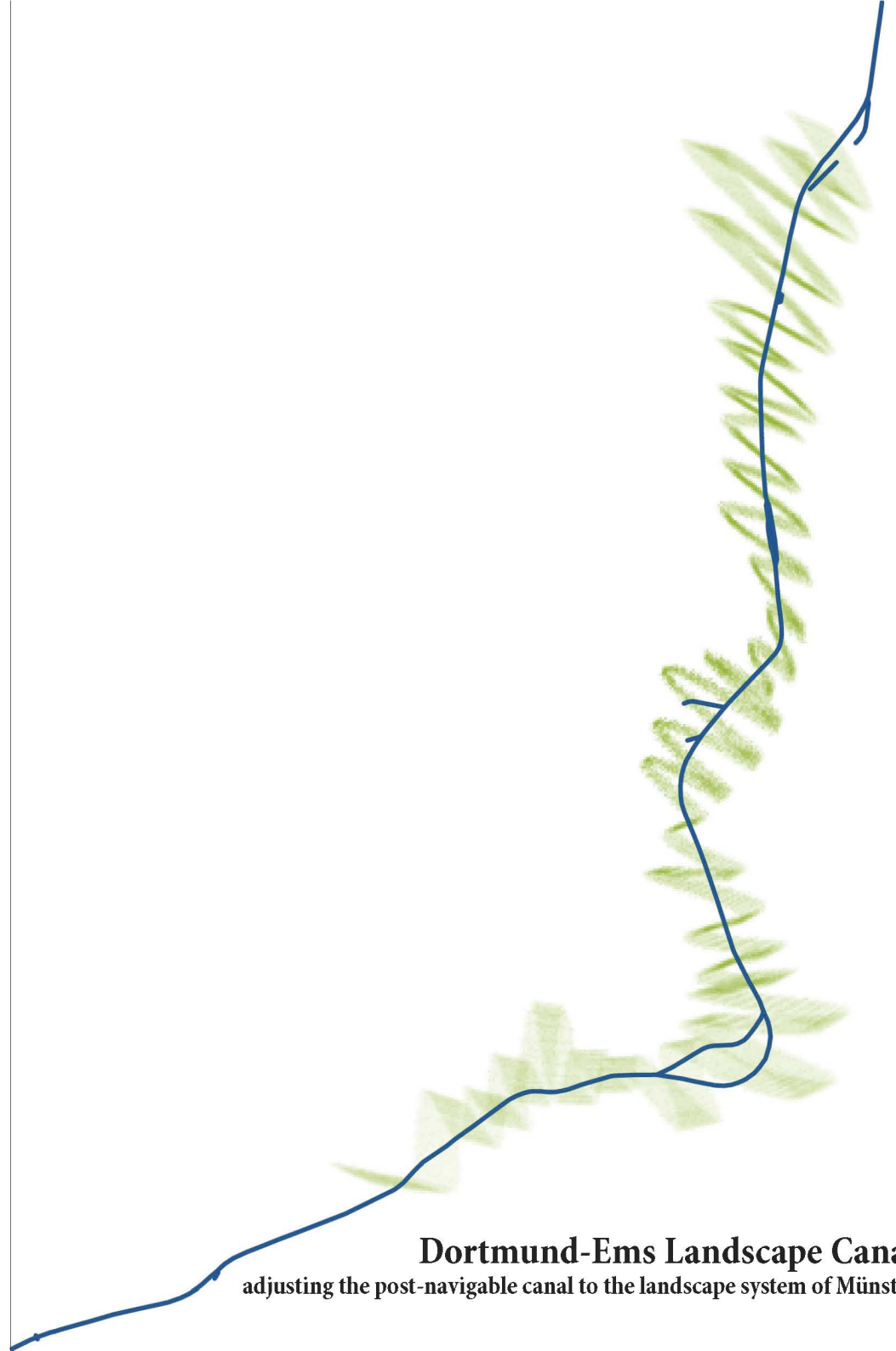


Dortmund-Ems Landscape Canal
adjusting the post-navigable canal to the landscape system of Münster



Master thesis
Dortmund-Ems Landscape Canal:
adjusting the post-navigable canal to the landscape system of Münster

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Graduation studio: Flowscales, Landscape Architecture, TU Delft

May 19th, 2015



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- 1.2 The reflexive infrastructure
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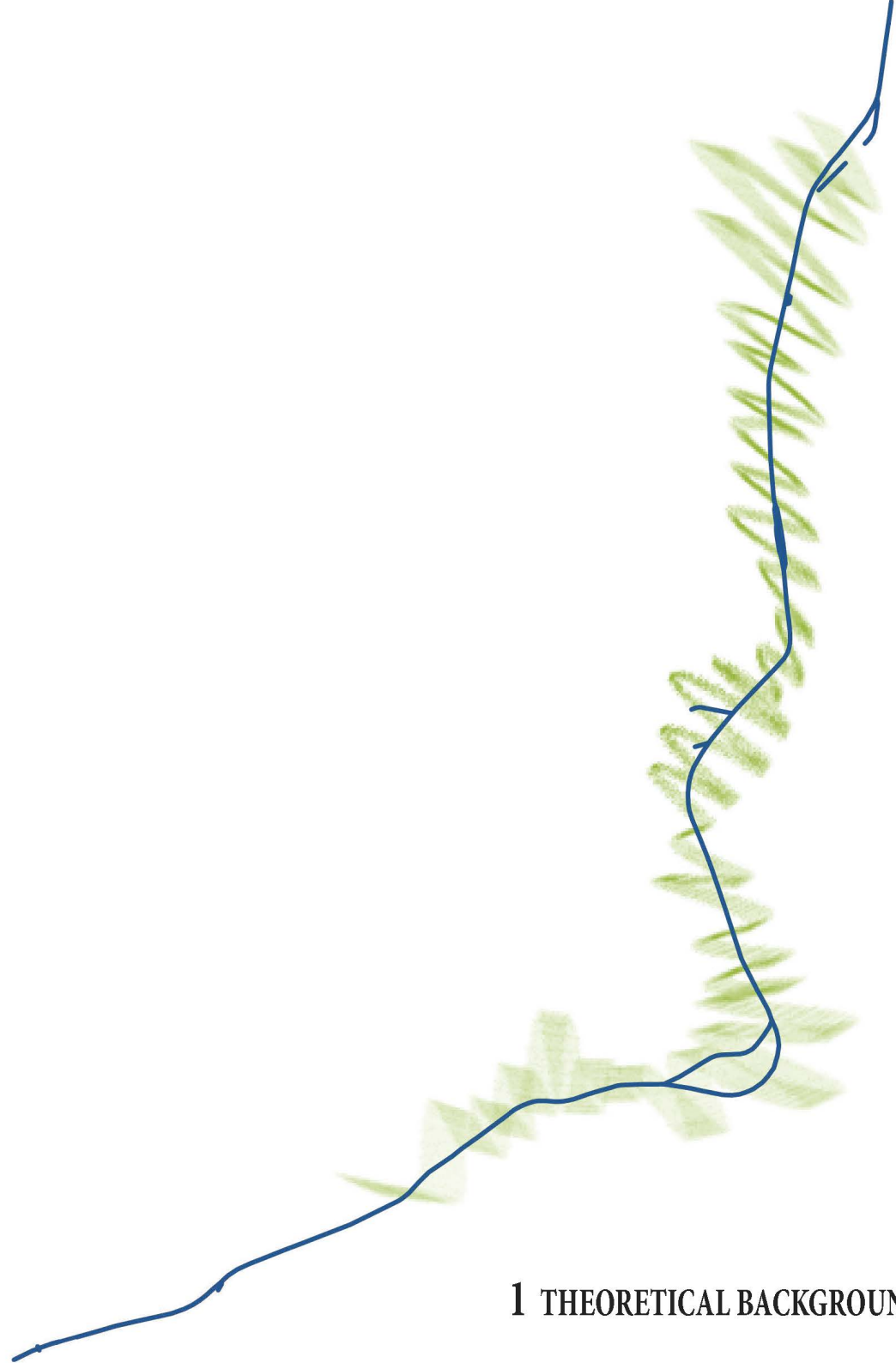
4 DESIGN TEST

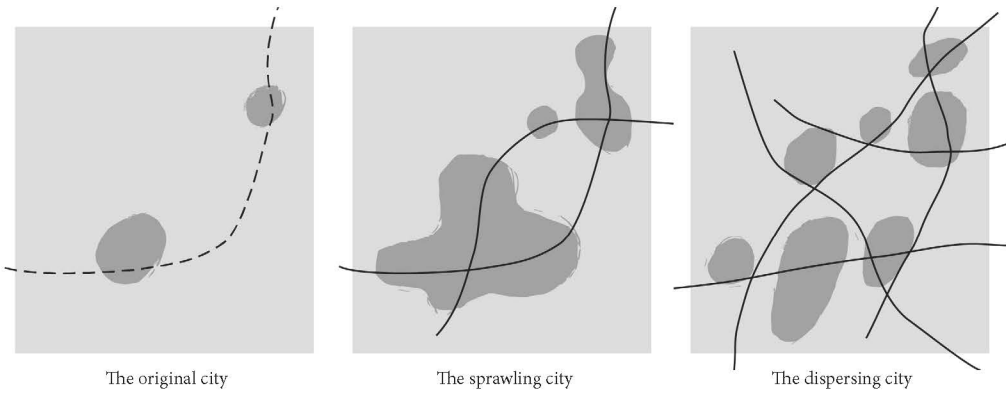
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 - Space
 - Program
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6 REFLECTION





1.1 Infrastructure: flowscapes in city evolution

The modern city revolution has experienced a sprawling period and is now getting into dispersing period. So the urbanism pattern is transforming from a condensed city quickly to a sprawling one, and now to a dispersing one (multi-centered), also known as metropolitanization.

The sprawling is mainly during the industrial revolution in the nineteenth century. The division of labor in industrial society was reflected in the spatial division between work and home. Industrial production also led to a massive increase in the transport of raw materials for production and energy generation for use by machines and produced goods. This increasing need of individual and material transport led to endeavor to construct traffic infrastructure. When the modern city develops into a dispersing one, many infrastructures are abandoned or found harmful.

Nowadays it is commonly recognized that infrastructure over the last centuries was in service of the conquest of nature, whereby the environment was denied its natural dynamism in favor of more controlled and static systems. However, widespread insights into the potentially irreversible harm this paradigm has done to natural systems is now manifest in a growing awareness that we have to create more harmonious forms of urban landscape architecture.



The traditional infrastructure in modern city: highway #5 Los Angeles, California, USA, 2009 / Courtesy of Edward Burtynsky

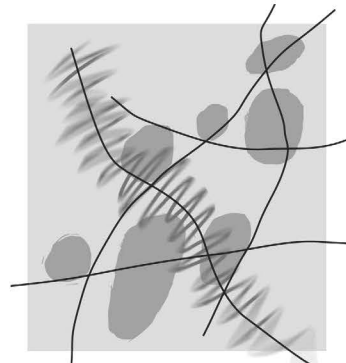


A converting experiment of infrastructure: highline of New York.

1.2 “the reflexive infrastructure”

According to Regine Keller (Infrastructural Urbanism: addressing the in-between), the current discourse on infrastructure is its “reflexivity”. One presentation of reflexivity is the relevant spaces that are on longer useable, or become harmful, and consequently shut down over time. Urban infrastructure influenced, dominated and even defined these spaces as its context. Thus the reflexivity is reflected in the infrastructure and its relevant domains.

These spaces are significantly marginal in big cities. Infrastructures such as railways, highways and drainage canals have this situation more or less.



Reflexive infrastructure in the dispersing city

1.3 Possibilities: what could it be?

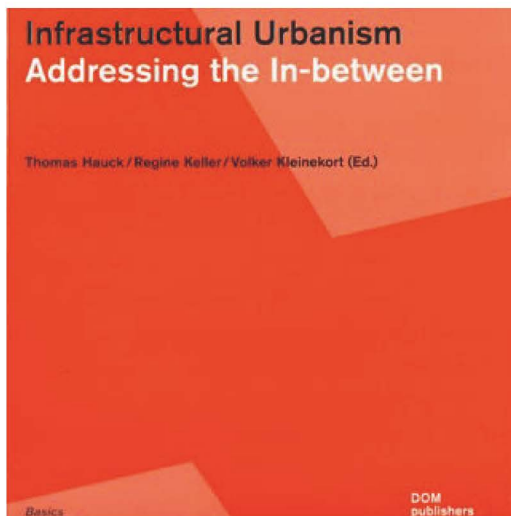
There are four precedents to show various promising possibilities of infrastructure in modern cities:

Highline in New York, a connector of people’s life and emotion, providing programs for people from different ages and different social groups, in different seasons.

Madrid Rio in Madrid, a backbone of urban spaces, bridges enhance the connection of two sides along the route.

Baana in Helsinki, a lowspeed traffic route for daily commute and leisure.

Bishan Park in Singapore, a naturalized drainage stream, also acts as an ecological corridor in urban context.



Hauck T., Keller R. & Kleinert V., Infrastructural urbanism: addressing the in-between (2011). Berlin: DOM publishers.



Check the available activities at highline park at thehighline.org



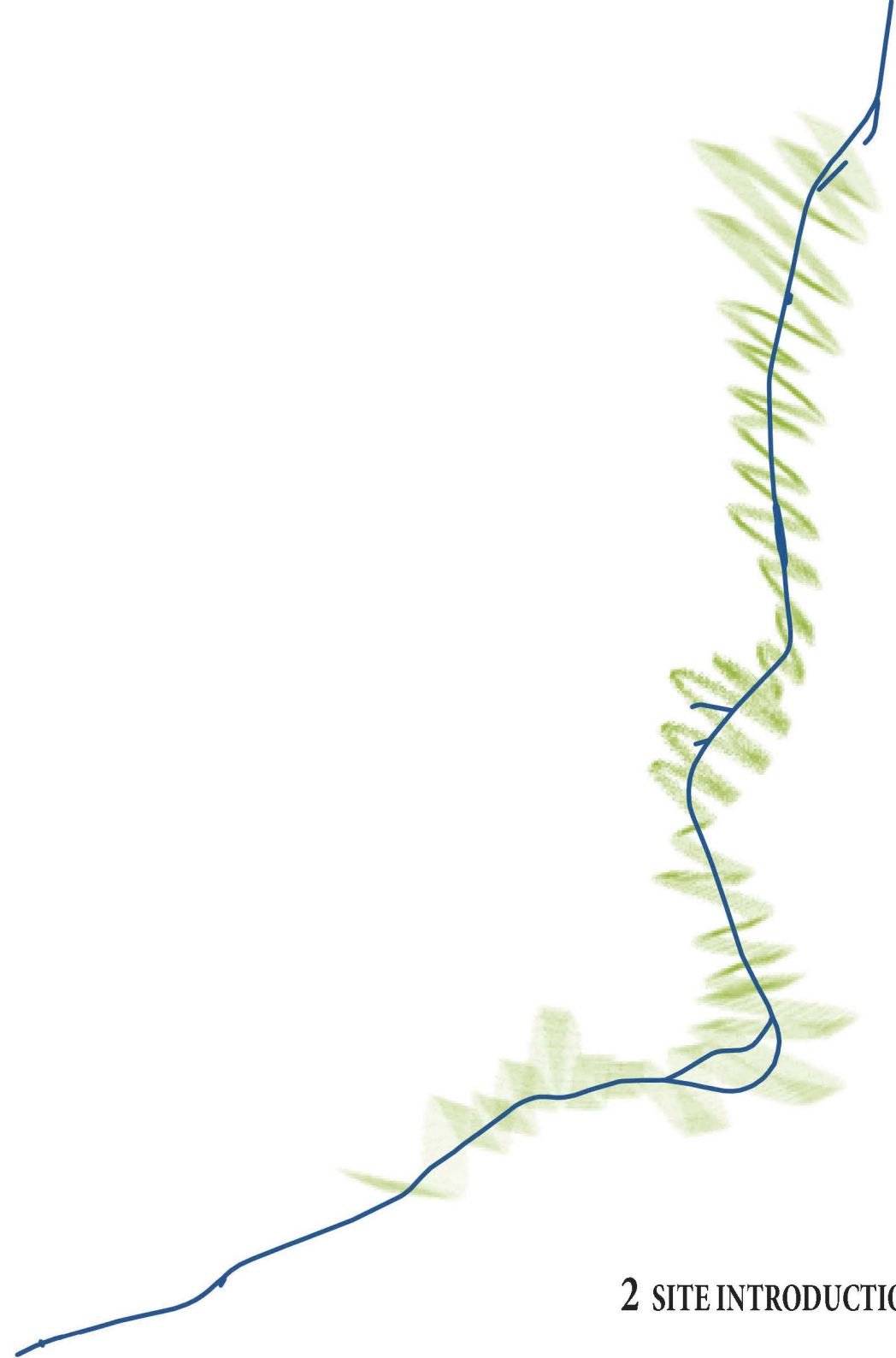
This Helsinki's new "Low Line" (as opposed to NYC's High Line) opened on June 12, 2012. It runs through the city centre, providing a safe bicycle and pedestrian route to many points in the city. Photo via HBL.fi by Tor Wennström.



The old highway now goes underground and the riverbank is converted into new urban space in Madrid. Photo via West8.



The old Kallang River is an artificial channel to collect and drain the rainwater from nearby urban surface. After naturalized, it has the functions of rainwater purification, ecology and recreation. Photo via wikipedia.



2 SITE INTRODUCTION

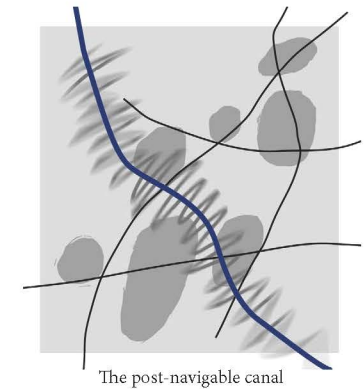


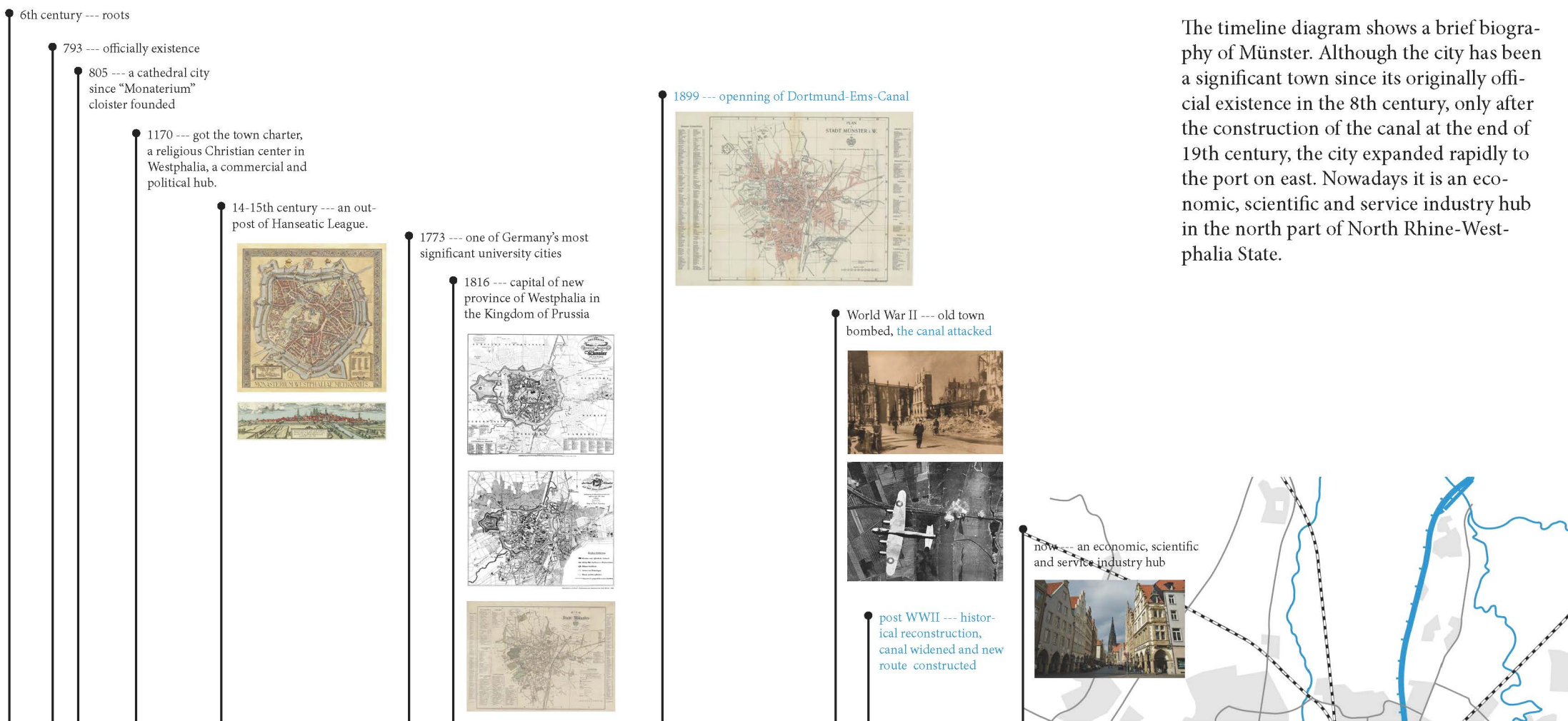
2.1 Site selection: a case study

My graduate project is choosing a particular infrastructure, the post-navigable canal, to do a design-based research. I choose *Dortmund-Ems-Kanal*'s section in *Münster, Germany*, as the project site. The canal was opened in 1899, during the prosperous time of Ruhr area. It starts from the inland port Dortmund and ends at the North Sea port Emden.

Inside *Münster*, the canal is 26.3 km long, generally 40-55m wide (at the twin lock is the widest, about 140m). There are 2 times of alternate routings, 2 locks (Zwillingsschleuse), 1 city port and 9 small docks.

Münster's development was once tightly related to the canal, while now the canal goes an opposite direction of the city's development.

