Grand Genève et son sol
Proprieté. Écologie. Identité.

A Charter for the Socio-Ecological Transition of a Cross-Border Metropolitan Region

ETH Zurich DARCH
Chair of Architecture
and Territorial Planning
Prof. Milica Topalović

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Master in Architecture
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Raumbureau A+U
Rolf Jenni

Final Project Report
Visions for Grand Genève Inhabiting the City–
Landscape of the 21st Century

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Voltaire and Rousseau, united: Grand Genève as an ecological metropolis?

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Colophon
Final Report Grand Genève Consultation
EQUIPE NR. 6 — 'Grand Genève et son sol.
PROPRIETÉ, ÉCOLOGIE, IDENTITÉ —
A Charter for the Socio-Ecological Transition of a Cross-Border Metropolitan Region'

This project report summarises the collaborative work of ETH Zurich DARCH Chair of Architecture and Territorial Planning Prof. Milica Topalović, University of Luxembourg FLSHASE Master in Architecture program Prof. Dr. Florian Hertweck and Raumbureau A+U Zurich, lead by Rolf Jenni and Tom Weiss.

The report encompasses the teams' contribution to the consultation 'Visions for Grand Genève — Inhabiting the City-landscape of the 21st century', initiated by the Braillard Architectural Foundation as a partner consortium consisting of the Canton of Geneva, the Metropolitan Pole of Franco-Geneva, the Services Industrial of Geneva (SIG), the Federation of Swiss Architects (FAS), the Federation of Architects and Engineers (FAI) of Geneva, the Swiss Federation of Planners (FSU), Swiss Heritage Geneva, and the Council of Architecture, Urbanism and Environment of Haute-Savoie, France (CAUE 74).

Grand Genève et son sol.
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Content

1 Preface p.9
Grand Genève et son sol Proprieté. Écologie. Identité.

2 Project Outline p.19
Grand Genève 2050— A Charter for the Socio-Ecological Transition of a Cross-Border Metropolitan Region
by Florian Hertweck and Milica Topalović

3 Project Statement p.45
The Relational Governance of Geneva+
by Markus Hesse

4 Project Statement p.55
Redefining Grand Genève: Towards a Socio-Ecological Region
by Nikolaos Katsikis

5 Charter p.61
Values for the Ecological Transition

I Cité Naturelle
II Cité Agricole
III Cité de Proximité
IV Cité Partagée
V Cité Cyclique

p.131
Simplified Lifecycle Sustainability Assessment of Decarbonisation Strategies of the Grand Genève Region
by Antonino Marvuglia and Thomas Gibon, LIST

6 Charter p.141
Territories of Urban Potentials

1 Bi-National Metropolis
2 Global-Local Territories
3 Post-Fossil Infrastructures
4 Metropolitan Countryside
5 Agri-Landscape Rooms
6 Vital Streams and Canopies
7 Mountain Parks

p.186
Notes on Modeling the Territories of Urban Potentials
by Nikolaos Katsikis

7 Charter p.187
The Region as the New Urban Figure

8 Charter p.191
Design Case Studies

1 Post-Fossil Infrastructures. The Urban Boulevard
2 Global Protagonists. CERN Knowledge Campus
3 Agri-Landscape Rooms. Metropolitan Gardens

Additional design case studies to be found in the studio reports of the design studios, conducted at the University of Luxembourg (GENEVA BUILT) and the ETH Zurich (GENEVA UNBUILT) during the spring and autumn semesters 2019.

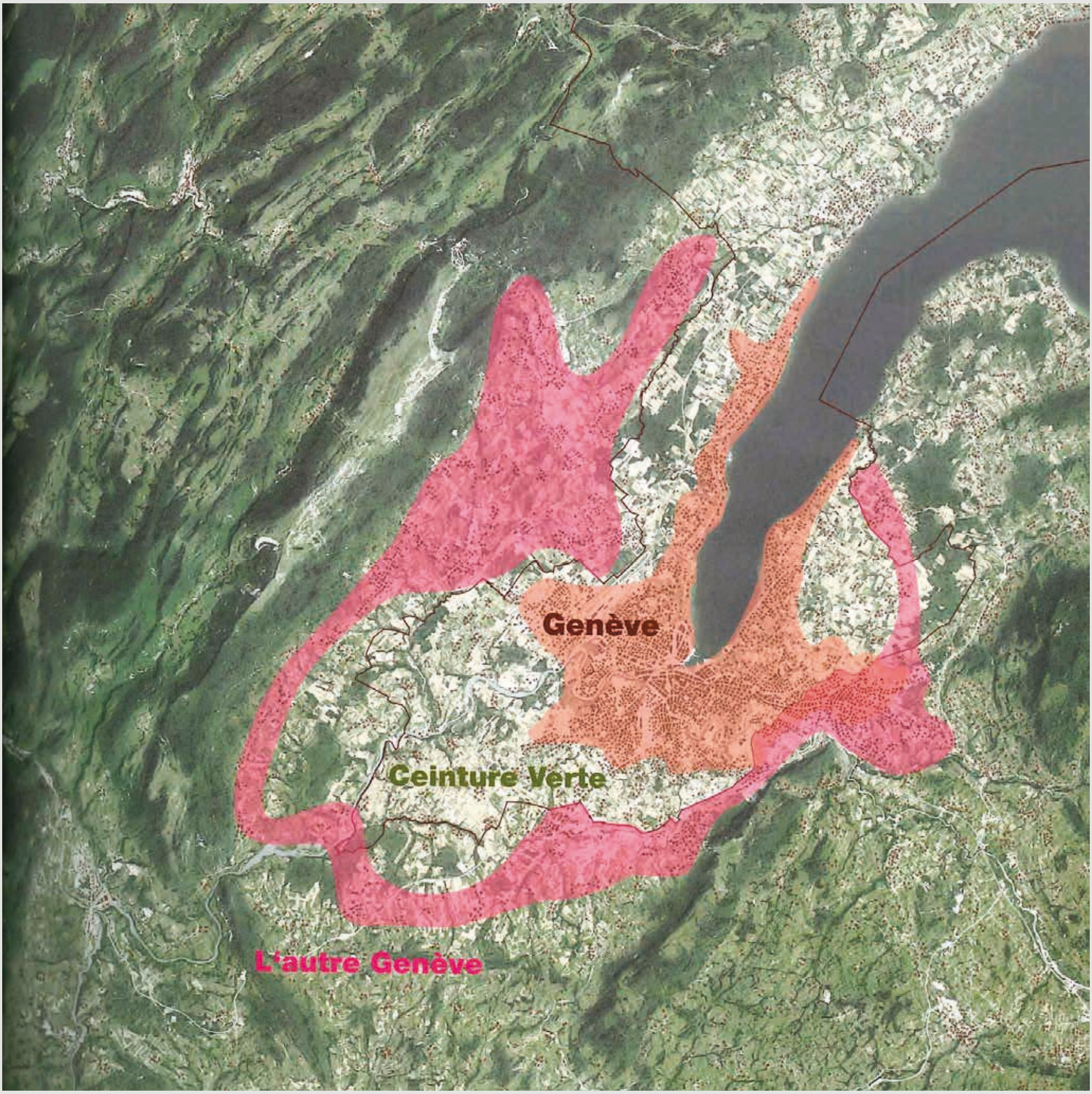
9 Project Documentation p.235
Appendix

Grand Genève et son sol.
Property. Ecology. Identity.

Geneva, one of the most attractive cities in Europe and the world, finds itself today in a profound crisis, both social and ecological. Fast population increase and high housing demand are projected for the future, but the territorial strategies that should accommodate it remain unclear. For the core city, the Canton of Geneva has embraced the strategy of “inner densification” which, in the eyes of many, has often worked to damage instead of improve the urban qualities of the city. At the metropolitan fringes, in the shadow of the Cité Internationale, French Geneva has served to absorb most of the incoming population.

Lacking a common vision and adequate trans-boundary governance solutions, the metropolitan region of Geneva has been exposed to haphazard urban development characterized by private speculation, compromising the quality of architecture and landscape. At the same time, the urgency to address the climate crisis and the biodiversity loss in the early 21st century, has become incompatible with the politics of ongoing growth and land consumption.

Thus the potentials are there, and the need to reverse the situation is acute. The maintenance of the status quo is becoming detrimental for Geneva and its region. A new territorial strategy is being sought.



Genève and L'Autre Genève
Diener, R.; Herzog, J; Meili, M; de Meuron, P; Schmid, C:
Switzerland, An Urban Portrait, 2005

Territorial Asymmetry: Genève et l'Autre Genève.
How to move from an opposition, toward a productive complementarity?

ASYMMETRIC CROSS-BORDER URBAN CONSTELLATION with polarising identities, Genève and L’Autre Genève.

UNEVEN TERRITORIAL DEVELOPMENT in terms of working and living places, economic opportunities and demographic characteristics.

HOUSING CRISIS and uneven housing pressures are exacerbated by the lack of public infrastructures and services (health, education, mobility) in the region.

PRIVATISATION OF LAND and land speculation, are consequences of (govern)mentalities that foster private over public interests and conceive urban growth merely in quantitative terms.

UNPRODUCTIVE REGULATIONS have failed to respond to the complexity of the territory.

INADEQUATE CROSS-BORDER PLANNING COORDINATION AND GOVERNANCE are reflected in the problems of mismatching scales and hierarchies, in the lack of political resources, and lack of exchange and willingness to pursue out-of-the-box solutions.

LACK OF APPROPRIATE ROLES FOR INTERNATIONAL PROTAGONISTS in the territory as potential crucial agents for the future of the metropolitan region (e.g. UN, CERN, financial sector).

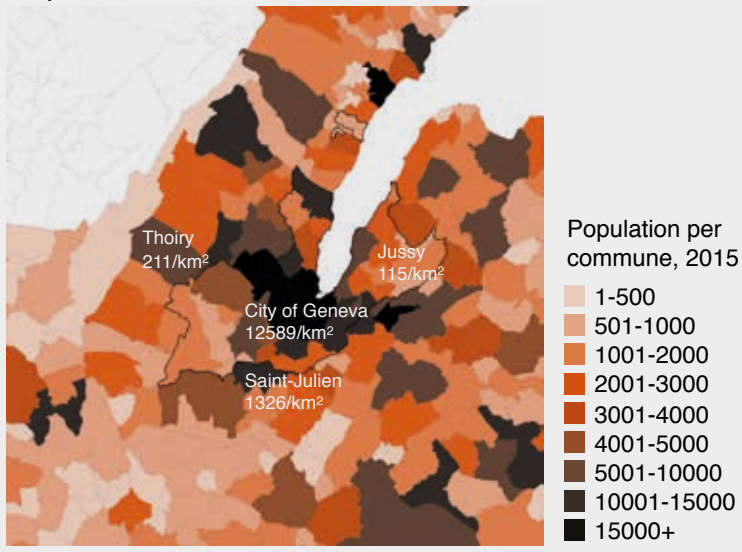
WEAK ENVIRONMENTAL DESIGN AWARENESS leads to understanding of „sustainable design“ as practice focused on the performance of single buildings, instead of the environment as a whole.

NEGLECT OF LANDSCAPE’S VITAL ECOLOGICAL ROLE for the metropolitan region.

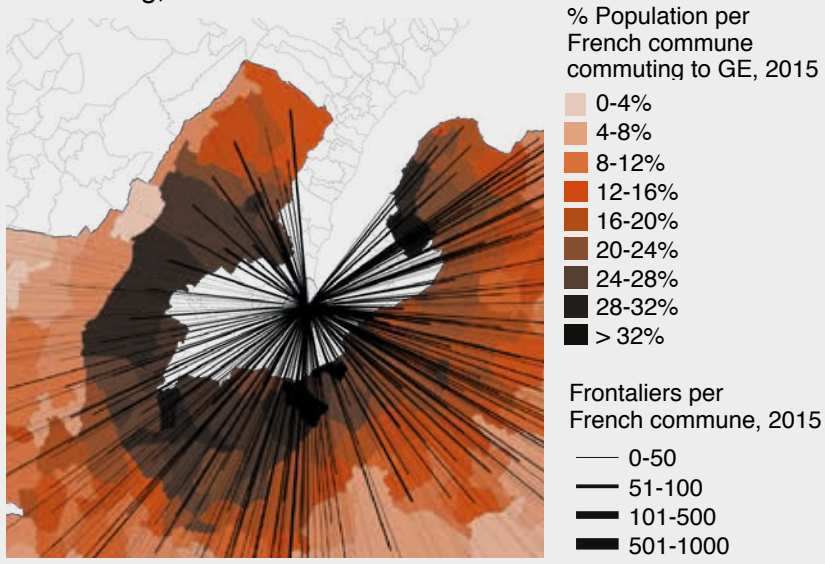
HIGH FUTURE UNCERTAINTY for local and regional plans and projects. For example, are we heading for a +3.2°C? or +0.7°C future?

Problem Statement.
Grand Genève et Son Sol

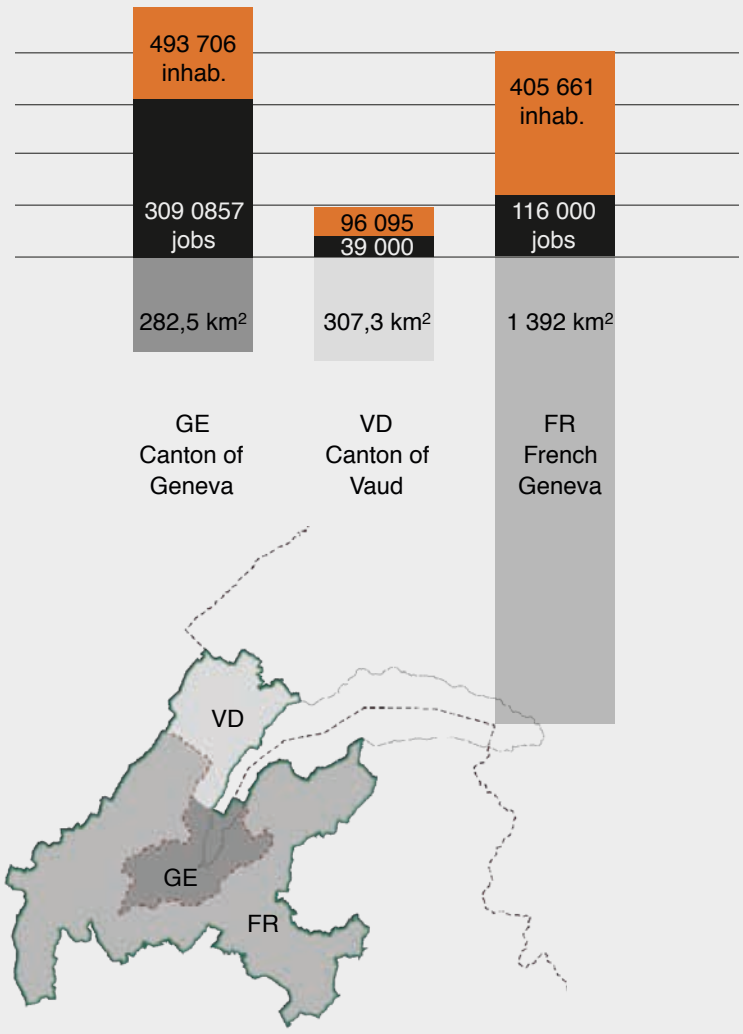
Population, 2015



Commuting, 2015

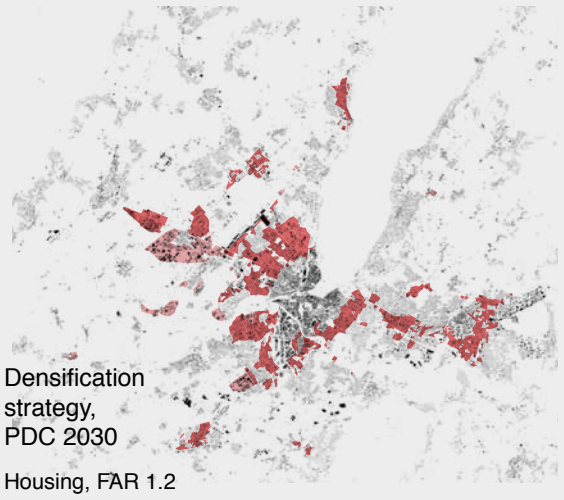


Population, Jobs and Surface Area 2016



Asymmetric cross-border urban constellation: population and commuting.

„Inner Densification“…

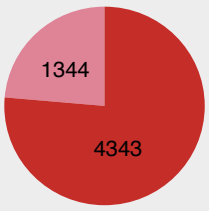


Densification strategy, PDC 2030

Housing, FAR 1.2
Businesses and amenities

… vs Outer Sprawl

% of single-family housing units of new housing per commune, 2005-2015

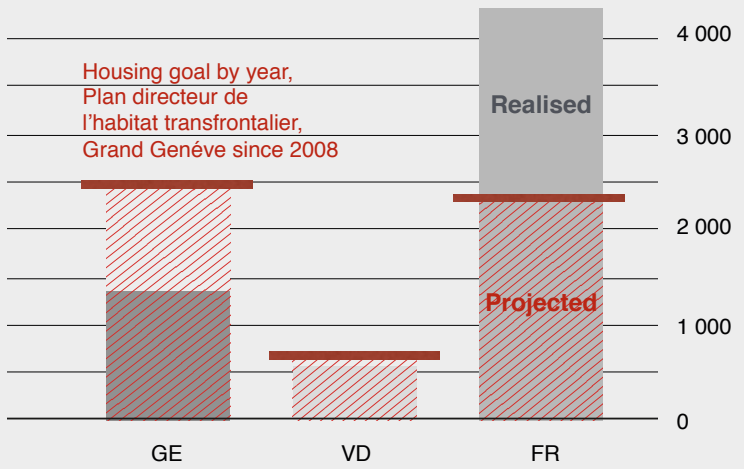


Housing production 2006 – 2013

French Geneva
Canton Geneva

French Geneva meeting the housing demands

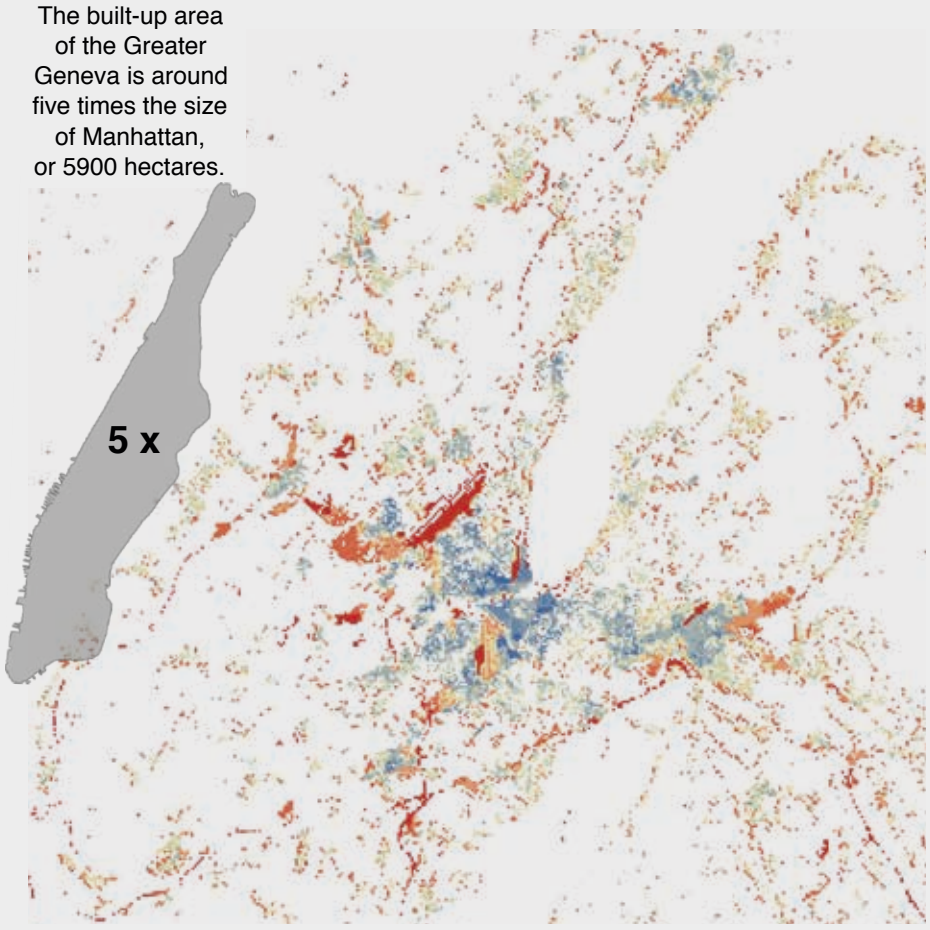
Average housing production in Grand Genève 2006 – 2013



Projected demographic growth in Grand Genève until 2040

Uneven territorial development in terms of working and living places, economic opportunities and demographic characteristics.

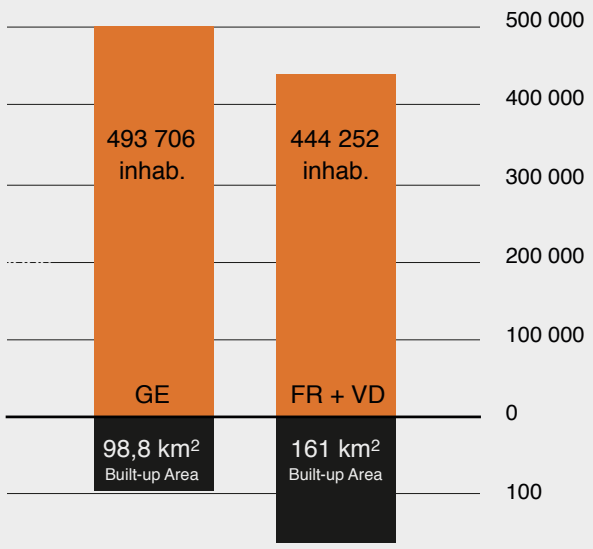
The built-up area of the Greater Geneva is around five times the size of Manhattan, or 5900 hectares.



Inhabitants per Hectare Built-up Area

0
0-10
10-20
20-50
50-100
100-500
500-1000
1000 +

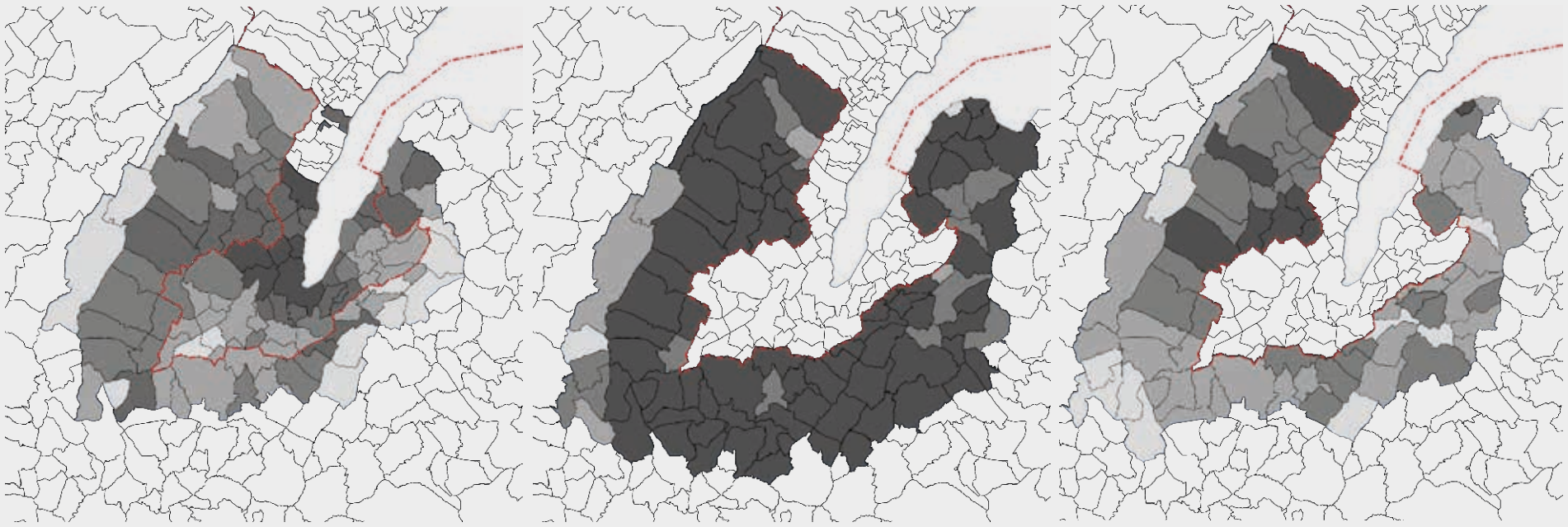
Inhabitants vs. Built-Up Area



Land Consumption

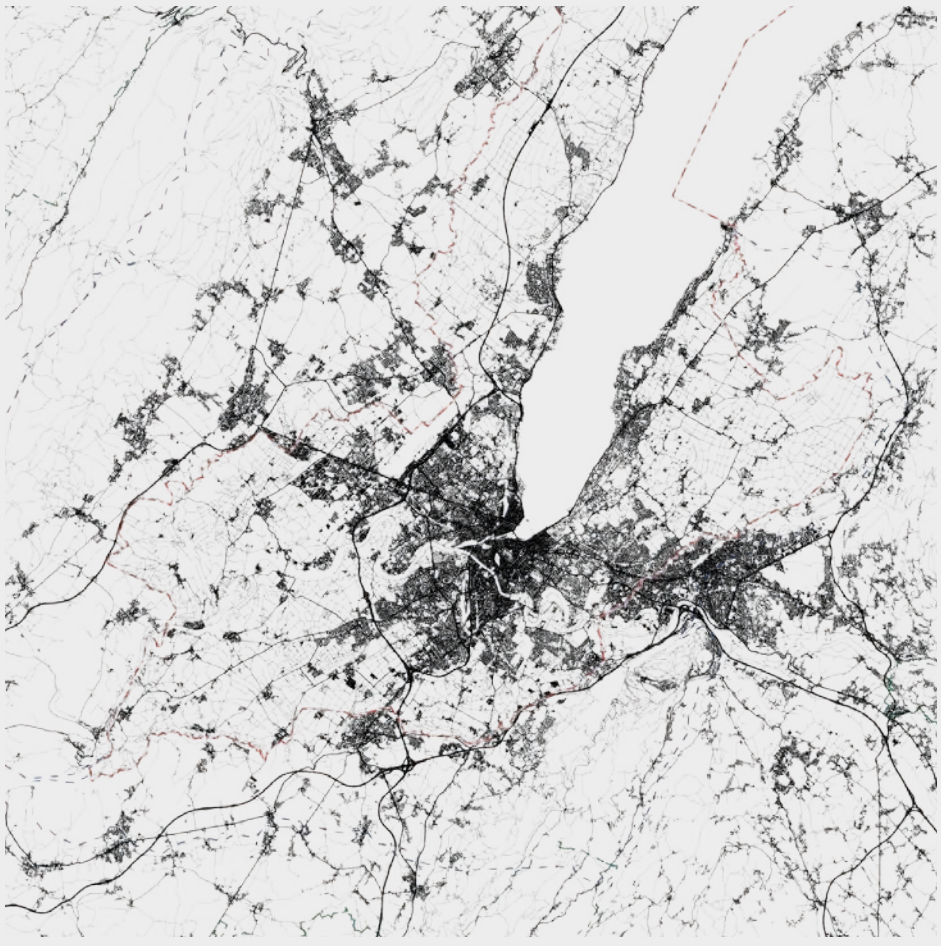
Density gradients between centre and periphery

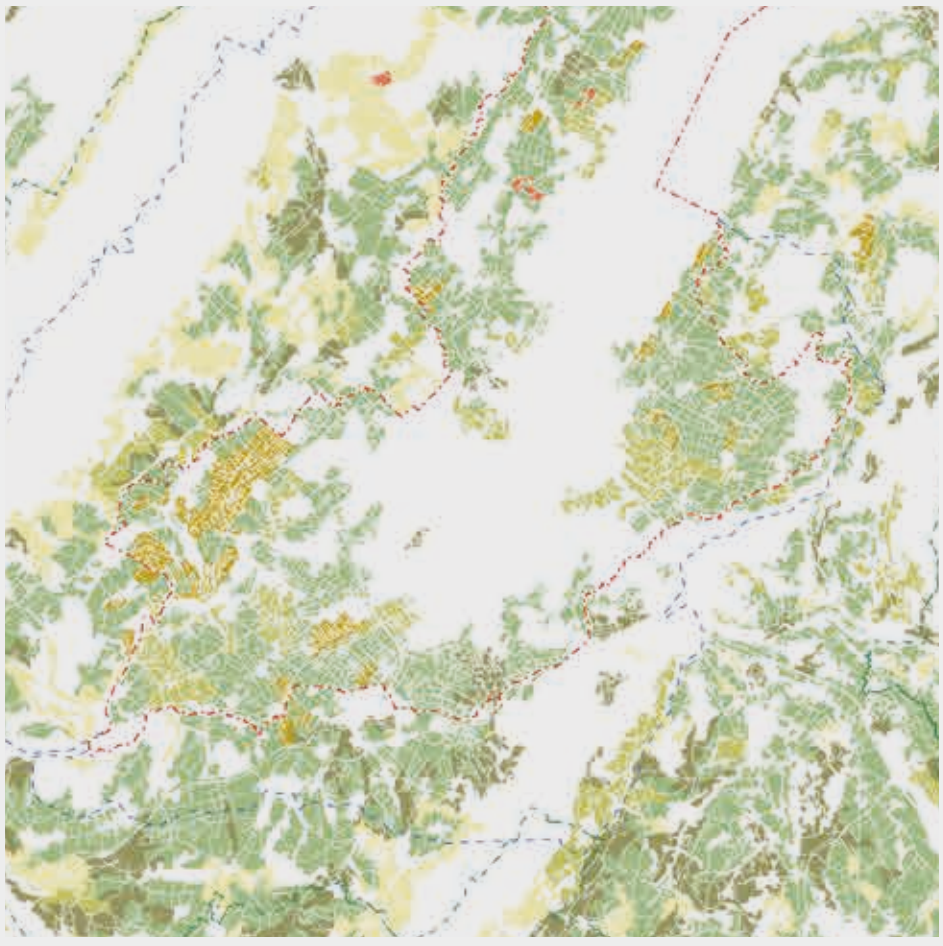
Land consumption. Density gradients between centre and periphery.



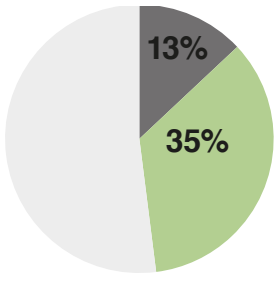
Data: map.datafrance.info/population

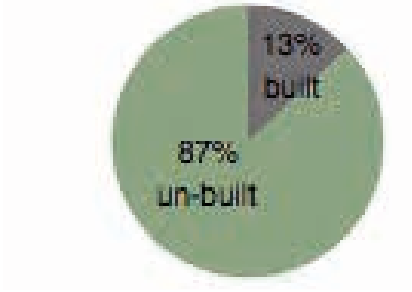
Periphery as a potential! French Geneva is international, young and educated.





26’000 ha Built Space (13%)
70’000 ha Agriculture (35%)





Landscape fragmentation through sprawl. The housing crisis and its uneven absorption of housing pressure, mainly in the former agricultural land, are exacerbated by the lack of public infrastructures and services (health, education, mobility) in the region.

1 Preface

Grand Genève 2050— A Charter for the Socio-Ecological Transition of a Cross-Border Metropolitan Region

by Florian Hertweck and
Milica Topalović

Genève and L'Autre Genève
Diener, R.; Herzog, J; Meili, M; de Meuron, P; Schmid, C: Switzerland, An Urban Portrait, 2005

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A Low Carbon Paradigm

Only recently did the theorem of the Anthropocene arrive in the political mainstream. Hardly any politician still doubts that man-made CO_2 emissions are causing global rise in temperatures and that the depletion of land, seas and their resources is threatening the biodiversity of the living world. The fact that most western European democracies have committed themselves to sustainability in policies that have in recent past performed in short cycles, is not only due to the achieved “scientific consensus”: scientists have been concerned with the effects of CO_2 emissions on the climate and have warned of the impending resource exhaustion since the early 1970s (1). Following the popularization of the sustainability debate by, among others, Al Gore and Nicholas Stern, the former head of the World Bank who outlined the financial consequences of climate change, (2) it is not only the recurring natural disasters and their devastating consequences such as mass migration, but also Fridays for Future and Greta Thunberg that are driving politics forward and giving the debate new momentum. In the meantime, only extremely liberal or extremely conservative critics are still indignant about “hysteria” with which the urgency of change is sometimes being communicated. On the contrary, the awareness of urgency of a major paradigm shift seems to have reached the very heart of the European society. However, despite various agreements, declarations and measures for climate protection, global CO_2 emissions have in 2019 reached a new record of 43.1 billion tonnes and thus rose again, albeit slightly, compared to the previous year(3). The target set by the Intergovernmental Panel on Climate Change to reduce emissions by two-thirds by 2050 compared to the 2005 baseline, now appears completely unrealistic, in view of the developments of the past ten years. Whereas in 2005 the global average CO_2 emissions were 4.4 tonnes per person per year, today they are 5.6. With an estimated 9.5 billion people in 2050, the Intergovernmental Panal on Climate Change (IPCC) target would allow annual per capita emissions of only 1 tonne of CO_2(4).

Why then, did the IPCC set this target, if it appears to be completely unattainable under our current political and economic system? A reduction in carbon emissions by two-thirds, according to official calculations, would limit the rise in global temperatures, measured from preindustrial levels (1900) to 2050, to a maximum of two degrees. The hope is that, with this level of global temperature increase, the consequences could

to some extent be controlled. Many frightening scenarios describe what would happen if the planet heated by more than two degrees, which is why this target is currently regarded as the absolute minimum goal. If we now follow the target set by the Intergovernmental Panel on Climate Change — the 1 tonne of CO_2 per capita — the question arises as to how could this paradigm be articulated at the urban level? The Consultation du Grand Genève is an opportunity to give form to a new paradigm in the field of urban development in the context of a wealthy, highly international European region particularly committed to change. Urban regions are, as is generally known, among the worst climate sinners, or as Peter Sloterdijk put it, they are “essentially nothing more than a waste machine and a human pampering facility” (5). Carbon emissions in the Canton of Geneva for example, at an estimated 10 tonnes per inhabitant and per year, are significantly higher than the average value for a Swiss citizen, which stands at 4.3 tonnes (6).

Under current conditions, the reduction of annual CO_2 emissions from over 10 tonnes to 1 tonne per Swiss and French citizen of Geneva would mean that the airport would have to be closed (not only for passenger traffic, but also for cargo), the car traffic and meat consumption would have to be stopped, and agriculture and industry would have to become emissions-free, so that in winter the buildings could be heated to at least 18°C. Is such a drastic reduction of the living standards and the down-sizing of the economic system doomed to failure from the outset when, as Sloterdijk claims, “a directly renunciation-oriented savings policy has no chance with the people of the present culture”? (7) In view of this defeatist anthropological standpoint, is the only hope then the progress of technology, which will create the “foundations for an alternative waste”? (8) Because if green planes fly and green cars drive, if green energy comes out of the socket, and if we only eat synthetic meat, then why would those who are not involved in the development of green tech-nology even bother to think about climate crisis? If technology will fix everything, why can’t we get back to business as usual in the field of urban development?

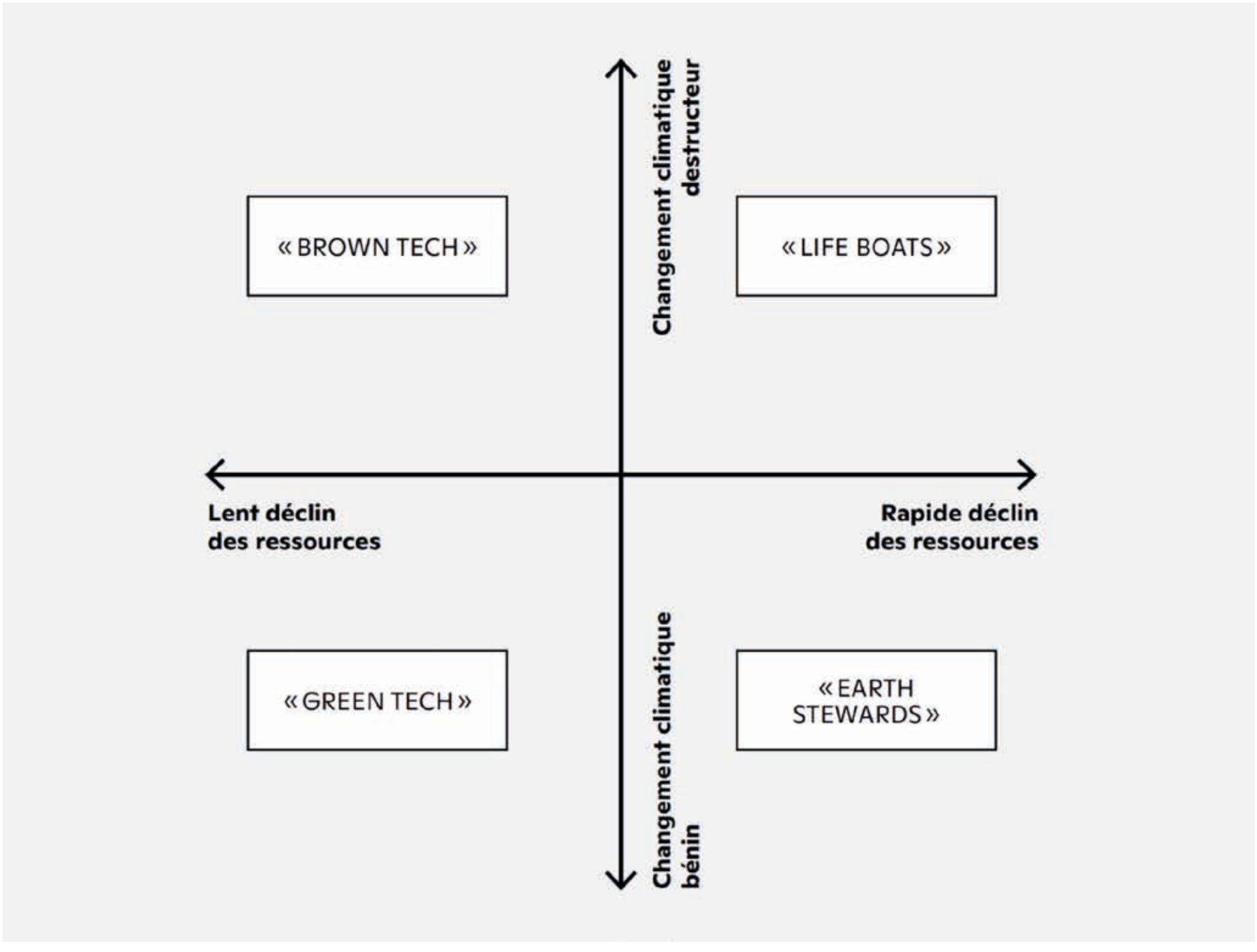
First, it is important to stress that technology alone has not yet solved any social and environmental problem. Second, no one can predict when which innovation will emerge and whether it will make its way into society. And third, to anyone sitting behind the wheel of an electric car, it becomes clear that technological innovation has contradictory effects on the environment. Not only is the battery problem still unsolved – the lack of range, high levels of grey energy, blatant resource consumption – but depending on the country, electricity mainly comes from fossil or nuclear primary energy. And even if all cars were one hundred % green, the problem of congested roads and urban sprawl would continue. The car is the co-producer of the single-family home, regarded the least sustain-

able of all housing typologies. The technological solution to one problem would not necessarily mean solving related problems.
We therefore counter green positivism with the opportunity of integral planning. Our project engages three fields of competence within our discipline: first, a radical interdisciplinary research based on the integration of the urban and the rural; second, a positive design narrative for the 2000-watt Society and the 1-tonne CO_2-emission Man; and third, prospective planning strategies based on the synergy of the Built and the Unbuilt.

A Project for 2050

The Consultation du Grand Genève has asked the teams to develop projects for 2050, a date in line with the target set by the Intergovernmental Panel on Climate Change. At first, 30 years may seem a long way, if one looks at personal life plans, political cycles and technological developments. However, if inertia of urban development is considered, 30 years is not very much. And it becomes an alarmingly short period for a radical paradigm shift, when one looks back 50 years into the 1970s, when virtually all knowledge about climate risks and resource scarcity was already at hand, and the possible solutions were on the table. In the past 50 years an alarmingly small amount of progress has been made; the rise of CO_2 emissions speaks to that fact, and so do the developments in the automobile and construction industries. Last year for example, SUV sales in Europe celebrated a new record, and buildings were still largely constructed in high-emission recycling-intensive reinforced concrete. It is becoming increasingly clear that the usual reformatory approaches will not suffice: design, planning and development practices, and indeed the governance, must all be turned on their head.

Many future scenarios are currently in circulation. One of the most interesting seems to us that of David Holmgren, one of the pioneers of permaculture, who proposes that the future will be determined by two momentous simultaneous developments: the pace of climate change and the pace of resource depletion (9). Holmgren intersects the two axes, arriving to four scenarios which can occur simultaneously in different places on Earth depending on the specific conditions. Where climate change is strongly felt and relatively abundant fossil energy is still available – such as in Australia and Brazil for example – we are likely to encounter the so-called brown-tech reaction, the business-as-usual driven by strong authoritarian states. In other places, where climate change is not yet making itself felt so strongly and a relatively abundant or cheap (fossil) energy is available too – such would be the case of the European Union and Switzerland – the predicted scenario is Green Tech investment in the development of renewable and stationary energies and other low-carbon solutions. The third future scenario proposed by



Marot, Sébastien: La Permaculture est un pari pascalien, Espazium, 19th June 2019 citing David Holmgren.

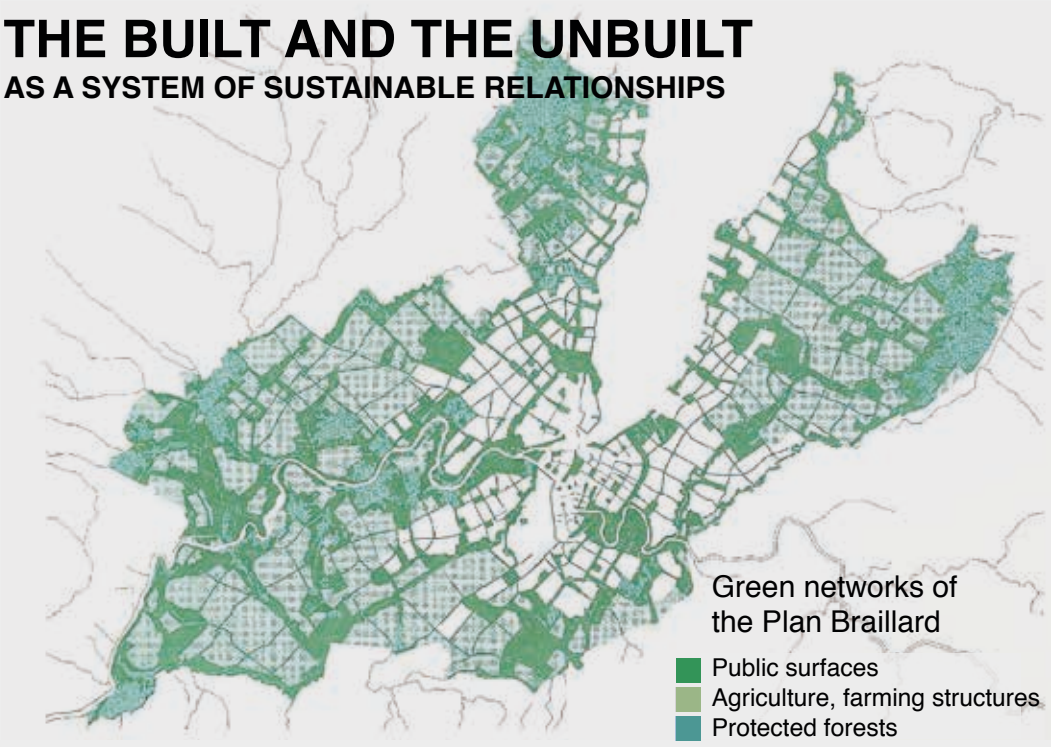
Future Scenario Earth Stewards. A regional and plannable future scenario for Grand Genève 2050 and ‘only plannable scenario‘ for the Ecological Transition.

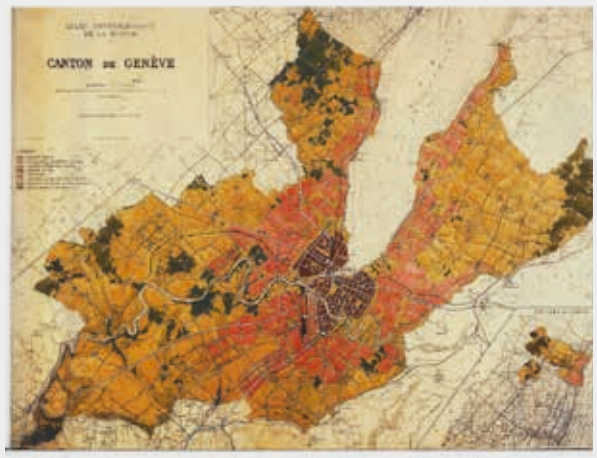
Holmgren concerns places where climate change is strongly felt, while fossil energy is in short supply. this would lead to “life-boats” crisis, marked by wide-spread social collapse and refugee migration. Finally, in geographies characterised by little available energy and relatively moderate or slow-paced climate change impacts, an “Earth stewardship” scenario is conceivable: these conditions may lead to economic shrinkage, urban exodus and return to the land, and a reduction of all energy intensive forms of production and transport. Instead, the people will seek energy where it is still available: in the soil. The soil is the key to our approach: we will return to it in a moment.

The same forecasting exercise has been developed by the Haute Ecole de Gestion de Genève and numerous thinkers for Geneva, looking ahead to the year 2050 (10). Here, the first scenario, the Brown-Tech, would assume an ongoing strengthening of the city’s/cantonal influence to the detriment of the federal state. Given its status as a global city of interna-tional institutions and financial services, central Geneva would benefit from this development and continue to grow. Limited by the small surface area, however, the incoming population would increasingly settle in the French hinterland, amplifying the existing differences. The infrastructures (of the cross-border mobility and other) would come under increasing strain, leading to frequent overload and blockages. The impasse would largely reflect the lack of adequate metropolitan governance solutions for the Grand Genève as a whole. Victims of the success of the Geneva core city would thus be middle classes and in particular working commuters which would be pushed further afield, while the land and real estate owners would continue to benefit from the trend. This forecast paints a negative picture of the business-as-usual approach, owing to the high social and environmental costs.

The second scenario illustrates what might happen if sole focus is placed on Green Tech, based on “clean energy” (hydro and renewables). With the increasing digitalization, mechanisation and automation of the economy, and with an emphasis on clean energy solutions (the spread of electric cars, the block-chain technology, artificial intelligence, 3D printers, heat pumps, home batteries, and so on), it is foreseeable that electricity supply systems wouldn’t be able to support the escalating demand. As a conse-quence, the population would need to consume less, including digitally, and to transform energy-intensive globalised industries to labour-intensive, regional ones. Sharing and solidarity would resurface as essential social values. This wouldn’t necessarily mean a demographic shrinkage, on the contrary; the attractiveness of Geneva would lead to a further demo-graphic increase, rejuvenating the population. The Green Tech ideology could thus ironically lead to a positive post-growth scenario, but only under severe energy shortages. For Geneva, it is rather likely that abun-dant and cheap fossil energy will continue to be available, dashing hopes of a positive future with the Green Tech.

HYPOTHESIS:
THE BUILT AND THE UNBUILT
AS A SYSTEM OF SUSTAINABLE RELATIONSHIPS





Cantonal Plan for Geneva, 1935-36

- Urban district
- Colonies of isolated dwellings
- Crops, agricultural construction
- Public surfaces / to be classified
- Woodlands to be conserved
- Main roads

Built-Unbuilt configurations for Geneva,
M. Braillard, *Plan directeur régional,* 1936.

Current state
The parks are randomly scattered across the city.

One proposition…
circular systematic distribution of the parks.

…and another
radial systematic distribution of the parks.

BAD
Uninterrupted extension of the city to suburban communes forming an "oil spil"

GOOD
Decentralized extension allowing the penetration of greenery

Planning the City with the Land
Maurice Braillard, Cantonal Plan for Geneva, 1935-36

The Built and the Unbuilt. New balances in a system of sustainable relationships arising from ecological awareness.

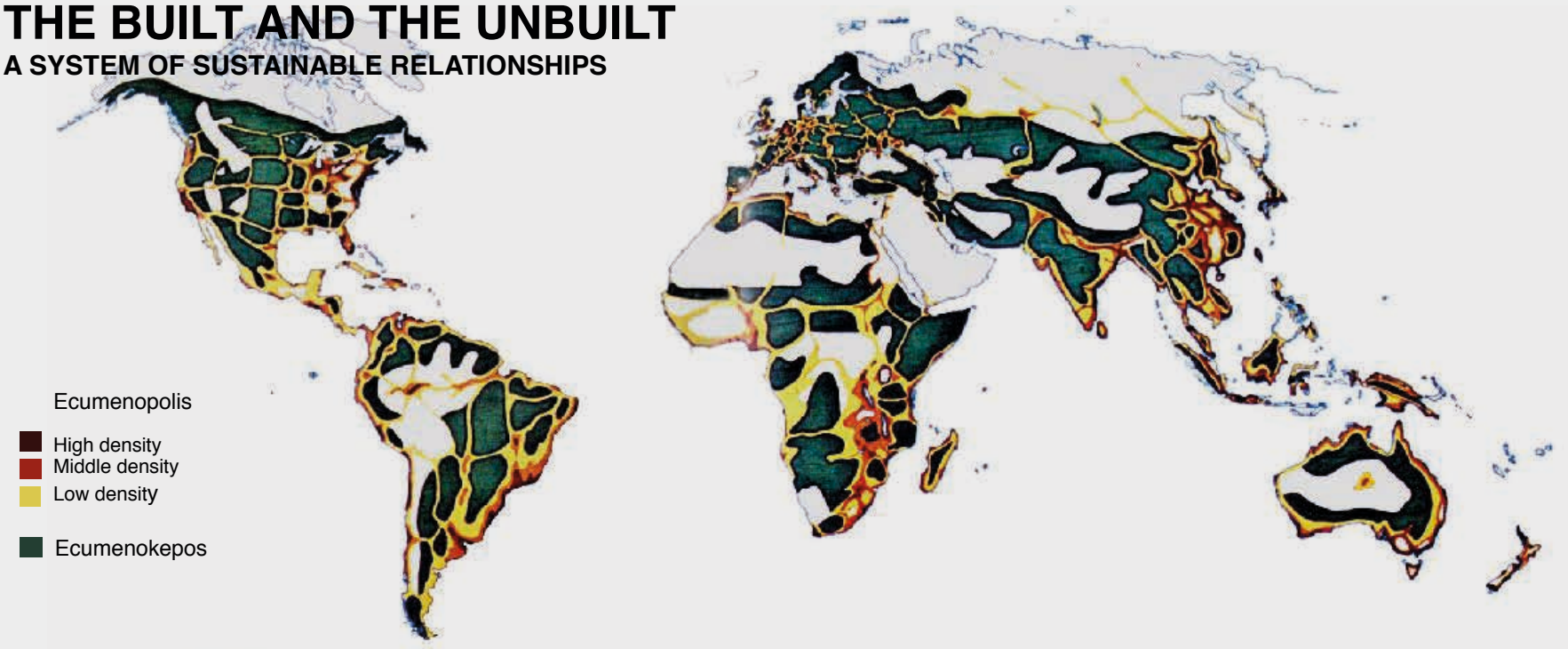
The third scenario, roughly equivalent to the Holmgren's Life-Boats, is the worst-case scenario, a dystopian future. It assumes resource and energy shortages coupled with a worsening of the climate crisis, which would cause global economic collapse and geopolitical chaos. Locally, the global instability would result in unpredictable demographic developments (such as uncontrollable influx of refugees), as well as highly volatile economic and political situations (broken supply chains, surging commodity prices, collapse of existing governance arrangements, and so on).

