High-speed Railway as Landscape Bonanza

TU-Delft Alternative Lelyline: A case study from Zwolle to Groningen

Final Presentation

4th July,2023

Bai Fazhong

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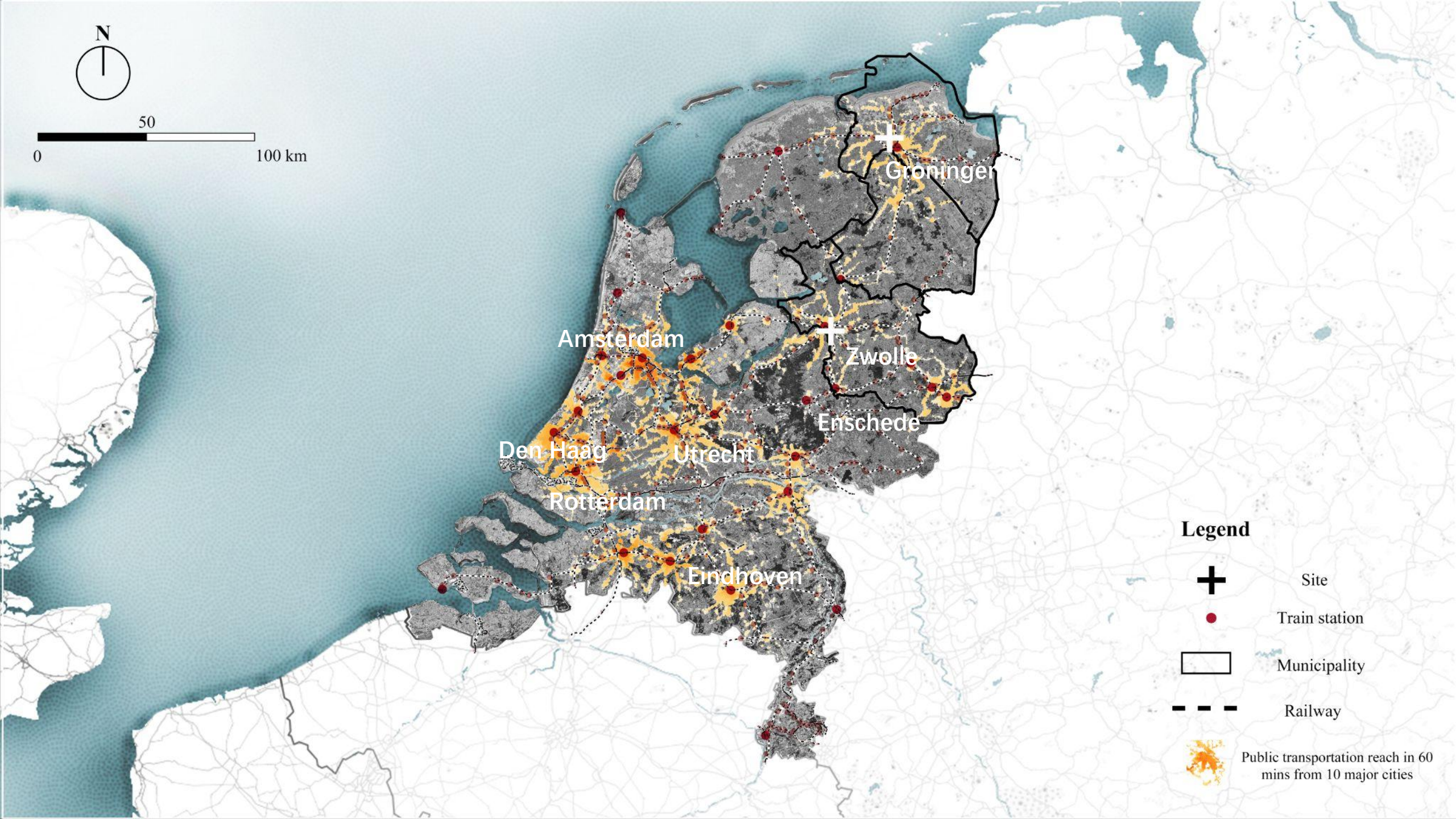
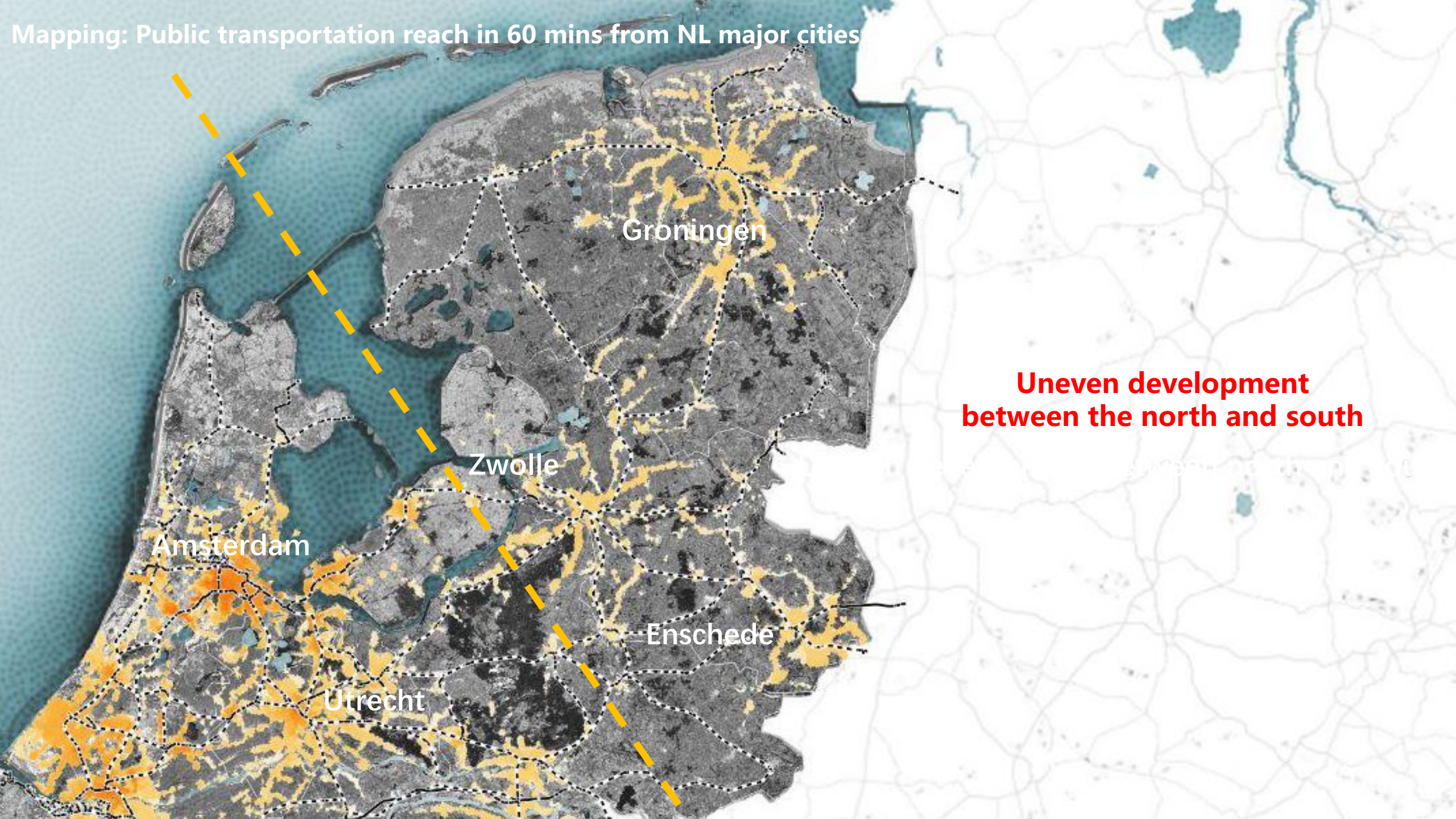
Second mentor: Aksel Ersoy
Board of Examiners: Peter de Jong

Fascination

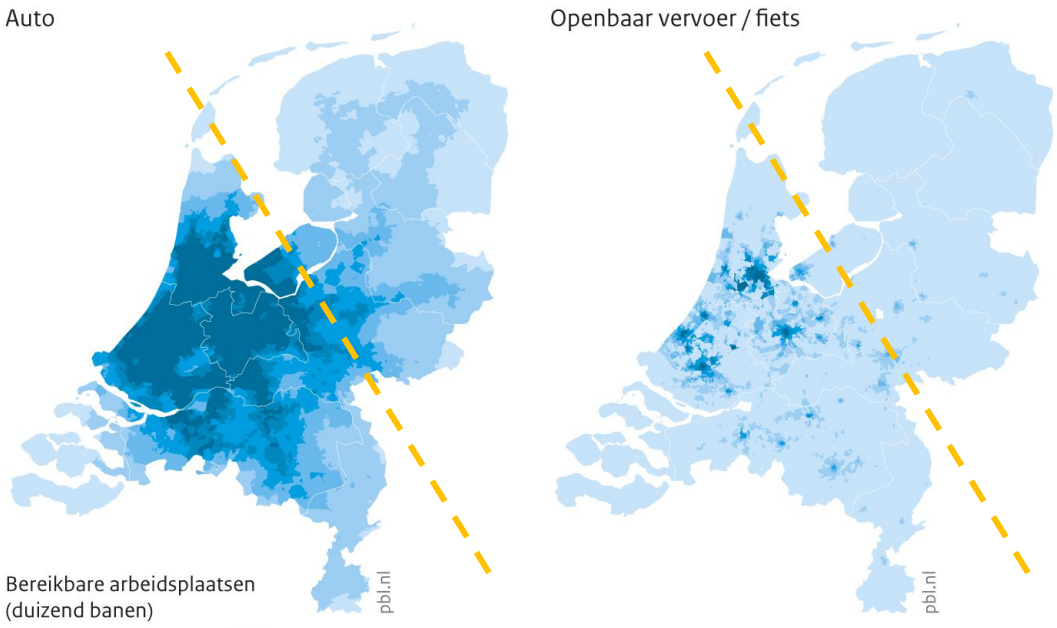

N
50
0
100 km
Groningen
Amsterdam
Zwolle
Enschede
Den Haag
Utrecht
Rotterdam
Eindhoven
Legend
Site
Train station
Municipality
Railway
Public transportation reach in 60 mins from 10 major cities

Souce: AD News
https://www.ad.nl/auto/reizen-met-de-trein-wordt-duurder-behalve-voor-de-vaste-klant~a33e1a00/


Mapping: Public transportation reach in 60 mins from NL major cities
Groningen
Zwolle
Amsterdam
Enschede
Utrecht
Uneven development
between the north and south

Official reports

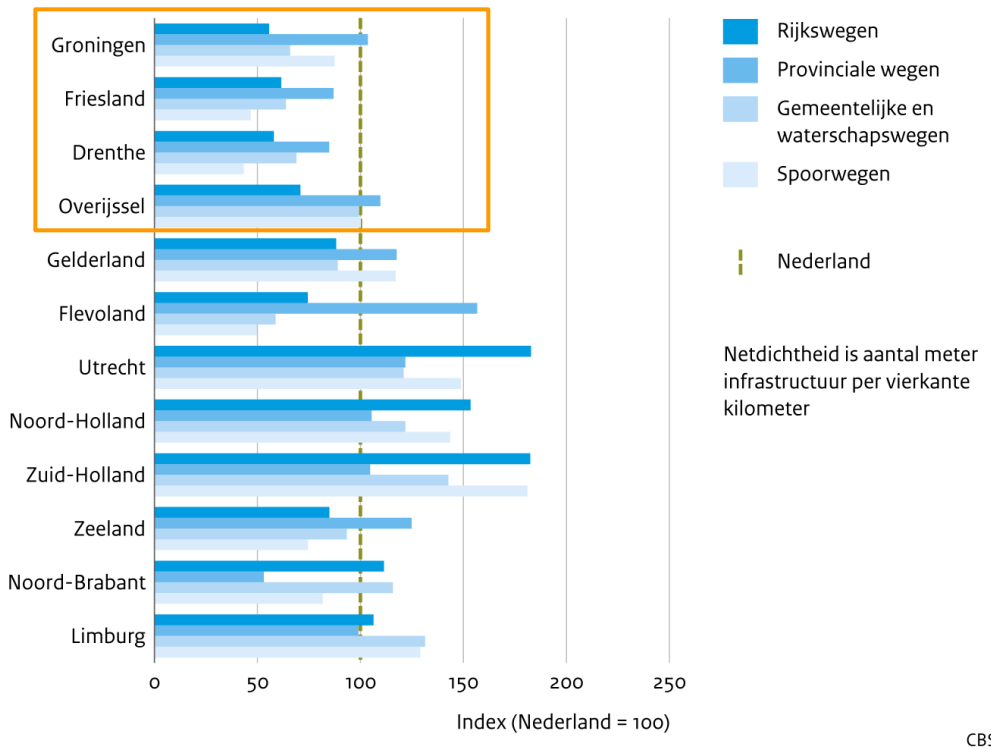
Bereikbaarheid arbeidsplaatsen tussen 7.00 en 9.00 uur, 2020



Bron: CBS; LISA; bewerking PBL

PBL/sep22
www.clo.nl/nl218702

Netdichtheid van lijninfrastructuur per provincie, 2018



Bron: RWS Nationaal Wegenbestand; CBS

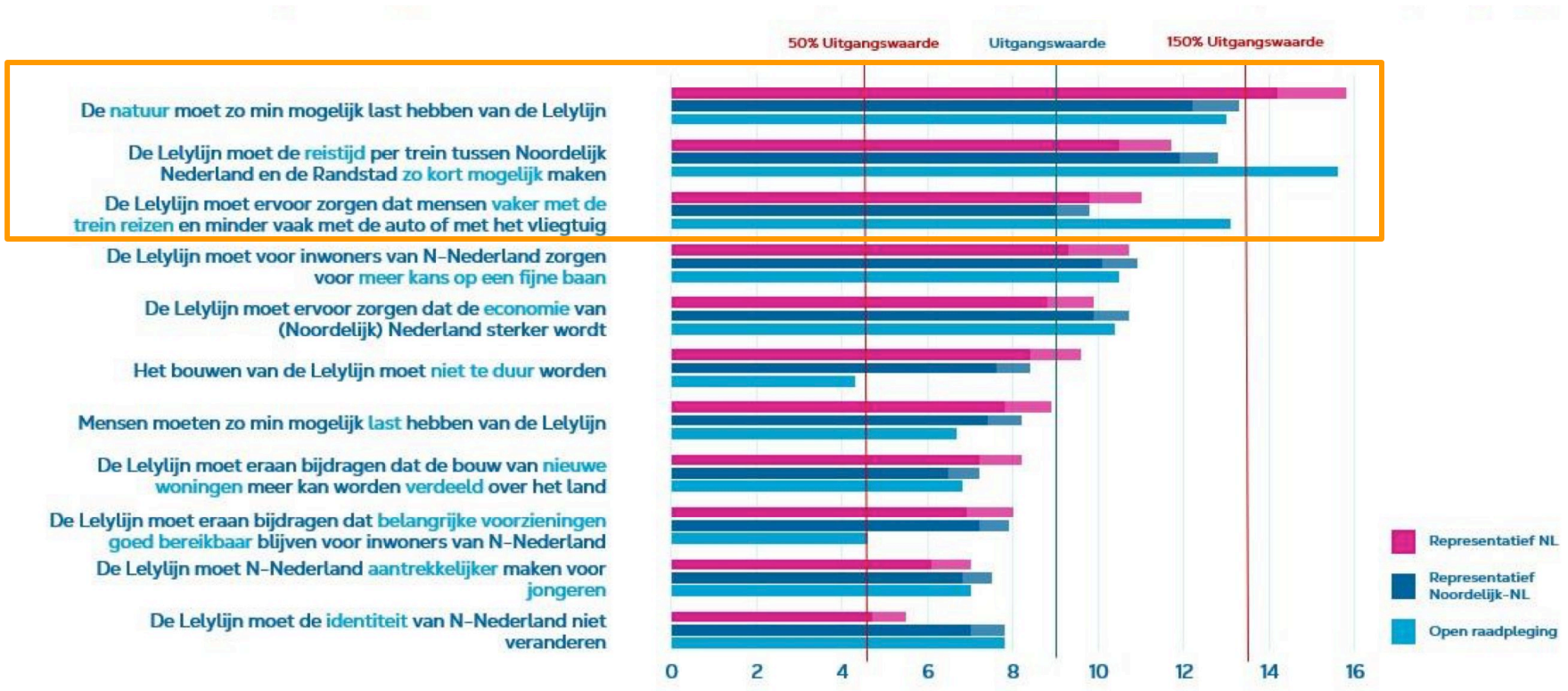
CBS/jan20
www.clo.nl/nl209608

Souce: https://www.clo.nl/indicatoren/nl2096-infrastructuur-wegen

The Lelylijn proposal

Souce: https://www.clo.nl/indicatoren/nl2096-infrastructuur-wegen

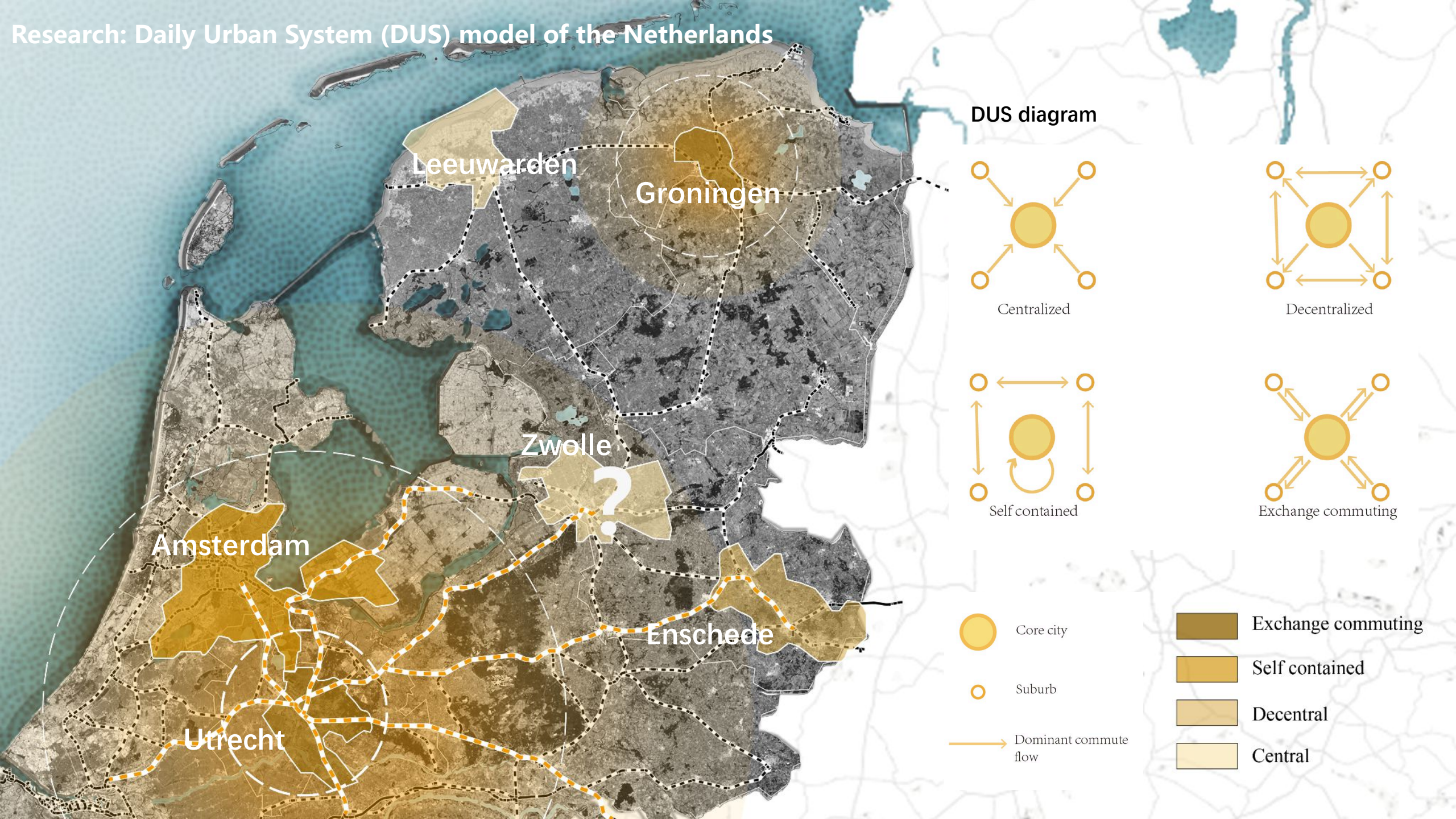
11,000 participants



The Lelyline can be **faster** and **more environmental friendly**.

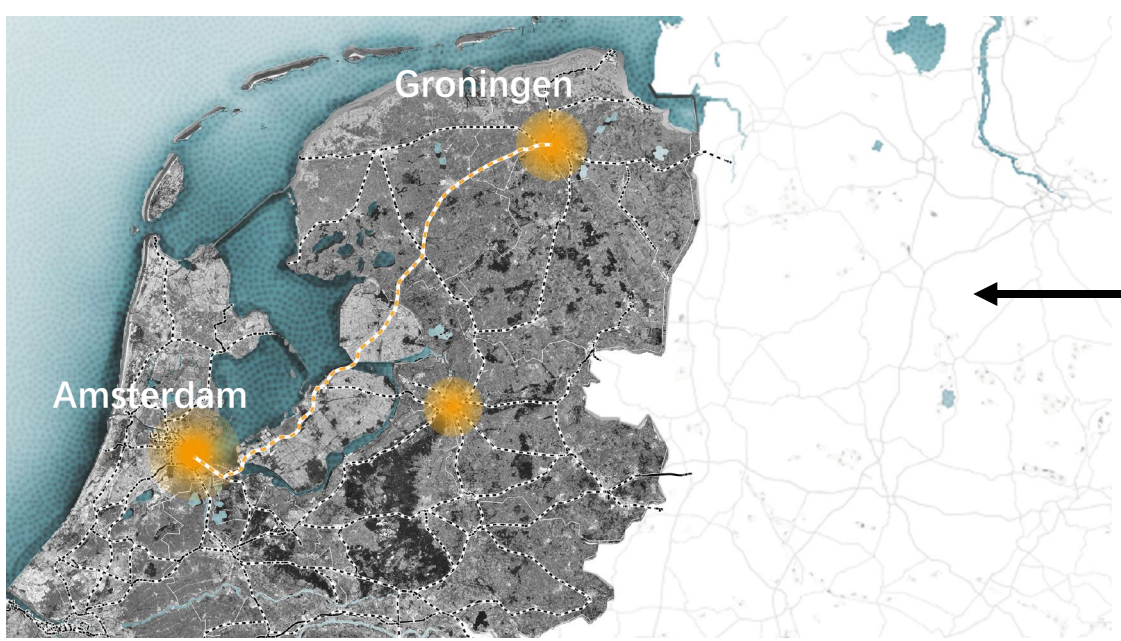
Souce: https://www.clo.nl/indicatoren/nl2096-infrastructuur-wegen

Research: Daily Urban System (DUS) model of the Netherlands

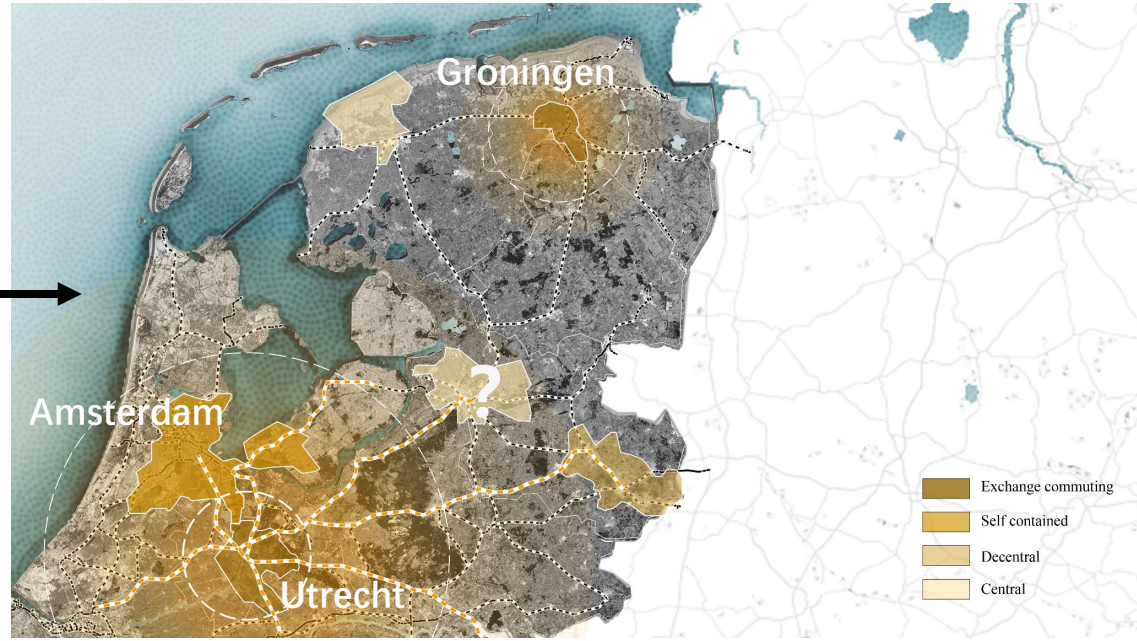


All the trains were marked cancelled, Utrecht central station

Souce: https://www.clo.nl/indicatoren/nl2096-infrastructuur-wegen



The Lelylijn



Utrecht DUS role

Problem field

Should be faster?

High-speed

Pressure on Utrecht?

Zwolle

Not environmental friendly enough?

We are landscape architects

Advantages of High-speed Train

High passenger capacity

Less time consuming

High security

High punctuality

High comfotancy

Lower energy consumption

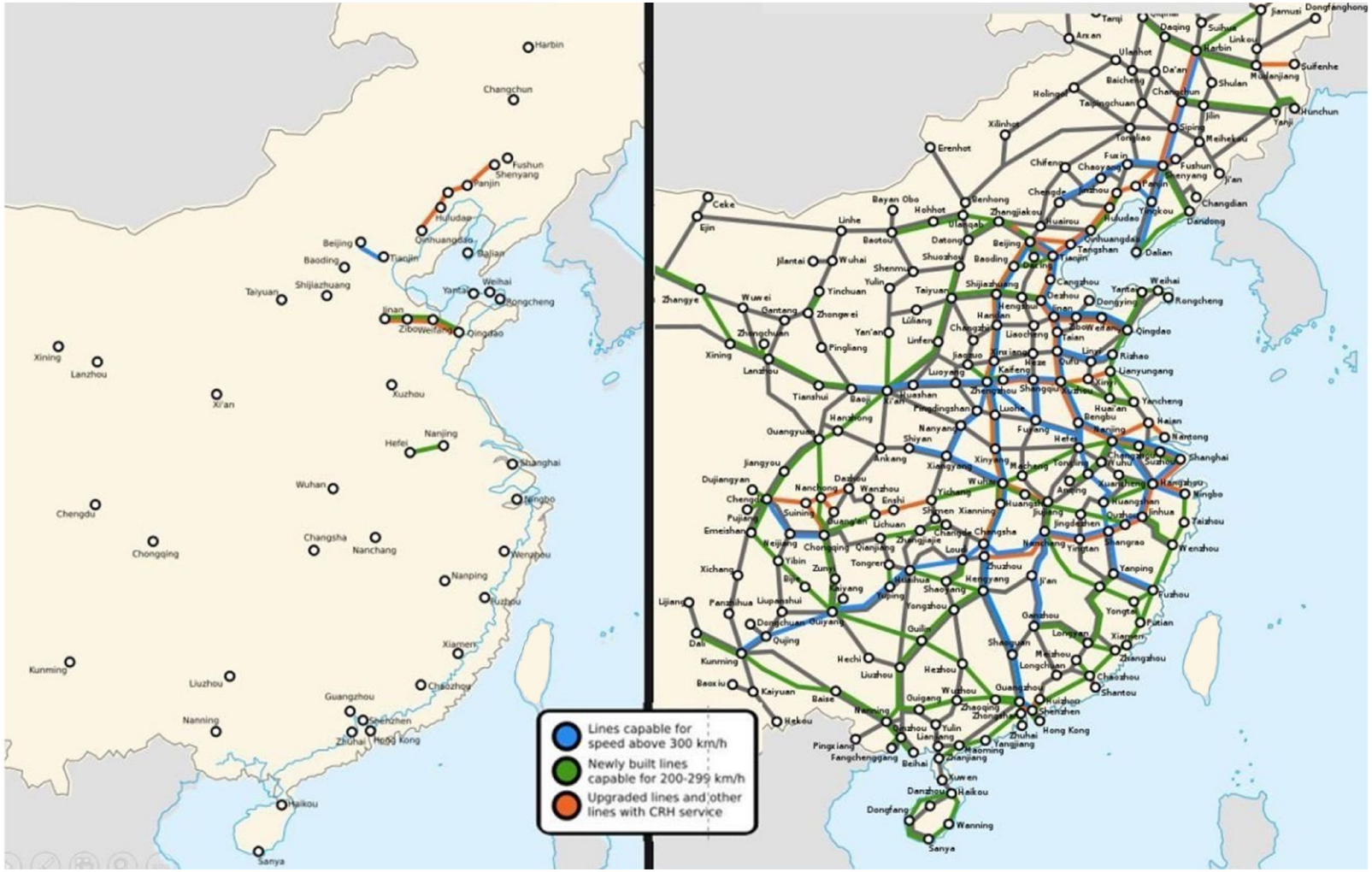
Drive the economy

Promote scientific research

How to build up a high-speed railway?

Chinese high-speed railway implementation

2008 2020

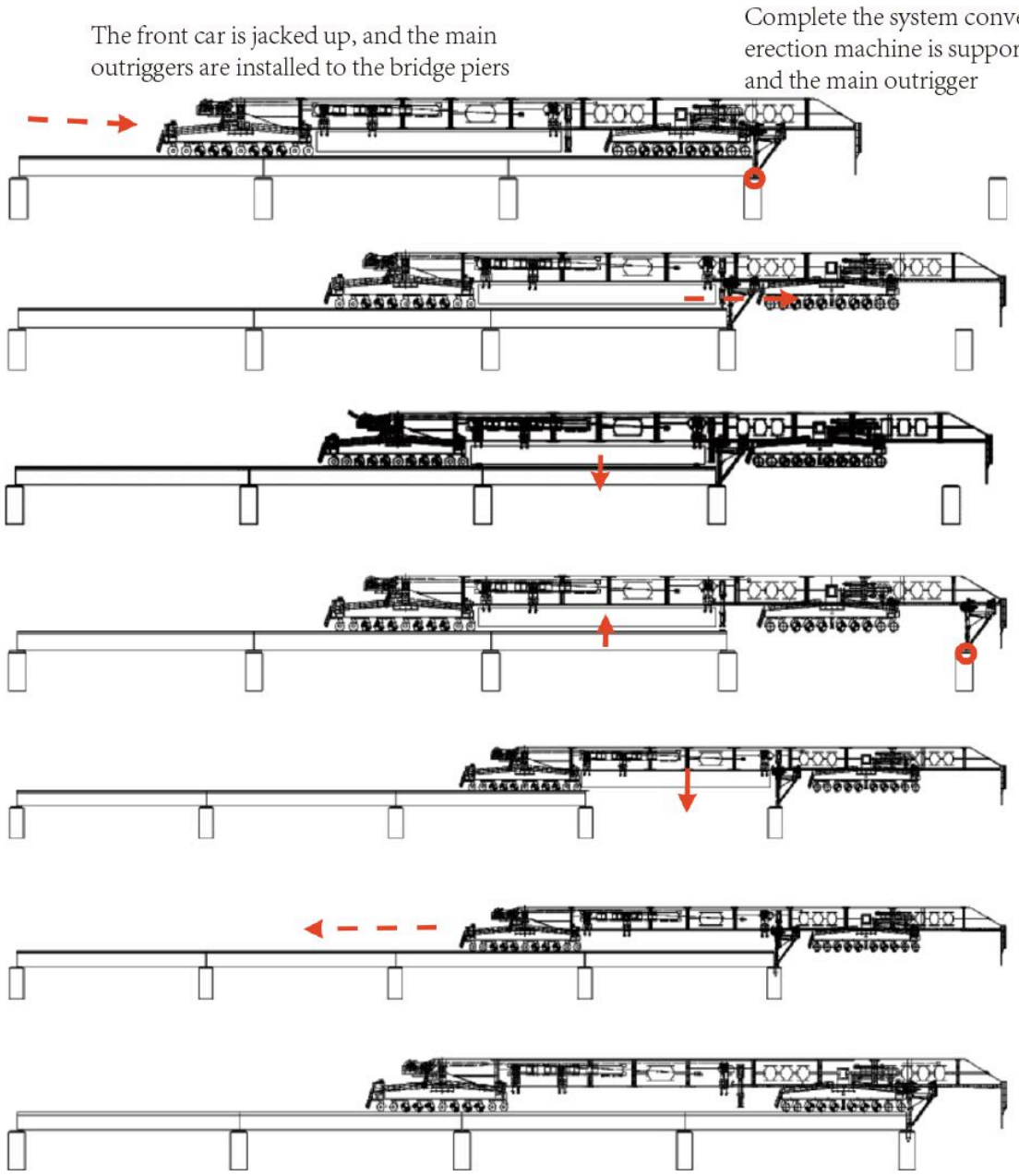


42,000 km implementation within 12 years!

