

Dyle Estuary Project

The Sigma Plan protects Flanders from flooding while bolstering estuarine nature.

The Scheldt is a tidal river. Twice a month, the ebb and flow dynamic causes a spring tide and when that happens water levels are very high. If this coincides with a northwesterly storm at sea, the water swells even more and it becomes a storm tide. The Gale of January 1976 is a well-known example of a storm tide. Causing severe damage in the Belgian provinces of Antwerp and East Flanders, the storm convinced the government that better protection was needed. This resulted in a large-scale water safety project called the Sigma Plan. The Sigma Plan was updated in 2005. The objective remains protection against flooding but at the same time the Flemish government will restore and further

develop the tidal nature along the river. Dyle Estuary is part of the updated Sigma Plan.

Sigma Plan project at the Dyle Estuary

This project consists of four sub-areas: Grote Vijver North and South, Zennegat, Tien Vierendelen and Bovenzanden. The works in Bovenzanden were completed in 2025. In Tien Vierendelen, the works are currently still in full swing. The Grote Vijver (North and South) was completely redesigned in 2022. Zennegat, which we completed in 2017, is now coming to life as a unique tidal nature reserve. In recent years it has already proved very useful on several occasions as a flood control area at storm tide.

Location

Province of Antwerp /
Mechelen and Willebroek

Surface area

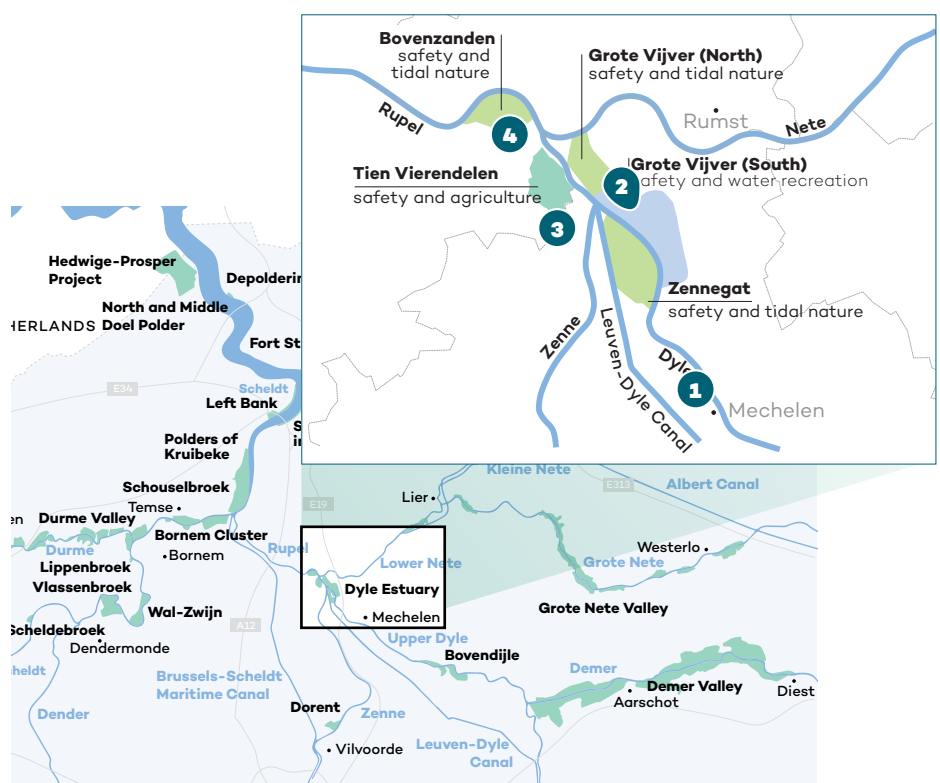
248.81 hectares

Measures

- Flood control area
- Flood control area with reduced tides

Why?

- Water safety
- Development of tidal nature



What measures have been taken?

