

## **Coal Regions in transition: Reinventing the carbon economy**



P5 presentation | 20/06/23  
Maria Agapi Kaperoni | 5620627

Graduation studio: Transitional Territories  
First mentor: Nikos Katsikis | Second mentor: Luca Iuorio  
Delegate of the Board of Examiners: Paul Kuitenbrouwer

## 1. Foundation

Motivation  
Problem Statement  
Research Question  
Methodology

## 2. Explorations

## 3. Field Trip

## 4. Dual Challenge

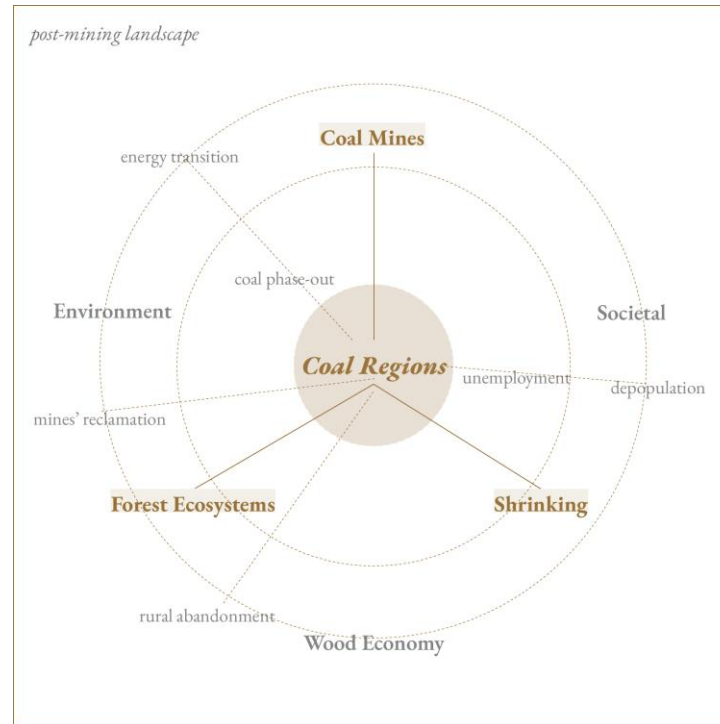
Shrinking  
Forests

## 5. Design

Strategy  
Design Interventions

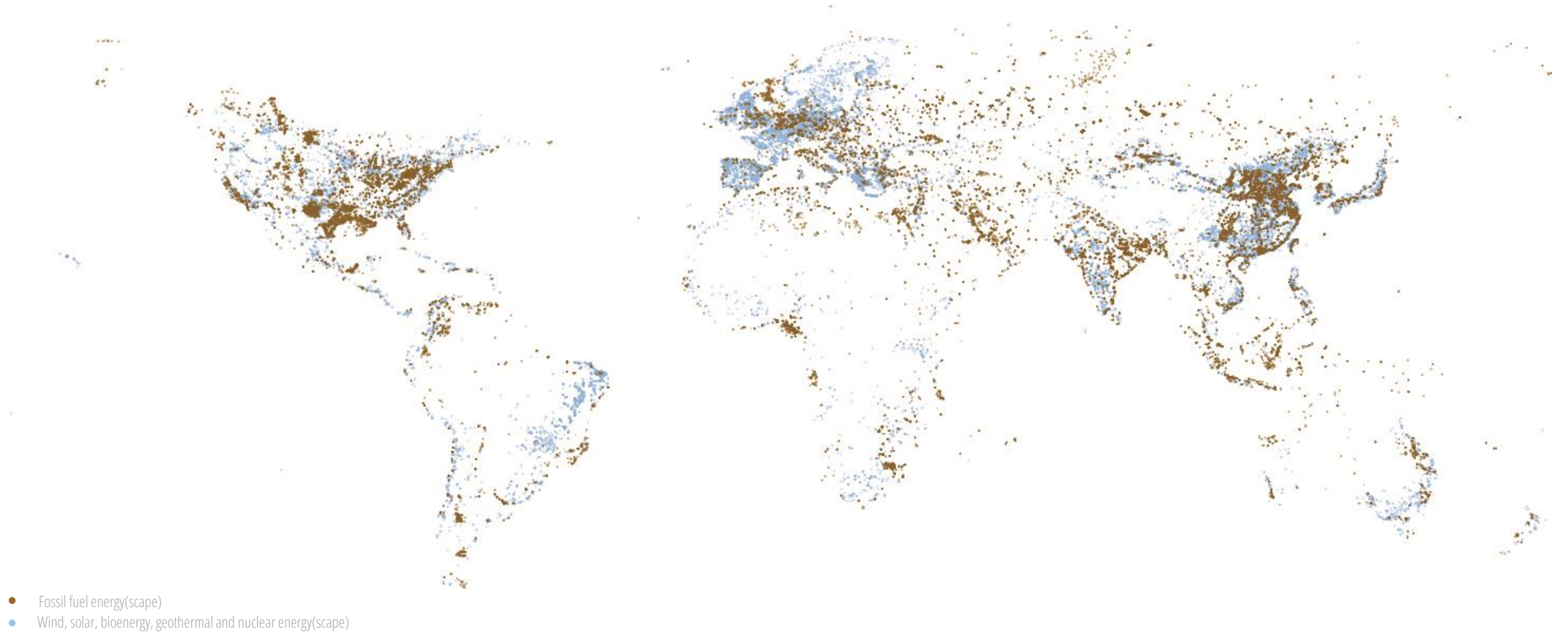
## 6. Epilogue

# Chapter 1: Foundation





- Coal mines
- Coal power plants, terminals



Energy (scape)  
Source: author



Coal mining landscape  
Source: YouTube

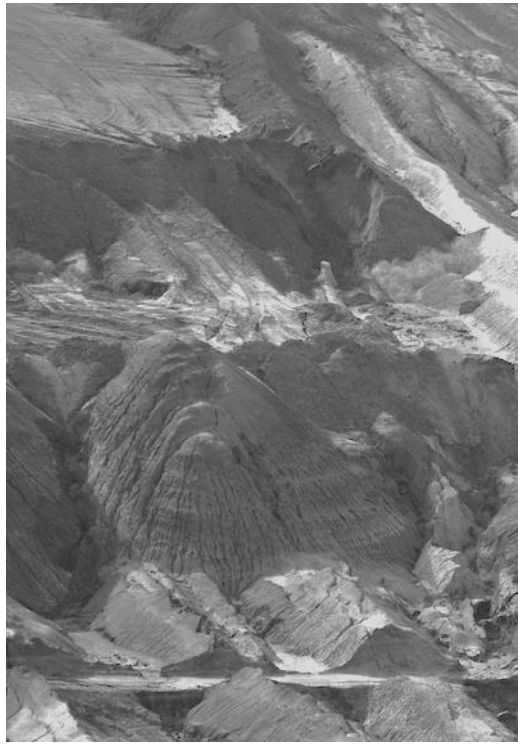


Village versus mine and Hambach Forest versus mine  
Source: By H.Kaiser in Deutsche Welle (2023), by D.Speier in Atlas Obscura (2018) and by Rueter in Deutsche Welle



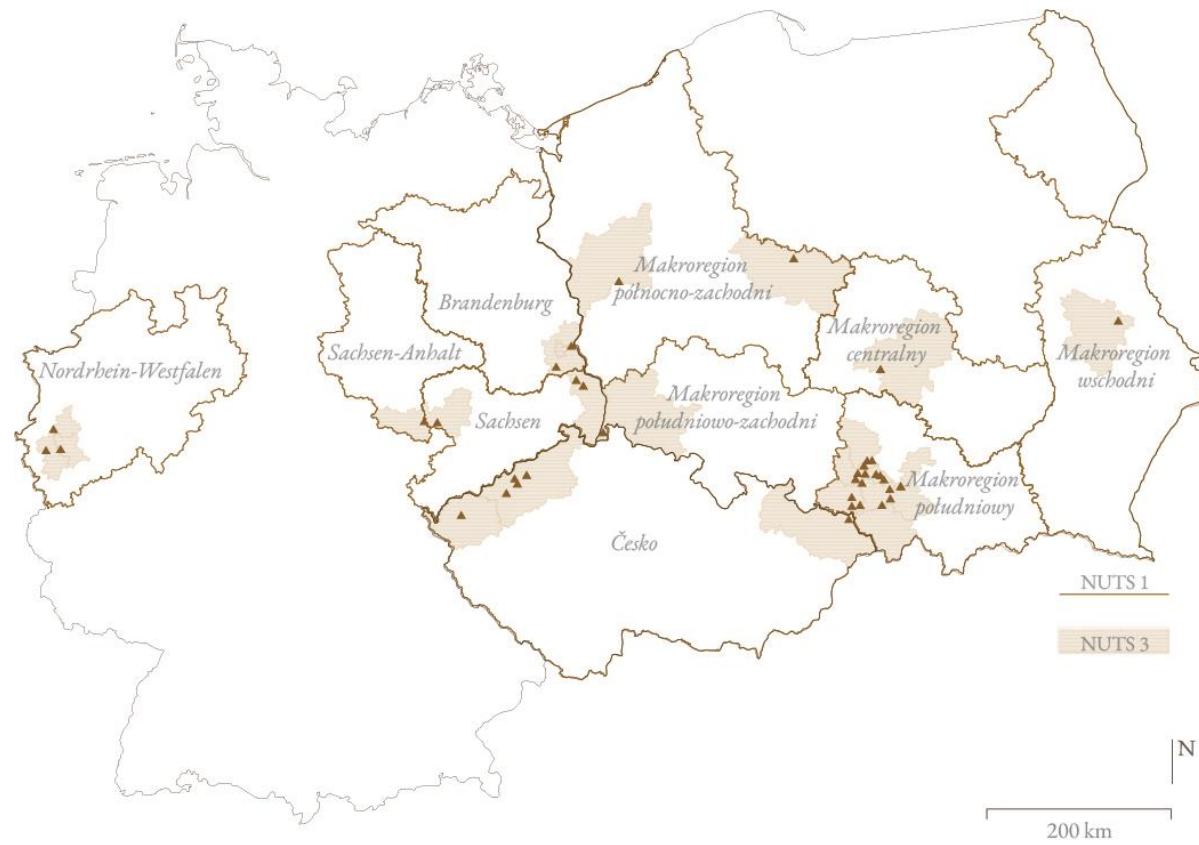
Uncertainty and unemployment  
Source: By H.Kaiser in Deutsche Welle (2018)

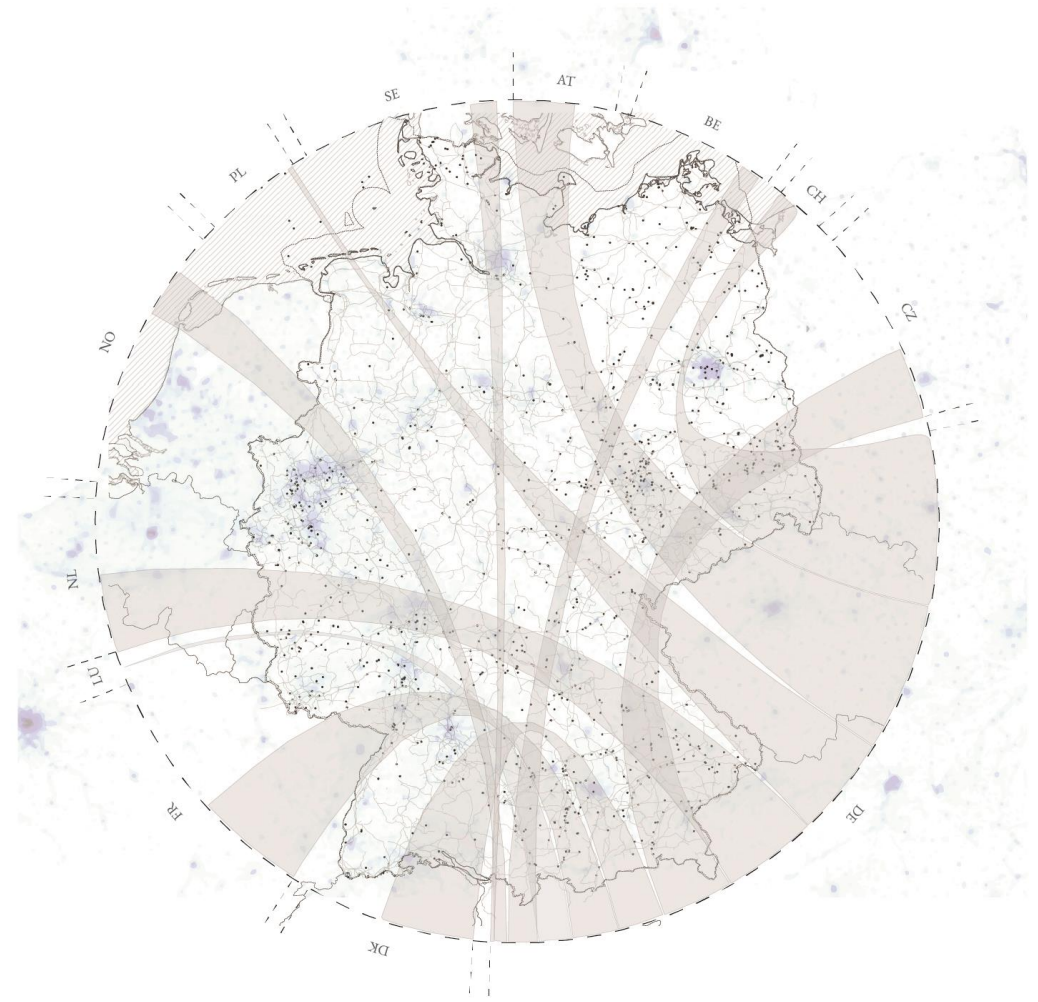
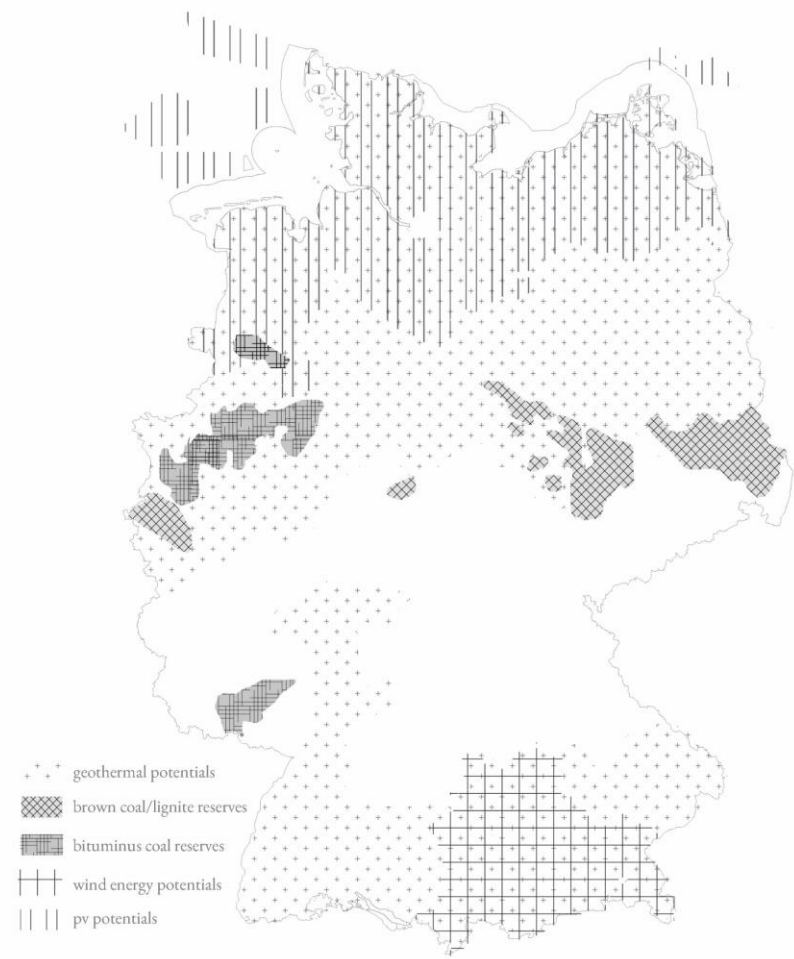


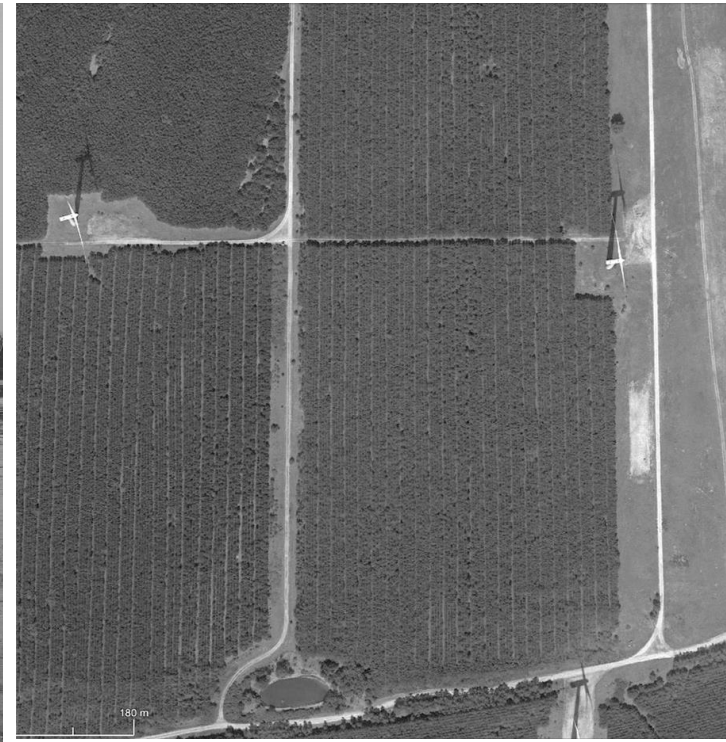


Trees for coal

Source: By E.Hadj-Hamdi and M. Goergens in Deutsche Welle (2018) and by L.Peter in ABCnet (2016)



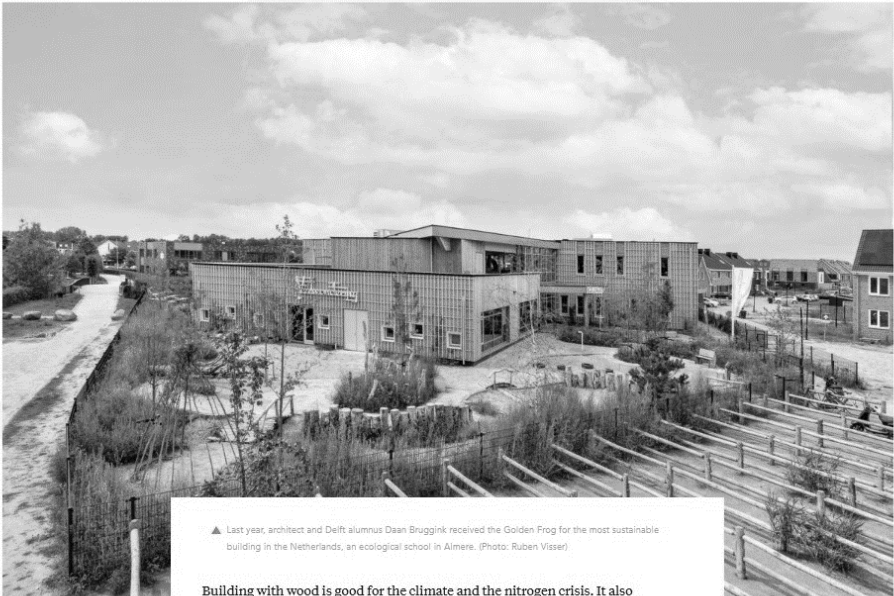






Mine reclamation and the deployment of renewables  
Source: "Retired Soil" by René Zieger (2007-2010) and by LEAG

### Timber construction: a cure for many crises



▲ Last year, architect and Delft alumnus Daan Bruggink received the Golden Frog for the most sustainable building in the Netherlands, an ecological school in Almere. (Photo: Ruben Visser)

Building with wood is good for the climate and the nitrogen crisis. It also accelerates housing construction and more. So why do we see so little of it?

Features | 9 November, 2022

## Net zero could drive up the global demand for timber, putting at risk the world's forests

Timber demand will quadruple by the year 2050, but great uncertainty surrounds where all the additional wood will come from.

By Jason Mitchell

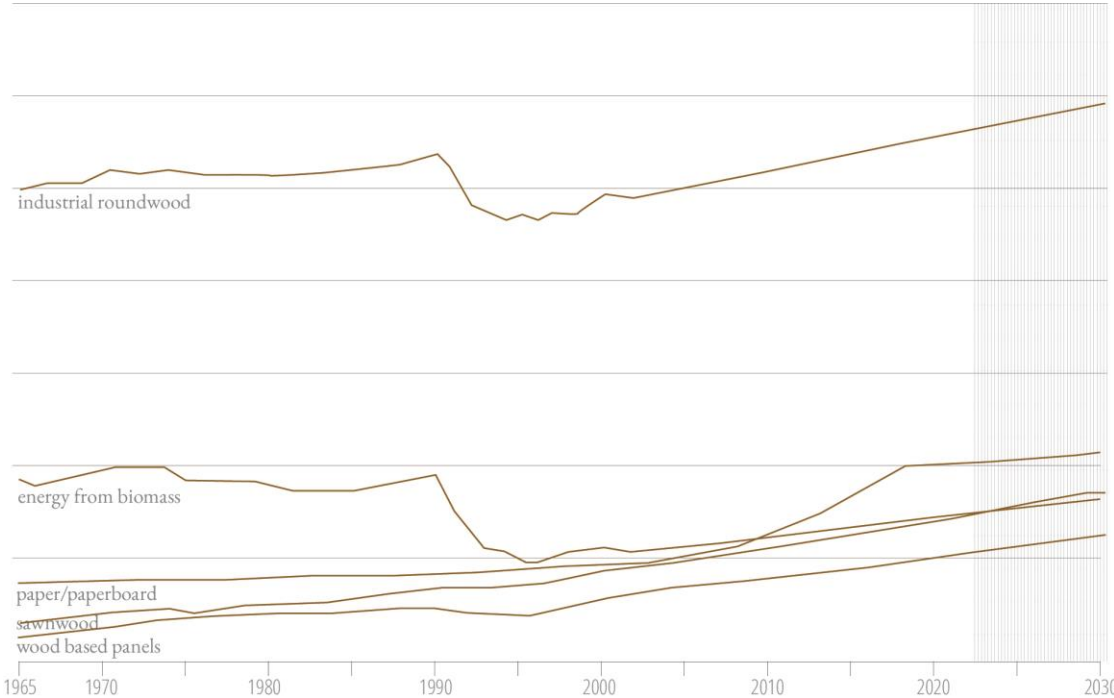


Features | 9 November, 2022

# Net zero could drive up the global demand for timber, putting at risk the world's forests

Timber demand will quadruple by the year 2050, but great uncertainty surrounds where all the additional wood will come from.

By Jason Mitchell



Timber demand

Source: graph by author and image in investmentmonitor.ai

The post-mining landscape has **two challenges**, an unavoidable *decline/decay/shrinkage* and greatly *altered/burdened ecosystems*. At the same time, this dual challenge can lead the way to a new interpretation of **carbon economies** with key elements, forests growth and a deliberate urban retreat.



**How can we systematically transform coal mining regions by introducing a productive, post-coal carbon economy?**

- Q1 What are the spatial transformations needed in the post-coal mining landscape that can facilitate forest and biodiversity growth while fostering sustainable forestry?
- Q2 How to repair the post-mining landscape based on the capacities of the current ecosystems?
- Q3 How to revitalize such regions that face depopulation, economic decline and an overall shrinkage?

Scale 1: Systemic approach

Scale 2: Transboundary Greater Region

Scale 3: Cluster of mines, Lusatia

Scale 4: Local interventions, Cottbus

Flow of approach/research



Transferability of the strategy to other coal regions, parts of the systemic zone



Applying the tested strategy on the greater regional scale.

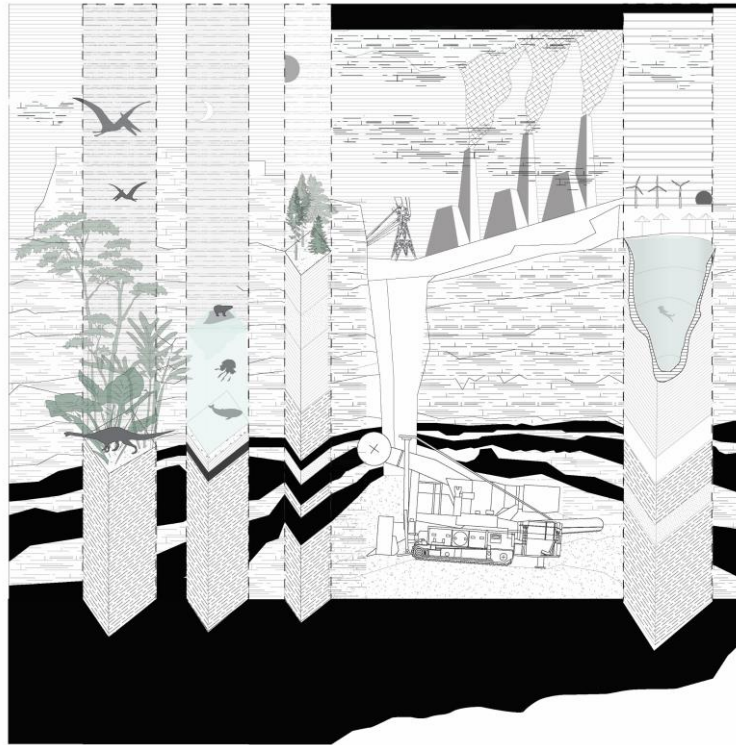


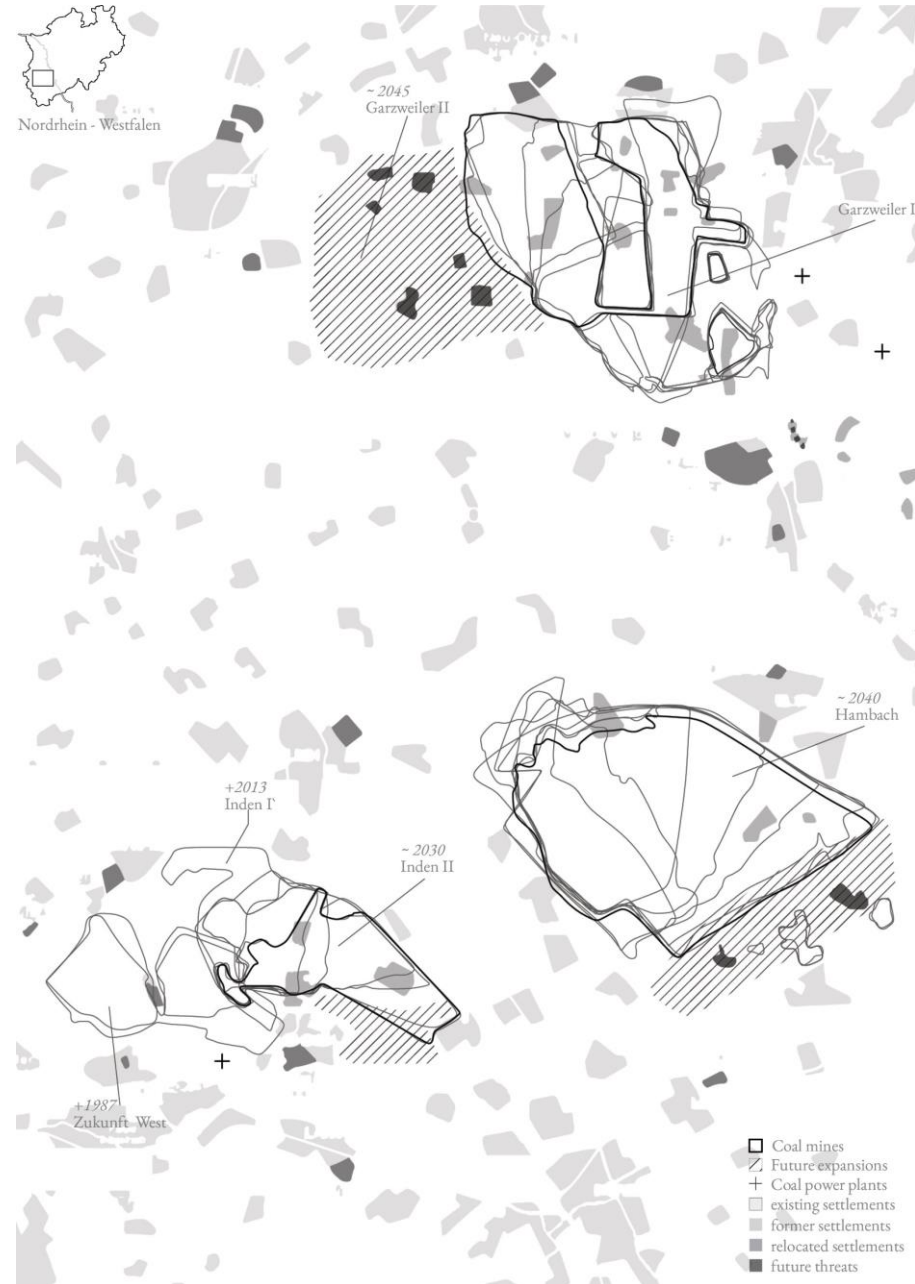
Checking the synergies and impact of the interventions in the cluster system

