INTEGRATION BY USING LANDSCAPE AS INFRASTRUCTURE

FLOWSCAPES :Infrastructure as landscape,landscape as infrastructure
Graduation lab landscape architecture 2016-2017

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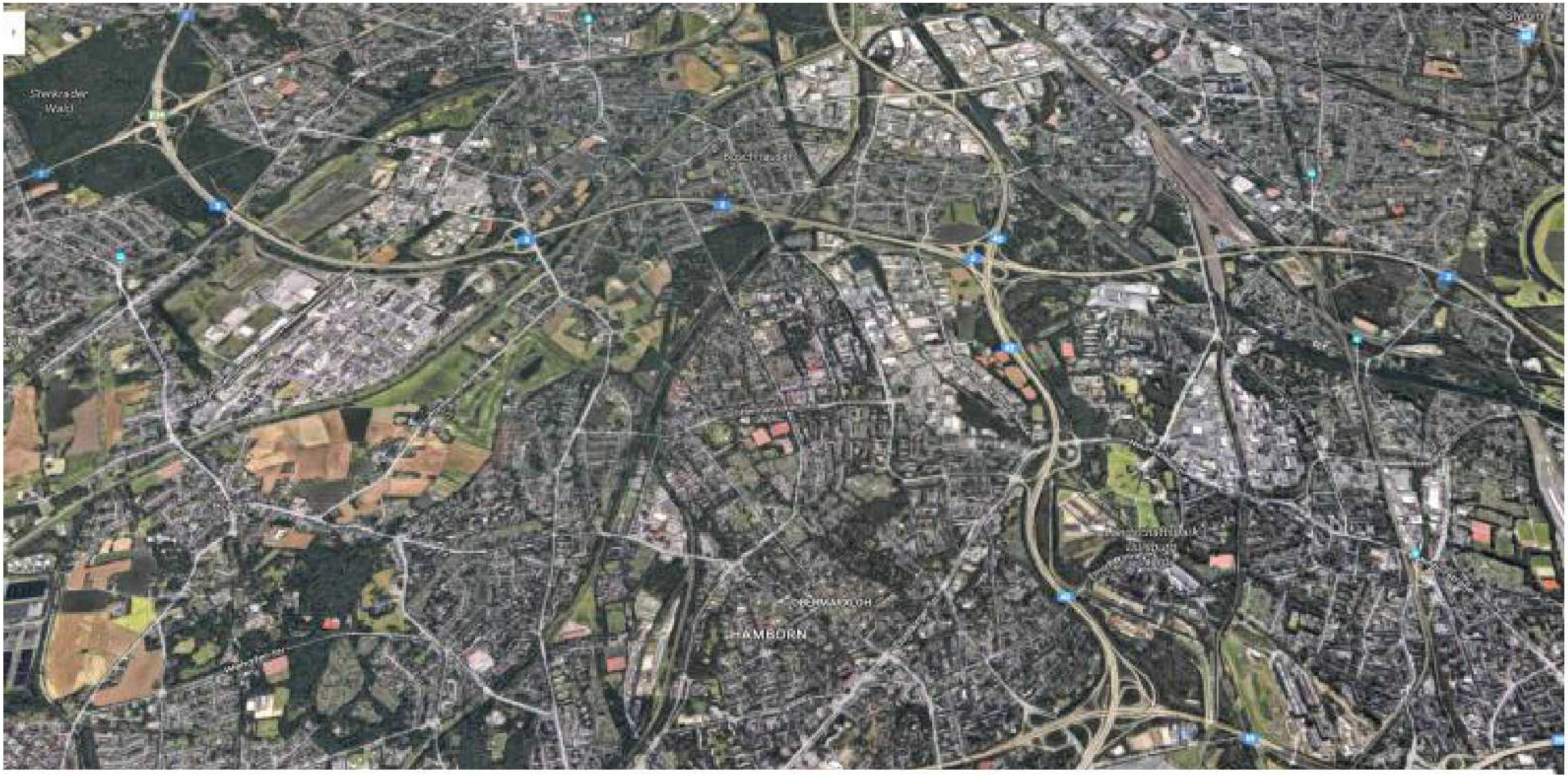
PROBLEM STATEMENT



Nature and urban expansion

In Ruhr area,the cities have geographically met each other,and the nature have become the space that left in-between.People is hard to have contacts with the wildness.The nature will be totally destroyed if the urban expansion still continues .

To understand this phenomenon,it studies on the process of Ruhr urban expansion overtime.

TIMELINE OF RUHR PROBLEM STATEMENT

The history of Ruhr urban expansion

Hundreds years before

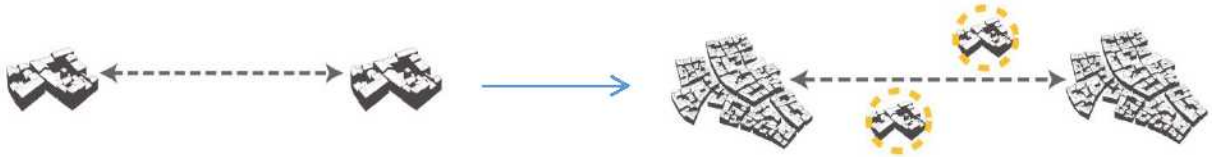
Now

The history of Ruhr area

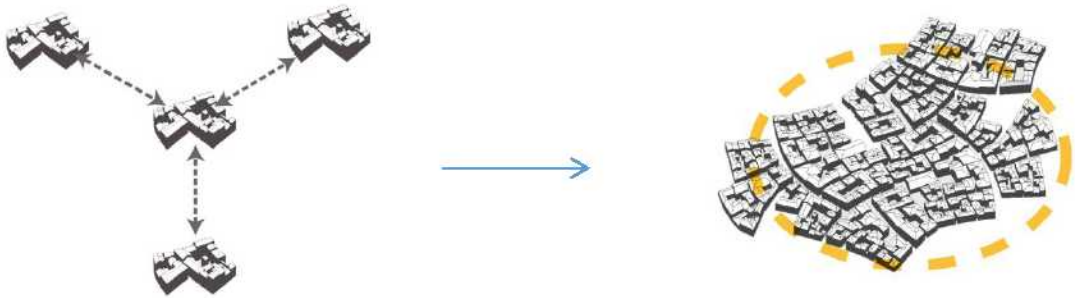
This diagram shows the urban expansion over time.The urban context keeps growing along the road and the nature space in between gets more and more fragmented.

THE MODEL OF RUHR URBAN EXPANSION PROBLEM STATEMENT

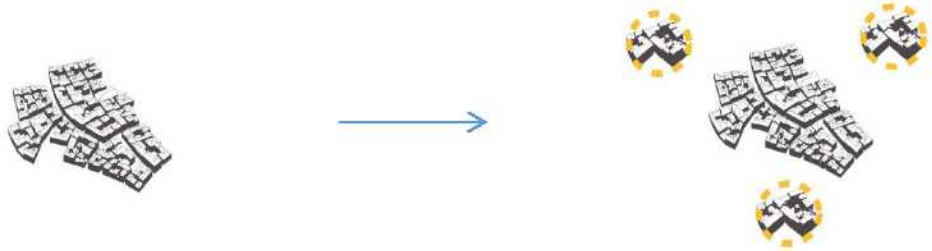
POLE-AXIS URBAN GROWTH THEORY.(SOMBART)

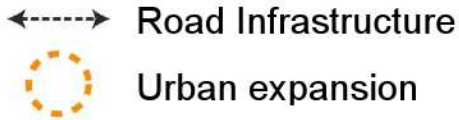


MULTI CORE GROWTH THEORY(HARRIS&ULLMAN,1945)



MEGALOPOLIS THEORY(J.GOTTMANN)





Integration(or development) by road infrastructure

The study on those urban expansion models shows the typical way of Rhur urban expansion .The Ruhr urban has been growing along the road until now.

FRAGMENTATION IS THE RESULT PROBLEM STATEMENT

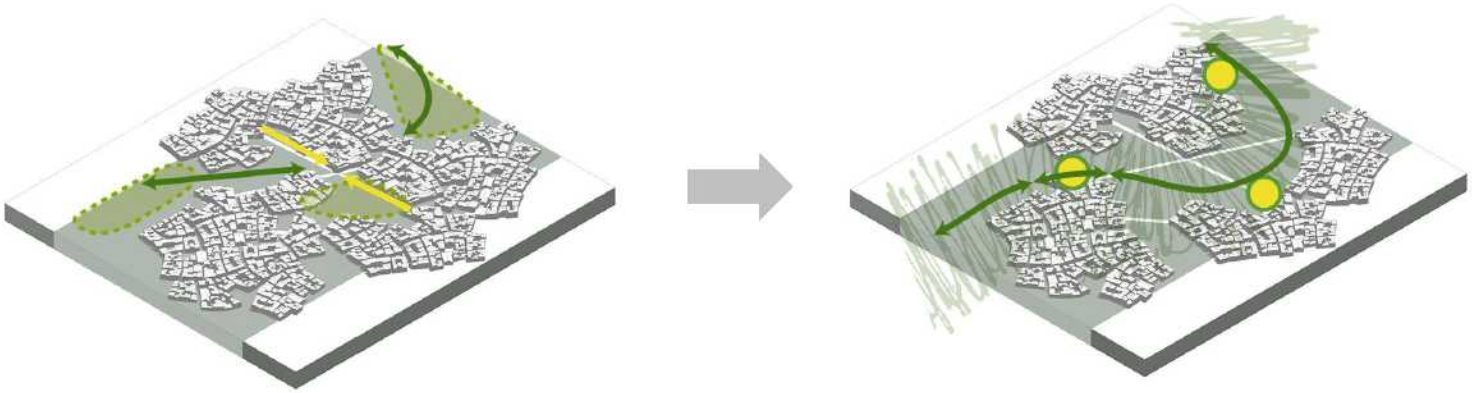
Fragmented green space

The urban expansion in such model causes the Greenspace become highly fragmented

CURRENT EMSCHER PROPOSAL PROBLEM STATEMENT

If urban still grows along the road

Emscher proposal

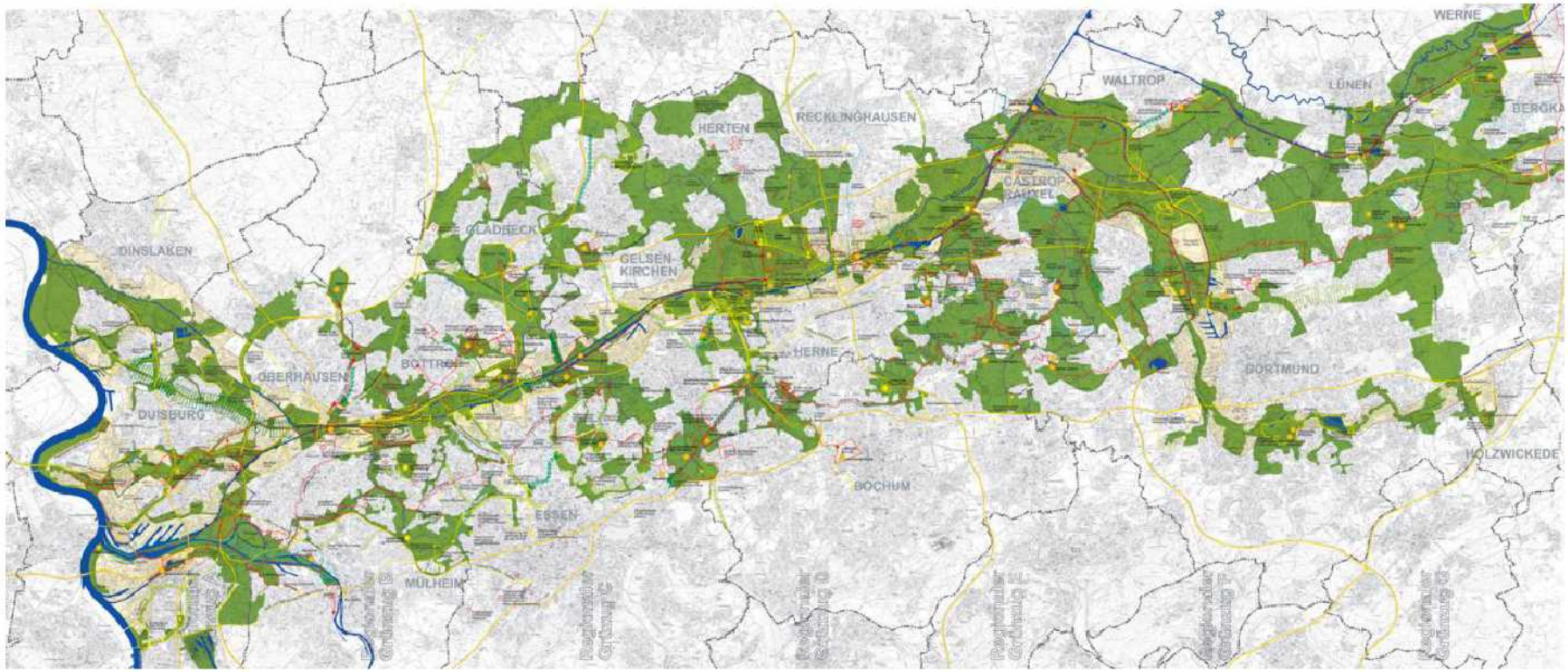


Current Emscher proposal

If the urban still grows along the road it will totally destroy the nature

To avoid this ,the greenstructure should be used as the development backbone so that the urban can grow along the greenstructure instead of road.For example,the Emscher greenstructure.

IS THE CURRENT EMSCHER THE RIGHT SOLUTION? PROBLEM STATEMENT



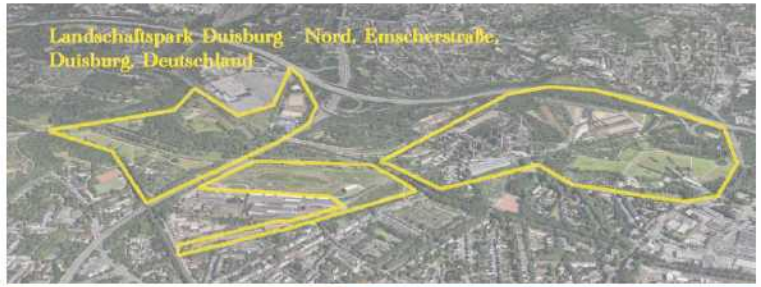
Current Emscher Proposal

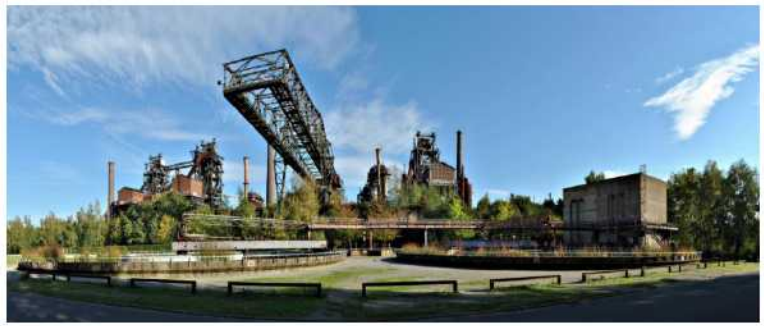
Here is the Emscher greenstructure which is used for guiding the future urban expansion in Ruhr but is it the perfect solution?

IS THE CURRENT EMSCHER THE RIGHT SOLUTION? PROBLEM STATEMENT

Current Emscher proposal

Duisburg landscape park



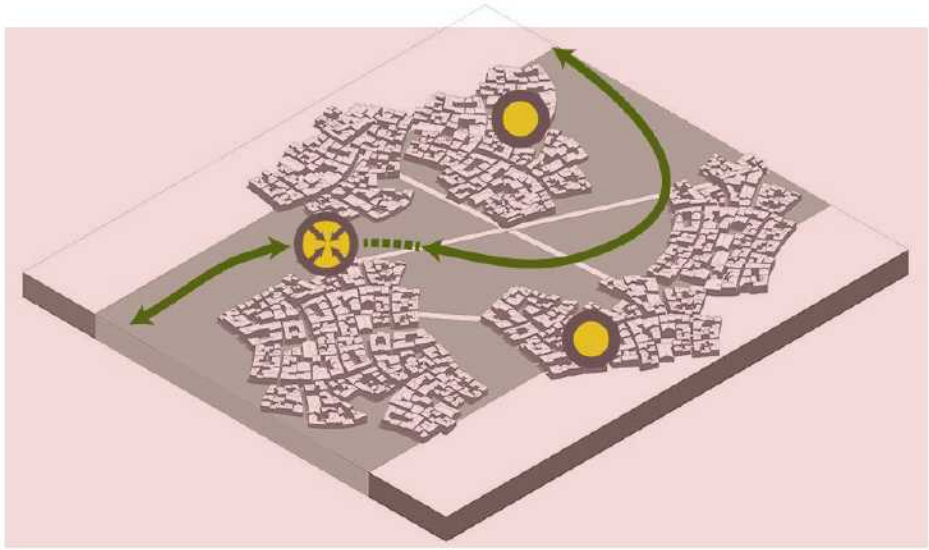


Current Emscher Proposal and not successful projects:

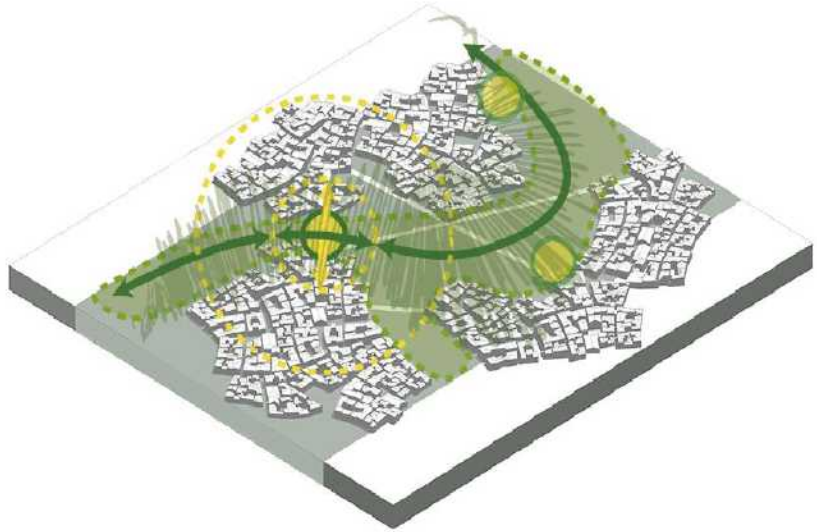
The project based on current Emscher proposal is not successful.For example,Duisburg landscape park is based this Emscher proposal.However ,it's isolated as spatial island and it even cause further fragmentation to the greenstructure.

IMPROVED EMSCHER PROPOSAL

Current Emscher proposal



Improved Emscher proposal

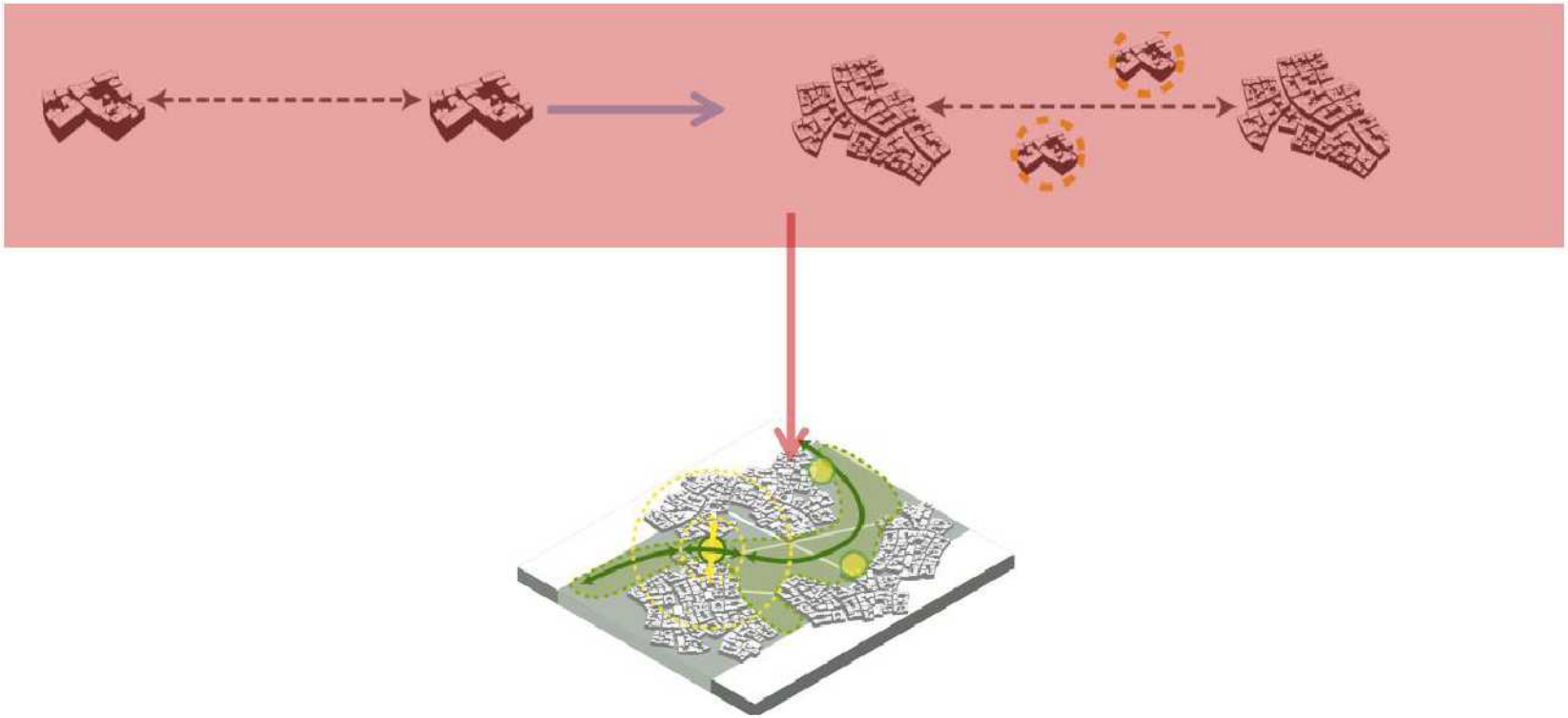


Suggestions to the current Emscher proposal

For the current Emscher proposal,the project in Emscher shouldn't be isolated and cause further fragments to the greenstructure.It should be well contextualized and thought in hierarchy scales .The project should be a part of Emscher context.

RESEARCH OBJECTIVE AND QUESTION

Research Objective and Question



Research question:

The thesis research on how to use landscape as infrastructure to guide future urban expansion and integrate the fragments natural and urban layers.

Research objective:

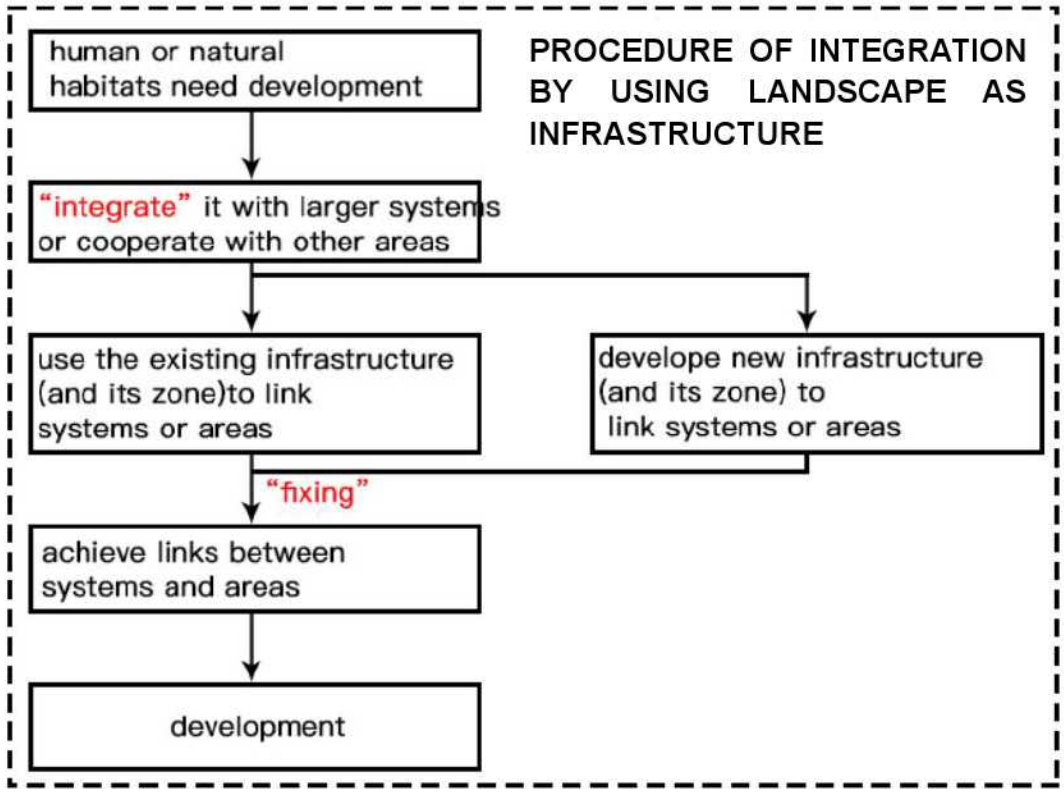
The study could help to prevent the further fragmentation of natural system in the urban expansion process.and it could help the current nature gain huge additional value because It can transform invalid and fragmentary greenstructure into a coherent structure.

THEORETICAL FRAMEWORK:DESIGN RELATED RESEARCH

Landscape architecture method
Design related research

-Understand the context(multi scale)
Understand the Spatiality,fragmented layers program,ecology,sociality.

-Landscape architecture design
Propose the proper contextualized structure and possible programs



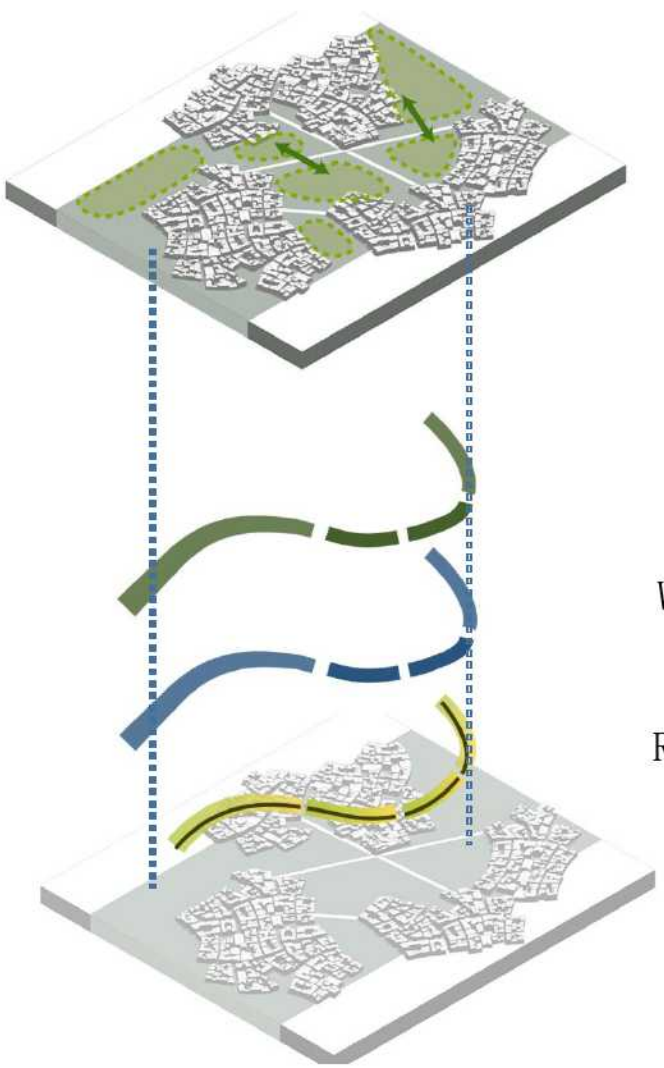
Theoretical framework

According to the design related research,the design process is the crucial part of the whole research process.
For the design process,It will firstly study on the natural and urban context of the site in multiply scales.
Then it will propose the proper contextualized landscape structure and possible programs for the project .

