Imagination
Design

Serious Games to think about Future Coasts

About

OUR FUTURE COAST

Coastal Communities are at the front-line of climate challenge. It is not possible to protect the whole coast with hard rock and concrete, it is not a good long-term solution and there isn't enough money. So, we need to get really good at working with nature – where possible we can utilise saltmarshes and sand dunes as a coastal defence. The essence of the **Our Future Coast** approach is designing the coastline together with our communities, putting them at the heart of **Our Future Coast**.

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About

MAGE – Morecambe Area Gaming Environment is a digital sandbox for coastal environments and management. This serious tabletop game is an analog version of the sandbox for public engagement covering the North-West UK coastline from Merseyside to Millom, Cumbria.

Our Future Coast

is led by Wyre Council, funded by Defra as part of the £200 million Flood and Coastal Innovation Programmes which is managed by the Environment Agency.

https://thefloodhub.co.uk/ourfuturecoast/

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Rules

1

Setup

1. This serious game involves turn-based dialogue with (2) players. **15-30 mins play**.
2. Setup a map, each & turn all cards face-down (Blanks-UP). **See Setup Card**.
3. There are 4x SMP cards and 10x Coastal Intervention cards. All cards must set face down (Blanks-UP).
4. Place all tokens in the bag.

Play

1. Players start by picking 1x SMP card.
2. Players pick 2x Coastal Interventions Cards.
3. Players roll a dice and take turns. Take the corresponding tokens from the bag and try to match the pattern on the coastal cards. If the tokens colours do not match, place the tokens back into the bag.

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Rules

2

4. The card is won if you complete the pattern on the card. If a pattern is complete on the coastal card, the card is won, draw another. You can only hold 2 coastal cards at a time.
5. Once all coastal cards patterns are complete, add the total score points on the cards. Highest score wins.

Dialogue

6. Once all coastal intervention cards are drawn and the winner is decided. Look at the game map and discuss the SMP for the map. What different interventions will you make between 20, 60, and 100 years? Does this work for the area? Discuss.

Data Utilised to make MAGE:

ENVIRONMENT AGENCY

Ordnance Survey

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Setup

15-30 minutes Gameplay

1

Game Items

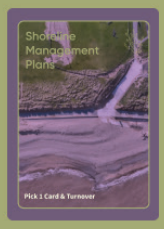
Token Bag

Tokens

1x D6 Dice

Each Player

+



1x SMP Card

2x Coastal Intervention Cards

+

Map & Pattern Grid

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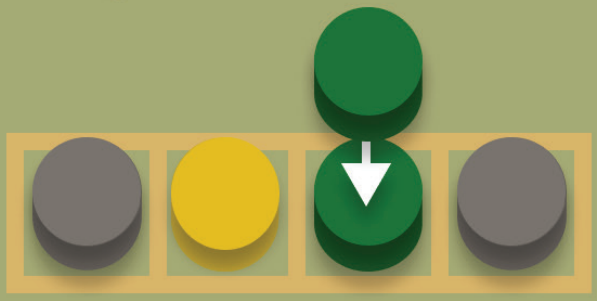
How to Play

2

Players select 1x Shoreline Management Card.

Select 2x Coastal Intervention Cards.

Roll the Dice - collect the corresponding number of tokens from the bag.



Match the tokens to the patterns on the cards and place this on you map. Some patterns require stacking of tokens to complete the pattern. Some cards are Hard Engineering some are Nature Based Solutions.

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How to Play

3

If any tokens do not match the patterns on the card, place back into the bag. The card is won if the pattern is complete. Place to the side and draw another card. Some card patterns can overlap on the map.

You can only have 2x Coastal Intervention Cards at a time. Once all cards are played, total the score on your cards. **Highest score wins.**

Discuss the SMP card. How do the coastal interventions fit within the timeline of 20, 60, and 100 years? Is this the right decision? Look at the design life on each card, how long will they last ?

Reverse of Map

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Credits

4

MAGE Serious Game designed by
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MAGE Project Research Team

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- Runze Xia
- Qianhui Lin
- Elliot Hartley
- Luigi Mussardo

Special thanks to Richard Spencer, Bowland Trust Academy. Additional thanks to Suzi Ilic, Serena Pollastri, Joseph Earl, Elanor Brown and all Our Future Coast team.

Imagination is an open and exploratory design-led research centre

imagination.lancaster.ac.uk/

SMPs

1

Advance the Line

Advancing the shoreline means building new coastal defences further out into the sea to protect the coast and reduce erosion on existing defences. This can involve creating new land or adding coastal habitats.

Complete Game & Discuss Adaption

SMPs

2

No Active Intervention

No active intervention means letting the coastline develop naturally, which may require adapting to flooding or erosion risks. Areas at high risk of erosion are usually low-lying, reclaimed land or made up of soft sediment.