Flow of strategy/design

## Chapter 2: Explorations

*drawings from Lines of Inquire*





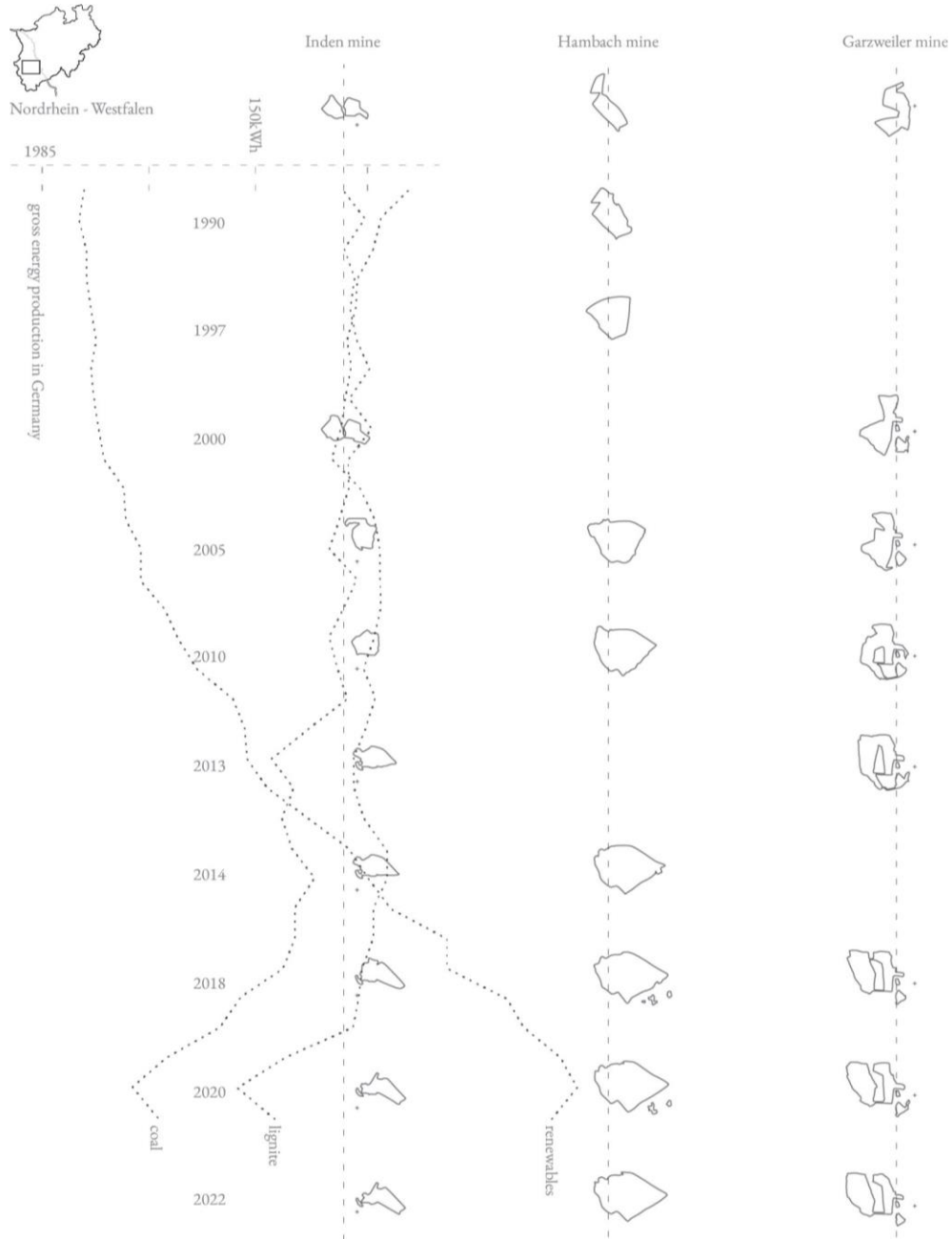
Spatial Transformations, boundaries and settlements over time

Source: author



Heuersdorf, village demolition Feb 2009

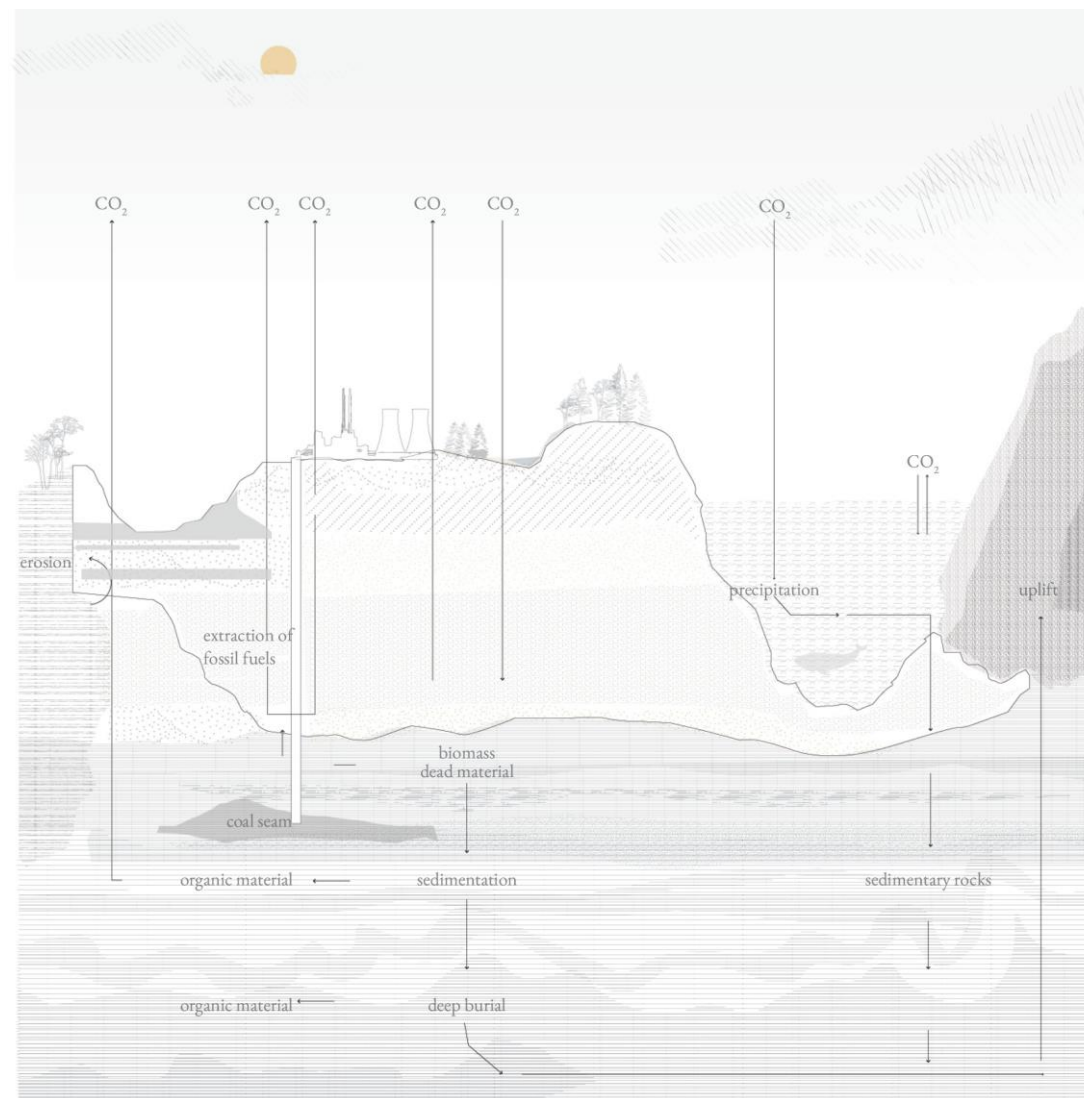
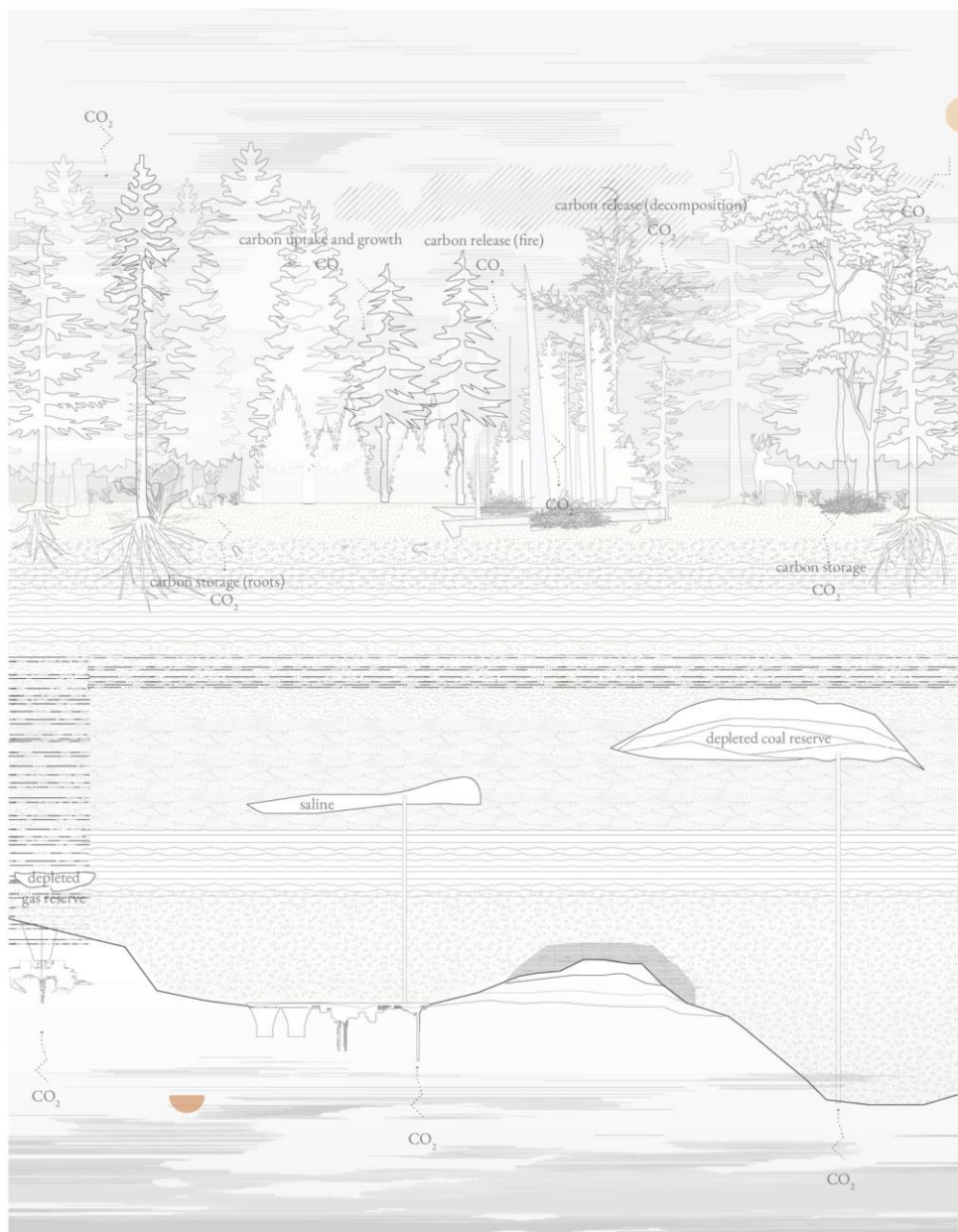
Source: By René Zieger from 'Retired Soil' 2007–2010 on Atlas of Places



current status			future projections
mine (lignite)	extraction site	production site (electricity)	solar
Inden		Eschweiler, North Rhine-Westphalia electrical output: 1.800 MW 1 unit F (300MW) 2 units G,H (600MW) 2 TGTs (270MW)	<u>inland Solar Farm</u> electrical output: 14,4 MW 26500 solar modules 1.4km x 100m
Hambach		Niederaussem Bergheim-Niederaussem, North Rhine-Westphalia electrical output: 3641 MW 2 units E & F (300MW) 2 units G & H (600MW) 1 unit K (1,000MW)	BoA unit PV & Storage electrical output: 12.1 MW
Garzweiler		Neurath Grevenbüsch-Neurath, North Rhine-Westphalia electrical output: 3622 MW unit C (300 MW) unit D, E (each 600 MW) unit F, G (BoA, each 1,100 MW)	BoA unit PV & Storage electrical output: 19.4 MW
		Frimmersdorf Grevenbroich, North Rhine-Westphalia electrical output: 635 MW 2 units (300 MW)	

Lignite mines' and power plants footprint

Source: author

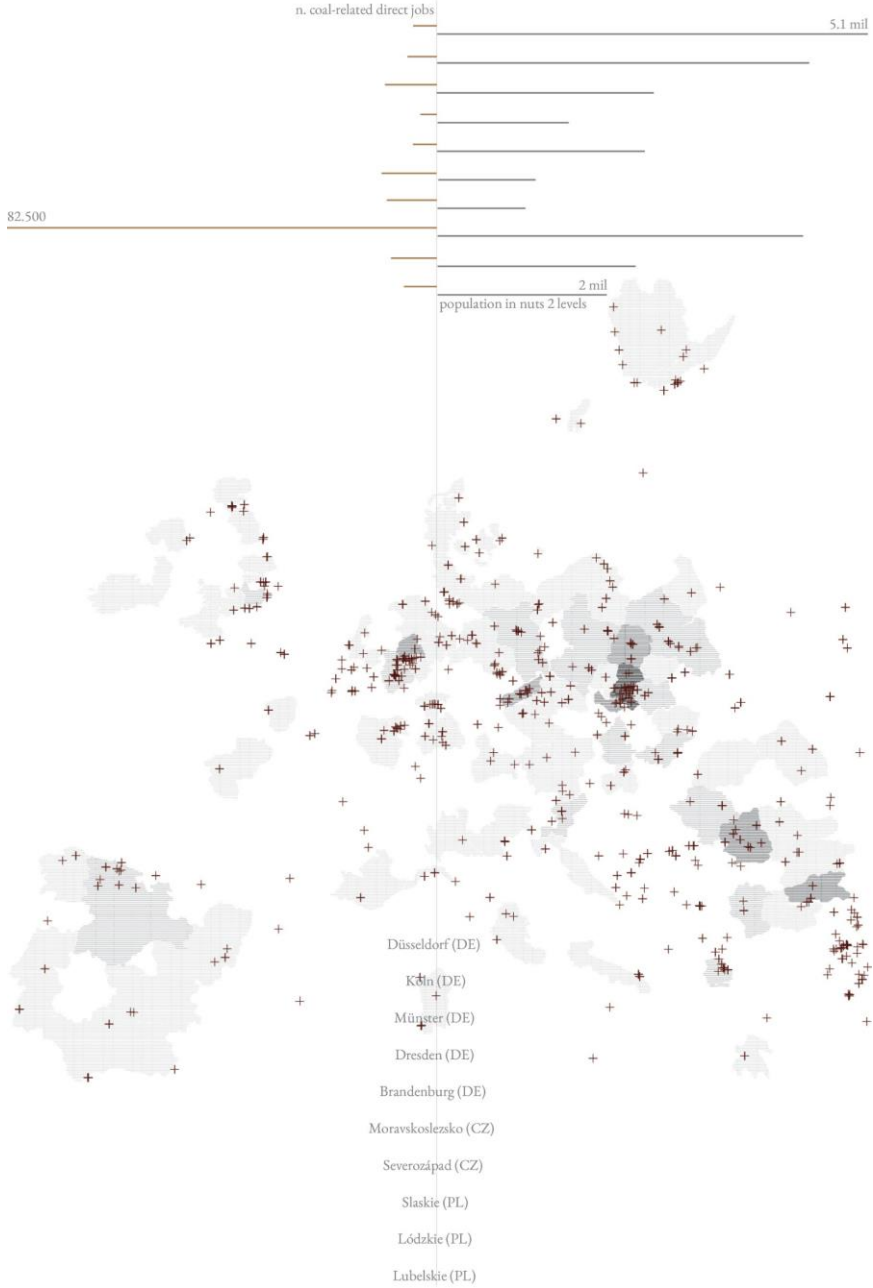


Carbon cycles  
Source: author

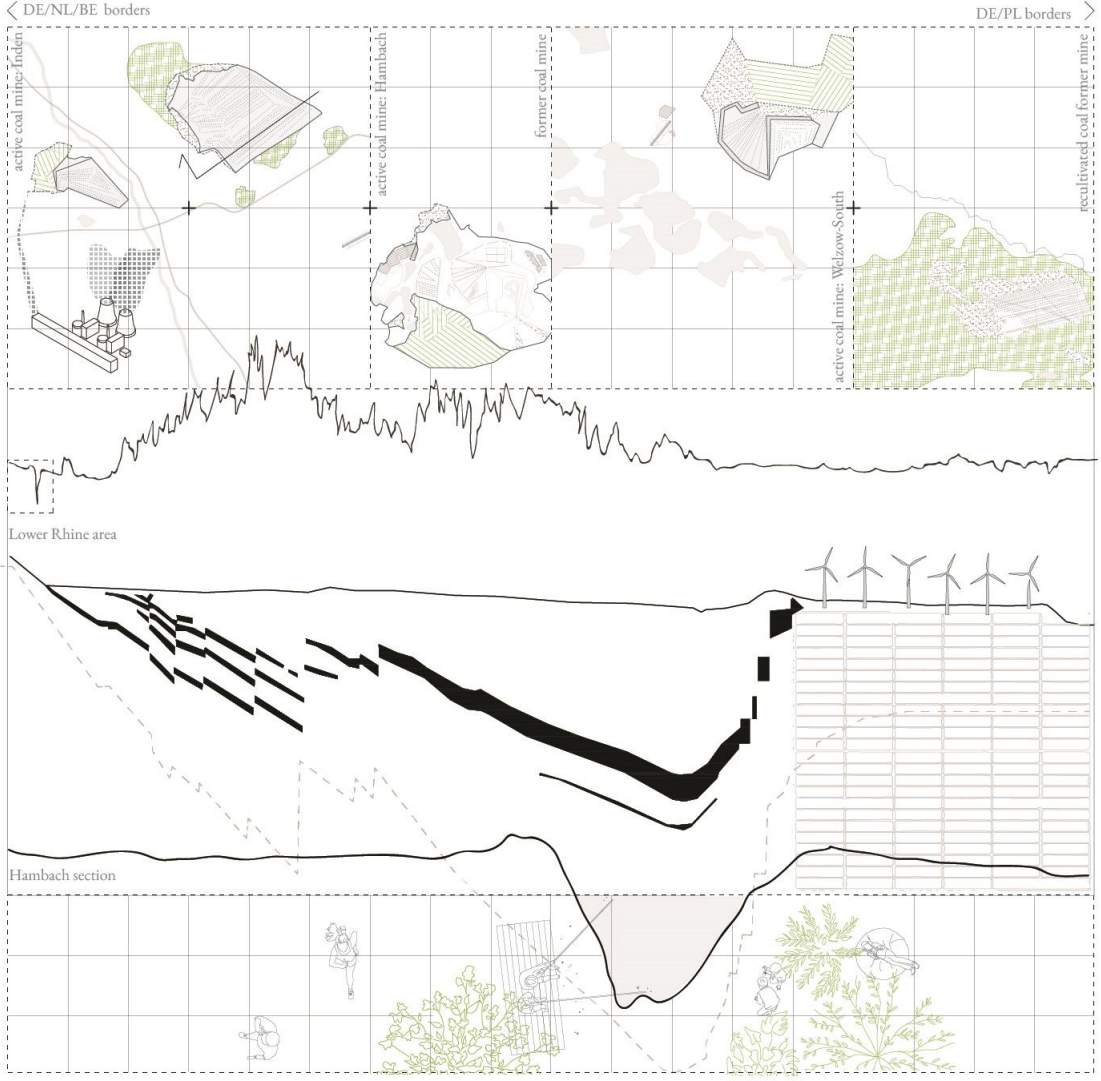


Tree gain and loss  
Source: author





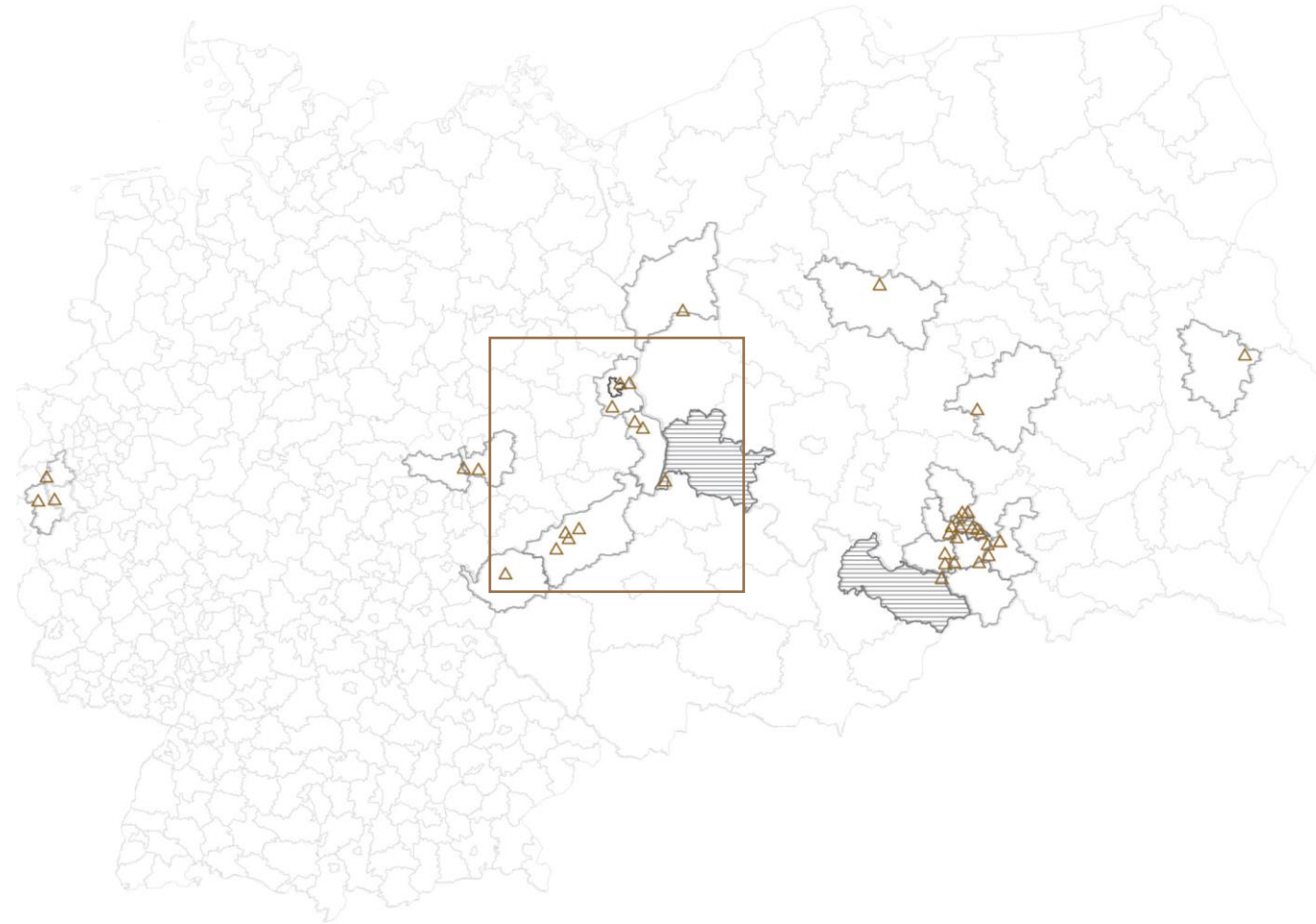
Coal phase-out and unemployment  
Source: author



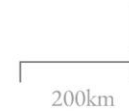
Early synthesis drawing



**Zoom In and Research**  
Transboundary Greater Region

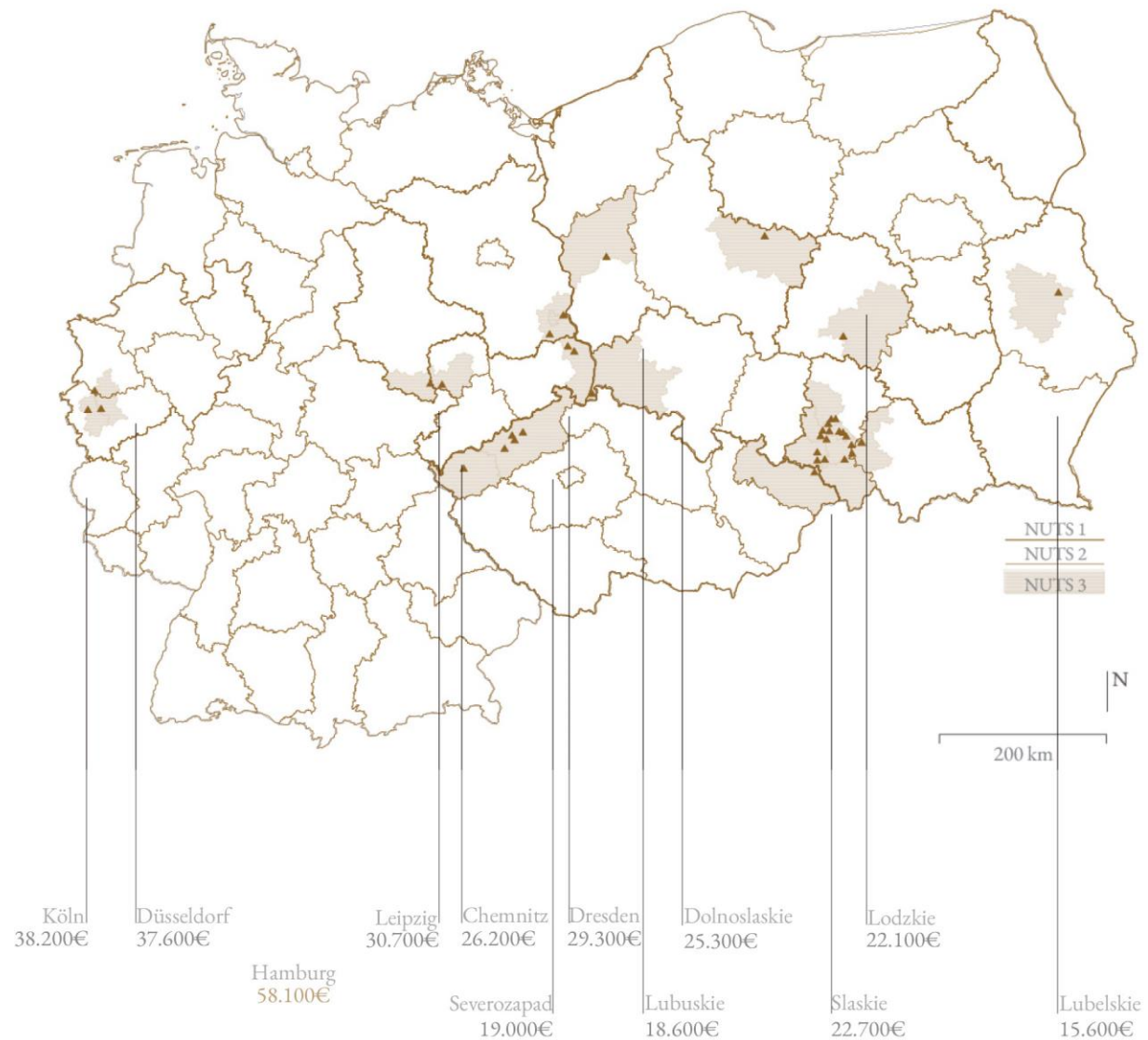


- △ coal mines
- p < -10.000
- -10.000 < p < 100.000
- ▨ p > 100.000
- p < +10.000