Source: https://www.reddit.com/r/MapPorn/comments/xszhbm/chinese_highspeed_railway_map_2008_vs_2020/

Girder Kunlun Bridge Erecting Machine (1000t/40m)

Work process



- Transport the bridge erecting machine

Pushed by the rear vehicle so that the front vehicle goes over the main outrigger

The middle outrigger is in place, and the beam is temporarily dropped

Install the main outriggers and contract the middle outriggers to complete the system conversion. Carry out the second beam feeding

Beam feeding ends, accurate alignment, ready to drop

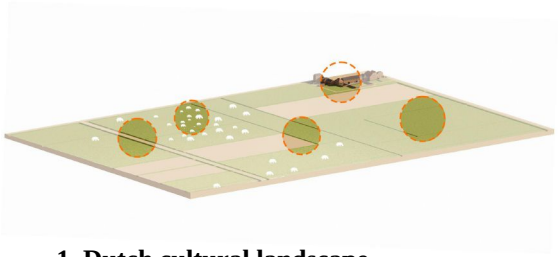
The fall of the beam is over, and the bridge erection machine is ready to withdraw

The bridge erecting machine is retracted in place, the main outriggers are retracted and ready to return beam field to transport beams

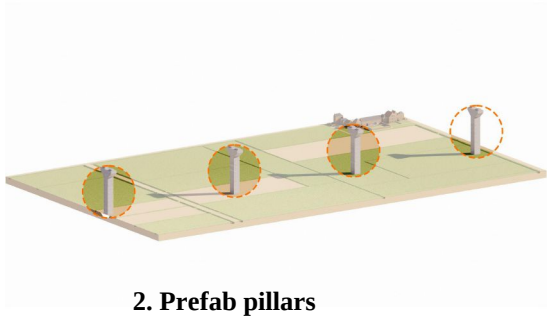
1-13 Construction process of high-speed railway viaduct with innovative girder erection machine,
He Jianhua, China Railway Fifth Survey and Design Institute Group Co.Ltd. Annotated by Author

Projection in the Dutch cultural landscape

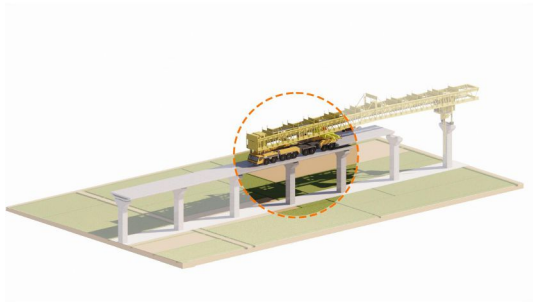
Modular construction technique



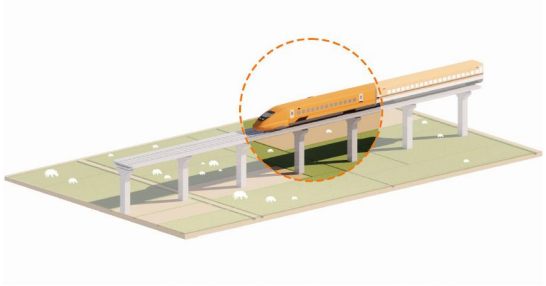
1. Dutch cultural landscape



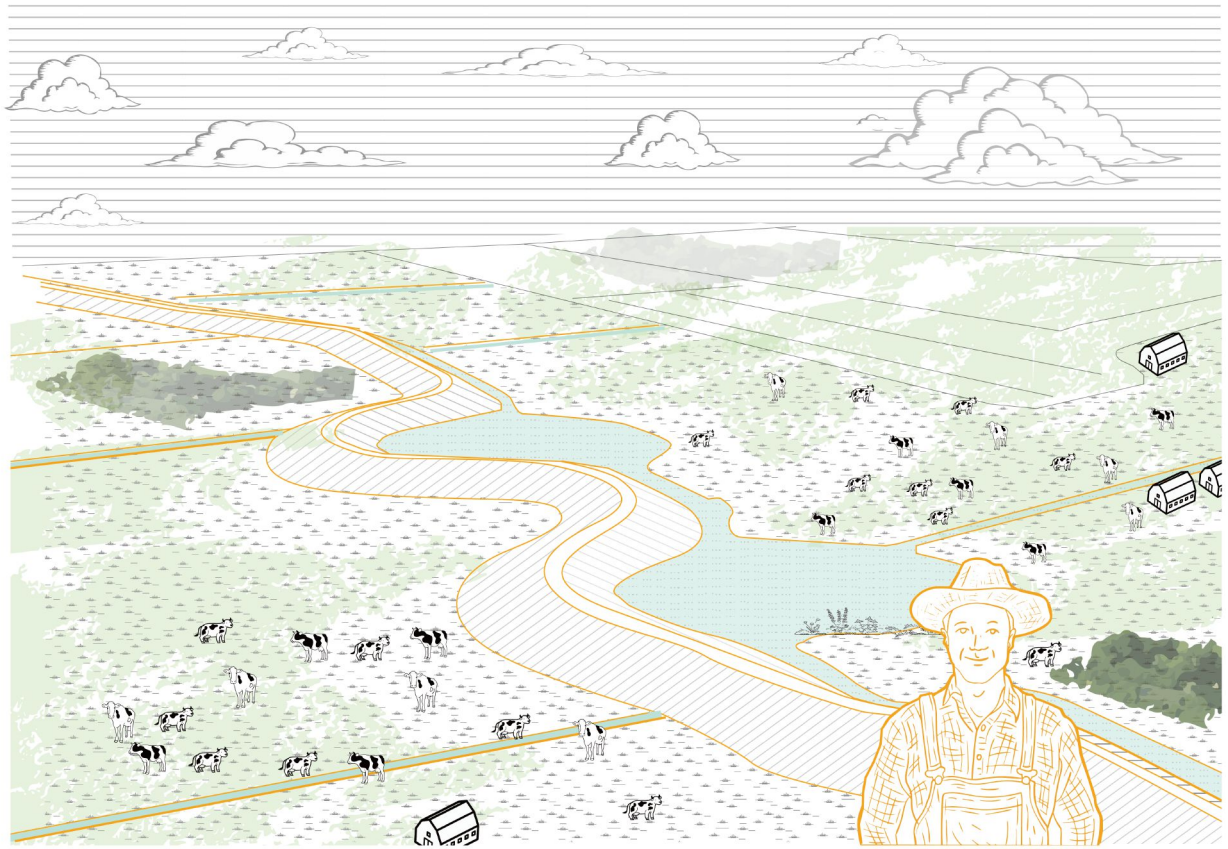
2. Prefab pillars



3. Machine bridging erection



4. Infrastructure within landscape

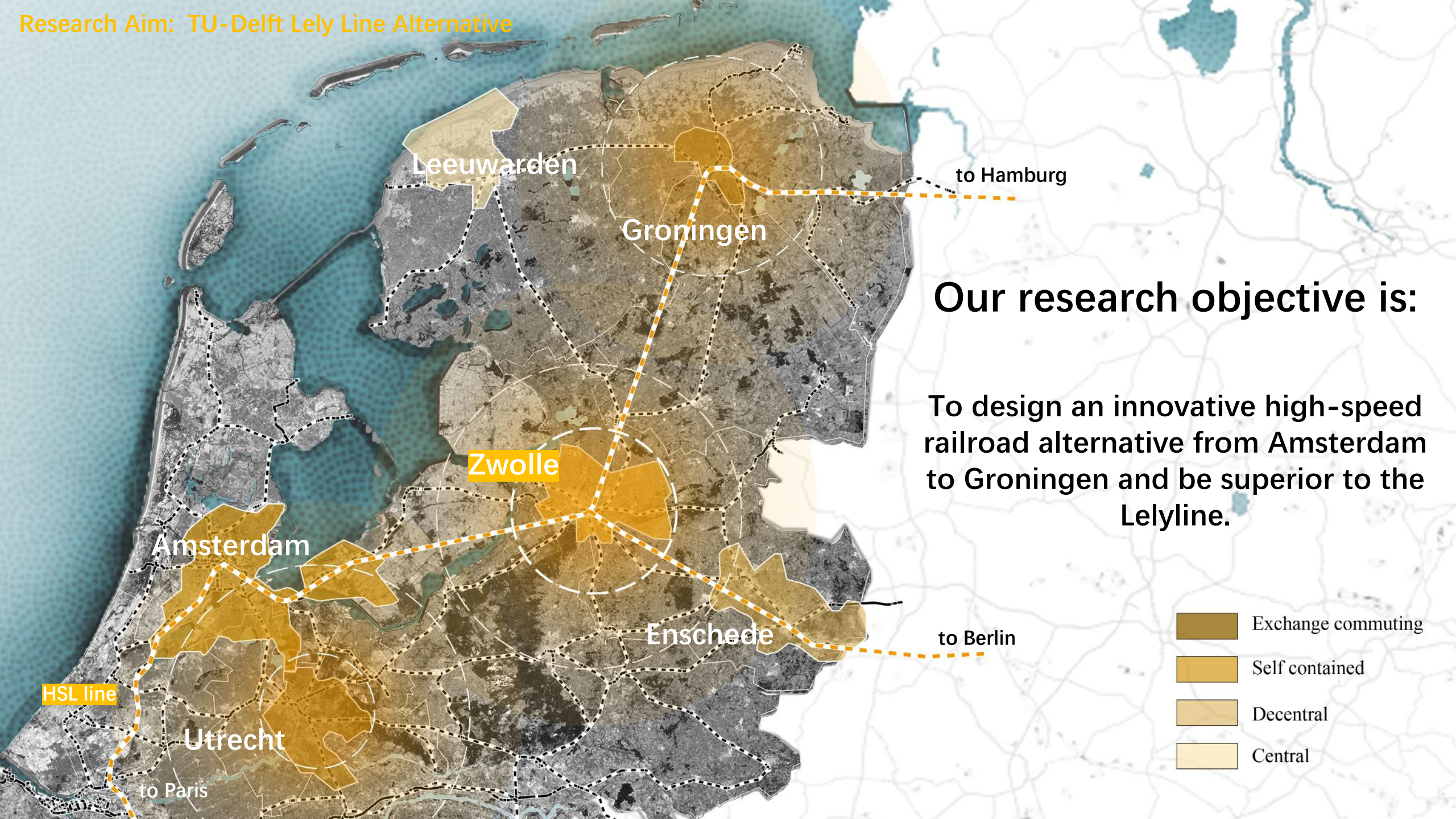


Dutch railway embedded in the cultural landscape

https://www.siebeswart.nl/image/I0000k3ZdjQUenyg

Methodology

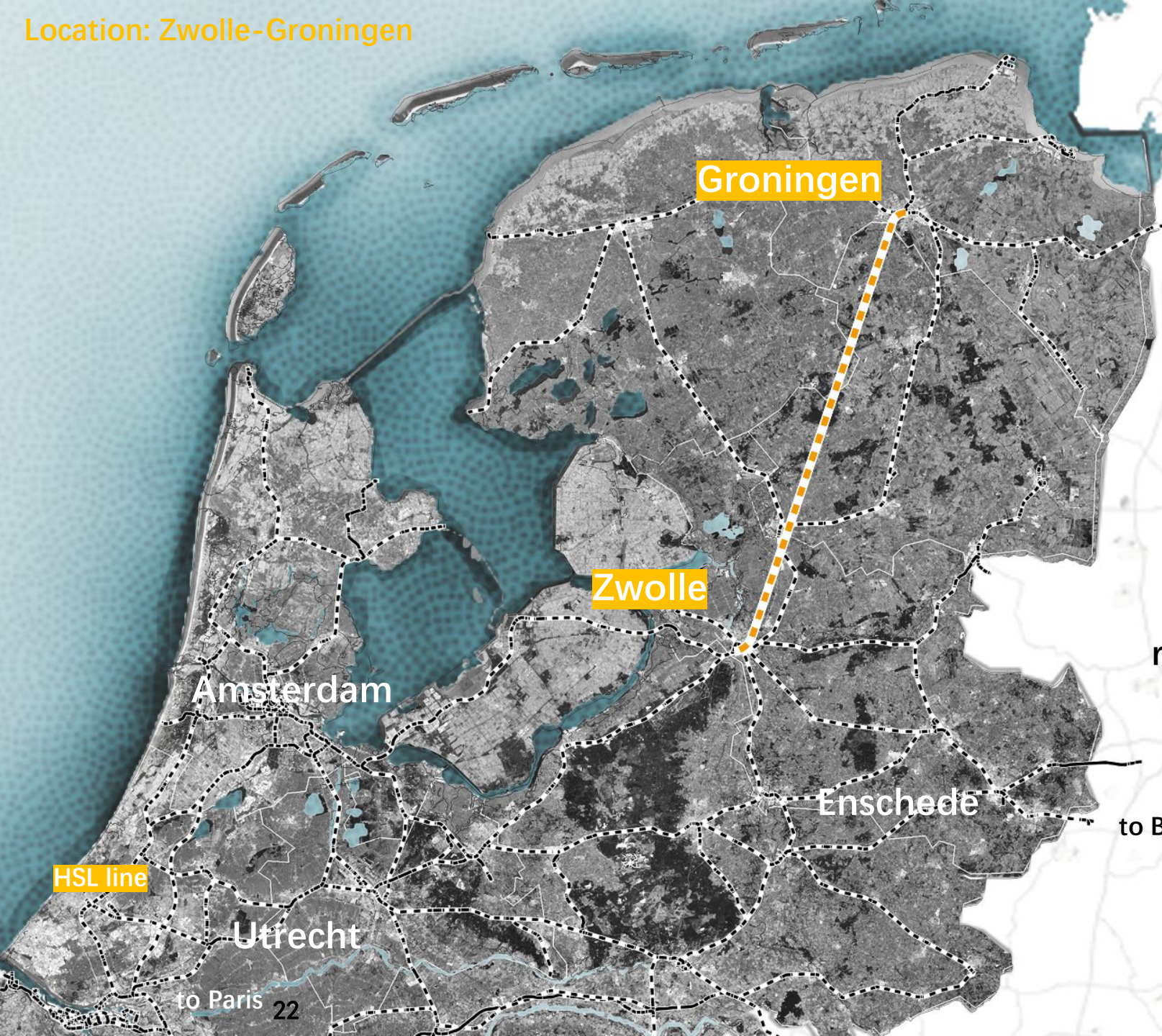
Research Aim: TU-Delft Lely Line Alternative



Our research objective is:

To design an innovative high-speed railroad alternative from Amsterdam to Groningen and be superior to the Lelyline.

Location: Zwolle-Groningen



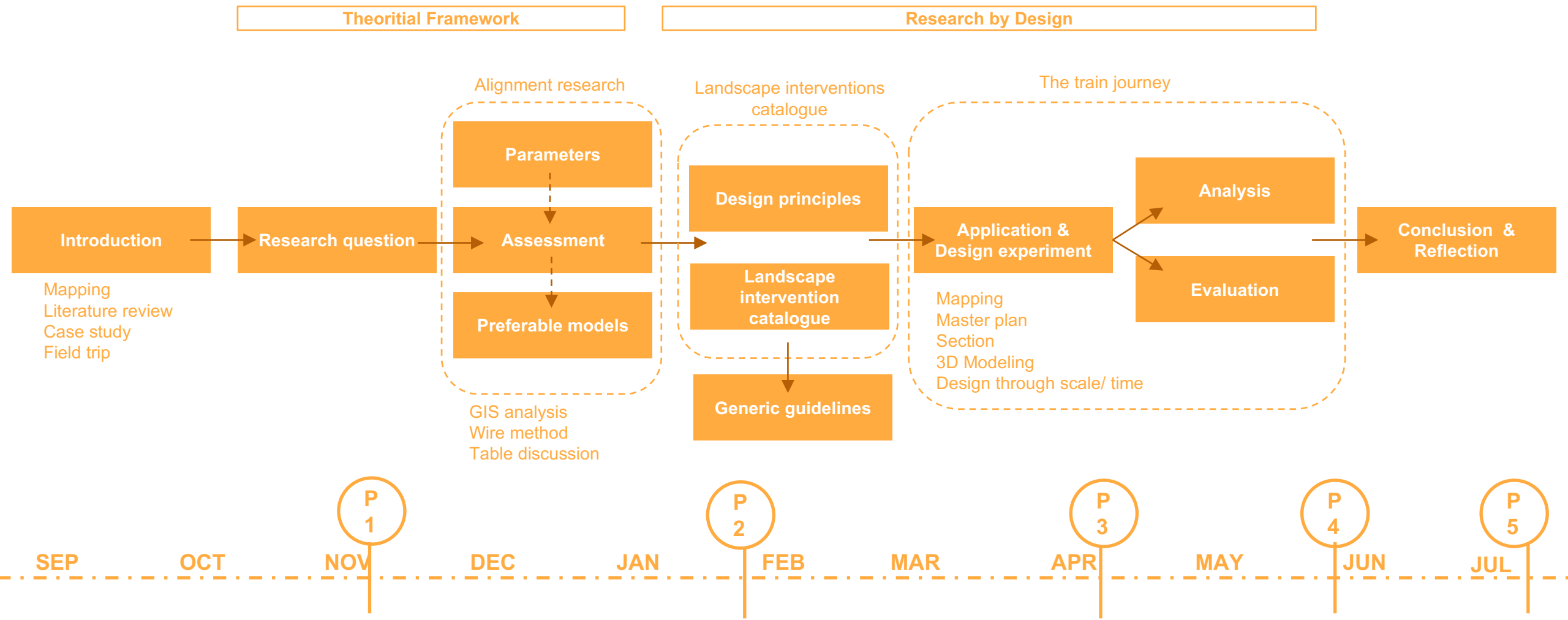
to Hamburg

to Berlin

My research question is:

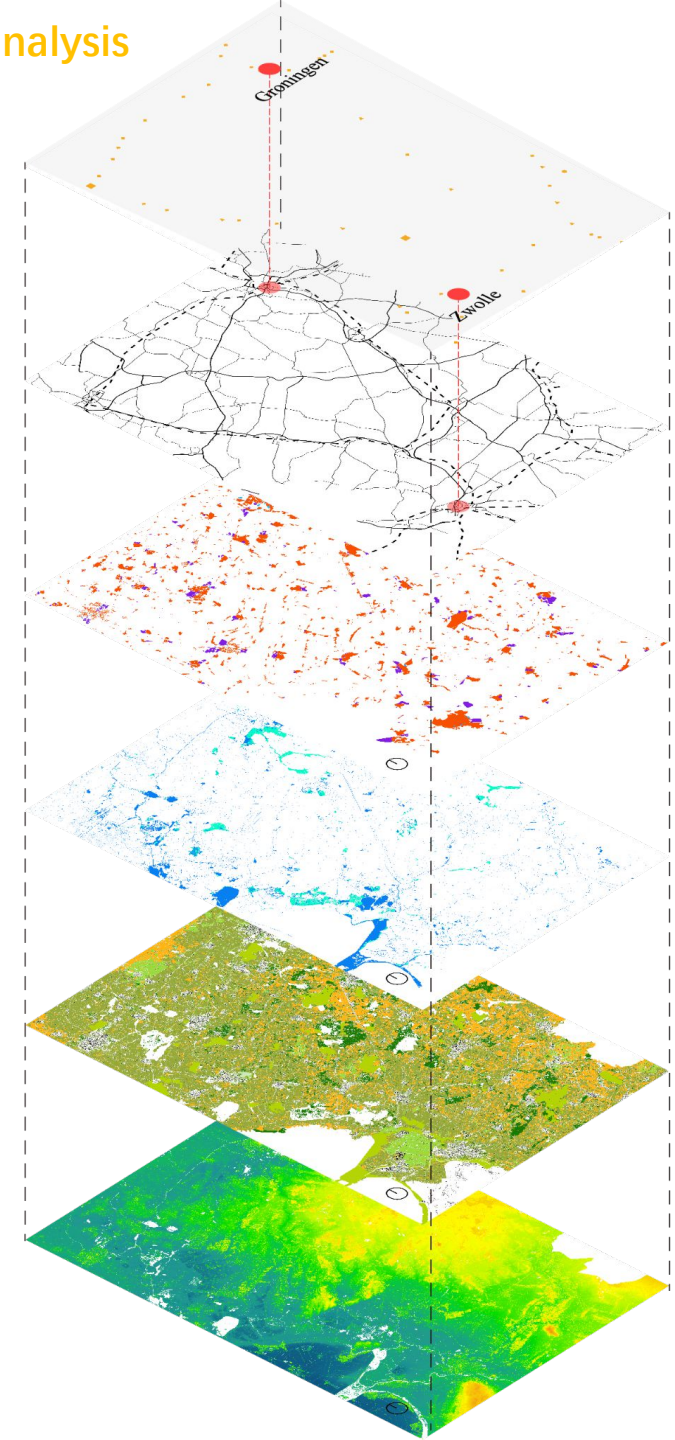
"How can the portion between Zwolle to Groningen of this innovative high-speed railroad
be implemented in a sustainable way
respecting the Dutch cultural landscape?"

Research framework



Alignment research

GIS analysis



RAILWAY STATIONS

The distribution of the stations shows the accsessibity to the suroundings

TRAFFIC INFRASTRUCTURE

The existing traffic infrastructure network can be take good use of in the new solutions

BUILT ENVIRONMENT

New alignment is supposed to get rid of cutting through the built environment

WATER BODY

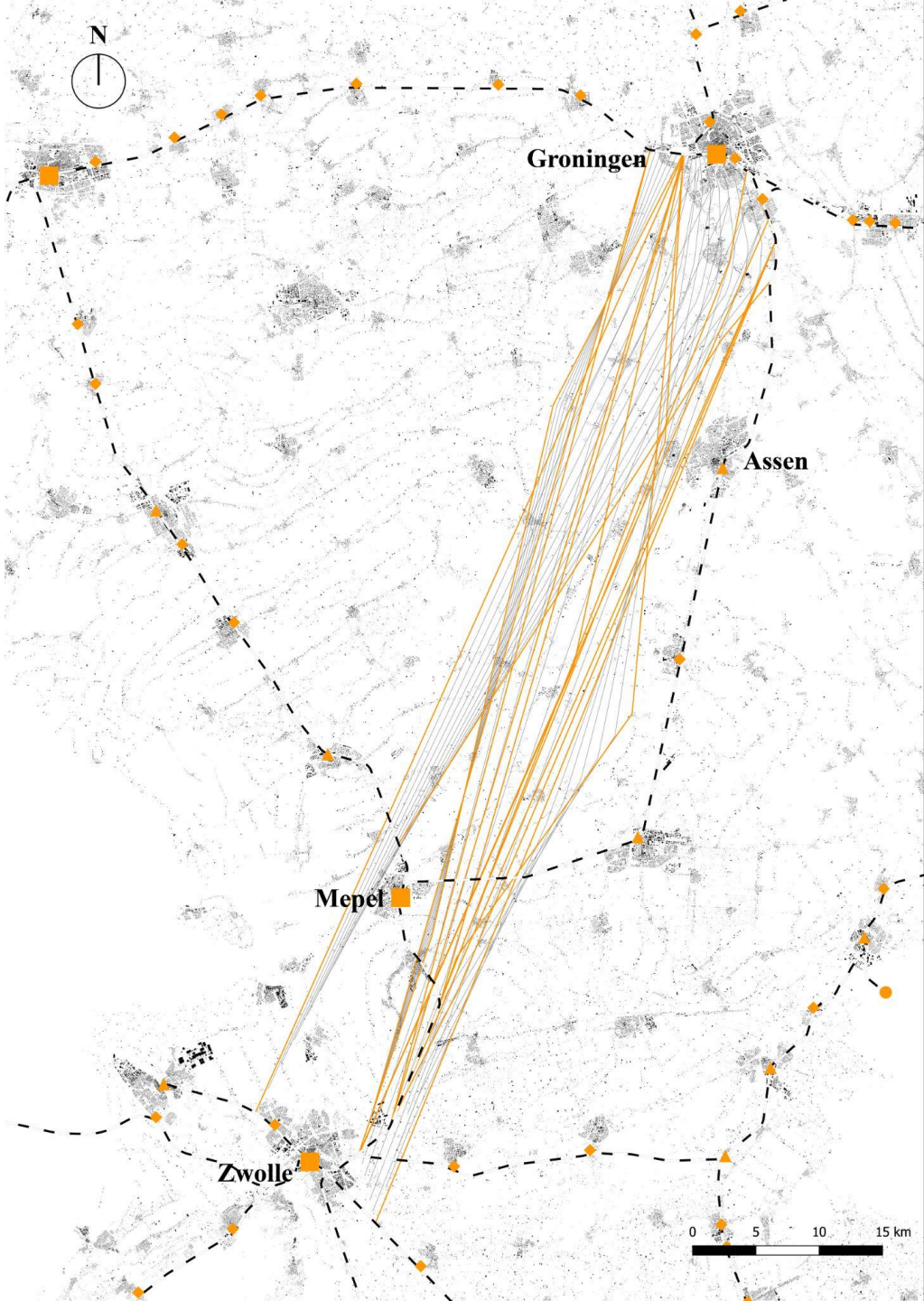
Identify the river, old canel, wetland, lake, ditch and etc. in the regional water tissue

GREEN SYSTEM

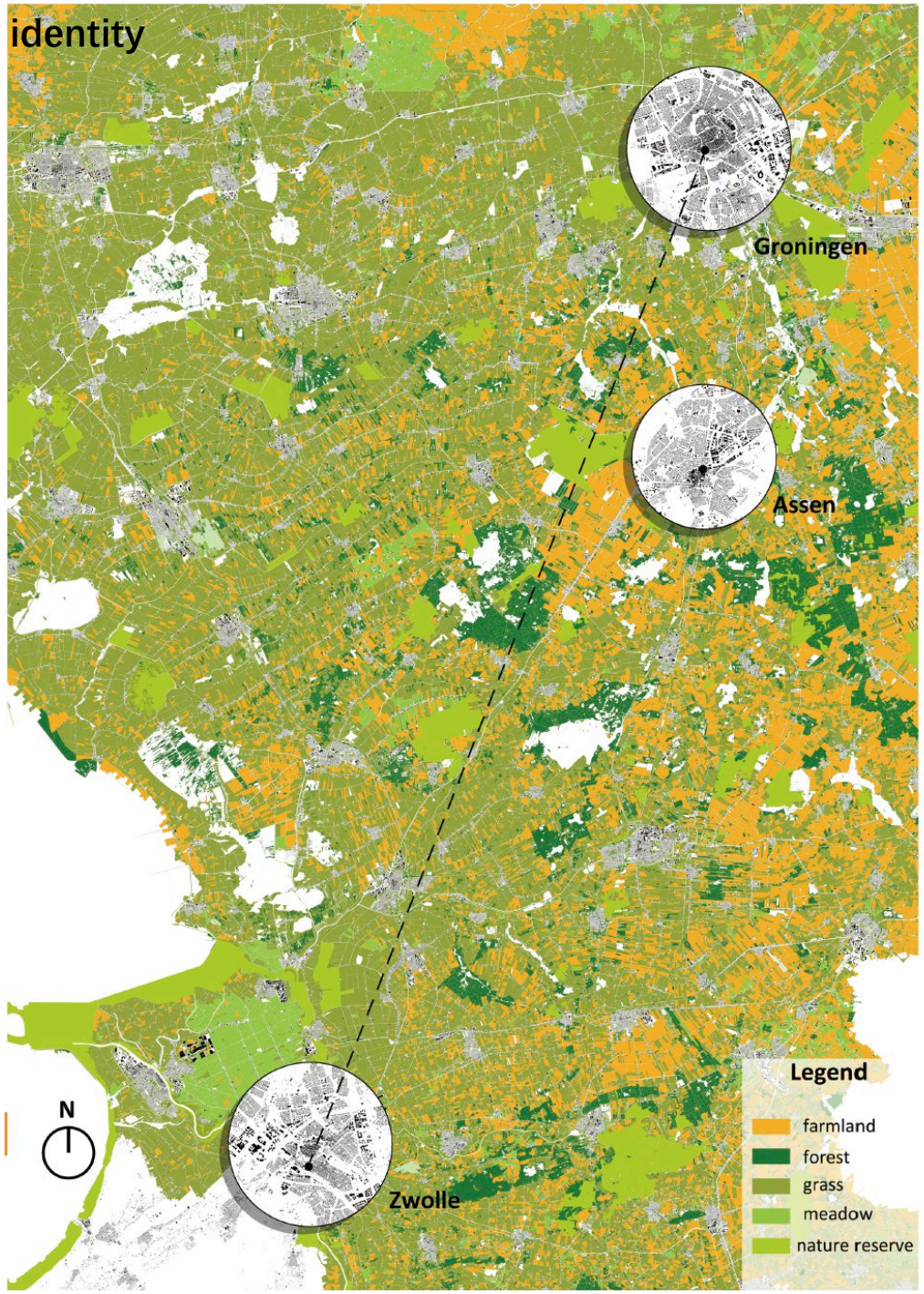
Look for the possibility of connect different green element, improve the sustainability and resiliency

HEIGHT MAP

Find economical solutions with less height difference on the route



Greenery identity



Wire method

Being detectives !
Searching for possible alignment

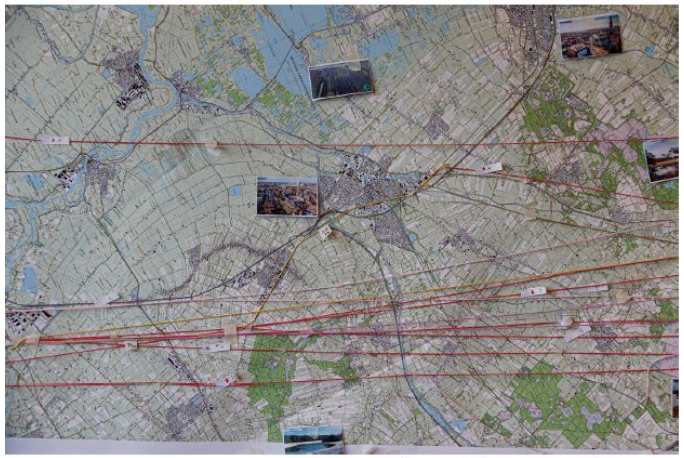
Options for entering Groningen, documented in the introduction video of the Master track Landscape Architecture TU Delft
Source: Youtube

