

PRATUM HABITATS

meadow habitats - a habitat for all

Floor van Hoorn - 6095577 - advanced housing design - ecologies of including - Olv Klein - Robbert Guis

PERSONAL FASCINATION



HUMAN

VS

BIODIVERSITY

“WHY WE ACTUALLY NEED TWO EARTHS”

“ALL SORTS OF PLANTS AND ANIMALS ARE DISAPPEARING: ‘WE REALLY HAVE NO IDEA’”

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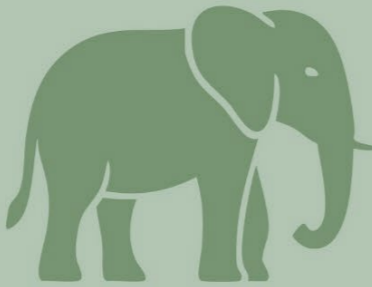
“THE NETHERLANDS LEADS THE WAY IN BIODIVERSITY LOSS; ‘THE STATE OF NATURE IS ALARMING’”

SPECIES DECLINE

Over the past 50 years



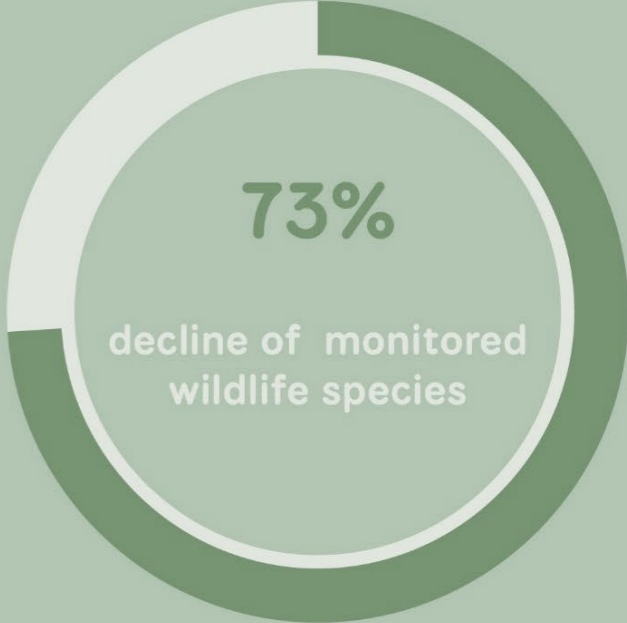
-85%
freshwater species



-69%
terrestrial species



-56%
marine species



decline of species (F. van Hoorn, 2026)

Data from WWF (2024)
Floor van Hoorn - 6095577

TIPPING POINTS



Mass extinction of coral reef

destruction of fisheries and the loss of coastal protection against storms



Death of the Amazon rainforest

would result in the release of CO2, changing weather patterns worldwide



Collapse sub polar gyre

would disrupt weather patterns in Europe and North America

Figure 13: decline of species (F. van Hoorn, 2026)

REGULATIONS

“Toch geen verplicht nestkastje voor huismus, vleermuis en gierzwaluw in nieuwbouw”

(NOS Nieuws, 2024)



REGULATIONS



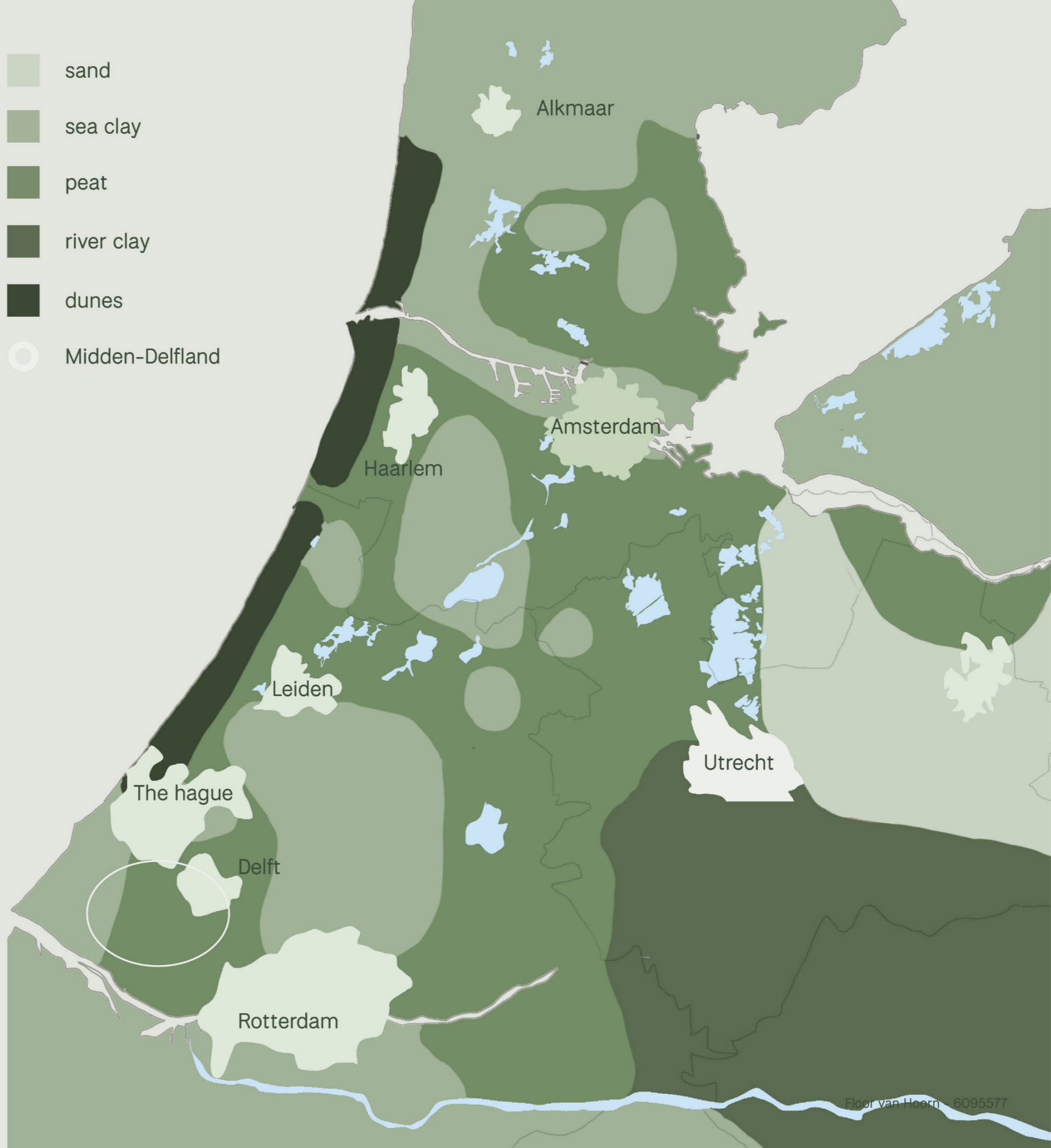
GOAL

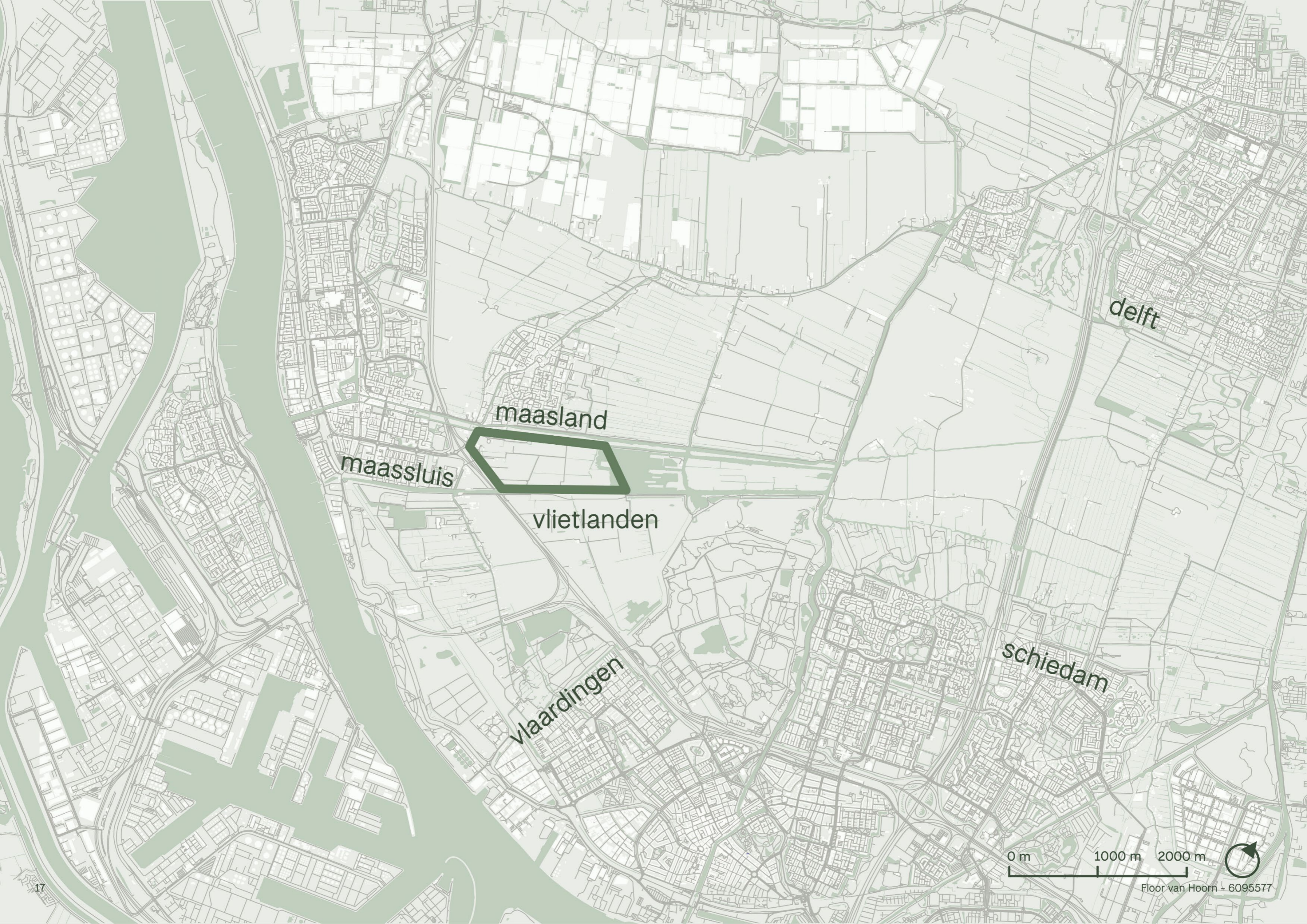
The goal of Pratum Habitats is to ensure that nature is not overlooked in the design process. The aim is to incorporate biodiversity into the design process from the outset, creating harmony between nature and humans.



LOCATION

- sand
- sea clay
- peat
- river clay
- dunes
- Midden-Delfland





delft

maasland

maassluis

vlietlanden

vlaardingen

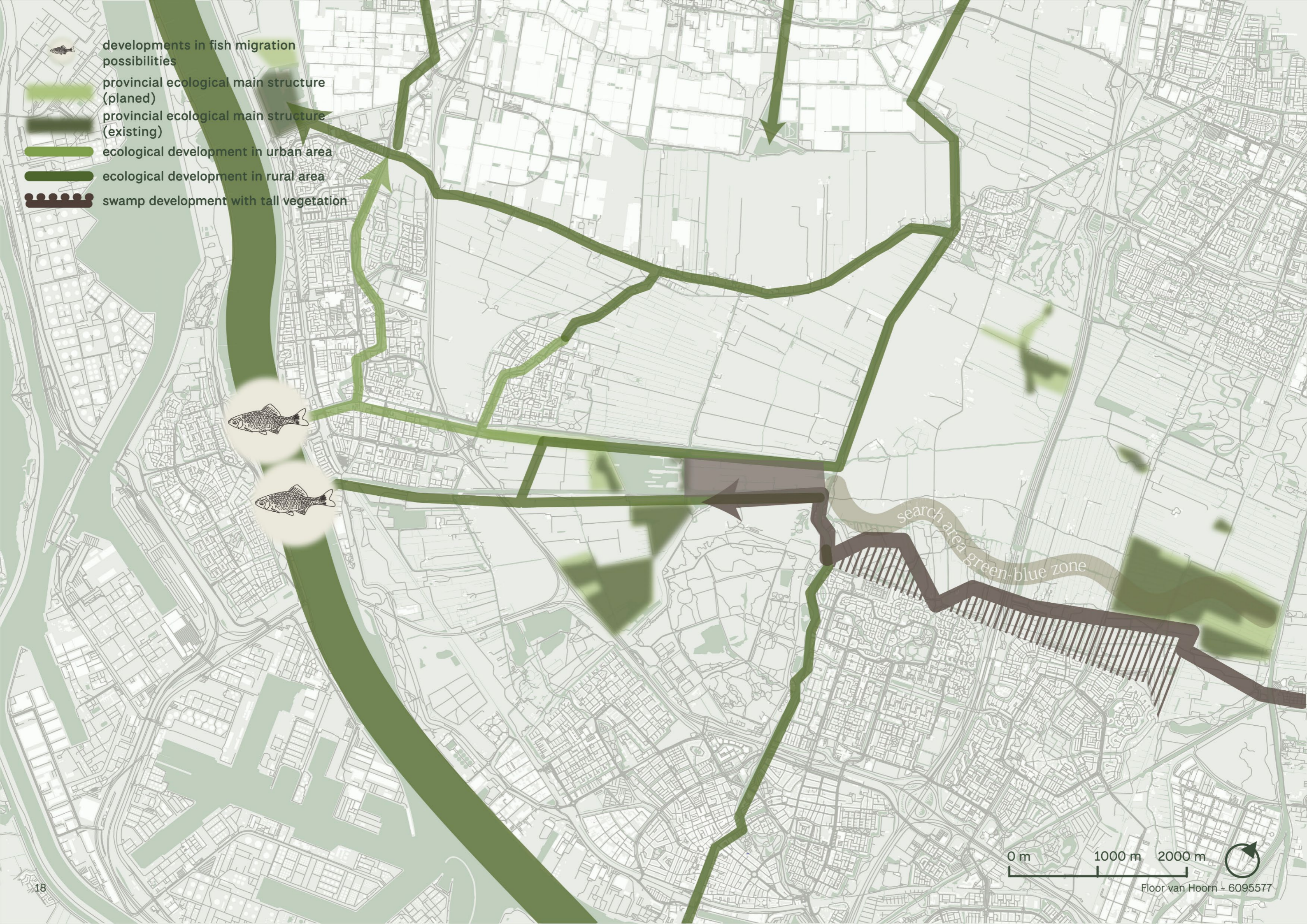
schiedam

0 m 1000 m 2000 m



Floor van Hoorn - 6095577










-  developments in fish migration possibilities
-  provincial ecological main structure (planned)
-  provincial ecological main structure (existing)
-  ecological development in urban area
-  ecological development in rural area
-  swamp development with tall vegetation











search area green-blue zone

0 m 1000 m 2000 m

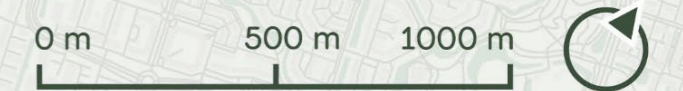


-  search area waterbuffer
-  possibility development panorama view
-  search area new pumping station
-  marshland on the east side with wet grasslands and reed vegetation; high ecological value
-  important meadow bird area
-  kano routes on the east and north boezems
-  new marina
-  gate of Middle Delfland
-  preserving and strengthening (dairy) livestock farming

-  open water
-  PEHS, existing and planned
-  water buffer
-  possible black-tailed godwit breeding sites
-  sight lines
-  cultural-historical value
-  indication development walking paths
-  development waterconnections
-  ecological connection zone
-  development bike paths



SCALE 1:16.000



bee species per hectare

- 30-50 per ha
- 50-70 per ha
- 70-100 per ha
- ≥ 100 per ha






SCALE 1:16.000



(F. van Hoorn, 2026.)
Adapted from (Nationaal georegister, 2025)
Floor van Hoorn - 6095577

species diversity

-  301-400 species
-  401-500 species
-  501-600 species
-  601-700 species
-  700+ species



SCALE 1:16.000

0 m 500 m 1000 m



(F. van Hoorn, 2026.)

