WIERDOK

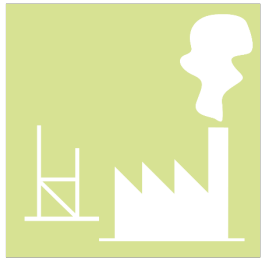
SEAWEEDFARM, SEAWEEDLOAMBRICK FACTORY AND EXPLORATION SITE

RIANNE REIJNDERS

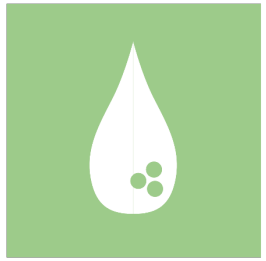
Problem statement

WORLDWIDE STRUGGLES IN THE BUILDING INDUSTRY

depletion of non renewable materials [1]



Increasing CO_2 production from the building industry [2]



high wateruse and pollution [3]

High energy use in building industry non-green energy [2]

1. Cole & Rousseau, 1992; **2.** Hamilton et al., 2020, p 4, 6-11; **3.** Hussin et al., 2013

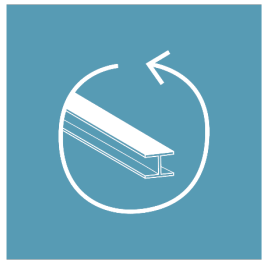
Problem statement

OBJECTIVES OF THE NETHERLANDS

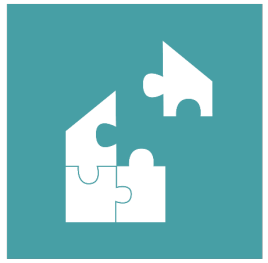
Nationwide program Circular Economy

The Netherlands circular before 2050 [4]

Focus on use of renewable resources



Optimizing material -use during the life-time of a buiding



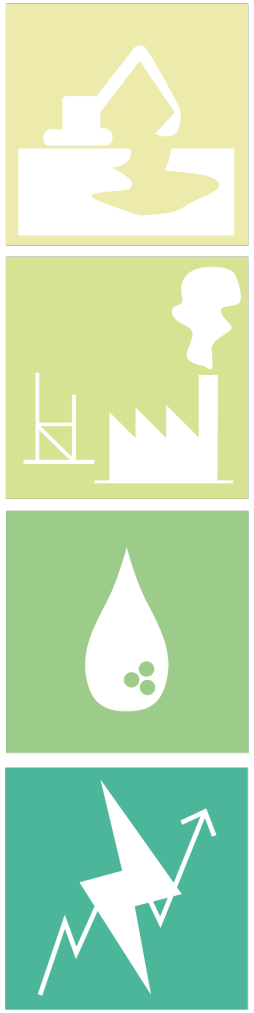
building sector that innovative and proactive regarding sociential changes and needs

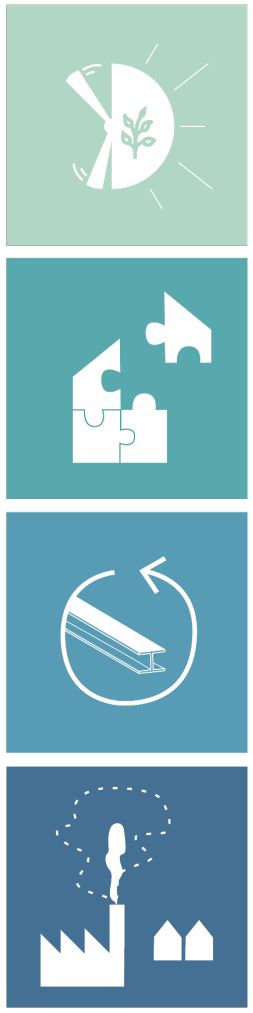
reduce CO_2 emissi-ons in building and use fases

4. Het ministerie van Infrastructuur en Milieu al., 2016, p 60-65

Problem statement

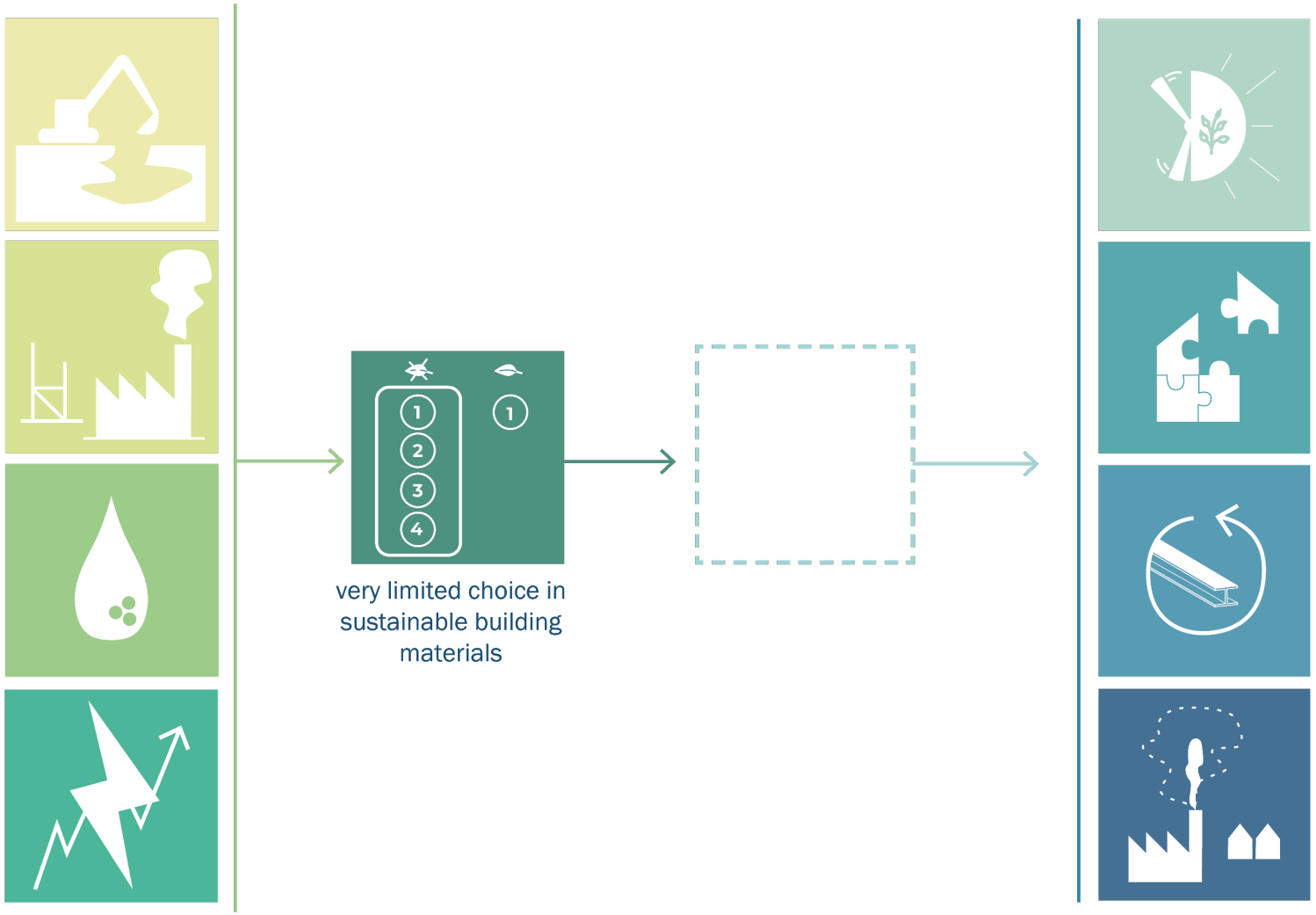
HOW TO FILL THE GAP?





Problem statement

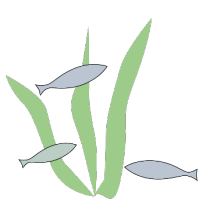
HOW TO FILL THE GAP?



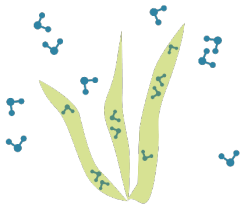
Problem statement

WHAT ABOUT SEAWEED AS BUILDING MATERIAL?

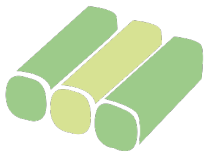
seaweed as solution



promotes biodiversity



absorbed co2



Insulating

fire proof

biodegrable

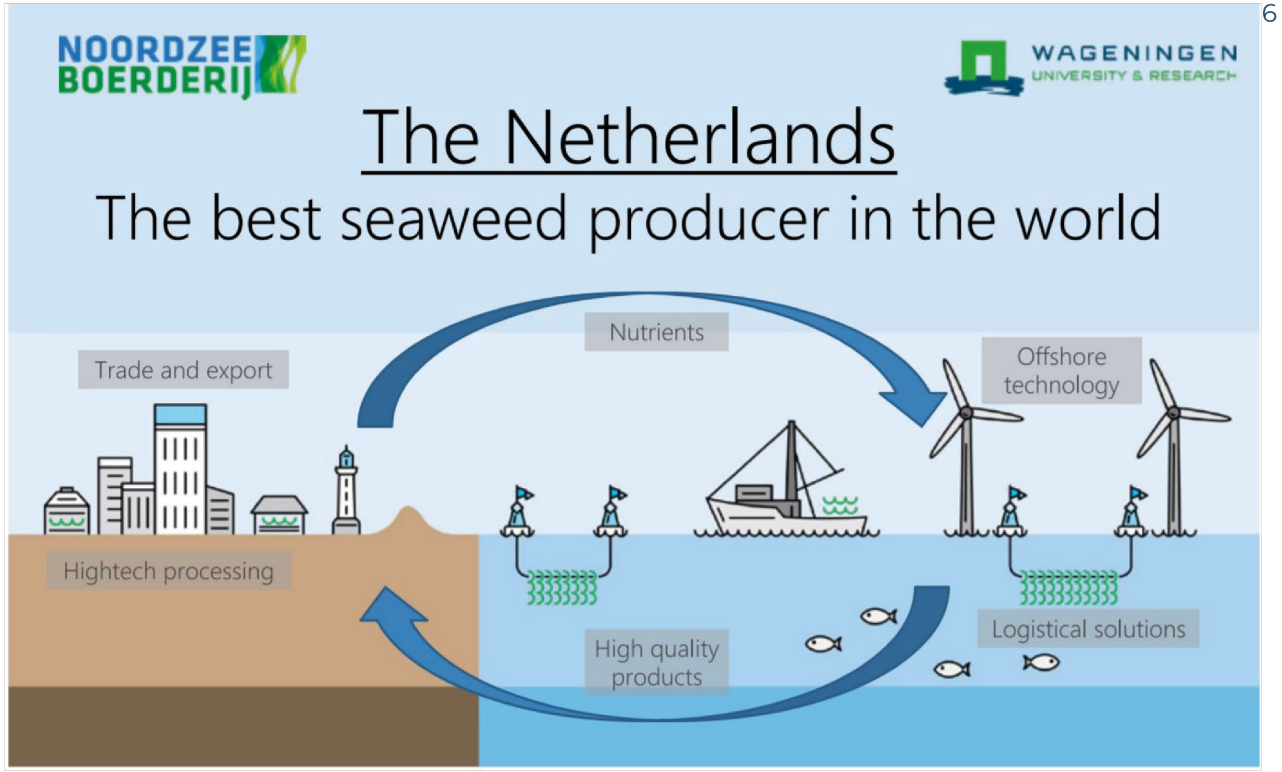
filters polluted water

5. Søndermark J., 2013; Yang, 2012; Widera, 2014

Problem statement

SEAWEED IN THE NETHERLANDS

Executionprogram Circular Economy
2019 - 2023



6

6. Het ministerie van Infrastructuur en Waterstaat et al. 2019, p13-16

Material Research

WHAT SEAWEED-BASED BUILDING SKINS ARE CURRENTLY DEVELOPED?

① board

Seawood-Blue Blocks:

② vapour tight layer
vapour open, water tight layer

③ insulation

Seaweed insulati-on-

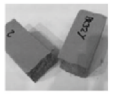
Seaweed insulation-Aerogel

Seaweed insulation-NeptuTherm .

Seaweed insulation Mats- Advanced Nonwoven

④ load bearing layer

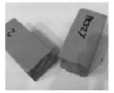
Sargablock - Omar Vazquez



Seaweed and unfired clay bricks-

⑥ cladding

Sargablock - Omar Vazquez



seaweed biopoly-mers and unfired clay bricks

Seaweed rolls - The Modern Seaweed House Vandkunsten:

Seaweed mortar

KNOT seaweed house - Warwick McLeod

Væve Installation - Studio Seagrass

Seaweed roof - Seaweed House coastal areas of Jiaodong:

Seaweed roof - Traditional Danish roof

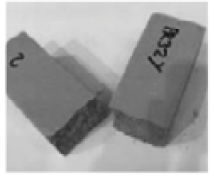
Seaweed thatching - Kathryn Larsen

Seaweed paviljoen - Kathryn Larsen

Material Research

④ load bearing layer

Sargablock -
Omar Vazquez



Seaweed and unfired
clay bricks-

Material Research

LOAM

SEAWEED

Material Experts

LOAM

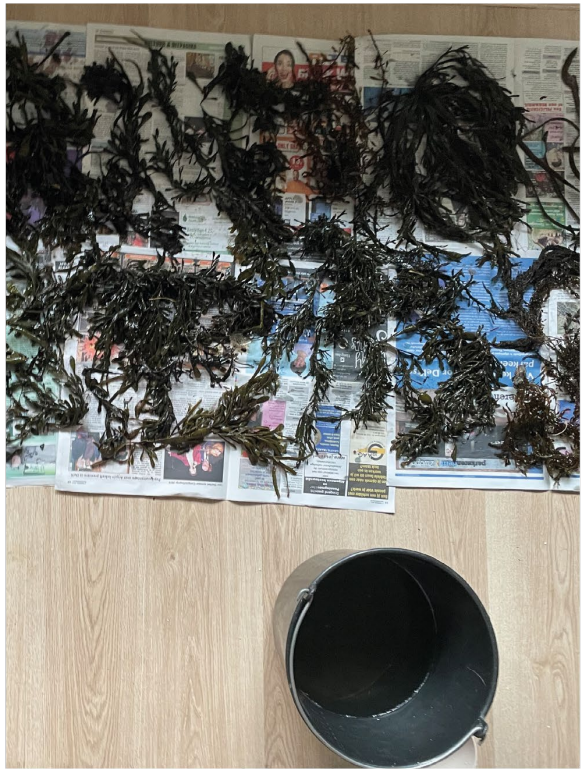
ROKUS OSKAM
OSKAM_VF

SEAWEED

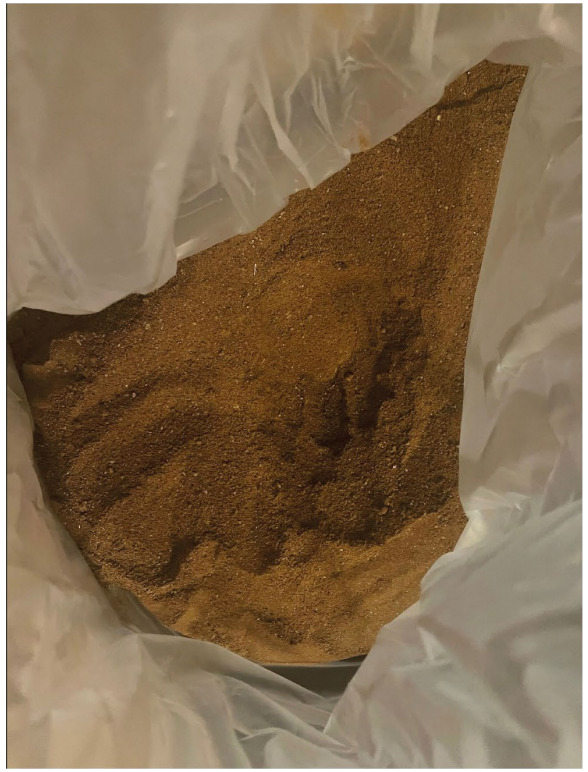
KATHRYN LARSEN
STUDIO KATHRYN LARSEN

PHOTO CREDIT: ROTTERDAM BRAND PHOTOGRAPHER SARAH TULEJ

Material Research



Material Research

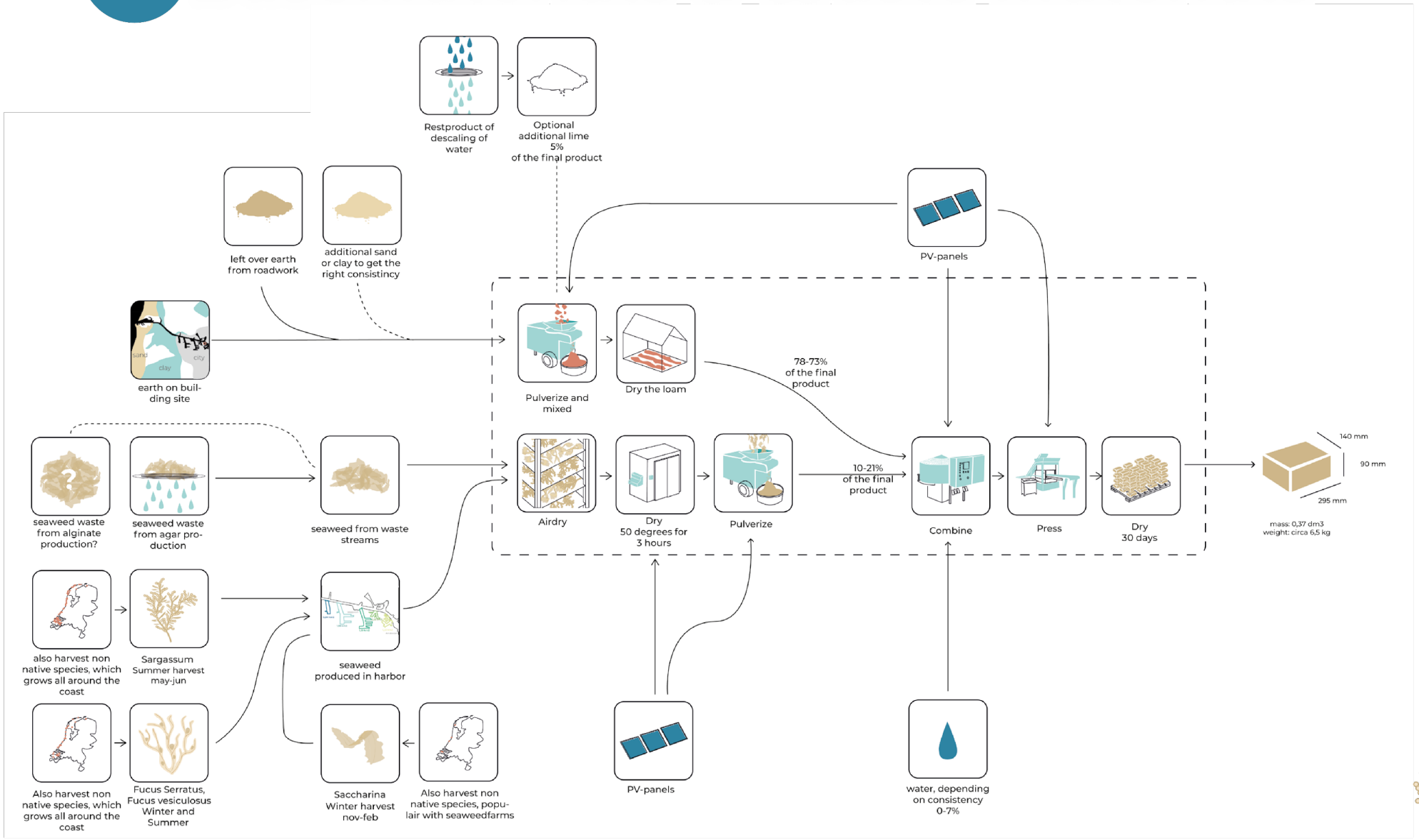


Material Research

Material Research

Seaweed loambrick

Basematerials & Waste materials



Seaweed loambrick

COMPARED TO OTHER MATERIALS

Material	quantity	kg CO2 emissions	m3 water-usage	MJ energy-usage
Seaweed brick (140 mm)	1 m2	11	0,017	13,848
fired brick (100 mm)	1 m2	74	0,022	172,800