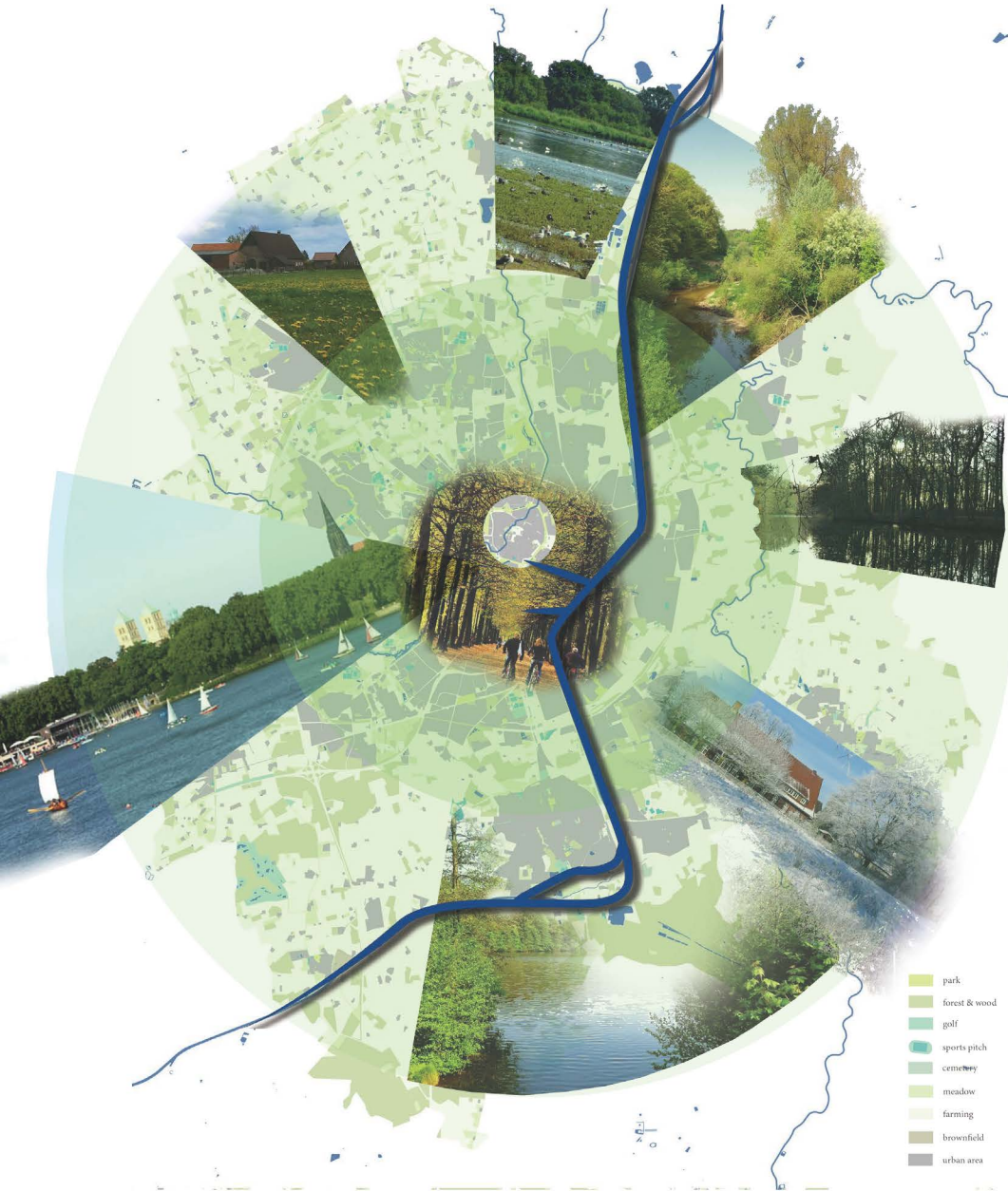




2.2 Site introduction

- Sprawling to the Canal

The timeline diagram shows a brief biography of Münster. Although the city has been a significant town since its originally official existence in the 8th century, only after the construction of the canal at the end of 19th century, the city expanded rapidly to the port on east. Nowadays it is an economic, scientific and service industry hub in the north part of North Rhine-Westphalia State.

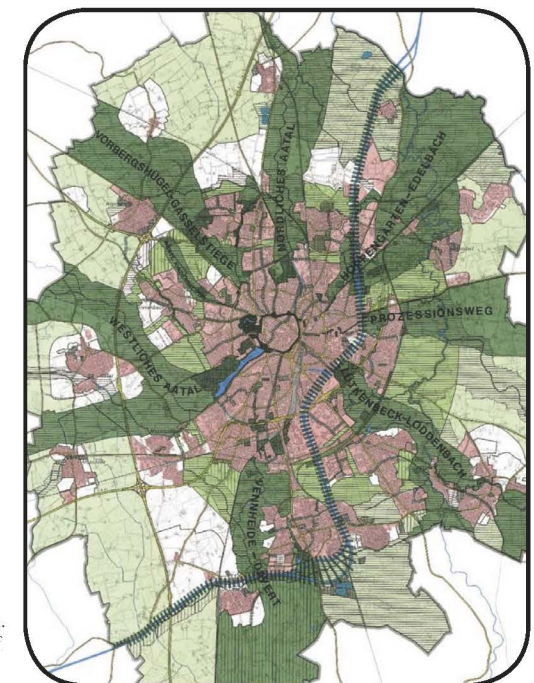


- The modern city of Münster

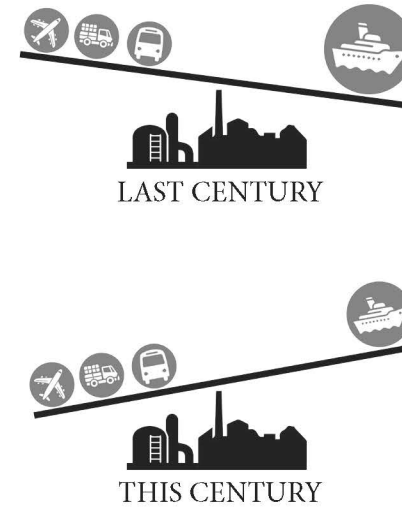
Now the Westphalian metropolis presents itself as the capital of Münsterland region, with simultaneous emphasis in economical, ecological, social and cultural objectives. Münster won “*the international awards for liveable communities 2004*” with the remarkable, comprehensive landscape system.

- Landscape system in Münster

According to the Green Space Ordinance of Münster, there is a systematic approach during the planning of green areas. The ordinance defines a green system consisting of three annular green rings and seven green corridors/wedges, which run towards the city center in a radial manner from the open countryside.

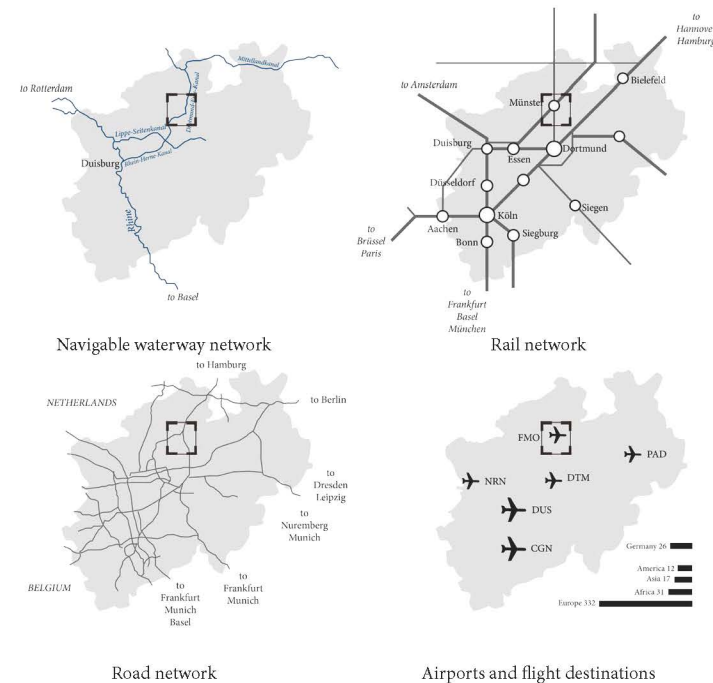


The guide plan of landscape system.
Source: Green Spaces Ordinance of Münster



- The canal out of use

As the industrial structure adjustment, the thriving railway and highway transport and other changes over time, inner land navigation has to face its decline. As a narrow early industrial canal, Dortmund-Ems-Canal is no longer the artery in the city or region.



Münster's transportation connection to cities in North Rhine- Westphalia

2.3 Problems & possibilities

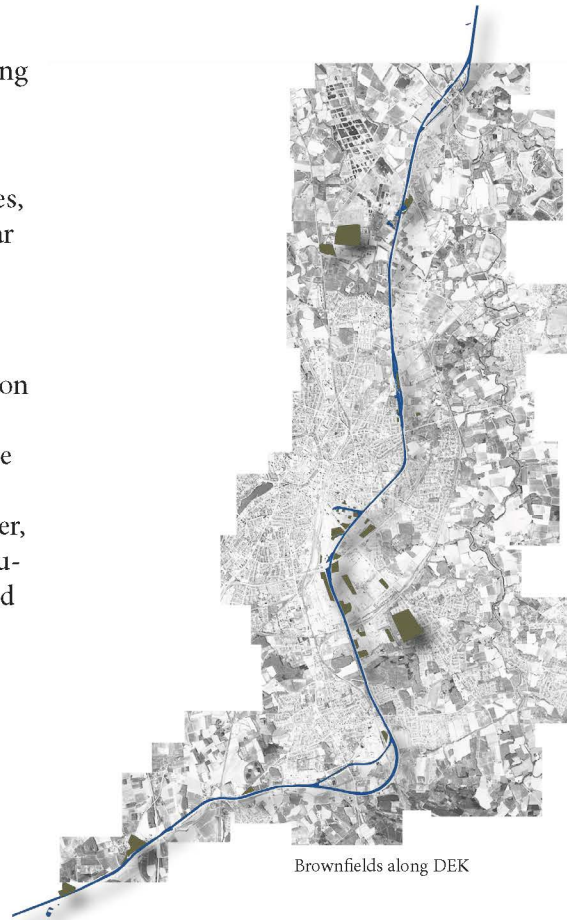
- Problems

As a past transportation infrastructure, the canal is a significant marginal space, together with its facilities (such as ports, locks, aqueducts, etc) and the surrounding industrial buildings and brownfields.

It is also a barrier of ecological system (hydrology and habitat), the urban spaces, traffic and programs because of the linear shape.

- Possibilities

Although no longer used as transportation infrastructure, the canal is promising in urban and landscape development. There are always people yachting on the water and waterbirds standing beside. Moreover, at the city port, many art galleries and museums, publishing houses, clubs, bars and restaurants are settled.



the port is the third urban frontier_

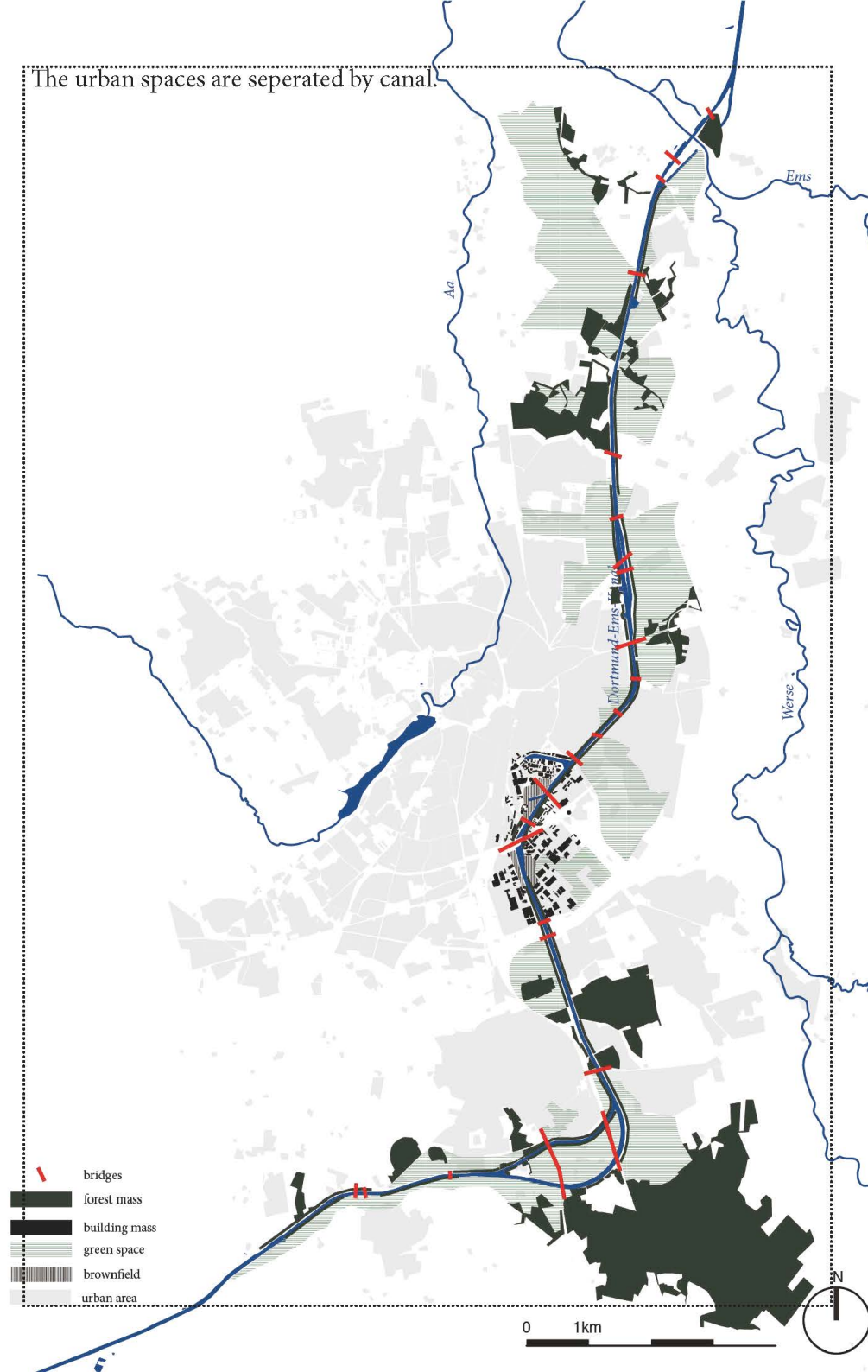


the canal is a new activity space_

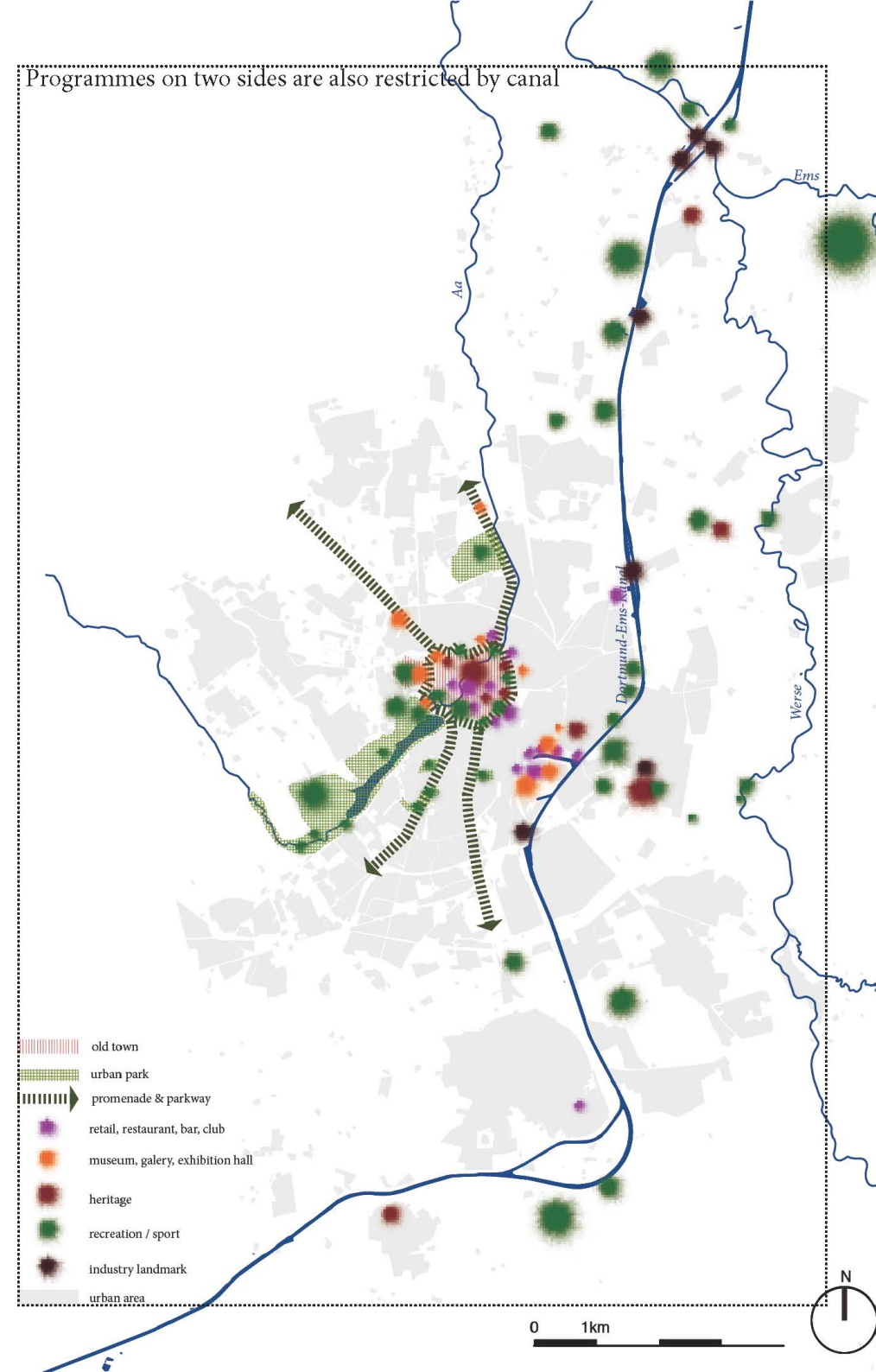


the canal is a new habitat_

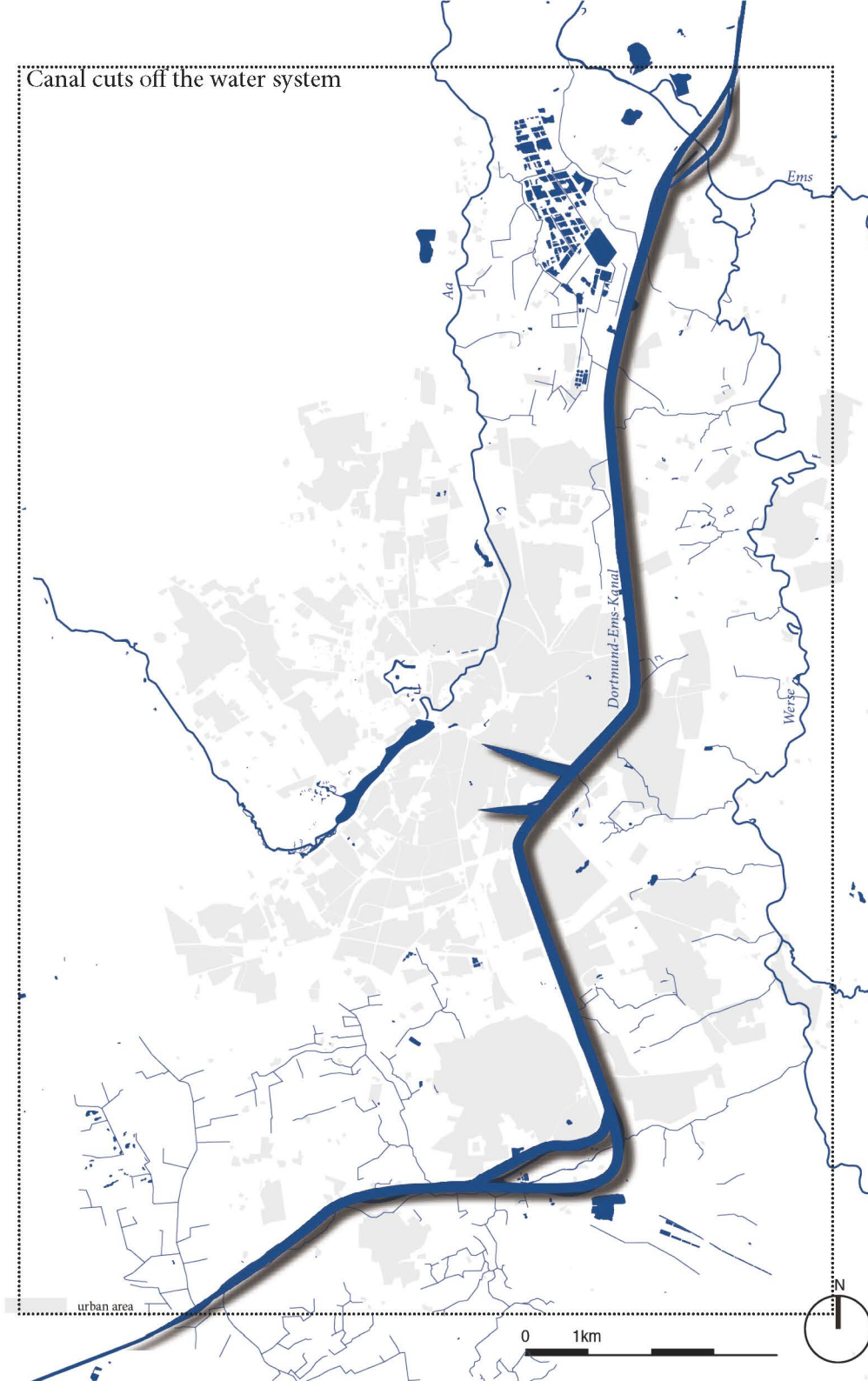
The urban spaces are separated by canal.



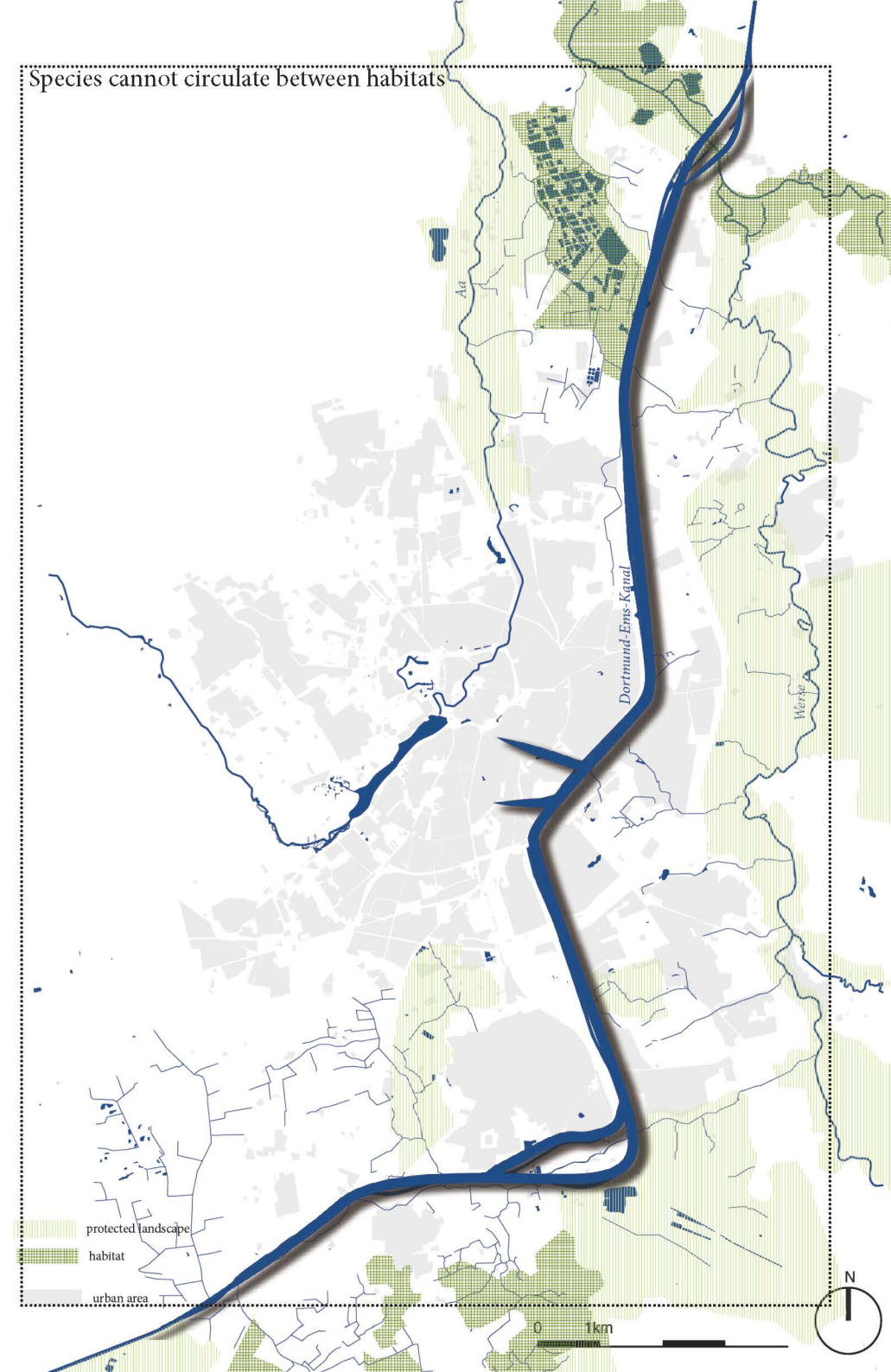
Programmes on two sides are also restricted by canal



Canal cuts off the water system



Species cannot circulate between habitats



RESEARCH GOAL

The project will explore a comprehensive landscape approach with *Dortmund-Ems-Canal* in Münster. By integrating the canal into the context of Münster, I want to gain a capacity strategy to convert the *post-navigable canal* into a crucial component of the landscape structure in the modern city.

