

Master Plan Scheldt Quays



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, which comes with higher water levels. 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 implemented in response to the floods caused by the Gale of January 1976. 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.

Scheldt Quays - a crossroads of innovation and creativity

Along a stretch of more than 7 kilometres, the Scheldt Quays in Antwerp are undergoing a thorough makeover. While we focus on water safety, the city of Antwerp is turning the quays into an inviting waterside location. The eight sub-areas are being redeveloped according to the master plan for the Scheldt Quays commissioned by the city of Antwerp, AG Vespa and De Vlaamse Waterweg nv. The latter will handle the stabilisation of the quay wall and the construction of a raised water barrier. A specific stabilisation technique is implemented in each of the subzones, tailored to the condition of the quay wall and its future use. The city of Antwerp and AG Vespa are responsible for redeveloping the public space. The entire project will be executed in different phases in the course of fifteen years.

Location:

Antwerp

Length 8 zones:

7.46 kilometres

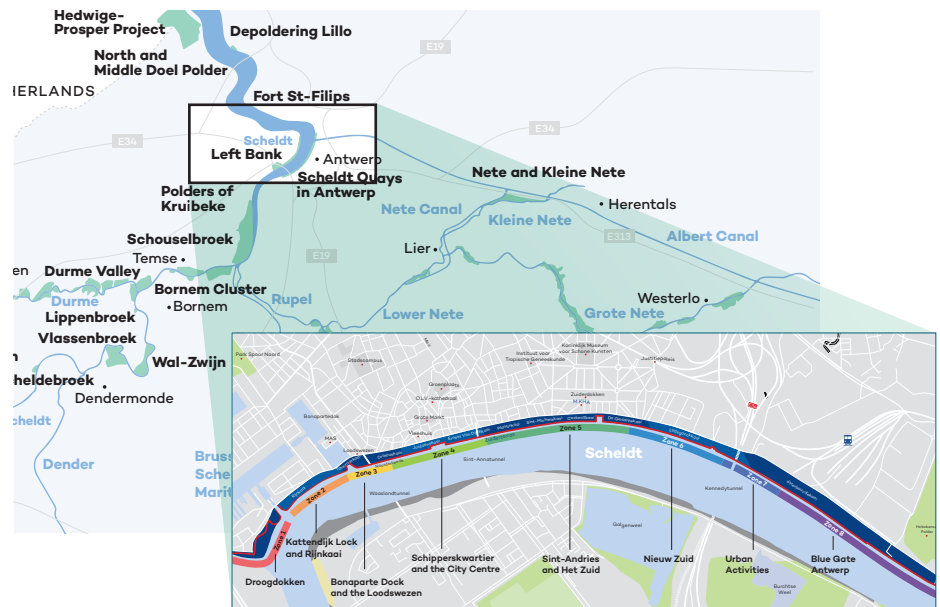
River: Scheldt

Measures

- quay wall stabilisation
- raising the water barrier
- redesigning public space

Why?

- Stabilising the 120-year-old quay wall for the next 100 years
- Flood protection
- Reconnecting city and river
- 8 zones, each with their individual character



What measures are being taken?

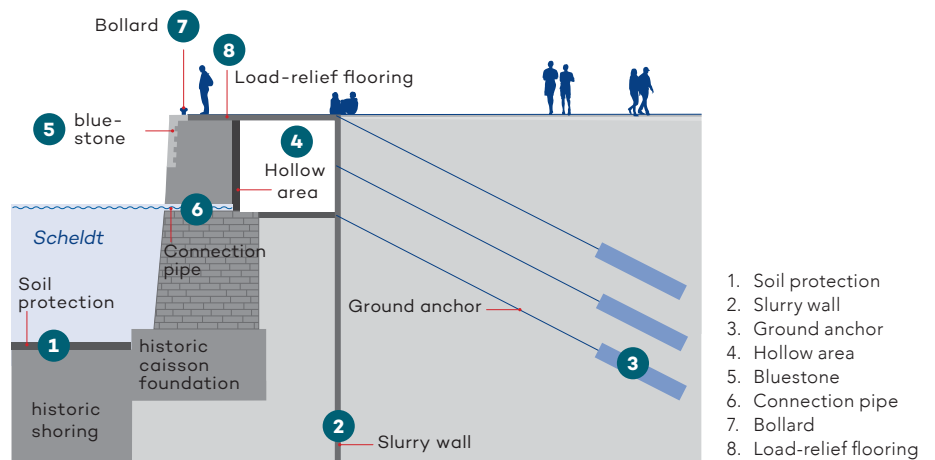
Stabilisation and restoration of the unstable centuries-old quay wall.

As long ago as 1883, engineers noticed that sections of the quay wall were moving towards the Scheldt. This instability is caused by groundwater pressure and the Boom clay beneath the wall's foundation. Over the past 130 years, building experts have developed a series of solutions, all of which proved inadequate. Within the context of the Sigma Plan, De Vlaamse Waterweg nv worked on a **definitive solution** for the unstable quay wall.

