Metrobasel

ETH Studio Basel 2006-07

Francis Fawcett and Florian Poppele

rhine-lake basel

an emergent waterscape

DRAFT

PREFACE

This book was produced at the ETH Studio Basel during the Metrobasel semester, taught by Prof. Pierre de Meuron and Prof. Jacques Herzog, and imon Hartmann, Manuel Herz and Ann-Sophie Rönnskog. At this point we would like to thank them for their multi-faceted, interdiciplinary and productive teaching, their support in the refinement of our ideas, and their motivation during difficult times of the project.

The book is divided into two parts. The first part is to do with research and information into the location, topography and nature of the specific site to the East of Basel, as well as into the technical details and processes of lakes. The second part describes the potential of forming a new lake in this location, and the processes and changes over time required for such a transformation.

Francis Fawcett, Florian Poppele
Basel, January 2007

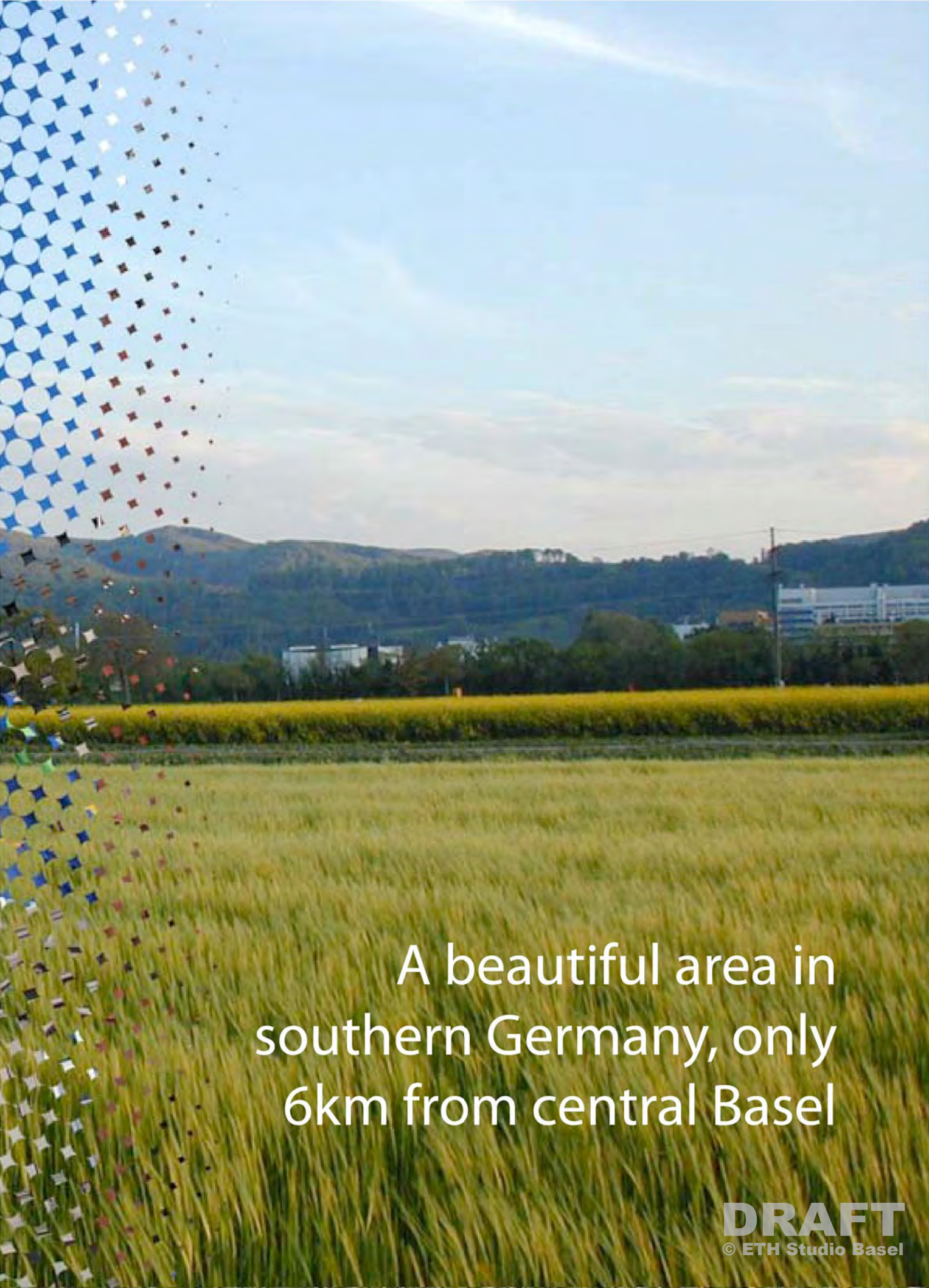
VORWORT

Das vorliegende Buch entstand im Rahmen des Semesters Meteobasel am ETH Studio Basel unter Leitung von Prof. Pierre deMeuron und Prof. Jacques Herzog, assistiert durch Simon Hartmann, Manuel Herz und Ann-Sophie Rönnskog. An dieser Stelle möchten wir allen vorgenannten für die Vermittlung einer vielseitigen, interdisziplinären und produktiven Arbeitsweise, ihre Unterstützung in der Präzisierung unserer Ideen und der Motivation in schwierigen Phasen des Projektes danken.

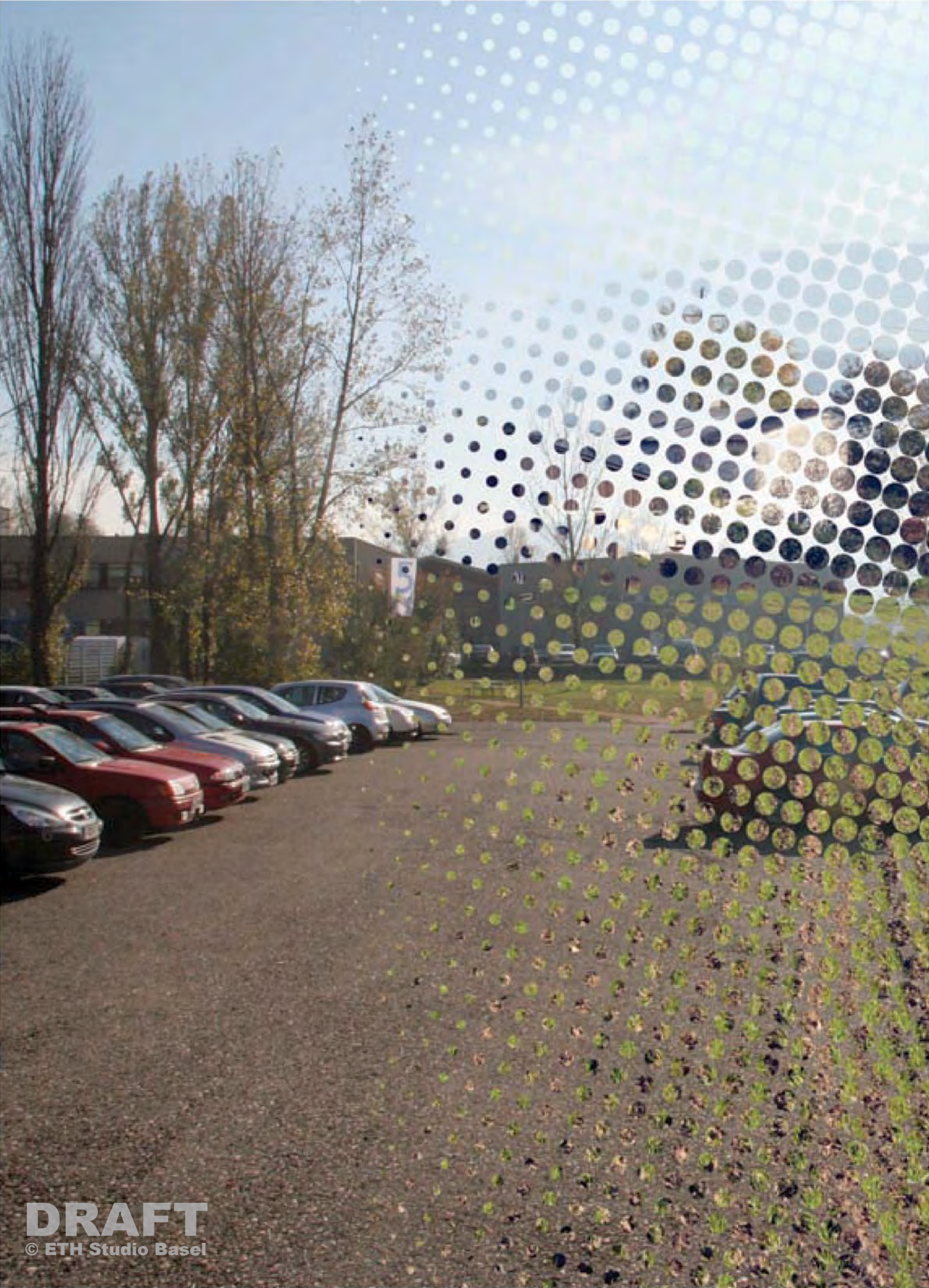
Das Buch gliedert sich in drei Teile. Der erste befasst sich mit Recherche uber den Ort, die Topografie und die Natur des Projektgebietes im Osten von Basel, wie auch mit den technischen Details und Prozessen eines Sees. Der zweite Teil erklaert das Potential das die Erstellung eines Sees an dieser Stelle und die Prozesse und Aenderungen ueber Zeit, die dafuer notwendig sind.

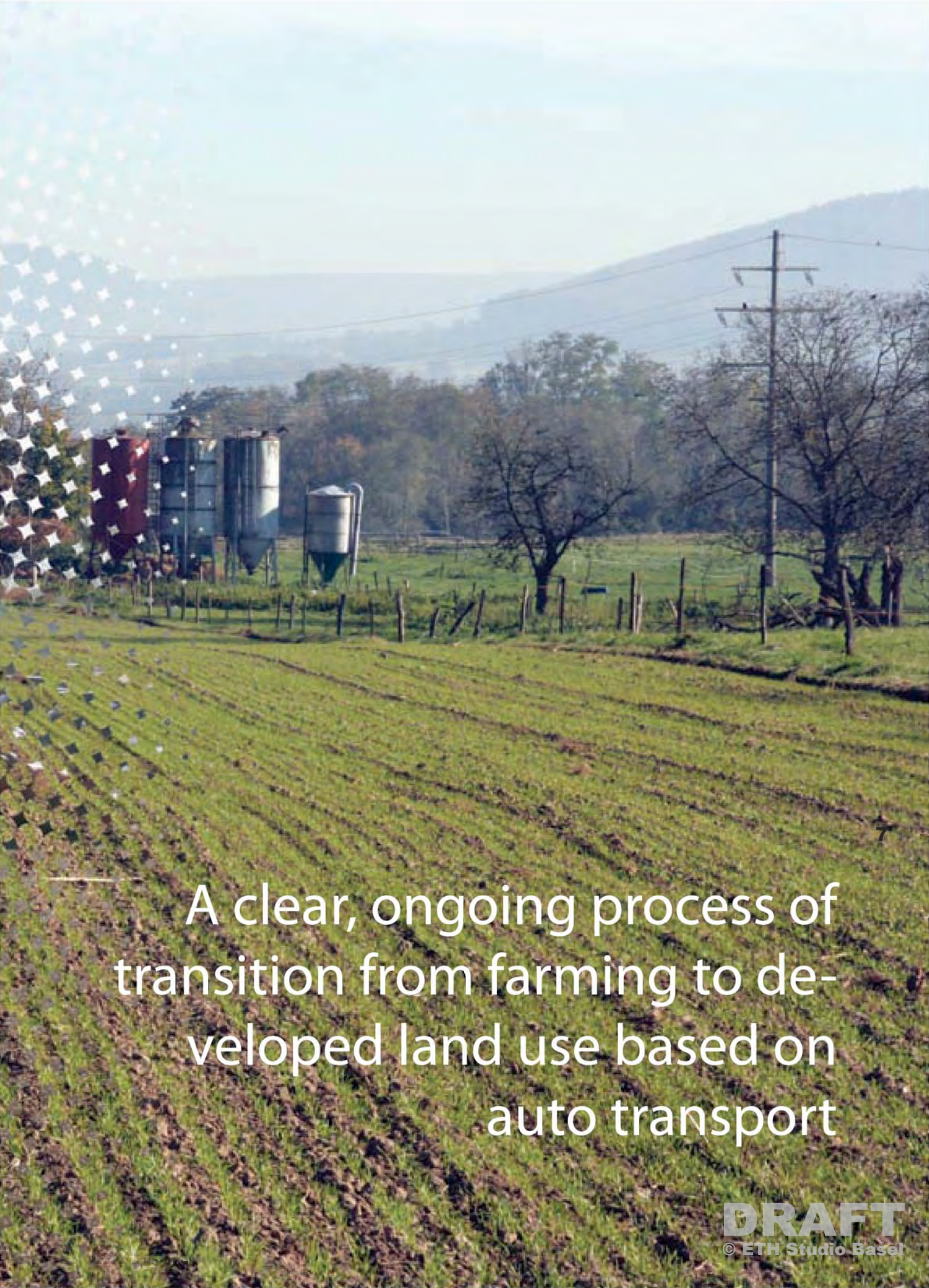
Francis Fawcett, Florian Poppele,
Basel, Januar 2007

CONTENTS

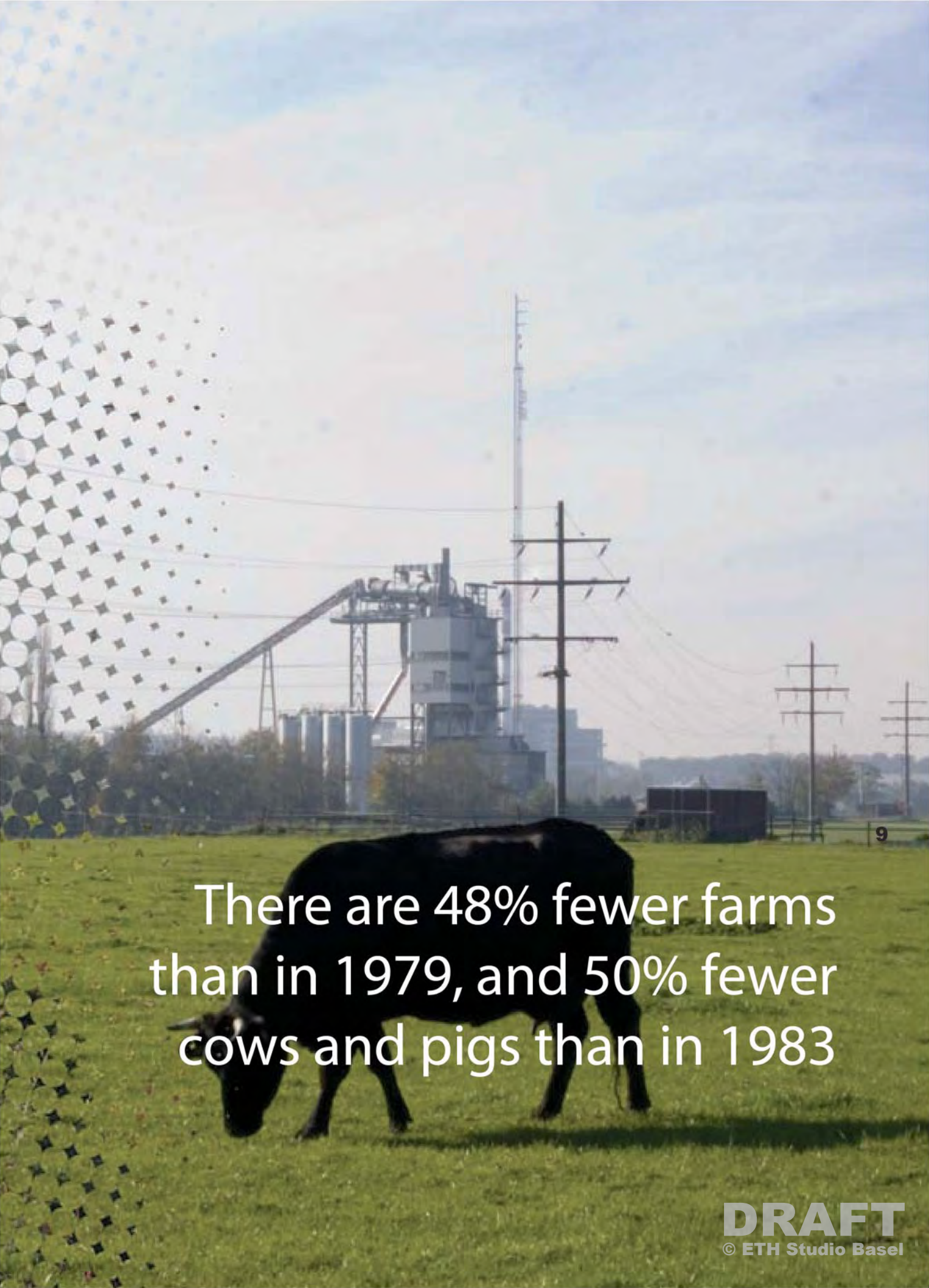


A highly underused south-facing area between the Jura and Schwarzwald, with 4.6km of riverbanks on the Rhine





A clear, ongoing process of transition from farming to developed land use based on auto transport



Value supermarkets continue to be built, replacing green space and leeching activity from the town centre

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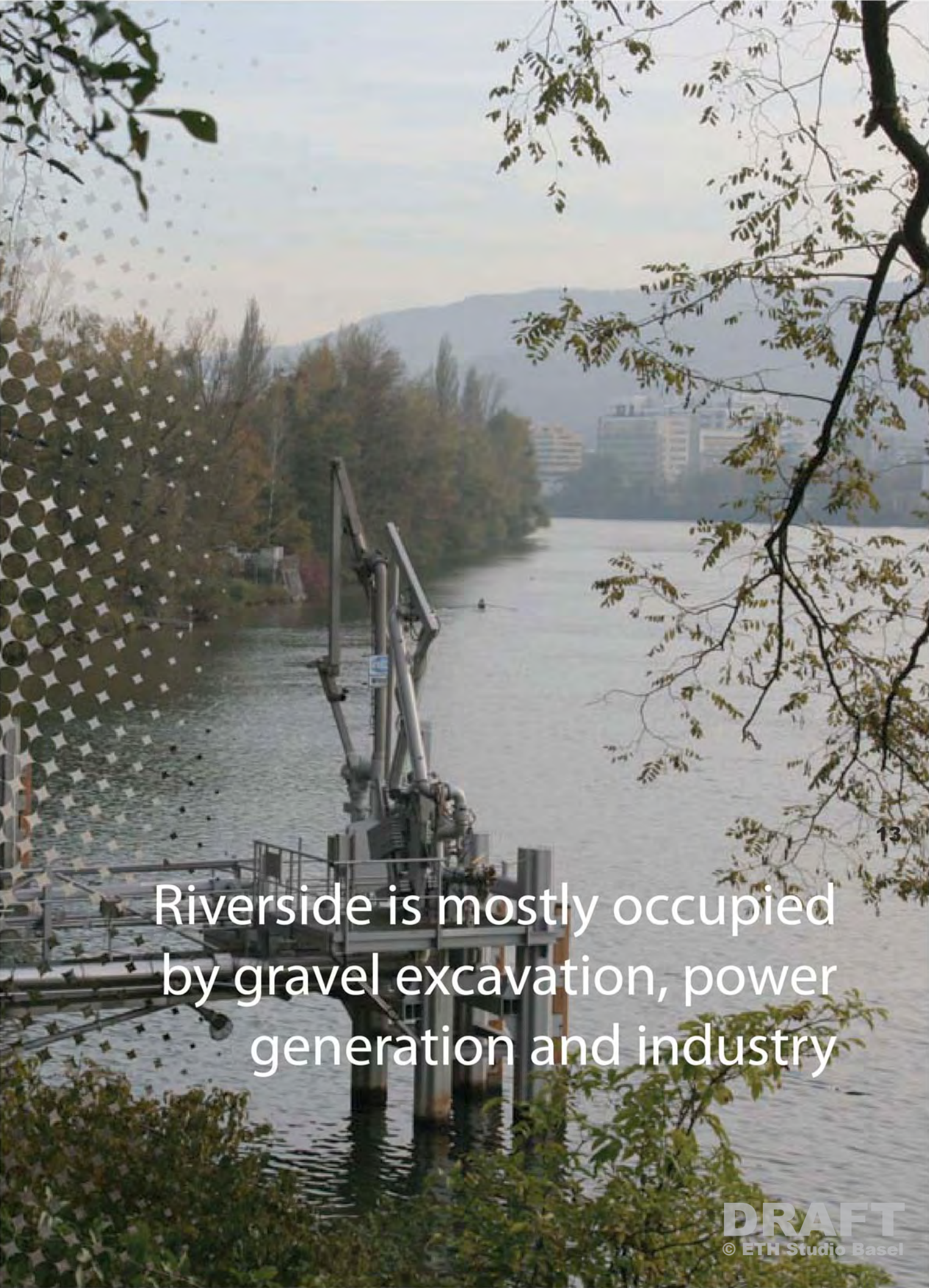
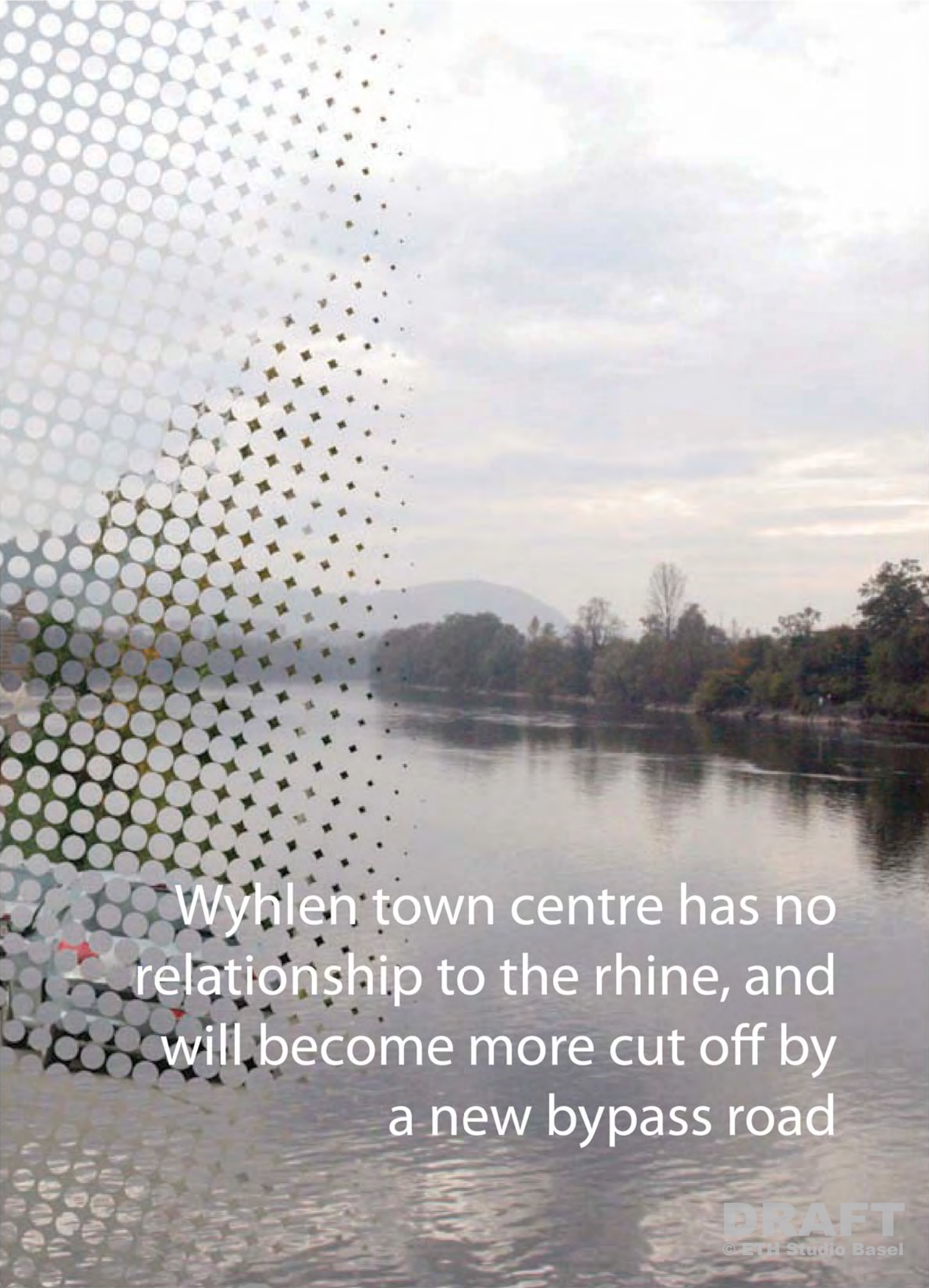


Riverside is mostly occupied by gravel excavation, power generation and industry

Manufacturing industry turnover has dropped by 74% since 1995, employing 52% fewer people



19

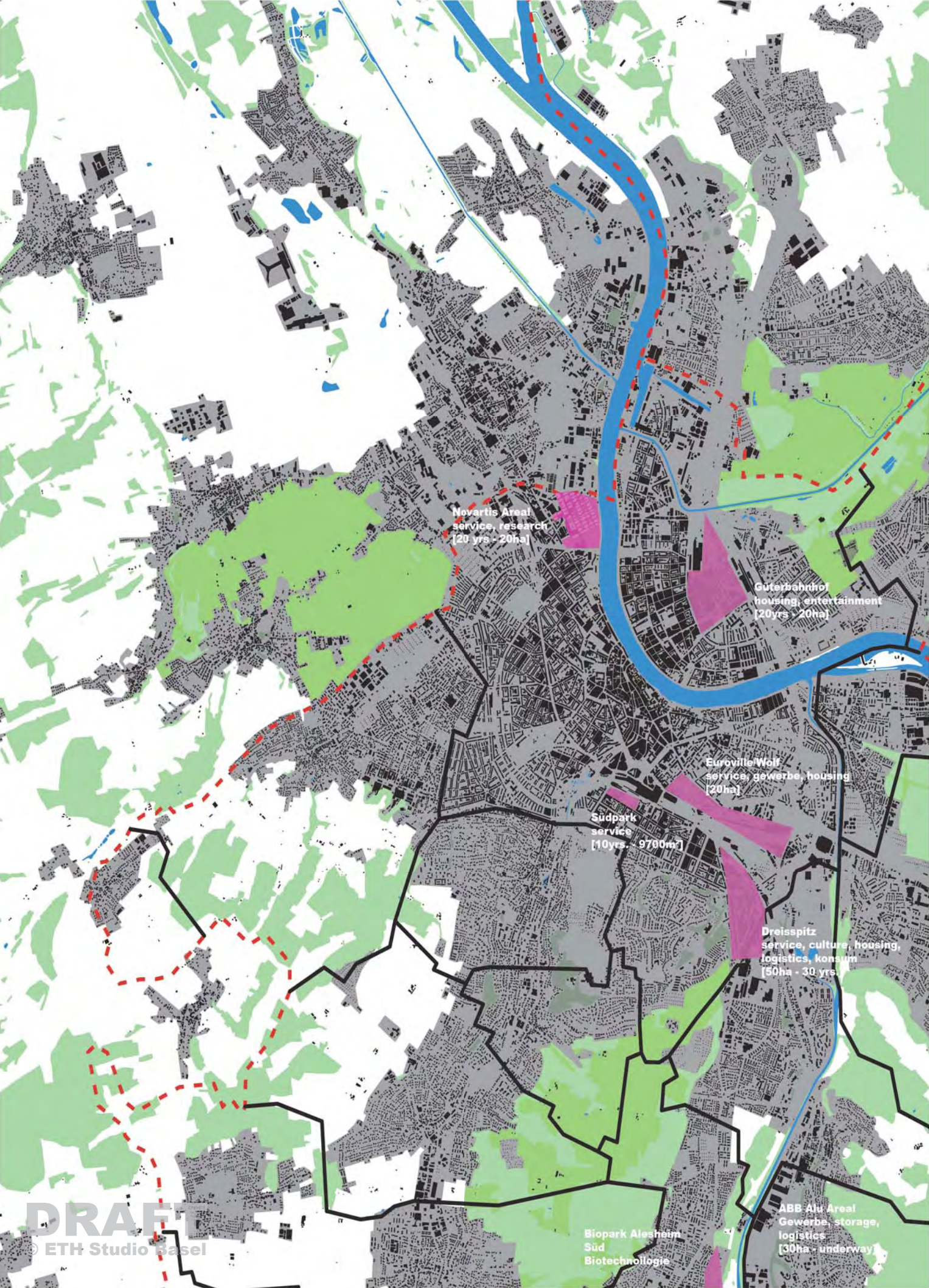
Landkreis Lorrach requires 15,337 new homes by 2020, 15.7% more than it has now

NOW: URBAN VOID WITH BIG POTENTIAL

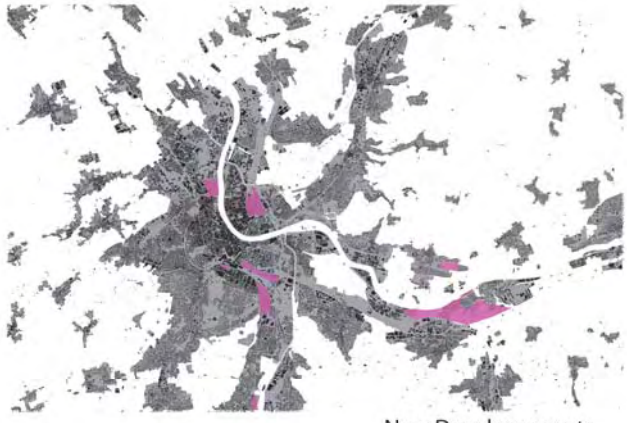
DYSTOPIA: WITHOUT ACTION WYHLEN WILL BE A NON-PLACE WITHOUT IDENTITY

LOCATION

TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING
ENERGY PRODUCTION



Political Boundaries



New Developements

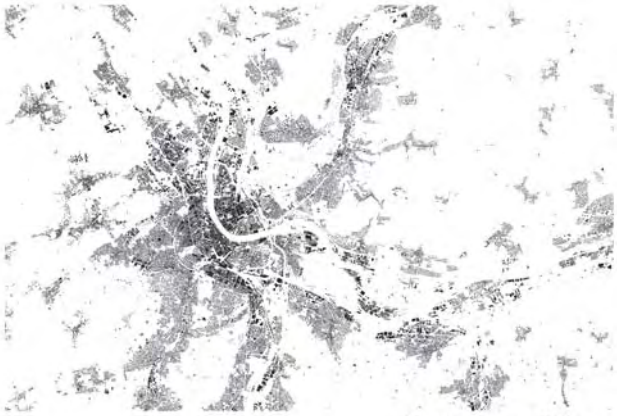
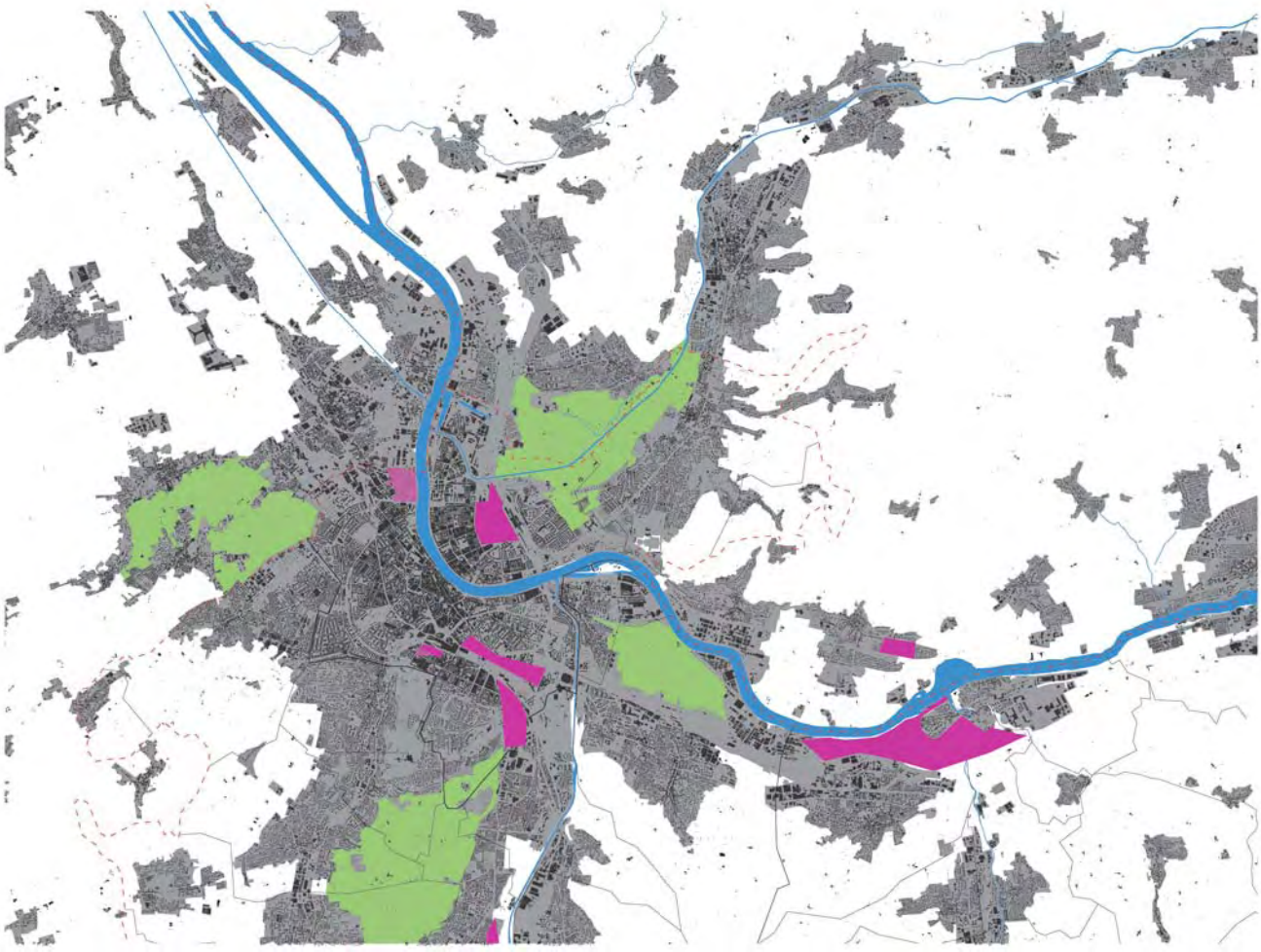


Figure Ground Plan

Urban Parks

WYHLEN: URBAN VOID WITH BIG POTENTIAL



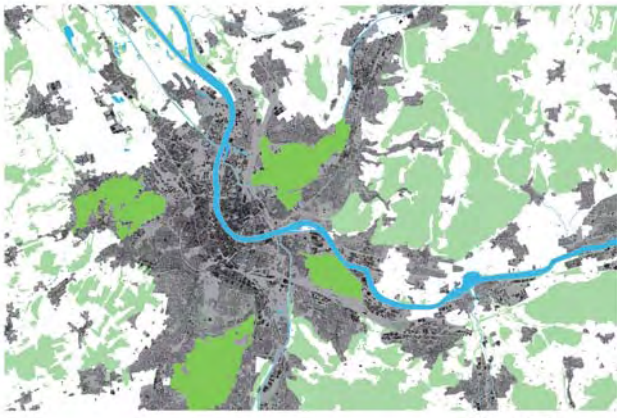
To the East of Basel, as with the whole urban area, a strong and far-reaching process of transformation is underway. This is taking place mainly on the Swiss side, and herein lies the potential risk, that neighbouring regions – particularly on the German side of the border – will not profit from this growth. At issue is not just the way that unique development areas are being allocated, but also the support of city and its surroundings for the future potentially damaging developments.
The unplanned settlement of the metropolitan region of Basel should be stopped, and be replaced by an emphasis on use of the existing, specific qualities of the locations, creating a more varied urban area for Basel, whose individual parts are stronger. Where there are currently no distinctive qualities, these must be created.

Due to its proximity to Basel and the immenent Salina Raurica develpoment, southern orientation,

Im Osten Basels kann wie im ganzen Stadtgebiet mit starken und weitreichenden Transformationsprozessen gerechnet werden. Diese finden hauptsächlich auf schweizer Seite statt. Hierbei besteht die potentielle Gefahr, dass angrenzende Gemeindeflächen, speziell auf der deutschen Seite nicht von diesen profitieren werden. Es handelt sich hierbei nicht nur um das leichtfertige Vergeben von einmaligen Entwicklungschancen, sondern auch um die Unterstützung von der Stadt und Landschaft der Zukunft abträglichen Entwicklung. Es gilt die uneplante Zersiedelung des metropolitnen Raumes Basel zu stoppen und durch Ausnutzung der spezifischen Qualitäten des jeweiligen Ortes einen gesamthaften, facettenreichen Großraum Basel zu schaffen, dessen einzelne Teile sich gegenseitig stärken. Wo bisher keine eindeutigen Qualitäten vorhanden sind, müssen diese geschaffen werden.

Motorways

Public Transport



Mountains

Nature

Individual and public transport

and location on the Rhine, the open space to the south of the borough of Grenzach-Wyhlen presents a unique opportunity for the area to generate a new high-quality area for the local town and the whole Metrobasel region. If a clear, well-presented new identity for the area is not developed soon, in the future the area will gradually become a placeless area on the edge of Basel. It is certainly worth trying to arrest this process.

1. Development of a clear identity on the basis of the area's existing assets, with a relevance to the larger region of Metrobasel
2. Use of this identity
3. Stronger connections to the city centre

A new lake fulfills these criteria particularly well, creating a clear and widely understandable identity.

Die südlich der Gemeinde Grenzach-Wyhlen gelegene Freifläche bietet durch stadtnahe Lage, Süd-Exposition und Nähe zum Entwicklungsgebeit Salina Raurica eine einzigartige Chance sich selbst und gesamt Metrobasel eine Qualität hinzuzufügen. Wird die Erschaffung einer klaren, ausdrucksstarken, exogenen Identität nicht bald eingeleitet, so wird mittel- und langfristig ein Unort am Rande Basels ohne Bezug zur Stadt selbst entstehen. Dies gilt es zu verhindern.
1. Schaffung einer klaren Identität auf Basis der vorhandenen Vorzüge mit Relevanz für den Raum Metrobasel
2. Nutzung dieser Identität
3. Stärkere Verknüpfung mit dem Stadtraum
Eine See erfüllt diese Kriterien besonders gut und schafft eine klare, allgemein verständliche Identität.

