

Kalkense Meersen

Nature as an ally in
the climate challenge







The Sigma Plan: flood protection through nature restoration

In the Belgian province of East Flanders, near Ghent, you will find the Kalkense Meersen: a project area within the Sigma Plan. With this plan, Flanders protects the Scheldt valley against flooding and the consequences of climate change.

At the same time, we are creating beautiful nature areas teeming with biodiversity. How do we do this? By using nature as a partner against floods and the consequences of climate change.

Valuable pioneering work has been carried out in the Kalkense Meersen, which serves as an example for other Sigma Plan areas. Flood control areas such as Paardeweide and Bergenmeersen are ready to store water at storm tide, a combination of spring tide and a northwesterly storm in the North Sea. The depoldering of Wijmeers gives the Scheldt extra breathing space. This decreases the strain on the levees along municipalities such as Wichelen and Berlare so these areas will remain dry. Finally, wet grasslands such as Paardebreek, the Kalkense Meersen wetland and the Wijmeers wetland form a habitat for rare plants and animals while protecting the region against water loss.

6 zones, 3 functions

The Kalkense Meersen Sigma project is divided into a number of carefully chosen sub-areas. They are designed in such a way that the environment is protected against flooding, giving nature every opportunity. Each area has a specific role.



◀ Wetland Kalkense Meersen

- 606 hectares
- nature reserve
- wetland*
- municipality of Laarne, Wetteren, Wichelen and Berlare

› Wetland and depoldering Wijmeers

- 159 hectares of depoldering*
- flood control area*
- floods once every 50 years
- wetland*
- 28 hectares of wetland
- tidal nature*
- municipality of Berlare and Wichelen





^Paardeweide

- 85 hectares
- flood control area*
- floods on average once a year
- wetland*
- municipality of Berlare and Wichelen



Flood control area

... is an area along the river that can store large quantities of water during high water levels. A ring levee will be built inland to protect the region. Along the river is a lower, reinforced overflow levee, allowing water from the river to flow into the area. Sluices in the overflow levee allow the water to flow back into the river once the level of the Scheldt has fallen sufficiently.

Wetlands

... act as a large sponge by collecting rainwater and slowly releasing it back into the river. This helps to prevent flooding and keeps the natural environment fresh in dry periods. The wetlands of the Kalkense Meersen consist of extensive wet grasslands with scattered open water fringed by reed beds. They are home to a great variety of rare plants and animals, such as the marsh marigold and black-tailed godwit.



> Paardebroek

- 28 hectares
- nature reserve
- wetland*
- municipality of Berlare



< Bergenmeersen

- 41 hectares
- flood control area with reduced tides*
- floods on average once or twice a year
- tidal nature*
- municipality of Wichelen



Flood control area with reduced tides

... combines the safety function of a flood control area with the development of rare tidal nature.

An inlet sluice high in the overflow levee allows a little water in every day at high tide, giving rise to tidal nature. At low tide, the water flows back to the river via an outlet sluice. During storm tides, the area can store large quantities of water.

Depoldering

... is a previously reclaimed area that we return to the river. Here, too, we will first build a ring levee, after which we create breaches in the old river levee. This allows the river to flow back in and out of the area to the rhythm of the tide, creating rare tidal nature. The extra space for the river reduces the risk of flooding further inland. Depoldering also tempers the strength of the tides.

Tidal nature

... is a special kind of nature that develops where the tides are given free rein. The water deposits a layer of silt each time, creating tidal mudflats that are teeming with invertebrate life. Higher-lying parts that only flood at spring tide are called tidal marshes. Plants that can tolerate regular flooding grow here. In this part of the River Scheldt, freshwater marshes with reeds, purple loosestrife and eventually willows will develop. The tidal willow forests along the River Scheldt are a rather rare biotope on a European scale, closely resembling tropical mangroves: dense, impenetrable woodlands in the water.



Smart interventions for added benefits



In the Kalkense Meersen we work with nature to protect the Scheldt valley from the effects of climate change but there is also a focus on nature management and experience. In recognition of the innovative interventions applied here, the Kalkense Meersen received the prestigious Working With Nature certificate from PIANC, the international organisation for water-bound transport infrastructure.





