



OVER THE FLEVOPOLDER

P5 – Juul ten Hove
Landscape Architecture

06 – 19
'23



84 4

CURVES SLOW DOWN AND ...



... CAUSE MAINTENANCE



UNSAFE CROSSINGS



FRAGMENTED LANDSCAPES

Low accessibility

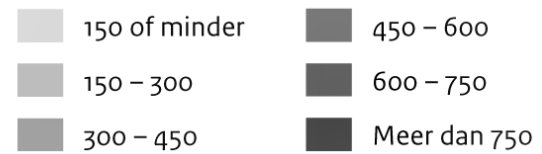
Car



Public transport



Bereikbare arbeidsplaatsen
(duizend banen)



Lelyline

- In 1.30 h travel time
- Speed: 200 km / h
- Step towards international connection

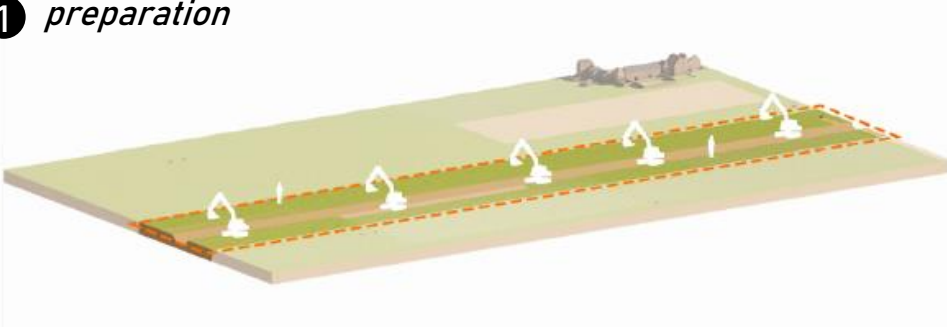




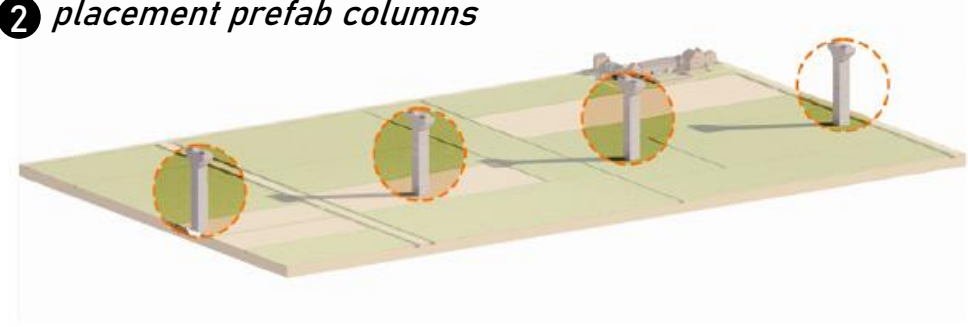
FENHE RAILWAY VIADUCT, CHINA

Modular construction technique

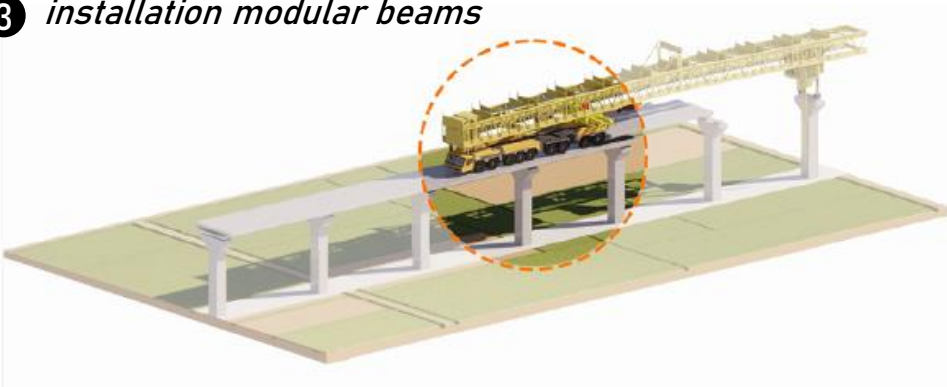
1 *preparation*



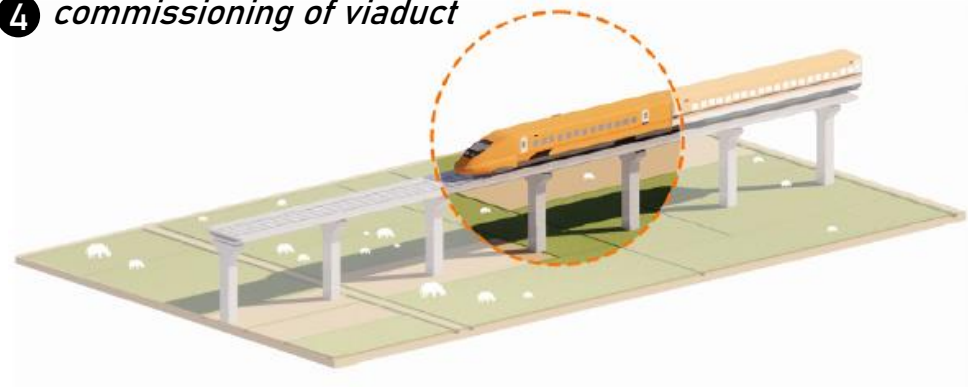
2 *placement prefab columns*



3 *installation modular beams*

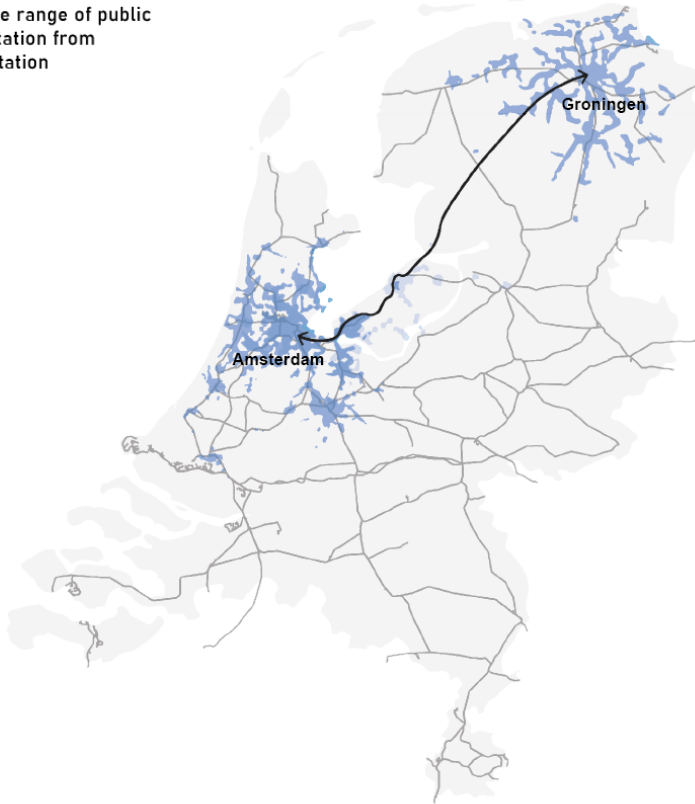


4 *commissioning of viaduct*

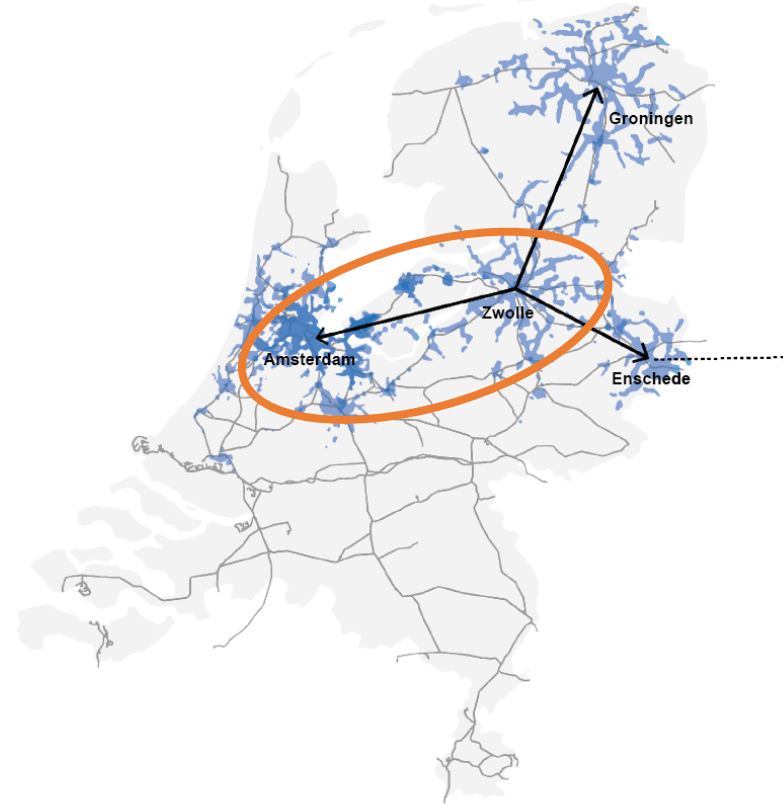


Reach Lelyline

60-minute range of public transportation from central station

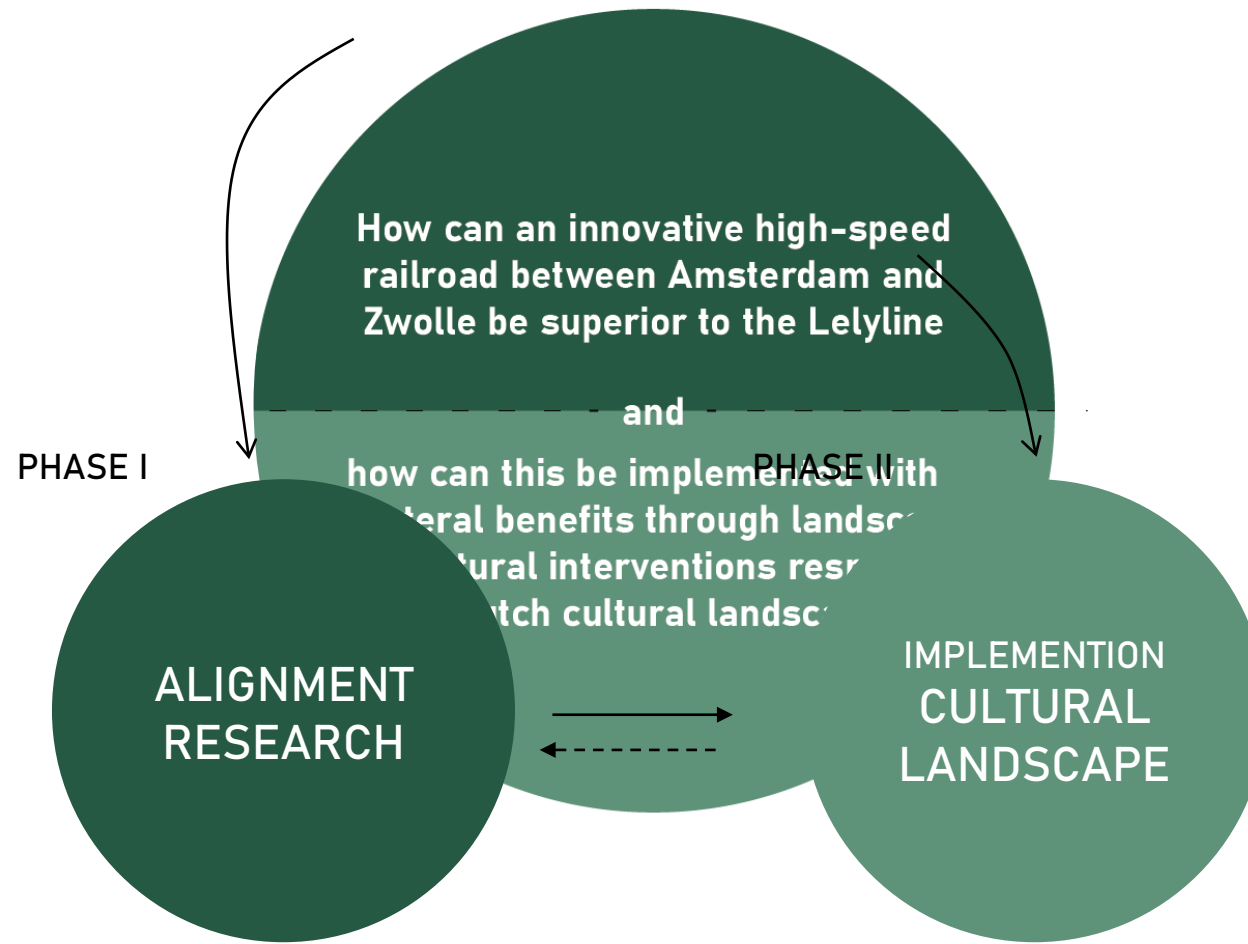


Reach *alternative* Lelyline



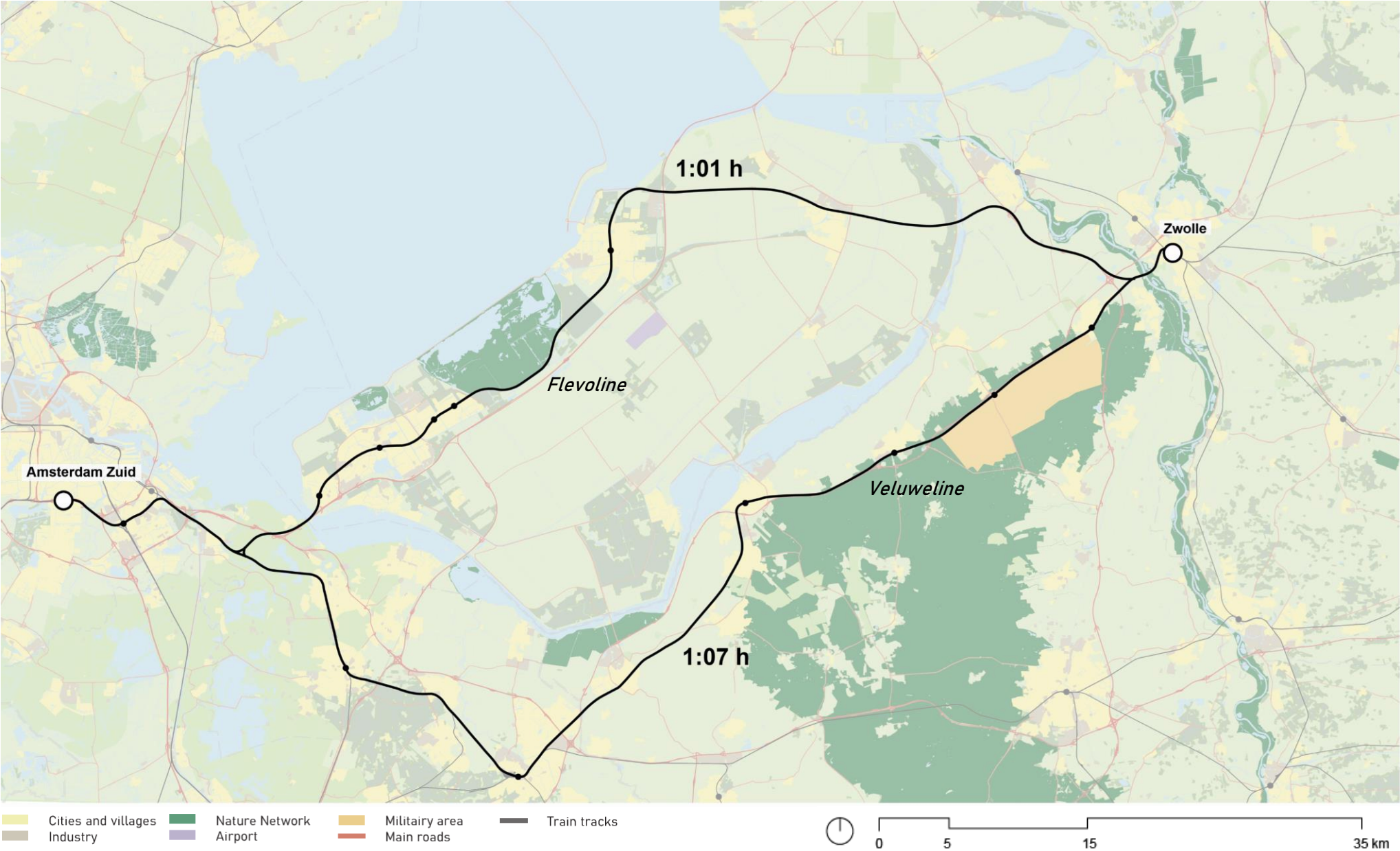
“ Zwolle is one of the most important railroad hubs in the Netherlands ”

ProRail (2021)

