4. Metropolitan analysis
Guidelines for a energy strategic project in Basel

INTRODUCTION

The following chapter contains analytical maps of various aspects on a metropolitan scale in relation to Basel's historical development, topographical nature, mobility patterns and typological composition. In order to approach our research topic Energy and the Metropolis from an architectural and urbanistic perspective we would like to emphasize the importance of understanding energy not merely as direct energy consumption but as embodied energy as well. For our research this means that we intend to analyse and work with the existing urban fabric as much as possible rather than a scenario of demolition and construction. In relation to this premise we therefore intend to provide an analysis that shows equally quantitative and qualitative characteristics of specific spatial configurations within the built environment in relation to embodied energy, spatial conditions, mix of uses, mobility and transformation potentials it could be transformed over time. Thereby, it is the aim to extend the current public debate on sustainable urban development beyond mere technical and functional solutions at the building scale to a broader urban typological viewpoint within existing cities. As we believe that the issue of energy is inextricably related to urban quality, the way we live together and in which way we experience space, it cannot be discussed as a mere technical problem with. In this sense, case studies of representative urban types within the Basel Metropolitan Region (MetroBasel) are undertaken to develop transformation strategies that relate to specific conditions which then hold the potential of being extended to comparable types within other cities.

The initial historical analysis of MetroBasel enabled us to define chronological stages of the city's topological pattern and its development over time in relation to spatial design principles, property division, use flexibility and structural characteristics. Moreover, each transformation period is also distinguishable in relation to its scope and scale, thereby providing essential information to which extent the artificial city pattern relates to its natural environment as well as which natural borders prevail or are overcome at a given time.

With the aim of following a causal chain of premises, strategies and transformation guidelines we defined an initial hypothesis in order to structure the scale and scope of the analysis. Hence, we claim that a city's capacity to transform appropriately in accordance with future demands is directly linked to its level of connectivity, spatial quality and potential to provide space for various uses simultaneously or at different stages over time. In order to avoid further urban sprawl towards the un-built natural environment we regard the already existing built areas at the MetroBasel scale as a primary zone of urban development. Multiple urban conditions and natural environments already exist within this perimeter that require further attention and analysis in order to be equally protected and transformed over time. In combination with public transportation we regard this spatial growth perimeter as key element for our further investigation. The residual of the total built area thus provides an overview of how far-reaching the MetroBasel zone currently is and along which perimeter a building limit could potentially be proposed.

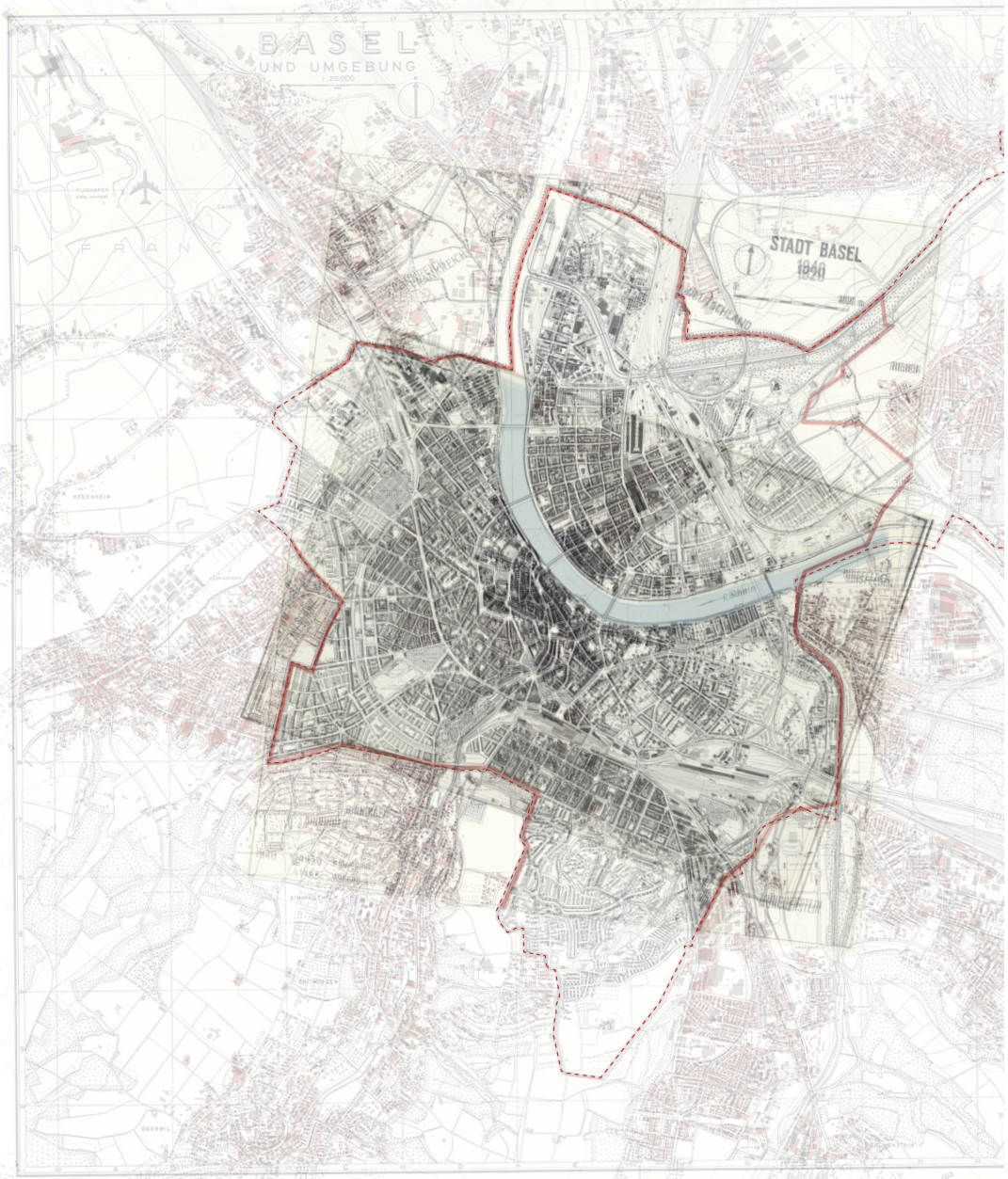
Within the built territory public transportation and vehicular traffic maps in relation to population density reveal existing concentrations and potential areas

for future development with high levels of transportation connectivity. With the aim to reduce vehicular traffic and air pollution as well as increase social engagement in public spaces we also define a relatively high level of connectivity to public transportation as a further favourable criterion within our transformation strategy.

Subsequently, we identified and mapped various urban types within MetroBasel that are clearly distinguishable from each other as well as existing in large-scale areas throughout the entire region. The composite map consists of urban types from different periods such as the historical core, perimeter blocks, row houses, high-rise buildings, mixed configurations, industrial areas, large free standing new developments and small free standing houses. As these spatial configurations are typical for Basel and European cities in general, they consequently also form the basis of our further investigation relating to energy efficiency, mix of uses, density, open space ratios and transport connectivity.

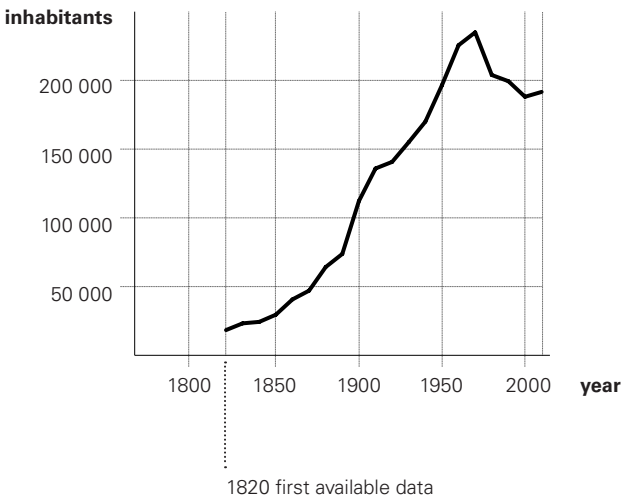
According to population growth prognoses published by the city of Basel, there are various scenarios ranging from a 7% decrease to a 13% increase in overall population throughout MetroBasel between 2010 and 2030. Therefore, as our primary focus is a general transformation of the existing built environment each individual study per urban type also includes scenarios whereby the space per resident is increased without raising the overall population. Whether means of public transportation would have enough or too much capacity to meet future demand requires a further in-depth analysis.

In conclusion, specific nodes and their travel-time distance to the central Basel area are defined in order to combine the aforementioned premise of combining public-transport with the selected urban types. Mapping perimeters around these nodes results in various overlapping zones of connectivity ranging between 5 to 40 or more minutes travel distance to the main central area around Basel SBB station. Exact time differences can be defined relatively accurately according to current public transport information. Further, metropolitan areas of potential development defined by BaselStadt are superimposed on to the travel-time/distance map, resulting in new fields of connected potential. Finally, these zones can be matched with those typologies which are designated as having the highest potential for future transformation. Ultimately, various scenarios and fields of further development can be tracked which all have the same conditions as premise, however, with differing outcomes.

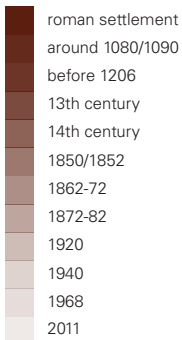

BASEL
UND UMGEBUNG
STADT BASEL
1840

HISTORICAL DEVELOPMENT

The current urban historical city centre is a result of a nearly 2000 years evolution. The development and use of the city centre is linked to the development and use of energy and transportation systems. The first Celtic settlements along the Rhine date back to the 5th century BC.
Abundance of fish at the river estuary of the Birsig and the safety present around the Münster high plateau (castle) allowed first human settlements to develop. The Roman contribution to the current urban structure was a system of roads that are still used today.
The construction of the Middle Rhine Bridge (completed in 1225) coincides with the opening of the bridge as an extension of the Gotthard road. The Rhine Bridge was the only fixed crossing of the 200-m-wide Rhine which enabled Basel to develop into a city of trade and prosperity.