3-6 FBI Agent behind detective board, , Source: getty images

3-7 Research team: Adriaan Geuze, Bai Fazhong, Juul ten Hove, Giordana Credendino (from left to right)
Illustration by Wanning Liang

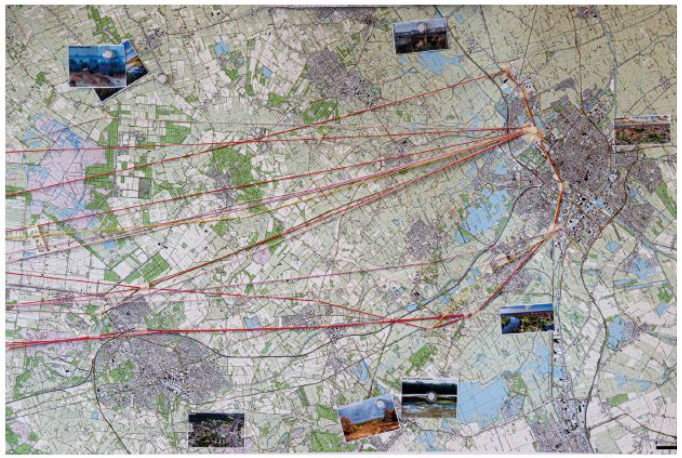
High-speed railway alignment between Zwolle to Groningen research wall
BK West 600, TU Delft

Overview



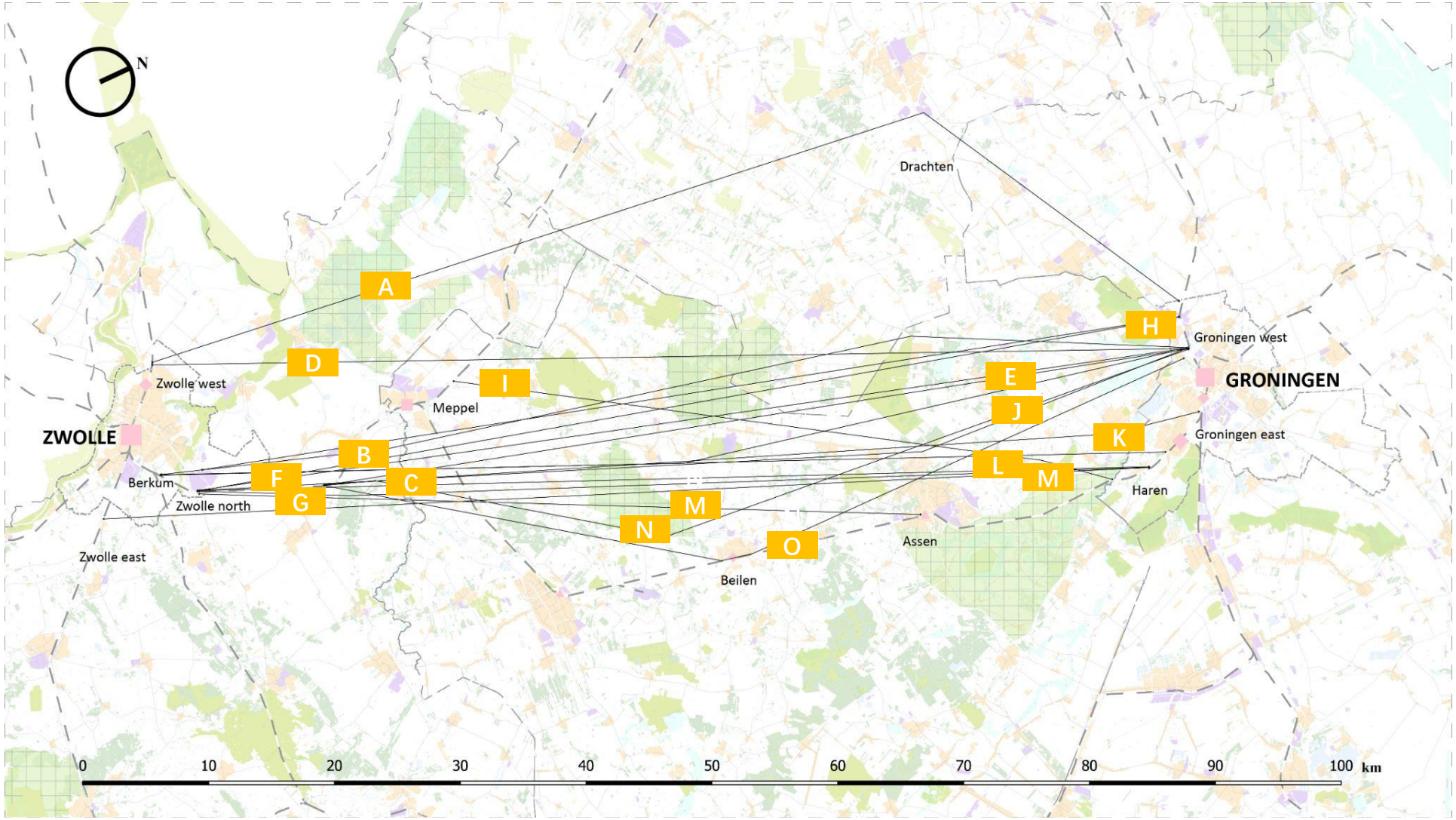
Zwolle - Staphorst

Dwingelderveld

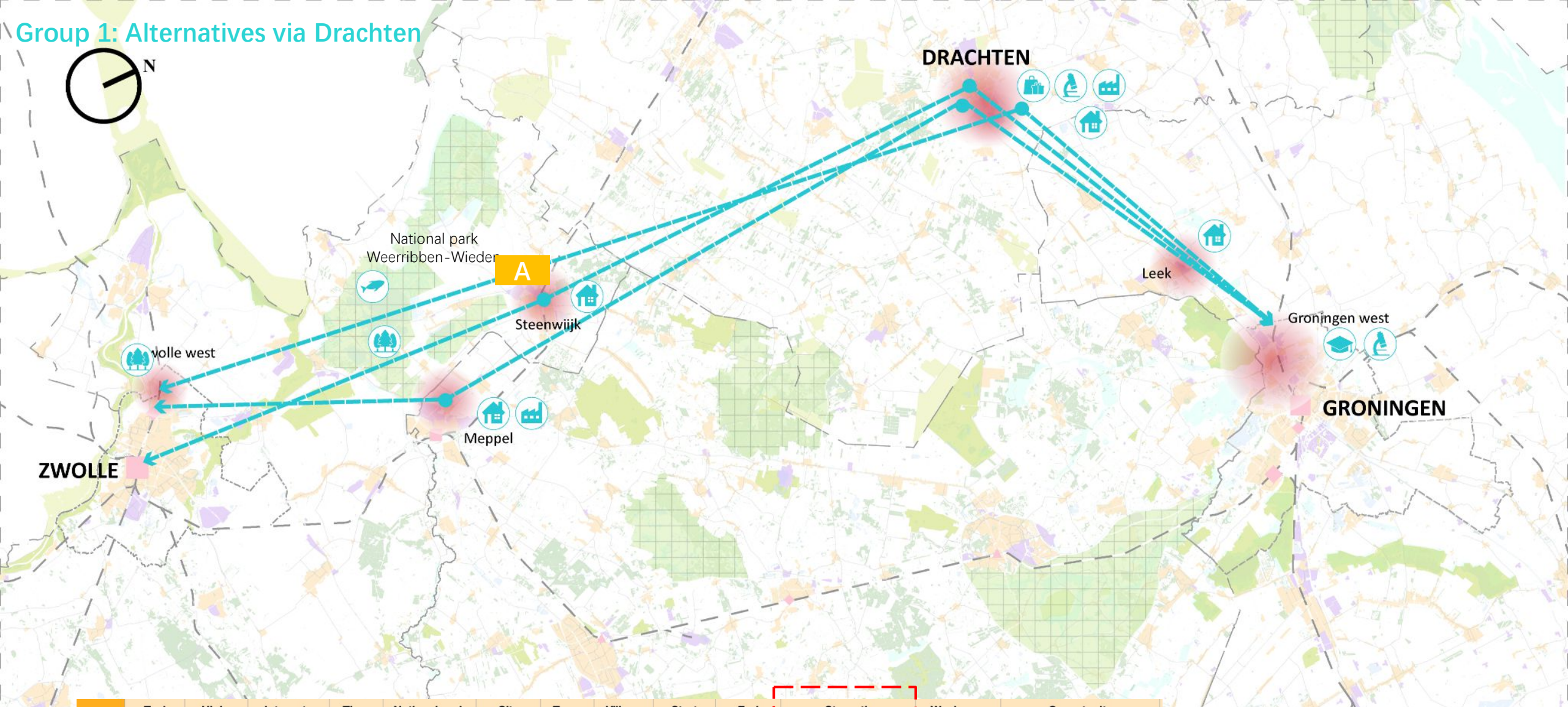


Fochteloerveen - Groningen

Feasible alignments



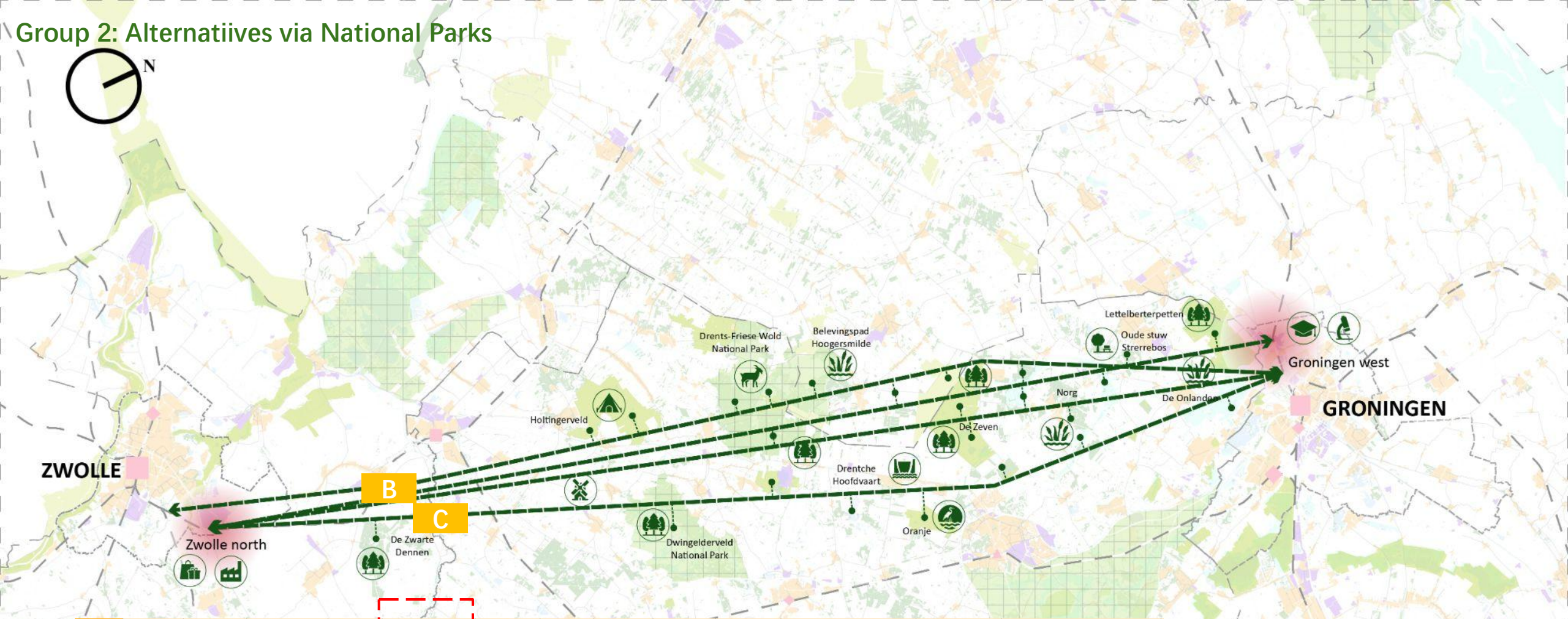
Group 1: Alternatives via Drachten



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (numbe r)	Village (number)	Start station	End station	Strength	Weakness	Opportunity
A	99.59	81.32	7	26	1 (+)	1	1	3	Zwolle West	Groninger Centraal	Drachten get connected to the railway network	Detour	Friesland provincial development

Drawn by Author

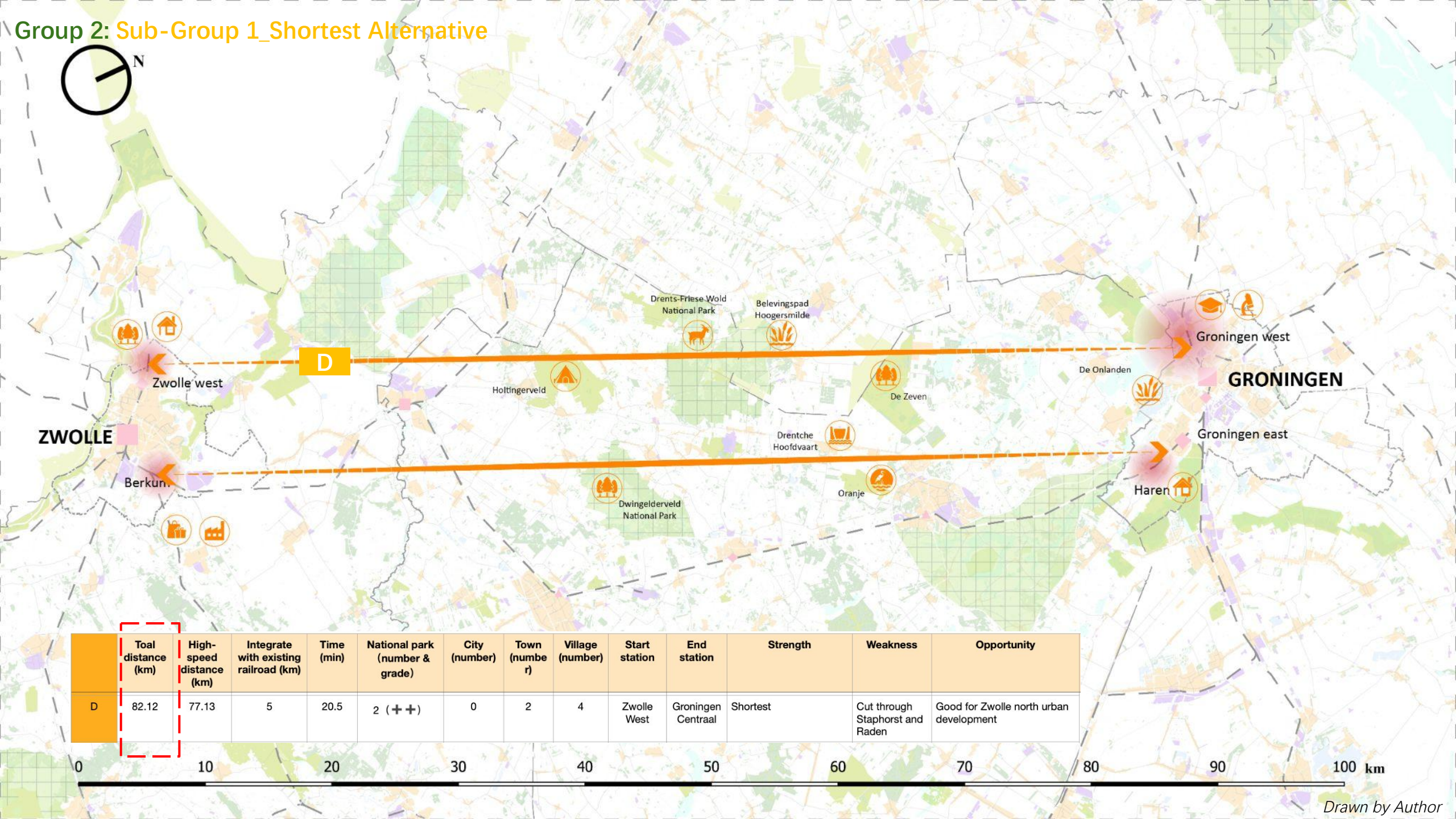
Group 2: Alternatiives via National Parks



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (number)	Village (number)	Start station	End station	Strength	Weakness	Opportunity
B	83.25	80.25	3	21	4(−+++)	0	1	4	Zwolle West	Groningen Centraal	1.Long high-speed section 2. Low construction cost	1. Fragment too many villages	Small height difference
C	93.05	52.50	40.55	24	2 (−−)	0	3	2	Mepal	Haren	1. Historical value (old canal) 2. Benefit Mepel a lot 3. Take advantage of existing railroad	1.Longer distance 2.Monotonous polder landscape	1. The railroad connects national parks as a green corridor. 2. Connect Assen and Groningen

Drawn by Author

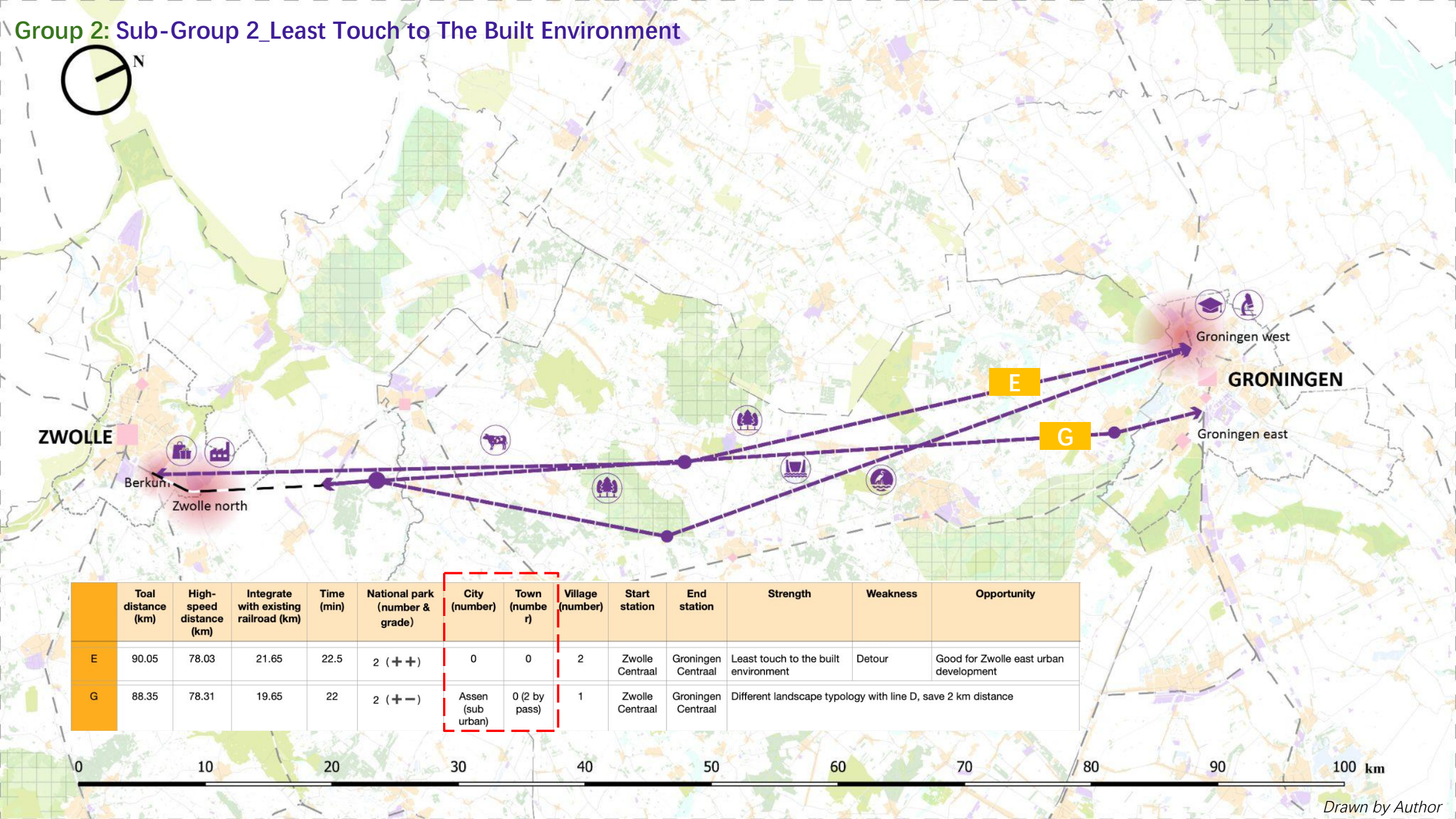
Group 2: Sub-Group 1_Shortest Alternative



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (number)	Village (number)	Start station	End station	Strength	Weakness	Opportunity
D	82.12	77.13	5	20.5	2 (++)	0	2	4	Zwolle West	Groningen Centraal	Shortest	Cut through Staphorst and Raden	Good for Zwolle north urban development

Drawn by Author

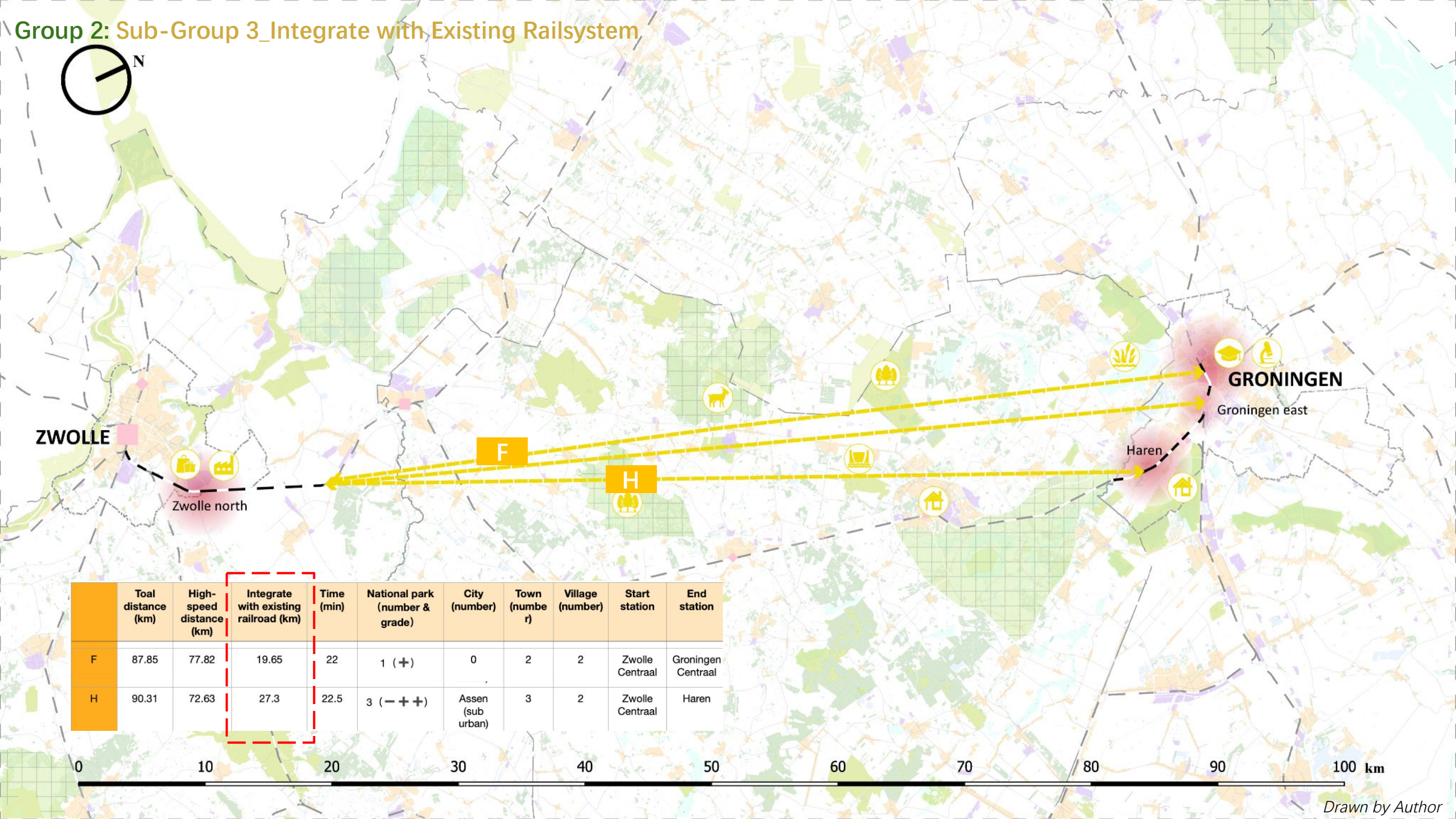
Group 2: Sub-Group 2_Least Touch to The Built Environment



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (number)	Village (number)	Start station	End station	Strength	Weakness	Opportunity
E	90.05	78.03	21.65	22.5	2 (++)	0	0	2	Zwolle Centraal	Groningen Centraal	Least touch to the built environment	Detour	Good for Zwolle east urban development
G	88.35	78.31	19.65	22	2 (+−)	Assen (sub urban)	0 (2 by pass)	1	Zwolle Centraal	Groningen Centraal	Different landscape typology with line D, save 2 km distance		

Drawn by Author

Group 2: Sub-Group 3_Integrate with Existing Railsystem



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (number)	Village (number)	Start station	End station
F	87.85	77.82	19.65	22	1 (+)	0	2	2	Zwolle Centraal	Groningen Centraal
H	90.31	72.63	27.3	22.5	3 (−++)	Assen (sub urban)	3	2	Zwolle Centraal	Haren

Drawn by Author

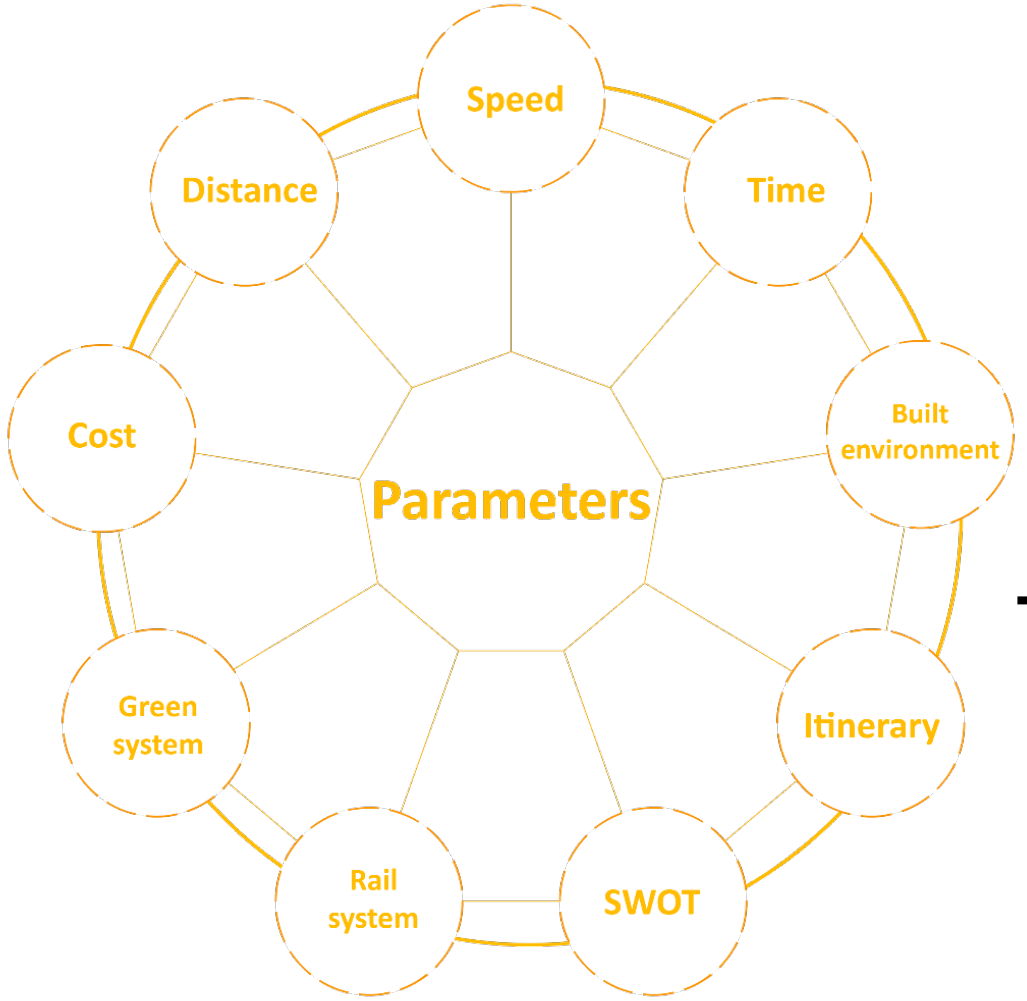
Parameter based evaluation

Assessment chart

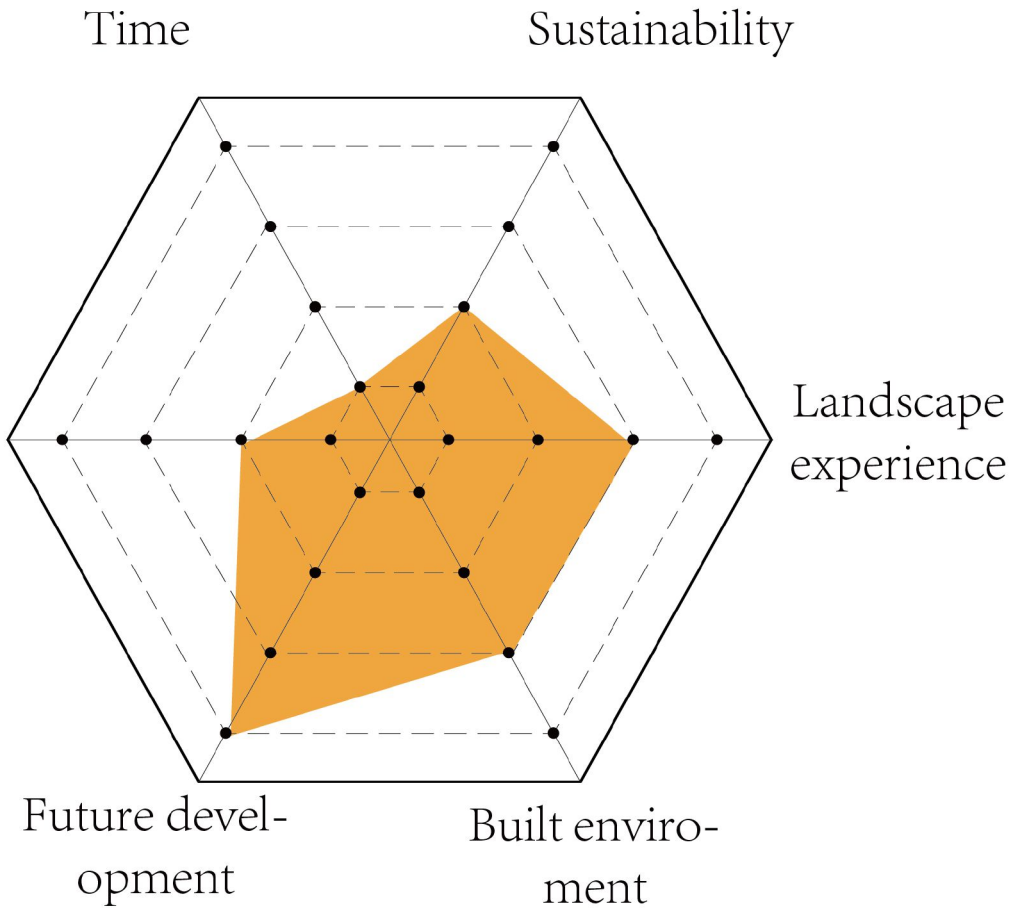
	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City (number)	Town (number)	Village (number)	Start station	End station	Strength	Weakness	Opportunity	Threat
A	99.59	81.32	7	26	1 (+)	1	1	3	Zwolle West	Groningen Centraal	Drachten get connected to the railway network	Detour	Friesland provincial development	Flooding, Erosion, Habitat lose, Relocation of the villages, Conflicts with both urban and rural area
B	83.25	80.25	3	21	4(−+++)	0	1	4	Zwolle West	Groningen Centraal	1.Long high-speed section 2. Low construction cost	1. Fragment too many villages	Small height difference	
C	93.05	52.50	40.55	24	2 (−−)	0	3	2	Mepal	Haren	1. Historical value (old canal) 2. Benefit Mepel a lot 3. Take advantage of existing railroad	1.Longer distance 2.Monotonous polder landscape	1. The railroad connects national parks as a green corridor. 2. Connect Assen and Groningen	
D	82.12	77.13	5	20.5	2 (++)	0	2	4	Zwolle West	Groningen Centraal	Shortest	Cut through Staphorst and Raden	Good for Zwolle north urban development	
E	90.05	78.03	21.65	22.5	2 (++)	0	0	2	Zwolle Centraal	Groningen Centraal	Least touch to the built environment	Detour	Good for Zwolle east urban development	
F	87.85	77.82	19.65	22	1 (+)	0	2	2	Zwolle Centraal	Groningen Centraal	Similar to line D			
G	88.35	78.31	19.65	22	2 (+−)	Assen (sub urban)	0 (2 by pass)	1	Zwolle Centraal	Groningen Centraal	Different landscape typology with line D, save 2 km distance			
H	90.31	72.63	27.3	22.5	3 (−++)	Assen (sub urban)	3	2	Zwolle Centraal	Haren	First draft of line F			
I	90.31	72.63	17.7	22.5	3 (−++)	Assen (sub urban)	2	2	Zwolle Centraal	Haren	1. Interrupt less built environment 2. Connect Assen			
J	92.85	82.20	17.05	23	4 (+−++)	Assen (sub urban)	3	1	Zwolle East	Haren	1. Longer national park viewing time (compare with line H			
Note					+ Long distance − Short distance									