Adapted from (Nationaal georegister, 2017)
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pesticide toxicity

- no toxicity
- minor toxicity
- high toxicity
- very high toxicity



SCALE 1:16.000

0 m 500 m 1000 m



(F. van Hoorn, 2026.)
Adapted from (Nationaal georegister, 2021)
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toxicity of all substances

- no toxicity
- minor toxicity
- moderate toxicity
- high toxicity
- very high toxicity



SCALE 1:16.000

0 m 500 m 1000 m



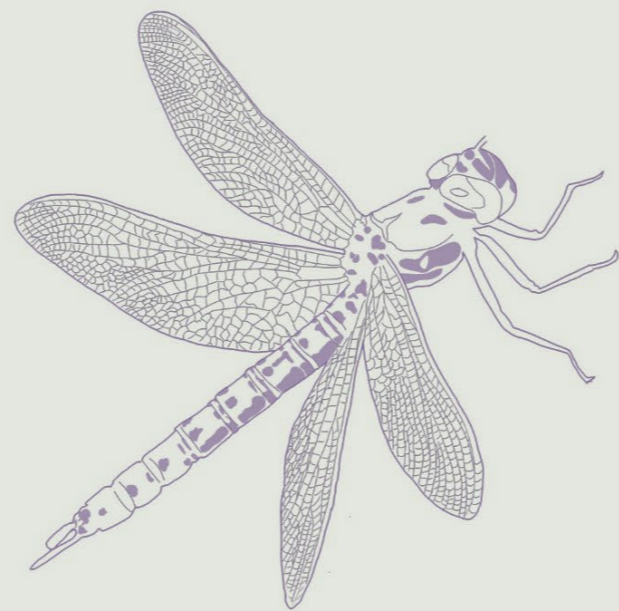
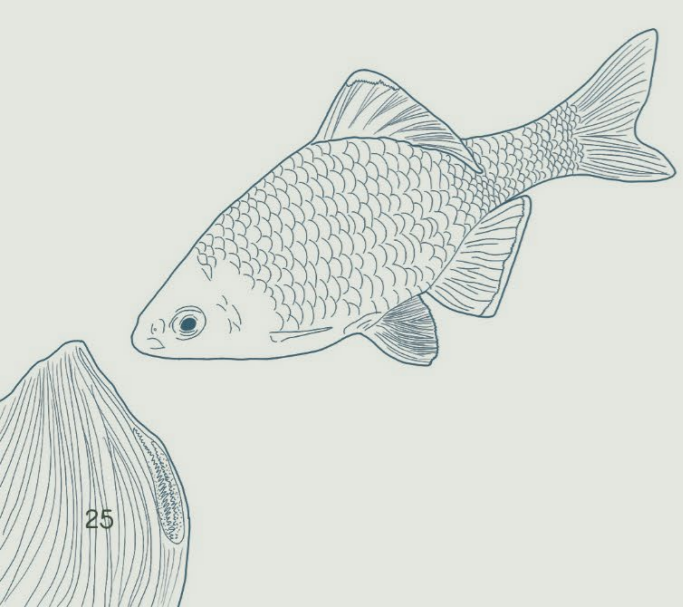
(F. van Hoorn, 2026.)
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- Boezembuffer; mainly waterstorage and reeds
- Boezem
- Peetlands: new forms of natural farming, wet fields zem
- Peet+clay lands: natural reserves, wetlands for birds
- Claylands: woodproduction, fruitpicking forests
- Dike around lower parts of the existing urban areas
- Urban area's
- Public transport nodes
- Designated areas for urban densification and waterbuffer within the city
- Boezem as a green blue

BUT WHAT ABOUT US?

WE where here first

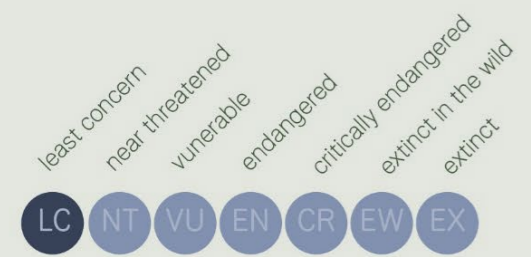


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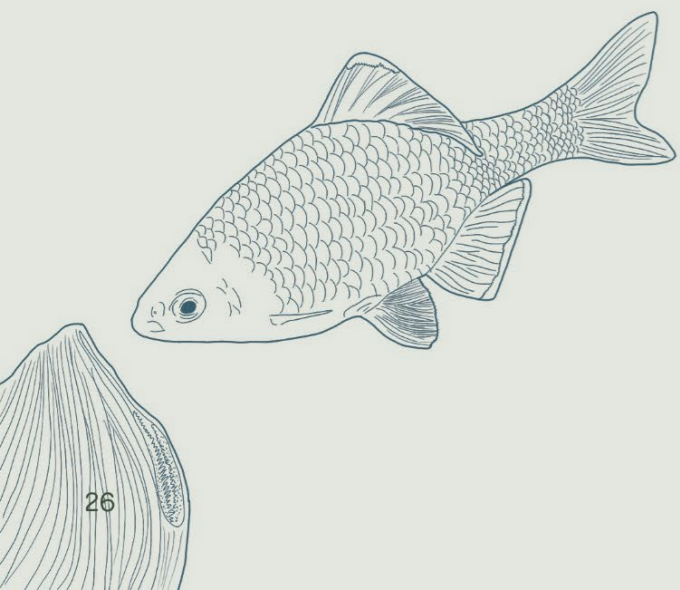
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Bitterling

Rhodeus amarus



population trend - increasing



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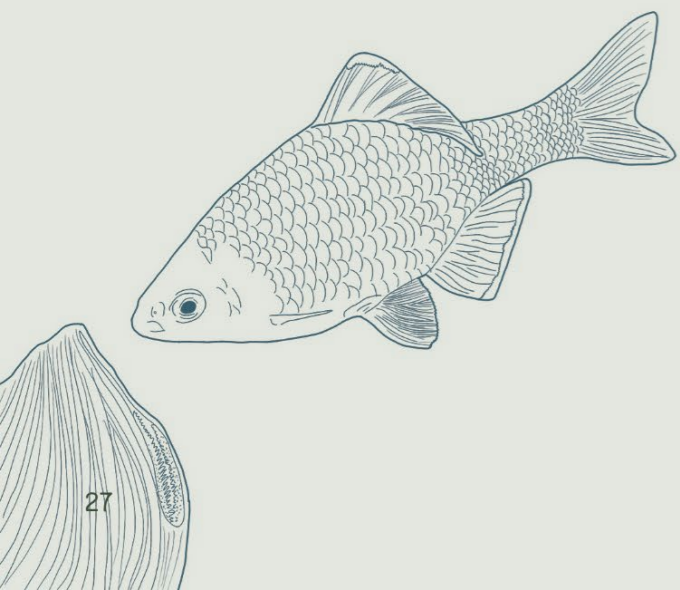
population trend - increasing

natterjack toad

Epidalea calamita



population trend - decreasing

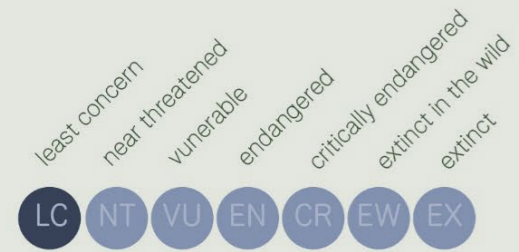


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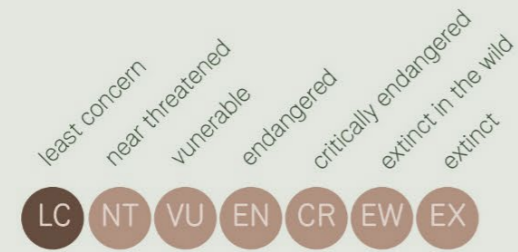
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natterjack toad

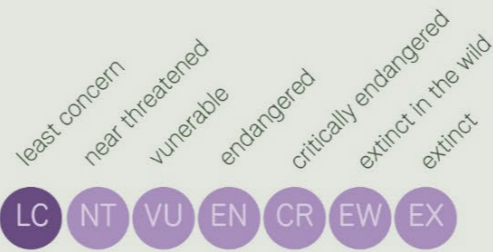
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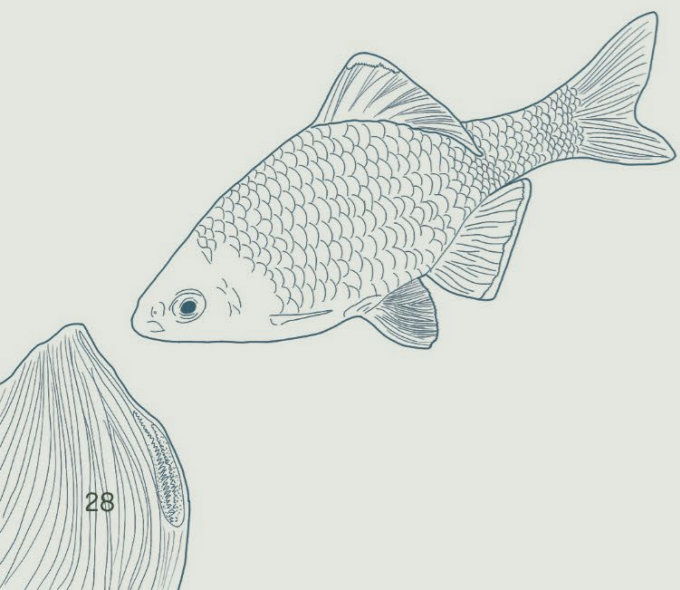
population trend - decreasing

Hairy dragonfly

Brachytron pratense



population trend - stable

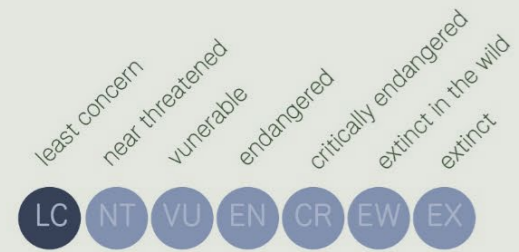


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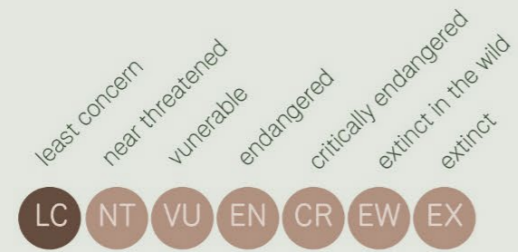
Rhodeus amarus



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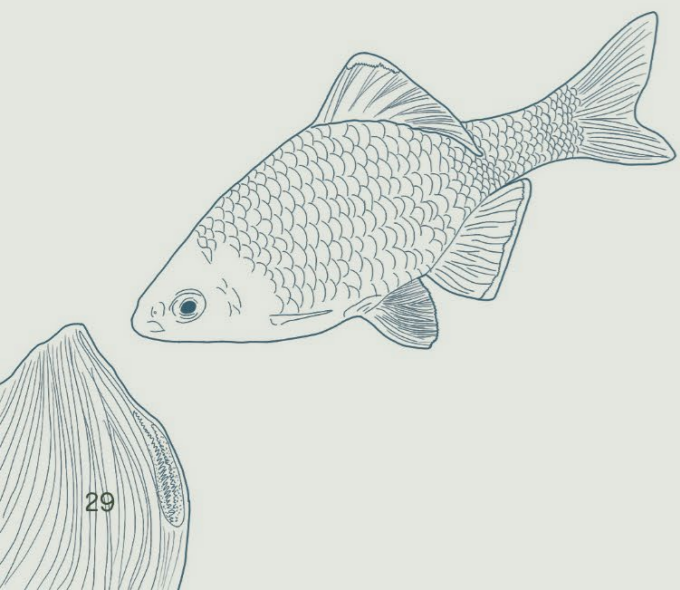
population trend - stable

early bumblebee

Bombus pratorum



population trend - stable

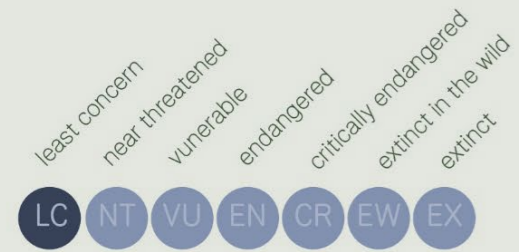


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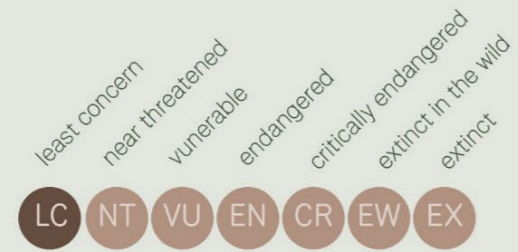
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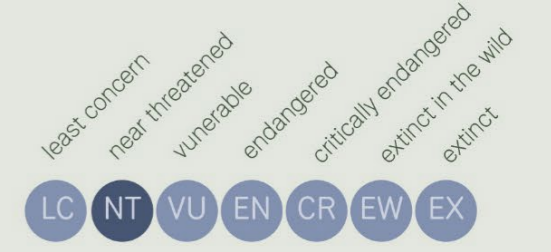
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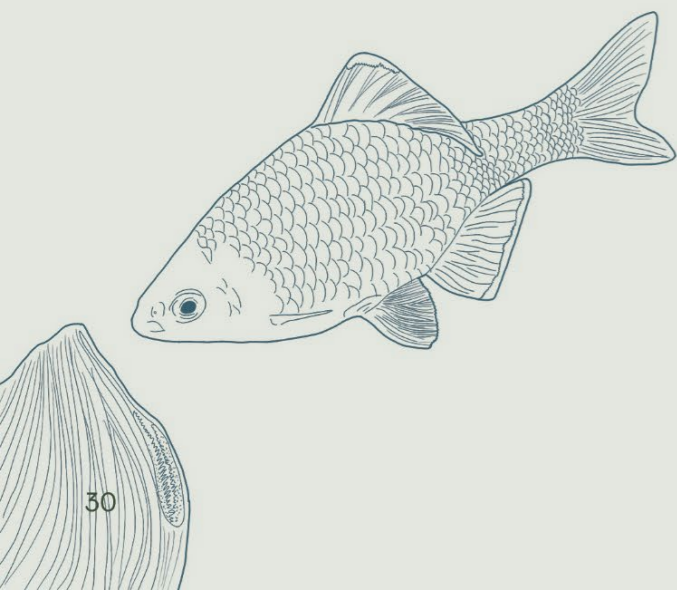
population trend - stable

black-tailed godwit

Limosa limosa



population trend - decreasing



RESEARCH QUESTION

How can architectural design principles be created to promote biodiversity in Midden-Delfland while looking at the Small five, while recognizing that different species respond differently to different densities?



BITTERLING

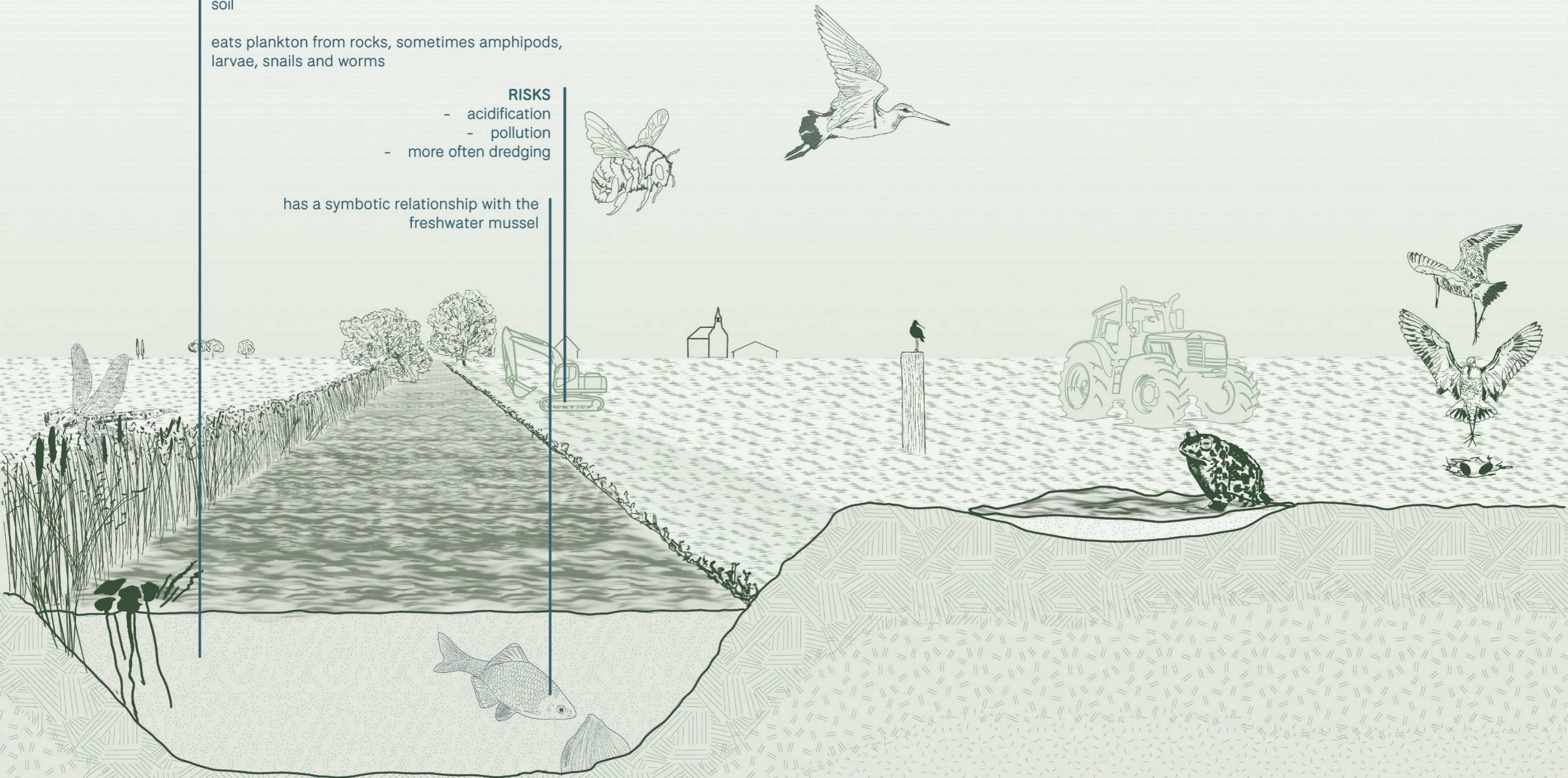
stationary or slow flowing clear water, relatively undep water witch rich underwater vegetation and not too soft soil