THE CONCEPTUAL TOOL APPLIED ON THE PROJECT

STEP1

Connect the fragments



STEP2

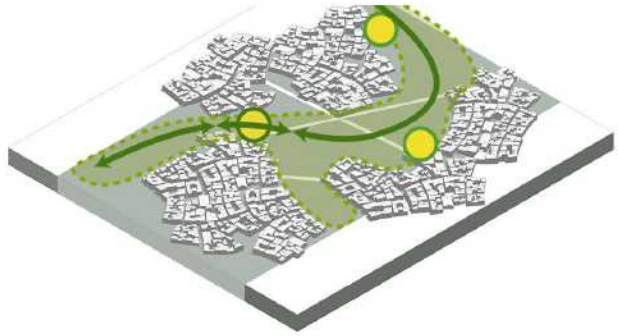
Hierarchy scales

Ecology corridor

Water Structure

Recreational space

Flows and projects



The implementation of this conceptual tool

Here is the implementation procedure of this conceptual tool

The first step is understanding the fragmentation and connect them.
Then propose proper landscape structure based on the context in hierarchy scales
The final step is propose possible programs and fill-in.

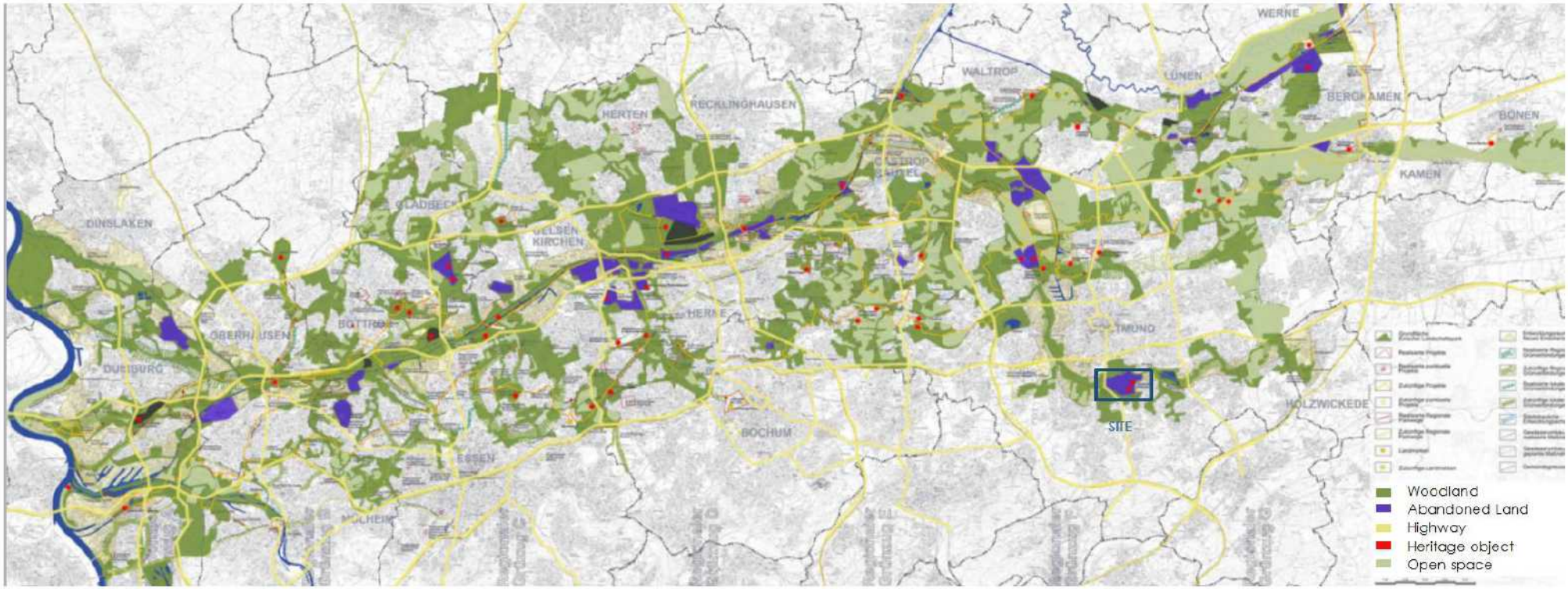
CONCLUSION FOR THIS PART

When the landscape is used as the backbone(or framework) to guide the urban expansion,the backbone(or framework) should be well connected.

The landscape as backbone(or framework) should also have good natural quality which will be the base for the future urban development.Transforming the fragmented landscape in a integral one is a powerful way to improve the natural quality.

INTRODUCTION OF THE SITE

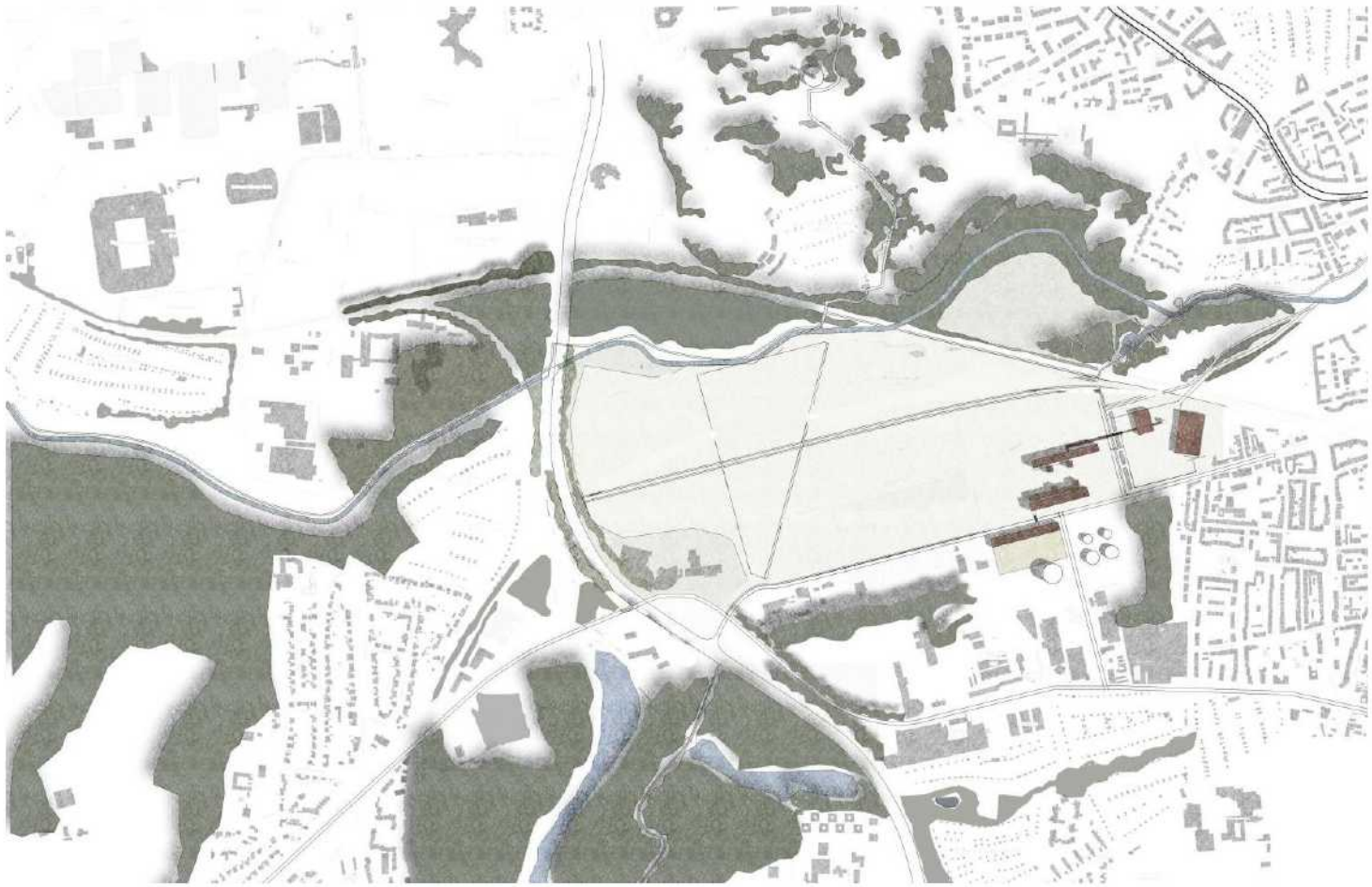
INTRODUCTION OF THE SITE

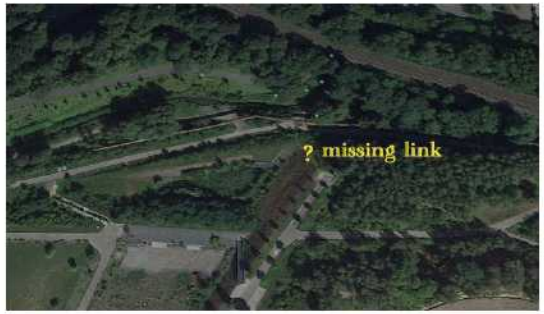


Fragmented Emscher

The Emscher is the framework for the future development in Ruhr.However,it is highly fragmented because the different projects and highway have segregated the Emscher greenstructure.
The experimental site is a abandoned land right in the Emscher structure which cause the fragmentation.

INTRODUCTION OF THE SITE





Current situation of the site

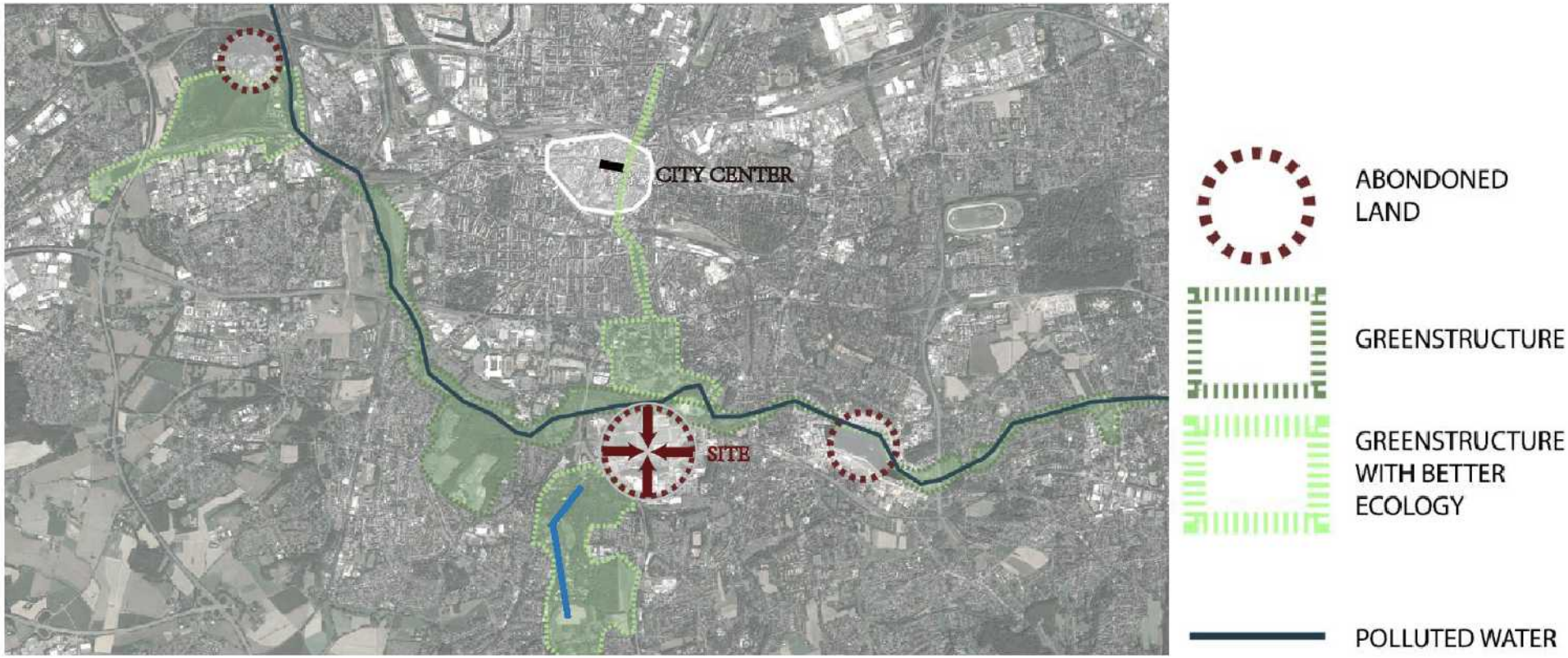
The site is a abandoned industrial land.Emscher and the site is polluted in the age of industrialization.There are many such sites in the Emscher.The site is in Dortmund,it has the potential to facilitate the future urban expansion because it is leftover and it has the potential to recover the shrinking Dortmund.

Video

BIRD EYES VIEW

DIAGNOSIS

OVERALL DIAGNOSIS



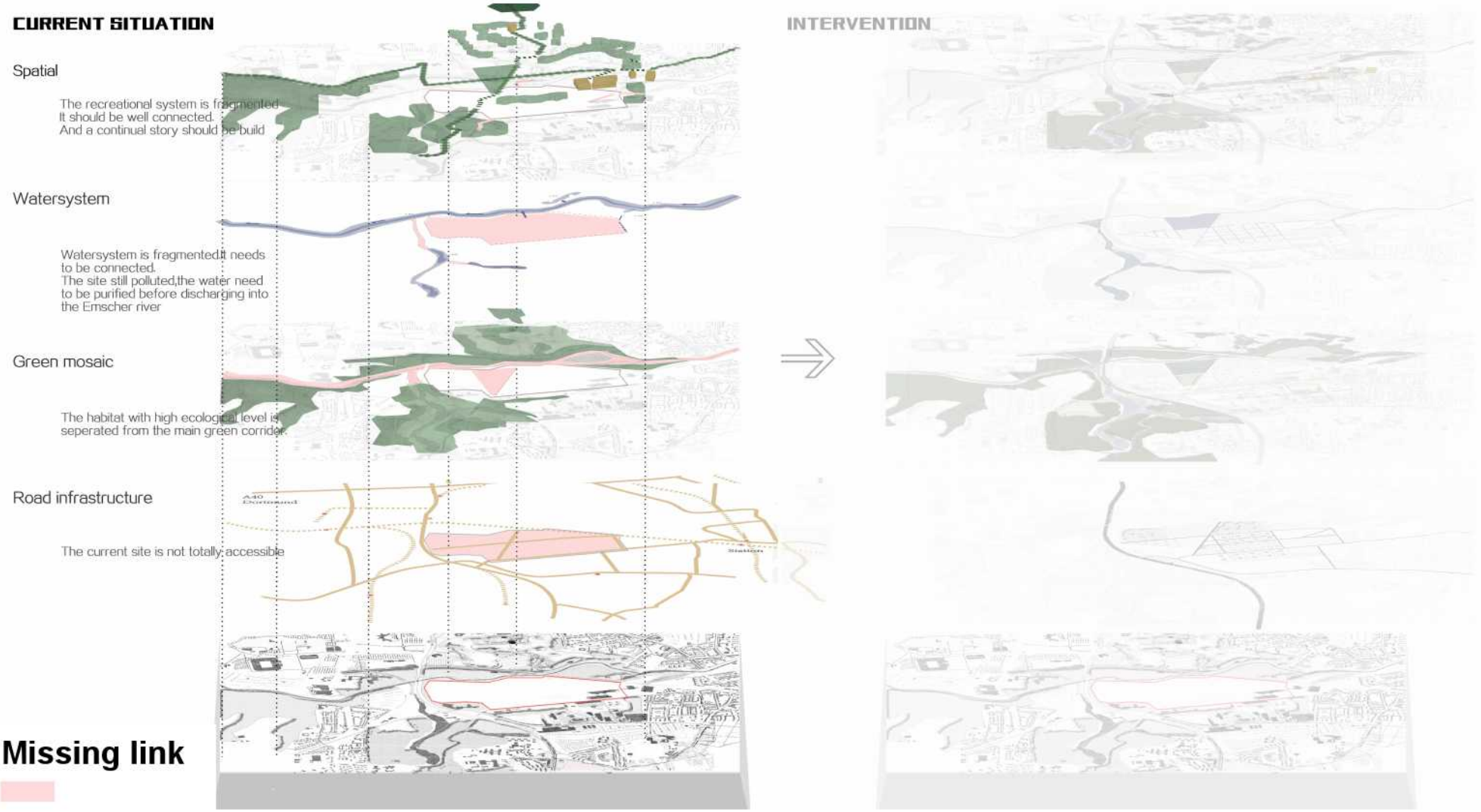
Current situation

The site is a abandoned industrial land.It separates the existing greenstructure.One is from the city center to rural park,and the other one is Emscher structure.and there is a separate water structure near the site.
Those natural and urban fragments are in different layers with different natural quality.

When the greenstructure is used as the backbone to guide the sustainable urban expansion,it should be well connected in each layer and have good natural quality .

LAYERS DECOMPOSING OF THE SITE

SITE LAYER DECOMPOSING



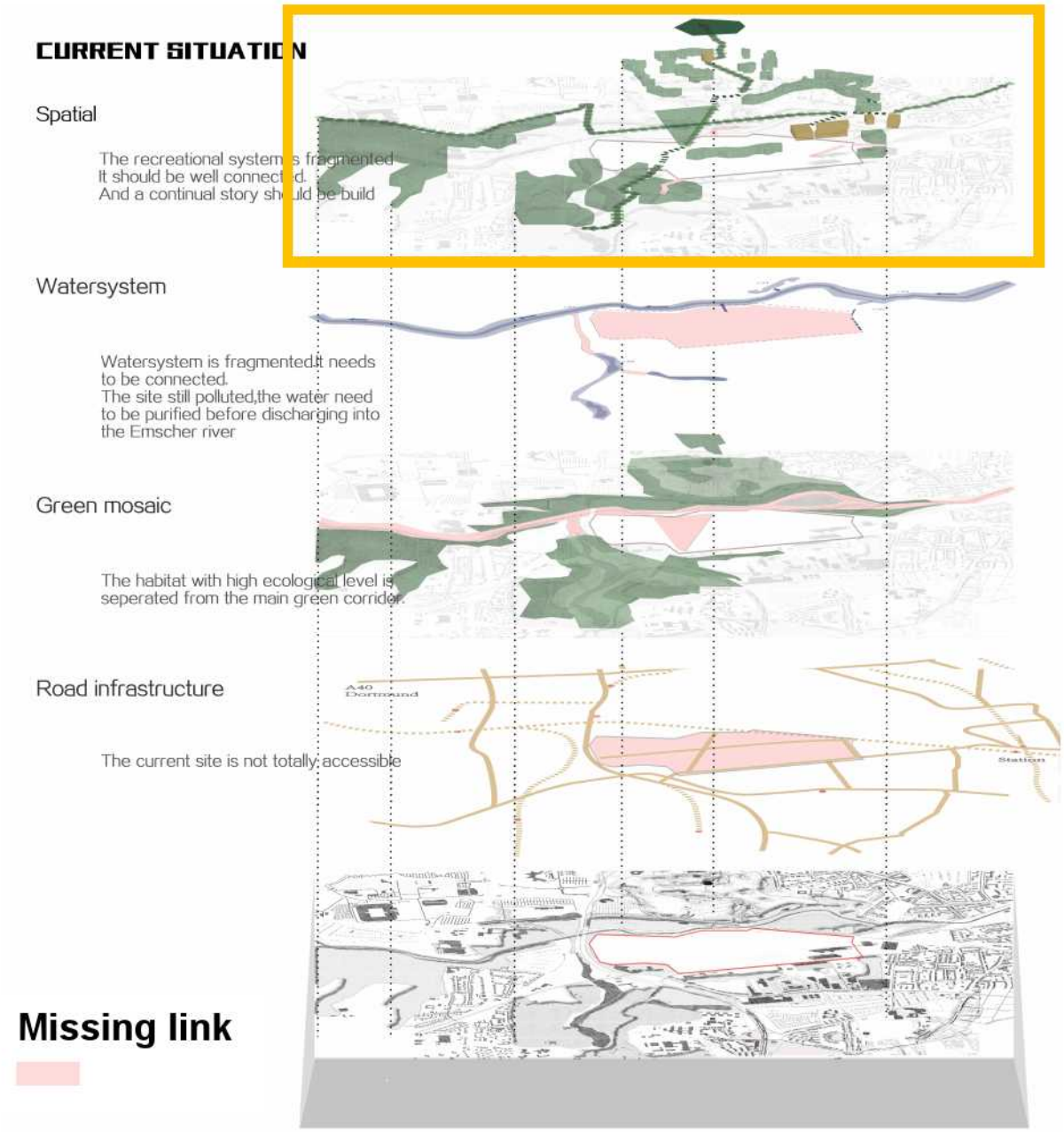
Current situation-space

It would be very hard to read everything in one layer of a map. So decomposing the map into different layers is a clear approach to make the site readable.

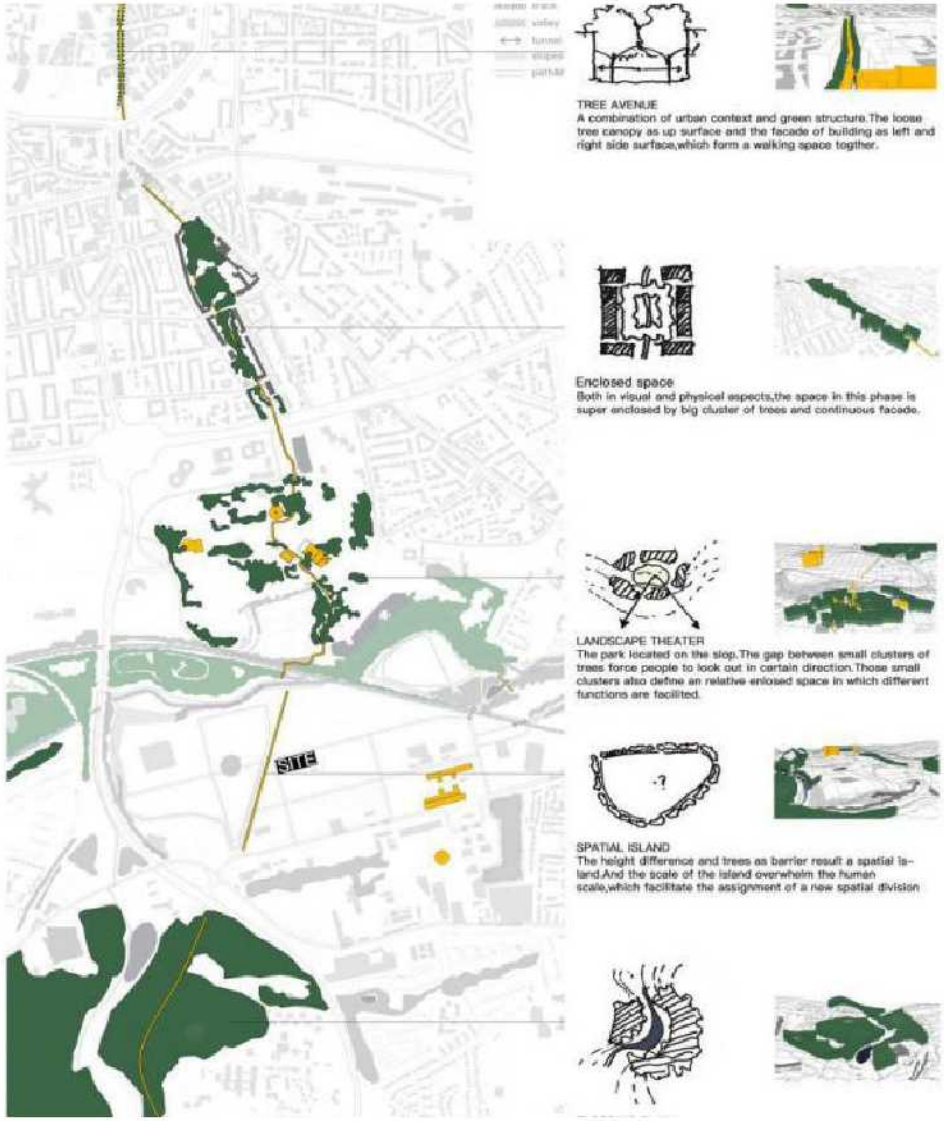
The decomposing layers diagram shows the fragmentation in the spatial layer,water layer ,ecological layer and road layer.In the following part,it will show the detailed analysis layer by layer

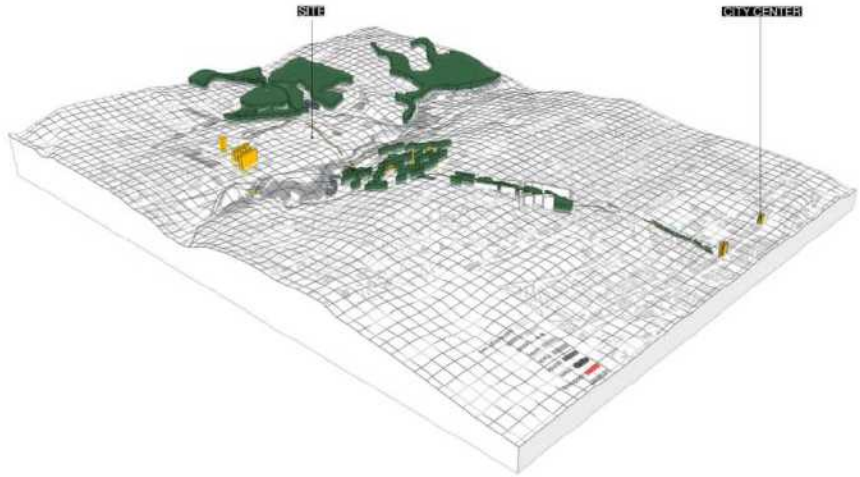
SPATIAL STUDY(SPATIAL LAYER)

The deep study on the spatiality (spatial layer) of the greenstructure



SPATIAL STUDY ON THE GREENSTRUCTURE





The spatial quality

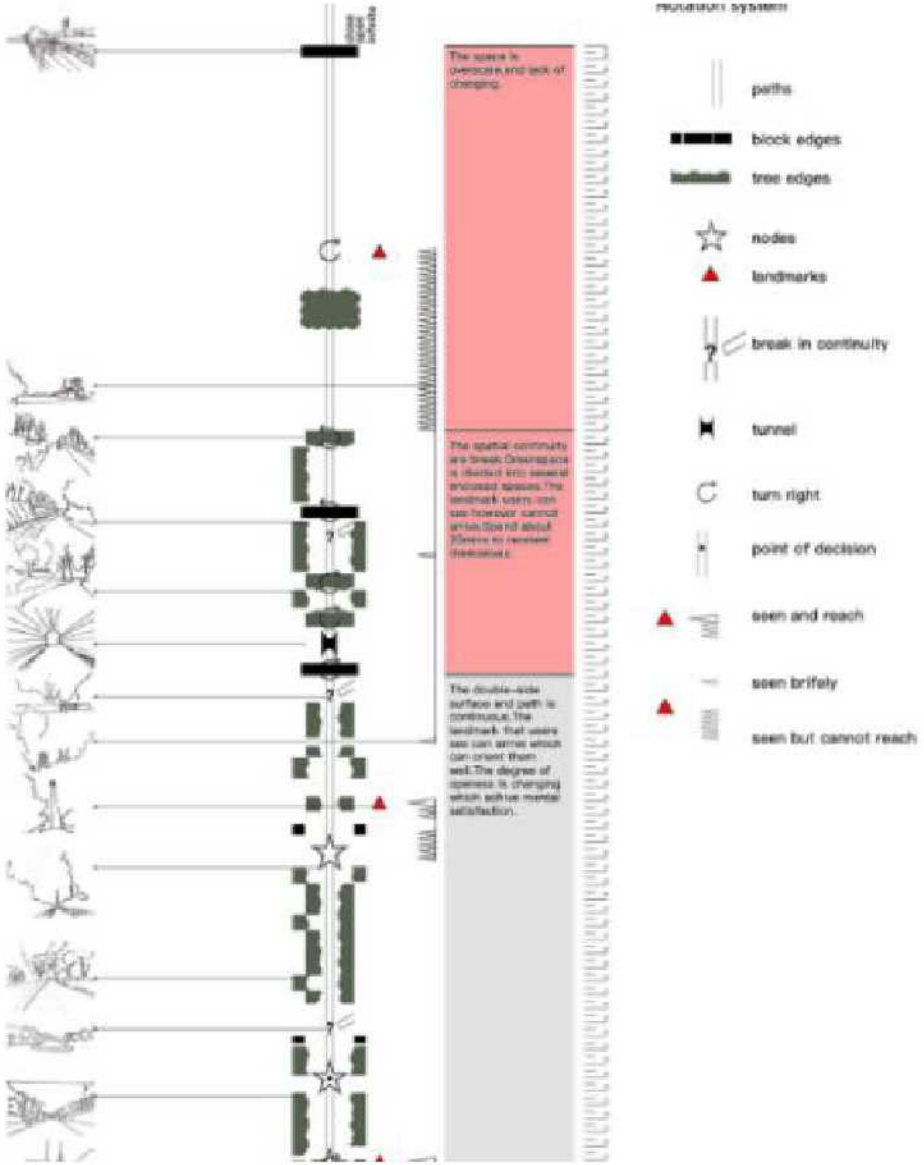
The greenstructure from city center to rural should presents a continuous story.Different parts should be highly related with each other.For example the site is part of the Emscher valley experiencing route.

