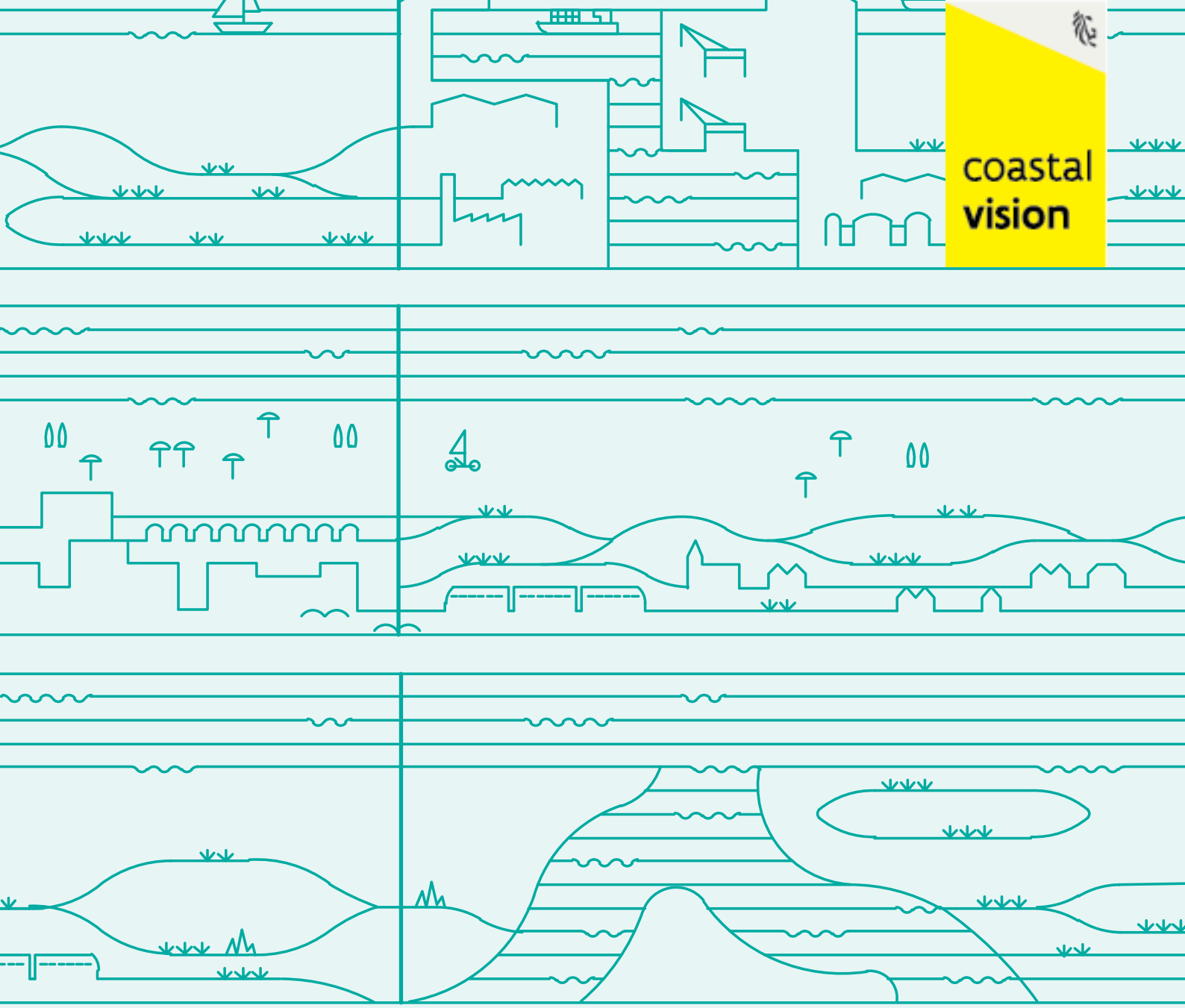

Coastal Vision

Brochure Strategic Policy Plan

DEPARTMENT OF
MOBILITY & PUBLIC WORKS

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Coastal Vision

Brochure Strategic Policy Plan

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MOBILITY & PUBLIC WORKS

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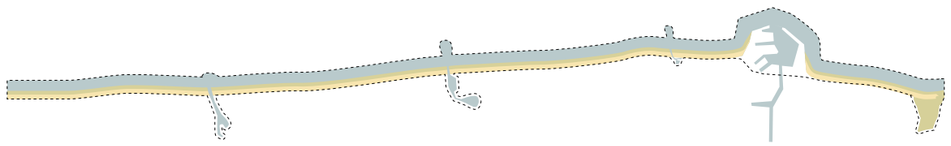
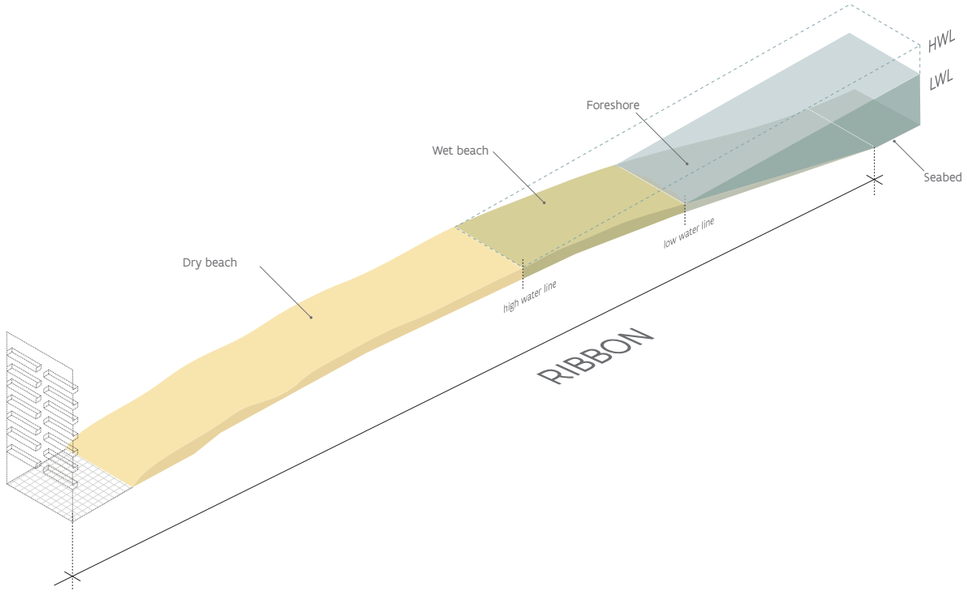
Coastal Vision creates one continuous, adaptive, resilient and robust ribbon that protects the Flemish coast from a possible sea level rise up to and including +3 m.
By doing so, we do not give up land to the sea.





With this strategic policy plan, we do not only want to preserve current functions. We also want to create opportunities for new developments.

Coastal Vision: more than just coastal protection

The climate is changing and sea levels are rising. These are facts that we cannot ignore and to which we must also respond in time. That is why we have been working intensively with many stakeholders in recent years on a promising strategic policy plan for our coast.

Coastal wide and promising coastal protection ribbon

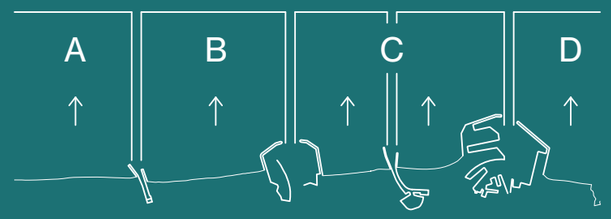
The result of that collaboration is a coastal protection ribbon with an accompanying strategic roadmap. This plan is now ready for decision. The intention is to take all future coastal protection measures within that coastal protection ribbon to continue to protect us from a thousand-year storm event at +1 m, +2 m and +3 m sea level rise. This ribbon stretches across the entire length of our coast, reaching from the French to the Dutch border. It also includes our 4 coastal ports. It runs from the first-line buildings, across (parts of) our rich dune landscape to the waterline.

Coastal Vision is much more than just coastal protection. The coast today has numerous assets and opportunities. Even with sea level rise, the coast must remain promising. That is why we have designed the ribbon so that coastal protection can go hand in hand with the further development of our coast in the future. In other words, with Coastal Vision we delineate a promising coastal protection ribbon along the entire length of the coast. Coastal Vision also provides a protection strategy for both beaches and ports. And we have developed roadmaps for the phased implementation of coastal protection. At the pace of sea level rise. Coastal Vision keeps a low profile when it comes to the nature of the coastal protection measures themselves. After all, we want to offer that freedom to future generations as much as possible.