Population change projection 2020-2050

Source: author



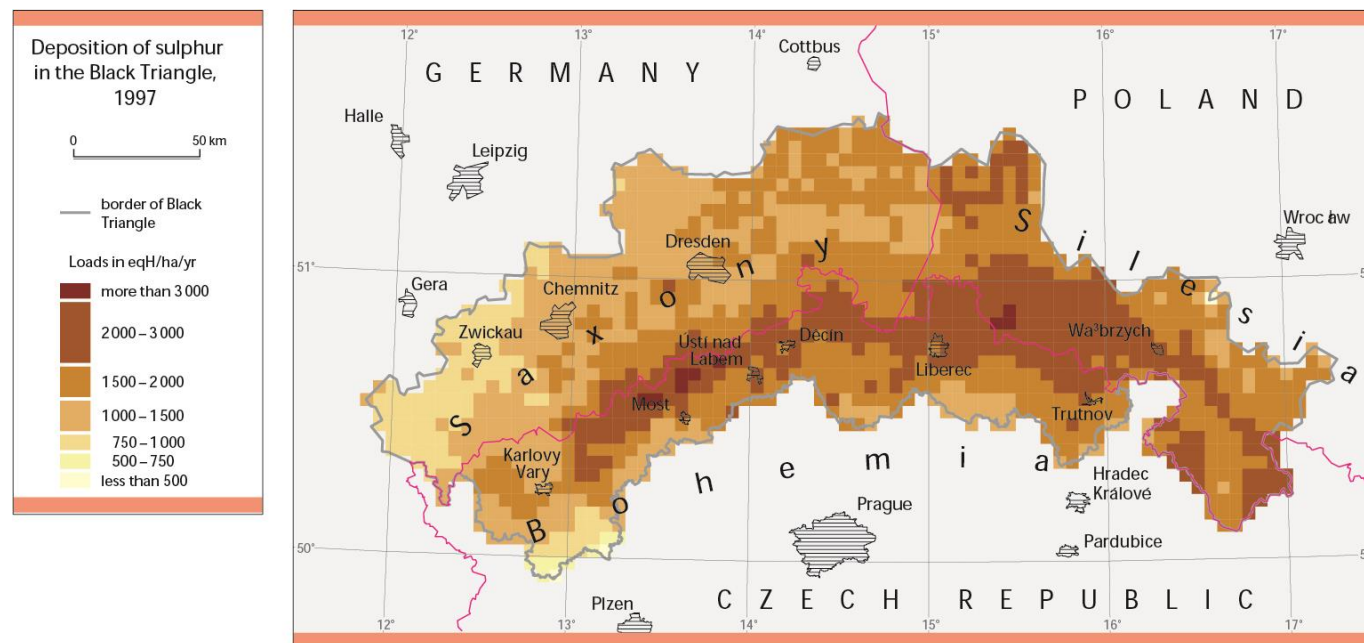
GDP per inhabitant 2020 (NUTS2)

Source: author

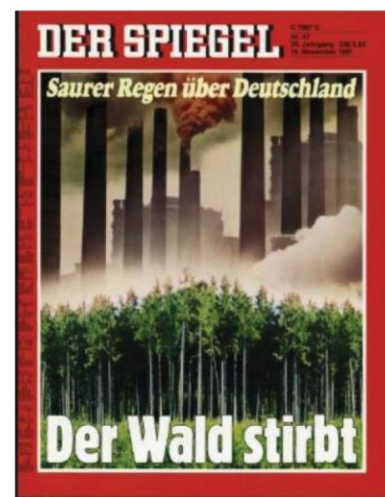


- Coal mines
  - Artificial surfaces
  - Agriculture
  - Mixed forest
  - Coniferous forest
  - Broadleaf forest
  - Water elements
- | 0      | 20      N |

Forest Cover  
Source: author



Black Triangle area  
Source: European Environmental Agency



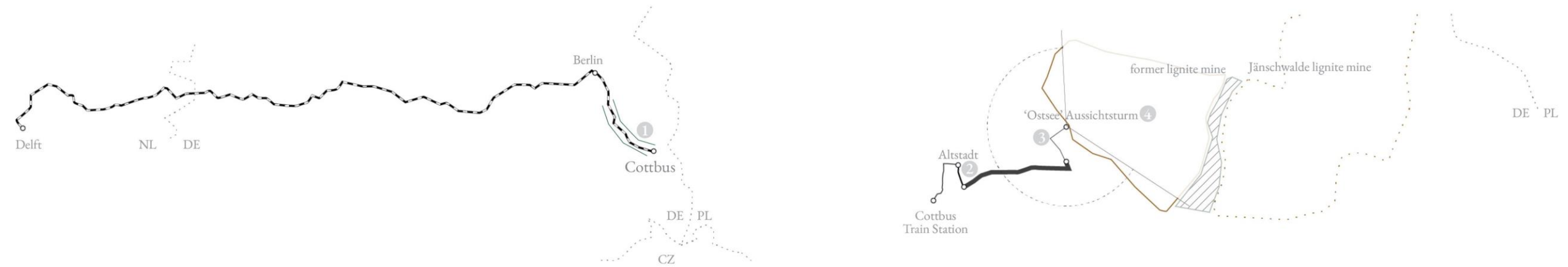
Environment and forests' death

Source: Der Spiegel





## Chapter 3: Field Trip





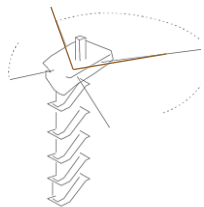
Mural "Aus dem Spreewald" by Heinz Sieger

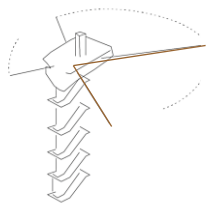




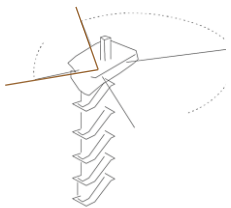


Aussichtungsturm Merzdorf "Ostsee", Cottbus  
Source: author











Pine forest  
Source: author

## Chapter 4: Dual Challenge



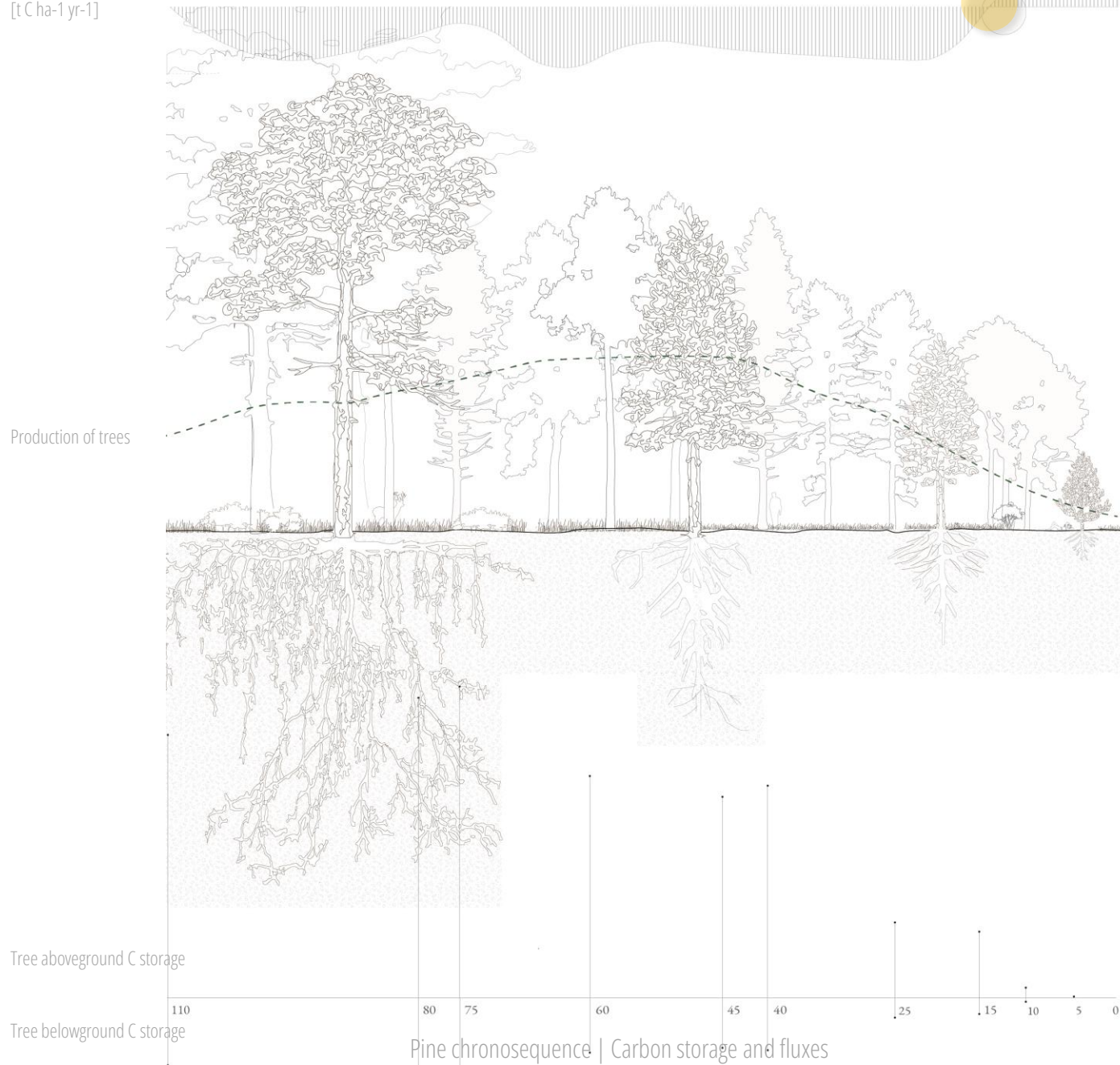
Cottbus

Source: LEAG, "Cottbus, von der Westseite", Robert Geissler, Lithographie, 1875 and "Cottbus, Gesamtansicht von Südosten", Henning (gez.), Hans Finke (gest.), Lithographie, 1841



How to grow a pine tree?  
Source: author

Ecosystem carbon budget  
[t C ha<sup>-1</sup> yr<sup>-1</sup>]

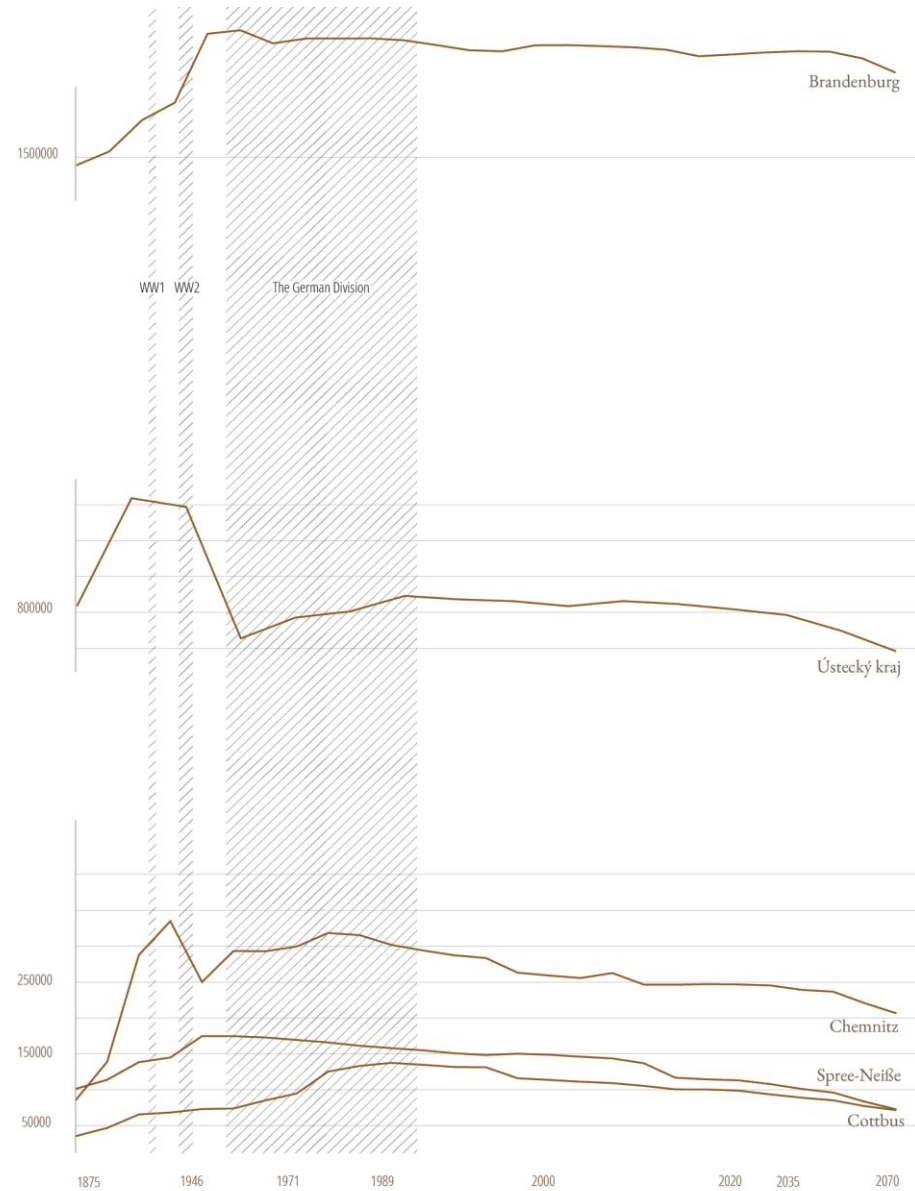


Pine chronosequence | Carbon storage and fluxes

Source: drawing by author

Conclusions from the URBACT, a project by the European Union:

*“Cities must learn to conceive of sustainable urban development as an ongoing cyclical process of change, rather than pretend that socio-economic development is a linear and predictable progression from the status quo to a better future”.*



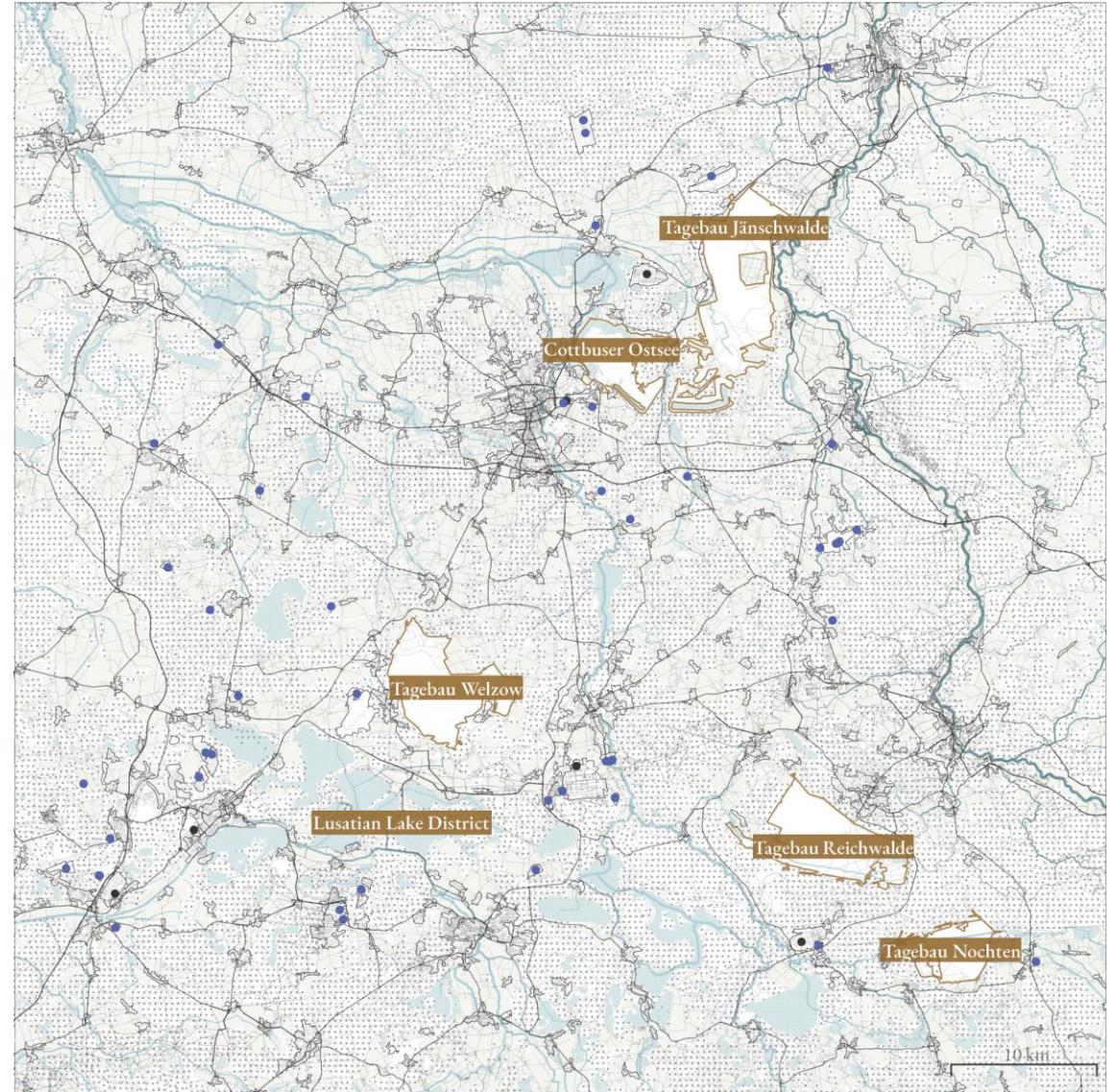
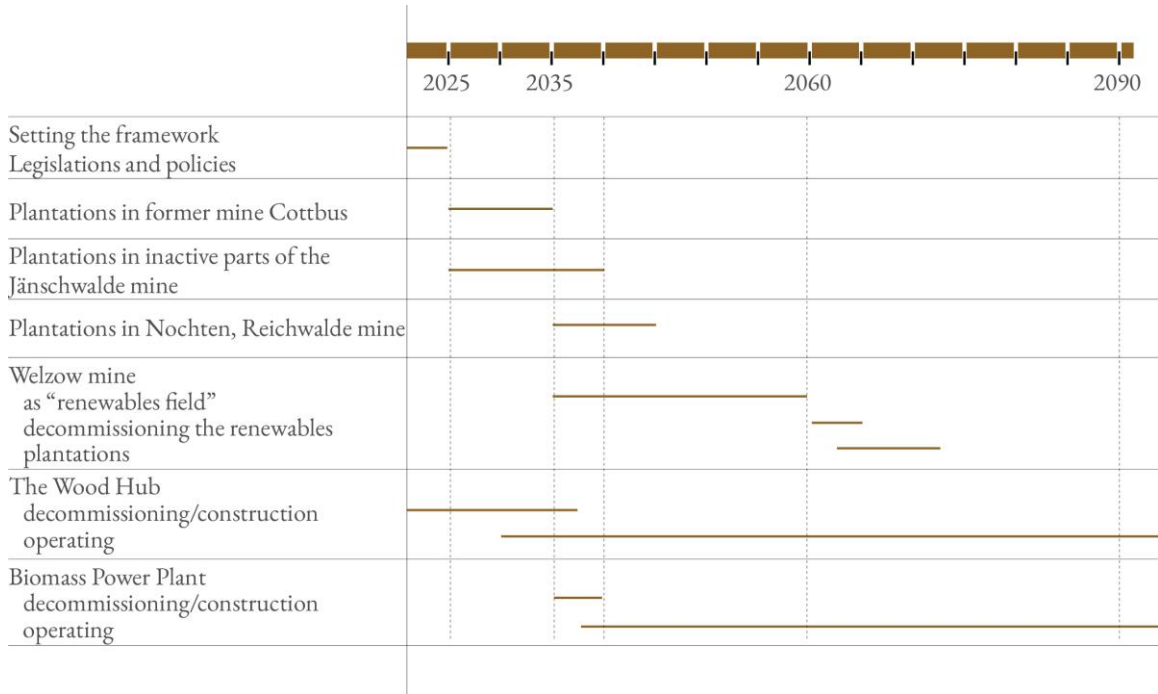
## Chapter 5: Design





Strategy for:

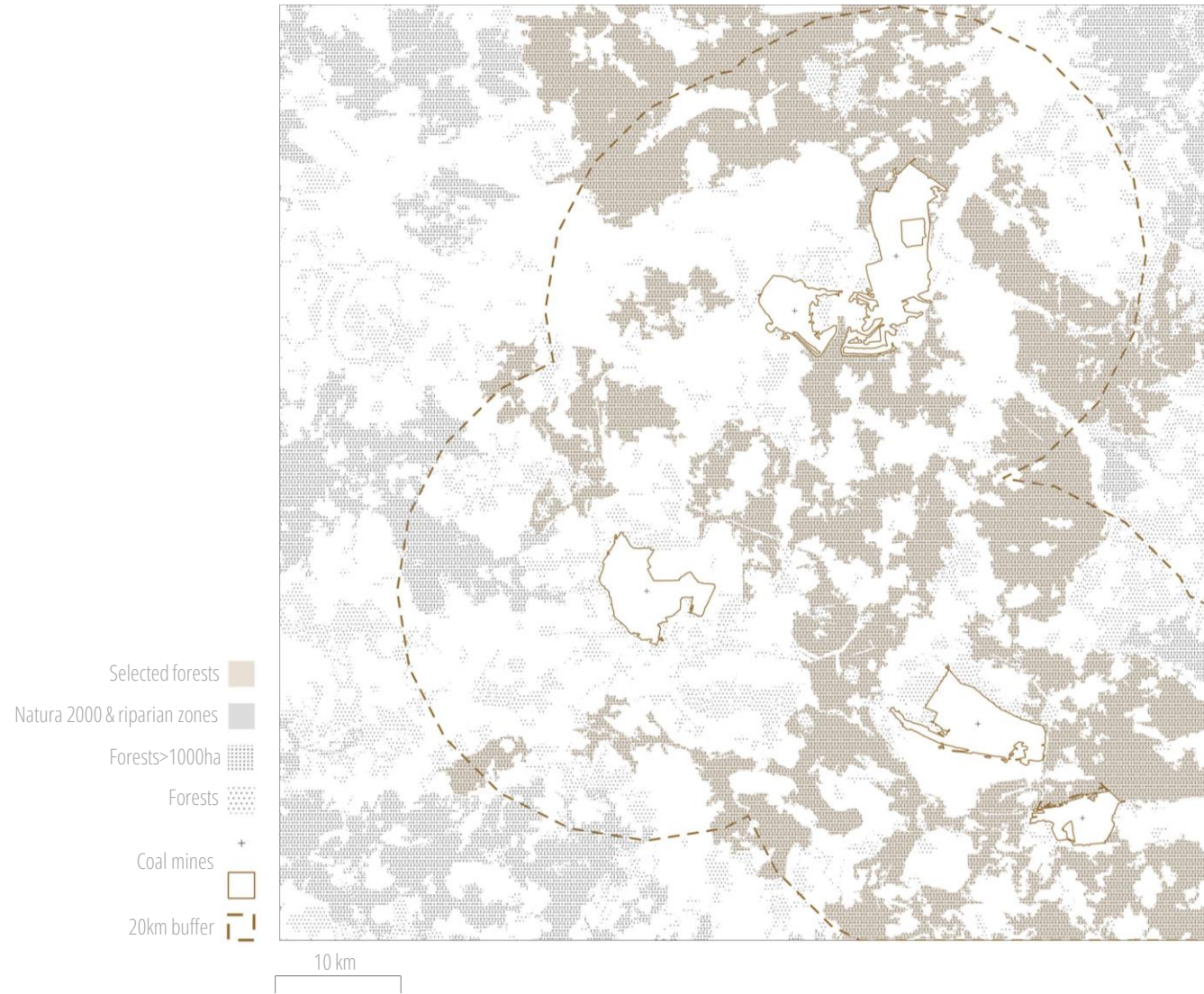
1. Forest growth, biodiversity corridors and plantations
2. Shrinking and retreat
3. Wood economy



● Renewable energy production site ● Energy production from fossil fuels □ Coal mines □ Network ■ Water elements

