DELTADO

Impact assessment of Delta21 on nature in the Voordelta

Wageningen University - ACT 2388

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About Deltado

Deltado is a consultancy group consisting of Master students. The consultancy originated during the course Academic Consultancy Training (ACT) at Wageningen University. Our team of six students has a diverse background in ecology, hydrology, nature conservation and environmental economics.

The name Deltado unifies the title of the Delta21 project and the scientific name of the common shelduck (*Tadorna tadorna*), one of the indicator species residing in the Voordelta region. The colors of our logo are inspired by its plumage.

Executive summary

Delta21 is a plan for improving inundation prevention, while simultaneously generating sustainable energy and restoring nature. It envisages the construction of two lakes in the Voordelta; a protected Natura 2000 area. Our consultancy team assessed the impact of the Delta21 project on the Voordelta, focusing on two important protected subareas: the Slikken van Voorne and the Hinderplaat. Specifically, we assessed the effects of Delta21 on the abiotic processes in the area and the resulting expected changes in terms of habitat types and species protected under the Habitats and Birds Directives. Subsequently, we identified the major legislative bottlenecks to getting the Delta21 project approved by Natura 2000 authorities. Our analysis is based on a literature study and interviews with relevant stakeholders.

As a result of the environmental assessment, we expect that both the Slikken van Voorne and the Hinderplaat will silt up due to the project constructions. Most of the habitat types in the Slikken van Voorne will increase in size. This is expected to be beneficial for stilts and ducks. The habitat type in the Hinderplaat is expected to change due to siltation. Seals (Habitats Directive species) and piscivorous birds (Birds Directive species) will be negatively affected as a result. Migratory fish species (Habitats Directive species) are expected to benefit from the opening of the Haringvliet.

For Delta21 to have a chance at being approved within the designated Natura 2000 area 'Voordelta', it must follow the stringent legal requirements prescribed by the Nature Conservation Act and contribute to the area-specific objectives set out in the Voordelta management plan. We conclude that Delta21 will negatively affect at least part of the Voordelta, notably the Hinderplaat and the area covered up by the construction of the Energy Storage Lake (ESL) (habitat type H1110 *Permanently flooded sandbanks*). Considering these negative effects, we expect the ADC-test to be the best option to get the project approved. According to ADC-test specifications, any loss of habitat or disruption of species must be minimized and can only be indemnified by providing the same area and type of lost habitat somewhere else. While the loss of H1140B can be compensated by the creation of a sandbank by the tidal lake (of at least the same size as the Hinderplaat), compensation for the area of H1110 that will be covered up by the ESL will likely be difficult. As the compensation measures for Maasvlakte II are failing to deliver their intended results, Delta21 will likely encounter considerable resistance from the area's Natura 2000 authorities.

Delta21 should ensure that they take the relevant stakeholders' interests into account in their project design and stay in close contact with those in power from an early stage. To convince their main stakeholders of the project's value for nature, it is important that Delta21 adapt their argumentation to the interests of the organisation they are addressing (benefits for nature in general as opposed to contributions to the Natura 2000 objectives). Next to collaborating with policy makers and area managers, we advise them to learn from and look for synergies with alternative projects.

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1 Advice to Delta21

This report aims to inform Delta21 about the project's expected environmental effects on the Voordelta, a designated Natura 2000 site that is subject to strict regulatory protection measures. For Delta21 to have a chance at approval by the relevant Natura 2000 authorities, it must follow the legal requirements prescribed by the Nature Conservation Act and contribute to the area-specific objectives set out in the Voordelta management plan (Rijkswaterstaat, 2016a). Based on (1) an assessment of the expected changes in the area due to the current project design and (2) an analysis of the underlying legislation, we propose a number of mitigation and compensation measures and offer some general recommendations. We expect that, by following this advice, Delta21 will be able to minimize its negative effects on the Voordelta's ecology and increase its chances of getting approved by Natura 2000 stakeholders.

To facilitate overall readability, the main assessment results and implications for Delta21 are summarized in blue boxes throughout the report. The advice presented in the remainder of this section follows from these results.

As outlined in this report's policy analysis (section 4.2), Natura 2000 regulations demand that projects to be implemented in Natura 2000 areas contribute towards achieving the conservation objectives laid out in the site's management plan. If this is not the case, i.e. the prescribed environmental impact analysis conducted by the project owner leads to the conclusion that the project is expected to (partly) degrade the quality of the area's habitats or disrupt the species present, the last possibility to get the project approved is by passing the ADC-test (see section 4.2.4).

The environmental assessment conducted for this report (section 4.1) revealed mixed effects of the Delta21 project on the affected area's habitats and species. The focus of the assessment was set on the Hinderplaat and Slikken van Voorne due to their proximity to the project site and their importance for Natura 2000. Though the positive effects listed hereunder may help Delta21 advocate the project's contribution to the Natura 2000 objectives for the area, we expect its negative effects to represent major bottlenecks to getting it approved by the competent authorities.

Positive expected effects of Delta21

- Slikken van Voorne's size increases due to siltation
- Expanded Slikken area increases food availability for stilts and ducks
- Fish migration is promoted by opening the Haringvliet sluices
- New delta system with (small) sandbanks might form at the end of the Slijkgat

Negative expected effects of Delta21

- Loss of H1110 (permanently flooded sandbanks) due to siltation and the ESL construction
- Boundary structures of the tidal lake located on the Hinderplaat
- Loss of the Hinderplaat as a sandbank due to siltation
- Dune habitats H2110 and H2120 are expected to become overgrown
- Most important resting place for seals will disappear
- Some piscivorous bird species are expected to be negatively affected

According to Natura 2000 legislation, any loss of habitat or disruption of species must be prevented and can only be indemnified by providing the same area and type of lost habitat somewhere else. In the case of Delta21, the main issues according to Natura 2000 are the losses in habitat types H1140B

(Silt and sandbanks (North Sea coastline); at the Hinderplaat) and H1110 (Permanently flooded sandbanks). Though it can be argued that H1140B can be compensated by the creation of a sandbank next to the tidal lake and possibly the natural formation of sandbanks southwest of the ESL, the area of H1110 that will be covered up by the construction of the ESL represents a critical argument against the project according to Natura 2000 (Baptist, interview, Appendix B11, 2020).

Considering the significant negative effects of the Delta21 project on certain key habitats and species in the Voordelta, we expect Delta21 to be obliged to conduct an ADC-test. For this, we advise them to follow the procedure outlined in section 4.2.4. For a more detailed roadmap of the steps to take when conducting an ADC-test, they may consult the *"Handreiking ADC-toets"* (Bij12, 2019). For reference on the arguments and compensatory measures required to get a project like Delta21 approved, they can consult the ADC test that was conducted for Maasvlakte II (document title "Rotterdam"). It is important to note that, although the final evaluation report on the compensation of the Maasvlakte II has not been published yet (expected release towards the end of 2020), it is becoming clear that the compensatory measures are failing to deliver their promised results (Baptist, interview, Appendix B11, 2020). This will likely pose an additional obstacle to Delta21, whose planned compensation measures will be met with an increased dose of scepticism. Furthermore, it is likely that Natura 2000 authorities will consider the cumulative impact of the projects in the area when assessing Delta21. In that case, they may conclude that Maasvlakte II is already placing too heavy of a strain on the area to be able to allow additional harmful interventions in the Voordelta (Baptist, interview, Appendix B11, 2020).

The ADC-test mandates that Delta21 fulfil three conditions in order to be approved by Natura 2000 authorities. Firstly, it will have to prove that the project represents the best alternative to address the issues it aims to solve. To do so, an assessment of competing solutions for energy storage, flood prevention and environmental restoration should be conducted. Secondly, it will have to argue that Delta21's objectives are of "overriding interest" in terms of public health, public safety or substantially beneficial effects on the environment (Bij12, 2019). Lastly, Delta21 will have to take adequate mitigation and compensation measures for its adverse effects on the area's nature values in its project design.

Mitigation is understood as measures taken within the project design to limit the adverse effects on the nature values protected by the area's management plan. Compensation is done when certain adverse effects of the project cannot be mitigated; it denotes measures taken outside the scope of the project design to counterbalance its adverse effects (Wetten Overheid, 2019). Based on our environmental assessment (section 4.1), we advise Delta21 to include the following mitigation and compensation measures in the project design.

Mitigation

- Aim for an improved Kierbesluit: open sluices are the preferred option between open sluices and the current Kierbesluit for nature, but this might not be feasible due to a lack of freshwater availability in the Haringvliet. Hence, consider an improved Kierbesluit (in terms of actual value for nature opening the sluices is better; but in terms of Natura 2000 the Kierbesluit creates less changes to the current situation).
- Adjust the planned size of the opening between the tidal lake and the sea, depending on the volume of the tidal lake. If the volume is bigger, the opening needs to be larger to minimize the change in tidal range.

- Minimize the size of the ESL and tidal lake to limit the amount of natural area that will be impacted (this is more important than avoiding constructions on the Hinderplaat, as it will be lost to siltation either way; the siltation cannot be avoided)
- Do not intervene (dredge) in the Slijkgat and Rak van Scheelhoek channels. This will primarily be another disturbance in the area, which should be avoided. If the sluices are opened, the Slijkgat will erode naturally.

Compensation

- Loss of habitat type H1140B (Hinderplaat): create a new sandbank of at least the size of the current Hinderplaat (sheltered by the ESL, minimize the disturbance of seals by prohibiting recreational activities near the sandbank).
- Likely degradation of H2110 (Embryonic dunes) and H2120 (White dunes): If the sandbank is at least 100m wide, new embryonic and white dunes might form on this sand bank.
- Loss of habitat type H1110 (permanently flooded sandbanks lost due to the ESL): ideally, create a new protected area of type H1110 (at least size of the ESL) outside of the current Natura 2000 area. As this was not possible in the case of Maasvlakte II, it will likely prove difficult for Delta21 as well. However, it represents the only way to compensate for the loss of H1110 according to Natura 2000.

Other considerations for getting Delta21 approved

Considering the broad variety of stakeholders with different roles, degrees of involvement, and degrees of executive power in the Voordelta and the adjacent Natura 2000 sites (see sections 4.2.2 and 4.2.3 for an outline of the formally appointed authorities), Delta21 should ensure that they take the relevant stakeholders' interests into account in their project design and stay in close contact with those in power. This includes explicit stakeholders such as Natura 2000 site managers and policy makers, as well as implicit stakeholders like citizens or NGOs that rely on activism to influence political decisions.

For the relevant stakeholders to be able to have their interests taken into consideration and feel included in the project design, but also because they often represent a valuable source of knowledge and connection to untapped contacts, Delta21 should involve them from an early stage (van Peijpe, interview, Appendix B5, 2020). Failing to do so may create obstacles to reaching the necessary political momentum and getting the project approved by all affected parties later on. Therefore, Delta21 should constantly monitor its stakeholder environment, openly communicate about its intentions and look for collaboration.

An important distinction to make when communicating with the project's stakeholders is between impacts of Delta21 that can be considered beneficial for nature in general and the ones that are desired by Natura 2000. As outlined in section 3.2.4 ("The broader debate on Natura 2000 legislation"), Natura 2000 objectives disregard the highly dynamic and integrated nature of ecosystems by setting static goals that are confined to small areas. Thus, the type of stakeholder addressed dictates the argumentation that will be necessary to convince them about the value of the project. Specifically, stakeholders responsible for defending Natura 2000 objectives (provinces, Ministry of Agriculture, Nature and Food Quality, Ministry of Economic Affairs) need to be convinced of Delta21's contribution to the Natura 2000 objectives listed in the Voordelta management plan. The municipalities and respective area managers likely have more area-specific objectives rather than an integrated view of the entire Voordelta region. Lastly, NGOs that aim to protect the integrity of nature as a whole (e.g. World Wildlife Fund (WWF)) should be convinced of the positive net effect of the project on nature.

> "*The challenge is to turn a necessary intervention into a win-win for all parties involved. Legislation is static, and values are subjective. Interventions can often be justified by looking at their net effect on nature, which may be positive*." (Fiselier, interview, Appendix B7, 2020)

Needless to say, the most important stakeholders that Delta21 must convince to get the project approved are the ones that hold the formal authority to grant permits for interventions in the Voordelta, i.e. the province of Zuid-Holland and the Ministry of Economic Affairs. It became apparent in the interviews we conducted that certain key stakeholders (including the province of Zuid-Holland, Zuid-Hollands Landschap, Natuurmonumenten, the municipality of Westvoorne, Havenbedrijf Rotterdam and Goeree Overflakkee) are currently opposed to Delta21 and have joint alternative plans for the management of the area (van der Pol, interview, 2020). An important endeavour for Delta21 thus consists of restoring a constructive dialogue with these parties to be part of their considerations. Considering the difficulty of this task at this point, we propose that Delta21 commission a third party to investigate possibilities to improve their relations with opposed stakeholders (e.g. ACT group, Royal Haskoning).

The ADC-test stipulates that a project must be the best alternative to get its objectives achieved in order to be approved. This implies that Delta21 should be aware of other projects aimed at flood prevention, energy storage and nature restoration to be able to defend their project vis-à-vis the Dutch authorities and the European Commission. We advise them to look to these alternative plans for inspiration on possible project design improvements, consider cooperating with other project owners and create synergies. Ultimately, Delta21 will have to prove that it is indispensable and the optimal solution for the issues it addresses. As it stands now, it seems that there is still considerable doubt among the relevant stakeholders that the project represents the best alternative. In summary:

> *"The main objective at this time should be to convince politicians about the urgency and need for this project. It is a matter of framing. Given rising sea levels, it is obvious that major interventions will be needed in this part of the Netherlands, either strengthening of the dikes, or a more innovative plan like Delta21. Whenever the political momentum is there, the plan should be part of the consideration*." (Fiselier, interview, Appendix B7, 2020)

Recommendations for further research

A variety of new topics to investigate emerged while we conducted our research. Due to the limited focus of this report, some questions remained unanswered and should be addressed by future research. Some of these topics are listed hereunder:

- Effects of the size of the opening between the tidal lake and the sea
- Shape and size of the tidal lake and ESL
- Baseline assessment to determine which species are currently present in the area
- Expected changes in quality of habitat types rather than only size (once there is a final project design)
- Assessment of alternative/competing projects for energy storage and flood prevention

2.1 Introduction

About 25 percent of the Netherlands is situated below sea level. Without the current protection measures, an estimated 65 percent of the country would be susceptible to flooding from the sea and rivers (Wesselink et al., 2007). After the flood of 1953, a national reinforcement of the flood prevention structures was initiated by the Dutch government. This included the Delta Project: one of the largest hydraulic engineering projects of its time (Pilarczyk, 2012). The project aimed to improve the safety of the Southwest of the Netherlands by shortening and reinforcing the coastline. This was accomplished by closing off the inlets and estuaries. As part of the Delta project, the Haringvliet sluices were built. This construction closed off the estuary of the Haringvliet and was built to ensure the safety of the inhabitants living in the area between Dordrecht and the Haringvliet outlet (Pilarczyk, 2012).

However, due to sea level rising and peak drainage in the rivers, the current situation needs to be adapted. To solve this, Huub Lavooij and Leen Berke devised a plan called Delta21. Their ambition is to solve the water safety problem without increasing the height of the dykes and the dependence on mechanical sluices (Berke & Lavooij, 2018). In addition to inundation prevention, the project will pursue the goals of sustainable energy and nature restoration. A short description of the three project goals is given below.

Inundation Prevention

To improve protection against inundation, Delta21 foresees the construction of a lake referred to as the Energy Storage Lake (ESL). This lake will be situated adjacent to the sea, thus creating a tidal lake between the ESL and the Haringvliet sluices (see Figure 1). Every 5 to 10 years, high river discharge and spring tide occurring simultaneously increase the inundation risk in the Haringvliet area. In that case, the ESL's water inlets are opened so excess river water can flow from the tidal lake into the ESL to avoid flooding of the surrounding areas without having to rely on dykes. The water will subsequently be discharged to the sea via a pumping system. This will increase the safety in the southwestern part of the Netherlands without having to further strengthen the dykes (Berke & Lavooij, 2018).

Sustainable Energy

A pumped hydro storage system is created that uses excess renewable (hydro or solar) energy to pump water out of the ESL when the demand for energy is lower than the production. At times of energy shortage, the water inlet is opened and seawater flows into the ESL through hydro turbines. This way, energy is generated using the hydropower that results from the difference in height between the ESL and the sea (Berke & Lavooij, 2017). This energy conversion has an approximate energy retention rate of 70 percent. At the same time, this ensures the continuous functionality of the pumps (H. Lavooij, pers. comm. Jan. 10, 2020).

Nature Restoration

After the completion of the Delta Project in 1986, the ecological consequences of closing the Haringvliet inlets into the sea became clear. The stagnant water in the closed-off estuaries and the inflow of polluted river water resulted in pollution problems. As a result, the government decided that the Oosterschelde would be partially closed (Wesselink et al., 2007). The closing of the Haringvliet, which was effectuated in 1970, changed the water conditions in the river from brackish to fresh and their associated biotopes. Delta21 aims to restore the brackish conditions in the Haringvliet and to enable fish to migrate upstream again. Some of the opportunities and challenges of restoring fish migration are summarized in Bensink et al., 2019.

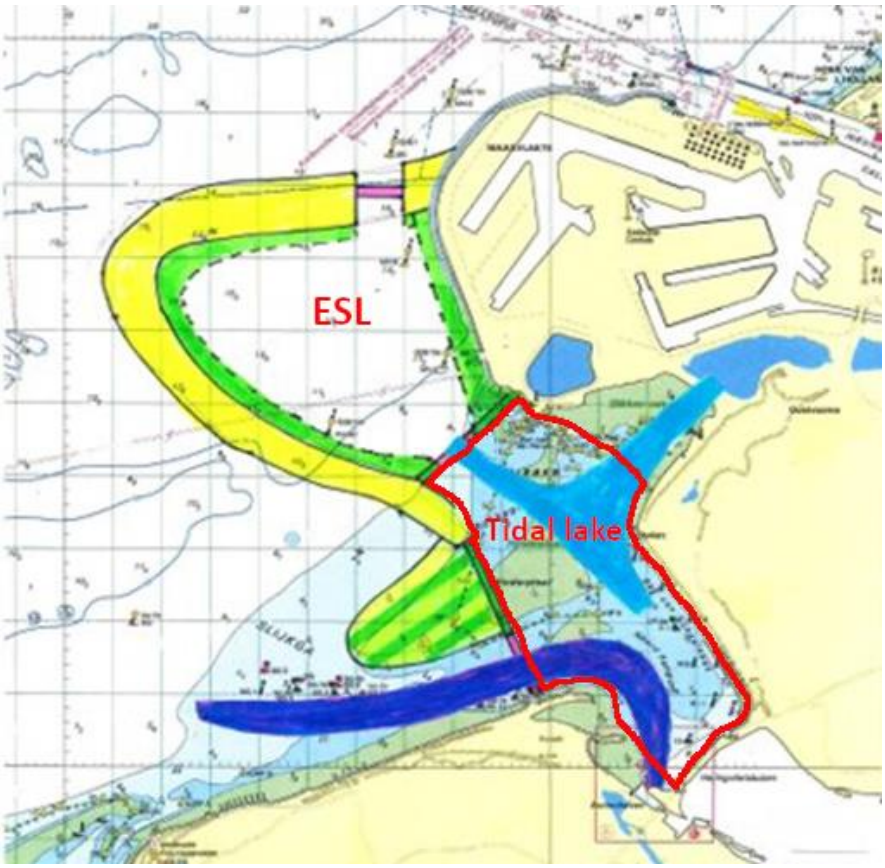

Figure 1. Most recent sketch of the Delta21 project design. In yellow: dykes/dunes that are the boundaries of the energy storage lake. Area within red line: tidal lake. Green/yellow striped: proposed new sand bank. Light blue: trench. Dark blue: main water outlet and inlet of Haringvliet. Adapted from: H. Lavooij, pers. comm. 10th Jan 2020

2.2 Project problem definition

As the development of Delta21 progresses, the design is continuously adapted to meet the demands of all stakeholders. The measures aimed at inundation prevention and energy storage promise to deliver valuable results. The goal of nature restoration, however, is still inadequately addressed in the current project design. Even though Delta21 is expected to positively influence nature values by restoring brackish water conditions of the Haringvliet estuary and fish migration, the project is still being opposed by several actors due to potential negative environmental effects. This is mainly because Delta21 is located in the Voordelta, an area that has been designated as a Natura 2000 area under both the Habitats and Birds Directives (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2020). Delta21 is expected to alter the environmental values of the area as defined under Natura 2000 legislation. This poses an obstacle to the approval of Delta21.

Although Delta21 is expected to have an impact on the entire area of the Voordelta, this report focuses on the effect on two specific areas within the Voordelta: the Hinderplaat and the Slikken van Voorne (see Figure 2). There are two main reasons for the selection of these two areas specifically. Firstly, the fact that these areas are considered as two of the three most important intertidal areas of the Voordelta because of their special meaning for the conservation goals of the area (Arts et al,

2016). Secondly, the impact on these areas is expected to be the highest since they are situated near or in the exact location of the planned interventions.

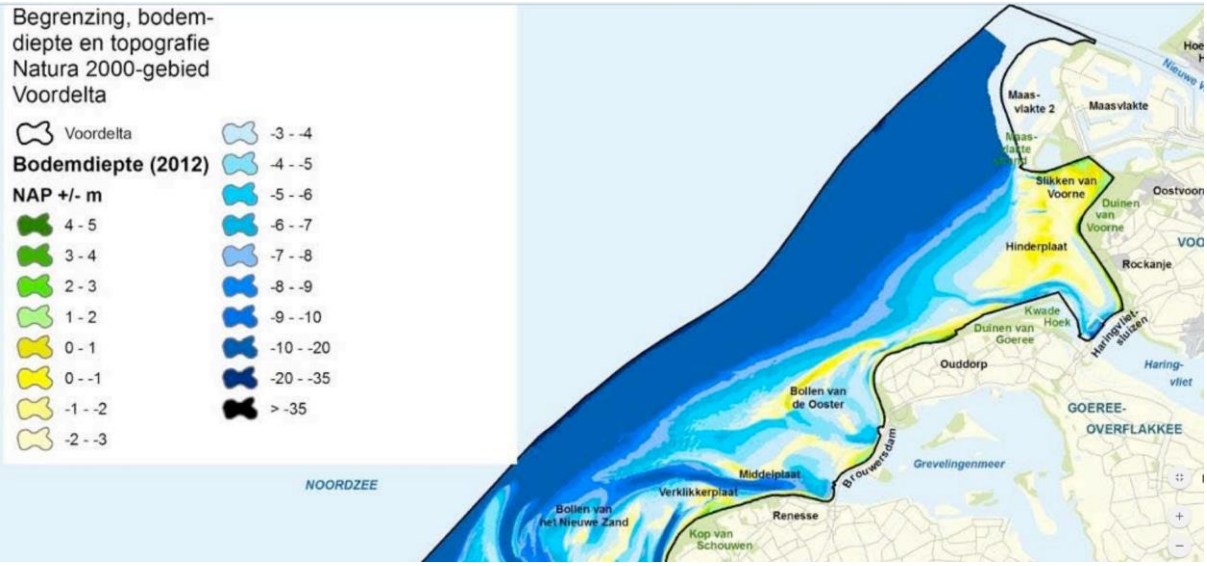

Figure 2. The Natura 2000 area "Voordelta" and its border, topography and soil depth. The Hinderplaat and the Slikken van Voorne are found in the northeastern corner of the Voordelta. Source: RWS, IENW (2016)

2.3 Integrated project purpose and research questions

The main goal of this research project is to provide Delta21 with valuable insights into the implications their project might have on the nature values in the Voordelta, thus providing them with relevant arguments in their quest for project approval. This section presents as a description of the research focus and the sub-questions that were answered to reach the project goal.

Project purpose: Assess the impact of Delta21 on nature (values) in critical areas of the Voordelta (i.e. Hinderplaat and Slikken van Voorne) and identify the related bottlenecks for project approval by Natura 2000 authorities.

Since the Hinderplaat and the Slikken van Voorne are expected to change significantly with the realization of Delta21 and are considered crucial areas within the Voordelta, possible negative impacts of Delta21 on these areas are most likely to hinder the approval of the project by Natura 2000 authorities. A thorough assessment of the Hinderplaat and the Slikken van Voorne is needed for Delta21 to be better informed when discussing the implications of their project for nature. Moreover, Delta21 must understand the legal background of Natura 2000 to be able to take the measures required to get the project approved. The project purpose translates into the following main research question:

Main research question: What are the impacts of Delta21 on nature (values) in the Hinderplaat and the Slikken van Voorne (both in absolute and relative terms as compared to the total Voordelta) and which ones are most likely to represent bottlenecks to project approval by Natura 2000 authorities?

To answer the main research question, the following sub-research questions are addressed:

- Which habitat types and species are most important to Natura 2000 in the selected areas?

- Which habitat types will (likely) disappear/emerge in the selected areas after the completion of Delta21 and what is the relative impact on the total area of these habitats in the Voordelta?
- Which species will (likely) disappear/emerge in the selected areas after the completion of Delta21?
- What are the legislative procedures and requirements to have infrastructural projects approved in Natura 2000 areas?
- Would the creation of a new sandbank as part of the Delta21 measures alleviate the identified bottlenecks to project approval by Natura 2000 authorities?

2.4 Methods

This section explains which information was used to answer the research questions, and how this information was obtained.

2.4.1 Environmental assessment

In order to answer the first three sub-research questions, an environmental assessment of the area was conducted. This part describes the procedures used for the assessment. It is important to note that environmental assessments normally consist of extensive in-depth field research. However, field work to obtain data about environmental processes has not been part of this research, because this was beyond the scope of our research. The type of data used for this environmental assessment is described in detail in this section and section 2.4.2.

To make statements about expected changes on habitat types and species within the focus areas, it was necessary to look at their underlying abiotic processes. Three main processes have been identified: currents, morphology and water composition. Delta21 indirectly impacts habitat types and species, mediated by the aforementioned abiotic factors (see Figure 3). Besides the three abiotic processes, the environmental assessment will also differentiate between two distinct scenarios: [1] the opening of the Haringvliet sluices and [2] the current situation with the Kierbesluit. The expected impact of Delta21 on the abiotic processes, and thus indirectly on habitat types and species, is assessed under both scenarios. The components of Figure 3 will be further elaborated on in the section below.