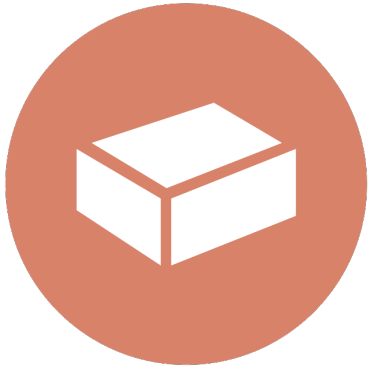
Goal

Goal

growing seaweed

Goal

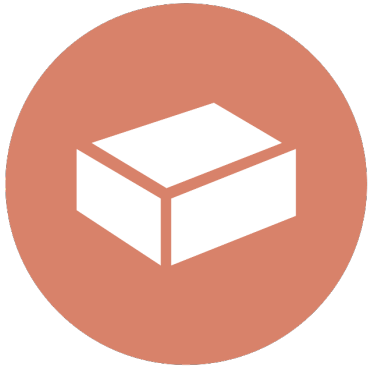
growing seaweed



producing the seaweed building product

Goal

growing seaweed

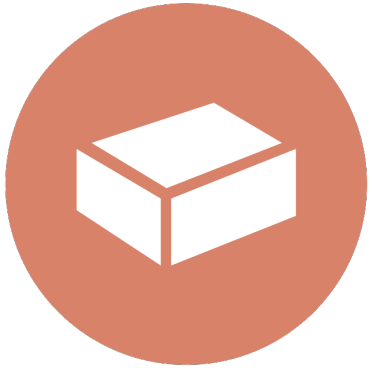


producing the seaweed building product

building with the seaweed product

Goal

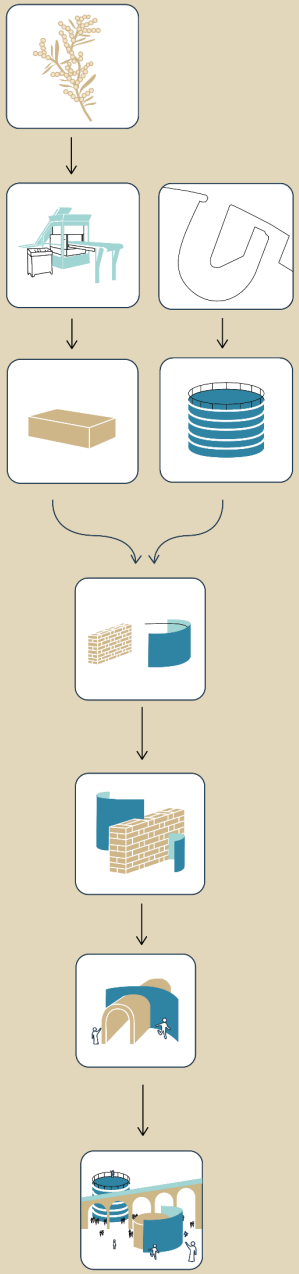
growing seaweed



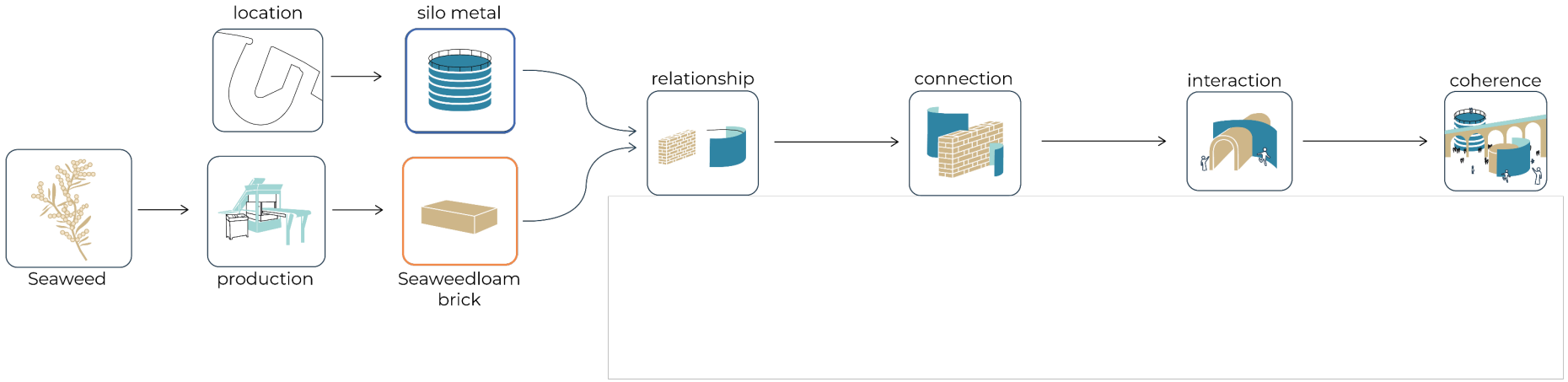
producing the seaweed building product

building with the seaweed product

create informational experience for visitor



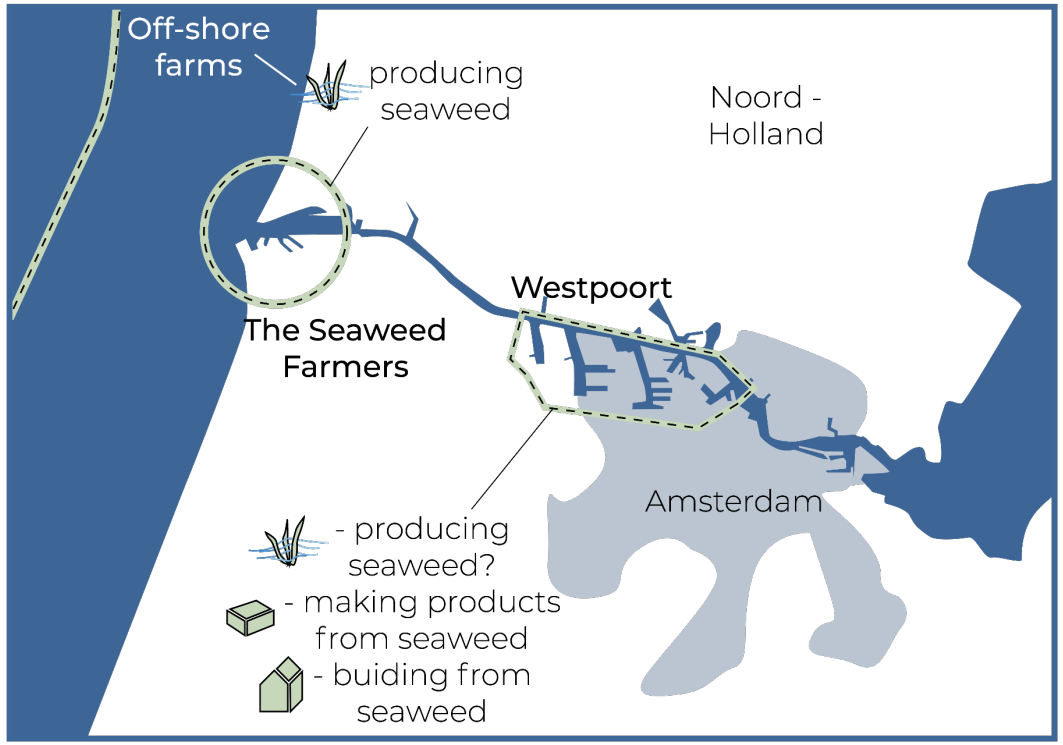
Goal

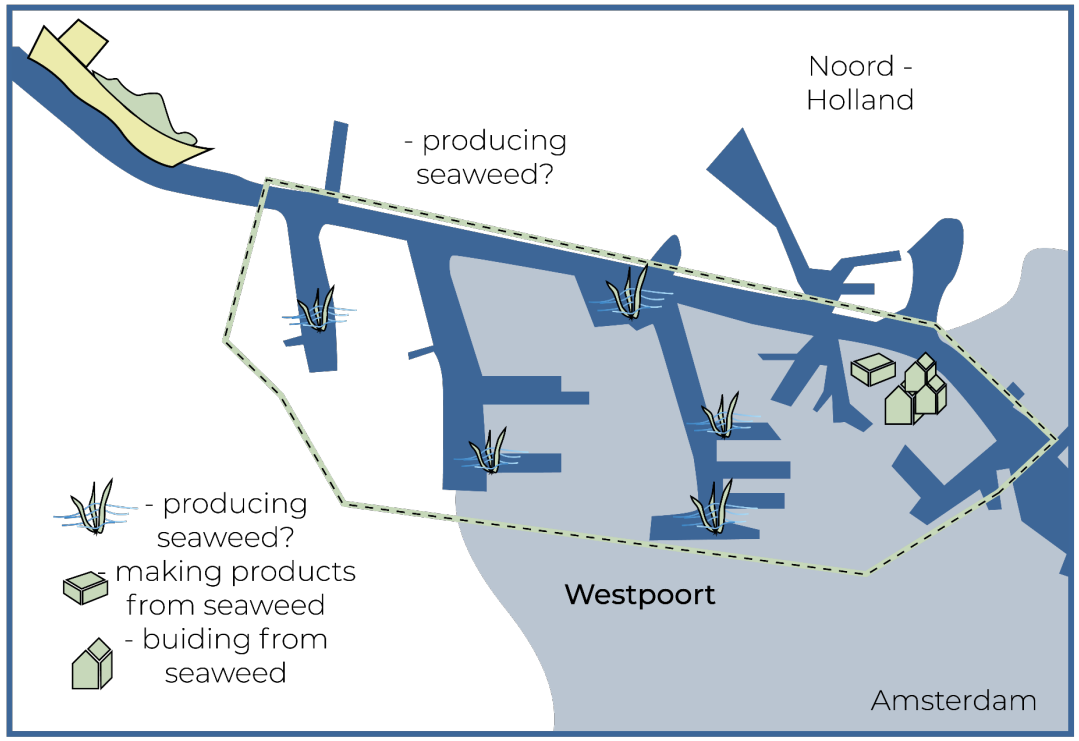


Rianne Reijnders

Location

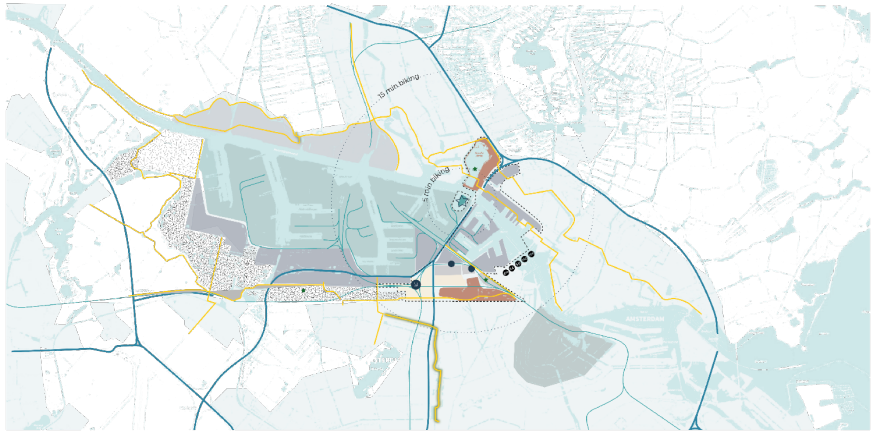
WHY SEAWEED IN THE HARBOR OF AMSTERDAM?



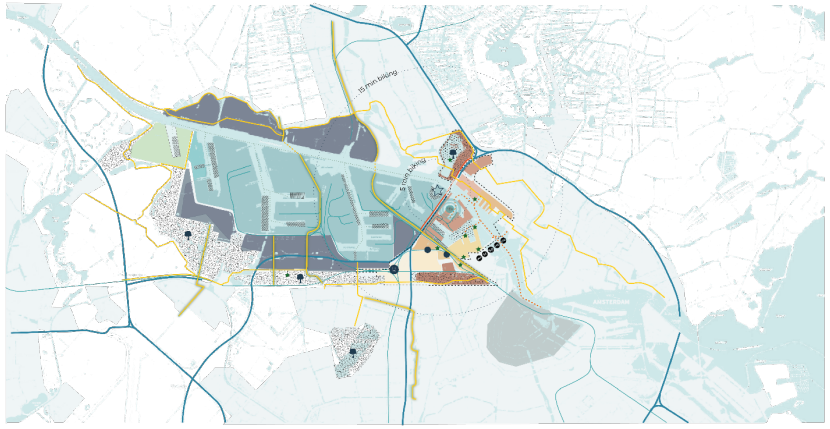


Westpoort

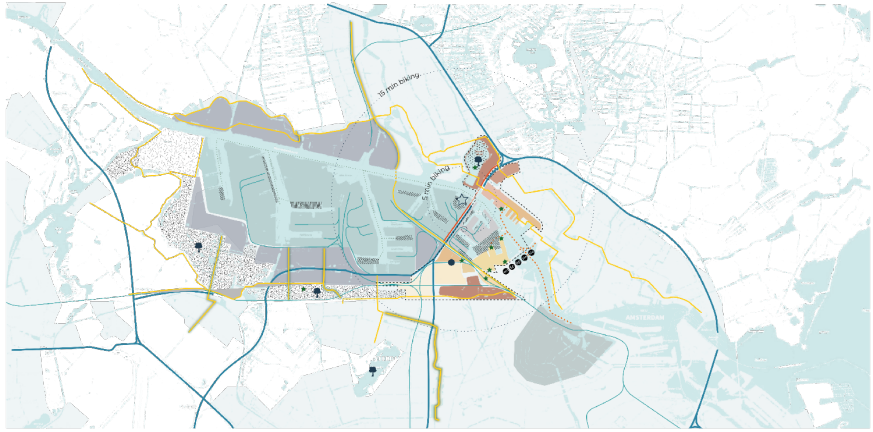
WHY SEAWEED IN THE HARBOR OF AMSTERDAM?



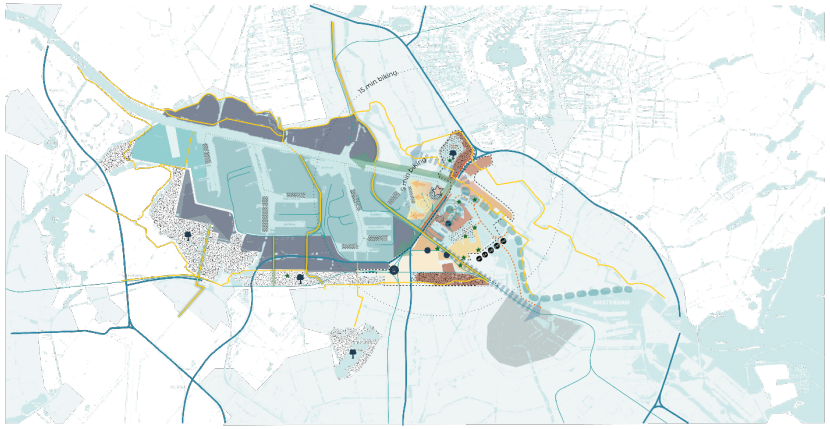
2022



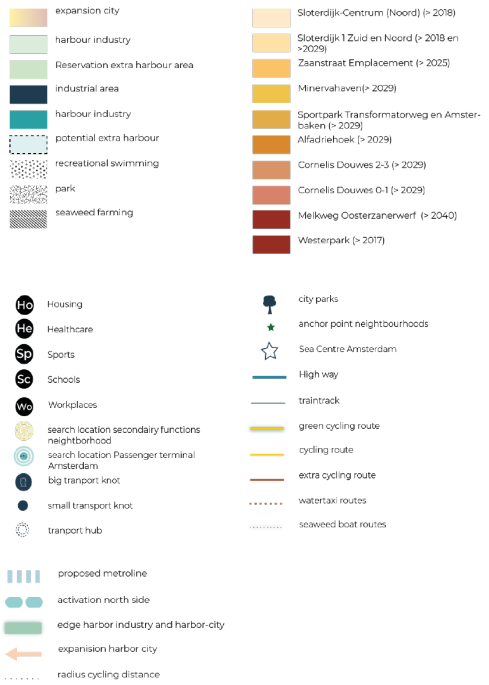
2030



2040



2050



Rianne Reijnders

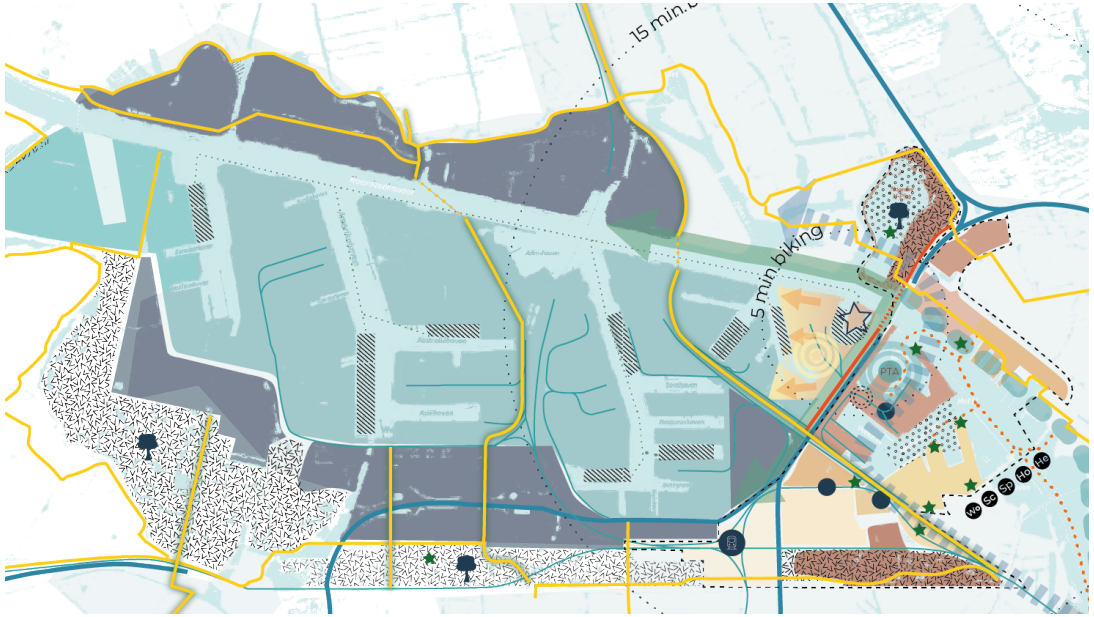
Westpoort

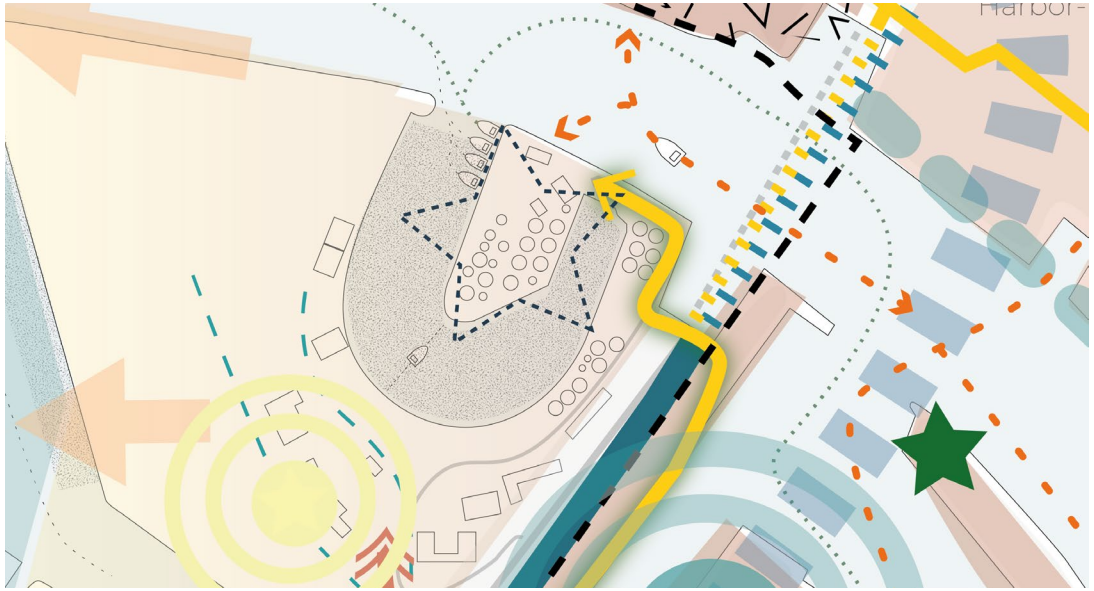
WHY SEAWEED IN THE HARBOR OF AMSTERDAM?