eats plankton from rocks, sometimes amphipods, larvae, snails and worms

RISKS

- acidification
- pollution
- more often dredging

has a symbiotic relationship with the freshwater mussel



NATTERJACK TOAD

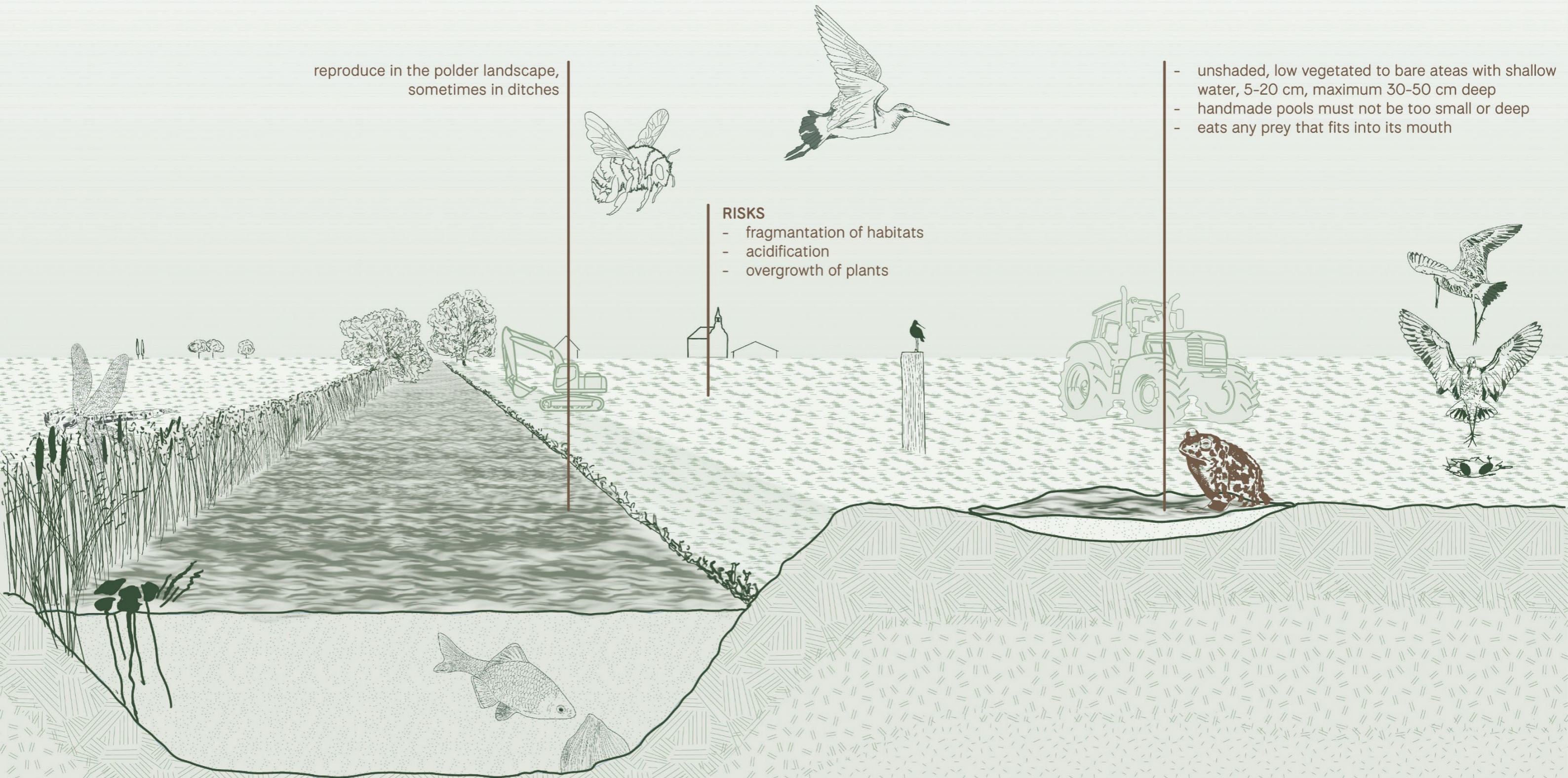
reproduce in the polder landscape,
sometimes in ditches



RISKS

- fragmentation of habitats
- acidification
- overgrowth of plants

- unshaded, low vegetated to bare areas with shallow water, 5-20 cm, maximum 30-50 cm deep
- handmade pools must not be too small or deep
- eats any prey that fits into its mouth



HAIRY DRAGONFLY

- waters < 10 m wide
- clear, moderately nutrient poor - nutrient rich
- eggs in waterlogged plants, larvae live around the roots
- feeds on small insects: midges, mosquitos, gnats and more

- bur reed - *Sparganium erectum*
- cattail - *Typha angustifolia*
- common club-rush - *Scirpus lacustris* L.
- wood club-rush - *Scirpus sylvaticus*
- sea club-rush - *Bolboschoenus maritimus*
- marsh fern - *Thelypteris palustris*
- reed - *Phragmites australis*
- common bladderwort - *Utricularia vulgaris*
- floating-leaf pondweed - *Potamogeton natans*
- crisp-leaved pondweed - *Potamogeton crispus*
- perfoliate pondweed - *Potamogeton perfoliatus*
- shining pondweed - *Potamogeton lucens*

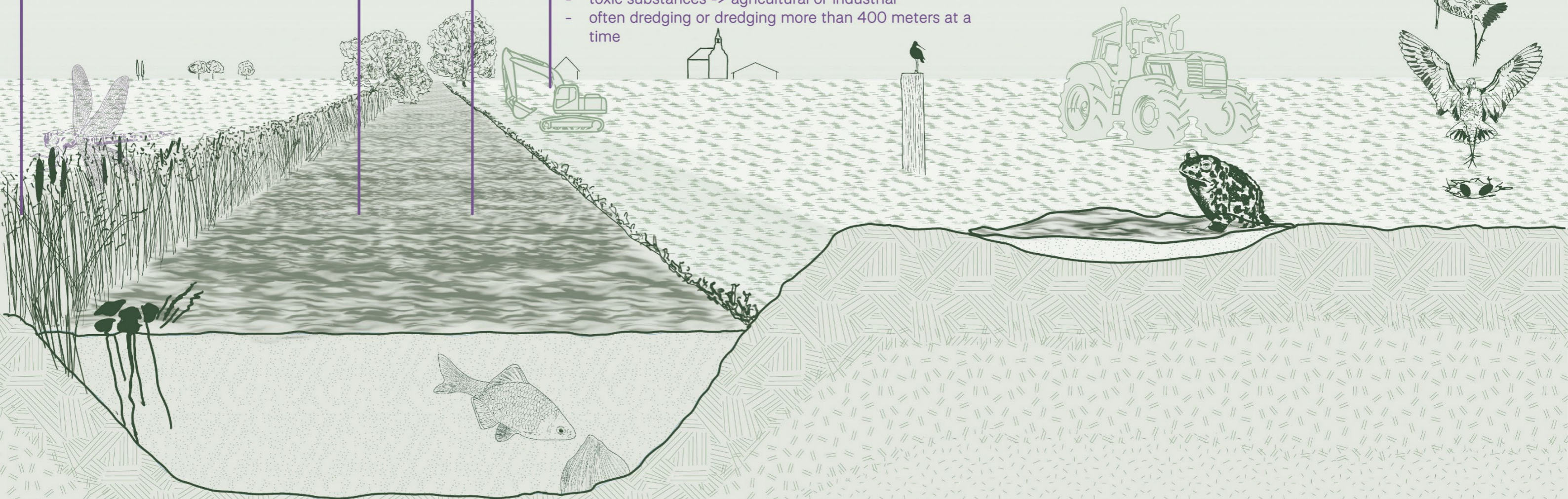
RISK

- lack of oxygen and waterplants
- lack of sunny sheltered spaces



RISKS

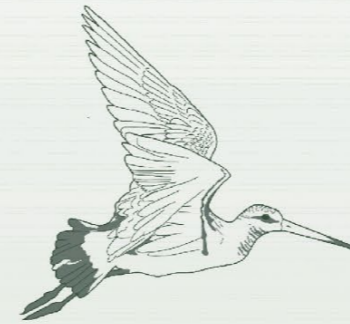
- toxic substances -> agricultural or industrial
- often dredging or dredging more than 400 meters at a time



EARLY BUMBLEBEE

- common figwort - *Scrophularia nodosa*
- heal all - *Prunella vulgaris*
- common comfrey - *Symphytum officinale*
- ground ivy - *Glechoma hederacea*
- red clover - *Trifolium pratense*
- red-flowering current - *Ribes sanguineum*
- fire weed - *Chamaenerion angustifolium*
- silver birch - *Betula pendula*
- basket willow - *Salix viminalis*
- dewberry - *Rubus caesius*
- blueberry - *Vaccinium myrtillus*
- blackberry - *Rubus fruticosus*

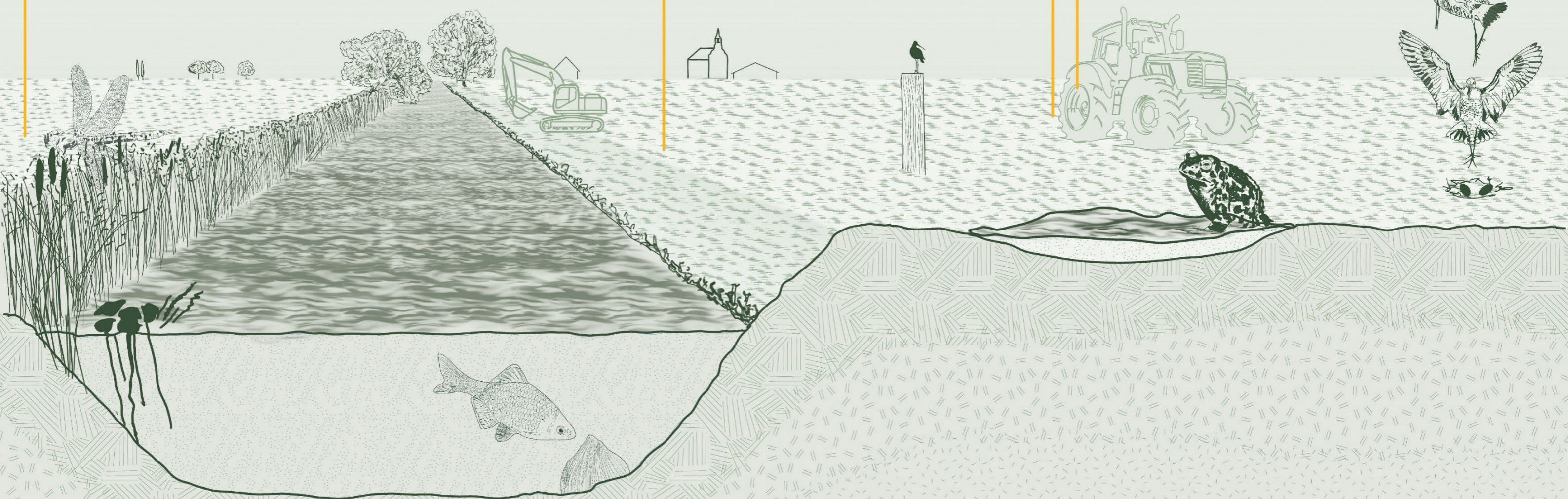
preference to blue and purple flowers, blue elements can help them find nests



It nests in old animal burrows or in the cavities of walls. It hibernates in dark, dry and cool places, such as north or west-facing slopes.

RISKS

- fertilizers and pesticides from agriculture
- lack of variety in landscape
- often mowing



BLACK-TAILED GODWIT

peat meadows, preferably extensive landscapes with higher vegetation

mostly eat soil animals, rainworms, leatherjackets, moscito larvae



RISKS

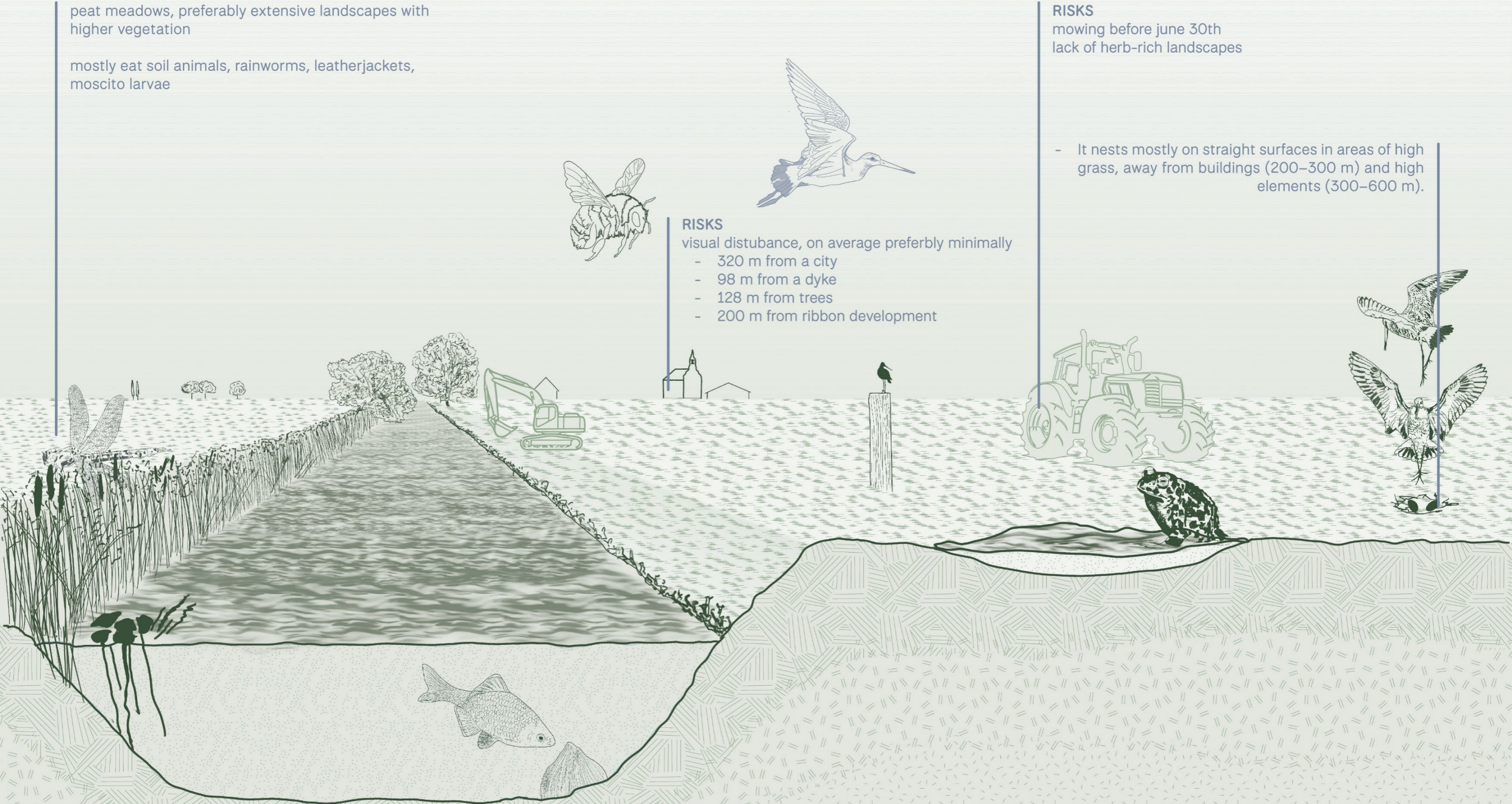
visual disturbance, on average preferably minimally

- 320 m from a city
- 98 m from a dyke
- 128 m from trees
- 200 m from ribbon development

RISKS

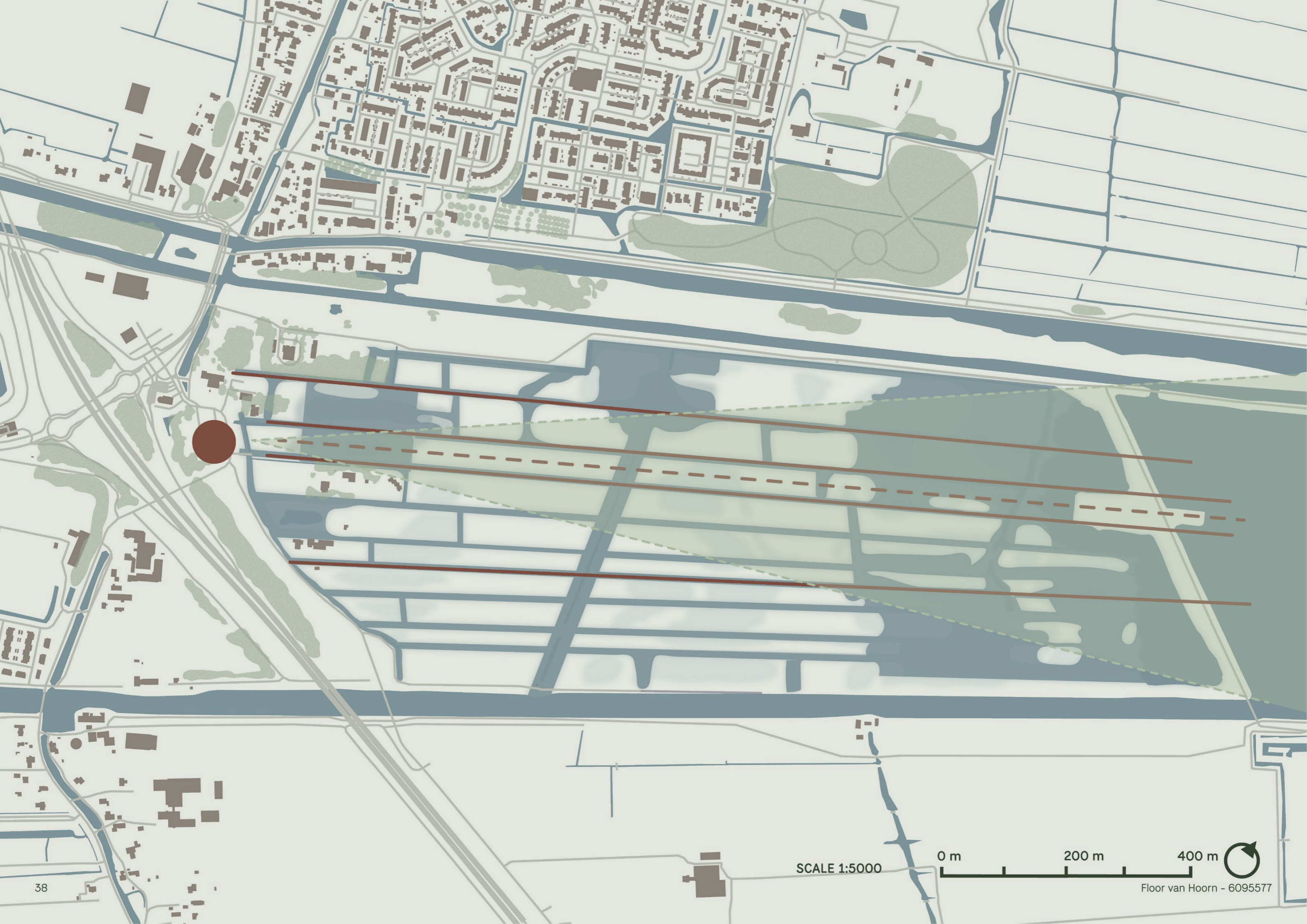
mowing before june 30th
lack of herb-rich landscapes

- It nests mostly on straight surfaces in areas of high grass, away from buildings (200–300 m) and high elements (300–600 m).