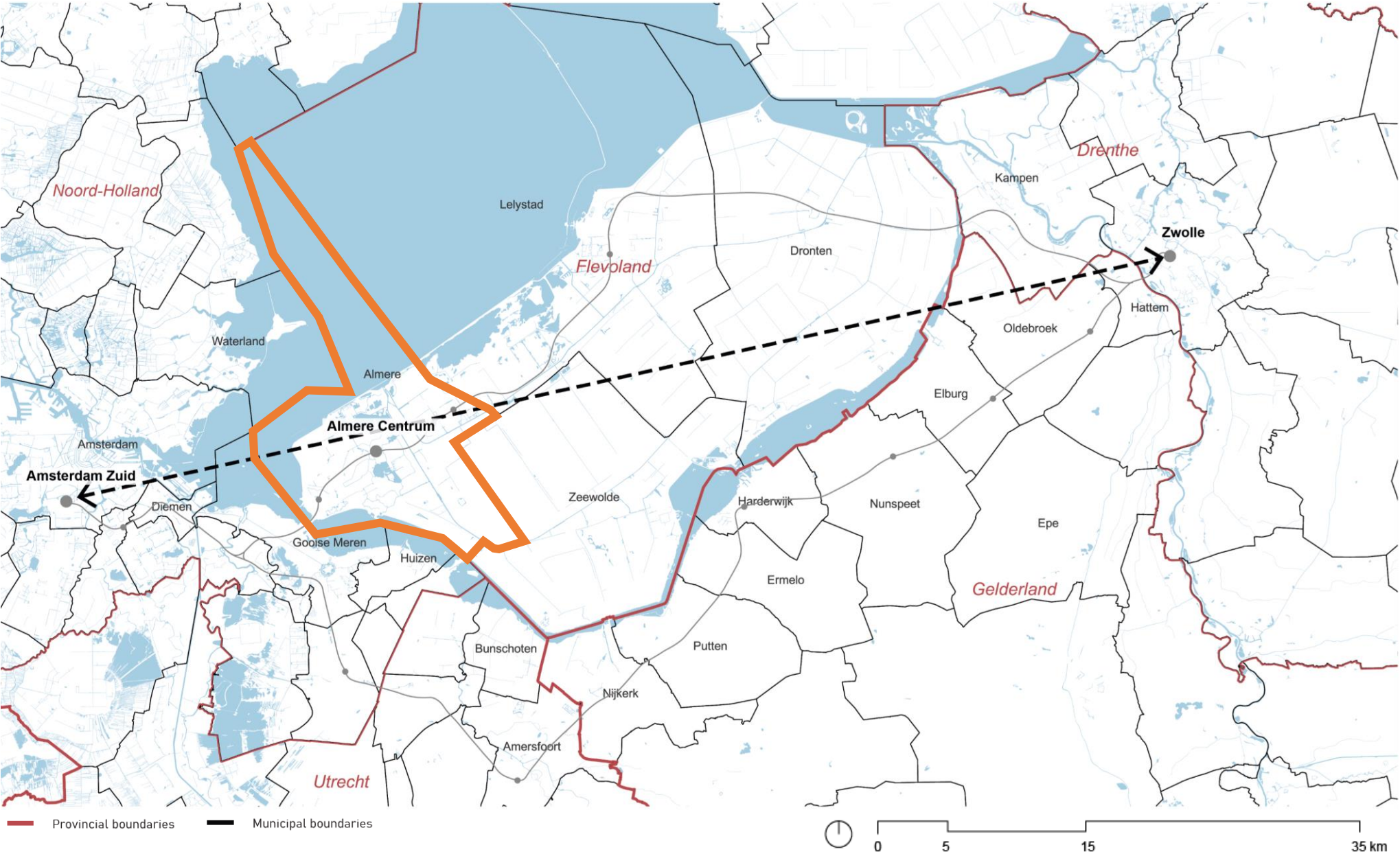


PHASE I

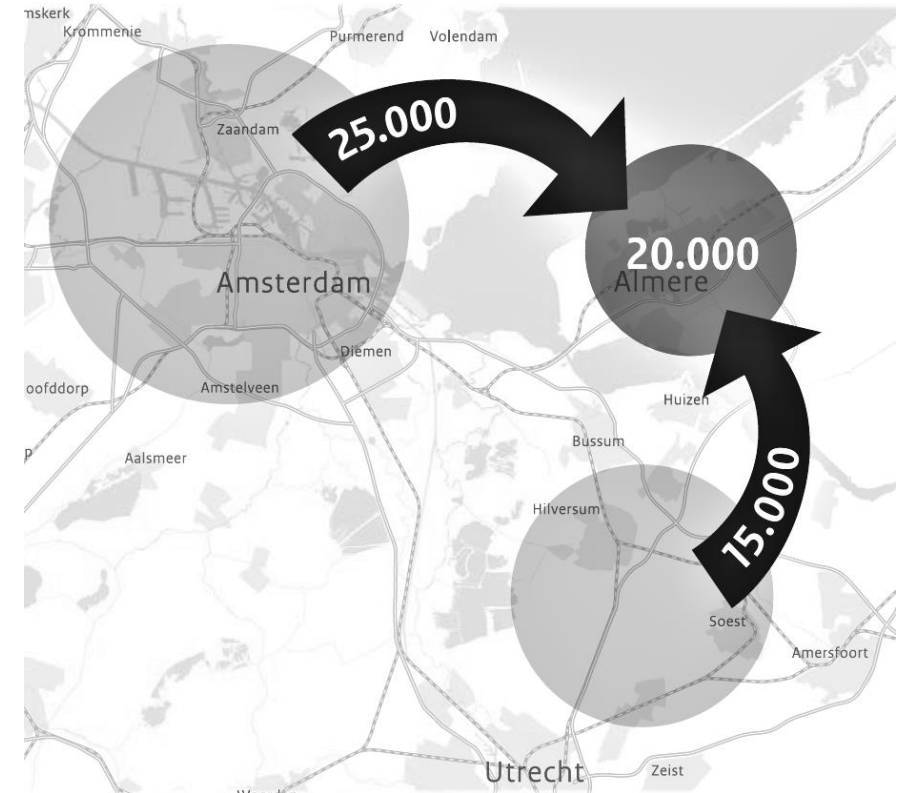
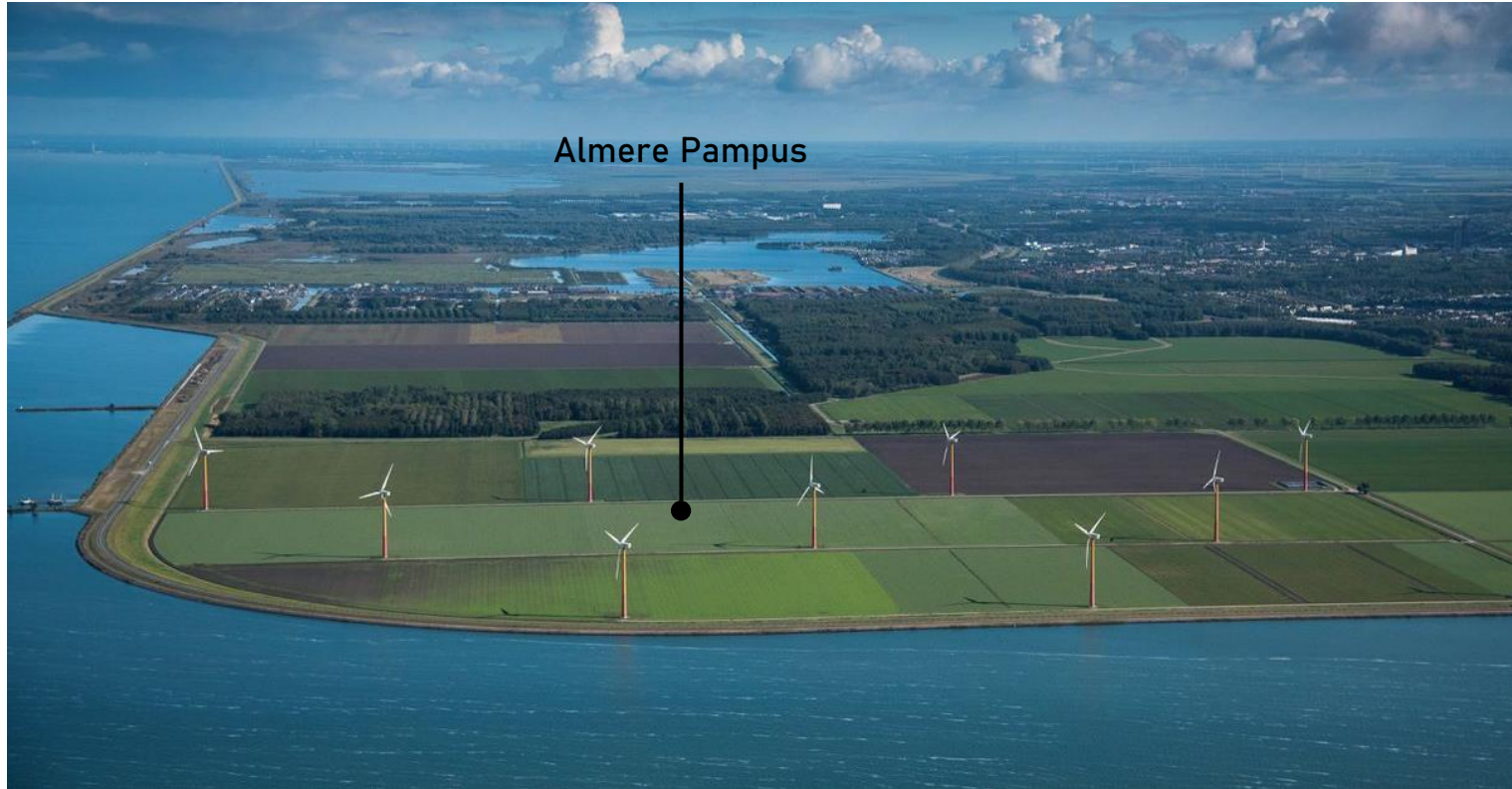
Current train connections



Straight line goes through Almere



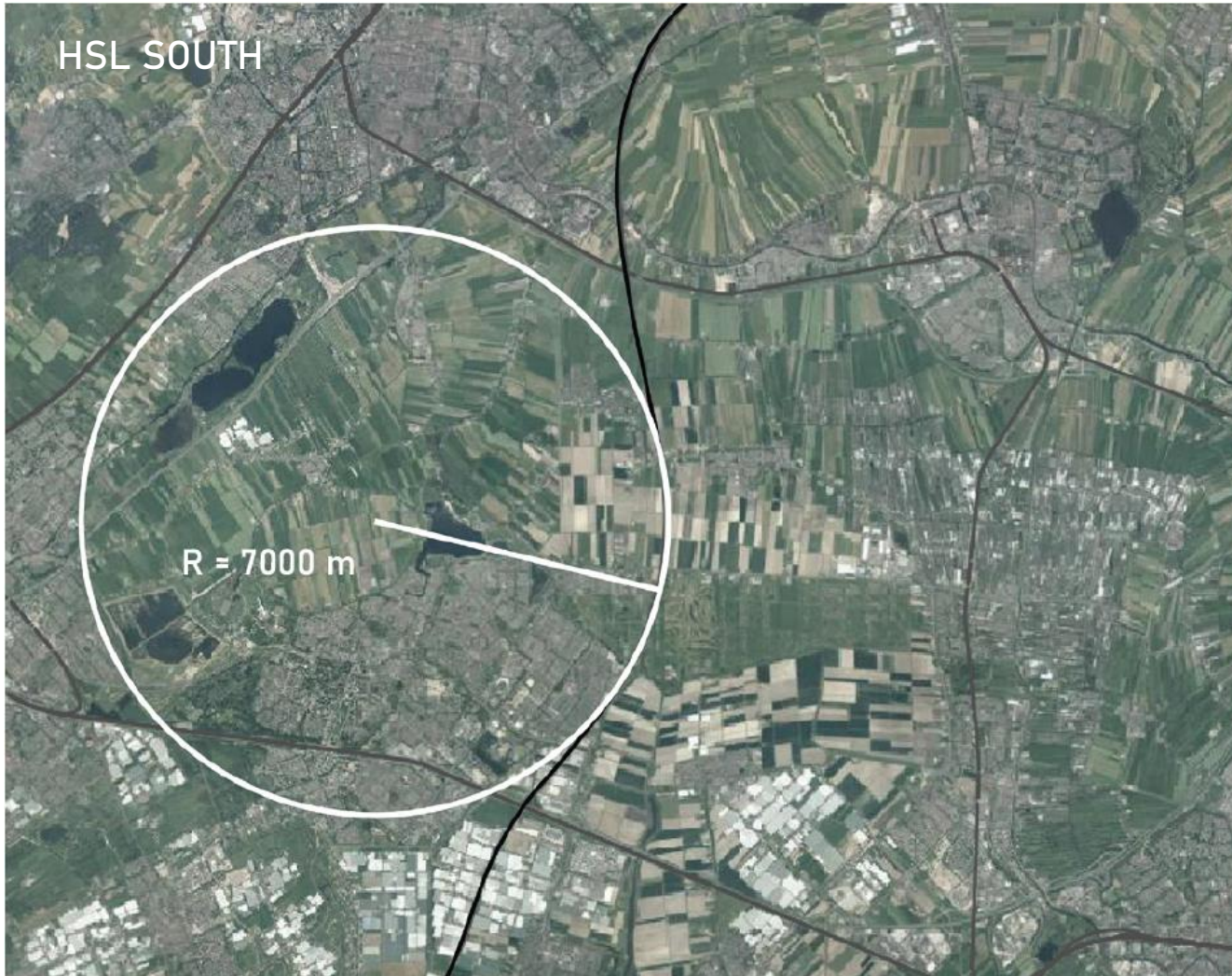
Almere offers opportunities for new housing development



IJmeer subway connection improves attractiveness of Almere



Required high-speed curve radii

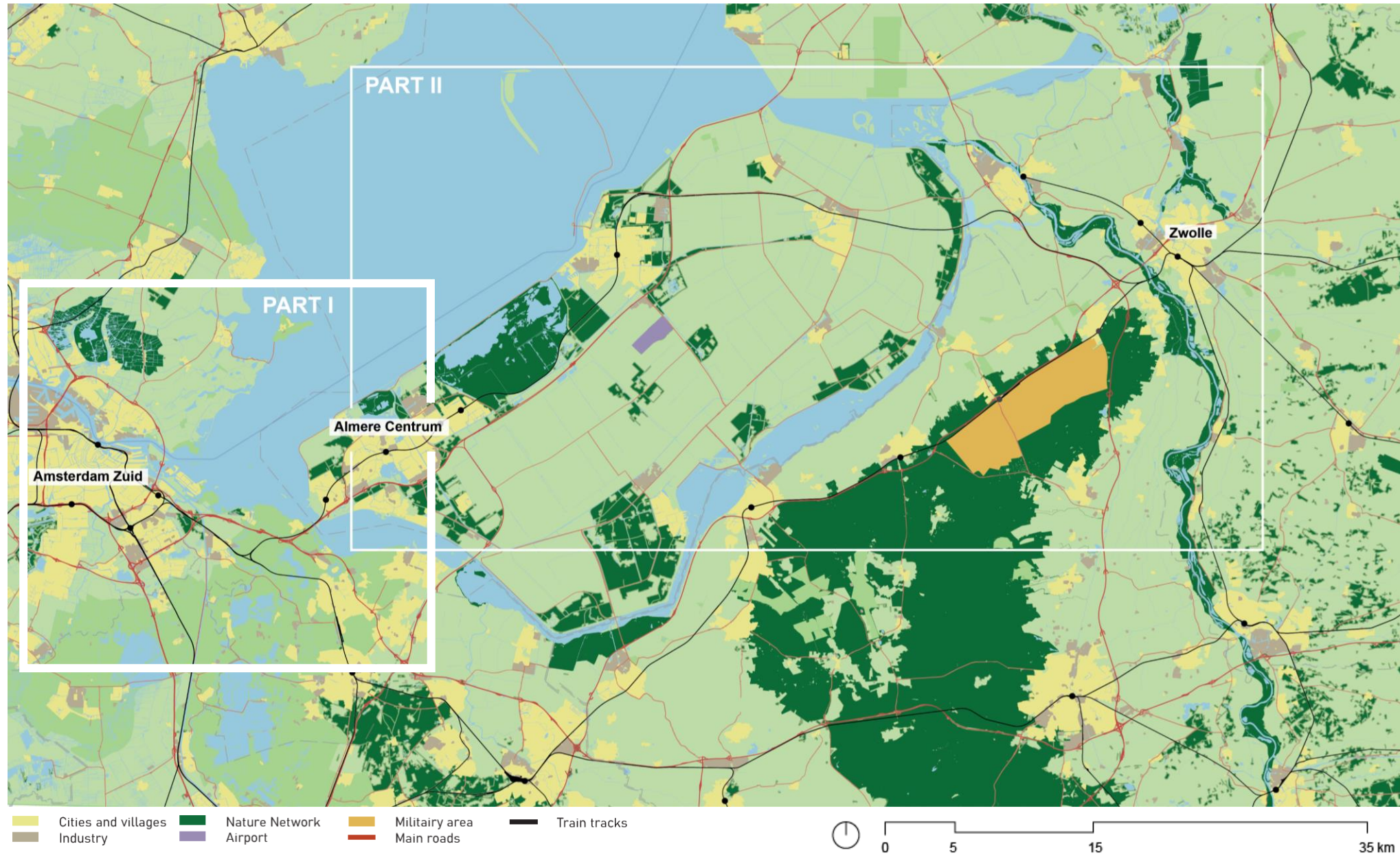


$V_{\max}$ (km/h)	Type of Track	$R_{\min}$ (m)		
		Good	Normal	Special
250	Ballastless track	3500	3000	3000
	Ballasted track	4000	3500	3000
300	Ballastless track	5000	4500	4000
350	Ballasted track	5500	5000	4500
	Ballastless track	7000	6500	5500
	Ballasted track	7500	7000	6000

The 'wire method'