Parameter based evaluation

Parameters

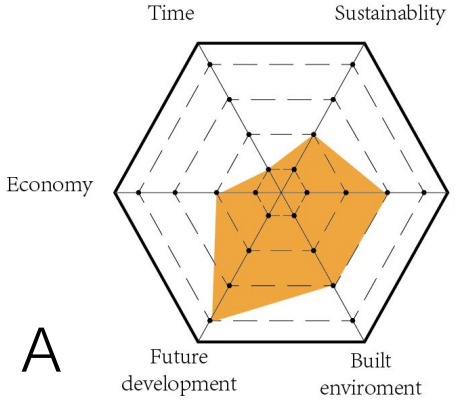


Scoring board

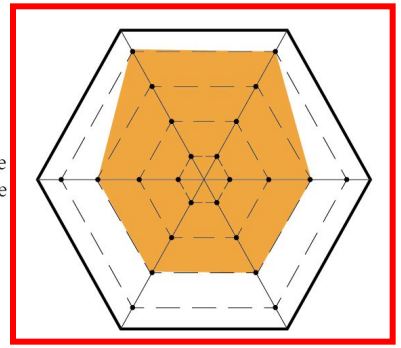


Alignment A

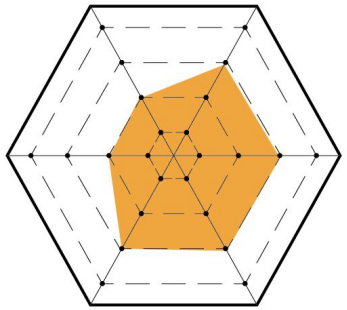
Evaluation



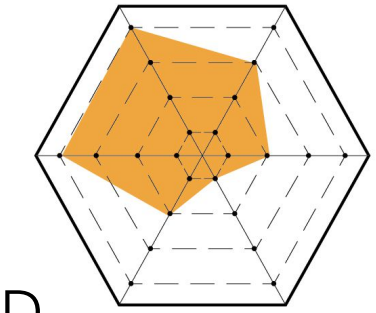
A



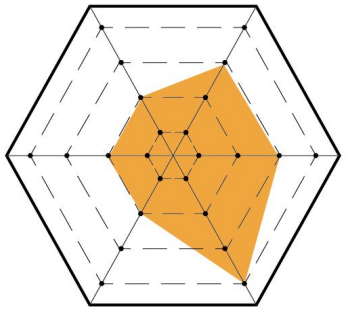
B



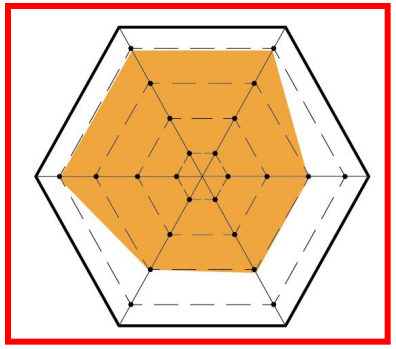
C



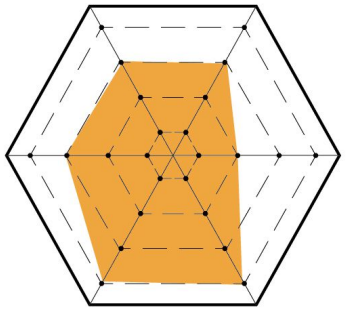
D



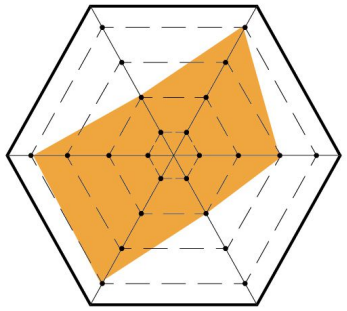
E



F



G



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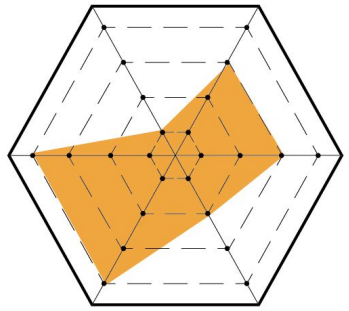

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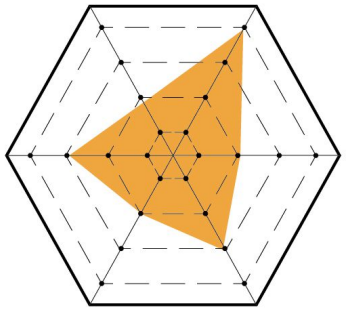

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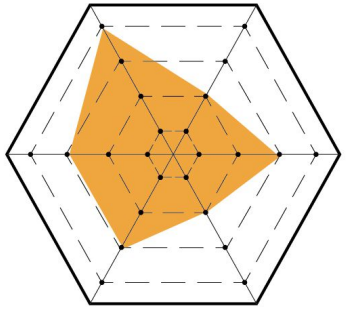

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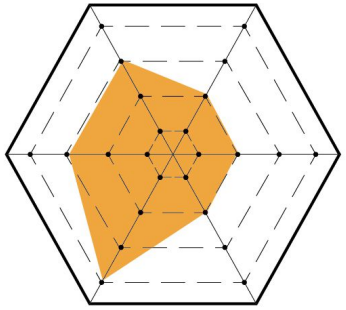

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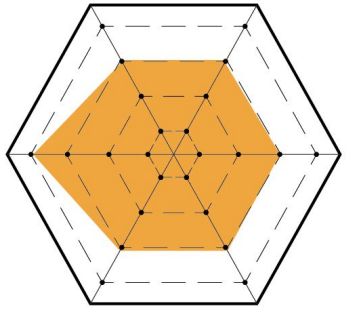

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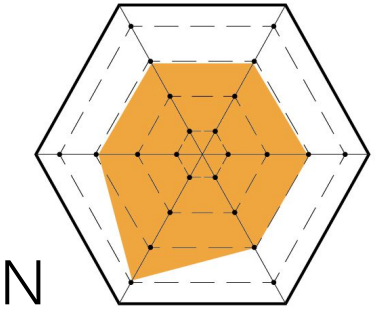

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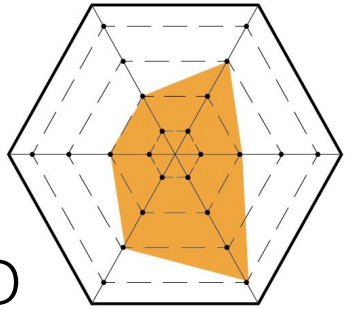
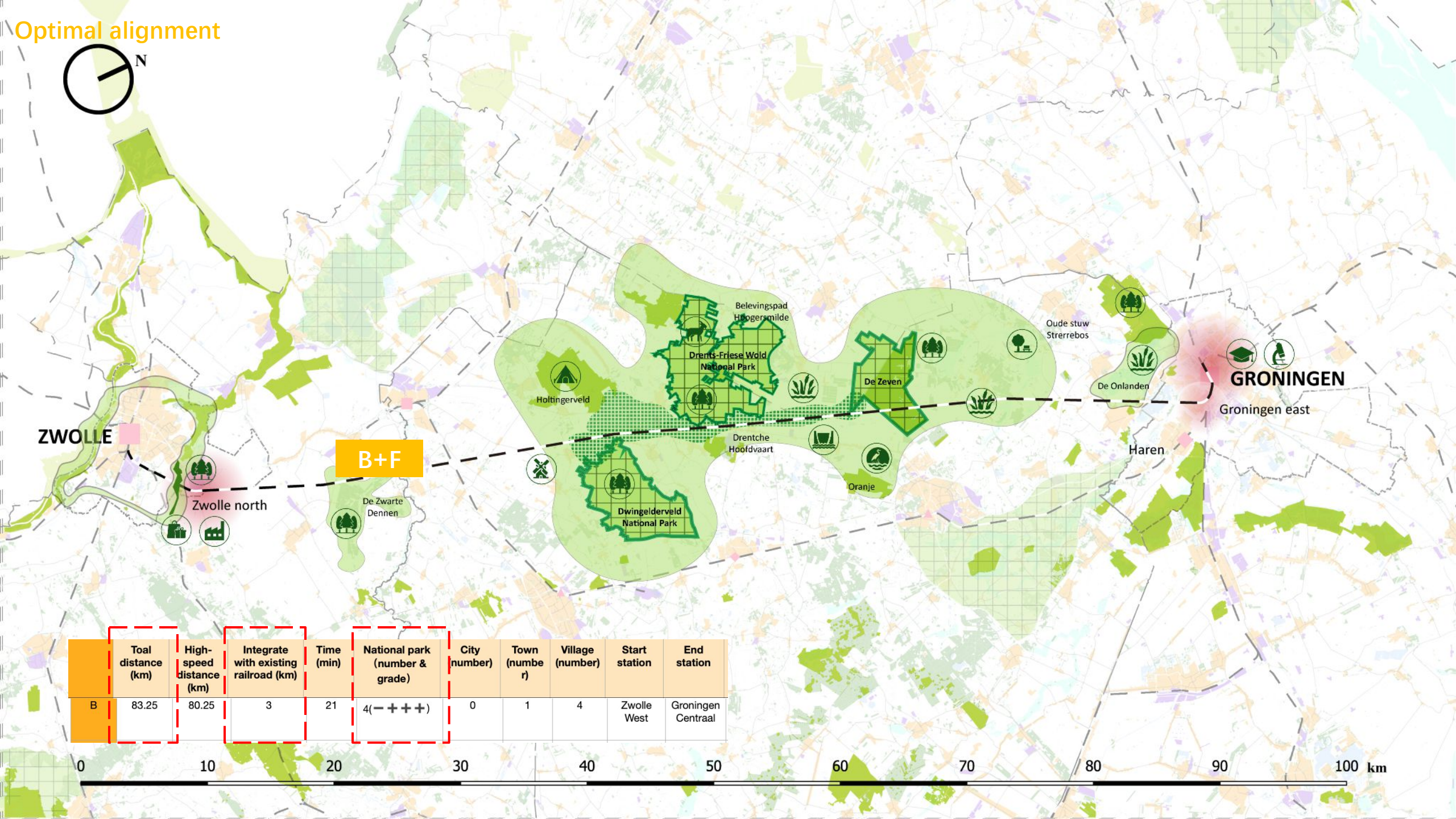


O

Optimal alignment



	Toal distance (km)	High-speed distance (km)	Integrate with existing railroad (km)	Time (min)	National park (number & grade)	City number)	Town (numbe r)	Village (number)	Start station	End station
B	83.25	80.25	3	21	4(−+++)	0	1	4	Zwolle West	Groningen Centraal

Physical model

National parks and nature reserve in the surrounding

Nationaal Park Drents-Friese Wold

The Drents-Friese Wold is the largest contiguous forest area in the Netherlands.

In 2000, more than 6,000 hectares of forest, wasteland, shifting sand and valley grassland were designated as national parks. The Drents-Friese Wold is one of the most beautiful and important nature reserves in Europe

Nationaal Park Dwingelderveld

Rare plants such as broom and bell gentian also feel at home in the Dwingelderveld National Park here. Nearly three hundred species of birds can be seen in the area, The conditions in the Dwingelderveld are also favorable for dozens of species of butterflies and almost all Dutch reptiles.

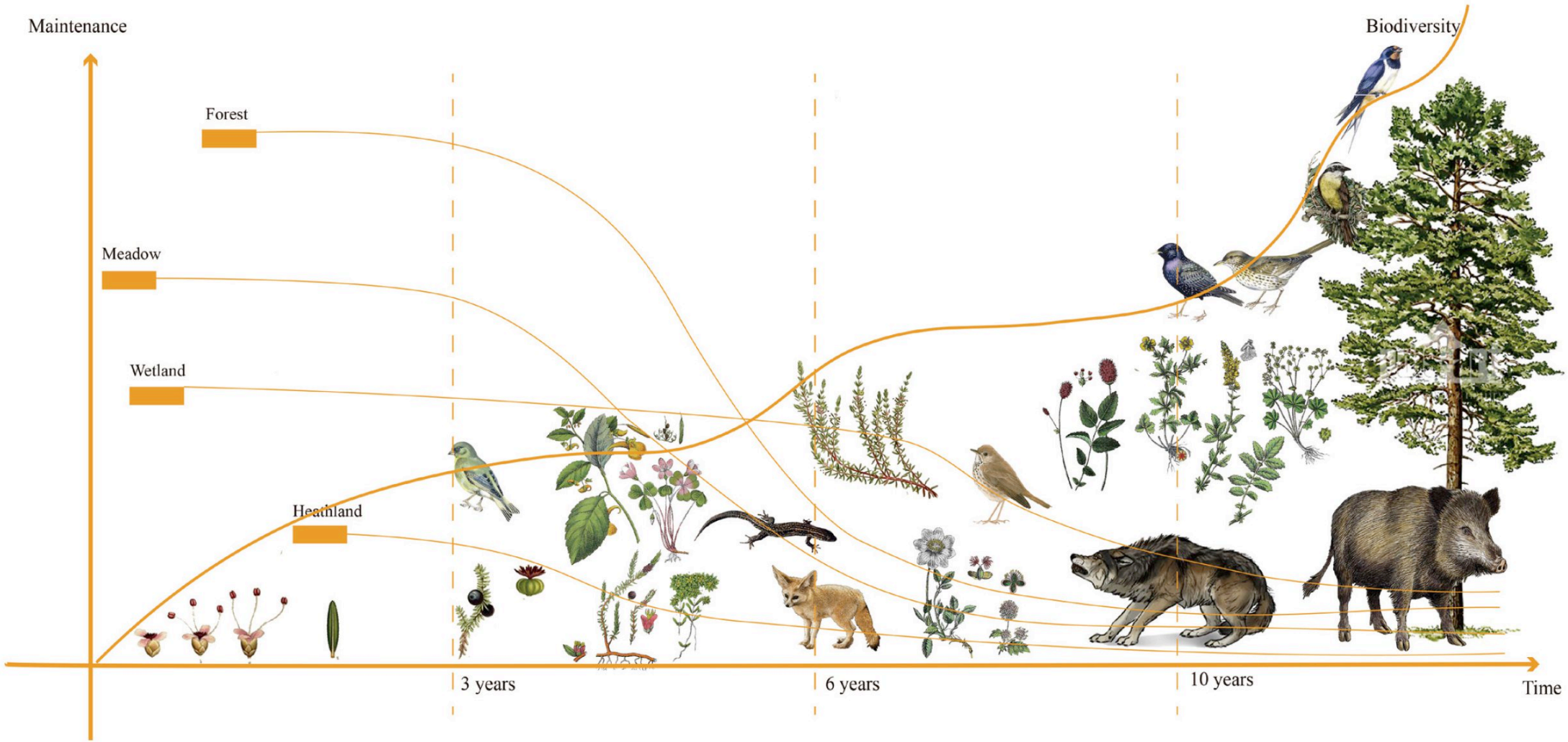
The cultural history of about a century ago is still tangibly present because of surrounding picturesque ash villages.

Holtingerveld

Together with Dwingelderveld and Drents-Friese Wold it forms the natural and cultural landscape of the Drents-Friese border region.

The slogan of the area is "primeval landscape molded by ice and war". This indicates that the past was important for the formation of the area.

Railway as corridor



RARE SPECIES

recorded on or within 1 km of the rail network

Plants
228

Birds
107

Butterflies
23

Reptiles and amphibians
11

Mammals
22

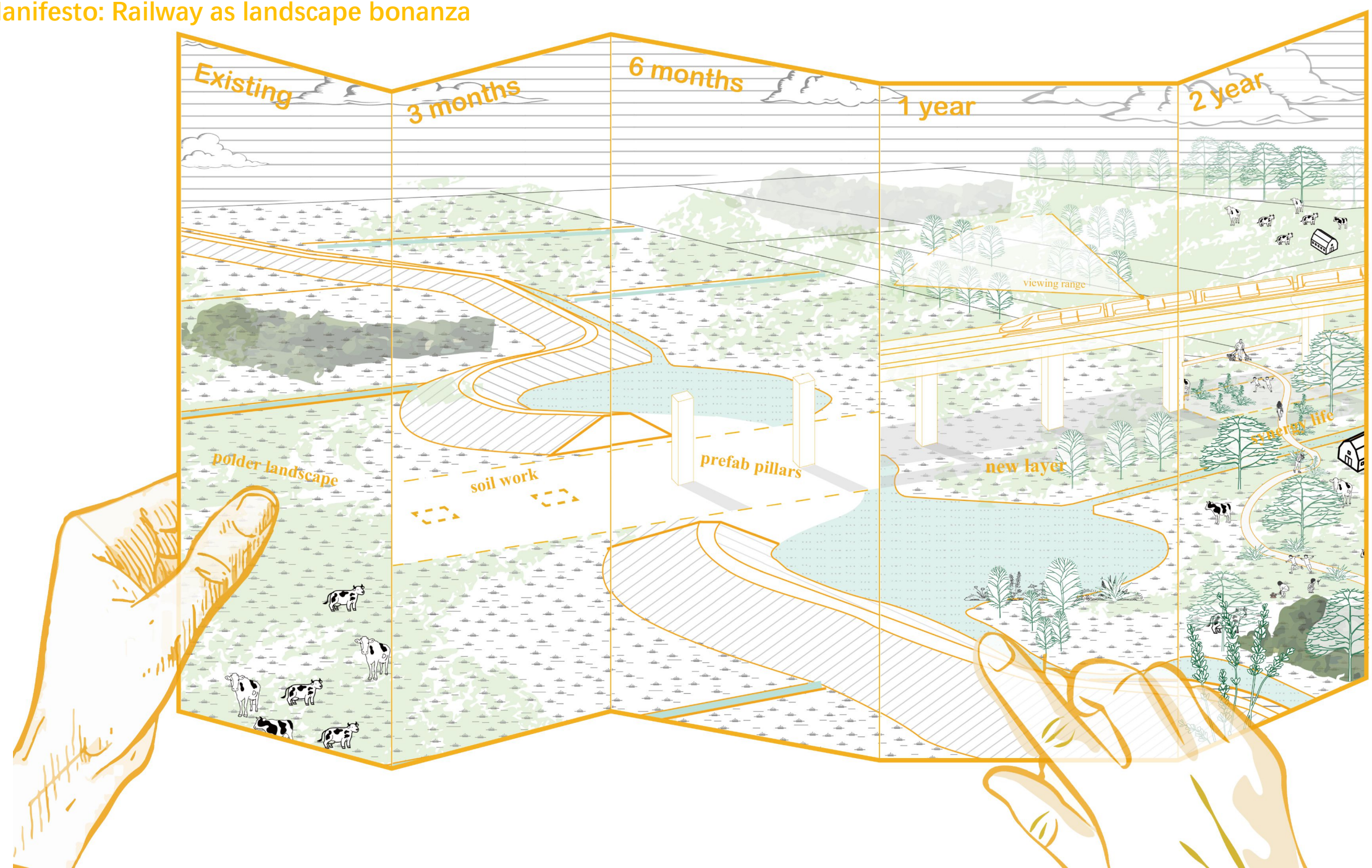
Moths
120

Bees
53

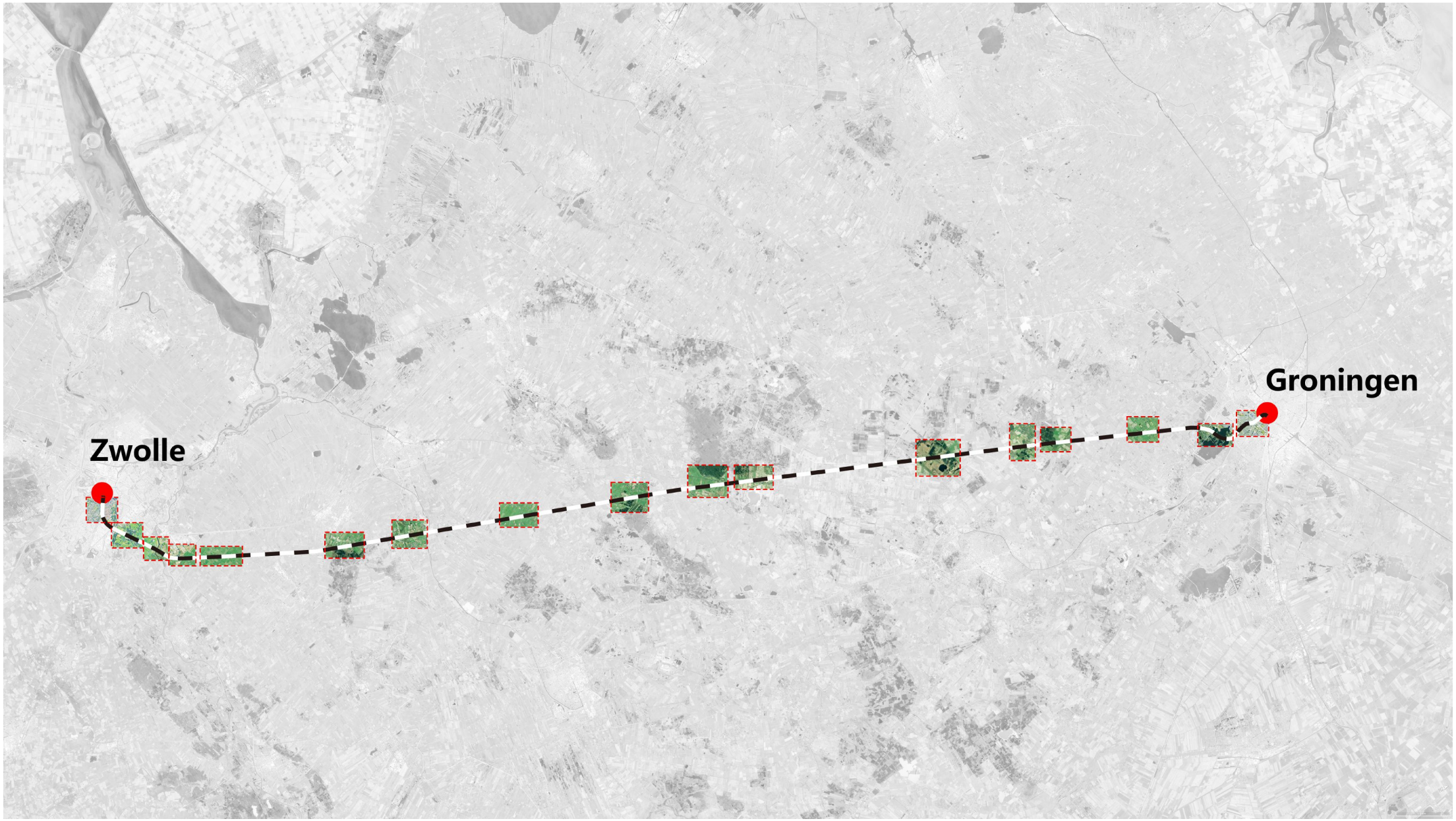
Other inverteebrates
213


VISION: Grand national park
Nationaal Park
Drents-Friese Wold
+
Nationaal Park
Dwingelderveld
+
Holtingerveld
Grand National Park
BUILT ENVIROMENT
Lettelberterpetten
Oude stuw
Strenrebos
GRONINGEN
PEIZE
De Onlanden
NORG
MEDIUM SENSITIVITY
De Zeven
Drents-Friese Wold
National Park
Drentche
Hoofdvaart
HIGH SENSITIVITY
Holtingerveld
BEILEN
MEPPEL
Dwingelderveld
National Park
STAPHORST
DE WIJK
MEDIUM SENSITIVITY
De Zwarte
Dennen
LOW SENSITIVITY
ZWOLLE
BUILT ENVIROMENT

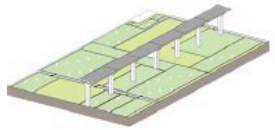
Manifesto: Railway as landscape bonanza



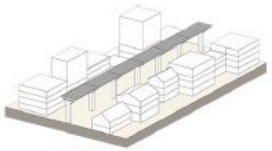
Zoom in



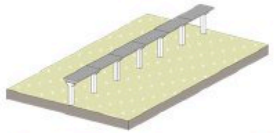
Landscape typology along the optimal alignment



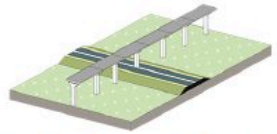
Polder cultural landscape
- Nieuleusen
- Staphorst
- De Wijk
- Dwingeloo
- Norg



Urban context landscape
- Zwolle
- Groningen



Heathland natural landscape
- Leggelderveld
- Esmeerwijk

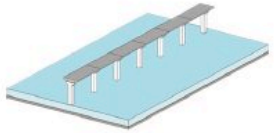


Existing road/highway
- N377
- A28
- N375
- N371
- N919
- N373
- N386

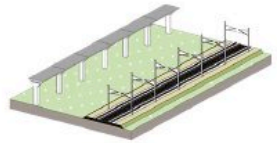
Rural context landscape
- Geeuwenbrug
- Hoogersmilde
- Norg

Forest natural landscape
- De Zwarte Dennen
- National Park Dwingelderveld
- Drents-Friese Wold National Park
- Hoogersmilde

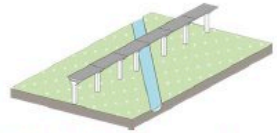
Onshore wind farm
- Hessenpoort



Lake natural landscape
- Achterste Plas
- Hoornsemeer



Existing railroad
- Zwolle - Staphorst east



Historical canal
- Drentse Hoofdvaart

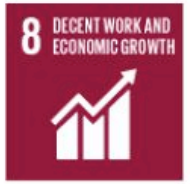
The UN Sustainable Development Goals (SDGs)

Zero hunger
- Greenhouses
- Community farming unit

Good health and well-being
- Sports facility
- Sunken garden
- Linar park
- Children playground

Clean water and sanitation
- Rain water collection and purification
- Resilient sponge for irrigation

Affordable and clean energy
- Energy consumption reduce
- Electric charging space
- 3rd generation wind farm co-development



Decent work and economic growth
- Create new job positions
- Stimulate urban/rural development
- Efficient daily commuting

Industry, innovation and infrastructure
- Prefabricated materials
- Automated high-speed railway girder erection machine

Sustainable cities and communities
- Public space in urban context
- Social space and events
- Inclusive living programme

Climate action
- Recyclable materials
- Less CO2 emission
- Flooding adaptive space

Life on land
- Ecological corridor
- Habitat for small animals
- Shelter for wildlife

Types of viaducts

Red viaduct
The space below viaduct has social and public functions, such as sports, recreation, and events holding.

Blue viaduct
The viaduct itself and space below have water related functions, such as rain water recycle and reuse.

Green viaduct
The space below the viaduct provides extra greenery, contribute to biodiversity and nature environment.

Yellow viaduct
The surrounding of the viaduct and viaduct itself produce or supply renewable energy.

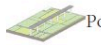
Grey viaduct
The viaduct co-develop with utility services and other installations.

Orange viaduct
The viaduct develops in a mutifunctional way, allows space for other mobility.

How to read this catalogue?

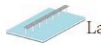
Legend

Landscape typologies


Polder landscape


Forest landscape


Heathland landscape

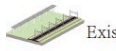

Lake landscape

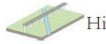

Rural context landscape


Urban context landscape


Wind farm landscape


Existing highway/road


Existing railroad


Historical canel

UN Sustainable Development Goals


Zero hunger


Good health and well-being


Clean water and sanitation


Affordable and clean energy


Decent work and economic growth


Industry, innovation and infrastructure


Sustainable cities and communities


Climate action


Life on land

Type of viaduct


Red viaduct


Blue viaduct


Green viaduct


Yellow viaduct


Grey viaduct


Orange viaduct

Slow traffic bridge

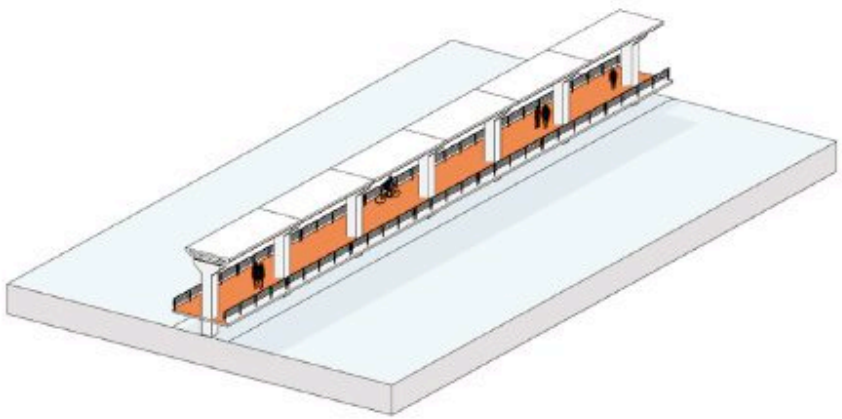
Location: Groningen Hoornsemeer, 78.2/84.5km

There is not yet a bridge to cross the Hoornsemeer lake from the west side to the east side. A double deck bridge is a good way to make this section extraordinary, the second deck is for slow traffic, which means walking and cycling

Landscape typologies: 

SDGs: 

Type of viaduct: 



Hoornsemeer, Groningen

Linar park

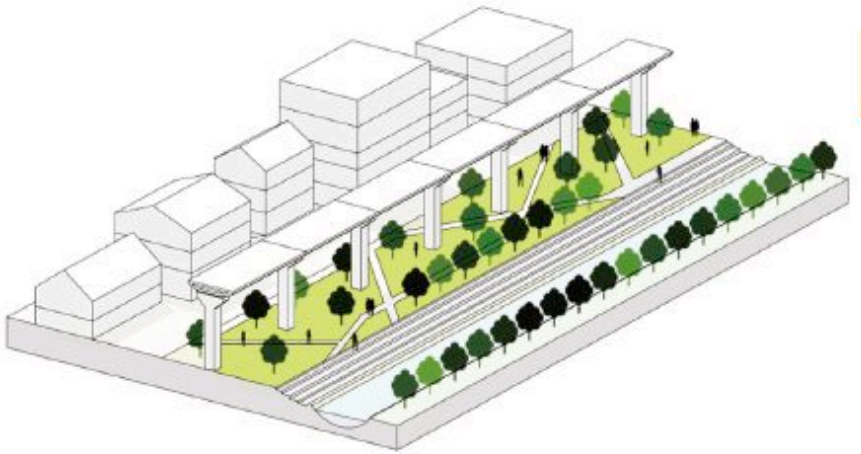
Location: Groningen canal, 80.7/84.5km

The high-speed railway viaduct will travel through the space between highway and canel in Groningen. This provides ar unique chance to turn the in-between unused space into a linar park, which will have a profound impact to the whole city.