influx of seaweed expertise and products

further incentive of researching
new building materials

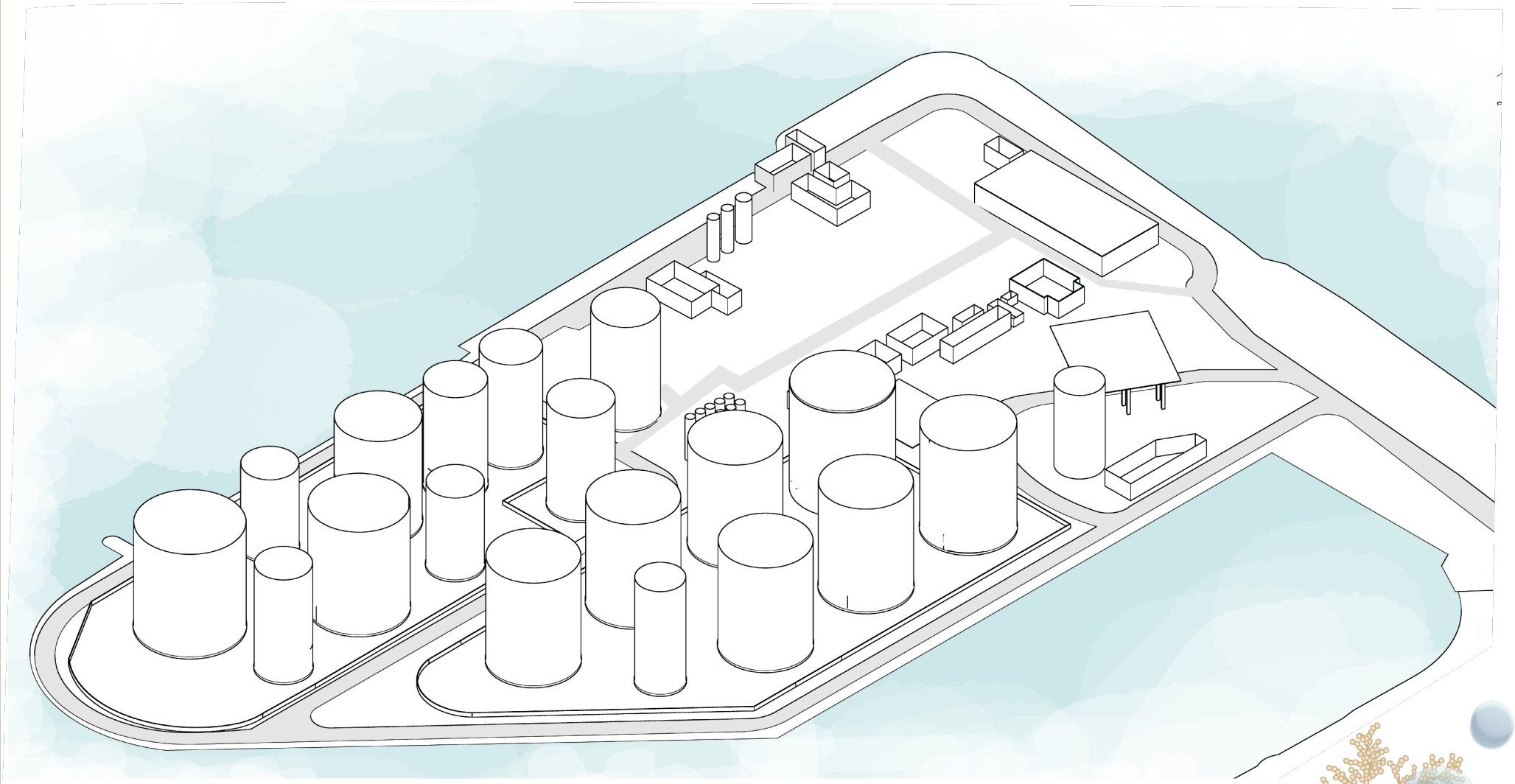
growth neighborhoods like harbor city





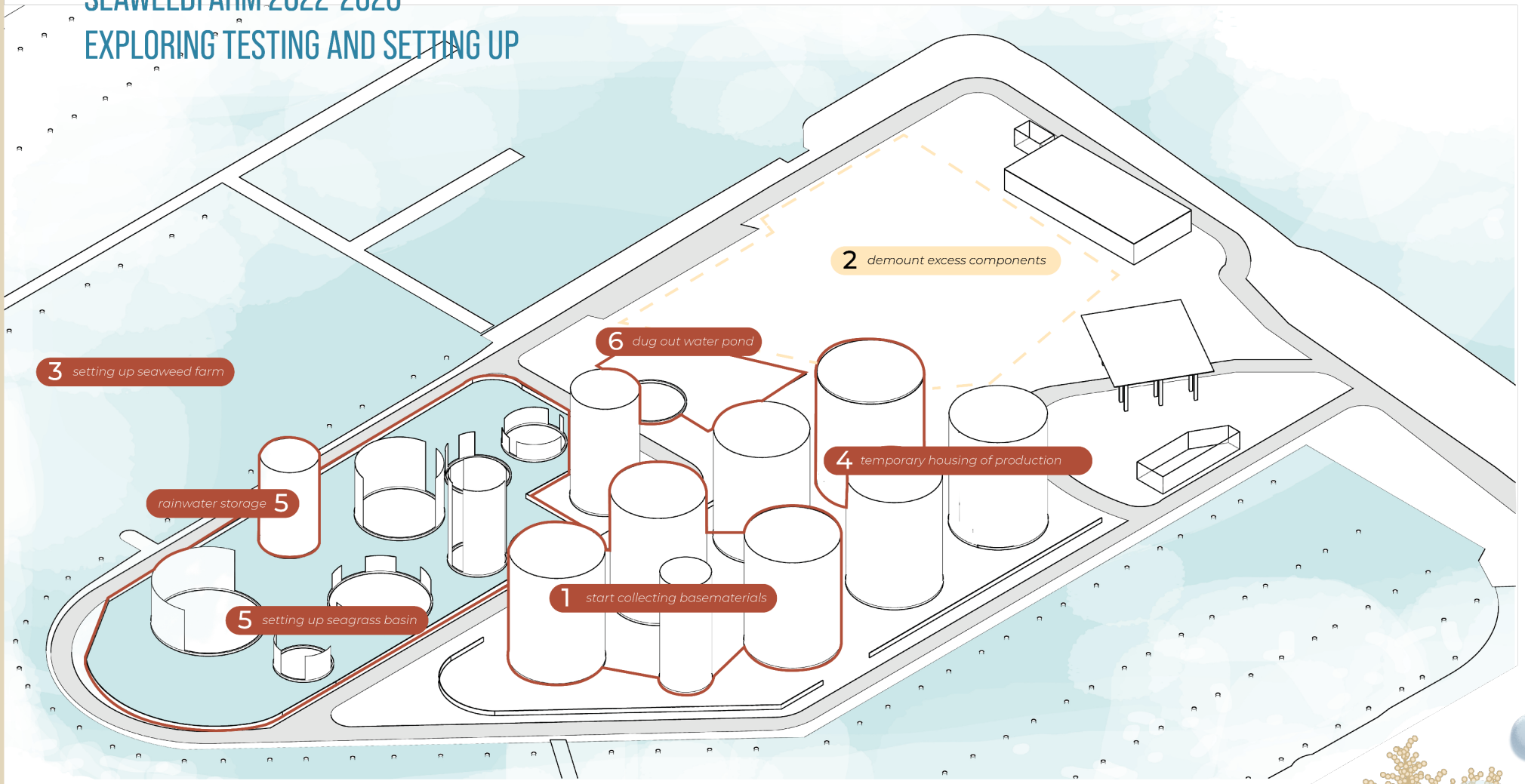
Rianne Reijnders

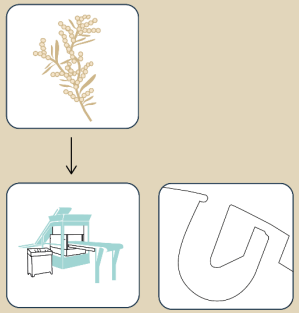
Phase 0:



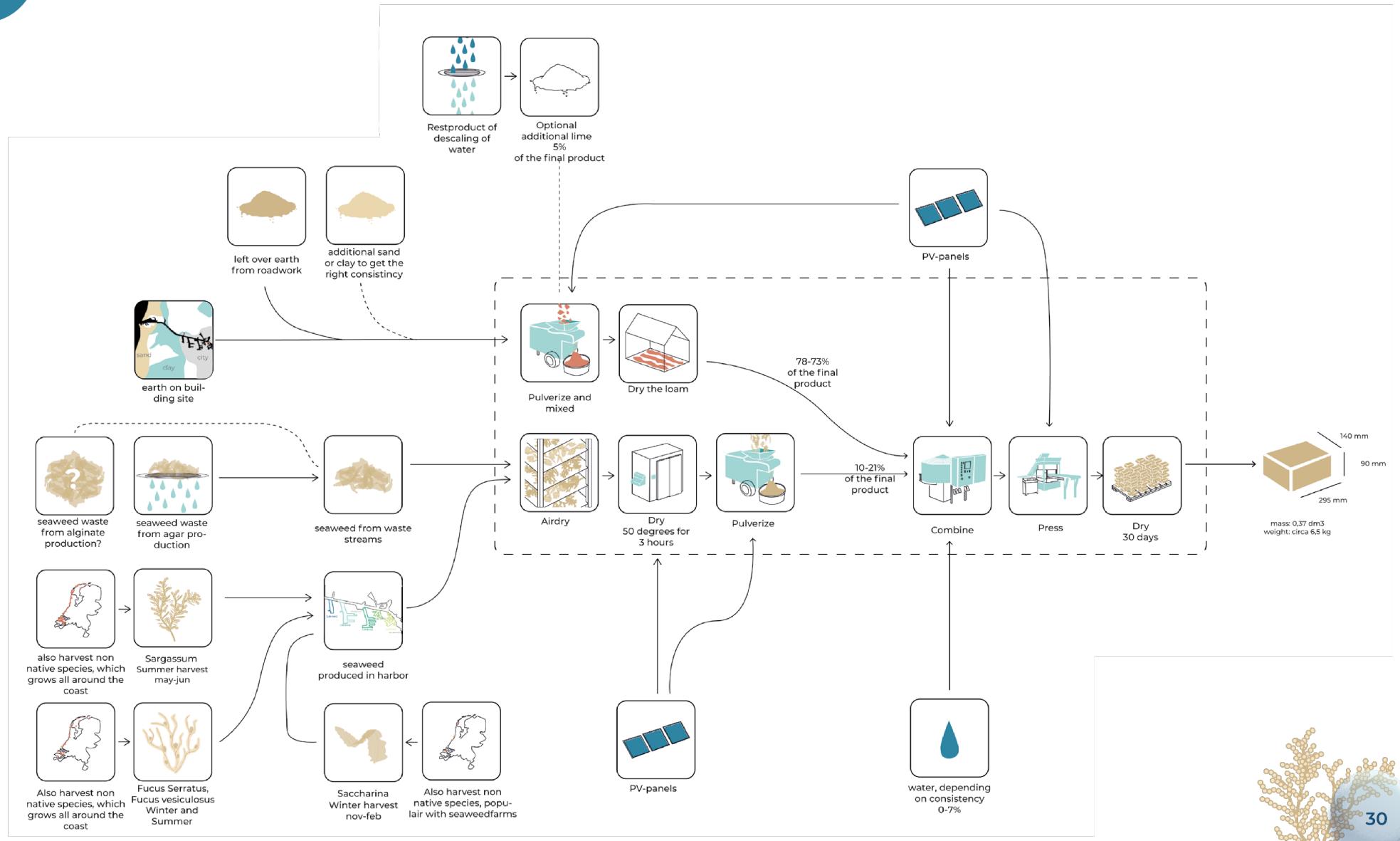
Phase 1:

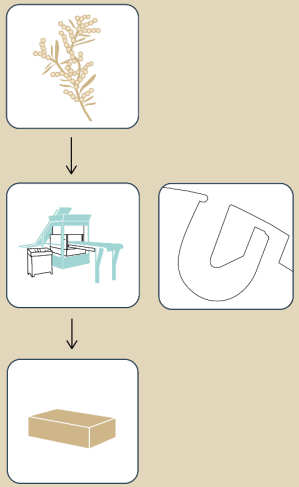
SEAWEEDFARM 2022-2026
EXPLORING TESTING AND SETTING UP



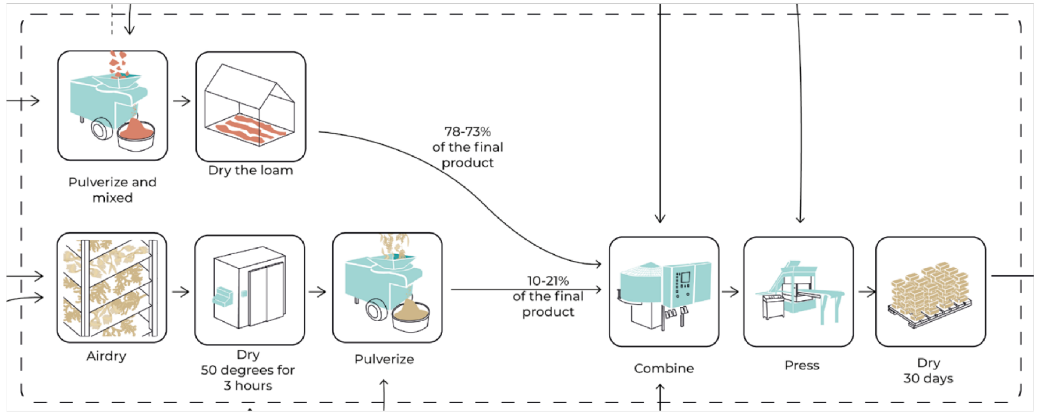


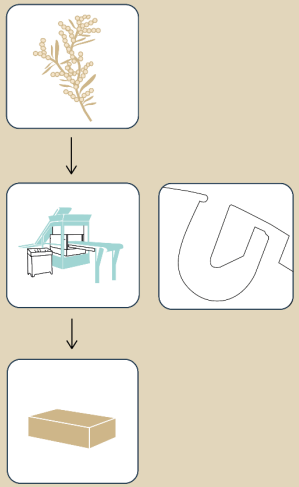
Proces


Restproduct of descaling of water
Optional additional lime 5% of the final product
left over earth from roadwork
additional sand or clay to get the right consistincy
PV-panels
earth on buil-ding site
Pulverize and mixed
Dry the loam
78-73% of the final product
seaweed waste from alginate production?
seaweed waste from agar pro-duction
seaweed from waste streams
Airdry
Dry 50 degrees for 3 hours
Pulverize
10-21% of the final product
Combine
Press
Dry 30 days
140 mm
90 mm
295 mm
mass: 0,37 dm3
weight: circa 6,5 kg
also harvest non native species, which grows all around the coast
Sargassum Summer harvest may-jun
seaweed produced in harbor
Also harvest non native species, which grows all around the coast
Fucus Serratus, Fucus vesiculosus Winter and Summer
Saccharina Winter harvest nov-feb
Also harvest non native species, popu-lair with seaweedfarms
PV-panels
water, depending on consistency 0-7%



