



Delta Programme 2017

Work on the delta

Linking taskings, on track together



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1 Introductory summary



Pluvial flooding in urban area

1.1 Connecting taskings, staying on track together

Connecting taskings, staying on track together. This is what the “Work on the delta” requires of all the governments, including in this phase. The joint approach that has resulted in widely supported Delta Decisions and preferential strategies over recent years is once again of paramount importance in their elaboration. All the governments are responsible for the continuation of the accumulated joint approach: by addressing the three Delta Programme taskings - flood risk management, water availability, and climate-proof design - in an inter-connected manner and continually linking up with other ambitions regarding the spatial planning of the Netherlands. This connection enhances the societal added value of the measures and expands their public support.

In January 2016, the Netherlands commemorated the floods that affected the Zuiderzee area 100 years ago. These and other flood disasters that have hit the Netherlands in the past underline the urgency of continuing to work on the delta. With the Delta Programme, we do so in a new fashion that is unique in history: rather than waiting for and responding to a new disaster, we are taking measures now in order to prevent a disaster. To that end, we have adopted an adaptive approach: looking far ahead and connecting future taskings to short-term decisions. In the selection and scheduling of measures, we always factor in potential developments. We adjust our course if so prompted by new knowledge.

As we focus on the long term and seek to link up with other policy areas whenever deciding on measures, other solutions sometimes crop up. For example, in the area around the major rivers it is effective to widen the rivers at some locations, supplementary to dyke improvements. Within the flexibilisation of the IJsselmeer lake water level, we connect the flood risk management and water availability taskings with ambitions in the field of nature development and recreation. Another example is the IJssel-Vecht delta, in which the regional authorities combine the multi-layer flood risk management and climate-proofing strategies with the ambitions relating to living, working and running businesses in the area.

Progress

The Delta Programme 2017 reflects the progress made over the past year and the measures scheduled under the Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply* (specified in detail for the first six years, outlined for the following twelve years, looking ahead to 2050). The Cabinet thanks the partners and the Delta Programme Commissioner for the proposal for the Delta Programme 2017 which they have jointly drawn up.

* Delta Plan on Freshwater Supply

In accordance with the Water Act (amended under the Delta Act).

In July 2016, the House of Representatives adopted the bill concerning the new standards for primary flood defence systems. This marks an important milestone in the process of anchoring the Delta Decision on Flood Risk Management and the new risk-based approach in law. The amended Water Act is expected to enter into force in January 2017. The Statutory Assessment Tools (WBI), which are also to enter into force in 2017, are currently being developed. With effect from 2017, therefore, the primary flood defence systems will be assessed on the basis of the new standards. The central government and the managers of the flood defence systems will bear joint responsibility for ensuring that the first assessment round is carried out in an effective and efficient manner, featuring, inter alia, a training programme and an adaptation of the information management system.

The parties will continue the dialogue regarding the application of the tools. We will keep up the pace, yet avoid being driven by haste: good quality is the first matter of importance. The aim is for the primary flood defence systems everywhere to meet the new standards by 2050. In the event of unforeseen effects, the parties will jointly look for a solution.

With the changing climate, the increasing probability of pluvial flooding, heat, and drought may also have a major (economic) impact. In order to reinforce the approach to water-resilient and climate-proof (re)development, the Delta Programme is also drawing up a Delta Plan on Spatial Adaptation, supplementary to the Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply. This will provide a better overview, enhance our decisive power, and boost mutual inspiration. The Delta Plan on Spatial Adaptation will be a component of the Delta Programme 2018.

An important step in the implementation of the Delta Decision on Freshwater Supply is that administrators have set down benchmarks in order to arrive at concrete agreements regarding water availability. In September 2015, the regional administrative agreements on freshwater supply were signed by the Minister of Infrastructure and the Environment, regional administrators, and consumers. These agreements set out the arrangements made regarding the funding, scheduling, and implementation of freshwater supply measures, and regarding the introduction and coordination of water availability.

Pilots and testing grounds are being prepared or are in progress, particularly with respect to Freshwater Supply and Spatial Adaptation; that is what this phase of the programme calls for. After completion of these projects, the focus will be on upscaling, and a wider application, of the know-how and innovations developed and the results achieved.

Evaluation of the Delta Act

In the first half of 2016, the Minister of Infrastructure and the Environment commissioned an independent committee to evaluate the Delta Act on Flood Risk Management and Freshwater Supply. The Cabinet has submitted the evaluation report and the associated Cabinet response* separately to the House of Representatives.

* the evaluation report and the associated Cabinet response
[Parliamentary Document 34 513 no. 1](#)

Adaptive approach: intervening at the right time, rather than waiting and seeing

An adaptive approach constitutes the heart of the Delta Programme: looking ahead to the taskings facing us and continuously checking whether we are proceeding at the proper pace and working in the right direction. New insights into climate change, technological possibilities, and economic or demographic trends in society may be reasons to adjust the pace or the direction.

An adaptive approach, therefore, does not entail waiting to be overtaken by new insights or developments, but rather continuously being alert and taking cost-effective measures at the right time. This requires us to accurately *monitor* what we are doing and what results this yields, to *analyse* what new insights experts have gained, and subsequently act on this knowledge as appropriate. In the Delta Programme, this is substantiated systematically through the “monitoring, analysing, acting” method.

This Delta Programme sets out the first elaboration of the “monitoring, analysing, acting” system, the “engine” of adaptive delta management. This enables us to paint a clear picture of the status of the Delta Programme. The Delta Programme will report annually on whether the elaboration and implementation of the Delta Decisions, preferential strategies and Delta Plans are on schedule. Every year, it will also review whether any new developments call for fine-tuning or adjustment of the preferential strategies and the associated Delta Plans. Within the framework of “system learning”, supplementary to this annual cycle of adaptive delta management, once every six years we will take a more fundamental look at the question of whether we have managed to keep up the pace and adjust our course on time.

The Delta Programme thus demonstrates how the measures contained in the Delta Plans contribute to achieving the (policy aims and objectives ensuing from the) Delta Decisions and preferential strategies.

All the preferential strategies and measures are directed by the Delta Scenarios: plausible views of future climate and socio-economic trends. Since the Delta Programme 2016 (DP2016), the Netherlands Bureau for Economic Policy Analysis (CPB) and the Netherlands Environmental Assessment Agency (PBL) have updated the socio-economic scenarios* from 2006. In addition, global agreements were made in December 2015 in Paris (COP21) regarding limiting global warming to a maximum of 2 degrees Celsius by 2100; whether this goal will be achieved is yet uncertain.

* socio-economic scenarios

CPB and PBL, 2015: *Toekomstverkenning Welvaart en Leefomgeving: Nederland in 2030 en 2050, twee referentiescenario's* [Exploration of the future, Prosperity and Living Environment: the Netherlands in 2030 and 2050, two reference scenarios]. The Hague.

The Delta Programme has commissioned Deltares research institute, the Royal Netherlands Meteorological Institute KNMI, PBL and CPB to explore the consequences that these new insights and developments will have for the Delta Programme. Their conclusion was that these new insights still fall within the bandwidth of the Delta Scenarios, and that the impact of the COP21 agreements will not be manifest in the water taskings* until 2050 at the earliest. This effect will be further quantified in the years ahead. In addition, the consequences for flood risk management may be incorporated into the next Statutory Assessment Tools (WBI) and the Design Tools, and the agreements regarding water availability. The conclusion is that the preferential strategies currently still constitute the proper basis for the further elaboration and implementation of the required measures.

* **water taskings**

Deltares, KNMI and PBL, 2016: *Verkenning actualiteit Deltascenario's* [Exploration of topicality of the Delta Scenarios].

On 30 March 2016, *Nature* magazine published new scientific insights regarding the melting process of the Antarctic ice cap and the accelerated rise in sea level this might cause. The Intergovernmental Panel on Climate Change (IPCC) will validate these insights and report their findings in 2019. Subsequently, the KNMI can update the sea level rise forecasts. Thereupon, the Delta Programme will examine, through the “monitoring, analysing, acting” process, whether and how the preferential strategies need to be adjusted.

Shared ownership, based on trust

In the Delta Programme, the governments have been collaborating right from the start: first on mapping out the taskings, and subsequently on the Delta Decisions, the preferential strategies, and the associated measures. In the implementation phase too, shared ownership based on everyone's own responsibility is a precondition for success. Shared ownership is based on trust. The *Power of Collaboration* pilot maps out the collaboration among the forty signatories of the IJsselmeer Region Pact. In 2017, the Delta Programme will review whether this method will be adopted on a wider scale.

Solidarity, flexibility, and sustainability

In the initial phase of the Delta Programme, solidarity, flexibility, and sustainability were identified as core values. These core values have directed the substantiation of the Delta Decisions and the preferential strategies, along with the goal of achieving sustainable and robust flood risk management and a sustainable and robust freshwater supply by 2050. The elaboration and implementation phases also require a great many choices. In this respect, the core values, along with the goals for 2050, can once again serve as beacons for orientation, quality and reflection. Especially in the implementation phase, it is essential to flesh out the joint pursuit of solidary, flexible and sustainable water management that is closely intertwined with spatial planning. It is up to the stakeholders to decide how the core values can best be “woven into” the selection process with a view to the implementation.

Connecting taskings, staying on track together

We are maintaining a steady course and keeping up the pace in our work on the taskings related to flood risk management, water availability, and climate-proofing the Netherlands. The horizon is 2050, with a view ahead to 2100. The Delta Programme 2015 sets out the standards and frameworks for the taskings. Wherever we can, we connect and link the taskings to other ambitions in the fields of spatial planning, nature, and the economy. Thus we can achieve synergy. Governments, market parties, knowledge institutes, and civic society organisations can all contribute to the Delta Programme taskings. We are keeping a close eye on any new circumstances that may impact our goals and the measures to be taken. If need be, we adjust them. Every year, we report on the results and look ahead. Thus we are staying on track together, remaining down to earth and alert.

The Cabinet emphasises the importance of jointly continuing the elaboration of the Delta Decisions and preferential strategies. Together with the Delta Programme Commissioner and the Cabinet, all the partners share the responsibility of maintaining the dynamics in moving forward.

The Cabinet endorses the necessity of joining forces, each party from within its own area of responsibility, to move ahead, also in the further elaboration and implementation phase. In this phase, it is important to factor in future developments and the changing climate, and substantiate adaptive delta management.

2 Delta decisions and preferential strategies



2.1 Introduction

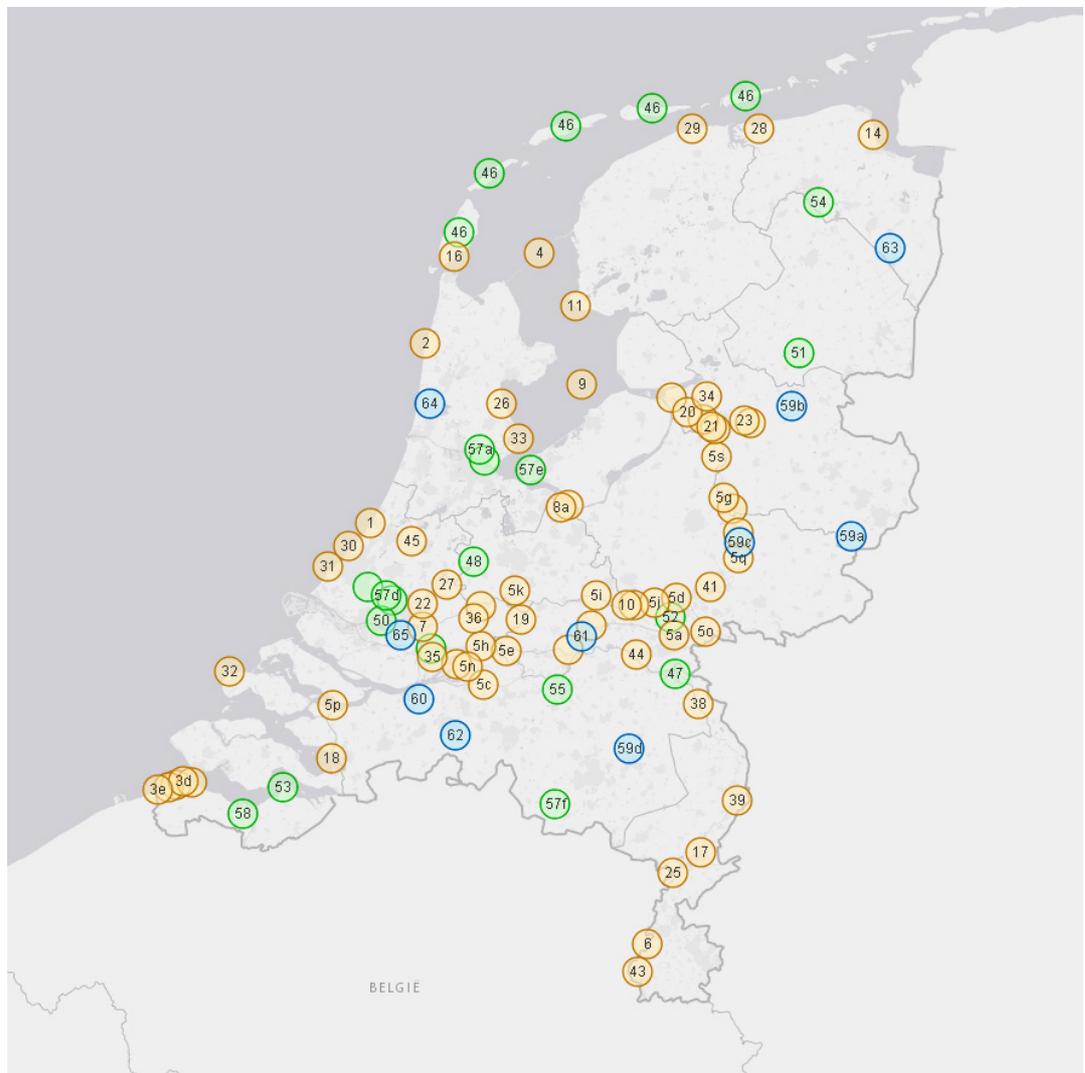
This chapter outlines the new developments in the Delta Programme since DP2016: the progress and relevant changes in the programme, and the milestones expected for the time ahead. [Paragraph 2.2](#) presents this information on the themes of flood risk management, spatial adaptation, and freshwater supply; [paragraph 2.3](#) focuses on the various regions. [Paragraph 2.4](#) contains an initial elaboration of the “monitoring, analysing, acting” system that will underpin the adaptive approach of the Delta Programme. [Paragraph 2.5](#) sets out the other developments: embedding with the various authorities, know-how, market and innovation, and international collaboration.

The Delta Programme is tasked with ensuring that flood risk management and the freshwater supply will be sustainable and robust by 2050, and that our country will be designed in a manner that enables it to continue to cope resiliently with the greater extremes of climate. In the implementation of measures, the parties look for options to connect taskings and ambitions in the field of water and spatial planning, and to capitalise on linkage opportunities, in order to thus arrive at effective solutions to flood risk management and freshwater issues. The approach is based on adaptive working methods and shared ownership. More information is provided below.

Connecting water and spatial planning

The ambition of the Delta Programme is to implement measures in an integrated fashion wherever possible, in order to arrive at effective and feasible solutions. This requires timely consultation and a timely coordination of investments in the areas of water and spatial planning. The Regional Consultative Bodies of the Delta Programme and the MIRT Consultation Committees may take decisions regarding Delta Programme taskings and projects of a (potentially) integrated nature, or whose scope exceeds flood risk management and freshwater issues, and which involve multiple parties. The Ministry of Infrastructure and the Environment intends to conduct MIRT Consultation Committee meetings twice a year: in the autumn to set down agreements on taskings, programmes and projects; in the spring focused on working visits and conducting strategic discussions.

Initiators aiming to connect spatial planning and water can learn a great deal from the know-how and experience of others. In order to foster such exchange, the Delta Programme has mapped out projects that connect water and spatial planning ([Map 1. Connecting Water and Spatial Planning](#)). The projects flesh out the taskings related to flood risk management, freshwater supply and spatial adaptation. The map and the associated [list of projects](#) do not present a comprehensive picture, but nonetheless show that integration between water and spatial planning is already widespread. The examples are derived from various projects, including the Flood Protection Programme, Room for the River, Natural Climate Buffers, and the Freshwater Supply and Spatial Adaptation programmes.



Map 1
Connecting Water and Spatial Planning

Erasmus University Rotterdam has mapped out the preconditions and tools available to successfully connect water and spatial planning. The [study](#) offers concrete starting points for project leaders, policy makers, and administrators. A key conclusion is that an area-oriented and wide-scoped approach, based on a continual dialogue and mutual commitment, is a precondition for being able to connect the Delta Programme taskings with other spatial planning issues. The [Spatial Dyke Improvement Tools](#) and the [evaluation](#) of the three multi-layer flood risk management pilots arrive at the same conclusion. The new Environmental Planning act also supports this approach.

Shared ownership, shared responsibility

Responsibility for a proper implementation of the Delta Programme is borne by all the government authorities, the business community, and organised interest groups. This new way of collaboration is substantiated in various ways.

With respect to the flood risk management issue, shared ownership plays a particular role in the utilisation of linkage opportunities. In 2016, regional stakeholders have once again discussed the provisional schedule of dyke improvements under the Flood Protection Programme in the Regional Consultative Bodies of the Delta Programme, indicating any linkage opportunities. The early and regular explorations of Flood Protection Programme projects also factor in the preconditions and wishes of the area. Several good examples have already come up. For the dyke improvements along the IJssel river, for example, timely discussions have been conducted on the basis of a map of linkage opportunities (see box, [Paragraph 2.3.3](#)). The Schieland and Krimpenerwaard district water board has initiated the Voorlanden national general exploration.

With respect to freshwater supply, the stakeholders have substantiated shared ownership by entering into administrative agreements that set out each party's contribution to the freshwater supply. With respect to spatial adaptation, the authorities involved will join forces in the Spatial Adaptation Administrative Platform to draw up the new Delta Plan on Spatial Adaptation (see [Paragraph 2.2.2](#)).

In the National Water and Climate Knowledge and Innovation Programme (NKWK), knowledge institutes, market parties, and government authorities have jointly been tackling knowledge issues pertaining to the Delta Programme since 2015 (see [Paragraph 2.5](#)).

Civic society organisations are involved in all the regions and in individual projects, as they have been in previous years. At the national level, the Infrastructure and the Environment consultative body (OIM) has provided advice ([see background document B](#)).

Adaptive approach

Adaptive delta management requires the adaptation of strategies, measures, and schedules if so prompted by new developments and insights. For example, following research, the locks in the Nieuwe Waterweg ([Locks plan](#)) will be taken into consideration as a fully-fledged alternative when the Maeslant storm surge barrier is due for replacement or earlier, when new insights into climate change, flood risk management, or freshwater supply so demand (see [Paragraph 2.3.2](#)).

The Delta Programme uses the “monitoring, analysing, acting” system to gather the information required to be able to adopt an adaptive approach. Via two tracks this system generates insights into the progress (output and outcome) and into new developments that could constitute reason for adjustments (see [Paragraph 2.4](#)). With effect from next year, the Delta Programme will use this information to underpin its report on the questions of whether we are on schedule and whether we are achieving the flood risk management and freshwater supply targets.

Knowledge development constantly produces new know-how about flood defence systems, such as “[proven strength](#)”. Once new know-how is stable, it will feature in reports and guidelines pertaining to the design of flood defence systems. Every twelve years, as a minimum, the Ministry of Infrastructure and the Environment will incorporate new know-how into the Statutory Assessment Tools.

Virtually all the themes and regions are conducting pilots involving new approaches and new measures. The pilots may be related to, for example, water availability, the climate-proof design of cities and villages, or the early exploration of linkage opportunities. Another form of adaptive delta management is learning from one another's experiences. This is not a matter of course. The Delta Programme will continue to focus attention on this in the years ahead. With respect to spatial adaptation, the knowledge portal (www.ruimtelijkeadaptatie.nl/en) is an important tool for sharing knowledge and exchanging experiences. Other examples of joint learning are the [climate adaptation living lab](#) and the [Climate Adaptation City Deal](#).

Private sector and innovation

In the first half of 2016, during its chairmanship of the European Union, the Netherlands has turned the spotlight on know-how and innovations generated by the Delta Programme. For example, the Lent project, completed in 2015 under the Room for the River programme, has garnered international attention as one of the icons of the work on the Dutch delta. Many countries have expressed their interest in this project, featuring a combination of flood risk management, area development, and attractive design.

Over the past year, the Delta Programme has put priority on collaboration options with the private sector. At the end of 2015, the Flood Protection Programme, the Top Sector Water, sector organisations and knowledge institutes signed a collaborative agreement focused on carrying out dyke improvement projects quicker, cheaper, and better. The collaboration involves both concrete projects and general explorations. The Delta Technology Taskforce (contractors and engineering firms) and the knowledge institutes play an active role in the efforts. The agreement spans a period of three years and is subject to annual evaluation.

Private sector days

In 2016 and 2017, the four district water boards in the eastern Netherlands will invest approximately 500 million euros in water projects. They intend to enable the private sector to anticipate their investment agenda at an early stage. To achieve this, they organised two private sector days in January 2016, in order to exchange knowledge and ideas with private sector parties. In March 2016, the Association of Dutch Regional Water Authorities organised a start-up meeting to update its private sector vision. The updated private sector vision will be presented during the national private sector day in November 2016.

Rijkswaterstaat [the executive branch of the Ministry of Infrastructure and the Environment], the Dutch construction and infrastructure confederation *Bouwend Nederland*, the Dutch association of consulting engineers *NL Engineers*, the *Vereniging van Waterbouwers* [association of hydraulic constructors], MKB INFRA [sector organisation for infra companies], *UNETO-VNI* [sector organisation of installation contractors and electro-technical retailers] and Association of Traffic Industries in the Netherlands *Astrin* presented a joint private sector vision in January 2016. The parties involved thus aim to create room for innovation and collaboration, in order to achieve better results.

This collaboration is already underway in actual practice. In 2016, the contract managers community of the Flood Protection Programme developed a design & construct contract (D&C contract) specifically aimed at the district water boards, in a so-called contract buffet. Under a D&C contract, the contractor is responsible for both the design and the construction of infrastructure. The model has been specifically adapted for use in dyke improvement projects initiated by the district water boards, and has been field-tested by the Rijnland district water control board.

2.2 Progress per theme

Continue reading

» [2.2.1 Flood risk management](#)

» [2.2.2 Spatial Adaptation](#)

» [2.2.3 Freshwater](#)

» [2.3 Progress per region](#)

2.2.1 Flood risk management

Implementation of the Delta Decision on flood risk management

For a description of the Delta Decision on flood risk management: see [DP2015](#).

The Delta Decision on flood risk management is embedded in the policy set out by the second National Water Plan. The legal anchoring of this policy review is on course: the amended Water Act is expected to go into force on 1 January 2017. The district water boards and Rijkswaterstaat are preparing for the assessment of primary flood defence systems based on the new flood risk management standards with a system test, a final rehearsal, and a training programme. In its schedule for 2017-2022, the Flood Protection Programme – aimed at improving primary flood defence systems – has anticipated the outcomes of the next round of assessments wherever possible, and set down priorities based on the urgency ensuing from the new standards. Along with other stakeholders, water managers are gaining increasingly more experience with the early exploration of linkage opportunities in intended dyke improvements.

A knowledge agenda for flood risk management is being developed. It will feature in DP2018.

Anchoring of new standards

One of the components of the Delta Decision on flood risk management is the introduction of new standards* for the primary flood defence systems. In 2014, this introduction was legally embedded in the interim amendment to the National Water Plan; the National Water Plan 2016-2021 continues this policy. The new standards will be set down in the Water Act. To this end, the New Standards for Primary Flood Defence Systems bill has been prepared. An online consultation concerning the draft bill was conducted in 2015, giving everyone the opportunity to have a say. Following discussion in the Council of Ministers, the bill was submitted to the Council of State for advice. The House of Representatives adopted the bill in July 2016. The amendment to the Water Act is expected to go into effect on 1 January 2017.

* new standards

See [DP2015](#), P16, Delta Decision on flood risk management.

Statutory Assessment Tools and design tools

The new standards come with an adjusted scheme allowing the district water boards and Rijkswaterstaat to assess the safety of the primary flood defence systems that fall under their authority (“Statutory Assessment Tools”). The central government has developed this scheme in consultation with managing authorities and experts. In 2016, the district water boards were officially heard with respect to the preparations for the scheme. In the fourth quarter of 2016, a final rehearsal will be conducted to field-test the software of the tools. Any improvements found necessary can then be carried out. The Dutch Human Environment and Transport Inspectorate (ILT) has conducted an enforceability test. The scheme is expected to enter into effect concurrently with the amendment to the Water Act. This will enable the managing authorities to adopt the new standards as the basis for their assessment of the primary flood defence systems in 2017.

A first national picture of the safety of the primary flood defence systems based on the new standards will be available by 2023. Defence systems that fail to meet the new standard may be registered with the Flood Protection Programme. From 2017 to 2023, all the managing authorities will set to work on the new assessment. The statutory assessment tools will be further developed for the second assessment round, in order to be able to fine-tune the safety picture during the next assessment rounds.

The Guideline for designing with flood probabilities (design instruments) will continue to apply to the design of dyke improvements. The gradual continued development of the Guideline will result in a fully-fledged set of tools by 2018.

New standards and subsidy scheme for flood protection

The improvement of flood defence systems managed by district water boards is largely funded from Flood Protection Programme resources, to which the central government and the district water boards contribute in equal measure. Improvement measures to dykes managed by the central government are funded under the Delta Fund; the associated expenses are entirely borne by the central government.

The New Standards for Primary Flood Defence Systems bill (amendment to the Water Act) is intended to already have the improvement of a primary flood defence system qualify for subsidy when it fails to meet the indication standard, and when the improvement measure is scheduled under the Flood Protection Programme. This enables the district water board to take timely measures, before the defence system reaches the lower limit. The lower limit indicates the minimum requirements to be met by a dyke section to provide the stipulated protection level.

In the areas around the major rivers, the agreed protection level can be achieved by means of dyke improvement, river widening, or a combination thereof. River widening measures may cut the cost of a required dyke improvement, which would mean a saving in the Flood Protection Programme resources. The New Standards for Primary Flood Defence Systems bill will enable this saving to be utilised for the river-widening measure. The same goes for so-called “smart combinations”. This is in line with the National Water Plan 2016-2021.

The Ministry of Infrastructure and the Environment is also preparing an amendment to the Flood Protection Subsidies Scheme 2014. The Ministry has joined forces with the district water boards to that end. The district water boards have been consulted regarding the amendment. The scheme is expected to enter into effect concurrently with the amendment to the Water Act.

Preparation by flood defence managers

Flood defence managers (district water boards and Rijkswaterstaat) are adapting their information systems in order to make the data available for the assessment and design of flood defence systems based on the new standards. They are also combining their expertise and know-how with a view to the efficient introduction of the new standards, for example in the Expertise and Knowledge Platforms, in which managing authorities can exchange know-how, experience and information. In addition, the Risk-based Approach Knowledge Platform (KPR) serves as a helpdesk and source of the specialist know-how amassed for the Flood Risk in the Netherlands (VKN2) project. It offers opportunities for the exchange of knowledge regarding the design of flood defence systems.

In 2015, the Dutch Foundation for Applied Water Research (STOWA) and Rijkswaterstaat rolled out training programmes for the implementation of the new standards. In 2016, the flood defence managers will set down agreements on collaboration and knowledge sharing. Agreements on the priority of measures in the years ahead will be set down in early 2017. In addition, an interim evaluation of the assessment process will be conducted in 2019. The parties thus assume joint responsibility for the effective and efficient completion of the first assessment round based on the new standards.

The district water boards are also preparing for the new standards in their everyday management, anticipating their introduction wherever possible, for example in the granting of permits.

Multi-layer flood risk management and smart combinations

In 2015, Erasmus University Rotterdam evaluated three multi-layer flood risk management pilots in collaboration with Deltares research institute. The pilots were conducted in Dordrecht, in the IJssel-Vecht delta and on the island of Marken. The outcomes of each pilot are presented in this Delta Programme under the relevant preferential strategy. The conclusions and recommendations are also of use in other locations. One of the recommendations is to initiate an area-based study as early as possible, in order to have time to coordinate spatial developments with flood risk management measures. The options for the application of multi-layer flood risk management are taken into consideration in the updates of the MIRT regional agendas. The Delta programme is exploring the goals, tools, and measures required to adopt multi-layer flood risk management in order to avoid future raising of the flood protection standards for primary flood defence systems, and how such measures can be taken into account by the government authorities concerned in their Environmental Visions. Another relevant consideration is the interconnectivity with pluvial flooding.

Following the evaluation, the Flood Risk Management Expertise Network (ENW) has issued an advisory report on the conditions under which “smart combinations”, as a form of multi-layer flood risk management, show promise. The ENW comments that in most cases, preventive measures are most efficient in reducing flood risks in the Netherlands. Supplementary to such locations, the ENW has identified 10 to 20 stretches of primary flood defence systems where “smart combinations” could offer prospects. These are stretches in which the Local Individual Risk (LIR) dictates the standard. With respect to these stretches, the Local Individual Risk may be reduced relatively simply by the implementation of layer 2 (spatial planning) and layer 3 (disaster management) measures. In addition, specific local circumstances, such as the presence of secondary flood defence systems, may offer opportunities for “smart combinations”. The Minister of Infrastructure and the Environment is going to put multi-layer flood risk management on the National Environmental Agenda and take its elaboration into consideration in the National Environmental Vision.