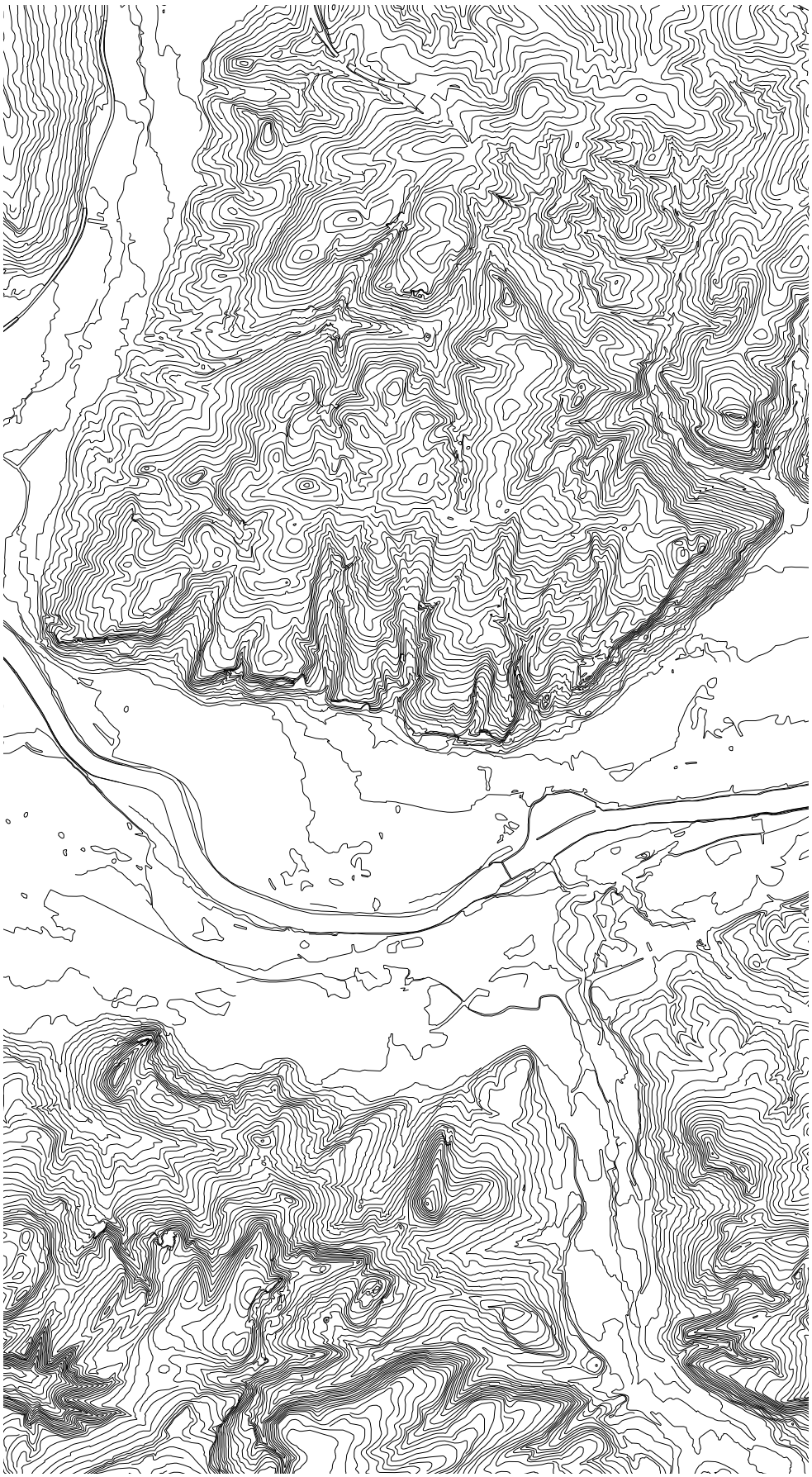


year	inhabitants	(correct year)
1770	16'726	1774
1780		
1790		
1800		
1810		
1820	18'365	1815
1830	23'254	1835
1840	24'316	1937
1850	29'555	
1860	40'680	
1870	47'040	
1880	64'207	
1890	73'749	1888
1900	112'227	
1910	135'918	
1920	140'708	
1930	155'030	
1940	169'961	1941
1950	196'498	
1960	225'588	
1970	234'945	
1980	203'915	
1990	199'411	
2000	188'079	
2010	191'606	



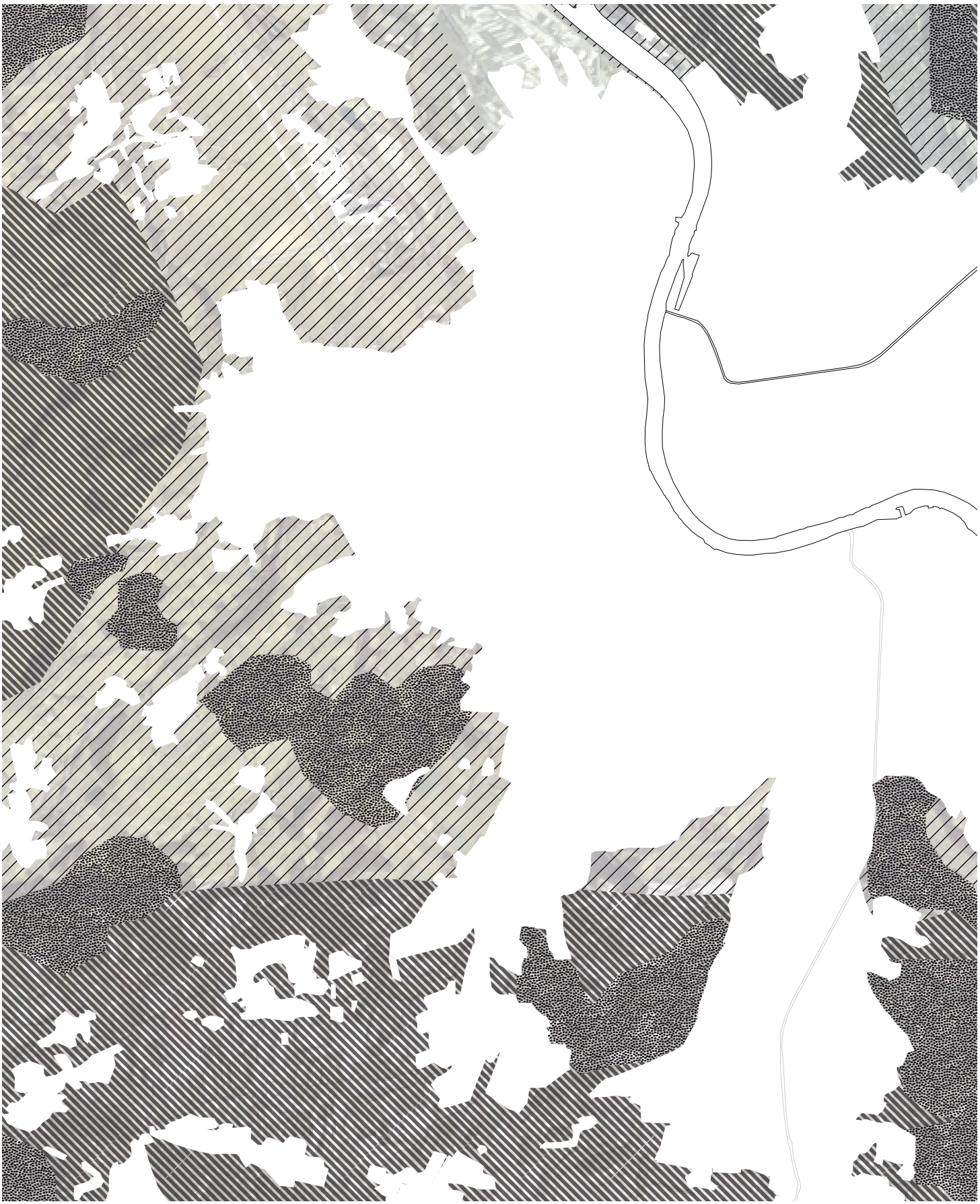
Source: Basels Stadtbild
www.statistik-bs.ch

