REPORT

Appropriate assessment Integrated River Management Programme

Appendix 1 of the Plan EIA

Contracting Authority: Ministry of Infrastructure and Water Management

Reference: BH8949-RHD-XX-XX-RP-EO-0001

Status: final

Date: 29 november 2023

Royal HaskoningDHV
Enhancing Society Together

Inhoud

1 Introduction

1.1 Background

The national government works together with provinces, water boards and local authorities on ensuring a safe, navigable water system with sufficient nature, good water quality, and spatial development. These river functions cannot be assessed or resolved separately from each other. This is a very urgent task, partly because it is already difficult to facilitate all river functions, and partly because it has been established that the already advanced riverbed erosion and climate change are complicating matters even further. The update of the KNMI climate scenarios released in 2023 confirm this urgency. For this reason, the river zone is being looked at as a whole, and challenges tackled together in a coordinated manner. That is the underlying idea of the Integrated River Management (IRM) Programme. The Integrated River Management Programme focuses on the tasks and opportunities in the river zone (consisting of the Meuse and Rhine tributaries) in the period up to 2050, while taking the period to 2100 into account.

The main task is to ensure the river zone is future-proof by making choices about the system characteristics that result in changes to the design of the river.

The aim is to adopt the Integrated River Management Programme in 2023. The Programme seeks connections with other programmes in the river zone. An Environmental Impact Assessment (Plan EIA) linked to the IRM Programme has been drawn up, in which the impacts of policy choices in the programme are examined. This appropriate assessment was drawn up because significant negative impacts on the conservation goals of Natura 2000 sites cannot be ruled out in advance.

1.2 Goals of the IRM Programme

The Integrated River Management Programme prepares the Dutch river zone for the consequences of climate change, while striking a new balance between the functions and values of the river zone for future generations. The design and management of the river zone are being revised due to climate change and its foreseeable consequences. In the future, high water levels will be more frequent and extreme, while low water levels will be lower and persist for longer. The first major task of the IRM Programme is to anticipate these events. Five goals have been formulated for the purpose. For more, see Chapter 2 of the Plan EIA. One of the goals concerns nature and ecological water quality.

The goal for nature and ecological water quality is to ensure a dynamic river system with robust nature, which also guarantees that the goals attained or planned in the context of the Water Framework Directive (WFD) and Natura 2000 are maintained:
The natural river system will be restored by creating an interconnected network of nature reserves and connecting zones, in which typical river ecotopes are reinforced and expanded. These goals are recorded in a Programmatic Approach to Large Water Bodies (PAGW) target image, which focuses on restoring the natural dynamics of the rivers (natural hydrodynamics and morphodynamics, good ecological water quality, and sufficient space for nature).

The measures identified and documented within the framework of the nature agreements between the national government and province, the WFD, and the management plans for Natura 2000 are considered a fundamental starting point for the PAGW and, consequently, the IRM Programme.

1.3 Purpose of this appropriate assessment

The IRM Programme contains new indicative policy choices. However, it cannot be ruled out in advance that they will not individually or collectively have a significant impact on Natura 2000 sites. For this reason, an appropriate assessment of the IRM Programme was required according to the Nature Conservation Act (*Wet natuurbescherming)*. The appropriate assessment is the statutory assessment of a plan associated with framework plans for which a significant negative effect cannot be ruled out in advance. The purpose of the appropriate assessment is to:

- Identify the risks of significant negative impacts on the natural features of the Natura 2000 network as a result of the new policy in the IRM Programme.
- Describe possible mitigation measures and/or policy adjustments needed to prevent significant impacts. This mainly concerns recommendations on the elaboration of the implementation decisions.

The level of detail in the appropriate assessment is compatible with the current level of detail in the IRM Programme. Given the current abstract nature of the policy choices, these are in outline, so it is, above all, a risk assessment. Based on this information, the appropriate assessment should demonstrate that damage to natural features of Natura 2000 sites can be ruled out, and that the new policy derived from the IRM Programme is feasible.

1.4 Contents Guide

The following chapter describes the Nature Conservation Act, the legal framework for this appropriate assessment. The situation in Natura 2000 sites in the river zone and associated issues are described in Chapter 3. Chapter 4 describes which IRM Programme policy statements have been assessed, and the relevant effects of these policy choices. Chapter 5 then assesses the risk that this influence will lead to significant effects on Natura 2000 sites. The report ends with a conclusion.

2 Legal framework

The relevant legal frameworks in the Nature Conservation Act relate to the Zone Protection section of this law. This section regulates the protection of Natura 2000 sites in the Netherlands. It follows that an assessment of possible impacts on natural values within the boundaries of these zones for which conservation goals have been formulated is required. These conservation goals, laid down in the designation decisions for Natura 2000 sites and further detailed in a management plan, serve as an assessment framework.

Based on the conservation goals, it must be determined if there are conflicts with the sustainable attainment of formulated conservation goals, and, if so, whether the essential characteristics and values of a Natura 2000 site are in jeopardy and significant negative consequences cannot be ruled out. External effects also play an important role here, in other words, the extent to which impacts caused by activities outside Natura 2000 sites have negative impacts on conservation goals within these zones must also be considered.

Projects or plans that could have a significant effect on Natura 2000 and associated conservation goals are in principle not permitted in accordance with Article 2.7 of the Nature Conservation Act. A preliminary assessment in the orientation phase can provide a definitive answer to whether the plan has no impact, significant or otherwise, and therefore no permit is required under Article 2.7 of the Nature Conservation Act, or whether there is a risk of a significant negative impact, and therefore an appropriate assessment and permit pursuant to Article 2.7 of the Nature Conservation Act is indeed required.

If the conservation goals cannot or potentially cannot be attained due to the proposed programme, there may be significant negative effects, and mitigating measures will have to be included in the IRM Programme.

Meaning of significant in the assessment of effects on Natura 2000 sites
Effects are significant if the natural features of a Natura 2000 site are affected in the light of the associated conservation goals[1]. If the conservation goals cannot or potentially cannot be achieved as a result of human interventions, a plan, or a project, there may be significant negative effects. Conservation goals can also be affected by direct loss of area or population size, among other things, as well as through a decrease in quality.

[1] Guidelines for determining significance Further explanation of the concept of 'significant effects' from the Nature Conservation Act, Steunpunt Natura 2000, 07 July 2009, and interpretation document of the European Commission, 2000. Management of Natura 2000 sites. The provisions of Article 6 of the Habitats Directive 92/43/EEC & Factsheet No. 25 Significance when assessing effects on Natura 2000 sites. EIA Commission, 2010.

3 Situation of Natura 2000 sites

3.1 Developments in the river zone

History

The major rivers of the Netherlands have become systems with intense human intervention due to standardization, construction of dams, and water distribution decisions. Partly in the light of safety (protection against high water levels) and the economic significance of the rivers, this places restrictions on the restoration of the characteristic processes required for habitat conservation and development.

Due to the fertility of the clay soils, almost the entire river zone, both on the landward side and water side of dykes, was used for agriculture. Woodland was almost completely cleared, replaced by arable land and later also by grassland. The beds of the reclaimed polders subsided, leading to prolonged higher groundwater levels and rendering them unsuitable for arable land. Fruit cultivation developed on river ridges. Clay, sand, and gravel were extracted on a large scale. The water and sludge became heavily contaminated in the twentieth century (Everts et al., 2016).

As a result of river normalization measures, such as the straightening of meanders, erosion has progressively deepened the bed of the river's main channel. This erosion has been the result of human intervention, to prevent the river channel from shifting and eroding the river forelands. It causes the river to cut deeper as it then collect sediments from the riverbed, instead of the river foreland. The Rhine and Meuse river basins are now no longer supplied with virtually any new sediment, due to the canalization of the Upper Rhine in Germany with weirs and the canalization of almost the entire Meuse. The erosion of riverbeds in the Netherlands has been further exacerbated by sand and gravel extraction from the main channel. Simultaneously with the erosion of the main channel, the sedimentation of the river forelands has been intensified through dyke construction. This has caused the sediment to be deposited in a narrower river foreland. As a result, the height difference between the main channel and the river foreland has continued to increase, and groundwater levels have lowered in the river forelands and in some cases also on the landward sides of dykes. This has led to desiccation and a decrease in the frequency of inundation, which in turn has had a negative effect on the quality of river nature (Klijn et al., 2022). For the PAGW, it has been established that the deeper (and still deepening) riverbeds have a much greater effect on nature in river forelands than the lower river discharges due to climate change (Van Geest et al., 2020).

Trends over the past twenty years related to climate change have led to a higher safety risk, mainly due to high river discharges. For this reason, new initiatives have been realized in the context of Room for the River (*Ruimte voor de Rivier*) and NURG (Further Elaboration of the River Zone), intended to guarantee long-term safety and promote river nature.

The future

In the future, climate change will make the task of attaining the Natura 2000 goals more difficult. The ongoing erosion and the increasing height difference between the main channel and the river forelands will also pose a threat to the sustainable development and maintenance of the Natura 2000 objectives in the future. The main channel of the rivers is too wide for the current and future low water discharges, while the winter riverbed is too narrow for high river discharges in the future. This hinders the development of a robust river nature in accordance with the goals of the PAGW, Nature Network Netherlands (*Natuurnetwerk Nederland)* and the WFD (Van Geest, 2020). Research by Dorenbosch (2022) shows that a further reduction in the inundation zone is expected in large areas of the Rhine tributaries and the Meuse during the growing season. Throughout the spring, there will be fewer and fewer temporarily flooded low areas in river forelands, and shallow river foreland ponds will dry out earlier or more often in the summer. This desiccation of the river forelands causes a deterioration in the area and quality of wet habitats, as has been noted in the Natura 2000 management plans and Analyses of Attainment of Conservation Goals in the Natura 2000 sites. In

particular, the wet, riparian softwood woodland in the upstream part of the Rhine tributaries will become further overgrown as a result. This effect is expected to have little effect along the Meuse, because the river is largely dammed. Low-lying meadows, particularly those with fox-tail grass, will also suffer a negative effect from this. However, the best developed foxtail meadows are located downstream or in regulated summer polders, and therefore much less affected. The new flooding pattern means that in theory there will be more room for types of habitat where flooding is relatively rare, such as riverine grasslands, oat grass meadows, ash-elm woodland, and hardwood riparian woodland.
The proportion of clay soil is expected to increase, while less or even no sandy soil is being added. This would increase the potential area of oat grass meadows and ash-elm woodland, but limit any increase in the potential area of riverine grasslands and hardwood riparian woodland. Along the Meuse, the impacts on existing habitat types are much smaller than along the Rhine, not only because there is less desiccation here (no riverbed erosion), but also because there are fewer Natura 2000 sites. The softwood riparian forests along the Meuse are not affected by climate change in the scenario calculated by Dorenbosch (2022). It should be noted that the impacts on groundwater levels were not considered in the research, although this factor can have a major influence, especially along the sandy and gravelly stretches of the Meuse. Changes are visible in the grasslands along the Zandmaas: the relatively wet parts are flooded less frequently, and the relatively dry parts more frequently. This is favourable for a larger part of the habitat types, because they are currently too dry.
Climate change and riverbed erosion also reduce the connections of secondary channels to the main channel, causing them to dry out more regularly. Too few changes are being made to the river system to counter this, while the riverbed continues to deepen. This causes the river, especially the Rhine, to channel itself further.

