Limburg Dross

Future Spatial Forms of Industrial Productive Landscapes


LOCATION

energy

landscape

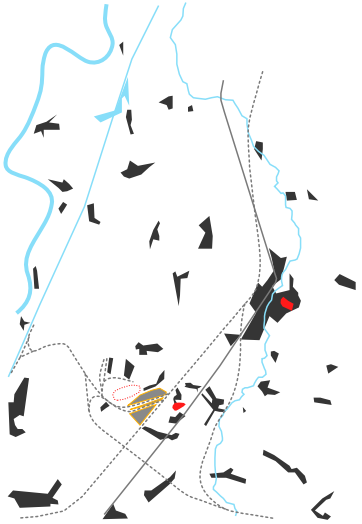
DROSS

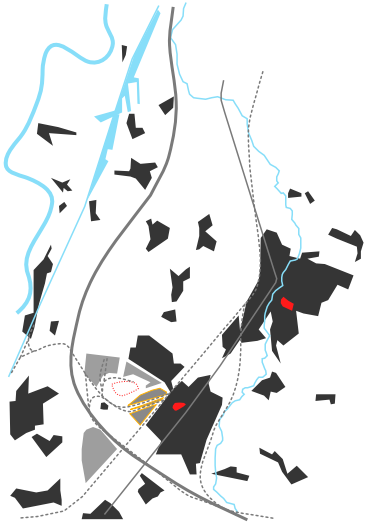
Vacant space in the city which is a consequence of defunct economic and production systems or urban sprawl and could benefit from reprogramming.

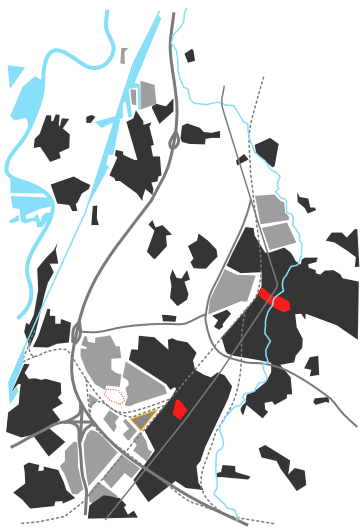
According to Alan Berger:
"Adaptively reusing this waste landscape figures to be one of the twenty-first century's great infrastructural design challenges."

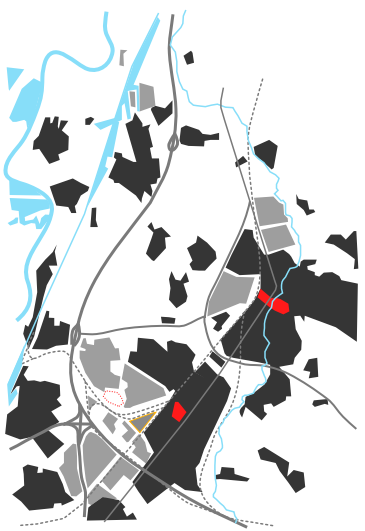
SITTARD-GELEEN


1860

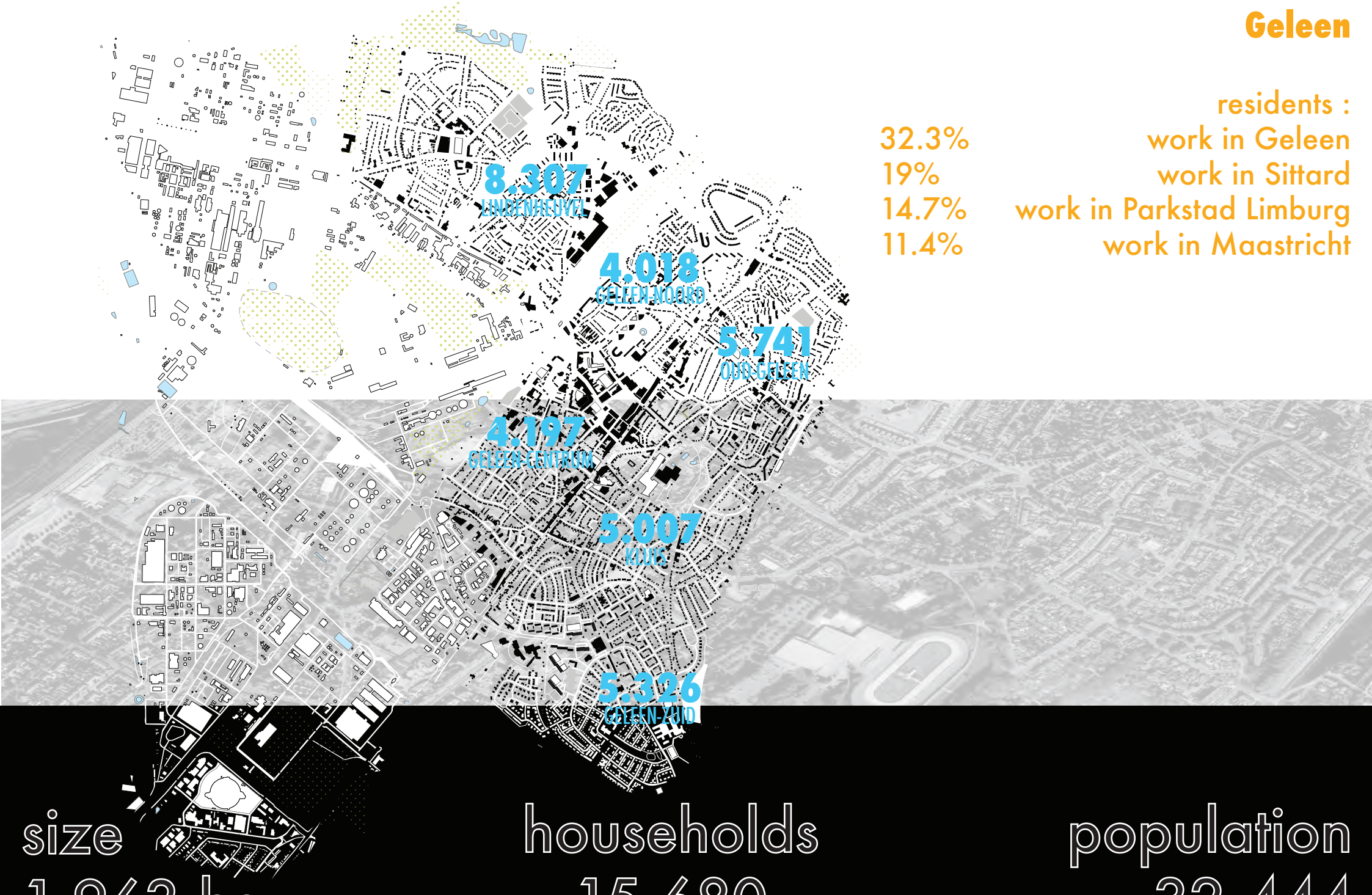

1937


1965


2004


2009

Geleen



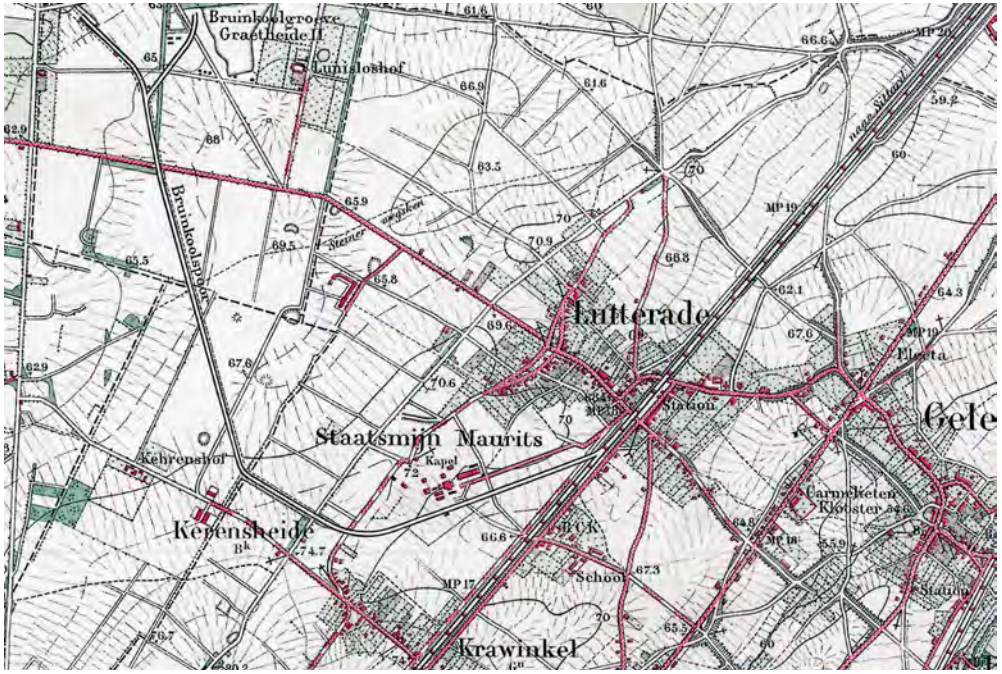
residents :

32.3%	work in Geleen
19%	work in Sittard
14.7%	work in Parkstad Limburg
11.4%	work in Maastricht

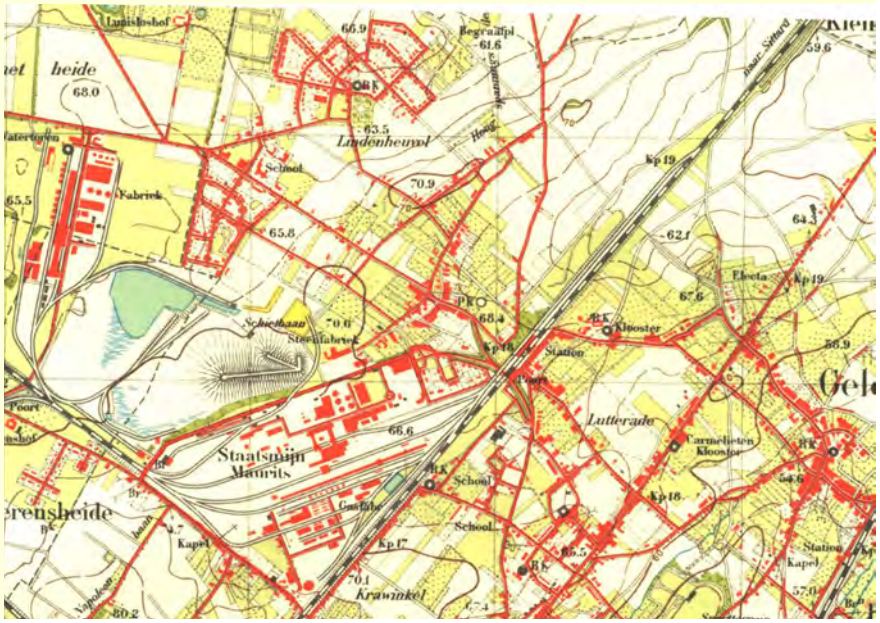
size
1.963 ha

households
15.680

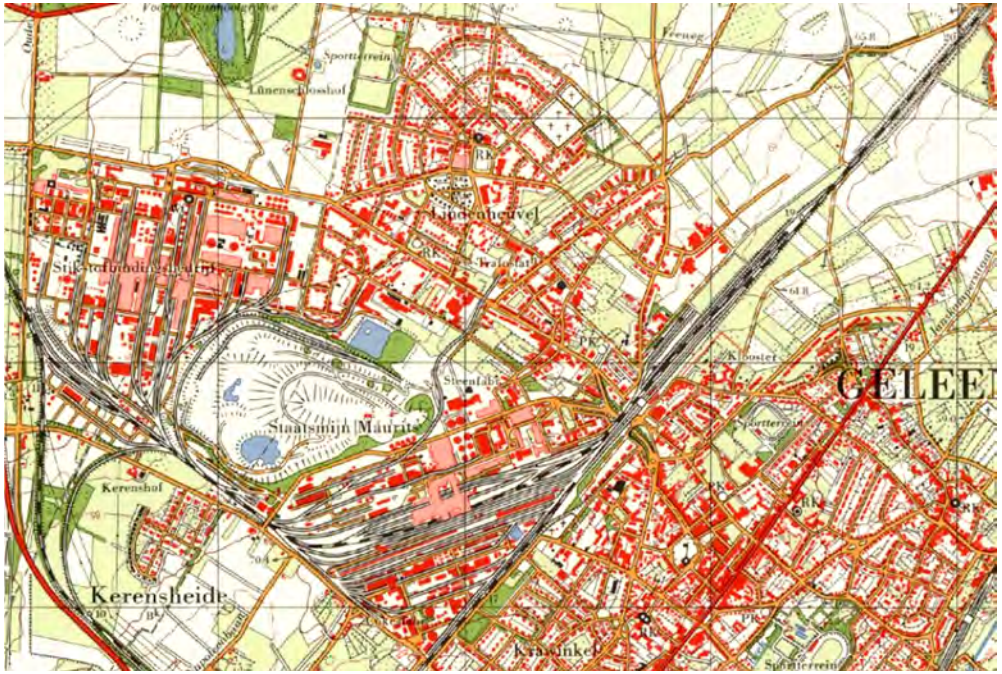
population
32.444



1923

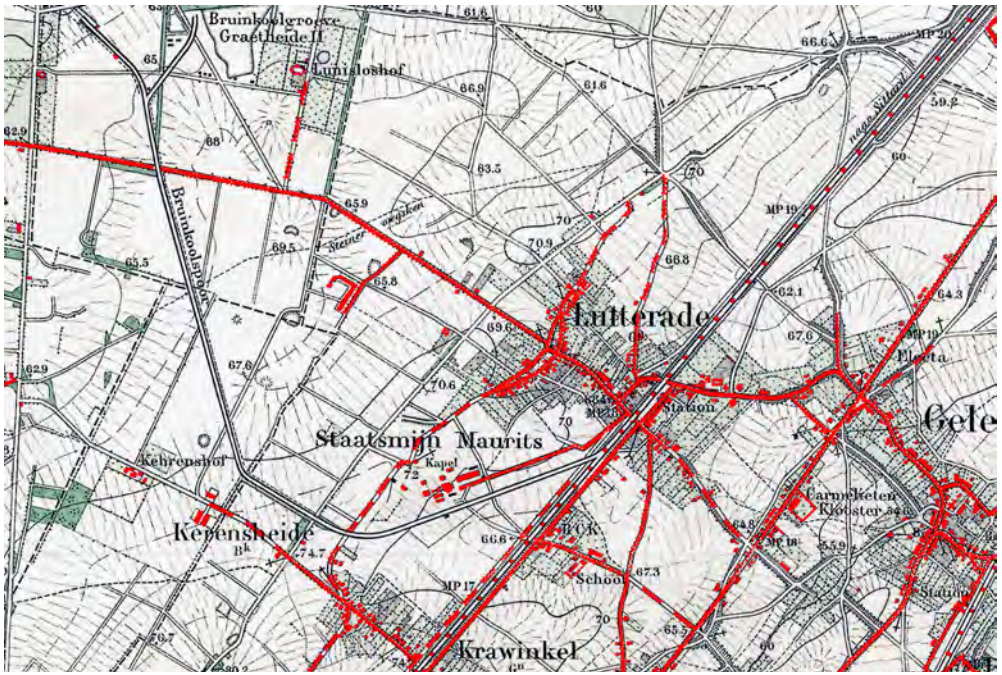


1935

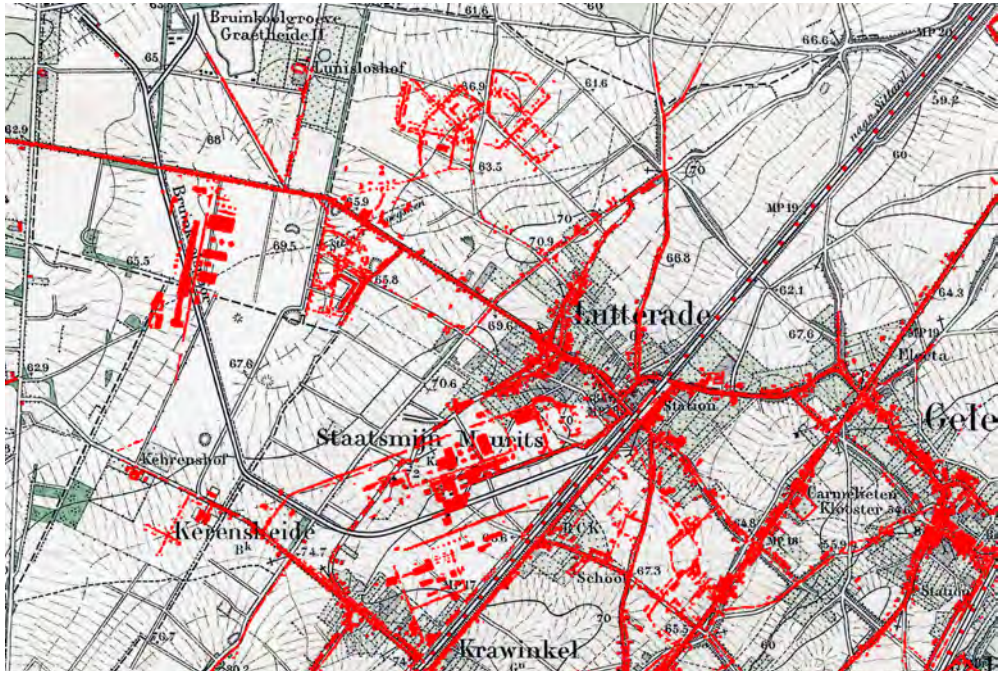


1968

2010

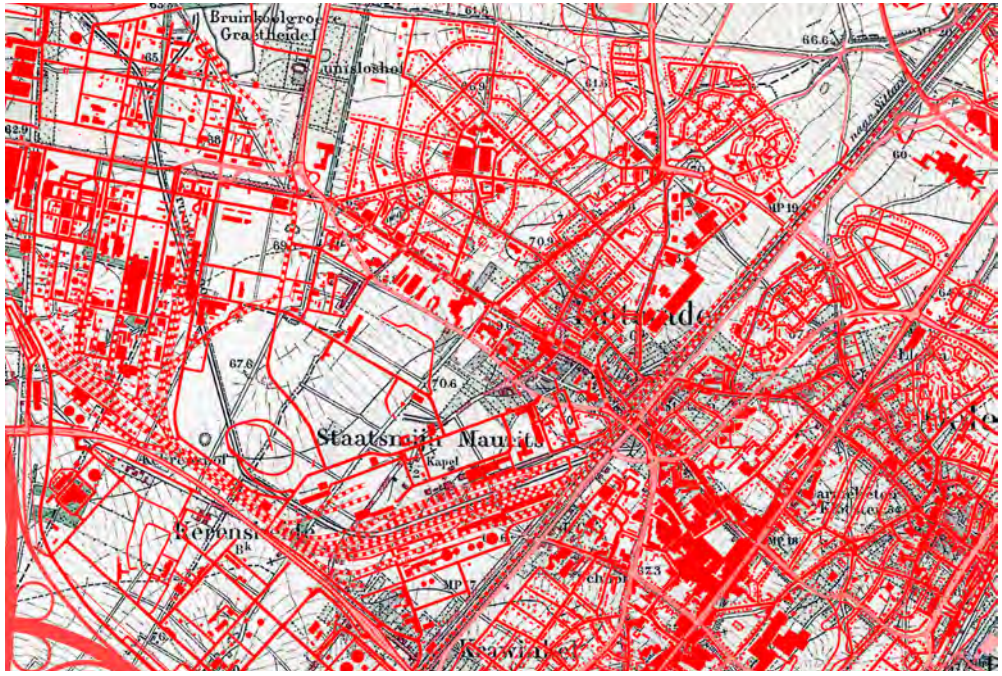


1923



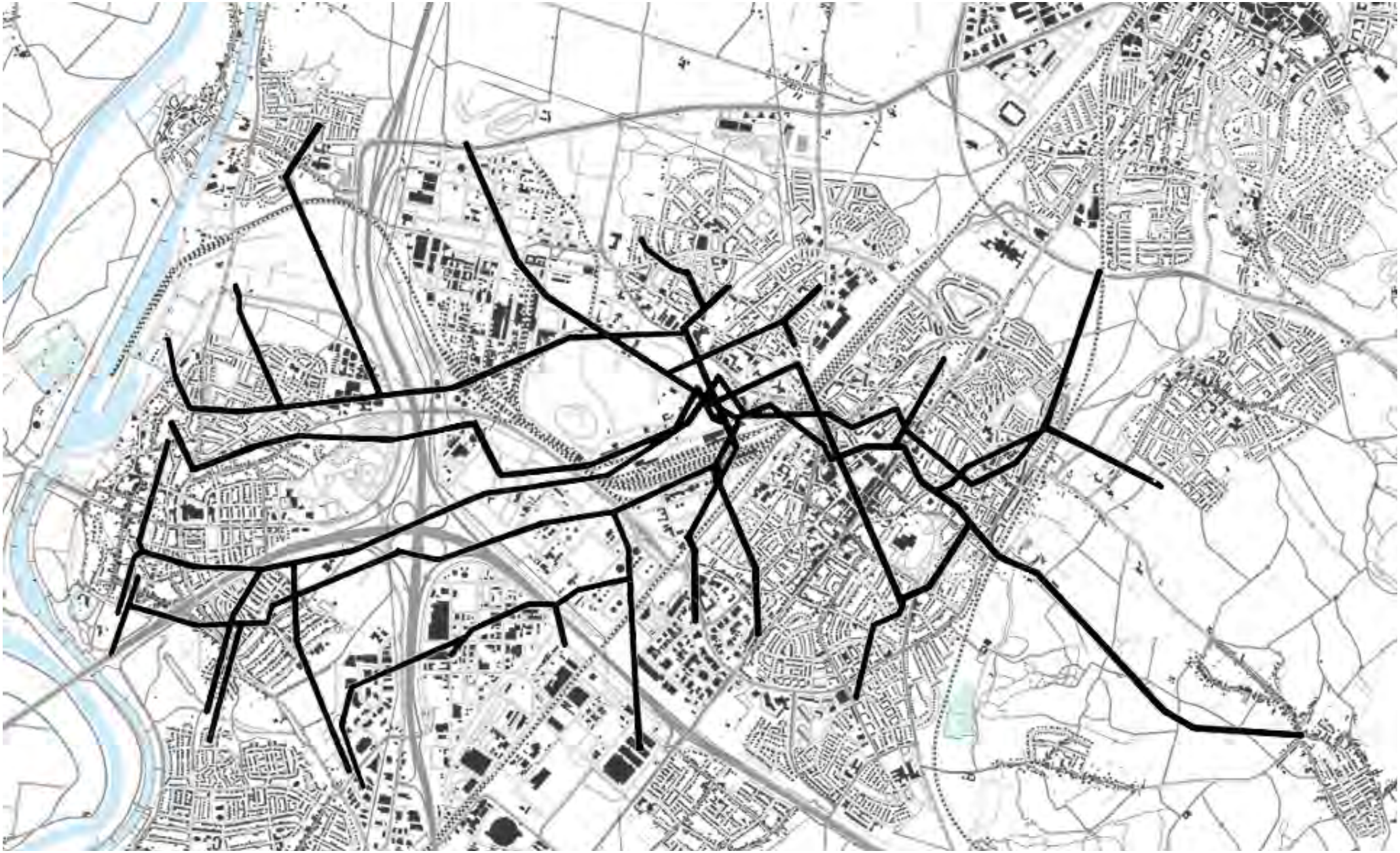
1935

1968



2010

STAATSMIJN MAURITS



Staatsmijn Maurits

1926-1967

6.500 miners below ground
2.800 workers above ground

shaft depths:
341/455/548/660/810m

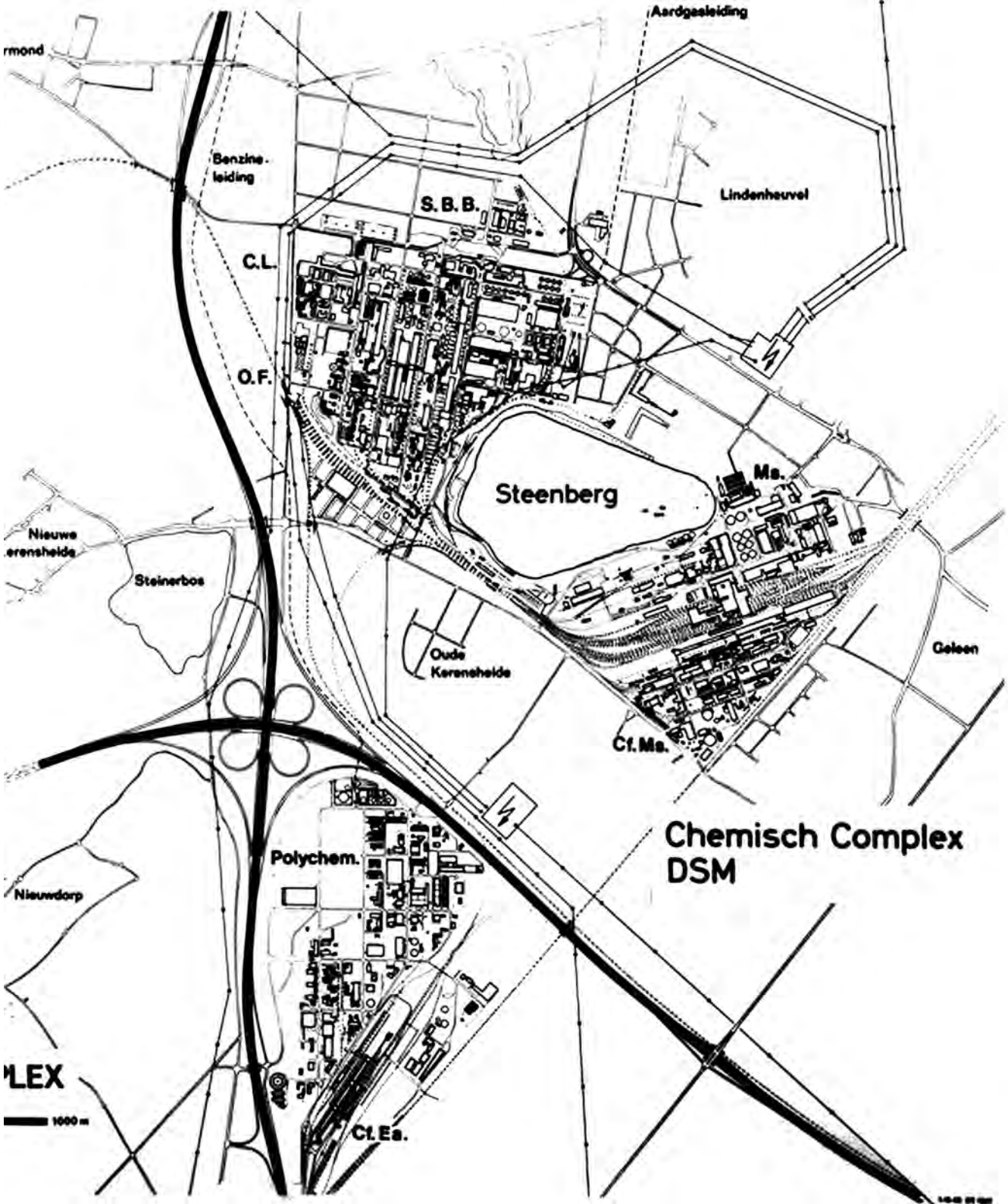
45m

700.000.000
kWh/year

size	jobs	length	tons
5.000 ha	10.000	180km	7mil

1968

1974


Aardgasleiding
Benzine-
leiding
S.B.B.
Lindenheuvel
C.L.
O.F.
Steenberg
Ms.
Nieuwe
Steinerbos
Oude
Kerensheide
Geleen
Cf. Ms.
Chemisch Complex
DSM
Polychem.
Nieuwdorp
Cf. Es.
1000 m