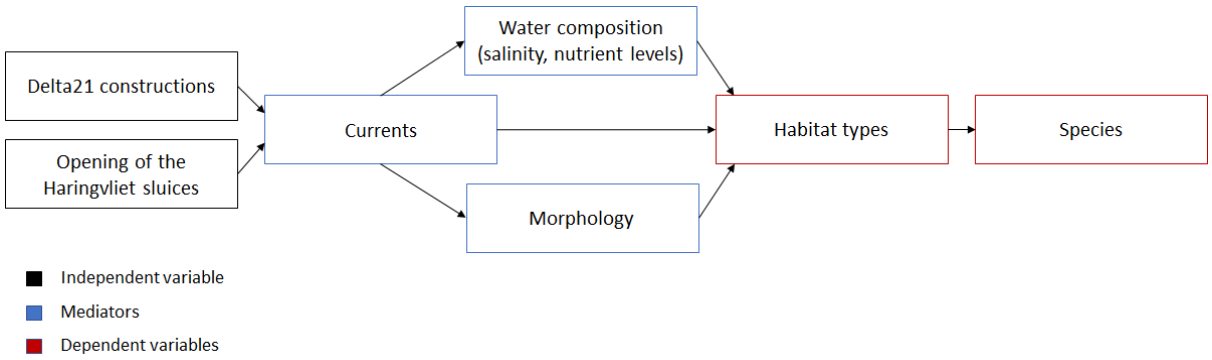

Figure 3. Conceptual model of how Delta21 is expected to impact habitat types and species. To predict the impact of Delta21 (and the opening of the Haringvliet sluices) on habitats and species in the selected areas, an assessment of expected changes in currents, water composition and morphology is needed. Adapted from DELTADO Research Proposal.

Two scenarios
In the Delta21 plan, the opening of the Haringvliet sluices is included. Currently, the sluices are opened according to the "Kierbesluit". Based on this Kierbesluit, the sluices are managed in a way that enables a salt - fresh water transition in the Haringvliet, which is necessary for migratory fish. At the same time, the primary function of flood defence is maintained. Freshwater availability is ensured by closing the sluices when the discharge in the Rhine is less than 1500 m^3/s at high tide or less than 1100 m^3/s at low tide. In dry years, this means that the sluices can still be closed for an extended period (Astma, 2011). This will happen mainly around October. It is calculated that once every three years the sluices will be closed for over a month, in dryer years this can be up to two to three months. In this period, especially migratory fish that want to enter the Haringvliet are hindered (Noordhuis, 2017).

Opening the Haringvliet sluices entirely and permanently might be challenging as previous investigations of this scenario have shown (Wijsman et al., 2018). Moreover, it is expected that the changes in the abiotic processes that are due to the Delta21 structures would be exacerbated by an opening of the Haringvliet sluices. To distinguish between these two causal factors, both scenarios are considered in the environmental assessment. Throughout the results, differences in impact between the scenarios are highlighted.

Abiotic processes
Three abiotic processes are expected to be influenced by Delta21 (see Figure 3). For all three processes, the current situation is described based on available literature and interviews. The expected changes are assessed using the information obtained in the interviews.

The first abiotic process that will be influenced due to Delta21 (both the structures and the opening of the sluices) are the currents. Changes in currents influence the morphology and water composition. In the morphology section, the current situation and expected changes in sedimentation and erosion are described. For water composition, both salinity and nutrient levels are expected to be affected.

Natura 2000 habitat types
The abiotic processes influence the Natura 2000 habitat types in the area (Figure 3). The existing habitat types are described based on available literature (section 3.1). The influence of changes in abiotic processes on the size of the Natura 2000 habitat types is assessed based on sections 4.1.1 - 4.1.3, interviews and literature. The current study only assesses changes in the size of the habitat types, rather than including the quality of the habitats, as this is outside of the scope of this environmental assessment. In order to conduct a reliable assessment of the quality of the habitat types after the implementation of Delta21, a more detailed analysis is needed. The effects of opening the sluices as opposed to the current Kierbesluit are summarized in tabular format. The gradations used are displayed in Table 1. Table 2 shows the template that was used to depict the differences between the two scenarios that were investigated. The effects are estimated based on the severity of the expected relative changes in the abiotic factors.

Table 1. Indicators for gradations of impact in assessment tables.

++	Very positive effect
+	Positive effect
0	No significant effect
-	Negative effect
--	Very negative effect

Table 2. Template for habitat type assessment.

Habitat type	Scenario 1	Scenario 2
H1110 Permanently flooded sandbanks	+	0
…	…	…

Natura 2000 species

The Voordelta is home to several animal species taken up in the Habitats and Birds Directives. The species present in the area are further described in the Area description (section 3). Changes in habitat types will inevitably affect Natura 2000 species, since the species utilize these habitats to forage and rest. Whether any particular species would be positively or negatively affected by Delta21 was assessed in terms of a qualitative change in living conditions in response to a change in habitat size. For example, if Delta21 were to reduce the area of habitat type H1110 (permanently flooded sandbanks), the food availability for porpoises would be negatively affected as fish populations would decrease. This represents a negative effect on the porpoises' living conditions.

For the Habitats Directive species, the data on expected relative change in living conditions was obtained through interviews with ecology experts and researchers.

Concerning the Birds Directive species, relative changes in living conditions are estimated based on three aspects; distribution range (DR), purpose of use (U) and importance of the Voordelta to the specific species (IV). These aspects are important for the life cycles of bird species and are derived from data in Beheerplan Voordelta 2015-2021 (Rijkswaterstaat, 2016b). For each of these aspects, the change in living conditions in response to changes in habitat size was approximated. Consequently, using Formula (1), an approximate value for relative change in overall living conditions was calculated.

$$(1)\quad Living\ conditions = \frac{DR \times (U + IV)}{4}$$

The distribution range (DR) was assessed by assigning bird species that use negatively affected areas a -2 and species that are found only on a positively affected area a 2. Species that use a positively affected area, but also use other areas score a 1. If the species are not found on in either of the focal areas, they score a 0. For the Use (U), we assigned a 2 to species that use the Voordelta as a sleeping/resting area as well as foraging area, and a 1 to species that use the area as a sleeping/resting area **or** as foraging area. The Importance in the Voordelta (IV) was derived from the scores mentioned in the Voordelta management plan (Rijkswaterstaat, 2016). The more a species relies on the Natura 2000 area, the higher the score ('-' = 1, '+' = 2 and '++' = 3). This score was assigned based on the distribution of specific species in the Voordelta relative to its distribution in Europe. For instance, if a specific species only inhabits the Voordelta and is seen nowhere else in Europe, the positive or negative effect of Delta21 on that species is amplified.

These three scores are used to calculate the final score, using formula (1), where DR serves as a base of the formula. If species use positively affected areas, the final score is positive, while species using the negatively affected areas have a negative final score. The DR score is amplified by U and IV, because the more a species use the area and important the area is, the larger their negative or positive influence will be. Lastly, the denominator has a value of 4 to skew the score of 'Impact' to a

final score between 2 and -2. A value of 2 is then transposed to '++', a value of 1 to '+', a value of 0 to '0', a value of-1 to '-' and a value of -2 to '--'. A detailed table with all used data from Beheerplan Voordelta 2015-2021 is shown in Appendix D.

Tables 3 and 4 served as templates to assess the general impact of Delta21 in terms of habitat types, and Habitats and Birds Directive species. Within these assessment tables, gradations of impact are indicated by the corresponding signs as seen in Table 1.

Table 3. Template for Habitats Directive key species assessment.

Key species	Latin name	Scenario 1	Scenario 2
H1365 Common seal	*Phoca vitulina*	+	-
...		...	...

Table 4. Template for Birds Directive species assessment.

Species	Latin name	Scenario 1	Scenario 2
A001 Red-throated loon	*Gavia stellata*	+	-
...		...	...

Relative impact on the whole Voordelta

Lastly, the relative impact of Delta21 on the entire Voordelta was investigated. The area size of the affected habitat types in the Hinderplaat and the Slikken van Voorne were expressed as a percentage of the total area size of these habitat types in the Voordelta. Table 6, which serves as a template for the assessment, shows hypothetical habitat type sizes in the Hinderplaat, the Slikken van Voorne and in the whole Voordelta. Assuming all habitat types in the Hinderplaat and the Slikken van Voorne are impacted by Delta21, we calculated what percentage of habitat types in the whole Voordelta are impacted as a result, using Formula (2). The habitat type sizes were calculated combining the Aerius Calculator, the management plan of the Voordelta and the Natura 2000 Network Viewer (Rijkswaterstaat, 2016b; European Environment Agency, 2018; Rijksinstituut voor Volksgezondheid en Milieu, 2019).

$$(2)\ Percentage\ impacted = \frac{habitat\ type\ size\ in\ Slikken\ van\ Voorne + Hinderplaat}{habitat\ type\ size\ in\ whole\ Voordelta} \times 100\%$$

This percentage serves as an indication of the importance of each impacted habitat type and can therefore be used to provide implications for mitigation. The relative importance is then expressed in gradations (A, B and C) as seen in Table 5. (Rijkswaterstaat, 2016b; European Environment Agency, 2018; Rijksinstituut voor Volksgezondheid en Milieu, 2019; Ministry of Agriculture, Nature and Food Quality, 2008).

Table 5. Indicators used for gradations of relative importance (Ministry of Agriculture, Nature and Food Quality, 2008).

A	makes up > 4% of habitat type in Europe
B	large relative importance (makes up 0,5 - 4% of habitat type in Europe)

C	considerable relative importance (makes up < 0,5% of habitat type in Europe)

Table 6. Template for assessment of relative Delta21 effects on the whole Voordelta. Calculates what percentage of the Voordelta is impacted as a result of changes in the Hinderplaat and Slikken van Voorne.

Habitat type	Area size in the Slikken van Voorne	Area size on the Hinderplaat	Area size in Voordelta	Percentage impacted	Relative importance in Europe
H1140 Slik- en zandplaten	50 ha	90 ha	600 ha	23%	A
…	…	…	…	…	…

2.4.2 Data sources

In order to conduct the environmental assessment as described above to determine the impact of Delta21 on different habitat types in the selected areas, several data sources were used. The same accounts for the last two sub-questions, aimed at policy related issues and bottlenecks.

Firstly, the management plan of the area served as a valuable source of information to understand what the priorities in terms of ecological values are, since conservation goals and measures to reach those are mentioned specifically. Documents about EU policy on Natura 2000 areas and the Dutch Nature Conservation Act were also studied. This was needed to identify the main bottlenecks and opportunities, both in terms of ecology and policy, for Delta21 to proceed.

Secondly, other projects that influenced delta nature in the Netherlands were used to make predictions about what will happen to the selected areas. First, a pre-selection was made of projects that are comparable in terms of implementation and decision making. This selection consisted of three projects, namely the Maasvlakte, the Zandmotor and the Markerwadden. After a thorough analysis of these projects, it was decided to focus on the Maasvlakte II only, since this project has most similarities with Delta21 in terms of necessary constructions, the area of implementation, the stakeholders and the main goal and argumentation of the plan. Important lessons from this project were drawn about the way impacts on nature were taken into account during the planning stage and how loss of nature was compensated. The Markerwadden and the Zandmotor were found to be less relevant because of their strong focus on building with nature, thus actively creating benefits for nature. These projects might be very useful when it is clear which impact Delta21 will have on the nature in the Voordelta. The plans could then serve as inspiration to mitigate and compensate the potential loss of nature.

Lastly, interviews with policy makers, managers and experts in relevant fields were held to gain additional information and to obtain in-depth information on expected changes to the area and the main expected bottlenecks for the projects. One of the first steps in this research consisted of a stakeholder analysis. From this stakeholder analysis, the most interesting organisations to interview were identified. Table 7 shows the groups of stakeholders and organisations we intended to interview. Besides mentioning the names of the organisations and how we categorised them, a general description of topics they can provide information on is given in the last column.

Table 7. Main stakeholder groups to be interviewed.

Stakeholder group	Organisations	Topics to be addressed
EU / Natura 2000 / Politicians	Ministry of Agriculture, Nature and Food Quality / LIFE-IP, Municipality of Westvoorne	Legislation on Natura 2000 and possible nature compensation measures
Natura 2000 managers	Rijkswaterstaat, Staatsbosbeheer, Zuid-Hollands Landschap	Legislation and management of Natura 2000 area, environmental state of the area, expectations and opinions on Delta21, compensation measures
Researchers / Consultancies	Wageningen Marine Research, Svašek Hydraulics, Deltares, Van der Goes & Groot Consultancy, Royal Haskoning DHV	Environmental dynamics in Delta area, stakeholders involved
Nature organisations	Staatsbosbeheer, Natuurmonumenten, WWF	Assessment of environmental state of the area, expectations and opinions on Delta21, compensation measures

From the twelve organisations we contacted with an interview request, nine were willing to cooperate. Zuid-Hollands Landschap was not willing to cooperate because they did not want to be involved with Delta21. Natuurmonumenten and WWF did not manage to find time to assist us. As a result, the view of leading nature organisations and the manager of the focus areas could not be included in this research. However, by speaking to other organisations that manage Natura 2000 areas (Rijkswaterstaat and Staatsbosbeheer) we managed to get insight in the role of managing institutions.

As some of the interviewees did not want to make statements in the name of their respective organisations, references throughout the text refer to the name of the interviewee rather than the organisation interviewed. Information should not be interpreted as reflecting the views of organisations unless this is explicitly stated.

In the table above, a general division of stakeholder groups was made. In order to answer our research questions, however, a more detailed division had to be made about which organizations could contribute to specific research questions. In order to answer the main research question, the conceptual model (Figure 3) was of great importance. Information about the abiotic processes (currents, morphology and water composition) mentioned in the conceptual model were essential. It is only when this information was available that predictions could be made by ecologists about what will happen to habitat types and species. For the choice of interviews, this meant that experts on abiotic processes were interviewed prior to experts on marine ecology. Information was thus additive.

Regarding the policy analysis, stakeholders that have a different position in the decision-making process were interviewed independently, this way creating a holistic overview of the process. We

strived towards a balance between experts in abiotic processes (such as morphology, currents and water composition), marine ecology and legislation of Natura 2000 areas. In Table 8, an overview is given of all the interviewees, their expertise and main contribution in this report.

Table 8. Overview of personal contacts of each organization and their fields of expertise.

Organisations	**Interviewees**	**Field of expertise**	**Contribution to specific topic (section of report)**
Svašek Hydraulics	Bram Bliek	Currents, waves and sedimentation processes; hydraulics	Currents (4.1.1) Morphology (4.1.2) Water composition (4.1.3)
Wageningen Marine Research (WMR)	Martin Baptist Johan Craeymeersch	Marine ecology, civil engineering projects in nature, Building with Nature, monitoring nature, nature evaluation	Effects on habitat types & species (4.1.4) Implementing infrastructural projects in Natura 2000 (4.2.4)
Staatsbosbeheer	Tara Schelling Theo Muusse	Management of nature areas, nature monitoring	Morphology (4.1.2) Effects on habitat types & species (4.1.4)
Deltares	Arno Nolte Theo Prins	Ecosystem management, coastal systems, marine ecology	Currents (4.1.1) Morphology (4.1.2) Water composition (4.1.3)
Van der Goes & Groot ecologisch onderzoeks- en adviesbureau	Dirk van der Goes	Monitoring and evaluation on nature, nature values	Morphology (4.1.2) Effects on habitat types & species (4.1.4)
Engaged local	Henk Bal	Social environment of the area	Policy Analysis (4.2)
LIFE-IP	Jip van Peijpe	Governance, Natura 2000 legislation	Policy Analysis (4.2)
Rijkswaterstaat (RWS)	JJM Brinkhof	Ecosysteem engineering, Building with Nature	Policy Analysis (4.2)
Royal Haskoning	Jasper Fiselier	Implementation of projects in Natura 2000 areas	Policy Analysis (4.2)
Gemeente Westvoorne	Lies van der Poel	Governance, socio-economic environment of the area	Policy Analysis (4.2)

More specifically, we conducted semi-structured interviews, which means that there is some degree of predetermined order of topics addressed, but flexibility in the way issues are addressed by the interviewees is still ensured (Longhurst, 2003). One main advantage of semi-structured interviews is that it can be structured into segments, moving from fully open questions to questions that are more theoretically driven (Galleta, 2013). By doing semi-structured interviews, we could ensure we asked similar questions to all respondents while at the same time remaining flexible to move in the direction/expertise that respondents could contribute to the most. In Box 1, the questionnaire used for the interviews can be found. This questionnaire contains our main questions that we wanted to have answered and served as a guideline during the interviews. The first two questions and the last three were asked to everyone. Depending on the expertise of the interviewee, expertise-specific questions were asked. These questions can be found in the interview summaries in Appendix B.

Box 1. Guide for the conducting the semi-structured interviews

What is your experience with the implementation of projects in Natura 2000 areas?

Are you familiar with Delta21? / How are you involved in Delta21?

Depending on the specific expertise of interviewees and the expected contribution to certain research questions (Table 8), tailor-made questions were asked to each interviewee. These questions can be found in the interview summaries in Appendix B.

Do you have ideas about mitigation and/or compensation measures?

What are the main bottlenecks Delta21 will encounter?

How likely do you think it is that Delta21 will be realized?

After each interview, a summary was made, highlighting the main points of interest and useful information in answering the research questions. This summary was sent to the interviewees to review the content and give permission for their statements to be used in the report. The final versions of the interview summaries can be found in Appendix B. The information from these final summaries is used and referred to throughout the report.

3 Area description

This chapter will give an in-depth description of the research areas. The focus will be on nature values as described by Natura 2000 legislation, meaning that social and economic aspects that characterize the area will not be discussed. The area description below can be understood as the way nature organisations look at the area.

3.1 Voordelta

The Voordelta was appointed a Natura 2000 area based on the Habitats Directive and the Birds Directive and has set aims to conserve and protect various habitat types and species important to the ecosystems in the Voordelta. The habitats present in the Voordelta according to Natura 2000, species taken up in the Habitats Directive, and the non-breeding bird species taken up in the Birds Directive are summarized in Tables 9, 10, 11 and 12 (Rijkswaterstaat, 2016b).

*Table 9. Natura 2000 habitat types located in the Slikken van Voorne. Source: Rijkswaterstaat (2014b) *Only area in the Voordelta where this habitat type occurs.*

Natura 2000 habitat type
H1110 Permanently flooded sandbanks
H1140A Silt and sandbanks (intertidal area)
H1310 Salty pioneer vegetation*
H1320 Spartina swards*
H1330 Atlantic salt meadows*
H2110 Embryonic dunes
H2120 Shifting Dunes

Table 10. Natura 2000 habitat types located in the Hinderplaat. Source: Rijkswaterstaat (2014b)

Natura 2000 habitat type
H1110 Permanently flooded sandbanks
H1140B Silt and sandbanks (North Sea coastline)

Table 11. Key species taken up in the Habitats Directive. Source: Rijkswaterstaat (2016b)

Key species
H1095 Sea Lamprey
H1099 River Lamprey
H1103 Fint
H1102 Shad
H1351 Porpoise
H1364 Grey seal
H1365 Common seal

Table 12. Bird species considered important by and taken up in the Birds Directive as a part of the Natura 2000 area 'Voordelta'. Source: Rijkswaterstaat (2016b)

A001	Red-throated diver	**A054**	Northern pintail	**A141**	Grey plover
A005	Great crested grebe	**A056**	Northern shoveler	**A144**	Sanderling
A007	Horned grebe	**A062**	Greater scaup	**A149**	Dunlin
A017	Great cormorant	**A063**	Common eider	**A157**	Bar-tailed godwit
A034	Eurasian spoonbill	**A065**	Common scoter	**A160**	Eurasian curlew
A043	Greylag goose	**A067**	Common goldeneye	**A162**	Common redshank
A048	Common shelduck	**A069**	Red-breasted merganser	**A169**	Ruddy turnstone
A050	Eurasian wigeon	**A130**	Eurasian oystercatcher	**A177**	Little gull
A051	Gadwall	**A132**	Pied avocet	**A191**	Sandwich tern
A052	Eurasian teal	**A137**	Common ringed plover	**A193**	Common tern

The habitat type *H1110 Permanently flooded sandbanks* is the main constituent of the Voordelta, with some spots of *H1140 Silt and sandbanks* areas which are sandbanks that function as foraging and resting spots for seals and many bird species. The Natura 2000 objectives for the Voordelta are therefore to preserve these sandbanks and prevent perturbations or disturbances. In the management plan of the Voordelta's five areas, mostly sandbanks have been chosen as focal points due to their significance for seal reproduction and bird foraging (Rijkswaterstaat, 2016).

As previously mentioned, the focus of this research will be the Slikken van Voorne and the Hinderplaat. For the location of these two areas, see Figure 4. A more detailed description of both areas can be found below.

3.2 Hinderplaat

For a long time, the Hinderplaat had no special value for water birds. It was merely used as a resting place by large numbers of seals and cormorants. However, after the reclamation of Maasvlakte II (2008-2012), some silting took place on Hinderplaat because it became more sheltered from wind and currents. The area developed into an important intertidal area in a short period of time, with many bird species foraging in the area today (Arts *et al*, 2016).
The Hinderplaat, consisting of many small sandbanks and the water surrounding it, is selected by Natura 2000 as one of the five major resting sites in the Voordelta. This resting site covers an area of 1250 ha. It functions as a resting and foraging site for the *Common seal* (H137) and many bird species, of which the *Common tern* (A193) and *Sandwich tern* (A191) are of most importance to Natura 2000. The characteristics of the Hinderplaat are summarized in Table 13.

Table 13. Summary of habitat types and which species have their resting and/or foraging site in the Hinderplaat.

Habitat types present	**Resting and/or foraging area for**
H1140 Silt and sandbanks	Common seal
	Sandwich tern
	Common tern
	Common eider

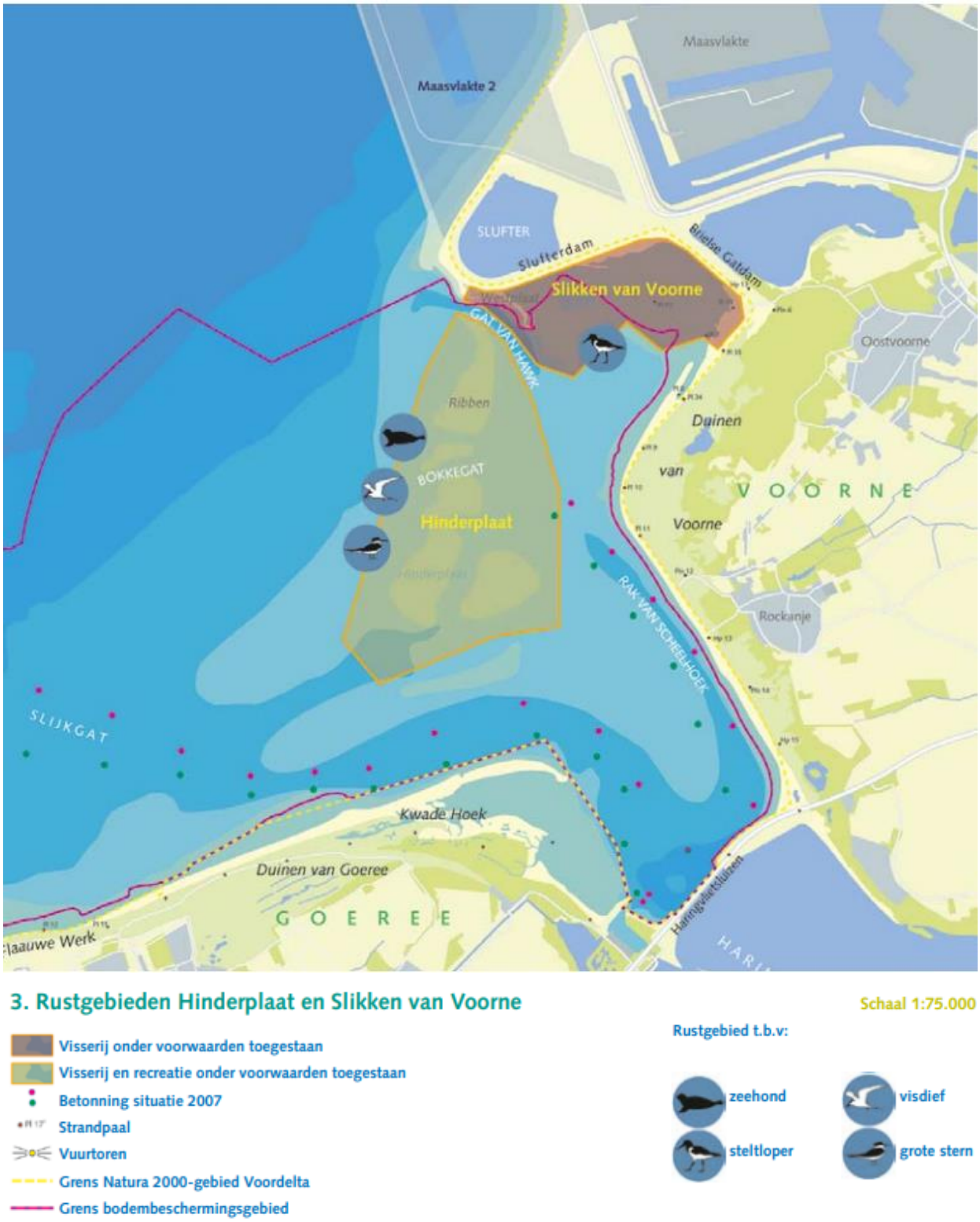

Figure 4. Map of the Hinderplaat and the Slikken van Voorne, showing borders of specified areas in the Voordelta and the important species associated with the resting areas assigned by Natura 2000. Source: Rijkswaterstaat (2016b)

3.3 Slikken van Voorne

The Slikken van Voorne is the only salt marsh and salt meadow area in the Voordelta, so there are no alternative resting and feeding possibilities for waders within the Voordelta (Rijkswaterstaat, 2014). In Figure 4, a map depicting the boundaries and important species associated with the resting areas can be found. Due to the construction of the Maasvlakte II, this area of 550 ha had formed because of induced changes in hydrology in the northern part of the Voordelta. Ever since, it has hosted a diversity of habitat types and species. It serves as a foraging area for many wader and duck species. Characteristics of the Slikken van Voorne are summarized in Table 14.

Table 14. Summary of habitat types and species that have their resting and/or foraging area in the Slikken van Voorne.

Habitat types present	Resting and/or foraging area for
H1110 Permanently flooded sandbanks	Stilts
H1140 Silt and sandbanks	Ducks
H1310 Salty pioneer vegetation	
H1320 Spartina swards	
H1330 Atlantic salty meadows	
H2110 Embryonic dunes	
H2120 Shifting dunes	

Summary: Importance of the Hinderplaat

Hinderplaat

- Important intertidal area with large numbers of ducks and waders
- Selected by Natura 2000 as one of the five major resting sites in the Voordelta

Importance of Slikken van Voorne

- Resting and foraging area for stilts and ducks
- Only salt marsh and salt meadow area in the Voordelta, so there are no alternative resting and feeding possibilities for waders within the Voordelta

4 Results

In this chapter, the main findings of our research will be presented. The results presented here are the scientific argumentations that led to the advice given in chapter 1. Therefore, this part should be regarded as the foundation of our advice. The results chapter can be divided in two parts; the environmental assessment (4.1) and the policy analysis (4.2).