The Nature Study on Large Rivers (*Natuurverkenning Grote Rivieren)* was drawn up by the Ministry of Economic Affairs in 2017 to resolve these issues. This study outlines a target image of the rivers and their immediate environment in which natural processes and dynamics are again given space, so that climate-proof nature can emerge and shared use is possible. The PAGW proposes measures to make large waters ecologically robust and resilient. The Ecological System Task PAGW-Rivers report (*rapportage Ecologische Systeemopgave PAGW-Rivieren*) (Heusden et al., 2021) describes what this requires. The river system will still be largely under human influence in 2050, and there are certain conditions set by humans that will prevent certain elements of the system from developing in a completely natural manner. However, these desired conditions can be approximated as much as possible through system, design, and management measures, so that biodiversity can nevertheless be boosted substantially.
Five key factors play a role in this. The extent to which a site complies with habitat types or habitats of species is related to the requirements for these key factors:

- Scale: size of an area
- Dynamics: river influence and natural processes
- Habitat quality: abiotic and biotic conditions
- Habitat diversity: gradients and mosaics
- Connectivity: spatial interconnectedness

The conservation goals in Natura 2000 are preconditions for changes to improve the safety of the river system.

3.2 Current issues in Natura 2000 sites

In addition to the issues described above that are present in the entire river system as a result of previous human intervention, this section looks in more detail at the current issues in the Natura 2000 sites in the context of the IRM Programme. Chapters 4 and 5 then determine if the Preferred Option of the IRM Programme would further aggravate these issues, or wholly or partly resolve them.

In the river landscape, the restoration strategy (Everts et al., 2016) distinguishes six gradient types based on their size (small and large rivers), their position in the morphological complex within the river basin (transport, deposition), their position in relation to the winter dyke (river forelands and landward side areas), and the occurrence of tides (freshwater tidal areas). There are four of these gradient types of Natura 2000 sites in the IRM Programme planning zone. For more, see Figure 3-1.

Table 3-1 Classification of Natura 2000 sites in the IRM Programme per gradient type

Gradient type	Natura 2000 site
River forelands in the transport zone of large rivers	Common Meuse Maasduinen Oeffelter Meent Eijsden section of the Meuse
River forelands in the deposition zone of large rivers	Rhine tributaries Loevestein, Pompveld and Kornsche Boezem Lek river forelands
River estuaries with weak tides	Zwarte Water & Vecht river forelands
River estuaries with strong tides	Biesbosch

The characteristics and issues associated with these Natura 2000 sites are described below. This is based on information from Natura 2000 management plans and Analyses of Attainment of Conservation Goals. Some Analyses of Attainment of Conservation Goals do not include all habitat types and species of the Natura 2000 site, and only relate to nitrogen-sensitive habitat types and species. The conservation goals of these Natura 2000 sites are included in Appendix 1.

Figure 3-1 Location of Natura 2000 sites in the IRM Programme

Royal HaskoningDHV

3.2.1 River forelands in the transport zone of large rivers

Common Meuse

The Draft Natura 2000 management plan, which was available for consultation at the time of writing, identifies a number of issues that stand in the way of the conservation goals. For example, there are no connected locations for the floating water crowfoot (H3260B Streams and rivers with aquatic plants, large potamogeton) due to the loss of current when water levels are low, unnaturally high and frequent discharge peaks, and insufficient variety in the soil composition. These issues also impact the conservation of the river lamprey and bullhead, although competition with invasive exotic gobies is decisive for the latter species. The habitat type 'H6430 Fringe-forming overgrowth vegetation' also occurs in areas that are too small, making this habitat vulnerable. Many river widening measures have already been implemented as part of the Meuse Works, which have resolved some of the issues. The work will continue until 2027 (Rijkswaterstaat, 2023).

The key issues:

- Unnatural river dynamics
- Presence of exotic gobies (bullhead)
- Too small areas and fragmentation

Maasduinen

The Maasduinen is a large Natura 2000 site located near the Meuse terraces (*Maasterrassen*). Many of the conservation goals concern habitats and species of heathland and fens, which are not related to the river system. Along the Meuse, riverine grasslands and hardwood riparian woodland occur locally. The biggest issue is the limited area, which currently makes it impossible for high quality habitats to develop. Due to the narrow gradient in which these habitat types flourish, expansion is difficult and must partly be found outside the Natura 2000 site. Eroding banks also pose a risk to the preservation of the area of riverine grassland, so landfill stone has been placed at the most vulnerable locations. High discharge peaks have been levelled off by the increased Meuse level and the river widening measures. This may result in riverine grassland not being inundated often enough. It is not known whether the level of the Meuse has a desiccating effect on other sub-areas within the Natura 2000 site further from the river as these are particularly dependent on apparent groundwater levels. How these interact with the level of the Meuse is unclear. The sand martin is a pioneer species that has disappeared with the end of sand and gravel extraction, so there are no breeding pairs in the site. The Analysis of Attainment of Conservation Goals questions whether the sand martin is a suitable target species for the Natura 2000 site, which largely consists of open heathland and woodland. Due to these issues, the intended attainment of goals has fallen short (Province of Limburg, 2022).

The key issues:

- Too small areas and fragmentation
- Reduced dynamics (flood frequency and duration)

Oeffelter Meent

An issue in this Natura 2000 site is the limited dynamics (and inundation). This hinders the development of riverine grassland, which is dependent on sand deposits. In the past, it was artificially compensated by sand and gravel extraction, but this no longer exists. Furthermore, the areas are small and isolated, which makes it difficult for characteristic species to establish themselves and is a barrier to sustainable conservation. The conservation goals of oat grass meadowland, the great crested newt, and the spined loach depend above all on good management. It is uncertain if goals have been attained, especially for oat grass meadowland. Because the site was used in the past for agriculture, conditions are too nutrient-rich. The Analysis of Attainment of Conservation Goals (Arcadis, 2023) describes the following most important issues in this site:

- Reduced dynamics (flood frequency and duration)
- Too small areas and fragmentation
- Excessive nutrients in oat grass meadows (former agricultural fields)

- Excessive nitrogen deposition (riverine grassland)

Eijsden section of the Meuse

There are still draft plans for this Natura 2000 site for softwood and hardwood riparian woodland, and river migratory fish such as river lamprey, salmon, and bullhead, among other ambitions. No Natura 2000 management plan has yet been drawn up for this site, so there is no insight into the current issues, measures, or attainment of goals.

The Analysis of Attainment of Conservation Goals shows that in the current situation, the critical load of the nitrogen-sensitive habitat types present in the Eijsden section of the Meuse is not exceeded by the current background deposition. Nitrogen deposition is expected to decrease further in the coming years, so this will not be an issue affecting the conservation goals for the habitat types and Habitat Species Directive for which the site was designated.

Research (Vriese et al., 2021) has revealed that the current situation for fish in the Meuse, among other things, is not yet in order. The dams in the Meuse have limited the availability of flowing habitat and obstructed fish passage.

The main issue is therefore the disrupted dynamics of the river.

3.2.2 River forelands in the deposition zone of large rivers

Rijntakken site

The measures in the Natura 2000 management plan prevent further deterioration of habitat types. However, there are still issues that hinder sustainable conservation, both now and in the coming management plan periods. There are still too few sustainable woodland cores for hardwood riparian forests. However, the Analysis of Attainment of Conservation Goals (Arcadis, 20230) does indicate that sufficient safeguards are in place for this. This is not known for the 'H9120 Beech-oak woodland with holly' habitat type, partly due to the lack of information given the habitat type was only added to the Natura 2000 site following the Amendment Decree.

Migratory river fish (salmon, shad, river lamprey and sea lamprey) benefit from the measures that have been taken, such as longitudinal dams, creating secondary channels, and removing stones from banks. The conservation of the bullhead is threatened by invasive gobies Species which thrive in less dynamic environments, such as the weatherfish and great crested newt, remain under pressure due to the disappearance of static environments and the possibility of reaching new areas.

It remains important that reed beds are developed in order to attain the objective for marsh birds. The Gelderse Poort is the most important area where measures have already been implemented. Connections with other areas in the Rijntakken (Kil van Hurwenen, Amerongse Bovenpolder, and Havikerwaard) and beyond (Randmeren, Wieden-Weerribben, Linge area, Utrechtse en Zuid-Hollandse plassengebied [Utrecht and South Holland lake area], and Bypass Kampen) are important. The black tern remains dependent on nest rafts because there is still not enough stratiotes aloides (water soldiers) vegetation. The main issue facing the spotted crake is the surface area of suitable habitat. The management plan indicates that the size and quality of the habitat of spotted crake and corn crake (meadowland/marshland) is now in order after the first management plan period (2024). Time will tell if the populations will actually recover, but so far this has not happened.[2] For the corn crake, regular agricultural mowing management remains an important issue
Due to the implementation of all kinds of river measures, there is sufficient habitat (shallow standing water, marsh, muddy banks and open water) for non-breeding birds. The area of agricultural land is also sufficient for grass-eating geese, Eurasian wigeon, and whooper swans. The failure to meet the population target of some species is due to factors outside the Rijntakken (Province of Gelderland, 2018).

[2] *Natura 2000 site Rijntakken | Sovon Bird Research*

The key issues:

- Disappearance of species which thrive in more static environments, such as the weatherfish and great crested newt.
- Insufficient surface area and quality of habitat for marsh birds (and possibly also spotted crake)
- The small areas and fragmentation (particularly the woodland types)
- Presence of exotic gobies (bullhead)
- Excessively intensive agricultural mowing management (corn crake)

Loevestein, Pompveld & Kornsche Boezem

For this appropriate assessment, only the Loevestein sub-area bordering the Waal was considered. The landward sub-areas Pompveld and Kornsche Boezem are located outside the river system, and have therefore not been taken into account. Thanks to design measures in Room for the River (*Ruimte voor de Rivier*) and the Munnikenland project, the river system is developing in a positive sense (more dynamic), which benefits muddy river banks and riverine grassland. It is also expected that the quality of softwood woodland will improve due to lower river forelands and the consequent rewetting. The key issues in this area are the poor grazing management coordination and the unacceptable water quality in the Boezem van Brakel: due to stable water level management in the polder and geese, there are insufficient opportunities for lakes with water soldiers to develop. The bullhead, which occurs along the stony banks of the Waal, is probably threatened by invasive gobies (Province of Gelderland, 2022). The Analysis of Attainment of Conservation Goals (Arcadis, 2023) indicates that there are no issues with regard to the nitrogen-sensitive habitat types and that there is no deterioration.