Biel

Geneva

Locarno

Lucerne

Neuchâtel

Thun

Zug

Zürich

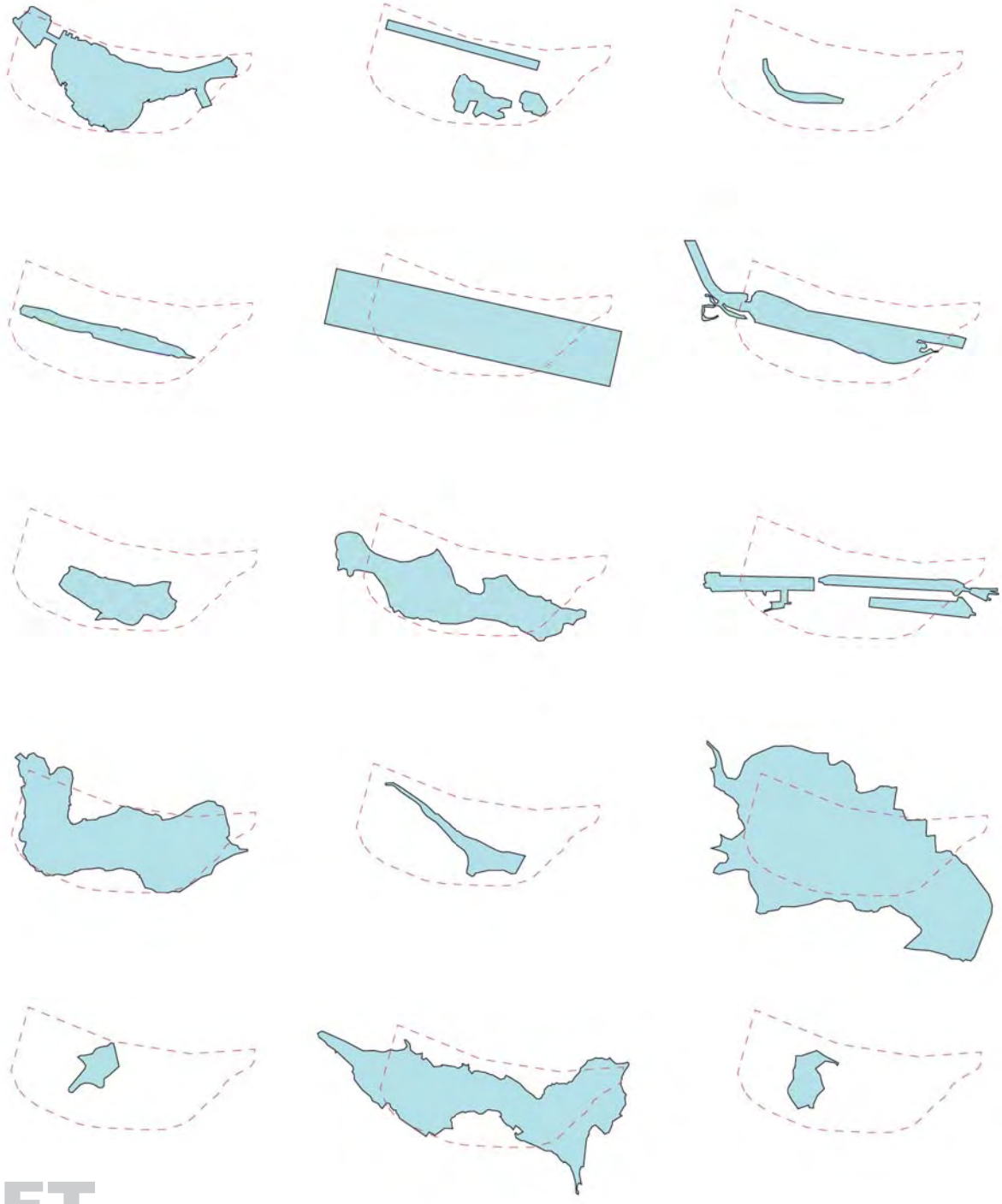
QUALITY OF LIFE, IDENTITY, LAND VALUE SURPLUS

Lugano

For all cities based on a lake, the lake undoubtedly forms a vital part of the identity and attraction of the city to inhabitants as well as visitors. As much as these cities are rightly proud of their lakes, and pleased with the recreational possibilities and natural beauty associated with their lakes, what does this mean for cities without lakes?

In recent years several Swiss cities such as Wintertur and Chur have discussed the possibility of making their own - artificial - lakes. Indeed the Hamburg Aussen- and Innenastler are artificial lakes, but in no way does that hinder its sense of authenticity or worth. This project is an exploration into the possibilities of artificial waterscapes.

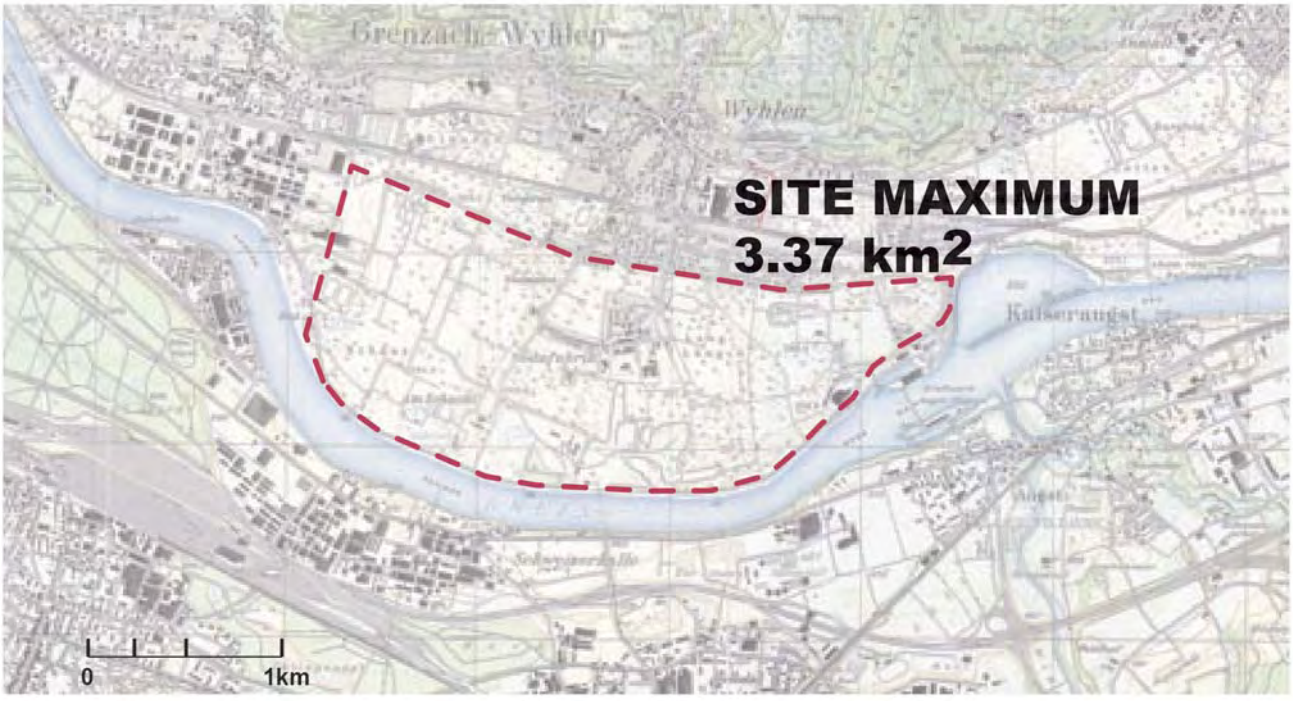
UNDERSTANDING THE SCALE: COMPARISON STUDIES



GRENZACH-WYHLEN PERIMETER

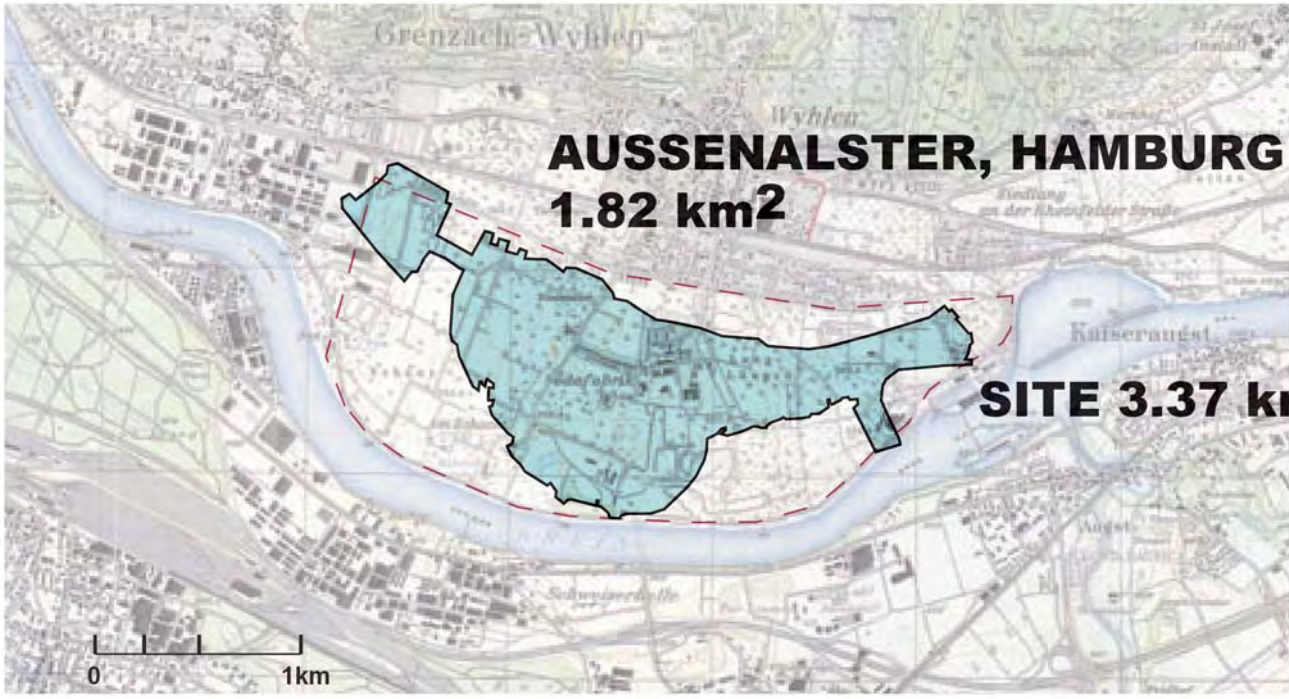
SITE: **WYHLEN**
SIZE: **3.37 sq.km**
PERIMITER: **8.4 km**
ALTITUDE: **270m**

- land is 3 - 5m above river level
- agricultural and industrail near Rhine
- residential towards Wyhlen



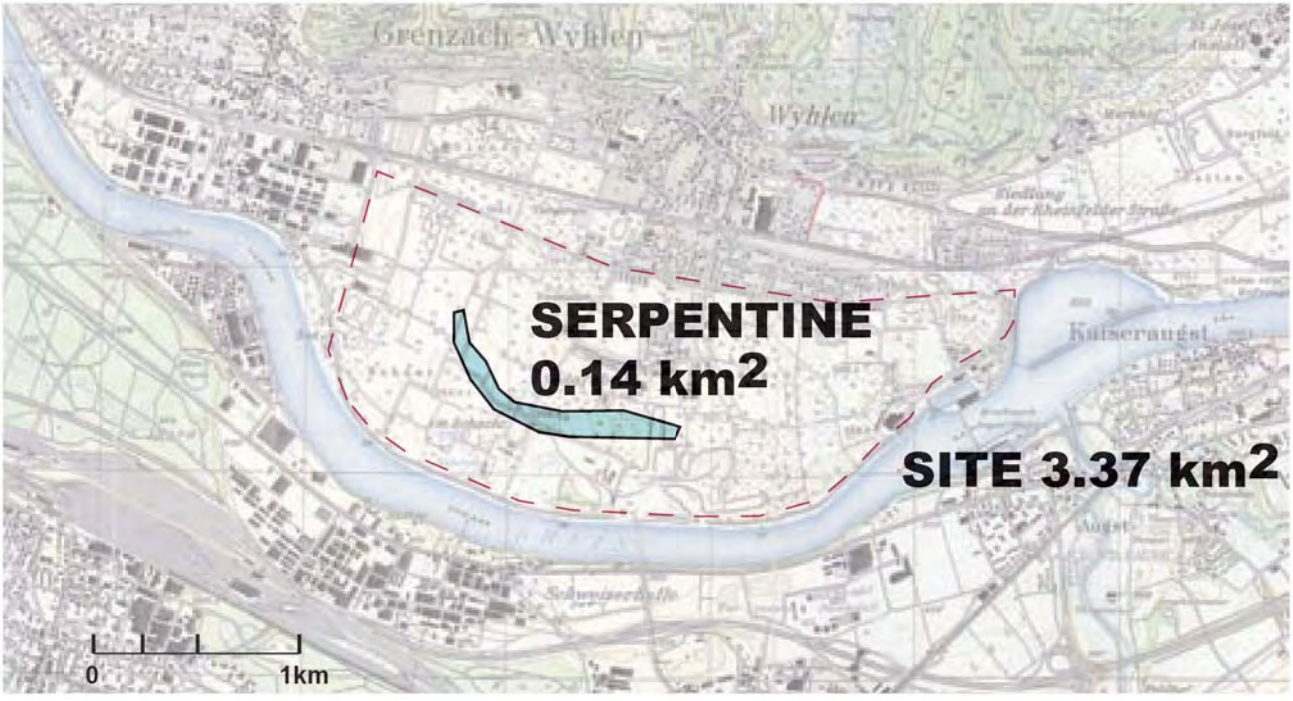
AUSSENALSTER, HAMBURG, GERMANY

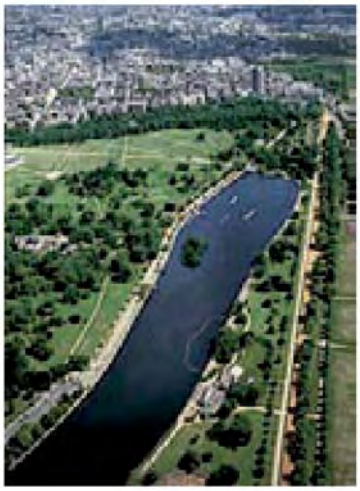
AREA: **1.84 sq.km**
PERIMETER: **10km**
VOLUME WATER: **9.2m m3 (5m depth)**
- artificial lakes
- part of central Hamburg
- public parks around
- popular for sailing and rowing
- popular for jogging



THE SERPENTINE, LONDON, UK

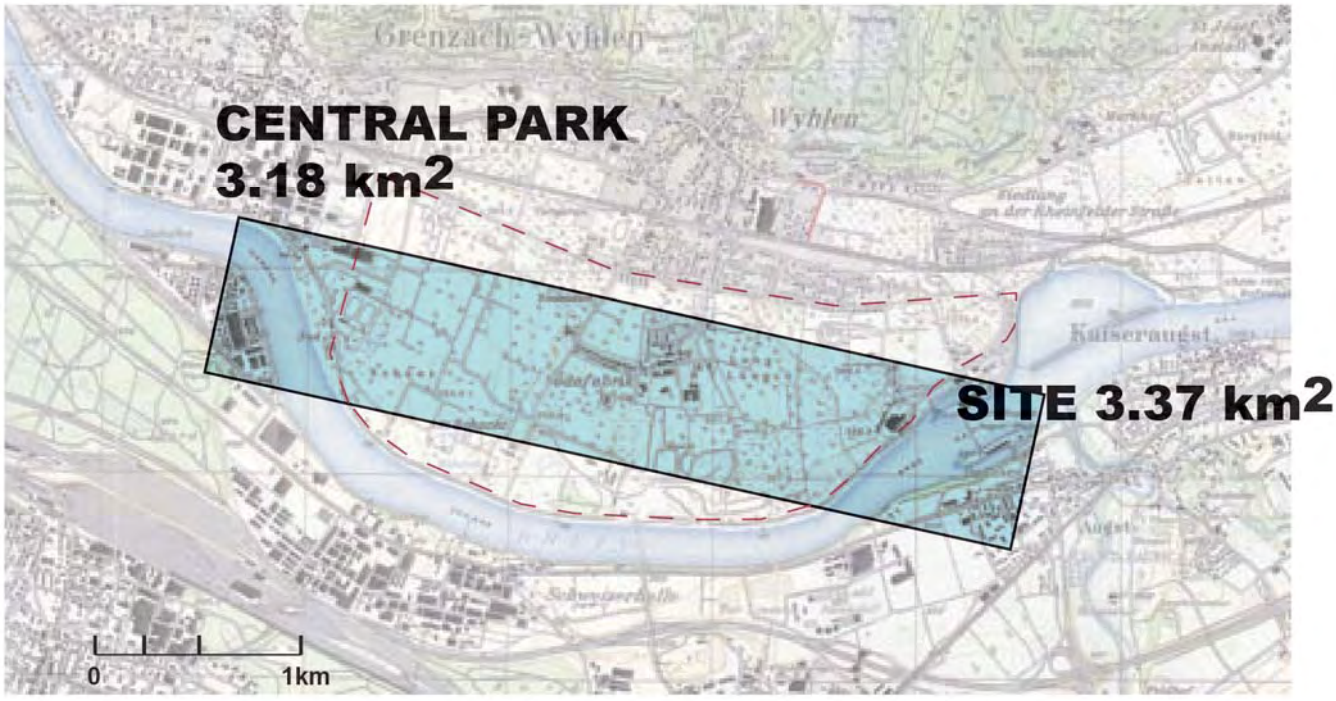
SITE: **THE SERPENTINE, LONDON, UK**
AREA: **0.140 sq.km**
PERIMETER: **2.9 km**
VOLUME WATER: **0.44m m3**
- artificial lake in Hyde Park
- paddle boats
- 500m rowing sprints
- jogging





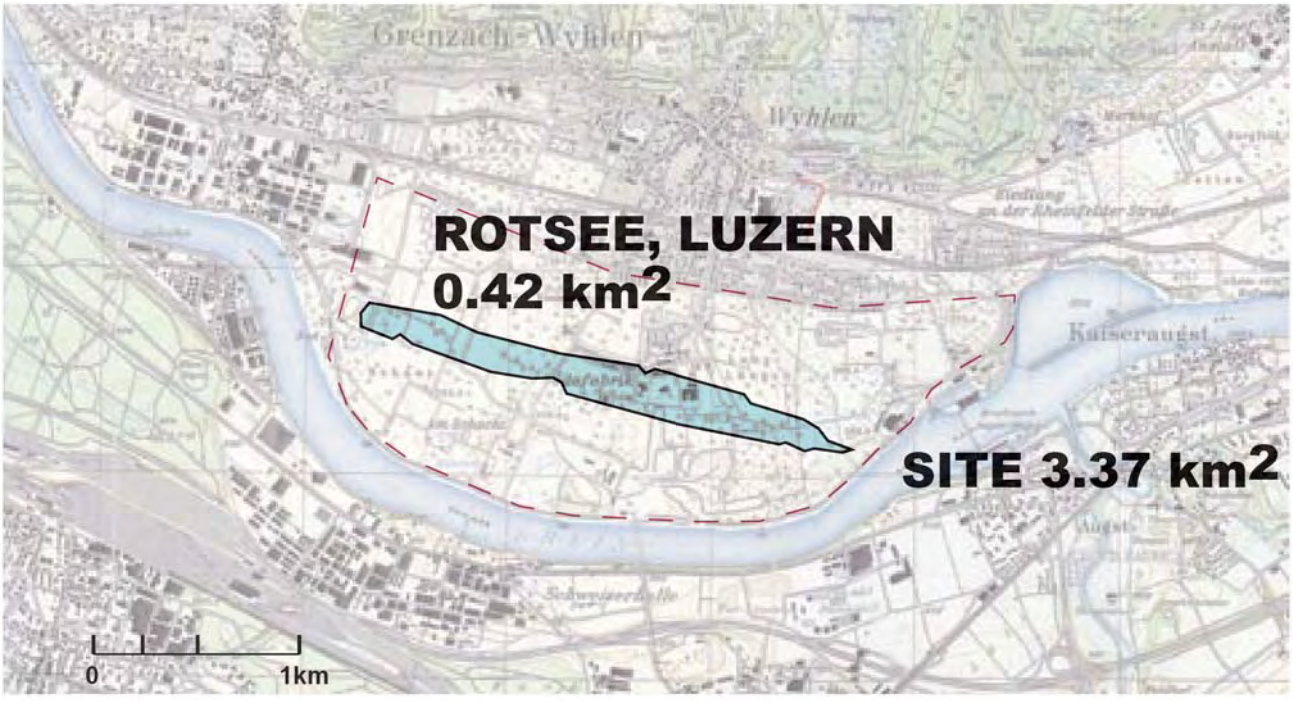
CENTRAL PARK, NEW YORK CITY

SIZE: **3.176 sq.km**
PERIMITER: **9.70 km**
- presented as a size comparison, assuming whole park is a lake



ROTSEE, LUZERN

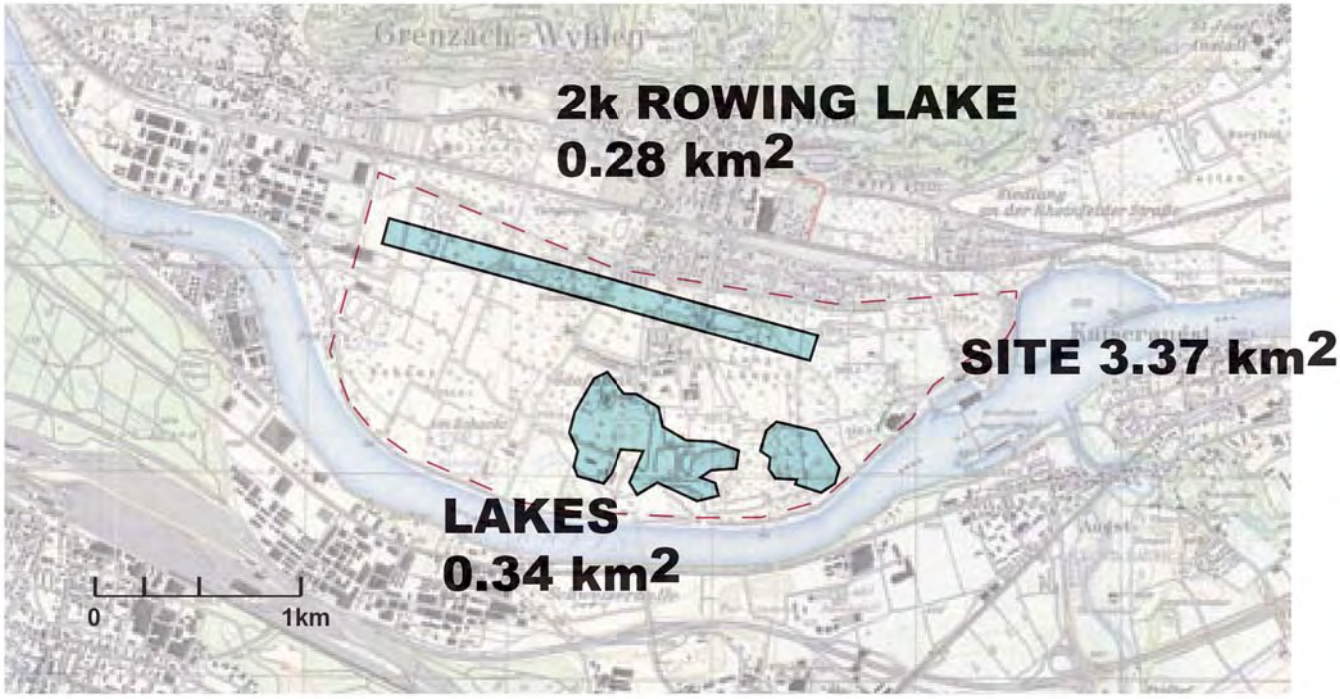
SITE: **ROTSEE, LUZERN**
SIZE: **0.421 sq.km**
PERIMITER: **5.2 km**
VOLUME WATER: **1.93m m3 (6m depth)**
- international rowing regattas
- natural lake
- 2.1 km length



NATIONAL WATERSPORTS CENTRE, NOTTINGHAM, UK

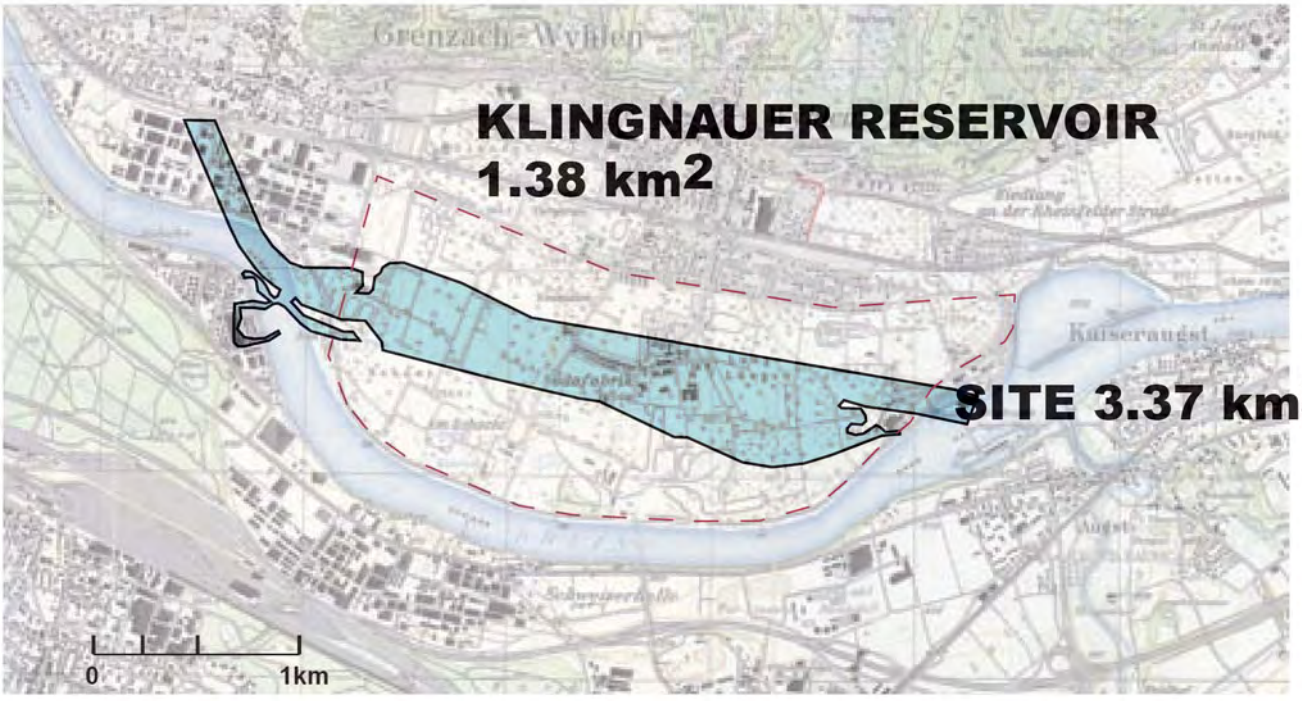
SIZE: **(lakes 0.344; rowing 0.275)**
PERIMITER: **4.6 km (rowing)**
VOLUME WATER: **0.56m m3 (2m depth rowing)**
1.36m m3 (4m depth lakes)

- access to River Trent
- National Watersports Centre
- 2000m regatta lake
- 700m canoe slalom course
- waterski lagoon
- dinghy sailing; windsurfing; powerboating



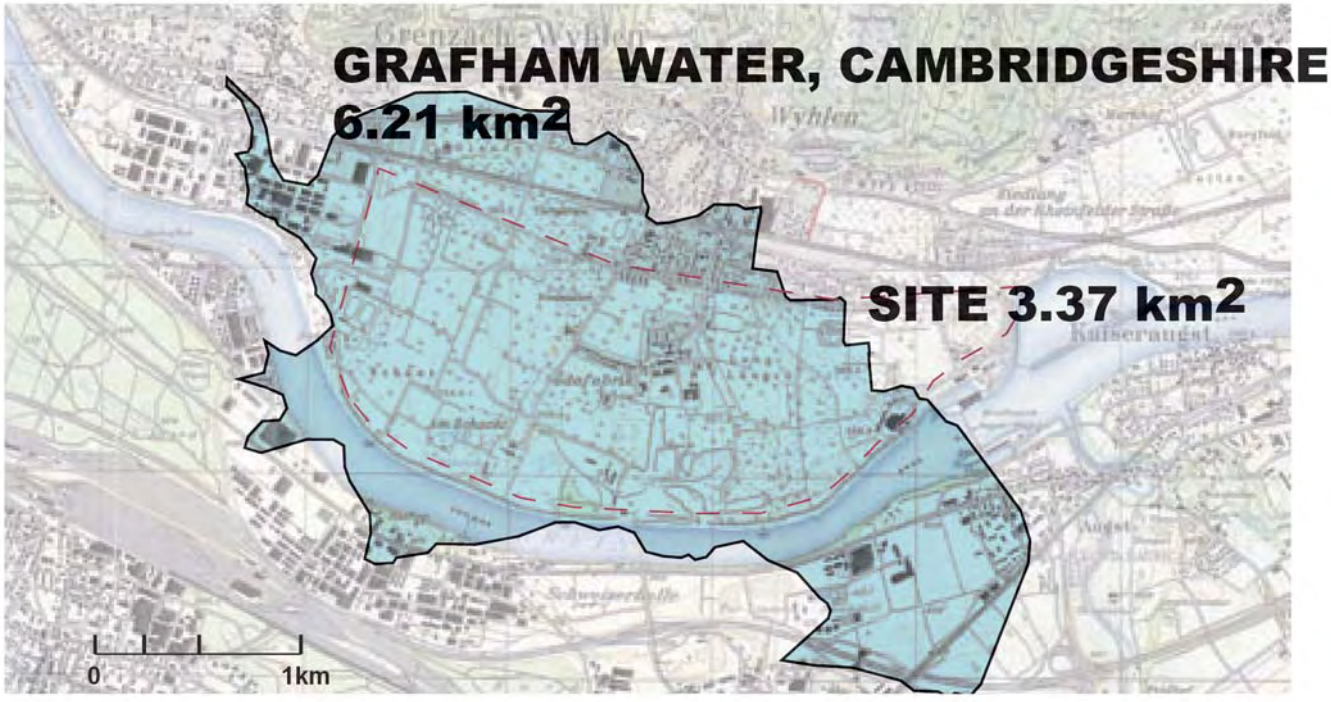
KLINGNAUER RESERVOIR

SIZE: **1.375 sq.km**
PERIMITER: **12.8 km**
MAX DEPTH: **8.5m**
ALTITUDE: **318m**
- low-altitude reservoir by the Rhine, located just before Aare river reaches the Rhine
- created from a flood of the Rhine breaching a flood defence bank in the late 1890s
- important nature reserve



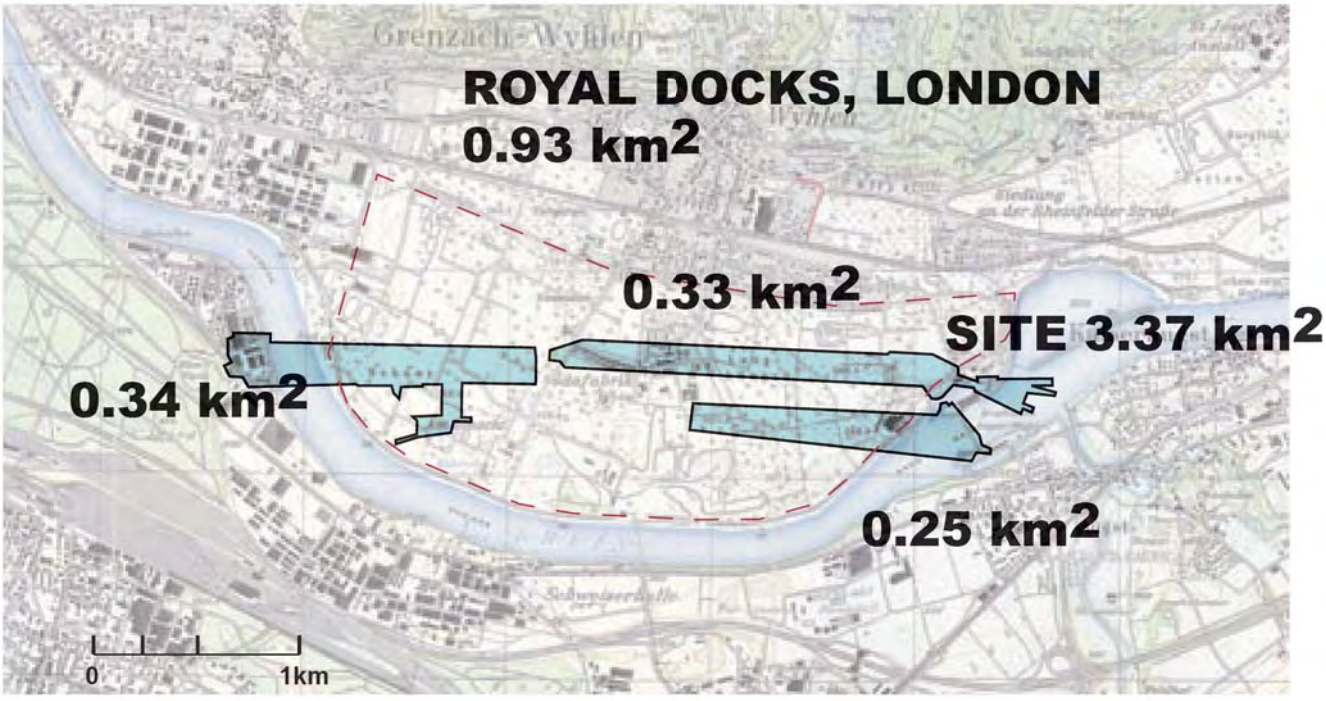
GRAFHAM WATER RESERVOIR, CAMBRIDGESHIRE, UK

SIZE: **6.213 sq.km**
PERIMITER: **15.0 km**
VOLUME WATER: **5.1m m3**
- sailing, windsurfing, powerboating clubs
- outdoor recreation centre
- walking and fishing
- provides drinking water, not electricity



ROYAL DOCKS, LONDON, UK

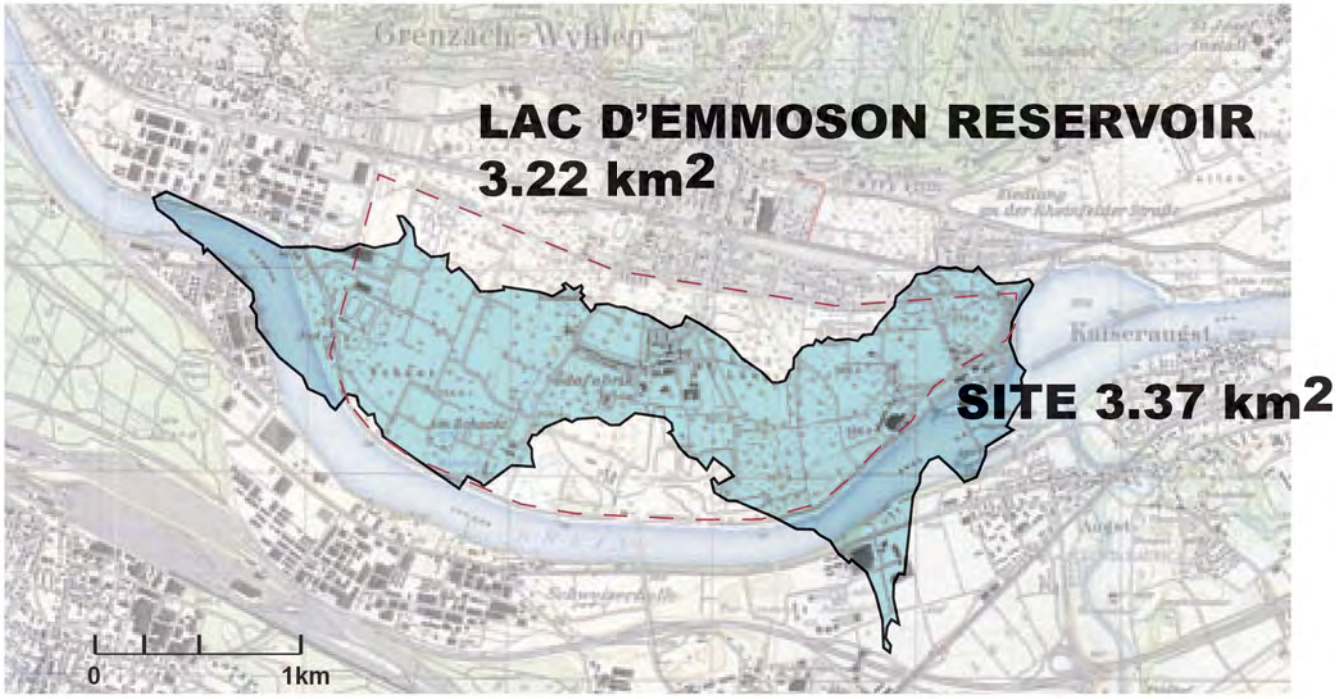
SIZE: **0.841 sq.km (0.31/0.30/0.23)**
PERIMITER: **21.6 km (4.46/5.44/3.15)**
VOLUME WATER: **6.72m m3 (8m depth)**
- previously used for large cargo ships
- now used for sailing, rowing clubs
- new office and residential areas under development



LAC D'EMMOSON RESERVOIR

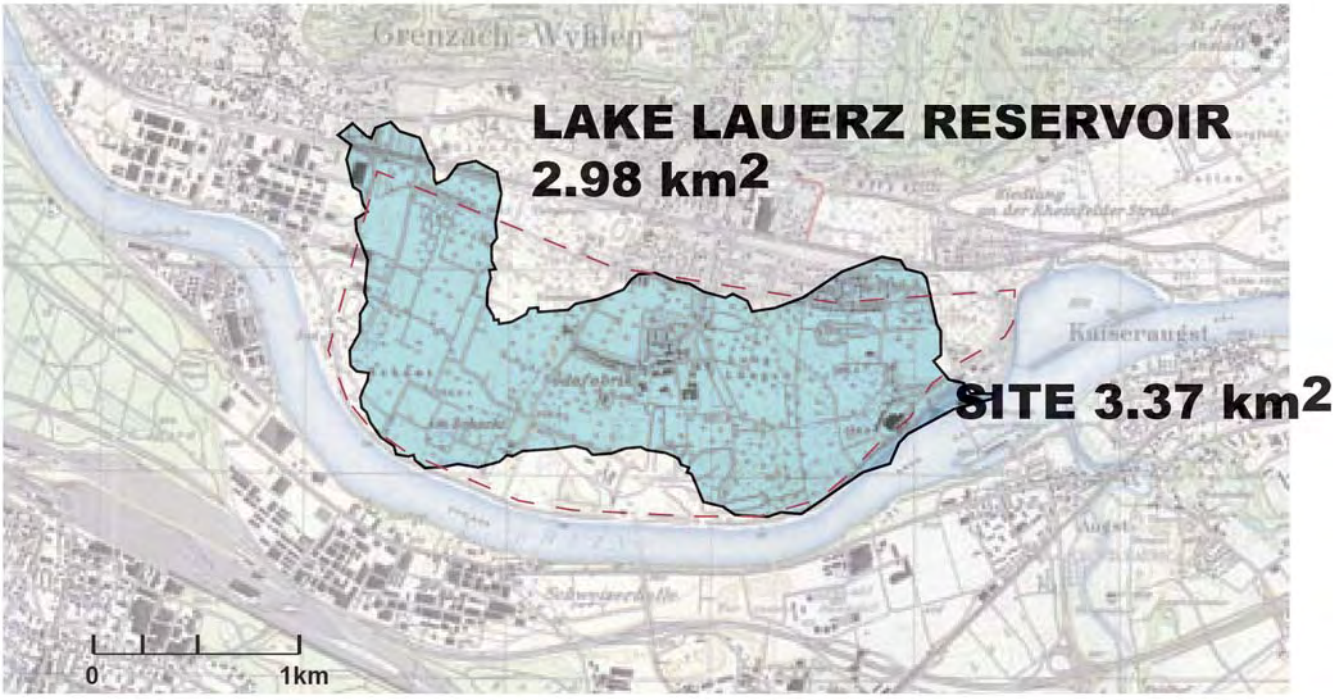
SIZE: **3.215 sq.km**
PERIMITER: **13.9 km**
MAX DEPTH: **161m**
VOLUME WATER: **227m m3**
ALTITUDE: **1930m**

- owned by SBB railway company
- 180m high arch dam wall
- high altitude electricity-generating dam, 60m3/s



LAKE LAUERZ RESERVOIR, SWITZERLAND

SIZE: **2.975 sq.km**
PERIMITER: **12.8 km**
MAX DEPTH: **13m (ave. 7.6)**
VOLUME WATER: **23.4m m3**
ALTITUDE: **447m**
- water residence time 0.3387 years
- two small islands in the middle