4.1 Environmental Assessment

Before implementing Delta21, it is necessary to evaluate its prospective effects on nature. This way, negative effects can be mitigated or compensated, and opportunities for nature development can be identified. The most obvious effects of Delta21 on the Voordelta are the areas that will disappear because they will be covered up by the constructions. Since the ESL will be built in an area that is classified as habitat type 'permanently flooded sandbanks (H1110)', Delta21 will result in a loss of this particular habitat type the size of the ESL. The same accounts for the Hinderplaat. Parts of the Hinderplaat will be lost because the structure of the boundary of the tidal lake will be built on top of the current Hinderplaat. These direct effects on H1110 and the Hinderplaat should not be overlooked and considered as serious threats to the project implementation. In the environmental assessment that follows, the focus will however be on indirect effects on the Hinderplaat and the Slikken van Voorne.

In the Delta21 plan, the opening of the Haringvliet sluices and the construction around the tidal lake are the two major aspects that will affect the area. This will change the hydrology and morphology of the tidal lake. These changes will likely influence the habitat types in the Slikken van Voorne and the Hinderplaat. The different components influencing the habitat types are summarised in Figure 3 (Section 2.4.1). The environmental assessment section starts with an in-depth description of currents (4.1.1), morphology (4.1.2) and water composition (4.1.3). Each of these section gives a description of the current situation and the expected changes due to the implementation of Delta21. The expected changes in currents, morphology and water composition are then used to derive predictions about the effects on habitat types and species (4.1.4). Section 4.1 will be concluded with the relative impact on the Voordelta in terms of habitat types (4.1.5). This section puts the expected impacts on habitat types and species into perspective.

4.1.1 Currents

Current situation

The wind direction in the North Sea varies strongly across seasons but mainly comes from the Southwest (Alkyon, 2006). The waves are generated by the wind and have about the same direction towards the north-east. The large waves are breaking at the shallow part of the Voordelta and reach the coast only via perpendicular flow channels (Alkyon, 2006).

Figure 5a shows a schematic overview of the tidal currents in the Haringvliet delta. During high tide (solid arrows) the currents are entering the area from the south-west (mainly via the Slijkgat) and leaving the area in the north-eastern part (Tönis et al., 2002). During low tide, the direction of the currents is reversed (dashed arrows). A larger water movement occurs during high tide than during low tide, which result in a northward net flow (Alkyon, 2006). Figure 5b shows the freshwater flow pattern from the Haringvliet sluices during high discharge from the rivers. Water will leave the area mainly via the Slijkgat. The second flow channel Rak van Scheelhoek has a lower discharge than the

Slijkgat because a layer of silt built up after the closing of the sluices (Bliek, interview, Appendix B9, 2020). The locations of the Slijkgat and Rak van Scheelhoek can be found in Figure 5a.

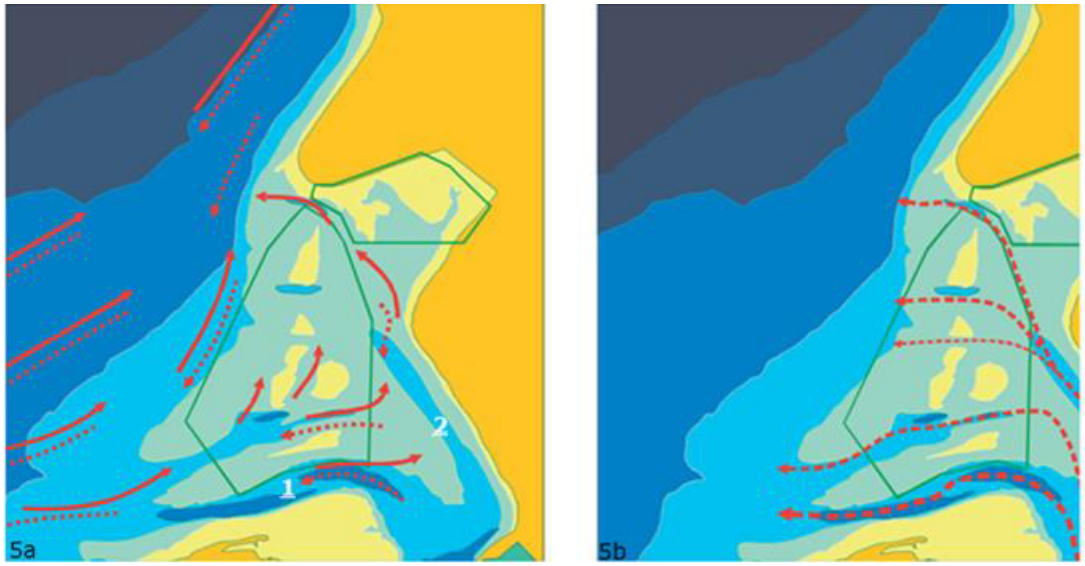

Figure 5. a = Schematic overview of the tidal currents. Number 1 indicates the Slijkgat and number two indicates the Rak van Scheelhoek. Source: Rijksinstituut voor Kust en Zee (RWS, RIKZ) (2007). b = Freshwater flow pattern during high discharge from the sluices, in the Haringvliet delta. The dashed arrows indicate the situation during low tide, the solid arrows during high tide. Source: Rijksinstituut voor Kust en Zee (RWS, RIKZ) (2007).

Expected changes

Based on the interviews with Deltares and Svašek Hydraulics, this section will give an overview of the expected changes on the currents due to Delta21. Since changes in currents are expected to influence morphology and water composition, they are an important factor in predicting changes in habitat types and species. The structures of Delta21 prevent waves from entering the tidal lake. Currently, this area is still influenced by waves. The main implications of this will be discussed in the section on morphology (4.1.2). Other changes in currents mainly depend on the size of the opening between the tidal lake and the sea, and the discharge of the Haringvliet.

Deltares and Svašek Hydraulics have a slightly different view on the effect of the opening between the tidal lake and the sea on the tidal influence in the Slikken van Voorne. According to Deltares, if the opening between the tidal lake and the sea is large enough, the tidal range will only be a few centimetres smaller than it currently is. If the opening is small, the tidal range will be much smaller (Nolte & Prins, interview, Appendix B1, 2020). Due to the Delta21 structures, the Slikken van Voorne will become even more sheltered than they currently are. Svašek Hydraulics expects that, as a result of the Slikken van Voorne becoming more sheltered, the tidal influences in this area will be weak (Bliek, interview, Appendix B9, 2020). Combining the different views, we expect that the size of the opening between the tidal lake and the sea is of critical importance. The minimum size of this opening depends on the size (volume) of the tidal lake. If the volume is bigger, the opening needs to be larger to ensure that there will be no significant changes in the tidal range. For instance, changing the shape of the tidal lake and/or moving the opening westwards influences the volume of the tidal lake. This affects the minimum size of the opening between the tidal lake and the sea that is required to maintain the same tidal range.

The influence of the discharge is described for two scenarios. We considered changes that would occur if the sluices were entirely open, and with the sluices being open according to the Kierbesluit (as described in section 2.4.1).

Haringvliet sluices entirely open

Opening the sluices will affect the tidal range. In the Slikken van Voorne, the tidal range could decrease a few centimetres. However, this effect will be smaller than the effect of a small opening between the tidal lake and the sea.

The main flow channel from the Haringvliet sluices towards the sea, the Slijkgat, will remain the main flow channel towards the sea. The layer of silt that has built up in the Rak van Scheelhoek has condensed over time and become clay. Since the Slijkgat consists of sand, this flow channel will erode more easily. Therefore, the Slijkgat will continue to be the main flow channel. In this flow channel, the flow rate will increase as compared to the current situation.

Haringvliet sluices opened according to Kierbesluit

In the scenario in which the sluices are kept open according to the Kierbesluit, the changes in the area will be less pronounced. The tidal range in the Slikken van Voorne will not be affected, if the opening between the sea and the tidal lake is large enough. Moreover, the effect on the flow channels will be less pronounced. The flow velocity and erosion in the Slijkgat will increase somewhat. The only passage for the river discharge to the sea is through the Slijkgat. However, since the discharge will not increase significantly as compared to the current situation, this will not be a pronounced effect.

Main expected changes regarding currents

- Water can only enter and exit through the Slijkgat
- The Slikken van Voorne will become more sheltered
- No more influence of waves in the tidal lake

Main difference between open sluices & Kierbesluit

- Effects expected to be the same, but less profound in Kierbesluit scenario

Main implications for Delta21

- Size of opening between tidal lake and sea is crucial for the effect on the tidal range
- Size of opening between tidal lake and sea also influences the flow rate and erosion in the Slijkgat

4.1.2 Morphology

Current situation

Figure 6 shows the net sedimentation (red) and erosion (blue) in the Haringvliet delta between 1964 and 2004. It is clearly shown that the location of the net sedimentation outside the delta moved towards the coast after the closing of the Haringvliet sluices. The discharge from the Haringvliet decreased after the closing of the sluices while the waves continued to transport sand towards the coast via perpendicular flow channels (Alkyon, 2006). As a result, the net sedimentation moved closer to the Haringvliet sluices (Rijksinstituut voor Kust en Zee (RWS, RIKZ), 2007; Alkyon, 2006). Figure 7 gives a schematic overview of the change in sedimentation pattern and the movement of sandbanks as result. In the situation before closing of the Haringvliet (A), there is a balance between the wave driven sediment transport and the tidal driven sediment transport from the Haringvliet. After closure of the Haringvliet (B), the tidal sediment transport is inhibited and the process of waves moving the sandbank coastwards became relatively stronger. This resulted in a new equilibrium (C) with sandbanks located closer to the coast.

Furthermore, the flow velocity in an area mainly determines the particle size distribution of sediment transport (Christiansen, Wiberg & Milligan, 2000). This results in a deposition of large particles (sand) at a high flow velocity and small particles (silt and eventually clay) at a low flow velocity (Rijksinstituut voor Kust en Zee (RWS, RIKZ), 2007). The area between Maasvlakte I and Voorne became sheltered from direct wave disposure after the creation of Maasvlakte I and the Slufter (see Figure 6). Fine sediments have been deposited in the sheltered area (due to low flow velocities) and the formation of the Slikken van Voorne started (Rijksinstituut voor Kust en Zee (RWS, RIKZ), 2007). According to the rapport of Rijksinstituut voor Kust en Zee (RWS, RIKZ) (2007) these processes have been reinforced since the finalization of Maasvlakte II in 2013.

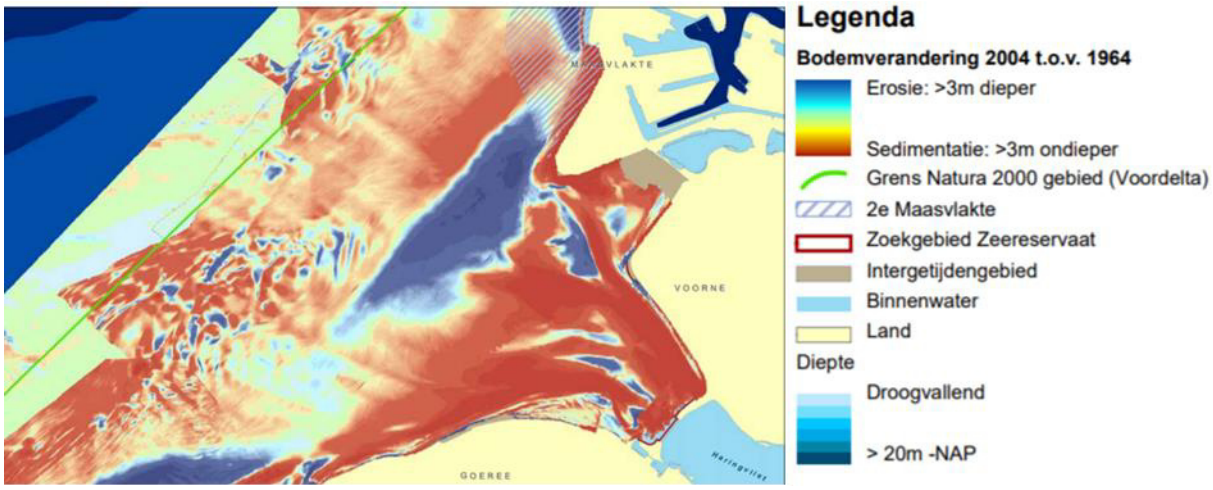

Figure 6. Sedimentation (red) and erosion (blue) in the delta of the Haringvliet (2004 compared to 1964). Source: Rijksinstituut voor Kust en Zee (RWS, RIKZ) (2007)

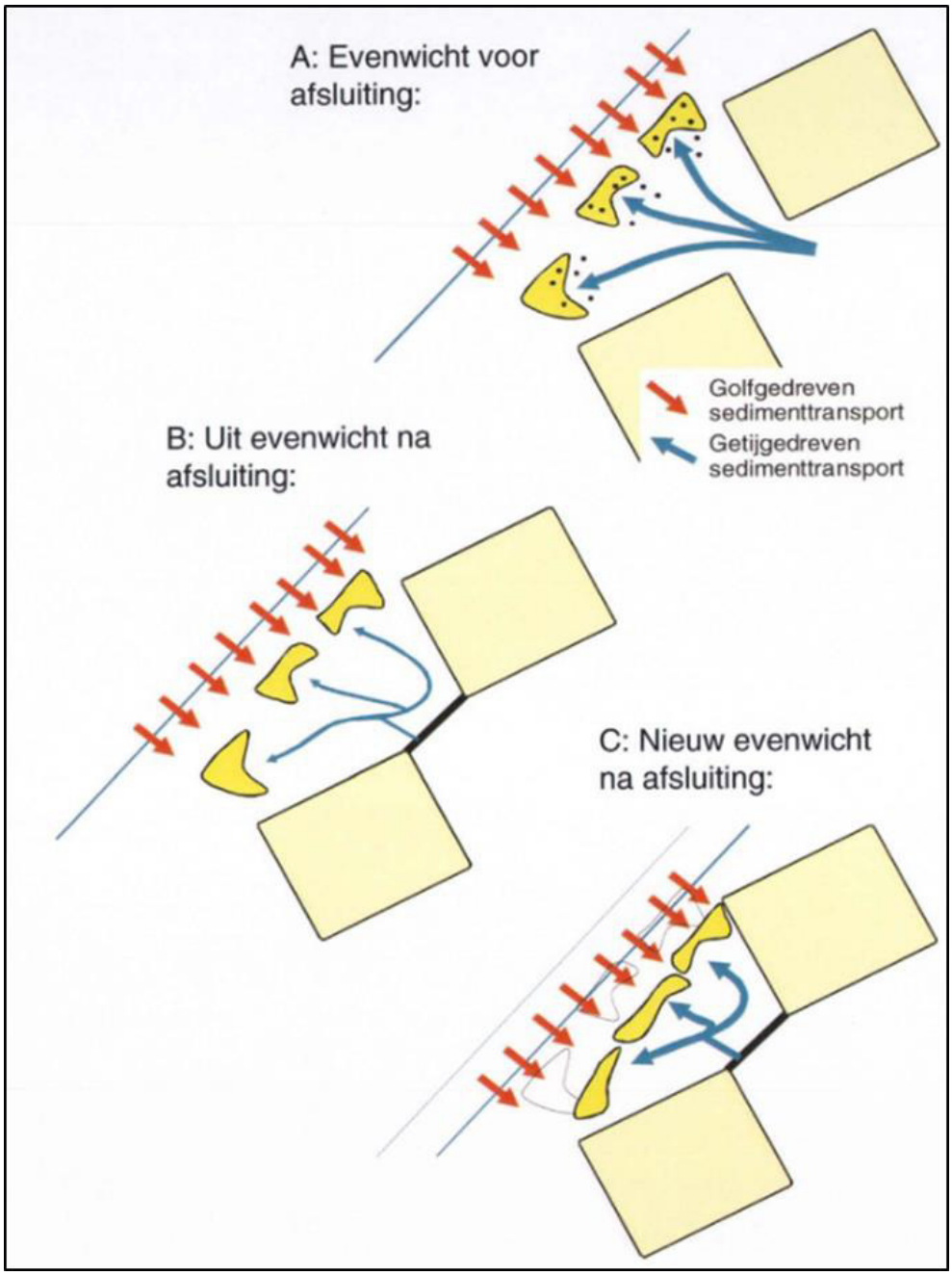

Figure 7. Development of a new sedimentation equilibrium after closure of the Haringvliet. A) equilibrium before closure, B) equilibrium transition phase due to decreased tidal currents after closure, C) new equilibrium reached after the movement of the sandbanks. Red arrows indicate wave driven sediment transport; blue arrows indicate tidal current driven sediment transport. Source: Alkyon (2006)

Expected changes

Both Svašek Hydraulics and Deltares agreed that, as a result of the structure that defines the tidal lake, waves will be absent in the tidal lake. Erosion by waves will therefore be prevented. Absence of waves also has consequences for the type of sediment that will be transported to the area. Sand supply from the sea towards the coast is mainly transported by waves. Therefore, the sedimentation of sand will decrease in the tidal lake. Sediment supply of fine sediments (silt) will continue to enter the area via the Haringvliet and the sea. The sediment supply from the Haringvliet depends on the discharge and the amount of sediment in this water. As a result of the absence of waves, a larger part of the total sedimentation in the tidal lake will consist of fine sediment.

The sedimentation pattern that is typical for deltas will move to the end of the Slijkgat (Nolte & Prins, interview, Appendix B1, 2020). The larger sediment (sand) in the river discharge will be transported by the faster flowing water. This sand will be deposited outside of the tidal lake, at the end of the Slijkgat. It is difficult to predict whether another flow channel will emerge parallel to the ESL (see Figure 8). In this scenario, an area with sand banks and small flow channels, like it is presently in front of the Haringvliet sluices, might emerge southwest of its current position (Figure 8).

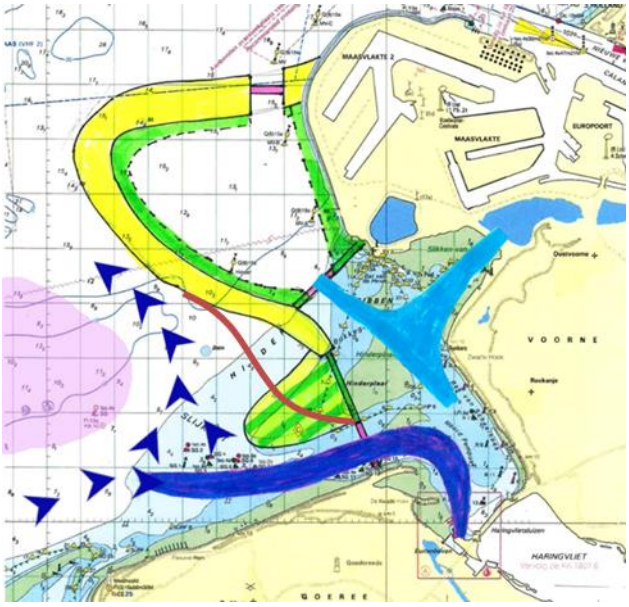

Figure 8. Possible new estuary area that might emerge after implementation of Delta21. In yellow: dykes/dunes that are the boundaries of the energy storage lake. Green/yellow striped: proposed new sand bank. Light blue: trench. Dark blue: main water outlet and inlet of Haringvliet (Slijkgat). Blue arrows: indication of where new flow channels might emerge, in addition to current ones. Water flows in both directions, depending on tide. Pink area: location where new sandbanks might emerge. Adapted from: H. Lavooij, pers. comm. 10th Jan 2020

The Slikken van Voorne will become even more sheltered (Nolte & Prins, interview, Appendix B1, 2020; Bliek, interview, Appendix B9, 2020; Goes van der, interview, Appendix B2, 2020). Both Deltares and Svašek Hydraulics expect that, as a result of the absence of waves and the low flow velocities, the Slikken van Voorne will silt up and expand in size.

Silt will also be deposited on the Hinderplaat due to the absence of waves and the low flow velocities. Therefore, the Hinderplaat it will not continue to be a set of sandbanks but may become more like the Slikken van Voorne (Bliek, interview, Appendix B9, 2020).

Both Svašek Hydraulics and Deltares agreed that creating a new sandbank could be realistic. However, they both suggested a more gradual shape along the ESL construction. The shape of the new sand bank will be influenced by the natural processes of sedimentation and erosion. The most important factors in these processes are the tidal currents and the waves. The sandbank is mainly eroded by the tidal currents (NW and SE) along the coast. It should therefore be close to the ESL to minimize erosion, since there is some shelter from currents (Bliek, interview, Appendix B9, 2020). A more gradual shape along the ESL construction would be more effective than the current proposed shape. Erosion will be less, and (part of) the eroded sediments will be naturally transported and sedimented along the construction (Bliek, interview, Appendix B9, 2020; Nolte & Prins, interview, Appendix B1, 2020). Bliek mentioned that an embryotic dune habitat could be formed on this sandbank.

Main expected morphological changes

- Sedimentation of sand will become minimal, majority of remaining sedimentation will be silt
- Typical delta sedimentation pattern might emerge at the end of the Slijkgat
- The Slikken van Voorne will silt up and expand
- The Hinderplaat will silt up

Main difference between open & Kierbesluit

- Haringvliet sluices open: siltation in Slikken van Voorne and Haringvliet is expected to speed up
- Haringvliet sluices open: typical delta sedimentation will be further seawards

Main implications for Delta21

- Sedimentation processes are severely impacted
- Opening Haringvliet sluices further impacts sedimentation processes
- In creating the new sandbank, the sedimentation and erosion processes should be taken into account

4.1.3 Water composition

As explained in the methods (section 2.4.1), the way of assessing water composition would be by looking at expected changes in both salinity and nutrients. However, based on opinions of experts, we found that the change in nutrient levels due to implementation of Delta21 will be small (Nolte & Prins, interview, Appendix B1, 2020) or would be difficult to assess due to other major factors, like climate change, that have an impact on nutrient levels (de Klein, personal communication, 2020). For these reasons, water composition was assessed only by looking at the salinity level.

Current situation

Fresh water originating from the Meuse and the Rhine mixes with salt water from the sea in the area seawards of the sluices (Deltares, 2011). According to Deltares (Nolte & Prins, interview, Appendix B1, 2020), the salinity in the tidal lake will mainly depend on the discharge from the Haringvliet and the size of the opening between the tidal lake and the sea. The amount of discharge varies throughout the year with the lowest average discharge occuring in October (Deltares, 2017). The discharge of the Haringvliet is regulated to prevent flooding, ensure fresh water for agriculture in the area and drinking water supply, and to regulate the water division in the Northern delta basin to minimalize saltwater intrusion (Deltares, 2011). In the current situation of the Kierbesluit, the sluices are often closed to ensure a sufficient freshwater supply (Nolte & Prins, interview, Appendix B1, 2020). Figure 9 gives an indication of the salinity levels in the current situation at different locations and water depths around the Haringvliet sluices.

Figure 9. Salinity level of the water in the Haringvliet delta at different locations and depths (at 29-01-2020). The levels at location 2 represent the upper and lower water layer. The values at location 3 represents the salinity level at respectively 2, 6, and 11 m water depth. Source: Rijkswaterstaat Waterinfo (2020a).

Expected changes

After opening the Haringvliet sluices, the amount of river discharge coming into the delta will increase. In general, the salinity levels will slightly decrease. When the discharge is higher, the salinity levels will temporarily drop. The organisms living in the Voordelta can adapt to (often small) changes, since it is a high dynamic area. Large changes in salinity can be tolerated, but only for a short amount of time. If salinity levels are low for an extended period, it will be harmful to specific

species. Since the Slijkgat will transport more fresh water, the species composition there will change to species which are capable of high salinity changes. The change in salinity around Hinderplaat and Slikken van Voorne will be small because they are located further away from the sluices.
An estuarine system with a salt-fresh gradient will develop after opening the sluices. This gradient will shift, depending on the amount of discharge. During high river discharge, the gradient is expected to be in the tidal lake or even offshore. During low river discharge, it will shift landward. However, Deltares (Nolte & Prins, interview, Appendix B1, 2020) expects that opening the Haringvliet sluices will change the distribution of river water among the different channels. All river branches are connected. Therefore, opening the sluices would affect the whole water system in the Netherlands. Availability of fresh water is especially important upstream of the Nieuwe Waterweg (Hollandse IJssel). Both agriculture (the Westland area) and the drinking water supply depend on enough discharge in the Nieuwe Waterweg. The less river water is discharged, the further sea water will come inland. This causes upward seepage of salt water in the Westland area.
In the scenario of a maintained Kierbesluit, the changes in the salinity levels will be quite small compared to the current situation – especially on the Hinderplaat and in the Slikken van Voorne, since these areas are not located next to the Slijkgat.

Main expected changes regarding water composition

- Delta21 structures will not influence the water composition, unless the Haringvliet sluices will be opened

Main difference between open & *Kierbesluit*

- Open sluices: salinity levels will decrease slightly in the tidal lake
- Open sluices: Slijkgat will transport more fresh water
- Open sluices: salt-fresh water gradient will shift over a larger distance (Haringvliet river – estuary)

Main implications for Delta21

- Opening the sluices and the size of the opening between tidal lake and sea are main factors of influence for salinity
- Opening the sluices will influence the distribution or river water over the different rivers and raises concerns about the freshwater availability

4.1.4 Effects on Natura 2000 habitat types

In the previous sections, the natural processes and their effect on the area of the Slikken van Voorne and Hinderplaat are described. In this section, we will describe these effects in terms of Natura 2000 habitat types. An overview of these effects is given in Table 15. It should be considered that this is merely a preliminary assessment. Not all aspects of Delta21 that are key factors in steering the abiotic processes are certain yet (e.g. discharge from Haringvliet, size of opening to tidal lake, etc.). This assessment does not take into account changes in the tidal range due to the size of the opening between the tidal lake and the sea (see section 4.1.1). The main causes influencing habitat types are the absence of waves and the increase in siltation. Salinity levels are not expected to impact the existing habitat types, since they will continue to be above the required threshold (Habitat requirements, Appendix A).

One of the major effects is that the part of the Hinderplaat that will still be present after the construction of the Delta21 structures will be sheltered from waves and silt up. This means that the current habitat type H1140B will be entirely lost, changing to habitat type H1140A. The Slikken van Voorne are expected to silt up and expand. Van der Goes (van der Goes, interview, Appendix B2, 2020) expects the tidal lake to reduce in relief (surface structure), as deeper parts silt up faster than higher parts. This causes the slope from land to sea to become more gradual. This could be beneficial for the habitat types that occupy a narrow niche on this slope (H1140A, H1310A, H1310B, H1320, H1330A). Their niche could become broader, allowing these habitat types to increase in size.