Landscape typologies:

SDGs:

Type of viaduct:



Julianweg, Groningen Zuid

Noise insulation tube

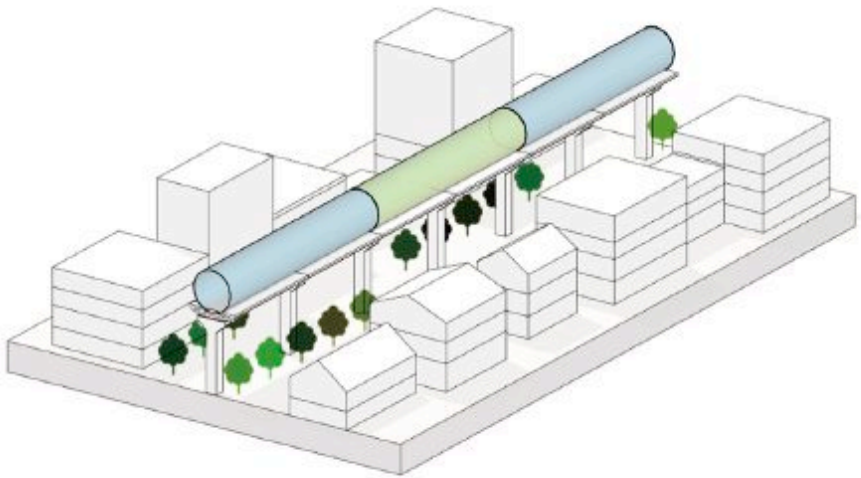
Location: Groningen central, 84.0/84.5km

The train is approaching the end station Groningen Centraal, which locates at the most high density residitial area of the city. In this case, noise insulation tube is suggested to reduce the side effect.

Landscape typologies: 

SDGs: 

Type of viaduct: 



Emmestraat, Groningen

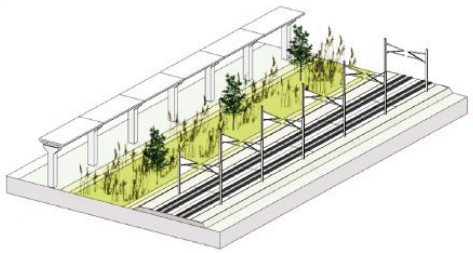
Ecological corridor
Location: Staphorst - Nieuwleusen, 14.1-18.3 /84.5km

Here, the proposed railroad will go in parrellel with the existing road track, leaving a 80 meters width corridor for wildness, it will act as a soft barrier for the traffic iinfraastructure and diversify the local founa and flora.

Landscape typologies:

SDGs: 3 6 13 15

Type of viaduct:



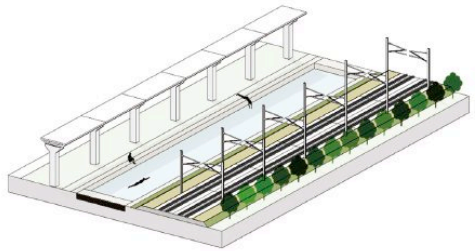
Outdoor swimming pool
Location: Staphorst - Nieuwleusen, 15.1/84.5km

Close to De Meele and Nieuwleusen, ouutdoor swimming pool is an experimental programme to provide space for sports and recreation, In winter, it will turn into a skating playground.

Landscape typologies:

SDGs: 3 6 11 13

Type of viaduct:



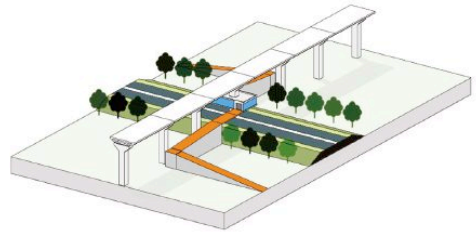
Traffic control room
Location: intersection with N377, 20.1/84.5km

An on-site traffic control room is neccessary and emergency avoidance space is on demand. It can also be a restroom for regular mantainance workers.

Landscape typologies:

SDGs: 8 9

Type of viaduct:



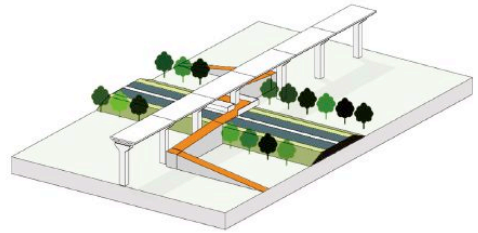
Viewing platform
Location: intersection with A28, 26.1/84.5km

The intersection of the viaduct and A28 highway is going to showcase the harmony of contemporary traffic infrastructure landscape. It's going to be an inspiring moment for all the people being here tourists, car drivers, and train passengers.

Landscape typologies:

SDGs: 3 9 11

Type of viaduct:



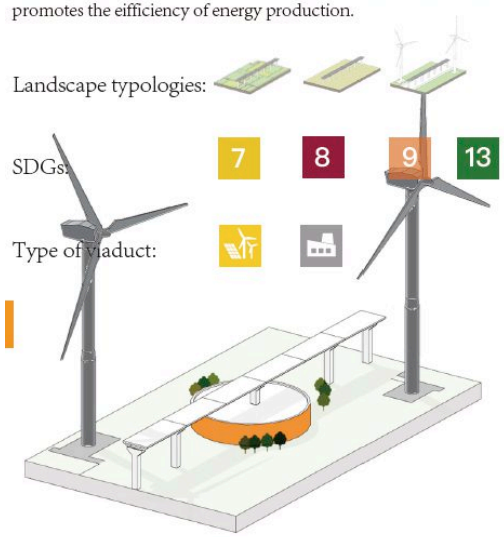
Energy research center
Location: Staphorst - Nieuwleusen, 17.0/84.5km

Renewable energy industry requires consistent investiment, wind farm is already built in this area, a research lab can monitor and promotes the eifficiency of energy production.

Landscape typologies:

SDGs: 7 8 9 13

Type of viaduct:



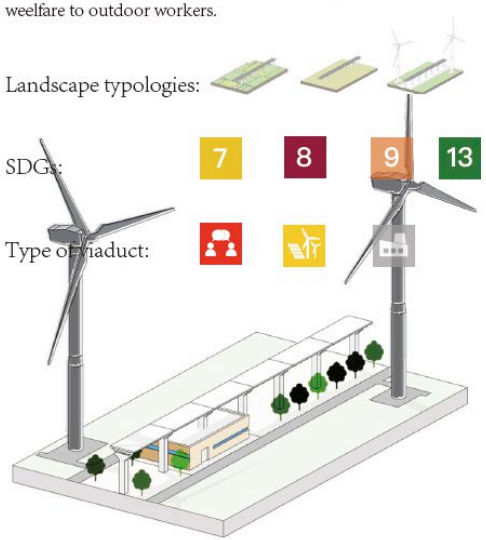
Warehouse & restroom
Location: Staphorst - Nieuwleusen, 17.8/84.5km

Energy infrastructure need maintenance and regular check, staff restroom can be embedded below the viaduct, offering better weelfare to outdoor workers.

Landscape typologies:

SDGs: 7 8 9 13

Type of viaduct:



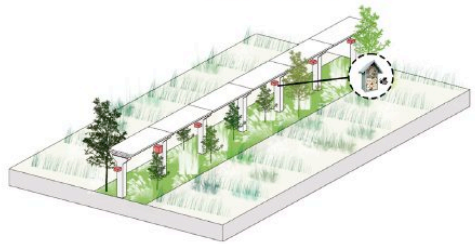
Wildlife shelter & corridor
Location: Dwingelderveld - Drents-Friese Wold, 42.5-52.7/84.5km

Instead of fragement two national park, the viaduct will turn the in between space into a corridor and bring two national parks both spatially and ecologically. It will play an important role as shelter for small mammals, insects ands ome rare specics of plants.

Landscape typologies:

SDGs: 3 6 13 15

Type of viaduct:



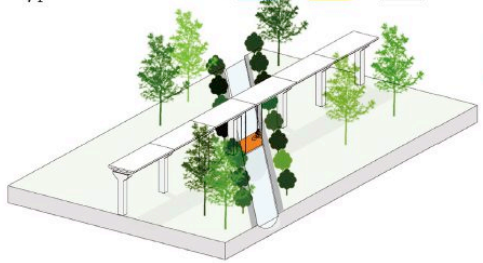
Switchable bridge
Location: intersection with Drentse Hoofdvaart, 49.7/84.5km

When the viaduct travel across the Drentse Hoofdvaart, a bridge for pedestrian below the viaduct will be a romantic dialogue engineering project for the two infrastructure.

Landscape typologies:

SDGs: 9 11

Type of viaduct:



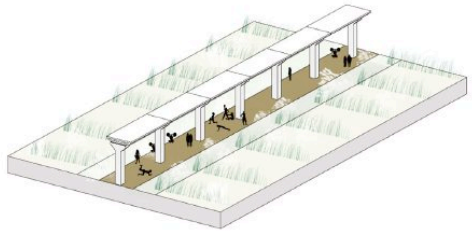
Suburban bootcamp
Location: Leggelderveld, 50.4/84.5km

Leggeldveld is close to two national park, but with different landscape type. It can connect better to the nearby villages by the high-speed railway, providing a new destination for daily recreational and sports activities.

Landscape typologies:

SDGs: 3 11

Type of viaduct:



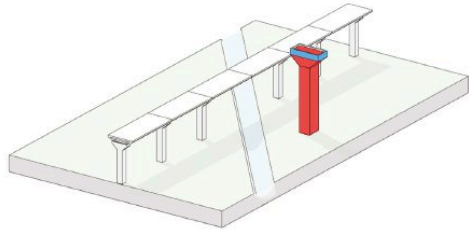
Watching tower
Location: intersection with Drentse Hoofdvaart, 49.7/84.5km

A iconic landmark is proposed at the crossing point of the viaduct and Drentse Hoofdvaart, which is the most important infrastructure for Drentse in history. It will be a drama point of the collision of contemporary and history.

Landscape typologies:

SDGs: 3 11

Type of viaduct:



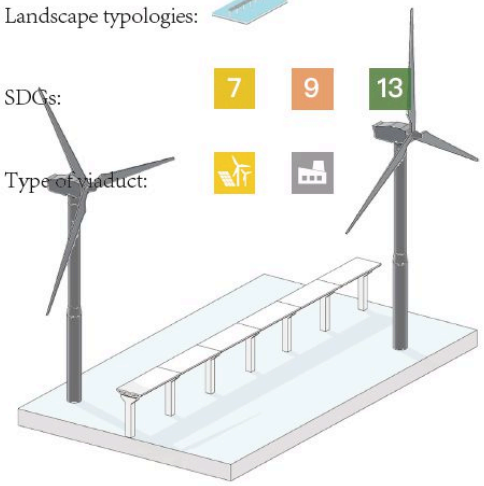
Lake wind farm
Location: Groningen Hoornsemeer, 78.2/84.5km

The water surface of Hoornsemeer still remains a possibility for renewable energy production, it's possible to co-develop wind farm here along with the viaduct. The energy it produces can be serve to the residential area nearby as a long term compensation.

Landscape typologies:

SDGs: 7 9 13

Type of viaduct:



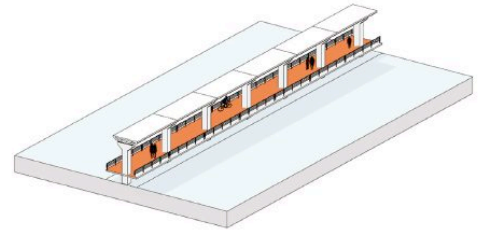
Slow traffic bridge
Location: Groningen Hoornsemeer, 78.2/84.5km

There is not yet a bridge to cross the Hoornsemeer lake from the west side to the east side. A double deck bridge is a good way to make this section extraordinary, the second deck is for slow traffic, which means walking and cycling

Landscape typologies:

SDGs: 3 9 11

Type of viaduct:



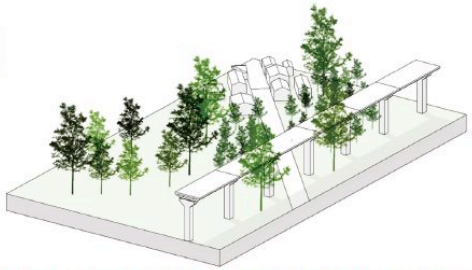
Forest buffer
Location: Norg, 65.9/84.5km

The high-speed railway route is offseted 500m from the original route in respect of the cultural landscape at Norg, forest buffer zone will grow here to mitigate the noise from the viaduct and provide recreational space for the local.

Landscape typologies:

SDGs: 3 11 13 15

Type of viaduct:



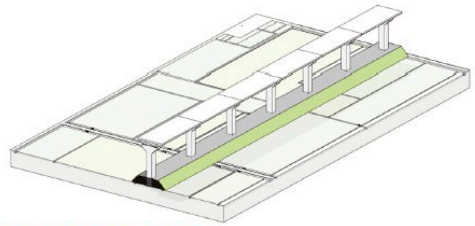
Mutifunctional slope
Location: Norg, 66.4/84.5km

The grass slope function as a dike if there is flood to come, while simultaneously enabling other uses. Slope can have roads on top, cables and/or pipelines running through them, or structures on them or are part of a historic landscape.

Landscape typologies:

SDGs: 6 9 11

Type of viaduct:



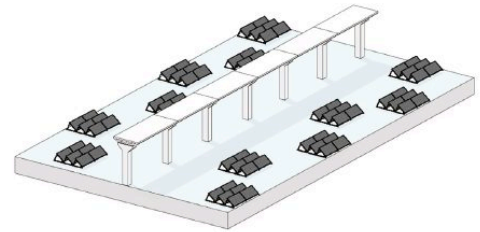
Lake solar farm
Location: Groningen Hoornsemeer, 79.5/84.5km

Similarly, ro the wind farm option, solar farm is also possible on the water surface.

Landscape typologies:

SDGs: 7 9 13

Type of viaduct:



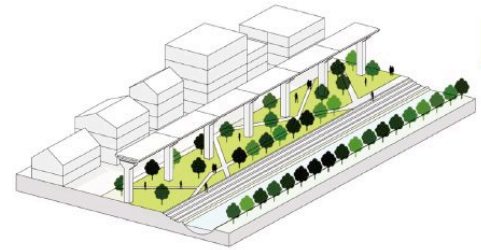
Linar park
Location: Groningen canal, 80.7/84.5km

The high-speed railway viaduct will travel through the space between highway and canel in Groningen. This provides an unique chance to turn the in-between unused space into a linar park, which will have a profound impact to the whole city.

Landscape typologies:

SDGs: 3 6 11 15

Type of viaduct:



Cycling lane

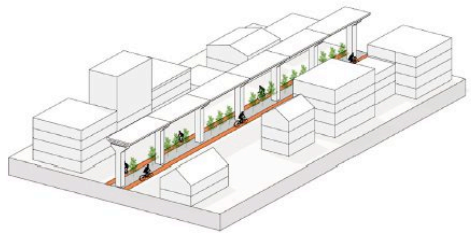
Location: Zwolle central, 1.2/84.5km

Cycling lane below the viaduct is not new, it's a pratical way to make the space below into good use. Also extra greenery will make the viaduct softer in urban texture. Additional function layer makes the viaduct more affiinitive.

Landscape typologies:

SDGs: 3 6 9 11

Type of viaduct:



Eletric vehicle charging terminal

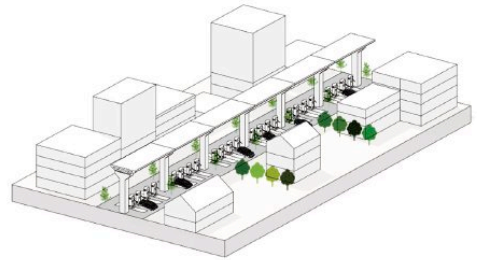
Location: Zwolle east, 3.8/84.5km

The 2040 vision of Zwolle has a statement of taking the chanllenge of energy transition and climate change. Electric vehicle is an important step, and linar space below the viaduct has a large potential for charging.

Landscape typologies:

SDGs: 7 9 11 13

Type of viaduct:



Sunken garden

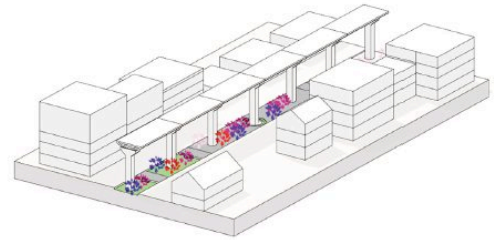
Location: Groningen Julianplein, 83.2/84.5km

Julianplein is the most busy and problematic intersection in Groningen, public and recreational space is very limited. Sunken garden below the viaduct will provide a connection space for the community around.

Landscape typologies:

SDGs: 3 6 11 13

Type of viaduct:



Noise insulation tube

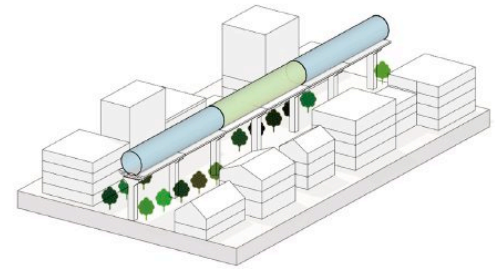
Location: Groningen central, 84.0/84.5km

The train is approaching the end station Groningen Centraal, which locates at the most high density residitial area of the city. In this case, noise insulation tube is suggested to reduce the side effect.

Landscape typologies:

SDGs: 9 11

Type of viaduct:



Skateboard park

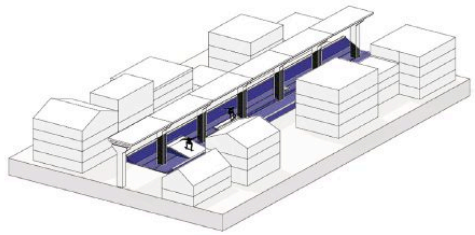
Location: Zwolle east, 6.3/84.5km

Zwolle east is an vibrant and long history community, skateboard park will stimulate the community's energy of youth

Landscape typologies:

SDGs: 3 6 11

Type of viaduct:



Greenhouse unit

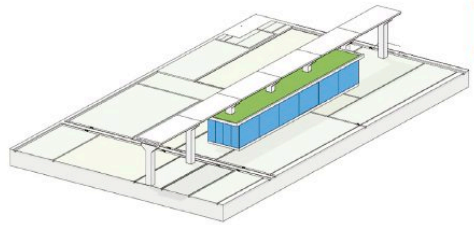
Location: Polder outside Nieuwleusen, 13.3/84.5km

The shade of viaduct has a side influence on the growing of grass. Greenhouse comes as a compensation solution for the production of the field, and at the same time make good use of the space below the viaduct.

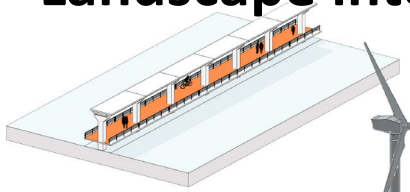
Landscape typologies:

SDGs: 2 6 8 11

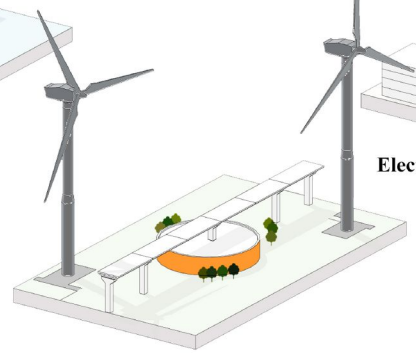
Type of viaduct:



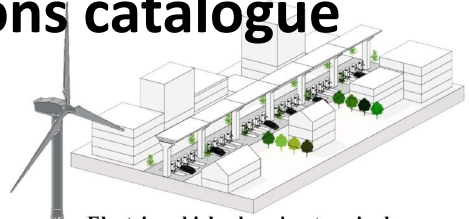
Landscape interventions catalogue



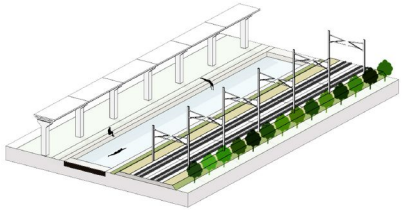
Slow traffic bridge



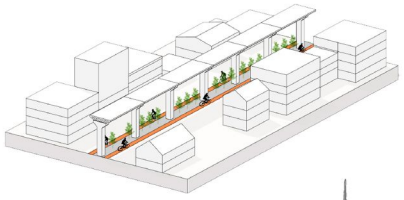
Energy research center



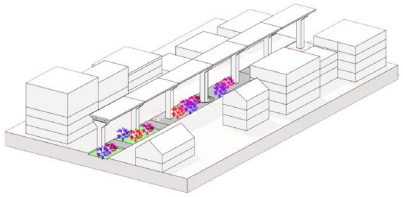
Electric vehicle charging terminal



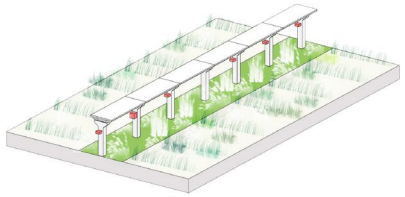
Skating & swimming pool



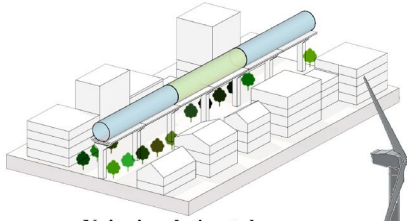
Cycling lane



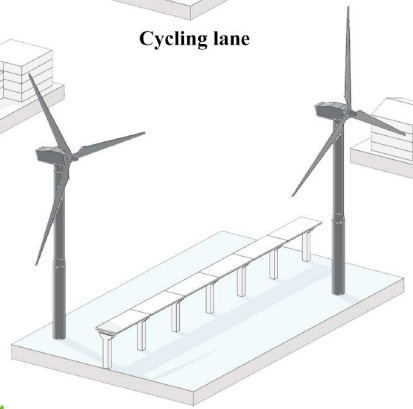
Sunken garden



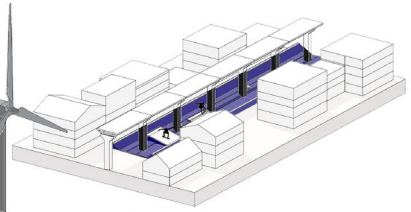
Wildlife shelter



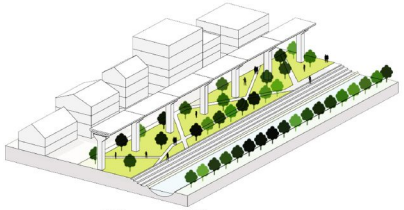
Noise insulation tube



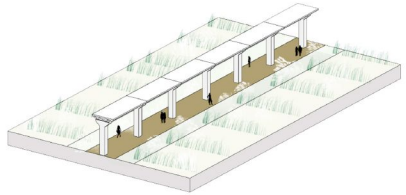
Lake wind farm



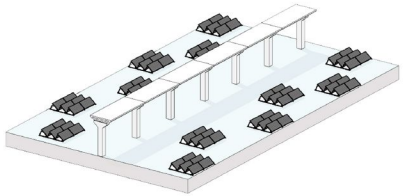
Skatboading park



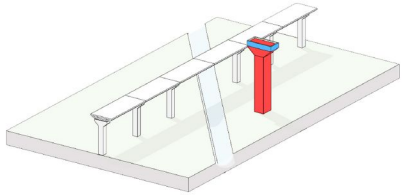
Linar public space



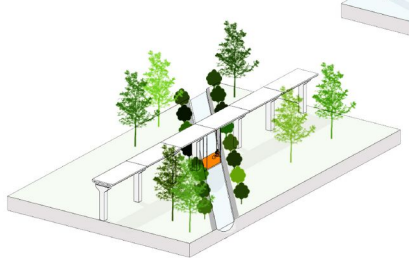
Suburban bootcamp



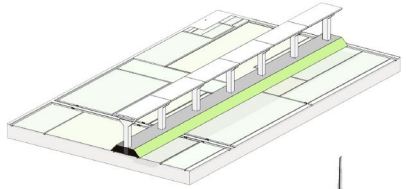
Lake solar farm



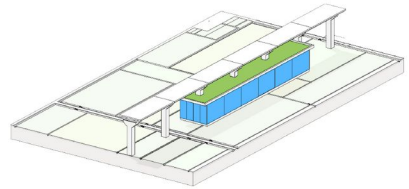
Watching tower



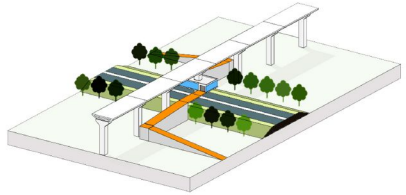
Switchable bridge



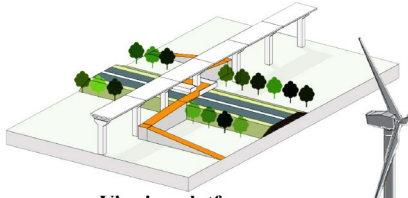
Mutifunctional dike



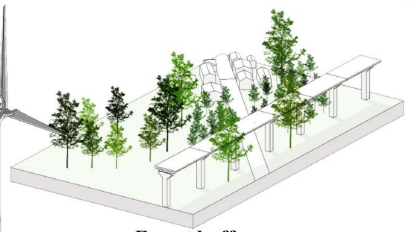
Greenhouse unit



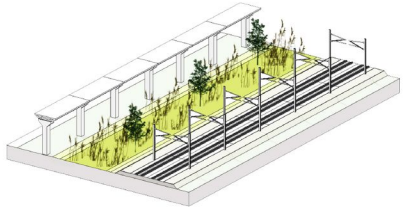
Traffic control room



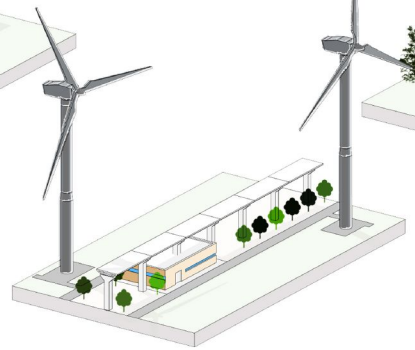
Viewing platform



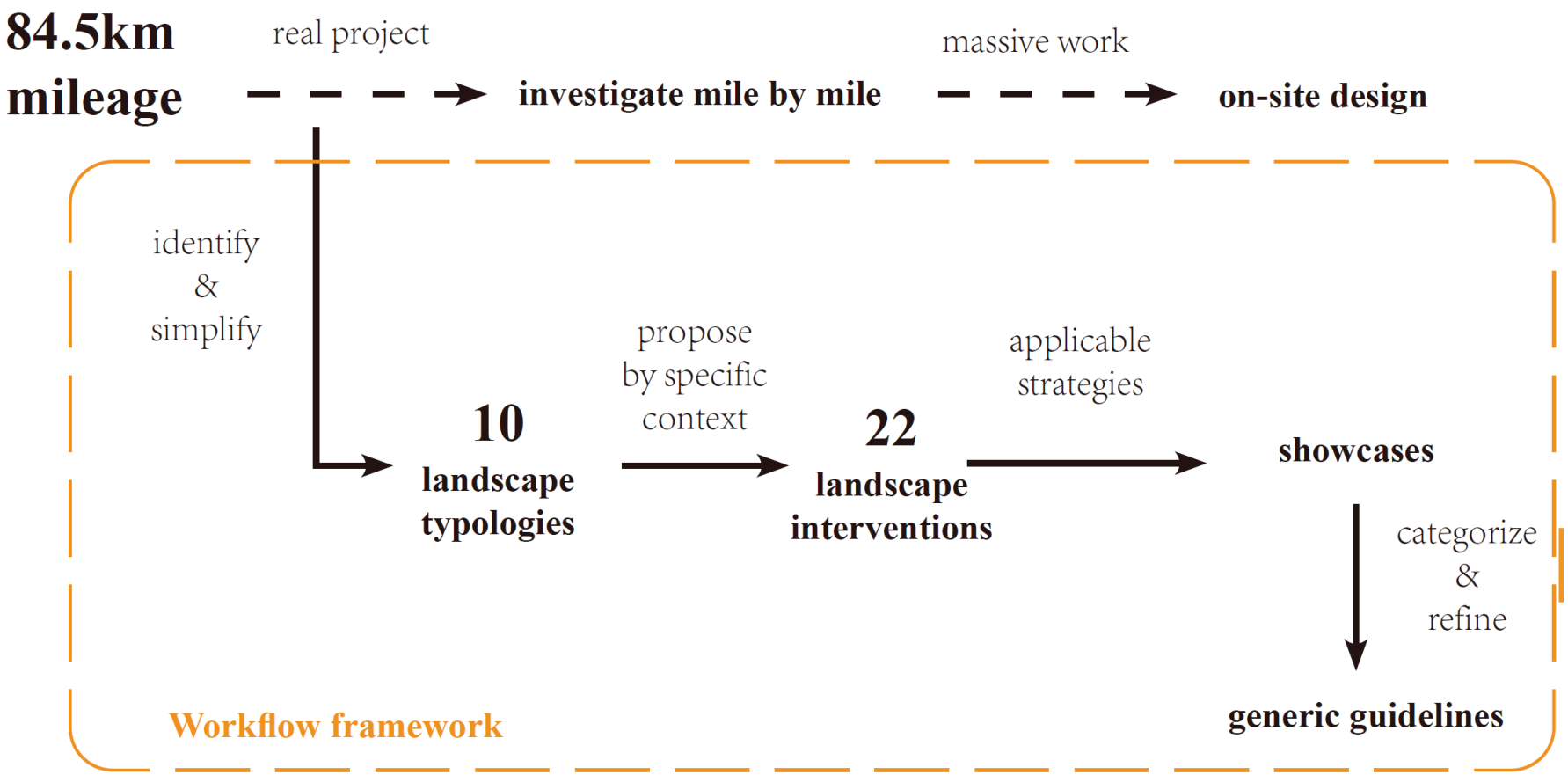
Forest buffer



Ecological corridor



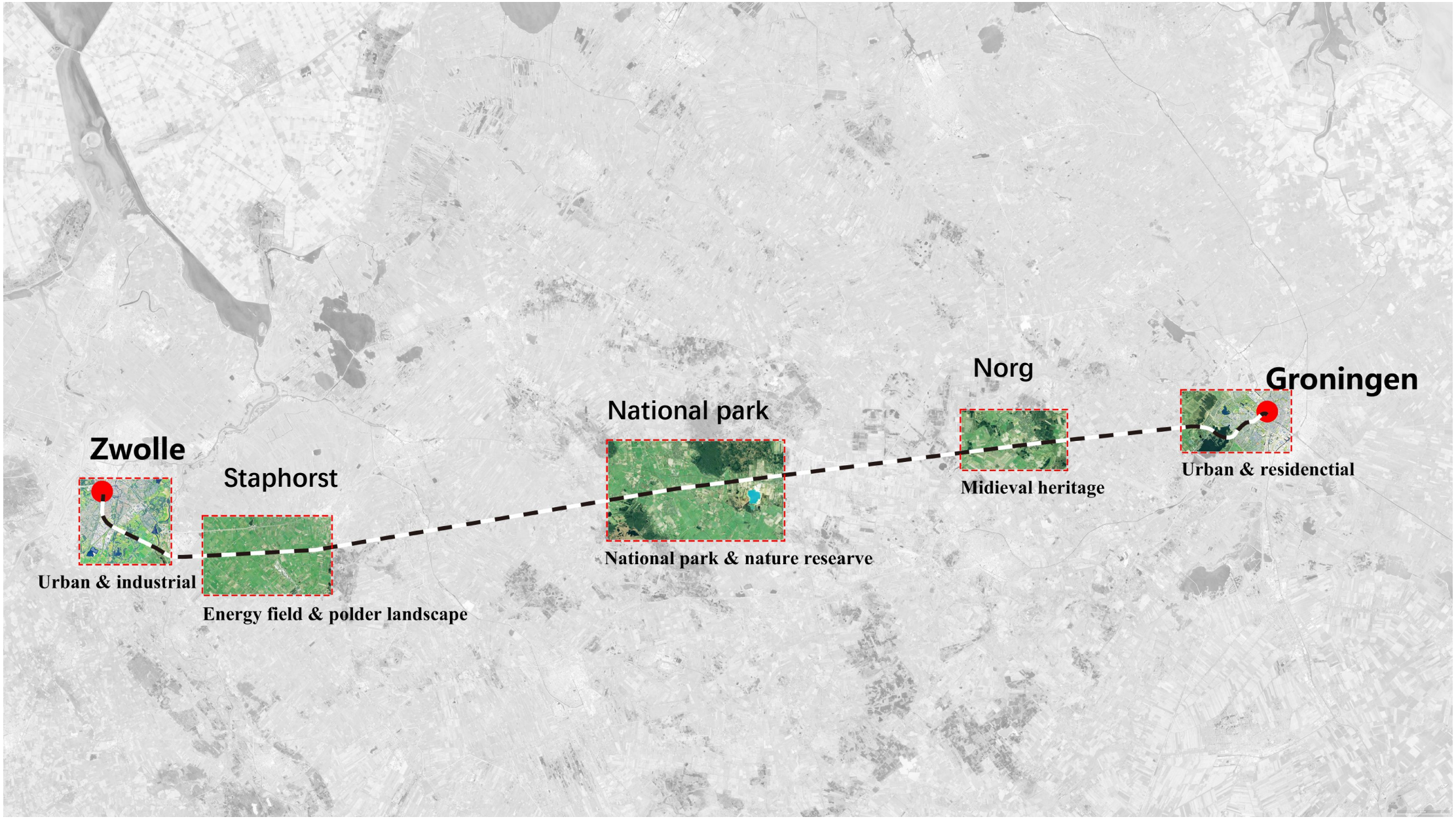
Warehouse & restroom


84.5km
mileage
real project
investigate mile by mile
massive work
on-site design
identify
&
simplify
10
landscape
typologies
propose
by specific
context
22
landscape
interventions
applicable
strategies
showcases
categorize
&
refine
generic guidelines
Workflow framework

"Below the viaduct,
so much more possibilities unfolds,
exceeding we all think and have now."