The most probable seems to us a combination of different effects of these scenarios, which we subsequently feed into our project. It is unlikely that all European primary energy will be renewable by 2050, even if the problem of storage is solved by then, if only because nuclear power cannot be coupled with renewable energy. We also expect the Geneva metropolitan region to continue to grow. Even with another financial crisis, migration to Geneva is likely to continue. This has already been shown during the last financial crisis of the 2007-8, when Geneva and Luxembourg, both centres of financial industry and international institutions, have hardly lost any appeal.

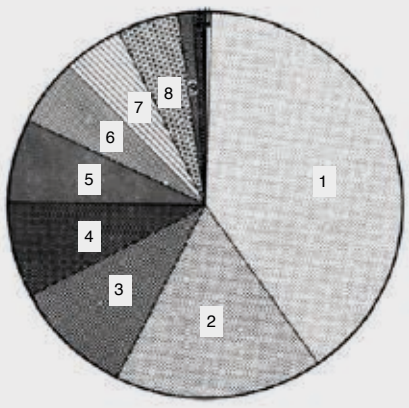
Our work does not illustrate a particular future scenario, rather it offers a prospect. The project presented in this report is not about seeing the future as it could be, but as we believe it should be in the field of urban development. This does not mean that we are developing a utopia – even if, according to Frederic Jameson, utopian impulses can help bring about paradigm shifts, and our project certainly includes utopian moments. Rather, we are putting forward a perspective that intertwines desired values of socio-ecological change (such as healthy environment and social equality), with the specific values of the territory of the Grand Genève (such as landscape and cultural heritage). In our prospect we did not specify future technological developments, which will undoubtedly influence the development of the territory, not only because they cannot be predicted (many predictions in this regard have turned out wrong), but because we see technological positivism as a fig leaf for a business-as-usual attitude.

The Prospect is therefore not a future scenario, but it is also not to be understood as a master plan. Many other outlooks on the 2000-watt Society and the 1-tonne CO_2 Man are conceivable. The prospect we have developed offers a positive image of an urban society in the year 2050 which orients itself around low carbon practices, and we hope such image can inspire public dialogue and Genevan administration. The projected ways of life and economic forms that may be frightening for some, and welcomed by others. We are convinced that the narrative we have developed is capable of winning a majority support. After all, 92% of Geneva's citizens believe that they are very concerned about environmental issues.

HYPOTHESIS
THE BUILT AND THE UNBUILT
A SYSTEM OF SUSTAINABLE RELATIONSHIPS

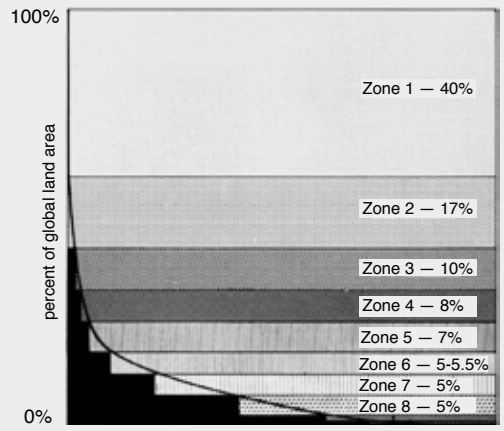


Composition of the Planetary City
and the Planetary Garden



Zone 1:	Real Wildlife	40%
Zone 2:	Wildlife Visited	17%
Zone 3:	Wildlife Embraced	10%
Zone 4:	Wildlife Invaded	8%
Zone 5:	Wildlife Conquered	7%
Zone 6:	Natural Cultivation	5.5%
Zone 7:	Industrial Cultivation	5%
Zone 8:	Physical Human Life	5%
Zone 9:	Low Density City	1.3%
Zone 10:	Middle Density City	0.7%
Zone 11:	High Density City	0.3%
Zone 12:	Industry and Waste	0.2%

Percentage of built-up area per zone



Zones 1-5: *Naturareas*
Zones 6-7: *Culivareas*
Zones 8-11: *Anthropareas*
Zone 12: *Industrareas*

Constantinos Doxiadis, Ecumenopolis.
The inevitable city of the future, 1974

The Built and the Unbuilt. Constantinos Doxiadis: Ecumenopolis and Ecumenokepos in 2100.

If the 1987 Brundtland Report by the World Commission on Environment and Development, defines sustainable development as one that “meets the needs of the present without compromising the ability of future generations to meet their own needs,” (11) then, in making a project for the 2050, we must first ask ourselves what the needs of future generations will be. This question must be simultaneously answered as a cultural question, political question and an economic question.

On the Ecological Transition

The term Ecological Transition was coined by the anthropologist John Bennett. In his eponymous book, first published in 1976, he describes Ecological Transition as “the development of an anthropocentric orientation toward the natural world that emerged in the Western Renaissance [...], the tendency to seek ever-large quantities of energy in order to satisfy the demands of human existence, comfort, and wealth” (12). The more the transition progresses, Bennett says, the more the individual is concerned with generating wealth in order to improve his social status. “Thus, the transition is marked by the expansion of ecological impact resulting from the accumulation of substances and objects for social purposes unrelated to biological survival,” (13) a statement that Vance Packard revealed already in his book *The Great Waste* in 1960, in which he drew the first features of a post-growth economy (14). Bennett sees the tragedy in the sense of Garrett Hardin’s work on the commons, when “resources become economic goods and move towards private ownership.” (15) From an ecological perspective, the Ecological Transition is “expressed in the growing incorporation of Nature into Culture and by the breakdown of local self-sufficiency” (16). Bennett, who studied the agrarian ecology, cooperative movements and communal social organization, explores in his book, among other things, the extent to which smaller structures and their proximity to more local resources can regain broader anthropological significance, with “natural food, simple pleasures, the refocusing of social activities toward interhuman satisfactions and away from material accumulation” (17). From a sociological perspective, Bennett notes that in the advanced stage of the Ecological Transition there is a social unrest, with a widening gap between those who have power and those who do not. It will not be possible to cure the ecological crisis, Bennett concludes his book, if we do not understand that “man’s use of nature is inextricably intertwined with man’s use of Man, and that remedies for destructive use of the environment must be found within the social system itself” (18).

The theses on the Anthropocene are well known today, however the correspondence of ecological and social questions — a substantial starting point for our project —is not yet fully acknowledged in the

discourse. Thus, in the debate about the ecological turnaround – now understood the other way around: as a transition to a post-Anthropocene – the social and ecological questions are often played off against each other. On the one side, Green Tech proponents in particular argue that the classic diagram of sustainability with the overlapping social, economic and environmental fields, should rather be interpreted as a wheel and, in view of the urgency of the ecological crisis, the wheel should be turned in such a way that the social is not positioned at the top, but the environmental. On the other side, many business representatives argue that the ecological turnaround will be expensive for companies and should be designed in a business-friendly manner. And finally, politicians are under pressure not to place an excessive burden on private households during the ecological turnaround, which is why many measures from the political centre are only being administered with a handbrake. A fear of extreme political forces is part of the calculation – the yellow vests in France being the case in point. However, the question is clearly not how socially acceptable and economically beneficial the ecological turnaround should be; it is rather that the social and economic grievances responsible for the ecological crisis must themselves be tackled systemically. Thus, Bernardo Secchi rightly suspects: “Social inequalities are perhaps not so much a result of the crisis, but rather are among its very causes; causes that are by no means incidental.” (19)

Charles Beer, President of the Conseil d’Etat du Canton de Genève from 2012 to 2013, supplied the clearest view of Geneva in this regard: “A process of gentrification unfolds through real estate speculation and the explosion of rents. The modest population is progressively driven out of the city of Geneva to the periphery, in les banlieues de la couronne. The popular neighbourhoods become trendy places for wealthy people and bobos. The spatial segregation gets organized.” (20) Currently, around 100,000 people cross the border every day to work in Geneva. According to the last census in 2011 — the situation which should have worsened considerably — 28% of employees of the Canton de Genève lived in France. It is well documented that in addition to being an instrument of territorial segregation, commuter traffic is also linked to CO_2 emissions, low air quality, high noise levels, soil destruction and other ecological ills. So far, the political discourse and planning measures have often supported such situation. “Swiss commuters and cross-border commuters”, goes the rationale of the first business-as-usual scenario for Geneva, “are essential to the functioning of the Geneva economy. However, their individual mobility is costly for the community from the point of view of infrastructure and externalities, whatever the mode of transport used.” The advantages of a further expansion of the local transport system are “disappointing compared to the initial promises”. This position questions also the Green Tech promise that the expansion of the local transport system, the introduction of electromo-

bility and the taxes on cars entering the city, will solve the problem. In the face of entropic urban sprawl and the ecological crisis, however, the questions we as planners have to address will even have to go far beyond the planning agenda outlined by Thomas Sieverts: “What can urban planning and local politics contribute to making the living conditions of groups with less “wealth” and a strong sense of local commitment tolerable?” (21)

An important starting point for our project is Ernst Friedrich Schumacher’s *small is beautiful. a study of economics as if people mattered,* who thinks through the social, the economic and the ecological spheres together, and sees a way out of the growth delusion of capitalism in the transformation of large economic structures into small ones. An illustration of what this new economy based on small agency could look like, was recently developed in Germany by the Konzeptwerk Neue Ökonomie association, together with actors from science and practice, in series of future-oriented workshops. Anne Pinnow of Konzeptwerk outlines a vision for the year 2048 as follows:

“The economy of the future is no longer built around profit-oriented companies, global financial markets and the compulsion to grow. Fossil and other environmentally destructive industries no longer exist. The glaring social inequality that divides society today has disappeared. There is hardly any private property left, at least of land, property and means of production. What is produced is based on their needs and the common good. The production is ecologically compatible, the products are durable and reparable. The companies are organized as cooperatives and democratically co-determined, the hierarchies are flat. What is possible is produced in the region. Raw materials are processed in the countries of origin, so that the global South has shaken off its dependence. World trade has declined sharply, but has not become impossible. This reduced freedom of movement for goods does not mean less freedom of movement for people — on the contrary (22).”

Again, this is not an illustration of a hypothetical scenario of how society could develop, but a prospect of how we believe it should be. The question which concerned us in this project is how a “positive vision” (Pinnow) of a sufficiency economy – renunciation as a gain – will be reflected in the field of landscape planning, urban planning, urban design and architecture. Here, too, it will be a matter of transforming the morphology of the industrial age and the neo-liberal economy into small plot, field and urban structures that ensure social and functional intermixing and short distances. And it will be about a vision of common land – a position we will return to many times in this report.
The prerequisite for such prospect is a policy of territorial justice. At the heart of the problem, of course, lies the painful disparity with the core

city capturing and concentrating all essential institutions and businesses, and benefiting from them – a situation that must change. All urban and landscape planning is doomed to failure if the policy does not set the course for a true Grand Genève that breaks down the dichotomy between city and periphery, between inside and outside, not least through a relatively even decentralisation of companies, institutions and facilities.

A City-Landscape as a New Balance between the Built and the Unbuilt

The term City-Landscape or *Stadtlandschaft* – the title of the Consultation du Grand Genève – was first used around 1920 as a descriptive category introduced by social geographers to designate groups of cities and settlements located in close proximity and sharing the same geographic area. As a planning category, the term was first used in the 1930s, and again after the Second World War by Rudolf Schwarz in the context of the reconstruction of Cologne. For Cologne Schwarz drew an image of a federation of communities, structured by green zones (23). The concept of the *Stadtlandschaft* aims at reconciling the city and the countryside, by “loosening up the existing building density, penetrating the building areas with green corridors and dividing the urban settlement mass into human scale units” (24). To a certain extent, one can already ascribe various modernist settlements such as the Hufeisensiedlung to the idea of the *Stadtlandschaft*, where urban planners such as Martin Wagner, architects such as Bruno Taut, and landscape architects such as Leberecht Migge, together pursued an organic landscape and urban development. In particular, many reconstruction and extension plans, as well as Braillard’s plan for Geneva, were concerned with reorganizing the cities in a coherent way and structuring them by means of green corridors, which, since Camillo Sitte and Martin Wagner have been assigned the role of sanitary green. According to Werner Durth, the buildings of these extension plans were “not to be created as isolated ‘objects in the greenery’, but as ensembles, also moving with the topography, and in dialogue with greened, publicly usable open spaces”. They also echoed the spirit of Ernst May, and his maxim coined already in the 1920s: ‘Urban planning is landscape enhancement’. May had also identified the green corridors in the New Frankfurt as ‘urban rooms’ and as ‘urban-land’, (25) while Migge in his “Grünes Manifest” demanded: “Create a country-town (26)!“

Much later, in the 1970s, the same term *Stadtlandschaft* was misused in many large housing projects, on the one hand by exploding the scale of buildings, and on the other hand by often neglecting the importance of the Unbuilt. In addition, the traffic planning of the car-friendly city was associated with the idea of the urban landscape, because the ever-greater distances had to be held together through fossil infrastructures.

This is why in the 1980s and 1990s, the concept *Stadtlandschaft* became an object of hatred for the proponents of the ideology of the Compact City, which propagated the separation of city and nature and concentrating, within the city, decorative greenery and bourgeois parks. At the same time, urban sprawl in fact progressed largely through outdated land use and zoning plans still based on the separation of functions. Since the 1990s, as a counter-project to the compact city, concepts such as Thomas Sievert's Zwischenstadt and Bernardo Secchi's Città diffusa have been brought into the field, once again based on the idea of the *Stadtlandschaft*, but this time seeking to intensify urban-rural linkages and bring them together into metabolic systems. Today it is a matter of increasing the intensity of the built and the Unbuilt by means of a small-scale mixing, and of looking at the development of the landscape no longer only from the perspective of the built, as was done previously, but also from the Unbuilt. By reversing this relationship, Pierre de Meuron believes that landscape can be respected "as a precious commodity, [which] takes on the role of protagonist and leaves the state of a passive resource" (27). Günther Vogt distinguishes three types of undeveloped areas in Switzerland that are inseparably linked to the country's economic situation: first, protected parks, nature adventure parks, regional nature parks, the national park and biosphere reserves protected as parts of the UNESCO World Heritage, where tourism is the driving force; second, wastelands, where one does not know what the future might bring; and third, efficient agricultural areas, which are "operated like large industrial plants laid out around the settlements". The last ones are also historically virtually untouchable due to the idea of self-sufficiency (28).

In our project, we would roughly distinguish between five landscape typologies that need to be thought of in a new way and above all in relation to each other as well as to the built environment: first, landscapes that contain elementary resources, water in particular; second, forests that are essential for biodiversity and CO_2 absorption and that need to be networked at the territorial scale; third, agricultural areas many of which have been primarily designated as Surface d'assolement, and are now largely cultivated industrially; fourth, landscapes that have recreational character with event spaces, sports playgrounds and other destinations encouraging regional tourism; and fourth, on the scale of buildings and architectural spaces, we talk of community gardens and other urban green spaces – the new meeting places of society and stepping stones of urban biodiversity. In general, as Sébastien Marot points out, it is important not only to reverse the division between the city and productive landscapes, but also to intertwine the two – with new land use plans and zoning plans in which parameters of biodiversity and climate neutrality must be inscribed (29).

City with the Land.

Grand Genève and its Land. Property, Ecology, Identity

With its unique history of internationalism, and beautiful yet constricted geographic situation in the cuvette genevoise, Geneva has provided profound lessons for study. It is not a coincidence that in Geneva the concepts of land and territory have been theorized at the highest level of intelligence throughout its modern history.
In the mid 1930s, Maurice Braillard and Hans Bernoulli articulated the question of land as property, while collaborating on the development of the first Cantonal Plan of Geneva (1935). They argued for municipal land ownership as an essential prerequisite for better development of both the city and the countryside.

Other remarkable intellectual figures from Geneva, in particular André Corboz, urban historian and Claude Raffestin, a human geographer, contributed crucial ideas to the understanding of contemporary territory. To Corboz we owe the conception of land as palimpsest—an archive of traces, a space of social practices, continually shaped and reshaped through human activity. Claude Raffestin on the other hand, revealed territory as space of power—a space that is both concrete and abstract, and that involves both techniques of control and room for individual liberty.

More recently, younger scholars have proposed the understanding of land as political ecology: an understanding that in the era of the Anthropocene, Nature and Society are intertwined and cannot be seen in isolation.

It is also not a coincidence that in this project, we have placed land and territory into the centre of our investigation. Having researched land and territory for several years in Geneva, Luxembourg, Singapore and other cities, we embarked on this project with a conviction that urban challenges of Geneva are always related to land: they stem from the ways land is imagined, constructed and managed. These problems encompass fragmented urban governance and planning processes, lack of access to housing, urban sprawl and long-distance commuting, unsustainable food system, loss of ecosystems, and the depletion of resources and biodiversity. Across European cities, a market-driven urbanisation based on private ownership has allowed for speculation and financialization of land and nature, leading to sprawling, unequal and unsustainable urban territories.

We have thus departed in this project with an intention to address land in its three essential and interrelated dimensions: property, ecology and identity.

Land as Property. Already in *Progetto e utopia*, Manfredo Tafuri has highlighted the conflict between a coherent urban development and "land rent speculation, whose parasitic mechanisms block the extension and transformation of the real estate market and prevent technological innovations from being reflected in the built environment" (30). For Tafuri, who surprisingly like only few other architectural theorists dealt with the issue that is so substantial for architecture, urban development and landscape design, the only way out of the dilemma was the municipalisation of land. Together with Hans Bernoulli, the author of the standard work *Towns and the Land* from 1946, this demand was also made by the Geneva's city architect Maurice Braillard – especially in connection with his masterplans for Geneva. The land question, i.e. the question of whether land should be privatised and treated as an object of speculation or, on the contrary, like air and water, as a public good, always becomes virulent in the situations of housing shortages. This was the case at the late 19th century as a result of the massive rural exodus in the wake of industrialisation, and after the Second World War, when Bernoulli and Braillard were concerned with shaping Geneva in a coherent way according to the principles of modernism – without the disturbing variety of plots of land in the historic city and the ownership of the surrounding farmland. Today, however, in the age of financialisation, in which more wealth is being pumped into land markets than ever before, the land question is above all about how urban agglomerations can advance their internal development both socially and ecologically. In our view, a comprehensive land reform is essential for the Ecological Transition, because only with its help can sustainable urban-rural planning be implemented. Traditional urban land use planning in the form of zoning plans and land use plans appear to be too weak as instruments. But what elements would characterize such a land reform? A number of different instruments of land reform are being discussed today, and they can be applied depending on the context. These instruments encompass fiscal measures, such as different types of land tax, measures that encourage socialisation of land for the public benefit, various subsidies to small owners for example, and regulatory measures that change conditions for private developers. All of these instruments are discussed in detail in this report in the chapter Cité Partagée (p.114ff).

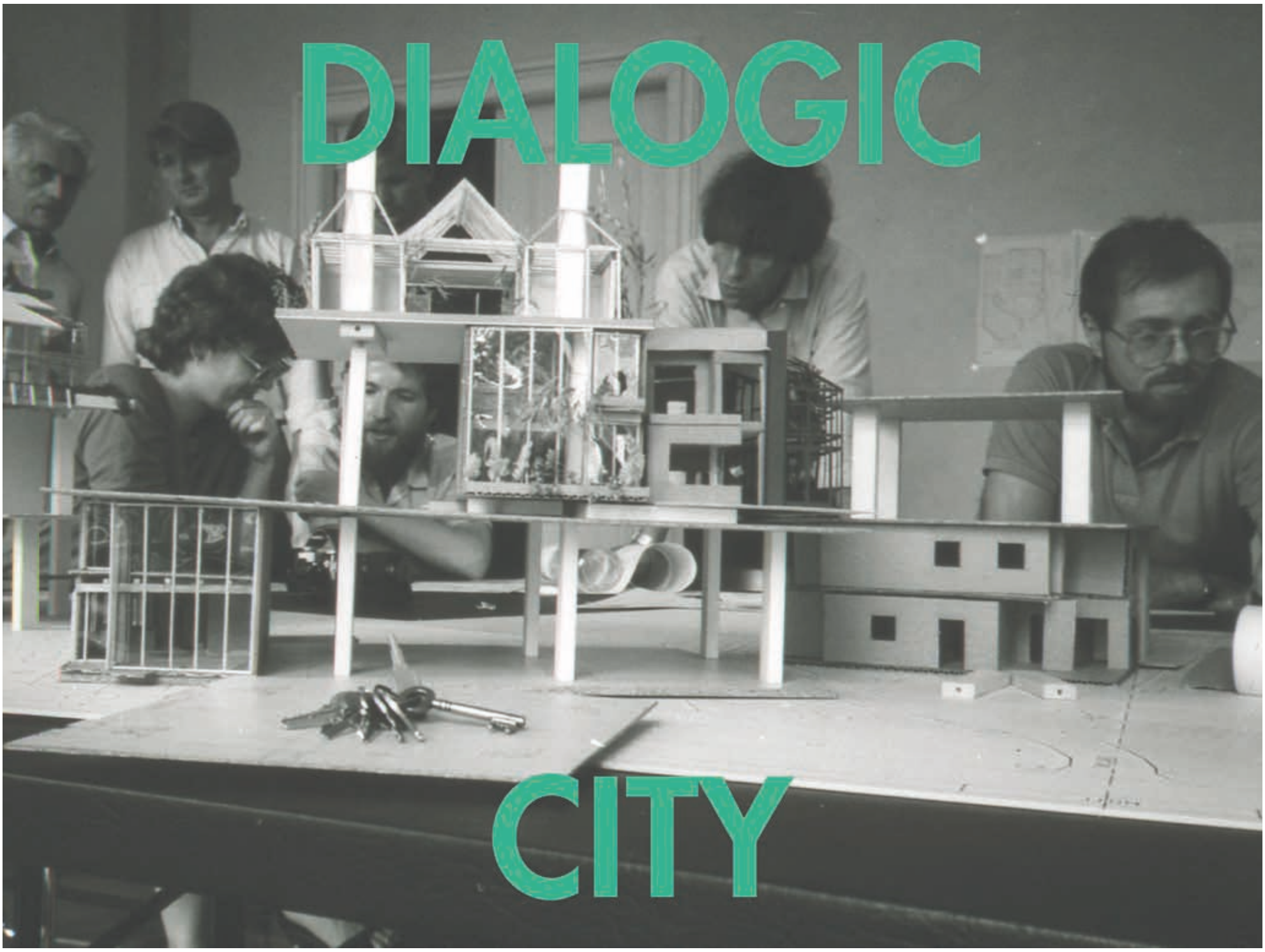
Through such approaches to land, a divergent picture would emerge between the Swiss and the French parts of the Grand Genève, and between the existing and the new developments.

Our position is that, in the Grand Genève priority should be placed on developing and implementing a unified land use model based on the described goals and strategies. This model would include higher taxes on large properties, the flow of revenues into environmental protection, the public land provision for self-building, for housing cooperatives and

social housing, and obligations of not-profit housing provision in all private housing developments.

Land as Ecology. The second theme at the start of our investigation concerned the status of open, unbuilt lands and resources such as soil and water. Like many urban regions in Europe, Grand Genève has experienced enclosure and fragmentation of nature areas and agricultural land under the pressures of new construction, increasing traffic and leisure. During our fieldtrips and studios, we documented emerging differences in the landscapes across the region: from the picturesque metropolitan villages surrounding the city, to abandoned pastures and forests in the Jura, and to high tech farms of the Zone Franche exporting to Geneva. We became aware that these transformations often come at high environmental costs and that they have also often flattened cultural specificities of places in the region. We recalled Braillard's radical idea in the Cantonal Plan of Geneva from 1935: the land should not be merely a background for the expansion of urban fabric. Instead, the City and the Land should be given equal status: both should be governed by a common vision, and through integrated planning and development processes. Following Braillard, in this project we have outlined an approach to land as ecology, based on the balance and complementarity of the Built and the Unbuilt, across different scales from a neighbourhood to the entire region. These relations are addressed in chapters Cité Naturelle p.62ff, Cité Agricole p.86ff, Cité Cyclique p.124ff, Agri-Landscape Rooms p.168ff, Vital Streams and Canopies p.174ff, and Mountain Parks p.180ff. This approach also made it possible to envision the Grand Genève region not merely as an agglomeration, but as a legible urban figure.

Land as Identity. Our third theme at the start of the investigation concerned a possibility of a changing narrative: could Geneva reframe the centre-periphery duality — the Swiss–French, the Protestant–Catholic, the International–Regional? Could Geneva and The Other Geneva be brought together into an inclusive and optimistic picture? Could Grand Genève become a popular political reality? During our fieldtrips and workshops, we understood that such reframing would hold enormous potential. The facts on the ground are already there: the centre-periphery opposition no longer fully holds, and a more complex and nuanced picture is emerging. The periphery itself has become bigger, more diverse, more urban, more international. We believe that Metropolitan Grand Genève holds a potential of a region where different identities in the territory can develop together toward a productive complementarity. In the project, we analysed and designed different parts of the Genevan territory, safeguarding identities of each part — through for example the new centres and proximities (see Cité Proximite, p.106ff) — but, bringing them together into a regional figure of potentials (see Territories of Urban Potentials p. 141ff, and The New Urban Figure p.187).


DIALOGIC
CITY

Methodology: A Dialogic Approach

Many dichotomies of territorial development have now been addressed that need to be overcome: centre and periphery, urban design and landscape design, built and unbuilt. One could add community and individuality, living and working, production and use. How can we now think these fields together again? The philosopher Edgar Morin has developed from the concept of the dialogical, to which various thinkers from Plato to Michael Bakhtin have devoted themselves, an approach to how the various disciplines in our knowledge society can communicate productively with one another. His dialogical principle means to think two or more mostly divergent or antagonistic logics together without their peculiarities dissolving. It thus joins the tradition of dialectical thinking from Heracles and Nikolaus Cusanus to Hegel and Marx. In contrast to Hegelian dialectic, however, it is not about a synthesis of opposites, not even about a hierarchy of diverging fields, but about recognizing contradictions and bringing them into interaction (31). Oswald Mathias Ungers, for whose thinking Nikolaus Cusanus' Coincidentia oppositorum was decisive, collaborated with Rem Koolhaas in the late 1970s with the hybrid work *The city in the city. Berlin: a green archipelago* made this attempt. The idea of a polycentric urban figure that grasps nature and culture, tradition and modernity, and fiction and reality in a dialogical way is a reference point for our project for Grand Genève. But today, in the sense of Edouard Glissant, it is a matter of conceiving the various parts of the city itself (and not just its federation) as heterogeneous and equal parts (32). The Dialogical City is in this respect related to Lefebvre's dialectic of the simultaneous. Christian Schmid emphasizes that Lefebvre is also concerned with declaring the accessibility of a clear synthesis as impossible, and he points out instead that contradictions cannot be poured into a synthesis, but can only be transformed, continuing to contain the former qualities (33). The starting point for Lefebvre's dynamic and open concept is the thesis that the production of space and the produced centrality are always contested. Centres are dominated by the dominant capital factions, the state and the political elites. Therefore, the dominance of economic growth in general must be overcome. At Lefebvre, it is necessary to find a social order – today we would say post-growth ecology – that profits from its contradictions and breaks with needs guided by economic logic and reason and opens itself up to the needs of the human being – here we are again with the needs of future generations.

Therefore, a prospective project for a socio-ecological turnaround cannot be based on capitalism as it exists today – with shareholder value, land speculation, growth indicators such as GDP, etc. On the other hand, it cannot only be about quantitative achievements such as CO_2 neutrality, but also about qualitative – spatial and atmospheric –

gains, about the quality of life. We have found that measurability can only be achieved in reduced situations, but no more if the complexity of a territory is taken into account. According to Roger Smook, the more complex an urban system is, “the more the general reactions depend on the interrelationships between the individual elements and the more difficult it is to understand them or to model them using conventional disciplines” (34). Yet we do not have any tools to measure these developments at the scale of the territory. If we have to acknowledge the limits of measurability on a territorial scale, we also see the impossibility of completely abandoning them. On the one hand, because they increase the controllability of resources, for example. Otherwise, according to Friedrich Schmidt-Bleek, author of the Factor 10 Manifesto, “our striving for sustainability remains a blind flight” (35). Useful indicators are, for example, the specific area intensity (FI) of products, buildings, infrastructure and services, which calculate, among other things, the degree of sealing of an area. On the other hand, simple quantitative findings, well noted as a narrative element, can be useful for political discourse.

The first part of our dialogical method are values of the Ecological Transition, which we project onto Grand Genève. In the next chapter, we will embed them in the specific geography of Grand Genève. The values the Ecological Transition – la Charte de Genève – are divided into five types of equal Cités: Cité Agricole, Cité Naturelle, Cité Cyclique, Cité Partagée, and Cité de Proximité. How can the city interweave with a local, organic agriculture? How can the city protect its resources? How can the city bring energy and resources into circulation? How can the city increasingly share resources, goods, houses and infrastructure? How can the city offer shorter distances between living, working, leisure and consumption? For each individual City, we have presented both qualitative and quantitative insights (for example, how much CO_2 can be saved if half of the commuters work from home three days per week!).

The values of the Ecological Transition inform the potential urban transformation areas. This creates a ramified matrix that can generate an infinite number of projects, some of which we have been drawn up in the final chapter of the report.

Methodology: A Territorial Approach

Central to the dialogical nature of the project is embedding the “Values for the Ecological Transition” into the particular geographies of the region, thus allowing selected elements of the landscape to be combined into a series of configurations crystalized into seven “Territories of Urban Potentials” through which the future form(s) of the territory can be traced. This approach allows the project to be both grounded to the specificities of the social and natural geography, but also remain flexible to the unpredictability of future scenarios.

Instead of trying to sketch a specific masterplan, with the associated land use maps, zoning schemes, and the usual urban regional planning devices, the project aims to define as precisely as possible, through geospatial modeling, the potentials that could emerge for different types of development throughout the region, which in combination would compile a holistic vision for Grand Genève.

The elements for these potentials can already be found within the region in the form of social, technical and ecological attributes of the geographical environment, and the goal of the project is to identify them, combine them in meaningful ways into the seven territories selected, and anticipate in a projective manner their transformation, guided by the values of Ecological Transition. Thus, the seven Territories of Urban Potentials suggest a novel, alternative framework of approaching territorial design, one that is at the same time emerging through geography, and allowing for its projective future manipulation.

Region as a new urban figure

From the intertwining of urban potentials and the values of Ecological Transition, a figure for 2050 emerges, on which the development of the Grand Genève can be oriented from now on. This figure dissolves the centre—periphery dichotomy, and thus the dichotomy between Geneva and the Other Geneva, giving form to territorial equity and justice. Today's peripheral communities, fields and infrastructures are now seen as part of the Grand Genève. Nature and culture articulate themselves in a sustainable, polycentric and regenerative city-landscape, which, in contrast to a rigid master plan, is able to respond to demographic growth as well as to shrinkage. While its external boundaries are clearly defined by the form of the cuvette genevois, an internal development takes place within the figure, placing the Unbuilt and the built in an intensive synergy.

Territories of Urban Potentials

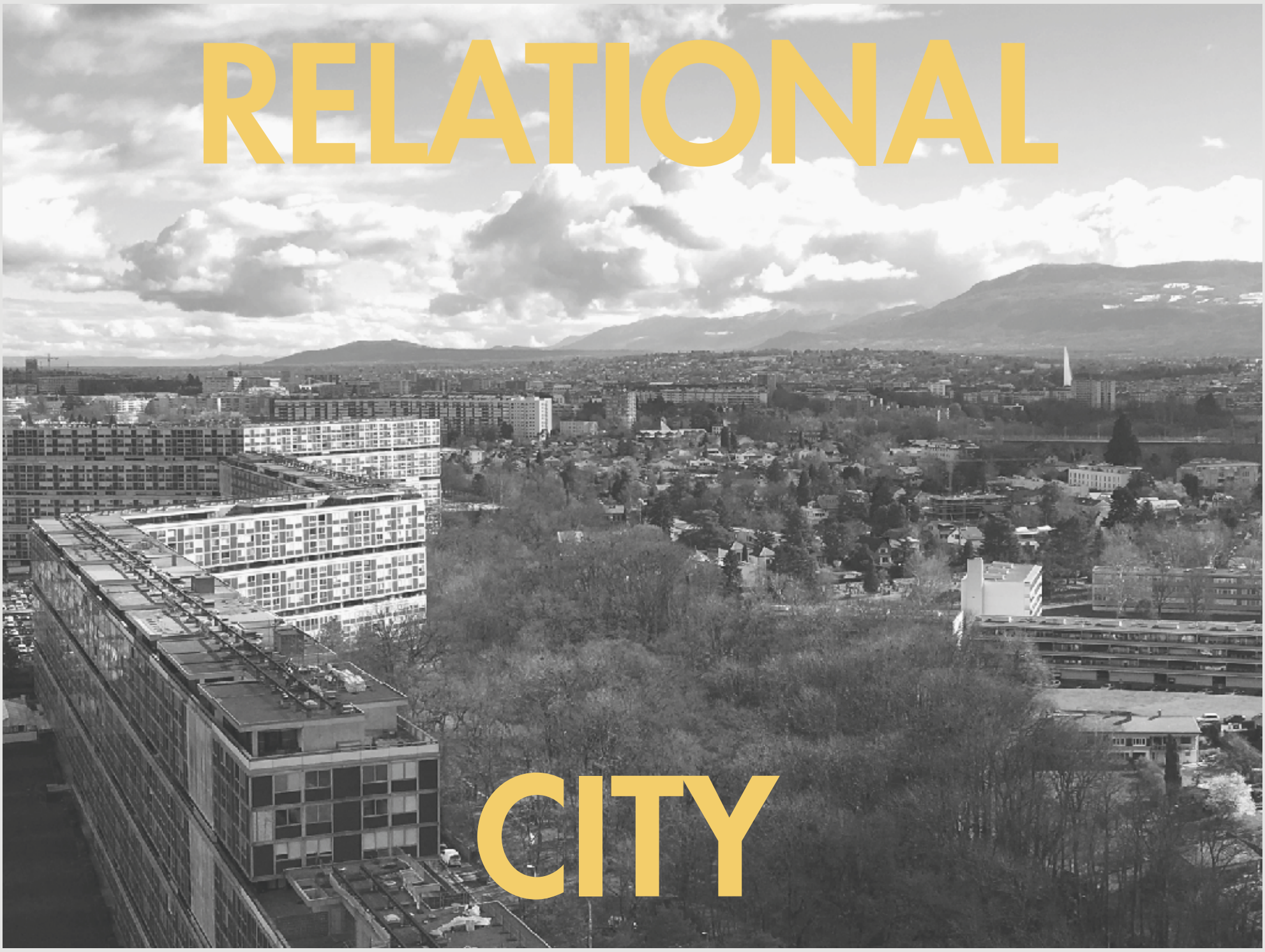
Values for the Ecological Transition

	I Cité Naturelle	II Cité Agricole
1 Bi-National Metropolis	Porous and unsealed urban surfaces Planting and maintainng of urban trees Green facades and roofs Reduction of light pollution Renaturing of urban parks Connectivity by "stepping stones" Open water surfaces and storm water retention areas ('sponge city') Opening of urban rivers Breeding and nesting sites for animals and birds Preserving open lands both above and below ground: building on the built Enforcing soil protection legislation against soil degradation (compacting, pollution)	Urban gardening, urban agriculture Mikro-agro: neighbourhoods with land Gentleman farming, part-time farming Indoor, vertical and underground farming Composting and local organic waste management Food waste reduction Regional food strategies (local markets and direct selling models, shortening supply chains) Education on food and farming culture (e.g. pomotion of plant-based diet, locavore, slow-food, seasonal products)
2 Global-Local Territories	Key urban actors (e.g. public institutions, large-scale land owners and employers) setting benchmark examples and projects in biodiversity and nature promotion see 1 and 4 for additional strategies	Key urban actors (e.g. public institutions, large-scale land owners and employers) setting benchmark examples and projects in regional farming and increased food self-sufficiency see 5 for additional strategies
3 Post-Fossil Infrastructures	Unsealing surfaces and unbuilding infrastructures (e.g. car surfaces including parking) Remelioration of contaminated soil Railway and road sides as wildlife and fresh-air corridors Wildlife passages (e.g. bridges and tunnels) Former mining sites as biodiverse nature parks	Rooftop farming and gardening Former infrastructure corridors as connection for food distribution Last-mile delivery for local food produce (e.g. bicycle delivery, food baskets)
4 Metropolitan Countryside	Integration of ecological corridors Renaturing of scenic routes Agroecological practicies in the cultural landscapes (e.g. mixed orchards, food forests, agroforestry, biodiverse vineyards) Permaculture Biodiverse private gardens (e.g. no chemical fertilizers, minimize lawns) Bocages or hedges Nature reserves (e.g. dry meadows, wetlands)	Promotion of local produce (e.g. wine)
5 Agro-Landscape Rooms	Biodiversity promotion schemes (e.g. subsidieced bocage or hedges) Nature reserves (e.g. managed dry meadows, wildflower strips) Conserving and restoring soils Genetic diversity of crops and domestic animals, promotion of cultivares	Agroecological practicies on agricultural land (e.g. mixed planting, agroforestry, organic farming, permaculture, returning biomass) Diversification of agricultural landscape (e.g. different crops, rotation schemes, mosaic field pattern) Stop to industrial animal farming, transport and trade Focus on regional free range rearing
6 Vital Streams and Canopies	Green and blue corridors Cross-border soil and watershed management River revitalization (Gewässerschutzgesetz GSchG) More space for the rivers, natural flooding regimes Riverine forests Protection of peat soils Connectivity for fish movement, such as fish ladder Prevention of water pollution by agricultural, urban and industrial run-off Protection and restoration of aquifers (prevention of over exploitation, promotion of natural replenishment of aquifers by unsealing porous soils)	Wild foods, suistainable fishing Suistainable aqaponics
7 Mountain Parks	Wilderness areas (nature reserves and parks) Managing adverse impacts of recreational uses Mixed and productive forests Mitigation of climate change impacts (e.g. protection against land slides, soil erosion, water retention against droughts, protective forest) Forest and soil as CO_2 storage	Reestablishing traditional extensive uses (e.g. biodiverse meadows, semi-open landscapes, alpages) Wild foods, suistainable hunting Promotion of local produce (e.g. herbs, cheese)

III Cité Cyclique	IV Cité Partagée	V Cité des Proximités
Development of a material bank for all new buildings in order to downcycle them Establish a new architectonic planning culture which allows more reuse of buildings Consider the costs of all life cycle in the development of projects	Promote cooperative housing Establish more commons (resources, gardens, squares) Establish a new model of land use that considers land as a common good. Reduce the housing surface per individual and rise the shared surface (common living rooms, common kitchen, guest apartments).	Reconnecting built and unbuilt Rebalances the uses of the territory (centralities) Decentralizing companies Establishing co-working spaces linked to housing complexes Small urban structures rising the intensity of the urban
	Experience of the commune Spirit of the community New forms of (common) property	Creation of pedestrian and bike networks Promotion to local commuting to work Promotion of the proximity of housing to the work place
Develop the public transport system at the scale of Grand Genève Project the tram network on the existing highways	Develop more bike sharing	Develop the urban fabric in relationship to the public infrastructure system New gardin cities will appear next to tram stations
		Local markets and direct selling points Articulate gardens with buildings Development plans should demand 30 m2 of gardening for every housing unit
	Regional contract farming Solidary production Food cooperatives	Limiting/ banning car traffic on agricultural roads
Regenerative metabolic flows Aquaponic architecture		Limiting car traffic ecological zones and nature parcs

The Relational Governance of Geneva+

by Markus Hesse


RELATIONAL
CITY

The relational governance of Geneva+
by Markus Hesse

Tendencies in urban governance across the globe

Urban development debates in what is described as the global North concern significant—and relatively recent—changes in governance configurations and associated practices (Brenner & Theodore, 2002). Both in metropolitan and non-metropolitan areas, city regions have become more and more integrated into the global economy, service industries and production networks. Consequently, city regions have been reconfigured as strategic, competitive locales for cognitive-cultural capitalism (Scott 2001). In terms of governance practices, most notable changes include the rise of corporate power within a neoliberal framework, a related shift from managerial to entrepreneurial urbanism and an urban politics increasingly driven by competition (McCann, 2017, p. 313-314).

While this debate had focused for some time on archetypical global cities, such as New York, London and Tokyo, and an increasing number of emerging (mega-)cities of more than five million inhabitants, the range of cities that are affected by such changes is much broader. This applies particularly to smaller, so-called “middle-weight” (Amin & Thrift 2017, 19) or “relational” cities (Hesse & Wong 2020) which have recently gained increasing importance in global services networks thanks to their ability to internationalise their economic portfolio and to achieve positionality in global networks. With the growth of the services industry (and even more so the financial market), these cities have been able to transcend their territorial and market-size limitations to become highly attractive locations for hosting a variety of advanced services.

Political institutions are another vital component of the functional-economic portfolio of such cities. This applies in the first instance to capital cities, particularly those that are either second-tier cities or were given capital status above other agglomerations for political or historical reasons, such as Canberra in Australia, Ottawa in Canada, The Hague in the Netherlands, or Bern in Switzerland (Kaufmann 2018). The same

applies to cities which host supra-national institutions, such as Brussels, Strasbourg and Luxembourg City, the political and administrative capitals of the European Union. This is also the case with Geneva, which in 1920 was chosen as a host city of the League of Nations, and after WWII the United Nations, now complementing Vienna and Nairobi as UN regional headquarters. This historical trajectory has rendered Geneva a truly global political and diplomatic hub. According to “Geneva International”, it hosts 179 nation-states represented by a permanent mission, 38 international organisations and 420 non-governmental organisations (NGOs), which in total employ 33,745 people, making it one of the most internationalised cities of this size on earth (data as of 2019).

A relational lens on cities

Assessing the relationality of somewhere provides an analytical lens to better understand places that are not confined to bounded, fixed territories and are beholden to the flows, economic linkages and relationships that help to successfully position themselves globally. Hence one of the key concepts that has broadened our understanding of urban and regional development at the global scale, and thus helping to develop a fresh view of geographical spaces, is that of flows: The movement of people (migration, commuting), jobs, commodities, capital and investments, ideas and ideologies is vital to the emergence of city regions more recently. The relevance of this approach is even clearer when we include the natural environment and urban-regional ecologies into our analyses: land for expansion, water supply, food production, biodiversity or the provision of spaces for recreation are ultimately city-regional, if not conceived at large scale. Cities as dense agglomerations of people, jobs, buildings and infrastructure can hardly be imagined without the services provided by the surrounding regions.

The practice of relationality is based on the ability of places to attract, manage and valorise a variety of flows, essentially extracting “streams of profit from extraterritorial terrain” (Olds & Yeung 2004, 492). These extraterritorial terrains can be situated in the neighbour regions, in more remote countries with which import-export relations are operated, and even in outer space, as satellite technologies and related services are increasingly used for operations on earth as well. The idea of relationality aims to pay justice to the rising degree of inter-connectedness of cities and regions, without omitting the role of the tangible materialities of the built environment. Precisely, when aiming to extract value from extraterritorial terrain, territorial issues still remain important: Flows need to be steered and managed in order to contribute to local development, and this requires appropriate infrastructure and institutions.

When the pace of growth cannot be met by the provision of infrastructure, regions face problems. Transport bottlenecks are among the most

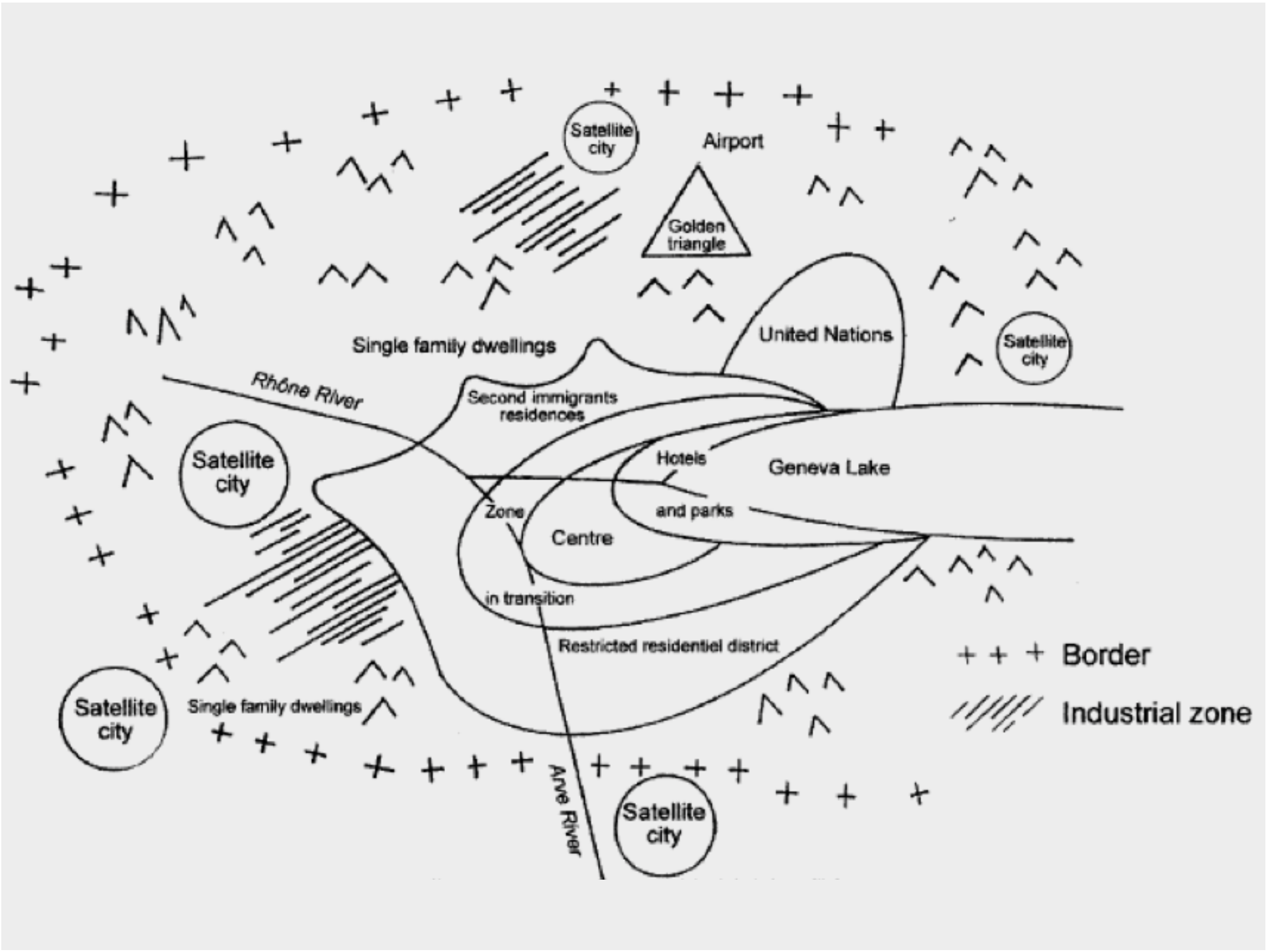
common problems that accompany the economic success or surplus of cities against their hinterlands; housing shortages occurring alongside expanding office spaces is a phenomenon that occurs in many economically successful cities. Most generally, the mismatch between size (small) and economic power (big) is striking. Land and property play a central role here: they are considered to be one of the five key strategic resources that are used by urban regimes to push development, as outlined by Lambelet (2019) in his study of the two Swiss cities of Bern and Zurich. As soon as these strategic resources (the other four being law, money, expertise and democratic support) become scarce, major problems arise for the city region as a whole.

The Geneva setting

Given the long-standing economic development trajectory that has shaped the city and canton quite significantly, it is clear that both internationality and mobilities are vital parts of their DNA and provide essential framework conditions for urban and regional development. This makes the place quite distinct from many other cities of the same size. Today Geneva is the smallest of the five major agglomeration areas in Switzerland, defined by the Federal measure (the other four being Zurich, Bern, Basel, and Lausanne). At the same time, its urban core has the highest degree of density among the five agglomerations. However, effectively Geneva represents a 'city-region' that stretches across different scales: it comprises 200,000 inhabitants at the commune level, and roughly half a million at the Canton level; almost one million people (950,000+ as of 2019) live in the Grand Genève agglomeration, necessitating strong linkages with neighbouring French territories.

The Geneva Canton is the youngest and smallest of the 26 cantons in the country, but its population has doubled since the early 1960s, and the last Federal Census, already somewhat obsolescent, revealed that the Cantonal workforce had reached an amount of more than 318,000 in 2011. The city of Geneva as such is characterised by an equilibrium between the number of residents and the number of people employed (both roughly at 200,000 as of 2018). On the one hand, as the city is densely occupied with physical workplaces, thus making efficient use of land and infrastructure. On the other hand, high density in the core also comes with a certain burden for the region as a whole: firstly as concerns commuter flows coming from neighbouring French territories, and secondly housing pressures resulting from the lack of supply, a pattern that seems persistent in all cities that qualify to be characterised as 'relational'.

Recent development dynamics have contributed to a heightening imbalance disequilibrium between the various territories and functions, where housing reaches increasingly beyond the Swiss-French border while



Grand Genève. A spatial imaginary. Antoine S. Bailly 1997.

employment growth has occurred in recent times primarily in fragmented patterns across the city of Geneva and its neighbouring municipalities (such as Ornex, Meyrin, or Reignier-Esery). Given the future prospects for demographic and economic development of the region, a lot rests on using land more efficiently and exploiting further resources without deteriorating the region's natural environment. As in other relational cities, housing appears to be the most pressing issue: "The shortage of housing is the most important problem that questions the attractiveness and prosperity of Geneva." (Delaugerre 2010, 94; own translation M.H.)

Using existing land resources more effectively is mainly to be achieved by increasing urban density, which is a task that has its obvious downsides: While the densely populated inner-city primarily offers potentials for fine-grain redevelopment only, the creation of new space is associated with large-scale urban developments (for example Annemasse, Les Vergers, Saint Genis-Centre or Viry) – projects that are complex and quite demanding in procedural terms. In this context, large-scale developments and the associated infrastructural investments (see the case of Annemasse) add to the complexities to which the region is already exposed, both in planning terms and also with regard to the broader political picture. In this sense, the problems identified here seem to be similar to other large city-regions in Western Europe – except that Geneva is small by territory but subject to enormous pressure on land and resources from above. It is thus challenged in specific ways, and it seems difficult to develop appropriate governance structures to deal with this problematic constellation satisfactorily.

Governance configurations and challenges

In terms of governance, an important starting point of a relational analysis is that urban regional territories and the realm of policy and politics are no longer congruent. Indeed, one may argue about the extent to which they ever were. However, major shifts have occurred which have now reached tectonic degrees, with complex regional consequences. To quote Wachsmuth (2014): "We examine the traditional concept of the city in the context of urbanisation processes that exceed it". This means that the fate of the metropolitan or city-region is that it owes its history to the process of urbanisation (expansion, qualitative change), and it is precisely this process that is now transforming its traditional form, function and meaning. This phenomenon is hardly new and widely discussed in geography, planning and political sciences, but yet lacks sufficient consequences for practice.

In this context, the specificity of a city like Geneva is that it has developed primarily on the grounds of internationality, even though the consequences certainly unfold in city-regional ways as well. This adds a sort of vertical dimension to the horizontal dynamics of urban expansion as it has manifested so far. This renders the city-regional constellation much

more complex. Therefore, such cities actually develop in two different, interrelated, and partly also conflicting, directions: they need to deal with a multi-dimensional system which entails urban growth into areas outside the city core, and also is targeted by specific forces that are effective at higher levels of spatial scale (region, canton, state, EU, UN). As a consequence, these cities are rarely able to steer such processes locally.