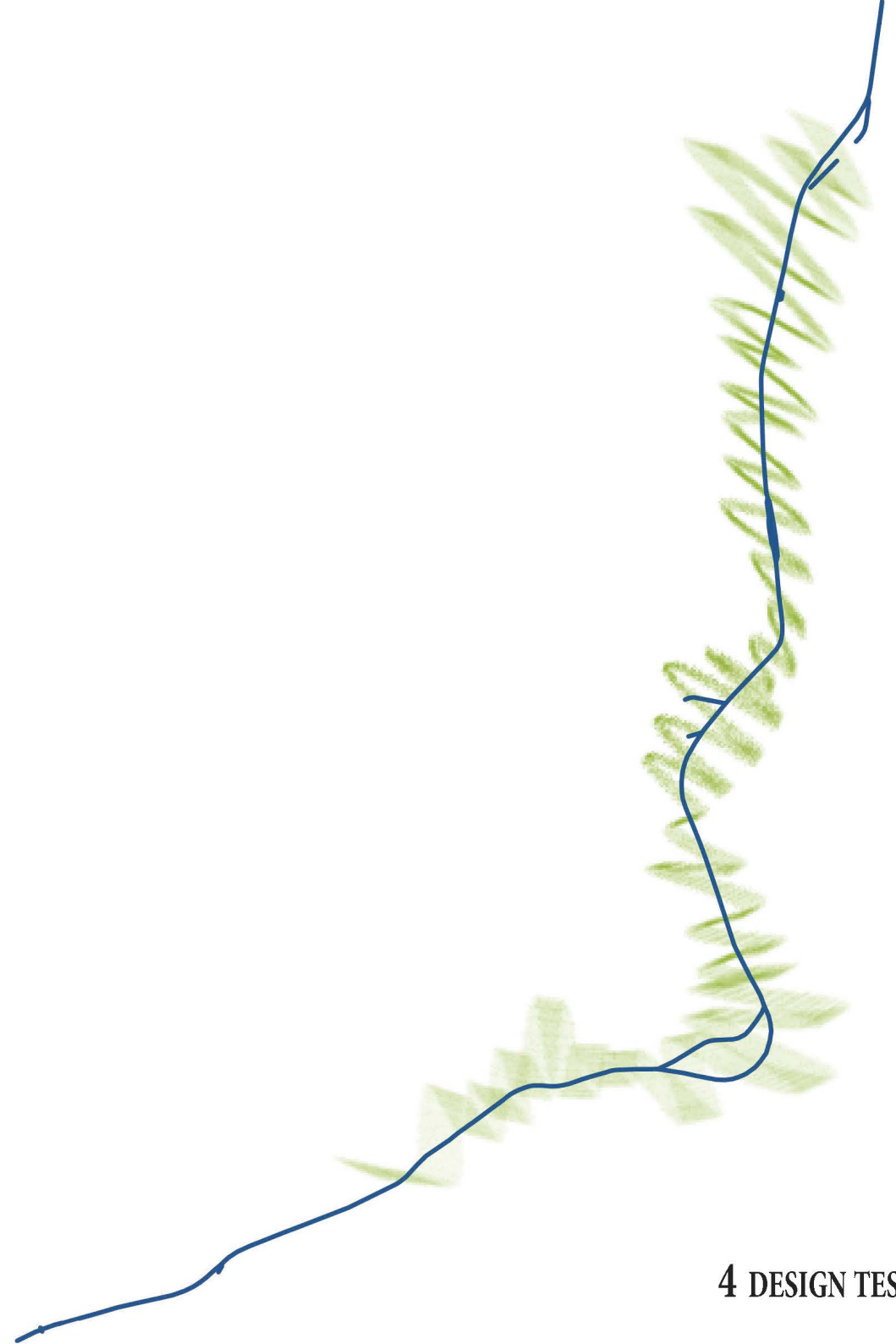
RESEARCH QUESTIONS

Main research question:

As the navigable function is declining, how could we find Dortmund-Ems-Kanal's new effective and possitive role in Münster, as a component of the city's *landscape system*?

Sub research questions:

- What are the *landscape opportunities* between the canal and city?
- What *principles* could be used?
- How to apply the principles at *local scale* ...
- and at *city scale*?



4.1 City port introduction

To get a grip on the canal's problems and possible solutions, I firstly do a design test at a crucial spot of the canal, the city port of Münster. It is the conflict junction of history and present, city and landscape, and the canal's problems and potentials.

From the view of external, there are types of landuses bordering here: industrial land, neighborhood, woods, suburban gardens, agricultural land, etc. On the other side of the central railway station is the old town of Münster. The port is also the conjunction point of infrastructural lines, canal, railway and highway, which cut the place into segments.

From internal view, the flowing two images show the history and present of city port.

_ The port in 1902: a freight and industry center

_ The port at present: As the canal out of use, and the port used to be the center, there are many discard warehouses and big patches of brownfields around the city port I & II. In the buildings some cultural and business activities (studios, clubs, galleries, museums and publishing houses) are settled. There are property developments here, such as apartment buildings, cinema, and a congress center.





The city port in 1902



Aasee

Messe und Congress Centrum Halle Münsterland

Jovel Music Hall

Cineplex

city hall

office building

Apartments, restaurant, café



old town



overgrown brownfield

Stadthafen II

overgrown brownfield

warehouse & brownfield

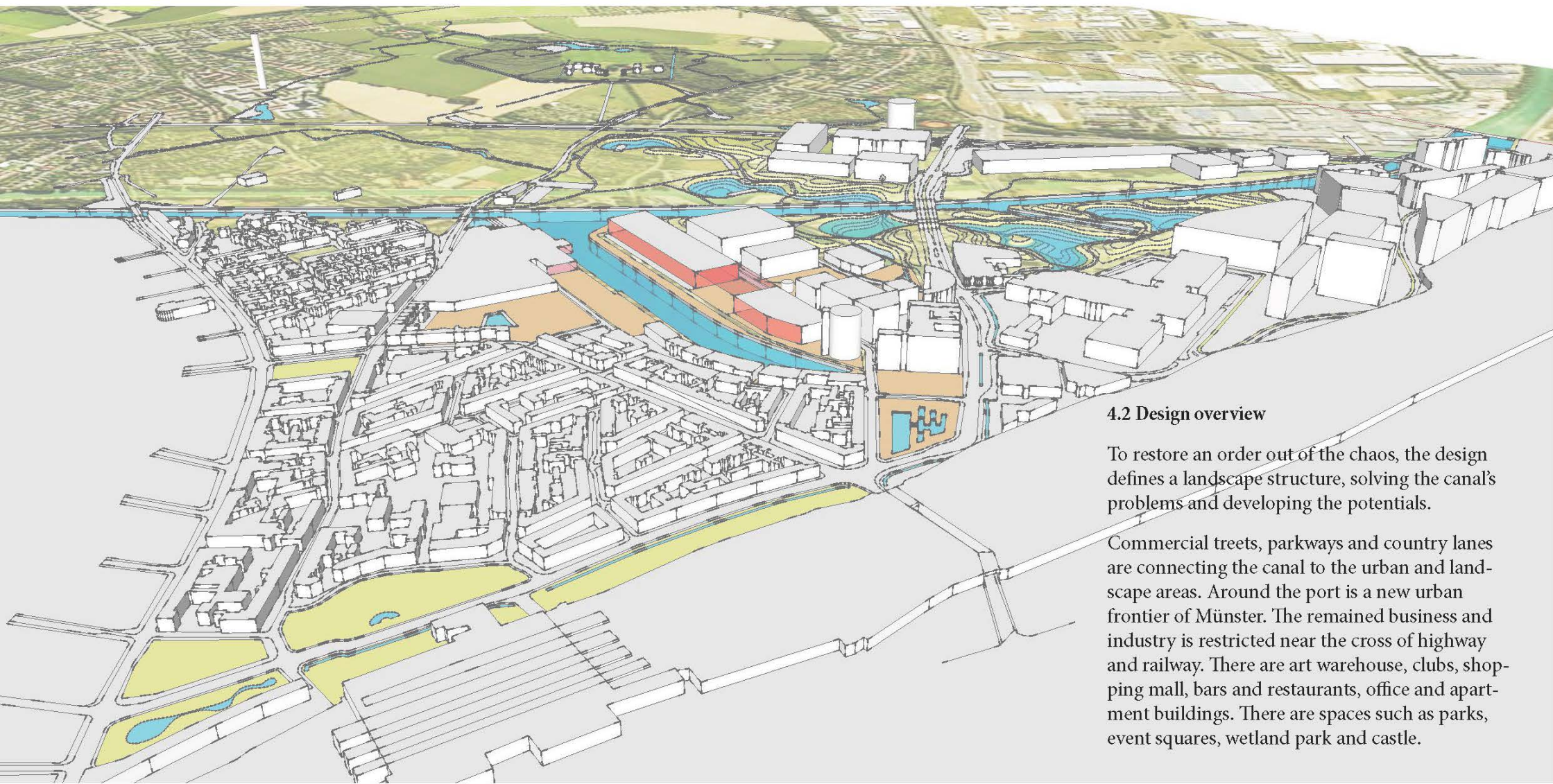
Stadthafen I

neighborhood

abandoned warehouse

warehouse

suburban landscape

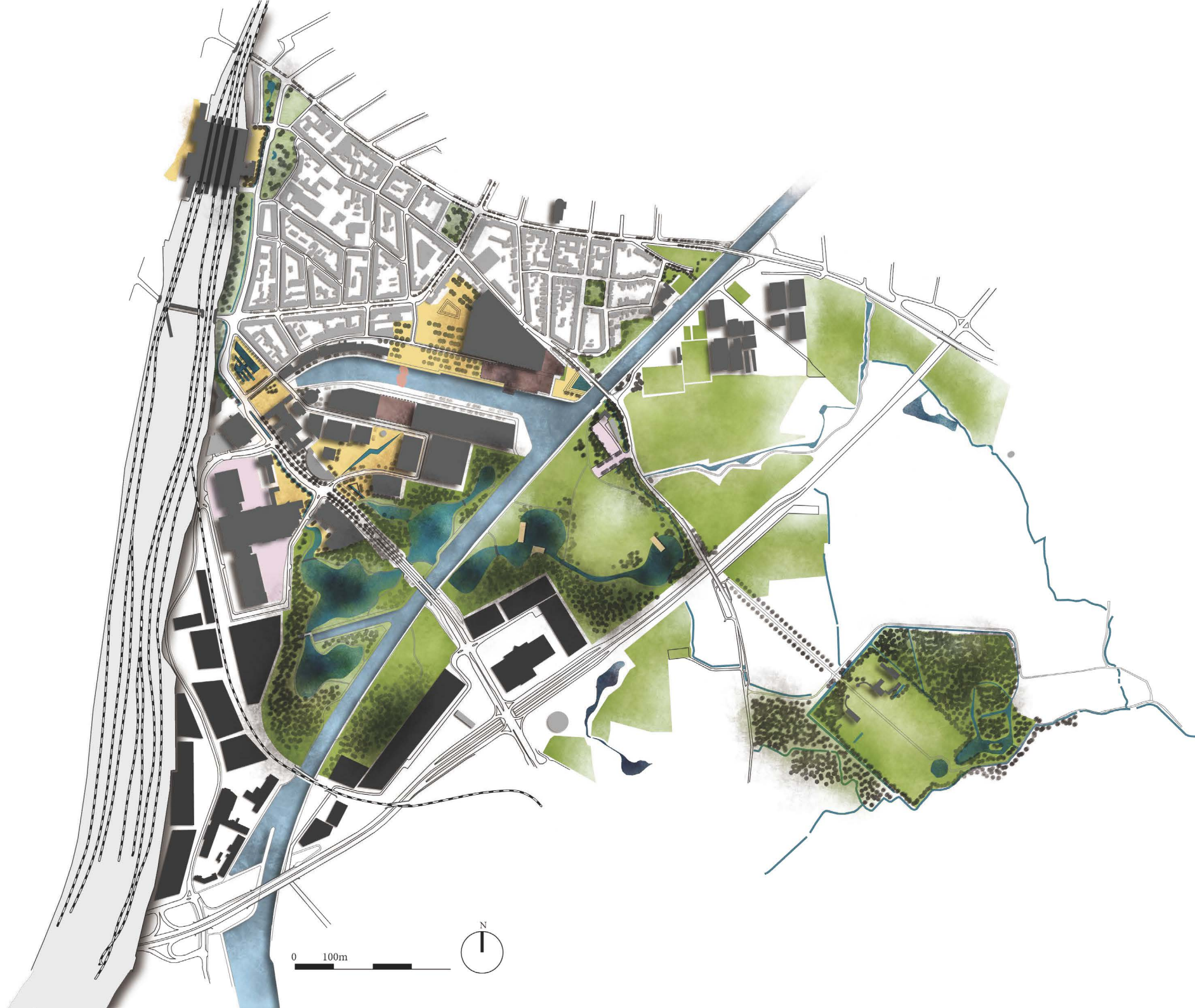


Future aerial view

4.2 Design overview

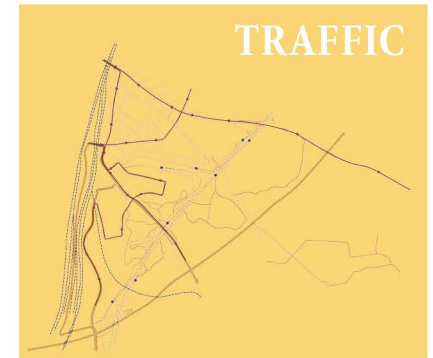
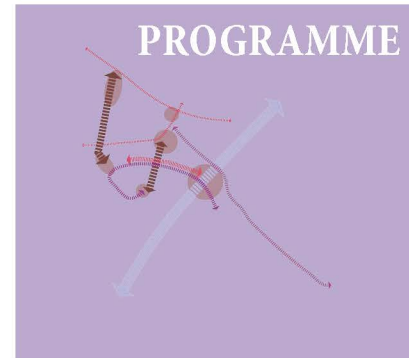
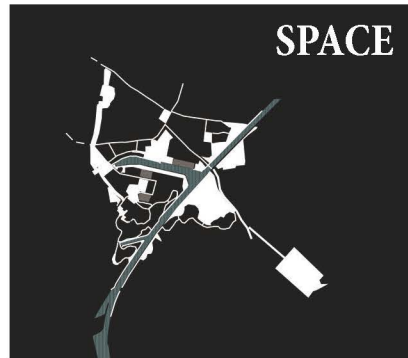
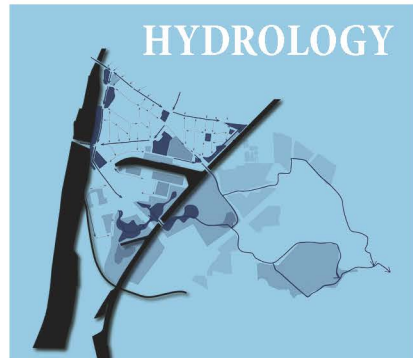
To restore an order out of the chaos, the design defines a landscape structure, solving the canal's problems and developing the potentials.

Commercial trees, parkways and country lanes are connecting the canal to the urban and landscape areas. Around the port is a new urban frontier of Münster. The remained business and industry is restricted near the cross of highway and railway. There are art warehouse, clubs, shopping mall, bars and restaurants, office and apartment buildings. There are spaces such as parks, event squares, wetland park and castle.



4.3 Deconstructing thematic layers

In this part, the design will be deconstructed into five thematic layers, to discuss the canal's problems and potentials, explore the principles and apply them locally at the port. The five layers are: Hydrology, habitat, mass & space, program and traffic.



HYDROLOGY

A rainwater discharge network

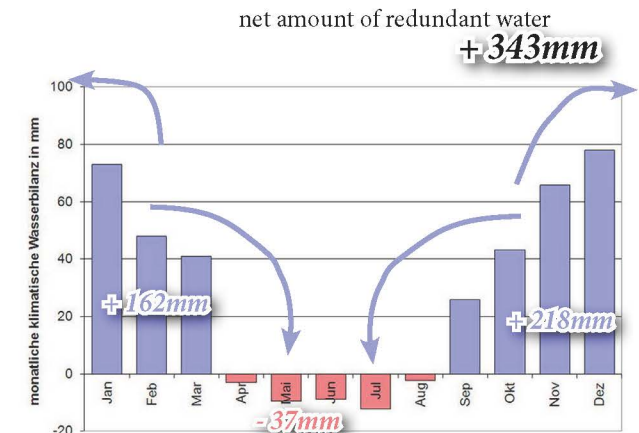


Annual fluctuation of monthly climatic water balance as a field agent for NRW for the period 1981-2010. Blue bars represent water to be discharged and red bars to be supplied (Data source: dwd.de).

_ A rain laden city

A well-known saying in Münster is “Entweder es regnet oder es läuten die Glocken. Und wenn beides zusammen fällt, dann ist Sonntag” (“Either it rains or the church bells ring. And if both occur at the same time, it’s Sunday”).

The perception of Münster as a rain-laden city isn’t caused by the absolute amount of rainfall but by the above-average number of rainy days with relatively small amounts of rainfall. The highest daily rainfall was registered on July 28, 2014: the State Environment Agency registered at one of its stations 292 l / m² during seven hours. From the map of soil capability of water, the city could not lade the water locally. The record rainfall in 2014 led to severe flooding throughout the city and the nearby Greven.





Streets around St. Paulus-Dom were flooded in 1946, photo from Municipal Archives Münster.

– The three main waterways

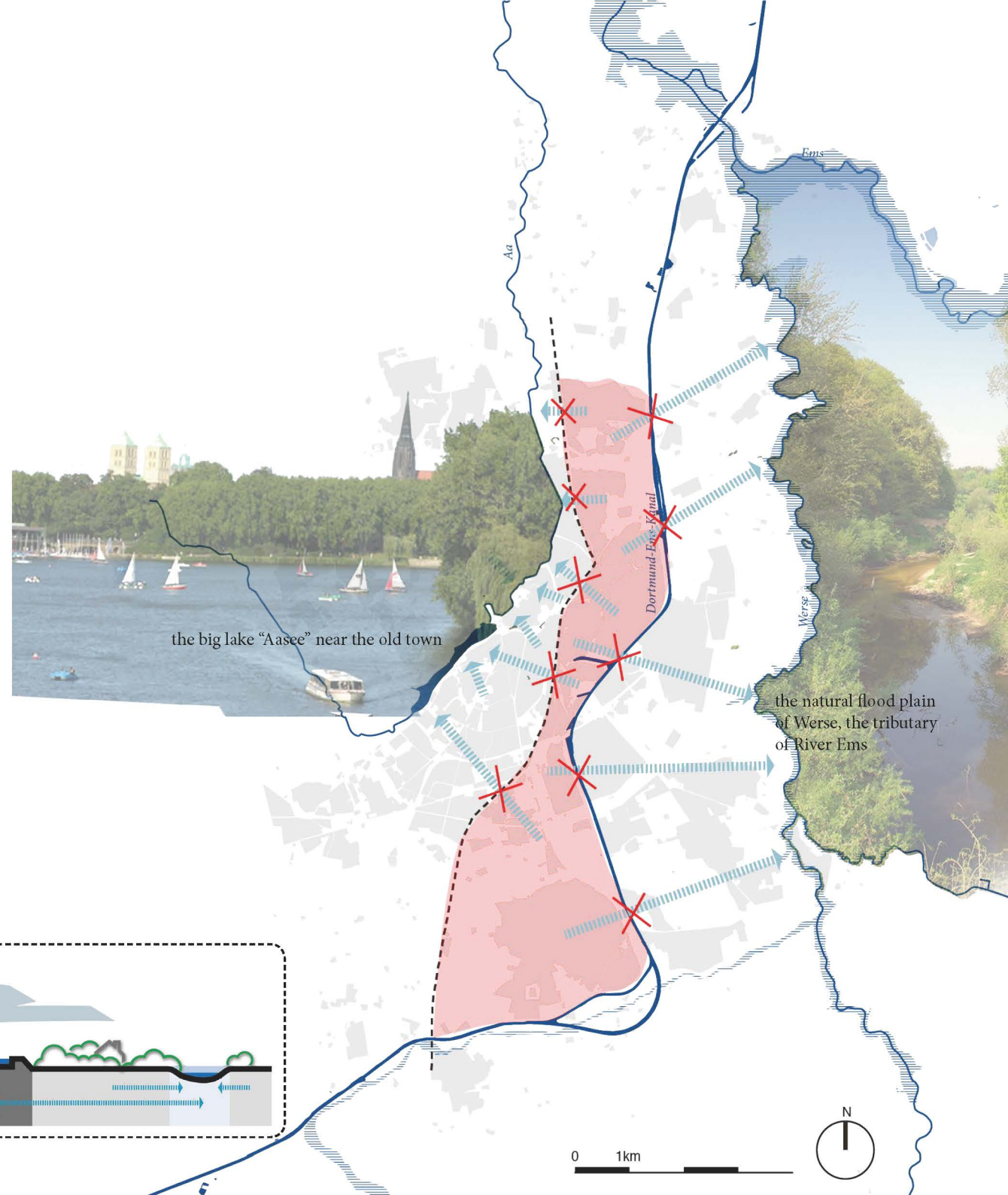
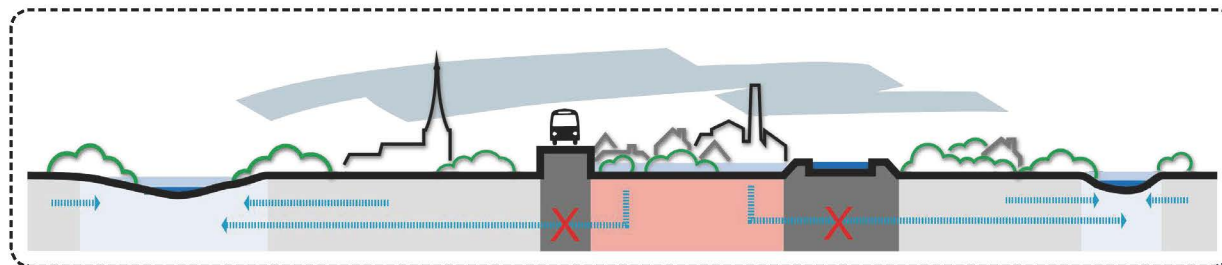
One of the city's three water bodies, brook Münstersche Aa in the west was deepened and widened near the inner town to accept the redundant rain water. Werse goes through the east natural and rural area and on north joins Ems. Around the stream and its tributaries there is linear riparian floodplain. Last, the artificial canal is separated with the natural water system.

– Problem

Together with the railway going through north and south, the canal is preventing the rainwater flow to either the Aasee on the west or the riparian floodplain on the east. Between the two infrastructures the urban area is like a basin, and the port zone is the bottleneck.