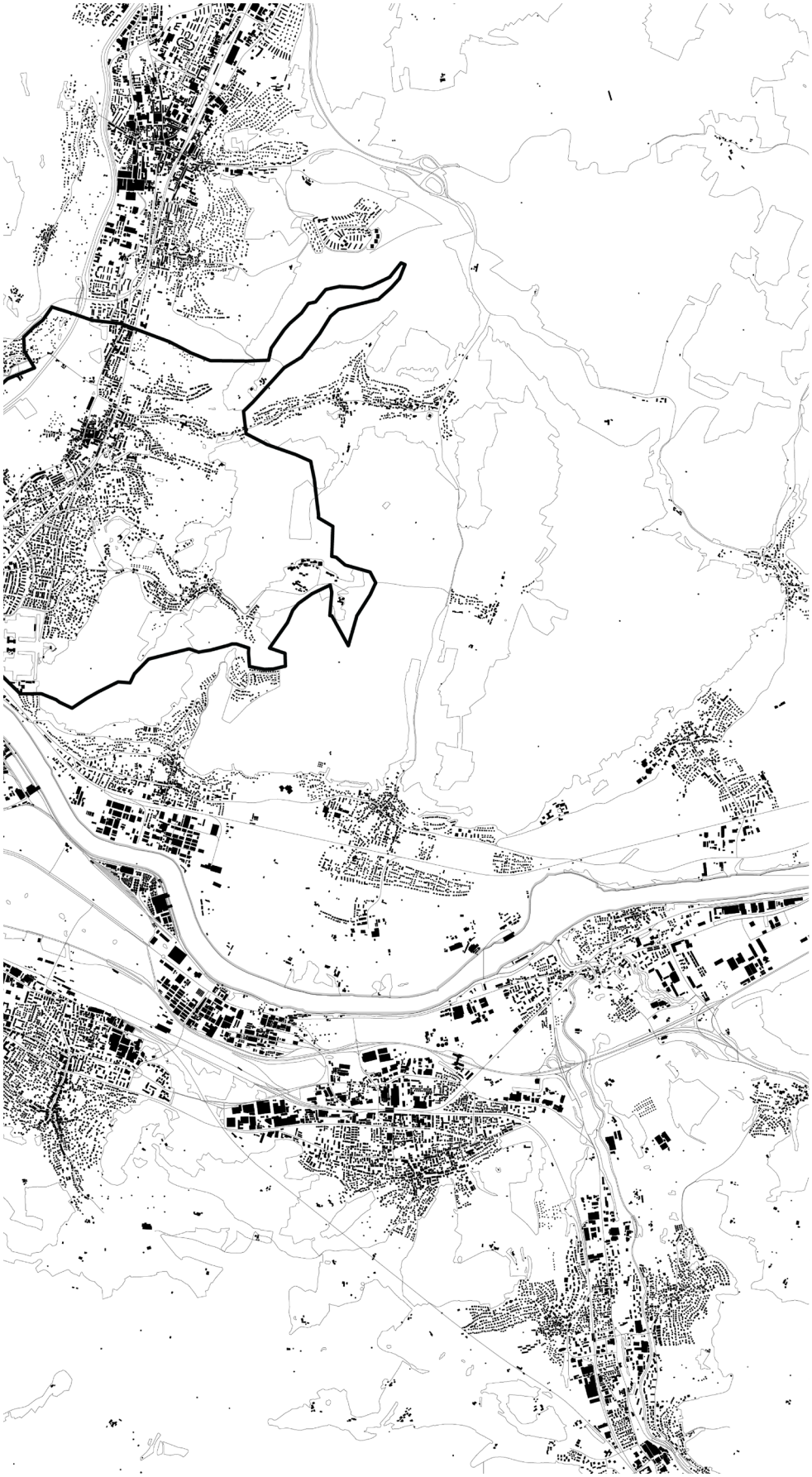
TOPOGRAPHY



Basel's topography is characterized by the outer branches of the Berner Alps in teh South, the Schwarzwald towards the North and the Rhine delta following a east to north-west direction. The rivers Birsig and Wiese also follow valleys in-between the sloping hillsides. At the height of Basel the riverbed of the Rhine makes a sharp bend of over ninety degrees. Coming from the High Rhine Valley towards the east the so-called Upper Rhine continues further north along the French-German border. The left southside of the Rhine is higher than the right and therefore offers a lot of terraces. As this was a natural protection against flooding, Basel situated its first settlement on the southside. The river Birsig originally formed a valley through the former closed plateau. Nowadays there is a change of steep and flat slopes which create a valley that changes from narrow to wide areas.

Source: Geodata ETHZ





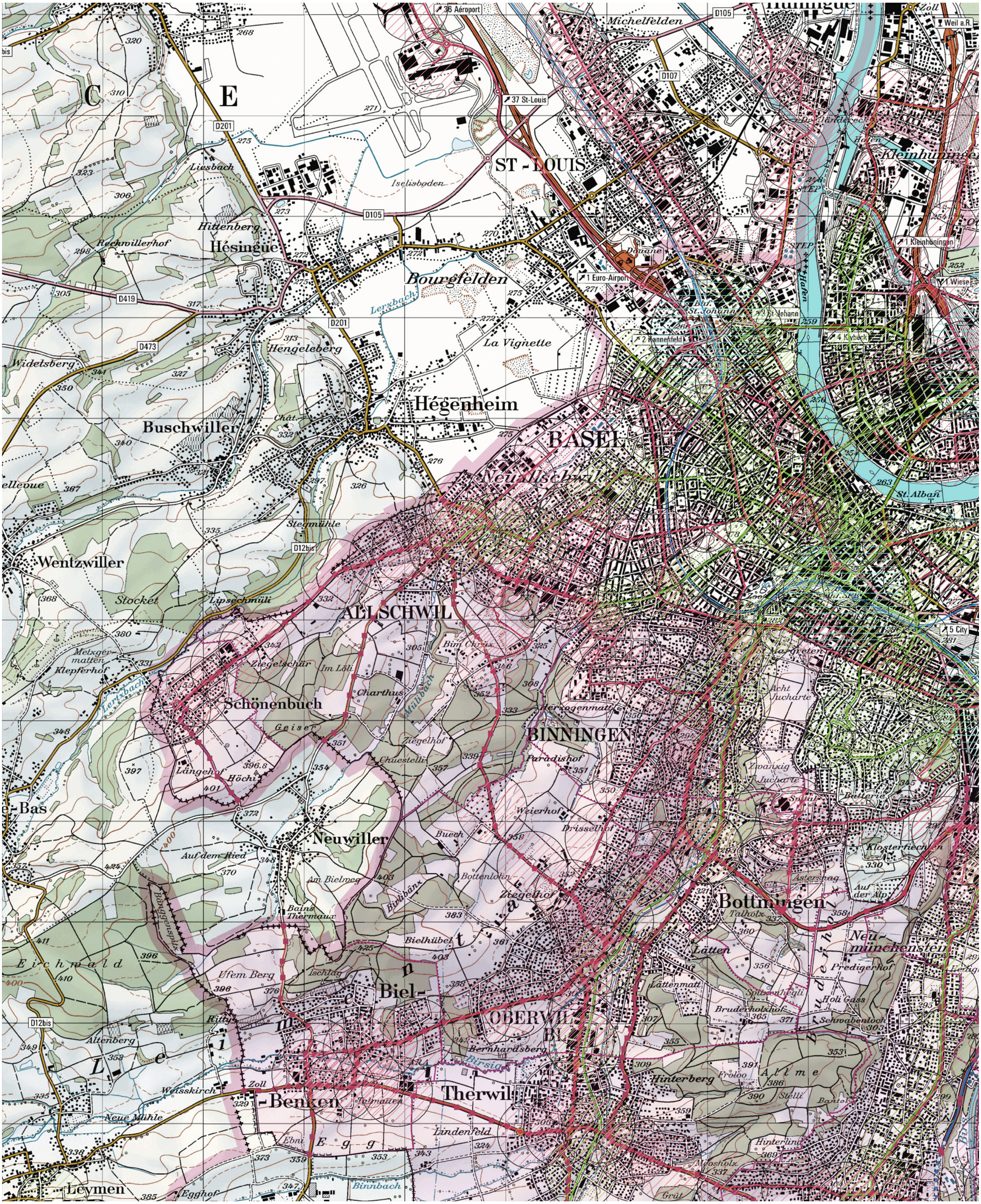
The urban topology of MetroBasel consists of an originally concentric growth pattern at the center of the old town situated along the Rhine. At its perimeter it disperses into long finger-like developments around the more narrow valleys. Villages on various sides of the tri-national borders have grown incrementally together with the Basel city pattern. This built pattern shows the current scope and scale of the Basel metropolitan region.

Source: Geoportal Basel Stadt

UN-BUILT SPACE

The residual un-built space is characterized by a topography of different conditions. As the fingers of the urban pattern branch out satellite villages interrupt these open fields and slopes at certain points. The white area representing the perimeter of all connected settlements within MetroBasel is defined as hypothetical building limit. Within this territory sites and areas for further development or transformation are investigated.