1968

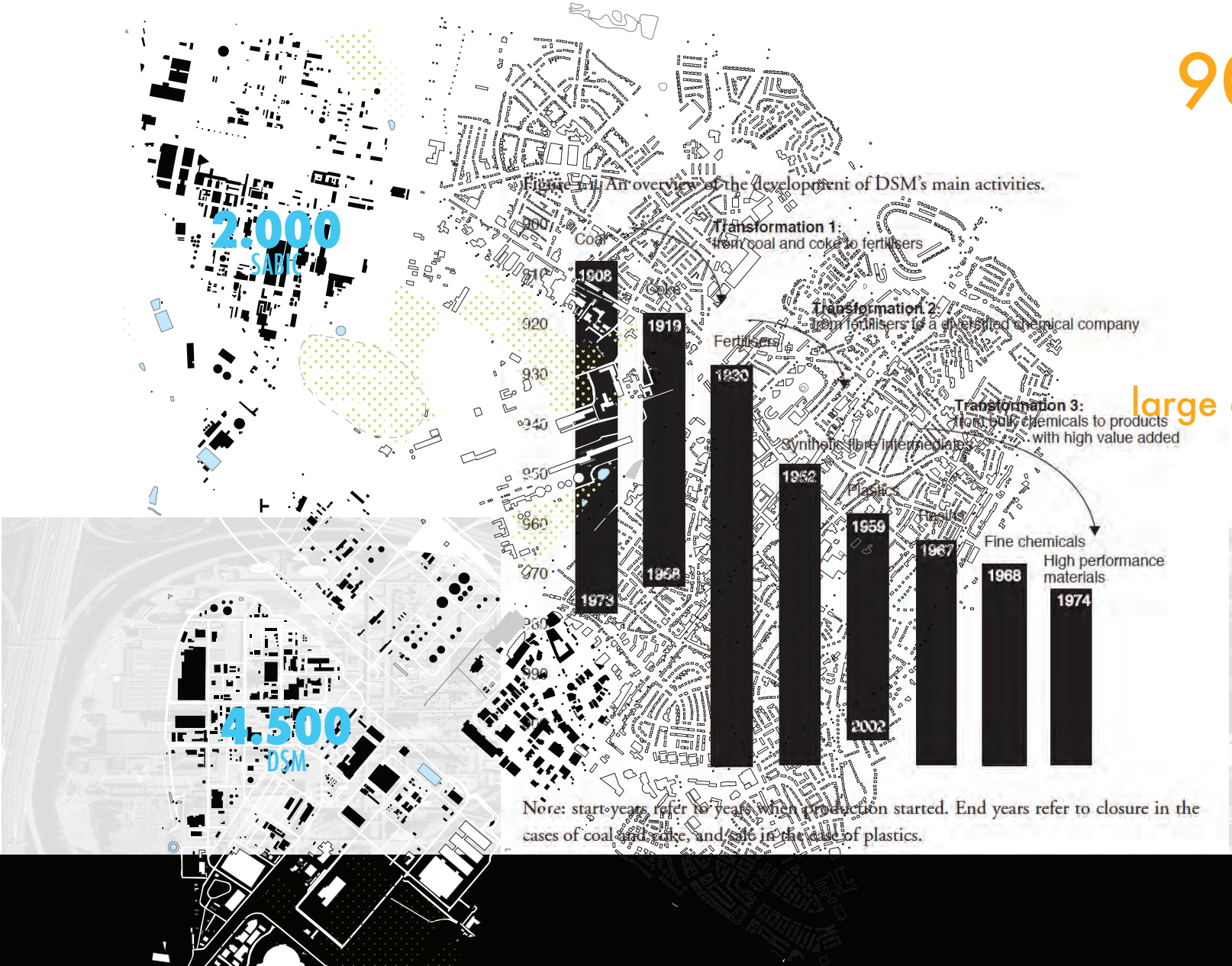
CHEMELOT

Chemelot

90+ companies

Research & Development
Start-up
Established Business
Service Provider

large chemical industrial complex

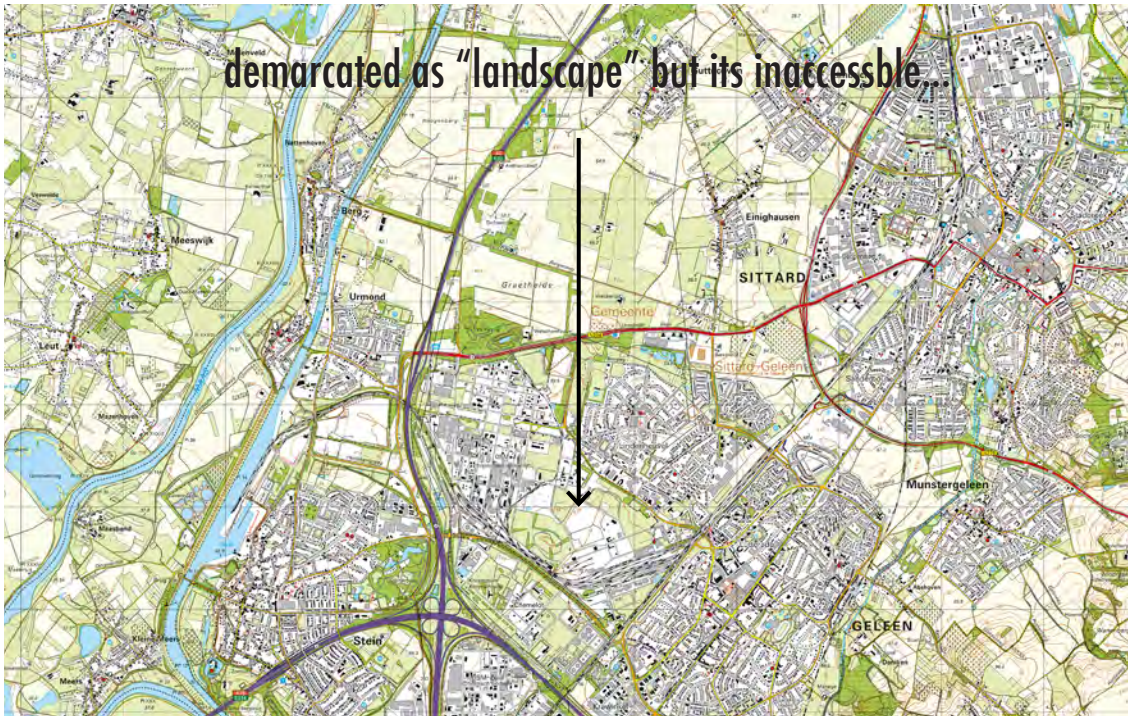


size
800 ha

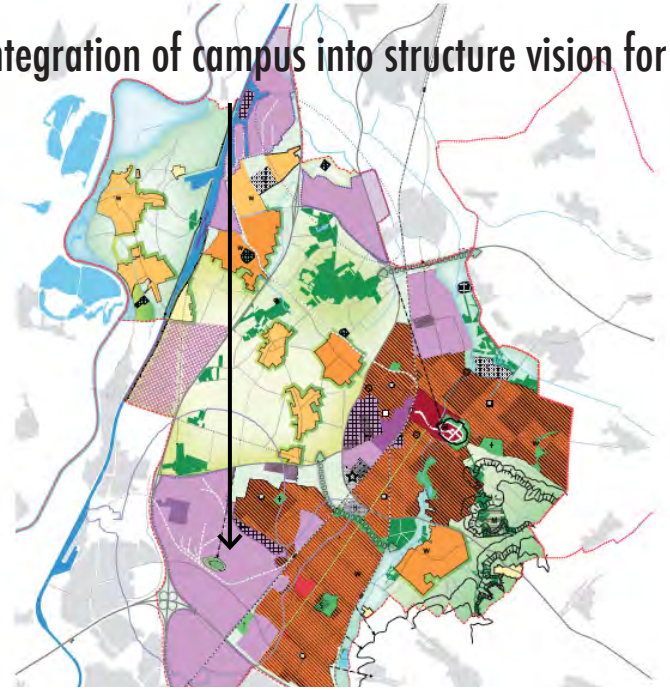
jobs
6.500

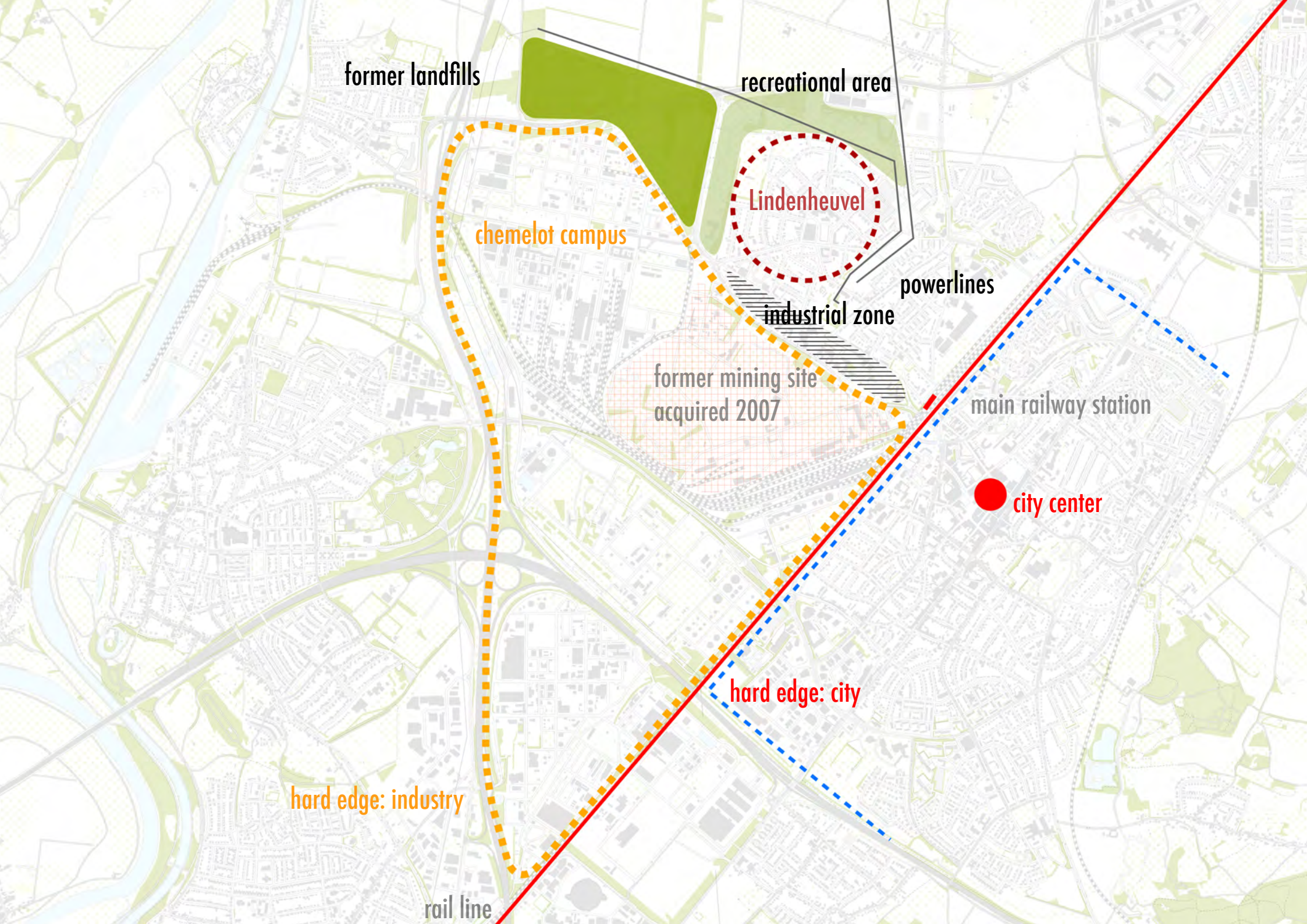
visitors
1.000

demarcated as "landscape" but its inaccessble...



no integration of campus into structure vision for 2020




former landfills
recreational area
Lindenheuvel
chemelot campus
powerlines
industrial zone
former mining site
acquired 2007
main railway station
city center
hard edge: city
hard edge: industry
rail line

chemelot in the background

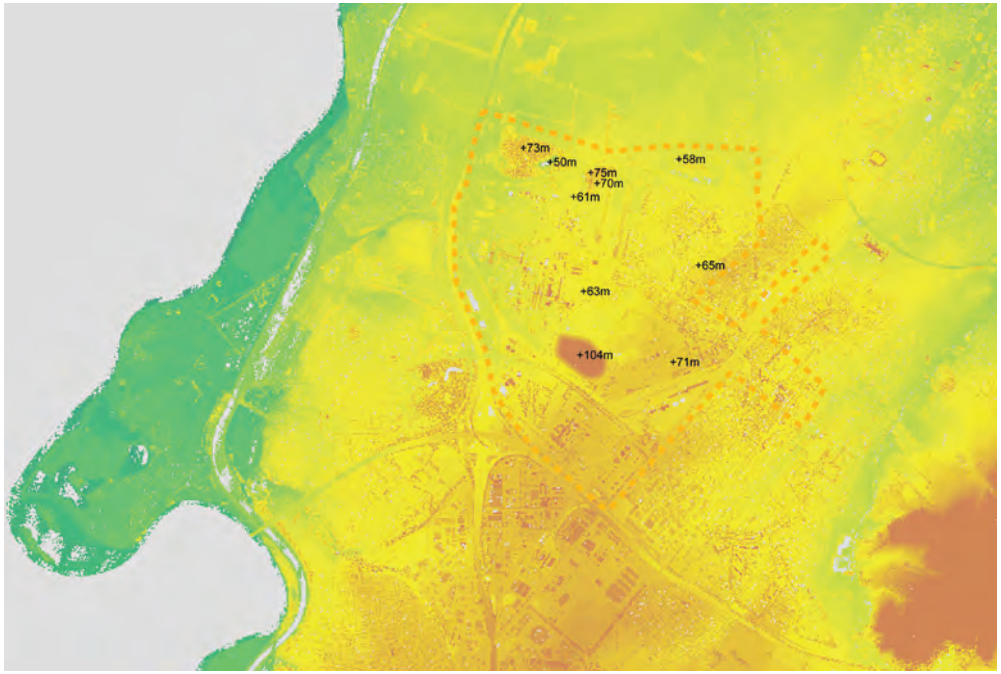
no real edge condition

romantiscizing the site

Radebrikgronden; zandige leem

Radebrikgronden; siltige leem

Soil - sandy and silty loam (where not built)



Heights

Lage storthopen en/of grind/zand/klei gaten

Losswand

Laagte ontstaan door afgraving

Daluitspoelingsrest-terras, bedekt met loss

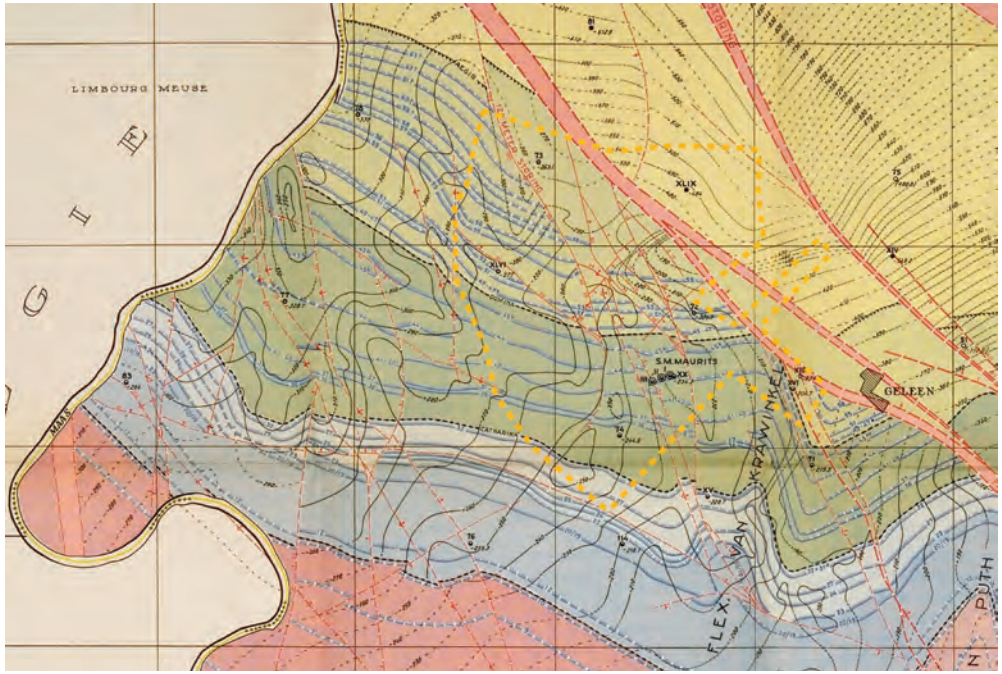
Tussenterras, bedekt met loss of zandige loss

Laagte ontstaan door mijnverzakking

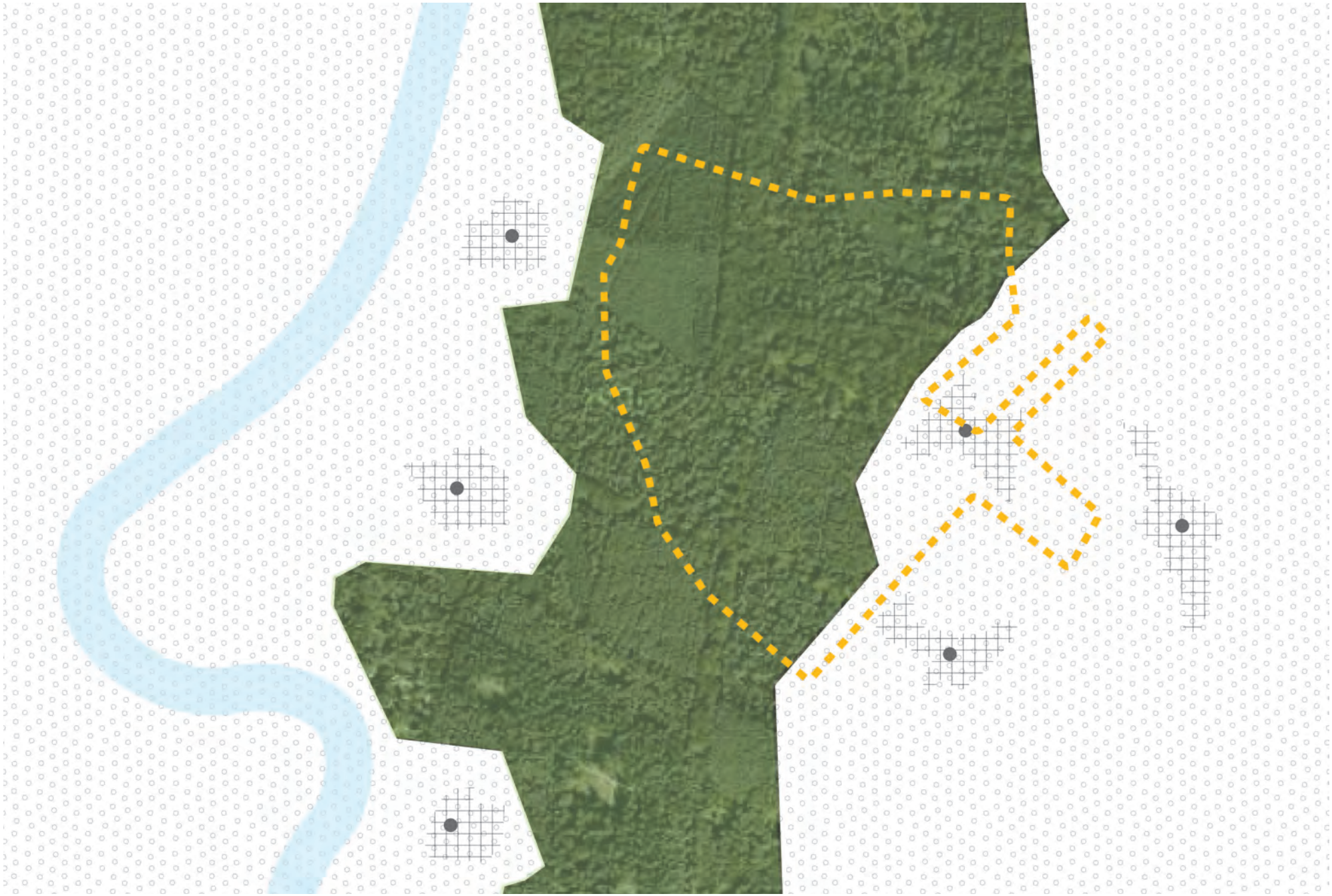
Hoge lossrug

Droog dal (+/-dekzand/loss)

Geomorphology



Carbon ridges and fault lines



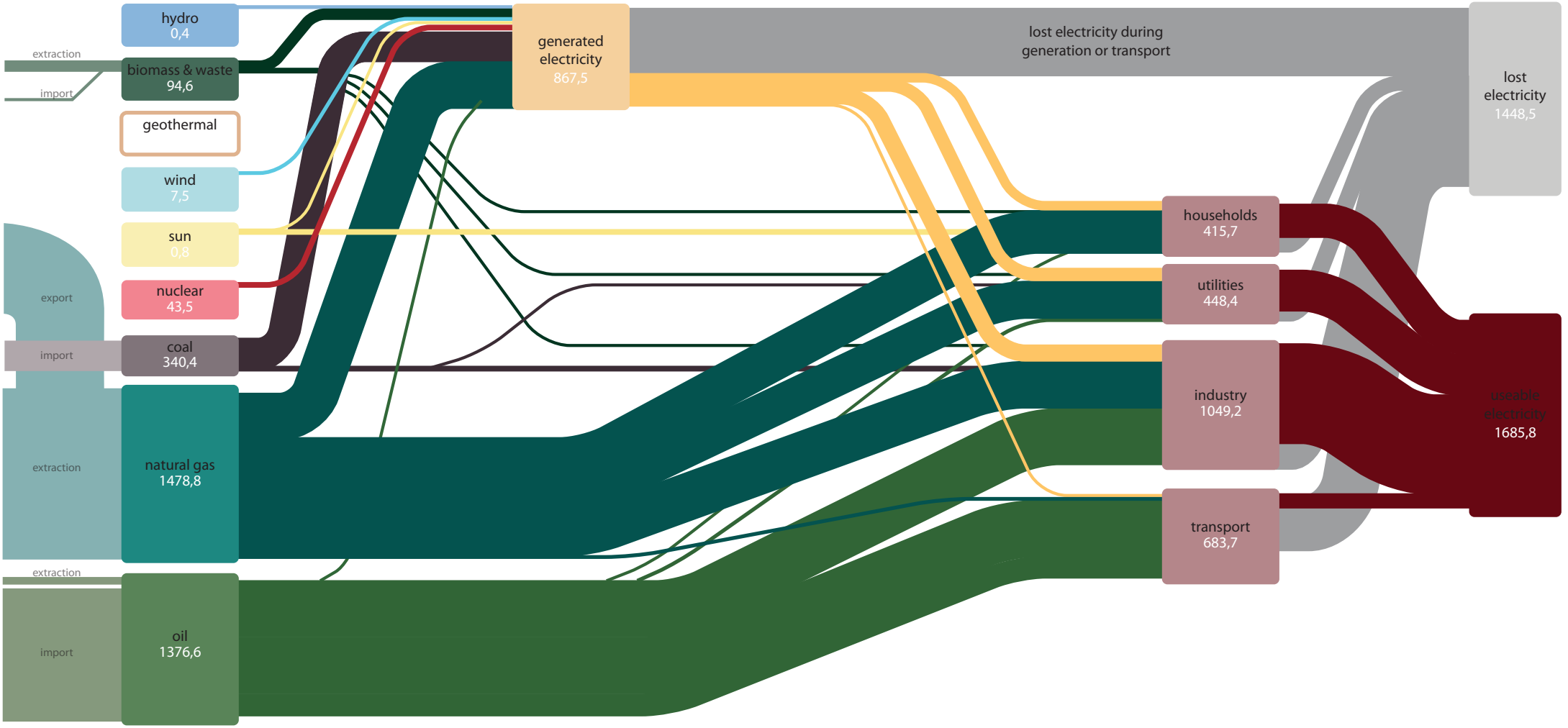
1400

1773

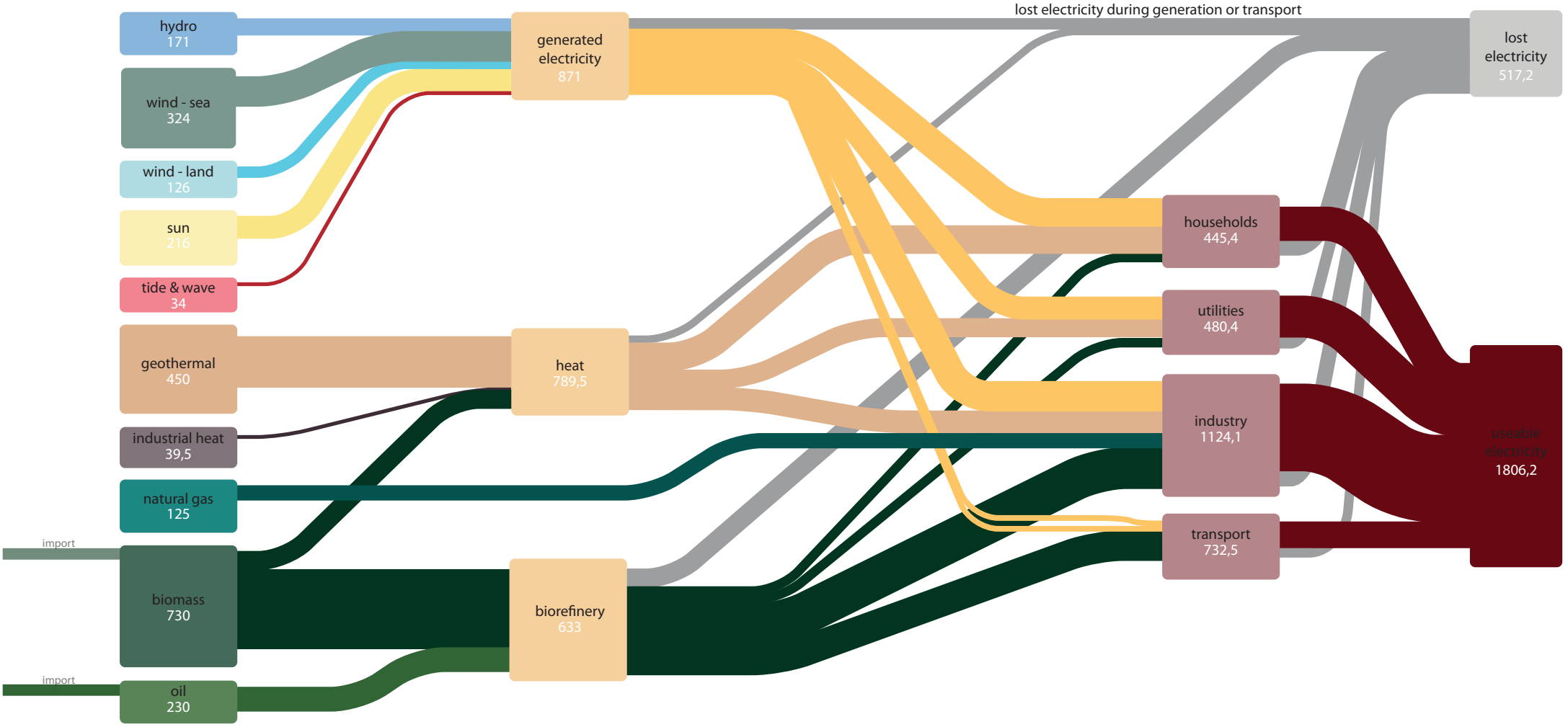
1935

1968

2010


extraction
import
hydro
0,4
biomass & waste
94,6
geothermal
wind
7,5
sun
0,8
nuclear
43,5
export
import
coal
340,4
extraction
natural gas
1478,8
extraction
import
oil
1376,6
generated
electricity
867,5
lost electricity during
generation or transport
lost
electricity
1448,5
households
415,7
utilities
448,4
industry
1049,2
transport
683,7
useable
electricity
1685,8