The port area in the ever biggest thunderstorm on July 28, 2014.

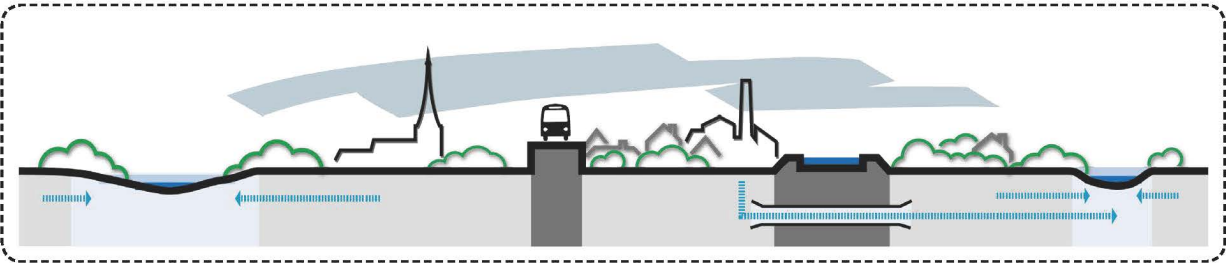
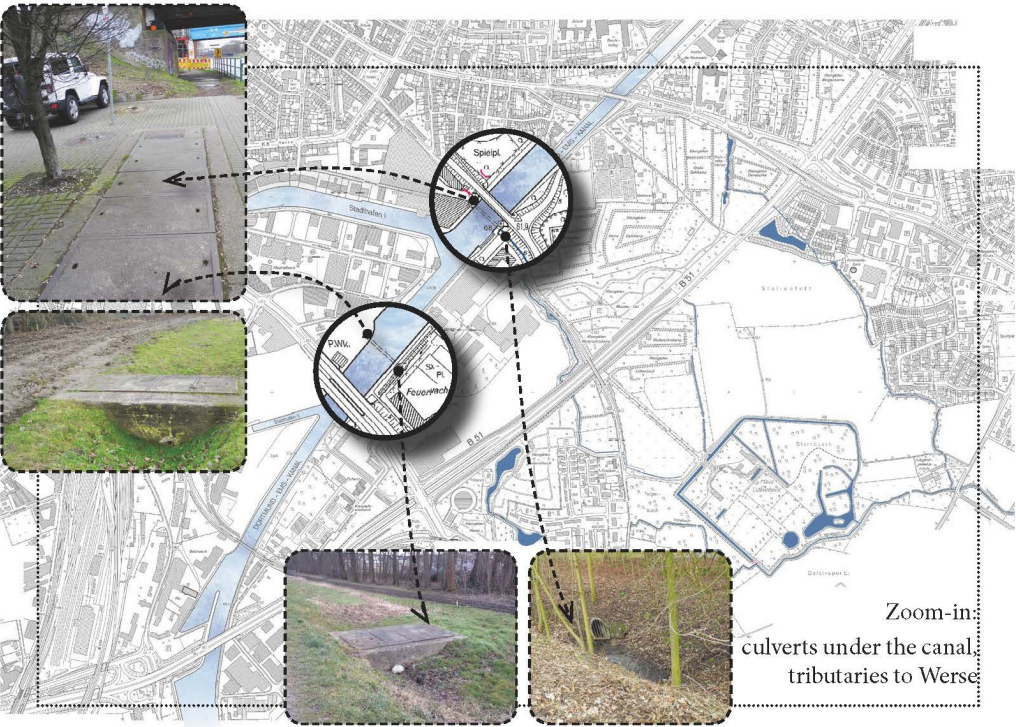


the big lake "Aasee" near the old town

the natural flood plain of Werse, the tributary of River Ems

– Opportunity

The culvert beneath the canal is intending to connect the urban drainage system with the natural streams. Obviously it is an opportunity to discharge surface water from urban to natural system.

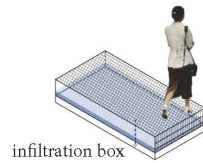


Principles

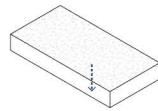
To collect surface water,
to let the water infiltrate locally as much as possible,
to store proper amount of water for dry season,
to leave retention spaces in case of a thunderstorm,
to discharge redundant rainwater from city,
to let the water get to landscape.

Application

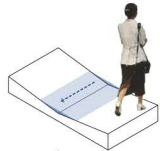
To design a climatic water discharge process of above steps



infiltration box



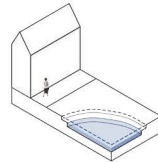
porous paving



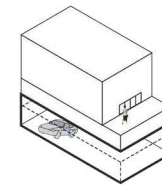
hollow road



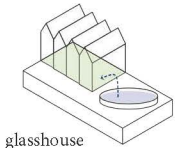
community park



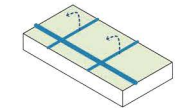
water square



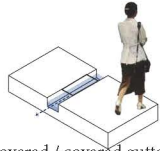
garage



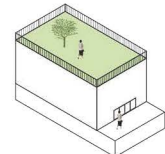
glasshouse



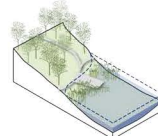
farmland



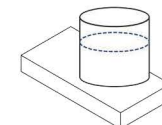
uncovered / covered gutter



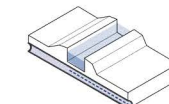
green roof



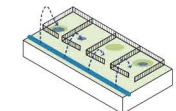
rainwater lake



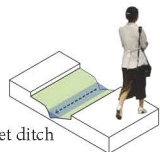
water tank



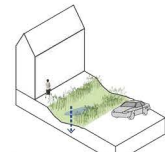
culvert beneath canal



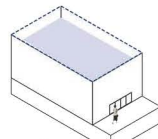
suburban garden allotments



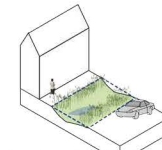
street ditch



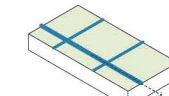
street swale



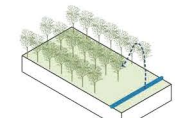
water roof



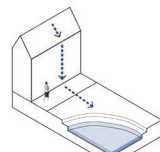
street swale



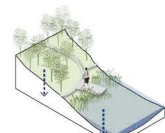
ditch



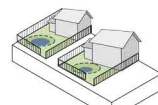
nursery



water square



wetland



water garden



eutrophic lake

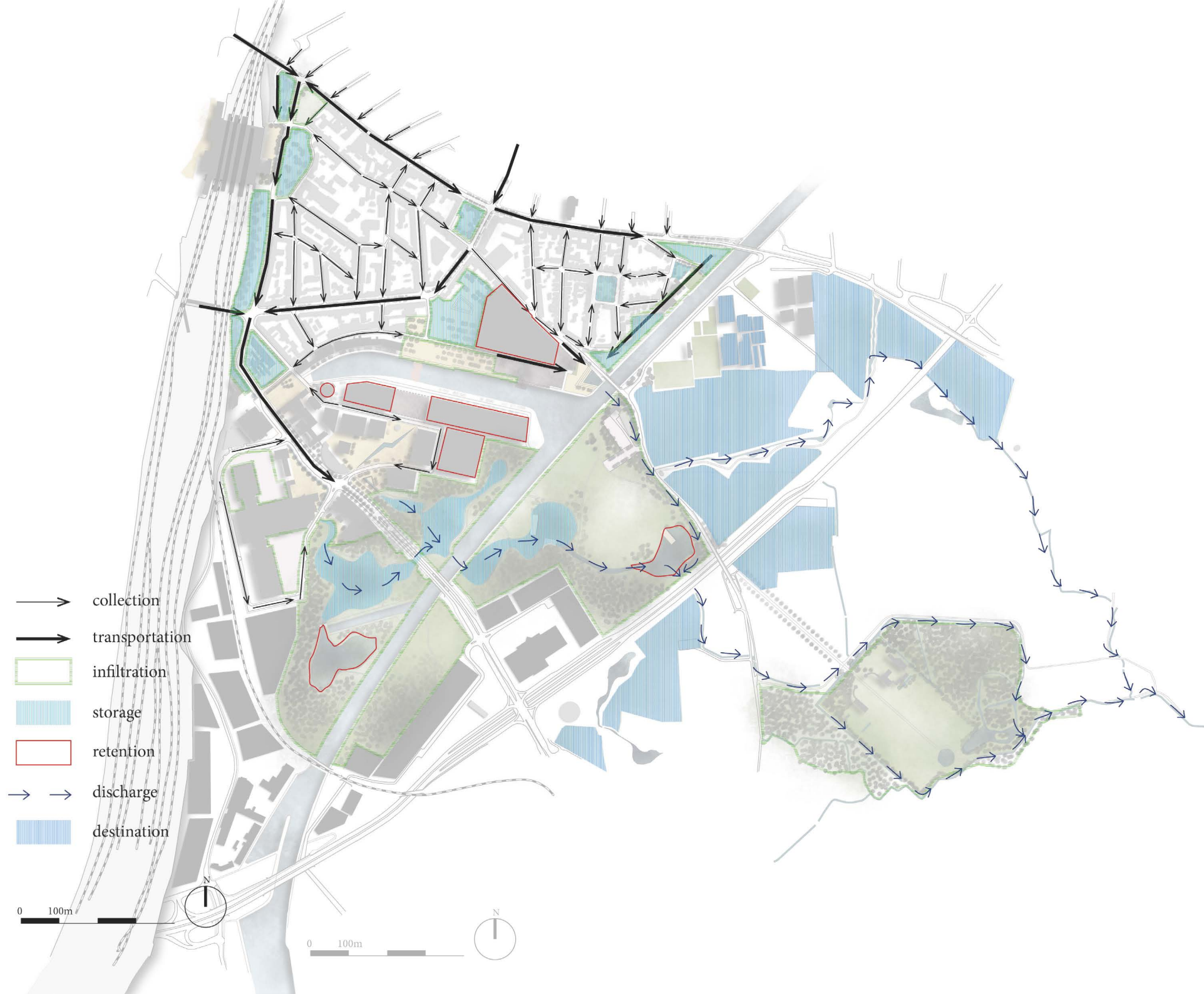


natural stream



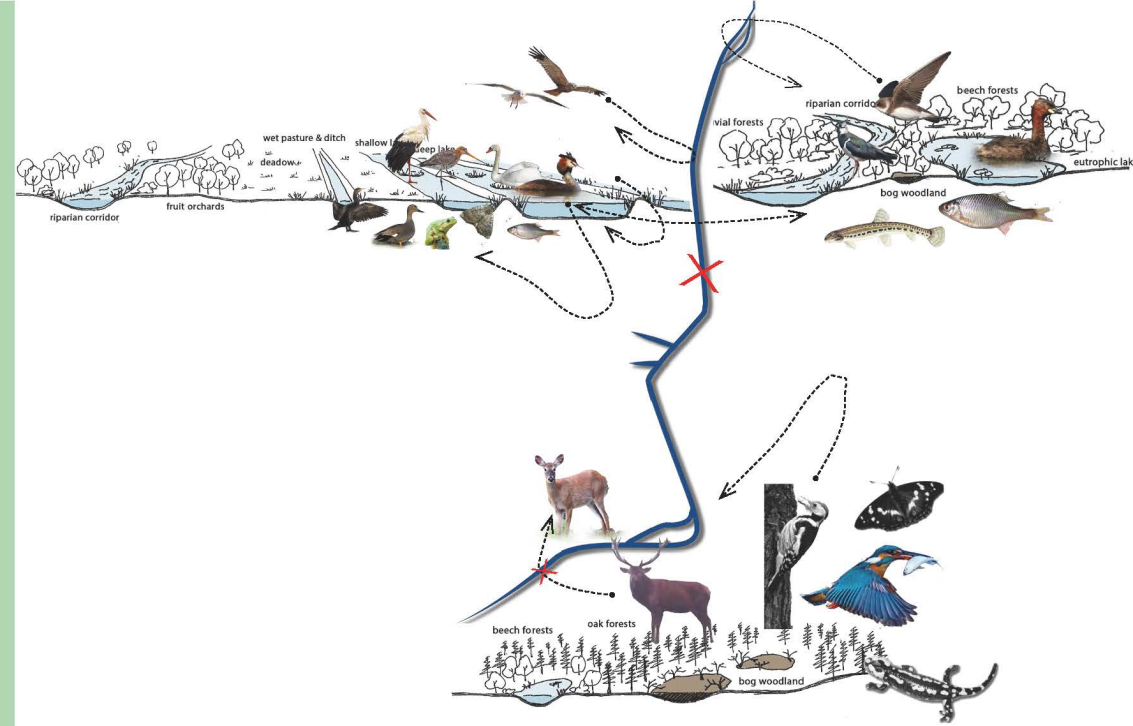
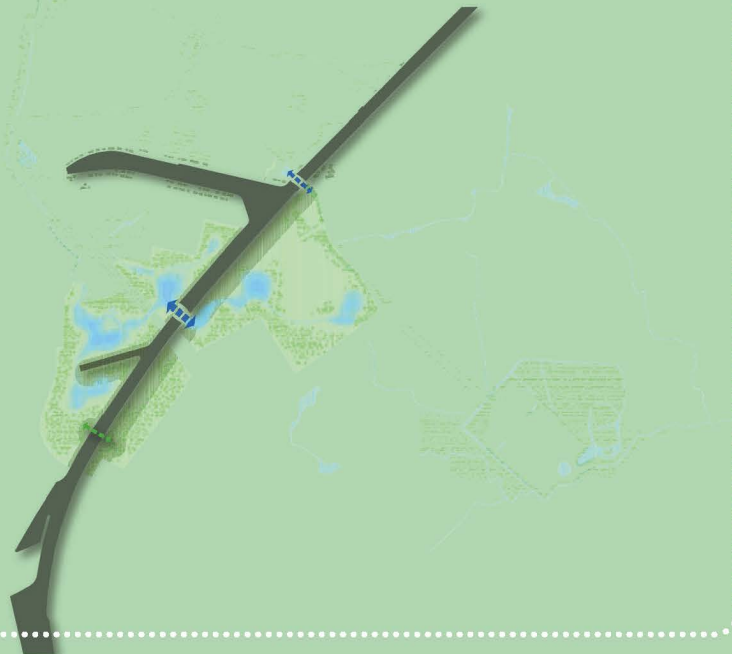
Werse, Ems

COLLECTION -----> **INFILTRATION** -----> **STORAGE** -----> **RETENTION** -----> **DISCHARGE** -----> **DESTINATION**



HABITAT

A crucial section of natural habitat circuitry



_ Low circuitry between existing habitats

There are three main habitats along DEK: the Ems riparian, Rieselfelder (a water bird sanctuary) and Davert (oak-hornbeam forests, acidophilous oak woods & Luzulo-Fagetum beech forest). Because the artificial canal is almost cutting off all the natural water system on two sides, the circuitry along and across it is limited.

For example, Rieselfelder, the remarkable sanctuary of waterbirds, is totally separated from the riparian corridor on the east. The Ems riparian has weak point when crossing the canal.



DEK goes over Ems by the new and old aqueduct.

Ems flood plain, 2722.8 ha

Species: amphibian-2, birds-35, invertebrate-10, mammal-6

Habitats:

- 32.7% natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation abundance
- 24.5% old acidophilous oak woods with *Quercus robur* on sandy plains
- 13.7% *Asperulo-Fagetum* beech forests
- 6.5% Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)
- 6.2% bog woodland
- 5.7% transition mires and quaking bogs
- 4.3% Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers
- 2.9% *Juniperus communis* formations on heaths or calcareous grasslands
- 2.4% lowland hay meadows (*alopecurus pratensis*, *Sanguisorba officinalis*)
- 0.9% water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation

Rieselfelder Münster, 436.7 ha

Species: amphibian-2, birds-35, invertebrate-10, mammal-6

Habitat:

- shallow lake zone
- deep lake zone
- wet pasture zone
- meadows and fruit orchards
- renaturalising and broaden the Aa-Ableiter stream

Davert, 2227.6 ha

Species: amphibian-1, birds-8, invertebrate-7, mammal-8, plants-14, reptile-2

Habitats:

- 48.9% sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli*
- 42.6% old acidophilous oak woods with *Quercus robur* on sandy plains
- 6% *Luzulo-Fagetum* beech forests
- 2.4% bog woodland

Natura2000

Habitats Directive Sites (SCI)

Scale above 1:100,000

 Habitats Directive Sites (SCI)

Bird Directive Sites (SPA)

Scale above 1:100,000

 Birds Directive Sites (SPA)


Nationally designated areas (CDDA)

CDDA - IUCN categories - large scale viewing and querying

 Strict Nature Reserve (I)


 National Park (II)

 Natural Monument (III, SI03)

 Habitat/Species Management Area (IV)

 Protected Landscape/Seascape (V)

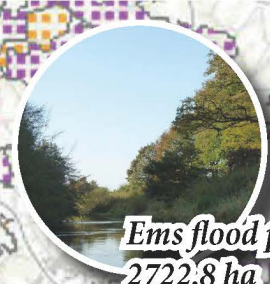
 Managed Resource Protected Area (VI)

 Other (UA, NA, <Null>)

Map of habitats in Münster. Source: Arcgis- European protected sites (arcgis.com).



Rieselfelder
436.7 ha



Ems flood plain
2722.8 ha

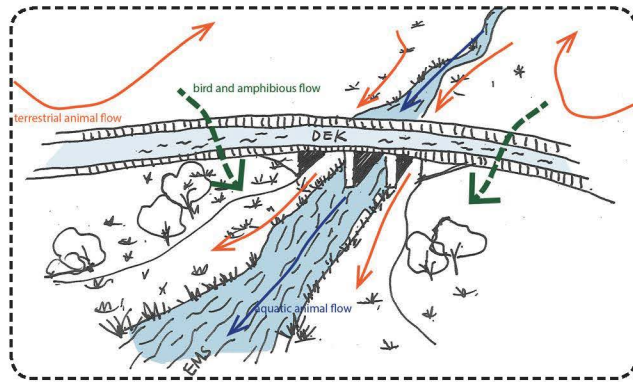


Davert
2227.6 ha

– Opportunities

As the third main waterway of Münster, the canal has the potential to become a habitat corridor for the protected species, such as birds, fishes and mammals.

The culverts beneath the canal could also developed as fauna passage (for aquatic and terrestrial animals), to improve the ecological circuitry across canal.



A intentional drawing for fauna passage under the infrastructure. Reference: Landscape ecology principles in landscape architecture and land-use planning. Redrawn by author.



The canal is a new habitat. Photo by author

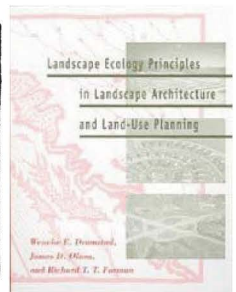
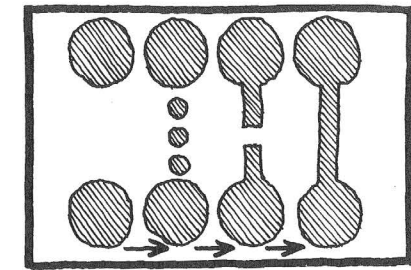


Culverts go beneath the canal. Image from bingmap

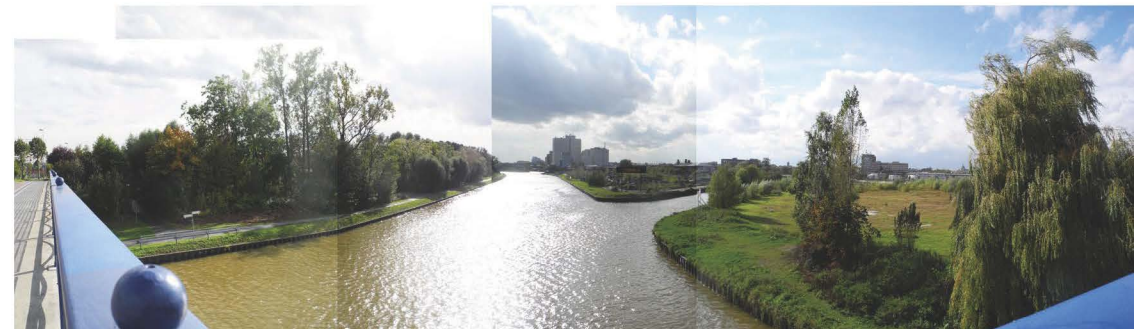
– Habitat steppingstones

According to Froman, a row of steppingstones (small patches) is intermediate in connectivity between a corridor and no corridor, and hence intermediate in providing for movement of interior species between patches. To convert the canal into a eco-corridor between north & south, habitat stepping stones are necessary.

At the port's city side, there is big area of overgrown fields; on the other side are a patch of woods, auburban gardens, nurseries and so on. So it is a potential point as a habitat steppingstone.



Stepping stone connectivity. Source: Landscape ecology principles in landscape architecture and land-use planning.



_ Principles

The first principle is to diversify habitat. The intentional living environments are:

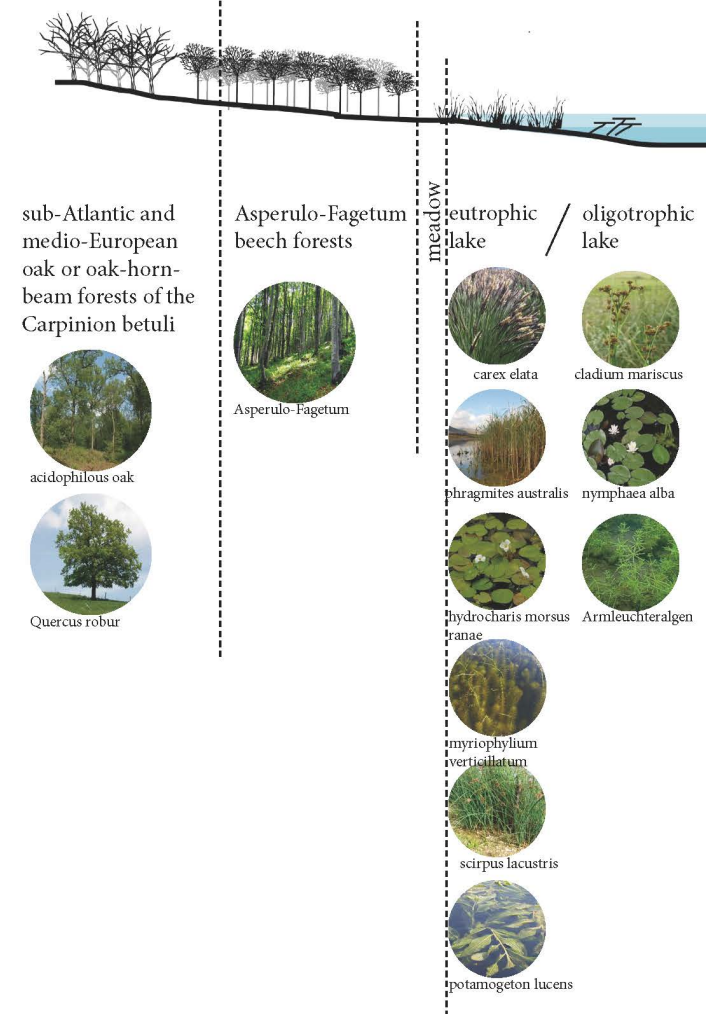
- Sub-Atlantic and medio-European oak or oak-horn-beam forests of the *Carpinion betuli*
- Asperulo-Fagetum beech forests
- Meadow
- Eutrophic lake
- Oligotrophic lake
- Floating wetland

The other principle is to connect habitats separated by canal:

- Fauna exist for big mammals
- Culvert for aquatic animals, small and medium-sized mammals



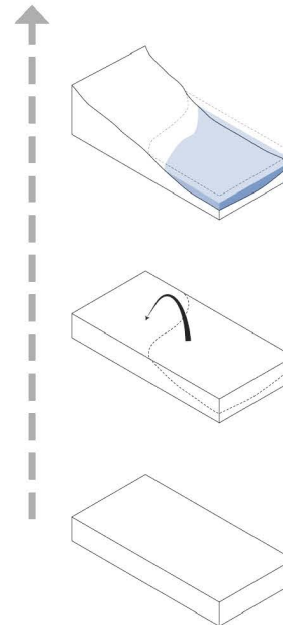
Different fauna passages. Source: Wildlife and traffic.

