Room for the River: Nijmegen dike relocation, Netherlands

Year of issue

2025

Summary

This flagship of the national Room for the River programme at Nijmegen set back the dyke at Lent and excavated the Spiegelwaal side channel, creating the Veur-Lent island and an urban river park that can take additional flood flow from the Waal. Completed in 2016, the scheme achieves about 35 cm lower design water levels—exceeding the original 27 cm target—and safely diverts high flows; the channel first overtopped its threshold in February 2016. Since delivery, the area has been reshaped as public space with new bridges and intense recreational use. In 2022 the city decided not to build housing on Veur-Lent, keeping the island largely as parkland (with limited facilities), while planning proceeds nearby. The Spiegelwaal now serves as a pilot in “Connected River” to balance flood safety, water quality and heavy leisure demand; bathing advice has at times been negative due to bacteriological risks. Funding came mainly from the State, with total costs reported at about €351 million.

Photo Gallery



Location

51.856, 5.862

Project

NWRM

National ID

Netherlands_01

Sector

Hydromorphology

Installation Date

2013-2016

Implementation status

Completed

Contact

Heather Williams and Dilian Jansen, AMEC

Overview

Location of the project

Near the town of Nijmegen, in eastern Netherlands

Country

Netherlands

NUTS2 Code

Gelderland

Sponge measures implemented in the case study

Floodplain restoration and management

Removal of dams and other longitudinal barriers

Objectives

Lower design high-water level by ~27 cm at Nijmegen for Q=16,000 m³/s; move the northern dike ~350 m inland; create an ancillary channel/urban river park. Result exceeded target with ~35 cm reduction post-completion (2016).

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
National water authority	Rijkswaterstaat	Financing	Financing	Responsible
Other	Gemeente Nijmegen	Implementation	Direct overall project responsibility	Responsible
National water authority	Ministerie van Infrastructuur en Milieu	—	Involved directly in planning and execution of infrastructural changes	Responsible

Authority type	Authority name	Authority role	Comments	Authority responsibility
Architects / Engineers	Staatsbosbeheer	Determination of design details of the measure	Involved in the planning and development of recreational and nature aspects on the future island	Supporting

Documents

cs-nl-01-final_version.pdf (944.18 Ko)

Site Information

Climate Zone

Cool temperate moist

Temperature (°C)

10.80 °C

Elevation range

13 m

Slope range

0-1%

Vegetation class

Mosaic of riparian grasslands, reed and tall-herb fringes, and softwood riparian forests (“ooibos”), consistent with Natura 2000 “Rijntakken” targets; grazed floodplain nature nearby (Gelderse Poort/Stadswaard).

WFD Ecological status

Poor

WFD Chemical status

Failing to achieve good

Water quality status

Bathing water frequently constrained by bacteria and episodic cyanobacteria; urban/recreation pressures in a busy side channel.

Design and Implementation

Project scale

Meso

Project scale specifications

Creates an entire new district of the city

Project area

70

Project area specifications

The 70 hectares only applies to the area where the dike will be moved back 350 meters.

Principles

The main principles were increasing water safety (reduced risk of flooding) within an integrative planning framework. The measures are incorporated with an area of urban development that will provide aesthetic and recreational benefits, together with an enhancement of the spatial quality in the area.

Factor constraints

The main factor that influenced the choice for this measure was the possibility to combine it with a larger city redevelopment project. The creation of a district on the other shore of the Waal, together with a revitalization of the shore at the old city center made the creation of this river park that will be in the center of the city in the future possible.

Constraints

This type of measure is suitable for rivers with permanent flow where the capacity to flow out-of-bank is currently restricted. There are no specific basin characteristics that are necessary, as the measures could be applied in a range of situations.

Favourable preconditions

The availability of open space in between the current river bank and the town. The sharp meander in the river provided a suitable geometry for addition of this type of measure

Financing

Total cost

351000000.00 €

Costs investment

351000000.00 €

Costs investment information

Cost of the entire project, including the water retention mesures.

Financing authorities

Authority name	Type of funding	Comments
Rijkswaterstaat	National funds	as part of the Room for the Rivers program

Compensations

Oui

Compensations annual information

Compensation is required to owners and occupiers of the land that will be used for the measures, who will be displaced.

Policy and Governance

Policy description

Addressing the risk of flooding from the River Waal, particularly following flooding events in 1993 and 1995. This is part of a national programme of work by the national government to make 'Room for the River'.

Land ownership

Spiegelwaal water/bed: State (Rijkswaterstaat). Bridges: City of Nijmegen. Most grounds on the city island (Veur-Lent): City. Stadswaard floodplain east of town: largely Staatsbosbeheer.

Policy targets

Peak-flow reduction

Increase Water Storage

Oher Societal Benefits

Target remarks

The water retention measure is being combined with a city development project.

Policy pressure

Directive	Relevant pressure

WFD identified pressure	Physical alteration of channel/bed/riparia n area/shore of water body for flood protection
Floods Directive identified pressure	Blockage / Restriction

Pressure remarks

Currently a bottleneck exists in the sharp bend of the river, which will be remedied moving back the dyke and the digging of a parallel channel inside the reconnected floodplain.