Complete Game & Discuss Adaption

SMPs

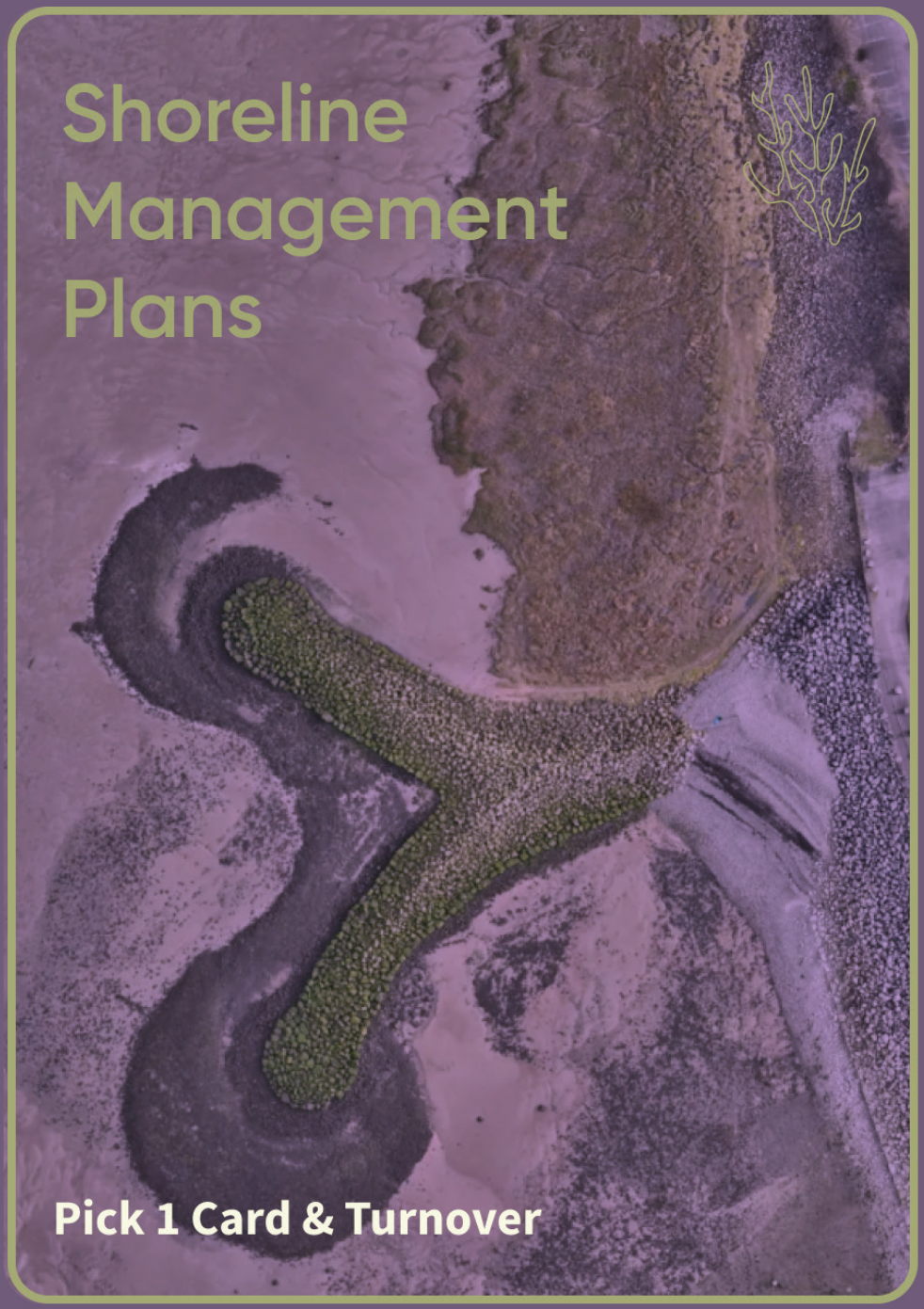
3

Managed Realignment

Managed realignment makes changes to the position of the shoreline in a controlled way, such as by slowing erosion or creating areas of habitat to help manage flooding.

It is also often a method that replaces hard coastal defence measures and depends on natural defences to absorb or dissipate the force of waves.

Complete Game & Discuss Adaption



SMPs

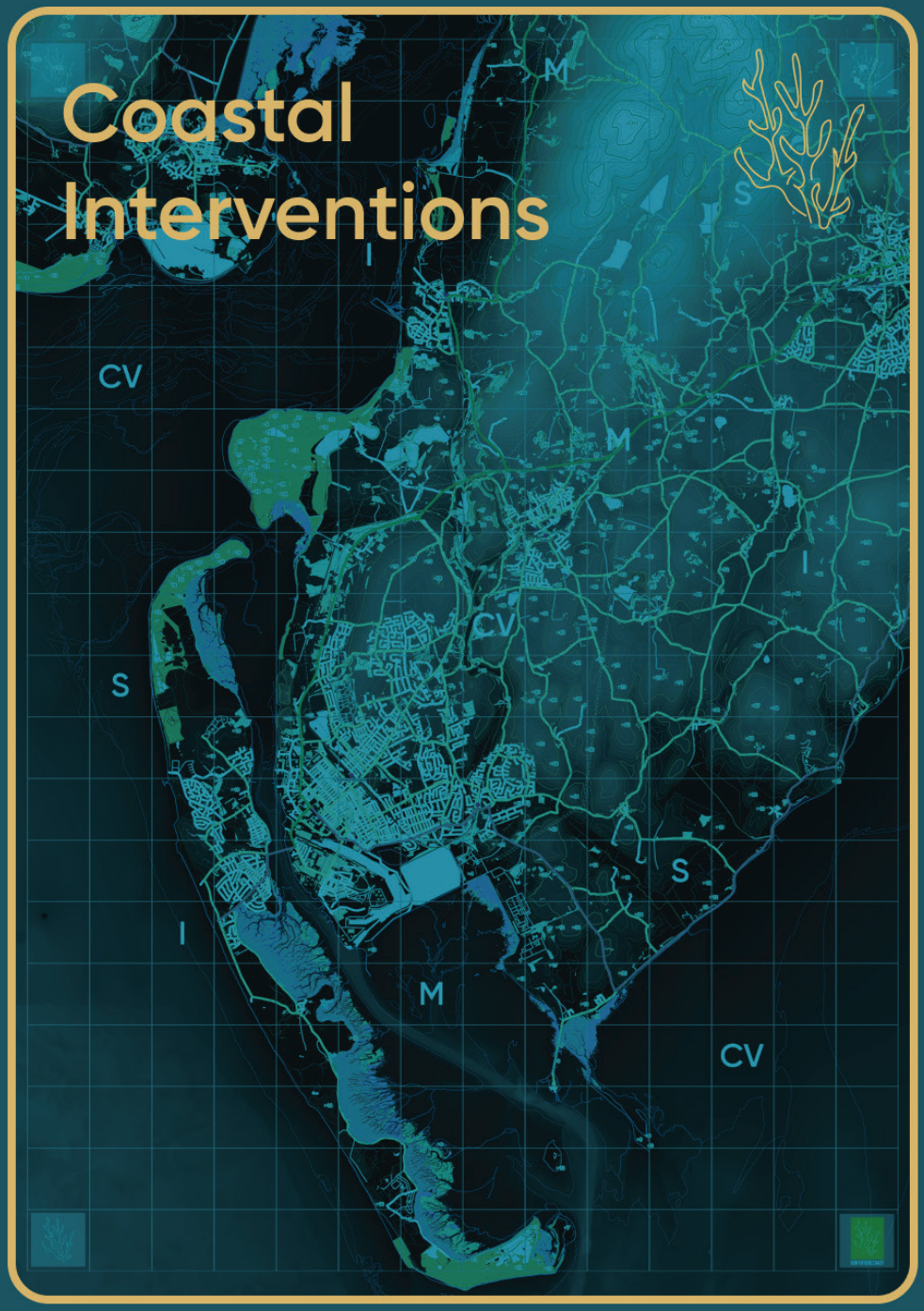
4

Hold The Line

Hold the line maintains or upgrades protection from flooding or erosion by holding the shoreline in broadly the same position.