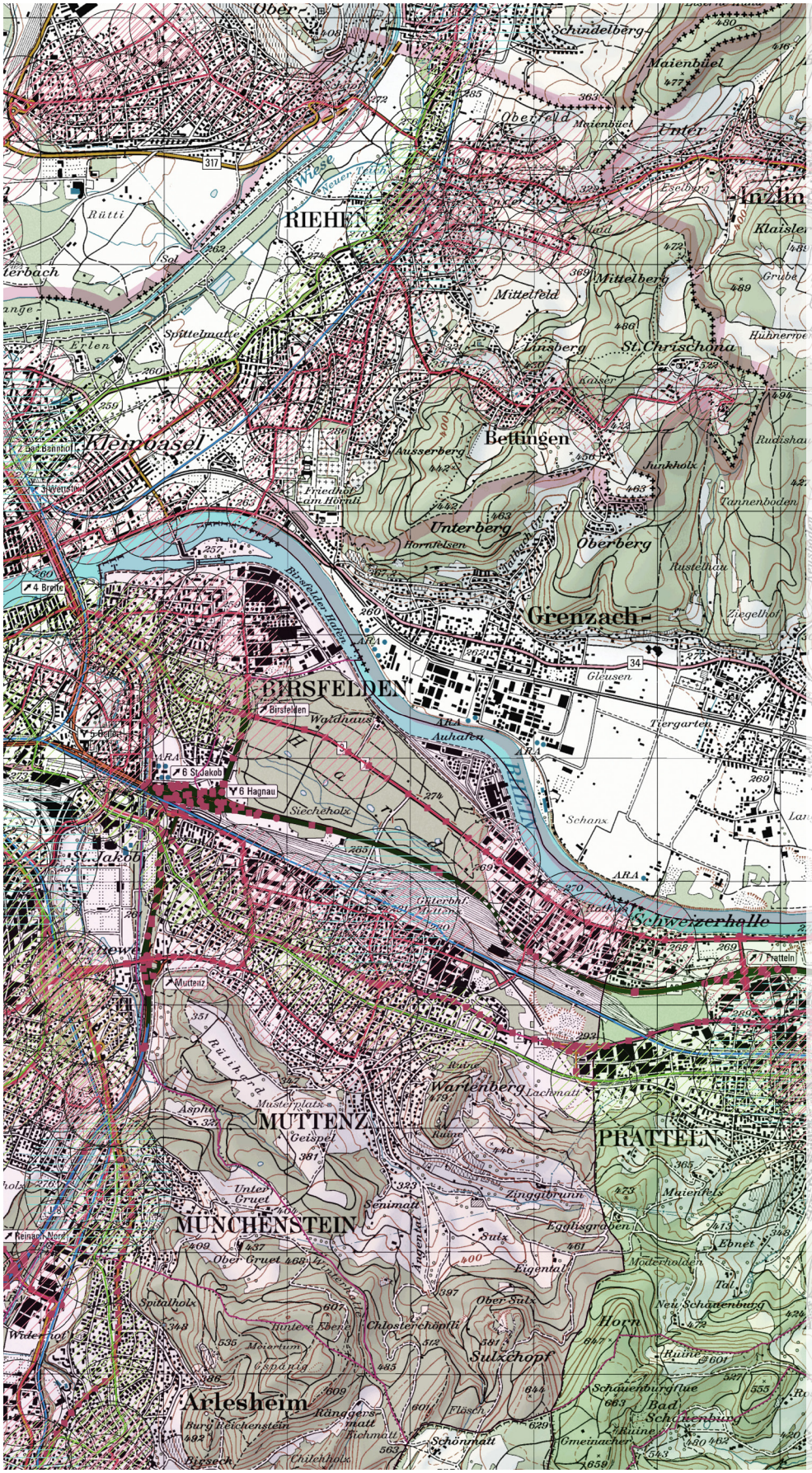
Source: google earth



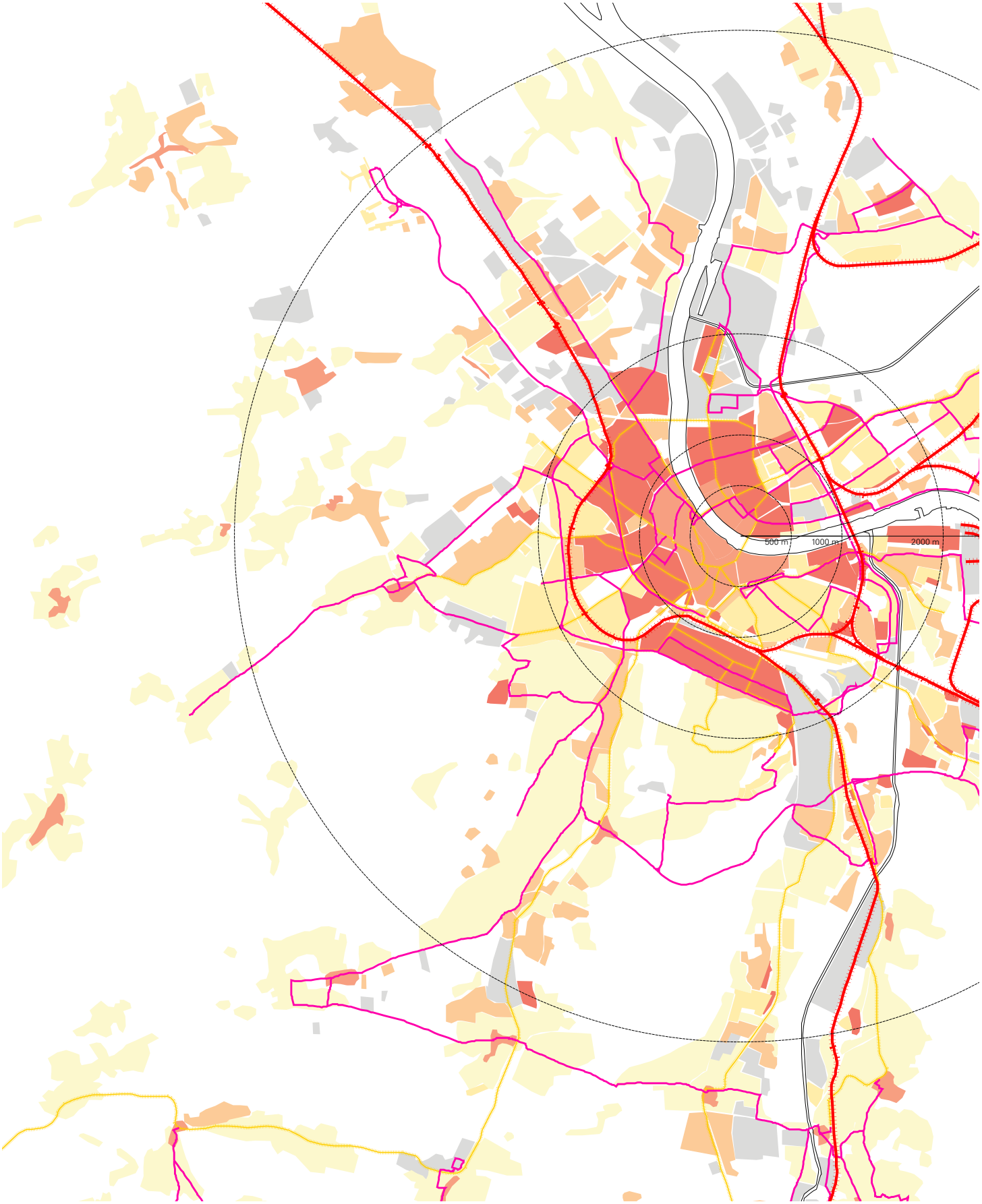
ST-LOUIS
Hésingue
Bourgfelden
Hégenheim
Buschwiller
BASEL
Wentzwiller
ALLSCHWIL
Schönenbuch
BINNINGEN
Neuwiller
Bottmingen
Biel-
OBERWIL
Therwil
Benken
Leymen
Michelfelden
Kleinhüningen
La Vignette
Liesbach
Hittenberg
Hengeleberg
Stegmühle
Lipsechmüli
Neumünchenstein
Lindenfeld

TRANSPORTATION NETWORK

MetroBasel is characterized by a close mesh of urban transportation. The map shows superimposed layers of catchment areas, traffic arteries, built space and landscape conditions. There is a harsh contrast in connectivity along the borders to France and Germany while the areas along the Rhine still seem to be well connected to the Basel transportation network. The main arteries in Switzerland disperse along the settlements towards the South throughout the Kanton Basel Land.

