IJmuiden Ver Gamma Offshore Grid

Summary of EIA report

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TABLE OF CONTENTS

1 Introduction

TenneT has been designated as the grid operator for the offshore electricity grid. TenneT's duties include building and managing the offshore electricity grid. To connect offshore wind farms, TenneT lays grid connections between offshore wind farm zones and the onshore high-voltage grid. TenneT is currently developing a grid connection for part of the IJmuiden Ver Wind Farm Zone. This connection is called IJmuiden Ver Gamma Offshore Grid. As part of the decision-making process, TenneT commissioned an Environmental Impact Assessment report (EIA). This document is the English translation of the summary of the EIA.

IJmuiden Ver Gamma Offshore Grid

The IJmuiden Ver Gamma Offshore Grid connects wind energy from the offshore IJmuiden Ver Wind Farm Zone to the national high-voltage grid via a direct-current connection with a capacity of 2 gigawatt (GW). This is carried out using an offshore platform and underground offshore and onshore cables and a converter station located on the Maasvlakte. The various components of the IJmuiden Ver Gamma Offshore Grid are shown on the maps in Figure 1-1.

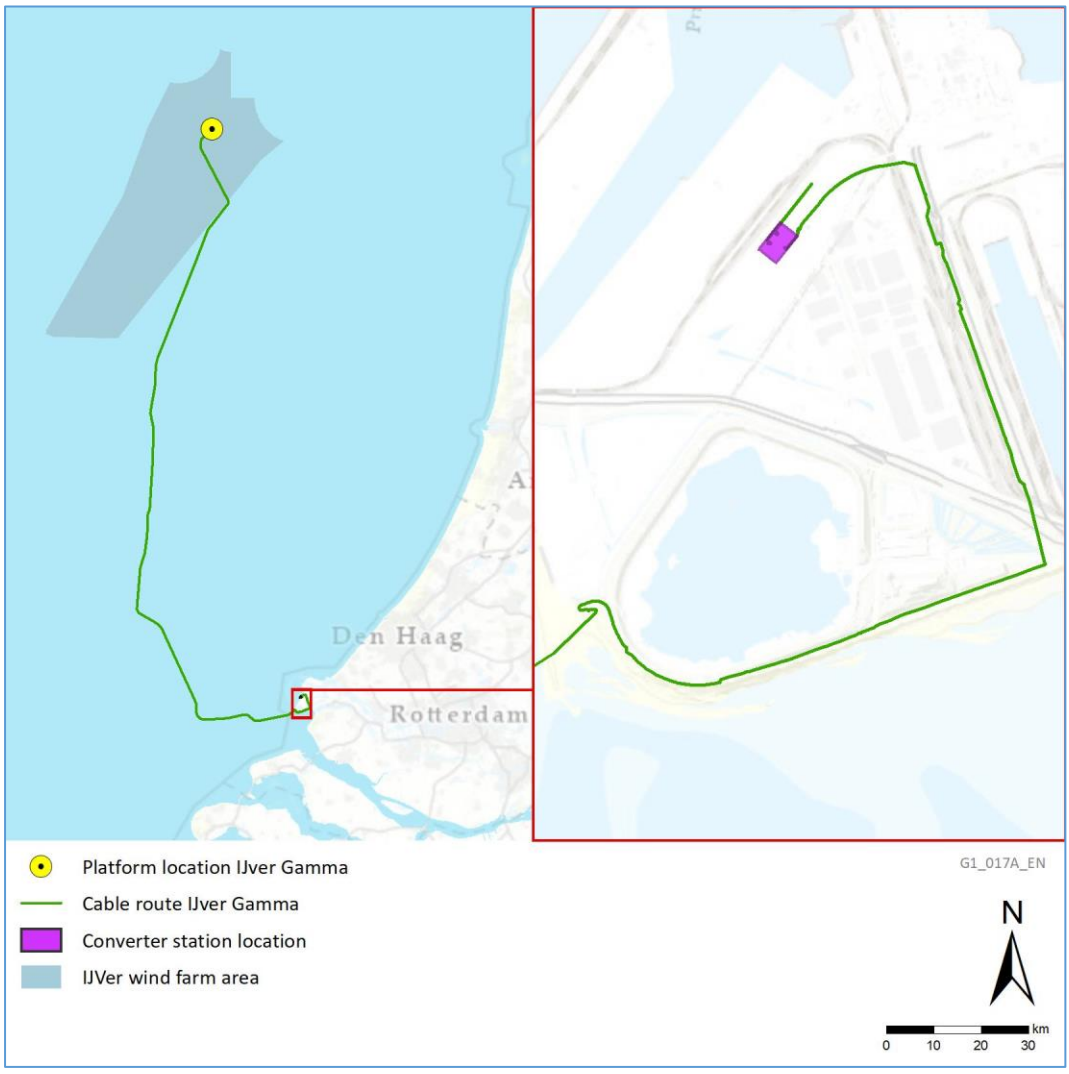


Figure 1-1 IJmuiden Ver Gamma Offshore Grid

IJmuiden Ver Alpha, Beta and Gamma offshore grids

A total of 6 GW will be connected from the IJmuiden Ver Wind Farm Zone to the national high-voltage grid via three connections (Figure 1-2). The IJmuiden Ver Gamma Offshore Grid is one of these connections. Most of the route of the IJmuiden Ver Gamma Offshore Grid connection runs parallel to the IJmuiden Ver Beta Offshore Grid route.[1] Both connections make landfall at the Maasvlakte and will be connected to the newly constructed 380kV high-voltage substation 'Amaliahaven'. The remaining 2 GW from the IJmuiden Ver Wind Farm Zone will be connected via the IJmuiden Ver Alpha Offshore Grid.[2] The IJmuiden Ver Alpha Offshore Grid will be connected to a high-voltage substation near Borssele. All projects are subject to a separate spatial planning and permitting procedure. This EIA focuses on the IJmuiden Ver Gamma Offshore Grid project.

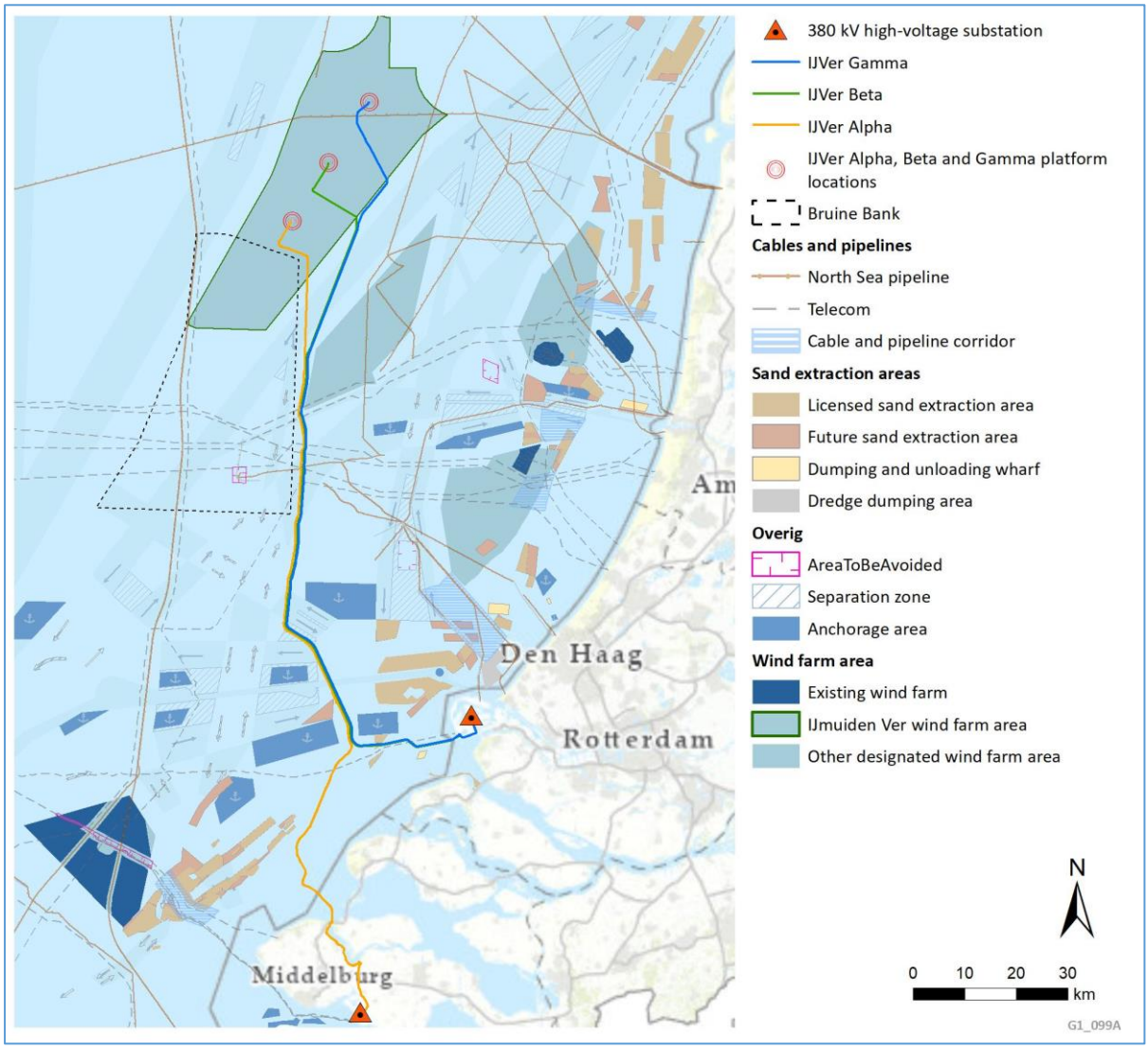


Figure 1-2 IJmuiden Ver Alpha, Beta and Gamma offshore grids.

[1] The decisions for the IJmuiden Ver Beta Offshore Grid were published on June 3rd, 2022. The decisions and further information can be found at: https://www.rvo.nl/onderwerpen/bureau-energieprojecten/lopende-projecten/hoogspanning/net-op-zee-ijmuiden-ver-beta.

[2] The decisions for the IJmuiden Ver Alpha Offshore Grid were published on June 10th, 2022. The decisions and further information can be found at: https://www.rvo.nl/onderwerpen/bureau-energieprojecten/lopende-projecten/hoogspanning/net-op-zee-ijmuiden-ver-alpha.

Reading guide

Chapter 2 further explains the proposed project. First, the background and the added value and necessity are explained. Next, the components of the project are described. Chapter 3 discusses the procedure and explains the decisions being prepared and the role of the EIA. Chapter 4 explains the main results from the environmental surveys. First, the method and assessment framework are explained. Next, the main environmental impacts are described for each component of the proposed project. This includes consideration of cumulative impacts with other projects and the impact of mitigating measures. Finally, the knowledge gaps and implications for the impact assessment are explained. Chapter 5 provides an overview of the EIA chapters and all the underlying studies. These documents can be consulted by the reader for more detailed information on the project or its environmental impact.

2 What will happen and why?

2.1 Reason for the project (added value and necessity)

The usage and depletion of oil, natural gas and coal causes greenhouse gas emissions. These gases cause additional global warming and change our climate. In addition, these energy sources are finite and not all available in the Netherlands, creating a dependence on other countries. To slow the rate of climate change and reduce its dependence on nonrenewable energy sources, the Netherlands is switching to cleaner energy from wind and other sources. In its updated 'Supplementary Offshore Wind Energy Roadmap 2030'[3], the Dutch government has stated around 21 GW of offshore wind farms will be built and connected by 2030. The IJmuiden Ver Gamma Offshore Grid project is part of the Supplementary Offshore Wind Energy Roadmap 2030. The project will connect 2 GW of offshore wind energy to the national high-voltage grid.

Climate change mitigation targets are derived from several international conventions. One of the main agreements is the UN Paris Climate Agreement in which the world agreed to strive to limit global warming by 1.5 degrees Celsius. In Europe and the Netherlands, concrete agreements have been made for this purpose, including for renewable energy generation. In the Climate Act, the Dutch government has set the target to reduce greenhouse gas emissions from the electricity supply by 49% in 2030 compared to 1990, and to reduce these emissions to zero by 2050. The national coalition agreement (15 December 2021) raised the 2030 target from 49% reduction in greenhouse gas emissions to 55%. Offshore wind energy makes it possible to achieve this raised target. The electricity generated by offshore wind turbines is brought ashore through the so-called 'offshore grids'. For the period beyond 2030, other innovative landfall options are also examined, for example the use of hydrogen.