This could be hard or soft engineering to prevent any further shoreline retreat. This could be increasingly expensive with sea level rise.

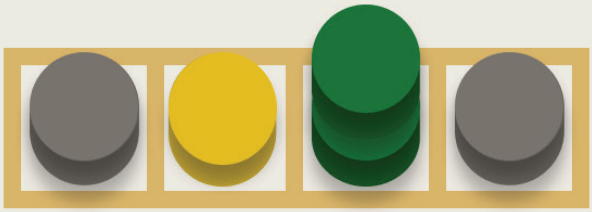
Complete Game & Discuss Adaption



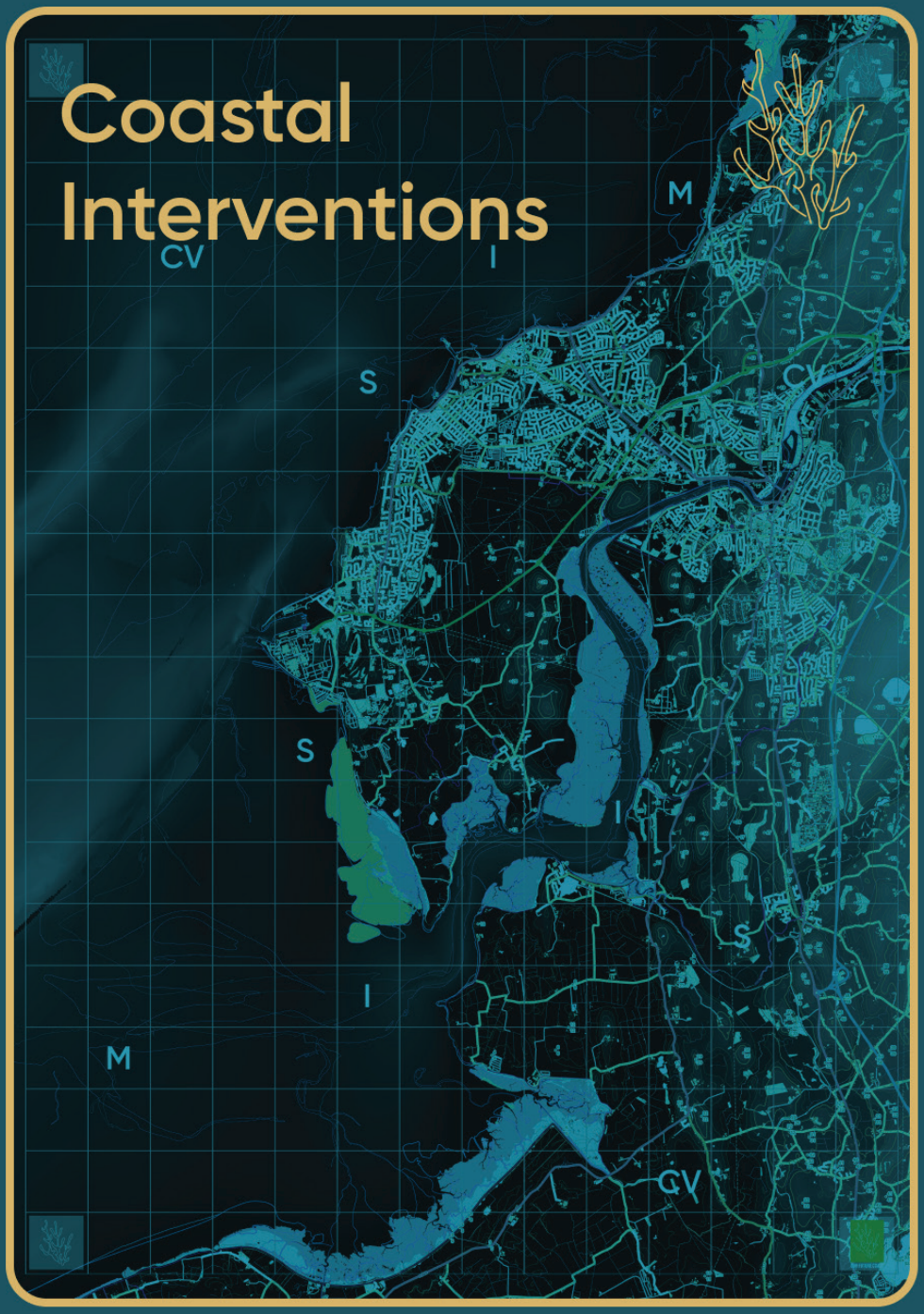
Breakwaters

Breakwaters are offshore, sloped or vertical concrete walls designed to reduce the erosive power of waves out at sea so that once they reach the shore, the wave energy is reduced. Breakwaters can be made from rock, stone or concrete and some run parallel to the shoreline.

Design Life - 30-50 years



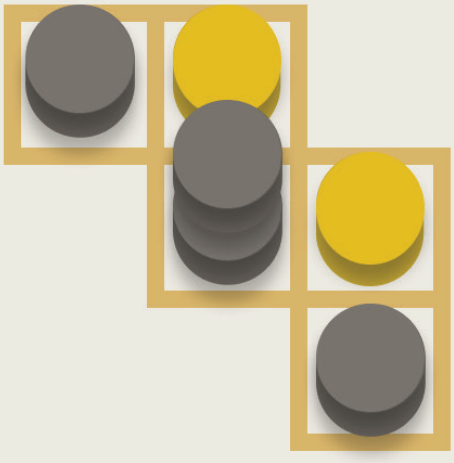
+3 Points Hard Engineering



Revetments

Revetments are sloping structures built on embankments or shorelines, along the base of cliffs, or in front of sea walls to absorb and dissipate the energy of waves in order to reduce coastal erosion. They can be made of concrete, stone, asphalt or wood, and the height of the revetments is designed to stop waves overtopping the defence.

