

“Nature is no longer a passive substance upon which humanity leaves its footprint. It becomes an active bundle of relations formed and re-formed through the historically and geographically specific movements of humans with the rest of nature.”

Jason Moore
Amsterdam is Standing on Norway II

Designing Devolution

Extraction Infrastructure Transformations for a Post-Capital Norrbotten

Kirthan Shekar

Mentors: Nikos Katsikis, Taneha Kuzniecowa Bacchin



Aurora Borealis in Svalbard (by Manx Edin, National Geographic)



Polar Bear on Camera (US Geological Survey)



Abandoned Coal Mine in Longyearbyen (by Shaun O'Boyle)



Mining Zone, Kiruna, Sweden

Designing Devolution

Extraction Infrastructure Transformations for a Post-Capital Norrbotten

Designing Devolution

devolutio = roll down (in latin)

(in governance)

decentralising power from the higher authority to the lower administration bodies

[Framing Part]

Critique + On-Site

Problematization, Research Question and Methodology

[Diagnosis Part]

Anatomy

Reading of the extraction landscape

[Projective Part]

Towards Devolution

Post - Project

Architecture of Devolution

Anti - Project

Territories of Devolution

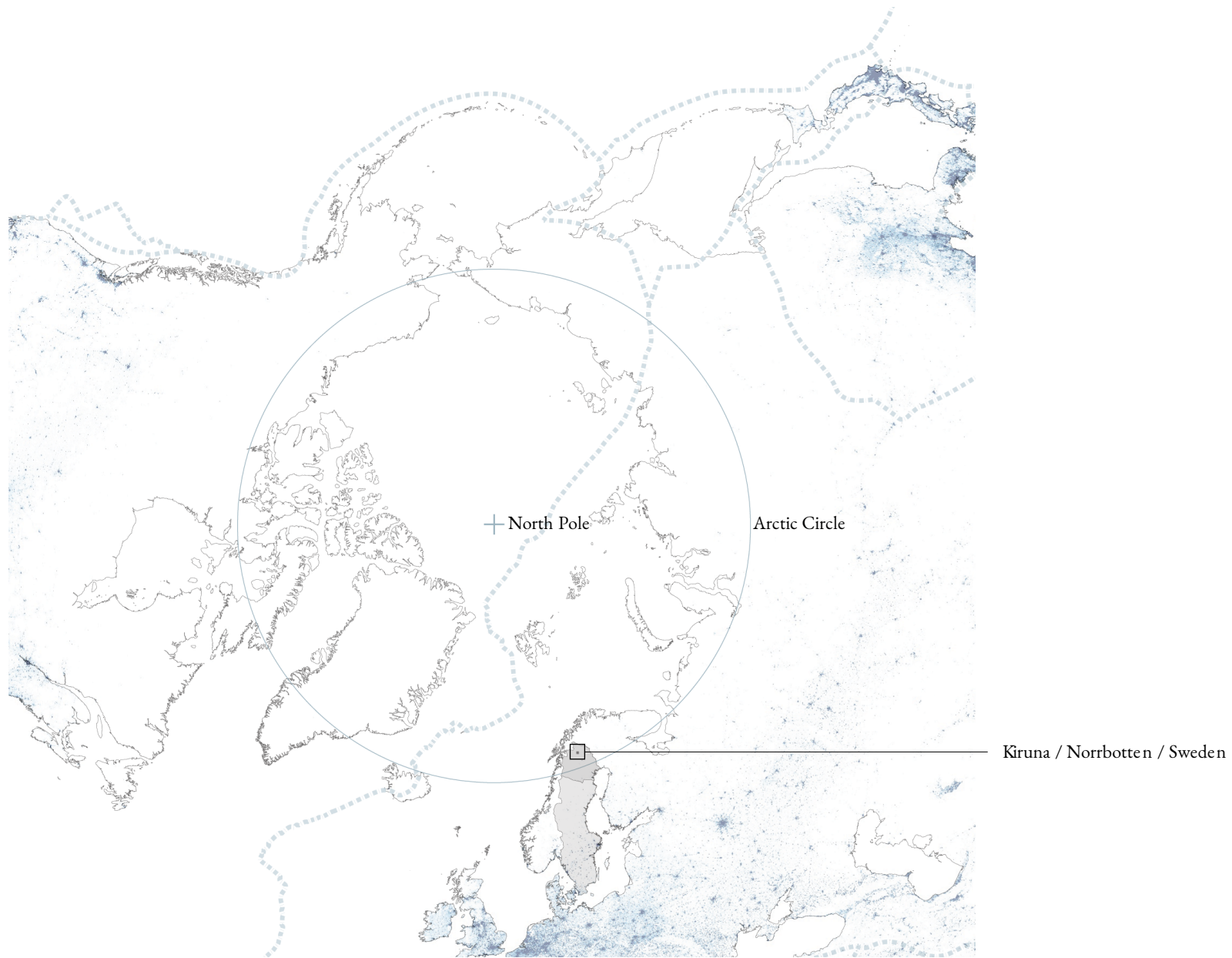
Meta - Project

[Conclusion]



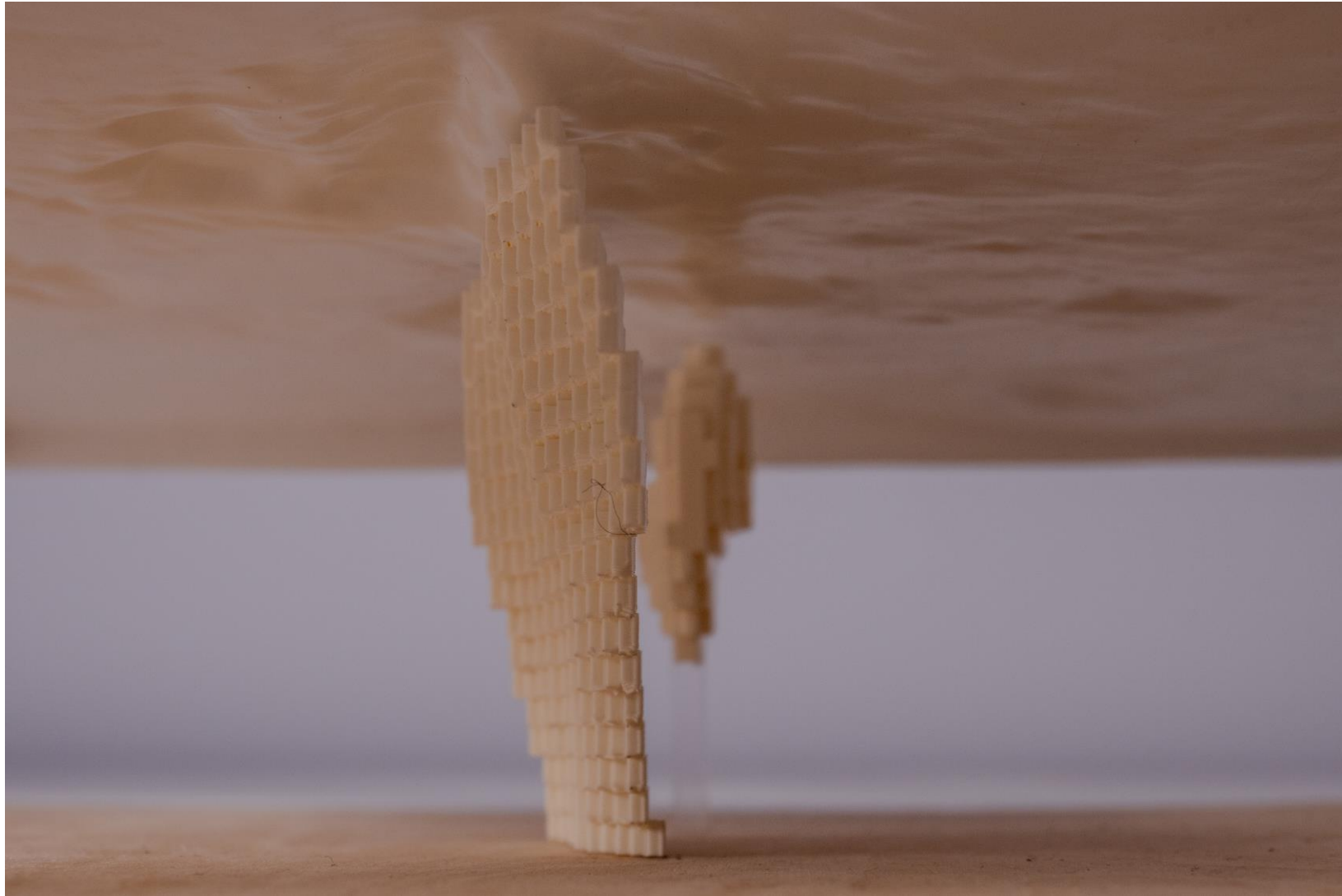
Kiruna, Sweden

Case / Context



Kiruna, Sweden

Case / Context



Kiruna Iron Mine – 1.2 km deep

Case / Context



Terrain deformations due to underground mining

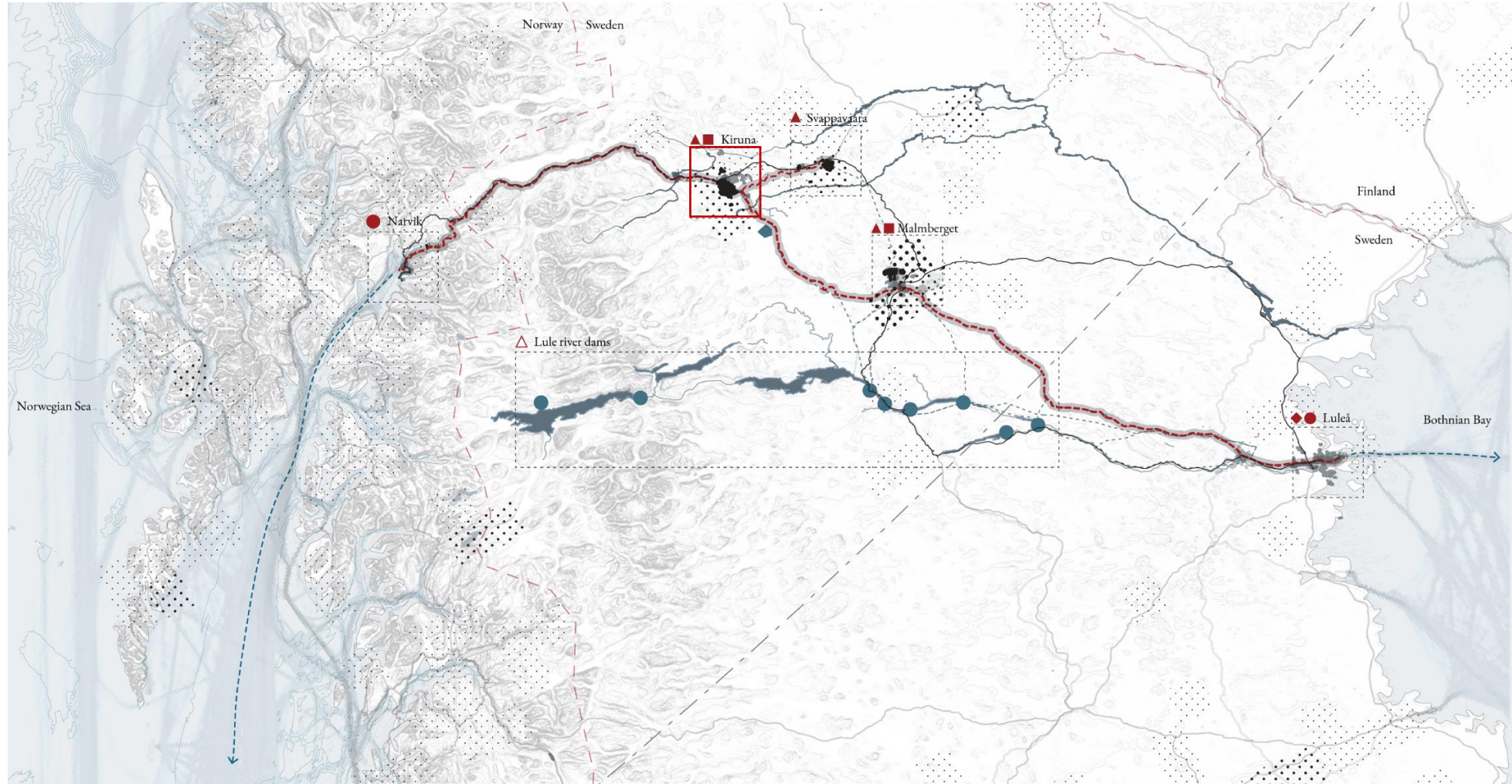
Case / Context



Relocation of the town 3 km east

(LKAB Press Footage)

- ▲ Mining
- Processing
- △ Power plants
- ◆ Steel plant
- Export
- Mining intensity
- Power network
- Road network
- Ore transport
- Shipping
- Arctic Circle
- - - National boundary



Kiruna – Norrbotten Technological Megsystem

(Hansson, 1998)

Europe's Largest Deposit of Rare Earth Metals Found in Northern Sweden



Jan Moström, CEO of LKAB, and Ebba Busch, Swedish Deputy Prime Minister and Minister for Energy, Business and Industry, presented important news for European self-sufficiency of critical raw materials. This happened on the same day the EU Commission visits Kiruna due to Sweden's presidency of the Council of the EU. (Photo: Wesley Overklift/LKAB)

Published at: Jan 13 2023 - 12:54 / Updated at: Jan 13 2023 - 14:28

The mining company LKAB has made major discoveries of rare earth elements in the northern Swedish city of Kiruna. The deposit has the potential to become Europe's most important mine for critical raw materials.

Discovery of REE deposits in Kiruna

(High North News / 13 Jan 2023)

Sweden's Sámi pay the price in Europe's quest for raw materials



Copyright euronews

By [Bryan Carter](#)

Published on 03/05/2024 - 18:40



Europe is striving to increase its domestic production of metals. Mines located in Northern Sweden will play a crucial role in fulfilling the EU's objectives, but they are already encountering resistance from local communities, foreshadowing potential challenges that may arise throughout the EU.

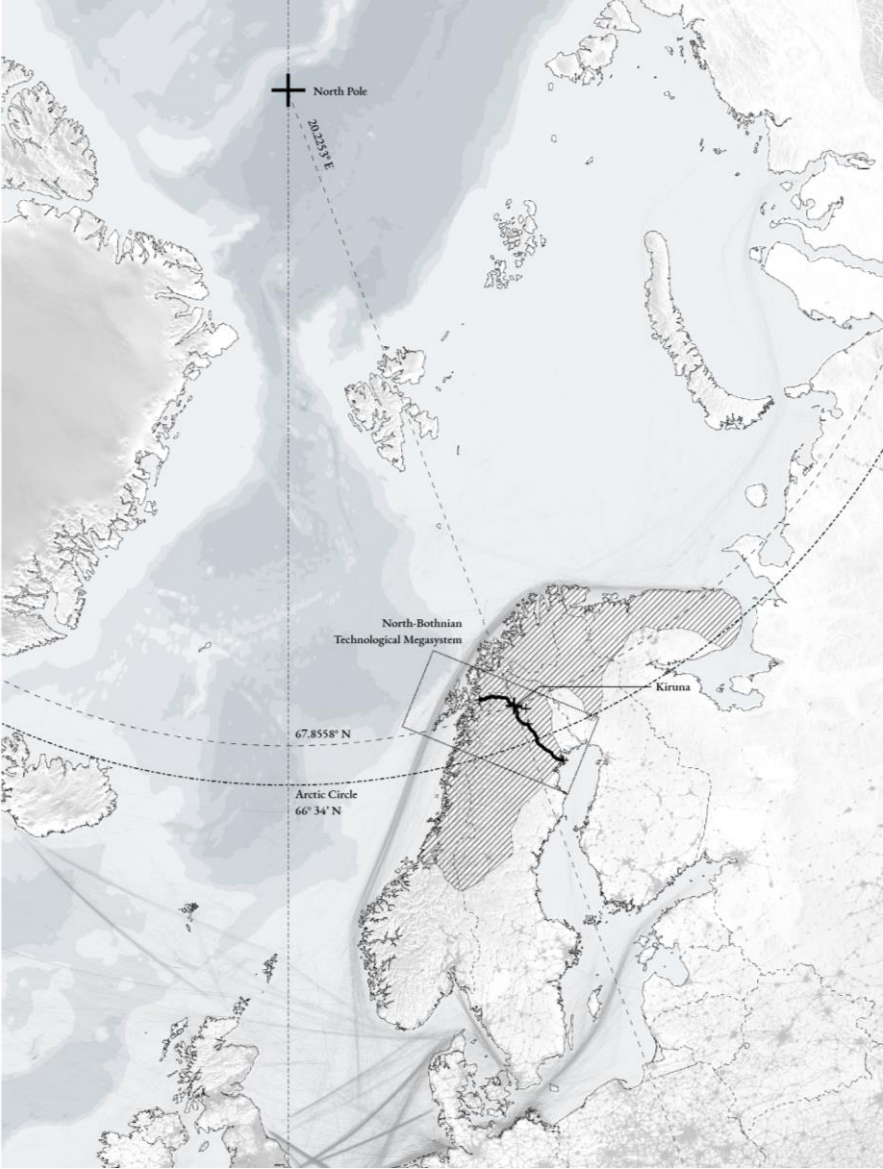
Opposition from the Sámi people

(Euronews / May 2024)



Sami family near Kiruna, 1900

(Swedish National Heritage Board)



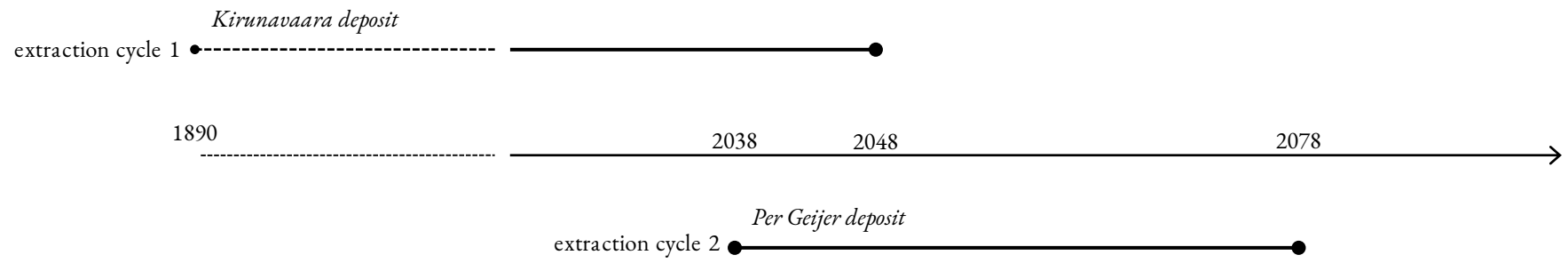
Sapmi - Land of the Sámi

as demarcated by Swedish State

Arctic extractivism projects have historically been conceived acts of colonisation of nature-cultures generating, sacrificial and monofunctional landscapes.

The repair and diversification of these sacrificial landscape is a post-extraction process and this reflexive rationalisation of extraction through repair tends to normalise the socio-ecological destructive act.

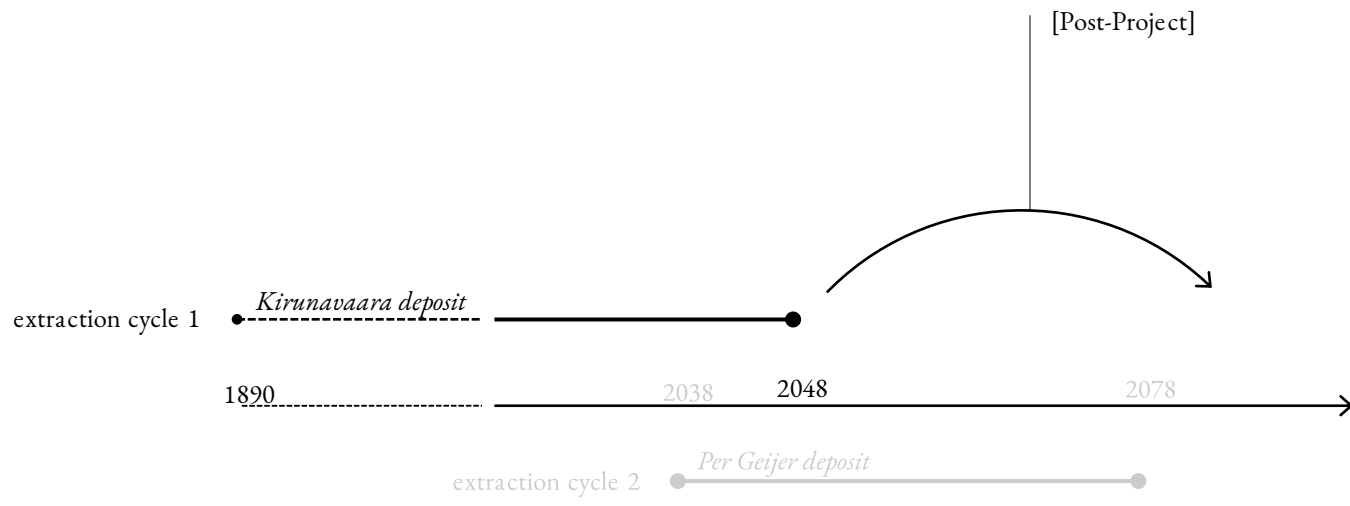
There is a need to envision the infrastructural landscape through their post-extraction potentials for socio-ecological regeneration simultaneously during the design and operationalisation of critical extraction processes.