Boosting disaster management

In 2016, the Water and Evacuation project will generate various tools that enable the Security Regions to determine the impact of a flood disaster and establish an evacuation strategy: a guideline for determining the impact of a flood and tools to boost the coping capacity of individuals. In 2016, the central government will focus its training programme on high water and floods. In collaboration with the Ministry of Security and Justice, the Minister of Infrastructure and the Environment will draw up a National High Water and Floods Crisis Plan. This Plan will be completed in the autumn of 2016. In various regions, such as Dordrecht and Rotterdam-North, the authorities have launched pilots in order to explore how disaster management can contribute to flood risk management.

The Evacuation in the event of Major Floods Module project (MEGO) was completed by mid-2016. Key results include the overstroomik.nl (“Can I be flooded”) app and website, and the National Water and Floods Information System (LIWO), providing up-to-date flood information for all the water and road management authorities, which constitutes a basis for impact-reducing measures. Rijkswaterstaat is explicitly incorporating the evacuation function of the main road network into its work processes, is preparing pilots to that end (involving, e.g., “reversed laning”), and has taken the lead in developing and improving coordinated regional evacuation plans. This will be monitored by the Management of Water Crises and Floods (SMWO) steering group.

Implementation and scheduling of flood risk management measures

For the schedule of flood risk management measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#). For a description of concrete measures: see the region concerned in [paragraph 2.3](#).

Transition to new standards

The measures under the Flood Protection Programme are scheduled in order of priority, i.e., the most urgent dyke improvements will be implemented first. The new standards will affect this ranking; this has already been anticipated in the schedule for 2017-2022. The projects scheduled for 2017-2022 have been re-prioritised on the basis of the new standards: projects featuring a large difference between the current flood probability (according to the calculations of the Flood Risk in the Netherlands project) and the flood probability according to the new standards will be given higher priority. Projects that have already been rolled out or are on the verge of being rolled out will retain their position in the schedule. The schedule for 2017-2022 has been expanded with 13 standard stretches whose safety is expected to differ rather substantially from the new standard, and that will therefore emerge from the coming assessment as urgent. In 2017, the managing authorities will conduct a safety assessment in order to endorse the urgency of these stretches; the Human Environment and Transport Inspectorate will indicate whether the safety assessment has been conducted in accordance with the stipulations in the ministerial regulations. Wherever such a stretch borders on an ongoing improvement project, the managing authority will take the new tasking into account in its implementation. The design of all current projects will be based on the new standards.

Flood Protection Programme

Status on State Opening of Parliament in September 2016

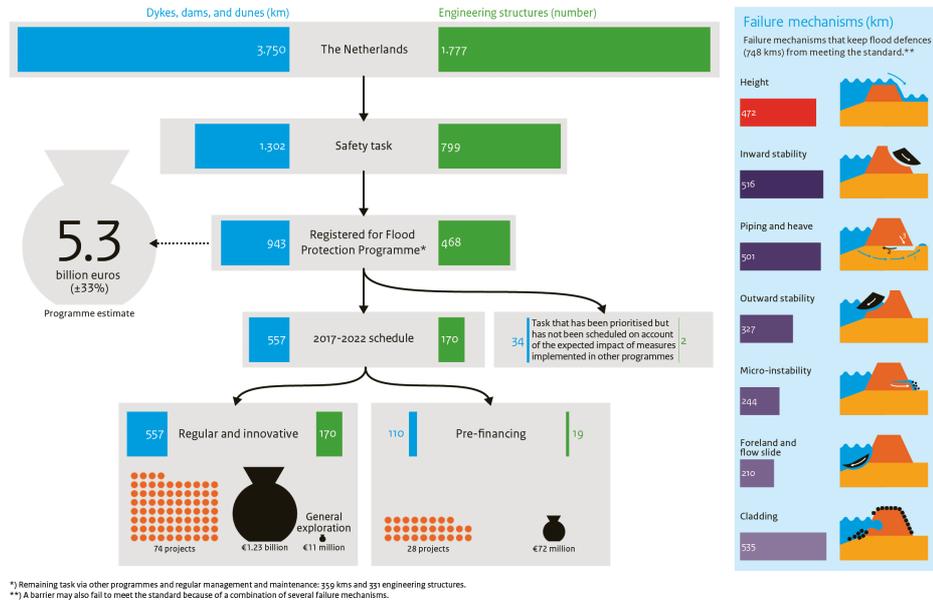


Figure 1
Flood Protection Programme, scope and taskings

Linkage with dyke improvements

At an early stage, the managing authorities of the flood defence systems will consider linkage opportunities in the vicinity of Flood Protection Programme projects, in consultation with stakeholders in the area. In any case, they will do so during the consultations regarding the draft Flood Protection Programme and its review in the Regional Consultative Bodies of the Delta Programme, and in some cases even earlier. The “early exploration” has been introduced in the Flood Protection Programme: an exploration in an earlier stage, in order to conduct a detailed safety analysis based on the test results. The early exploration affords stakeholders more time to capitalise on linkage opportunities in the preferential alternative. * Map 1: Connecting Water and Spatial Planning reflects several examples.

* preferential alternative.

An important consideration in the funding of spatial planning ambitions is the difference between incorporating, linking, and exchanging. For more information, see the website of the Flood Protection Programme.

Innovations in flood protection

Innovations are essential in order to elaborate the flood risk management taskings in a timely and efficient manner. In 2015, another opportunities scan was conducted in order to identify new knowledge and innovation opportunities in the Flood Protection Programme. Two general explorations are focused on the development of new know-how and technology in order to find smarter and cheaper solutions to problems involving piping* and macro-stability*. Several drainage techniques seem to offer prospects for resolving both piping and macro-stability issues. In 2017, a general approach will probably be launched to address three issues: contracts, cables & pipes, and a system elaboration for the river Vecht.

* piping

Piping involves water passing underneath the dyke and carrying along sand. This may compromise the strength of the dyke.

* macro-stability

A large-scale stability problem causing the core of the dyke and the layers of soil underneath the dyke to collapse.

The general exploration regarding piping, which commenced in 2014, has by now generated its first results. These show that more certainty regarding aspects such as the subsoil, the groundwater level, and the trend in hydraulic load in time may reduce the probability of rejection of a dyke following a piping assessment. In addition, the general exploration has generated a tool for combining the theoretical computation rules of the assessment with the practical experience of the water manager and the insights from the exploration. This also ensures that dykes are less likely to be rejected, and generates effective and sustainable measures. In addition, the general exploration is mapping out innovative measures that save costs vis-à-vis traditional measures, and develops test and design regulations to that end. For example, a pilot has been conducted involving Vertical Sand-tight Geotextile, and a piping innovation challenge took place in 2016. The general exploration regarding piping will be completed at the end of 2017.

Management, maintenance and replacement

In the Replacement Tasking for Hydraulic Structures project (VONK), Rijkswaterstaat has been working on the Hydraulic Structures Susceptibility Test. This test will give a forecast regarding the technical residual lifespan and a forecast regarding the functional residual lifespan based on the Delta Scenarios. The susceptibility test has been used to determine the technical residual lifespan of virtually the entire spectrum of structures in the main waterways network and the main water system. The test has only been used to a limited extent to determine the functional residual lifespan. In the susceptibility test pertaining to the technical lifespan, the structures were categorised in different groups. The results have been incorporated into the updated forecasts for medium-term and long-term replacement and renovation, and are presented in the 2016 National Budget. The VONK expertise will be further developed and expanded within the National Water and Climate Knowledge and Innovation Programme (future-proof hydraulic structures research line) for the benefit of other water managing authorities.

2.2.2 Spatial Adaptation

Implementation of the Delta Decision on Spatial Adaptation

For a description of the Delta Decision on Spatial Adaptation: see [DP2015](#).

The essence of the Delta Decision on Spatial Adaptation is the collaboration among government authorities, companies, and civic society organisations aimed at climate-proofing and achieving water resilience in the Netherlands. Increasingly more government authorities are exploring the impact of climate change. Throughout the country, spatial adaptation pilot projects are underway. The Delta Programme supports these efforts by making available guidelines, research results, and experiences at the [Knowledge portal](#) and encouraging pilots. The House of Representatives has tabled a motion requesting an Urban Water Management action plan.* The desirability of an Urban Water Management action plan and supplementary or alternative tools will be determined on the basis of the outcomes of the evaluation that will commence in the autumn of 2016. This evaluation examines the appropriateness of the current working methods. The Delta Programme is working on a Delta Plan on Spatial Adaptation to provide insight into all the activities. The central government is improving the flood protection of the vital and vulnerable national functions in the manner agreed upon; pilots have been initiated for the regional functions in collaboration with regional and local authorities.

* Urban Water Management action plan.
[Parliamentary Document 34300 J no. 22](#).

The progress made regarding knowledge development on spatial adaptation is stated in the [Knowledge Agenda \(NH1-NH7\)](#).

Monitoring

In the spring of 2016, all the authorities (central government, provinces, district water boards, and municipalities) received a questionnaire, for the second year in a row, from the Delta Programme on Spatial Adaptation in order to map out the progress made with respect to spatial adaptation. The general picture that emerged from the results did not fundamentally differ from the outcome in 2015 (see Figure 2). The municipalities, district water boards, and provinces that completed the monitor indicated that they have achieved comparatively significant progress with respect to flood risks and pluvial flooding issues, slightly less progress with respect to drought, and the least progress with respect to issues relating to heat stress and vital and vulnerable functions. In addition, all the parties score relatively high on “Analysis”, slightly lower on “Ambition”, and slightly lower still on “Action”.

With respect to pluvial flooding and flood issues, all the parties indicated that they have made sufficient progress to achieve the goal of incorporating climate-proofing and water resilience into policy and actions by 2020. Less progress, however, has been made with regard to drought issues, as the municipalities indicated. According to the respondent authorities, even less progress has been made, on average, with respect to issues related to heat stress and vital and vulnerable functions. The results of the survey are available at www.ruimtelijkeadaptatie.nl/en and www.waarstaatjegemeente.nl.

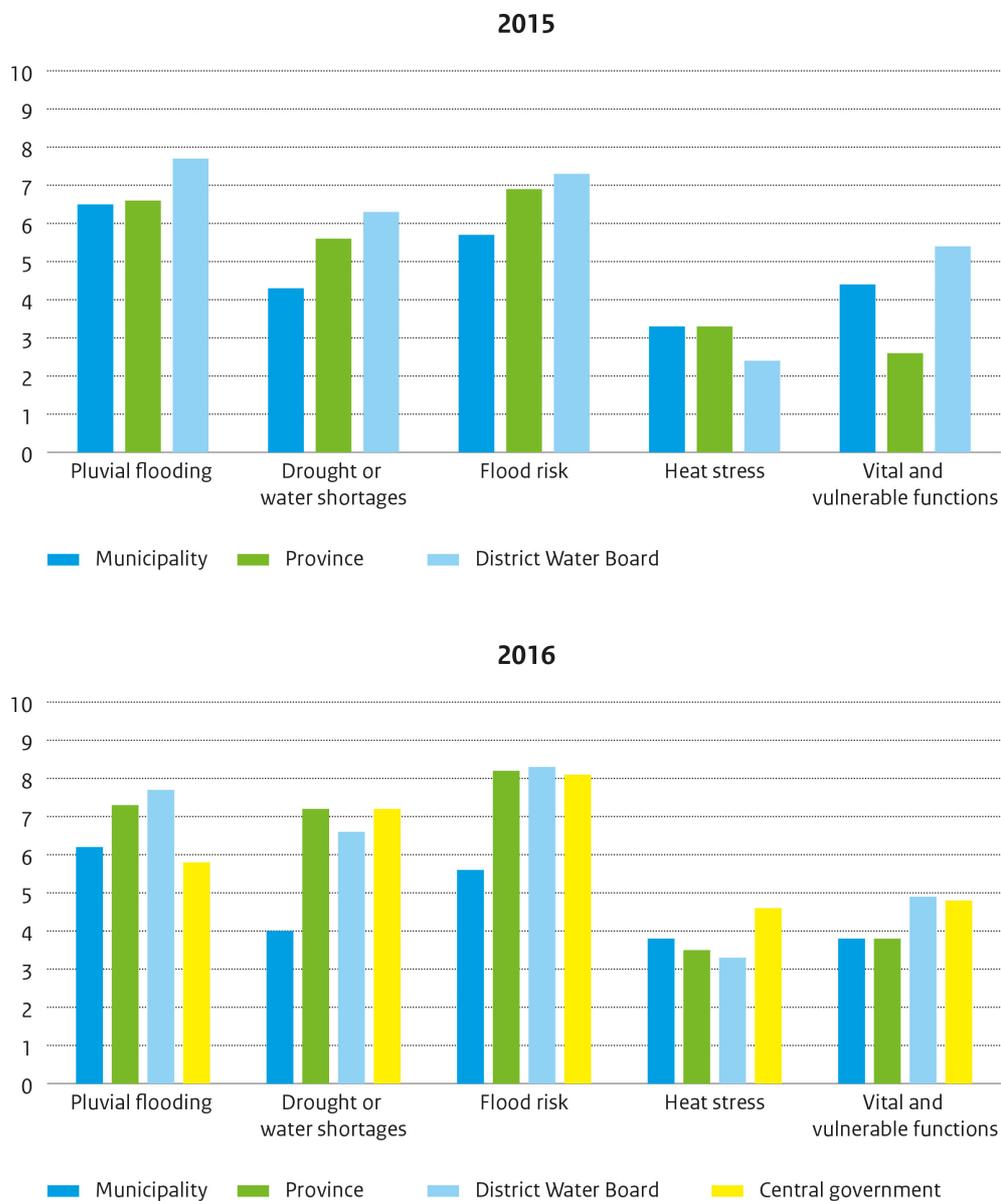


Figure 2

Respondents' estimate of their progress in achieving the goal of incorporating climate-proof and water-resilient design into policy and actions by 2020 (Y axis: 1 = no progress at all, 10 = very good progress)

Knowledge portal

The Spatial Adaptation knowledge portal (www.ruimtelijkeadaptatie.nl/en) is an important tool for sharing knowledge and experience. By now, the portal comprises a large number of tools which organisations may use to determine which effects of climate change they need to reckon with or can factor in (torrential rain, pluvial flooding in regional water systems, pluvial flooding in urban areas emanating from sewerage, drought, heat, flood-resilient construction) and which measures they can take in their spatial planning. Examples include the Climate Adaptation Atlas, the Stress Test Guide, the risk map, the Linkage Manual and the Green-Blue Grids Manual. The portal also features a practical map showing projects and the implementing parties.

Sharing knowledge and networking

The Delta Programme on Spatial Adaptation organises theme meetings in order to share knowledge. The past year saw meetings on the stress test, funding, communication on climate-proof gardens, and vital and vulnerable functions. The programme aims to expand the network of parties working on spatial adaptation and is expending various efforts to that end, for example by contacting sector organisations such as Bouwend Nederland [the Dutch construction and infrastructure confederation] and Tuinbranche Nederland [horticulture, garden centres, nurseries], and government collaboratives such as G32 [network of major cities in the Netherlands] and the Climate-Proof Cities Alliance. These networks may accelerate and reinforce climate adaptation efforts.

Vital and vulnerable functions

The central government is implementing the agreements made to improve the flood protection of the thirteen national vital and vulnerable functions that require particular attention* in terms of flood risks. Over the past two years, the Ministries responsible have gained more insight into the nature and extent of the risks a flood entails for these functions. For each function, the Ministry responsible determines the degree of water resilience that is necessary and proportional. In some cases, the efforts are focused on rapid recovery rather than actually protecting the function against flooding (e.g., the waste water function). In other cases, protection is only aimed at the most vital and vulnerable components of the network (e.g., emergency communication).

* attention

See [DP2015](#), P30, Delta Decision on Spatial Adaptation.

Expectations are that flooding will result in power failure and roads becoming impracticable within a short period of time. For those remaining behind in flooded areas, emergency drinking water will still be available, depending on the scenario. Outside the flooded area, power supply will continue to operate. Chemical companies are urged to take all – reasonable – measures in order to prevent serious impact on the environment or public health in the event of a flood. See also [paragraph 2.2.1 under Boosting disaster management](#).

Figure 3 reflects how the various vital and vulnerable functions have completed the steps of “Analysis”, “Ambition” and “Action”:

- With respect to all the functions, insight (“Analysis”) has increased considerably. The list is topped by the functions of electricity, gas, oil, telecom / IT basic response facilities, main infrastructure, and nuclear. Telecom / IT public network, drinking water, health, flood defence and management, and infectious substances follow at some distance. Waste water and chemical will submit their results in 2017, as set down in the agreement.
- Most of the functions have made progress regarding the “Ambition” step, aimed at completion in 2020. The realisation of measures (“Action”) will commence following completion of the “Analysis” and “Ambition” steps. Some functions have already embarked on “Action”.
- The nuclear function has completed the entire “Analysis”, “Ambition” and “Action” cycle. In line with the “continuous improvement” principle, it is currently working on optimising its approach through knowledge, policy, regulations and implementation.

A detailed description of the progress and plans for the year ahead is provided in the [Second progress report on the Approach to national vital and vulnerable functions](#).

The experience gained in the Botlek, Zeeland, Amsterdam Westpoort and IJssel-Vecht delta pilots has provided information regarding the approach to vital and vulnerable functions, the delineation between national and regional responsibilities and chain dependencies, and the relation between functions. Together with Wageningen University & Research Centre, the Ministry of Infrastructure and the Environment is mapping out international know-how regarding the chain dependencies of vital and vulnerable functions in the event of a flood. The goal is to identify and, if need be, fill any gaps. The province of Overijssel has charted its vital and vulnerable functions. The province of Zeeland has set up a broad-based coalition to work on issues such as raising flood awareness among the managers of vital and vulnerable functions.

Climate-proof Cities NKWK

One of the lines of research of the National Water and Climate Knowledge and Innovation Programme (NKWK, see [Paragraph 2.5.2](#)) relates to climate-proofing cities (NKWK-KBS). The Delta Programme on Spatial Adaptation is fleshing out this line of research in collaboration with STOWA and other parties. Project visits are intended to help consumers liaise with providers of know-how regarding climate-proofing and water-resilient planning, exchange experience, and pick up new knowledge issues. The first project visit in April 2016 involved the Twente Climate-Active City Partnership. The aim is to conduct some four visits per annum. The new knowledge issues constitute input for the NKWK-KBS Knowledge Agenda to be drawn up, for which the parties intend to realise joint funding. Knowledge issues that come up relate to, inter alia, cost and benefit of measures, funding constructions, governance, and system knowledge (see www.waterenklimaat.nl).

Increase in tasking related to pluvial flooding

According to the most recent KNMI scenarios, the climate has changed more than was assumed on the establishment of the pluvial flooding standards (current standards from the National Administrative Agreement on Water). Consequently, the pluvial flooding tasking is larger than was previously envisaged. The Association of Dutch Regional Water Authorities intends to take the initiative of joining forces with the partners in order to tackle the increased pluvial flooding tasking.

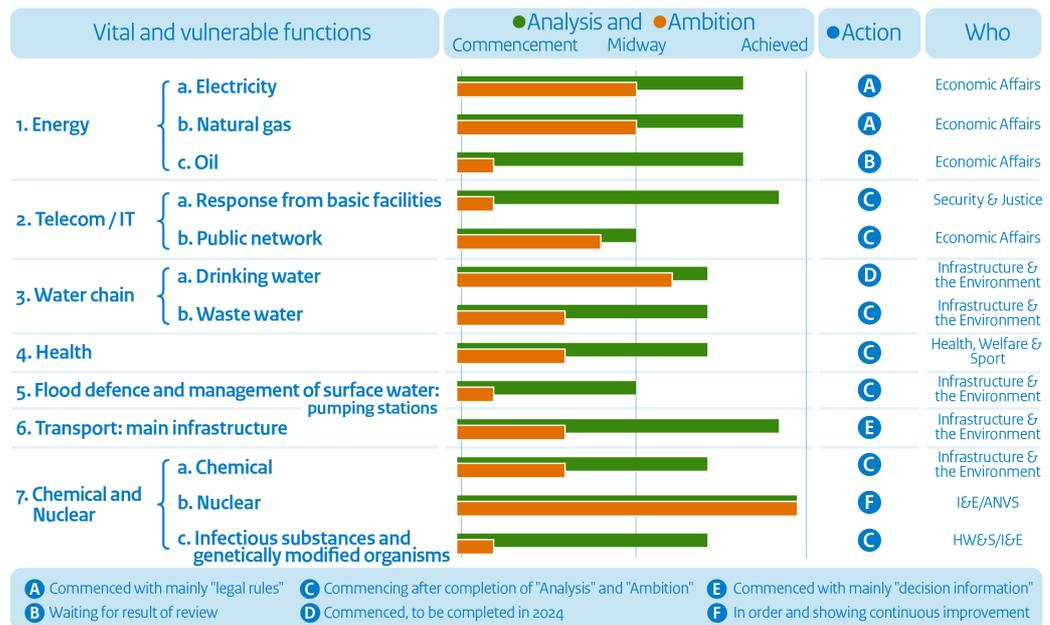


Figure 3

Summary of progress among vital and vulnerable functions with respect to "Analysis, Ambition, Action" steps

Implementation and scheduling of spatial adaptation measures

For a description of concrete measures: see the relevant area in [Paragraph 2.3.](#)

Delta Plan on Spatial Adaptation

Supplementary to the Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply, the authorities concerned are also drafting a Delta Plan on Spatial Adaptation. The Delta Plan on Spatial Adaptation sets out how the parties will move forward together with respect to the goals and transitional tasking of the Delta Decision on Spatial Adaptation and what mix of tools and measures they will be using to this end. Supplementary to the quantitative monitoring, the qualitative interim evaluation of the Delta Decision on Spatial Adaptation (2017) will demonstrate which tools and measures will be appropriate in this respect. The authorities concerned may use the outcomes of this evaluation for their own policy and action choices, and incorporate these into the Delta Plan on Spatial Adaptation. The Delta Plan on Spatial Adaptation will be presented as a component of the Delta Programme 2018.

Incentive programme

For the period of 2015-2017, Delta Fund resources have been allocated to the Spatial Adaptation Incentive Programme (0.8 million euros a year). These resources are earmarked for the funding of impact projects, learning communities, contributions to *living labs*, theme meetings, knowledge disclosure through the knowledge portal, and other exchanges of knowledge and information. Various factors are taken into account in the use of these tools: distribution across the issues of pluvial flooding, flood risk, drought, and heat; the commitment of the key organisations in the network; and the distribution across the various regions. In 2017, an evaluation will map out the transition to climate-proof and water-resilient action among the authorities, and how the Incentive Programme is contributing to achieving this transition. Based on the first results of the monitoring programme and practical experience, expectations are that support from government authorities, companies and other parties will continue to be advisable beyond 2017. The evaluation will provide insight into the potential measures and tools that the authorities may use in order to achieve the climate-proof and water-resilient action target by no later than 2020.

Stress test light pilot

The “Stress test light” is a comparatively simple way for authorities to paint a rough picture of locations that are susceptible to pluvial flooding, drought, and heat, to map out the impact of flooding, and to gain insight into potential solutions. Ten municipalities/coalitions participated in a pilot in 2015. The pilot indicates that a stress test is most effective if incorporated into ongoing local or regional (policy) developments. Prior agreement on the spatial scale level is important. A climate workshop turns out to be a suitable format for developing a common picture. A stress test is customised and requires proper preparation and joint objectives. The result may be either a strategy or a set of concrete measures.

Impact projects

In 2015-2016, fifteen impact projects were selected in three rounds (each round comprising five impact projects). Under the Spatial Adaptation Incentive Programme, the projects received a maximum support of 25,000 euros to accelerate the climate-proofing of an area or a particular issue. The results and lessons (do’s and don’ts) will be disseminated widely through the Knowledge Portal, the Spatial Adaptation newsletter, and theme meetings. The results of the first and second round impact projects are outlined under each specific area* (Paragraph 2.3). In June 2016, the third round of impact projects was selected. These are:

- Development of heat stress tool for cities and villages in the rural area (Zeeland)
- Sharing City (Amsterdam, Rotterdam, Dordrecht and other cities)
- Climate-resilient development of Offem-Zuid in Noordwijk
- Cooling and utilising heat (Utrecht)
- Hemels Water [water from heaven] Expedition (Zutphen)

* The results of the first and second round impact projects are outlined under each specific area

Information on the impact projects *Programma Ontwikkeling Veengebied Woerden* [Woerden peat area development programme] and *Differentiatie belastingen voor klimaatadaptieve gebouwen* [Tax differentiation for climate-adaptive buildings] is available at www.ruimtelijkeadaptatie.nl/en.

Investments in and funding of climate adaptation

At the end of 2015, a study was conducted to explore the options and conditions for private investments in climate adaptation of urban areas. The study focused on two pilots: Merwe-Vierhavens in Rotterdam and Westpoort in Amsterdam. The conclusion is that an active focus on added value is needed, for example, through area development. Sound agreements on funding (e.g., through an area-based fund) and linking the short term to a distinct “point on the horizon” are also essential to successfully invest in climate adaptation. On 20 April 2016, public and private parties shared their experience with the funding of implementation projects during two national theme meetings on this topic. The reports are available on www.ruimtelijkeadaptatie.nl.

Living lab on climate adaptation

In April 2016, the first *living lab* on climate adaptation was launched: the Living lab Twentesteden and Zwolle/IJssel-Vecht delta. In this lab, authorities (district water boards, municipalities, provinces, central government), companies, knowledge institutes and citizens join forces to tackle concrete climate adaptation projects at the local level. The Delta Programme on Spatial Adaptation supports *living labs* for 12 to 18 months by providing knowledge, making contacts, and/or offering funding for the implementation of concrete projects. More *living labs* are expected to commence in the years ahead.

Climate Adaptation City Deal

In March 2016, the cities of The Hague, Dordrecht, Gouda, Rotterdam, and Zwolle, the Drents Overijsselse Delta district water board, the Schieland and Krimpenerwaard district water control board, the Delfland district water control board, and the Ministry of Infrastructure and the Environment signed the Climate Adaptation City Deal. This sets out concrete agreements for close collaboration on this issue in the next four years, by learning from one another, experimenting, and innovating. The authorities are cooperating with Ecoshape, Heijmans, BPD, Tauw, Stichting Kennisland, Netherlands Water Partnership and Rotterdam Centre for Resilient Delta Cities. This City Deal is part of the Dutch Urban Agenda (*Agenda Stad*).

Multi-layer flood risk management

For the results of the multi-layer flood risk management pilots: see Paragraph 2.3. Flood risk management.

2.2.3 Freshwater

Implementation of Delta Decision on Freshwater Supply

For information on the Delta Decision on Freshwater Supply: see [DP2015](#).

Measures aimed at the economical use, retention, storage and supply of freshwater have been implemented all across the Netherlands. The Delta Plan on Freshwater Supply is largely on schedule. At the administrative level, it was decided to replace the term “supply level” by the more comprehensible concept of “water availability”; the content remains the same. The regions and the central government are substantiating water availability. Meetings are held with major water consumers (agriculture, shipping, nature, drinking water companies, and the industry) regarding a more economical use of water. Pilots are underway in all the regions. The water managing authorities are working on “smart water management”, among other reasons with a view to a more efficient distribution of water during water shortages. The parties collaborating in the Delta Programme have fleshed out the Freshwater Supply Knowledge Agenda in more concrete terms. This is going to yield the new knowledge required.

Comprehensive information regarding the progress of freshwater supply measures, at the national and regional levels, is available in the [Progress Report on Freshwater Supply in the Delta: looking back on 2015 and looking ahead to 2016-2017](#).

Embedding in administrative agreements

In September 2015, the Minister of Infrastructure and the Environment, regional administrators, and other stakeholders from five freshwater supply regions signed administrative agreements on freshwater supply. The administrative agreement for the sixth region, the Southwest Delta, was signed in March 2015 on account of its interconnectivity with the administrative agreement on the development of the Grevelingen/Volkerak Zoommeer lake. The six agreements contain commitments regarding the funding, scheduling, and implementation of freshwater supply measures with effect from 2016, and set out their justification. The introduction and coordination of water availability has also been accommodated in the agreements. The freshwater consumers, such as agriculture, nature, the drinking water sector, and industry, have major stakes in the measures. For that reason, representatives of the consumers in the Elevated Sandy Soils East and South region, the area around the major rivers, and West-Netherlands have also signed the agreement.

Water availability

The freshwater supply regions and the central government are elaborating water availability in the regions and the main water system according to the plans they drew up to that end in 2015. The agreed division of tasks with respect to water availability, as set out in DP2016, has been properly substantiated in nearly all the regions. A total of some twenty water availability pilots have been launched, at least one in each freshwater supply region (see [Freshwater supply map](#) and [Appendix II, Table 12](#)). Here the water managing authorities show how the current water system functions in periods of little water, and where bottlenecks are to be expected. On this basis, they look for opportunities for optimisation, together with consumers, and wherever necessary they set down agreements regarding the responsibilities borne by authorities and consumers. Most water availability pilots are currently in the first stage: transparency (see Figure 4).

In order to monitor the implementation process of water availability, the Freshwater Administrative Platform has set down benchmark dates. At the end of 2016, the Administrative Platform will discuss how the water availability pilots will flesh out step 1 in the regions and the main water system, and if possible how step 2 (optimisation) will initially be substantiated. Furthermore, they will discuss the impact of the pilots on the water system in each region, whether clear process agreements have been made, and whether there is an initial quantitative insight into the demand from the regions on the main water system, and the supply of the main water system to the regions (in particular in low-lying parts of the Netherlands). In mid-2017, the Platform will also discuss the possibilities for upscaling pilots, in addition to their progress. The agenda for October features the initiation of a complete picture of the exchange of supply and demand between the main water system and regional water systems. Based on these discussions and the experience gained in the pilots, the progress, ambition, and process will be evaluated in 2018.