We briefly outline the size of the ribbon and the various possible protection strategies in this brochure.
More detailed explanations can be found on the website **www.kustvisie.be.**

Guide to rolling out Coastal Vision in function of sea level rise

In function of sea level rise, zones determine their own seaward rhythm



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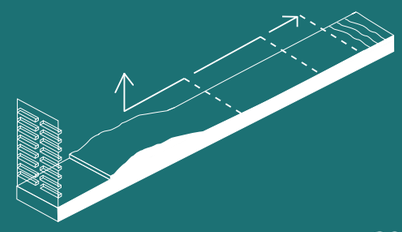
The seaward rhythm can proceed in steps or in one leap



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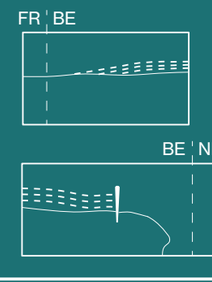
Connection with France and the Netherlands



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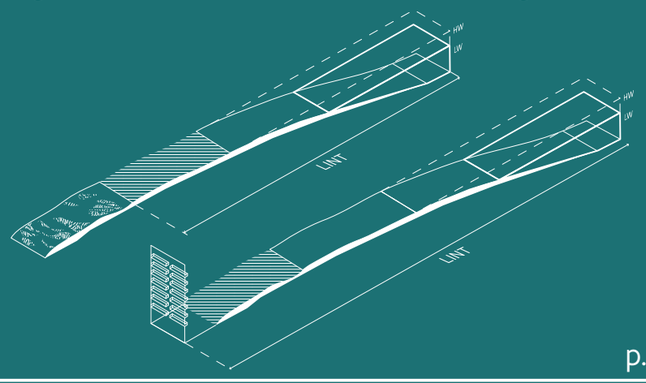
The ribbon extends seaward from parts of the existing dunes and from the first-line buildings



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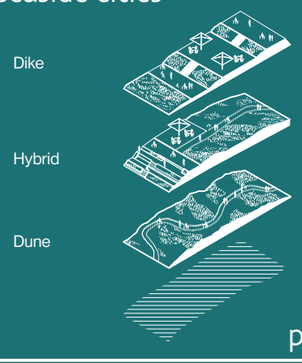
Freedom to choose type of protection measure at seaside cities



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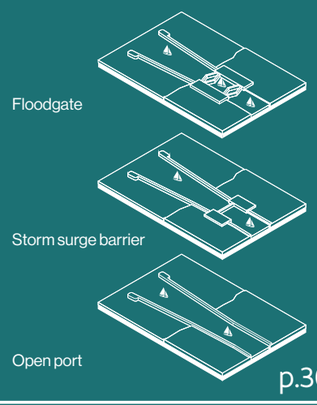
Choices at ports



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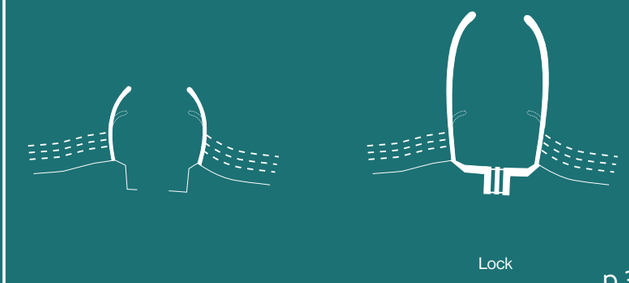
Breakwater dams grow or adapt to the chosen strategy



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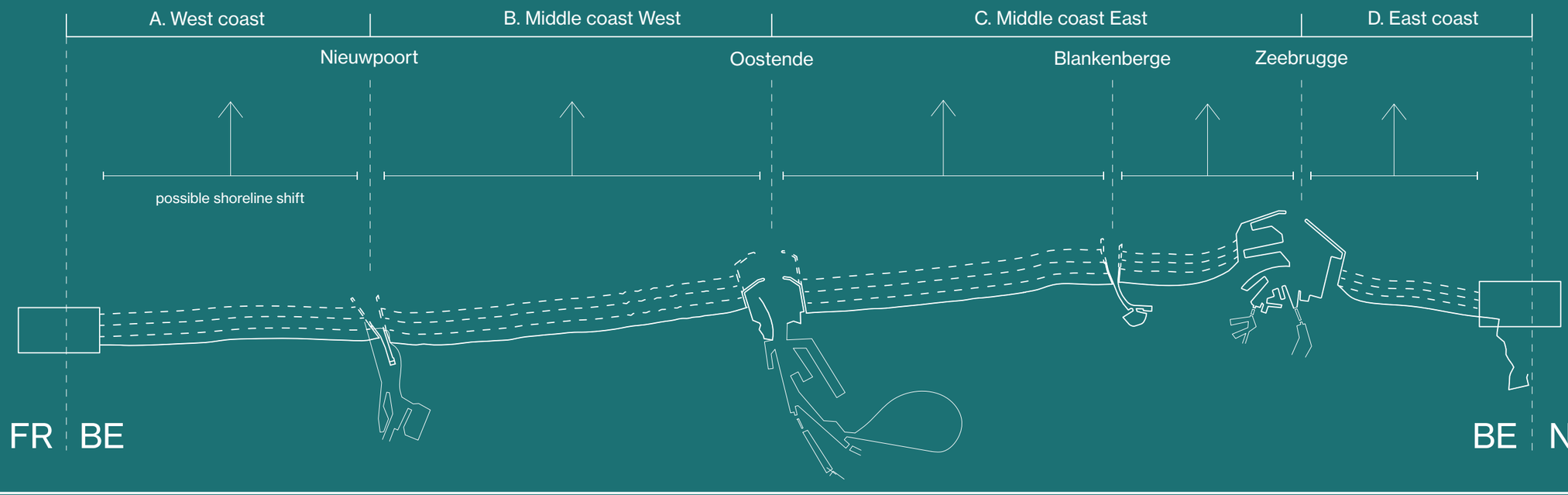

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Working together

Coastal Vision is the result of intensive cooperation with virtually all the stakeholders on and around our coast. Each of them has helped to shape Coastal Vision according to their own vision and taking into account their own needs. That is precisely what makes this plan so promising. To make the most of this opportunity in the future, cooperation will continue to be crucial.

The Master Plan for Master Plan for Coastal Safety(2011) protects us to at least +0.3m sea level rise by 2050. Coastal Vision is consistent with this. And although 2050 is still a long way ahead, we need to prepare now. Indeed, in the ports of Oostende and Blankenberge, we already need to take additional measures between 2030 and 2050. And in the port of Zeebrugge, between now and 2060.

Actions

We have therefore worked together with all stakeholders to develop a first action plan to guide the implementation of Coastal Vision over the next 10 years. We have included a brief overview of this at the end of this brochure. All the proposed actions are cross-cutting. This is the only way we can realise the promise of Coastal Vision.

Collaboration structure

Also up till now, cooperation has been central. The current contours of Coastal Vision are the result of intensive cooperation between more than a hundred stakeholders, from the French to the Dutch border, and from all sectors of coastal society. In order to make Coastal Vision a reality, cooperation will continue to be essential.

Later in this brochure, we describe the outline of this future cooperation structure.

> Coastal Vision relies on an integrated approach so that tomorrow's coastal protection will be an ecological, tourist-recreational and an economical success.

Coastal Vision covers the entire coastline from the French to the Dutch border, including the four coastal ports.

0 5Km

NIEUWPOORT PORT

OOSTENDE PORT

BLANKENBERGE PORT

ZEEBRUGGE PORT

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

WEST COAST

MIDDLE COAST WEST

MIDDLE COAST EAST

EAST COAST

De Panne

Koksijde

Nieuwpoort

Middelkerke

Oostende

Bredene

De Haan

Wenduine

Blankenberge

Zeebrugge

Knokke-Heist

België
Nederland

Frankrijk
België

Challenges

The expected sea level rise is the main reason for additional long-term coastal protection and is at the same time the most uncertain factor.

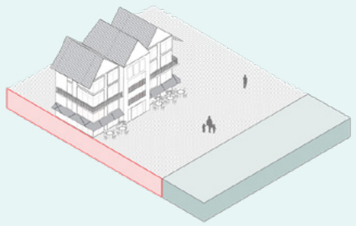
+1 m, +2 m and +3 m sea level rise

We know that sea levels are rising. And around the world there is evidence that sea levels have been rising faster on average per year in recent decades than in the last century. The Master Plan for Master Plan for Coastal Safety(2011) will protect our coast from a 1000-year storm event until at least 2050. Most climate scenarios indicate that sea levels will have risen by around +0.3 m by then. How fast sea levels will rise in the future depends very much on how global our greenhouse gas emissions, the associated rise in average temperatures and the melting of glaciers will develop. And the further into the future we try to look, the more divergent the results between different climate scenarios. According to most models, sea levels along our coast are likely to rise by about +1 m over the next 100 years. Some models predict - with a small probability - an even higher sea level rise. In order to prepare Flanders for even the most pessimistic scenario, Coastal Vision also looks at +2 m and +3 m sea level rise.

Insurance

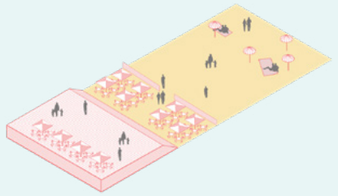
If we do nothing, the consequences are incalculable. Buildings at risk, people at risk but also the coastal economy at risk. The survival of our four coastal ports that will be threatened as will all activities in the tourism and recreation sector. Not to mention the hinterland with its numerous residents, vast agricultural polders and nature reserves.... Looking to the future, Coastal Vision is the only right solution to protect us from sea level rise in the long term. It is our insurance to keep Flanders dry - without giving up any land. Only in this way can we guarantee that present and future generations can continue to invest in and enjoy our coast without worry!

Thanks to its adaptive nature, the ribbon will grow along with sea level rise. The continuous protection is accompanied by strategic step-by-step plans with tipping points. This way, we know in advance when we need to make decisions and move on to the next phase.



