

Room for the River

Reshaping the Dutch river system
for better flood protection



Royal HaskoningDHV

Leading role in Room for the River

Room for the River

Room for the River is a national flood risk management programme in the Netherlands. In essence, it is a collection of measures aimed at increasing the discharge capacity of the country's main rivers while also enhancing environmental and spatial quality. The programme's scale is unprecedented: the entire river system of the Rhine-Meuse delta in the Netherlands is being reshaped. Royal HaskoningDHV is playing a leading role in implementing the programme.

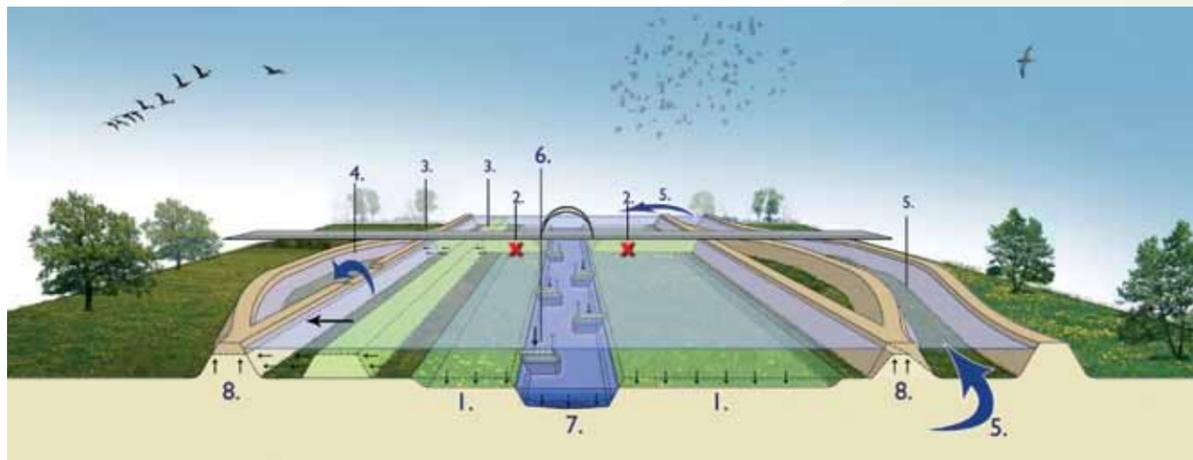
A toolbox of river bed measures

Room for the River breaks with the traditional Dutch reliance on dike reinforcement in flood risk management. Instead, it seeks solutions by increasing river conveyance by opening up more room for the water to flow through. The objective is to increase discharge capacity by approximately 10% without raising the dike levels. The toolbox of flood safety measures involved often requires changes in land use and close interaction with regional spatial planning, with the explicit aim of enhancing spatial quality.

The programme consists of a coherent set of measures to be implemented at approximately 30 river locations in the country. Its total budget is €2.3 billion and it is planned to be completed by the end of 2015.

Governance

Room for the River takes an innovative programmatic approach, providing a flexible framework, rather than a fixed set of projects. The Dutch government first developed the basic set of flood risk management measures as a preliminary package, and then invited regional governmental bodies and private parties to contribute regional alternatives— that is, either new measures or modifications to the preliminary package. These alternatives, which usually involve extra costs, can replace the preliminary measures once the additional financing for them is assured; in such cases, the national government therefore acts as co-financer. By law, the desired level of flood safety has to be reached before the end of 2015, so that the measures to this end have also to be implemented by that time.



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|---------------------------------|---------------------------|
| 1. Lowering flood plains | 5. Lateral flow channel |
| 2. Removing hydraulic obstacles | 6. Lowering of groynes |
| 3. Setting back dikes | 7. Deepening flow channel |
| 4. Retention reservoir | 8. Dike reinforcement |



Royal HaskoningDHV: market leader in Room for the River design and planning

Royal HaskoningDHV is proud to be part of the Room for the River programme. We are involved in most (including the most complex) Room for the River projects. Our involvement encompasses scoping studies, environmental impact assessment, design and engineering, procurement and supervision of works. We apply the “Nature Driven Design” principles to ensure sustainability of the developed measures. We use the integrated project management approach to assure the smooth progress of the complex processes involved in planning and execution of the works.

Altering a river system on the scale of the Room for the River programme is unprecedented, and is a technical challenge with often large social impacts. Technically, the impact assessment of the measures on the river system is an enormous task entailing a number of risks. We have managed these risks through:

- hydraulic, groundwater and morphological modelling
- environmental impact analysis
- ecological and landscaping analysis
- monitoring programmes
- dedicated designs

Room for the River projects can have a major impact on the local community and individual land owners. Our project managers and experts have a profound understanding of the context and strategic processes, and have a proven ability to clearly communicate complex issues to stakeholders and the public at large. By combining these project management and communication skills with our top rate technical expertise, we make a unique contribution to the successful implementation of the Room for the River measures.