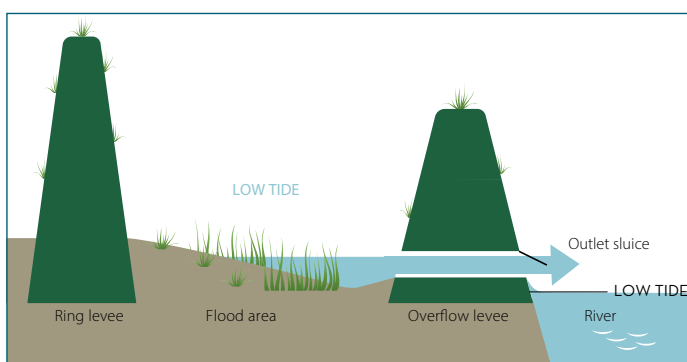
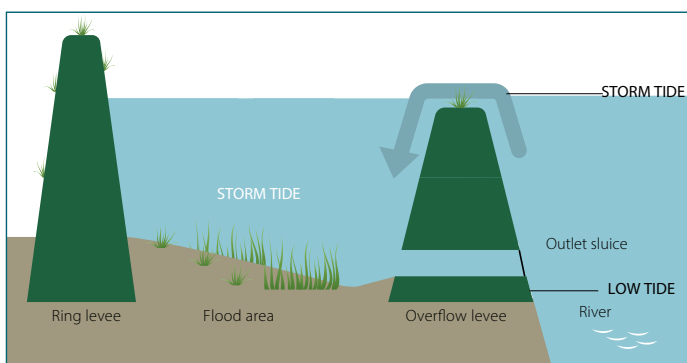
Increasing water safety in the region.

The Sigma Plan protects the Dyle Estuary and surrounding residents with a cluster of flood areas. Grote Vijver offers 119 hectares of additional buffer capacity at storm tide. Grote Vijver North is a flood control area with reduced tides. Its operation is quite simple: at storm tide and high water levels, water flows from the River Dyle over the lowered overflow levees and onto the plain. Here, the water meets a high, wide ring levee that protects the hinterland from flooding. The sluices by the rivers Dyle and Nete can then drain the water back into the rivers once the river levels have dropped again.

Zennegat is the place where the River Zenne, the Leuven-Dyle Canal and the River Dyle merge. Like Grote Vijver North, it is a flood control area with reduced tides. Zennegat has already proved on several occasions that the Sigma Plan works. Both flood areas lessen the peak of floods and reduce the risk of flooding in the Mechelen region as well. Bovenzanden holds excess water from the River Rupel at storm tide. Grote Vijver South will only be used as a flood area in case of extreme storm weather. Tien Vieren-delen will also only flood when Bovenzanden, Zennegat and Grote Vijver North do not have sufficient capacity to accommodate the water.

Flood control area

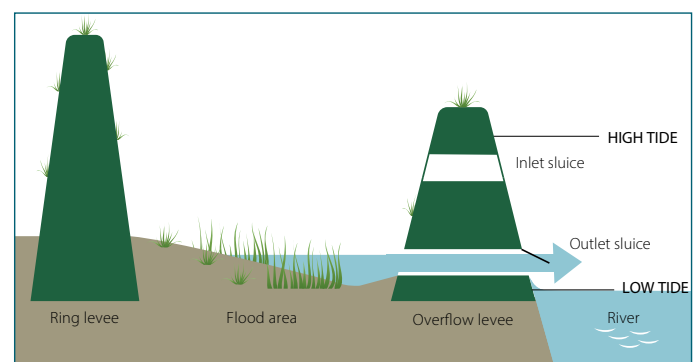
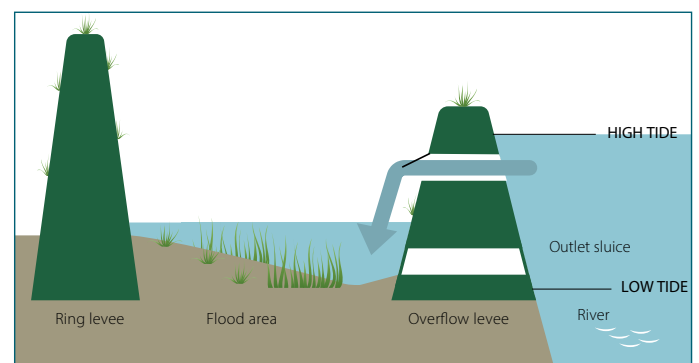
A flood control area is an area of flat land alongside a river that buffers water under extreme weather conditions. The water flows over an overflow levee and onto the plain. A ring levee always protects the hinterland to prevent any residential areas from getting flooded as well.