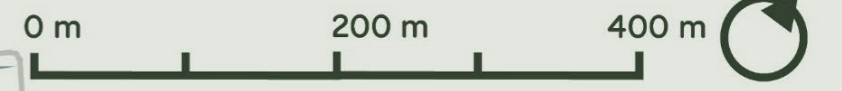


But how does this translate into design?





SCALE 1:5000



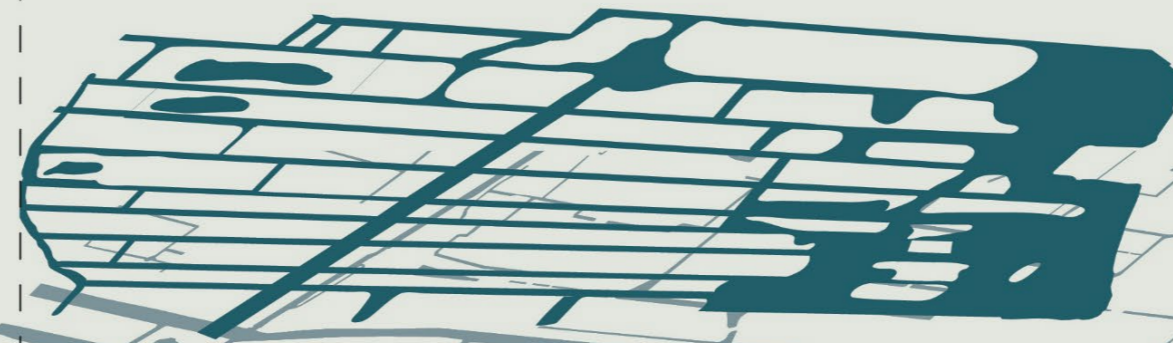
wet situation



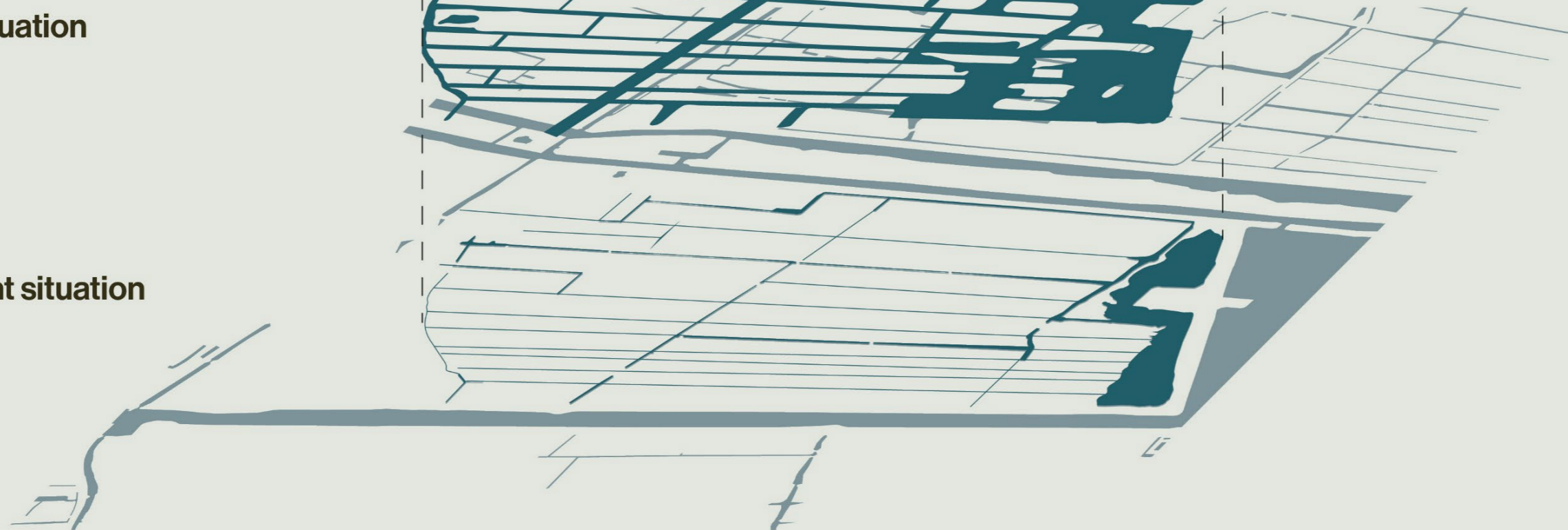
regular situation

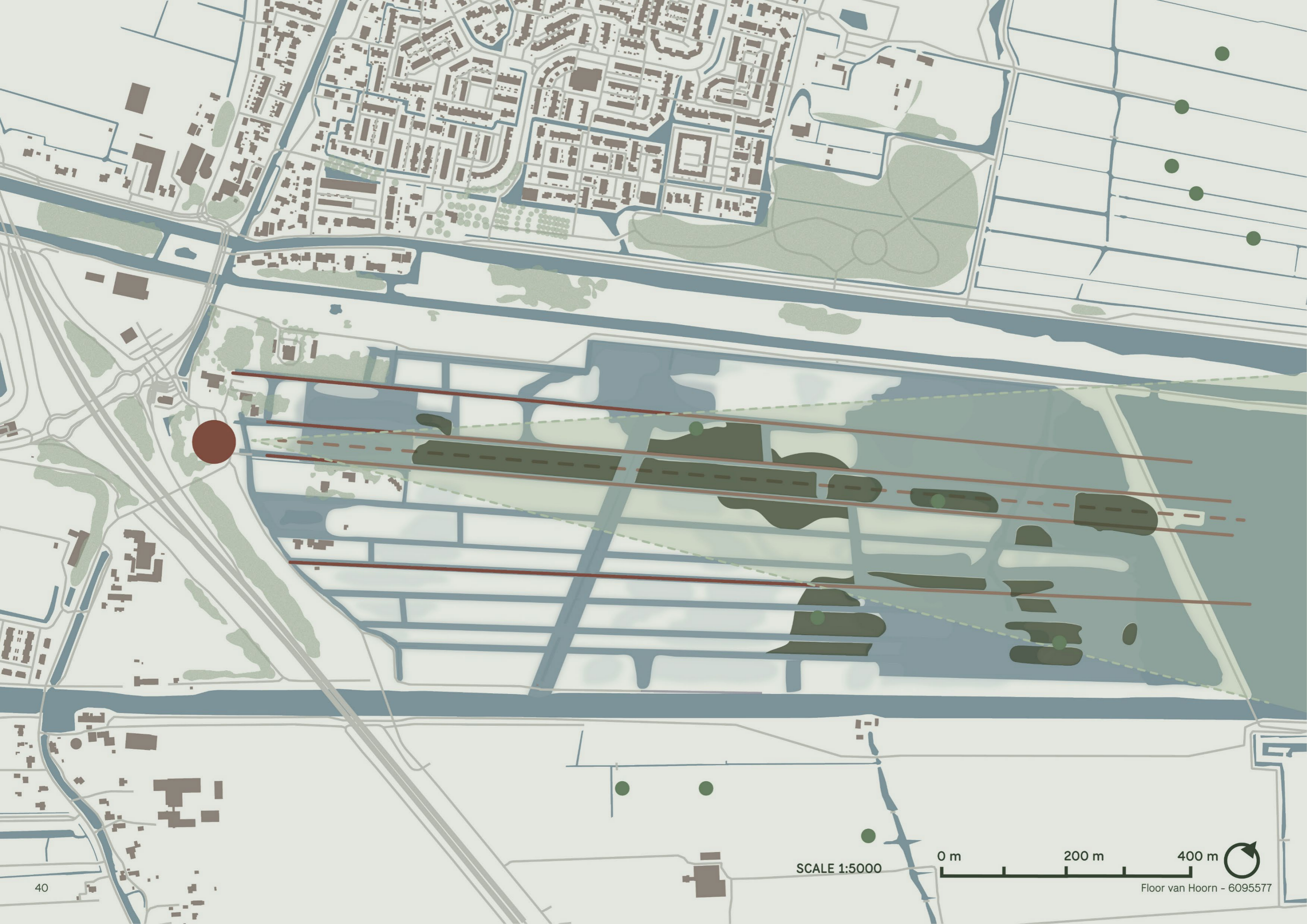


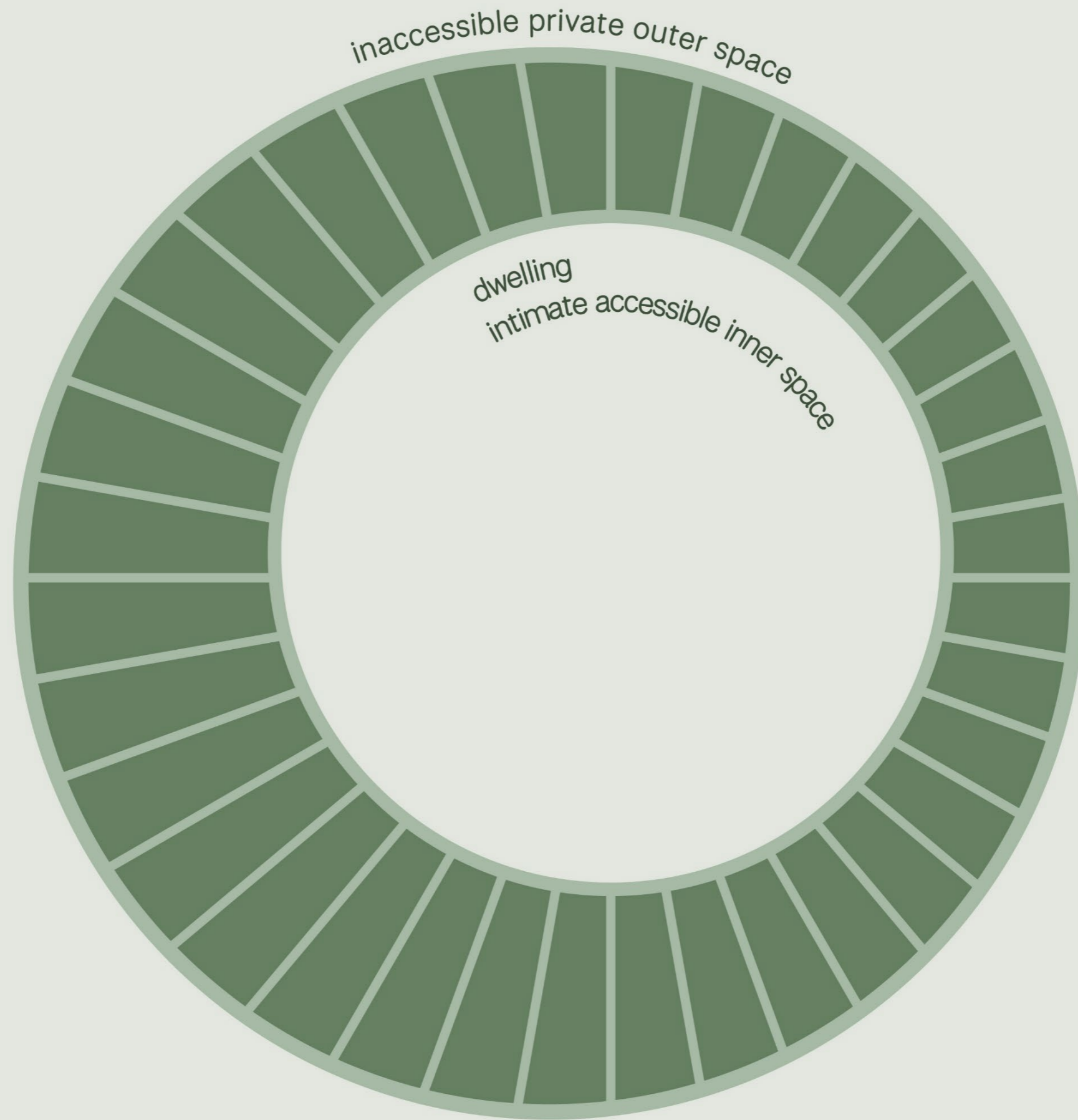
dry situation






current situation

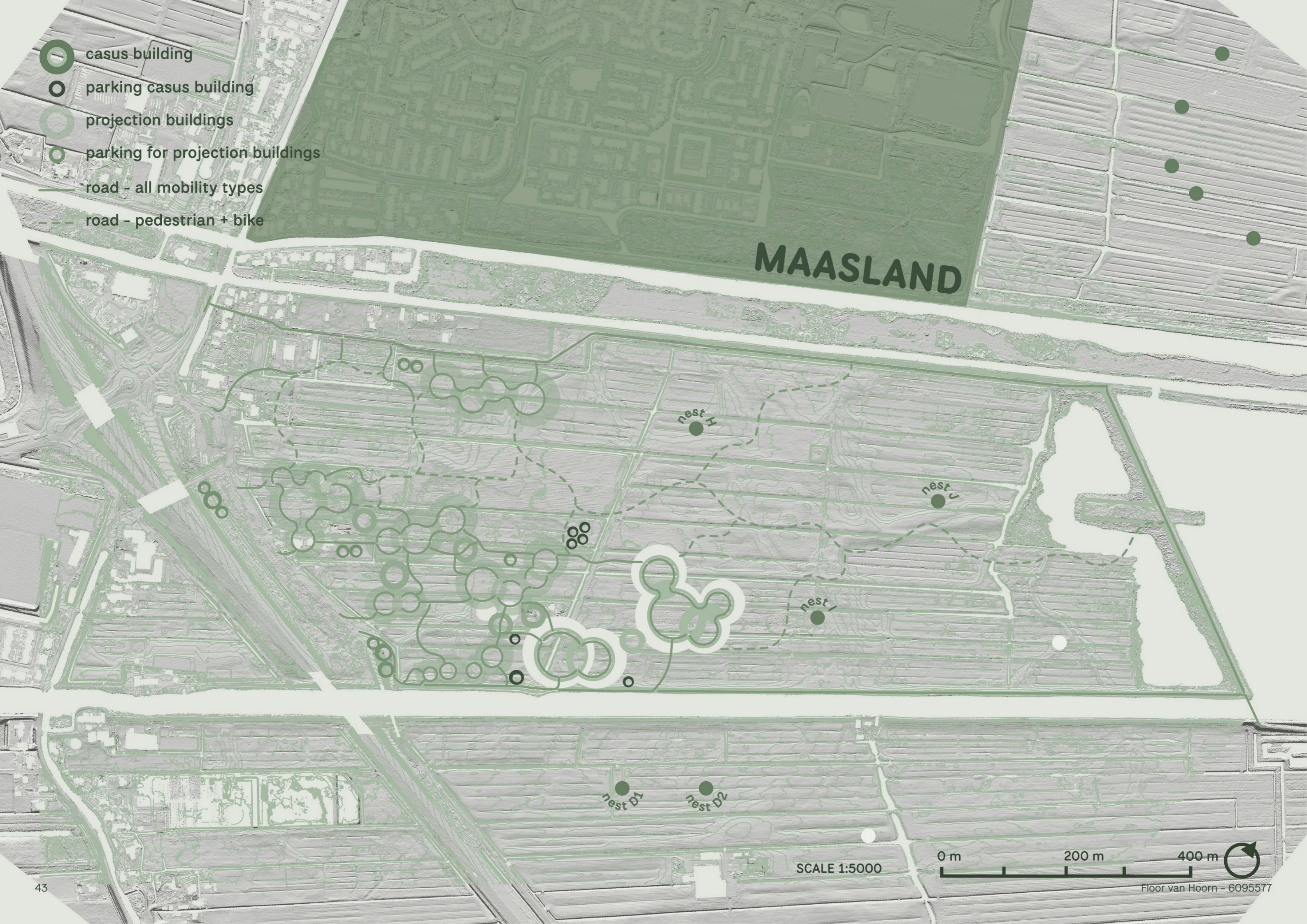


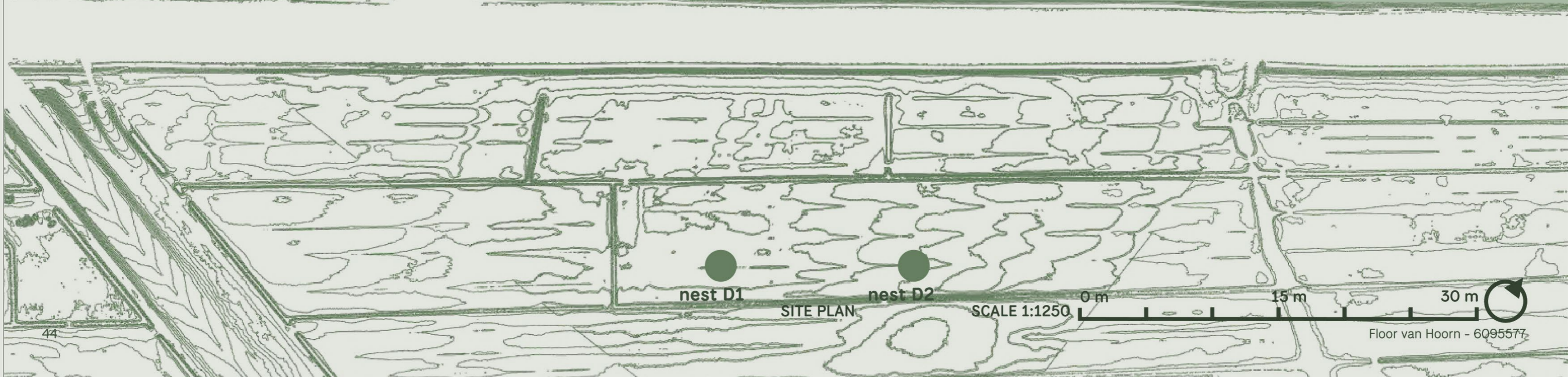