2005 - NL


hydro
171
wind - sea
324
wind - land
126
sun
216
tide & wave
34
geothermal
450
industrial heat
39,5
natural gas
125
import
biomass
730
import
oil
230
generated
electricity
871
heat
789,5
biorefinery
633
lost electricity during generation or transport
lost
electricity
517,2
households
445,4
utilities
480,4
industry
1124,1
transport
732,5
useable
electricity
1806,2

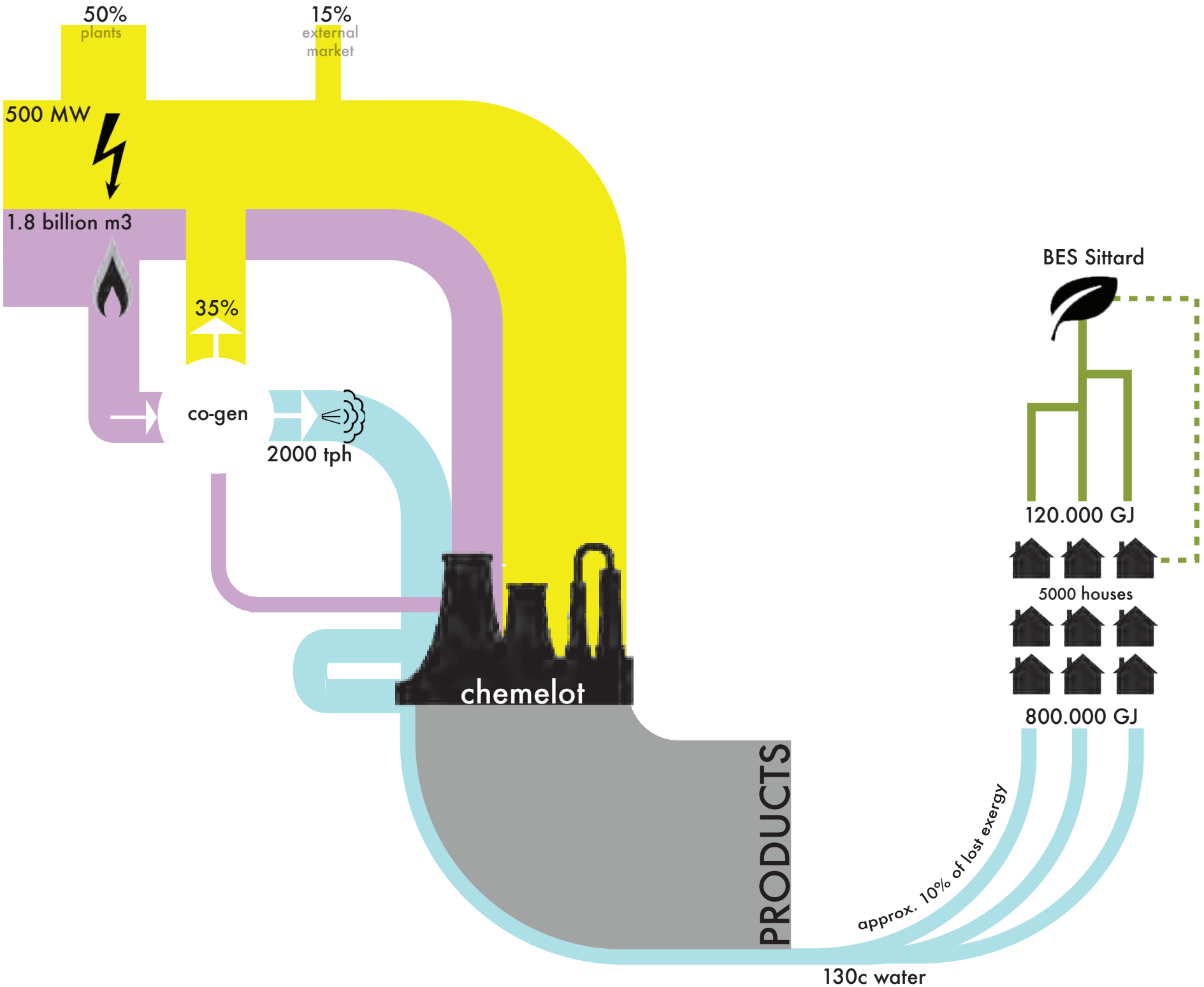
2050 - NL

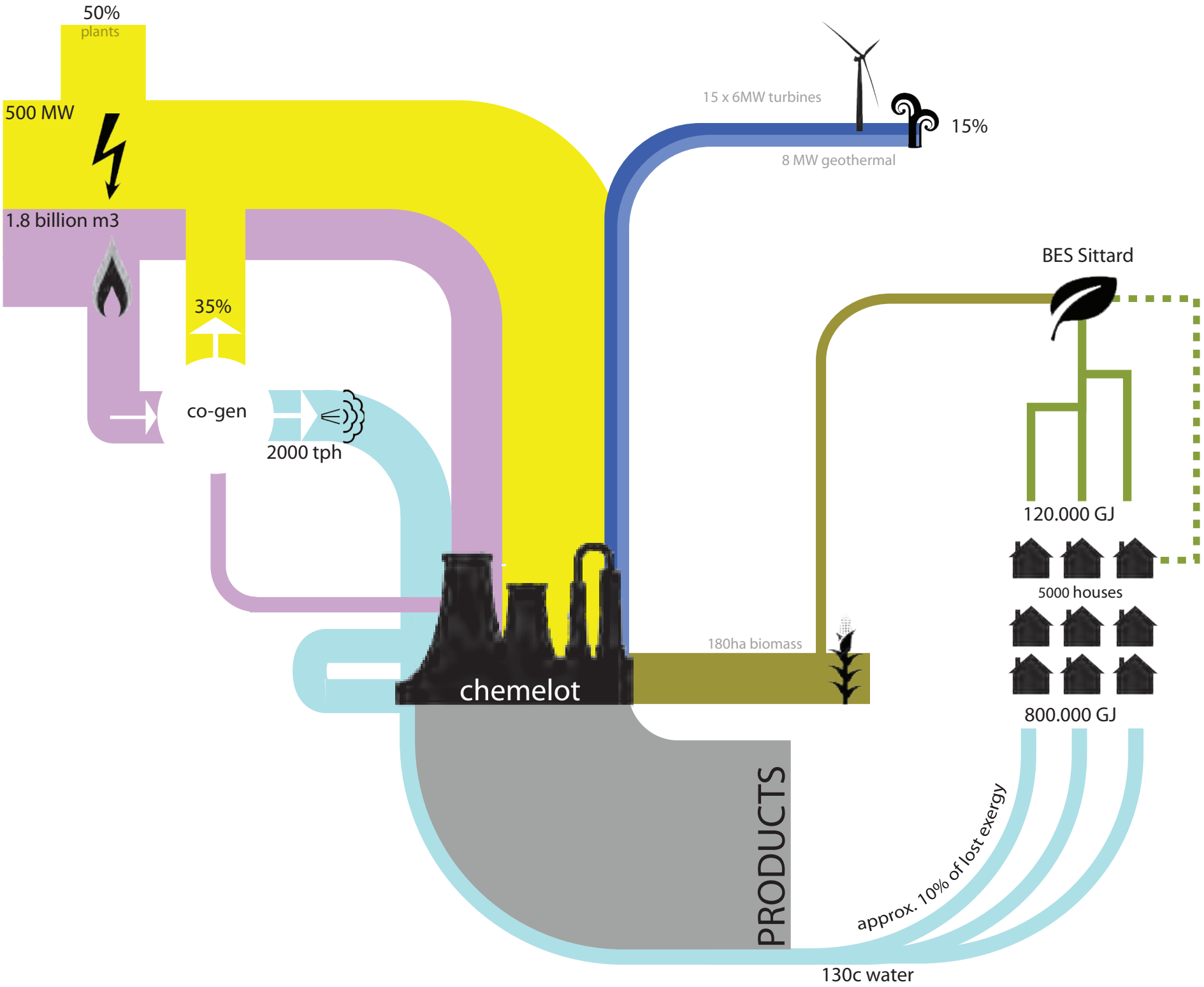
ELECTRICITY

40%
Limburg

NATURAL GAS

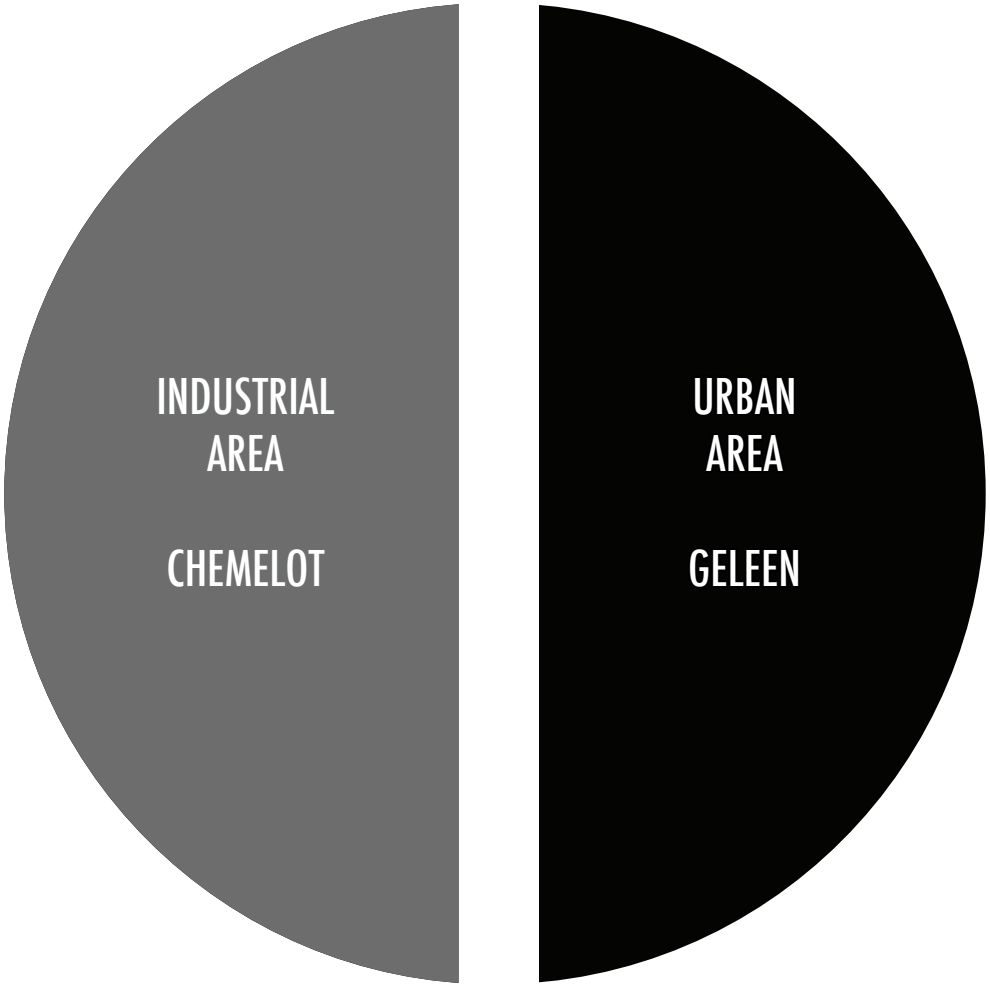
4-5%
Netherlands

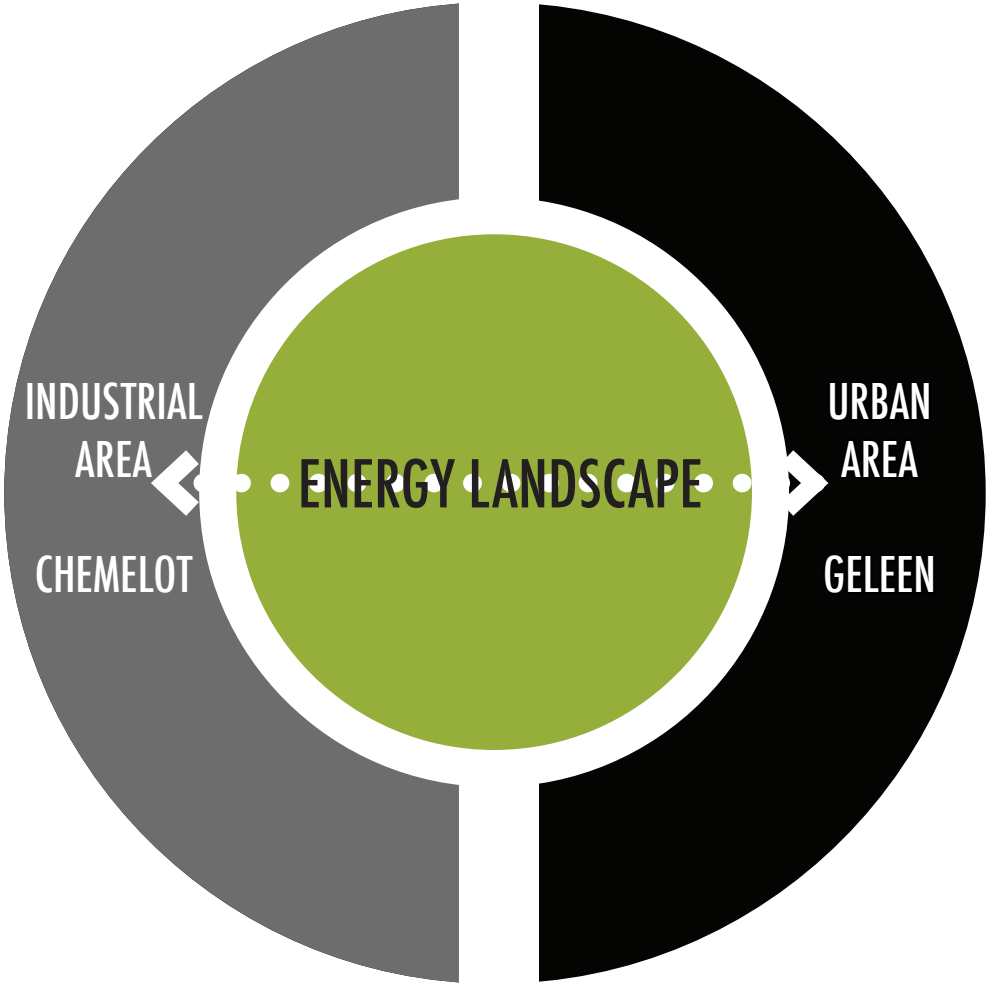

50%
plants
15%
external
market
500 MW
1.8 billion m3
35%
co-gen
2000 tph
chemelot
PRODUCTS
BES Sittard
120.000 GJ
5000 houses
800.000 GJ
approx. 10% of lost exergy
130c water


50%
plants
500 MW
1.8 billion m3
35%
co-gen
2000 tph
15 x 6MW turbines
15%
8 MW geothermal
BES Sittard
120.000 GJ
5000 houses
800.000 GJ
180ha biomass
chemelot
PRODUCTS
approx. 10% of lost exergy
130c water

WHITE BIOTECH & BIOECONOMY

PROPOSAL


INDUSTRIAL
AREA
CHEMELOT
URBAN
AREA
GELEEN


INDUSTRIAL AREA
CHEMELOT
ENERGY LANDSCAPE
URBAN AREA
GELEEN

TO CREATE A NEW SPATIAL COHESION

TO CHANGE THE RELATIONSHIP OF CHEMELOT TO THE CENTER OF GELEEN

TO CREATE A PRODUCTIVE PERFORMATIVE LANDSCAPE FROM WASTED SPACE

(that used to produce 700million kWh/yr)

ECOLOGICAL

phytoremediation
phytodemarcation

SPATIAL

expand the green network of the city

establish new civic space

RECREATIONAL

connect existing paths

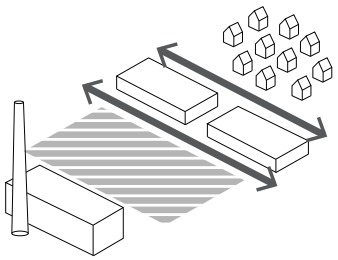
add recreational space for all age groups

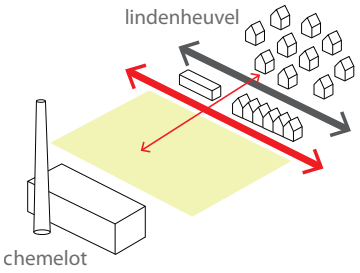
PRODUCTIVE

energy

biomass

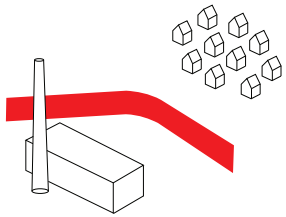
1. civic axis

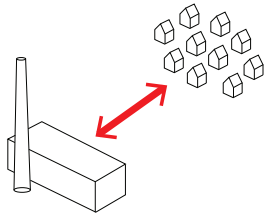




redevelop the industrial zone into new mixed use and civic space

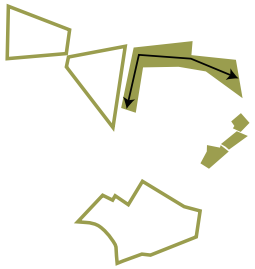
2. campus and city

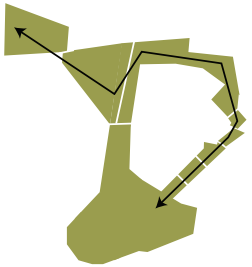




reconnect the campus and the city to encourage exchange

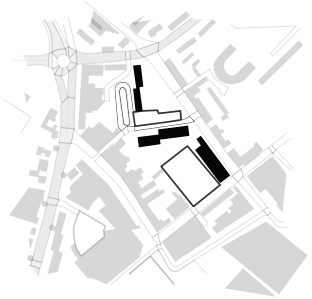
3. fragmented landscapes

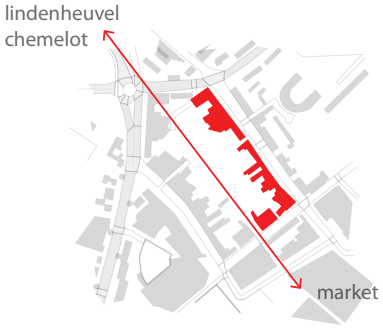




connect vacant landscapes into one large system of productive and recreational spaces

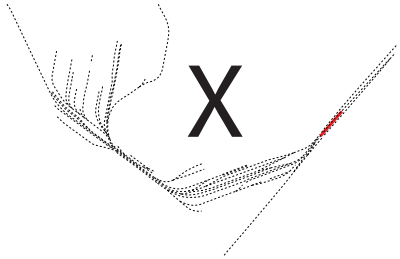
4. city center

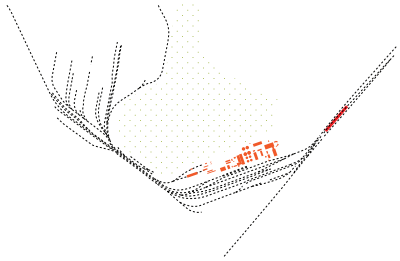




remove highrise blocks replace with properly scaled mixed use to open up access to market

5. energy production



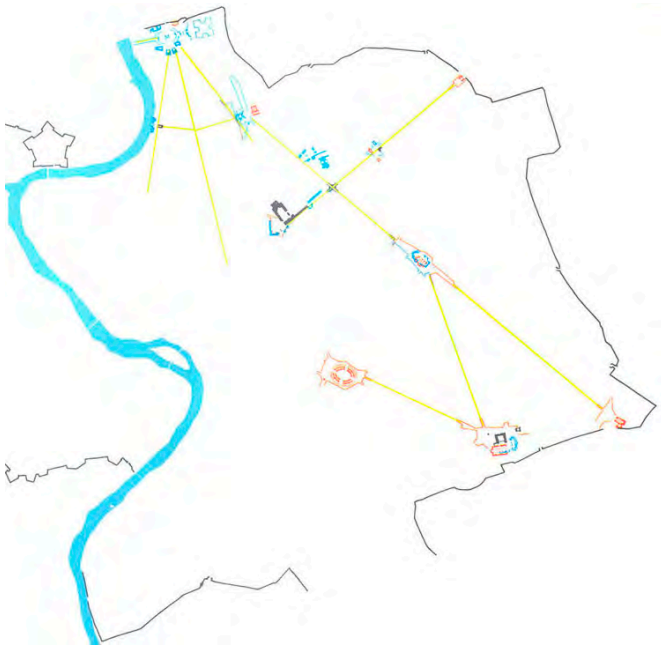


use the site for energy production once again : rebuild on the former mining site