It is difficult to give any precise predictions about the increase in size per habitat type. In the scenario of the open Haringvliet sluices, we expect that there will be more sediment transported to the area. This could speed up the silting process.

The dune habitat types (H2110 and H2120) in the Slikken van Voorne are also expected to be influenced. Contrary to the current situation, there will be no waves in the tidal lake after implementation of Delta21. Therefore, sand transportation into the lake will be more limited than in the current situation. Sand transportation is one of the basic requirements for dune formation. If sand transport is minimized, the dynamic processes are expected to be hampered. These processes are an essential part of the formation and conservation of the pioneer dune habitats. It is therefore expected that the density of the vegetation in the dunes will increase due to the reduction of dynamics in the tidal lake (van der Goes, interview, Appendix B2, 2020). Keeping the vegetation limited is necessary for the dunes to remain actively mobile. This is already a concern to nature organisations, since atmospheric nitrogen deposition also resulted in increased vegetation density over the last decades (Jones et al., 2004).

All other habitat types that currently exist in the Slikken van Voorne (H1310, H1320, H1330) will also be affected by the siltation. Their current location may not be suitable anymore, since they need a specific groundwater level (Habitat requirements, Appendix A). They may be able to shift seawards (where the required moisture levels are met) as the siltation happens. It should be considered that not all habitat types are able to move at the same speed as the environment changes. However, since these are pioneer vegetations, this might not be an obstacle.

The majority of the Voordelta consists of habitat type H1110 (Permanently flooded sandbanks). When the Slikken van Voorne expand, it is very likely that this will be at the cost of habitat type H1110. To compensate for the disappearance of the Hinderplaat, the creation of a new sandbank is included in the Delta21 plan (H. Lavooij & L. Berke, pers. comm. Jan. 10, 2020). This would compensate for the loss of habitat type H1140B. However, it will be in an area that is assigned

habitat type H1110. Therefore, permanently flooded sandbanks (H1110) will also reduce in size as an indirect result of the changes in the Slikken van Voorne and Hinderplaat.

Table 15. Expected effects of Delta21 on the area of habitat types present in the Slikken van Voorne and the Hinderplaat, as defined by Natura 2000, in the two scenarios; opened Haringvliet and Kierbesluit. + indicates positive effect, - indicates negative effect, -- indicates a severely negative effect.

Habitat type	Open Haringvliet	Current Kierbesluit
H1110 Permanently flooded sandbanks	--	--
H1140B Silt and sandbanks (North Sea coastline)	--	--
H1140A Silt and sandbanks (intertidal area)	+ / ++	+
H1310A Salty pioneer vegetation (*Salicornia*)	+	+
H1310B Salty pioneer vegetation (*Sagina maritima*)	+	+
H1320 Spartina swards	+	+
H1330A Atlantic salty meadows	+	+
H2110 Embryonic dunes	-	-
H2120 Shifting dunes	-	-

Main expected changes in habitat types

- Dune habitats (H2110 and H2120) are expected to be overgrown.
- In the Slikken van Voorne, all habitat types except for dunes are positively affected.
- The habitat type of the Hinderplaat (H1140B) will disappear due to siltation.
- The size of the habitat type Permanently flooded sandbanks (H1110) will reduce due to Delta21 structures and siltation processes

Main differences between open sluices & *Kierbesluit*

- Open sluices: siltation in the Hinderplaat and Slikken area is expected to be accelerated.

Main implications for Delta21

- Increase of most of the habitat types of Slikken van Voorne (except the dune habitats) offers opportunities for nature.
- The Hinderplaat will disappear entirely.
- Loss of permanently flooded sandbanks (H1110) habitat type.

4.1.5 Effects on Natura 2000 species

Besides habitat types, the Habitats Directive also incorporates 'key species'. For the Voordelta, seven key species are appointed, consisting of mammals and fish. Table 16 shows the expected effects of Delta21 on these species. The four fish species (River Lamprey, Sea Lamprey, Fint and Shad) are anadromous species, meaning that they are born in fresh water but spend most time in sea. They migrate from the sea through the delta, upriver to spawn. All species have been severely affected by the closing of the Haringvliet. The Sea Lamprey, Fint and Shad have almost disappeared (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2008b, c, d, e; 2014a, b, c). In contrast to the current Kierbesluit, reopening the Haringvliet restores the migration routes of these species. In the current phase of the Kierbesluit, the sluices are opened only a few times per year, making migration possible only for a fraction of anadromous fish (Nolte & Prins, interview, Appendix B1, 2020). Therefore, to help the four anadromous key species, Delta21 should consider realising a full opening of the Haringvliet.

The other three key species (Porpoise, Grey seal and Common seal) do not benefit from a fully open Haringvliet. The grey seal loses a portion of its habitat to Delta21 (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2014c; Baptist, interview, Appendix B11, 2020). The porpoise is expected not to be influenced at all by Delta21, as it lives in deeper parts of the North Sea and its large distribution range is only marginally reduced by the ESL and the tidal lake (Baptist, interview, Appendix B11, 2020). The porpoise is sensitive to disturbance trough sound and vibration. The building process of Delta21 therefore does negatively impact this key species temporarily (Minister van Landbouw, Natuur en Voedselkwaliteit, 2014a). The common seal is most negatively affected. The Hinderplaat is of special importance as a resting area for this species (Ministerie van Landbouw, Natuur en Voedselkwaliteit, 2014b). As indicated above, this area is expected to disappear.

Table 16. Expected effects of Delta21 on the key species taken up in the Habitats Directive, in the two scenarios; opened Haringvliet and Kierbesluit. ++ indicates a very positive effect, 0 indicates no significant effect, - indicates a negative effect, -- indicates a severely negative effect.

Key species	Latin name	Opening haringvliet	Kierbesluit
H1095 Sea Lamprey	*Petromyzon marinus*	++	0
H1099 River Lamprey	*Lampetra fluviatilis*	++	0
H1103 Fint	*Alosa fallax*	++	0
H1102 Shad	*Alosa alosa*	++	0
H1351 Porpoise	*Phocoena phocoena*	0	0
H1364 Grey seal	*Halichoerus grypus*	-	-
H1365 Common seal	*Phoca vitulina*	--	--

The Birds Directive in the Voordelta counts 30 protected bird species. Table 17 shows the expected effects of Delta21 on these species. For all bird species, it is expected that differences between the current Kierbesluit and a fully open Haringvliet have no influence. In general, ducks, geese, stilts and spoonbills are using the Slikken van Voorne, and therefore profit from this area expanding. Benthivores, species that feed on species that live in the seabed, are generally unaffected by Delta21, as they occur mostly outside of the Hinderplaat and Slikken van Voorne (Rijkswaterstaat, 2016b). Some piscivorous bird species (that feed on fish) are negatively affected. This is because the great cormorant, sandwich tern, common tern and common eider use the Hinderplaat extensively as a resting area as well as foraging area (Rijkswaterstaat, 2016b). They will suffer from the loss of this area.

Table 17. Expected effects of Delta21 on the bird species taken up in the Bird's Directive, in the two scenarios; opened Haringvliet and Kierbesluit. Scores are calculated using methods from 2.4.1 ++ indicates a very positive effect, + indicates a positive effect, 0 indicates no significant effect, - indicates a negative effect and -- indicates a severely negative effect.

Ducks and geese	Latin name	Opening Haringvliet	Current Kierbesluit
A048 Common shelduck	*Tadorna tadorna*	++	++
A050 Eurasian wigeon	*Mareca penelope*	++	++
A056 Northern shoveler	*Spatula clypeata*	+	+
A043 Greylag goose	*Anser anser*	++	++
A054 Northern pintail	*Anas acuta*	+	+
A052 Eurasian teal	*Anas crecca*	0	0
A051 Gadwall	*Mareca strepera*	0	0
Stilts and spoonbills			
A130 Eurasian oystercatcher	*Haematopus ostralegus*	++	++
A132 Pied avocet	*Recurvirostra avosetta*	++	++
A137 Common ringed plover	*Charadrius hiaticula*	++	++
A141 Grey plover	*Pluvialis squatarola*	++	++
A144 Sanderling	*Calidris alba*	++	++
A149 Dunlin	*Calidris alpina*	+	+
A157 Bar-tailed godwit	*Limosa lapponica*	++	++
A160 Eurasian curlew	*Numenius arquata*	++	++
A162 Common redshank	*Tringa totanus*	++	++
A169 Ruddy turnstone	*Arenaria interpres*	0	0
A034 Eurasian spoonbill	*Platalea leucorodia*	+	+
Benthivores			
A067 Common goldeneye	*Bucephala clangula*	+	+
A062 Greater scaup	*Aythya marila*	0	0
A063 Common eider	*Somateria mollissima*	-	-
A065 Common scoter	*Melanitta nigra*	0	0
Piscivores			
A001 Red-throated diver	*Gavia stellata*	0	0
A007 Horned grebe	*Podiceps auritus*	0	0
A005 Great crested grebe	*Podiceps cristatus*	0	0
A017 Great cormorant	*Phalacrocorax carbo*	--	--
A069 Red-breasted merganser	*Mergus serrator*	0	0
A191 Sandwich tern	*Thalasseus sandvicensis*	--	--
A193 Common tern	*Sterna hirundo*	--	--
Other birds			
A177 Little gull	*Hydrocoloeus minutus*	0	0

Main expected changes in Natura 2000 species

- For Habitats Directive species, migratory fish are expected to benefit from the opening of the Haringvliet and seals to be harmed by the disappearance of the Hinderplaat and the loss of potential foraging area.
- For the Birds Directive species, we generally expect stilts and ducks to profit from increasing Slikken, while some piscivores are negatively affected, as they lose foraging area on the Hinderplaat.

Main differences between open sluices & *Kierbesluit*

- The current Kierbesluit prevents fish migration, while opening of the Haringvliet allows this.

Main implications for Delta21

- Delta21 does offer some opportunities for benefiting protected animal species in the Slikken van Voorne.
- Some other protected animal species are negatively affected, which is forbidden under Natura 2000

4.1.6 Relative impact on whole Voordelta

To predict the impact of Delta21 on the Voordelta, we narrowed down our focus to the two most important sub-areas within the Voordelta (Arts *et al*, 2016): the Hinderplaat and the Slikken van Voorne. To put their importance into perspective, the size and importance of each habitat type in the two sub-areas was calculated and compared to the whole Voordelta. In Table 18, these calculations are shown next to the 'percentage impacted' which is the percentage of habitat type that the Slikken van Voorne and Hinderplaat take up in the whole Voordelta. Furthermore, the importance of the habitat type in Europe is shown. This is based on the proportion that the Dutch habitat area represents in the European Union (Ministry of Agriculture, Nature and Food Quality, 2008). As the habitat types are sorted by level of succession, Table 18 suggests that mid-successional habitat types are especially rare in the Voordelta. Their exclusivity could be explained by the Voordelta generally having a high wave influence, which prevents this pioneer vegetation to develop. Only the Slikken van Voorne are shielded by the Maasvlakte and are therefore able to develop these fragile habitat types. The relative importance in Europe shows that 4 out of 9 habitat types have the highest protection priorities, again stressing the importance of the Hinderplaat and Slikken van Voorne.

In conclusion, these two areas are of exceptional importance within the Voordelta, but also in Europe. Delta21 must avoid impacting these areas and otherwise generously compensate for any loss.

Table 18. Habitat type sizes in the Hinderplaat, the Slikken van Voorne and in the whole Voordelta. The numbers are used to calculate what percentage of the whole Voordelta is impacted as a result of changes in the Hinderplaat and Slikken van Voorne. A = very large relative importance (makes up > 4% of habitat type in Europe), B = large relative importance (makes up 0.5 - 4% of habitat type in Europe), C = Considerable relative importance (makes up < 0.5% of habitat type in Europe) Source: Rijkswaterstaat (2016); European Environment Agency (2018); Rijksinstituut voor Volksgezondheid en Milieu (2019).

Habitat type	Area size in the Slikken van Voorne (ha)	Area size on the Hinderplaat (ha)	Area size in Voordelta (ha)	Percentage impacted	Relative importance in Europe
H1110 Permanently flooded sandbanks	67	1028	81260	1%	A
H1140B Silt and sandbanks (North Sea coastline)		223	1857	12%	B
H1140A Silt and sandbanks (intertidal area)	367		367	100%	A
H1310A salty pioneer vegetation (*Salicornia*)	47		47	100%	A
H1310B salty pioneer vegetation (*Sagina maritima*)	0.2		0.2	100%	B
H1320 Spartina swards	7		7	100%	C
1330 Atlantic salty meadows	41		41	100%	A
H2110 Embryonic dunes	14		25	57%	B
H2120 Shifting dunes	7		32	22%	B
Total	**550**	**1250**	**82636**	**2%**	

Importance of habitat types in the Slikken van Voorne and Hinderplaat, in relation to the whole Voordelta

- Five out of nine habitat types in the Voordelta are only located in the Slikken van Voorne.
- Four out of nine habitat types have the highest protection priorities in Europe.

Main implications for Delta21

- The Slikken van Voorne are unique in the Voordelta.
- The Hinderplaat is less vital in the Voordelta, as 88% of this habitat type is found elsewhere in the Voordelta. On the other hand, this habitat type is of the highest importance in Europe.

4.2 Policy analysis

The project location of Delta21 is situated in a designated Natura 2000 area, which is subject to certain regulatory protection measures. We expect these legal restrictions to represent a central obstacle to the approval and implementation of the project. It is therefore important for Delta21 to understand the existing legislative framework of Natura 2000. The following section will therefore address the background of Natura 2000 legislation (4.2.1), the administrative structures of Natura 2000 in general and within the Voordelta (4.2.2), the stakeholders of the Natura 2000 sites situated in close proximity to the Voordelta (4.2.3) and the procedure for implementing infrastructural projects in Natura 2000 areas (4.2.4). The section will be finalized by giving insight into the broader debate on Natura 2000 legislation.

4.2.1 Natura 2000 legislation: background

Natura 2000 is the largest initiative aimed at conserving and restoring biodiversity in the European Union. In the Netherlands, Natura 2000 areas are designated by the Ministry of Agriculture, Nature and Food Quality, based on the European Birds and Habitats Directive. The areas are then protected by the legislation that applies to them, as well as management measures to protect, restore and develop specific habitat types and species (Ministry of Agriculture, Nature and Food Quality, 2005).

Natura 2000 legislation differentiates between “Special Protection Areas” (SPA) for birds, designated under the Birds Directive, and “Special Areas of Conservation” (SAC) for other species and habitat types, designated under the Habitats Directive. SPA are appointed directly by each European member state, whereas SAC are listed as “Sites of Community Importance” (SCI) by the member states and must subsequently be approved by the European Commission in order to become Natura 2000 sites, i.e. SAC. The Voordelta area has been a SPA since March 2000 and a SAC since March 2008. Hence, the area is subject to both the legislation that applies to areas protected under the Birds and the Habitats Directives (Ministry of Agriculture, Nature and Food Quality, 2018).

The Dutch interpretation of the European Birds and Habitats Directives is laid down in the Nature Conservation Act of 2017 (‘*Natuurbeschermingswet*’), next to regulations on other nature areas in the Netherlands (e.g. nature reserves that do not classify as Natura 2000 sites). The Act effectively integrated and replaced the previous Nature Conservation Act of 1998 on the preservation of nature areas, the Flora and Fauna Act on the protection of plant and animal species, and the Forestry Act (Ministry of Agriculture, Nature and Food Quality, n.d.).

4.2.2 Administrative structures: Natura 2000 site Voordelta

The Nature Conservation Act prescribes the drafting of a management plan for every Natura 2000 site that lays out the rules and regulations on the allowed activities in the area and the planned nature conservation measures. Management plans are drafted for time periods up to six years and may subsequently be extended. Generally, the respective provincial authorities are responsible for setting and implementing the regulation in their protected areas (Ministry of Agriculture, Nature and Food Quality, n.d.). In the case of the Voordelta, the implementation of the agreed-upon measures is the joint responsibility of the Ministry of Infrastructure and the Environment, the Ministry of Economic Affairs and the provinces of Zeeland and Zuid-Holland (Rijkswaterstaat, 2016a). Rijkswaterstaat was appointed the main managing entity of the area and author of the Voordelta management plan (co-authored by the provinces of Zuid-Holland, Zeeland, and the Ministry of Economic Affairs). The current plan is effective for the time period from 2015 to 2021.

To complicate matters, a variety of organizations were commissioned to oversee and implement the protective measures laid out in the management plan in different provincial subareas of the

Voordelta: Stichting Zuid-Hollands Landschap, Stichting Het Zeeuws Landschap, Vereniging Natuurmonumenten, and Staatsbosbeheer (Rijkswaterstaat, 2016a). The Slikken van Voorne and the Hinderplaat are both managed by Stichting Zuid-Hollands Landschap. The national government is responsible for the management of the sea, unless it lies within the administrative boundaries of the provinces and municipalities. This concerns the largest part of the Voordelta Natura 2000 area, as the provincial borders range from one to six kilometers seaward from the low tide line along the coast (Rijkswaterstaat, 2016a). In particular, the Ministry of Infrastructure and the Environment acts as coordinating manager of the North Sea and is responsible for water quality and the safety, while the Ministry of Economic Affairs is responsible for nature, fishing and recreation.

For most (smaller) projects to be authorized, the respective municipalities are the competent authorities to address. They are responsible for the spatial planning within the municipal boundaries and can set local regulation on public safety and environmental matters. Municipalities can grant environmental permits under the 'Wabo' (*'Wet Algemene Bepalingen Omgevingswet'*) that may fall under the Nature Conservation Act permit. The Voordelta comprises the following eight municipalities: Rotterdam, Westvoorne, Hellevoetsluis, Goeree-Overflakkee, Schouwen-Duiveland, Noord-Beveland, Veere and Vlissingen (Rijkswaterstaat, 2016a).

For large infrastructural projects that are not confined to the boundaries of a certain municipality, as it is the case with Delta21, different authorities must be addressed. The responsibility for regional spatial planning, including the executive authority to grant environmental permits and exemptions for the implementation of large interventions in the Voordelta, lies with the provinces of Zuid-Holland and Zeeland, as well as the Dutch Ministry of Economic Affairs in exceptional cases (Rijkswaterstaat, 2016a).

4.2.3 Stakeholders of Natura 2000 sites adjacent to the Voordelta

The Voordelta Natura 2000 site is bordering several other Natura 2000 sites, among which the Voornes Duin, the Duinen van Goeree and the Kwade Hoek, the Kop van Schouwen, the Manteling van Walcheren, the Vlakte van de Raan and the Deltawateren Haringvliet, the Grevelingen, and the Oosterschelde and the Veerse Meer (Rijkswaterstaat, 2016a) (see Figure 10). Those natural reserves are managed, regulated and partly owned by five different entities: Stichting Zuid-Hollands Landschap, Stichting Het Zeeuws Landschap, Vereniging Natuurmonumenten, Staatsbosbeheer and Recreatieschap Voorne-Putten-Rozenburg. Site managers can lay down more detailed rules for their areas, e.g. on the basis of recreational ordinances (Rijkswaterstaat, 2016a).

The formal authority for the aforementioned sites lies with the provinces of Zuid-Holland and Zeeland, which have the executive power to grant permits and exemptions to project owners.

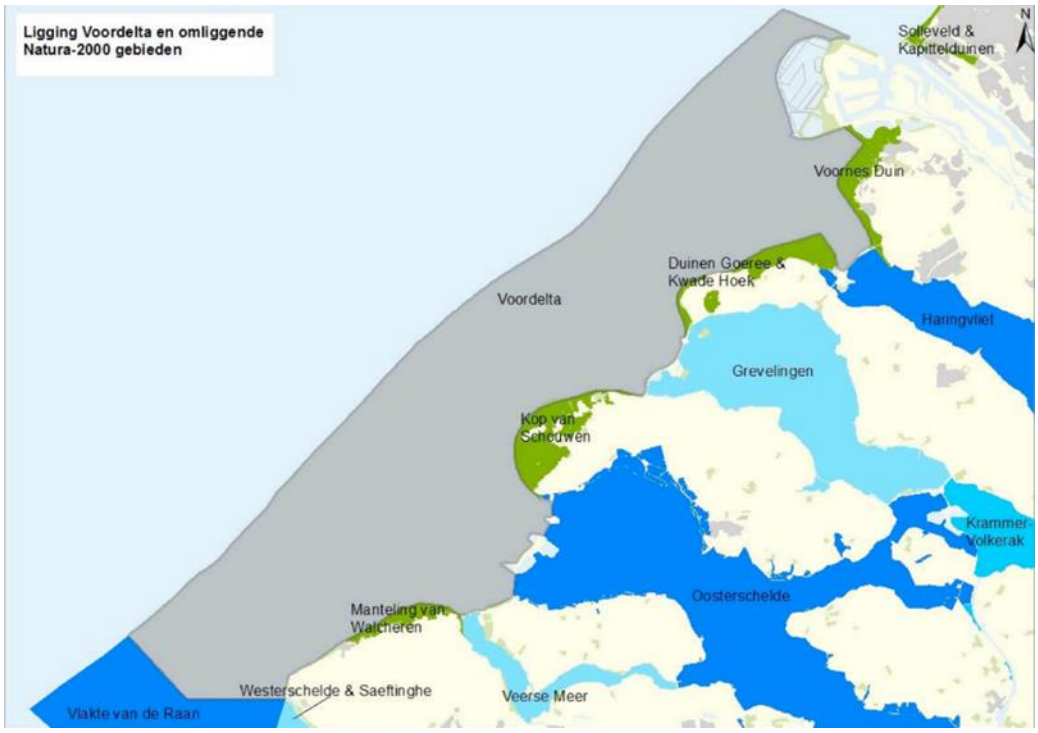

Figure 10. Voordelta and surrounding Natura 2000 areas (in green and blue). Source: Rijkswaterstaat (2016a)

4.2.4 Implementing infrastructural projects in Natura 2000 areas

Implementing an infrastructural project in a Natura 2000 area is quite a challenge. As it stands, a project only has a good chance to be approved if it contributes to reaching the Natura 2000 goals for its specific region. Infrastructural projects are often problematic in terms of their high degree of uncertainty about the effects they will have on ecosystems (Peijpe van, interview, Appendix B5, 2020). Conservation objectives in Natura 2000 are strict and rigid and do not allow such uncertainty. The following section outlines the legal procedure that must be followed in order to comply with the rules of the Nature Conservation Act.

Conducting an environmental assessment ('passende beoordeling')

As soon as an area is designated a Natura 2000 area, it is prohibited to carry out activities that, in view of the conservation objectives laid out in the site's management plan, may degrade the quality of natural habitats in that site or have a significant disruptive effect on the species present (Wetten Overheid, 2019). In principle, a permit can only be granted if it has been ascertained that there will be no significant negative effects on the habitats and species in the area. In order to do so, the project owner must carry out an environmental assessment ('*passende beoordeling*'). If the project owner is not capable of conducting the assessment themselves, it will be done by the managing authority, in this case the province of Zuid-Holland (see section 4.2.2).

An important question that arises when looking at the environmental assessments is when negative effects are considered significant. This has not been made specific in Natura 2000 legislation and depends on the respective Natura 2000 site. Concrete values and thresholds for acceptable losses of habitat types or species do not exist. However, the example of the Maasvlakte II helps to get an impression of a possible criterion. In this case, a loss of less than 1% of the total area of a certain habitat type was considered to be insignificant. For losses between 1% and 5%, an investigation was needed to determine whether compensation would be necessary. For losses above 5% of the total area of a certain habitat type, compensation was considered necessary (Nolte & Prins, interview, Appendix B1, 2020). The environmental assessment should give an objective outlook on the

expected effects on nature in the area. Subsequently, it is the responsible authority's responsibility to make the final decision on whether the expected impact should be considered significant (Wetten Overheid, 2019). Based on this, the province decides to grant or deny a permit for the project.

The ADC-test as a "last resort"

If the environmental assessment (as described above) concludes that a project will have negative consequences for Natura 2000, granting a permit is still possible by passing the so-called ADC-test. This is often referred to as the 'last resort' by the European Commission, since it is the only possibility to grant a permit for a project with negative effects on Natura 2000 areas. The ADC-test consists of three conditions (Wetten Overheid, 2019):

A. there are no alternative solutions to reach the project's objectives;
D. the project's objectives constitute imperative reasons of overriding public interest;
C. the necessary compensation measures are taken in the project design to ensure that overall cohesion of Natura 2000 will be maintained.

A project objective would be regarded as an "imperative reason of overriding public interest" if it concerns either of the following three domains: public health, public safety or substantially beneficial effects on the environment (Bij12, 2019).

For a more complete description of when these requirements are met, consult the document "*Handreiking ADC-toets*" (Bij12, 2019), to be found in Appendix E or via this hyperlink. This document also contains useful examples of projects that used the ADC-test to give an impression of the line of argumentation that is needed.

The ADC procedure prescribes that the provincial authority requests an advice from the European Commission through the Ministry of Agriculture, Nature and Food Quality. To do so, it is required to fill in the standardized form "Assessment of plans and projects significantly affecting Natura 2000 sites". This form can be found in Appendix C or via this hyperlink. In case the project is of national interest, the Ministry will fill in the form. Based on the information presented therein, the European Commission provides an advice to the Ministry and the provincial authority that will inform their final decision on whether to grant a permit (Bij12, 2019).

Summary

- Natura 2000 legislation is very strict when it comes to negative impacts on habitat types and species;
- If negative effects cannot be prevented by mitigation, an ADC-test must be conducted to show that [1] there are no other alternatives, [2] there are imperative reasons of overriding public interest and [3] compensation measures are taken.

Main implications for Delta21

- In the context of current legislation an ADC-test seems to be Delta21's best option;
- Province of Zuid-Holland is the leading authority when it comes to granting permits, also for the ADC-test;
- Delta21 should be aware that there is a plethora of other organisations involved in the management of the Voordelta and adjacent Natura 2000 areas that can influence decision making.

The broader debate on Natura 2000 legislation

As became apparent in our policy analysis, Natura 2000 legislation and guidelines are currently very strict and static. When a Natura 2000 area is being designated, habitat types and species present at that particular time are captured in the management plan. Nature conservation according to Natura 2000 aims to preserve the status quo of an area's ecological value. The objective is thus to maintain or increase the area of the habitat types and number of species over time. Although this concept contradicts the dynamic nature of natural ecosystems, nature legislation, including the regulations set out by Natura 2000, is generally conservative (Fiselier, interview, Appendix B7, 2020).