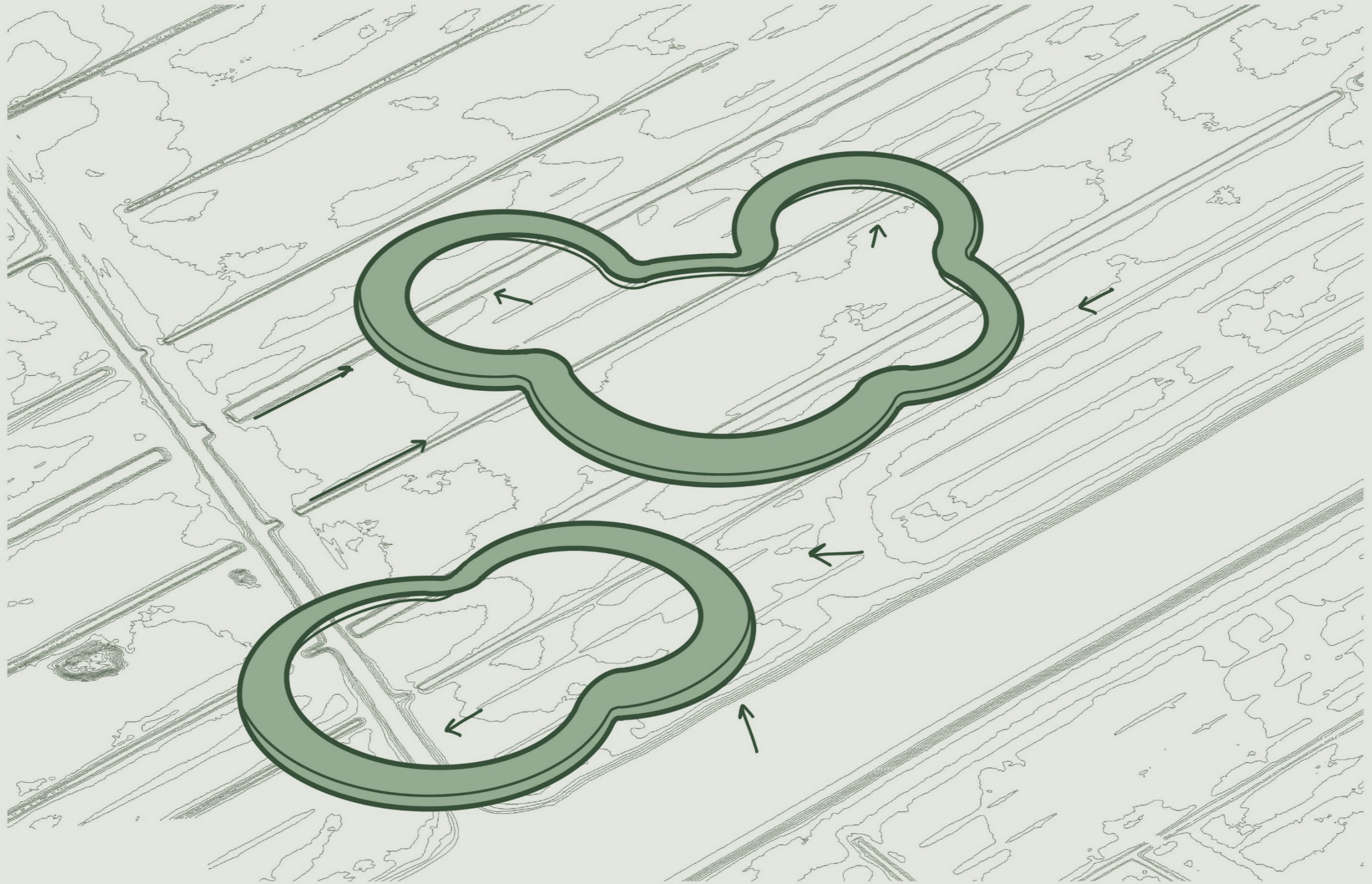


-  casus building
-  parking casus building
-  projection buildings
-  parking for projection buildings
-  road - all mobility types
-  road - pedestrian + bike

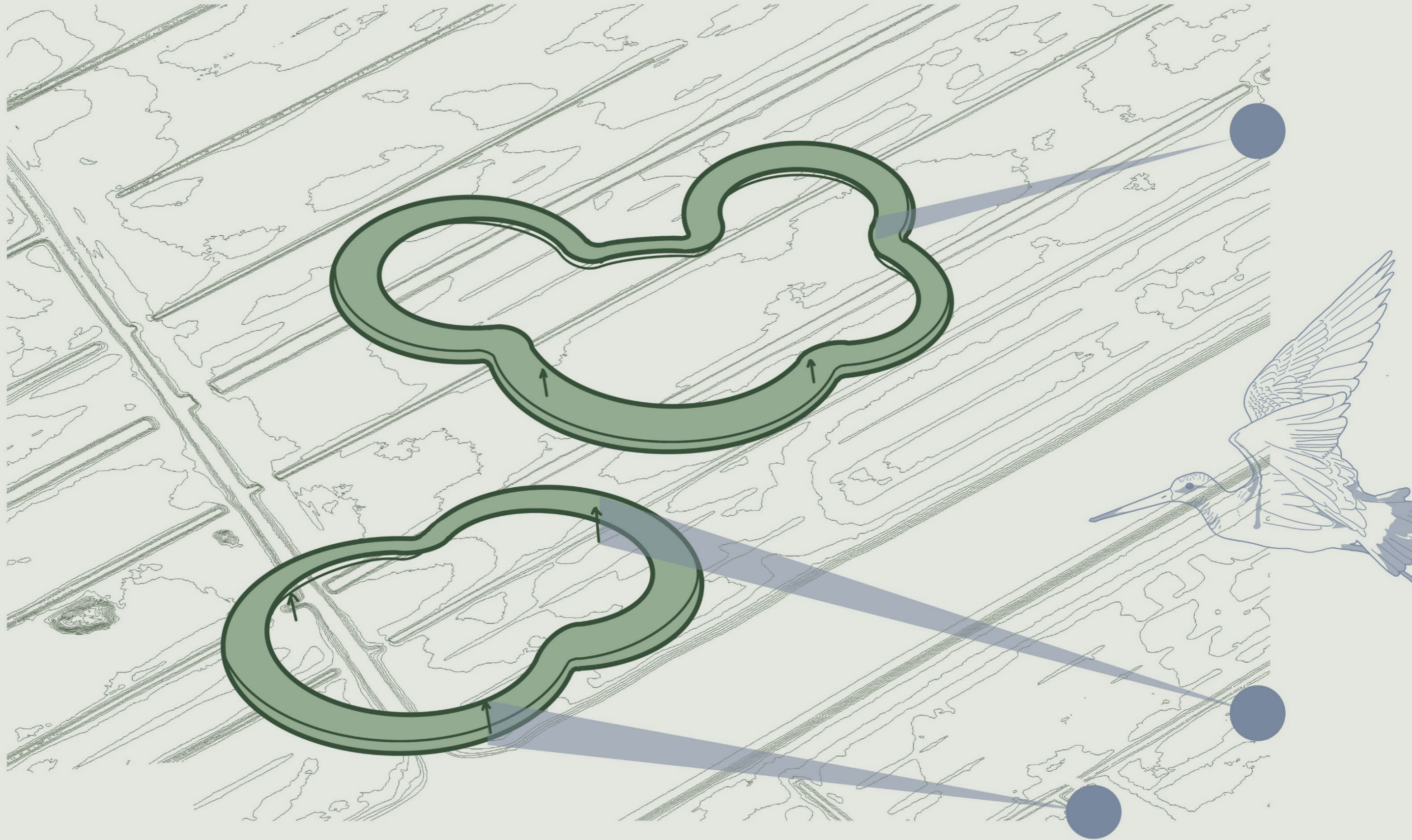
MAASLAND



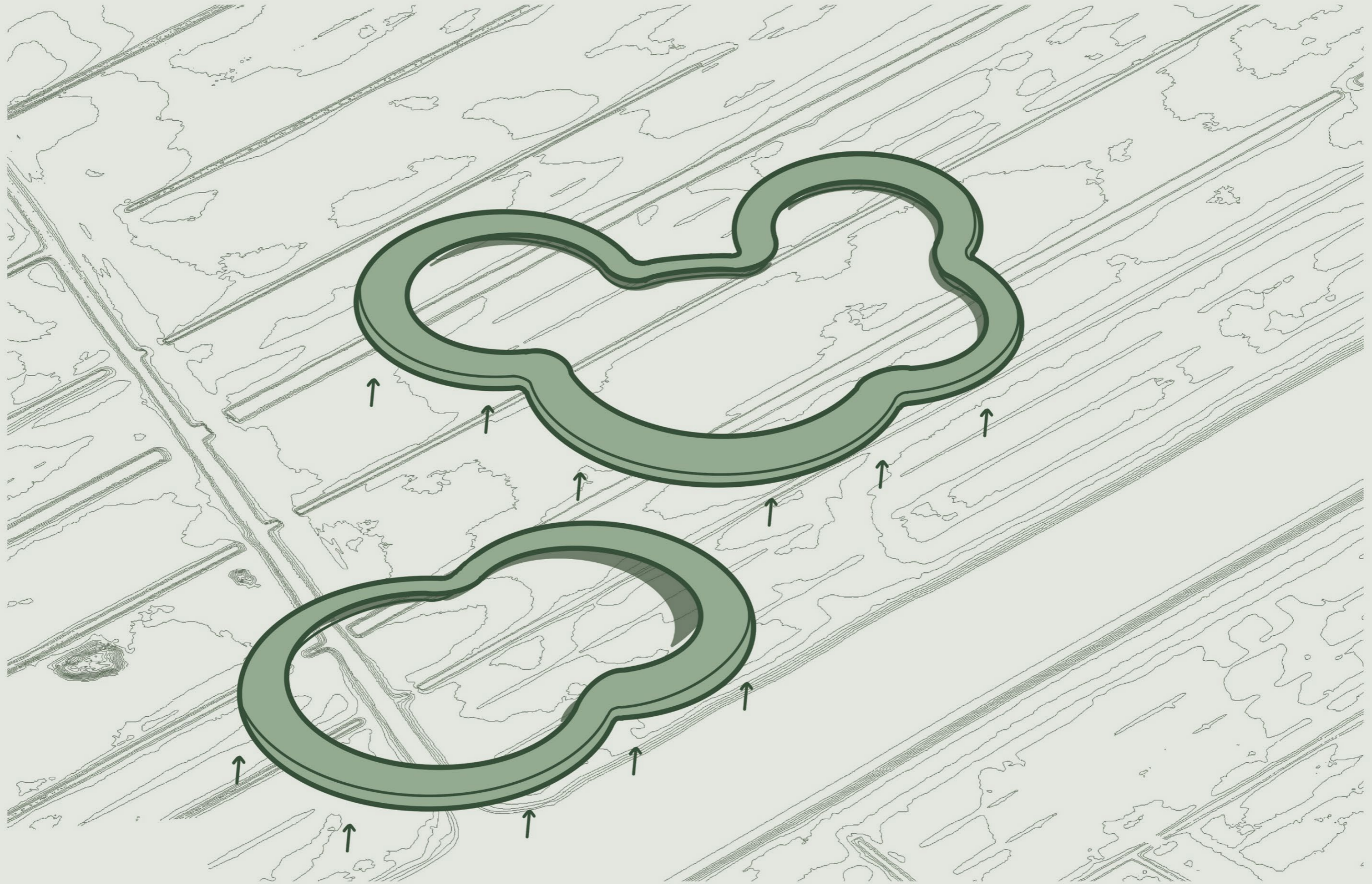




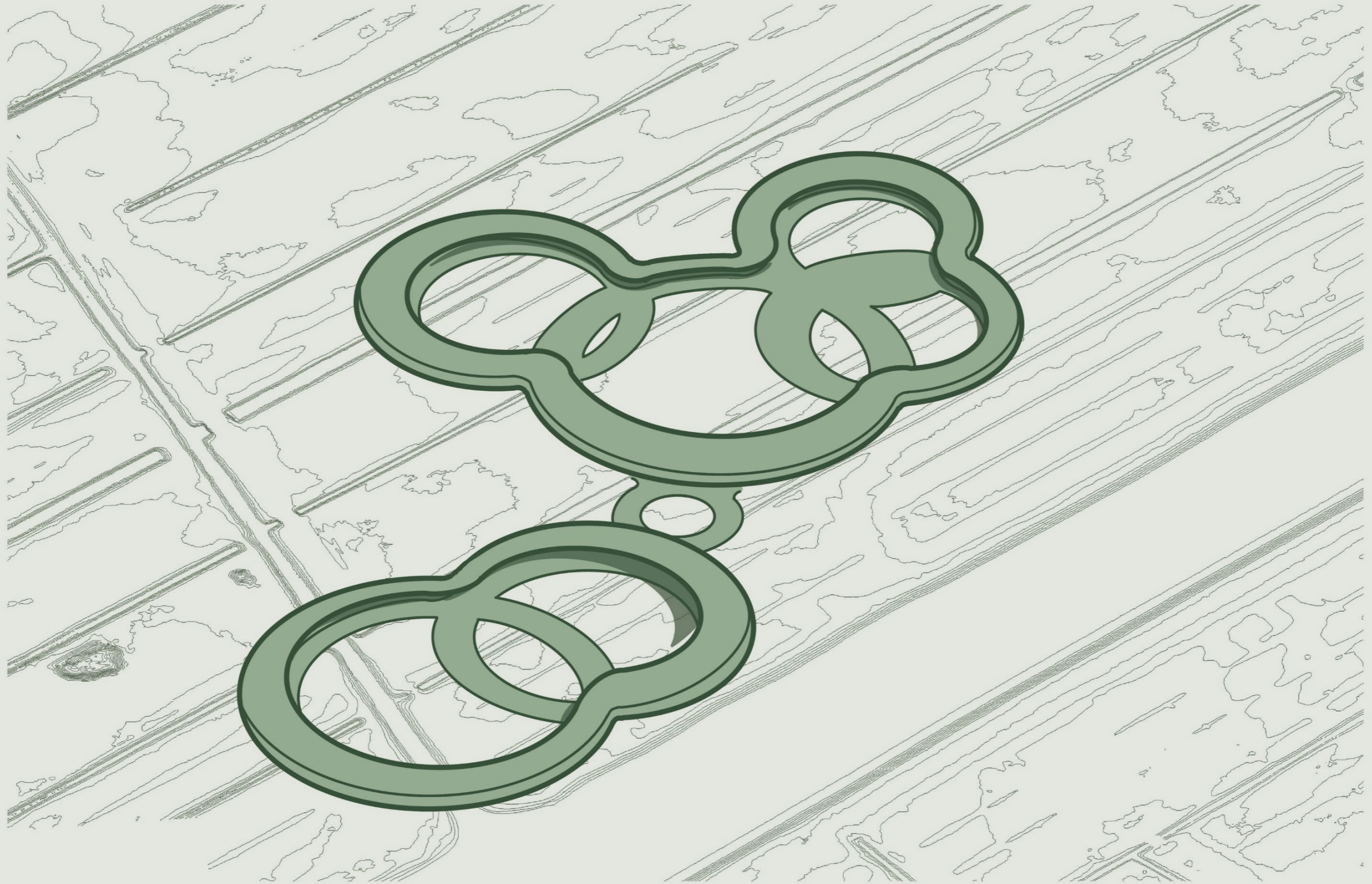
move volumes around the site elevation determines the position