The key issues identified:

- Presence of exotic gobies (bullhead)
- Management (grazing, water level management, and geese)

Lek river forelands

The Analysis of Attainment of Conservation Goals shows that all the goals will remain unattainable unless additional measures are taken. The key issues are disturbed river dynamics, resulting in desiccation and poor hydrodynamics and morphodynamics. This is also caused by the location of the habitat types on a side branch of the river, which results in limited erosion and sedimentation. Furthermore, these are small areas that are isolated and vulnerable in terms of their long-term viability.

The oat grass meadow goal is attainable with appropriate management. The populations of the great crested newt are now small and fragmented. There is a complete absence of places where they can survive the winter (Province of Utrecht, 2023).

The key issues:

- Disrupted river dynamics
- Too small areas and fragmentation
- Management

3.2.3 River estuaries with weak tides

Zwarte Water & Vecht river forelands

In 2020, various work was started to reduce inundation as much as possible, and boost fritillary meadows. Further measures include the construction of a secondary channel, optimization of water level management, improvement of the quality of reed marshes, and expansion of hardwood riparian forest. These measures are intended to resolve the existing issues regarding hydrology and insufficient good-quality reed beds for marsh birds (Province of Overijssel, 2017).
The Analysis of Attainment of Conservation Goals (Province of Overijssel, 2023) concluded that hydrological restoration has prevented deterioration, but that the small areas and isolated location of habitat types remain issues for attaining the conservation goals.

The key issues:
- Too small areas and fragmentation

3.2.4 River estuaries with strong tides

Biesbosch

An important issue in the Biesbosch is the loss of tidal action, which means that the dynamics have largely disappeared, succession and land formation have occurred, and sludge has accumulated. These all have a negative effect on riparian woodland, riverine grasslands, muddy river banks, marshland, and reed beds as breeding sites for the Eurasian bittern and marsh harrier, among others. The damming of the Haringvliet inlet has also led to a decline in migratory fish. The habitat is suitable, but cannot be reached. To solve this issue, the Haringvliet locks are regularly left slightly open, but whether this is having the desired effect on migratory fish is unknown. The Analysis of Attainment of Conservation Goals reveals that the goal will not be obtained for all species and habitats unless additional measures are taken. This is largely due to the reduced river dynamics and the emergence of exotic or invasive species, such as Himalayan balsam. The Analysis of Attainment of Conservation Goals describes the key issues in the site (Arcadis, 2023)
- Reduced river dynamics (desiccation and insufficient inundation)
- Too small areas and fragmentation
- Excessive nutrients in surface water
- Inadequate management, recreation, hunting, and fishing
- Exotic or invasive species

3.2.5 Summary of issues

Based on the above information from Natura 2000 management plans and Analyses of Attainment of Conservation Goals, it can be generally concluded that the key issues in the river zone consist of:
- Disrupted river dynamics, including insufficient inundation
- Small areas & fragmentation
- Desiccation
- Nitrogen deposition
- Inadequate management
- Exotic or invasive species

These issues can be used as a guide when assessing the impacts of the proposed policy in the IRM Programme. If developments aggravate an issue, it may be an indication of an increase in the risk of significant negative effects on Natura 2000 sites. When assessing the risks, the main aspects taken into account are space occupation, interconnectedness, river dynamics, and desiccation.

4 IRM Programme Preferred Option to be Assessed

4.1 Goal of the Preferred Option

The initial results of the EIA were used to help formulate an indicative Preferred Option as a guideline. The preferred option was selected on the basis of the guiding principle of 'water and riverbed management'. This principle is also reflected in the IRM Programme's ambition: '*a future-proof river zone that functions well as a system, and is available for multiple purposes*' The priority here is a well-functioning water and riverbed system. Two policy choices make a substantial contribution to the realization of this ambition:

- A sufficient, stable and manageable level of the main channel riverbed that helps natural river dynamics recover, and ensures good navigability and water distribution across the Netherlands when river discharges are low.
- Sufficient drainage and storage capacity to absorb the higher river discharges expected in the course of this century and to facilitate spatial developments, nature, riverbed levels, and other tasks.

Stimulating robust and resilient nature development in the river zone is also an important aspect of the IRM Programme. For natural dynamics to be restored, it is important to prevent further riverbed erosion, raise the level of the riverbed, and lower river forelands and summer dykes. River widening is an important measure to limit riverbed erosion and tackle the related issues in combination with the low-water flow problem. Reducing the erosive trend in the main channel requires an increase in the discharge capacity in the area of the central channels, and therefore more space. This is particularly pertinent for a number of sections of the Rhine tributaries.

4.1.1 Riverbed levels & sediment management

The most urgent task is to stop riverbed erosion in the Meuse and the Rhine tributaries, and to raise the eroding parts of the Rhine tributaries to previous levels where necessary and feasible. Work is therefore being carried out in this respect for the Meuse upstream of Lith and for the Rhine tributaries. This involves putting a stop to excavations in the main channel as quickly as possible, unless this is opposed by a general interest such as channel deepening. The aim for the Common Meuse is to add sediment in addition to ending excavations (see raising the riverbed in Figure 4-1 by the Common Meuse). This will prevent further deepening of the riverbed. In addition to ending excavations in the main channel, measures are being developed to stop erosion in the Rhine tributaries (including adding sediment in the eroding stretches, see Figure 4-1) due to the major task along the Waal, Pannerdensch Canal, and IJssel. Efforts will also be made to raise the riverbed of the Rhine tributaries to earlier levels in the long term, where necessary and feasible. Measures to deal with this will be elaborated in more detail. The national government will consider when the ongoing excavations in the main channel can actually be stopped.

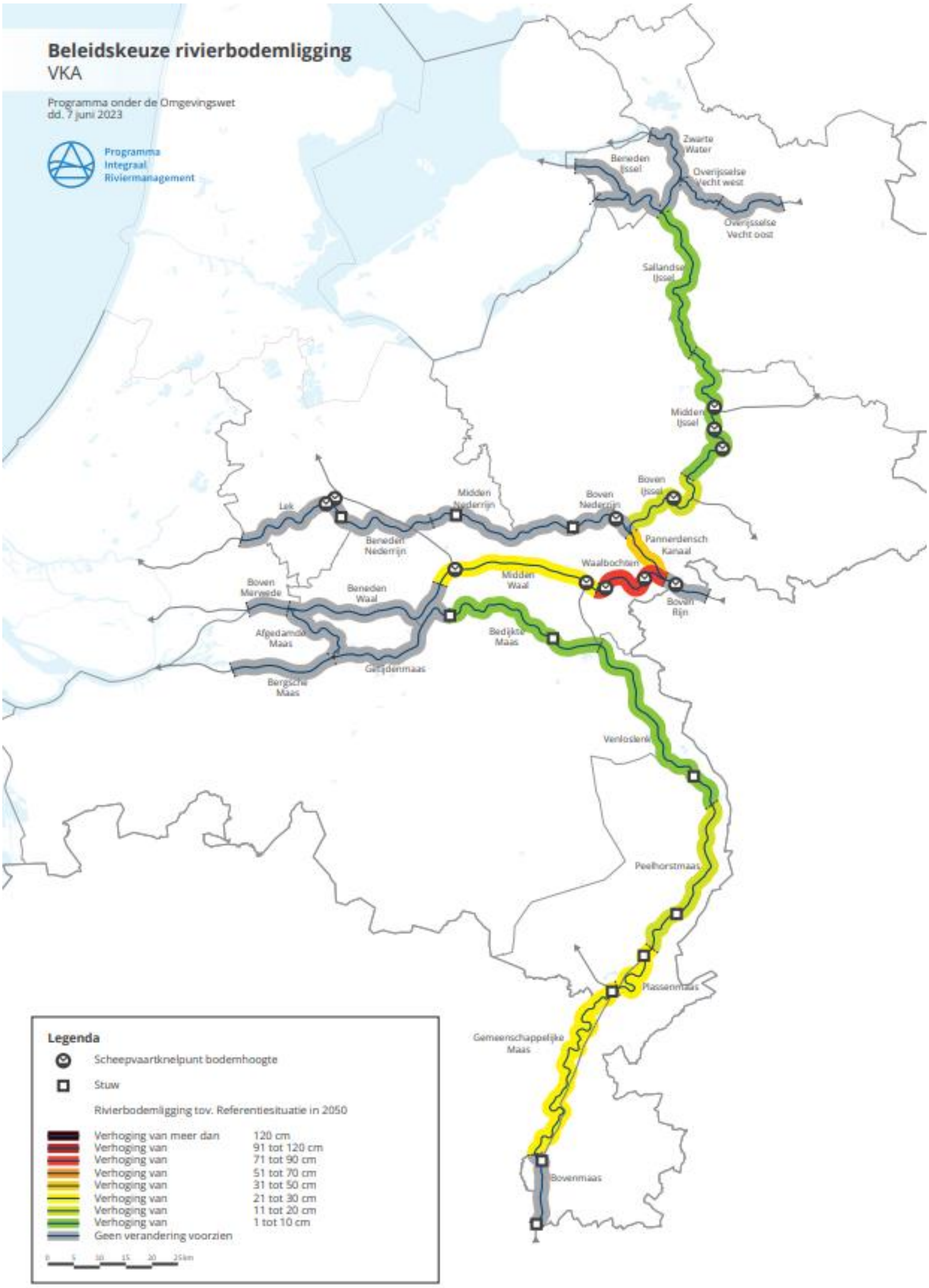

Figure 4-1 Policy choice for riverbed level

4.1.2 Discharge & storage capacity

Figure 4-2 shows the degree of river widening expressed in required centimetres of water level reduction for the indicative Preferred Option. It is clear that many sections require a reduction in water levels of 20 to 70 cm to respond to the various tasks that will cause water build up, and solve the discharge capacity issue. However, there is a great deal of uncertainty about the reduction in water level required to counter this build up, and further elaboration is needed to define a specific intervention at route level. For this reason, further research is being initiated to determine the necessary and desired long-term discharge and storage capacity of the rivers based on the various river functions, and which combination of interventions (raising of dykes, widening of the river inside and outside the dykes) are needed to attain this.

When drawing up river widening measures, the effect of the regional system on the main water system will be examined, along with the effect of the water level reduction in the main water system on the regional water system. The indicative Preferred Option includes the following measures to ensure a drop in water levels:

- Facilitate the 2050 climate task: Flexibility to respond to the climate task (15 to 40 cm increase in water height as a result of a higher river discharge);
- The nature task: The task concerning nature and ecological water quality, which includes realizing the desired ecotopes, the water level reduction that this entails, and compensating for any water level increase that is the result of the ecotope change (2-25 cm);
- Riverbed: Compensation for the high water level effect of higher riverbed levels in the branching points of the Rhine tributaries (3-14 cm)
- System measures in the Meuse: The part of the Meuse system task that still needs to be realized (0-7 cm);
- Water side dyke reinforcement: compensation of water side dyke reinforcements (2 cm);
- Zone development, existing and new: Compensation for river-related zone developments (0-2 cm);
- Management space: for management (1-5 cm).