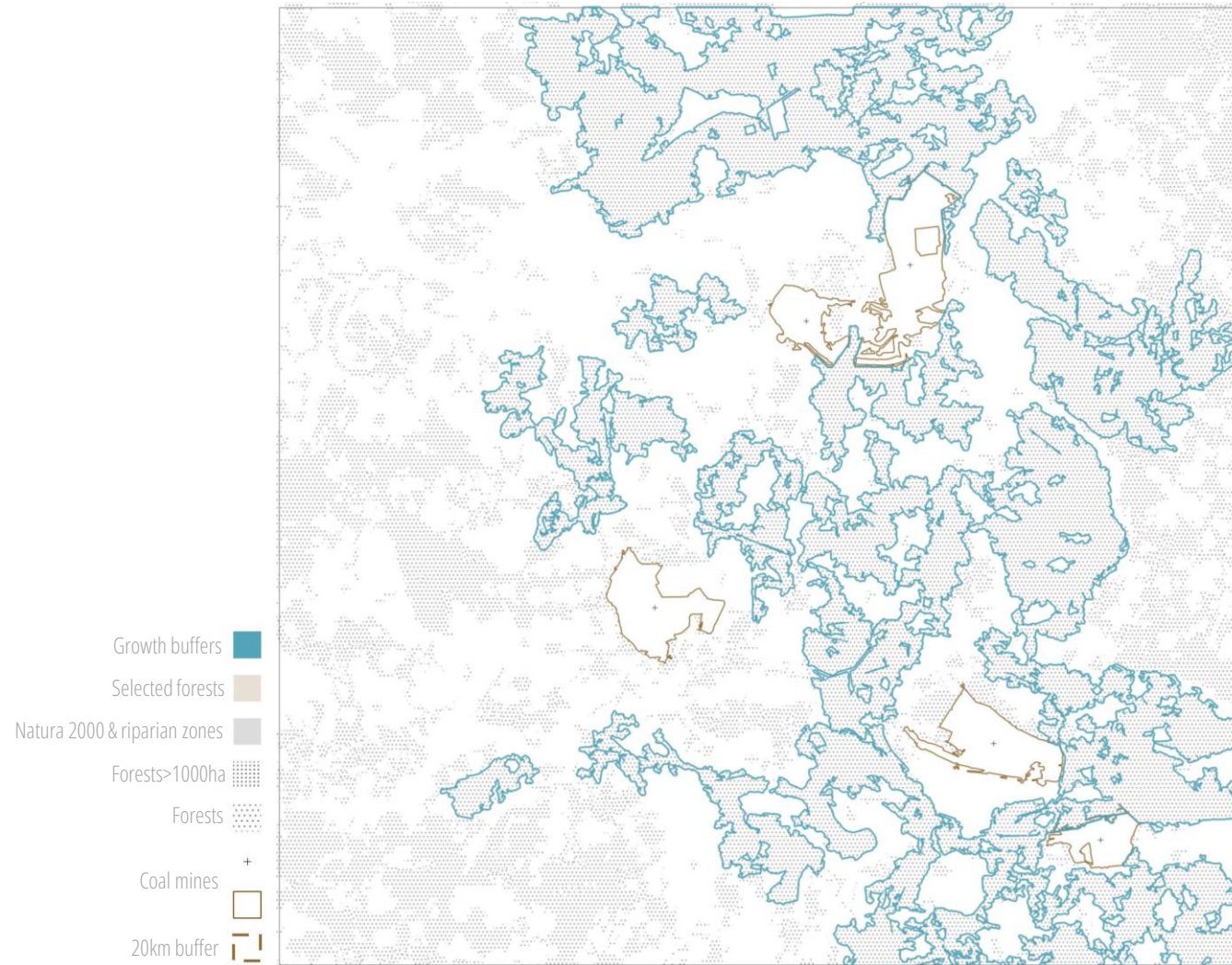


1. Forest growth, biodiversity corridors and plantations



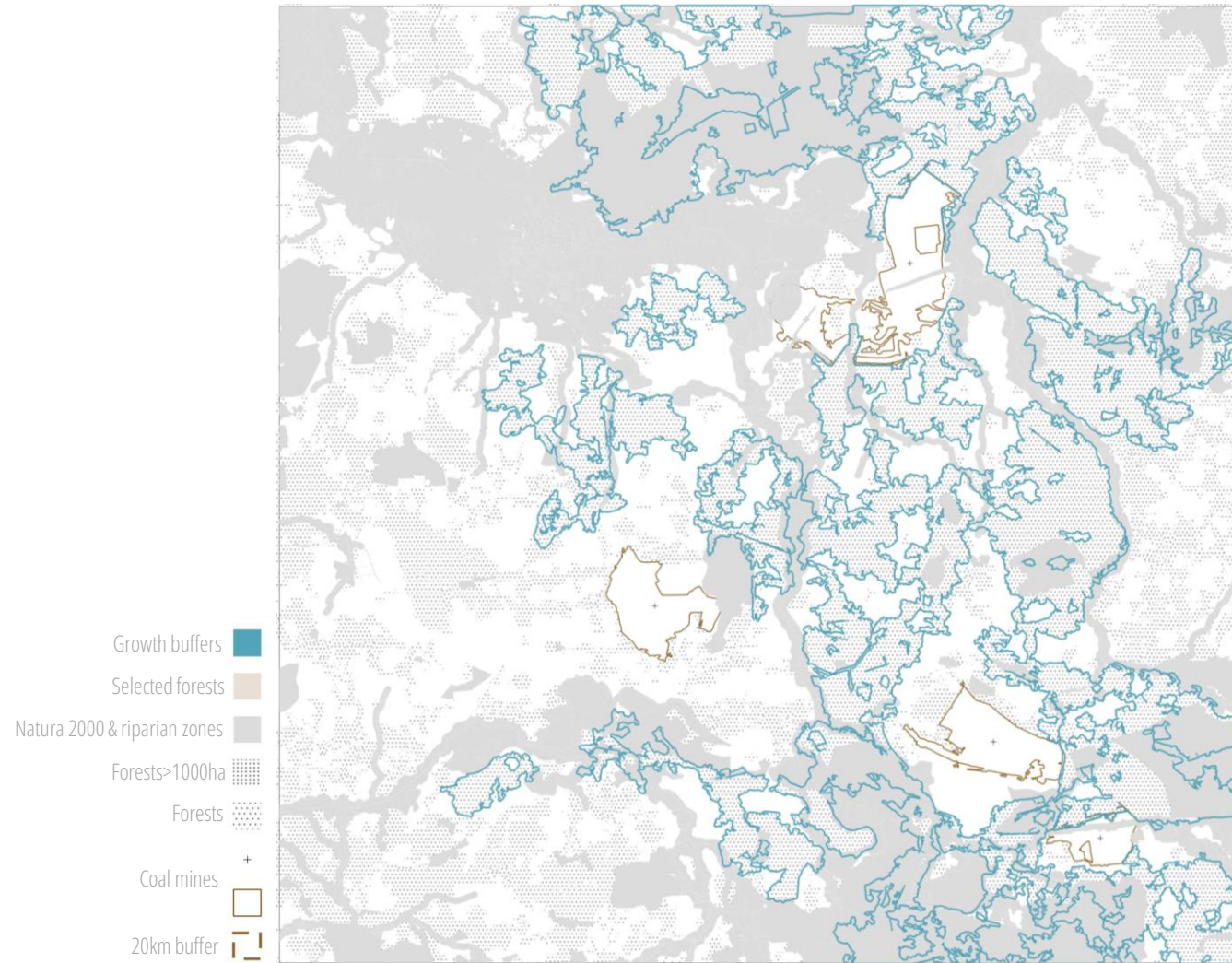
Selecting the forests  
Source: author

1. Forest growth, biodiversity corridors and plantations



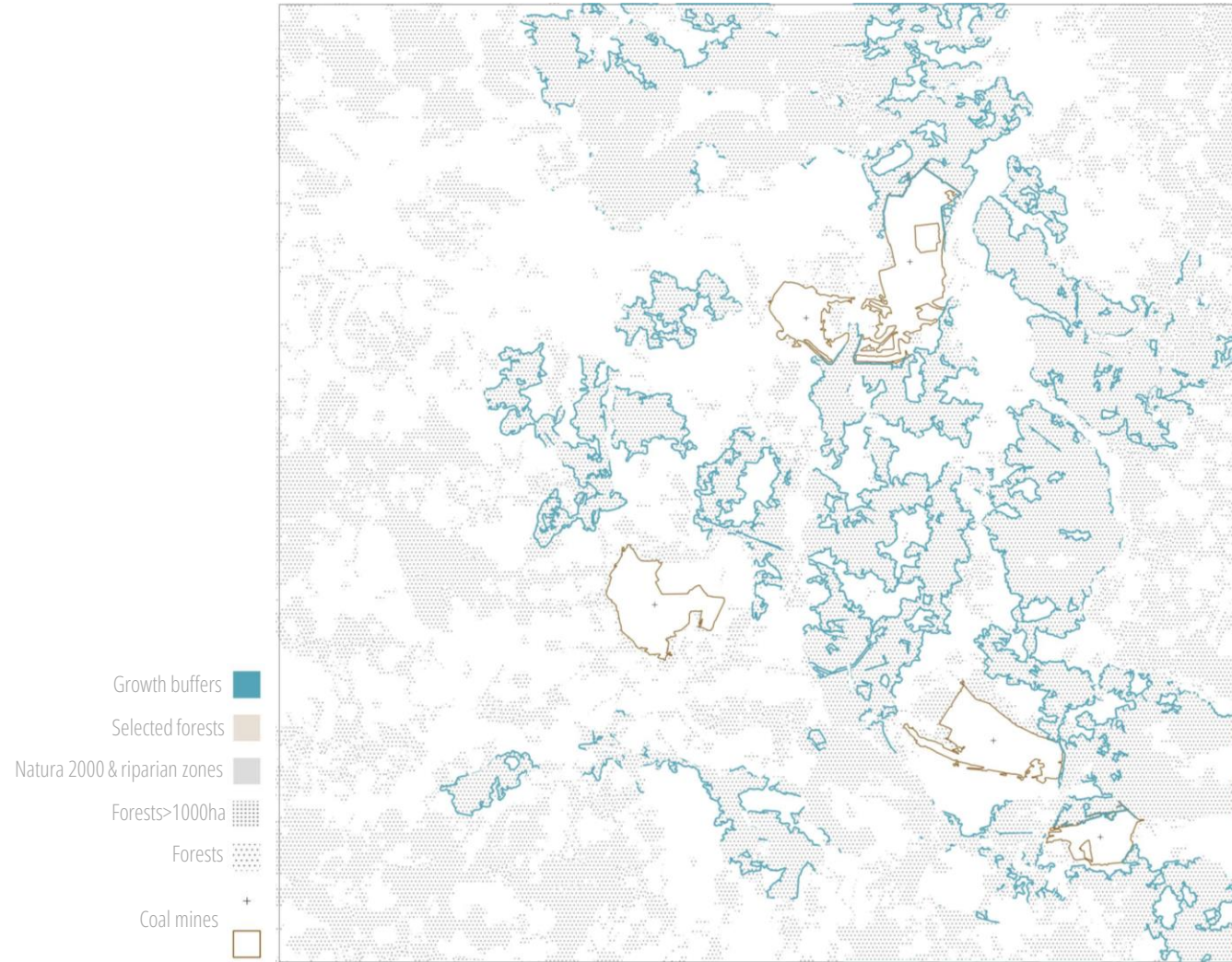
Defining the buffer  
Source: author

1. Forest growth, biodiversity corridors and plantations



Considering the buffers  
Source: author

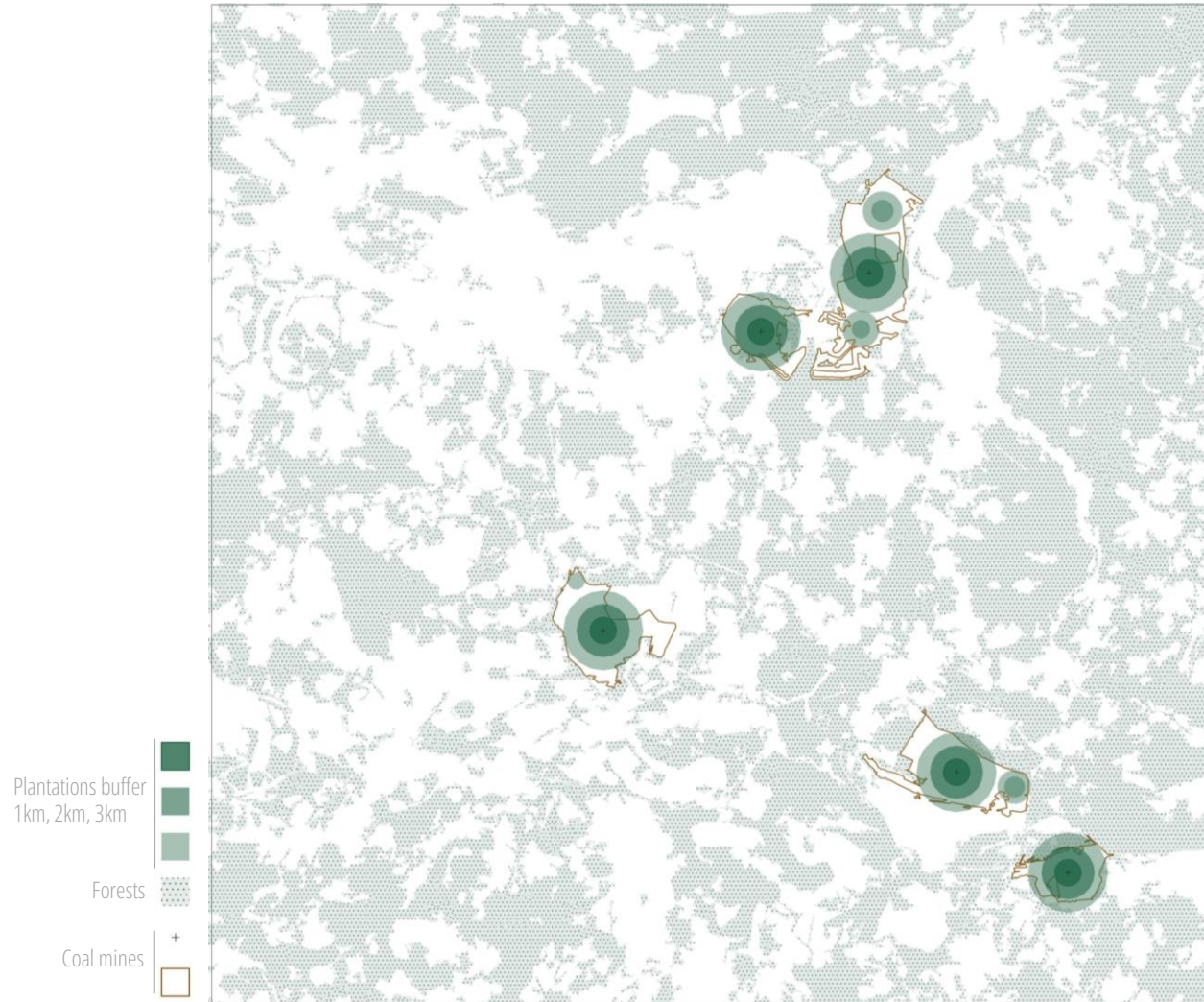
1. Forest growth, biodiversity corridors and plantations



Final buffer zones

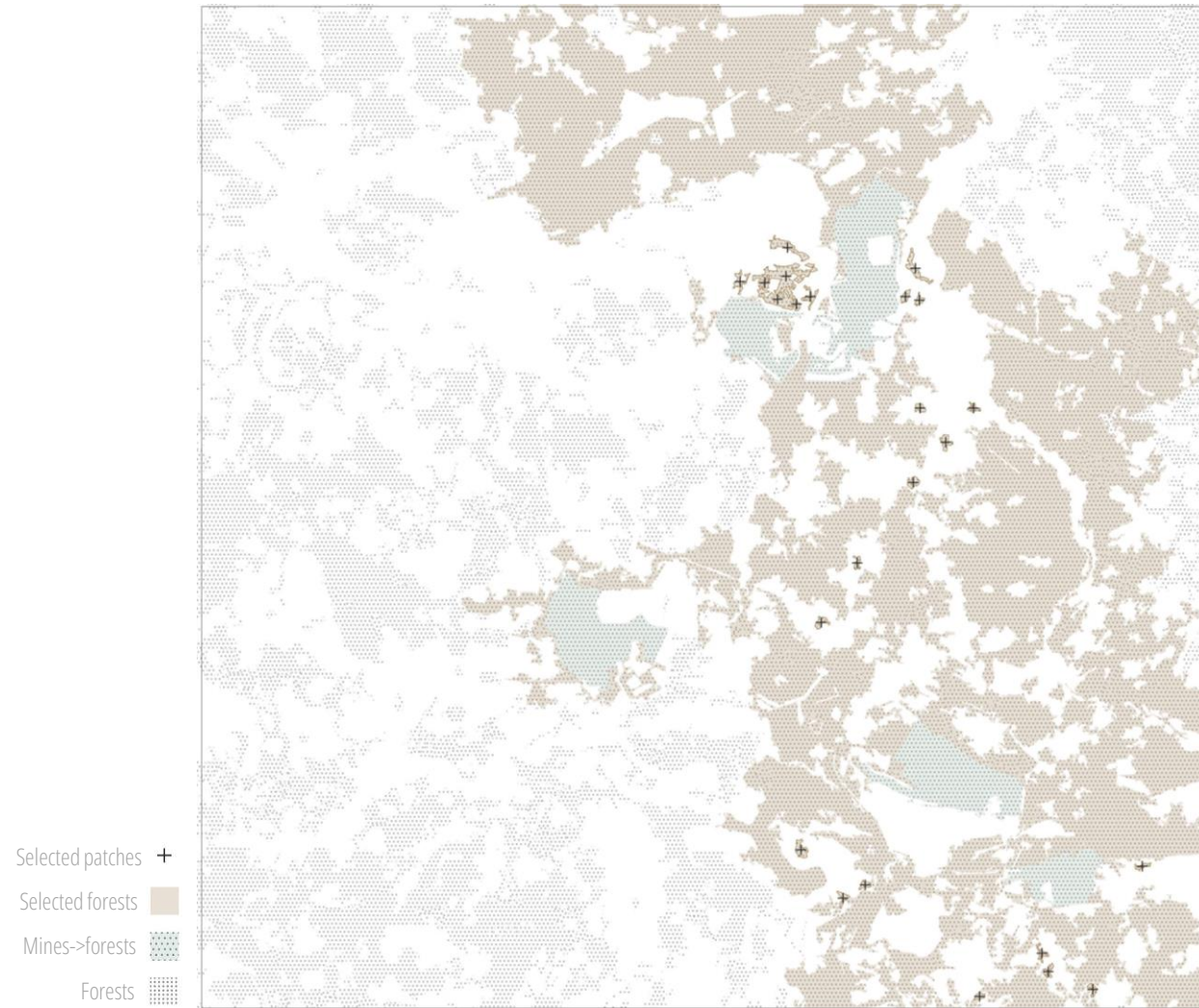
Source: author

1. Forest growth, biodiversity corridors and plantations



Plantations  
Source: author

1. Forest growth, biodiversity corridors and plantations



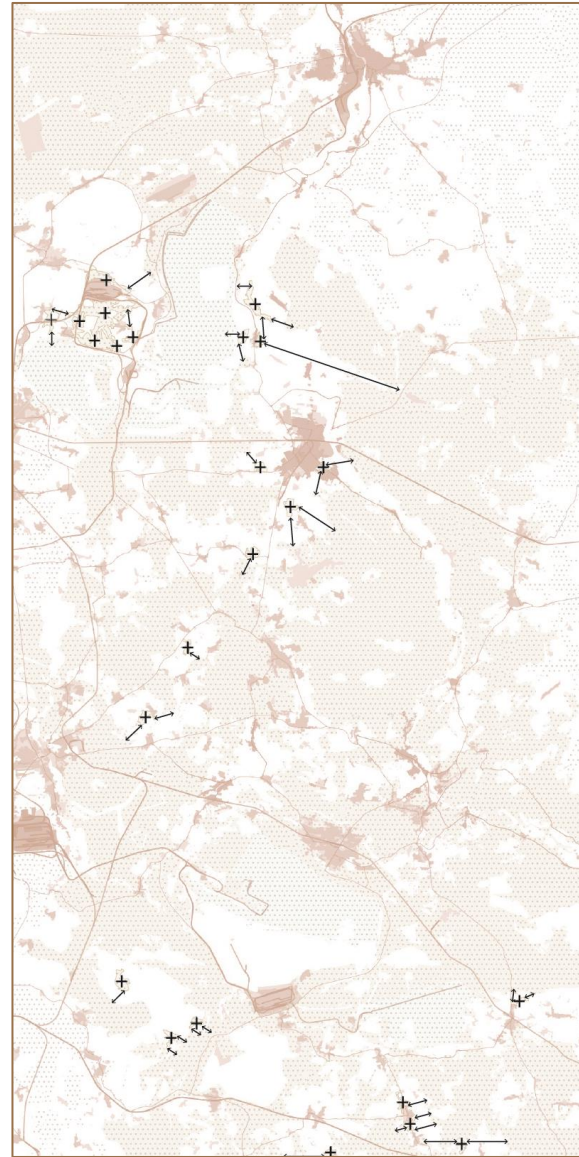
Selecting fragmented forests

Source: author

1. Forest growth, biodiversity corridors and plantations

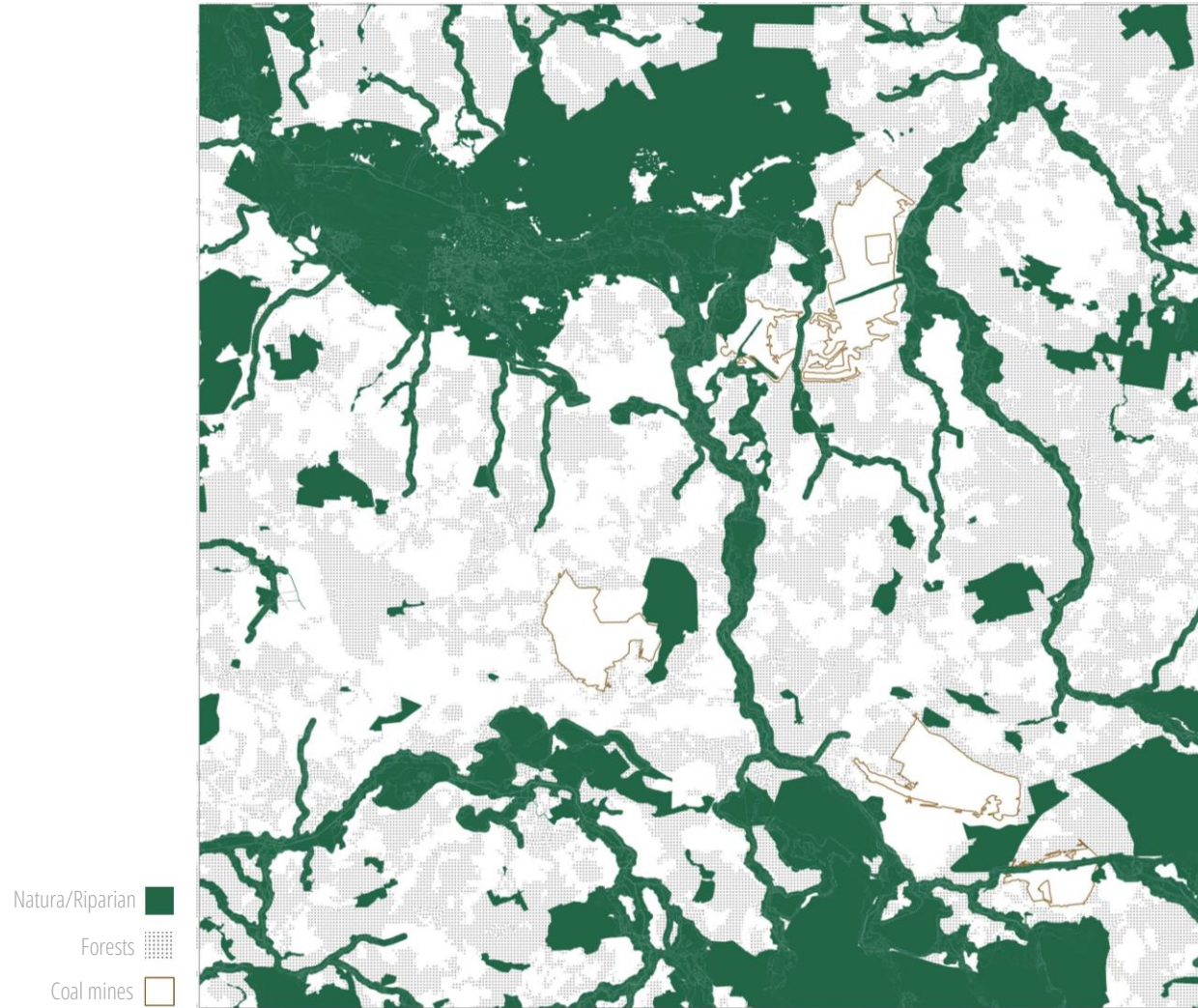


- Selected patches +
- Selected forests ■
- Mines->forests ▒
- Biod. corridors —
- Forests ▒
- Rail network —
- Road network —
- Built environment ■



Drawing biodiversity corridors  
Source: author

1. Forest growth, biodiversity corridors and plantations

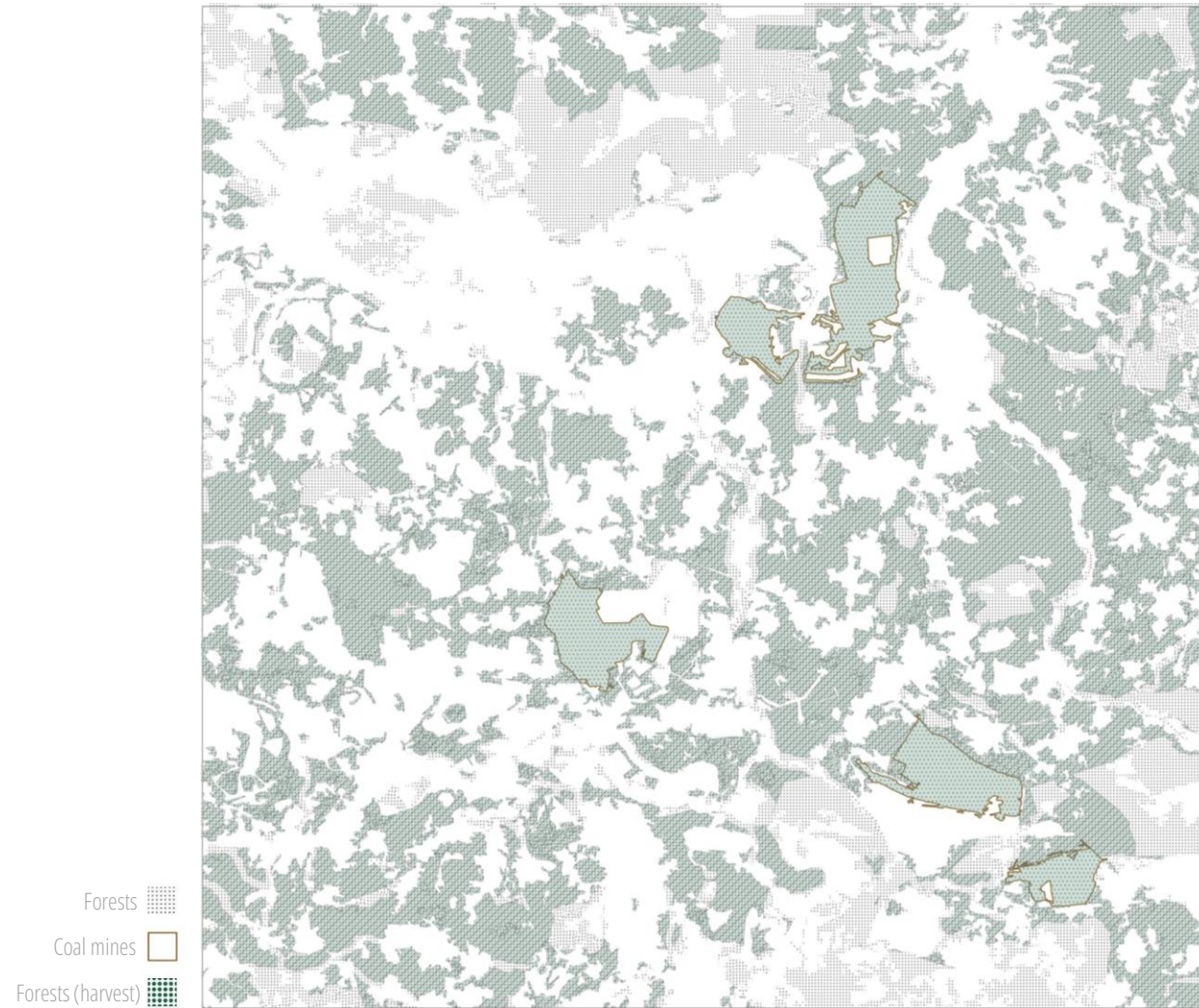


Setting the parameters for the harvested areas

Source: author

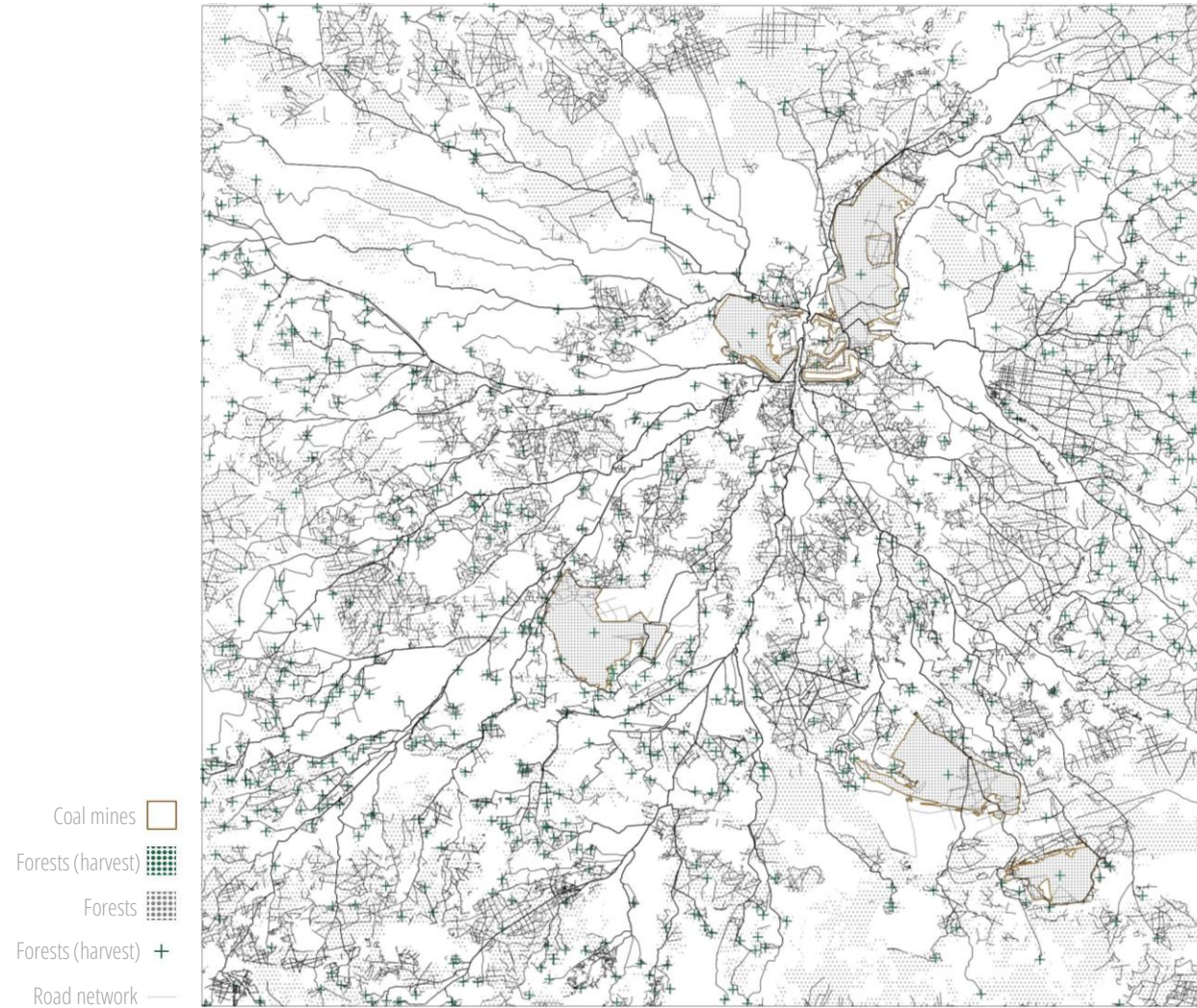


1. Forest growth, biodiversity corridors and plantations



Possible areas for harvesting  
Source: author

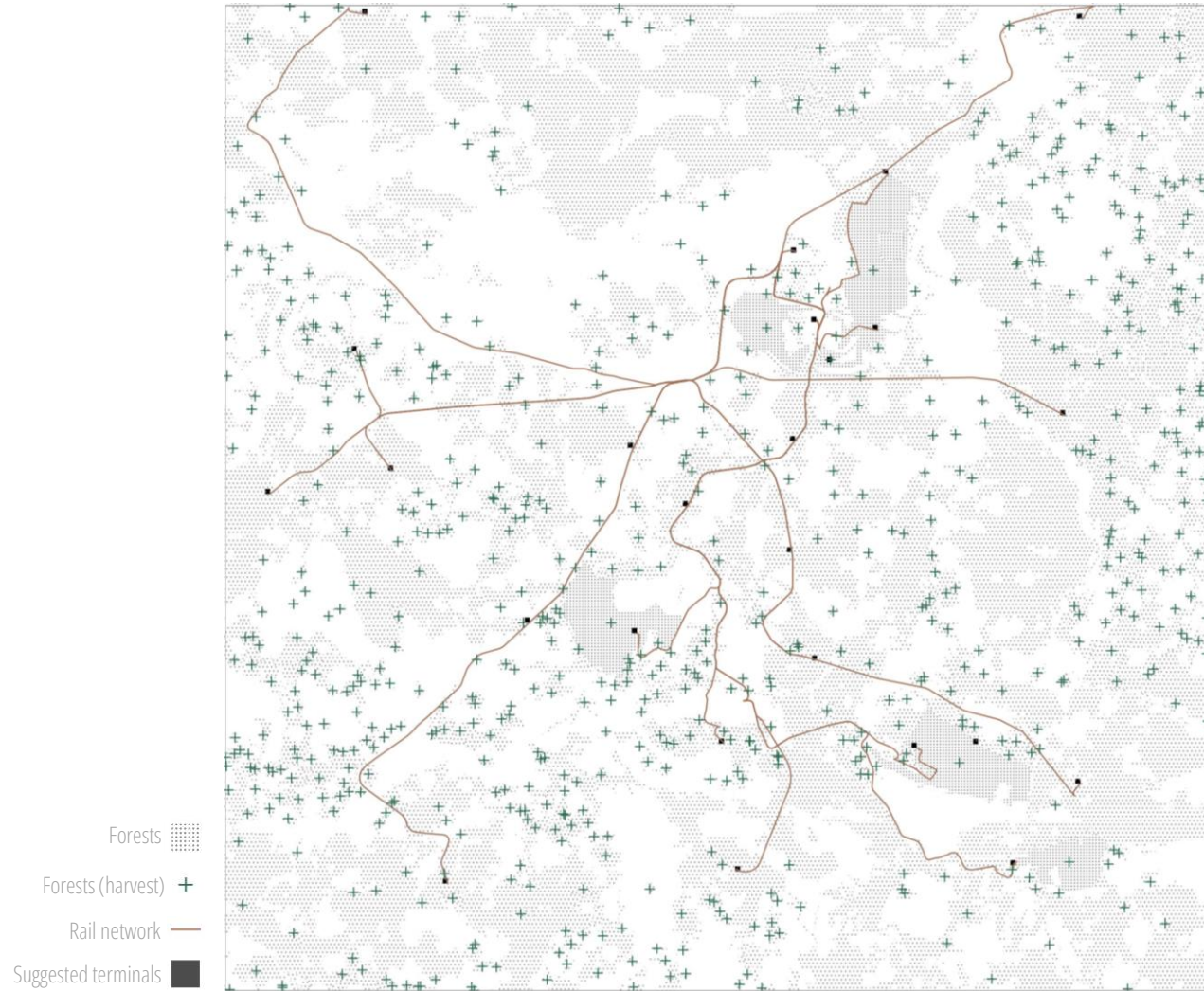
1. Forest growth, biodiversity corridors and plantations