SPATIAL STUDY ON THE GREENSTRUCTURE

Visual analysis

Valuable visual elements in the Valley geometry which will influence on the design decision.

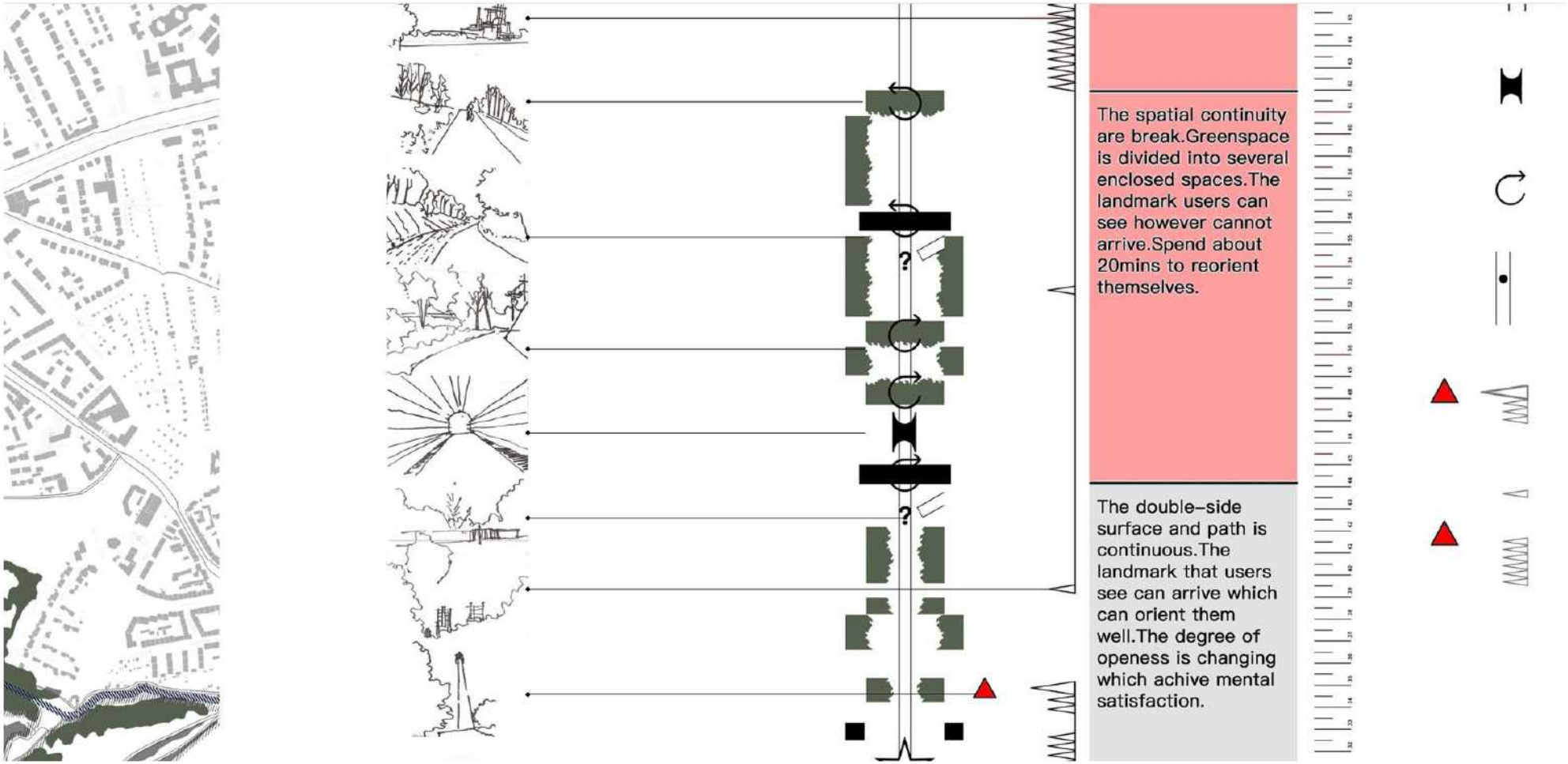
SPATIAL STUDY ON THE GREENSTRUCTURE



Perception analysis

Here is the perception study of the greenstructure.The conclusion is that in some part people is hard to orient themselves , the greenstructure is not continual in the perception level

SPATIAL STUDY ON THE GREENSTRUCTURE

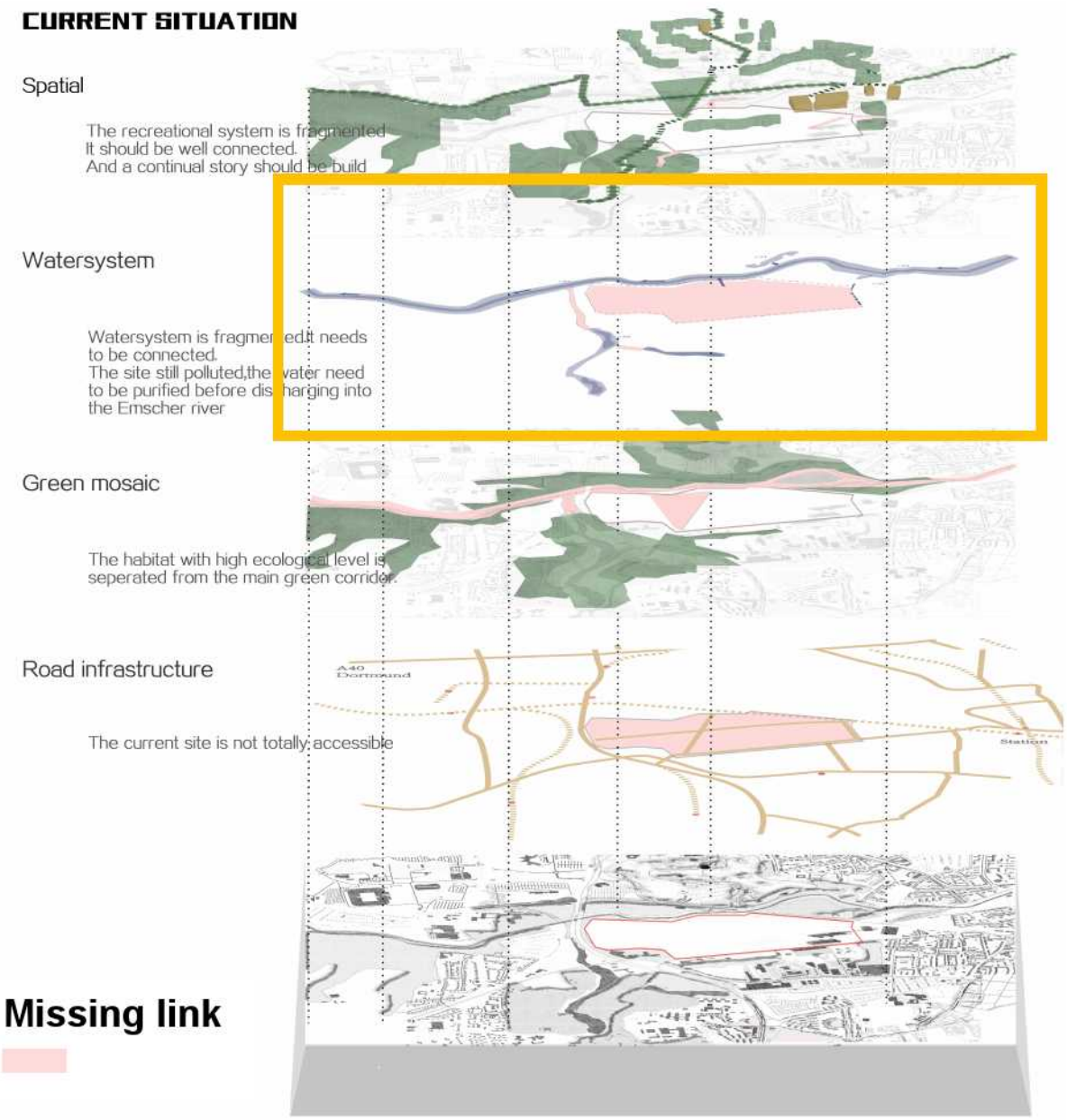


Perception analysis diagram zoom in

CONCLUSION OF SPATIAL STUDY ON THE GREENSTRUCTURE

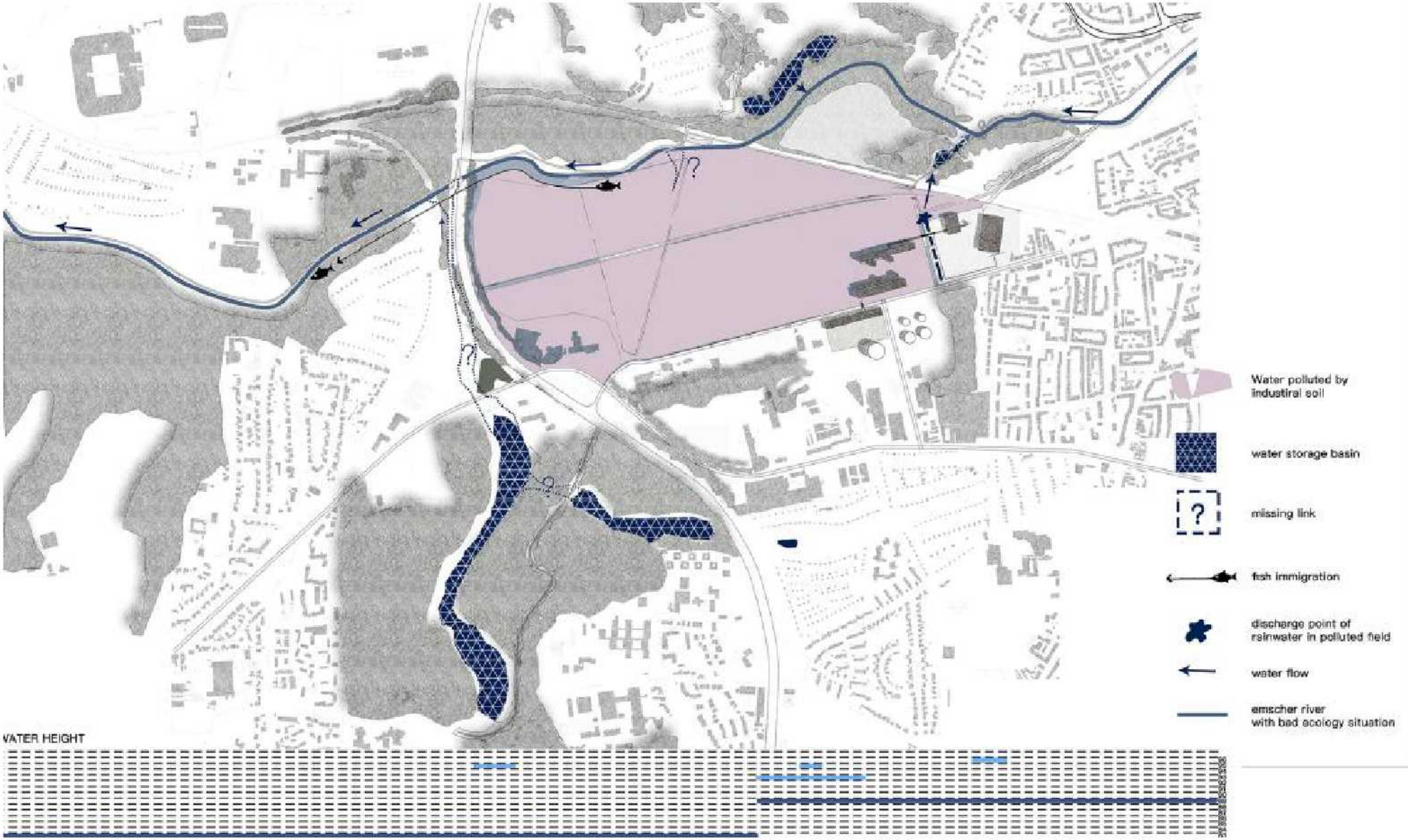
Conclusion of problems and visual potentials

WATER LAYER



The deep study on the water layer

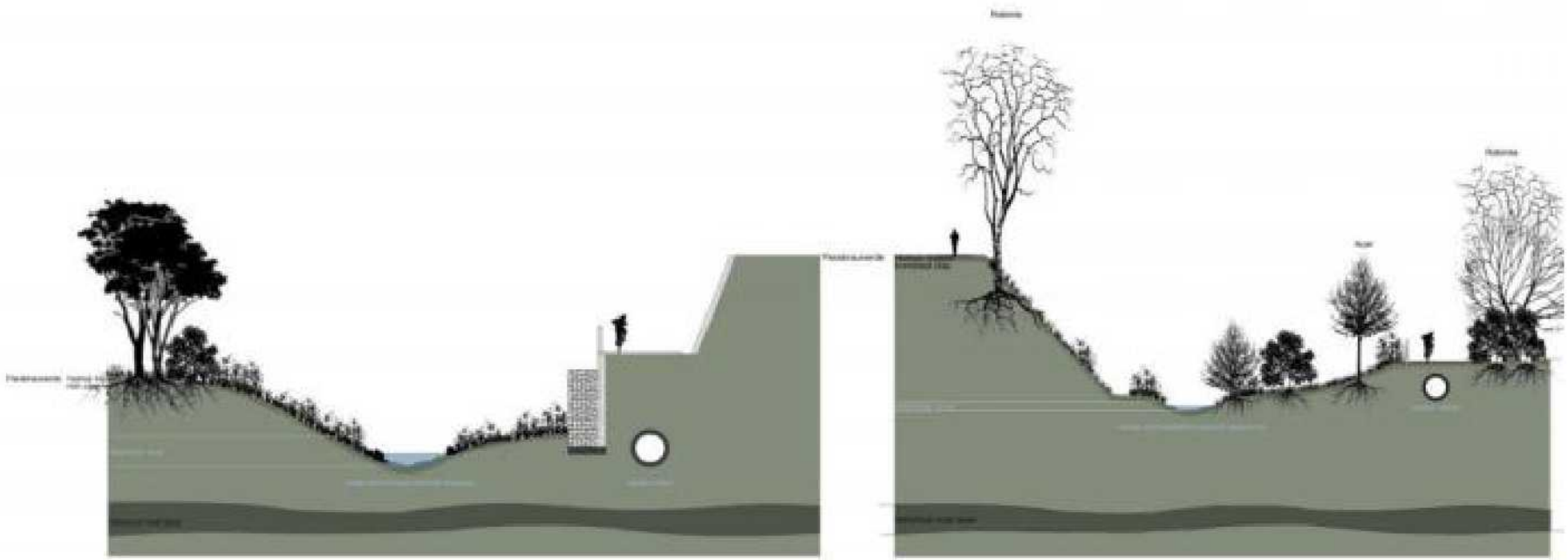
WATER SYSTEM



water system

A link between Emscher river and high level habitat is missing in the water layer.Those high level habitat have the potential to relive the pollution caused by the old industrial site

WATER SYSTEM



problematic

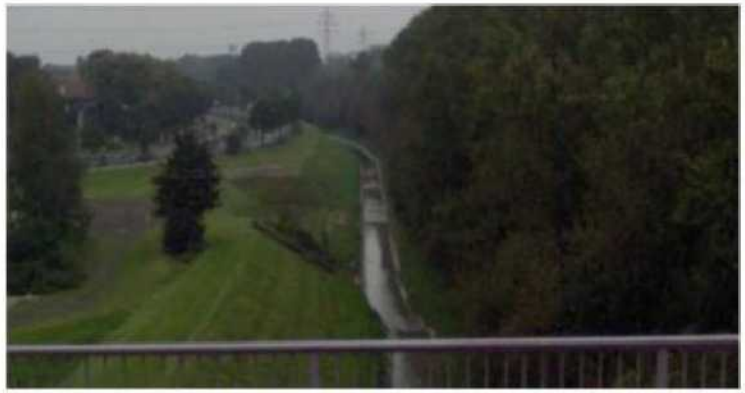
-lacking surface or groundwater resources in the branch of emscher river.The industrial water supply relies completely on importion from neighbour basin,and people hard to touch the water
-the mix water source in seweage system:wastewater and urban stormwater ,natural source
-the purification ability of nature is not enough
-mining subsidence

solution

-better water storage capacity to slow down the discharging speed of water.
-high height level water storage basain as the opportunity for users to interact with water.
-more water storage basin to collect water and discharge into sewage system.
-sperate water system.

WATER SYSTEM

The ecosystem is destoried in the age of industralization.Now the assignment is regenerate the destoried ecosystem along the river



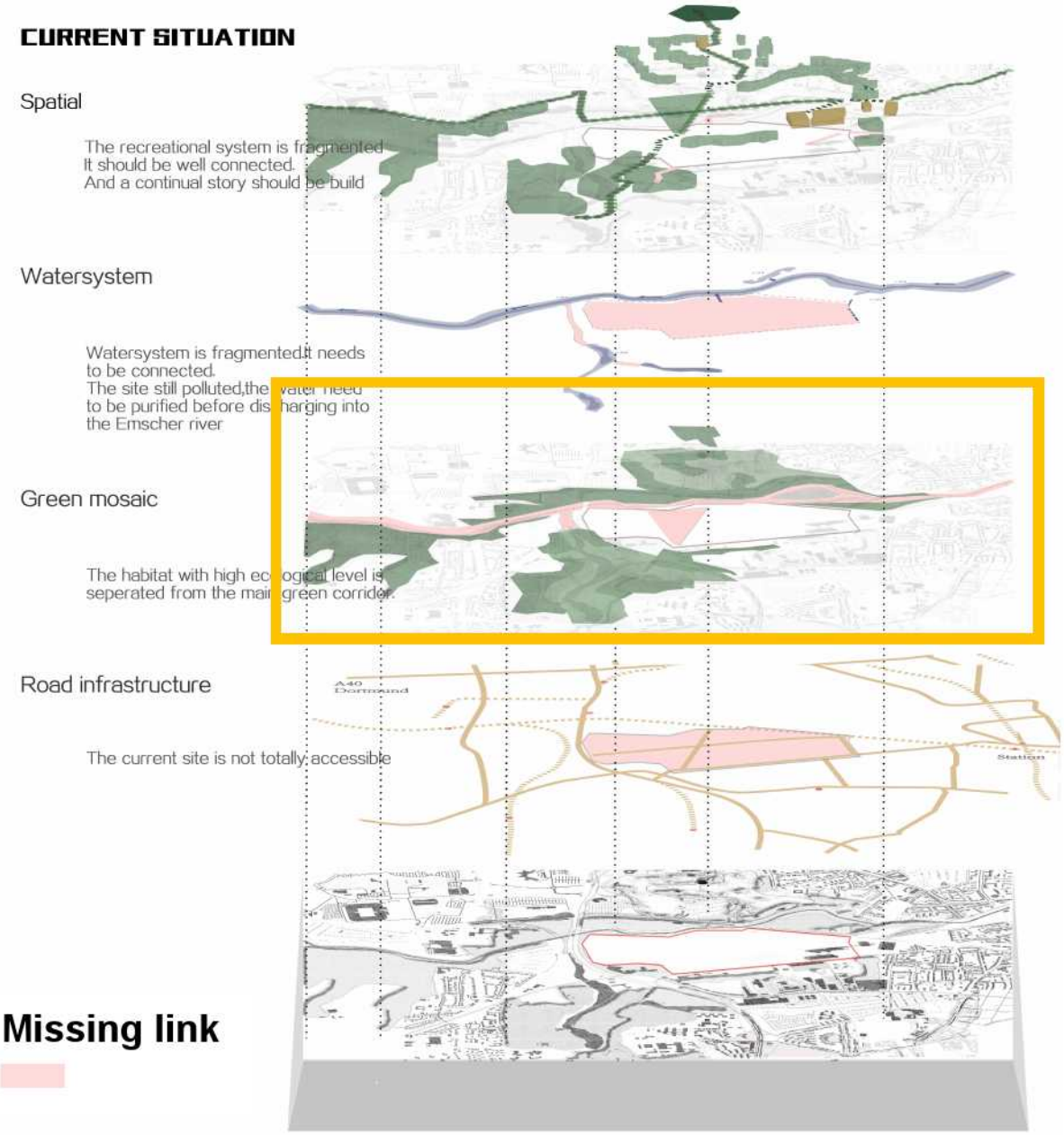
The main river course cannot be transformed into a riverspace with various physical conditions to achive ecological diversity.

-river dike on double sides of main river course
-the size of river space is limited by urban context

Polluted Emscher

In the age of industrialization,the old Emscher river is only used for discharging the polluted water.Now,the polluted watersystem and ecology need to be recovered.

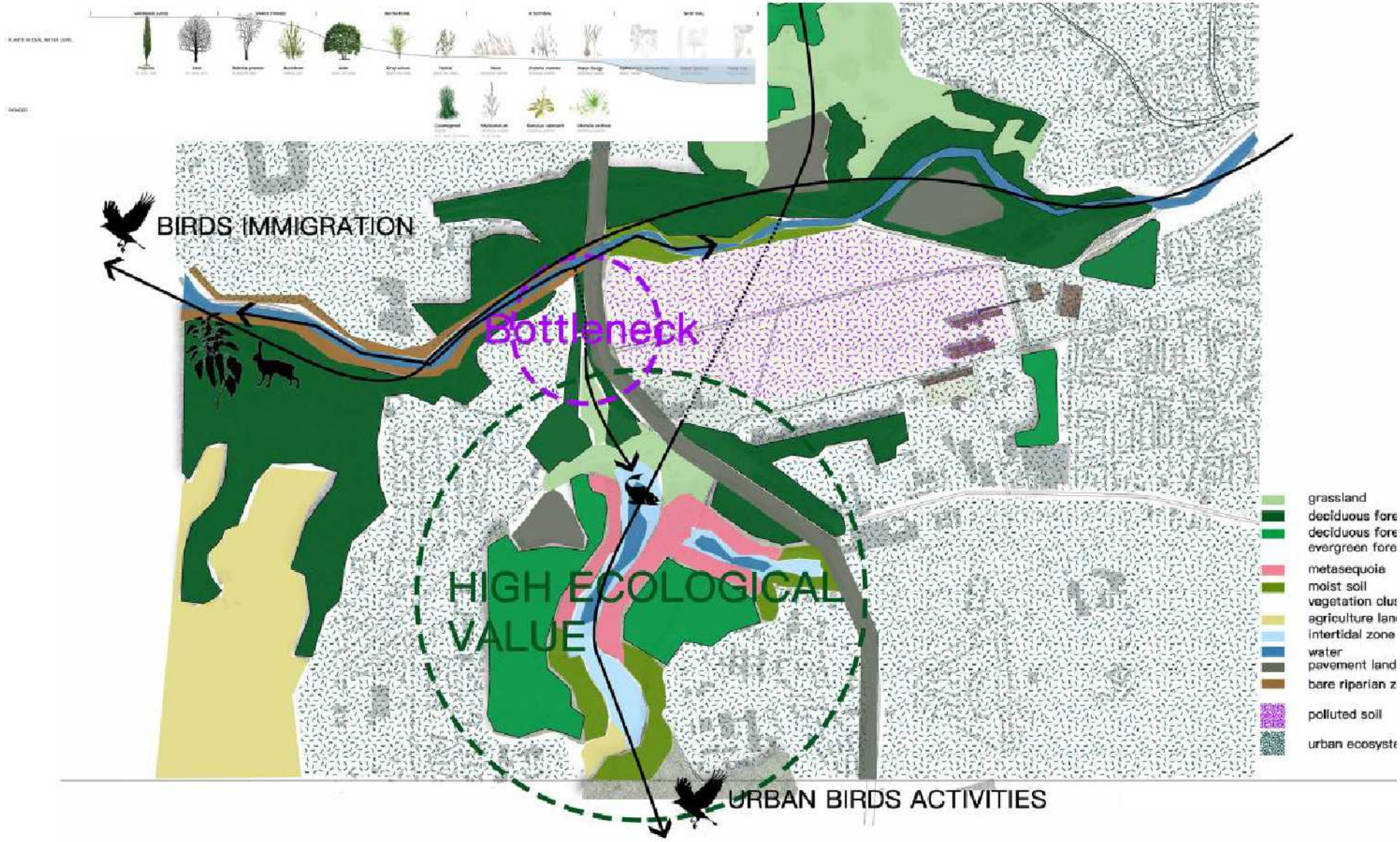
Current situation:ecological layer



The deep study on the ecology of the greenstructure

Missing link

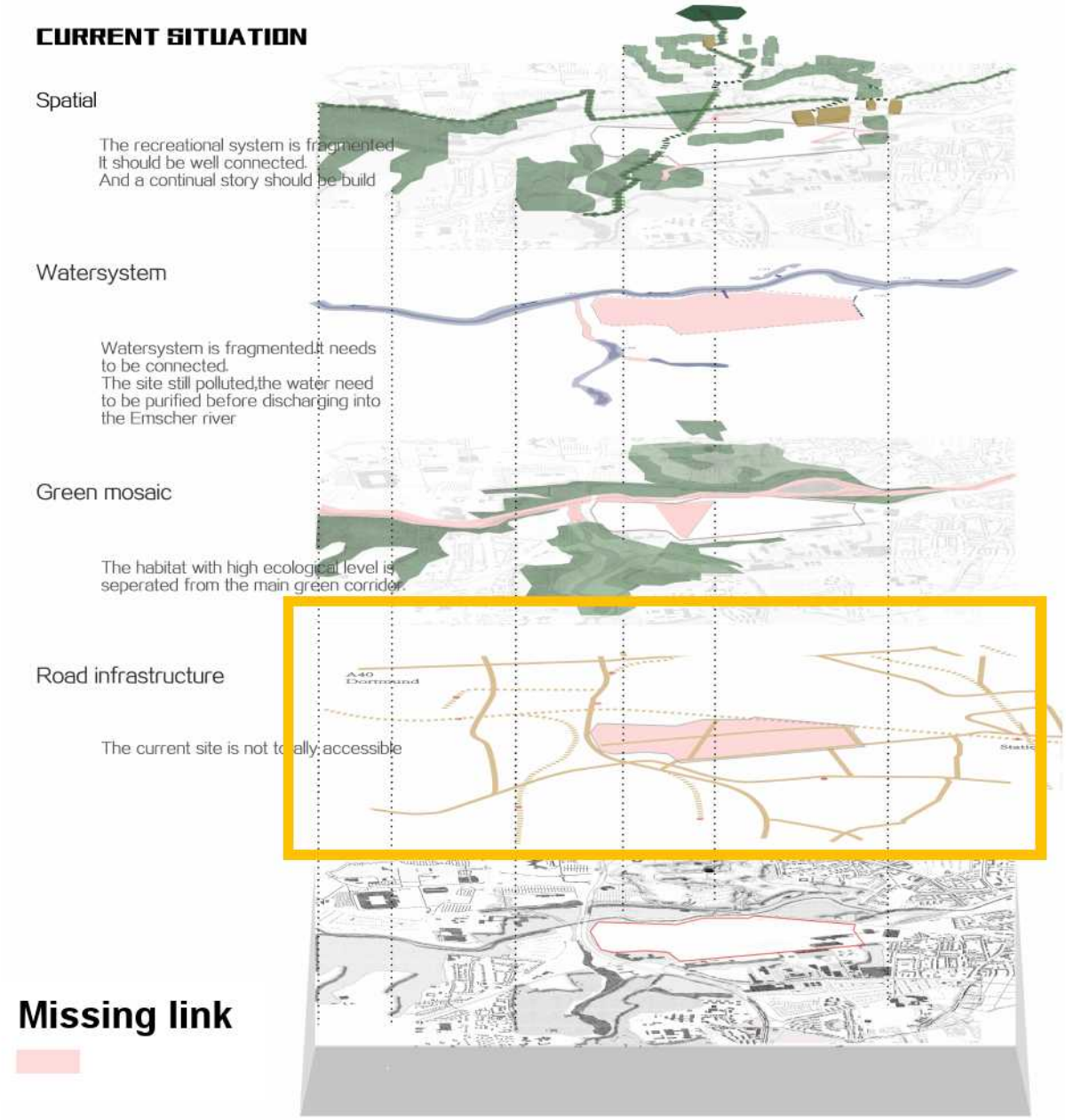
ECOLOGICAL LAYER



Analysis:ecological system

The important ecological connection between high level habitats and Emscher is missing.