Royal HaskoningDHV

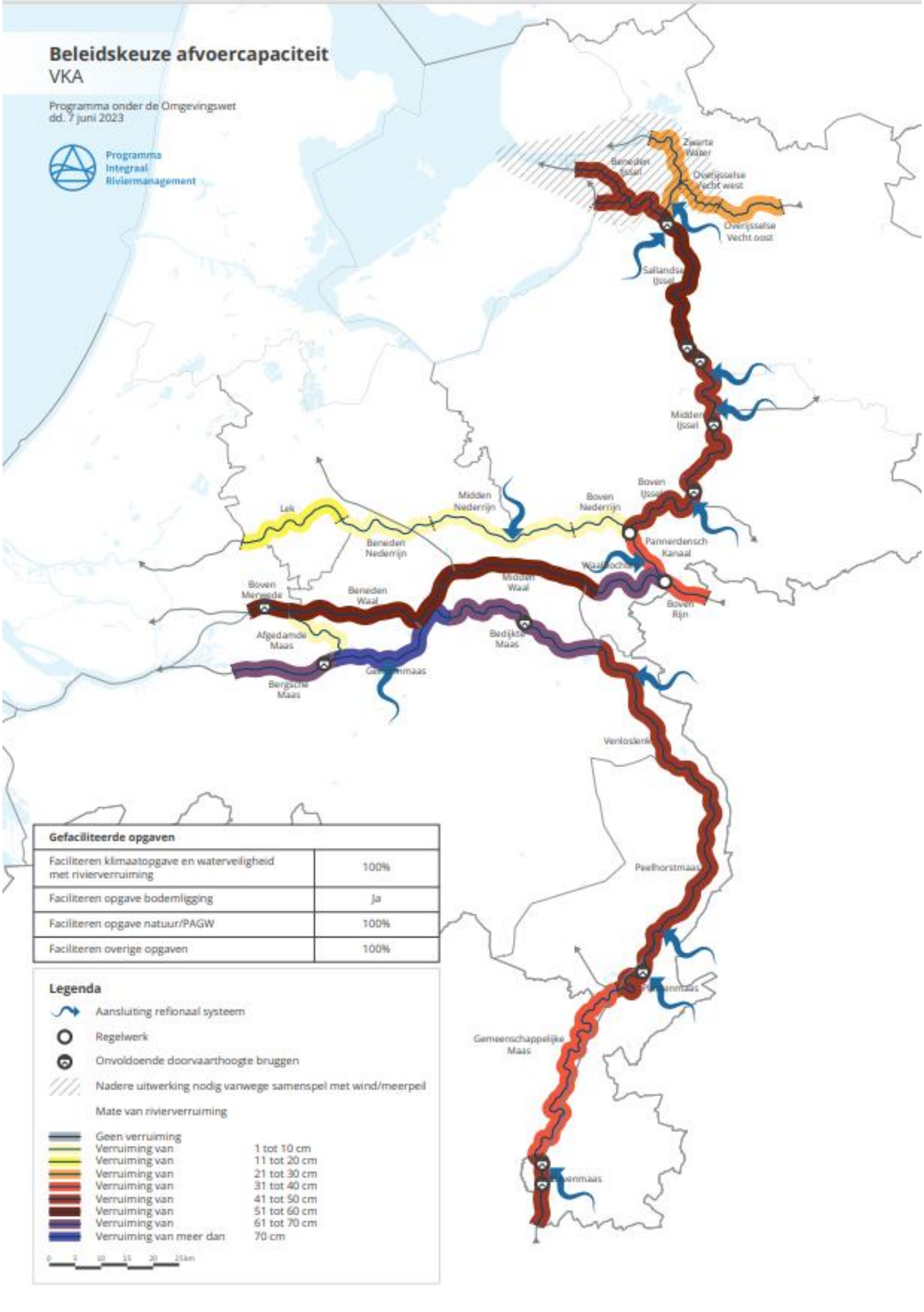

Figure 4-2 Policy choice for discharge capacity (indicative)

The map below shows in which sections the spatial needs of the river widening measures in the IRM Programme up to 2050 can be found on the water sides of the dykes, and which require space on the landward sides. The demand for space on the landward side of the dykes (partly also outside the General Spatial Planning Regulations Decree [Barro] reservation, indicated in red) is most urgent along the Tidal Meuse, Bergse Maas, Sallandse IJssel, Beneden-IJssel and the branching zone of the Rhine tributaries (with the Rijnstrangen spatial reservation). This task is of such a magnitude that space on the landward sides of the dykes may also be required until 2050. This also applies, but to a lesser extent, to the other sections of the IJssel and the Waal/Boven Merwede, the Common Meuse and the poldered Meuse, and the downstream part of the Overijsselse Vecht. Reservations on the landward sides of dykes in the hotspot areas have been determined or are still being determined in preliminary studies. In the orange river sections, the required space on the water sides of the dykes is sufficient, but leads to a significant spatial task in the riverbed. What this map reveals is a shared responsibility to design a future-proof river zone, without passing on the impacts of that design to the future. Further decisions in this respect will be made in an integrated spatial assessment, in close collaboration with the elaboration of the new Spatial Planning Policy.

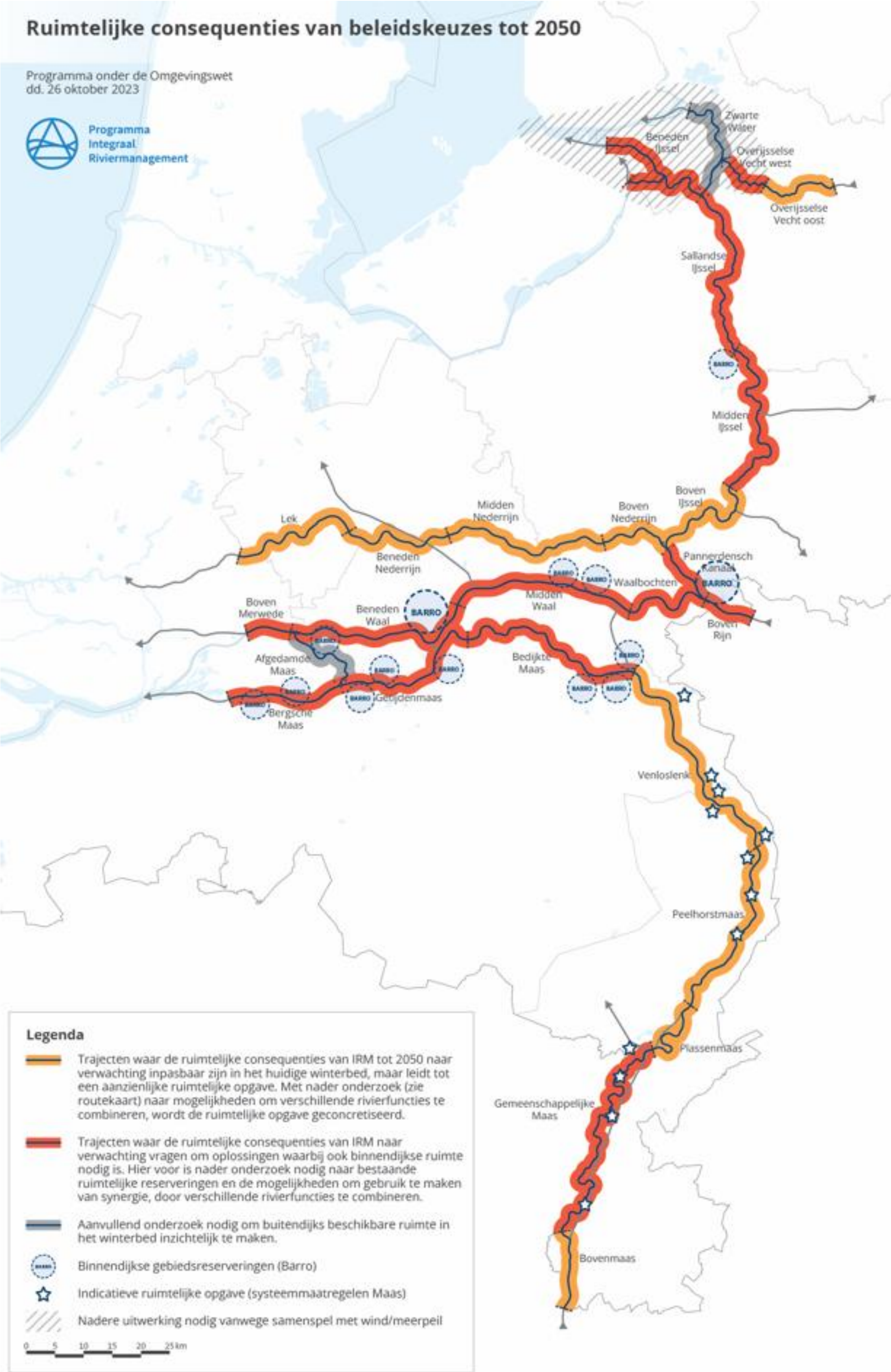

Figure 4-3 Area available for river widening to increase discharge capacity

4.1.3 Nature development

Lastly, stimulating robust and resilient nature development in the river zone is an important part of the IRM Programme. For natural dynamics to be restored, it is important to prevent further riverbed erosion, raise the level of the riverbed, and lower river forelands and summer dykes.

The natural river system will be restored by creating an interconnected network of nature reserves and connecting zones, in which typical river ecotopes are reinforced and expanded. This goal is recorded in a Programmatic Approach to Large Water Bodies (PAGW) target image, which focuses on restoring the natural dynamics of the rivers (natural hydrodynamics and morphodynamics, good ecological water quality, and sufficient space for nature).

This will result in an increase in characteristic river nature on the river forelands, such as riparian woodland, creating secondary channels, floodplain grasslands, and reed marshes, and a decrease in production agriculture. The changes in vegetation will change the roughness of the river forelands. This can cause water to build up, and thus influence the drainage capacity of the rivers. In accordance with current policy, the water build-up must be compensated with river widening measures. Measures such as river foreland excavation, creating secondary channels, and lowering summer embankments both help nature and reduce water levels, and can partly compensate for additional water build-up as a result of overgrowth caused by nature development.

A lot of physical space (surface area) is also needed to create sizeable habitats. The focus here is to preserve and strengthen the Natura 2000 sites, WFD water bodies, and NNN (Netherlands Nature Network) areas, and to realize the PAGW target[3]. In essence, the task is to create sizeable units of robust, resilient, and interconnected nature which can withstand a blow and will not require more intervention in the short term. This requires a certain degree of oversizing with robust, no-regret interventions.

The focus is on a nature network consisting of four hotspots, two of which lie entirely and two partially within the IRM Programme planning zone (see Figure 4-4). The hotspots are interconnected via the rivers (corridors and stepping stones). The hotspot around the Gelderse Poort is probably the only site that cannot be accommodated entirely outside the dike. This requires additional General Spatial Planning Regulations Decree (Barro) reservations and zones on the landward sides of dykes.