Road network for the wood economy  
Source: author

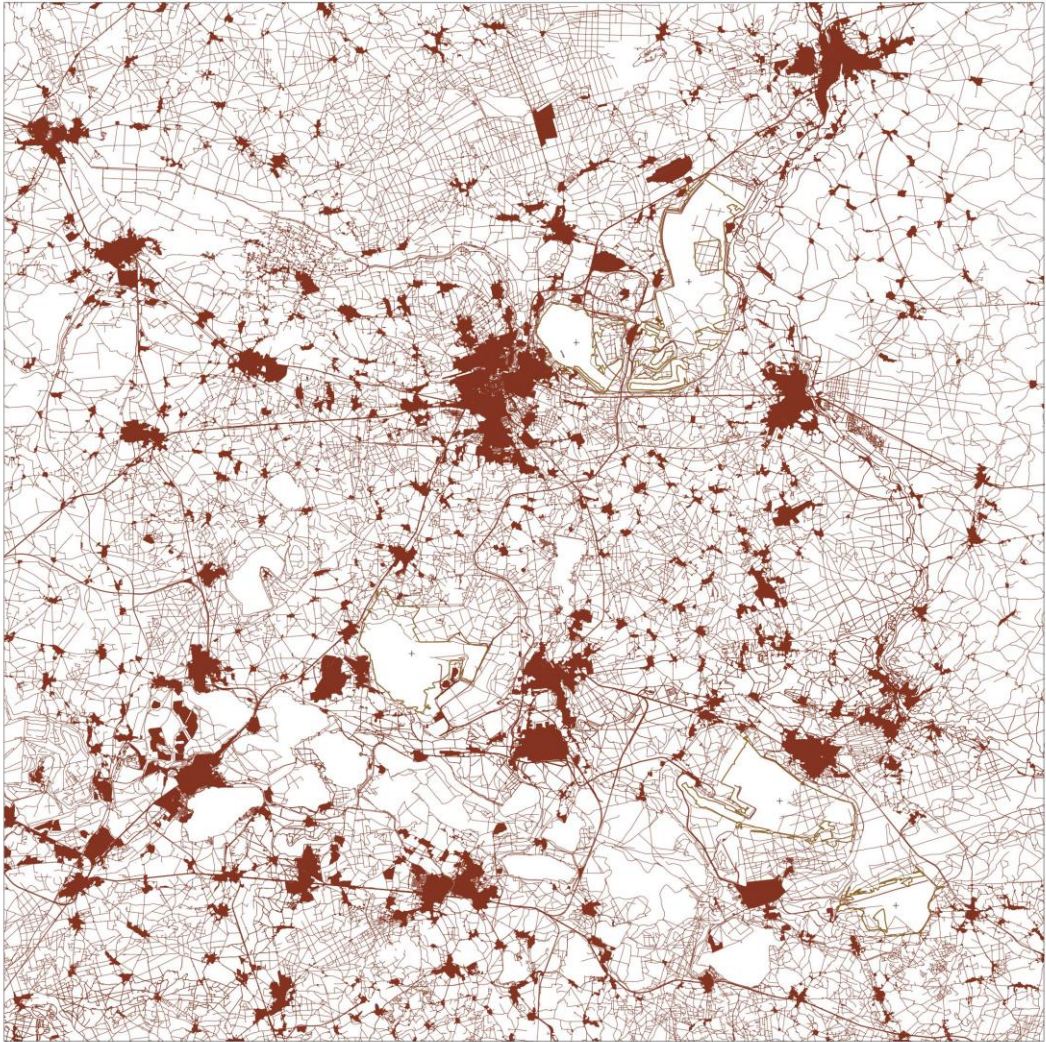
1. Forest growth, biodiversity corridors and plantations

3. Wood economy



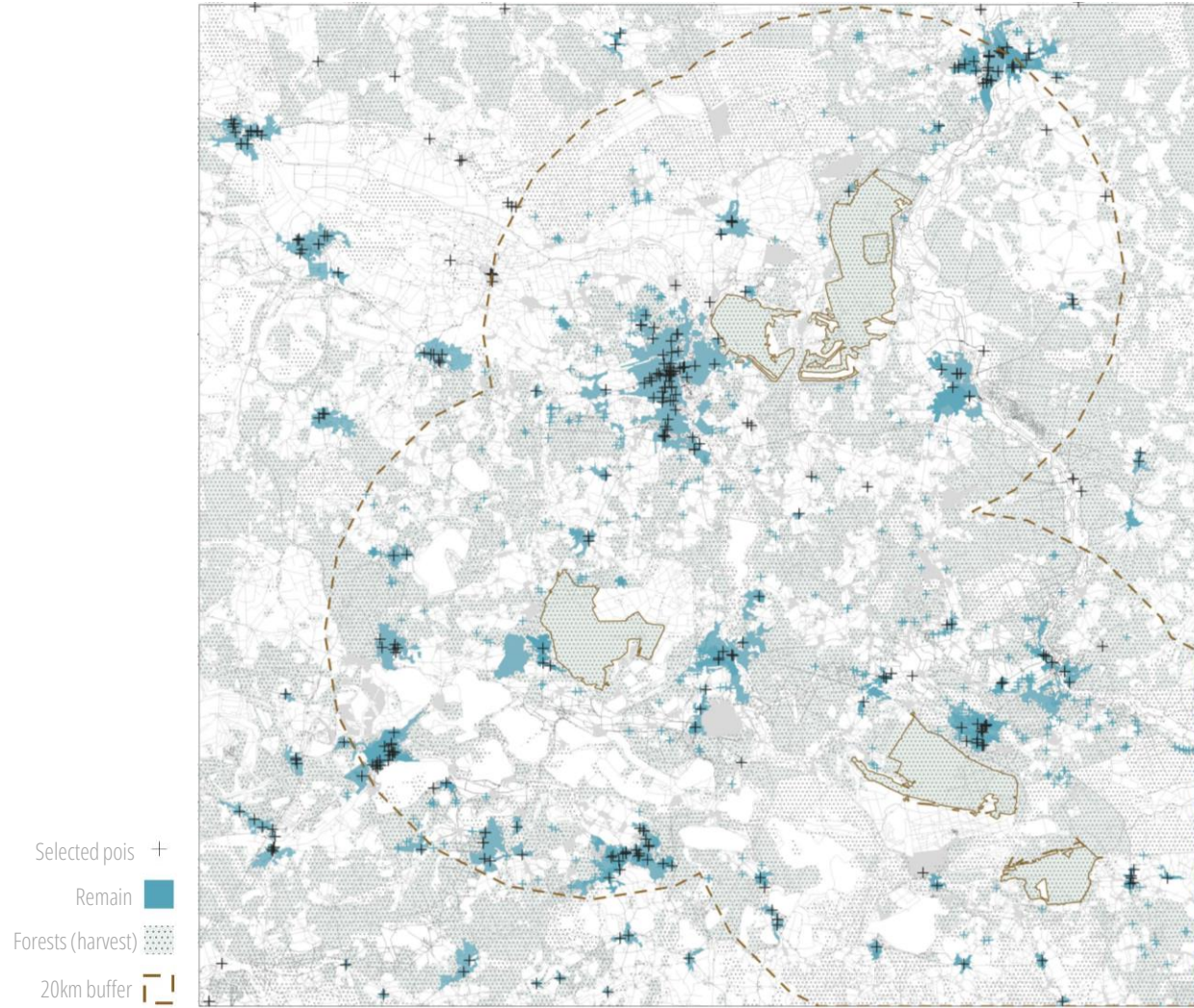
Rail network for the wood economy

Source: author

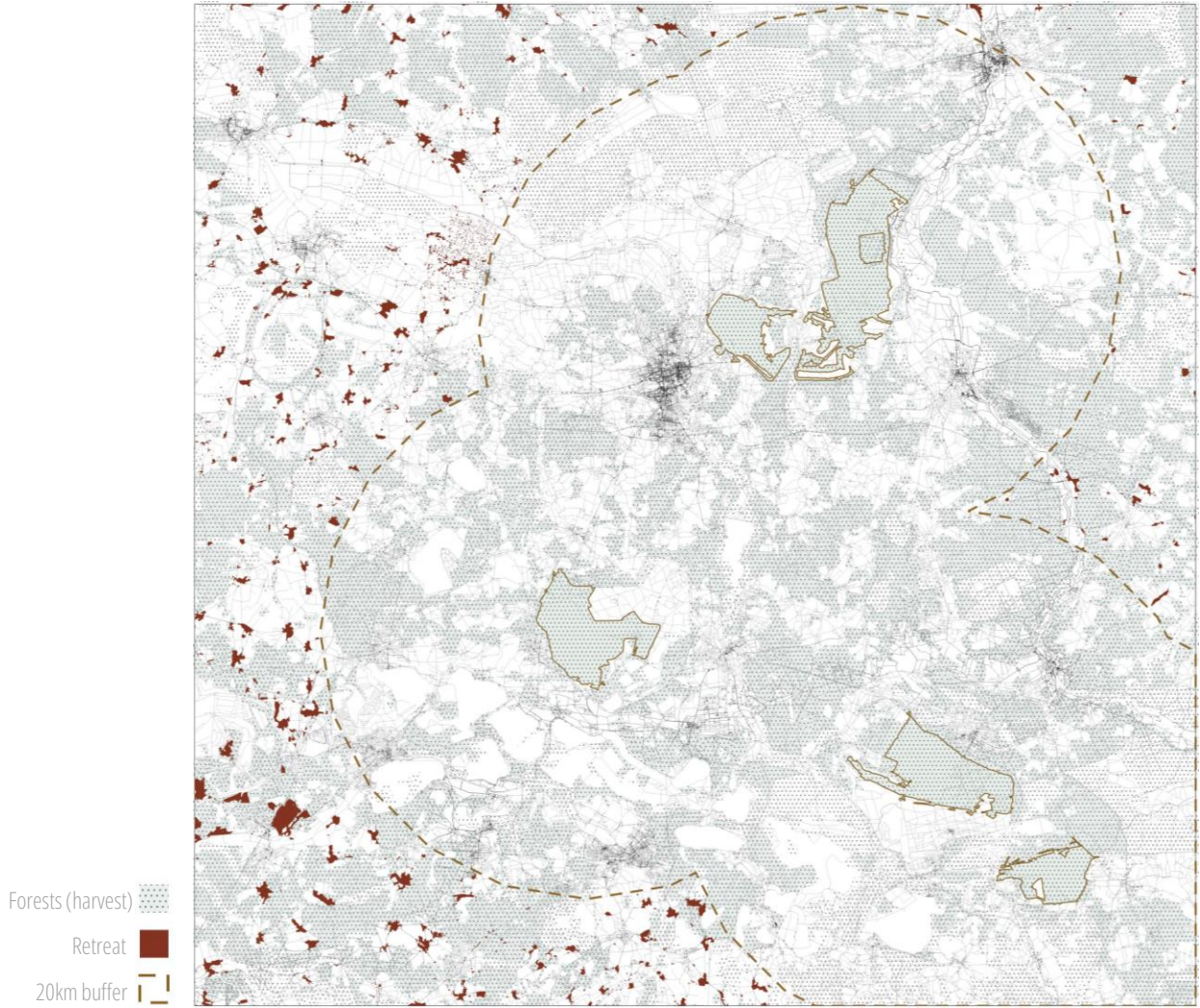


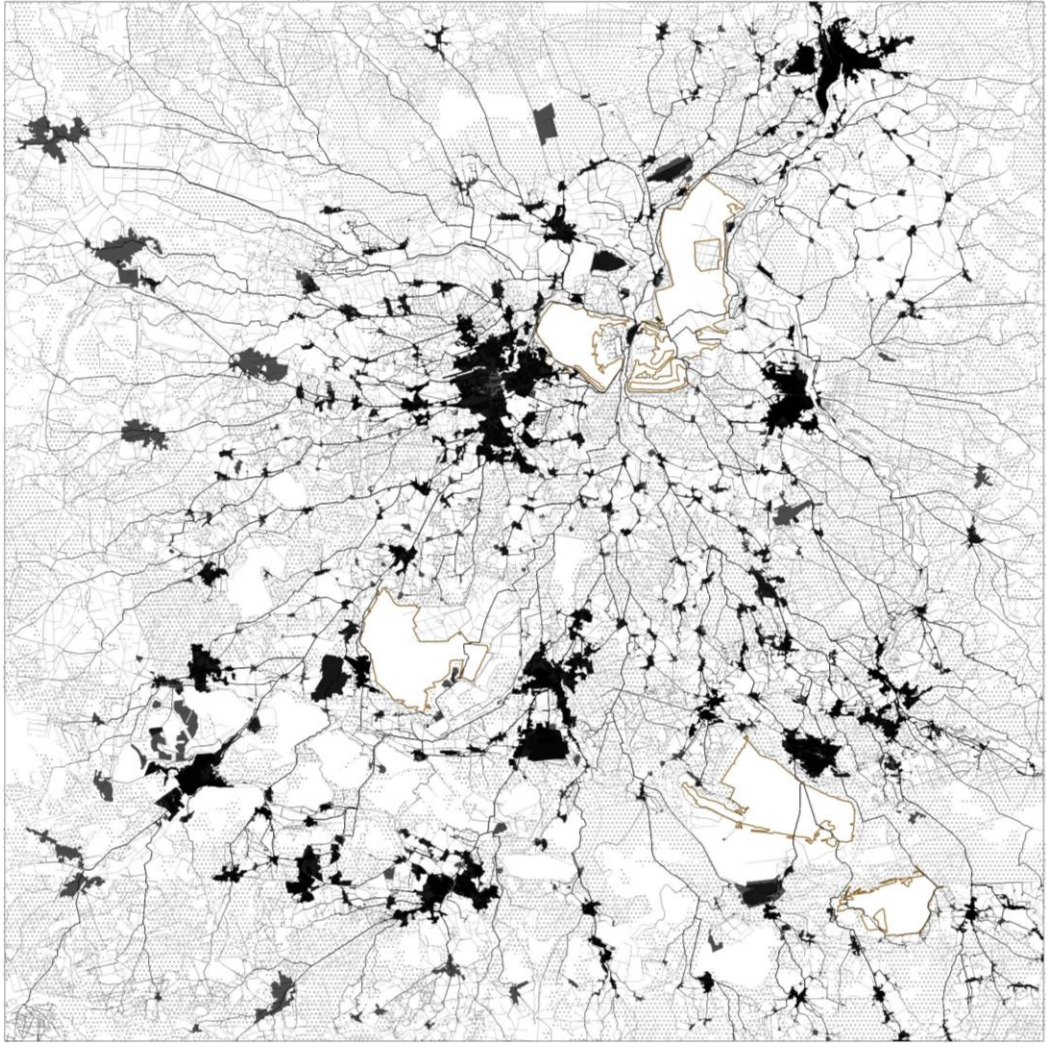
Built areas and network

Living Centers (urban/rural) now  
Source: author



Retreat into...  
Source: author



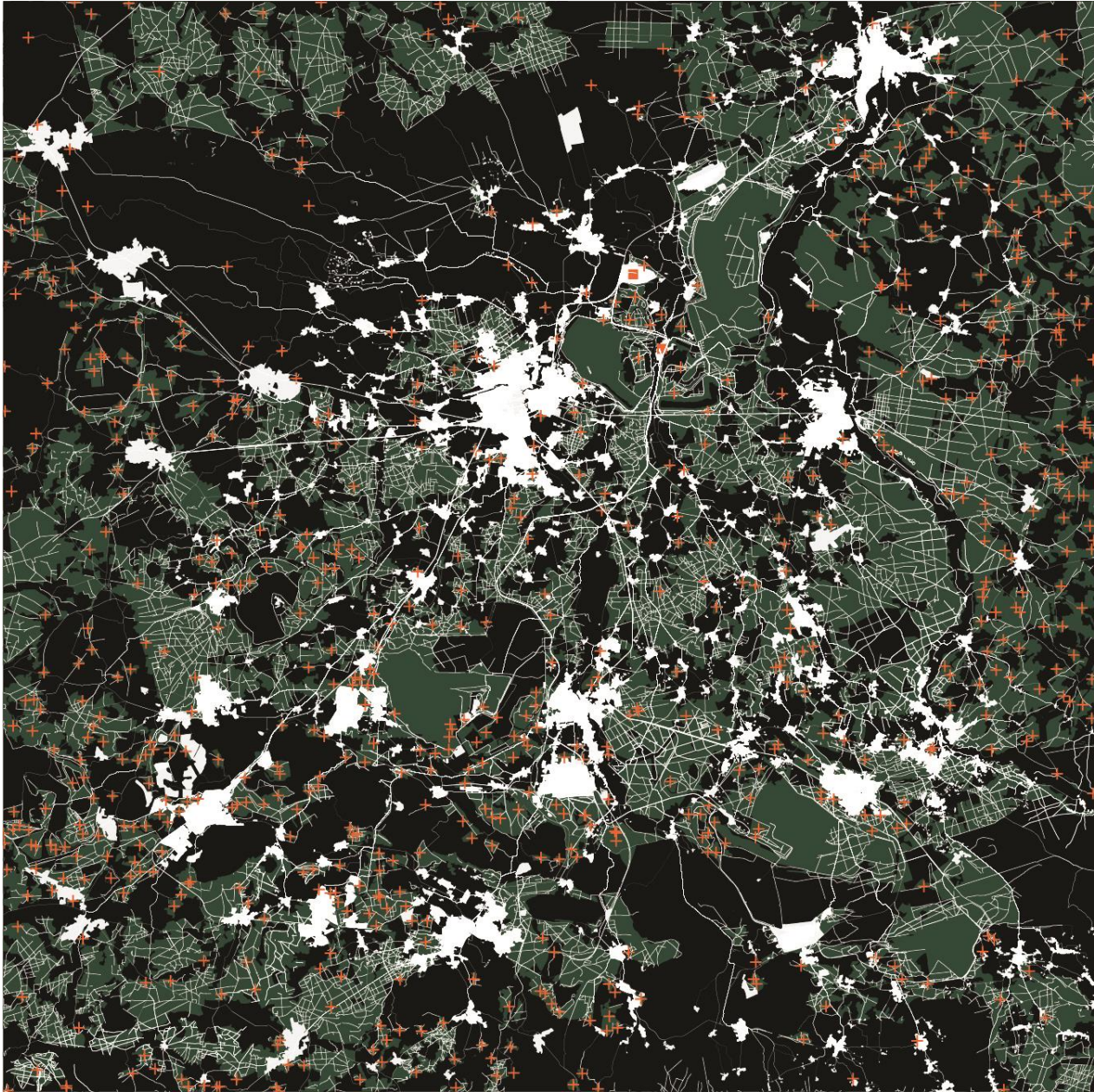


Network —  
Built environment ■

Remaining living centers and network  
Source: author

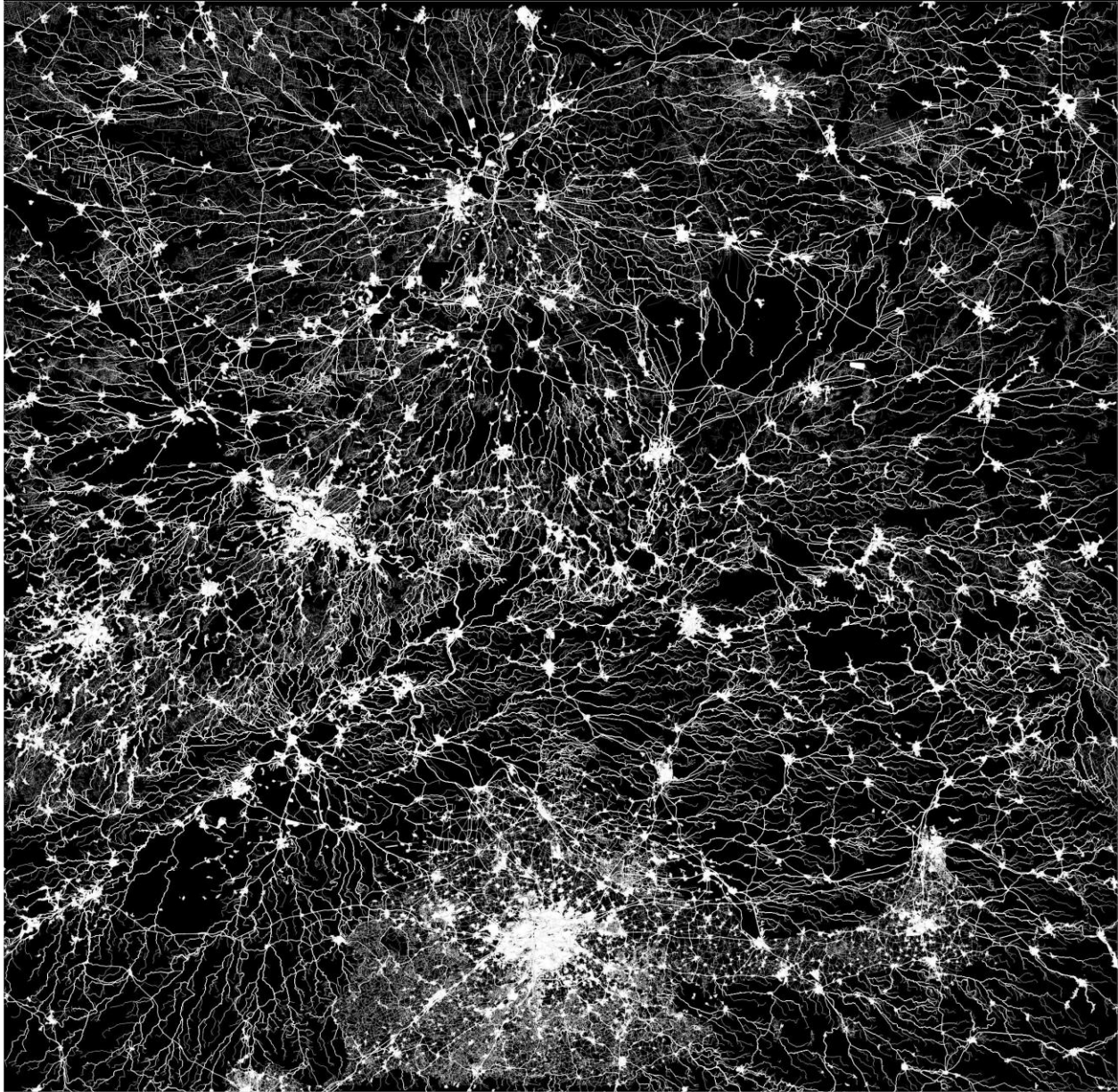






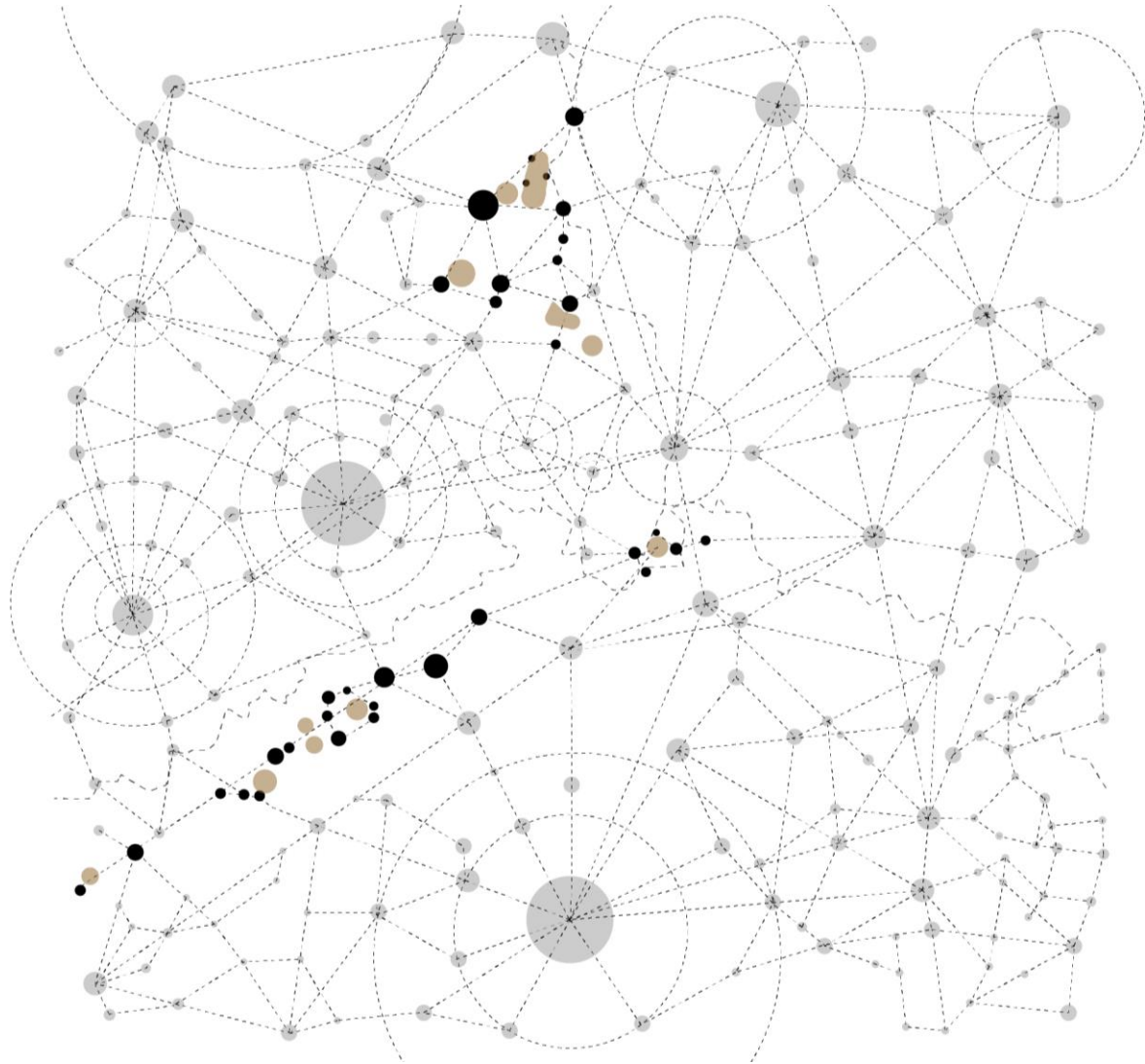
- Network —
- Built areas □
- Potential harvested areas ■
- Forests centers +