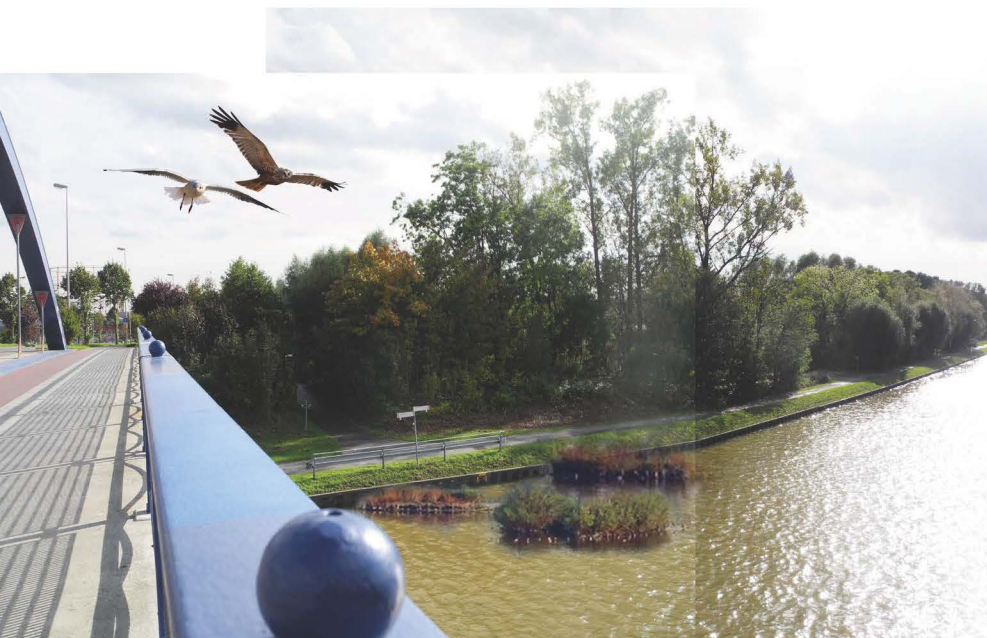


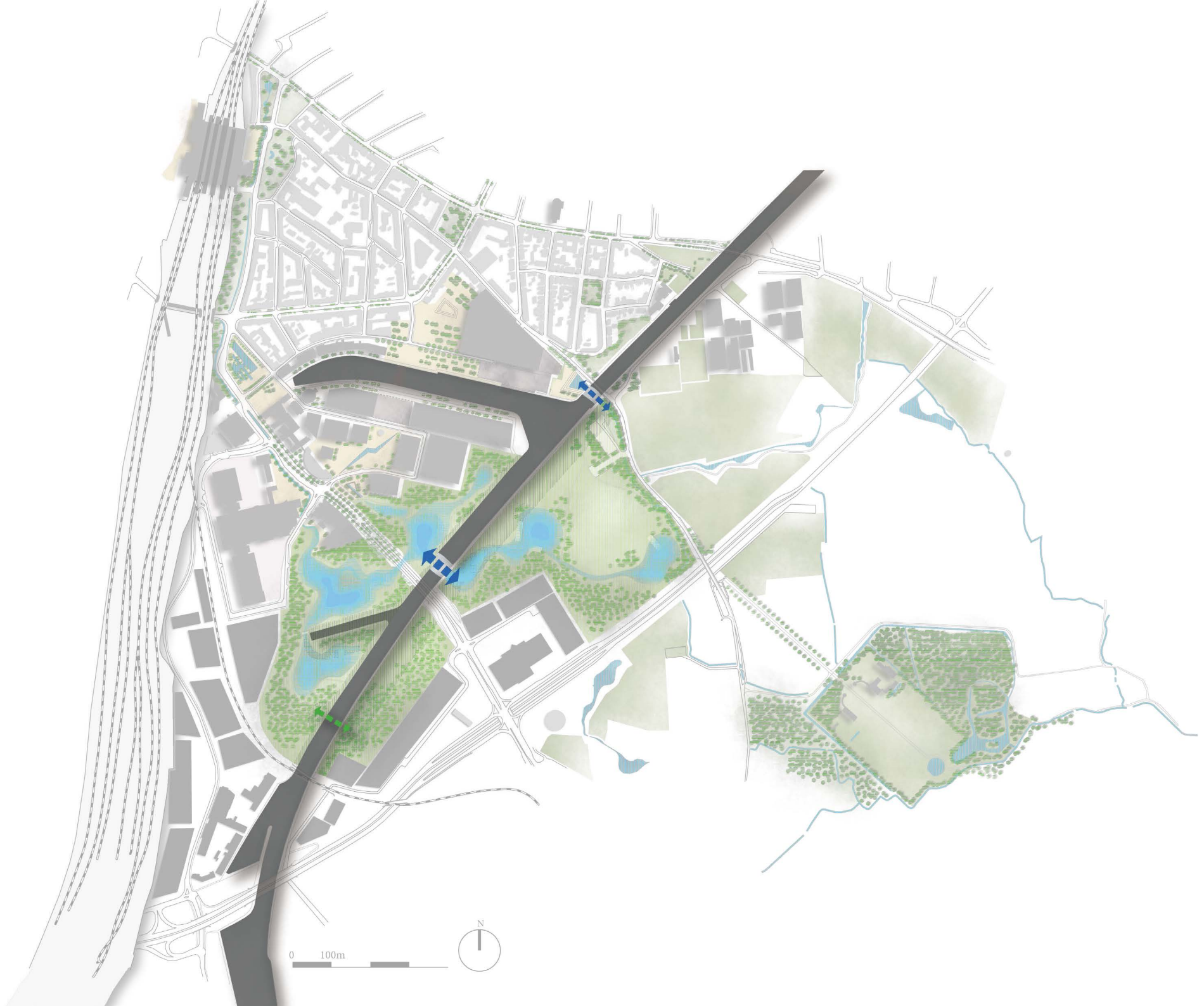
_ Application

At the port there is flat landform now. By cutting the soil from one place and filling it in other, to create topography of various eco-environments. There would be upland, lowland, coast and water zone. On the upland will be oak woods, on the lowland beech forests, along the coast hydrophilic plants and at lowest eutrophic and oligotrophic lakes. The floating wetland is a particular type to naturalize the canal as far as possible.

To restore the connection of habitats on the two sides, there are fauna exists beside canal, and also tunnels under it.







SPACE

Serial urban-canal-landscape spaces

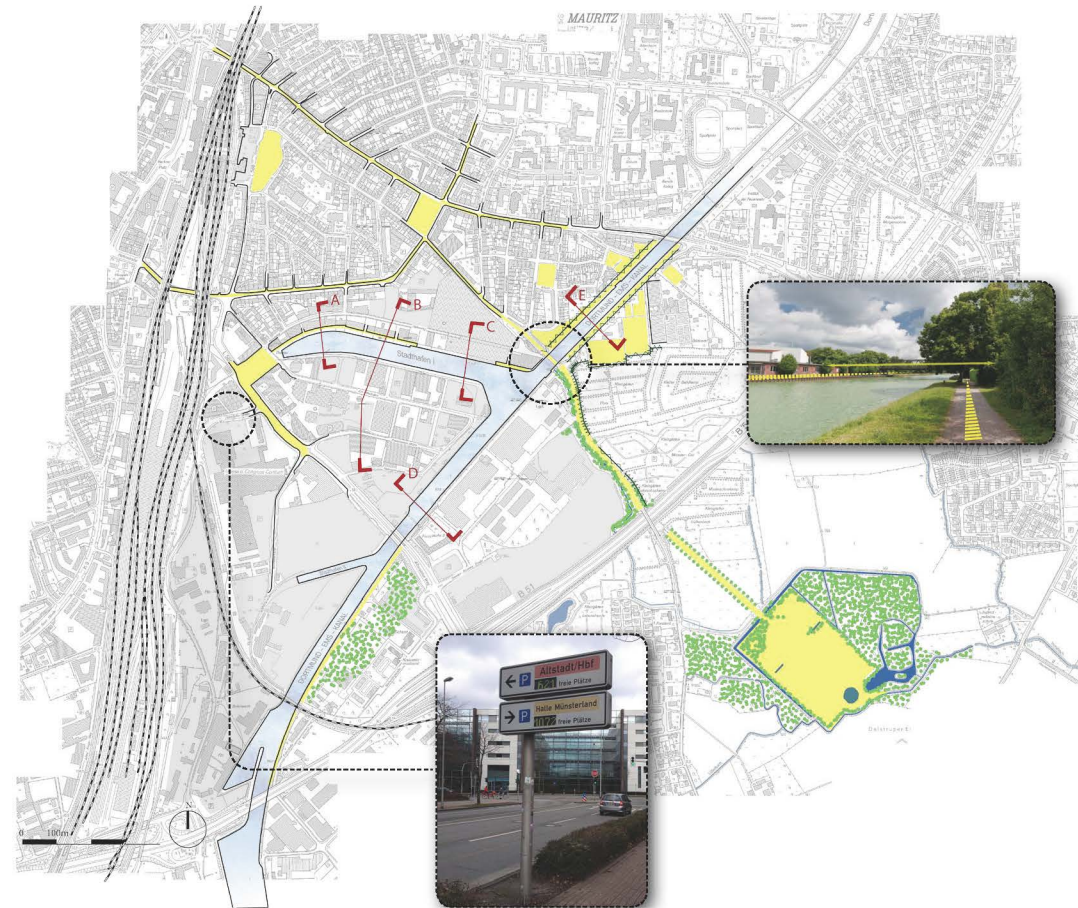


_ The canal is a barrier

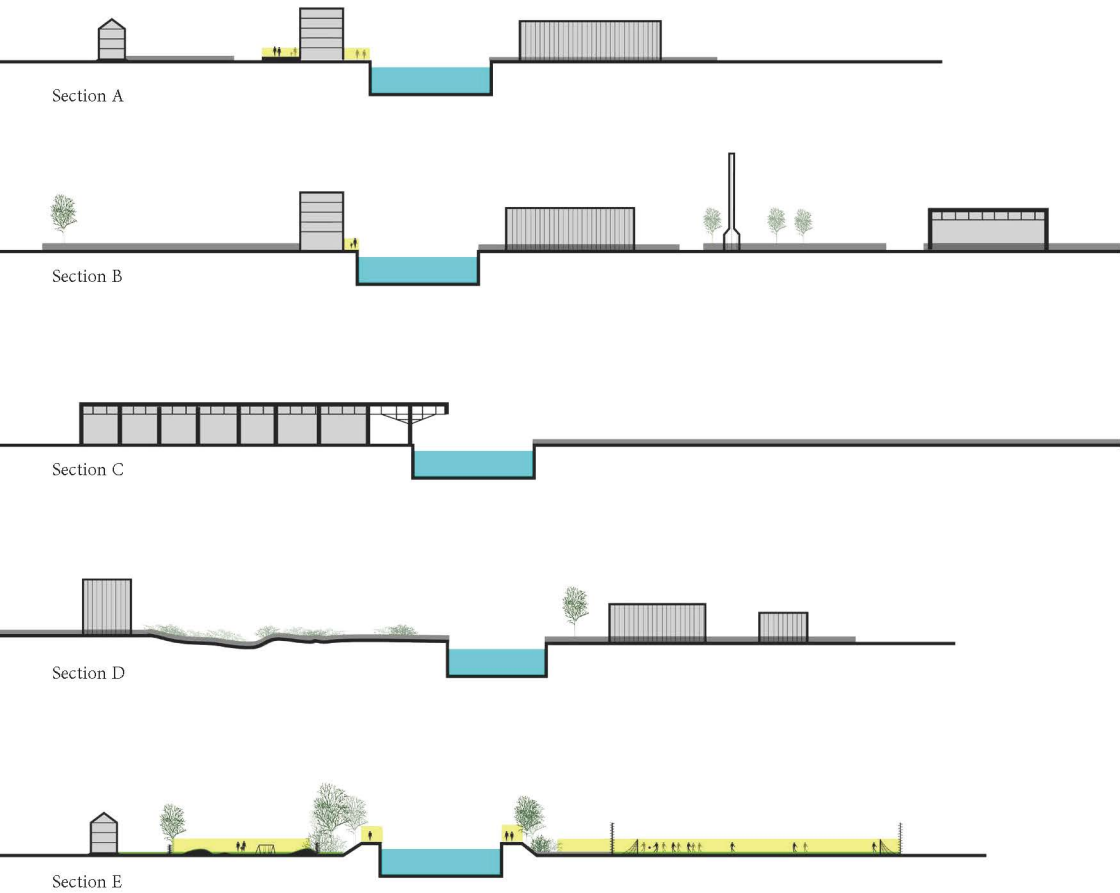
The canal could be seen as a barrier through the city. From the space permeability map, we can find that the urban space is going away and over the canal.

_ The canal is the city backyard

Meanwhile, the relevant spaces of canal are isolated and fragmented. Patches of empty lands are temporarily used as parking lots but never sufficiently occupied. In the canal sections (next page) there are few public spaces.



_ There are spaces in, on and beside the canal.



_ Principles

In order to overcome the barrier and convert the backyard, there are two spatial principles:

To extend the urban & rural spaces to canal.

Path: Street, parkway, arcade, country lane

Node: Park, square, important building, traffic node, landmark

To define and connect the urban space & canal space.

To remove fences, bushes and dense tree rows;

to add canal exit to the nearby green spaces, such as ramps, stairs;

to open/ semi-open the ground floor of buildings: gallery, shop, café, arcade, etc.

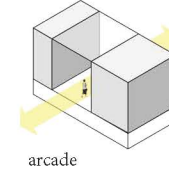
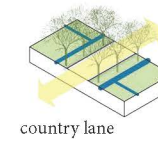
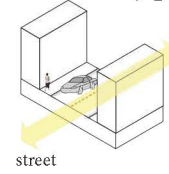
(Floating) platform, boat café/restaurant, trampoline bridge, water ball, floating swimming pool

_ Application

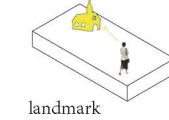
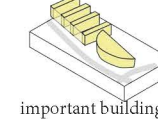
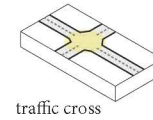
Firstly the paths compose a spatial network, extending the city and landscape to the canal. At the junction of paths are nodes, implying important urban spaces.

Then the canal space is opened to surrounding spaces. The canal could be easily accessed from urban spaces such as parks, playgrounds, squares, etc. And canal spaces are developed beside, on and in the water.

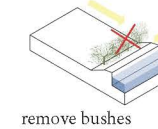
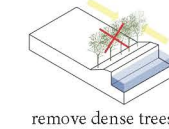
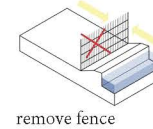
EXTEND by path



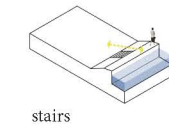
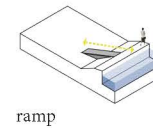
EXTEND by node



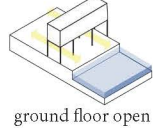
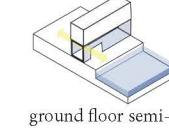
DEFINE / CONNECT - removing



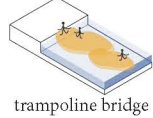
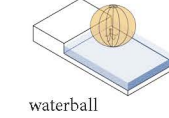
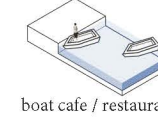
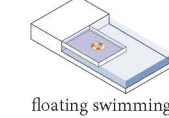
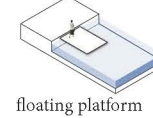
DEFINE / CONNECT - exit

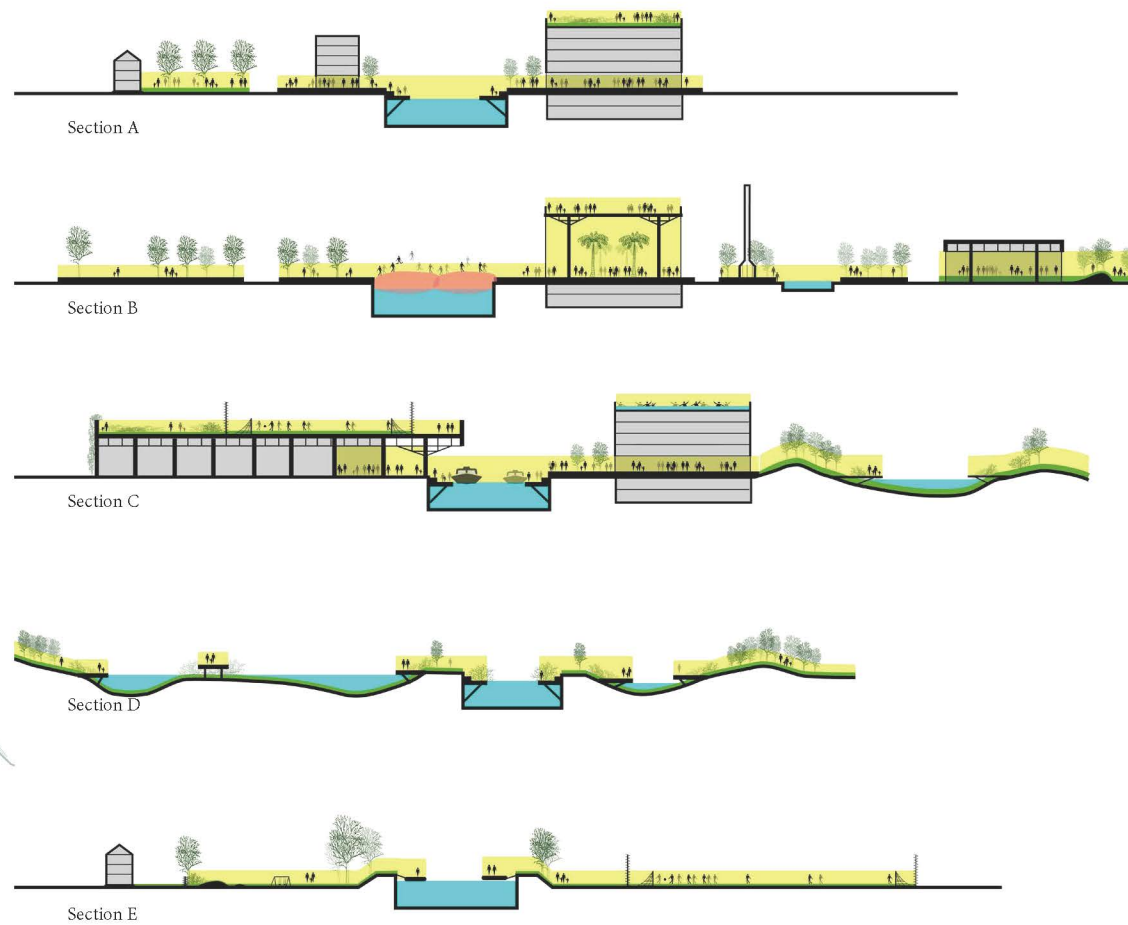
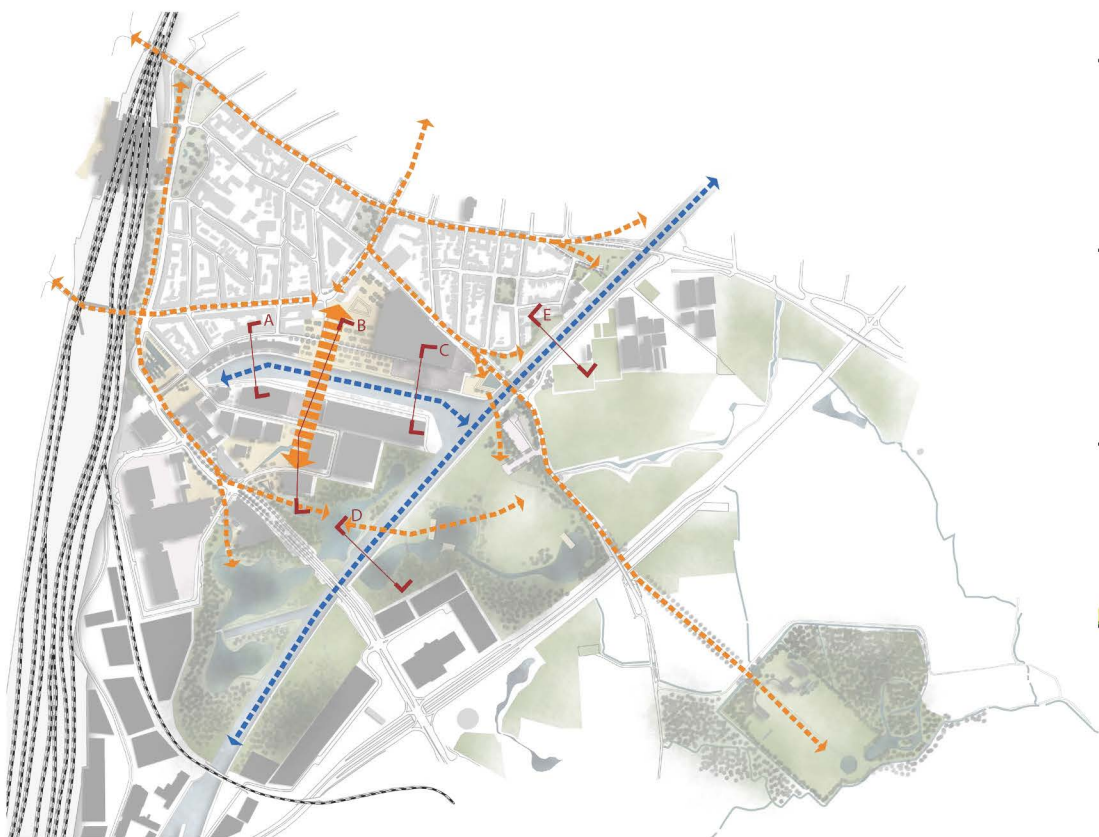


DEFINE / CONNECT - opening



DEFINE / CONNECT - canal space







PROGRAMME

A multi-used urban center



_ The three urban frontiers

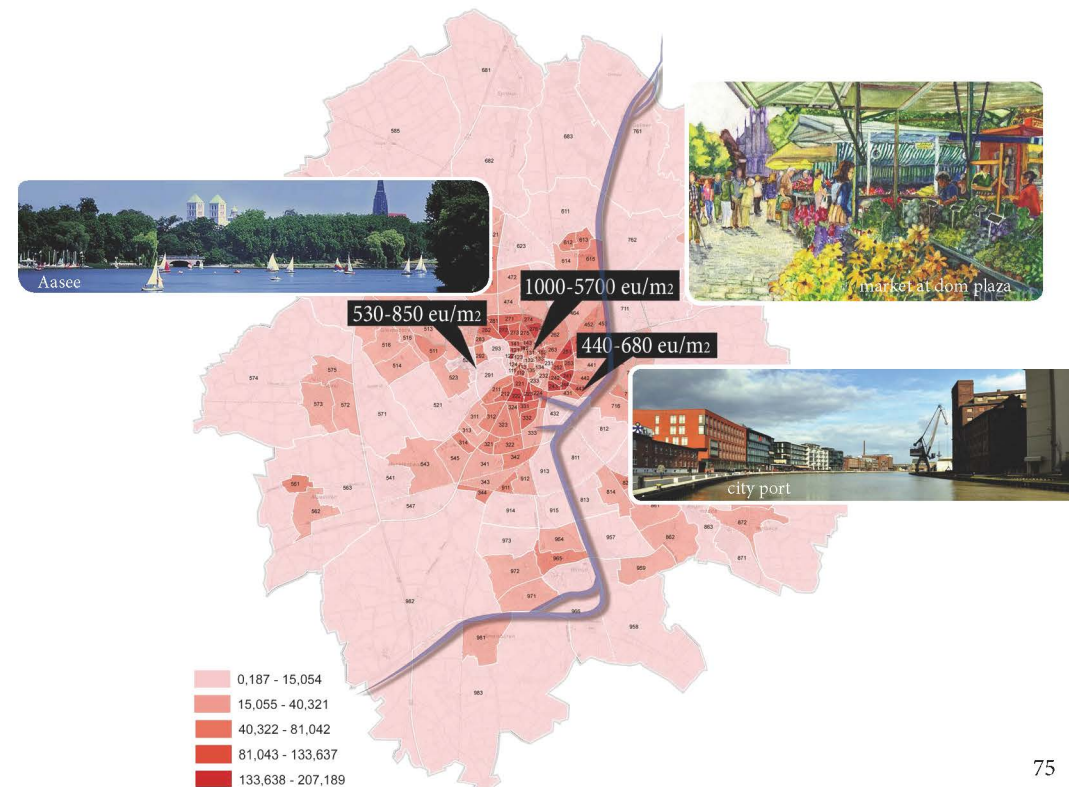
When studying the urban activity map (following page), we can find activities form three urban frontiers. They are the old town, the Aasee, and the port area.