2.2 The project

2.2.1 Project components

The wind turbines in the offshore wind farm will be connected to an offshore platform located in the wind farm zone. On the platform, electricity from the wind turbines is converted from 66 kilovolt (kV) alternating current (AC) to 525 kV direct current (DC). A cable runs in the seabed from the

[3] The Offshore Wind Energy Roadmap 2030 was updated in June 2022. For the Parliamentary Letter, see: https://www.rijksoverheid.nl/documenten/kamerstukken/2022/06/10/aanvullende-routekaart-windenergie-op-zee-2030

platform to the coast and further underground to an onshore converter station located on the Maasvlakte. The converter station converts the 525 kV DC into 380 kV AC. After this, the 380 kV AC will be transported to a newly constructed onshore high-voltage substation.

The IJmuiden Ver Gamma Offshore Grid consists of the following main components:

- An offshore platform for connecting the wind turbines and converting 66 kV AC (the electricity from the wind turbines into 525 kV DC.
- An underground offshore cable system for the transport of 525 kV DC.
- An underground onshore cable system for the onward transport of 525 kV DC to a converter station.
- A converter station on the Maasvlakte to convert 525 kV DC to 380 kV AC.
- An underground 380 kV (AC) onshore cable system between the converter station and the newly constructed 380 kV high-voltage substation 'Amaliahaven' for connection to the national high-voltage grid.

When the EIA mentions the IJmuiden Ver Gamma Offshore Grid, it includes these components. The wind turbines, the infield cabling from the wind turbines to TenneT's offshore platform and the realization of the Amaliahaven 380 kV high-voltage substation are not part of the IJmuiden Ver Gamma Offshore Grid.

The main components are shown in Figure 2-1. Each component is explained in more detail below. The figure shows which components are part of the Offshore Grid that TenneT is realizing. For these components, the EIA has been prepared.

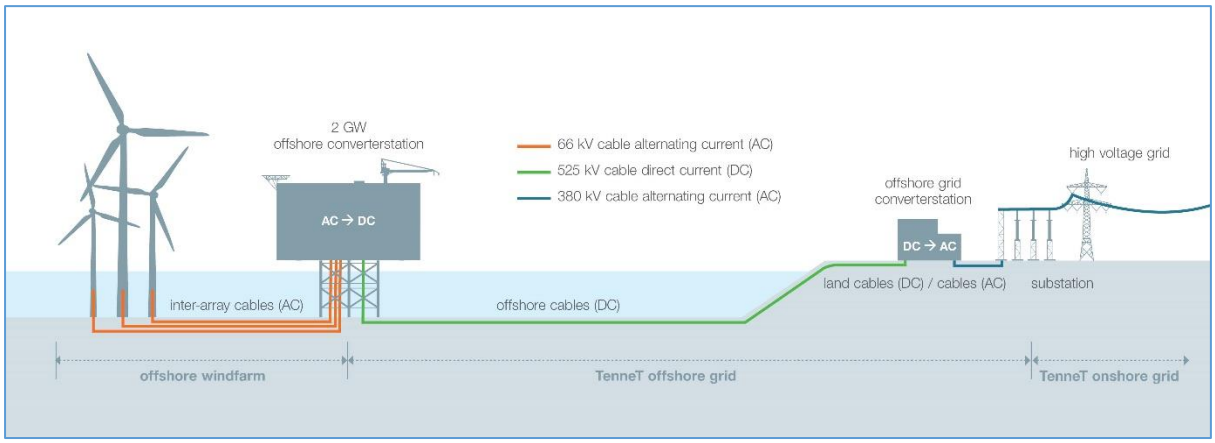


Figure 2-1 Components of the IJmuiden Ver Gamma Offshore Grid, shown schematically

Platform

The offshore platform (hereafter 'platform') is centrally located in the northern part of the IJmuiden Ver Wind Farm Zone. The location is shown on the map in Figure 1-1. The platform is about 70 km offshore.

The platform is a converter station which consists of a so called 'topside' as well as a support structure. The support structure, also called the 'jacket', is placed on a foundation. Two options are available for this: a jacket founded on piles or on suction buckets. A suction bucket is a type of foundation that uses suction, where the pressure difference generated between the inside of the

'bucket' and the water around it causes the foundation to be sucked into the ground and therefore stand firm. The construction of the platform is further explained in Section 4.4.1.

Figure 2-2 Impression of the platform

Offshore cables

The offshore 525 kV DC cable bundle consists of four cables. There is a plus cable, a minus cable, a fiber-optic cable and a ground cable (a.k.a. the 'metallic return'). This bundle can be installed in two ways: as a single bundle, i.e. a (1x4)-cable configuration, or in two smaller bundles, i.e. a (2x2)-cable configuration. This involves spacing the two bundles at a maximum of 5 meters apart. The choice of cable configuration depends on the contractor and has implications for the installation method. The EIA assessed the configuration with the greatest environmental impact (the worst-case situation), i.e. the (2x2)-cable configuration.

From the platform, the IJmuiden Ver Gamma Offshore Grid route runs southwards out of the wind farm zone. The route crosses a shipping corridor and then runs south to join the route of the IJmuiden Ver Beta Offshore Grid. From this point, the IJmuiden Ver Gamma and Beta offshore grids run parallel to each other over a length of about 128 km. Southwest of the Hollandse Kust (west) Wind Farm Zone, the route of the IJmuiden Ver Alpha Offshore Grid joins the routes of the IJmuiden Ver Beta and Gamma offshore grids. The three routes run parallel to each other for about 78 km.

After passing lighting platform Goeree and the '4 East' and '4 West' anchorage areas, the route of the IJmuiden Ver Alpha Offshore Grid bends southwards towards Borssele. The routes of the IJmuiden Ver Beta and Gamma offshore grids run further east towards the Maasvlakte. Both connections make landfall on the southwest side of the Maasvlakte. The installation and operation of the offshore cable route is further explained in Section 4.5.1.

Onshore cables

Like the offshore cables, the onshore cables consist of 525 kV DC cables and the route is about 8 km in length. The route is shown in Figure 2-3. The onshore cable route also runs parallel to the route of the IJmuiden Ver Beta Offshore Grid. This minimizes land use and spatial constraints for other developments on the Maasvlakte. The cable route runs along the south side of the Maasvlakte and heads north near the Europaweg to the converter station of IJmuiden Ver Gamma. From the converter station, 380 kV alternating current (AC) cables will be connected to the new Amaliahaven high-voltage substation, which will be realized via a separate procedure. The AC route passes along the converter station of IJmuiden Ver Beta, see Figure 2-3. The installation of the onshore cable route is further explained in Section 4.6.1.

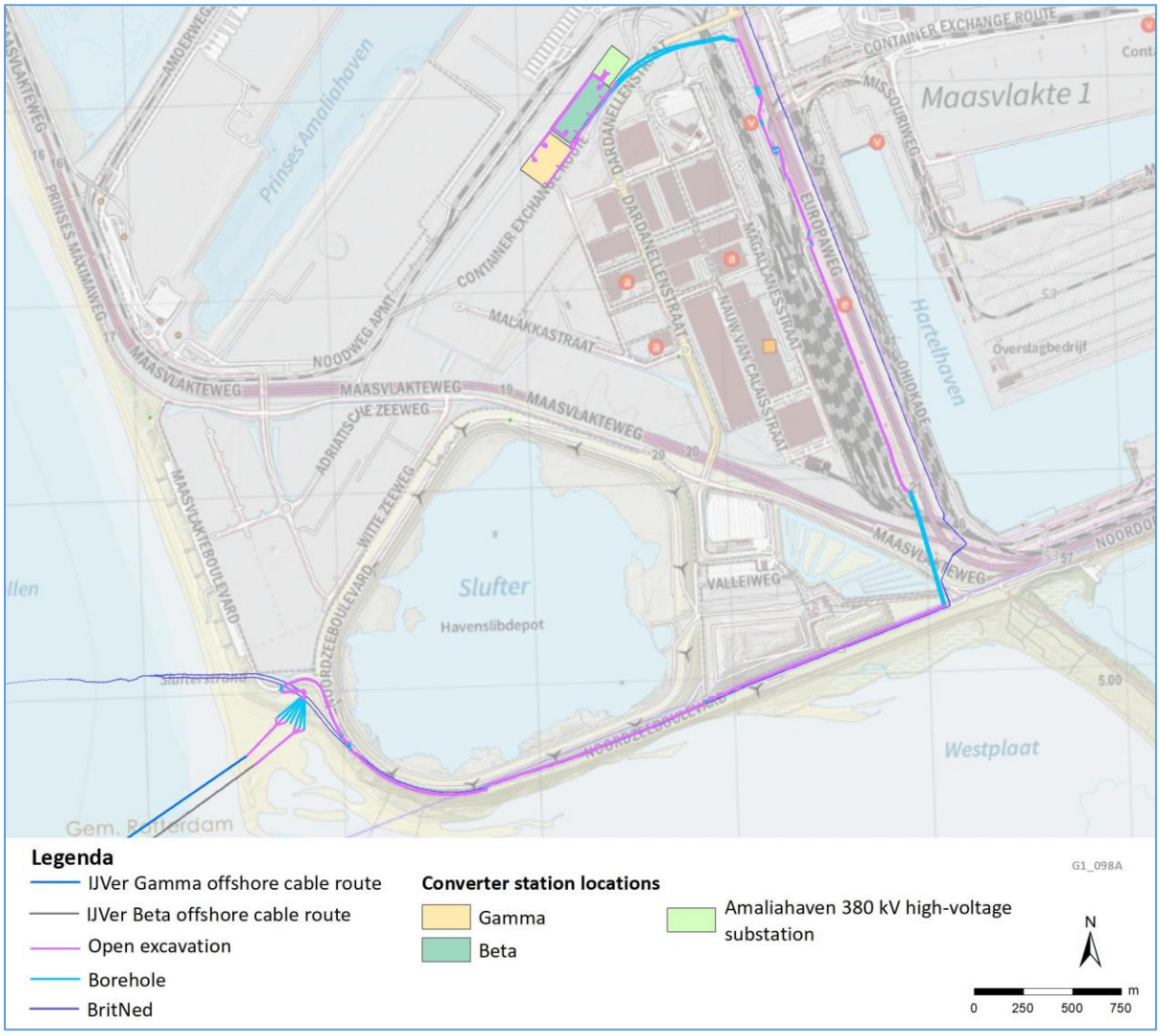


Figure 2-3 Landfall, land route and converter station location

Converter station

At the onshore converter station, the 525 kV DC is converted to 380 kV AC. The converter station covers an area of about 4.0 ha. The IJmuiden Ver Gamma Offshore Grid converter station is located adjacent to the IJmuiden Ver Beta Offshore Grid converter station (see Figure 2-3). Both converter stations will be connected to the new 380 kV high-voltage substation Amaliahaven using 380 kV AC cables. The construction and operation of the converter station is further explained in Section 4.7.1.

2.2.2 The timeline

The timeline of the IJmuiden Ver Gamma Offshore Grid is shown in the following figure. It lists the procedural steps and the subsequent realization. The IJmuiden Ver Gamma Offshore Grid is scheduled for commissioning in 2029.

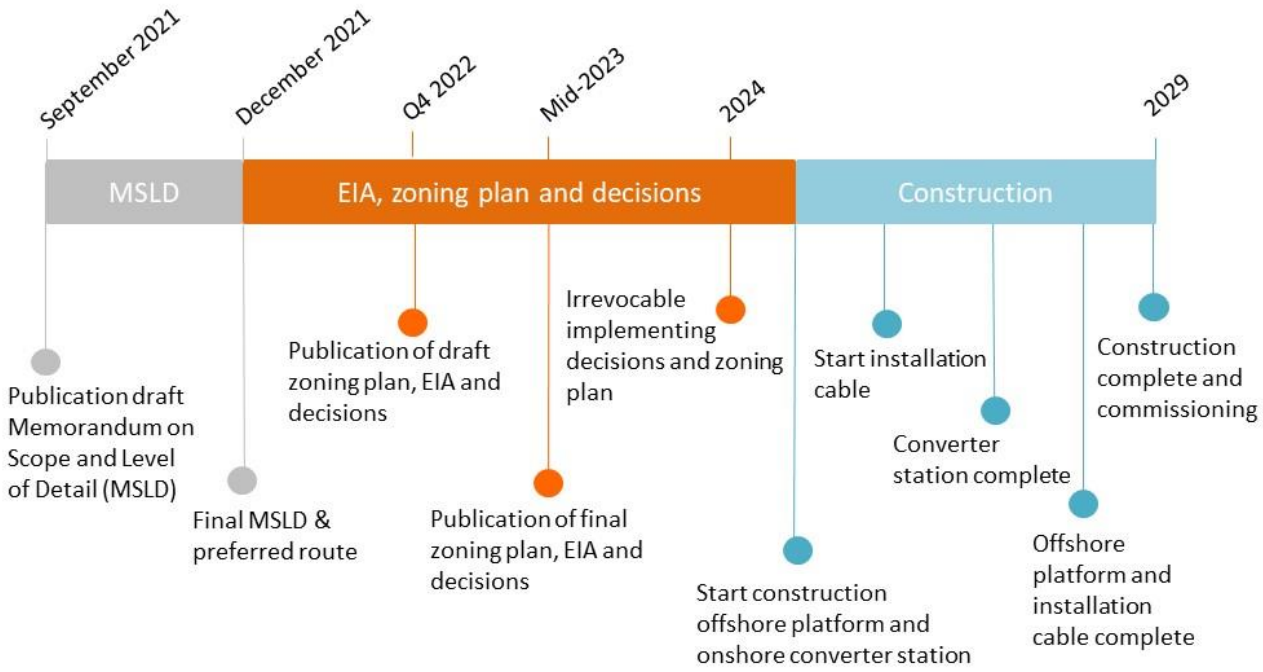


Figure 2-4 The timeline for the IJmuiden Ver Gamma Offshore Grid

3 Procedure – EIA and decisions

3.1 Why an environmental impact assessment

3.1.1 Required decisions

Construction and operation of the IJmuiden Ver Gamma Offshore Grid require several decisions, such as the zoning plan and several permits and exemptions. These include permits and exemptions under the Water Act, the Nature Conservation Act and the Environmental Permitting (General Provisions) Act. The necessary permits are collectively referred to as 'implementing decisions'.