Two parts for alignment study



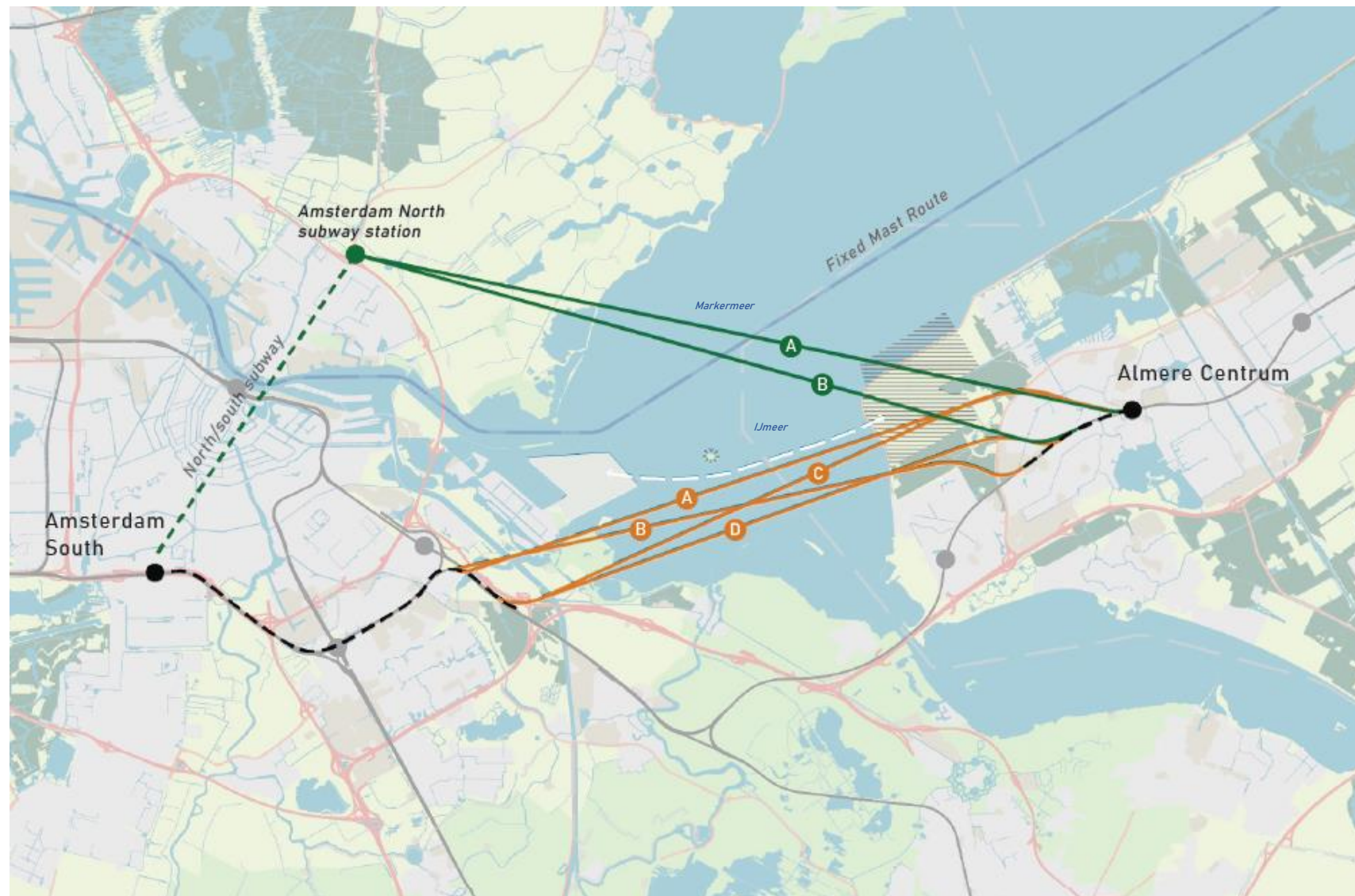
PART ONE

AMSTERDAM SOUTH - ALMERE

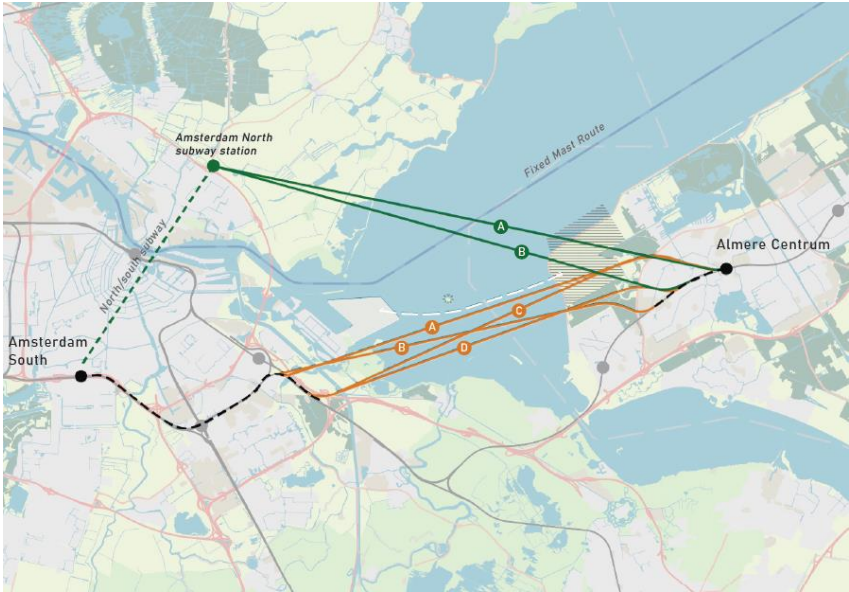
● Markermeer

● IJmeer

- Cities and villages
- Industry
- Nature Network
- Main roads
- Existing train tracks
- Pampus island

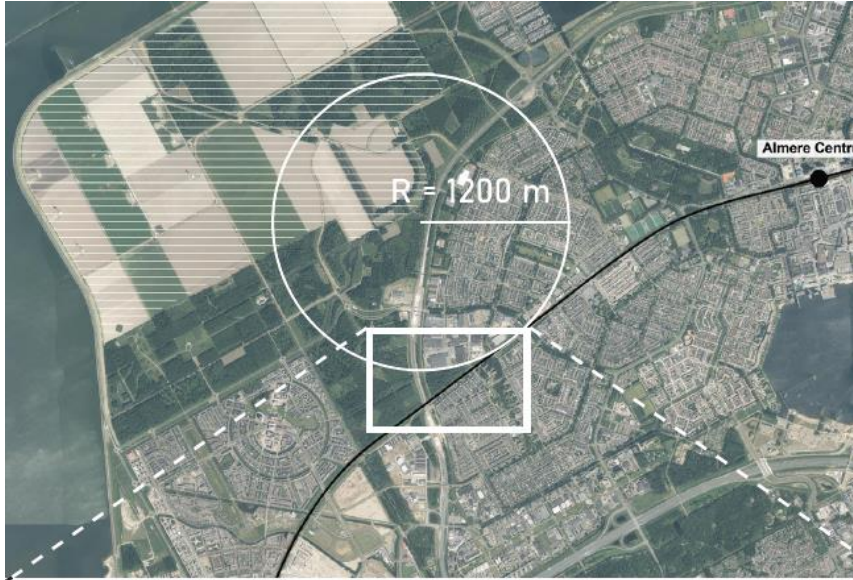


Line assessment: ● IJmeer. B scores best



	Crossing Fixed Mast Route	Compatibility with IJmeer Connection	Impact on urban development	Travel time (min)
● Markermeer. A	yes	low	high	18
● Markermeer. B	yes	low	high	18
● IJmeer. A	no	high	medium	8
● IJmeer. B	no	high	low	8
● IJmeer. C	no	medium	medium	9
● IJmeer. D	no	low	low	9