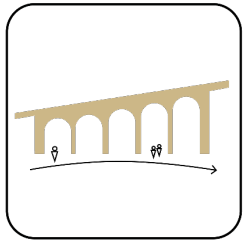
Production facilities

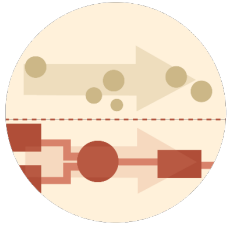




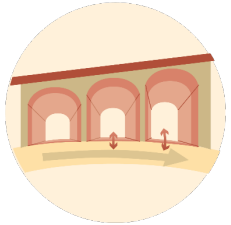
Production facilities

8 production facilties

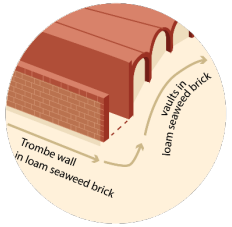




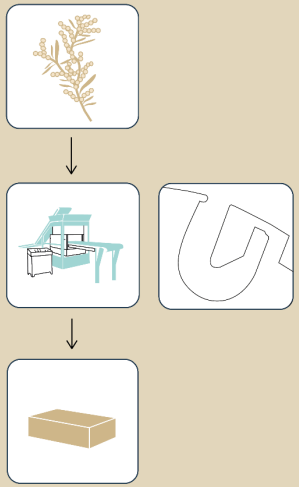
people and proces parallel



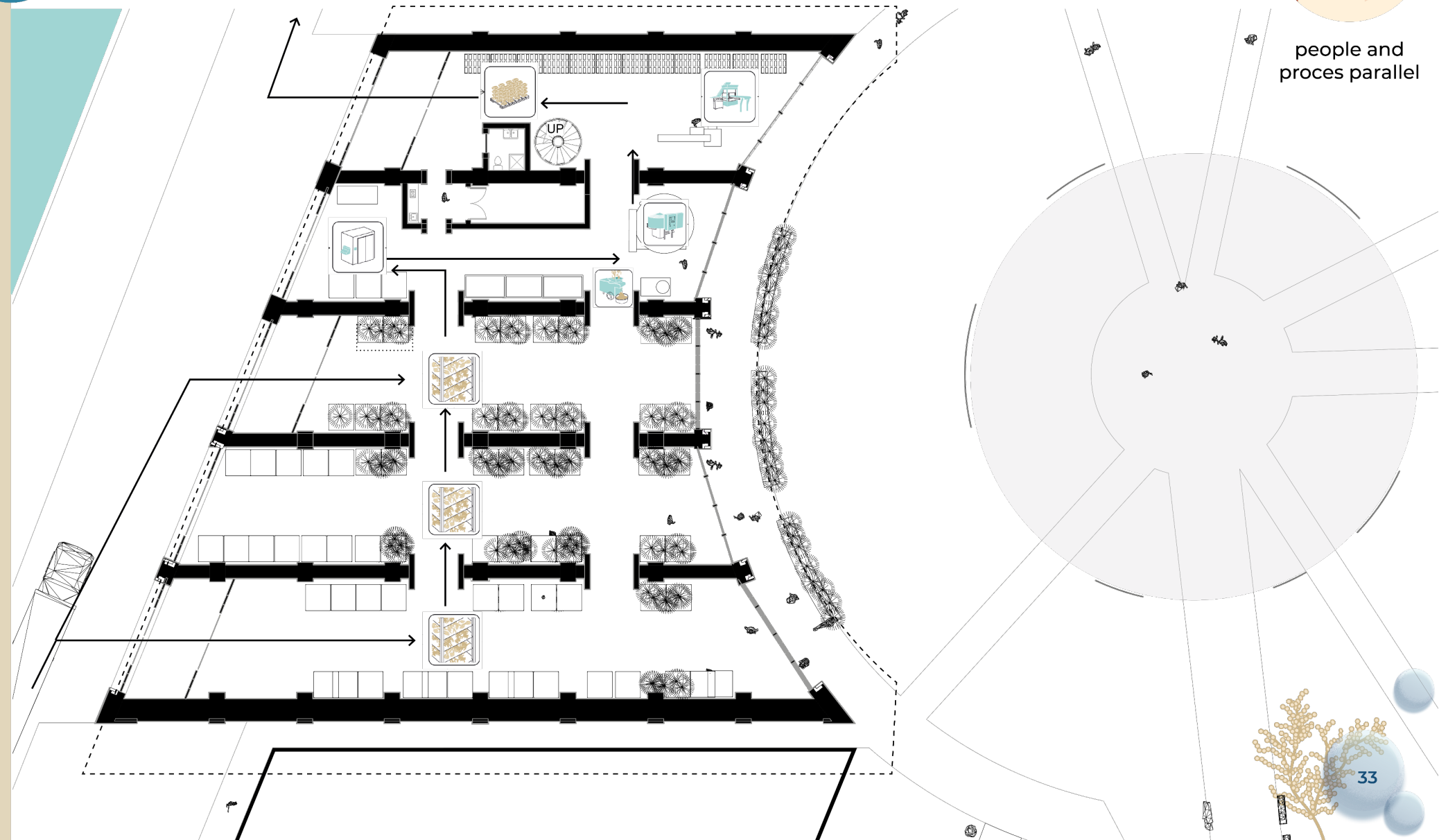
full transparancy in production

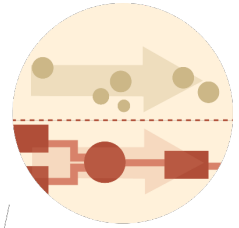


showcase of material



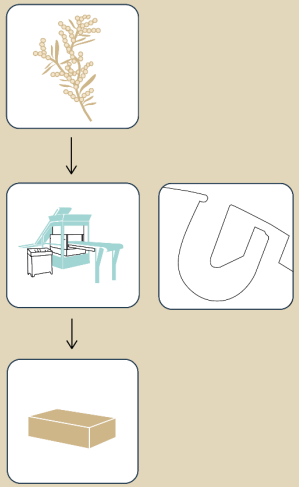
Production facilities





people and
proces parallel


35
CAT



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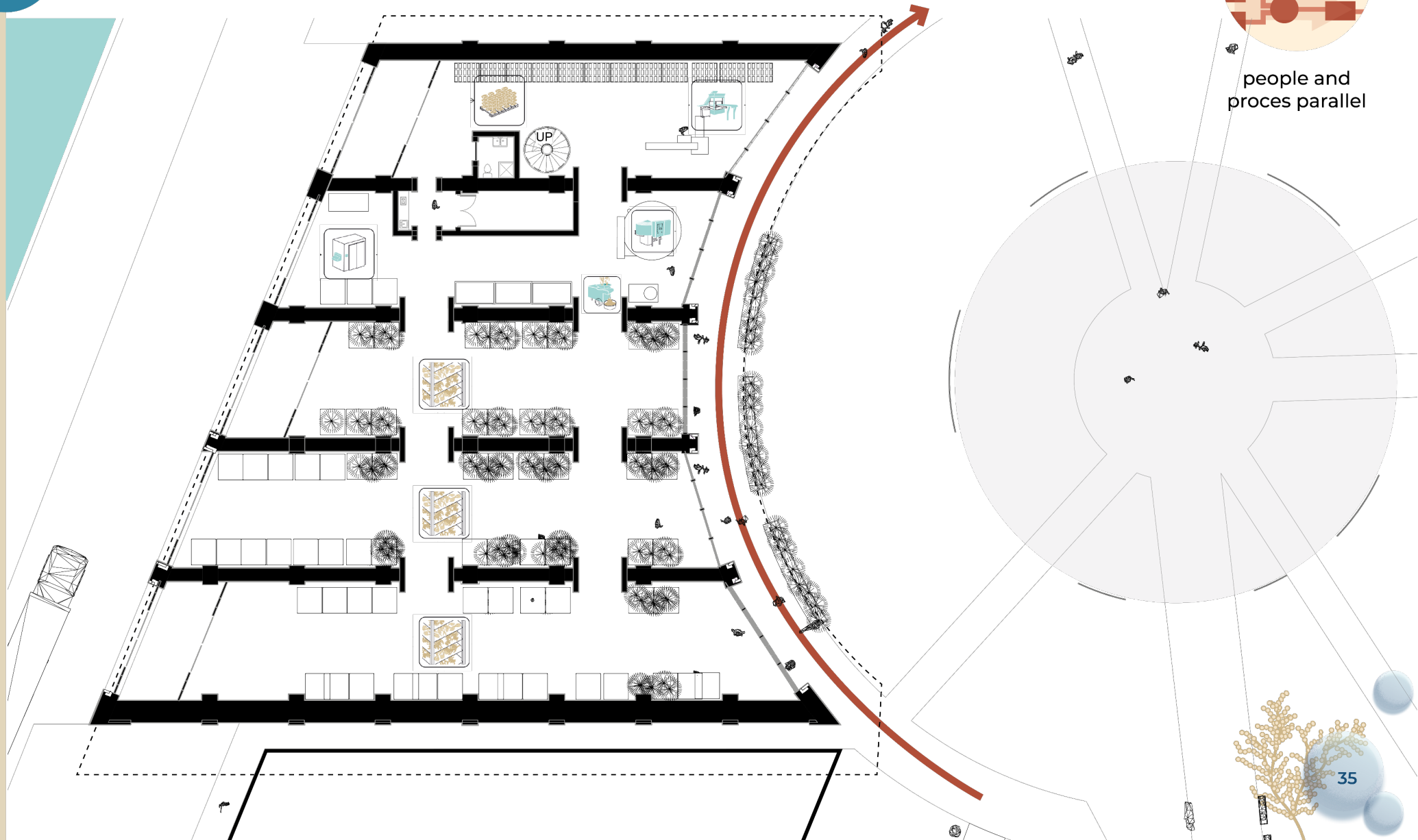
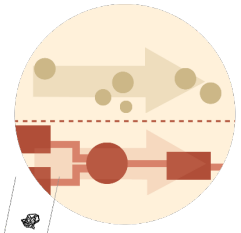
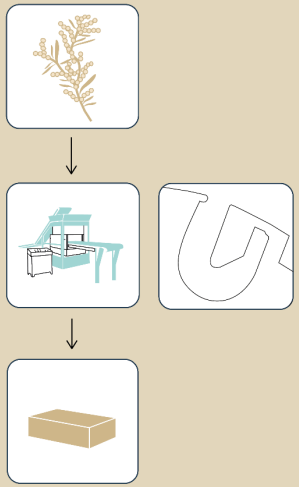




people and
proces parallel



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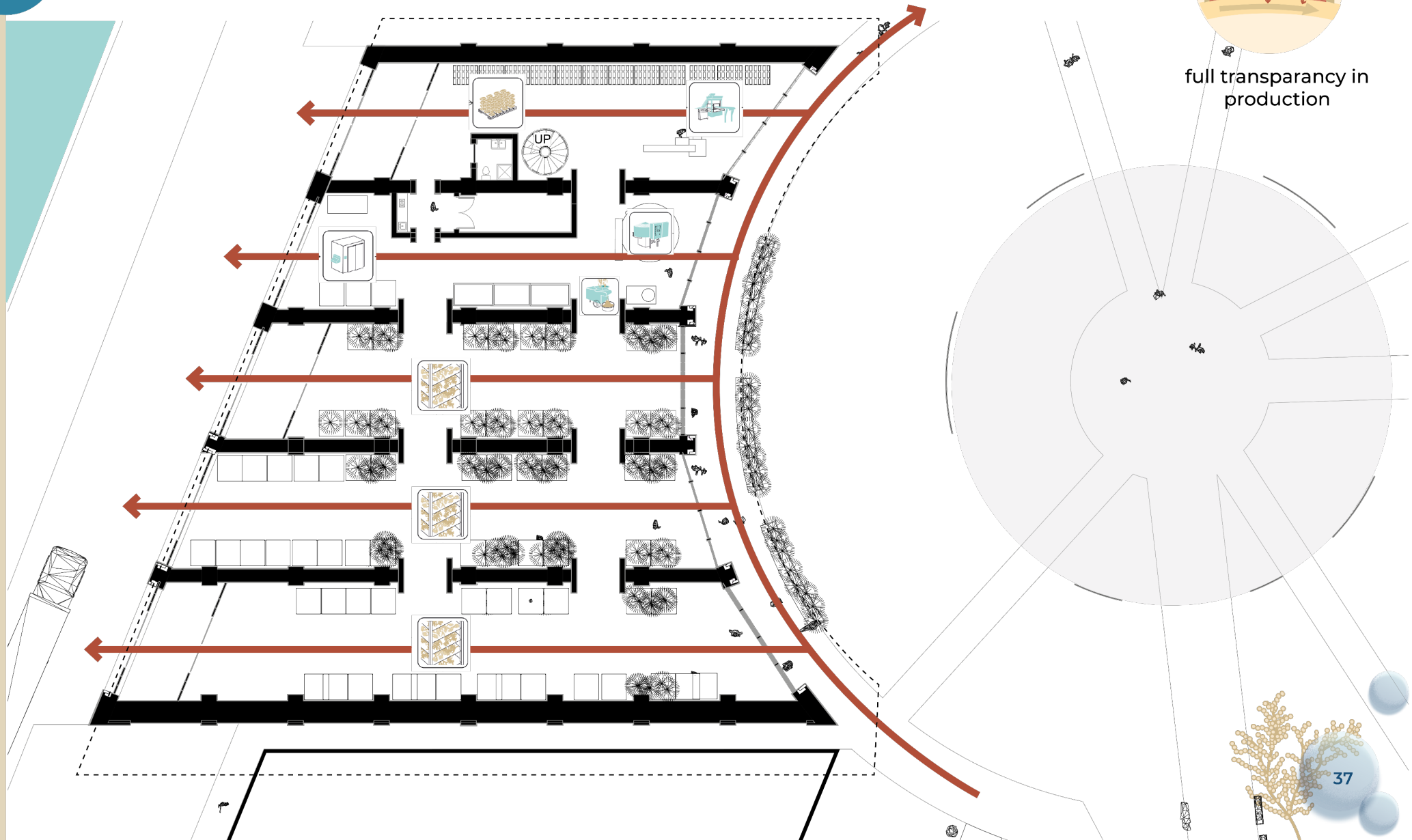
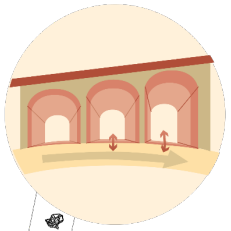
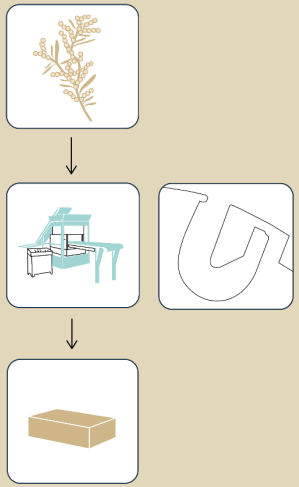


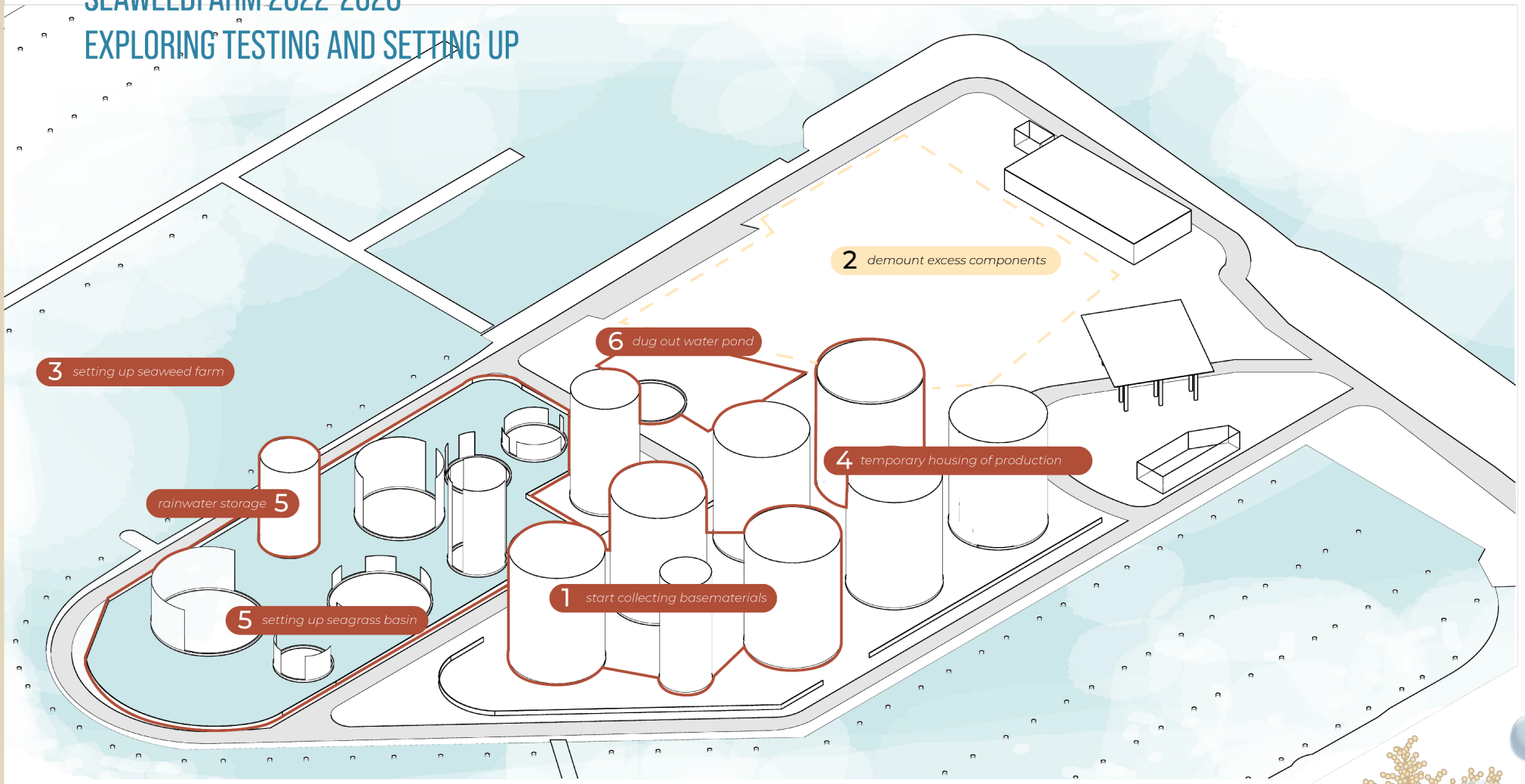


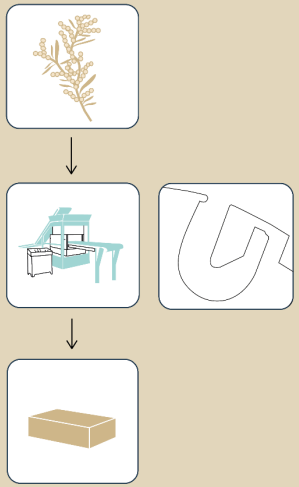
full transparancy in production



Phase 1:

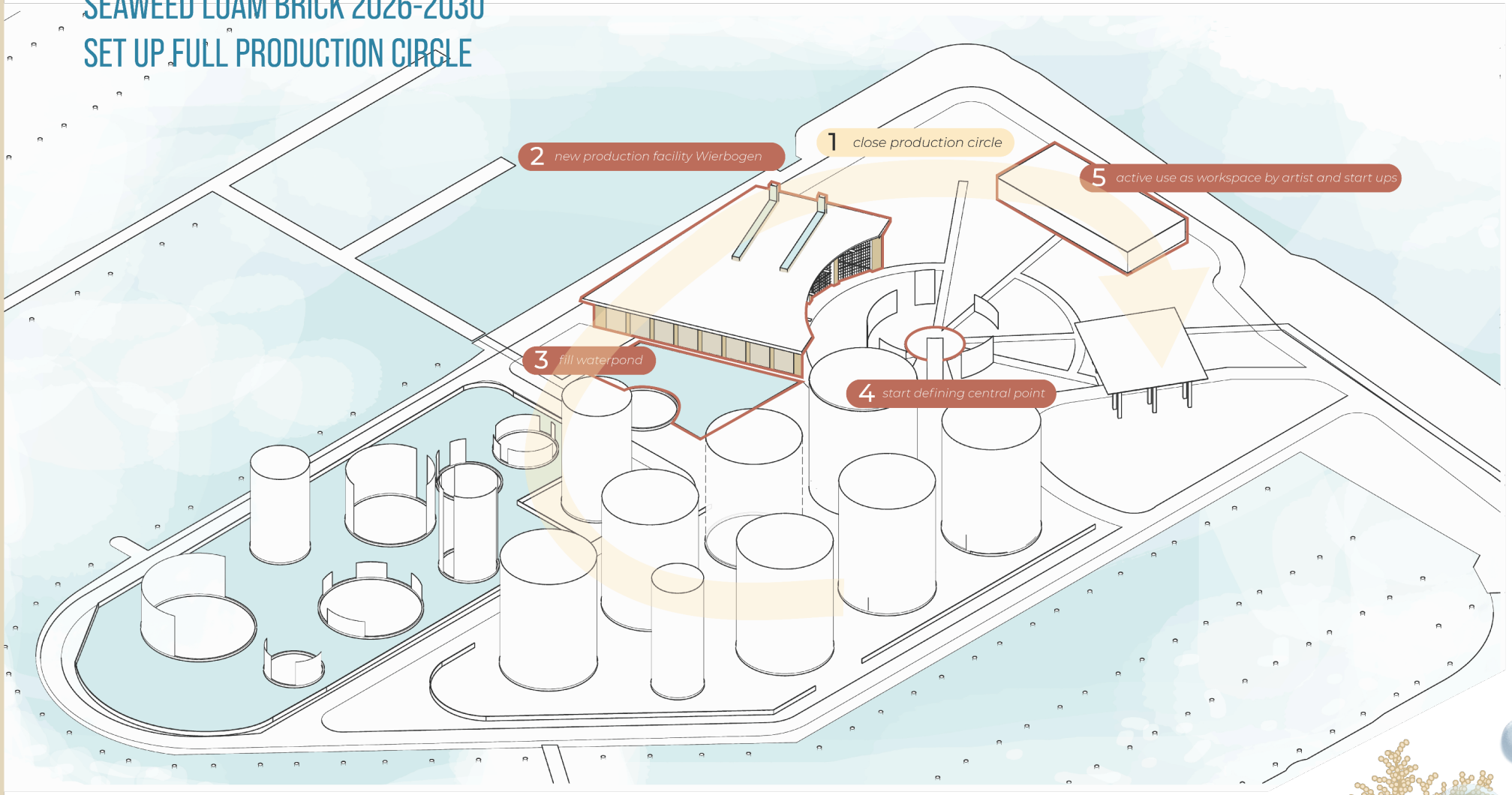
SEAWEEDFARM 2022-2026
EXPLORING TESTING AND SETTING UP

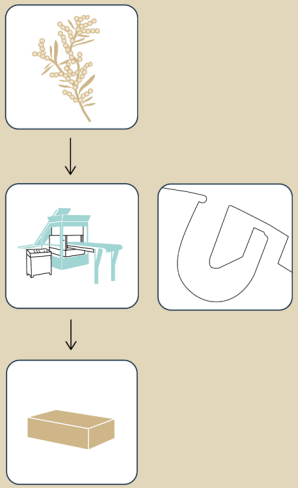




Phase 2:

SEAWEED LOAM BRICK 2026-2030
SET UP FULL PRODUCTION CIRCLE

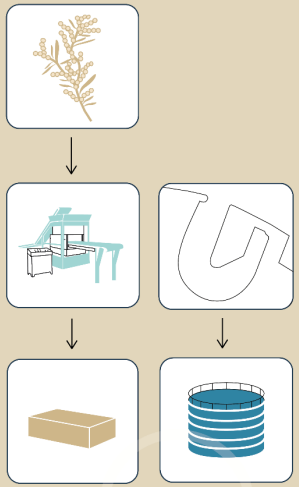




References

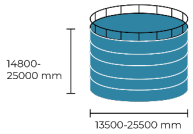
SUIKERFABRIEK TERREIN, GRONINGEN

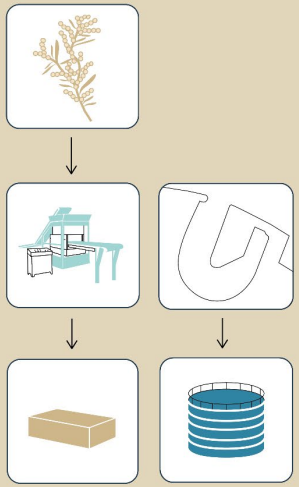
METAAL KATHEDRAAL, UTRECHT



Silo

Silo Steel materials



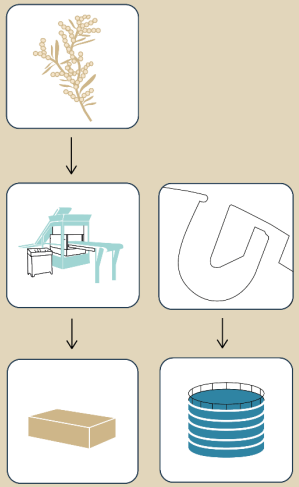


Silo

Amsterdam op de kaart

Video Honing

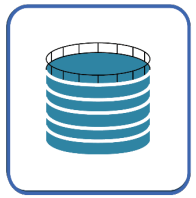
Berlinda van Dam

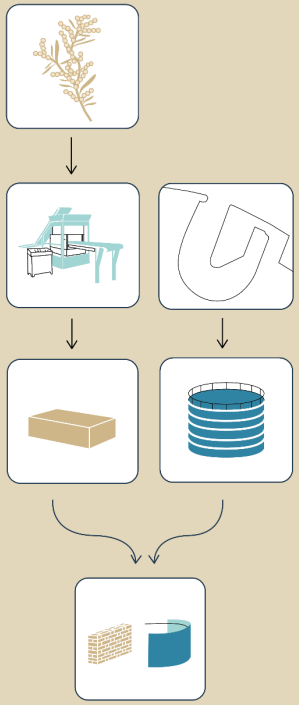


Relationship

Seaweed loam brick

Silo Steel materials





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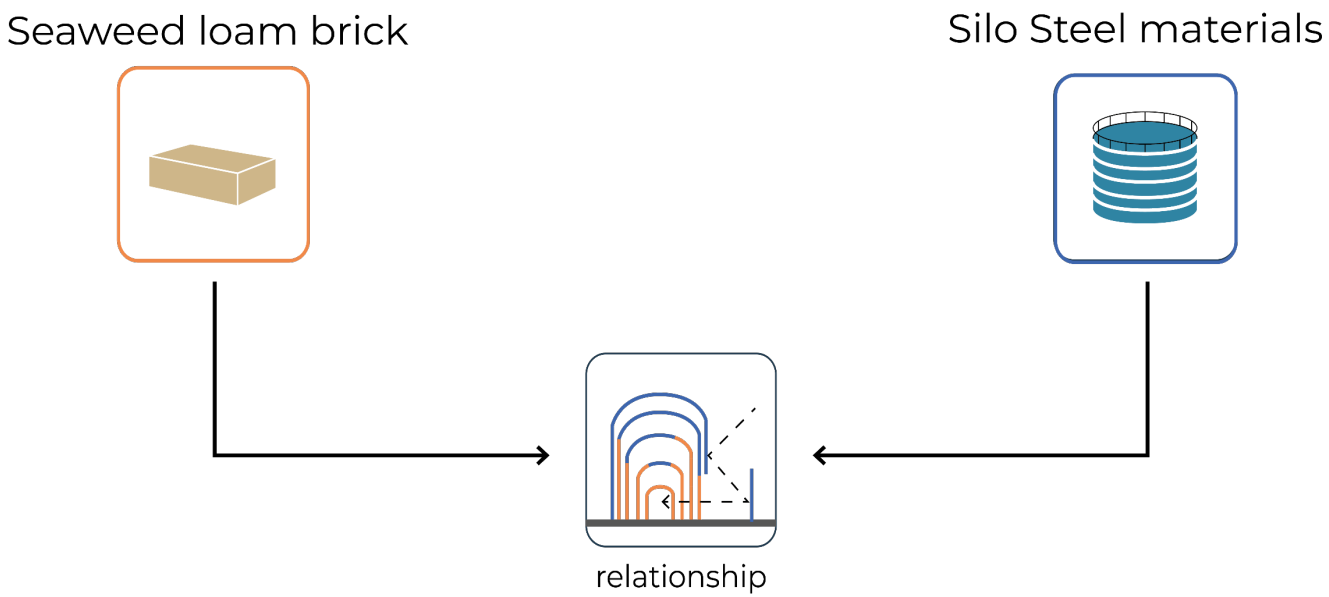

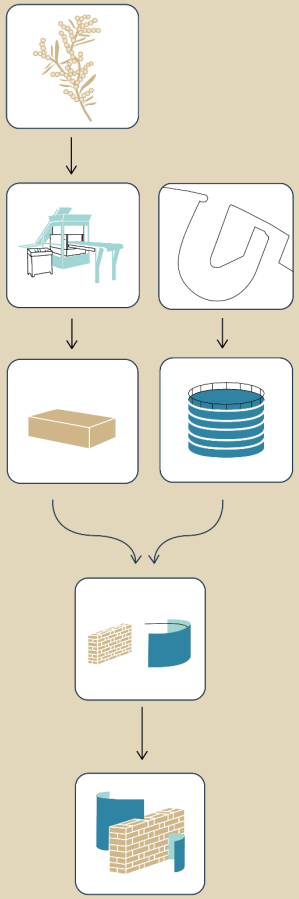

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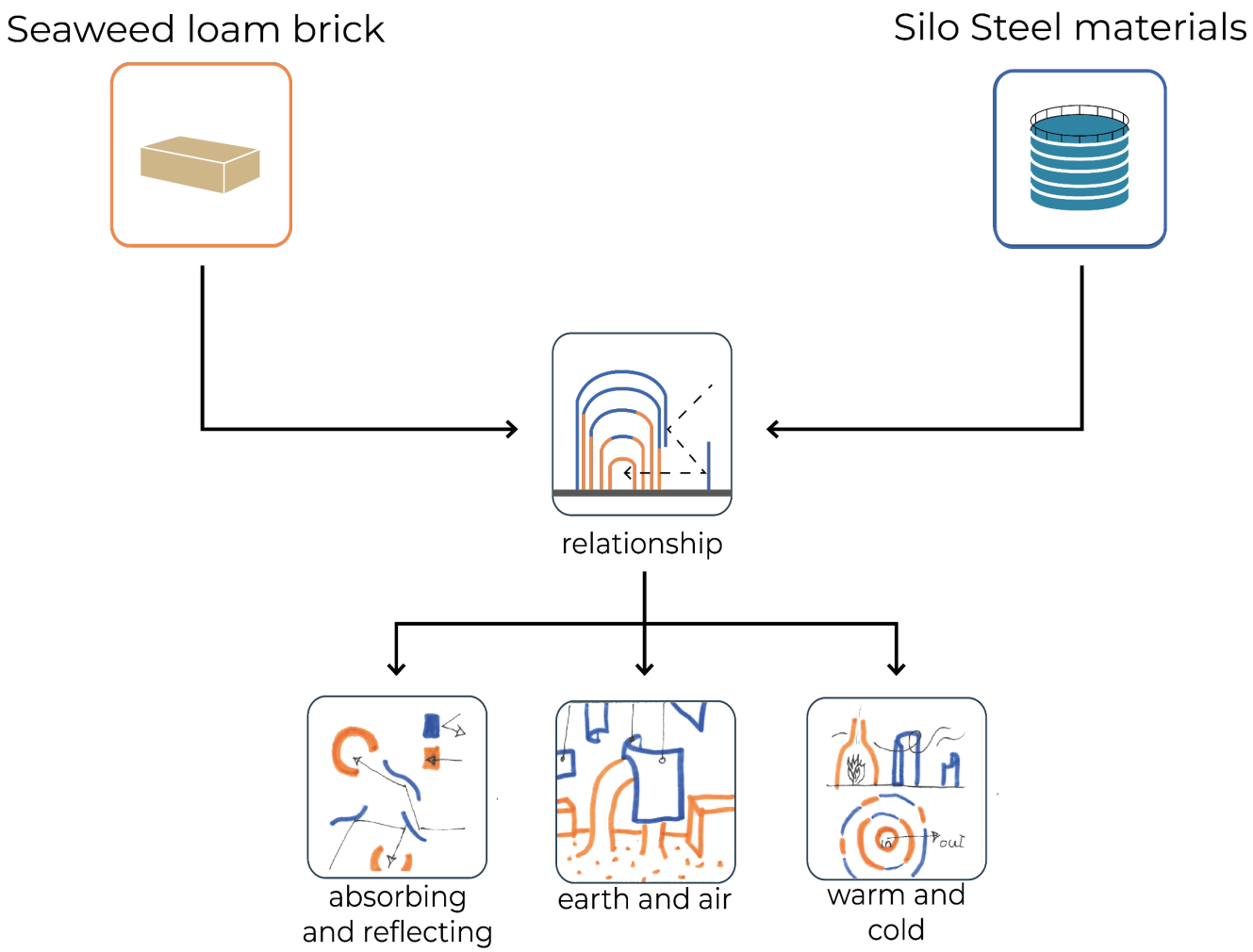
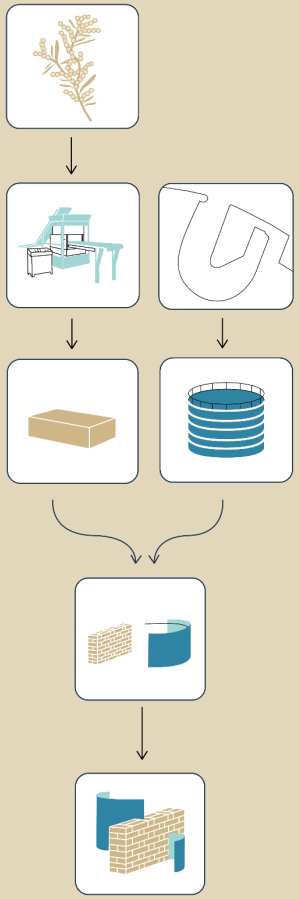
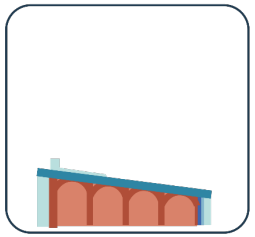
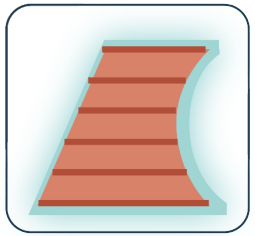