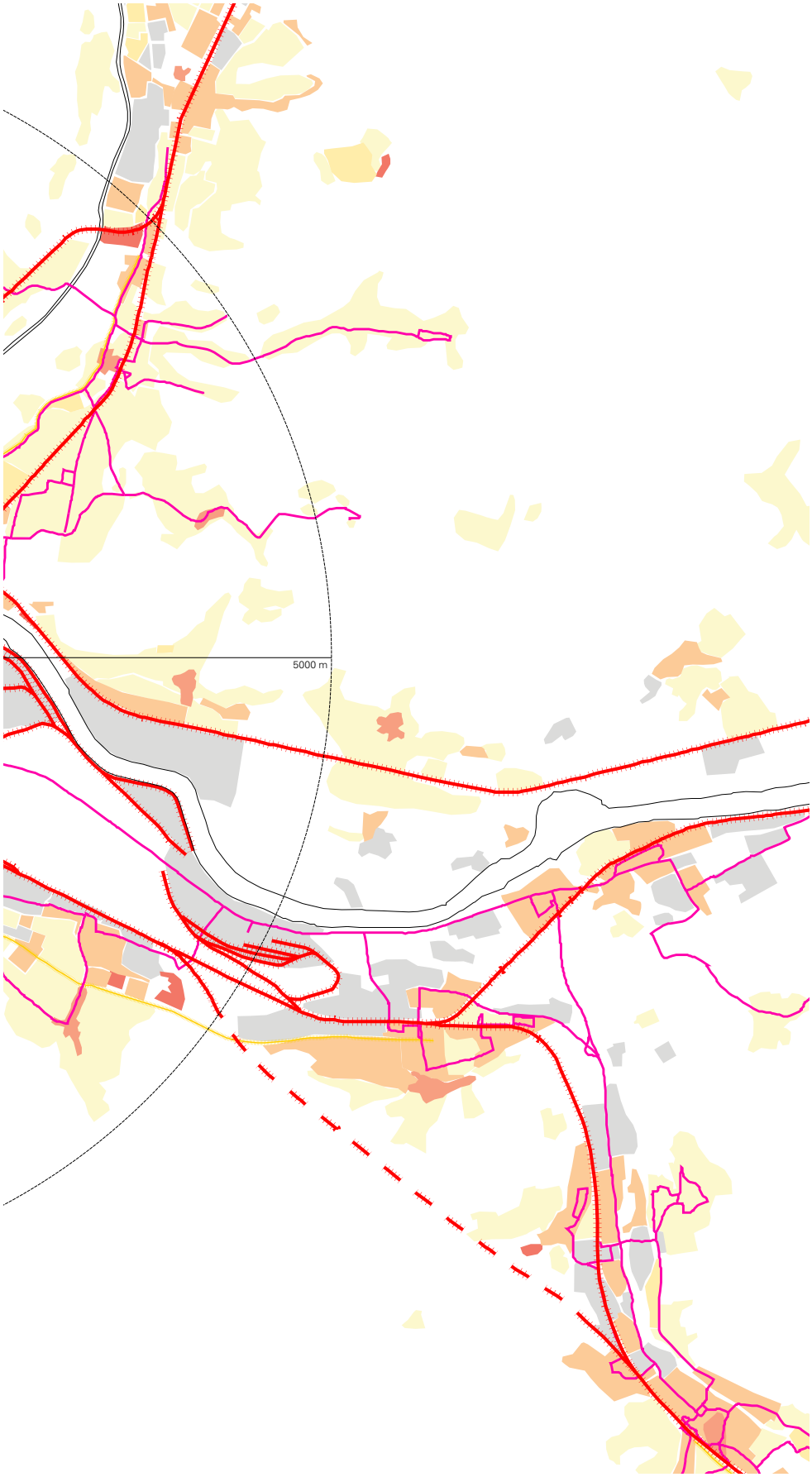


Source: geoportal basel land


500 m
1000 m
2000 m

PUBLIC TRANSPORTATION AND DENSITY

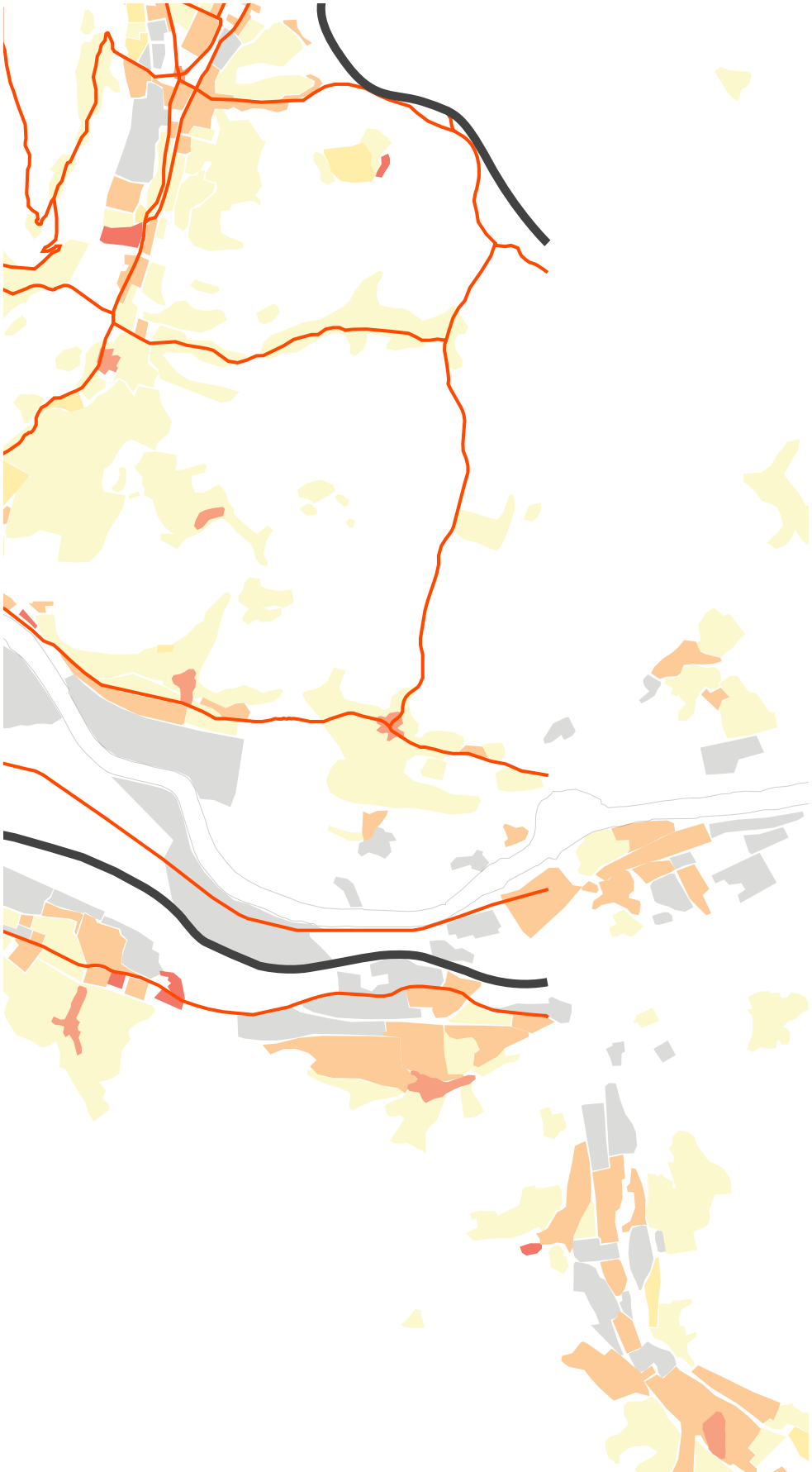
The railway corridors appear to have been main borders of urban expansion at certain periods in Basel's development. As an interrgional connector the railway also attracts further concentrations along its routes in the peripheral satelites. The tram and bus network function as in-between connectors supplying public transport to an approximate perimeter of 5 kilometers.



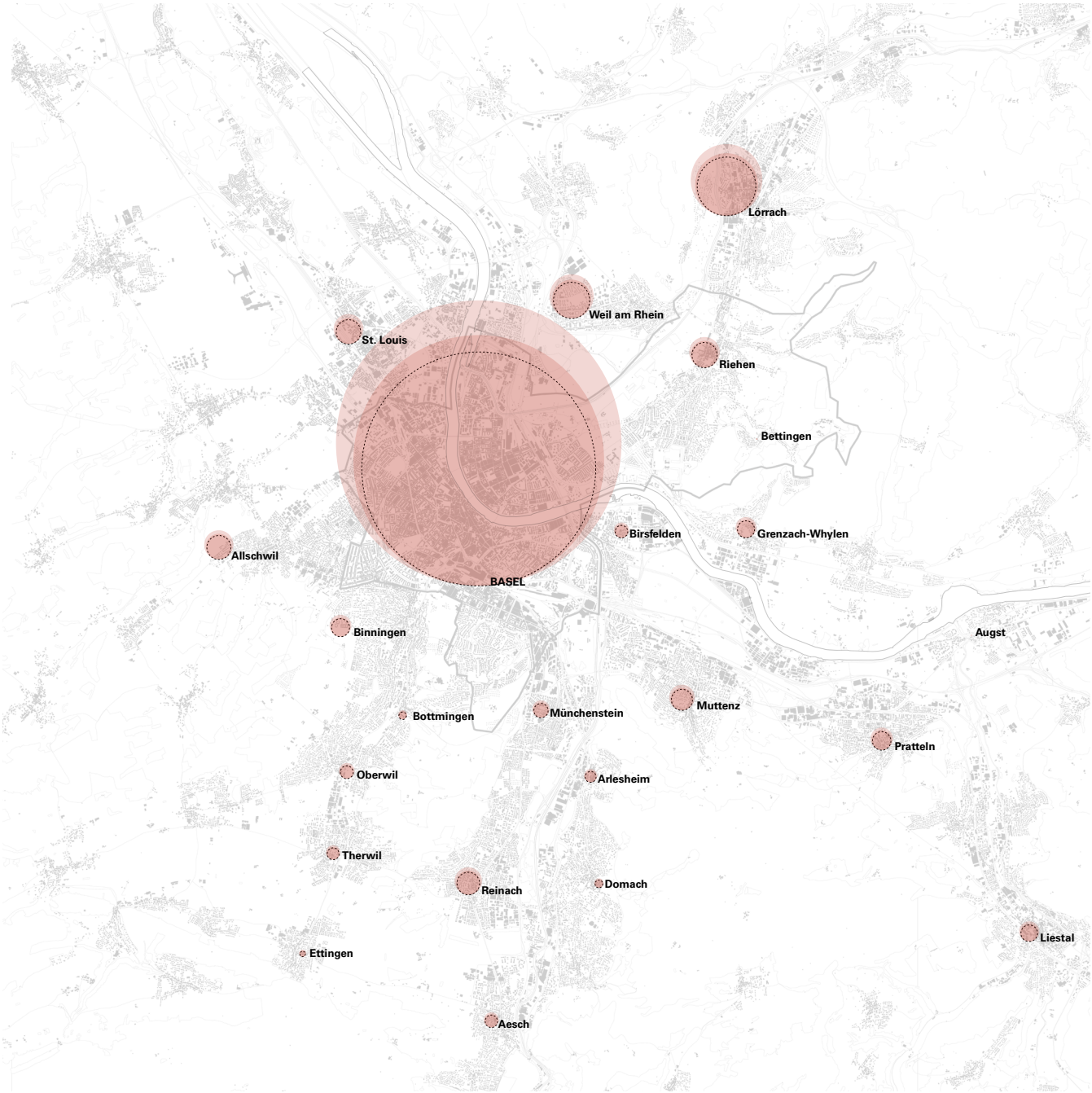
Source: Richtplan Basel Stadt

VEHICULAR TRAFFIC AND DENSITY

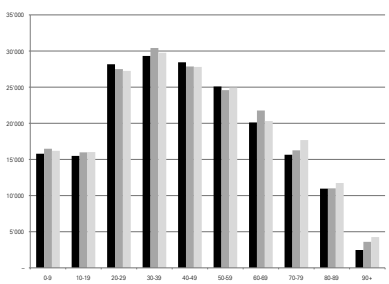
In contrast to the more linear structure of the rail corridors, the vehicular traffic pattern of national highways and Kanton routes represents a large scale grid encompassing similar sized fields of curvilinear rectangle or triangle fields. The further away a route is from the center the larger these fields become.