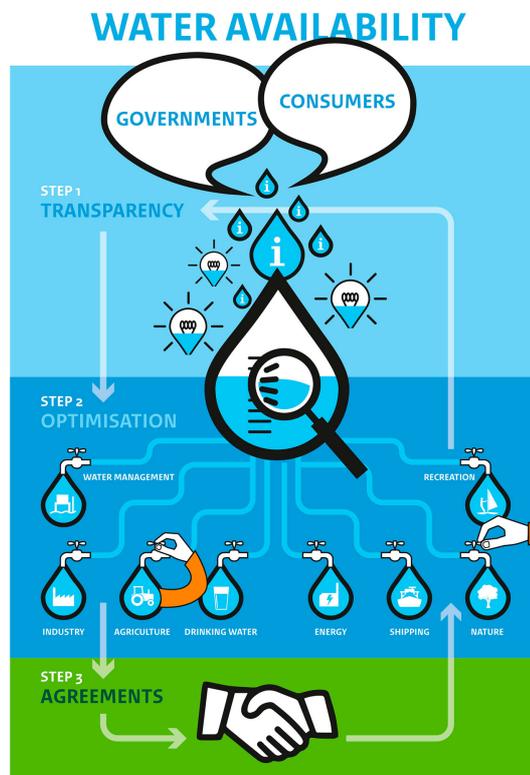


Figure 4
Water availability is established through a three-step dialogue process

Haarlemmermeer pilots

The province of Noord-Holland and the Rijnland district water control board launched a joint process for the Haarlemmermeer water availability pilot. The Haarlemmermeer polder is actively flushed, in particular to provide the agriculture sector with freshwater. A dialogue between authorities and consumers (featuring “kitchen table talks” and a field visit, inter alia), enabled these parties to gain insight into one another’s work and the options in the event of drought. This showed that possibilities for optimisation exist. The parties are currently exploring such options, including whether the polder’s inlet and flushing system can be made more efficient. Farmers will be monitoring actively to this end and substantiate their wishes.

Knowledge Agenda

In 2015 and 2016, the Delta Programme set down the Freshwater Supply Knowledge Agenda in more concrete terms, together with various other stakeholders such as the freshwater supply regions. In the years ahead, the on-going studies will generate important knowledge about matters such as the salt tolerance of crops, improving the coping capacity of users, comparative assessments of costs and benefits of (adaptive) interventions in the main water system and the regional water systems, and indicators and threshold values (intervention points in adaptation paths and the substantiation of adaptive delta management in actual practice). The progress made in the freshwater supply studies is set out in the [Knowledge Agenda](#) (components ZWV1-8).

Implementation and scheduling of freshwater supply measures

For the schedule of freshwater supply measures, see [Delta Plan on Freshwater Supply \(Appendix II\)](#). For a description of concrete measures: see the relevant area in [Paragraph 2.3](#).

Scheduling of Delta Plan on Freshwater Supply

The parties involved in the Delta Plan on Freshwater Supply set down the scheduling and funding [procedure](#) in DP2016. In line with these rules of play, in the autumn of 2015 the Freshwater Administrative Platform agreed to a reservation of 4 million euros in the Delta Fund to eliminate setbacks hampering the implementation, such as a tender turning out higher than expected. This sum of 4 million euros pertains to the budget not yet allocated. The Freshwater Administrative Platform has also agreed to reserve a maximum of 2.5 million euros out of these 4 million euros for the first implementation phase of the Roode Vaart in West-Brabant and Zeeland. A precondition is that the parties involved provide a further substantiation of the need for allocating these funds now.

Smart water management

In early 2016, the water managing authorities involved and the Ministry of Infrastructure and the Environment set down the Smart Water Management 2016-2021 programme. The essence of “smart water management” is that the use of IT fosters efficient management of the water system. Together with the understanding that water management more than ever needs to cross geographical management boundaries, this offers opportunities for making better use of the water and assuming joint responsibility for this. The [Smart Water Management](#) programme focuses on this transition. In 2015 and 2016, [various projects were rolled out](#). For example, the Rijnland district water control board demonstrates that “smart water management” enables a more economical and more effective use of the [freshwater supply](#).

Combating salinisation effects in spatial measures

The Ministry of Infrastructure and the Environment, the province of Noord-Holland, and the city of Amsterdam are elaborating a measure aimed at combating at source the increasing salinisation caused by the new IJmuiden sea locks. The initiators have set aside 58 million euros for this purpose. Compared to the effects of climate change, the deepening of the Nieuwe Waterweg navigation channel has a comparatively minor impact in terms of salinisation. Measures that offer sufficient security to tackle this issue at source are not available here. For that reason, the parties are looking for effective measures further upstream in the water system to limit the impact. The deepening will not lead to a more frequent use of the Small Scale Water Supply (KWA), but this supply will be called on sooner and for longer periods of time, because of the effects low water discharges cause on salt intrusion along the northern border. The Rotterdam Port Authority is working on agreements on this issue with the water managing authorities, in parallel to the permit procedures for the deepening of the Nieuwe Waterweg. By means of monitoring and evaluation, the parties are checking whether the impact is not exceeding the forecast. Both at the IJmuiden sea lock and at the Nieuwe Waterweg, attention is devoted to the retention of freshwater for, inter alia, the drinking water supply.

Innovative freshwater climate adaptation pilots

All the regions have launched innovative climate adaptation pilots to climate-proof their freshwater supply (see [Paragraph 2.3](#)). Most of the pilots have completed the preparatory stage and are entering the practical implementation stage. Many projects involve measurements and several cases have already produced the first results. Across the board, the climate adaptation pilots proceed according to the plans. More information on the results is provided under the relevant area in [Paragraph 2.3](#).

2.3 Progress per region

Continue reading

» [2.3.1 IJsselmeer Region](#)

» [2.3.2 Rhine Estuary-Drechtsteden](#)

» [2.3.3 Rivers - Rhine](#)

» [2.3.4 Rivers - Meuse](#)

» [2.3.5 Southwest Delta](#)

» [2.3.6 Coast](#)

» [2.3.7 Wadden Region](#)

» [2.3.8 Elevated Sandy Soils](#)

» [2.2 Progress per theme](#)

2.3.1 IJsselmeer Region

Implementation of Delta Decision and preferential strategy

For a description of the Delta Decision on the IJsselmeer Region and the preferential strategy for the IJsselmeer Region: see [DP2015](#).

The essence of the Delta Decision and the preferential strategy for the IJsselmeer Region is ensuring sufficient capacity for water discharge into the Wadden Sea, by a combination of discharge by gravity and pumping at the IJsselmeer Closure Dam (*Afsluitdijk*) and flexible water level management in order to expand the freshwater supply. Rijkswaterstaat has already launched the procedure for implementing the new IJsselmeer water level ordinance. The water managing authorities around the IJsselmeer lake are working on “smart water management” by, among other ways, drawing up joint lines of reasoning on tackling imminent pluvial flooding or freshwater shortages. The IJssel-Vecht delta, Amsterdam Westpoort and Rainproof Amsterdam projects do pioneering work in the fields of spatial adaptation and multi-layer flood risk management. The system study into promising measures for the second half of this century has generated new insights, including into ways in which the winter water level can be regulated by means of pumping and discharge by gravity beyond 2050. The study now focuses on the costs of dyke improvements required under the various water level management options.

The progress of studies regarding the IJsselmeer Region is outlined in the [Knowledge Agenda](#) (components IJM1-10).

New water level ordinance

A [new water level ordinance](#) enables flexible water level management and expansion of the freshwater supply. An Environmental Impact Assessment is being conducted for the purpose of the new water level ordinance; the Scope and Detail Level Memorandum was available for consultation in the autumn of 2015. The views and recommendations of the Environmental Impact Assessment Committee do not constitute reason for reviewing the course. The Minister of Infrastructure and the Environment is expected to make the draft water level ordinance and the assessment report available for consultation in the final quarter of 2016.

IJsselmeer Region system study

This study (in full: Integrated Study into Flood Risk Management and Water Level Management) focuses on promising management and planning variants beyond 2050. In 2015, an analysis was conducted into flood risk management in the IJsselmeer Region, and the new DEZY computer model was used to carry out the first explorations into the impact of climate change, planning, and management on the lake water levels. This has produced new insights, including ways in which the winter water level can be regulated by means of pumping and discharge by gravity beyond 2050. In 2016, a method will be developed to calculate the effects of various options regarding lake water level dynamics on the costs of the required dyke improvements. Calculations are carried out to this end using a set of future scenarios for a range of pilot locations. The results will subsequently be translated to the entire area. The study is on schedule and will be completed in 2018.

Regional Agenda for the IJsselmeer Region 2050

The central government, regional and local authorities, civic society parties, private parties, and citizens are working in concert on the Regional Agenda for the IJsselmeer Region 2050. The goal is to boost interconnectivity between all the developments in the IJsselmeer Region, making more efficient use of the potential of the area, looking for synergy, and safeguarding environmental quality. The regional agenda focuses on developments in fields such as flood risk management, freshwater supply, climate adaptation, nature, water quality, energy production, fisheries, tourism, recreation, and urbanisation. The regional agenda builds on, inter alia, the Delta Decision and the preferential strategy for the IJsselmeer Region set down in the Delta Programme 2015, and will comprise a directive perspective, a knowledge and innovation agenda, and an implementation agenda. The regional agenda will be completed by the end of 2017.

Progress of measures: flood risk management

For an overview of the measures: see [Delta Plan on Flood Risk Management \(Appendix 1\)](#). The progress made since DP2016 is outlined below.

IJsselmeer Closure Dam project

In early 2016, the Minister of Infrastructure and the Environment set down the National Spatial Plan for the IJsselmeer Closure Dam (Rijksinpassingsplan Afsluitdijk). The tender procedure for the work will commence at the end of 2016. The procedure will also cover work commissioned by the regional authorities, such as the construction of a closable passage in the dam for migrating fish. The contract will be awarded in 2018, whereupon the work will commence. The improvement must be completed by 2022. Other projects on and near the IJsselmeer Closure Dam will be implemented at the same time, such as the construction of an Experience Centre on the former island of Kornwerderzand.

Improvement of Houtrib dyke

A milestone in this project was the adoption of the Water Act Houtrib Dyke Improvement Project Plan in 2016. Immediately following the adoption, Rijkswaterstaat applied for the main permits. The tender procedure for the realisation will commence in mid-2016. The contract is scheduled to be awarded in early 2017; the work is expected to be completed by 2020. The sandy dyke improvement opted for offers good opportunities for linkage with nature and recreation.

Flexible flood defence system in Spakenburg

The realisation of a flexible flood defence system in Spakenburg will commence in 2016. This integrated, fold-out flood defence system is an example of innovation under the Flood Protection Programme. Remarkable about this dam is that it is integrated into a historic and protected rural area. It is one of the longest flexible flood defence systems constructed as yet. Its completion is scheduled for the spring of 2017.

Markermeer dykes improvement project (Houtrib dyke pumping study)

In 2015, a *joint fact finding* process was conducted into the effect of pumping on the Houtrib dyke. Pumping turns out to have a minor impact on the required improvement of the Markermeer dykes, whereas the costs are high. For that reason, the Minister of Infrastructure and the Environment has decided against placing pumps on the Houtrib dyke. Taking the “proven strength” of the dykes as the basis for an adapted dyke design does seem to offer prospects. This entails that the actual behaviour of a dyke body under (measured) extreme conditions is taken into account in designing the dyke improvement. This method has not been applied yet; the designers currently include a “safe margin”. Rijkswaterstaat and Deltares are working on the continued development of the proven strength method for the entire Flood Protection Programme.

The Hollands Noorderkwartier district water control board will receive the interim results in order to incorporate them into the design of the Markermeer dykes. It is emphasised that the proven strength concept seems promising; however, there is no certainty yet in this respect.

The Minister has informed the advisory group of residents and other directly involved parties in this regard. The Alliance (collaborative of Hollands Noorderkwartier district water control board and contractors) is elaborating a final design in consultation with the local stakeholders, factoring in linkage opportunities. The activities relating to the required (permit) procedures have also been initiated. The work is expected to commence in 2017.

Marken

In 2013 and 2014, the MIRT Study into Multi-Layer Flood Risk Management explored several variants for the three layers of multi-layer flood risk management. Developing a single solution strategy appeared to be impossible. For that reason, it was decided to further optimise layer 1 (i.e., flood defence) in the MIRT exploration regarding the Marken dyke improvement, and concurrently elaborate the opportunities for linkage with recreation and the optimisation of the water system. The exploration has mapped out solutions for the Marken dyke improvement (western and southern embankments). The preferential alternative encompasses an outward improvement involving a planning period of 50 years. Settling control constitutes a key precondition. The elaboration of the plan will commence after the summer of 2016. Implementation of the dyke improvement is expected to commence in 2019 and will be completed in 2022. In addition, further research has been and is being conducted into the options for achieving long-term water resilience in Marken. Under the direction of the Security Region, the stakeholders are working on an emergency plan. Marken is scheduled for a major flood drill on 2 and 3 November 2016.

IJssel-Vecht delta

At the end of 2015, the central government and the region adopted the results of the IJssel-Vecht delta MIRT Study. The regional authorities have set down an implementation programme for the strategy regarding multi-layer flood risk management and climate-proofing of the IJssel-Vecht delta.

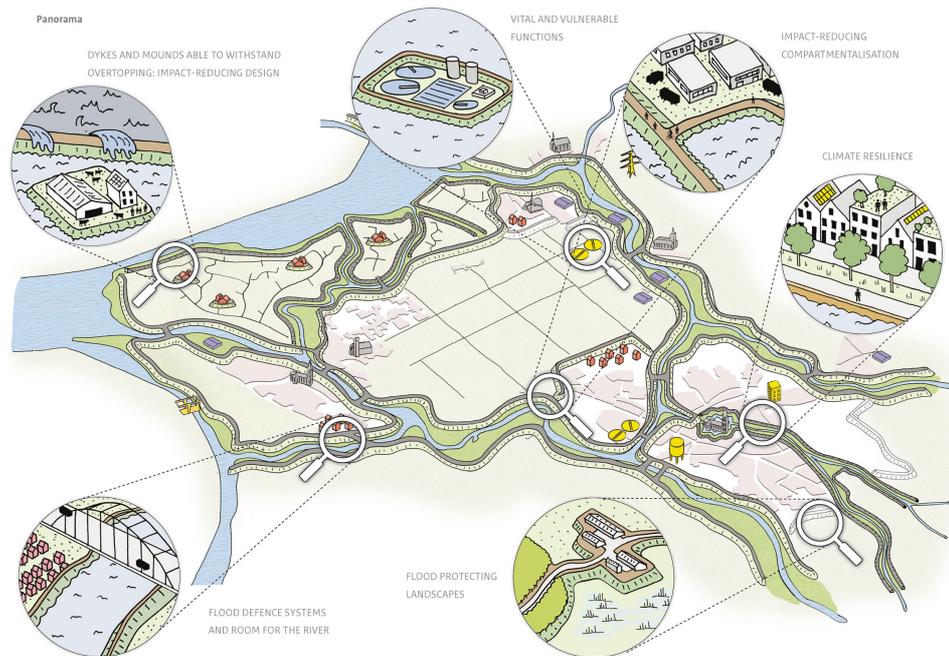


Figure 5

IJssel-Vecht delta multi-layer flood risk management and climate resilience strategy

The measures can be divided into four issues: dynamic water level management, multi-layer flood risk management, climate-resilient development, and innovative collaboration (e.g., experimenting together with private parties on forms of financial collaboration and legal arrangements). The central government is supporting the efforts by exchanging knowledge and providing a platform for the project. The region is actively looking for areas in the eastern part of the delta, where multi-layer flood risk management or “smart combinations” appear promising.

Progress of measures: spatial adaptation

For an overview of the measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Amsterdam region transitional area

The flexibility of the water system in this region is limited and even minor interventions may have a major impact. In addition, spatial developments and the water system are intertwined. The city of Amsterdam has incorporated spatial adaptation in the Sustainability Agenda; the province of Noord-Holland has done so in the Water Vision. The two pioneer projects, Amsterdam Rainproof and Flood-proof Westpoort will both be continued. The substantiation of Amsterdam Rainproof in visible projects on streets, squares and rooftops, and in gardens is expected to commence in 2017. With respect to Westpoort, various stakeholders are jointly drawing up an adaptation strategy for vital infrastructure and vulnerable objects that is scheduled to be completed by 2017: namely, the city of Amsterdam, Amstel, Gooi & Vecht district water board, the province of Noord-Holland, Rijkswaterstaat West-Nederland Noord, the port authority, the Security Region, and the Omgevingsdienst Noordzeekanaalgebied regional implementation organisation.

The parties will use these insights to work on an adaptation strategy for the entire city in 2017. The city is latching on to urban developments in order to improve the flood protection of vital infrastructure and vulnerable objects by adopting a multi-layer flood risk management approach. The authorities concerned will enter into a dialogue with the managers of vital and vulnerable functions, initially to raise awareness. Expectations are that this will lead to concrete no-regret measures.

Impact project: towards a rainproof city together with insurance companies

In this project, insurance companies, real estate owners, and municipalities are mapping out useful action perspectives for reducing water damage to private homes caused by heavy downpours. To this end, the actual damage suffered because of the downpour on 28 July 2014 in a residential area in Amsterdam-West is compared to the damage information held by the aforementioned parties.

Progress of measures: IJsselmeer Region freshwater supply region

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#).

Operationalisation of flexible water level management

Flexible water level management and “smart water management” call for close collaboration among the water managers in the IJsselmeer Region. The managers have already made great headway with control criteria and assessment rules for flexible water level management. In addition, the water managers have set down agreements on the expansion and sharing of water system knowledge, the exploration of options for optimising the management, and the improvement of the information exchange. Their aim is to complete the assessment rules for the implementation of flexible water level management by the end of 2017.

Study into robust natural shores

Flexible water level management calls for robust shores. The Ministry of Infrastructure and the Environment has commissioned a study to explore where dyke improvements along the IJsselmeer and Markermeer lakes may be combined with robust natural shores, and whether such shores may set off the second step in the flexibilisation of the water level (beyond 2050). The study maps out the Natura 2000 goals on which this second step may have a negative impact. From a legal perspective, using the current construction of robust natural shores – linked to dyke improvements – to set off the impact of a future measure turns out to be complicated. Creating a surplus of nature by means of smart links between flood risk management and nature holds more promise.

Linkage opportunities for the Frisian IJsselmeer shore

The pre-exploration regarding linkage opportunities for the Frisian IJsselmeer shore maps out the options for linking measures aimed at combating coastal erosion (in anticipation of flexible water level management) with other taskings and ambitions both inside and outside the dykes. Recreation seems to offer good prospects. The province of Fryslân has initiated the pre-exploration; it has been commissioned by the Súdwesthoeke Regional Agenda steering group. The aim is to set down agreements on a MIRT exploration at the end of 2016.

Amsterdam-Rijn canal – North Sea canal Smart Water Management

Within the framework of “smart water management”, six water managing authorities in the Amsterdam-Rijn canal / North Sea canal area are improving their collaboration in order to prevent pluvial flooding and freshwater shortages. In 2016 they will set down lines of reasoning regarding how to tackle imminent pluvial flooding or freshwater shortages; these will be operationalised in 2017. In 2017 the parties will also work on an information screen with data pertaining to good water management. In addition, a failure probability analysis for the Amsterdam-Rijn canal and the North Sea canal will be completed in 2017, focused on situations involving water shortage and pluvial flooding.

IJsselmeer Region innovative pilots

The Wadden Fund *Spaarwater* [Water Saving] project focuses on innovative technologies for the utilisation and storage of freshwater. Drip watering turns out to noticeably improve crop yields, such as larger bulbs and more seed potatoes. In addition, it seems to reduce the amount of germs entering the soil. The Wadden Fund has extended its funding of the *Spaarwater* project, thus enabling this climate adaptation pilot to run up to and including 2018. Flevoland farmers have also embarked on the project. Measuring equipment has been placed in five parcels of land, enabling the farmers to monitor groundwater levels. Based on this data, measures will be taken in 2016 to control the groundwater level of two parcels. The Hunze en Aa’s testing ground comprises several projects and has produced various results, including a first version of a map of opportunities for water preservation using small weirs in the Veenkoloniën region, in the eastern part of the provinces of Groningen and Drenthe. Farmers in Drenthe are experimenting with drip watering of bulbs, edible potatoes and onions. The main goal of the pilots is to encourage a more efficient use of water among consumers.

The “Elevated Sandy Soils” programme encompasses measures and several studies aimed at reducing the demand for water and preserving water. Examples of such measures include brook restoration and flexible water level management aimed at preservation and irrigation using groundwater.

2.3.2 Rhine Estuary-Drechtsteden

Implementation of Delta Decision on Rhine-Meuse delta

For a description of the Delta Decision on the Rhine-Meuse delta: see [DP2015](#).

Benefit and necessity of keeping open the option of changing Rhine discharge distribution after 2050

The study into the benefit and necessity of changing the Rhine discharge distribution after 2050 is aimed at determining whether it is desirable and feasible to keep open the option of changing the discharge distribution among the Rhine tributaries after 2050. The study commenced in 2015 and comprises, among other things, a line of reasoning with provisional conclusions. In early 2017, the study report will be used as input for the decision on whether or not to keep open the option of changing the discharge distribution in the long run.

Geurts motion: study into sea locks

Following a motion, further research has been conducted into sea locks in the Nieuwe Waterweg navigation channel (Locks Plan). On the basis of this research, the Minister of Infrastructure and the Environment has decided against constructing such locks in the near future, but rather taking this option into consideration as a fully-fledged alternative in the study into the replacement of the Maeslant storm surge barrier (this study is expected to commence around 2040). Until that time, the region is energetically continuing on the preferential alternative, implementing the work as no-regret measures. The Delta Programme is keeping track of new insights into climate change, flood risk management, and freshwater supply, in order to be able to launch the study at an earlier date if need be. This decision is in line with the recommendations of the Rhine Estuary-Drechtsteden Steering Group and the Delta Programme Commissioner.

Other progress information concerns the study into maximum river discharges (see [Paragraph 2.2.3](#), Rivers-Rhine and [Paragraph 2.3.4](#), Rivers-Meuse).

The progress of studies relating to the Rhine-Meuse delta is outlined in the [Knowledge Agenda](#) (components RMD1-6).

Implementation of preferential strategy for the Rhine Estuary-Drechtsteden area

For information on the preferential strategy for the Rhine Estuary-Drechtsteden area: see [DP2015](#).

In the densely populated and economically significant Rhine Estuary-Drechtsteden area, the implementation of the preferential strategy for flood risk management and freshwater supply is going full steam ahead. It is substantiated with various projects, area processes, and studies. When the study into the replacement of the Maeslant storm surge barrier is launched around 2040, the Locks Plan will be taken into consideration as a fully-fledged alternative. The region has taken new initiatives, such as the Rotterdam-North disaster management case study, and drawing up a regional perspective for the northern rim of Voorne-Putten. The “[Water-Spatial Planning Evaluation](#)” report shows that the collaboratives in the region are a success factor for connecting water and spatial planning. The evaluation has also generated points for attention with respect to linkage, spatial adaptation, and the institutional context. For example, bottlenecks for linkage may form if the expectations for, and the scale and scheduling of various taskings diverge. The region is using these points for attention in the continuation of these efforts.

The progress of studies relating to the Rhine Estuary-Drechtsteden area is outlined in the [Knowledge Agenda](#) (components RD1-12).

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Alblasserwaard-Vijfheerenlanden MIRT Study

This study focuses on dyke improvements in combination with maintenance and reinforcement of the cultural-historical identity, the spatial quality, and the economic strength. The linkage opportunities have been mapped out and options for tying in with solutions to the flood risk management tasking are being explored. Attention is focused on [three area-based taskings and three regional taskings](#). The aim is to achieve alliances with civic society organisations and the business community, in order to consolidate the linkage opportunities. The MIRT Study will be completed in the autumn of 2016.

Integrated approach to Hollandsche IJssel

The taskings facing the area along the Hollandsche IJssel river relate to the storm surge barrier, forelands, and dykes. In early 2016, the regional administrators examined the taskings in interconnection, and explored linkage opportunities. The Schieland and Krimpenerwaard district water control board will initiate a follow-up meeting, on the basis of the outcomes of the national Voorlanden [Forelands] general exploration^{*} or earlier, if there is reason to do so.

^{*} national Voorlanden [Forelands] general exploration
See [DP2015](#), p 20-21.

Spatial Dyke Improvement Tools Pilot

The Schieland and Krimpenerwaard district water control board has commissioned a study to verify whether the current spatial planning tools suffice to reserve room for future dyke improvements, with the Krimpenerwaard as a reference area. The financial ramifications of the various options for dyke improvements and spatial reservations have also been examined. The stakeholders have been consulted as to what they deem important in terms of spatial planning. The conclusion is that the spatial reservation tools are in order. The tools are particularly effective if used by the stakeholders on the basis of a joint regional vision. This requires administrative readiness and collaboration between government authorities, residents, and companies in the area.

The researchers recommend that a pilot project be initiated to gain experience with this method. Agreements have meanwhile been made to launch a pilot within the framework of the Voorlanden general exploration, in order to jointly develop a regional vision for a dyke stretch and the surrounding area.

Dordrecht multi-layer flood risk management MIRT Study

The concept of multi-layer flood risk management has been elaborated for Eiland van Dordrecht, aimed at enhancing the coping capacity of the residents of the island. The study has produced a promising “smart combination” of layers one, two, and three measures that together constitute the flood risk management strategy for an island capable of responding effectively to a disaster (see Figure 6). This combination will be further elaborated in the MIRT Study into the operationalisation of the strategy to enhance the coping capacity of Eiland van Dordrecht. In 2017, the municipality, district water board, province, Security Region, and the central government will jointly decide whether this “smart combination” can serve as an alternative to simply improving the primary flood defence systems.

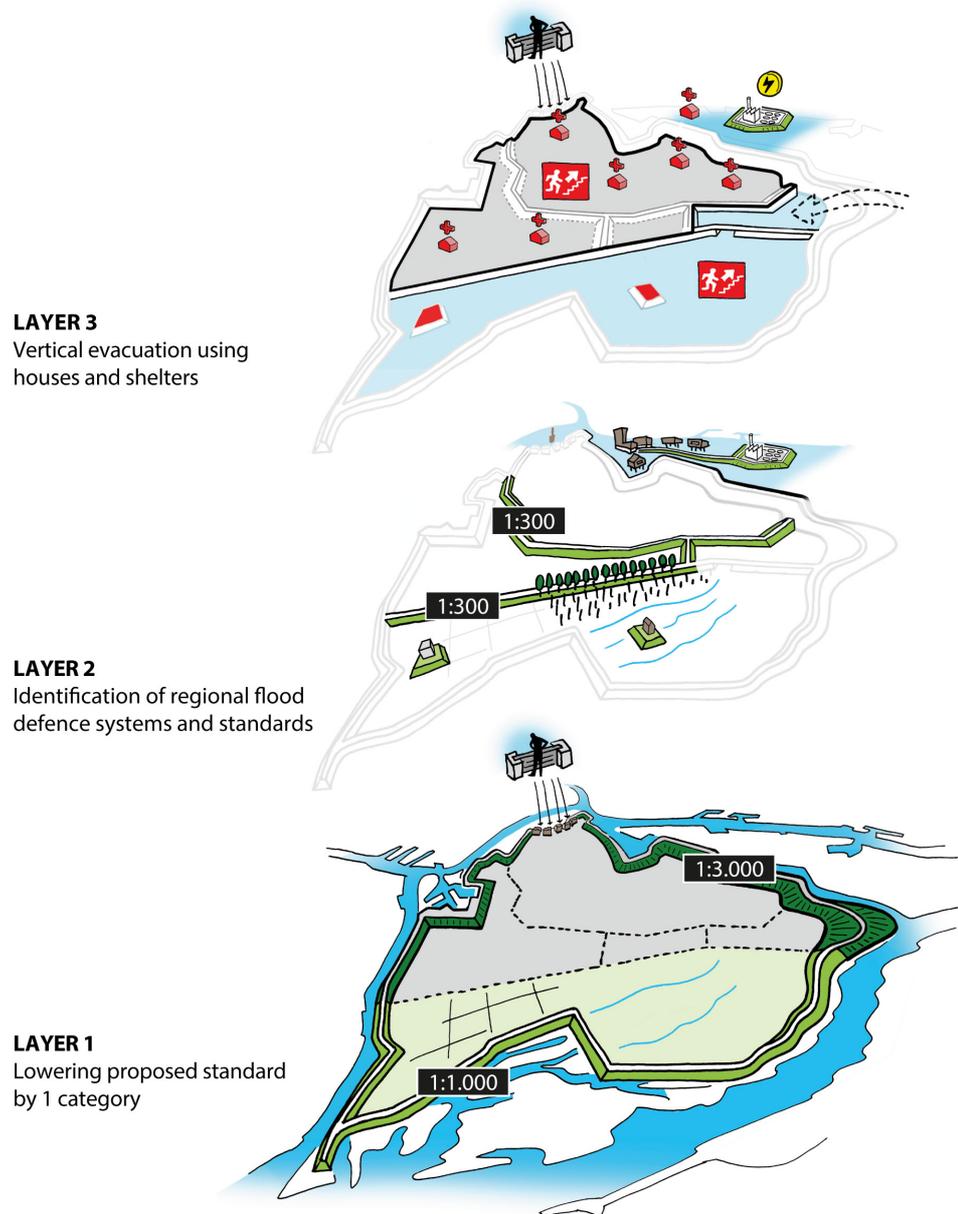


Figure 6
Current proposal for Eiland van Dordrecht multi-layer flood risk management strategy

Regional vision for northern rim of Voorne-Putten

The four municipalities on the island of Voorne-Putten have embarked on the detailed elaboration of the opportunities for multi-layer flood risk management and the opportunities for linking up with a (potential) dyke improvement along the northern rim of Voorne-Putten. The first step is to set down the delineation (in terms of scope and spatial planning) and the emphases of the project, factoring in the Flood Protection Programme schedule for 2017-2021, the Dykes Regional Profile project of the province of Zuid-Holland, and the standards for compartmentalisation dykes.

