) in places where they are exposed to a magnetic field with an annual average strength of more than 0.4 microtesla. The Municipality of Amsterdam has incorporated this advice into its policy. The limit of 0.4 microtesla is not a legal limit.

Calculation of the EMF contour

At the Municipality's request, Liander has had the 0.4-microtesla EMF contour of the new substation [calculated](#). This calculation reveals that the EMF contour does not affect any existing homes (see image). The GGD therefore does not expect there to be any risks to the health of local residents. [The advisory letter from the GGD can be read here](#) (in Dutch).

Impact of EMF on office buildings around the substation

Part of the ground floor of the probation service offices will be affected by the EMF contour. The GGD advises that the users of this building should be informed of this fact. Even though they do not spend long periods of time there, the GGD's advice is that employees should be given the choice of whether or not to work at a location where the magnetic field is stronger than 0.4 microtesla. This applies in particular to pregnant women. The Municipality of Amsterdam is currently in discussion with the users of the building. Studies are in progress to determine whether the project could be optimised more with the aim of further reducing the magnetic field.



The EMF contour in this image is a maximum contour. The contour may be made smaller by optimising the design.

Your health and fossil energy

The electrification of the city also means that eventually less fossil energy will be consumed. This is necessary to achieve our climate targets. However, electrification also has an impact in another way. After all, burning gas and petrol produces harmful combustion gases and other forms of air pollution. This happens in your home when you cook using gas or turn on your heating, but it also happens outdoors, as combustion engines emit harmful exhaust gases. The electrification of homes and vehicles will reduce air pollution inside and outside the home. And that is good for everyone's health.

5. Noise

The transformers and fans at the substation make a low humming noise. Whether you will be able to hear this will depend on the distance to the substation and on the ambient noise, such as traffic and wind.

Although the new substation will have bigger transformers capable of supplying more electricity, it will probably be quieter than the existing substation. That is because the new transformers and fans will be less noisy than the old ones.

The spaces in which the transformers and fans will be installed will also be well insulated. In the Environmental Quality Decree the Dutch Government has laid down rules on the permitted noise level and Liander is complying with these. Liander is having a noise survey carried out by an independent agency to determine whether the substation complies with the rules. This will be verified by the Municipality of Amsterdam and the Environment Service.

6. How might the work affect you?

Upgrading the substation will cause disruption. Large vehicles will be required and the demolition and building work may be noisy. Nevertheless, Liander will do everything possible to keep any inconvenience to a minimum.

We are not yet able to tell you what work will be carried out and when, and how this may affect you. As soon as we have a clearer picture of this we will let you know.

Generally speaking, we can say that:

- You will not experience constant disruption throughout the construction period. Some of the building work will take place indoors, which means it will be less noticeable for people in the area. Liander will also take measures to limit the disruption (including using low-vibration drilling) and we will, of course, do all we can to reduce the risk of damage.
- You will be given details of the construction schedule in advance. We will be working where you live, so it is important that you know what is happening and when. We will provide you with prompt information via the Bouwapp and other channels and may also organise opportunities for contact on site.
- Safety is our top priority. We will be building in a busy inner-city area and are aware that the movement of large vehicles entails risks. Everything possible will be done to ensure that such transport movements are carried out safely. We will deploy traffic controllers and will inform you about the use of large vehicles in good time.
- We will combine jobs: when we dig up the street to lay cables we will inform our colleagues who will be working on the sewer, gas and water pipes. They will then be able to do their work at the same time.

7. Next steps: Communication, participation and schedule

Phased upgrade

The substation will be demolished and rebuilt in phases. At the moment we can break this process down into the following phases:

1. Part of the old buildings will be demolished.
2. The site will be prepared for construction. It may be necessary to clean up the soil and carry out an archaeological survey.
3. The new substation will be built.
4. The technical installations will be installed. You will probably not notice any of this work.
5. The underground cables will be laid/rerouted. It may be necessary to dig up the street close to the substation for a time to carry out this work.
6. The last part of the old buildings will be demolished.
7. The site will be tidied up and finished.

How will we reduce the risk of damage during construction?

- We will be surveying building foundations and groundwater levels in the local area, amongst other things.
- Homes close to the construction site will be surveyed by a specialist agency. The findings will be recorded in a baseline measurement report and shared with stakeholders.
- We will select the appropriate construction method on the basis of these findings. This will be done in collaboration with our specialist partners and the specialists from the building and housing inspectorate.

Provisional schedule	
July 2024	Site decision by the Municipality of Amsterdam
October 2024	<ul style="list-style-type: none"> • Information meeting on the site decision • Neighbourhood survey by Bureau Bewonerszaken. You will receive an invitation to participate.
November 2024	We will let you know when the report of the neighbourhood survey is online.
2025 – 2026	<ul style="list-style-type: none"> • Drafting of (technical) design • Information meeting on the design. • Liander will apply for permits.
2027 – 2029	<ul style="list-style-type: none"> • Demolition of the old electricity substation (in phases). • Construction of the new electricity substation (in phases). • Connection of the electricity substation to the grid via underground cables.
End of 2029	Commissioning