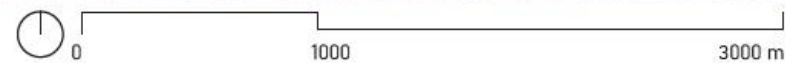
How to enter Almere



Alignment through Almere



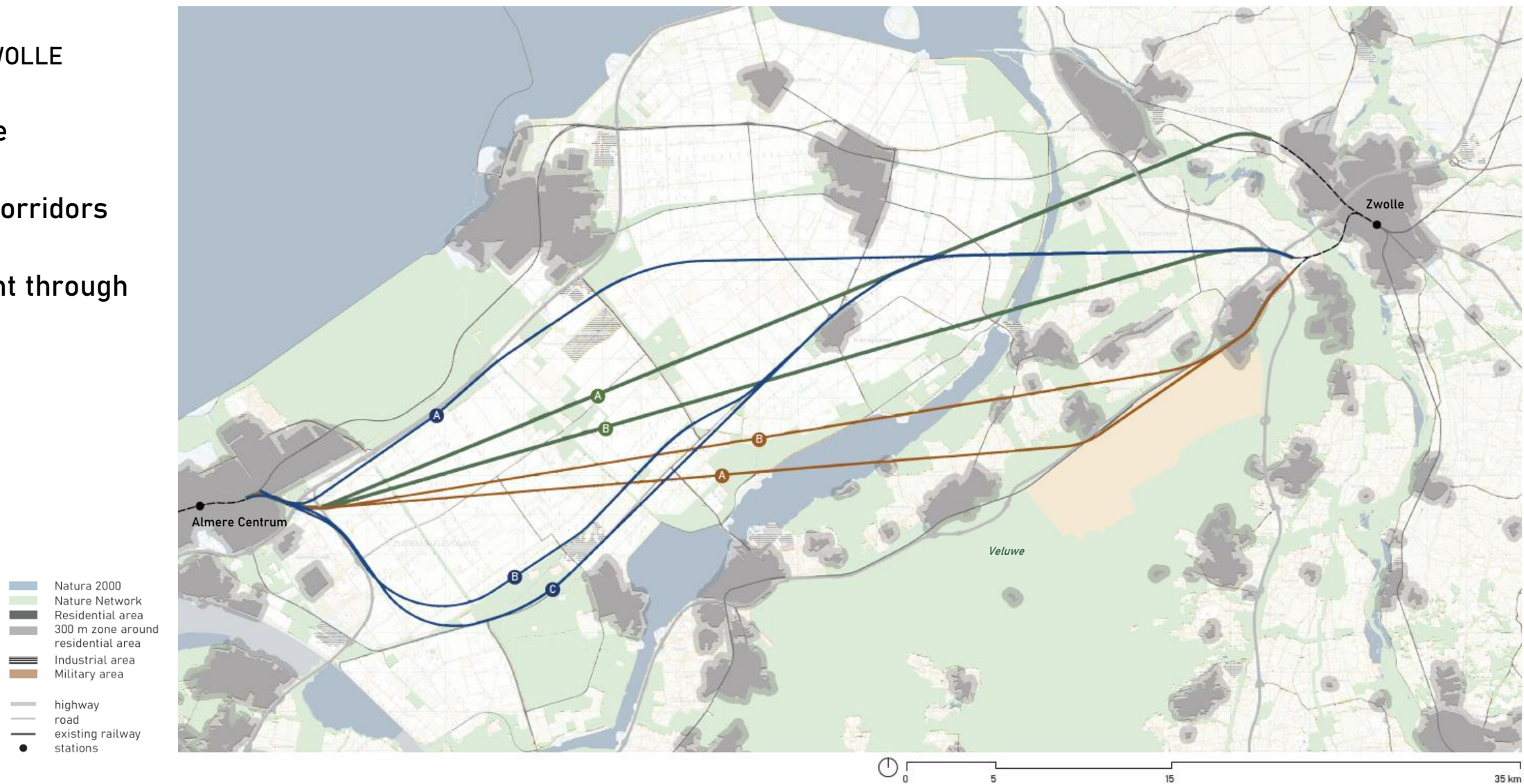
— preferred HSL alignment



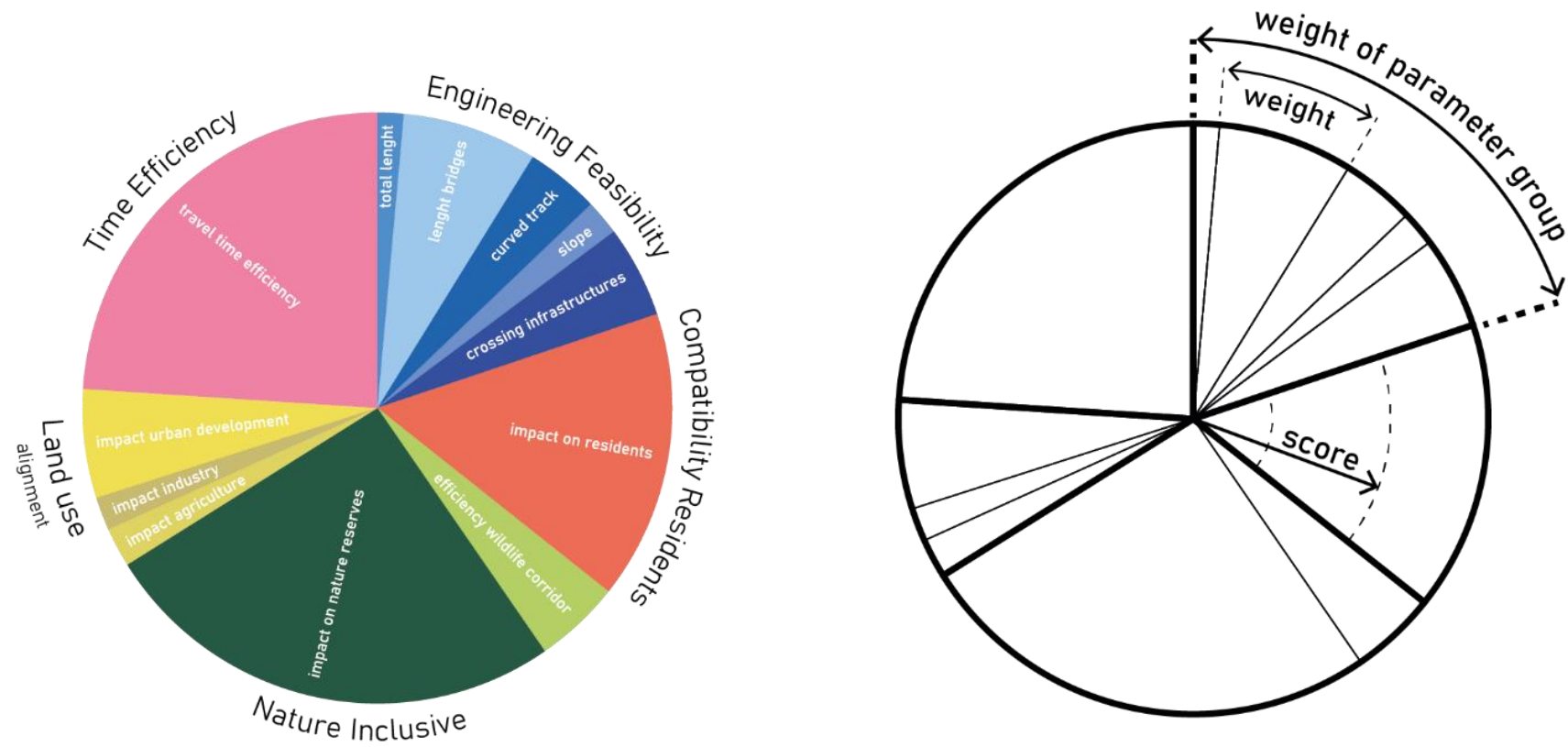
PART TWO

ALMERE – ZWOLLE

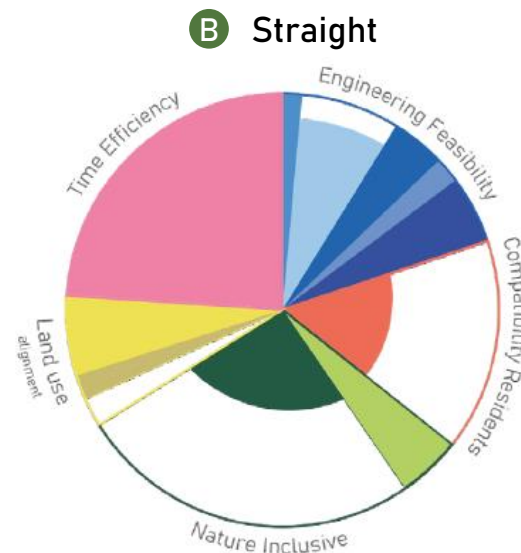
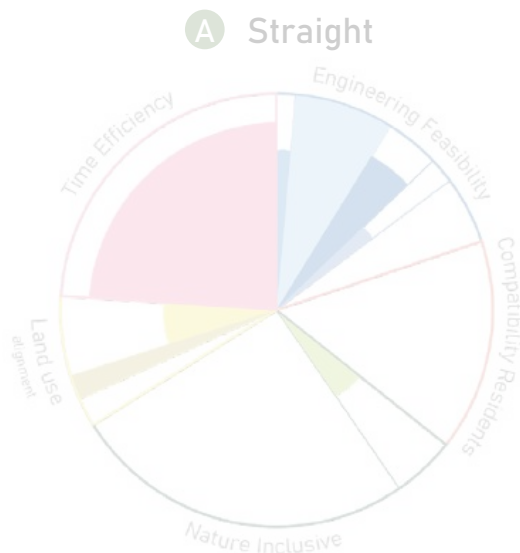
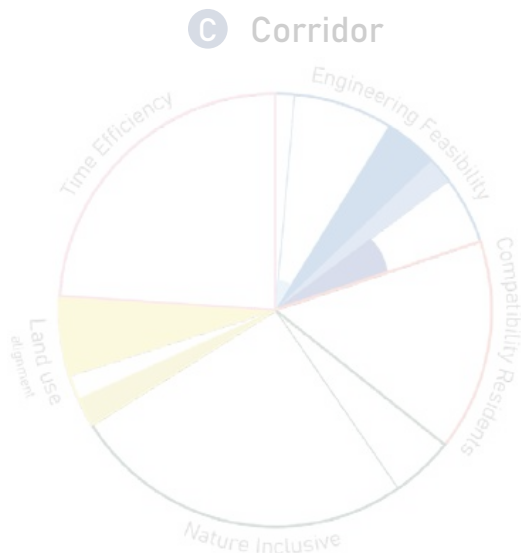
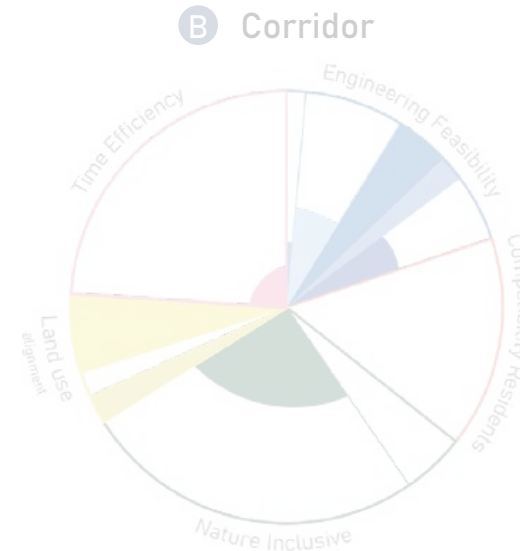
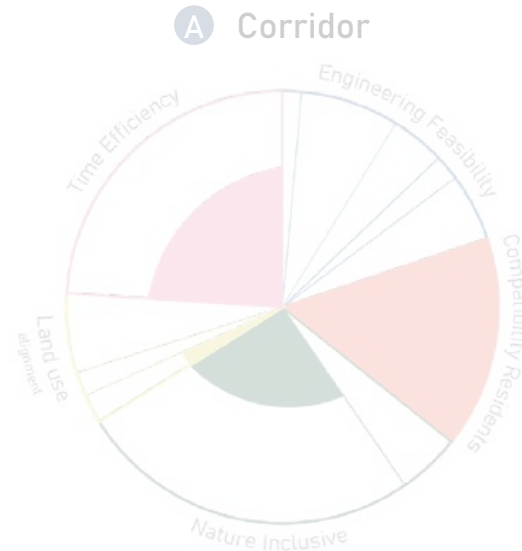
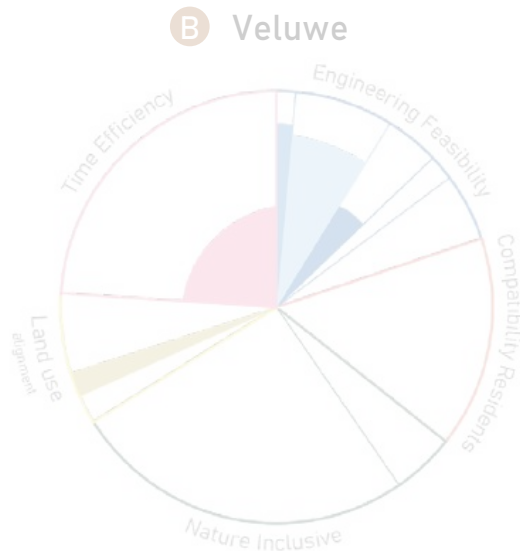
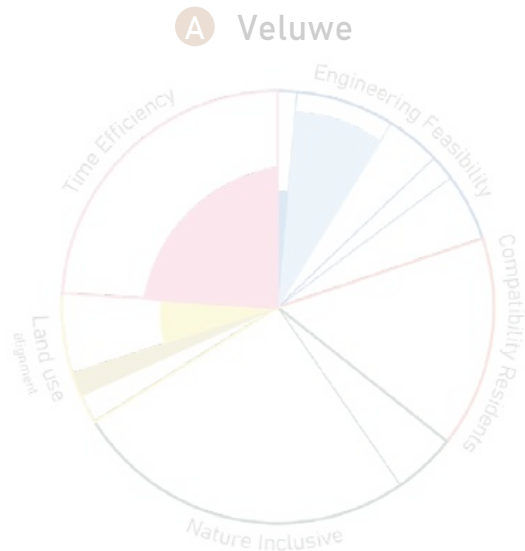
- Veluwe
- Infra Corridors
- Straight through polder



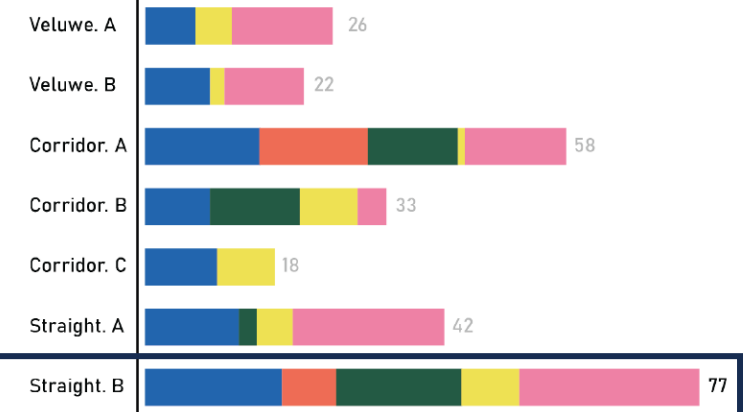
11.000 participants: “Lelyline should be fast and nature friendly”



Multi-Criteria Analysis



TOTAL SCORES



PREFERRED ALIGNMENT

22 minutes ride

Time win of 35 minutes

80 % straight, modular track



PHASE II

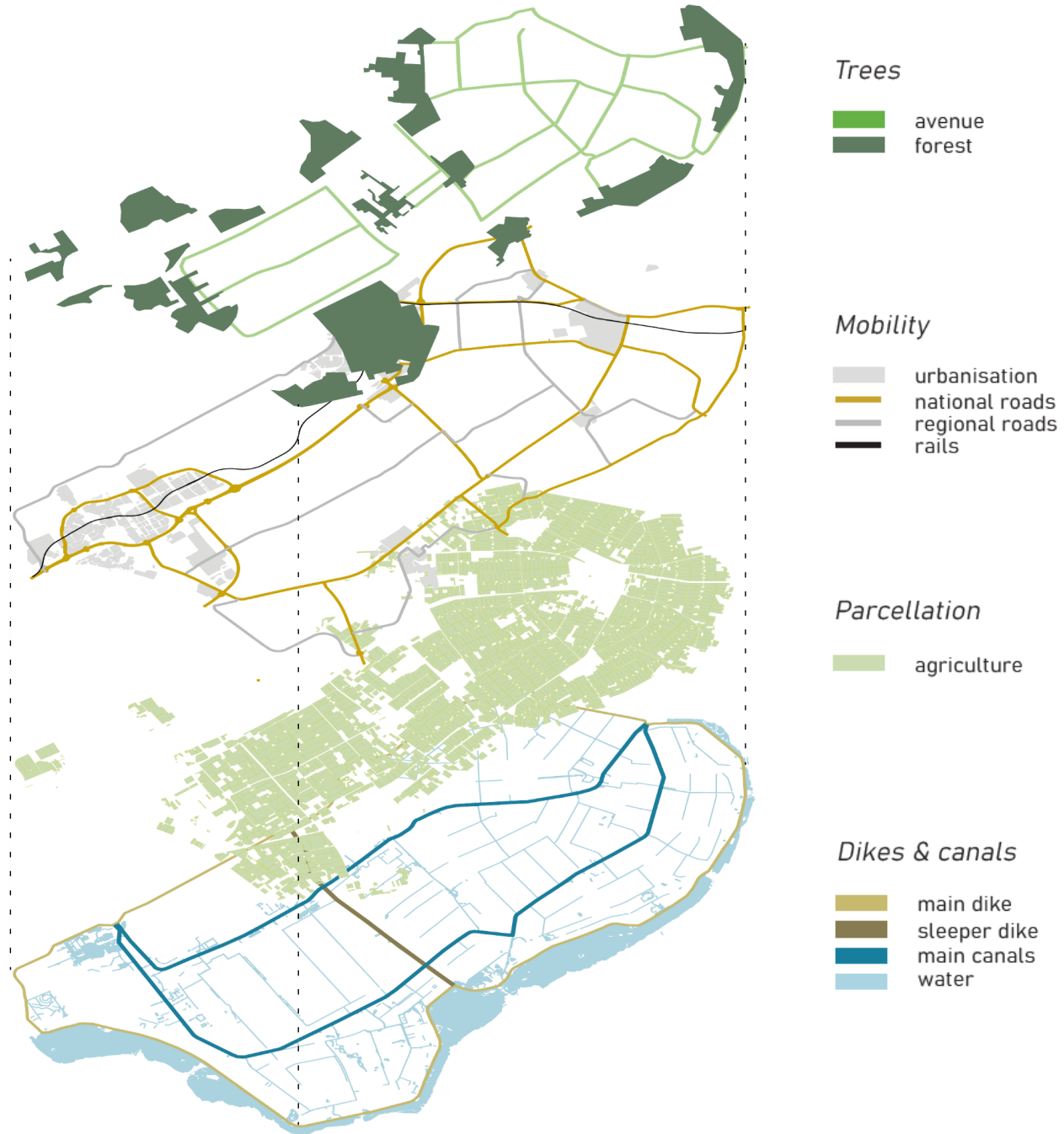






“ No variety for the sake of variety ”

Hudigs et al. (1928)



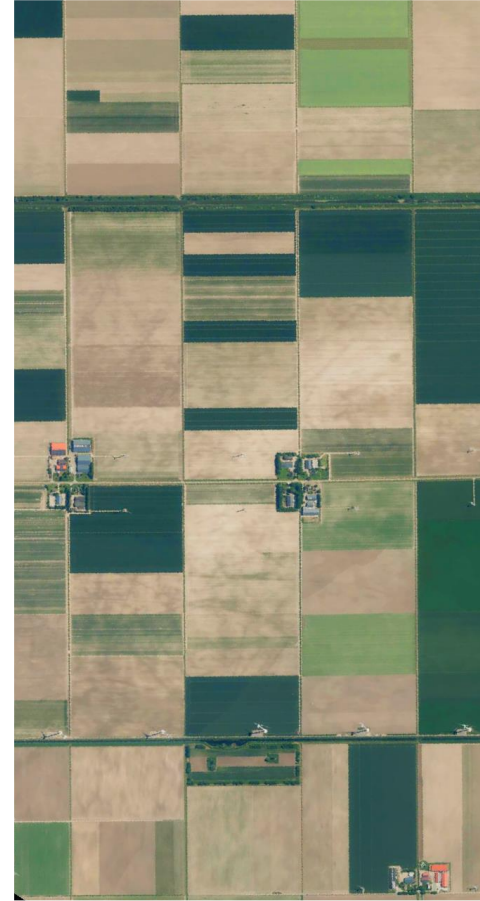
Open / closed



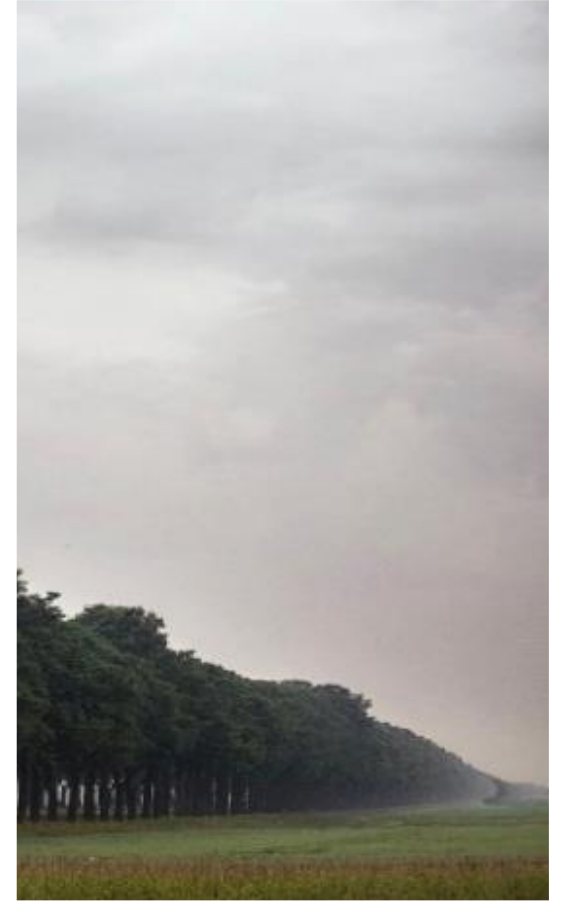
Long, wide ditches



Rythm



Strong sightlines



Neat and aligned



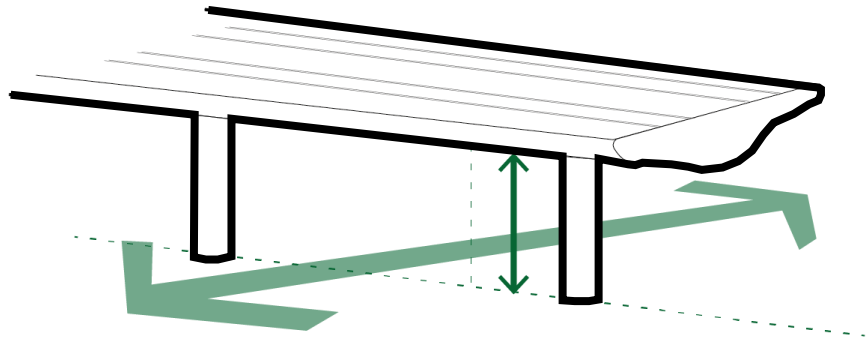
CLUTTERED LANDSCAPE



Chaos & conflicts
Structure & integration

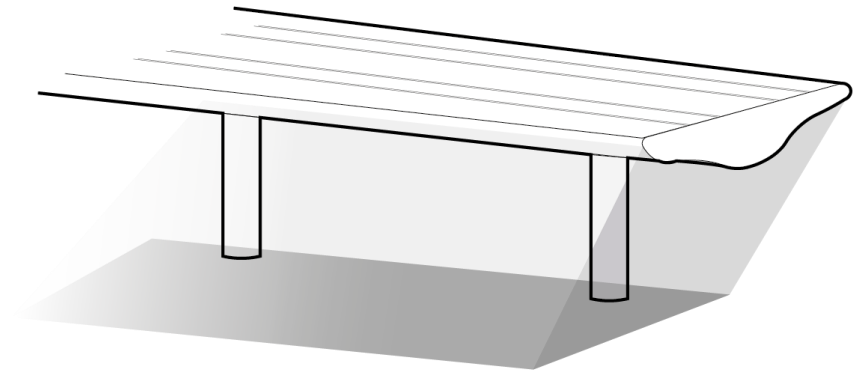


THE VIADUCT



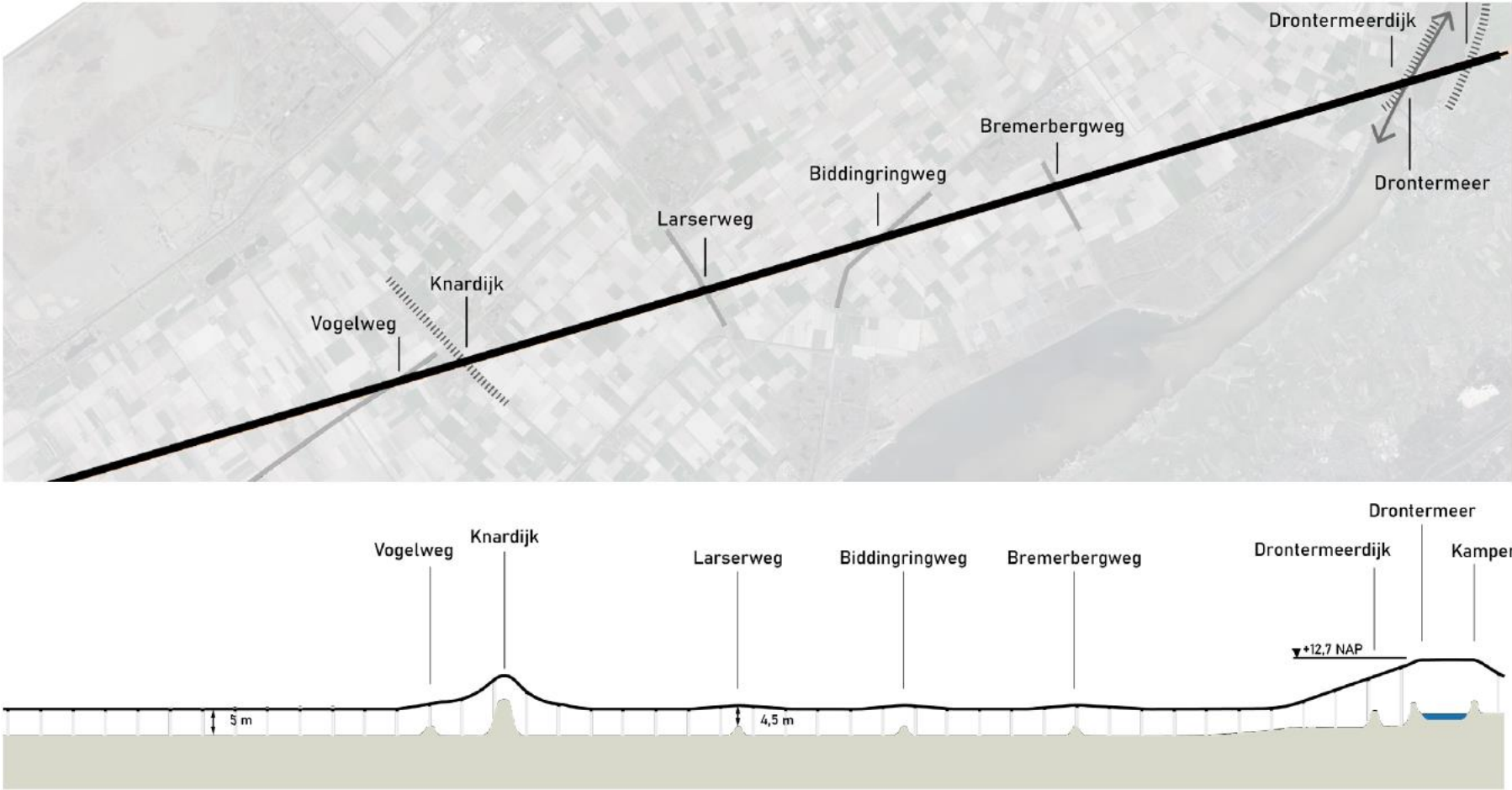
Accessibility of land, look & proportions