Rotterdam-Noord disaster management case study

Together with the district water boards, Rijkswaterstaat, and the municipal authorities, the Security Region Rotterdam-Rhine Estuary is conducting a case study into how to improve flood disaster management by making available and developing know-how. In 2016, the study will generate guidelines for more efficient disaster management in various stages of a crisis, from the development of a threat up to and including the reconstruction of a flooded area. One of the taskings is to flesh out “vertical evacuation”.

River as a Tidal Park project

The River as a Tidal Park project comprises various measures, aimed at e.g. green banks that enhance spatial quality and flood risk management. Implementation of the Green Port South (Rozenburg peninsula) is underway. It involves the construction of a new “foreshore” behind which a sheltered intertidal area can form. This is conducive to nature development combined with recreation. Preparations for the implementation of the Mallegat and Nassauhaven (Feijenoord) components have commenced. Plans for five other locations are being developed.

Maeslant storm surge barrier

This study focuses on verifying whether safety in the Rhine Estuary-Drechtsteden area can be improved by reducing the failure risk of the Maeslant storm surge barrier or by factoring in the partial closure of the barrier. The sub-study into the question whether partial closure is physically feasible has almost been completed. The sub-study mapping out the options for reducing the risk of failure will also be completed during the course of 2016. This means that the entire study will be rounded off at the end of 2016.

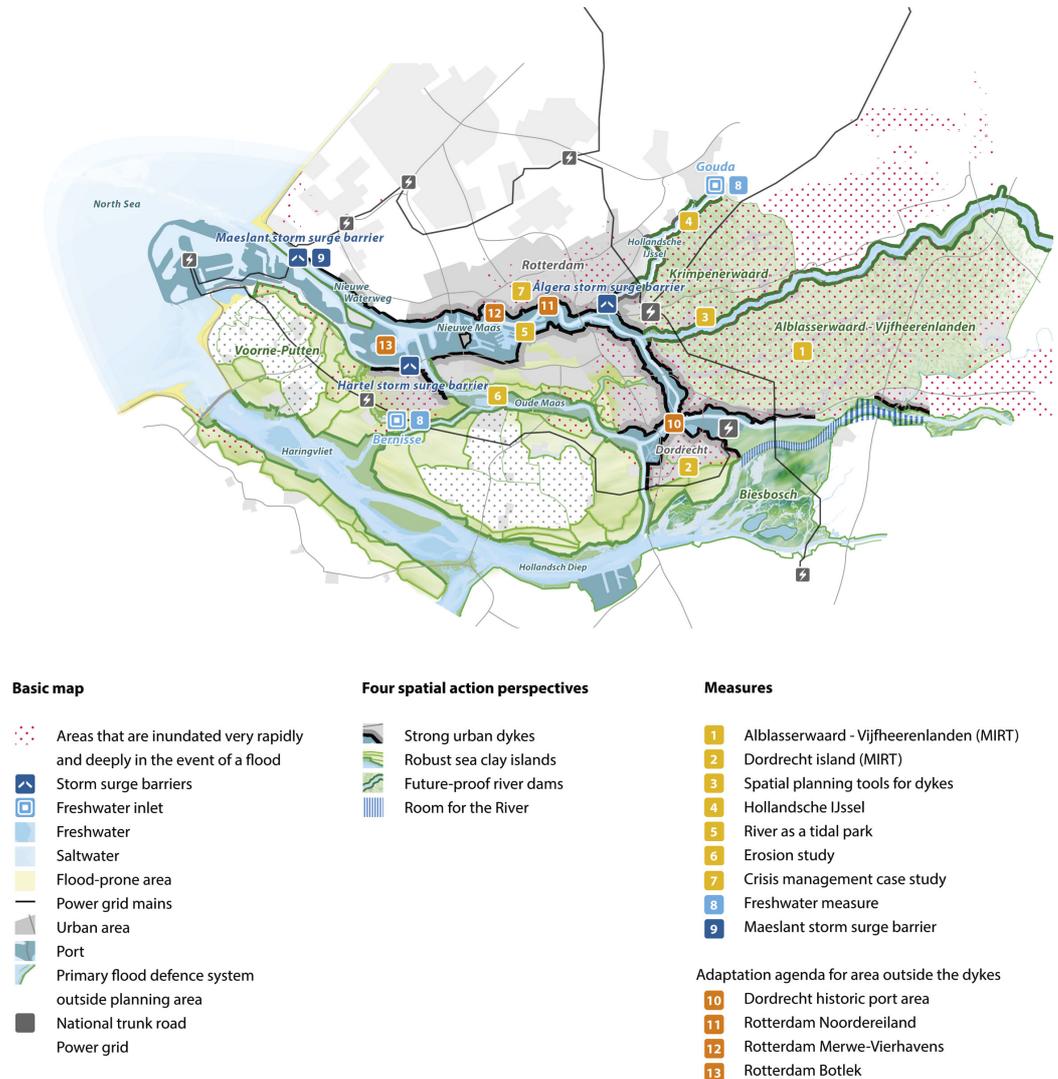


Figure 7
Implementation agenda for Rhine Estuary-Drechtsteden

Progress of measures: spatial adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Strategic adaptation agenda for the areas outside the dykes

The cities of Rotterdam and Dordrecht, and the Rotterdam Port Authority have joined forces with other partners to work on four pilot projects aimed at developing a strategic adaptation agenda for the areas outside the dykes in the Rhine Estuary-Drechtsteden region.

Noordereiland pilot and Dordrecht pilot

The Noordereiland and Dordrecht historic port area pilots have mapped out the vulnerability of houses and potential measures at the residential level. One of the conclusions of the Noordereiland pilot is that home owners are prepared to invest, but also have a need for more information on effective measures. One of the conclusions of the Dordrecht pilot is that communication has raised awareness, yet the embedding of this communication needs to be improved. The two pilots together constitute the [impact project](#) Adaptation Agenda for the Dordrecht and Rotterdam areas outside the dykes.

Merwe-Vierhavens pilot

The Merwe-Vierhavens pilot has generated an analysis of flood risk management issues in the area and an adaptation strategy. These have been incorporated into the development vision for the area. The plans will be elaborated if new developments arise in the area.

Botlek flood risk management pilot

The bulk of the Rotterdam Port and Industrial Complex is situated outside the dykes. In the Botlek flood risk management pilot, stakeholders have jointly analysed the current flood risks. In working sessions, they explored the impact on vital and vulnerable functions such as tank storage, refineries, a motorway, electricity, natural gas supply, drinking water, waste water, sewerage, and telecom. The pilot is supervised by a project group comprising representatives from the Rotterdam Port Authority, Rijkswaterstaat, the city of Rotterdam, and the Ministry of Infrastructure and the Environment. In parallel, a number of companies have conducted risk analyses of their own premises. In consultation with the stakeholders, the Botlek flood risk management project group intends to develop a strategic adaptation agenda in 2016. The agenda will provide some initial insights into the measures which authorities and/or companies may take to reduce or avoid risks, and the best time to do so.

Rotterdam Resilience Strategy

In the autumn of 2013, Rotterdam was selected for participation in the prestigious 100 Resilient Cities (100RC) programme, along with, e.g., New York and London. This programme – initiated by the Rockefeller Foundation – aims to help cities across the globe improve their resilience in response to physical, social, and economic challenges of the 21st century, including floods and climate change. Supported by the 100RC network, Rotterdam has drawn up a [Resilience Strategy](#) for the city. One of the objectives of the strategy is “Climate-resilient Rotterdam to the next level”, among other ways by upscaling small-scale initiatives and improving flood crisis management. Attention to cyber security, including in water management, and climate-resilient vital infrastructure are priorities. This strategy enhances the efforts expended on spatial adaptation and flood risk management in Rotterdam. Membership of the international network affords the cities the opportunity to showcase their expertise and experience in the field of climate adaptation, and to learn from the expertise and experience of other cities.

Spatial Adaptation City Deal

Four cities and three district water boards in the Rhine Estuary-Drechtsteden area are participating in the Spatial Adaptation City Deal ([see Paragraph 2.2.2](#)).

Impact project Agniesebuurt/Zomerhofkwartier testing ground (second phase)

Together with the city of Rotterdam, a consortium comprising Havensteder housing corporation, the Schieland and Krimpenerwaard district water control board, and design agencies is developing expertise on climate-proofing the houses owned by the corporation (at the block and neighbourhood levels), with attention to spatial, scheduling, legal, financial, and organisational aspects. This will lead to a proposal for three housing blocks in the Agniesebuurt and Zomerhofkwartier neighbourhoods. The realisation of at least one block is scheduled to commence in 2016. The goal of the impact project is to develop a “Climate Block” approach that has added value for all the parties involved, and can be used by private parties and authorities at other locations.

Progress of measures: West-Nederland Freshwater Supply Region

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#).

Water availability

Eight pilots have been launched to gain insight into the availability of freshwater, and the management efforts required to that end; one pilot is being prepared. The Haarlemmermeer pilot is described in [paragraph 2.2.3](#). Consumers are involved in all the pilots. In addition, regional stakeholders are actively contributing to the Communities of Practice regarding water availability that are organised by the Delta Programme on Freshwater Supply.

Freshwater supply measures

The exploration phase of the study into the capacity expansion of the small-scale water supply (KWA) will be completed in 2016. The study is aimed at developing a preferential alternative for a climate-resilient water inlet in the Amsterdam-Rijn canal for the purpose of the small-scale water supply. The Irene Locks Bypass project entered the exploration phase in 2016; it is aimed at ensuring a sufficient freshwater supply for the Amsterdam-Rijn canal. Under the Smart Water Management project, five sub-projects will be rolled out in 2016, based on the options identified in 2015. At the end of 2016, the Optimisation of Brielse Meer Lake Water Supply measure will enter the plan elaboration phase. In addition to major projects, co-funded by the Delta Fund, the region is also tackling smaller projects, such as a study into underground rainwater storage, more flexible water level management and more effective flushing, measures at the company level in the agriculture and drinking water sectors, and a number of pilots aimed at elaborating water availability. Finally, regional authorities and civic society parties have embarked on a joint fact finding process regarding a further expansion of the water supply to the western Netherlands and alternatives, including a permanent eastern supply route.

Innovative climate adaptation pilot De Groote Lucht Freshwater Plant

This pilot, initiated by the Delfland district water control board, is aimed at exploring the usability of effluent after various purification methods, and exploring the options for upscaling the pilot. The water product may have several uses, including for water level maintenance and as industrial process water; thus, it may contribute to the freshwater supply. Tests involving an ozonation plant will commence in 2016.

2.3.3 Rivers - Rhine

Implementation of Delta Decision on the Rhine-Meuse delta

For a description of the Delta Decision on the Rhine-Meuse delta: see [DP2015](#).

In the past year, the implementation of the Delta Decision generated new progress information regarding the study into peak discharges on the Rhine (see paragraph below). Other progress information pertains to the study into maximum Meuse discharges (see [Paragraph 2.3.4](#)) and the Locks Plan (see [Paragraph 2.3.1](#)).

Rhine peak discharges

With respect to the flood risk management measures along the river Rhine it is important to be aware of the discharges that may enter the Netherlands at Lobith, and of the current and future probability of such discharges. This has been calculated using the new [GRADE method](#) based on the [KNMI climate scenarios](#). The calculations show that the maximum discharge of 18,000 m³/s in 2100 is a likely upper limit, based on the insights into the increase in discharge, the impact of floods in Germany, and the impact of German measures (both preventative and contingency measures). For that reason, the Delta Programme will continue to use the upper limit above as its point of departure for the Rhine discharge. The upper limit is not all conclusive. Depending on the applicable standard and the failure mechanism, a range of discharges will be taken into consideration in the calculations.

Implementation of preferential strategy for the Rivers - Rhine

For information on the preferential strategy for the Rivers: see [DP2015](#).

The preferential strategy for the Rhine remains a powerful combination of dyke improvement and river widening. The dyke improvement tasking is substantial and urgent, in particular along the Waal and in the IJssel-Vecht delta. The district water boards and the central government are tackling this issue in the Flood Protection Programme. In the autumn of 2015, the Rhine Administrative Platform forwarded the regional proposal for river-widening measures up to 2028 to the Minister of Infrastructure and the Environment. Meanwhile, two MIRT explorations aimed at river-widening measures have been launched: the Varik-Heesselt bypass and IJsselpoort River Climate Adaptation Park. In parallel to these explorations, the stakeholders are jointly working on a long-term approach to river widening, in interconnection with dyke improvement, within the framework of the further elaboration and updating of the preferential strategy under the Rhine and Meuse river widening ambition project. This is a concerted effort by the Ministry of Infrastructure and the Environment (including Rijkswaterstaat), the Flood Protection Programme, the provinces, district water boards and municipalities represented on the Rhine Administrative Platform, the steering groups for the individual Rhine tributaries, the Meuse Delta steering group, and the staff of the Delta Programme Commissioner.

The progress of the studies concerning the Rivers is outlined in the [Knowledge Agenda](#) (components R1-8). The progress of the dyke improvements is reflected in the [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Long-term ambition for Rhine and Meuse river widening

New insights (including into the new standards) and results from current studies and projects (see below and in the paragraph on the preferential strategy for the Meuse) have prompted an update of the preferential strategy. In November 2015, the parties sitting on the MIRT Consultation Committee East and South decided to set down concrete and feasible targets with respect to river widening, in interconnection with dyke improvement. The Rhine Administrative Platform and the Meuse Delta Programme Steering Group subsequently commissioned the realisation of the joint long-term ambition regarding river widening in interconnection with dyke improvements. Each individual tributary (Waal, Nederrijn-Lek, IJssel, Meuse) is addressed separately, with room for customisation. This will lead to a structural basis for river widening and clear points of departure for dyke improvement. The task has been charged to the Rhine and Meuse river widening working group, with representatives from the central government (including Rijkswaterstaat), the Rhine Delta Programme, the Meuse Delta Programme, the Flood Protection Programme, and the staff of the Delta Programme Commissioner.

In the first quarter of 2017, the central government and the region will set down broadly supported, feasible, and justifiable packages of river widening measures, in relation to dyke improvement. The measures will pertain to the entire Meuse and to the Rhine at the level of the three tributaries (Waal-Merweddes, IJssel, and Nederrijn-Lek) and the bifurcations area. On this basis, the central government and the regions will set down agreements by no later than the end of 2017 (for the Rhine tributaries) and the first half of 2018 (for the Meuse) regarding the joint long-term river widening ambition (in interconnection with dyke improvement). This ambition will be translated into a water level reduction (stage line) up to 2050 and for the period beyond. This flood level reduction will constitute the point of departure for dyke improvements; it will be set down in the design tools (OI2018). The elaborated sets of river widening measures serve as a starting point, but within the sets measures are open to exchange. The ambition will be based in part on a social cost-benefit analysis and on assessment criteria and information agreed upon beforehand at the administrative level. The ultimate goal is to achieve an evolving schedule and an evolving implementation of river-widening measures in interconnection with dyke improvement. This is in line with the first parallel track as set out in [DP2016](#).

In-depth studies into river widening

The Ministry of Infrastructure and the Environment is examining how river widening will cut the cost of the dyke improvement tasking along the Waal, IJssel and Meuse. These savings will be utilised for the long-term river widening ambition. The cost savings differ for each tributary. For example, in the event of a decline in overall water level, river-widening measures along the Waal appear to generate more cost savings than such measures along the IJssel. A study into river widening in a robust section of the area around the major rivers shows that river widening reduces the flood risk more than dyke improvement alone. The study will be followed up in 2016, aimed at determining the impact of river widening measures for each dyke section. In addition, the Ministry of Infrastructure and the Environment is mapping out the opportunities for linkage with other national objectives. The results are expected to be available in the autumn of 2016.

Further study regarding Werkendam/Merweddes

One of the measures set out in the preferential strategy for the Rivers is the Werkendam dyke relocation. However, this measure lacks regional support. Further study has generated an alternative set of measures that has less of an impact on the area and is considerably cheaper than (inward) dyke relocation: secondary channels near Sleeuwijk, Avelingen, and in the Werkendam floodplains, and flood-proofing the Beatrixhaven port. In April 2016, the Rhine Administrative Platform agreed that the final decision regarding the realisation or otherwise of the Werkendam dyke relocation measure will be taken into consideration in the long-term river widening ambition.

Study into bifurcation points area

The study into the Rhine tributaries bifurcation points area commenced in 2015. The study has mapped out the impact of five combinations of measures on the water levels and discharge distribution in the bifurcation points area (see Figure 8). In general terms, with a discharge of 17,000m³/s, all the variants accommodate maintenance of the discharge distribution as set down in policy. However, lower discharge levels may have a considerable impact. The study shows how the impact of river widening in the bifurcation points area continues to a considerable distance downstream along all the river tributaries. The province of Gelderland has mapped out [how the measures taken in the bifurcation points area](#) will impact the surrounding area, and identified connections with other policy taskings. The study and the report will be followed up in the long-term river widening ambition that is to be set down within the framework of updating the preferential strategy. The parties thus ensure a proper coordination of measures and considerations regarding river widening and dyke improvements along all the Rhine tributaries (Waal-Merweddes, IJssel, and Nederrijn-Lek) and in the bifurcation points area, with a view to their impact on the discharge distribution. The point of departure is that the discharge distribution set down in policy remains unchanged.



Figure 8
Diagram of bifurcation points area and measures explored

Rijnstrangen study

The province of Gelderland has explored, in concert with the other authorities, how the spatial development of the Rijnstrangen area can be continued despite the spatial reservation for retention purposes. Developments that comply with the zoning plan are permitted in any case: new nature and infrastructure, expansion of farms, renovation or construction of new houses, and a holiday park. Initiators of new developments are advised to enter into a dialogue with the municipal authorities at an early stage. Since the reservation in 2005, any development envisaged has been possible. In part, this can be explained by the fact that until 1960 Rijnstrangen used to serve as a peak water storage area. For that reason, the results cannot be applied just like that to other reservation areas, yet the approach and line of thought can. A reservation does not lock this or other areas; developments within the zoning plan can continue, and an early dialogue with the municipal authorities is vital with respect to new developments.

Spatial reservations

Four spatial reservations for future flood protection measures have been cancelled in the new Decree on General Spatial Planning Regulations*, in accordance with DP2015: the spatial reservation for the Zutphen flood channel (alternative measures outside the dykes are available), Noorddiep dyke restoration (this measure is not cost-effective, and alternatives are available), Heesselt dyke restoration (replaced by a new reservation for the Varik-Heesselt bypass), and the Reeverdiep near Kampen (redundant due to accelerated implementation of phase 2).

* Decree on General Spatial Planning Regulations
Government Gazette 2016 202.

Involvement of civic society organisations

A new aspect of the collaboration on the Rhine issues is that two representatives of civic society organisations have been participating in the Rhine Administrative Platform since October 2015: a representative of the Waal-Merwedede Reflection Group and a representative of the Consultative Group of the Regional Administrative Body on Water – Rhine East/Centre Sounding Board Group. Agreements have also been made with civic society organisations regarding the dissemination of Rhine study results.

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Dyke improvement

The proposed Flood Protection Programme schedule for 2017-2022 features a large number of projects in the areas around the major rivers. New additions to the schedule are projects that anticipate the new standards (see [Paragraph 2.2.1](#)), such as the Grebbedijk exploration along the Nederrijn and the Zwolle-Olst exploration along the IJssel (to be launched at the end of 2016). Along the Waal, an exploration will commence of the Wolferen-Sprok dyke section, which will factor in the interconnectivity with the Oosterhout dyke restoration as set down in the preferential strategy for the Rivers. The Centraal Holland general exploration has entered its final stage.

Map of linkage opportunities

Dyke improvements offer opportunities for linking taskings, ambitions, and wishes with respect to the economy, nature, and recreation to flood risk management. For projects already scheduled, the district water boards are discussing such options with the regional stakeholders. Regarding the dyke improvements along the IJssel in the province of Overijssel, discussions were held at an early stage on the basis of a map of linkage opportunities. This map reflects all the potential initiatives that may be linked to flood risk management measures set out in the Flood Protection Programme. The map is updated on a regular basis by staff of the municipalities, district water board, the province, and other stakeholders. This example has inspired the province of Gelderland and the Rivierenland district water board to explore whether such a map can be developed for the Waal.

MIRT explorations regarding river-widening measures

On the basis of the regional proposal, the Minister of Infrastructure and the Environment has approved the commencement of the MIRT explorations regarding flood risk management in the Varik-Heesselt area, and regarding the IJsselpoort River Climate Adaptation Park. Both projects offer opportunities for combinations with other functions. The Varik-Heesselt exploration is coordinated with the Tiel-Waardenburg dyke improvement project scheduled under the Flood Protection Programme, on the basis of a well supported [project initiation document](#) in accordance with the motion tabled by Smaling c.s.* Because the Varik-Heesselt exploration and the Tiel-Waardenburg dyke improvement are interconnected in terms of content and procedure, the two projects are developing a single preferential alternative and a single integrated decision, following a single environmental impact assessment procedure. Dyke improvement is necessary in any case. The exploration focuses on the question of whether and how river widening could be of additional benefit. The parties involved in the IJsselpoort River Climate Adaptation Park are drawing up an integrated regional flood risk management tasking with long-term development scope for nature, recreation, and economic activity, factoring in the impact on the discharge distribution. The regional tasking will constitute the basis for a well-supported preferential alternative. The results of the study into the bifurcation points area are also relevant to this exploration. Both explorations are expected to be completed in the spring of 2018.

* motion tabled by Smaling c.s.
[Parliamentary Document 34 300 J, no. 13.](#)

Grebbedijk

The Grebbedijk features in the Flood Protection Programme schedule for 2017-2022. The provinces of Gelderland and Utrecht, the Vallei and Veluwe district water board, and the municipality of Wageningen have decided to conduct a comprehensive exploration regarding the Grebbedijk ambition. They are planning to extend the exploration to the spatial taskings or area developments that can tie in with the flood risk management tasking and the opportunities for a Delta dyke. Scheduling in the Flood Protection Programme marks the commencement of the exploration; the regional stakeholders aim to accelerate the pace of its execution.

Acceleration of Reevediep 2nd phase

Phase 1 of the Reevediep project was launched in 2015 and involved the construction of a flood channel between the IJssel and the Drontermeer, and dredging in the IJssel in order to lower the summer bed. At the end of 2015, the central government and the region decided to go ahead with the second phase as well. This phase comprises the removal of the Roggebot lock and the Roggebot flood defence system, and the construction of a new bridge in interconnection with the reconstruction of the provincial road. In addition, the Drontermeer dyke will be improved. A lock with sluice structure will be constructed in the Reeve dam, together with an adjusted inlet structure. At the Roggebot recreational area, flood protection measures will be implemented that will allow the Reevediep to discharge approx. a quarter of the IJssel flood water and reduce the flood level between Zwolle and Kampen by 50 cm to 100 cm. After completion of the 2nd phase, the Reevediep will make an even more frequent contribution to the discharge flow, thus reducing the dyke improvement tasking along the IJssel. The acceleration of the 2nd phase will result in savings of more than 10 million euros, because it will obviate the need for a number of temporary measures. The work is expected to be completed by 2022, three years ahead of schedule.

IJssel-Vechtdelta MIRT Study

See IJsselmeer Region, [Paragraph 2.3.3](#).

Progress of measures: Spatial Adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Eastern boundary of Betuwe polder area development

The Rivierenland district water board and the province of Gelderland have launched an area development in order to enhance, together with regional stakeholders, the coping capacity of residents and consumers in the area. A study into multi-layer flood risk management commenced in 2015. The goal is to explore logical combinations of spatial planning and contingency planning measures in order to improve flood risk management. A second study will map out the feasibility of using surface water for the storage or generation of (thermal and electrical) energy. A third exploration concerns one of the twenty water availability pilots rolled out in the Netherlands.

Spatial Adaptation Coalition, Utrecht Region

The Stichtse Rijnlanden district water control board, six municipalities in the province of Utrecht, the province of Utrecht, and the Utrecht Security Region are working on spatial adaptation according to a joint action plan. In 2015 they conducted a stress test and developed local stress tests. They also shared experiences regarding measures and water governance among one another, and mapped out “pioneer projects”. For areas facing soil subsidence (peat grasslands), the RE:PEAT serious game has been developed, a tool for long-term planning including climate impact.

Progress of measures: freshwater supply in areas around the major rivers

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#).

Longitudinal dams study and Boven-Rijn pilot project

Rijkswaterstaat has conducted a pilot involving the construction of longitudinal erosion control dams in the Waal between Tiel and Ophemert and the simultaneous removal of the groynes in that section. The longitudinal dams, parallel to the bank, improve discharge at high water and are additionally aimed at reducing river bed subsidence. River bed scouring as a result of human intervention has been steadily continuing over the past centuries. As sluices, locks and resistant sections of the river bed do not scour in equal measure, at low discharge this subsidence is causing increasingly more problems for shipping, the freshwater supply to the regional water system (extra pumps are needed), and the drying up of the floodplains on account of lower groundwater levels. In addition, in the long run, river bed scouring may cause flood risk management problems, because it may disrupt the distribution of water across the Rhine tributaries.

Another potential measure for combating river bed subsidence is depositing sand and gravel onto the river bed. In April 2016, Rijkswaterstaat conducted a pilot project in the Boven-Rijn near Tolkamer, involving the application of a 30-cm layer of gravel and sand in the deep section of the river bed. The sand and gravel are expected to disperse naturally in the river. In this pilot project, Rijkswaterstaat has joined forces with its German sister organisation Wasser- und Schifffahrtsamt Duisburg-Rhein. The Netherlands has no practical experience with the deposit of gravel and sand onto river beds. Germany, on the other hand, has been successfully depositing gravel since the 1980s. However, these experiences cannot be translated one-for-one to the Dutch situation. The river bed in Germany is much coarser and more resistant, which means it is less dynamic than the Dutch soil. For that reason, the Netherlands is depositing finer gravel and sand.

In the years ahead, Rijkswaterstaat will gauge the effects of the two pilot projects. The results will be available in 2020 and 2022.

Collaboration with Germany

Along the Rhine, several German-Dutch collaborative efforts are underway: at the bilateral level in the border area, and at the level of the major rivers catchment area through the International Committee for the Protection of the Rhine. Flood protection measures are coordinated within the framework of the Floods Directive. With respect to flood risk management of the Rhine, agreements regarding targets and measures up to 2021 have been set down at the entire catchment area level. These targets and concrete measures have been set down in the international flood risk management plan 2016-2021, which was endorsed by the International Committee for the Protection of the Rhine (ICBR) at the end of 2015.

The Rhine Flood Action Plan 1998-2020 constitutes the basis for the collaboration and the flood risk management plan for the catchment area. The ICBR monitors progress and the effect of measures. Germany has indicated its intention to complete its dyke improvement programme and carry out the river widening projects set down in the umbrella flood risk management plan 2016-2021 in the not too distant future.

Flood risk management standards in Germany are lower than they are in the Netherlands. For example, the probability of exceedance assumed by North Rhine-Westphalia for the border area is approx. once every 500 years, whereas the Netherlands currently observes an annual exceedance probability of 1/1250. This means that North Rhine-Westphalia is also basing its dyke designs in the border area on lower design discharges (14,500 m³/s, versus 16,000 m³/s in the Netherlands). On the other hand, Germany has more stringent design requirements (such as a higher freeboard); consequently, the height of the German dykes near the border, upstream from Lobith, does not differ from the height of our dykes.

The aim is for the Netherlands to adopt the new standards for primary flood defences with effect from 1 January 2017. Any future scenarios and potential measures to be taken by Germany will be factored in upon the implementation of the new standards. On account of the lower standards, Germany already carries out retention measures under circumstances that precede design conditions in the Netherlands. Because of the lower standards, Germany will see floods at lower discharges than the Netherlands. The impact of these floods at Lobith exceeds the effect of the German river widening and retention measures. Another fact to be taken into account is that in the event of extreme river discharges, German authorities will take emergency measures (placing sandbags) in order to prevent or reduce imminent floods. This has been taken into consideration in the extreme discharge calculations using the GRADE method.

Together with North Rhine-Westphalia, the Netherlands is currently exploring the flood risk in the border area, aimed at gaining insight into an effective protection of the area. The study focuses on the application of the Dutch risk-based approach, as developed within the Delta Programme. The study maps out the differences in flood risk management and how they impact the safety of residents on both sides of the border, in order to be able to properly coordinate future flood risk management measures. The results will be available in 2017.

Good and timely information on water levels is essential for crisis management in the event of imminent floods. The Dutch Water Management Centre (WMCN) measures and calculates water levels in the major rivers, and uses models to draw up high water level forecasts. The WMCN has made agreements with similar institutes in Germany regarding the exchange of data.

2.3.4 Rivers - Meuse

Implementation of the Delta Decision for the Rhine-Meuse delta

For a description of the Delta Decision Rhine-Meuse delta: see [DP2015](#). During the past year, the implementation of the Delta Decision has generated new progress information on the study into Meuse peak discharges (see paragraph below). Other progress information pertains to the study into maximum Rhine discharges (see [Paragraph 2.3.3](#)) and the Locks Plan (see [Paragraph 2.3.1](#)).

Maximum Meuse discharge

For the development of the flood risk management measures along the Meuse, it is important to know the current and future maximum volumes of water that can enter the Netherlands. The standards in force along the Meuse differ widely. This means that we have to reckon with discharges with highly different probabilities of occurrence. The Meuse discharge statistics have been re-calculated using the GRADE method. The results will be discussed with the stakeholders in the Meuse area, as will further choices to be made regarding the scenarios and flows to be observed in order to set down the 2018 design tools.