An increasing amount of resistance against this concept is being expressed. Natura 2000 sites are often relatively small areas with idiosyncratic objectives. Changes in certain habitat types of an area are prohibited even if they would benefit the natural integrity of a wider area. To illustrate this, we will use the example of the Grevelingenmeer. This lake came into being with the finalization of the construction of the Brouwersdam in 1971. Before the establishment of the dam, there was an open connection between the sea and the estuary. After the closure, certain freshwater habitat types developed and are now protected under Natura 2000. Today, there are plans to open the Brouwersdam to restore nature as it was before 1971. However, a major obstacle for this to happen is the fact that this would negatively impact the freshwater habitat types in the Grevelingenmeer as defined in the Natura 2000 conservation goals for the area (Peijpe van, interview, Appendix B5, 2020). This illustrates that, even for those that try to improve nature within the Netherlands, the rigidness of Natura 2000 legislation poses an obstacle. Although the opening of the Brouwersdam would be considered a gain for many nature organizations, its realization is being impeded because of the negative effects on a certain habitat type that exists due to a manmade construction.

One organization that aims to address the lack of flexibility in Natura 2000 legislation is LIFE-IP Deltanatuur: a Dutch project funded through the LIFE programme, a European fund to finance environment and climate action. It is owned by the Dutch Ministry of Agriculture, Nature and Food Quality and runs from October 2016 to September 2021. LIFE-IP aims to develop and integrated governance approach that improves coordination of interests in Natura 2000 areas (between government, NGOs, businesses etc.) and remove legislative obstacles for the achievement of Natura 2000 objectives in the Netherlands. It is in constant dialogue with the European Commission to make Natura 2000 legislation more flexible.

For Delta21, the movement towards a more flexible Natura 2000 framework and the argumentation behind it may be very helpful in communicating the ecological impacts of the project to the various stakeholders involved. It is important to note that the conservative view corroborated by current Natura 2000 legislation is still dominant, but that support for a more flexible approach is growing. In practical terms, this means that strict legislative requirements will be determining for the implementation of the project, but that the more flexible argumentation on the added value of Delta21 for other nature values and areas might help to get political support for the project. The argument of opening the Haringvliet might become increasingly important.

5 Conclusion

This report investigates the impacts of Delta21 on the nature values in the Hinderplaat and the Slikken van Voorne – both in absolute and relative terms as compared to the total Voordelta – and determines the bottlenecks to project approval by Natura 2000 authorities. To do so, it answers a set of sub-research questions based on a literature study and Interviews with relevant stakeholders.

In light of the whole Voordelta, most habitat types in the Slikken van Voorne (H1140A, H1310A, H1310B, H1320, H1330A) are of exceptional importance, as they do not occur in any other location in the Voordelta. The Hinderplaat seems less vital in the Voordelta, as 88% of this habitat type (H1140B) is found in other areas of the Voordelta. However, this habitat type has the highest conservation priority according to the EU. Additionally, many Habitats and Birds Directive species use both sites as resting and foraging area. Stilt and duck species use the slikken, while piscivorous birds and the common seal use the Hinderplaat. Aside from this, it is important to note Natura 2000 legislation prohibits change to *any* habitats or species, making their relative importance less relevant for Delta21.

In terms of Delta21's impact on the habitat types in the Slikken van Voorne and Hinderplaat, we conclude the following. We expect the two areas to silt up due to reduced wave influence and their sheltered position. Because of this, habitat types H1140A, H1310A, H1310B, H1320 and H1330A are expected to increase in the Slikken van Voorne, while H1110, H2110 and H2120 are expected to decrease. Due to the silting up we expect the Hinderplaat to disappear and lose all of habitat type H1140B while H1140A arises. Because of these changes, we also expect the species present to be affected. For the Habitats Directive species, we expect migratory fish to benefit from the opening of the Haringvliet and seals to be harmed by the disappearance of the Hinderplaat and the loss of potential foraging area. For the Birds Directive species, we generally expect stilts and ducks to profit from the increase in slikken, while some piscivores are negatively affected, as they lose foraging area on the Hinderplaat.

For a project to have a chance at being granted a permit by the relevant Natura 2000 authorities, it must follow the legal requirements prescribed by the Nature Conservation Act and contribute to the area-specific objectives set out in the Voordelta management plan. If a project fails to do so, i.e. the prescribed environmental impact analysis conducted by the project owner leads to the conclusion that the project is expected to degrade the quality of the area's habitats or disrupt the species present, the last possibility to get the project approved is by passing the ADC-test with the European Commission. Considering the effects of Delta21 on the Voordelta, we expect this to be the best option for the project. The test requires projects to fulfil three conditions in order to be approved: (1) there may be no alternative solutions to reach the project's objectives; (2) the project's objectives must constitute imperative reasons of overriding public interest; and (3) the necessary compensation measures must be taken in the project design to ensure that overall cohesion of Natura 2000 is maintained.

According to the specifications, any loss of habitat or disruption of species must be minimized and can only be indemnified by providing the same area and type of lost habitat somewhere else. In the case of Delta21, the main issues according to Natura 2000 are the losses in habitat types H1140B (Hinderplaat) and H1110 (permanently flooded sandbanks). Though the loss of H1140B can be compensated by the creation of a sandbank by the tidal lake (of at least the same size as the Hinderplaat) and possibly the natural formation of sandbanks southwest of the ESL, the area of H1110 that will be covered up by the construction of the ESL represents a critical argument against the project according to Natura 2000.

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Appendix

A: Tables and figures

Habitat requirements

Multiple habitat types important for Nature 2000 occur in the **Slikken van Voorne**:

- H1140A Slik- en zandplaten (Mudflats and sandflats not covered by seawater at low tide, tidal area)

'Schor' habitat types:

- H1310 Zilte pionierbegroeiingen (Salicornia and other annuals colonizing mud and sand)
- H1320 Slijkgrasvelden (Spartina swards (Spartinion maritimae))
- H1330 Schorren en zilte graslanden (Atlantic salt meadows (Glauco-Puccinellietalia maritimae))
- H2110 Embryonale duinen (Embryonic shifting dunes)

One habitat type occurs on the **Hinderplaat**:

- H1140B Slik- en zandplaten (silt and sandbanks not covered by seawater at low tide, tidal area.

Requirements for each of these habitat types are established on moisture, acidity, nutrient level, salinity, and soil type. The Dutch GVG ('*gemiddelde voorjaars grondwaterstand*') is used as an indicator for the moisture levels in soil. This average spring groundwater level is calculated by taking the average of the groundwater levels at 14 March, 28 March, and 14 April and averaging these yearly spring levels over a period of at least eight year. The nutrient level of the habitat types is categorized using the Waternood+ classification (described in Table A1). These requirements are shown in Table A2 to A6. The vulnerability of each habitat type for the changes due to Delta21, can be assessed using these requirements. Besides, each habitat type is vulnerable for changes in flow velocity, flooding frequency and dynamic substrate.

Table A1. Waternood+ classification (translated to English) Source: KWR (2009).

Nutrient level (voedselrijkdom)	In groundwater and surface water		In soil				
	NO3 (mg/L)	PO4 (mg P/L)	C/N	C/P	N-mineral	Ellenberg N-number	Production (ton dry material/ha)
Low (voedselarm)	< 1	< 0.04	> 35	> 750	< 60	1-4	< 4
Moderate (matig voedelrijk)	1 - 2	0.04 - 0.10	20 - 35	300 - 700	60 - 180	5 - 6	4 - 8
High (zeer voedselrijk)	> 2	> 0.10	< 20	< 300	> 180	7 – 9	>8

H1140 Slik- en zandplaten

Mudflats and sandflats not covered by seawater at low tide, also called tidal area
H1140A (Slikken van Voorne): low-dynamic plates sheltered from waves (fine sediment)
H1140B (Hinderplaat): high-dynamic plates exposed to waves (coarse grained sediment)

Table A2. Requirements H1140 Slik- en zandplaten. Source: Synbiosys Alterra (2020a)

Abiotic parameter	Waarde
Moisture	GVG > 20 cm above groundlevel
Acidity	pH-H2O>6.5 / pH-KCl>6.1
Nutrient level	low – moderate
Salinity	Cl >10.000 mg/L
Soil type	Sand - mud

H1310 Zilte pionierbegroeiingen

Salicornia and other annuals colonizing mud and sand plates, which are periodically flooded with saltwater.

Table A3. Requirements H1310 Zilte pionierbegroeiingen. Source: Synbiosys Alterra (2020b)

Abiotic parameter	Waarde
Moisture	GVG >10 cm below groundlevel
Acidity	pH-H2O>6.5 / pH-KCl>6.1
Nutrient level	Low-moderate
Salinity	Cl >10.000 mg/L
Soil type	Sand - loam

H1320 Slijkgrasvelden

Mud plates with perennial pioneer species dominated by Spartina (*Spartina sp*), which are periodically flooded with saltwater.

Table A4. Table A4. Requirements H1320 Slijkgraslanden. Source: Synbiosys Alterra (2020c)

Abiotic parameter	Waarde
Moisture	GVG >50 cm above groundlevel - GVG > 10 cm below groundlevel
Acidity	pH-H2O>6.5 / pH-KCl>6.1
Nutrient level	Moderate-high
Salinity	CL>5.000 mg/L
Soil type	Sand - loam - clay

H1330 Schorren en zilte graslanden

Atlantic salt meadows which are regularely flooded with saltwater.

Table A5. Requirements H1330 Schorren en zilte graslanden. Source: Synbiosys Alterra (2020d)

Abiotic parameter	Waarde
Moisture	GVG < 10 cm above groundlevel
Acidity	pH-H2O> 5.5 / pH-KCl>4.8
Nutrient level	Moderate-high
Salinity	Cl >5.000 mg/L
Soil type	Sand - loam - clay

H2110 Embryonale duinen

First stage of dune formation.

Table A6. Requirements H2110 Embryonale duinen. Source: Synbiosys Alterra (2020e)

Abiotic parameter	Value
Moisture	GVG > 40 cm below groundlevel
Acidity	pH-H2O>6.5 / pH-KCl>6.1
Nutrient level	Moderate
Salinity	1.000-10.000 mg/L
Soil type	Sand

B: Interview summaries

1. **Nolte A. & Prins T. – Deltares (17/02/2020)**

Background of experts:

Arno Nolte: senior advisor integrated ecosystem management and coastal systems

Theo Prins: senior advisor/researcher marine ecology and involved in projects in the Voordelta

Deltares is an independent, not for profit institute for applied research and is partly funded by the government.

How is Deltares involved in Delta21?

Huub Lavooij and Leen Berke approached Deltares for advice. Deltares is not able to sponsor the project but can share information and knowledge.

What changes in currents can be expected in the tidal lake?

The changes in currents mainly depend on the size of the opening between the tidal lake and the sea, and the discharge from the Haringvliet. The tidal range will be slightly smaller than in the current situation, if the opening is big enough. If the opening is small, the tides will be much less significant. However, if the opening is large enough, the tidal range will only be a few centimetres smaller. The size of the opening needed to maintain a significant tidal range can be calculated.

The tidal range in the Slikken van Voorne could decrease a few centimetres if the sluices of the Haringvliet are completely open. This effect will be smaller than the effect of a small opening towards the sea.

The main flow channel from the Haringvliet sluices towards the sea, the Slijkgat, will remain the only flow channel after the implementation of Delta21. Moreover, the flow velocity in this channel will increase.

How will the process of sedimentation in the tidal lake change because of changes in water currents?

The sedimentation pattern that is typical for estuaries will probably move to the end of the Slijkgat, at the entrance to the sea. Furthermore, the construction around the lake will prevent that waves enter the tidal lake. This will prevent erosion of the area caused by the waves. However, sand supply from the sea towards the coast is mainly transported by waves. Therefore, sedimentation of sand on the intertidal areas will also be inhibited in the tidal lake due to the lack of waves. Sediment supply of fine sediments will enter the area via the Haringvliet and from the sea. Sediment supply from the Haringvliet will depend on the discharge and the amount of sediment in this water. In the current situation, the amount of sediment supply from the Haringvliet to the tidal lake is small compared to the supply from the sea. The question will be if the amount of sediment supply from the Haringvliet and the

sea will be enough to keep up with sea level rise. A first-order magnitude of sedimentation can be calculated quite easily. Deltares expects that sedimentation of fine sediments will most likely not be sufficient to keep up with sea level rise and certainly not with accelerated sea level rise. The Hinderplaat will probably slowly decrease in size. Erosion will be little but in combination with sea level rise, the Hinderplaat will slowly disappear in the future.

What type of sediment will be deposited after implementation of Delta21?

In the current situation, sand is the main sediment type in the area of the tidal lake. The Hinderplaat and the Slikken van Voorne are in the middle/Northern part of the tidal lake. Here, the flow velocity will be low because of the construction around the tidal lake. Due to this low velocity, the lighter mud/silt will be deposited instead of the heavier sand particles. Especially the Slikken van Voorne will silt up.

Could the formation of a new sandbank be realistic at the assigned location?

A new sandbank could be created at the seaside of the construction. However, the current proposed shape of the sandbank does not appear optimal yet. The current will be parallel to the ESL construction. This should be taken into account when creating a sand bank. A more gradual shape along the ESL construction would be more effective (see Figure B1). Erosion will be less, and (part of) the eroded sediments will be naturally transported and sedimented along the construction.

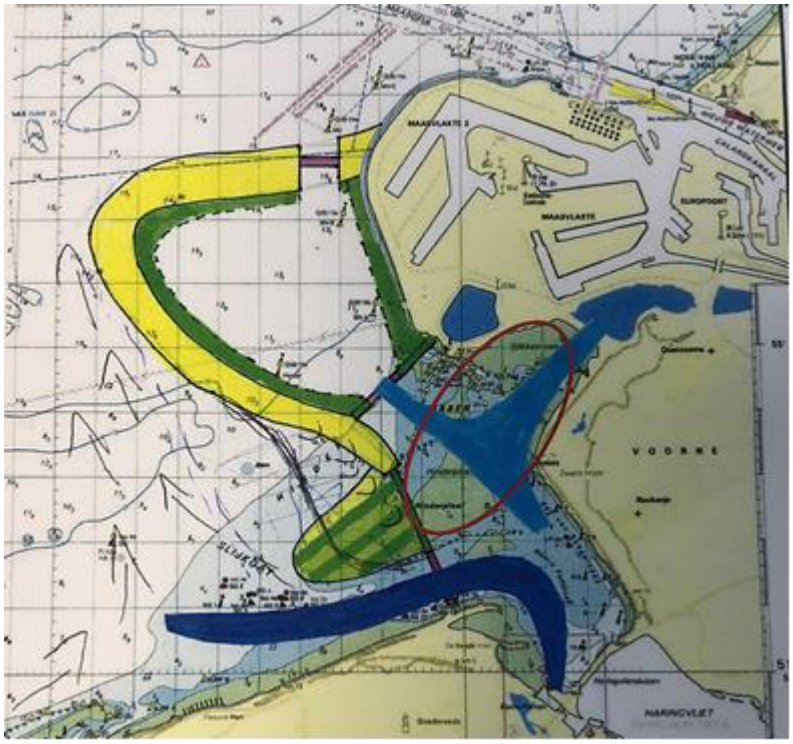

Figure B1. Figure B1. Most recent sketch of the Delta21 project design including an alternative location for the sandbank. In yellow: dykes/dunes that are the boundaries of the energy storage lake. Area within red line: Slikken van Voorne & Hinderplaat (part of the planned tidal lake). Light blue: trench. Dark blue: main water outlet and inlet of Haringvliet. Green/yellow striped: proposed new sand bank. Black lines drawn with pencil: indicate the end result or alternative location of the sandbank. Black arrows: sea currents.

What salinity levels can be expected in the tidal lake after the opening of the Haringvliet sluices?

The salinity levels in the tidal lake depend mainly on the amount of freshwater discharge from the Haringvliet. This depends on seasonal differences in river discharge and water management operation of the sluices. High discharges will occur during winter and low discharges during summer. Fresh water is very important for agriculture. This is not only the case along the Haringvliet, but especially upstream of the Nieuwe Waterweg (Hollandse IJssel). Both agriculture (the Westland area) and the drinking water supply depend on enough discharge in the Nieuwe Waterweg. When less river water is discharged through the Nieuwe Waterweg, sea water will come more inland. This causes silt seepage, which is especially problematic to the drinking water supply. Therefore, the water discharge is regulated, especially in the summer. In the current situation of the Kierbesluit, the sluices are often closed when there is insufficient river discharge. Opening the Haringvliet sluices changes the distribution of the river water among the different channels. Since all river branches are connected, opening the Haringvliet sluices would have a large impact on the whole water system in the Netherlands.

A permanent opening of the Haringvliet sluices has not been decided yet. As far as Deltares knows, no timeline for such a decision is foreseen. Therefore, it is difficult if not impossible for the Delta21 plan to assume such a decision. It is recommended to work out the two scenarios of the current Kierbesluit and the possible future permanent opening. In the case of continuing the Kierbesluit, the changes in salinity level in the tidal lake will be rather small. Especially since the Hinderplaat and the Slikken van Voorne are not located at the main discharge channel from the sluices. During moments of high freshwater discharge, the salinity levels can temporarily drop. This sudden change could have a negative effect on specific species. However, in a high dynamic area, species are adapted to these (often small) changes in salinity. Species located in the Slijkgat will change to species which are capable of high salinity changes.

In the scenario that the sluices are permanently opened, an estuarial system will originate. The salinity levels will decrease, and a salt-fresh gradient will occur. The location of this gradient will shift according to the amount of discharge. During low river discharge the gradient will be more inland, while during high river discharge the gradient may be in the new tidal basin or even offshore, leaving the Haringvliet (almost) completely fresh.

What nutrient levels can be expected in the tidal lake after the opening of the Haringvliet sluices?

The influence on the nutrient levels are quite comparable to the influence on the salinity levels. The predicted changes will probably be rather small. The residence time of the water in the tidal lake is also an important factor for the influence of the nutrient levels.

How will habitat types change due to Delta21?

The Voordelta mainly consists of habitat type H1110 (Sandbanks which are permanently slightly covered by sea water). Therefore, the habitat type that will lose the biggest area due to Delta21 will be H1110. This area cannot be compensated in a different location because

the shallow sea bottom has reached its maximum size in the Voordelta. An alternative could be to improve the quality of the area, as was done for the compensation of Maasvlakte2. However, it is difficult to predict how this goal could be achieved.

The Hinderplaat could slowly disappear as a result of sea level rising in combination with a decreased sedimentation. However, this could also happen without the implementation of Delta21, as a result of a sea level rise in the current situation. The tides and waves can morphologically move the Hinderplaat, but it is unknown whether this would preserve the Hinderplaat. The loss of the Hinderplaat could be compensated by a new sandbank, but this will increase the area loss of habitat type H1110 (permanently flooded sandbanks).

Often, the importance of a loss depends on the percentage of habitat area that is lost in a certain area. For the Maasvlakte2 development, it was assumed that if less than 1% is lost, it is no problem. From 1-5%, investigation is needed to decide if compensation is necessary. At more than 5% loss, compensation will be needed. A project can be approved on the basis of the 'ADC-test'. This means that project approval is possible if there are no alternative solutions (A), if there are imperative reasons of overriding public interest (D), and if there are taken compensatory measures (C) to ensure that the overall coherence of Natura 2000 is preserved.

Ecosystems are very complex. Therefore, it is hard to predict how habit types will react to these kinds of interventions.

What are the main bottlenecks? How likely will Delta21 be realized?

The added value for nature in this project is small. The benefits for nature as a result of the opening of the Haringvliet sluices compared to the Kierbesluit are complex to predict, as it depends on many factors. This could only be realized by changing the entire freshwater distribution in the Netherlands, but that is probably not a realistic option. In addition, it is hard to predict the consequences for nature in the Voordelta, just like with Maasvlakte II.

Furthermore, there are more energy island ideas. An integrated assessment of these ideas, e.g. to look for the best location of one or more energy island plans, is recommended.

2. Goes van der D. – Van der Goes & Groot (24/02/20)

The views expressed in this interview are the views of D. van der Goes and do not necessarily reflect the opinion of Van der Goes & Groot

Background of expert:

Dirk works both as manager director and vegetation expert at Van der Goes en Groot.

Van der Goes en Groot is an ecological consultancy. There are hired by other parties to investigate nature values in the context of "SNL" monitoring (Subsidiestelsel Natuur en Landschap). They also monitor Natura 2000 habitat types and species. They are involved in nature legislation through "natuurtoetsen", quick scans, and nitrogen calculations.

How are you involved in the Voordelta area?

Dirk did the assessment of birds and plants in the Slikken van Voorne and surrounding dune areas.

Do you know Delta21?

No, Dirk read about it in our email.

What changes do you expect to happen due to Delta21?

The area has radically changed during the last century (construction of Maasvlakte II and Nieuwe Waterweg). The Oude Maas is not functional anymore due to the construction of the Nieuwe Waterweg. Between Voorne and the Maasvlakte a dam is realised. This resulted in a sheltered bay where salt marshes ("schorren", shallow water with slick) have developed. At low tide this is a foraging area for birds.

After the implementation of Delta21 this will become even more sheltered than currently. Changes due to other projects in the Oosterschelde and Haringvliet have resulted in a decrease of dynamics. The construction of the Oosterschelde dam resulted in an area that could be comparable to that after the implementation of Delta21. It could therefore be used as a reference project. Often a reduction of dynamics reduces the relief, due to a reduced sediment supply. The higher plates will slowly disappear. In the sheltered bay there will be silt clay sedimentation. The risk of these changes is that foraging areas of water birds may be lost. Possibly also a reduction of salt marsh vegetation might disappear. Dirk also expects the relief in the area to disappear, evening out the differences between shallow and deeper areas.

If, like Deltares and Svašek Hydraulics expect, the Hinderplaat would become rich in silt clay as well, this could be a positive development for water birds. However, it is questionable whether the seal population would still use the Hinderplaat.

Not only the sand banks are influenced, but also the adjacent areas. This includes beaches, Marram grass vegetation, and embryonic dunes. Due to the reduced dynamics, also the white and grey dunes may become more densely vegetated. Keeping the dunes open is

already a conservation challenge, as nitrogen deposition also causes dunes to be overgrown with shrubs and trees. The building of Delta21 will even worsen the nitrogen deposition, as it will require heavy machines and boats. The beach close to Rockanje may also change because of changing dynamics. For Rockanje, this beach is key, as it is the main attractor of tourism in the area. If the beach would silt up, e.g. beach tent owners would not be happy about this.

Lastly, the Kwade Hoek could be affected. This natura 2000 area is one of the very few places in the Netherlands with natural dynamics. This area could also be affected as a result of Delta21.

All this potential change will probably evoke resistance from nature organisations. Their main issue would be: ***You know what you have, but you don't know what you'll get***. There are always unforeseen consequences in these kinds of projects.

What are bottlenecks regarding Natura 2000?

Natura 2000 legislation protects the area pretty strictly. It is prohibited to change foraging areas of protected species. The effects of a project like Delta21 are hard to substantiate. In the case of Maasvlakte 2, the economic importance for the Netherlands was so great that the nature loss was accepted. To compensate, the port of Rotterdam has done (and still does) major investments in nature development and monitoring.

In this project there are many possible negative effects (as described earlier). A lot of political will is needed for the realisation of a project like Delta21. A substantial economic national interest needs to be involved for project approval, if there are this many uncertainties about the effects.

It is certain that there are both negative effects and chances for nature. But Natura 2000 legislation does not allow a net difference. Losing habitat type A while gaining habitat type B instead is not accepted. Whatever is present now, cannot be negatively influenced.

Are there any other documents/resources that could be useful for us?

Aerius - Online portal about habitat types (area, location, etc).

Province of South Holland also has an overview of the habitat types. You could get in touch with them to ask for more information. They finance many projects, therefore they also get the investigation report.

Website with all protected areas of the Netherlands. All the levels of protection are showed. There are about 5 protection regimes. Habitats directive is the strictest. National legislation is handled less strictly.

RWS has a public portal about bird species.

What is normally included in an environmental impact report?

The nature values (habitat types) and the protected species (NDFF species list) are listed. What is present and what will be influenced will be described. It is also investigated what other habitat types are present within a radius of 5 km. Then it can be evaluated whether the expected effects will have an effect on the species as well. This clarifies the impact of the expected changes.

The final result is a document with what (species, habitats, etc) could be influenced. This document is included in a project application.

Compensatory measures could be proposed in the case of major economic interest. Sometimes it is asked to think along. Therefore, one can also suggest compensatory measure themselves.

What is your point of view on opening the Haringvliet sluices?

The fact that the sluices are not open now has nothing to do with inundation safety. The biggest issue is that stakeholders are afraid of salty seepage. As long as this issue is not properly solved, opening the sluices is not really a valid goal.

What are bottlenecks for project approval?

- There are a lot of protection measures in the Voordelta
- Effects of a project like Delta21 are hard to substantiate
- Several Natura 2000 areas are expected to be negatively affected
- Other stakeholders are likely to oppose this plan

3. Bal H. – local (31/01/2020)

Background of Henk Bal

Henk worked for Shell and has a background in security and meteorology. He lives in Goeree. He is also a member of Natuurmonumenten and has an interest in nature.

How is the interviewee involved in the Delta21 project?

In April 2019, Henk saw an article about Delta21 that ignited his interest in the project. He initially disagreed with the plans, because the tidal lake was closed in the first versions of the plan. Henk contacted Huub and Leen and ended up staying in contact with them and is positive about the current version pf the plan. He has proposed to alter the plan to include dunes to shield off the view onto the Maasvlakte from Goeree.

What is the interviewee's experience with the Slikken van Voorne and the Hinderplaat?

Before the Maasvlakte, there used to be a lot more tidal influence on the Slikken van Voorne. Because of this, there was a white beach. Now, the area lost the dynamics and became visually unappealing.

What do locals think about Delta21? How realistic does the interviewee think it is that the project will be realized, and what are the main bottlenecks?

Because of the Delta21 project, the inhabitants of Oostvoorne will lose their view on the sea, making the Slikken van Voorne an unappealing place to visit.

"With the plan, we create new nature when the lake of Oostvoorne is opened with the sea with high and low tides".

There remains a lot to be done in terms of outward communication of the project. Locals should be informed and included.

4. Craeymeersch J. – Wageningen Marine Research (20/02/2020)

Background of expert:

Johan Craeymeersch works for Wageningen Marine Research. He is involved in the monitoring and evaluation of the nature compensation measures for Maasvlakte 2.

Involvement in Delta21

Johan Craeymeersch has not yet heard about Delta21. Because of his involvement in the nature compensation for the Maasvlakte 2, he can give us some insights in how nature compensation for Natura 2000 works.

What will happen to the Hinderplaat and Slikken van Voorne as a result of Delta21?