The wood economy  
Source: author

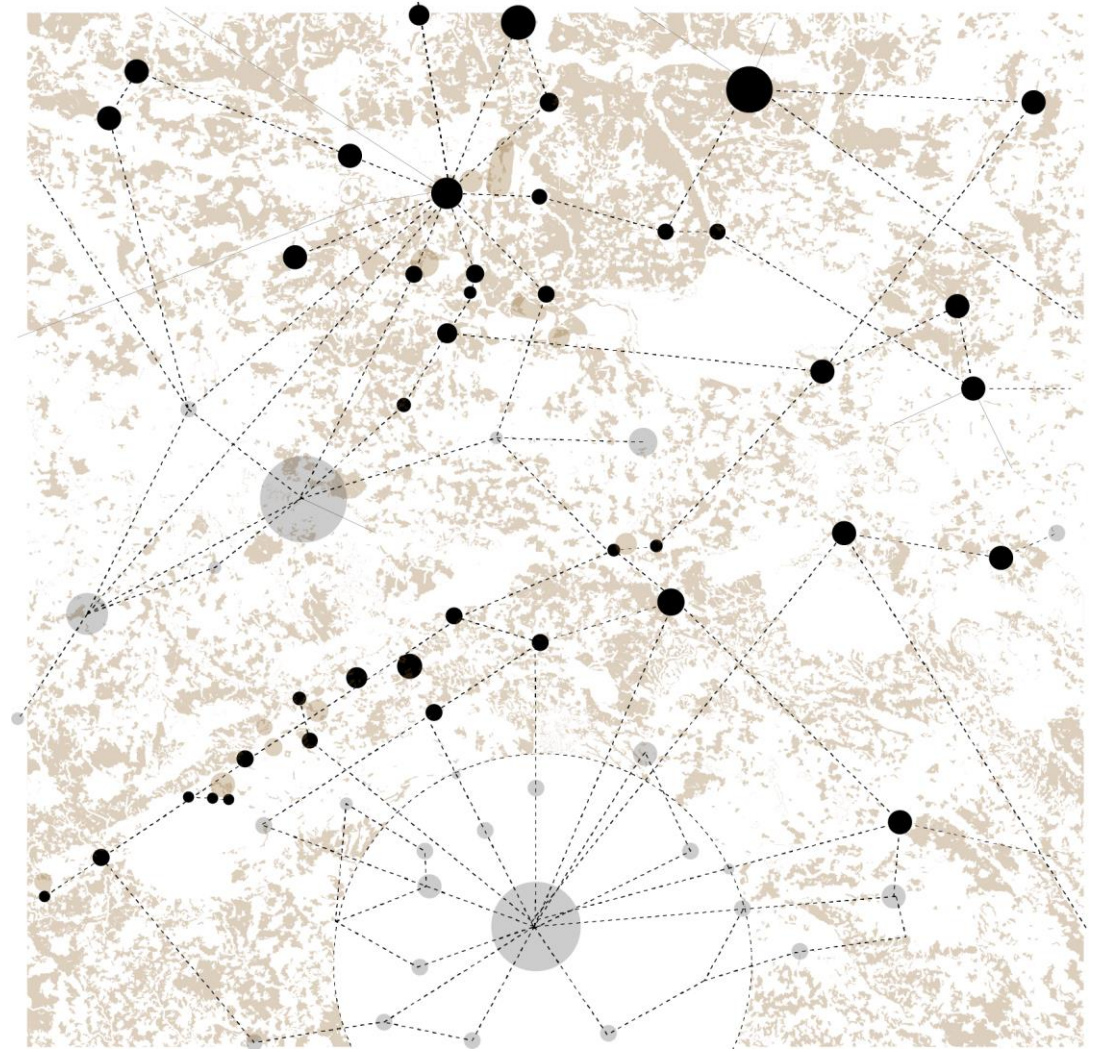


Coal and post-coal spatial footprint

Source: author



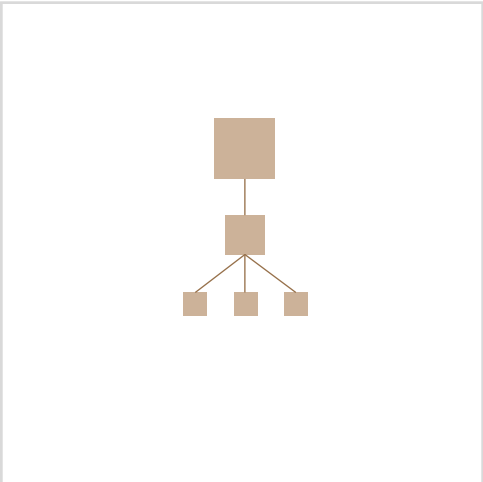
● Coal cities ● Extractive system: coal mines ● Centers (settlements, urban)



● "Extractive system" timber ● Centers (settlements, urban) ● Expanded rural development system



Synthetic drawing  
Source: author

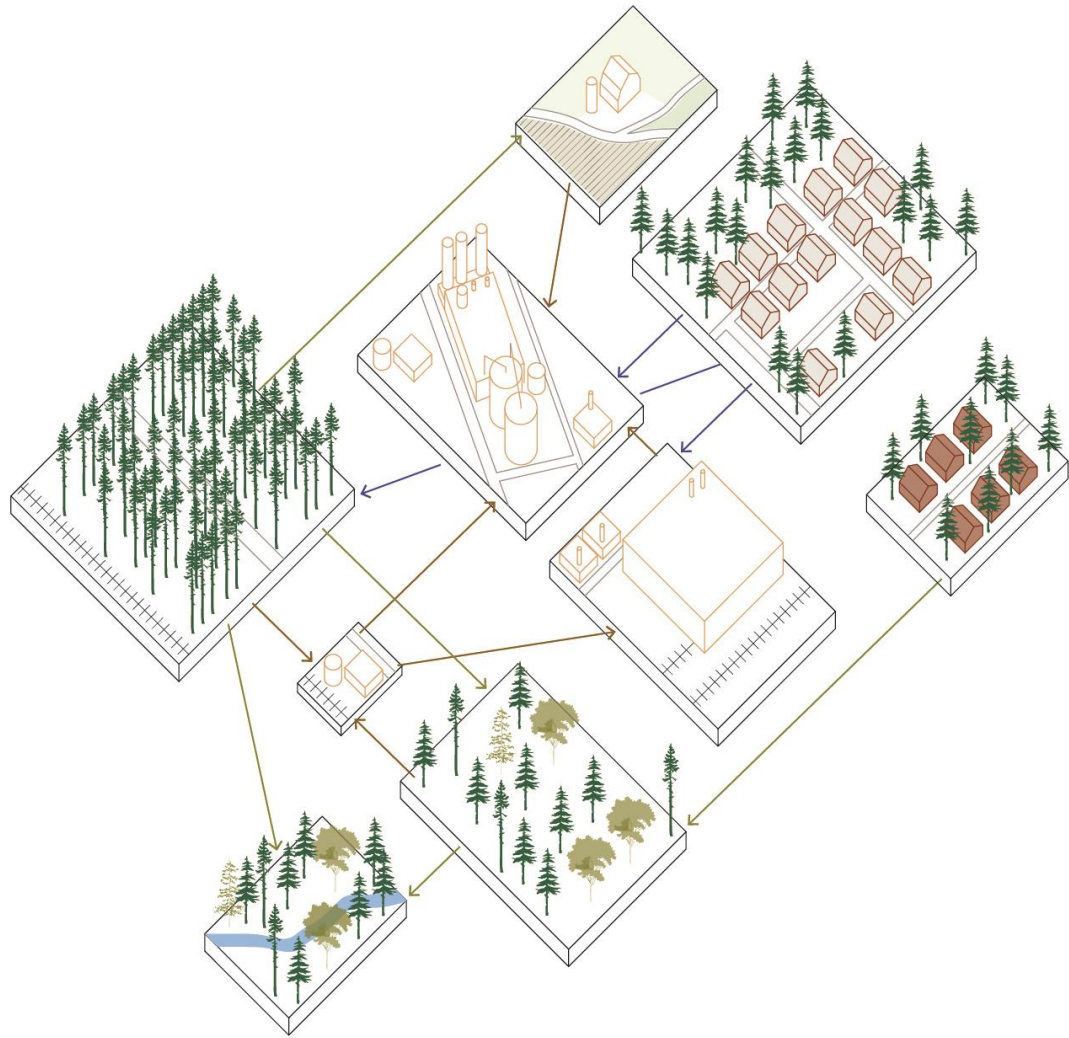


Local interventions

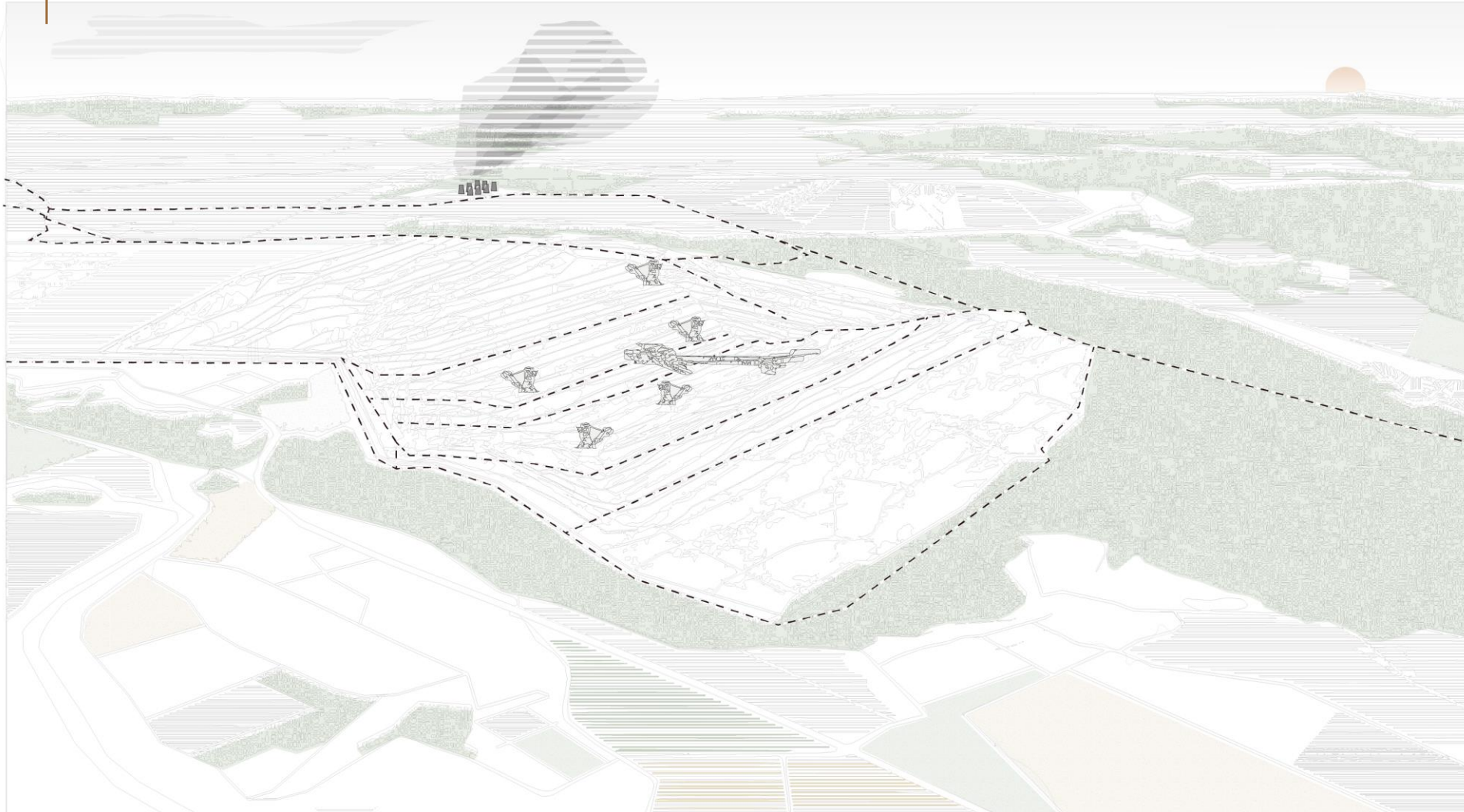


Local interventions in the area around Cottbus and Jänschwalde mine

Source: Google Earth Pro edited by author

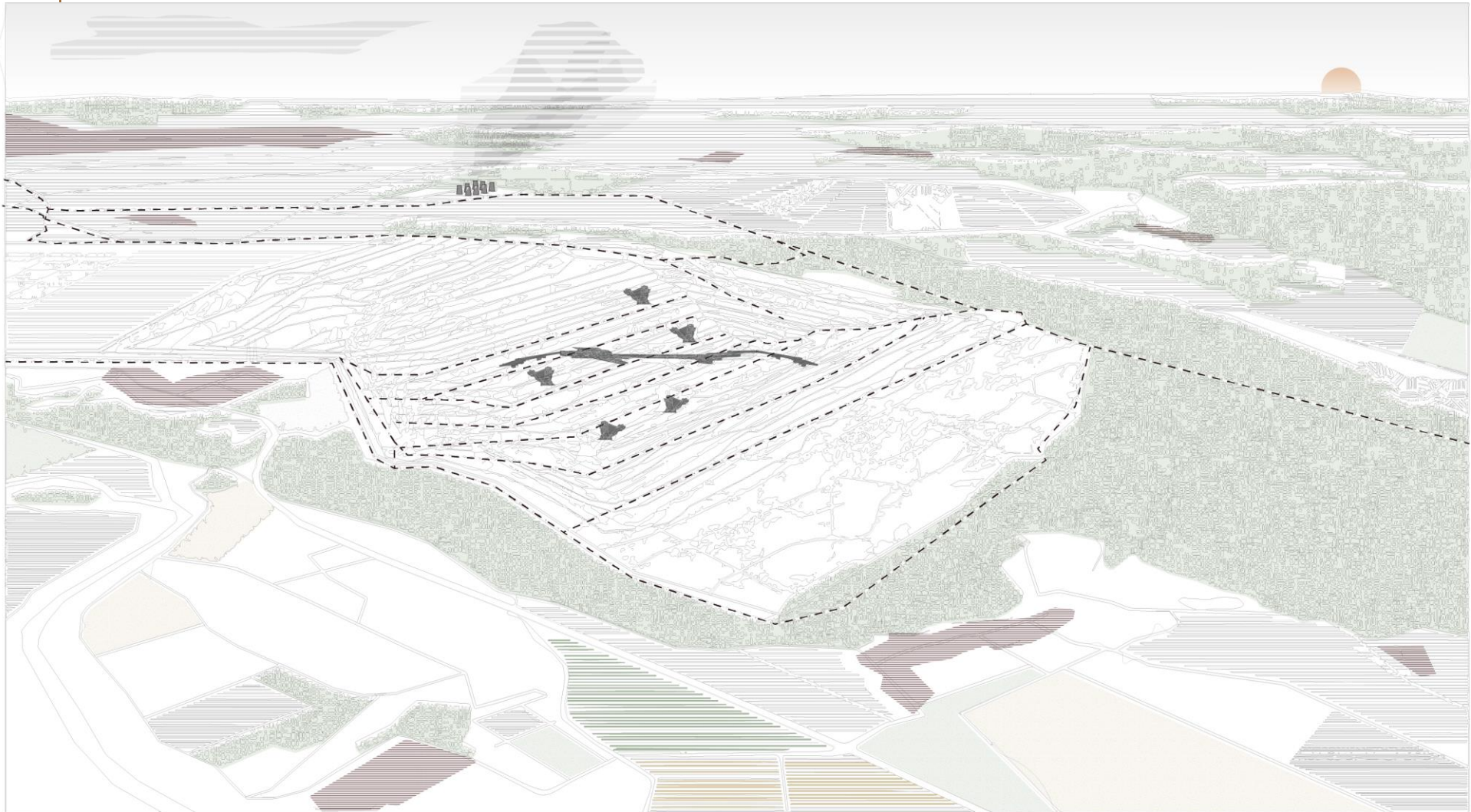


Spatial components of the wood economy  
Source: author



Site 1: Jänschwalde mine Nord  
Source: author





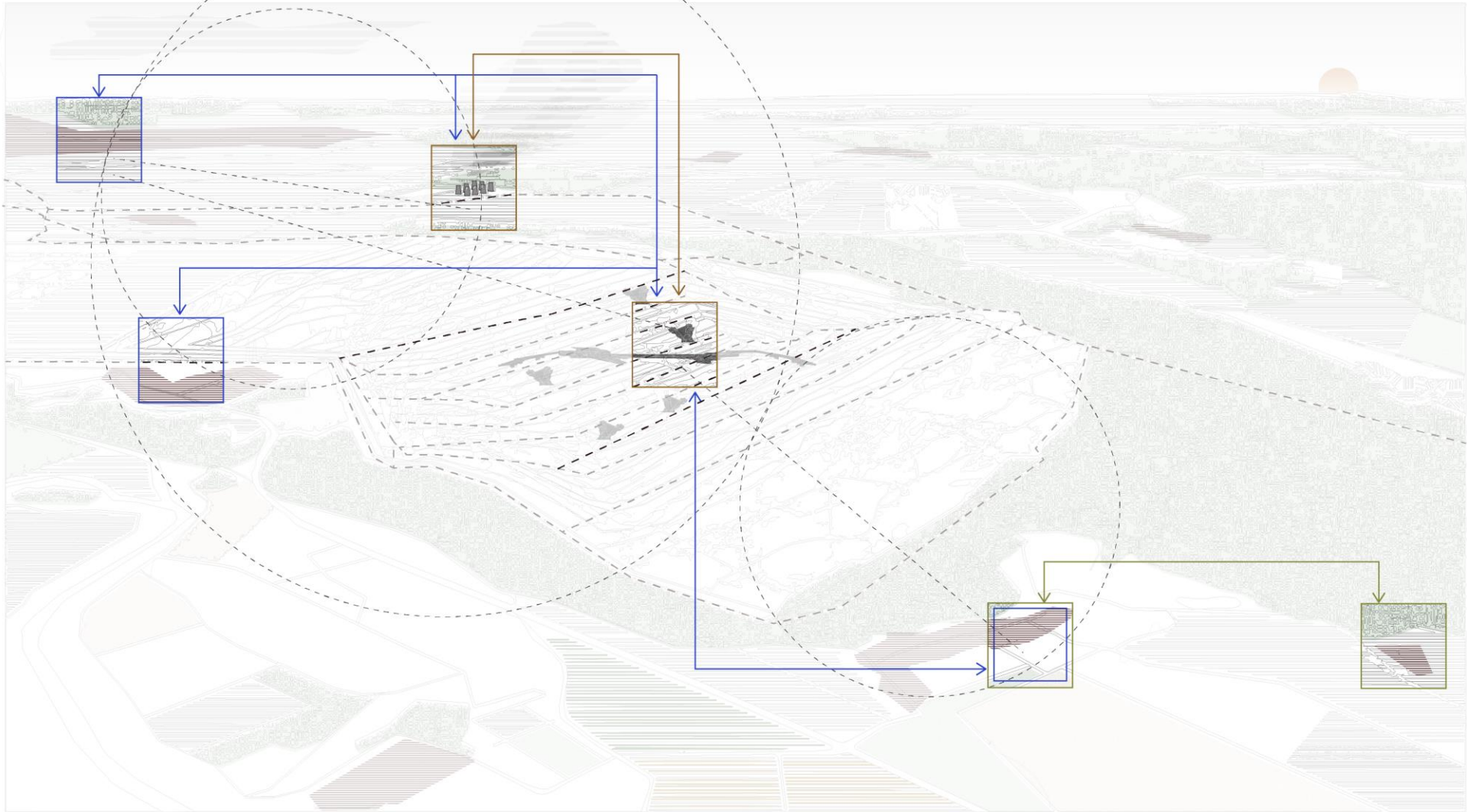
- settlements
- agricultural land
- forests
- - - rail network

Site 1: Jänschwalde mine Nord  
Source: author



- settlements
- agricultural land
- forests
- rail network

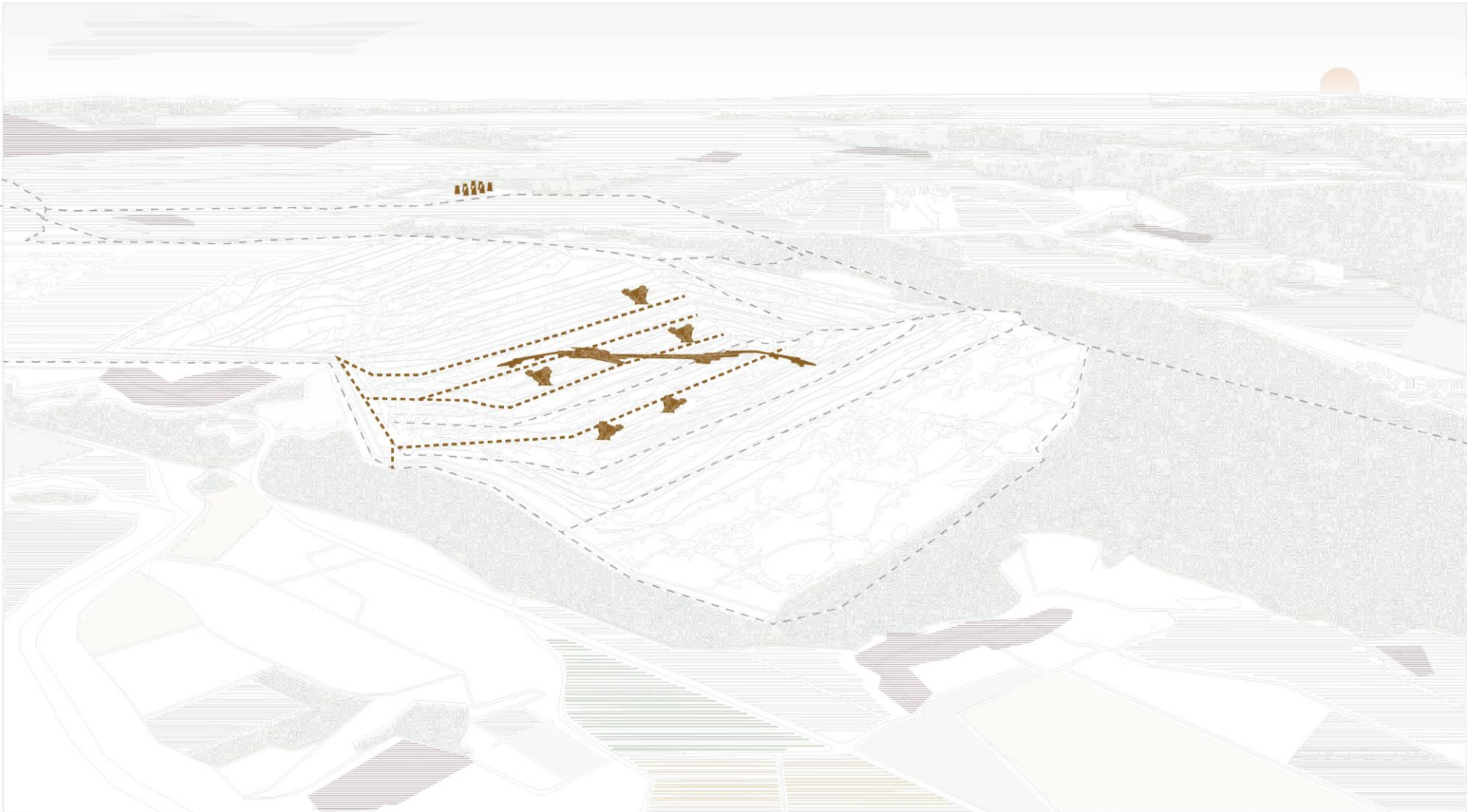
Site 1: Jänschwalde mine Nord  
Source: author



- settlements
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- rail network

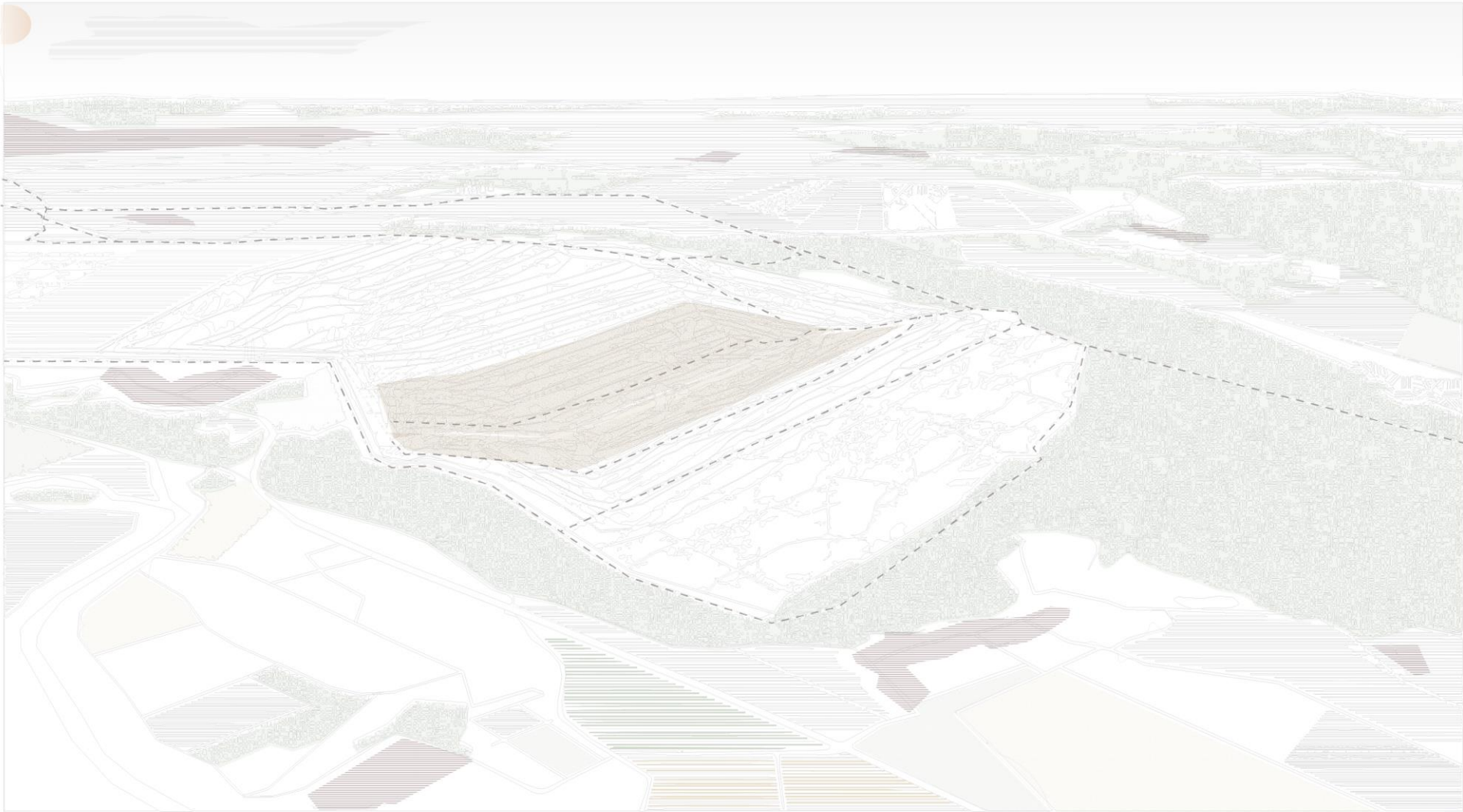
- coal economy
- people
- nature

Site 1: Jänschwalde mine Nord  
Source: author



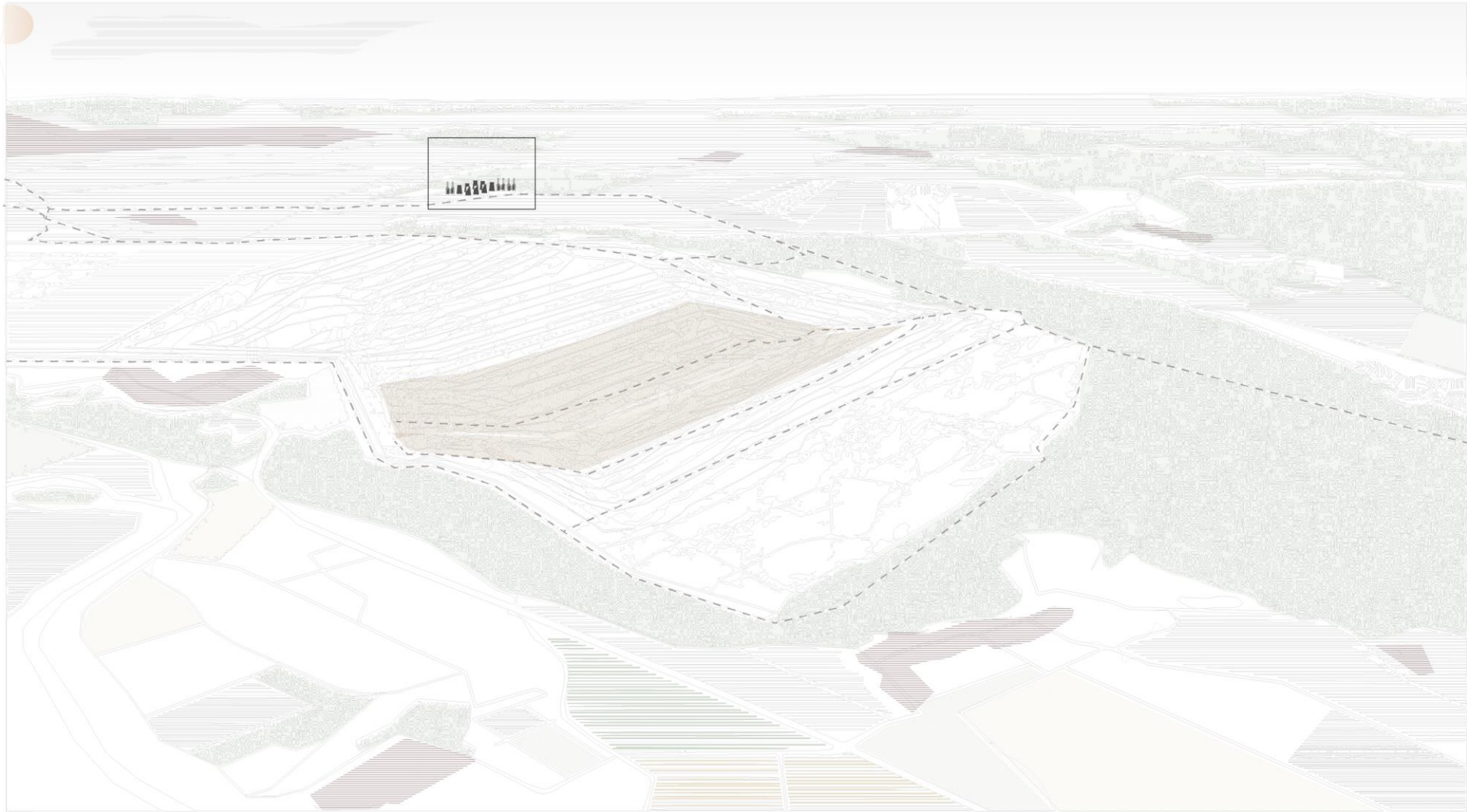
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Site 1: Jänschwalde mine Nord  
Source: author