Implementation of preferential strategy for the Rivers - Meuse

For information on the preferential strategy for the Rivers: see [DP2015](#).

The preferential strategy for the Meuse consists of a powerful combination of dyke improvements and river widening. The Meuse region is currently updating the preferential strategy. In the autumn of 2016, the Regional Proposal for the Meuse will be completed. This provides the framework for the measures up to 2028 and proposals to launch MIRT explorations for a number of projects. The Meuse region is concurrently working on a long-term implementation strategy for river widening and dyke improvement along the Meuse. To that end, the Meuse Delta Programme Steering Group is collaborating with the Ministry of Infrastructure and the Environment (including Rijkswaterstaat), the Flood Protection Programme, the staff of the Delta Programme Commissioner, and the provinces, district water boards, and municipalities represented on the Rhine Administrative Platform and the steering groups for the individual Rhine tributaries.

The progress of the studies regarding the Rivers is outlined in the [Knowledge Agenda](#) (components R1-8).

Long-term river widening ambition for the Rhine and Meuse

The manner in which the long-term river widening ambition is realised is outlined under Rivers-Rhine, [paragraph 2.3.3](#). With respect to the Meuse, the ambition pertains to the entire Meuse (Meuse valley and dyked river Meuse together). On this basis, in the first half of 2018 the central government and the region will formulate a feasible and widely supported joint ambition regarding river widening (in interconnection with dyke improvement) for the long term, translated into a flood level reduction (stage line) up to 2050 and beyond. A point for attention in the Meuse ambition is the set of compensating measures related to terminating the overtopping capacity of the flood defence systems in Limburg (transmission effects).

Updating of preferential strategy

The preliminary results of a study into the difference between the current flood probability and the new standards show that the taskings resulting from the new flood risk management standards in force along the dyked river Meuse vary more than was assumed when drawing up the preferential strategy. In addition, both the dyked river Meuse and the Meuse valley appear to be faced with increased strength issues (piping). Furthermore, discharge volumes from Belgium are expected to increase under extreme conditions. This may affect the ratio between dyke improvement and river widening. The parties along the Meuse valley and the dyked river Meuse will use these outcomes to update the preferential strategy. In addition, the region and the central government will draw up a strategic framework for the coordination of future river widening and dyke improvement measures.

Study into cost reduction of dyke improvements by river widening

Researchers have collected considerable additional data (see above) in order to be able to determine the cost savings that river widening will generate for dyke improvement measures. According to a first analysis by the Ministry of Infrastructure and the Environment, the savings generated by river-widening measures along the Meuse and along the Waal appear comparable. In the Meuse valley, river widening will generate additional savings on the additional dyke extensions needed for the dykes to continue to link up with the elevated soils, even at higher water levels.

Improvement of Meuse transmission effects

The adoption of the new standards has terminated the requirement that the flood defence systems in the Meuse valley must be able to withstand overtopping, subject to the precondition of compensating measures being taken. Without compensation, water levels in the Meuse valley and the dyked river Meuse will rise. Further research shows that this unwanted effect can be compensated by dyke relocations and retention areas along the Meuse valley. These aggregate measures are designated as “improvement of Meuse transmission effects”. Depending on the decisions to be made in October 2016 on the basis of the Regional Proposal for the Meuse, four comprehensive dyke relocation explorations (Arcen, Venlo-Velden, Well, and Baarlo) and one retention area exploration (Thorn) will be launched in combination with Flood Protection Programme projects. A MIRT Study is considered regarding a sixth location (Lob van Gennep retention area). The other measures aimed at improving the transmission effects have not yet been scheduled.

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Regional Proposal for the Meuse and Adaptive Implementation Strategy for the Meuse

In the autumn of 2016, the Meuse Delta Programme Steering Group will present a joint proposal for measures along the dyked river Meuse and the Meuse valley up to 2028: the Regional Proposal for the Meuse. The steering group will ensure that the proposed measures comply with the Adaptive Implementation Strategy for the Meuse that is also being prepared. This implementation strategy sets out – on the basis of the aforementioned river widening ambition – the measures up to 2050, the scheduling of the measures, the roles of the parties involved, and the incorporation of new insights. The strategy will be completed in 2018.

Meuse river widening pioneer projects

The preparation of flood risk management measures for six sections of the Meuse is in full swing. On 5 November 2015, the parties in the MIRT South Consultation Committee approved three MIRT Studies, involving Venlo, Ravenstein-Lith, and Maastricht. In addition, studies have been launched for Den Bosch Meuse Bank Park, Oeffelt-Vortum, and Ravenstein Waterfront. The Regional Proposal for the Meuse comprises proposals for MIRT explorations that can commence in the autumn of 2016. The measures outlined in the proposal are effective with respect to flood risk management, provide opportunities for synergy and linkage, and offer options for (co) funding.

Assessment of Flood Protection Programme measures

Many dykes in the northern and central parts of Limburg fail to meet the standards. The required dyke improvements are largely outlined in the Flood Protection Programme for the period beyond 2016. For each project, the Meuse Delta Programme Steering Group has assessed whether the dyke improvements fit in with the long-term strategy. At a number of locations, the dyke improvement can go ahead as planned. Other locations require a more comprehensive exploration phase, as the envisaged measures are interconnected with measures to compensate the effect of terminating the overtopping capacity of the Limburg flood defence systems (see paragraph above).

Progress of measures: spatial adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Climate-resilient Land van Cuijk impact project

Since 2015, five municipalities in the Land van Cuijk area, the Aa and Maas district water board, and the province of Noord-Brabant have been working on climate-proofing the Land van Cuijk. The parties are using the Spatial Adaptation Guide that offers assistance in climate-proof and water-resilient planning (www.ruimtelijkeadaptatie.nl/en). The pilot comprises the embedding of climate adaptation in the methods and procedures of the organisation, and raising awareness among residents.

Sittard-Geleen stress test

Together with the district water board, the municipality of Sittard-Geleen has conducted a stress test light to map out the effects of climate change with respect to drought, heat, pluvial flooding, and floods (www.ruimtelijkeadaptatie.nl/en). The study constitutes the first step of the “**Analysis-Ambition-Action**” process aimed at climate-adaptive planning. In a climate adaptation workshop, municipal officials and district water board staff have discussed the climate impact and the urgency. The results are presented in the report entitled *Klimaateffecten Sittard-Geleen* [Climate Impact on Sittard-Geleen].

Progress of measures: freshwater supply to the area around the major rivers-South

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#) and the progress at the Elevated Sandy Soils, [Paragraph 2.3.8](#).

Study into Meuse-Waal connection

In 2015, Rijkswaterstaat embarked on the study into the measure concerning the Waal to Meuse water supply at low discharge. This study maps out the costs and benefits of this measure. In addition to the benefits for part of the Meuse catchment area (particularly for drinking water intake and agriculture), it also examines potential damage elsewhere, taking account of the different utility functions (such as shipping and agriculture). The first step involved drawing up the water balance of the Lith and Grave backwater sections, and examining the usefulness and necessity of drinking water intakes from the Bergsche Maas. The study will be completed in 2018. If the benefits turn out to outweigh the costs, the measure will qualify for scheduling in the Delta Plan on Freshwater Supply and a follow-up study will be conducted.

Irrigation freshwater supply measure

In the southern part of the freshwater supply region around the major rivers, a study is being conducted into efficient irrigation (or equivalent technologies) of approx. 300 hectares of high-grade crops (fruit culture, arboriculture, and horticulture). The parcels are situated in the Land van Maas en Waal (priority) or in the Bommelerwaard, the Rijk van Nijmegen, or the Land van Heusden en Altena. A project team has been set up with representatives from the Rivierenland district water board, the Dutch Federation of Agriculture and Horticulture (LTO), and consumers with high-grade crops. In 2016-2017, the district water board will make an incentive scheme available for which farmers may apply. The Southern Agriculture and Horticulture Organization (ZLTO) and the district water board will gauge the desirability and potential of such a scheme among businesses. The scheme is expected to go into effect in 2017.

2.3.5 Southwest Delta

Implementation of Delta Decision on the Rhine-Meuse delta

For a description of the Delta Decision on the Rhine-Meuse delta: see [DP2015](#). During the past year, the implementation of this Delta Decision has generated new progress information, including information about the Locks Plan (see [Rhine Estuary-Drechtsteden](#)). Information about the decision on Sand (progress of Coastal Genesis II study) is provided in the paragraph on the [Coast](#).

Implementation of preferential strategy for the Southwest Delta

For information on the preferential strategy for the Southwest Delta: see [DP2015](#).

The preferential strategy for the Southwest Delta is aimed at achieving a climate-proof, safe, ecologically resilient, and economically vital delta. This interconnectivity determines the choice and implementation of measures in the Southwest Delta. Key components are the development of Grevelingen and the Volkerak-Zoommeer lake, and the measures to future-proof the freshwater supply in the Southwest Delta. Along the coast and in the Oosterschelde, flood risk management continues to be based on the concept of “flexible where possible, rigid where needed”, linking up with ecological and spatial ambitions wherever possible. A new feature in the preferential strategy is the spatial adaptation tasking, which the authorities are actively addressing. The preferential strategy for the Scheldt estuary will be optimised, with effect from 2018, on the basis of the new insights which will be provided by the Dutch-Flemish Agenda for the Future.

The progress of studies involving the Southwest Delta is outlined in the [Knowledge Agenda](#) (components ZWD1-5).

National framework vision for Grevelingen and Volkerak-Zoommeer lake

The central government, the provinces, and civic society parties are working on business cases and funding strategies for the measures required to restore limited tidal movement in the Volkerak-Zoommeer lake and the Grevelingen. Such measures will improve water quality, create room for robust nature and sustainable tidal energy, and boost the regional economy. Following these measures, the Volkerak-Zoommeer lake will salinise again. Decisions on the finalisation of the national framework vision for Grevelingen and the Volkerak-Zoommeer lake are expected to be made at the end of 2016 and depend on the funding of the required measures.

Scheldt estuary: Agenda for the Future

The Agenda for the Future of the Flemish-Dutch Scheldt Commission aims to further reinforce the balance between safety, natural development, and accessibility in the Scheldt estuary. This agenda kicked off in 2014 with a research programme that continues up to 2018. At the end of 2016, an interim review will be conducted in concert with the stakeholders. The organisation and working methods adopted in the Scheldt estuary can serve as a source of inspiration for other water systems with similar cross-border issues. This interim review will be the theme of the Scheldt Symposium that will take place in the autumn of 2016.

Energy from water

The Southwest Delta is pre-eminently suited to experimenting with new technologies. This may produce significant export products. Such opportunities are arising, for example, at the Flakkee sluice that is being activated again. This will improve the water quality in the eastern part of the Grevelingen area. Private parties will have the opportunity of setting up a Tidal Testing Centre at the sluice to test various technologies for generating energy from water. Technologies that turn out successful can be put to large-scale use elsewhere. Expectations are that the sluice will be operational in 2017.

In addition, in September 2015 a pilot was launched involving the placement of five turbines in the Oosterschelde storm surge barrier to generate tidal energy. A key condition is that the Oosterschelde storm surge barrier can continue to fulfil its main purpose: closing if required with a view to flood risk management. Together with nature organisations, the initiators are examining the impact on nature, in order to determine the feasibility of future expansion within the flood risk management precondition. The initiative lies with private parties; government authorities merely facilitate. Once tidal movement is restored in the Grevelingen, the passage in the Brouwersdam will also offer opportunities for generating energy from water. A business case has been formulated for a potential tidal centre in the Brouwersdam.

The know-how amassed through these experiments will contribute to the Dutch hydraulic expertise and can also be applied abroad.

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Doing More With Dykes

In the Doing More With Dykes project, the Zeeland Flood Defence Systems consultative body is exploring the linkage opportunities for dyke sections facing improvement or spatial taskings. A top-10 of potential locations in Zeeland has been compiled to this end. An example of a potential linkage location is the Sint-Annaland port front. Urban development is scheduled for the quays to be improved, and immediately behind the dyke; for that reason, dyke improvement should be tackled rather urgently. The same goes for the area around the Vlissingen locks (Arsenaal and port) and the dykes near Borssele. The region is also exploring, in relation to the Flood Protection Programme schedule for 2017-2022, whether implementation of these projects can be accelerated.

Oosterschelde Integrated Safety

The Oosterschelde Integrated Safety MIRT study commenced in 2015. The study maps out the most appropriate measures for ensuring long-term safety. Such measures may concern the Oosterschelde storm surge barrier, the dykes along the Oosterschelde, and sand replenishment on the foreshores and shoals. Opportunities for nature and the economy are factored in. The study will be completed by the end of 2016. The Oosterschelde Sand Demand MIRT exploration was completed at the end of 2014. In line with the preferential strategy, the impact of sand demand can be counteracted by sand replenishment in intertidal areas. Sand replenishment at the Roggenplaat shoal will commence in 2017-2018. Funding has been provided by the central government, the province, municipalities, civic society partners, and residents (through crowdfunding). The regional contributions include a pending EU subsidy. The other areas are covered by the Oosterschelde Integrated Safety MIRT Study.

Progress of measures: spatial adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Climate adaptation in Zeeland

The province of Zeeland is working on the Zeeland Climate Adaptation programme within a comprehensive coalition. In mid-2015, various authorities in Zeeland endorsed the Climate Adaptation in Zeeland project brief. One of the goals of the project is to develop a climate test for flood risk management, pluvial flooding, drought, and heat stress, using the existing tools. The Zeeland Waste Water Chain Collaborative (SAZ) is involved as a key data supplier. The aim is to come up with a simple test that is fully supported by the authorities involved. The test will also be suitable for mapping out climate adaptation taskings in spatial plans and visions at an early stage, and for taking climate adaptation into account in new construction and restructuring projects. In 2016, pilots will be conducted on the former island of Noord-Beveland and the Walcheren peninsula. In the period from 2016 to 2020, all the municipalities in the province of Zeeland will be subjected to a climate test.

Area elaboration regarding vital and vulnerable functions in Zeeland

A component of the approach adopted in Zeeland is raising flood awareness among vital and vulnerable functions. To this end, meetings have been held with representatives of such companies. A next step involves determining which second layer spatial planning measures could reduce the impact of a flood. Making more efficient use of secondary dykes appears promising in this regard. In the years ahead, the province of Zeeland will be updating the regional flood defence systems and the associated standards for each dyke ring.

Zeeuws-Vlaanderen Robust Water System impact project

This project is aimed at developing a sustainable and climate-resilient water system that is optimally subservient to the infrastructure in the region and that enhances the vitality of the area. To this end, the participating parties intend to share knowledge and experience. To facilitate this exchange, they have developed a wiki that connects information on the Internet and thus generates new insights. The wiki went online in mid-2016. It is used to give a workshop to present the robust water system concept to a wider public.

Progress of measures: freshwater supply in the Southwest Delta region

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#).

Freshwater supply measures

An important first step required for the alternative freshwater supply necessitated by the salinisation of the Volkerak-Zoommeer lake is the Roode Vaart transfer in the heart of Zevenbergen. This no-regret measure also improves the current freshwater supply in West-Brabant. The measure is being prepared by the municipality of Moerdijk and the Brabantse Delta district water board. In 2015, the municipality amassed building blocks for a detailed design and planning, through an interactive process involving residents. Optimisation of the design has created options for extended gravity water intake, thus reducing management and maintenance costs. Realisation will take place no later than in 2018.

The optimisation studies for the West-Brabant, Tholen and St. Philipsland Passage measure have been completed. They have given the region a picture of potential cost savings. The opportunities will be elaborated in the course of 2016 and set down in the Collaborative Agreement, as was agreed in the administrative agreement on freshwater supply of March 2015.

Water availability pilots

The provinces of Zeeland, Zuid-Holland, and Noord-Brabant have each drawn up an action plan for the elaboration of water availability, together with the district water boards and in consultation with consumers. In the Rietkreek water availability pilot, the Brabantse Delta district water board, in conjunction with farmers, is exploring opportunities for water preservation and joint optimisation of the regional water system. The parties will use this study as a basis for setting down agreements, no later than in 2018, on responsibilities for water availability in the area.

Rijkswaterstaat is conducting a pilot to map out water availability through the Haringvliet, Hollandsch Diep, and Spui. The pilot takes account of the drinking water supply, nature, industry and the relation to the Brielse Meer lake. In the context of this water availability pilot, the need for information has been surveyed, and analysis and visualisation tools have been developed. Based on the recommendations of the scientific advisory group and comments of the consumer advisory group, the preferential direction has been determined for a methodology and a tool for presenting statistic results to consumers. The pilot was continued in 2016.

Zeeland freshwater testing ground innovative climate adaptation pilot

The parties involved in the Zeeland Freshwater testing ground are elaborating opportunities for enhancing the coping capacity of individuals by expanding the availability of freshwater and reducing the freshwater dependency of saline areas. To this end, tests are conducted involving expansion of freshwater storage in the soil and expansion of the rainwater lens. This will significantly enlarge the subsoil freshwater volume. The freshwater-saltwater mapping, reflecting the subsoil saltwater distribution for the entire province of Zeeland, will be available via the websites of the province and the district water board at the end of 2016.

The GO-FRESH II project is continuing the research into three forms of subsoil water preservation and the monitoring of three pilot projects: Freshmaker (replacing saline groundwater by freshwater), inversion ridge infiltration (adapted weir management to lower the freshwater-saltwater interface) and Drains2buffer (deep drainage to expand the rainwater lens). The study pertains to technological feasibility and economic efficiency. In addition, an exploration will identify the locations in the vicinity of Dow Chemical in Terneuzen that qualify for natural pre-purification of slightly brackish surface water using a helophyte filter, and how such water may be used. In 2015, a field test was conducted involving the upgrading of different potato varieties to raise their salt tolerance. The dry spring hampered the success of the test. For that reason, the test set-up for 2016 has been adapted: the plants will be subjected to increased salt conditions earlier in the growing season.

2.3.6 Coast

Implementation of the decision on Sand

The essence of the Delta Decision on Sand is keeping the sand balance along the Dutch coast up to par by means of sand replenishment. For a description of the decision on Sand: see [DP2015](#). During the past year, the implementation of this decision has resulted in the design and implementation of the Coastal Genesis II research programme.

Coastal Genesis II

Coastal Genesis II is a long-term research programme focused on sand transport along the Dutch coast. The programme addresses the demand for knowledge regarding area preservation, coastal safety, ecology, and spatial planning on a “learning by working” basis. Rijkswaterstaat set down an action plan in 2016, focused on the demand for knowledge regarding the coastal foundation and on the exchange with tidal inlet/outlet systems, as a basis for long-term area preservation and coastal safety. A number of sub-studies have already been marketed. With respect to the remaining studies, the parties involved (district water board, the province, a university, the business community, and Rijkswaterstaat) have expressed their intention to secure joint funding. Various sub-programmes of the Interreg project Building with Nature will involve international collaboration. The demand for knowledge on the topics of “ecology”, “implementation”, and “economy and use” will need to be tackled by the partners in the National Water and Climate Knowledge and Innovation Programme (NKWK). The parties represented on the National Consultation Committee on the Coast (LOK) will also be involved.

Implementation of the preferential strategy for the Coast

For information on the preferential strategy for the Coast: see [DP2015](#).

The preferential strategy for the Coast focuses on a safe, appealing, and economically viable coast by connecting the flood risk management tasking with spatial ambitions. The intention of the Minister of Infrastructure and the Environment to expand the scope for construction in the coastal zone has caused a heated discussion. The Minister and the coastal partners involved are now jointly examining the options for keeping the coast safe and concurrently enhancing its appeal and economic strength. For the time being, the integrated tasking set out in the National Coastal Vision will remain the point of departure for the preferential strategy. The decision on Sand, based on the principle of “flexible where possible, rigid where needed”, continues to be of importance in this respect.

The progress of studies concerning the Coast is outlined in the [Knowledge Agenda](#) (components Sand 1-2).

Coastal Pact

Various parties are drawing up a “Coastal Pact” for the coast: provinces, municipalities, and district water boards represented on the National Consultation Committee on the Coast, representatives of the “Protect the Coast” coalition (such as Natuurmonumenten, Zeeuwse Milieufederatie, and Natuur- en Milieufederatie Zuid-Holland), Stichting Natuur en Milieu, the recreational sector, drinking water companies, the Ministry of Infrastructure and the Environment, and the National Landscape and Water Consultant. The Coastal Pact pertains to the coast in a broad sense and also addresses issues regarding, in particular, recreational facilities inland from the coastal foundation. The parties are thus substantiating the promise made by the Minister of Infrastructure and the Environment to the House of Representatives*.

* promise made by the Minister of Infrastructure and the Environment to the House of Representatives [Parliamentary Document 29383, no. 253 \(in Dutch\)](#).

Zeeland Coastal Vision

On 9 March 2016, the province of Zeeland initiated its plan for a coastal vision, to be drawn up in collaboration with the municipalities on the North Sea coast, nature and environmental organisations, tourist interest groups, the Southern Agriculture and Horticulture Organization ZLTO, Rijkswaterstaat, and the district water board. The vision will focus on three taskings faced by the Zeeland North Sea coast: preservation and improvement of the dykes and beaches, nature and landscape values, and the future of the recreational sector. The coastal vision will be completed by the end of 2016 and will underpin the new provincial environmental vision that will take effect in 2018.

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

West-Zeeuws-Vlaanderen Weak Link

The improvement of the flood defence system near Cadzand Bad in Zeeland was completed in early 2016, as one of the five sub-projects of the West-Zeeuws-Vlaanderen Weak Links programme. The current flood defence system meets the standard. Through a public-private cooperation structure, the improvement has been combined with the construction of a marina which is expected to be put into operation in the autumn of 2016. The Waterdunen project, involving dyke improvement, the construction of a climate adaptation dune, and a nature and recreation project, has also been completed albeit with a slight delay. This marks the consolidation of the West-Zeeuws-Vlaanderen Weak Link.

Zuid-Holland coastal measures

In the province of Zuid-Holland, a programme will be initiated in the Meijndel area to monitor the development of artificial inlets in the sea strip. Near Ter Heijde, the effects of dune compensation on behalf of the Maasvlakte extension and of the Sand Engine are monitored. This will generate a picture of the consequences for flood risk management and the natural values.

Schouwen coastal pearl

Sand replenishment on the Kop van Schouwen beach will be skipped just once in order to examine whether this will have a positive impact on the coastal nature (Natura 2000 area) and in particular on the rejuvenation of the dunes. The sand saved will be deposited on the recreational beach near the Brouwersdam, co-funded by the region. The effects of the measures will be monitored.

Progress of measures: spatial adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Den Helder testing ground

This testing ground has explored options for multi-layer flood risk management. The water tasking in Den Helder can be hooked up with the improvement of spatial quality through the realisation of a climate adaptation dyke with a residential and storage function.

2.3.7 Wadden Region

Implementation of the decision on Sand

The essence of the Delta Decision on Sand is that sand replenishment will be used to preserve the sand balance along the Dutch coast. For a description of the decision on Sand: see [DP2015](#). The past year, the implementation of this decision generated progress information regarding Coastal Genesis II (see Coast, [Paragraph 2.3.6](#)).

Implementation of preferential strategy for the Wadden Region

For information on the preferential strategy for the Wadden Region: see [DP2015](#).

The preferential strategy for the Wadden Region is aimed at the preservation of the buffering function of islands, outer deltas, and intertidal areas. Measures for maintaining the sand balance along the coast and its Wadden Sea basins, innovative flood defence systems, and an integrated flood risk management strategy for each Wadden island are developed and integrated in an interconnected manner. The integrated approach adopted for dyke improvements has already produced illustrative examples, as has the application of innovations. The Coastal Genesis II research programme has not been fully consolidated for the sand system. Pilots involving channel margin replenishments are being prepared. The De multi-layer flood risk management study for the Wadden islands has been completed and constitutes the basis for an integrated strategy for each individual island.

The progress of studies regarding the Wadden Region is outlined in the [Knowledge Agenda](#) (components W1-6).

Sand strategy

Two pilots involving channel margin replenishment are being prepared for the islands of Vlieland and Ameland. Their implementation will commence no later than in 2017. The aim is to gain insight into sand transport between the coastal foundation, the tidal inlets and outlets, and the basins. A number of knowledge issues from the Delta Decision on Sand have already been formulated in the [Coastal Genesis II](#) research programme, but not yet consolidated in financial terms. This knowledge is required in order to be able to make integrated decisions on large-scale replenishment pilots and beach replenishment management beyond 2021. Within the framework of collaboration around the North Sea, the Interreg project Building with Nature was rolled out in the spring of 2016, involving research into sand movements following replenishment in the Wadden Sea sand system. This project comprises a comparison of international know-how on the effectiveness of replenishment, with a focus on learning with respect to the volume, timing, and location of replenishments.

Wadden Sea dykes general exploration – innovative dyke concepts

The first phase of the Wadden Sea dykes general exploration has been completed. During this phase, the three northern district water boards have elaborated promising solution strategies in concert with other regional authorities, market parties, knowledge institutes, and stakeholders. The second phase, that will run up to 2018, will involve the testing and examination of twelve solution strategies. These concern new dyke concepts, the use of materials, and hydraulic preconditions. The studies will be linked to dyke improvements scheduled for dyke section 6 (Wadden coast). The end product will be solution strategies for the Wadden Sea dykes that are widely supported at the administrative level and that may possibly also be applicable elsewhere.

The dyke improvement along the Eems-Dollard (from Eemshaven to Germany) is geared to the improvement of the estuary wherever possible. The focus is on the collection and utilisation of sediment. In the Kleirijperij pilot, various sediment flows are subjected to individual treatments in order to examine whether they can be processed into suitable dyke clay and explore possible other uses. The Wide Green Dyke pilot along the Dollard involves dyke improvement by levelling off the outside bank using these treated sediments.

Process innovation – new dyke concepts

1	Wide Green Dyke
2	Dyke with forelands
3	Rich dyke
4	Dyke able to withstand overtopping
5	Channel management
6	Double dyke
7	Multi-functional dyke

Product innovation – testing of materials

8	Grass and clay cladding
9	Asphalt cladding
10	Stone cladding

Hydraulic preconditions – review of calculation models and design tools

11	Risk analysis of HR models, including secondary loads
12	Effectiveness of forelands

Innovation of Wadden Sea dykes

More information regarding these innovations is available on the website of the [Wadden Sea dykes general exploration](#).

Study into a sand engine for the Wadden Region (SEAWAD)

If we allow Nature to run its course in the Wadden Region, the coast off the Wadden islands will eventually erode and the sand will be deposited in the Wadden Sea. For that reason, the Wadden islands are regularly subjected to sand replenishment. In September 2015, researchers from three universities embarked on SEAWAD: a four-year research project focused on exploring whether a huge sand replenishment at the islands' seaward side will produce the same result. With SEAWAD, the research institutes are addressing a key question from the preferential strategy for the Wadden Region.

Progress of measures: flood risk management

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Eemshaven-Delfzijl dyke improvement

In 2016, the Eemshaven-Delfzijl dyke improvement will be implemented ahead of schedule, in order to earthquake-proof this dyke and have it meet the standard. The province, municipality, district water boards and the central government have agreed that innovative dyke concepts will also be used. At the end of 2015, they signed agreements regarding three linkage projects to the dyke improvement (a "rich dyke", a bicycle lane, and a "double dyke"), linkage with the urban beach, and a project involving Delfzijl-Noord yet to be substantiated. The agreements set out how the province and municipality will contribute to the linkage projects, in order to enable the implementation of these projects to commence in interconnection with the dyke improvement.

Progress of measures: spatial adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Multi-layer flood risk management on the Wadden islands impact project

A scenario study involving a sample island examined what can go wrong in the event of a flood. The sample island comprises the coastal protection features of all the Wadden islands. The flood simulation, based on past experience, maps out the vulnerable locations and situations with respect to accessibility, crisis management, and the time-lag of a flood. The study shows how island residents jointly cope with the initial impact of floods and flood risks. In 2017, an integrated strategy for each island will be developed based on this scenario study. The strategy offers solutions for coping with the effects of floods that span a longer period of time (such as emergency shelters on the islands), connections with the mainland (accessibility of ferry causeways), and sustainable management of a dynamic coastal zone (dune management, wash-overs).

Progress of measures: IJsselmeer freshwater supply region

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#).

Natural planning of Dwarsdiep area

The Natural planning of the Dwarsdiep measure features in the spatial organisation plan for the Zuidelijk Westerkwartier in Groningen, which is yet to be drawn up. In 2016, a preliminary study will be conducted into the options for water preservation on the flanks of the stream valley. The outcomes will serve as a building block for the spatial organisation plan.

2.3.8 Elevated Sandy Soils

Implementation of the preferential strategy for the Elevated Sandy Soils

For a description of the preferential strategy for the Elevated Sandy Soils: see [DP2015](#).

The preferential strategy for the Elevated Sandy Soils involves saving water (economical use and preservation), optimising the current water supply, and adapting to the consequences of climate change. The district water boards are conducting pilots to explore water availability. The region is also sticking to its intention of realising its additional ambition in terms of measures, and is seeking funding among all the signatories to the administrative agreement. In addition, the region has drawn up a regional Knowledge Agenda, geared to the national Freshwater Knowledge Agenda. The regional agenda interlinks water shortage, pluvial flooding, and water quality.

The progress of the studies concerning the Elevated Sandy Soils is outlined in the [Knowledge Agenda](#) (component HZ1).