Different types of stabilisation

Stabilisation 1 (Loodswezen, Sint-Andries and Het Zuid)

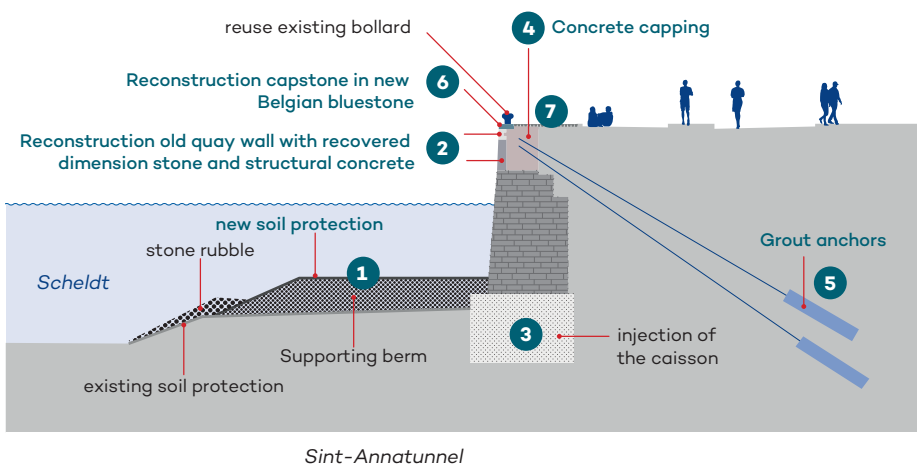
On top of the historic 19th-century shoring a supporting berm in stone rubble is being constructed to keep the quay wall in place. Rubble and fortifying asphalt mats ensure stability. Ten metres behind the quay wall we are installing a slurry wall down to a depth of 30 metres. This wall will take over the function of the old wall. Ground anchors provide stability for the new wall. Sensors help us create a 3D image so that the exact position of the ground anchors can also be determined in the future. An impressive inlet and outlet vault will be constructed on the inside of the quay wall (a.o. at Sint-Andries and Het Zuid). This 'belly' is almost 7 metres wide. A series of openings in the old quay wall allow the Scheldt water to flow in and out of the hollow area to keep the pressure constant on both sides of the quay wall.



Stabilisation 2 (zone Centre and Rijnkaai)

Fragile spots in the old quay wall will be stabilised by installing a new supporting berm and soil protection and by sealing the joints between the various quay wall components. Part of the existing masonry will be replaced by an anchored concrete capping beam that stabilises the quay wall through inclined (grout) anchors. With the reconstruction we aim to restore the historic aesthetic as accu-

ately as possible. This will be achieved through a combination of structural concrete, recovered dimension stone and new material (including Belgian bluestone). The existing bollards will be reused. A drop manhole will improve the drainage of the city canals towards the Scheldt. And finally, we will reconstruct the sett paving and renew ladders, rubbing boards, covers...



- | | | |
|--|---|---|
| 1. Supporting berm with new soil protection | 3. Injection of the caisson with a grout mixture | 7. Breaking up existing pavement (including old train tracks, cobblestones, bollards...): reused in finishing |
| 2. Reconstruction old quay wall with recovered dimension stone and structural concrete | 4. Concrete capping beam anchored in historic masonry | |
| | 5. Grout anchors | |
| | 6. Reconstruction capstone in new Belgian bluestone | |

* A grout anchor keeps the quay wall in place and prevents it from shifting and/or leaning towards the Scheldt. This anchor consists of a long steel core encased in grout and with a wide grout root.

Raising the water barrier

The Scheldt Quays always flood during heavy storm surges. Antwerp is very prone to flooding due to its location on the banks of the Scheldt. In the wake of the 1976 storm surge a water barrier was erected: a concrete wall 5.5 kilometres long and 1.35 metres high. Due to climate change and rising sea levels it has become necessary to raise this water barrier by 90 centimetres. This will be done once the quay wall has been stabilised. The primary function of the water barrier is flood protection but it obviously also determines the aesthetic of the quays. That is why these works are combined as much as possible with the redesign of the quay plain.

Reconnecting city and river

Restoring the connection between the city and the river was a priority in the redevelopment of the Scheldt Quays. The Master Plan aims to restore the quays to an inviting residential and leisure area by the waterfront. The water barrier will be raised using different methods. In some zones we are building an embankment construction, a fixed water barrier wall or a floodgate. In the centre zones, the view of the Scheldt will be preserved by a mobile water barrier that will only be visible with exceptionally high water levels.



8 zones, each with their individual character

Whereas we focus on water safety, the municipal authorities are turning the quays into an inviting area along the water. The eight different sub-areas are being redesigned according to the master plan for the Scheldt Quays. Every sub-area will have its own character.



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Water barrier integrated in the quay plain



©S. Van Watermeulen

Surge barrier



©TM Artes Roegiers-Aggers

Simulation mobile water barrier

Different types of water barriers

The new and raised water barrier will protect Antwerp against high water levels during storm tide. Depending on the zone, different types of water barriers are possible. This way levees, slopes, buildings and even street furniture can be deployed as fixed water barriers. In the Antwerp centre areas, the connection with the city is important. So here we have opted for mobile water barriers that are only activated when there is a risk of flooding.