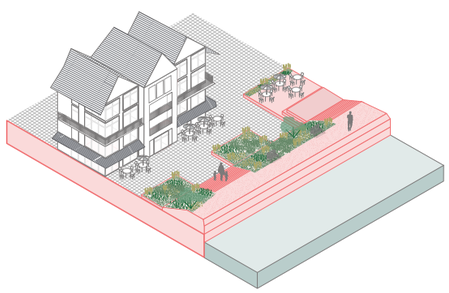
Port zones

Principle ‘ribbon’ outlined based on recreational ports



Beach areas

Principle ‘ribbon’ outlined based on generic beach zone



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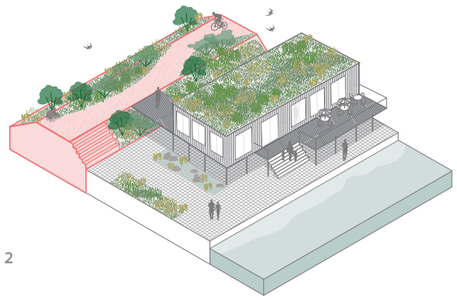

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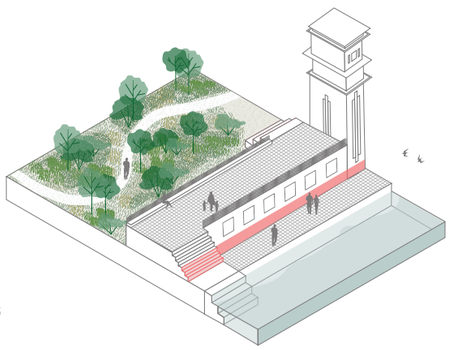

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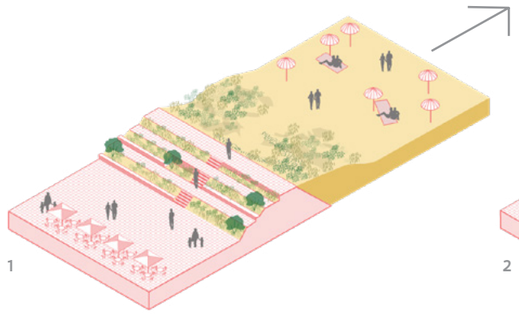
We cannot keep on raising storm walls. After all, we want to avoid high dikes and storm walls undermining the usability of a harbour. That is why we take a broader view with Coastal Vision. We define a zone rather than a line. A zone where the necessary sea defence measures will be taken in the future. In this way, Coastal Vision creates the possibility of providing the most optimal protection strategy on a location-specific basis. We illustrate this above with a few examples of possible promising coastal protection measures: 1. A multifunctional dike between the harbour channel and the city / 2. A dike behind the buildings. Buildings are flood-proofed / 3. a building with a flood defence function / 4. a site is partially or fully raised to become a flood defence park.



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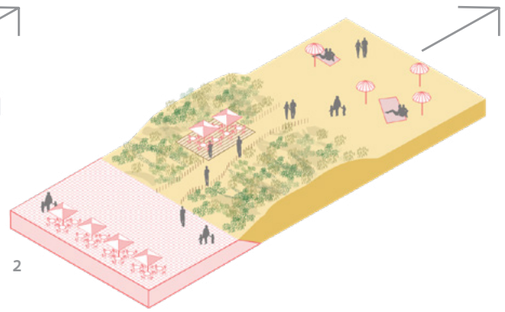

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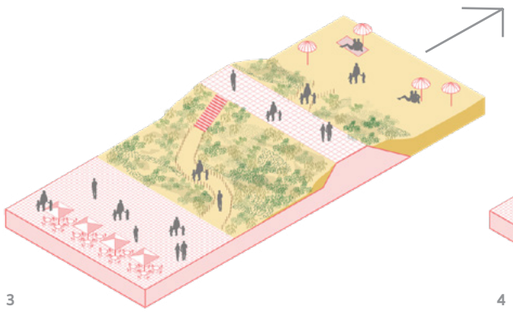

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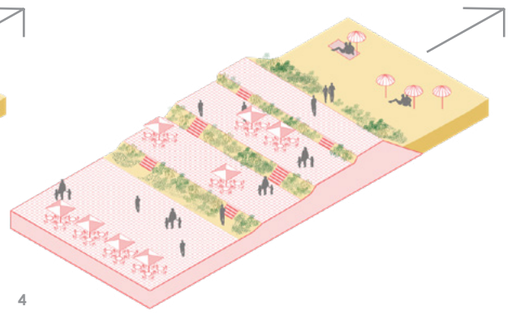


4

Also for the beach zones, we take a broader view. We define a zone wide enough to accommodate the necessary coastal protection measures in a qualitative and promising way. Coastal Vision creates thus the possibility, also for the beach zones, to provide the most optimal protection measure for each location. We illustrate this above with a few examples of possible promising coastal protection measures: 1. a dune for dike / 2. a dune / 3. dike wrapped in a beach park / 4. a stepped dike

> In a promising coastal protection ribbon, coastal protection goes hand in hand with economic, recreational, natural, ... developments. The space for the ribbon is provided accordingly.

Chance: From Line to Ribbon

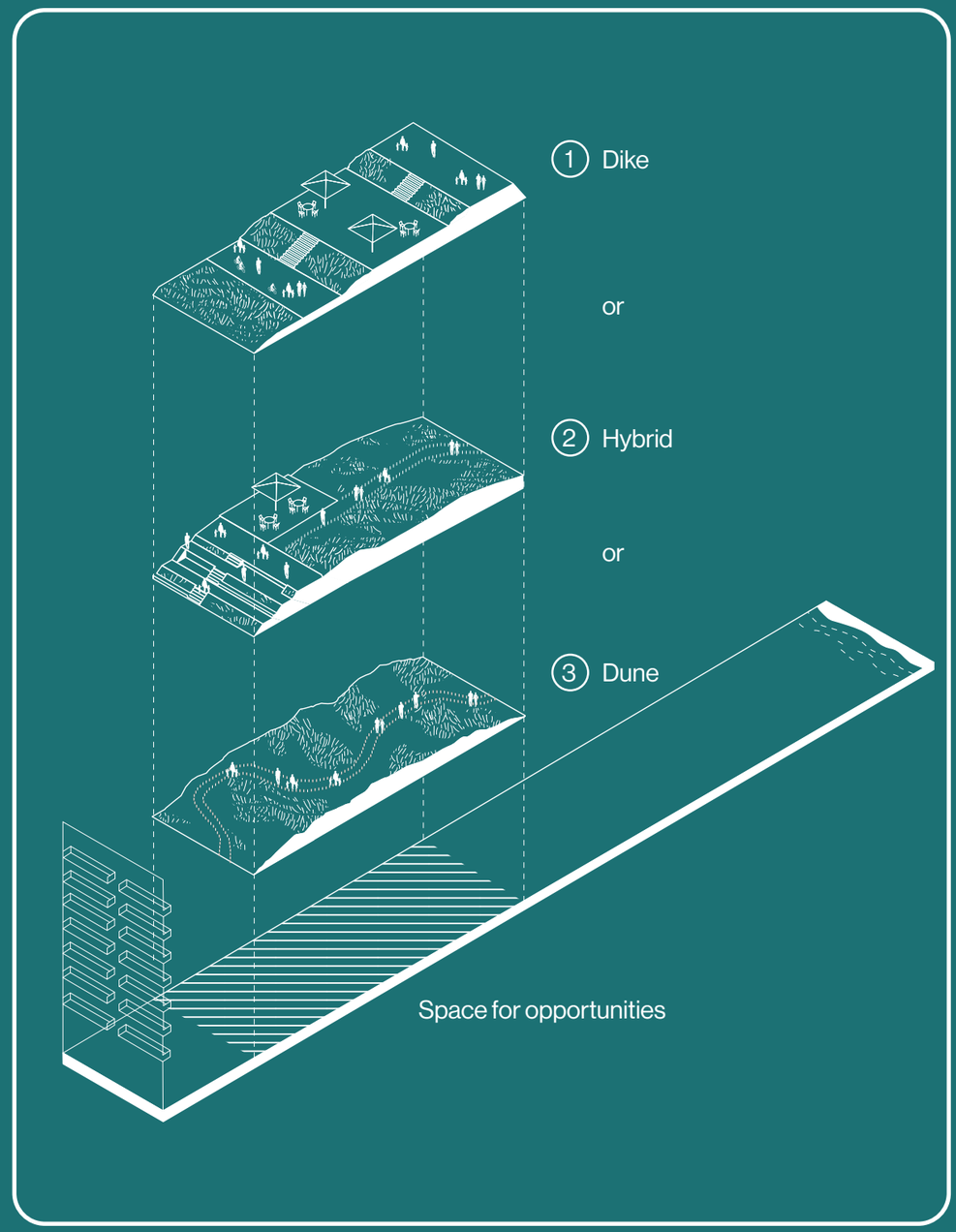
The ribbon is robust and can withstand extreme conditions: a sturdy coastal protection that can withstand rough and intensive handling, even in multi-purpose use.

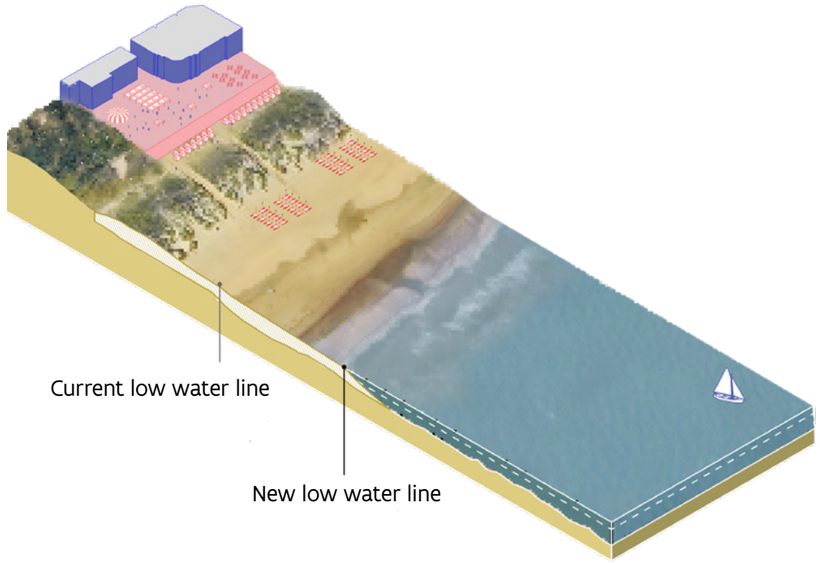
Protecting the beach and port zones against a sea level rise of +3 m poses special challenges. After all, to implement the necessary protection measures successfully with high quality, we need sufficient space. For example, we cannot continue to raise storm walls. That would undermine the usability of our ports. And we would destroy the quality of the public space along the coast.