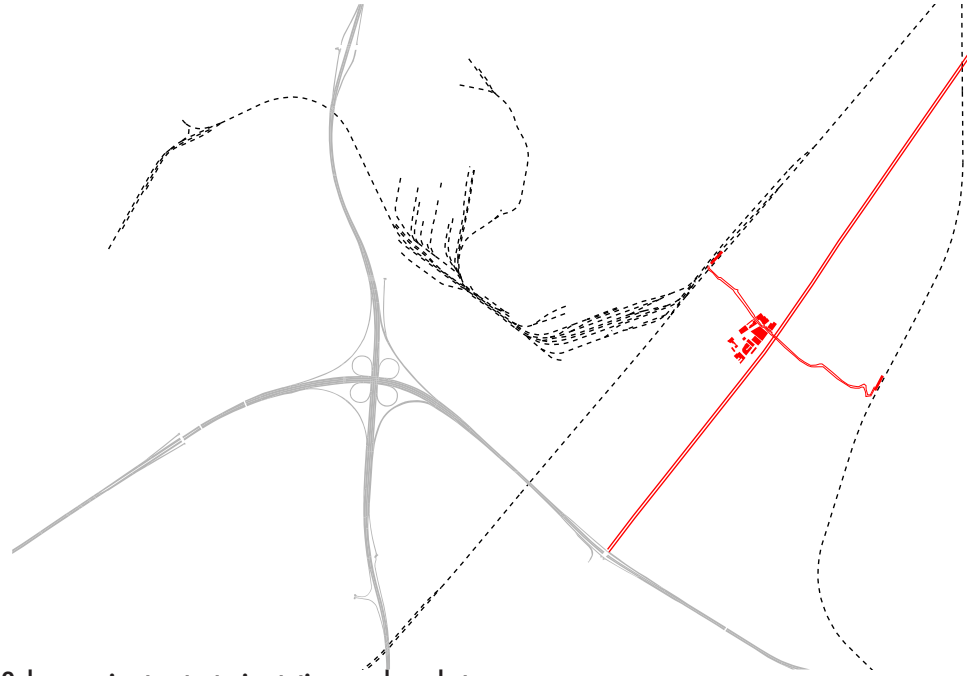
METHOD


1. SPATIAL - URBAN DESIGN
2. CONNECTION - LANDSCAPE
3. ENERGY PRODUCTION
EXISTING PLANS FOR THE AREA

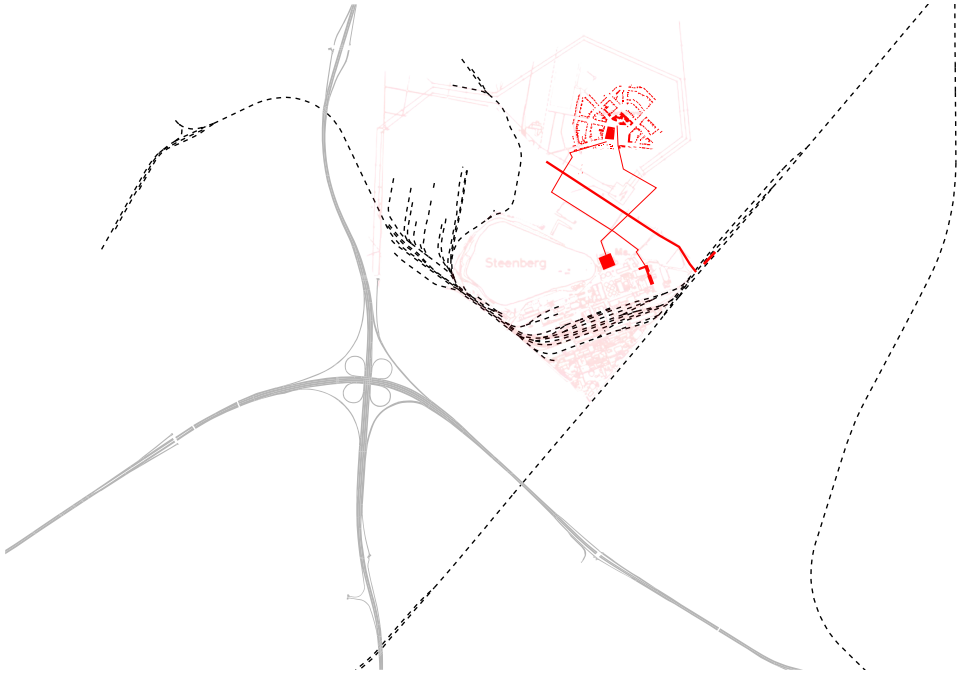
URBAN



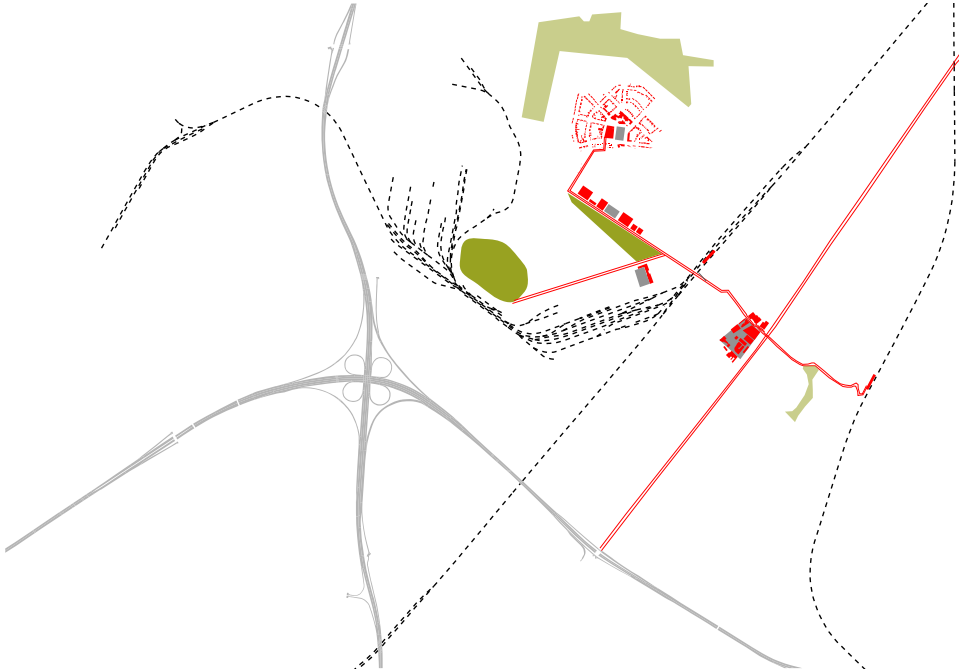
Spatial analysis of Rome by EN Bacon



Geleen main streets, train stations and market square



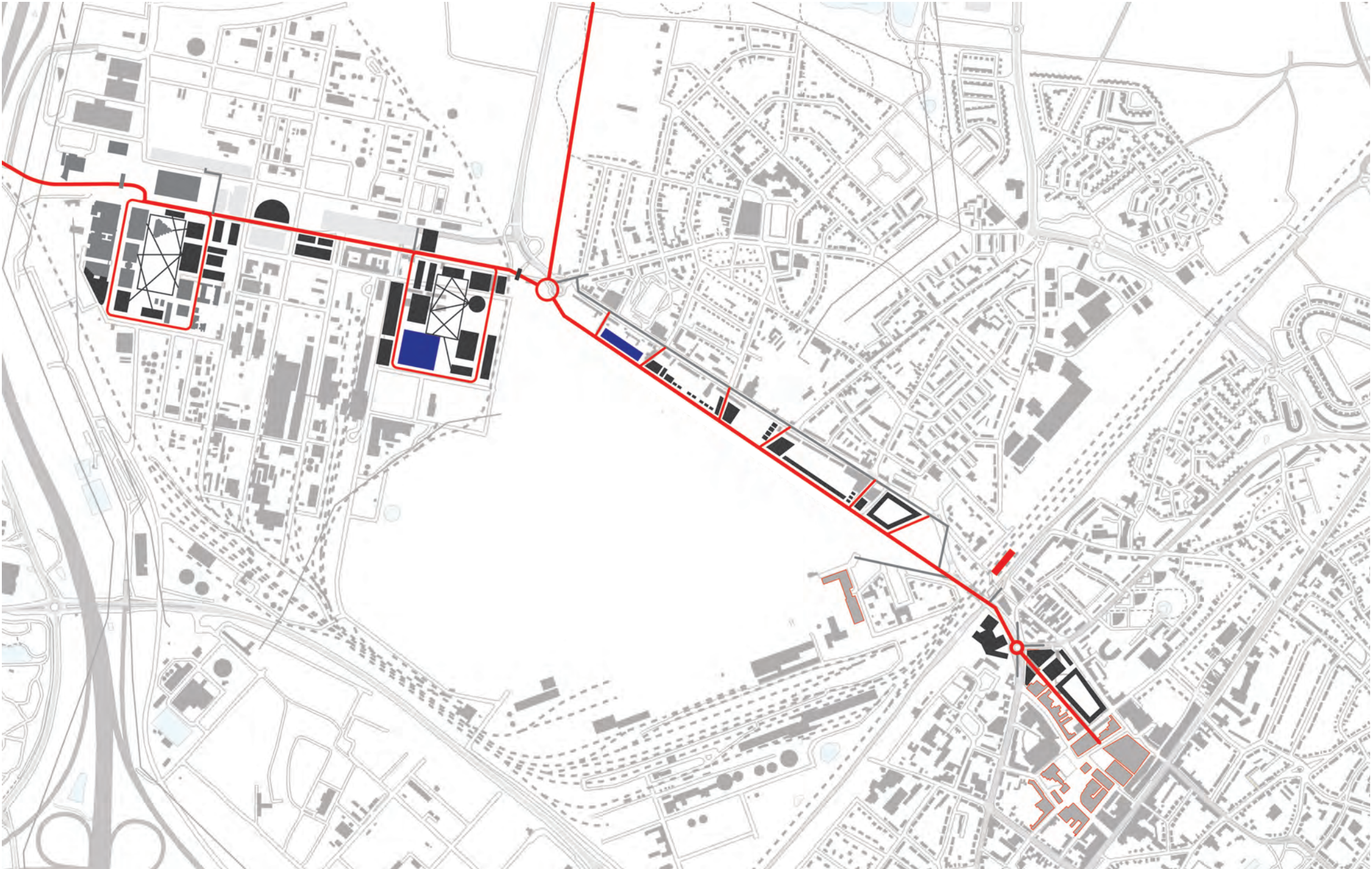
Lindenheuvel to Staatsmijn Maurits and the train station



Lindenheuvel to the market square and the site

EXISTING SITUATION

PROPOSAL

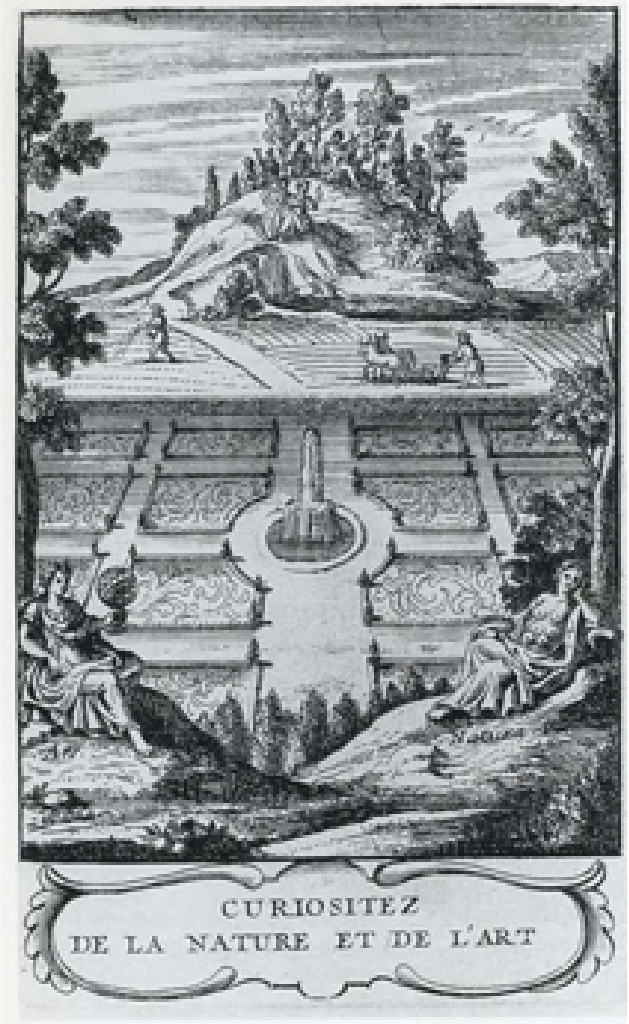


LANDSCAPE

INSPIRATION - 3 NATURES

We tend to categorize our desciptions of nature into three types: the garden and park (first nature), agricultural lands and pastures (second nature), and wilderness (third nature).

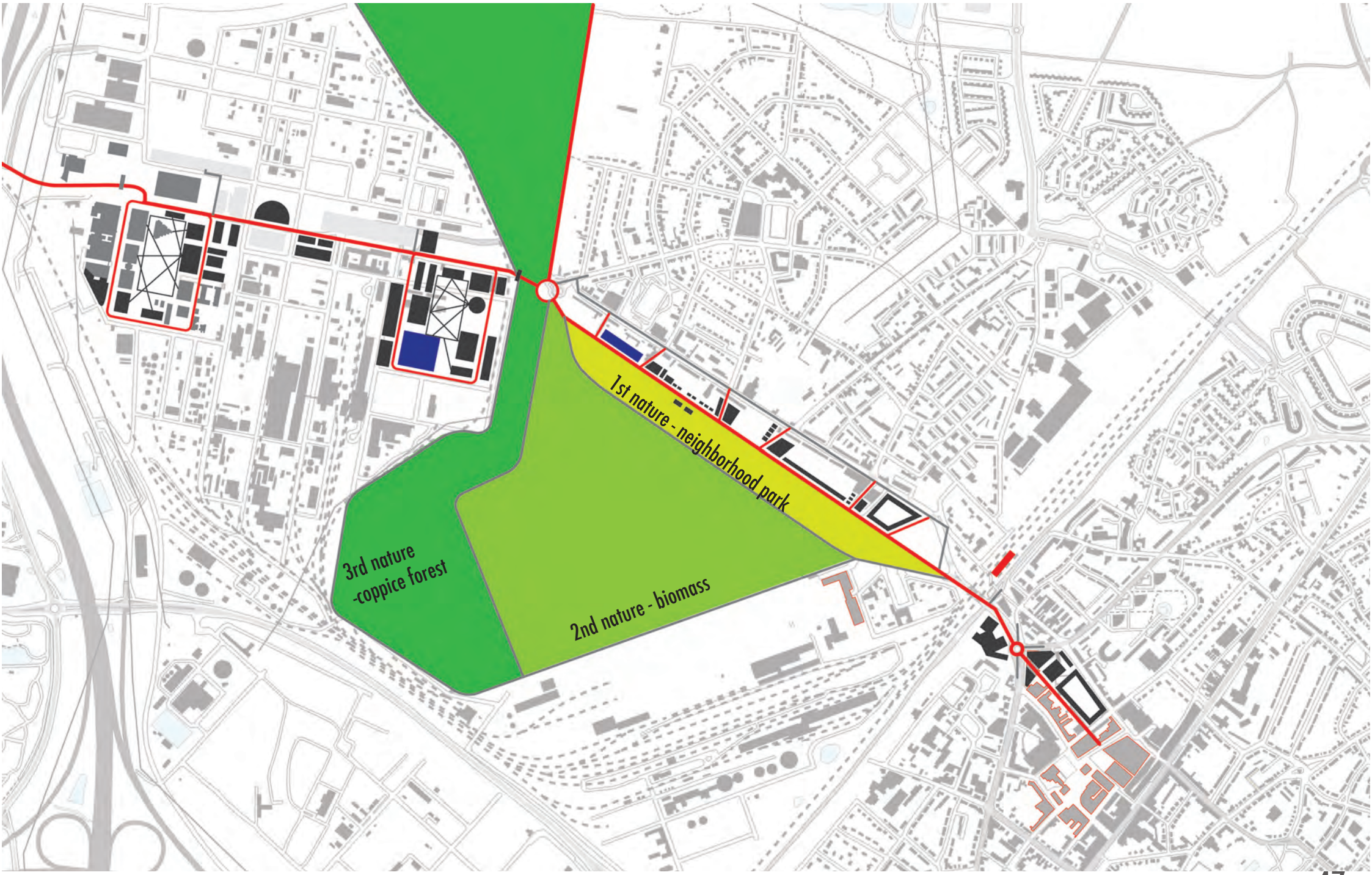
1st nature: private gardens, city park
2nd nature: city orchard, meadows, biomass fields
3rd nature: CO2 compensation forest, agro-forest