A logical consequence derived from scientific analysis and observation in such contexts is the call for more and better policy coordination. While this call is certainly justified, it is neither new, nor do we precisely know how to cut off the Gordian knot of institutional fragmentation for the purpose of better integration. Perhaps this simply reflects the extremely high concentration of international organisations in the city of Geneva that places certain constraints on such integration, as organisations such as the United Nations, its peripheral international associations, or supra-national bodies such as CERN tend to follow their own operational logics and future planning. Maybe the degree of internationalising the city has already been exaggerated – as Delaugerre (2010) argued in his paper titled “Genève – métropole trop bonne elevée ?” The difficulty in dealing with the “international” component of Geneva with reference to local issues (such as land, resources and the like) is of course that it is itself subject to complex regimes and settings of policy bargaining, and additionally, inter-urban competition. As Groen (2016) has shown in her comparison of the Dutch capital The Hague, Geneva and Vienna (Austria), the attraction of international organisations to these cities was and still is subject to a powerful competitive constellation, where multi-level bargaining and lobbying are practiced in order to deliver for institution and host alike. In effect, this practice certainly clashes with the meticulous system of (horizontal) spatial planning as it is practiced in Switzerland. It can be argued that, as a result of the imminent upscaling of the city’s position, urban development is increasingly accelerated, which makes planning much more difficult than it is already under more routine circumstances.

Spatial and urban planning in the Geneva region is practiced at various levels of scale, given the injection of a certain sense of metropolitan-ness coming from the Federal government’s agglomeration concept (‘Métropole Lémanique’) and also in light of associated activities of the city of Geneva for housing or mobility issues. However, the Cantonal level seems to be the most relevant and powerful body in charge here. The considerations laid down in the Canton’s Masterplan for 2030 (Plan Directeur Cantonal) focus on preserving open space and achieving more efficient land use in the built environment, a significant improvement of the regional infrastructure for public transit and its natural entanglement with settlement patterns (both for work and housing purposes).

In institutional and political terms, the future challenge will be to better link the different representations of the 'two Genevas', the local (regional) one vs. the international one (and the Swiss one vs. the French one, respectively), and to make their different spheres converge. This is a real challenge given not only the apparent politico-administrative complexities, but also the vested interests of the various municipalities, governments and stakeholders involved. Almost three decades ago, the social geographer Antoine S. Bailly from the University of Geneva reflected upon a possible international institutional architecture that pays justice to these complex politico-administrative patterns: "Each scale of intervention, by addressing cross-border issues in different ways, complicates the related decision-making mechanisms." (Bailly 1992, 221; own translation M.H.) These complexities were also revealed in the governance of technical systems such as the Geneva tram network, as Audikana, Kaufmann & Messer (2015) have shown.

On another occasion, Bailly (2000) sketched the socio-topography of the city-region in a diagram, as a result of his observation of the spatial fragmentation of the region (Bailly 2000, 165). Obviously inspired by Park & Burgess' classical zonal model of the city (1926), he identified a fragmented pattern that characterised the socio-spatial dynamics of Geneva's urban-regional development. While the urban core is situated between lakeshore and concurring land uses, space for expansion seems limited (partly contained by zones of transition) given the small size of the city. Political decision-making identifies hotspots for primary development (UN, Golden Triangle with the airport as core), while a number of satellite cities are obviously needed to cater for the consumption requirements of the middle-class workforce of the hosted institutions and organisations. How are these hotspots being governed, by whom? How can they be better integrated in the overall planning framework and practice of the region as a whole? If Grand Genève aims to keep the promises laid down in recent action plans and commitments for the foreseeable future, these questions need to be addressed clearly and comprehensively.

Conclusions

From an international and comparative research perspective, Geneva represents an extra-ordinarily interesting case of 'small but global'-urbanisation. It can be argued that the search for a more balanced development path between economic power, social divides and spatial coherence will be the most important challenge for the present and future for cities that we approach as being 'relational' (like Geneva). In this context of a small and constrained but highly connected relational space, the mobilisation of land and a sustainable management of mobility requirements seem crucial for mastering this challenge. Taking this challenge seriously would mean that the cross-border territories

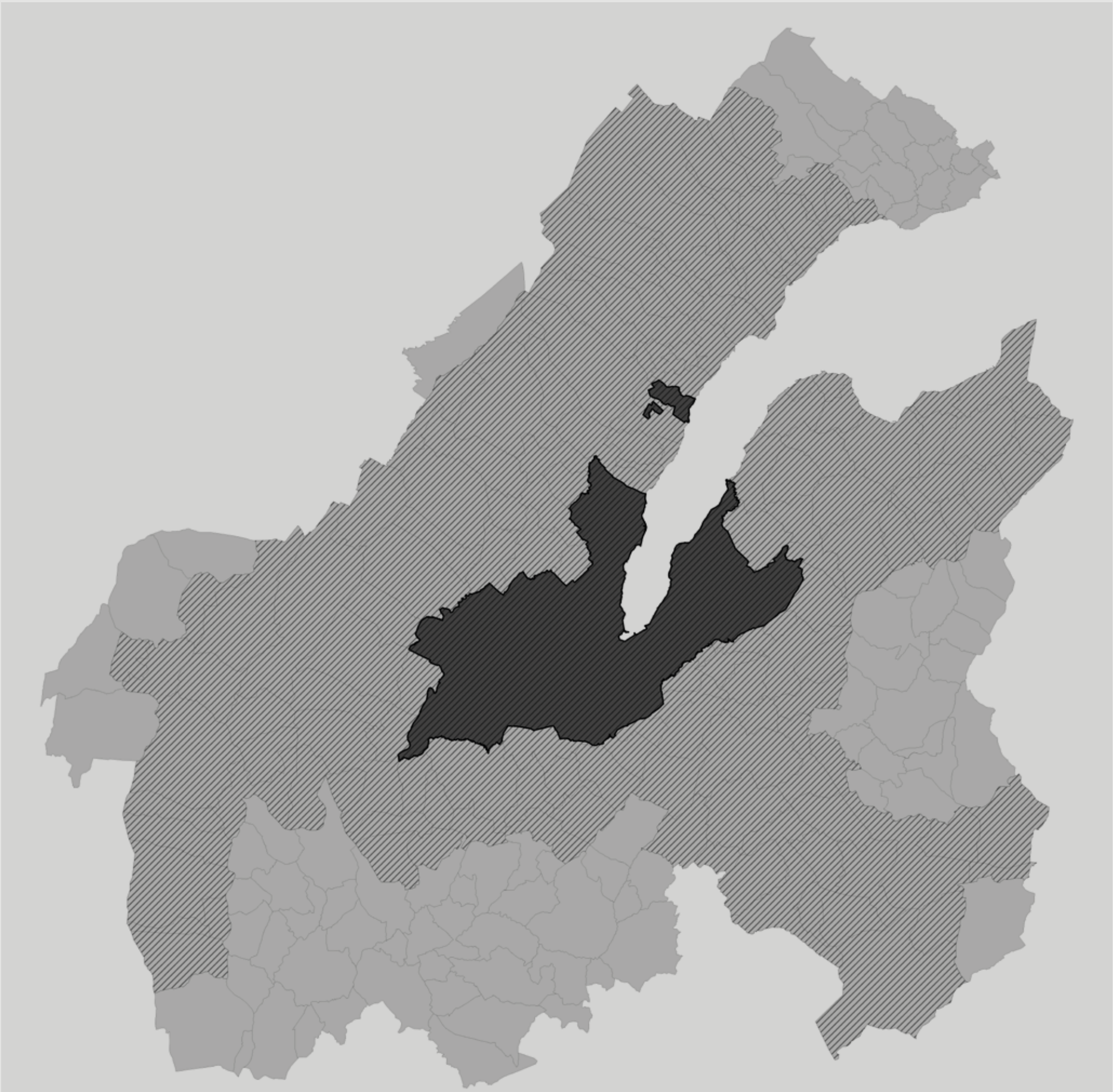
cannot be considered the mere functional back-up and hinterland for a burgeoning centre, but the region overall needs to address its functional inter-dependencies with more coherence. “Thus, what is really needed is thinking about how to build territorial coherence in planning processes and what forms of governance should be implemented when developing the project and defining strategic guidelines.” (Bertrand, Cremer-Schulte & Perrin 2015, para 28).

Again, this claim is neither new, nor would it have to be perceived as sensational. However, it seems rather appropriate. The authors recall that the inaugural activities of establishing the first steps in the direction of what thereafter became labelled Grand Genève date back to 1973, when institutions and policy makers decided to embark on a collaborative path for the region. This is obviously a rather long way to go; but given the wicked nature of the problems that are prevalent here, there seems to be hardly a reasonable alternative available. Hence this set of governance problems can be understood as a challenge for the next two decades, whose material foundations however need to be set in place right now.

Redefining Grand Genève: Towards a Socio-ecological Region

by Nikolaos Katsikis

How can the region of Grand Geneva be redefined in a way that takes into consideration not only its social dynamics and the structure of administrative boundaries, but also major ecological factors? This investigation aims to renegotiate the boundaries of Grand Geneva through an overlay of its daily functional dimensions according to commuting patterns, and dominant ecological functions associated with its hydrographic structure. The result is a suggestion for a "socio-ecological" region for Grand Geneva.

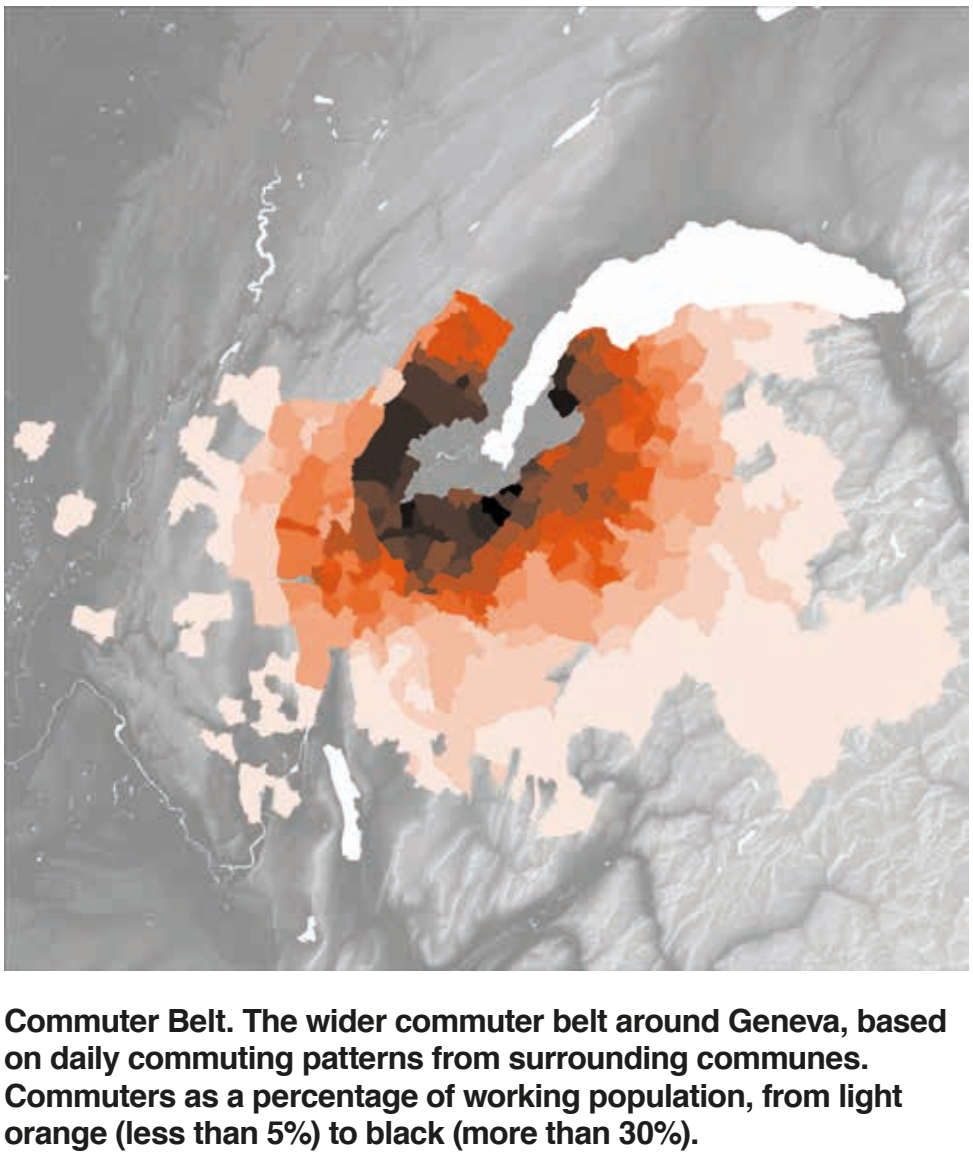


Overlay of the socio-ecological region of Grand Genève (light gray) with the boundary of Grand Geneva (dashed) and the canton of Geneva (dark gray).

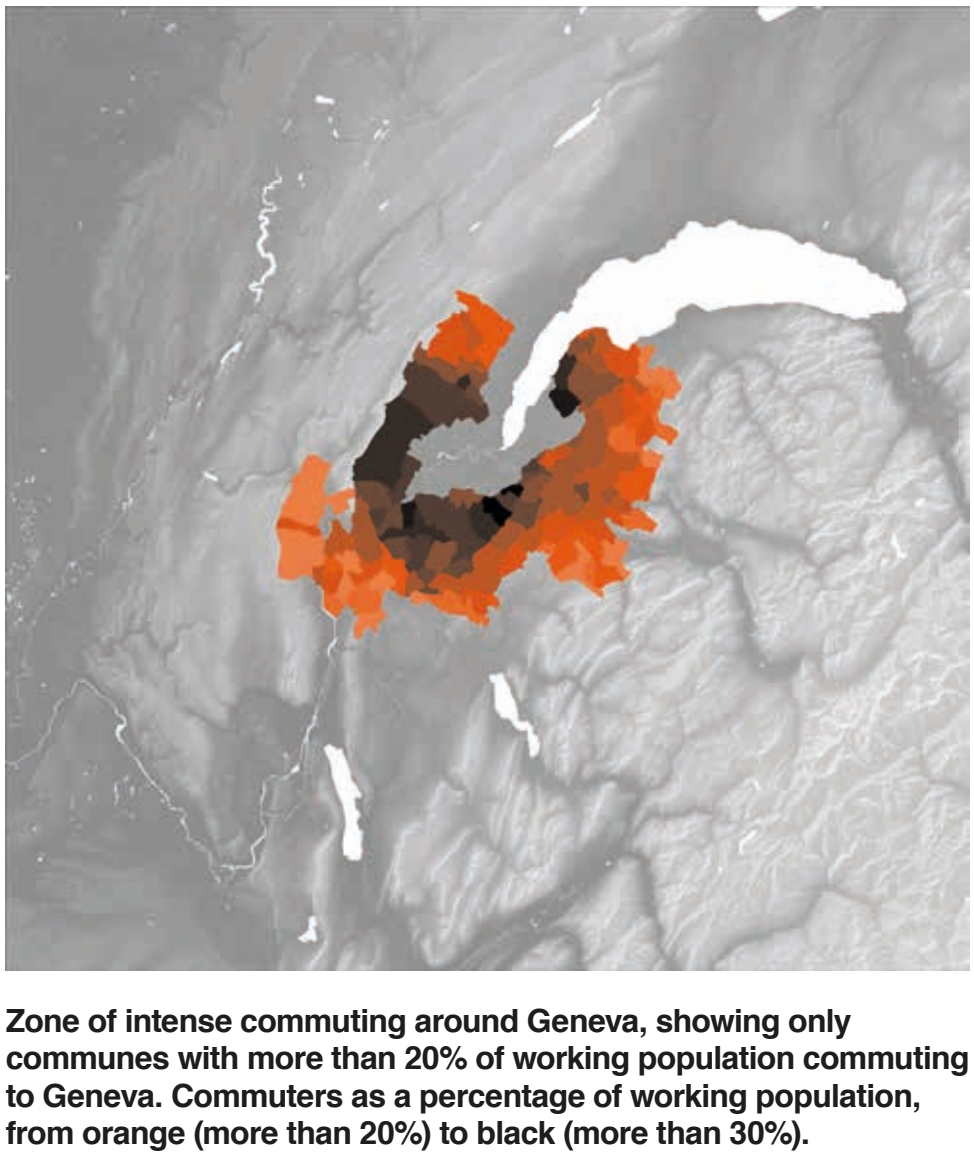
Redefining Grand Genève: Towards a Socio-ecological Region
by Nikolaos Katsikis

The task of sketching a charter for the socio-Ecological Transition of the cross-border region of Geneva, hinges upon the re-definition of the region itself in a way that can reflect the spatial interplay of both social and ecological aspects. The competition brief relies on the official definition of Grand Geneva, which crystalizes an effort to define an extended statistical, but also political coordination unit, around the city of Geneva. The region includes 212 communes, allocated in the in the Franco-Valdian-Geneva Territory. While the effort to develop a larger metropolitan unit is important, the definition of Grand Genève mostly reflects social criteria, such as population movement and activities across the region, inscribed within inherited administrative units (municipalities). The effort to define Grand Geneva in a way that also encapsulates the ecological aspects of the region is largely missing. In what follows, we introduce an effort to redefine Grand Genève based both on social and ecological indicators. A social-ecological region consists of 'a bio-geo-physical' unit and its associated social actors and institutions. We still rely on the inherited structure of administrative boundaries, but we end up expanding the number of municipalities included in the socio-ecological region, based on a combination of two factors: commuting patterns, and a combination of topographical and hydrographic elements.

Starting with the definition of the commuting, or functional region, we map the percentage of commuters to canton Genève, over total population of communes (map 01). The lighter orange color is less than 5%, then orange is 10% and the dark gray and black colors correspond to more than 30% of the population commuting to Geneva. The general rule for defining commuting zones is to delineate areas in which more than 20% of working population commutes to a specific location, a result that for the case of Geneva is shown in map 02. The second geographical element that is taken into consideration for the definition of the socio-ecological region, is the broader hydrographic structure within which Grand Geneva is positioned. The hydrological structure is important both for the definition of the topographic basin that delineates devel-

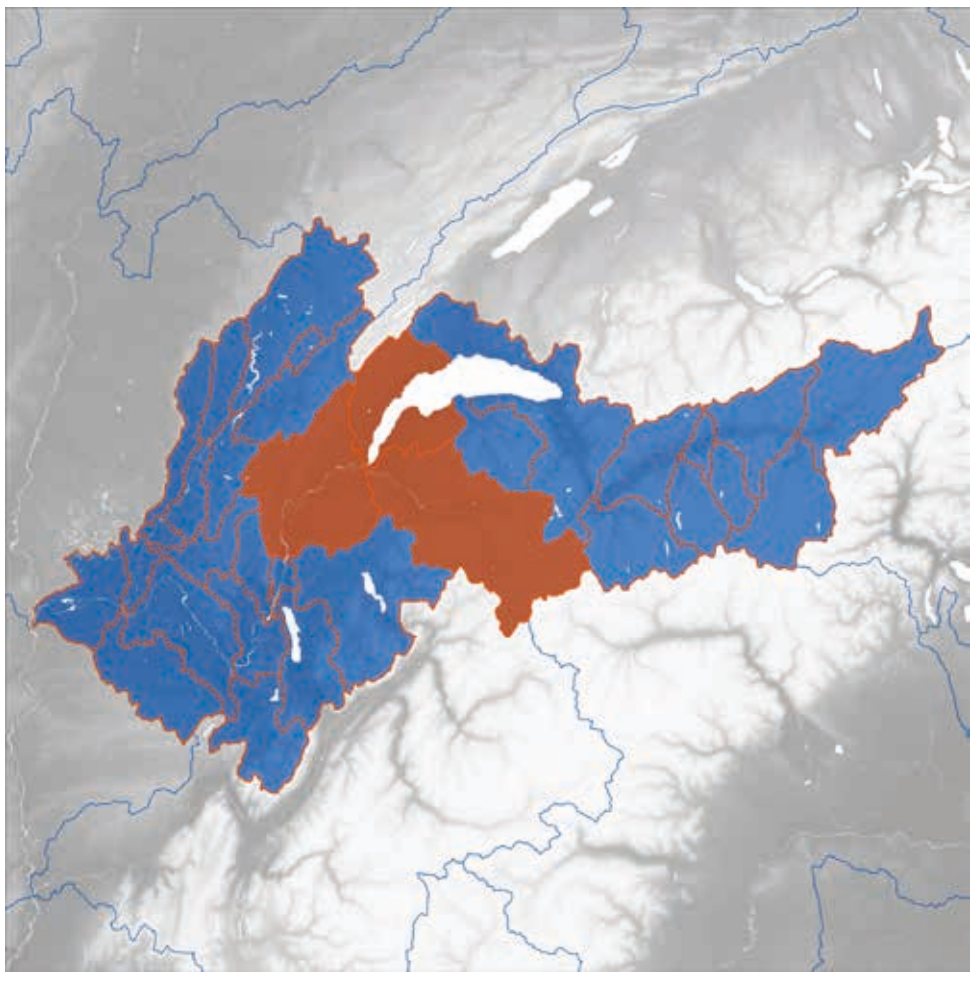


Commuter Belt. The wider commuter belt around Geneva, based on daily commuting patterns from surrounding communes. Commuters as a percentage of working population, from light orange (less than 5%) to black (more than 30%).



Zone of intense commuting around Geneva, showing only communes with more than 20% of working population commuting to Geneva. Commuters as a percentage of working population, from orange (more than 20%) to black (more than 30%).

The higher level watersheds in which Grand Geneva is positioned. The Rhone watershed in light blue (level 5), and the Lac Leman watershed in dark blue (level 6).



The lower level watersheds in which Grand Geneva is positioned. The upper Rhone and Arve watersheds that roughly encapsulate Grand Geneva in orange (level 8), and the Lac Leman watershed within which they are positioned in dark blue (level 6).

Geospatial exploration for the definition of the socio-ecological region of Grand Geneva, based on a combination of two factors: commuting patterns, and a combination of topographical and hydrographic elements.

opment, as well as for the importance of agriculture and water management in general in the region. Watersheds are defined in different levels according to the level of streams that they drain. On map 03, the boundaries of different watersheds of different levels are shown with the blue lines. Thicker lines are higher level watersheds. At the higher level, the Geneva region is part of the Rhone river basin that extends west and south of Geneva and into the Mediterranean. In the map it is shown in light blue and it is subdivided in smaller waterheds. On a second level, Geneva is part of a smaller watershed shown in darker blue that includes all the lake basin and extends to the south and west. It is shown in more detail in map 4, which unpacks how the Lac Leman watershed (light blue) is subdivided in smaller watersheds based on smaller scale streams. From these watersheds, the highlighted orange area best corresponds to the area in and around Grand Genève. It is a system of watersheds that are around the lake and along the Arve and Ain rivers.

Taking into consideration the two aforementioned investigation, we can start to sketch the composite social and ecological region of Grand Genève, as a combination of the functional region of commuting, and the ecological region of the watersheds. Map 5 overlays the watershed system specified above, with the outline of the commuter belt and the Grand Geneva shown in the previous maps. The orange is the watershed system; the black is canton Genève; the gray is the commuter belt as defined above; the line pattern with the black outline is the Grand Genève boundary. The watershed system almost perfectly corresponds to the Grand Genève outline, except in the southeast extension where it follows the Arve basin.

Based on this overlay, we define a new boundary for the socio-ecological region of Grand Genève, shown in map 6. The map shows in light gray the extents of the socio-ecological region, compared to the Grand Genève outline shown with the line pattern and canton Geneva in black. The region consists of 296 municipalities across Franco-Valdian-Geneva Territory (compared to the 212 of Grand Genève), covering an area of 284.447 hectares. It encapsulates all major commuting areas, as well as the largest part of the main watershed, excluding only its southeast extension along the Arve, which does not overlap with an intense commuting zone.

4 Socio-Ecological Region

Values for the Ecological Transition

The first part of our dialogical method are values of Ecological Transition which we project onto Grand Genève. In the next chapter, we will embed them in the specific geography of Grand Genève.
The values for the Ecological Transition – la Charte de Genève – are divided into five types of equal Cités: Cité Agricole, Cité Naturelle, Cité Cyclique, Cité Partagée, and Cité de Proximité. How can the city interweave with a local, organic agriculture? How can the city protect its resources? How can the city bring energy and resources into circulation? How can the city increasingly share resources, goods, houses and infrastructure? How can the city offer shorter distances between living, working, leisure and consumption?
For each individual Cité, we have presented both qualitative and quantitative insights — for example, how much CO_2 can be saved if half of the commuters work from home three days per week!
The values of the Ecological Transition inform the potential urban transformation areas. This creates a matrix that can generate an infinite number of projects, some of which we have been drawn up in the final chapter of the report.

How many trees — and what kind of trees— have to be planted to reduce the CO_2 emissions per inhabitant from 10 to 1 tonne per year? How much surface would be needed to plant these trees?

The best way to increase CO_2 uptake using trees is to plant short rotation coppice (SRC) varieties, like popular and willow clones. SRC can give an uptake of about 2.3 tCO_2/ha/year.

2.2 Mha of tree area would be necessary, only for the inhabitants of Canton Geneva without any further action to reduce individual CO_2 emissions from their current levels.

Ferdinand Hodler, Der Petit Salève, 1892.

I Cité Naturelle

Cité Naturelle, with its symbols of the Jura and the Alps, is crucial to Genevian cultural heritage.

Cité Naturelle is part of the Ecological Region which extends around the Région Lemanique.

Cité Naturelle can become a new paradigm for Grand Genève; a paradigm that surpasses the ‘Cité des Parcs’.

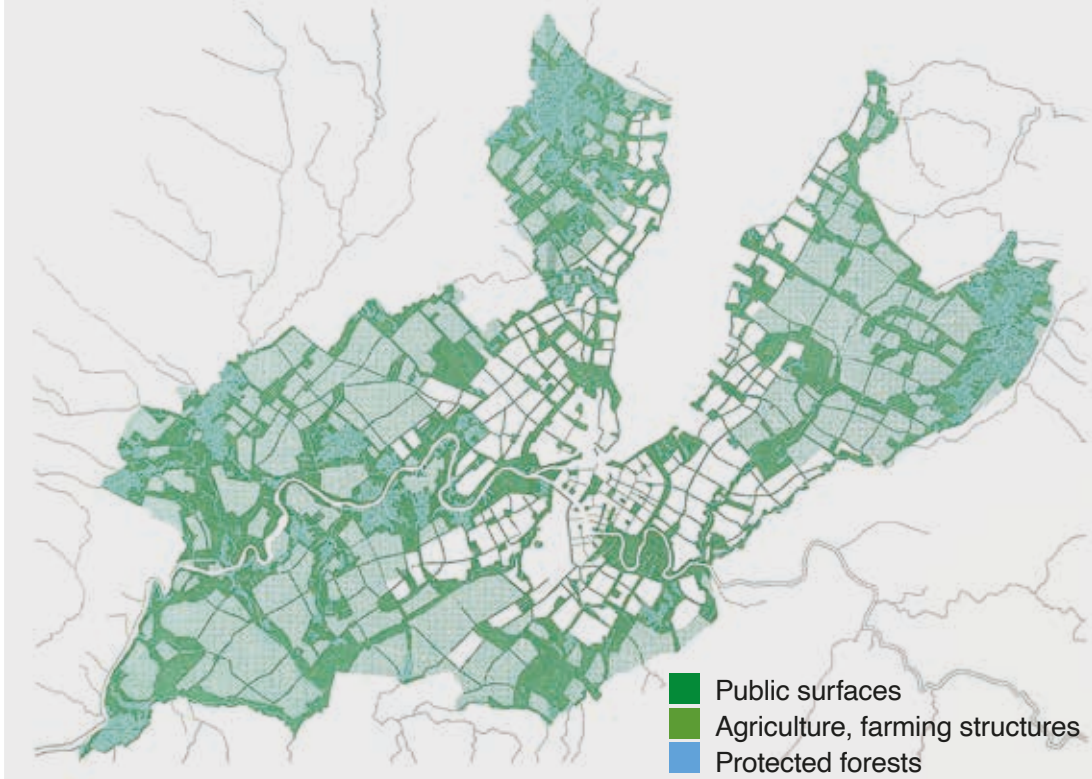
Cité Naturelle preserves nature areas and wildlife in the metropolitan region.

Cité Naturelle allows for the use of natural resources such as wood and drinking water.

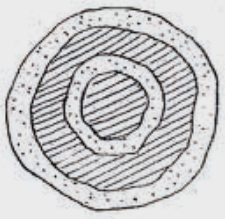
Cité Naturelle has the strongest design potential in the face of climate crisis and the process of Ecological Transition.

Geneva civitas: carte de Micheli du Crest 1722, reproduite au point de vue des cultures

Historic landscape elements of the extended Geneva territory.
Fields interspersed by bushes and trees, countryside roads lined by tree alleys, watchtowers, and watermills.

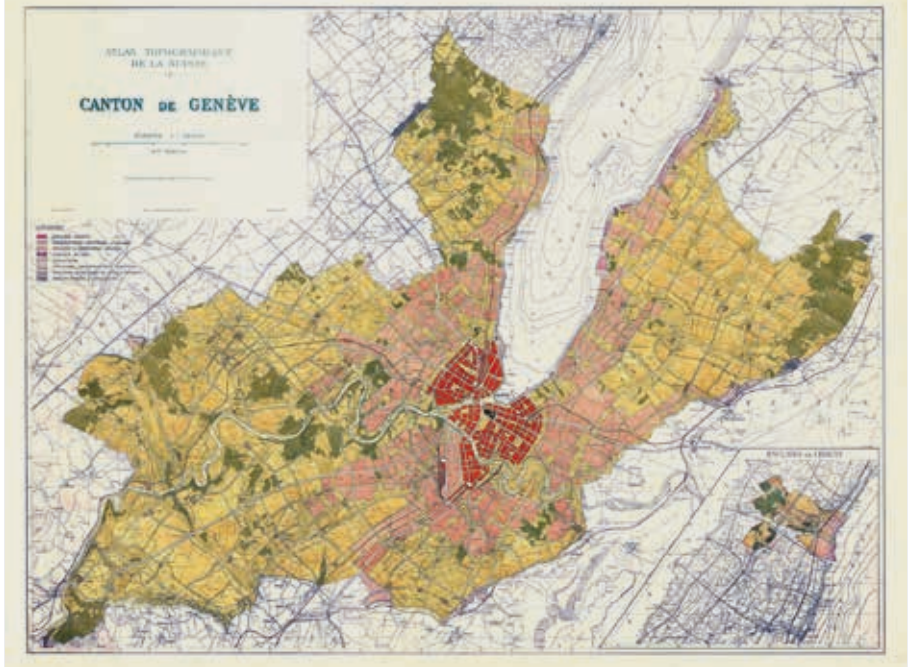


Current state
The parks are randomly scattered across the city.

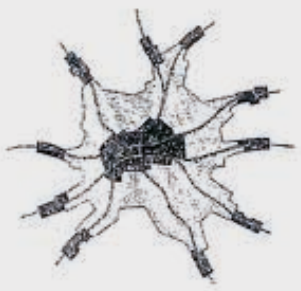


One proposition…
Circular systematic distribution of the parks.

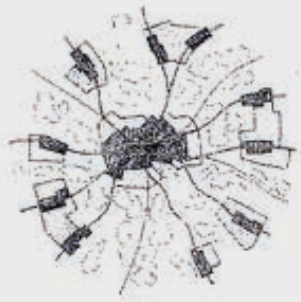
…And another
Radial systematic distribution of the parks.



Urban district
Colonies of isolated dwellings
Crops, agricultural construction
Public surfaces/ to be classified
Woodlands to be conserved
Main roads

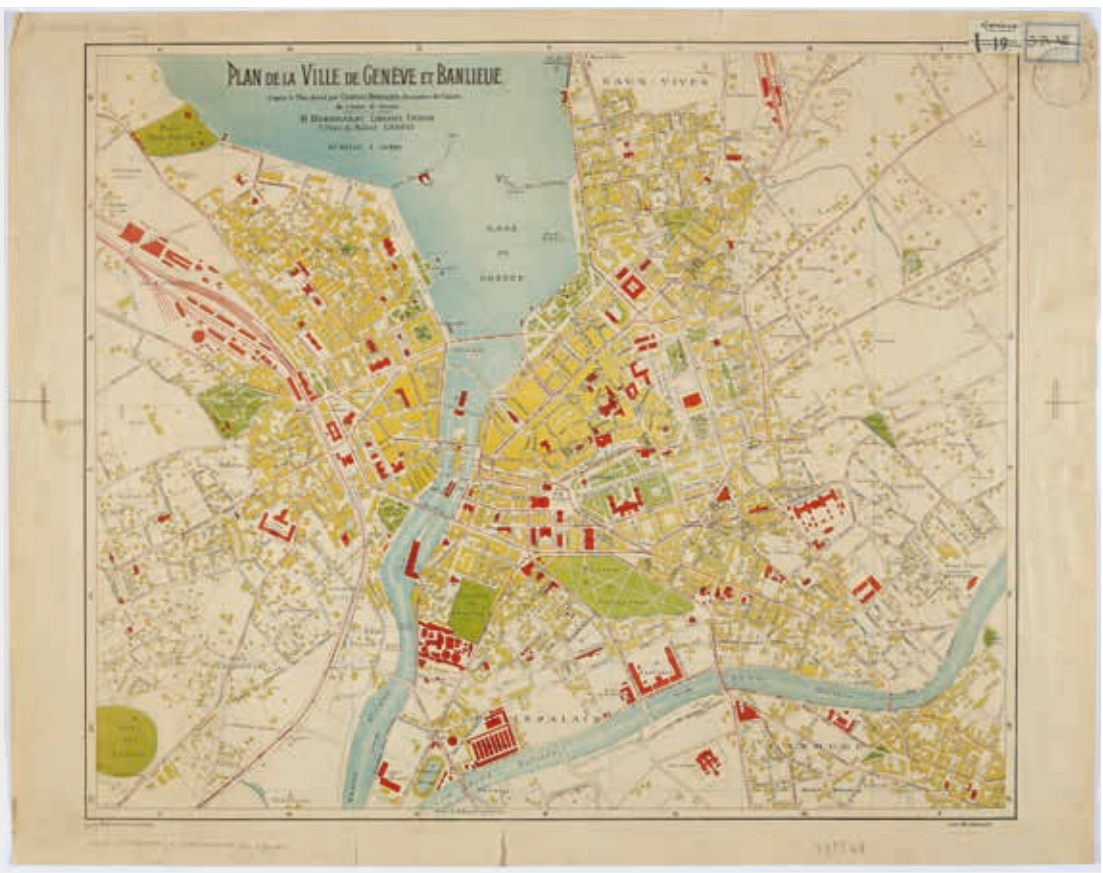


Bad
Uninterrupted extension of the city to suburban communes forming an “oil spill”



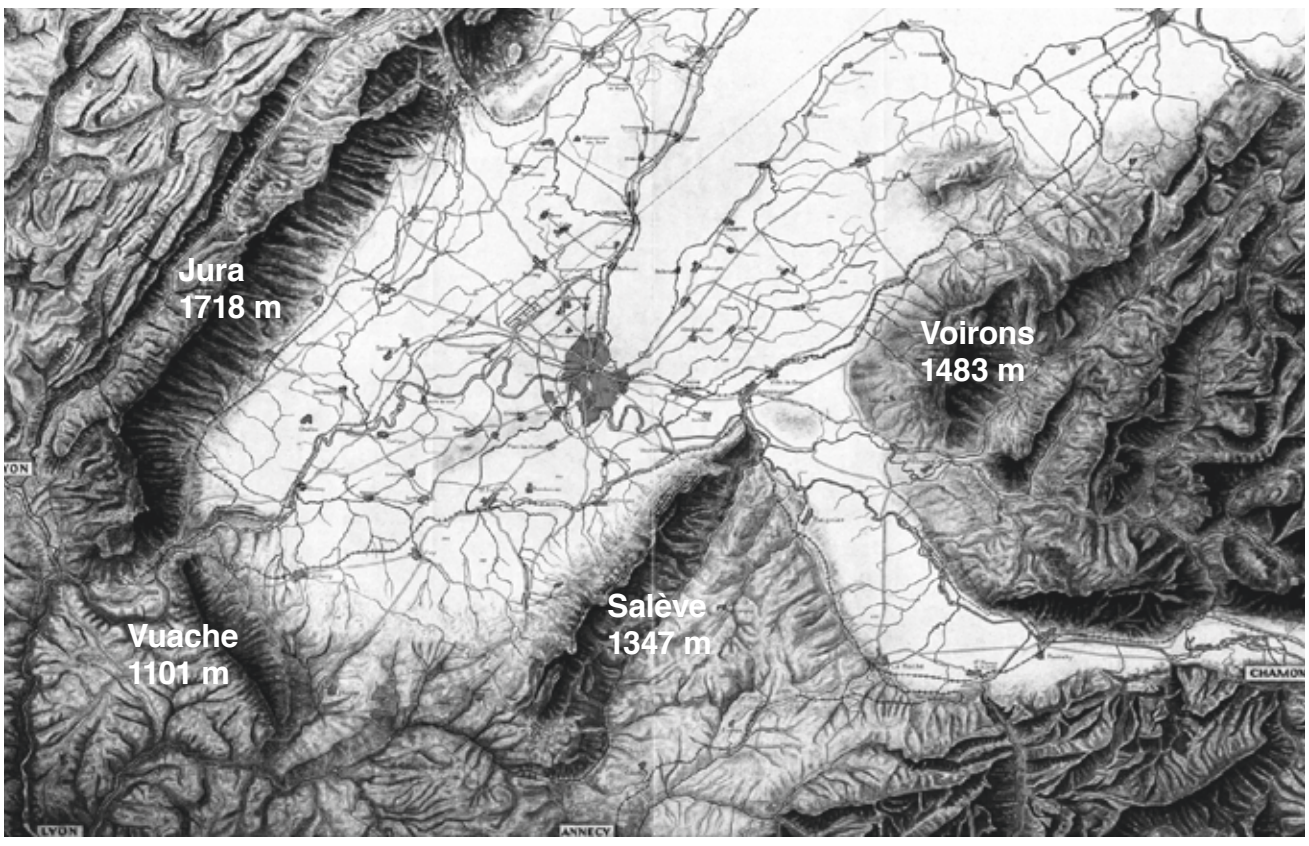
Good
Decentralized extension allowing the penetration of greenery

Maurice Braillard, Cantonal Plan for Geneva, 1935-36



Plan de la ville de Genève et banlieue
Bobillier, Charles
Genève : R. Burkhardt, [1909?]

Historic green networks connecting the countryside and the City.
Since 1909 Geneva was titled “Cité des Parc”, emphasizing public spaces in the city fabric. In 1935, “The Cantonal Plan“ declared new open public surfaces, agriculture land, and forests as part of a green network.

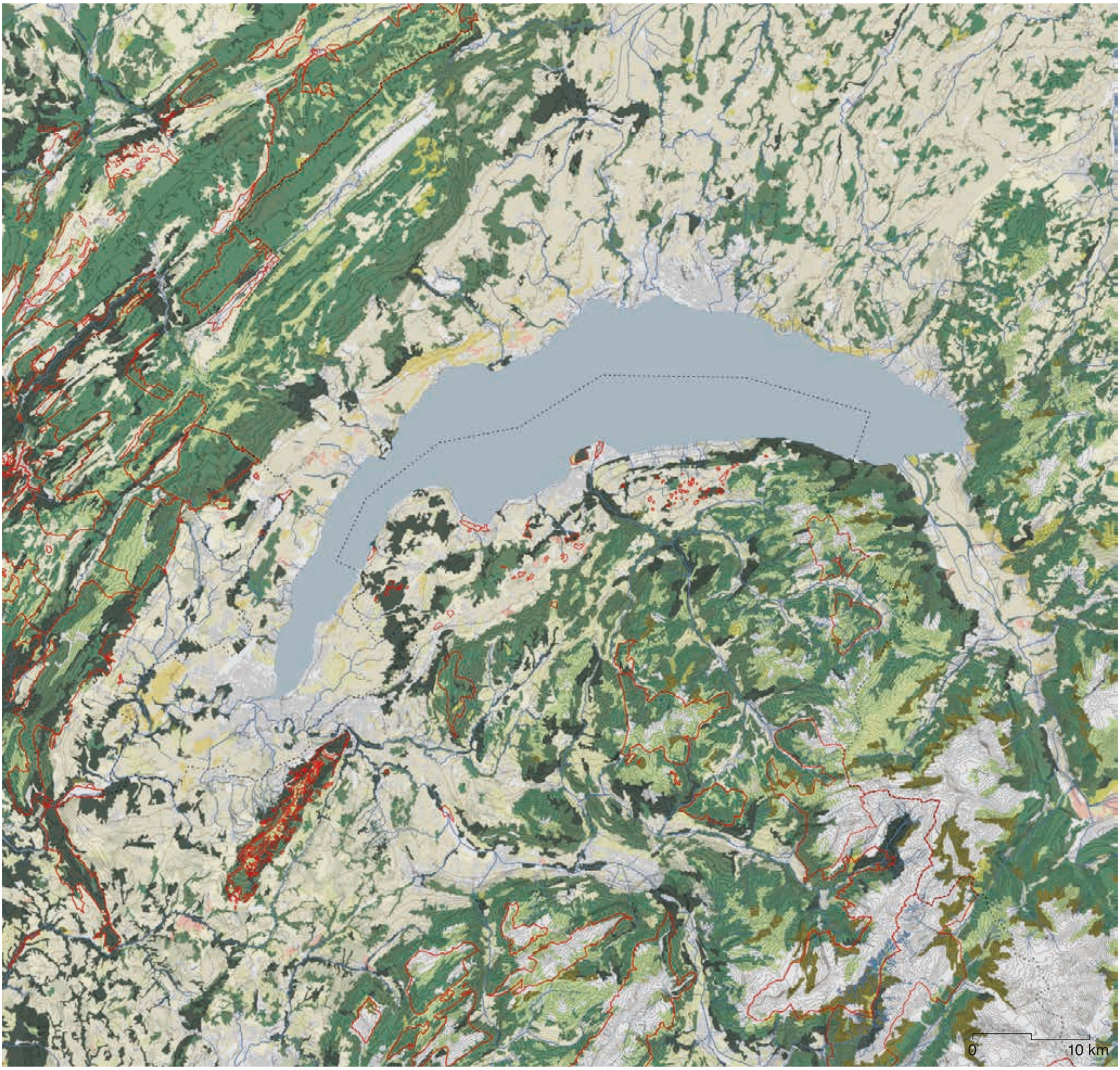


View from Salève Mountain towards Geneva, 2019.
Located at its very heart at 373m above sea level, Geneva is surrounded by a panorama formed by Le Jura, Le Salève, Le Vuache, Le Mont de Sion, Les Voirons and Le Môle, all on French territory.

The Cuvette Genevoise. A nestled bowl surrounded by mountain ranges whose gentle slopes level off towards the basin of the Lac Leman conveys an intuitive sense of unity. While national borders often follow natural circumstances, the “Cuvette Genevoise” is divided into several political units of France and Switzerland.

Plan and panorama of Lac Léman, drawn from the steam boat le Guillaume Tell, Lith de H. Brunet et C., Lyon, 1824
Henri Mallet, Carte Géographique de la Suisse romande, 1781

Region Lemanique. Lac Léman and the surrounding mountain peaks form an inner and outer horizon and supply boundless landscape imaginaries to the whole region of the Léman; a collective regional identity bound to the landscape and countryside attributes.

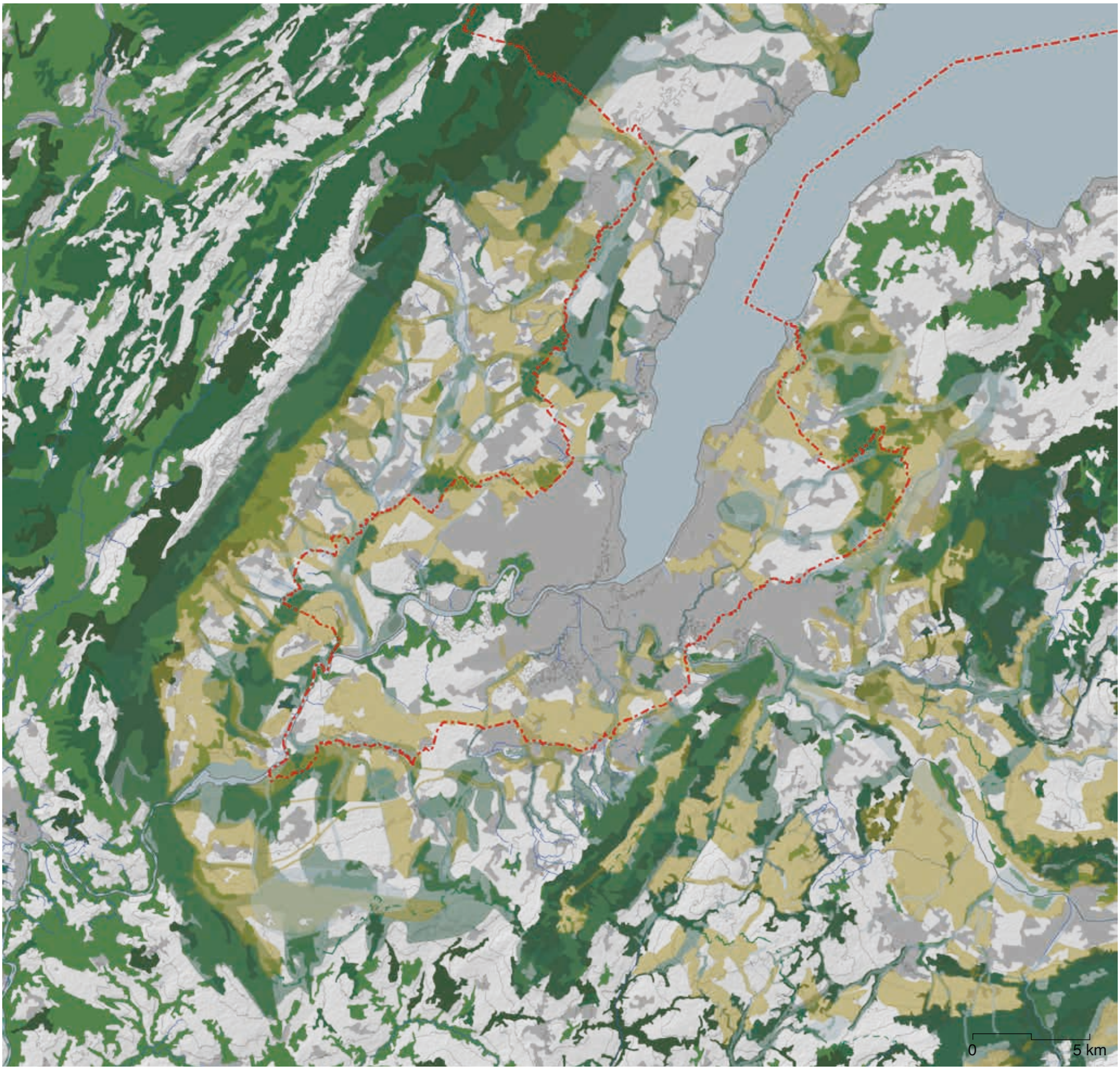


Protected Areas
Natura 2000 Sites*

* Natura 2000 is a European network of sites designated to protect core areas for rare and threatened species and habitats.

Changing views of nature and conservation. Over the past 50 years, the prevailing view of conservation has changed several times. For example a shift in emphasis to ecosystem.
Source: Département du Territoire (DT) Office cantonal de l'agriculture et de la nature (OCAN), 2018.

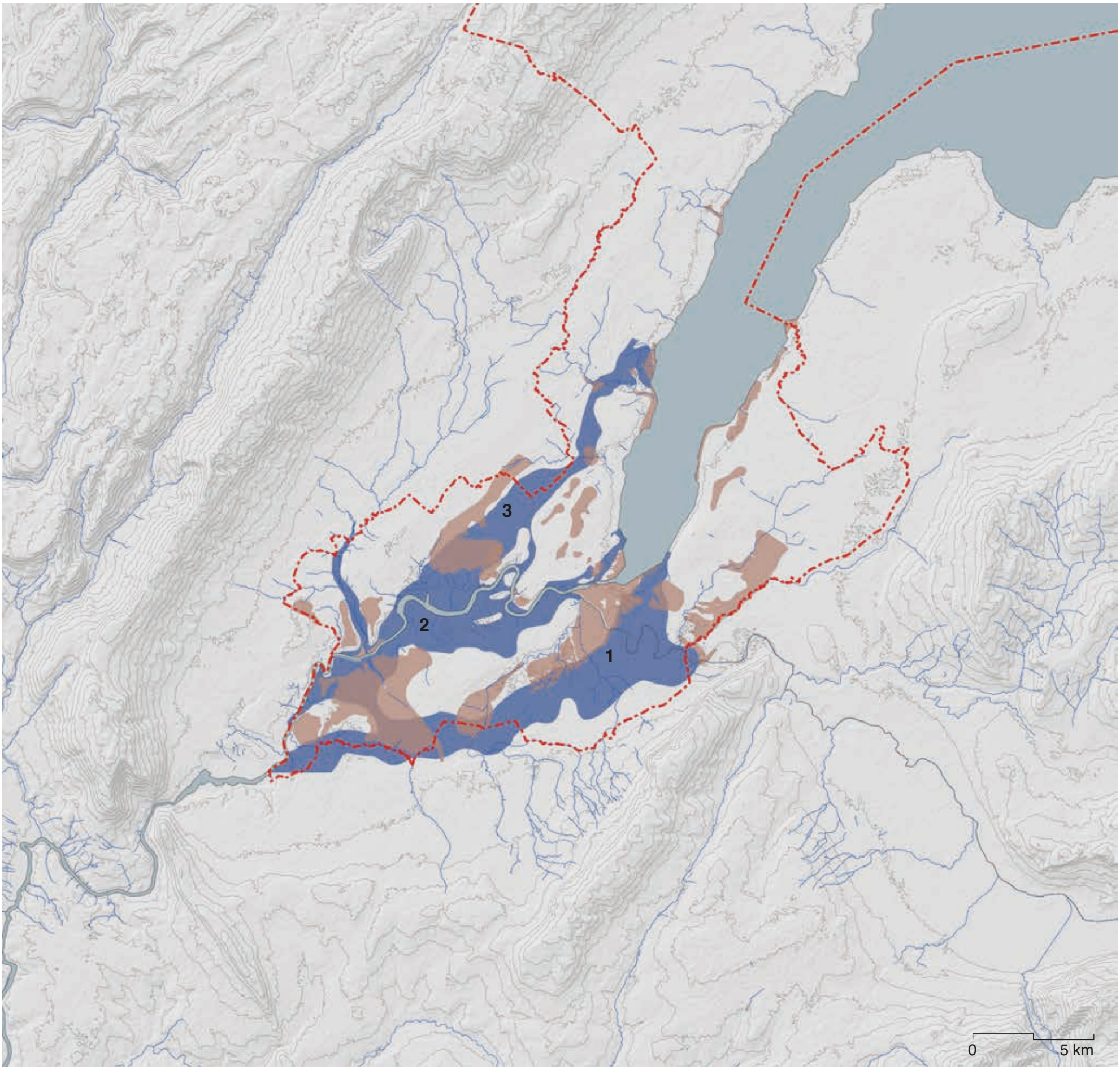
Fragmented protection versus integration and expansion. In order to preserve nature and wildlife biodiversity, it needs to be anchored and strengthened as territorial capital as such. A resilient biodiversity, e.g... one that allows the territory to continue to function and develop despite what "falls on it", is an essential prerequisite for absorbing the effects of climate change. Initiating the Ecological Transition to a world implies a nature that does not need to be protected.