Source: Richtplan Basel Stadt

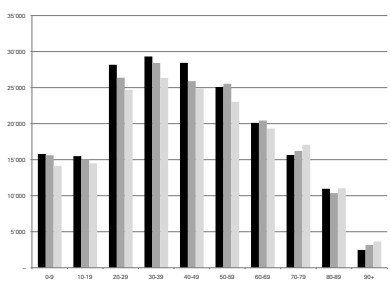


low scenario



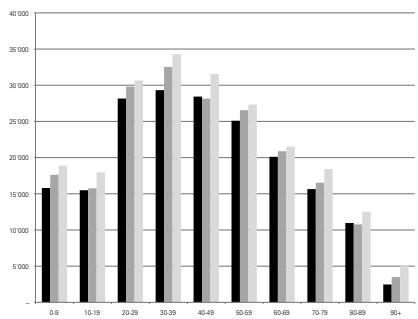
whole population will shrink & between 70 - 90+ will grow

middle scenario



population between 70 - 90+ will grow

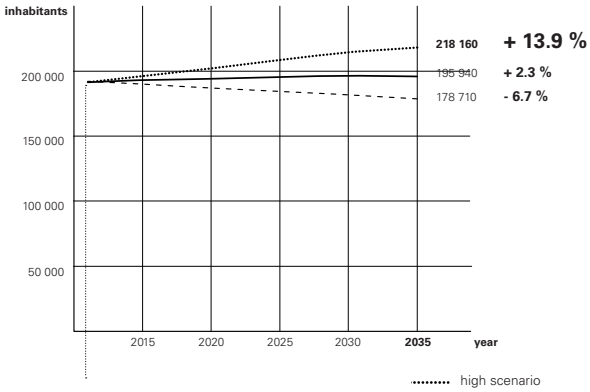
high scenario



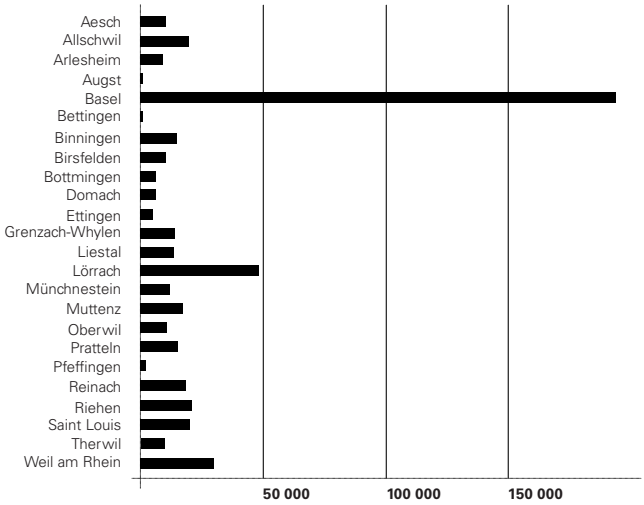
whole population will grow mainly between 0 - 9 & 20 - 49

2011 2020 2035

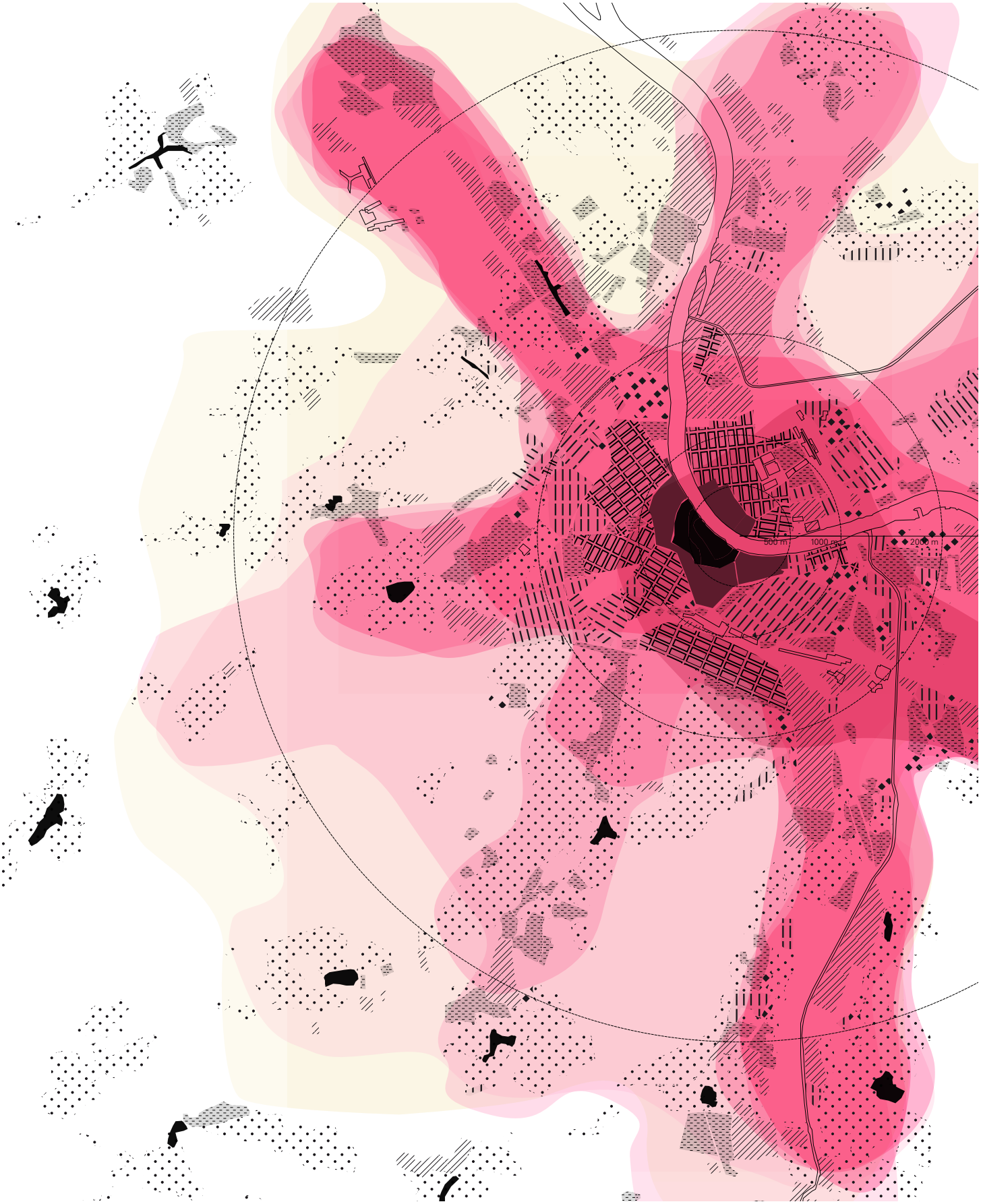
According to population growth prognoses by the city of Basel, the metropolitan area will either face negative or positive growth scenarios within the next 15 years.



2011
191 470 inhabitants

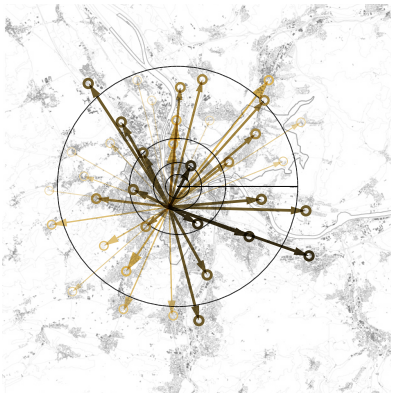


Source: www.statistik.bl.ch / www.france-voyage.com / www.statistik-bw.de


500 m
1000 m
2000 m

TRAVEL TIME / DISTANCE

The map identifies various points of settlement concentration and their travel-time distance according to current public transportation information. These nodes enable a broad mapping of different zones of connectivity. The zones ranging between 5 and 40 or more minutes of travel-time to the central Basel area are superimposed on to the urban typologies.