Combination sluice in Bergenmeersen

Bergenmeersen: a first for the combination sluice

Bergenmeersen can store 1.5 million m³ of water during a storm tide, but it is the sluice that makes the area unique. It is the first flood control area in the world where the inlet and outlet sluices are combined into one whole.

This combination sluice allows water to flow in and out twice a day to the rhythm of the tide. Thanks to a system of weirs, the inflow of water can be regulated, thereby also adjusting the erosion and sedimentation in the area. We call this Belgian innovation a flood control area with reduced tides.

To limit the pressure of recreation on the nature reserve, traffic flows and parking facilities were reviewed and optimised – with attention to natural values, management and recreational co-use. In 2022, the project around the Old Scheldt, including the pathway structure and the Roerdompbrug, was the recipient of a Public Space Award.

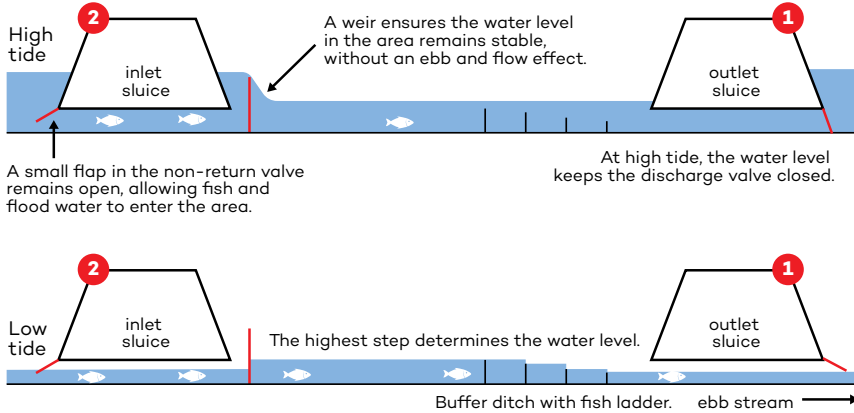
Paardeweide: a fish-friendly resting point

The easternmost part of Paardeweide is a wet area with water features and reeds: a reed atoll. This zone is connected to the River Scheldt via two sluices, in combination with a fish ladder. The system was specially designed for this area to allow fish to swim to and from the Scheldt, while stabilising the atoll's water level. The fish-friendly link had a significant impact. One year after completion, sixteen different fish species were found in Paardeweide, including eel, perch and roach.

The other sub-areas of the Kalkense Meersen were also designed with a focus on fish migration. It's a quiet environment for fish where they can reproduce. This is not only improving the fish stock. The animal species that depend on the fish also benefit.



Paardeweide



Wetland Kalkense Meersen: the return of the Old Scheldt

At the end of the 19th century, the River Scheldt was straightened in the wetland of the Kalkense Meersen. A river bend (or meander) was cut off and subsequently filled in. Digging that 'Old Scheldt' creates an attractive habitat for the kind of animal species the Sigma Plan aims to attract, such as the spotted crane. Fish also feel at home here. In turn, they attract rare birds such as the great bittern. The birds can find shelter between the reeds and the marsh plants in the shallow parts and along the banks.



To allow rainwater – including runoff from the village of Kalken – to drain into the River Scheldt, the Old Scheldt has been connected to a series of ditches. The network of ditches is managed through a combination of fish ladders and a sluice, similar to the fish ladder at Paardeweide: fish can move freely and at low tide the water naturally flows back into the Scheldt.



Depoldering Wijmeers: easy depoldering with the flood channel

A depoldered area undergoes a gradual transformation under the influence of the tides. In the initial phase, a lot of silt regularly floods in – these are known as tidal mudflats. Over time, the silt accumulates and most tidal mudflats develop into tidal marshes, which rise above the water level.

Gradually tidal willow forests develop, which are home to a wider variety of plants and animals such as the bluethroat, shelduck and roach. A trench was also dug out to allow floodwater to flow in easily at high tide: a flood channel. As a result, the river water can flow in and out more easily, enabling the depoldered area to optimally absorb the force of the tides and also drain faster. The excavation works were partly funded by the EU through the Interreg project Immerse.