Road Infrastructure



The deep study on the road network

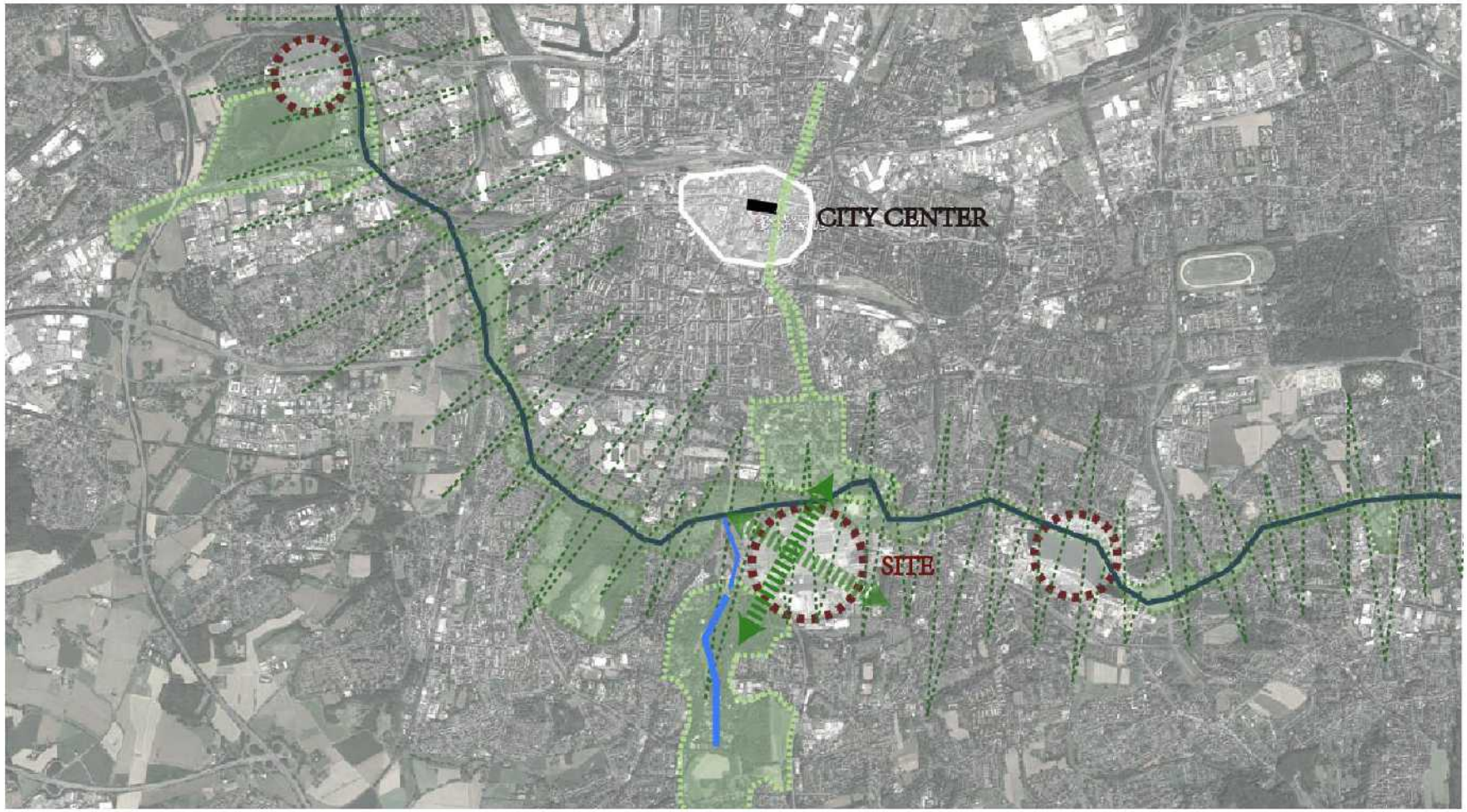
ACCESSIBILITY-DEFINE AND SOLVE THE WELL DEFINED PROBLEM

The site can be connected with a international highway,public transportation and slow traffic system

SCHEME

Intervention:Layers decomposing of the site

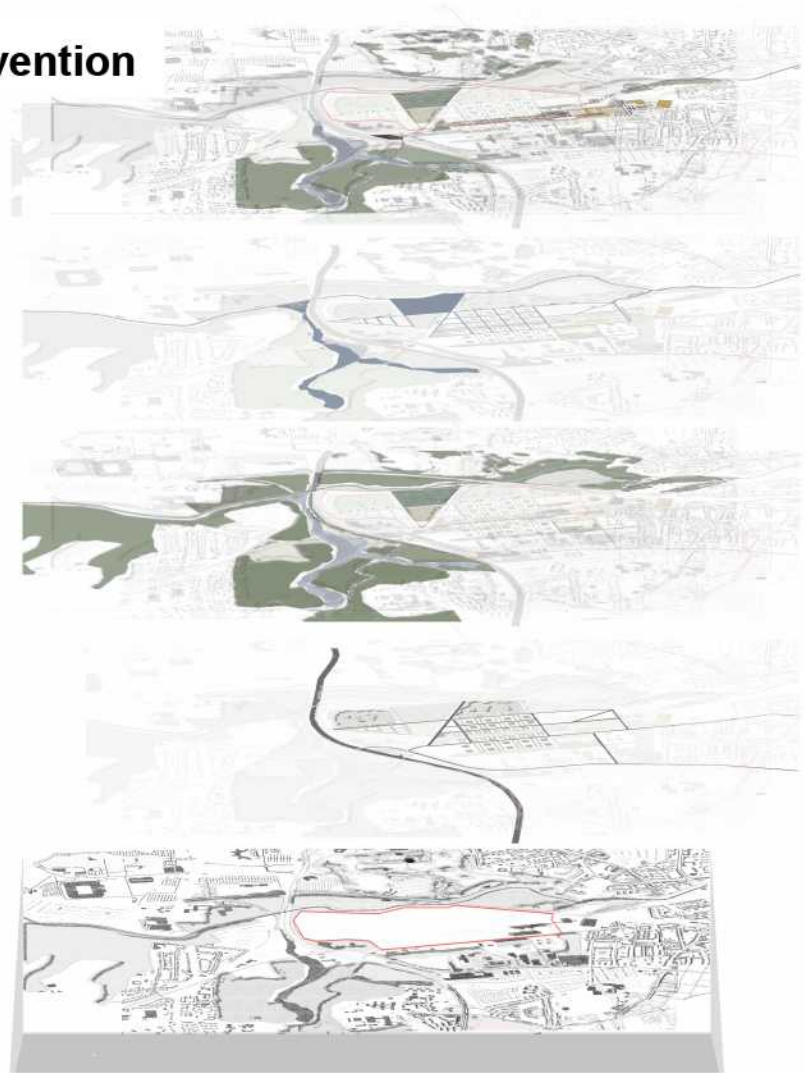
OVERALL SCHEME



Intervention

The main landscape structure of the project will connect those fragments into a continuous green backbone.Those separated habitats and fragmented water system will be connected and thus improve the natural quality and continuity of the Emscher backbone.

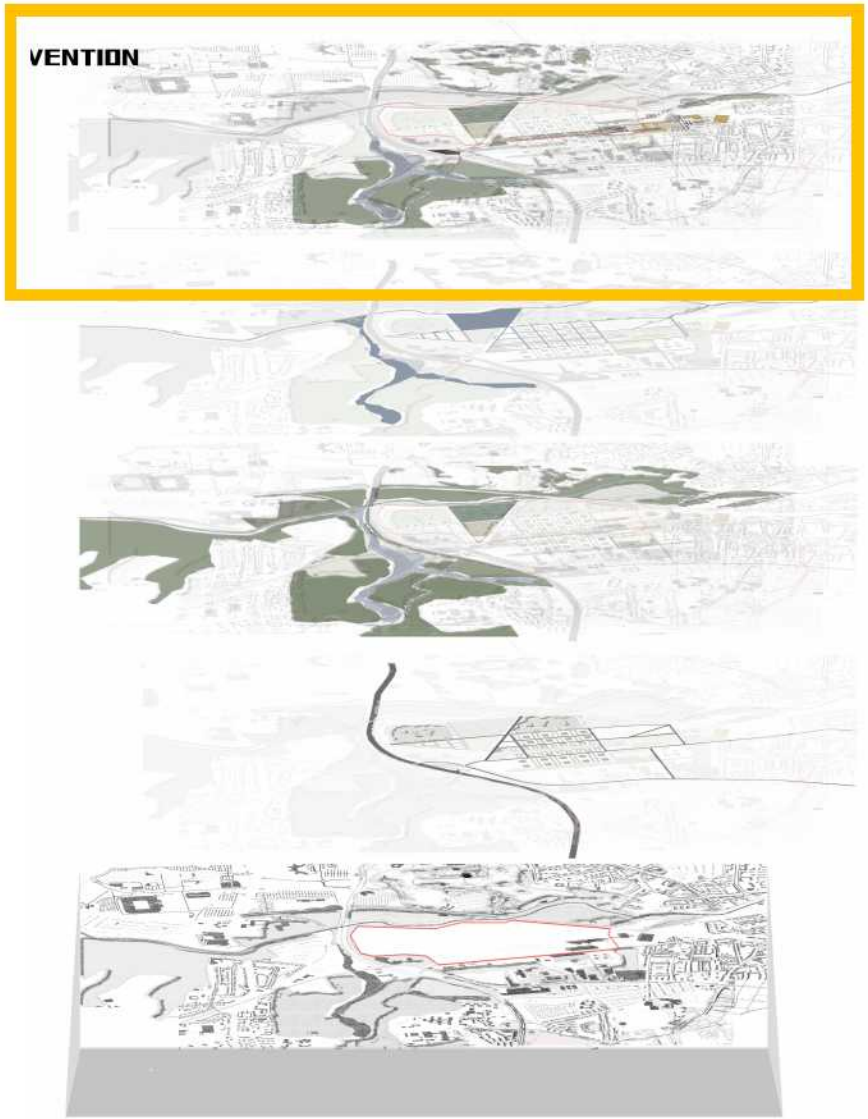
Layers decomposing of the site



Intervention

Based on the previous decomposing map.The landscape integration will be implemented layer by layer

THE SPATIAL INTERVENTION ON THE GREENSTRUCTURE

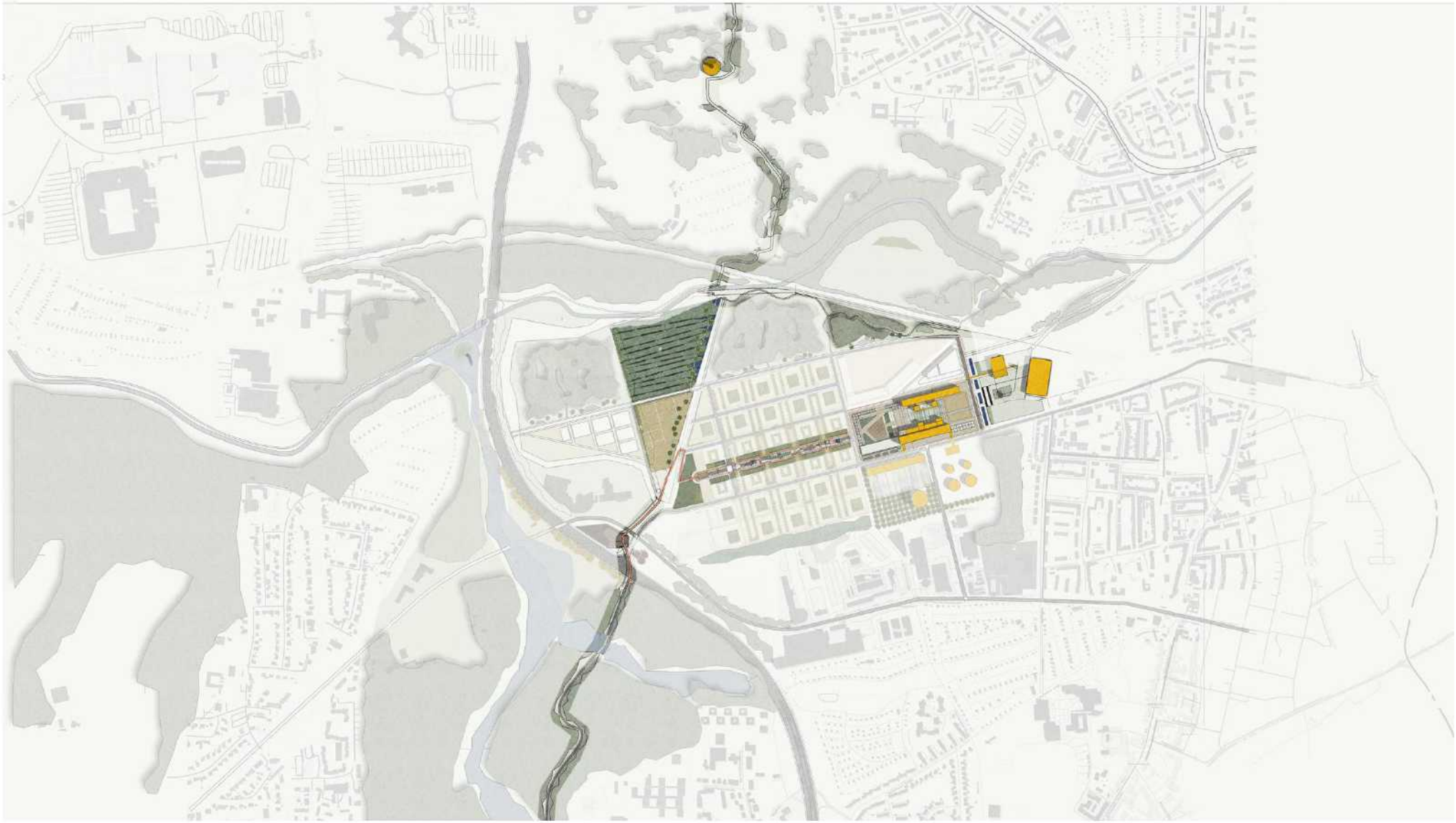


THE SPATIAL INTERVENTION ON THE GREENSTRUCTURE

Intervention

The site will be connected with a larger green structure.

THE SPATIAL INTERVENTION ON THE GREENSTRUCTURE

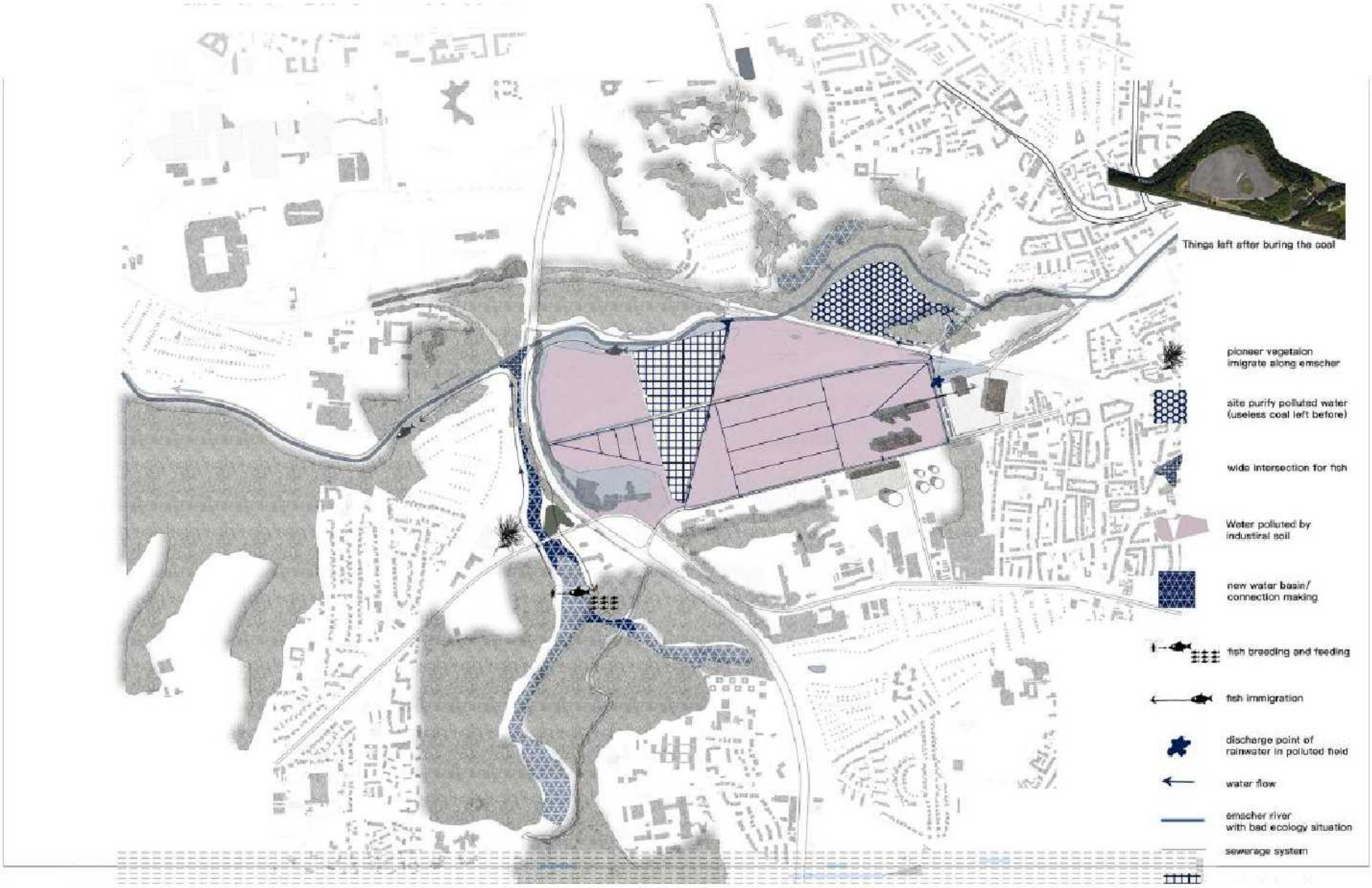


Intervention shown in Master plan

INTERVENTION ON THE WATER SYSTEM

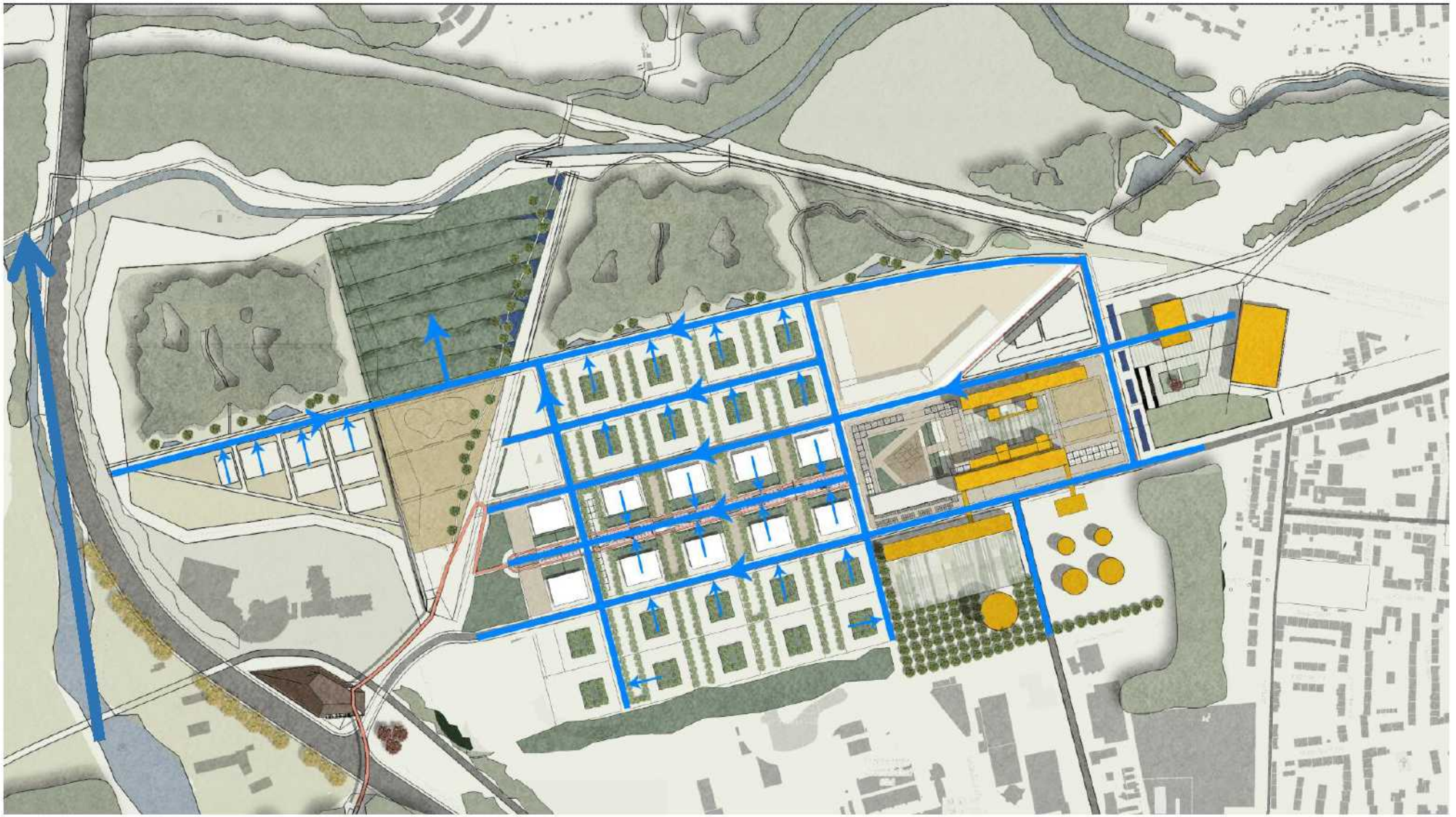
Intervention on the watersystem

INTERVENTION ON THE WATER SYSTEM



Intervention

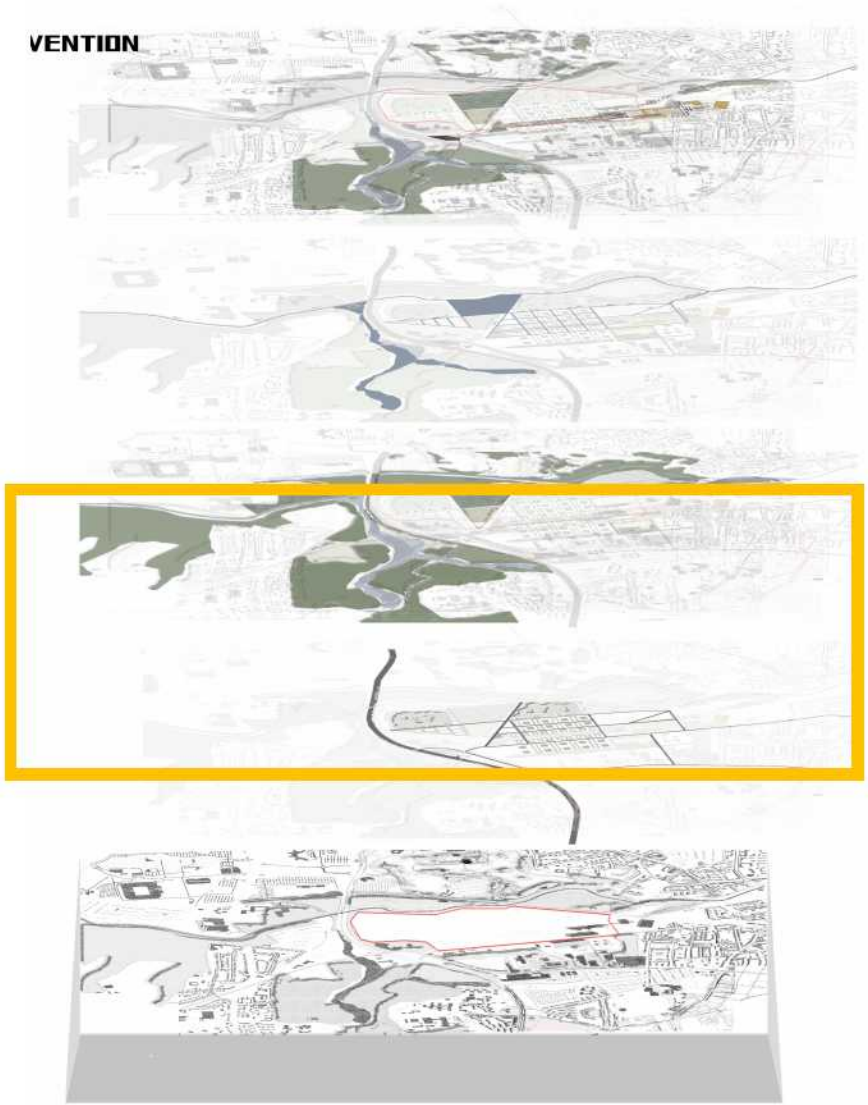
The Emscher river will embrace a larger water structure to improve the water quality,have a better water resilience and collect more water in the Emscher river



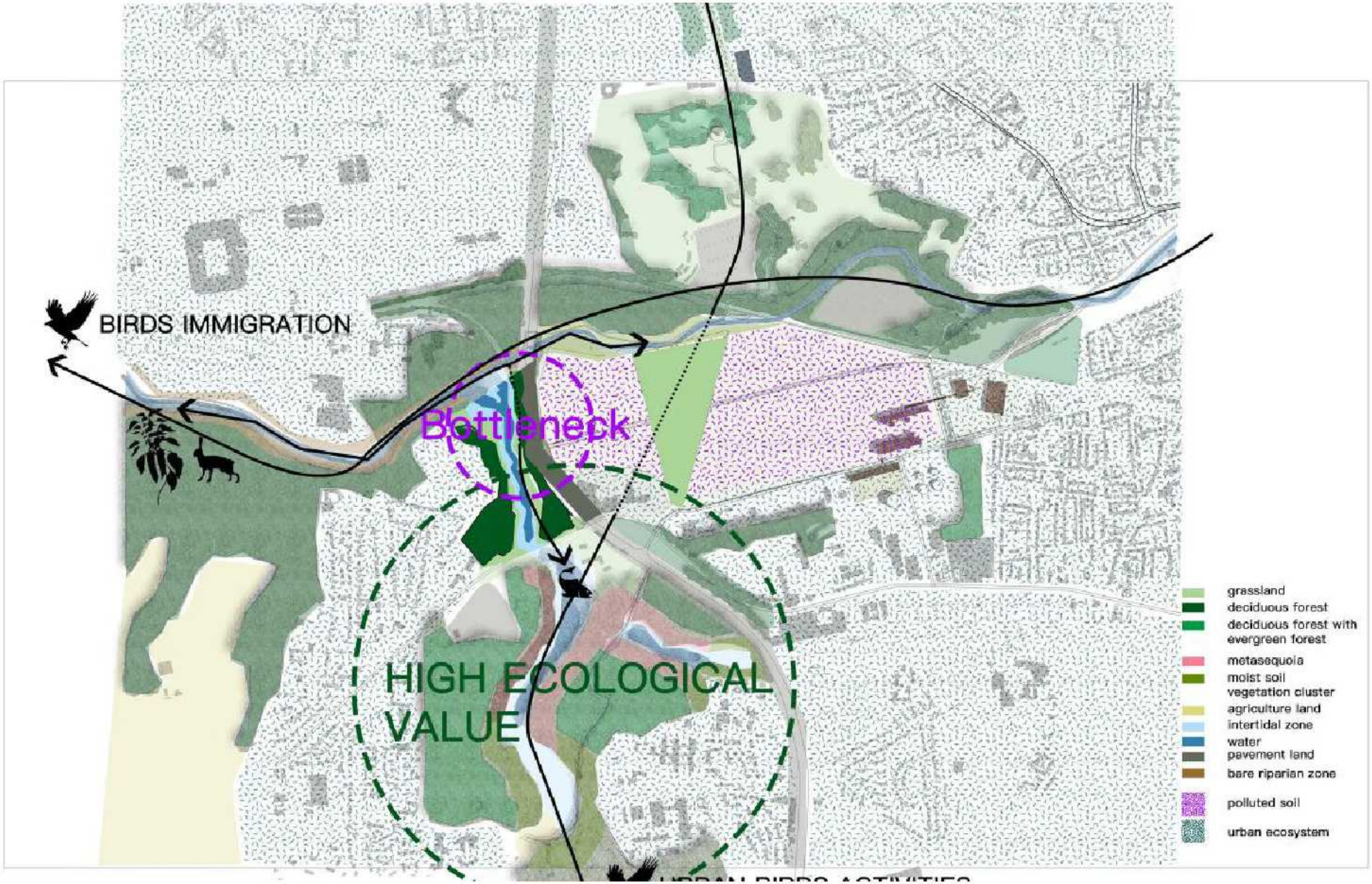
Intervention shown in masterplan

The water inner the site will all be discharged into Emscher river after being purified,the connection will be made.