Collected by Juul, Giordana, and Bai

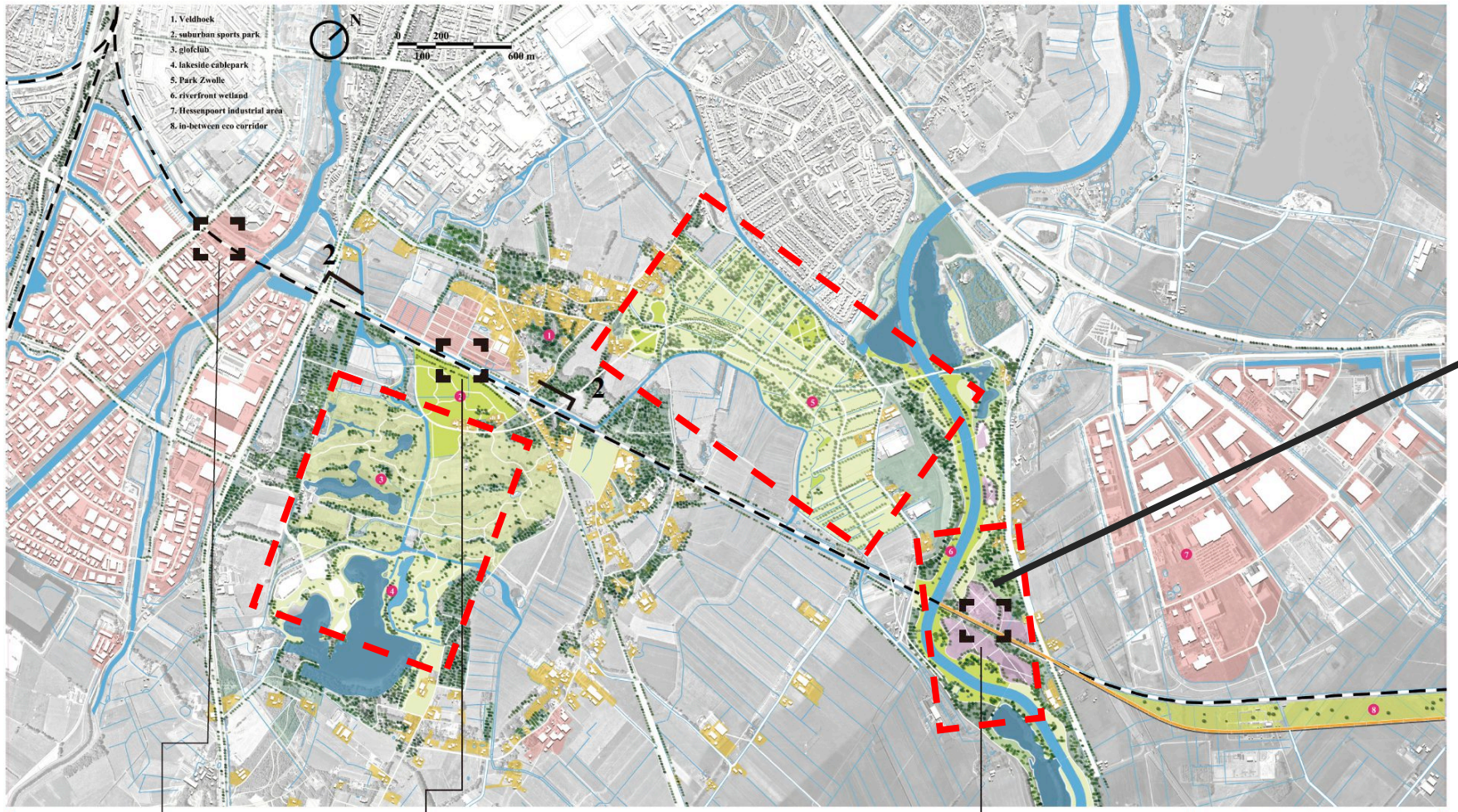
The train journey


Zwolle
Staphorst
National park
Norg
Groningen
Urban & industrial
Energy field & polder landscape
National park & nature researve
Midieval heritage
Urban & residenctial

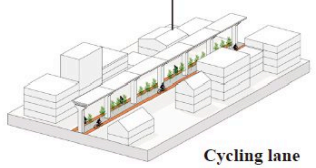

Zwolle
option 1
option 2
option 3
existing railroad
high-speed railway viaduct

Zwolle-regional green vision

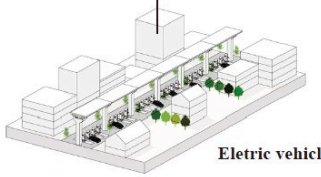
Zwolle- Master plan



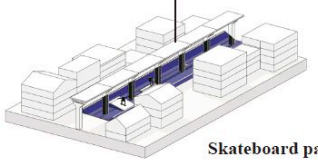
5-2 Master plan of Zwolle, drawn by Author



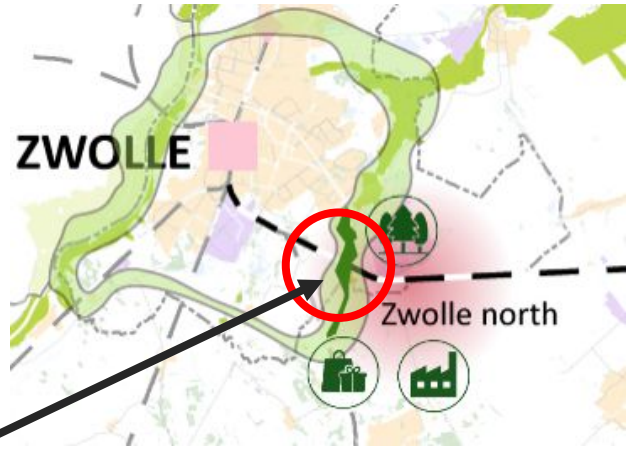
Cycling lane

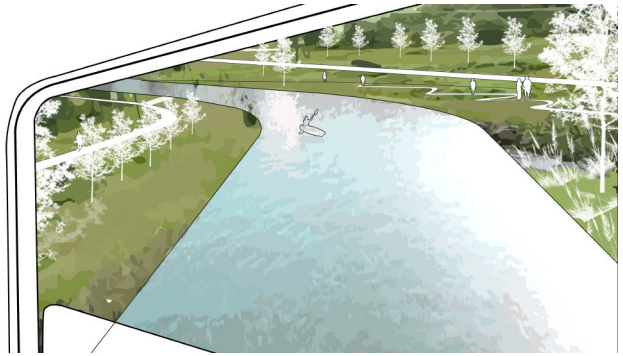


Eletric vehicle charging terminal

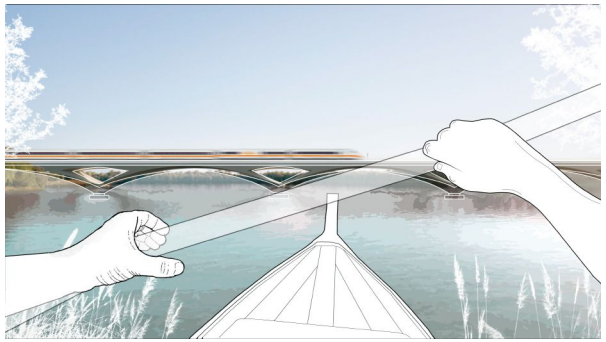


Skateboard park



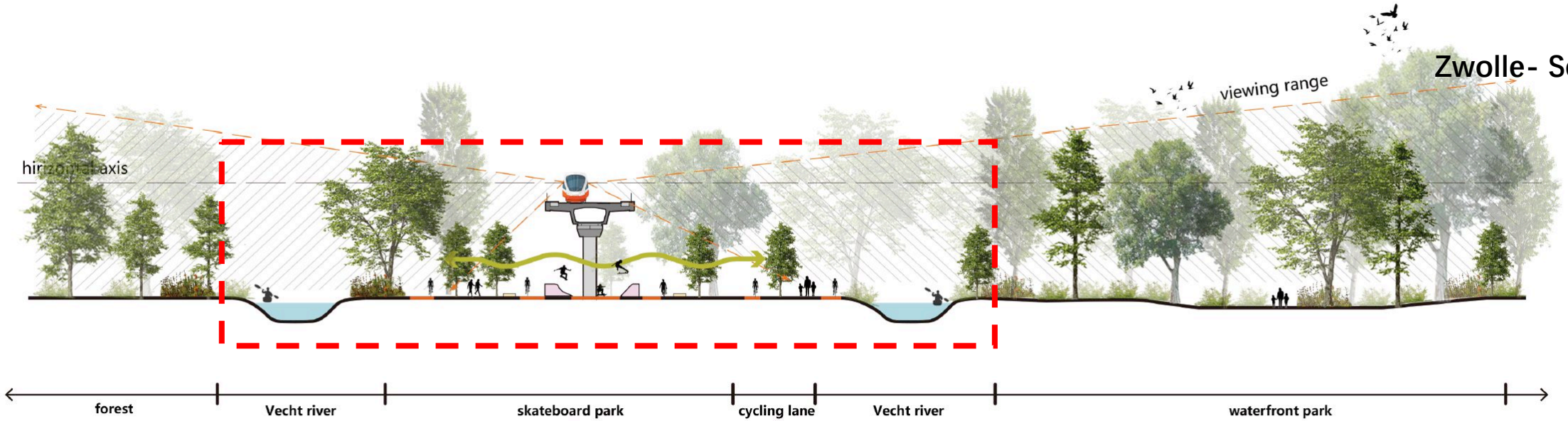


view from train

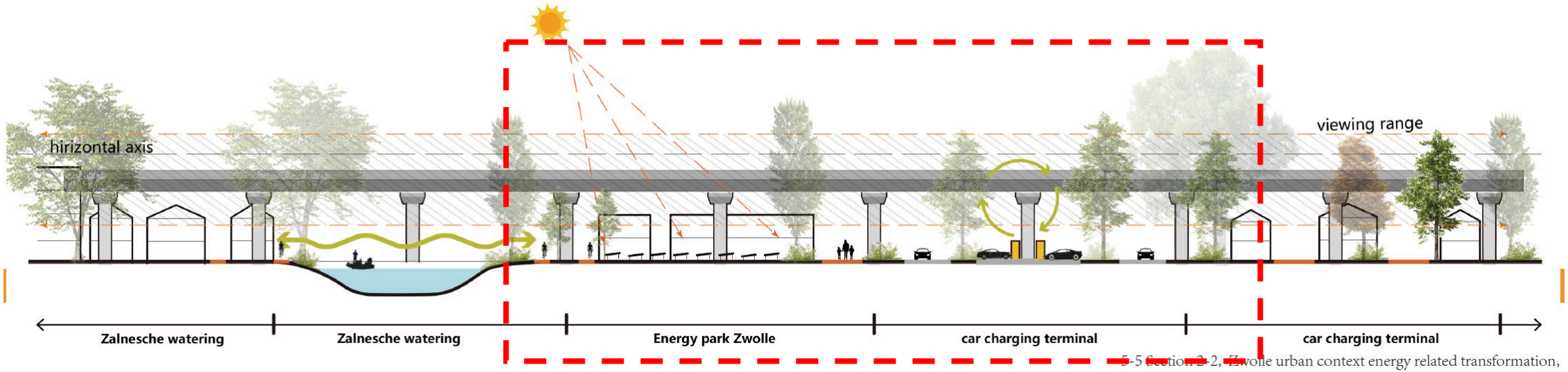


view from Vechte river

Zwolle- Sections



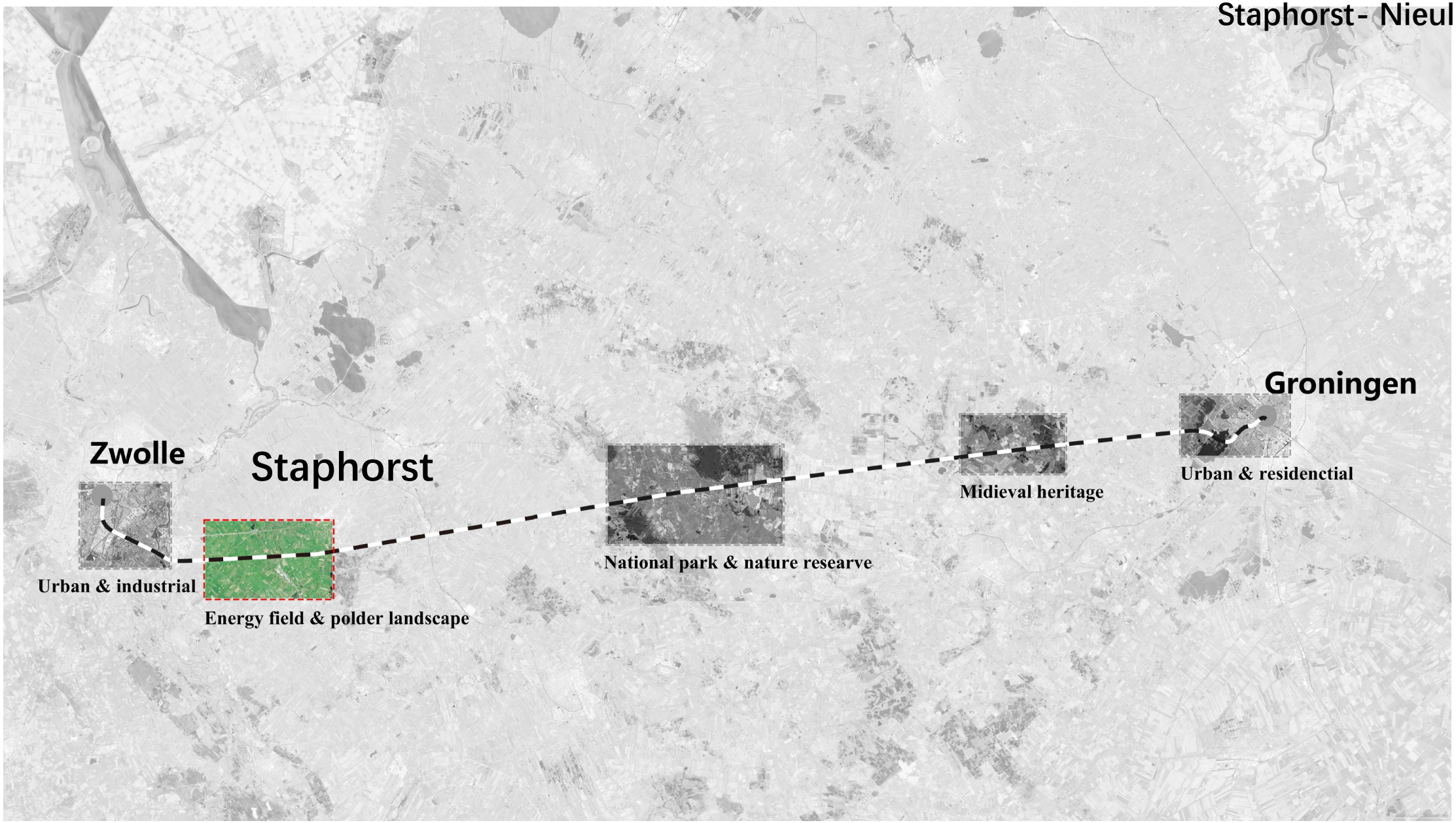
5-4 Section 1-1 skateboard park below the viadduct and revitalized wateerfront, drawn by Author

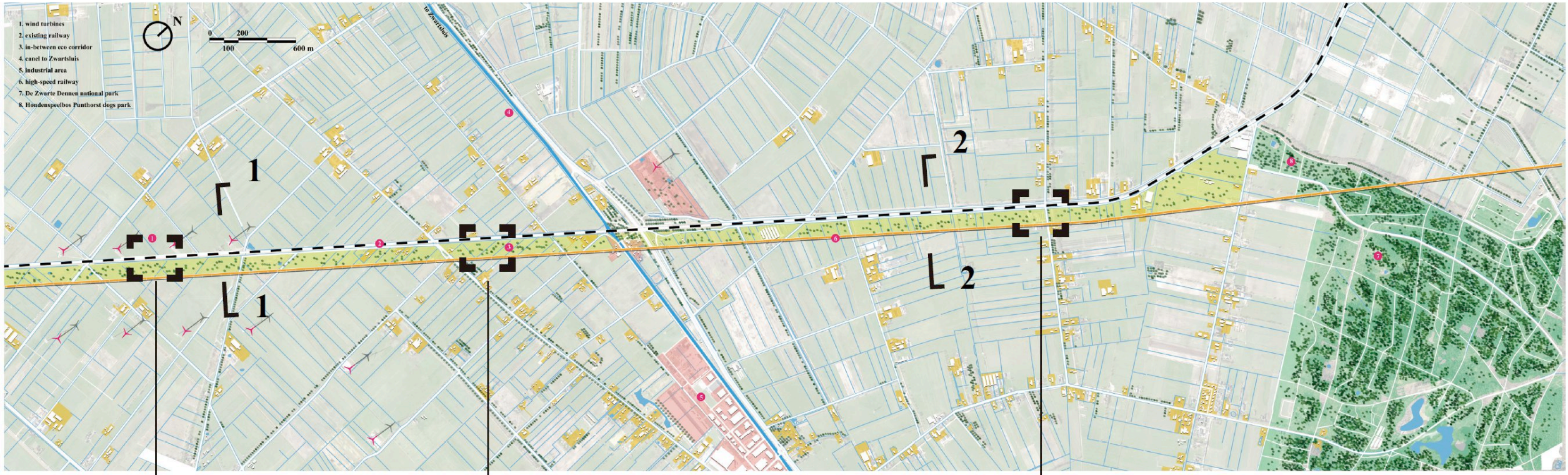


5-5 Section 2-2, Zwolle urban context energy related transformation, drawn by Author

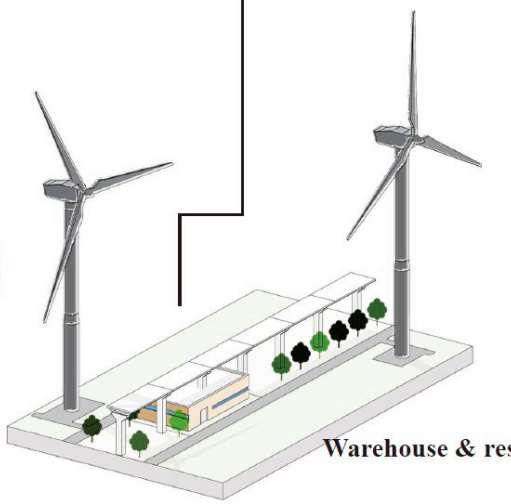

Zwolle- Birdseye view
Residential
Industrial
Residential
Sports parks
Residential
Recreational park
Residential
Polder
Waterfront park
Eco corridor
Industrial

Staphorst- Nieuleusen

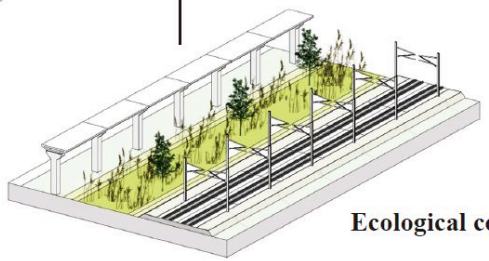




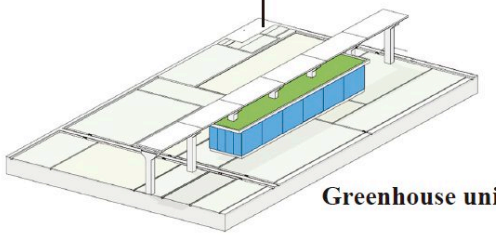
5-9 Master plan of Nieulesen,
drawn by Author



Warehouse & restroom

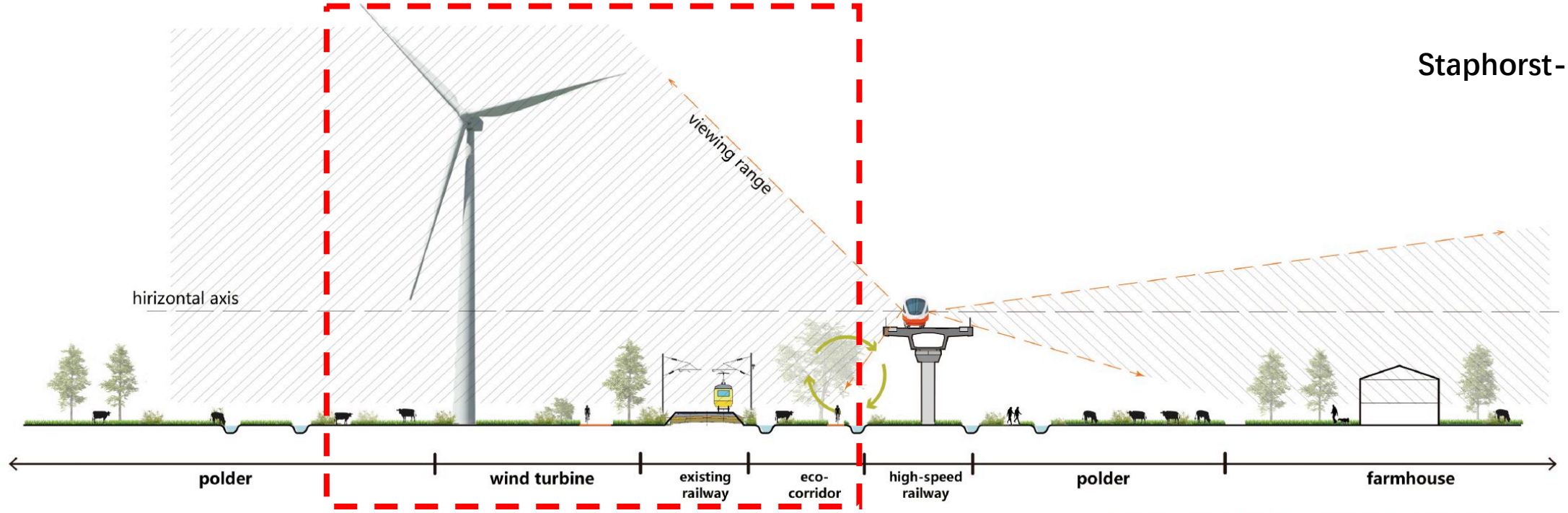


Ecological corridor

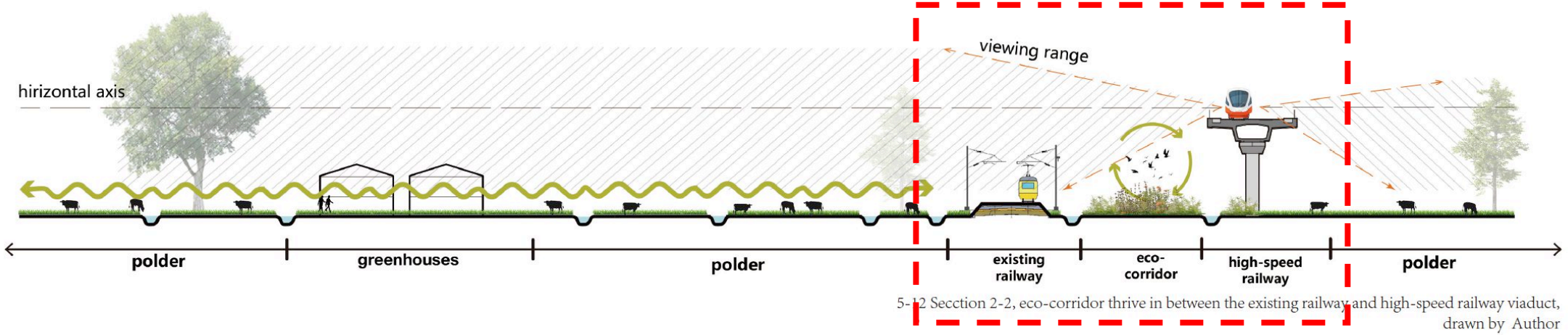


Greenhouse unit

Staphorst- Sections



5-11 Secction 1-1, wind turbine and high-speed railway in contrast, drawn by Author



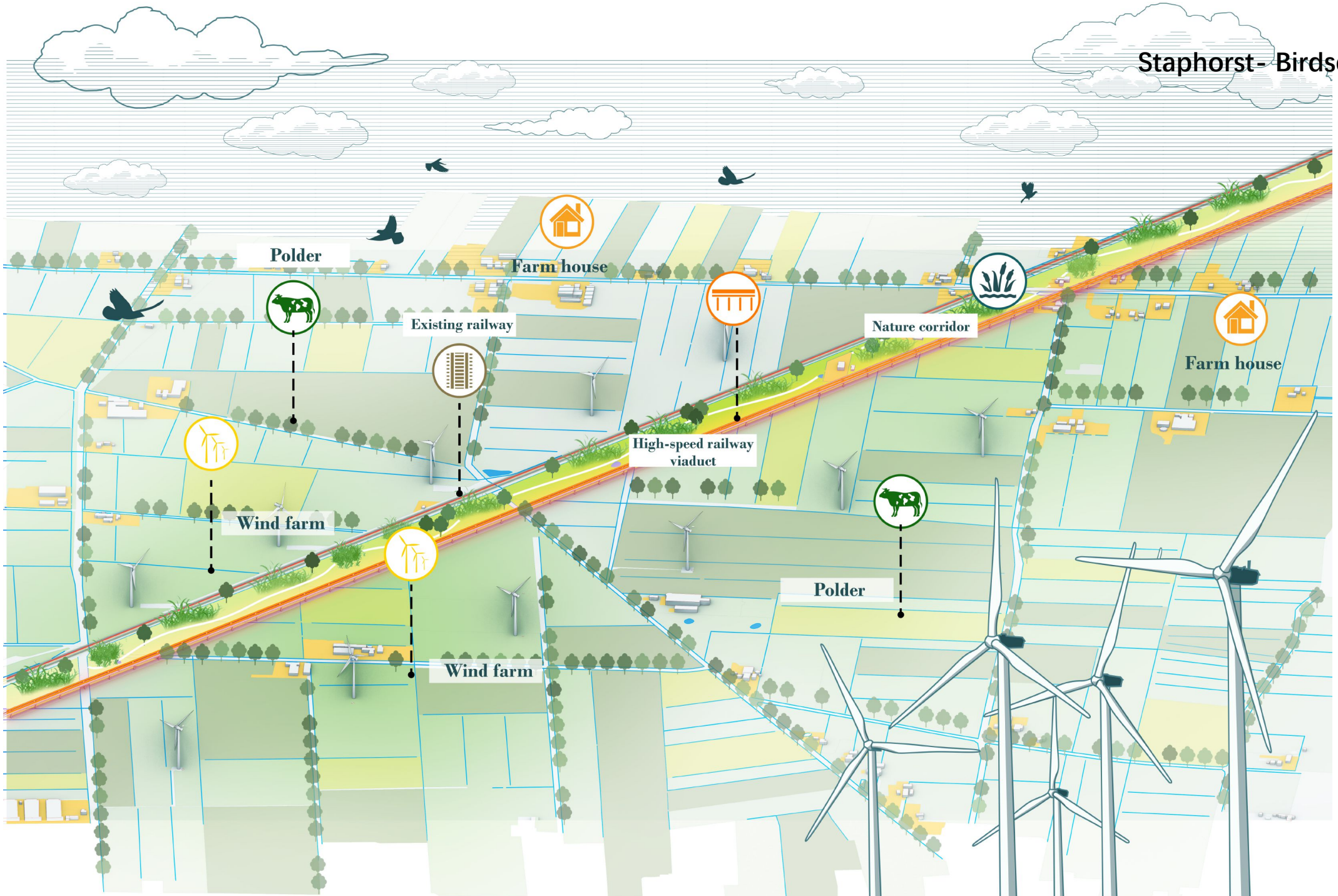
5-12 Secction 2-2, eco-corridor thrive in between the existing railway and high-speed railway viaduct, drawn by Author