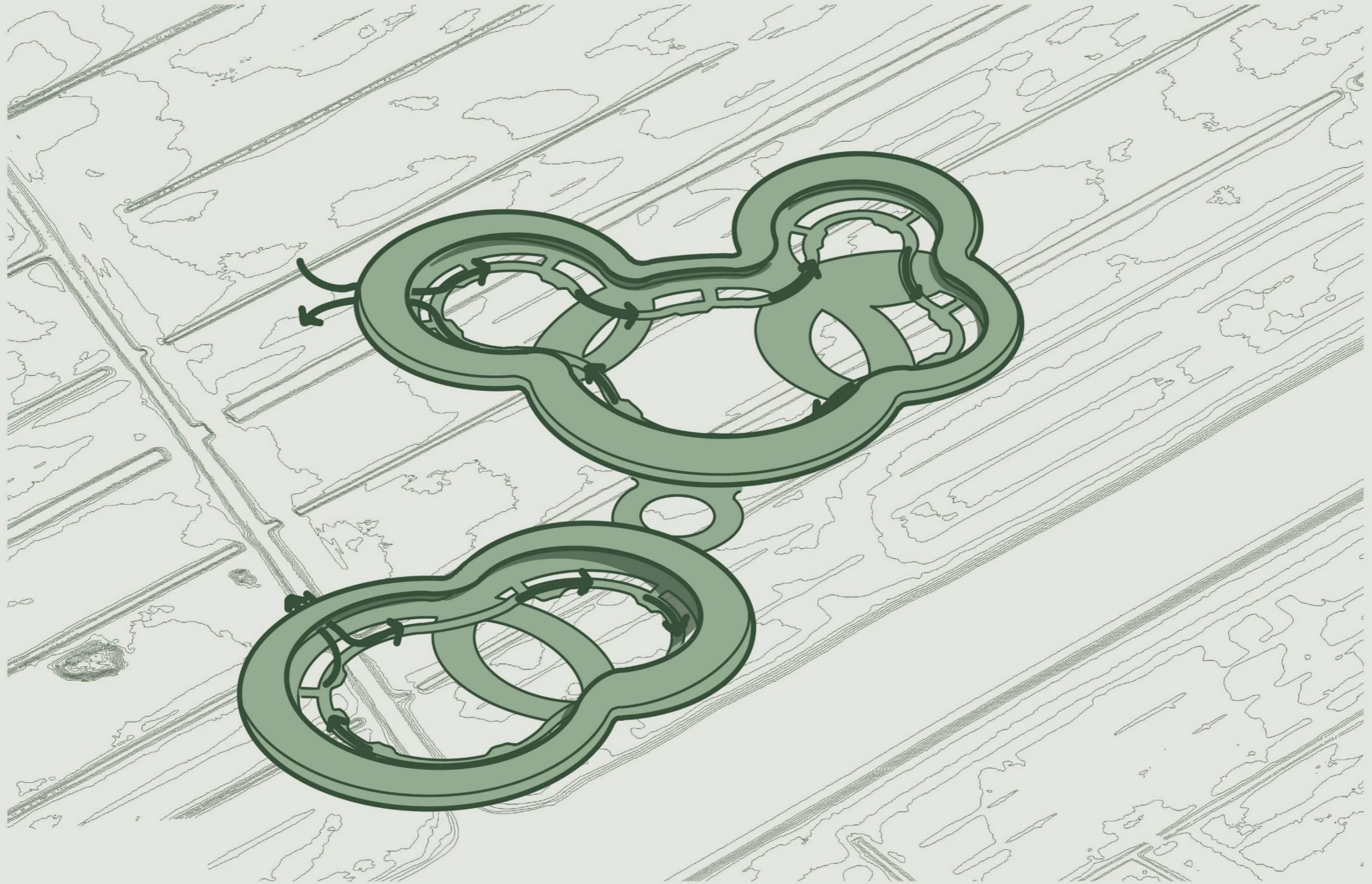
nest locations determine the building height



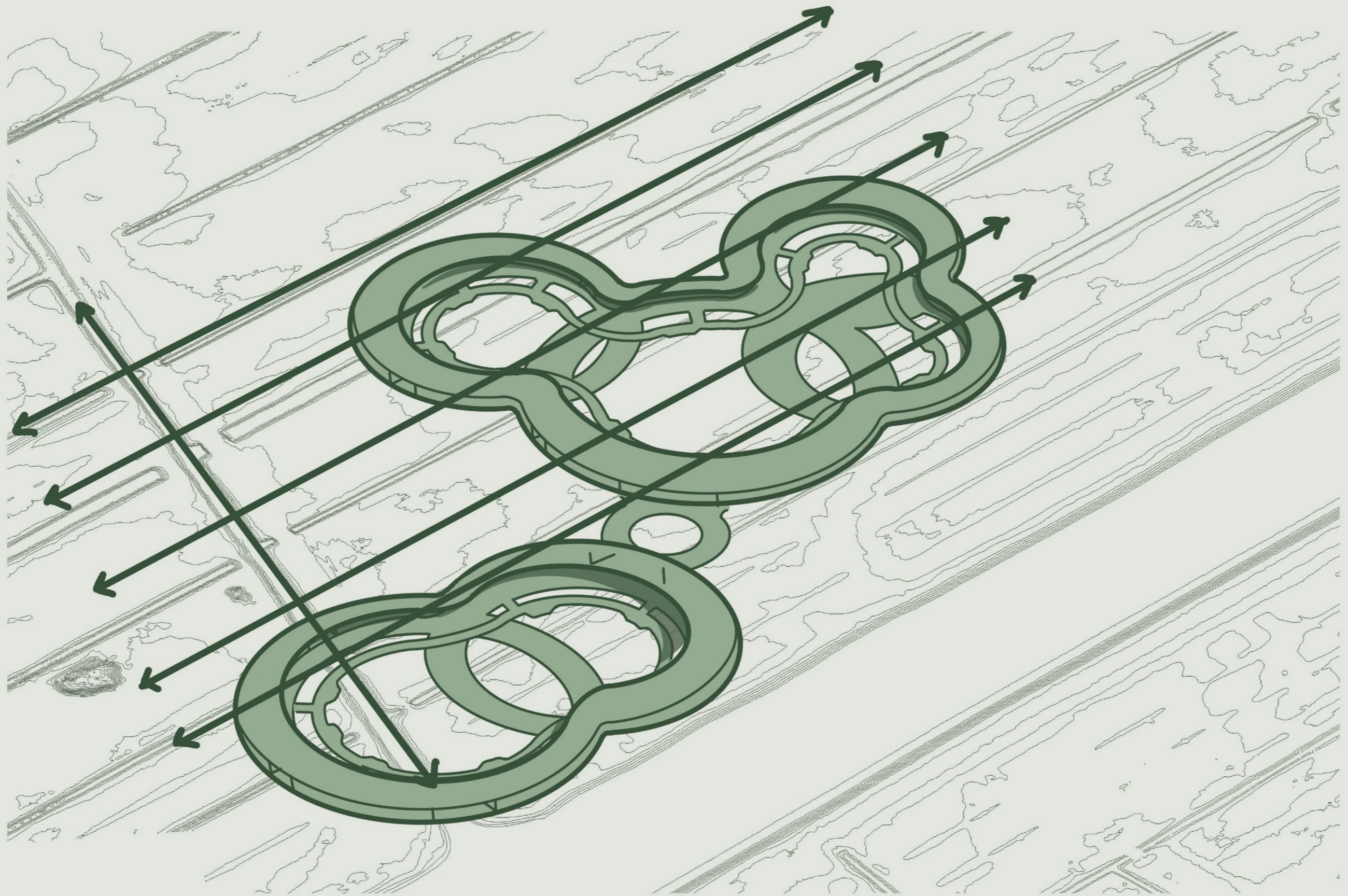
elevate the building to prevent flooding



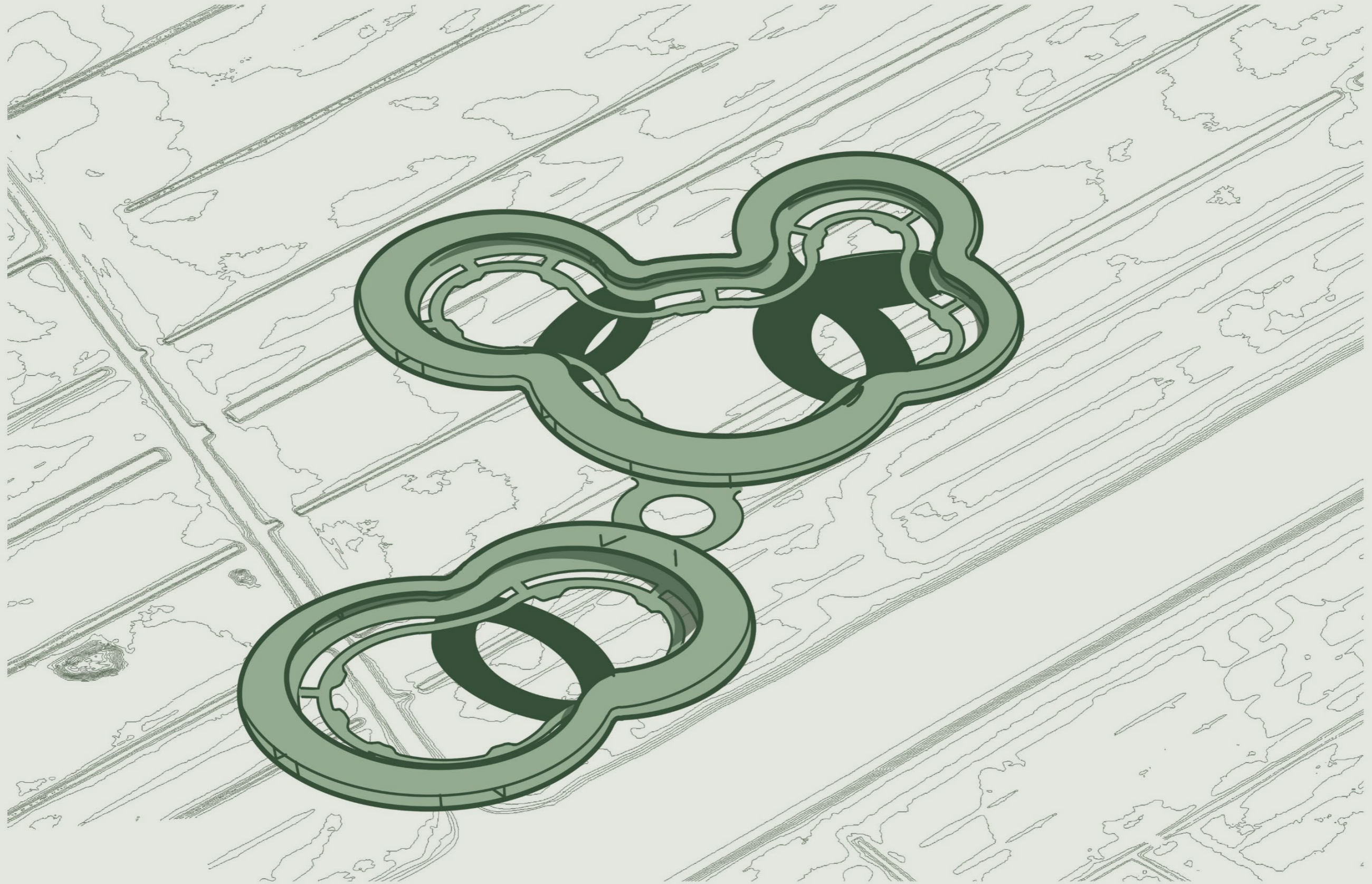
add pathway around the building volumes



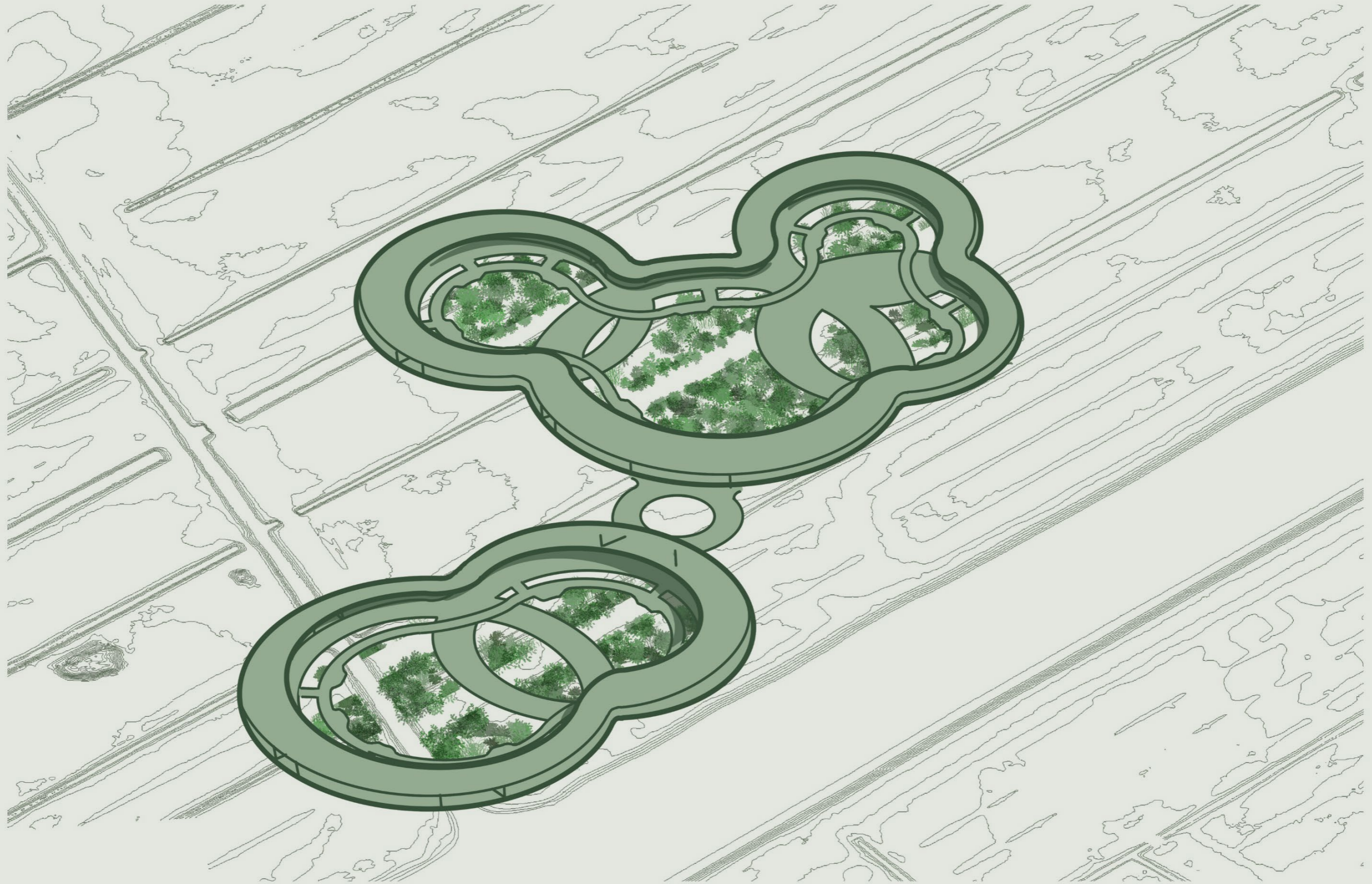
add a emergency and service route



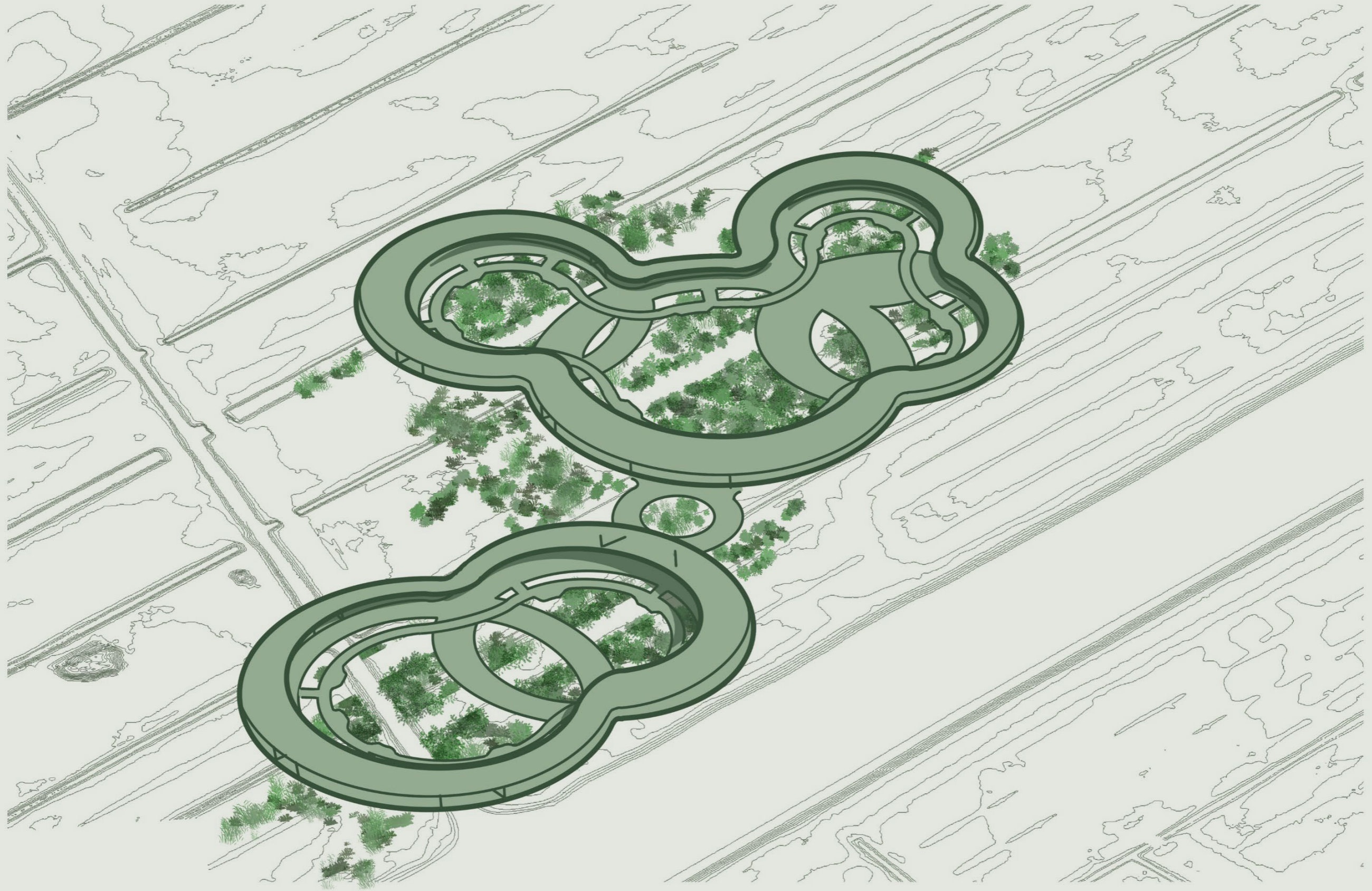
cut volumes around waterways, keep ditches open