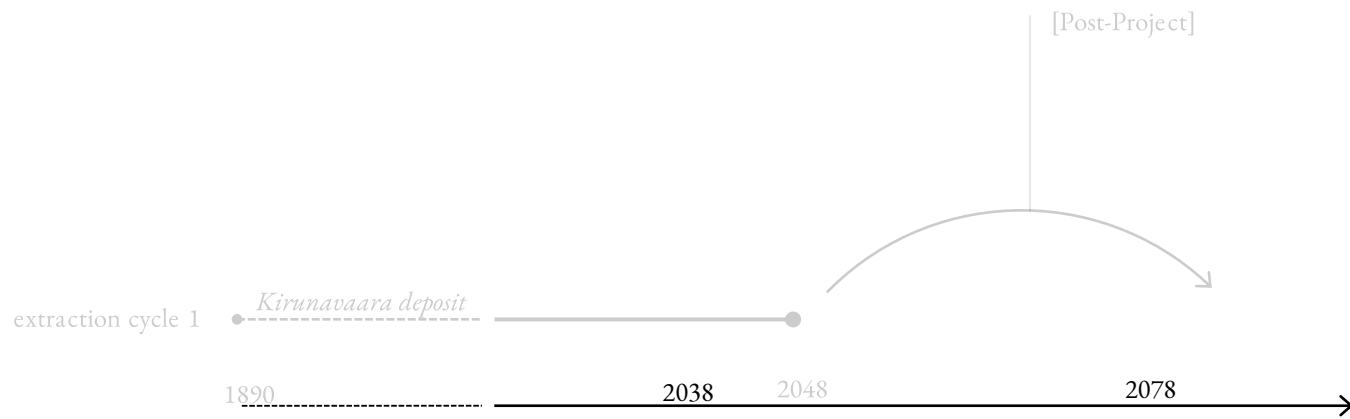
Extraction cycles

Problem Statement

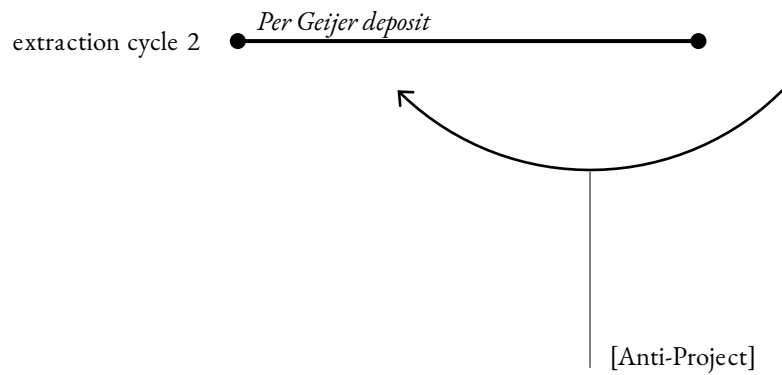
How can post-extraction potentials inform the design agency to transform Arctic infrastructural landscapes towards a post-capital landscape of co-existence?



How can post extraction transformation of the current mine create a spatial logic to devolve power and regenerate nature-cultures?

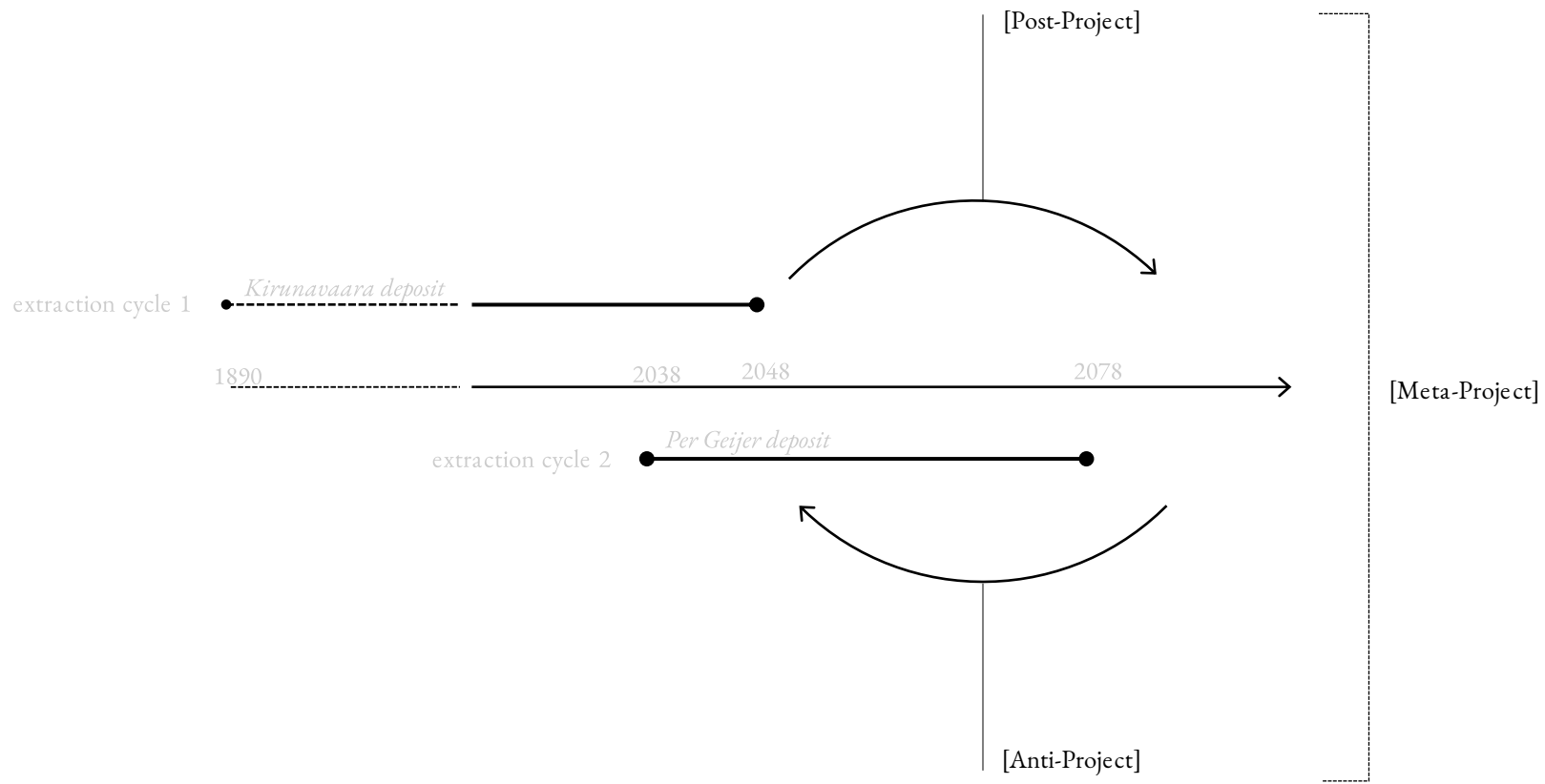


How can post extraction transformation of the current mine create a spatial logic to devolve power and regenerate nature-cultures?



How can the new spatial logic inturn inform the mining of the anticipated deposit?

Post – Anti – Meta Project
Design Methodology



How can post extraction transformation of the current mine create a spatial logic to devolve power and regenerate nature-cultures?

What are the spatio-temporal limits of this new logic in the process of the devolving the Norrbotten Technological Megsystem?

How can the new spatial logic inturn inform the mining of the anticipated deposit?

Post – Anti – Meta Project

Design Methodology

Political Ecology, Economic Geography, Environmental Humanities



Landscape Urbanism

[Framing Part]

Critique + On-Site

[Diagnosis Part]

Anatomy

Reading of the extraction landscape

1. Extraction landscapes are Monofunctional



Mine Zone

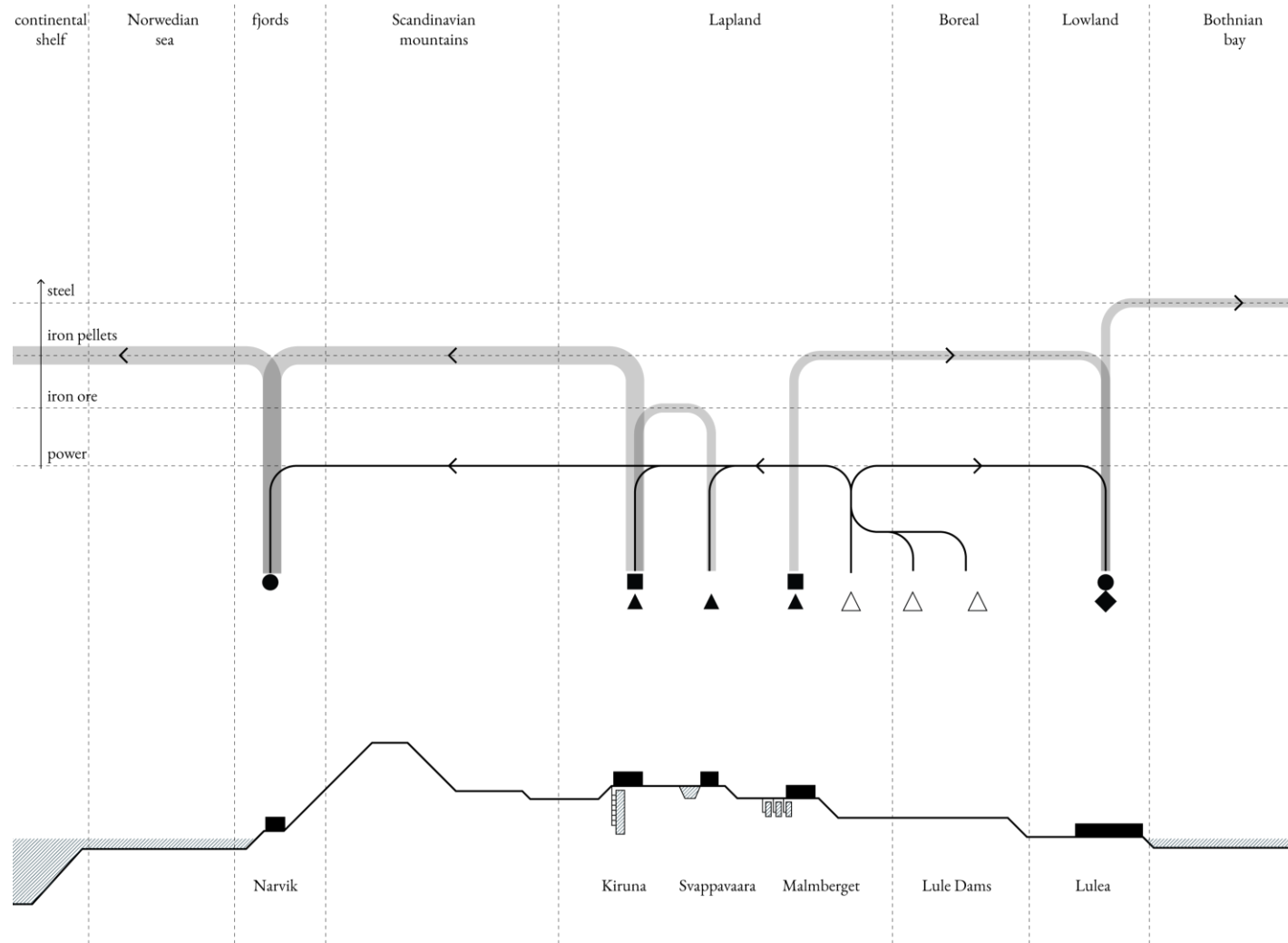
- *Mining*
- *Processing*
- *Logistics*

Inhabitation Zone

- *Social Reproductions*

Composition of Kiruna

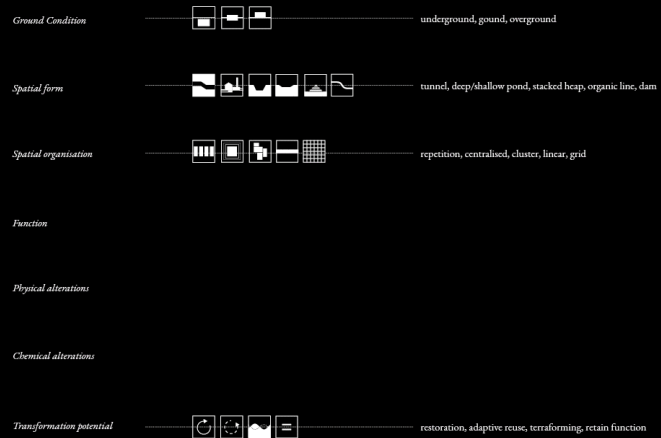
1. Monofunctional Landscape





























Alteration – Norrbotten Technological Megasystem

1. Monofunctional Landscape

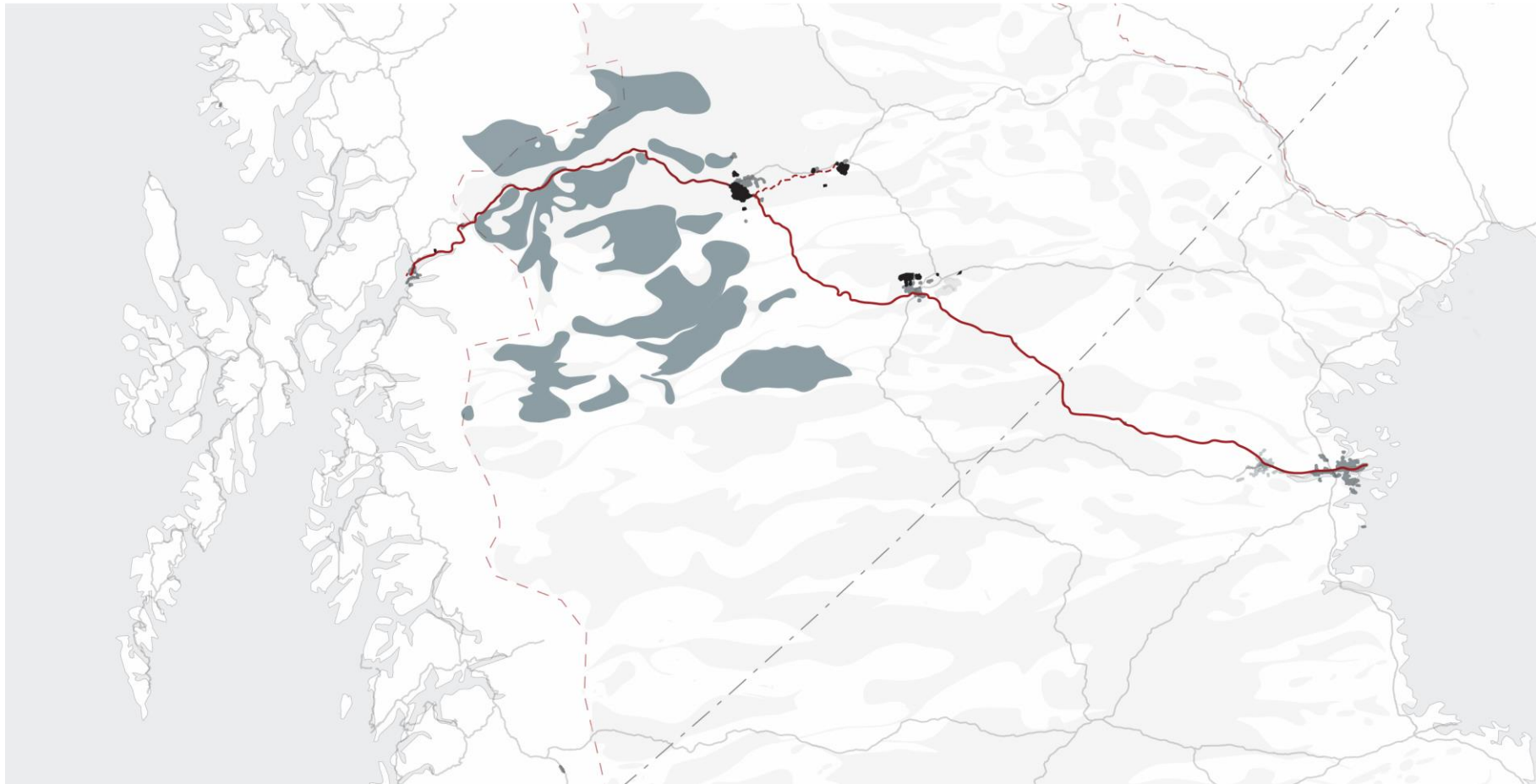
Catalogue of Mining Infrastructure



	Narvik	Kiruna	Swappavaara	Malmberget	Lule dams	Luleå
Mine						
Processing Plant						 Steel plant
Tailing Pond						
Tailing Pile						
Logistics						
Inhabitation						

1. Extraction landscapes are Monofunctional

2. Extraction landscapes are Sacrificial



Reindeer Herding Pattern

2. Sacrificial Landscape



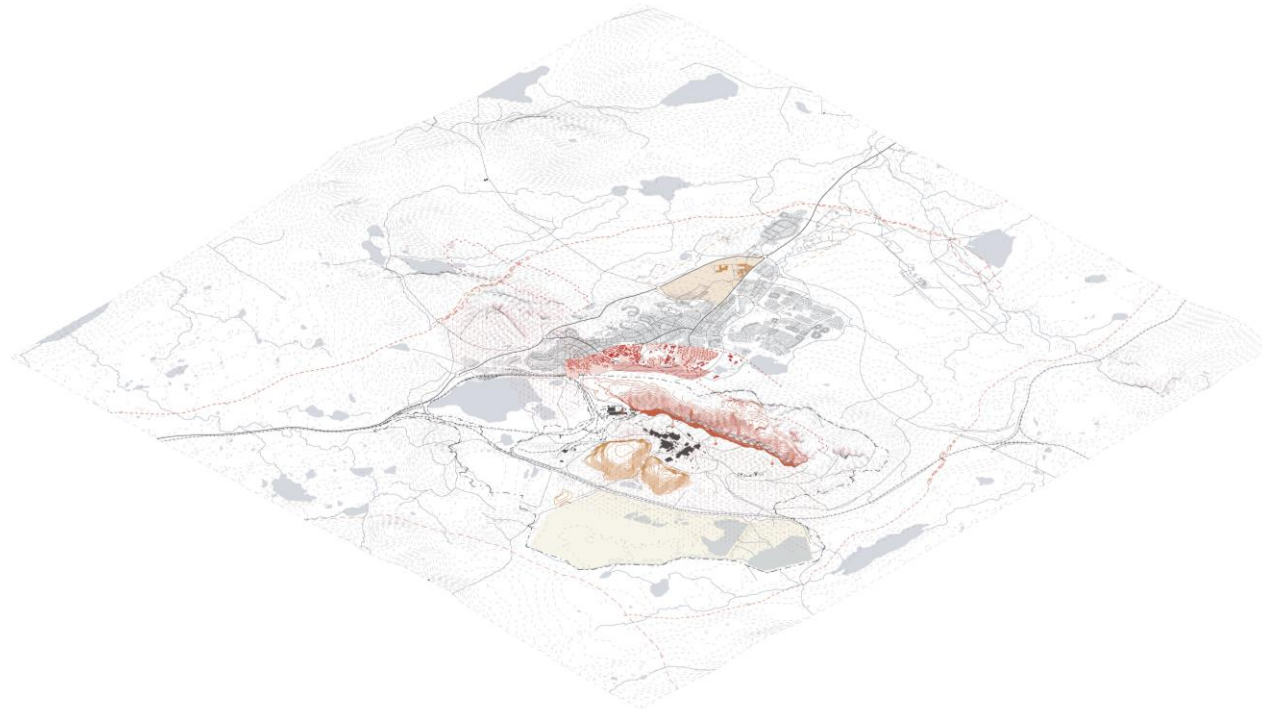
Memorial ceremony for the lost pastures in Kiruna in 2023 (Min Odda Giron)