LOCATION

TOPOGRAPHY

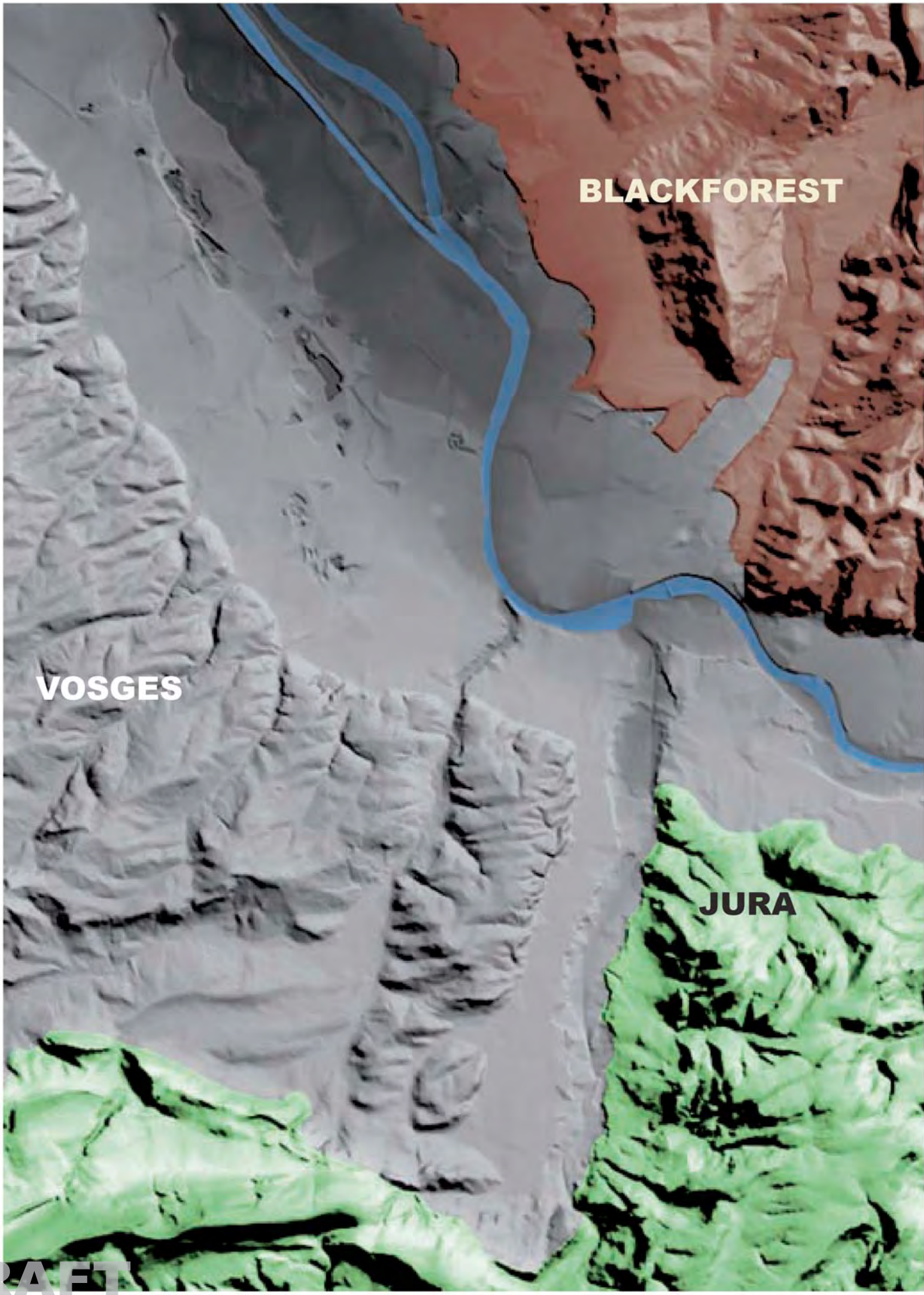
NATURE

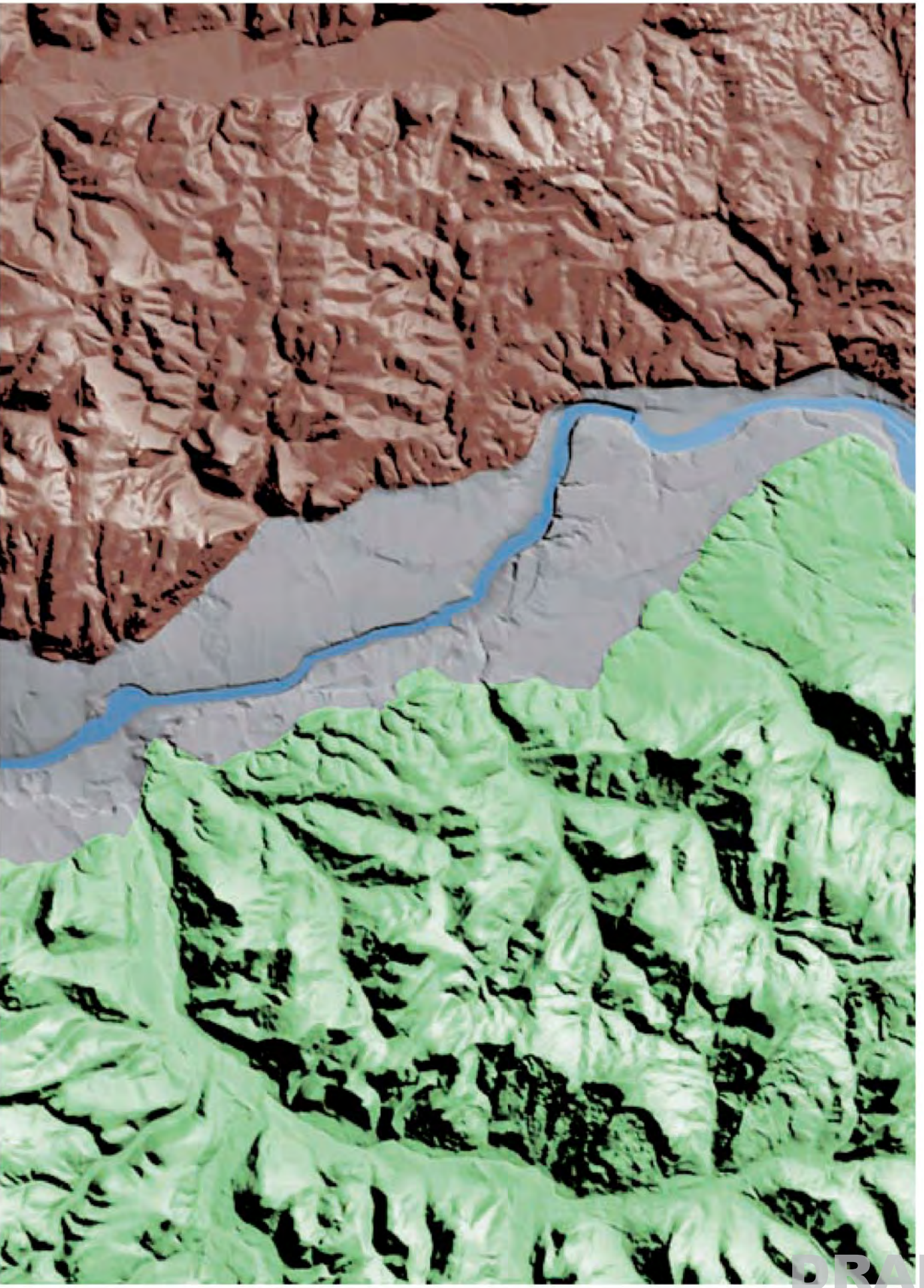
TOWN

INDUSTRY

FLOODING

ENERGY PRODUCTION



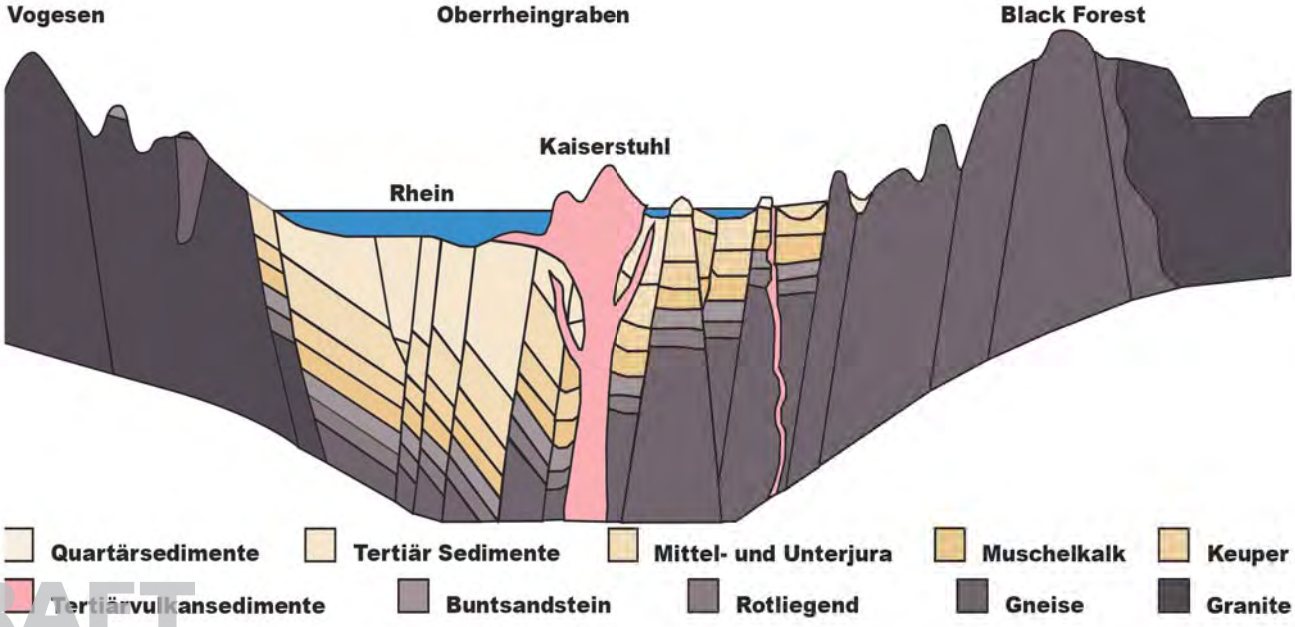


Location

From Basel the black forest stretches 160 km north along the oberrhynian lowlands. It measures 60 km of width in the south and only 30 km in the north.

Formation of the black forest

[65 - 56 mya] by lowering of the oberrhein rift. A wave-like movement resulted and lifted the edges. black forest and vogesen are today the witnesses. Thus the older cristalline foundation was uncovered. Today the gneis can be seen where the layer of Trias (Buntsandstein, Muschelkalk und Keuper) has been weathered away (mainly south- and middlepart).



THE BLACK FOREST IS A RESULT OF THE FORMATION OF THE OBERRHEIN FAULT

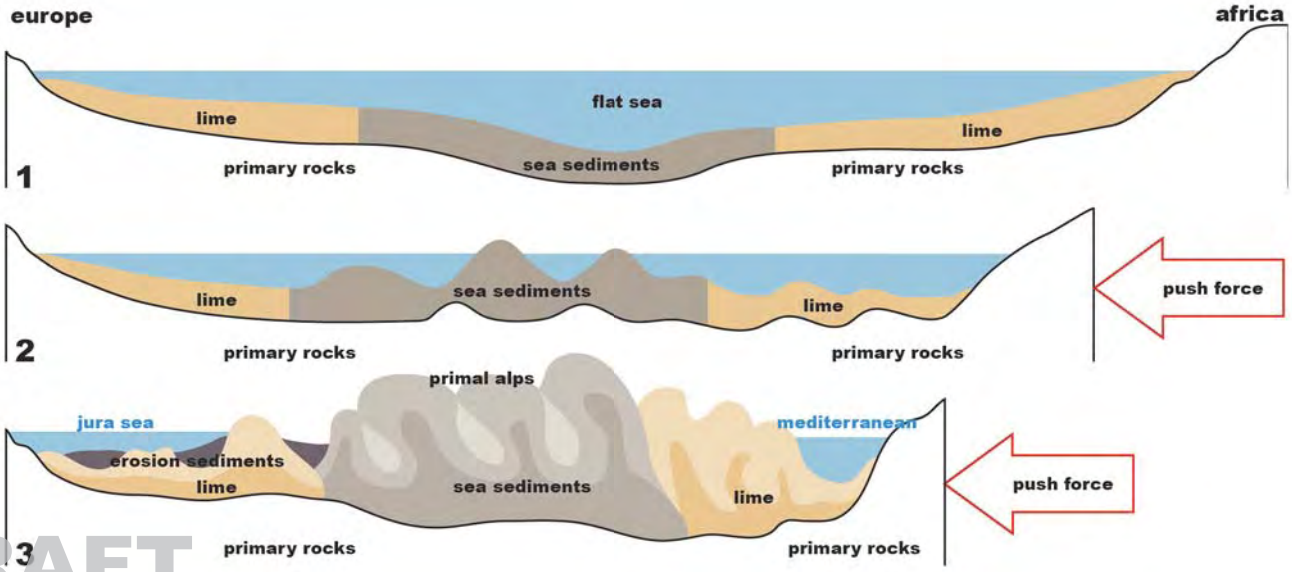
Landscape
The Black Forest can be divided by its geomorpholigy in the eastern part with its rounded hills, wide plateaus, the danubian relief, and the intensively insected ridge towards the Oberrheingraben, the rhynian relief. There the highest hilltops can be found (the highest is the Feldberg with 1493m absolute altitude) and the biggest height differences (upto 1000 m). The valleys are mostly narrow gorges, rarely basin-like.

Location

The Jura Mountain Range stretched over 750km from Isère in Eastern France first towards North, then towards North-East to the Upper Main in Germany.
French and Swiss Jura form a continous mountain range which is seperated by the southern tips of Black Forest and the Rhine from the German Jura.

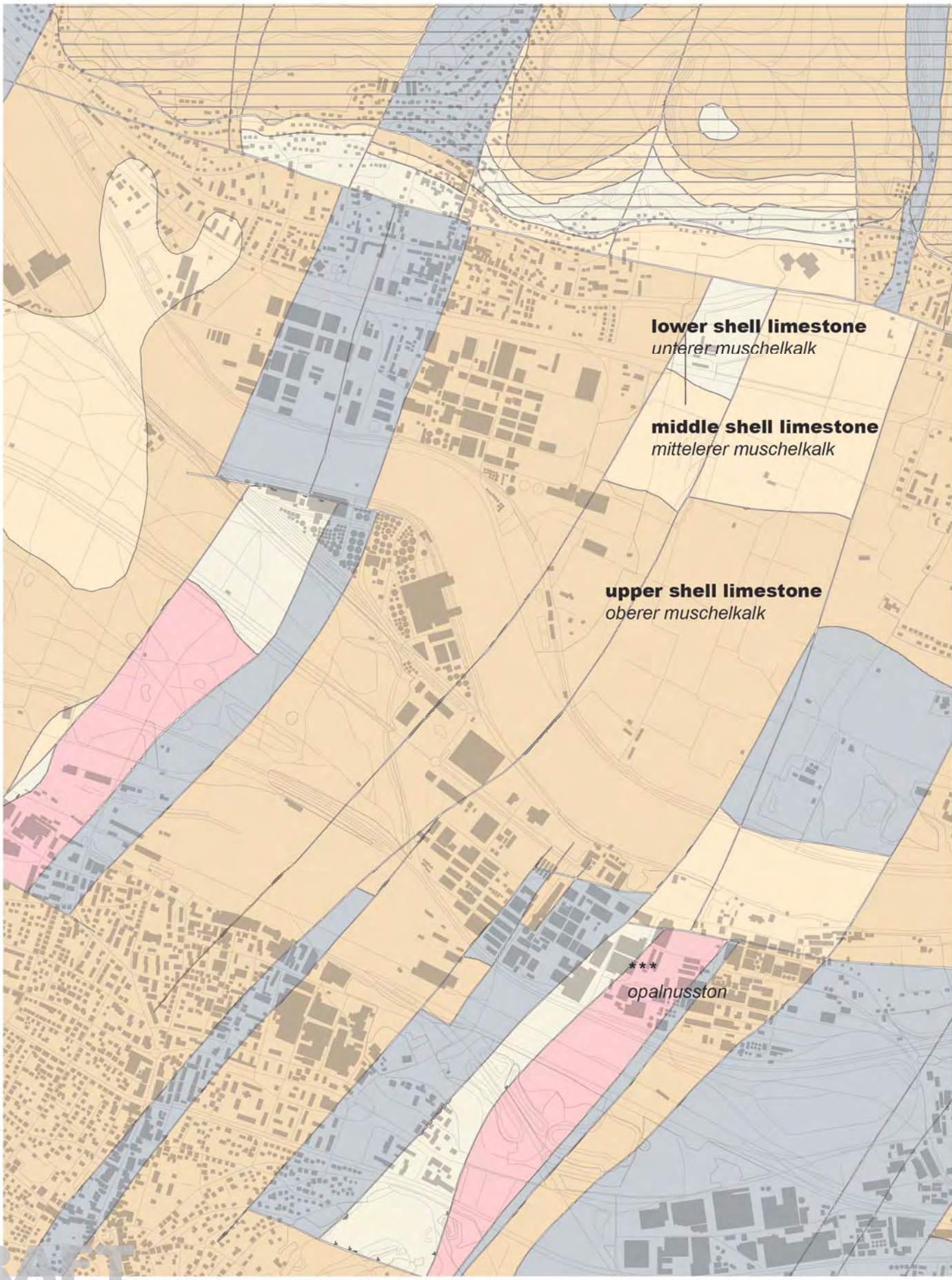
Formation of the Jura [10 - 2 mya]

The constant pushing forces that had formed the alps lifted the geosynclinats from the earlier timeage of the jura which had meanwhile filled with molassesediments (2/3 consisting of limestone, the rest of marl and clay-layers). The Layers were folded whereas the cristalline base was not. The distance of the sliding movement varies between 2 and aproximately 35 km (section at Mont Risoux). The rock salt which is today used in Rheinfelden and near Schweizerhalle was formed before that, through evaporation of water from the Thetys sea which covered all the area south of the black forest and the vogesen - the alps didn't yet exist.

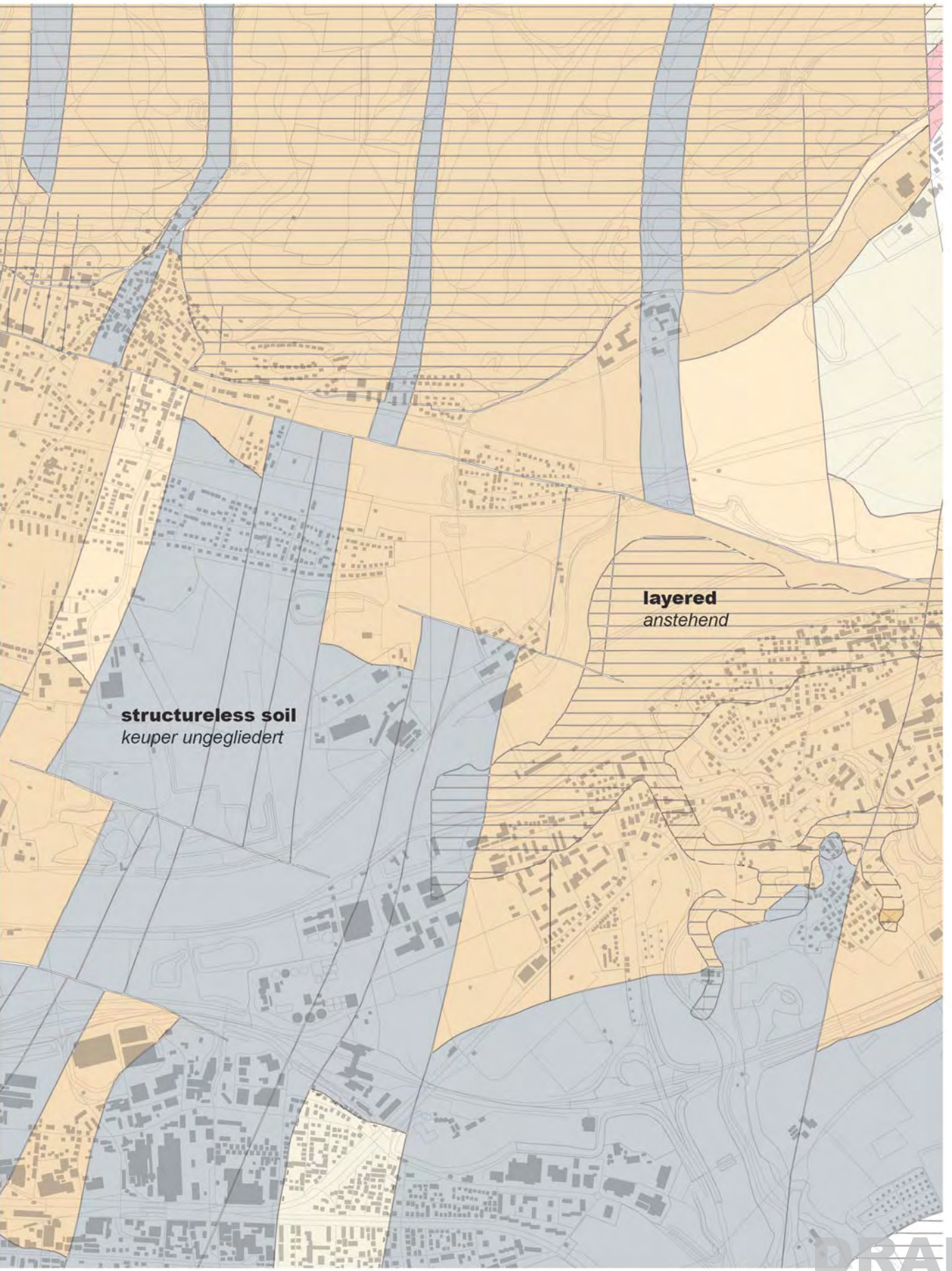


THE YOUNG JURA RANGE IS OF SEDIMENTARY ORIGIN

Landscape
Dependend on the kind and intensity of folds you can differenciate two different forms of landscape. Tafeljura is unfolded and can only be found on the northern end. The rest consists of Faltenjura which can be further subdivided into Plateaujura und Kettenjura. Latter is most characteristic for the Jura with its succession of folding maxima (Antiklinalen) and folding basins (Synklinalen).



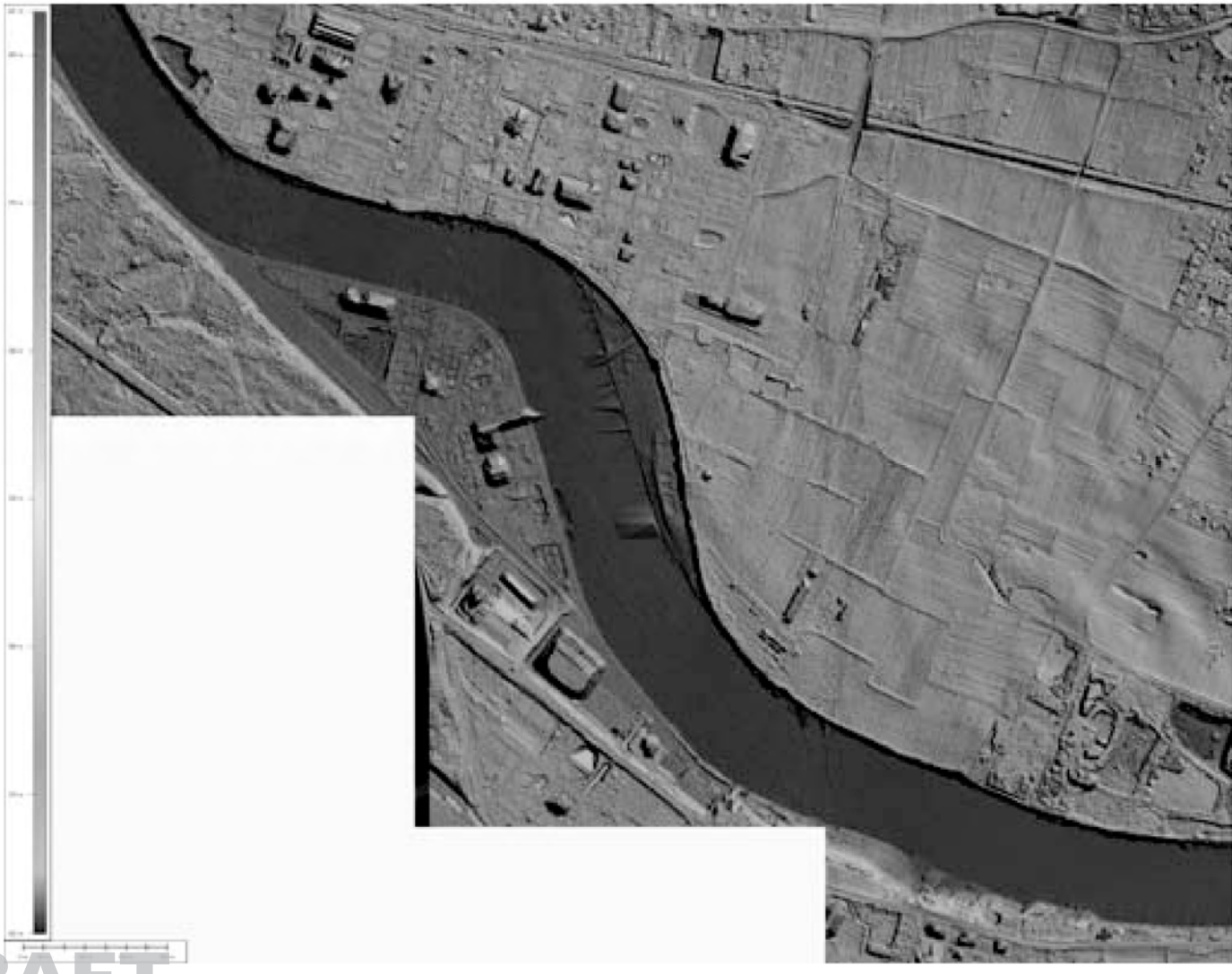
GEOLOGICAL MAP OF SITE



maps: staStABS planarchiv
G1,20; G1,25; G1,17

1711

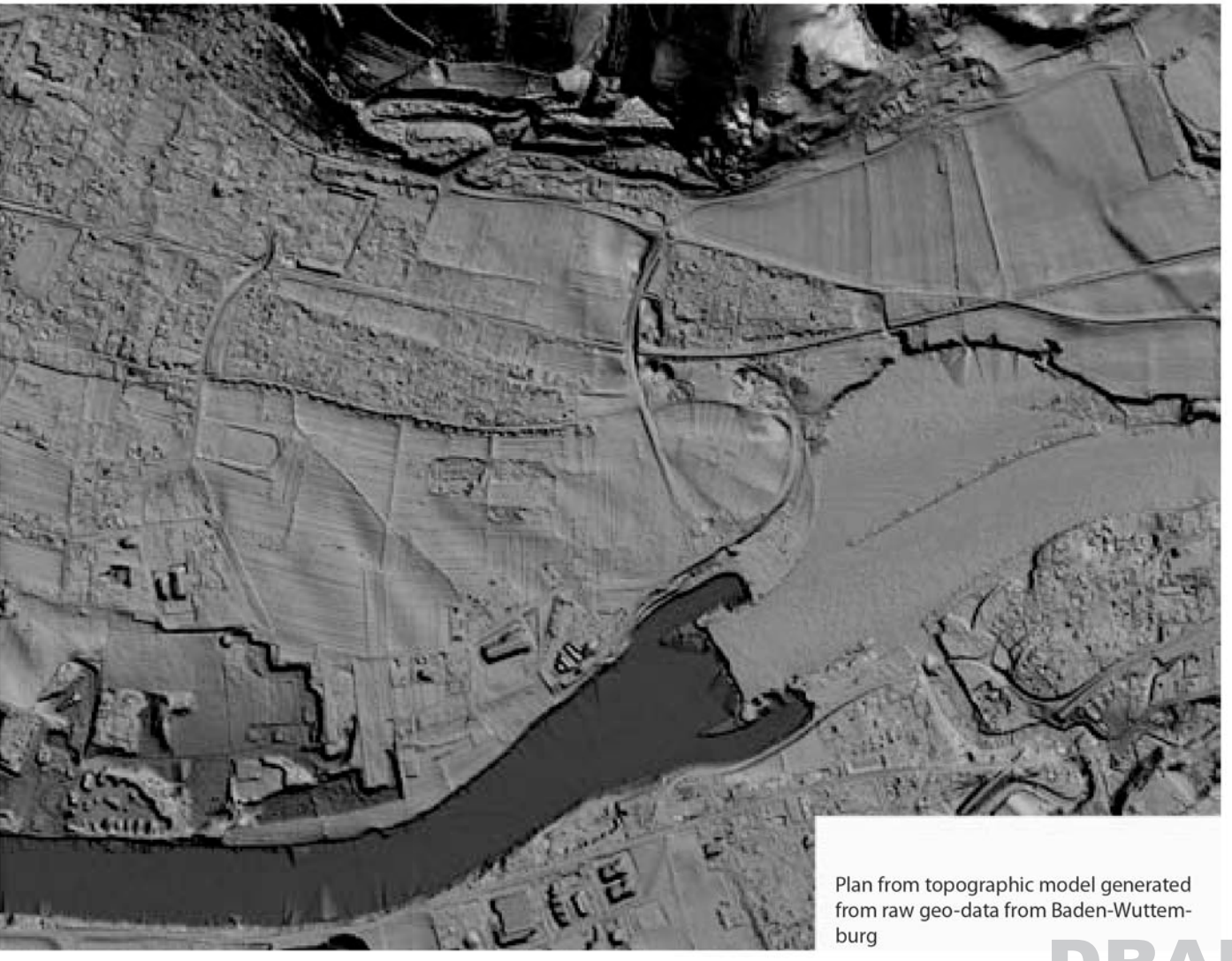
1827



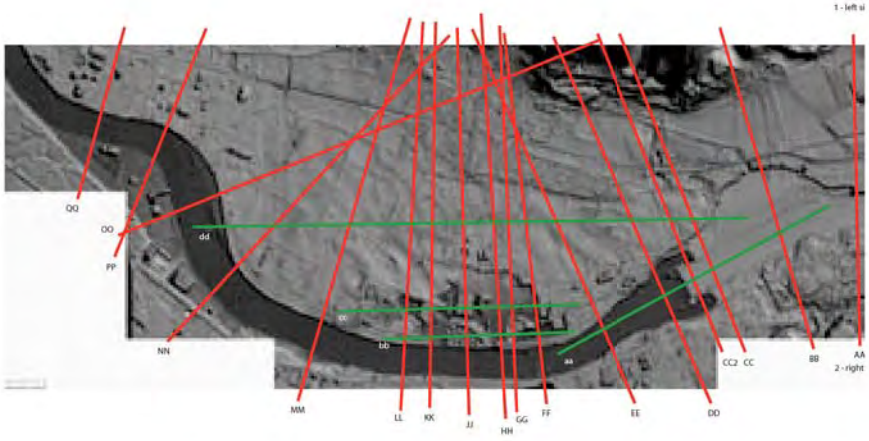
RIVER PATH HAS NOT CHANGED RECENTLY

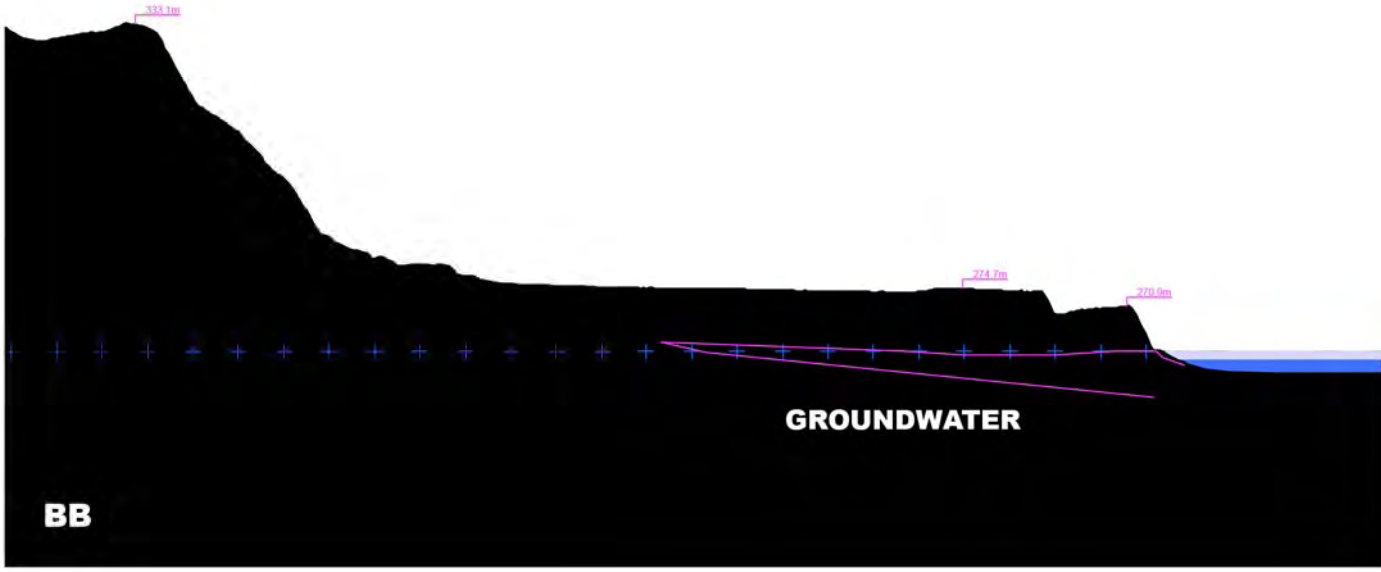
1879

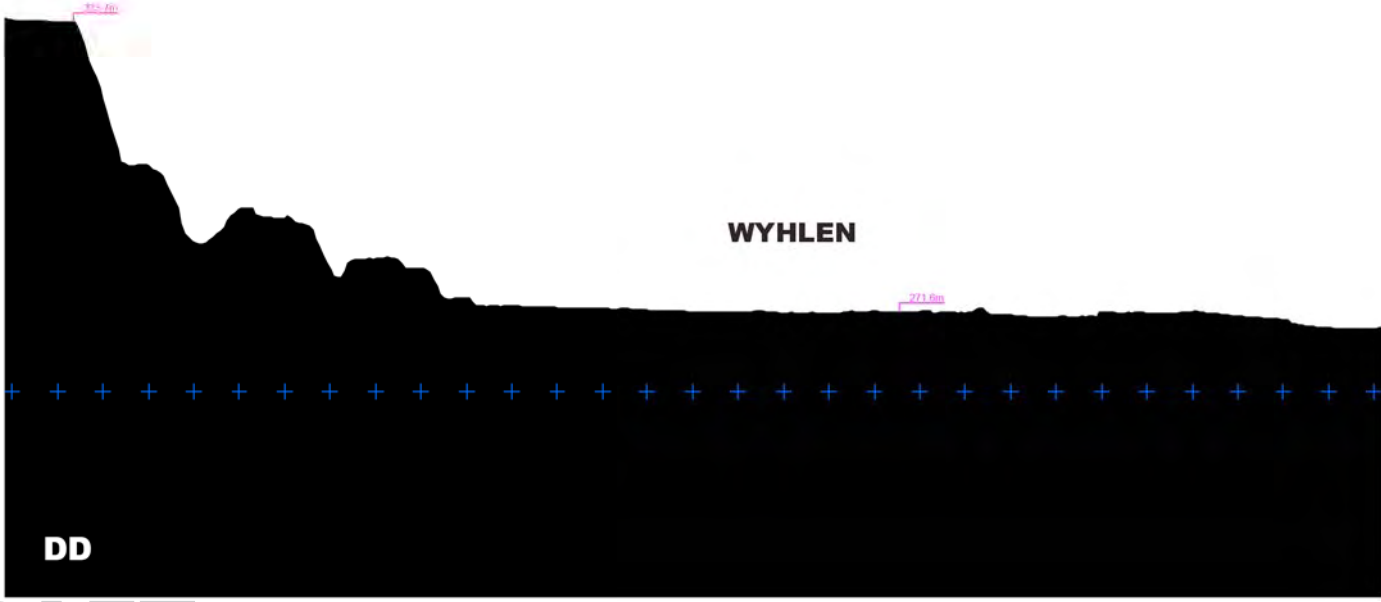
2004



Plan from topographic model generated from raw geo-data from Baden-Wuttemburg







SECTIONS CLEARLY SHOW THE HEIGHT OF THE RIVER BANKS RELATIVE TO THE WATER LEVEL

The sections presented below are key to understanding the challenges and opportunities that the site presents for a new lake. Additionally, it is clear that the river level would have to rise by over 6m for any of the upper land to be flooded. However, clearly many of the gravel pits have the potential to be flooded more easily, and indeed several have shallow water pools, coming through from groundwater.

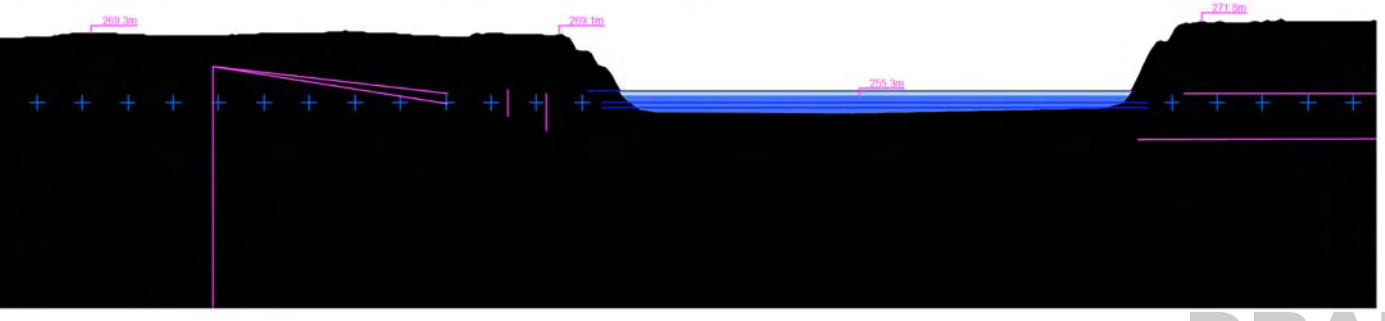
The level of the river does change, however, represented by the lighter blue line (high point) and the lower darker blue line (low point). Pink lines underground indicate areas and depths of groundwater, which does meet the river at the banks.