SITG Corridors biologique, Contrats corridors, Cahiers thématiques, Grand Genève

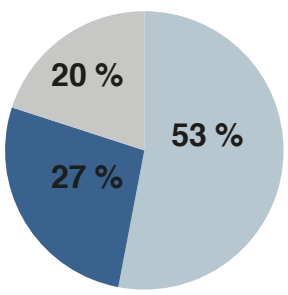
- **Built fabric**
- **Forest**
- **Forestal corridor**
- **Aquatic corridor**
- **Agricultural corridor**

Cross-Border network of green and blue corridors. The Ecological continuum of Grand Genève encompass all the environments used by wildlife during their movements. These networks may be aquatic, forestal or agricultural. In addition, Geneva is characterised by a large number of protected areas, ranging from regional, national to international importance.



Sources of drinking water
Grand Genève, Chiffres Clefs, 2014

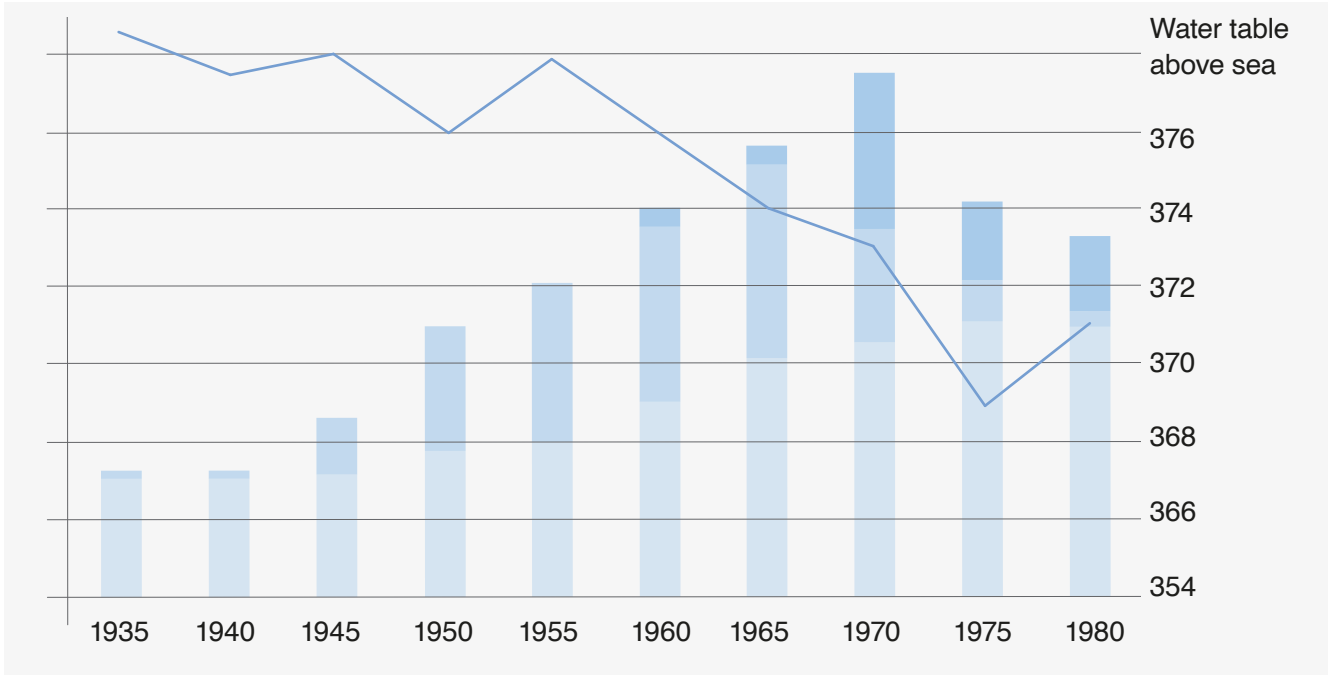
53 %	Lac Leman
27 %	Groundwater
20 %	Sources

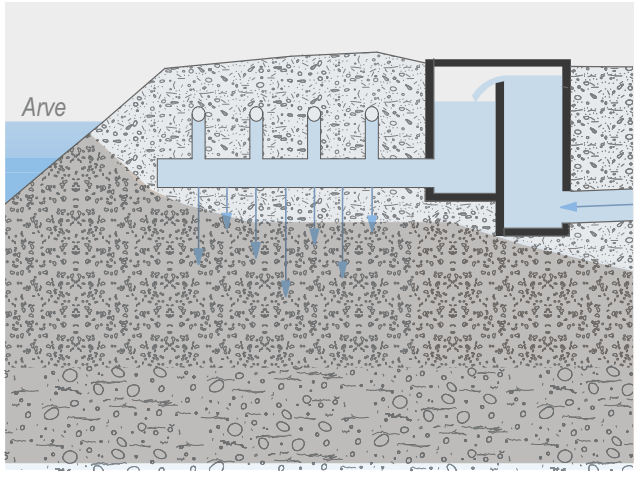


Permanent aquifers (Nappe)
1. Nappe du Genevois
2. Nappe du Rhône
3. Nappe de Montleury

Surface and temporary water

Drinking water. The origins of Geneva's underground glacial deposits date back to the retreat of the Rhone Glacier 20000 years ago. These water-saturated, porous and permeable rocks, sands and gravel, known as aquifers, the reservoirs in which water can accumulate and which allow groundwater exploitation. Some of them are used as cross-border drinking water resources. They provide about 27% of the drinking water distributed in Grand Geneva, while 53% is pumped from the lake.





Berges de Vessy. Formerly a water pumping plant this site has been rehabilitated and became part of Geneva's industrial heritage.

Water demand vs. resources
Grand Genève, Chiffres Clefs, 2014

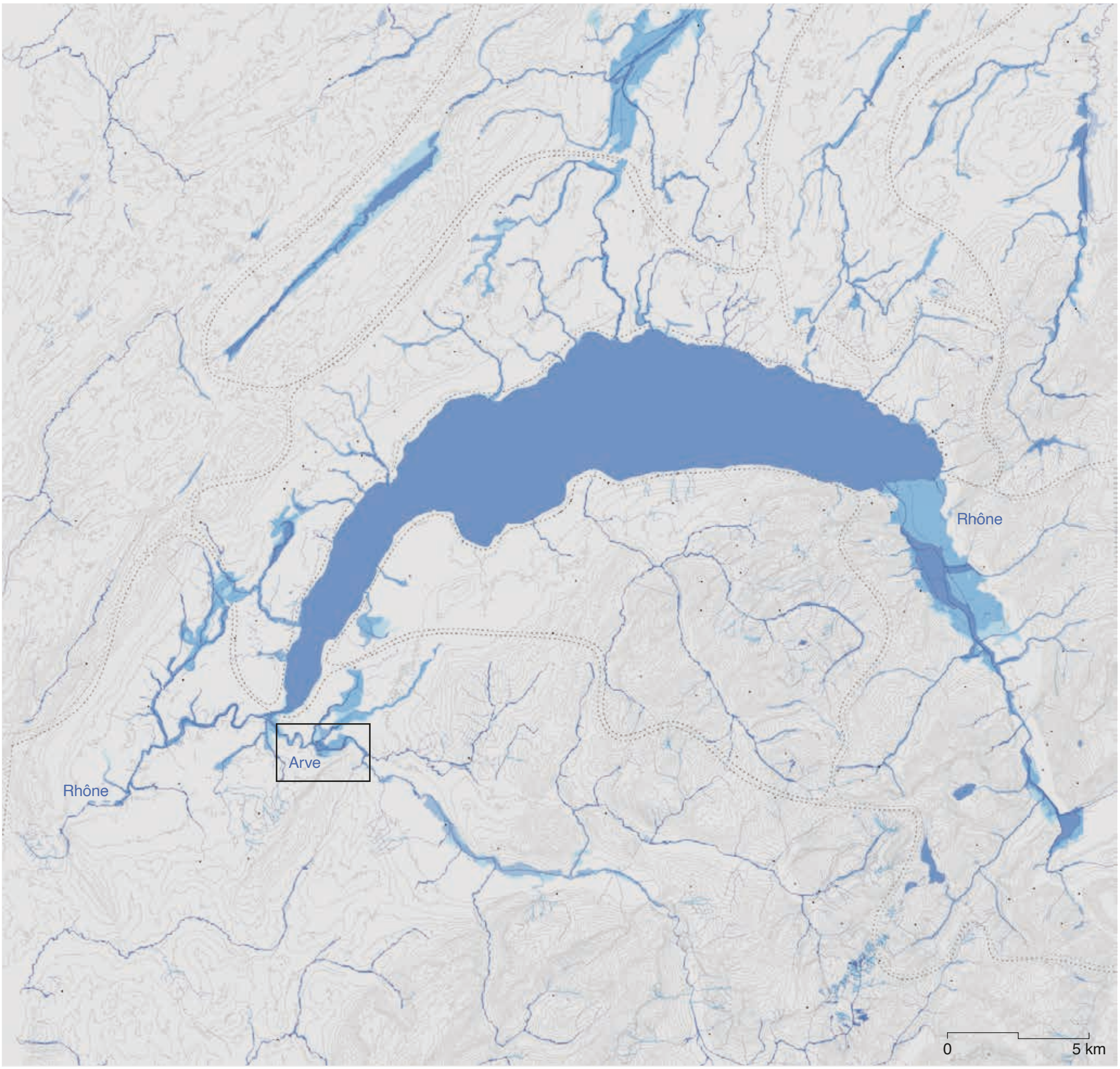
Environmental management of water resources. Due to rising drinking water demands and simultaneous sinking water levels since the 1960s, the aquifer gets artificially replenished to ensure clean drinking water.

0 5 km

Soil characteristics of Grand Genève

- Glacio-lacustrine deposits
- Lacustrine deposits
- Sandstone and marl
- Limestone
- Massive limestone
- Oolitic limestones
- Clays and flat silts
- Moraines
- Alluvial valley ground
- Withdrawal Alluvium

Geology. In contrast to the Rhone valley, whose soil has a predominantly porous structure, the Arve valley, with the exception of the alluvial zone, is largely covered with clay. The geological clay deposits contain varying amounts of water, which are trapped in a mineral structure that does not allow natural percolation. However, they provide excellent protection for the underlying groundwater table. The negative effect of clay soils, on the other hand, is that they render the role of precipitation useless for the natural recharge of the groundwater level.

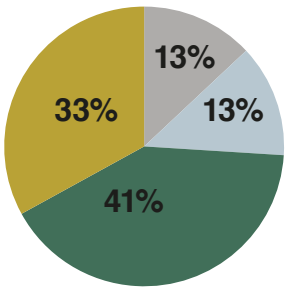


Flood 50 year scenario
Flood 100 year scenario
Flood 250 year scenario
Flood 500 year scenario

Flooding and soil porosity. The area around Lac Léman has a very dense net of water streams. Large amounts of water from the watershed of the river Rhône in Valais cause severe flooding at its estuary. The floodable areas are mainly used as agricultural land, and projected governmental measures are causing distress among the inhabitants. Geneva itself is directly affected by the flooding from the river Arve.

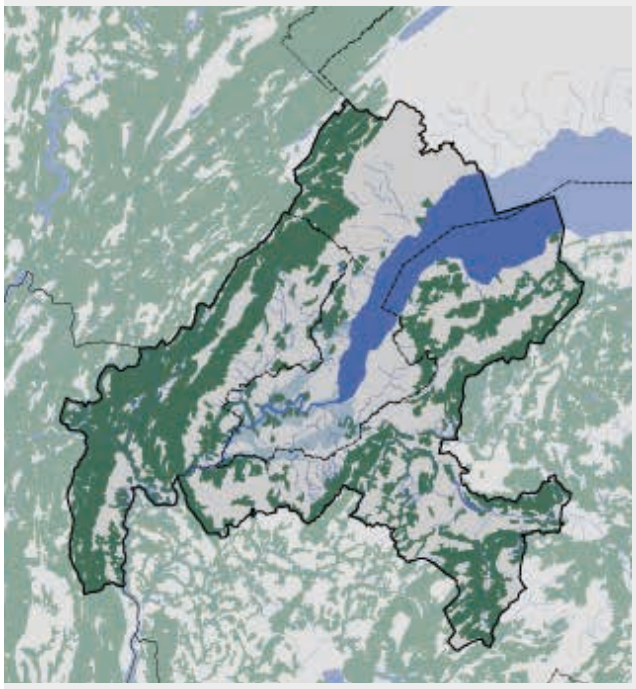
Land use of Grand Genève
Chiffres clefs, Grand Genève, 2014

41 %	**Forest**
33 %	**Agriculture**
13 %	**Water**
13 %	**Built Area**



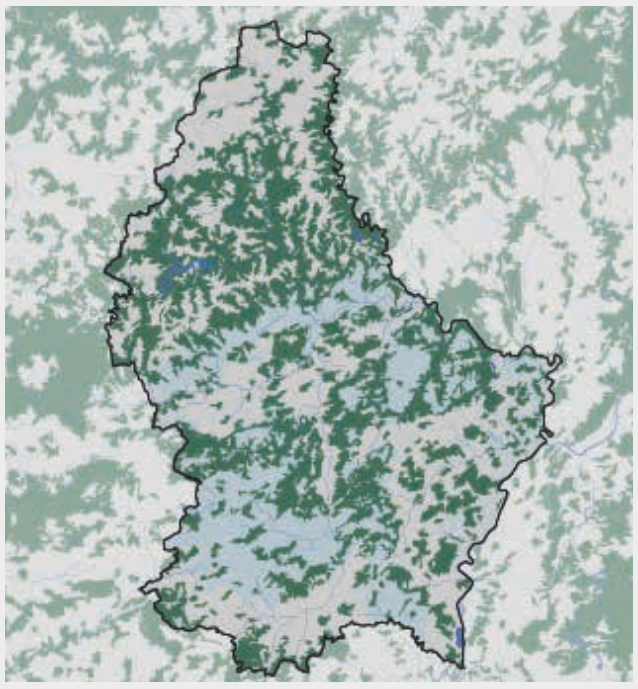
Cité Naturelle in Surfaces. Natural and agricultural areas occupy the vast majority of the 2,000 km^2 of the metropolitan area.

Grand Genève



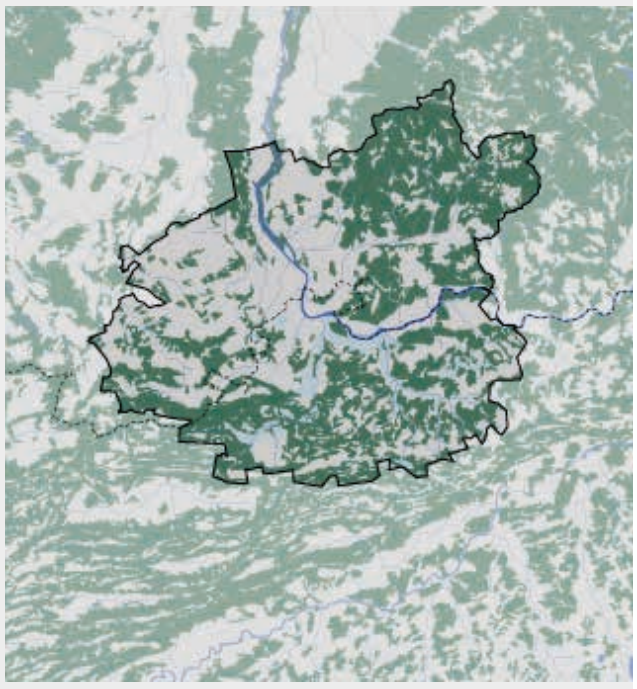
Grand Genève
41% Forest
13% Water

Luxembourg



Luxembourg
33,5 % Forest
0.6% Water

Basel



Basel
x% Forest
x% Water

Sources: Grand Genève, Chiffres Clés Singapore, sciencedirect.com Metropole Grand Paris SCOT synthese diagnostitic provisoire, 2018 statistiques.public.lu

Cité Naturelle in Surfaces. Comparing amounts of forest and water land cover in metropolitan regions.

5 Values

Habitats and Biological continuity. In order to maintain or even increase the freedom of movement of animals, large contiguous natural areas and existing connections must be maintained and, where necessary, supported by structural measures such as artificial wildlife passages.

Late cutting. As one of the many local ecological engineering practices it effects to enrich nature and wildlife. Further effects are restoration and rehabilitation of diverse local and regional species in the region.

I Cité Naturelle
Agenda for Actions: Biodiversity and Continuity

1. Ensure biological continuity between lower altitudes of urban density and high countryside and forest lands through preservation and creation of natural corridors. Integrate them into the Cross-Border spatial planning employing legal tools such as corridor contracts.

2. Preserve large heterogeneous natural areas. Made up of agricultural fields, forests, nature reserves, and open water surfaces, these broad areas represent a key element of the territory's biodiversity wealth, both quantitatively and qualitatively.

3. Promote ecological engineering practices of nature areas at the local level.
Examples are late cutting, mowing export, reduction of obstacles for wildlife, construction of permeable structures (parking lots, roofs) and the creation of small biotopes likes ponds or meadows.

Unsealing Land. After the railway operations at Tempelhof discontinued in 1952, nature has gradually reclaimed the area. Valuable dry grassland, high herb fields and untouched forest emerged from the railway desert. Today, large parts of the site are declared as nature conservation area

Carbon stockage. Soil is the second largest active carbon store on our planet. Its organic matter, a mixture of residues of plants, animals and organisms, contains about 60% carbon and is a decisive factor for the influence of soil on the global carbon cycle.

I Cité Naturelle
Agenda for Actions: Soils and Open Land

1. Preserve soil as a resource.
Promote soil-conservation and preservation of robust, healthy lands as a resource for flora and fauna, a base for life.

2. Improve cross-border soil management.
To better address soil contamination by wind and water erosion, compaction by heavy equipment, sealing due to construction and urbanisation, salinization due to irrigation practices, acidification due to inappropriate use of fertilisers and soil contamination due to certain industrial and agricultural activities.

3. Ensure basic function of soil as CO_2 storage.
Open land has a positive and decisive role in efforts to limit climate change.
By returning biomass to the ground, soil tillage and utilization of harvest residues, and proper water management erosion by water and wind should be avoided.
Soils with high carbon content, namely peat soils, flat moor, high-carbon pastures and forests need to be protected as CO_2 storage. Practices such as ploughing, the use of mineral fertilizers, organic soil drainage, or deforestation lead to the loss of stored carbon. Sustainable and ecological practices in agriculture and forestry will help to maintain and increase the amount of sequestered carbon. This can/will harness the soils considerable potential for climate change mitigation.

Renaturing streams and canals. The project of the river Aïre creates a multifunctional landscape by allowing a previously channelled watercourse to regain its freedom in a peri-urban and territorial context. The riverbed has created a valuable biotope for plants and animals as well as a recreational area appreciated by the population.

Green and Blue infrastructures. The Plateau de Gavot, protected as “wetland zone” by the Ramsar Convention, represents the heart of the Évian water impluvium. Water collected from the Alps slowly filter and purify via the multiple geological strata, starting a process that fifteen years later results in natural mineral water. In order to protect the watersheds from the intrusion of pollutants, a special set of rules for agricultural cultivation was established.

I Cité Naturelle
Agenda for Actions: Water

1. Regional monitoring and sustainable use of vital groundwater resources need to go hand in hand with reduced individual consumption and waste of water. The management of water resources is a matter of the Ecological Region.

2. Secure drinking water supply for the Metropolis through natural resources.
The main goal is to reduce and replace artificial and technical support infrastructures with natural green and blue infrastructures and landscaping.

3. Change from channelled and sealed water surfaces to open and natural ones for more nature experience and for cooling purposes. Equally, reintroduce porous surfaces, especially along the rivers and aquifers to reduce increasing flood events and combat impoverishment of soils and extreme hydrological cycles.

4. Collect water run-off in sealed neighbourhoods by integrating “blue and green areas” in the urban fabric. Here parts of the excess water during heavy rainfall can be stored temporarily, which contributes to the overall cooling of dense areas, and prevents urban heat islands.

5. Use Agricultural land in the aquatic area only extensively. The water area should remain mostly free of new facilities.

Productive Forest. In addition to their social, biological and protective functions, forests provide a valuable resource of indigenous wood and promote its rational use as a raw material for construction timber and other economic products as well as an energy source.

Mixed forest. To help forests adapt to changing climatic conditions, forest rejuvenation aims for a wider range of sustainable tree species. Juveniles are wrapped in sheaths to protect them against game damage.

I Cité Naturelle
Agenda for Actions: Forest

1. Introduce territorial future oriented “adaptive management” in forestry.
Develope dequate climate scenarios, altitudinal zone models, habitat suitability and water availability against increasing tree death —especially spruce death by drought and the bark beetle.

2. Re-establish healthy and productive woodlands.
Forestry practices needs to shift from pure afforestation by monocultural woods to gradual replanting of specific tree species with mixed stands (eg. spruce, fir trees, forest pines). This will strengthens the forest’s resilience against damaging climate change effects.

3. Transition from the steady growth of the entire forest area towards an integration of essential stages of wood development: from current 3,4% to 13% light forests and 9,6% to 20% natural forests.

4. Increase the carbon storage in forest soil through species selection, stock management (‘gentle collection’), maintenance and weed control, leaving harvest residues, fire management, protection against disturbances, and pest events.

5. Preserve species diversity in the face of the deforestation of alpine pastures. Both loss of scrub land and intensification of forest cover lead to loss of species.

How much CO_2 savings would it bring if all inhabitants of Grand Genève would switch to an EAT-Lancet diet?

About 492kt CO_2eq/year could be saved, which translates to 24% less carbon emission.

What would be the consequences for the total agricultural output if all intensive and industrial agriculture were transformed into organic agriculture?

Moving from intensive to organic production induces a reduction of 12% in yield for cash crops and 9% for feed crops. 8500 ha of additional agricultural surface would be needed to keep the current production constant.

Paraglider in the fields and admits glasshouses, Commune Bardonnex, 2018

II Cité Agricole

Cité Agricole already exists but its potentials should be realised in full.

Cité Agricole could allow for increased food self-sufficiency for Grand Genève above the existing 48%.

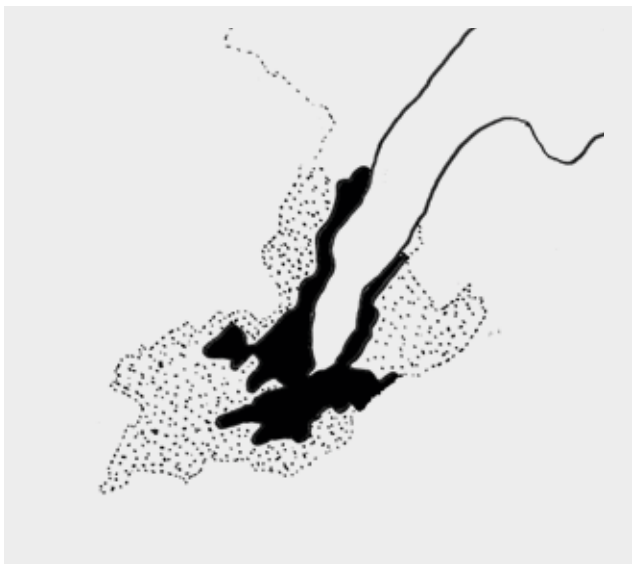
Cité Agricole chould allow for social and cultural performance of agriculture land by incorporating recreation, education and new places for work and living.

Cité Agricole should be based on the principles of Agro-Ecology.

Agricultural production of Canton Geneva

56 %	Field crops
24 %	Grassland
12.5 %	Viticulture
3.1 %	Fallow land
2.1 %	Vegetables
1.4 %	Diverse
0.8 %	Arboriculture
0.1 %	Horticulture

0 5 km



Canton Geneva,
the City and its green belt

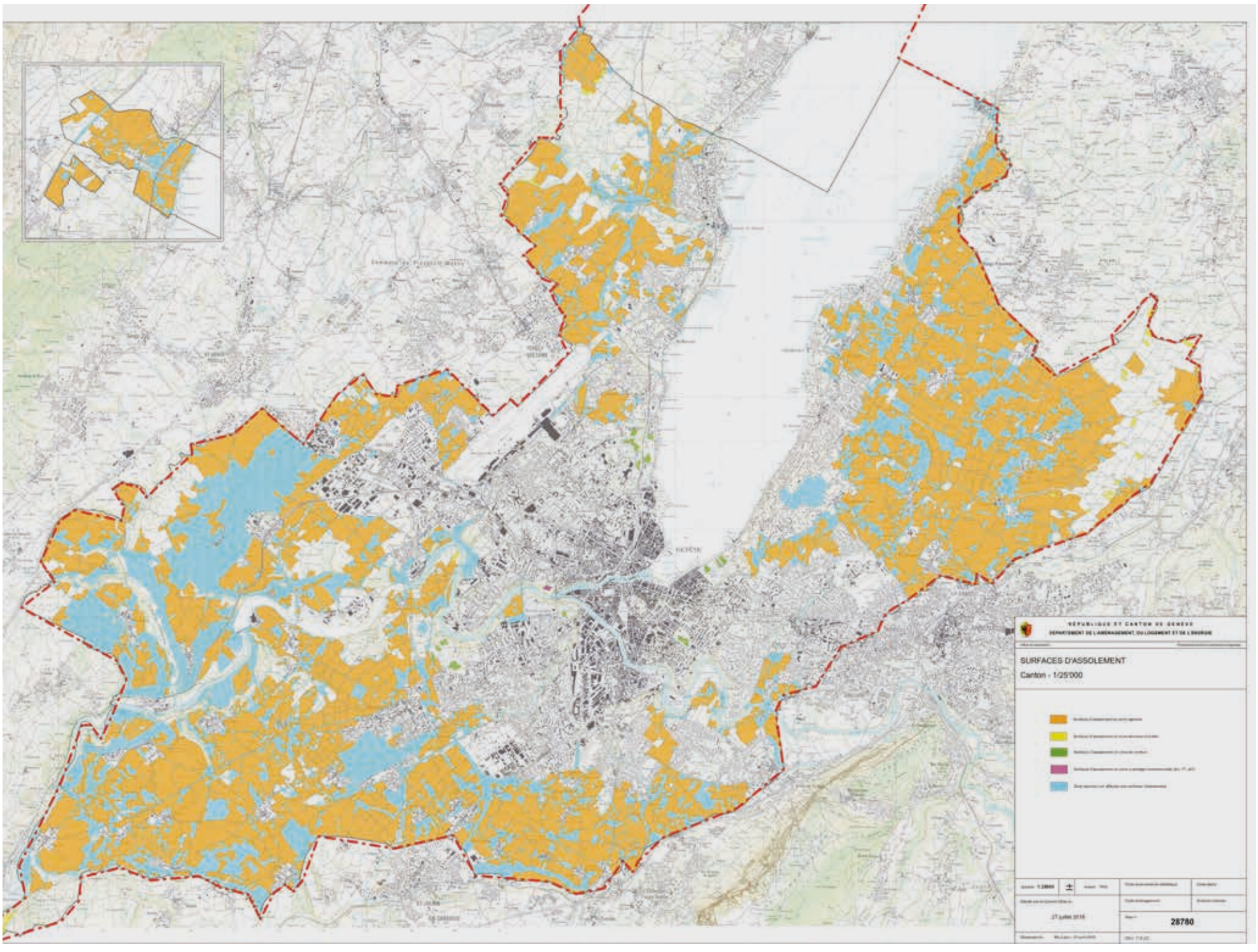
Canton Geneva
28200 ha total Surface
10050 ha of Agricultural Land
38% SAU/ Agriculture Land Use*
***SAU - Surface agricole utile: land used for crop production, without forests and mountain pastures.**

- Agricultural land
- Agricultural land interspersed with natural areas
- Fruit tree orchards
- Vineyards
- Complex cultivation patterns
- Pastures

20 % Self-Sufficiency rate

500 000 inhabitants
313 458 MF/year
Food needs
63 552 MF/year
Food production

Swiss agriculture. Geneva is already today an agricultural city. One third of the cantonal surface is dedicated to agricultural productions and it is about 20% self-sufficient in terms of food production.



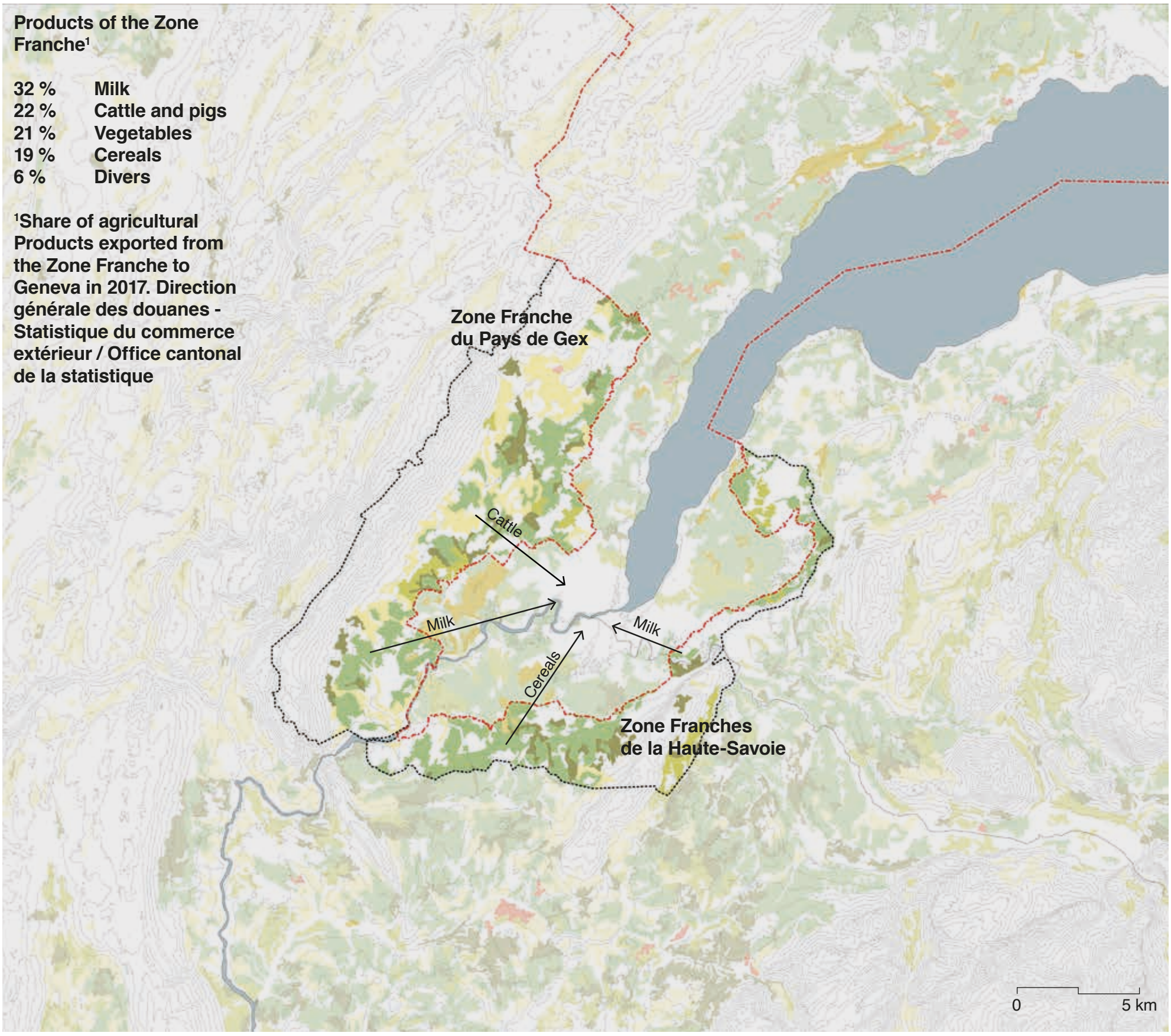
Protected Agriculture land of Surface d‘Assolement (SDA), Canton Geneva

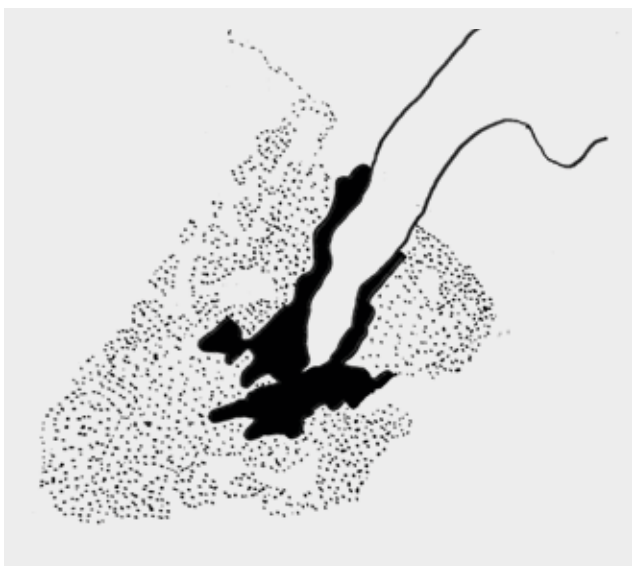
Agriculture protected by Swiss Federal Law: Surface d’Assolement.
In 1992, 40 years after the inauguration of the cantonal protection law, the federal spatial planning unit introduced a Swiss-wide quota, requiring each canton to protect suitable land for crop rotation (Surfaces d’assolement agricole, SDA). Accordingly, almost all of Geneva’s agricultural land was ‘frozen’ for urban development. It has been estimated that by 2023 the city won’t be able to grow anymore according to the current plans.

Products of the Zone Franche[1]

32 %	Milk
22 %	Cattle and pigs
21 %	Vegetables
19 %	Cereals
6 %	Divers

[1]Share of agricultural Products exported from the Zone Franche to Geneva in 2017. Direction générale des douanes - Statistique du commerce extérieur / Office cantonal de la statistique





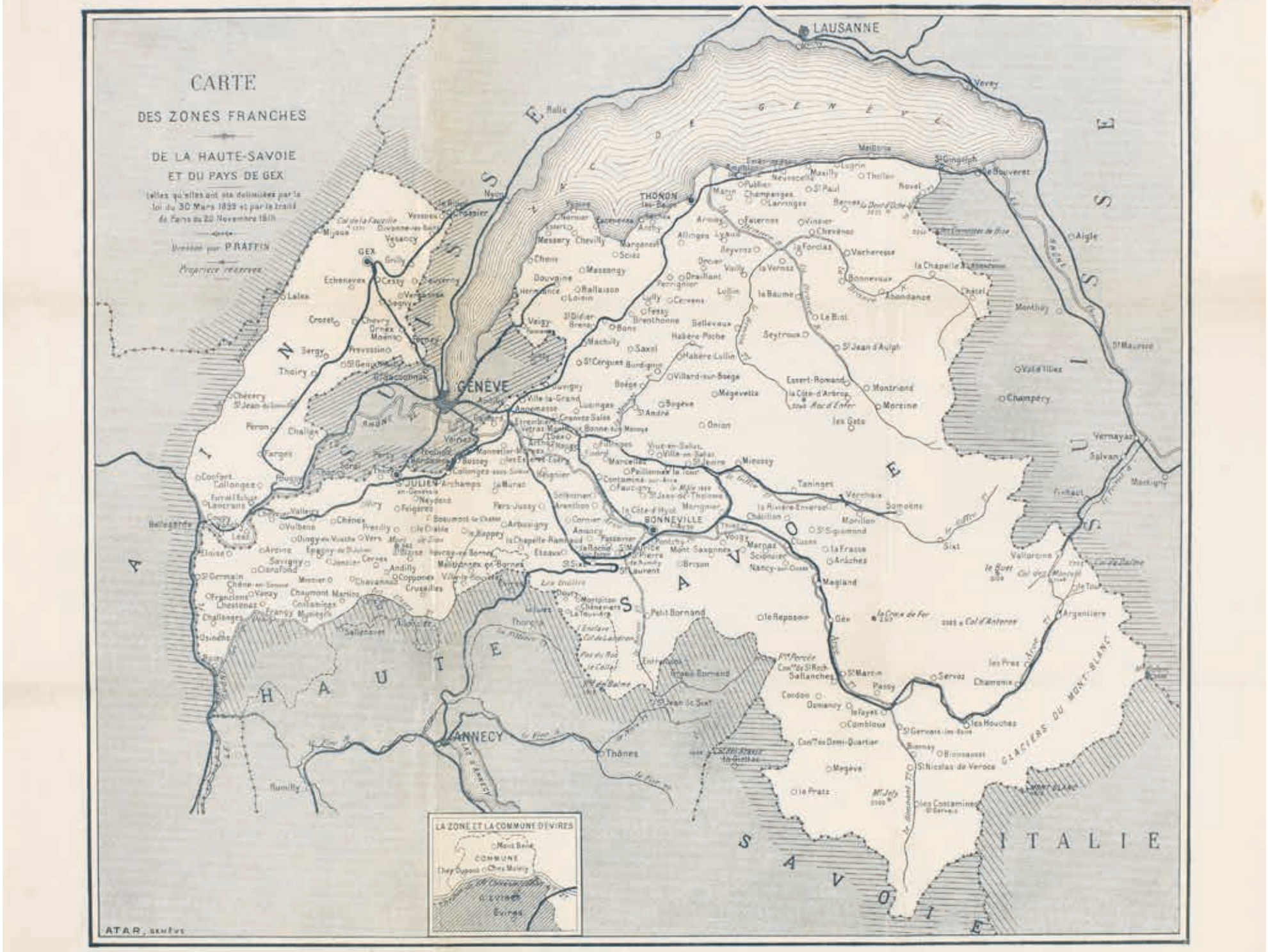
Zones Franches
54.000 ha total Surface
18.600 ha of Agricultural Land
34% SAU/ Agriculture Land Use

Agricultural land
Agricultural land interspersed with natural areas
Fruit tree orchards
Vineyards
Complex cultivation patterns
Pastures

Geneva and the Zone Franche, extended agrarian territory

French agriculture. Separated from the French agrarian regions by political decisions in 1815, the free trade zone guaranteed Geneva's supply with agricultural products. As territorial extension the zone grants agricultural exports to Switzerland in a privileged, but authoritarian regime. While imports of agricultural products into Geneva are subject to quantitative restrictions and rigorous requirements, farmers benefit from the possibility to sell their local products on Swiss market at higher prices.

~~Genève~~
~~V .42.~~



ANNEXE DE L'ANNUAIRE COMMERCIAL DE LA ZONE FRANCHE (ZONE-COMMERCE) — RAFFIN & Cie, ÉDITEURS-IMPRIMEURS, THONON-LES-BAINS (Hte-SAVOIE)

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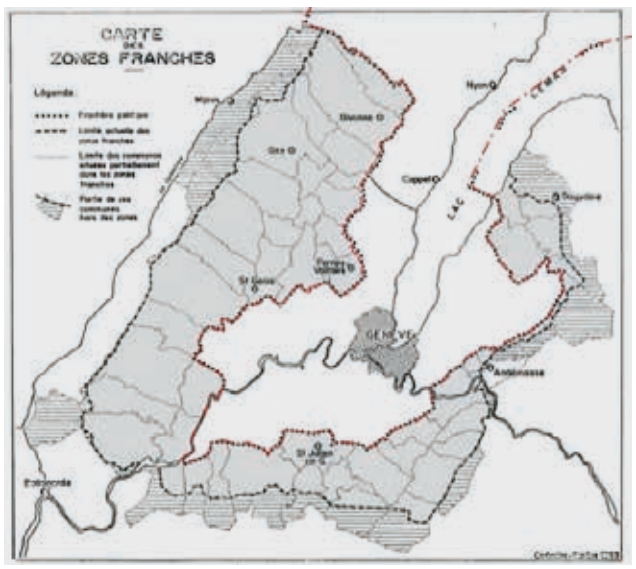


Map Zones Franches (with the Grande Zone Sarde 1860 - 1919) as delimited by the Law of 30 March 1899 and by the Treaty of Paris of 20 November 1815, P. Rafin

Map Zones Franches with adapted borders since 1939 until today

French agriculture. Adapting to the city's demands. While the rhythm of rural life in the French villages in the zone franches was determined by natural seasons and historically grown social structures, the agricultural production soon adapted to the city's requirements; financial security outweighed the submission to Swiss regulations and industrialized economic cycles.

5 Values

Château Voltaire, engraving from Baron Zurlauben's topography , 1780.
Villars II, 1950, and Cité-jardin d'Aïre, 1920.
Jardin de Cocagne, Geneva, 2009.

Regional History of social- agricultural innovation. Benefiting from many international influences, Geneva induced innovative and socially integrative forms of agriculture since early times. In his spirit «il faut cultiver notre jardin», Voltaire started his permaculture project already in the 18th century. In 1920 the 'Cité-Jardin d'Aïre', a project of 500 low-cost housing units with individual vegetable gardens based on the model of garden cities, launched the idea of the garden city in Geneva.

Swiss self-sufficiency. The plan Wahlen included the use of representative squares into cultivation area. Potatoes on Bellevueplatz in Zurich, 1943. Urban agriculture at Bern Bundesplatz, 1941.Bean harvest on Chauvet Street Bern, 1943.

Urban agriculture and food self-sufficiency. The cultivation plan was an attempt to promote agricultural production and an increase in yield to secure the food supply and to convert Switzerland to self-sufficiency during the Second World War.

An historical agricultural practice defining the landscape. Campagne Genevoise, J. Chenevière, Photographies M-F. Chiffelle, 1961.

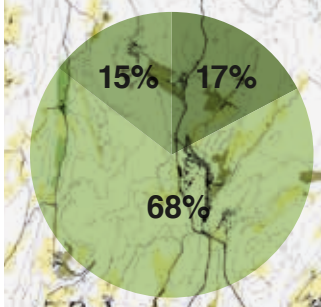
Bocage Genevois. A characteristic trait of the Campagne Genevoise since the Middle Ages, made from mixed hedges punctuated with mostly oak or fruit trees. Originally a productive agricultural structure, which delineated property and functionally enclosed fields, the Bocage Genevois has recently been reconsidered for its ecological properties.

Today the agriculture surface is largely cleared out of bocage and hard edges between dense urban fabric and productive areas dominate the landscape, 2019.

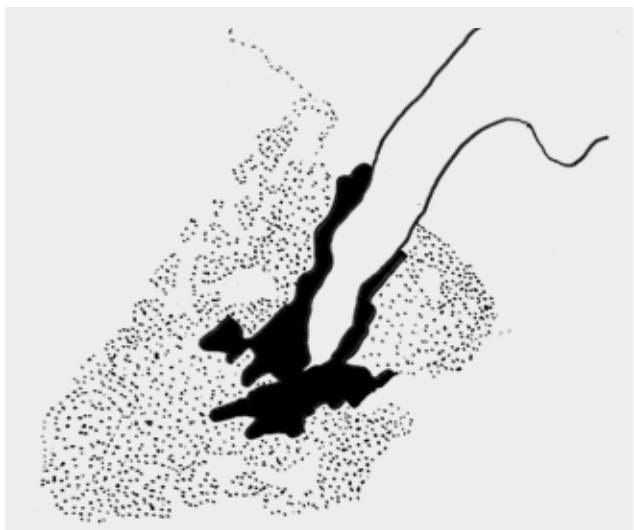
The former green belt encompassed by rapid urbanisation

Urban Agriculture. The urban figure of the Grand Genève is constantly growing together around the former green belt of Geneva. As a result, agricultural areas are not only moving spatially into the centre of the metropolis, but are increasingly assuming hybrid functions of inner-city open spaces.

Grand Genève
200.000 ha total Surface
70.000 ha of Agricultural Land



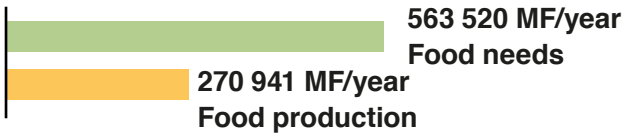
Distribution of Agriculture
17% in Canton Geneva
68% Genevois Francais
15% in District Nyon



Grand Genève
200.000 ha total Surface
70.000 ha of Agricultural Land
1000000 inhabitants
(56.545 ha SAU, Surface Agricole Utile)

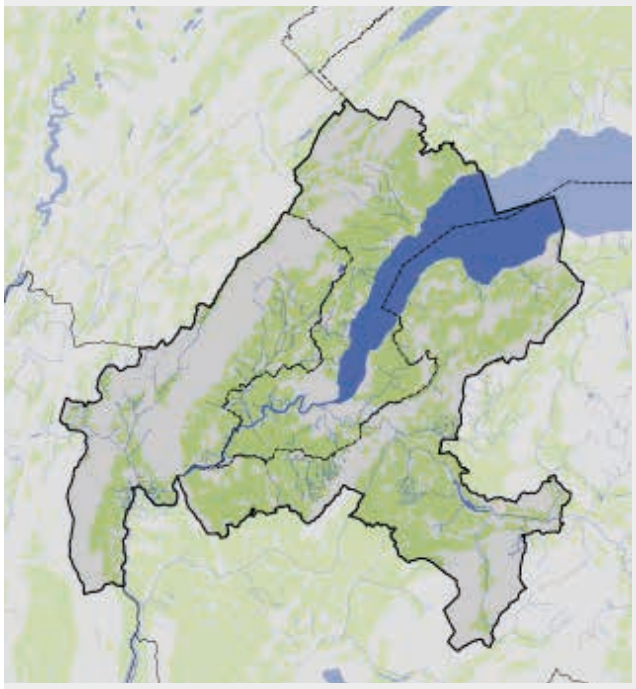
Agricultural land
Agricultural land interspersed with natural areas
Fruit tree orchards
Vineyards
Complex cultivation patterns
Pastures

48 % Self-Sufficiency rate

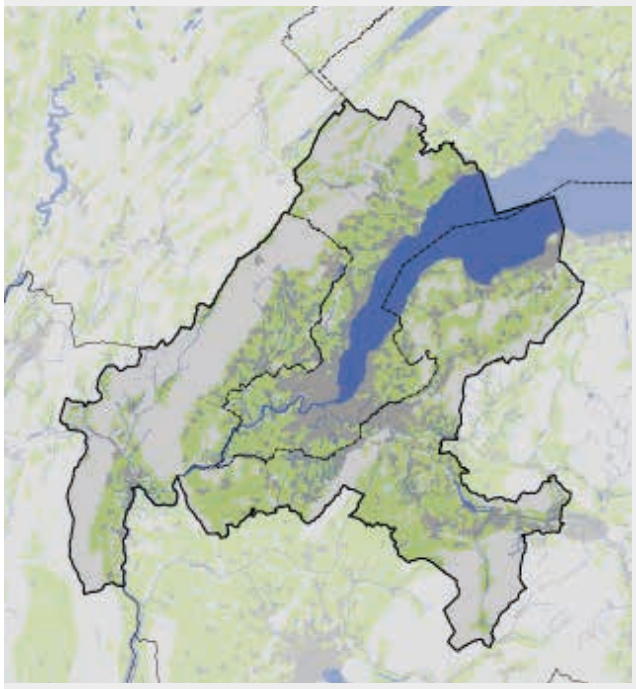


Cité Agricole. With 70 000 ha of agricultural land, including milk production and grasslands, field crops, fruit and vegetables, wine and even honey or fish farming, the food production of Grand Genève covers 48% of the population's food needs. With appropriate and spatially precisely adapted agro-ecological measures, this rate could further improve.

Grand Genève

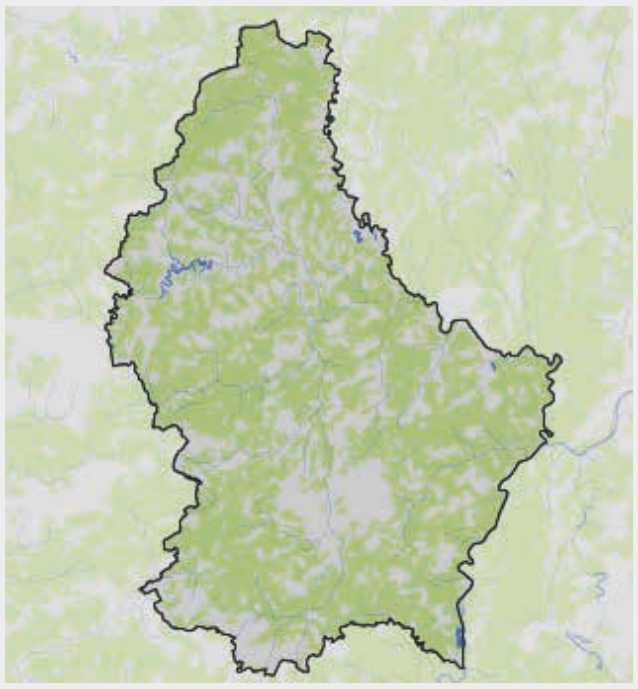


33 % agriculture
48 % food self-sufficient

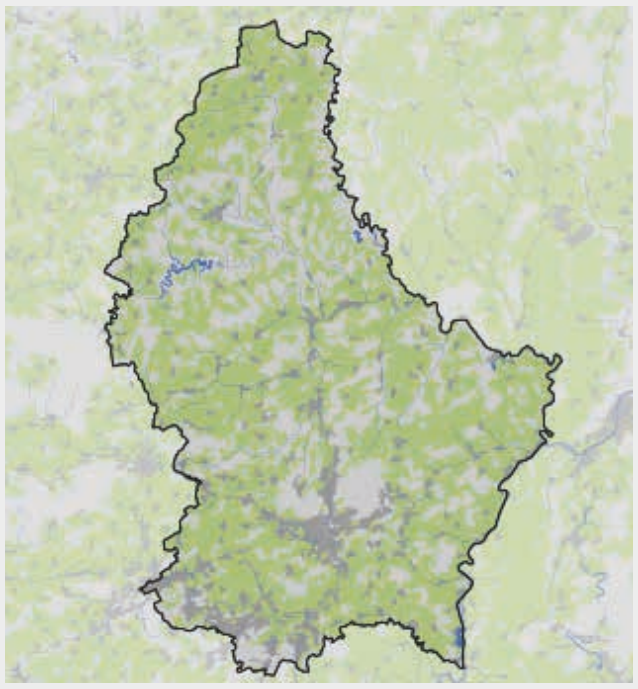


1 Million Inhabitants
480 inhabit./km²

Luxembourg

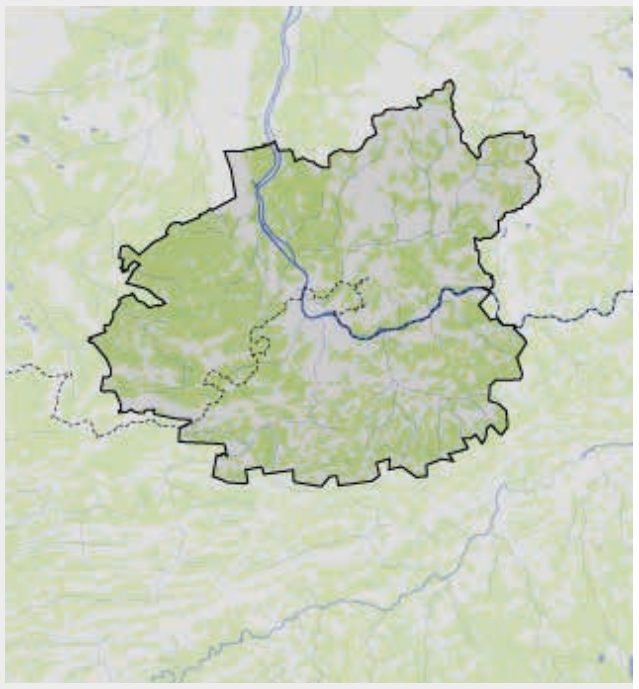


54 % agriculture
xx % food self-sufficient

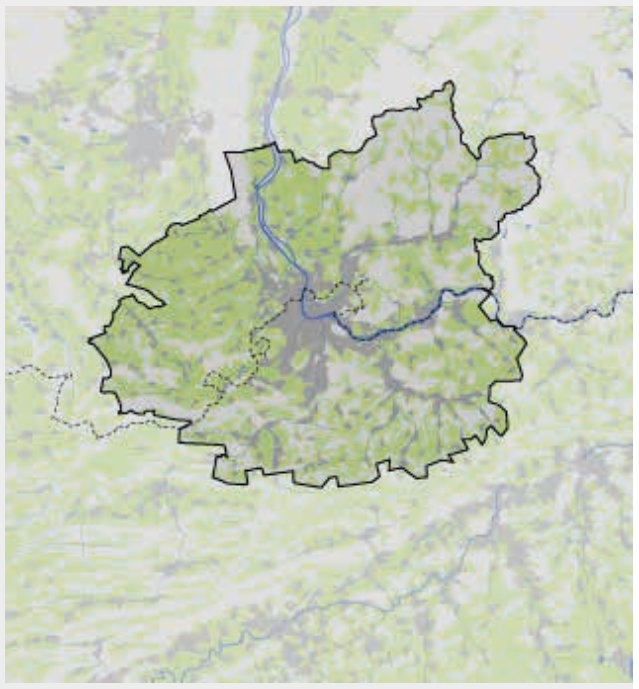


600.000 Inhabitants
232 inhabit./km²

Basel



x% agriculture
x % food self-sufficient



782.000 Inhabitants
x inhabit./km²

0 20 km

Comparing amounts of built fabric and population size in metropolitan regions

Comparing agriculture in cities. Comparing amounts of agricultural land covers and self-sufficiency rates in metropolitan regions

5 Values

Silva- Pastures and agroforestry. A mixture of trees and crops in cultivated parcels increases land productivity, offers many environmental benefits and enables long-term visions of firewood as a renewable energy source. At the same time, it can perform 30% more productive than conventional monoculture.