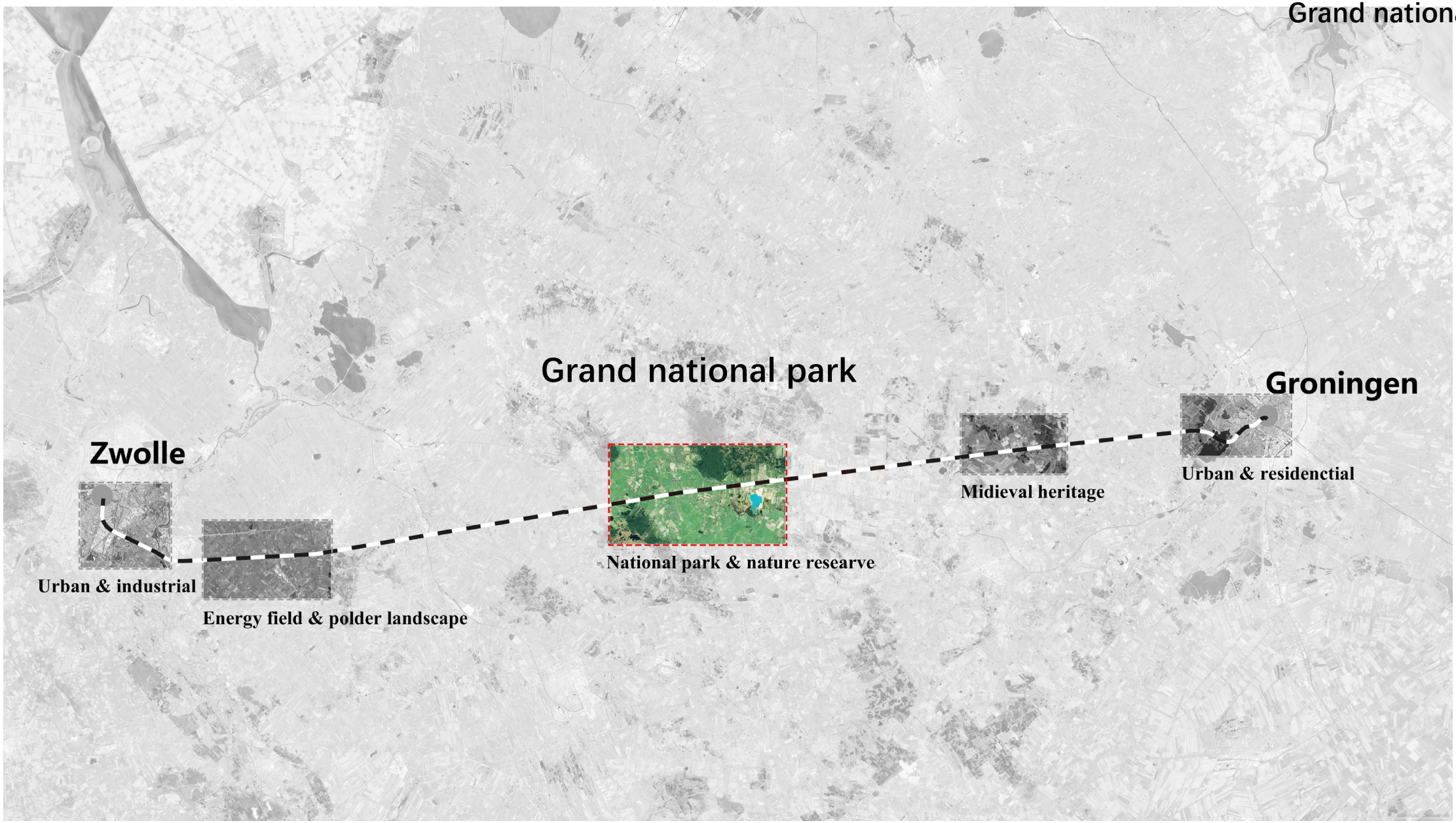
Nature and infrastructures are in harmony

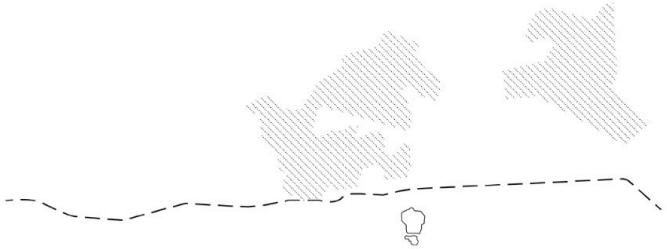
viaduct in harmony with wind farm and polder

nature corridor thrive in between viaduct and existing railway track

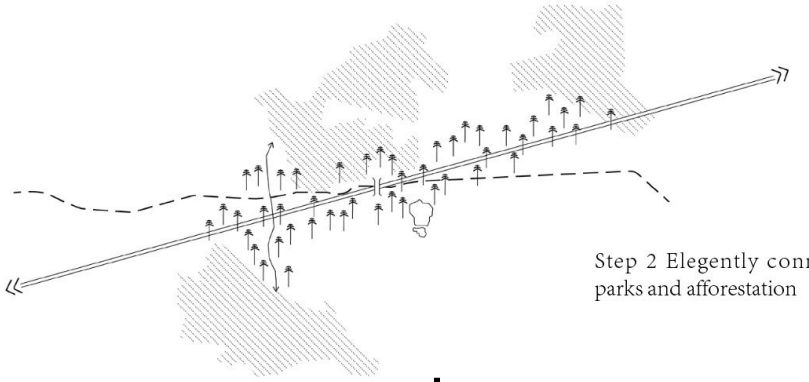
Staphorst - Birdseye view




Grand national park
Zwolle
Groningen
Urban & industrial
Energy field & polder landscape
National park & nature researve
Midieval heritage
Urban & residenctial

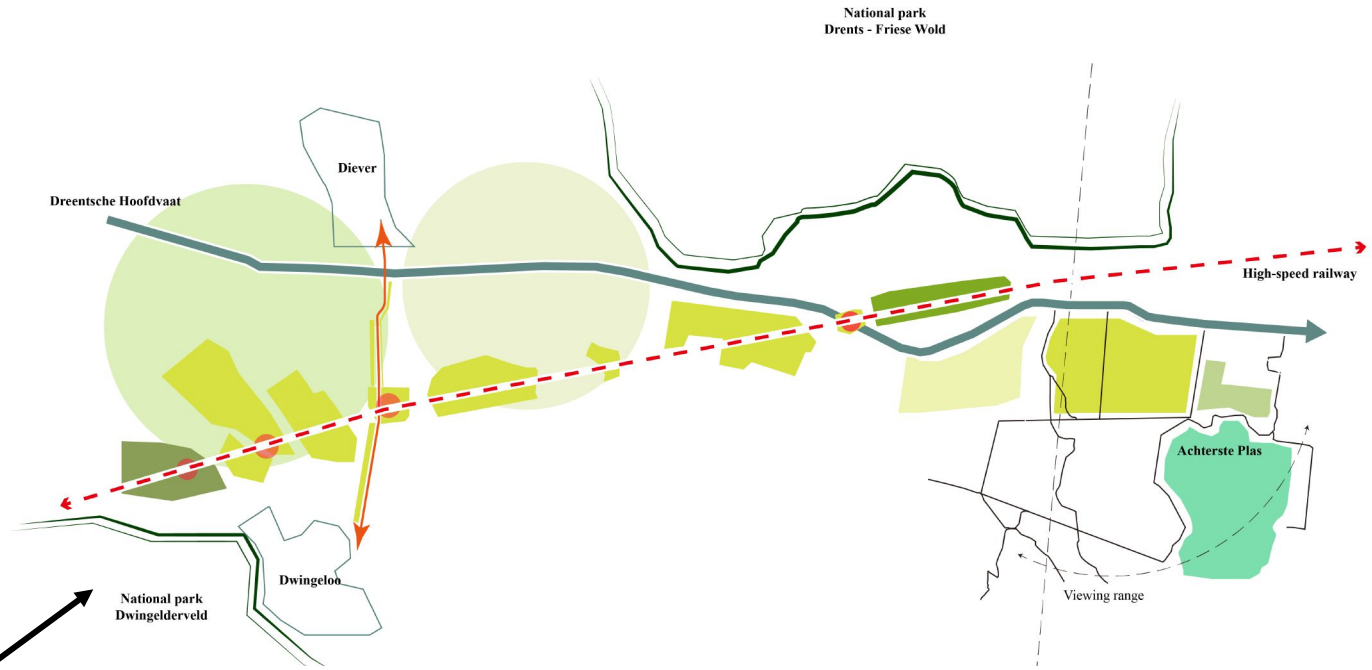


Step 1 Indentify the national parks and canal



Step 2 Elegently connect national parks and afforestation

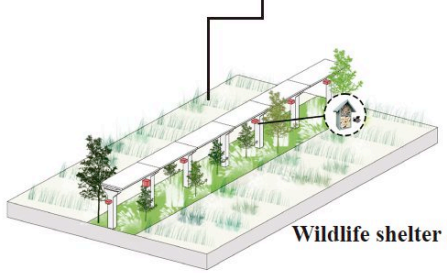
Step 3 Ecological and spatials measures to make the national parks merge



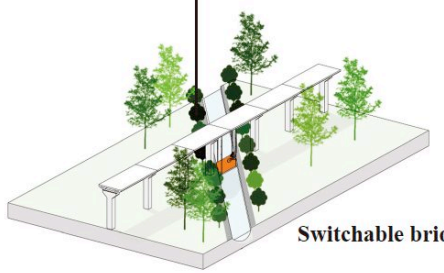
Integration process of the Grand National Park

Grand National Park – Master plan

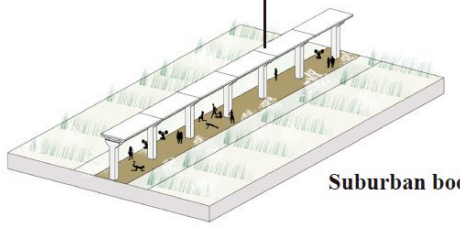
5-16 Master plan of the in between area of the national parks, drawn by Author



Wildlife shelter & corridor

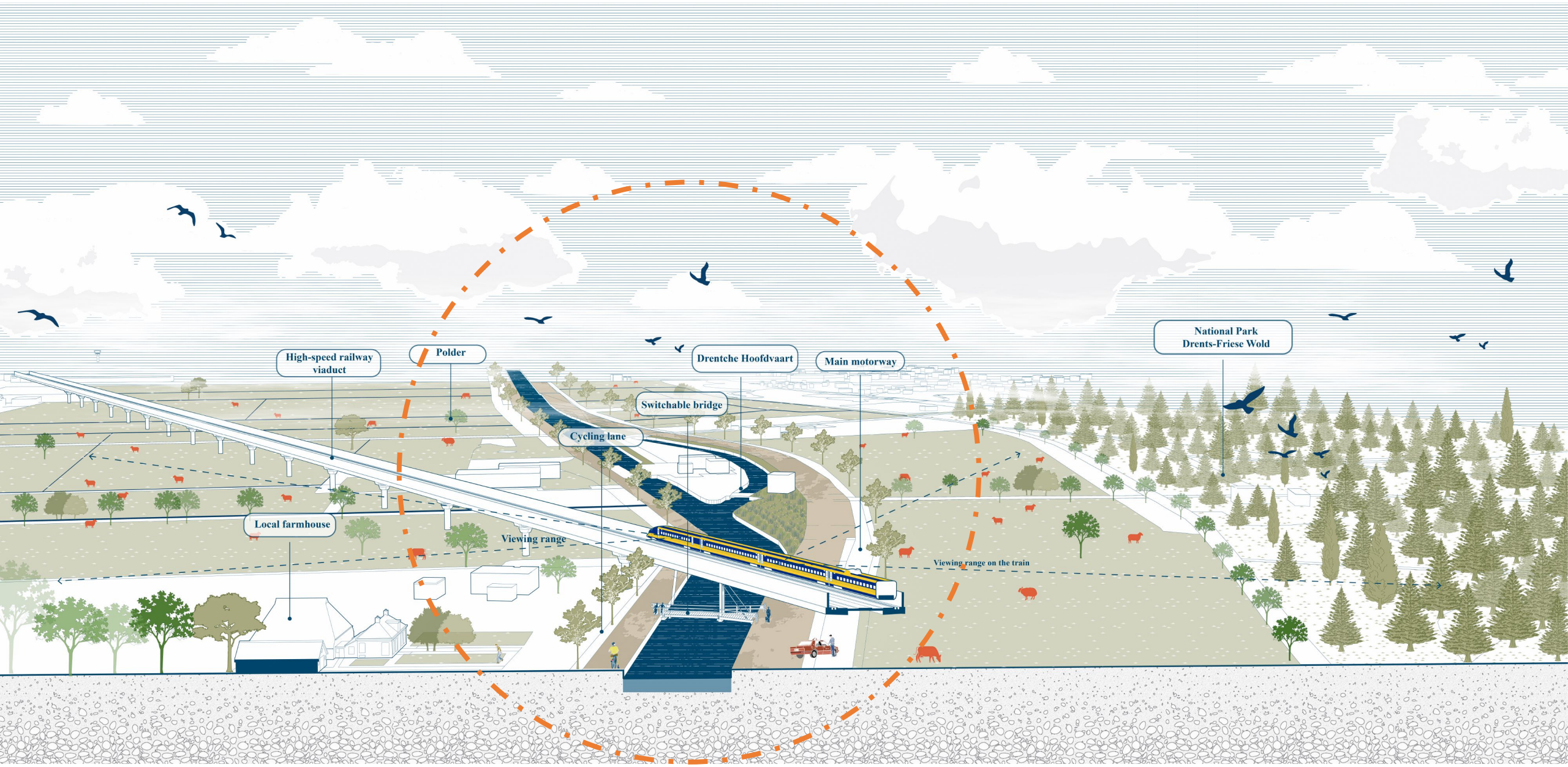


Switchable bridge

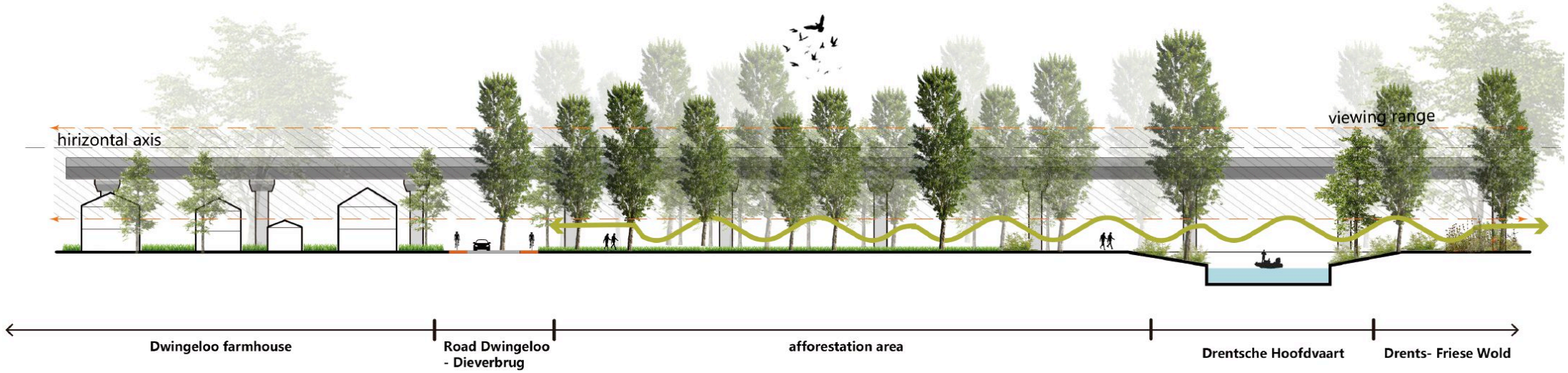


Suburban bootcamp

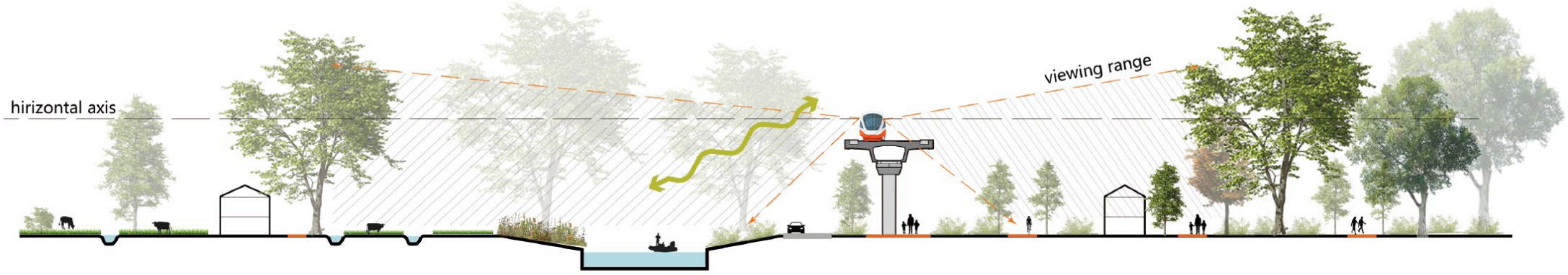
Grand National Park – Viaduct meets canal



Grand National Park – Sections

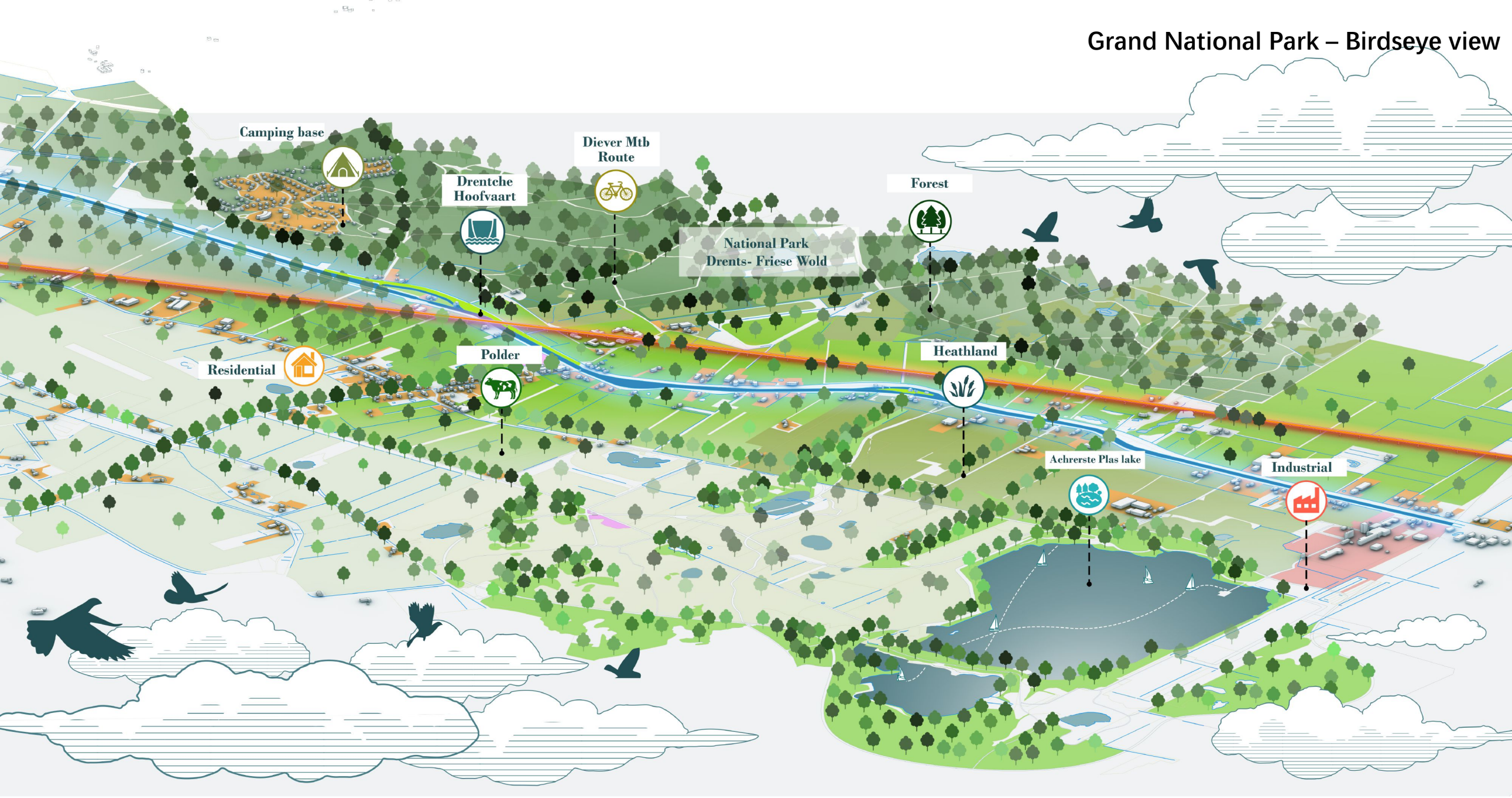


5-18 Secction 1-1, viaduct kissing through the afforestation area, drawn by Author

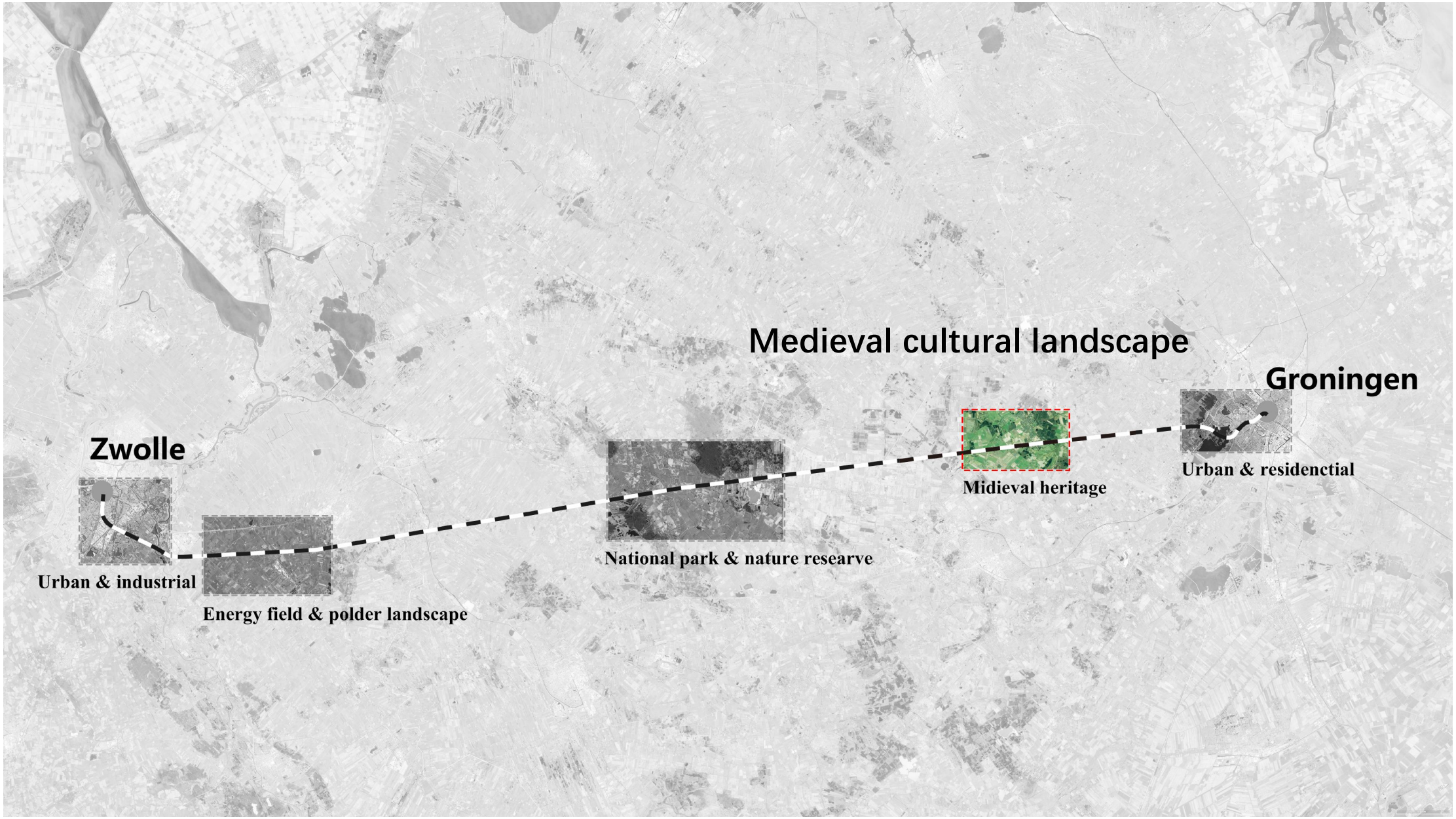


5-19 Secction 2-2, contemporary high-speed railway viaduct encouters historical canal, drawn by Author

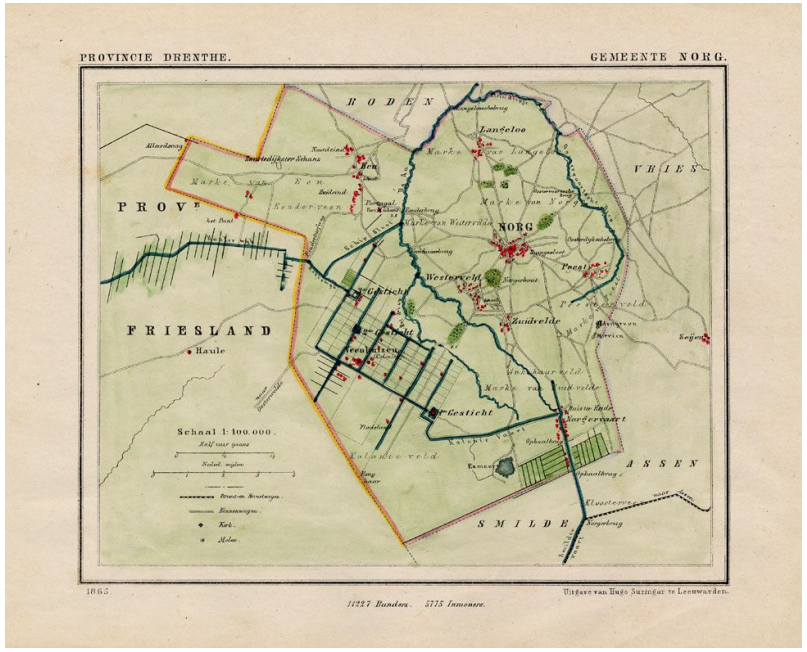
Grand National Park – Birdseye view



Norg – Medieval cultural landscape



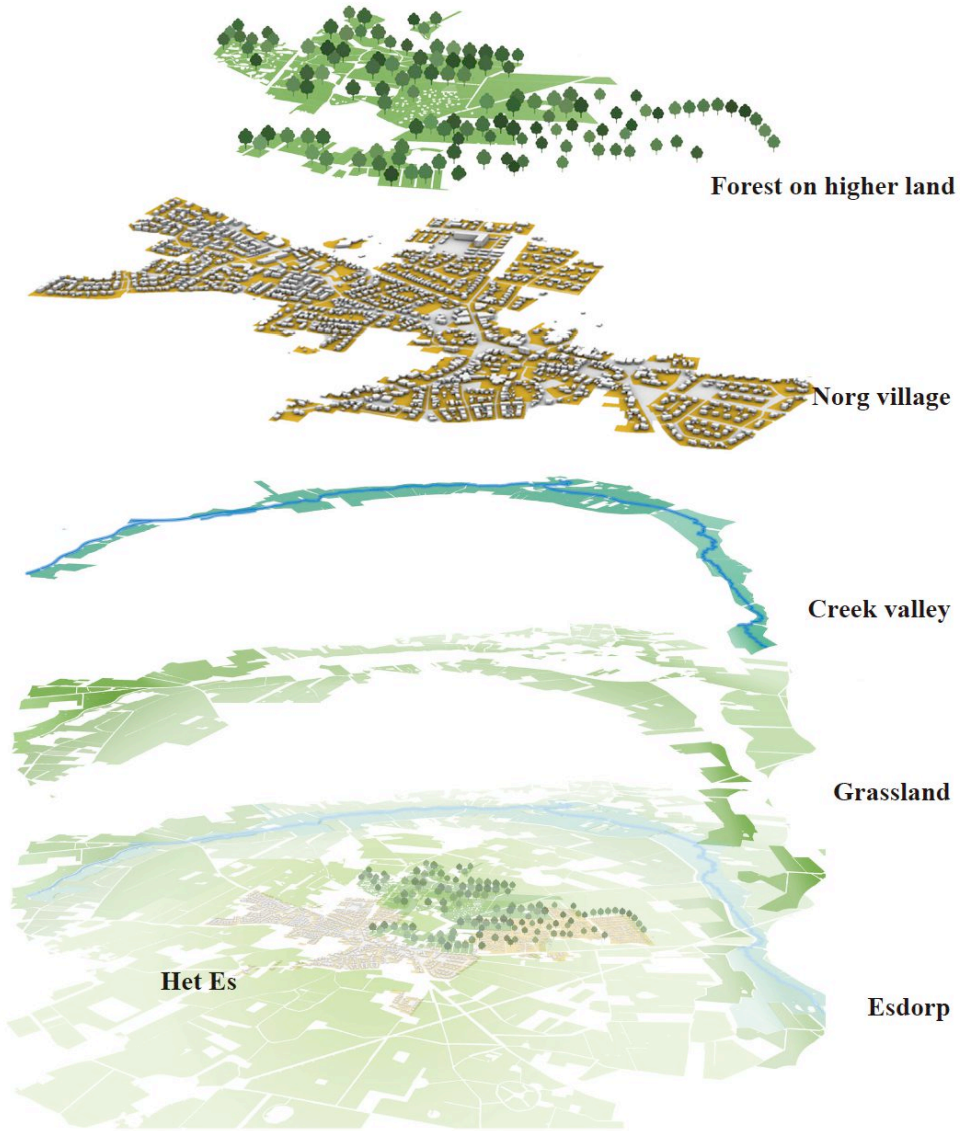
Esdorp

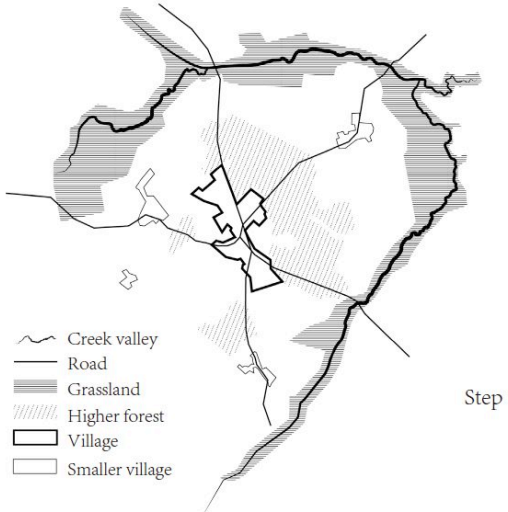


Norg's esdorp spatial structure remains for centuries since Medieval

Source: https://www.canonvannederland.nl/nl/drenthe/noordenveld/esdorpen

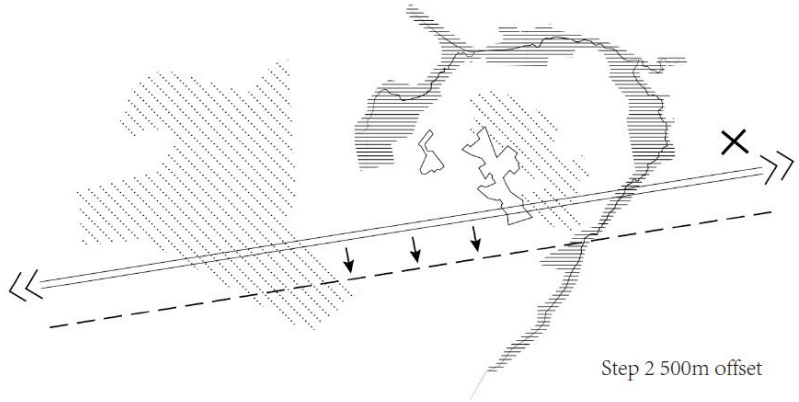
Spatial elements of the esdorp landscape