1. Extraction landscapes are Monofunctional

2. Extraction landscapes are Sacrificial



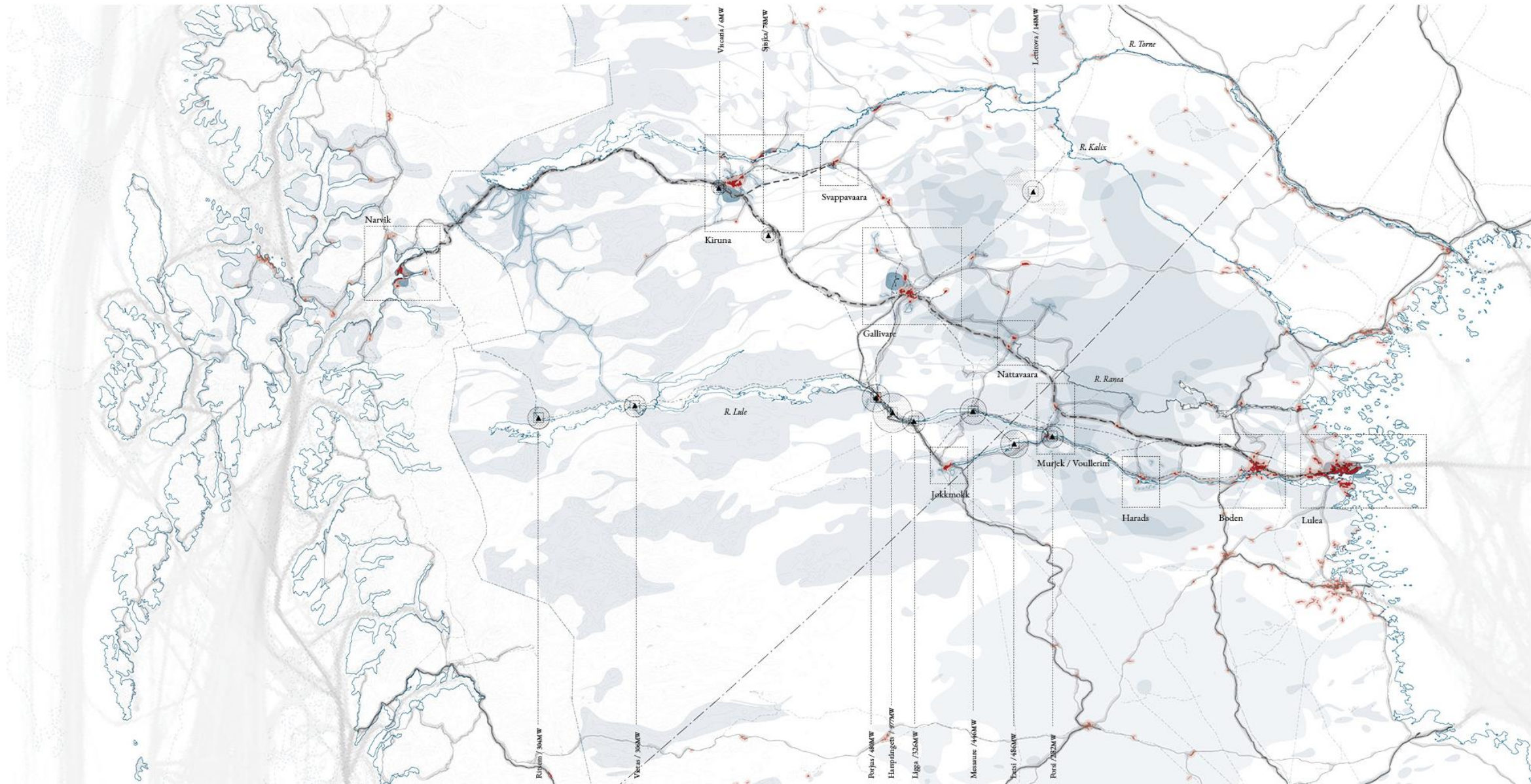
3. Extraction landscapes are Determinate



-
- Addition
 - Subtraction
 - Permanent
 - Persistent

Matter and Habitat – Palimpsest of Kiruna

3. Determinate Landscape



- Fixed Capital - infrastructures
- Economic activities
- Social Reproduction - settlements

Accumulation of Fixed Capital

3. Determinate Landscape



10

50 km

Diversification of Programme

Hybridisation of Sacrificial Processes and Repair Processes

Need for Indeterminacy in Programming to React to Uncertainties – Public / Social Spaces

Inferences for Design

Anatomy

Diversification of Programme

Hybridisation of Sacrificial Processes and Repair Processes

Need for Indeterminacy in Programming to React to Uncertainties – Public / Social Spaces



Decentralisation of Agencies – Devolution

Inferences for Design

Anatomy

Diversification of Programme

Hybridisation of Sacrificial Processes and Repair Processes

Need for Indeterminacy in Programming to React to Uncertainties – Public / Social Spaces



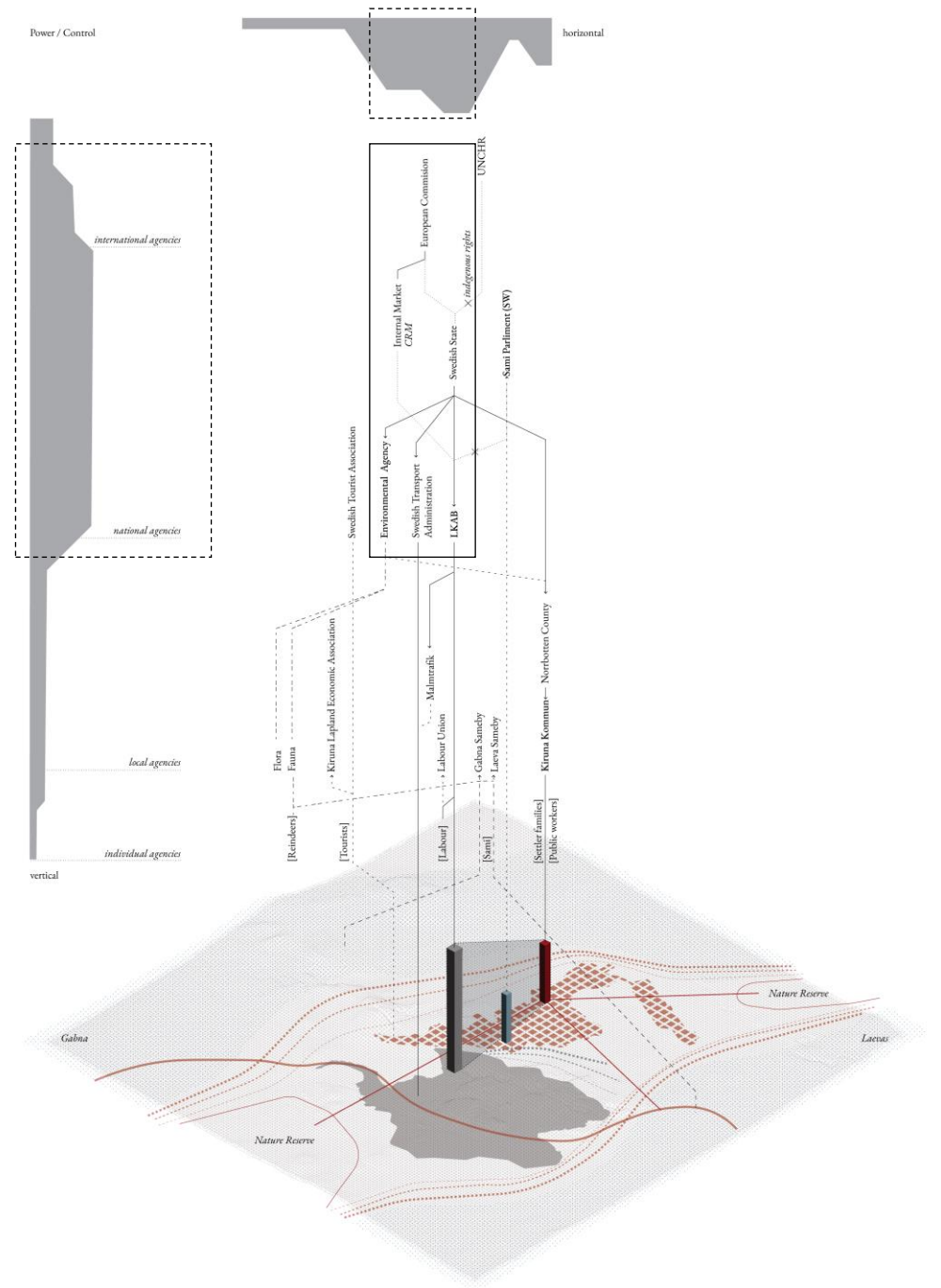
Decentralisation of Agencies – Devolution



Use of the Spatial Organisation of the Territory for the Devolution of Norrbotten Technological Megasystem

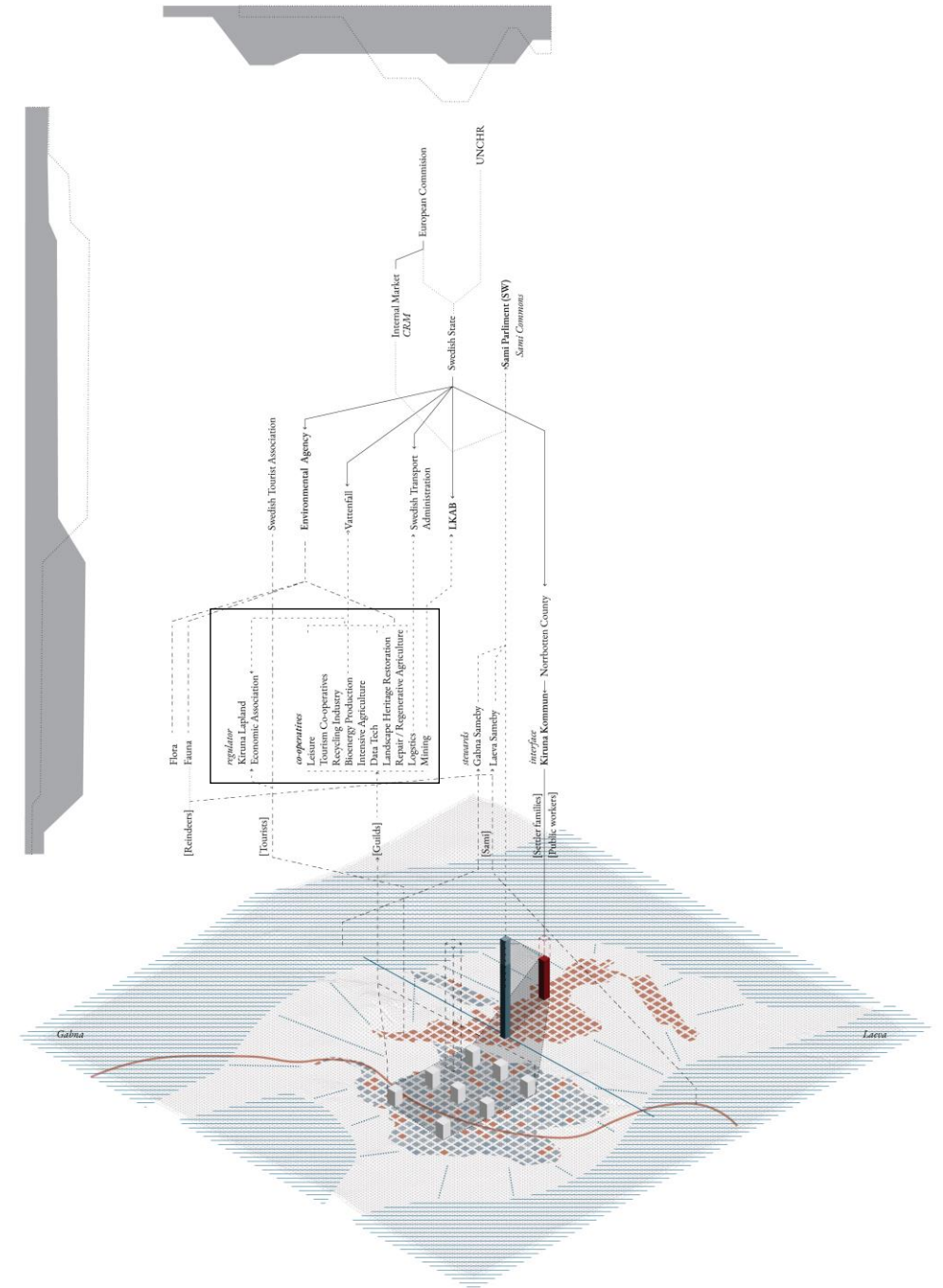
Inferences for Design

Anatomy



Current Stakeholder Hierarchy
Towards Devolution [Post-Project]

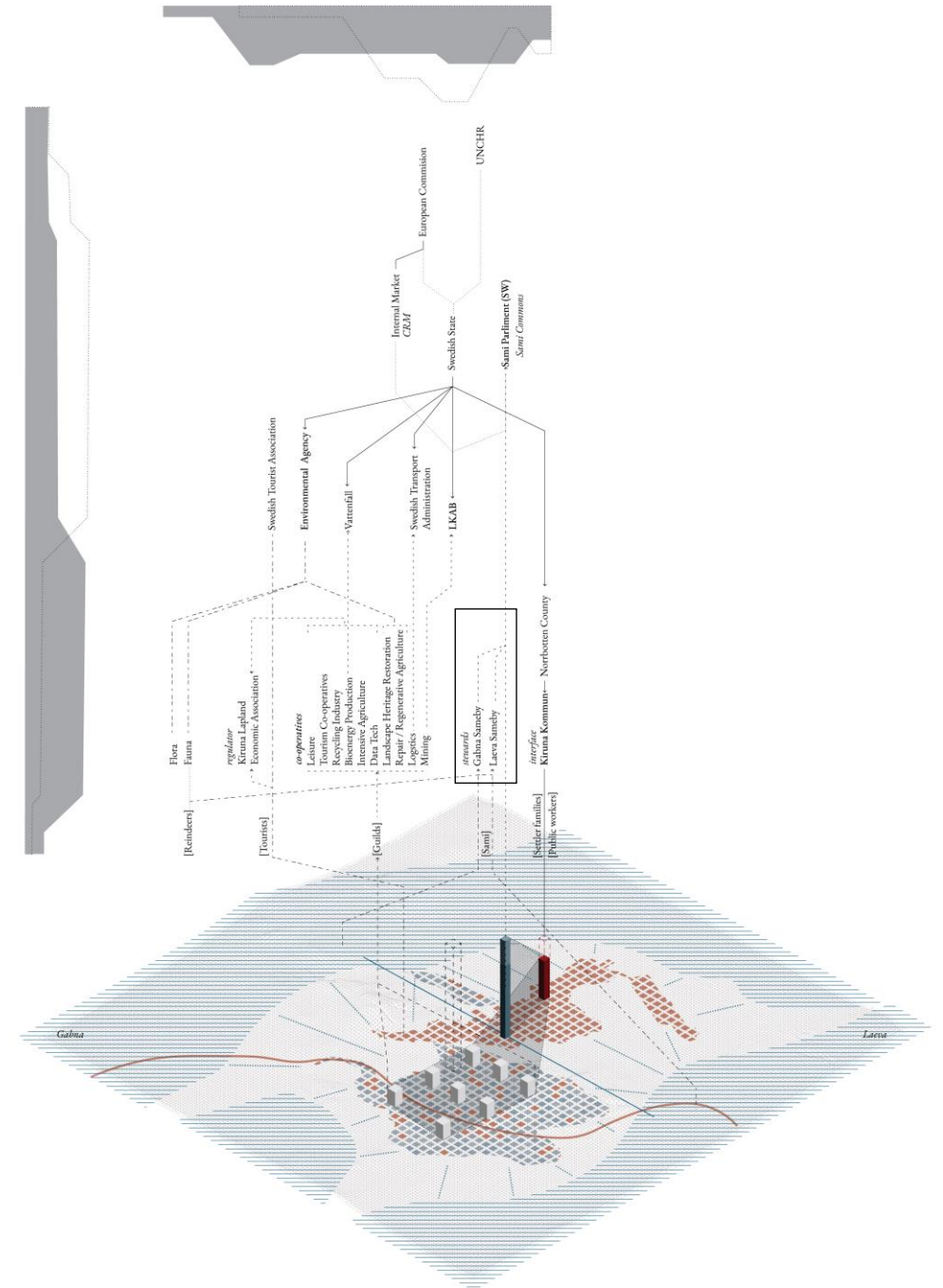
Decentralisation of LKAB – formation of guilds



Devolution Mechanism
Towards Devolution [Post-Project]

Decentralisation of LKAB – formation of guilds

Empowering Land Stewardship and Traditional Knowledge Exchange – Sámi Commons



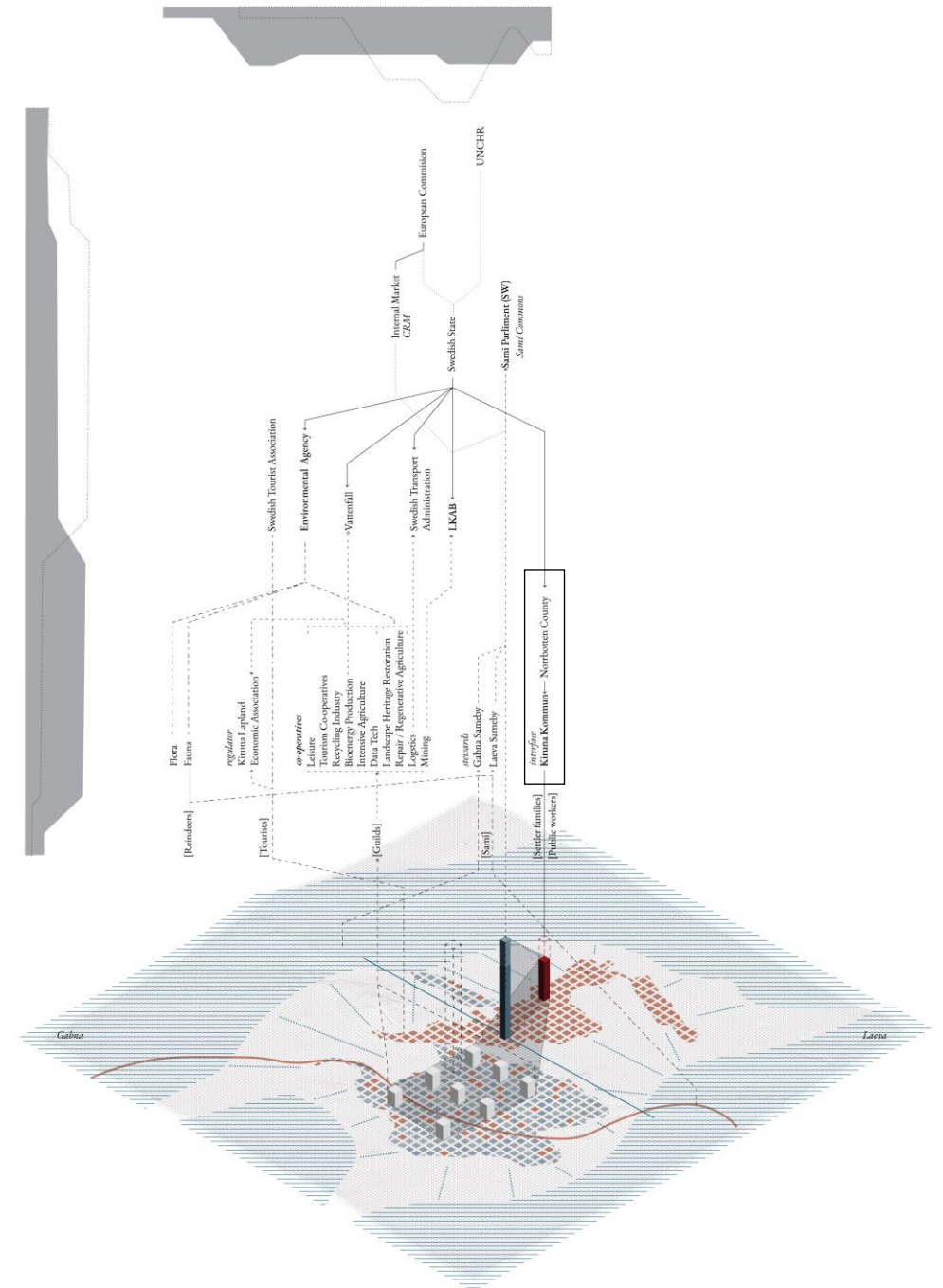
Devolution Mechanism

Towards Devolution [Post-Project]

Decentralisation of LKAB – formation of guilds

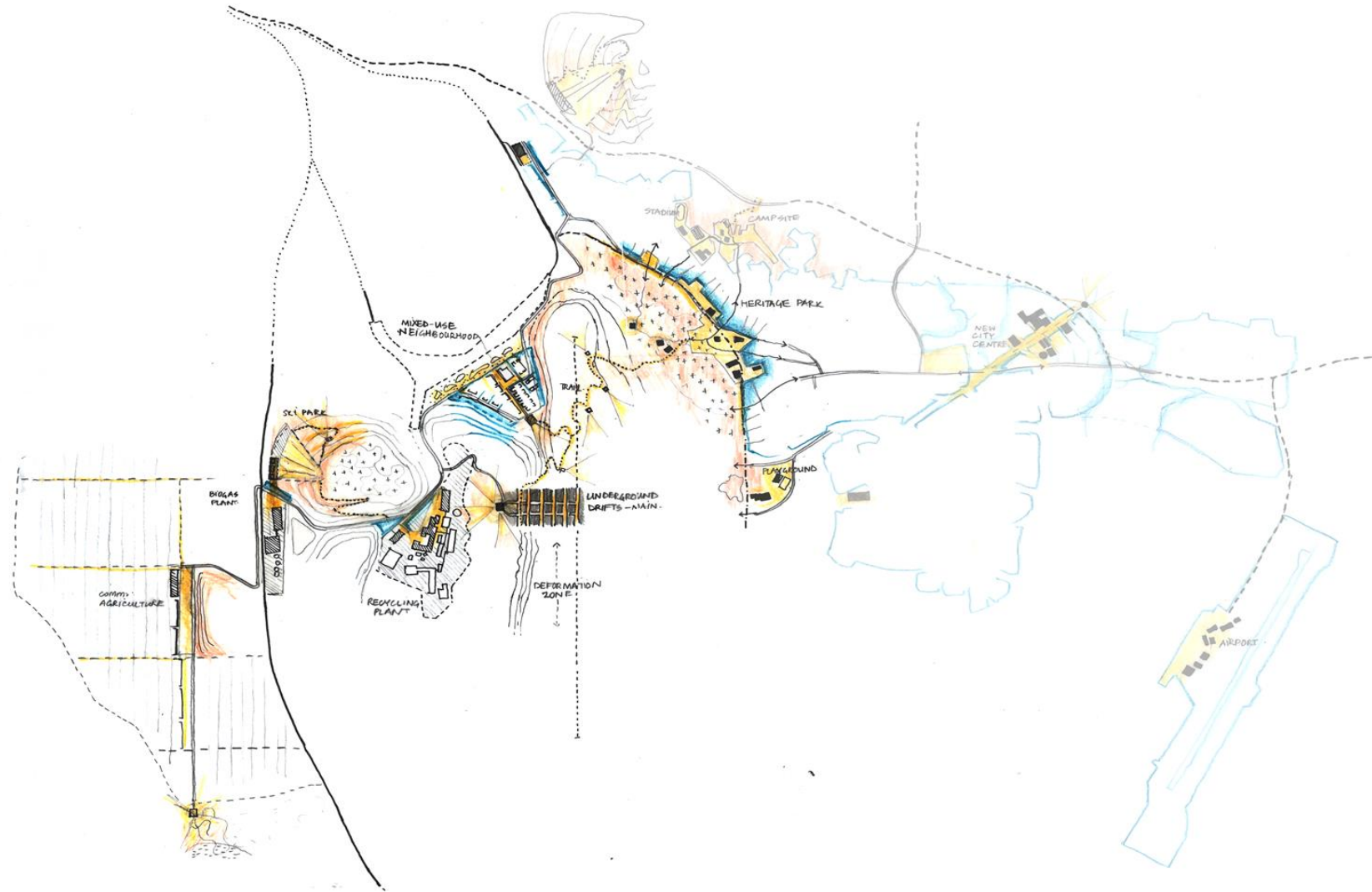
Empowering Land Stewardship and Traditional Knowledge Exchange – Sámi Commons