That is why in Coastal Vision we are working with a coastal protection ribbon: a zone within which future coastal protection measures can be built with quality. And in which we take into account the needs of all actors. Near the coastal towns, the ribbon provides therefore enough space to combine coastal protection with economy, recreation, nature, etc. Think of multifunctional dikes with space for bars and terraces, sports, parks, etc. Think of protective grass dikes with space for footpaths and playgrounds. Or think of protective dunes with space for recreation and nature development. In the ports, we must also consider ‘staying operational’, in addition to protection - even at high water levels. There is a direct correlation between the ease of access to the port and the necessary adjustments and elevations of dikes, quays and storm walls, locks, etc. This should be taken into account when selecting and designing the appropriate protection measures. For this reason, the ribbon also provides sufficient space in the four coastal ports. In this way, coastal protection becomes an opportunity for further development of the ports and for other activities in and around the ports. Within the ribbon, developments are and will remain possible without compromising coastal protection. In order to give all stakeholders certainty towards the future, we have included in the first action plan the priority of creating an accompanying legal framework. Coastal Vision must not prevent current and future development in any field on our coast. On the contrary.

Beach areas

Our coast is a 67 kilometre long and can be seen as a unique chain of beads of dunes and seaside resorts. In order to keep this chain of beads safe and attractive even when the sea level rises, the Coastal Vision provides a coastal protection ribbon that is wide enough to preserve, support and even enrich the individuality of the various beads.





Seaward

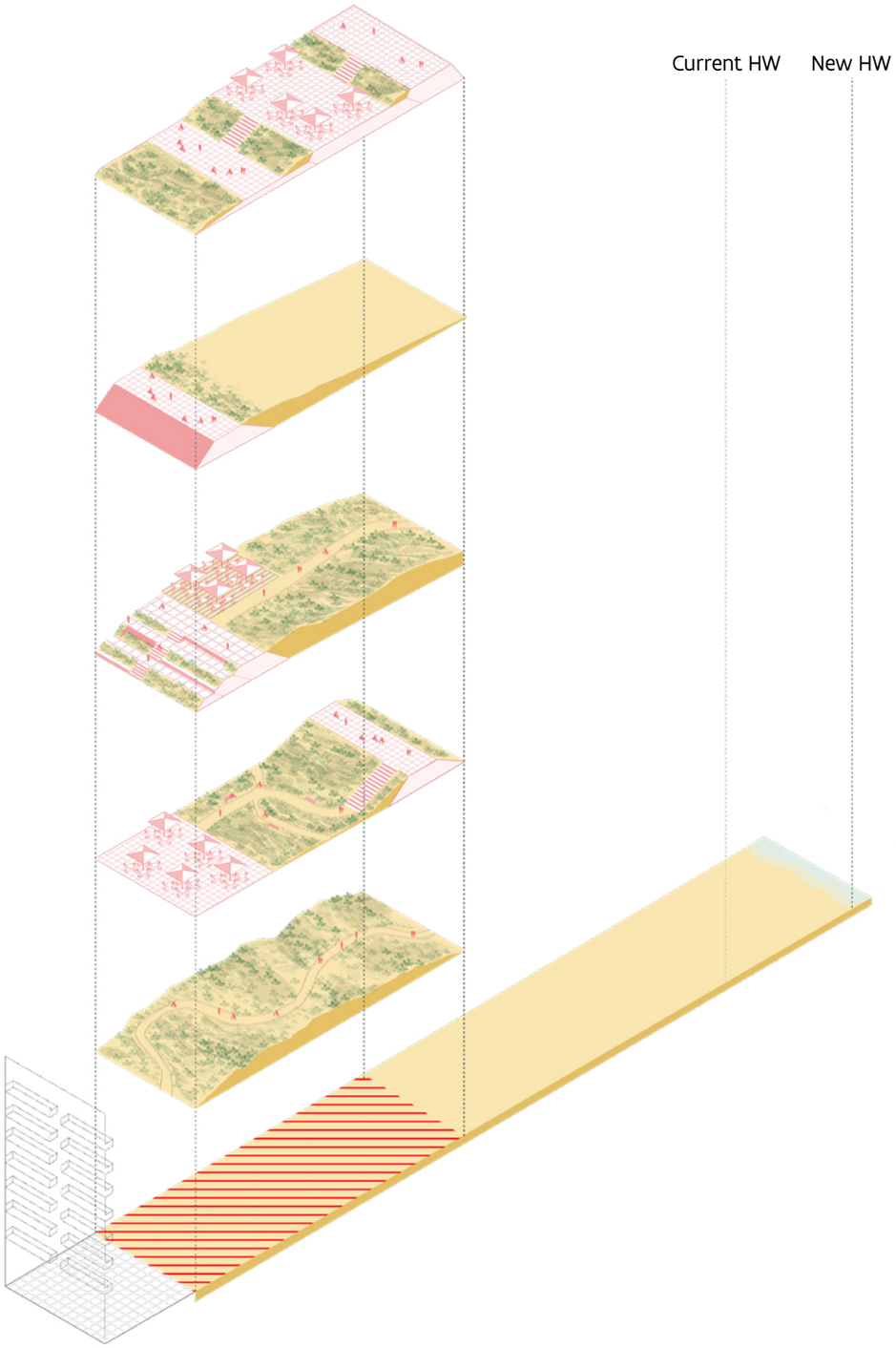
To protect our coast from a sea level rise of+3m sea, we shift the high and low water line (in time) on average a hundred metres seaward. That is quite a lot. By doing so, we create more space for incorporating coastal protection measures and we can (at least) maintain the current dry beach width. The ribbon is wide enough to eventually accommodate a protective dune landscape - also at the coastal towns. As an advantage this changes the coast into one continuous robust dune landscape, stretching from the French to the Dutch border.

Anyway, we are already opting for a ‘dune for dune’ for existing dunes. In places where no dunes border the beach today, other options are also possible. After all, the width of the ribbon allows for a range of coastal protection measures. Think of a multifunctional dike with sports recreation facilities, a stepped grass dike with terraces or a generously designed dune park. And what we gain in dry beach can also be used to widen the promenade.

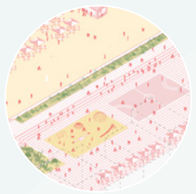
To connect the raised and seaward expanded beach to the existing seabed, the wet beach will also be shifted seaward and connected to the foreshore. We do not need to widen all the beaches as much. Each zone - West Coast, Central Coast West, Central Coast East and East Coast - can follow its own rhythm as a zone. Provided the water is kept out.

With its location and its ability to offer space, the ribbon contributes to a high quality experience of the coast - as a living environment, as a tourist-recreational destination and as a natural area.

Coastal Vision



With Coastal Vision, we are still giving future generations choices for each coastal town. We are making the ribbon wide enough so that a wide range of coastal protection measures remains possible.



The multifunctional dike accommodates many commercial and recreational functions

As a paved dike is the most compact solution, it results in an even wider beach

Plant beds provide cooling and rainwater infiltration

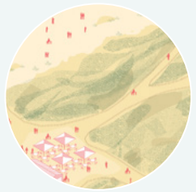
For example, we can see future coastal protection as an extension of the current public space.

Thanks to the dune for dike, a green ribbon is created connecting dune areas – all along the coast.

The current width of the dry beach will be maintained

The stepped shape of the dike provides space for numerous play and sports facilities, terraces as well as seating areas

We may as well see the future coastal protection as one elongated beach park.



A protective body of dunes, between beach and promenade, gives the coastal town a natural character