Bocage Genevoise. A traditional productive agricultural structure delineating property and functionally enclosed fields, which has recently been reconsidered for its biological properties. It consists of mixed hedges punctuated with mostly oak-trees, sometimes fruit trees such as walnuts to feed grazing animals.

II Cité Agricole
Agenda for Actions: Agro-Ecological Practices

1. Shift from industrialised agriculture practices and food production systems to agro-ecological practices. Current agricultural practices that involve ploughing arable land, using mineral fertilizers, draining organic soils and crop rotations with reduced grass content should be changed to more sustainable ecological- agriculture models.

2. Integrate agro-environmental measures for sustainable and ecological agricultural systems, smaller field structures with interspersed scrubs, hedges, bocage, wetlands, etc., to increase biodiversity and productivity.

3. Promote the hybridization of agricultural production such as permaculture and agroforestry. Develop small field structures and crop mosaics to respond efficiently to the respective precondition of the fields.

Regional contract farming abolishes product prices and finances agricultural production directly, by binding consumers and producers for the supply of food by contract: Consumers pay farm contributions to cover the full production costs. This contract defines the quality, quantity, production method, prices, and delivery terms of the products. The shift goes from the conventional product price to an annual operating contribution. This allows them to share risks, relieve producers of price pressure, and secure their income.

Food cooperatives and solidarity production. From global trade of food goods with severe economic and ecological consequences to local production and distribution, increasing the self-sufficiency rate or capacity of autonomy. The 'Union Maraichère de Genève' (UMG), a cooperative of the vegetable producers of Geneva, operated as an intermediate station between the producer and the place where the products are sold.

II Cité Agricole
Agenda for Actions: Local Food Economy and Self-Sufficiency

**1. Shift from export-oriented production and distribution to a regional, demand-based, regional, cooperative production and distribution.
Increasing the self-sufficiency rate from currently 48% coverage of the population's food needs to 100%+ in the Cross-Border Metropolitan Region.**

2. Reintroduce and invent approaches that once again regard food production, processing and distribution in a regional context, increasing the capacity, autonomy and resilience of the food supply system. For example food- cooperatives, regional contract farming, micro-agro models.

**3. Rescind the dependence on overarching policies and agriculture subsidies.
Strengthen local farmers, producer groups, as well as, new forms of engagement in production to conceive food production once again from the respective spatial conditions and supporting autonomous groups and independent businesses.**

4. Decreasing individual vulnerability to economic, social or climate caprices to a system of equally shared risks. Share infrastructures, reduce use of heavy machinery, invest in additional education for the farmers, producers, distributors, and consumers.

New architecture typologies and the gentleman farmer.
Through innovative mixed-living models and architecture interventions altogether more people can be active in agriculture again, at least partly. So it is possible to be at home in the city and in the countryside and to combine local recreation with a contribution to one's own food supply.

Permaculture and biointensive micro-agriculture.
Neighbourhoods with a Land Base: Micro-Agro. A basic supply of regional products for 500 people requires approx. 60 hectares of cultivated land (including cereal cultivation and livestock husbandry). Fresh products such as vegetables, milk, yoghurt, eggs, berries and fruit are grown and produced as close as possible to the consumers (within a radius of 20 to 50 km). Concepts of Micro-Agro: Fair and reasonable prices: 8% of a Swiss household's budget is spent on food in 2013, (6.4% of a Geneva household's budget, one of the lowest rates in the world!) compared to 40% in 1913. Engagement and Integration: Instead of buying their food in the retail trade, consumers should be directly involved in the management of a farm.

II Cité Agricole
Agenda for Actions: The new Culture of Agriculture

1. Enable the cultural performance of agriculture. Incorporate recreation, education and new places to work and live.

2. Food production and harvest should become once again integrative elements of our society and urban living. From secluded farms to a neighbourhood with a land-base. The neighbourhood runs its own processing facilities such as a bakery, pasta and preserving kitchens. The land base offers insights into agriculture - appreciation and understanding of the farm work are promoted.

3. Develop new territorial strategies to organise and plan the productive territory, linked up planning, architecture and agriculture need to be thought of.

4. Transition towards a reasonable land consumption. From a current food system threatening human health and environmental sustainability to enabling an EAT-Lancet diet for all with smart production and eating —60 ha, covering the needs of 500 people.

How much energy/ CO_2 could be saved if every commuter worked one day per week from a co-working space?

A 20% cut in emissions, a carbon footprint of 90 kt CO_2 -q./year/person could be achieved.

How much CO_2 savings would be possible if half of the commuters worked three days per week from a co-working space?

The commuting demand would decrease by 30%, which would yield a total carbon footprint of 79 kt CO_2-eq./year.

How much CO_2 savings would be possible if half of the commuters were able to walk or bike to their office?

Soft mobility (walk, bike) would cut emissions by half. In this case, the commuting carbon foot-print would decrease to 56 kt CO_2-eq./year.

Pop-up office Bern, 2019

III Cité de Proximité

Cité de Proximité gives form to the local turn, offers new typologies for the makers movement related to the housing complexes.

Cité de Proximité reconnects the built with the Unbuilt, and brings together housing, working, leisure and commerce – activities that are unevenly spread across the territory today.

Cité de Proximité rebalances the uses of the territory between the day and the night, and between work days and weekends.

Cité de Proximité brings more urbanity to the periphery – a new land use model based on smaller structures and functional diversity.

Cité de Proximité generates a coherent urban development related to local transport networks.

Cité de Proximité

While the migrations to economically strong urban agglomerations in Europe have been increasing, the chances of an average citizen to live in the core city, where jobs and cultural and commercial facilities are concentrated, have been in a steady decline. With gentrification process moving from the city to the periphery, only few well-paid newcomers (especially expats with housing bonus provided by their employers) are able to afford living in the core city. In the Canton of Geneva in 2017 for example, 2,600 apartments came under construction, while in the French Genevois, construction of 5,700 apartments, more than twice as many, commenced in the same year – adding to roughly the same housing stock in the two parts of the Grand Genève (1). As a consequence, the number of commuters has been increasing year by year. Today in the Grand Genève over 100,000 people cross the border in their cars twice a day. One in three professionals living in the French Genevois works in Geneva. As a result, the average income in the French Genevois is 15 % higher than in the neighbouring Rhône-Alpes region (2). In a cascading effect, many workers from the surrounding region are attracted to work in the French Genevois. In Annemasse, a large part of the population works in Geneva, while large part of the people working in Annemasse live in its outskirts. “The fundamental right to freedom of movement”, criticises Peter Sloterdijk, “translates for us into a human right to waste energy in the service of excessive private mobility” (3). In Geneva, 10 % of CO_2 emissions are caused by car traffic. Adding to environmental pollution, both commuters and residents suffer the excessive traffic. In Geneva, another 120,000 people are exposed to traffic noise. The air quality has also worsened dramatically: the concentrations of ozone (O3), nitrogen dioxide (NO2) and fine particulate matter (PM10), have all begun to exceed the limit values set by the Swiss law (4).

In the recent decades the planning culture has reversed, from its former orientation toward a car-friendly city, toward the city of short distances. Both regional and urban planning now aim to limit car traffic. The hope expressed by André Gortz that, after the car has killed the city, it will kill itself, has begun to resonate (5). Given the political will and economic support, two factors could potentially lead to a drastic reduction of automobile traffic: the local reintegration of living, working and commerce (as well as complementary activities including leisure, administration, and so on) — the Cité de proximité — and the coherent development of alternative local transport networks (public transport, bicycle, minibus, etc.). Such integration would only be feasible within a coherent urban figure, against the proliferating sprawl. The aim of the Cité de proximité is thus an integrated urban-rural development, in which citizens would perceive less mobility as a gain contributing to better life quality.

The spatial integration of places of residence and workplaces will have to be established on three levels: first, through the decentralization of institutions and companies. Second, those who are forced to work in the core city owing to the nature of their jobs – such as employees in trade (15% of commuters) and health care (13% of commuters) – must be given the opportunity of affordable housing close to the core city. Therefore, more affordable housing in central locations is urgently required – the topic of the next chapter. At the same time, many employees in the service industry, media technology, creative economy and even administration belong to a category which will experience significant workplace overhaul over the next two decades. The permanent, location-bound workplace will largely disappear, to be replaced by different patterns. On the one hand, digitalization and other forces are likely to lead to reorganization of company as an economic agency: the “gradual dissolution of the model of the company as a matrix of professional activity” is to be expected. On the other hand, this change will also result from the penetration of telework. Although telework has been debated since years, many companies are now adapting to it. SAP, Europe’s largest service company for example, has left it up to all of its employees to decide where they want to work. “Spatial planning,” demanded Thomas Sieverts already in 2002, “should ensure that appropriate locations are available for different lifestyles and work styles, combined with excellent telematic equipment, so that this group (of workers) is encouraged to substitute as many car trips as possible with telematic communication.” (6) However, home office also brings risks of reduced social contact, and the loss of work synergies and other benefits for the individual. For this reason, new types of working spaces must be provided at different scales and for different forms of work: when planning new residential complexes, collaborative workspaces for service providers, creative hubs and ateliers, joint workshops for craftsmen, and other similar spaces should be planned. These programmes must be inscribed in the new, resolutely hybrid architecture in combination with childcare and catering services. In addition, companies and institutions must again be encouraged to build company housing for their employees, while offering different types of work spaces as well.

In addition to the integration of new spatial typologies of work into housing complexes, the development of urban districts must be structurally designed in such a way that they are also – beyond the integration of living and working – more use-intensive. This is not a question of density, but of the urban structure layout: a local turn in urban design should ensue. In small-scale urban structures, living, working, gardening, production, shopping, administration and leisure can be brought together. In such approach, shopping malls would no longer receive building permits, while development plans would offer a fine-grained urban structure where small shops and start-ups of the makers movement could develop.

Cité Vieusseux pedestrian promenade, by Maurice Braillard, Geneva 1929 – 1931

Cité Vieusseux Geneva. The Société coopérative d'Habitation commissioned Maurice Braillard to plan the Cité Vieusseux in the midst of the virulent housing question in Geneva in the late 1920s, for which he drew inspiration from Ernst May's work on the Existenzminimum in Frankfurt. Instead of creating apartments on the ground floor, Braillard envisaged a gallery with several shops there. He also planned a school, which was never realized.

**Cité Vieusseux groundfloor shops,
Maurice Braillard, Geneva 1929 – 1931**

How much energy and CO_2 could be saved if we reduced the average housing surface per inhabitant?

A reduction of about 16.5% in energy consumption if we decrease the number of square meters from 36m² to 30m².

How much energy and CO_2 could be saved if we reduced the ratio of single-family houses among all housing buildings from 57% to 30%?

A 17% reduction in the energy consumption could be obtained.

Repartition and distribution of cheeses,
Thyon mountain pasture, 1934

IV Cité Partagée

Cité Partagée is rooted in the experience of the commune.

Cité Partagée promotes the meeting of differences and new synergies among them, enhancing the spirit of the community.

Cité Partagée is an expression of desires and needs for sharing – sharing houses, gardens, cars, sharing work and knowledge… In the Cité Partagée new forms of property emerge.

Cité Partagée builds on the experiences of cooperative housing models and of common property ownership forms.

Cité Partagée

Since Europe experienced the so-called economic miracles of the post-war period – what Burkhart Lutz has called the brief dream of ever-lasting prosperity (1) – individualism has come dominate western European democracies. The slogan “my house, my garden, my car” has shaped the generation of our parents, who spent their lives working for an employer close to home and raising children in a single-family house. In this mentality, individual ownership and growth of one’s property were deemed prerequisites for social advancement. In the Canton of Geneva today, the living space per inhabitant is 36 m^2; in the French part of the territory it is possibly much higher. The settlement area per capita is 218 m^2, with 119 m^2 for buildings and 55.5 m^2 for infrastructure (2). Although this is below the Swiss average, both values need to be significantly reduced. In fact, 57% of all residential buildings in the Canton of Geneva are single-family houses; between 2011 and 2017 their ratio even reached 62.5% (3). It is well-known that free standing single-family houses consume most land and energy as well as highest CO_2 emissions. What is more, horizontal urban expansion is responsible for increasing distances and for large traffic volume. From 1932 to 2014, the population of the French Genevois tripled, and the Canton of Geneva will also continue to grow according to the forecasts of the Swiss Bundesamt für Statistik, from 495,249 inhabitants currently, to between 516,000 and 667,000 inhabitants in 2045 (4). This means that in Geneva alone, housing needs will reach between 25,000 and 100,000 new dwellings. It would be extremely irresponsible, both socially and ecologically, to continue construction of single-family homes at the current high rates, to meet the housing pressure.

Instead, Grand Genève should aim to avoid construction of new detached houses, and to reidentify parts of the existing detached single-family housing areas. At the same time, the individual living space per inhabitant should be reduced, with the average standard set at 25 m^2. These goals however can only be achieved under new types of property relations, and in a cultural climate where radical individualism gives way to new communities. In the cultural history of Switzerland, we find particular historical precedents, now being discussed worldwide: *Allmende* or commons, and cooperatives.

As a form of ownership, commons belong a category between the private and the public, which can be managed by various communal structures such as villages, and with its resourced available to the community. Clean water and clean air are understood by many as common pool resources. Elinor Ostrom has shown that the governance of common pool resources by a community can be more effective than the state or private management (5). To counter land speculation, gentrification and increasing territo-

rial disparities in Grand Genève, its land should be regarded a common good. But what elements would characterize such land reform, and how can it be achieved? A number of different instruments of land reform are being discussed today, and they can be applied depending on the context.

In the tradition of Henry George, the first measure is a fiscal one: the land rent can be socialized, without transferring the property of the land into national or municipal ownership. In particular two types of taxes stand out: the pure land tax and the land value increase tax. In contrast to the real-estate tax such as the one applied in Geneva, the pure land tax is levied only on land and does not include the buildings. At the same time, the land value increase tax refers to the proceeds obtained by converting agricultural land into building land. In addition to positive economic effects – routing money flows from unproductive to productive areas – both taxes also have significant social and ecological effects by promoting the development of inner urban areas. The land tax makes fallow building land unprofitable, thus accelerating its mobilisation, while the land value increase tax makes the conversion of land into building land more expensive. Henry George's idea of a single tax, i.e. the sole taxation of land with the abolition of all other taxes including income tax, may seem unrealistic at first glance. However, Jacqueline Badran, a member of the Swiss National Parliament and an expert on land property, has calculated that if the state owned all the land and granted rights of use for 2% of it, it could finance the entire Swiss budget (6).

The second instrument of land reform is the socialisation of land. After the land has been transferred into national or municipal ownership, it would be given to third parties or auctioned off by means of rights of use – an idea that was prominently presented historically by Silvio Gesell and Hans Bernoulli — but today seems politically unattainable. A variant of this instrument is the building lease, which is popular in Switzerland and also provides for a divorce between the owner of the land and the owner of the building, who usually pays an annual building interest over 100 years for the right to use the land. In German-speaking Switzerland, many charitable foundations hold land and – depending on the urban and social policy ambitions of the city – they grant rights of use either to investors or to cooperatives who are dependent on receiving land use rights of on preferential terms. In 2016 in Basel, a land initiative achieved that public land can no longer be sold, and only building rights can be granted. In Geneva, as Michèle Tranda-Pittion points out, the public sector holds only an extremely small share of the total land reservoir (7). The question arises then, how is the public sector to replenish its vital reservoir? This can be done by systematically exercising the right of first exemption or by expropriation with full or limited compensation. The canton could theoretically apply both, but does not currently do so.

The third instrument used by moderate land reformers in particular is to bring many owner-occupiers into small-scale ownership through subsidies and land use planning. Small owner-occupiers can be helped through measures such as radically diversified land use plans and fine grain zoning plans (e.g. with typologies such as contiguous terraced houses with an outer edge of 4 metres), as well as by home ownership subsidies and credit subsidies. In this process, not only is land consumption relatively low, but territorial equity is increased, because here too the developer's margin is eliminated and, given the current loan interest rates, it is more advantageous for owner-occupiers to pay off a loan than a rent. The Homeruskwartier in Almere is an example of this principle of "self-building", with land plot sizes varying extremely (from 17 m^2 to several hundred square metres per plot). The disadvantage of this concept is that, from an urban planning point of view, monofunctional residential areas are often created, which is why this instrument should either be scattered or used in concentrated form.

The fourth model focuses on the question of what can be demanded of private developers in the realisation of a building project. In Munich, the so-called model of socially equitable land use (SoBoN) has been in force since 1994. This model obliges all private developers in the city to reserve 40 % of the gross floor area of a realised project for social rental housing, to contribute to infrastructure costs and, depending on the size of the project, to provide social infrastructure such as kindergartens. Thus, a social mix is mandatory on every new property. A similar model exists in the Canton of Geneva. For example, in the so called Zones de développement which serve the main land reservoir, private developers must produce one quarter of the project as LUP – Logement à Utilité Publique – and another quarter as social housing of the HLM type, with the state controlling the land prices as well as the sale price of the apartments and the rents in the LUP for 10 years (8). In contrast, no similar requirements for private developers exist in France. Here, social housing is produced solely by the public sector. A private developer obtains a plot of land, develops a project for it in accordance with the development plan and then sells or rents the housing units on the market. As far as the land and property stocks in Geneva are concerned, owners who do not use but rent their own stock yield significant influence on the housing in the region. As it is stated out in the 1st scenario for 2050 presented by the Haute Ecole de Gestion de Genève "land owners are a social class in its own right, often idle, living on their comfortable real-estate or other patrimonial rents, they come out enriched by the mechanism of spatial segregation" (9). For example, our field study has shown that land speculation in Geneva is directed even at the agricultural lands protected as crop rotation areas under federal law, the Surface d'assolement. Many landowners, including international corporate firms active in Geneva, are speculating on a later conversion of these protected areas into building land, in the context of a severe housing crisis for example.

Our position is that, in the Grand Genève priority should be placed on developing and implementing a unified land use model based on the described goals and strategies. This model would include higher taxes on large properties, the flow of revenues into environmental protection, the public land provision for self-building, for housing cooperatives and social housing, and obligations of not-profit housing provision in all private housing developments.

We will now turn our attention to the second component of the Cité Partagée, the cooperatives. Although cooperatives have played a decisive role in the urban development in the German-speaking Switzerland – in Basel and Zurich in particular – Geneva too has a long tradition of housing and other cooperatives, which have in recent years experienced a veritable renaissance. Similar to the commons, cooperatives constitute an alternative model of housing ownership between state or municipal financed housing and privately financed housing (including co-housing). Cooperatives are structures for self-help, traditionally associated with land reforms, because they are dependent on the availability of land at favourable conditions. Cooperative inhabitants identify more, and are better integrated with the community of neighbours, through various indoor and outdoor common spaces, which can be created in new projects if the individual living space is reduced. Genevian example of the Codha cooperative in Rigaud shows that such communities are also becoming increasingly diverse, mixing up locals and newcomers, young families and older residents, educated middle-classes and craftsmen, and so on. The principle of cooperatives is not only confined to housing. on the contrary. It is being transferred to the field of economic production, in businesses ranging from architectural offices to crafts workshops, and to agricultural cooperative producers and distributors. In *Ecologia*, André Gorz paints a picture of a sustainable society in which “almost everything that is necessary and desirable can be made in cooperative communal workshops”. Even if these workshops are organized locally, Gorz believes that they would “be connected around the world and able to share their experiences, inventions, ideas and discoveries” (10).

Younger generations are less willing to adopt their parents’ approach to ownership, and more open to sharing the goods and resources that they have and use: from apartments, cars, bicycles, and gardens, to technologies, knowledge, time, and labour... A critical examination of trends in sharing economy shows that new sharing practices may “bring to bear a new understanding of ‘economy’, which includes forms of social and solidarity-based economy as well as activities such as home care, and community activities and networks such as neighbourhood help and exchange platforms” (11).

Cooperative CODHA based on participation, conviviality, solidarity, 1994

CODHA in Rigaud is an example of a cooperative that brings individuality and community into a sustainable relationship and contributes to the mix of the city district. While 39 of the 49 housing units are destinated to migrants, 10 are reserved for residents of the municipality. The cooperative is also building a kindergarten and a public square. Complementary to the individual apartments, a common room with kitchen, 3 guest rooms, 1 music room, vegetable gardens in permaculture and a co-working space on the ground floor have been established. The community is self-consumer of the photovoltaic energy it produces.

5 Values

How much energy and CO_2 could be saved if concrete and steel is ruled out from all new houses, instead build them in wood?

Using wood instead of concrete and steel would bring to an avoided CO_2 emission in 2050 of up to 7.5 Mt.

Water used for cooling CERN and heating Meyrin housing, Lac des Vernes, 2019

V Cité Cyclique

Cité Cyclique focuses on material and energy flows and cycles at various scales, from the building to the territory.

Cité Cyclique engages urban metabolic flows in a manner that is regenerative and restorative.

Cité Cyclique is based on the principles of circular economy and takes into account the cycles of the environment and the human body: seasons, day/ night.

Cité Cyclique is based on a design culture which creates a dialogue between rationalisation and specific context of the territory: It’s climate, resources and energy.

Cité Cyclique creates buildings which drastically reduce their ecological impact in three key cycles: Their production cycle, their life cycle and their recyclability.

III Cité Cyclique

The paradigm of the “cyclical city” goes beyond the ideas of circular economy. A cycle describes both a circle, as in the circling of matter and energy, and a regular or periodic recurrence of phenomena. Thinking and planning our environment cyclically therefore means both establishing resource-saving cycles and addressing the temporal nature of living beings and things. Both are by no means common in our culture today. For example, on average 90 % of natural resources extracted or moved to produce food, machines and infrastructure, become waste already in the course of the production process. To maintain the current lifestyles in the industrialized countries, almost 100 tonnes of non-renewable resources are consumed per person each year; in addition, more than 500 tonnes of fresh water is used. Nearly 3 tonnes of non-renewable raw materials are needed to build a car catalytic converter, while between 8 and 14 tonnes are used to make a PC. “We have broken the circle of life,” outlines Barry Commoner, “transforming its eternal cycles into a linear sequence of man-made events” (1). At the same time, our food culture hardly takes into account the seasonal cycles of local cultivation. Louis XIV’s excessive habit of being able to eat his beloved asparagus all year round has become the norm of the mass food consumption today. Our working and living patterns are increasingly diverging from the day and night rhythm. Contracted working hours diverge from biorhythms and significantly increase electricity consumption in winter.

In the field of architecture, the linear and anti-cyclical culture is particularly pronounced. In Europe for example, construction accounts for 50 % of the consumption of natural resources and 35 % of energy consumption, as well as for half of the total volume of waste (2). For more than thirty years, approaches to circular construction economy and life-cycle-oriented urban planning have been discussed. In sum, such approaches have been oriented toward direct reuse or conversion of the available resources, and finally, toward recycling. It is not new that buildings should be planned in a way that they can be adapted to different uses. In contrast to functionalist approaches, where form follows a certain function, the aim here is to develop neutral, generously dimensioned and maintenance-friendly structures with flexible floor plans, and with uniformly laid access and supply cores, which allow for different uses over time. This also implies, however, that buildings must be constructed from materials that can be carefully dismantled at the end of the building life cycle. Geneva could be a pioneer in this respect, alongside examples in Dutch cities, in creating a material bank for all new buildings, which acts as building material emporium, and gives information on the various materials and their life cycles, enabling users to reduce downcycling to a minimum. The planning culture must again

support a reduction in the use of materials – both in terms of quantity and variety. Keeping different building materials at a minimum “results in a significantly improved overall balance, since fewer replacement cycles are created and these are better coordinated with each other” (3). More generally, political will should be summoned to stop demolishing most of the existing buildings, and instead to encourage conversions and extensions. The new construction would thus become considerably more expensive. At the same time, new construction should be regulated against further soil destruction and degradation, through soil movement, compaction, construction of underground spaces and artificial ground surfaces (in Geneva 1.3 million m^3 of soil are moved every year). The new design and planning culture, could be promoted through new efforts in architectural and planning education in the Geneva region, which would place urban and landscape ecology at the heart of the curriculum across all scales and disciplines.

Many current economic approaches and rationales are at odds with the aspirations of circular economy and life-cycle-oriented planning. For example, when calculating the costs of a building project – whether privately or publicly financed – usually only the land price, the planning costs and the construction costs are calculated; this accounts for up to 70 % of the total costs of a building depending on location. The remaining cost of maintenance, demolition, disposal or future conversion for example, are hardly ever taken into account at the project commencement. The life cycle of a building today often adheres to a short-term mentality, following the expected yield and the technical conditions of the building. Every year, the construction industry floods the market with ostensibly “new innovations” whose technologies will soon become obsolete. Architects and specialist planners are only commissioned to deliver a building layout; this includes neither the conception of possible future conversions, nor the integration of recyclability of the material stock.

An ecological construction economy would thus have to take into account the total costs of the building’s entire life cycle: planning, construction, operation, maintenance, value retention, demolition and disposal. If such approach cannot be legally enforced on private developers, then end users could be incentivised to become developers themselves. Not only would developer margins be reduced or eliminated, but the awareness of the overall costs would increase. This is especially true for cooperatives, as their members develop communal approach and build awareness of the various ramifications of the common project, including its material and energy consumption. An ecological construction economy would also have to take into account the follow-up costs of CO_2 emissions: further incentives can be introduced to subsidise low emission solutions, and vice versa, financial

burdens can be placed to discourage high emissions. In Geneva, 24 % of CO_2 emissions are attributable to building services – heating, electricity, hot water – and 52 % of total energy consumption is attributable to heating. Major emissions reduction and energy savings could be achieved through the widespread use of air-to-water heat pumps, appropriate thermal insulation, and, where possible, photovoltaic systems. New developments should be based on sustainable district heating systems, an optimistic prospect, still uncommon.

The worldwide production of cement accounts for an extraordinarily large proportion of CO_2 emissions: higher than the emissions caused by international air traffic. Switzerland has a great tradition of concrete buildings. The neo-brutalism that has come into fashion in Swiss architecture is unecological, despite the reduction in materials use. A building made of wood emits 88 % less CO_2 than the same building made out of concrete. However, only 7 % of all residential buildings in Switzerland are made of wood. A reinforced concrete construction can only be recycled at great expense, while sand resources are being depleted all over the word. The third future scenario for Geneva mentioned in the opening of this report, assumes a shortage of sand towards the end of the 2030s, which would dramatically increase the building production costs. According to estimates, Geneva's sand reserves will be sufficient for another 80 years. For these reasons, the switch to timber construction should already be intensively promoted, on condition that the timber originates from regional sources.

Simplified Lifecycle Sustainability Assessment of Decarbonisation Strategies of the Grand Genève Region

by Antonino Marvuglia and Thomas Gibon,
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This report contains the results of the calculations done by LIST's working group to obtain the estimates requested in the service offer for the five designated scenarios. In the following of this document, the question addressed by each scenario is reported, followed by a short description of the main assumptions made by LIST's working group and the calculation procedure applied. The results are based on numerous assumptions, the use of data proxies and approximations that are affected by a high uncertainty. Therefore, the results have to be used with caution and only as a very rough evaluation of each scenario. More detailed and reliable results would require an extensive data collection and the implementation of several models, that were not possible in the very limited time assigned to this study.

I Cité Agricole

This scenario aims at answering the questions:
• How much CO_2 savings would it bring if all inhabitants of Grand Genève would switch to EAT-Lancet diet?

Currently we estimate food-related emissions of 2090 kg CO_2 eq./person/year for an average French inhabitant and 2100 kg CO_2 eq./person/year for an average Swiss inhabitant (Froemelt et al., 2018). Considering the composition of the Grand Genève region (in 2015), 403045 inhabitants lived in French communes and 575745 inhabitants lived in Swiss communes (Hertweck, 2020). Based on the estimates provided above, it follows that the current carbon footprint related to food consumption, for the inhabitants of the Grand Genève region, can be estimated in about 2.05 Mt CO_2 eq./year.

Switching to the EAT-Lancet diet (Hirvonen et al., 2020, p. e61) would bring the food-related carbon footprint to about 1593 kg CO_2 eq./person (the calculations have been performed using lifecycle emission data from the databases ecoinvent 3.6 and Agribalyse). Multiplying this value for the entire population of the Grand Genève region and comparing the result with the current food-related emissions in the region, one obtains a saving of about 492 kt CO_2 eq./year, which translates in about 24% savings. In this respect, it is important to underline that the EAT-Lancet diet has alleged positive impacts on people's health; however what would have a meaningful impact in carbon emissions would be the switch to a diet with significantly reduced meat and dairy consumption.

• What would be the consequences for the total agricultural output in Grand Genève if all the intensive and industrial agriculture were transformed into organic agriculture (assuming that all the current agriculture is intensive)?

As a preliminary note, we need to point out that the transition from traditional to organic agriculture does not necessarily reduce the environmental impacts of agriculture. In particular, there are cases in which organic agriculture performs better than traditional agriculture only for certain impact categories (e.g. land use) but not for climate change (which is the impact category more directly linked with emissions of CO_2-eq.), or cases in which, due to the much lower yield, it performs worse than traditional agriculture (Poore and Nemecek, 2018). (Bos et al., 2014) points out that "to reduce energy use and greenhouse gas emissions related to food production, choices on food package composition are more relevant than the choice between organic or conventional farming".
Having said that, when focussing on organic agriculture we need to highlight that the difference in yield with conventional agriculture varies significantly from country to country. For Switzerland, (Nemecek et al., 2011) reports that passing from intensive to organic production induces a reduction of 12% in yield for cash crops and 9% for feed crops.
The amount of agricultural land occupation in the Grand Genève region is reported in Table 1 (Hertweck, 2020):

Land occupation type	Surface trad. (ha)	Surface organic (ha)	Difference (ha)
Arable land	32353	35948	3595
Vineyards	2839	--	--
Fruit orchards	545	--	--
Pastures	17081	--	--
Mixed cultivation patterns	22103	24559	2456

Table 1. Land occupation in the Grand Genève region. The columns "Surface trad." Reports the land areas assuming that the current agriculture is based entirely on intensive agriculture practices. The column "Surface organic" reports the land areas needed to supply the same amount of agricultural produce with organic agriculture (excluding fruits).

As a first approximation we can use the values reported in (Nemecek et al., 2011) for the entire Grand Genève region (including the part belonging to the French territory).
Therefore, applying a 9% yield reduction fraction to the land types Arable land and Mixed cultivation patterns, one can infer that the switch from traditional to organic agriculture would imply the need for an additional agricultural surface of about 8500 ha, in order to keep the current production constant. Table 1 reports the respective differences between the current land areas and the land areas needed in the hypothesis to switch to organic agriculture (under the assumption that all the current agriculture in the Grand Genève region is intensive).

Finally, as pointed out in (Bos et al., 2014), differences between organic and conventional crop production depend on the way in which these are calculated. As a first approximation, (Bos et al., 2014) refers to the following differences:

- Energy use per unit crop produce is respectively 10-30% higher in organic arable farming and 40-50% higher in organic vegetable farming than in their conventional counterparts;
- Greenhouse gas emissions per unit crop produce is respectively 0-15% higher in organic arable farming and 35-40% higher in organic vegetable farming compared to conventional farming.

However, if the differences between organic and conventional are calculated as the average of differences between crop pairs, the same study by (Bos et al., 2014) reports the following values:

- Energy use in organic arable is estimated 9% higher than in conventional, and in organic vegetable cropping it is estimated 43% higher than in conventional;
- The corresponding percentage for GHG emission in organic vegetable production is estimated 35%, while organic arable scores equal to conventional.

These values can be used as a rough indication of the differences between the two agricultural practices, but they have to be used cum grano salis, because they cannot be generalised and a more accurate study of the specific region (supported by more data) would be needed to draw meaningful conclusions.

A last consideration needs to be mentioned about the impacts of the change in land use patterns that the shift to organic agriculture would cause on biodiversity, habitat loss and landscape fragmentation. These impacts are very complex to assess and detailed data and accurate modelling would be needed to infer any conclusion on this aspect. An example of a similar study, addressing some animal species has been carried out by LIST for Luxembourg (Almenar et al., 2019).

II Cité Naturelle

This scenario aims at answering the question:

- How many trees (and what kind of trees) have to be planted to reduce the CO_2 emissions per inhabitant from 10 to 1 tonne per year? How much surface would be needed to plant those trees?

We consider here only the scenario consisting in managed trees stocks (short-term), rather than forests with trees of long lifetime (over 250 years). In this scenario, the best way to uptake CO_2 in trees is planting short rotation coppice (SRC) trees, i.e. specie that are harvested several times to produce wood. Obviously, this action would be effective is the wood is not

burned, but used for construction, furniture, etc. In this case, from a previous study (Rugani et al., 2015) we can estimate that species like poplar clones and willow clones, can uptake on average a net quantity of 8.5 t C/ha/year.
The corresponding amount of theoretically sequestered CO_2 can be calculated based on the molecular weight ratio as follows: 1 tCO_2 is equivalent to 44/12 tC. Therefore, the SRC can give an uptake of about 2.3 tCO_2/ha/year.
In the hypothesis of keeping the current emission rates of the population, assuming only planting trees as the action to compensate for 9 t CO_2/inhabitant/year, and assuming a population of the Grand Genève region of 978790 people in 2015, and assuming the same population growth pace in Grand Genève as in the Canton of Geneva, we calculated the trend of SRC area showed in . This would mean that, without any further action to reduce individual CO_2 emissions (and assuming a current rate of 10 t CO_2/person/year), in the hypothesis that the wood grown in the SRC is used to store CO_2 (not burned), 2.2 Mha of tree area would be necessary to compensate the 9 t CO_2 per inhabitant, only for the inhabitant of the Canton Geneva.

	Pop. Greater Geneva	Pop. Canton Geneva	Mt CO_2/y to be compensated in Greater Geneva	Mt CO_2/y to be compensated in Canton Geneva	Mha of SRC necessary to compensate Greater Geneva	Mha of SRC necessary to compensate Canton Geneva
2015	978790	458991	8.81	4.13	3.8	1.8
2020	1027862	482002	9.25	4.34	4.0	1.9
2025	1075079	504144	9.68	4.54	4.2	2.0
2030	1119866	525147	10.08	4.73	4.3	2.0
2035	1156896	542511	10.41	4.88	4.5	2.1
2040	1178879	552820	10.61	4.98	4.6	2.1
2045	1194348	560074	10.75	5.04	4.6	2.2
2050	1209817	567328	10.89	5.11	4.7	2.2

Table 2. Population projections for Canton Geneva, and linearly extrapolated to the Grand Genève region. The third and fourth columns report respectively: the amount of CO_2 to compensate (in the hypothesis to offset 9 t CO_2/person/year) in Grande Geneva region and in the Canton Geneva, and the corresponding areas of SRC necessary to compensate those emissions

The study by (Bastin et al., 2019), shows the values of potential tree coverage (i.e. total area of canopy cover that could exist under the current climate) country by country, as well as the values of the tree restoration potential (i.e. the area, excluding existing trees and agricultural and urban area, that is not yet occupied by forest, and it could be converted to canopy cover). For Switzerland the potential tree coverage amounts to 2.37 Mha and the tree restoration potential to 0.72 Mha. Therefore, there is an excess of almost 1.5 Mha of tree area that would be necessary and is not available. This evidently shows that using only trees to compensate carbon emissions is not a viable strategy.

III Cité de Proximité

In 2019, 72058 commuters have been assumed to drive between France and Geneva daily, for work. According to the ecoinvent 3.6 lifecycle inventory (LCI) database, the average EURO5 diesel vehicle driven in Europe emits between 230 and 380 g CO_2-eq./km, for respectively small (A, B) and large (D, E) segments, overall their lifecycle. Petrol vehicles emit between 270 and 410 g CO_2-eq./km. According to Auto-Schweiz , over the period 2016-2018, there were 846774 passenger cars sold in Switzerland, with the follow breakdown: 24% small (“micro” or “petites”), 65% medium (“moyenne inférieure” or “moyenne supérieure”), and 12% large (“supérieure” or “luxe”). Assuming each segment is composed of the same diesel/petrol split, namely 31%/69% according to the Swiss Statistical Office , we can estimate the composition of the car fleet, as shown on Figure 1.

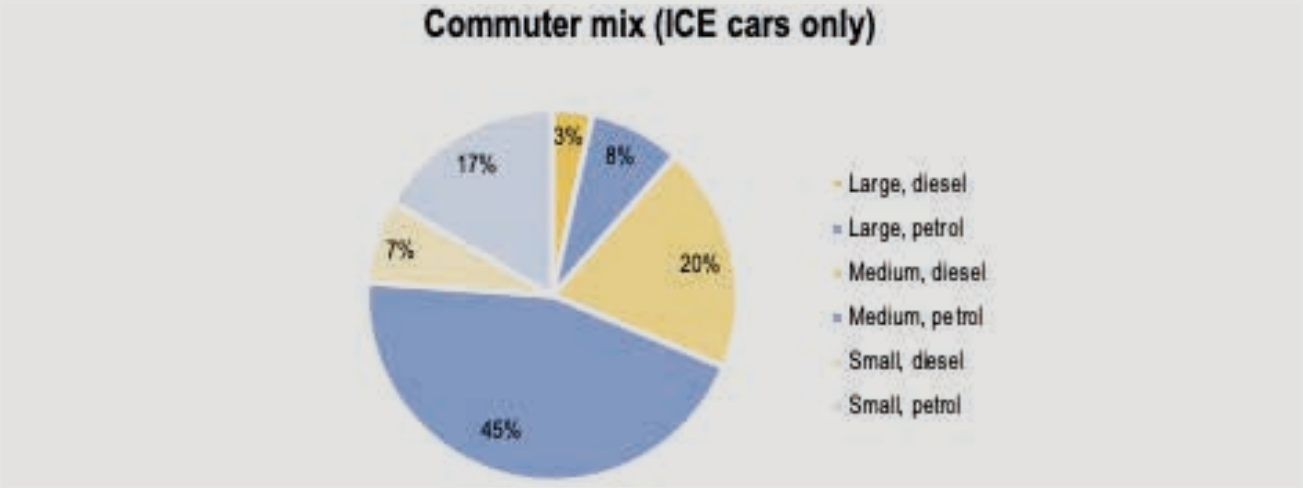


Figure 1. Estimate of commuter car fleet by size and powertrain.

The reference annual demand for the cross-border commuters of the Grand Genève region is estimated to be about 349 million passenger-km. With an average of 323 g CO_2 eq./vehicle-km, 215 working days per year, and 1 passenger per car, this corresponds to a reference carbon footprint of 113 kt CO_2-eq./year, or 1.6 tonne CO_2-eq. per commuter on average, annually.

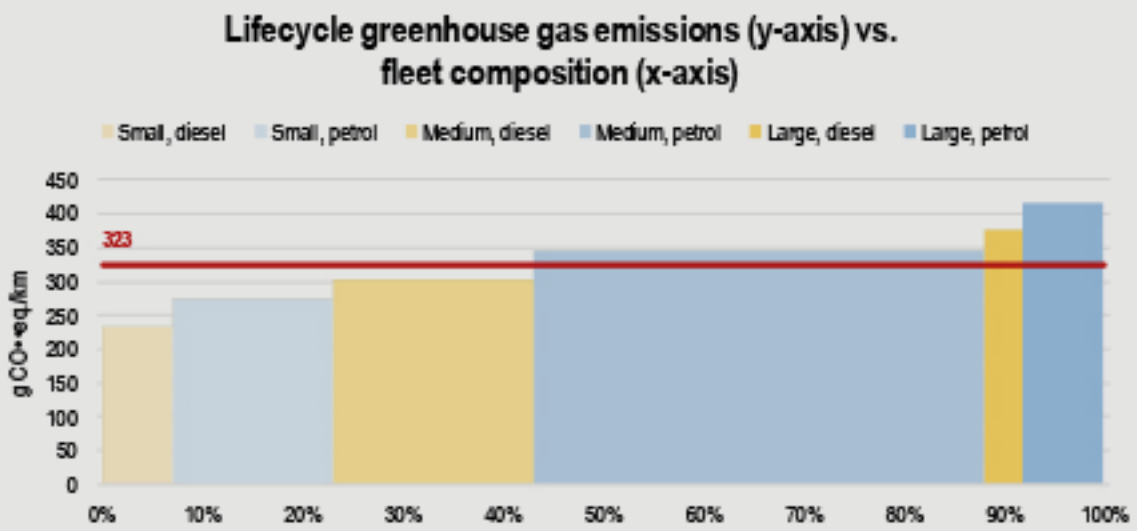


Figure 2. Estimate of commuter car fleet composition with specific lifecycle greenhouse gas emissions.

5 Values

The scenario termed “Cité de proximité” aims at answering the following questions:

• How much CO_2 savings would be possible if:

- case a): every commuter worked one day per week from a co-working space?

Having the option to work from a co-working space closer from home one day per week would reduce the footprint from commuting. In this situation, we consider that commuters would be able to walk or bike to a closer location where they could remotely work, including their own home. This would translate directly into a 20% cut in emissions (one day out of five, 172 commutes per year), i.e. a carbon footprint of 90 kt CO_2 eq./year, or 1.2 tonne CO_2-eq. per commuter on average, annually.

- case b): half of the commuters worked three days per week from a co-working space?

If half of the commuters have the option to work from a co-working space three days per week, the commuting demand would decrease by 50% × 3/5 = 30%, which would yield a total carbon footprint of 79 kt CO_2-eq./year, or 1.1 tonne CO_2-eq. per commuter on average (620 kg CO_2-eq. for the remote working commuters, and 1.6 for the rest). The result may vary significantly, depending on which half of the commuters is able to work remotely.

- case c): half of the commuters were able to walk or bike to their office?

A situation in which half of the commuters can commute with soft mobility (walk, bike) would cut emissions by half. In this case, the commuting carbon footprint would decrease to 56 kt CO_2-eq./year or 1.1 tonne CO_2-eq. per commuter on average (0 kg CO_2-eq. for the remote working commuters, and 1.6 kg CO_2-eq. for the rest).

- case d): all fossil fuelled cars were dismissed, and the car fleet was limited to 10% of the today’s number of cars, assuming that they were only electric and if those cars were autonomous and electric (with electricity coming from renewables)?

Both France and Switzerland have a low-carbon electricity system, it is therefore interesting to explore how much greenhouse gas emissions would be cut by switching to electric mobility. An electric vehicle fuelled with the average Swiss grid consumption mix of 104 g CO_2-eq./kWh (ecoinvent 3.6) has a carbon footprint of 59 g CO_2-eq./km. If charged in France (62 g CO_2-eq./km low voltage consumption mix), the same vehicle contributes to 54 g CO_2-eq./km over its lifecycle. As a first approximation, limiting the car fleet to 10% the existing fleet in 2019 would reduce the amount of passenger-km driven by 90%. However, autonomous vehicles can optimize trips; one vehicle can meet the mobility demand of several commuters per day.

Furthermore, autonomous cars can theoretically also allow a much higher passenger occupancy by optimizing trips. This aspect is often put forward as an advantage of autonomous vehicles, although there is debate whether it would be offset by empty return trips (Truong et al., 2017).
Results for this scenario are presented in Table 3 and Figure 3.

Case	Ref.	a	b	c	d	e (CH)	e (FR)	e (ren.)
Total footprint of cross-border commuting (kt CO2 eq./year)	113	90.1	78.8	56.3		10.3	9.36	8.63
Average commuter footprint (kg CO2 eq./year)	1562	1250	1094	781		143	130	120

Table 3. Results of the climate impacts of cross-border commuting scenarios. For case e, the various electricity mixes are presented.

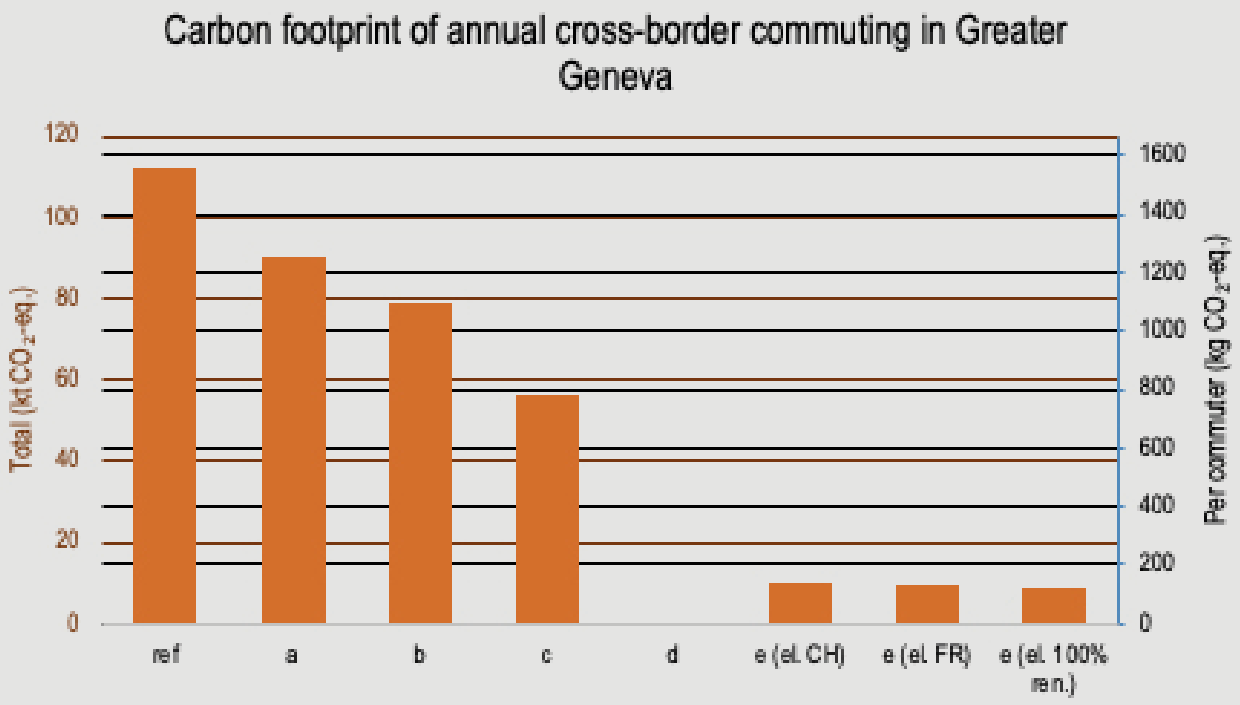


Figure 3. Carbon footprint of annual cross-border commuting in Grand Genève, for the reference case, and the various cases presented in the section.

IV Cité Partagée

The question this scenario aims to answer is how much energy and CO_2 savings could be obtained if:
- case a): we reduced the average housing surface per inhabitant in Geneva from 36 m^2 to 30 m^2?

Using an estimation taken from (Zimmermann et al., 2005) for Switzerland, the energy index (i.e. energy consumption per m^2 and per year) is distributed between SFH and MFH as shown in Table 4.

	Energy index MJ/(m^2 year)	Use phases
Multi-family houses (MFH)	508	Heating, hot water
	120	Power, including on-peak
	73	Construction materials, production
Single-family houses (SFH)	562	Heating, hot water
	96	Power, including on-peak
	100	Construction materials, production

Table 4. Energy index for MFH and SFH, differentiated per use phase, according to (Zimmermann et al., 2005)

5 Values

Using population statistics from Federal Statistical Office (FSO), Section Demography and Migration (STATPOP, 2018), referring only to the canton of Geneva, and assuming that households of 4 people and more live in SFH, we obtain a reduction of about 16.5% in energy consumption if we decrease the number of square meters per occupant from 36 to 30 m^2. This means the same perceptual reduction in CO_2 emissions. However, the value of 36 m^2 per person as the actual space per person seems underestimated. In fact, from national Swiss statistics (averaging for houses of all the periods of construction, from before 1919 to 2018) we obtain on average 42.7 m^2 per person for MFH and 53.9 m^2 per person for SFH. Therefore, if we reduce to only 30 m^2 per person in both categories of houses, the attainable percentage reduction in CO_2 emissions is up to 39%.

- case b): we reduced the ratio of single-family houses among all housing buildings from 57% to 30%?
This means a reduction of 27/57=47.4% of the number of SFH.
Assuming that all the occupants from the SFH that disappear would move to MFH, and assuming an average occupancy rate of 6.5 people for SFH and 12 people for MFH, we obtain a reduction in the energy consumption of roughly 17%.

V Cité Cyclique

This scenario aims to estimate the expected reduction of CO_2:
• hypothesizing to rule out concrete and steel from all new houses and build them in wood (no more concrete anymore) until 2050.
If we consider the evolution of buildings as proportional to the evolution of population according to the projections by FSO , we obtain the projections for population and buildings respectively shown in Table 5 and Table 6.
For the Canton Geneva, assuming the population projections shown in Table 5 and an average area per person of about 38.5 m^2, as a first approximation we used the values of embodied CO_2 estimated from a previous study in Luxembourg (Bolowich, 2018). In this study the cases of constructions made from concrete and steel were compared with the case of using wood as construction material.

	Reference Scenario	High Scenario	Low Scenario
2015	458991	459723	458248
2020	482002	489598	474759
2025	504144	519891	489268
2030	525147	549727	501822
2035	542511	575678	510771
2040	552820	593092	514073
2045	560074	607209	514723
2050	567328	621326	515372

Table 5. Population projections in Canton Geneva (n. of inhabitants).

	n. of buildings in Canton Geneva in ref. scenario	n. of buildings in Canton Geneva in High scenario	n. of buildings in Canton Geneva in Low scenario
2015	88083	88083	88083
2020	92499	93807	91257
2025	96748	99611	94045
2030	100779	105328	96459
2035	104111	110300	98179
2040	106089	113636	98814
2045	107481	116341	98938
2050	108874	119046	99063

Table 6. Buildings projections in Canton Geneva (n. of buildings).

The estimated values of embodied carbon emissions in (Bolowich, 2018) for constructions made of steel and concrete, were 456 kg CO_2 eq./m^2 and 532 kg CO_2 eq./m^2, respectively with and without using DfD practices. For constructions made of wood, these values drop respectively to 340 kg CO_2 eq./m^2 and 372 kg CO_2 eq./m^2. Using these estimates, we obtained the values of avoided CO_2 emissions (only embodied emissions, not considering the operational phase of the buildings) shown in Table 7.

		Embodied carbon (Mt of CO_2-eq)				CO_2-eq emissions savings when using wood (Mt)	
		Concrete and steel		Wood			
Year	Total building area ($10^6 \cdot m^2$)	With DfD	Withouth DfD	With DfD	Withouth DfD	With DfD	Withouth DfD
2015	37.7	17.2	20.1	12.8	14.0	4.4	6.0
2020	39.6	18.1	21.1	13.5	14.7	4.6	6.3
2025	41.4	18.9	22.0	14.1	15.4	4.8	6.6
2030	43.2	19.7	23.0	14.7	16.1	5.0	6.9
2035	44.6	20.3	23.7	15.2	16.6	5.2	7.1
2040	45.4	20.7	24.2	15.4	16.9	5.3	7.3
2045	46.0	21.0	24.5	15.7	17.1	5.3	7.4
2050	46.6	21.3	24.8	15.9	17.3	5.4	7.5

Table 7. Estimated embodied carbon emissions for constructions in concrete and steel and constructions in wood, with and without implementing design for deconstruction (DfD) practices.