Wetland Wijmeers: free-roaming Galloways

To support the development of a rich and diverse wetland in Wijmeers, the site requires a specific type of management. By allowing parts of the area to be grazed by Galloway cattle, the landscape remains open and valuable plants are given space to develop. The breed is particularly well suited to the task because it not only grazes on grass, but also feeds on brambles, branches and twigs. In addition, Galloways are well adapted to surviving outdoors during the winter months.



A willow mat is transported over the water.

Less dredging thanks to willow mats

In many places, the River Scheldt is sensitive to erosion and silting. This means the river must be dredged regularly in order to remain navigable, which is quite expensive. A pilot project was therefore set up in the Kalkense Meersen as part of the sustainable management plan for the Upper Sea Scheldt. At Uitbergen, large mats made of braided willow branches, weighted down with stones, were fastened to the river bed. These mats are designed to combat erosion, reducing the need for dredging activities.

Factoids about Kalken



Butterfly-friendly mowing

The embankments in the Kalkense Meersen are regularly mowed to impoverish the soil. This creates a more diverse vegetation with grasses, herbs and flowers. This plant diversity is important to maintain the strength and stability of the levees. However, there is a downside: by mowing, butterflies lose a large portion of their habitat. How to solve this? In Wijmeers, as an experiment, a section of the grass verge was left unmown with each mowing session, ensuring enough food (nectar) and habitat remained intact for butterflies and other insects. The result is impressive: rare butterfly species such as the small heath, the Queen of Spain fritillary and the mallow skipper have taken up residence here.

Willow-growing art

Visitors to the Kalkense Meersen shouldn't miss the Salicetum. This artwork consists exclusively of living, natural materials, specifically young willow branches woven around pollard willows that had to be relocated as part of the landscaping of the Wijmeers Wetland. The Salicetum grows and changes with the seasons and that's why artist Will Beckers comes by every year to steer its wild growth in the right direction.



13,000 trees planted

During the creation of the Wijmeers flood control area, a number of exotic trees scattered throughout the area were cleared. In their place, a continuous woodland of native species was planted in Wijmeers Wetland and in Paardeweide. Local students lent a helping hand and together they planted as many as 13,000 trees.

Unexpected swallows

Swallows are doing surprisingly well in the Kalkense Meersen, even though the measures were not aimed specifically at attracting this species. Thanks to the nature management efforts, there's a profusion of insects here for the birds. The swallows use silt from the River Scheldt to build their nests.



Exotic species

Exotic species or exotics are species that do not naturally occur in these parts. Humans have introduced non-native shrubs and trees into our natural environment, either deliberately or unintentionally, for instance through transport or by importing ornamental plants. Most of these species do not cause any problems. However, some exotics do have a negative impact, in which case action must be taken.

Japanese knotweed is one such exotic species that smothers native plants, preventing them from growing. This harms biodiversity but the plant also damages the hydraulic infrastructure and undermines the stability of river levees.