Figure 4-4 Illustration of the nature network of large rivers (Heusden et al., 2021)

[3] The PAGW target image was assessed on the basis of the description of the PAGW-Rivers ecological system task (see also the Plan EIA, IRM Programme, Chapter 3) and concerns, among other things, 28,300 hectares of ecotope change.

Royal HaskoningDHV

The measures identified and documented within the framework of the nature agreements between the national government and province, the WFD, and the management plans for Natura 2000 are assumed as a starting point. This is established policy, so it does not need to be appropriately assessed again in the context of IRM.

4.2 Relevant impact of the final phase of the IRM Programme on Natura 2000

Various aspects can affect the quality of Natura 2000 sites, so there is a risk of significant negative effects in these areas. The results of the Plan EIA indicate that the IRM Programme could impact the following aspects of Natura 2000 sites: space occupation, interconnectedness, salinization, desiccation, river dynamics (hydro/morphodynamics). Considering this is a general programme in which particular measures have not yet been defined, it cannot be determined in any detail at the present time to what extent these effects will arise.

Space occupation
The zone elaborations that must be drawn up to further define the river widening task will have a particularly profound impact on the layout of the river zone and space occupation. It is not yet known where and what measures will be taken to reduce the water level sufficiently so that the discharge and storage capacity can be optimized. However, it is known that the river widening will mainly occupy agricultural land, because the target image includes an estimate of the area required for ecotope change, whereby agricultural land on the water side of dykes in the hotspots will have to be converted into nature or nature-inclusive agriculture.

Interconnectedness
The interventions planned in the river zone also aim to improve the interconnectedness of nature reserves. This can take place at different levels.
On the one hand, a number of hotspots are realized that are interconnected by smaller nature reserves and connecting zones. On the other hand, raising the level of the riverbed of the main channel and lowering the river forelands will also improve the connection between the river and its forelands. Secondary channels will be constructed in a climate-robust manner so that they dry out less quickly and maintain a connection with the main channel even in dry periods.

River dynamics
One of the goals of the IRM Programme is to realize a dynamic river system with robust river nature. The aim is to achieve this through hydrodynamics and morphodynamics that are as natural as possible. What is relevant here is the frequency with which the river forelands flood and the variation in space and time in which flow takes place in the bank zone and the river forelands. In this respect, the supply of sediment and the degree of sediment exchange between the main channel and the river forelands are important. Insufficient dynamics in the river prevent river nature developing, so improving these dynamics is a key factor. However, there is also valuable nature in the river zone which flourishes in more static environments, such as reed marshland, where the Gelderse Poort, Biesbosch and IJssel-Vechtdelta are the most important sites. The PAGW Programme is investing in maintaining and further developing more static environments. Nature which needs more static environments also occurs locally and on a smaller scale between these sites, and this nature could actually experience negative effects from an increase in river dynamics.

Desiccation
The ongoing erosion and the increasing height difference between the main channel and the river forelands put the sustainable development and maintenance of the Natura 2000 objectives in jeopardy, and climate change is only making the situation worse. Throughout the spring, there will be fewer and fewer temporarily

flooded low areas in river forelands, and shallow river foreland ponds will dry out earlier or more often in the summer.
Two measures will influence low-water flow in the river and the associated groundwater levels in the river forelands; raising the riverbed of the main channel, and changing the discharge distribution between the river branches. Measures such as longitudinal dams can also have some impact on holding back water. Furthermore, river foreland lowering reduces the distance between the groundwater and ground level, and therefore also influences the groundwater situation in the river forelands.

Salinization
The sea level is rising, causing the salt-water area downstream (Maas, Merwede, Lek) to penetrate further into the riverbed and the hinterland ('salinization'). This is further aggravated by low river discharges (insufficient back pressure), which are becoming more common due to climate change. Desiccation and salinization via groundwater therefore lead to negative impacts on nature on the landward sides of dykes. This mainly affects desiccation along the free-flowing river sections, and to a lesser degree along the dammed river sections of the Meuse and Nederrijn-Lek. Salinization is mainly an issue in the downstream parts of the Maas, Merwedes, and above all the Lek. The Plan EIA has already concluded that the measures in the Preferred Option have little impact on the degree of salinization, so this issue is not considered further.

4.3 Relevant impact of the construction phase

In addition to the final outcome of the IRM Programme measures in the river zone, Natura 2000 objectives are also expected to suffer effects during the construction phase to implement the measures. It is beyond the scope of this general programme, in which particular measures have not yet been defined, to assess these impacts. However, consideration of this aspect can be taken into account in the further development of the measures to limit the impact on Natura 2000 sites. The following factors play an important role here.

Nitrogen deposition
The river zone is a relatively nutrient-rich system where nitrogen deposition is less of an issue for the sustainable maintenance of habitat types than in other parts of the Netherlands. However, there are also habitat types in the river zone with less nutrients which are sensitive to excessive nitrogen deposition, such as riverine grasslands and oat grass meadowland.

The use of machinery during the implementation of the measures is the most important temporary source of nitrogen deposition during the construction phase. On the other hand, large areas of agricultural land will be taken out of use, or used less intensively, resulting in a permanent decrease in nitrogen deposition.

Disturbance
Noise, light, and human presence are forms of disturbance that arise during the work, and potentially disturb sensitive species such as birds. The extent of such negative effects depends entirely on the method and period of implementation. Various interventions in the river zone at the same time can also play a role, especially if there are not enough alternative habitats available and if species do not have space to temporarily flee their habitat. This is a problem for species such as the sea lamprey, river lamprey, shad and salmon, which mainly occur in the main stream of the river and can be affected by major simultaneous depositing of sand fill.

4.4 Summary of relevant effects

The table below shows which effects in the final phase and construction phase of IRM have consequences for the existing issues in the river zone, as described in section 3.2.5. These consequences can be positive or negative. This is assessed in the next chapter.

Table 4-1 Impact of the IRM Programme on existing issues in the river zone

Existing issues in the river zone	Impact of final phase of IRM Programme				Impact of construction phase of IRM Programme	
	Space requirement	Interconnectedness	River dynamics	Desiccation	Nitrogen deposition	Disturbance
Disrupted river dynamics			X			
Small areas & fragmentation	X	X				
Desiccation				X		
Nitrogen deposition					X	
Inadequate management						
Exotic or invasive species						

X: The IRM Programme has an impact on the issue in question

5 Assessment of the Preferred Option

5.1 Assessment framework

The purpose of this assessment is to identify policy choices with questionable feasibility due to their impacts on Natura 2000 sites. If they are questionable, measures must be included in the IRM Programme that sufficiently mitigate the negative impacts and demonstrate that the policy is feasible. The table below contains the assessment framework for this appropriate assessment.

	Risk of a significant negative effect
	High risk of significant negative consequences. Feasibility in compliance with the Nature Conservation Act is doubtful, even with mitigating measures. Mitigating measures must be elaborated as part of the IRM Programme to demonstrate feasibility.
	Risk of negative consequences. Feasibility in compliance with the Nature Conservation Act is not at stake, sufficient space for mitigating measures. Mitigating measures will be elaborated in follow-up decisions.
	No risk of negative consequences, positive effect on the Natura 2000 objective. The policy is feasible.

Below, the feasibility of the policy choices in the IRM Programme is assessed per theme as a result of the risks of negative impacts on Natura 2000 sites. Preconditions and points of attention for the further elaboration of the policy are described where appropriate.

5.2 Impact assessment

5.2.1 Riverbed levels & sediment management

The table below shows the relevant effects described in section 4.2. It then indicates whether the impact in question entails a risk of significant negative consequences or whether it has a positive impact on the Natura 2000 objective. This is explained in more detail below the table, where preconditions and points of attention necessary in the further elaboration of the policy are described.

Impact		Use phase of the IRM Programme
Space occupation		A higher riverbed causes the groundwater level to rise, so the nature in these areas will be higher quality. There is potential to increase the size of suitable habitats, which helps resolve issues related to areas that are too small.
Interconnectedness		A higher riverbed causes the groundwater level to rise, so the nature in these areas will be higher quality. There is potential to increase the size of suitable habitats, which in turn increases the size of the ecological corridors and stepping stones. This helps resolve issues related to habitat fragmentation.
River dynamics		The higher riverbed level increases the frequency of inundation, provoking more sedimentation processes in the river forelands. In the current situation, limited river dynamics, caused by factors such as too little deposition of sandy substrate,

Royal HaskoningDHV

		are an issue in many areas. Reinforcing river dynamics has a positive impact on Natura 2000 objectives.
Desiccation		The higher riverbed level will cause groundwater levels in adjacent river forelands to rise, but does not completely resolve the desiccation problem. Raising the riverbed does, however, helps solve the challenge (less overgrowth of wetland habitats and therefore an improvement in quality). Raising the riverbed reduces the distance between the ground level and the groundwater, creating more space for wetland habitats.
Impact		**IRM construction phase**
Nitrogen deposition		Due to the use of machinery, nitrogen will be temporarily deposited during the execution of the work. Given that the measures on riverbed deepness and sediment management mainly concern the main flow of the rivers, nitrogen deposition will decrease barely or not at all as a result of agricultural land being taken out of use. This is discussed in 5.2.2.
Disturbance		Possible measures include depositing fill in the main flow of the rivers. This is, among other things, the habitat of species protected under the Habitats Directive ('*habitatrichtlijnsoorten*') such as sea lamprey, river lamprey, shad, and salmon. Large-scale disturbance or degradation of the habitat of these species could have significant negative impacts on conservation goals, and must be avoided.

In summary, it can be concluded that measures concerning riverbed deepness and sediment management are positive in terms of Natura 2000 objectives, and in the final phase there is no risk of significant negative effects on Natura 2000 sites. Erosion in the main channel, the deepening riverbed, and the associated lower groundwater levels in the river forelands and beyond lead to desiccation of river forelands. Raising the level of the main channel is therefore an important measure to combat the issue of desiccation in river forelands. This has already been demonstrated in an exploratory study into promising measures for the conservation and development of nature (including natural wetlands) in the Gelderse Poort (RHDHV, 2023). It helps disturbed river dynamics recover, and increases the potential for the realization of wetland river nature. This is necessary to ultimately solve the issue of small areas and fragmented habitats in the Natura 2000 sites through more spatial measures in the river forelands.

Points of attention for the construction phase

Disturbance

Negative effects on species, especially those sensitive to disturbances, can often be prevented by conducting sufficient studies in advance into the occurrence of species in the planning zone, and, on the basis of the outcomes, avoiding vulnerable periods and harmful implementation methods, carrying out the work in phases over various periods and in various areas, and taking timely mitigation measures. Experience has shown that feasible working methods can always be found. This is a point that has to be considered in the further development of this policy and has no consequences for the feasibility of the IRM Programme, something ultimately necessary to achieve the Natura 2000 objective.