The main decisions for the IJmuiden Ver Gamma Offshore Grid are summarized as follows:

- Zoning plan: this plan sets the spatial planning terms under which the realization of the IJmuiden Ver Gamma Offshore Grid is made possible. The zoning plan covers the onshore part of the project as well as the offshore part within municipal jurisdiction (appr. 2 km from shore).
- Water permit: under the Water Act, a water permit is required for realizing and maintaining marine works and crossing coastal/flood defenses.
- Environmental permit: under the Environmental Permitting (General Provisions) Act, an environmental permit is required for the construction of the converter station on the Maasvlakte.

- Permit under the Nature Conservation Act due to possible impacts on Natura 2000 areas for the construction and operational phase.
- Exemption under the Nature Conservation Act due to potential negative impacts on protected species.

For smaller parts of the construction and installation, additional permits and/or exemptions will be required, e.g. a groundwater abstraction permit. These will be requested, by TenneT or contractor at a later date.

3.1.2 The role of the EIA

The installation and operation of the IJmuiden Ver Gamma Offshore Grid may have impact on the surrounding area; it could have an impact on people, for example through the noise generated by the converter station. It could also be impacts on plants and animals (nature), such as the impact on harbor porpoises due to underwater noise from pile driving. It may also include impact on the landscape or subsoil. In short, these are the 'environmental impacts'. These impacts have been identified by conducting research. The Environmental Impact Assessment report (EIA) describes the research findings.

An EIA aids the decision-making process for the decisions mentioned above. The purpose of an EIA is to provide an understanding of environmental impacts so that they can be taken into account in decision-making. This ensures environmental concerns are part of the project decision-making process. Therefore, an EIA is always linked to a decision for the plan or project.

Impact on Natura 2000 areas is considered in a separate document. Under the Nature Conservation Act, these impacts must be assessed 'appropriately'. The impacts were therefore described not only in the EIA but also in a so-called Appropriate Assessment.

3.2 Steps of the EIA procedure

The following steps of the EIA procedure and participation for the IJmuiden Ver Gamma Offshore Grid have been completed:

1. The notification of intent for the proposed project and the participation plan were published on April 8th 2021. From April 8th 2021 to May 21st 2021, both were open for public review. During this period, everyone had the opportunity to comment.
2. On 17 September 2021, the draft Memorandum Scope and Level of Detail (MSLD) was published along with the updated participation plan. The draft MSLD describes the routing options to be investigated in the EIA and describes the environmental impact to be researched. Everyone was given the opportunity to review and comment on the draft MSLD. The draft MSLD and participation plan were available for public review until October 29th 2021.
3. An independent auditing committee has been established by law (the Netherlands Commission for Environmental Assessment, or NCEA). The NCEA can prepare an advice upon the request of a government authority. On November 16th 2021, the NCEA issued an advice on the draft MSLD.
4. On December 16th 2021, the final MSLD was adopted by the Secretary of State for Economic Affairs and Climate Policy, by which the preferred route, platform location and converter station site were defined.

5. Carrying out and drafting environmental impact studies for the preferred route, platform site and converter station site. Route optimizations implemented after the preferred route was published are included in the studies. At the same time, the draft zoning plan and permit applications were prepared using the information from the EIA.

For this project, the following steps of environmental impact assessment and participation under the spatial planning and permitting procedure will still be taken:

6. Publication of the draft zoning plan, the draft implementing decisions and associated permit applications with the EIA and Appropriate Assessment as appendices. This is scheduled for December 2022.
7. Collection of advice (including NCEA's) and views on the draft zoning plan, the draft implementing decisions and contents of the EIA during the period in which the draft decisions were made available for public review.
8. Decision on the adoption of the final zoning plan and implementing decisions, with the EIA as an appendix, and their publication. This is scheduled for mid-2023.
9. Opportunity to appeal against the zoning plan and implementing decisions during the period for public review of the final decisions.
10. Monitoring and evaluation of environmental impacts.

3.3 Participation during the EIA procedure

The Ministry of Economic Affairs & Climate Policy and TenneT consider early and continuous participation with project stakeholders to be of great importance. Experience shows that early dialogue with stakeholders and other parties leads to better projects with broader support. The spatial integration of the project is also better when stakeholders participate and local knowledge and ideas are contributed. In addition, mutual understanding of interests and views increases through cooperation.

Due to the parallel routing of the IJmuiden Ver Gamma and Beta offshore grids, the results from the earlier participation process of the IJmuiden Ver Beta Offshore Grid have been used to develop the IJmuiden Ver Gamma Offshore Grid. This includes coordination in relation to other developments on the Maasvlakte and consideration of possible impact on recreational use during construction.

The following has been done, or is being done, in relation to participation:

- Individual consultations with stakeholders such as ProRail, Port of Rotterdam Authority and Hutchison Ports ECT Euromax.
- Consultation and coordination with landowners, leaseholders, rights holders and cable and pipeline operators.
- Consultations with authorities in regional consultations and administrative consultations and the like.
- Communication and information provision via project website and other channels, www.netopzee.eu/ijmuidenvergamma/ with response/contact options and digital newsletters and messages.
- Communication through media and communication channels of other organizations.
- Information meetings related to various steps in the preparation for the project.

4 Environmental Impact of the IJmuiden Ver Gamma Offshore Grid

4.1 Introduction to impact assessment method

Environmental impact is examined in the following way. First, the current situation is described, such as the functions of surrounding buildings and the presence of animals and plants. Then, the impact of the IJmuiden Ver Gamma Offshore Grid on the current situation is examined. This is described and summarized in the form of an assessment. For a strongly noticeable positive change, the EIA gives the impact an ++ assessment, meaning *very positive,* or a strongly noticeable negative change an -- assessment, meaning *very negative,* and so on. For each environmental aspect, we use the rating scale in Table 4-1. This ensures that the effects of different environmental impacts are comparable. This summary of the EIA briefly describes the main findings. The assessments for the different aspects are presented in an overview table at the end of the summary.

Table 4-1 Assessment scale

Assessment	Impact assessment	Change in reference situation due to the IJmuiden Ver Gamma Offshore Grid
++	*Very positive*	A strongly noticeable positive change
+	*Positive*	A noticeable positive change
0/+	*Slightly positive*	A very small positive change
0	*Neutral*	No change
0/-	*Slightly negative*	A very small negative change
-	*Negative*	A noticeable negative change
--	*Very negative*	A strongly noticeable negative change

The EIA examined the environmental impact for a wide range of aspects. These are summarized as the environmental aspects Soil and water, Nature, Archeology, Landscape and cultural history, and Living environment, Spatial functions and other uses. Each environmental aspect has its own assessment framework which describes different sub-aspects and how impacts may affect them. For each environmental aspect, onshore and offshore impacts are assessed in their respective chapters.

The EIA also takes into account future developments that are certain to occur. These are called ‘autonomous developments’. For example, the future electricity connections IJmuiden Ver Alpha and Beta offshore grids and the Amaliahaven high-voltage substation on the Maasvlakte are identified as autonomous developments. The autonomous developments and the current situation together form the ‘reference situation’. This is the current situation and the future situation in the event that the IJmuiden Ver Gamma Offshore Grid is not developed. The environmental impact is determined relative to the reference situation.

The impact of the IJmuiden Ver Gamma Offshore Grid may occur at the same time as those of other (autonomous) developments. The combination of impacts may be important for the decisions to be made because the impacts may be greater or different from the impacts of the project alone. The sum of impacts is considered in the EIA under ‘cumulative impacts’. This includes the cumulative impacts of the IJmuiden Ver Alpha, Beta and Gamma offshore grids when they are all constructed at the same time.

The EIA also examines whether it is possible to mitigate negative impacts or even avoid them altogether. In the EIA, the assessment with and without mitigating measures has been indicated.

The IJmuiden Ver Gamma Offshore Grid is a large project where many different major and minor environmental impacts may occur. Detailed specialist reports have been prepared for a number of impacts. In the EIA, the results of those studies are summarized in the impact assessment. The reports are attached to the EIA as background information.

4.2 Overview of other developments

The following table summarizes the autonomous developments occurring in the vicinity of the IJmuiden Ver Gamma Offshore Grid. The Ecology and Cumulation Framework (KEC 4.0) is also mentioned in the table. This framework describes the sum of impacts of the wind farms and offshore grids on protected nature. In addition, it shows ways in which the impacts can be mitigated to prevent them from adding up to an excessive burden on nature. The IJmuiden Ver Gamma Offshore Grid project is included in the framework.

Table 4-2 Autonomous developments in relation to the IJmuiden Ver Gamma Offshore Grid

Autonomous development	
Offshore	**Onshore**
• IJmuiden Ver Wind Farm Zone*	• MVL2 Container Exchange Route (CER)
• IJmuiden Ver Alpha Offshore Grid*	• IJmuiden Ver Beta Offshore Grid
• IJmuiden Ver Beta Offshore Grid*	• Porthos CO_2 pipeline
• Hollandse Kust (north) and (west (Alpha and Beta)) Offshore Grid and Wind Farm Zones	• Maasvlakte West Distripark
	• Maasvlakte 2 Wind Farm
• North Sea sand extraction	• Maasvlakte geothermal heat detection survey
	• Amaliahaven 380 kV high-voltage substation
	• Westvoorne municipality wind energy search area

**Includes Ecology and Cumulation Framework (KEC 4.0)*

4.3 Assessment framework and impact assessment

To assess the environmental aspects, first an overview of all possible environmental impacts was prepared. These have been broken down into smaller sub-aspects. A major overview table describes the impacts and sub-aspects in concrete terms. The overview table of all aspects is included at the end of the summary (see paragraph 6.1). For all these aspects, the assessment was carried out using the rating scale in Table 4-1. After the overview table of all aspects, an overall summary of all assessments of the aspects is also included (see paragraph 6.2).

In the description below, a brief explanation is provided of the environmental impact for each component of the project. This explanation is the background of the assessments in the overview table (in paragraph 6.2).

4.4 Environmental impacts of the platform

4.4.1 Construction and operation of the platform

The construction of the platform components is carried out onshore. The platform is transported to the platform site virtually ready-to-go by a transport vessel.

Figure 4-1 One of the methods for installing the platform superstructure

Before the installation of the jacket, the seabed will be dredged and leveled where necessary. Scour protection will be then installed to prevent erosion around the platform. After that, the jacket is installed. For the foundation option using piles, the worst-case scenario assumes that about 16 piles need to be used and that they are inserted around 80 m into the seabed. Pile driving produces noise and will take about 16 days. For the foundation option with suction buckets, much less noise is produced as pile driving is not required. The buckets are sucked into the seabed as water is pumped out.

The installation period of the platform is about three months, while the entire construction phase takes about one year.

The platform will be in operation for at least 40 years. Noise and vibrations are produced during the operational phase. This is caused by the transformers that convert electricity from the wind turbines to direct current. Noise also occurs when connections are switched, but this happens only a few times a year. Annual maintenance is required during the operational phase. Crew and equipment arrive at the platform by ship and/or helicopter.

4.4.2 Soil and water

Assessment of environmental impact

The location of the platform has been chosen so that few sand waves are present, reducing the need for dredging prior to the installation. This is positive because it causes limited local disturbance. Scour protection will be installed around the platform, providing protection for the platform from the abrasive impact of currents and waves. The scour protection disturbs an area of about 15,000 m^2 (1.5 ha). This applies to both foundation methods and is a permanent impact in the operational phase of the platform. Due to the location of the platform and the limited size of the disturbed area, the impact of the intervention has been assessed as slightly negative.

