

# Restoration of a natural water landscape for climate adaptation

## Results of changes implemented to the 'Vloeiweide' site by the Brabantse Delta Water Board



The site 'Vloeiweide', prior to the implementation of Ecosystem-based Adaptation measures.

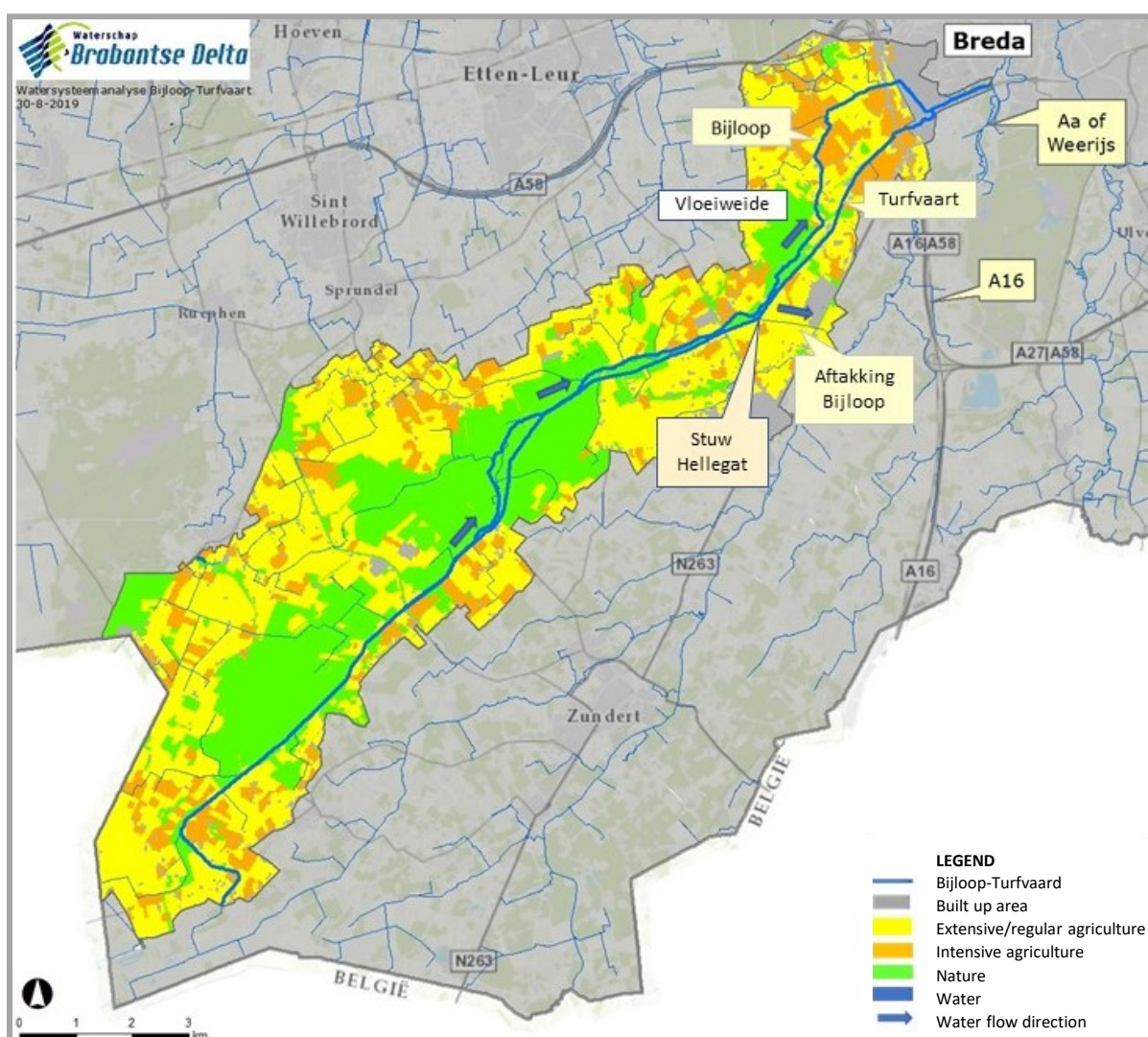
### UNDERSTANDING THE CATCHMENT

The Vloeiweide is located on the border of the municipalities of Breda and Zundert. The area is located on two sand ridges, which were formed after the last Ice Age. The area offers many opportunities for wetland development, due to its lower location in the brook valley. Seepage (groundwater resurfacing) is an important source of nutrition for the area.