INTERVENTION ON THE ECOLOGICAL LAYER



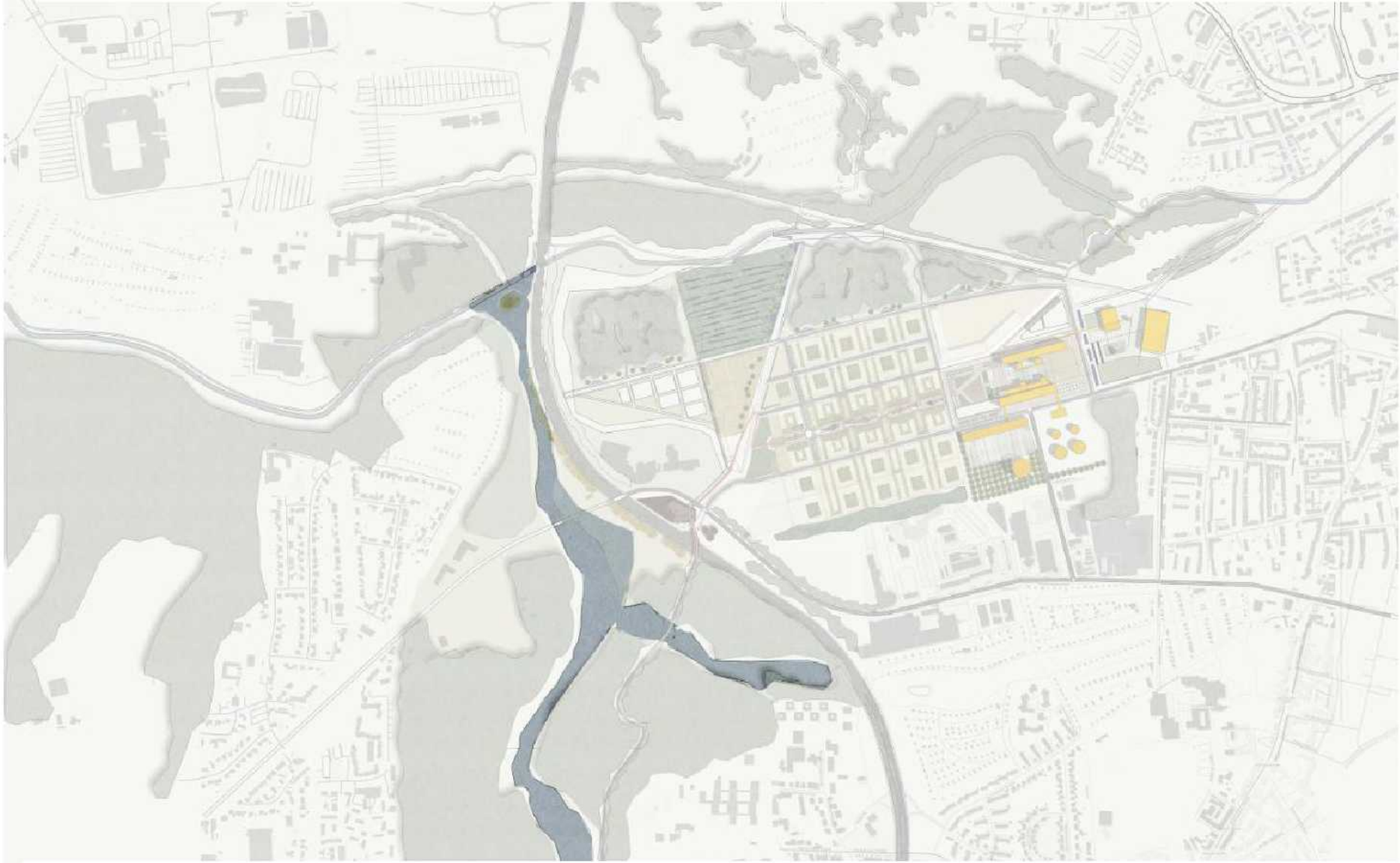
THE INTERVENTION ON THE ECOLOGICAL STRUCTURE



Intervention:ecological system

The Emscher river course will be connected with more natural habitats,and thus the ecology of the Emscher will recover faster.

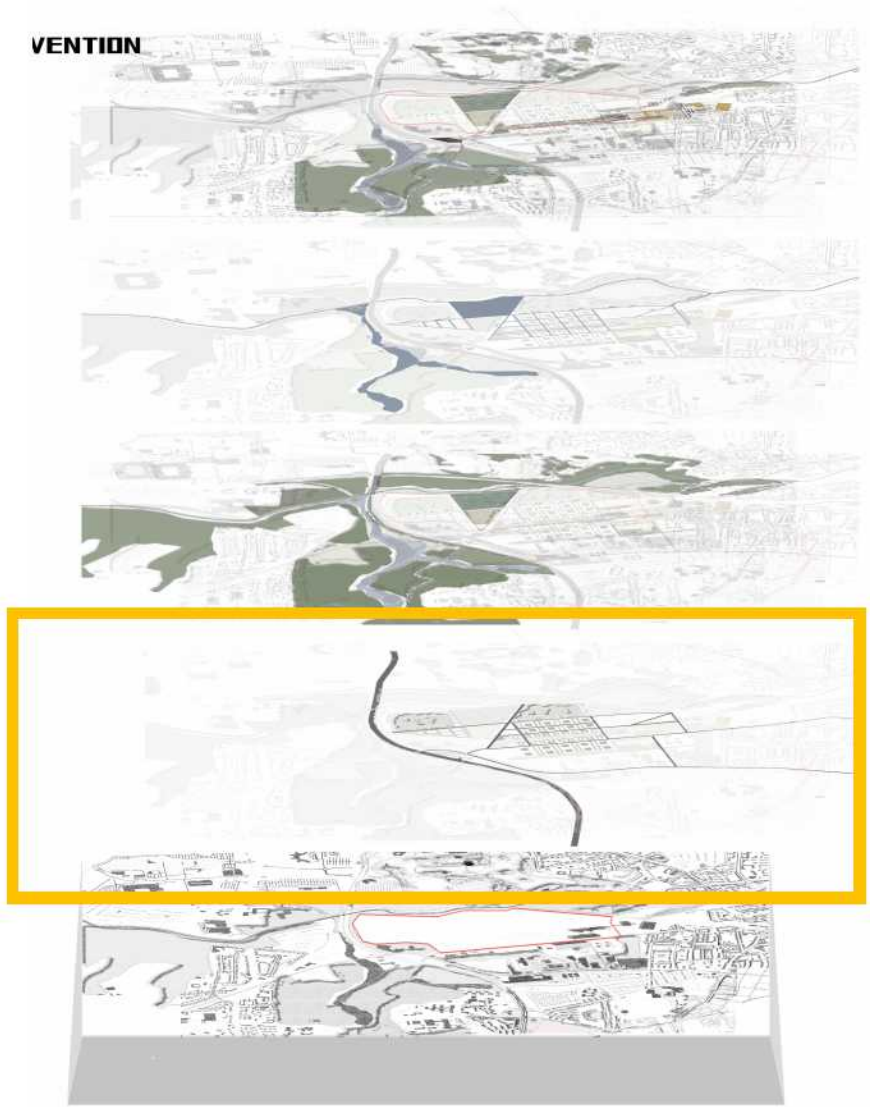
THE INTERVENTION ON THE ECOLOGICAL STRUCTURE



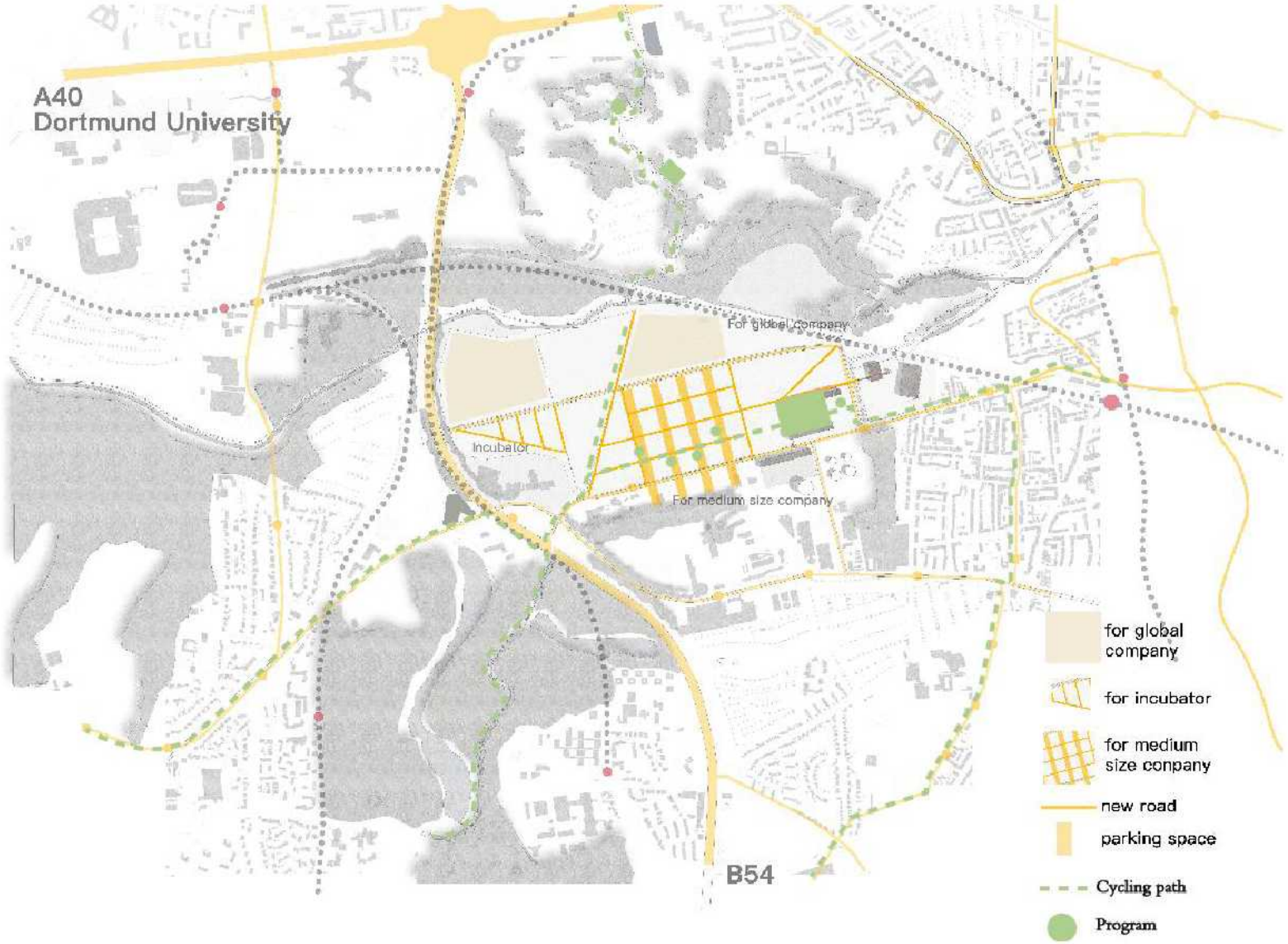
Intervention:ecological system

The Emscher river course will be connected with more natural habitats,and thus the ecology of the Emscher will recover faster.

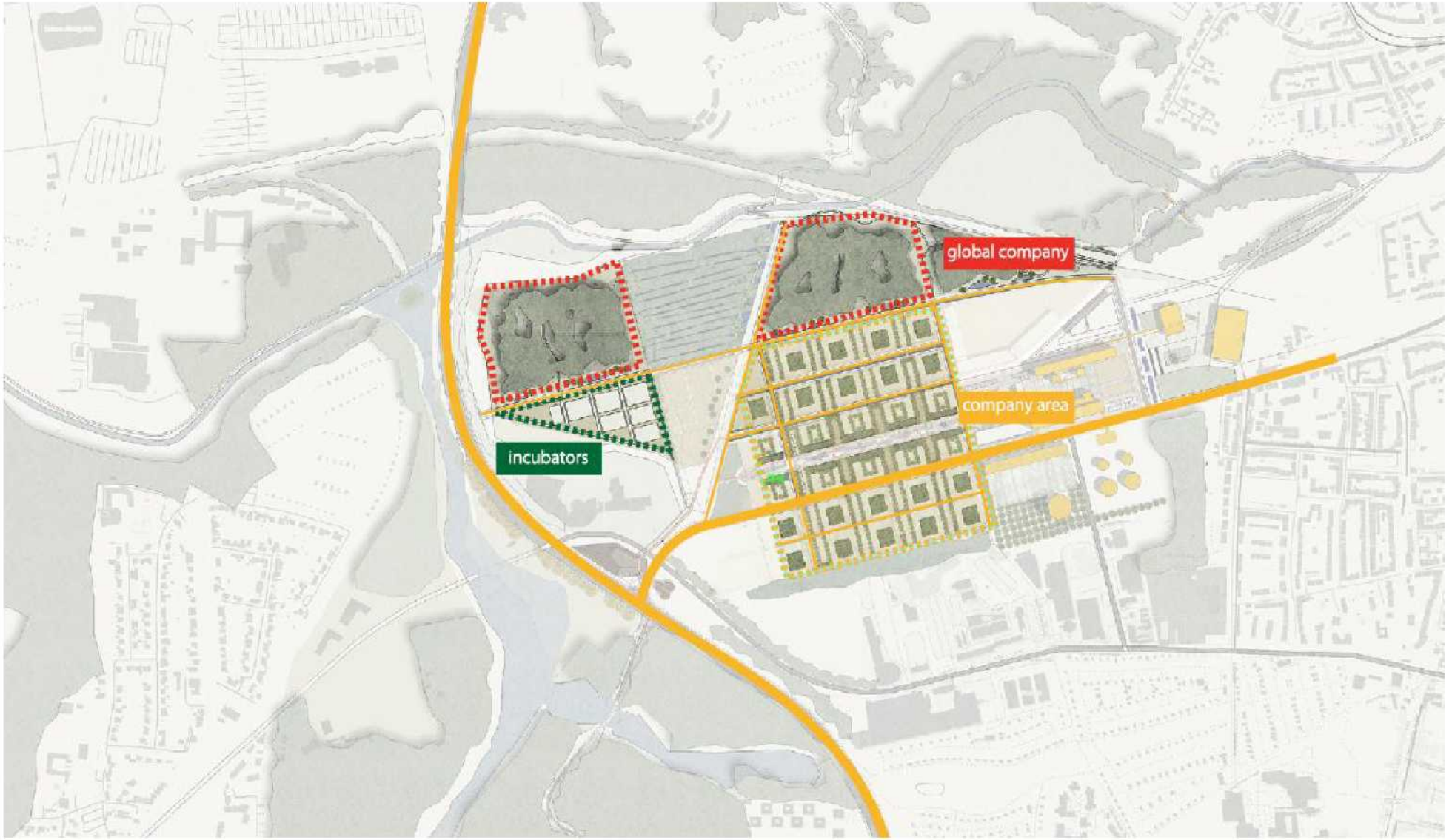
INTERVENTION ON THE ROAD AND SLOW TRAFFIC SYSTEM



INTERVENTION ON THE ROAD AND SLOW TRAFFIC SYSTEM

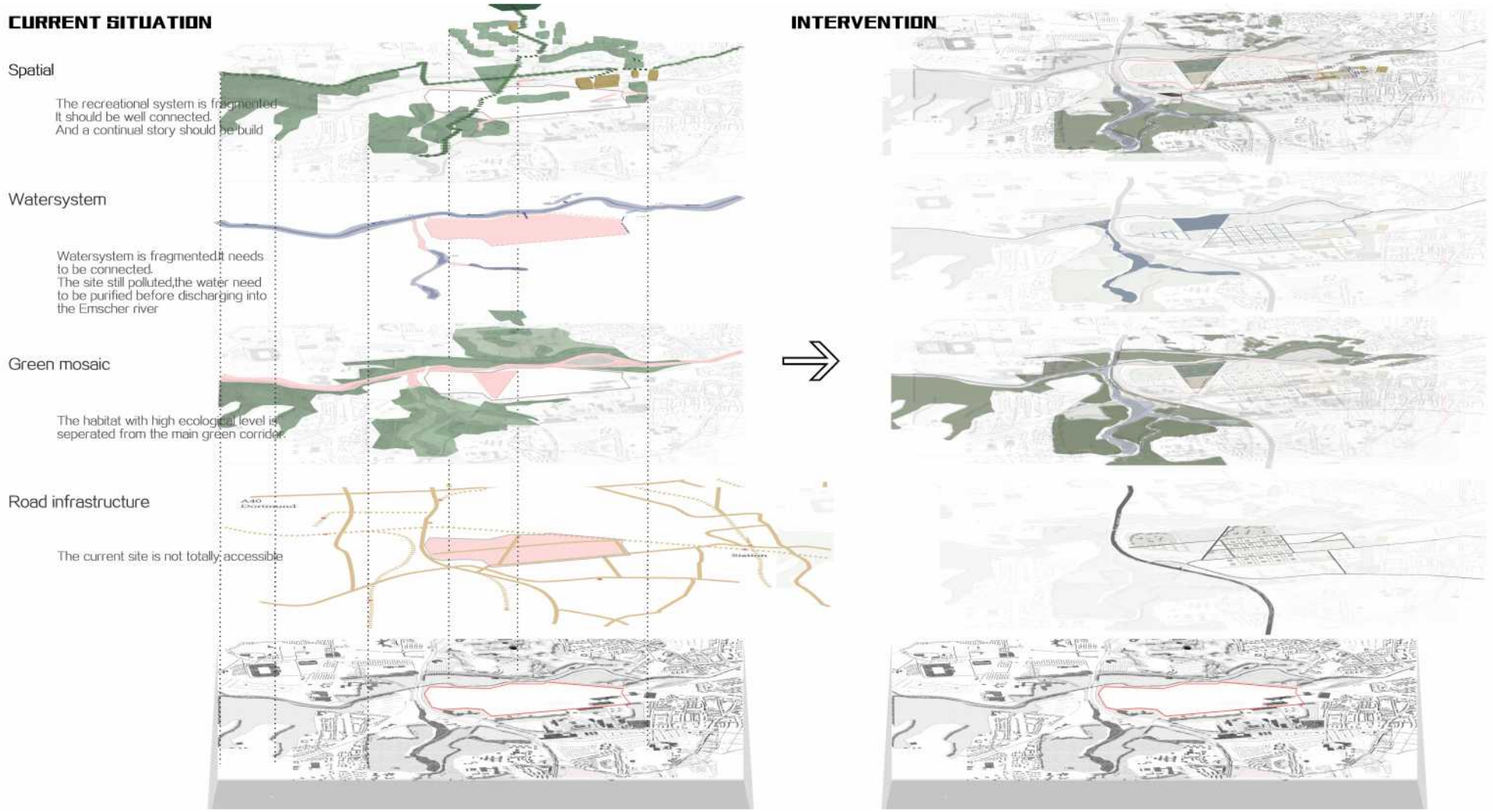


After the connecting,it will provide three types of grids for different landuse.The site will connect the slow traffic system.



Integrate it with a larger road infrastructure
Master plan

Conclusion for this part



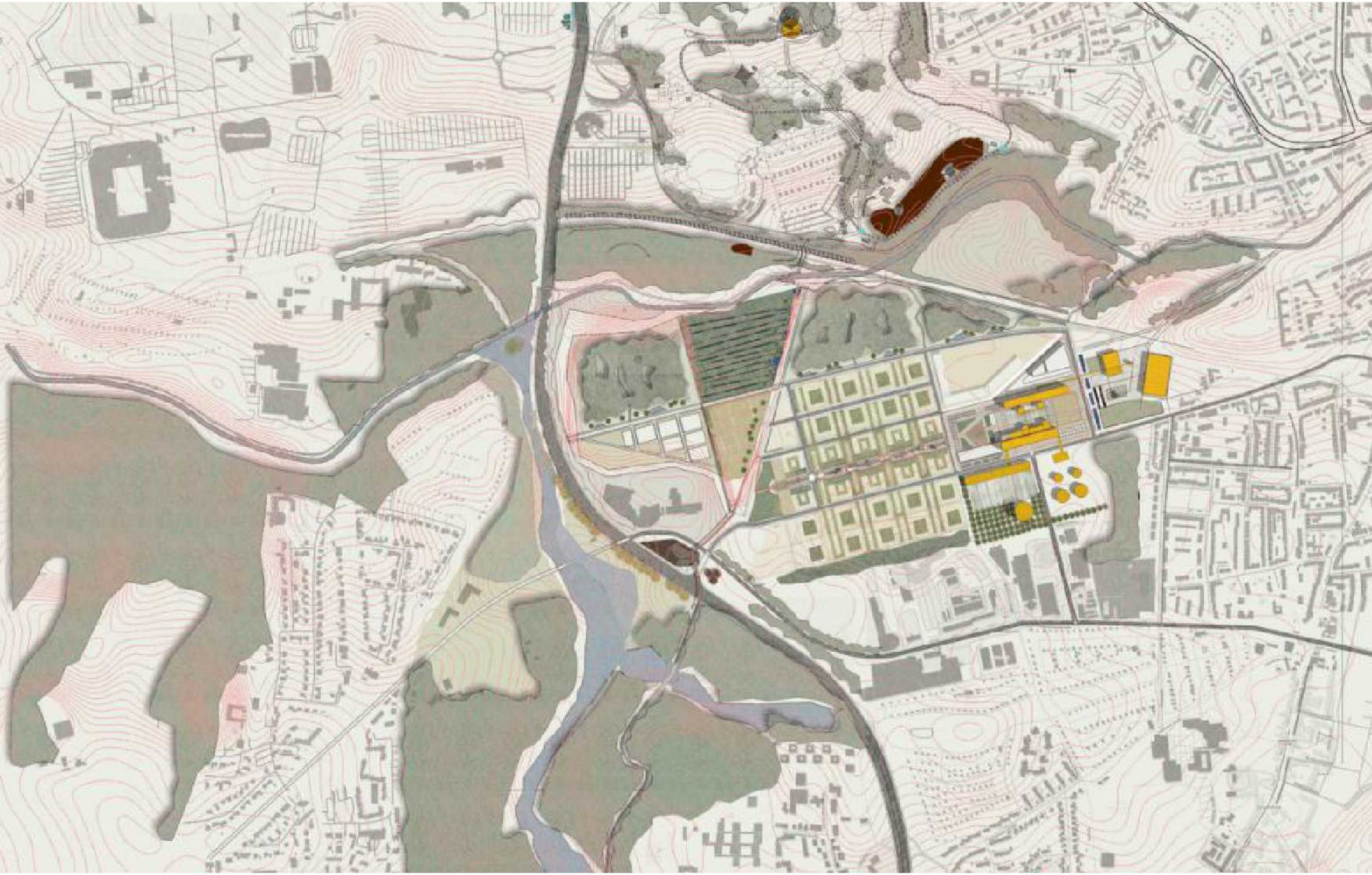
When the greenstructure is used as the backbone to guide the urban expansion,it should be well connected in each layer and have good natural quality .

By connecting the fragments in different layers,it contributes to a more integral greenstructure and natural system.Thus the natural quality of the backbone is improved.A more continual green backbone means a stronger operative force that can facilitate the sustainable development.