Cumulative impact
For the offshore platform, cumulation with the IJmuiden Ver Alpha and Beta offshore grids or with other projects is not an issue, as this is a local intervention of limited size.

Mitigating measures
No mitigating measures are needed to reduce or prevent impact from construction or operation of the platform. With careful site selection, the impact has already been limited.

4.4.3 Nature

Assessment of environmental impact
The impact on nature as a result of platform construction can be broadly divided into two categories: impact above water and impact below water.

Impact above water
The impact above water is temporary and the result of the platform's construction work. Light, noise and movement can disturb birds. These include birds living in the area around the platform or passing the construction site. The disturbance may cause stress to the birds and/or flight behavior. This can cause birds to temporarily avoid the area, which can then lead to reduced food intake and eventually weakening of a bird species group. However, there is plenty of available area left in the North Sea where birds can find food.

The construction of platform will also produce noise, for example from machinery and ship engines. However, this noise is limited and does not cause relevant disturbance.

Impact below water
The platform and foundation will be anchored into the seabed. At this location, degradation of the soil life present will occur. Mortality of benthic animals and fish may also occur locally. The sandy flat seabed is converted to a hard and rough substrate. However, the affected area is limited and thus no negative impact on species or protected nature reserves is expected.

To ensure the stability of the platform, piles will likely be used. Underwater noise disturbance occurs when piles are driven into the seabed. This is peak noise, also called impulse underwater noise. Marine mammals (such as harbor porpoises and seals) and fish are temporarily disturbed by this impulse underwater noise. Harbor porpoises – a protected species – are particularly sensitive to this noise. This impact is assessed as very negative in the EIA. Impulse underwater noise also reaches into the Natura 2000 area Brown Bank.

The impact of impulse underwater noise occurs not only during construction of the IJmuiden Ver Gamma platform, but also for other projects carried out in the context of offshore wind energy (wind turbines, cables and platforms). The Ecology and Cumulation Framework (KEC 4.0) includes an assessment of all impulse underwater noise caused by the realization of offshore wind farms. Several policy frameworks and the Ecology and Cumulation Framework have agreed that as a result of offshore wind deployment, no more than 5% of the harbor porpoise population can be lost. To stay below this limit, the Ecology and Cumulation Framework proposes(noise) standards for projects. The maximum noise standard of 160 dB at 750 meters is an important standard for harbor porpoise protection. Calculations by TNO show that the realization of the IJmuiden Ver Gamma platform

creates 167 dB and thus exceeds the standard. Mitigating measures, as explained below, can reduce the noise.

When suction buckets are chosen for the platform's foundation, no piling is done and there is no impact on marine mammals and fish due to impulse noise.

Continuous underwater noise from the platform during the operational phase disturbs a relatively small area. It is possible that marine mammals or migratory fish avoid the maintenance vessels and/or the platform during the construction phase. However, no negative impact occurs as a result of this.

Cumulative impact
Underwater impulse noise may not only occur during construction of the IJmuiden Ver Gamma platform foundation by the piling method, but this impact also occurs during construction of other platforms, such as the IJmuiden Ver Alpha and Beta offshore grids, during the installation of wind turbine foundations and during seabed surveys. These are all included in the Ecology and Cumulation Framework as indicated above. When the maximum noise levels per project as defined in the Ecology and Cumulation Framework are not exceeded, the negative impact to marine life is acceptable. Because the noise limit is exceeded for the IJmuiden Ver Gamma platform, mitigation is needed to avoid excessive negative impact.

Mitigating measures
Mitigating measures are needed for impulse underwater noise from the piling works to avoid excessive impacts on marine life. This can be done by installing a sound barrier (a so-called bubble screen) underwater, which reduces noise. By using a single or double screen with air bubbles around the sound source, sound levels can be reduced by up to 20 decibels.

Aside from the bubble screen, measures will also be taken to keep marine animals away from the works. Building up piling operations slowly (in time and force) will also limit the impact.

By implementing the above measures, the noise limit set in the Ecology and Cumulation Framework will not be exceeded and the survival of protected species such as harbor porpoises and seals will not be endangered by underwater noise. The impact from impulse underwater noise with application of these measures is assessed as slightly negative in the EIA, as disturbance still occurs.

4.4.4 Archeology

Assessment of environmental impact
No known shipwrecks of archeological value or aircraft wrecks are present within the search area for the platform site. The platform lies entirely in a zone with a low expected archeological value. Therefore, the platform has no impact on either the sub-aspects impact on known archeological value and impact on expected archeological value. The impact for both foundation methods is therefore assessed as neutral.

Cumulative impact
There is no cumulative impact for the offshore platform.

Mitigating measures
Mitigating measures are not applicable.

4.4.5 Spatial functions and other uses – offshore

Assessment of environmental impact
No relevant impacts on Spatial functions and other uses offshore are expected from the platform. The area is already designated for the realization of wind turbines.

Cumulative impact
As no impact occurs, there is no cumulative impact caused by the platform.

Mitigating measures
Mitigating measures are not applicable.

4.4.6 Conclusion on the platform

The assessments of all environmental aspects are summarized in the overview table at the end of the summary. The construction and operation of the platform will have limited negative impacts on the environment. However, mitigation is needed to reduce underwater noise levels due to pile driving. This ensures that impact on sensitive species, such as harbor porpoises and seals, is limited.

4.5 Environmental impact of the offshore cable route

4.5.1 Construction and operation of the offshore cable route

Offshore cables are installed by ships as seen in Figure 4-2. To protect offshore cables, the cables are buried in the seabed. In coastal areas, they must be buried at least 3 meters deep. For the cables to be installed at 3 meters below the seabed, dredging is often required first. Further offshore, the minimum depth of 1 meter is sufficient to protect the cables. In that case, dredging is only required if the site has mobile sand layers that move due to currents. The cables are laid in the seabed using techniques such as jetting, possibly after dredging.[4]

[4] In case of jetting, the seabed is liquefied under high water pressure, after which the cable can be lowered into the soil under its own weight or guided to the target depth.

Figure 4-2 Installation in shallow seabed areas in the coastal zone

In coastal areas, cables are laid and buried at the same time. Further offshore, the cable is first laid on the seabed and then buried. Laying and burying the cable will be done using two different vessels. Cables are buried as soon as possible after laying. For the (2x2)-cable configuration, an additional installation vessel will be used for the second cable bundle.

The service life of the cables is about 40 years. The cables will be removed only when removal has less environmental impact than leaving them in place.

4.5.2 Soil and water

Assessment of environmental impact

The preferred cable route crosses a dynamic area of the North Sea. The presence of dynamic seabed forms, such as sand waves, calls for a greater burial depth, which means that the seabed will be more disturbed, as more dredging is required. This has a greater impact on the environment. Along the entire length of the route, more than half of the seabed is dynamic. Despite this disturbance being temporary, it is assessed as very negative due to the cable length.

If there are silty deposits or peat in the subsoil where the cable will be installed, the risk of turbidity is higher. Also, silty deposits and peat do not allow the cables to dissipate their heat sufficiently, so these trenches are replaced with sand before the cables are installed. This replacement has a negative impact on the environment because it requires additional dredging. The seabed surveys show that there are hardly any silty deposits or peat along the cable route, so the impact is limited. Moreover, the effects only occur during construction and are temporary.

The Voordelta is a dynamic and varied coastal area along the Zuid-Holland and Zeeland delta and forms a transition zone between the (former) estuaries (or large bodies of water) and the sea. Changes in flow patterns, wave action and the transport of silt and sediment can cause the Voordelta to decrease or increase in seabed elevation. The seabed surveys show that along the cable route, the seabed elevation of the Voordelta has decreased significantly. This means that the cable connection must be buried deep enough to account for a further decrease in seabed elevation.

The consequences of the intervention in the seabed may lead to impacts on other environmental aspects, such as the effect of turbidity on marine life. These have been assessed under other environmental aspects.

Cumulative impact
The impact of the intervention is limited to the construction site. Therefore, the construction work for other projects such as the IJmuiden Ver Alpha and Beta offshore grids does not lead to a different assessment. The larger affected area will be smaller because the width of the combined corridor of three parallel connections is smaller. However, the area that is disturbed by the installation is the same as three cable trenches still need to be dug.

Mitigating measures
The route of the cables may be shifted several tens of meters to avoid silty deposits and peat. This is called micro-rerouting. With these mitigating measures, the distance over which these deposits are present can be shortened, but it will not be possible to avoid them completely. Therefore, the assessment does not change. No mitigating measures are possible for the other impacts.

4.5.3 Nature

Assessment of environmental impact
The impact on nature due to the installation and operation of the 525 kV DC cables can be broadly divided into two categories: impact above and below water.

As a result of cable laying, disturbance of the seabed will take place and temporary turbidity will occur. This can have an impact on nature below water (fish) and nature above water (birds). Turbidity occurs when sand and silt from the seabed mixes with seawater as a result of the construction work. Turbidity will be particularly likely to occur outside the coastal zone (more than 10 km offshore). No negative impact is expected on protected fish due to turbidity. The expected turbidity in Natura 2000 area Voordelta is limited, and no barrier effect will occur. Seabed disturbance caused by cable laying may affect soil life, such as the ross worm (*Sabellaria spinulosa*) and its reefs. This is a limited impact and recovers over time.

Due to turbidity, birds that seek and catch food from the water (foraging) may temporarily have trouble obtaining food. However, the area where turbidity occurs is limited compared to the entire foraging area of the (sight-hunting) bird species present. Therefore, sufficient alternative foraging area remains. Impact due to turbidity is assessed as slightly negative.

The main impact on nature above water is the disruptive effects caused by the presence of working vessels and the dynamics and noise of the works. This may cause disturbance to nursing seals and molting shelducks. Without mitigating measures, these impacts are assessed as very negative in the EIA because these species may find it difficult to move to less disturbed areas during nurturing or molting. However, the impacts can be mitigated.

During cable laying, underwater disturbance may occur in the form of continuous noise and impulse noise. Continuous underwater noise from ships moves with the ships and thus will not occur simultaneously throughout the area. There will be no barrier to migration of marine mammals or migratory fish. Impacts in the form of impulse noise may occur as a result of the geophysical surveys to be carried out. These marine surveys are conducted to understand the soil conditions of the

seabed. Marine mammals (such as harbor porpoises and seals) and fish are temporarily disturbed by this impulse underwater noise. Harbor porpoises – a protected species – are particularly sensitive to this noise. This impact is assessed as negative in the EIA. The disturbance contour of impulse underwater noise also overlaps with Natura 2000 areas Brown Bank and Voordelta.

The operation of the cables generates magnetic fields, which can reach the water surface. There are indications that certain animal groups in the North Sea may be affected by this. These include porpoises, invertebrates and various species of fish. A defect in any part of the cable system may temporarily create a larger-than-normal magnetic field. Much is still unclear about the long-term impact of magnetic fields. Based on currently available research and literature, there is no evidence of negative impacts on species or ecosystems. As negative impact cannot be completely ruled out at the local level, the impact of magnetic fields is assessed as negative.

Cumulative impact
Several other projects also cause impulse underwater noise from surveys, turbidity and magnetic fields.

The impact of impulse underwater noise occurs not only during the surveys for the IJmuiden Ver Gamma Offshore Grid, but also for other projects carried out in the context of offshore wind (wind turbines, cables and platforms). The Ecology and Cumulation Framework includes an assessment of all impulse underwater noise caused to realize the offshore wind farms. Several policy frameworks and the Ecology and Cumulation Framework have agreed that due to offshore wind deployment, no more than 5% of the harbor porpoise population may be lost. To stay below this limit, the Ecology and Cumulation Framework proposes (noise) standards for projects. The proposed surveys adhere to the standards of the Ecology and Cumulation Framework. However, the occurrence of temporary hearing damage in an individual animal cannot be ruled out. The impact is therefore assessed as negative in the EIA, as well as the cumulative impact.

Turbidity also occurs during the construction of other offshore grids. The research shows that the combined effect does not lead to a different assessment.

Finally, with regard to magnetic fields, when offshore grids are situated in parallel, the fields are in close proximity to each other. The research shows that the fields do not reinforce each other. Therefore, the conclusions regarding the impact of electromagnetic fields do not change when cumulative impact is considered.

Mitigating measures
The impacts due to disturbance to nursing seals and/or molting shelducks can be avoided by avoiding construction work during the nursing and/or molting period of seals and shelducks, or by stopping the works if animals are near the construction site during this period. These measures reduce this impact to slightly negative. To reduce the impacts of impulse underwater noise, measures will be taken to keep marine animals away from the construction site. Building up piling operations slowly (in time and force) will also limit the impacts. This limits the impact to slightly negative. In terms of electromagnetic fields, the magnification of the electromagnetic field in the event of a disturbance situation can be limited by switching off the cable in a timely fashion. This limits the impact to slightly negative.