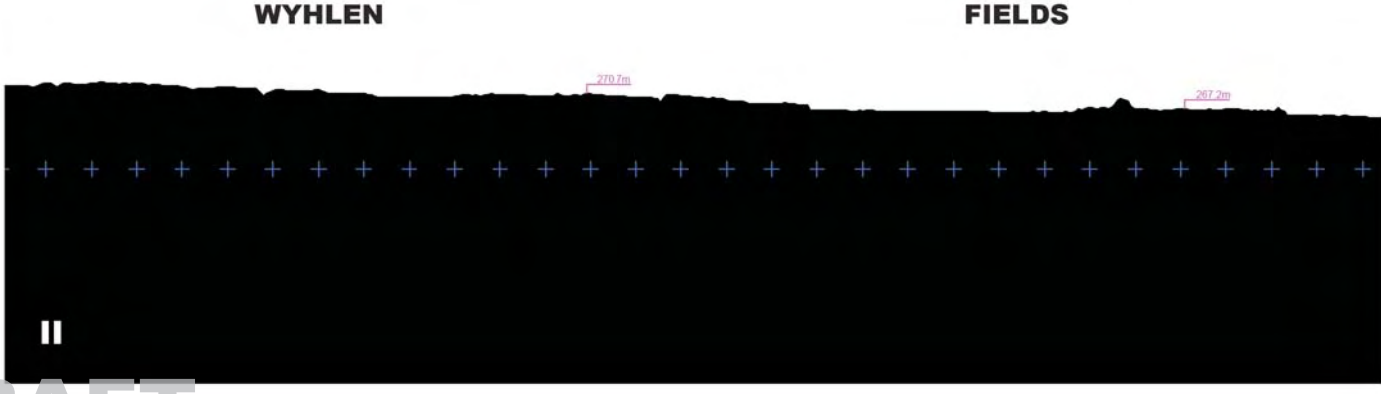
The sections have been exaggerated vertically by a factor of three to make the topological differences ea-

BEFORE DAM

AUGST

AFTER DAM

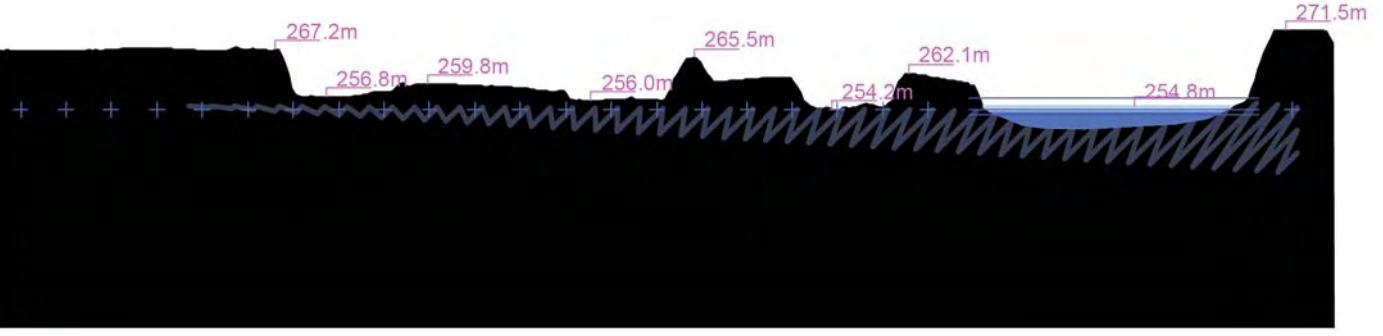




AUGST

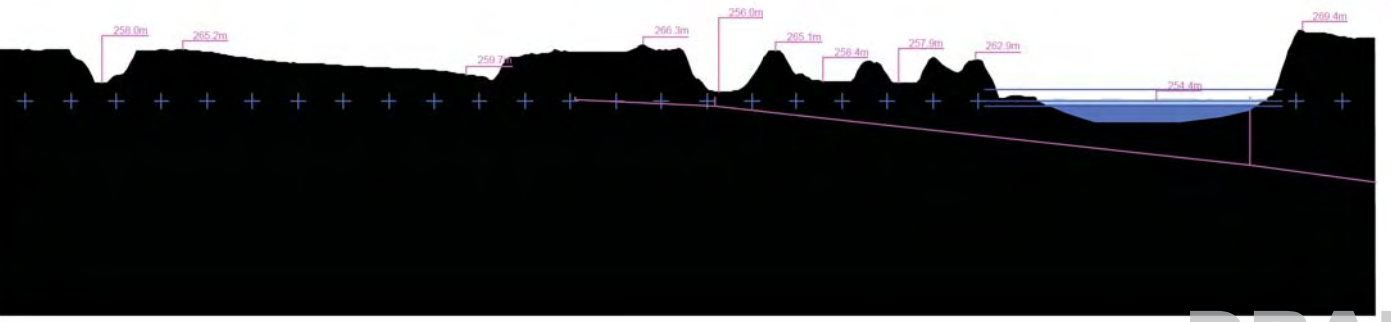
INDUSTRIAL PARK

GRAVEL PITS



PRATTELN

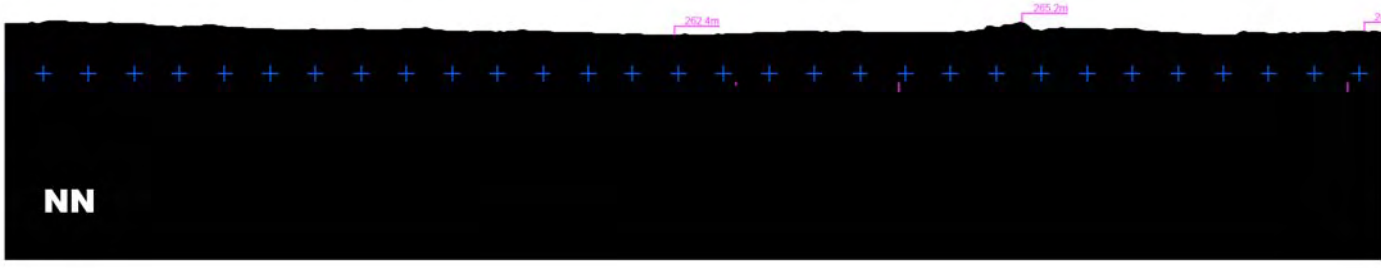
GRAVEL PITS



WYHLEN

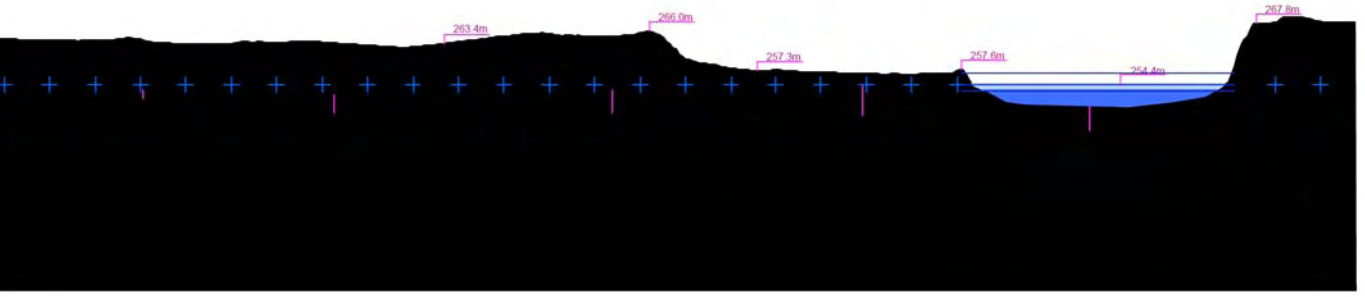
FIELDS

FIELDS

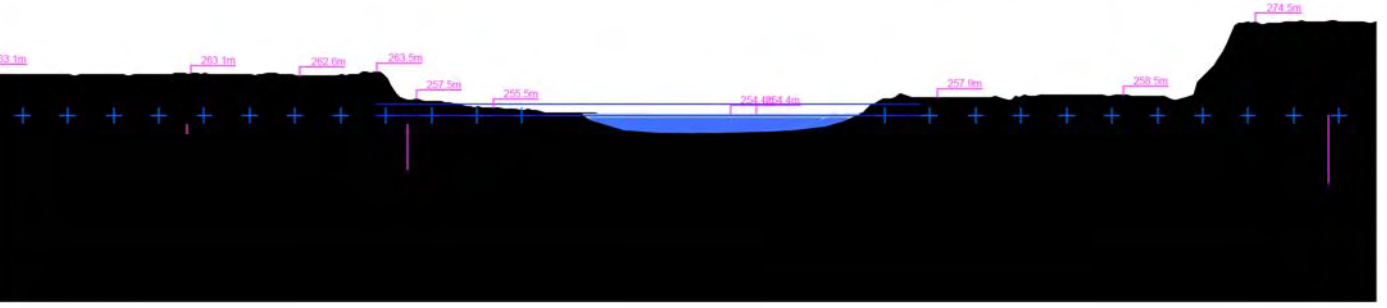


64

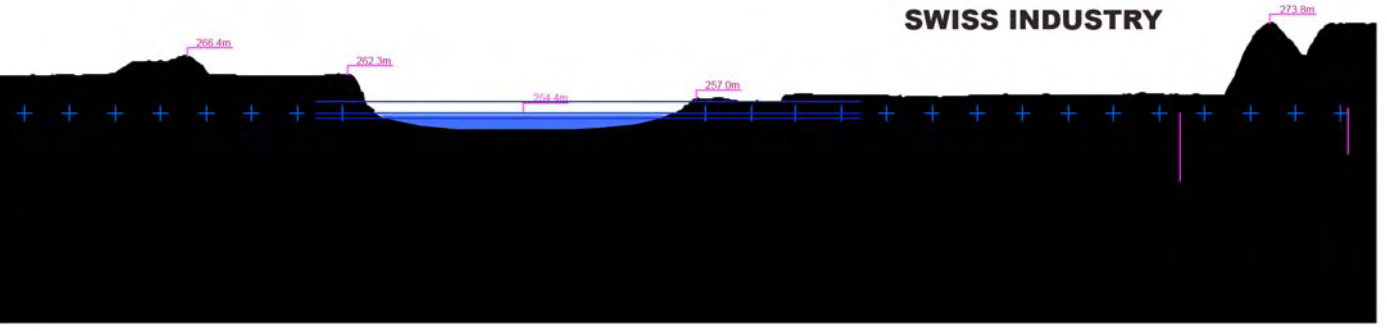
SWIMMING POOLS

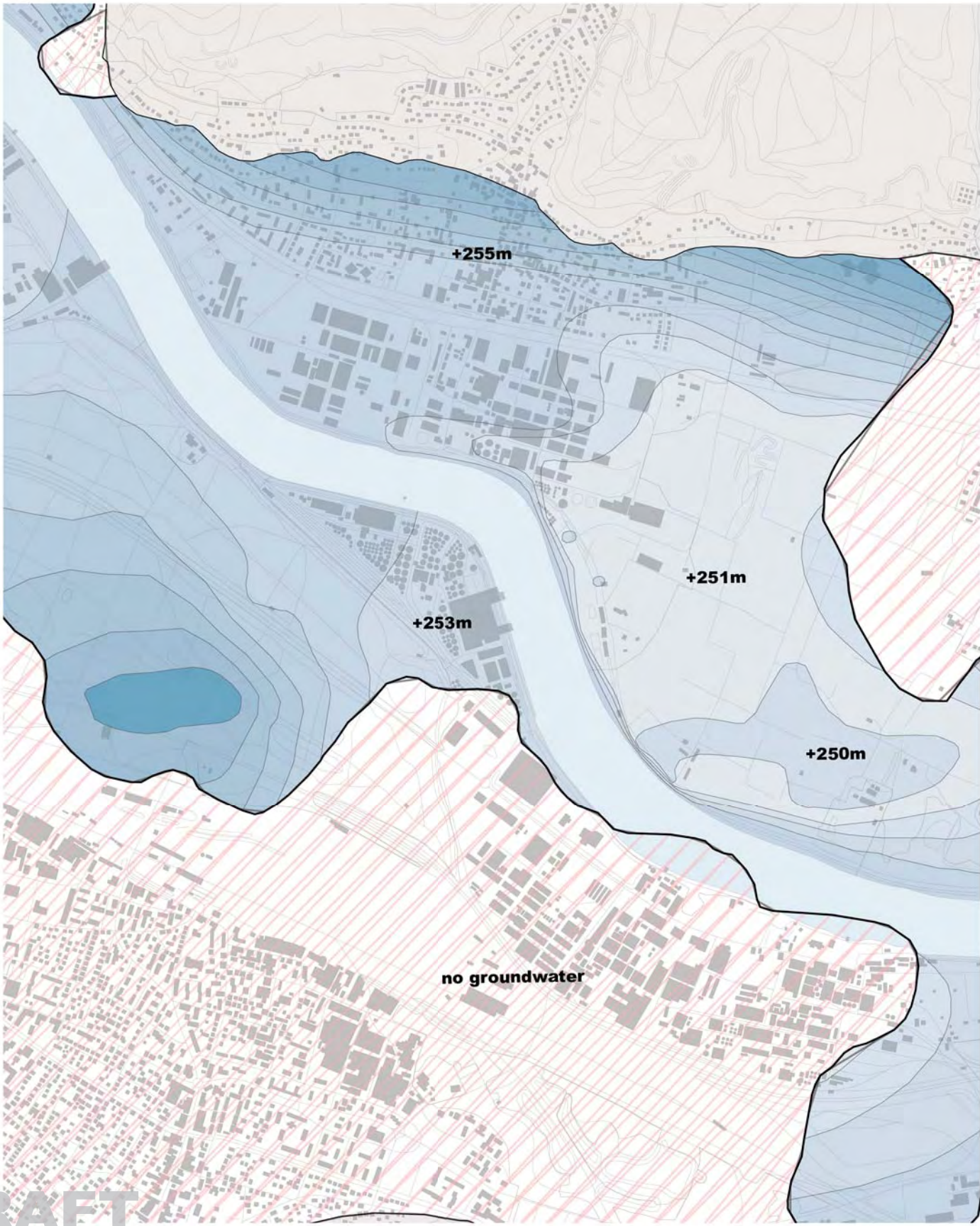


SWISS INDUSTRY

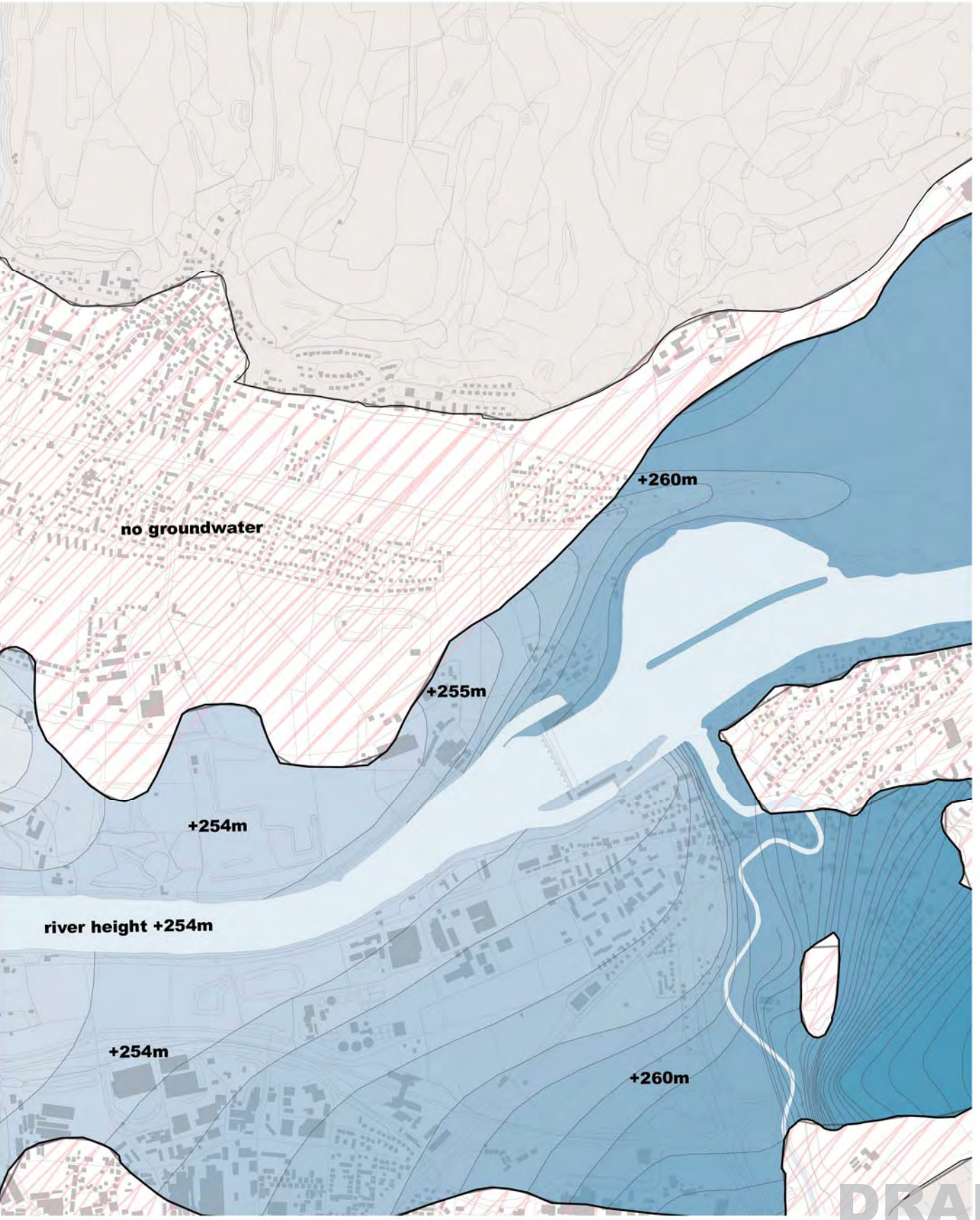


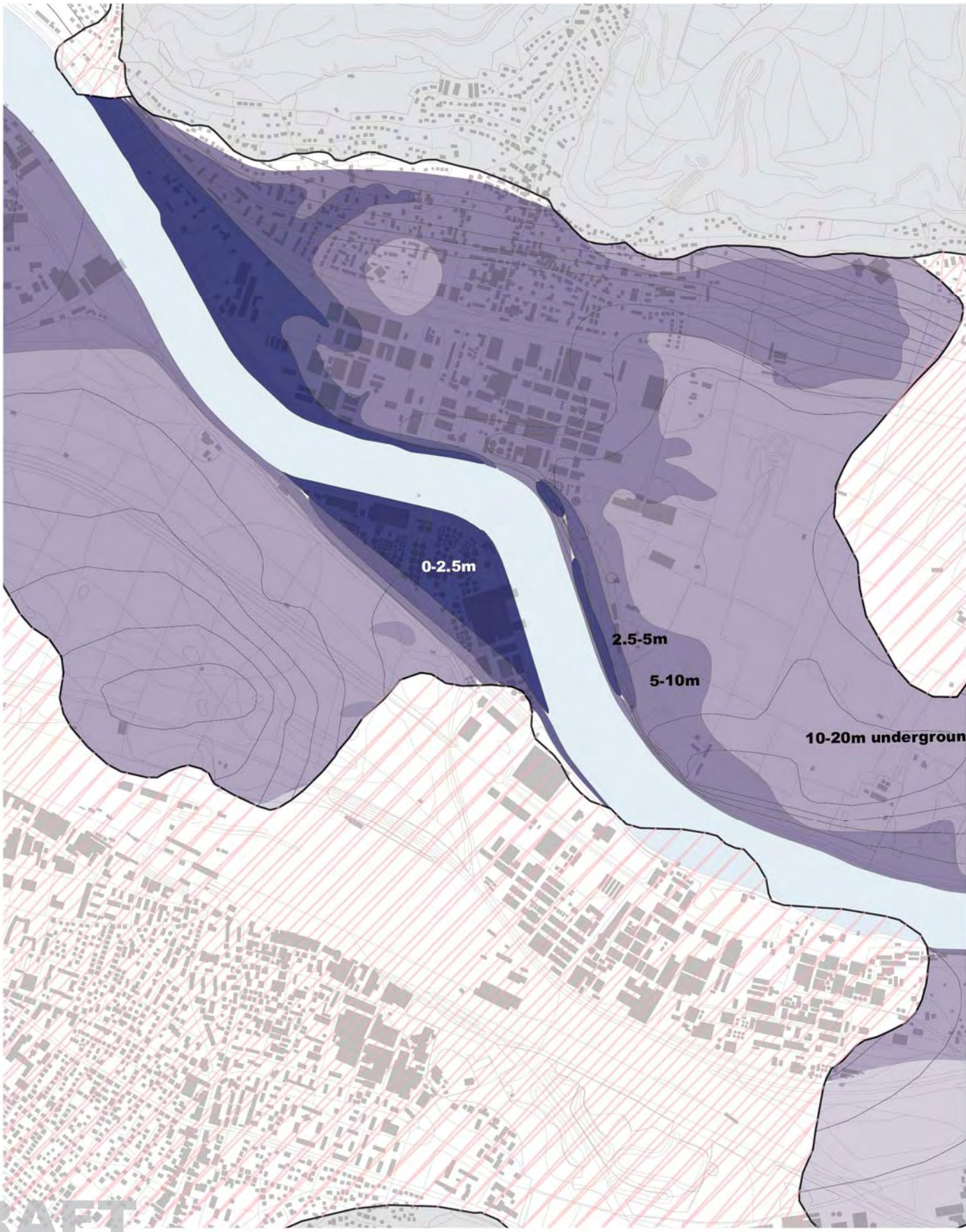
SWISS INDUSTRY



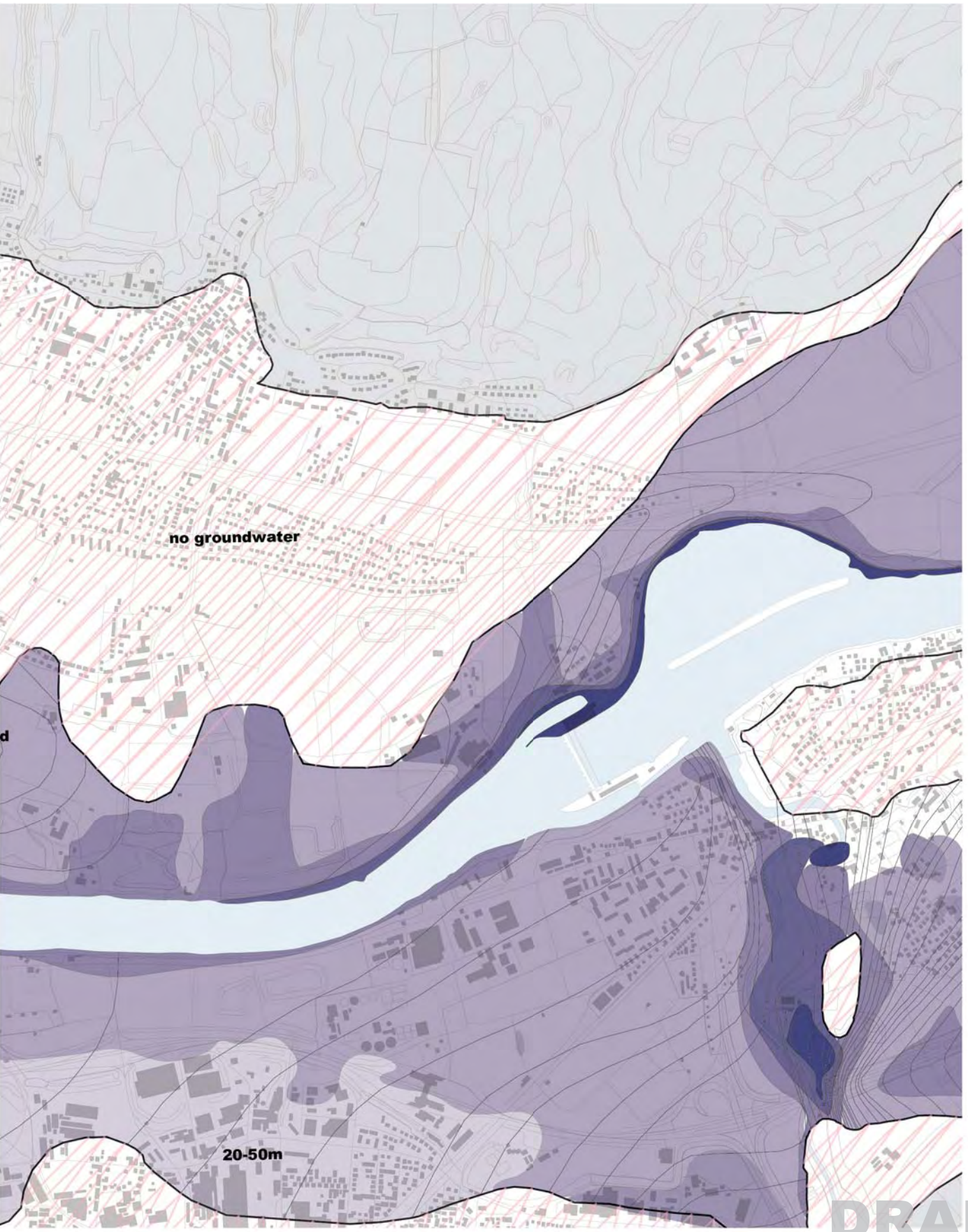


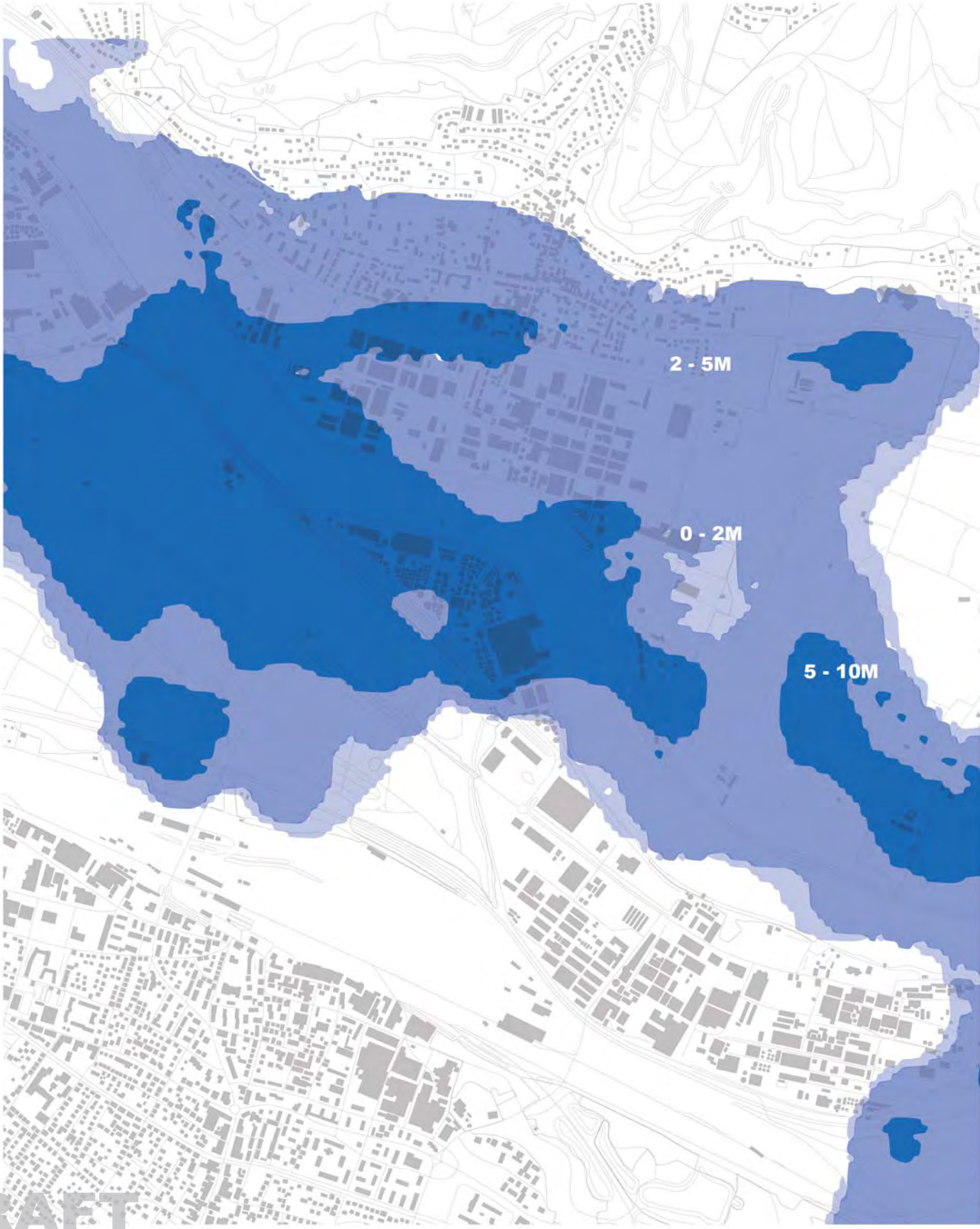
TOP LEVELS OF GROUNDWATER



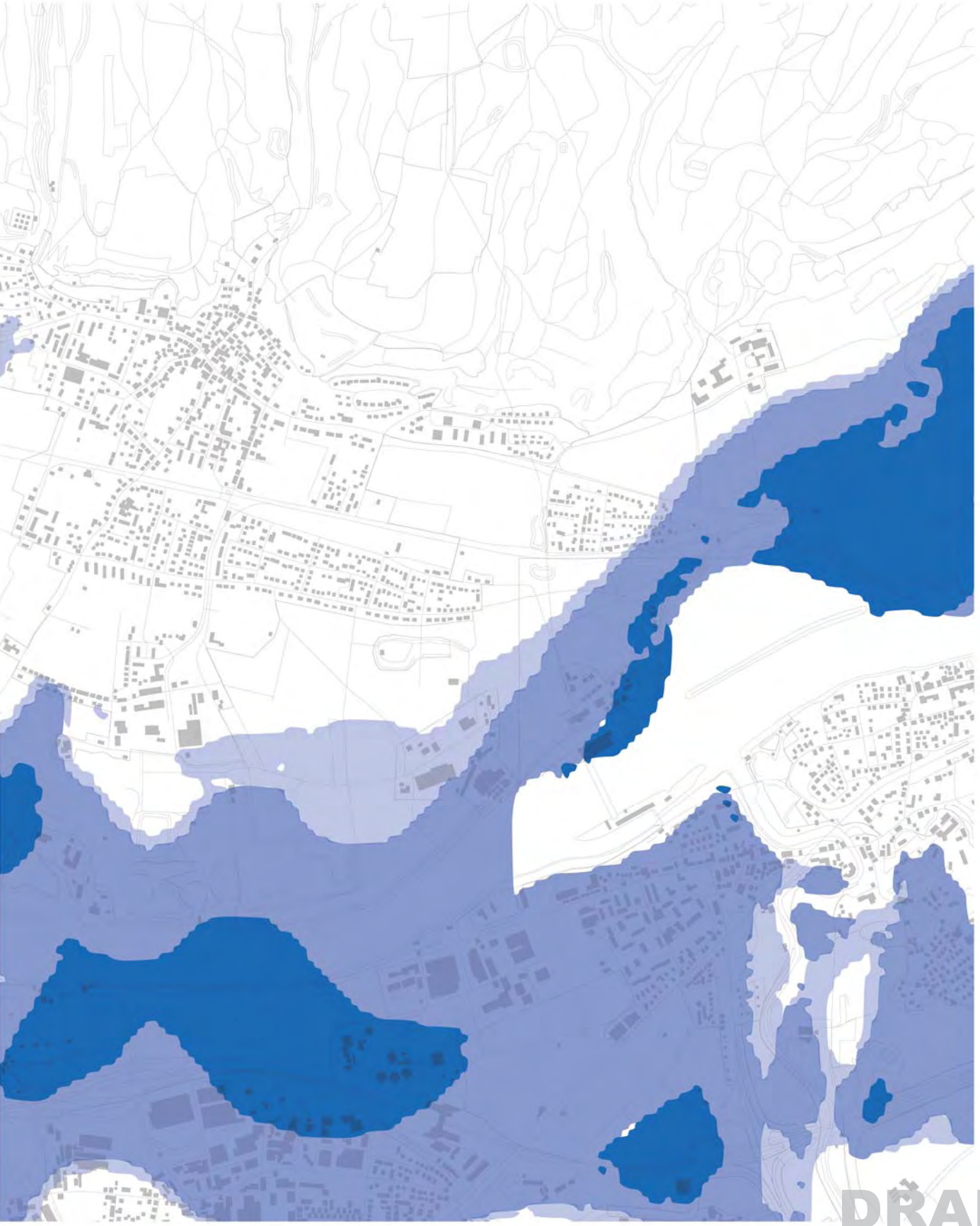


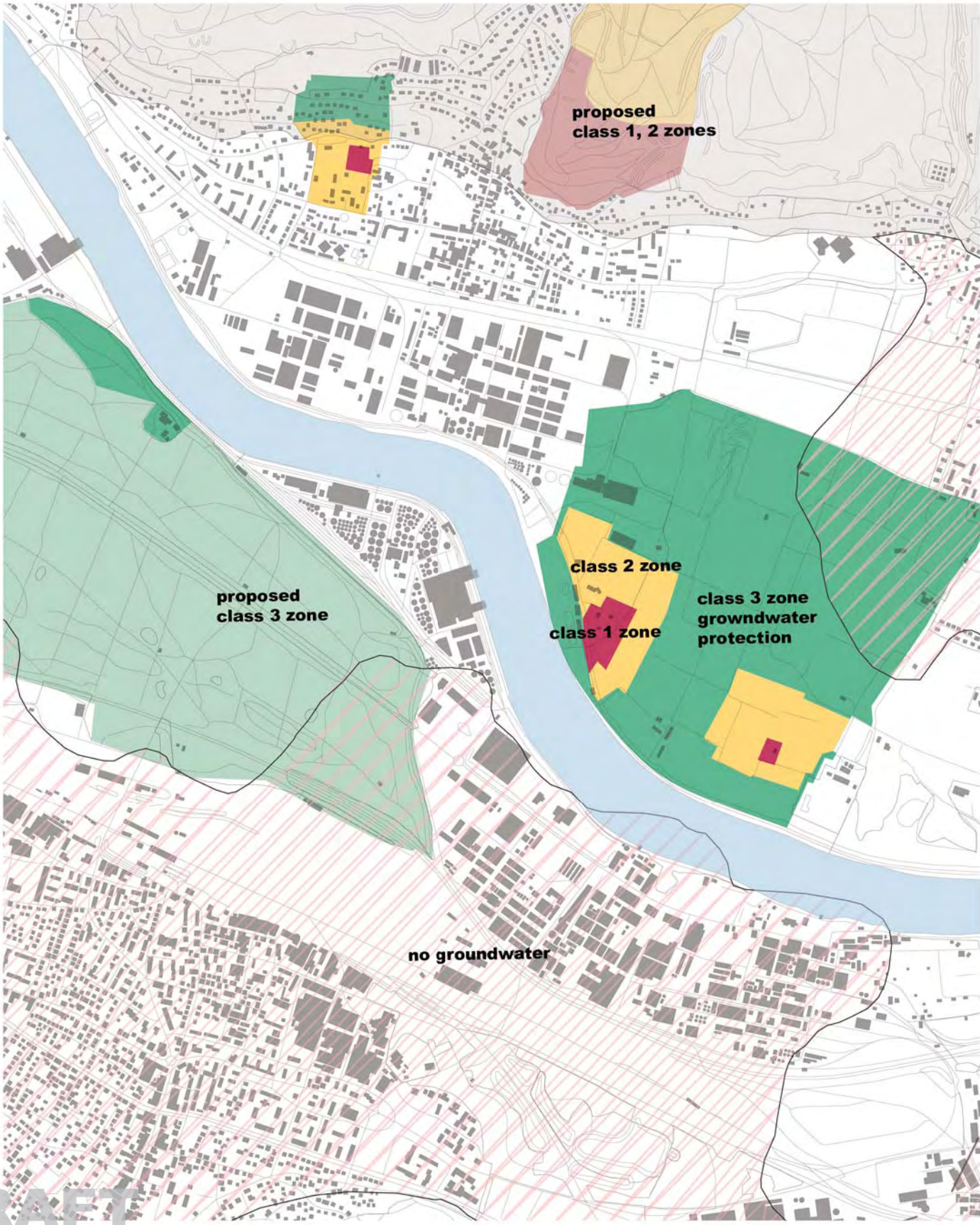
DEPTH OF GROUNDWDATER FROM SURFACE



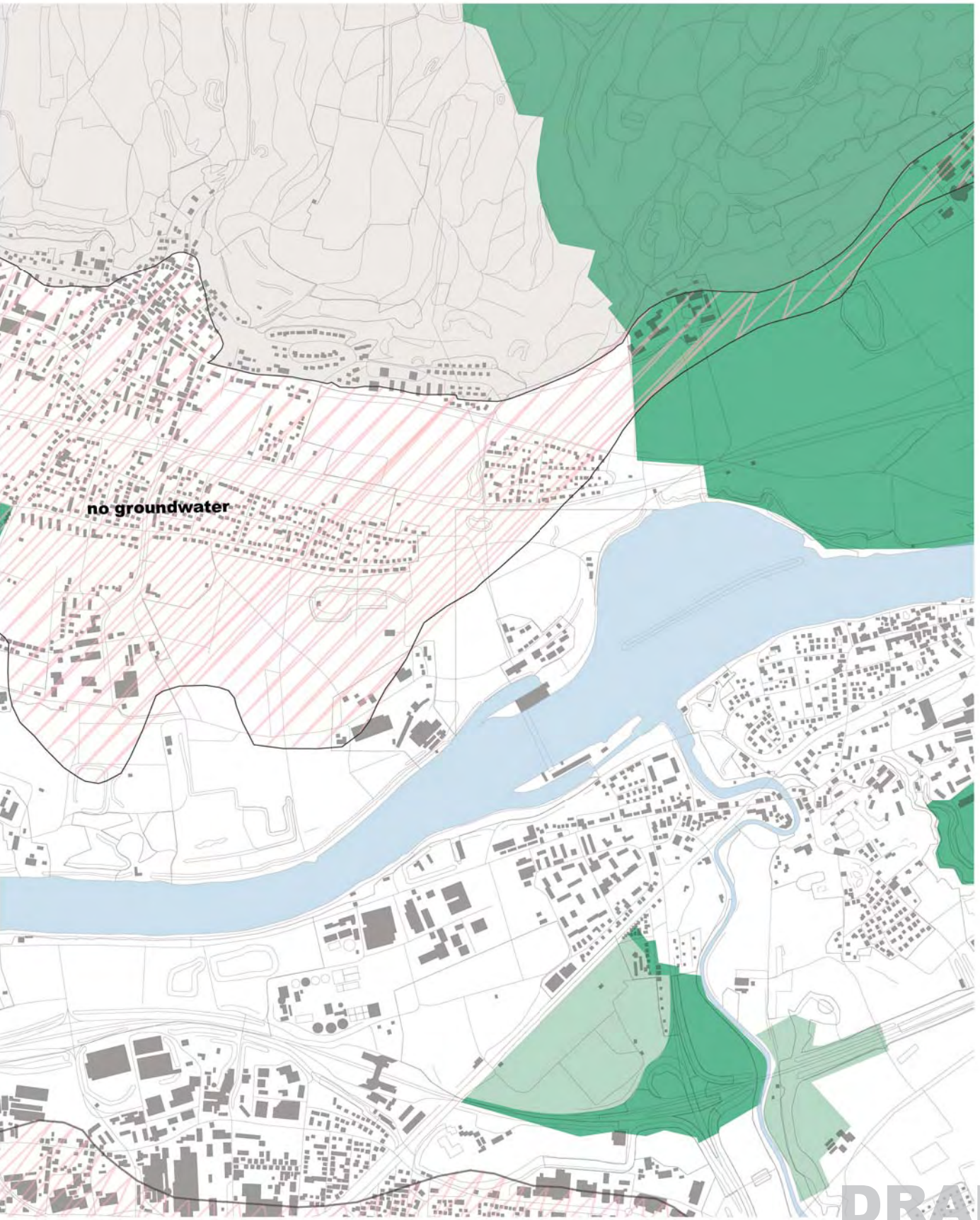


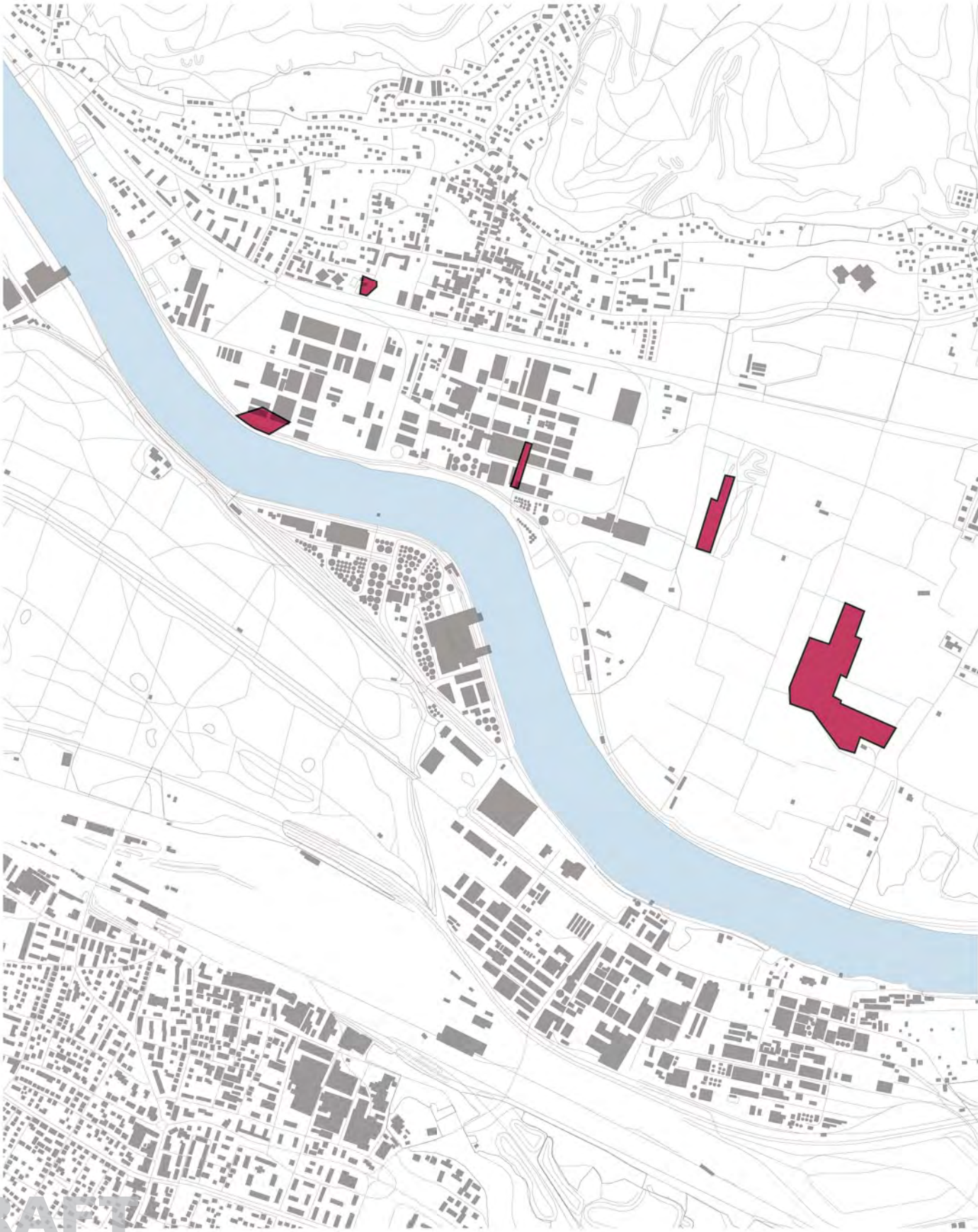
GROUNDWATER ZONE THICKNESS



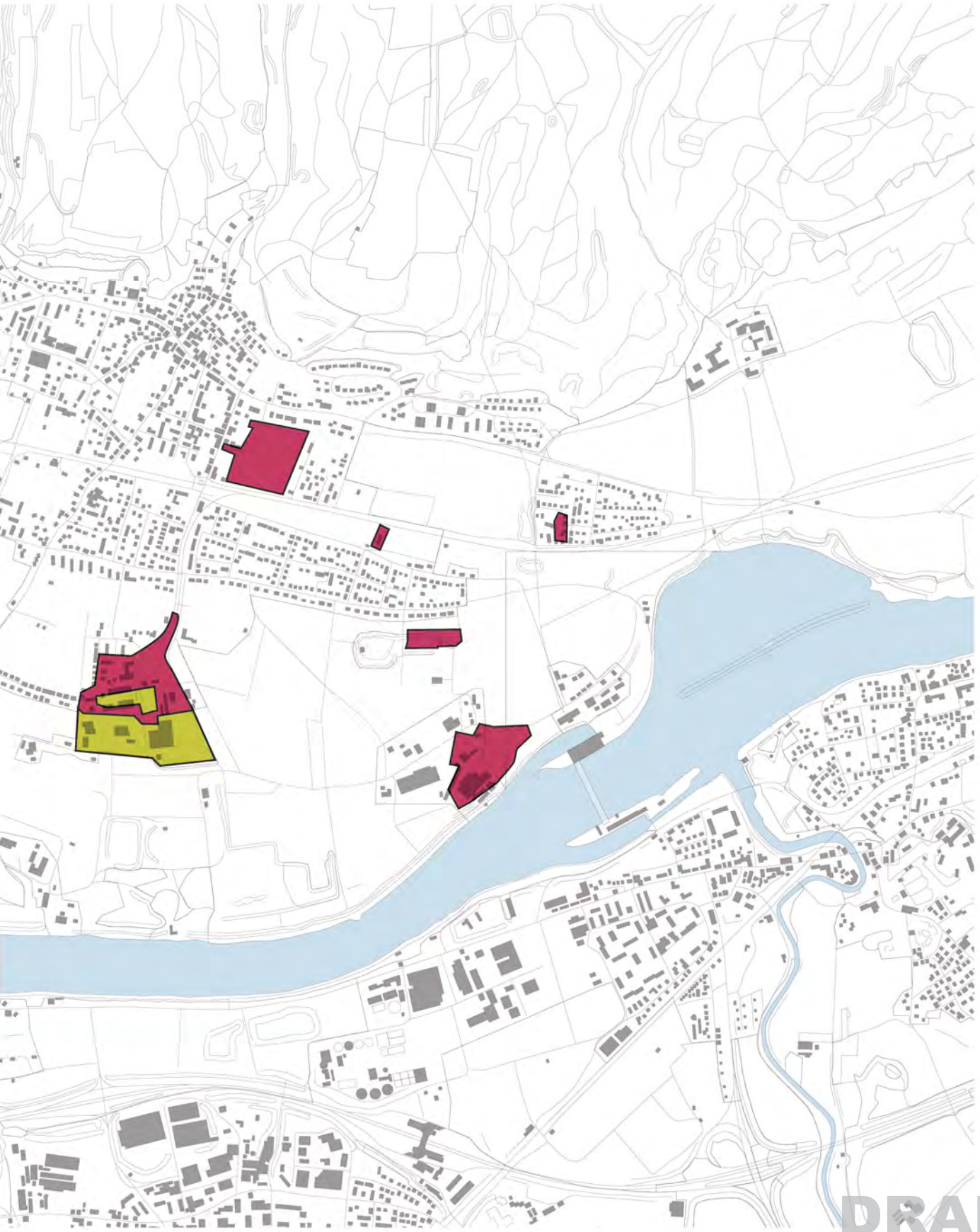


PROTECTED GROUNDWATER ZONES





CONTAMINATED SOILS



GROUNDWATER REGULATIONS

Vorsorgender flächenbezogener Grundwasserschutz

Der vorsorgende Grundwasserschutz durch die Festsetzung von Schutzflächen mit Restriktionen für grundwassergefährdende Nutzungen hat in beiden Ländern hohe Priorität. In der Karte sind erstmals im Hochrheingebiet grenzüberschreitend alle festgesetzten und geplanten Wasserschutzgebiete (D) und Grundwasserschutzzonen (CH) mit ihren Zonierungen dargestellt. Dies ist eine wesentliche Voraussetzung um von Schadensfällen ausgehende Gefahren für das Nachbarland schnell und sicher bewerten zu können.