As Table 7 shows, in the case of the implementation of DfD, using wood instead of concrete and steel would bring to an avoided CO_2 eq. emission in 2050 of up to 7.5 Mt.

• insulating existing buildings in passive house standard and using only renewable energy (air pumps combined with photovoltaic cells) to heat them.

Given the different level of details found in the literature that was retrieved to obtain some rough estimation to assess this scenario, we decided to compare primary energy use in the current situation and in

the situation desired in this scenario. This assured a better comparability of the data found in the literature. Moreover, being impossible, without a detailed composition of the different buildings of the building stock, to quantify the situation in which passive houses are fed only with renewable energy, we approximated this last scenario with a scenario in which existing buildings are converted into net zero energy buildings (nZEB), which implies more restrictive efficiency constraints with respect to the Passive House standard.

From (Zimmermann et al., 2005, p. 1153) one can derive the primary energy consumption for heating, hot water, power, ventilation and air-conditioning. We used the value referred to “total buildings” (as the composition of the building stock in the Grand Geneva region is unknown), which is 552208 TJ for a total surface of 539.4 Mm^2. This yields a value of 284.4 kWh/m^2/year of primary energy. We assume this as an estimate for calculating the total primary energy demand of the current building stock in the Grand Genève region. Multiplying this value for the total building area estimated for 2020 (taken from Table 7 above) one obtains about 11266 kWh for 2020 (assuming 2020 as the year to quantify the current situation).

In order to estimate the primary energy consumption imagining to convert the current building stock according to passive house standards (not considering the energy consumption linked to the lifecycle of the materials and the conversion process) we use an indicative vales of primary energy consumption of 111 kWh/m^2/year for Switzerland (and we assume it is valid for the entire Grand Genève region.
The multiplication of this value for the total building area for 2020 (from Table 7) yields 4397.6 kWh of primary energy for 2020.
Finally, the specific primary energy for nZEB was assumed to be 50 kWh/m^2/year, as reported in (Attia et al., 2017) for Lyon (FR), which is reasonably considered in the same climate zone as Geneva. Multiplying this value for the total building area for 2020 (from Table 7), one obtains a primary energy consumption of about 1981 kWh of primary energy for 2020.
In conclusion, with the rough estimations and assumptions made above, we estimated that if the entire building stock currently existing in the Grand Genève was converted according to passive house standards, the total primary energy consumption for heating, hot water, power, ventilation and air-conditioning would drop from 11266 kWh to 4397.6 kWh (i.e. about a 61% reduction), while if it was converted to according to nZEB standards it would drop to about 1981 kWh (i.e. about 82% reduction). To convert primary energy into final energy, knowing the share of each energy sources, one could use conversion factors from ecoinvent (see (Zimmermann et al., 2005, p. 1152)).

Territories of Urban Potentials

Central to the dialogical nature of the project is embedding the "Values for the Ecological Transition" into the particular geographies of the region, thus allowing selected elements of the landscape to be combined into a series of configurations crystalized into seven "Territories of Urban Potentials" through which the future form(s) of the territory can be traced. This approach allows the project to be both grounded to the specificities of the social and natural geography, but also remain flexible to the unpredictability of future scenarios. Instead of trying to sketch a specific masterplan, with the associated land use maps, zoning schemes, and the usual urban regional planning devices, the project aims to define as precisely as possible, through geospatial modeling, the potentials that could emerge for different types of development throughout the region, which in combination would compile a holistic vision for Grand Genève.

The elements for these potentials can already be found within the region in the form of social, technical and ecological attributes of the geographical environment, and the goal of the project is to identify them, combine them in meaningful ways into the seven territories selected, and anticipate in a projective manner their transformation, guided by the values of Ecological Transition. Thus, the seven Territories of Urban Potentials suggest a novel, alternative framework of approaching territorial design, one that is at the same time emerging through geography, and allowing for its projective future manipulation.

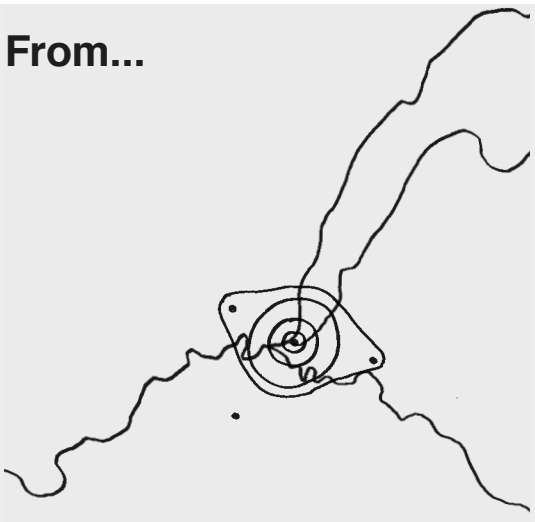
Real estate development in St. Genis Pouilly, 2018

1 Bi-National Metropolis

For the Bi-National Metropolis the goal has been to define areas of development along existing concentrations of buildings, infrastructures, transportation and services in a way that would condense and structure development according to compact, accessible development principles. The highest potential for the landscapes of the Bi-National Metropolis is presented in areas that are close to existing concentrations of buildings, and close to existing transport infrastructures, as well as accessible in relation to educational, administrative, commercial, health and recreational facilities. These values where modeled through distance, accessibility and density gradients, classified under 9 classes (highest with highest potential) and combined also with topographical restrictions privileging development within the Lac Leman basin. The weighted overlay of these attributes led to the Bi-National Metropolis potential envelope.

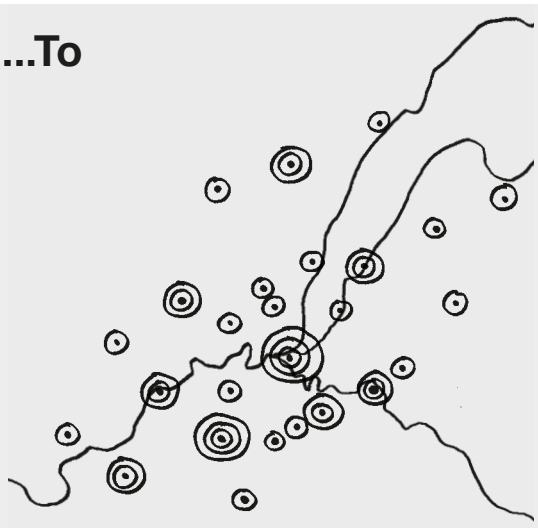
6 Urban Potentials

From...



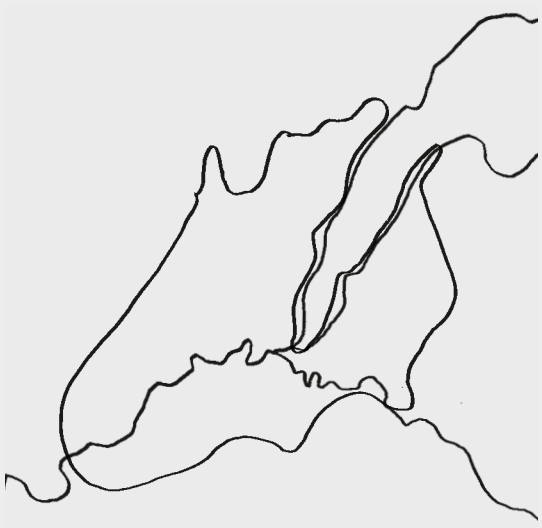
A territory centered in Geneva

...To



A poly-centric Metropolis

Two Geneva's
Geneva and L'Autre Geneva

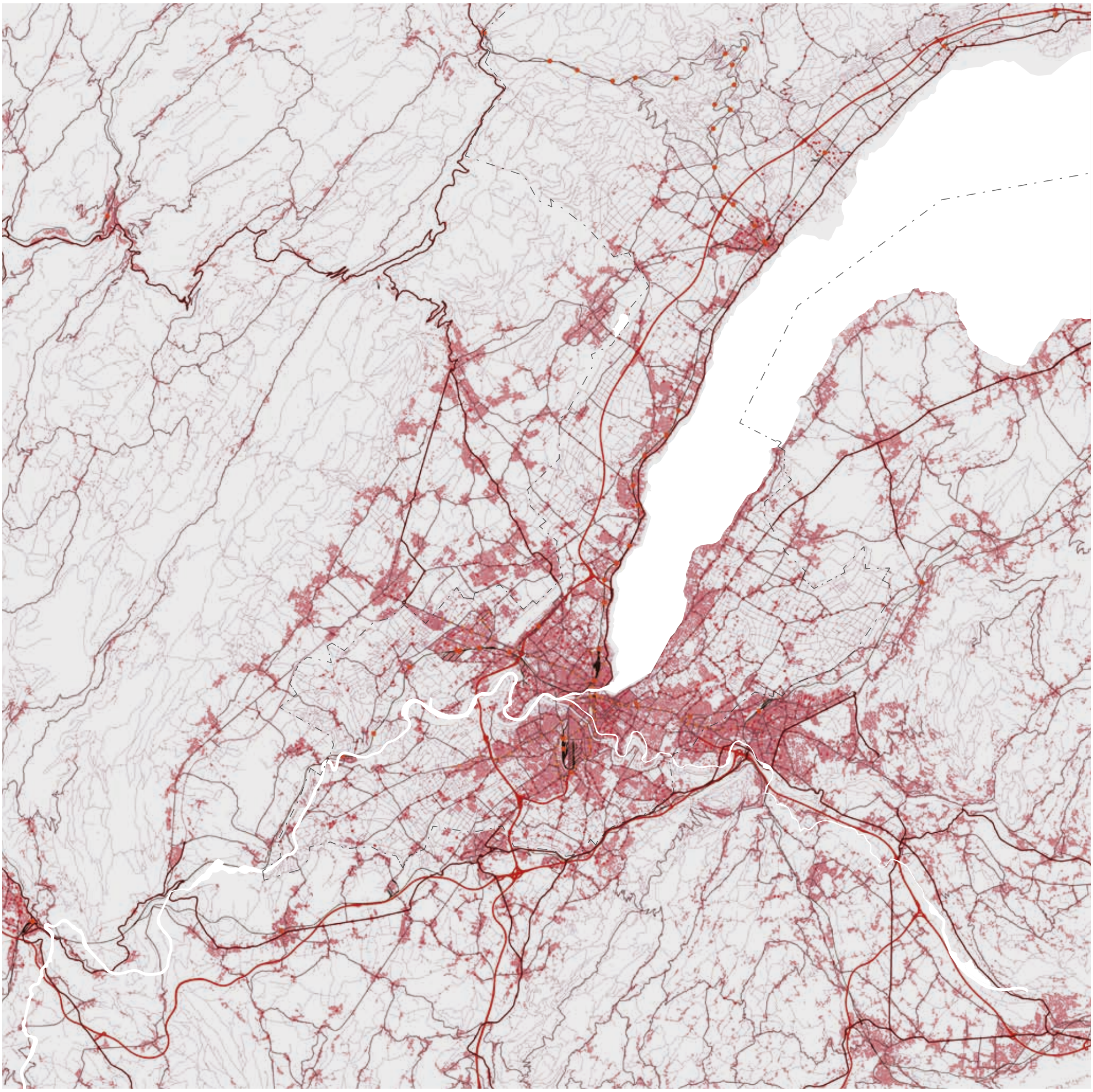


One Bi-National Metropolis

Sprawl and local planning

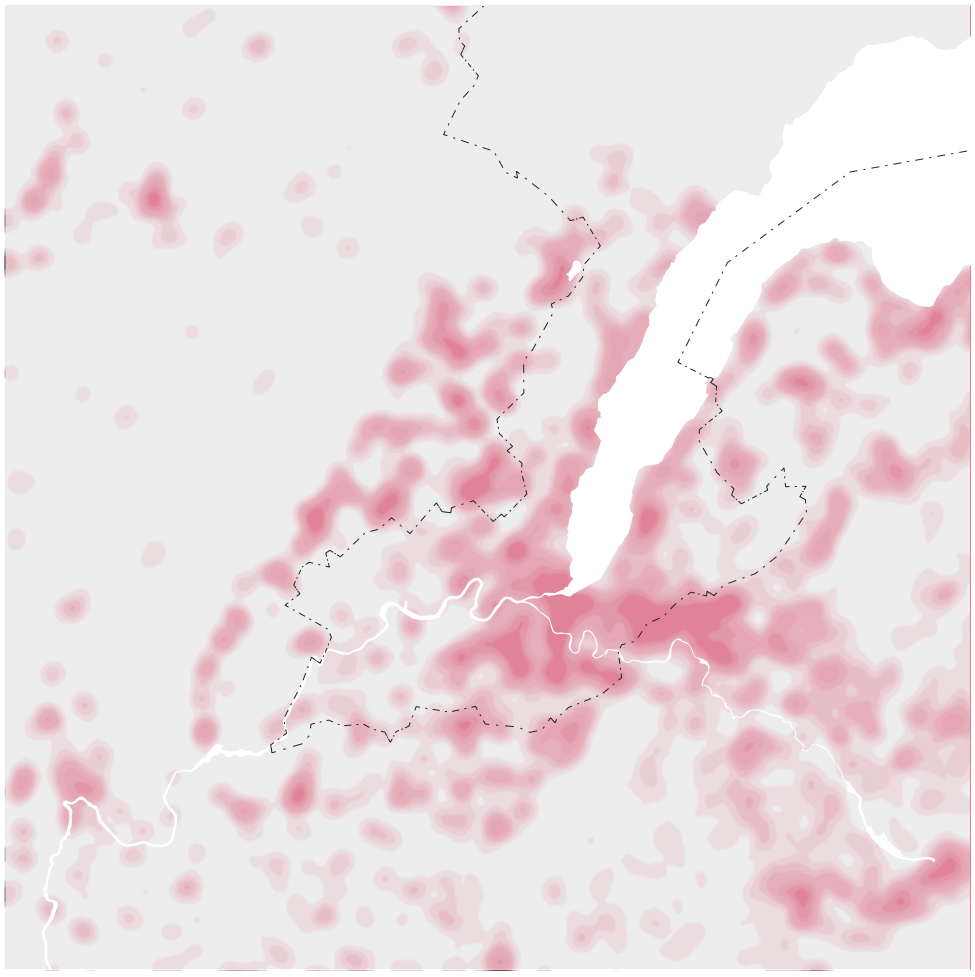
A legible, integrated territorial figure

Forming of a new Bi-National Metropolis. From an asymmetric Cross-Border urban constellation, with polarising identities, towards a legible figure that allows for a common territorial cross-border vision and guide for future planning decisions.



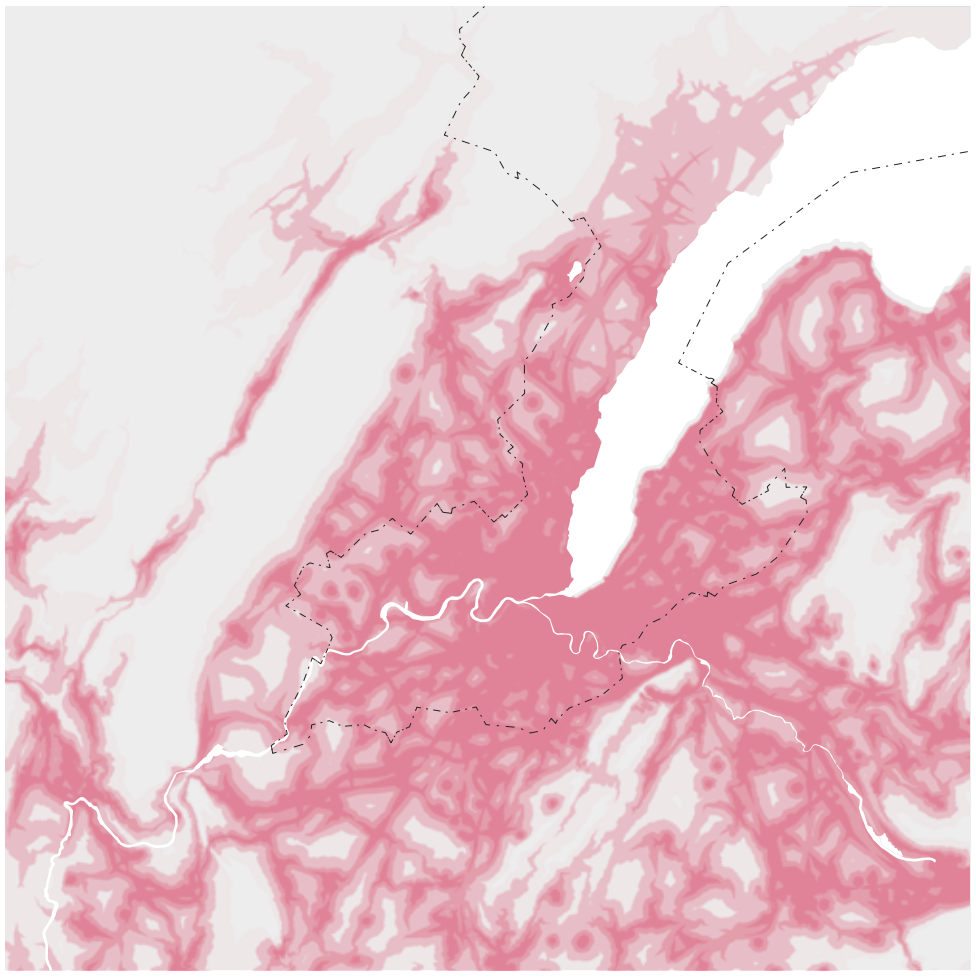
- Train stops
- Bus stops
- Tram stops
- Railway network
- Highway network
- Primary and secondary roads
- Building footprint

‘Genève’ and ‘L’autre Genève’: Uneven territorial expression across the national border.



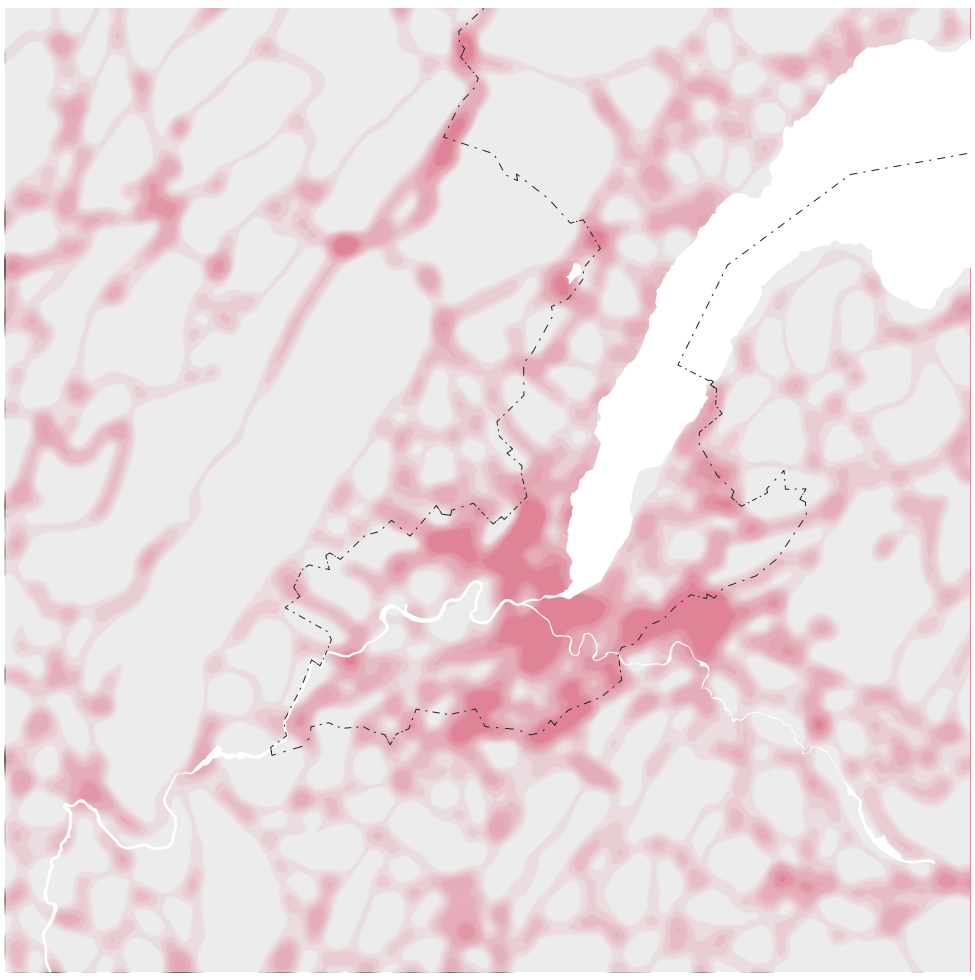
1 Density of buildings

The gradient shows number of buildings per km² from light to dark (100, 200, 300, 400, 500, 600, 700, 800, 1000 or more)



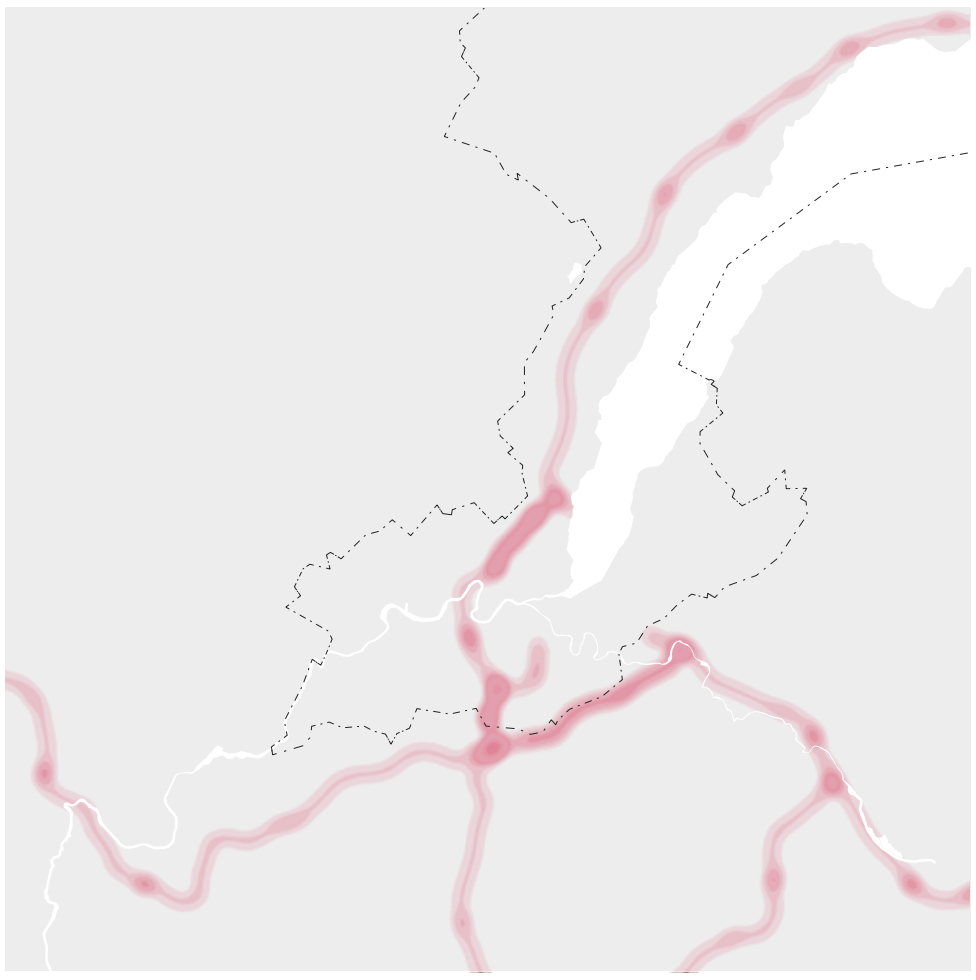
2 Accessibility by car to major central functions

Distance in minutes from light to dark (5', 10', 15', 20', 25', 30', 35', 40', 45' and more)



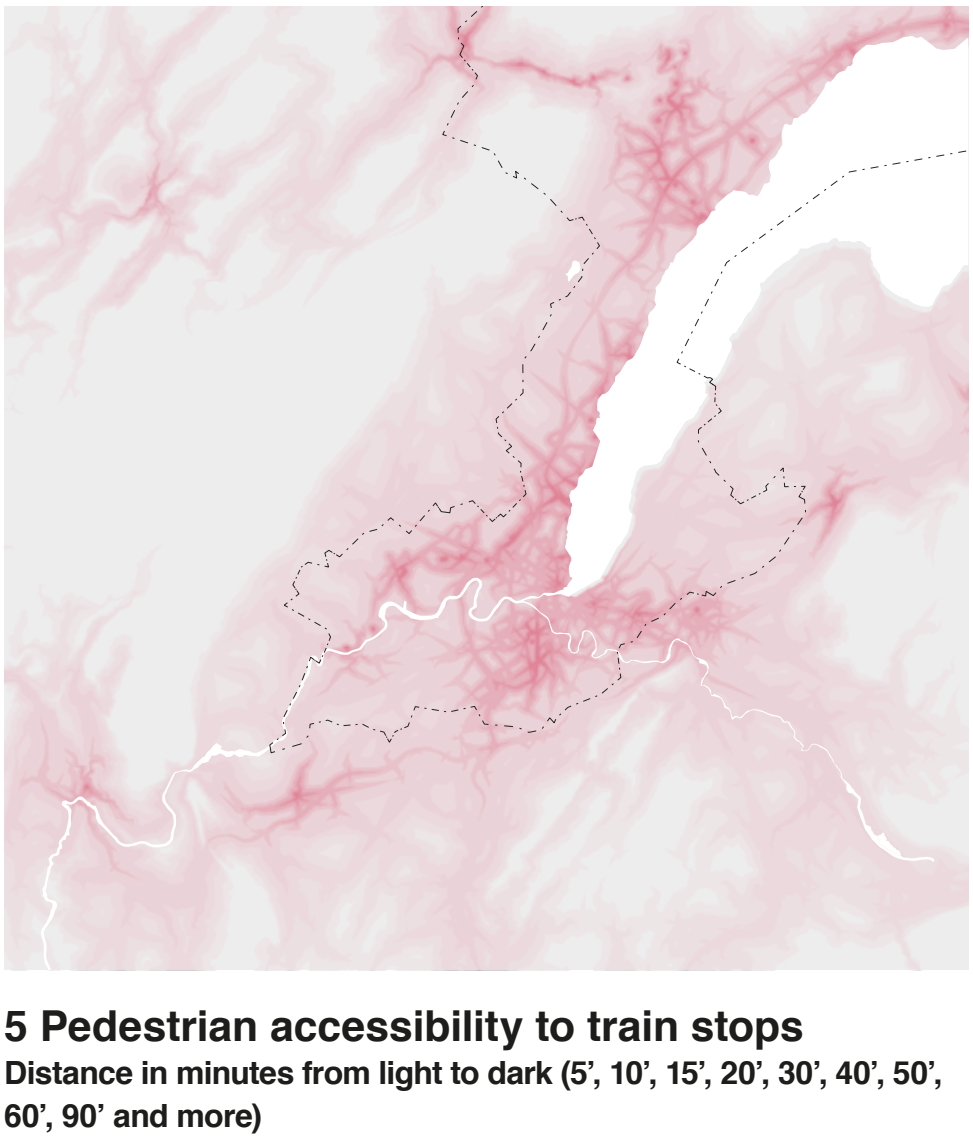
3 Density of major road networks

The gradient shows the length of roads per km² from light to dark (1, 2, 3, 4, 5, 6, 7, 8, 10 or more)



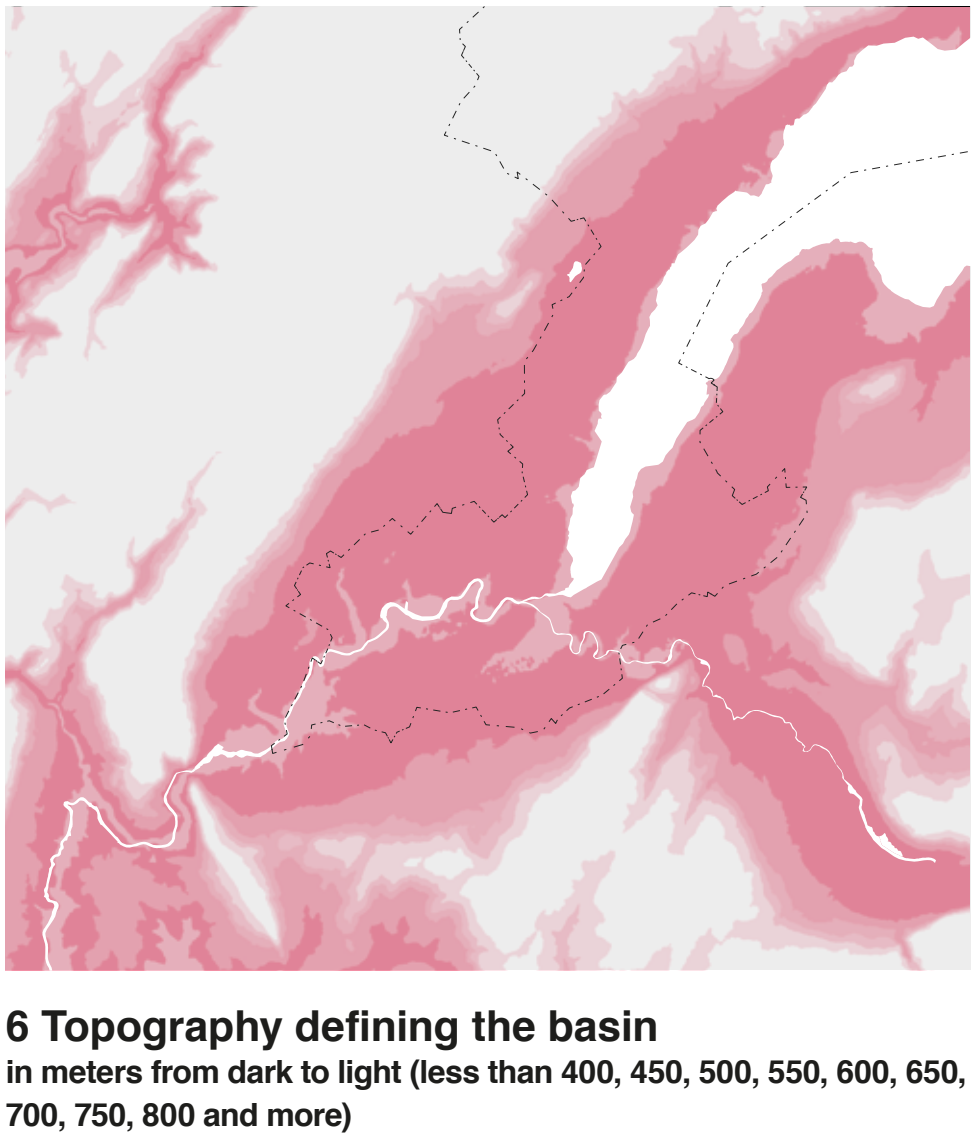
4 Density of major railway networks

The gradient shows the length of railways per km² from light to dark (1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 or more)



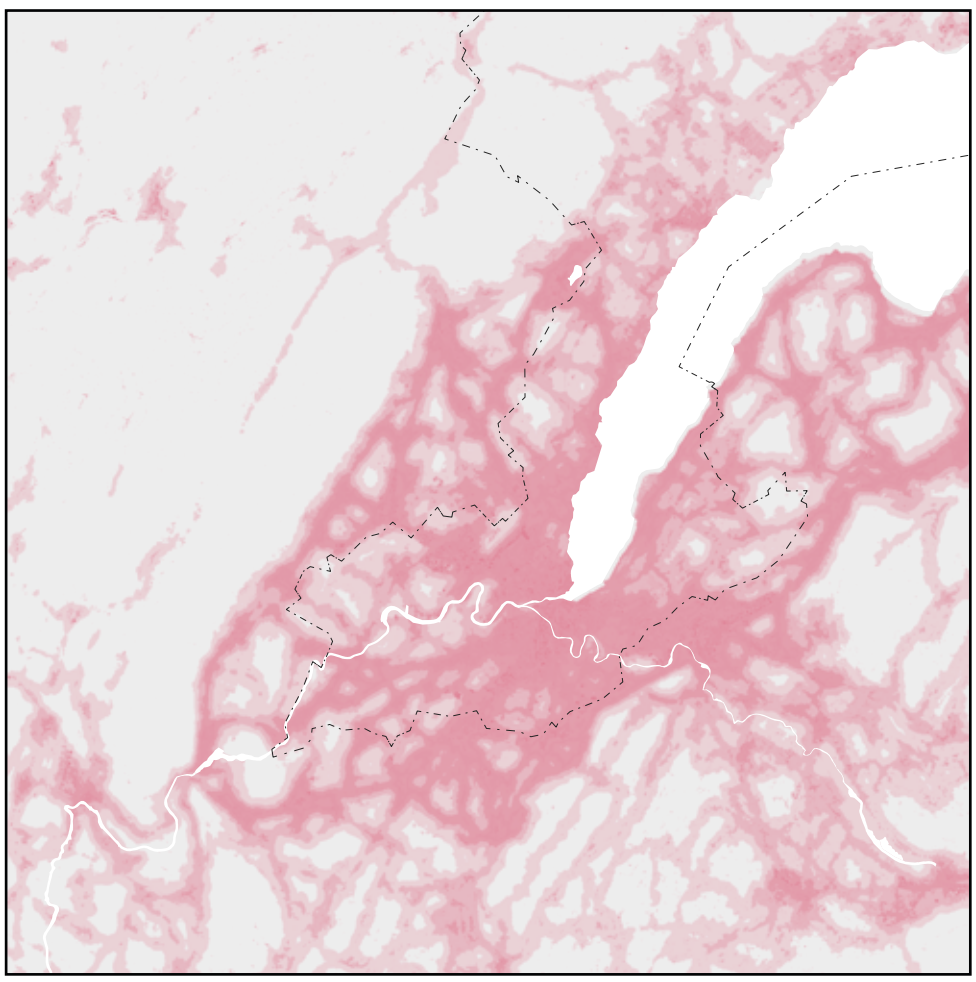
5 Pedestrian accessibility to train stops

Distance in minutes from light to dark (5’, 10’, 15’, 20’, 30’, 40’, 50’, 60’, 90’ and more)



6 Topography defining the basin

in meters from dark to light (less than 400, 450, 500, 550, 600, 650, 700, 750, 800 and more)



Composite figure of the Bi-National Metropolis based on the indicators 1-6

Low **High potential**

6 Urban Potentials

Geneva City Centre

Commune Thoiry

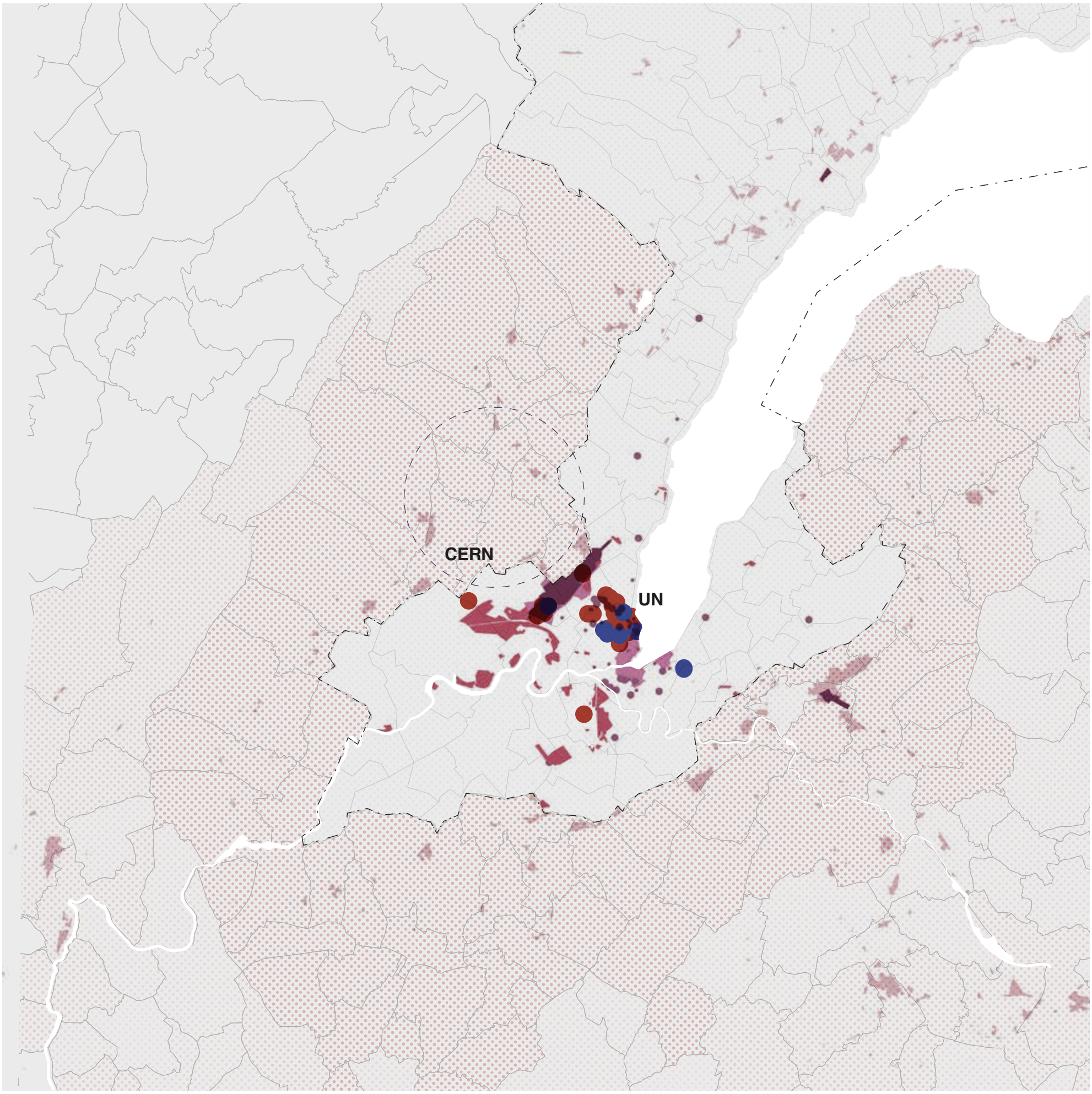
Bi-National Metropolis. Interconnected villages along the Jura Foothills.

Jardin des Nations, 2019

2 Global-Local Territories

For the Global-Local Territories the goal has been to define the concentrations of the major global actors and the potential areas for the decentralization across the region. High potential for the landscapes of the Global-Local Territories is presented in areas that are close to, and accessible from, existing concentrations of international organizations, universities, company headquarters, as well as to the major airports of the region and CERN. Moreover, high potential is also presented in areas that could host the decentralization of this functions, modeled as the distance and accessibility from existing settlement centers other than Geneva. These values where modeled through distance and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Global-Local Territories potential envelope.

6 Urban Potentials



- Intergovernmental organisation
- International organisation, business headquarters and offices
- Universities and other international research institutions
- International Airport
- Tourist centers
- Tourist tax zone
- Logistic and industrial zones

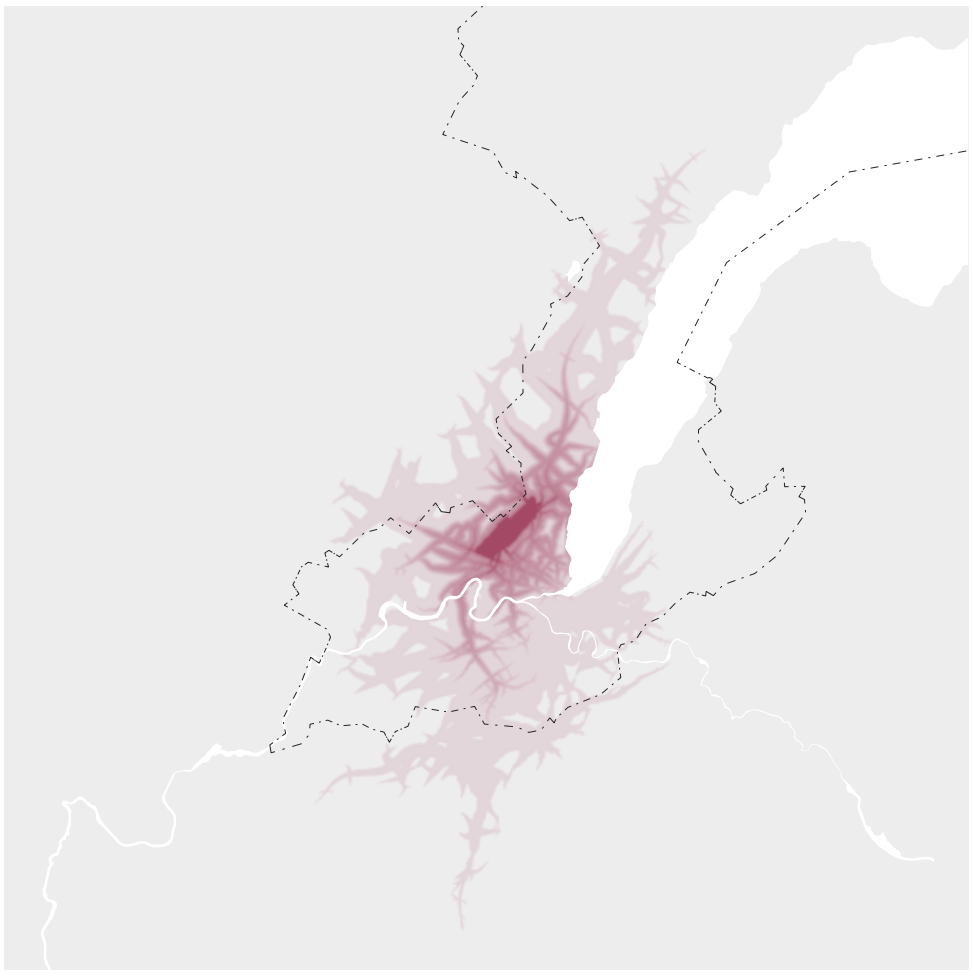
Inhabitants working in Switzerland per commune

- < 3%
- 12 - 3%
- 25 - 12%
- 40 - 25%
- > 40%

From global organisations to global-local protagonists in the territory.
Global protagonists act also as agents of urban transformation on the global and local level — real estate development, public infrastructures and services.

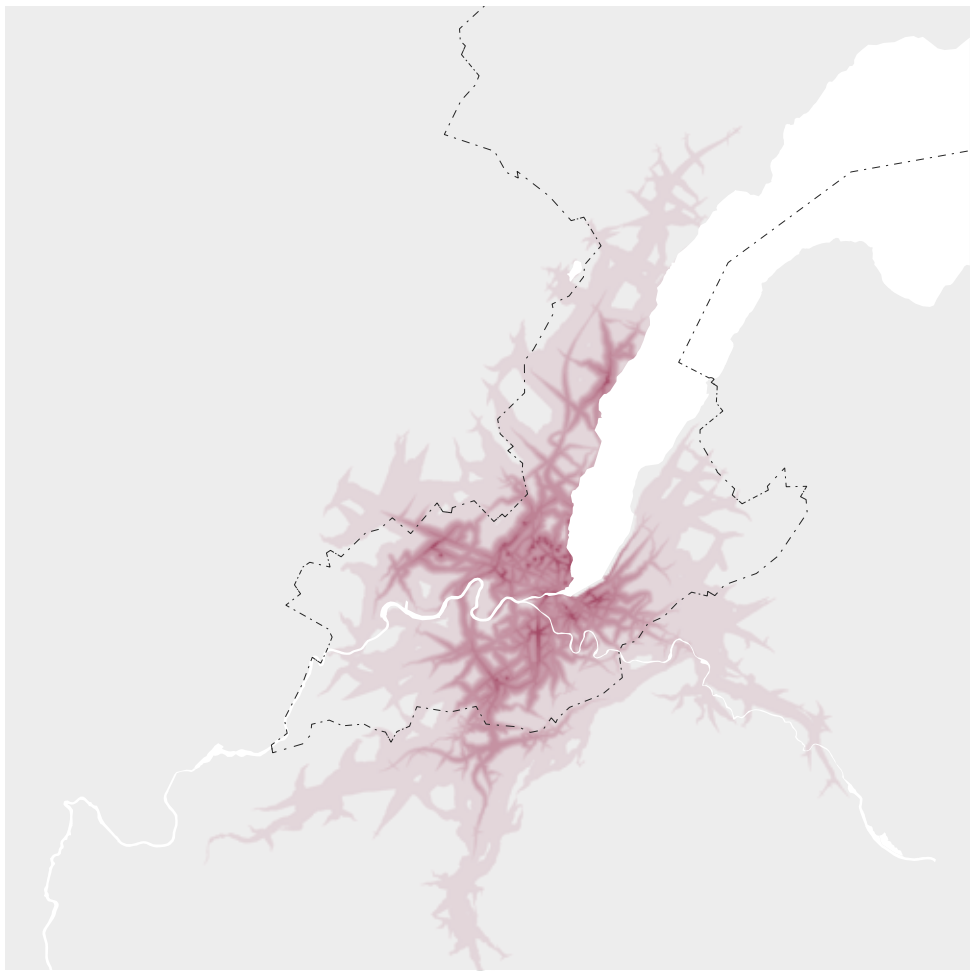
CERN Meyrin Site

Global-Local Territories. From CERN as fortress, to CERN as open campus.



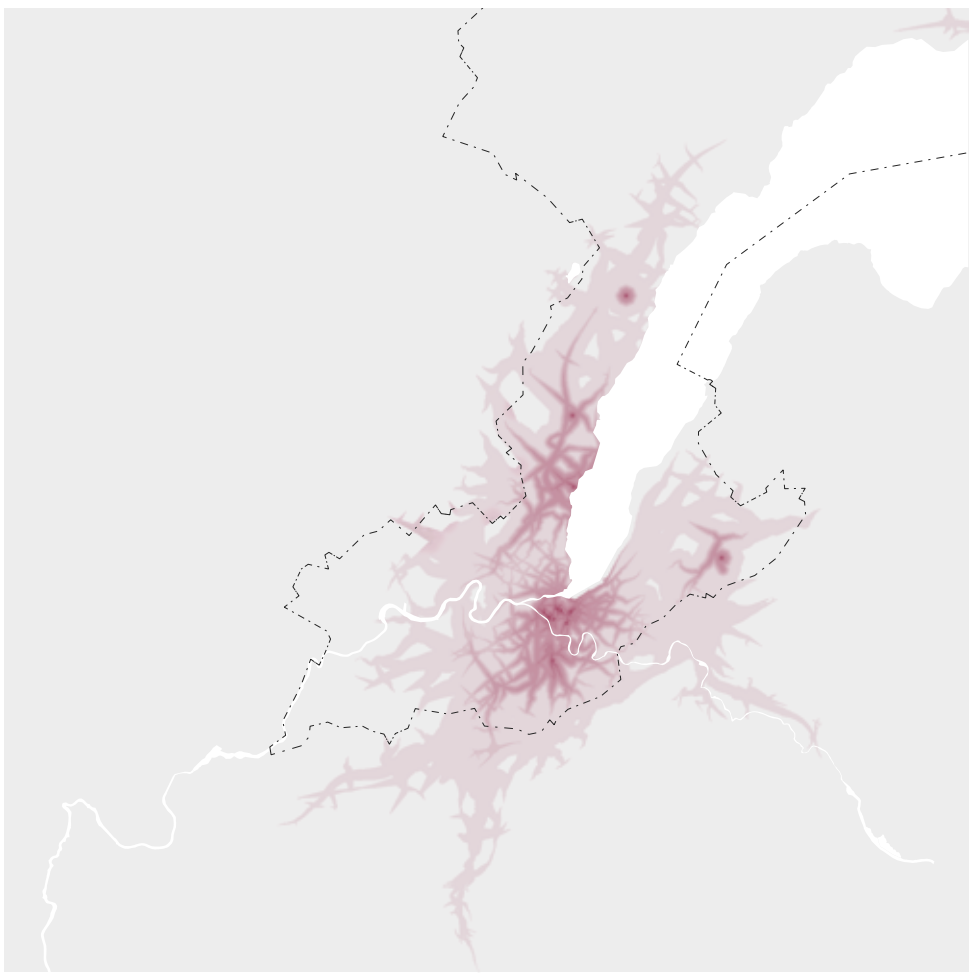
1 Accessibility by car to Geneva Airport

Distance in minutes from light to dark (5’, 10’, 15’, 20’, 25’, 30’, 35’, 40’, 45’ and more)



2 Accessibility by car to international organisation, business headquarters and offices

Distance in minutes from light to dark (5’, 10’, 15’, 20’, 25’, 30’, 35’, 40’, 45’ and more)



3 Accessibility by car Access international research institutions and facilities

Distance in minutes from light to dark (5’, 10’, 15’, 20’, 25’, 30’, 35’, 40’, 45’ and more)

to be completed

4 Access to international schools

to be completed

5 Access to exclusive leisure facilities like horse riding ranches, golf courses

to be completed

6 Access to benefit zones

to be completed

Composite figure for Global-Local Territories based on the indicators 1-6

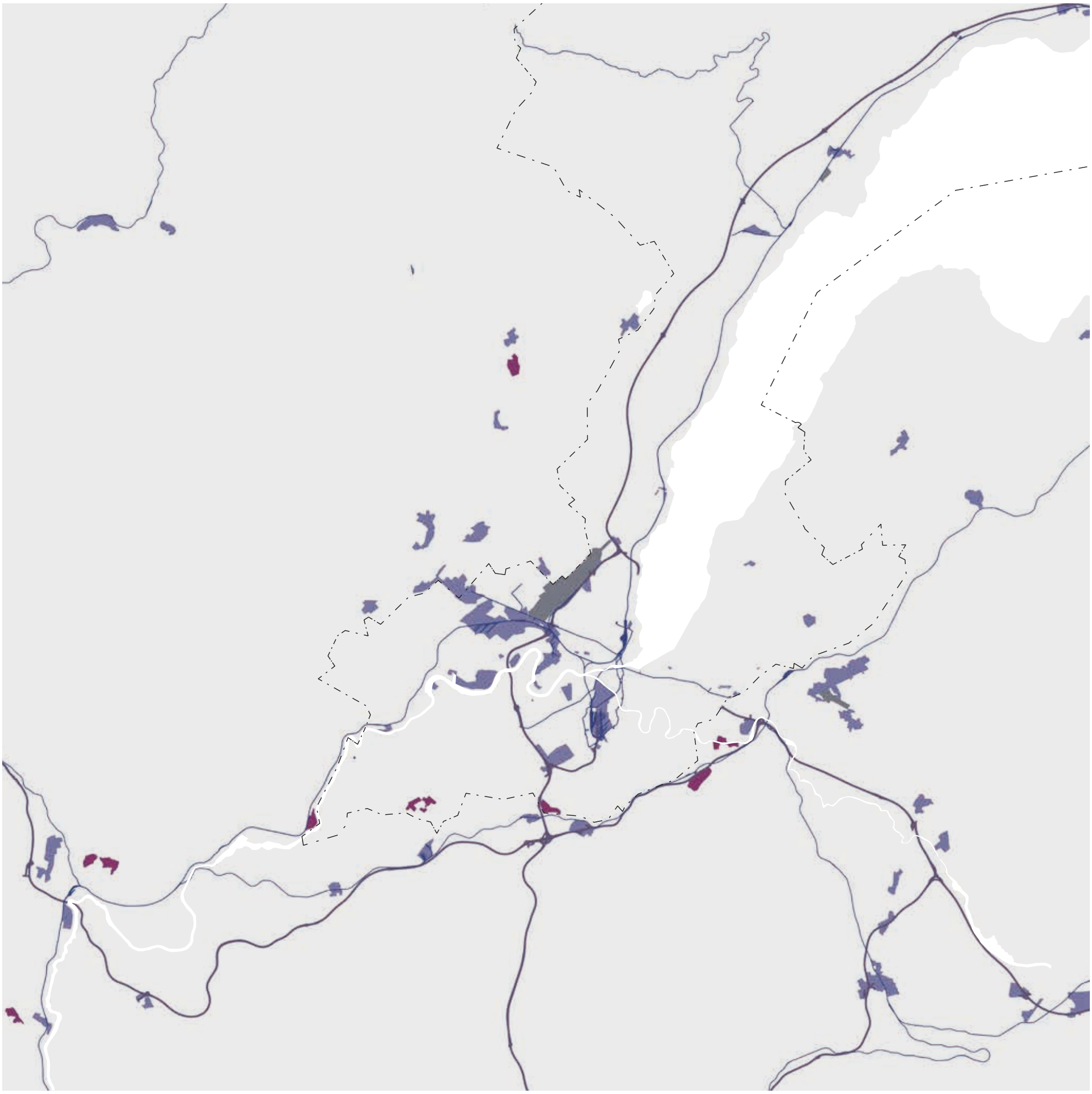
Low **High potential**

View along the A1 highway, 2019

3 Post-Fossil Infrastructures

For the Post-Fossil Infrastructures Territories, the goal has been to define the concentrations of the major transport infrastructures that could be transformed into post-carbon development areas, as well as the concentrations of former mining and dump sites. High potential for the landscapes of the Post-Fossil Infrastructures Territories is presented in areas that are close to existing concentrations of railway infrastructures and railyards, as well as former mining and dump sites. These values where modeled through distance and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Post-Fossil Infrastructures Territories potential envelope.