The zones Centre and Loodswezen will be equipped with a tailor-made mobile water barrier (along a stretch of max. 842 m). This water barrier will be integrated in the to-be-constructed public space and this with a minimum of hard obstacles. The mobile water barrier will rise at storm tide, when the water of the Scheldt is high enough. This Flemish invention ensures the city is protected against flooding while preserving the (open) connection between the city and the Scheldt.



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Droogdokken – zone 1

^ Droogdokken, a hinge between the city and the port

Situated west of the Kattendijk dock, this industrial zone has meanwhile been transformed into a wonderful cityscape. The quay wall has been strengthened and raised here so it can double as a water barrier. In addition to the observation point the Belvédère, the construction of an amphitheatre, a green embankment and the strengthening of the natural river bank are still on the agenda.

> Discrete water barrier

In the short term, the quay wall will be stabilised and the raised water barrier will be integrated as much as possible in a new public space, allowing the preservation of the typical appearance of the quay with the old port cranes. The new layout creates a sense of coherence with the Eilandje and the Droogdokkenpark.



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Rijnkaai – zone 2



© Bureau Bas Smets

Loodswezen – zone 3

< Strengthening the connection with the river

In order to preserve lines of sight, we opted (in part) for mobile water barriers here. The integration of a war memorial for Antwerp's WWII casualties is also on the planning. In that design the quay will become considerably greener in its new role as a park with several gardens and a sunbathing area.

> Redevelopment with respect for archaeological heritage

Zone Centre is located between the pavilions of the Northern and Southern Terrace. Meanwhile the quay wall has been stabilised along its entire length. A mobile, floating water barrier will be installed for a large section between Het Steen and the Southern Terrace. Thanks to the new cruise terminal, the passengers on river or sea cruises now benefit from an excellent reception in Antwerp. The hangars are being fully restored.



© Palmhout Urban Landscapes – Tractebel

Centre – zone 4



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Sint-Andries and Het Zuid – zone 5

^ Safety and spaciousness

This zone stretches from the Southern Terrace to just past the Zuiderluis. Over a 1.4-km stretch, the quay wall was stabilised and a higher water barrier was installed that blends in seamlessly with the expansive quay landscape. It is the only location along the 7-km long project area to still have that authentic quay feeling.



© PROAP- WIT- Sweco

Nieuw Zuid – zone 6

^ Water barrier in the form of a park

The quay wall in Zone Nieuw Zuid was in appalling condition and had to be largely replaced by a new construction. The redevelopment – including water barrier – of the public space comprises a 5.5-hectare park for pedestrians and cyclists, with room for relaxation, lots of trees and greenery, water features and 3 pavilions.

> Full renovation with room for metropolitan activities

In the Zone Urban Activities, a significant stabilisation of the quay wall and an elevation of the water barrier are urgently needed. The public space is being reorganised into a place with room for urban activities. It is in this zone that the new pedestrian and cycling bridge will connect the left and right bank.



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Urban Activities – zone 7



© AG Vespa

Blue Gate Antwerp – zone 8

< Innovative, sustainable and water-related industrial estate

Blue Gate Antwerp is situated on the former site of Petroleum Zuid. This location is in urgent need of stabilisation and a raised water barrier, primarily in the form of a reinforced natural river bank. A 13-hectare logistics zone borders the loading and unloading dock.



Project name	Length	Location	Duration	Measure
Droogdokken – zone 1	580 metres	between Royers Lock and Kattendijk Lock	phase 1 2017-2019 phase 2 2027-2029	- Quay wall stabilisation - Raising the water barrier - Redesigning the public space - Natural river bank
Rijnkaai – zone 2	850 metres	between Kattendijk Lock and Rijnkaai	2026-2030	- Quay wall stabilisation - Raising the water barrier - Redesigning the public space
Loodswezen – zone 3	440 metres	from Bonaparte dock to Northern Terrace	phase 1 2019-2021 phase 2 2025-2027	- Quay wall stabilisation - Raising the water barrier (partly mobile) - Redesigning the public space
Centre – zone 4	740 metres	Between Northern and Southern Terrace	2019-2027	- Quay wall stabilisation - Raising the water barrier (partly mobile) - Redesigning the public space - New cruise terminal
Sint-Andries and Het Zuid – zone 5	1.5 km	from Plantinkaai to and including De Gerlachekaai	2014-2027	- Quay wall stabilisation - Raising the water barrier - Redesigning the public space
Nieuw Zuid – zone 6	750 metres	from De Gerlachekaai to the Kennedy Tunnel at D'Herbouvillekaai	2014-2025	- Quay wall stabilisation - Raising the water barrier - Redesigning the public space
Urban Activities – zone 7	650 metres	along D'Herbouvillekaai (from the Kennedy Tunnel to the new transshipment quay)	2025-2030	- Quay wall stabilisation - Raising the water barrier - Redevelopment with a view to new urban activities
Blue Gate Antwerp – zone 8	1,95 km	from the new transshipment quay to the Hoboken Polder	phase 1 2015-2016 phase 2 2025-2030	- Quay wall stabilisation - Raising the water barrier - Redevelopment of the industrial estate