Operation of a flood control area at storm tide.

Flood control area with reduced tides or tidal flood area

A flood control area with reduced tides has the same structure as an ordinary flood control area but its overflow levee also contains a smart sluice system. At high tide, a high inlet sluice allows a limited amount of water in, just enough to trigger the development of tidal mudflats and tidal marshes. At low tide, the water slowly flows back through a low outlet sluice and on to the River Scheldt. The area therefore ensures water safety while fostering the development of tidal nature.



Operation of a flood control area with reduced tides.



Bovenzanden in 2025

© Vilda



Oystercatcher

© Luc Meert



Purple loosestrife

© Vilda

**At the same time,
we are restoring rare
tidal nature.**

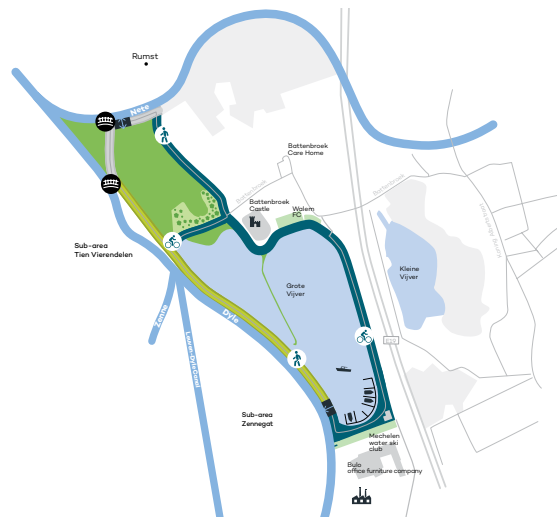
Through flood control areas the Sigma Plan works with nature to protect Flanders from high water levels on the surrounding rivers. This has nothing but benefits. These natural buffers can hold large quantities of water as nature is given free rein. For example, every day a small amount of Dyle water flows through the Dyle levee's bidirectional sluice and onto the Zennegat flood area. This creates tidal

nature with rare freshwater mudflats and marshes, a perfect habitat for a variety of extraordinary animals and plants. Over time, they will evolve further into tidal willow forests, one of the rarest, most exceptional ecosystems in Europe.

1 Zennegat



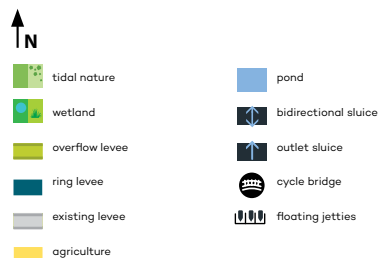
2 Grote Vijver



3 Tien Vierendelen



4 Bovenzanden



	1. Zennegat	2. Grote Vijver	3. Tien Vierendelen	4. Bovenzanden
Location:	Antwerp / Mechelen (north of Battel)	Antwerp / Mechelen	Antwerp / Heindonk (Willebroek)	Antwerp / Heindonk (Willebroek)
Duration:	2008-2017	2008-2022	2008-2026	2008-2025
Surface area:	59 hectares	119 hectares	37 hectares	34 hectares
Measure:	flood control area with reduced tides	- North: flood control area with reduced tides - South: flood control area	flood control area	flood control area with reduced tides
Why?	- Flood protection - Habitat for rare birds - Development of tidal nature	- Flood protection - Development of tidal nature - Water recreation area (water skiing)	- Flood protection - Area for farmers	- Flood protection - Development of tidal nature - Habitat for rare birds