COLLATERAL EFFECT: SHADOW

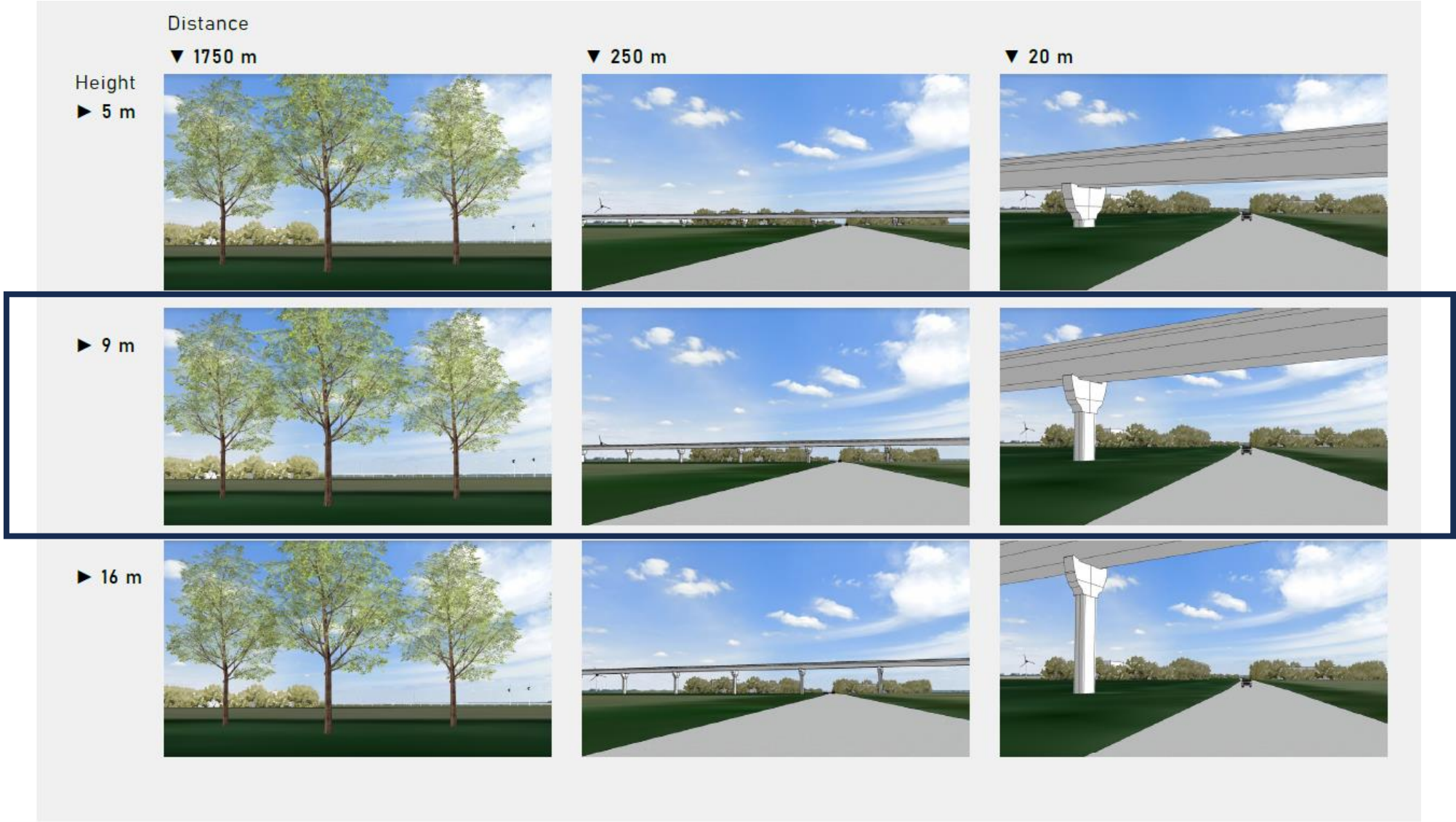


Opportunities of shaded cropland

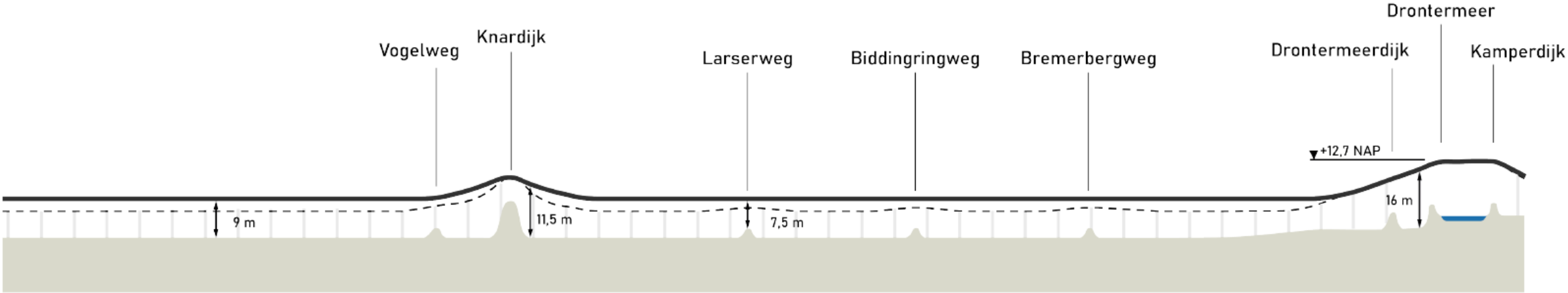
Required height profile: 5 m free height



Height & perspective

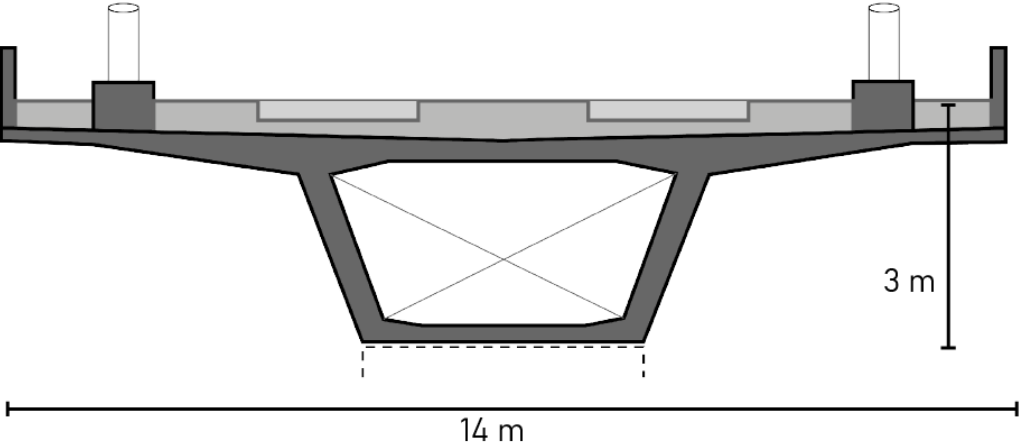


Height profile: 9 m free height

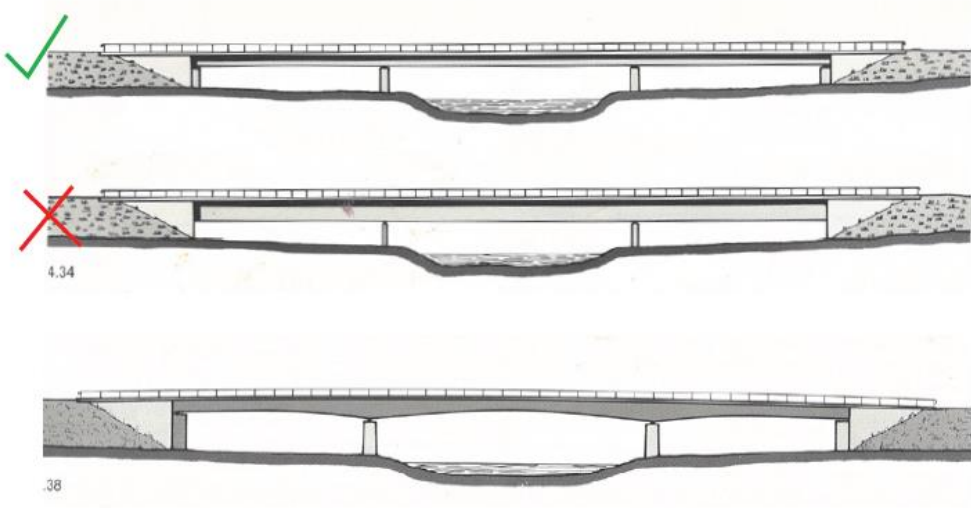


Construction:

Section beam construction

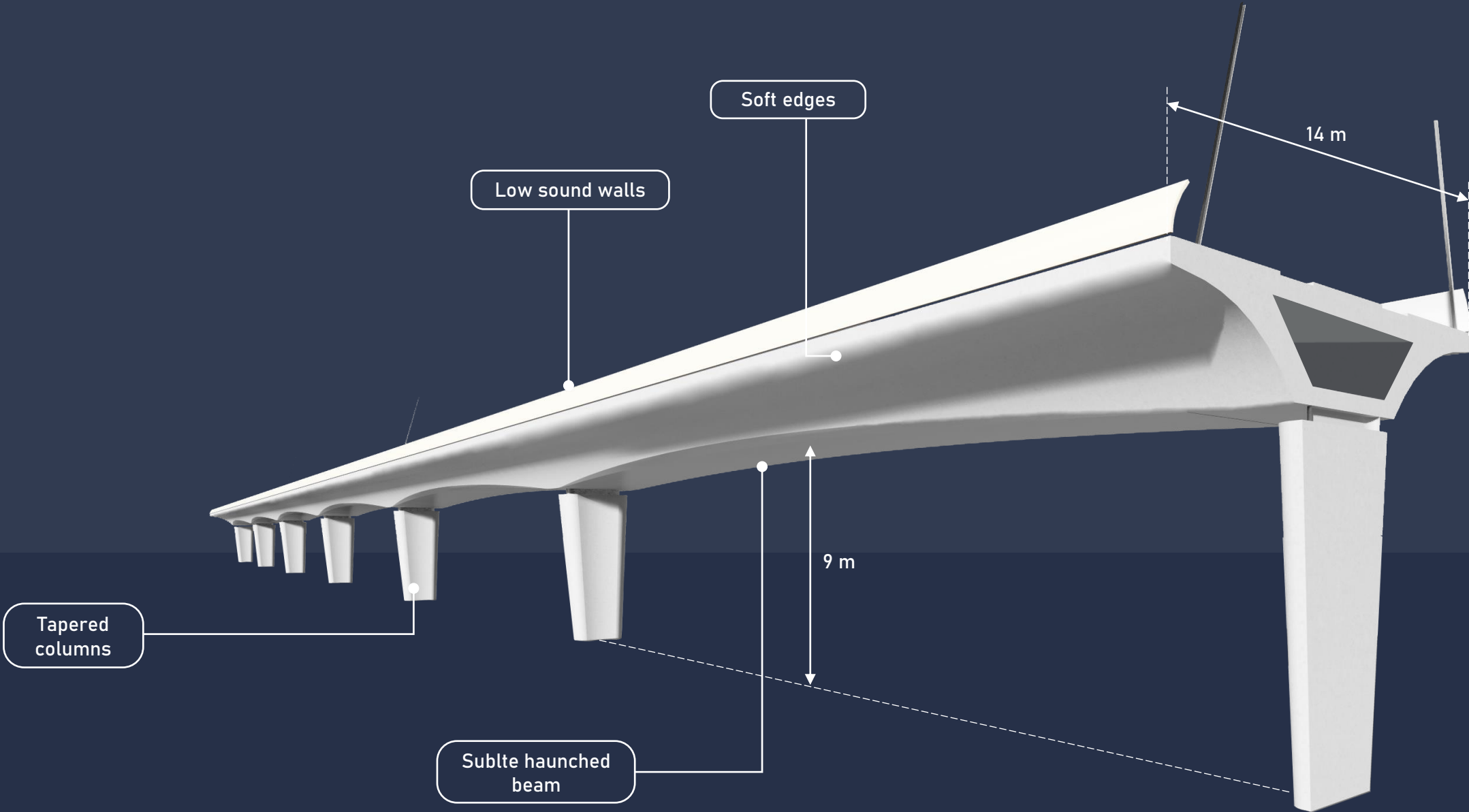


Rules of thumb: proportions



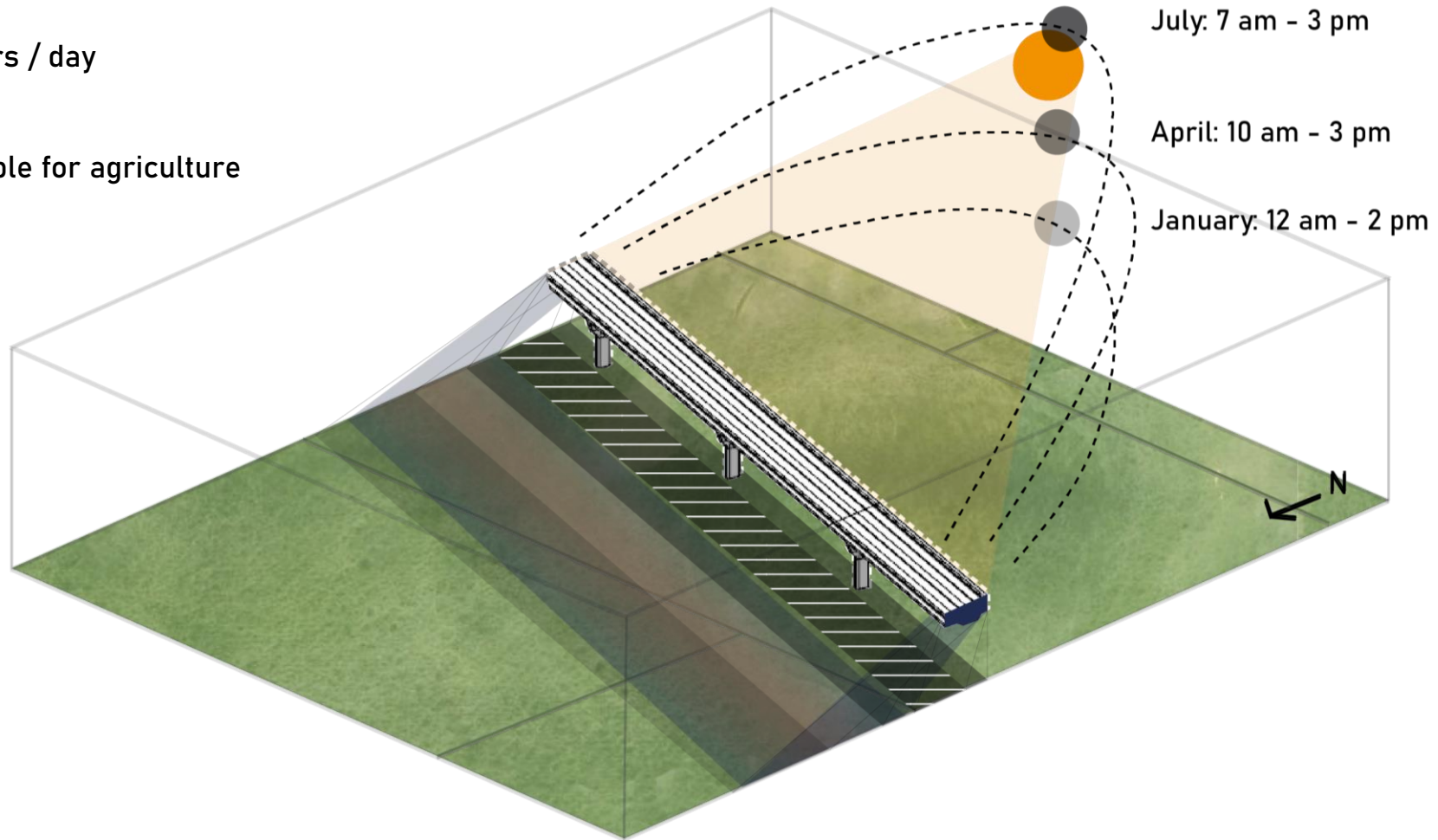
Step-by-step modelling



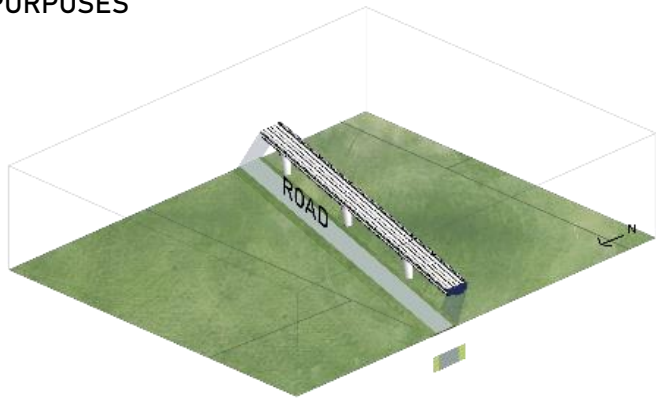


SHADOW IMPACT

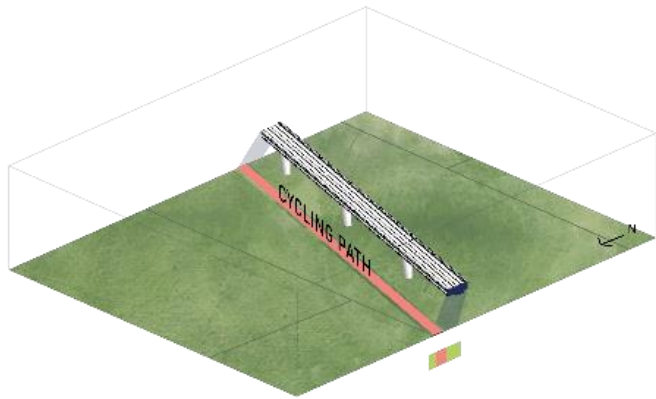
- 6,5 shaded hours / day
- 14 meters wide
- no longer suitable for agriculture