HOESCH


HOESCH


HOESCH



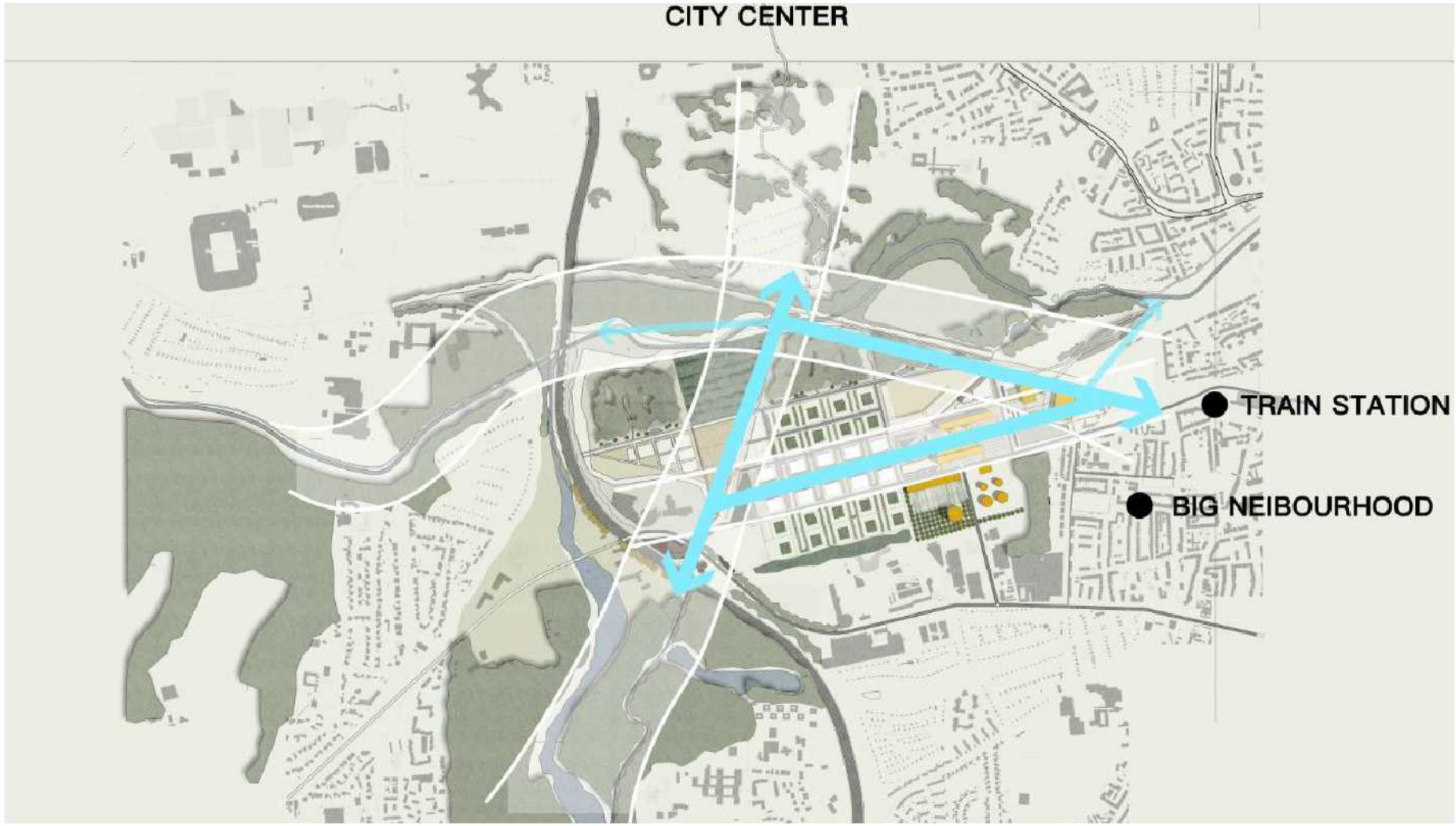
ELABORATION DESIGN

-Axis/Public space

-Wedge

-Program

THE ELABORATION DESIGN ON THE ROOM OF LANDSCAPE FRAMEWORK

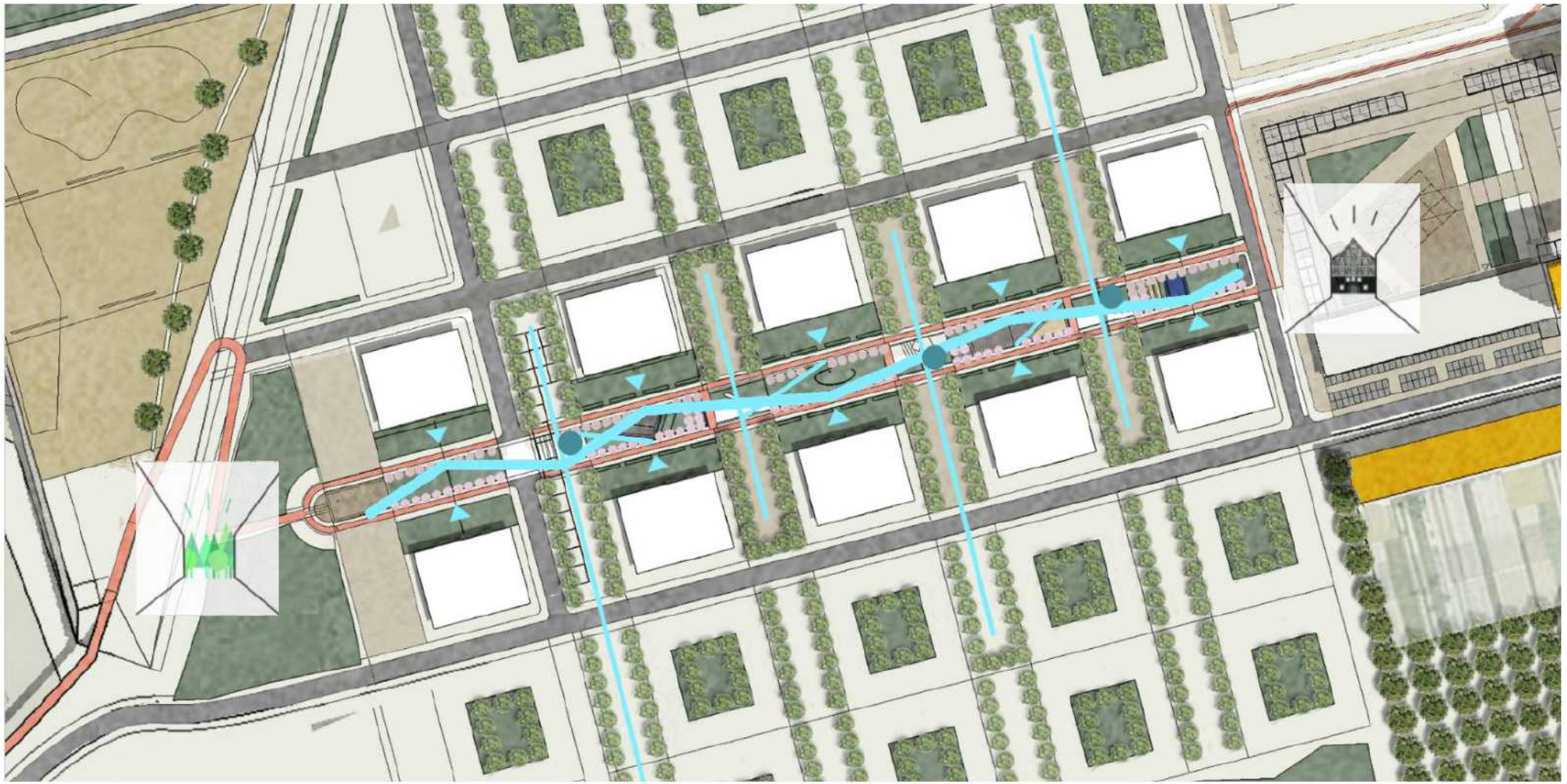


There are three potential flows

The task is designing on the room for those connection and flows on the backbone(or framework).Those main room for flows connects the city center to the rural park,and it solves the fragmentation in different layers.

LINEAR PARK

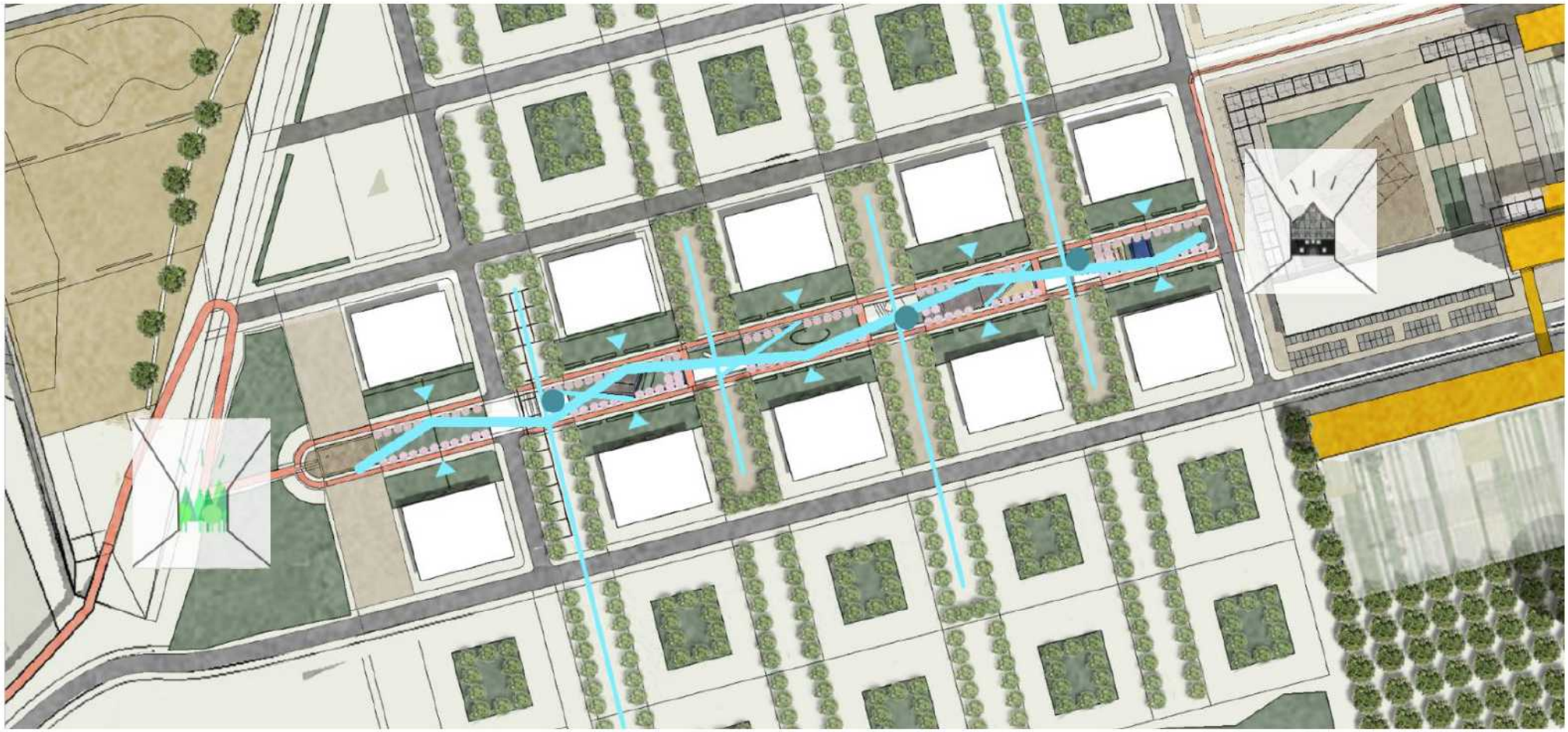
CENTRAL AXIS DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



Linear park-Transition area

The linear park is a transition area between rural and neighborhood.Thus,it should give different picture and feeling when you walk towards to different sides.

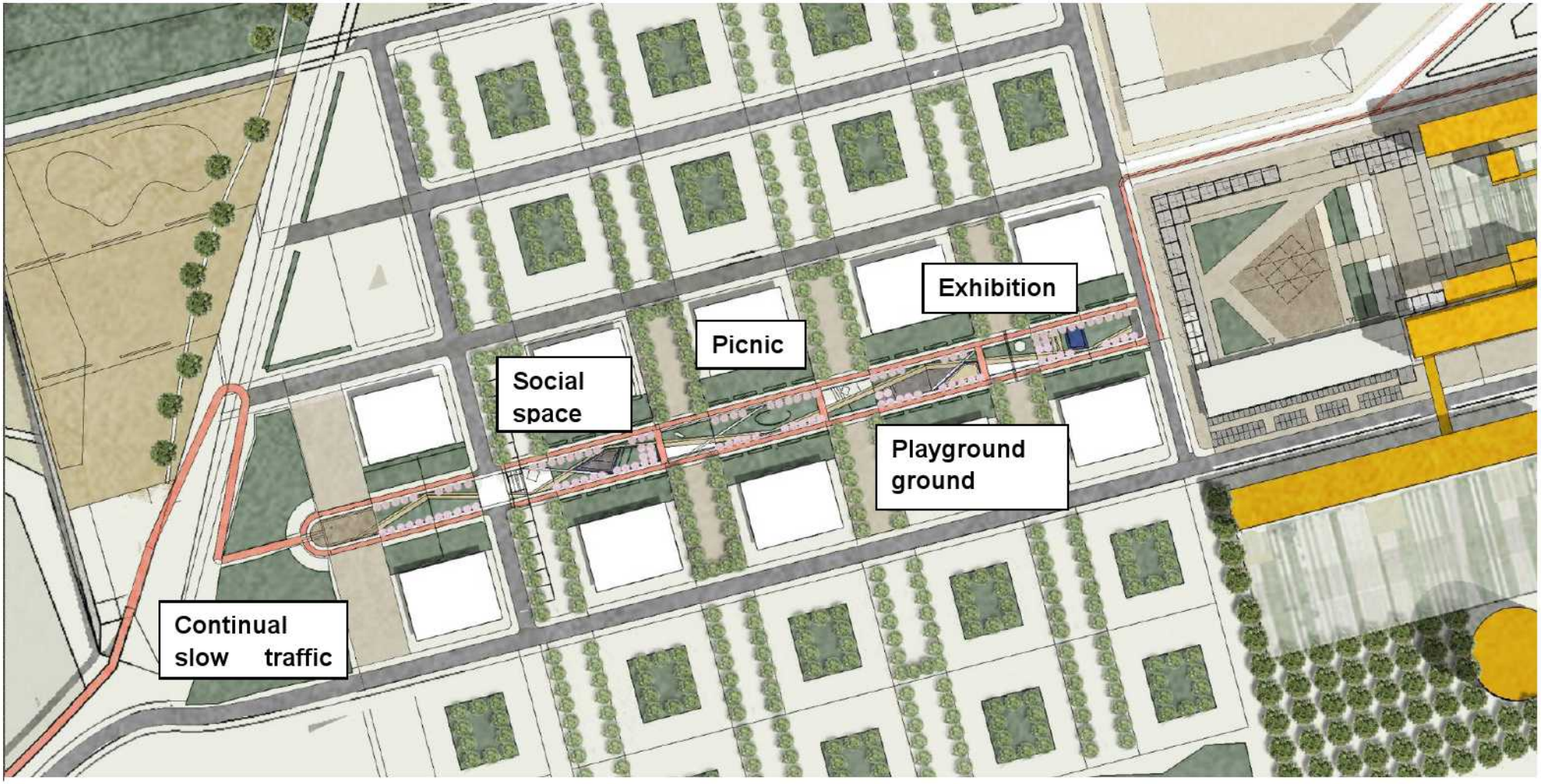
CENTRAL AXIS DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



Liner park-Spatial concept

The heritage as a landscape element define a space that could give strong spatial experience,this space will be the backbone of the industrial park. The main path is decided by the entrance of the building.The liner cherry trees is planted on the double sides.Group trees inner the park provide a place for stay.Such movement and group trees provide diverse visual engagement with the heritage object.

CENTRAL AXIS DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS

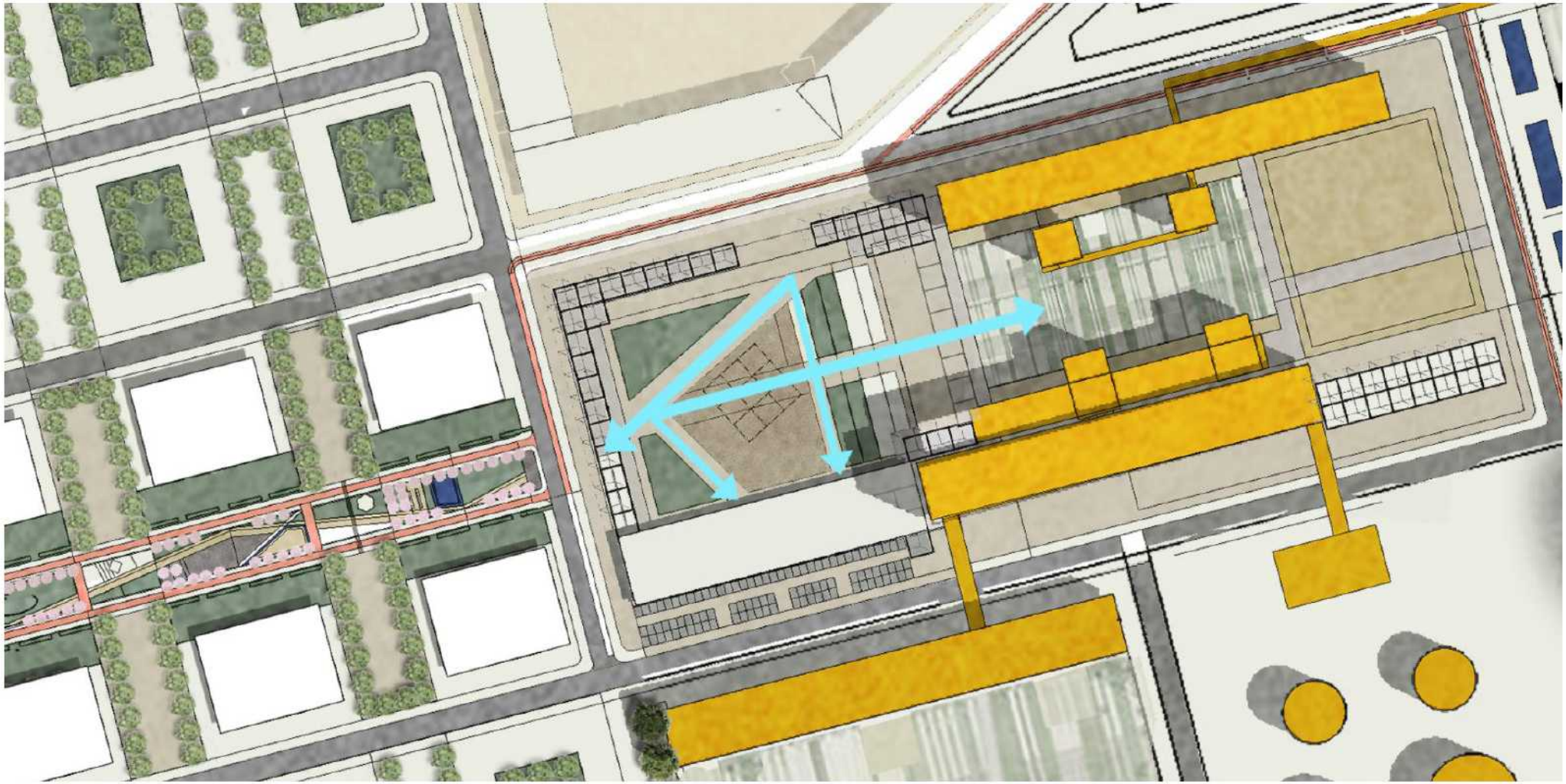


Liner park

Recreational programs could be developed along the central axis.The four exhibition spaces make up a continuous story line about high tech industrial. The shared space is a relative public area and it will be used for exhibition.

INDUSTRIAL SQUARE

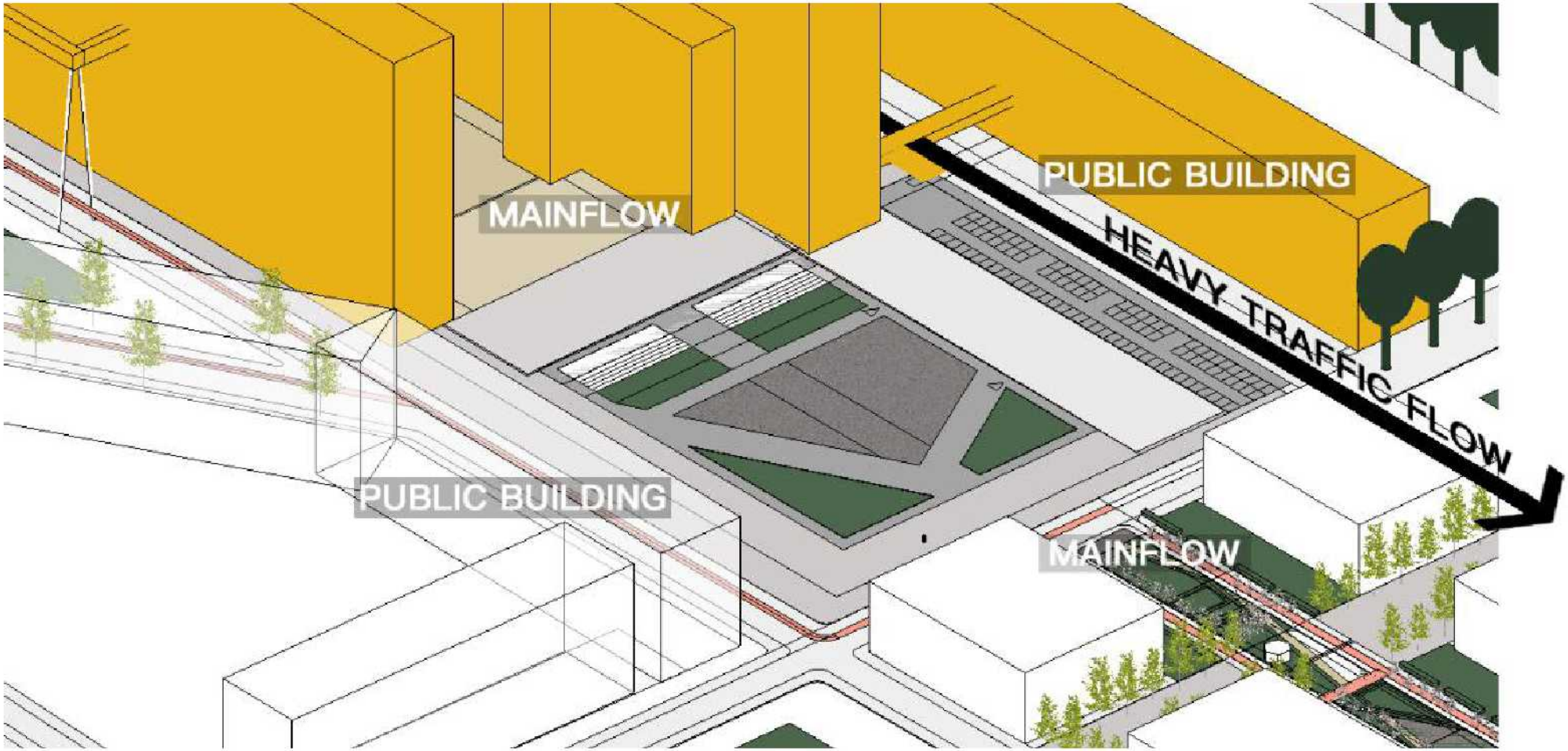
CENTRAL PLAZA DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



Central square

It’s the central public space of the park.Main flows decide the basic pattern of the square

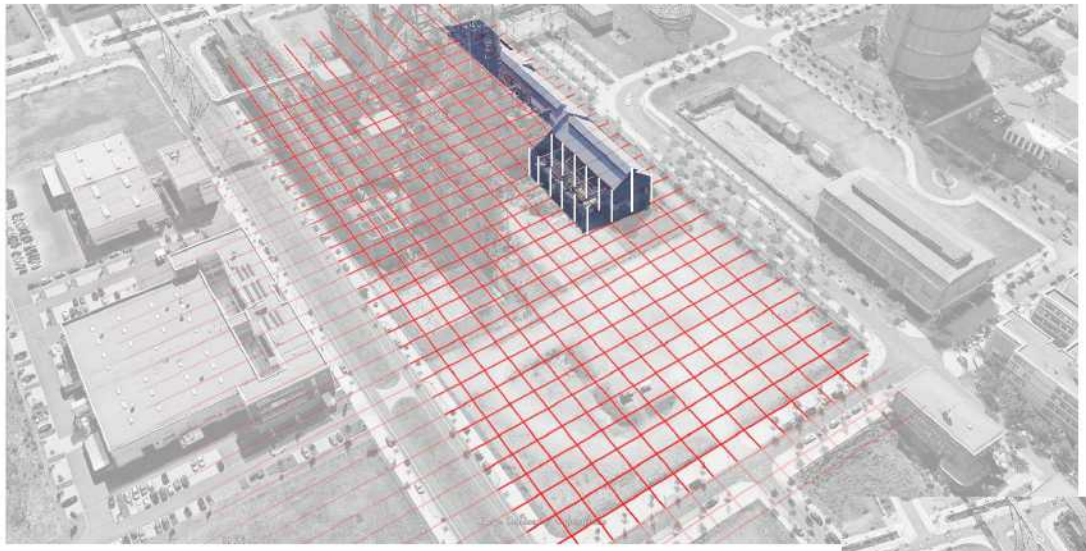
CENTRAL PLAZA DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS

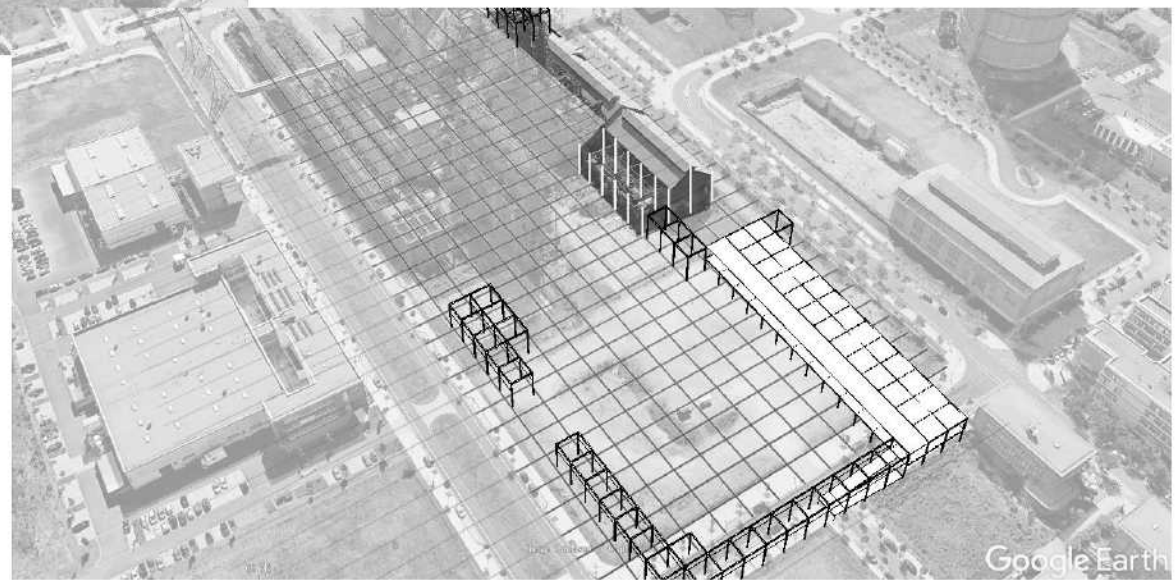


The potential for being a square

The square is surrounded by public buildings and heritage buildings.It have the potential to be a central space,and it can be a stopping point of heavy traffic and human flows.