Design Life - 30-50 years

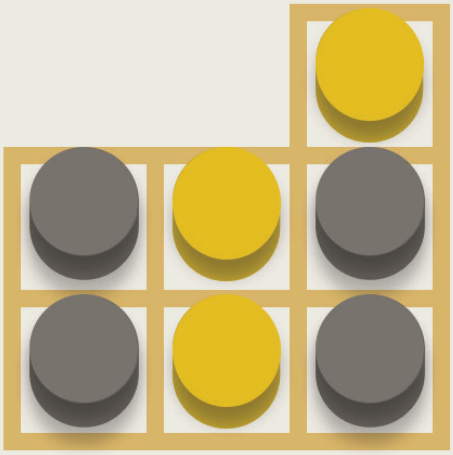


+5 Points Hard Engineering

Groynes

Groynes are low lying wood or concrete structures which are situated out to sea from the shore. They are designed to trap sediment, dissipate wave energy and restrict the transfer of sediment away from the beach through long shore drift. Longshore drift is caused when prevailing winds blow waves across the shore at an angle which carries sediment along the beach.

Design Life -
Timber
10-25 years
Concrete
30-50 years

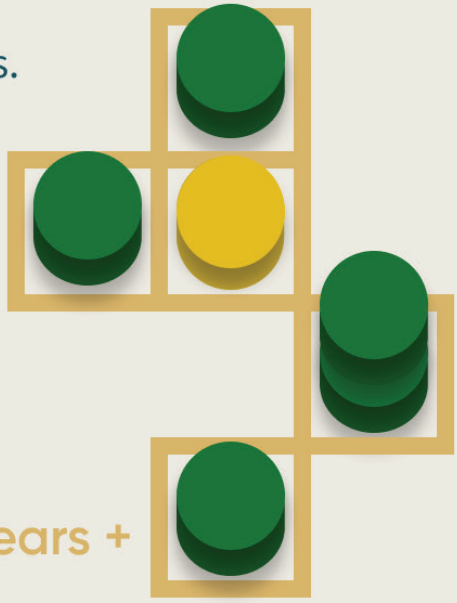


+4 Points

Hard Engineering

Seagrass

Seagrass is recognized as a highly effective nature-based solution (NBS) in coastal engineering for reducing flood risk, mitigating erosion, and storing carbon. Acting as a 'soft' engineering technique, seagrass meadows provide a sustainable alternative or supplement to traditional 'hard' structures like sea walls.



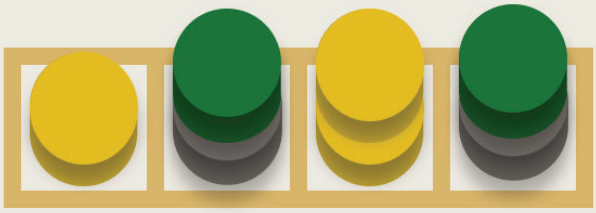
Design Life - 20 Years +

Nature Based Soultions
+6 Points

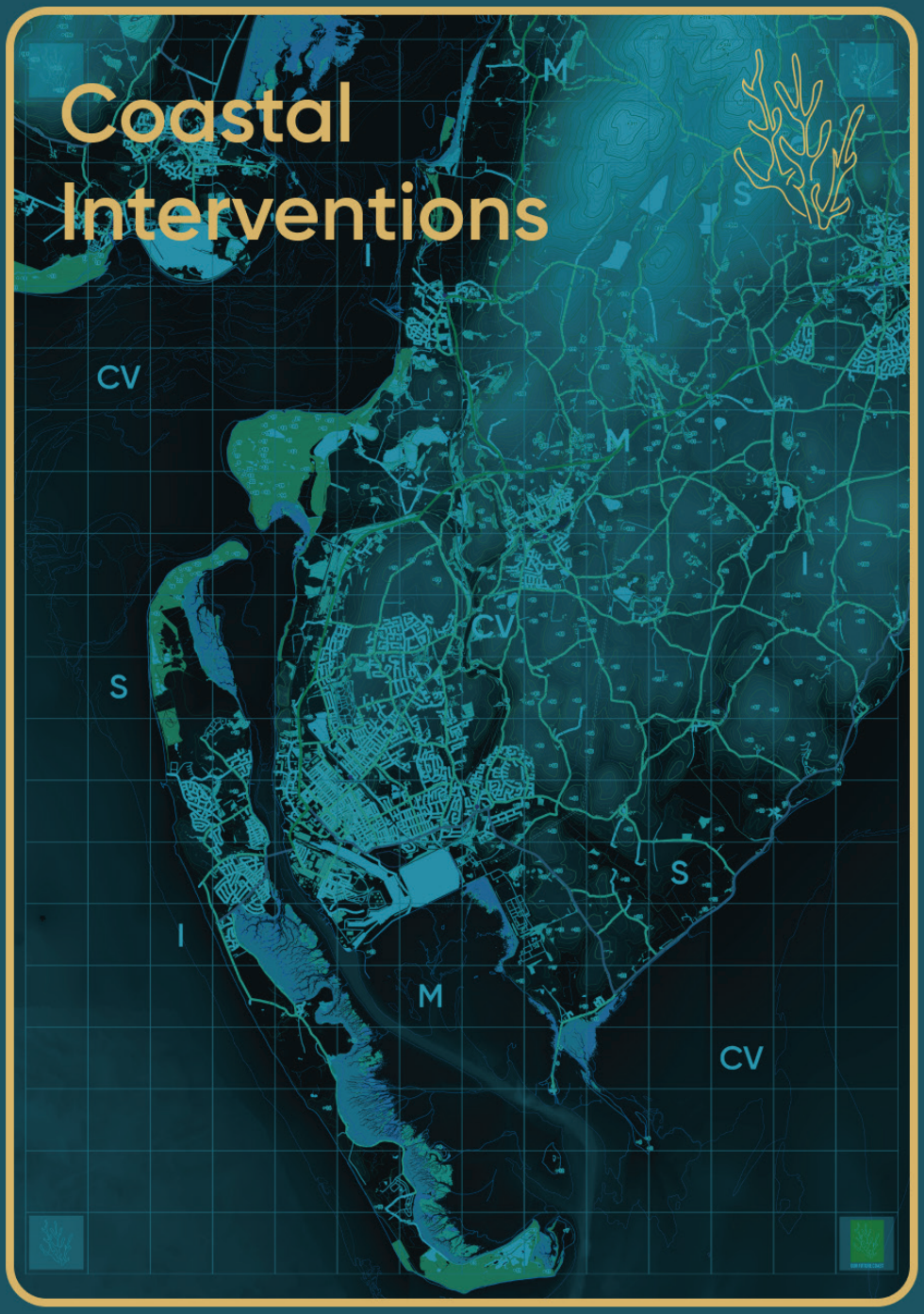
Gabions

Gabions are wire cages filled with rock, used in coastal engineering as flexible, permeable, and durable hard engineering structures to prevent erosion and manage coastal land. They act as revetments, groynes, or retaining walls, absorbing wave energy, allowing drainage, and adjusting to ground settlement.