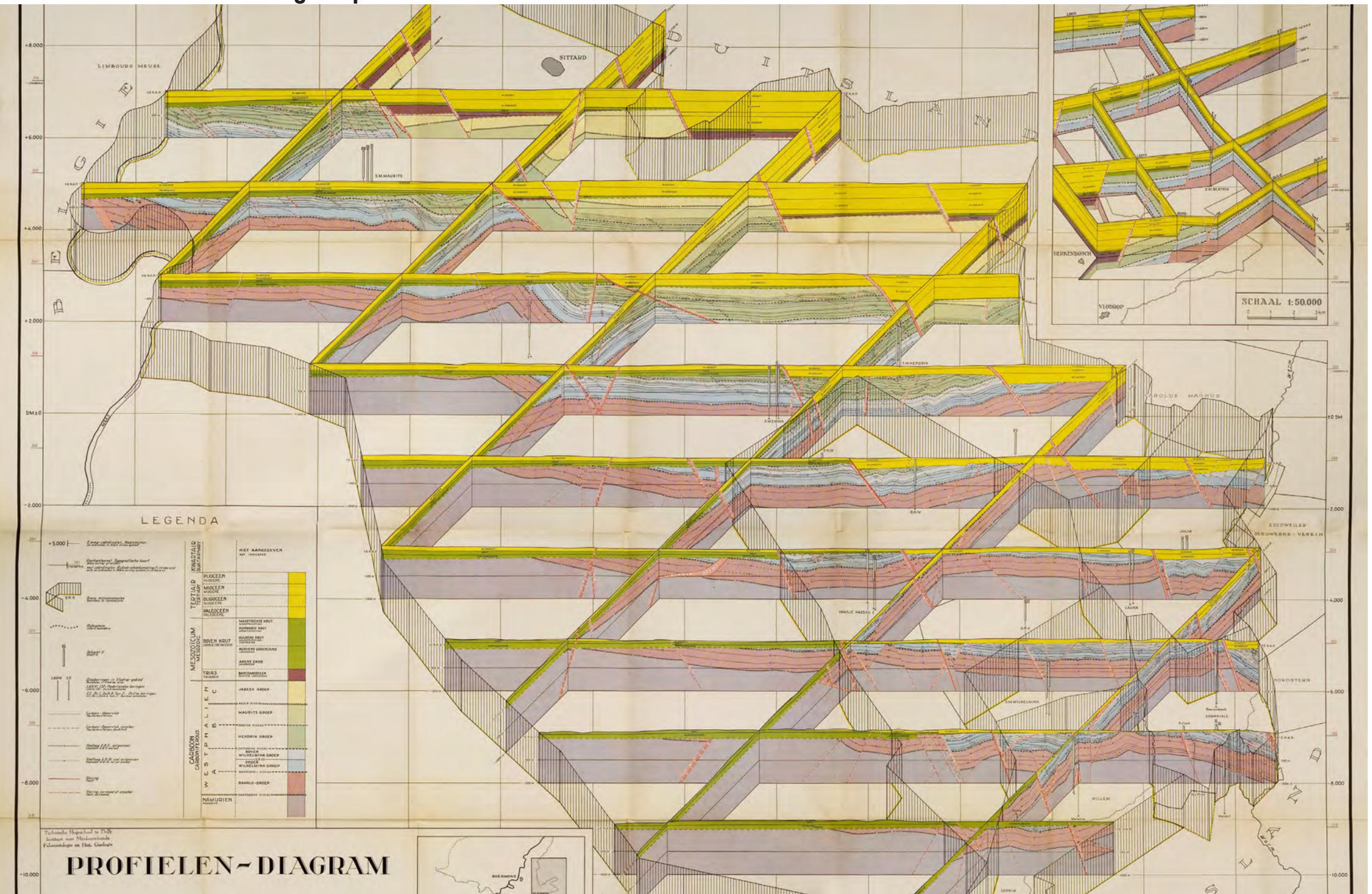
3rd - wilderness

2nd - pastoral

1st - garden

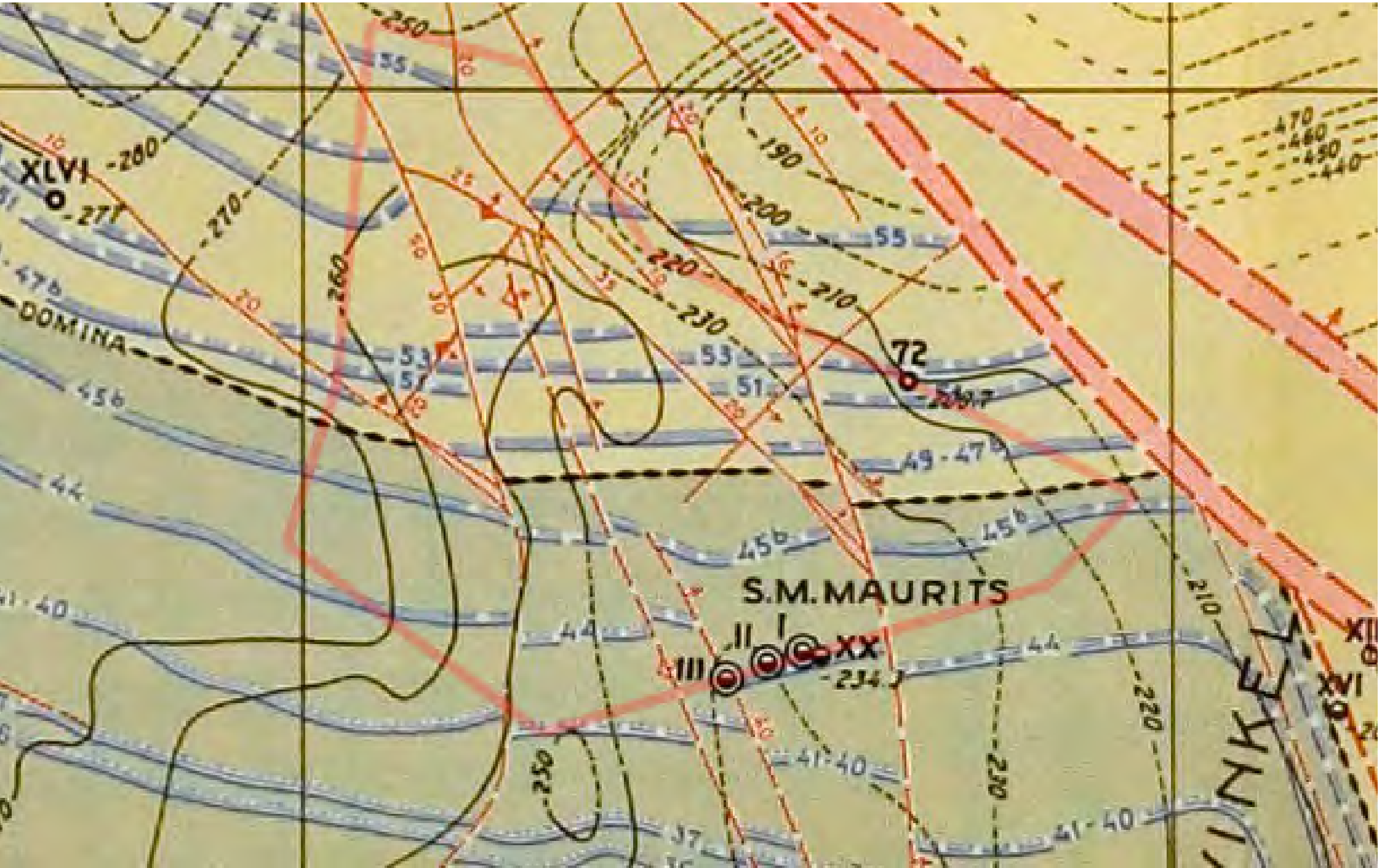

1st nature - neighborhood park
2nd nature - biomass
3rd nature
-coppice forest

INSPIRATION - mining maps

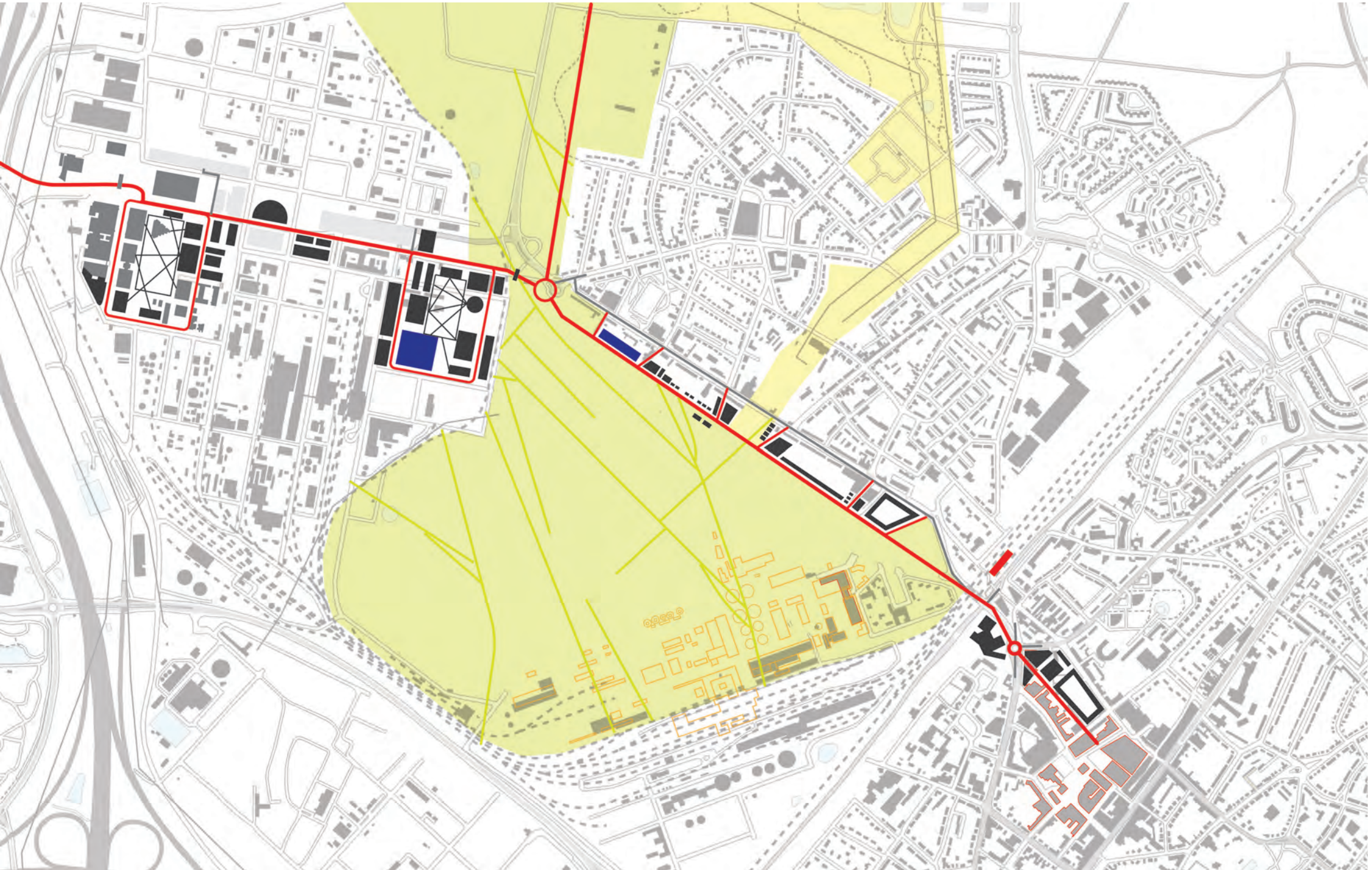


FAULT LINES AND COAL SEAMS

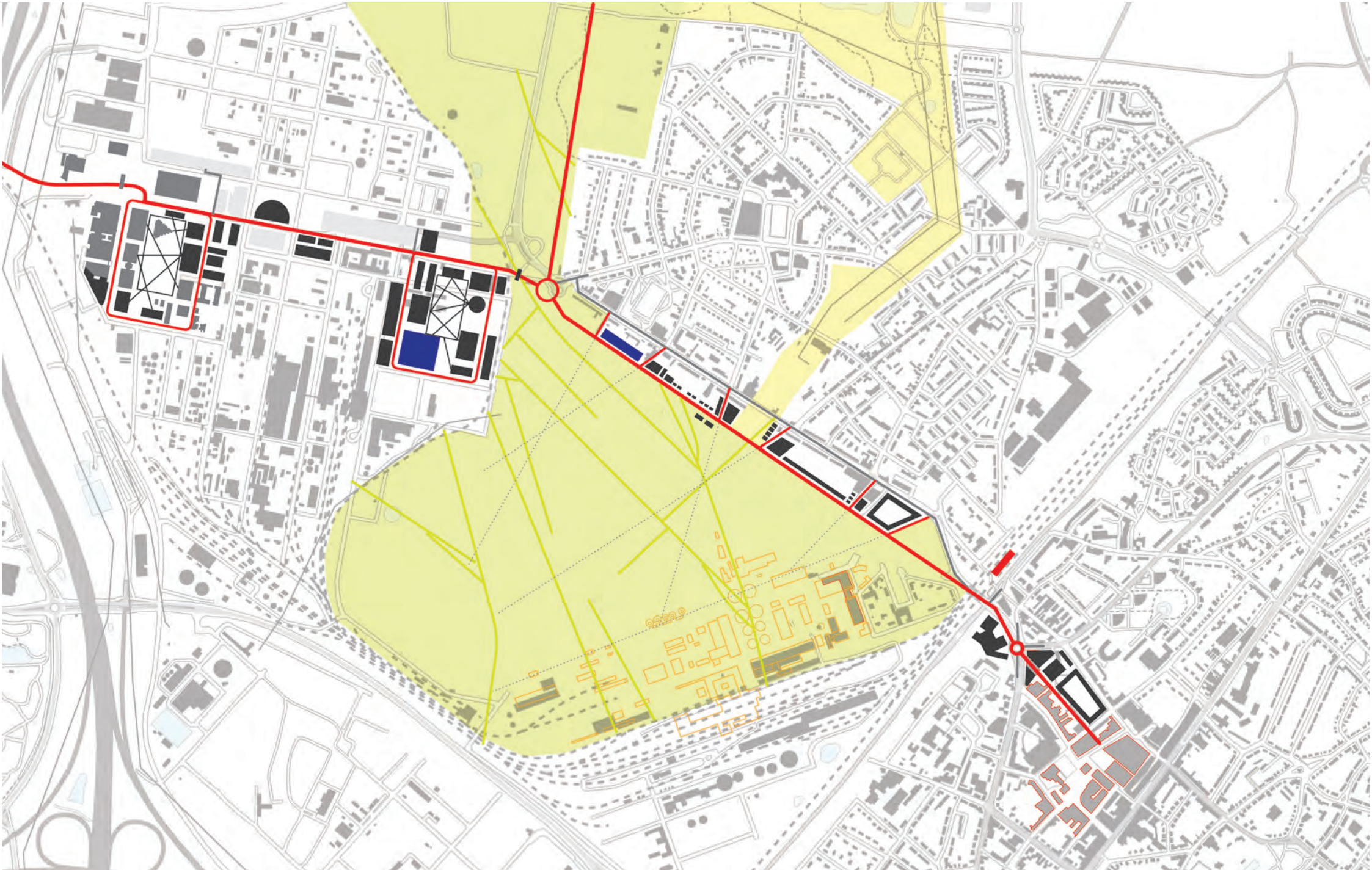
FAULT LINES AND COAL SEAMS



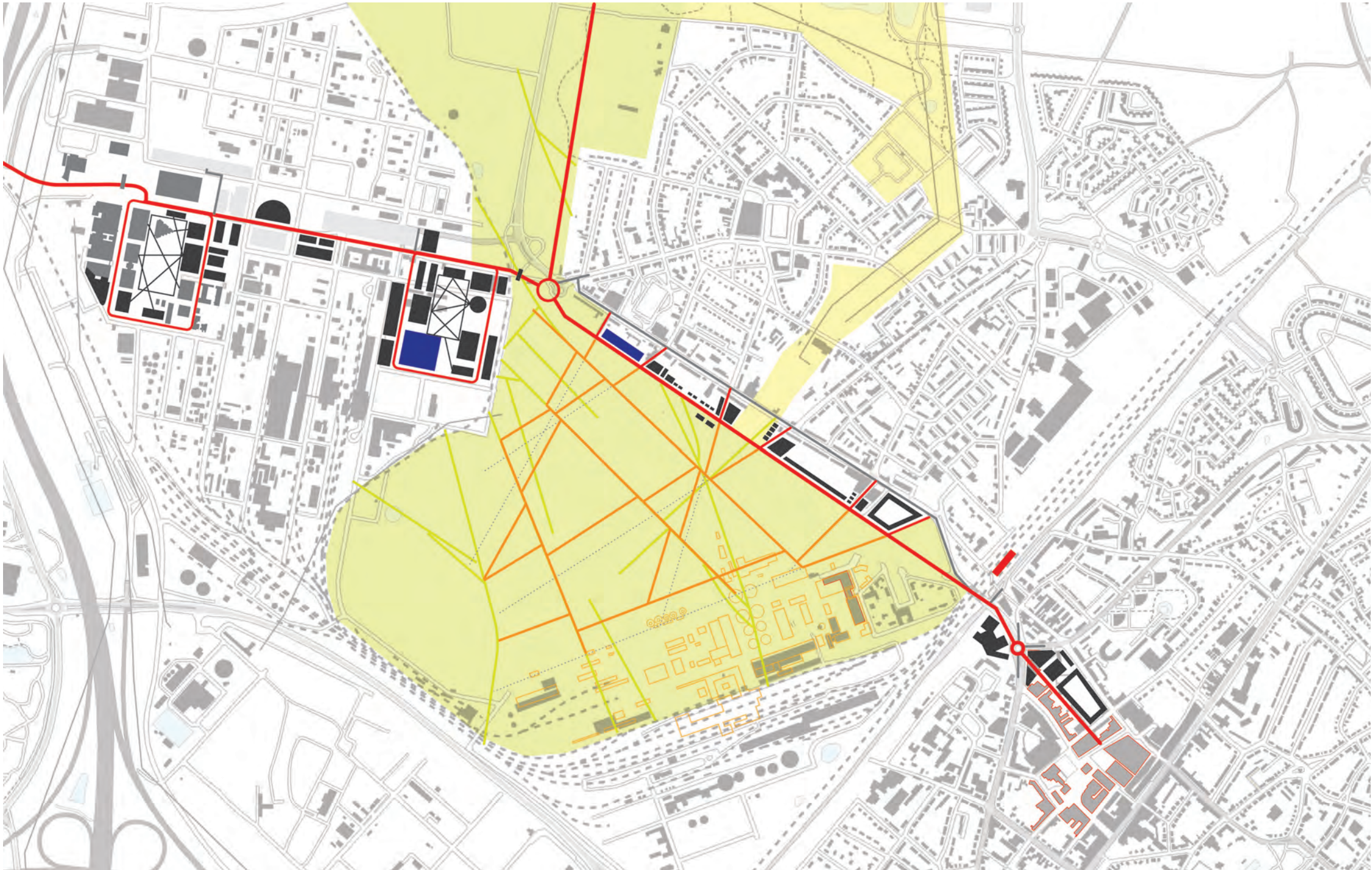
LANDSCAPE - faults



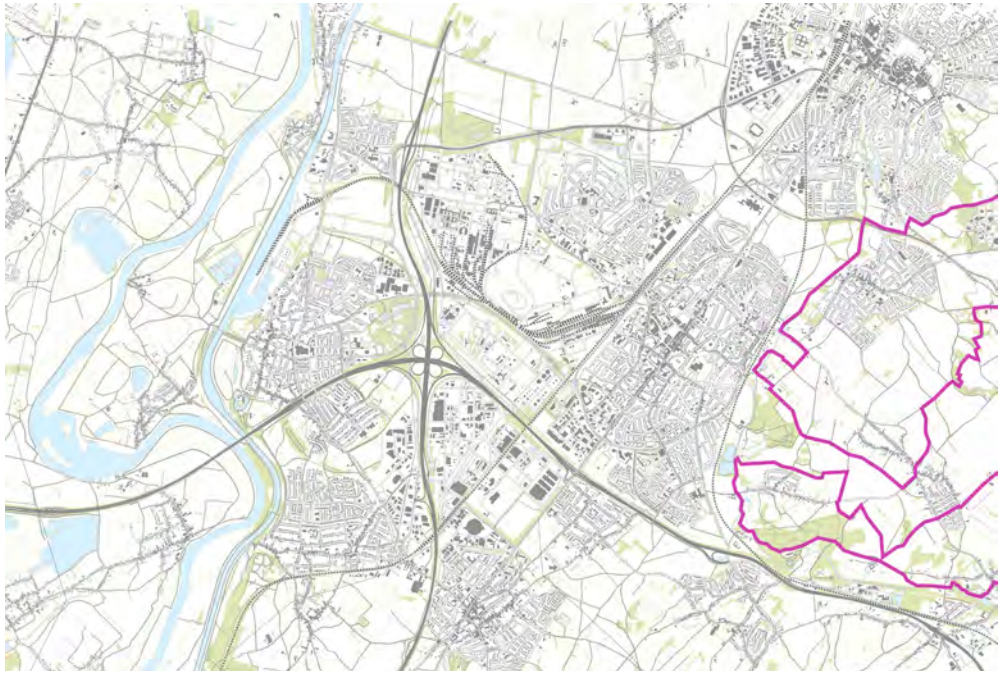
LANDSCAPE - axis extension



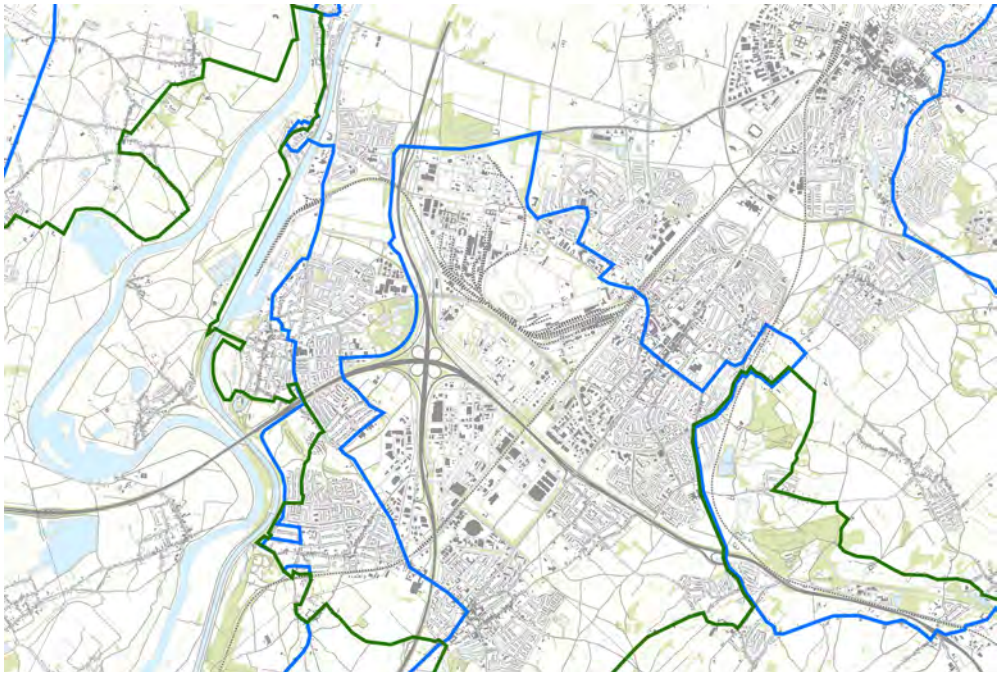
LANDSCAPE - axis shift



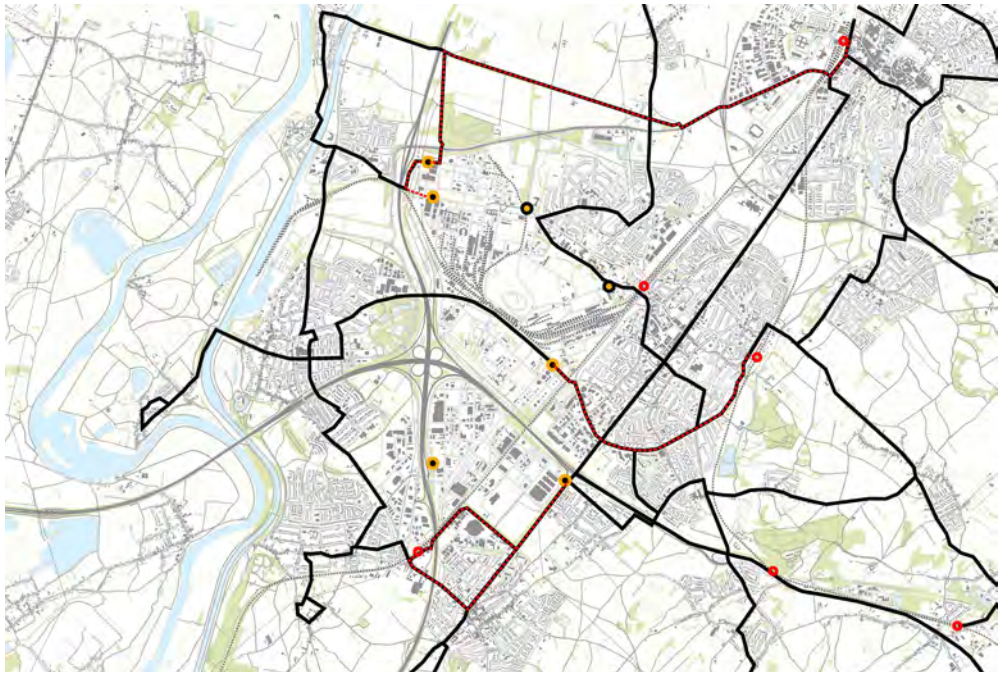
Official bike routes



Limburg walking routes

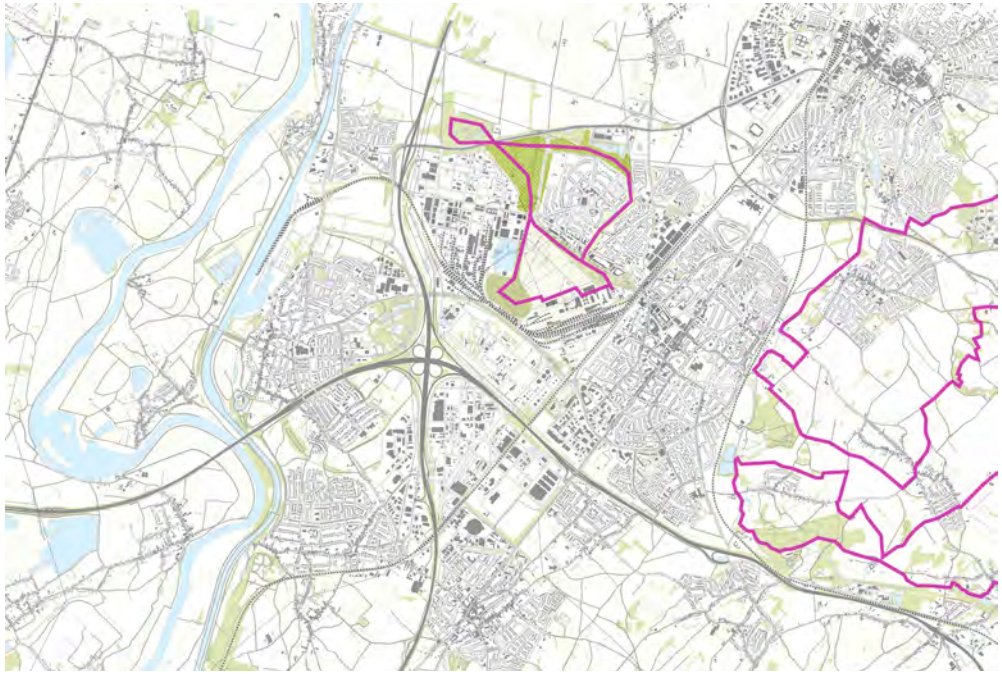


Green metropolis routes

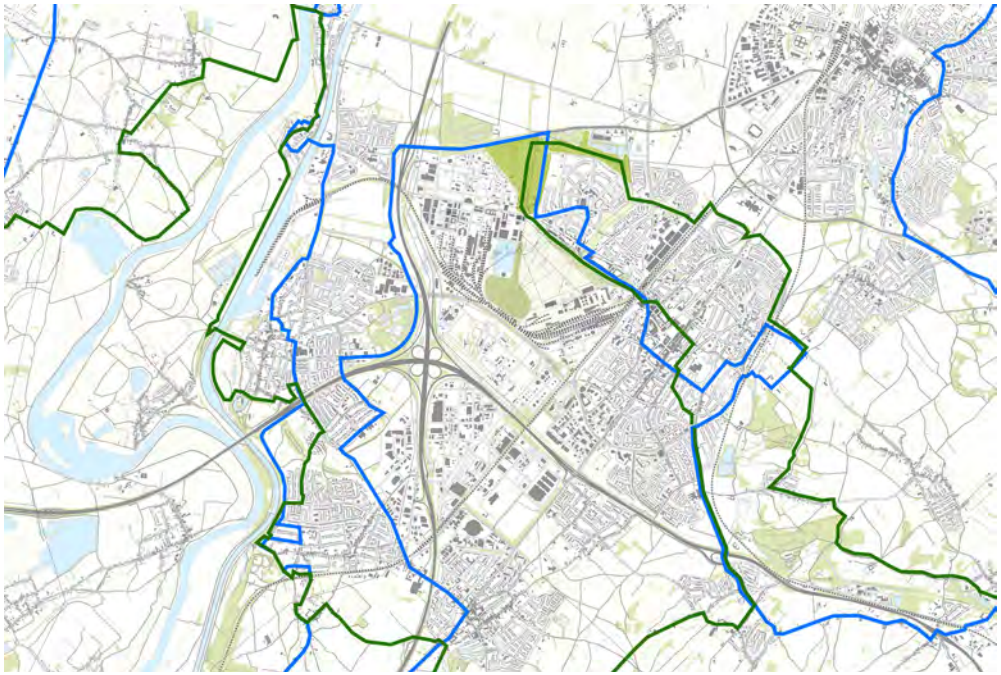


Train stations and bus line connections

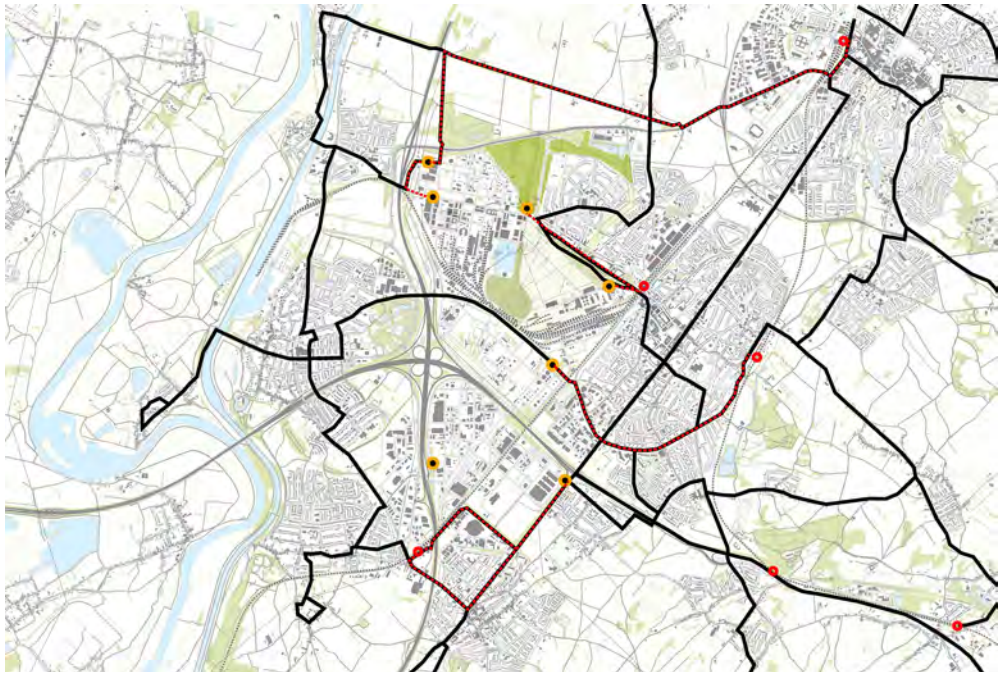
Official bike routes



Limburg walking routes



Green metropolis routes



Train stations and bus line connections

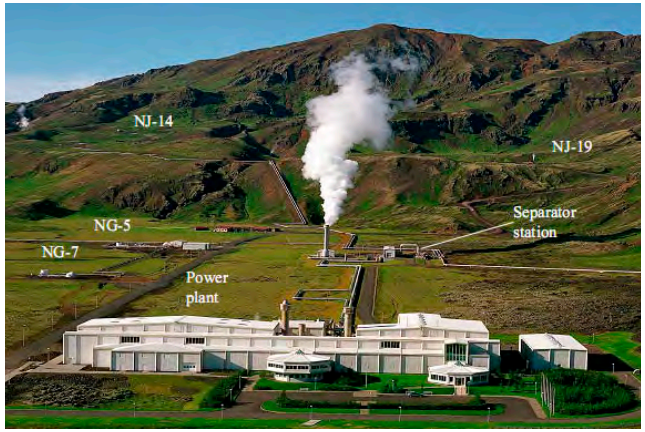
ENERGY

HEAT CASCADE - Green Net

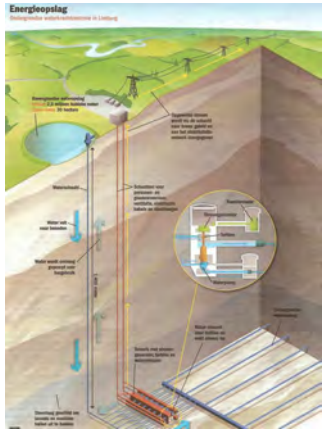
WIND - turbine test site

WASTEWATER TREATMENT - indoor greenhouses

BIOREFINERY - biomass processing

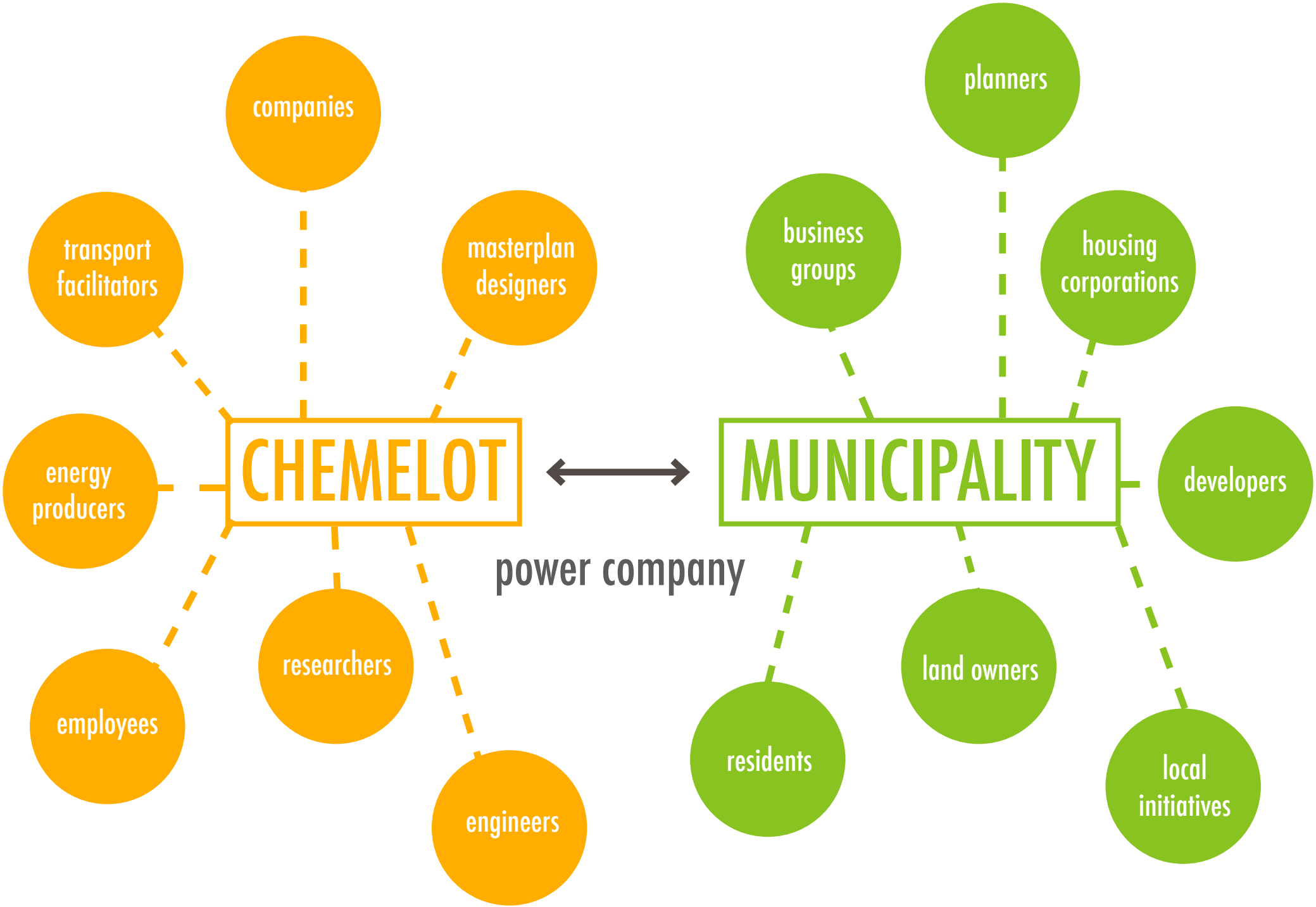


GEOTHERMAL - 4km deep tubes



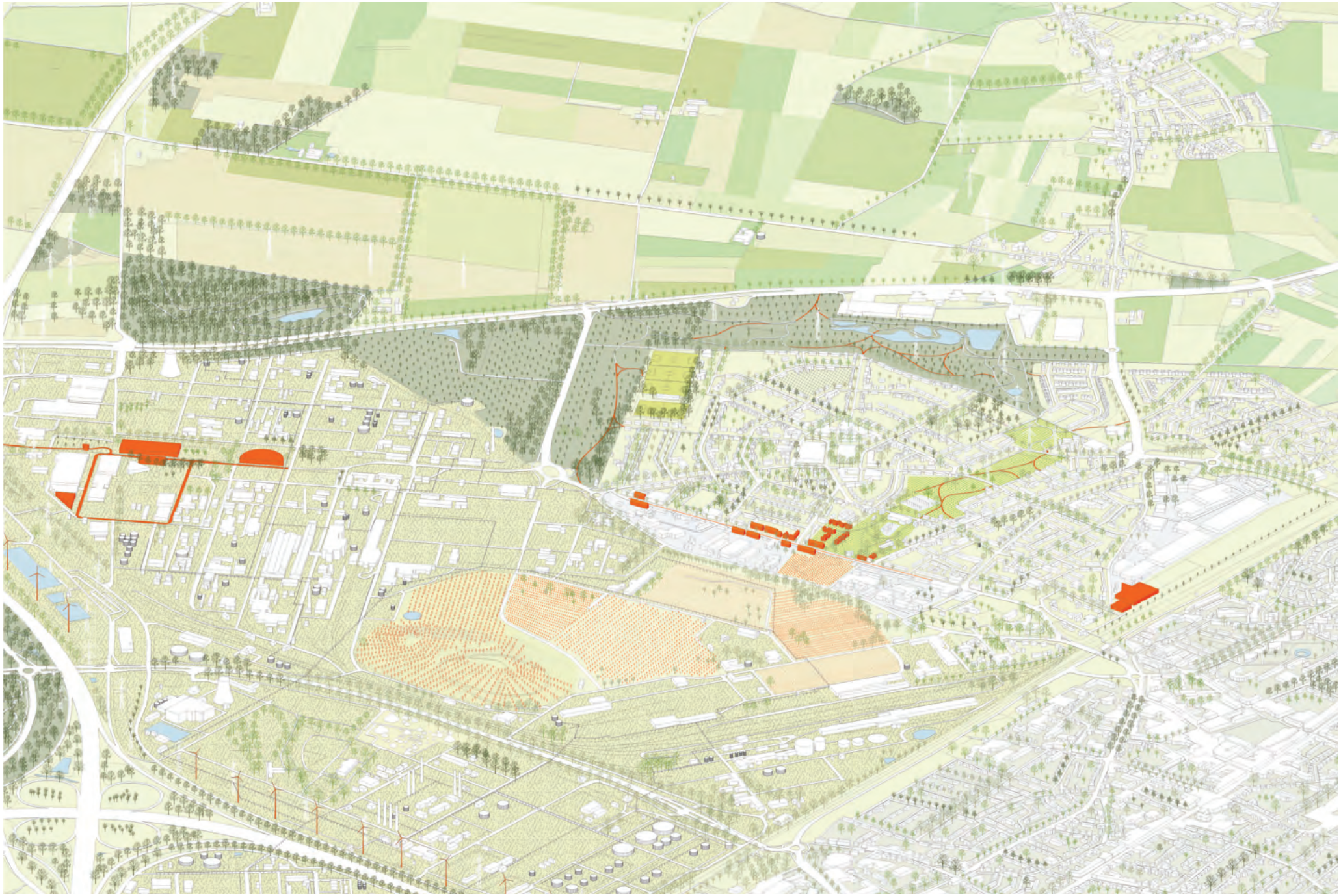
OPAC - off peak energy storage

PHASING


companies
transport facilitators
masterplan designers
energy producers
CHEMELOT
researchers
employees
engineers
power company
planners
business groups
housing corporations
MUNICIPALITY
developers
land owners
residents
local initiatives