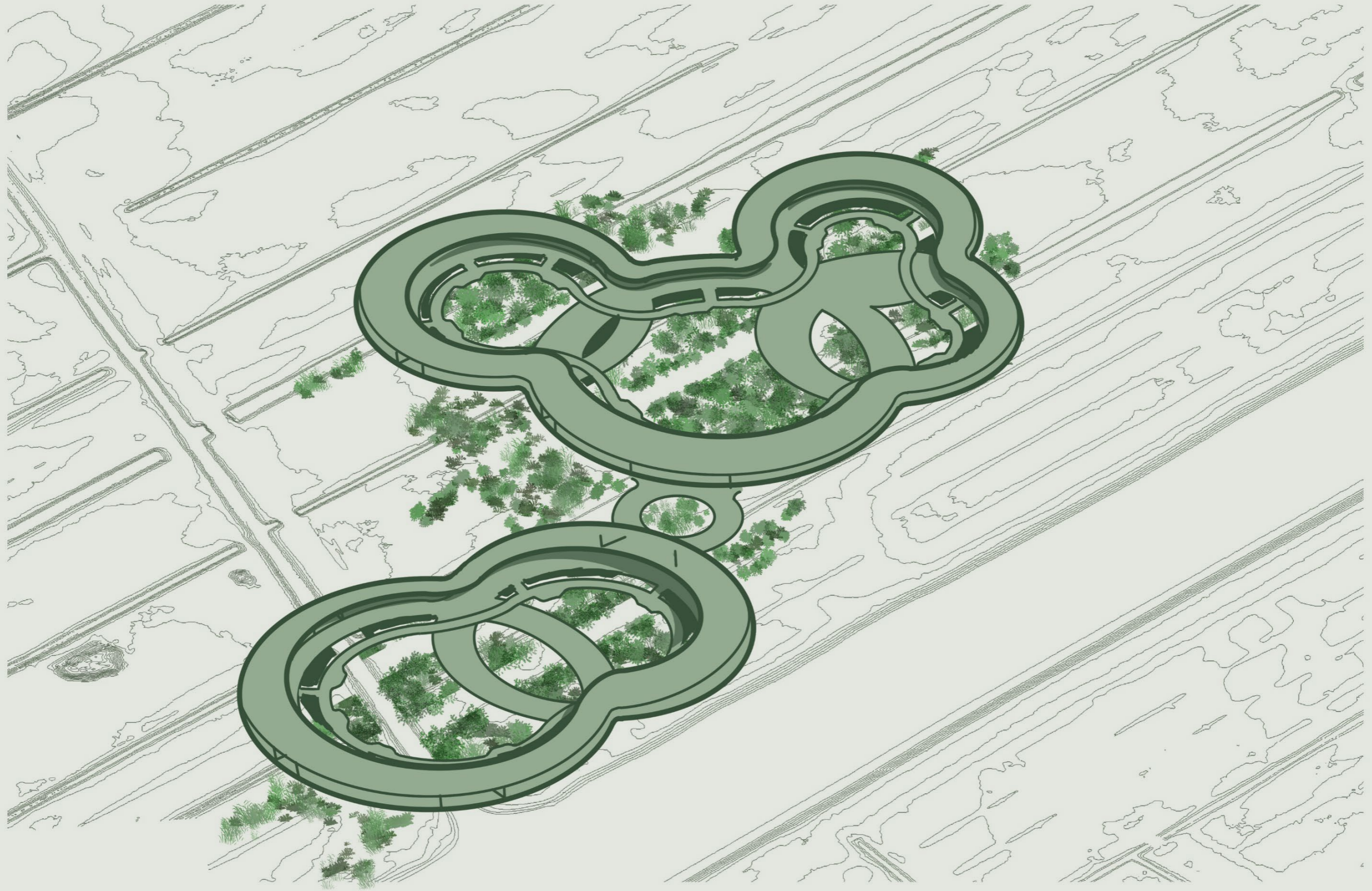
community spaces on platform



plant the old native plants to increase biodiversity



bleed the native planting into the polder landscape



add helophyte filters



GFA 53 m²
gross floor area

GFA 55 m²
gross floor area

community space 1
guestroom
GFA 52 m²
gross floor area

community space 2
guestroom
GFA 42 m²
gross floor area

GFA 44 m²
gross floor area

GFA 47 m²
gross floor area

GFA 50 m²
gross floor area

GFA 53 m²
gross floor area

GFA 61 m²
gross floor area

16

WM WM WM WM

WM WM WM WM WM

16

vi-200

vi+0

facade

helophyte filter

skylight

skylight

skylight

skylight

skylight

skylight

skylight

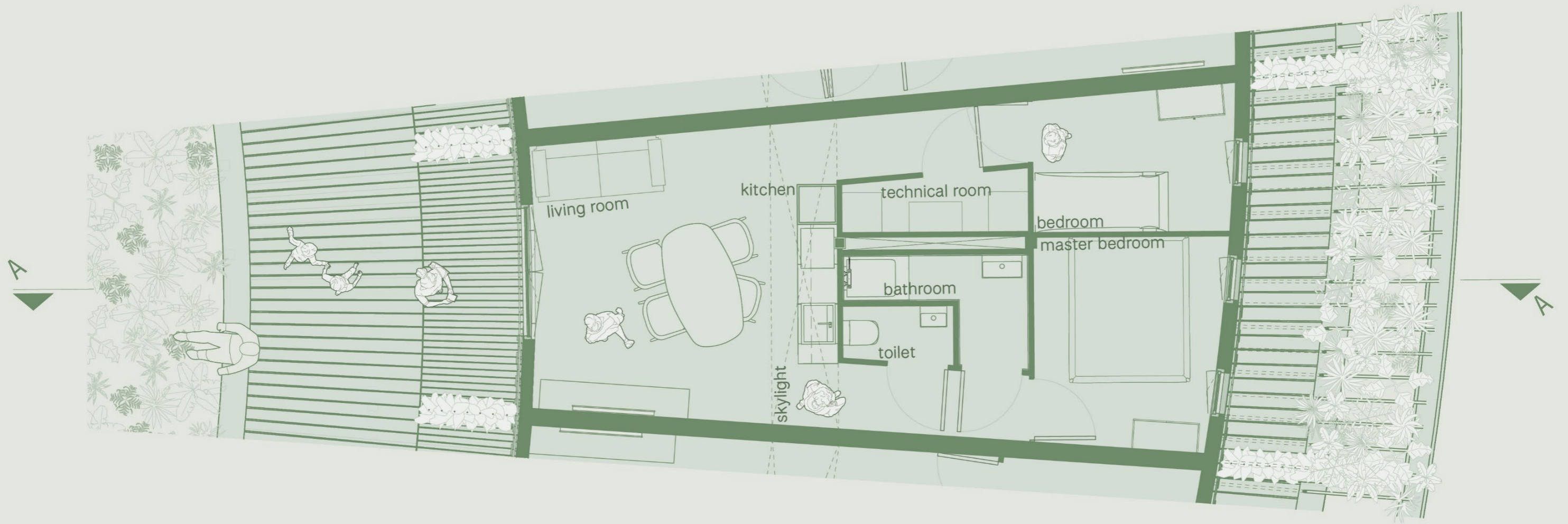
sky

vi+0

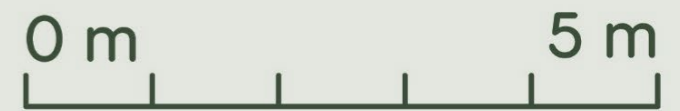
A







variant 1, 1:60











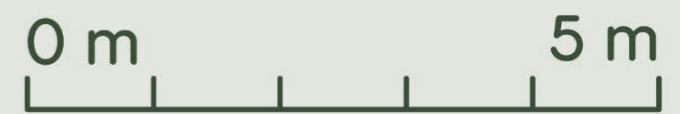


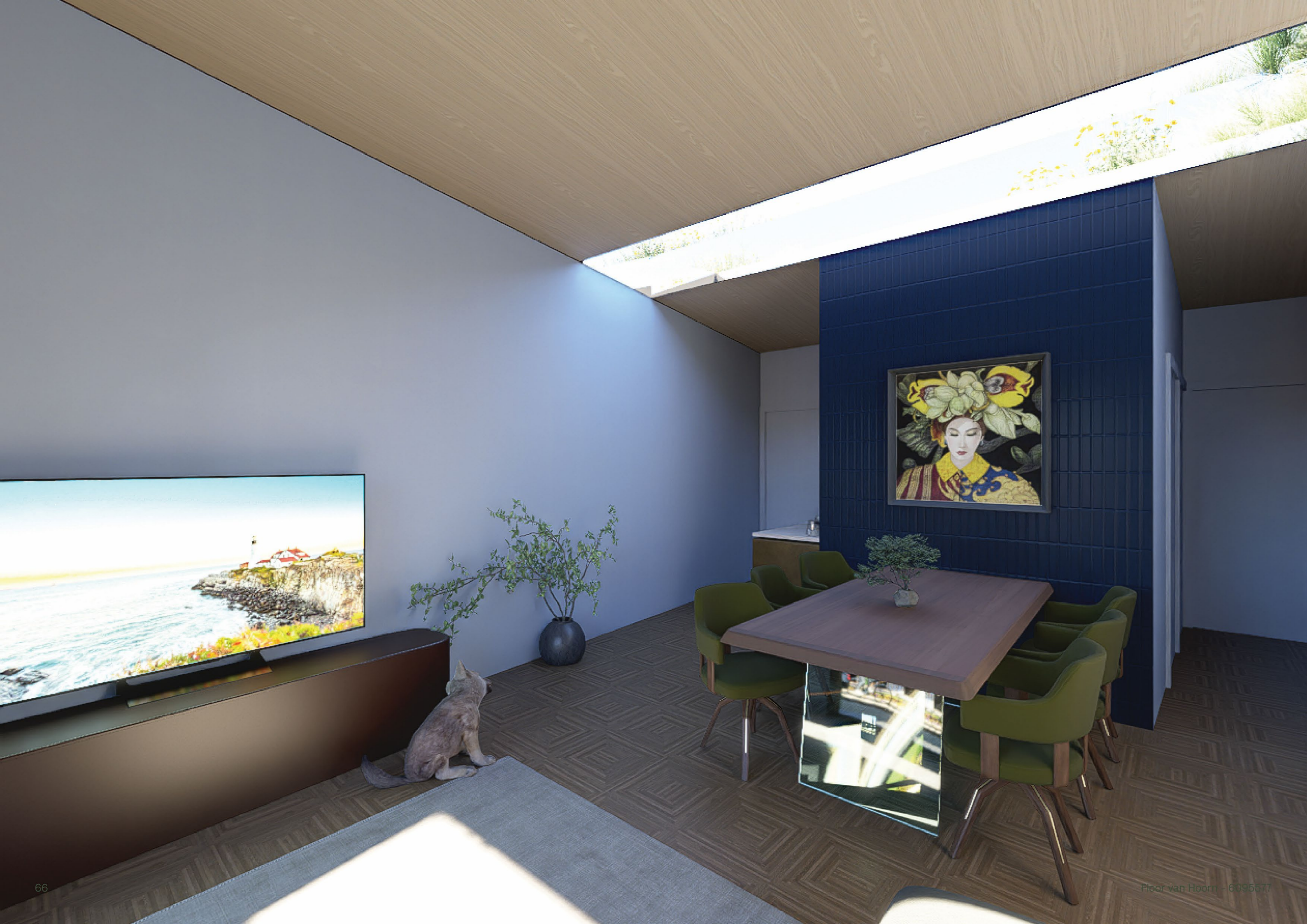






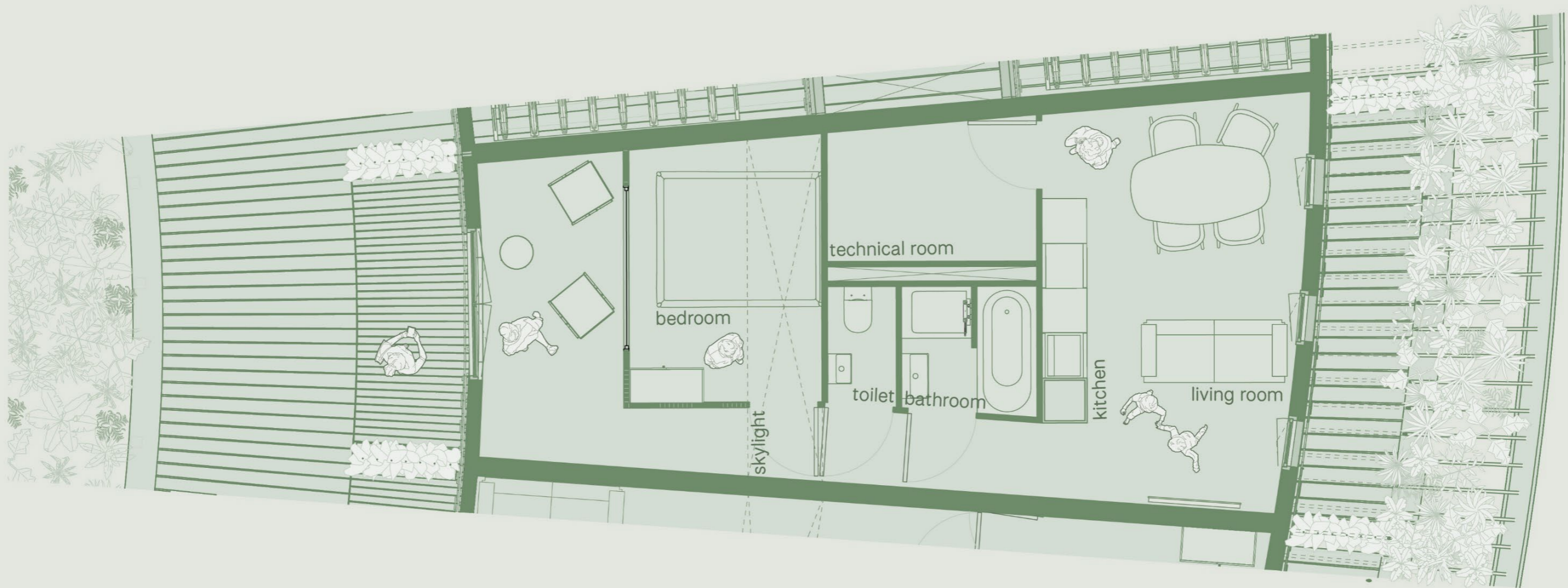
variant 3, 1:60







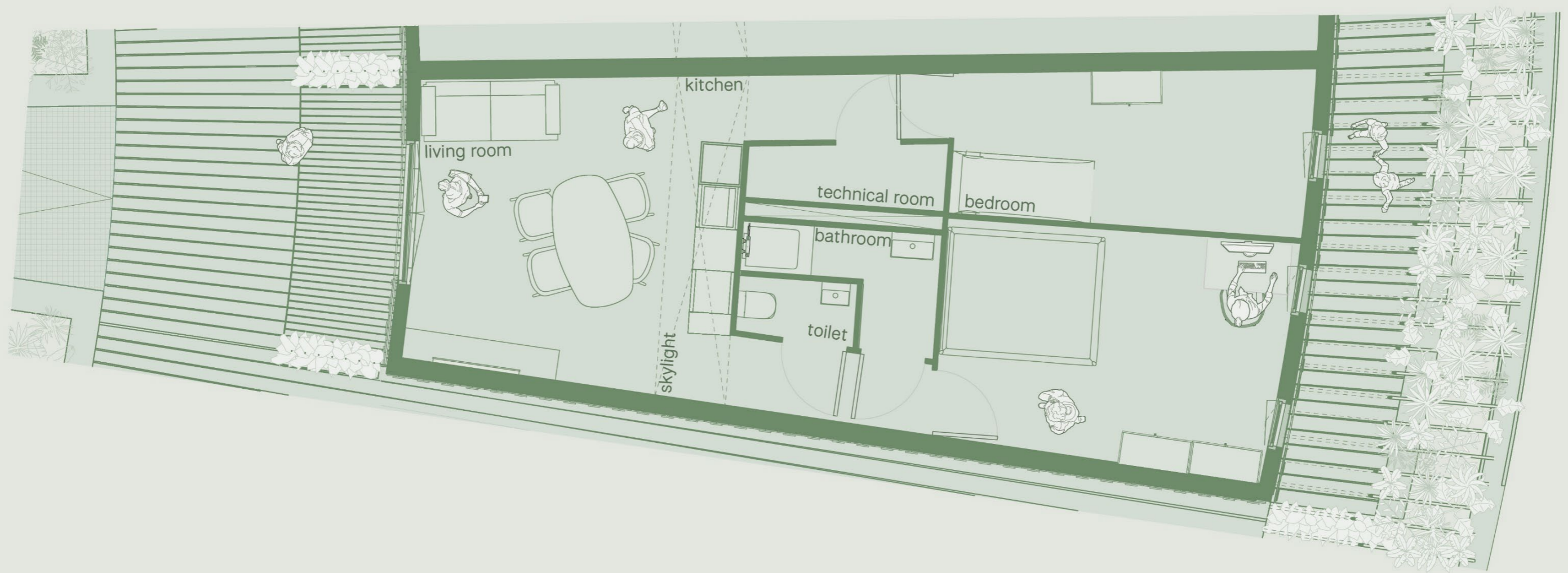








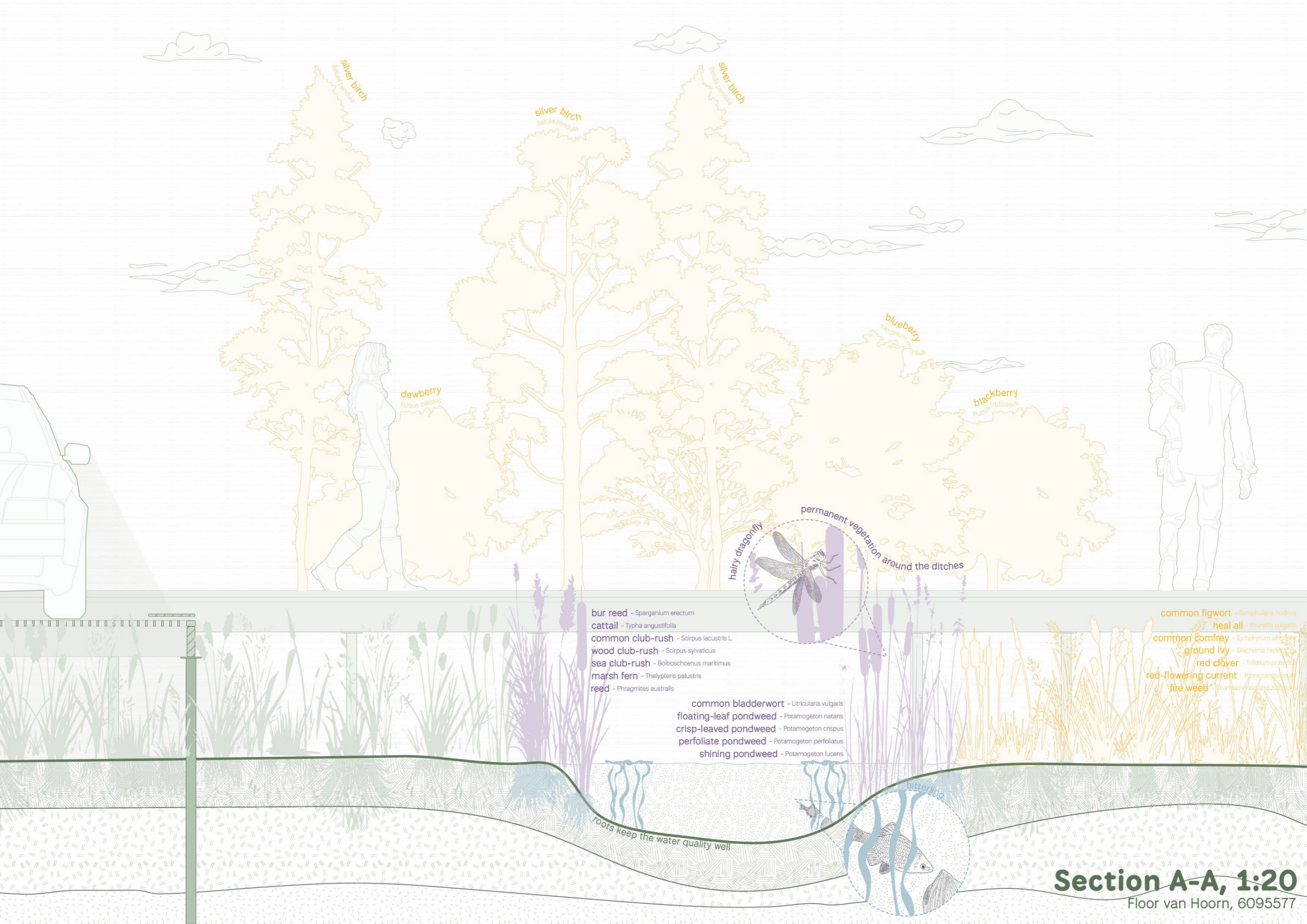












silver birch
Betula pendula

silver birch
Betula pendula

silver birch
Betula pendula

dewberry
Rubus caesius

blueberry
Vaccinium myrtillus

blackberry
Rubus fruticosus

hairy dragonfly

permanent vegetation around the ditches

- bur reed - *Sparganium erectum*
- cattail - *Typha angustifolia*
- common club-rush - *Scirpus lacustris L.*
- wood club-rush - *Scirpus sylvaticus*
- sea club-rush - *Bolboschoenus maritimus*
- marsh fern - *Thelypteris palustris*
- reed - *Phragmites australis*

- common bladderwort - *Utricularia vulgaris*
- floating-leaf pondweed - *Potamogeton natans*
- crisp-leaved pondweed - *Potamogeton crispus*
- perfoliate pondweed - *Potamogeton perfoliatus*
- shining pondweed - *Potamogeton lucens*

- common figwort - *Scrophularia nodosa*
- heal all - *Prunella vulgaris*
- common comfrey - *Symphytum officinale*
- ground ivy - *Glechoma hederacea*
- red clover - *Trifolium pratense*
- red-flowering current - *Ribes sanguineum*
- fire weed - *Chamaenerion angustifolium*

roots keep the water quality well

bitterling

Section A-A, 1:20

Floor van Hoorn, 6095577

= 3860, variable



00 NAP, level = 0



silver birch
Betula pendula

basket willow
Salix vitrea



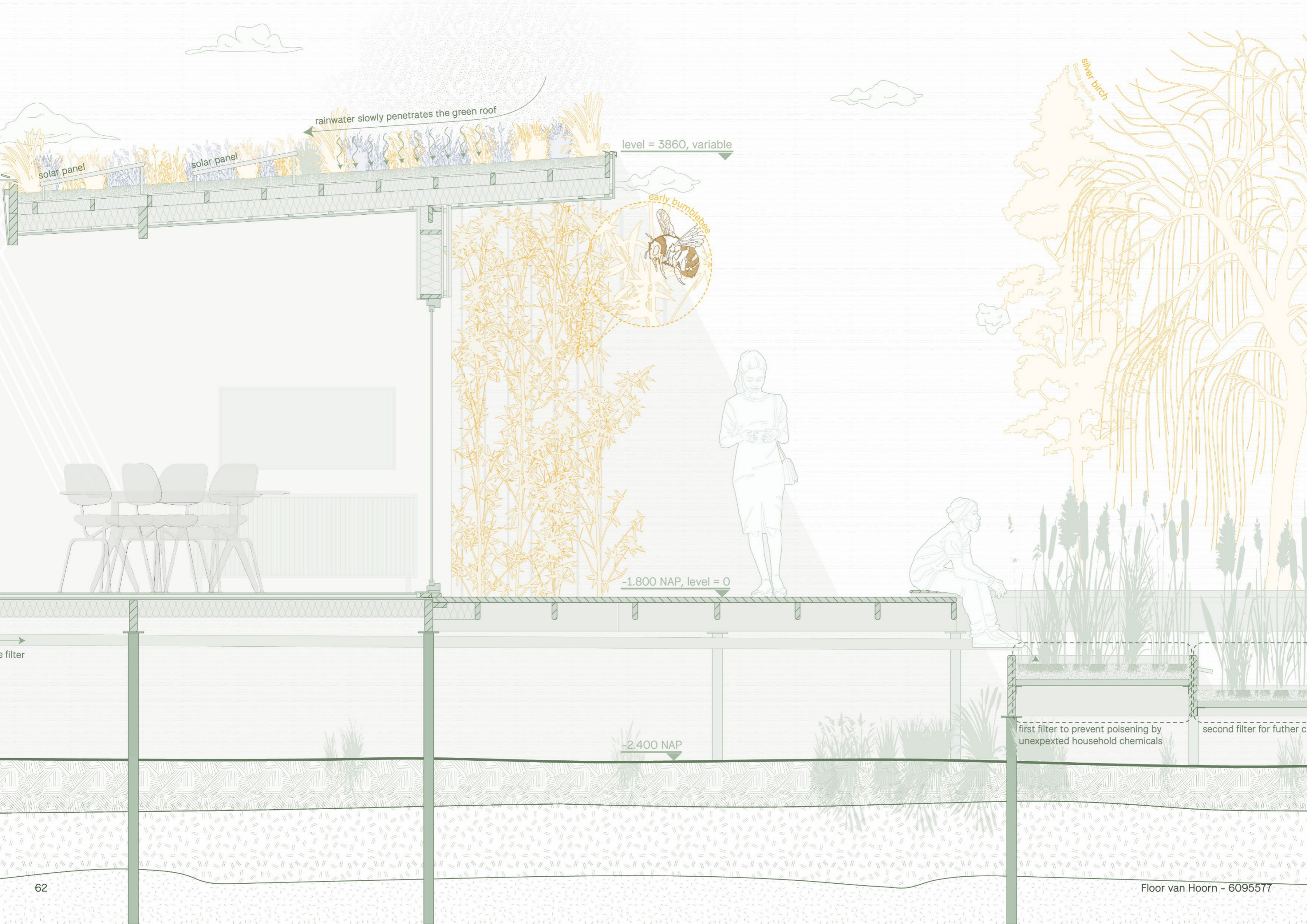
-2.2 NAP, level = -400

00 NAP

first filter to prevent poisoning by unexpected household chemicals

second filter for further cleaning