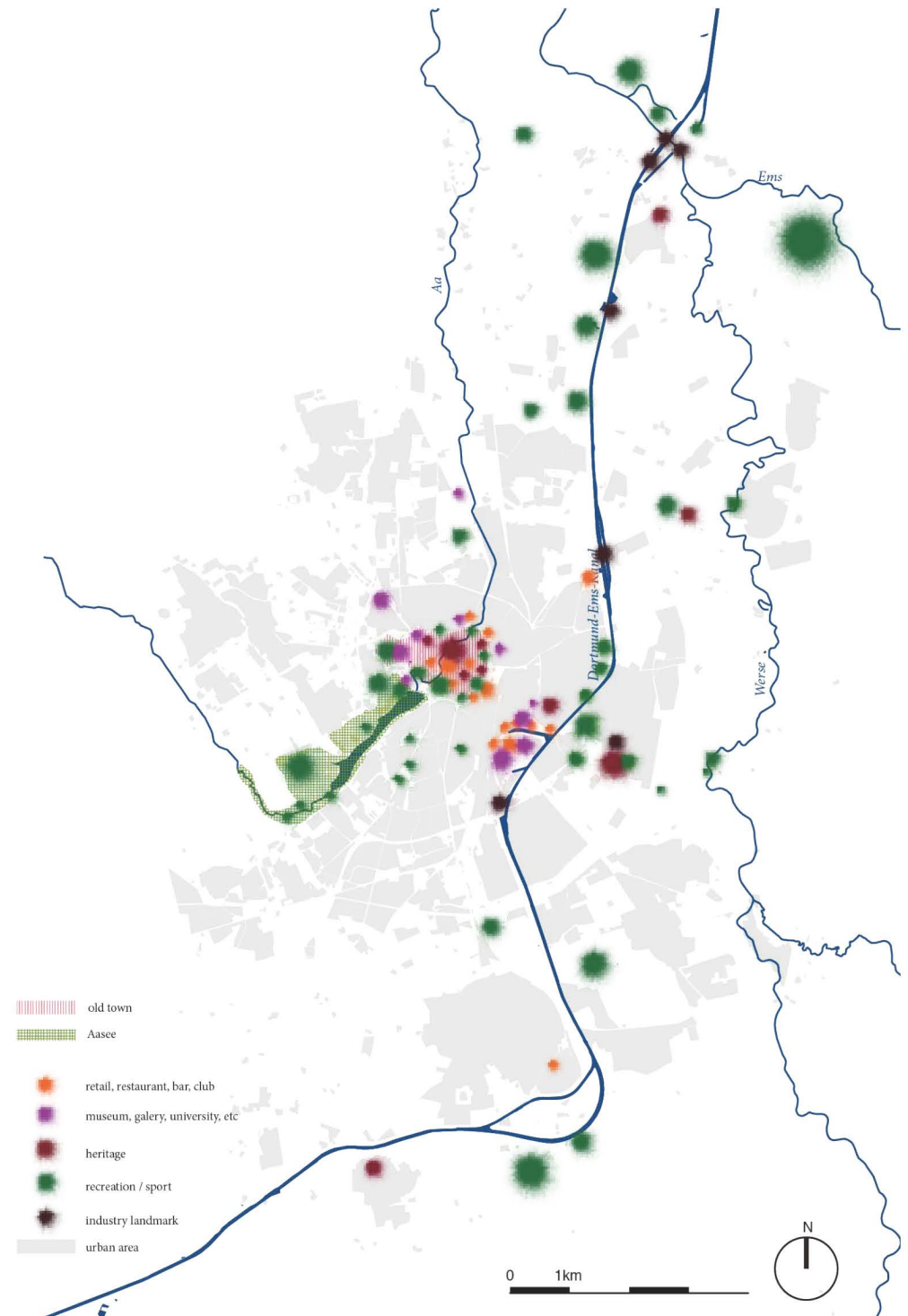
The *old town* is now a heritage with many cathedrals, houses and fortresses, attracting tourists during the year. It is also the center of citizen's daily shopping and living life. So there is a conflict of people's daily life and tourism. The old town is too crowded.

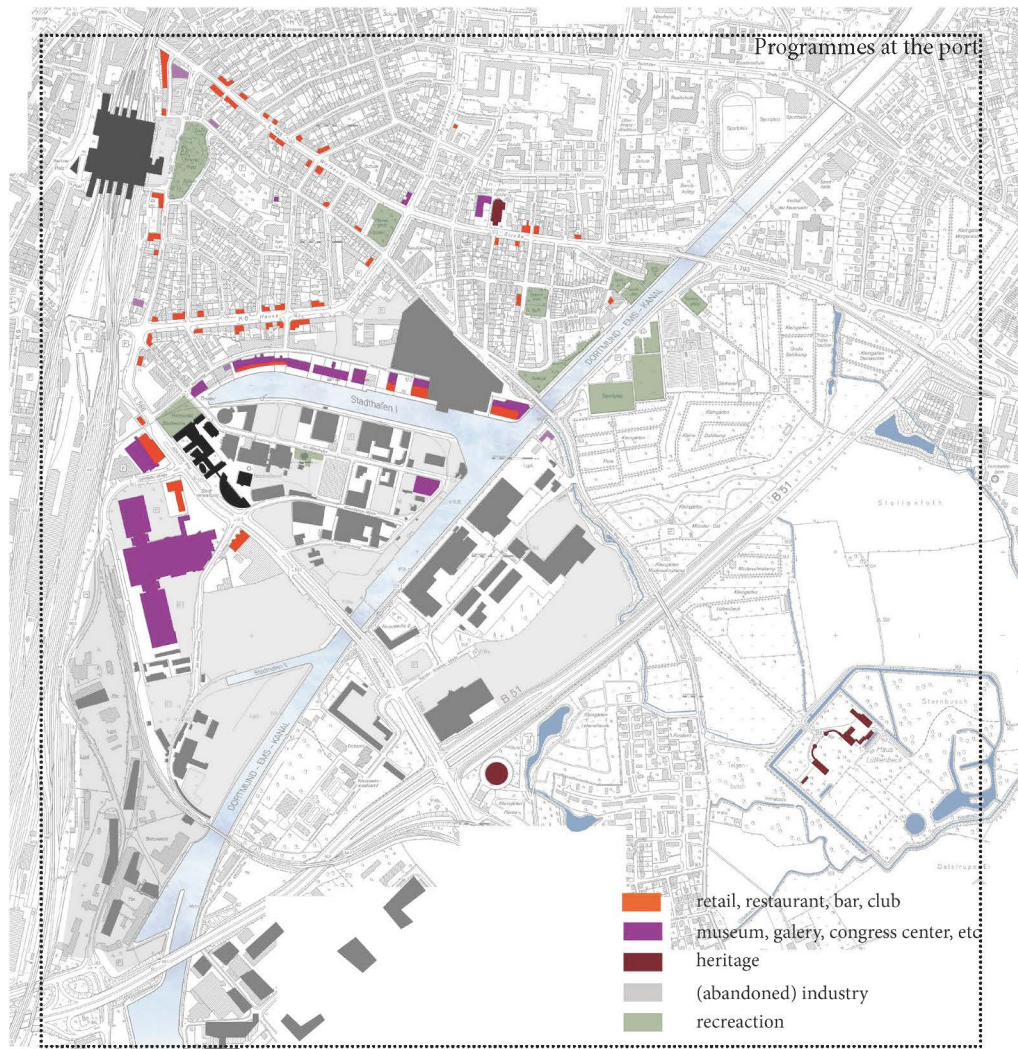
The lake *Aasee* is the best recreation destination for local people in holidays. Besides the lake, there are parks, parkways, zoo, yachting clubs and so on.

The *port area* is gradually becoming the city's third urban frontier. Cultural activities take place in some discard industry buildings. New buildings are constructed here, such as cinema, hotel, apartment buildings and a congress center. The new city hall is also beside the the port.

However, the development situations are unbalanced between the three sites. The situation is proved by the population density map. The difference of each area's property price also tells the unbalance.





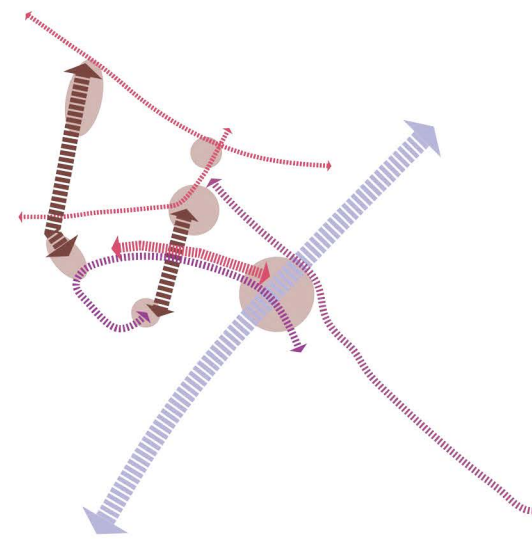


_ Local analysis of city port

Because the cultural activities take place in cheap discard industry buildings, they are fragmented and mixed with industrial activities in the map.

Other program in this area is mainly neighborhood retail shops.

This area also lacks of outdoor activities.



_ Principles

The port's objective is becoming the future center of citizens' modern life. There are principles need to follow:

Cultural potential is promoted.

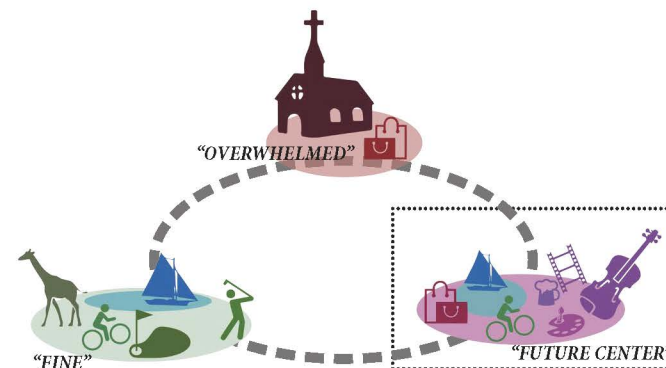
Commercial program is also developed at the port, to distract the load of old town.

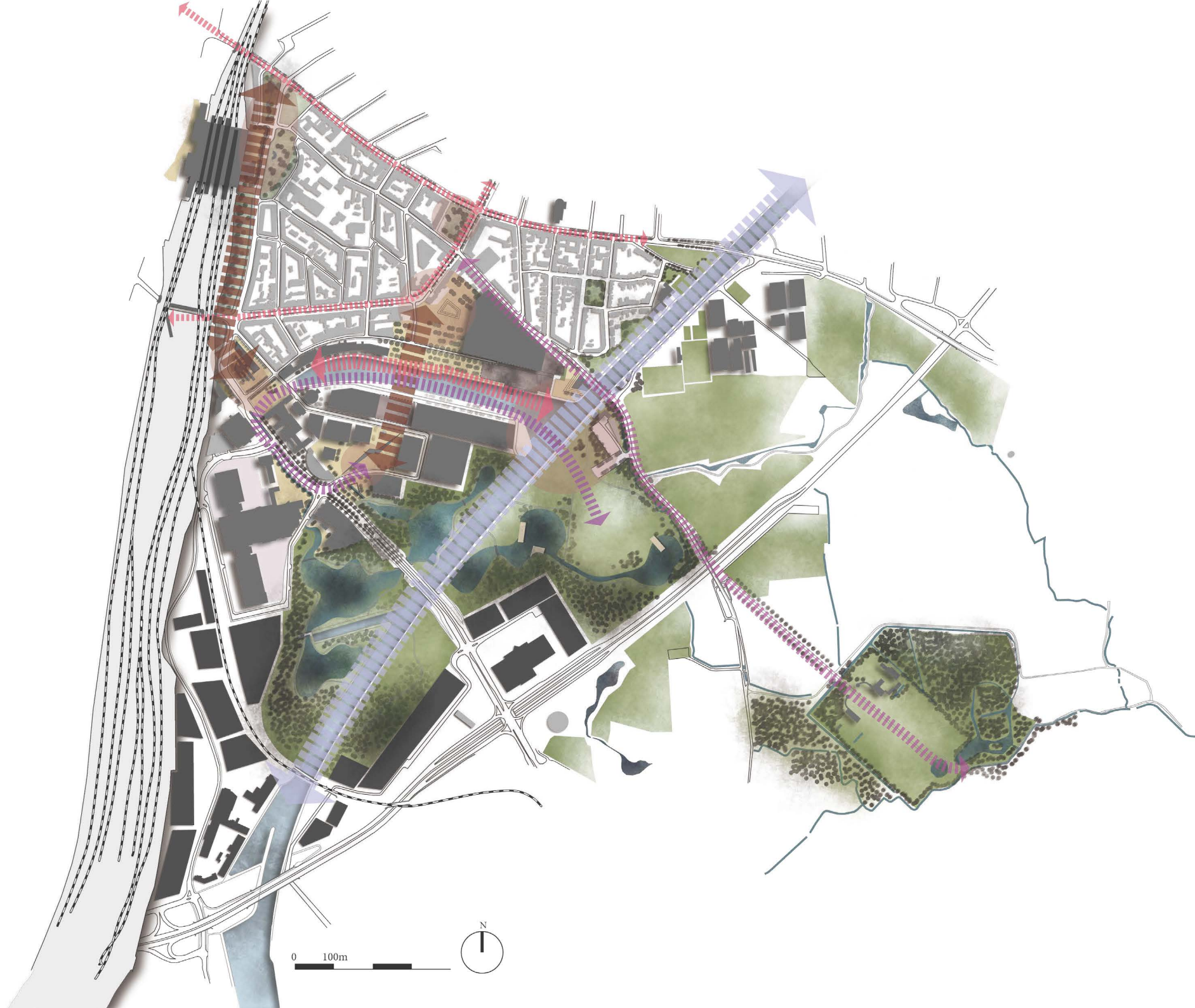
Recreation programs are also necessary to increase the area's competitiveness in the whole city's development.

Business & industry programs are constricted in particular place.

_ Application

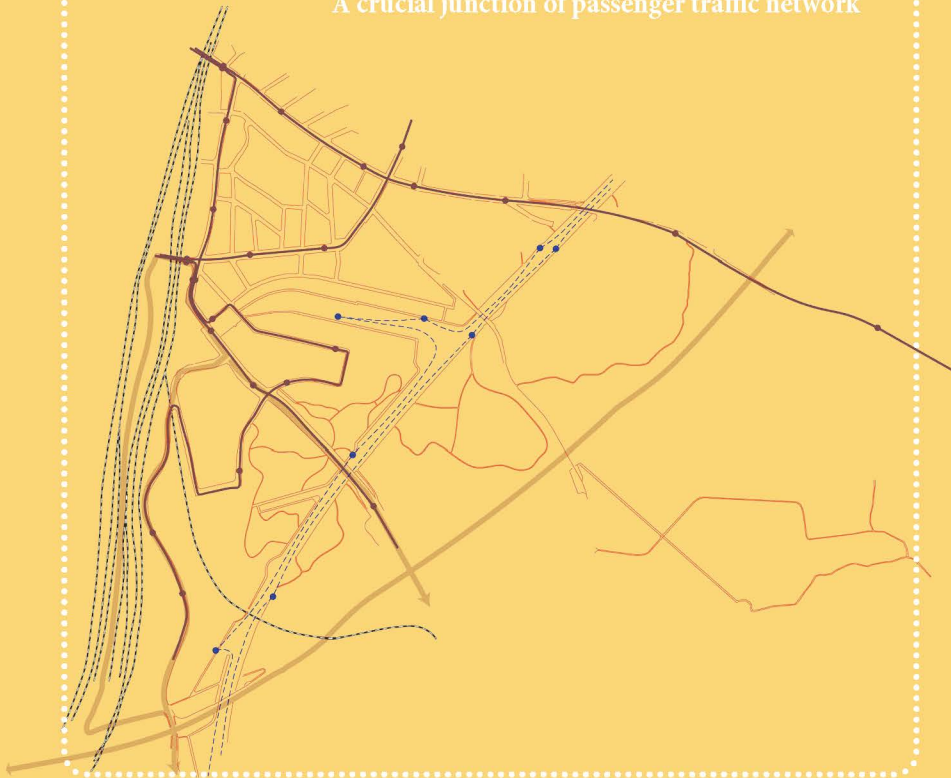
The program corridors integrate the port into the citizen's social life.





TRAFFIC

A crucial junction of passenger traffic network



_ The port is no longer the logistics center

Because of the industrial structure adjustment, the thriving railway and highway transport and other changes over time, the narrow early industrial canal, Dortmund-Ems-Canal is no longer in use. As a consequence, rather than the city port, the present logistic center is at the crossing junction of the railway and highway #43 (here is the load and unload railway station of cargoes).

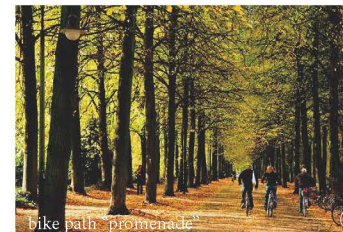
Locally the existing industry and routing are too many and dispersed. Although close to the central station, this area's passenger traffic is problematic. The existing bicycle path is fragmented, and not permeable enough. The existing busline is also not permeable.

_ The future hub of passenger traffic

To integrated into the city's traffic network, the post-industrial area has to develop passenger traffic network. And there are three opportunities that promise it becoming the future hub of passenger traffic:



bike renting & parking near railway station



bike path "promenade"

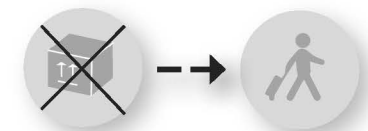


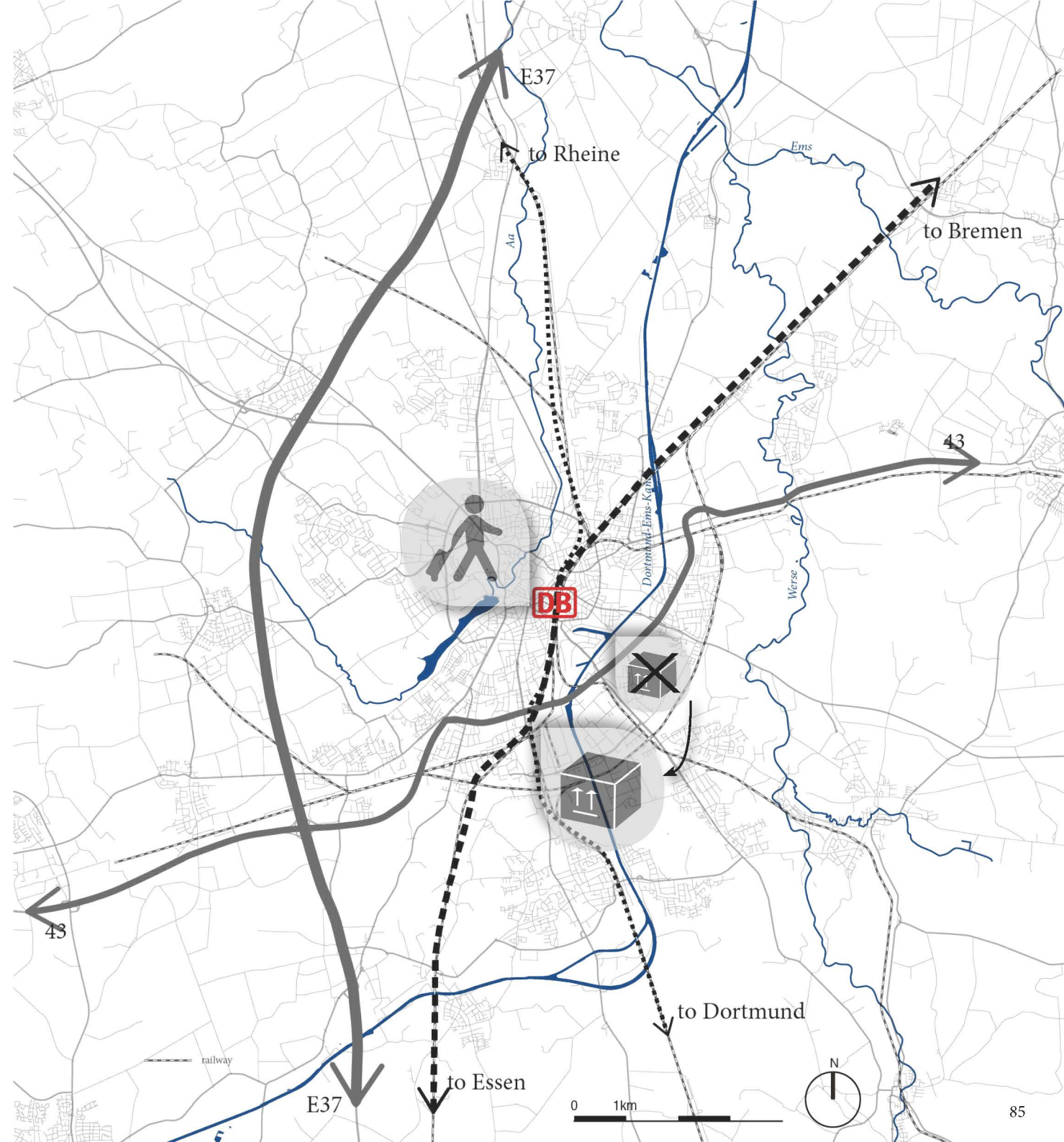
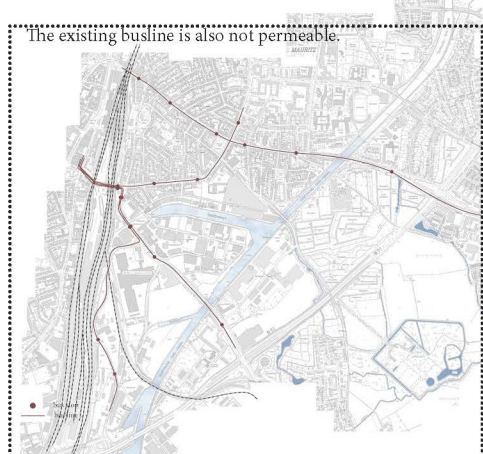
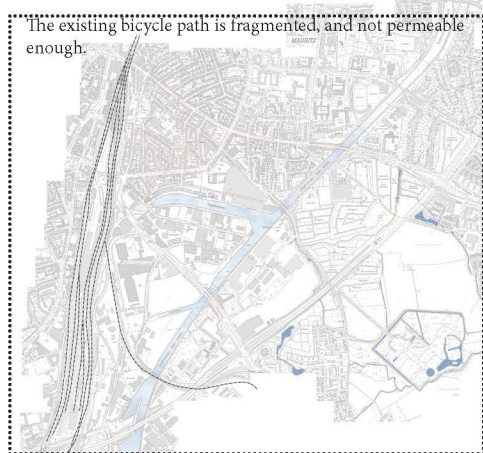
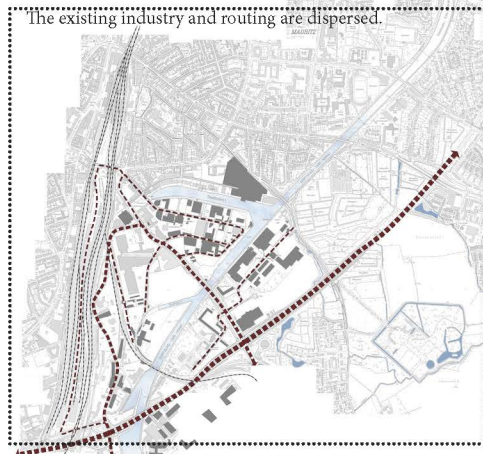
waterbus on Aasee