Design Life - 50-60 Years



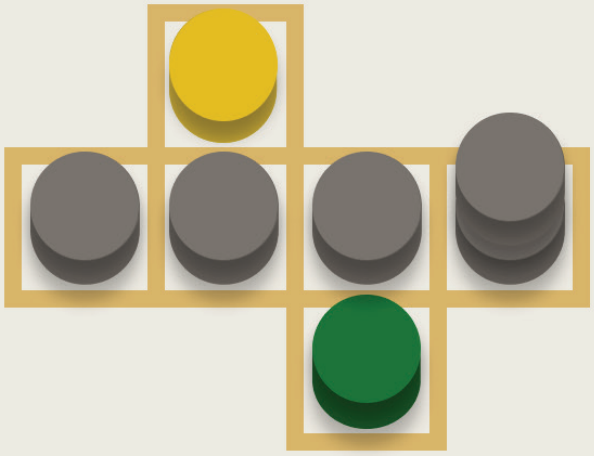
+2 Points Hard Engineering



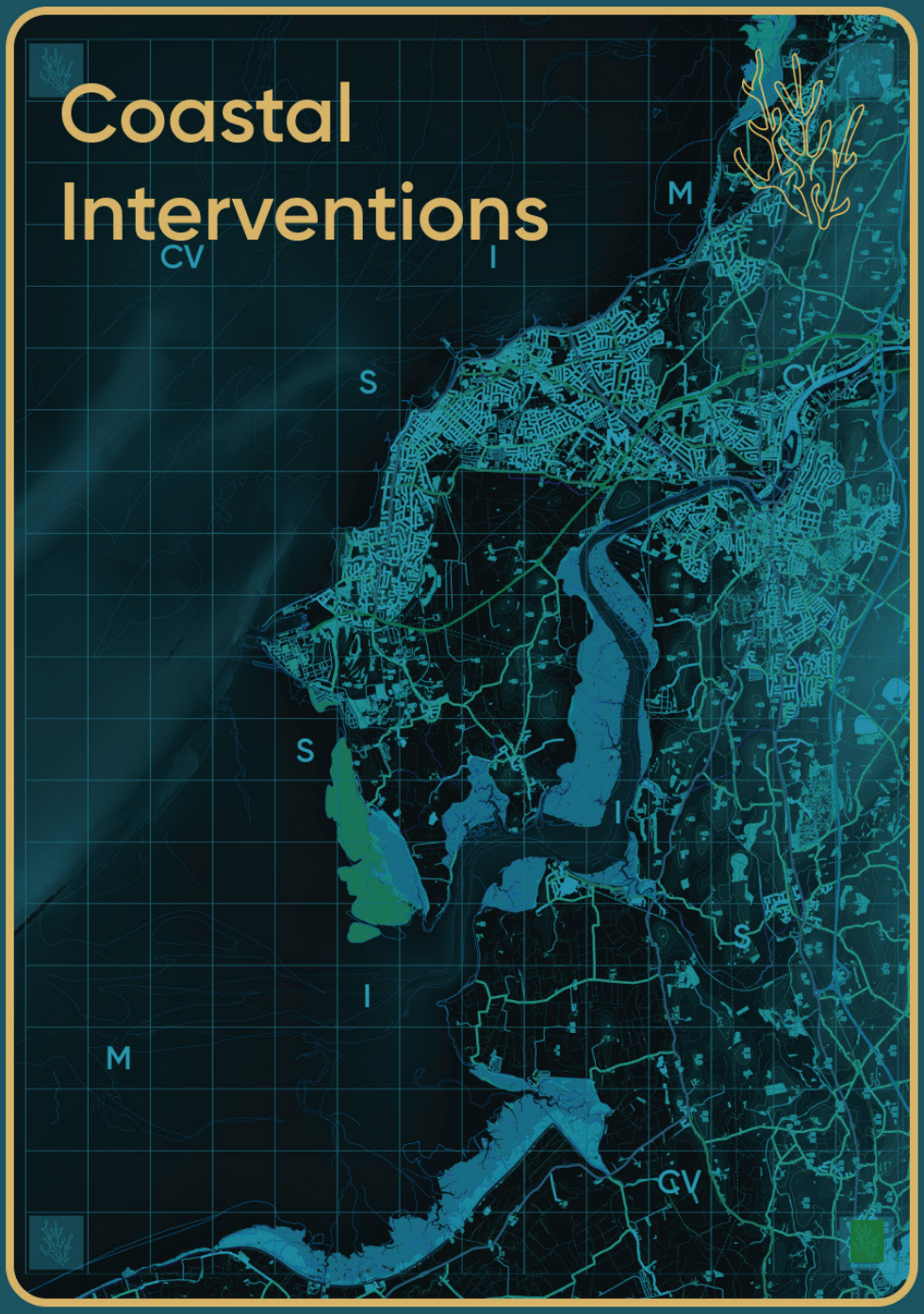
Sea Wall

Sea walls are a solid barrier made from concrete, masonry, or gabions and are designed to prevent high tides and storm surges reaching inland and causing flooding. They can have a variety of profiles such as sloped, stepped or vertical. A number of sea walls have been constructed across the UK to reduce the risk of flooding however they require frequent maintenance so that they don't fail.

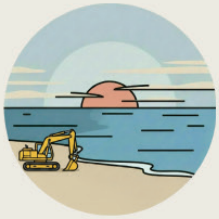
Design Life - 30-50 Years



+8 Points Hard Engineering

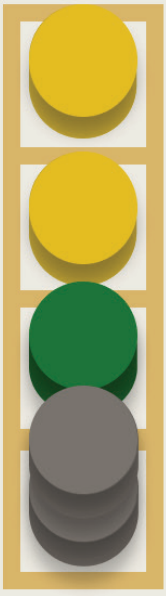


Beach Replenishment



Beach replenishment describes a process by which sediment (usually sand) lost through longshore drift or erosion is replaced from sources outside of the eroding beach. Beach replenishment is used in response to shoreline erosion, although flood reduction benefits may also occur.