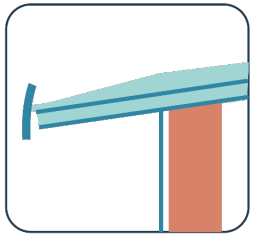
Roof



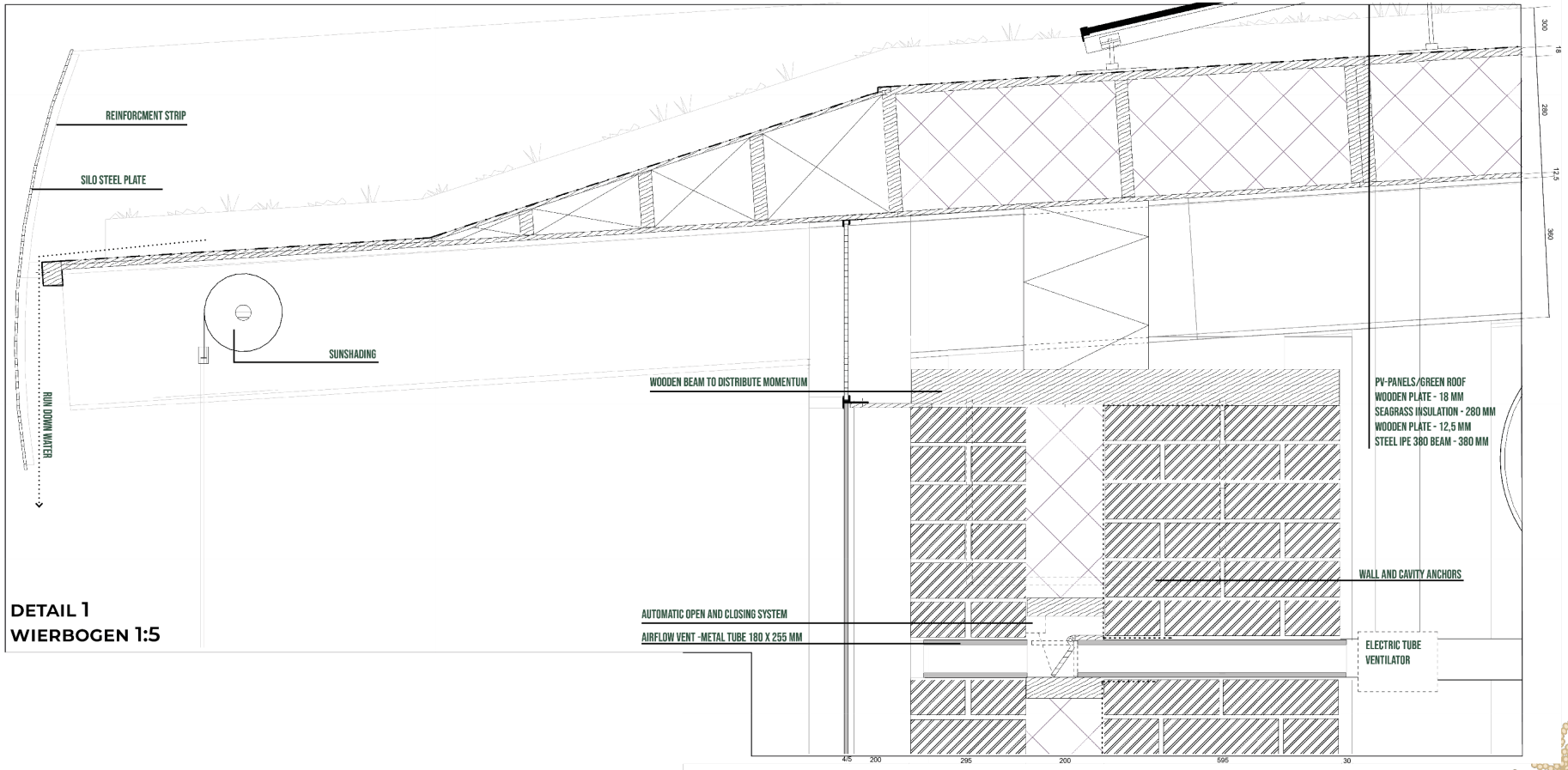
Wierbogen

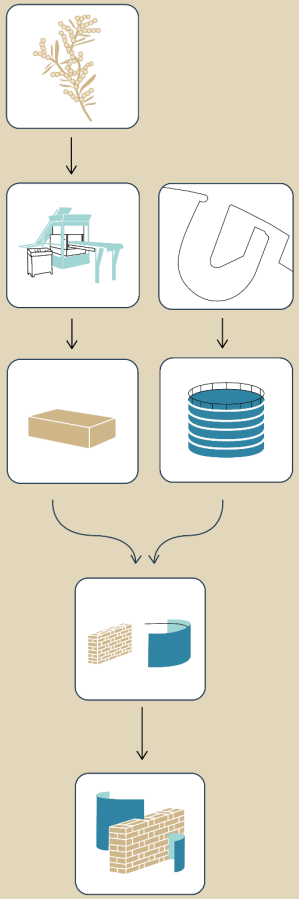


Wierbogen

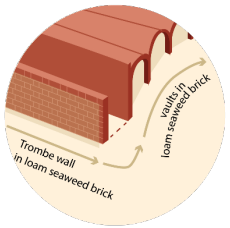


roof - wall

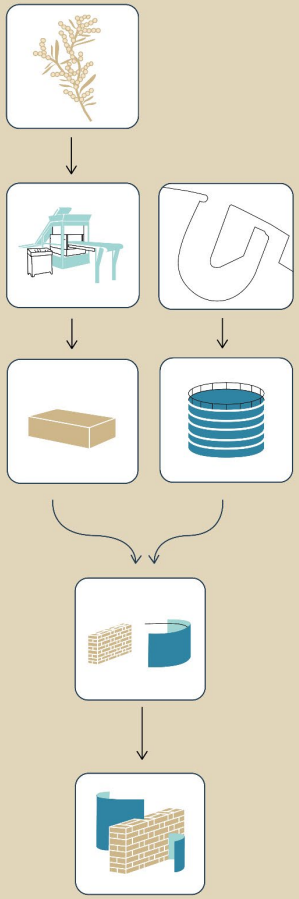




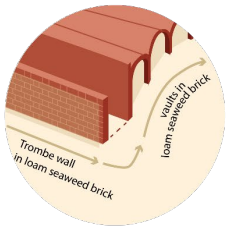
Experience



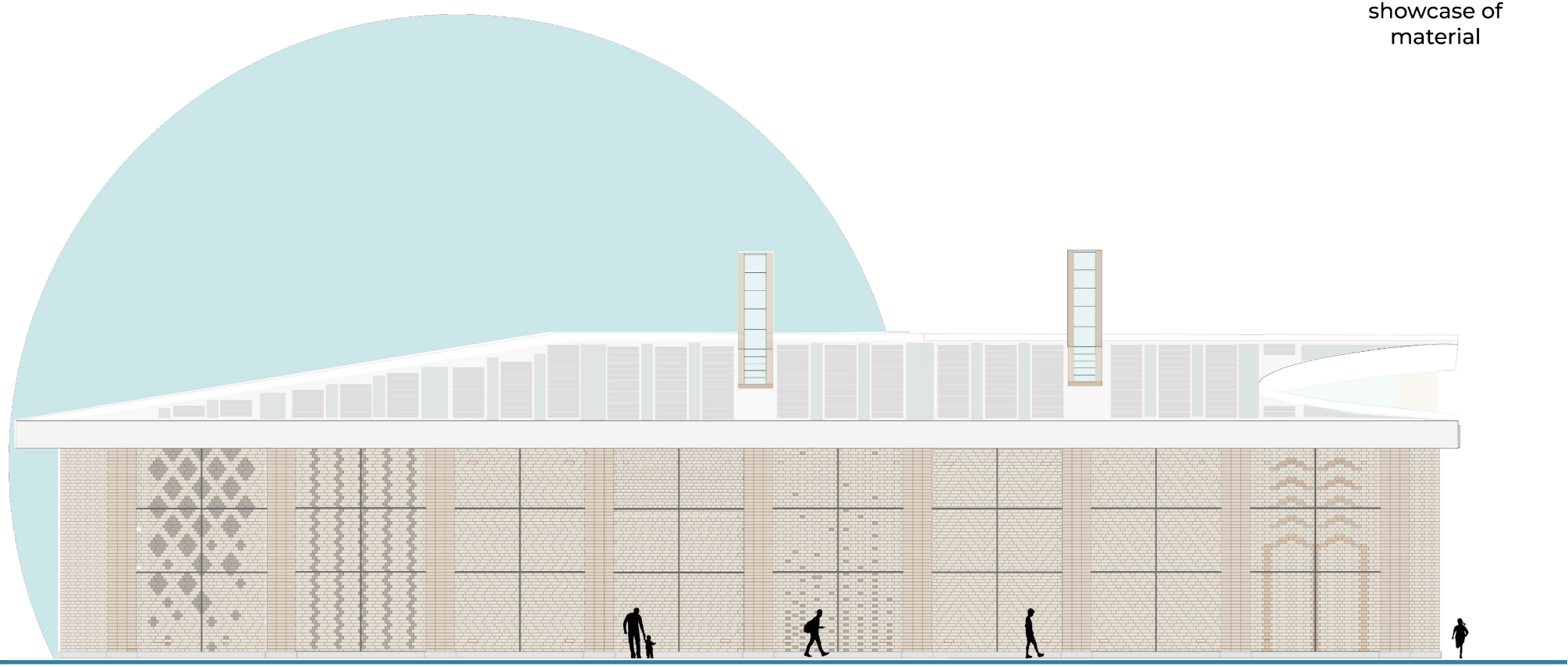
showcase of material

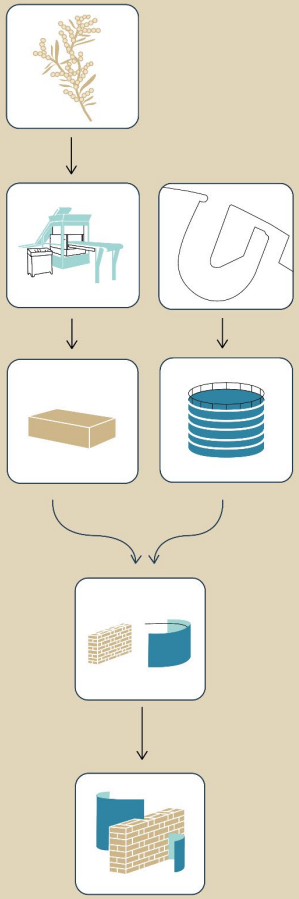


South facade

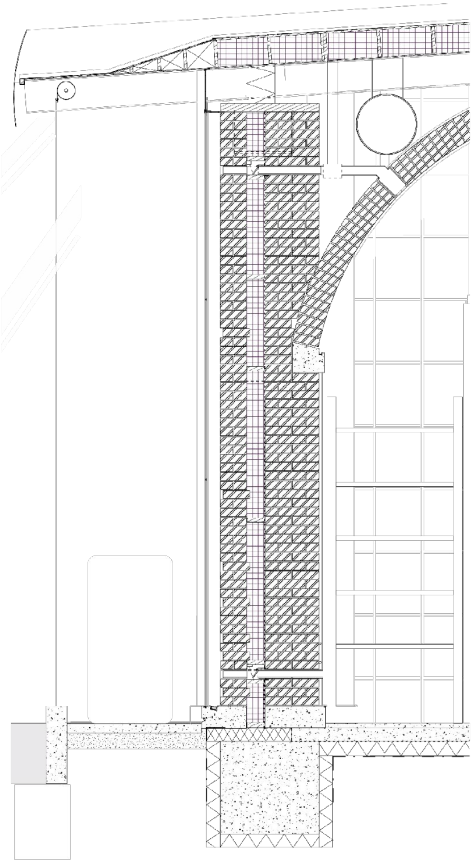


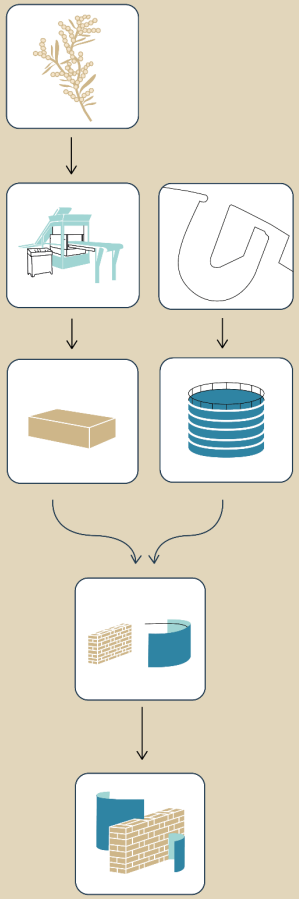
showcase of material



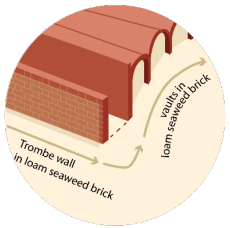


Model

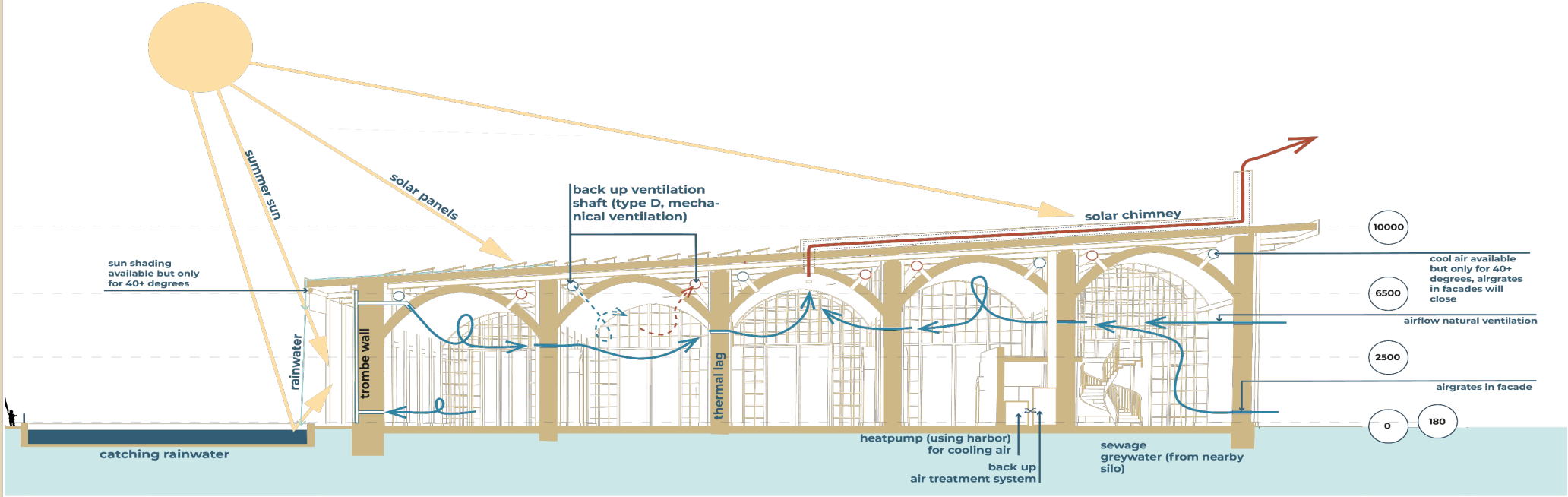


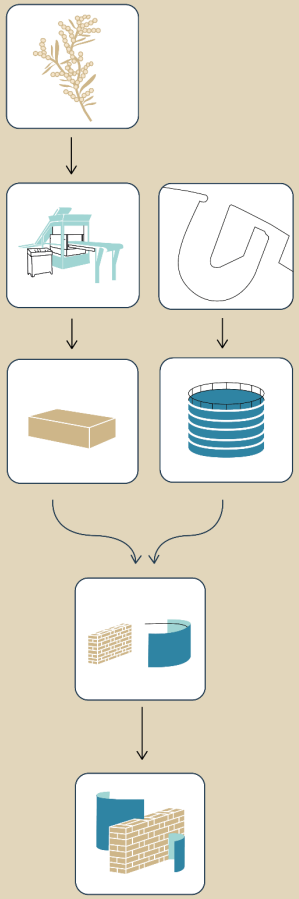


Climate concept

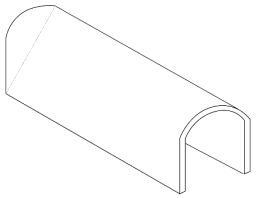


showcase of material

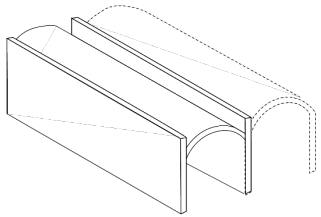




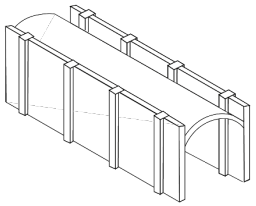
Load bearing structure



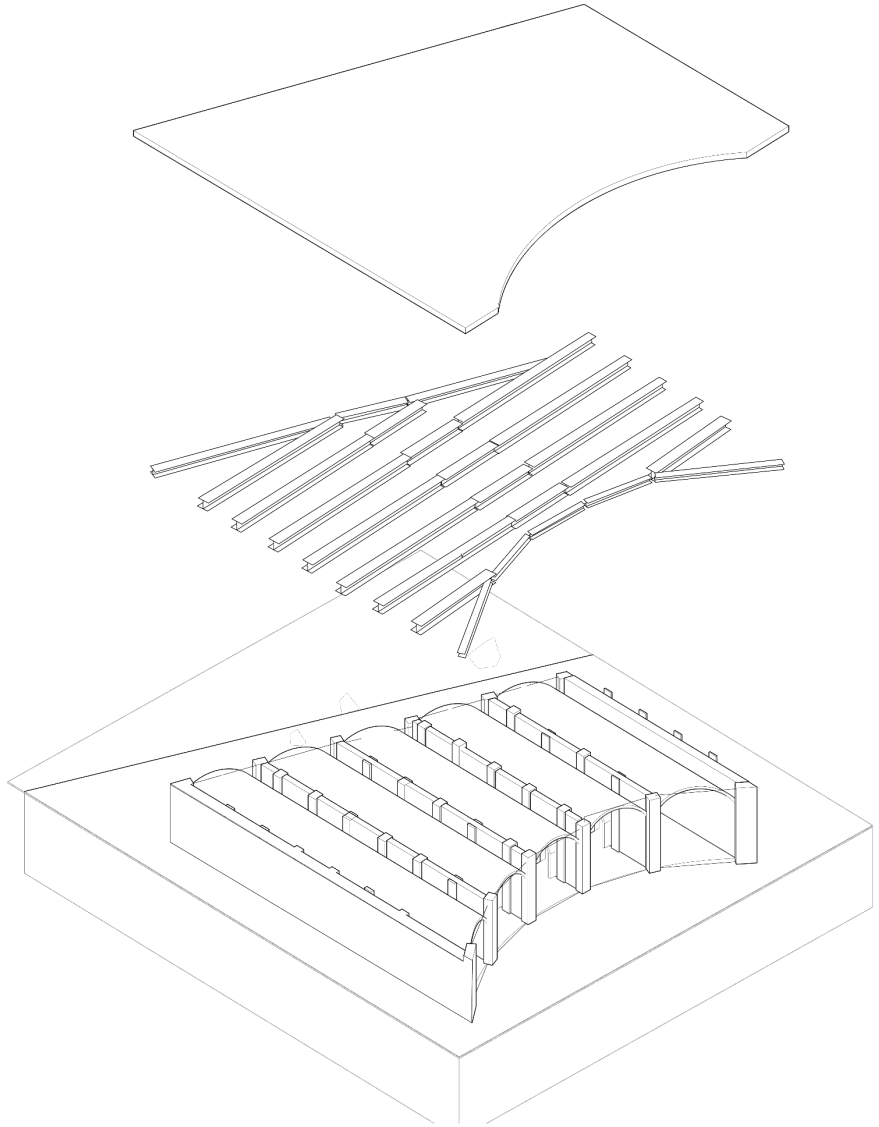
Barrel Vault, inverted catenary curve

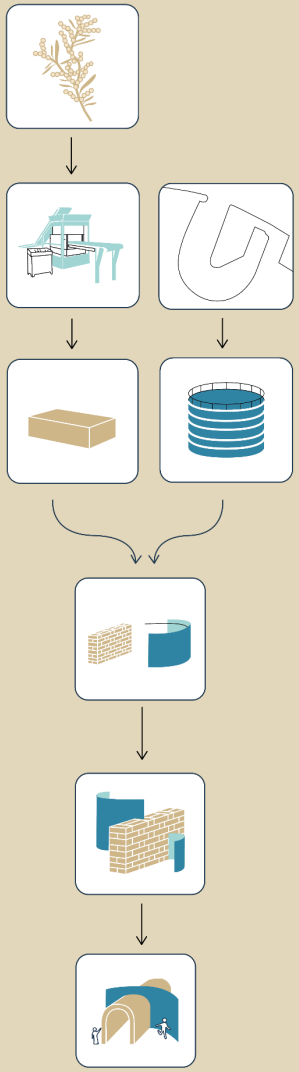


mirroring vault to neutralize horizontal load & using superimposed load



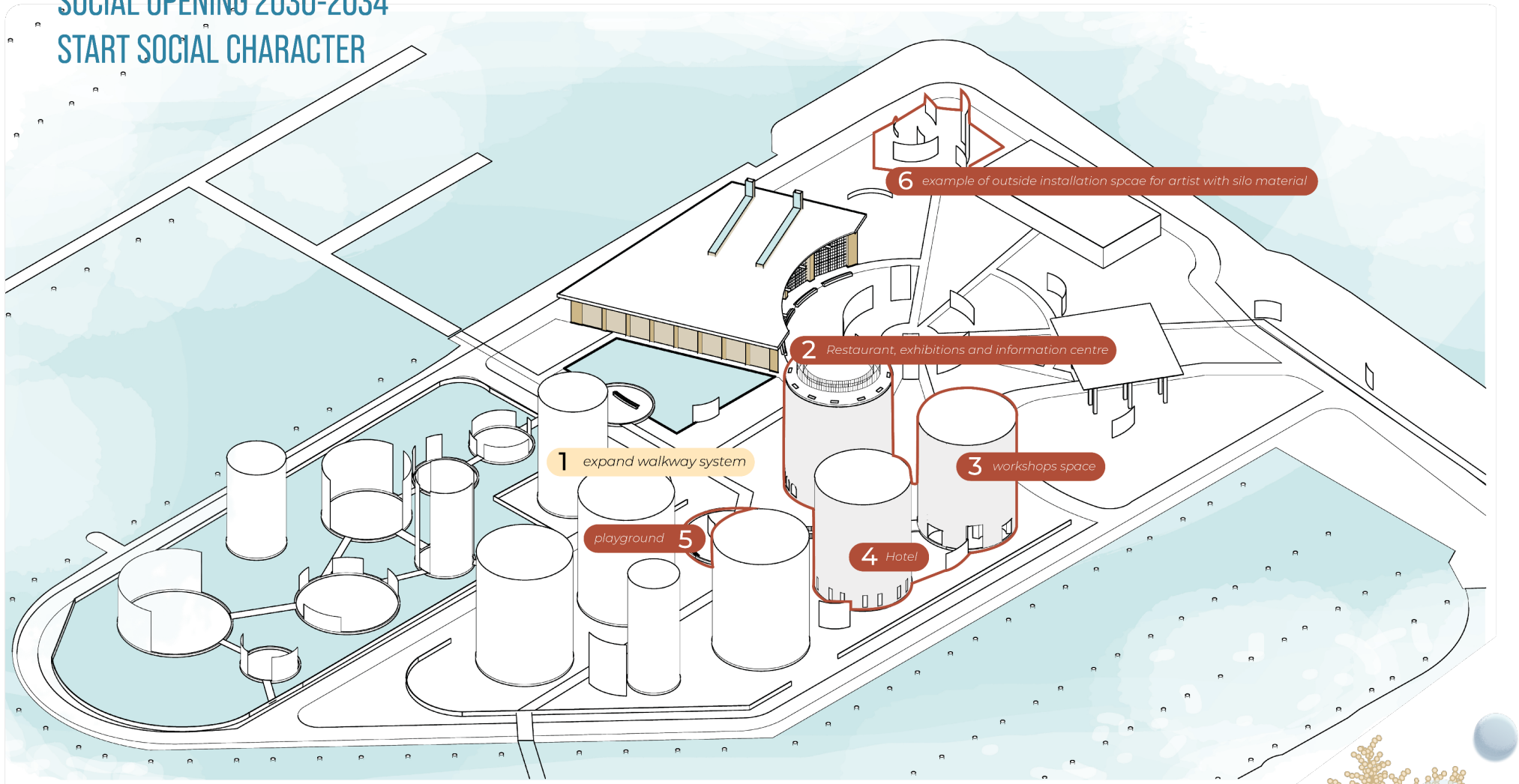
using butresses to prevent buckling when carrying roof beams