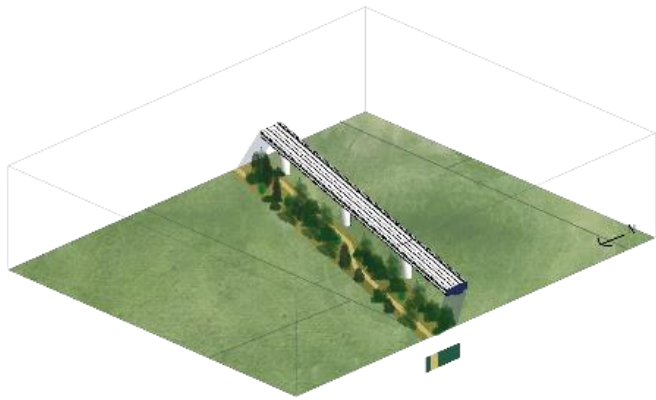
 MOBILITY
PURPOSES



Road

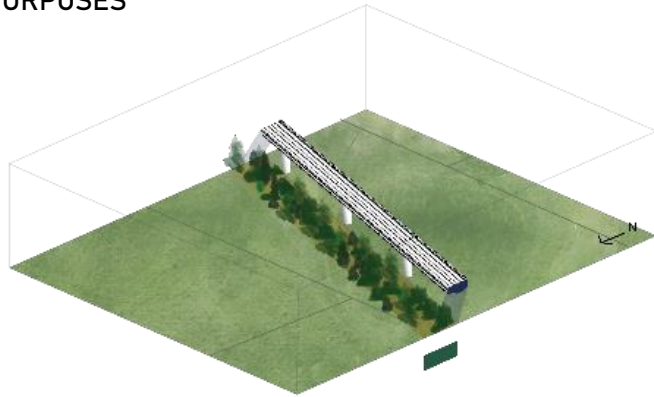


Cycling path

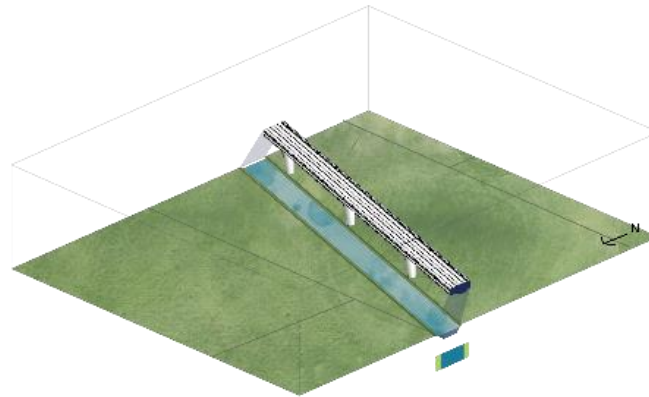


Pedestrian path

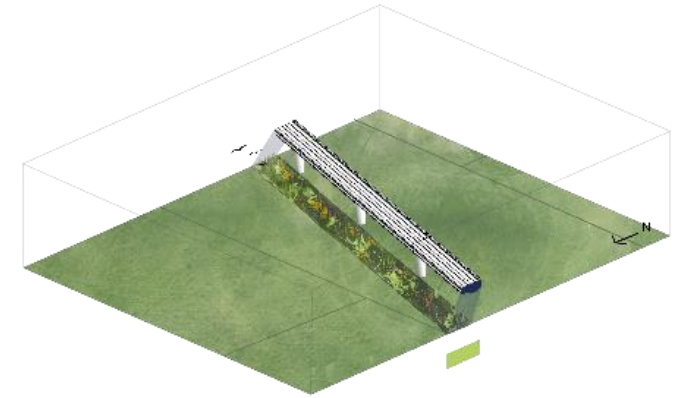
 ECOLOGICAL
PURPOSES



Forest

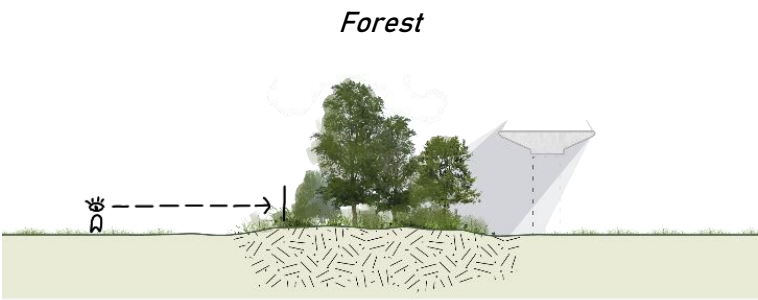


Wet zone

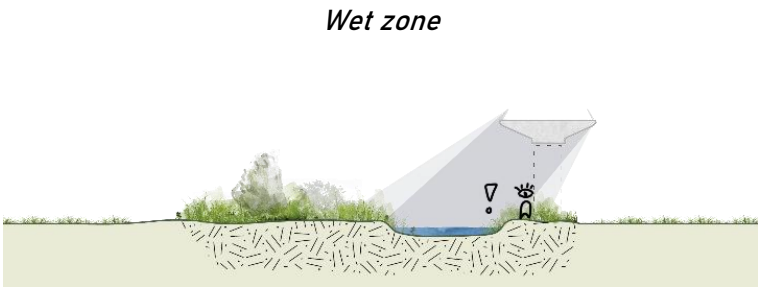


Low shadow vegetation

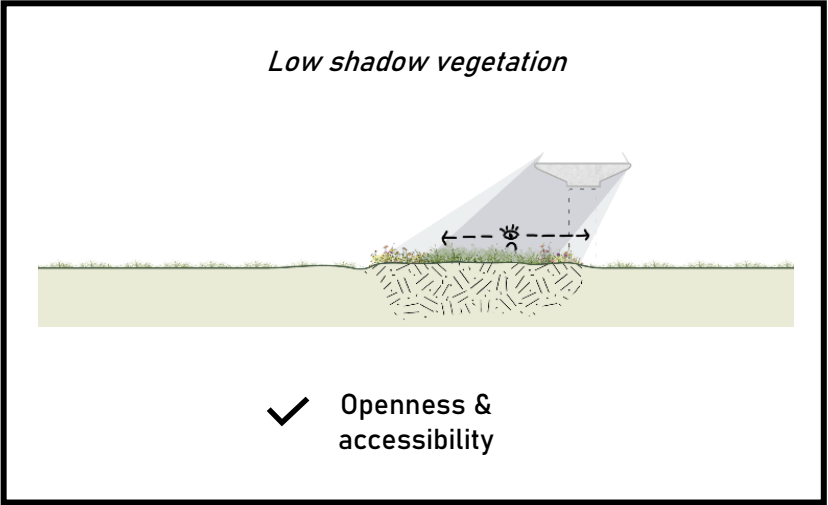
increase **biodiversity** & a **boost** for insects