Design Life - 10 to 20 Years

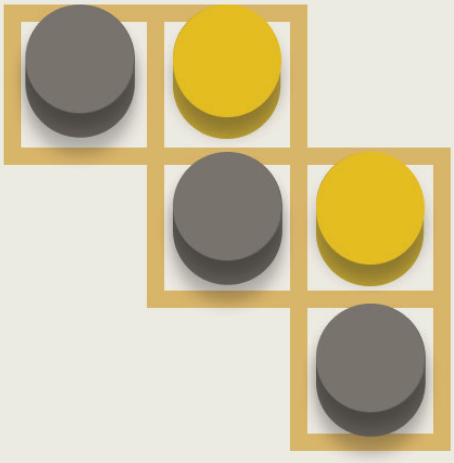


Nature Based Soultions
+8 Points

Rock Armour

Rock armour (or Rip Rap) is a hard engineering technique using large, durable boulders—typically granite—placed along shorelines, revetments, or breakwaters to absorb wave energy, reduce erosion, and protect coastal infrastructure.

Design Life - 20-40 Years

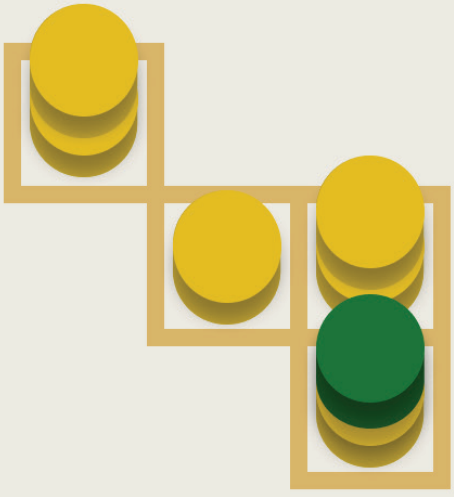


+2 Points Hard Engineering

Sand Dunes

Sand dunes provide natural protection against storms and flooding. Dunes form above the level of high tide when the plants that live in these salty, damp conditions trap wind-blown sand, and the dunes increase in size, more habitat is created in which more plants and ecosystems can live.

Design Life - 20-30 Years

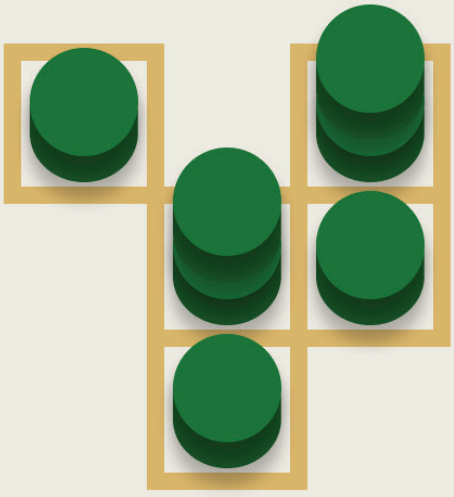


Nature Based Soultions
+7 Points

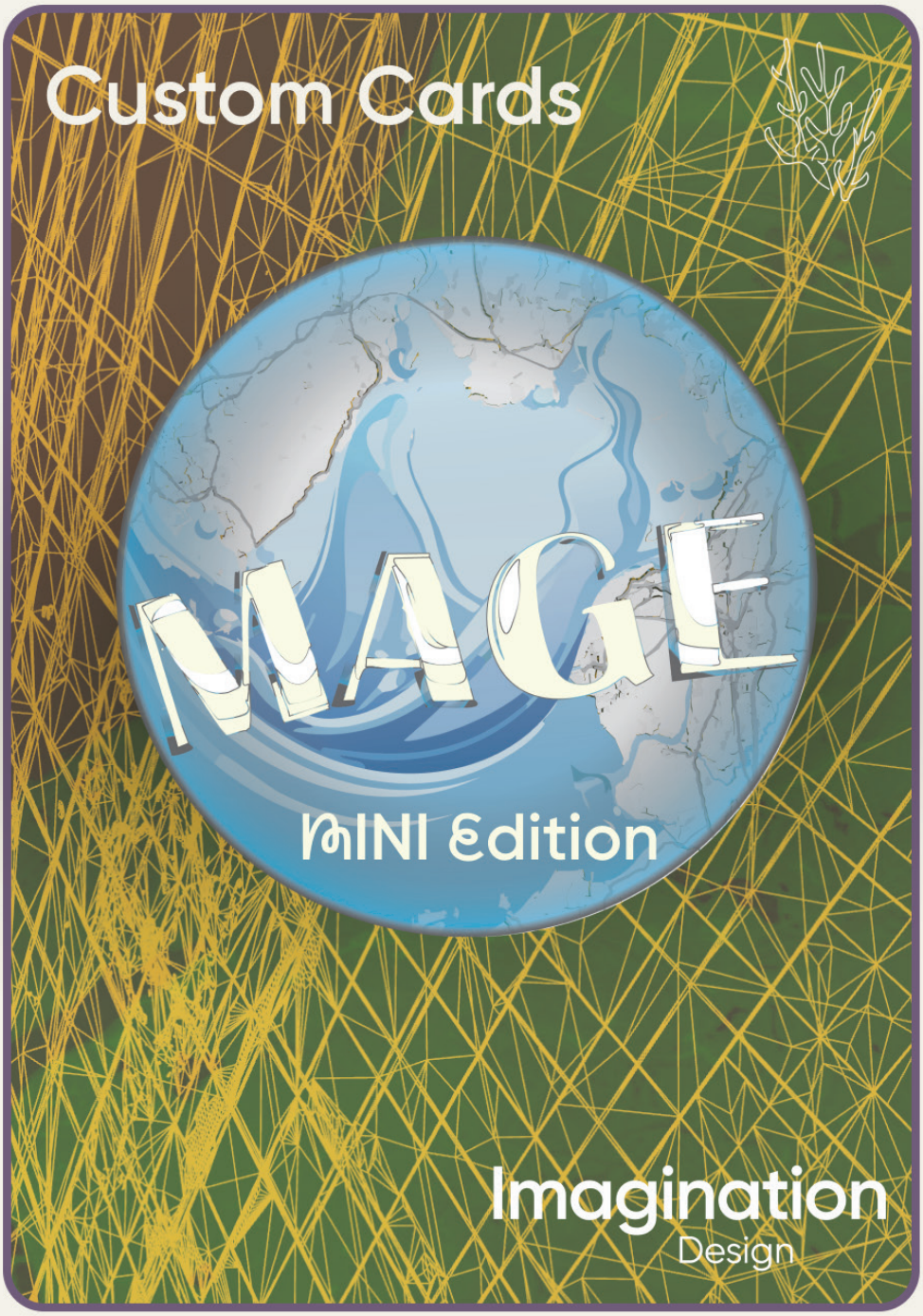
Salt Marsh

Salt marshes are valuable for coastal management due to their ability to reduce wave energy, mitigate erosion, and protect against flooding. They act as natural buffers, absorbing wave energy and storm surges, and their vegetation helps to stabilise shorelines.