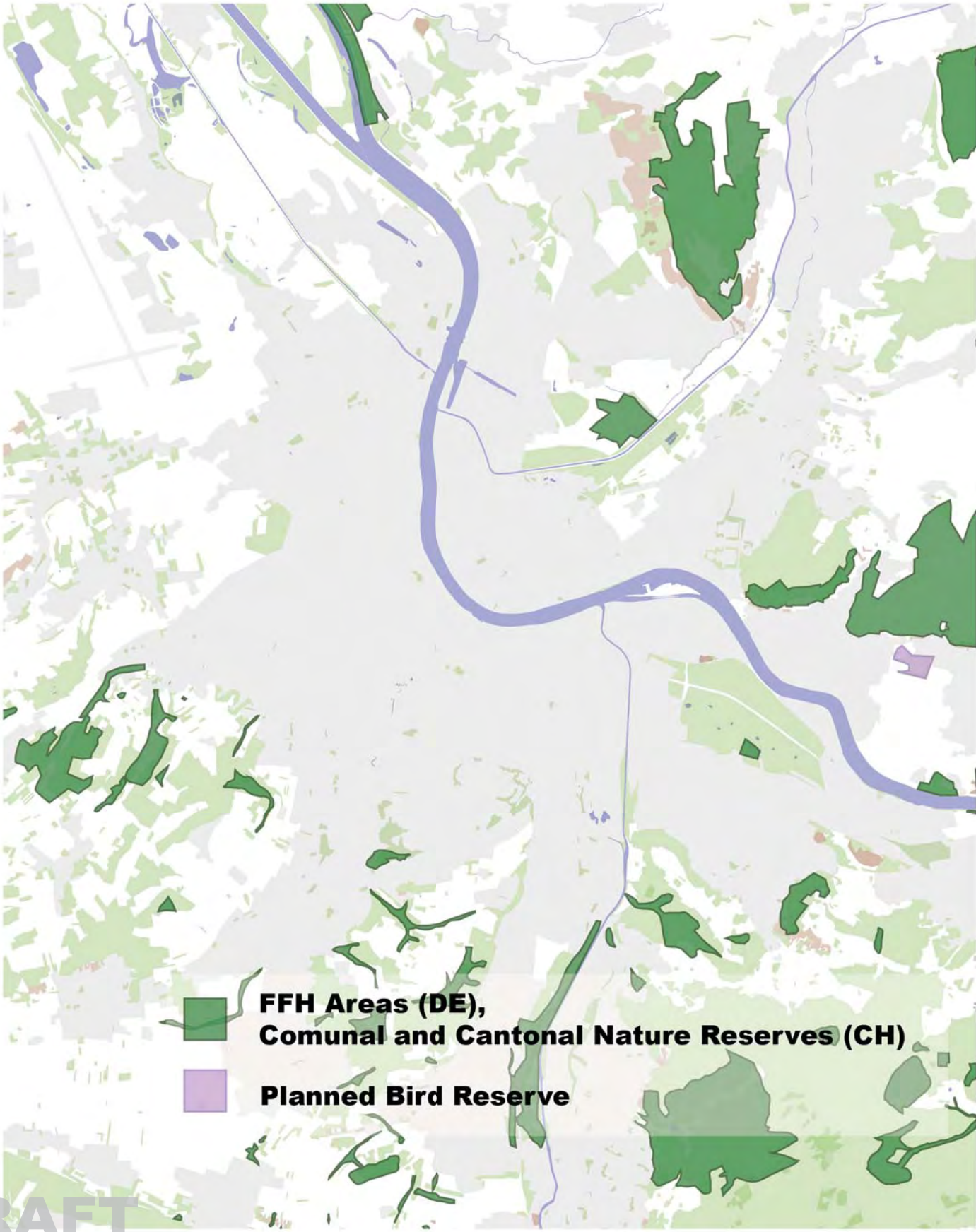
Text and Content

Interreg Projekt, www.grundwasserleiter-hochrhein.de
Wasserhaushaltsgesetz und Wassergesetz für Baden-Württemberg, 2005, www.um.baden-wuerttemberg.de/servlet/is/3187/Wasserhaushaltsgesetz_und_Wassergesetz%20.pdf?command=downloadContent&filename=Wasserhaushaltsgesetz_und_Wassergesetz%20.pdf

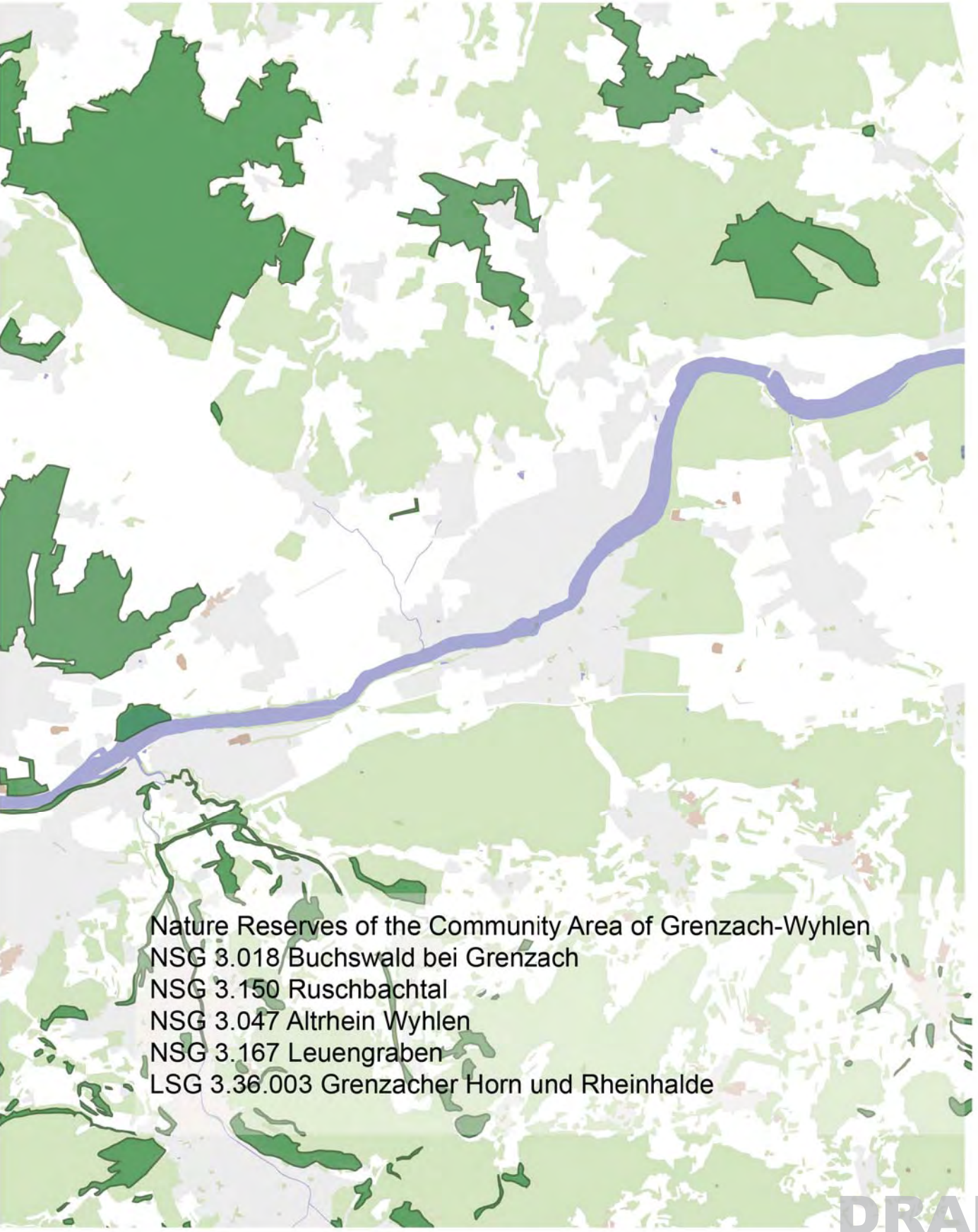
Illustration and Graphics

Foto Black Forest, www.flickr.com/photos/perelandra/68970705/
Foto Jura, www.flickr.com/photos/yobert/324773291/in/set-72157594424315982/

LOCATION
TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING
ENERGY PRODUCTION



HIGHLY FRAGMENTED, SMALL SWISS NATURE RESERVES CONTRAST WITH CONTINOUS, LARGE AREAS IN GERMANY



CATALOGUE: AGRICULTURAL BUILDINGS

SHEDS



FARMS




GREENHOUSES




INSTALLATIONS


CATALOGUE: FARMED GOODS

LIVESTOCK

VEGETABLES

ROOT VEG

FRUIT

ANY PROJECT TOUCHING THE EXISTING NATURE RESERVES MUST BE CLASSIFIED TO HAVE AN POSITIVE IMPACT ON NATURE

Building Restrictions in European Nature Reserves (FFH)

Impact assessment required. Criteria are protected value of area, and the extend and duration of the impact. The decision will be positive as long as there are no negative effects on the habitats. In the event of a negative decision, exceptions are possible.

Expetions
Criteria are: no reasonable alternative solution without or with less impact is possible, or importance on the grounds of overwhelming public interest – particularly social and economic grounds. It is also in the public interest for the project to have fewer effects on the environment.

USE OF THE IN WATER PROTECTION ZONE II IS RESTRICTED

Building Restrictions in Water Reserves in Germany

Water protection zone – Class 1 – extraction point
Any use or access to this area for ineligible people is banned.

Water protection zone – Class 2 – close protection area
The flow time of the water to the well source should last at least 50 days, in order to ensure the drinking water is cleansed of bacteria. Damage to the land surface is forbidden, thus the use is limited for buildings for agriculture and industry, or land uses which involve excavation of the upper land surface.

A LAKE PROJECT COULD PLAY AN IMPORTANT ROLE AS A NATURE RESERVE OF EUROPEAN IMPORTANCE

Protected Biospheres

Buchsbaumgebüsche trockenwarmer Standorte (5110)
Kalk-Pionierrasen (6110)
Kalk-Magerrasen (orchideenreiche Bestände) (6210)
Magere Flachland-Mähwiesen (6510)
Kalktuffquellen (7220)
Kalkfelsen mit Felsspaltenvegetation (8210)
Höhlen (8310)
Waldmeister-Buchenwald (9130)
Orchideen-Buchenwälder (9150)
Schlucht- und Hangmischwälder (9180)
Auenwälder mit Erle, Esche, Weide (91E0)

Biber
Castor fiber

Grünes Besenmoos
Dicranum viride

Protected Species

Gelbbauchunke
Bombina variegata

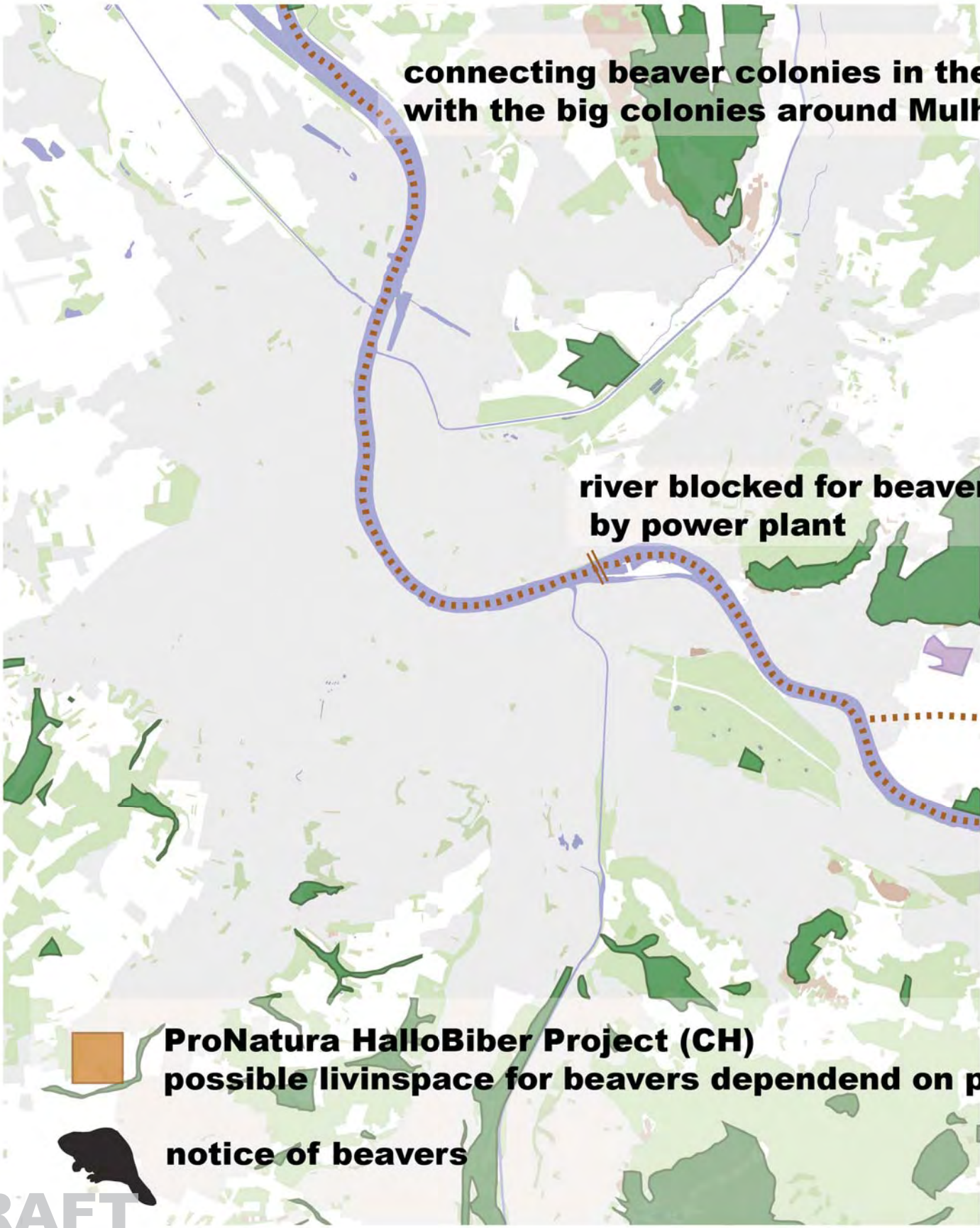
Hirschkäfer
Lucanus cervus

From Extinction Endangered Species

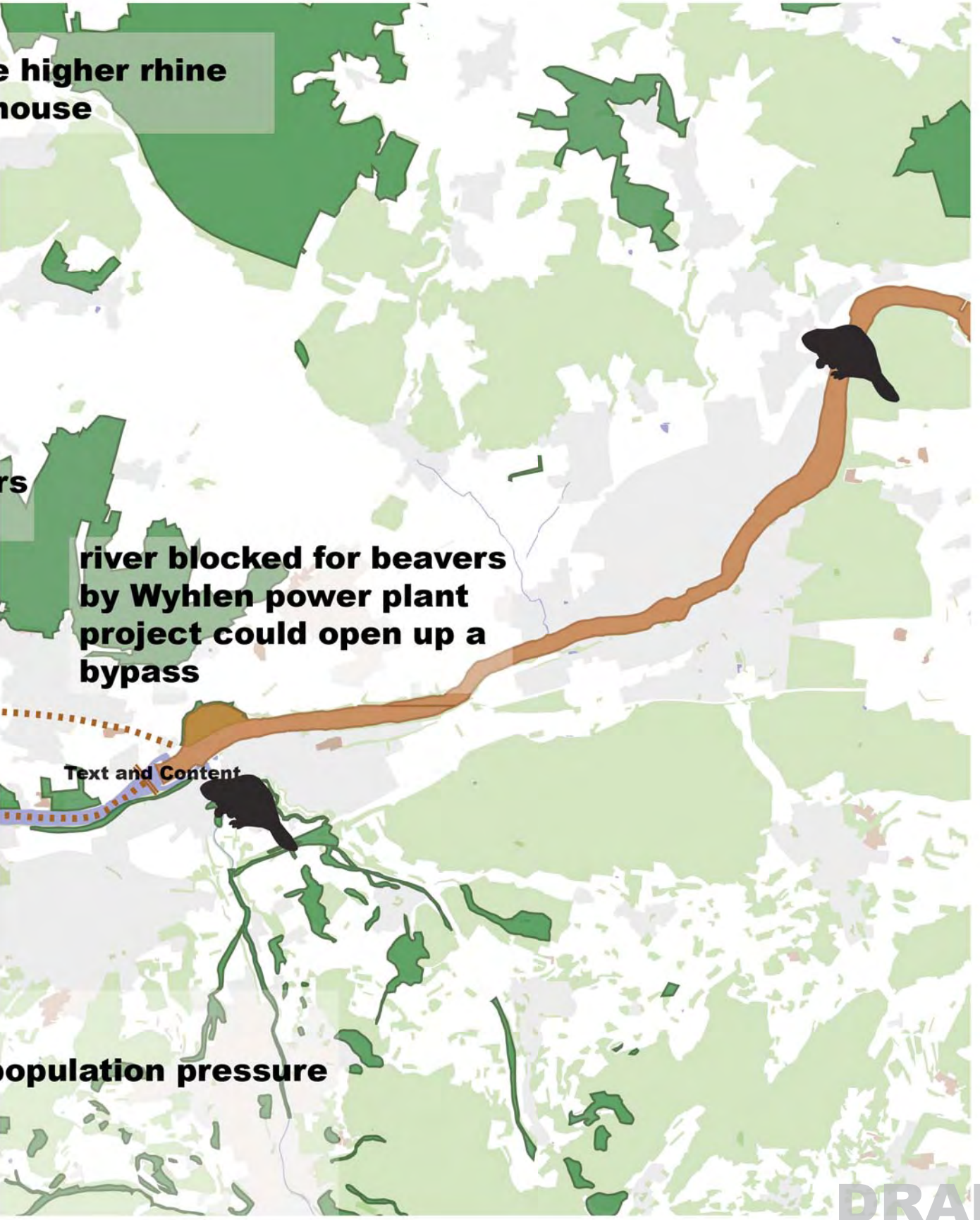
Rebhuhn, Wachtelkönig, Bekassine, Grosser Brachvogel, Zwergohreule, Steinkauz, Rotkopfwürger, Raubwürger, Purpurreiher

SMARAGD Species found in Rhine (European Importance)

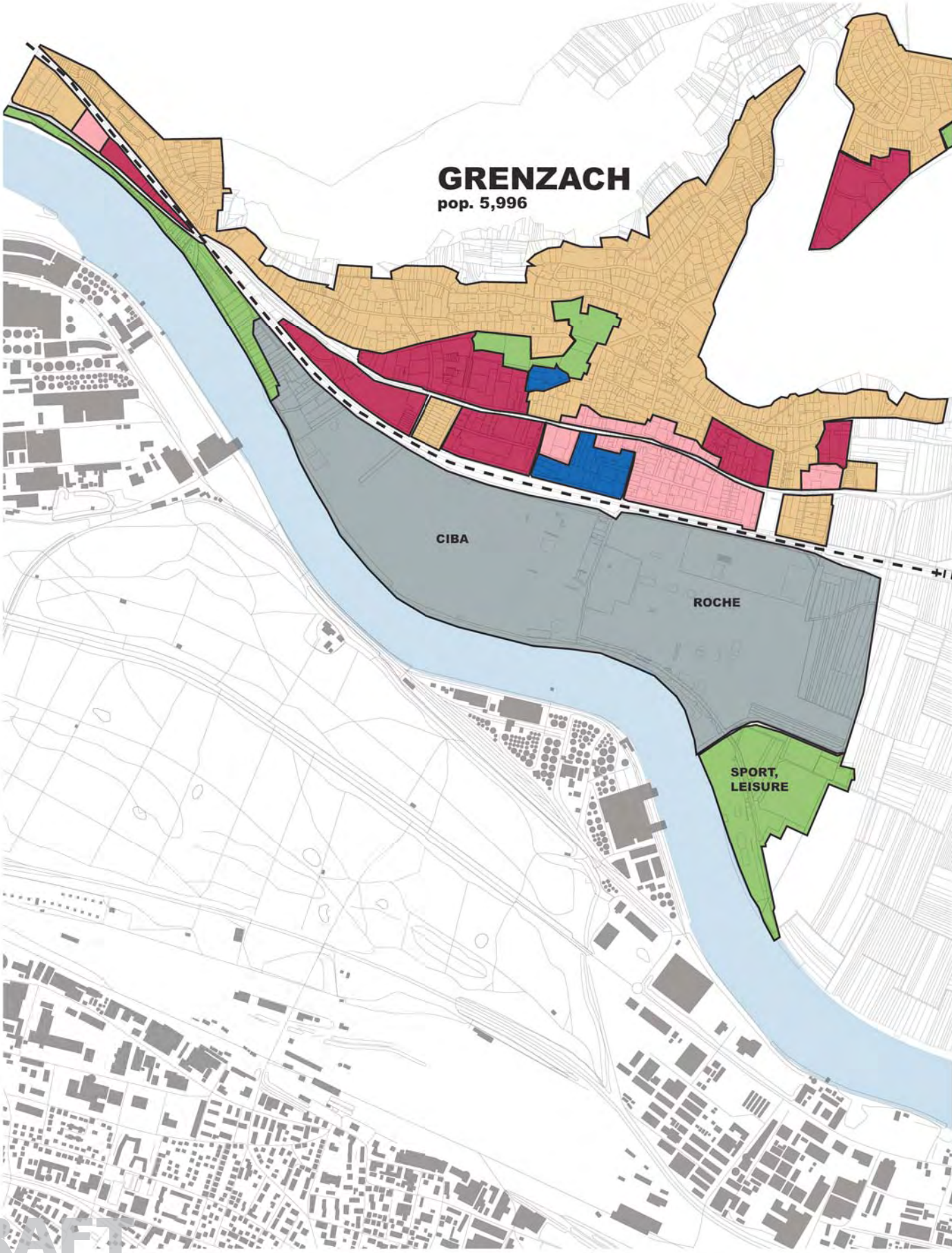
Strömer, Lachs, Groppe, Bachenauge, Biber



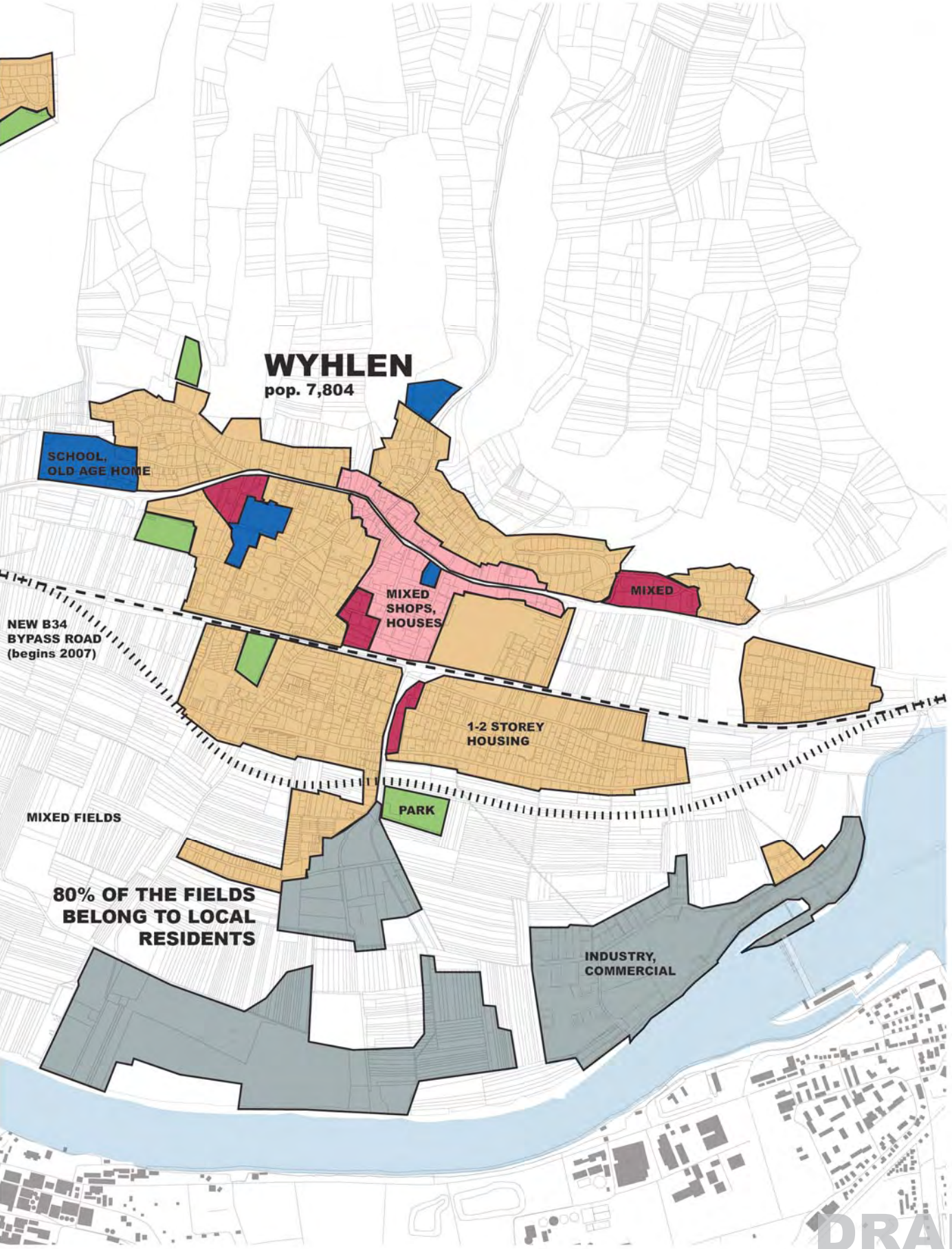
RAURICA LAKE PROJECT COULD HELP OPEN UP AN EAST WEST PASSAGE FOR BEAVERS

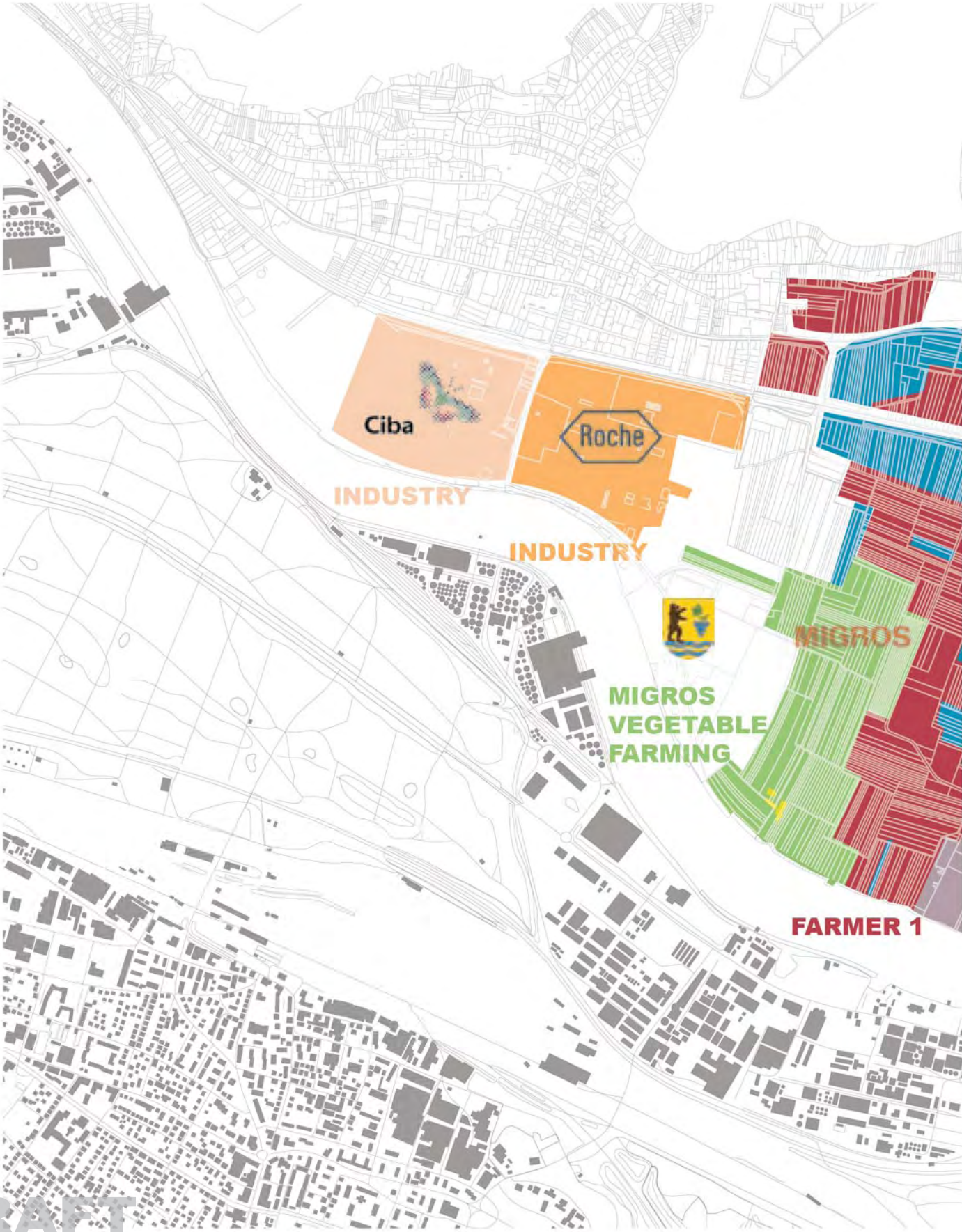


LOCATION
TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING
ENERGY PRODUCTION