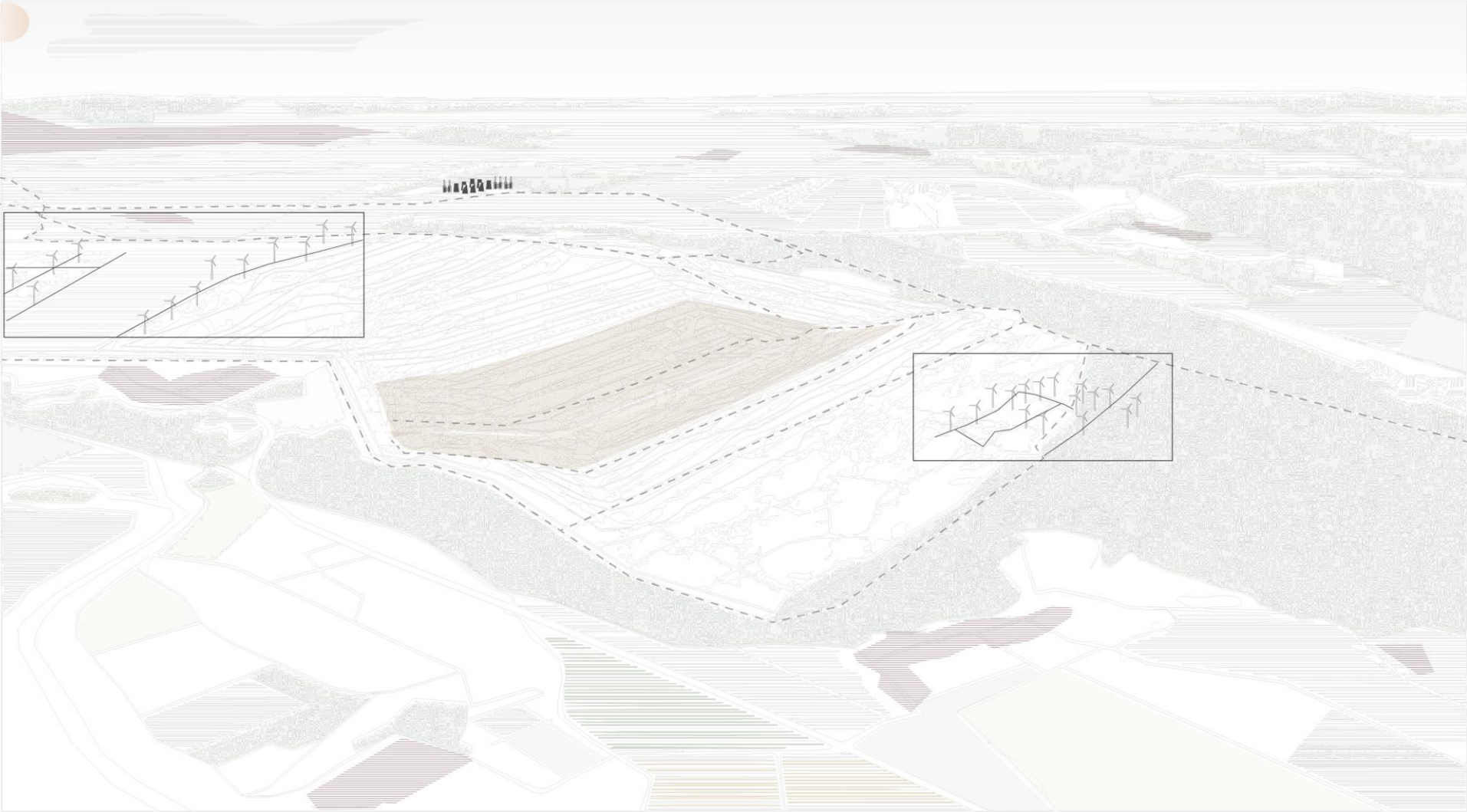
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Site 1: Jänschwalde mine Nord  
Source: author



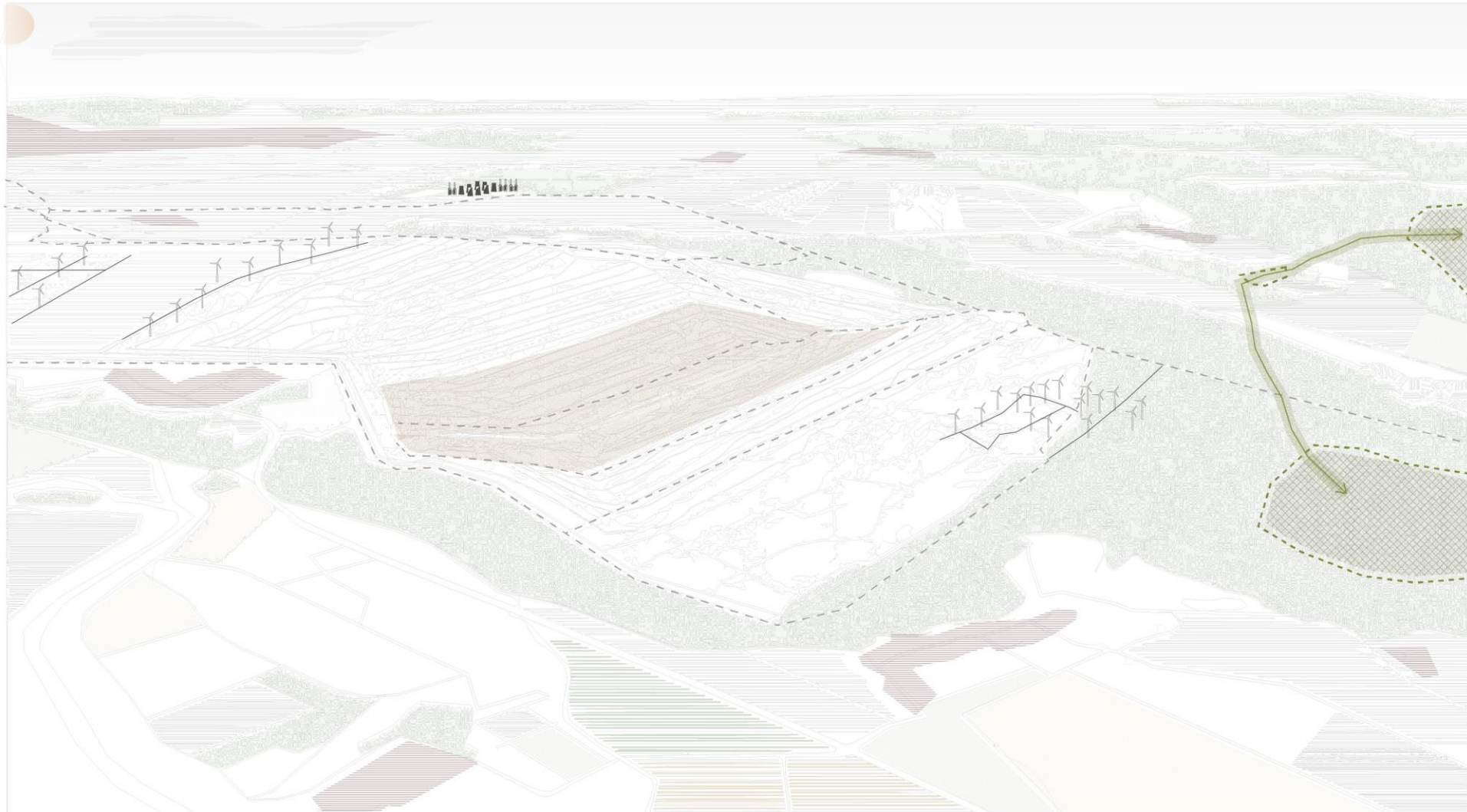
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Site 1: Jänschwalde mine Nord  
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- settlements
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Site 1: Jänschwalde mine Nord  
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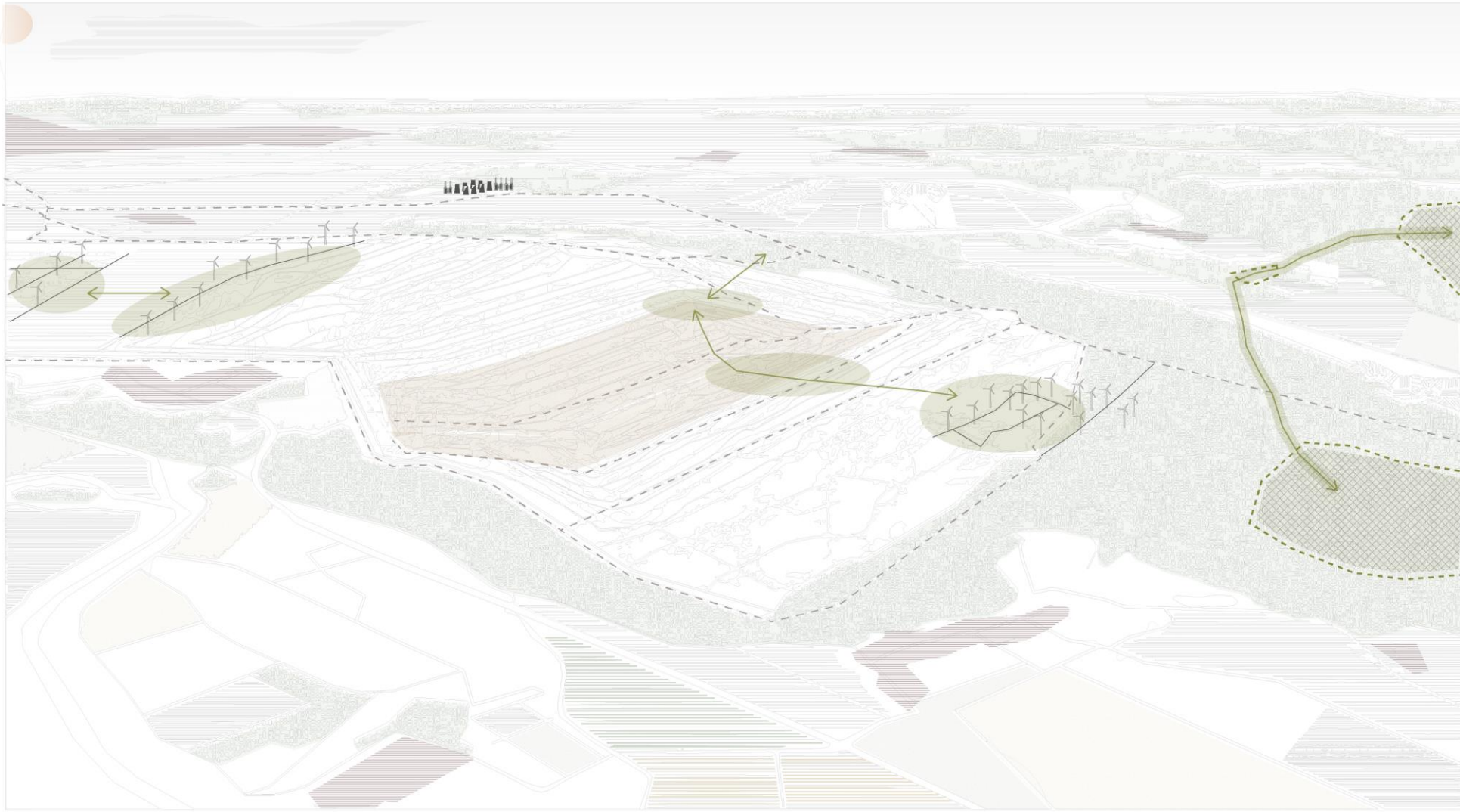


- settlements
- agricultural land
- forests
- rail network

- Reclaimed soil
- Forest core
- Biodiversity corridor

Site 1: Jänschwalde mine Nord  
Source: author

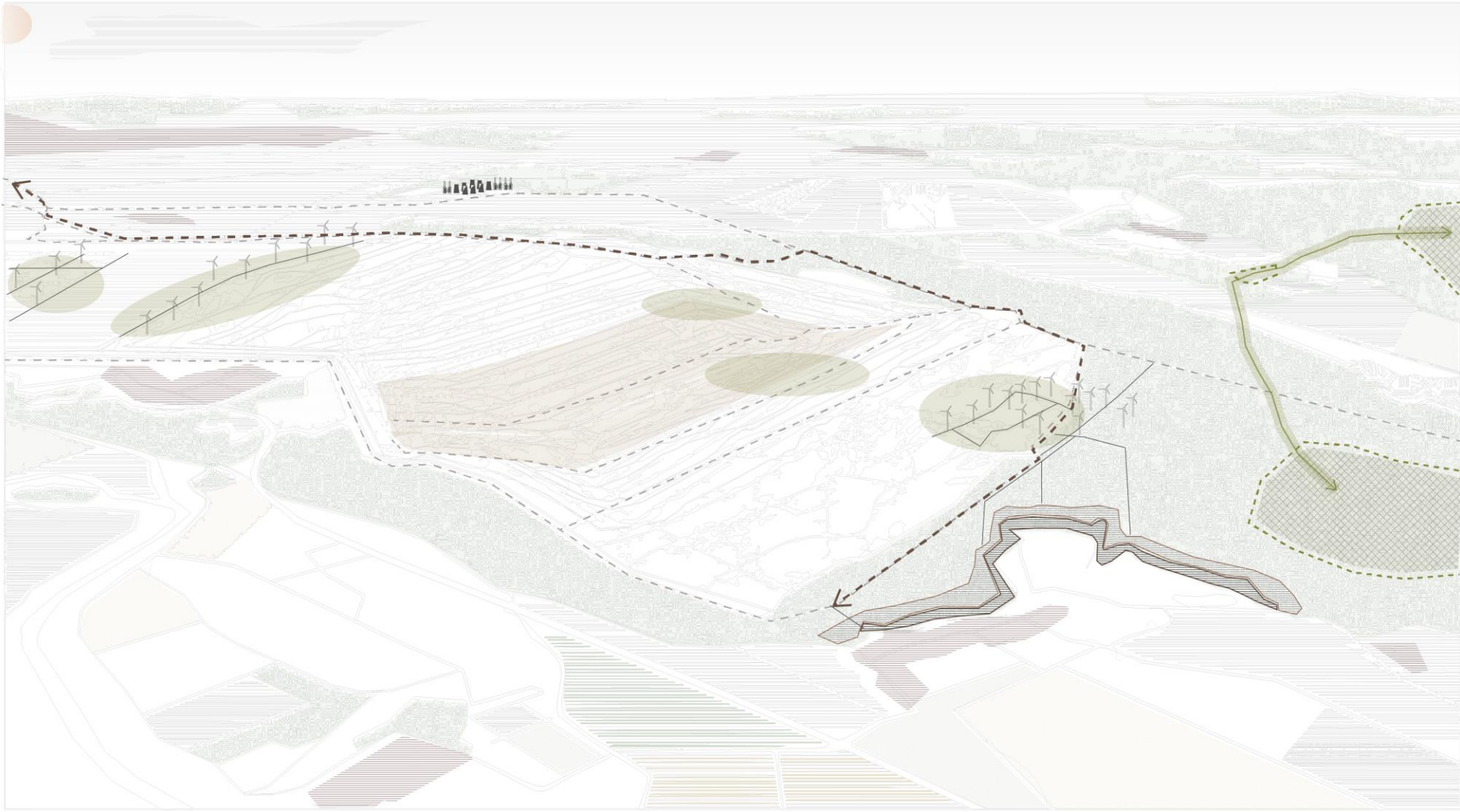




settlements  
agricultural land  
forests  
rail network

Reclaimed soil  
Forest core  
Biodiversity corridor  
plantations

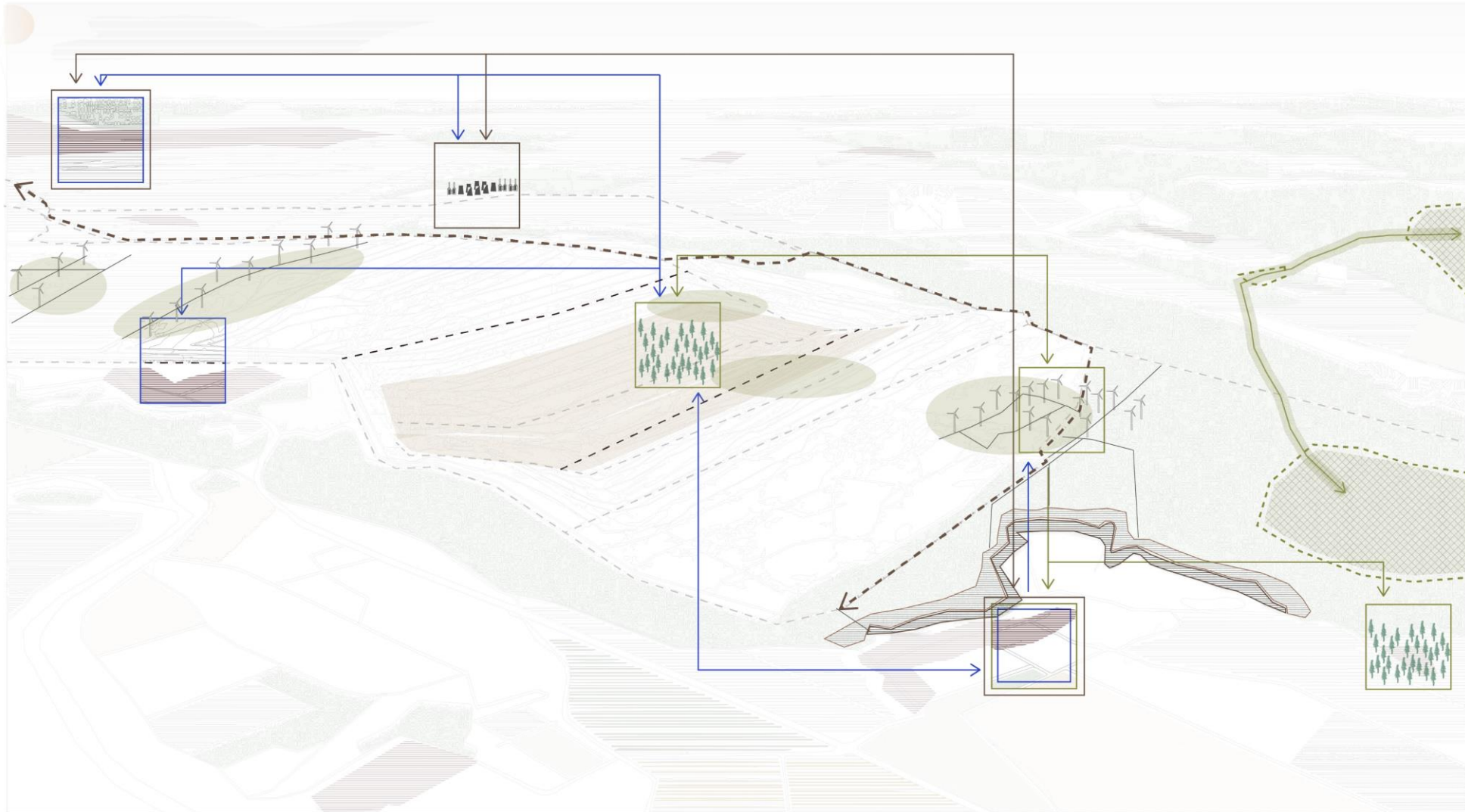
Site 1: Jänschwalde mine Nord  
Source: author



settlements  
agricultural land  
forests  
rail network

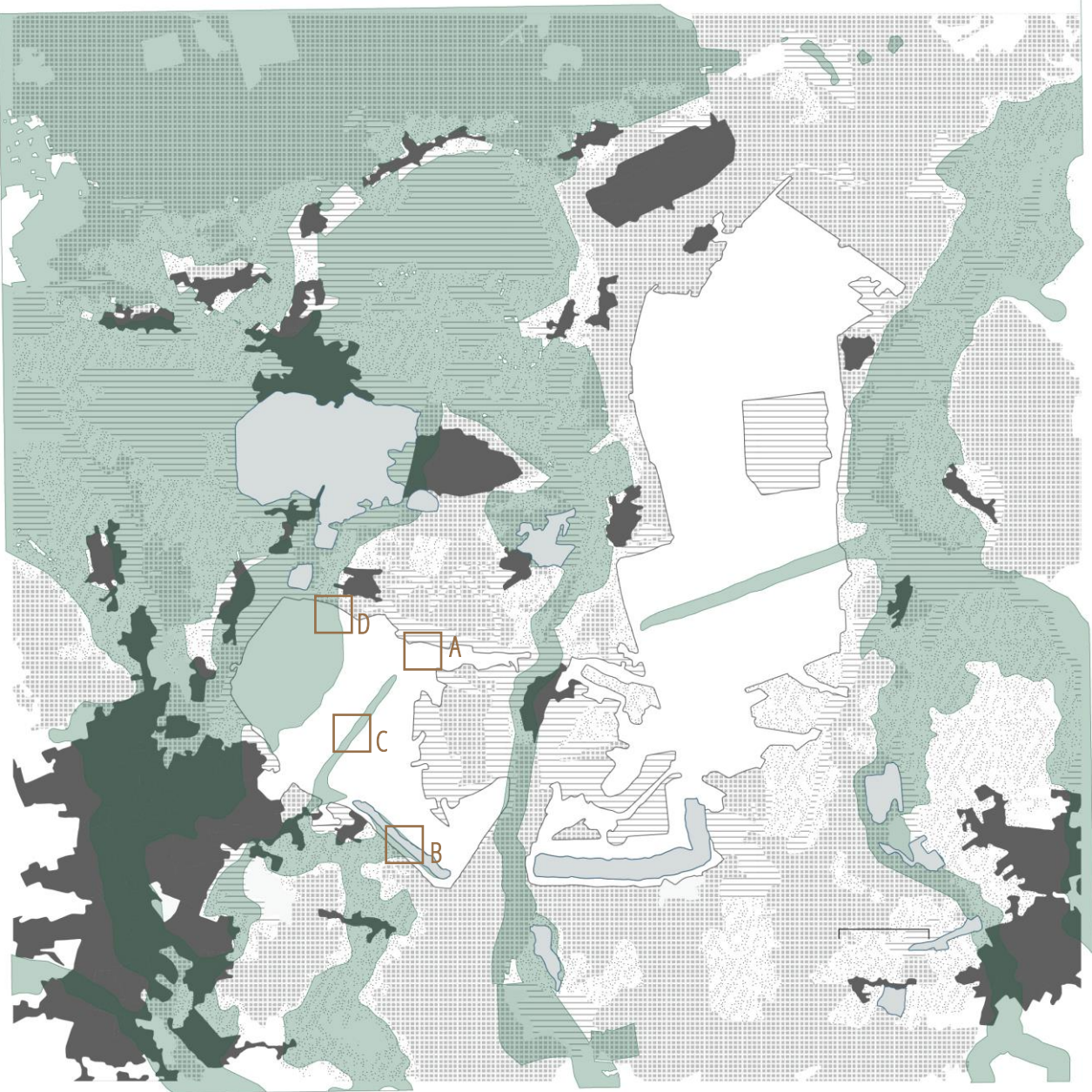
Reclaimed soil  
Forest core  
Biodiversity corridor  
plantations  
Wood thinning  
Wood harvesting  
Timber transportation

Site 1: Jänschwalde mine Nord  
Source: author

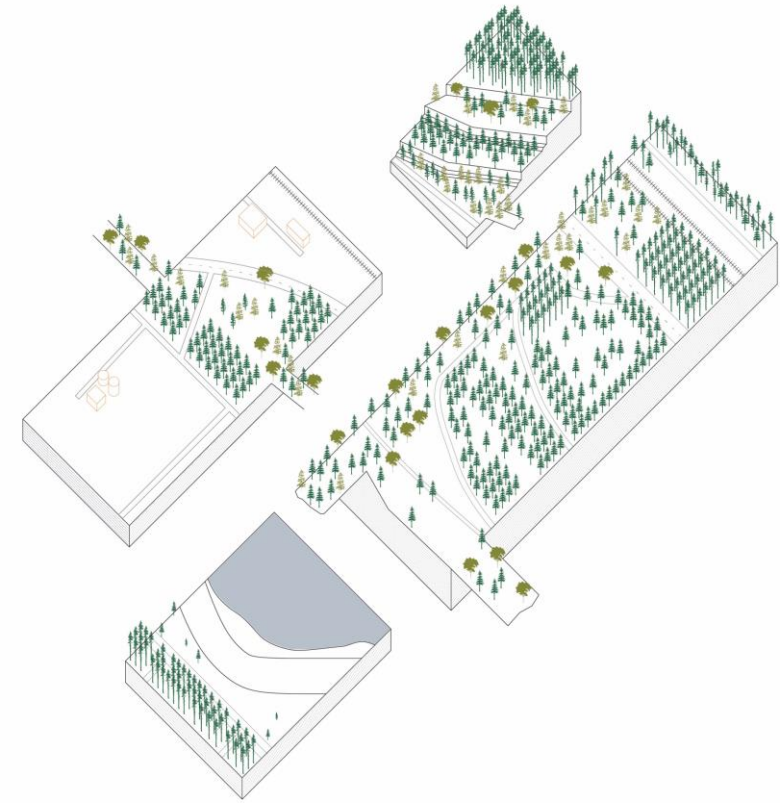
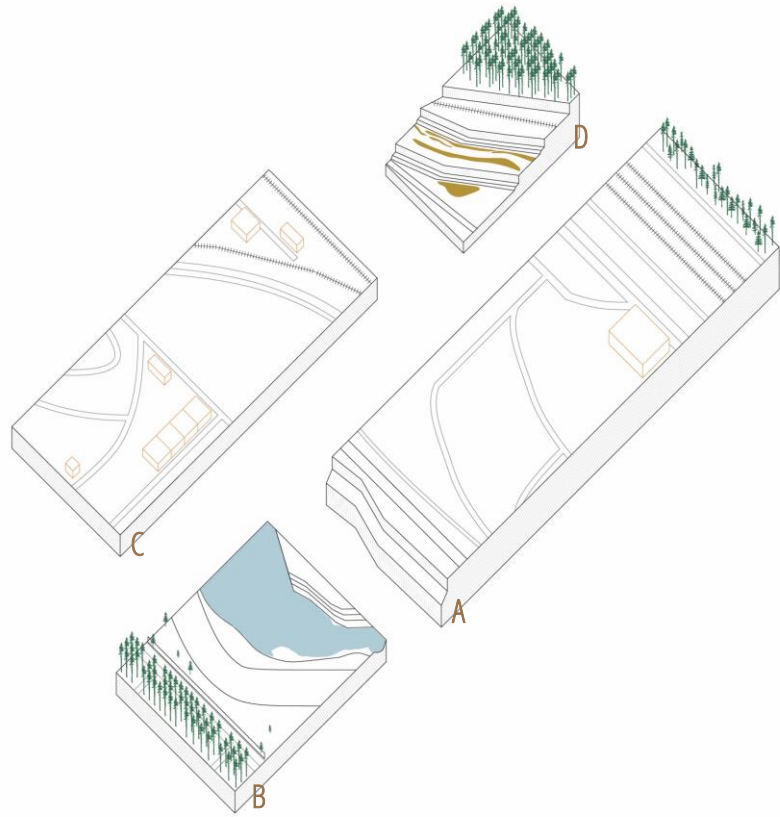


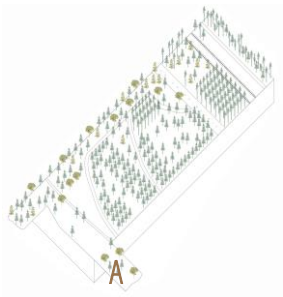
- Reclaimed soil
- Forest core
- Biodiversity corridor
- plantations
- Wood thinning
- Wood harvesting
- Timber transportation

- people
- wood economy
- nature

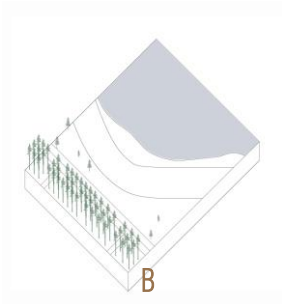


Interventions inspired from the strategy for forest/biodiversity growth in Cottbus former mine  
Source: author