The normalised brook 'Bijloop' flows through the Vloeiweide towards Breda. The area is bordered at the south-eastern side by the ditch Turfvaart. The brook and ditch belong to the catchment of the river Aa or Weerijis (tributary to the river Mark). The weir "Hellegat" is located where the Bijloop flows into the Vloeiweide. With this weir, the upstream flow of the Bijloop is divided between the Bijloop and the Bijloop diversion channel, an artificially dug watercourse that carries water directly to the river Aa or Weerijis. The weir opens when a certain downstream water level is exceeded. As a result, a large part of the discharge flows via the diversion channel to the Aa or Weerijis. The downstream part of the Bijloop, including the Vloeiweide, has a limited discharge all year round.

### IDENTIFYING & ENGAGING STAKEHOLDERS

The basic idea in the 'Payment for Ecosystem Services' (PES) financing model is that 'buyers' who invest in climate adaptation measures, earn back their investments through the provision of 'ecosystem services' (ES) by the 'sellers'. The financing of the Vloeiweide took place in the more traditional Dutch way, thanks in part to water board levies as well as European and regional subsidies, including the European Regional Development Fund (ERDF) and the Brabant Green Development Fund. The targeted ES that buyers (tax-payers) receive in return are more stable supply and division of freshwater over the area (alleviating pressure in the rivers Aa and Weerijis during heavy rainfall events; allowing water to slowly release to the environment in times of drought) and restored nature.



Restoration works in the Vloeiweide. A meander in the previously normalised brook Bijloop will be restored. Works are expected to be completed in Fall 2022.



### PRIORITISING LOCATIONS FOR CLIMATE ADAPTATION MEASURES

PROWATER's water system map identifies 'natural places' in the landscape for seepage and infiltration. The map shows that the Vloeiweide is suitable for the development of permanently and temporarily wet nature with potential for special plants due to the presence of the seepage. The challenge is a more stable distribution of water over the whole area and across seasons. The water must remain available in the catchment area for longer.

This is possible through a combination of climate adaptation measures. 2.6 km of brook restoration (raising the soil, introducing woody debris and allowing more water to pass through the brook), hydrological restoration of 45 ha of nature reserve (soil restoration, restoration of natural depressions, smart water distribution). Smart, adapted control of the weirs and distribution system Hellegat allows as much water as possible to flow through the nature reserve via the Bijloop. An important precondition is that flooding downstream of the Vloeiweide (agricultural and urban area of Breda) does not increase. This is possible due to the increased water storage capacity created in the Vloeiweide. Consequently, less water is diverted to the Aa and Weerijis, also lowering the pressure during rainfall events in the Aa and Weerijis (tributaries to the river Mark).

### MONITORING & EVALUATION

A monitoring plan is implemented to develop a more accurate understanding of the water balance of the project area and the hydrological effects of the restoration measures. This plan has been drawn up in consultation with Brabants Landschap (nature manager). Groundwater levels are measured at a number of places. On the basis of the results, water and nature management can be adjusted in the future where desirable.

Participation in PROWATER has yielded several insights for the waterboard. The main one being: there is no blueprint for 'participatory area development', because every area is different. Governments, water and nature managers and private initiators need time to properly organize such a participatory process. A clear division of roles, clear rules and time-out moments are important here.

FOR MORE INFORMATION: • [www.pro-water.eu/output-library](http://www.pro-water.eu/output-library)  
• <https://www.pro-water.eu/markdal-nl>



**Groundwater dominated catchment**  
**Hill top / Plateau** – infiltration area, where water can infiltrate to ground water bodies (indicated in brown)  
**Valley height** – infiltration area, where water can infiltrate to ground water bodies (indicated in yellow). Water that infiltrates here will have less residence time before it emerges in streams. However, flood attenuation can be achieved by infiltration.  
**Hill depression / Valley depression** – Temporarily wet area, where runoff can be retained and slowly infiltrate. (indicated in green)  
**Floodplain** – Temporarily wet area, where runoff and seepage can be retained and slowly infiltrate. (indicated in blue)



The red oval indicates the part of the Bijloop along which several measures will be implemented. The water system map confirms the potential to restore a natural wetland (with potential for permanently wet areas and temporary wet areas indicated in blue and green).

### A cross-border cooperation

From November 2017 to March 2023, 10 partners from Flanders, the Netherlands and the United Kingdom work together on PROWATER. The project has a budget of more than 5.5 million euros. In each country, water production companies, governments and research institutes as well as land managers are involved in order to achieve a supported vision for Ecosystem-based Adaptation (EbA).

The project PROWATER receives 3.315.974 € through the Interreg 2 Seas fund, co-funded by the European Regional Development Fund (ERDF), to work on climate change adaptation and to increase resilience against droughts and extreme precipitation based on ecosystem services.