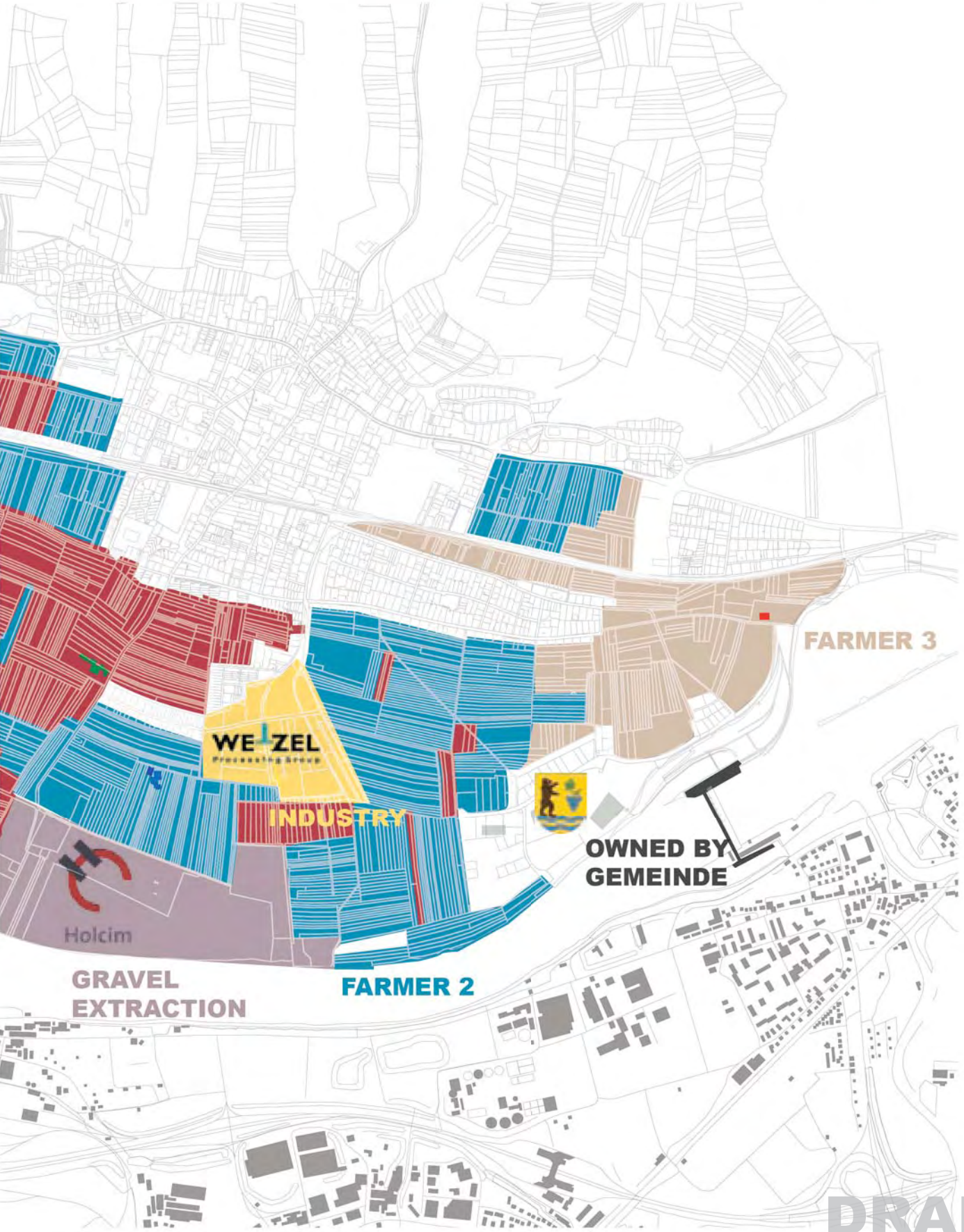


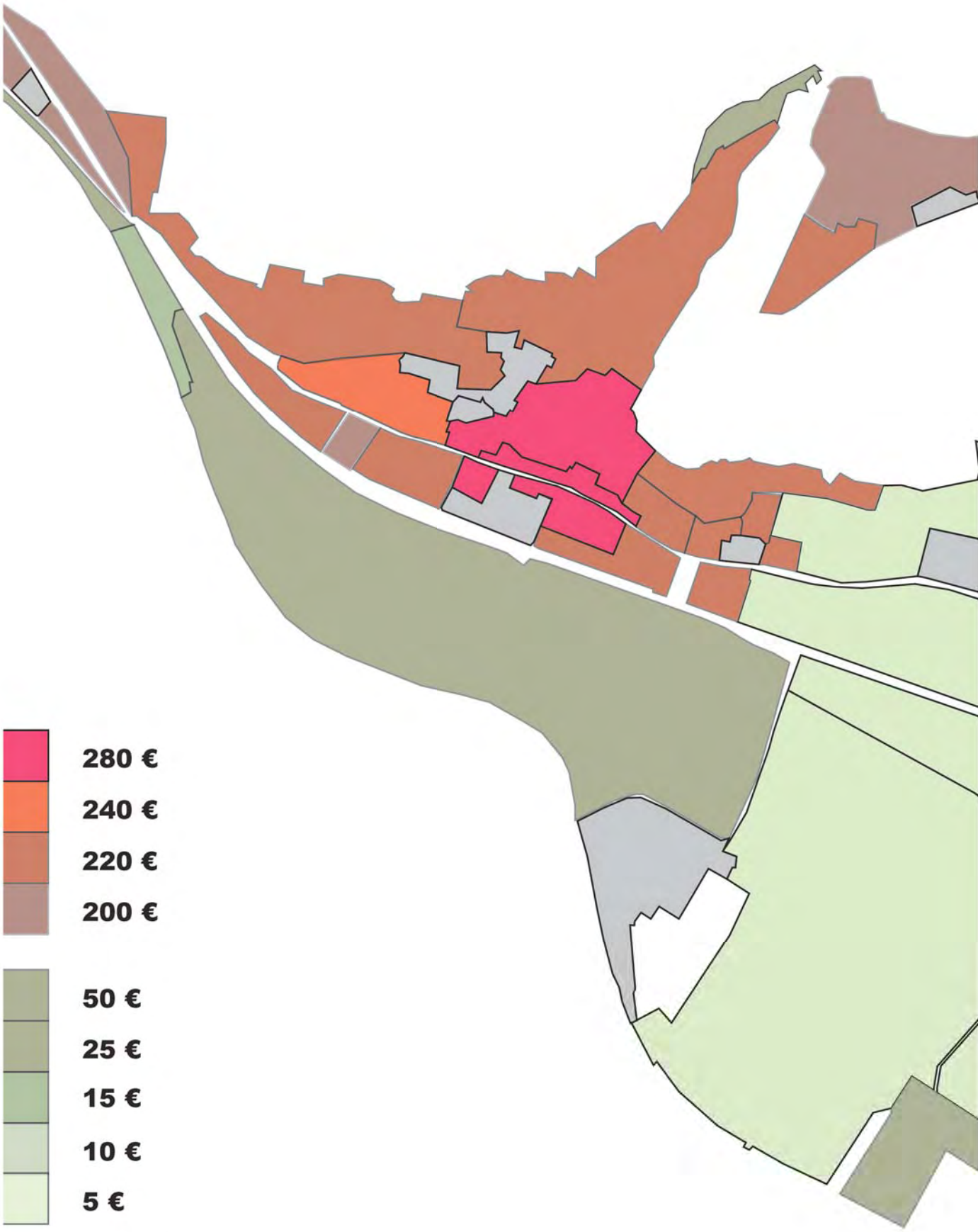
ZONE PLAN INDICATES SEPARATION OF NEIGHBOURING TOWNS





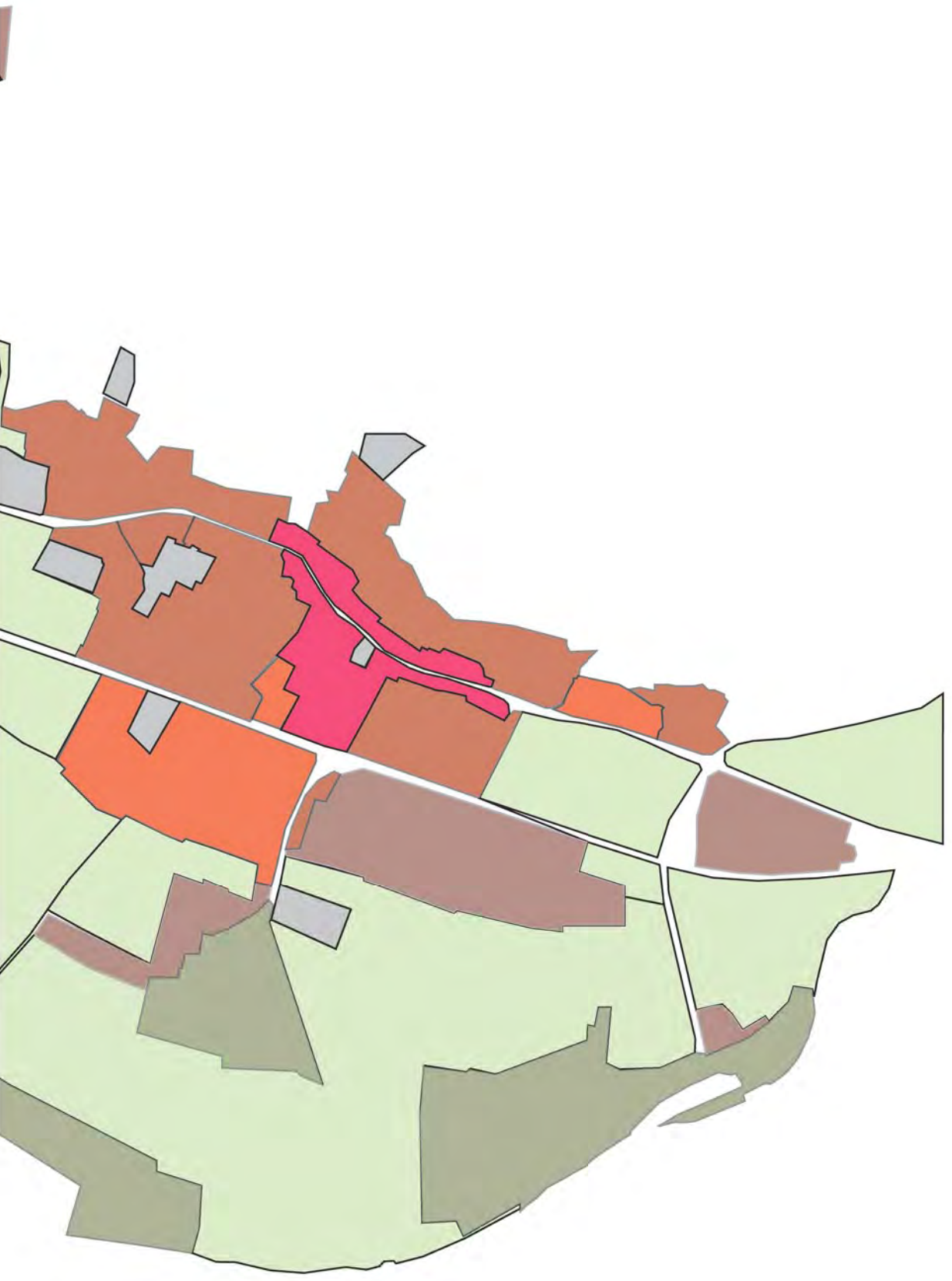
WHILE 80% OF THE FIELDS ARE OWNED BY LOCAL RESIDENTS, FARMERS RENT THE FIELDS





94

LAND PRICE PLAN SHOWS LOW COST OF BUYING FIELDS



CATALOGUE: RESIDENTIAL BUILDINGS

DETACHED	SEMI-DETATCHED	TERRACED	APARTMENT
			
			
			
			
			

CATALOGUE: RECREATION

SWIMMING POOLS

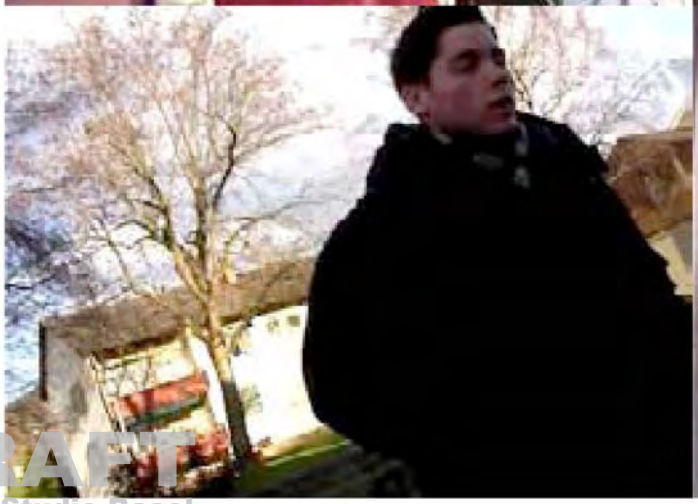
WATER-BASED

SPORTS

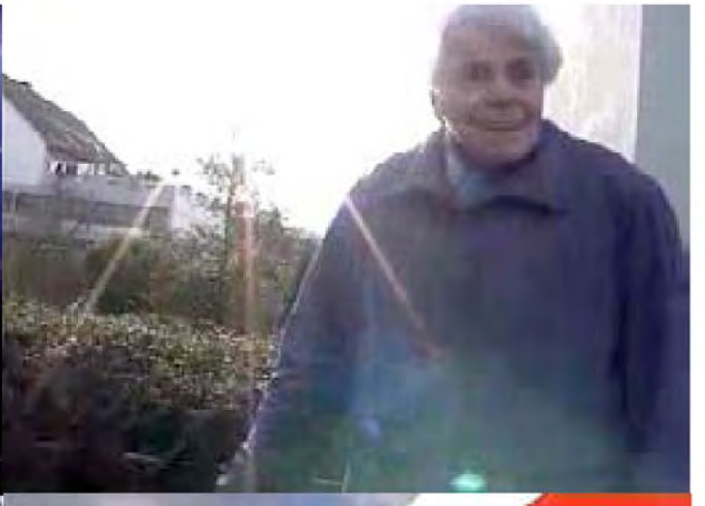
USING PATHS

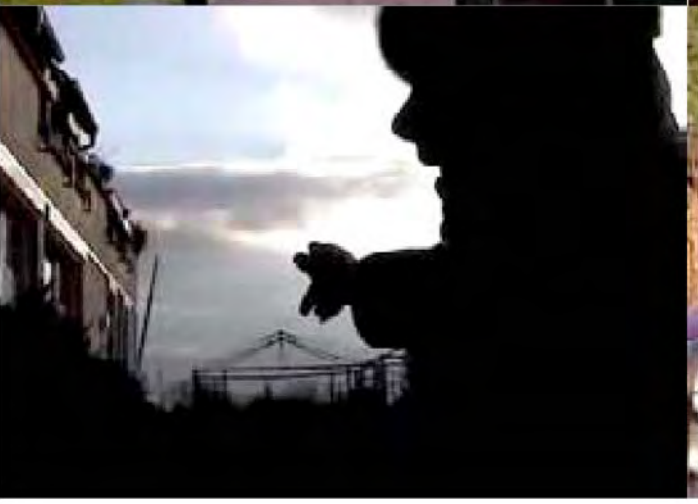







CATALOGUE: VIDEO INTERVIEWS 060112


LOCATION
TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING
ENERGY PRODUCTION

CATALOGUE: INDUSTRY

GRAVEL

PHARMACEUTICAL

ENERGY

ABANDONED

CATALOGUE: COMMERCIAL BUILDINGS

LIGHT INDUSTRY





AUTOMOBILE



CONSTRUCTION





UNKNOWN





GRAVEL INDUSTRY IN WYHLEN

Gravel extraction has been taking place in the wyhlen gravel pits since 1980, currently owned by Holcim. Each year over 320m Tonnes of gravel is extracted in Germany, one of the largest gravel prodcuers in the world.
Extracted gravel is directly poured into barges on the Rhine and transported upstream to distribution centres.

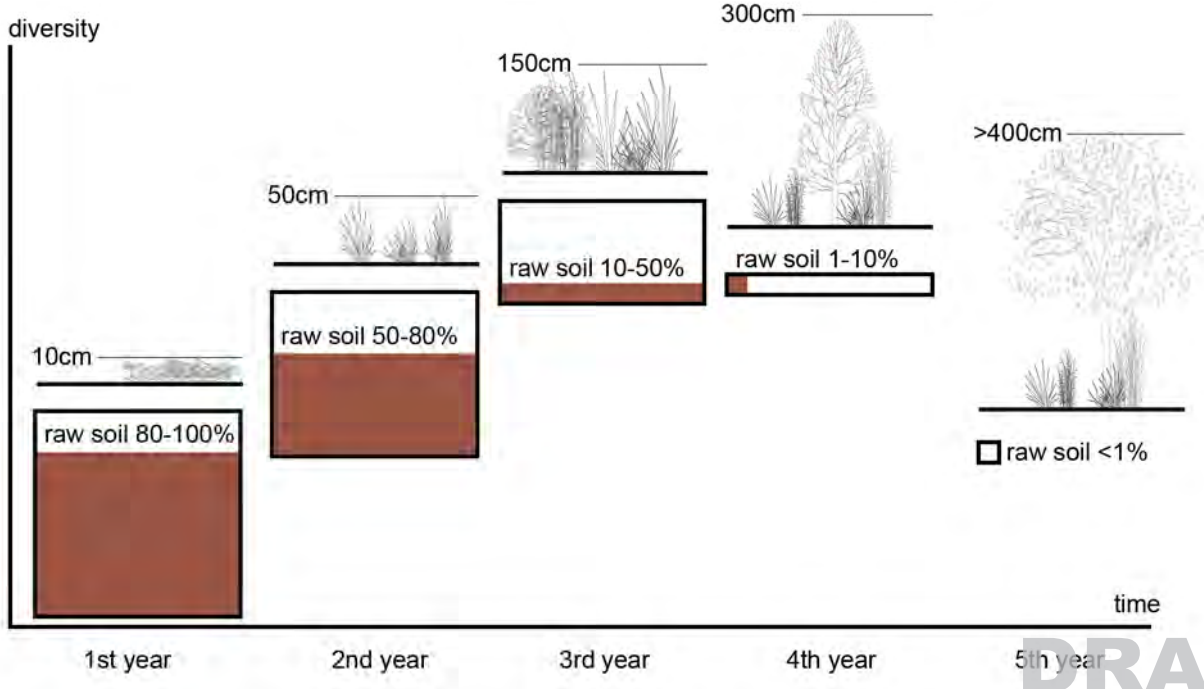
So far approximately 45m Tonnes of gravel has been extracted at the Wyhlen site, over an area of 0.84 sq.km. The gravel bed extends to beneath the groundwater level, which is where the deepest of the pits have been excavated to.

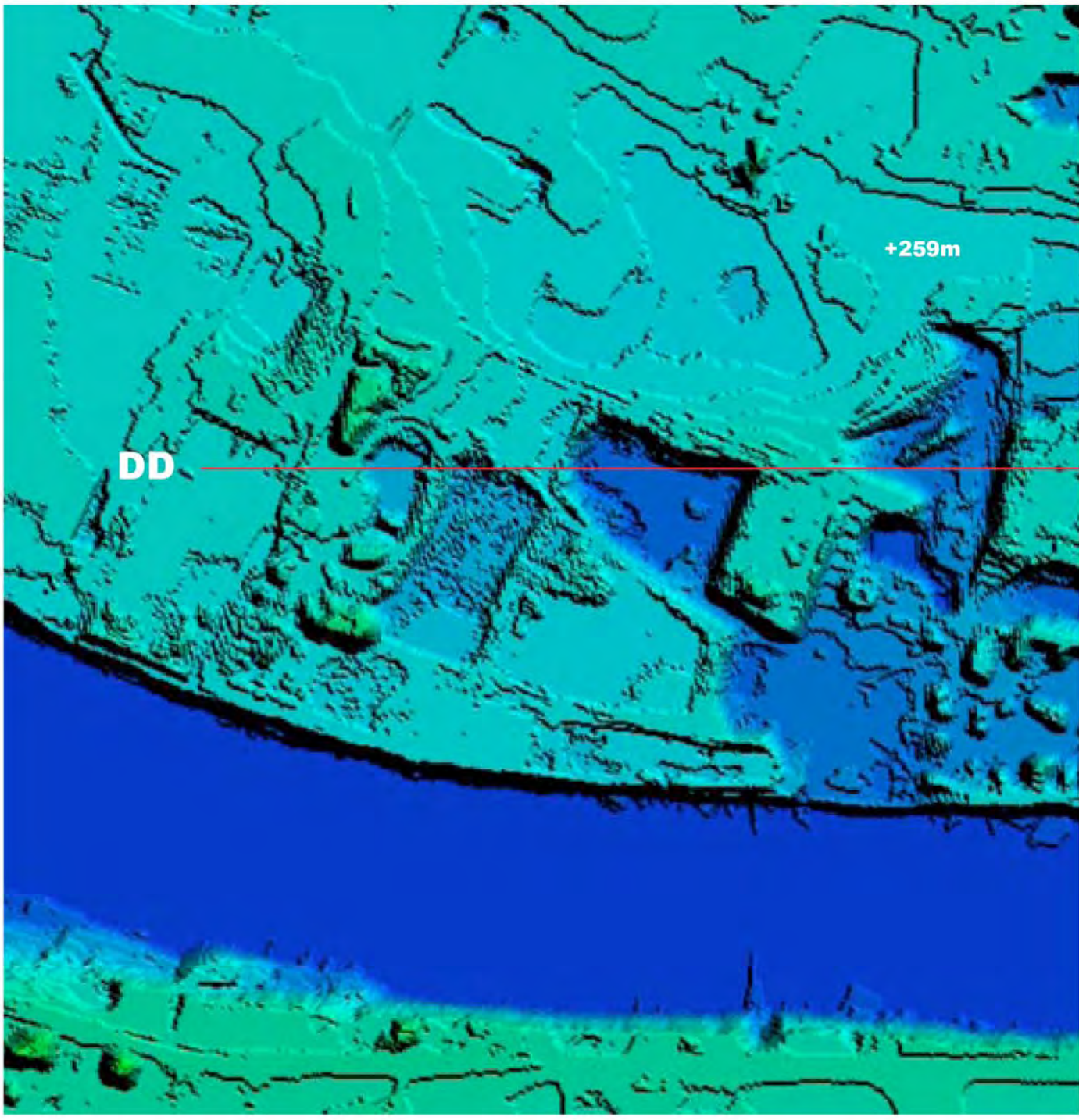
Gravel extraction is an economic process which can dramatically change the physical qualities of a place. By strategically extracting gravel down to below the groundwater level or level of the Rhine, this process could be used to create remarkable and beautiful landscapes.

ECOLOGICAL RECOVERY FROM GRAVEL EXCAVATION

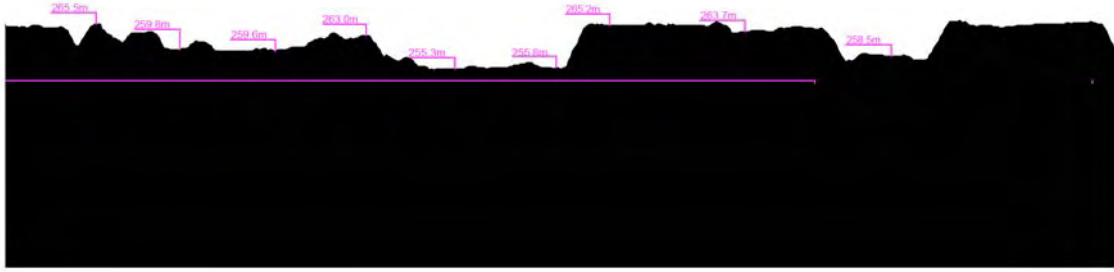
There are many examples of renaturised gravel pits, particularly in the gravel-rich areas of western Germany. These often involve lakes and are used as recreational facilities, but also provide exceptional habitats for wildlife. The abandoned mining sites quickly adapt to the new situation, particularly the varied terrain which offers valuable breeding grounds, particularly for migratory birds, and amphibians.

Two of the abandoned extraction sites in Wyhlen have already been converted into publicly-accessible biotopes.

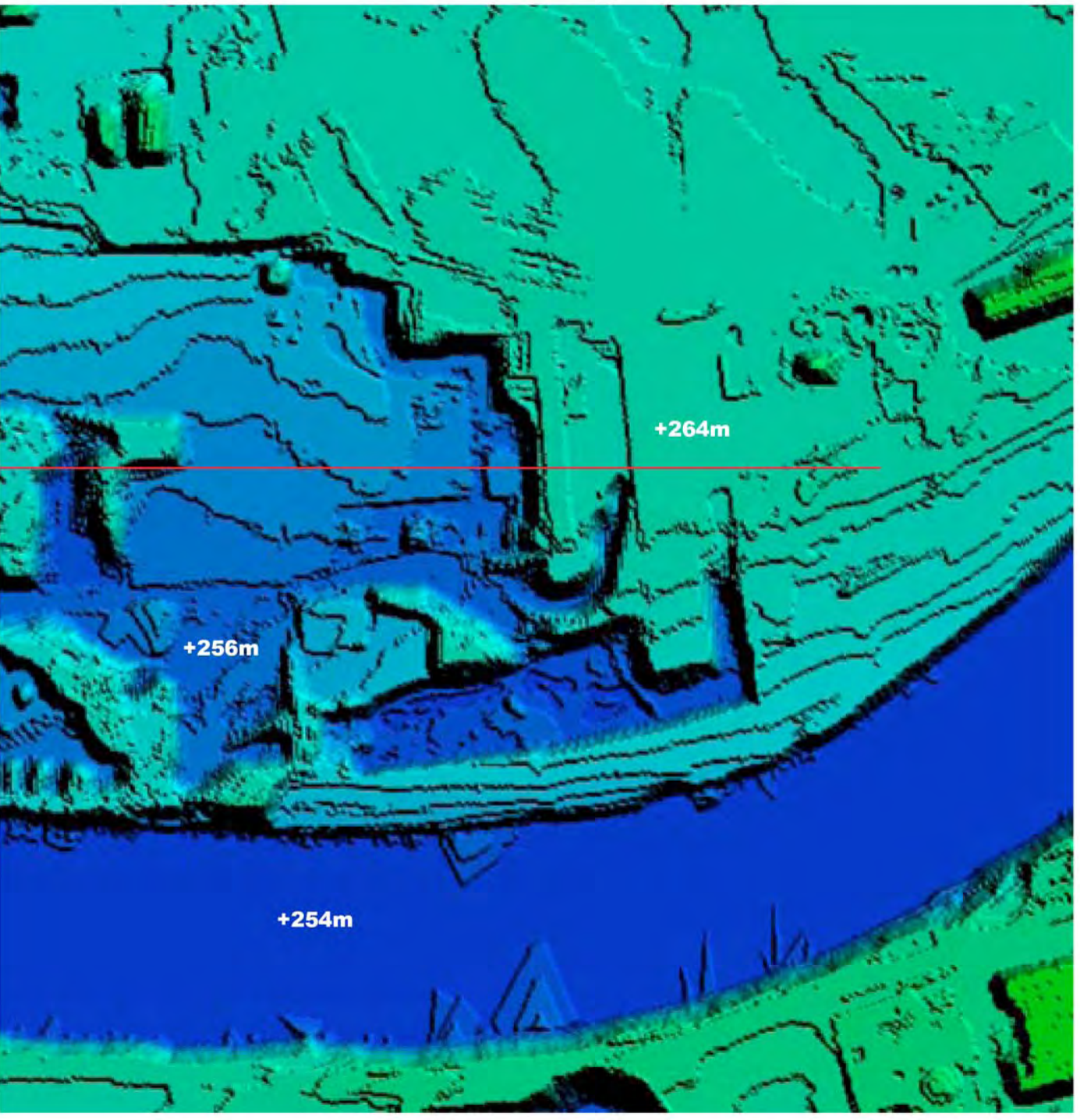


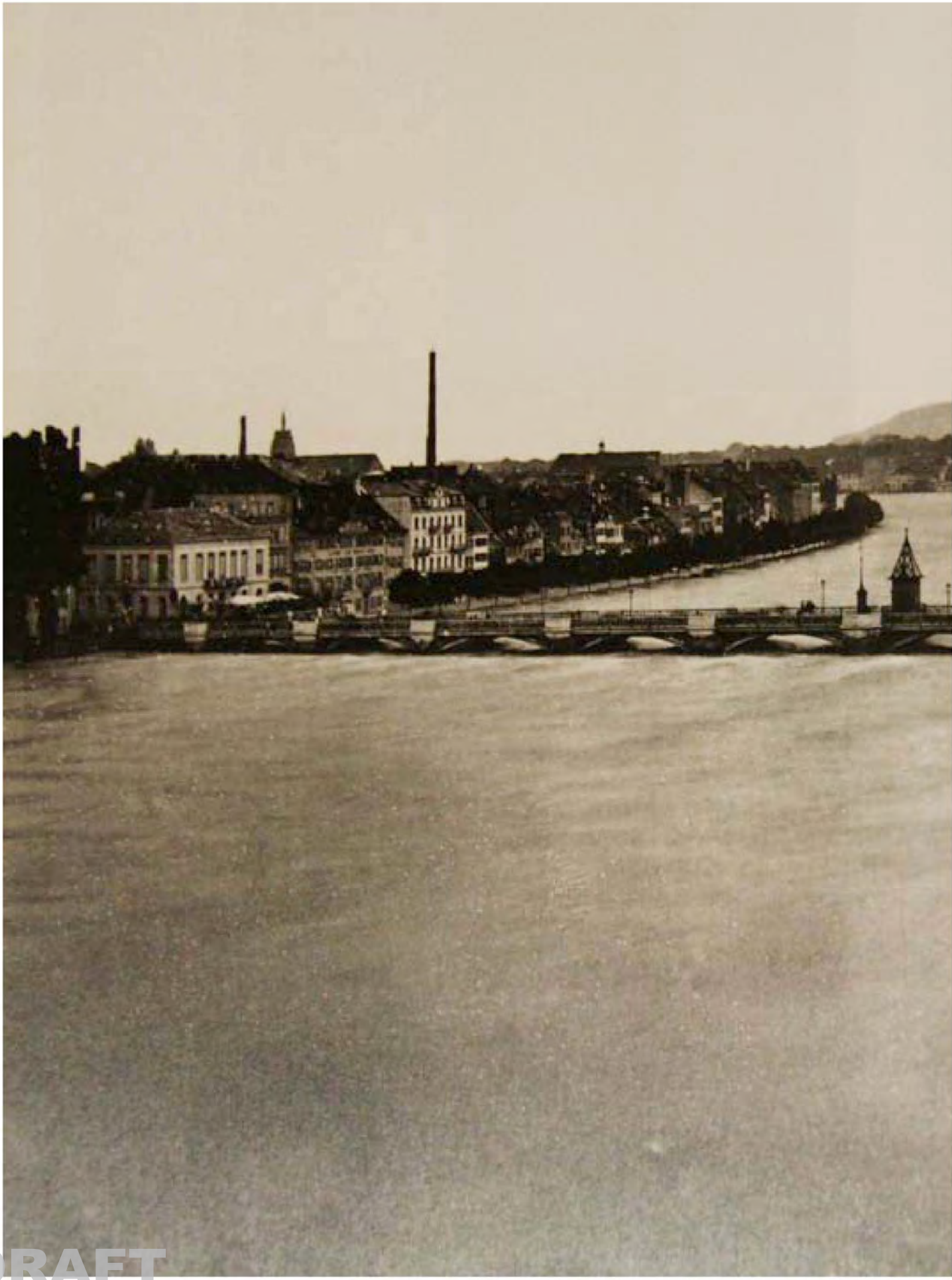


106



PHYSICAL EFFECTS OF GRAVEL EXCAVATION





LOCATION
TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING
ENERGY PRODUCTION

HIGH FLOOD RISKS IN GERMANY AND NETHERLANDS

PROJECTED COSTS OF LARGE FLOODING:

HIGH RHINE (CH, DE)	38M euro
UPPER RHINE (FR, DE)	12Bn euro
MIDDLE RHINE (DE)	1.7Bn euro
LOWER RHINE (DE)	20Bn euro
RHINE DELTA (NL)	131Bn euro

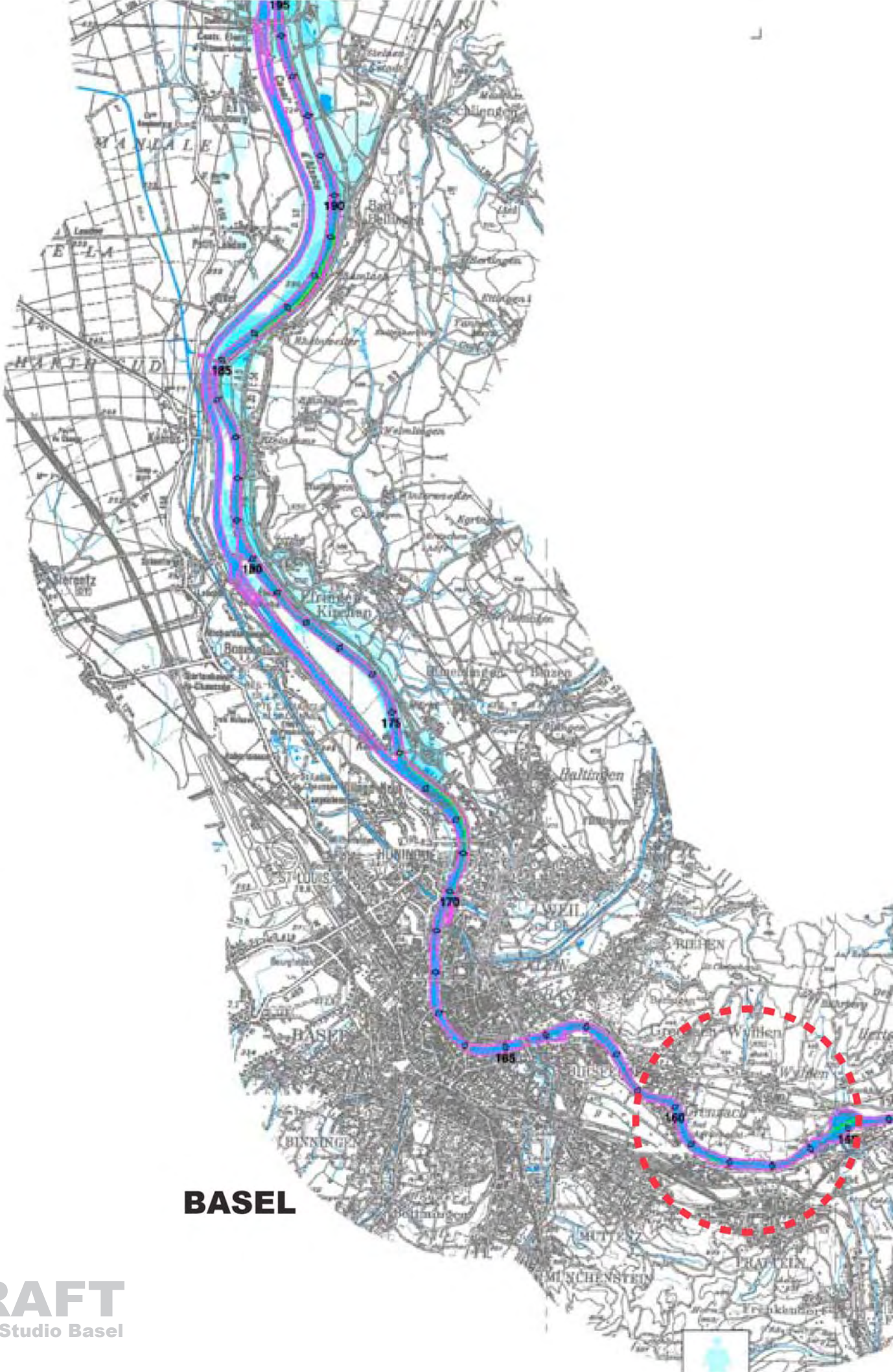
Devastating floods have occurred in recent years in the high- and low-Rhine areas (before and after the steep cliffs between Wiesbaden and Bonn). As a result of excessive building on former flood plains and the canalisation of the Rhine, Alpine meltwater and rainfall run-off flows very quickly to flood-prone areas.

The floods are usually caused by high rain levels combined with melting snow from the alps.

- last 200 years, Rhine lost over 85% of its alluvial areas (iskr.de)

- Switzerland: over 90% alluvial forests disappeared

- 1955 - 77: over 50% former flooding areas protected against flooding, now used for housing and farming



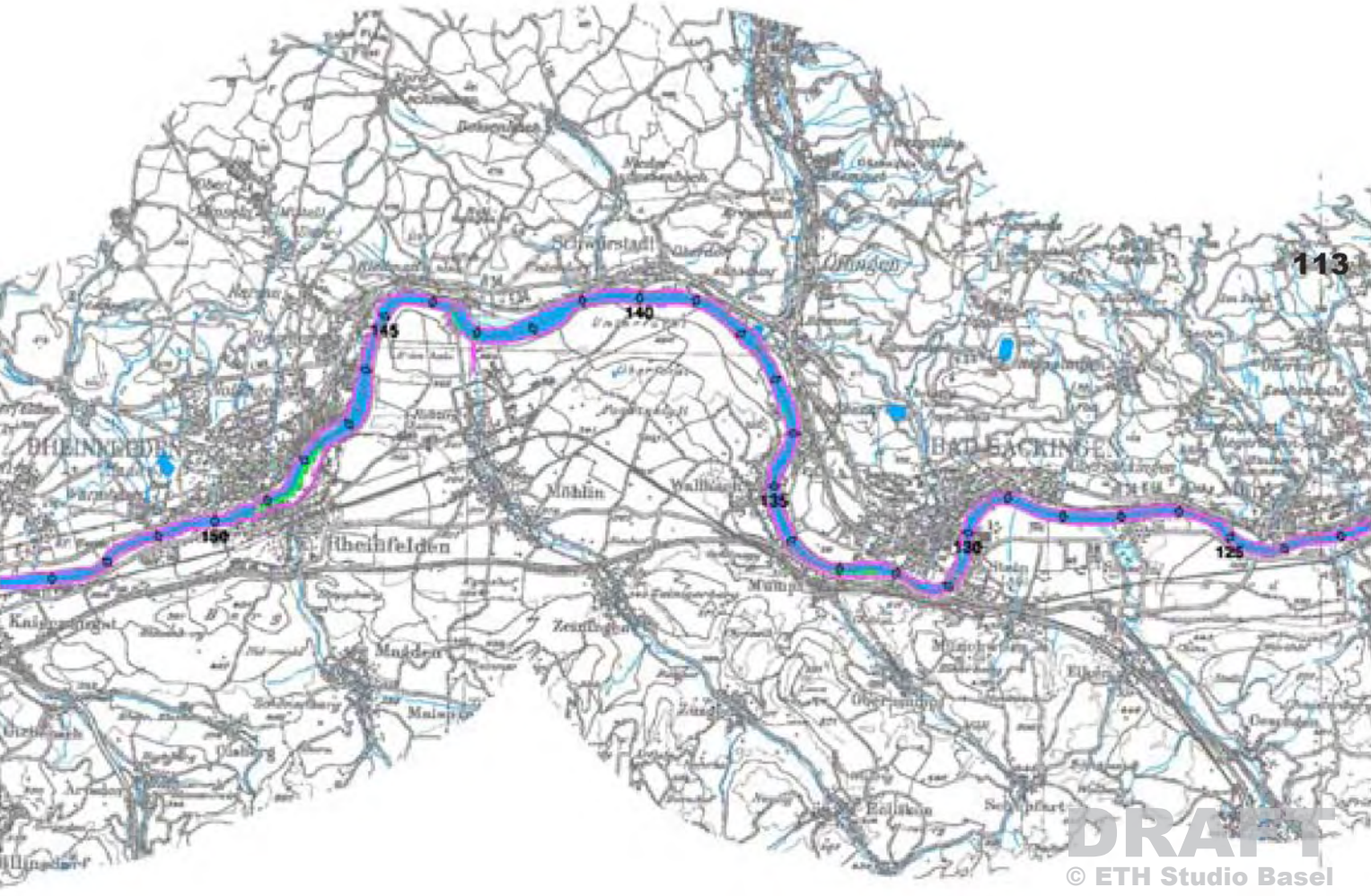
RHINE FLOODS START AFTER BASEL

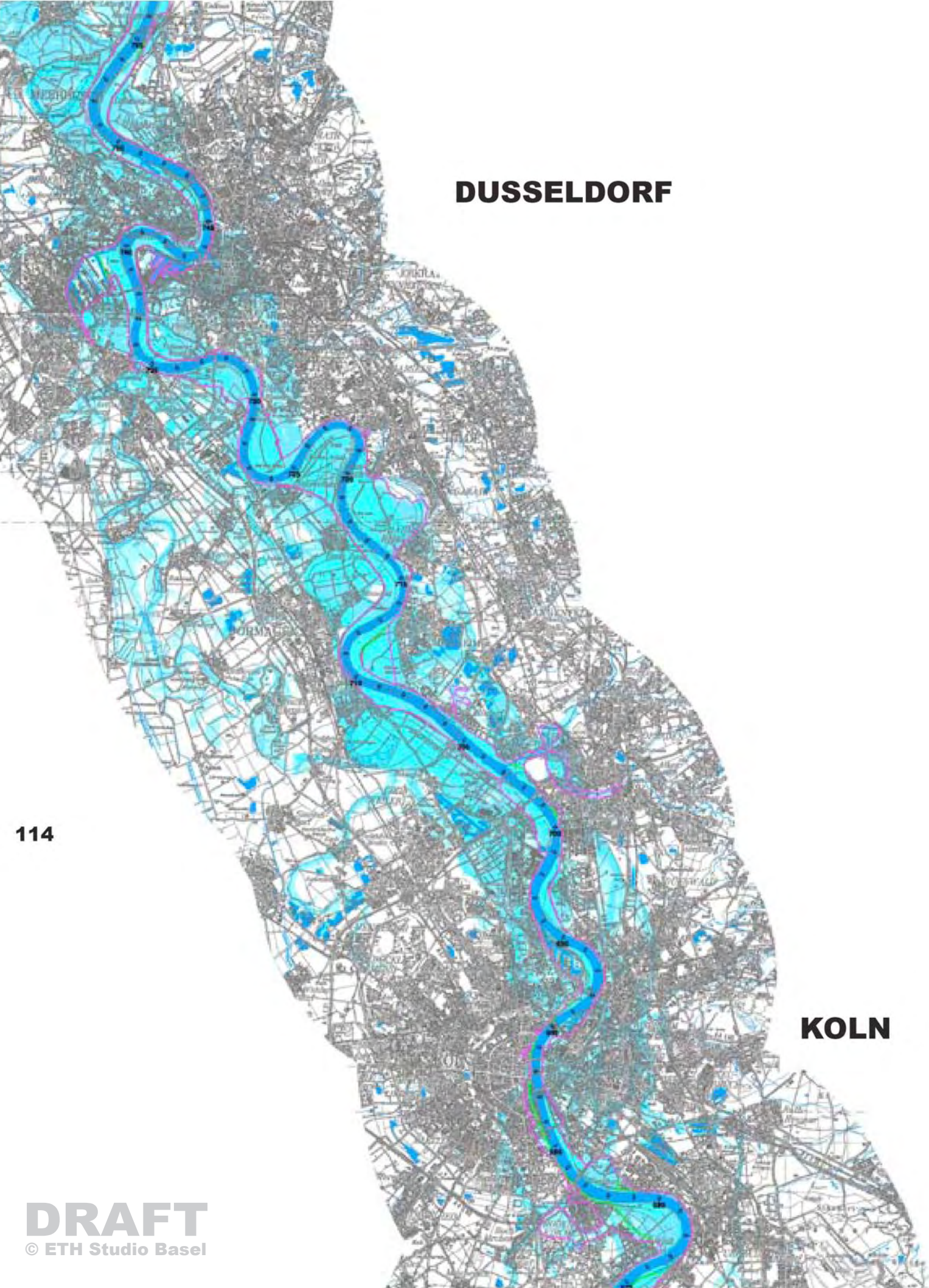
"The Hochrein (Bodensee - Basel) flows in a mostly deep-cut valley, and is made up of a series of dams. Only localised areas, usually at the junction of rivers or where in larger towns where there is riverside development, are in potential danger from flooding."

MAXIMUM 5500

FLOW (m^3/s)

AVERAGE 1032





FLOOD RISKS: GERMANY

The floods cause billions of Euros in damage to cities, industry and agriculture.
Much of the damage is in German cities such as Karlsruhe and Cologne.