Nitrogen deposition

If the machinery used to carry out the work runs on fossil fuels, it will lead to a temporary increase in nitrogen deposition during the period this machinery is used. Improvements in technologies that will enable earthworks and dyke reinforcements, among other things, to be realized with limited emissions are in full swing. It is therefore expected that the footprint of nitrogen emissions caused by machinery will become smaller in the future, and possibly be eliminated completely.
To create sufficient space for the development of a climate-proof river ecosystem, all agricultural land on the water side of dykes in the hotspots will be transformed into nature or nature-inclusive agriculture. Most

of the river-widening measures will also require agricultural land. Ending agricultural use leads to a permanent decrease in nitrogen deposition. This permanent decrease is expected to be more than sufficient to offset the consequences of temporary and limited increases due to the use of machinery. This will have to be further detailed in the various zone elaborations that will be drawn up, which will also have to consider the burden on areas outside the river zone. This aspect has no consequences for the feasibility of the IRM Programme, something ultimately needed to achieve the Natura 2000 objective.

5.2.2 Discharge & storage capacity

It is currently unknown how the discharge and storage capacity will be increased to ensure a climate-robust river system. This will be further detailed in integrated zone developments, so assessing the risk of significant consequences for Natura 2000 sites is difficult. The emphasis is therefore on preconditions and points of attention that can prevent significant consequences and which must subsequently be further elaborated in specific policy elaborations and zone developments.

Impact	Use phase of the IRM Programme
Space occupation	Measures for the discharge and storage capacity include interventions such as lowering river forelands, creating secondary channels, and lowering the summer dykes and the like, which give the river more space and also provide room for more nature development in the river forelands. This offers scope for expanding areas of, for example, riparian forest and riverine grasslands that are too small. This space is largely at the expense of agricultural land. However, there are also Natura 2000 goals such as grass-eating water birds in the Rhine tributaries that use agricultural land for foraging. The disappearance of this foraging area will partly be compensated by new foraging areas in the form of pond-wetlands, floodplain grasslands, and secondary channels. New foraging areas can also be made accessible by creating new open water in the river forelands. The carrying capacity of the river zone for grass-eating water birds will change due to large-scale conversion from agriculture to nature. The disappearance of agricultural land is not exclusively due to the IRM Programme. Other ambitions, such as that expressed in the National Rural Area Programme (*Nationaal Programma Landelijk Gebied* - NPLG) will also reduce the area used for agriculture. The IRM Programme offers sufficient flexibility in future land use (such as nature-inclusive agriculture) and redevelopment of the river zone, so that this does not limit the feasibility of the plans.
Interconnectedness	The space created for nature development in the river zone, through measures such as lowering river forelands and the construction of secondary channels, will reinforce the interconnectedness of habitats. This offers a partial solution to the issue of fragmentation and isolation of certain habitats and habitats, provided that this is taken into account in the further detailing of the river widening plans.
River dynamics	Measures such as river foreland excavations and summer dyke lowering increase the inundation frequency and duration of river forelands. It also raises groundwater levels, bringing them closer to ground level. The river dynamics in dammed river branches (the Nederrijn-Lek and most of the Meuse), increase to a lesser extent. The weirs here ensure a limited exchange of sediment between the main channel, banks, and river forelands. All in all, river widening measures will benefit the Natura 2000 objective by increasing river dynamics in the river forelands.

		The river zone also contains areas which are more static, where an increase in river dynamics is not directly beneficial to the Natura 2000 objective. However, the PAGW (part of the IRM Programme) does provide for the sustainable further development of the most important wetland areas in the Rijnstrangen zone (located on the landward side of the dyke) and the IJssel delta, which are important for marsh birds. Amphibians, such as great crested newts, which are scattered along the river zone, are also sensitive to an increase in inundation frequency and duration. If large-scale measures in the river zone do not take sufficient account of this nature that thrives in more static environments, there is a risk that insufficient habitat will be preserved, with potentially significant negative consequences. This point should be given attention when elaborating river widening measures in follow-up decisions.
Desiccation		River foreland lowering will bring the ground level closer to the groundwater, which will promote the development of wetland habitats. Together with the increase in inundation frequency and duration, this has a positive effect on obtaining the Natura 2000 objective. This is especially the case in areas where further erosion has increased the distance between the river and the river forelands. The river forelands dry out at these locations, especially during the growing season. In the above locations, lowering river forelands will help resolve the desiccation issue.
Nitrogen deposition		By converting agricultural land to nature, especially in the four PAGW hotspots, nitrogen deposition will also decrease permanently. Where these locations are located near poor habitat types such as oat grass meadowland and riverine grassland, this helps reducing overload in these areas. In addition, less fertilizers will be leached via groundwater, helping to reduce the eutrophication aggravated by agriculture.
Impact		**IRM construction phase**
Nitrogen deposition		Due to the use of machinery, nitrogen will be temporarily deposited during the execution of the work. At the same time, many measures will be at the expense of agricultural land. Taking agricultural land out of use will permanently reduce nitrogen deposition. This permanent decrease is expected to be more than sufficient to offset the consequences of temporary and limited increases due to the use of machinery.
Disturbance		Measures will mainly be implemented in the river forelands, which may cause disturbance. The extent of such negative effects depends entirely on the method and period of implementation. Various interventions in the river zone at the same time can also play a role, especially if there are not enough alternative habitats available and if species do not have space to temporarily flee its habitat.

The objective of the IRM Programme is to create a climate-robust river ecosystem where existing issues, such as insufficient river dynamics and desiccation, are resolved. This is an essential step to realize the Natura 2000 objective, both now and into the future when climate change will have an increasing impact on this objective. For natural dynamics to be restored, it is important to prevent further riverbed erosion, raise the level of the riverbed, and lower river forelands and summer dykes. River widening is an important measure to limit riverbed erosion and to tackle the related bottlenecks in the Natura 2000 task.

Points of attention for the future
The necessity of the IRM Programme and the PAGW to achieve the Natura 2000 objective in the river zone are not disputed, also in view of the impact of climate change. There is a risk that measures in the river zone will cause certain habitats to temporarily or permanently disappear. This is the case for agricultural grasslands which form foraging areas for grass-eating water birds and static environments for marsh birds, amphibians and fish. Below, some preconditions are described that must be taken into account in the further elaboration of the policy.

- Redevelopment of the river zone will be at the expense of agricultural land, which will result in a change in the carrying capacity for grass-eating water birds, especially in the Rhine tributaries. Attention must be paid to this aspect in the further elaboration of this policy in integrated area developments, which must also include areas on the water sides of dykes outside the Natura 2000 sites. After all, grass-eating water birds need nutrient-rich grasslands, but such foraging areas are also present outside the river zone. In addition, agricultural land will also be transformed or managed differently for other objectives based on other policies, such as the National Rural Area Programme (*Nationaal Programma Landelijk Gebied*'), so the conversion of agricultural land and the consequences for grass-eating birds is therefore not solely the responsibility of the IRM Programme.
- Redesigning the system will also allow the river to have more impact on the river forelands, which will increase river dynamics. This is an important contribution to solving the current river foreland issues in this zone. However, there are also Natura 2000 sites where goals have been formulated for nature which thrives in less dynamic environments, such as the reed marshes in the Rijnstrangen area and the IJssel delta, to improve conditions for marsh birds such as the Eurasian bittern. The objective expressed in the PAGW is also to maintain and further reinforce these zones, important for interconnectedness. The focus should, therefore, primarily be on the smaller static areas located between dynamic zones, where species such as great crested newts and weatherfish are found. In the further elaboration of the river widening plans, attention must be paid to ensure there are enough static environments that are both interconnected and linked to areas on the landward side of dykes.
- In line with this, river widening offers opportunities to develop sufficient diversity in the river zone, an important step forward on the pathway to a climate-robust river ecosystem. It also shows that the same measure does not have to be taken everywhere; area-specific assessments based on landscape ecological processes should be drawn up to determine which measure is appropriate for the Natura 2000 objective and reflects the DNA of the river.

5.2.3 Nature development

In addition to the policy choices assessed above, stimulating robust and resilient nature development in the river zone is an important aspect of the IRM Programme. This is explicitly reflected in the Preferred Option, as described in the Plan EIA.

The Programmatic Approach to Large Water Bodies (*Programmatische Aanpak Grote Wateren* - PAGW) focuses on measures that benefit the ecological functioning of large water bodies at system level, whereas Natura 2000 and the Water Framework Directive (WFD) focus on achieving established statutory and other goals for areas within this system. The measures identified and documented within the framework of the nature agreements between the national government and province, the WFD, and the management plans for Natura 2000 are assumed as a starting point. This is established policy, so it does not need to be appropriately assessed again in the context of IRM.

As already concluded in section 5.2.2, the conversion of land for an ecologically robust river system can also have negative effects on certain Natura 2000 objectives. This is also recognized in the context of the PAGW, and given attention in the Nature Profit Plan (*Natuurwinstplan*) and the further elaboration of this policy.

Consequently, there is no reason to draw other conclusions in the context of this appropriate assessment.

5.3 Cumulative impacts

The IRM Programme contains an outline cumulative overview of measures that can be taken in the river zone, so this appropriate assessment also provides a cumulative consideration of the risks of possibly significant negative consequences.
The impact of the indicative measures is so dominant in the river area that they will not lead to different outcomes compared to other licensed but still unfinished projects,
but nevertheless some points should be considered to prevent cumulative impacts within the IRM Programme:

- Cumulative loss of agricultural land, which will have a negative effect on grass-eating water birds
- The cumulative loss of nature that thrives in a static environment, especially amphibians, marsh birds, and fish
- Cumulative disturbance during implementation, if this occurs at too many locations simultaneously.

Attention must be paid to this aspect in the further elaboration of this policy in integrated area developments, as further described in section 5.2.

6 Conclusion

IRM Programme necessary for realization of Natura 2000 objectives

The IRM Programme's ambition is a future-proof river zone that functions well as a system, and is available for multiple purposes. Based on the tasks, the ambition has been translated into a number of goals to be attained for the various river functions with the help of the IRM Programme. Goals are formulated as end situations to be attained. Incidentally, these are not entirely the responsibility of the IRM Programme, but also depend on policy development and decision-making at other tables, such as the NPLG.

One of the goals concerns nature and ecological water quality: a dynamic river system with robust nature, which also guarantees that the goals attained or planned in the context of the Water Framework Directive (WFD) and Natura 2000 are maintained.
The natural river system will be restored by creating an interconnected network of nature reserves and connecting zones, in which typical river ecotopes are reinforced and expanded. This goal is recorded in a Programmatic Approach to Great Waters (PAGW) target image, which focuses on restoring the natural dynamics of the rivers (natural hydrodynamics and morphodynamics, good ecological water quality, and sufficient space for nature).

The measures identified and documented within the framework of the nature agreements between the national government and province, the WFD, and the management plans for Natura 2000 are considered a fundamental starting point for the PAGW and, consequently, the IRM Programme.