The currents will change after the construction of Delta21. The changes as a result of Delta21 will probably be comparable to what happened after the building of the Maasvlakte, but more severe.

How have the nature compensation measures of Maasvlakte 2 been set up?

By looking at what Natura 2000 habitats and species would be negatively affected. For the Birds directive, the habitat loss of the Common scoter has to be compensated. For the Habitats directive, the loss of habitat type H1110 (permanently flooded sandbanks) needs to be compensated.

Due to the construction of the Maasvlakte 2 foraging area for birds was lost. To compensate, it was aimed to improve the food availability with 10% elsewhere. It was estimated that the size of a sea reserve should be tenfold the area of the Maasvlakte 2. Johan is not sure how this was estimated, but will look this up for us and send it [see Lindenboom (2002), Syntheserapport PMR NCV]. In this sea reserve bottom trawling has been prohibited, to improve the quality of the seabed.

At the moment, the final evaluation is being written. Interestingly, both measures don't seem to have improved the area very much. The common scoter did not seem to use the Maasvlakte area so much before the construction of Maasvlakte 2. Prohibiting bottom trawling seems to have not significantly improved the seabed. It was observed that bottom trawlers did not use this area intensively anymore even before it was prohibited. Another explanation could be that the seabed organisms are so well adapted to dynamics that bottom trawling does not have a significant negative effect on their population dynamics.

The Slikken van Voorne and the Haringvliet haven't been investigated for nature compensation of the Maasvlakte 2.

How does nature compensation get approved? Can you compensate by improving a different type of nature in a different area, like the Haringvliet?

Nature compensation eventually gets final approval by the ministry of LNV and Brussel. Rijkswaterstaat is also involved (via LNV). According to Natura 2000, nature should be compensated in the same area and the same habitats that will be lost need to be created elsewhere. Therefore, improving the Haringvliet as a compensation for nature loss in the Voordelta does not work according to Natura 2000 rules. Johan believes that this should be possible. He believes that the Delta should be considered as a whole.

Does the Delta21 plan sound realistic?

No, this enormous structure will have a drastic influence on the whole delta, not only on the Slikken van Voorne and the Hinderplaat.

Interesting notes

- Nowadays we have a better understanding of what the consequences of the Maasvlakte 2 were for nature. Therefore, the compensation measures for the Maasvlakte should be revised.
- It is doubtful whether it is useful to try to compensate for Delta21 by again prohibiting fishing
- South of the Maasvlakte, also the soil fauna was investigated.
- The Hinderplaat has mostly served as a resting area, not as foraging area. It may become a foraging area due to Delta21.
- The location of the Hinderplaat (as a resting area during high tide) is important. If the resting area is further away from the foraging area it takes more energy to fly from the foraging area to the resting area and vice versa.

5. Peijpe van, J. – LIFE-IP (18/02/2020)

What is LIFE IP and what is its role?

LIFE IP Deltanatuur is a Dutch project funded through the LIFE programme, a European fund to finance environment and climate action. It is owned by the Dutch Ministry of Agriculture, Nature and Food Quality, in close cooperation with several authorities and NGO's. The program runs from October 2016 to September 2022. It aims to develop an integrated governance approach that improves coordination of interests in wet Natura 2000 sites (between government, NGOs, businesses etc.) and **improve the possibilities for the achievement of Natura 2000 objectives** in the Dutch main waters. It is in constant dialogue with the European Commission to make Natura 2000 legislation more flexible, for the development of a resilient nature network. LIFE-IP supports several field projects in Dutch Natura 2000 areas.

How is the policy process around Natura 2000 organized? Who is involved?

While the **Ministry of Agriculture, Nature and Food Quality** is responsible for monitoring the implementation of the Natura 2000 goals in the Netherlands, the management of the sites is the role of the respective **provinces** and **Rijkswaterstaat**. In the case of the Delta21, the Ministy of Agriculture, Nature and Food Quality is probably responsible for assessing interventions in the Voordelta. The **European Commission** only gets involved when projects considered harmful to Natura 2000 objectives are to be approved and one or more affected N2000-objectives are highly prioritized. If, in such cases, there is doubt if the project should be considered as an 'imperative reason of overriding public interest', the EC must make a decision.

What are the main bottlenecks in implementing infrastructural projects in Natura 2000 areas? How flexible is legislation? What kind of arguments are needed to get a project approved?

Natura 2000 legislation is currently very strict and static. As it stands, a project has a good chance to be approved if it **contributes to reaching the Natura 2000 goals** for its specific region. An Infrastructural project in a dynamic site such as the Voordelta van be problematic in terms of their high degree of **uncertainty** about the effects they will have on ecosystems. An alternative line of argumentation that may lead a project to be considered by the relevant authorities is **indispensability**: if the measures to be taken represent an 'imperative reason of overriding public interest', cannot be achieved via alternative solution approaches and there is no doubt that compensation will be realised before N2000-goals are negatively affected.
The realization of certain flagship projects can also help LIFE IP to search opportunities for flexibility in the implementation of the Bird and Habitat Directives in the Netherlands.

Mitigation and compensation

Projects applying for approval to be implemented in Natura 2000 areas must conduct **mitigation and compensation assessments** themselves. The project has the responsibility to prove that there will be no harm to N2000-objectives. One difficulty with projects like Delta21 is that the sea constitutes a dynamic ecosystem that makes an assessment of the effectiveness of planned compensation measures difficult. When it comes to compensation,

the loss of certain ecological values cannot be compensated by the improvement of a different type of value, but must be of the same kind.

How should Delta21 proceed to have a chance of approval?

From a general political perspective, it is advantageous that Delta21 combines several different objectives. However, to convince Natura 2000 authorities, there will have to be a clear argumentation on what and how urgent the main project's **objectives** are and if there are from an ecological point of view no better **alternatives** to achieve them. An expected **improvement towards the area's N2000-goals** represents the strongest possible argument in favor of the project from a Natura 2000 perspective. Other strong arguments are for example (but not only) goals that concern safety, environment or public health. Any expected harm on protected habitats or species requires a clear **mitigation and compensation plan**.

Although the amount of public support for a project is not an argument in the assessment for N2000, from a more general perspective it is important to **involve affected parties** from an early stage of the project: Delta21 should try to get support from the government, provinces and managers of the Natura 2000 area, and discuss it with relevant NGOs. The latter can be used as a source of knowledge to improve the design of the project.

6. Brinkhof JJM. – Rijkswaterstaat (18/02/2020)

Background info JJM Brinkhof:

Technical manager at Rijkswaterstaat. Works a lot with ecosystem engineering/building with nature. Not actively involved in projects and management of the Voordelta.

What is the role of Rijkswaterstaat within the Voordelta?

Hans Brinkhof himself is not actively involved in any project in the Voordelta. He could provide us with useful information by looking at the database of RWS. In general the role of RWS in Nature 2000 areas is the maintenance of a nature area. RWS hires a certain party to maintain the nature areas. One goal is avoiding loss in surface of certain habitat types and abundance of certain species as defined in the Natura 2000. In short, RWS builds houses for nature and maintains them. For waterbodies in general RWS looks at the maximal ecological potential that can be reached. Parameters are designed which will be monitored over time by RWS.

How is RWS related to EU policy on Natura 2000?

Through the ministry (LNV), RWS is assigned as the manager of certain Natura 2000 areas, amongst which the Voordelta. Decision making about the rules and regulations regarding these areas is responsibility of LNV.

Familiarity with Delta 21?

Very familiar with the project since Huub Lavooij is a former colleague of Hans Brinkhof.

What are the possibilities for nature compensation/mitigation?

For everything RWS does in a nature area, they have to compensate. For a project like this compensation should be quite extensive. For the proces it is important to include nature organisations from the beginning. They have knowledge about the area and should be informed about what will be lost and gained. For example, we could look at which species survive well in a place with big differences in water (like what will happen in the storage lake).

What are the main bottlenecks for the implementation of Delta 21?

Main bottleneck is that the area of implementation is located in the area assigned as compensation for the Maasvlakte. It will be hard to convince people that we can build again in this area.

The current debate about nitrogen (stikstof) does not allow for big infrastructural projects. This however might be short-term and this project is long-term.

Is the Delta 21 realistic? How realistic is it that it will be implemented?

Economically speakinng the plan is very realistic because it reduces costs of dike strenghtening. Especially since the pressure from the rising sealevel will be increasing in the coming years, innovative solution are needed to protect the hindland. Something needs to be done in the coming decennia. Within twenty years is a good planning for such a project.

Useful information for the continuation of our project

Conceptual relation schemes

Ecoshape = consortium of different parties focused in building with nature

Incose system engineering

Ecological keyfactors (ecologische sleutelfactoren) STOWA

Omgevingswijser.org <-- SDGs

TRL technical readiness level --> ecological readiness level

Comparison between Voordelta and Markermeer & Zandmotor

7. Fiselier J. – Royal Haskoning (27/01/2020)

How is Royal Haskoning involved in Delta21?

Provides advice on a voluntary basis.

Experience with the implementation of projects in Natura 2000 areas:

In general, it is difficult to implement projects in Natura 2000 areas, especially when it comes to areas under the Habitats Directive, more so than under the Birds Directive. Natura 2000 areas are not designed to prevent economic development but to ensure sustainable development, and compromising is possible when interventions are **urgent/indispensable** in economic or safety terms. However, nature organisations are generally quite conservative (although their legal flexibility varies). Changes to nature areas are per definition considered as something negative and every hectare of a particular habitat type that is lost must be compensated by (at least) the same area of that habitat somewhere else. To understand their view, it is important to include **nature organisations** in the project planning from an early stage. Several projects (Maasvlakte, Markerwadden, Prins Hendrikzanddijk, Delfzijl, Den Helder, Balanseiland) have been successfully implemented in Natura 2000 areas, though they seemed impossible from a **legal point of view** at first. It is key to understand the needs of nature organisations and think about **mitigation** before talking about **compensation**. The challenge is to turn a necessary intervention into a **win-win** for all parties involved (think about what problems it could resolve for nature organizations). **Legislation is static, and values are subjective**. Interventions can often be **justified** by looking at their **net effect** on nature, which may be positive.

How will habitat types change due to Delta21?

Intuition suggests that Slikken van Voorne might increase due to **weakened hydrodynamics**, whereas the Hinderplaat decreases. Modelling could possibly give a good overview of what will happen. However, modelling such changes is a difficult process and is not always accurate or needed.

Ideas about mitigation and compensation

Maasvlakte II is considered one of the most successful projects in terms of nature compensation (dunes & marine reserve). To get an idea about possible measures this could serve as a **reference project**. Compensation can also be sought in areas outside of the Voordelta.

What are the main bottlenecks? How likely will Delta21 be realized?

The main objective at this time should be to convince politicians about the **urgency and need** for this project. It is a matter of **framing**. Given rising sea levels, it is obvious that major interventions will be needed in this part of the Netherlands, either strengthening of the dikes, or a more innovative plan like Delta21. Whenever the **political momentum** is there, the plan should be part of the consideration.

For our assignment, we will assume that Delta21 is the best possible plan to ensure future protection against flooding. We will focus on assessing its expected **(net) effect(s)** on nature in the Slikken van Voorne and Hinderplaat. Furthermore, we will consider possibilities to **mitigate and compensate** for ecological losses incurred because of the project.

8. Schelling T. & Muusse T. – Staatsbosbeheer (20/02/2020)

Background of experts:

Tara Schelling is 'forest ranger management', meaning that she is responsible for the management of nature areas. Theo Muusse is 'forest ranger ecology' and does more monitoring in the area. Tara Schelling is a manager of the Hoekse Waard.

Involvement in Delta21

Both Tara and Theo have never heard of the project. This is probably because they are both managing areas that are quite far away from the Voordelta.

What is your knowledge on the Hinderplaat and Slikken van Voorne?

Both Tara and Theo are not managing the Voordelta. This area is managed by Rijkswaterstaat. Theo does have experience in the area because of his bird-watching hobby which he often practices in the Slikken van Voorne. Theo mentions that at Voorne there are dune valleys, as well as silt pioneer vegetation. In response to the expansion of the Maasvlakte, The Slikken van Voorne have expanded and more sand has come into the area.

What will happen to the Hinderplaat and Slikken van Voorne as a result of Delta21?

There will be a big lee southeast of the Energy Storage lake. This will cause silting and therefore further expansion of the Slikken van Voorne. Furthermore, the dunes will become less influenced by seawater, causing them to be rougher ('*verruigen*'), with shrubs and trees developing. Theo notes that eventually a beech forest will develop, as this always eventually develops in the Netherlands. The nature we have is all there due to the type of management.

What is the vision of Staatsbosbeheer considering the whole delta area of the Netherlands?

Christine Lammerts wrote a vision/ 12-year ambition for the delta.

Does the Delta21 plan sound realistic?

Yes. Theo is very interested in what could develop south of the Energy Storage Lake.

How can we get more information on habitat types and their sizes in the Voordelta?

Staatsbosbeheer only possesses this information for their own Natura 2000 areas. As Rijkswaterstaat manages the Voordelta, we should contact them for a map of the habitat types in the Voordelta.

Interesting notes

- Staatsbosbeheer is managing the Voornse Putten. We could contact Casper Zuyderduyn (C.Zuyderduyn@staatsbosbeheer.nl, 0653327465)
- Wales, Ramsey Island is an interesting project as a comparison. They also looked a lot at nature compensation in a delta area.

9. Bliek, B. – Svašek Hydraulics (17/02/2020)

Background of experts:

Bram Bliek is specialised in morphology, currents and waves. Svašek Hydraulics is an independent consultancy specialised in waves and predictions of currents, amongst other things.

Involvement in Delta21

Bram knows the project from publications. He has been doing some planning himself on the same topic, for “energielandschap voor de toekomst”.

How did the morphology of the Haringvliet delta change over time?

Situation before closing the Haringvliet sluices

There were two trench systems just outside of the Haringvliet sluices. Both were kept open by the tides. The sandbanks were situated further away from the coast than in the current situation. Waves came from the west, which brought in sand, while the water discharge from the Haringvliet pushed the sand away from the coast.

Situation after closing the Haringvliet sluices

After the closure, the seaward movements weakened. As a result, the plates moved towards the coast. One of the trenches (Rak van Scheelhoek) is almost entirely silted up. Moreover, the closed sluices contribute towards the Slikken van Voorne being rich in silt.

What will happen to the morphology of the Hinderplaat and Slikken van Voorne as a result of Delta21?

Influence of opening the Haringvliet (entirely)

Opening the sluices will result in the tides affecting a larger area. However, this will not result in the reopening of the Rak van Scheelhoek. The layer of silt that has built up has condensed over time and become clay. The other trench still consists of sand. Because the clay trench will not erode as easily, the trench with sand will continue to be the main trench. In this trench, the flow rate will increase after the opening of the sluices.

Sand will be deposited further away from the coast after opening the Haringvliet sluices. It will be transported through the main trench and deposited outside of the tidal lake.

Influence of Delta21 structures

The construction of the Maasvlakte did not stop the current shoreward movement of the Hinderplaat. Delta21 will stop this movement, since the influence of waves will be much less significant in the Hinderplaat area (within the tidal lake).

The Slikken van Voorne will become even more sheltered as a result of Delta21. Tidal influences will be weak in this area. This could result in more sedimentation (mainly fine materials). The heavy sand particles are transported through the trench due to the high flow velocity. The flow velocity in the Slikken van Voorne will be low, resulting in the deposition of the light weighted materials.

Furthermore, the Hinderplaat will probably silt up. Again, this is because the heavy sand particles are transported out of the tidal lake and the lighter silt particles will be deposited due to the low flow velocity.

The area in the tidal lake will become a low-dynamic system. In this system, one can expect more biodiversity than in a high-dynamic system. The optimal tides for the habitats in the tidal lake should be investigated.

Could the formation of a new sandbank be realistic at the assigned location?

The main trench is influenced by the tidal currents (NW and SE) along the coast. The sandbank should therefore be close to the ESL to avoid erosion, since there is some shelter from currents. The sandbank could also be created as an overhang (as in the current Delta21 plans). In that case, the natural processes (waves and tidal influences) will change the shape of the sandbank. This will probably have a similar result to putting it closer to the ESL in the first place (see Figure B2).

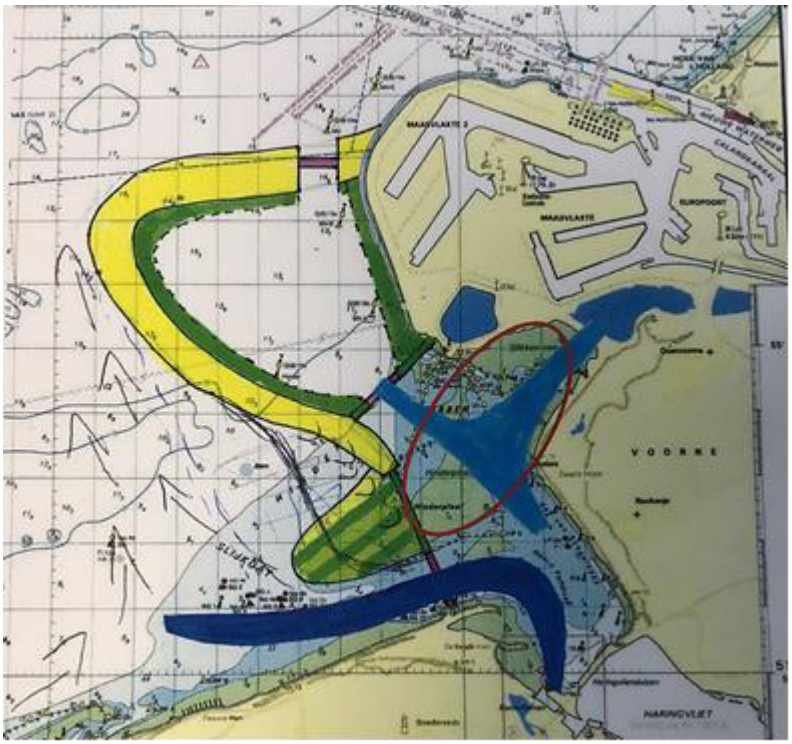

Figure B2. Most recent sketch of the Delta21 project design including an alternative location for the sandbank. In yellow: dykes/dunes that are the boundaries of the energy storage lake. Area within red line: Slikken van Voorne & Hinderplaat (part of the planned tidal lake). Light blue: trench. Dark blue: main water outlet and inlet of Haringvliet. Green/yellow striped: proposed new sandbank. Black lines drawn with pencil: indicate the end result or alternative location of the sandbank. Black arrows: sea currents.

Moreover, embryonic dunes (H2110) might emerge on the new sandbank. They could be formed because there are waves transporting sand, but no seaward recirculation of sand.

Point of attention: the Hinderplaat is an island, but this new sandbank won't be completely surrounded by water. This could be less favourable for seals. An alternative option could be to create the new sandbank further away from the coast. The sandbank will be surrounded by water but easier to erode. A Northern trench between the island and the boundaries of the ESL may also emerge if the island is large enough.

What are the main bottlenecks? How likely will Delta21 be realized?

The implementation of Delta21 in its current design in not very realistic. There are several reasons:

- From a natural perspective, it is a large invasive intervention
- In the Netherlands, generating energy by waterpower has a low efficiency per m2. Other systems (like osmosis) have a higher capacity per m2
- The effect in terms of inundation protection is limited. Other suggested projects around the coast would also protect the dune area.

10. Pol van der, L. – Gemeente Westvoorne (21/2/2020)

The information from this interview cannot be published yet, due to confidentiality reasons. It might be made available after the submission of this report.

11. Baptist M. – Wageningen Marine Research (27/2/2020)

Background of expert

Martin Baptist works for Wageningen Marine Research as a researcher of coastal areas, especially the Wadden sea. He is also interested in ecological consequences of hydraulic engineering projects and is involved with projects of Building with Nature.

What is your experience with the Voordelta?

The expertise of Martin Baptist mainly lies within the Wadden Sea, but the system is comparable. Martin has done research in the Voordelta on Porpoises. He also has some areal pictures from the Hinderplaat and Slikken van Voorne. He will send us these pictures.

What will happen to the Hinderplaat and Slikken van Voorne as a result of Delta21?

Martin agrees with our ideas. He thinks part of the Tidal lake will indeed silt up. This offers opportunities for bird species, mainly for stilts. More silt means more food, which means more biomass of benthic food. This in turn means more shellfish banks and more mussel banks.

The dam between the Energy Storage Lake will probably silt up as well. If this would pose a problem for the Delta21 design, we should let Huub and Leen know.

There is currently a problem with silting up in the main ship fairway. Due to Delta21, the fairway is elongated and narrowed. This could remedy the silting up problem.

Marine juveniles (juvenile fish, mostly, but also other marine species) need a place along the river mouth. Here they grow for 2/3 years.

In the beginning, the tidal lake will be good for fish eating (piscivorous) birds, because of the dams sheltering the area. But the more the area will silt up, the less fish there will be. In the end, Martin expects, it will therefore be harmful for piscivorous birds. However, silty areas are good for biomass in the soil (benthic species) which provide a good foraging area for benthivorous bird species (stilts and ducks).

Could the new sandbank in the way it is proposed now, mitigate the loss of the Hinderplaat?

Seals require a sand bank to the close to deep water. In this way they can get away quickly in case of danger. They also like a sandbank to be far away from the coast and in an island form, because this reduces disturbance by human activity. If the sandbank lies along the dunes, foxes that inhabit dune areas, but also people with dogs, could reach it. This will cause disturbance.

What could happen to the species in the habitat directive as a result of Delta21 and changing habitat types?

For this question, we assumed that Delta21 will manage to fully open the Haringvliet sluices and that without Delta21 this will not happen. Assuming this, migratory species only profit from Delta21. The Shad would then possibly spawn in the Biesbosch, and the other habitat directive species will migrate even further. The building of the Energy storage lake and Tidal lake will not harm them, since they don't use that area anyways.

The Porpoise needs open water. Therefore, everything that is built in open water is negative. However, the North Sea is so big compared to the Energy storage lake and tidal lake that the negative impact is probably marginal.

The Grey and Common seal lose a place to rest and to forage. The Voordelta is especially important as these shallow seas make catching fish easier. Also, the fish species that seals like to eat live there.

Does the Delta21 plan sound realistic?

Delta21 is going to need a lot more research than what the WUR students is offering them. Take the compensation measures for Maasvlakte 2 for example. A lot of research took place before the compensation could happen. Also, cumulative effects need to be taken into account; the effects of Delta21 should be considered **on top** of the effects that the Maasvlakte brought to the Voordelta. The compensation for the Maasvlakte is already lacking which means Delta21 probably cannot be put through, in cumulative sense.

The Voordelta keeps getting smaller. Natura 2000 is right in not allowing any changes made in their areas, because otherwise everyone keeps taking small bits of the area, while reasoning that it is a small portion of the whole anyways.

Lastly it is good to realise that even though Delta21 might not be as bad for habitat types in the Slikken van Voorne, it still takes an enormous part of H1110 (permanently flooded sandbanks) from the Voordelta. Natura 2000 legislation proses a significant obstacle in getting the project through.

Interesting notes

- In response to the building of the Maasvlakte, the Voornse Duinen changed considerably already.
- There used to be a problem of Porpoises washing up on the shore. After an investigation, Martin found out that this was due to Grey seals that eat Porpoise. Martin will send the report that he made.
- Evaluation reports from compensation for Maasvlakte 2 will be finished this year.

Form for submission of information to the European Commission according to Art. 6(4) of the Habitats Directive

Member State*:* Date*:*

Information to the European Commission

according to Article 6(4) of the Habitats Directive

(92/43/EEC)

Documentation sent for: ☐ information Art. 6(4).1 ☐ opinion Art. 6(4).2

Competent national authority:

Address:

Contact person:

Tel., fax, e-mail:

Is the notification containing sensitive information? If yes, please specify and justify

1. PLAN OR PROJECT

Name of the plan/project:

Promoted by:

Summary of the plan or project having an effect on the site:

Description and location of the elements and actions of the project having potential impacts and identification of the areas affected (include maps):

ASSESSMENT OF NEGATIVE EFFECTS[1]

Name and code of Natura 2000 site(s) affected:

This site is:

□ a SPA under the Birds directive

□ a SCI/SAC under the Habitats directive

□ hosting a priority habitat/species

□ priority habitats/species are affected

Site's conservation objectives and key features contributing to the site integrity:

Habitats and species that will be adversely affected (e.g. indicate their representativity, if applicable their conservation status according to Art.17 on national and biogeographic level and degree of isolation, their roles and functions in the site concerned).

Importance of the site for the habitats and species that will be affected (e.g. explain the role of the site within the national and biogeographical region and in the coherence of the Natura 2000 network).

Description of adverse effects expected (loss, deterioration, disturbance, direct and indirect effects, etc.); extent of the effects (habitat surface and species numbers or areas of occurrence affected by the project); importance and magnitude (e.g. considering the affected area or population in relation to the total area and population in the site, and possibly in the country) and location (include maps).

Potential cumulative impacts and other impacts likely to arise as a result of the combined action of the plan or project under assessment and other plans or projects.

Mitigation measures included in the project (indicate how these will be implemented and how they will avoid or reduce negative impacts on the site).

3. ALTERNATIVE SOLUTIONS

Identification and description of possible alternative solutions, including the zero option (indicate how they were identified, procedure, methods)

Evaluation of alternatives considered and justification of the alternative chosen (reasons why the competent national authorities have concluded that there is absence of alternative solutions)

4. IMPERATIVE REASONS OF OVERRIDING PUBLIC INTEREST

Reasons to carry out this plan or project in spite of its negative effects

- ☐ Imperative reasons of overriding public interest, including those of a social or economic nature (in the absence of priority habitats/species)
- ☐ human health
- ☐ public safety
- ☐ beneficial consequences of primary importance for the environment
- ☐ other imperative reasons of overriding public interest

Description and justification of the reasons and why they are overriding[2]:

5. COMPENSATORY MEASURES[3]

Objectives, target features (habitats and species) and ecological processes/functions to be compensated (reasons, why these measures are suitable to compensate the negative effects)

Extent of the compensatory measures (surface areas, population numbers)

Identification and location of compensation areas (including maps)

Former status and conditions in the compensation areas (existing habitats and their status, type of land, existing land uses, etc.)

Expected results and explanation of how the proposed measures will compensate the adverse effects on the integrity of the site and will allow preserving the coherence of the Natura 2000 network

Time schedule for the implementation of the compensatory measures (including long-term implementation), indicating when the expected results will be achieved.

Methods and techniques proposed for the implementation of the compensatory measures, evaluation of their feasibility and possible effectiveness

Costs and financing of the proposed compensatory measures

Responsibilities for implementation of compensatory measures

Monitoring of the compensatory measures, where envisaged (e.g. if there are uncertainties concerning the effectiveness of the measures), assessment of results and follow-up

[1] NB.: focus on the adverse effects expected on the habitats and species for which the site has been proposed for the Natura 2000 network. Include all the information that may be relevant in each case, depending on the impacts identified for the species and habitats affected.