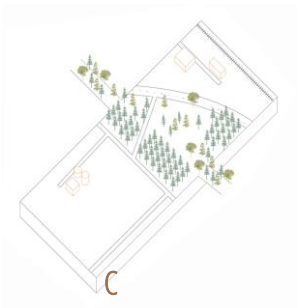




Waldkindergarten in Cottbuser Ostsee  
Source: author

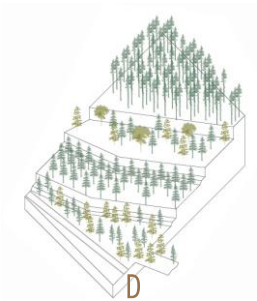


Recreational activities in Cottbuser Ostsee  
Source: author

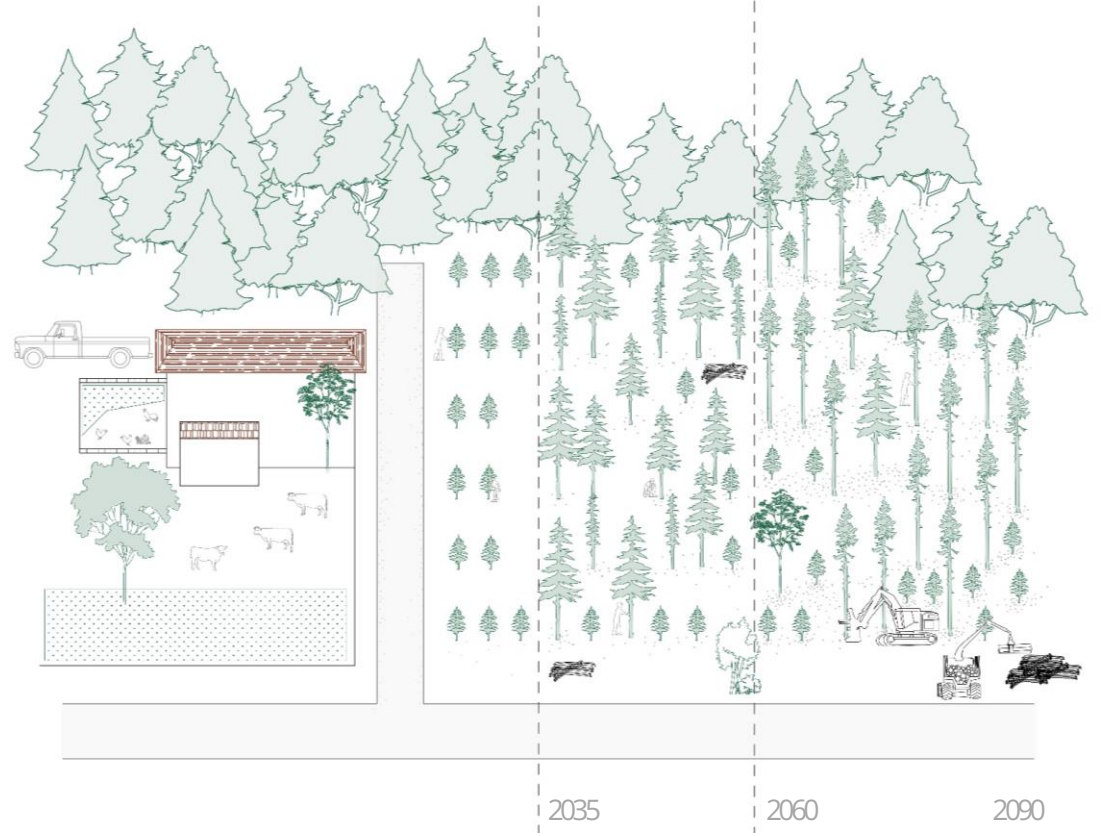
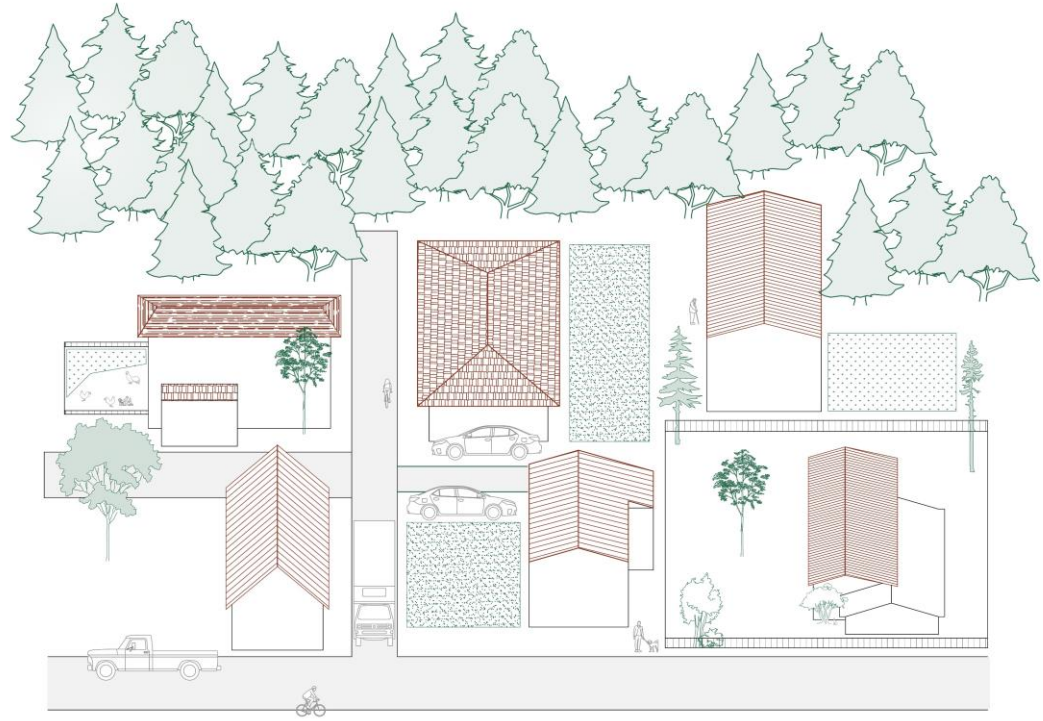


Agro-forestry activities in Cottbuser Ostsee  
Source: author

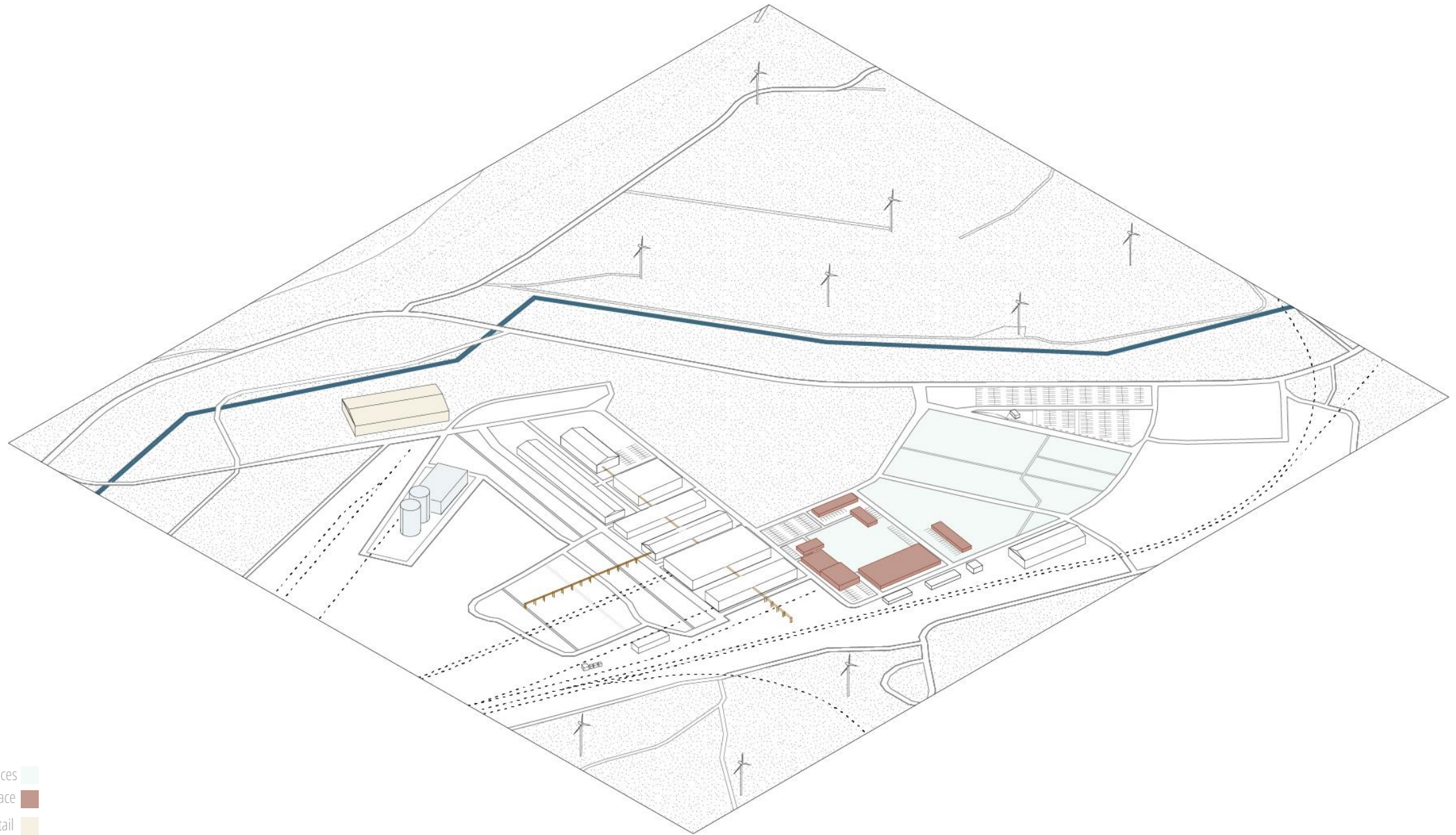




Biodiversity corridors in Cottbuser Ostsee  
Source: author



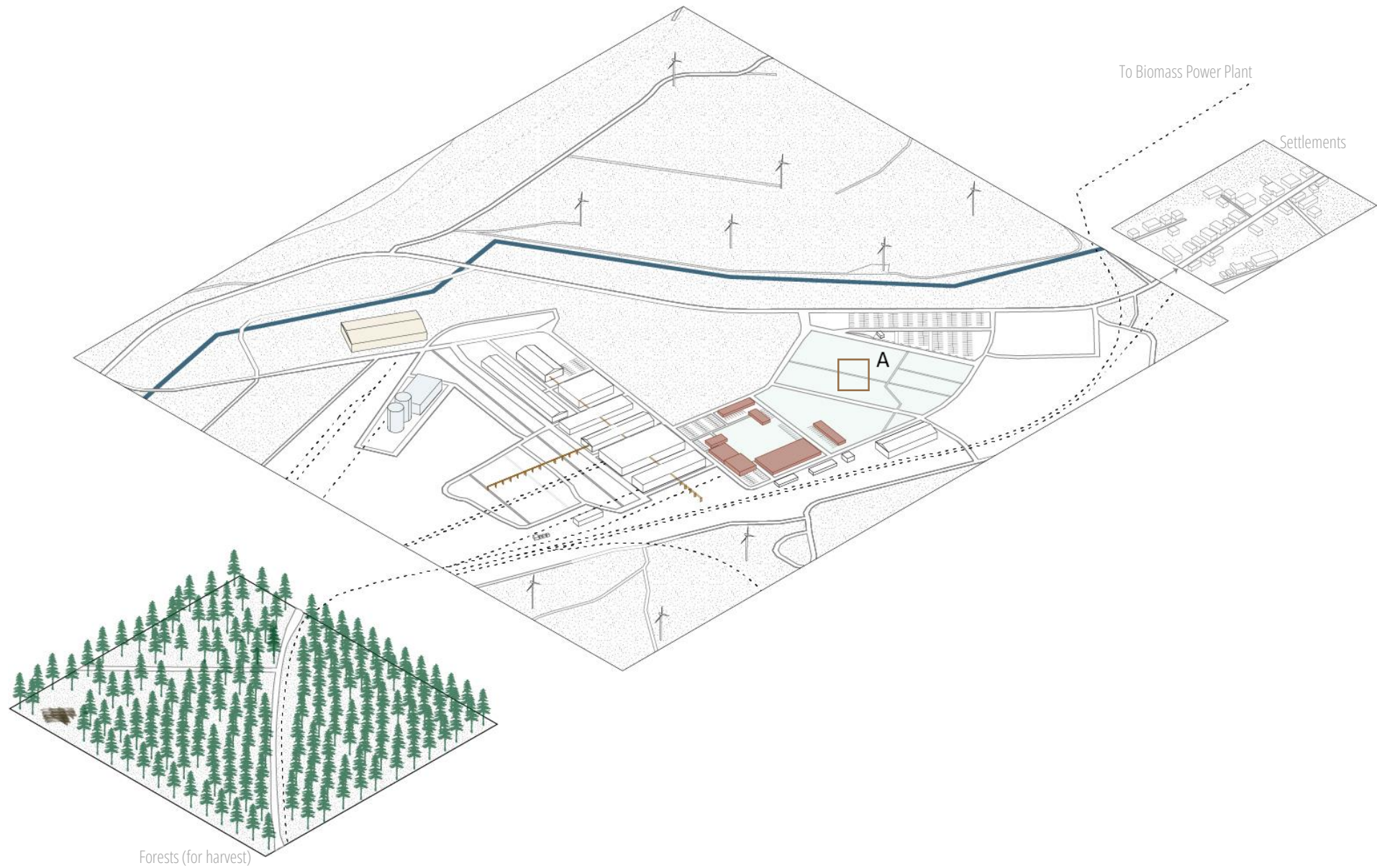
Settlements in the coal and post-coal times  
Source: author



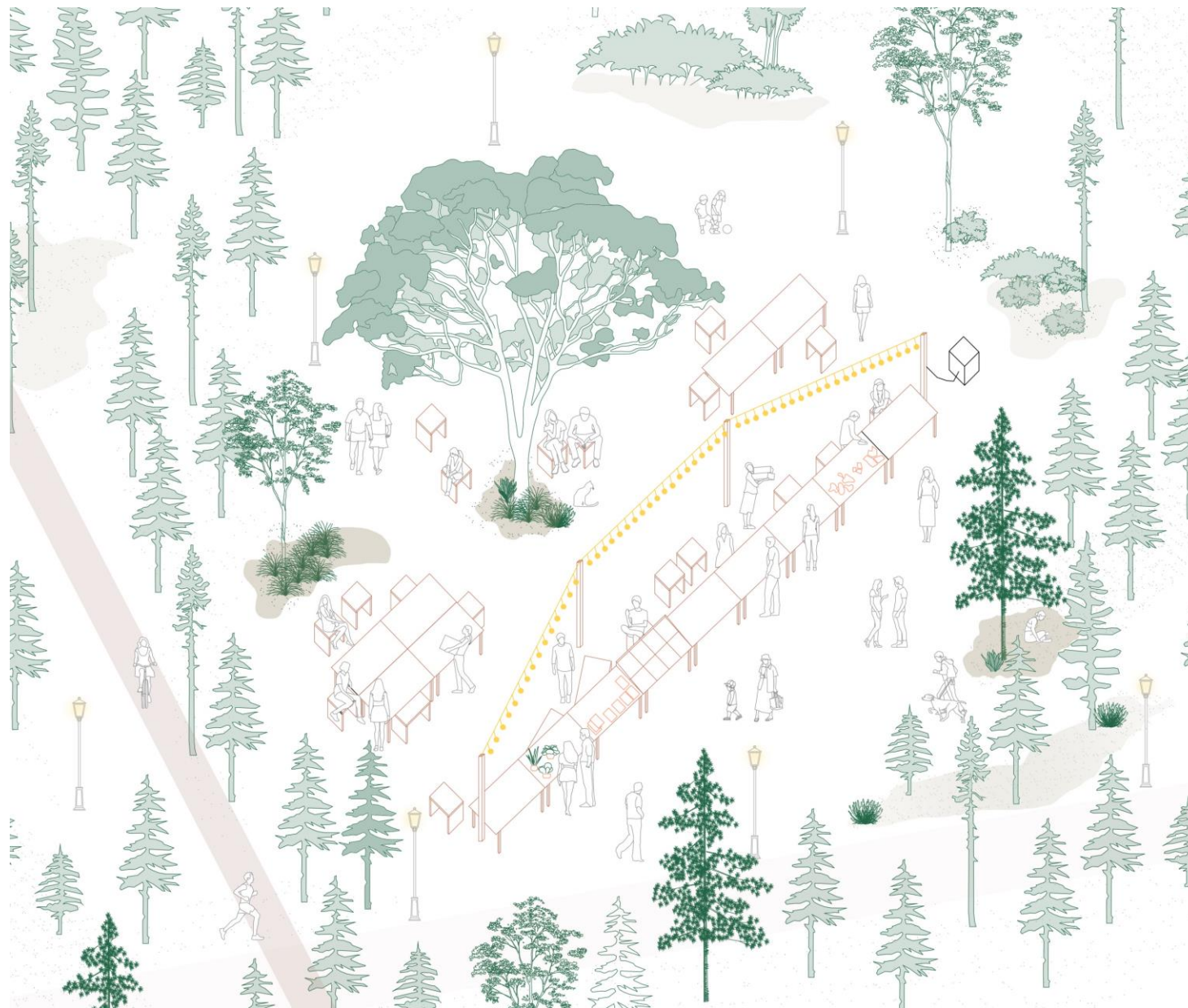
- Community spaces
- Makers' space
- Retail
- Storage (biomass)
- Rail

Wood processing units, auxiliary services and community spaces

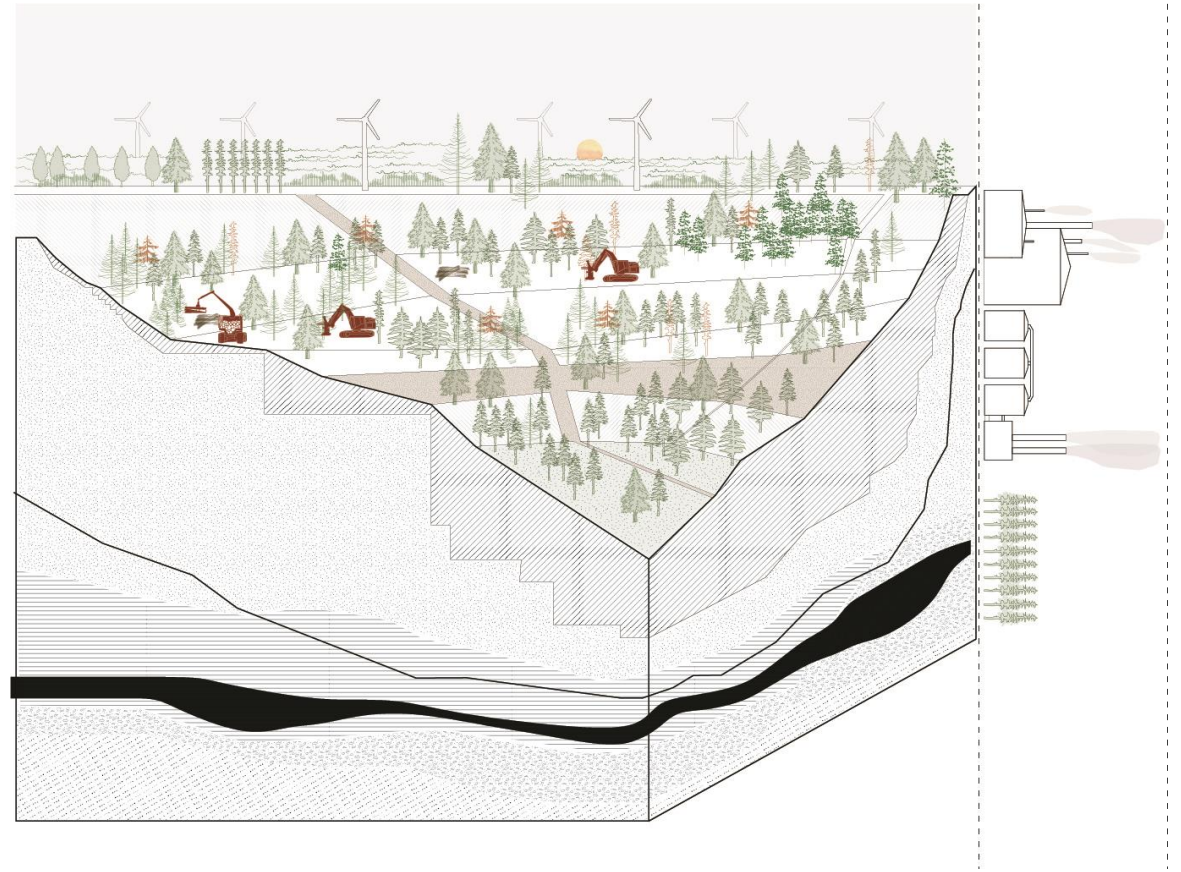
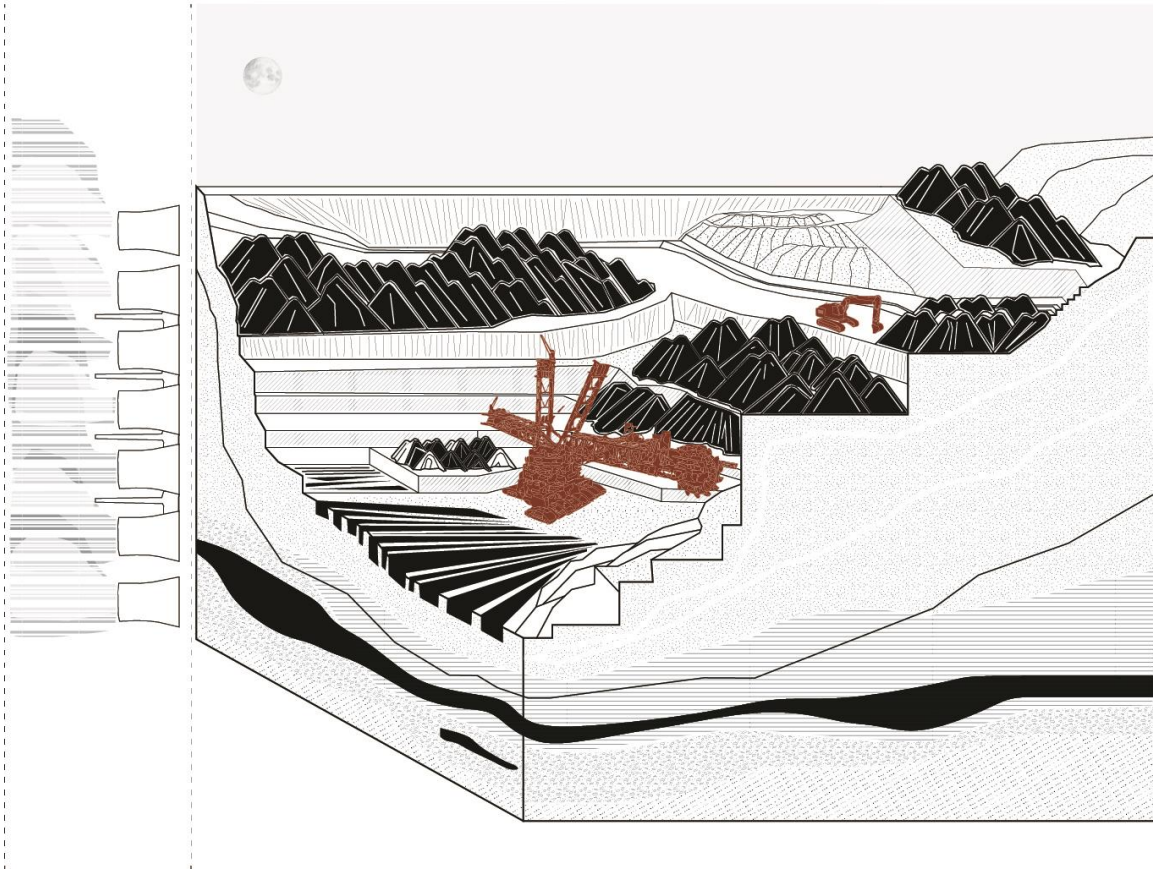
Source: author



Wood hub and connected components  
Source: author



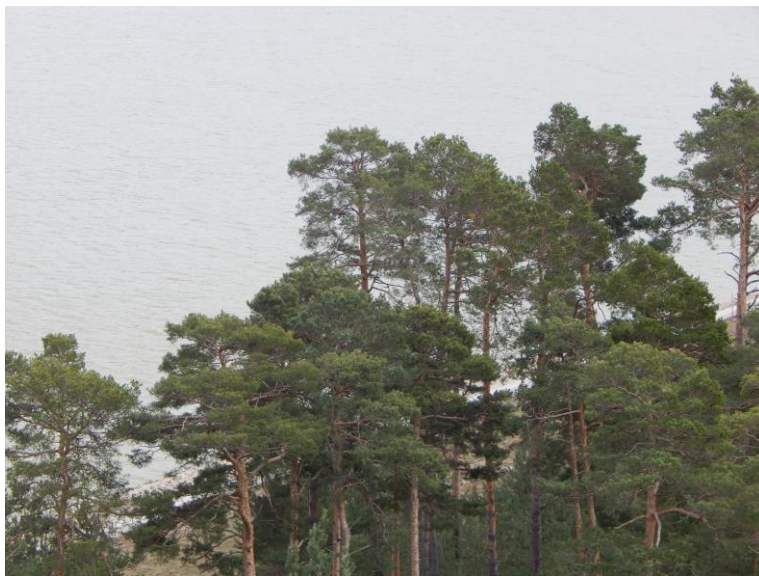
Public spaces  
Source: author





Cottbus mine  
Source: author

## Chapter 6: Epilogue







Systemic zone, forests and coal mines  
Source: author

Σὰ βγεῖς στὸν πηγαμὸ γιὰ τὴν Ἰθάκη,  
νὰ εὕχεσαι νᾶναι μακρὺς ὁ δρόμος,  
γεμάτος περιπέτειες, γεμάτος γνώσεις.

Τοὺς Λαιστρυγῶνας καὶ τοὺς Κύκλωπας,  
τὸν θυμωμένο Ποσειδῶνα μὴ φοβᾶσαι,  
τέτοια στὸν δρόμο σου ποτέ σου δὲν θὰ βρεῖς,  
ἂν μὲν ἢ σκέψεις σου ὑψηλῆ, ἂν ἐκλεκτὴ  
συγκίνησις τὸ πνεῦμα καὶ τὸ σῶμα σου ἀγγίζει.

Τοὺς Λαιστρυγῶνας καὶ τοὺς Κύκλωπας,  
τὸν ἄγριο Ποσειδῶνα δὲν θὰ συναντήσεις,  
ἂν δὲν τοὺς κουβανεῖς μὲς στὴν ψυχὴ σου,  
ἂν ἢ ψυχὴ σου δὲν τοὺς στήνει ἐμπρὸς σου.

.Νὰ εὕχεσαι νὰ ἴναι μακρὺς ὁ δρόμος.  
Πολλὰ τὰ καλοκαιρινὰ πρωῖὰ νὰ εἶναι  
ποῦ μὲ τί εὐχαρίστηση, μὲ τί χαρὰ  
θὰ μπαίνεις σὲ λιμένας πρωτοειδωμένους·

Νὰ σταματήσεις σ' ἐμπορεῖα Φοινικικά,  
καὶ τὲς καλὲς πραγμάτειες ν' ἀποκτήσεις,  
σεντέφια καὶ κοράλλια, κερυμπάρια κ' ἔβενους,  
καὶ ἡδονικὰ μυρωδικὰ κάθε λογῆς,  
ὅσο μπορεῖς πιὸ ἄφθονα ἡδονικὰ μυρωδικά.

Σὲ πόλεις Αἰγυπτιακὲς πολλὲς νὰ πᾶς,  
νὰ μάθεις καὶ νὰ μάθεις ἀπ' τοὺς σπουδασμένους.  
Πάντα στὸ νοῦ σου νάχης τὴν Ἰθάκη.  
Τὸ φθάσιμον ἐκεῖ εἶν' ὁ προορισμὸς σου..

Ἀλλὰ μὴ βιάζης τὸ ταξεῖδι διόλου.  
Καλλίτερα χρόνια πολλὰ νὰ διαρκέσει.  
Καὶ γέρος πιά ν' ἀράξης στὸ νησί,  
πλούσιος μὲ ὅσα κέρδισες στὸν δρόμο,  
μὴ προσδοκῶντας πλοῦτη νὰ σὲ δώσῃ ἡ Ἰθάκη.

Ἡ Ἰθάκη σ' ἔδωσε τ' ὥραϊο ταξίδι.  
Χωρὶς αὐτὴν δὲν θὰ βγαίνεις στὸν δρόμο.  
Ἄλλα δὲν ἔχει νὰ σὲ δώσῃ πιά..

Κι ἂν πτωχικὴ τὴν βρῆς, ἡ Ἰθάκη δὲν σὲ γέλασε.  
Ἔτσι σοφὸς ποῦ ἐγίνες, μὲ τόση πείρα,  
ἤδη θὰ τὸ κατάλαβες ἡ Ἰθάκης τί σημαίνουν.

As you set out for Ithaka  
hope your road is a long one,  
full of adventure, full of discovery.

Laistrygonians, Cyclops,  
angry Poseidon—don't be afraid of them:  
you'll never find things like that on your way  
as long as you keep your thoughts raised high,  
as long as a rare excitement  
stirs your spirit and your body.

Laistrygonians, Cyclops,  
wild Poseidon—you won't encounter them  
unless you bring them along inside your soul,  
unless your soul sets them up in front of you.

Hope your road is a long one.  
May there be many summer mornings when,  
with what pleasure, what joy,  
you enter harbors you're seeing for the first time;

may you stop at Phoenician trading stations  
to buy fine things,  
mother of pearl and coral, amber and ebony,  
sensual perfume of every kind—  
as many sensual perfumes as you can;

And may you visit many Egyptian cities  
to learn and go on learning from their scholars.  
Keep Ithaka always in your mind.  
Arriving there is what you're destined for.

But don't hurry the journey at all.  
Better if it lasts for years,  
so you're old by the time you reach the island,  
wealthy with all you've gained on the way,  
not expecting Ithaka to make you rich.

Ithaka gave you the marvelous journey.  
Without her you wouldn't have set out.  
She has nothing left to give you now.

And if you find her poor, Ithaka won't have fooled you.  
Wise as you will have become, so full of experience,  
you'll have understood by then what these Ithakas mean.