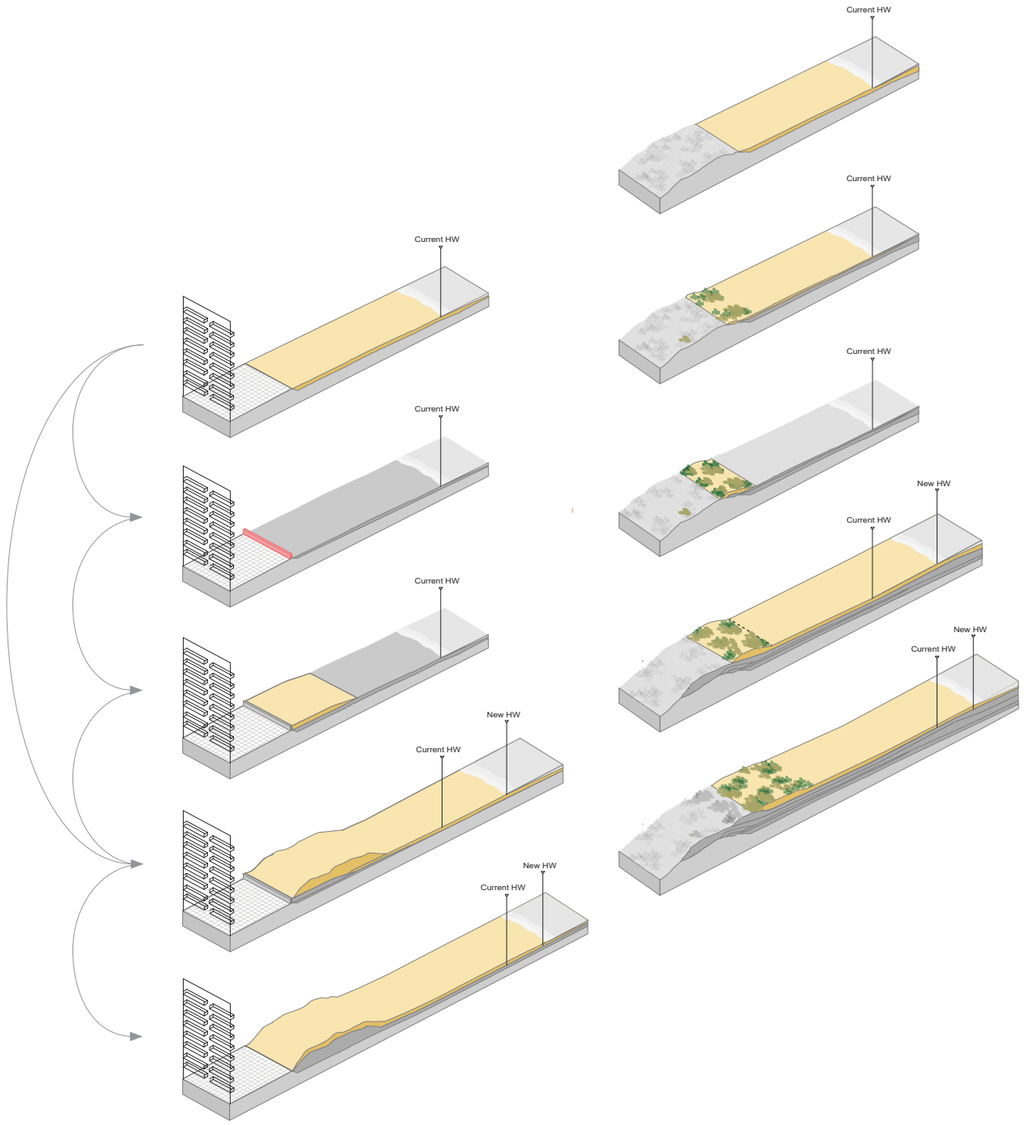
New dunes strengthen existing dune areas and provide opportunities for nature and ecology

Open spaces between the dune and the dike accommodate sports fields, playgrounds or other functions

Or rather as an ecological, multifunctional dune park? Everything is possible!

We put as much effort as possible into 'Nature-based solutions'. These are solutions that are as close as possible to the natural processes. That way, in the long term, the ribbon can evolve into a biodiverse and nature-rich ribbon, sustainably intertwined with coastal protection.

At the level of existing dunes, Coastal Vision proposes only soft measures (sandy solutions).



'Seaward' can be done step by step or immediately in one very big step to widen the beach seaward in one go.

We have designed the coastal protection ribbon to allow us to choose how ambitiously we let our coast grow as sea level rises.

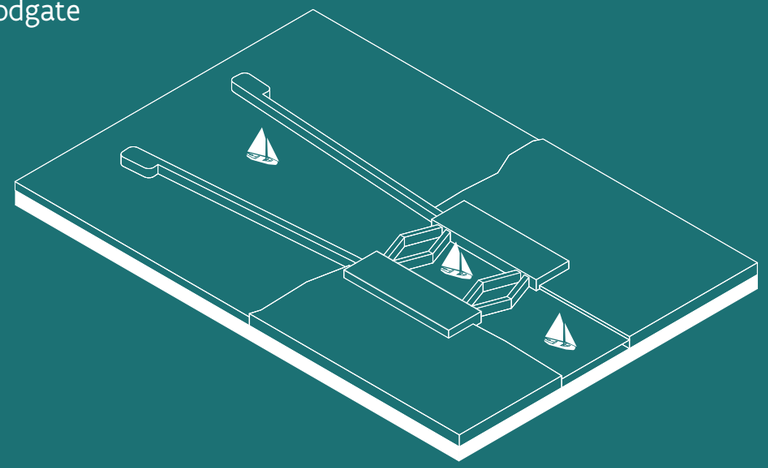
Do we wish to grow in smaller intermediate steps? In which we shift the high and low water line more seaward when we feel the spatial impact of coastal protection measures is too big?

Or do we just choose to proactively expand the beach seaward in the short term? By opting for the big leap straight away, we also immediately create space to realise coast-wide sandy coastal protection while preserving the current dry beach and numerous other opportunities. Including maximum natural growth of protective dunes.

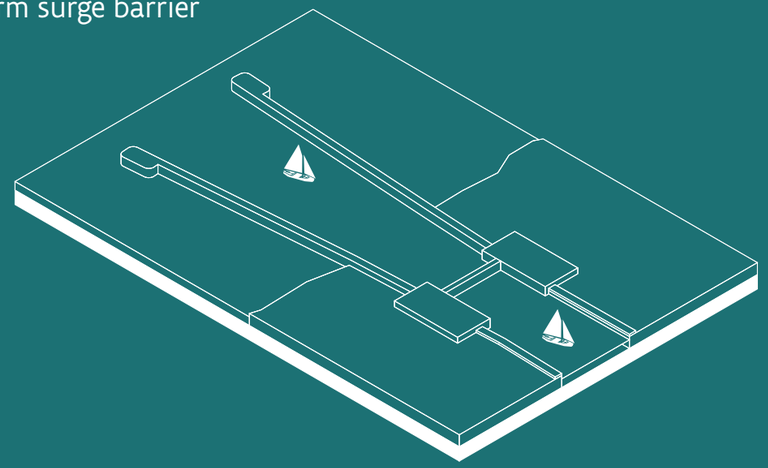
Ports

Ports breach the continuous coastline. To protect port activities and the hinterland from rising sea levels, actions are also required here. Moreover, the ports are the anchor points to accommodate the seaward expansion of beaches. Decisions still need to be taken for three of the four ports. In the coming years, a port development vision will be drawn up for the future of our coastal ports - and this in close consultation with the stakeholders involved. The aim of the study is to obtain objective insights in order to make the right protection choices for each port.

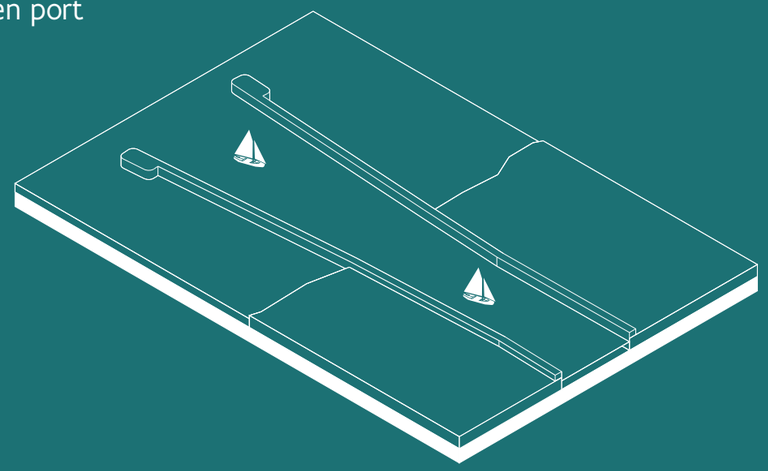
Floodgate



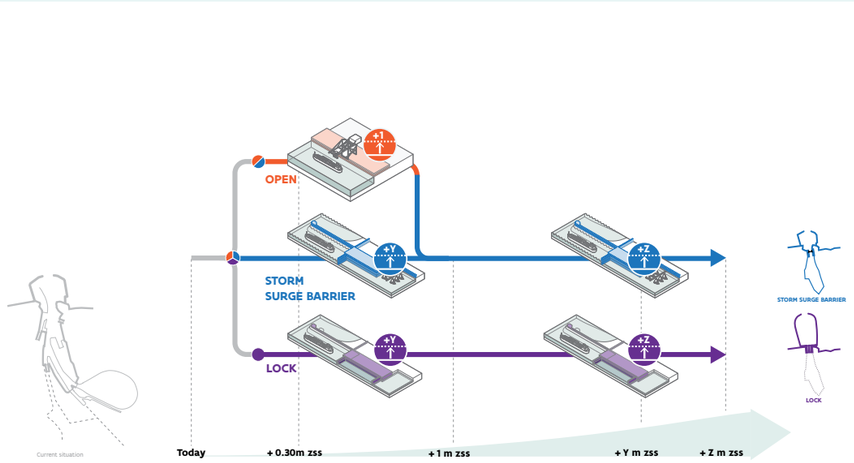
Storm surge barrier



Open port



Oostende



Thanks to the measures implemented and planned in the Master Plan for Master Plan for Coastal Safety, the port of Oostende will be protected against a sea level rise of +0.3 m anyway. To protect the port and the hinterland against an even higher sea level rise, there are still a number of alternatives to choose from: opting for the open port followed by a storm surge barrier in the entrance by 2030, opting for a storm surge barrier or opting for a lock in the entrance. Taking into account sea level rise and necessary planning deadlines, a final choice should be made by 2030.

The City of Oostende, the Port of Oostende and Flanders commit to come to a supported decision the following years.

Open harbour mouth up to +1 m sea level rise followed by a storm surge barrier

In this alternative - up to +1 m sea level rise - storm walls, dikes, and quays are further raised (to a limited extent).We then opt here for a storm surge barrier in the harbour mouth. The dikes realised by then are sufficient to cope with increased normal high water levels; in other words, no additional dikes are needed inside the port up to +3 m sea level rise.