6 Urban Potentials

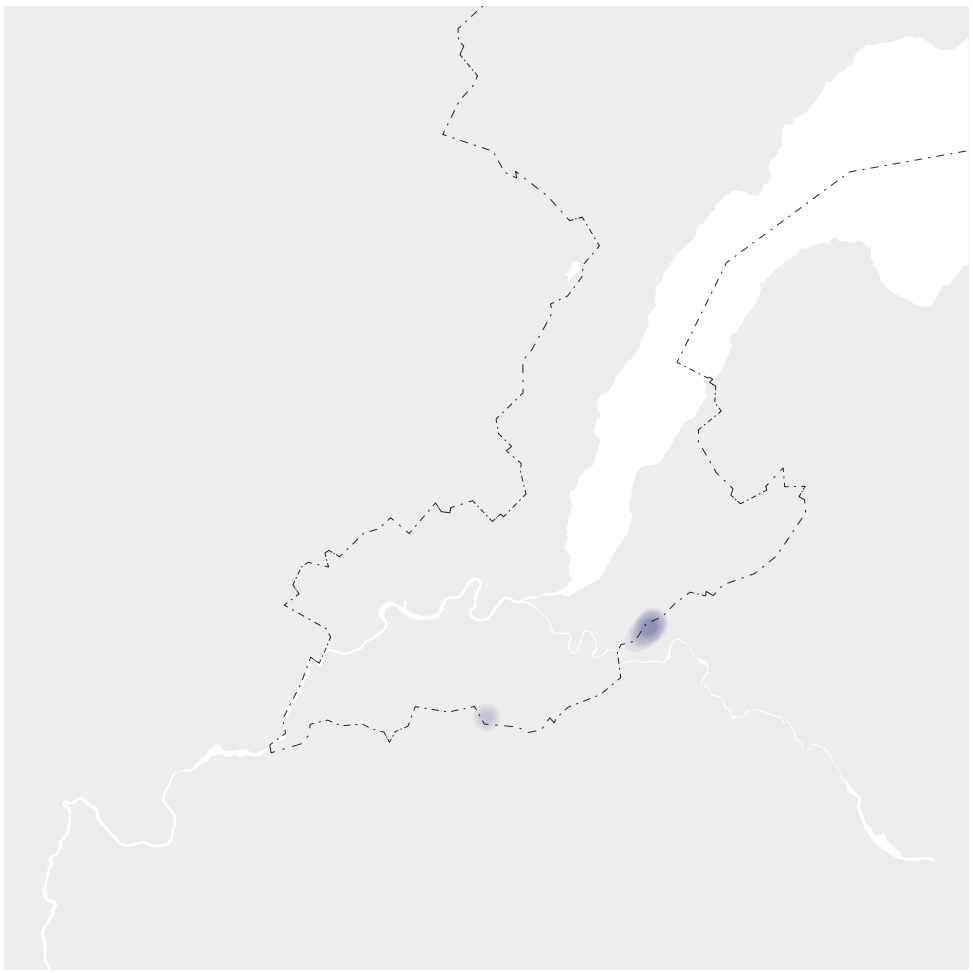


- Highway network
- Railway network
- Border crossing
- Parking and park and ride
- International Airport
- Logistic and industrial zones
- Industrial mining sites

From fossil infrastructures to potential post-fossil infrastructures.
Transformation of heavy sealed surfaces and corridors into territories of hybrid infrastructures for new residential programs, recreational and nature areas, traversing the metropolitan region from in periphery to the center.

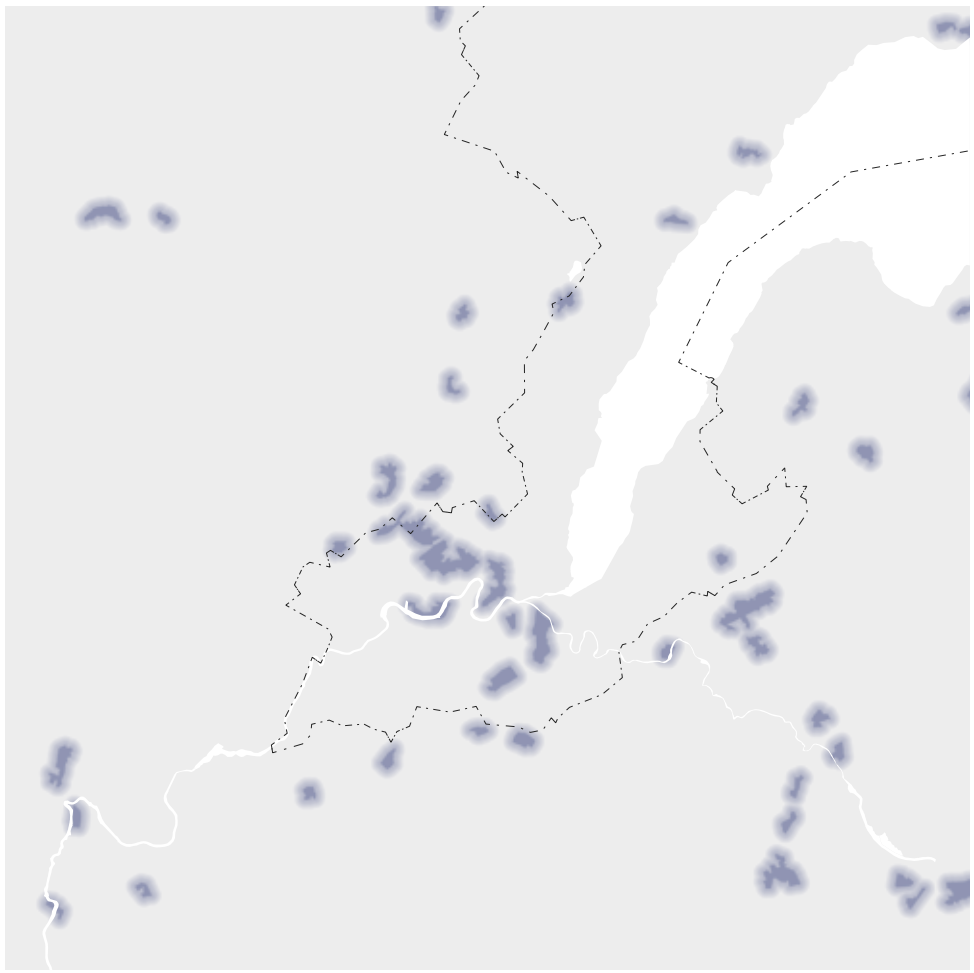
A1 highway and Geneva Airport

Post-Fossil Infrastructures. Former large infrastructure networks can serve as new corridors for fresh air exchange, passages for nature and wildlife.



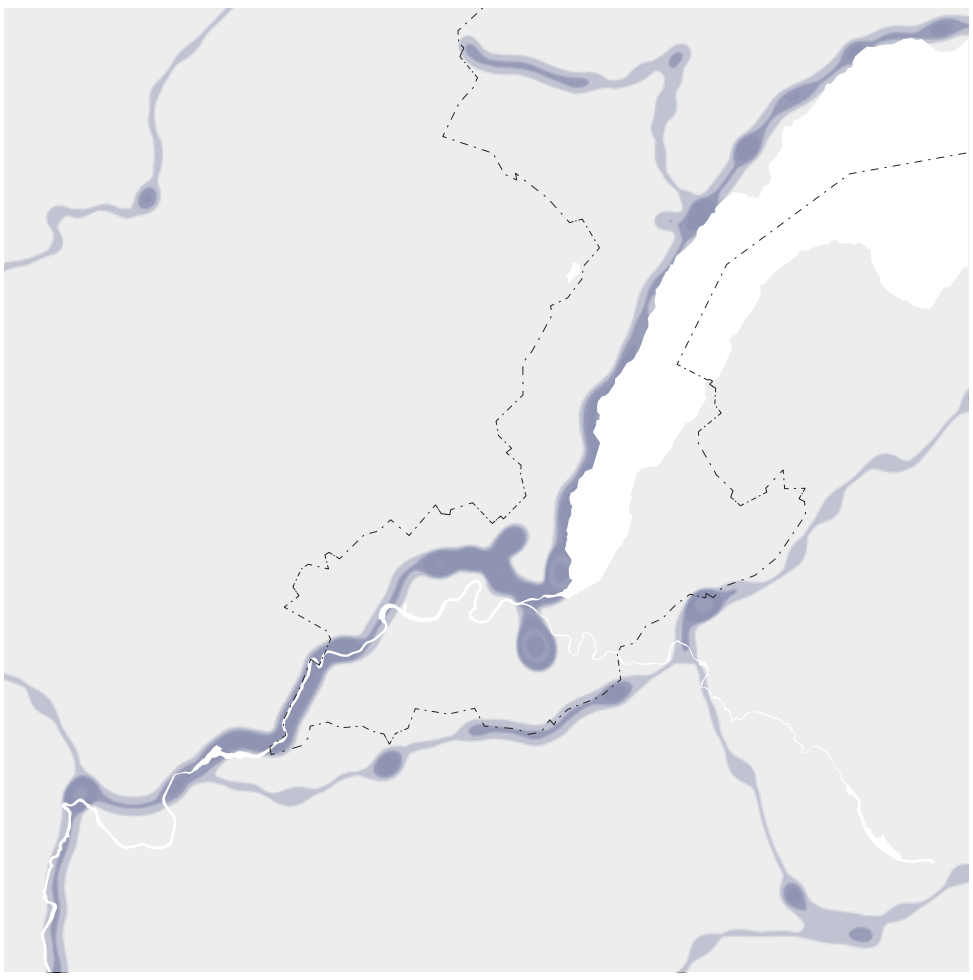
1 Distance from redundant border crossings

Distance in meters from dark to light (0, 5, 10, 50, 100, 200, 300, 400, 500 and more)



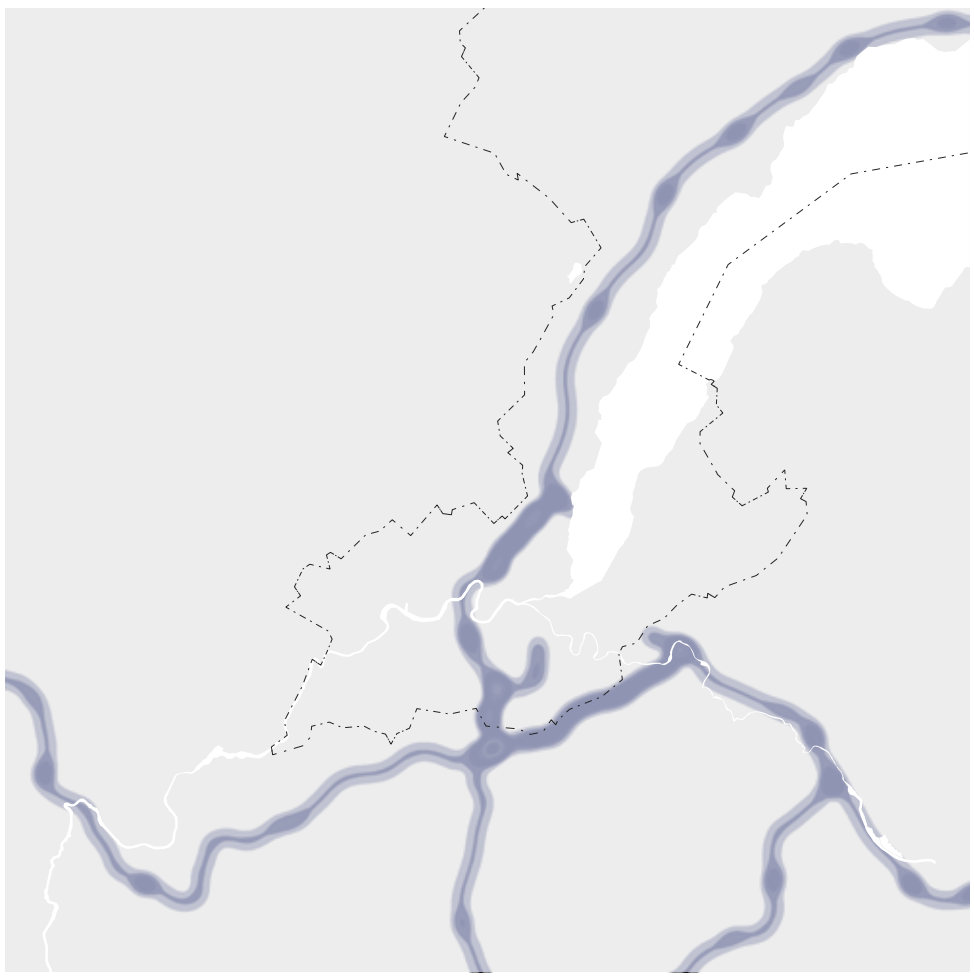
2 Distance from logistics and industrial surfaces.

Distance in meters from dark to light (0, 5, 10, 50, 100, 200, 300, 400, 500 and more)



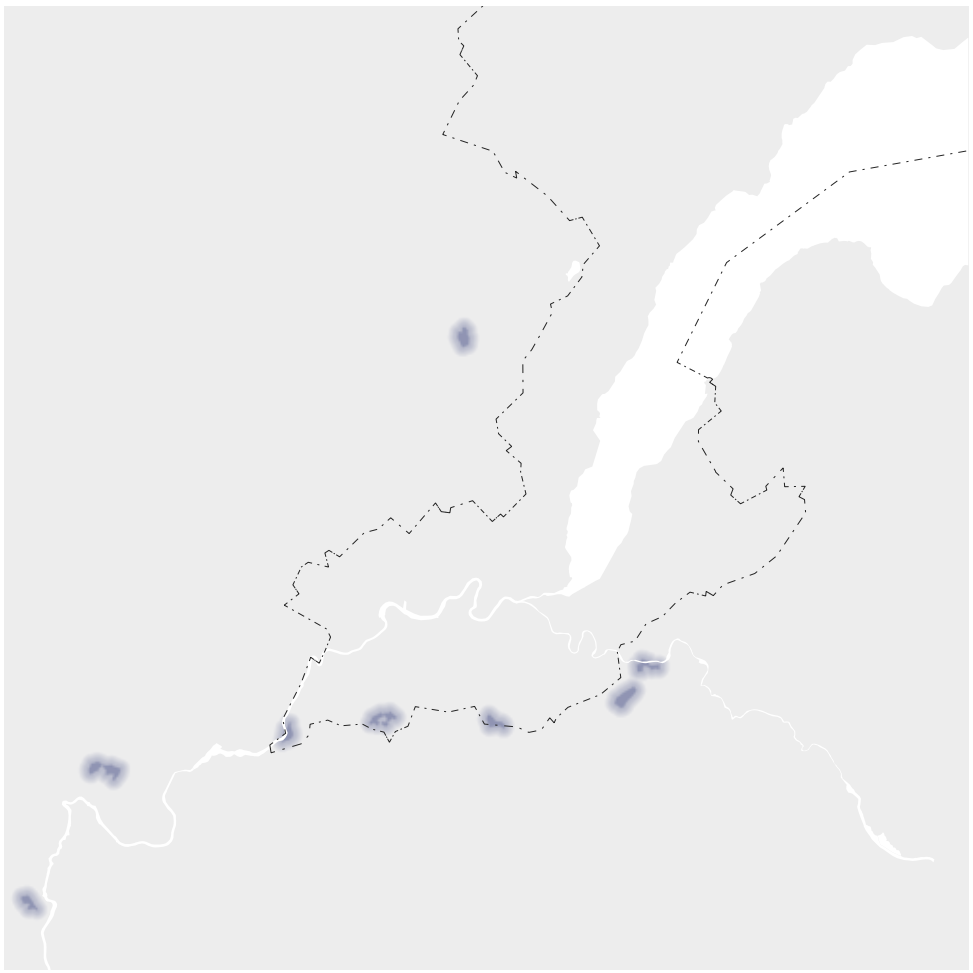
3 Density of railway infrastructure

The gradient shows the length of railways per km² from light to dark (1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 or more)



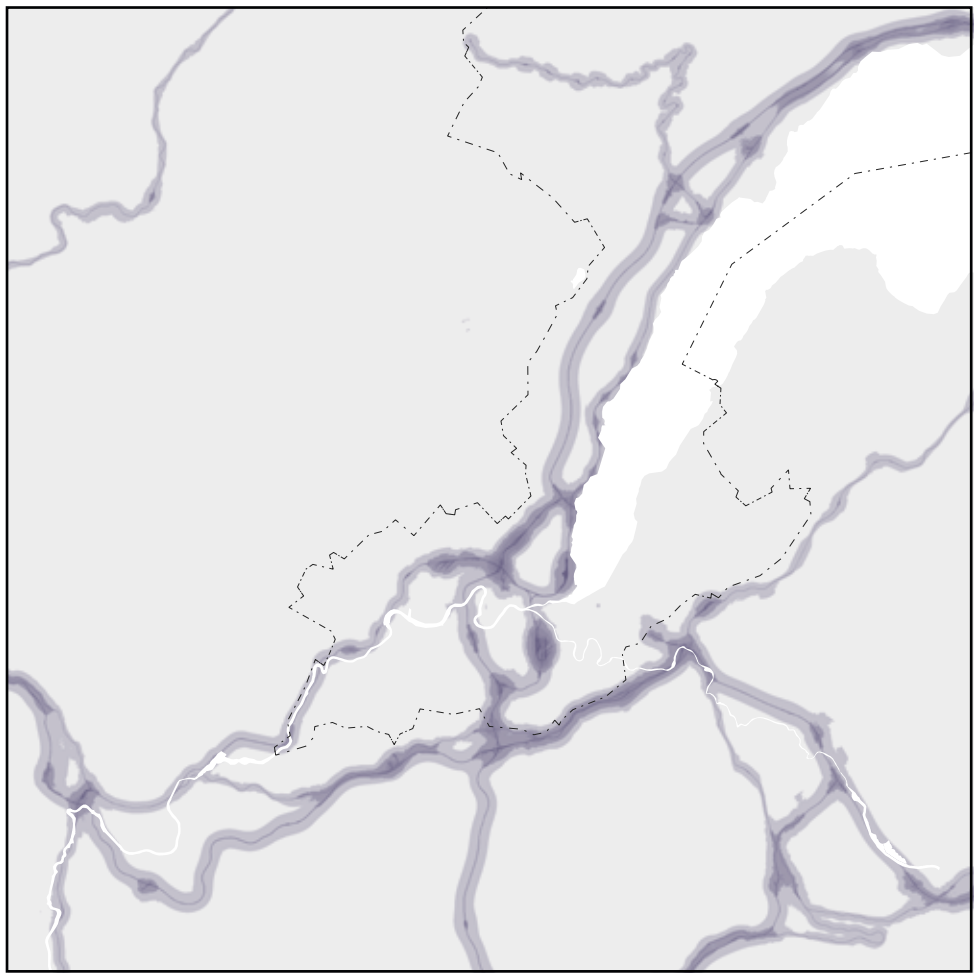
4 Density of highway infrastructure.

The gradient shows the length of highways per km² from light to dark (1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 or more)



5 Distance from logistics and industrial surfaces

Distance in meters from dark to light (0, 5, 10, 50, 100, 200, 300, 400, 500 and more)



Composite figure for Post-Fossil Infrastructures based on the indicators 1-5

Low **High potential**

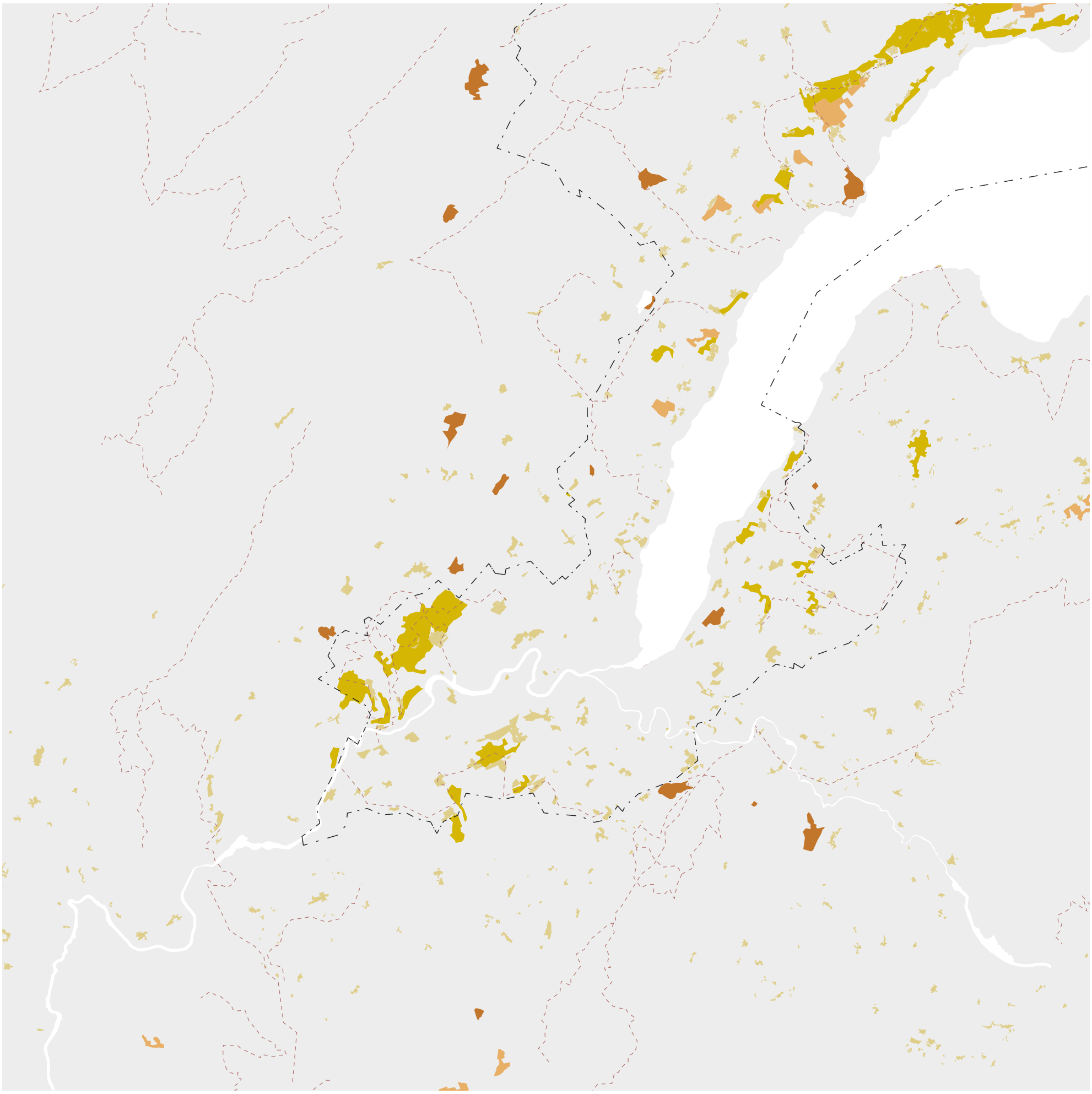
6 Urban Potentials

Vineyards of Vinzel, 2018

4 Metropolitan Countryside

For the Metropolitan Countryside Territories, the goal has been to define the concentrations of certain agricultural and recreational elements of the countryside. High potential for the landscapes of the Metropolitan Countryside Territories is presented in areas that are close to existing concentrations of vineyards and orchards, as well as golf courses, existing village cores, and trains. These values where modeled through distance, accessibility and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Metropolitan Countryside Territories potential envelope.

6 Urban Potentials

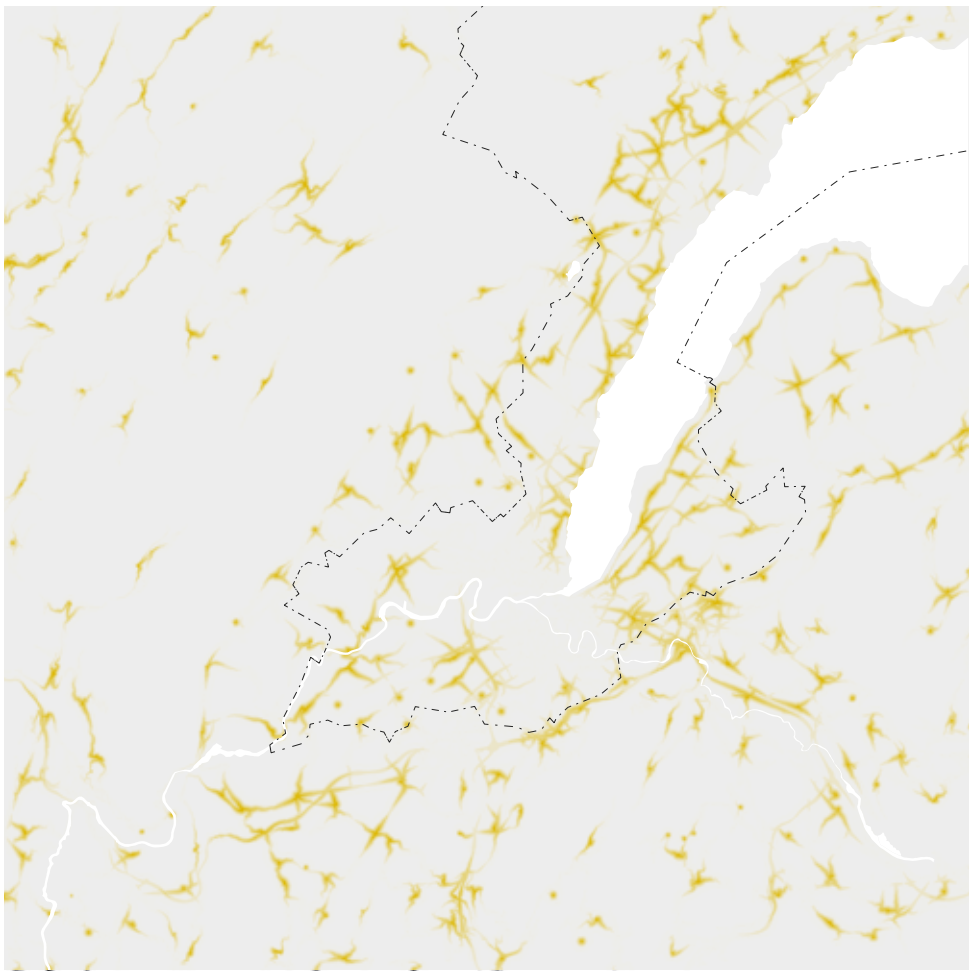


- Panorama and scenic routes
- Historic and protected villages
- Vineyards
- Fruit tree orchards
- Golf courses

From exclusive leisure landscapes of horse riding ranches and golf courses, towards open cultural countryside destinations in the metropolitan region. New accesses and public facilities can strengthen the village as an active actor in the metropolis again.

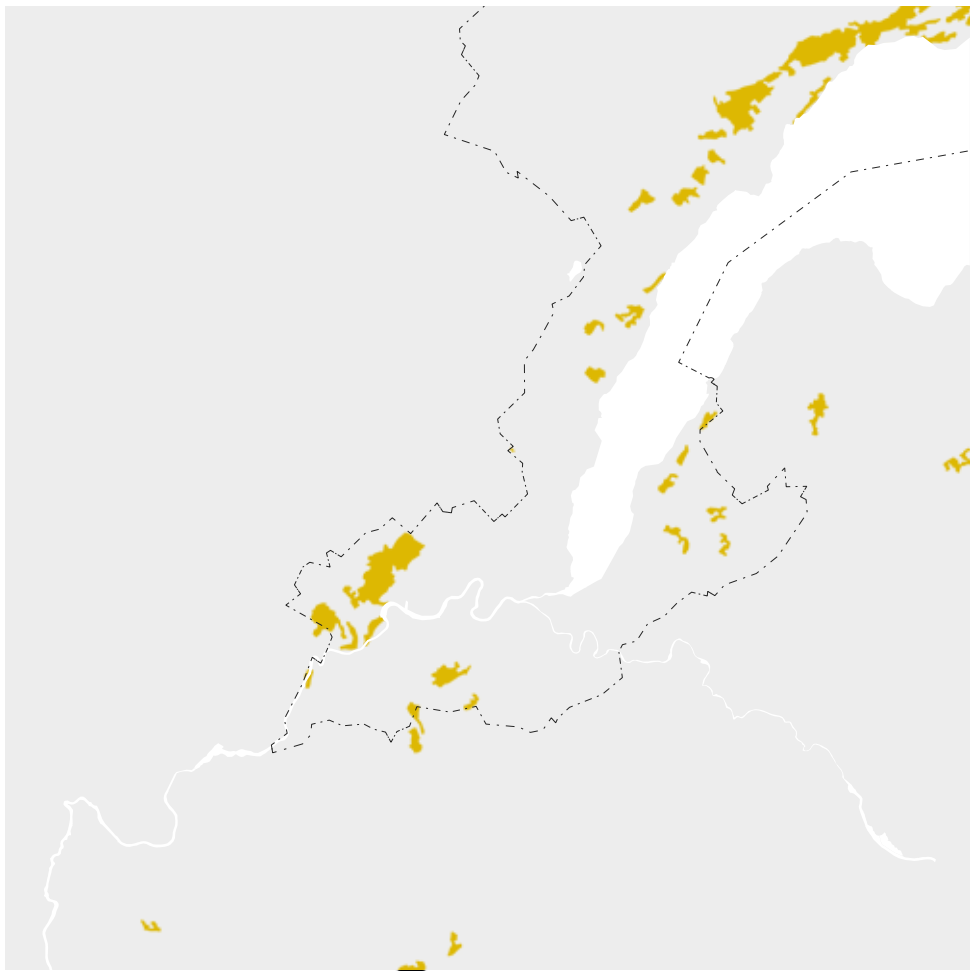
Vineyards and fields of Russin and Dardagny

Metropolitan Countryside. Large residential islands with strong ties between the village and land.

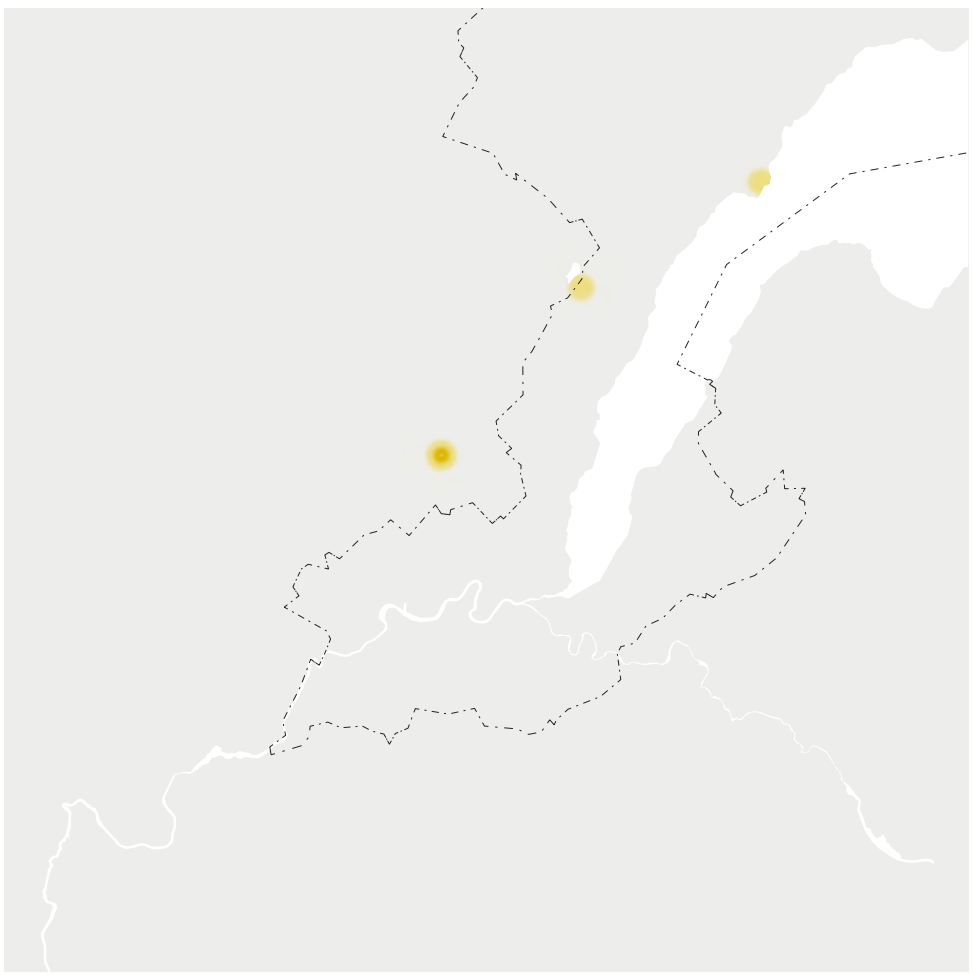


1 Pedestrian accessibility to protected village cores

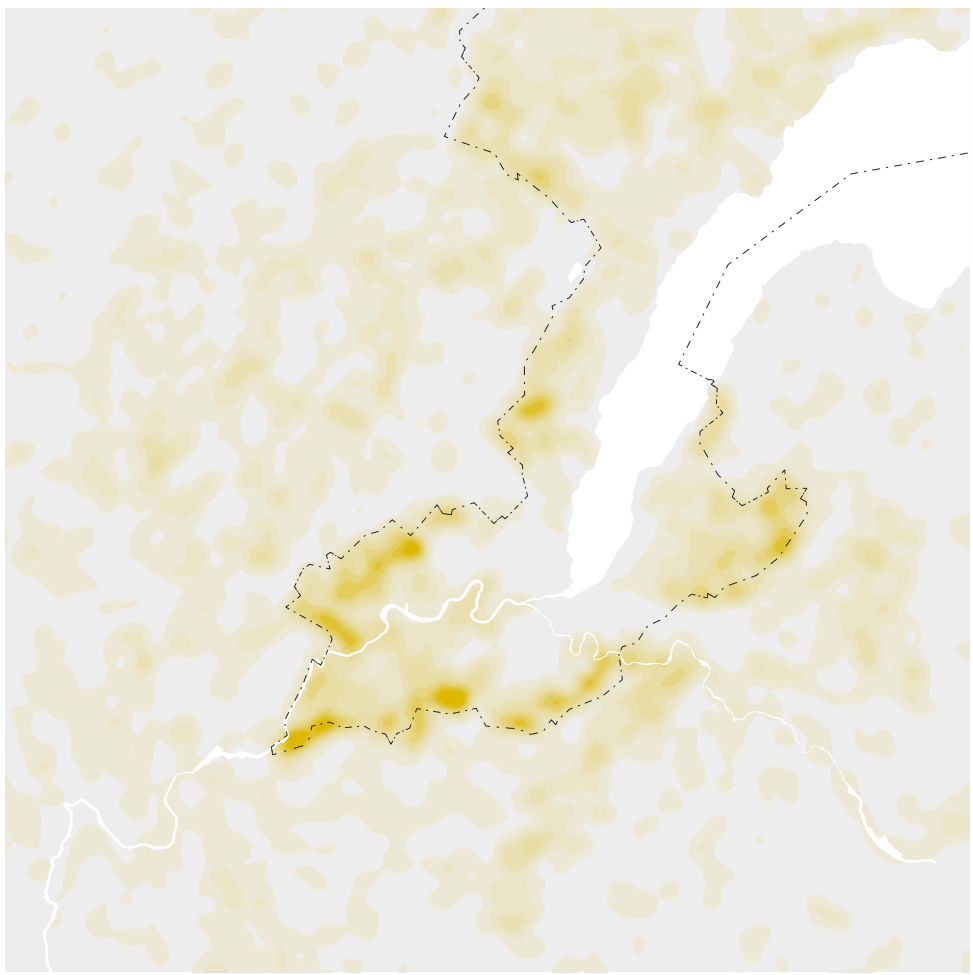
Distance in minutes from light to dark (5’, 10’, 15’, 20’, 30’, 40’, 50’, 60’, 90’ and more)



2 Location of vineyards and fruit tree orchards

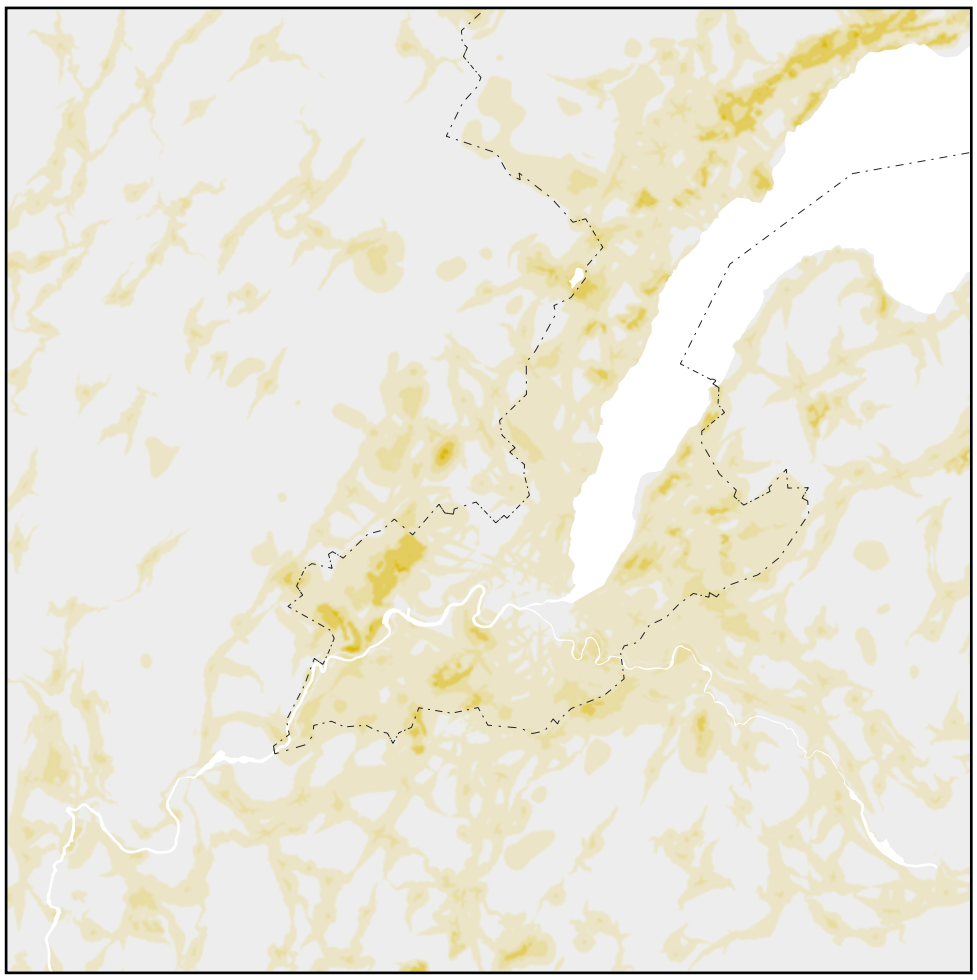


3 Location of golf courses



4 Density of pedestrian trails of panorama and scenic routes

The gradient shows the length of trails per km^2 from light to dark (1, 2, 3, 4, 5, 6, 7, 8, 10 or more)



Composite figure for Metropolitan Countryside based on the indicators 1-4

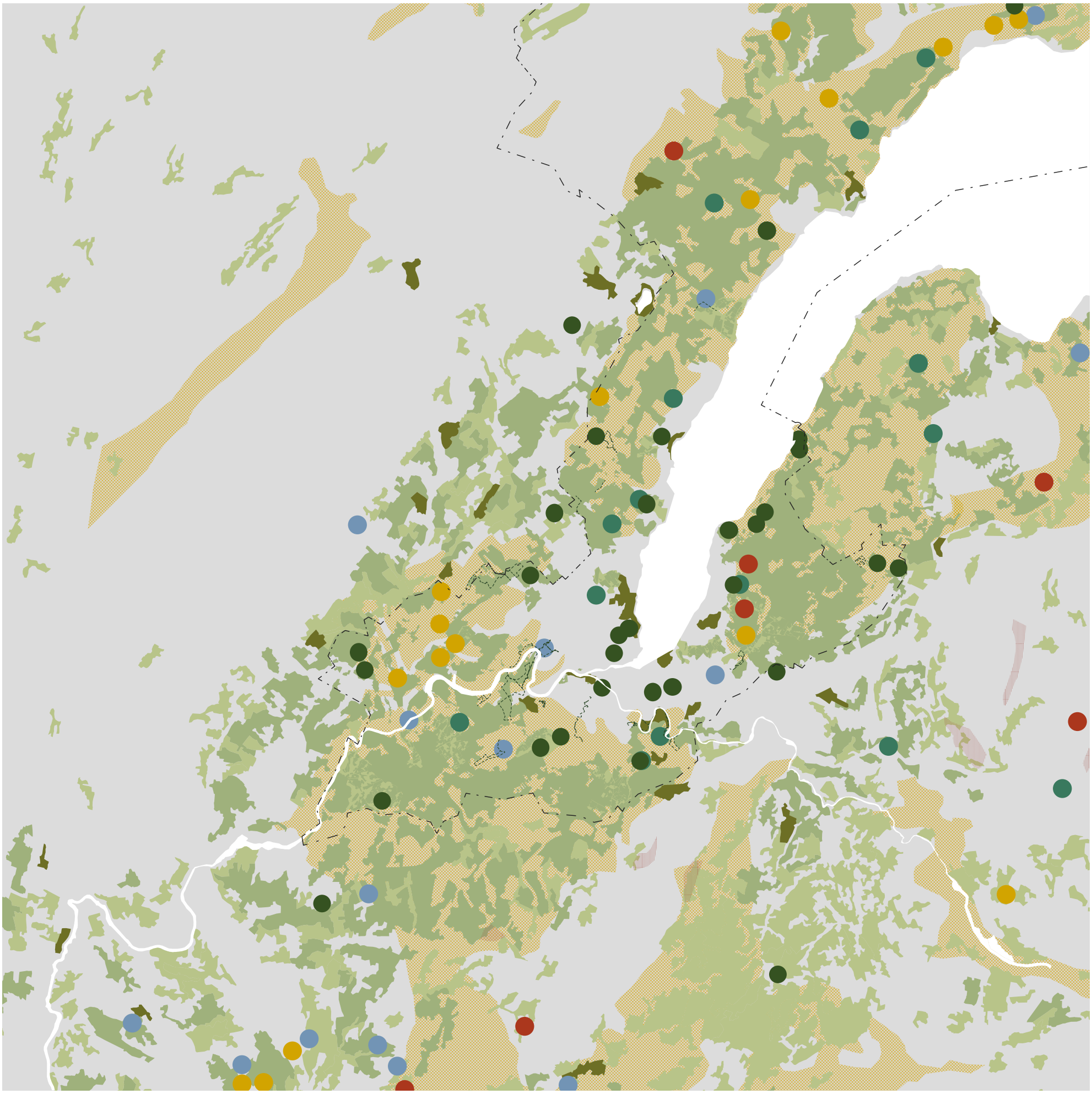
Low High potential

Large fields for crop rotation agriculture in the commune Jussy, 2018

5 Agri-Landscape Rooms

For the Agro-Landscape Rooms Territories the goal has been to define the concentrations of productive agricultural lands. High potential for the landscapes of the Agro-Landscape Rooms Territories is presented in areas that are close to existing concentrations of cash crop agriculture, with optimal slope and topographic conditions, overlapping with SDA zones, taking into consideration water, forest and settlement concentration restrictions. These values where modeled through distance and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Agro-Landscape Rooms Territories potential envelope.

6 Urban Potentials

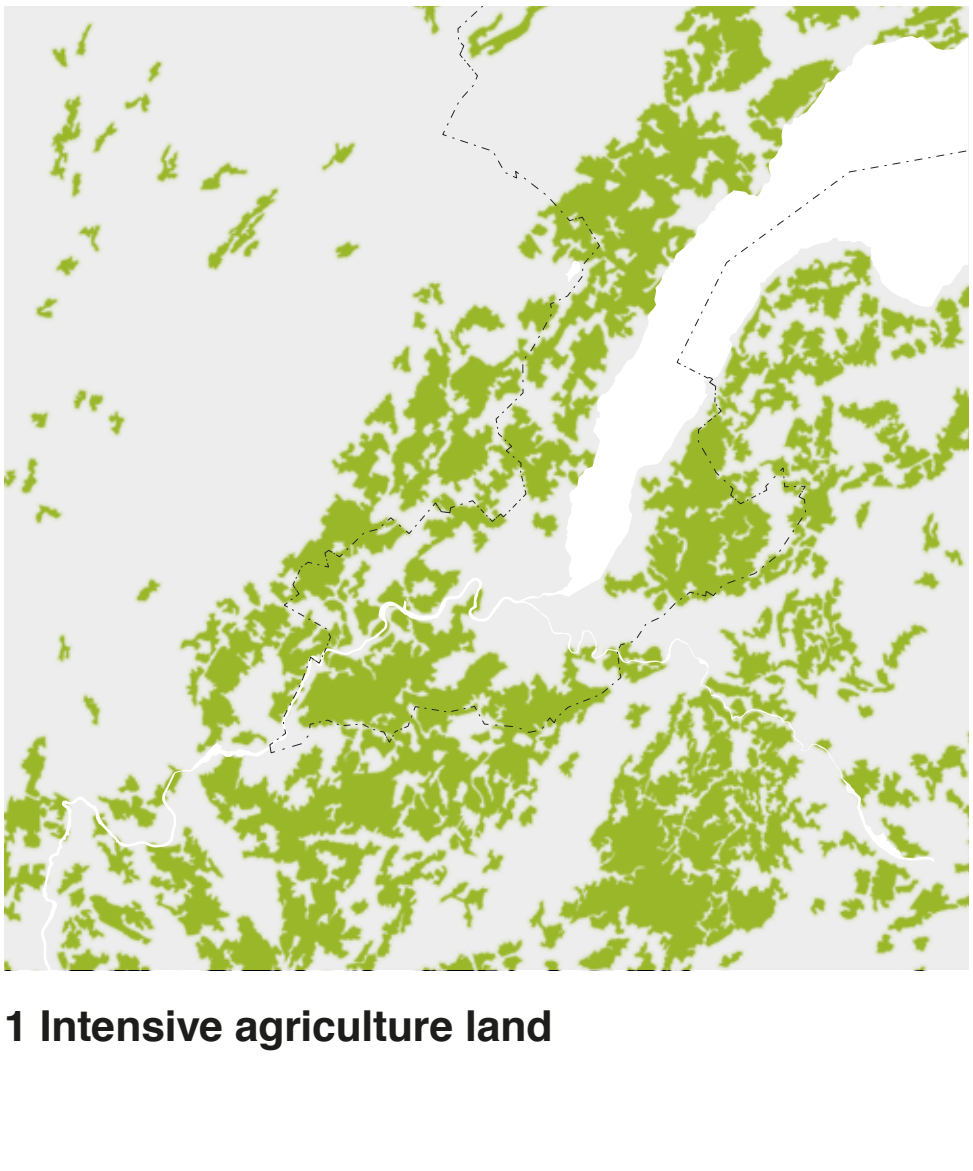


Direct selling points
Fruits and vegetables
Meat product
Milk products
Hiking trails in the plain
Large scale sport and leisure facilities
Intensive agriculture land
Fertile soil
Erosion zones

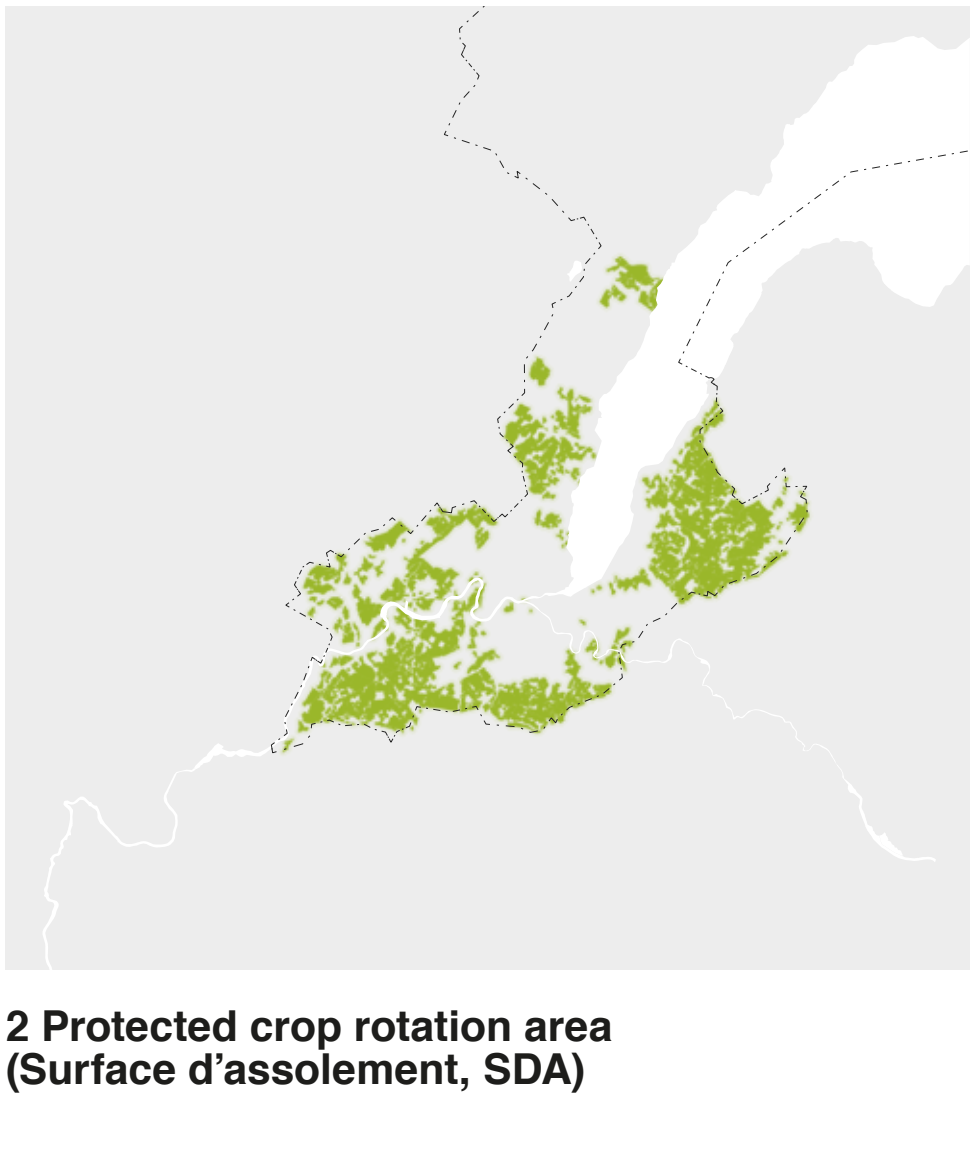
From fractured agricultures parcels encroached and slowly taken by the expanding city fabric to defined large metropolitan landscape spaces. Agri-Landscape Rooms are viable productive and recreational recognisable landscapes, inter-dispersed in the metropolitan fabric.