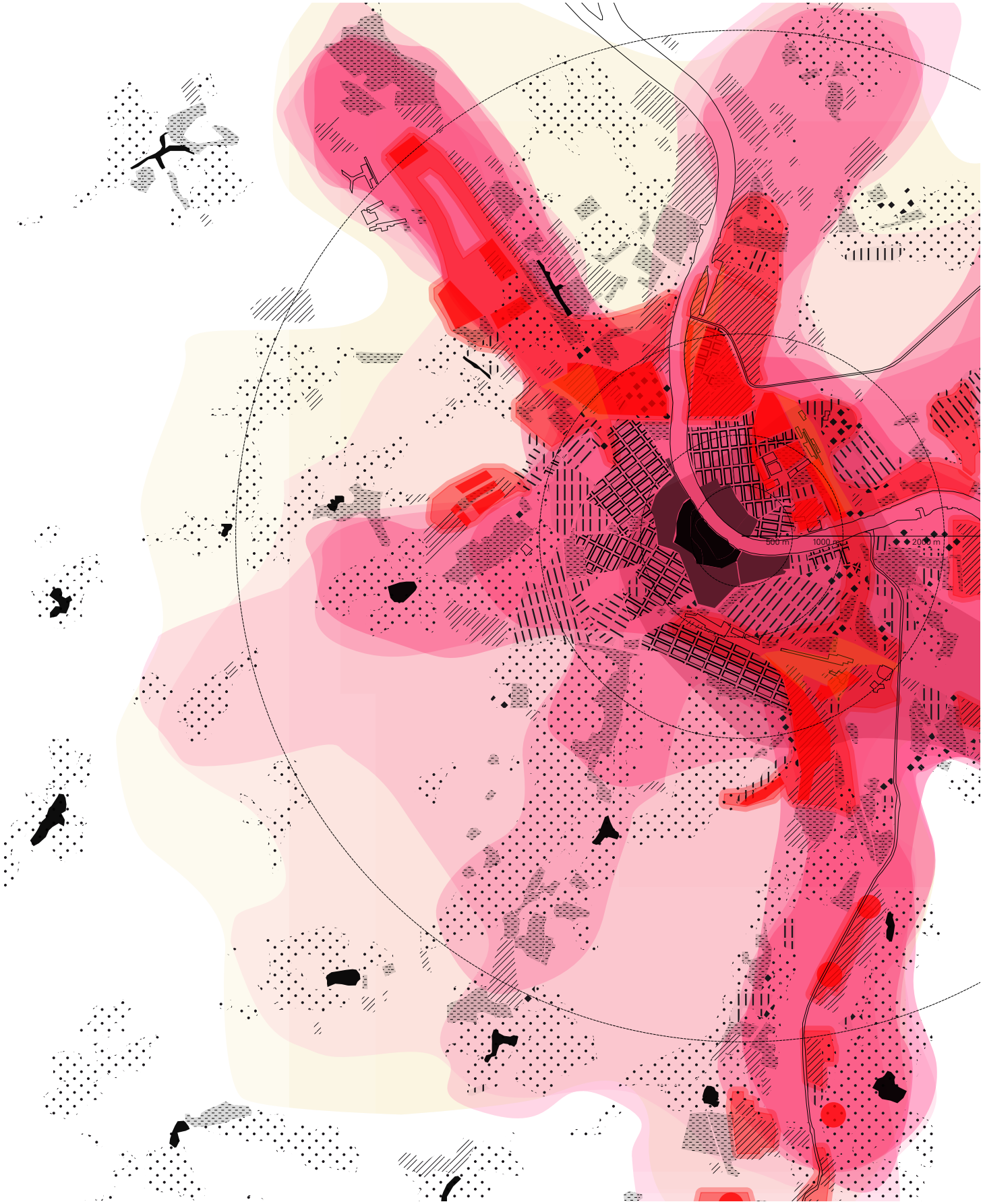


travel time - distance / nodes

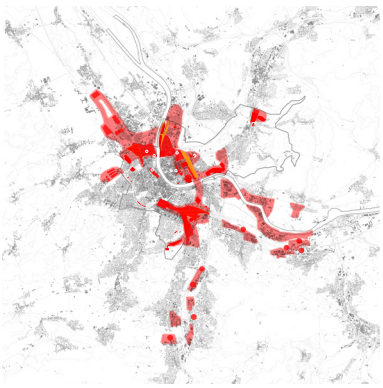
travel time to central perimeter (1km)

- 5-10 min
- 10-15 min
- 15 - 20 min
- 20 - 25 min
- 25 - 30 min
- 30 - 35 min
- < 40 min

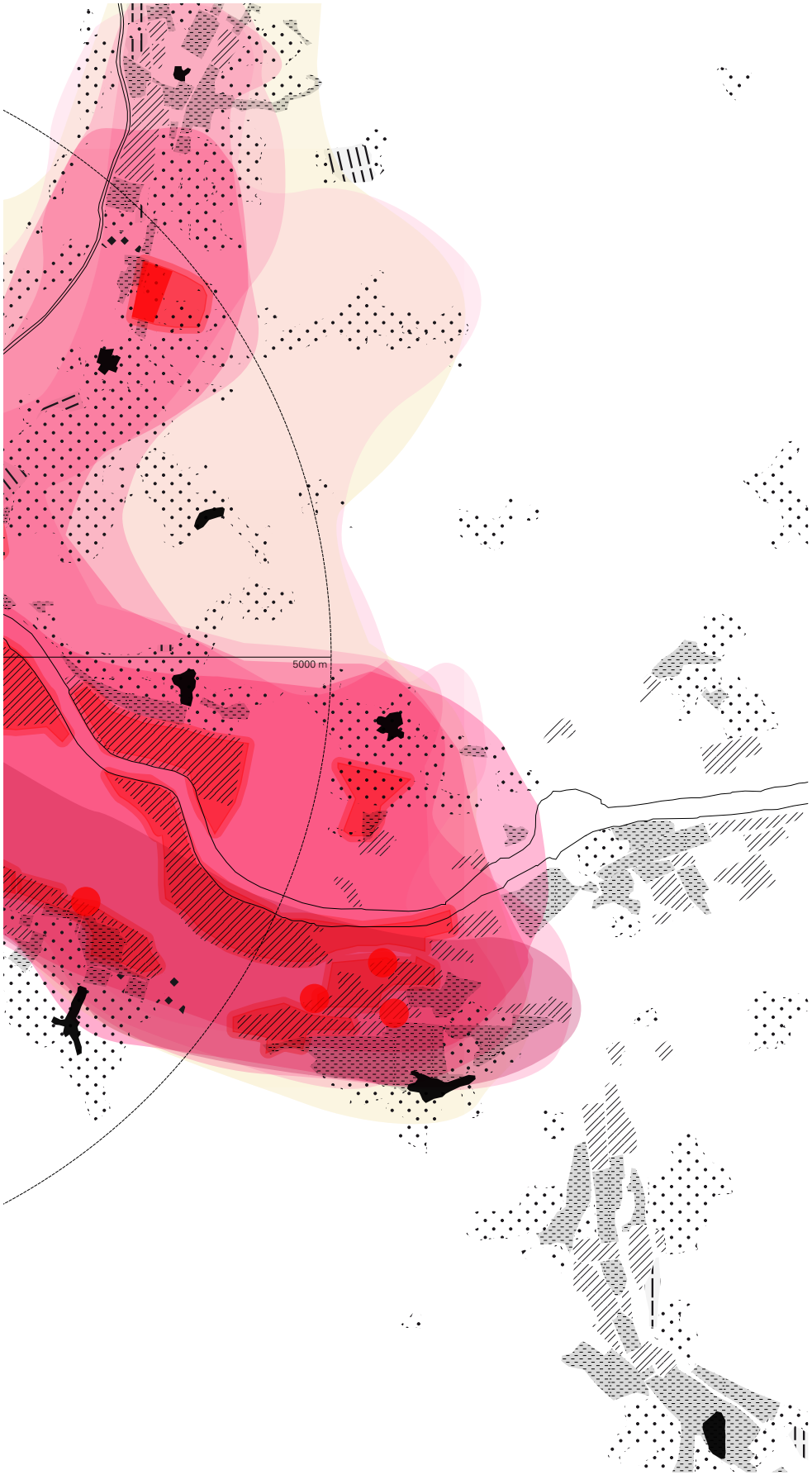
Source: Richtplan Basel Stadt


500 m
1000 m
2000 m

In its so-called Richtplan, the city of Basel has defined certain areas of future development mostly along the rail lines between the south west area of Muttenz and the north-west area towards the Airport and Saint-Louis. The connectivity zones are superimposed on to these areas together with the urban types as underlay. Thereby potential areas for development are revealed according to metropolitan connectivity, municipal spatial planning and respective urban typology.

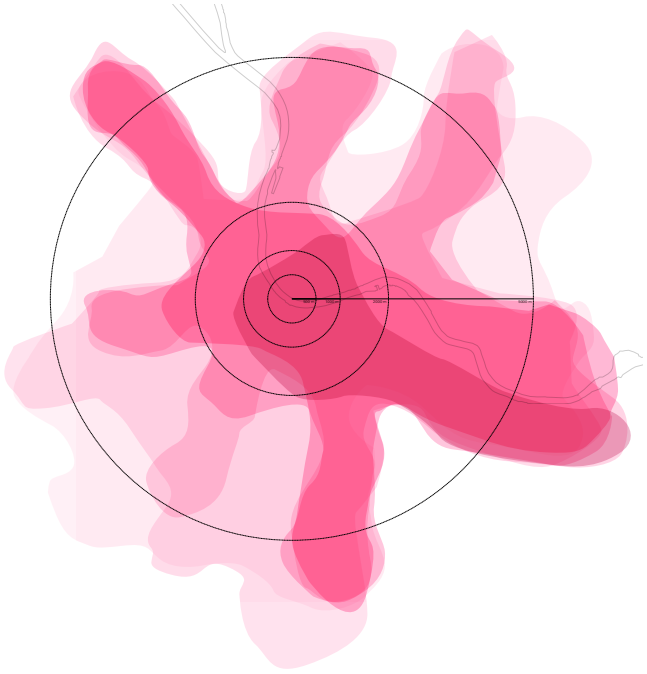


municipal development zones



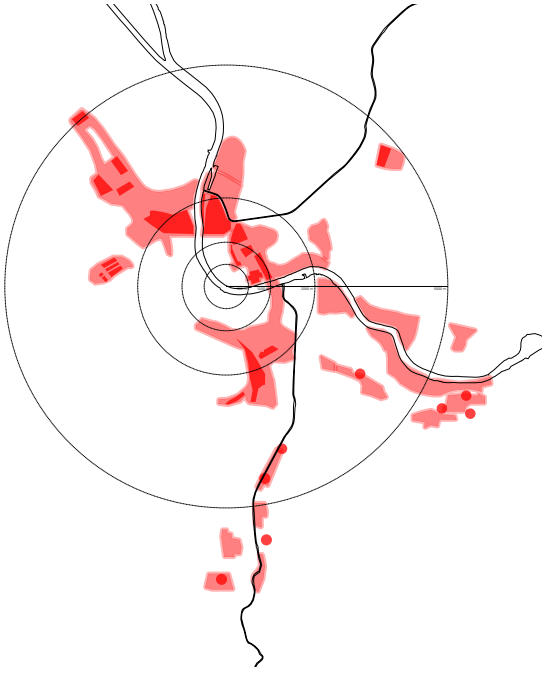
Source: Richtplan Basel Stadt / www.sbb.ch