Dec 1993
Bonn, Koblenz
e400-500M

Jan 1995
Koln
e1Bn

NEW FLOOD RETENTION BASIN COULD BE RELATIVELY LARGE

All values given in terms of maximum million square metres

ORT 11.9M

14M

NGEN 12M

URWEHR KEHL 37M

LTENHEIM 17.6M

M

SACH 9.3M

RIESACH 25M

RAURICA 20M

URICA 15M

10M

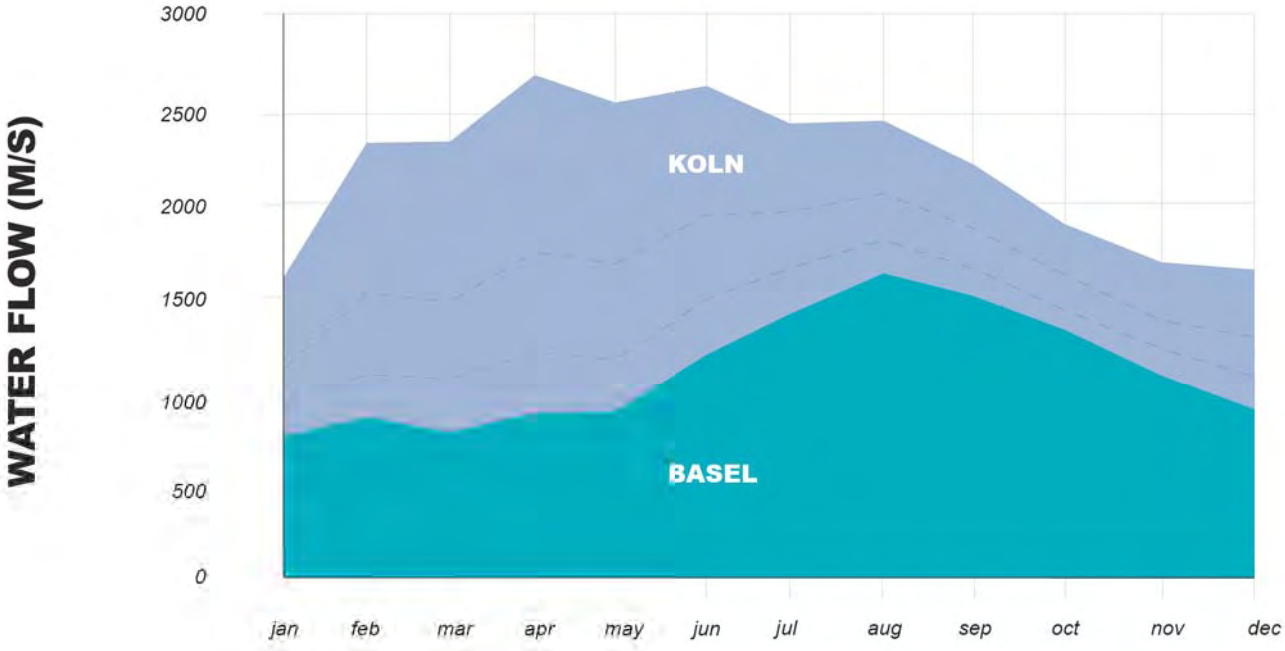
EXISTING

PLANNED

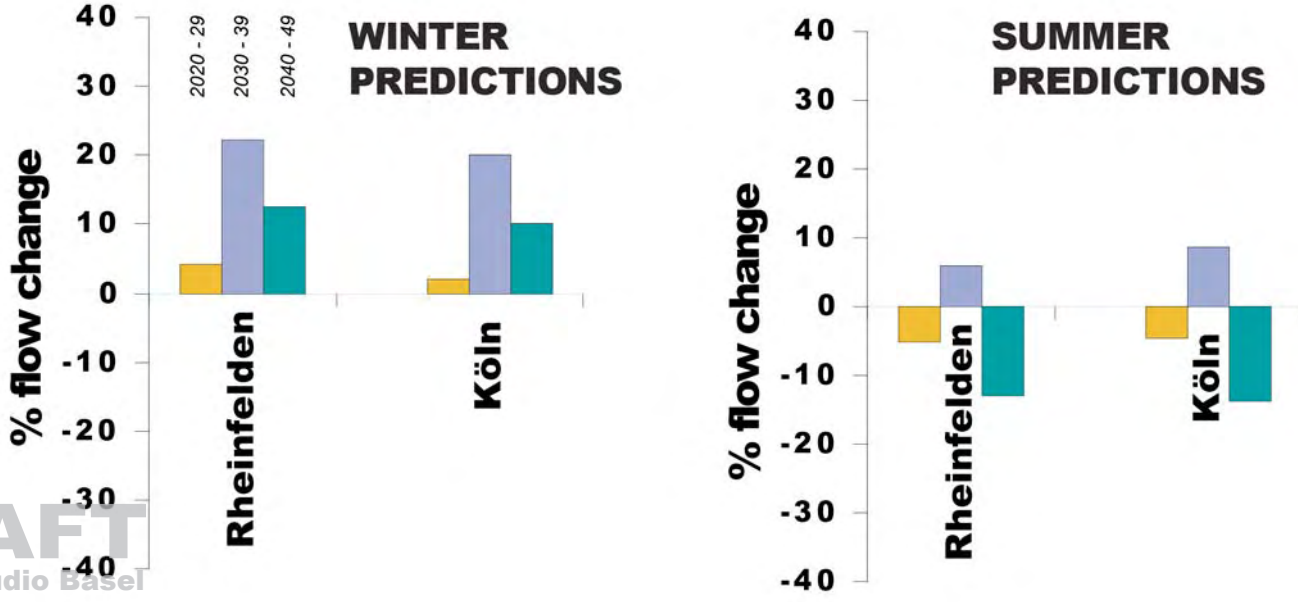
PRE-PLANNING

NEW PROPOSAL

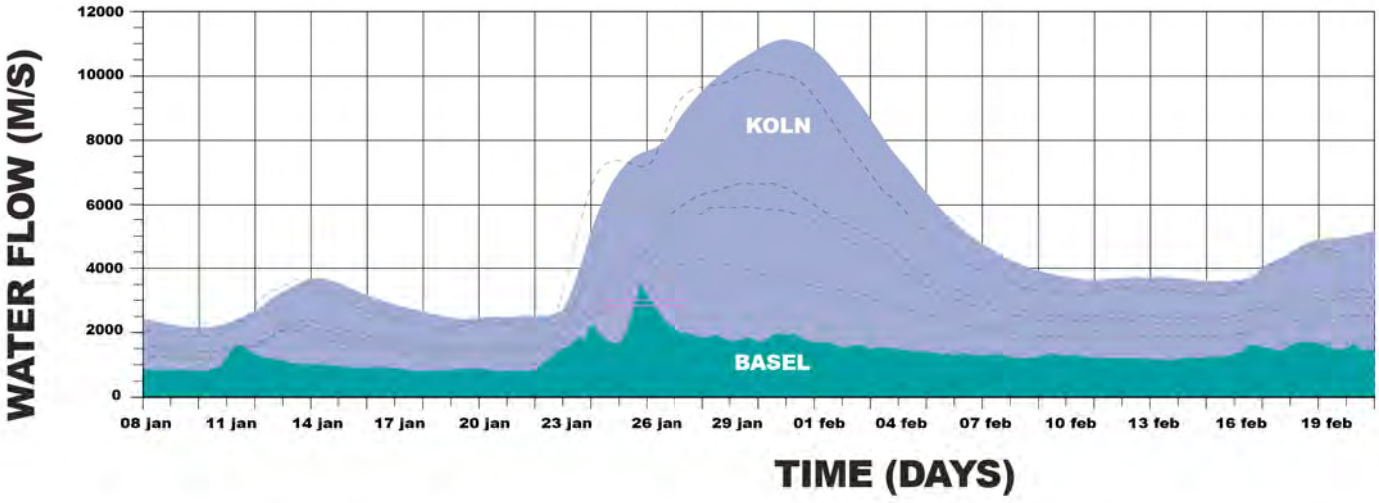
AVERAGE MONTHLY WATER FLOWS: BASEL AND KOLN



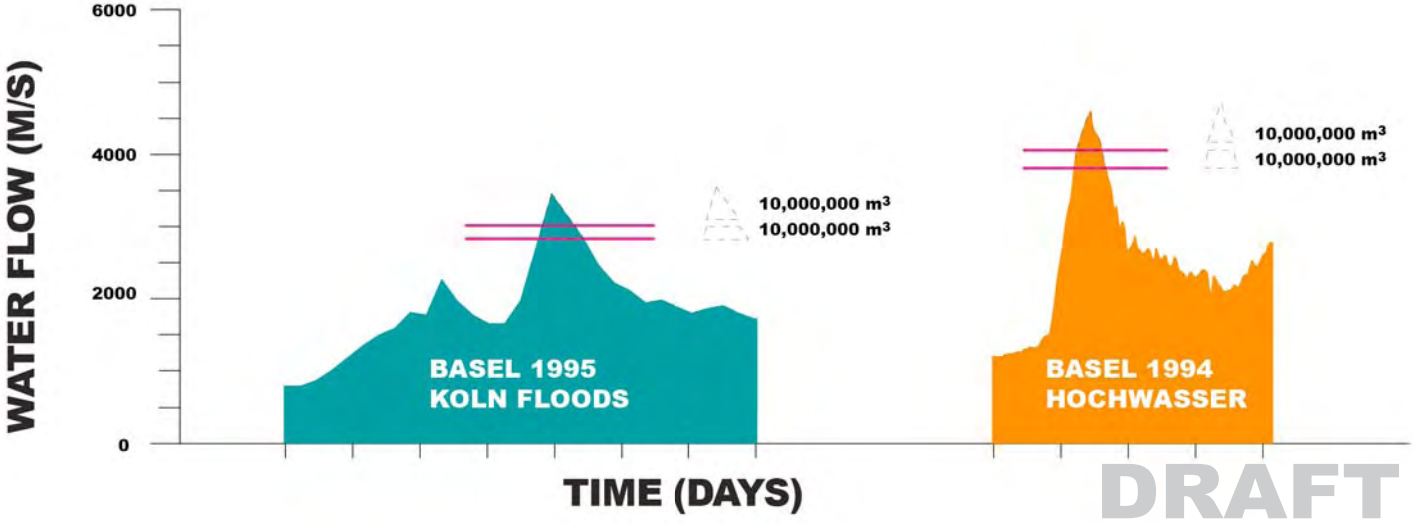
WINTER WATER VOLUMES ARE SET TO INCREASE



BASEL FLOWS RELATED TO KOLN: 1995 FLOODS



IMPACT OF 10M OR 20M m^3 RETENTION BASIN ON PEAK FLOWS THROUGH BASEL



LOCATION
TOPOGRAPHY
NATURE
TOWN
INDUSTRY
FLOODING

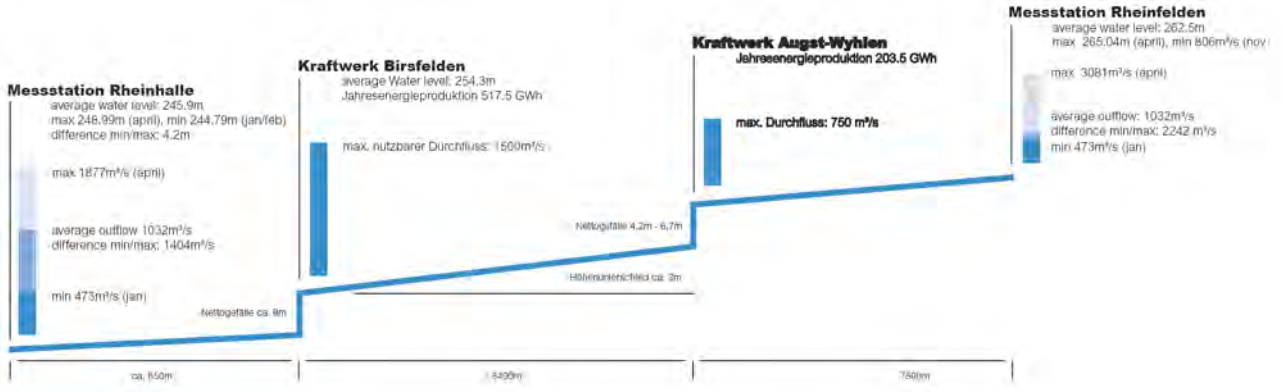
ENERGY PRODUCTION

HYDROELECTRIC ELECTRICITY GENERATION

The Upper Rhine length of river is largely dominated by a series of 11 hydroelectric dams, each with a height drop of between 3m to 8m to generate the necessary force to generate power. This abundant, sustainable resource provides power to all the nearby towns.

The dams also closely regulate the flow of water along the Rhine, ensuring also that the risk of flooding is minimal. However, the dams block the natural migratory paths of animals, particularly beavers and salmon.

Another important role of the dams is to provide public crossing-points of the 160m-wide Rhine. These are also border crossings for pedestrians and cyclists, but currently the Augst-Wyhlen dam does not provide a road crossing.



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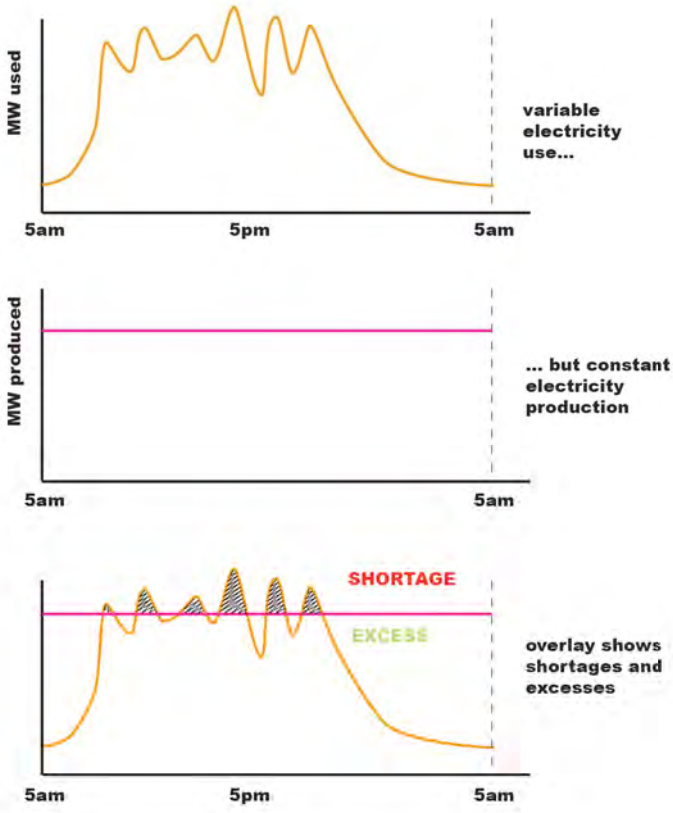
all data is based on 2006 statistics, except Birsfelden energy production is 1999 data

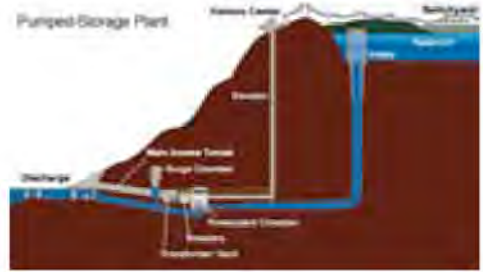
PUMP-STORAGE TECHNOLOGY INAPPROPRIATE



Pump-storage facilities are often used to effectively store energy until times of peak energy demand. In this way they act as a top-up to existing major energy plants, and are particlarly effective as a way to make use of a constant energy source. In this way they operate as large batteries, pumping water up to a high reservoir at times of low demand, and quickly releasing it back down when demanded.

However, in order to be economically viable, pump-storage facilities require large height differences - typically over 100m - in order to efficiently store the energy.

In an interview with Benno Zund at the ETH Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie, it was clear that there was not a viable way to use the potential 6m height difference at Wyhlen.



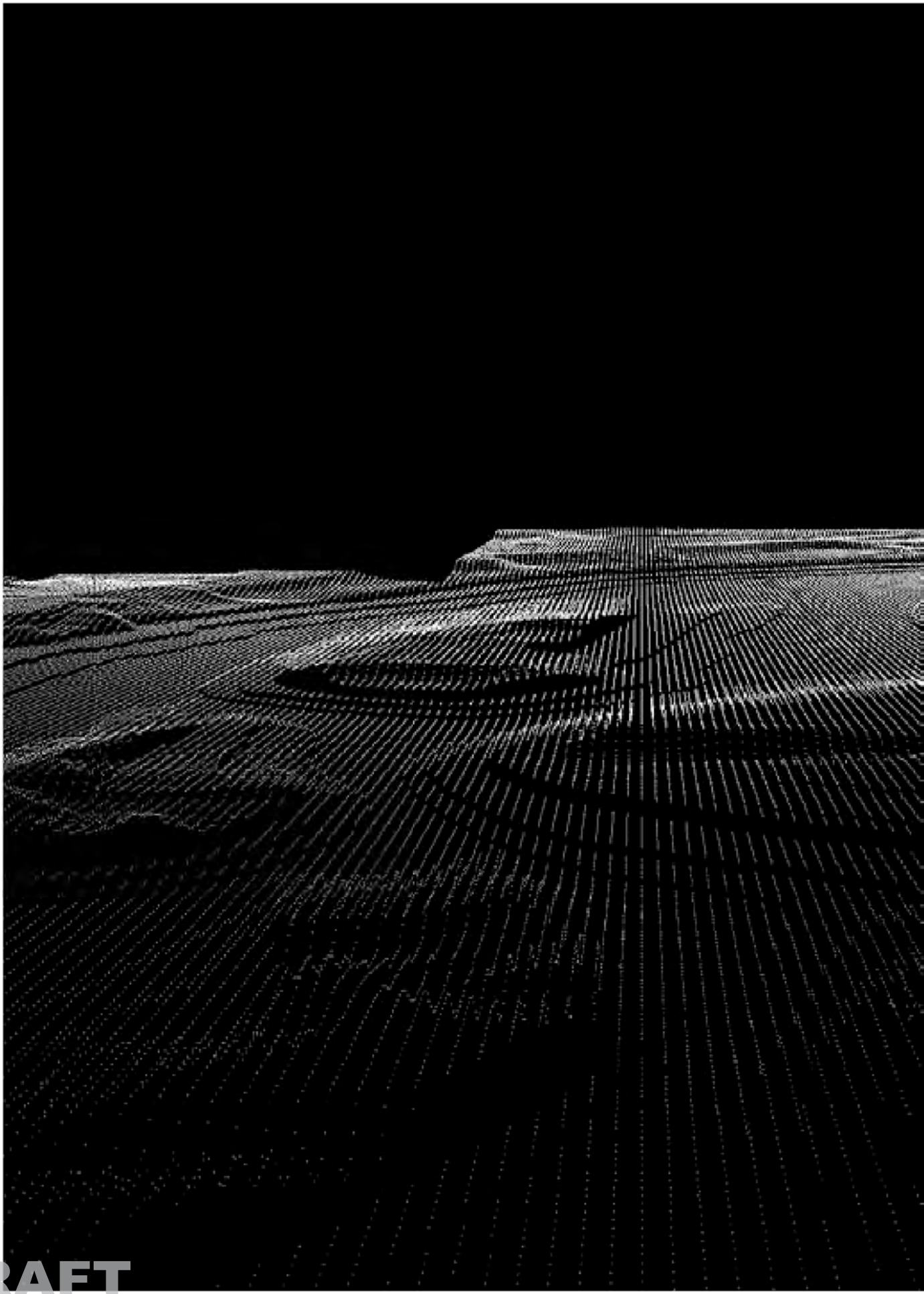
CALCULATIONS

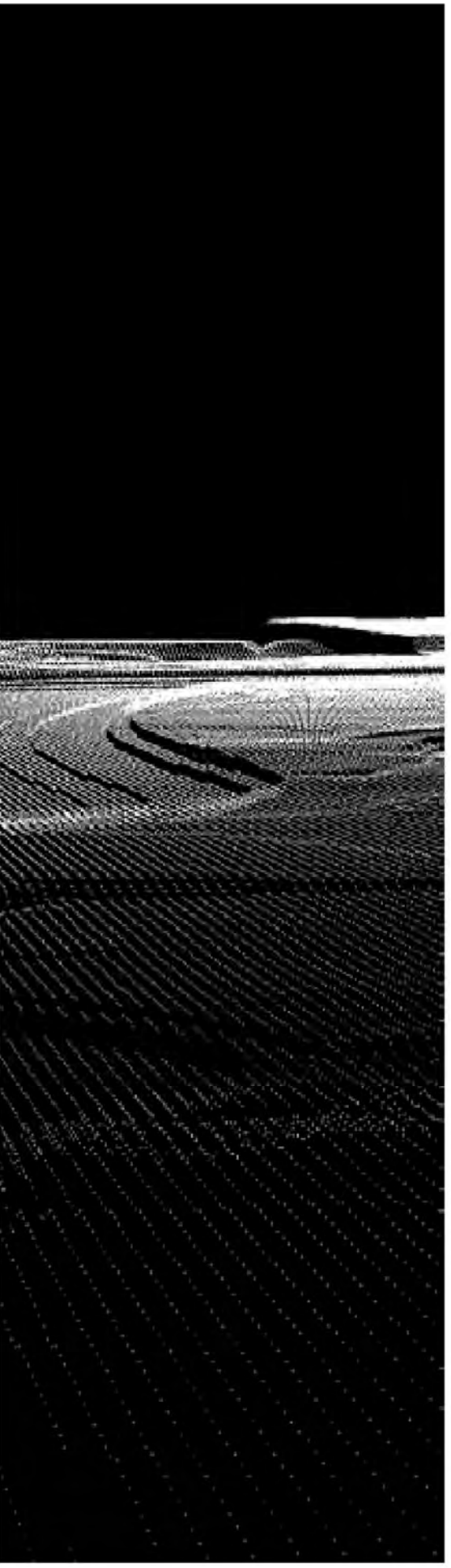
ASSUMPTIONS: 5m HEIGHT DIFFERENCE
10 m3/s AVERAGE FLOW
75% EFFICIENCY

ENERGY OF 1M3 WATER (1000kg) AT 5m HEIGHT = 9.81 x 1000 X 5
= 49050 W/m3
= 13.625 Wh/m3

ENERGY CONVERTED PER YEAR AT 10m3/s = 13.625 x 10 x 60 x 60 x 24 x 365 x 0.75
= 3223 MWh per year
= 3.2 GWh per yea

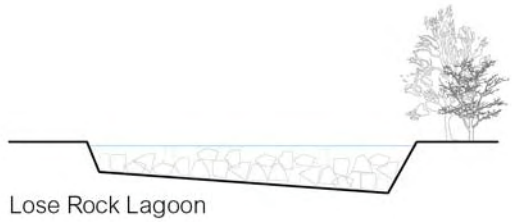
ENERGY FROM BY WYHLEN POWER STATION = 255 GWh per year





PART 2:
LAKE PROPOSAL

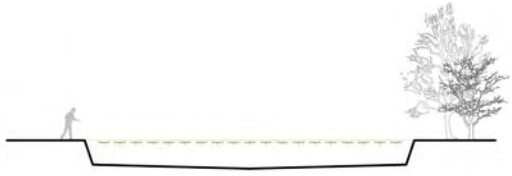
Lagoon Sequence



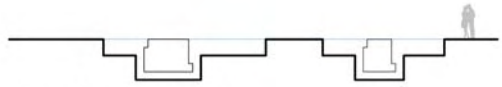
Lose Rock Lagoon

Breaking Water Lagoon

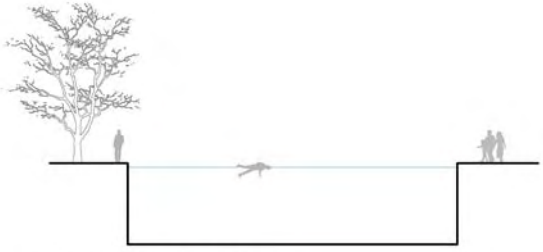
Breaking Water Lagoon



Water Lilies Lagoon



Water Object Lagoon



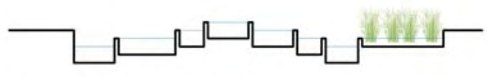
Deep Water Lagoon

Interactive Lagoon

Reed Lagoon

Shallow Water Lagoon

Island Lagoon



Stepped Levels Lagoon

NEW LAKE REQUIREMENTS

There is a range of possible shapes for a new lake, the most crucial factor in the Wyhlen location is how to form a lake in an area at least 9m above the river level and 12m above the groundwater level. While it is clear that a new lake will require gravel excavation, the depth of the lake (and amount of extraction) will affect the quality and eco-systems of the new lake.

The shape is important on a number of levels. Wiggly perimiters by their nature have more coves and inlets appropriate for breeding grounds and nesting areas. The shape is also important for the intended use of the lake, for example whether it is to be a rowing lake or a series of small biotopes.

key considerations:

WATER SOURCE

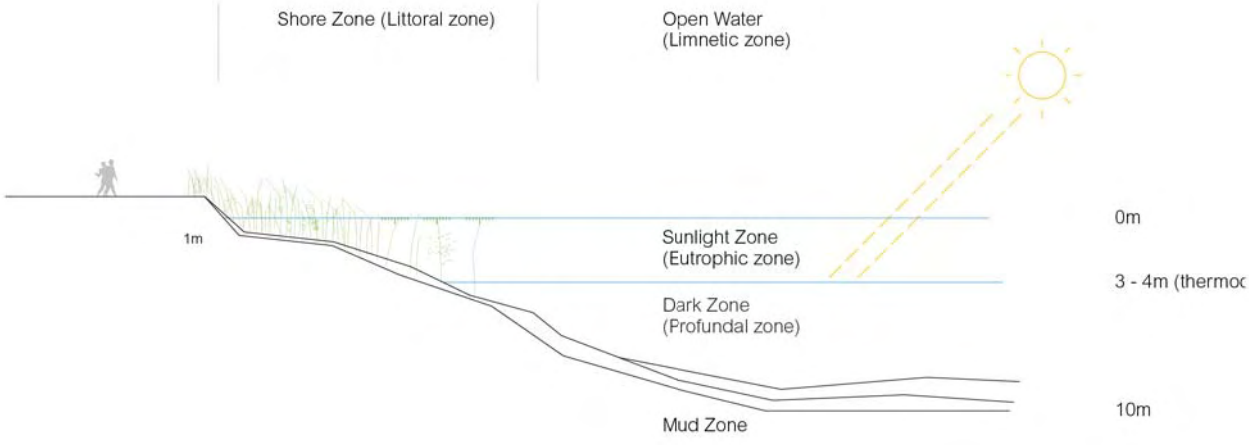
above dam
groundwater
pumped up

DEPTH

3m - light and wind disturbance penetrates to bottom
10m - stable zones at bottom encourage lake ecology

SCALE

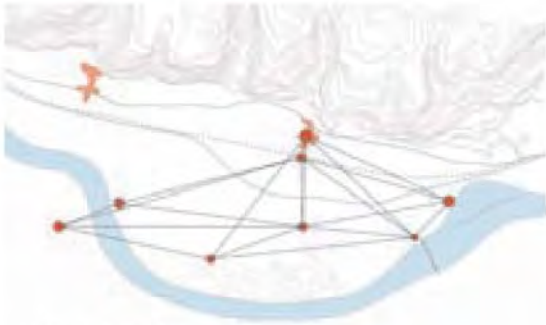
SHAPE



SITUATION: GRENZACH-WYHLEN

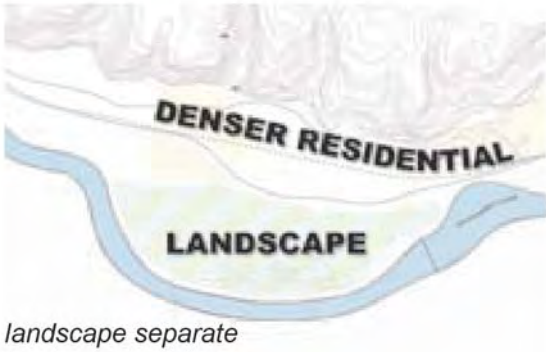
existing condition

new industial developments already encroaching on the open land

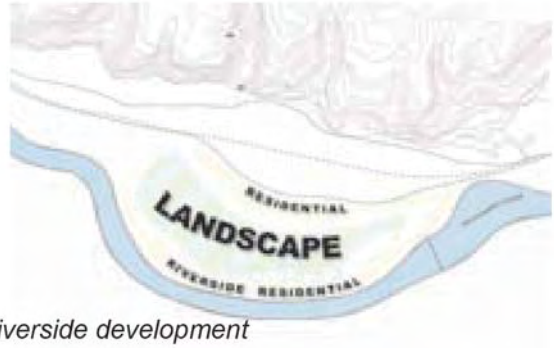


node points for connections

MIX TYPOLOGIES



landscape separate



riverside development

mixed fingers

NEW LAKE TYPOLOGY MATRIX

ECOLOGY

biotope series for smaller, varied habitats

SPORT

simple cut-in with less perimeter but more space for deep areas

FLOOD DEFENCE

low-level polder excavated deep and mantained mostly empty

perimiter zones for natural habitats with the chance of deep zones

delta formation at low level

gradual field aquisition and excavation

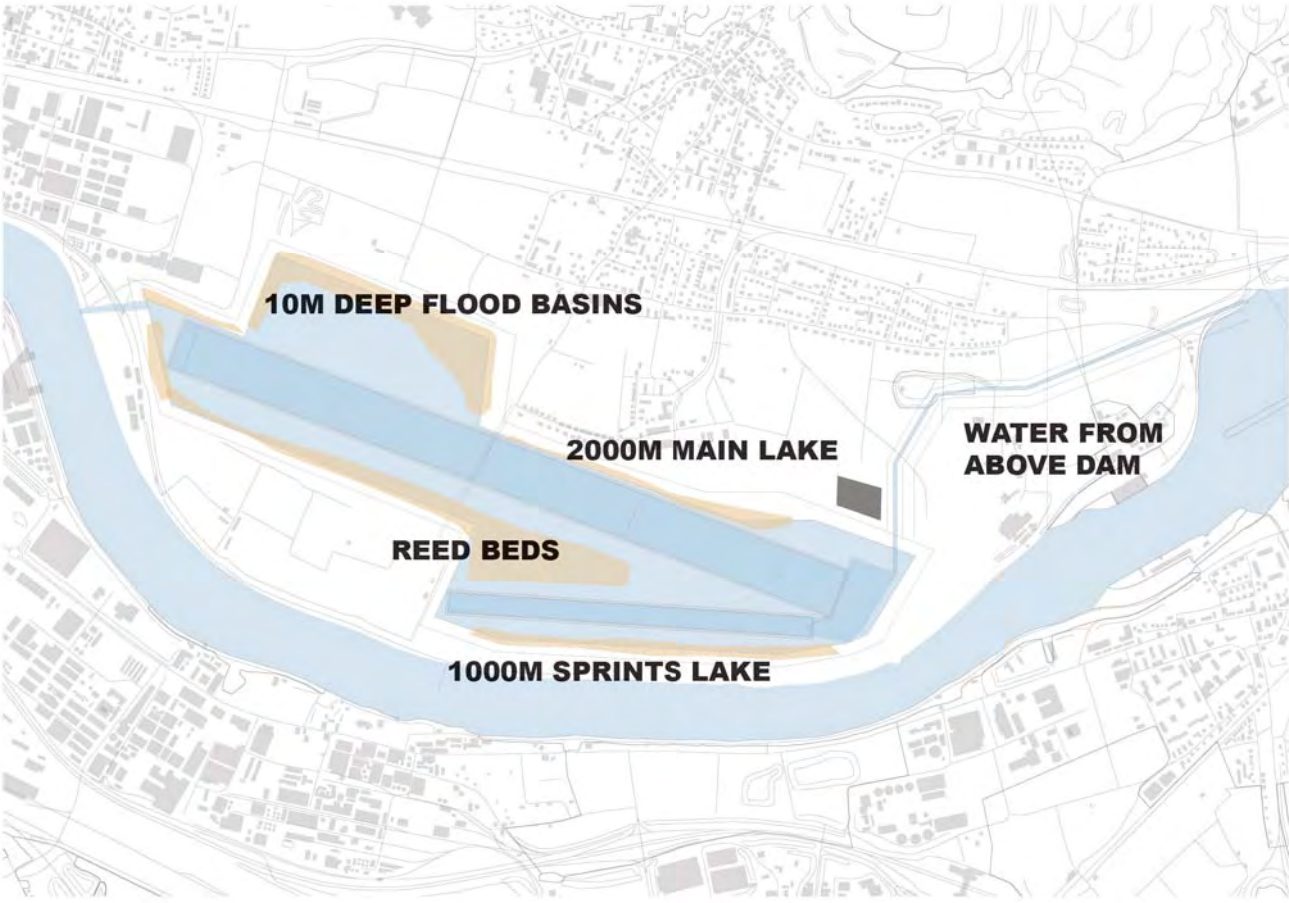
rowing lake from above or groundwater, 3m depth

wider river by gravel extraction

water from above dam supplies lake

POSSIBLE SCENARIO
SUMMER OLYMPICS IN SWITZERLAND - ROWING AND CANOEING IN BASEL

PROPOSAL 1: FLOODING ROWING LAKE



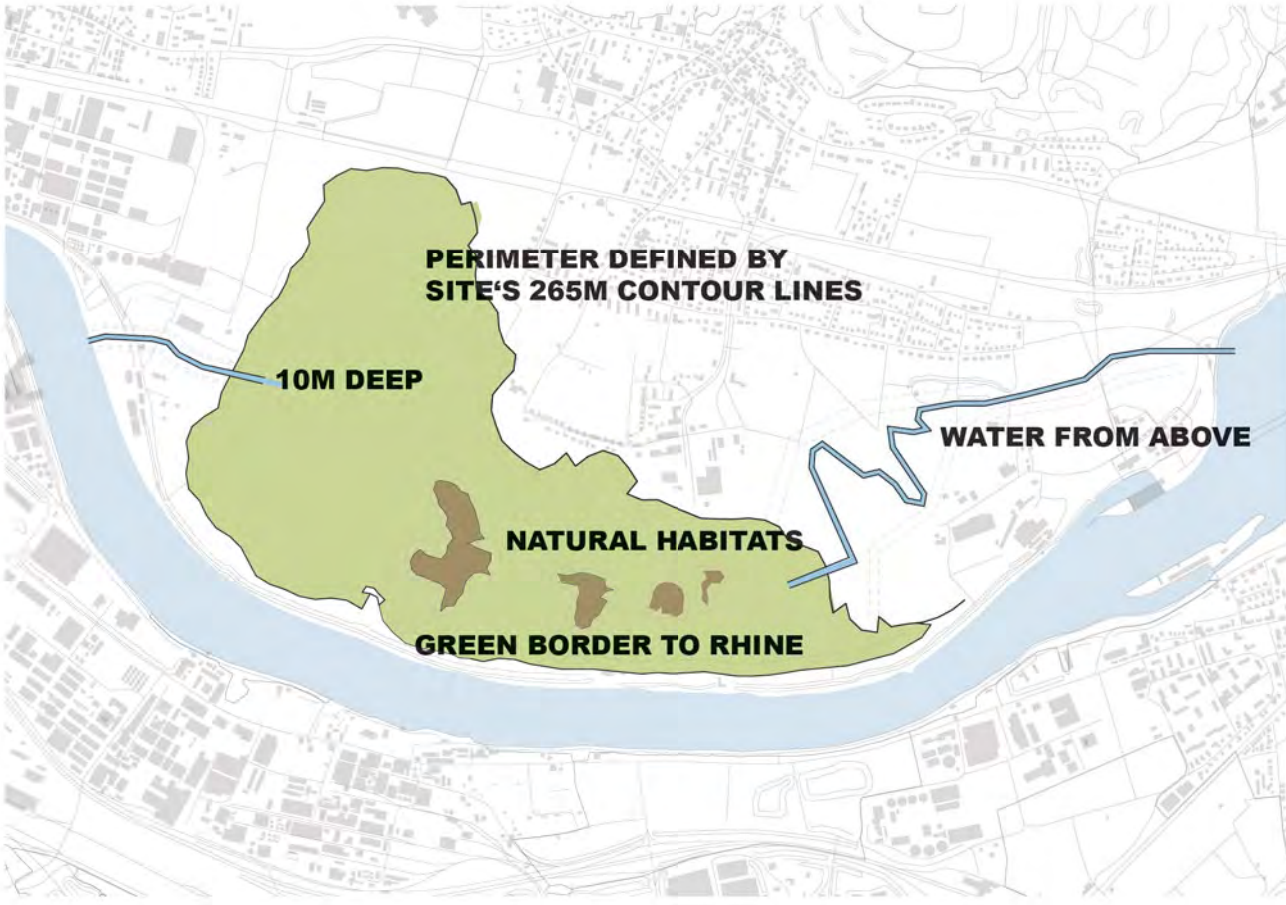
The lake is dug 10m into the gravel, to create two rowing courses 3m deep, and a surrounding 1m deep area for reed beds.

The flooding capacity of the lake would be about 9 million cubic metres.

However, the lake form and function does not seem to offer as much as other options in terms of public functions, relevance to the landscape, or actual value of the intervention.

POSSIBLE SCENARIO
NATURE RESERVE AND RECREATION AREA

PROPOSAL 2: CONTOUR LAKE



The north edge of the lake is defined by the 265m contour line - the highest flooding point of the upstream river.

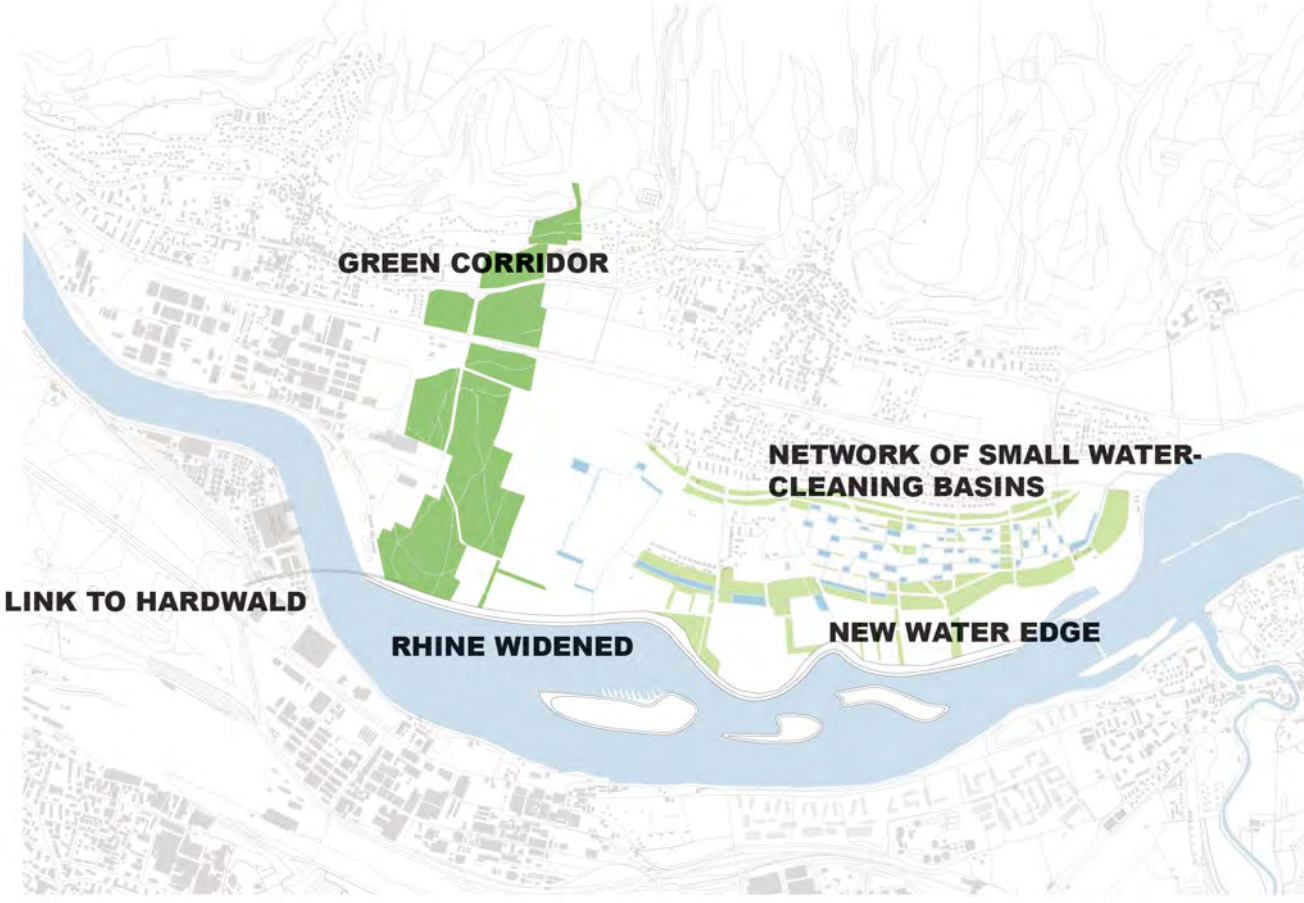
The shape of the southern and western sides also derives from the existing contours, and the promontories are the current high-points in the gravel pits.