In summary, it can be concluded that the policy choice for the level of the riverbed and sediment management, along with the measures required to achieve the policy chosen, have a positive effect on Natura 2000 goals, and there is no risk of significant negative effects on Natura 2000 sites in the final phase. The deepening riverbed and the associated lower groundwater levels in the river forelands and beyond lead to the desiccation of river forelands. Raising the level of the main channel is therefore an important means of reversing the issue of desiccation in the river forelands. It helps disturbed river dynamics recover, and increases the potential for the realization of wetland river nature. This is necessary to ultimately solve the issue of small areas and fragmented habitats in Natura 2000 sites.
The policy choice for discharge and storage capacity and the measures required to achieve this also have a positive effect on achieving the Natura 2000 objectives, both now and in the future when climate impacts will have an increasingly dominating impact on nature objectives. Important conditions for the restoration of natural dynamics are the prevention of further riverbed erosion, raising the level of the riverbed, and lowering river forelands and summer embankments, in line with the DNA of the river.

River widening interventions in the context of the further elaboration of the IRM programme are important to limit riverbed erosion and to address the related issues affecting Natura 2000 objectives, including disturbed river dynamics, desiccation, fragmentation, and small areas. As a result, the policy choices in the IRM Programme can be implemented under the Nature Conservation Act (*Wet natuurbescherming*).

Points of attention for follow-up decisions

The policy in the IRM Programme has not yet been developed to such a specific extent that the impacts can be fully visualized. This appropriate assessment has revealed points that should be considered in follow-up decisions. These points of attention do not lead to conflicting goals that would require amendments to the policy in the IRM Programme, but do have to be taken onboard in the follow-up phase.

- Redevelopment of the river zone will be at the expense of agricultural land, which will result in a change in the carrying capacity for grass-eating water birds, especially in the Rhine tributaries. Attention must be paid to this aspect in the further elaboration of this policy in integrated area developments, which must also include areas on the water sides of dykes outside the Natura 2000 sites. After all, grass-eating water birds need nutrient-rich grasslands, but such foraging areas are also present outside the river zone.

Redesigning the system will also allow the river to have more impact on the river forelands, which will increase river dynamics. The objective expressed in the PAGW is to maintain and further reinforce hotspots with more static environments, which are important for interconnectedness. The focus should, therefore, primarily be on the smaller static areas located between dynamic zones, where species such as great crested newts and weatherfish are found. In the further elaboration of the river widening plans, attention must be paid to ensure there are enough static environments that are both interconnected and linked to areas on the landward side of dykes.

The negative effect of measures promoting an ecologically robust river system on certain Natura 2000 objectives is also recognized in the context of the PAGW, and attention is paid to this in the Nature Profit Plan and the further elaboration of this policy.

Points of attention for the construction phase

Risks are also anticipated for the construction phase, particularly in situations where large-scale interventions are implemented simultaneously. In practice, this is unlikely to arise because the consequences are temporary and the elaboration of the policy and its final implementation will take place in phases.

- Possible measures to realize the policy choice for riverbed level and sediment management include depositing fill in the main flow of the rivers. This is the habitat of species protected under the Habitats Directive such as sea lamprey, river lamprey, shad, and salmon. When depositing fill, it is important to prevent excessive disturbance or other forms of damage to this habitat.
- Disturbances such as noise, light, and human presence will arise during the execution of the work, which can affect sensitive species such as birds. The extent of such negative effects depends entirely on the method and period of implementation. Various interventions in the river zone at the same time can also play a role, especially if there are not enough alternative habitats available and if species do not have space to temporarily flee their habitat.
- River widening measures in the context of the elaboration of the IRM programme will also take place on agricultural land. Ending agricultural use leads to a permanent decrease in nitrogen deposition. This permanent decrease is expected to be more than sufficient to offset the consequences of temporary and limited increases due to the use of machinery.

7 Consulted literature

Arcadis (2023). *Natuurdoelanalyse 112 Biesbosch* [Analysis of Attainment of Conservation Goals 112 Biesbosch], Province of North Brabant
https://www.brabant.nl/-/media/edcf8bc1efd34b2c81163b2b5bcc27f8.pdf

Arcadis (2023). *Natuurdoelanalyse 141 Oeffelter Meent* [Analysis of Attainment of Conservation Goals 141 Oeffelter Meent], Province of North Brabant. https://www.brabant.nl/-/media/ddf93b5a9d7d4a3e9a1a81499dfd681a.pdf

Arcadis (2023). *Natuurdoelanalyse Rijntakken (38)* [Analysis of Attainment of Conservation Goals Rijntakken (38)], Province of Gelderland
Natuurdoelanalyse Rijntakken (38) (parlaeus.nl)

Arcadis (2023). *Natuurdoelsnalyse Loevestein, Pompveld en Kornsche Boezem (71)* [Analysis of Attainment of Conservation Goals in Loevestein, Pompveld and Kornsche Boezem (71)], Province of Gelderland
Natuurdoelanalyse Loevestein, Pompveld en Kornsche Boezem (71) (parlaeus.nl)

Dorenbosch M., M. de la Haye, R. van de Haterd, F. Huthoff, A. van Kleunen & W. Liefveld (2022), *Klimaateffecten op riviernatuur* [Climate effects on river nature], Report number OBN-2020-121-RI, OBN Knowledge Network, Driebergen.

Everts, F.H., A.J.M. Jansen, G.J. Maas, J.H. Bouwman, A.T.W. Eysink & E. Takman (2016). *Herstelstrategie Rivierenlandschap* [River landscape recovery strategy].
5 Rivierenlandschap (natura2000.nl)

Geest van, de Rijk & Altena (2020). *Rivieren en klimaat - PAGW Effecten van lage rivierpeilen op de vochttoestand van uiterwaarden langs de Rijn en MaasRivers and climate*
[PAGW Effects of low river levels on moisture status of river forelands along the Rhine and Meuse]

Heusden, W. van, H. Sluiter, M. Tijnagel, W. Vercruijsse, A. Zuidhof, 2021. *Ecologische Systeemopgave PAGW-Rivieren – Naar klimaatbestendige robuuste riviernatuur in 2050* [Ecological System Objective PAGW Rivers – Towards climate-proof robust river nature in 2050]. Netherlands Enterprise Agency, Rijkswaterstaat and Staatsbosbeheer.

Klijn, F., H. Leushuis, M. Treurniet, W. van Heusden & S. van Vuren, 2022. *Systeembeschouwing Rijn en Maas ten behoeve van ontwerp en besluitvorming* [Rhine and Meuse system review for design and decision-making]. Integrated River Management Programme, Ministry of Infrastructure and Water Management
Systeembeschouwing Rijn en Maas | Bouwplaats IRM

Ministry of Economic Affairs (2017). *Natuurverkenning Grote Rivieren, veerkrachtig ecosysteem voor de grote rivieren* [Identification of nature in the major rivers, a resilient ecosystem for the major rivers].

Province of Gelderland (2022). Loevestein, Pompveld & Korsche Boezem (71). Draft Natura 2000 site management plan
Loevestein, Pompveld, Kornsche Boezem (71) - Ontwerp-beheerplan Natura 2000-gebied (gelderland.nl)

Province of Gelderland (2018). Natura 2000 Rijntakken (038) management plan
Beheerplan Natura 2000 Rijntakken (038) (gelderland.nl)

Province of Limburg (2022). *Pilot Natuurdoelanalyse Maasduinen* [Pilot Analysis of Attainment of Conservation Goals in Maasduinen]. https://www.ecologischeautoriteit.nl/projectdocumenten/010940_5003_Natuurdoelanalyse_Maasduinen.pdf

Province of Overijssel (2017). Definitive Natura 2000 management plan. *Uiterwaarden Zwarte Water en Vecht* [Zwarte Water and Vecht river forelands] https://www.bij12.nl/wp-content/uploads/2019/04/170927_definitief_natura_2000_beheerplan_uiterwaarden_zwarte_water_en_vecht_versie_13_juni_2017.pdf

Province of Overijssel (2023). Natuurdoelanalyse Uiterwaarden Zwarte Water en Vecht [Analysis of Attainment of Conservation Goals in Zwarte Water and Vecht river forelands] 036_Uiterwaarden+Zwarte+Water+en+Vecht_NDA_OV_20230328 (notubiz.nl)

Province of Utrecht (2023). *Natuurdoelanalyse natura 2000 Uiterwaarden Lek [82]* [Analysis of Attainment of Natura 2000 Conservation Goals. Lek river forelands [82] Natuurdoelanalyse Uiterwaarden Lek (provincie-utrecht.nl)

RHDHV (2023). *Verkenning kansrijke maatregelen voor behoud en ontwikkeling van (natte) natuur in de Gelderse Poort en de morfologische effecten.* [Exploratory study into promising measures for the conservation and development of nature (including natural wetlands) in the Gelderse Poort].

Rijkswaterstaat (2023). Natura 2000 draft management plan Grensmaas 30 augustus t/m 10 oktober 2023: Ontwerpbeheerplan Natura 2000 Grensmaas | Platform Participatie

Rijkswaterstaat, PAGW rivers (2023). *Conceptmemo; Hydrologische randvoorwaarden van de ecotopen in PAGW rivieren.* [Draft memo; Hydrological preconditions of the ecotopes in PAGW rivers].

Vriese F.T., J. Hop, B. Reeze, M. de la Haye, N. van Kessel, M. Claus & A. van Winden (2021). *Stromend habitat en connectiviteit in de Maas* [Flowing habitat and connectivity in the Meuse. *ATKB voor natuur en leefomgeving* (ATKB environmental services).

Websites consulted:
www.sovon.nl
Natuurdoelanalyses - BIJ12
Natura 2000 management plans - BIJ12

Royal HaskoningDHV

Appendix 1 Conservation goals

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
Common Meuse						
Habitat types						
H3260	Streams and rivers with aquatic plants	>	=			
H3270	Muddy riverbanks	=	>			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6430C	Fringe-forming overgrowth vegetation (dry woodland edges)	=	=			
H91E0A	Wet alluvial forests (softwood riparian woodland)	=	>			
H91E0C	Wet alluvial forests (woodland alongside streams)	=	>			
Habitats Directive species						
H1099	River lamprey	>	=			
H1106	Salmon	>	=			
H1163	Bullhead	=	=			
H1337	Beaver	>	=			
Maasduinen						
Habitat types						
H2310	Shifting sand heaths with scrub heather	>	>			
H2330	Sand drifts	>	>			
H3130	Weakly buffered fenland	>	>			
H3160	Acidic fenland	>	>			
H4010A	Wetland heaths	>	>			
H4030	Dry heaths	>	>			
H6120	Riverine grasslands	=	=			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6430C	Fringe-forming overgrowth vegetation (dry woodland edges)	=	=			
H7110B	Active raised bogs	>	>			
H7150	Pioneer vegetation with beak-rush	=	=			
H9120	Beech-oak woodland with holly	=	=			
H9190	Ancient oak woodland	=	=			