CENTRAL PLAZA DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS

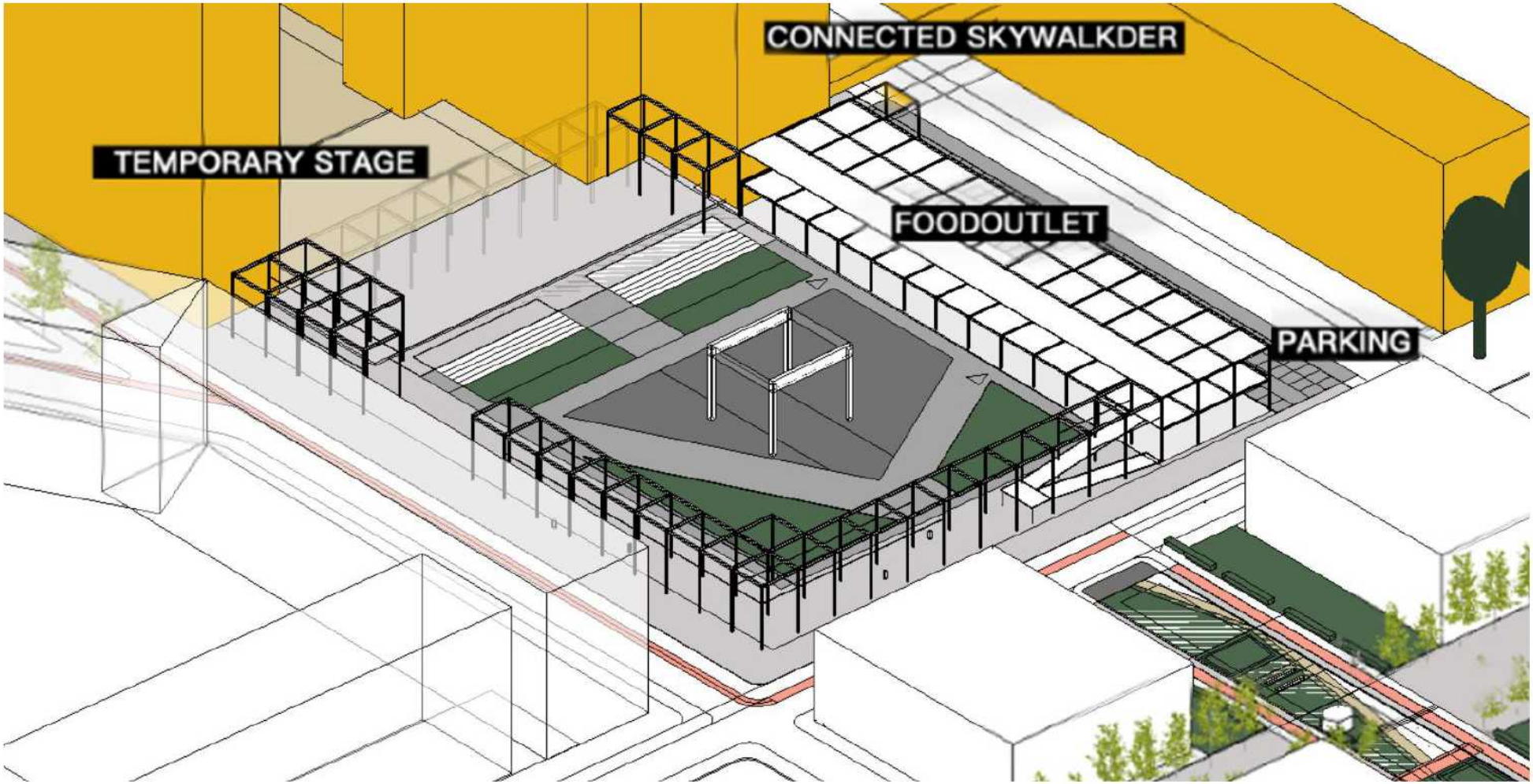




Study on the grid of the heritage building

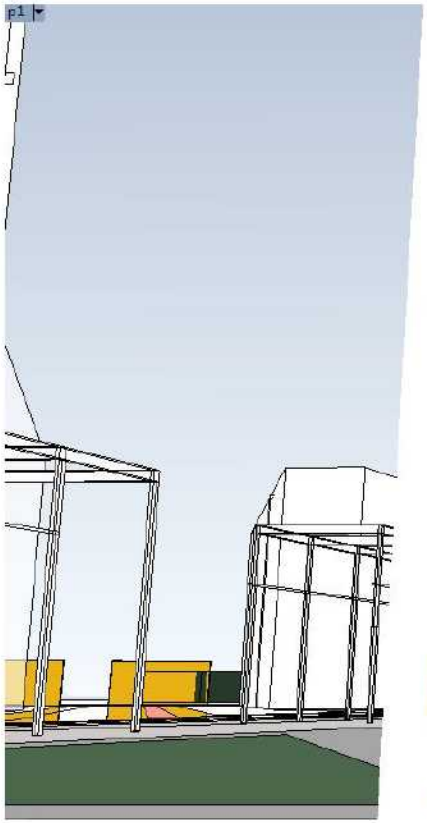
New built construction will based on the existing grid of heritage building

CENTRAL PLAZA DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



Design on the central square

The left metal construction will be used for building a corridor on the existing grid.The corridor provide a intermediate layer between over scaled building and human scale space.It's also the interface between space of flows and space of stopping .Corridors make a half enclosed space and the feeling of being a place.The construction in center divide the over scaled space into four spaces.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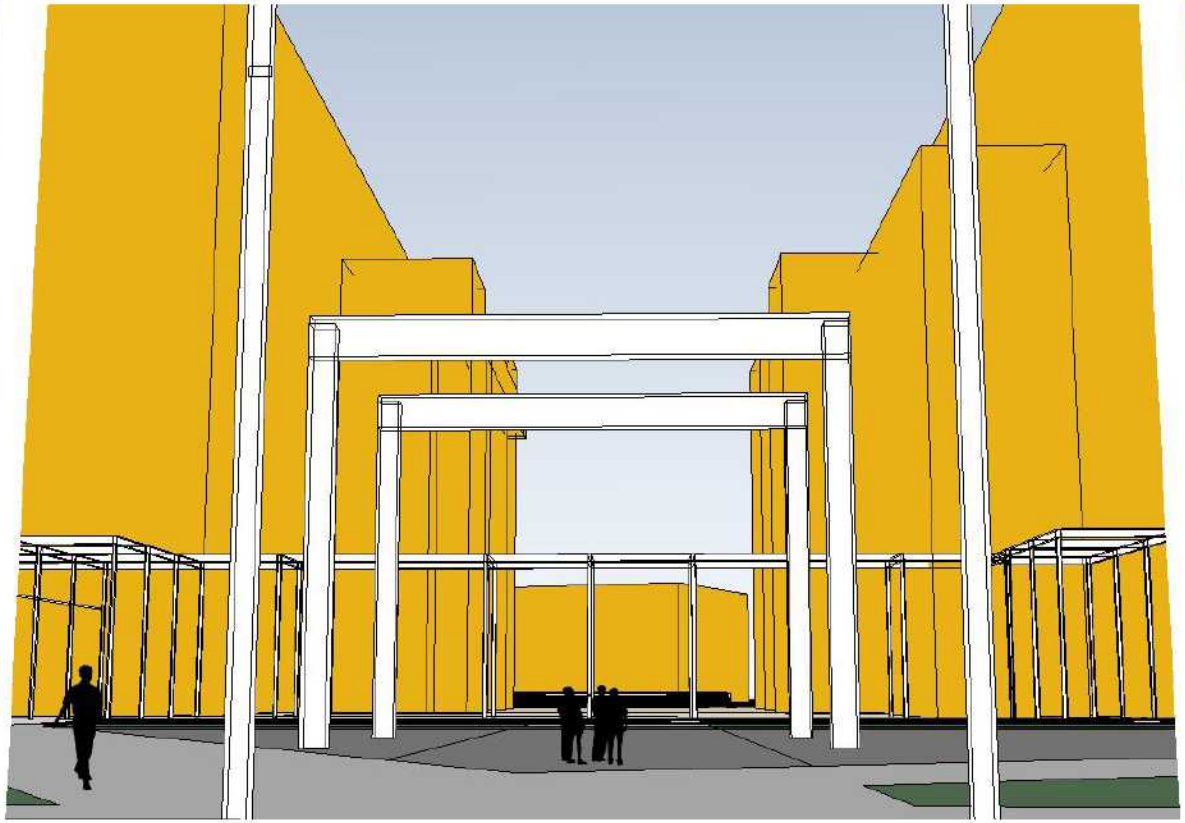
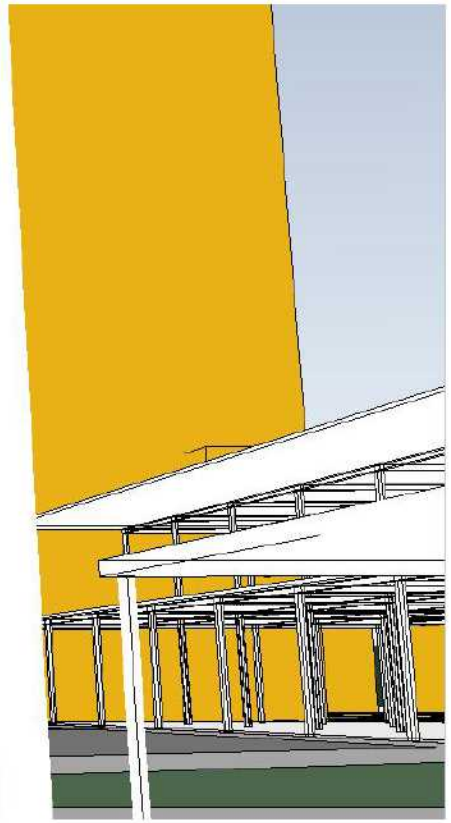
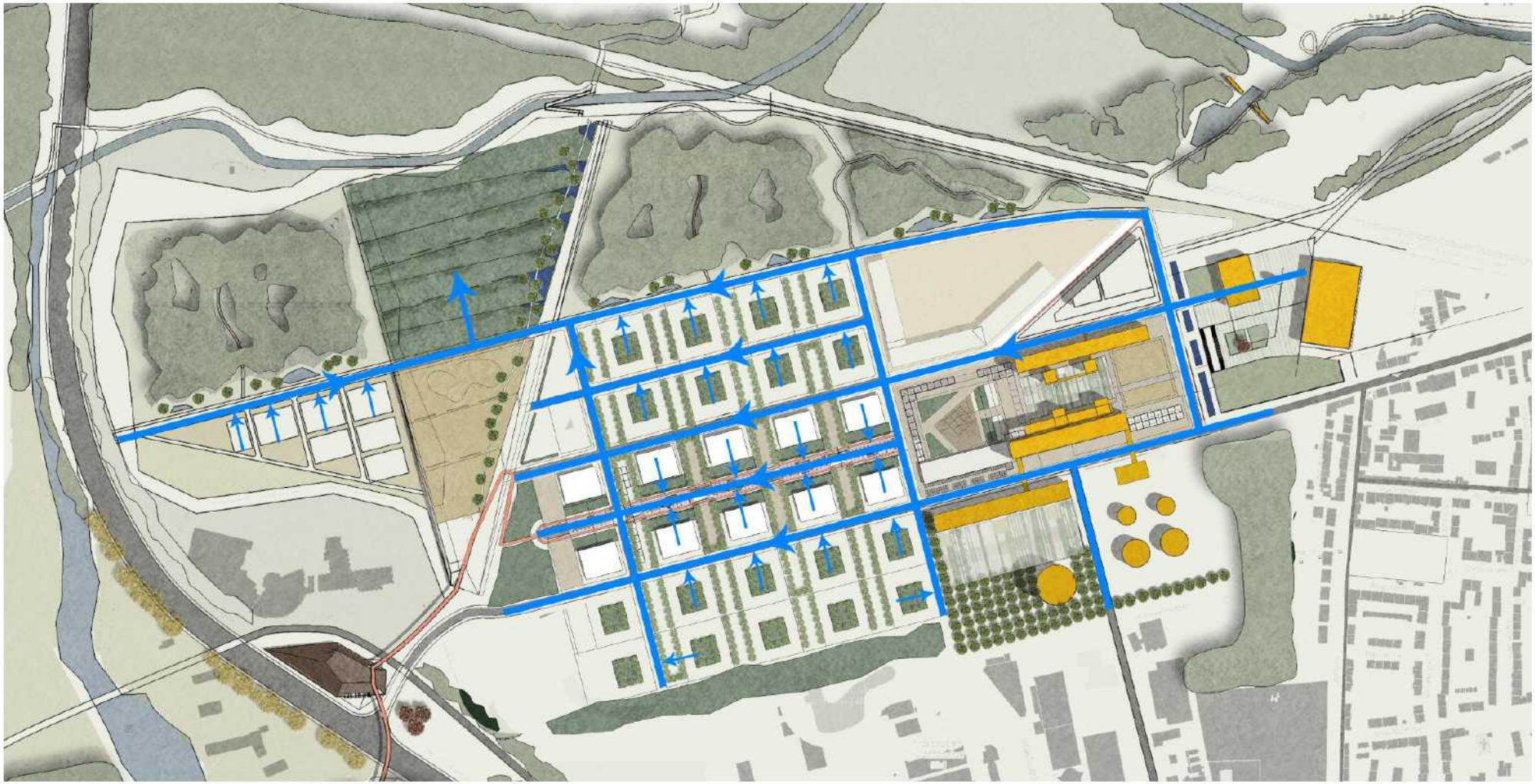




WEDAGE

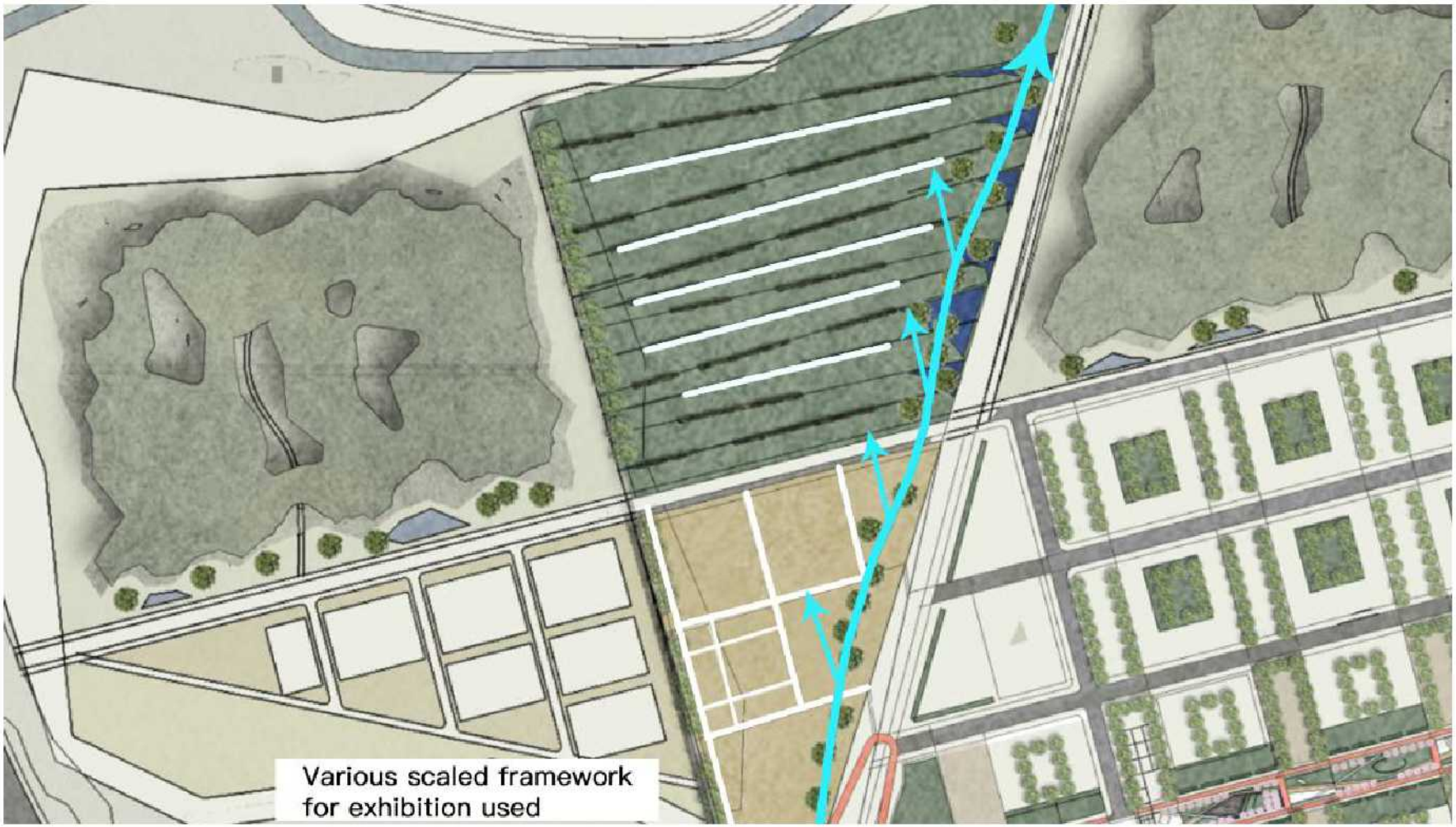
WEDGE DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



Design on the wedge

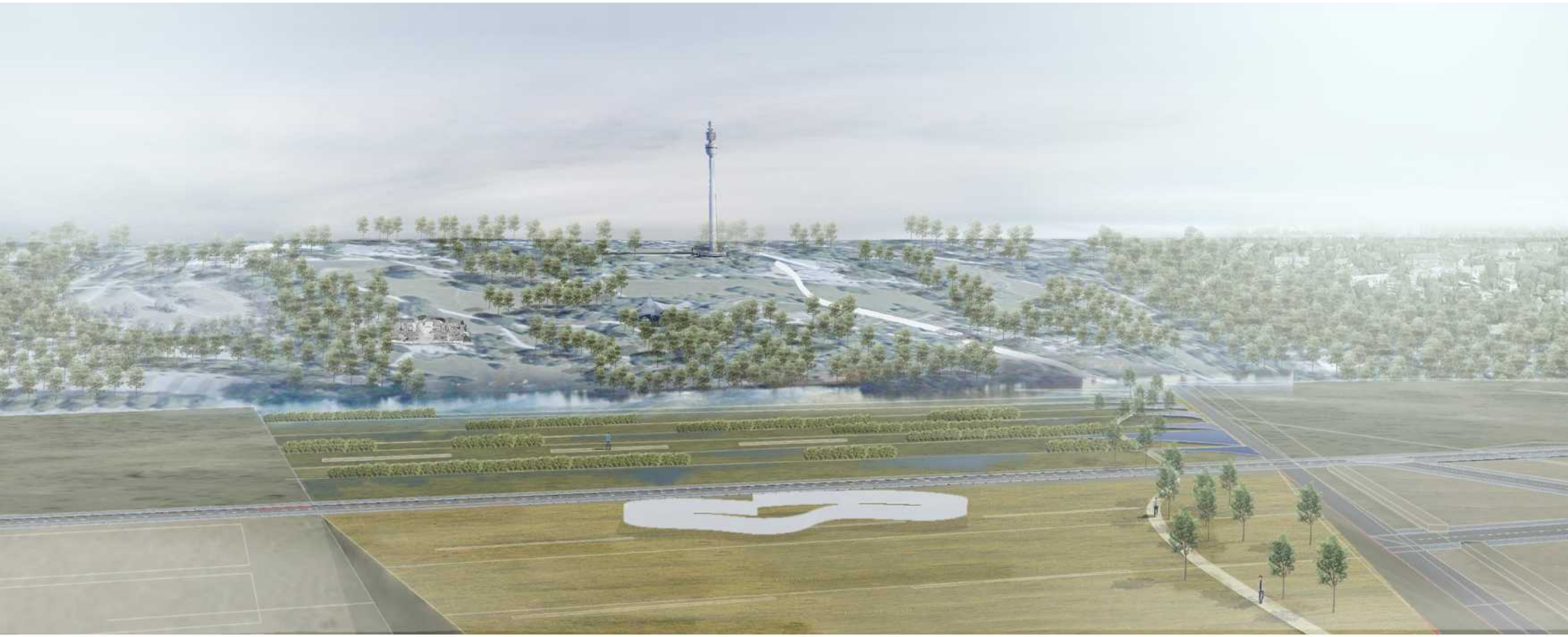
The soil is still polluted in the site.To solve this problem,the rain water will be collected first and discharged into the bio terrace.The water flow will create diverse physical condition for vegetation growth on the wedge

WEDGE DESIGNELABORATION DESIGN ON THE ROOM OF FLOWS

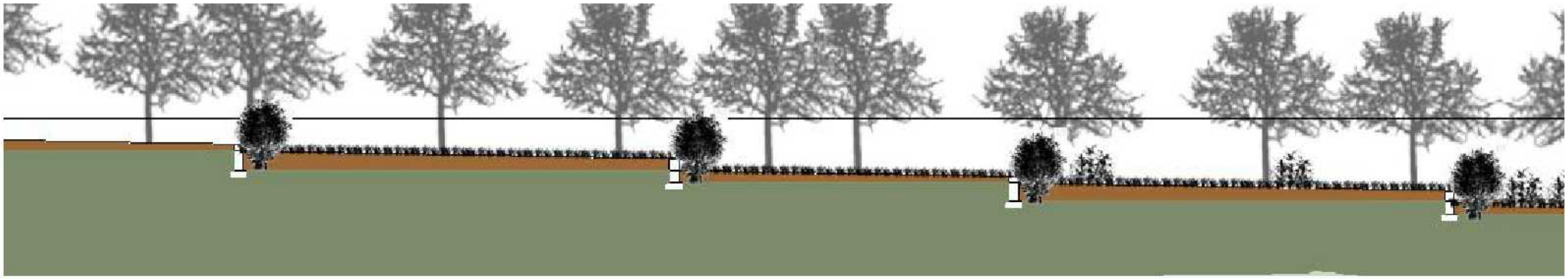


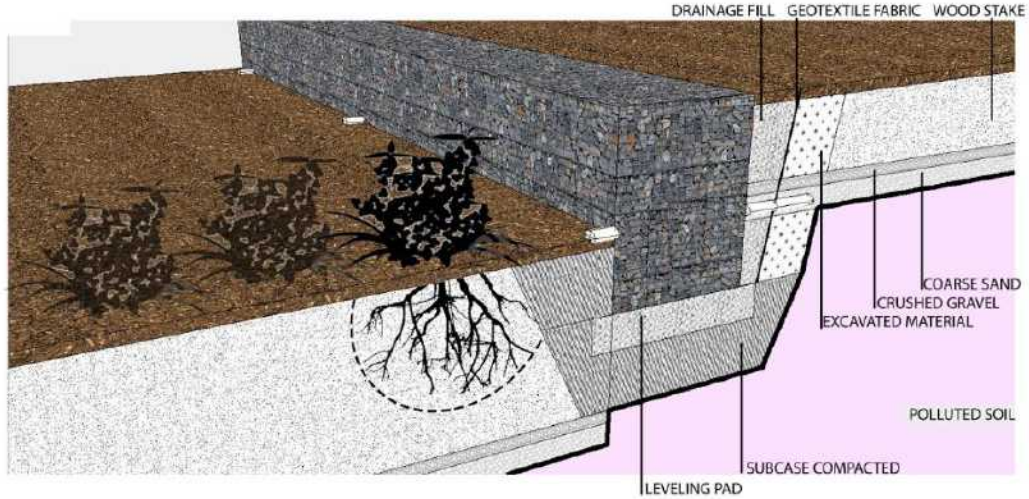
Spatial quality of the wedge

The wedge is the only open space in the industrial park.It is a landscape theater which looks at the bottom of the valley.When people move forward,the liner space moves back(white line),those liner space are caused by natural forces.In the southern part, small path provides the various-scaled framework for temporary exhibition.



WEDGE DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS



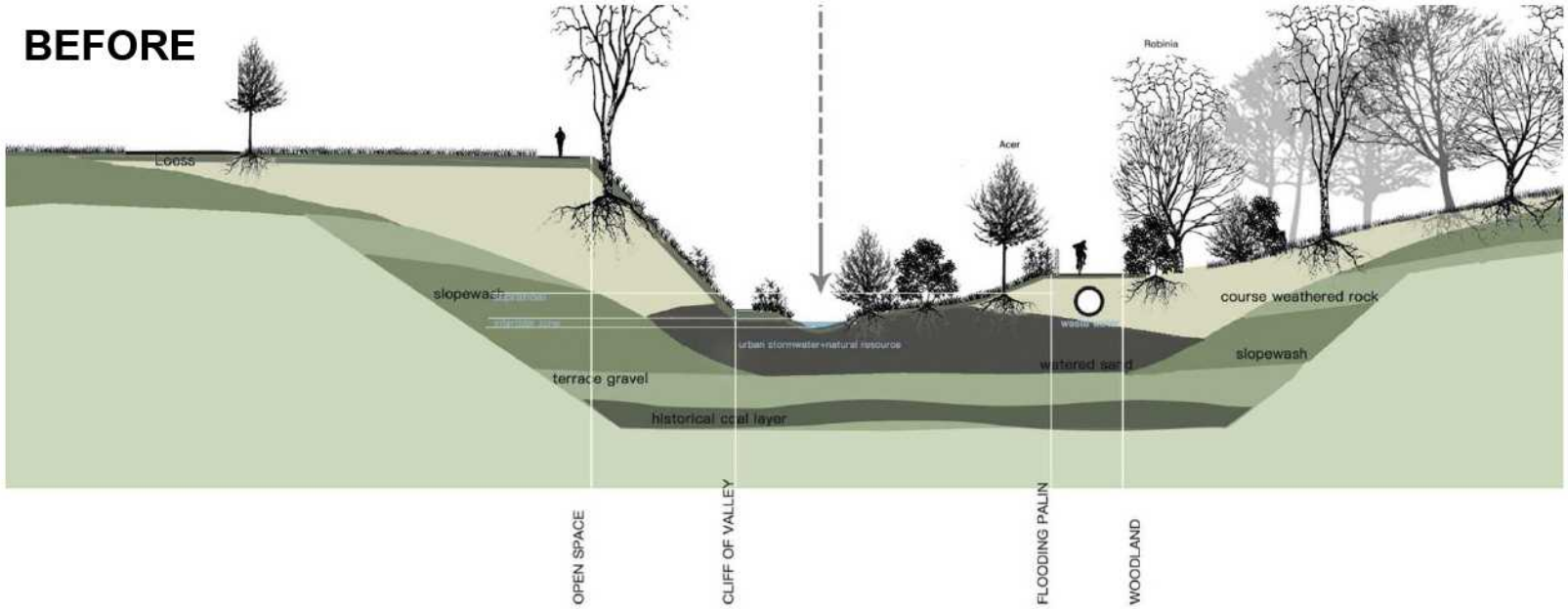


Design on the wedge

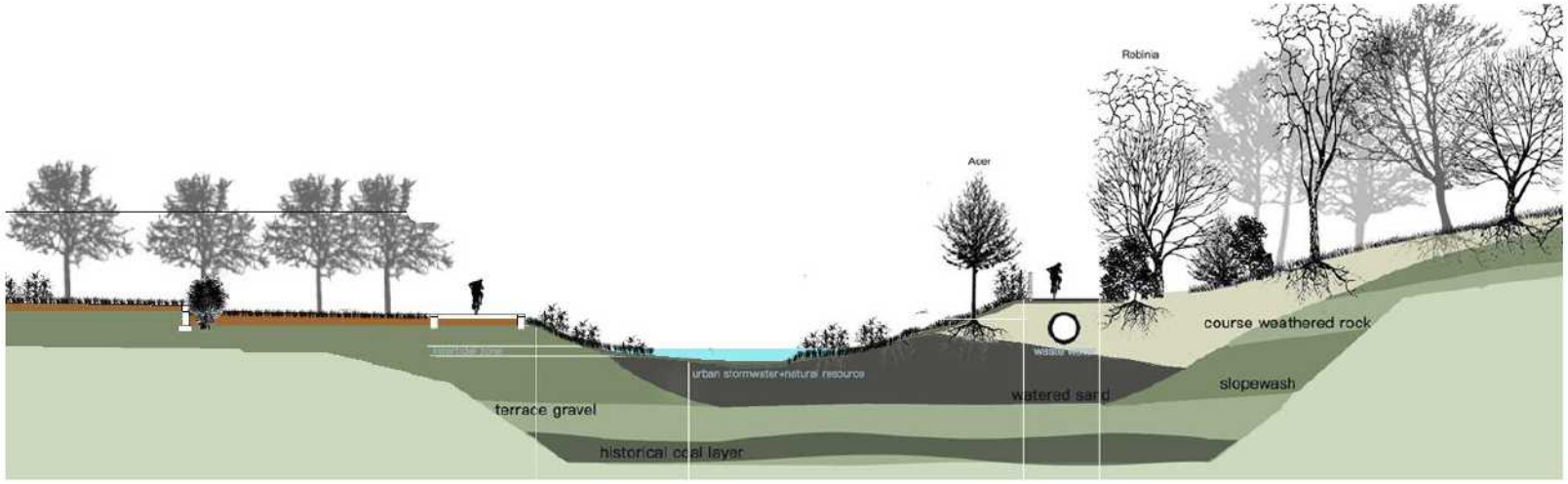
A technical layer is added to decrease the water penetration because the water is still polluted in the site.The underground pipe will lead the water to the next terrace and purify it again.The layer will also limit the root of vegetation,which means only low trees can grow in this visual corridor