The depth reaches 10m, allowing a balanced eco-system to develop, and has shallower areas around the vegetation-lined borders. The rate of through-flow must not be too high.

The water source is from above the dam and requires the wall to the Rhine to be made safe.

POSSIBLE SCENARIO
ALL NEW HOMES HAVE A VIEW ONTO WATER - EITHER THE RHINE OR SMALL BASINS

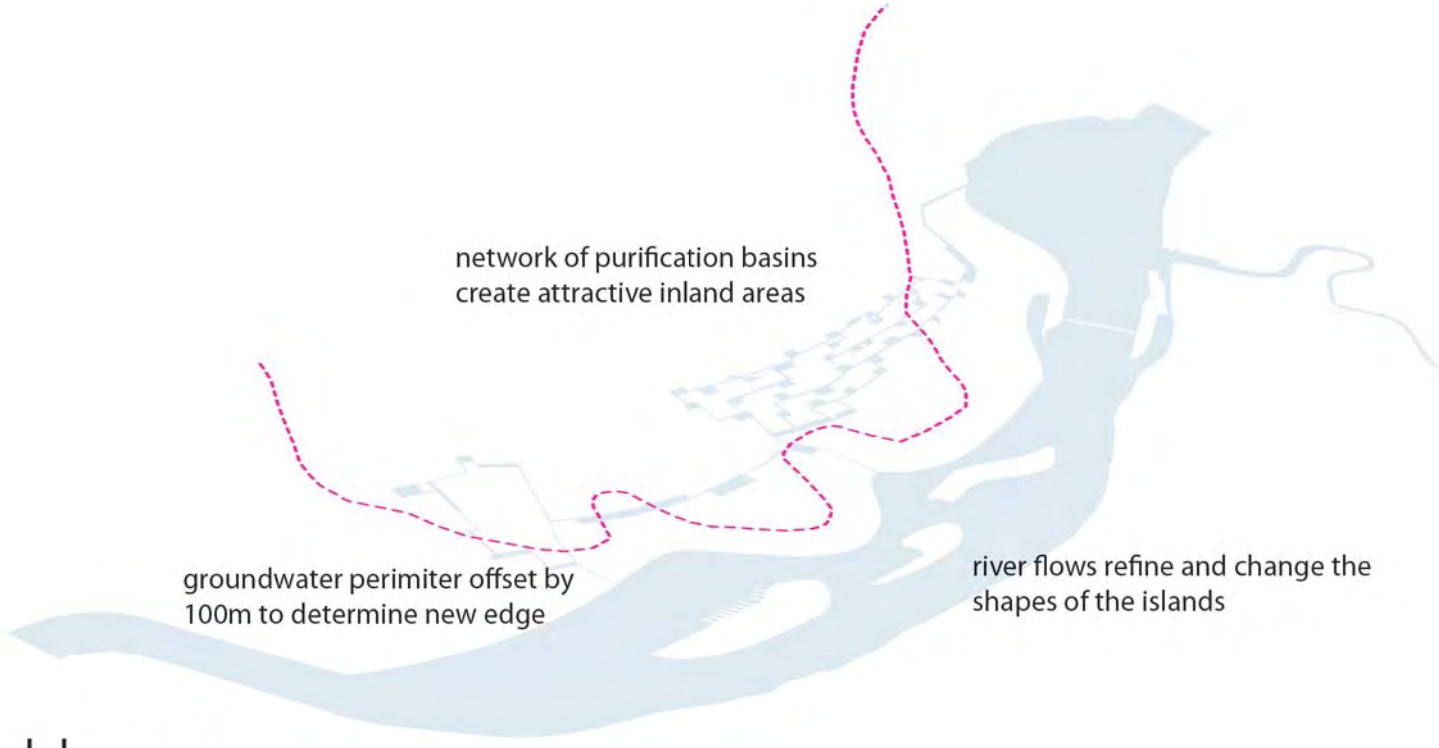
PROPOSAL 3: RHINE CUTOUT AND FIELDS



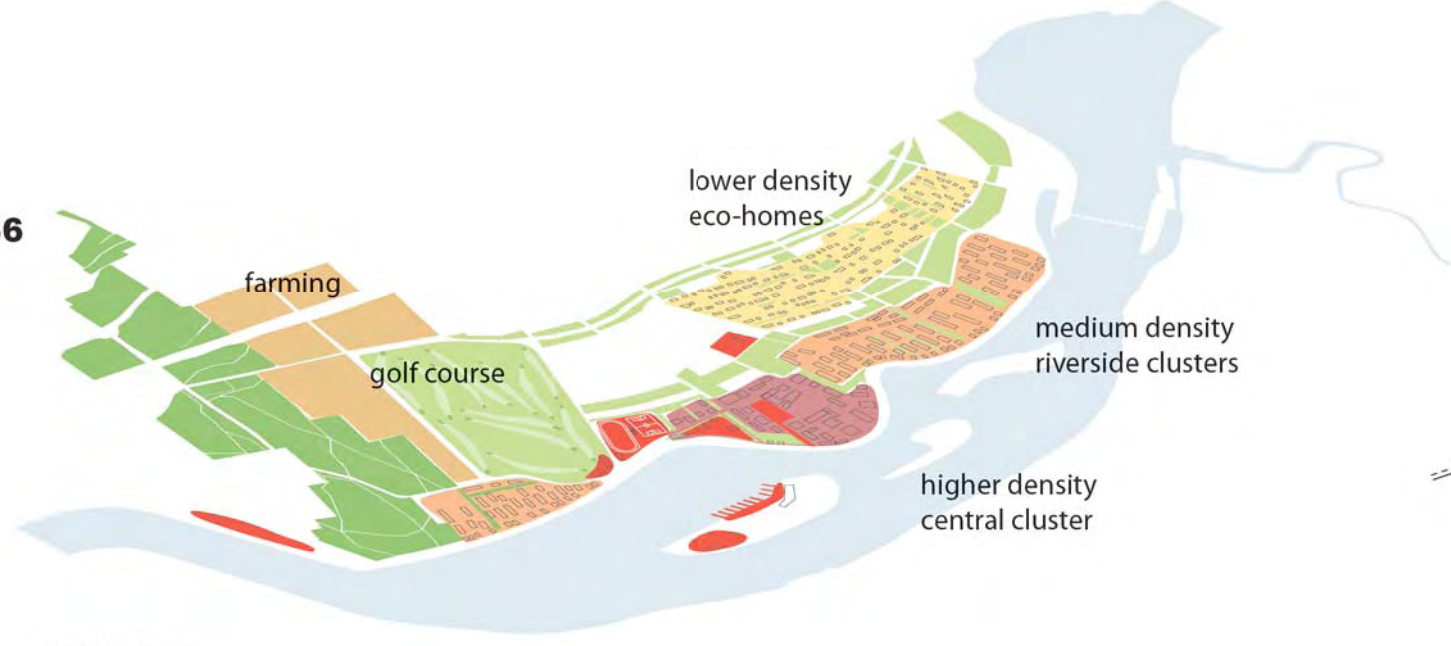
As if the Rhine had somehow broken its banks and flooded the land, the river becomes almost 400m at points, with leftover islands marking the high points of the land.

The time-based process is open-ended and adaptable, as it is largely driven by the acquisition of the privately-owned fields. The scheme accomodates the progressive re-use or redevelopment of the industrial areas, and creates a new 4km waterfront area with great attractive value for new residents or visitors.

The inland fields network together to clean water and provide inland water views.

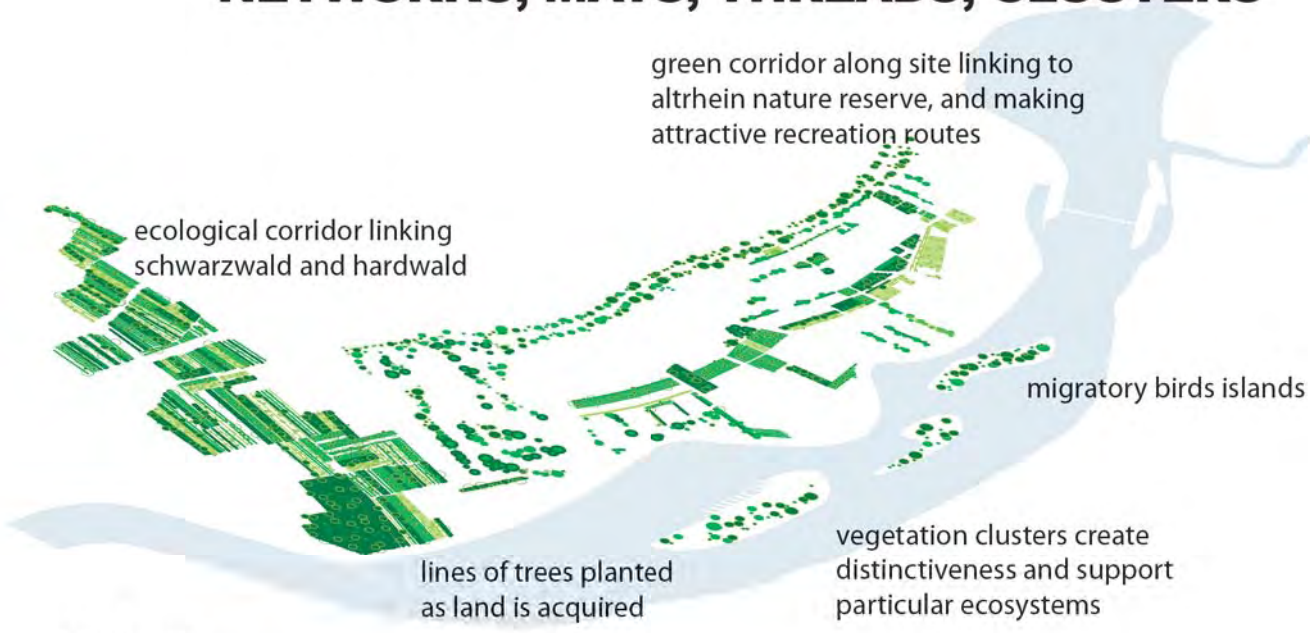


lakescape

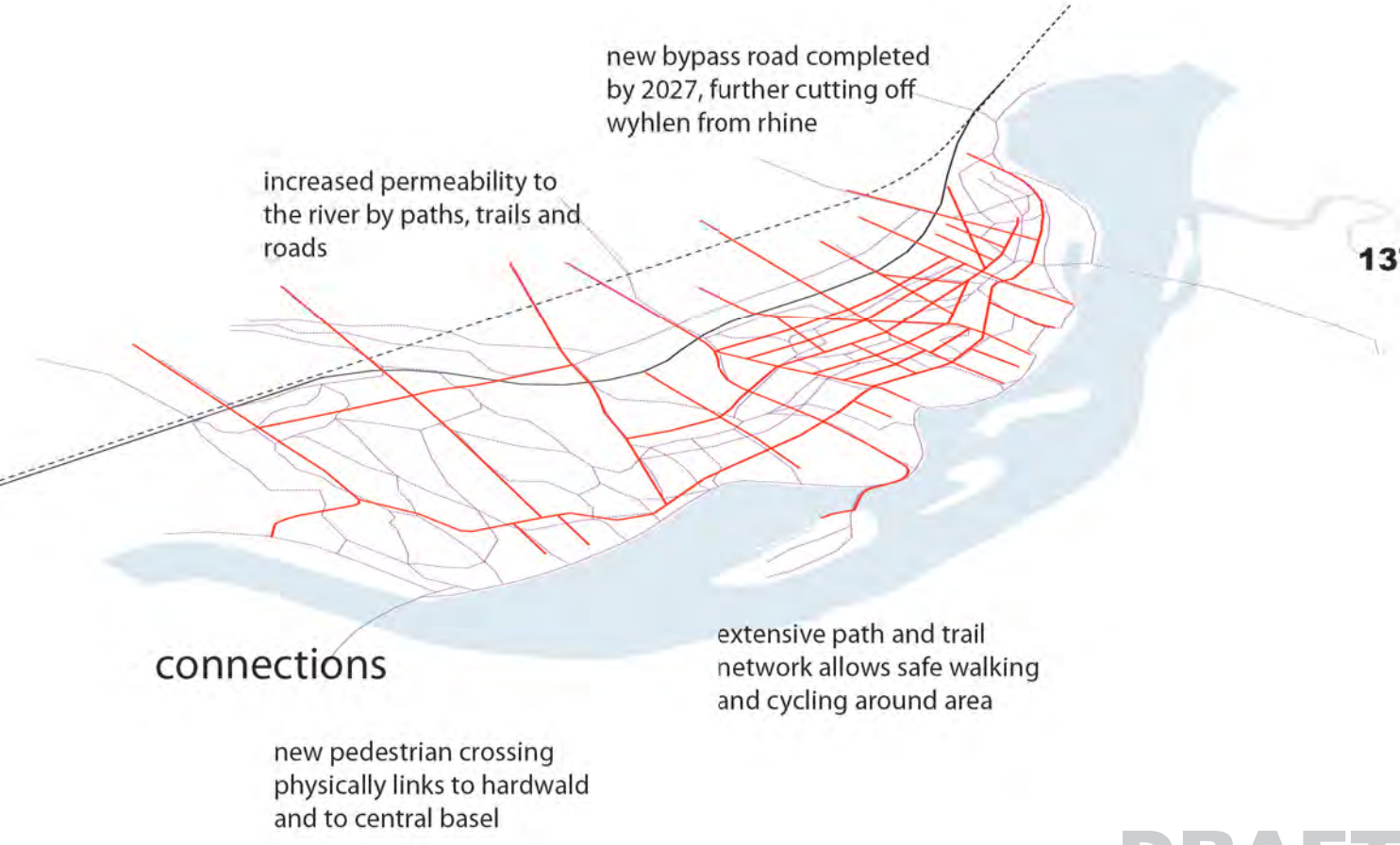


program

NETWORKS, MATS, THREADS, CLUSTERS

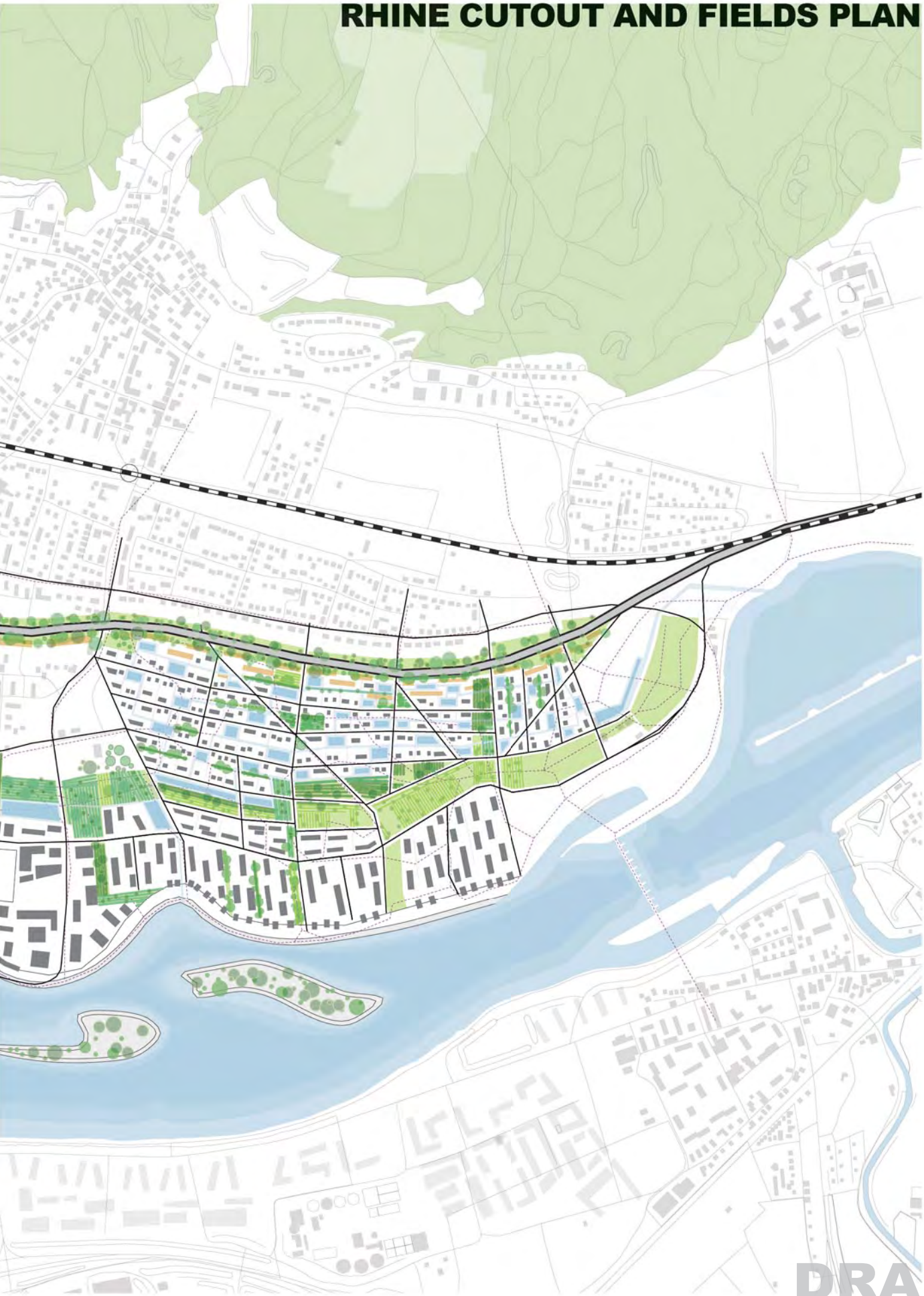


ecology



connections

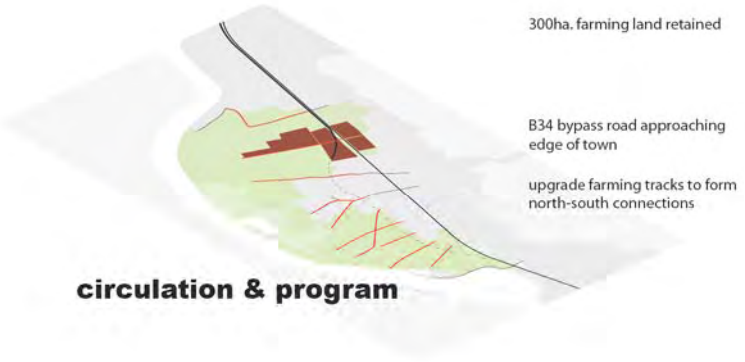
RHINE CUTOUT AND FIELDS PLAN



phase 1 - seeding
5 yrs

phase 2 - growing
10 yrs

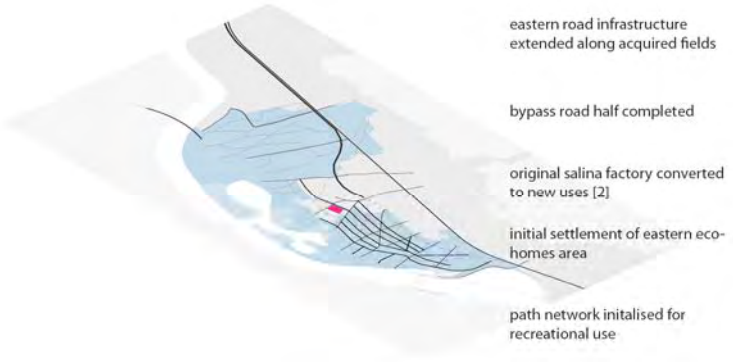
circulation & program



300ha. farming land retained

B34 bypass road approaching edge of town

upgrade farming tracks to form north-south connections



eastern road infrastructure extended along acquired fields

bypass road half completed

original salina factory converted to new uses [2]

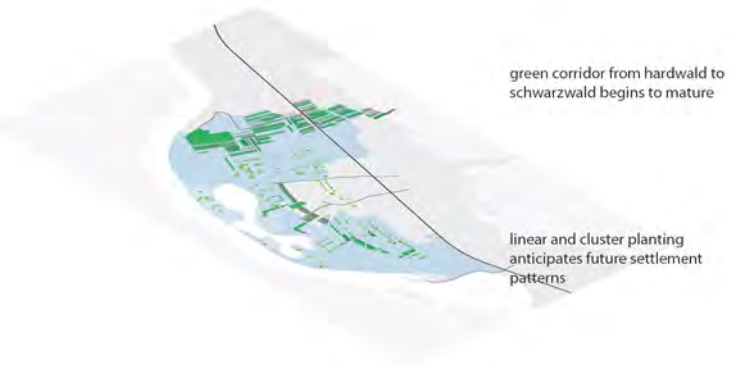
initial settlement of eastern eco-homes area

path network initalised for recreational use

ecology

planting of linear rows of mixed trees begins in acquired fields

tree cluster planting begin in specific areas



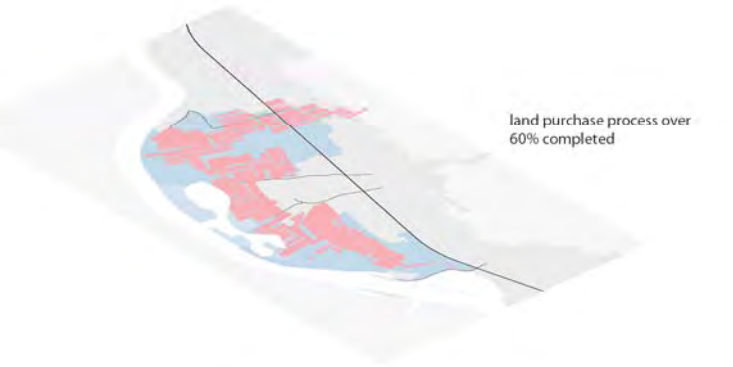
green corridor from hardwald to schwarzwald begins to mature

linear and cluster planting anticipates future settlement patterns

land acquisition

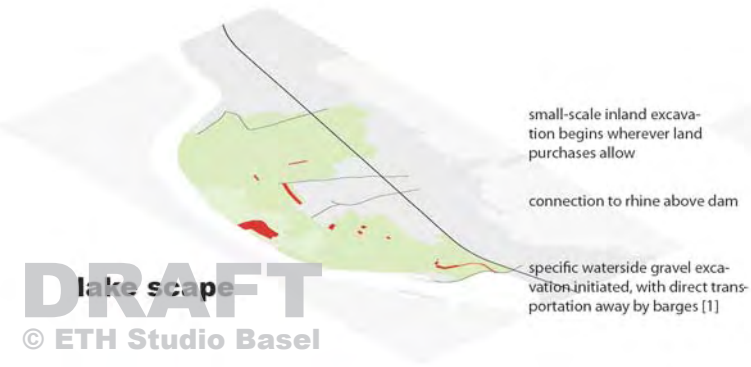
land purchase process initiated

areas owned by the local council are integrated



land purchase process over 60% completed

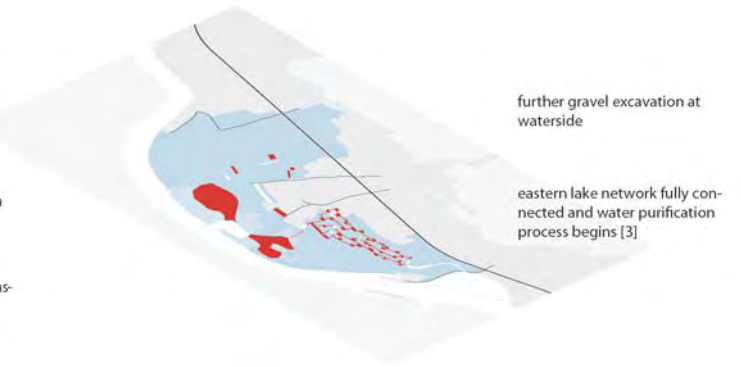
lake scape



small-scale inland excavation begins wherever land purchases allow

connection to rhine above dam

specific waterside gravel excavation initiated, with direct transportation away by barges [1]

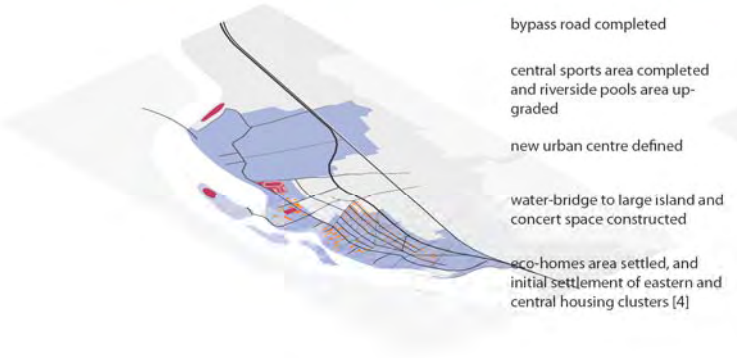


further gravel excavation at waterside

eastern lake network fully connected and water purification process begins [3]

PROCESSES OVER TIME

phase 3 - layering
20 yrs



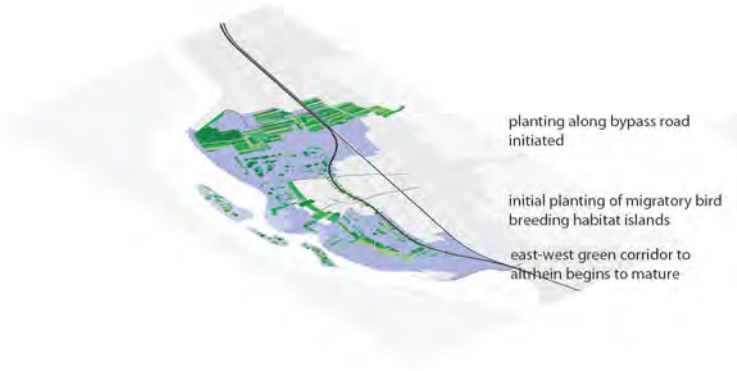
bypass road completed

central sports area completed and riverside pools area up-graded

new urban centre defined

water-bridge to large island and concert space constructed

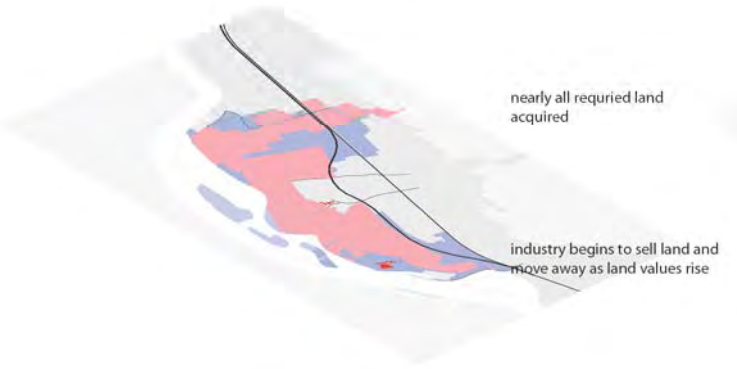
eco-homes area settled, and initial settlement of eastern and central housing clusters [4]



planting along bypass road initiated

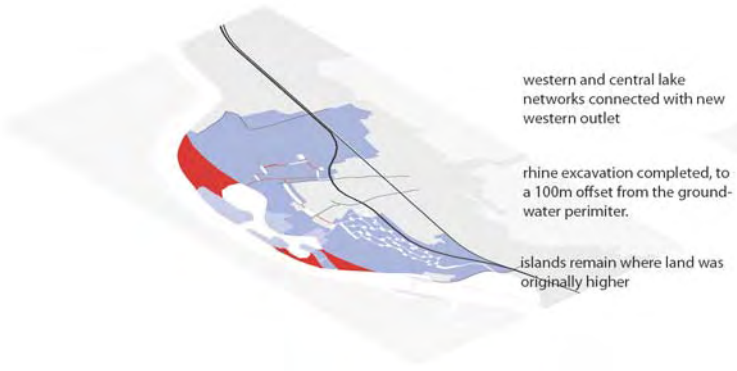
initial planting of migratory bird breeding habitat islands

east-west green corridor to altrhein begins to mature



nearly all requried land acquired

industry begins to sell land and move away as land values rise

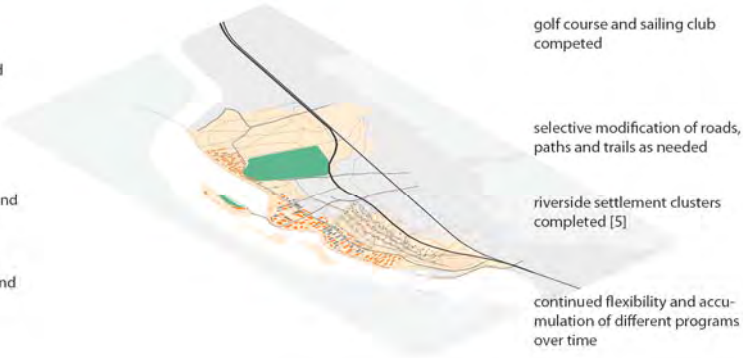


western and central lake networks connected with new western outlet

rhine excavation completed, to a 100m offset from the ground-water perimiter.

islands remain where land was originally higher

phase 4 - adaptation
30 yrs

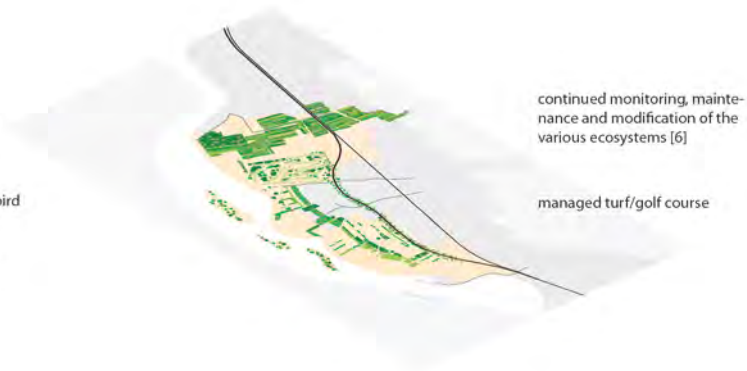


golf course and sailing club competed

selective modification of roads, paths and trails as needed

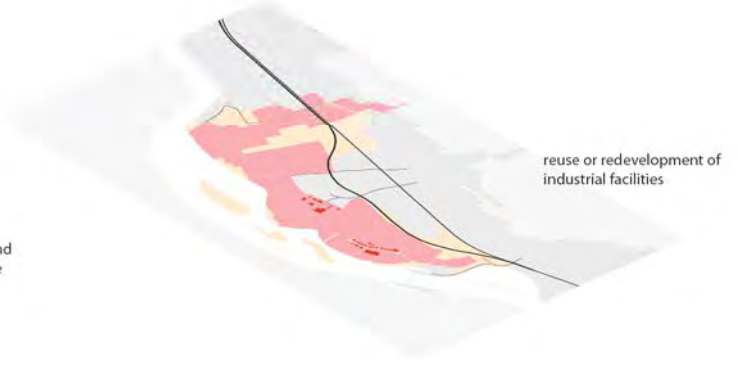
riverside settlement clusters completed [5]

continued flexibility and accu-mulation of different programs over time

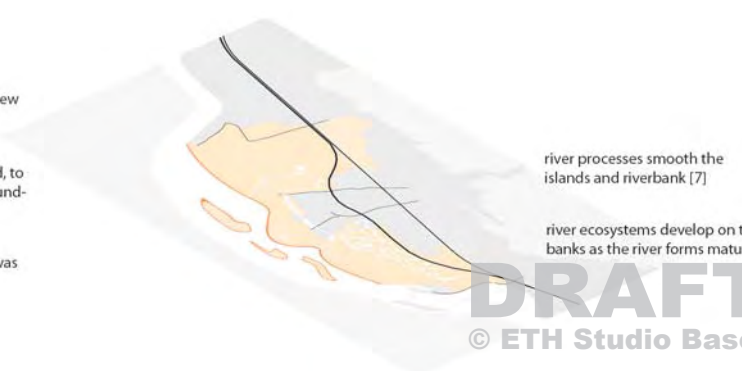


continued monitoring, maintenance and modification of the various ecosystems [6]

managed turf/golf course



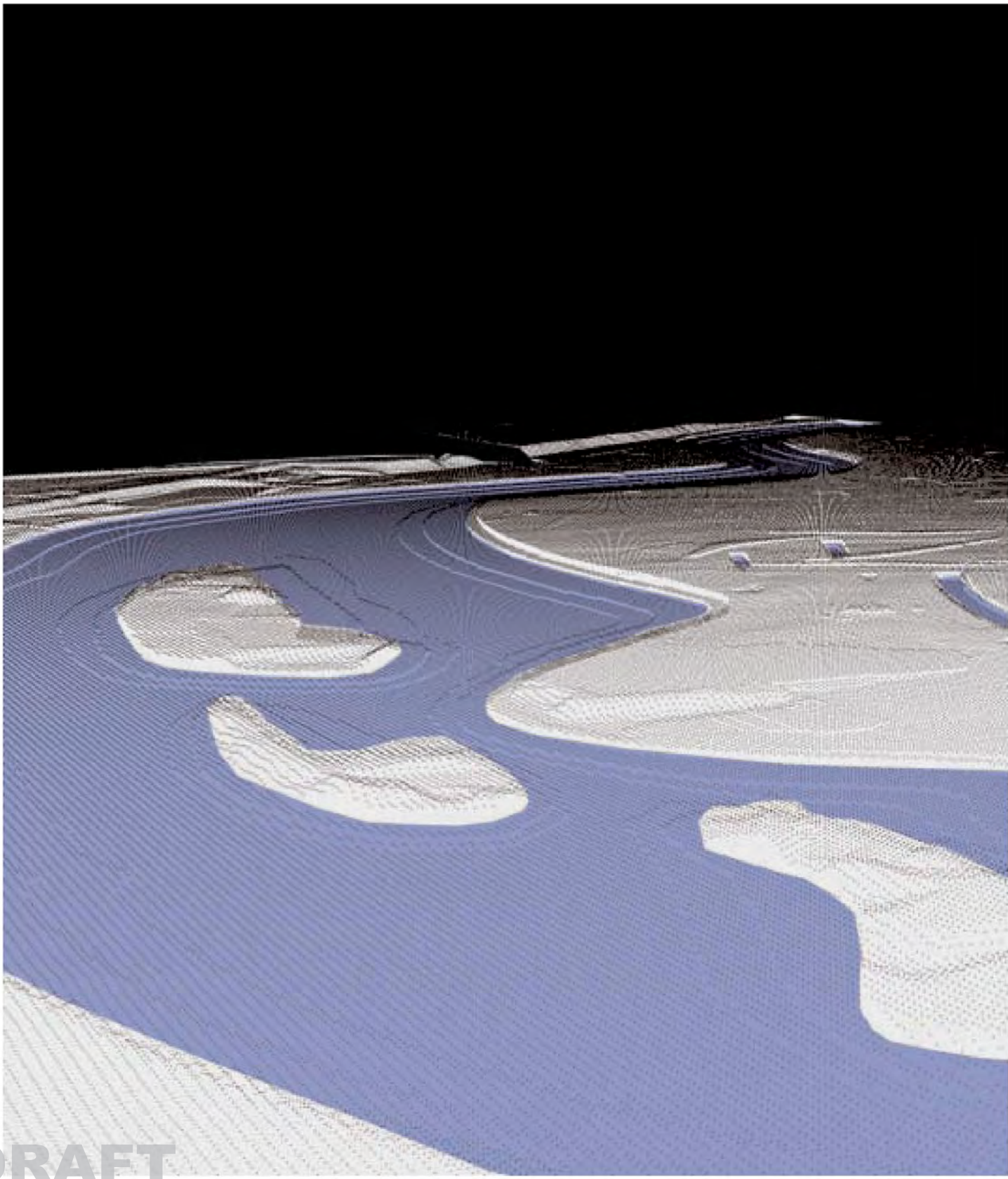
reuse or redevelopment of industrial facilities



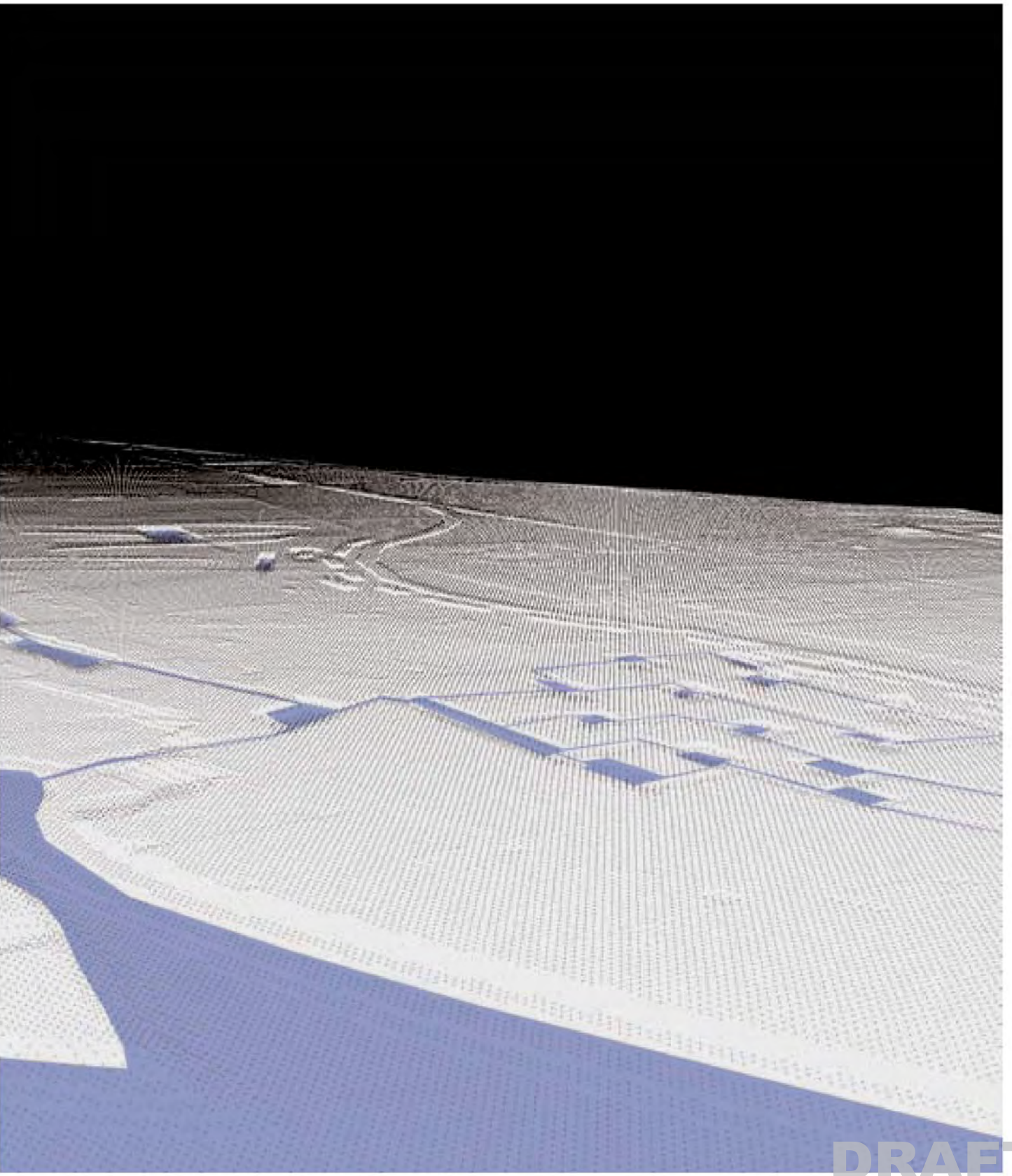
river processes smooth the islands and riverbank [7]

river ecosystems develop on the banks as the river forms mature

PERSPECTIVE AMONGST THE ECO-VILLAS



TOPOGRAPHIC PERSPECTIVE LOOKING WEST



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Die spät- und postglaziale Landschafts- und Vegetationsgeschichte des südlichen Oberrheintieflands

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Florian Poppele