EXISTING SITUATION - 2014

PHASE ONE - RELOCATION AND REMEDIATION - 2017



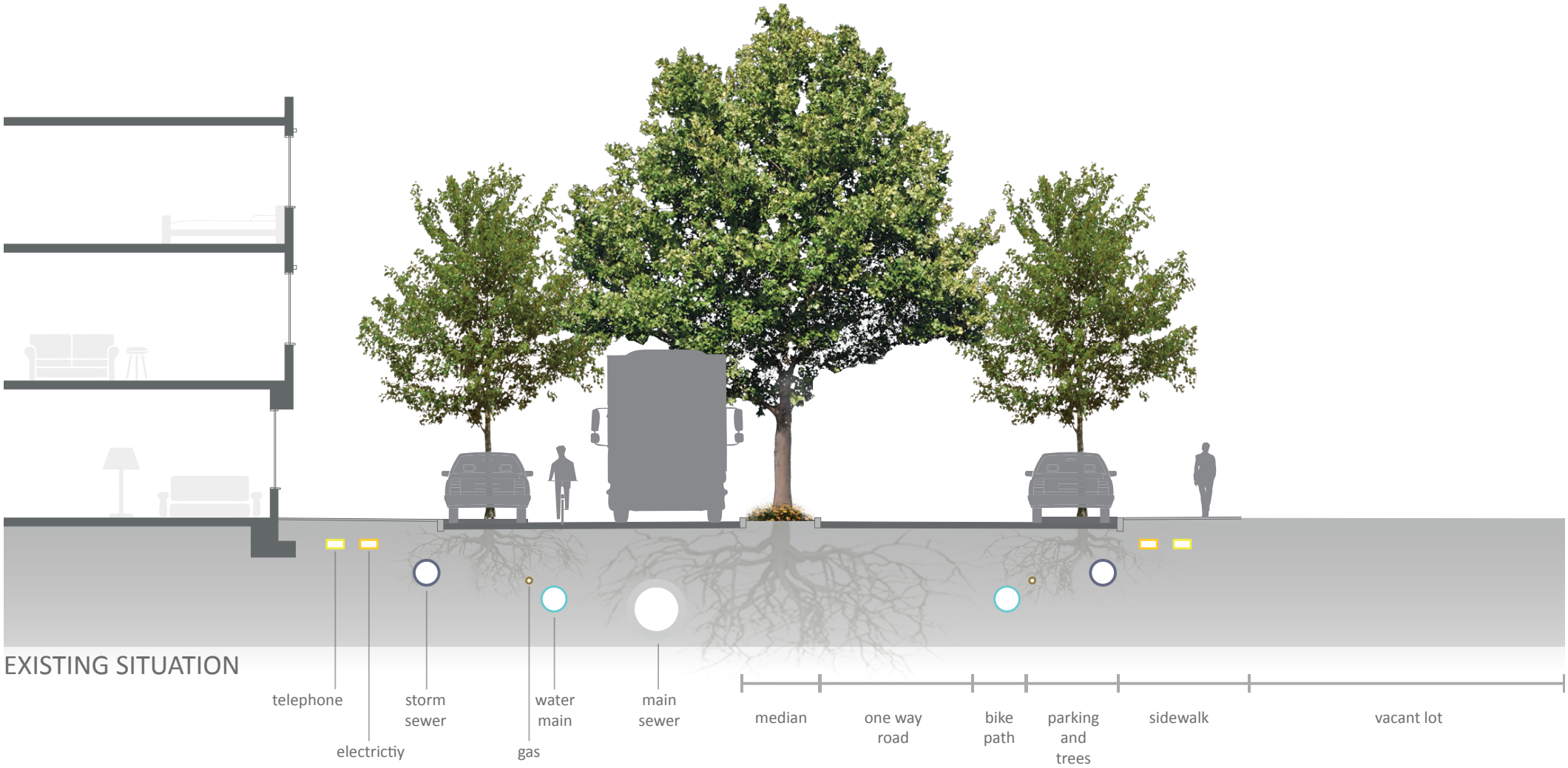
Transition between housing and landscape

Swales to filter storm runoff

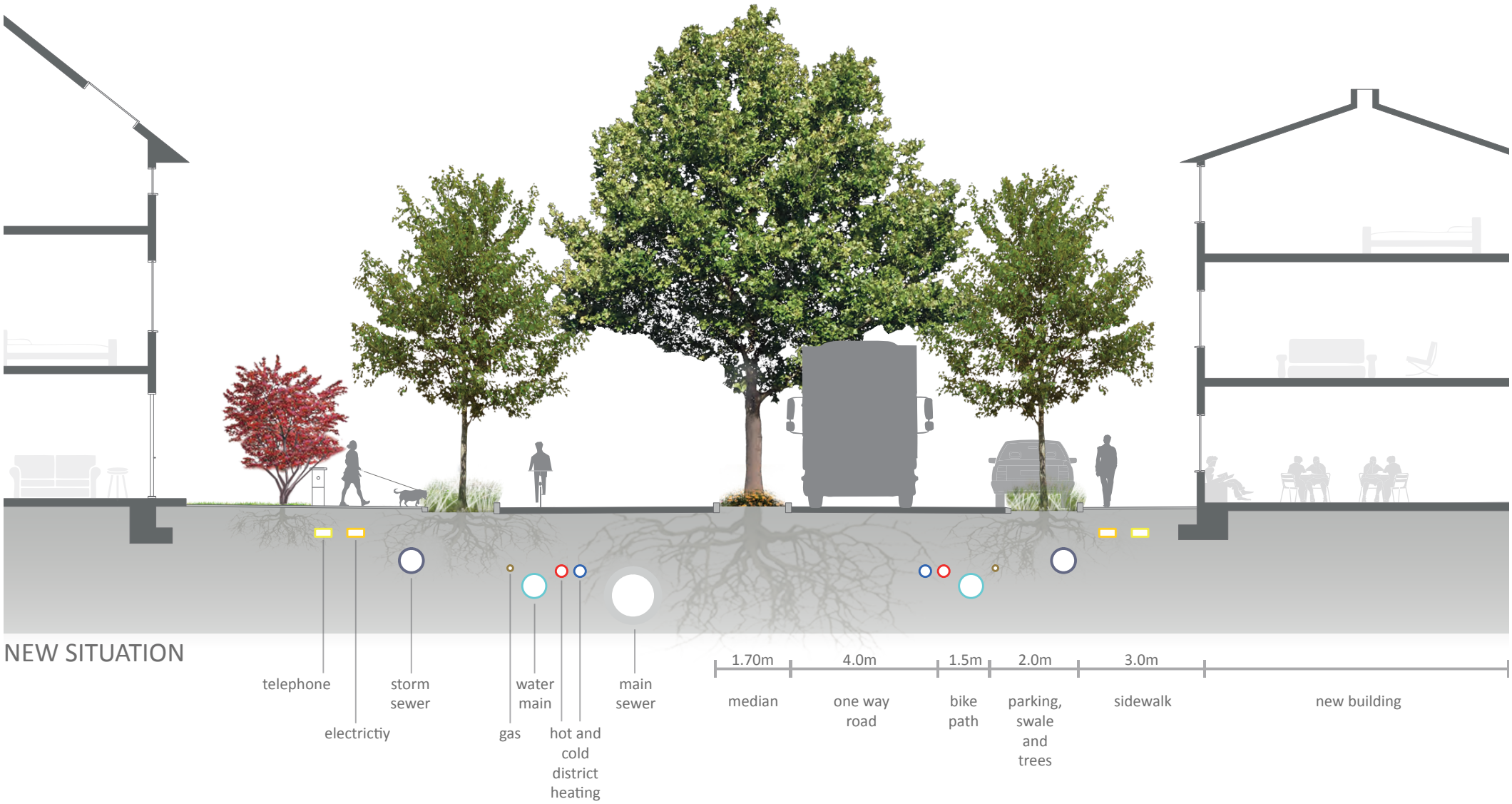
City fruit and nut orchard

Meadows under powerlines with paths mown through

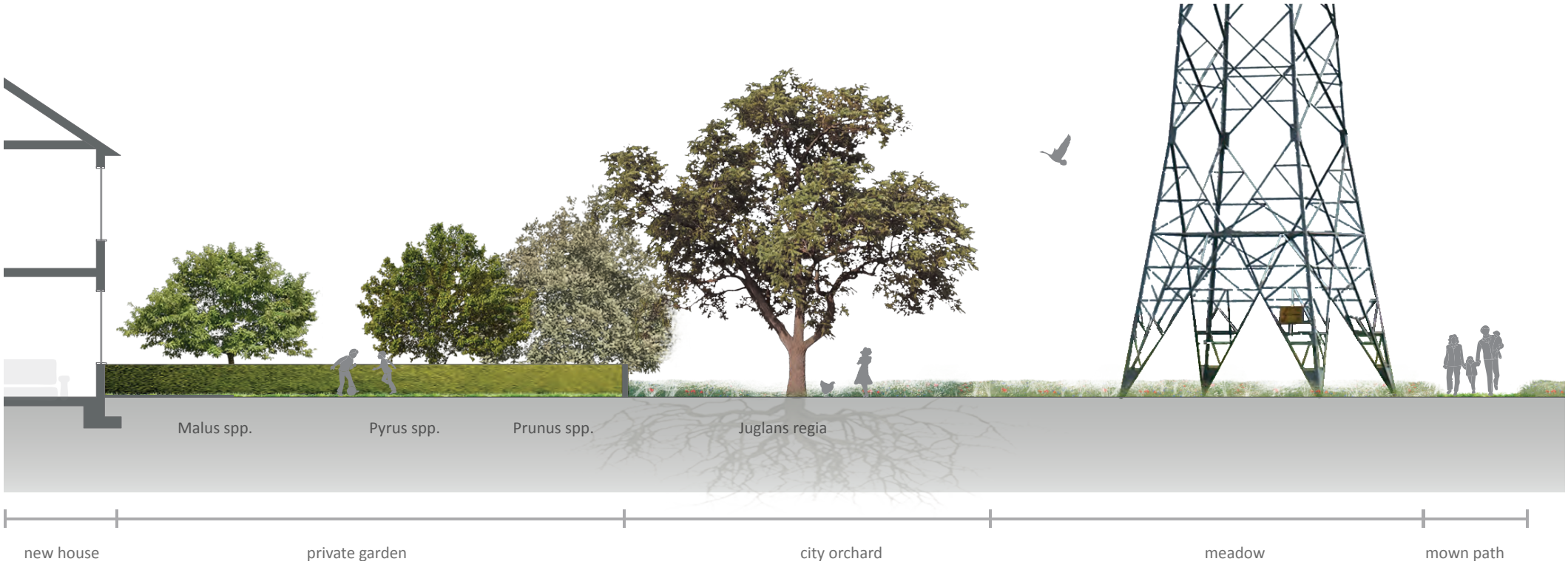
Proposed transitional zone between the city and the space under the powerlines

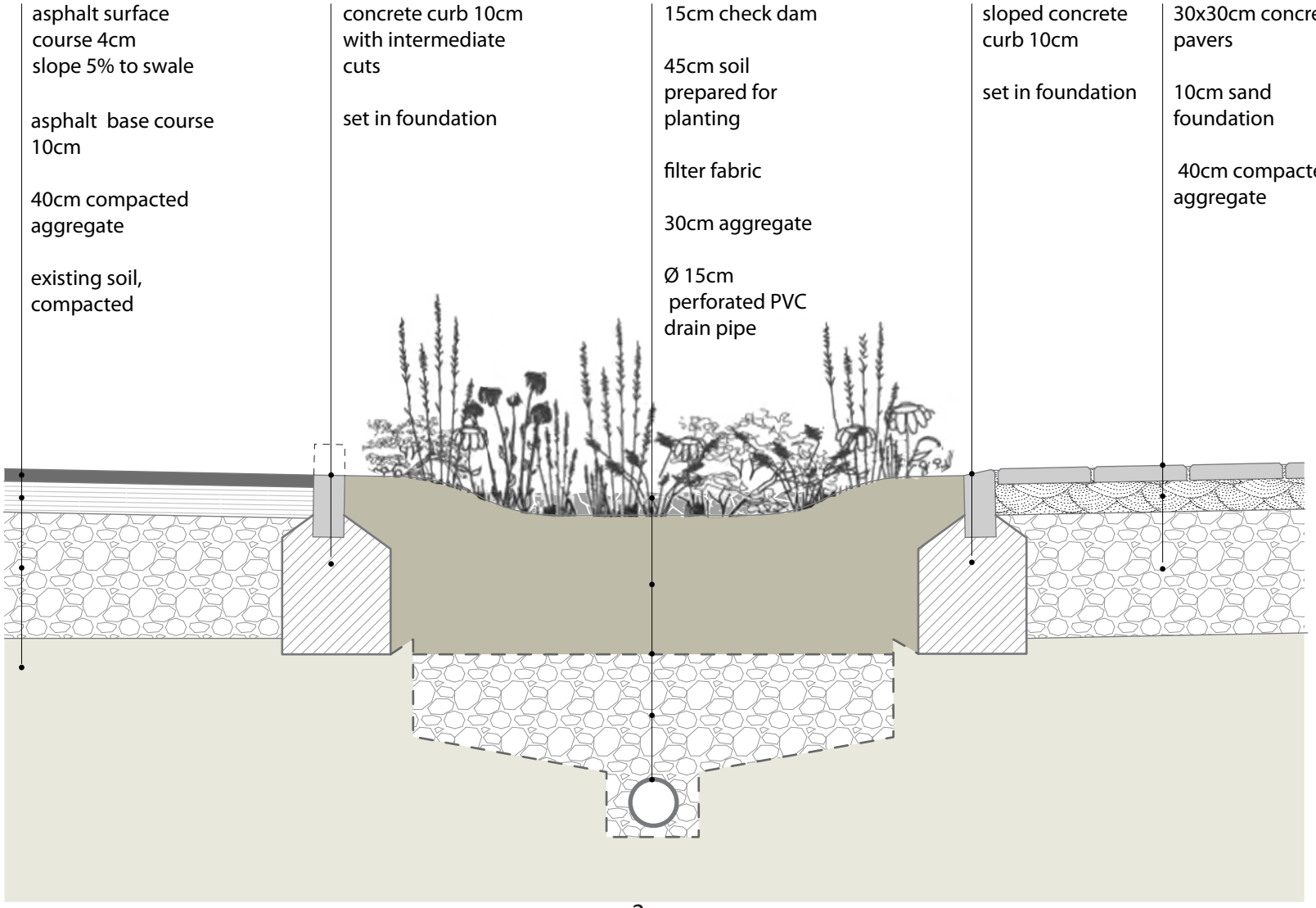


EXISTING SITUATION



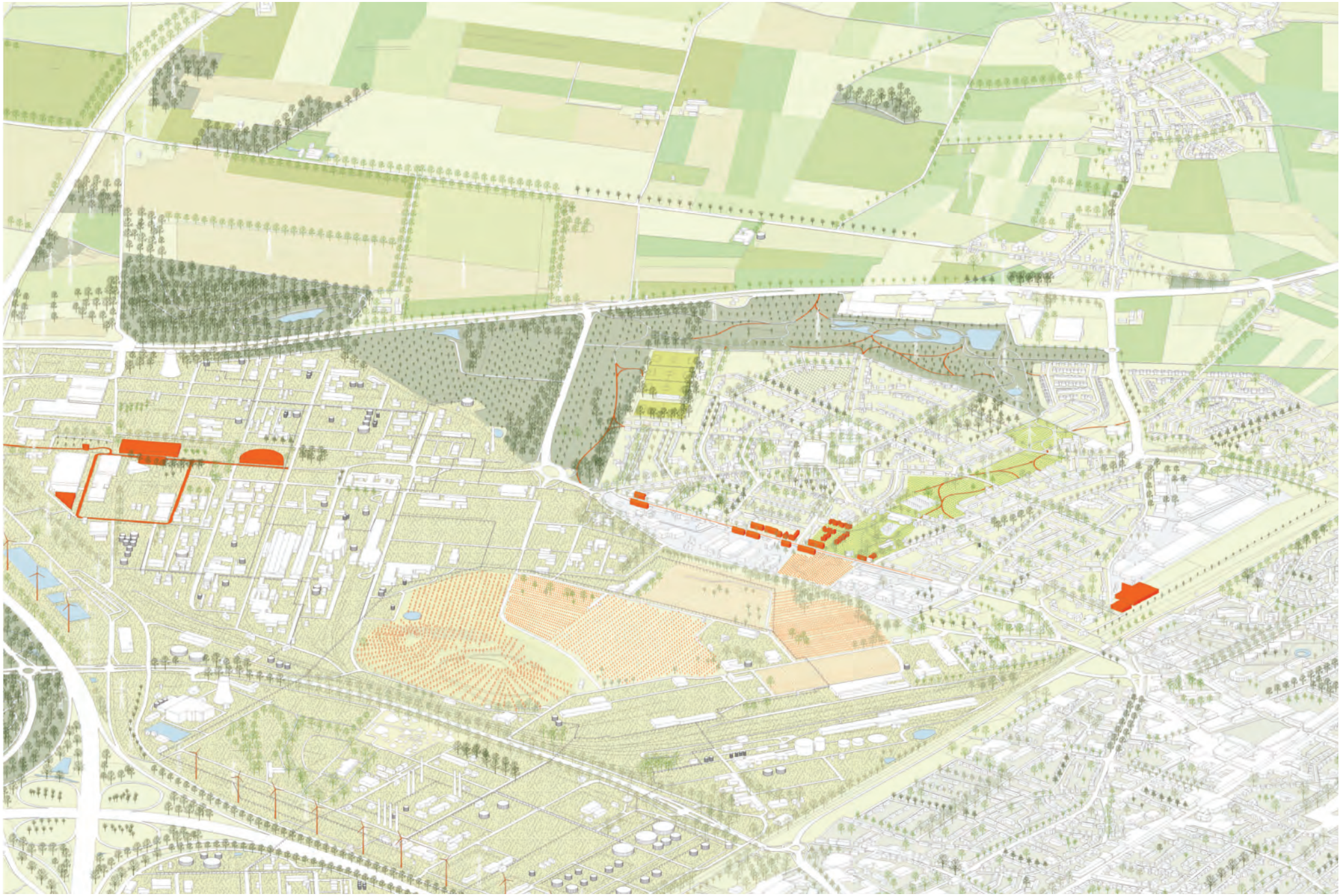
NEW SITUATION


Malus spp.
Pyrus spp.
Prunus spp.
Juglans regia
new house
private garden
city orchard
meadow
mown path

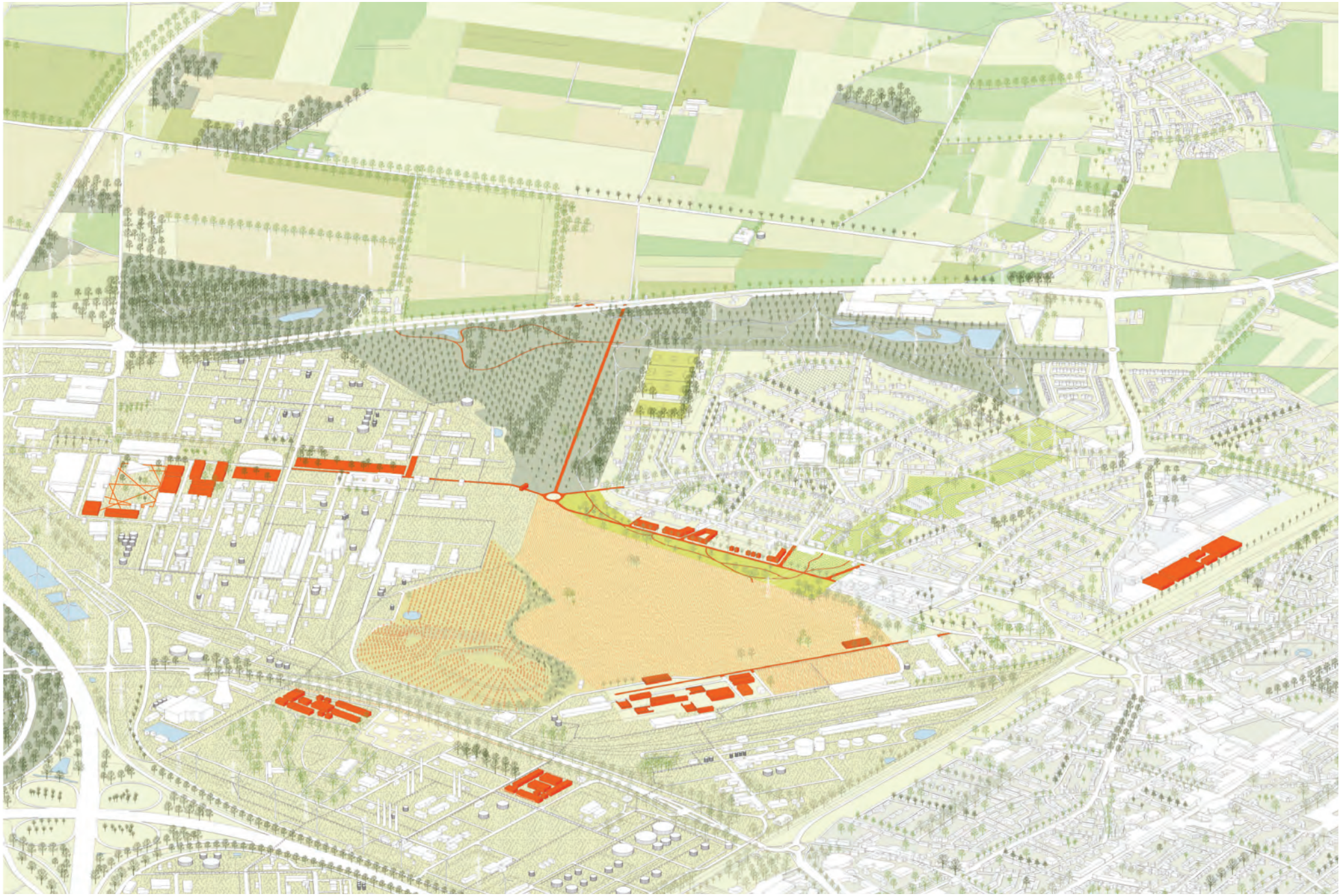


planting for bioswales:

Angelica sylvestris	Centaurea jacea
Butomus umbellatus	Valeriana officinalis
Typha latifolia	Lathyrus pratensis
Lotus pedunculatus	Cardamine pratensis
Filipendula ulmaria	Ranunculus flammula
Galium palustre	Veronica beccabunga