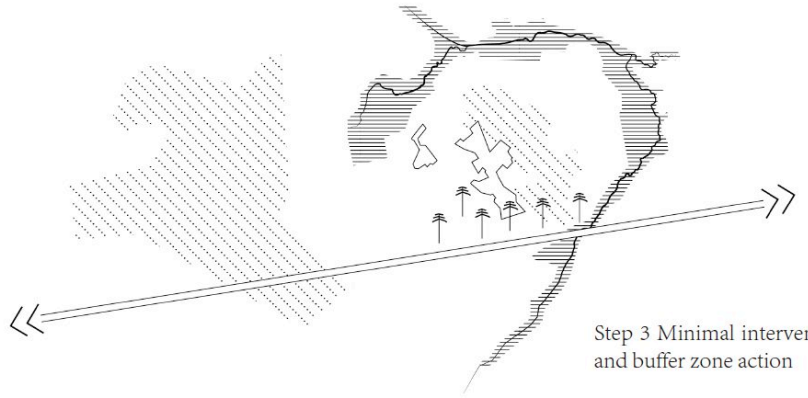


Step 1 Read the esdorp landscape

Minimal intervention -500 m offset

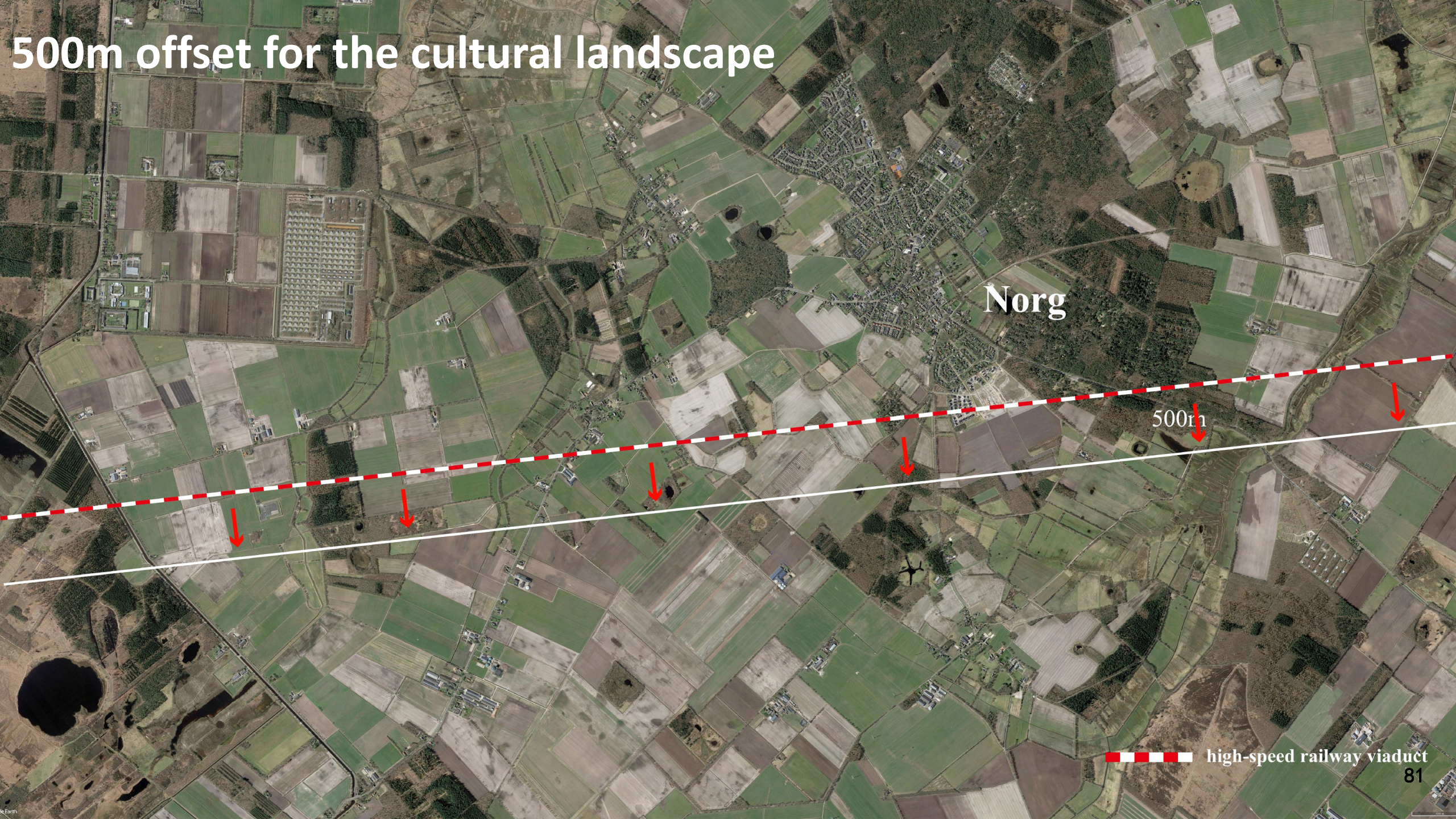


Step 2 500m offset



Step 3 Minimal intervention and buffer zone action

500m offset for the cultural landscape



1. nursery
2. heathland &natural area
3. Esmeer lake
4. canel to Zwartsluis
5. De Fledders forests
6. high-speed railway
7. Zuidveide
8. ecological ponds
9. Norg
10. WW II monumental site

N

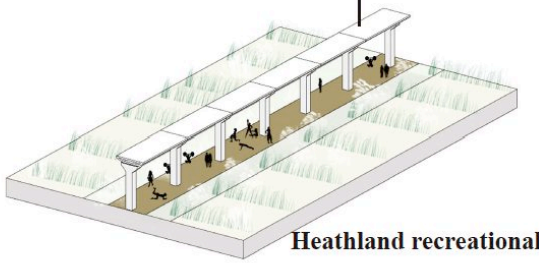
0 200 100 600 m

1 1

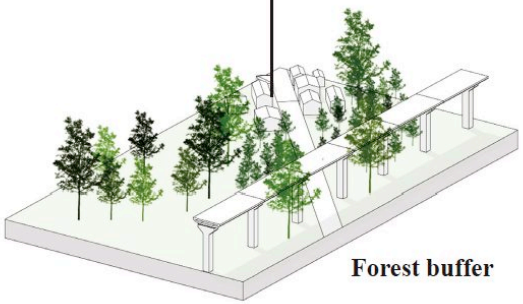
2 2

3 3

5-23 Master plan of the minimal intervention design, Norg
drawn by Author

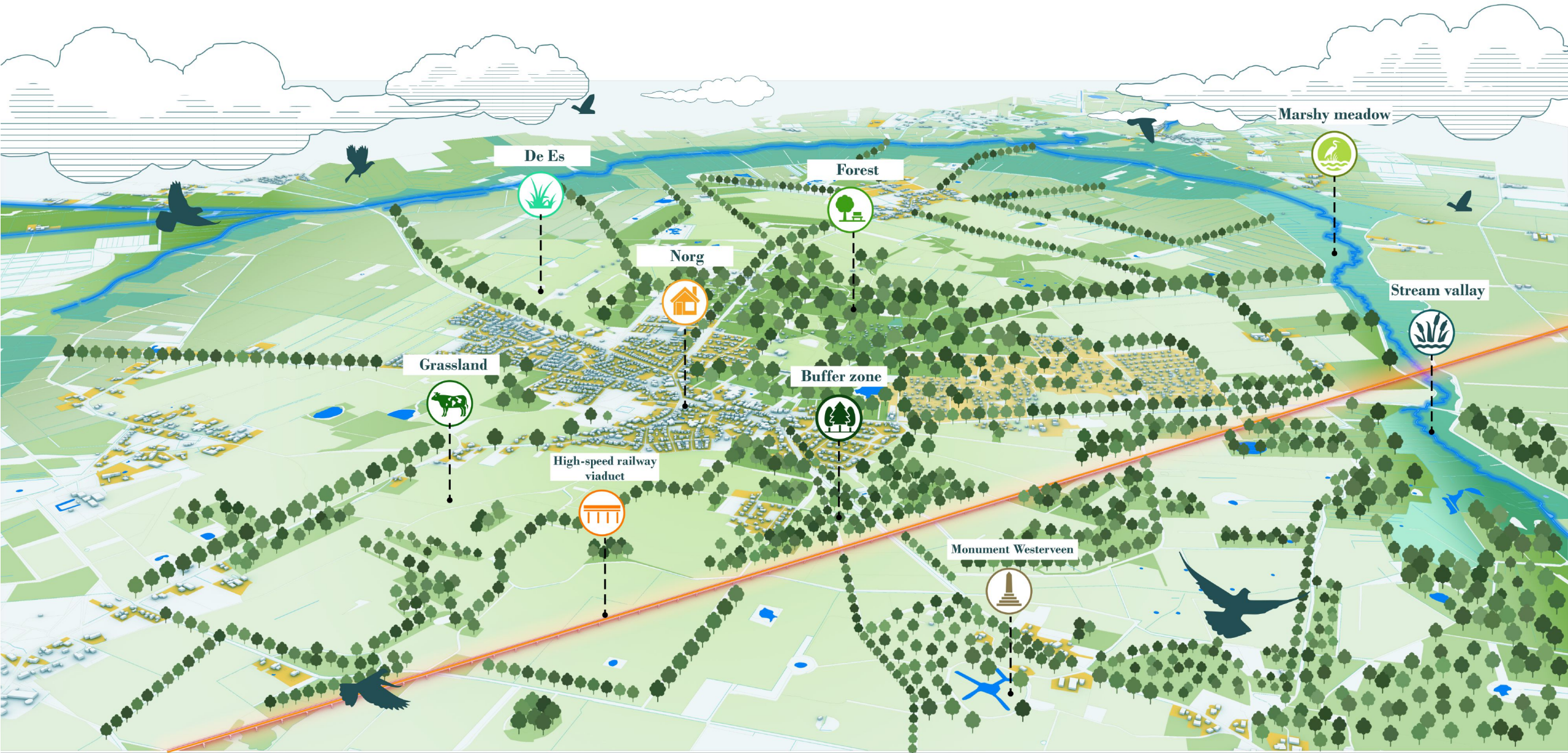


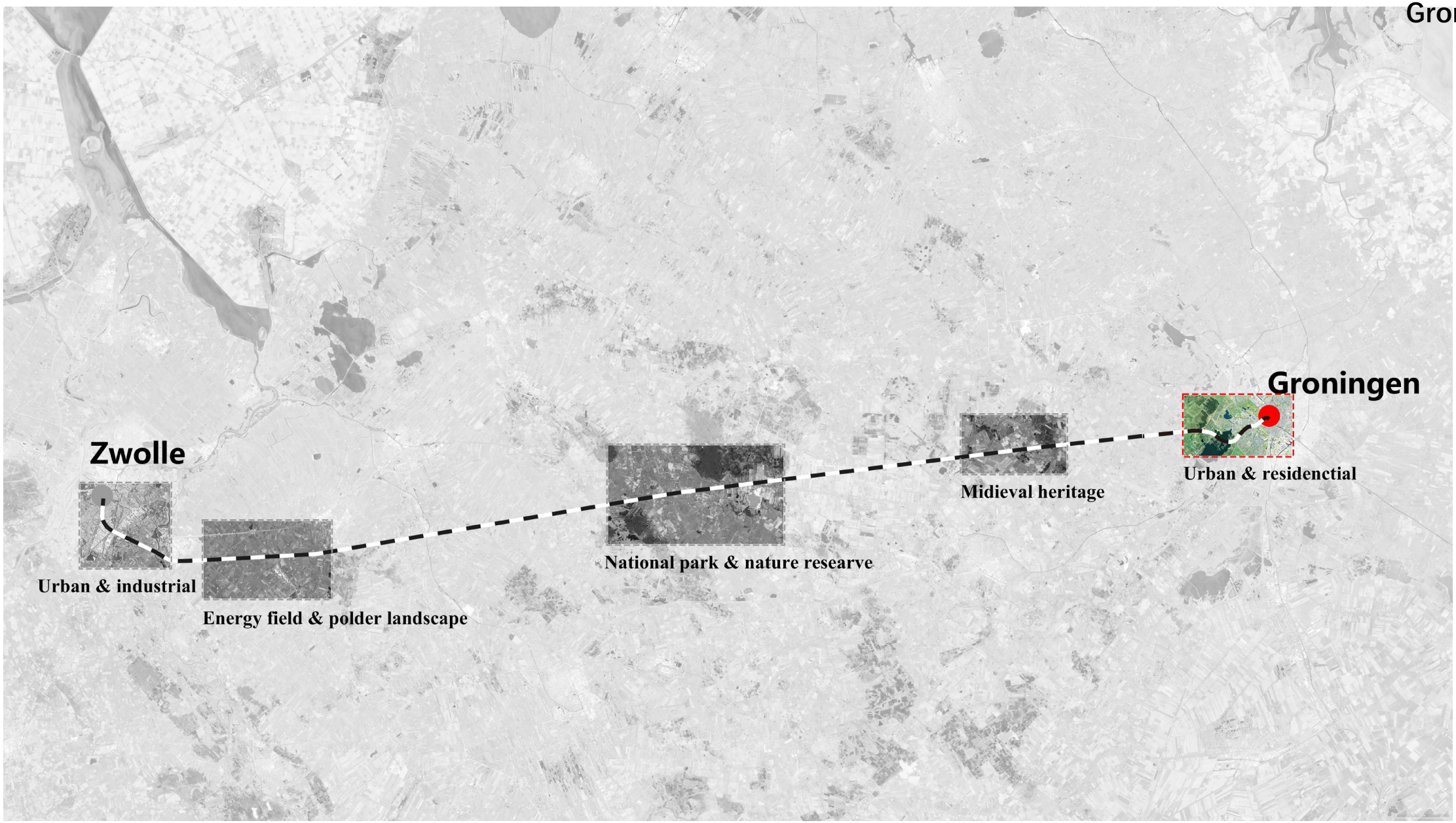
Heathland recreational bootcamp



Forest buffer

Norg – Birdseye view




Zwolle
Urban & industrial
Energy field & polder landscape
National park & nature researve
Midieval heritage
Groningen
Urban & residenctial


5.5. Groningen
Groningen
option 1
option 3
option 2
existing railroad
high-speed railway viadu

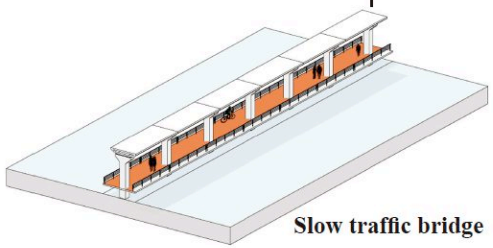
Groningen – Master plan

1. hoornse plas park
2. wetland grove
3. village
4. Hoornsemeer
5. bird-watching islands
6. wetkland park
7. forest
8. noise buffer
9. waterfront linar park
10. Groningen centraal

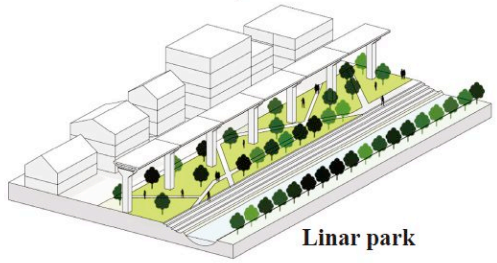
N

0 200 100 600 m

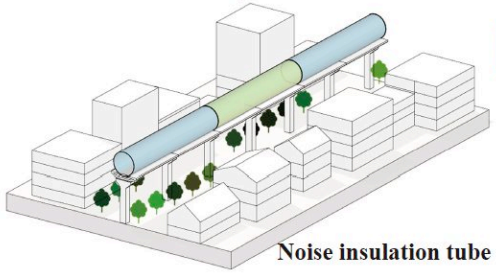
5-29 Master plan of the last 3 minutes journey in the urbaan context of Groningen, drawn by Author



Slow traffic bridge

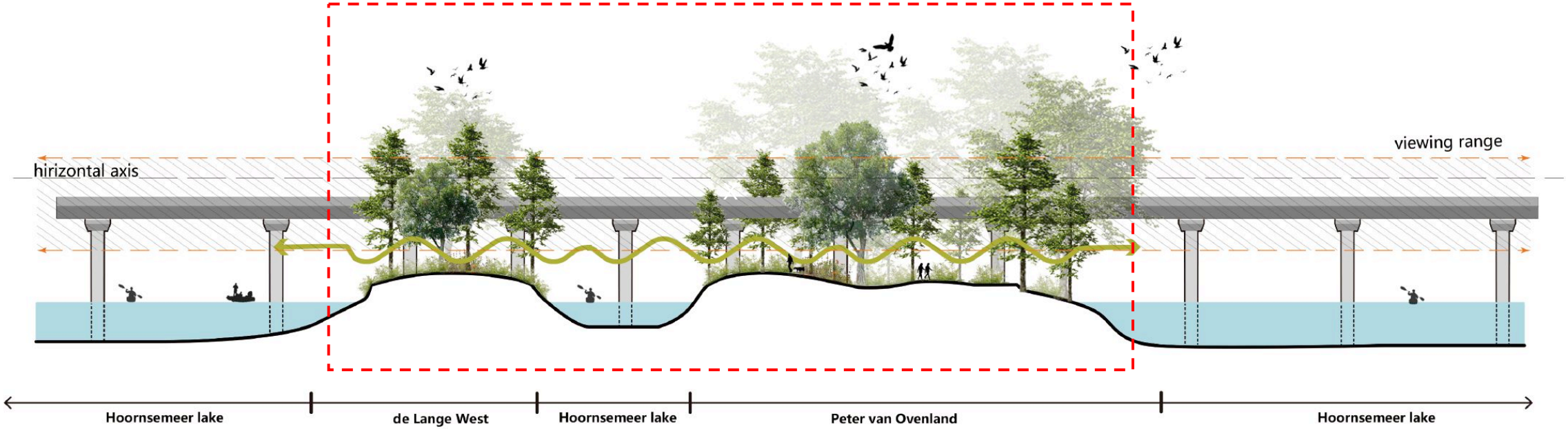


Linar park



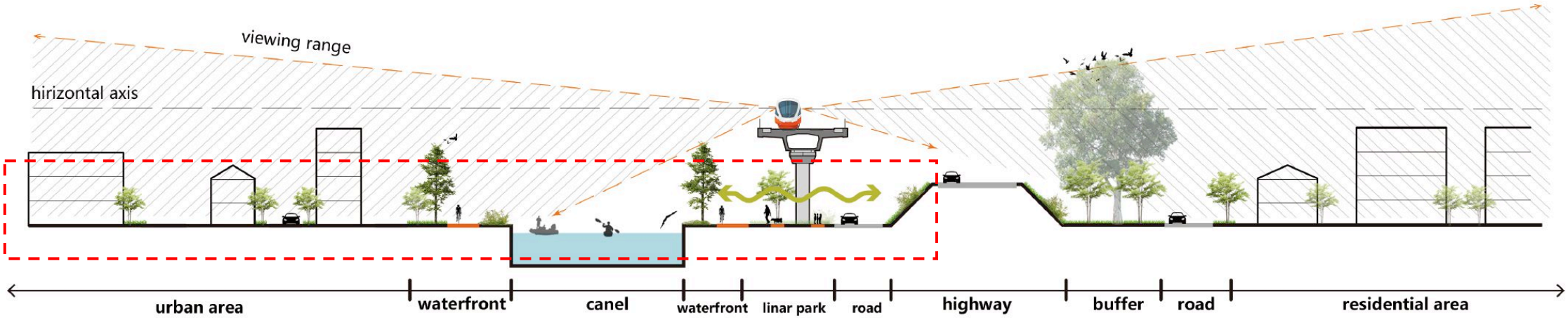
Noise insulation tube

Lake and wetland



5-30 Section 1-1,high-speed railway viaduct crossing the lake Hoornsemeer
drawn by Author

Urbanity and canal



5-31 Section 2-2, high-speed railway viaduct pick up the space between the canal and existing highway to join the urban context, drawn by Author


Groningen – Birdseye view
Urbanity and canal
Lake and wetland
Linar park
Commerce
Residential
Canel
Residential
Research
Forest park
Bird island
Wetland

Conclusion & reflection

MAIN RESEARCH QUSETION

Research objective

To design an innovative high-speed railroad alternative from Amsterdam to Groningen and be superior to the Lelyline

Research question

"How can the portion between Zwolle to Groningen of this innovative high-speed railroad be implemented in a sustainable way with minimal intervention respecting the Dutch cultural landscape?"

SUB-RESEARCH QUESTION

Why do we need a high-speed railway-implementation from Zwolle to Groningen?

Where can be better options than the Lelyline?

What are the spatial possibilities for the alignment between Zwolle and Groningen?

How to design the railway and landscape aliong the itineraty in a sustainable way?

METHOD

Analysis
Mapping(L), Fieldtrip

Literature review

GIS research
Literature review, Mapping(M), Fieldtrip

Wire method
Mapping, Desk discussion, Sketching, Modeling

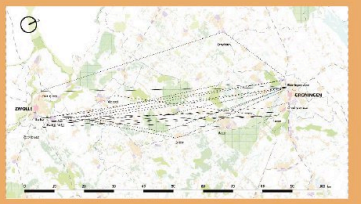
Parameter based evaluation
Systematical assessment

Fieldtrips
Landscape typologies research

Research by Design
3D modeling, Landscape interventions catalogue, Design through scales (L, M, S)

Research by Design
Sections, Master plans, Bird eye view, Perspectives Design through scales (L, M, S)

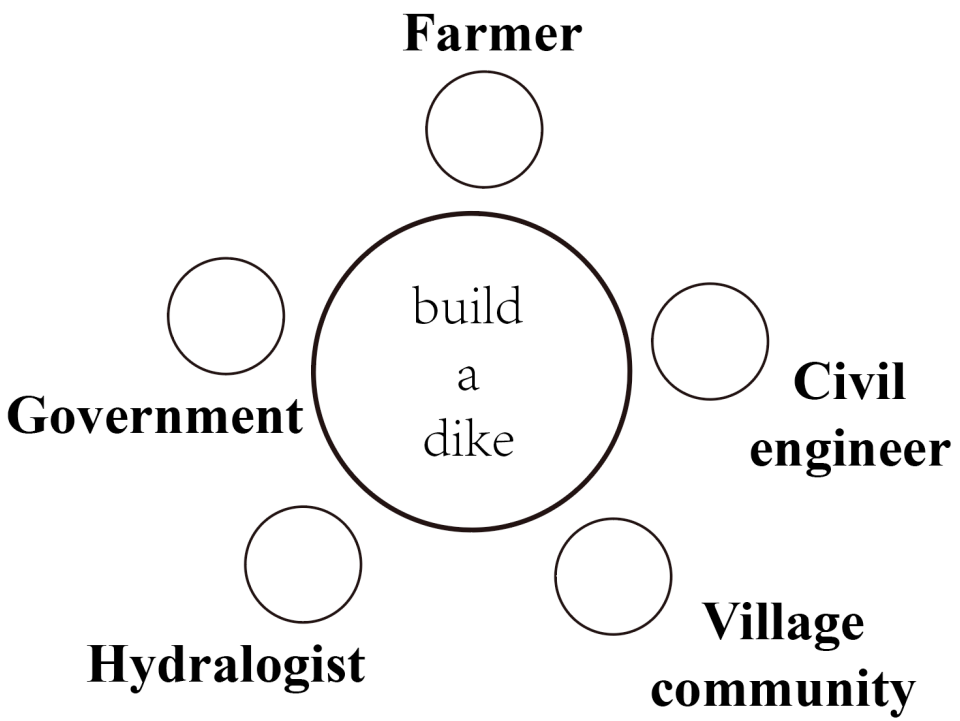
SAMPLE PRODUCT



RESEARCH QUESTION

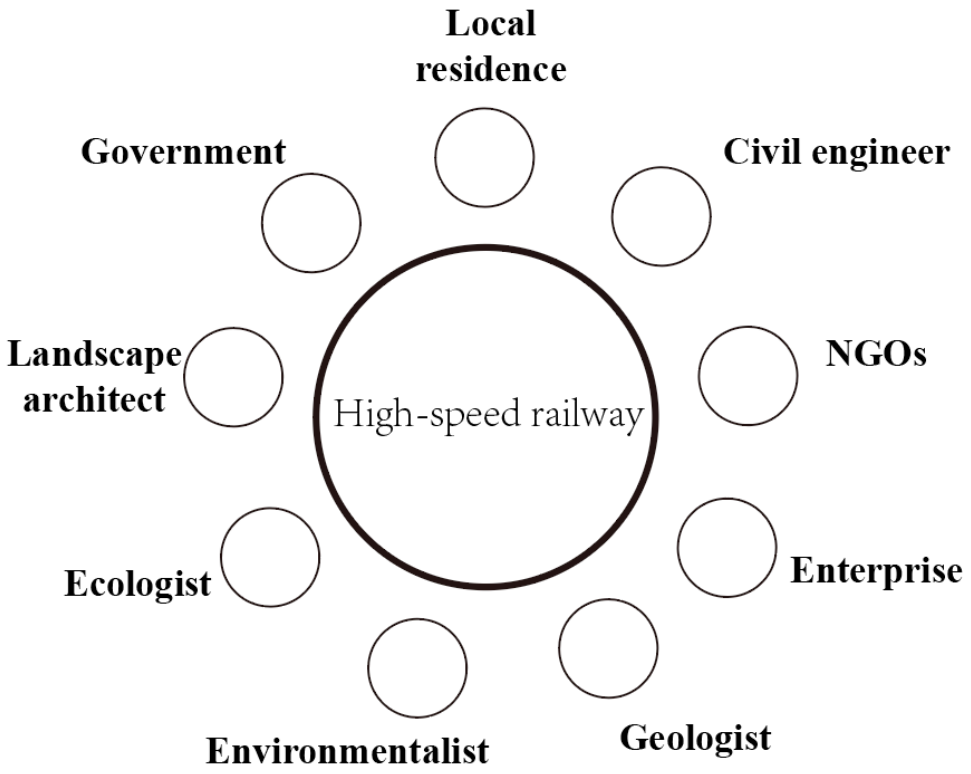
"How can the portion between Zwolle to Groningen of this innovative high-speed railroad be implemented in a sustainable way respecting the Dutch cultural landscape?"

Chinese mindset encounters Dutch spirit



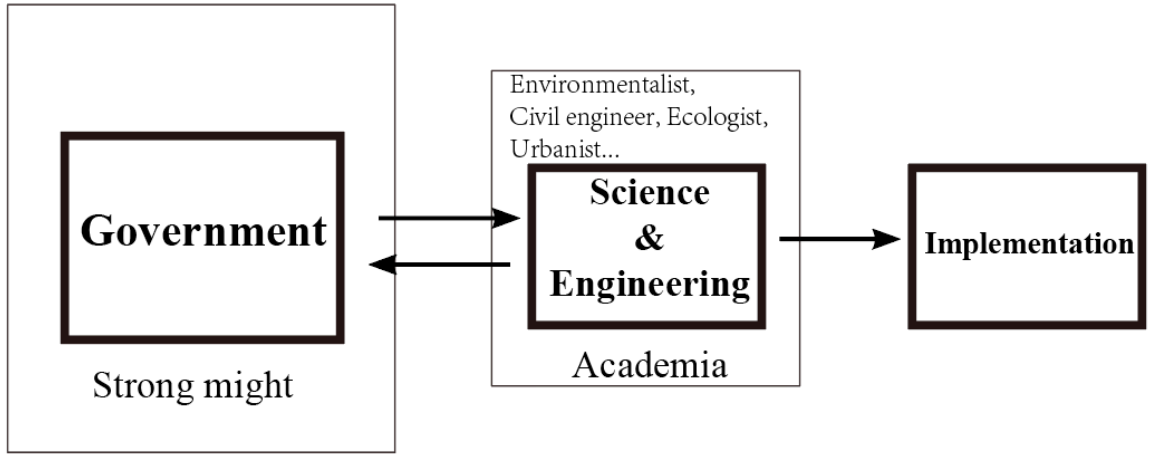
6-3 The model of building a dike in the history,
drawn by Author

Chinese efficiency mindset encounters Dutch polder spirit



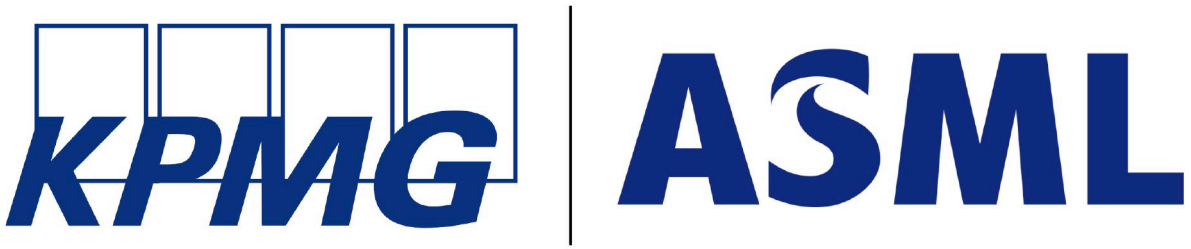
6-4 Dutch high-speed railway decision making model, slow in proceess and too much internal meaningless friction, drawn by Author

Polder spirit

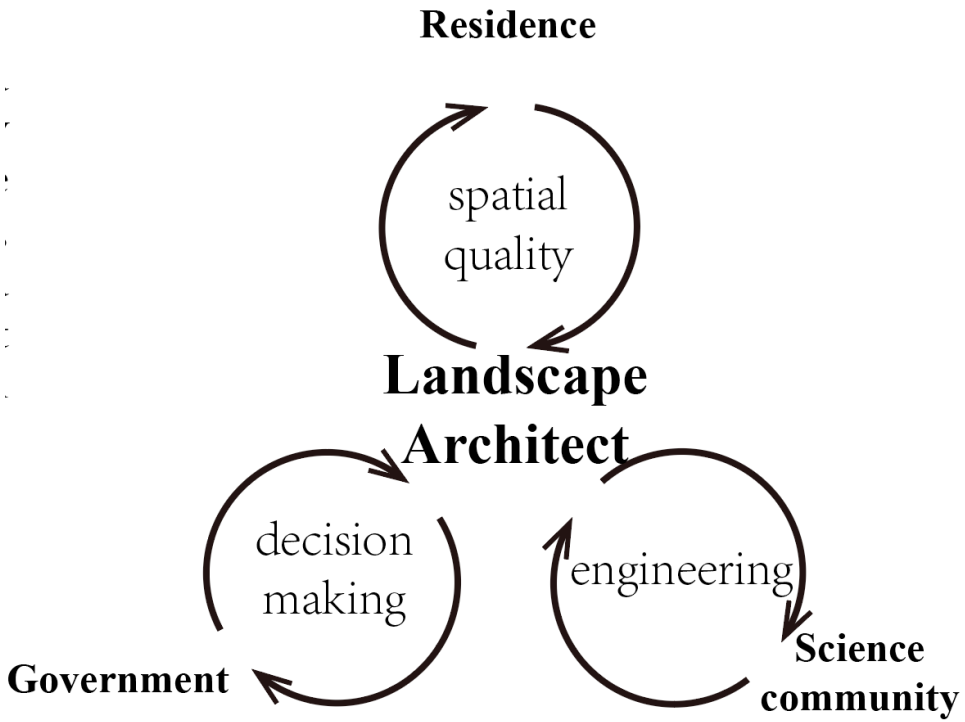


6-5 Chinese high-speed railway decision making model, which is efficient but sometimes can be intrusive to locals and no spatial concern, drawn by Author

Efficiency



6-4 Dutch high-speed railway need to be like "KPMG", instead of "ASML"



6-6 The optimal model of infrastructure decision making in the future, drawn by Author

Resource integration

Geek

To close the presentation

Take a ride to Staphorst!

Thanks for your attention!

感 谢 捧 场