Examples of different types of solutions are presented in this folder.

Groyne lowering

The branches of the Rhine in the Netherlands were canalised in the 19th century through the construction of hundreds of groynes, which help to keep the navigation channel at an appropriate depth. However, the groynes also reduce water conveyance at high river stages. Indeed, the lowering of 500 groynes in the main Rhine branch – the Waal – would result in a significant reduction in extreme water levels. Since the Waal is Europe’s main transport corridor, the morphological impacts of the project are particularly important. In a pilot project, the first 100 groynes were lowered. Lessons learnt were applied in the next phases of the project. Royal HaskoningDHV modelled and monitored the morphological response of the riverbed. In the overall project’s design, we used a phased approach, so that lessons learnt in earlier phases could be applied to later ones.

This resulted in a constant improvement in design and innovation in construction techniques, with the associated large savings in the use of construction materials. One unique aspect of this technical project was the attention given, in collaboration with landscape architects, to the spatial integration of the new groynes.



River bypass

The urban development of the city of Kampen is constricting the IJssel River (Rhine branch), creating a bottleneck for river flow. The national government had anticipated building a large bypass around the city after 2050. However, regional stakeholders took the initiative to prepare a regional development plan, including a bypass, for implementation in the short term. The challenge for the project has been to combine various developments (bypass, urban development, infrastructure and agriculture) in the area into a single, integrated spatial development plan, acceptable to all stakeholders. The planning process started with exploration of various bypass scenarios. A widely accepted and economically feasible development plan has been produced thanks to various factors, including Royal HaskoningDHV's outstanding technical and environmental knowledge, the use of state-of-the-art bypass construction tools (hydraulic, groundwater and water quality models and probabilistic design tools), and the close involvement of the public, as well as governmental and private stakeholders.

Returning reclaimed land to the river

Large parts of the lower delta of the Rhine and Meuse have been reclaimed over the centuries, reducing the area available for the water flow. To improve flood safety, a large polder, the Noordwaard (4,450 hectares), will be reconnected to the river. During high river stages, 25% of the flow from the Waal (the main Rhine branch) will be conveyed through the polder to the Meuse River. The polder

will be partly covered by intertidal vegetation and become an extension of the adjacent De Biesbosch national park, thus doubling the park's size and enhancing its ecological value.

The project's challenge was to reconcile the interests of flood protection with those of the farmers. The entire area is divided into several compartments, which will be inundated in a stepwise manner to make optimal use of the retention capacity. The farmhouses will be placed on mounds to protect them during the winter floods. Agricultural activities will still be possible on the land during the summer.

Royal HaskoningDHV was responsible for the project's Environmental Impact Assessment, extensive hydraulic calculations, implementation and maintenance programme, permit requests and design; we also supported the client in the tendering and supervision of the works.

Particular challenges were presented by the design of the overtopping-proof dikes and the development of an innovative wave-protection concept using willow vegetation.

Retention

Water retention in Lake Volkerak-Zoom (8,300 hectares) in the south-west delta of the Rhine and Meuse is one of the largest Room for the River projects. A total storage of 200 million m³ water will be used to safeguard the delta in the event that exceptionally high river discharge coincides with a severe North Sea storm. The project was particularly complex due to the many responsible governmental entities involved, the extensive project area situated at the cross-line of the river and sea influence, and the large number of structures requiring adaptation.

Royal HaskoningDHV provided a wide range of services, from a first outline of the measures to the detailed design and tender documents. Full attention was given to the impact of the rising water table on the environment and land use, and to the adaptation of hydraulic structures. Royal HaskoningDHV elaborated the plans in close cooperation with the stakeholders.

Dike relocation

The 'Room for the Waal River' project is one of the most complex projects in the Room for the River programme. Widening the bottleneck in the Waal (main Rhine branch) near the city of Nijmegen will significantly improve flood safety. A 'complete makeover' of the floodplain will be conducted within the heart of the densely populated urban area, and therefore affects many functions and stakeholders.

Because of the plan's scale and location, Royal HaskoningDHV developed a multi-disciplinary approach, involving direct communication with the local community. This innovative approach drew on general knowledge and local expertise to generate ideas, which were used to solve highly complex multi-disciplinary problems and integrate functions. Thanks to this approach, the planning process took less time and could count on greater support among residents and decision makers – as the jury of the Waterfront competition 2011 in New York stated: "This plan is about moving things forward and setting an example for the world".





With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, non-listed companies and top 40 overall, the company's 8,000 staff provide services across the world from more than 100 offices in over 35 countries.

Our connections

Innovation is a collaborative process, which is why Royal HaskoningDHV works in association with clients, project partners, universities, government agencies, NGOs and many other organisations to develop and introduce new ways of living and working to enhance society together, now and in the future.

Memberships

Royal HaskoningDHV is a member of the recognised engineering and environmental bodies in those countries where it has a permanent office base.

All Royal HaskoningDHV consultants, architects and engineers are members of their individual branch organisations in their various countries.

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