PHASE TWO - REALIGNMENT - 2020

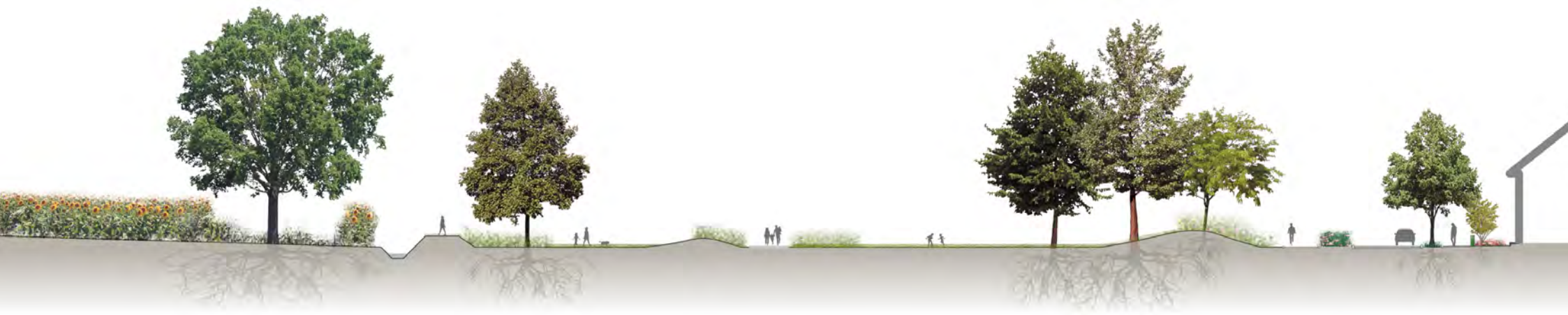


Direct connection of the city to the park

Park with large trees - solitaires or groups

Wildflower meadows encircling lawns

Phytoremediation of polluted soils



existing tree

Liriodendron tulipifera
tulpenboom
tulip tree

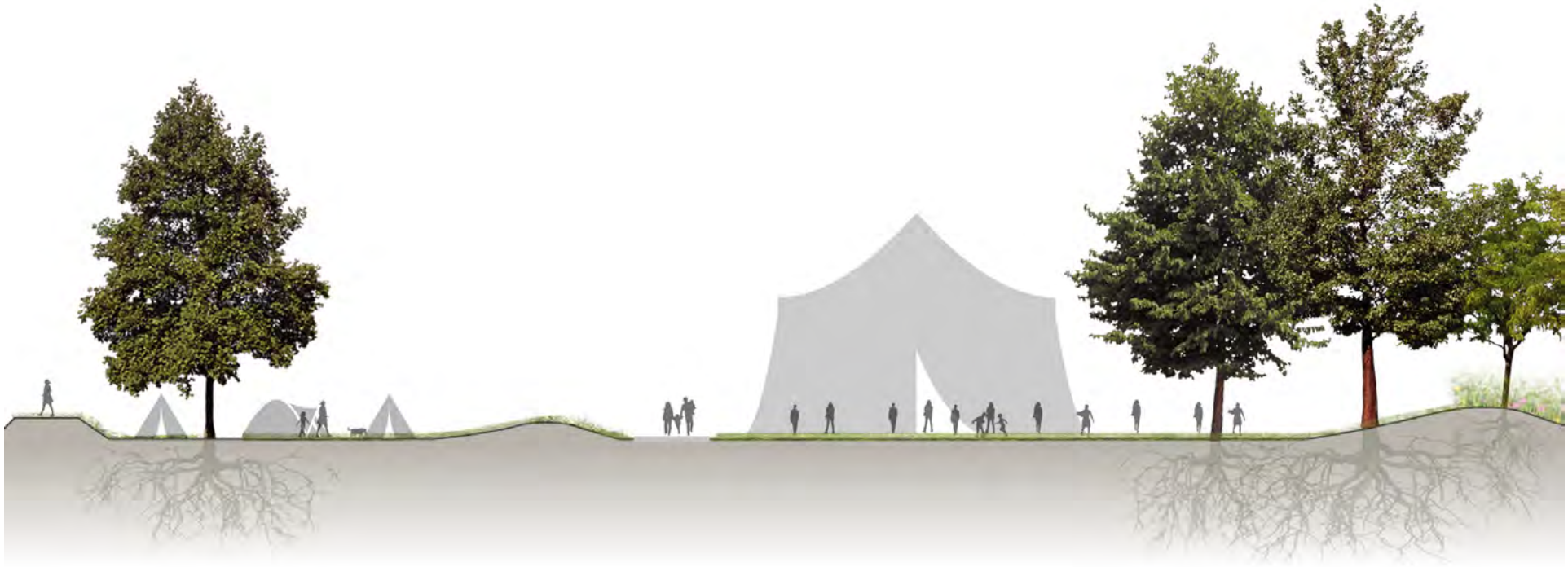
Corylus avellana
hazelaar
common hazel

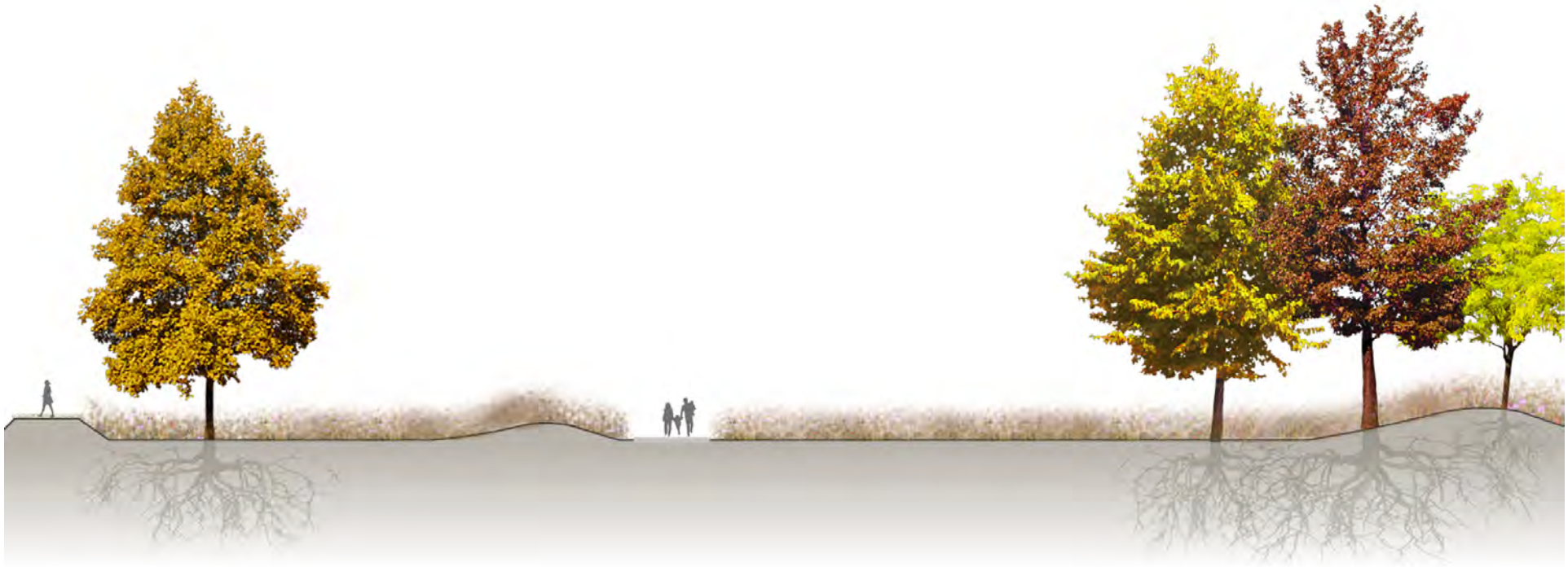
Liquidambar styraciflua
amberboom
sweetgum

Gleditsia triacanthos
valse Christusdoornen
honey locust

Tilia cordata
winterlinde
small-leaved lime

		3.0m	varies	varies	varies	3.0m	varies	varies	varies	3.0m	3.0m	6.0m	2.0m	2.5m	
phytoremediation planting - Helianthus annuus	ditch	grass path	uncut meadow	cut meadow	uncut meadow	park path grijs halfver-harding	uncut meadow	cut meadow	uncut meadow	bike path red asphalt	swale	road dark asphalt	swale	sidewalk 30x30 concrete pavers	house and garden





phyto extraction

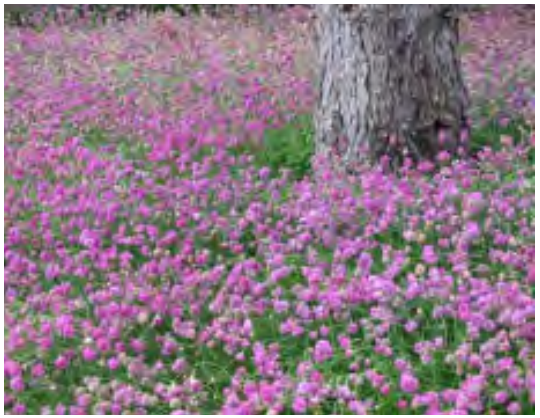
Helianthus annuus

Agrostis castellana

phyto stabilization

Brassica juncea

Triticum aestivum



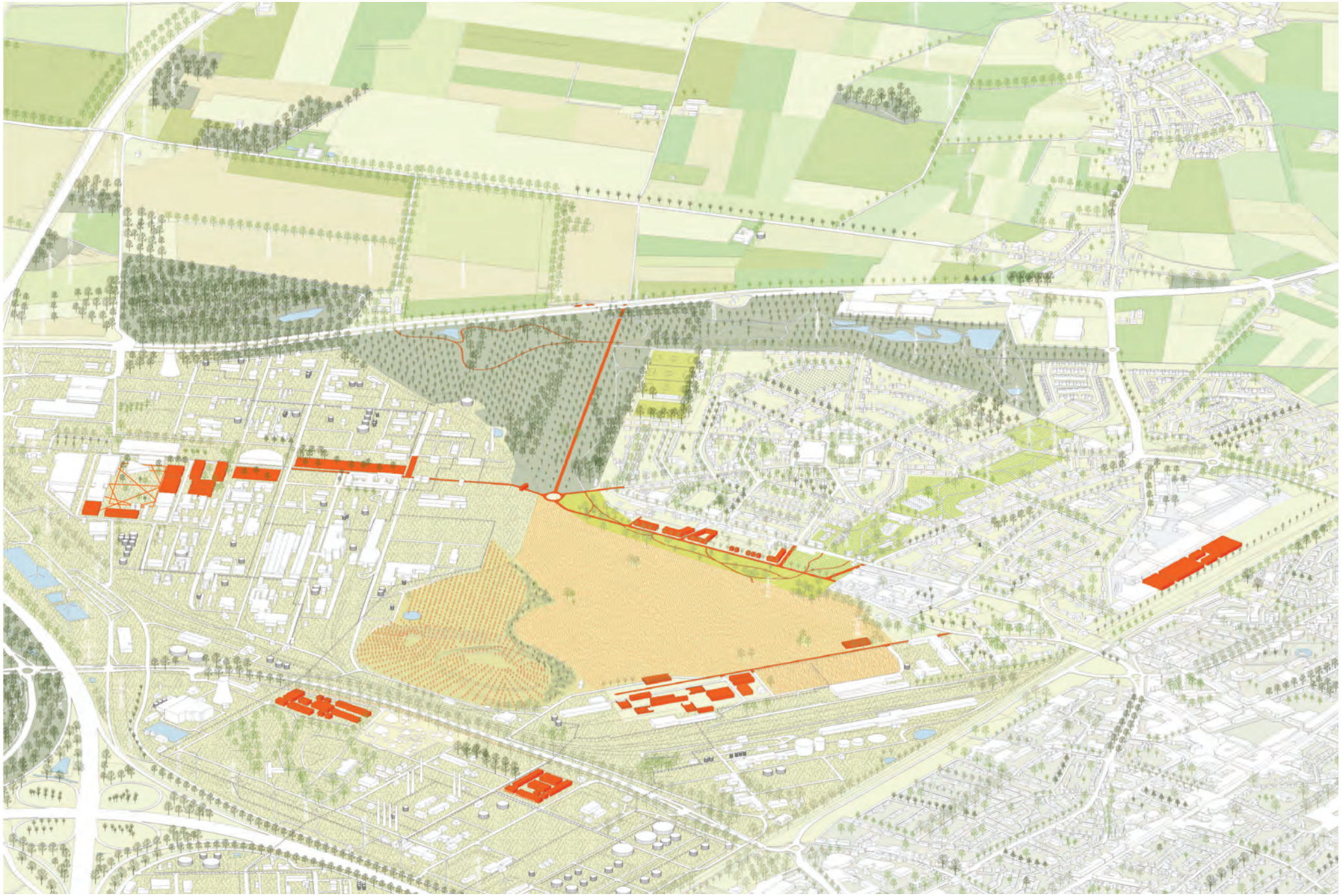
Armeria maritima

Agropyron cristatum

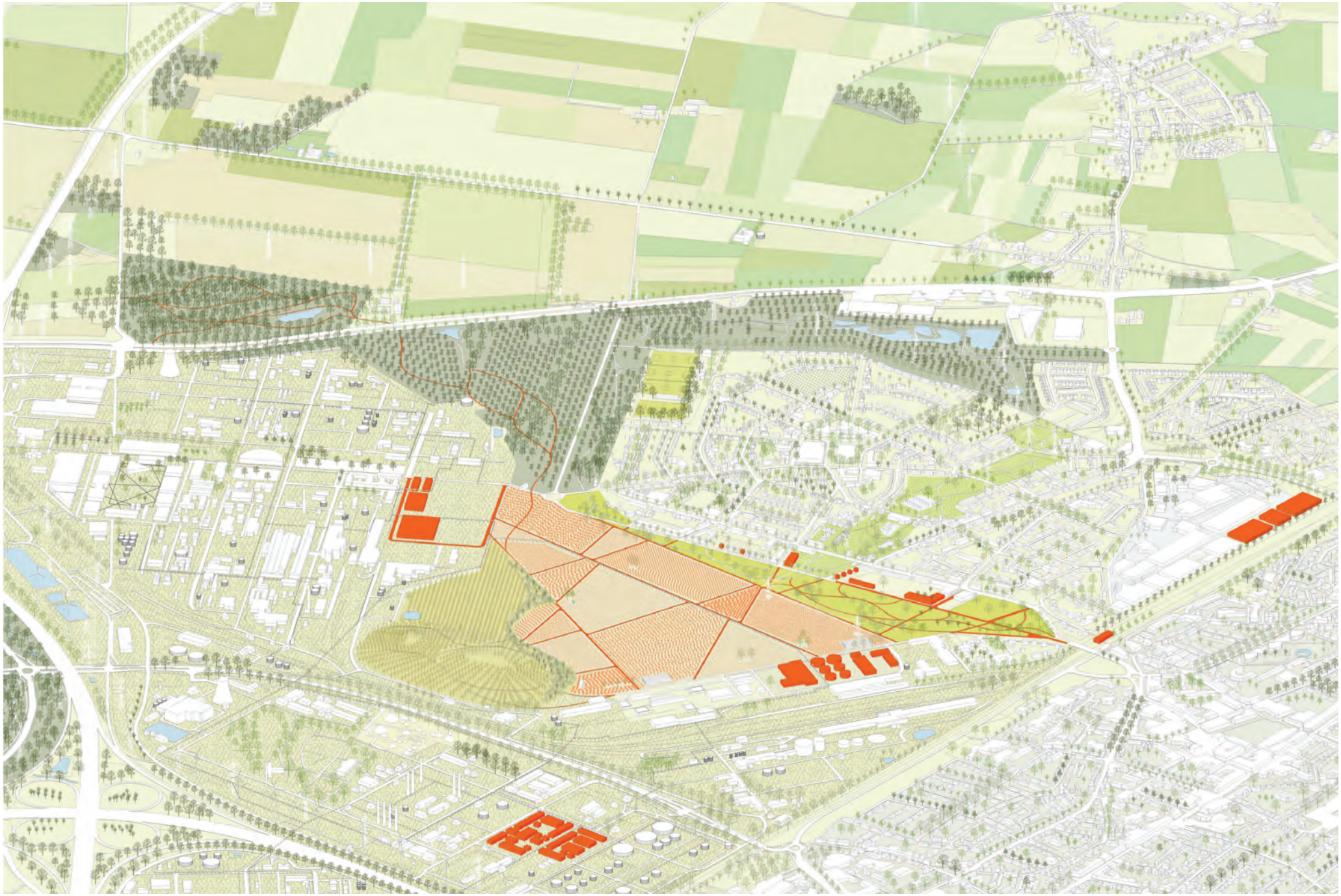
phyto degradation

Salix viminalis and others

Populus deltoides



PHASE THREE - RECONNECTION - 2025



Biomass field harvest times and patterns

White biotech field research

Ecological houtwal

Production forest

1st generation

Zea mays

Brassica napus

Beta vulgaris

Triticum estivum

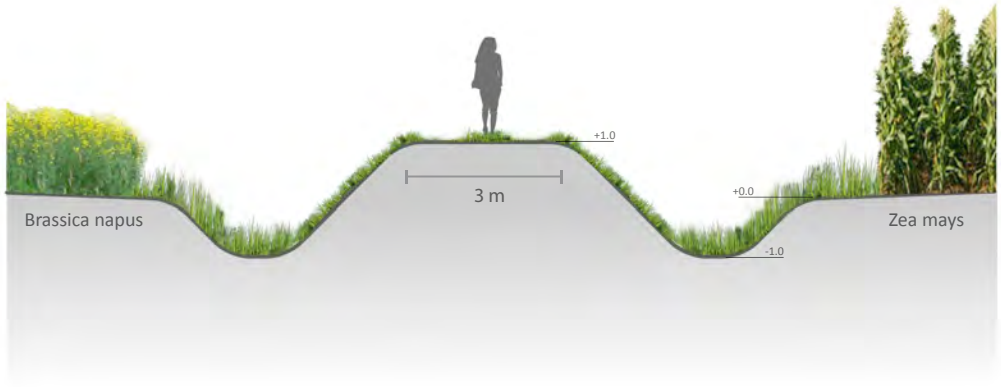
2nd generation

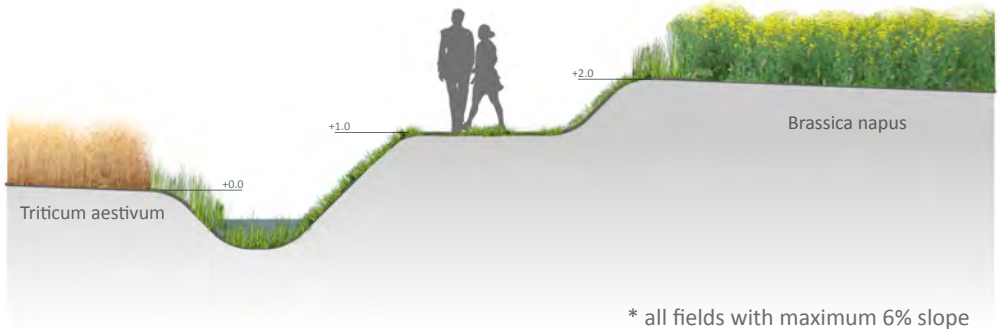
Agroforestry-poplar, robinia, birch

Short rotation coppice-poplar, robinia, birch

Panicum virgatum

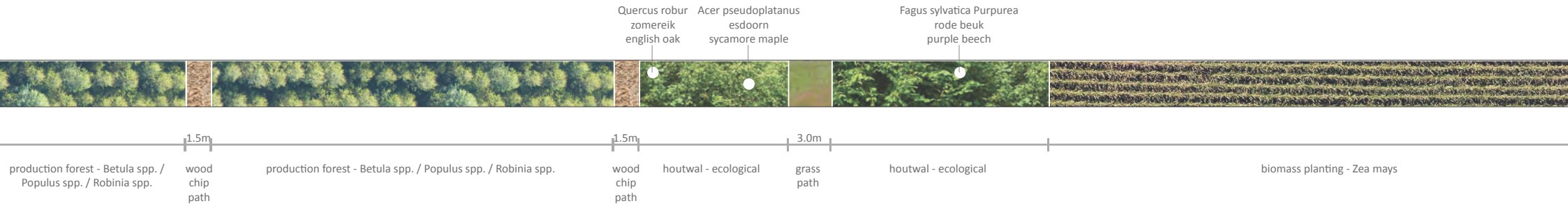
Miscanthus x giganteus

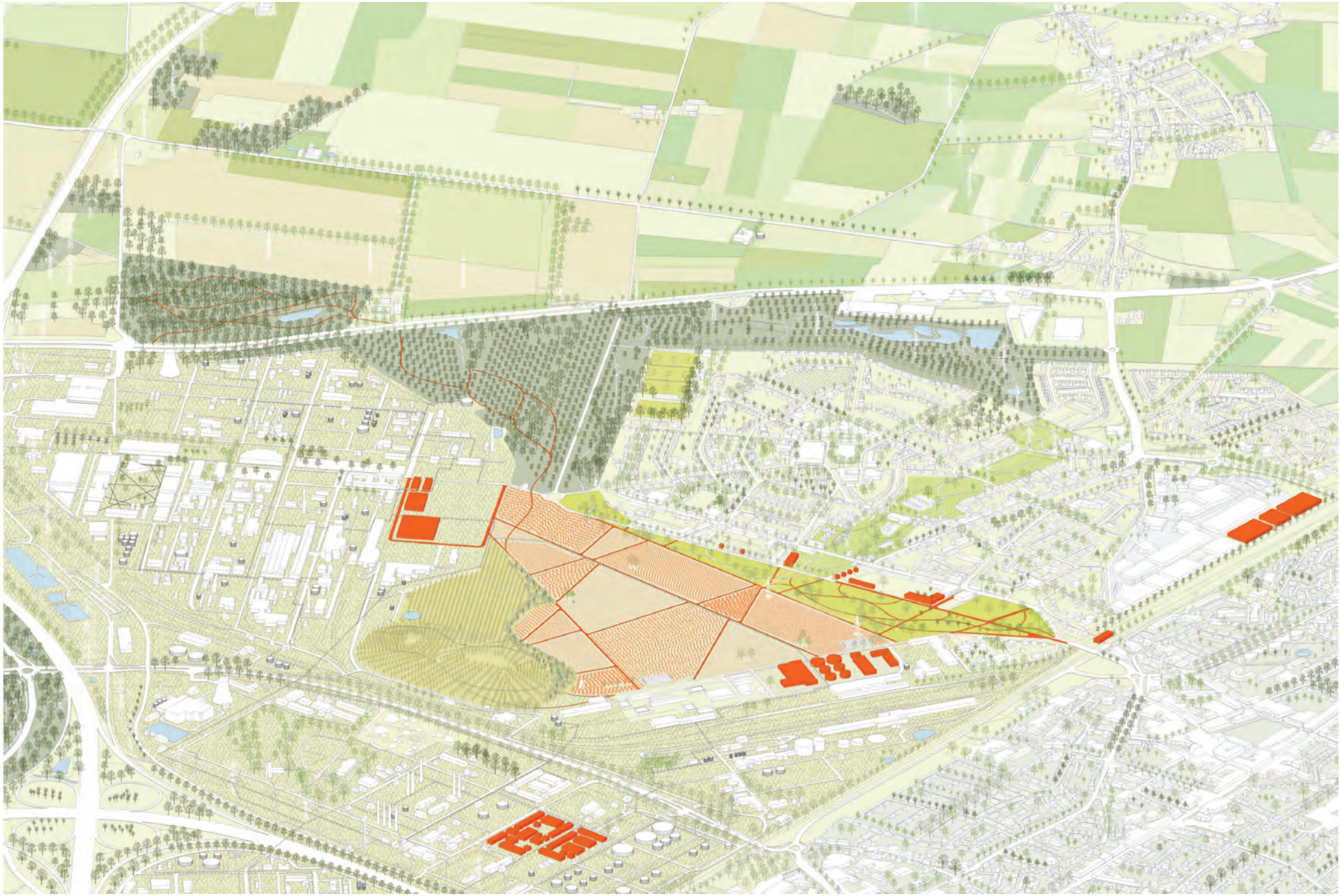




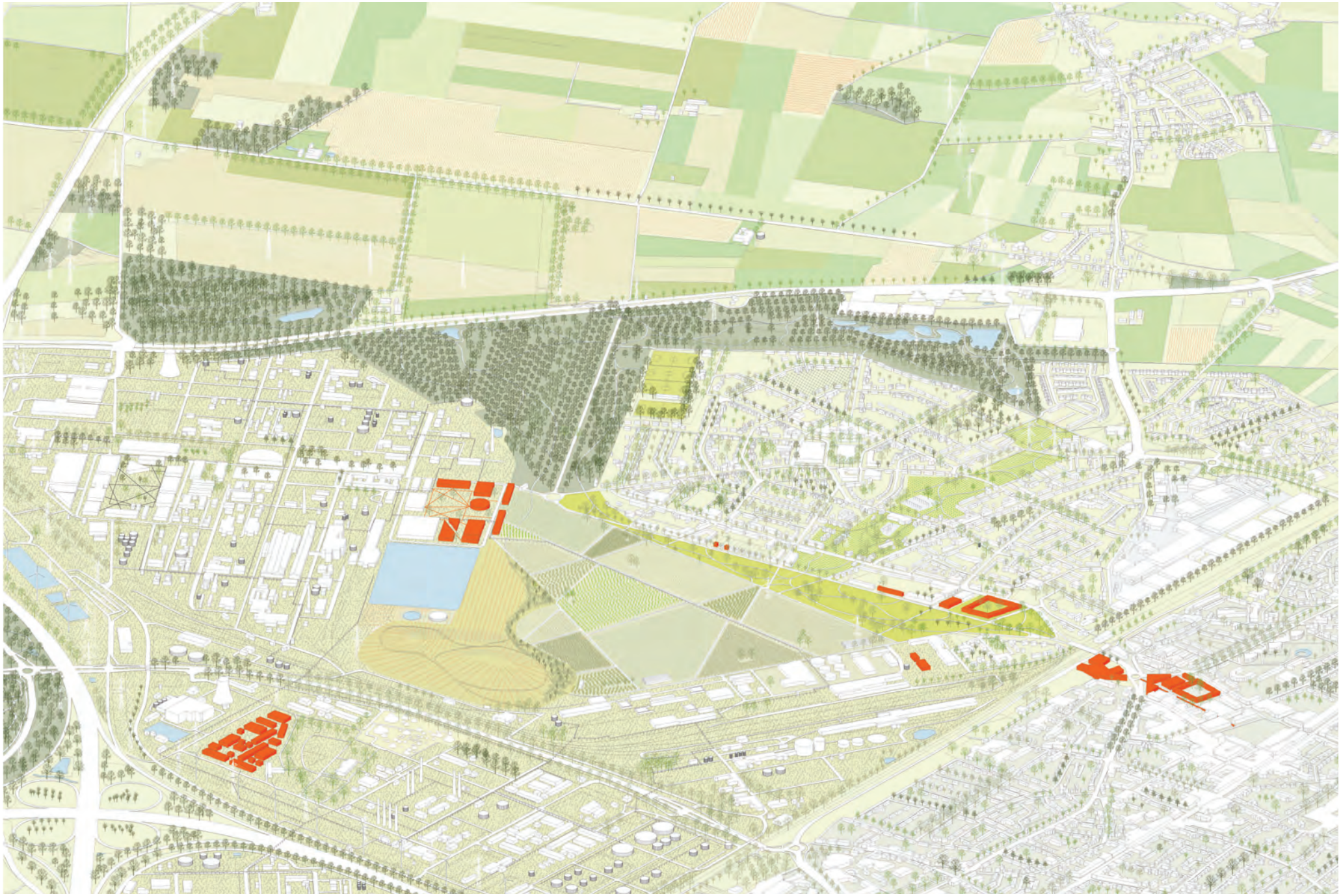
* all fields with maximum 6% slope

Transition from biomass fields, with axes formed by fault lines, through an ecological houtwal, to the priduction forest behind


Quercus robur
zomereik
english oak
Acer pseudoplatanus
esdoorn
sycamore maple
Fagus sylvatica Purpurea
rode beuk
purple beech
1.5m
1.5m
3.0m
production forest - Betula spp. / Populus spp. / Robinia spp.
wood chip path
production forest - Betula spp. / Populus spp. / Robinia spp.
wood chip path
houtwal - ecological
grass path
houtwal - ecological
biomass planting - Zea mays