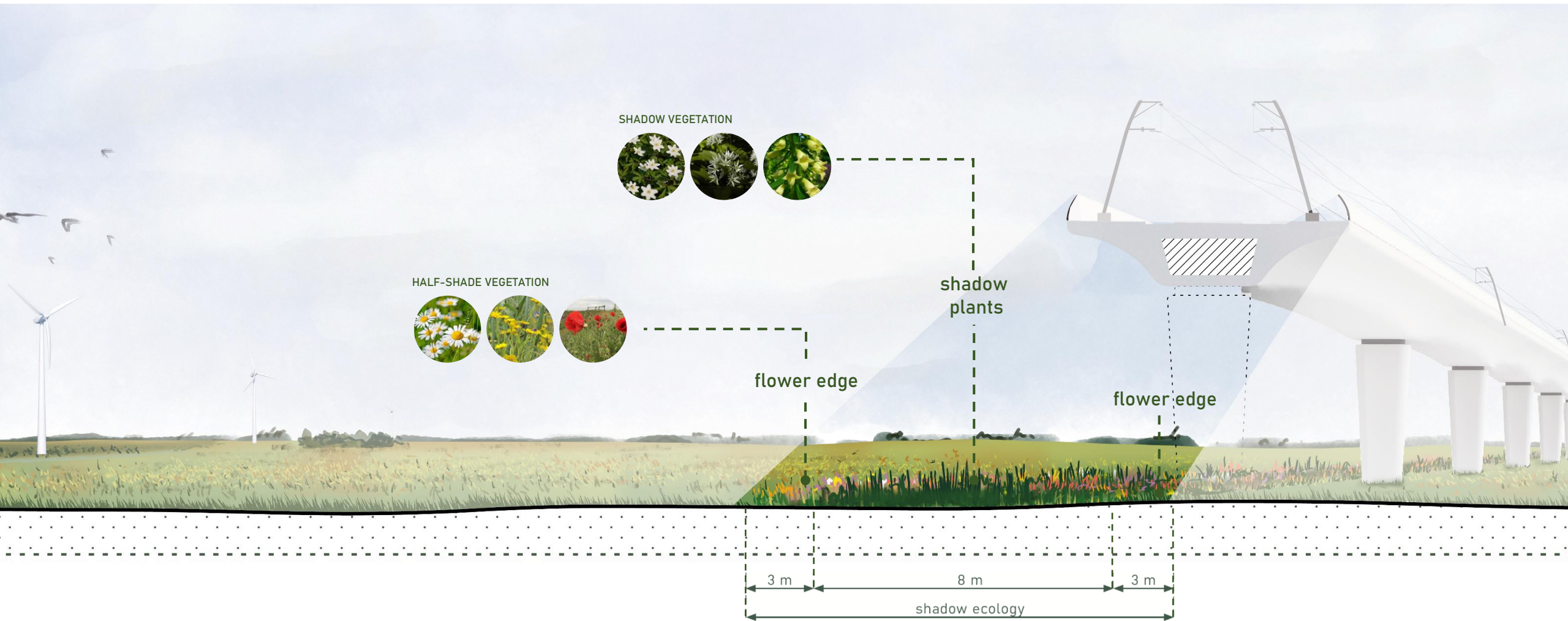


✗ Visual barrier



✗ Physical barrier

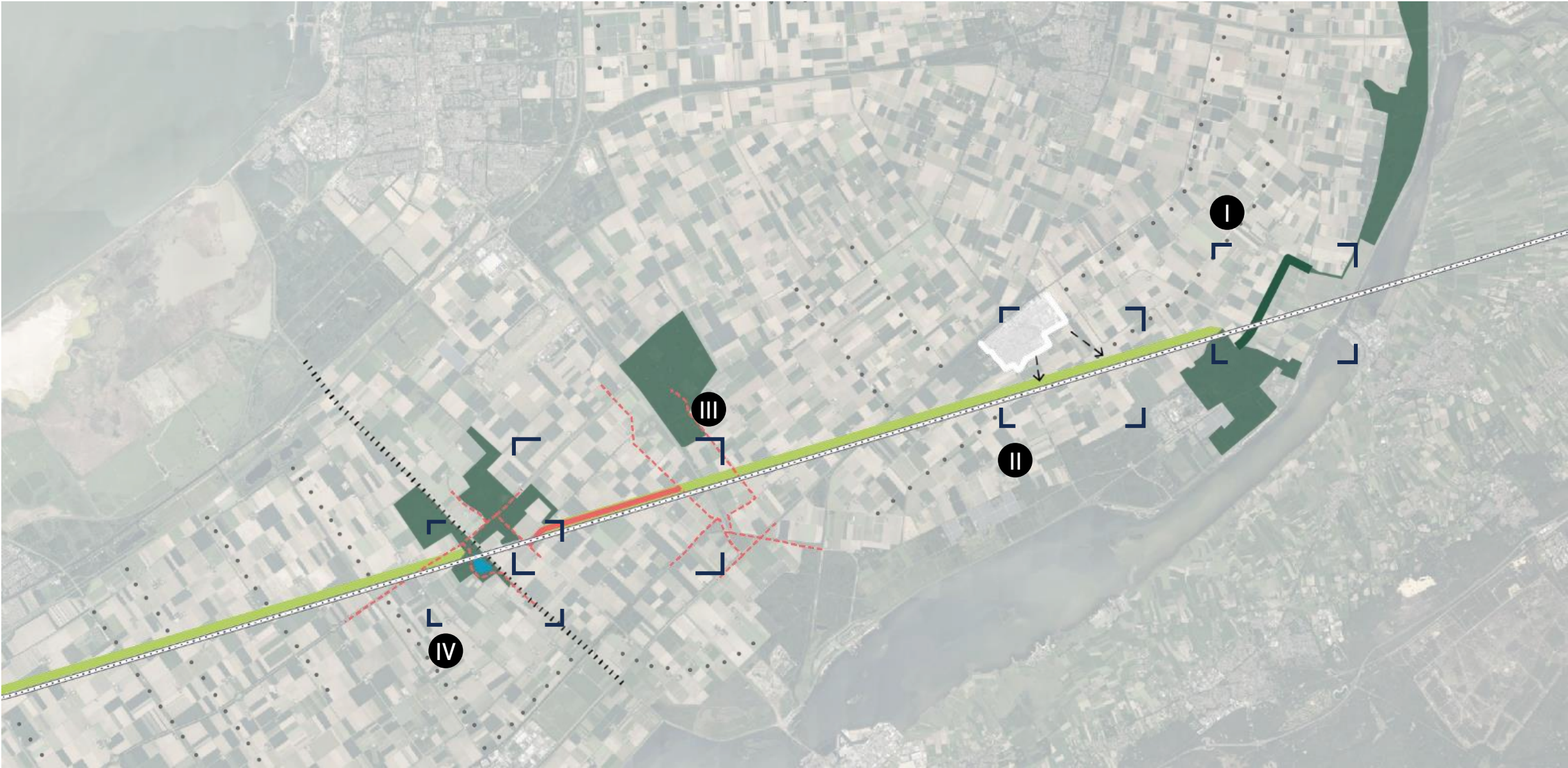




Interconnected ecological network

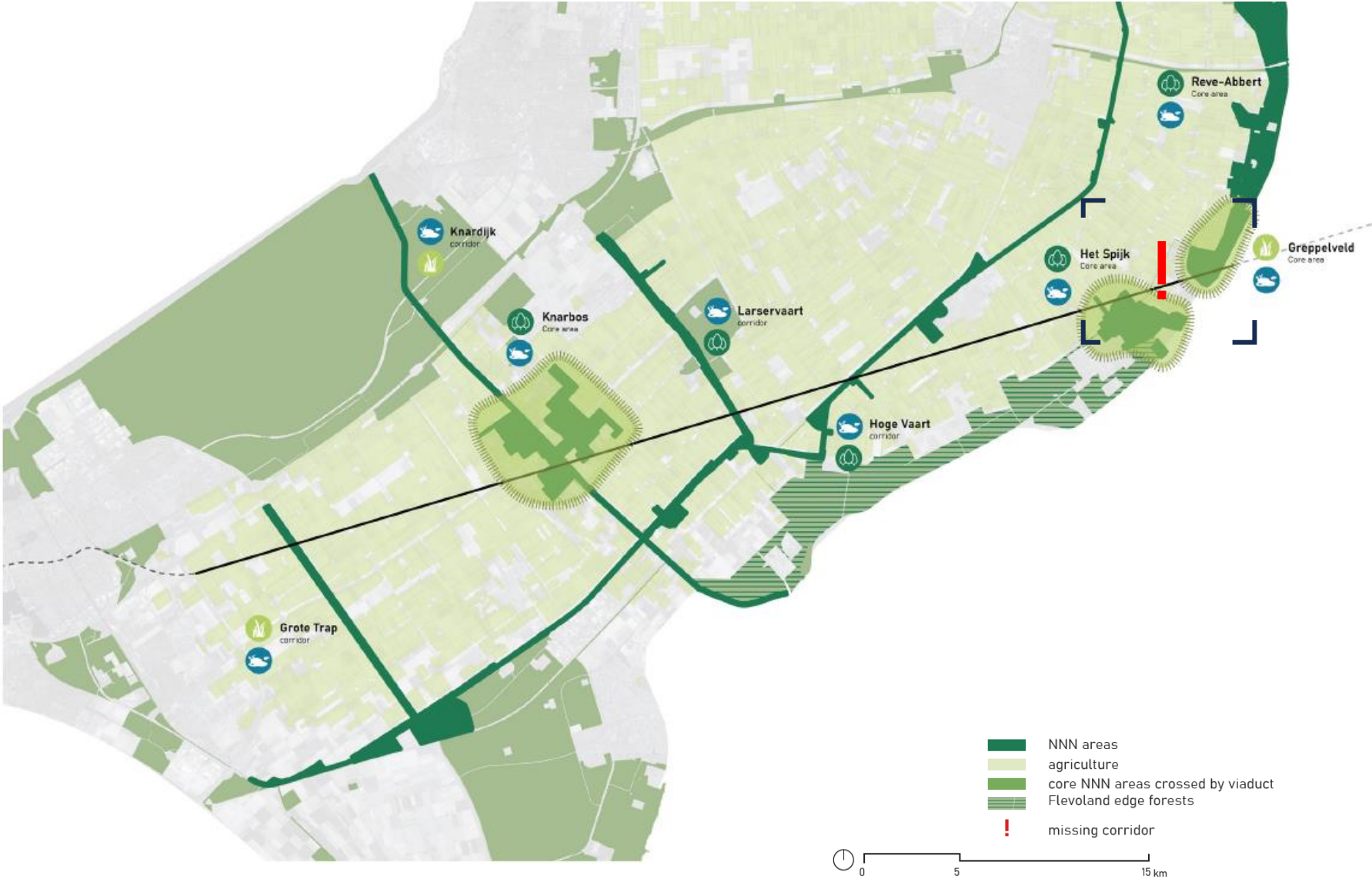


Masterplan high-speed landscape





Nature Network Flevoland



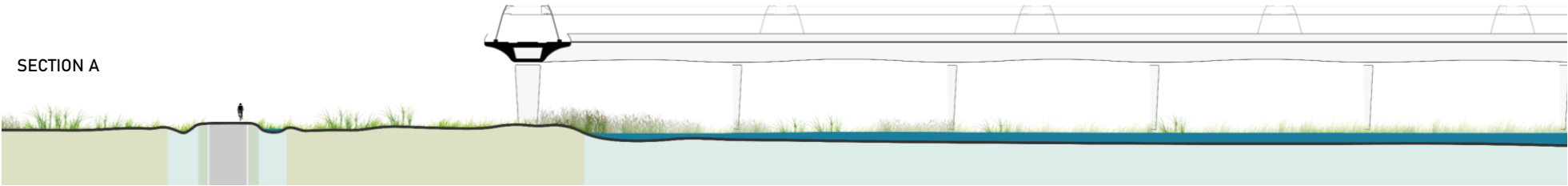
Optional routes for new wildlife corridor







SECTION A



- wet meadow
- agricultural land
- ditch & pond
- forest vegetation
- road
- bike path

0 3 10 m



SECTION B



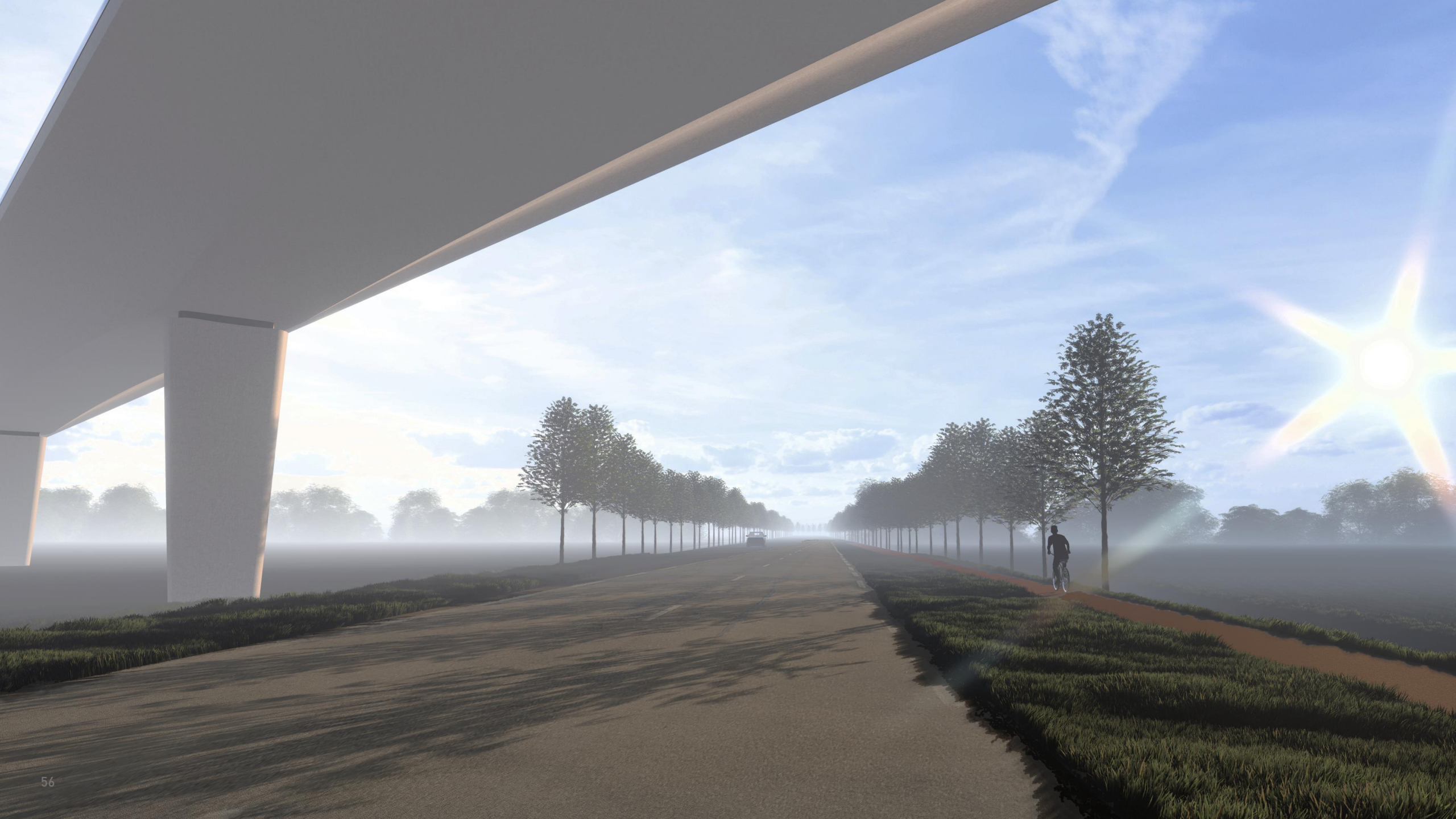
- | | | |
|---|---|---|
|  wet meadow |  ditch & pond |  road |
|  agricultural land |  forest vegetation |  bike path |





- wet meadow
- agricultural land
- ditch & pond
- forest vegetation
- road
- bike path