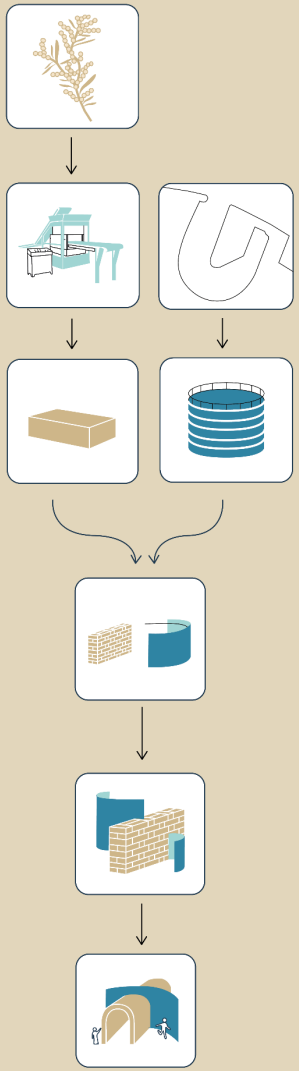




Phase 3:

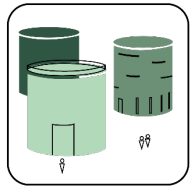
SOCIAL OPENING 2030-2034
START SOCIAL CHARACTER