City / Municipality as an interface between the commons and the cooperatives – Public Spaces



Devolution Mechanism

Towards Devolution [Post-Project]



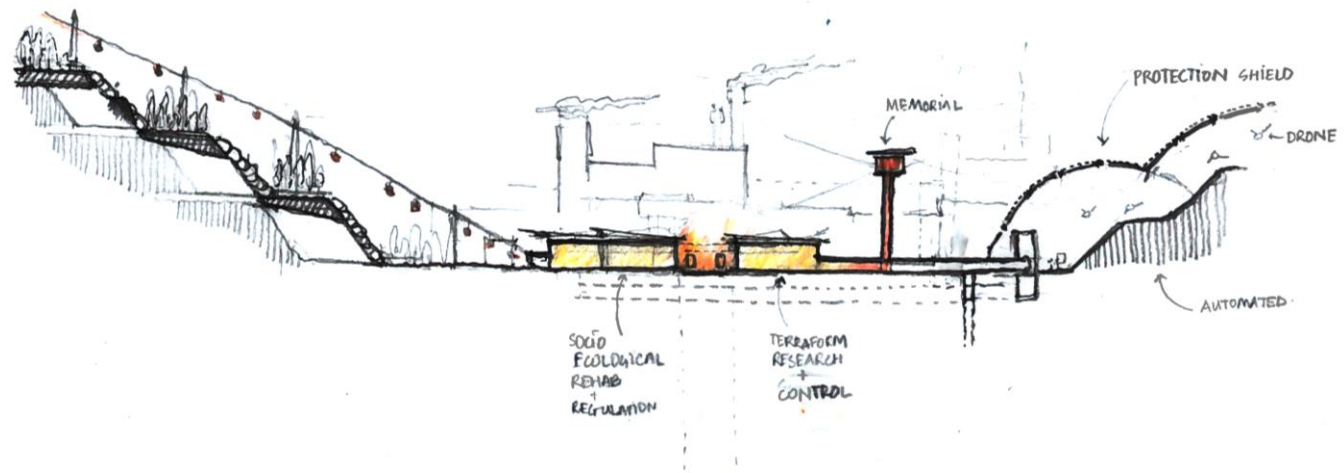
Introduction of Public Spaces into the Mine zone

Towards Devolution [Post-Project]



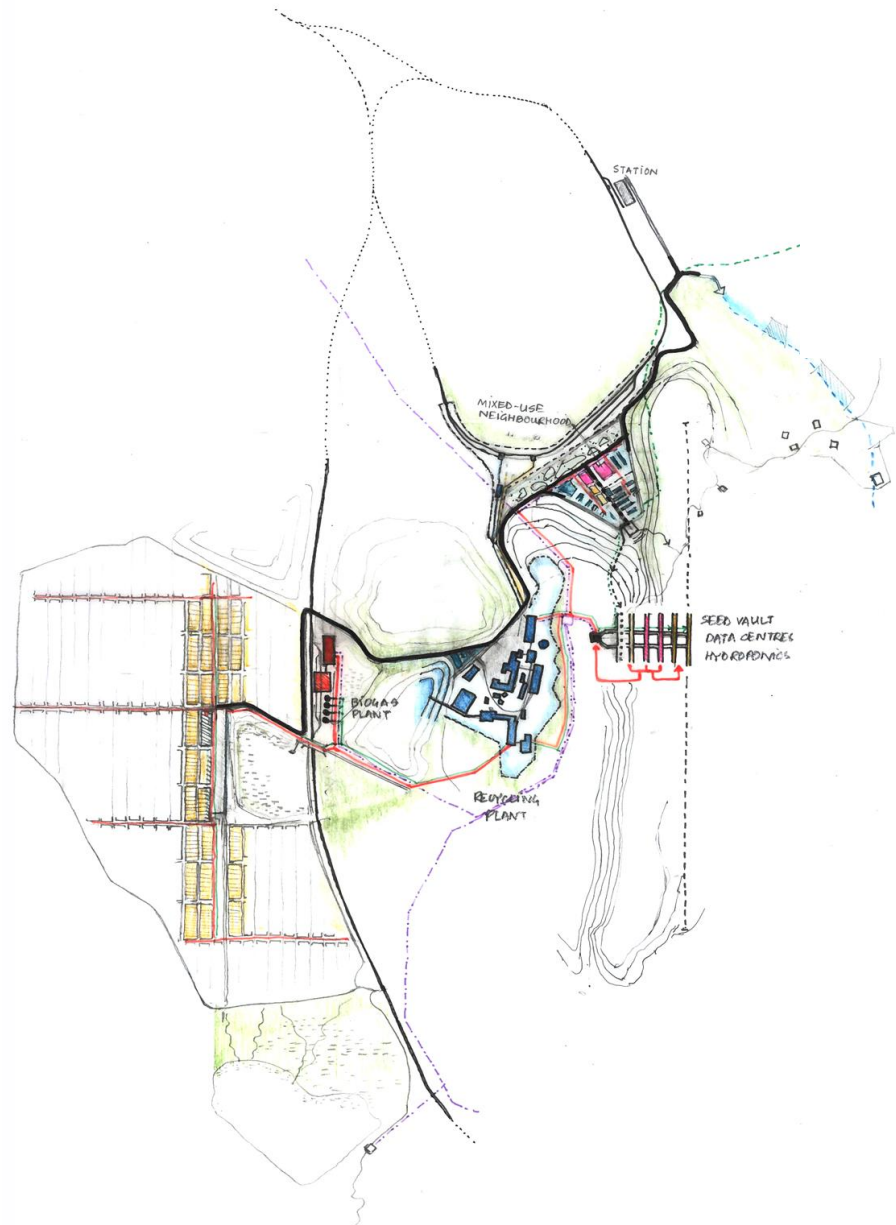
Introduction of Public Spaces into the Mine zone

Towards Devolution [Post-Project]



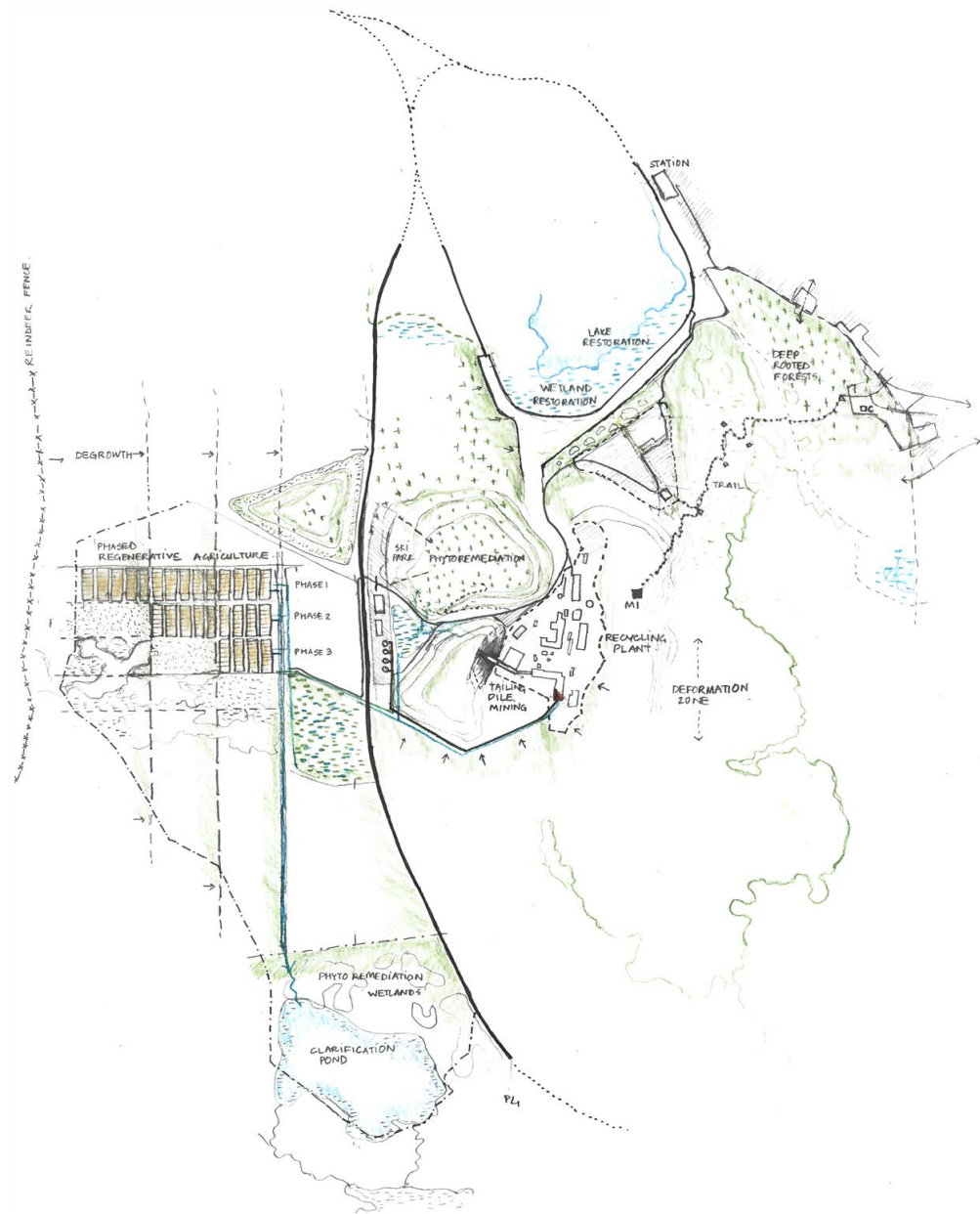
Indeterminate Interface

Towards Devolution [Post-Project]



Catalyst for Program Diversification

Towards Devolution [Post-Project]

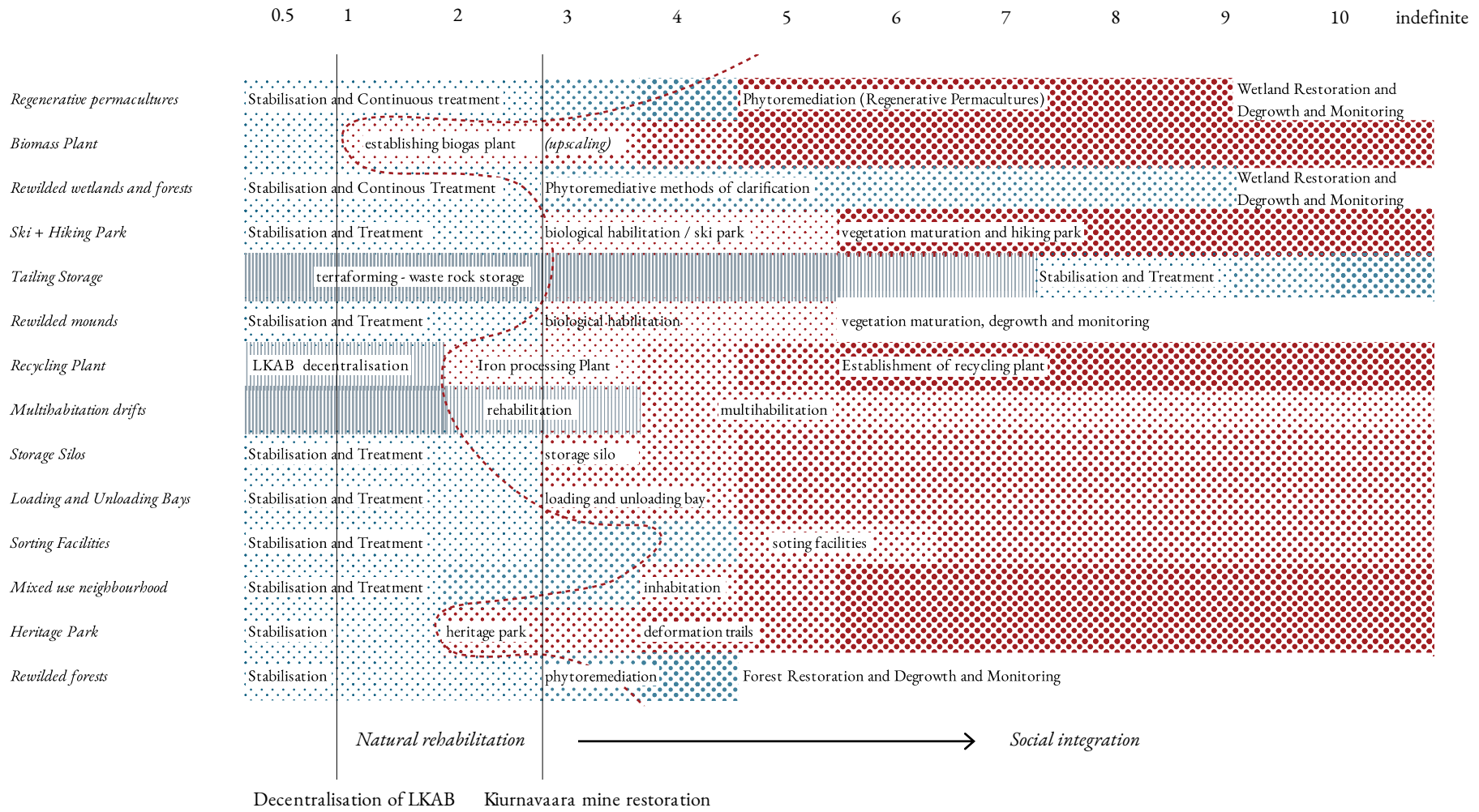


Catalyst for Natural Rehabilitation

Towards Devolution [Post-Project]

Transformation function

Geographical time – Longue durée (*decades*)

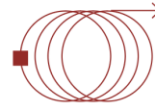


Catalyst for Socio-Ecological Repair

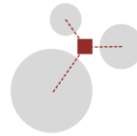
Towards Devolution [Post-Project]



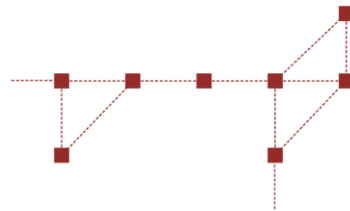
Catalyst for socio-ecological repair



Spatio-temporal regulator



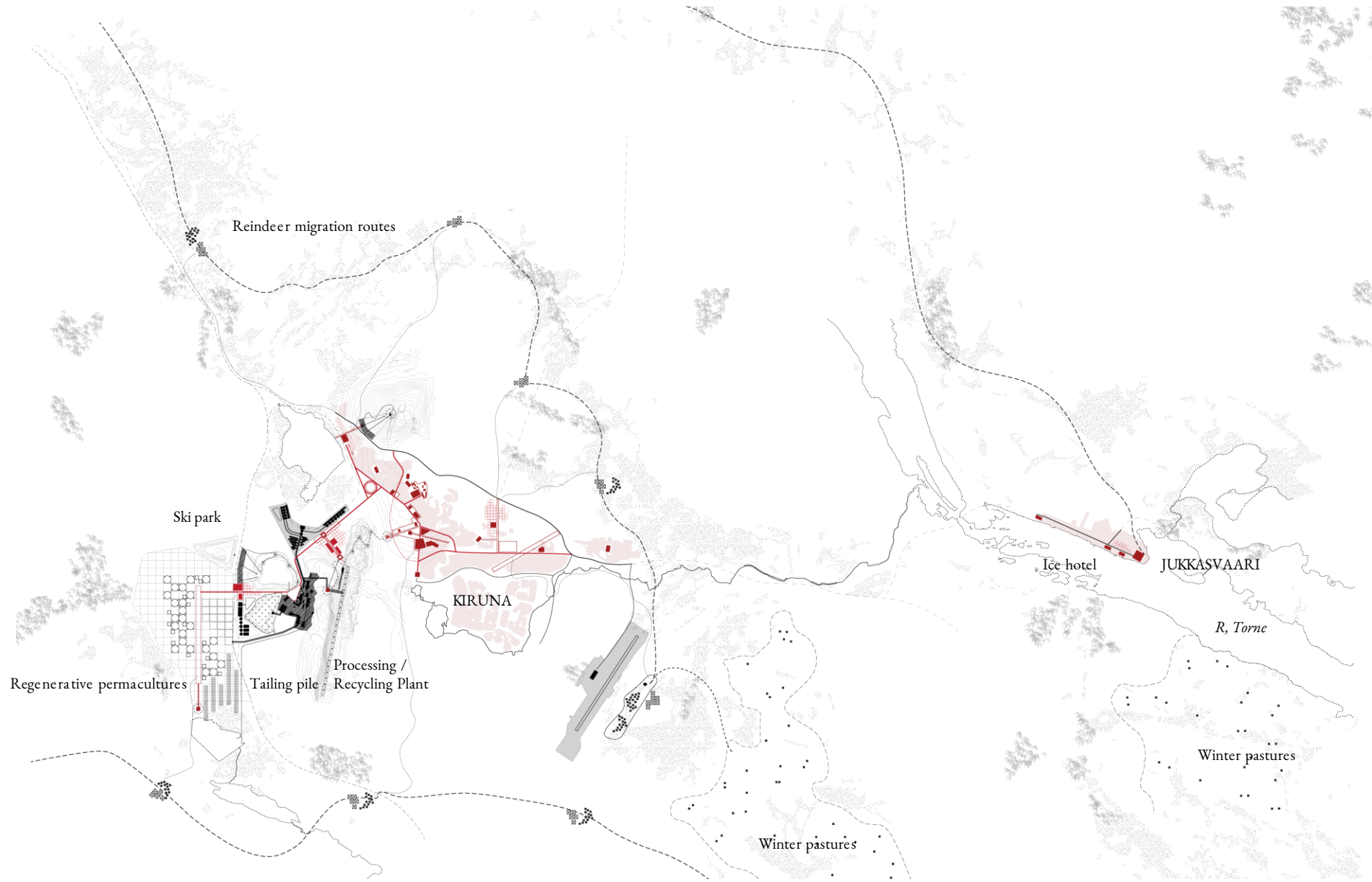
Interface for stakeholders and spatial functions



Interface between different interfaces

Functions of Indeterminate Interfaces

Towards Devolution [Post-Project]



Fabric of Indeterminate Interfaces

Towards Devolution [Post-Project]

[Framing Part]

Critique + On-Site

[Diagnosis Part]