Design Life - 10-50 Years



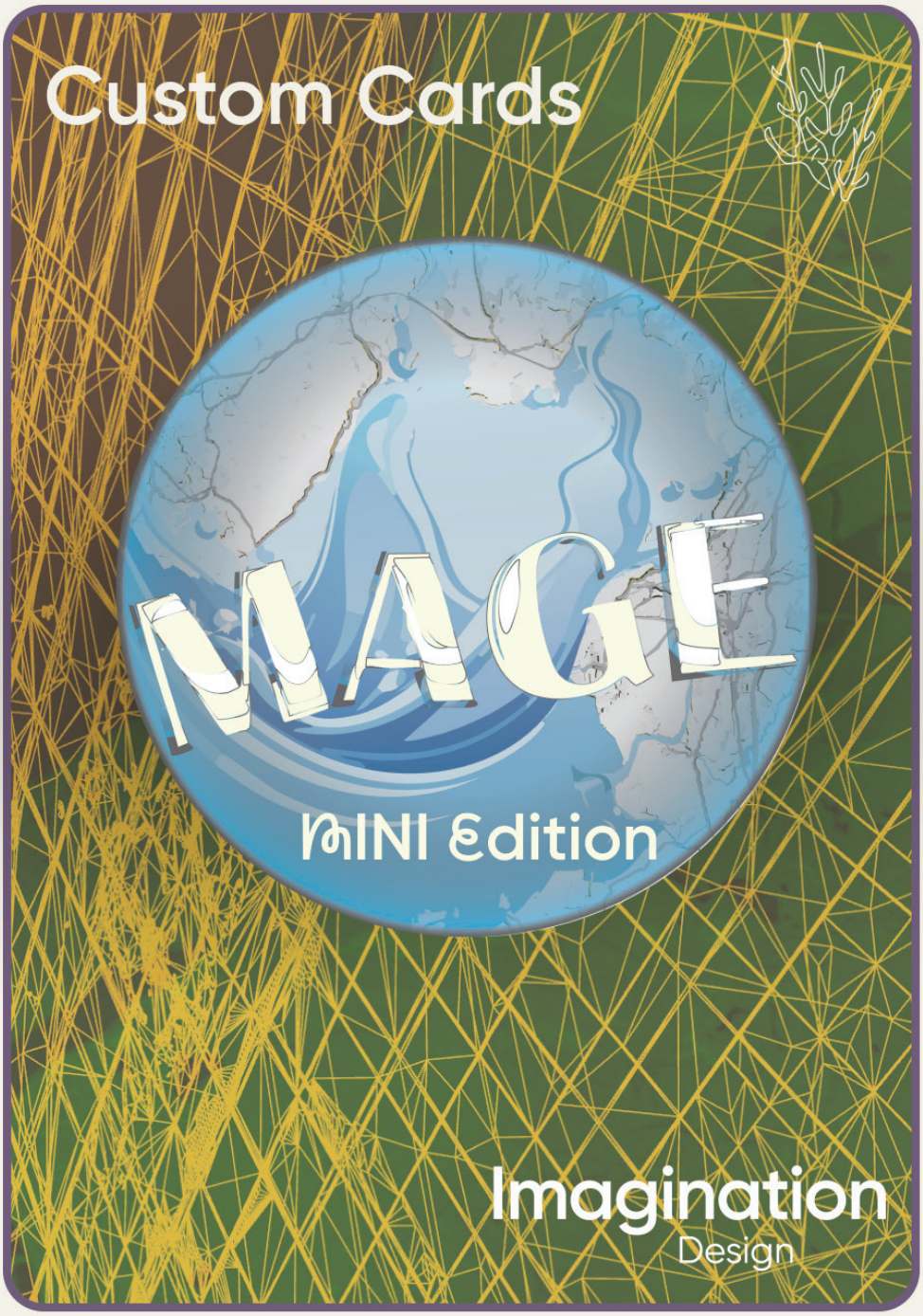
Nature Based Soultions
+9 Points



Custom Cards

Customise this card for Coastal Interventions of new SMPs.