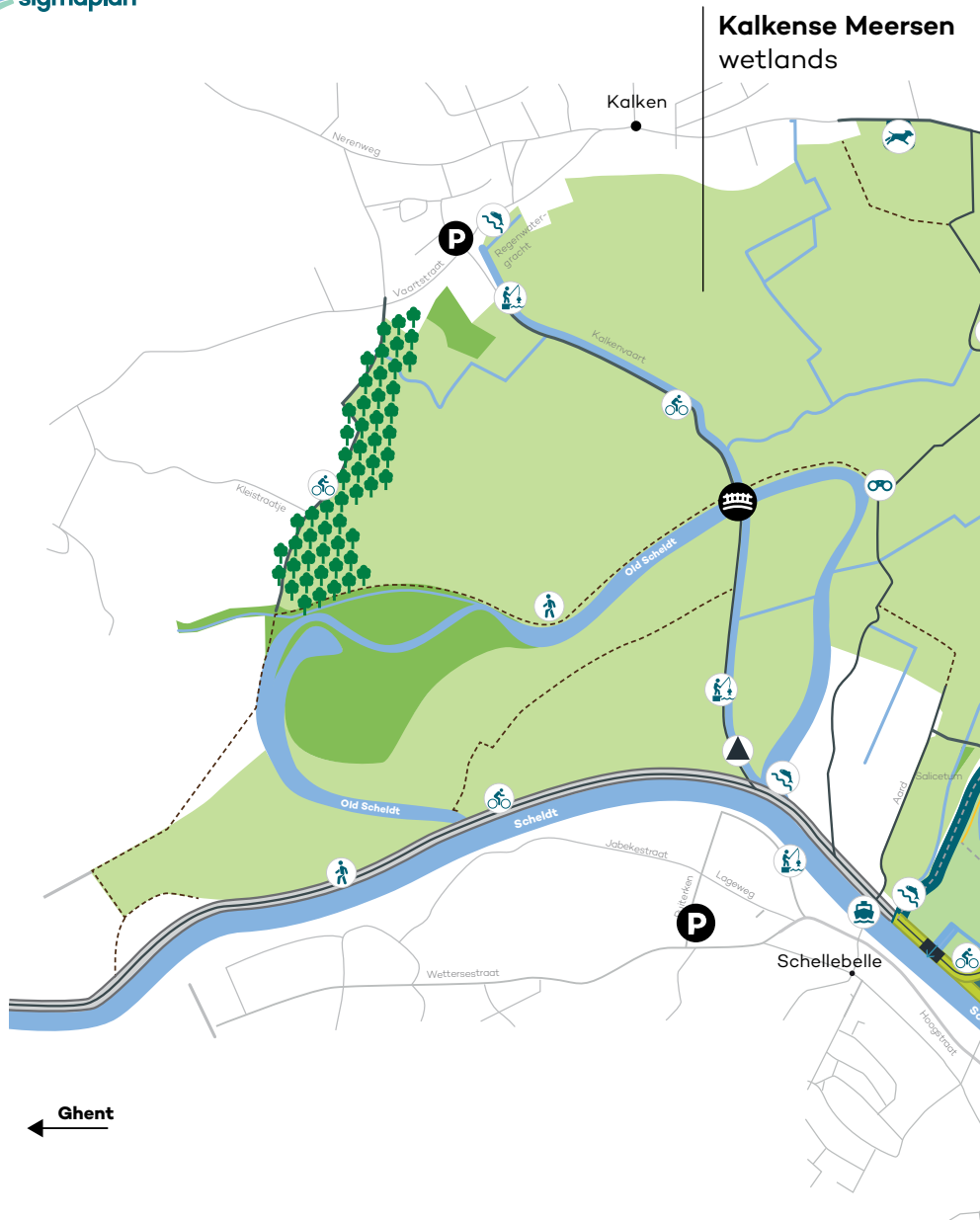




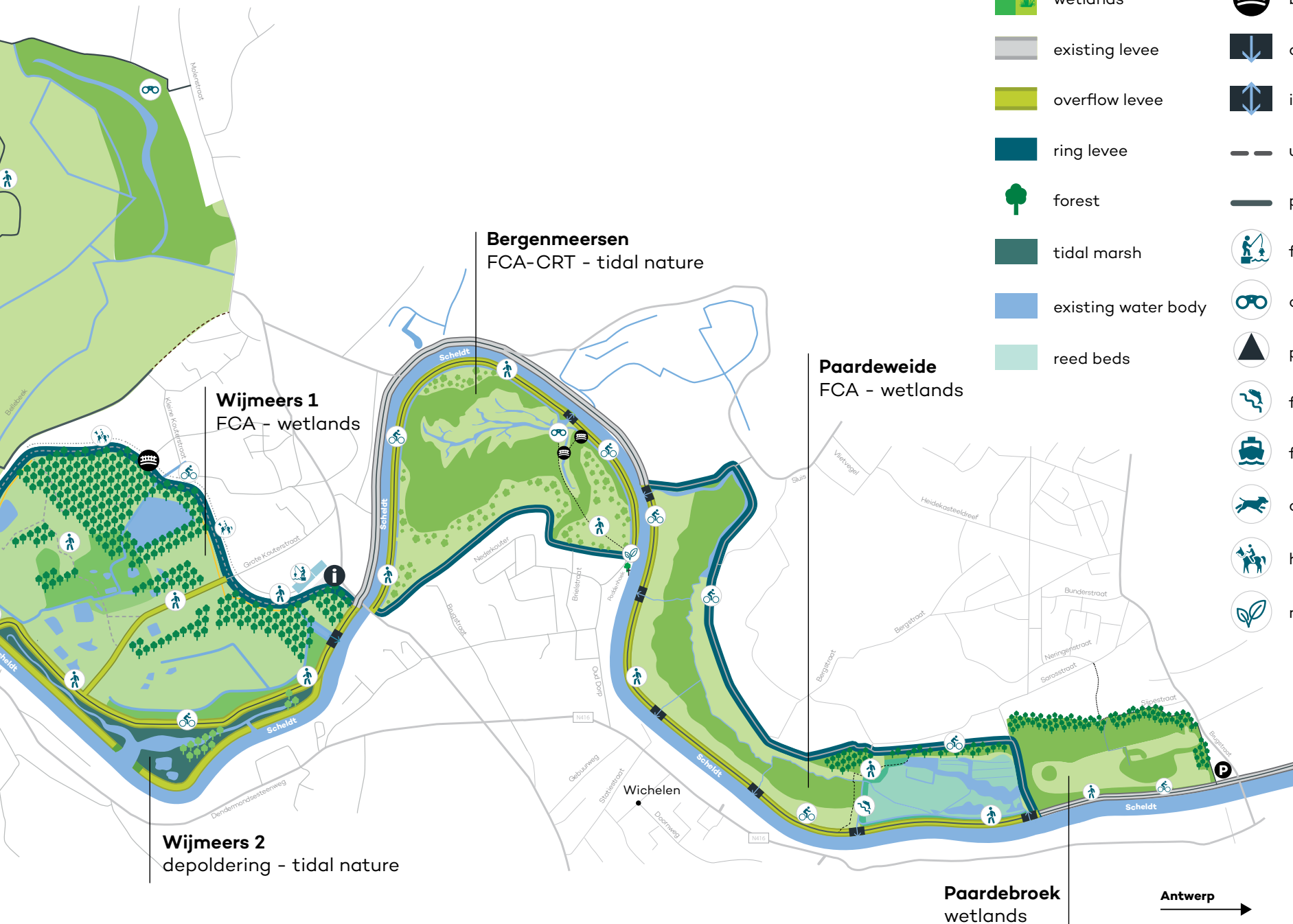
Chinese mitten crab

Invasive exotic species

The Kalkense Meersen have to deal with a number of exotics: species that are not indigenous in our parts but are now present due to factors such as globalisation and climate change, causing damage to the environment. The Chinese mitten crab is a good case in point. These crabs scour our river beds in their millions, devouring water plants, digging into riverbanks and disturbing the sediment. In the Kalkense Meersen a crab trap was installed at the fish ladder near the Old Scheldt in an attempt to limit their numbers. The trap is specially designed to catch crabs: it resembles a large letterbox buried in the river bed with the opening facing up. As crabs crawl along the river bed, they fall through the slot in the trap, while fish swim past unharmed.



Come and discover the Kalkense Meersen!



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|---|---------------------|--|-------------------------|
|  | tidal nature |  | car park |
|  | wetlands |  | bridge |
|  | existing levee |  | outlet sluice |
|  | overflow levee |  | inlet and outlet sluice |
|  | ring levee |  | unpaved |
|  | forest |  | paved |
|  | tidal marsh |  | fish |
|  | existing water body |  | observation point |
|  | reed beds |  | pumping station |
| | |  | fish ladder |
| | |  | ferry |
| | |  | off-leash dog area |
| | |  | horse-riding trail |
| | |  | nature experience |



Nature as a good neighbour

The project areas of the Kalkense Meersen are spread across the municipalities of Berlare, Laarne, Wetteren and Wichelen. Through close collaboration with the municipal authorities and local associations, the Sigma Plan contributes to the economic and recreational assets of the region. A few examples: the construction of a new pier with mooring posts in collaboration with Schellebelle offers more opportunities for passenger shipping on the River Scheldt. Picturesque cycling and walking routes allow visitors to fully experience the tranquillity, vastness and diversity of the Sigma Plan areas, as well as the nearby Donkmeer and Berlare Broek. The visitors attracted to the Kalkense Meersen give the local hospitality industry a boost.

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