Anatomy

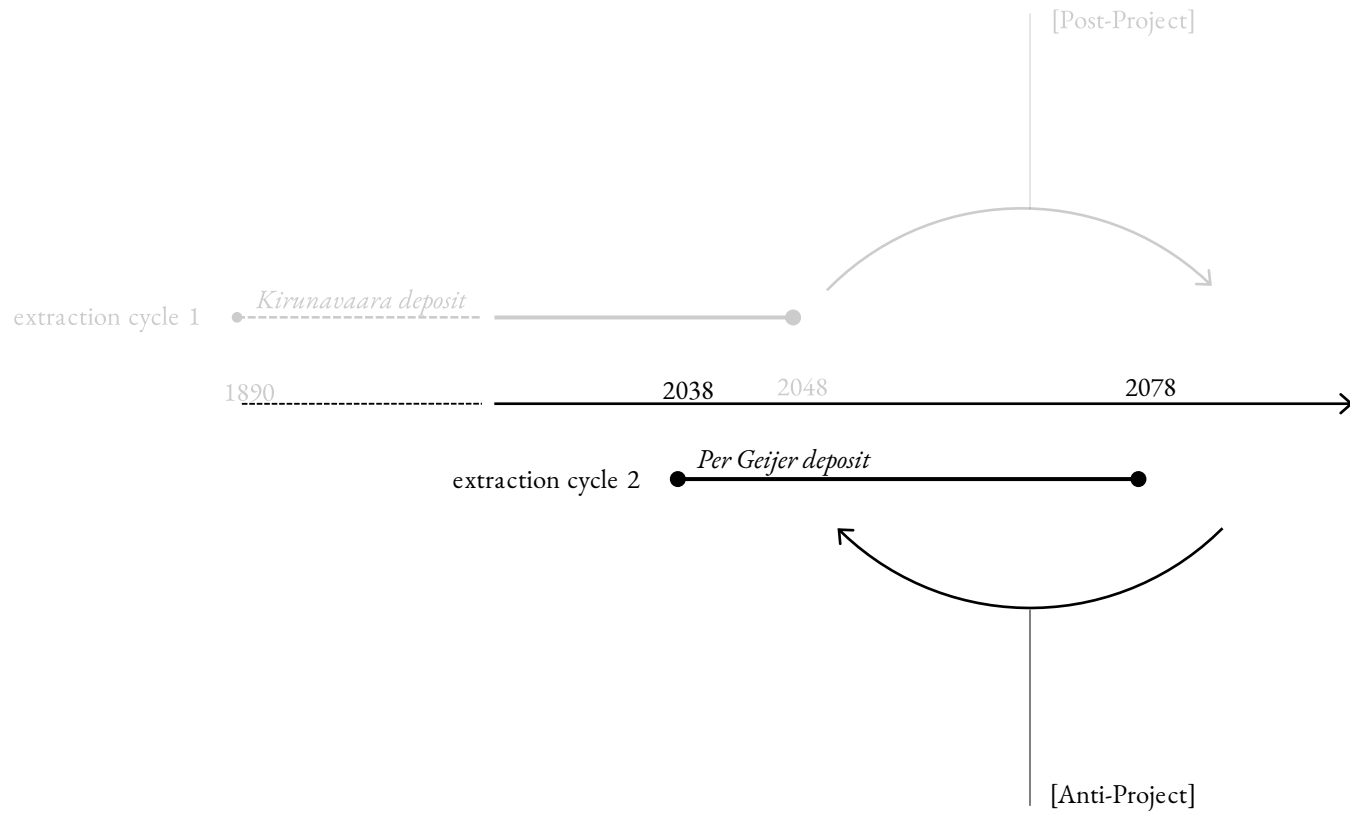
[Projective Part]

Towards Devolution

Post - Project

Architecture of Devolution

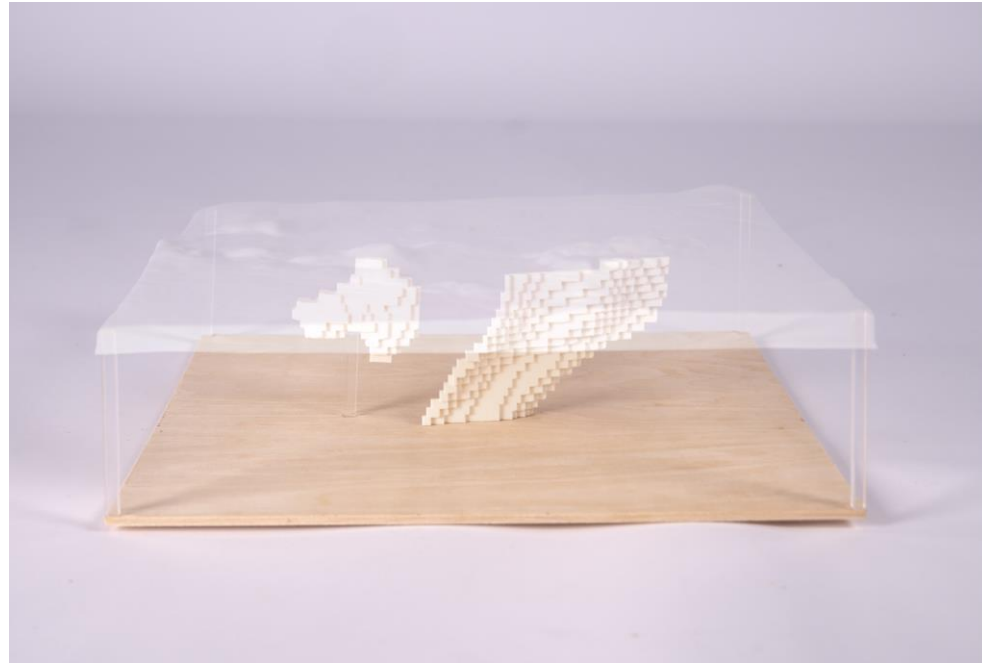
Anti - Project



How can the new spatial logic
inturn inform the mining of the
anticipated deposit?

Post – Anti – Meta Project

Design Methodology



Per Geijer
Deposit

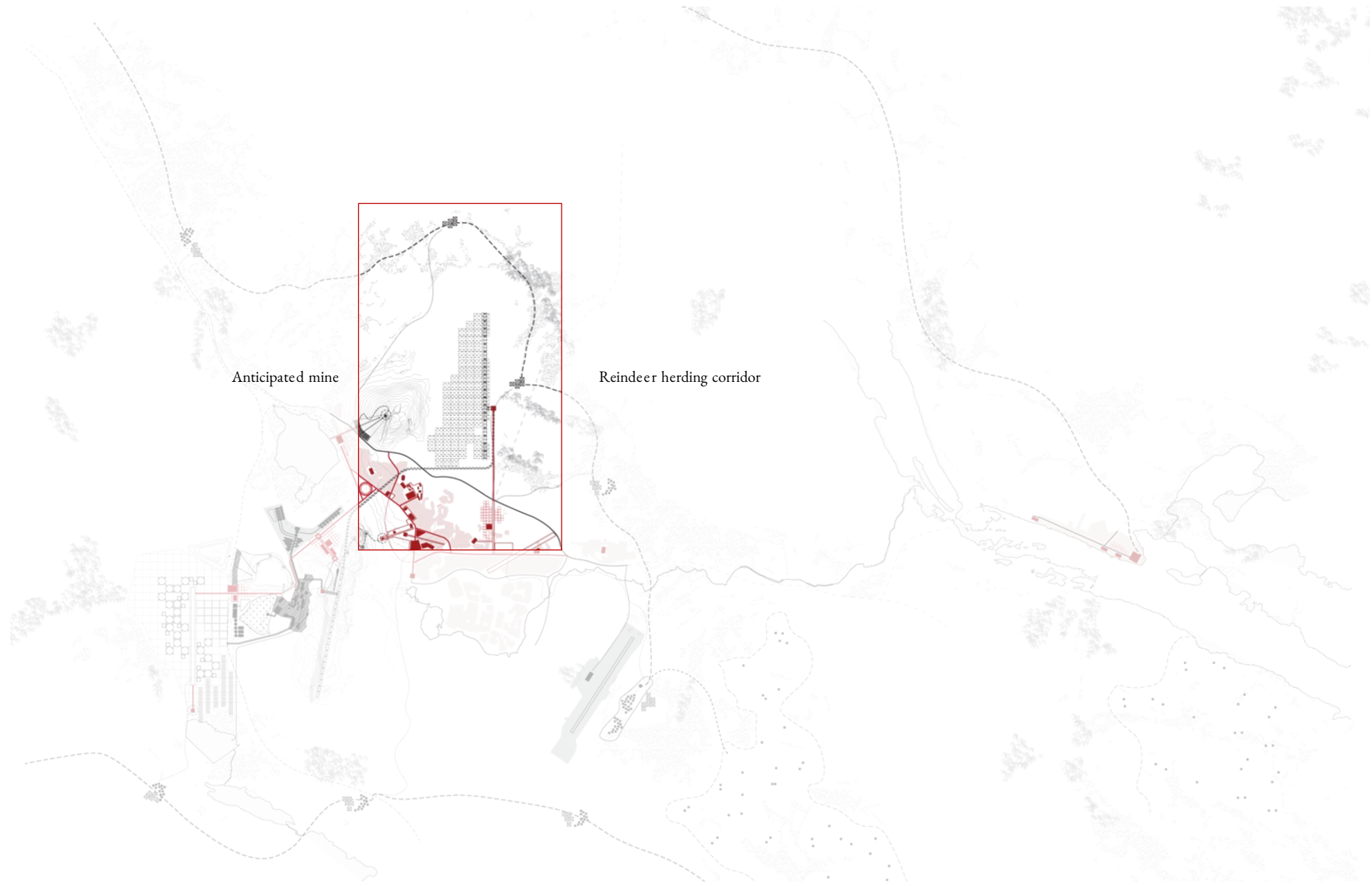
*anticipated
from 2038*

Kirunavaara
Deposit

*operational
till 2048*

Anticipated extraction cycle

Architecture of Devolution [Anti-Project]

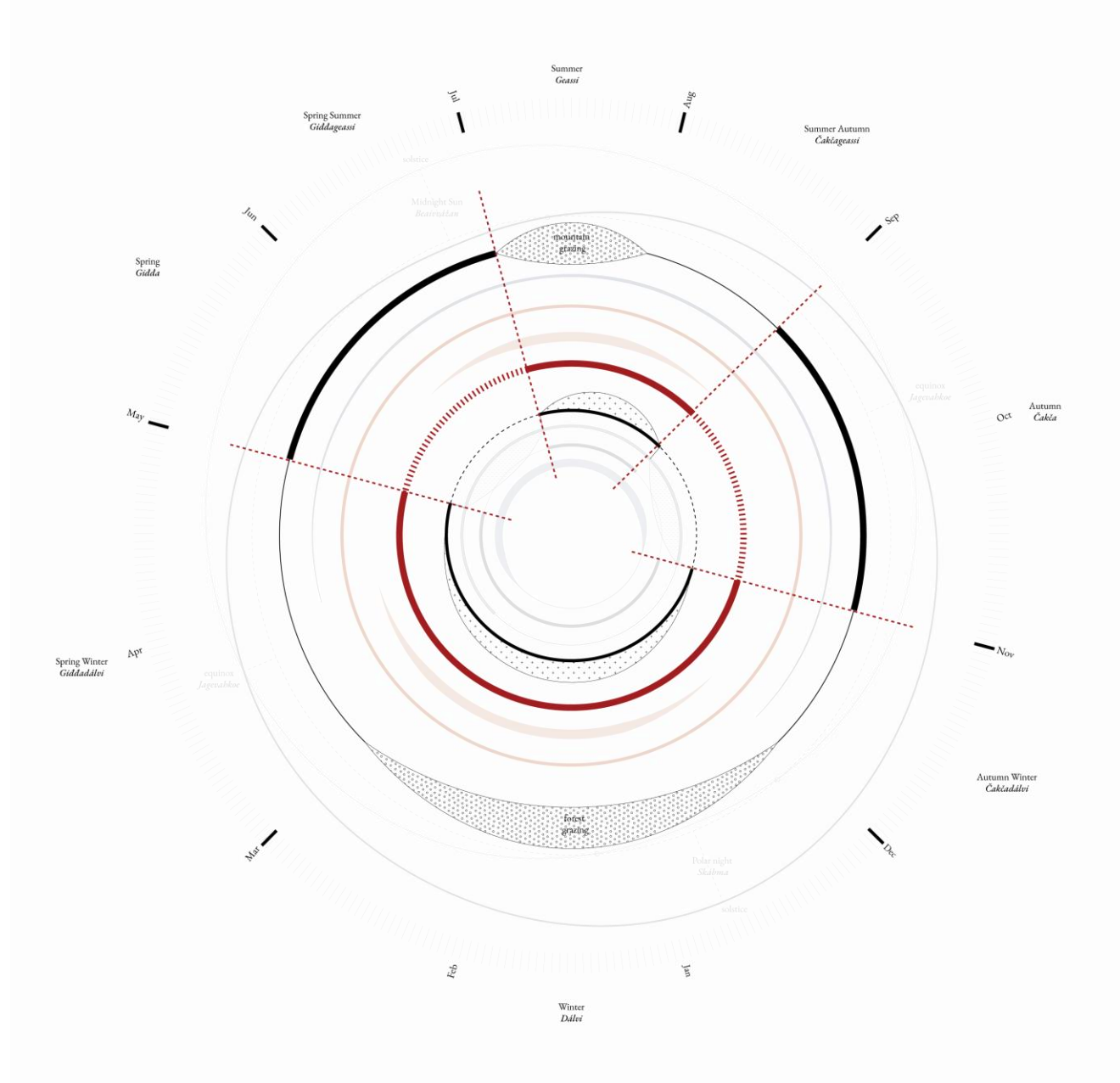


Anticipated mine

Reindeer herding corridor

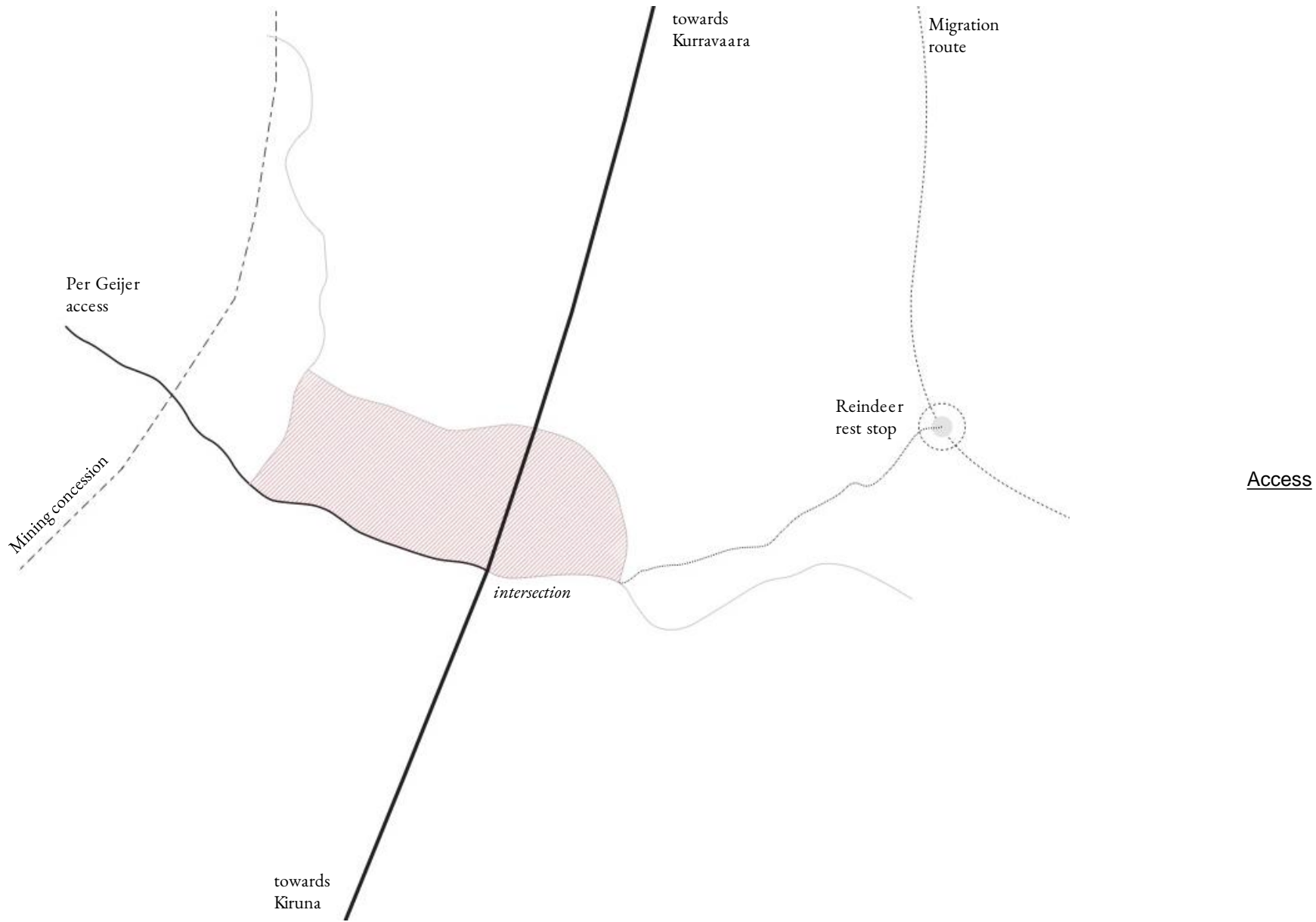
Location of the Interface

Architecture of Devolution [Anti-Project]



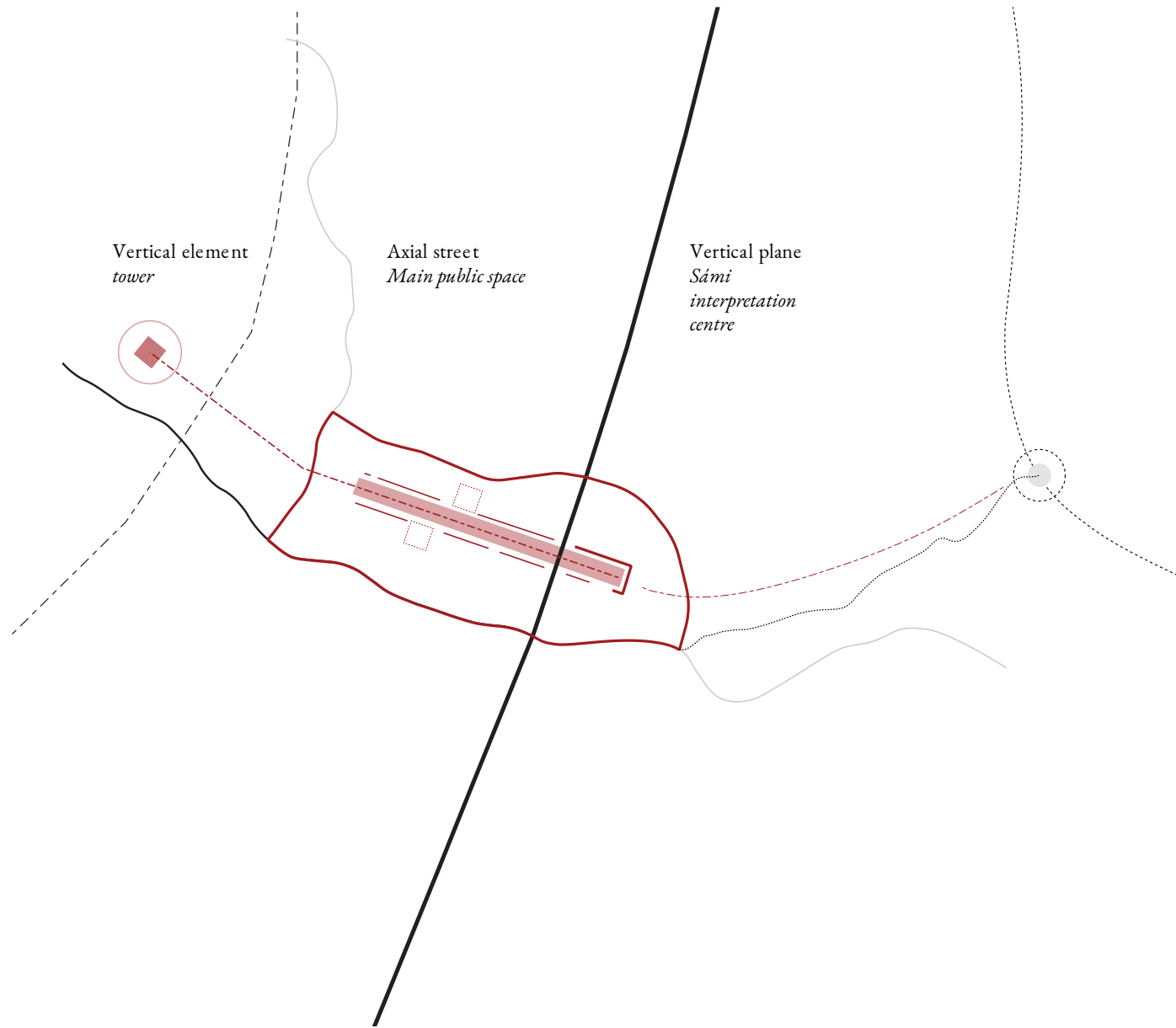
Temporal Regulation

Architecture of Devolution [Anti-Project]