Water availability

The Regional Consultation Committee for the eastern region has set down how water availability will be substantiated; the provinces of Noord-Brabant and Limburg have done so for the southern region. In 2016 and 2017, the district water boards will be exploring the procedures in pilot areas, under the direction of the provinces. The main point of attention is communication with the users. The results are intended to be used for the evaluation in 2018. Depending on the outcomes of the pilots, the substantiation will cover the entire area. Wherever possible, the measures will link up with ongoing processes, such as implementation under the Desired Ground and Surface Water Regime (GGOR), the Framework Directive on Water, and the updated water level ordinances.

Water availability in pilot areas

In the eastern region, two pilot areas have been set up to elaborate water availability. The Drents Overijsselse Delta district water board is conducting a pilot for the Oude Diep, linking the water availability issue to the optimisation of the sub-basin. The Rijn en IJssel district water board is elaborating water availability for the Berkel, underpinned by economic data from Imprex*. In both processes, the dialogue with users is the central point of focus.

The southern region is working on water availability in several ways. In Limburg, consultations between consumers and umbrella organisations will commence. In parallel, in-depth studies are conducted in two pilot areas. Noord-Brabant is developing various building blocks, such as water level ordinance targets in areas with gravity driven drainage, new irrigation policy, and a distribution priority sequence differentiated at the regional level.

* Imprex

IMPRES: Project Improving predictions and management of hydrological extremes (see www.imprex.eu)

Progress of measures: Elevated Sandy Soils freshwater supply region

For an overview of measures: see [Delta Plan on Freshwater Supply \(Appendix II\)](#) and [factsheets](#) on the Elevated Sandy Soils measures.

Knowledge Agenda

The eastern and southern regions are drawing up regional Knowledge Agendas that tie in with the national Knowledge Agenda. The regional agendas focus on the examination of the effects of the aggregate measures: on the water system as a whole, water availability, the costs and benefits, and the contributions to other regional aims and objectives. In the agendas, the regions interrelate water availability with pluvial flooding and the taskings and measures pertaining to water quality.

Lumbricus and testing grounds

In 2016, the Lumbricus programme was rolled out in the eastern and southern regions, as a sub-programme of the national Soil and Subsoil Knowledge and Innovation Programme (KIBO). In this context, knowledge regarding the interconnectivity between soil, freshwater, and subsoil is being developed and applied in testing grounds. Testing grounds in the southern region are the sub-areas of Agger, Raam, and Groote Molenbeek; in the eastern region, the Vecht between Junne and Hardenberg serves as a testing ground. Responsibility for the testing grounds lies with the relevant district water boards.

Freshwater measures

The eastern and southern regions have set up project initiation meetings to mark the transition from planning to implementation. In the eastern region, municipalities and consumers (agriculture, area managers, private land owners, and drinking water companies) account for a considerable share in the set of measures, along with the district water boards and provinces. In the southern region, the provinces and district water boards have earmarked 20% of the total Elevated Sandy Soils implementation budget for parties that have not yet pledged a financial contribution in the administrative agreement, such as municipalities and freshwater users (nature, agriculture, industry, water plants). The provinces of Noord-Brabant and Limburg have created a subsidy scheme to this end; in 2016, initiators could submit applications in two rounds. In the eastern region, 16 pilots will be conducted up to 2017, focused on various issues such as the use of effluent from a sewage water purification plant, more efficient water and soil management on estates, the conversion of coniferous forests into deciduous forests, and adaptation of the urban water system. Three pilots will be co-funded from the Delta Fund.

In 2017, the central government will expand the water supply from the Zuid-Willemsvaart via the Noordervaart to the Peel area to a minimum of 5,4 m³/s. The district water boards are preparing the optimisation of the water distribution across the hinterland, including local measures to the water supply system.

Innovative climate adaptation pilots

The goal of the Elevated Sandy Soils South Sub-irrigation pilot is to optimise drainage systems by letting in shallow groundwater (“drainage 3.0”). The system appears to offer prospects for improving the water balance in the soil. More calculations and a field test are scheduled for the year ahead. Knowledge development takes place in interconnection with the Lumbricus programme.

At the Elevated Sandy Soils East, the innovative climate adaptation pilot involving sub-infiltration with effluent has been successfully completed. The drinking water sector and STOWA have indicated that they would like to be involved in the follow-up scheduled for 2017. At the Smart Weir (Sawax Weir), which has been operational for a year now, the focus in 2016 is on monitoring the effects. In the Zutphen Water Distribution pilot near the town of Zutphen, authorities and residents are seeking, inter alia, possibilities for enhancing the quality of the living environment, for example with wet nature.

Progress of measures: Spatial Adaptation

For an overview of measures: see [Delta Plan on Flood Risk Management \(Appendix I\)](#).

Hoogeveen climate-adaptive city impact project

The municipality of Hoogeveen aims to develop a strategy for climate-proofing the town centre. The municipality and the district water board have conducted a stress test in order to gain a picture of the issue. At the end of 2015, they organised a master class for staff working in the fields of greenery, sewerage, water, and spatial planning. In three meetings, the participants became acquainted with all the aspects of climate adaptation, explored potential adaptive measures, and field-tested measures. This turns out to be a suitable formula for municipalities to substantiate the “Ambition” with their own organisation in a practical manner.

Climate-active cities (KAS)

The municipalities of Almelo, Enschede and Hengelo, the Vechtstromen district water board, and the province of Overijssel have joined forces in order to limit the impact of climate change in and around cities. In Enschede, a study is underway into options for developing the Enschede Stadsbeek [Urban Brook] water corridor in combination with improving spatial quality.

Hunze climate buffer

The Hunze climate buffer has been rounded off. At various locations along the Ruiten Aa, the Hunze, and the Drentse Aa the brook is meandering again and new wet nature has been developed. The aim is to counteract pluvial flooding and drought, and reinforce nature.

2.4

Initial elaboration of the “monitoring, analysing, acting” system

The Delta Programme has adopted an adaptive approach: reviewing choices and plans, and adapting if developments so require. The themes of flood risk management, spatial adaptation, and freshwater supply are addressed in an interconnected manner, as are the regions, in order to ensure a consistent and efficient approach. In addition, the efforts are coordinated with the implementing organisations and the umbrella organisations of the regional and local governments.

To substantiate this process, the Delta Programme is developing the “monitoring, analysing, acting” system. [DP2016](#) has set down the outlines of this system and the past year saw an initial elaboration. The Netherlands Environmental Assessment Agency, the University of Amsterdam, and Delft University of Technology have jointly produced an advisory report* on the subject.

* advisory report

Koers houden in de delta. Ontwerp van een monitoring- en evaluatiekader voor het Deltaprogramma. [Staying on track in the delta. Draft monitoring and evaluation framework for the Delta Programme.] See www.pbl.nl/publicaties.

Monitoring and evaluation along two lines

The goals of the “monitoring, analysing, acting” system (MAA) are:

1. keeping a finger on the pulse to enable timely adjustment (essential to the adaptive approach of the Delta Programme);
2. safeguarding the dynamics of the joint learning process by sharing experiences and successes;
3. providing a basis for giving an external account regarding the progress of the Delta Programme and for the external justification of the resources spent.

The focus is on the following questions:

- Are we doing what we agreed to? (output)
- Are we thus achieving our goals? (outcome)
- Are the preconditions still in order? (input for follow-up)

The MAA system uses two lines to provide the answers to these questions. The “blue line” is used to map out whether the elaboration and implementation of Delta Decisions, preferential strategies, and Delta Plans are proceeding as planned and are on schedule. The “green line” is used to identify any developments that might affect the elaboration, implementation, and possible adjustment of the preferential strategies and Delta Plans: are we on track?

Blue line: are we still on schedule?

As a first step, the blue line indicates whether we are living up to our commitments: is the implementation on schedule (output) and are we achieving our goals (outcome)? The output pertains, in particular, to the agreements contained in the Delta Plans and the preferential strategies; the outcome concerns the goals set out in the Delta Decisions and the preferential strategies.

The input is also considered: are the preconditions still in order for the follow-up? This step calls for information across the entire spectrum of the Delta Programme regarding funding, expertise, and confidence in the effectiveness of the collaboration. In 2016, a pilot was conducted in the IJsselmeer Region to gauge the confidence in the collaboration. This pilot may possibly be expanded to other regions in 2017.

Within the MAA system, information is categorised under the themes of flood risk management, freshwater supply, and spatial adaptation, and the cross-theme of “connecting water and spatial planning”. Connecting water and spatial planning (“linkage”) is a key ambition for each of the three themes of the Delta Programme. Linkage involves the mutual interaction among the three themes, and the interaction with themes beyond the Delta Programme, such as shipping, urban construction projects, recreation, and nature. Options for the monitoring and evaluation of the “linkage” ambition are explored for each of the three themes. Maps present examples of projects related to the three themes and the cross-theme (maps 1 to 3).



Figure 9

The blue line: “Are we still on schedule?” provides information on the output and outcomes of the Delta Decisions, preferential strategies, and Delta Plans.

The Delta Programme has set up a “Strategy and Implementation” *Community of Practice* that reviews the progress of the preferential strategies and Delta Plans several times a year, and shares knowledge and experience. The Delta Programme annually reports on its progress: in Chapter 2 on the Delta Decisions and preferential strategies, and in the Appendices on the Delta Plans.

Green line: are we still on track?

The green line is used to gain insight into developments that may necessitate refinement or adjustment of choices made earlier. This involves the systematic monitoring of three categories of developments:

- “knowledge and innovation”: for example, new know-how regarding dyke strength (“proven strength”), the elevation of the river bed in the upstream part of the major rivers, the cost effectiveness of river widening, the discharge distribution across the Rhine tributaries, soil subsidence;
- “climate and socio-economic developments”: for example, the new Prosperity and Living Environment scenarios, new climate scenarios, global mitigation agreements set down during the Paris climate summit, new insights into depopulating areas;
- “societal preferences”: for example, the decision to have the Delta Programme tie in more closely with adjoining policy fields, such as water quality and the Major Waters Nature Ambition, new options such as placing pumps on the Houtrib dyke, and the Locks Plan.

A Signal Group of external experts will be set up to analyse which information is of relevance to the Delta Programme. This group will meet once or twice a year. The results of the analyses will be discussed in the “Community of Knowledge”, the existing Delta Programme Knowledge Network, comprising representatives of the themes, the regions, and knowledge institutes.

The Signal Group will initially focus on “knowledge and innovation” and “climate and socio-economic developments”. The feasibility and desirability of a similar working method for “societal preferences” will be reviewed at a later stage.

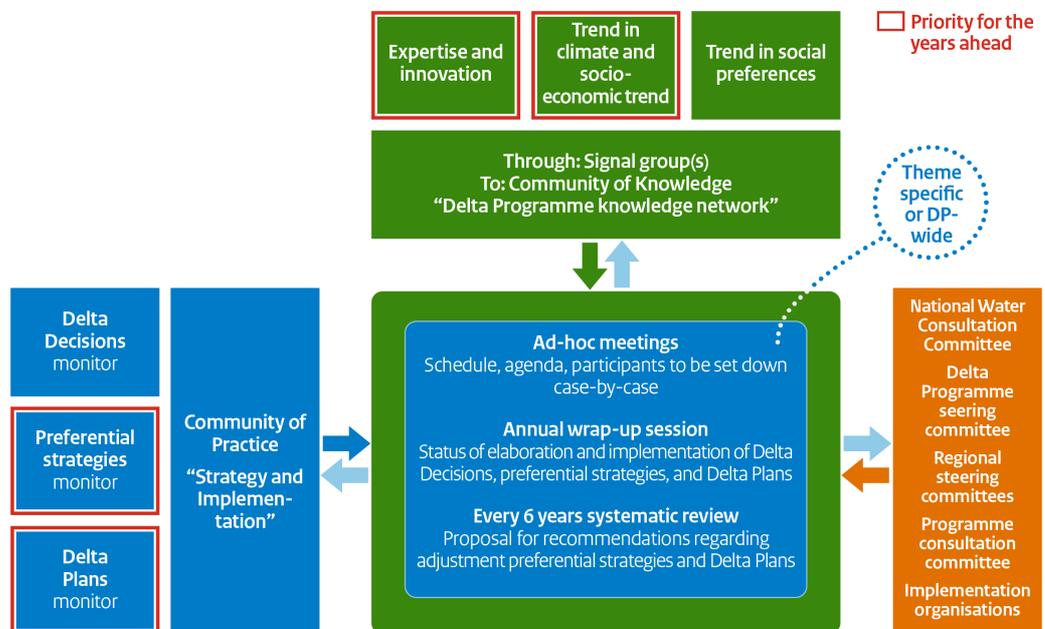


Figure 10
Regular coordination between the blue line (output and outcomes) and the green line (external developments) and advisory process.

Connecting green and blue

The “Strategy and Implementation” *Community of Practice* (blue line) and the Signal Group (green line) meet once a year in order to jointly evaluate the elaboration and implementation of the Delta Decisions, preferential strategies, and Delta Plans, and to discuss external developments. The groups inter-relate the results of the two lines and discuss the image that emerges. On this basis, they determine the topics on which they will provide recommendations and to whom they will address their report, depending on the content and the scope of the recommendations.

The rhythmicity of “learning” in the Delta Programme

The developments outlined above (the “green line”) show that the Delta Programme is operating in a dynamic environment. The continuous adaptation of all the strategies to those developments is neither feasible nor necessary. In order to structure the debate on an adequate rhythmicity for the adaptation of strategies and plans, it has turned out to be functional to distinguish three types of learning processes: technical-substantive learning (do we know enough; are we doing things right?), strategic learning (are we still doing the right things; do we need to adjust our strategies?), and system learning (does the manner in which we, as the Delta Programme, are organised enable us to timely adjust our pace or course; do we need to further expand the learning capacity of the Delta Programme?).

The recommendations ensuing from the annual connection of the green and blue lines (Figure 10) may pertain to both progress (are we still on schedule?) and direction (are we still on track?). To this end, the potential consequences of new developments for the preferential strategies are assessed, as is the certainty of those consequences. If the consequences are substantial, occur in the very near future, and are certain, the recommendation is that the strategy be adapted in the short term. If the consequences appear substantial but are yet uncertain in terms of scope or term, the recommendation will be to have further research conducted. In other cases, the recommendation will be to take a decision regarding possible adjustment following the systematic review that will take place once every six years.

The technical-substantive learning is a continuous process, underpinned by the Water and Climate National Knowledge and Innovation Programme ([Paragraph 2.5.2](#)). The sub-programmes and knowledge institutes are affiliated with the programme through the Delta Programme Knowledge Network. The strategic learning, focused on the timely adjustment of the preferential strategies and the associated Delta Plans, is subject to the maxim of “once a year if necessary; once every six years if possible”. The dynamics of the system learning will follow the six-year rhythmicity.

The phased incorporation of new insights into the design tools and evaluations already scheduled, for example, of the new flood protection standards bill, and the connection of water and spatial planning*, will be accommodated in this process.

* **new flood protection standards bill, and the connection of water and spatial planning**
Cf. National Water Plan 2016-2021.

Follow-up

In the autumn of 2016, the Steering Group Delta Programme will discuss proposals for the implementation of the “monitoring, analysing, acting” system and an initial calendar. The proposals will be drawn up on the basis of discussions on the question of which elements of the Delta Decisions, preferential strategies, and Delta Plans need to be monitored and how they can be translated in terms of input, output, outcomes, and achieved linkage. Representatives of the themes and the regions will be involved in these discussions, as will the staff of the Delta Programme Commissioner. The meetings will be coordinated with the Ministry of Infrastructure and the Environment, Rijkswaterstaat, the Flood Protection Programme, and the umbrella organisations of the regional and local governments.

The MAA system will be substantiated step by step. The main topics will be addressed first. Wherever possible, the monitoring, evaluations, and the discussion of the results will conform to existing structures. The aim is to have the system operational by 2017.

2.5

Embedding, expertise, private sector and innovation, international collaboration

Continue reading

» [2.5.1 Embedding in policy and management](#)

» [2.5.2 Expertise](#)

» [2.5.3 Private sector and innovation](#)

» [2.5.4 International collaboration](#)

2.5.1 Embedding in policy and management

Central government

At the end of 2014, the central government anchored the national policy ensuing from the proposed Delta Decisions and preferential strategies in policy with the interim amendment to the National Water Plan 2010-2015. At the end of 2015, the subsequent National Water Plan 2016-2021 was endorsed. It also features the Delta Decisions and preferential strategies. The Delta Decisions and preferential strategies will be embedded in the National Environmental Vision. The Minister of Infrastructure and the Environment ratified the Management and Development Plan for the National Waters 2016-2021 (BPRW) at the end of 2015. This also incorporates the Delta Programme policy, insofar as it pertains to the management of the national waters.

Provinces

The provinces embed the Delta Decisions and preferential strategies into their provincial policy and their framework or environmental visions. They have already been set down in the following policy documents:

- the Fourth Water Management Plan of the province of Fryslân
- the Groningen Environmental Vision
- the Drenthe Environmental Vision
- the Noord-Holland Water Vision 2021
- the Spatial Planning and Mobility Vision of the province of Zuid-Holland
- the Utrecht Soil, Water and Environment Plan
- the Environmental Vision and the Waalweelde West Framework Vision of the province of Gelderland
- the partially revised Environmental Plan Water 2015 (in which the province of Flevoland has anchored the Delta Decisions on flood risk management and freshwater supply)
- the Noord-Brabant Provincial Environment and Water Plan 2016-2021
- the Limburg Provincial Water Plan 2016-2021

The following policy documents still await ratification and anchoring:

- the revised Overijssel Environmental Vision
- the partially revised Zeeland Environmental Plan 2012-2018

In 2015, an administrative agreement on freshwater supply was set down for each freshwater supply region. Under these agreements, the provinces play a key role in the elaboration of water availability.

Various provinces have also taken new steps towards anchoring the Delta Decision on spatial adaptation:

- In its Environmental Vision, the province of Groningen has set down its intention to point out areas in which the “function follows stage” principle needs to be given a more important part. The Environmental Vision contains a sample map with areas prone to peat oxidation and a map of low-lying areas which in principle call for water-resilient construction.
- In the second Friesland Administrative Water Chain Agreement 2016-2020, the province of Fryslân, Wetterskip Fryslân, and municipalities have set down agreements on spatial adaptation.
- In its implementation programme for 2015, the council of Flevoland has set down the ambition to adopt a water-resilient and climate-proof approach to the (re)development of built-up areas by 2020. The council will use its spatial planning tools to foster the resilience of cities and villages against pluvial flooding, water shortages, and heat stress, among other ways by including the theme of climate adaptation in the Flevoland Environmental Vision in 2016.
- All the Flevoland authorities have jointly signed the Flevoland spatial adaptation declaration of intent.
- The province of Utrecht is using spatial planning tools on account of pluvial flooding and the protection of vulnerable and vital infrastructure. The province is participating in various collaboratives aimed at water-resilient and climate-proof planning.
- The province of Overijssel has mapped out its vital and vulnerable functions.
- In its Environmental Vision, the province of Gelderland has indicated its intention to factor in pluvial flooding and heat stress due to climate change when planning developments, in order to ensure a healthy urban environment.
- The province of Zeeland has assumed a directive role in the approach to climate adaptation within its territory.

District water boards

In 2015 and 2016, the district water boards anchored relevant policy from the proposed Delta Decisions and preferential strategies in their new water management plans.

Municipalities

In this context, a primary task of the municipalities is to anchor policy ensuing from the proposed Delta Decision on spatial adaptation and to implement this Delta Decision. The Spatial Adaptation 2016 survey shows that the general picture does not fundamentally differ from the picture in 2015 (see [Paragraph 2.2.2](#)). With respect to the themes of pluvial and river flooding, the municipalities indicate that they have made sufficient progress for incorporating climate-proof and water-resilient planning into their policies and actions by 2020. This is not the case for the theme of drought. With regard to the themes of heat stress and vital and vulnerable functions, the regional and local governments indicate that across the board, their progress is not up to par.

2.5.2 Expertise

Knowledge Agenda

The knowledge issues from the Knowledge Agenda DP2015 have been incorporated into the knowledge development programmes of such bodies as the Ministry of Infrastructure and the Environment, Rijkswaterstaat, STOWA, KNMI, Deltares, Alterra, and universities. The knowledge issues also played a directive role in the new knowledge and innovation agenda, and contracts awarded by the Top Sector Water. The Netherlands Organisation for Scientific Research NWO has embedded the knowledge issues in their *calls* for the themes of Urban Deltas of the World and New Deltas. [Background document E](#) reflects the status of all the components of the Knowledge Agenda DP2015. In early 2016, the Freshwater Administrative Platform set down an updated Freshwater Supply Knowledge Agenda.

Embedding expertise from Room for the River and Meuse Projects

The Ministry of Infrastructure and the Environment and the regional governments are using the expertise and experience gained in the Room for the River and Meuse Projects programmes in the elaboration of the preferential strategy for the Rhine and Meuse, and the run-up to the implementation of a number of river-widening measures envisaged for 2030. This expertise is also used to develop a long-term river widening ambition aimed at river widening beyond 2030 (see [Paragraph 2.3.3](#)).

Rijkswaterstaat puts priority on the maintenance and reinforcement of the know-how of the river system after completion of the Room for the River and Meuse Projects programmes, both within its own organisation and in a close collaboration with universities, knowledge institutes, the private sector, and other parties involved in the Delta Programme (through the National Water and Climate Knowledge and Innovation Programme NKWK). Existing expertise and experience, and knowledge yet to be developed will thus be available for the implementation and operation of flood risk management projects in order to achieve a sustainably functioning river system.

National Water and Climate Knowledge and Innovation Programme

Most of the knowledge issues aimed at gaining more in-depth knowledge have been included in the [National Water and Climate Knowledge and Innovation Programme](#) (NKWK). The parties involved in the NKWK have bundled the knowledge issues and budgets into theme-oriented working programmes, looking for options for the practical implementation of the knowledge through pilots. An interim evaluation has shown that the NKWK has managed to create a network enabling the participants to liaise and pool their knowledge issues. The agendising has also produced good results. The joint scheduling demands more time than expected; this will be the focus for the NKWK in the period ahead. For that reason, the Board of Supervisors has decided to provide additional support to six promising lines of research (coastal genesis, rivers, flood protection, smart water management, national water model, Markerwadden) in order to achieve results in terms of scheduling by the end of 2016. The annual [NKWK knowledge conference](#) took place on 17 May 2016. Concrete results of the conference included the launch of an EU facility, two collaboration agreements between educational organisations and the government regarding knowledge sharing and the human capital agenda, and close collaboration between Smart Water Management and the National Water Model in the field of open data.

Results

The progress of studies on specific themes or areas is outlined in [Paragraphs 2.2](#) and [2.3](#). A significant example is the method aimed at improving societal appreciation of freshwater benefits. Furthermore, initial steps have been taken towards a more risk-based assessment of the demand for fresh water. Long-term studies and multi-disciplinary studies into system behaviour are being prepared and implemented in the NKWK context. Part of this research is conducted in NWO/STW or EU projects; examples are Coastal Genesis II (aimed at gaining in-depth knowledge on the large-scale and long-term behaviour of the coast, and its interaction with the Wadden Sea and the estuaries), and the river research (including on river morphology and the behaviour of bifurcation points).

Other studies are of national significance, such as the development of the National Water Model, and the studies into delta scenarios and future-proof hydraulic structures. The development of the Delta Model in accordance with the National Water Model (NWM) has been set in motion. The NWM provides insight into the impact of climate change in the Netherlands. Linking existing models and data to the most recent climate scenarios and the most recent status of the water system generates basic forecasts. These set out the “water dynamics” of the Netherlands in 2050 and 2085, and are available for the development of knowledge on flood risk management and freshwater distribution. Water quality will be included with effect from 2018. The forecasts are freely accessible for policy preparation and to private sector parties. The National Water Model may also be used to calculate the effects of intended measures. A component of the model is the National Hydrology Model ensuing from the Dutch Hydrology Tools.

Delta Design Platform

DP2016 sets out a line for a joint effort aimed at safeguarding spatial quality and connecting water and spatial planning (see [map Connecting Water and Spatial Planning](#)). This line is continued. Spatial design plays a key role in this respect. The Delta Design Platform provides advice on the use of spatial design and designers in the elaboration of the regional taskings, and encourages the exchange of expertise and experience. In addition, the platform supports design workshops active on the interface of spatial planning and water. In December 2015, the first results were presented in a network meeting, discussed, and made available through an [online magazine](#). The Delta Design Platform will provide demand-driven design contributions to twenty existing and new initiatives in 2016.

2.5.3 Private sector and innovation

Top Sector Water

As a domestic market, the Delta Programme offers a life-size laboratory for tackling water-related problems. In the Top Sector Water, the government, business community, and knowledge institutes are pooling their strengths to capitalise optimally on the potential of this expertise and know-how to boost the Netherlands' earning capacity. One of the efforts expended to this end is the development of innovative business models.

During the past year, the Top Sector Water has drawn up the Knowledge and Innovation Agenda 2016-2019 and the Knowledge and Innovation Contract 2016-2017. These documents outline the joint knowledge schedule for the years ahead, identify important themes, and set out the financial contributions of the parties involved. They also incorporate the knowledge themes of the National Water and Climate Knowledge and Innovation Programme (NKWK) and various societal issues from the Delta Decisions. Furthermore, the parties are working on a new, cross-sectoral icon project (working title: Atlantis 2050), together with other top sectors and authorities. The goal is to gather the aggregate technical potential of the Netherlands in the field of water into a single, large testing ground. This testing ground – for example, a floating island – will serve as a showcase to the rest of the world. The Dutch water sector already presented a fine sample of the innovations at the Innovation Expo in April 2016.

Innovations

The motto of the Dutch EU presidency was “the innovative Union”. Visitors from abroad and investors could become acquainted with the top 100 of Dutch innovations at the www.topdutchinnovations.nl website. This also featured several innovations from the Delta Programme, such as the Sand Engine, and the Hondsbossche and Pettemer sea walls.

During the Dutch presidency, the European Water Innovation Partnership held its third conference in Leeuwarden, capital of the province of Friesland. This partnership is a platform for collaboration between all the actors engaged in water and innovation. The conclusion of the conference was that innovations are essential to be able to cope with the effects of climate change and growing cities. Collaboration between the government, business community, and knowledge institutes is vital to encourage innovations and accelerate their accessibility to end users. These conclusions fit with the implementation taskings of the Delta Programme.

Rijkswaterstaat is encouraging innovations in the fields of water management and area development. The www.innoverenmetwater.nl website contains a host of documents, photos, and short films as a source of inspiration for water managing authorities, contractors, engineers, researchers, and other initiators.

All the regions are conducting innovative climate adaptation pilots in order to climate-proof the freshwater supply (see Paragraph 2.3). Innovations may enhance the approach. An example is an innovative conductivity sensor for smartphones that three companies have developed in concert. It enables farmers to gauge the water quality of ditches and thus optimise water system management together with the district water board, with the ultimate goal of saving freshwater.

Flower power dyke

With a view to promoting [flowery dykes](#) in the Netherlands, the Chair of De Dommel district water board has created an annual award. The award is based on the conviction that dykes full of flowers are conducive to the diversity of plant and animal life, water awareness of the population, the perceptibility of the landscape, and – provided they are properly managed – the stability of the dykes. Depending on the situation, the management may be combined with pasturing and recreation. In 2016, the award was presented to five initiatives:

- [Landscape association “De Ploegdriever”, representing Rivierenland district water board](#)
- [Mr Barkema, representing Zuiderzeeland district water board](#)
- [Foundation DE4DAAGSE](#)
- [Flood defences and waterways team of Brabantse Delta district water board](#)
- [Water management department of Stichtse Rijnlanden district water board](#)

A flowery dyke is covered by a wide diversity of floriferous herbs and grasses, which on the one hand ensures and if possible furthers the safety of the dyke, while on the other hand offers a habitat for animals that will not cause damage to the dyke.

2.5.4 International collaboration

The Delta Programme Commissioner is engaged in close collaboration with the Special Envoy for International Water Affairs for the Kingdom of the Netherlands in order to have the national water strategy of the Delta Programme tie in with the international efforts expended by the Netherlands in the field of water.

International Water ambition

The Ministers of Infrastructure and the Environment, Foreign Trade and Development Cooperation, and Economic Affairs have jointly drawn up the International Water Ambition and presented it to the House of Representatives. This document outlines the structural contributions the Netherlands aims to make to flood risk management and water security across the world. Its main points of departure ensue from the Delta Programme, such as a preventative and integrated approach, adaptive measures, and multi-layer flood risk management in urban deltas. The *Dutch Delta Approach* sketches the essential building blocks for a sustainable long-term approach to climate adaptation, and puts other countries on their way with their strategies. The Partners for Water 2016-2021 is the main source of funding for the activities.

An example is the support that the Netherlands is providing to Bangladesh in setting down the Bangladesh Delta Plan 2100 (BDP2100). To this end, Dutch knowledge institutes are collaborating with Bengali governments and institutes to develop a long-term vision, area-oriented adaptive strategies, and an associated investment programme. The Delta Programme Commissioner's staff is contributing experience with the organisation of the strategy development process, knowledge management, and governance in the implementation phase. The BDP2100 is expected to be ready for political decision-making this year. The Netherlands, Bangladesh, and the World Bank signed a Memorandum of Understanding in 2015 to continue the current support in the implementation phase of BDP2100.

Climate summit: more attention to climate adaptation

At the Paris climate summit in December 2015, the countries decided to focus more attention on climate adaptation, along with mitigation. Structural funds will be made available to promote concrete initiatives in less developed countries. The Netherlands can act as a partner in this respect. This development reinforces the Dutch position as a global leader in the field of climate adaptation, and offers additional opportunities for exporting the Delta Programme expertise. The Netherlands is presenting an image as Centre of Excellence in the field of climate adaptation.