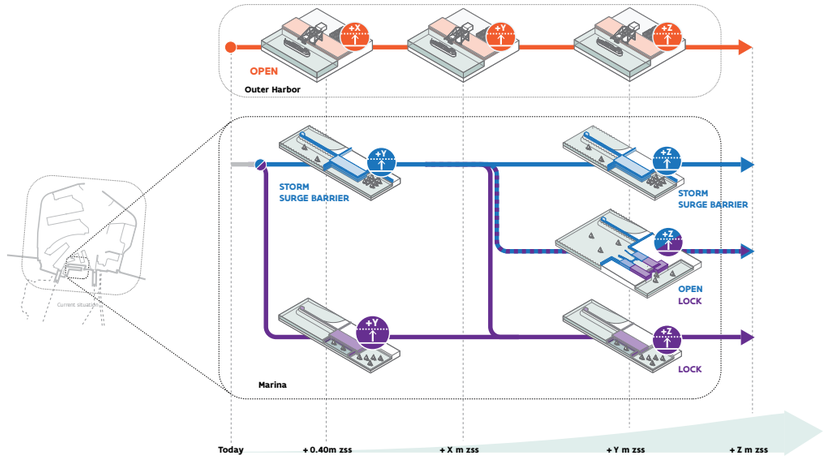
Port protected by a storm surge barrier

In this path, we opt for a storm surge barrier in the harbour mouth as early as +0.3 m sea level rise. If the closure frequency of the storm surge barrier is increased to 13 times per year at +2 m sea level rise, the storm walls implemented and planned under the Master Plan for Coastal Safety are sufficient to protect for the increased normal high water levels. To permanently protect port and hinterland also afterwards, we will then build a higher storm surge barrier in combination with raising storm walls, dikes and quayss around the port.

Port protected by a lock

In this path, we opt for a lock as early as +0.3 m sea level rise. Thanks to the lock, there will be no need to build additional dikes in the port on top of the storm walls implemented and planned as part of the Master Plan for Coastal Safety. In time, the lock should be further raised and strengthened. Accommodating a lock does require a considerable lengthening of the breakwaters (see below).

Zeebrugge



Outer Harbour

From economic and nautical considerations, the only option is to keep the outer harbour open. To maintain the same level of protection as today, we will eventually have to raise all quay areas to a greater or lesser extent. We also need to systematically raise the breakwaters. We need to raise them for the first time in the next 40 years.

Marina

In the marina, the Master Plan for Coastal Safety provides protection up to +0.4 m sea level rise. To protect the marina and the hinterland, we have several choices: a storm surge barrier (with several options afterwards) and the lock.

Marina protected by a storm surge barrier (with several options afterwards)

To protect the marina in the long run, we opt in this path for the construction of a storm surge barrier in the marina mouth. If the closure frequency of this storm surge barrier is increased to 7 times per year at +2 m sea level rise, no further dikes on top of the measures of the Master Plan for Coastal Safety are necessary.

In the event of an even higher sea level rise, several choices lie ahead:

- Raise and strengthen the storm surge barrier with additional dikes around the harbour

- Adding a floodgate

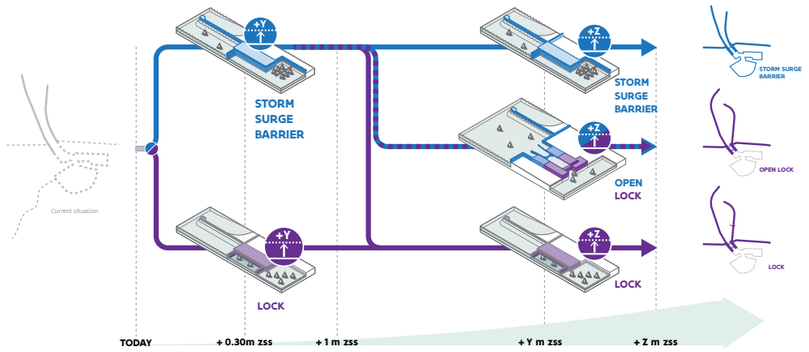
- Replacing it with a lock

The advantage of opting for a storm surge barrier with keeping options open afterwards is that we can take into account uncertainties today and future generations.

Marina protected by a lock.

In this path, we opt for a lock as early as +0.3 m sea level rise. Thanks to the lock, there will be no need to build additional dikes in the port on top of those carried out and planned in the Master Plan for Coastal Safety. In time, the lock should be further raised and reinforced. The advantage of choosing one path is clarity, immediately. After drawing up a vision of the future for the four coastal marinas, we will have to make a choice here by 2040 at the latest. After all, taking into account sea level rise and the necessary planning deadlines, this is the ultimate choice moment. The final path should in any case connect to the open outer harbour and also be aligned with the new Visart lock.

Blankenberge



Thanks to the measures implemented and planned as part of the Master Plan for Coastal Safety, the port of Blankenberge will in any case be protected against a sea level rise of +0.3 m. To protect the port and the hinterland, we have several choices : a storm surge barrier (with several options afterwards) and the lock.

Marina protected by storm surge barrier (with several options afterwards)

In order to protect the port and the hinterland up to +3 m sea level rise, we opt in this path for a storm surge barrier in the harbour mouth at +0.3 m sea level rise. If the closure frequency of the storm surge barrier is increased to about 15 times a year at +2 m sea level rise, the existing storm walls around the harbour will suffice. At even higher sea level rise, several choices lie ahead:

- A raised and reinforced storm surge barrier with additional embankments around the harbour

- Add a floodgate

- A lock

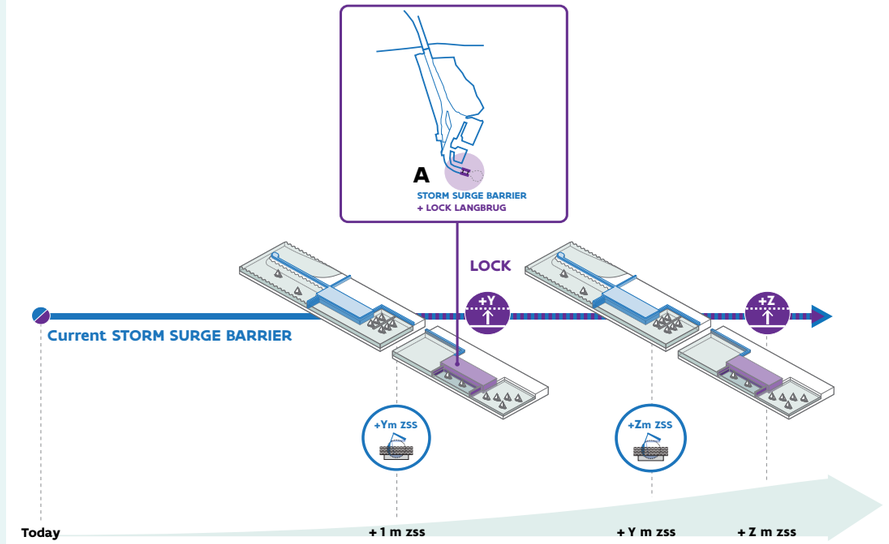
The advantage of choosing a storm surge barrier with keeping options open afterwards is that we can take into account uncertainties today and future generations.

A lock

In this path, we opt for a lock as early as +0.3 m sea level rise. Thanks to the lock, there will be no need for any additional measures in the port on top of those carried out and planned under the Master Plan for Coastal Safety. In time, the lock should be further raised and reinforced. The advantage of choosing one path is clarity for future developments in and around the port.

Further coordination between all stakeholders involved should lead to a final choice by 2030. Taking into account sea level rise and the necessary planning deadlines, this is the latest moment at which a choice should be made.

Nieuwpoort

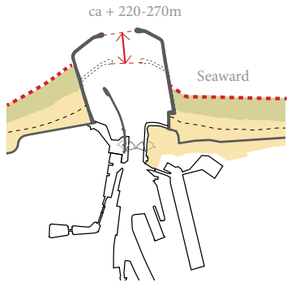


In Nieuwpoort, a storm surge barrier is currently being built in the harbour mouth. It will protect the harbour and the hinterland up to a sea level rise of 80 cm. With (eventually) limited adjustments to the storm surge barrier and in the port itself (embankments up to about 20 cm over a limited area), the port and hinterland are further protected up to +1 m sea level rise. In order to protect port and hinterland up to +3 m sea level rise, one alternative remains open in Nieuwpoort - according to an appropriate assessment based on European legislation.

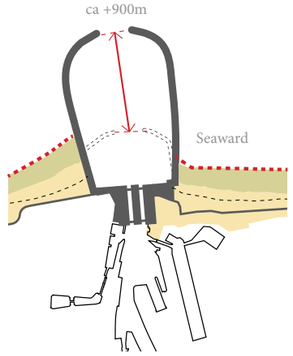
Marina protected by means of a storm surge barrier in the harbour mouth combined with a lock (with pump pumping stations) near the Langbrug

To further protect the port and the hinterland up to +3 m sea level rise, we will eventually raise and reinforce the storm surge barrier and build an additional lock near the Langbrug. Between the storm surge barrier and the lock, the dikes must be systematically raised according to the rhythm of sea level rise. To guarantee permanent drainage of the hinterland, sufficient space will be provided in the ribbon to accommodate the necessary pumping stations. Now and in the future.