4.5.4 Archeology

Assessment of environmental impact
The seabed surveys show that there are four (potential) wreck sites within 100 meters of the offshore cable route. One of these sites is directly on the cable route. Additionally, there are three objects of potential archeological value. As a result, the route is assessed as negative for known archeological values. The construction work is likely to disturb these (potential) archeological objects.

Some parts of the seabed are expected to be relevant for archeology. Prehistoric remains may be present here from the time when these landscapes were not flooded. Almost 400 hectares of the area around the cable is located in a zone with a medium expected archeological value. Therefore, the route is assessed as slightly negative for expected archeological values.

Cumulative impact
The installation of multiple cable routes (IJmuiden Ver Alpha, Beta and Gamma) parallel to each other within the cable corridor may limit space for route adjustments to avoid archeological objects within the corridor. If there is less space to avoid archeological values, the impact on archeology may increase. Some of the objects of potential archeological value are located where the Gamma route runs parallel to other cable routes. However, based on expert judgements, it seems the objects can be avoided by adjusting the cable route. As a result, there are no cumulative impacts within the available cable corridor.

Mitigating measures
The IJmuiden Ver Gamma Offshore Grid cables will be installed within the boundaries of the cable corridor. Experience gained in the previous offshore grid projects Borssele and Hollandse Kust (south) indicates that it is possible in most cases to avoid obstacles within the corridor. This leads to smaller impacts on archeology and lower costs over the service life of the cables (compared to investigating and removing those objects). The exploratory seabed survey shows that it is possible to optimize the route and thus preserve archeological remains. That might involve rerouting the cable several tens of meters to the left or to the right. The impact is therefore assessed as neutral after mitigation.

4.5.5 Spatial functions and other uses – offshore

Assessment of environmental impact
The installation and use of the cables may interfere with other offshore activities or spatial functions.

The impact on shipping has been assessed as very negative, due to the disturbance caused to regular shipping traffic by the slow-moving work vessels during the installation phase. This involves crossing some of the busiest shipping areas in the North Sea.

The offshore cable route also passes through areas where unexploded ordnance (UXO) is likely to be left behind from World War II, which results in a negative assessment. UXO pose a safety risk to personnel and can damage the cables. There are also existing cables and pipelines in the seabed of the North Sea that are important for digital connectivity and energy systems in the Netherlands. As

the 2 GW cable route crosses them relatively frequently, the impact assessment for this is negative. Special work needs to be carried out for each crossing.

The offshore cable route has a slight negative impact on areas with dumped munitions and military activity. The route crosses an area where the Dutch Ministry of Defense conducts military training. This may be restricted if work vessels for the IJmuiden Ver Gamma Offshore Grid are carrying out work. The cable route also crosses a zone intended for sand extraction. The cable route limits opportunities for sand extraction, as sand extraction near cables is not allowed due to the risk of cable damage. However, as most of the sand in the proximity of the cable route is not extractable, the impact is assessed as slightly negative.

Cumulative impact
The cumulative impact of the offshore wind farms and associated cables has been considered in the North Sea Programme 2022-2027[5]. The cumulative impact is therefore assessed equally. The total land usage of the cables together is smaller when the offshore grids are laid parallel to each other. For each cable, there is a safety zone that must be observed that limit for example sand extraction. When the offshore grids run parallel, the safety zones of the cables are combined, and the restricted zone is smaller. This does not lead to a different assessment.

Mitigating measures
For some sub-aspects, impacts are improved with mitigating measures. By making planning agreements with the Ministry of Defense regarding the use of the training grounds and adjusting operations accordingly, the impacts on areas with dumped munitions and military activity can be reduced to neutral. It is also possible to reduce the impacts on UXO to neutral. This can be done by working according to the UXO safety protocol and by conducting field surveys for UXO along the cable route. This virtually eliminates the chance of an actual explosion.

4.5.6 Conclusion on the offshore cable route

The assessments of all environmental aspects are summarized in the overview table at the end of the summary. The installation and operation of the cables will have negative impacts on the environment. These mainly concern negative impacts during the installation phase due to disturbance of seals and shelducks during sensitive periods, which can be mitigated by taking into account the presence of these species. In addition, there are obstructions for shipping when working in shipping lanes. During the operational phase, the presence of the cable is an obstacle to other spatial functions and other offshore activities.

4.6 Environmental impacts of the onshore DC cable route

4.6.1 Construction and operation of the onshore cable route

The offshore cables will make landfall on the Maasvlakte via four boreholes under the beach, shown in Figure 2-3. The onshore DC cable routing will be executed using the open excavation installation method wherever possible. At complex crossings with roads and other infrastructure, underground directional boring will be used for long distances and compression boring for short distances. The onshore route of the IJmuiden Ver Gamma Offshore Grid runs parallel to the route of IJmuiden Ver

[5] For the North Sea Programme 2022-2027, see: https://www.noordzeeloket.nl/en/policy/north-sea-programme-2022-2027/

Beta. There is an obligation to remove cables after their service life unless removal causes greater environmental impact than leaving them in place.

4.6.2 Soil and water

Assessment of environmental impact
On the route sections where the cables are installed by open excavation, drainage must be used if groundwater levels are too high. For most of the route, groundwater levels are deeper than the dewatering depth required for installation. On a small part of the route, however, drainage is required to temporarily lower groundwater levels. Locally, this leads to a temporary small change in groundwater levels and groundwater flow. This has little or no impact on the surrounding environment or on groundwater or surface water quality. Due to the presence of (mild) contamination along parts of the route, very small negative changes (displacement or further spreading) in soil quality may occur during excavation work. If these sites are remediated, the impacts are temporary.

Cumulative impact
Simultaneous construction of the onshore sections of the IJmuiden Ver Beta and IJmuiden Ver Gamma offshore grids means that during construction, the trench in which the two cable systems are laid is several meters wider compared to single installation. As a result, more groundwater has to be drained to ensure a dry trench. However, the area of influence of groundwater level lowering remains largely the same. Therefore, in cumulation, the impacts are not assessed differently. Simultaneous construction has the advantage of requiring only one intervention and drainage.

Mitigating measures
The groundwater level lowering that takes place during installation of the cable route can be mitigated by pumping the water back to the ground or by installing sheet piling. This almost completely mitigates the impact. In terms of the change in soil quality, no mitigating measures are possible that reduce the impact.

4.6.3 Nature

Assessment of environmental impact
The impacts on nature due to the installation of the onshore cable route can be divided into impacts on nature reserves and impacts on protected species. The Nature Conservation Act refers to protected areas and protected species.

Protected areas
A small part of the Maasvlakte cable route lies within the designated nature reserve Voordelta (Natura 2000) and the National Ecological Network (NNN) area Slikken van Voorne. To install the cables, excavation will be carried out within these nature reserves. The area involved is about 0.15 hectares of dune area, which is limited considering the overall size of these nature reserves. Because this is a relatively small area, the impacts are temporary and this area can recover naturally after the intervention, this impact is assessed as slightly negative.

Disturbance also occurs due to noise, light and visible work during construction. There are non-breeding bird species present in the Voordelta nature reserve that may be disturbed by the construction work. As the construction takes place in an area already disturbed by traffic and

recreation on the Maasvlakte (beach) and the disturbance is temporary, it is assessed as slightly negative. In the operational phase, the cable is buried and there is no impact on animals or plants.

The impact due to nitrogen deposition on nature reserves (through acidification) has been assessed for the entire IJmuiden Ver Gamma Offshore Grid project. Modeling calculations show that in the operational phase there is no deposition, hence no impact. Deposition does occur during the construction phase due to nitrogen dioxide emissions released from the use of vessels and vehicles with combustion engines. In the ecological nitrogen assessment (an appendix of the Appropriate Assessment), it is concluded that the project's temporary deposition is too small to cause a measurable change in the ecosystem. Therefore, the expected nitrogen deposition will not negatively affect nitrogen-sensitive nature. Although no ecological impacts are expected, there will be limited nitrogen deposition, so this component has been assessed as slightly negative.

Protected species
The Maasvlakte is the habitat of several protected animals and plants. The construction works may affect the following protected species: smooth cat's-ear, natterjack toads, sand lizards, breeding birds and rabbits. The work may disturb or injure species such as the natterjack toad present at the construction site, as well as damage habitat and breeding grounds. This impact is assessed as negative.

Cumulative impact
The onshore cables for the IJmuiden Ver Gamma Offshore Grid will be installed jointly with the cables for the IJmuiden Ver Beta Offshore Grid. The cables follow the same route, allowing them to be installed simultaneously in one operation. Physical intervention in the soil, and thus possible damage to vegetation, is slightly greater, but still many times less than in the situation where both cable routes are installed separately. Simultaneous cable installation will limit any disturbance and risk of damage to a single period. Since negative impacts will still occur, the impact assessment for simultaneous cable laying nevertheless remains the same as the assessment for the installation of the IJmuiden Ver Gamma Offshore Grid alone.

Mitigating measures
Impacts on protected species can be mitigated by implementing various measures.

To avoid disturbance and destruction of nests, the work will have to be carried out outside the breeding season of birds or, in case of the natterjack toad and sand lizard, outside the active season. In addition, measures will have to be taken that ensure these species do not settle in the area where the work is to take place. To ensure that natterjack toads and sand lizards are not present the area can be fenced off with screens well before the start of the work. Animals still present within the area can be caught and released outside the area. Careful planning and execution of the excavation will mitigate the impact on rabbits.

If habitat of smooth cat's-ear is lost due to installation and construction work, negative impact can be mitigated or avoided by relocating these plants. Smooth cat's-ear is an annual plant, making replanting an effective and proven method.

Implementation of these types of measures will eliminate any negative impact on the survival of the species groups mentioned. The impacts on protected species are assessed as slightly negative with the application of mitigating measures.

4.6.4 Landscape and cultural history

Assessment of environmental impact
The Maasvlakte has a large, open and industrial character. The main landscape structures are the port basins and the seawall. Two landscape elements near the plan area are the artwork 'de Zandwacht' and the hiking trail 'Vogelboulevard' that runs through a diverse nature reserve. Geological values are present near the project area. These are parts of the landscape that tell us something about the natural genesis of an area, such as the phenomenon of young (embryonic) dunes.

After completion of the work, the components of the onshore cable route are not visible at ground level. The two landscape elements are located well away (more than 100 meters) from the cable route and will not be affected by the works. Therefore, there are no impacts on these landscape elements. Digging and drilling during the construction phase may have a disruptive effect on embryonic dunes that may be present. However, due to the dynamics of the landscape, this is a temporary impact.

Cumulative impact
There is no cumulative impact for Landscape and cultural history.

Mitigating measures
Mitigating measures are not applicable for Landscape and cultural history.

4.6.5 Archeology

Assessment of environmental impact
The onshore cable system is assessed as neutral for the sub-aspect known archeological values and for the sub-aspect expected archeological values. The land usage of the onshore route does not overlap with any Archeological Monuments Map sites or archeological finds and is located entirely in a zone with a low expected archaeological value.

Cumulative impact
The parallel and simultaneous installation of the IJmuiden Ver Beta and IJmuiden Ver Gamma onshore cable systems leads to greater disturbance of the soil. However, as the land usage of both projects occupies a zone of low expected archeological value, there is no cumulative impact.

Mitigating measures
It is possible that accidental archeological finds may be encountered during the construction, in which case they should be reported to the competent authority. If micro-rerouting is subsequently not possible, the only option is documenting the values to be destroyed.

4.6.6 Living environment, spatial functions and other uses

Assessment of environmental impact

The onshore route is assessed as neutral for unexploded ordnance and impact on the living environment, as no change from the reference situation is expected here. Impact on oil & gas extraction and geothermal energy is assessed as slightly negative because the onshore cables lead to a very slight restriction for the geothermal exploration permit on the Maasvlakte. This impact is of a permanent nature. There will be a temporary disturbance for recreation and tourism on the Maasvlakte beach (and the roads leading to it) during the installation of the cables. This leads to a slightly negative assessment. Crossing the seawall at the Maasvlakte is considered technically complex. Hence, the primary flood defenses sub-aspect was assessed as negative. The negative assessment for cables and pipelines is due to the limited space available at cable and pipeline crossings. The amount of road and railway crossings lead to a negative assessment for impact on spatial functions.

Cumulative impact

The simultaneous installation of the IJmuiden Ver Beta and IJmuiden Ver Gamma grids does not lead to negative cumulation impacts for any of the aspects. With simultaneous installation, the duration of temporary restrictions on other activities is reduced. This does not lead to a different assessment.

Mitigating measures

There are no mitigating measures for the DC cable route. The various spatial functions on the Maasvlakte require careful preparation and implementation of cable laying. This will control risks to existing functions such as rail tracks to be crossed and the seawall.