Synthesis

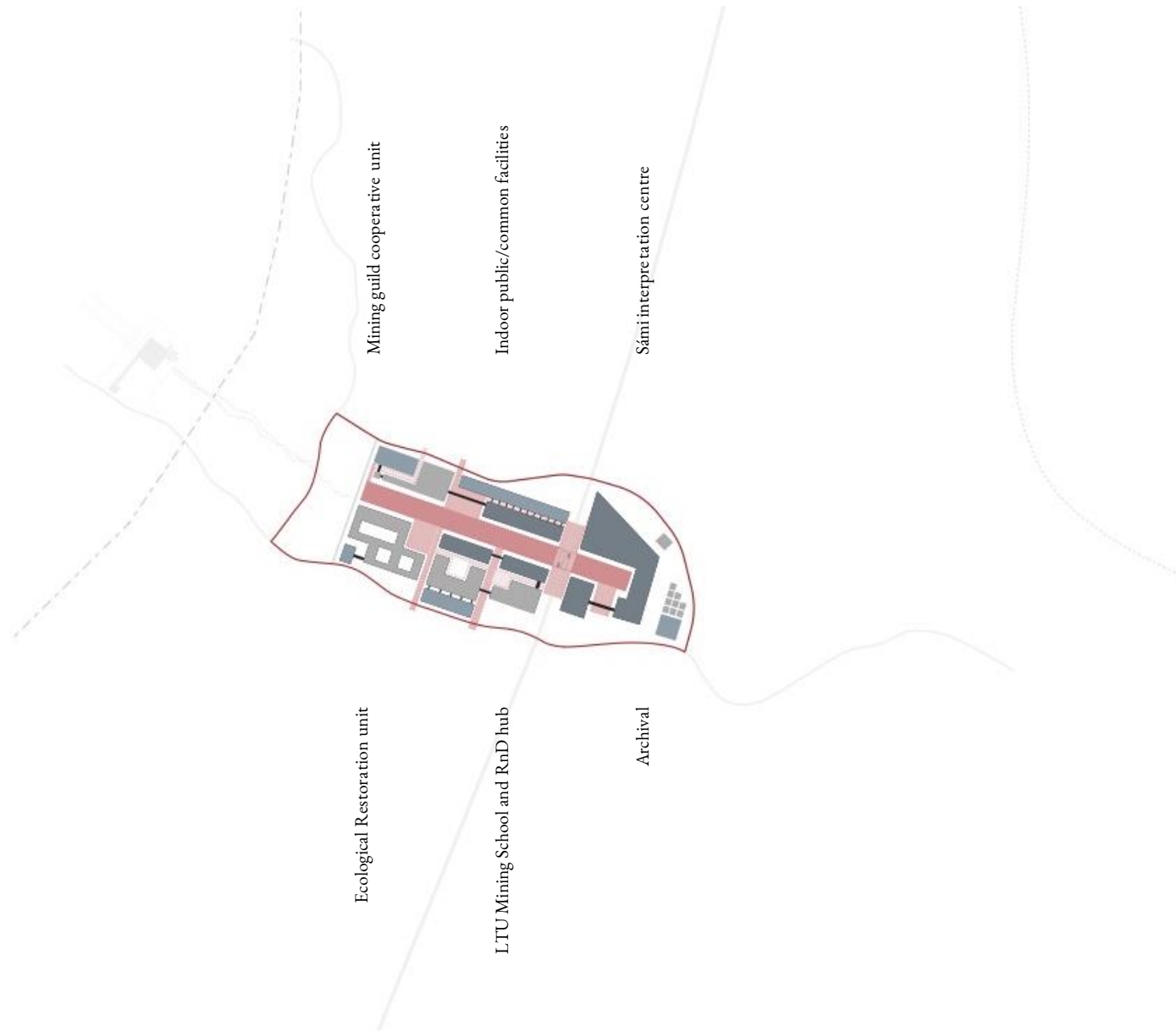
Architecture of Devolution [Anti-Project]



Axial Condition

Synthesis

Architecture of Devolution [Anti-Project]



Internal Interface

- Program
- Depth of Space
- Built connections
- Compact fabric

Synthesis

Architecture of Devolution [Anti-Project]

|0

|100m





Peripheral Interface

- seasonal
- snomobile track
- trails
- reindeer migration
- mine

Synthesis

Architecture of Devolution [Anti-Project]

|0

|100m

N



External Interface

- Bus stop

Synthesis

Architecture of Devolution [Anti-Project]

|0

|100m

N

Mine drift access

ventilation shaft
access tower
tourist view point

underground
drifts

anticipated
deformation
zone

built core

Sámi interpretation
centre

Migration
equipment
storage

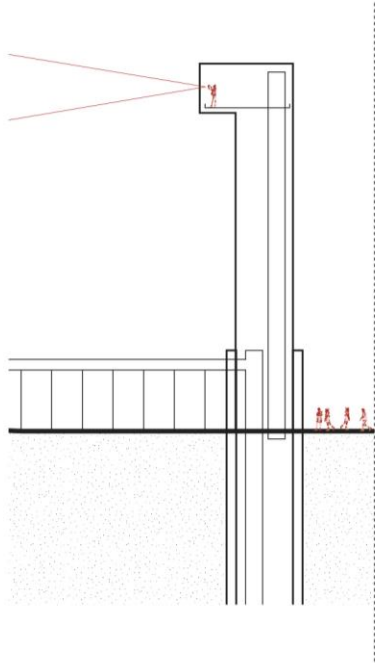
Reindeer
migration
rest stop

- Buildings
- Forest
- Grassland
- Wetland



Plan of the Interface

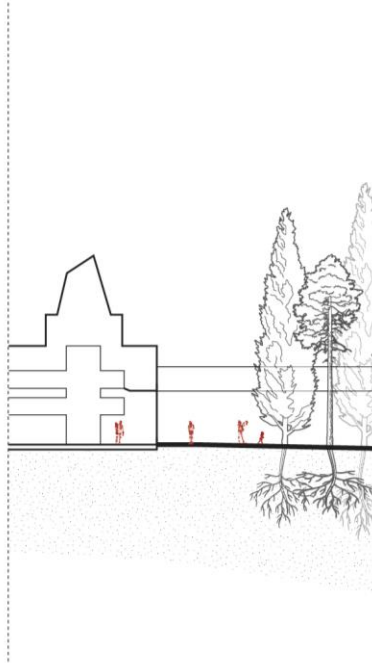
Overlapping program
*View tower, access point,
ventilation shaft*



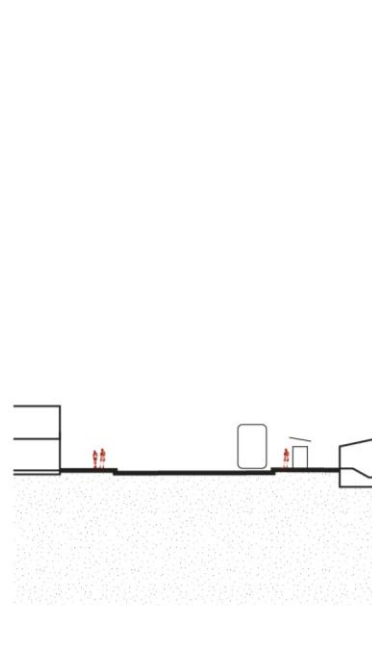
Buffer forest
Future expansion zone



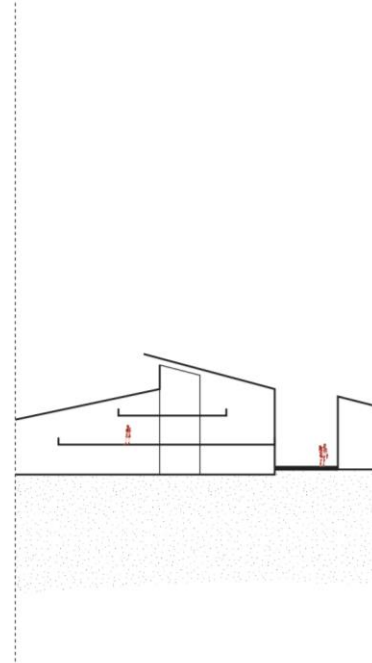
Shared common
facilities



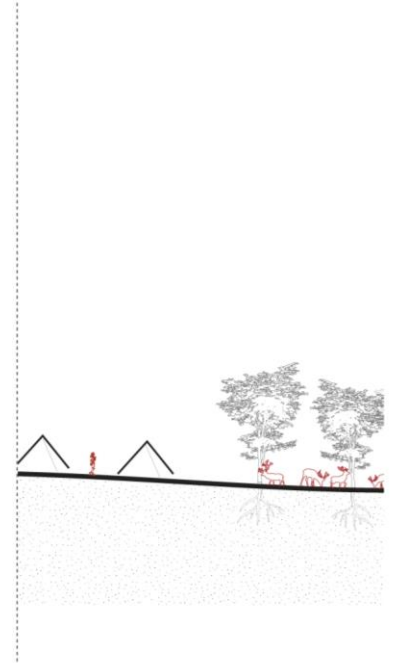
Kurravaaravagen



Sami Interrelation Centre
*Archival
Cultural*

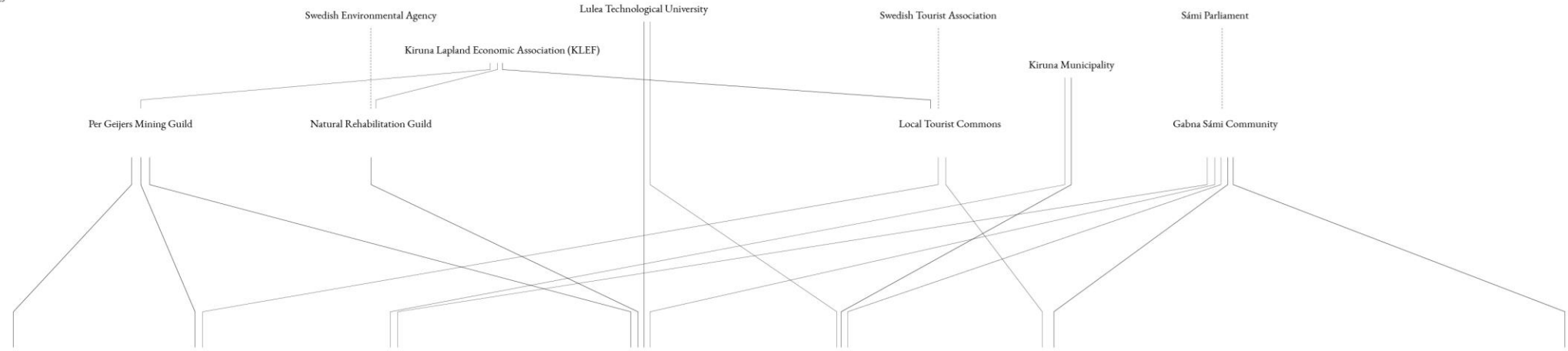


Temporary Reindeer herding
Rest stop

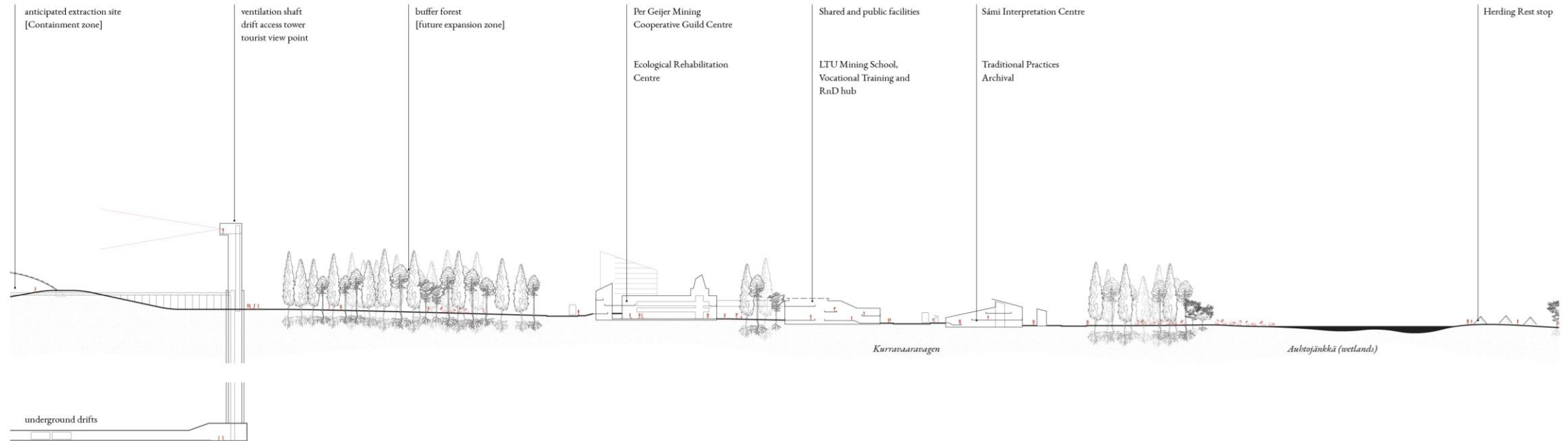


Longitudinal Section

Institutional agencies

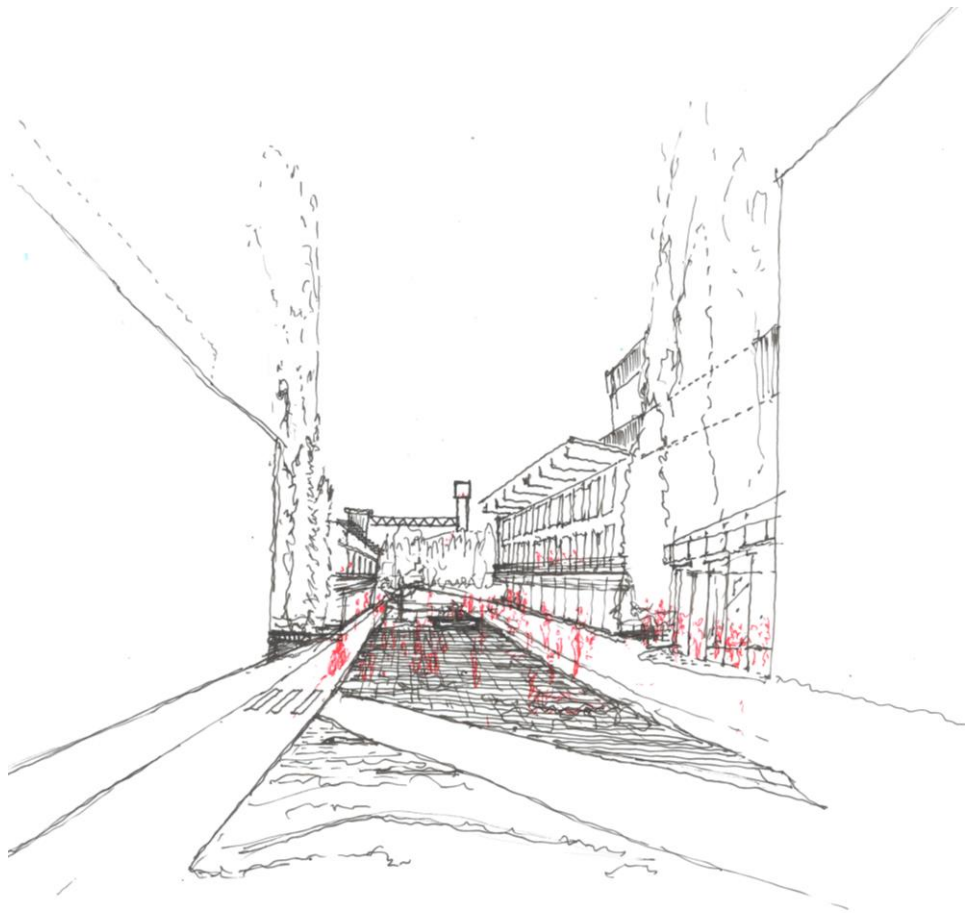


Spatial Elements

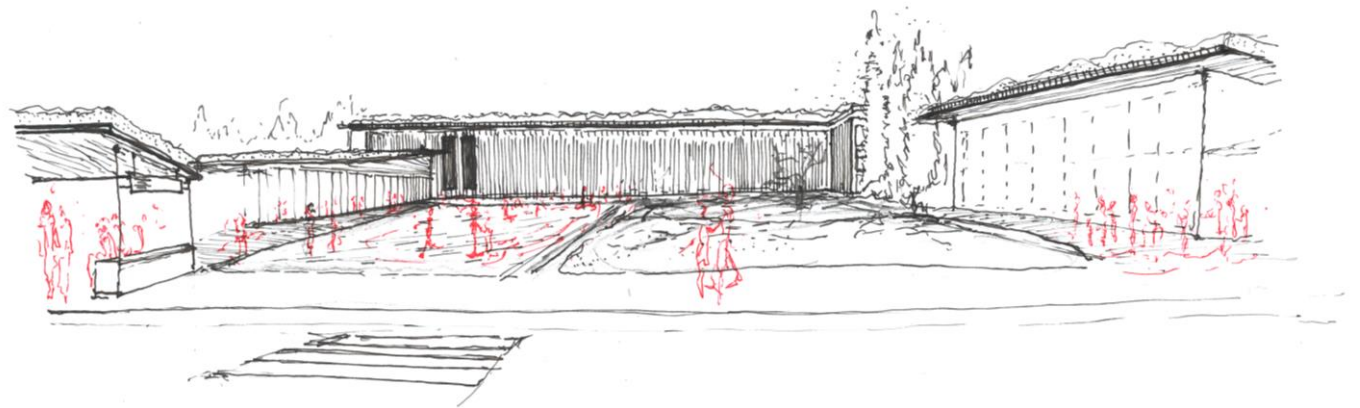


Longitudinal Section

Architecture of Devolution [Anti-Project]



Axial street
Summer



Sami Interpretation centre
Winter

Intended Spatial Quality

Architecture of Devolution [Anti-Project]

[Framing Part]

Critique + On-Site

[Diagnosis Part]

Anatomy

[Projective Part]

Towards Devolution

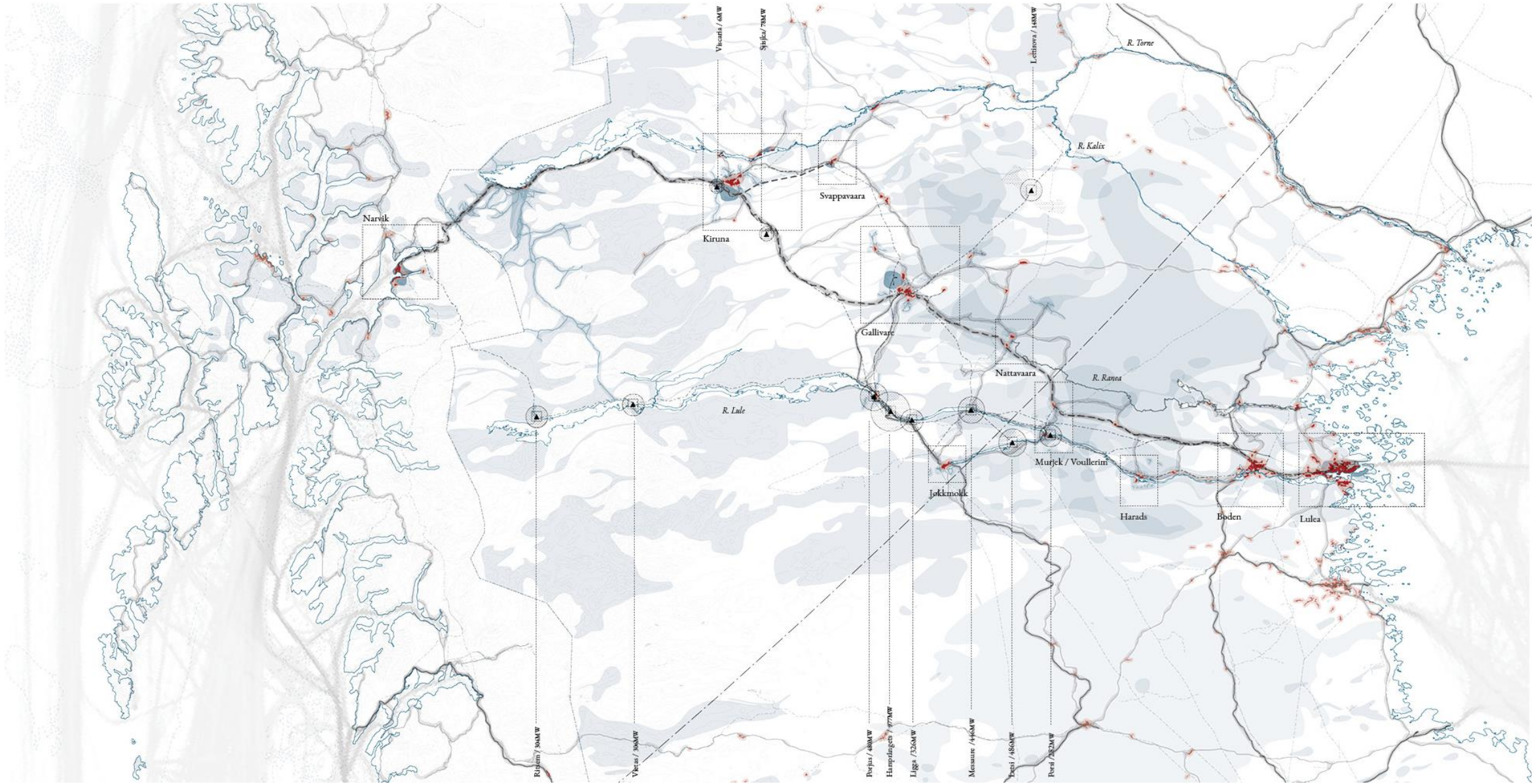
Post - Project

Architecture of Devolution

Anti - Project

Territories of Devolution

Meta - Project

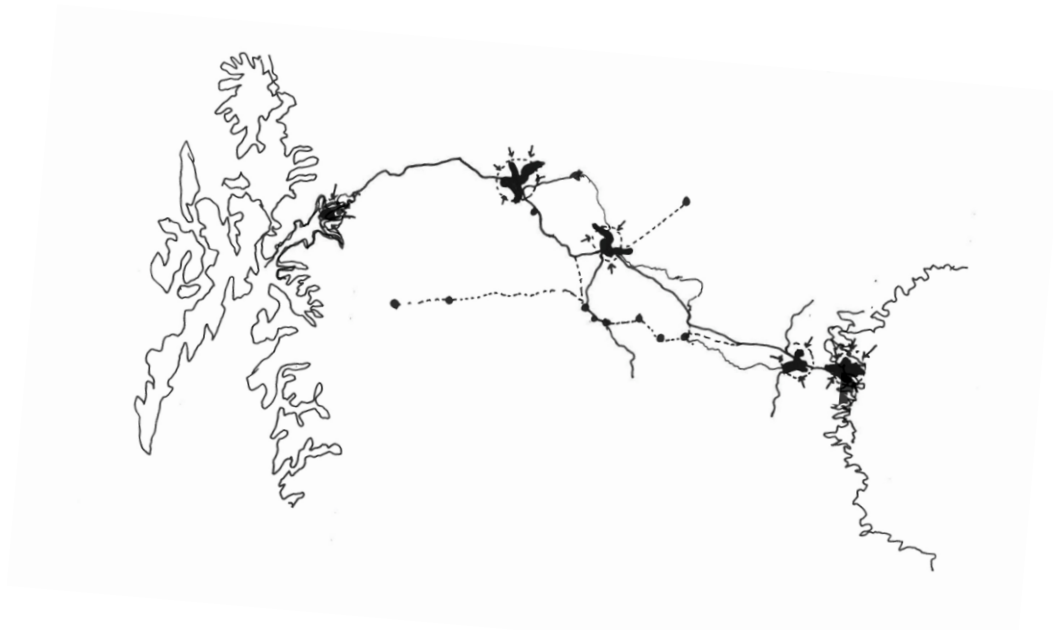


- Fixed Capital - infrastructures
- Economic activities
- Social Reproduction - settlements