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
H91D0	Raised bog woodland	=	>			
H91E0C	Wet alluvial forests (woodland alongside streams)	=	=			
H91F0	Dry hardwood riparian woodland	=	=			
Habitats Directive species						
H1042	Large white-faced darter	>	>	>		
H1149	Spined loach	=	=	=		
H1163	Bullhead	=	=	=		
H1166	Great crested newt	>	>	>		
H1337	Beaver	=	=	>		
H1831	Floating water plantain	=	=	=		
Breeding birds						
A004	Little grebe	=	=			50
A008	Black-necked grebe	=	=			7
A224	Nightjar	=	=			30
A236	Black woodpecker	=	=			35
A246	Woodlark	=	=			100
A249	Sand martin	=	=			120
A276	Stonechat	=	=			85
A338	Red-backed shrike	>	>			3
Oeffelter Meent						
Habitat types						
H6120	Riverine grasslands	>	>			
H6510A	Oat grass and foxtail meadows (oat grass)	>	>			
Habitats Directive species						
H1149	Spined loach	=	=	=		
H1166	Great crested newt	=	=	=		
H1337	Beaver	=	=	=		
Eijsden section of the Meuse						
Habitat types						
H3260B	Streams and rivers with aquatic plants (large potamogeton)					
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	Report				
H6430C	Fringe-forming overgrowth vegetation (dry woodland edges)					

Royal HaskoningDHV

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
H91E0A	Wet alluvial forests (softwood riparian woodland)					
H91E0B	Wet alluvial woodland (ash-elm woodland)					
Habitats Directive species						
H1099	River lamprey	Report				
H1106	Salmon					
H1163	Bullhead					
Rhine tributaries						
Habitat types						
H3150	Lakes with water soldiers and potamogeton	>	>			
H3260	Streams and rivers with aquatic plants	>	=			
H3270	Muddy riverbanks	>	>			
H6120	Riverine grasslands	>	>			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6430B	Fringe-forming overgrowth vegetation (hairy willowherb)	=	=			
H6430C	Fringe-forming overgrowth vegetation (dry woodland edges)	>	>			
H6510A	Oat grass and foxtail meadows (oat grass)	>	>			
H6510B	Oat grass and foxtail meadows (meadow foxtail)	>	>			
H9120	Beech-oak woodland with holly	>	>			
H91E0A	Wet alluvial forests (softwood riparian woodland)	=	>			
H91E0B	Wet alluvial forests (ash-elm woodland)	>	>			
H91E0C	Wet alluvial forests (woodland alongside streams)	=	=			
H91F0	Dry hardwood riparian woodland	>	>			
Habitats Directive species						
H1095	Sea lamprey	>	>	>		
H1099	River lamprey	>	>	>		
H1102	Allis shad	=	=	>		
H1106	Salmon	=	=	>		
H1134	European bitterling	=	=	=		

Royal HaskoningDHV

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
H1145	Weatherfish	>	>	>		
H1149	Spined loach	=	=	=		
H1163	Bullhead	=	=	=		
H1166	Great crested newt	>	>	>		
H1318	Pond bat	=	=	=		
H1337	Beaver	=	>	>		
H1355	Otter	Report				
Breeding birds						
A004	Little grebe	=	=			45
A017	Great cormorant	=	=			660
A021	Eurasian bittern	>	>			20
A022	Little bittern	>	>			20
A119	Spotted crake	>	>			40
A122	Corn crake	>	>			160
A153	Snipe	=	=			17
A197	Black tern	=	=			240
A229	Kingfisher	=	=			25
A249	Sand martin	=	=			680
A272	Bluethroat	=	=			95
A298	Great reed warbler	>	>			70
Non-breeding birds						
A005	Great crested grebe	=	=		570 (S, R, F)	
A017	Great cormorant	=	=		1,300 (S, R, F)	
A037	Bewick's swan	=	=		100 (S, R, F)	
A038	Whooper swan	=	=		30 (S, R, F)	
A041	Egyptian goose	=	=		35,400 (F)	
A041	Egyptian goose	=	=		180,100 (S, R)	
A043	Greylag goose	=	=		8,300 (F)	
A043	Greylag goose	=	=		21,500 (S, R)	
A045	Barnacle goose	=	=		920 (F)	
A045	Barnacle goose	=	=		5,200 (S, R)	
A048	Common shelduck	=	=		120 (S, R, F)	
A050	Eurasian wigeon	=	=		17,900 (S, R, F)	

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
A051	Gadwall	=	=		340 (F)	
A052	Teal	=	=		1,100 (F)	
A053	Wild duck	=	=		6,100 (F)	
A054	Pintail	=	=		130 (F)	
A056	Shoveler	=	=		400 (F)	
A059	Pochard	=	=		990 (F)	
A061	Tufted duck	=	=		12,300 (F)	
A068	Smew	=	=		40 (F)	
A125	Coot	=	=		8,100 (F)	
A130	Oystercatcher	=	=		340 (S, R, F)	
A140	Golden plover	=	=		140 (F)	
A142	Lapwing	=	=		8,100 (F)	
A151	Ruff	=	=		1,000 (F)	
A156	Godwit	=	=		690 (S, R, F)	
A160	Curlew	=	=		850 (S, R, F)	
A162	Redshank	=	=		65 (S, R, F)	
A702	Tundra bean goose	=	=		2800 (S, R)	
A702	Tundra bean goose	=	=		125 (F)	
Loevestein, Pompveld, and Kornsche Boezem						
Habitat types						
H3150	Lakes with water soldiers and potamogeton	>	>			
H3270	Muddy riverbanks	>	>			
H6120	Riverine grasslands	=	=			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6510A	Oat grass and foxtail meadows (oat grass)	>	>			
H91E0A	Wet alluvial forests (softwood riparian woodland)	=	>			
H91E0C	Wet alluvial forests (woodland alongside streams)	=	=			
Habitats Directive species						
H1134	European bitterling	=	=	=		
H1145	Weatherfish	>	>	=		
H1149	Spined loach	=	=	=		
H1163	Bullhead	=	=	=		

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
H1166	Great crested newt	=	=	=		
H1337	Beaver	=	=	>		
Lek river forelands						
Habitat types						
H3270	Muddy riverbanks	=	=			
H6120	Riverine grasslands	>	>			
H6510A	Oat grass and foxtail meadows (oat grass)	>	>			
H91E0A	Wet alluvial forests (softwood riparian woodland)	=	>			
Habitats Directive species						
H1166	Great crested newt	=	>	=		
Zwarte Water and Vecht river forelands						
Habitat types						
H3150	Lakes with water soldiers and potamogeton	>	>			
H6120	Riverine grasslands	=	=			
H6410	Cirsio dissecti-Molinietum	=	=			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6430B	Fringe-forming overgrowth vegetation (hairy willowherb)	=	=			
H6510A	Oat grass and foxtail meadows (oat grass)	=	=			
H6510B	Oat grass and foxtail meadows (meadow foxtail)	>	=			
H91E0A	Wet alluvial forests (softwood riparian woodland)	=	=			
H91E0B	Wet alluvial forests (ash-elm woodland)	=	=			
H91E0C	Wet alluvial forests (woodland alongside streams)	=	=			
H91F0	Dry hardwood riparian woodland	>	>			
Habitats Directive species						
H1134	European bitterling	=	=	=		
H1145	Weatherfish	=	=	=		
H1149	Spined loach	=	=	=		
H1163	Bullhead	=	=	=		
H1355	Otter	Report				

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
Breeding birds						
A021	Eurasian bittern	=	=			1
A119	Spotted crake	=	=			10
A122	Corn crake	=	=			5
A197	Black tern	>	>			60
A298	Great reed warbler	>	>			2
Non-breeding birds						
A037	Bewick's swan	=	=		4 (F)	
A041	Egyptian goose	= (<)	=		2,100 (F)	
A050	Eurasian wigeon	= (<)	=		570 (S, F, R)	
A054	Pintail	=	=		20 (F)	
A056	Shoveler	=	=		10 (F)	
A125	Coot	=	=		320 (F)	
A156	Godwit	=	=		80 (S, F, R)	
Biesbosch						
Habitat types						
H3260B	Streams and rivers with aquatic plants (large potamogeton)	=	=			
H3270	Muddy riverbanks	>	>			
H6120	Riverine grasslands	>	=			
H6430A	Fringe-forming overgrowth vegetation (meadowsweet)	=	=			
H6430B	Fringe-forming overgrowth vegetation (hairy willowherb)	>	=			
H6510A	Oat grass and foxtail meadows (oat grass)	=	>			
H6510B	Oat grass and foxtail meadows (meadow foxtail)	>	=			
H91E0A	Wet alluvial forests (softwood riparian woodland)	= (<)	>			
H91E0B	Wet alluvial forests (ash-elm woodland)	>	>			
Habitats Directive species						
H1095	Sea lamprey	=	=	>		
H1099	River lamprey	=	=	>		
H1102	Allis shad	=	=	>		
H1103	Twait shad	=	=	>		
H1106	Salmon	=	=	>		

Royal HaskoningDHV

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
H1134	European bitterling	=	=	=		
H1145	Weatherfish	=	=	=		
H1149	Spined loach	=	=	=		
H1163	Bullhead	=	=	=		
H1318	Pond bat	=	=	=		
H1337	Beaver	=	=	=		
H1340	Northern vole	>	>	>		
H1387	Orthotrichum rogeri	>	>	>		
H4056	Lesser ramshorn snail	=	=	=		
Breeding birds						
A017	Great cormorant	=	=			310
A021	Eurasian bittern	>	>			10
A081	Marsh harrier	=	=			30
A119	Spotted crake	>	>			9
A229	Kingfisher	=	=			20
A272	Bluethroat	=	=			1,300
A292	Savi's warbler	=	=			130
A295	Reed warbler	=	=			260
Non-breeding birds						
A005	Great crested grebe	=	=		450 (F)	
A017	Great cormorant	=	=		330 (S, R, F)	
A027	Great egret	=	=		10 (F)	
A027	Great egret	=	=		60 (S, R)	
A034	Spoonbill	=	=		10 (F)	
A037	Bewick's swan	=	=		10 (S, R, F)	
A041	Egyptian goose	=	=		34,200 (S, R)	
A041	Egyptian goose	=	=		1,800 (F)	
A043	Greylag goose	=	=		2,300 (S, R, F)	
A045	Barnacle goose	=	=		870 (F)	
A045	Barnacle goose	=	=		4,900 (S, R)	
A050	Eurasian wigeon	=	=		3,300 (S, R, F)	
A051	Gadwall	=	=		1,300 (F)	
A052	Teal	=	=		1,100 (F)	
A053	Wild duck	=	=		4,000 (F)	

Habitat type and species		Target surface	Target qual.	Target pop.	Carrying capacity, number of birds	Carrying capacity number of breeding pairs
A054	Pintail	=	=		70 (F)	
A056	Shoveler	=	=		270 (F)	
A059	Pochard	=	=		130 (F)	
A061	Tufted duck	=	=		3,800 (F)	
A068	Smew	=	=		20 (F)	
A070	Goosander				30 (F)	
A075	Sea eagle				2 (F)	
A094	Osprey				6 (F)	
A125	Coot	=	=		3,100 (F)	
A156	Godwit	=	=		60 (S, R, F)	