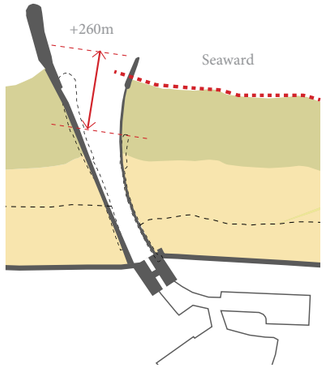
Impact on breakwaters



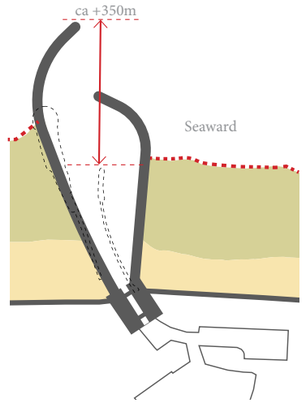
Oostende ‘Open to Storm surge barrier’ and ‘Storm surge barrier’
When choosing these paths, the breakwaters follow the seaward widening of the beaches. Longer breakwaters are needed here to support the advancing coastline and to prevent sedimentation of the channel as much as possible. At the same time, the breakwaters need to be raised gradually to accommodate sea level rise and to keep protecting the port



Oostende ‘Lock’
If in the port of Oostende would be protected with a lock, longer breakwaters are necessary to allow ships to enter safely. The Seaward alternative in the beach zones can effortlessly accommodate this. To cope with sea level rise, we need to raise the breakwaters gradually.



Blankenberge ‘Storm surge barrier’
Choosing the storm surge barrier, the breakwaters follow the seaward widening of the beaches. Longer breakwaters are needed to support the forward shoreline as well as to prevent sedimentation of the channel as much as possible. At the same time, the breakwaters must be raised to cope with rising sea levels.



Blankenberge ‘(Keer)Sluis’
If the harbour mouth in Blankenberge would be protected with a lock, longer breakwaters are necessary to allow ships to enter safely. To cope with rising sea levels, we need to raise the breakwaters gradually.

Coastal Vision is our insurance against steady sea level rise, our insurance to keep Flanders dry without giving up land. So that present and future generations can continue to invest and enjoy our coast without worry.

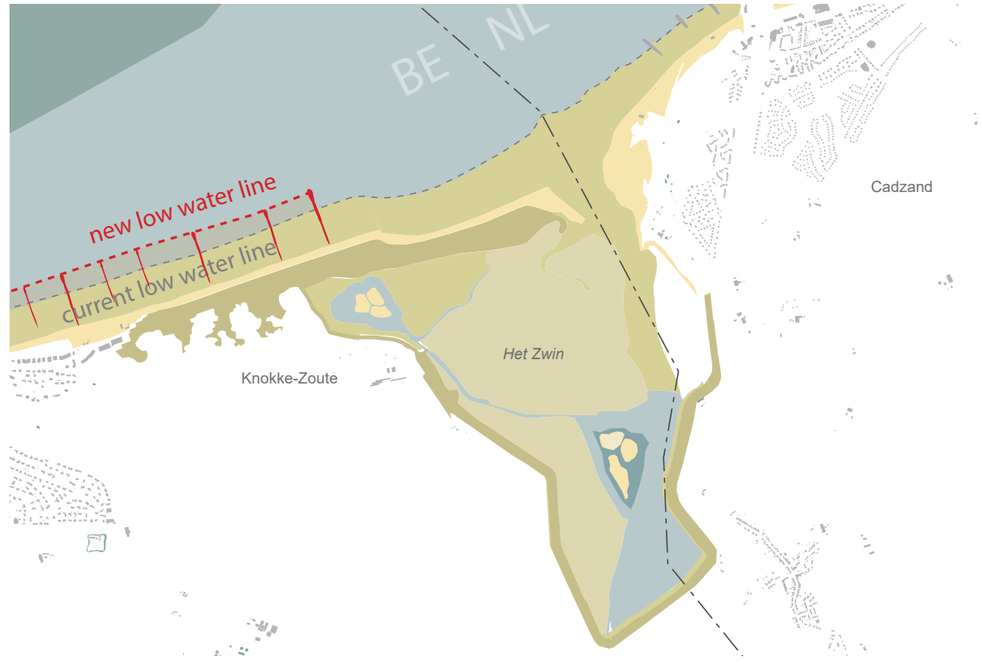
Connections

Connecting with our neighbours

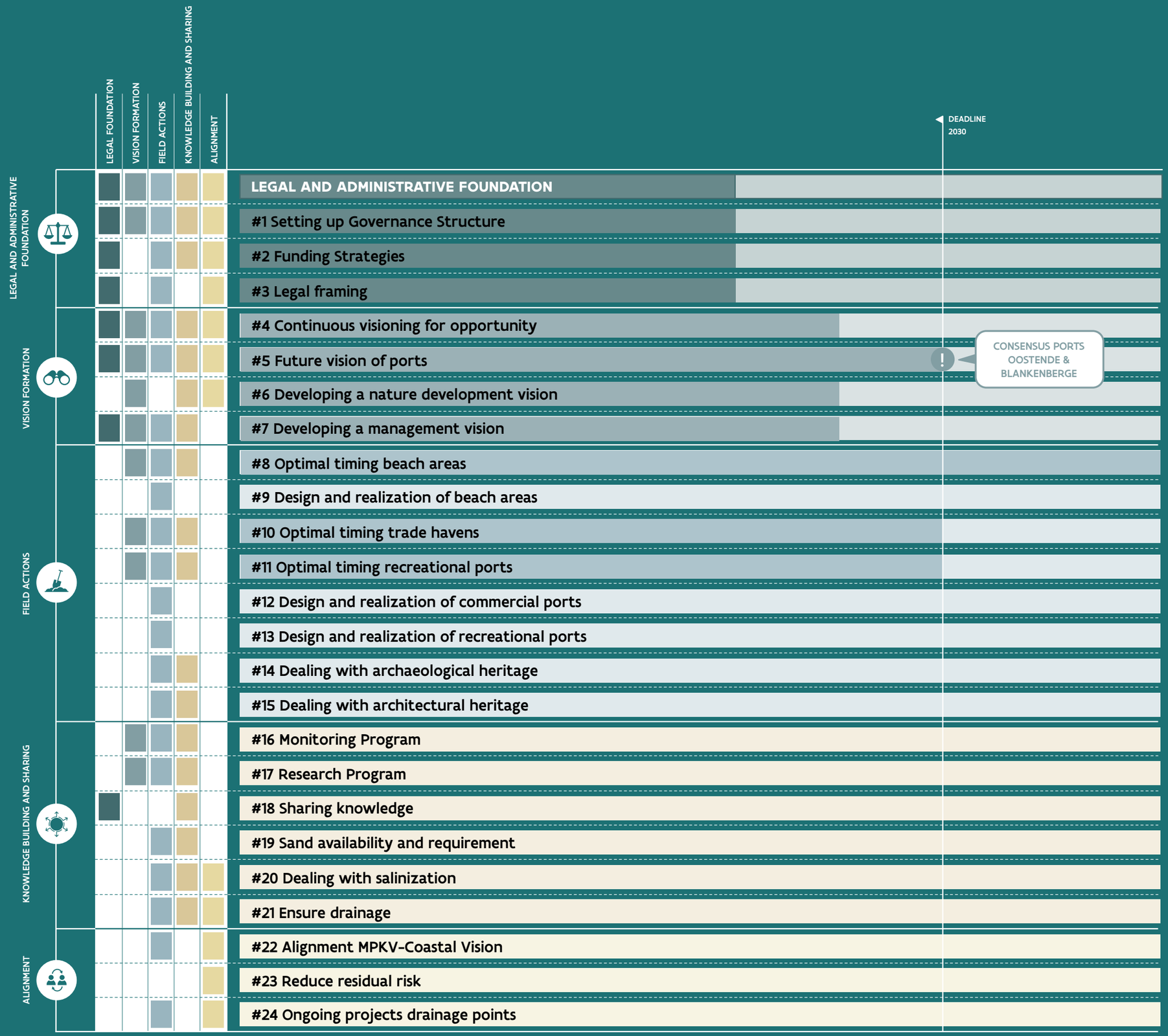
The promising coastal protection ribbon has been extensively discussed with our neighbours.

'Seaward' can connect to the coastal protection of our neighbours. And there is still plenty of time for further and more detailed coordination with our neighbours.

The border with France is situated in an extensive dune area. 'Seaward' proposes sandy solutions at the French border, aiming at widening and strengthening beaches and dunes. The theoretical abrupt transition with a jump in the coastline at the French border will - if France does not move seaward together - in reality be a gradual and natural transition. Soft measures still allow for a gradual transition to happen. The connection to coastal protection in the Netherlands is made at the Zwin. We are committed to preserving the natural value of the Zwin. In time, the dikes around it will have to be raised. In order to connect with the wider beaches in het Zoute, a series of groynes to the west of the Zwin is possible. And this to prevent increased sedimentation of the Zwin channel. Today, with Coastal Vision, we are ahead of our neighbours in terms of concrete approach. They are watching with great interest the steps we have already taken successfully. And also at the steps we will still take - hopefully just as successfully.



Coastal Vision



Actions

First action plan with implementation horizon (2024 - 2034)

To realise the promising coastal protection ribbon, stakeholders will need to take actions over the next decades and beyond. Together, we have developed a list of actions we need to initiate over the next 10 years, shown in the figure opposite. Some of these actions need to be started as a priority (shown in dark in the figure) and also have a deadline. After all, we know from the port alternatives that in Blankenberge and Oostende we have to make a decision by 2030 at the latest. The actions are of a strategic nature. That way, they can give direction and preserve the integrated character of the necessary solution directions. Coastal Vision is about realising a promising coastal protection ribbon.