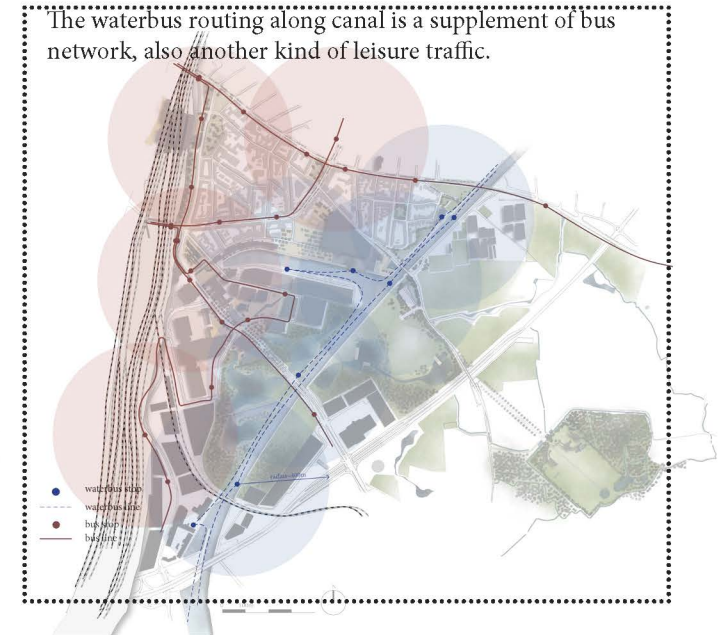
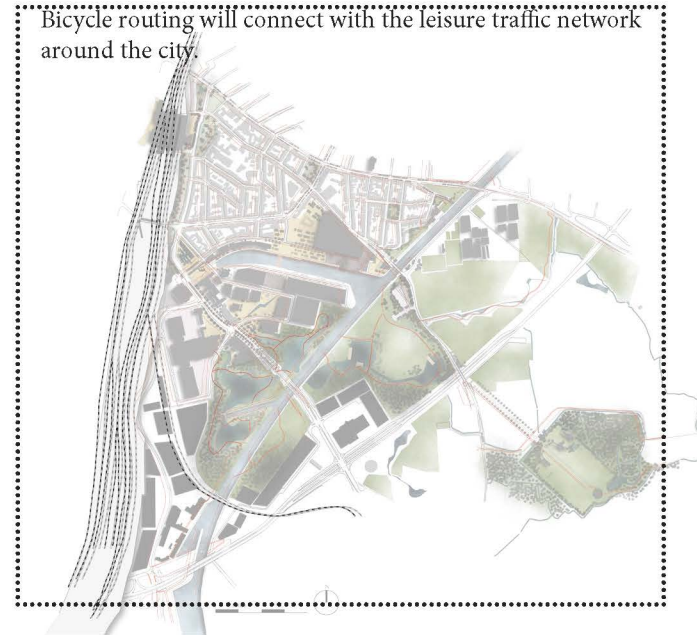
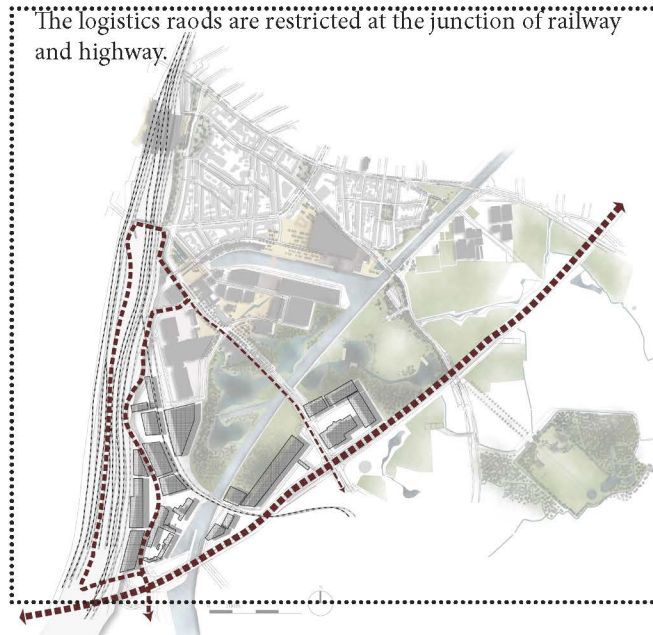
The port is next to the central railway station.

Münster is developing its "bicycle capital" designation. So there are bicycle pathes, the most famous one called "promenade" around the old town. There are also bike renting and parking stations around (biggest at the railway station).

There is a short waterbus routing on the lake of Aasee for tourism and recreation. It could be applied on the canal.







Principles

To decrease the freight transport;
to complete the bicycle path;
to add waterbus as a means of public traffic.

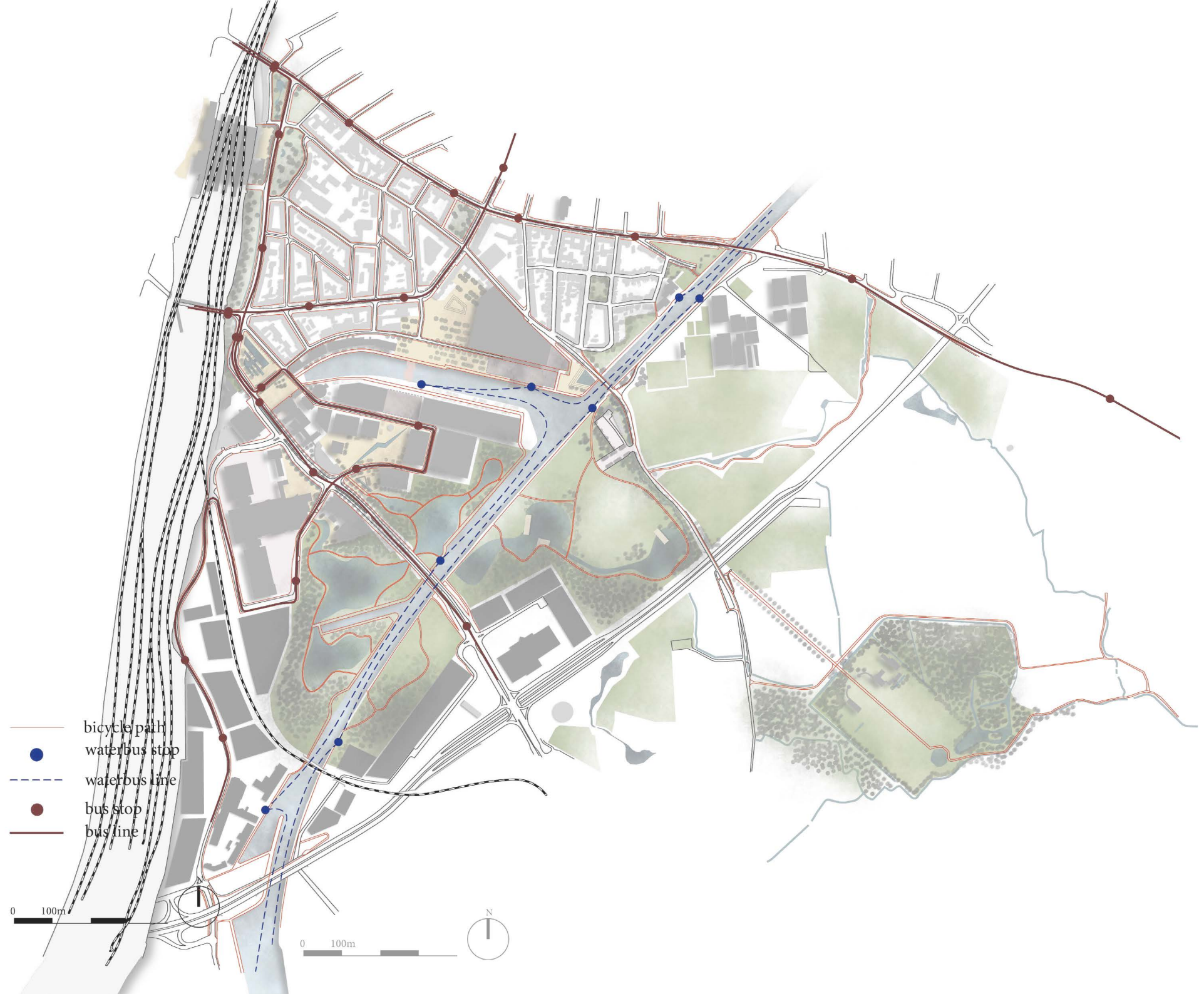
Application

The logistics roads are restricted at the junction of railway and highway.

Bicycle routing will connect with the bicycle path network around the city (map in next chapter).

The waterbus routing along canal is a supplement of bus network, also another kind of leisure traffic.





4.4 Summary of principles

_ HYDROLOGY Principles

To collect surface water,
to let the water infiltrate locally as much as possible,
to store proper amount of water for dry season,
to leave retention spaces in case of a thunderstorm,
to discharge redundant rainwater from city,
to let the water get to landscape.

_ HABITAT Principles

The first principle is to diversify habitat. The intentional living environments are:

Sub-Atlantic and medio-European oak or oak-horn- beam
forests of the Carpinion betuli
Asperulo-Fagetum beech forests
Meadow
Eutrophic lake
Oligotrophic lake
Floating wetland

The other principle is to connect habitats separated by canal:

Fauna exist for big mammals
Culvert for aquatic animals, small and medium-sized mammals

_ SPACE Principles

In order to overcome the barrier and convert the backyard, there are two spatial principles:

To extend the urban & rural spaces to canal.

Path: Street, parkway, arcade, country lane

Node: Park, square, important building, traffic node, landmark

To define and connect the urban space & canal space.

To remove fences, bushes and dense tree rows;

to add canal exit to the nearby green spaces, such as ramps, stairs;

to open/ semi-open the ground floor of buildings: gallery, shop, café, arcade, etc.

(Floating) platform, boat café/restaurant, trampoline bridge, water ball, floating swimming pool

_ PROGRAM Principles

The port's objective is becoming the future center of citizens' modern life. There are principles need to follow:

Cultural potential is promoted.

Commercial program is also developed at the port, to distract the load of old town.

Recreation programs are also necessary to increase the area's competitiveness in the whole city's development.

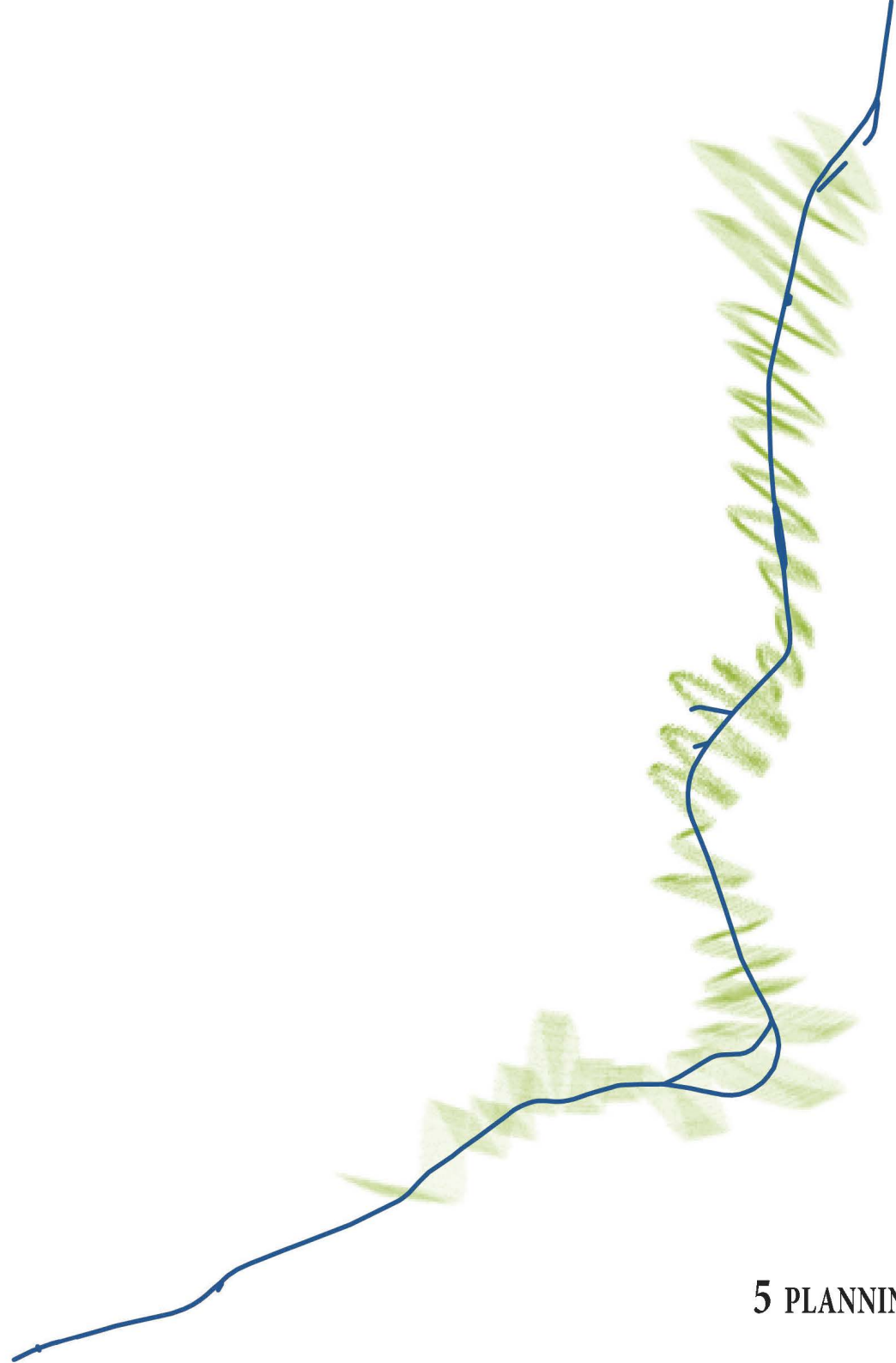
Business & industry programs are constricted in particular place.

_ TRAFFIC Principles

To decrease the freight transport;

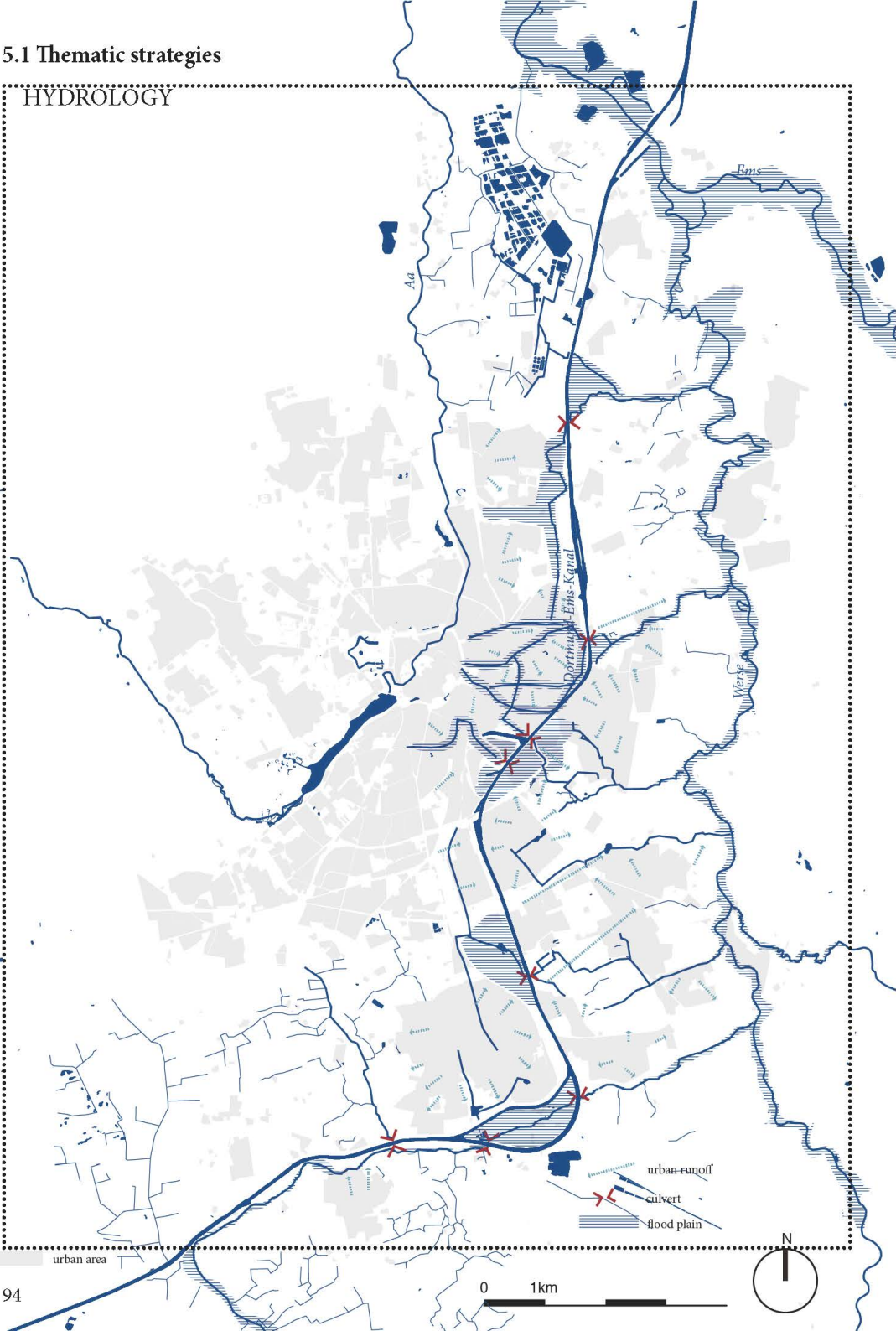
to complete the bicycle path;

to add waterbus as a means of public traffic.