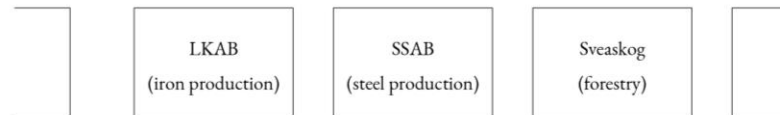
Accumulation of Fixed Capital

Territories of Devolution [Meta-Project]

1.
Accumulated State
Infrastructure and agencies



[Swedish State]

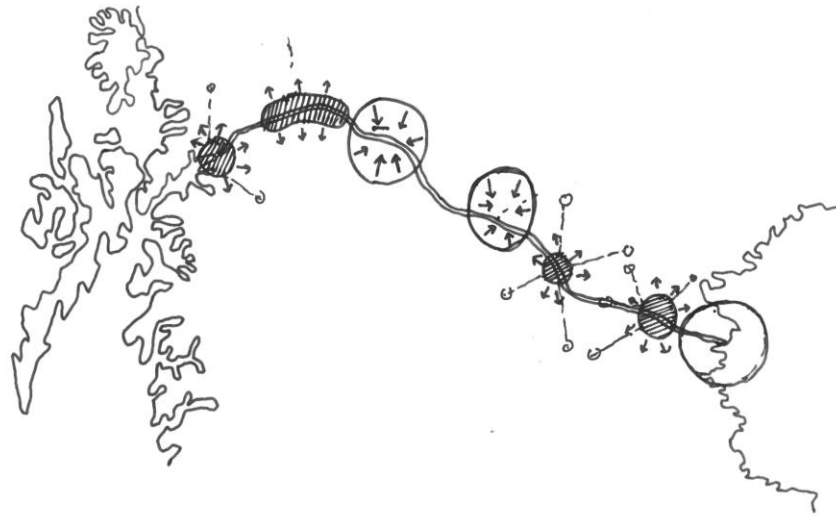


Devolution Mechanism

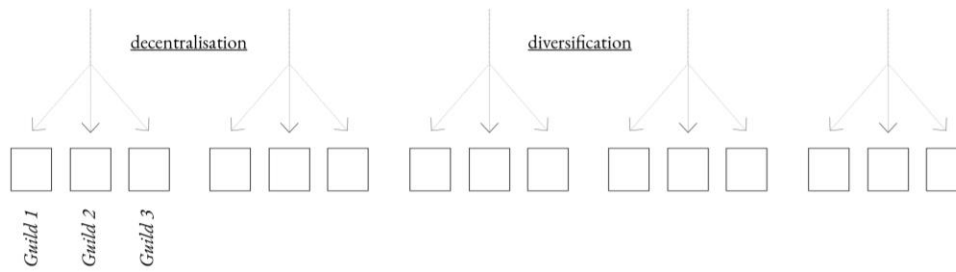
Territories of Devolution [Meta-Project]



2.
Decentralisation
Diversification



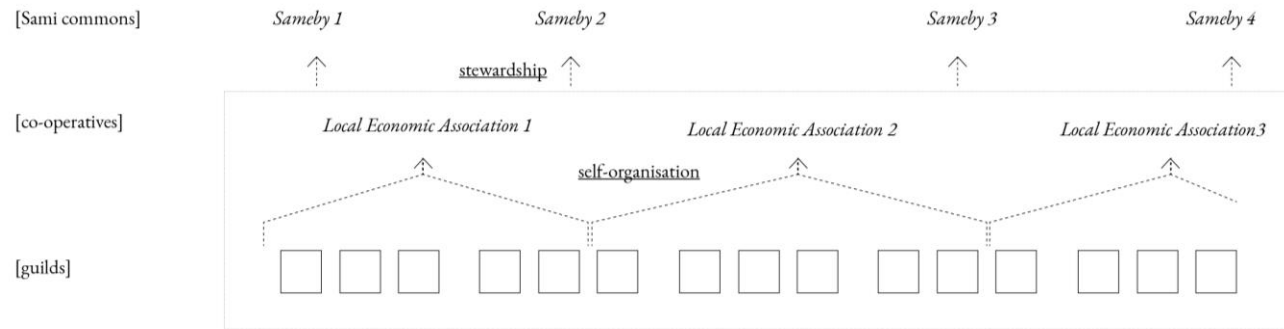
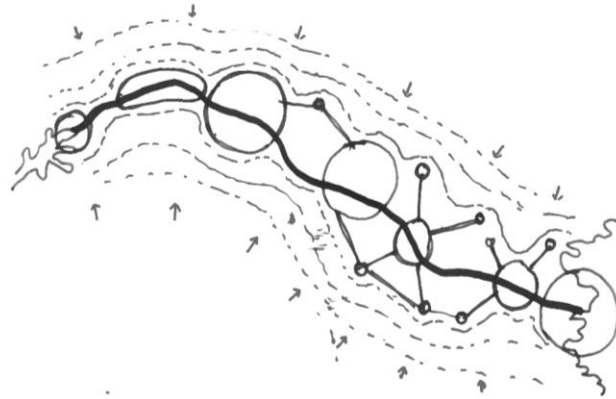
[guilds]



Devolution Mechanism

Territories of Devolution [Meta-Project]

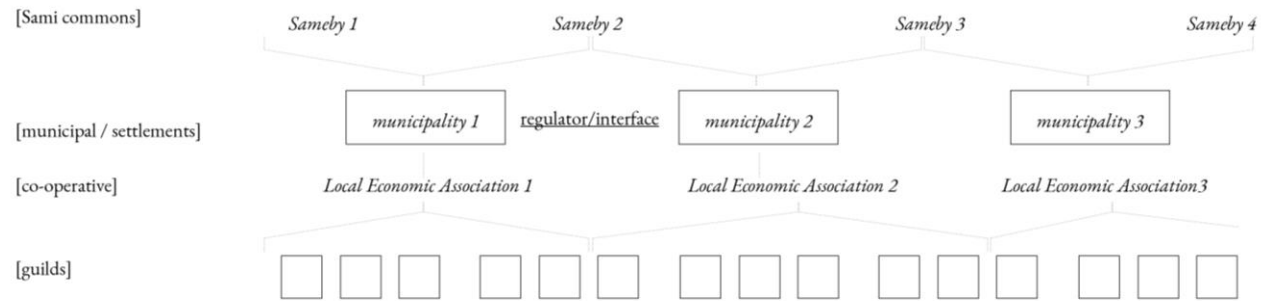
3.
Self organisation
concentration and Retreat
stewardship



Devolution Mechanism

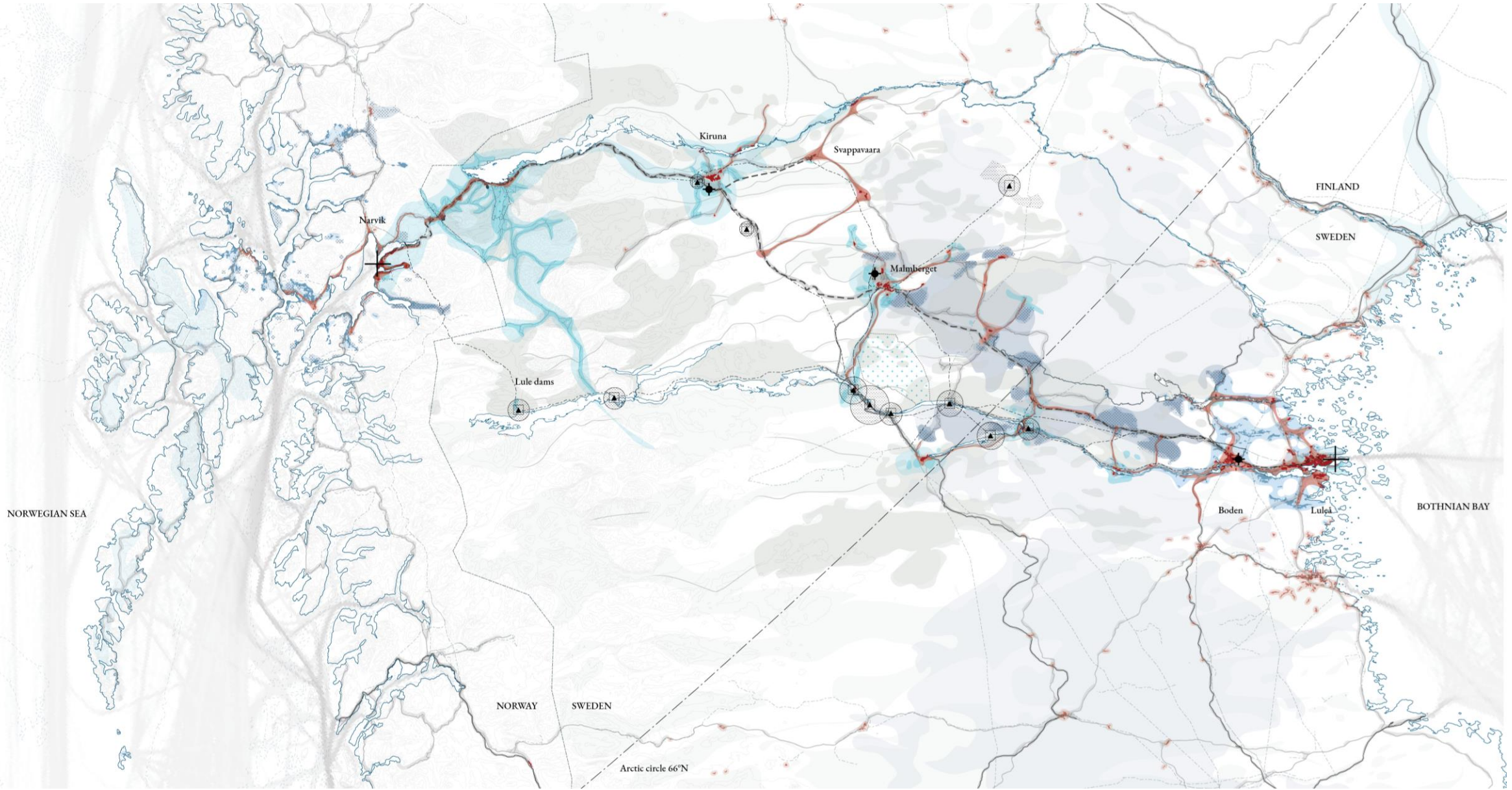
Territories of Devolution [Meta-Project]

3.
Settlements as interfaces



Devolution Mechanism

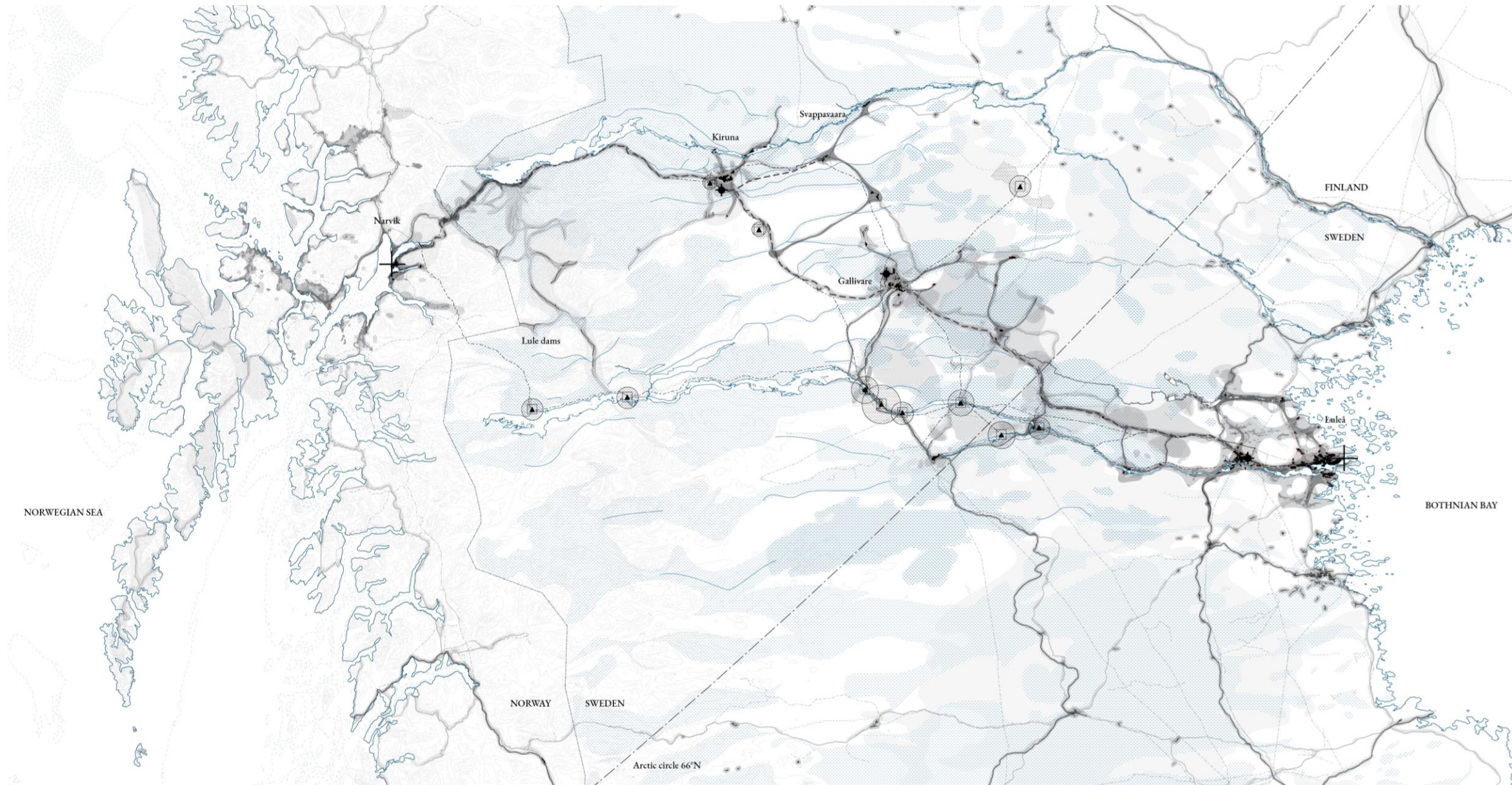
Territories of Devolution [Meta-Project]



- Urban
- Productive Forestry
- Agriculture
- Tourism - Ski parks, hiking trail

Diversification

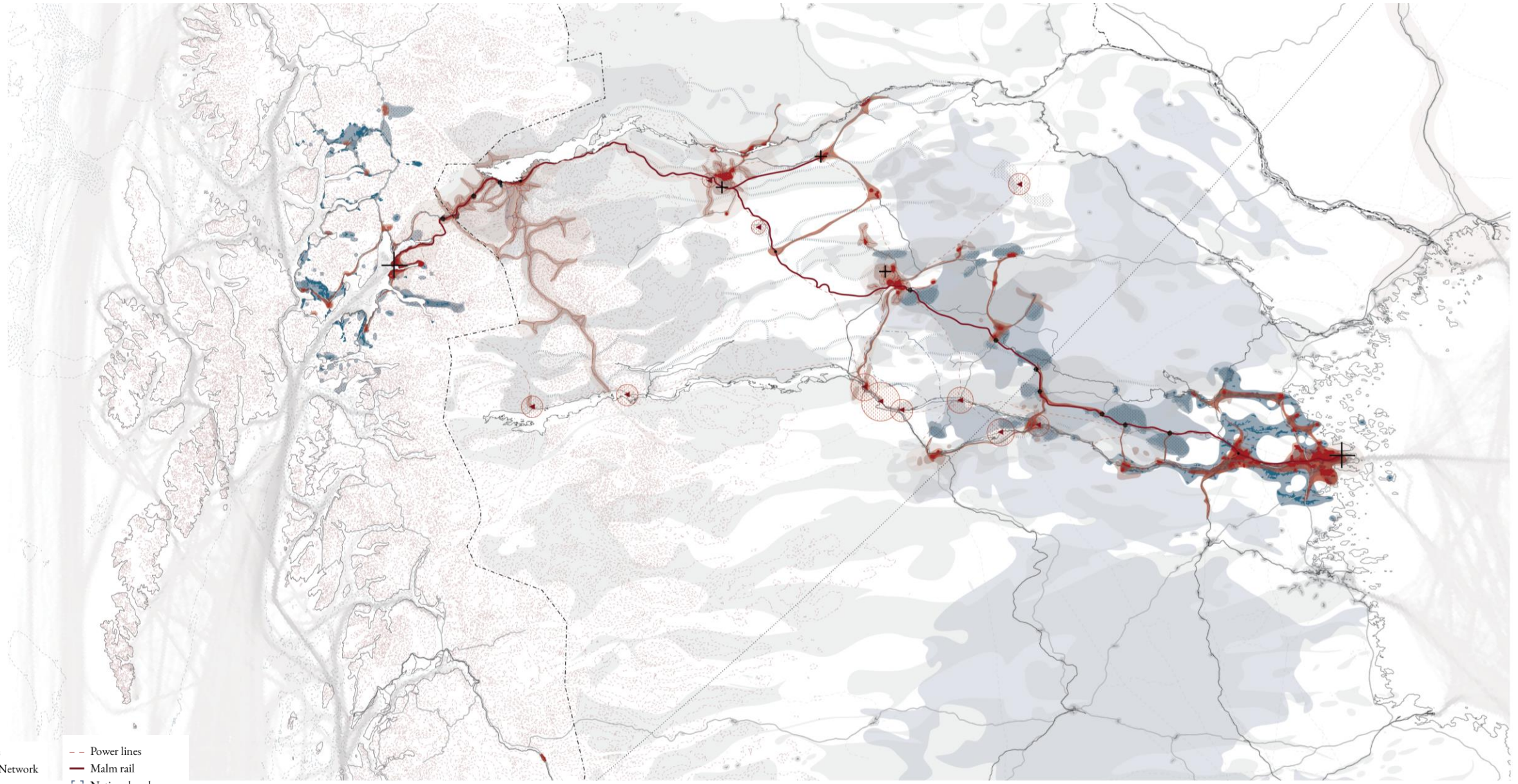
Territories of Devolution [Meta-Project]



Degrowing Landscape

Territories of Devolution [Meta-Project]

- Urban
- Concentration pattern
- Reindeer pastures
- Reindeer migration corridors



- Settlements
- Projection-Network
- Forestry
- Reindeer herding
- Seasonal agriculture
- Tourism
- Energy production
- Power lines
- Malm rail
- National parks
- + Post-mines
- ⊕ Forestry depots
- + Ports

Settlements as indeterminate interfaces

Territories of Devolution [Meta-Project]