Therefore, actions are realised in mutual interaction (visible in the left-hand column). We have chosen a time span of 10 years for the first action plan. This way, we do not plan too far ahead and we can keep our finger on the pulse at the same time. Every 10 years, we will adjust or develop a new action plan. Or when tipping points of e.g. sea level rise are exceeded. In this way, we can constantly adapt the speed and the way in which we realise the strategic vision together to reality and progressive insight.

Cooperation structure

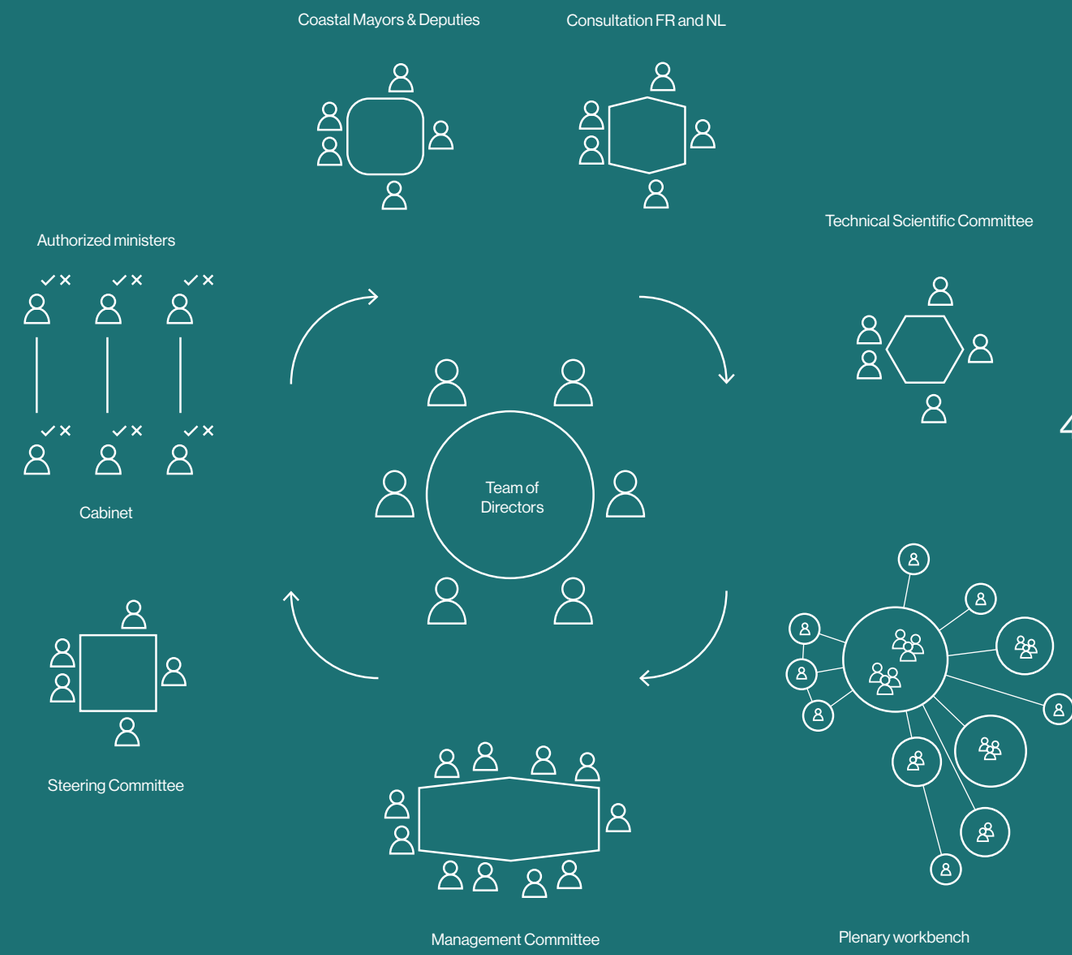
Building blocks

Coastal Vision is complex due to its scale, challenges and diverse interests. Thanks to the intensive cooperation between more than a hundred professional stakeholders, we were able to bridge points of difference and draw a supported promising coastal protection ribbon. To maintain the support base that has been built up and tho realise all the opportunities, Coastal Vision needs its own cooperation structure in the future. This process is already underway today and as is stated in the strategic policy plan. There is already support for the building blocks of the new cooperation structure; Its filling will be done during 2024.

The principle of cocreation remains guiding: in each project, all stakeholders involved will continue to work together. And to continue to capture all challenges and interests and align solutions, it makes sense to build on the consultation structures that have already proven their success today. We propose to enrich them here and there. Representatives from civil society, the business world, academia, government and stakeholders serving environmental interests continue to meet in project-specific working groups. Here, involved stakeholders work together in a focused way to find supported solutions. Project leaders and key stakeholders meet in a management committee.

This is where ongoing projects are coordinated. A steering committee helps to follow up the strategic lines. Here, too, the composition reflects the various challenges and interests specific to Coastal Vision. To ensure an integrated approach at all levels, Coastal Vision will in future fall under the Ministers in charge of Mobility and Public Works, Environment and Tourism. And when necessary, coordination will take place with the federal minister responsible for the North Sea. On a recurring basis, coordination will be done with the coastal mayors. Here, the governor retains his role as advocate and consensus builder. Consultation with our neighbouring countries France and the Netherlands will be organised at regular intervals. A Technical Scientific Committee will serve as a scientific sounding board. This solution-oriented dynamic is steered, driven and coordinated by a Team of Directors. The Team of Directors will include representatives from various policy fields, reflecting the diversity of challenges and interests. All together, they will soon guarantee the promising coastal protection we aim for with Coastal Vision!

> Coastal Vision came about thanks to a streamlined process of cocreation and alignment. The future governance structure will continue this approach.



Colophon

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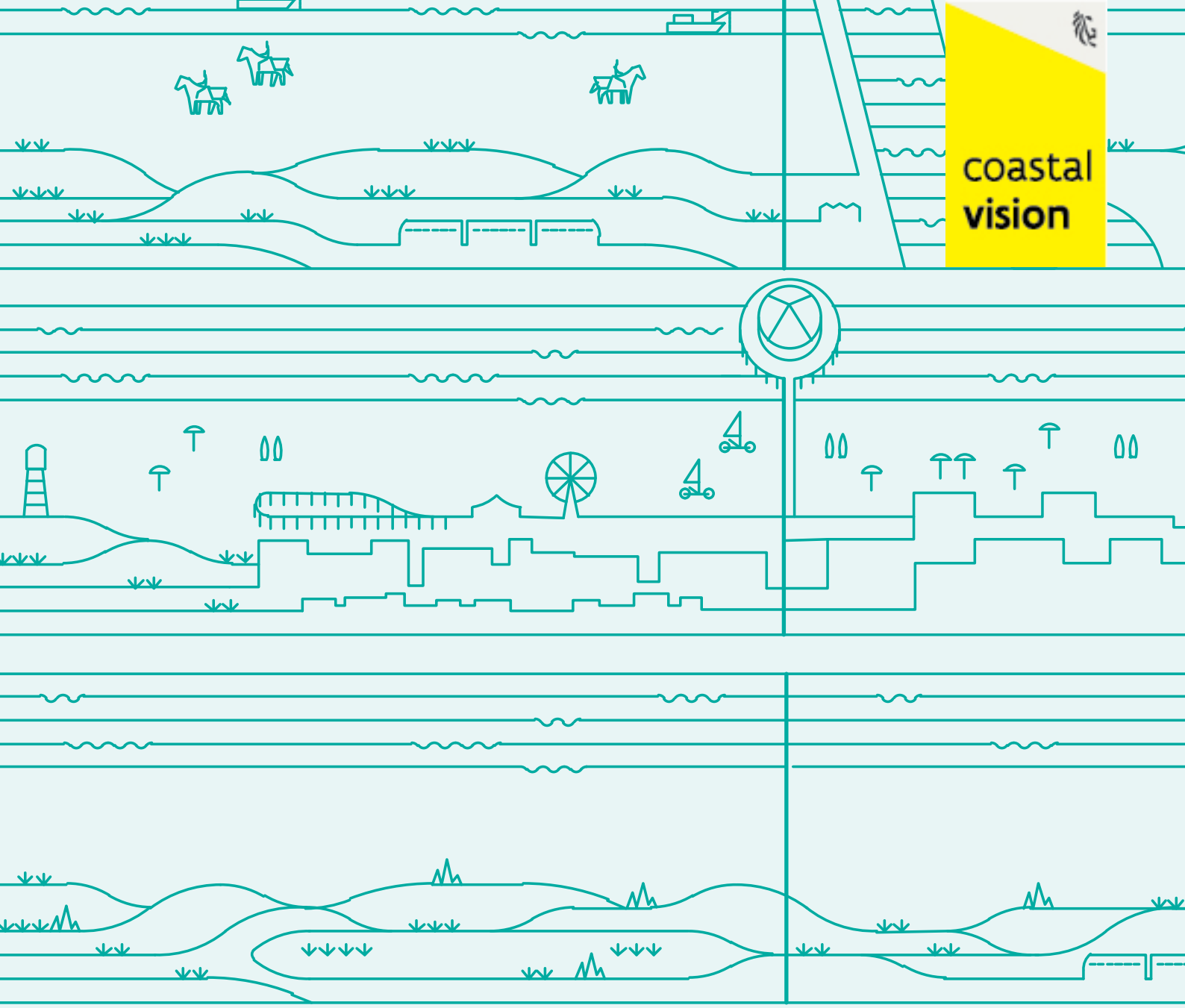

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