Open view from Biddinghuizen





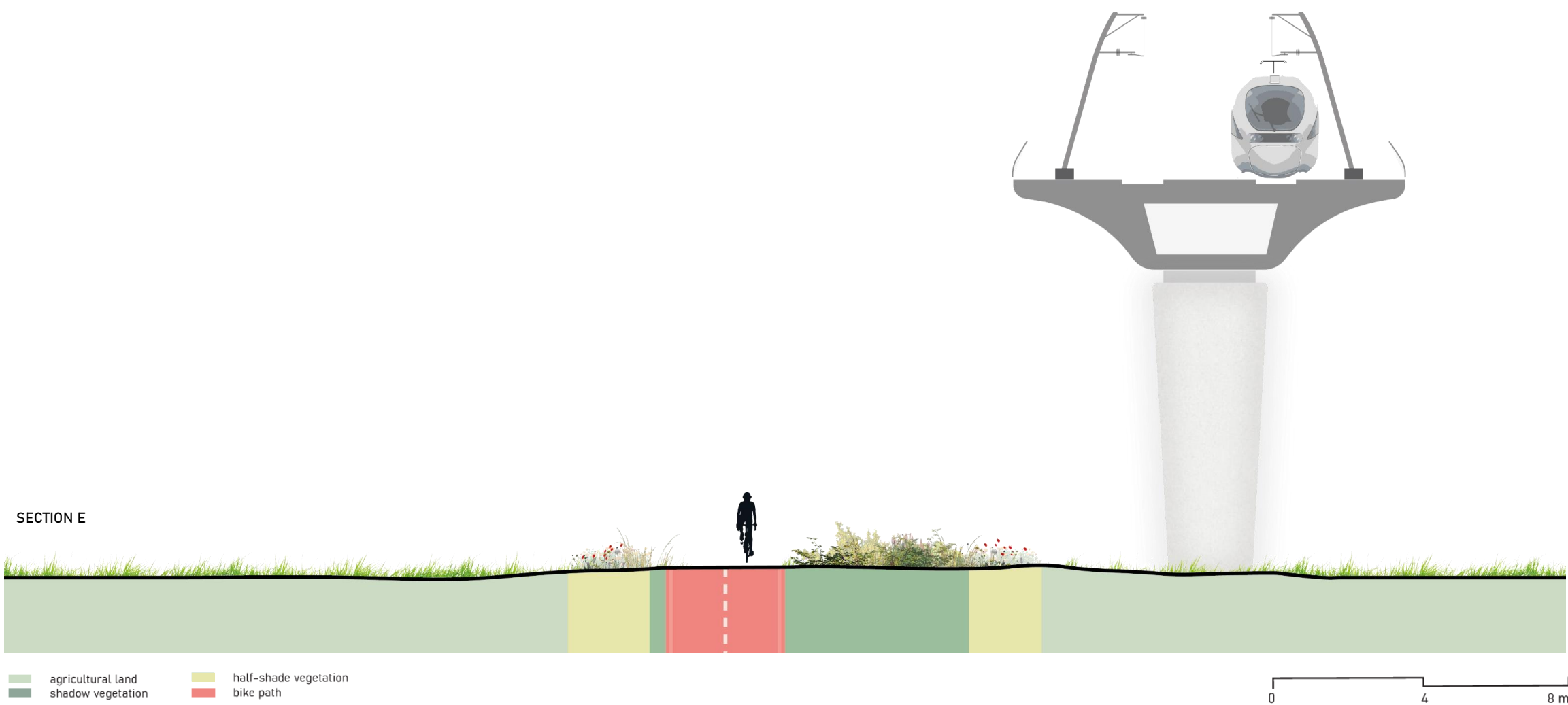


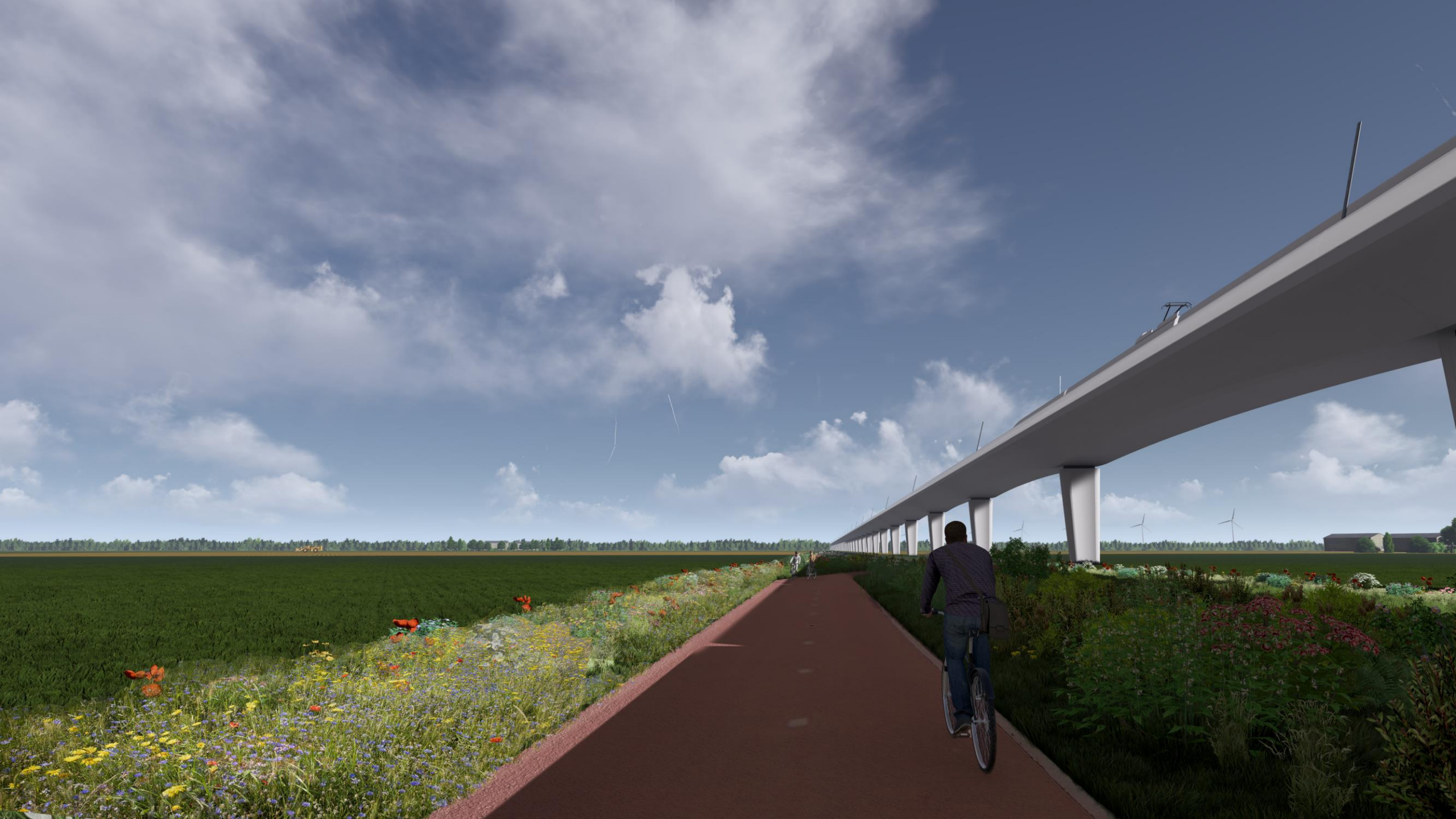


Open centre of polder











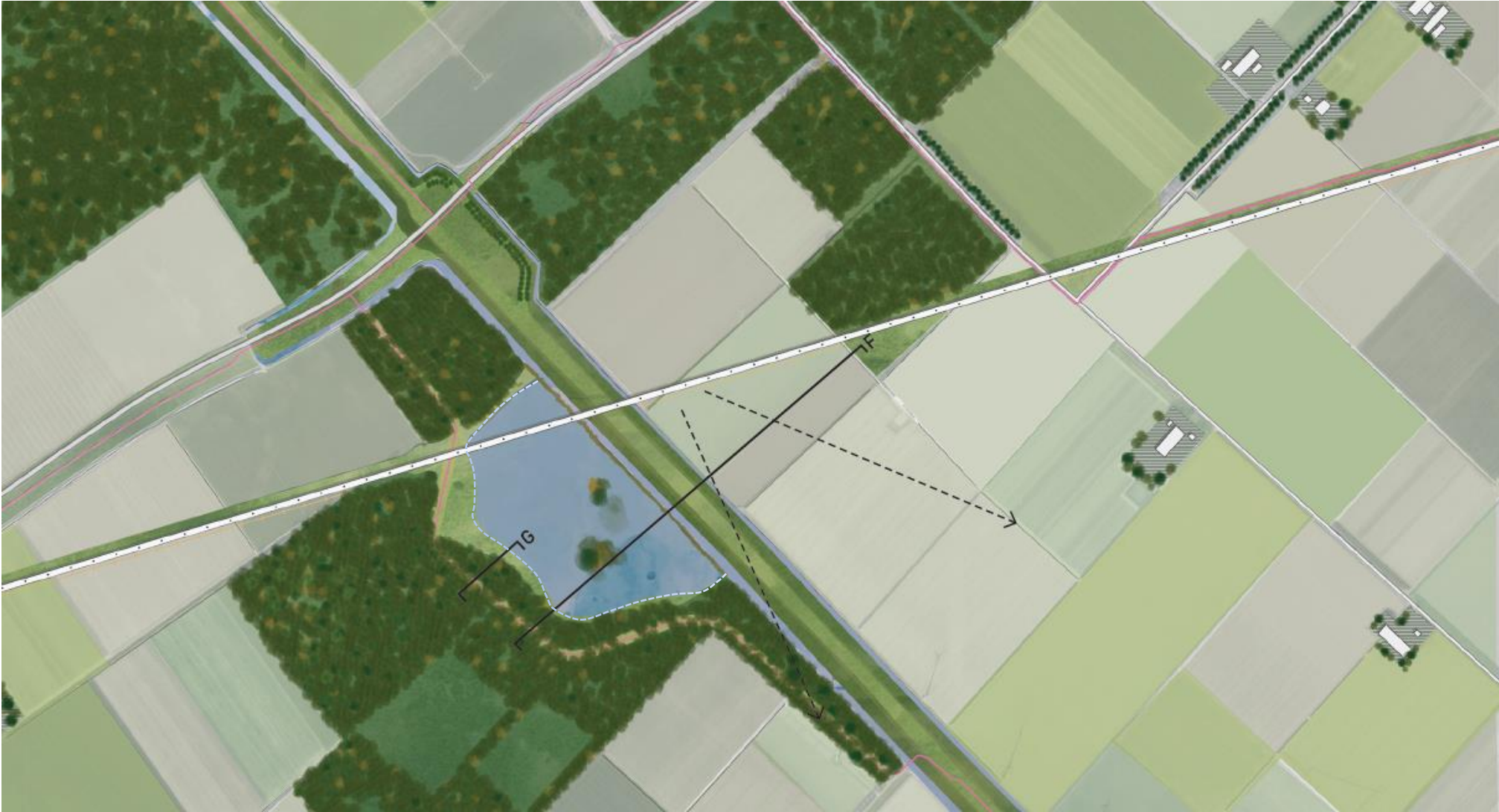
Knardijk

Sea dike



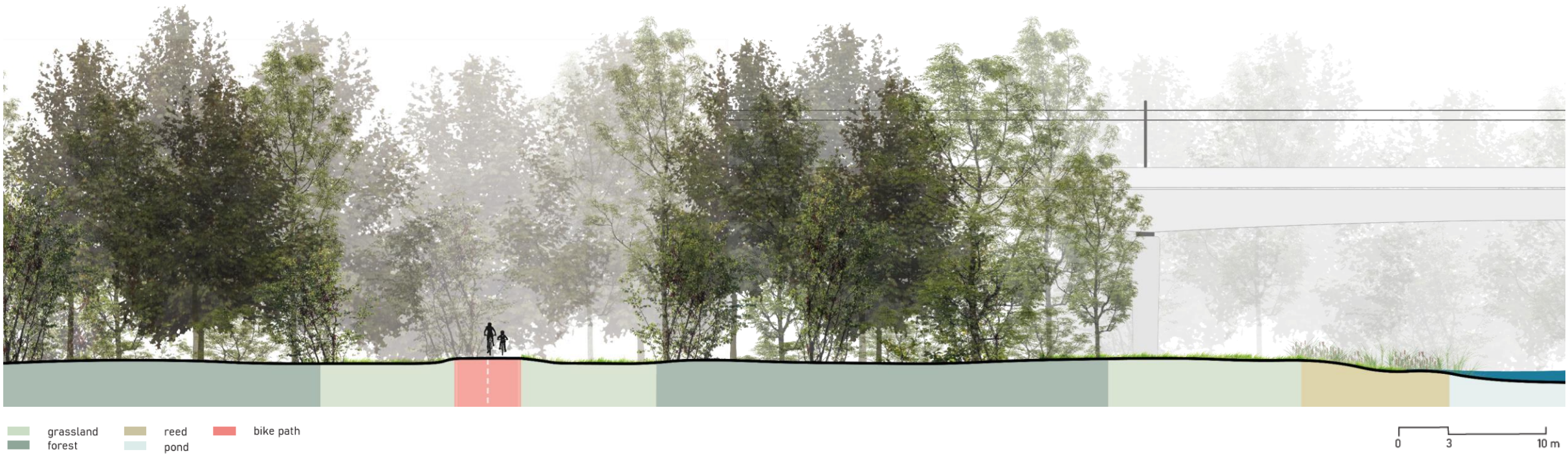
Green sleeper dike





SECTION F

SECTION G





OVER
THE
FLEVOPOLDER



WITHIN 100 M

Too close / on track: 14 farmyards

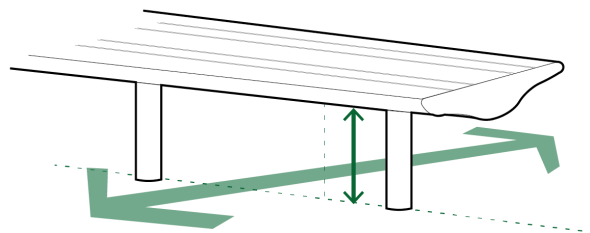


WITHIN 300 M

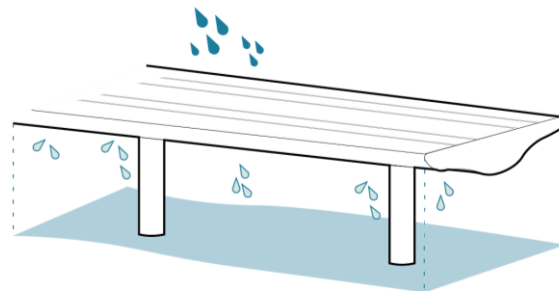
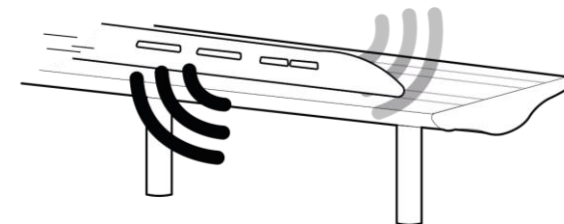
Noise impact within 300 m of track:

27 farmyards

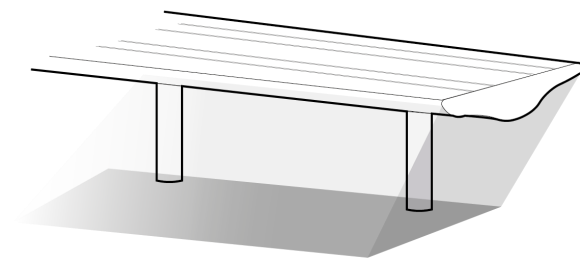
Accessibility



Noise impact



Reduced precipitation

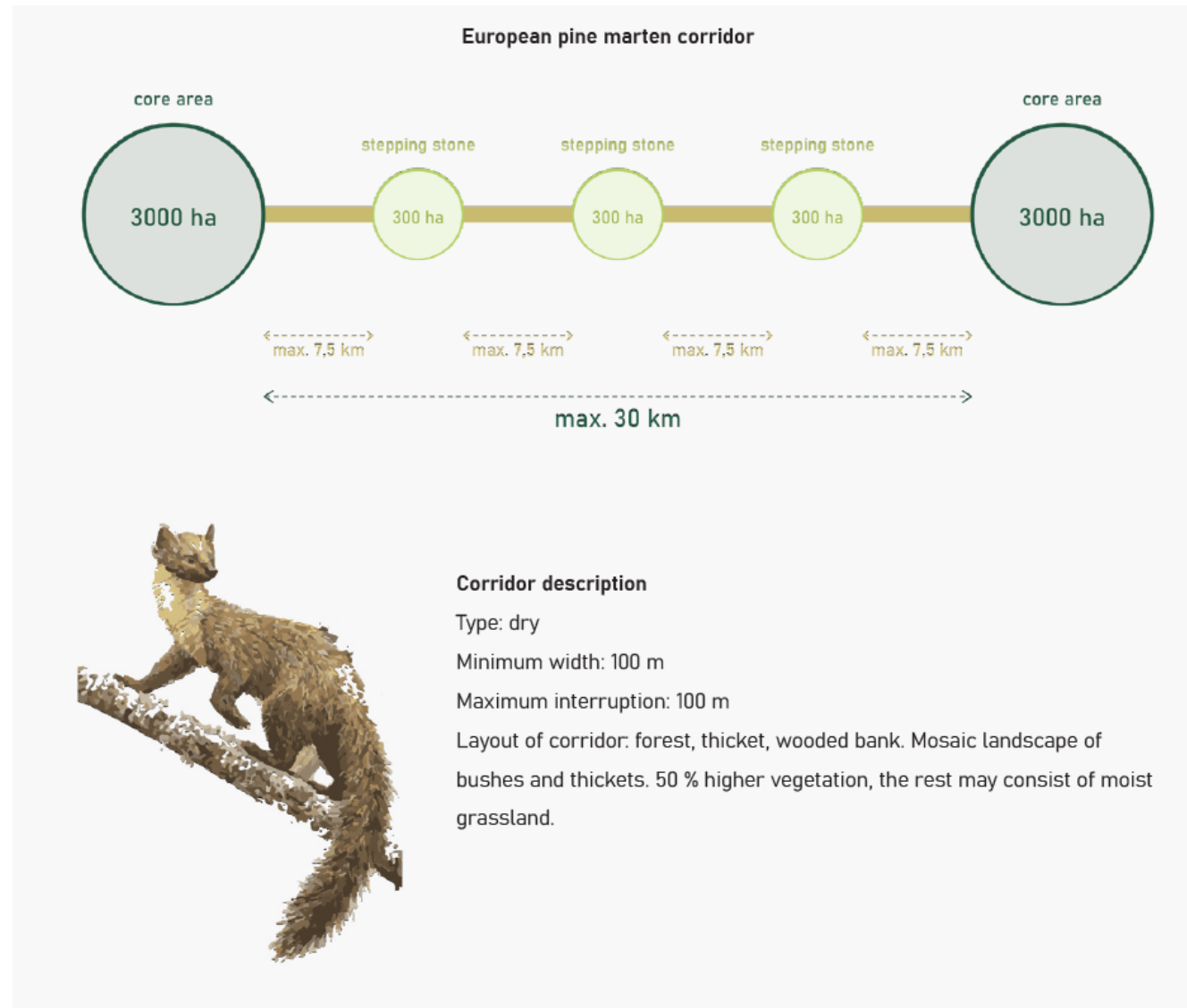


Shadow impact on agriculture

Cycling network Flevoland



Ecoprofile pine marten



Plants list shadow plants

euphorbia aygdaloides

arum

allium paradoxum

arctostaphylos uva-ursi

poa chaixii

cystopteris fragilis

muscari latifolium

stachys sylvatica

anemone nemorosa

mercurialis perennis

veronica montana

milium effusum

stellaria nemorum

myosotis sylvatica

galium sylvaticum

lysimachia nemorum

carex sylvatica

dryopteris dilatata

epipactis helleborine sussp. Helleborine

campanula latifolia

actaea spicata

maianthemum bifolium

allium ursinum

moehringia trinervia

blechnum spicant

melica uniflora

geum urbanum

digitalis lutea

lamiastrum galeobdolon subsp. Galeobdolon

pulmonaria officinalis

lamium maculatum

polypodium vulgaren

polygonatum multiflorum

ficaria verna

parietaria officinalis

circaea lutetiana

scilla forbesii

luzula sylvatica

corydalis cava

humulus lupulus

lunaria annua

thlictrum minus

orobanche hederarum

geum rivale

osmunda regalis

galium odoratum

alliaria petiolata

mespilus germanica

stellaria nemorum subsp. Montana

pulmonaria obscura

myrrhis odorata

luzula pilosa

senecio ovatus

carex strigosa

helleborus foetidus

chrysosplenium alternifolium

corydalis solida

doronicum plantagineum

oxalis acetosella

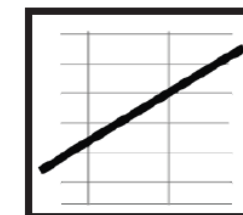
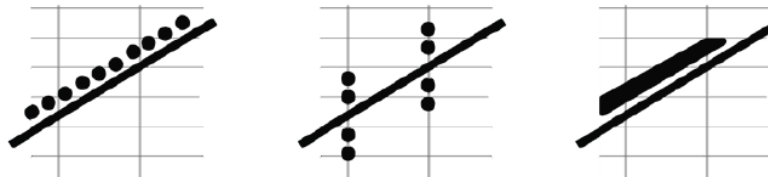
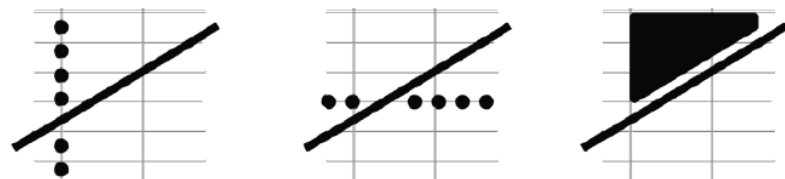
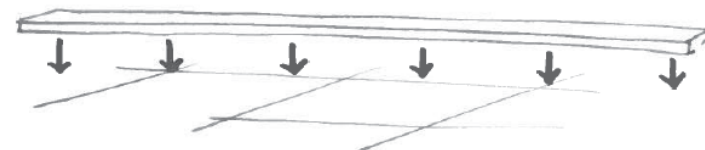
luzula luzuloides

helleborus viridis

Polder is leading



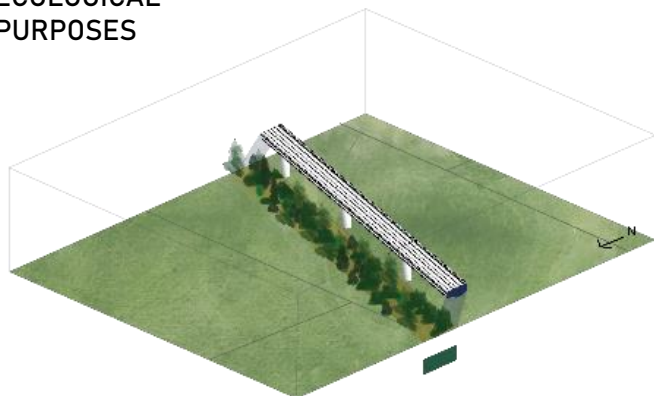
Viaduct is leading



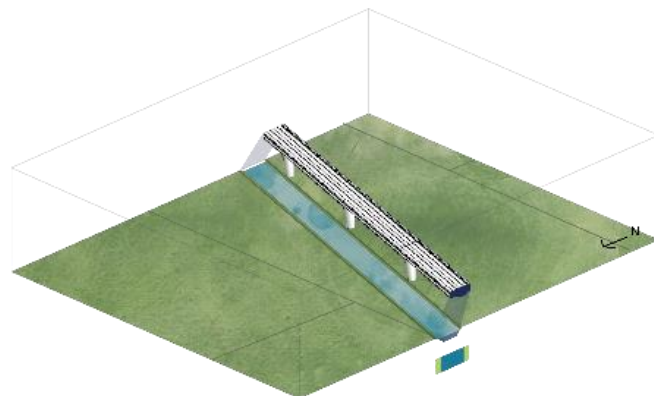
NEW CLUTTERING IN LANDSCAPE

● tree ■ group of trees — viaduct

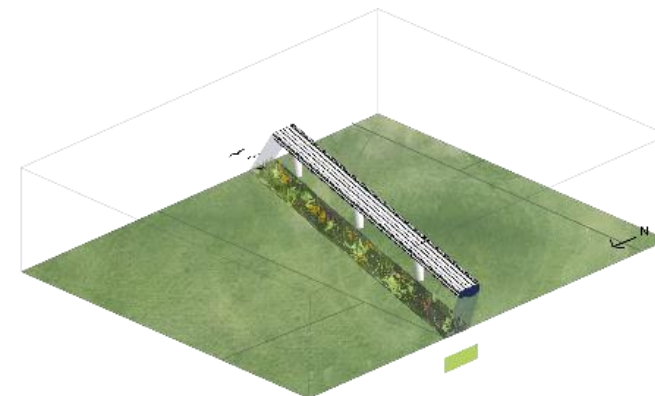
 ECOLOGICAL
PURPOSES



Forest

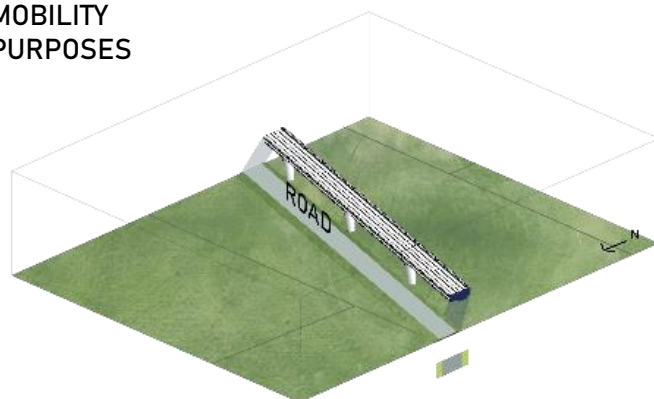


Wet zone

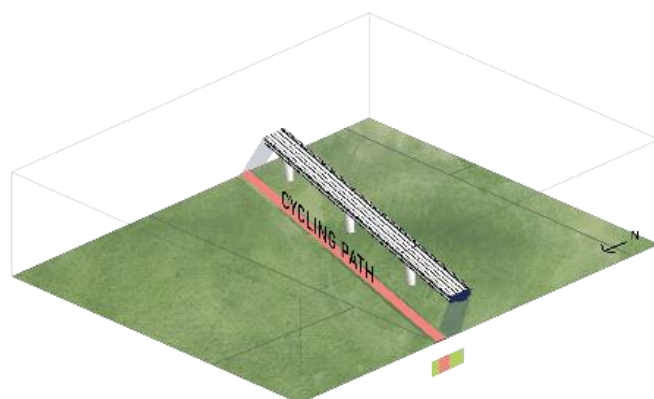


Low shadow vegetation

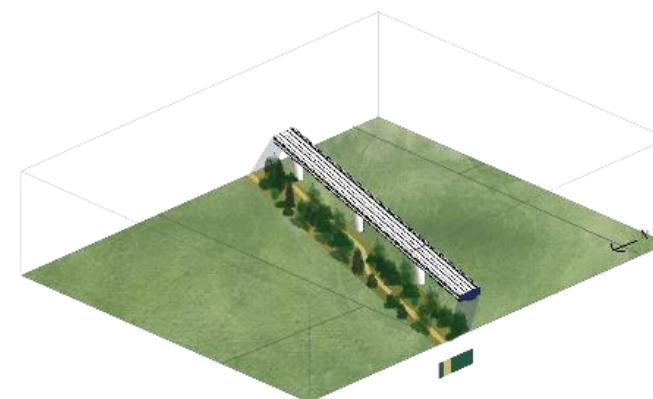
 MOBILITY
PURPOSES



Road



Cycling path



Pedestrian path