PHASE FOUR - REDEVELOPMENT COMPLETE - 2030

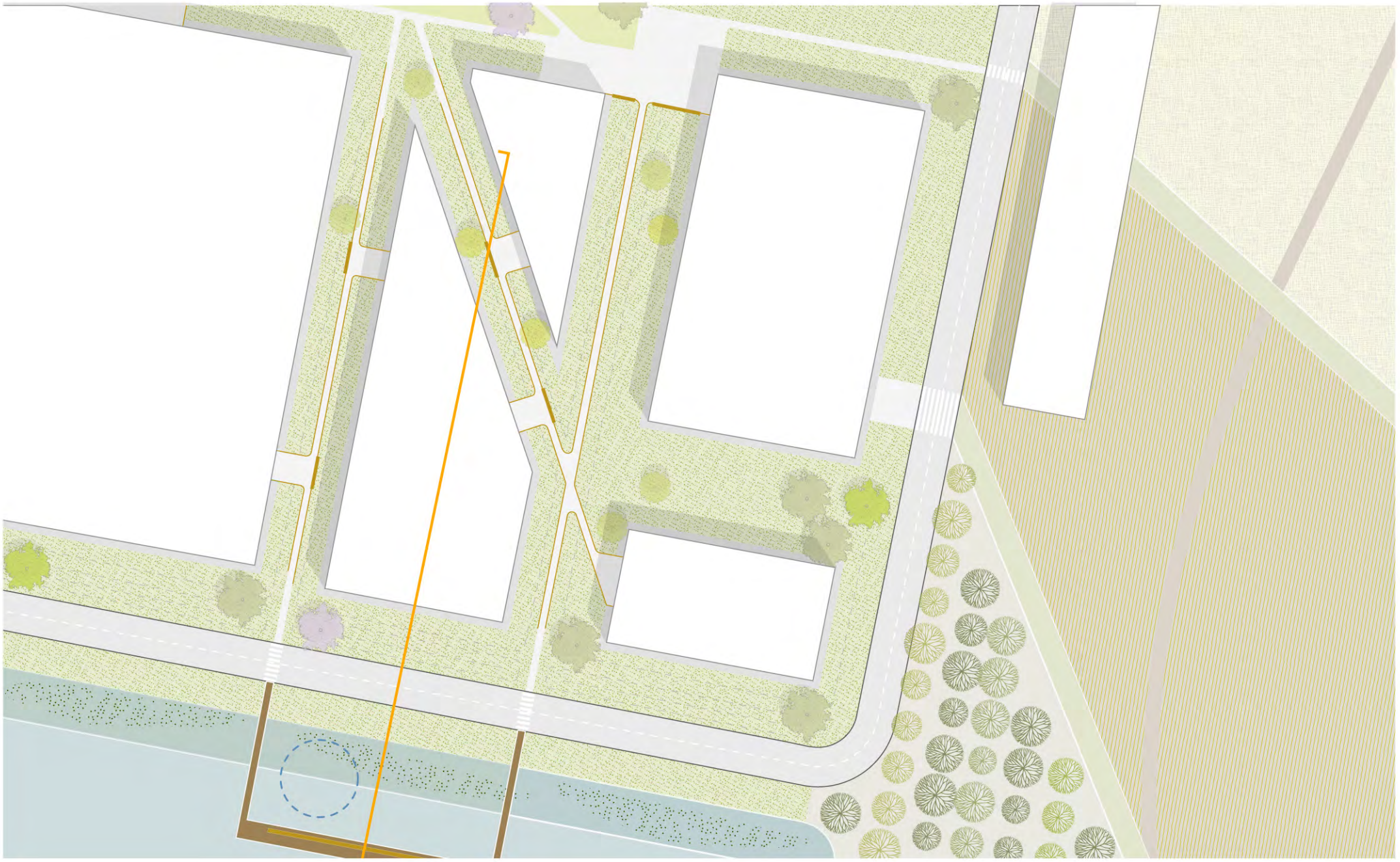


Campus path network and open space

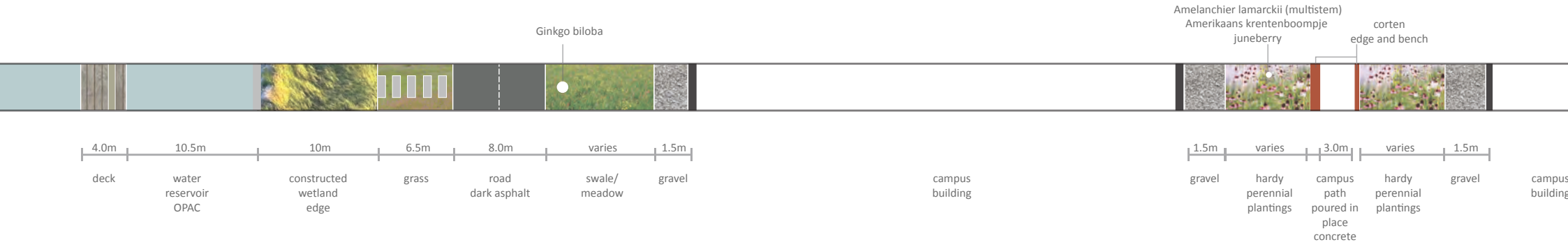
Water as a feature

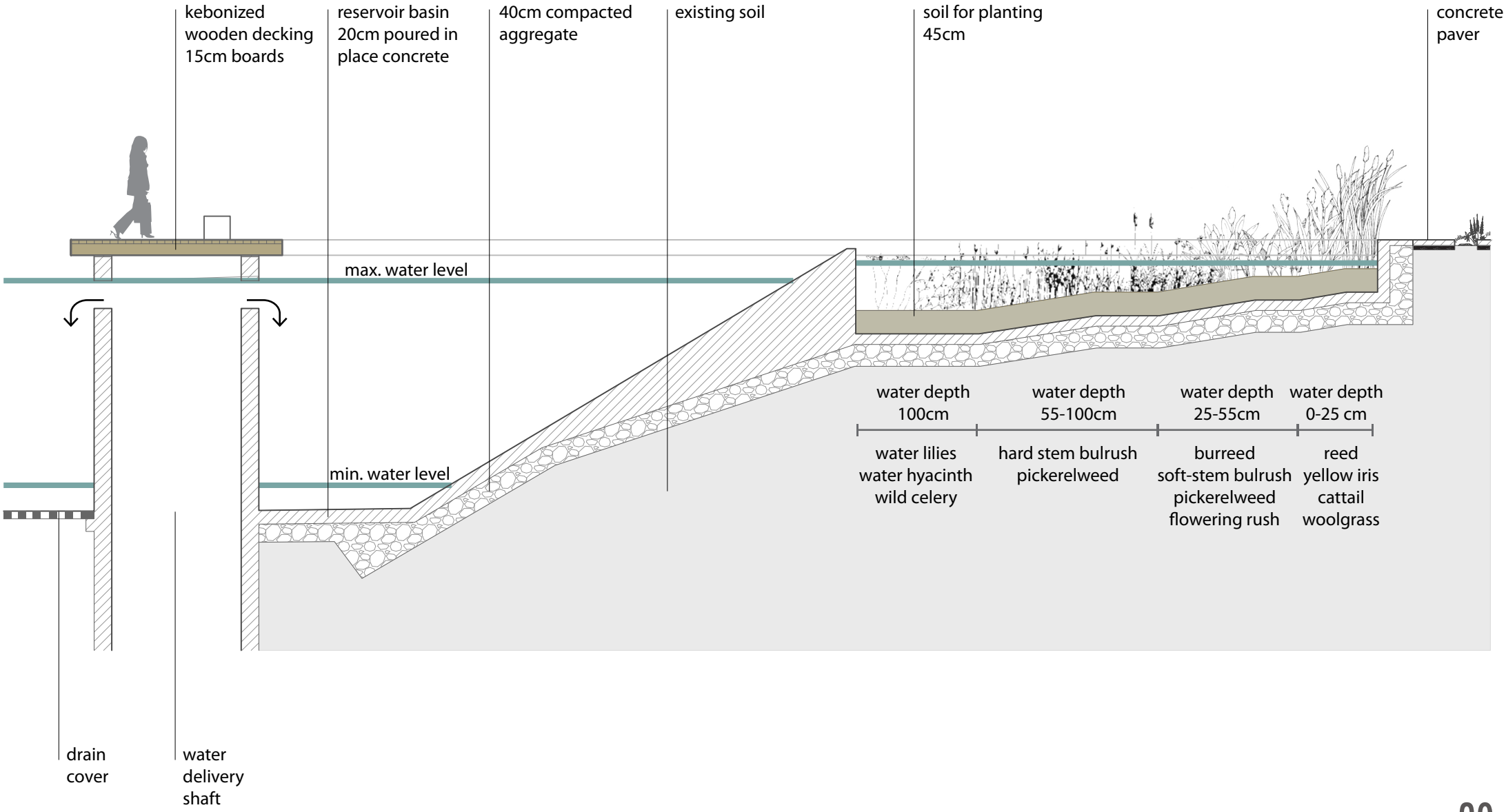
Agrarian ideal

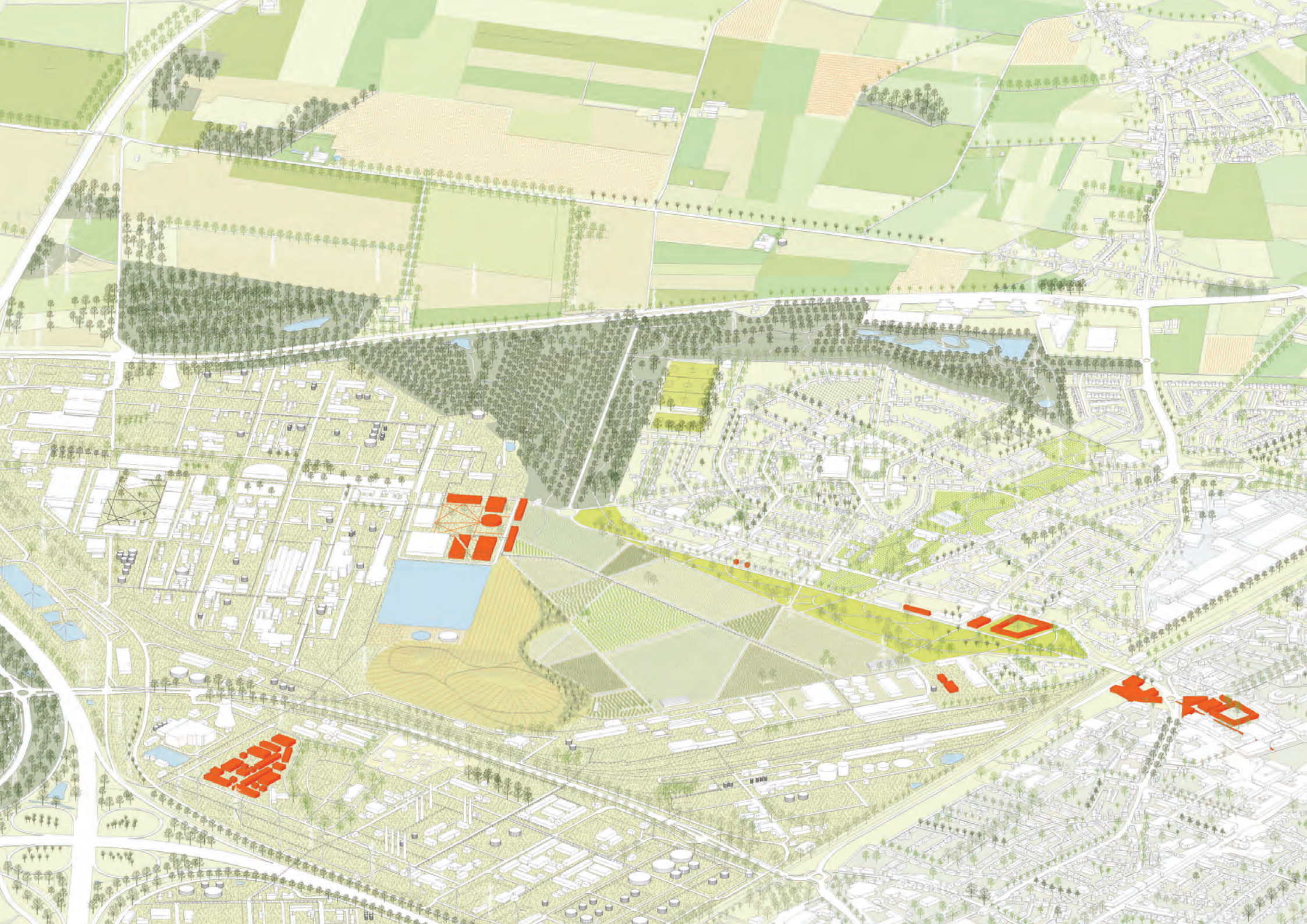
Reflection of the hill in water



Transition from the Chemlot campus to the OPAC reservoir


Ginkgo biloba
Amelanchier lamarckii (multistem)
Amerikaans krentenboompje
juneberry
corten
edge and bench
4.0m
10.5m
10m
6.5m
8.0m
varies
1.5m
deck
water
reservoir
OPAC
constructed
wetland
edge
grass
road
dark asphalt
swale/
meadow
gravel
campus
building
1.5m
varies
3.0m
varies
1.5m
gravel
hardy
perennial
plantings
campus
path
poured in
place
concrete
hardy
perennial
plantings
gravel
campus
building


kebonized
wooden decking
15cm boards
reservoir basin
20cm poured in
place concrete
40cm compacted
aggregate
existing soil
soil for planting
45cm
concrete
paver
max. water level
min. water level
water depth
100cm
water depth
55-100cm
water depth
25-55cm
water depth
0-25 cm
water lilies
water hyacinth
wild celery
hard stem bulrush
pickerelweed
burreed
soft-stem bulrush
pickerelweed
flowering rush
reed
yellow iris
cattail
woolgrass
drain
cover
water
delivery
shaft



CHEMELOT

increase in campus quality will attract more companies

greater connection to Geleen, feels less isolated

chance to advertise changing practices to the world

RESIDENTS

access to higher quality green space

connection of walking routes in the area

city park on their doorstep

increase in housing values

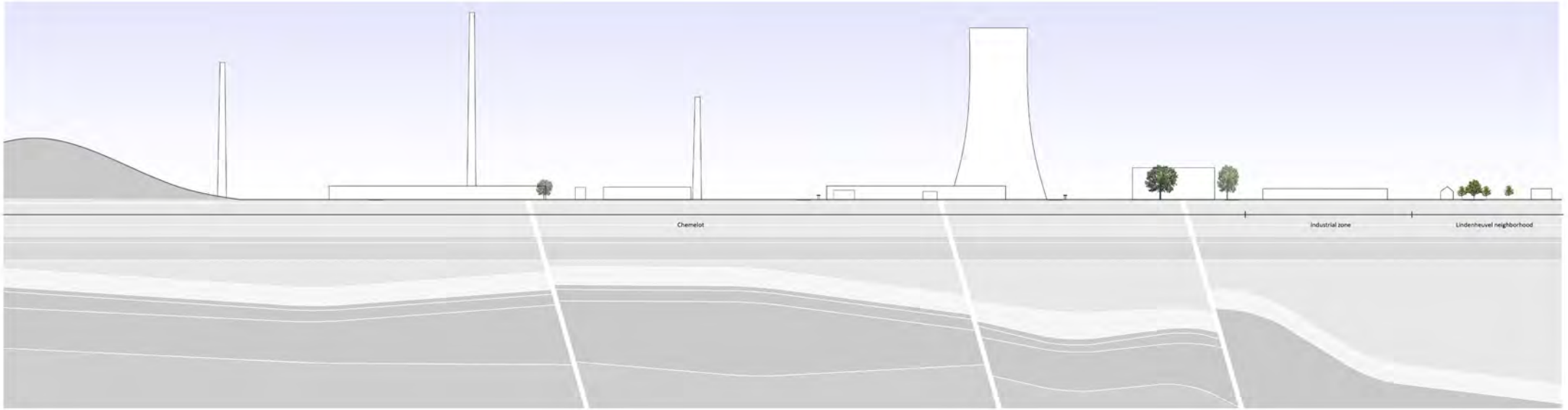
GELEEN

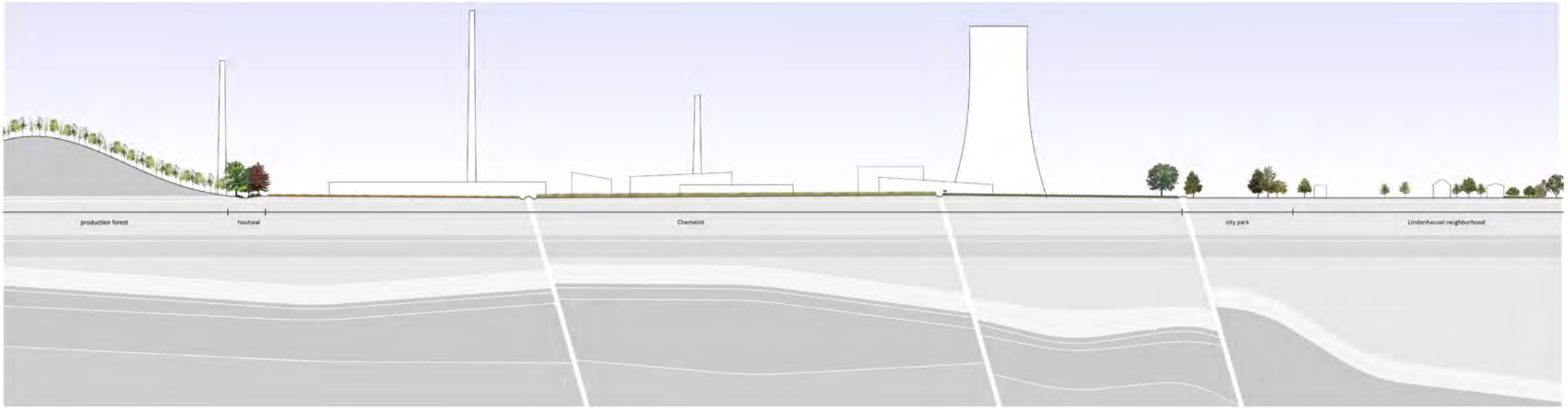
chance to redevelop a dying area

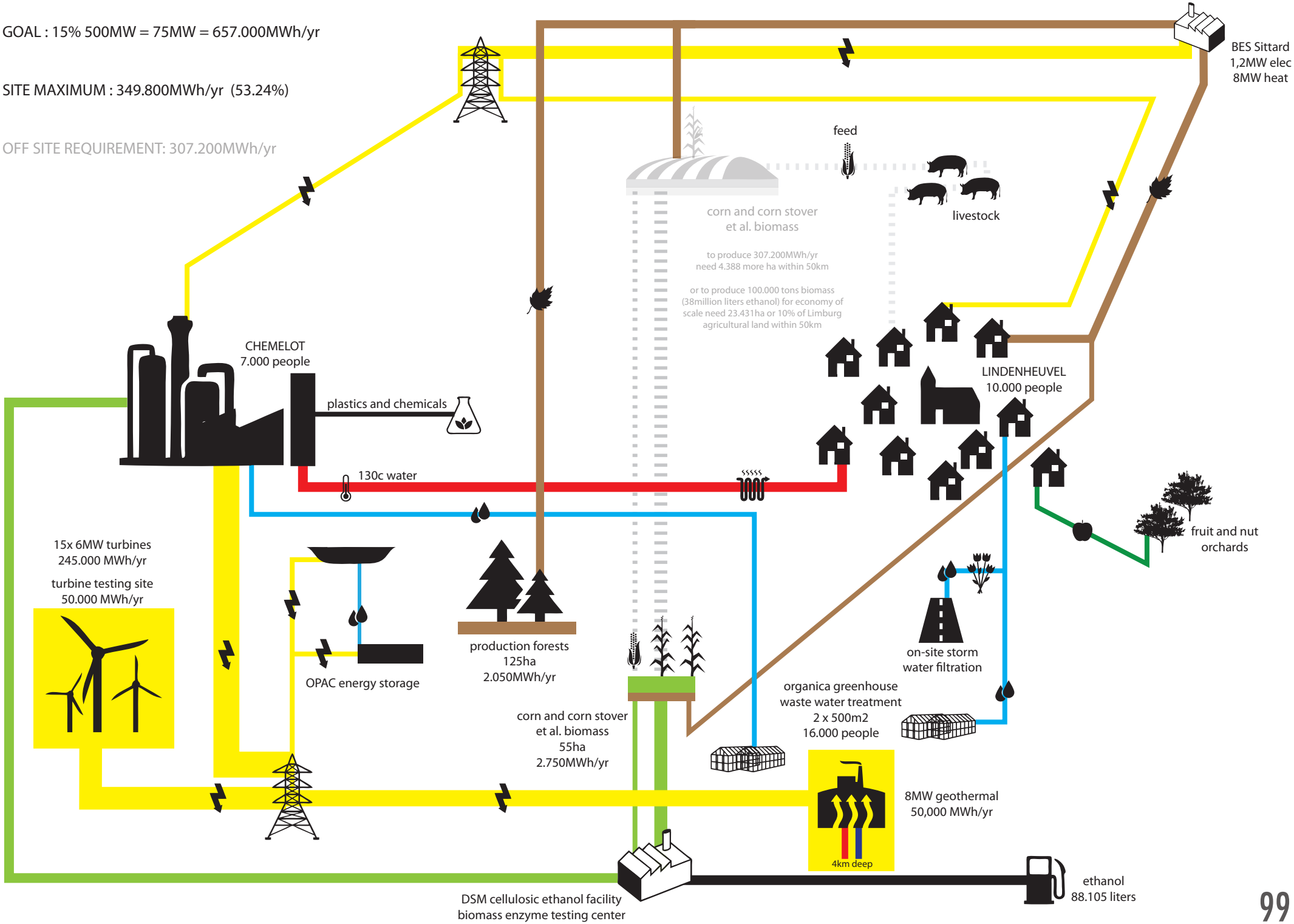
attract new residents and businesses

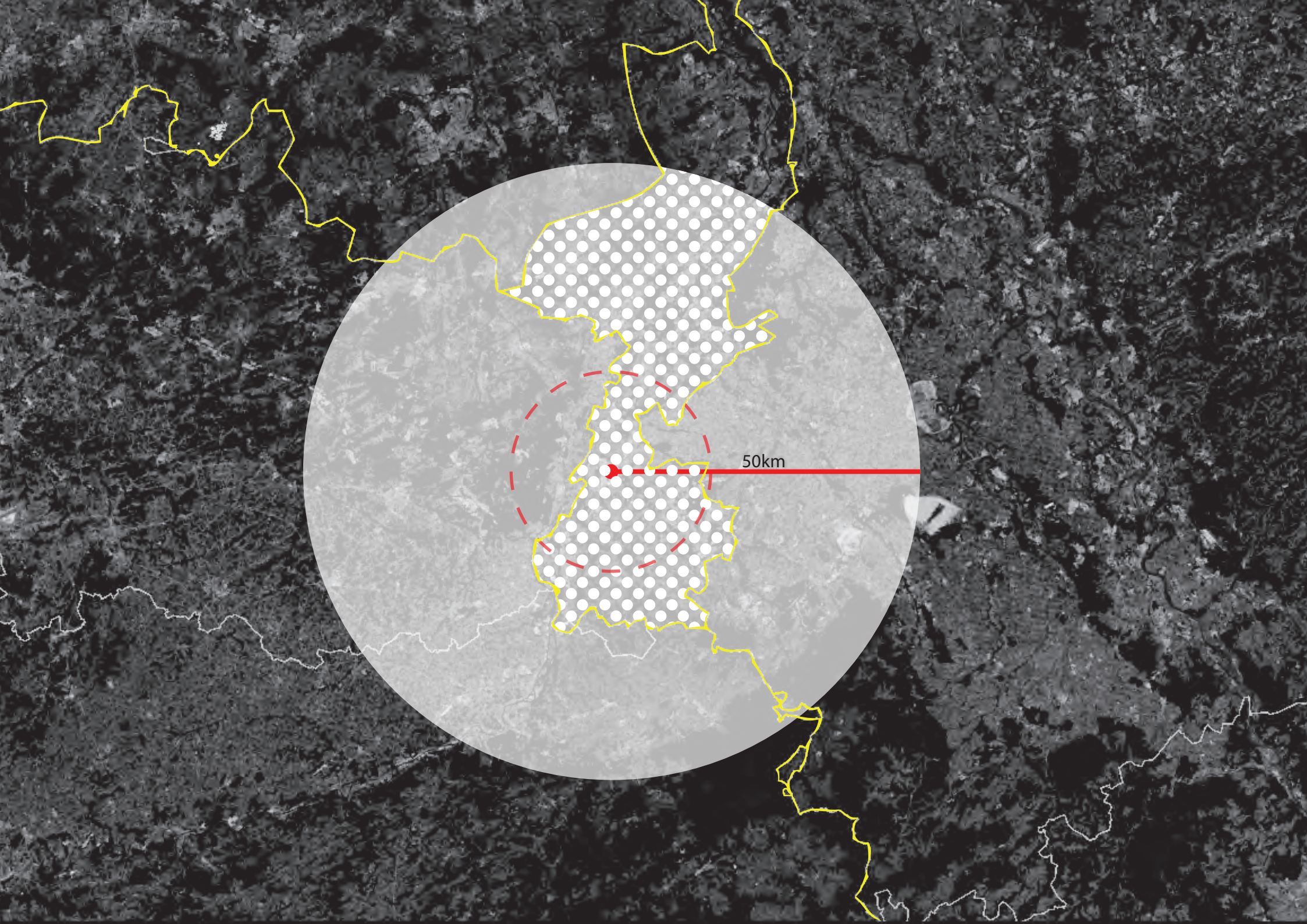
increase quality of life

work towards a sustainable city


Chemelot
Industrial zone
Lindenheuvel neighborhood


production forest
houtwal
Chemelot
city park
Lindenheuvel neighborhood


GOAL : 15% 500MW = 75MW = 657.000MWh/yr
SITE MAXIMUM : 349.800MWh/yr (53.24%)
OFF SITE REQUIREMENT: 307.200MWh/yr
BES Sittard
1,2MW elec
8MW heat
feed
livestock
corn and corn stover
et al. biomass
to produce 307.200MWh/yr
need 4.388 more ha within 50km
or to produce 100.000 tons biomass
(38million liters ethanol) for economy of
scale need 23.431ha or 10% of Limburg
agricultural land within 50km
CHEMELOT
7.000 people
plastics and chemicals
130c water
LINDENHEUVEL
10.000 people
fruit and nut
orchards
15x 6MW turbines
245.000 MWh/yr
turbine testing site
50.000 MWh/yr
OPAC energy storage
production forests
125ha
2.050MWh/yr
on-site storm
water filtration
organica greenhouse
waste water treatment
2 x 500m2
16.000 people
corn and corn stover
et al. biomass
55ha
2.750MWh/yr
8MW geothermal
50,000 MWh/yr
4km deep
DSM cellulosic ethanol facility
biomass enzyme testing center
ethanol
88.105 liters


50km