4.6.7 Conclusion on the onshore DC cable route

The assessments of all environmental aspects are summarized in the overview table at the end of the summary. The installation and operation of the onshore DC cable route on the Maasvlakte will have negative impacts on the environment. During the construction phase, these mainly concern negative impacts on protected flora and fauna on the Maasvlakte. Mitigating measures can reduce or avoid negative impacts.

4.7 Environmental impacts of the onshore converter station and the AC route

4.7.1 Construction and operation of the converter station and AC route

Converter station

The area required for the converter station is around 4.0 hectares. The indicative dimensions of the converter station are 158 m x 255 m, with a maximum height of 25 m above grade. The layout of the converter station is shown in Figure 4-3.

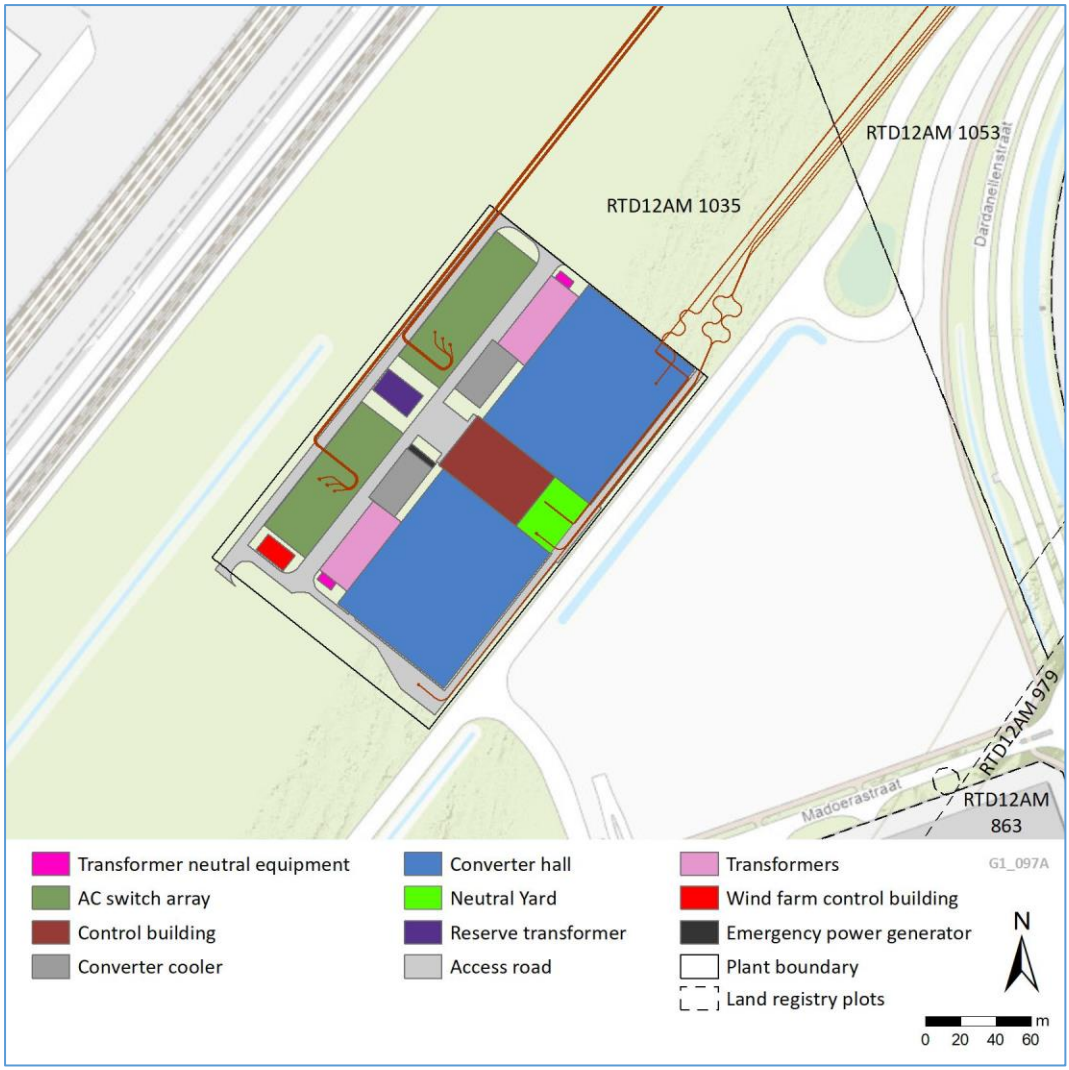


Figure 4-3 The converter station

The site will be raised about 0.70 meters to meet TenneT's flood risk requirements. The construction period of the converter station is three years (worst-case scenario) and takes place after the site has been raised. The converter station on the Maasvlakte will be founded on steel (no piles).

During operation of the converter station, several components make noise. The service life of the converter station is around 40 years. If the building then ceases to have a function, it will be removed.

AC route
The AC route will be installed underground directly next to the IJmuiden Ver Beta Offshore Grid converter station using open excavation on TenneT property.

4.7.2 Soil and water

Assessment of environmental impact
The construction of the converter station basement requires drainage. Drainage is also required for cable laying along the AC route. This means a temporary lowering of groundwater levels. This is a temporary impact. Otherwise, no impacts occur for this aspect. The Maasvlakte consists mainly of

raised sand that is largely insusceptible to land subsidence and can be restored well. There is no known soil contamination. As a result, there are no changes in groundwater quality and surface-water quality.

Cumulative impact
The yet-to-be-constructed Amaliahaven 380 kV high-voltage substation will be located northeast of the IJmuiden Ver Beta converter station. If drainage is required for the construction of this substation, and if it takes place at the same time, it could lead to a larger area of influence and different groundwater flow. The amount of water abstracted will not be much greater, as the drainage operations affect each other.

Mitigating measures
The groundwater level lowering that takes place during construction of the cable route can be mitigated by pumping the water back into the ground or by installing sheet piling. This virtually mitigates the impact.

4.7.3 Nature

Assessment of environmental impact
The impacts on nature due to the construction of the converter station and installation of onshore AC cables can be divided into impacts on protected nature reserves and impacts on protected species. The Nature Conservation Act refers to protected areas and protected species.

Protected areas
The converter station and AC cable route are not located within nature reserves. Natura 2000 and National Ecological Network (NNN) areas are located well away from the construction site. Disturbance or degradation of these areas is thus ruled out.

The impact due to nitrogen deposition on nature reserves (through acidification) has been assessed for the entire IJmuiden Ver Gamma Offshore Grid project. Modeling calculations show that there is no relevant deposition in the operational phase, so no impact. Deposition does occur during the construction phase due to nitrogen dioxide emissions released from the use of vessels and vehicles with combustion engines. In the ecological nitrogen assessment (an appendix of the Appropriate Assessment), it is concluded that the project's temporary deposition is too small to cause a measurable change in the ecosystem. Therefore, the expected nitrogen deposition will not negatively affect nitrogen-sensitive nature. Although no ecological impacts are expected, there will be limited nitrogen deposition, so this aspect has been assessed as slightly negative.

Protected species
The Maasvlakte is the habitat of several protected animals and plants. The construction works may affect the following protected species: smooth cat's-ear, natterjack toads, sand lizards, breeding birds and rabbits. In terms of smooth cat's-ear, growth sites at the converter station site will be permanently lost. The work may disturb or injure species such as the natterjack toad present at the construction site, as well as damage habitat and breeding grounds. This impact is assessed as negative.

Cumulative impact
The converter station for the IJmuiden Ver Gamma Offshore Grid will be constructed adjacent to the converter station for the IJmuiden Ver Beta Offshore Grid. In terms of protected animal species, work at both converter stations could lead to disturbance. Both impacts are temporary, which does not change the conclusion in cumulation. Smooth cat's-ear is not found at the site of Beta's converter station. The impact assessment for smooth cat's-ear due to construction of both converter stations does not change.

Mitigating measures
Impacts on protected species can be mitigated by implementing various measures.

To avoid disturbance and destruction of nests, the work will have to be carried out outside the breeding season of birds and the active season of the natterjack toad and sand lizard, or measures will have to be applied that ensure these species do not settle in the area where the work is to take place. To ensure that natterjack toads and sand lizards are not present within the area where the work is to take place, the area can be fenced off with screens well before the start of the work. Animals still present within the area can be caught and released outside the area. Careful planning and execution of the excavation will mitigate the impact on rabbits.

The loss of growth sites of smooth cat's-ear due to the cable installation and construction of the converter station, can be mitigated or prevented by relocating these plants and/or compensating growth areas.

Implementation of these types of measures will eliminate any negative impact on the survival of the species groups mentioned. The impacts on protected species are assessed as slightly negative with the application of mitigating measures.

4.7.4 Landscape and cultural history

Assessment of environmental impact
The converter station is part of an industrial complex on the Maasvlakte, comprising industrial facilities and energy infrastructure. The converter station fits well in this landscape and therefore has a positive impact on the characteristics of the area. This also applies to the experience and visibility of the converter station. On the Maasvlakte near the converter station, there are no landscape features, geologically valuable areas or geological monuments.

Cumulative impact
There is no cumulative impact for Landscape and cultural history.

Mitigating measures
Mitigating measures are not applicable for Landscape and cultural history.

4.7.5 Archeology

Assessment of environmental impact
The converter station and the AC route lie entirely in a zone with a low expected archeological value. There are also no known archeological values (i.e. finds) in the area. The impacts of the AC route and converter station are therefore assessed as neutral.

Cumulative impact
There is no cumulative impact for archeology.

Mitigating measures
It is possible that accidental finds may be encountered during the works, in which case they should be reported to the competent authority. If micro-rerouting is subsequently not possible, the only option is documentation and excavation. However, this does not count as a mitigating measure, as the aim is to leave archeological values unaffected.

4.7.6 Living environment, spatial functions and other uses

Assessment of environmental impact
Without mitigation, noise from the transformers at the converter station has been assessed as very negative for the aspect of impact on the living environment. The noise production exceeds the permitted noise level of the Maasvlakte noise zone. However, any dwellings are a large distance from the converter station. At the site of the nearest dwellings in Oostvoorne and Hoek van Holland, no relevant noise impact from the converter station is expected, including low-frequency noise. Given the distance of dwellings from the converter station, they do not experience any nuisance for other aspects either. The cables and pipelines aspect is assessed as slightly negative due to the presence of some cables in the vicinity of the converter station.

Cumulative impact
The converter station of the IJmuiden Ver Gamma Offshore Grid will be located next to the converter station of the IJmuiden Ver Beta Offshore Grid. Cumulative noise impacts occur, leading to a change in the noise situation. However, the noise standard set on the Maasvlakte noise zone is not exceeded, so the cumulative impact on the quality of the living environment is the same.

Mitigating measures
By using better sound-insulating units and equipment, noise nuisance can be reduced, and the permissible noise levels of the established noise zone can be met. This means that for the sub-aspect of impact on the living environment, the impacts are fully mitigated.

4.7.7 Conclusion on the converter station and AC route

The assessments of all environmental aspects are summarized in the overview table at the end of the summary. The construction and operation of the converter station and AC route on the Maasvlakte will have negative impacts on the environment. During the construction phase, these mainly concern negative impacts on protected flora and fauna on the Maasvlakte. During the operational phase, the permitted noise levels may be exceeded. Mitigating measures can reduce or avoid negative impacts.