MAPPING COMPONENTS

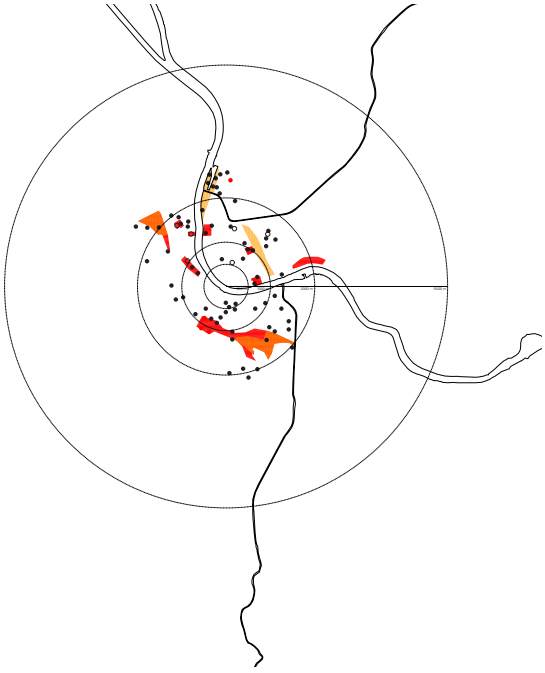


travel time / distance zones

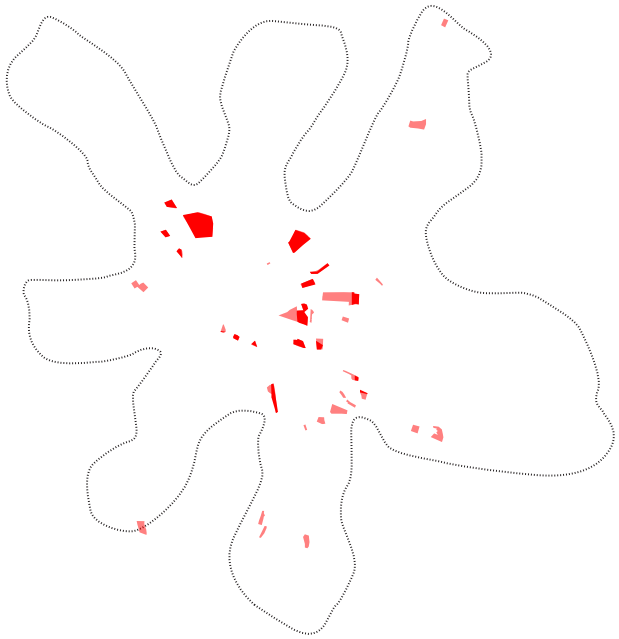
urban types



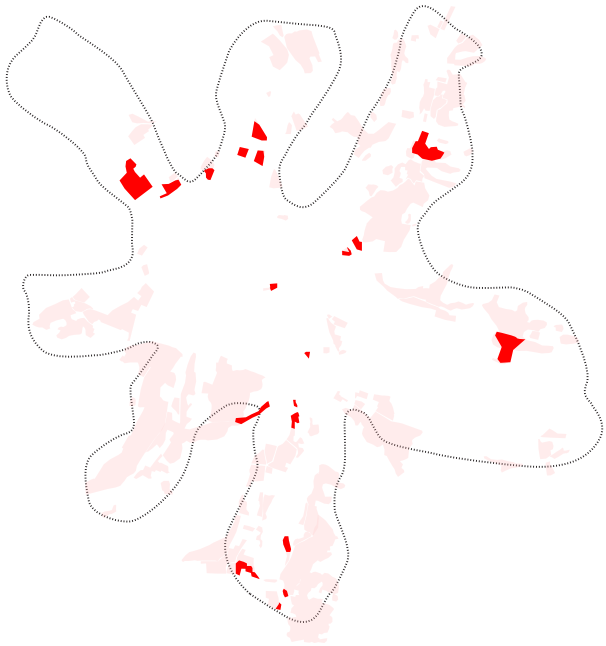
municipal development zones



existing & potential highrise zones



high-rise



small free standing

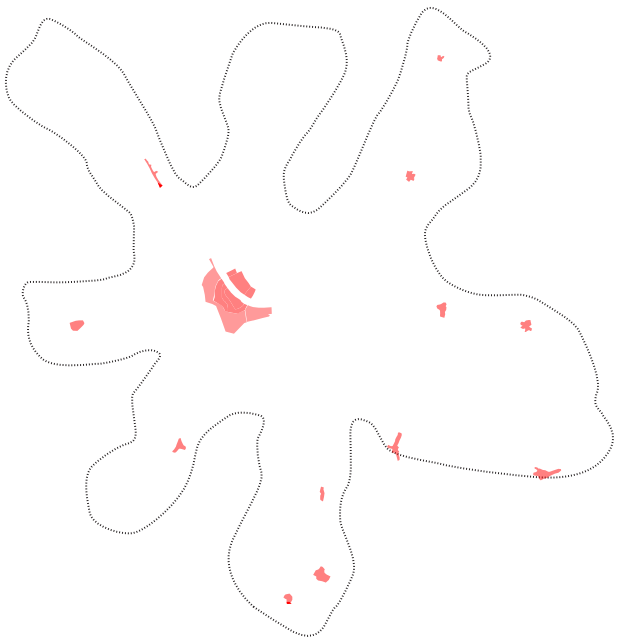
As a final exercise specific types are superimposed on top of an ideal connectivity zone of 25 minutes travelling and within the current municipal development plan. The overlay by individual urban type produces residual fields which should have a relatively high development potential. These newly identified areas thus represent the highest level of potential in relation to the premises of the research. Hence, in a scenario analysis it is possible to detect a certain site of a chosen urban type within a highly connected zone and in accordance with the municipal development plans.

25 min conectivity zone

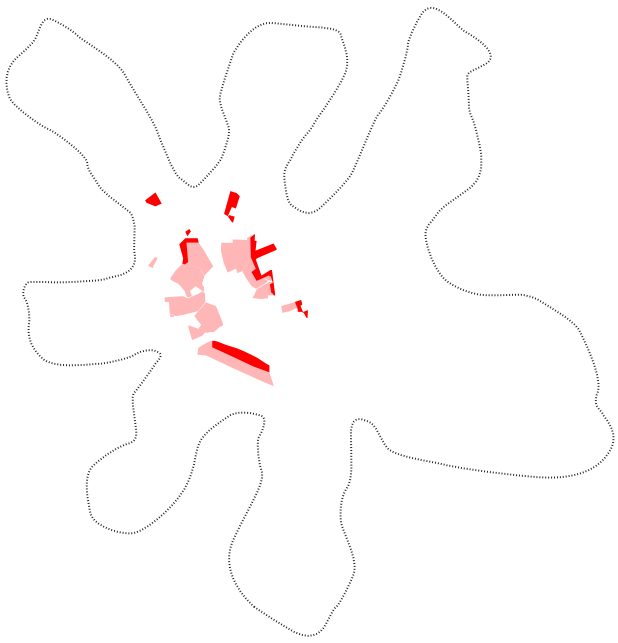
high development potential

moderate development potential

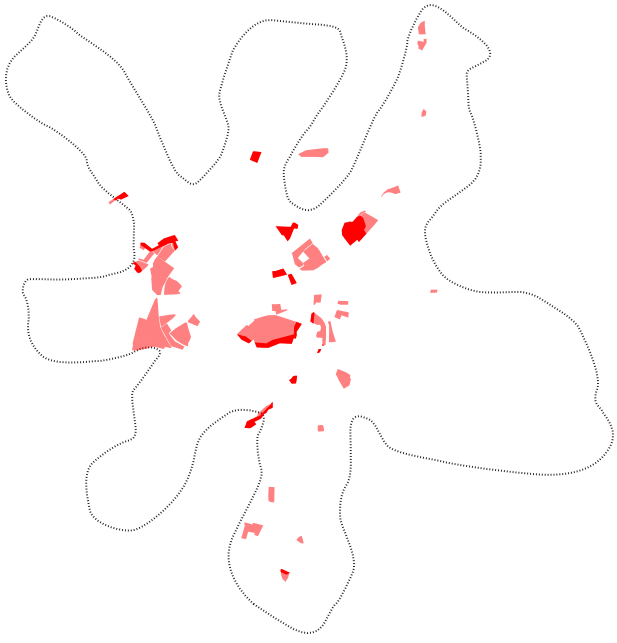
Source: Richtplan Basel Stadt / www.sbb.ch



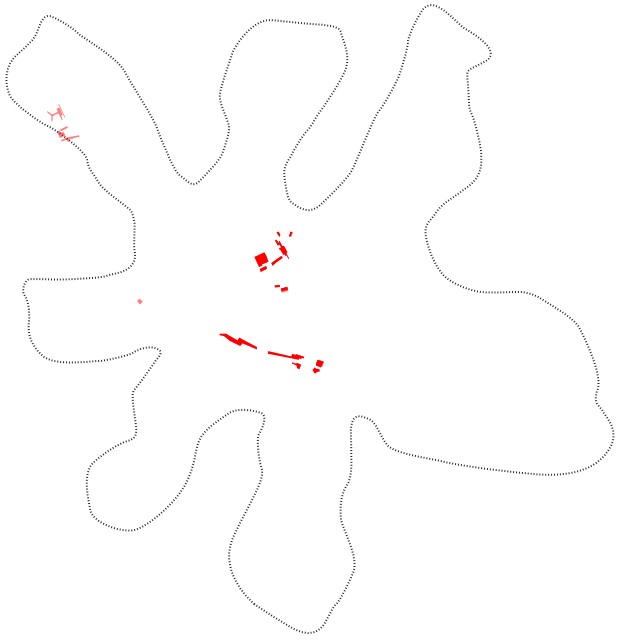
historical core



perimeter block



row houses



large free standing

In comparison, the urban type with the most quantitative potential appears to be the industrial type followed by the mixed typology and small free standing buildings. Finally, if one considers the municipal plan as relevant, the urban type with the least quantitative development potential appears to be the compact historical core.

Source: Richtplan Basel Stadt / www.sbb.ch