Public buildings

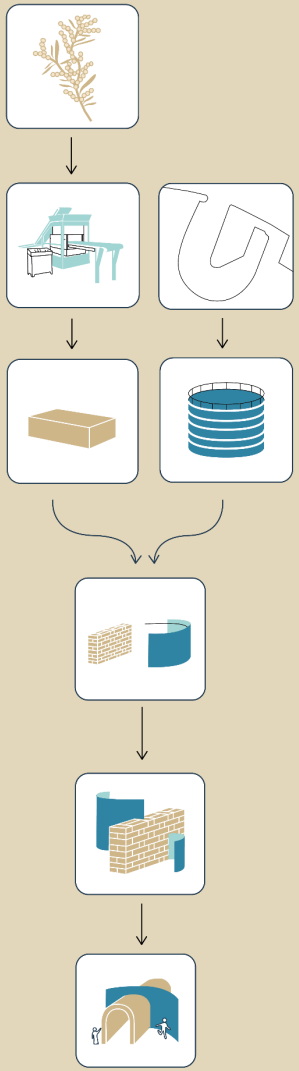
2 public space



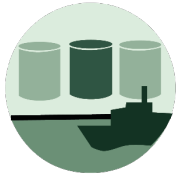
heritage of loca-
tion

housing social and
service functions

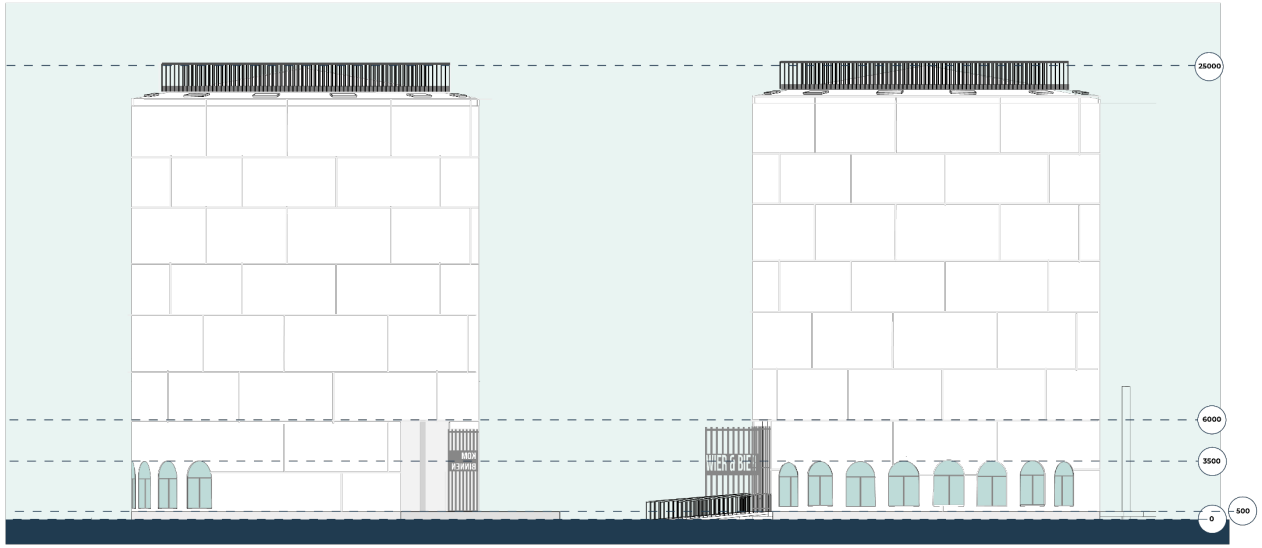
contrast old and
new materials



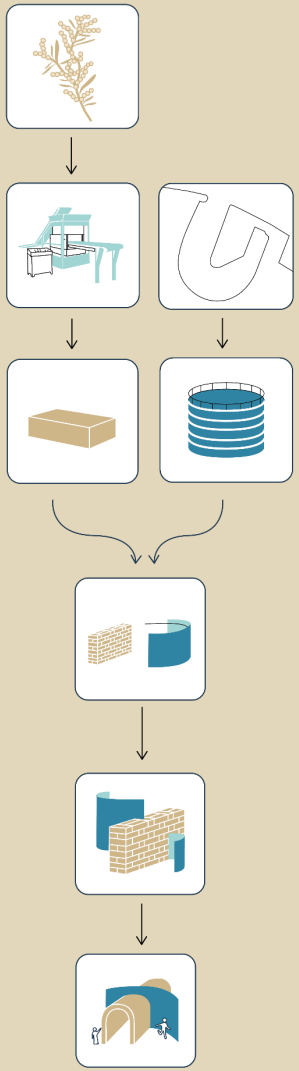
facades



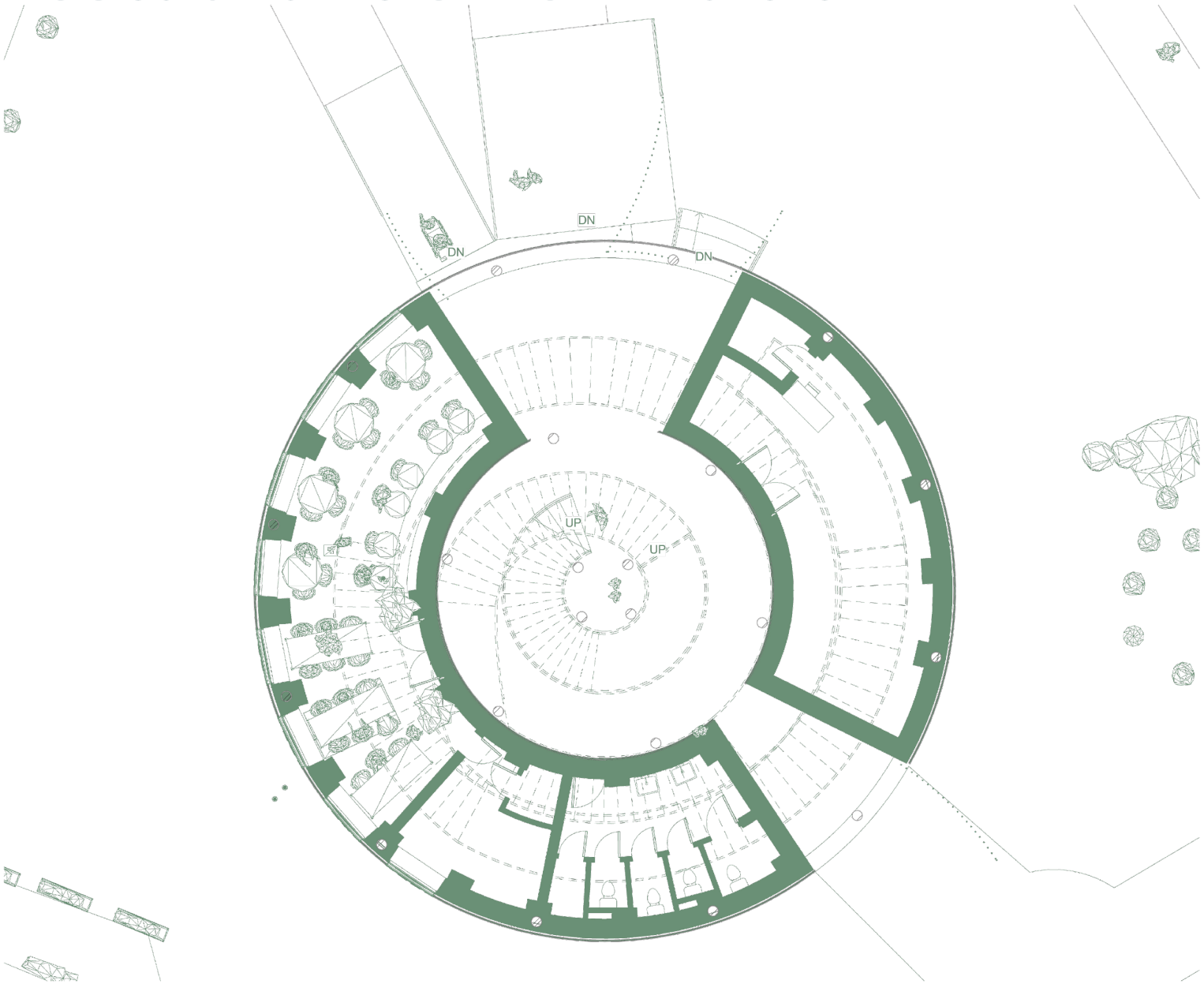
heritage of loca-
tion



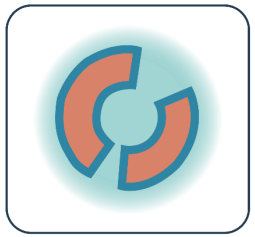

WIER & BIER
INFORMATION CENTRE



Restaurant en exhibition

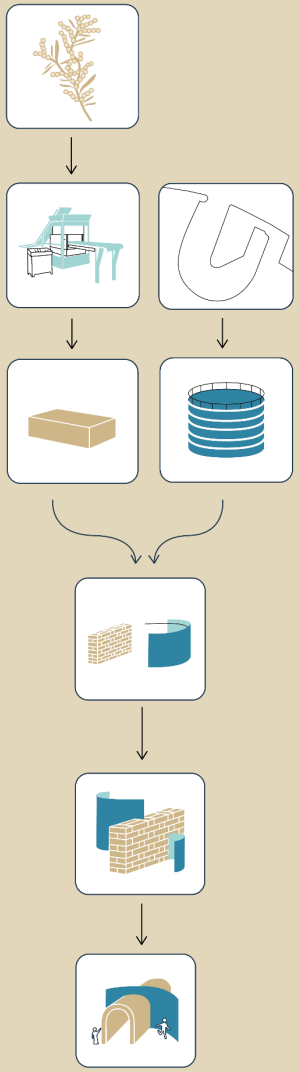


housing social and service functions

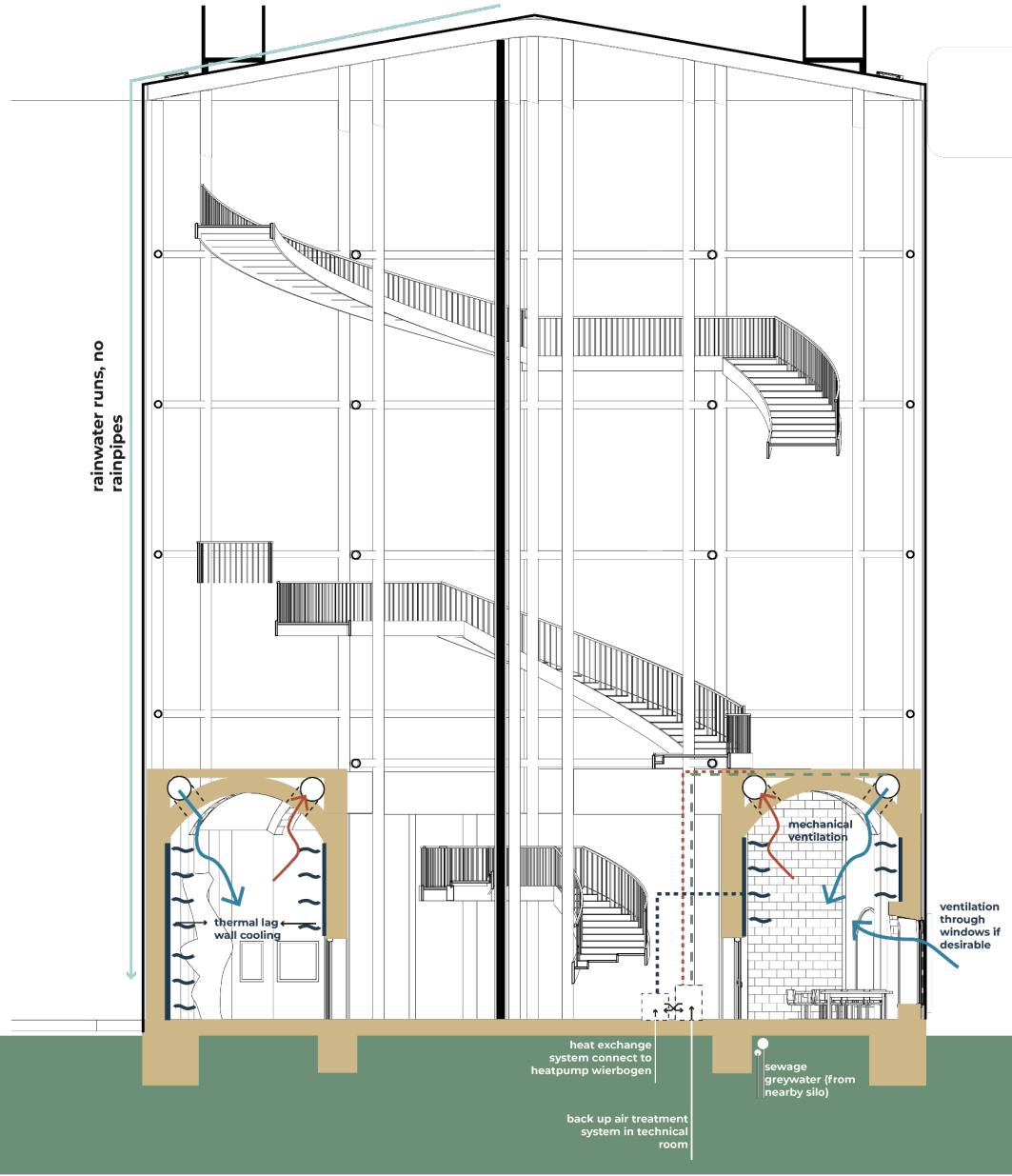


restaurant

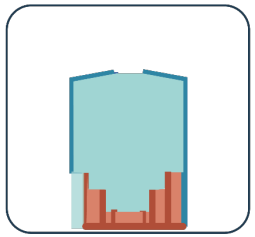
Rianne Reijnders



Section

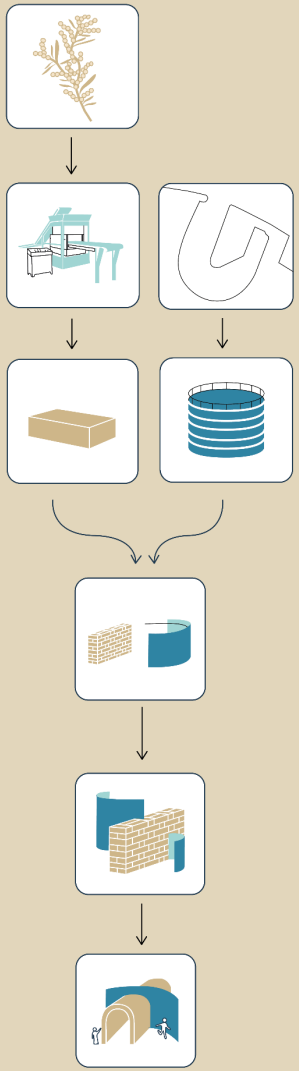


contrast old and new materials

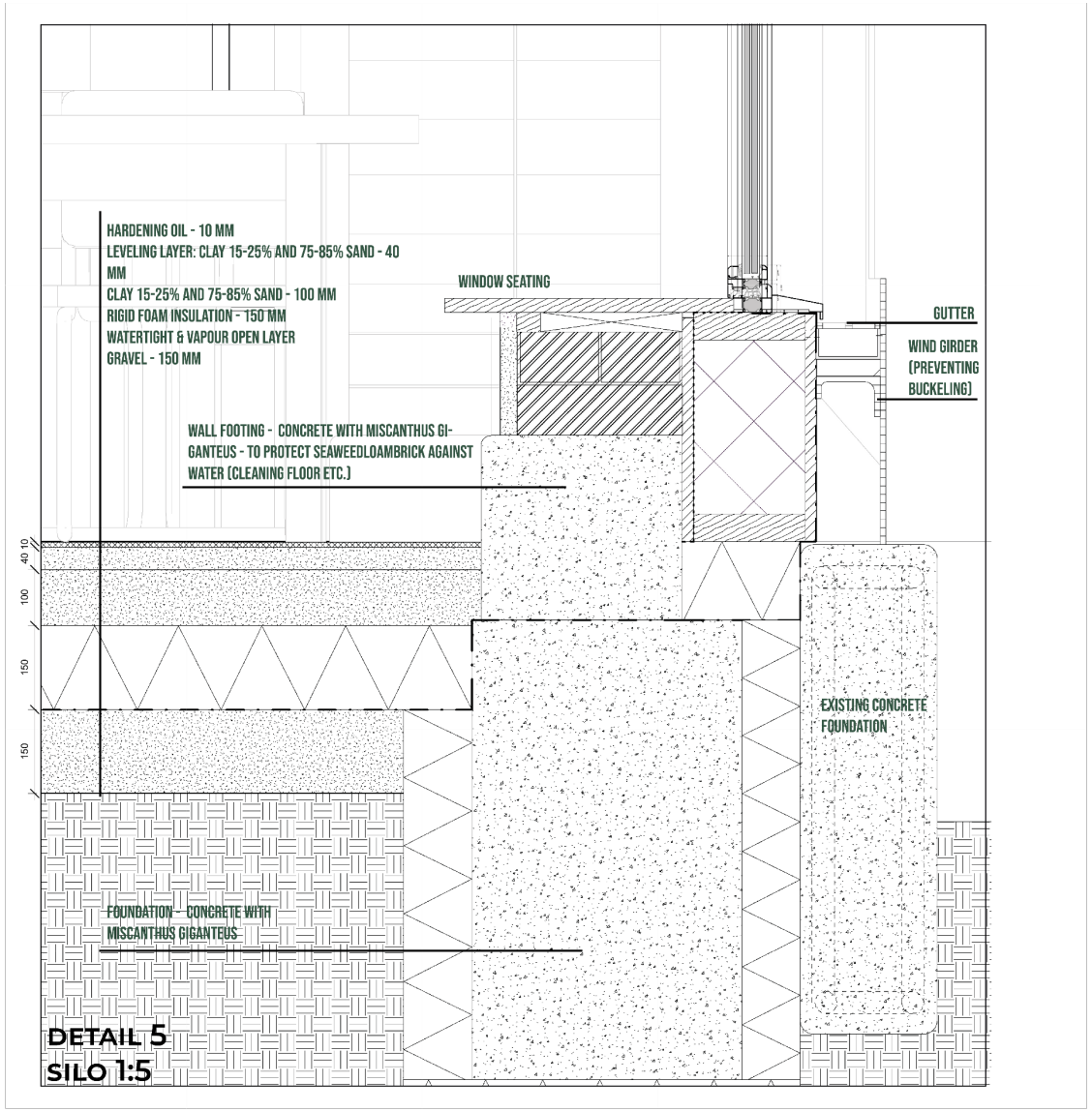


Silo

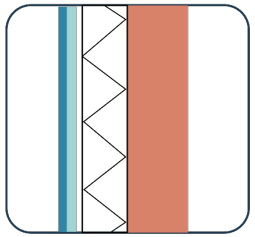
Rianne Reijnders



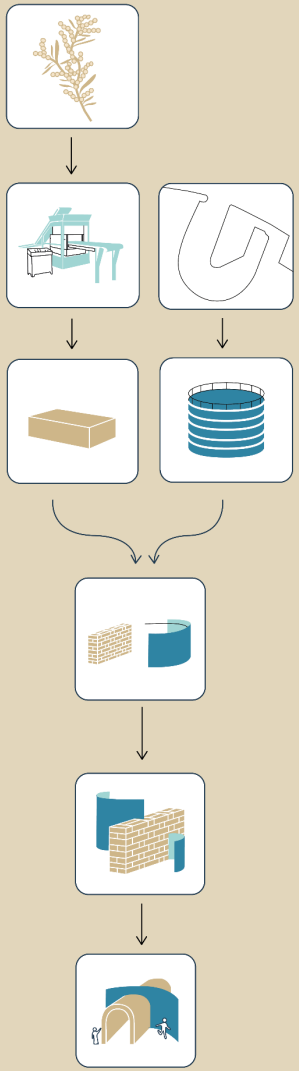
Detail window



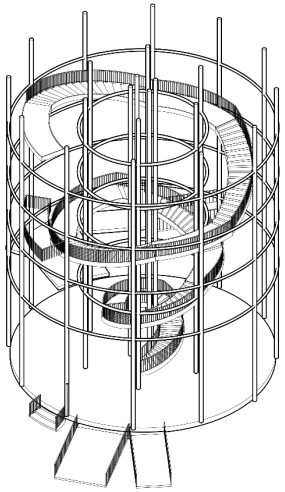
contrast old and new materials

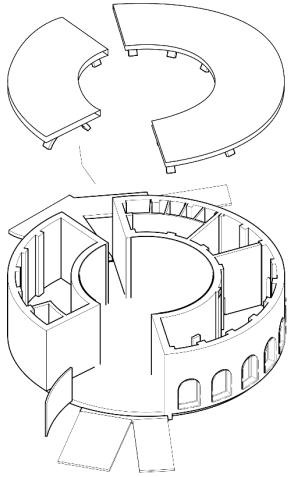


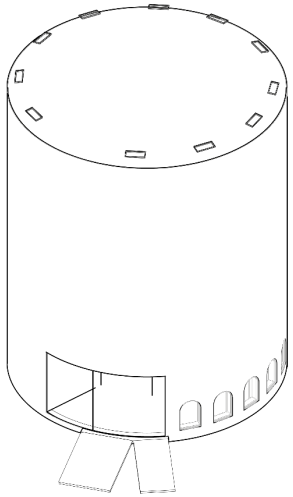
wall



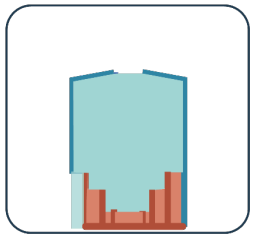
Construction Silo



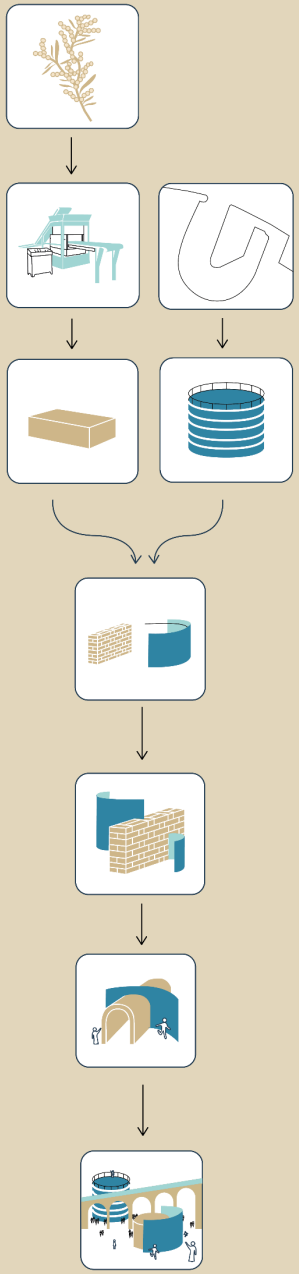




contrast old and new materials

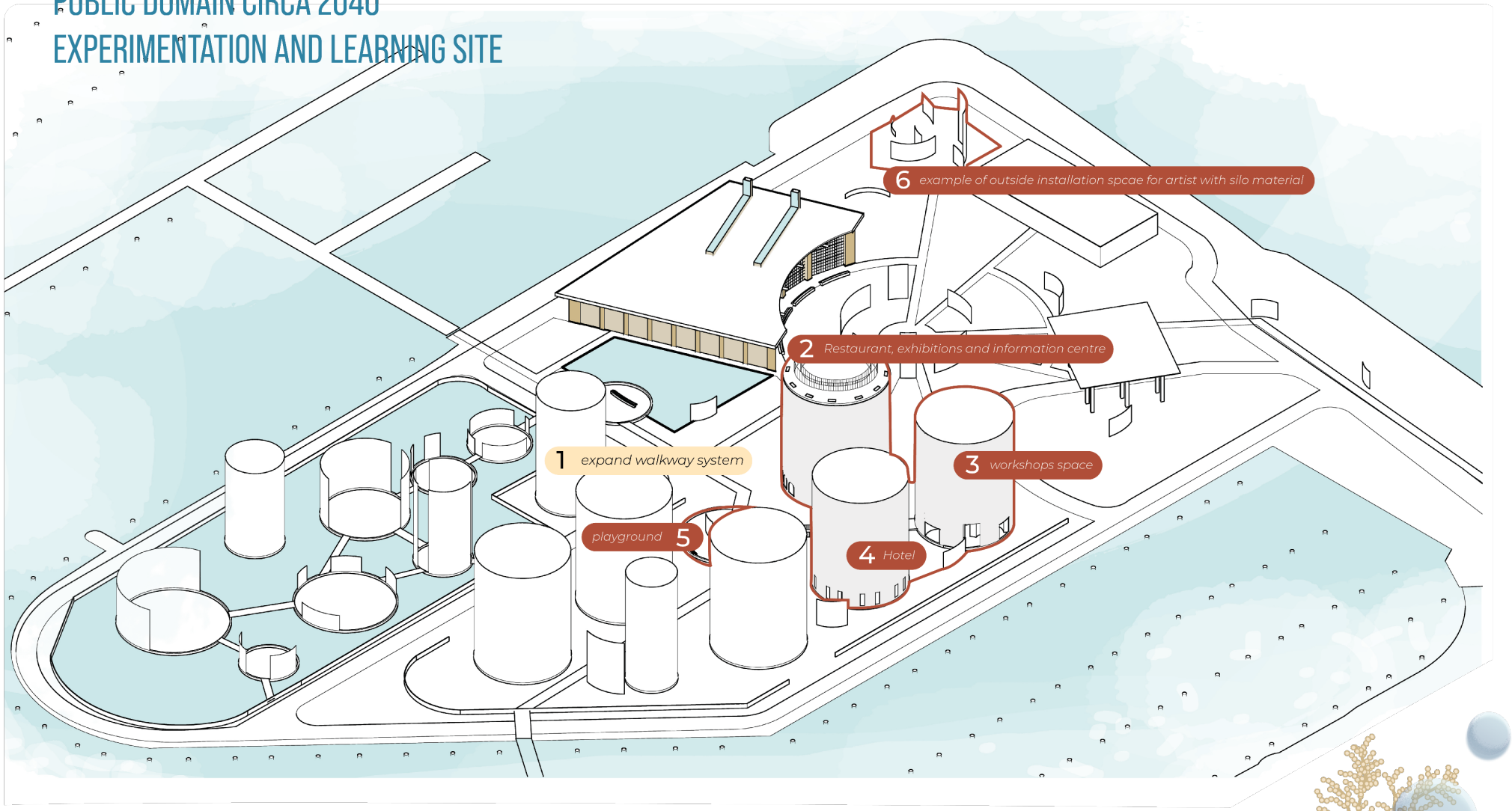


Silo



Phase 4:

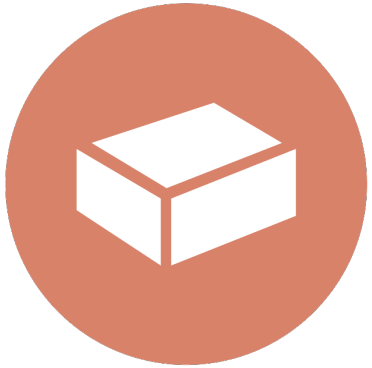
PUBLIC DOMAIN CIRCA 2040
EXPERIMENTATION AND LEARNING SITE



Rianne Reijnders

Goals

growing seaweed

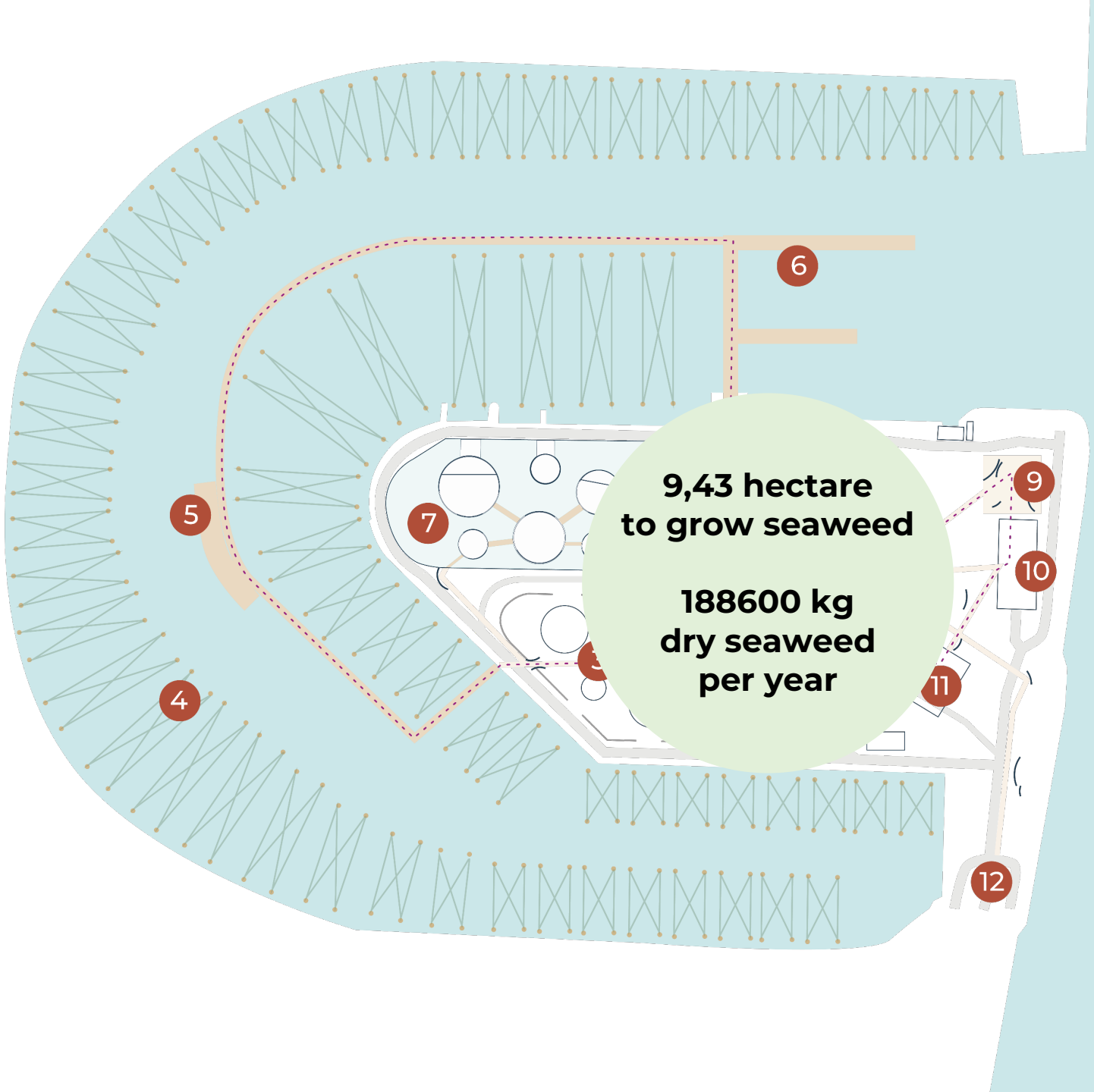


producing the seaweed building product

building with the seaweed product

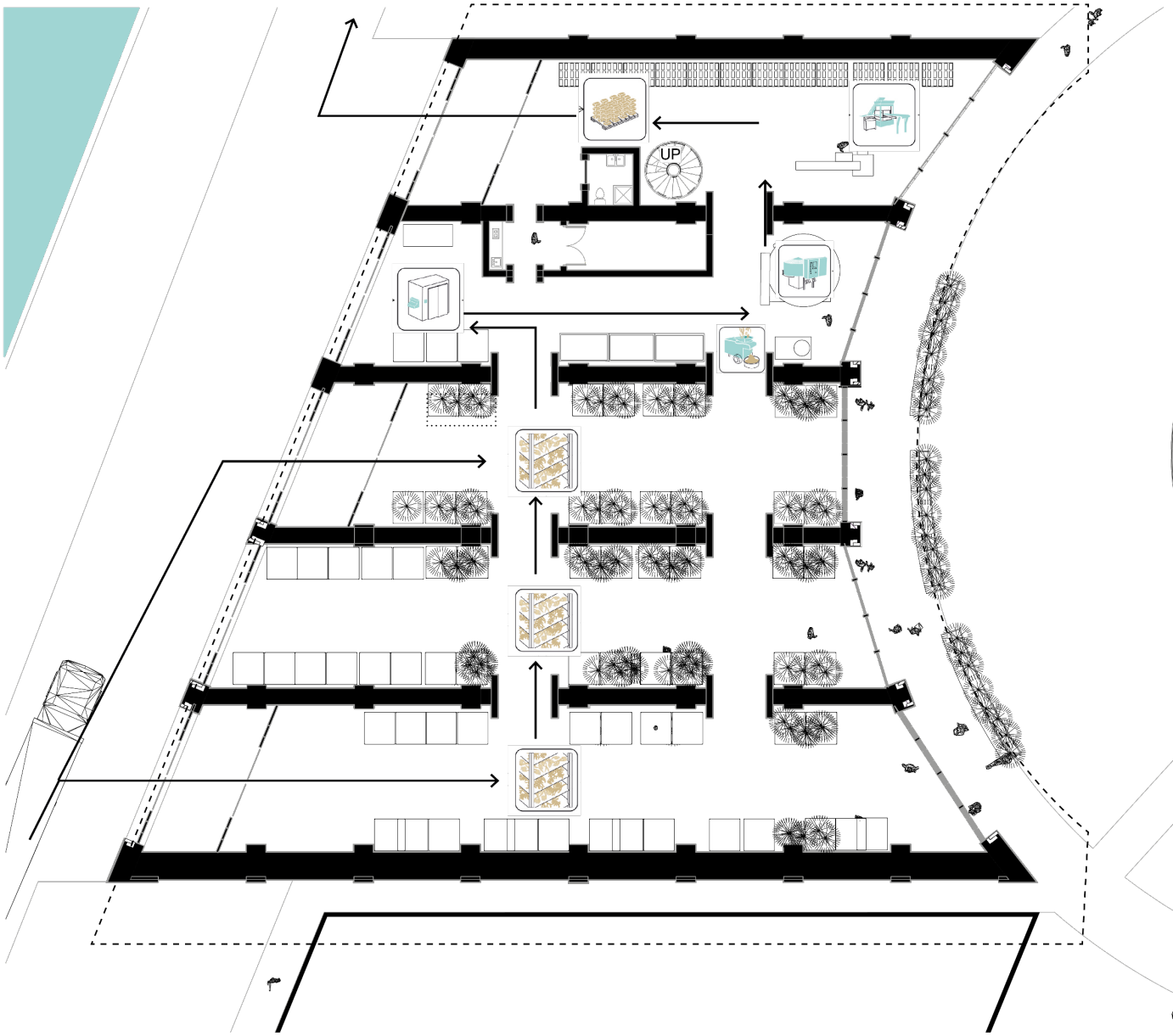
create informational experience for visitor

growing seaweed



Rianne Reijnders

producing the seaweed building product

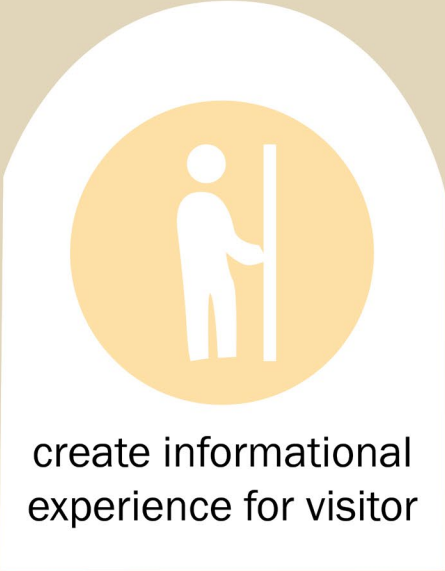


360 bricks per hour

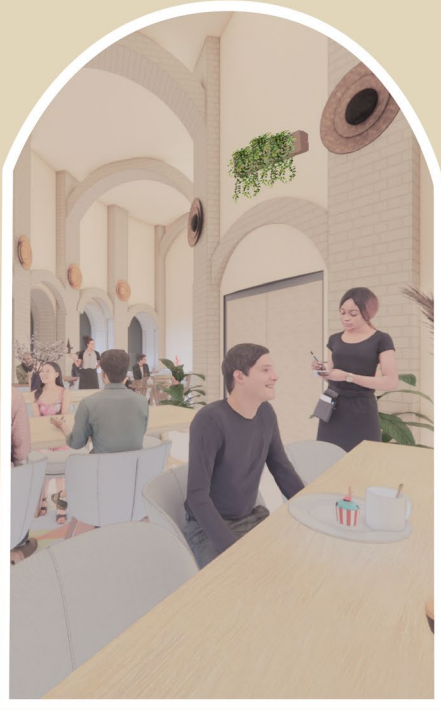
Making all the bricks for wierbogen would take 6 weeks

building with the
seaweed product

Rianne Reijnders



create informational experience for visitor



Thank you for your attention!

FEEL FREE TO LOOK AT THE POSTERS
AND MATERIALS ON THE TABLE!

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