4.8 Knowledge gaps

The EIA provides insight into the impacts of the construction and operation of the IJmuiden Ver Gamma Offshore Grid. Much research has been carried out for the impact assessments. For some environmental aspects, not all information is available, so these are knowledge gaps. The following

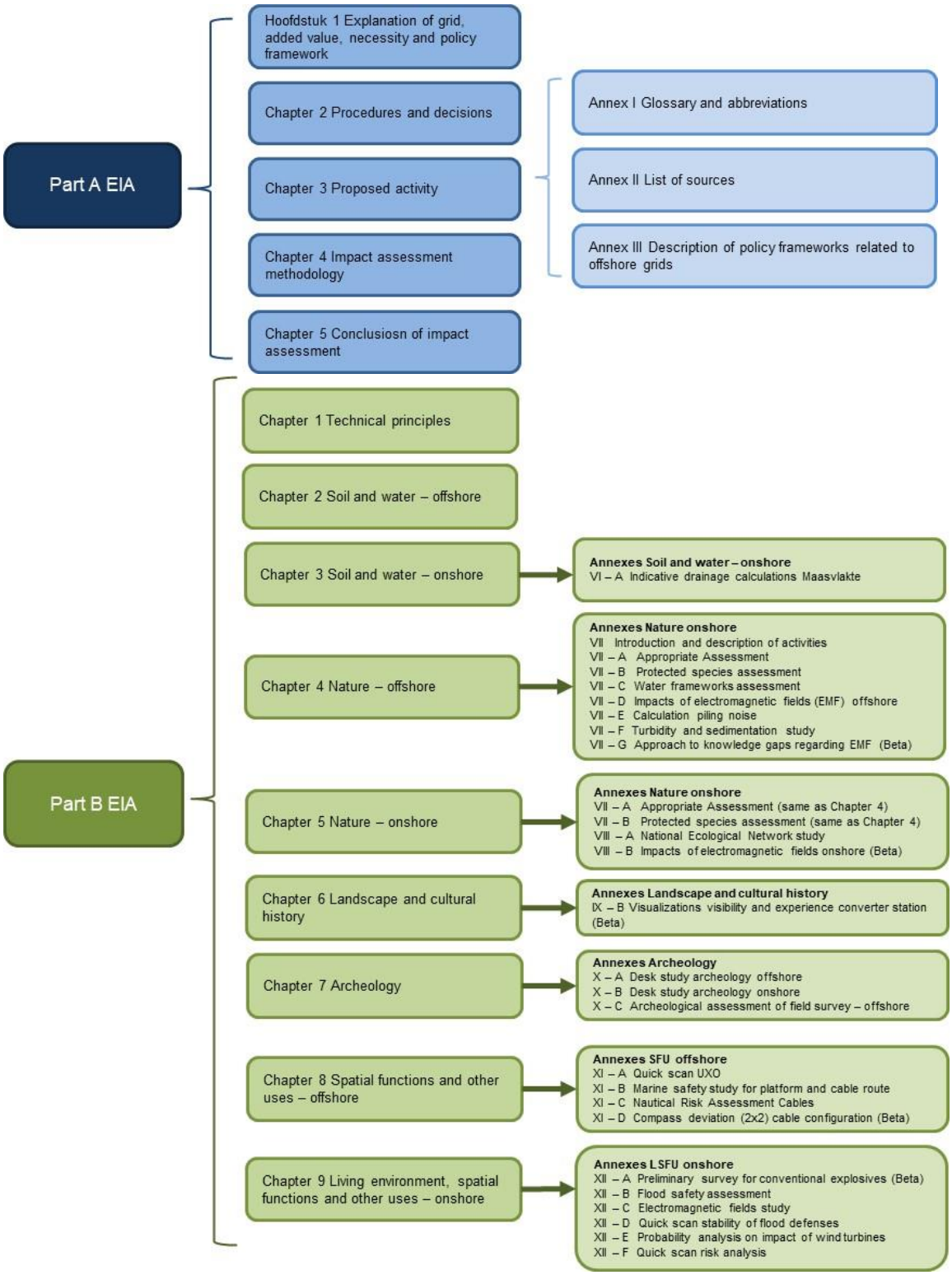
table indicates where this is the case, how it can be dealt with and whether it is relevant to project decision-making.

Table 4-3 Knowledge gaps and impact on decision-making

Knowledge gap	How is it dealt with?	Does it impact decision-making?
Soil and water – onshore		
Groundwater levels: There are no longer periods of measurement data, making it difficult to say what the average highest groundwater level is. This affects the drainage recommendations and the EIA criterion 'change in groundwater level'.	In preparation for implementation, detailed surveys and comprehensive drainage recommendations are required. Risks have been identified in the indicative drainage advice (Annex VI-A).	No
Nature – offshore		
Disturbance: It is unclear to what extent birds and bats will be disturbed by the platform and the activities taking place there.	The knowledge gaps are already known to the competent authority and play a role in all similar projects. By assuming a worst-case impact, there is assurance that the most negative impacts of the plan are assessed.	No
Underwater noise: There are uncertainties about the exact impact of continuous underwater noise on birds, fish and marine mammals. These include noise produced by ships during construction.		No
Electromagnetic fields: The impacts of electromagnetic fields around offshore cables are not fully known, for example on the migration of fish and marine mammals or on the orientation of whales and dolphins.		No
Turbidity: The impact of turbidity on catch levels for sight-hunting birds is still unclear. Turbidity reduces visibility for these birds.		No
Relationship between disturbance of individual animals and possible population-level impacts.		No
Archeology		
Expected offshore archeological values: The offshore cable route crosses archeologically interesting underwater landscapes that have a high expectation value. However, it is not possible at this stage to make those expected values concrete.	With follow-up surveys on the seabed, more information about the archeologically interesting sites can be obtained (e.g. about how they originated and what the landscape situation used to be like).	No
Known offshore archeological values: It is not known whether the objects found during the marine survey have archeological value.	Further research is part of project preparation and any archeological values can be avoided.	No
Archeology – onshore: Not all archeological objects are known. There remains a possibility of accidental finds during construction.	This probability will always remain. Follow-up research has not been advised.	No
Spatial functions and other uses		
UXO: For limited parts of the route, the expectation of UXO is not yet known. For the route sections with an expectation of UXO, the presence of UXO is not yet definitively known.	Further investigation is part of project preparation and any UXO can be avoided or removed.	No

5 Overview of documents

Because the EIA contains a lot of information, it has been divided into several sections. There are two parts. Part A contains information about the project, the reason for the project, an explanation of the EIA's methodology and the main conclusions. Part B is the comprehensive impact assessment with specialist background appendices. The following diagram gives an overview of the sections. Some appendices are taken from the IJmuiden Ver Beta Offshore Grid EIA.



6 Overview tables of assessment framework and impact assessments

The previous chapters have summarized the main results of the surveys on the impacts of the construction and operation of the IJmuiden Ver Gamma Offshore Grid. The following tables present the overall summary of the assessment framework and impact assessments from the EIA.

6.1 Overview of assessment framework

Table 6-1 Explanation of offshore environmental aspects of the assessment framework

	Sub-aspect	What is the environmental impact?
Soil and water – offshore	Length of cable route	The length gives an indication of the area on the seabed that will be temporarily disturbed by the installation of the cable.
	Seabed dynamics	The presence of seabed formations in certain parts of the route could require burying the cables at greater depths. Burial at greater depths means more disturbance of the seabed. This is a temporary impact during the construction phase (impacts may well continue beyond this phase) and during maintenance (operational phase).
	Presence of silty deposits and peat	If there are very silty deposits and peat in the seabed, the probability of turbidity occurring in the water column is greater. This impacts nature. In addition, there is a Pleistocene layer below the peat where the cable could potentially be laid. This may have an impact on archeology. Silty deposits and peat also mean that the cables cannot dissipate enough heat into the immediate vicinity. In large bodies of water, these can be replaced with sand before the cable is laid. This can lead to more exchange of saltwater with groundwater. For the same reason, silty deposits and peat can play a role in salinization around landfall points. This is a temporary impact during the construction phase (impacts may well continue beyond this phase) and during maintenance (operational phase).
	Voordelta dynamics	Within this aspect, it is considered whether there is expansion of the basic coastline seaward in the Voordelta, or whether erosion occurs and the Voordelta moves landward. In principle, the cables will be installed deep enough that they will not become exposed or will require other maintenance. However, if the cables nevertheless become fully or partially exposed due to erosion, they will have to be buried again. This means the seabed will be disturbed again. If the cables become more covered over time, any repair work will result in more localized disturbance to the seabed. This causes turbidity and impacts nature. This is a temporary impact during the construction phase (impacts may well continue beyond this phase) and during repair work (operational phase).
	North Sea seabed surface and local disturbance and seabed change	These sub-aspects relate to the platform. The surface area gives an indication of the area disturbed. The local disturbance and alteration of the seabed consists, on the one hand, of the installation of the foundation and, on the other, of the installation of scour protection around the platform foundation. Both impacts are permanent.
Nature – offshore	Areas protected by the Nature Conservation Act	This aspect considers whether the construction and operational phases cause temporary or permanent impacts on protected habitats, such as Natura 2000 areas. Impacts can occur through habitat degradation, disturbance (above and below water), turbidity and sedimentation, emissions and electromagnetic fields.
	Species protected by the Nature Conservation Act	This aspect considers whether there are temporary or permanent impacts on protected animal and plant species in the construction and operational phases. Impacts can occur through disturbance (above and below water), turbidity and sedimentation, and electromagnetic fields.
	Marine Strategy Framework Directive	This aspect considers whether the construction and operational phases result in temporary or permanent impacts on protected habitats, as statedthe Marine Strategy Framework Directive. Impacts can occur through habitat degradation, underwater disturbance, turbidity and sedimentation, and electromagnetic fields.
	Water Framework Directive	This aspect considers whether the construction and operational phases result in temporary or permanent impacts on protected habitats, as stated the Water Framework Directive. Impacts can occur through habitat degradation, underwater disturbance, turbidity and sedimentation, and electromagnetic fields.
Archeology - offshore	Known archeological values	Known offshore archeological values include shipwrecks, aircraft wrecks and obstructions (potential wrecks). If these lie along the cable route, the possibility of rerouting the cable can be considered, but if this is not possible, known values must be removed (permanent impact on archeology). This plays a role in the construction phase.
	Expected archeological values	In the context of this aspect, an estimate has been made of the probability that the intervention will reach archeologically relevant layers (Pleistocene landscape). It indicates the possibility of permanent impacts on archeologically relevant layers. This mainly plays a role in the construction phase.

	Sub-aspect	What is the environmental impact?
Spatial functions and other uses – offshore	Areas with dumped munitions and military activity	The construction, maintenance and removal of the cables that cross areas where military activities take place (such as training grounds suitable for firing practice) may lead to a temporary impact on this spatial function due to the deployment of working vessels in these areas. In addition, the cable itself may be affected if it is installed in or close to an area of dumped munitions as there is a risk of munition exploding. This is mainly an issue in the construction phase and during maintenance (operational phase).
	Dredge dumping	The installation, maintenance (any repair work) and removal of the cables in dredge dumping areas may temporarily impact this spatial function, because work vessels will be deployed in these areas. During installation and maintenance work, dumping is not possible. Dredge dumping can also have an impact on the cable. Permanent erosion holes may occur, for example, causing the cable to be exposed and thus require maintenance. Impacts from dredge dumping on the cable mainly play a role in the operational phase.
	Oil and gas extraction	There may be temporary impacts during construction if it takes place near an (abandoned) mining platform. Ships can cause damage to the platform, and an abandoned pit may be damaged. Existing platforms have a safety zone within which the cable may not be laid. The cable may lead to restrictions on the location choice of new platforms. There can also be an impact on the cable caused by mining activities or the remains of abandoned pits. This is mainly an issue in the construction phase and during maintenance (operational phase).
	Fishing and aquaculture	The surface area of fishing grounds may be temporarily reduced due to the safety zones around the offshore cable ships during the construction phase. Fishing and aquaculture (farming of fish, mussels and seaweed, etc.) may be temporarily inconvenienced in the vicinity of the cables due to both the installation (soil disturbance, turbidity) and operation (disturbance and turbidity due to maintenance) of the cables. This is mainly an issue in the construction phase and during maintenance (operational phase).
	Sand and shell extraction	No sand may be extracted on either side of the cable within 500 meters. The cable thus imposes permanent spatial restrictions on areas intended for sand extraction. This is particularly applicable to the operational phase.
	Shipping	During the construction and maintenance (operational phase) of the cables and platform, there is a temporary increase in vessel movements. These additional movements consist mainly of slow-moving vessels with limited maneuverability. These vessel movements may temporarily or permanently hinder normal shipping traffic. There is a permanent impact because ships are not allowed to anchor where the cables are located.
	Unexploded Ordnance (UXO)	There may be temporary impacts of unexploded ordnance (UXO) on cable and platform construction when it takes place near UXO. This poses risks to cable laying.
	Cables and pipelines	When crossing other cables and pipelines, there are temporary impacts, as this requires additional measures to be taken (e.g. rock berms). In addition, there is a temporary impact on the assets of third parties, as maintenance and any removal of their cables and pipelines becomes more complex due to the (new) crossings. Permanent impacts on other cables and pipelines may also occur due to electrical and magnetic interference.
	Wind farm zones	The land usage of the cable route (including maintenance zone) may lead to a loss of space for future wind farm zones and/or cause fragmentation of wind farm zone(s). This is a permanent impact.
	Recreation and tourism	There may be temporary impacts on recreational boating, because a safety zone must be maintained around cable ships. This is a temporary impact during the construction phase.