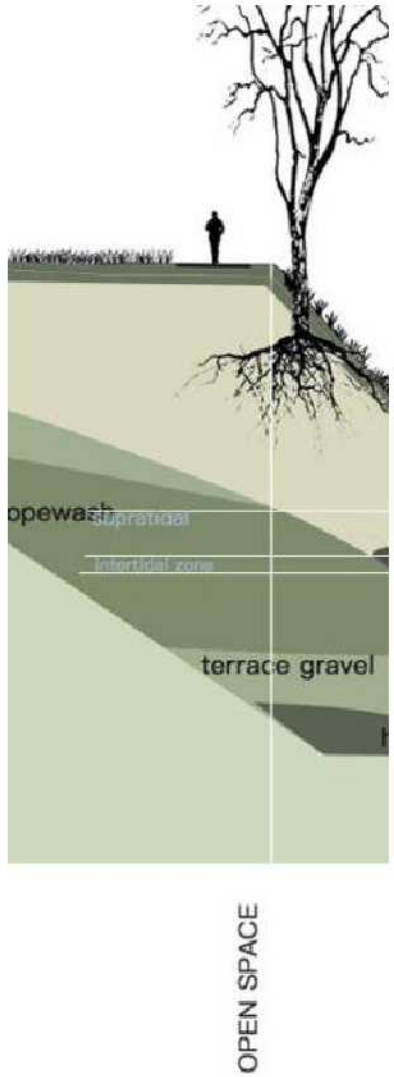
WEDGE DESIGN ELABORATION DESIGN ON THE ROOM OF FLOWS

BEFORE



AFTER





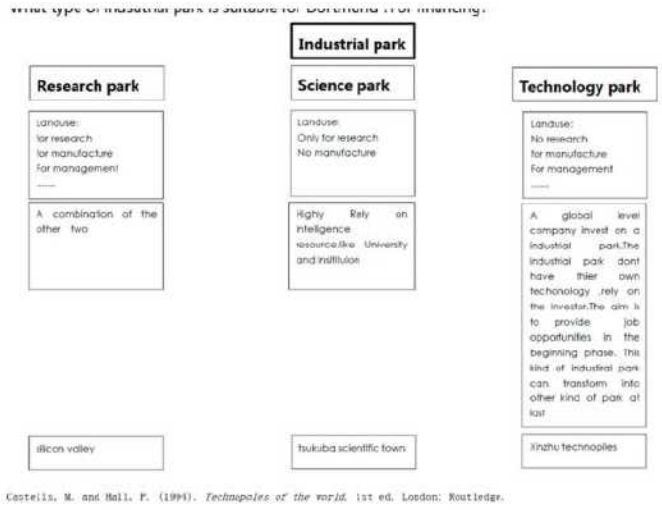
Design on the wedge

The intertidal zone is enlarged,and people can touch the water now

POSSIBLE PROGRAMS AND INSUTRIAL

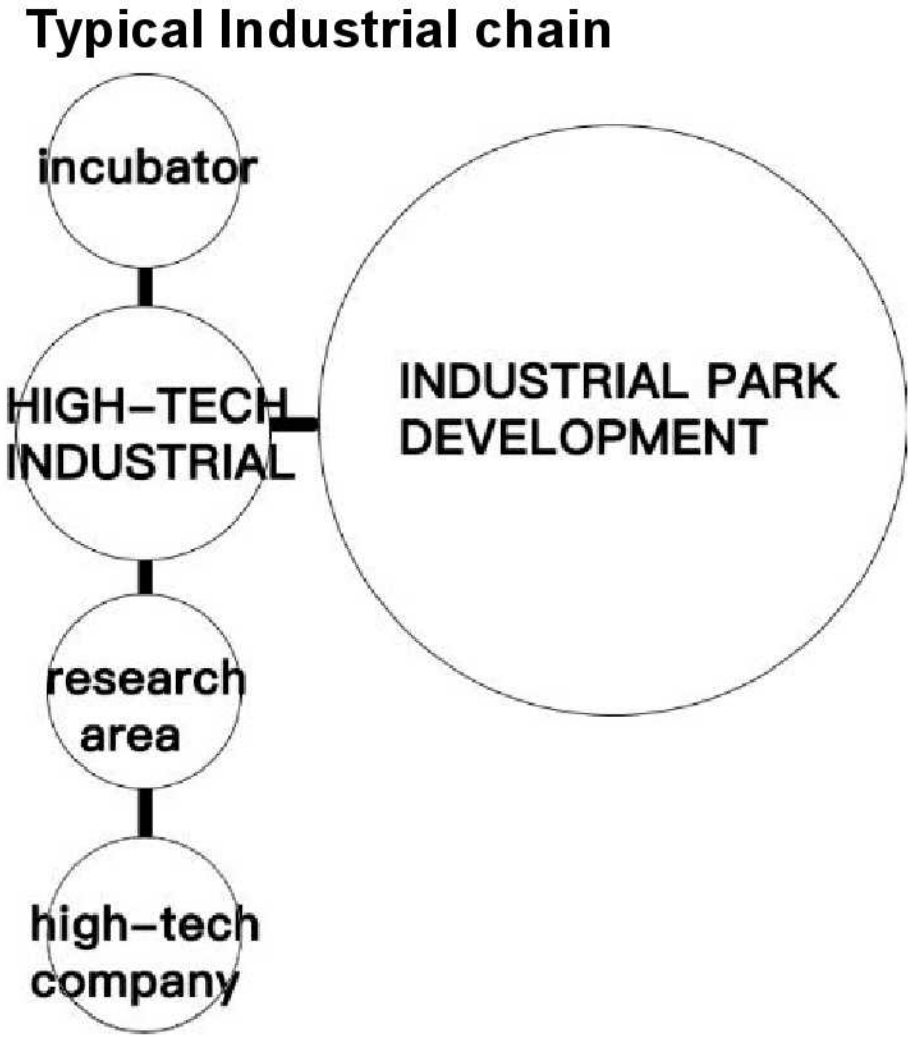
INDUSTRIAL AND PROGRAM

- Research on the industrial park



	Industrial park	
Research park	**Science park**	**Technology park**
Landuse: for research for manufacture For management	Landuse: Only for research No manufacture	Landuse: No research for manufacture For management .....
A combination of the other two	Highly Rely on inteligence resource,like University and institution	A global level company invest on a industrial park.The industrial park dont have thier own technology ,rely on the investor.The aim is to provide job opportunities in the beginning phase. This kind of industrial park can transform into other kind of park at last
ilicon valley	tsukuba scientific town	Xinzhu technopiles

Castells, M. and Hall, P. (1994). *Technopoles of the world.* 1st ed. London: Routledge.

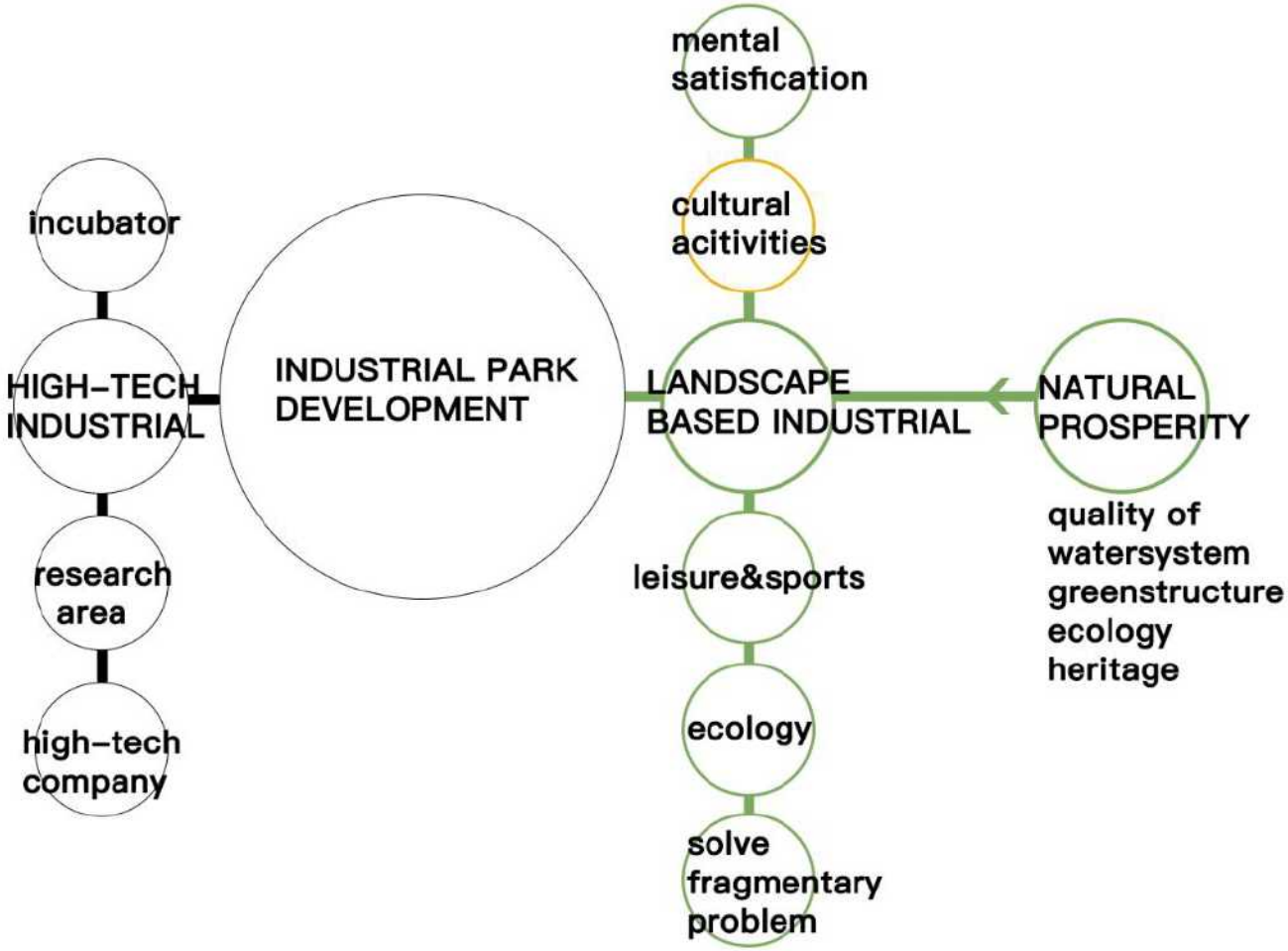


The typical industrial chain

The site is located in Dortmund and Dortmund is a shrinking city.In order to provide more work opportunities, it is possible to develop a industrial park. The typical German industrial park is based on the high tech industrial.The industrial chain will includes incubator,research institution and high tech company.

INDUSTRIAL AND PROGRAM

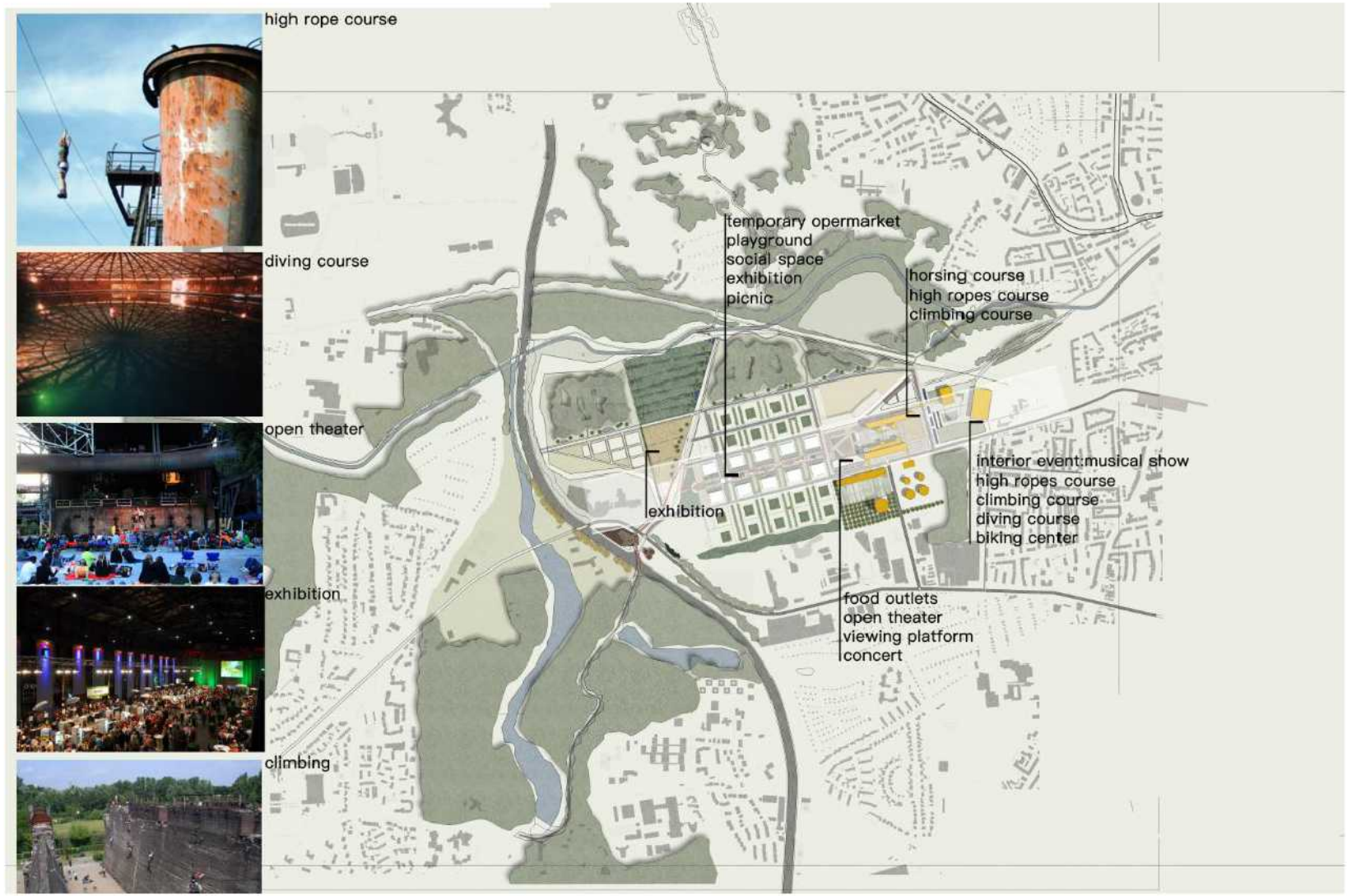
Upgraded Industrial chain



Upgraded industrial chain

Based on the unique quality of the landscape framework , more recreational industrial can be developed.The industrial chain is upgraded.It will contributes to the economics growth and better working environment.

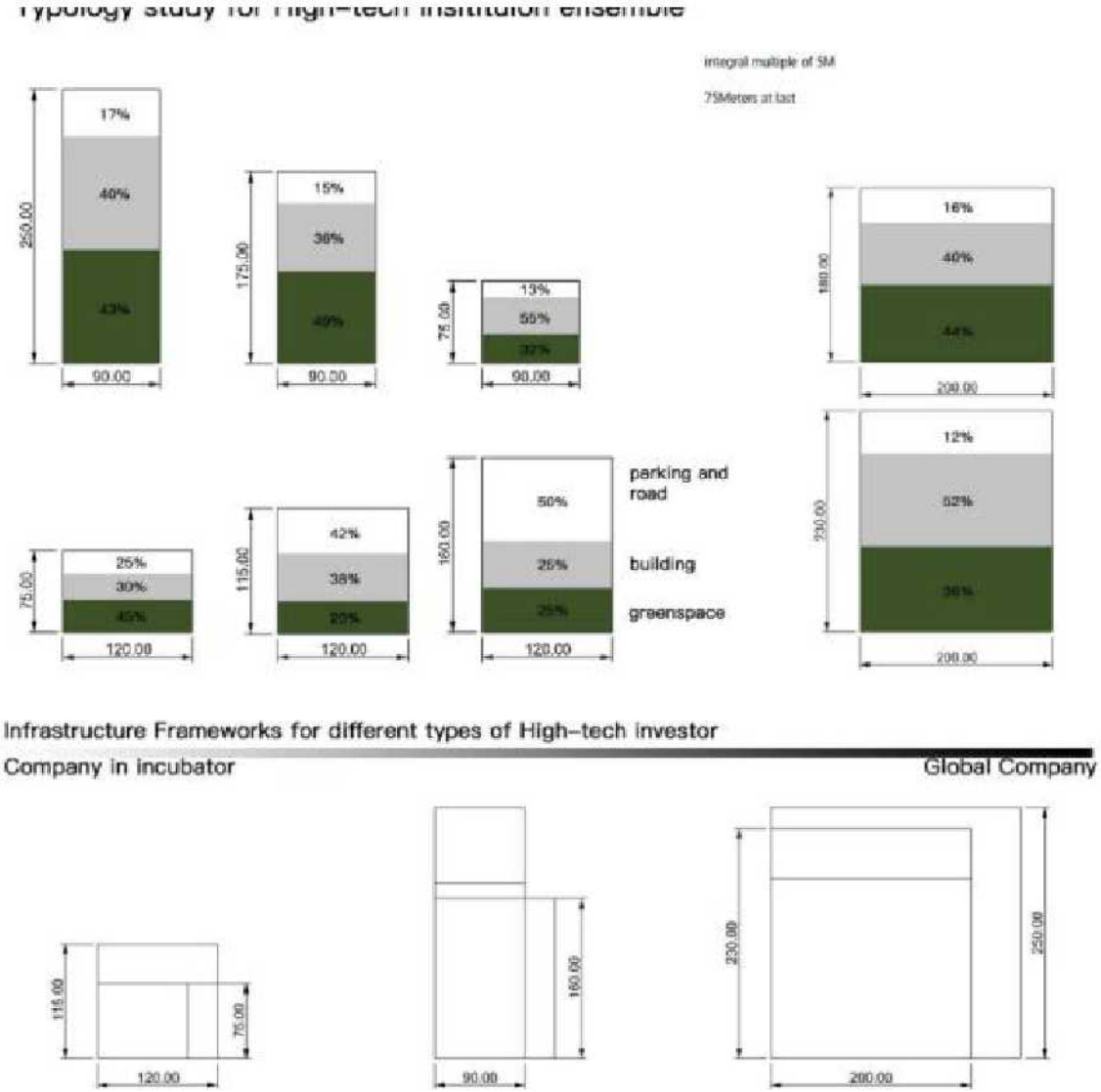
INDUSTRIAL AND PROGRAM



Possible programs on slow traffic route

Recreational programs could be developed along the slow traffic route.For example,high rope course.The cool tower will be developed as the diving center,and liner park will provide the space for high tech show.

ADDTIONAL RESEARCH ON THE INDUSTRIAL PARK



Research on the existing industrial park

Here is some additional research on the framework of the industrial park.It has a typology study on the existing industrial park in Germany.It finds the most suitable landuse and the size of road framework that can be applied in Dortmund

RESEARCH ON THE EXISTING INDUSTRIAL PARK

Berlin Adlershof

Complansoft im Biotechnologiepark

Technologiepark Dortmund

Technologiepark Paderborn

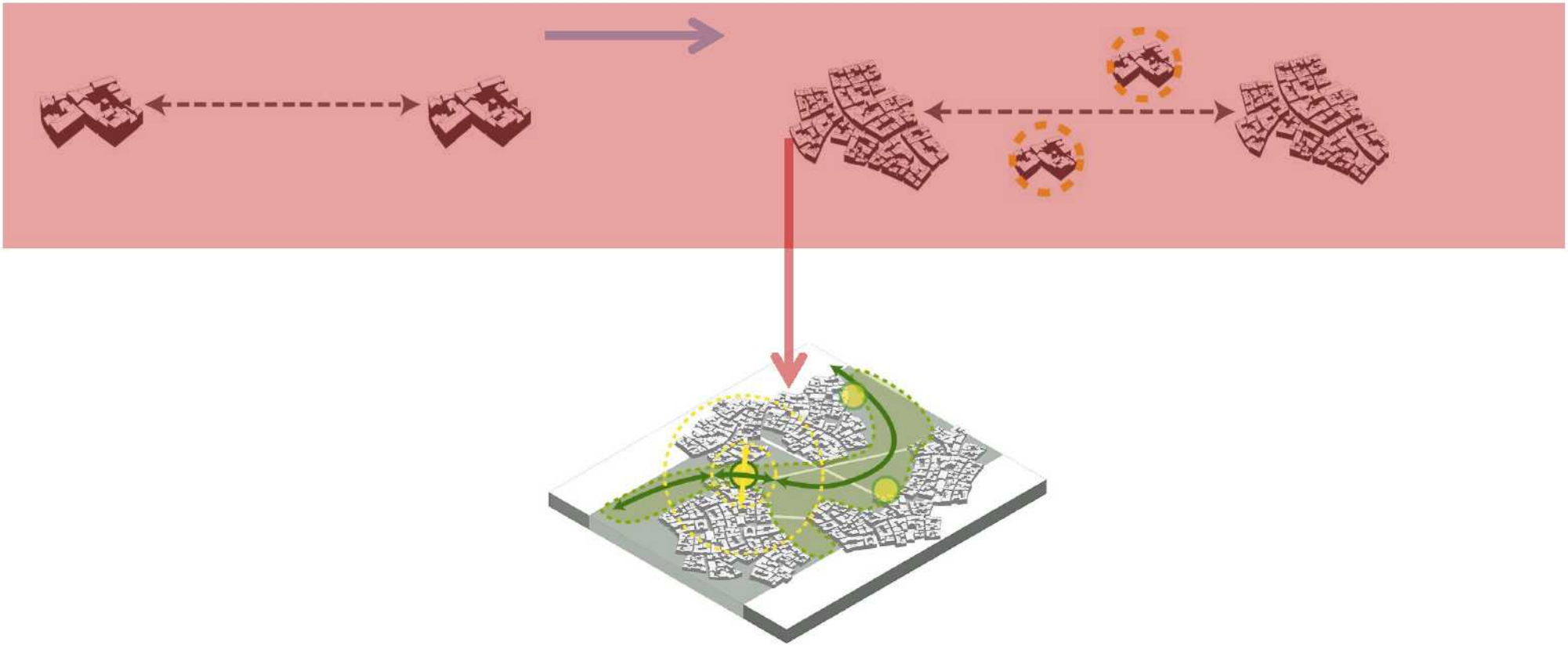
Research on the existing industrial park

It has a typology study on the existing industrial park in Germany.It finds the most suitable landuse and the size of road framework that can be applied in Dortmund

CONCLUSION

Most urban expansion and development is guided by road infrastructure.It ignores the integrity and quality of the natural layer.The thesis and the design study on how to use landscape to guide the urban expansion in a sustainable way ,and it studies on how to 'integrate' the fragments in urban and natural layer.Using landscape to integrate is caring more about the natural quality and the integrity of the natural ,instead of just human interests.

For the future projects based on the Emscher proposal,it should be well contextualizing locally and regionally instead of the isolated one



1.one scars the other one

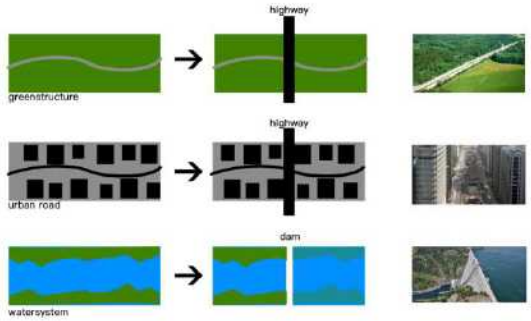
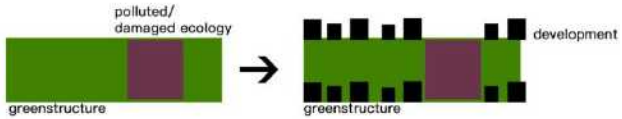


Figure13:one scars the other one

2.projects damage the continuity of infrastructure (and its zone)

Figure14:The developed Industrial site break the continuity of infrastructure and its zone

4.the quality difference in infrastructure zone



3.missing link of the infrastructure(and its zone)network

Figure15:Missing link of road infrastructure(and its zone)network

Figure16:Missing link of water infrastructure(and its zone)network

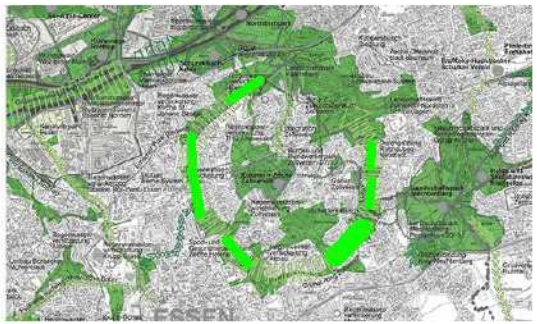
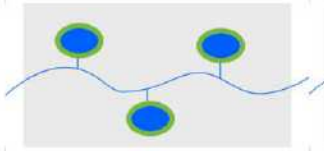
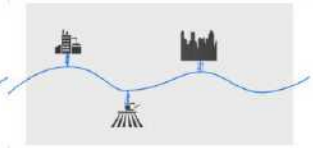
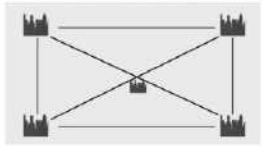
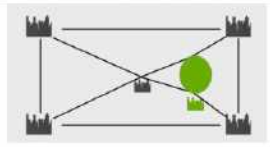
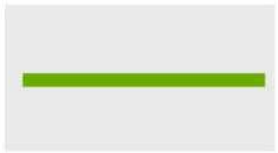
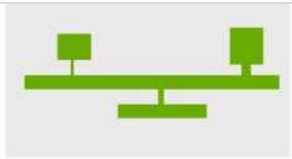
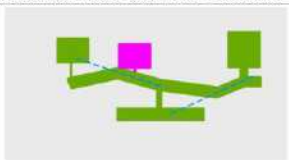


Figure17:Missing link of green infrastructure(and its zone)network

Diagnose tool

During the design process,the “fixing” diagnose tool is developed which aims at solving the fragmentary problems and it can practically realize ”integration”by landscape

waterflows				
integration with other water system	original	integrate it with a bigger and higer watersysten	integrate with natural water basins	integrate with agriculture land, urban or factory
				
	normal water flow, water level and water quality	water level will be heighter. a faster water flow, which may cause a better water quality or more sediment in the water. a higher flooding risk. better ecology condition	collect more water, higher water level, lower flooding risk, better ecology condition , better water quality.	less water, lower water quality, worse ecology condition
transportation flows	original	higher degree of integration	integrate with natural resources	
				
		economics development, and share the urban resources	sustainable economics development, a stronger flow because of recreational purpose, better view of road, new nature-based industrial is developed along the network	
ecological and recreational flow	original	integrate with other greenstructure	integrate with other habitats	integrate with other habitats and playgrounds share the visual resources
				
		paln shape green structure can catach more creatures	better ecology, a stronger creatures flow	better ecology , build a spatial sequences for recreation, a stronger recreational flow
	integrate with other habitats and result a wider green corridor	integrate with urban greenstructure		
				
	better ecology, a stronger creatures flow	stronger recreational flow nature based happiness, better urban ecology, better economics		

Integration toolbox

During the design process,the “integration” toolbox is developed ,it aims at integrating natural layer and achieve natural prosperity.

APPRECIATION:
Thanks for the patient guide and the priceless knowledge from Steffen and Els.

THE END