Delta Coalition and Delta Alliance

Twelve nations have signed the treaty regarding participation in the international Delta Coalition, an initiative of the Netherlands aimed at sharing knowledge. The coalition promotes the interests of deltas and emphasises the importance of flood risk management and water security in international debates on sustainable development. The approach and experience of the Delta Programme and the substantiation of the Sustainable Urban Deltas concept constitute a significant contribution to the Delta Coalition.

In March 2016, five Dutch universities and 16 delta countries renewed their collaboration with the Delta Alliance. The Alliance acts as a knowledge broker for these parties, and monitors the Knowledge Agenda, among other ways by connecting knowledge gaps among foreign parties to Dutch knowledge organisations. The Delta Alliance is thus actively working on the propagation of the *Dutch Delta Approach*. The Delta Programme and the Delta Alliance are cooperating closely when providing know-how to delegations from abroad, and presenting solution strategies at international conferences and forums.

3

Delta Fund



Leeghwater pumping station, Buitenkaag

3.1 Introduction

This chapter provides insight into the financial underpinning of the Delta Programme, by comparing the resources available in the Delta Fund to the expected financial scope of the Delta Programme taskings.

The paragraphs below successively outline the status of the Delta Fund, the resources contributed by the other Delta Programme partners, and the financial taskings of the Delta Programme up to 2050. This is followed by the Delta Programme Commissioner's conclusion regarding the financial security of the Delta Programme.

3.2 The status of the Delta Fund

The Delta Fund contains financial resources which the central government has earmarked to fund investments in flood risk management, freshwater supply, and water quality, and the associated management and maintenance by the central government. Water quality only comes to the fore in this analysis in interconnection with the Delta Programme taskings (flood risk management and freshwater supply). The Delta Plan on Flood Risk Management and the Delta Plan on Freshwater Supply contain an overview of all the studies conducted and concrete measures scheduled under the Delta Programme, including the budget allocated ([Delta Plan on Flood Risk Management, Appendix I](#) and [Delta Plan on Freshwater Supply, Appendix II](#)).

Delta Fund budgets

In the letter by the Minister of Infrastructure and the Environment dated 16 June 2016, the Cabinet announced that the Delta Fund will be extended by two years in the 2017 national budget. An inter-ministerial policy study has been conducted into the topic of flexibility in infrastructural planning. The Cabinet is expected to present the report on this study to the House of Representatives shortly, including the Cabinet response. Among other details, the report will provide a view of the manner in which the funds may be continued in the future, and the appropriate time to do so. The Delta Fund financial resources have been secured up to and including 2030. In the 2017-2030 period, a sum of approx. 16.3 billion euros will be available, which generates an average annual budget of close to 1.2 billion euros. This is evident from Table 1, reflecting the itemised and total Delta Fund budgets for the budget year 2017 and the period 2017-2030. Figure 11 reflects the itemised development in the budgets for the years up to and including 2030.

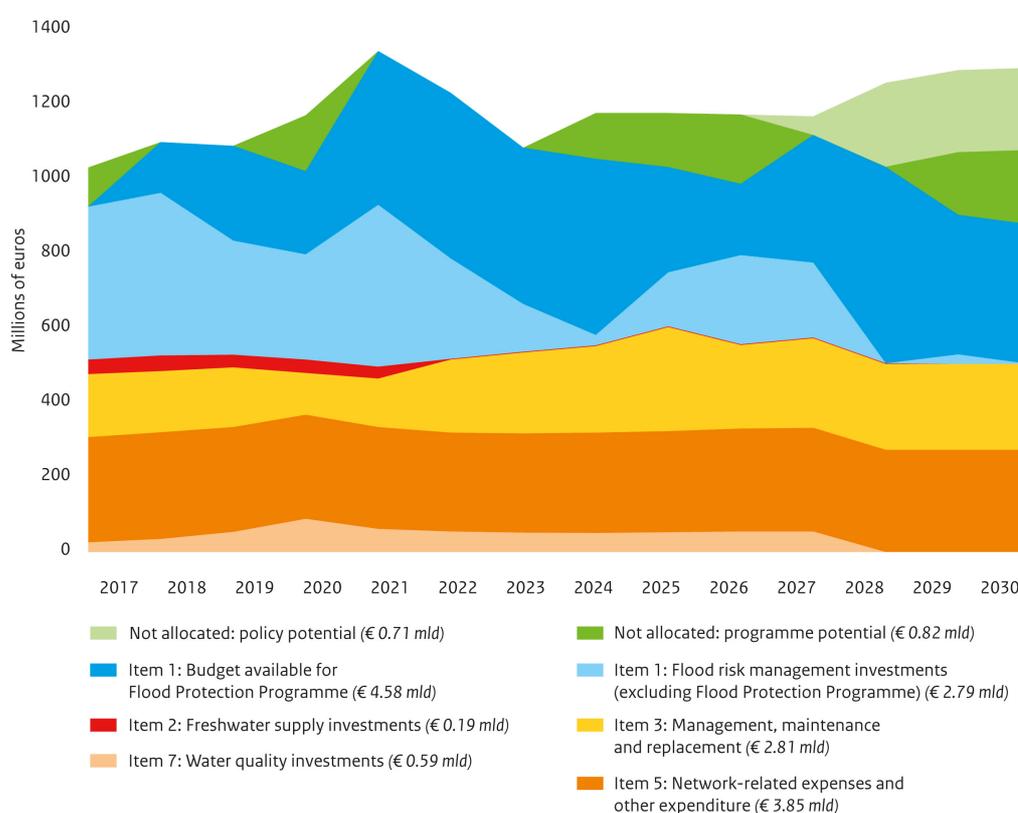


Figure 11

Delta Fund budgets in 2017, per item and totals, based on 2017 draft Budget

Delta Fund budgets in 2017 and totals, based on the 2017 draft Budget (in millions of euros)

	2017	Total (2017-2030)
Item 1 Flood risk management investments	536.7	7,366.0
Item 2 Freshwater supply investments	39.0	194.9
Item 3 Management, maintenance and replacement	169.5	2,813.2
Item 4 Experiments	-	-
Item 5 Network-related expenses and other expenditure	133.4	5,380.9
<i>of which not allocated: programme potential</i>	-148.4	820.3
<i>of which not allocated: policy potential</i>	-	713.9
Item 6 Contribution from other national budgets	-	-
Item 7 Water quality investments	26.1	587.4
Total Delta Fund expenditure	904.7	16,342.3

Table 1

Delta Fund budgets in 2017, per item and totals, based on the 2017 draft Budget (in millions of euros)

Programme potential and policy potential

Table 1 shows that endorsement of the Delta Fund budget for 2017 will leave this Cabinet with a non-allocated budget available for investment (programme potential) of some 820 million euros up to and including 2030. The programme potential, de facto, is the free space in the Delta Fund budget: this is where financial breaks are collected, setbacks are accommodated, and new investments are funded. In addition, subsequent Cabinets will have a policy potential of another 714 million euros up to and including 2030. One-third of any unused Second Flood Protection Programme resources will be added to the investment potential of the flood risk management tasking within the Delta Fund; two-thirds will be allocated to the (new) Flood Protection Programme, in accordance with administrative agreements between the Minister of Infrastructure and the Environment, and the Association of Dutch Regional Water Authorities set down on 18 June 2014.

The Cabinet has reserved part of the programme potential in the Delta Fund budget 2017 for the implementation of measures and provisions ensuing from central government policy as anchored in the interim amendment to the National Water Plan, following the Delta Decisions and preferential strategies proposed in [DP2015](#).

The main developments in the programme potential are:

- With the two-year extension of the Delta Fund, a total of 0.4 billion euros has been added to the programme potential, earmarked for the Delta Programme priorities.
- Budget reserves for additional costs of river widening: the Ministry of Infrastructure and the Environment is setting aside a maximum of 96 million euros for the Varik-Heesselt and IJsselpoort River Climate Park projects, out of the 200 million euros available for the additional costs of river widening. In addition, the Ministry is spending 4 million euros to increase the conveyance capacity of the southern land abutment of the existing bridge on the A27 motorway across the Boven-Merwede (Sleeuwijk). At the end of 2016, the central government will take a decision regarding the remaining budget (a maximum of 100 million euros), based on the regional proposal for the Meuse.
- Transfer of unused Second Flood Protection Programme resources (327 million euros) in accordance with the aforementioned administrative agreement, i.e., two-thirds to the new Flood Protection Programme (218 million euros) and one-third to the programme potential for the flood risk management tasking (109 million euros).

3.3 Resources from other partners

Delta Programme

The Delta Programme is working on effective, integrated solutions to flood protection and freshwater supply taskings that are of national importance. In accordance with the Water Act, amended as per the Delta Act, the central government resources in the Delta Fund are intended for the measures and provisions substantiating these taskings, including the associated management and maintenance, and the statutory implementation costs. With effect from the 2015 Delta Fund budget, they are also being used to safeguard water quality. In comprehensive projects, whose scope extends beyond flood risk management and freshwater supply, financial responsibility is usually shared by several Delta Programme partners. The same is true for flood risk management and freshwater supply solutions involving both additional costs and additional benefits.

The integrated approach of the Delta Programme offers opportunities for nature-inclusive solutions to water and nature taskings. In the years ahead, the Ministry of Economic Affairs will invest 12 million euros in projects aimed at achieving the ambitions set out in the Nature Ambition for Large Waters (NAGW) and support the regional partners in translating the NAGW into concrete actions linking the water taskings for the Wadden Region, IJsselmeer Region, the areas around the major rivers, and the Southwest Delta to the NAGW*.

* NAGW

Parliamentary document no. 31 710 no. 46.

Cultural heritage and the Delta Programme

The Heritage and Spatial Planning Vision of the central government focuses on the relation between water taskings and the cultural character of the Netherlands. The central idea is to take account of cultural heritage in the early process development and planning stages, thus providing inspiration for designs, controlling risks, and creating support for measures.

The Ministry of Education, Culture and Science, and the Ministry of Infrastructure and the Environment will continue their heritage and spatial planning policies in 2017 and 2018, in the run-up to the National Environmental Vision. Thus, knowledge and resources will remain available for experimental projects at the interface of flood risk management and heritage. Examples of such projects can be found at www.kiezenvoorkarakter.nl (in Dutch).

With its Heritage and Spatial Planning Vision, the central government strives to tie in with Delta Programme measures wherever possible, for example, using historic structures for current taskings, such as the study into the significance of historic secondary dykes for flood protection (in collaboration with the Flood Protection Programme), or the restructuring of old water mill systems in the elevated part of the country to regulate peak discharges (in collaboration with STOWA). Supplying cultural-historical data and information at the earliest possible stage will reduce the risk of cultural-historical surprises and associated implementation costs. In 2016, the digital archaeological “Expectation map for the floodplains in the areas around the major rivers” was supplemented by, inter alia, map layers reflecting historic buildings and sites, and landscapes. This instrument provides an early insight into all the cultural-historical values to be taken into account in the implementation of measures.

Cultural history is increasingly used as a starting point for major spatial planning projects, in order to enhance the support for far-reaching measures. From the “story of the Waal river” to the historic basis for the IJsselmeer regional agenda: building on the genesis adds perspective to new measures.

District water boards

Under the Water Act, the central government and the district water boards are responsible for funding the improvement of the primary flood defences. In the 2016-2019 period, the aggregate district water boards expect to invest a total of 5 billion euros, of which 2 million euros will be for flood defence systems.* A substantial part of this investment is the so-called water authorities’ contribution to the improvement of the primary flood defences managed by the district water boards. Over recent years, this contribution has increased to a structural sum of 181 million euros per annum, with effect from 2015 (see [Delta Plan on Flood Risk Management, Appendix I](#)).

* 2 million euros will be for flood defence systems

Source: CBS

Investments by district water boards, 2016-2019

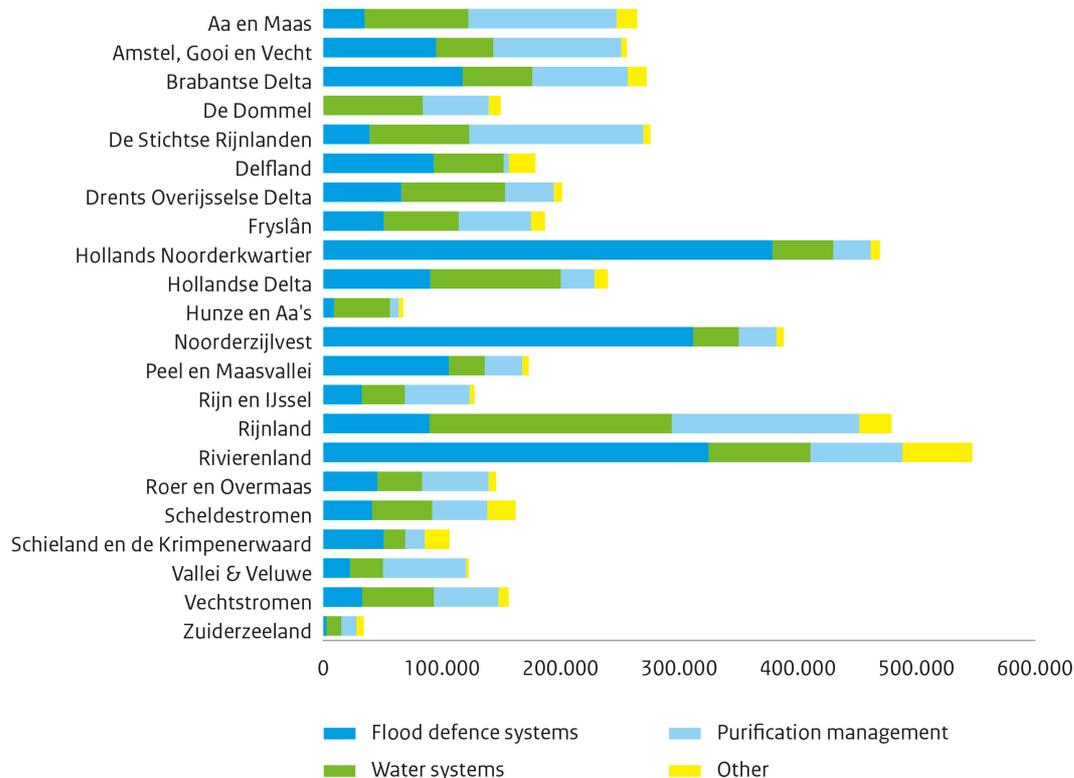


Figure 12
Investments by district water boards, 2016-2019

Figure 12 lists the water authorities' investments for the period 2016-2019, broken down by district water board. The investments by the district water boards mainly concern the long term. The expenditure involved is not directly charged to residents but rather divided over several years, similarly to the approach used by the other government authorities, apart from the central government. Expenditures on water management will total 2.7 billion euros in 2016, i.e., a 4% increase vis-à-vis 2015.

Total district water board expenditure for 2016 is estimated at 2.6 billion euros. Forty percent of this amount pertains to the construction and operation of waste water purification plants, 28% involves the development and management of the water system, 12% is used for the construction and maintenance of flood defence systems, and 19% goes to the other policy domains (see Figure 13). Spending on the construction and maintenance of flood defence systems accounts for a relatively minor part of total expenditure, yet this share has risen due to the water authorities' contribution to the Flood Protection Programme: from 5% in 2011 to 12% in 2016*.

* from 5% in 2011 to 12% in 2016

Source: <http://waterschapsspiegel.nl/belastingen/kosten-van-de-waterschappen/>. See <http://www.destaatvanonswater.nl/financiering> for a comparison with 2010 and 2015.

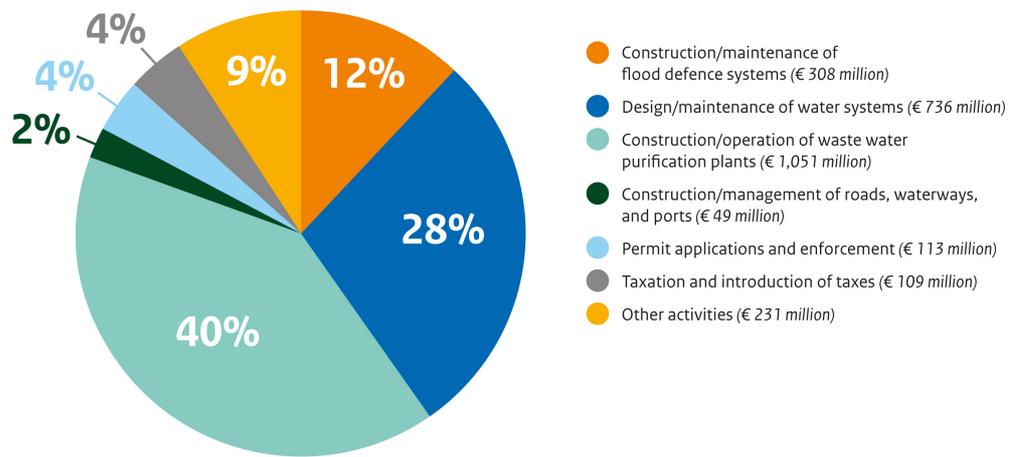


Figure 13
Operating costs 2016 by policy field

Provinces, municipalities, and civic society organisations

The Delta Programme comprises various comprehensive projects co-funded by a number of government authorities and, in some cases, a civic society organisation. Examples include the longitudinal erosion control dams pilot, the Ooijen-Wanssum area development, and the IJsselpoort River Climate Adaptation Park MIRT exploration. * Municipal authorities are jointly investing in the Spatial Adaptation sub-programme with a view to developing their municipalities in a more water-resilient and climate-adaptive manner. In addition, Elevated Sandy Soil municipalities are making available financial resources for their own freshwater availability measures. Compared to dyke improvement measures, river-widening measures that boost long-term security usually involve higher costs but also increased benefits, for example, in terms of the economy, spatial quality, nature, resilience, lower dykes, and reduced impact of a dyke failure. At locations offering opportunities for linking flood protection measures to other taskings or developments, the parties involved examine what proportion of the cost may be funded from such other taskings. This differs from one project to the next. Dyke improvements also offer opportunities for incorporating spatial taskings or provincial and municipal ambitions involving the dyke and its vicinity, thus enhancing spatial quality.

* Examples include the longitudinal erosion control dams pilot, the Ooijen-Wanssum area development, and the IJsselpoort River Climate Adaptation Park MIRT exploration.
See [Map 1, Connecting Water and Spatial Planning](#), projects no. 61 (Longitudinal Erosion Control Dams Pilot), 38 (Ooijen-Wanssum area development), and 4 (IJsselpoort River Climate Adaptation Park MIRT exploration).

3.4 The financial taskings of the Delta Programme

DP2015 contained an initial indication of the costs of the Delta Programme up to and including 2050. The taskings have been estimated at approx. 20 billion euros + PM; by far the largest proportion of this sum pertains to investments in flood risk management. The PM item in the cost estimate consisted of a non-specific reserve for other projects, additional management and maintenance costs ensuing from increased acreage and risks. Based on further analyses, the risk reserve in DP2016 has been raised by 5 billion euros; the anticipated costs item has been raised by some 1 billion euros. The implementation of the Delta Programme up to and including 2050 is thus costed at 26 billion euros +/- 50%, a realistic bandwidth at this stage of the programme (see DP2016). This estimate still holds good.

3.5 Financial security of the Delta Programme

By extending the Delta Fund up to and including 2030, the Cabinet further reinforced the financial foundation of the Delta Programme. Assuming the budgets for 2031 to 2050 inclusive remain unchanged, a sum of approx. 23 billion euros will be available for the implementation of the Delta Programme.

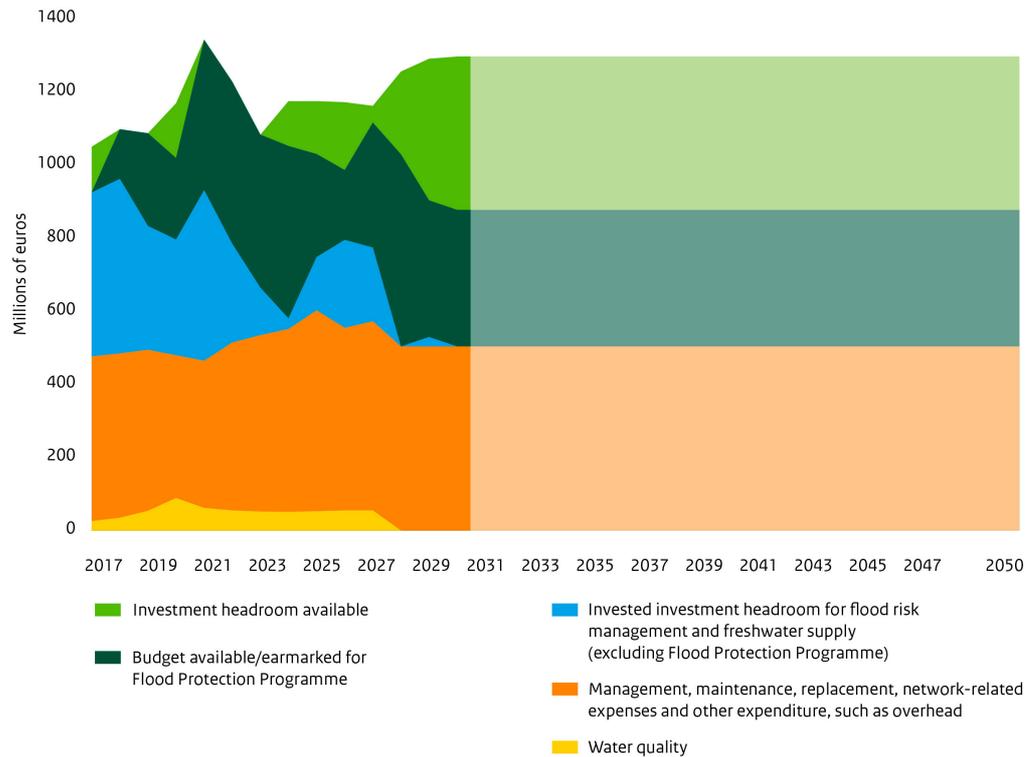


Figure 14
Tentative extrapolation Delta Fund

The tentative extrapolation in the above figure is based on the year 2030. In accordance with the agreements between the central government and the district water boards, as anchored in the Water Act, the Delta Programme Commissioner has assumed that the district water boards will continue the series earmarked for new flood protection measures after 2028. The extrapolation shows that out of the approx. 1.3 billion euros going around annually in the Delta Fund in the period from 2031 to 2050, an annual sum of close to 0.5 billion euros is needed for management, maintenance and replacement (item 3) and network-related and other expenses (item 5). In terms of investment budget (items 1 and 2, including the series available / earmarked for new flood protection measures by the district water boards), an annual sum of approx. 0.8 billion euros will be available in the period 2031 to 2050. This would free up an investment budget of nearly 16 billion euros in the period 2031-2050. This means that up to and including 2050, a total of some 23 billion euros would become available for the flood risk management and freshwater supply taskings of national importance. Added to this sum will be the funds that Delta Programme partners other than the central government and the district water boards, such as the provinces, are expected to provide.

This has led the Delta Programme Commissioner to conclude that, provided the Delta Fund will be continued up to and including 2050, the taskings and the available resources appear to be reasonably balanced, and that “the long-term financial safeguarding of the Delta Programme” currently seems to be in order. The importance of co-funding by the other Delta Programme partners in this respect has been outlined in [Paragraph 3.3](#).

An aerial photograph of a coastal town, likely Cadzand-Bad, showing a large stone dike separating the town from the sea. The town features numerous houses with red roofs and several multi-story apartment buildings. A yellow marker is visible in the water in the foreground. The background shows green fields and a clear sky.

Appendix I Delta plan on flood risk management

Delta plan on flood risk management

The Delta Plan on Flood Risk Management comprises all the Delta Programme studies, measures and provisions, scheduled or to be scheduled, pertaining to flood risk management and spatial adaptation. The measures are funded from the Delta Fund, and, in some cases, from the Ministry of Infrastructure and the Environment budget. Where appropriate, the Delta Plan also features regional measures not subsidised by the central government.

Every year, the Delta Programme Commissioner submits a proposal for the Delta Programme, comprising “studies, measures, and provisions” in the fields of flood risk management and freshwater supply. The proposal contains a detailed schedule for the first six years and an indicative schedule for the subsequent twelve years. It looks ahead to 2050 and beyond (in accordance with Art. 4.9 paragraph 5 of the Water Act, amended under the Delta Act).

The tables in this Appendix provide information on the planning and phasing of the flood risk management projects. In addition, the projects have literally been mapped out. Paragraph 1.1 provides insight into the progress of studies scheduled in DP2015, the elaboration of new (assessment and design) tools, and the preparation of new projects. Paragraph 1.2 outlines the Flood Protection Programme schedule for 2017-2022. Paragraphs 1.3 up to and including 1.8 subsequently provide an overview of the other measures scheduled. Table 2 presents an overview of the studies, projects, and implementation programmes, stating the paragraphs in which they are discussed.

Studies (I 1.1)	Explorations (I 1.1)	Flood Protection Programme (I 1.2)	Realisation (I 1.3 - I 1.8)	Management, maintenance, and replacement (3.2 - 3.3)
Studies scheduled in DP2015 (see Table 3 of this Appendix)	MIRT Explorations regarding widening of the Rhine: Varik-Heesselt and IJsselpoort	Flood Protection Programme	Second Flood Protection Programme (including Weak Links on the Coast)	Management, maintenance, and water management
Pilots involving multi-layer flood risk management and “smart combinations” Dordrecht, Marken, and IJssel-Vecht delta	Grevelingen and Volkerak-Zoommeer national framework vision (no. 441. See 2.3.5 Southwest Delta)		Room for the River (including IJssel delta and IJsselsprong)	Replacement Tasking for Hydraulic Structures (VONK) (see 2.2.1, Flood Risk Management)
MIRT Studies regarding widening of the Meuse: Venlo, Ravenstein-Lith, Maastricht			Further Elaboration of Area Around the Major Rivers (NURG)	
MIRT Study Oosterschelde integrated safety			Meuse projects (Grensmaas and Zandmaas)	
			IJsselmeer Closure Dam	
			WaalWeelde	
			Ooijen-Wanssum area development	
			Vlieland and Terschelling dyke boundaries (no. 441)	
			Repair of Oosterschelde and Westerschelde stone claddings	

Table 2
Projects and implementation programmes within the Delta Plan on Flood Risk Management

1.1 Flood risk management and spatial adaptation studies and explorations

A number of follow-up studies have been scheduled and tools will be developed with a view to the elaboration of the Delta Decisions and preferential strategies.

Flood risk management		2017	2018	2019	2020	2021	2022
<i>Instruments and tools</i>							
101	Statutory Assessment Tools, including legal spatial safeguarding of forelands)	■					
102	National Water Model	■	■	■	■		
<i>Optimisation issues</i>							
114	IJsselmeer Region system study	■	■				
<i>Preparations for new projects</i>							
121	Studies and explorations regarding widening of Rhine distributaries: Reevediep phase 2, Grebbedijk Delta Dyke, Varik-Heesselt MIRT exploration, and IJsselpoort River Climate Adaptation Park MIRT exploration						
122	Follow-up MIRT Study Alblasterwaard-Vijfheerenland	■					
123	Hollandsche IJssel MIRT Study						
124	Studies and explorations regarding widening of the Meuse: Oeffelt-Vortum, Ravenstein water front, Den Bosch Meuse Bank Park, Maastricht MIRT Study, Venlo MIRT Study, Ravenstein-Lith MIRT Study						
<i>Fundamental research</i>							
131	Additional monitoring, study and pilots regarding sand systems	■	■	■	■		
132	Morphological behaviour of river systems and stability of bifurcation points (budget chapter XII)	■	■	■	■		
<i>Pilots involving multi-layer flood risk management and "smart combinations"</i>							
141	Dordrecht multi-layer flood risk management MIRT Study	■					
142	Marken dyke improvement MIRT exploration	■	■	■	■	■	■
143	IJssel-Vecht delta multi-layer flood risk management and climate-proofing strategies	■					
<i>Spatial adaptation</i>							
151	Spatial Adaptation incentive programme	■					
<i>Further area-oriented elaboration</i>							
161	Krimpenerwaard						
162	Westpoort	■					
163	Rotterdam and Dordrecht areas outside the dykes	■					

■ Study ■ Exploration ■ Plan elaboration ■ Realisation

Table 3
Schedule of flood risk management and spatial adaptation studies and explorations

1.2 Schedule of Flood Protection Programme measures

The Flood Protection Programme comprises measures for the improvement of sub-standard flood defence systems.