Policy impact

Directive	Relevant impact
WFD identified pressure	Altered habitats due to hydrological changes
Floods Directive identified pressure	Rural land use

Impact remarks

Rural area in the area between the current dike and the town of Lent will be affected as the channel will be dug here and the area will be completely reformed, leaving no room for previous uses.

Requirement directive

Requirement directive	Specification
WFD-mitigation of significant pressure	Bottleneck at a location with high population density will be solved
WFD-achievement of good ecological status	On the new island there will be room for nature development
Floods Directive-mitigating Flood Risk	The measure will significantly reduce the flood risk

Policy challenges requirements

The Planologisch kernbesluit (PKB) Ruimte voor de Rivieren forms the overall impetus for this NWRM. The PKB identifies roles and responsibilities for 30 individual NWRM related projects to reduce flood risk of the entire river system.

Part of a wider plan

Oui

Wider plan

Wider plan type	Wider plan focus	Name	Comments
National	Water	Room for the River programme	National strategy to create more space for flooding, rather than raising dykes further, initiated following widespread flooding in 1993 and 1995
National	Water	FloodResilienCity (FRC)	INTERREG IVB programme enabling public authorities in eight cities in North West Europe to better cope with urban flooding. Nijmegen is one of the eight cities

Public consultation

Oui

Consultation activities

Comments
Extensive public communication for the national programme as a whole, as well as locally for this specific measure

Has contractual arrangements

Non

Impacts and Monitoring

Impact Assessment Methodology

Performance impact assessment method

Laboratory

Performance impact estimation information

Monitoring is carried out of river flows in the Waal. The measure has been modelled prior to implementation, consistently with all schemes in the Room for the River programme: this has allowed the performance of the whole Room for the River programme to be assessed, not only this individual scheme.

Socio-economic Impacts

Direct benefits information

Flood risk reduction in the lower Waal

Ancillary benefits information

Amenities and social benefits relating to housing provision, recreation, greening cities : Creation of new permanent aquatic habitat. Urban development with a strong blue-green connection.

Biophysical impacts: Hydrology

Information on retained water

Reduced extreme water levels by ≈35 cm; during high flows ~⅓ of discharge is routed via the Spiegelwaal; overtopping threshold provides controlled activation; creation of a new island and low-flow habitats altered local hydromorphology.

Information on peak flow reduction

The measure provides a 35 cm reduction in design flood peak height on the River Waal.

Information on increased groundwater level

Groundwater levels can already be high in this area, causing groundwater seepage. It was a specific aim of the project to ensure that groundwater seepage did not increase.

Information on Restoring hydraulic connection

Hydraulic connection between the river and part of its floodplain is being restored by moving the dyke backwards by 350m, and developing a new channel within the floodplain that will always contain water and will provide additional flood capacity.

Information on peak delay effects

In addition to reducing peak height, the measure is also likely to delay the peak, although no quantification was available

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

Provision of increased aquatic and riparian habitat along the edges of the new channel

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Not relevant for this application

Soil quality overall improvements

Not relevant for this application

Biophysical impacts: Others

Ecosystem impact climate regulation

No specific impact

Lessons Learned

Key lessons

The ability to have an influence at a large scale, particularly in the lower reaches of a major river basin, requires commitment at high levels of government. This is the case with the Room for the River programme.

The integration of this particular scheme in to a wider programme with an overall goal ensures that individual measures do not adversely affect flood vulnerability in down- or upstream locations or in other river basins, and that the combination of individual measures leads to a cumulative, quantifiable positive effect on flood risk.

Barriers

Barrier type	Barrier role	Comments
Attitude of relevant stakeholders	Main barrier	Reluctant attitude of people who owned, farmed or lived on the land that is being used for the scheme
Attitude of the public	Secondary barrier	Concerns from the public towards the financial risk Nijmegen is taking with the ambitious “Nijmegen omarmt de Waal”project – although the water-part of the project is founded by the national government.

Drivers

Driver type	Driver role	Comments

Past flooding events	Main driver	Flooding events in 1993 and 1995 led to the development of the national Room for the River programme
Organisation committed to it	Main driver	The national government decided on this approach and has led and funded its implementation

Success factors

Success factor type	Success factor role
Attitude of decision makers	Main factor
Financing possibilities	Main factor

Cost effectiveness

A traditional approach may have been to increase the flood defenses of the existing channel of the Waal.

Flexibility / Adaptability

The current NWRM did not only aim to meet current peak water levels historically measured, but the Ruimte voor de Rivieren program as a whole aims to be able to handle an increased flow rate to 16,000 m3/s (from 15,000 m3/s) (across the main distributaries of the Rhine); this in anticipation of future more extreme weather circumstances caused by climate change.

Transferability

The measure here is being applied to a large river near the bottom of a very large transboundary river basin. However similar measures could also be applied on a smaller scale.
In a water retention measure being combined with a city redevelopment project, it is important that there is an actual demographic/public demand to attract future private investment in the newly developed housing area and recreational activities.

Basin characteristics influence

This type of measure is suitable for rivers with permanent flow where the capacity to flow out-of-bank is currently restricted. There are no specific basin characteristics that are necessary, as the measures could be applied in a range of situations.

Sources

Sources

Dijkteruglegging Lent