[2] Different level of detail may be required depending on whether the notification is submitted for information or for opinion.

[3] Different level of detail may be required depending on whether the notification is submitted for information or for opinion.

D: Process and calculation for the impact assessment on Birds Directive species

Table D1. process and calculation for the impact assessment of Birds Directive species. The distribution range (DR) was assessed by assigning bird species that use the Hinderplaat a –2 (negative because we expect it to disappear) and species that are found only on the Slikken van Voorne a 2. Species that use the Slikken van Voorne, but also use other areas score a 1. For the Use (U), we assigned a 2 to species that use the Voordelta as a sleeping/resting area as well as foraging area, and a 1 to species that use the area as a sleeping/resting area ***or*** *as foraging area. The Importance in the Voordelta (IV) was derived from the scores mentioned in the Voordelta management plan (Rijkswaterstaat, 2016). The more a species as a whole relies on the Natura 2000 area, the higher the score ('-' = 1, '+' = 2 and '++' = 3). These three scores are used to calculate the final score. Using the formula (DR*(U+IV))/4, DR serves as a base of the formula. If species use the Slikken van Voorne, the final score is positive, while species using the Hinderplaat have a negative final score. This DR score is then amplified by U and IV, because the more a species use the area and important the area is, the larger their negative or positive influence will be. Lastly, the denominator has a value of 4 to skew the score of 'Impact' to a final score between 2 and -2. A value of 2 is then transposed to '++', a value of 1 to '+', a value of 0 to '0', a value of-1 to '-' and a value of -2 to '--'.*

Species code and English name	Latin name	Distribution range				Use			Importance		End Score	
Ducks and geese		Only Slikken van Voorne	Partly Slikken van Voorne	Hinderplaat	Score	Sleep and resting area	Foraging area	Score	Judgement from RWS	Score	Calculation: (DR * (U + IV))/4	**Final score**
A048 Common shelduck	*Tadorna tadorna*	X			2	X	X	2	-	1	1.5	++
A050 Eurasian wigeon	*Mareca penelope*	X			2	X	X	2	-	1	1.5	++
A056 Northern shoveler	*Spatula clypeata*	X			2		X	1	-	1	1	+
A043 Greylag goose	*Anser anser*	X			2	X	X	2	-	1	1.5	++
A054 Northern pintail	*Anas acuta*		X		1		X	1	+	2	0.75	+
A052 Eurasian teal	*Anas crecca*				0		X	1	-	1	0	**0**
A051 Gadwall	*Mareca strepera*		X		1		X	1	-	1	0.5	**0**
Stilts and spoonbills												
A130 Eurasian oystercatcher	*Haematopus ostralegus*	X			2	X	X	2	-	1	1.5	++
A132 Pied avocet	*Recurvirostra avosetta*	X			2	X	X	2	-	1	1.5	++
A137 Common ringed plover	*Charadrius hiaticula*	X			2	X	X	2	+	2	2	++
A141 Grey plover	*Pluvialis squatarola*	X			2	X	X	2	-	1	1.5	++
A144 Sanderling	*Calidris alba*	X			2	X	X	2	+	2	2	++
A149 Dunlin	*Calidris alpina*		X		1	X	X	2	-	1	0.75	+
A157 Bar-tailed godwit	*Limosa lapponica*	X			2	X	X	2	-	1	1.5	++
A160 Eurasian curlew	*Numenius arquata*	X			2	X	X	2	-	1	1.5	++
A162 Common redshank	*Tringa totanus*	X			2	X	X	2	+	2	2	++
A169 Ruddy turnstone	*Arenaria interpres*				0	X	X	2	+	2	0	**0**
A034 Eurasian spoonbill	*Platalea leucorodia*	X			2	X	X	2	-	1	1.5	+
Benthivores												
A067 Common goldeneye	*Bucephala clangula*		X		1		X	1	+	2	0.75	+
A062 Greater scaup	*Aythya marila*				0		X	1	-	1	0	**0**
A063 Common eider	*Somateria mollissima*			X	-2		X	1	-	1	-1	-
A065 Common scoter	*Melanitta nigra*				0		X	1	++	3	0	**0**
Piscivores												
A001 Red-throated diver	*Gavia stellata*				0		X	1	++	3	0	**0**
A007 Horned grebe	*Podiceps auritus*				0		X	1	+	2	0	**0**
A005 Great crested grebe	*Podiceps cristatus*				0	X	X	2	-	1	0	**0**
A017 Great cormorant	*Phalacrocorax carbo*			X	-2	X	X	2	-	1	-1.5	--
A069 Red-breasted merganser	*Mergus serrator*				0		X	1	+	2	0	**0**
A191 Sandwich tern	*Thalasseus sandvicensis*			X	-2		X	1	++	3	-2	--
A193 Common tern	*Sterna hirundo*			X	-2		X	1	++	3	-2	--
Other birds												
A177 Little gull	*Hydrocoloeus minutus*				0		X	1	+	1	0	**0**

Werkt voor provincies

Handreiking ADC-toets

oktober 2019

1. Inleiding en afbakening

De ADC-toets is in de systematiek van de Habitatrichtlijn de laatste stap die doorlopen kan worden, nadat uit de passende beoordeling naar voren is gekomen dat significante negatieve effecten **niet** (volledig) uitgesloten kunnen worden. De ADC-toets wordt daarom door de Europese Commissie ook wel aangeduid als een 'last resort'. De ADC-toets is gebaseerd op artikel 6, vierde lid van de Habitatrichtlijn (hierna Hrl 6.4), terwijl de passende beoordeling gebaseerd is op artikel 6, derde lid van de richtlijn (Hrl 6.3).

Vóór de uitvoering van een ADC-toets is al een aantal stappen doorlopen. Dit zijn achtereenvolgens:

1. Het nemen van bronmaatregelen om te komen tot een zo gering mogelijke emissie (inclusief intern salderen);
2. Onderbouwing in de passende beoordeling in hoeverre een toename van stikstofdepositie leidt tot een significant negatief effect (ecologische onderbouwing)[1];
3. Het treffen van mitigerende maatregelen overeenkomstig Hrl 6.3 (waaronder extern salderen).

Bovenstaande volgorde is dwingend voorgeschreven. De ADC-toets komt pas aan de orde als de voorgaande stappen zijn doorlopen.

Indien de passende beoordeling van een plan of project (of programma) niet de vereiste zekerheid biedt dat de natuurlijke kenmerken van een Natura 2000-gebied niet worden aangetast, kan alleen toestemming voor een plan of project worden verleend indien:

A - Er geen alternatieven zijn,
D - Sprake is van dwingende redenen van groot openbaar belang en
C - De nodige compenserende maatregelen worden getroffen om te waarborgen dat de algehele samenhang van Natura 2000 bewaard blijft.

In zijn algemeenheid geldt dat hoe groter de aantasting van de natuurwaarden, hoe zwaarder de eisen die gesteld worden aan de onderbouwing en afweging in het kader van de toetsing van de alternatieven en dwingende reden van groot openbaar belang.[2]

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[1] Wanneer uit ecologisch onderzoek bijvoorbeeld blijkt dat stikstofdepositie voor de duur van de vergunning geen knelpunt is voor het behalen van de instandhoudingsdoelstelling, kan teruggevallen worden op het spoor van een ecologische beoordeling en is compensatie niet noodzakelijk. Dit geldt ook in gevallen waarbij ondanks een overschrijding van de KDW en in het licht van de uitgevoerde natuurmaatregelen en het gebiedsbeheer geconcludeerd kan worden dat stikstofdepositie geen knelpunt vormt voor de betreffende instandhoudingsdoelstelling.

[2] Deze conclusie volgt met name uit jurisprudentie m.b.t. de soortenbescherming. In artikel 16 lid 1 en sub c Hr voor soortenbescherming worden evenals in artikel 6 lid 4 Hr voor de gebiedsbescherming ook de begrippen 'geen andere bevredigende oplossing' en 'dwingende reden van openbaar belang' gebruikt. Aangenomen mag worden dat beide begrippen op dezelfde manier geïnterpreteerd moeten worden, ongeacht of het gaat om bescherming van gebieden of van soorten.

In de volgende hoofdstukken/ paragrafen wordt een toelichting gegeven op de drie onderdelen van een ADC-toets.[3]

2. Criterium 'Geen Alternatieven'

Een eerste vereiste voor toestemmingverlening wanneer niet verzekerd is dat de natuurlijke kenmerken van het Natura 2000-gebied niet worden aangetast, betreft de afwezigheid van alternatieven. Dit begrip is verder niet gedefinieerd en is rechtstreeks afkomstig uit de Habitatrichtlijn. De invulling van dit begrip geschiedt via de jurisprudentie en richtsnoeren van de Europese Commissie.

Uit het alternatievenhoofdstuk van de ADC-toets moet blijken dat er géén reële alternatieven zijn die geen of minder aantasting van de natuurwaarden veroorzaken én waarmee de projectdoelstelling kan worden gehaald. Het gaat er niet om dat het meest geschikte alternatief is gekozen.[4]

De bespreking van de alternatieven kan via de volgende stappen plaatsvinden. De afweging tussen de verschillende alternatieven moet voldoende navolgbaar zijn.

1. Beschrijf welke reële alternatieven zijn onderzocht. Hierbij moet ook worden gekeken naar de 'nul-optie', d.w.z. de situatie waarbij het project of plan niet wordt uitgevoerd.[5]
2. Reële alternatieven zijn in ieder geval de alternatieven die zijn onderzocht in het MER, indien een MER moet worden opgesteld. Daarin zijn alle reële alternatieven beschouwd, te weten, alternatieven die technisch haalbaar en redelijkerwijze betaalbaar zijn[6], en op het eerste oog probleemoplossend kunnen zijn. De volgorde in tijd of de wijze waarop de alternatieven zijn ontstaan is in beginsel niet relevant, tenzij dit noodzakelijk is om de alternatieven te begrijpen en van elkaar te kunnen onderscheiden (navolgbaarheid).
3. Vaak is in het MER-proces uiteindelijk gebleken dat een aantal alternatieven onvoldoende bijdraagt aan de projectdoelstelling. De projectdoelstelling wordt dan niet behaald. Licht kort toe welke alternatieven dit waren en waarom. Deze alternatieven vallen af. Het is dus niet relevant welke natuureffecten die alternatieven hebben. Hetzelfde geldt voor de alternatieven die zijn afgevallen omdat ze bijvoorbeeld technisch niet uitvoerbaar zijn of vanwege andere randvoorwaarden niet voldoen.
4. Er is niet in alle gevallen een MER-procedure doorlopen en ook zijn in het MER (met één alternatief) niet altijd alle alternatieven afdoende onderzocht. Kijk dus los van het MER of er vanuit het natuurbelang nog alternatieven zijn.
5. Resultaat van de stappen 1 tot en met 4 zijn de alternatieven waarmee de projectdoelstelling zou kunnen worden bereikt, die technisch uitvoerbaar zijn en aan de overige randvoorwaarden voldoen. Van deze alternatieven moeten de natuureffecten tegen elkaar worden afgewogen. Hieruit kunnen vier resultaten komen:
   a. De alternatieven hebben grotere stikstofeffecten dan het Voorkeursalternatief (VKA);

[3] Hierbij is rekening gehouden met de richtsnoeren van de Europese Commissie d.d. 21 november 2018, "Managing Natura 2000 sites The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC", nr C(2018) 7621 final (hierna aangeduid met Richtsnoeren EC 2018).
[4] ABRvS 27 april 2000, *JB* 2000/176
[5] Richtsnoeren EC 2018 par. 5.3.1.
[6] Richtsnoeren EC 2018 par. 5.3.1.

b. De alternatieven hebben kleinere stikstofeffecten dan het VKA, maar hebben andere zwaardere effecten op Natura 2000, waardoor het VKA toch gunstiger is;
c. De alternatieven en het VKA zijn niet onderscheidend. De effecten op natuur zijn qua orde van grootte ongeveer gelijk;
d. Het oorspronkelijke VKA leidt tot een significante aantasting en een van de alternatieven niet.

6. Als de alternatieven wat betreft effecten op N2000 niet onderscheidend zijn, maakt het voor de ADC-toets niet uit welke wordt gekozen. Leg in dat geval kort uit waarom de keuze op het VKA is gevallen.
7. Wanneer er een alternatief is dat beter scoort qua natuur dan het VKA, dan dient deze verder worden uitgewerkt.

Mogelijke oplossingen zijn de keuze van alternatieve locaties of routes, de vaststelling van andere ontwikkelingsschalen of -ontwerpen of de overstap naar alternatieve processen.[7]

Zie voor een voorbeeld van een uitspraak waarin de ABRvS uitgebreid toetst of er geen alternatieven voor een project zijn: ABRvS 25 november 2015, ECLI:NL:RVS:2015:3623 (Reevediep; overwegingen 8.1 – 8.6).

3. Criterium 'Dwingende reden van groot openbaar belang'

Het tweede criterium van de ADC-toets is de dwingende reden van groot openbaar belang (hierna afgekort tot Drgob). Er kan alleen toestemming voor een project worden verleend op basis van de ADC-toets als het project noodzakelijk is vanwege een dwingende reden van groot openbaar belang. Dit criterium kent een aantal aspecten waaraan het bevoegd gezag moet toetsen.

Er moet sprake zijn van:

- Een reden van openbaar belang;
- Dwingendheid;
- Een voldoende zwaarwegend (groot) belang.
- Een sluitende onderbouwing waaruit volgt dat de aangevoerde reden openbaar, dwingend en voldoende zwaarwegend is.

Initiatiefnemers zullen in hun onderbouwing moeten aantonen dat het project voldoet aan deze aspecten. Aandachtspunten daarbij zijn:

- Veel belangen kunnen – naast de menselijke gezondheid, openbare veiligheid of met wezenlijk gunstige effecten voor het milieu - een Drgob zijn. Er moet sprake zijn van een openbaar belang, maar dat kan ook behartigd worden door een particulier/commercieel initiatief;
- Het verwezenlijken van de Drgob moet aantoonbaar onontbeerlijk zijn;
- Ondubbelzinnig moet vast staan dat het belang van de realisering van het project op lange termijn zwaarder weegt dan het belang van de bescherming van de aanwezige natuurwaarden;
- Het belang waarop een beroep wordt gedaan moet kenbaar (expliciet) worden afgewogen tegen het belang van de bescherming van de aanwezige flora en fauna;

[7] Europese Commissie, *Richtsnoeren voor de toepassing van art. 6 lid 4 Habitatrichtlijn* 2007, p. 6-7.

- De Drgob moet afdoende worden onderbouwd met actuele gegevens. De vraag wanneer gegevens nog actueel zijn, hangt mede af van de dynamiek van een gebied. Een indicatie voor een termijn is 2 jaar[8].

3.1 Bijzondere positie prioritaire soorten of habitattypen: advies EC vereist

Het is van belang om in een zo vroeg mogelijk stadium vast te stellen of het plan of project significante gevolgen kan hebben voor een prioritair habitattype of een prioritaire soort. In bijlage 1 is een lijst opgenomen van prioritaire habitattypen en -soorten.

Als het project NIET aantoonbaar onontbeerlijk is voor de behartiging van een van de volgende belangen:

- Menselijke gezondheid of
- Openbare veiligheid of
- Indien het project of plan wezenlijk gunstige effecten heeft voor het milieu,

maar wel vanwege andere dwingende redenen van groot openbaar belang, dan mag het project alleen worden toegestaan **na een advies** van de Europese Commissie met betrekking tot de belangentoets. In zijn richtsnoeren stelt de Europese Commissie dat haar advies over de 'andere dwingende redenen' niet juridisch bindend is[9]. De nationale instanties kunnen besluiten een negatief advies niet te volgen en het plan of project toch uit te voeren. De Commissie verwacht dan dat in het besluit ingegaan wordt op de argumenten van de Commissie en dat wordt toegelicht waarom van het advies wordt afgeweken. De Commissie zal indien zij dat nodig acht passende juridische stappen ondernemen.

In de Habitatrichtlijn is geen termijn opgenomen voor het vaststellen van het advies door de EC. Hoewel de EC heeft toegezegd er alles aan te doen om zo spoedig mogelijk te adviseren, is op basis van ervaringsgegevens gebleken dat het gemiddeld tussen de 9 maanden tot een jaar duurt. Bij complexere projecten is een paar jaar niet ongebruikelijk.

In bijlage 2 is beschreven hoe de procedure van het verzoek om advies verloopt.

3.2 Groot openbaar belang

Wanneer is een belang openbaar?
Het gaat alleen om openbare belangen, ongeacht of deze belangen door een overheidsorgaan of een particuliere organisatie worden behartigd. Dat betekent dat projecten die uitsluitend de belangen van een bedrijf of (individuele) personen dienen, daar niet onder vallen. (Overheids)werken met het oog op de vestiging of de uitbreiding van een onderneming vervullen die voorwaarden slechts in uitzonderlijke gevallen.

Voorbeeld:
De aanleg van infrastructuur ten behoeve van een administratief centrum van een private vennootschap voor een Belgische luchthaven werd niet als dwingende

[8] Zie ook artikel 3.1.1a BOR en (het nog niet in werking getreden) artikel 16.15 lid 1 Omgevingswet.
[9] Dit staat expliciet in par. 5.5.3 van de vorige richtlijnen uit 2000, aangevuld door de richtsnoeren van januari 2007 (met verduidelijking van de volgende begrippen: alternatieve oplossingen, dwingende redenen van groot openbaar belang, compenserende maatregelen, algehele samenhang, advies van de commissie), die door de huidige richtsnoeren van 2018 zijn vervangen. Hoewel minder expliciet overgenomen in de huidige richtsnoeren, mag ervan worden uitgegaan dat dit niet is gewijzigd (zie par. 3.10 e.v. Richtsnoeren EC 2018)

reden van groot openbaar belang aangemerkt[10]. De uitbreiding van een productielocatie van een commerciële vliegtuigfabrikant echter wel, omdat dit bij zou dragen aan de concurrentie positie van de Europese luchtvaartsector als geheel en het creëren van hoogwaardige werkgelegenheid in een regio waar sprake was van industriële krimp.[11]

Om welke redenen van openbaar belang gaat het?
Bij een valide Drgob moet het gaan om redenen die gericht zijn op de bescherming van voor het leven van de burger fundamentele waarden. Om welke openbare belangen het precies moet gaat, is niet limitatief bepaald. In de Wet natuurbescherming staan specifiek genoemd:

- Menselijke gezondheid of;
- Openbare veiligheid of;
- Het plan of project is nodig vanwege de wezenlijk gunstige effecten voor het milieu.

In de jurisprudentie zijn ook de volgende redenen erkend:

- Werkgelegenheid;
- Woningbehoefte;
- Drinkwatervoorziening;
- Verbeteren van de verkeersdoorstroming of ontsluiting;
- Verbetering van de leefbaarheid;
- Duurzaamheid;
- Ontwikkeling van de economie.

Bovenstaande opsomming is niet limitatief. Daarom is het niet uitgesloten dat een hiervoor niet genoemd belang wel als zodanig kan kwalificeren. In bijlage 3 zijn voorbeelden uit de jurisprudentie van erkende belangen opgenomen.

3.3 Dwingende reden

Wanneer is een reden dwingend?
De aangevoerde reden van openbaar belang moet dwingend zijn. Dit houdt in dat:

- Het verwezenlijken van de reden aantoonbaar onontbeerlijk moet zijn;
- Alleen op lange termijn persistente openbare belangen dwingend kunnen zijn;
- Het niet voldoende is dat het plan of project zorgt voor een verbetering van een bestaande situatie. Die verbetering moet ook echt aantoonbaar nodig zijn.

Voorbeeld:
Door het verleggen van een vaarweg verbetert de geluidbelasting op dichtbijgelegen woningen. Hiermee is niet automatisch sprake van een dwingende reden vanwege verbetering van de leefbaarheid. Het verlagen van de geluidbelasting moet ook werkelijk noodzakelijk zijn. Bijvoorbeeld omdat de normen ter plaatse worden overschreden.

Het is echter niet noodzakelijk dat de dwingende reden ook de belangrijkste reden is voor het ondernemen van het project of het opstellen van het plan. Zolang met het plan of project maar een dwingende reden van groot openbaar

[10] HvJ EG 16 februari 2012, ECLI:EU:C:2012:82, C-182/10, MenR 2012/73, Solvay e.a.).
[11] Advies EC d.d. 14 april 2000, E/610/2000.

belang is gediend, hoeft deze niet ook in de doelstellingen te zijn opgenomen en daarmee ten grondslag zijn gelegd aan de besluitvorming[12].

Voor voorbeelden van dwingendheid: zie bijlage 4.

Wanneer is een reden voldoende zwaarwegend?
De betreffende dwingende reden of redenen hoeven niet op zichzelf staand zwaarwegend te zijn. De initiatiefnemer moet onderbouwen en het bevoegd gezag moet beoordelen of de reden voldoende zwaarwegend is in het licht van de aantasting van de natuurwaarden die het plan of project veroorzaakt. Met andere woorden: het belang van het project moet worden afgewogen tegen het belang van het behoud van de instandhoudingsdoelstellingen van de betrokken Natura 2000-gebieden.

De afweging van de betrokken belangen moet kenbaar gebeuren
Voor het project Westerschelde Container Terminal oordeelde de ABvRS dat wel was aangevoerd dat de WCT economisch belang had, maar was niet afgewogen waarom dit belang zwaarder moest wegen dan het natuurbelang[13].

Onderbouwing
Het daadwerkelijk bestaan van de aangevoerde dwingende reden zal door de initiatiefnemer moeten worden aangetoond. Daarbij geldt dat:

- De enkele stelling dat een dwingende reden aanwezig onvoldoende is;
- Zo veel als mogelijk gebruik wordt gemaakt van cijfermatige gegevens om de dwingende reden te staven.

4 Criterium 'Compensatie' oftewel de Compensatie-toets

Compenserende maatregelen beogen de negatieve resteffecten van het plan of project die overblijven na het doorlopen van artikel 6 lid 3 Habitatrichtlijn te compenseren voor de betrokken habitattypen of soorten, dus na het nemen van mogelijke mitigerende maatregelen.

4.1 Definitie compensatie?

Het begrip 'compensatie' of 'compenserende maatregelen' in de zin van artikel 6 lid 4 Habitatrichtlijn is noch in de Habitatrichtlijn noch in de Wet natuurbescherming nader gedefinieerd. In de richtsnoeren van de EC 2018 is in par. 5. de volgende omschrijving van 'compenserende maatregelen' in de zin van artikel 6 lid 4 Hrl opgenomen:

Compenserende maatregelen zijn plan of projectspecifieke maatregelen die worden genomen naast de normale plichten die voortvloeien uit de Vogel- en Habitatrichtlijn. Deze maatregelen beogen precies die negatieve gevolgen van het plan of project te compenseren voor de betrokken soorten en habitats. Zij vormen het 'laatste redmiddel' en worden alleen toegepast wanneer de andere beschermingsmaatregelen waarin de richtlijn voorziet zijn uitgeput, en wanneer het besluit is genomen om een project of plan toch uit te voeren dat ongunstige gevolgen heeft voor de natuurlijke kenmerken van het Natura 2000-gebied of wanneer dergelijke effecten niet kunnen worden uitgesloten. [14]

4.2 Wanneer compensatie?

[12] ABRvS d.d. 21 maart 2012, ECLI:NL:RVS:2012:3654
[13] ABRvS d.d. 16 juli 2003, ECLI:NL:RVS:2003:AH9872
[14] https://www.google.com/search?client=firefox-b-d&q=handreiking+EC+art+6%2C+lid+4

De bepalingen van artikel 6 lid 4 Hr gelden wanneer de conclusies van de passende beoordeling overeenkomstig het derde lid van artikel 6 Hrl negatief of onzeker zijn. Dat wil zeggen:

1. Het plan of project zal schadelijke gevolgen hebben voor de natuurlijke kenmerken van het gebied; of
2. Er blijven twijfels bestaan of het betrokken plan of project geen negatieve gevolgen zal hebben voor de natuurlijke kenmerken van het gebied.

4.3 Wettelijke eisen aan compensatie

De Habitatrichtlijn en de Wet natuurbescherming schrijven voor dat de 'compenserende maatregelen moeten waarborgen dat de algehele samenhang van Natura 2000 bewaard blijft'.

Compenserende maatregelen zijn een 'laatste redmiddel'. Zij worden alleen toegepast wanneer de andere beschermingsmaatregelen waarin de richtlijn voorziet, ondoeltreffend blijken en wanneer het besluit werd genomen om een project of plan dat ongunstige gevolgen heeft voor een 'Natura 2000'-gebied, toch uit te voeren.

Hierbij wordt opgemerkt dat het toepassen van de richtsnoer van de Europese Commissie 2018 op stikstofdepositie lastig is. Het mogelijke negatieve effect dat door stikstofdepositie wordt veroorzaakt onderscheidt zich immers in belangrijke mate van meer 'traditionele' negatieve effecten zoals verstoring door geluidtoename of oppervlakteverlies. Daarvoor zijn wel compensatiemethoden beschikbaar. Bij stikstofdepositie wordt een relatief klein maar mogelijk wel negatief effect op een groter oppervlak veroorzaakt. Dit vraagt ook om een andere aanpak voor een afdoende compensatie.

4.4 Ecologische onderbouwing compensatie-opgave doorslaggevend

Voor de aard en omvang van de benodigde compensatie om te voldoen aan het vereiste van de Habitatrichtlijn is een goede ecologische onderbouwing van essentieel belang. Daarbij kan onder meer gebruik worden gemaakt van de gebiedsanalyses.

In de rechtszaken die tot nu toe hebben gediend, hebben de gebiedsanalyses geen noemenswaardige rol gespeeld. De verwachting is dat dit bij vergunningverlening zonder PAS wel het geval zal zijn. De gebiedsanalyses zijn voor een deel niet meer bruikbaar, omdat ze zijn gebaseerd op aannames uit de passende beoordeling van het PAS.

De in de meest recente versies van de gebiedsanalyses (GA) van het PAS opgenomen beschrijving van de habitattypen en de leefgebieden van soorten, de kwaliteit daarvan en de relevante knelpunten kunnen wel als uitgangspunt dienen voor de ecologische beoordeling[15]. Voor gebieden waarvoor de gebiedsanalyses slechts beperkte informatie bevatten over bijvoorbeeld de actuele kwaliteit zal men dit zelf moeten aanvullen, bijv. door veldonderzoek of andere bronnen voor de beschrijving van habitattypen/soorten.