clean water





green roof merges into the polder landscape from above
 herb-rich plant species provide nectar for insects
 rainwater is led to the downpours into the reflection pond

prevent visual disturbance for the
 surrounding landscape

solar boiler

solar panel

solar panel

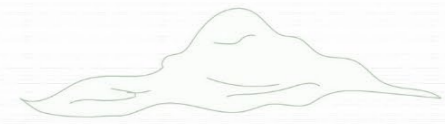
natterjack toad

unvegetated pools create hatching places for the natterjack toad

clean- and black water in pressure line

grey water to helophyte filter

screw poles on
 load-bearing
 sand layer > 15
 meters

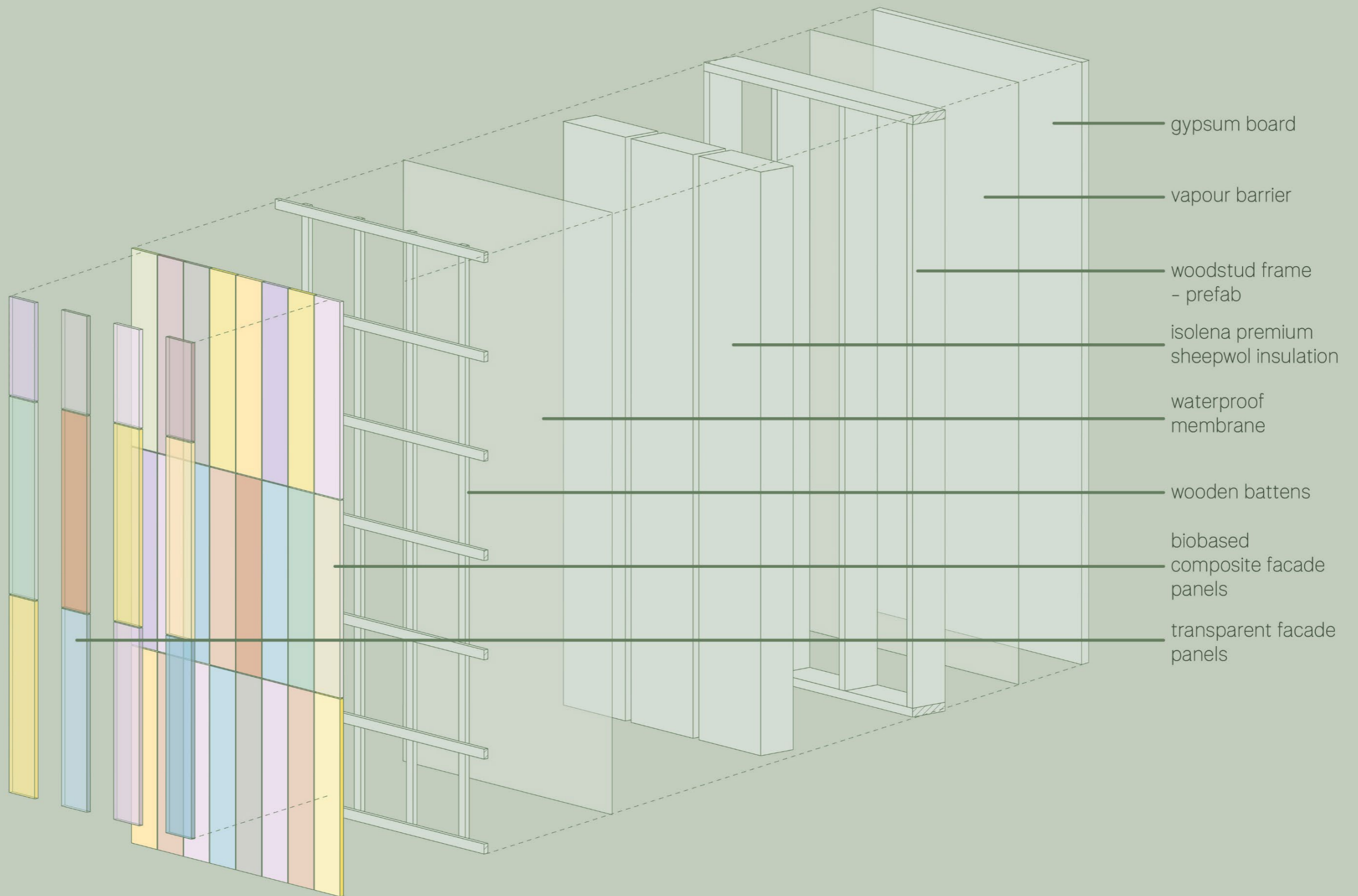


gradual transition from high biodiverse plant mix to highly treasured grass mix, enhanced biodiversity by introducing herbs into this mix

green roof and slanted wall prevent visual disturbance for the black-tailed godwit as the building merges into the polder landscape

the overflow in the reflection pond leads it to the surface where it can flow into semi-permanent naturally formed pools

unvegetated p...



- gypsum board
- vapour barrier
- woodstud frame - prefab
- isolena premium sheepwol insulation
- waterproof membrane
- wooden battens
- biobased composite facade panels
- transparent facade panels



'photoframe' in facade, sightlines around the ditches remain visible.

native vegetation, returning biodiversity to the land, reducing the amount of 'grassphalt' in the polder.

variable roof height, based on the distance to the nest of the black-tailed godwit. minimum 3,2 m, maximum 14 m

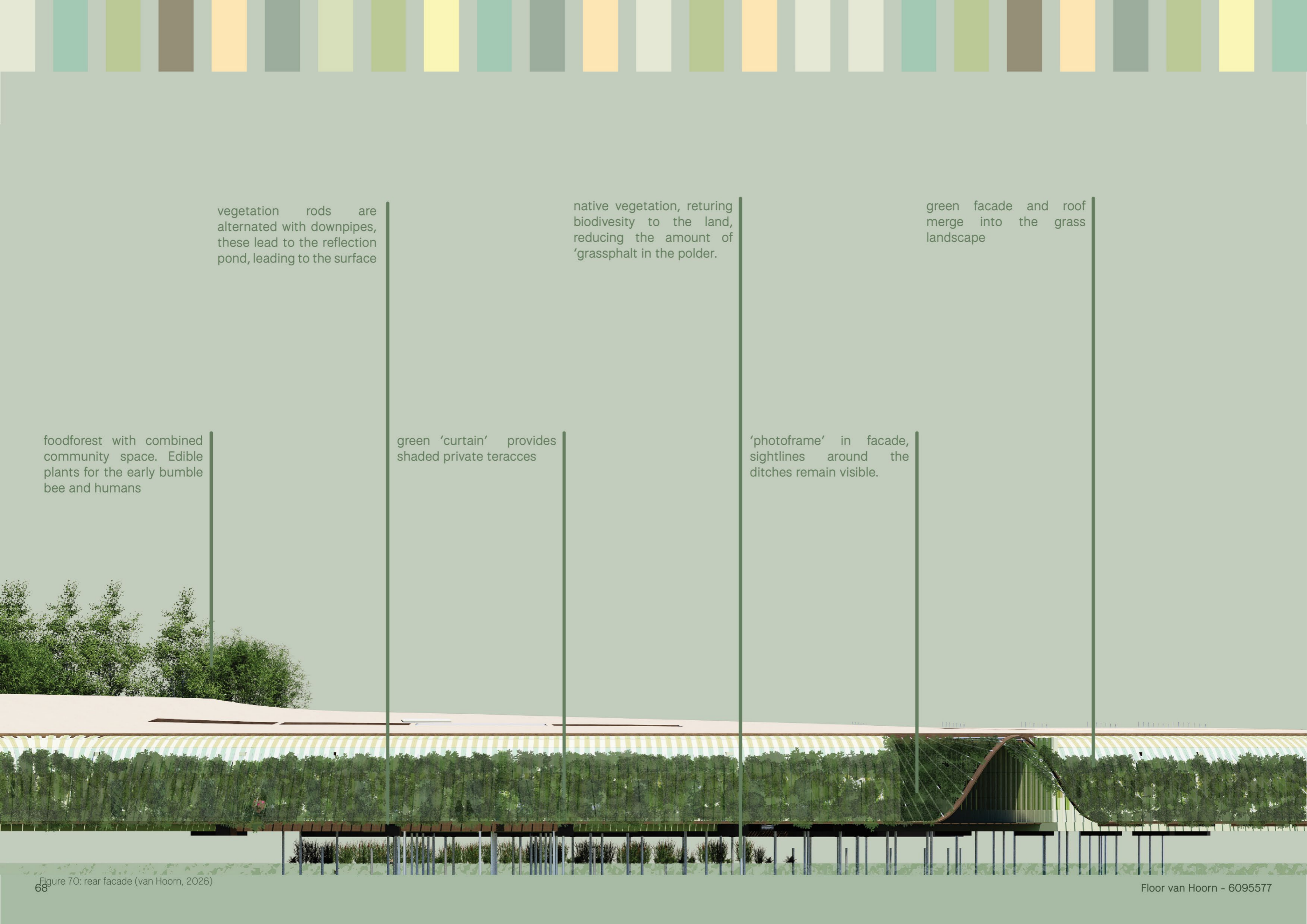
plants around waterways stimulate a suitable living place for the hairy dragonfly and the bitterling.

blue panels provide nesting places for the early bumblebee

green roof merges into the polder landscape from above, reducing visual disturbance for the black-tailed godwit.

foodforest with combined community space. Edible plants for the early bumble bee and humans





vegetation rods are alternated with downpipes, these lead to the reflection pond, leading to the surface

native vegetation, returning biodiversity to the land, reducing the amount of 'grassphalt' in the polder.

green facade and roof merge into the grass landscape

foodforest with combined community space. Edible plants for the early bumble bee and humans

green 'curtain' provides shaded private terraces

'photoframe' in facade, sightlines around the ditches remain visible.



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