Table 6-2 Explanation of onshore environmental aspects of the assessment framework

	Onshore sub-aspect	What is the environmental impact?
Soil and water	Change in soil composition	Disrupting the soil structure during excavation changes the soil composition, which potentially has an impact on other land uses. This impact may occur during the construction and operational phases. It is a temporary impact, which can also be permanent in some soil compositions (such as peat).
	Change in soil quality	During the construction phase, contaminants might be found in the soil. These pose risks for the people involved in the work and also lead to environmental risks in the surrounding area. Additionally, the spread of contamination would lead to a deterioration of soil quality in the surrounding area. The impact is temporary, because measures must be taken at all times if the impact occurs (remediation).
	Land subsidence	This sub-aspect considers the possibility of land subsidence occurring due to drainage in the construction phase. The degree of land subsidence is determined by the amount of reduction in the pore pressure and the compaction sensitivity of the soil. Impacts due to land subsidence may be permanent (ground level subsidence and subsidence of buildings).
	Change in groundwater quality	This sub-aspect considers the possibility of crossing layers with low hydraulic conductivity. Excavations in layers with low hydraulic conductivity affect the quality and flow rate of groundwater. This can lead to temporary and permanent impacts (salinization). The impacts occur in the construction phase and the operational phase.
	Change in groundwater level	This sub-aspect considers the possibility of groundwater levels and flows being affected by drainage in the construction phase. This impact can consist of a possible temporary effect

		(decrease in growth/development of vegetation) or permanent effect (desiccation/death of vegetation).
	Change in surface water quality	This sub-aspect considers the extent of groundwater discharge (released during drainage) in relation to the sensitivity of the water system and dependent functions. In principle, this is a temporary impact during the construction phase (when drainage is necessary). However, the impact may also be permanent if, for example, ecological functions are affected by changes in water quality.
	Increase in paved surfaces	The increase in paved surfaces affects water storage capacity and leads to accelerated storm-water runoff, which can lead to flooding. The impact is permanent.
Nature	Impact on Natura 2000 areas, excl. nitrogen emissions and acidification	This sub-aspect considers the possibility of temporary and permanent impacts on protected habitats or Natura 2000 areas in the construction and operational phases. Impacts may occur due to disturbance (noise, light, visual), mechanical impacts, desiccation, surface loss and electromagnetic fields. Most of the impacts are temporary and take place during the construction phase. However, permanent impacts (disturbance and electromagnetic fields) can still occur during the operational phase.
	Impacts on Natura 2000 areas, incl. nitrogen emissions and acidification	This sub-aspect considers the impacts of nitrogen emissions and acidification. Acidification occurs as a result of emissions of substances such as nitrogen during the construction phase. These emissions are temporary and take place during the construction phase. Impacts due to nitrogen emissions and deposition may be permanent.
	Impact on National Ecological Network	This sub-aspect considers the possibility of temporary or permanent impacts on the National Ecological Network. This examines whether there is a temporary or permanent impact on qualifying values of relevant National Ecological Network types.
	Impact on protected species	This sub-aspect considers the possibility of temporary and permanent impacts on species protected under the Nature Conservation Act.
Landscape and cultural history	Impact on cohesion between specific elements and their context	This sub-aspect considers the possibility that elements of historical and/or landscape value are affected. This is an impact that takes place during the construction phase but is permanent in nature.
	Impact on the characteristics of the area	This sub-aspect considers the possibility of a major contrast between the converter station and the character of the landscape. The characteristics of an area are determined by the origins, appearance and significance of that area. The impact is permanent in the operational phase.
	Impact on visibility and experience	This sub-aspect describes the impact on the visible features of the landscape, as experienced by the user in the surrounding area. The impact is permanent in the operational phase.
	Impact on geological values	This sub-aspect describes the impact on geologically valuable areas and geological monuments based on their origins and size. Impacts are permanent.
Archeology	Known archeological values	Known onshore archeological values are sites shown on the Archeological Monuments Map. The construction work for the cables and converter station may potentially cause permanent degradation of archeological values.
	Expected archeological values	For this aspect, an estimate was made of the probability that the intervention will reach expected archeological values. It gives an indication of the likelihood of permanent impacts on archeological values during the construction phase.
Living environment, spatial functions and other uses	Oil & gas extraction and geothermal energy	This sub-aspect considers impacts on exploration and extraction areas. If the cables pass through an area with a permit for mineral or geothermal extraction, a (permanent) spatial restriction is imposed on the permit holder.
	Primary flood defense	This sub-aspect considers the primary flood defenses to be crossed and the complexity of the crossings. The location within protection zones is also considered. The crossings and the location can result in permanent impacts. These include both temporary impacts due to construction and permanent impacts on flood defenses.
	Unexploded Ordnance (UXO)	The cable may be affected if its route crosses unexploded ordnance (UXO). This creates risks for the installation.
	Cables and pipelines	This sub-aspect considers the quantity and nature of the cables and pipelines that have to be crossed and the degree of influence on other cables and pipelines. The crossings have no impact on these cables and pipelines, but mainly impact technology, cable-laying techniques, costs and maintenance. Fewer crossings result in lower costs and less risk of damage to other cables and pipelines and requires less coordination with cable and pipeline owners. Influence from the AC connection could potentially occur on other cables and pipelines. This impact is permanent in the operational phase.
	Impact on spatial functions	This sub-aspect considers the intersection of spatial functions, the intersection of infrastructure and secondary flood defenses, impacts on railways and secondary flood defenses, and impacts on the cable from high-risk installations and flooding. Most sub-criteria within this sub-aspect relate to permanent impacts of the cable on spatial functions in the operational phase. The sub-criteria of high-risk installations and flood risk relate to permanent impacts on the cable or converter station.
	Impact on the living environment	This sub-aspect considers noise nuisance, magnetic fields and traffic movements. Noise nuisance plays a role in the construction and operational phases. Traffic movements are only relevant during the construction phase and are temporary. Magnetic fields are present in the operational phase.
	Recreation and tourism	This sub-aspect considers the impact on recreation and tourism. These impacts may be temporary (noise and view of works in construction phase), or permanent (noise, view of converter station).

6.2 Summary of impact assessments

The following tables show the impact assessments in the EIA. The tables show if the assessment changes when measures are applied to reduce or prevent the impacts (mitigating measures).

Table 6-3 Conclusion table for the offshore platform

Aspect	Assessment without mitigating measures		Assessment with mitigating measures*	
	Platform – Piles	Platform – Suction buckets	Platform – Piles	Platform – Suction buckets
Soil and water – offshore (EIA Part B, Chapter 2)				
Surface area of the North Sea seabed (ha)	1.5	1.5	1.5	1.5
Local disturbance and change of the seabed	0/-	0/-	0/-	0/-
Nature – offshore (EIA Part B, Chapter 4)				
Areas protected by the Nature Conservation Act				
Habitat degradation	0	0	0	0
Disturbance – above water	0	0	0	0
Disturbance – below water	-	0	0/-	0
Species protected by the Nature Conservation Act				
Habitat degradation	0	0	0	0
Disturbance – above water	0/-	0/-	0/-	0/-
Disturbance – below water	--	0/-	0/-	0/-
MSFD (Marine Strategy Framework Directive)				
Habitat degradation	0/-	0/-	0/-	0/-
Disturbance – above water	0/-	0/-	0/-	0/-
Disturbance – below water	-	0/-	0/-	0/-
Archeology (EIA Part B, Chapter 7)				
Known archeological values	0	0	0	0
Expected archeological values	0	0	0	0
Spatial functions and other uses – offshore (EIA Part B, Chapter 8)				
Oil and gas extraction	0	0	0	0
Shipping	0	0	0	0
Unexploded Ordnance (UXO)	0	0	0	0
Cables and pipelines	0	0	0	0

**Gray assessments are unchanged after mitigation.*

Table 6-4 Conclusion table for the offshore 525 kV DC cables

Aspect	Offshore 525 kV DC cables	
	without mitigating measures	with mitigating measures*
Soil and water – offshore (EIA Part B, Chapter 2)		
Length of preferred route along the seabed (km)	157 km	157 km
Seabed dynamics	- -	- -
Presence of silty deposits and peat	0/-	0/-
Voordelta dynamics	-	-
Nature – offshore (EIA Part B, Chapter 4)		
Areas protected by the Nature Conservation Act		
Habitat degradation	0/-	0/-
Disturbance – above water	- -	0/-
Disturbance – below water	0/-	0/-
Turbidity	0/-	0/-
Sedimentation	0	0
Electromagnetic fields	0/-	0/-
Species protected by the Nature Conservation Act		
Habitat degradation	-	0/-
Disturbance – above water	- -	0/-
Disturbance – below water	-	0/-
Turbidity	0/-	0/-
Sedimentation	0/-	0/-
Electromagnetic fields	0/-	0/-
MSFD (Marine Strategy Framework Directive)		
Habitat degradation	-	-
Disturbance – above water	-	0/-
Disturbance – below water	0/-	0/-
Turbidity	0/-	0/-
Sedimentation	0/-	0/-
Electromagnetic fields	-	0/-
WFD (Water Framework Directive)		
Habitat degradation	0/-	0/-
Disturbance – below water	0	0
Turbidity	0/-	0/-
Sedimentation	0	0
Electromagnetic fields	-	0/-
Archeology (EIA Part B, Chapter 7)		
Known archeological values	-	0
Expected archeological values	0/-	0/-
Spatial functions and other uses – offshore (EIA Part B, Chapter 8)		
Areas with dumped munitions and military activity	0/-	0
Dredge dumping	0	0
Oil and gas extraction	0	0
Fishing and aquaculture	0	0
Sand and shell extraction	0/-	0/-
Shipping	- -	- -
Unexploded Ordnance	-	0
Cables and pipelines	-	-
Offshore wind farm zones	0	0
Recreation and tourism	0	0

**Gray assessments are unchanged after mitigation.*

Table 6-5 Conclusion table for the onshore 525 kV DC cables

Aspect	Onshore 525 kV DC cables	
	without mitigating measures	with mitigating measures*
Soil and water – onshore (EIA Part B, Chapter 3)		
Change in soil composition	0	0
Change in soil quality	0/-	0/-
Land subsidence	0	0
Change in groundwater quality	0	0
Change in groundwater level	0/-	0
Change in surface water quality	0	0
Change in paved area	0	0
Nature – onshore (EIA Part B, Chapter 5)		
Natura 2000 areas		
Disturbance (noise, light, visual)	0/-	0/-
Mechanical impacts	0	0
Desiccation	0	0
Nitrogen emissions and acidification	0/-	0/-
National Ecological Network (NNN)		
Disturbance (noise, light, visual)	0/-	0/-
Mechanical impacts	0/-	0/-
Desiccation	0	0
Protected species		
Disturbance	-	0/-
Landscape and cultural history (EIA Part B, Chapter 6)		
Impact on coherence between specific elements and their context	0	0
Impact on geological values	0	0
Archeology (EIA Part B, Chapter 7)		
Known archeological values	0	0
Expected archeological values	0	0
Living environment, spatial functions and other uses – onshore (EIA Part B, Chapter 8)		
Oil & gas extraction and geothermal energy	0/-	0/-
Primary flood defense	-	-
Unexploded Ordnance (UXO)	0	0
Cables and pipelines	-	-
Impact on spatial functions	-	-
Impact on the living environment	0	0
Recreation and tourism	0/-	0/-

**Gray assessments are unchanged after mitigation.*

Table 6-6 Conclusion table for the converter station and the 380 kV AC cables

Aspect	Converter station		380 kV AC cables	
	without mitigating measures	with mitigating measures*	without mitigating measures	with mitigating measures*
Soil and water – onshore (EIA Part B, Chapter 3)				
Change in soil composition	0	0	0	0
Change in soil quality	0	0	0	0
Land subsidence	0	0	0	0
Change in groundwater quality	0	0	0	0
Change in groundwater level	0/-	0	0/-	0
Impact on surface water quality	0	0	0	0
Change in paved area	0	0	0	0
Nature – onshore (EIA Part B, Chapter 5)				
Natura 2000 areas				
Disturbance (noise, light, visual)	0	0	0	0
Mechanical impacts	0	0	0	0
Nitrogen emissions and acidification	0/-	0/-	0/-	0/-
Desiccation	0	0	0	0
National Ecological Network (NNN)				
Disturbance (noise, light, visual)	0	0	0	0
Mechanical impacts	0	0	0	0
Desiccation	0	0	0	0
National Ecological Network (NNN)				
Protected species	-	0/-	-	0/-
Landscape and cultural history (EIA Part B, Chapter 6)				
Impact on the characteristics of the area	+	+	n/a	n/a
Impact on coherence between specific elements and their context	0	0	0	0
Impact on visibility and experience	+	+	n/a	n/a
Impact on geological values	0	0	0	0
Archeology (EIA Part B, Chapter 7)				
Known archeological values	0	0	0	0
Expected archeological values	0	0	0	0
Living environment, spatial functions and other uses – onshore (EIA Part B, Chapter 9)				
Unexploded Ordnance (UXO)	0	0	0	0
Cables and pipelines	0/-	0/-	0	0
Impact on spatial functions	0	0	0	0
Impact on the living environment	--	0	0	0
Recreation and tourism	0	0	0	0

**Gray assessments are unchanged after mitigation.*

COLOPHON

IJmuiden Ver Gamma Offshore Grid Summary of EIA report

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