[15] Hoewel de gebiedsanalyses onderdeel zijn van de Passende beoordeling van het PAS en daarmee juridisch niet langer gebruikt kunnen worden om toestemming te verlenen bevatten zij wel de meest recente informatie/wetenschappelijke inzichten over de beschrijving van het voorkomen van de aangewezen habitattypen en de leefgebieden van soorten, de kwaliteit daarvan en de relevante knelpunten in het Natura 2000-gebied. Deze informatie is dus nog steeds van belang voor de projectspecifieke passende beoordeling en voor de bepaling van de compensatie-opgave.

Ook is een kritische blik bij de in de gebiedsanalyses opgenomen beheermaatregelen nodig, omdat die maatregelen niet als compensatie gebruikt mogen worden indien de maatregelen al nodig zijn om de instandhoudingsdoelen van het Natura 2000-gebied te behalen (instandhoudingsmaatregelen op grond van art. 6 lid 1 Hrl), verslechtering tegen te gaan (passende maatregelen op grond van art. 6 lid 2 Hrl) of de negatieve effecten van het plan of project zoveel mogelijk te beperken (beschermende of mitigerende maatregelen op grond van art. 6 lid 3 Hrl). Bovendien dienen de maatregelen op grond van de leden 1 en 2 van art. 6 Hrl al uitgevoerd te zijn én het positieve effect ervan dient vast te staan, alvorens er in het kader van de passende beoordeling van lid 3 rekening mee mag worden gehouden in het kader van de beoordeling van de staat van instandhouding.

4.5 Vaststellen van de compensatie-opgave

Bij het vaststellen van de compensatie-opgave dient vastgesteld te worden of er in het kader van het project of plan *aanvullende* maatregelen nodig zijn om de algehele samenhang van Natura 2000 te waarborgen.

Omvang van de compensatie-opgave
Wanneer is vastgesteld voor welke habitattypen en soorten en in welke omvang binnen het Natura 2000-gebied compensatie nodig is, moet dit worden vertaald naar compenserende maatregelen elders in het gebied of daarbuiten.

De ecologische effecten van de stikstofdepositie op een bepaald habitattype bepalen de aard van de aantasting en dus ook de richting waarin compensatie gezocht dient te worden. Te denken valt aan effecten als verzuring en/of vermesting en daarvan afgeleide effecten als uitspoeling van mineralen, veenafbraak, verruiging, effecten op de kwaliteit van kwelstromen etc.

De Habitatrichtlijn noch de Wet natuurbescherming schrijven een bepaalde methode voor ter bepaling van de omvang van het gebied waar de compenserende maatregelen worden getroffen. De richtsnoeren voor compensatie lijken weinig toegespitst op de kenmerken van stikstofdepositie (klein effect over een groot oppervlak). Zoals hiervoor onder paragraaf 4.2 vermeld, is er met de compensatie van de negatieve gevolgen van stikstofdepositie nog weinig ervaring opgedaan.

Hierbij is het van belang op te merken, dat de hoogste bestuursrechter geen enkele methode heeft aangemerkt als de (enig) juiste methode. Wat een geschikte methode is, is afhankelijk van de aard van het project in relatie tot het daardoor veroorzaakte effect. Gaat het om een éénmalige depositie of permanente deposities, hoge of lage deposities, zeer lokaal of juist over een groot oppervlak, de aard van de natuurwaarde die in het geding is en de mate waarin een initiatiefnemer in de gelegenheid is (of wordt gesteld) om compenserende maatregelen uit te voeren. Voor iedere methode geldt dat er een robuuste ecologische onderbouwing is vereist.

Tenslotte: in theorie kan de realisatie/uitvoering van compenserende maatregelen negatieve gevolgen hebben voor instandhoudingsdoelstellingen, bijvoorbeeld als hiervoor kap- of graafwerkzaamheden in een Natura 2000-gebied nodig zijn. Deze gevolgen dienen in de compensatietoets passend beoordeeld te worden.

Afstemming met voortouwnemer van het beheerplan van het Natura 2000-gebied vereist
De initiatiefnemer is verplicht om in overleg met de voortouwnemer van het beheerplan van het betreffende Natura 2000-gebied om de compenserende maatregelen vorm te geven. Het bevoegd gezag zal de inbreng van de voortouwnemer van het beheerplan bij zijn beoordeling van de compenserende maatregelen betrekken. Indien compensatie is voorzien buiten een Natura 2000-gebied, dient in overleg te worden getreden met de provincie op wiens grondgebied de compensatie wordt beoogd.

Meldplicht compenserende maatregelen EC
Lidstaten zijn verplicht om compenserende maatregelen bij de Europese Commissie te melden. Dit gebeurt door het bevoegd gezag voor de toestemmingsverlening en – indien het bevoegd gezag niet de minister van LNV is – via deze minister. Zie voor meer informatie over de meldprocedure bijlage 2.

Vooralsnog dient ervan worden uitgegaan, dat het doen van een melding slechts kan leiden tot een bericht van ontvangst met de mededeling dat er geen behoefte is aan aanvullende informatie of een bericht dat die informatie wel nodig is. Bij een melding zal relatief snel duidelijk zijn dat de EC-akkoord is met het treffen van de gemelde compenserende maatregelen. De toestemmingverlening is evenwel niet afhankelijk van het akkoord van de EC.

4.6 Uitvoering van de compensatie-opgave inclusief monitoring

Planning/extra compensatie
Hoewel het de voorkeur geniet dat het resultaat van de uitgevoerde compensatie-maatregelen zichtbaar is op het moment dat de te compenseren natuurwaarden worden aangetast door de uitvoering van het plan of project is het niet altijd mogelijk om zo lang te wachten met de uitvoering van het plan of project. Sommige habitattypen hebben een lange ontwikkelingsduur. Het resultaat van de compenserende maatregelen, hoeft niet te worden afgewacht alvorens het plan of project uit te voeren (en daarmee de te compenseren natuurwaarden aan te tasten). Wel is vereist dat op het moment dat met het project/plan wordt begonnen alle specifieke maatregelen (technisch, juridisch en financieel) genomen zijn om bij eventuele – onvoorziene – verliezen van natuurwaarden die tussentijds optreden direct te kunnen ingrijpen, mede ter voorkoming van vertragingen die de effectiviteit van de compenserende maatregelen kunnen belemmeren. Onder bepaalde omstandigheden kan overcompensatie worden toegepast om tussentijdse verliezen te compenseren.[16] Overcompensatie kan evenwel nooit de oplossing zijn voor ruimtegebrek en/of (blijvende) onzekerheid over het succes van compenserende maatregelen.

[16] Richtsnoeren EC 2018, Par. 3.7.15

Randvoorwaarden voor deze overbrugging van tijdverschillen zijn dat ze alleen toegestaan kunnen worden, indien

- Vaststaat dat ze geen afbreuk doen aan de algehele samenhang van het Natura 2000-netwerk (geen netto-verliezen);
- Ze niet leiden tot bijvoorbeeld populatieverliezen van soorten die zijn opgenomen in bijlage II Habitatrichtlijn of bijlage I Vogelrichtlijn. Hierbij nemen de prioritaire soorten of habitattypen een extra belangrijke plaats in.

Soms is het mogelijk om compenserende maatregelen uit te stellen afhankelijk van het tijdstip waarop de significant negatieve effecten zich voor zullen doen: op de korte, middellange of lange termijn. Als die negatieve effecten zich op pas op lange termijn manifesteren, mogen de compenserende maatregelen ook wat later genomen worden.

Monitoring
Samenhangend met de planning is monitoring een belangrijk aandachtspunt bij de uitvoering van compenserende maatregelen.

De natuur is grillig en laat zich niet altijd sturen en voorspellen. Bij compenserende maatregelen kan derhalve sprake zijn van een mate van onzekerheid over het te behalen succes en de tijdigheid daarvan. Monitoring van de ontwikkeling van habitattypen en leefgebieden van soorten dient dan ook nadrukkelijk onderdeel uit te maken van het compensatieplan, alsook voorstellen voor extra compensatie, wanneer de monitoring tot een negatief oordeel leidt.

Compensatie binnen het Natura 2000-gebied
Het treffen van de compenserende maatregelen wordt juridisch geborgd door het opnemen daarvan in de vergunningvoorschriften. Dat kan een natuurvergunning zijn (zie art. 2.8 lid 7 Wnb) of – bij aanhaken – een omgevingsvergunning (zie art. 5.22 lid 1 BOR). Daarmee zijn de maatregelen door het bevoegd gezag afdwingbaar. Het is van belang dat de initiatiefnemer zelf van de beheerder(s) van het compensatiegebied toestemming heeft om de maatregelen uit te voeren. Indien die ontbreekt kan de initiatiefnemer problemen krijgen met het bevoegd gezag dat de vergunning heeft verleend. Daarvoor kan hij niet als excuus gebruiken dat de beheerder niet meewerkt. Het bevoegd gezag zal vóór het verlenen van de vergunning om stukken vragen waaruit blijkt dat er met de beheerder overeenstemming is bereikt, bijvoorbeeld door het overleggen van (getekende) contracten met de beheerder.

Deze afspraken dienen niet alleen te gaan over het treffen van de compenserende maatregelen zelf (bijv. het geschikt maken van de compensatiegebieden voor bepaalde habitattypen), maar ook over het vervolgbeheer (bijvoorbeeld het regelmatig maaien van de locatie). Dit laatste kan het bevoegd gezag ook meenemen in het beheerplan. De compensatiegebieden moeten geschikt blijven om de vervangende functie van het gecompenseerde gebied te kunnen vervullen.

Het bevoegd gezag heeft de taak om ervoor te zorgen dat de compensatie blijvend wordt geborgd. Dit wil zeggen dat de nieuwe locaties bij de habitatkartering moeten worden geregistreerd als te beschermen locaties voor het betreffende habitat. Deze aanpassing dient vervolgens meegenomen te worden bij overige toestemmingsverlening.[17]

[17] Hiervoor is het relevant dat de habitatkaarten in AERIUS periodiek geactualiseerd worden.

Compensatie buiten het Natura 2000-gebied
Compensatie binnen een Natura 2000–gebied verdient de voorkeur.[18] Er is algemene consensus dat de lokale omstandigheden, die vereist zijn voor het herstel van de bedreigde natuurwaarden, zo dicht mogelijk bij het door het plan of project beschadigde gebied moeten liggen. Daarom verdient het de voorkeur compensatiemaatregelen toe te passen in of dichtbij het betrokken Natura 2000-gebied op een locatie waar de omstandigheden bevorderlijk zijn voor het welslagen van de compensatiewerkzaamheden.

Indien er geen mogelijkheden zijn binnen bestaande Natura 2000-gebied is het raadzaam *zo dicht mogelijk bij, of aangrenzend aan* bestaande Natura 2000-gebieden te compenseren.

Compensatie buiten bestaande Natura 2000-gebieden is mogelijk. Er zijn omstandigheden denkbaar, bijvoorbeeld ontwikkelingen die maatschappelijk van zeer groot belang zijn, waarin deze optie uitkomst kan bieden. De voorwaarden die daaraan worden verbonden zijn:

- De initiatiefnemer moet aantonen dat compensatie binnen bestaande Natura 2000-gebieden niet tot de mogelijkheden behoort;
- Het bevoegd gezag moet in de overwegingen betrekken of bestaande activiteiten of andere ontwikkelingen daardoor in hun mogelijkheden worden beperkt.

Daarnaast zijn de volgende artikelen van de Wet natuurbescherming van toepassing op compensatie buiten Natura 2000-gebieden:

- De gronden waarop de maatregelen worden uitgevoerd worden alsnog aangewezen als Natura 2000-gebied (art. 2.8 lid 8 Wnb);
- De gronden die nodig zijn voor compensatie – vooruitlopend op de aanwijzing als Natura 2000-gebied – kunnen worden aangewezen als bijzonder nationaal natuurgebied (art. 2.11 lid 1 onderdeel c Wnb).

[18] Van zowel de Europese Commissie als de Commissie Remkes (zie Advies 'Niet alles kan' d.d. 25 september 2019, pag 43).

Bijlage 1: Overzicht van prioritaire habitattypen en -soorten

H2130 - Grijze duinen
H2140 - Duinheide met kraaihei
H2150 - Duinheide met struikhei
H6110 - Pionierbegroeiingen op rotsbodem
H6120 - Stroomdalgraslanden
H6230 - Heischrale graslanden
H7110 - Actieve hoogvenen
H7210 - Galigaanmoerassen
H7220 - Kalktufbronnen
H91D0 - Hoogveenbossen
H91E0 - Vochtige alluviale bossen
H1340 - Noordse woelmuis
H1078 - Spaanse vlag

Bijlage 2: Procedure richting Europa bij toepassen van de ADC-toets

Hieronder wordt de procedure beschreven in situaties waarbij een advies aan de EC wordt gevraagd (zie par. 3.1) en compenserende maatregelen worden gemeld (zie par. 4.4).

In artikel 2.8, zesde lid, van de Wet natuurbescherming (Wnb) worden de melding en het advies procedureel ingekaderd: het advies wordt door de Minister van LNV gevraagd, het bestuursorgaan/gedeputeerde staten doen daartoe een verzoek aan de Minister. In het zevende lid staat dat ook de melding van de nodige compenserende maatregelen om te waarborgen dat de algehele samenhang van Natura 2000 bewaard blijft, door het bestuursorgaan/gedeputeerde staten gedaan wordt aan de minister van LNV die de Europese Commissie van de maatregelen op de hoogte stelt.

In de praktijk betekent dit dat projecten die ofwel een melding of een advies willen indienen bij de EC gebruik kunnen maken van het formulier dat via bijgevoegde link kan worden gedownload (Assessment of Plans and Projects significantly affecting Natura 2000 sites).

Europa breed is er de afgelopen 25 jaar 21 keer een advies aan de EC gevraagd [19]. De melding/vraag om advies geschiedt middels een beschikbaar formulier. Dit formulier wordt ingevuld door het bevoegd gezag dat ook de passende beoordeling uitvoert (dus (kortweg) provincies voor de meeste projecten, LNV voor projecten van nationaal belang en RWS voor tracébesluiten).

Het ingevulde formulier wordt door LNV doorgezet naar de EC. Dit vindt plaats op ambtelijk niveau.

[19] Zie voor een overzicht van de adviezen van de EC: https://ec.europa.eu/environment/nature/natura2000/management/opinion_en.htm.

Bijlage 3: Voorbeelden van tot dusver aangevoerde openbare belangen

Openbare veiligheid en volksgezondheid
Openbare veiligheid en volksgezondheid zijn reeds 'wettelijk erkend' als Drgob (zie hiervoor), maar ook deze belangen dienen per project of plan geconcretiseerd te worden. Hierbij kan gedacht worden aan hoogwaterveiligheid, verkeersveiligheid, vereiste verbetering van luchtkwaliteit of schadelijke geluidsniveaus en een betrouwbare, continue elektriciteitsvoorziening.

Hierbij kan niet alleen aan grotere aanlegprojecten worden gedacht, maar ook aan noodzakelijk beheer en onderhoud. Plannen of projecten die strekken tot onderhoud van wegen, vaarwegen of waterkeringen kunnen het belang van de openbare veiligheid dienen. Onvoldoende onderhoud van wegen of vaarwegen brengt risico's voor het weg- en scheepvaartverkeer mee en onvoldoende onderhoud van waterkeringen brengt het risico van overstromingen met zich, waarbij de veiligheid van de bevolking in gevaar komt.

Voorbeelden daarvan zijn de maatregelen die zijn uitgevoerd in het kader van het project van RWS Ruimte voor de Rivieren[20]. De aanleg van een randweg in de gemeenten Beverwijk, Heemskerk en Velsen vormde een Drgob omdat de doorstroming van het verkeer daarmee verbeterde en de verkeersveiligheid en leefbaarheid werd vergroot[21].

Voor het project Blankenburgverbinding werd het creëren van een extra ontsluitingsroute bij incidenten een dwingende reden van groot openbaar belang geacht door de Afdeling[22].

Een later voorbeeld in het kader van de ontheffing soortenbescherming betreft de uitspraak van de 'Haak om Leeuwarden', een rijksweg die de A31 bij Marsum en de N31 bij Hemriksein verbindt. De ABRvS vond dat met de aanleg ervan voldoende was onderbouwd dat de volksgezondheid ermee werd gediend, omdat de verslechtering van de luchtkwaliteit werd beperkt, de verkeersveiligheid verbeterde en een aantal vormen van overlast werd voorkomen[23].

(Drink)watervoorziening
Het leveren van voldoende water voor menselijk verbruik, industrieel gebruik en de landbouw, werd succesvol toegepast als dwingende reden van groot openbaar belang bij het project voor het La Breña II-reservoir in Spanje. Het Guadalquivirbekken kon in de huidige toestand niet in deze behoeften voorzien.

Verbetering van de doorstroming
Het hiervoor genoemde project (aanleg van een randweg in de gemeenten Beverwijk, Heemskerk en Velsen) laat zien dat verbetering van de doorstroming ook een dwingende reden van groot openbaar belang kan zijn[24].

Bij verkeerprojecten wordt extra waarde gehecht aan de Europese status van een project. Zo was bij het project TGV-Est in Frankrijk sprake van een door de Europese Raad verkozen prioritair (infrastructuur)project. Ook bij verschillende Duitse snelwegen is verwezen naar de bijdrage die zij leveren aan het TNT-netwerk van Europa.

[20] ABRvS d.d. 1 april 2015, ECLI:NL:RVS:2015:1046 (Cortenoever), ABRvS d.d. 25 november 2015, ECLI:NL:RVS:2015:3623 (Reevediep)
[21] ABRvS d.d. 23 juli 2008, ECLI:NL:RVS:2008:BD8324
[22] ABRvS 18 juli 2018, ECLI:NL:RVS:2018:2454
[23] ABRvS d.d. 21 maart 2012, ECLI:NL:RVS:2012:3654
[24] Zie in dit verband ook ABRvS d.d. 24 juli 2019, ECLI:NL:RVS:2019:2560 (Veldhoven/ N69)

(Regionale) werkgelegenheid
Een regionaal werkgelegenheidsbelang kan een Drgob zijn, mits dat belang overtuigend wordt aangetoond en het project ook op de lange termijn (dus blijvend) bijdraagt aan de werkgelegenheid. De eisen die de Afdeling daaraan stelt zijn hoog.

In een Friese zaak werd het Polderhoofdkanaal bevaarbaar gemaakt waarmee een voor recreatie en watersport aantrekkelijk gebied zou ontstaan en daaraan gerelateerde werkgelegenheid. Na nadere onderbouwing stelde de ABRvS vast dat de betrokken gemeenten deel uitmaken van een krimpregio en te maken hebben met een relatief hoge werkloosheid. Een project waarmee werkgelegenheid in de gemeenten wordt gecreëerd kan daarmee een drgob dienen. Op basis van de onderzoeksresultaten komt de ABRvS tot de conclusie dat met ruim 100 nieuwe banen, gezien de werkloosheid in de regio, het hiermee gestelde werkgelegenheidsbelang van het project overtuigend is aangetoond[25].

Voor de aanleg van de Westerschelde Container Terminal kon geen succesvol beroep worden gedaan op de werkgelegenheid als drgob. De ABRvS oordeelde dat onvoldoende was aangetoond dat het project daadwerkelijk nodig was voor de werkgelegenheid. Uit de stukken bleek niet waarop de verwachting van een significante neergang van de werkgelegenheid in de Zeeuwse havengebieden was gebaseerd. Daarnaast was aangevoerd dat het project werkzoekenden van buiten de regio Zeeland zou aantrekken, maar niet was duidelijk hoe dit zich verhield tot de stelling dat de aanleg van de WCT nodig was om werkgelegenheid in de havens te behouden en de bestaande werkloosheid onder de Zeeuwse bevolking te bestrijden[26].

Relevante projecten van buiten de landsgrenzen zijn de aanleg van de snelweg A20 in Duitsland om daarmee de bereikbaarheid te verbeteren en de uitzonderlijk hoge werkloosheid in het gebied te bestrijden. De aanleg van het bedrijventerrein van Daimler Chrysler Aerospace Airbus in Duitsland zou bijdragen aan het concurrentievermogen van de Europese (lucht-)vaartindustrie en zorgen voor een groot aantal nieuwe, hooggekwalificeerde banen. Dit zou een tegengewicht kunnen vormen voor de aanzienlijke werkgelegenheidsdaling in de plaatselijke industrie.

Woningbehoefte
De ABRvS oordeelde dat in het woningbouwproject IJburg in Amsterdam genoegzaam was aangetoond dat een dringende noodzaak voor woningbouw bestond ten behoeve van de gemeente Amsterdam en directe omgeving[27].

Ook kleinere woningbouwprojecten kunnen als dDgob aangemerkt worden. Zo heeft de ABRvS geoordeeld dat een project met 1.050 nieuwbouwwoningen en 150 woon(zorg)eenheden in de gemeente Edam-Volendam ook als Drgob kan worden aangemerkt, omdat voldoende was aangetoond dat met het bouwproject zowel aan de gemeentelijke als regionale woningbehoefte werd tegemoet gekomen. Daarbij was van belang dat de verwachting was dat het inwoneraantal van de gemeente zou blijven groeien en er veel ingeschrevenen voor een nieuwbouwwoning waren geregistreerd. Ook was de vergrijzing in de regio van belang, die naar verwachting het landelijk gemiddelde zou overstijgen[28].

[25] ABRvS d.d. 22 januari 2014, ECLI:NL:RVS:2014:112
[26] ABRvS d.d. 16 juli 2003, ECLI:NL:RVS:2003:AH9872
[27] ABRvS d.d. 11 januari 2000, ECLI:NL:RVS:2000:AH6955
[28] ABRvS d.d. 21 januari 2009, ECLI:NL:2009:BH0446

Ook de sloop en sanering in het kader van de herontwikkeling van een voormalig ziekenhuis in een woningbouwlocatie waarbij 350 woningen zouden worden gerealiseerd, werd als drgob aangemerkt, omdat vast stond dat:

- Er behoefte bestond aan het type woningen waarin het project voorziet;
- Met de uitvoering van het project een noodzakelijke doorstroming op de woningmarkt wordt bereikt;
- Het project het mogelijk maakt dat op het terrein ook woningen in de sociale sector worden gerealiseerd[29].

Belang van de Nederlandse economie
Dit belang was aan de orde bij het Project Mainportontwikkeling Rotterdam en de baanverlenging van Groningen Airport Eelde.

In 2005 oordeelde de ABRvS dat in het Project Mainportontwikkeling Rotterdam de drgob overtuigend was aangetoond, omdat de landaanwinning moest worden uitgevoerd vanwege – onder meer - de volgende elementen:

- De haven – en industriële activiteiten in het gebied rond Rotterdam vormen een van de hoekstenen van de Nederlandse economie;
- De verwachte groei in de sectoren internationale containeroverslag en –vervoer en industriële chemie zal tot een grotere vraag naar ruimte leiden, waaraan moet kunnen worden voldaan, wil de Rotterdamse haven zijn concurrentiepositie in het gebied Hamburg- Le Havre kunnen behouden;
- De Rotterdamse haven is een essentieel multimodaal kruispunt in het Trans-EU Netwerk Transport en is aldus van communautair belang[30].

Groningen Airport Eelde is een regionale luchthaven gericht op Noord-Nederland. De baanverlenging was nodig om de functie die de luchthaven vervult als internationale luchthaven te versterken. Daarmee zou ook het internationaal vestigingsklimaat van de regio verbeteren en dat zou weer positief zijn voor de werkgelegenheid. Naast nog vele andere voordelen voor de regio maakte dat de baanverlenging gezien werd als een Drgob[31].

Een internationaal voorbeeld is de uitbreiding van de Prosper Haniel-kolenmijn in Duitsland. Hier was sprake van het open houden van de kolenmijn vanwege het belang van een continue energievoorziening, het behoud van de leidende positie van de Europese energietechnologie en de economische en sociale gevolgen voor de regio (banenverlies). De sluiting van deze mijn zou onaanvaardbare rechtstreekse en onrechtstreekse economische en sociale gevolgen hebben voor de regio, zoals onmiddellijk banenverlies in de mijnsector, de toeleverende industriële bedrijven en de dienstleveringsondernemingen verderop in de keten.

Duurzaamheid
Het opwekken van duurzame energie kan eveneens een drgob zijn, gelet op de stijgende behoefte aan duurzame energie en de nationale en internationale doelstellingen die erop gericht zijn om de uitstoot van broeikasgassen terug te dringen.

De ABRvS oordeelde dat bij slechts 3 windmolens in de Sabinepolder sprake was van een dwingende reden van groot openbaar belang[32]. Dat het project slechts

[29] ABRvS 13 mei 2009, ECLI:NL:RVS:2009:BI3701
[30] Maasvlakte II, ABRvS d.d.26 januari 2005, ECLI:NL:RVS:2005:AS3915
[31] ABRvS d.d. 8 augustus 2012, ECLI:NL:RVS:2012:BX3968
[32] ABRvS d.d. 18 februari 2015, ECLI:NL:RVS:2015:438

een kleine bijdrage levert aan een grote opgave hoeft dus geen beletsel te vormen.

Bijlage 4: Voorbeelden van dwingendheid

Het project N31 Haak om Leeuwarden werd volgens de doelstellingen van het project uitgevoerd vanwege de bereikbaarheid van Leeuwarden, de regionale economische ontwikkeling en de verstedelijkingsopgave van Leeuwarden. Er was echter ook sprake van een verslechtering van de luchtkwaliteit in de regio in de bestaande situatie, die door het project werd beperkt. Daarnaast werden verkeersveiligheidsknelpunten verholpen. De ABRvS oordeelde dat het feit dat uitsluitend de bereikbaarheid van Leeuwarden, de regionale economische ontwikkeling en de verstedelijkingsopgave van Leeuwarden als belangen ten grondslag zijn gelegd aan het Tracébesluit, niet betekent dat met de aanleg van de Haak om Leeuwarden het belang van de volksgezondheid of openbare veiligheid niet zou zijn gediend of zwaarwegend is[33].

Bij het project Westerschelde Container Terminal oordeelde de ABRvS dat de verwachte groei van het containervervoer bij realisatie van de WCT en de geschiktheid van het terrein voor de aanleg geen rol kunnen spelen bij de beantwoording van de vraag of sprake is van dwingende redenen van groot openbaar belang. Deze factoren bepalen immers enkel de geschiktheid van de gekozen ontwikkeling en geven geen antwoord op de vraag of het belang van het creëren van werkgelegenheid in dit geval als dwingende reden van groot openbaar belang moet worden aangemerkt[34].

[33] ABRvS d.d. 21 maart 2012, ECLI:NL:RVS:2012:BV9455
[34] ABRvS d.d. 16 juli 2003, ECLI:NL:RVS:2003:AH9872