Narvik

Settlements as indeterminate interfaces

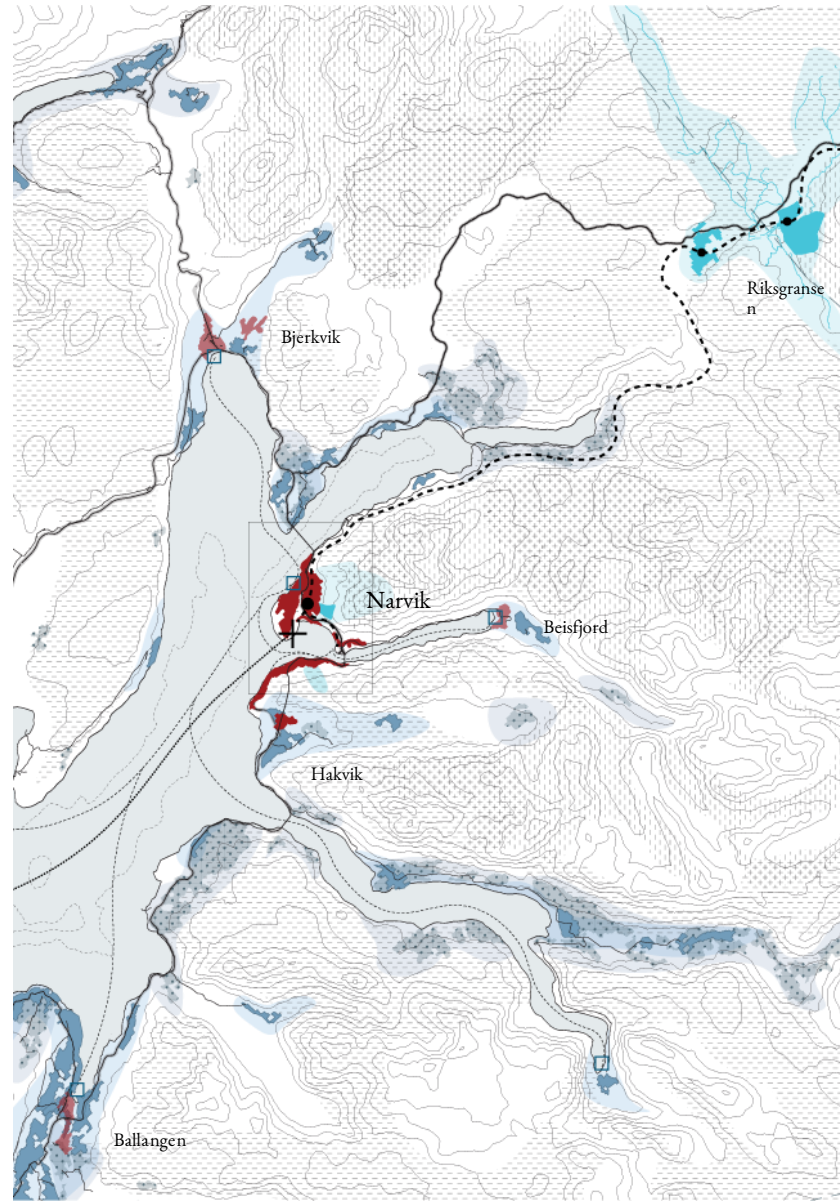
Territories of Devolution [Meta-Project]



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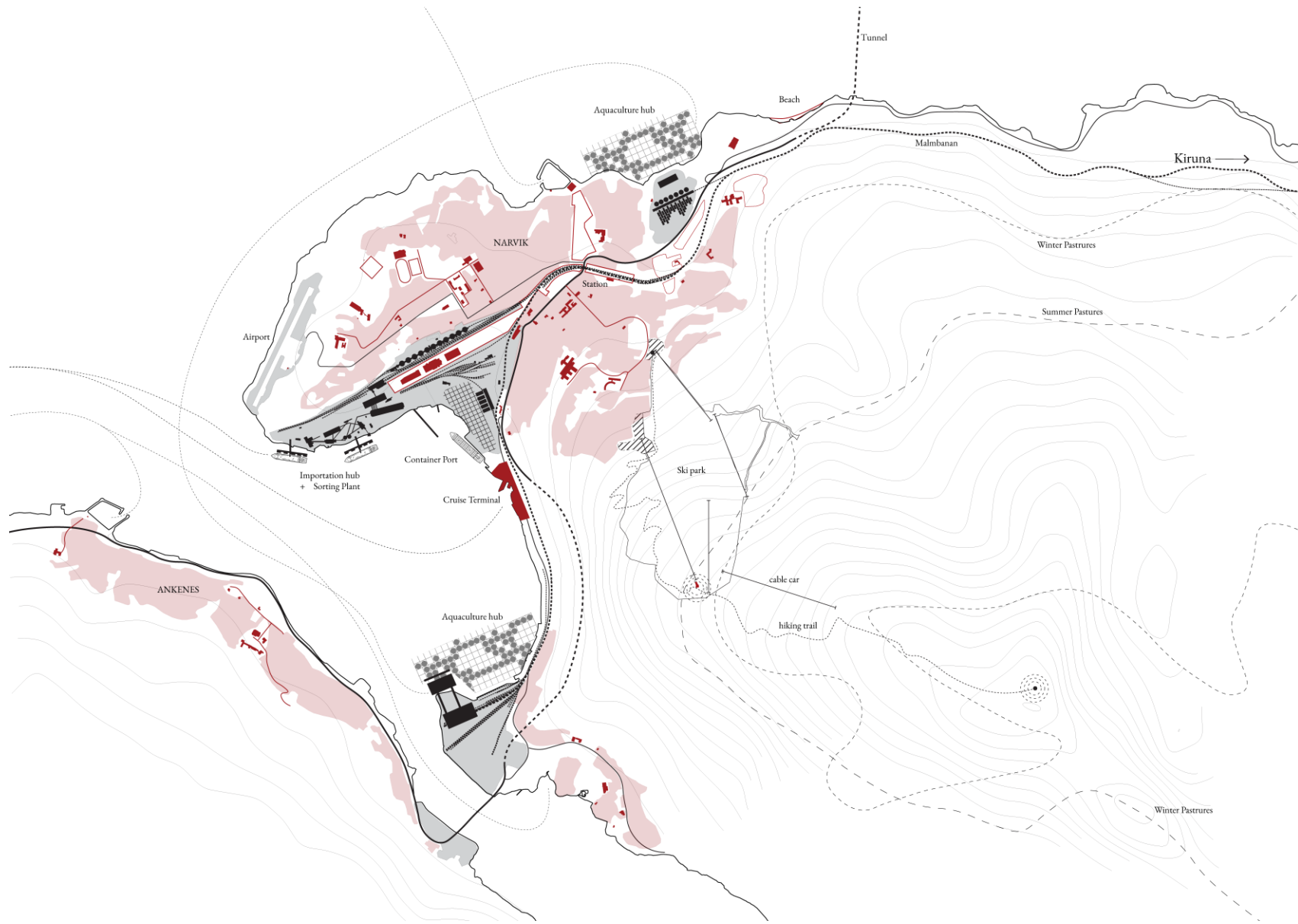
50 km

- Urban
- Productive Forestry
- Agriculture
- Tourism - Ski parks, hiking trail
- Pastures - Summer, winter, all year
- Roads
- Railway
- Water Transport
- Raw material shipping
- Aquaculture farms
- Port
- Railway Station



Interface Demonstration - Narvik

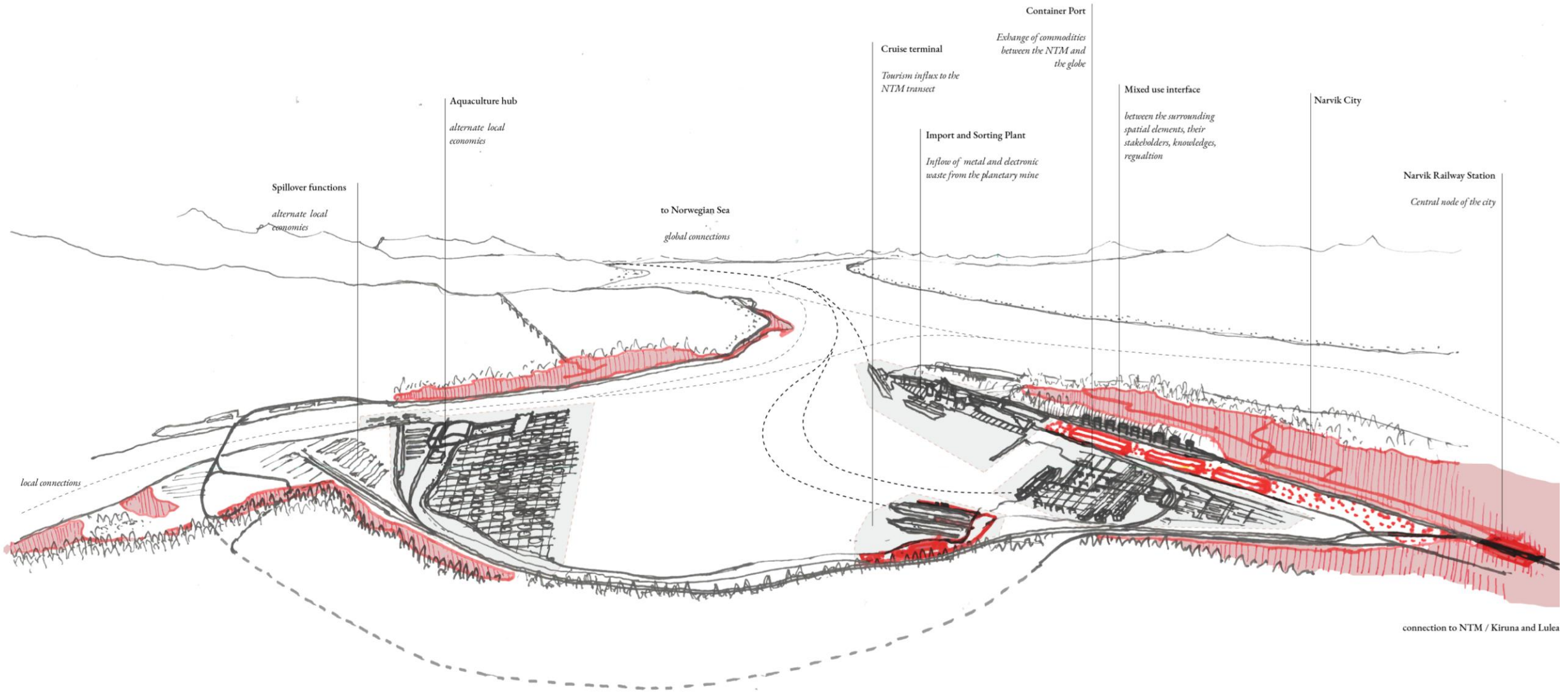
Territories of Devolution [Meta-Project]



Productive Coastline - Narvik

Territories of Devolution [Meta-Project]





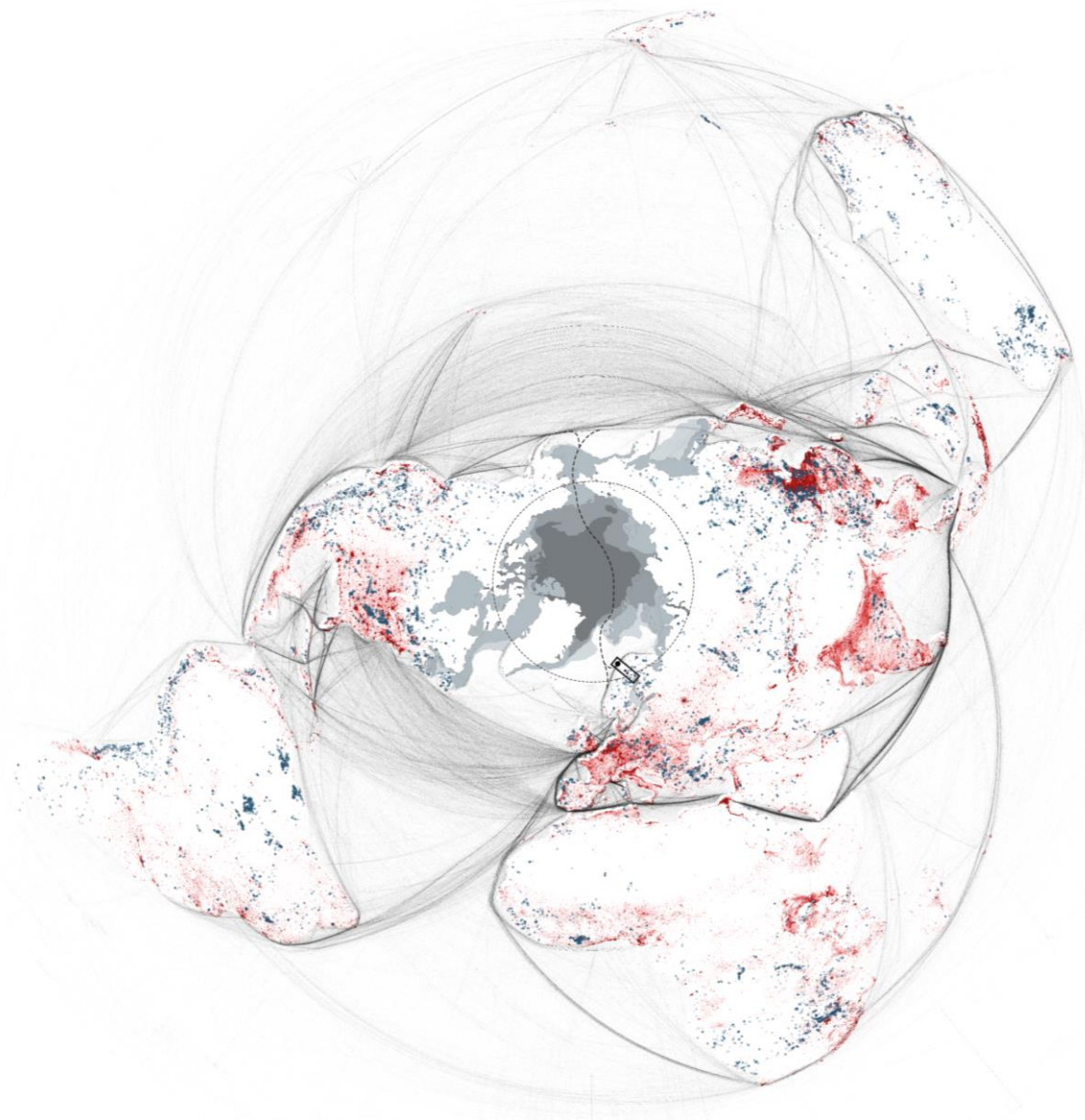
Productive Coastline - Narvik

Territories of Devolution [Meta-Project]



0

50 km



- Norrbotten Technological Megsystem
- Human Influence Index - Planetary Mine
- Marine transport
- Geological mines
- Arctic Circle
- ⋯ Transpolar Sea Route

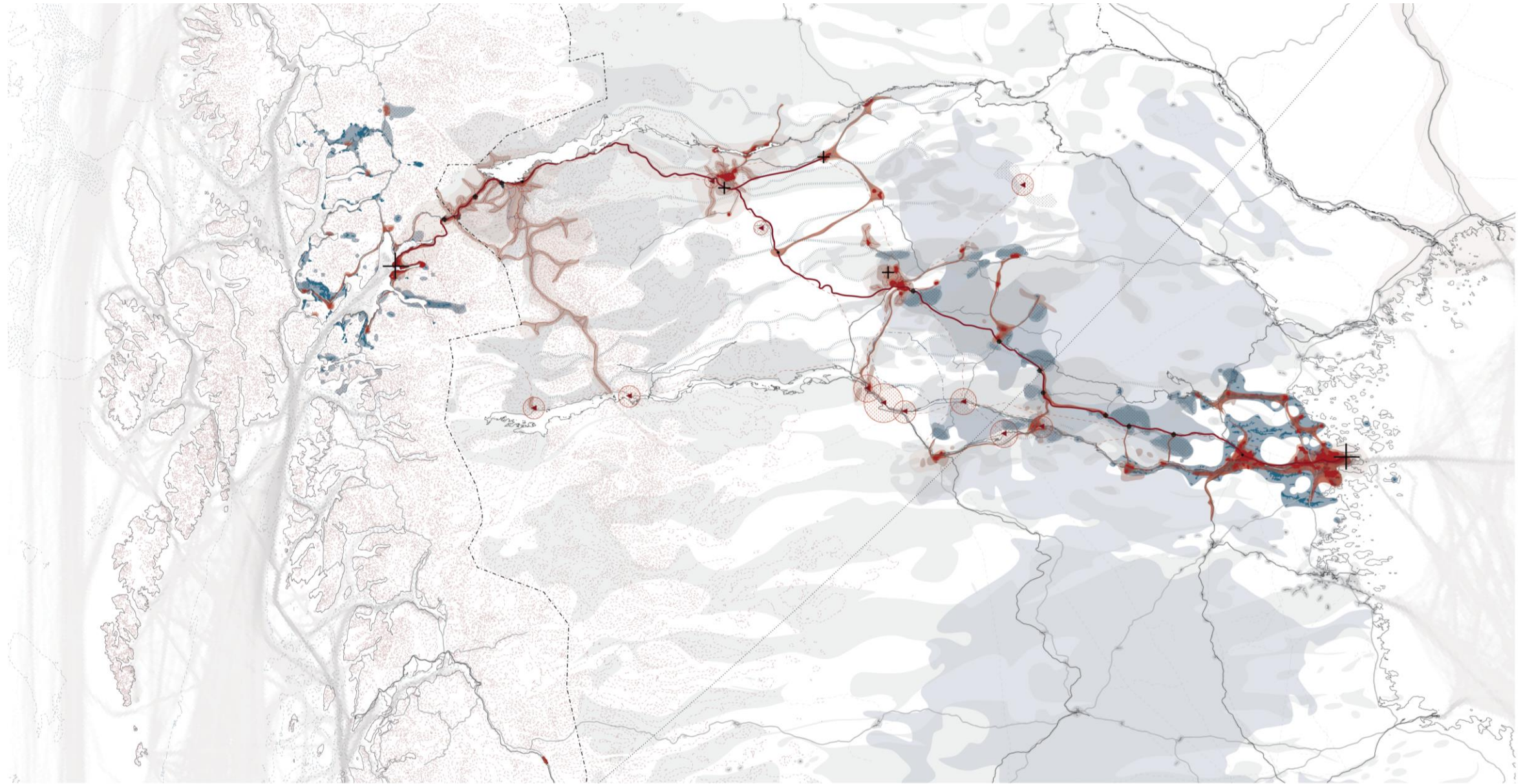
Connection with the Planetary Mine

Territories of Devolution [Meta-Project]



10

50 km



Settlements as indeterminate interfaces

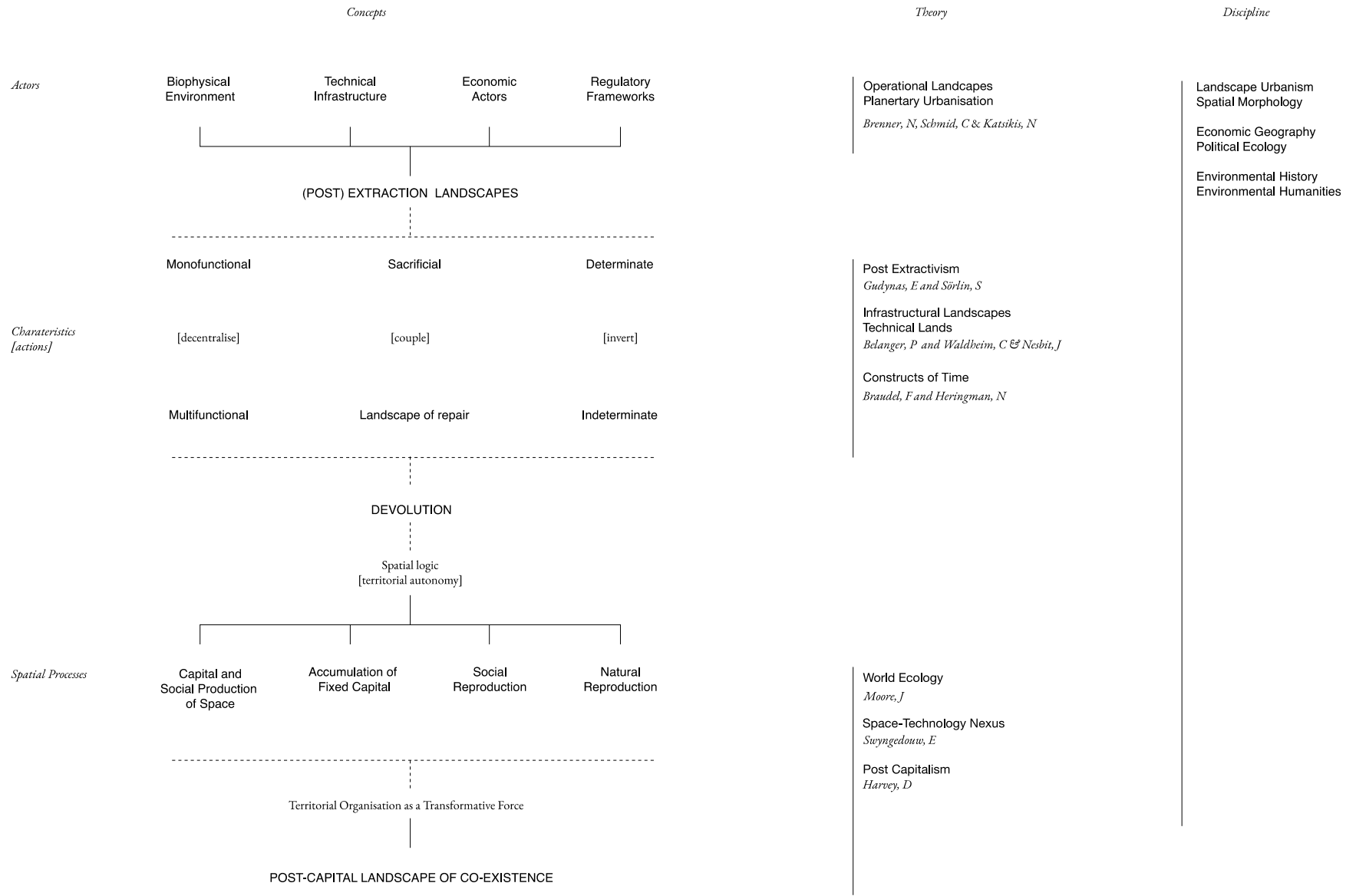
Territories of Devolution [Meta-Project]



0

50 km

How can post-extraction potentials inform the design agency to transform Arctic infrastructural landscapes towards a post-capital landscape of co-existence?



Conceptual and Theoretical Framework

“Capitalism does not act upon nature so much as it unfolds through nature–society relations”

Jason Moore
Amsterdam is Standing on Norway II