Token Pattern



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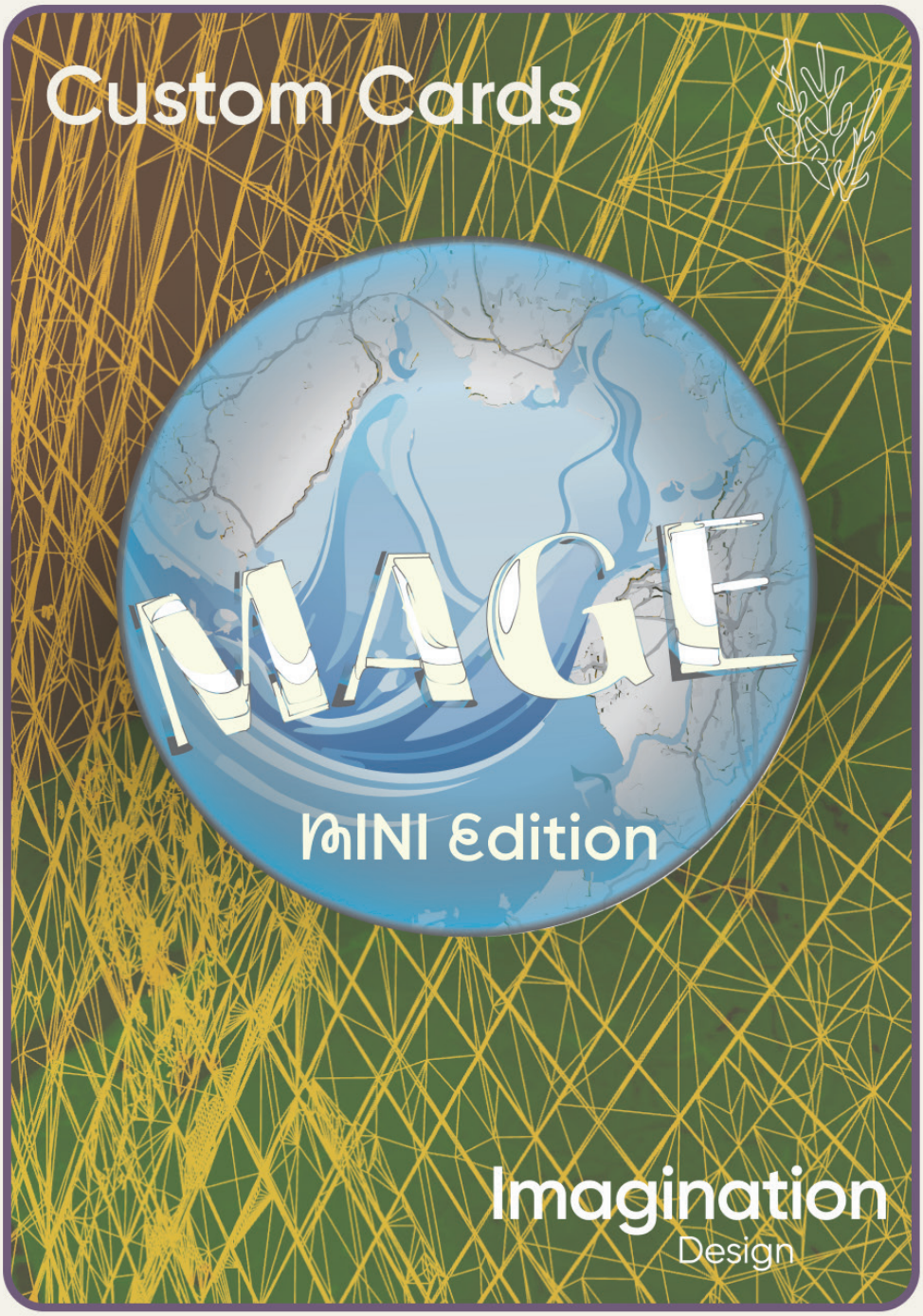

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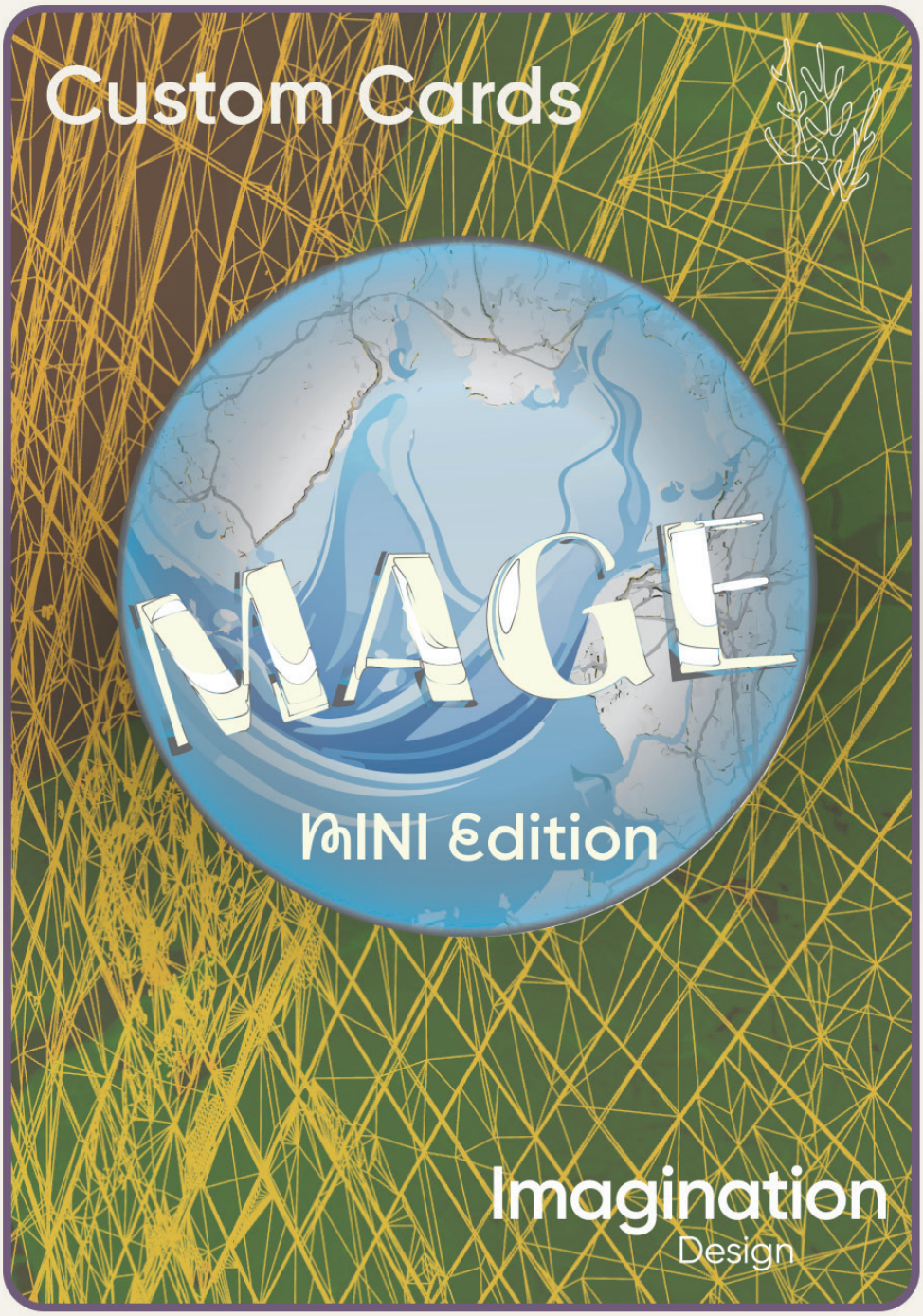

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