Flood Protection Programme			2017	2018	2019	2020	2021	2022	>
Budget including project-related share (10%): total 4.9 billion euros (up to and including 2030)									
Budget available for district water board projects including project-related share (10%) in millions of euros per year in the 2017-2022 period.			112	114	228	204	384	410	
Budget available for Rijkswaterstaat projects in millions of euros per year in the period 2017-2022.			7	16	21	15	23	30	
No. on map	Project no.*	Project name							
201	22W	Vianen							
202	+13	Intermediate section: Ameide lock - Fort Everdingen							
203	+13	Grebbedijk							2025
204	22L	Sprok – Wolferen							
205	+13	Intermediate section: Tiel (ARK) - A50 (connects to 22L)							
206	+13	Intermediate section: Tiel (ARK) - A50 (connects to 22D)							2023
207	22D	Neder-Betuwe							2023
208	06A	Capelle/Moordrecht							
209	06F	Remainder of Hollandsche IJssel tasking							
210	05C	IJsseldijk Gouda (phase 2)							
211	06D	Capelle/Zuidplas							
212	05D	IJsseldijk Gouda improvement (VIJG) track 1							
213	05E	IJsseldijk Gouda improvement (VIJG) track 2							
214	22M	Lingewaard							2026
215	+13	Intermediate section: A50 - Doornenburg (connects to 22M)							2026
216	+13	Intermediate section: A50 - Doornenburg (connects to 22L)							
217	22K	Tiel							2023
218	22X	Gorinchem-Waardenburg (GoWa)							
219	22Y	Tiel-Waardenburg (TiWa)							
220	+13	Intermediate section: Gorinchem - Tiel (connects to 22X, 22Y, 22K)							
221	16E	V3T flow slide							2023
222	+13	Section no. 20_3							2024
223	+13	Streefkerk - Ameide							
224	+13	New project (component of Central Holland general exploration)							2025
225	+13	Doornenburg - A50							2026
226	+13	Section 36_3 Ravensteijn-Lith							2025
227	24S	Zuid-Beveland-West, Westerschelde							
228	24G	Gras Schouwen/Zuid-Beveland-West							
229	24AC	Ritthem/Baarland							
230	+13	Intermediate section: Zuid Beveland-West, Rittum/Baarland (24S, 24AC)							2024
231	+13	Section no. 30-2							
232	12B	Hollandsche IJsselkering storm surge barrier (gate) (national flood defence budget)							
233	06K	Krachtige IJsseldijken Krimpenerwaard (KIJK)							2026
234	+13	Intermediate section: KIJK							
235	24AD	Schouwen-Duiveland							
236	15Q	Zwolle-Olst							2023
237	21C	Pannerden/Loo							
238	06E	Krimpen aan de Lek							
239	15E	Zwolle							2023
240	15N	Zwolle flood gate							2023
241	15P	Vecht-Zuid							2027
242	22E	Gameren							
243	25N	IJssel 2 sections							
244	15O	Vecht-Noord							2028
245	18A	Eemshaven-Delfzijl							

245	10A	LEMBHAVEN-DELIJZIJ								
246	15J	Mastenbroek IJssel								2028
247	250	IJssel 3 sections								
248	240	Zuid-Beveland-Oost, Oosterschelde								
249	15K	Mastenbroek Zwarte Meer								2028
250	15L	Mastenbroek Zwarte Water								2026**
251	15D	Genemuiden – Hasselt								2026**
252	28M	Noorderhavendam sand asphalt								
253	28F	Koehool-West Holwerdepolder								2024
254	28G	West Holwerdepolder-Lauwersmeer								2024
255	18D	Lauwersmeer/Vierhuizergat								2024
256	15G	Deventer								
257	15C	Around Kampen								
258	25K	Hattem quay and Apeldoorn canal								
259	10A	Vlieland (national flood defence budget)								
260	25I	Eemdijk/Spakenburg								
261	09D	Marken (national flood defence budget)								
262	07-19A	Bossherveld lock (national flood defence budget)								
263	01-2-5-11A	Central Holland								2025
264	03E	Wieringermeer (category C dyke)								2025
265	03I	North Sea canal								2024
266	08A	Drongelen canal (P52) (national flood defence budget)								
267	09C	IJmuiden (national flood defence budget)								
268	22F	Diefdijk								
269	25L	Northern Randmeer dyke								
270	27C	Noordoostpolder engineering structures								
271		Water control structures policy								
272	03U	Wieringermeer (category C dyke) Oostersluis (D3K1)								
273	03F	Markermeer water control structures (D17 and D19)								

* The schedule for 2017-2022 has been expanded with thirteen sections whose failure probability is expected to fall relatively far short of the new standard, and which will consequently be regarded as urgent in the pending assessment. In this table, these sections have been marked “+13”. The exact project location of some of these sections will be determined during the exploration phase. The sections governed by the new standards are indicated on the map.

** Exploration to commence in 2016.

Flood Protection Programme general approach		2017	2018	2019	2020	2021	2022	>
321	Piping general exploration							
322	Wadden Sea general exploration							
323	Forelands general exploration							
324	Macro-stability general exploration							
325	Cables and pipes joint approach							
326	Contracts joint approach							
327	Vecht flood perspective system elaboration***							

*** In 2017, the Drents Overijsselse Delta district water board and Vechtstromen district water board will draft a flood perspective for the Vecht, together with their German counterparts and the province of Overijssel. The study to this end will comprise an exploration of the prospects of system measures (upstream) for reducing the (downstream) dyke improvement tasking. The two district water boards will jointly consider whether this will be submitted to the Flood Protection Programme as a general exploration.

Administrative agreement on the Meuse ****		2017	2018	2019	2020	2021	2022	>
331	23ABC Alexanderhaven							
332	19C Blerick, near the old foundry							
333	19D Steyl-Maashoek							
335	19H Thorn							2023
336	19I Heel							2023
337	19J Arcen							2023
338	19K Well							2023
339	19L Venlo-Velden							2023
340	19M Baarlo							2023

341	19N	Nieuw Bergen							2023
342	19O	Buggenum							2023
343	19P	Beesel							2023
344	19Q	Belfeld							2023
345	19R	Kessel							2023
346	19S	Blerick Groot Boller							2023

**** The acceleration of the Meuse Agreement projects focuses on the concerted execution of the exploration, plan elaboration, and realisation of the dyke improvement projects. With the exception of the Blerick dyke improvements (19C), near the old foundry, and those at Steyl-Maashoek (19D), all the dyke improvements will now be elaborated in a single comprehensive exploration. The Meuse Agreement reserve has been set down at 160 million euros. Any remaining projects or project phases will be incorporated into the regular Flood Protection Programme in due time, on an urgency basis.

Reserve for pre-financing outside the Flood Protection Programme ****			2017	2018	2019	2020	2021	2022	>
350	24T	Sint Annaland						€	
351	14A	Geertruidenberg/Amertak							Pre-financing of exploration approved and paid
352	17A	Delfzijl-Chemiepark						€	
353	17B	Chemiepark-Punt van Reide						€	
354	03K	WIJD dyke sections connection						€	
355	24R	Zuid-Beveland Oost, Westerschelde						€	
356	28J	Lemsterhoek							
357	04A	Delfland-1; Spuihaven Schiedam						€	
358	21A	Rijnkade						€	
359	21F	Twente canal						€	
360	21I	IJsselpaviljoen						€	
361	21K	Vispoorthaven						€	
362	21H	Havenstraat						€	
363	03N	Balgzand dyke (D88) – Amsteldiep dyke (D89)						€	
364	24P	Zuid-Beveland canal						€	
365	03O	Wieringen sea wall (D90)						€	
366	21E	Grutbroek industrial zone						€	
367	22B	Jannezand							
368	03R	Markermeer dyke sections (D24 - D30) – detached part of Durgerdam						€	
368	03R	Markermeer dyke sections (D24 - D30) – Exploration						€	
370	03S	Markermeerdijk connection						€	
371	27A	Noordoostpolder Randmeer dyke							
372	27B	Flevopolder Randmeer dyke							
373	06H	Stolwijk lock						€	
374	03B	WIJD water control structures connection						€	
375	25R	Schans pumping station							
376	20B	De Whaa lock							
377	20C	Vollenhove water control structures							
378	24H	Michiel de Ruyterhaven (Koopmanshaven lock)						€	

***** The € signs in this table refer to funds set aside for repayment by the Flood Protection Programme of pre-financed projects implemented outside the context of the Flood Protection Programme.

Engineering structures pilot			2017	2018	2019	2020	2021	2022	>
381		Guidelines for improving water control structures							
382		Sassluis lock							
383		Noordersluis lock						€	
384		Zuidersluis lock						€	
385		Hornsluis lock							€
386		Oostoever sluisce							€

■ Study ■ Exploration ■ Plan elaboration ■ Realisation

Table 4
Schedule of Flood Protection Programme measures

1.3 IJsselmeer Closure Dam

The IJsselmeer Closure Dam (Afsluitdijk) project encompasses dyke improvements and provisions for the expansion of the discharge capacity. For more information: see [Parliament Document 34300 A, nr 60](#).

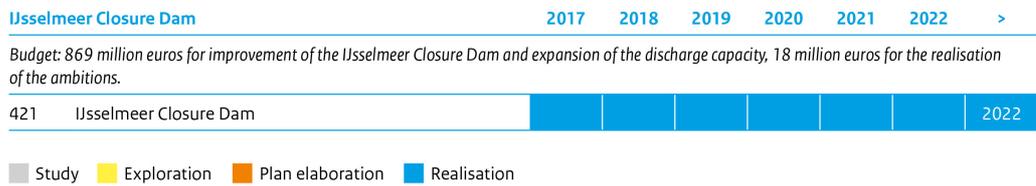


Table 5
Schedule of IJsselmeer Closure Dam measures

1.4 Waalweelde

In WaalWeelde, regional parties, the central government, companies and residents have joined forces under the direction of the province of Gelderland, in order to work on a safe, natural and economically viable Waal river.

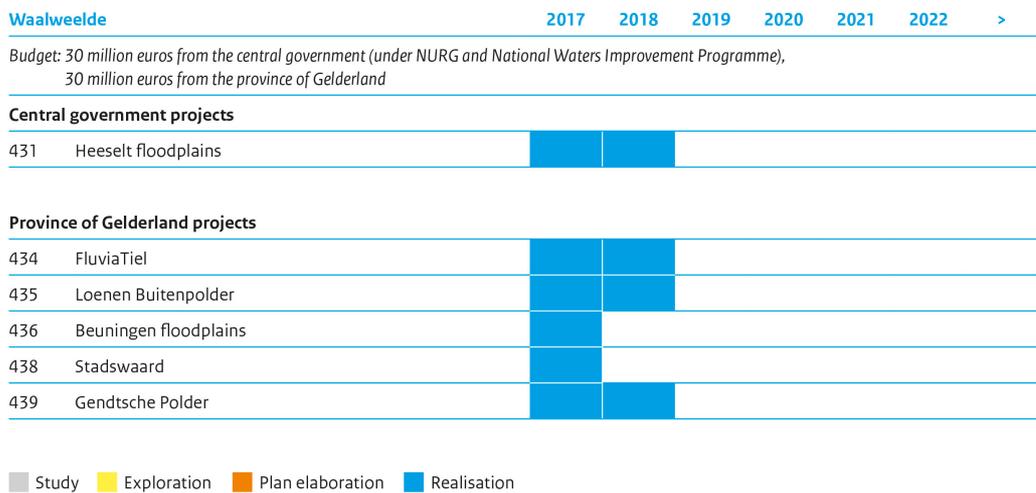


Table 6
Schedule of Waalweelde measures

1.5 Second Flood Protection Programme

The Second Flood Protection Programme mainly comprises projects ensuing from the first and second assessments of the primary flood defence systems. For more information: see the 9th progress report of the Second Flood Protection Programme*.

* 9th progress report of the Second Flood Protection Programme
[Parliamentary Document 32698 nr. 26](#), (in Dutch)

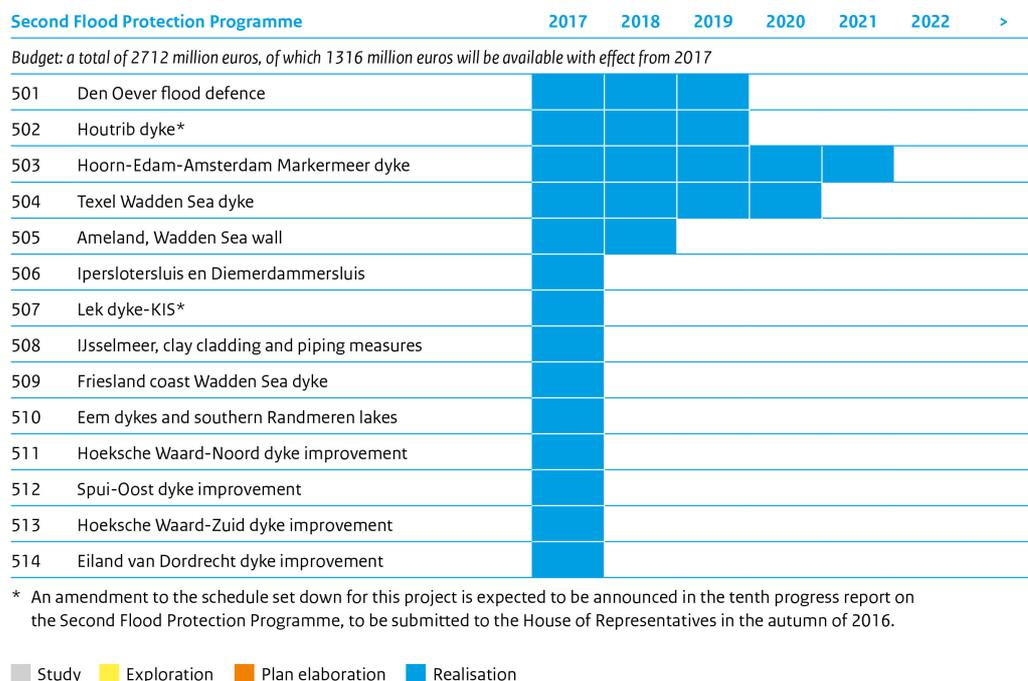


Table 7
Schedule of Second Flood Protection Programme measures

1.6 Room for the River

This programme encompasses the measures along the Rhine tributaries and the downstream part of the Meuse, as set down in the Room for the River Key Planning Decision. For more information: see the 27th Room for the River progress report*. This also sets out the progress of the Further Elaboration of the Area Around the Major Rivers programme (NURG).

* **Room for the River progress report**
[Parliamentary Document 30080 nr. 81.](#)



Table 8
Schedule of Room for the River measures

1.7 Meuse Projects

The Meuse Projects concern the Grensmaas and Zandmaas areas. For more information: see the 29th Zandmaas and Grensmaas progress report*.

* **Zandmaas and Grensmaas progress report**
[Parliamentary Document 18106 no. 234.](#)



Table 9
Schedule of Meuse Projects measures

1.8 Oosterschelde and Westerschelde stone claddings, Zeeland foreland deposits

This project comprises the reinforcement of the stone cladding of dykes along the Oosterschelde and Westerschelde.



Table 10
Schedule of measures pertaining to repair of Oosterschelde and Westerschelde stone cladding, and Zeeland foreland deposits.

Flood Risk Management Delta Plan



Projects and implementation programmes Project numbering refers to measures scheduled in the Delta Programme (see Tables 2 to 13 in Appendices I and II). Colour, if any, indicates plan phase.

Delta Programme (MIRT) studies

- 100 Project number
- Project location

Flood Protection Programme 2017-2022

- 200/300 Project number
- Dyke improvement project
- General explorations:
 - Piping (321)
 - Wadden Sea dykes (322)
 - Central Holland (323)
 - Macro-stability linked to project (324)
- Meuse agreement project
- ⊙ Pre-financed dyke improvement project

Second Flood Protection Programme (HWBP-2)

- 500 Project number
- Improvement to dyke, dune, dam, or engineering structure
- Dyke section
- ⇒ Weak Links on the Coast project

Room for the River project

- 600 Project number
- Project location

Further Elaboration of Area Around the Major Rivers (NURG)

- 700 Project number
- Project location

Meuse projects: Grensmaas and Zandmaas

- 800 Project number
- Project location

Other projects

- 400 Project number
- Project location
- WaalWeelde

Repairs of stone cladding in Oosterschelde and Westerschelde

- 900 Project number
- Deposit location

Sand replenishment location

- Beach replenishment
- Beach replenishment completed
- Shore face replenishment
- Shore face replenishment completed

Status per project: Plan phase as of 2017

- Not yet entered plan phase
- Study
- Exploration
- Plan elaboration
- Between elaboration and realisation
- Realisation
- Completed

Basic map

- Freshwater
- Saltwater / brackish water
- Flood-prone area
- Area outside the dykes
- Urban area
- Docks
- Border

Appendix II Delta plan on freshwater supply



Longitudinal erosion control dam, Waal near Tiel

Delta plan on freshwater supply

The Delta Plan on Freshwater Supply comprises all the measures, studies, and knowledge issues scheduled and envisaged which pertain to a sustainable freshwater supply and which are – in whole or in part – funded from the Delta Fund.

Table 11 provides an overview of the studies and measures scheduled and envisaged to elaborate the Delta Decision and preferential strategies pertaining to freshwater. These studies and measures ensue from the Freshwater Investment Programme 2015-2021, as set down in DP2015. The investment programme has been compiled on the basis of a national investment agenda, the regional implementation programmes of the freshwater supply regions, and a number of implementation programmes of the user functions.

IJsselmeer Region

171	<i>Flexibilisation of IJsselmeer lake water level</i>					
171a	MWS: new IJsselmeer lake water level ordinance (2017)	■				
171b	MWS: operationalisation of flexible water level management	■	■	■	■	
171c	MWS: measures pertaining to Frisian IJsselmeer lake shores	■	■	■	■	
171d	MWS: robust and natural shores in IJsselmeer Region, phase 1	■	■			
171e	Mitigating measures, Rijkswaterstaat water level ordinance		■	■	■	
172 Northern region elevated grounds project programme, involving:						
172a	Natural design of Dwardsdiep area	■	■	■	■	
172b	Climate-proofing Drentse Aa basin	■	■	■	■	
172c	Optimisation of farmland inlets, Northern Netherlands elevated (sandy) soils	■	■			
172d	Dulf-Mersken and vicinity area development	■	■	■	■	
173 IJsselmeer Region testing ground, involving:						
173a	Spaarwater	■	■			
173b	Gouden gronden	■	■	■		
173c	Hunze en Aa's testing ground	■	■	■	■	
173d	Wetterskip Fryslân testing ground	■	■	■		

Elevated Sandy Soils

174	Implementation programme for Elevated Sandy Soils Delta Plan, Southern Region	■	■	■	■	
175	Implementation programme for Elevated Sandy Soils freshwater supply, Eastern Region	■	■	■	■	
176	Innovative climate adaptation pilot South: sub-irrigation	■				
177	Climate adaptation pilot East 1: effluent sub-infiltration	■				
178	Climate adaptation pilot East 2: smart weir	■				
179	Climate adaptation pilot East 3: water distribution	■				

Western Netherlands

180	MWS: Irene locks (KWA+ in MWS)	■	■	■	■	
181	Small-scale water supply (KWA) capacity expansion step 1	■	■	■	■	
182	Optimisation of Brielse Meer lake water supply, step 1	■	■			
183	Innovative climate adaptation pilot De Groote Lucht freshwater plant	■				

Southwest Delta

184	Roode Vaart transfer to West-Brabant and Zeeland	■	■	■	■	
185 Innovative climate adaptation pilot Zeeland freshwater supply testing ground, involving:						
185a	Zeeland - FRESHM freshwater-saltwater mapping - E1	■				
185b	GO-FRESH II – subsoil water storage in Southwest Delta - E2	■				
185c	Expansion of use and recycling of local water flows - E4	■				
185d	Salt-tolerant potato – E6	■				
185e	E3, E5, E7 & E8	■	■			

Area around the major rivers

186	MWS: study into longitudinal control dams		■	■		
187	Launch of measures in southern area around the major rivers-	■	■	■	■	
188	Innovative climate adaptation pilot regarding sustainable use of shallow groundwater			■	■	

Main water system (cf. measures outlined for each region)

189	Water availability in the Main Water System (MWS)	■	■	■	■	
189a	Hollandsch Diep pilot	■	■	■	■	

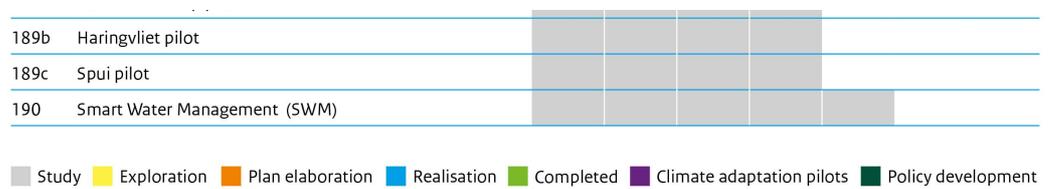


Table 11
Schedule of measures, Delta Plan on Freshwater Supply

Number	Name of pilot
IJsselmeer Region	
501	Texel Water
502	Northern sandy grounds
503	Oostpolder
504	Schoonwatervallei
Elevated Sandy Soils	
506	Oude Diep
507	Berkel
508	Elevated Sandy Soils South
Western Netherlands	
511	Oud- en Nieuw Wateringveldsche Polder
512	Boskoop
513	Westland
514	Westeramstel
515	Eiland van Schalkwijk
516	Northern Vechtplassen
517	Inlaagpolder
518	Wilnis
519	Haarlemmermeer
Southwest Delta	
520	Zeeland water availability
Area around the major rivers	
530	Eastern boundary of Betuwe polder

Table 12
Overview of water availability pilots

Delta Plan on Freshwater Supply 2017-2022		Delta Fund	Region*	Total (2017-2021)	Total contribution from Delta Fund 2015-2021
IJsselmeer Region					
171	Flexibilisation of IJsselmeer lake water level:				
171a	MWS: new IJsselmeer lake water level ordinance (2017)	0.1	0.0	0.1	1.0
171b	MWS: operationalisation of flexible water level management	0.7	0.0	0.7	0.9
171c	MWS: measures pertaining to Frisian IJsselmeer lake shores	12.0	0.0	12.0	12.0
171d	MWS: robust and natural shores in IJsselmeer Region, phase 1	2.4	0.0	2.4	2.5
171e	Mitigating measures, Rijkswaterstaat water level ordinance	3.7	0.0	3.7	3.7
172	Northern region elevated grounds project programme, involving:				
172a	Natural design of Dwardsdiep area	0.5	1.3	1.9	0.6
172b	Climate-proofing Drentse Aa basin	0.2	2.7	2.8	0.2
172c	Optimisation of farmland inlets, Northern Netherlands elevated (sandy) soils	0.0	0.0	0.0	0.0
172d	Dulf-Mersken and vicinity area development	0.1	6.7	6.9	0.2
173	IJsselmeer Region testing ground, involving:				
173a	Spaarwater	0.3	1.2	1.5	0.7
173b	Gouden gronden	0.1	0.4	0.5	0.1
173c	Hunze en Aa's testing ground	0.2	0.5	0.6	0.2
173d	Wetterskip Fryslân testing ground	0.2	0.2	0.4	0.2
Elevated Sandy Soils					
174	Implementation programme for Elevated Sandy Soils Delta Plan, Southern Region	29.6	95.7	125.3	32.9
175	Implementation programme for Elevated Sandy Soils freshwater supply, Eastern Region	24.4	80.2	104.6	27.1
176	Climate adaptation pilot South: sub-irrigation	0.0	0.2	0.2	0.1
177	Climate adaptation pilot East 1: effluent sub-infiltration	0.0	0.0	0.0	0.0
178	Climate adaptation pilot East 2: smart weir	0.0	0.0	0.0	0.0
179	Climate adaptation pilot East 3: water distribution	0.0	0.0	0.0	0.0
Western Netherlands					
180	MWS: Irene locks (KWA+ in MWS)	2.9	0.0	2.9	3.0
181	Small-scale water supply (KWA) capacity expansion step 1	37.5	0.0	37.5	40.0
182	Optimisation of Brielse Meer lake water supply, step 1	1.4	0.5	1.8	1.5
183	Climate adaptation pilot De Groote Lucht freshwater plant	0.0	0.4	0.4	0.5
	Other measures pertaining to the regional water system	0.0	16.7	16.7	0.0
Southwest Delta					
184	Roode Vaart transfer to West-Brabant and Zeeland	12.4	12.4	24.9	12.5
185	Climate adaptation pilot Zeeland freshwater supply testing ground, involving:				
185a	Zeeland - FRESHM - E1 freshwater-saltwater mapping	0.0	0.0	0.0	0.7
185b	GO-FRESH II - subsoil water storage in Southwest Delta - E2	0.1	0.0	0.1	0.2
185c	Expansion of use and recycling of local water flows - E4	0.0	0.0	0.0	0.1
185d	Salt-tolerant potato - E6	0.0	0.0	0.0	0.1
185e	E3, E5, E7 & E8	0.3	0.0	0.3	0.3
Area around the major rivers					
186	MWS: study into longitudinal control dams	0.1	0.0	0.1	0.1
187	Launch of measures in southern area around the major rivers	0.4	0.8	1.3	0.5
188	Climate adaptation pilot regarding sustainable use of shallow groundwater	0.1	0.2	0.3	0.1

Main water system (cf. measures outlined for each region)

189	Water availability in the Main Water System (MWS)	0.9	0.0	0.9	1.2
190	Smart Water Management (SWM)	3.8	0.0	3.8	4.8
Total		134.3	220.1	354.4	148.1

* The aggregate contributions from sources other than the Delta Fund. Agreements on funding have been set down in Freshwater administrative agreements.

Table 13

Freshwater Supply investment programme 2017 - 2021 (in millions of euros)

Map 3

Freshwater Supply projects map

Background documents and colophon



Background documents and downloads

The Delta Programme 2017 features the following background documents:

[Background document A - List of projects to Connecting Water and Spatial Planning map](#) (in Dutch)

[Background document B - Advisory report of Infrastructure and the Environment Consultative Body and response by the Delta Programme Commissioner](#) (in Dutch)

[Background document C - Second progress report regarding Approach to national vital and vulnerable functions](#) (in Dutch)

[Background document D - Progress report on Freshwater supply in the Delta: looking back on 2015 and looking ahead to 2016-2017](#) (in Dutch)

[Background document E - Delta Programme Knowledge Agenda](#) (in English)

[Background document F - "Monitoring, analysing, acting", first elaboration](#) (in Dutch)

[Click here](#) to download the entire Delta Programme 2017 in pdf format for printing.

The maps of DP2017 are available for download in English:

[Map 2 – Delta Plan on Flood Risk Management](#)

[Map 3 – Delta Plan on Freshwater Supply](#)

The background documents and maps are also available at www.deltacommissaris.nl

Colophon

The Delta Programme 2017 is a publication of the Ministry of Infrastructure and the Environment, and the Ministry of Economic Affairs.

Implementation

Staff of the Delta Programme Commissioner

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Photos

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Pluvial flooding in urban area: Hollandse Hoogte-Henk Braam

Kristalbad, Almelo: Tineke Dijkstra

Leeghwater pumping station, Buitenkaag: Tineke Dijkstra

Cadzand-Bad: Peter Buteijn

Longitudinal erosion control dam, Waal near Tiel: Tineke Dijkstra

Ameland Wadden Sea dyke: Wetterskip Fryslân, Jan Hateboer

Maps and figures

Map 1 Connecting Water and Spatial Planning

Image: Staff of the Delta Programme Commissioner and GIS Competence Centre, Netherlands Enterprise Agency (RVO), Ministry of Economic Affairs

Map 2 Delta Plan on Flood Risk Management

Image: Posad

Map 3 Delta Plan on Freshwater Supply

Image: Posad

Figure 1 Flood Protection Programme, scope and taskings

Image: Rikker Infographics

Figure 2 Respondents' estimate of their progress in achieving the goal of incorporating climate-proof and water-resilient design into policy and actions by 2020

Image: VormVijf

Figure 3 Summary of progress among vital and vulnerable functions with respect to "Analysis, Ambition, Action" steps

Image: Rikker Infographics

Figure 4 Water availability is established through a three-step dialogue process

Image: Imagro

Figure 5 IJssel-Vecht delta multi-layer flood risk management and climate resilience strategy

Image: Urhahn and Infram

Figure 6 Current proposal for Eiland van Dordrecht multi-layer flood risk management strategy

Image: De Urbanisten

Figure 7 Implementation agenda Rhine Estuary-Drechtsteden

Image: De Urbanisten and D.EFAC.TO

Figure 8 Diagram of bifurcation points area and measures explored

Image: Posad

Figure 9 The blue line "Are we still on schedule?" provides information on the output and outcomes of the Delta Decisions, preferential strategies, and Delta Plans.

Image: Rikker Infographics

Figure 10 Periodic coordination between the blue line (output and outcomes) and the green line (external developments) and consulting.

Image: Rikker Infographics

Figure 12 Investments by district water boards, 2016-2019

Image: VormVijf

Figure 11 Delta Fund budgets in 2017, per item and totals, based on 2017 draft Budget

Image: VormVijf

Figure 13 Operating costs 2016 by policy field

Image: VormVijf

Figure 14 Tentative extrapolation Delta Fund

Image: VormVijf



Flood Risk Management



Freshwater supply



Spatial Adaptation



Rhine Estuary-Drechtsteden



Southwest Delta



IJsselmeer Region



Rivers-Rhine



Rivers-Meuse



Coast



Wadden Region



Elevated sandy soils

The Delta Programme is a national programme involving an innovative collaboration between the central government, the provinces, municipalities and district water boards, with input from civic society organisations, knowledge institutes, citizens, and the business community. The aim is to protect the current and future generations of the Netherlands against flooding, to ensure a sufficient supply of freshwater and to climate-proof our country in order to prevent major damage.

Delta Programme

The Delta Programme is a national programme involving an innovative collaboration between the central government, the provinces, municipalities and district water boards, with input from civic society organisations, knowledge institutes, citizens, and the business community. The aim is to protect the current and future generations of the Netherlands against flooding, to ensure a sufficient supply of freshwater and to climate-proof our country in order to prevent major damage.

The Delta Programme Commissioner submits an annual proposal for the Delta Programme to the Minister of Infrastructure and the Environment, fosters the implementation of the Delta Programme, and monitors progress. The proposal comprises all the measures scheduled and provisions made to reduce floods, pluvial flooding and water shortages. The Delta Programme is presented to the States General every year on *Prinsjesdag*, the state opening of Parliament.

Eight areas are working on the further elaboration and implementation of the strategies outlined in the Delta Programme. These areas cover the entire country. They are:

- Rhine Estuary-Drechtsteden
- Southwest Delta
- IJsselmeer Region
- Rhine
- Meuse
- Coast
- Wadden Region
- Elevated sandy soils

www.rijksoverheid.nl/deltaprogramma
www.deltacommissaris.nl

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