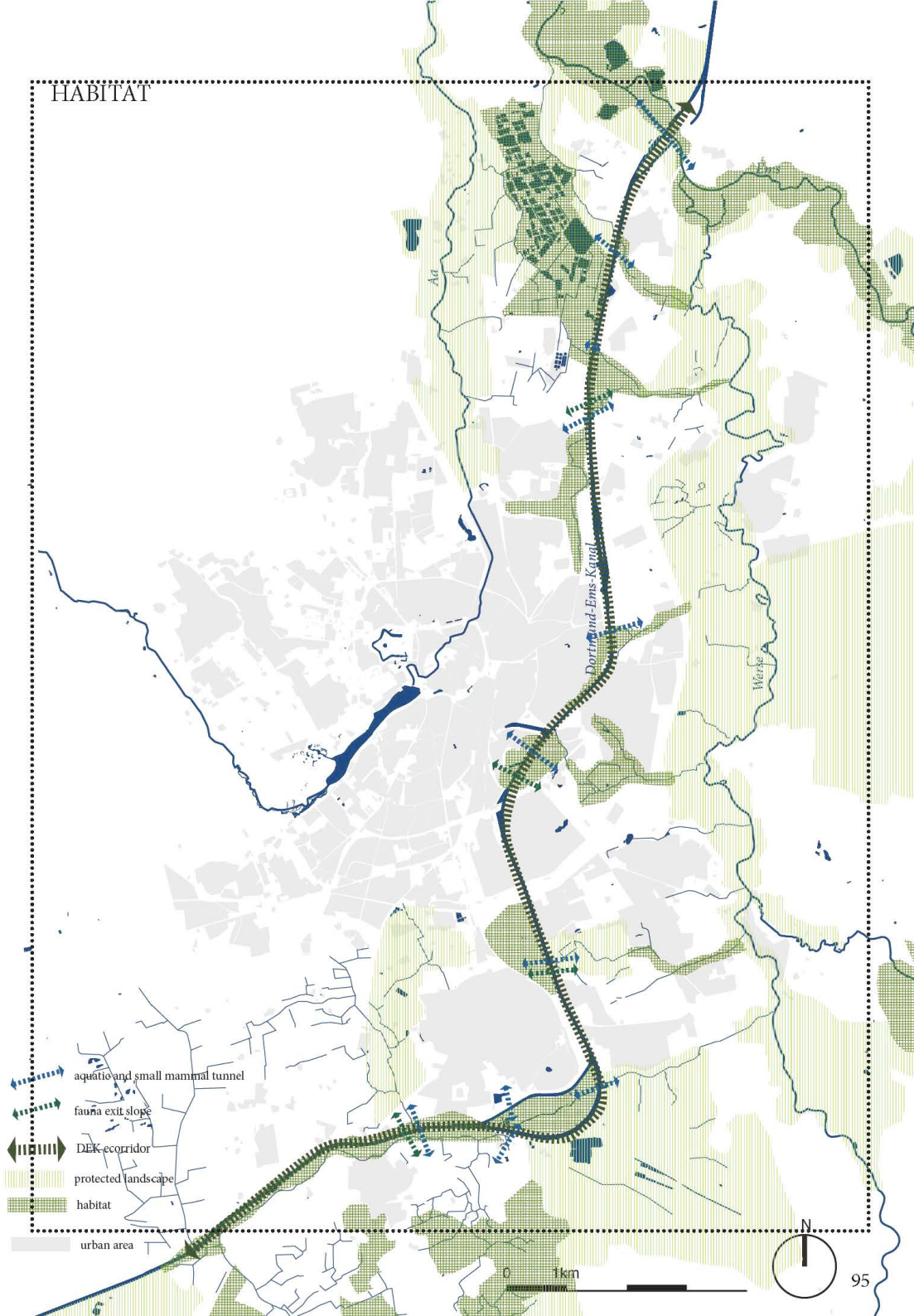


5.1 Thematic strategies

HYDROLOGY



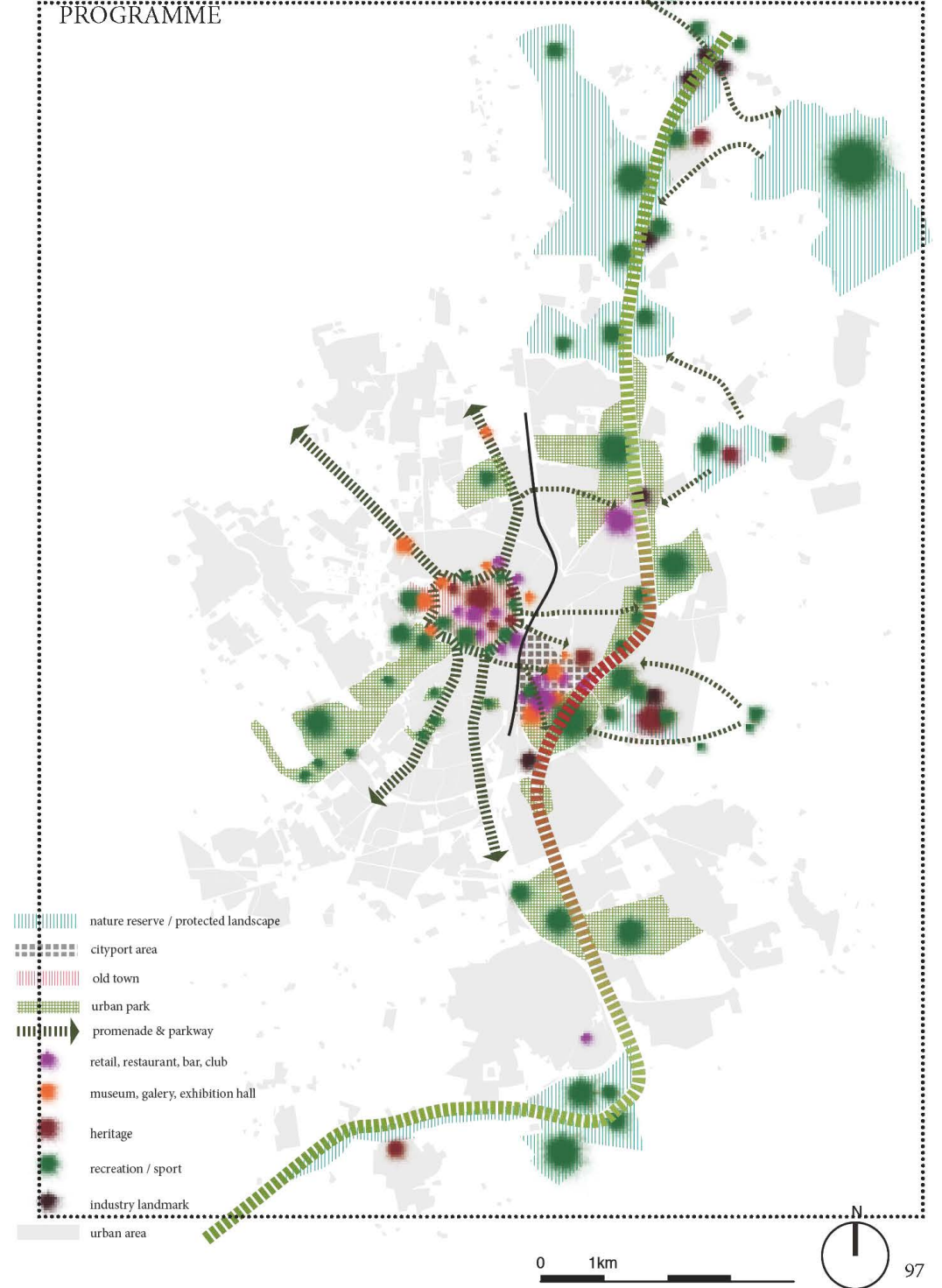
HABITAT



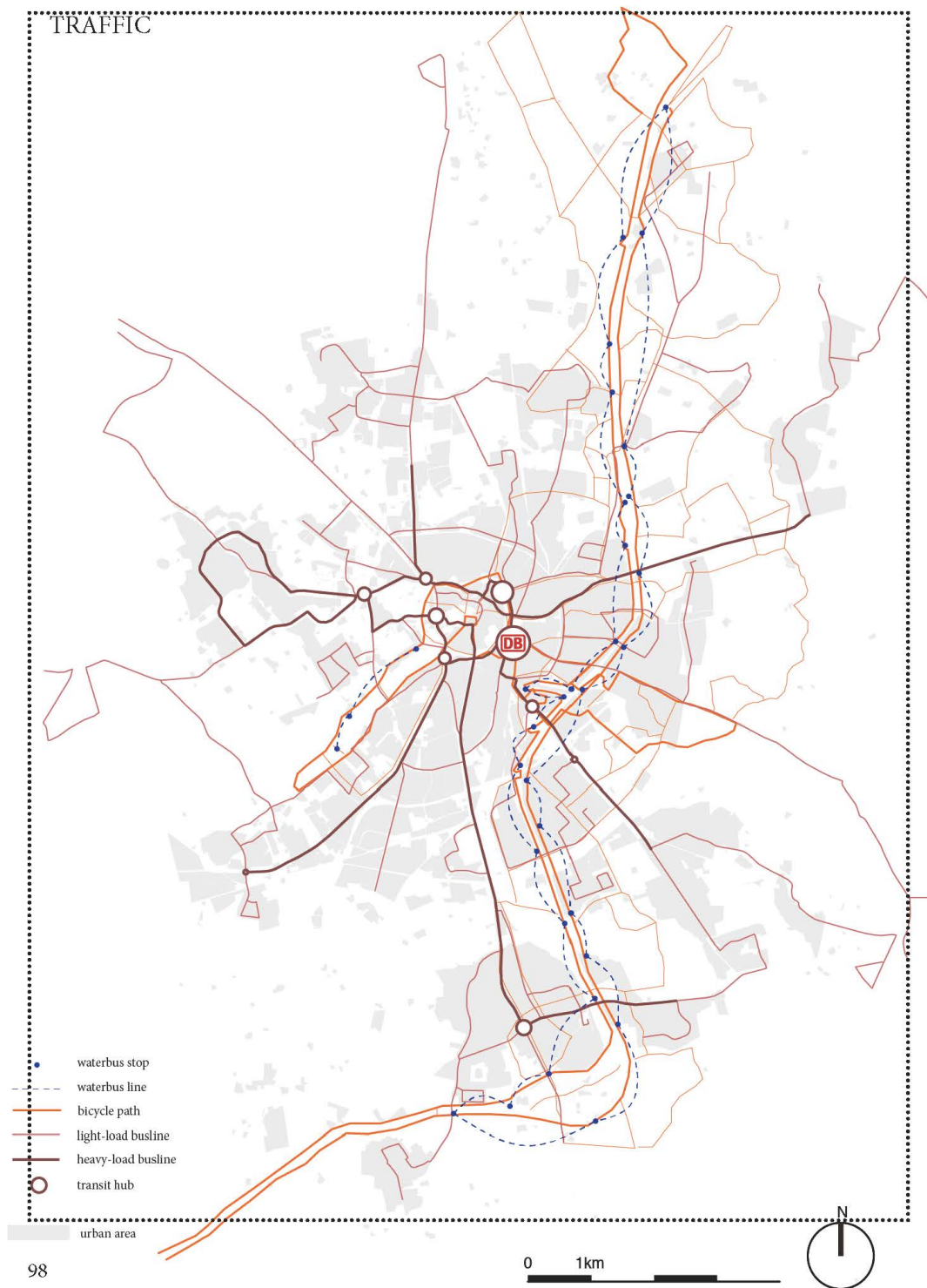
SPACE



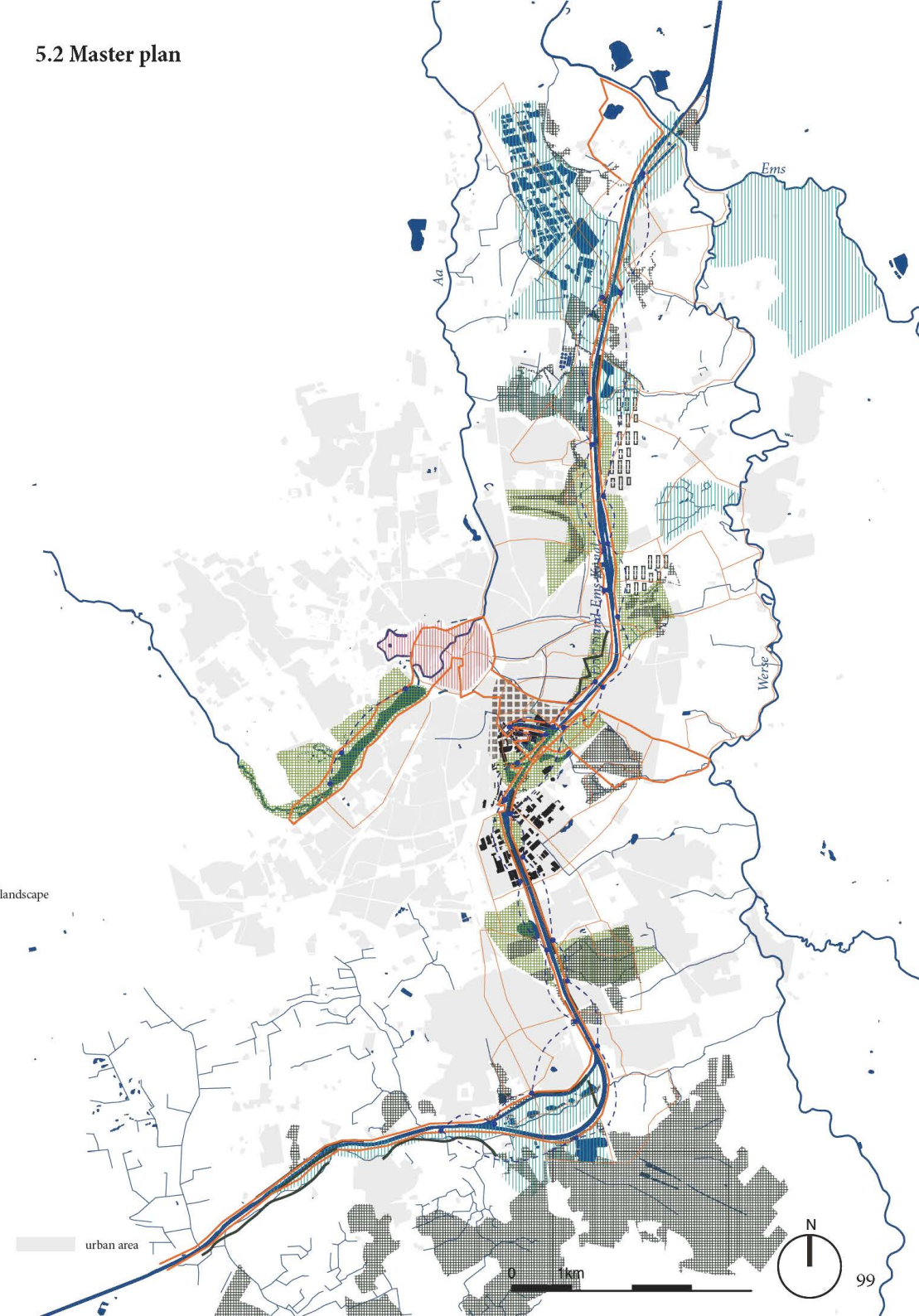
PROGRAMME

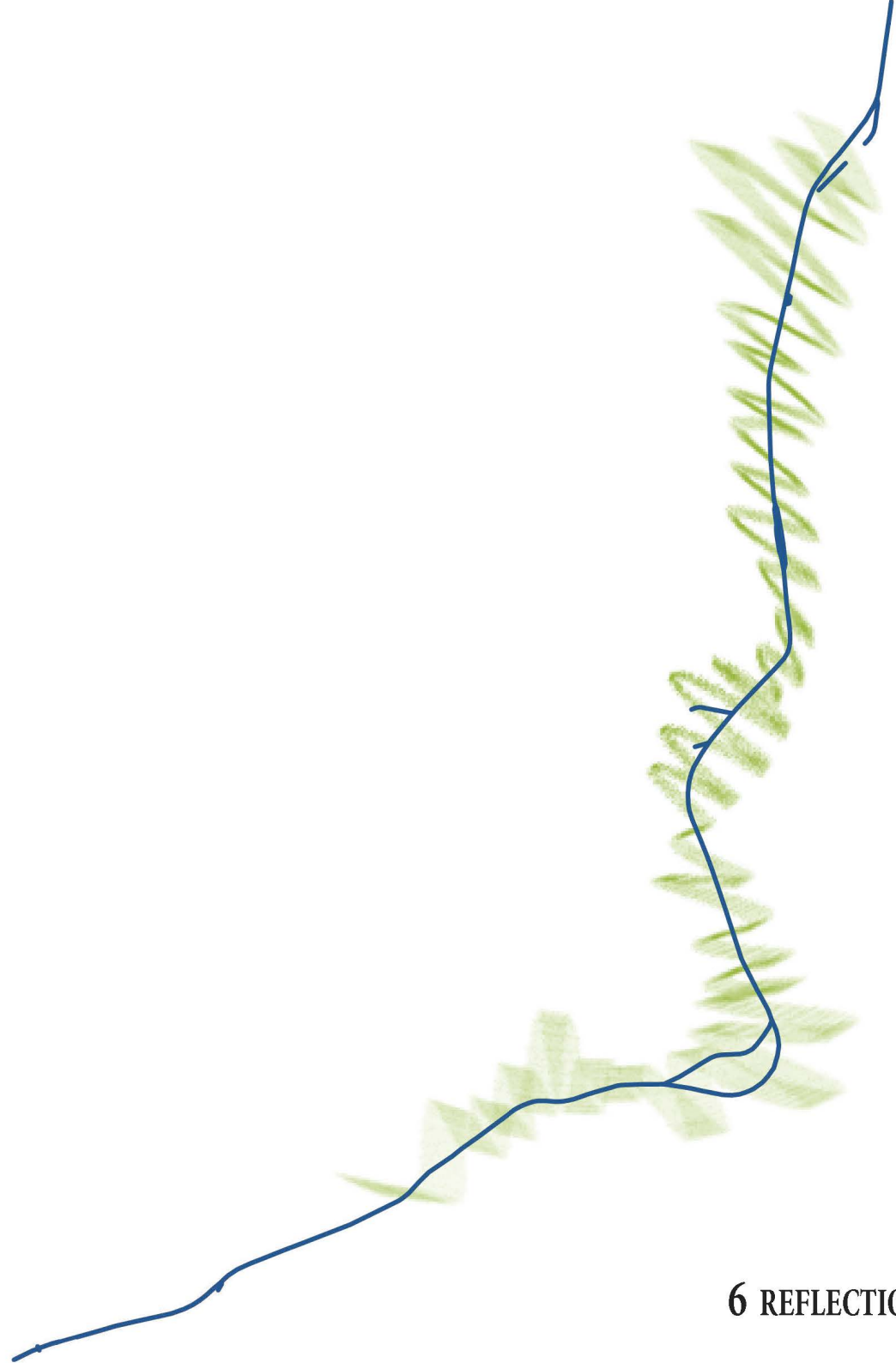


TRAFFIC



5.2 Master plan





Flowscapes

The studio explores infrastructure as a type of landscape and landscape as a type of infrastructure (cf. Strang, 1996). The hybridization of the two concepts seeks to redefine infrastructure beyond its strictly utilitarian definition, while allowing landscape design to gain operative force in territorial transformation processes.

“The reflexive infrastructure”

According to Regine Keller (Infrastructural Urbanism: addressing the in-between), the current discourse on infrastructure is its “reflexivity”. One presentation of reflexivity is the relevant spaces that are no longer useable, or become harmful, and consequently shut down over time. Urban infrastructure influenced, dominated and even defined these spaces as its context. Thus the reflexivity is reflected in the infrastructure and its relevant domains. These spaces are significantly marginal in big cities. Infrastructures such as railways, highways and drainage canals have this situation more or less.

A design-based research of post-navigable canal

My graduate project is choosing a particular infrastructure, the post-navigable canal, to do a design-based research. I choose Dortmund-Ems-Kanal's section in Münster, Germany, as the project site. It was opened in 1899, during the prosperous time of Ruhr area. It starts from the inland port Dortmund and ends at the North Sea port Emden. Münster's development was once tightly related to the canal, while now the canal goes an opposite direction of the city's development. The modern city of Münster is now a regional capital of the region of Münsterland, with a future sustainability. It is the most livable city in the world, with a comprehensive landscape system (composed of three green rings and seven wedges). But the canal's navigable function is declining gradually, becoming marginal space, and causing problems (a barrier of ecological system, social and spatial)

to the city.

So the research goal is to explore a comprehensive landscape approach with Dortmund-Ems-Kanal in Münster. By integrating the canal into the context of Münster, I want to gain a capacity strategy to convert the post-navigable canal into a crucial component of the landscape structure in the modern city.

Main Research question:

How could we find Dortmund-Ems-Kanal's new effective and positive role in Münster, as a component of the city's landscape system?

Sub research questions:

- What are the landscape opportunities between the canal and city?
- What principles could be used?
- How to apply the principles at local scale ...
- and at city scale?

To get a grip on the canal's problems and possible solutions, I firstly do a design test at a crucial spot of the canal, the city port. At the port there is chaos of history and present, city and landscape, problems and potential. So the design defines a local landscape structure, based on which problems and potentials are discussed, principles are explored and applied in five thematic layers. The five layers are: Hydrology, habitat, mass & space, program and traffic.

Through the design test, the infrastructure's problems are more clearly defined, its opportunities in the context of city are explored and principles and applications are gained. Based on these lessons five thematic landscape strategies will integrate the canal into the landscape structure of Münster.

DEK's problem and opportunity in the landscape system of Münster

The project discusses about the problems a particular reflexive infrastructure brings to modern city. As a past transportation infrastructure, the canal is a significant marginal space, together with its facilities (such as ports, locks, aqueducts, etc) and the surrounding industrial lands. It is also a barrier of ecological system (hydrology and habitat), the urban spaces, traffic and programs because of the linear shape.

The project also seeks for solutions of the problematic object. Targeting at the defined thematic problems, the project gained principles and their possible applications, to convert the canal into a component of the city's landscape system.

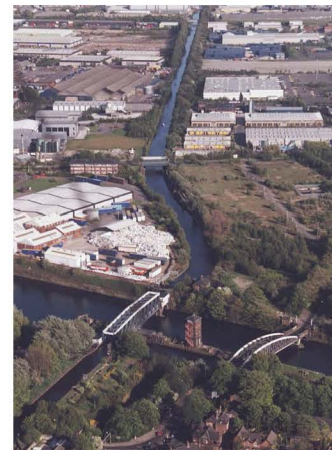
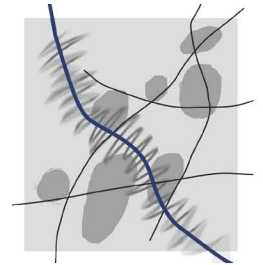
As a result the project finds opportunities of the discard canal's role in modern city. And the canal could make effects in many ways: it could be an eco-corridor to link habitats, it could be the backbone of traffic network, and it could also become link and connector of urban spaces and activities along and beside it.

However, sometimes it is not practical to convert it into a positive role. For example, it would be a huge and expensive work to naturalize the canal because it is a totally artificial waterway. So the wise ecological principle of getting across the canal barrier is to make use of the culvert and tunnels beneath it. The culverts could discharge redundant rainwater from the city to the rural side, and also work as fauna passages. In this case, the canal's negativity is eliminated, rather than converted into positivity.

The post-navigable canal as a component of landscape system

_ The post-navigable canal

The project would become a reference of converting the particular discard infrastructure, the post-navigable canal, which is common in modern cities. If look into some big metropolitan regions in the world, such as Manchester (England) and Rhine-Ruhr region (Germany), we can find that the navigable canals is also in this situation. They were built during the explosion of urban settlement in industry revolution. But as the industrial structure adjustment, the thriving railway and highway transport and other changes over time, these inner land canals have to face its decline. They used to be the artery in cities, regions and even countries. Even when their infrastructural role is written off, cast aside, they still leave visible and perceptible traces in the city, leaving problematic marginal spaces. So the infrastructure's fortune is linked with the city evolution, and vice versa.



The swing-aqueduct(left) carrying the Bridgewater Canal over the Manchester Ship near Manchester, England.



Rhine-Herne canal at DuisburgPort, in Rhine-Ruhr region, Germany.

_ Metropolitan park system of Greater Boston

Before the turn of twentieth century, Charles Eliot and Sylvester Baxter, the pioneer of metropolitan park system, concerned the symptoms of the Boston metropolis: the problematic marginal spaces.

Eliot specifically wrote to his childhood friend Governor Russell in December 1890:

Within five miles of Beacon Hill is seated much the largest body of population in Massachusetts. This population is rapidly growing, and as it grows it becomes more and more crowded. The best building-ground is already occupied, and much wet and unhealthy land is being built upon. Within a comparatively few years there will be a continuous dense city between the State House and the Neponset River, the Chestnut Hill Reservoir, the Fresh Pond Reservoir, Medford, and Malden: and if nothing is done to prevent, much of this great city will consist of low-lying and badly drained slums.



Boston park system, 1901. Diagram from Senate Park Commission Report.

When selecting the space for the park system, Eliot believes that as well as in the “field and tree district”, development could take place in low-lying places such as waterways and seacoasts. (Moga, 2009)

First of all, water has crucial influence on ecological environment of landscape. Water provides low-lying lands the possibility of creating what we now call “riparian corridors” or “greenways.”

Second, since twentieth century, settling development on marshland, flood plain or tidal flats has never been temperance. Factory plants and slums on the shore side face away from water and blocked public access. In Eliot and Baxter’s Boston park system case, they also sought to undo what they perceived to be one of the worst cases of bad development: Revere Beach. Their proposal led to the successful redevelopment of waterways and open spaces around metropolitan Boston.

Last, a creek or river it self may be polluted, and it can string industrial land, overexploited and undeveloped sites, areas of hidden or damaged scenic beauty and other leftover, unwanted or interstitial spaces. A waterway should be involved in the park framework for healthy development of metropolis.



Historical picture of the Revere Beach, showing the wrong kind of development in the past. Source: Journal of Planning History, by Steven T. Moga.

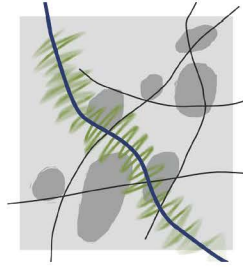


Now the Revere Beach is crowded in summer, with beach pavilions and other features. The federal government has designated the site a National Historic Landmark. Source: Journal of Planning History, by Steven T. Moga.

_ The post-navigable canal as a component of landscape system

Therefore, my case explored a particular waterway, the early industrial infrastructure's new role in the landscape system of modern city. It might be or produce marginal space, and my experiment proposes an operative way to convert it.

Since the flowscapes studio is exploring a harmonious hybridization of landscape and infrastructure, my project is a case study about how the post-navigable canal, as a structural component, is integrated into modern city's landscape system.



Last but not least

Besides the understanding and design knowledge of the discard canal, the more important things I gain from this project are the working process and design-based research benefits.

To well understand the canal, I have to investigate the site in external and internal context. To gain applicable principles as solution for different scales, it is wise to select crucial significant location to do design test. Through these tests the multi-scalar design is becoming convincing. Meanwhile the test also adds knowledge to the understanding of the research object – the discard canal. Thus, the process of working through scales is necessary and helpful for a comprehensive design.

The design-based research is also beneficial for both design and research. The design gives a reference for some academic topic (post-navigable canal, in my case), as stated before. On the other hand, the research-aimed design also gives me a wider and deeper view of the design project. This helps me work in more systematic and convincing way.