Agri-Landscape Room
Bardonnex- Compesières

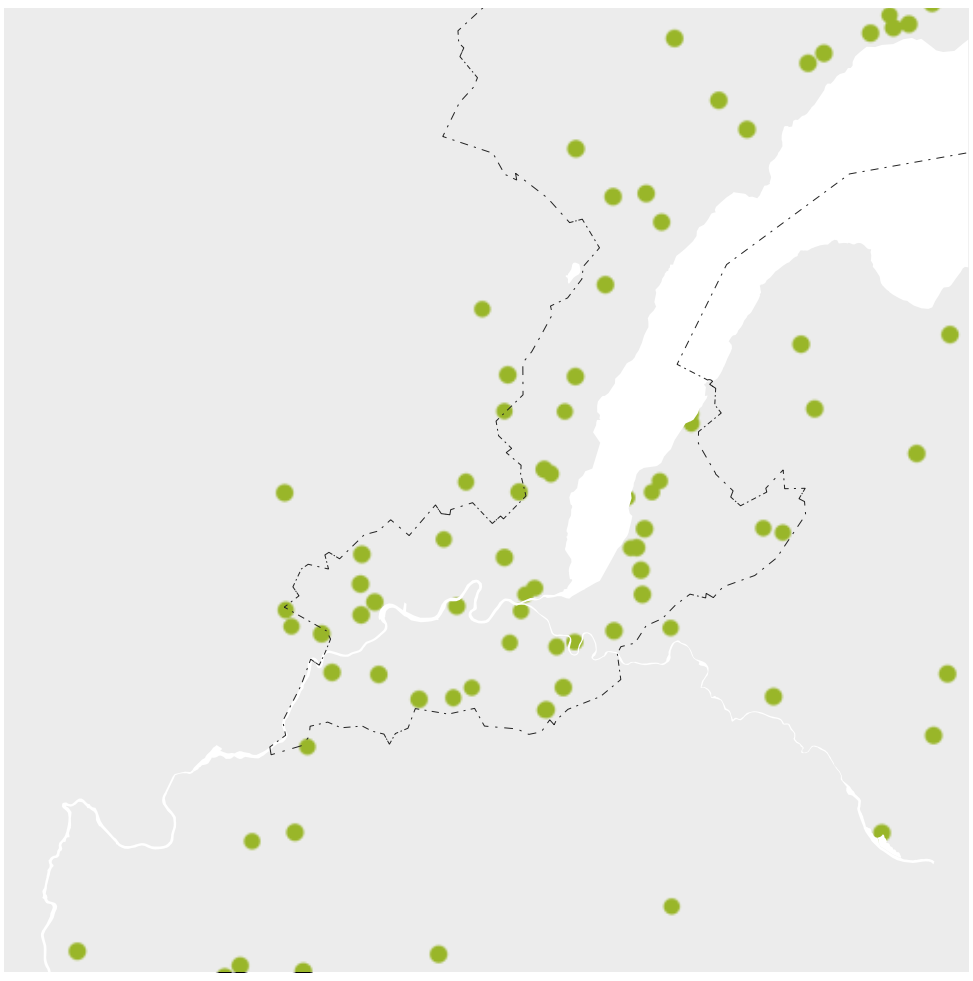
Agri-Landscape Rooms. Distinct open landscapes in the metropolis, that connect agro-ecological practices and new metropolitan commons.



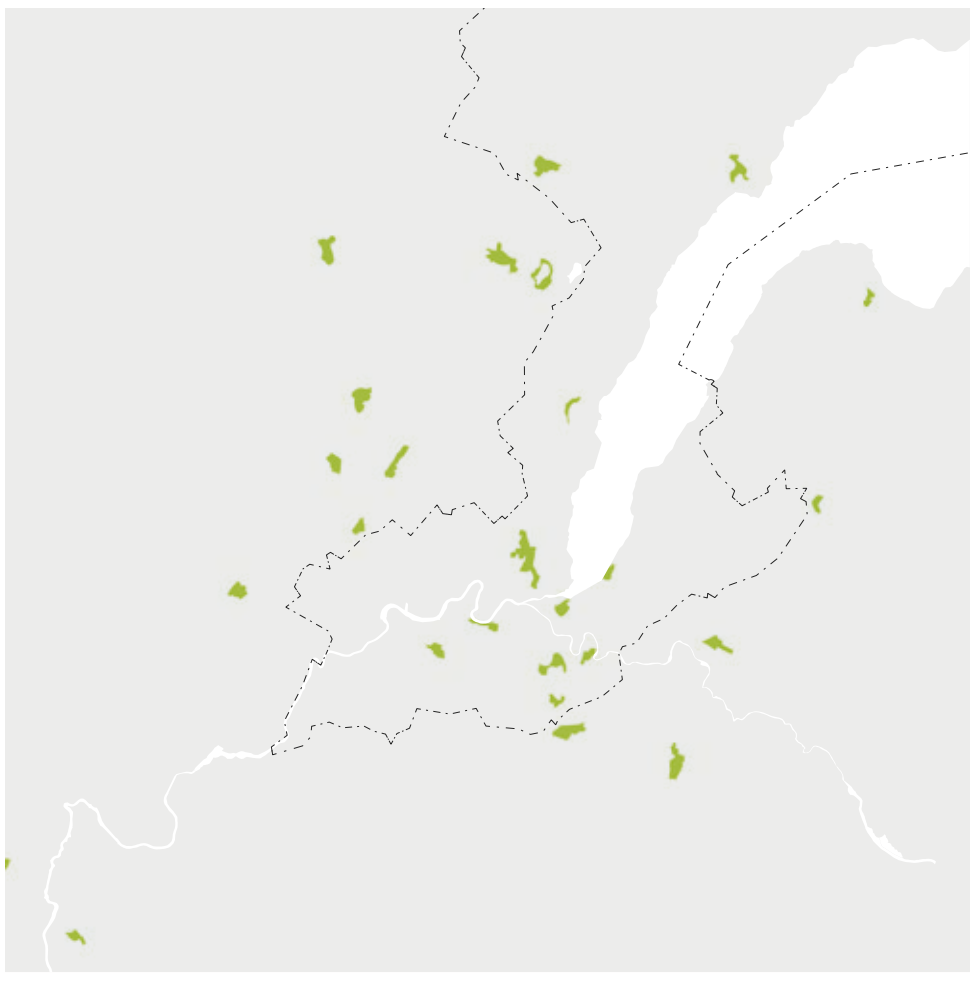
1 Intensive agriculture land



2 Protected crop rotation area (Surface d’assolement, SDA)

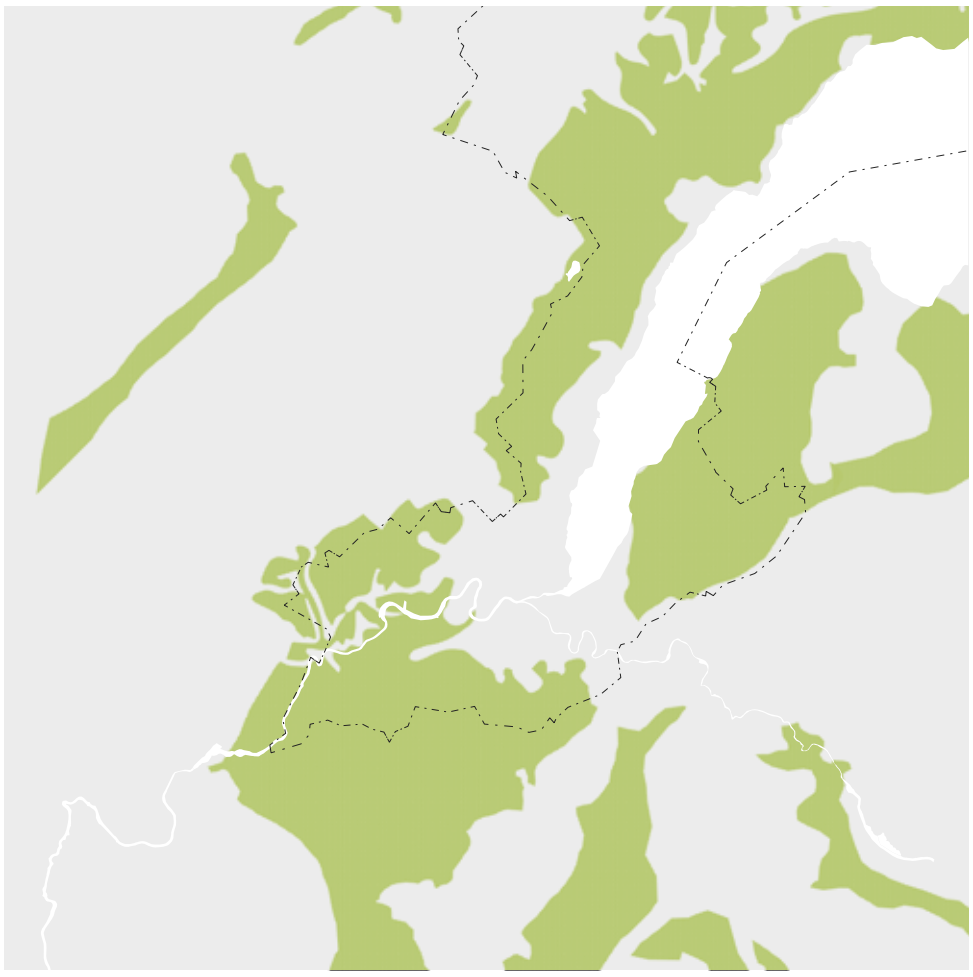


3 Location of direct selling point for agriculture produce

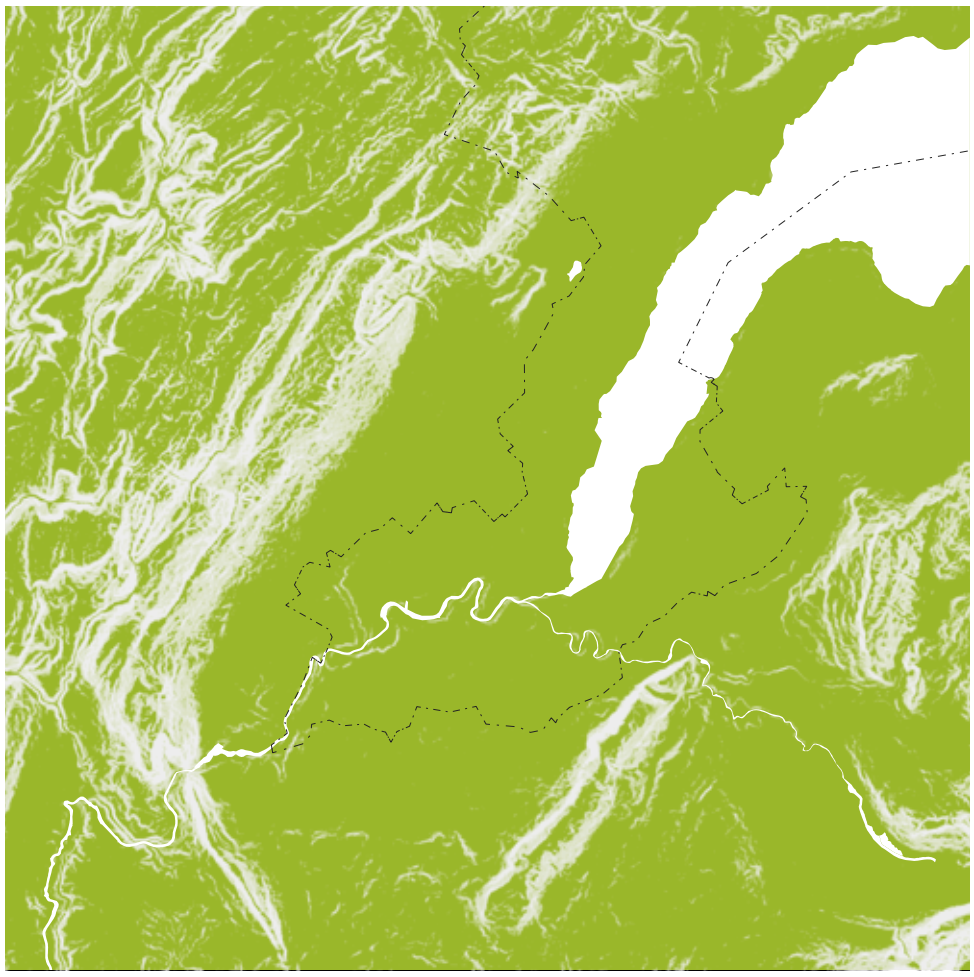


4 Location of large scale sport and leisure facilities

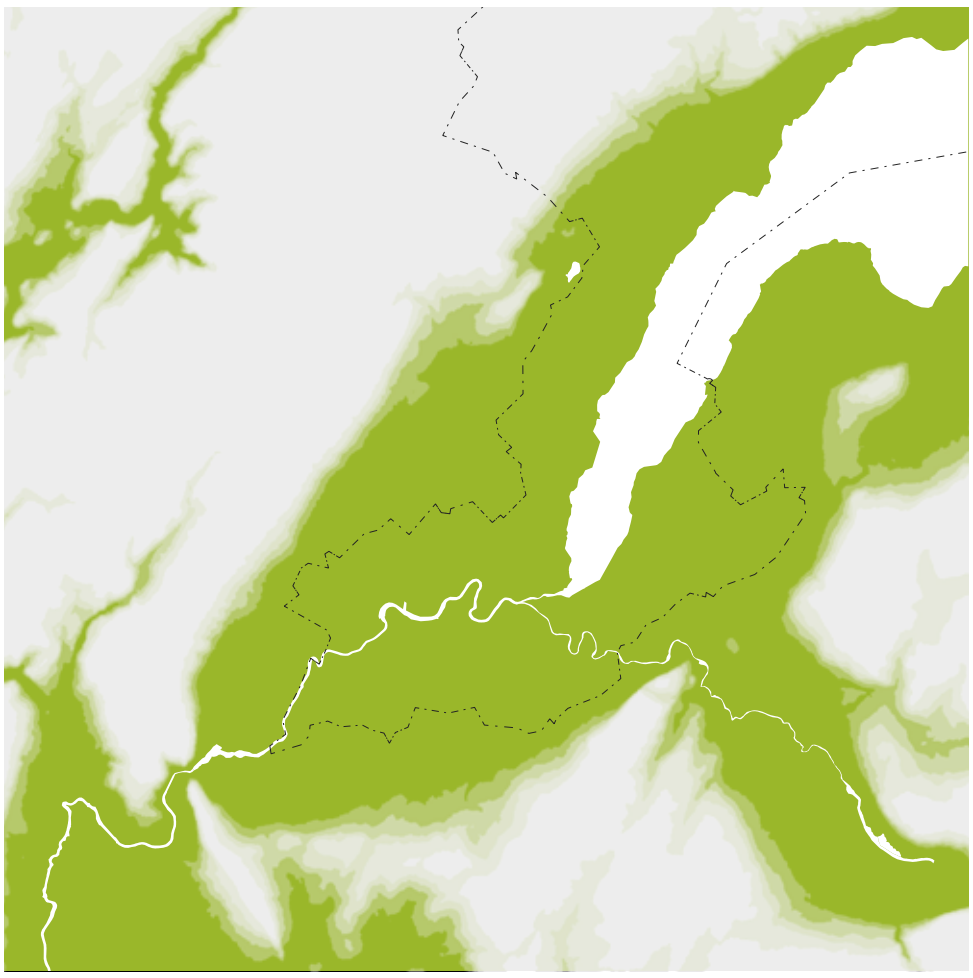
Indicators of potential territories for Agri-Landscape Rooms.



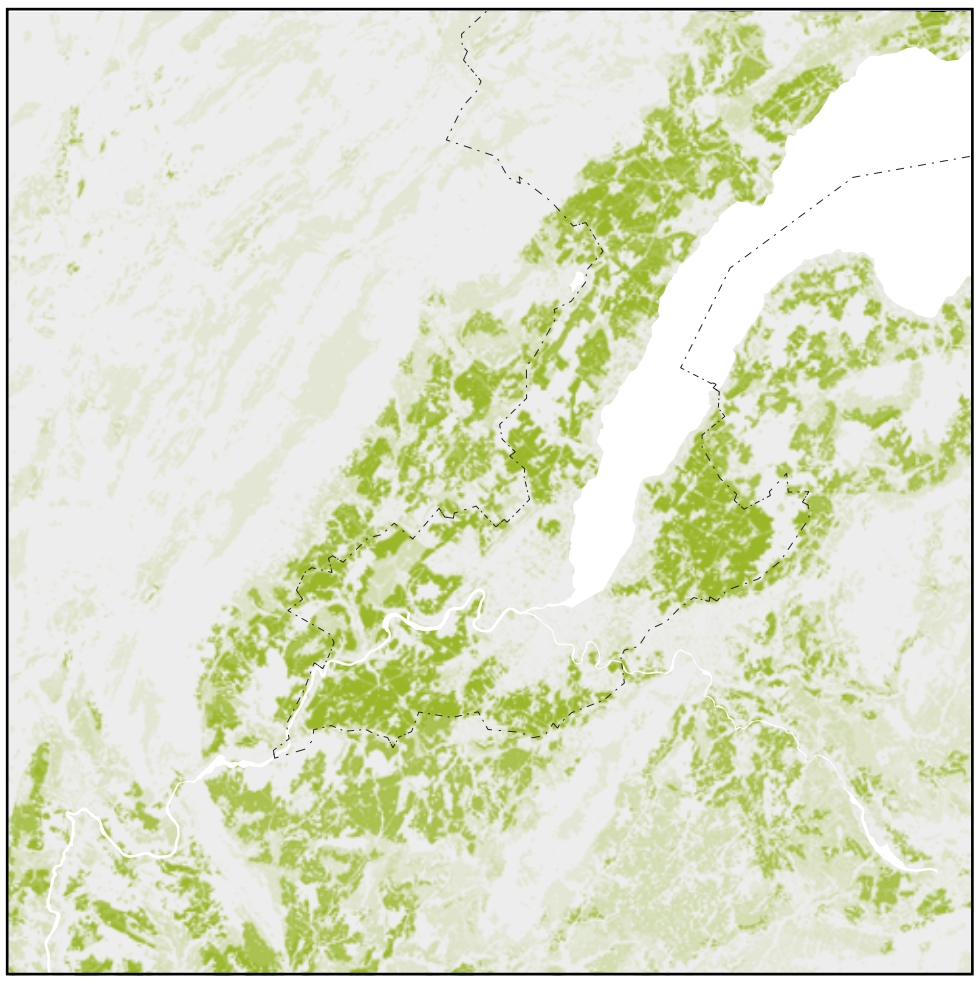
5 Areas of high soil fertility (dark)



6 Exposure to sun (aspect) along south, south-west, and south east orientation (dark)



7 Topography defining the cultivation basin
in meters from dark to light (less than 400, 450, 500, 550, 600, 650, 700, 750, 800 and more)



Composite figure for Agri-Landscape Rooms based on the indicators 1-7

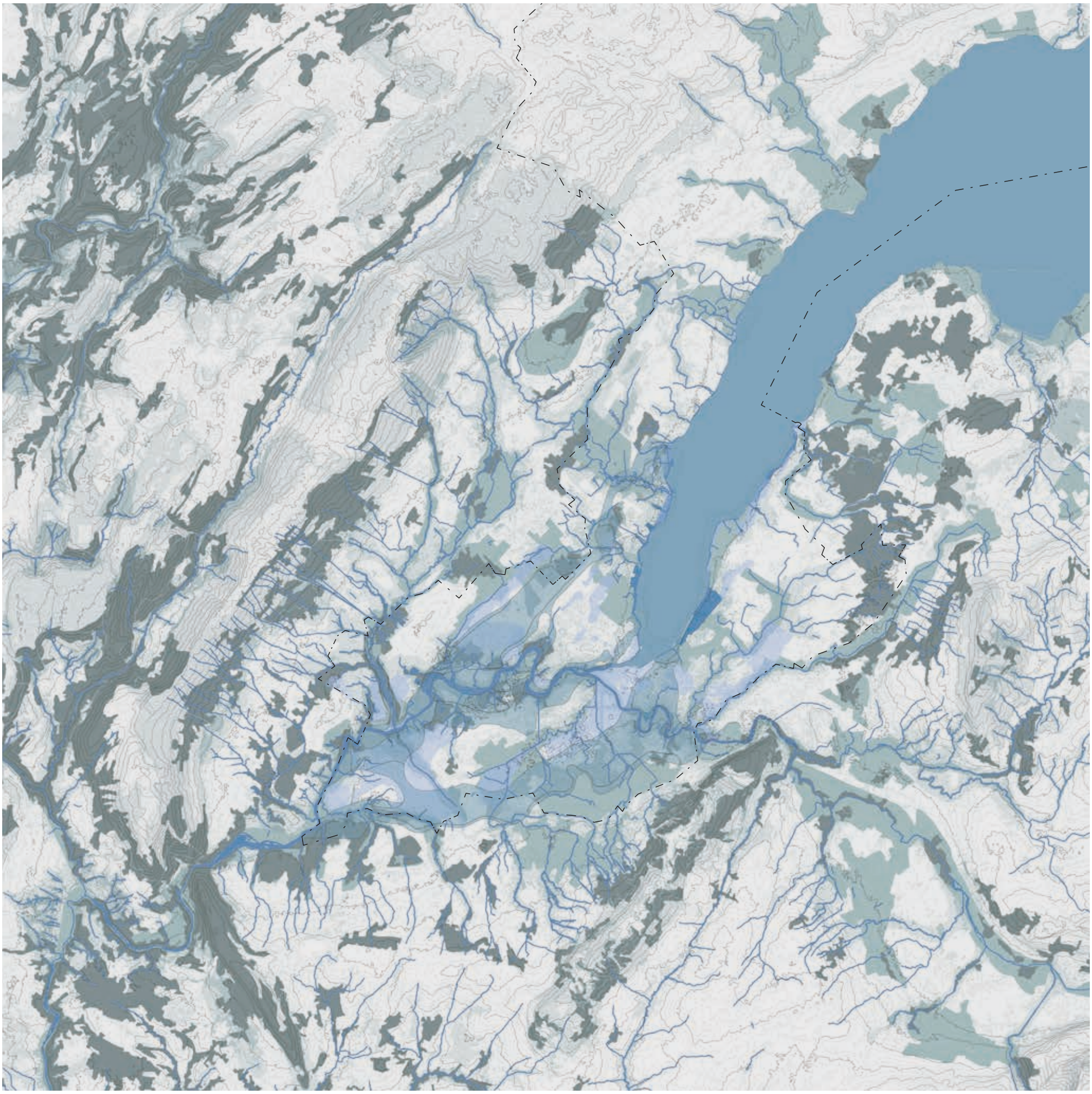
Low **High potential**

Old canal d’Aire, 2018

6 Vital Streams and Canopies

For the Vital Streams and Canopies Territories the goal has been to define the concentrations of water and green zones within the main basin of Lac Leman. High potential for the landscapes of the Vital Streams and Canopies Territories is presented in areas that are close to existing concentrations of water, natural protection zones, and tree cover density, taking into consideration slope and topographic variables privileging lower altitudes within the basin. These values where modeled through distance and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Vital Streams and Canopies Territories potential envelope.

6 Urban Potentials

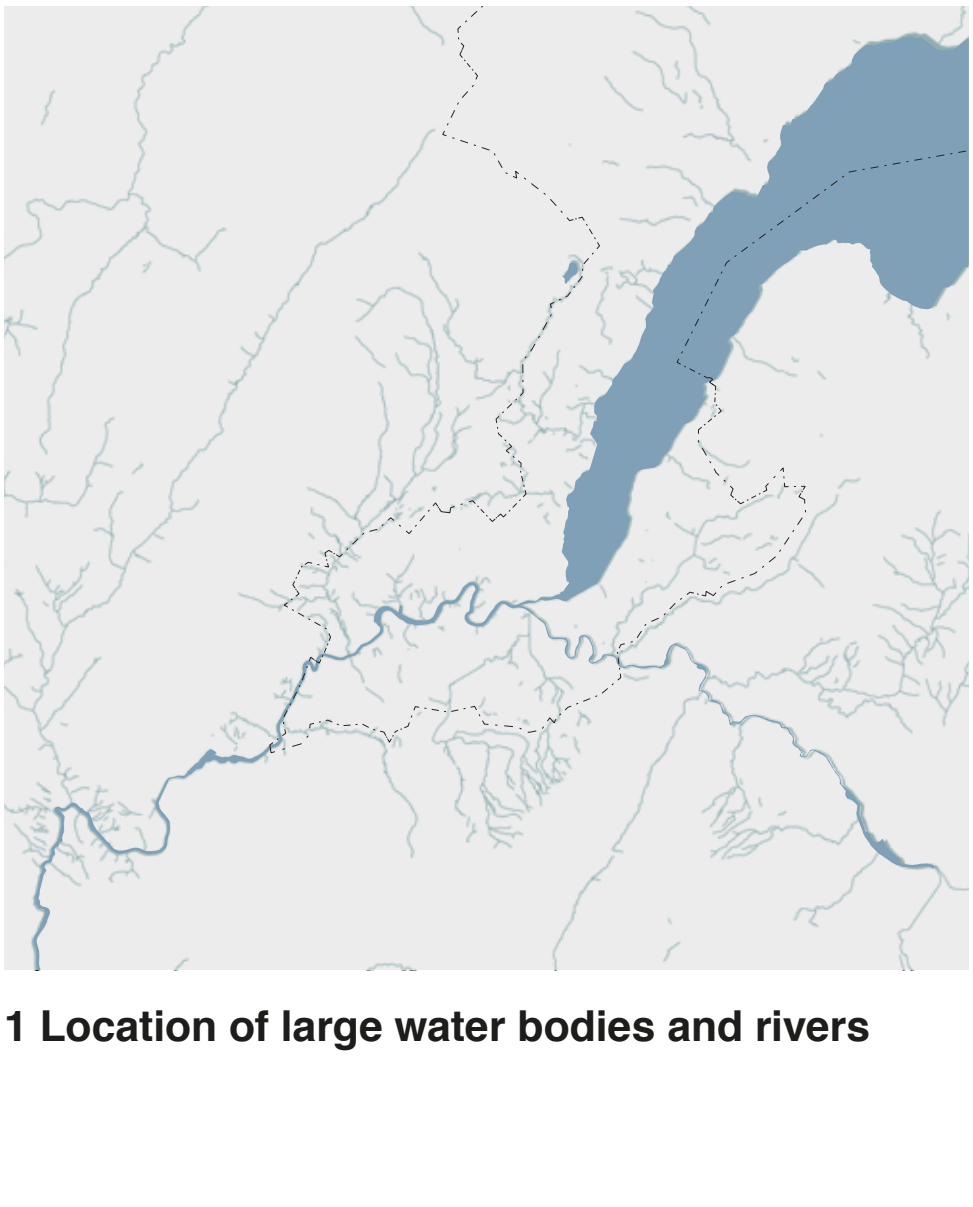


- Rivers and small streams
- Wetlands
- Large water bodies
- Protected water areas
- Permanent aquifers
- Flood risk zones
- Blue and green corridors
- Deciduous forest, woods and shrub lands

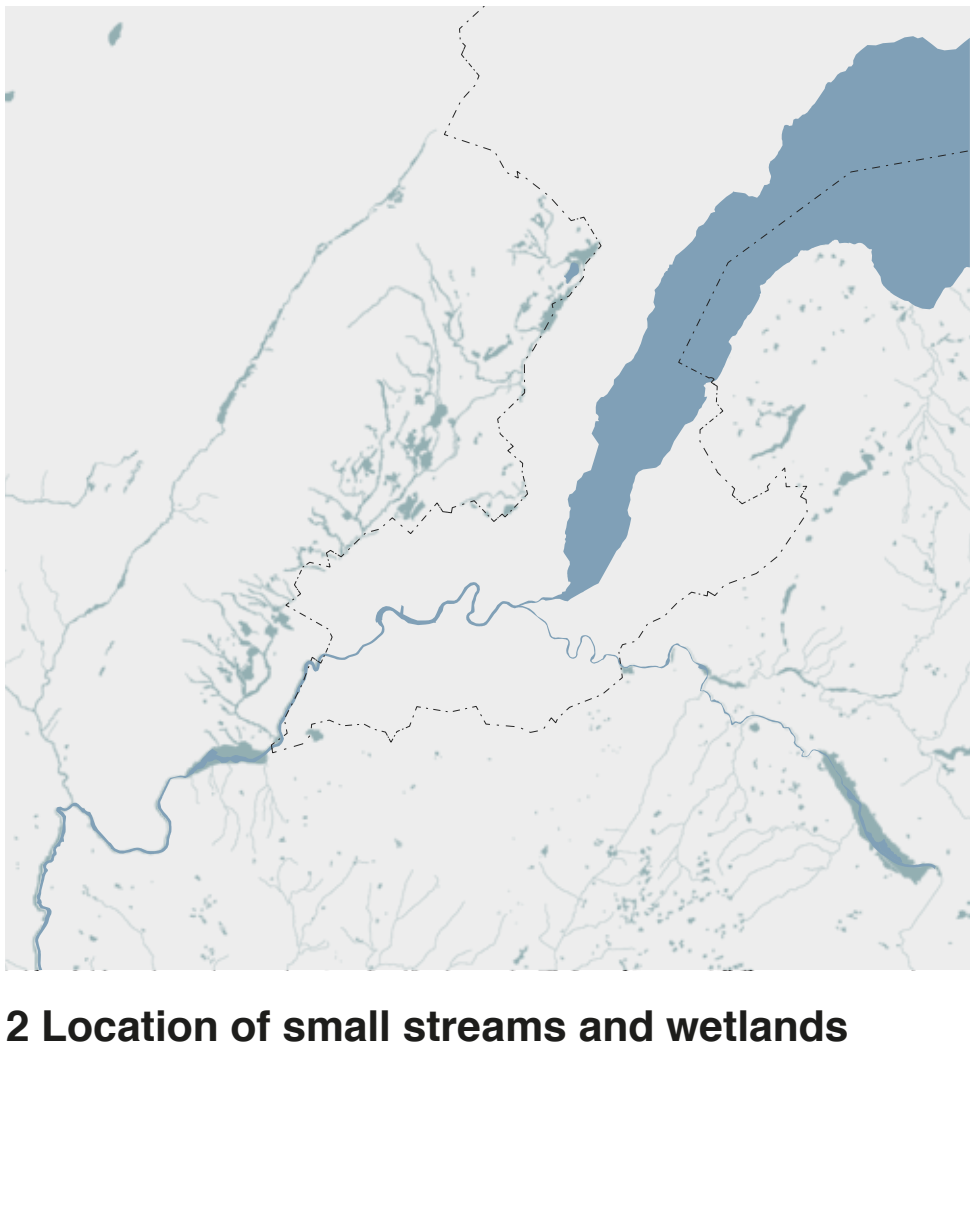
From fragmented natural areas towards an integrated, refined network of vital streams and canopies. Meandering down from the hilltops and through the plain of the Cuvette Genevois, they reach into all parts of the metropolis.

Streams and Canopies of Valleiry

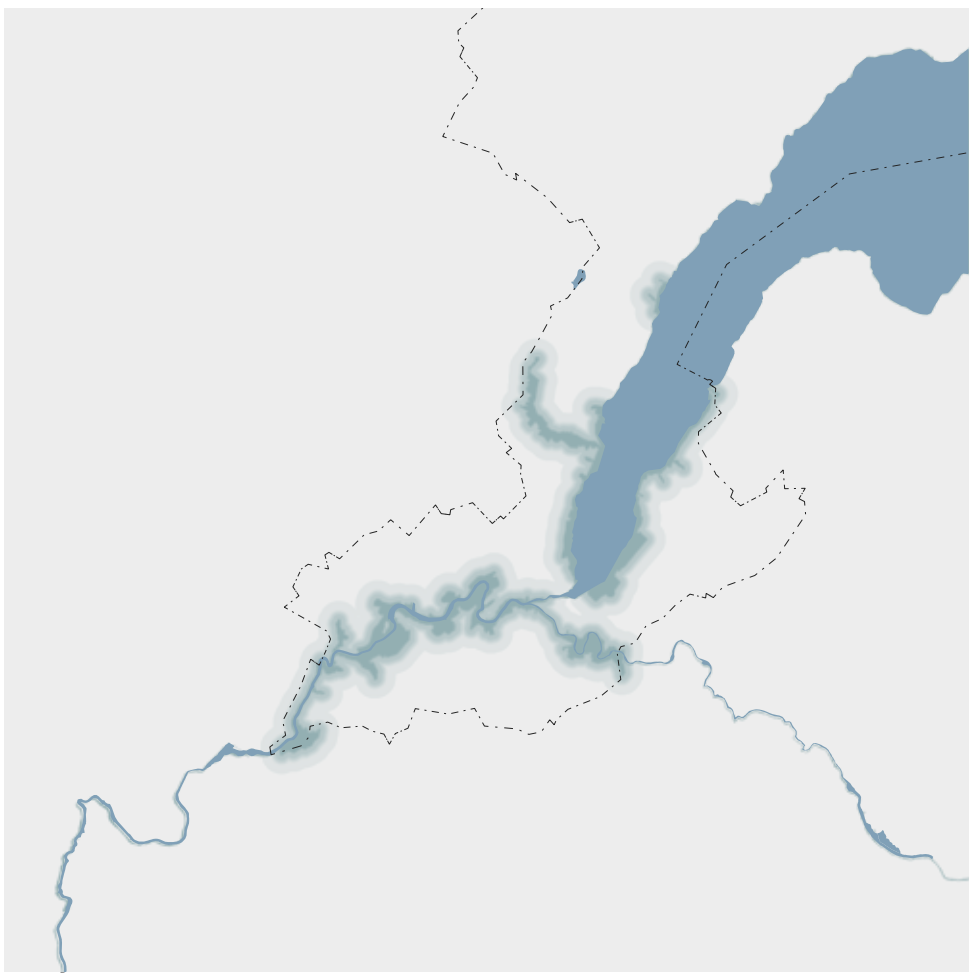
Vital Streams and Canopies. Blue and green corridors that secures important resources and functions of nature protection in the metropolitan region.



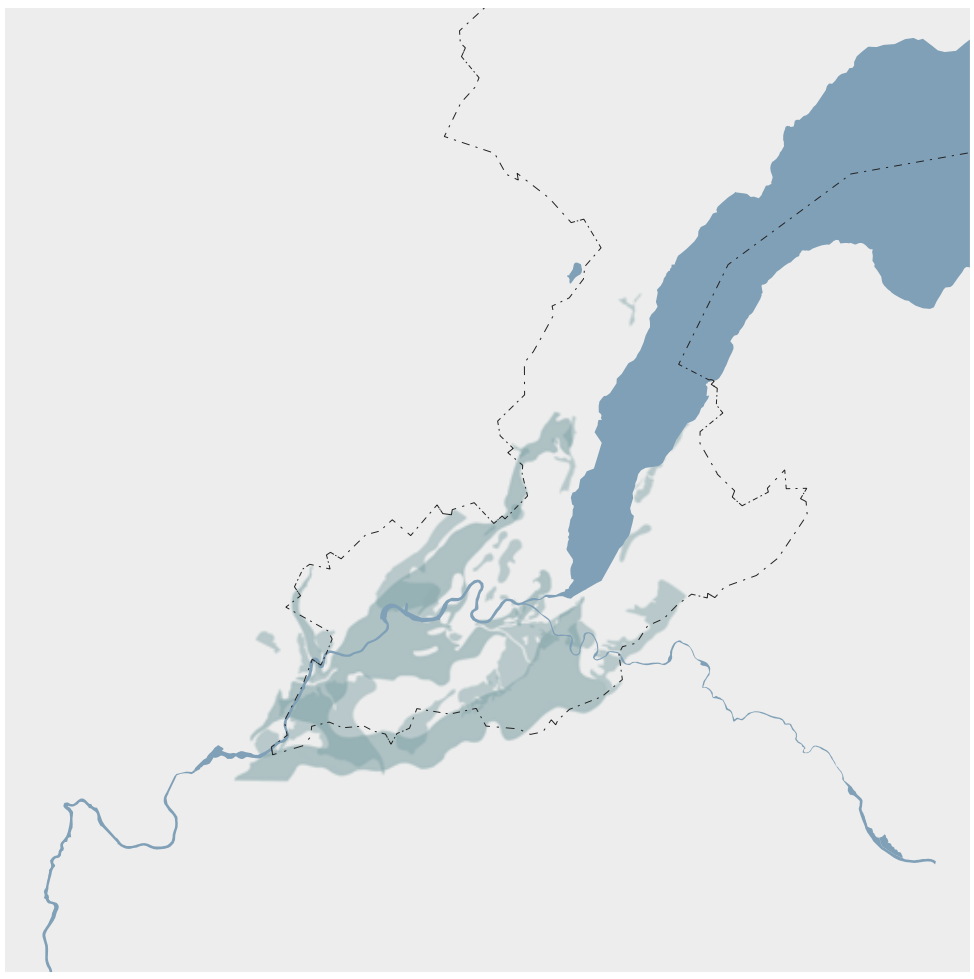
1 Location of large water bodies and rivers



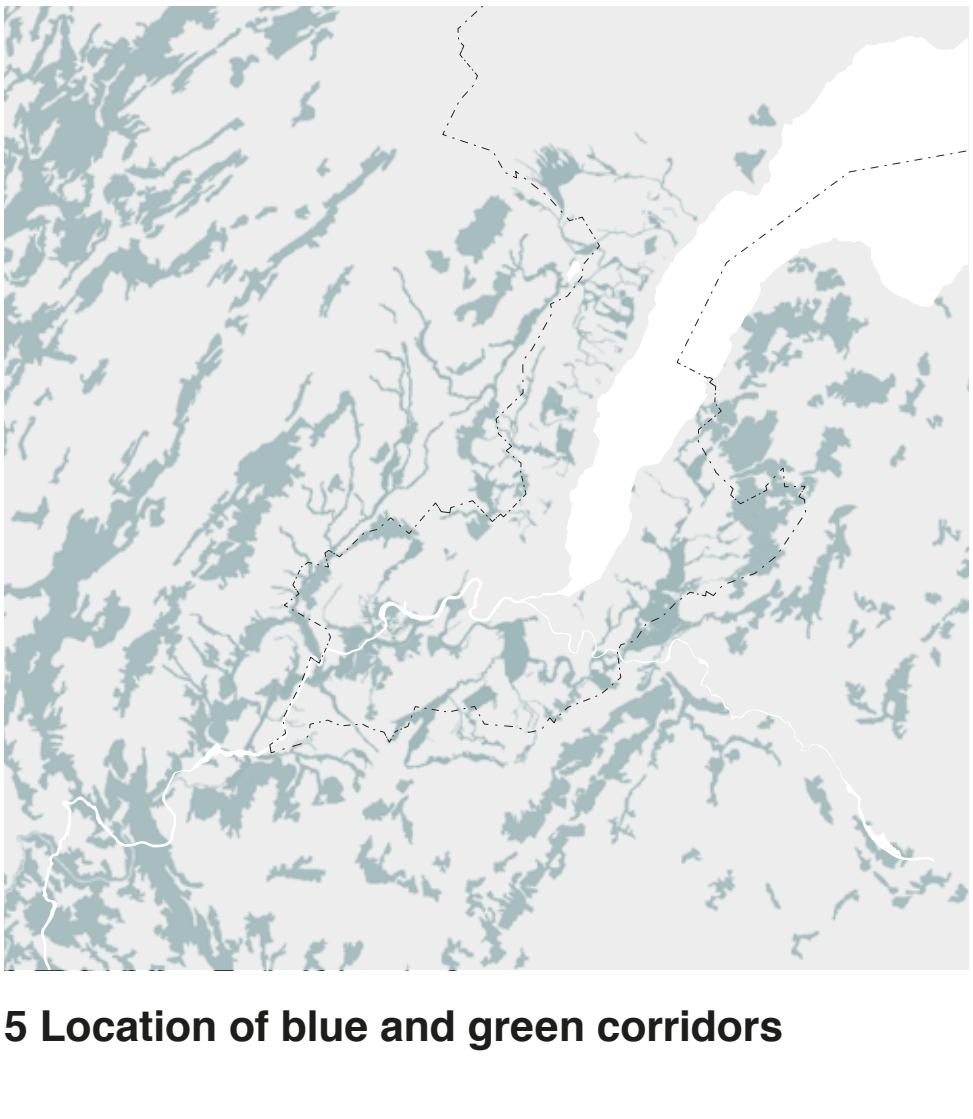
2 Location of small streams and wetlands



3 Location of protected water areas

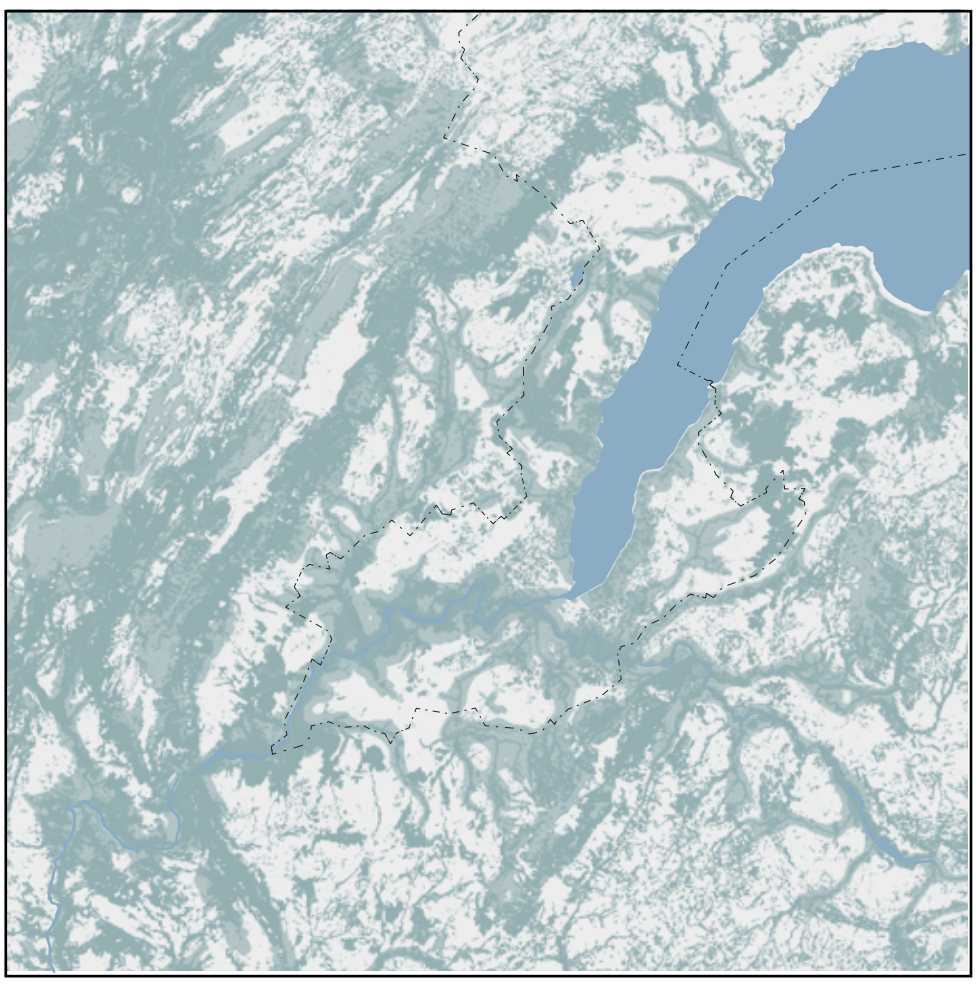


4 Location of flood risk zones and aquifers



5 Location of blue and green corridors

6 Location of deciduous forest, woods and shrub land



Composite figure for Agri-Landscape Rooms based on the indicators 1-6

Low High potential

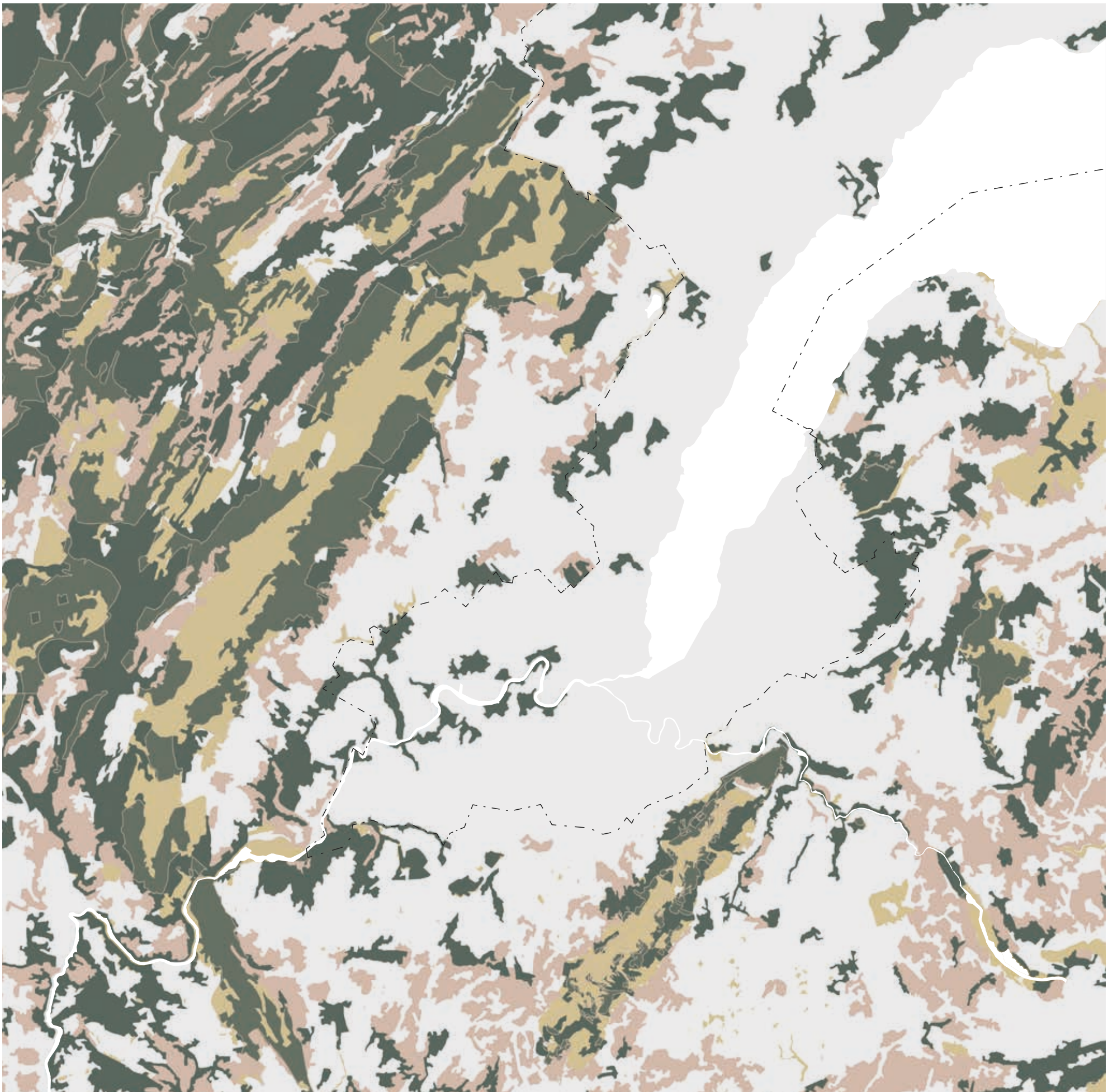
6 Urban Potentials

Tracking path through the forest,
Jura Mountain, 2019

7 Mountain Parks

For the Vital Streams and Canopies Territories the goal has been to define the concentrations of water and green zones within the main basin of Lac Leman. High potential for the landscapes of the Vital Streams and Canopies Territories is presented in areas that are close to existing concentrations of water, natural protection zones, and tree cover density, taking into consideration slope and topographic variables privileging lower altitudes within the basin. These values where modeled through distance and density gradients and classified under 9 classes (highest with highest potential). The weighted overlay of these attributes led to the Vital Streams and Canopies Territories potential envelope.

6 Urban Potentials

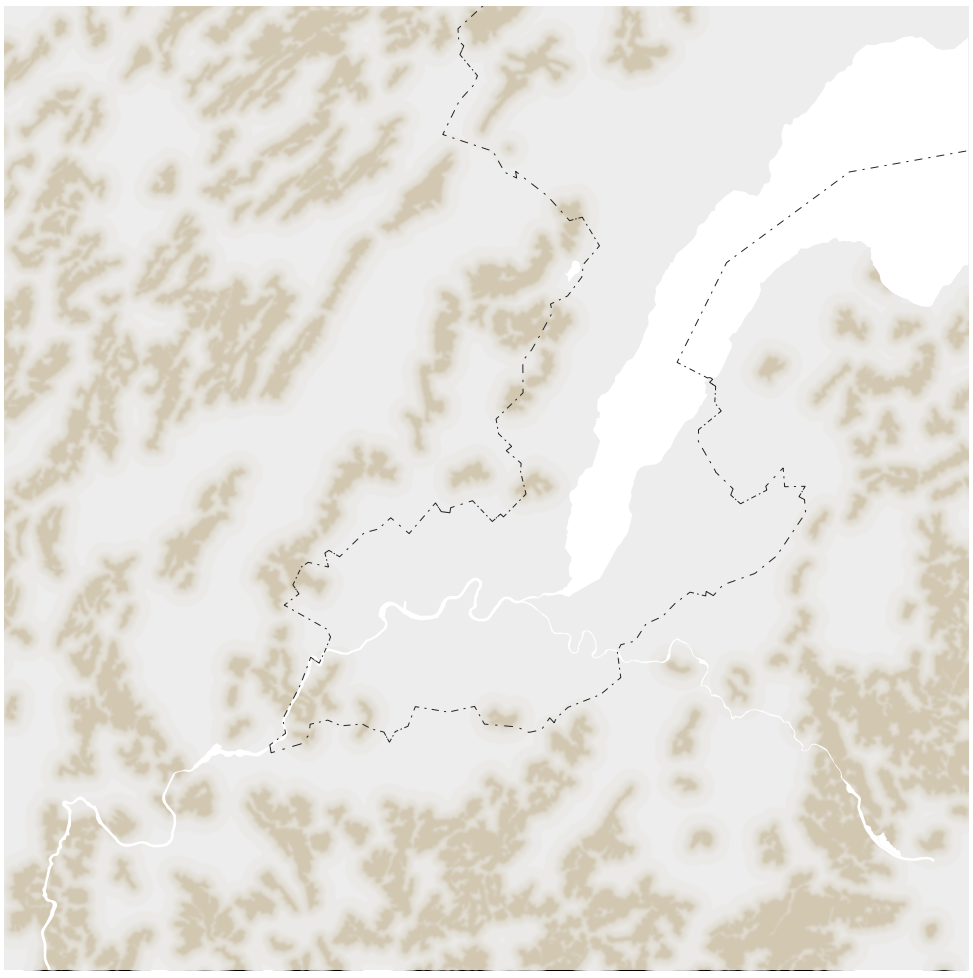


Deciduous forests, woods and shrub lands
Pastures and cattle grazing area
Nature reserves
Hiking path
Cable car
Ski pistes

From singular natures reserves and protected areas, towards an ecological frame of the metropolis. Large landscapes of wildlife protection an nature experience in close vicinity, overlooking the metropolitan basin the Cuvette Genevoise.

View into the Cuvette Genevoise from the Saleve Mountain range

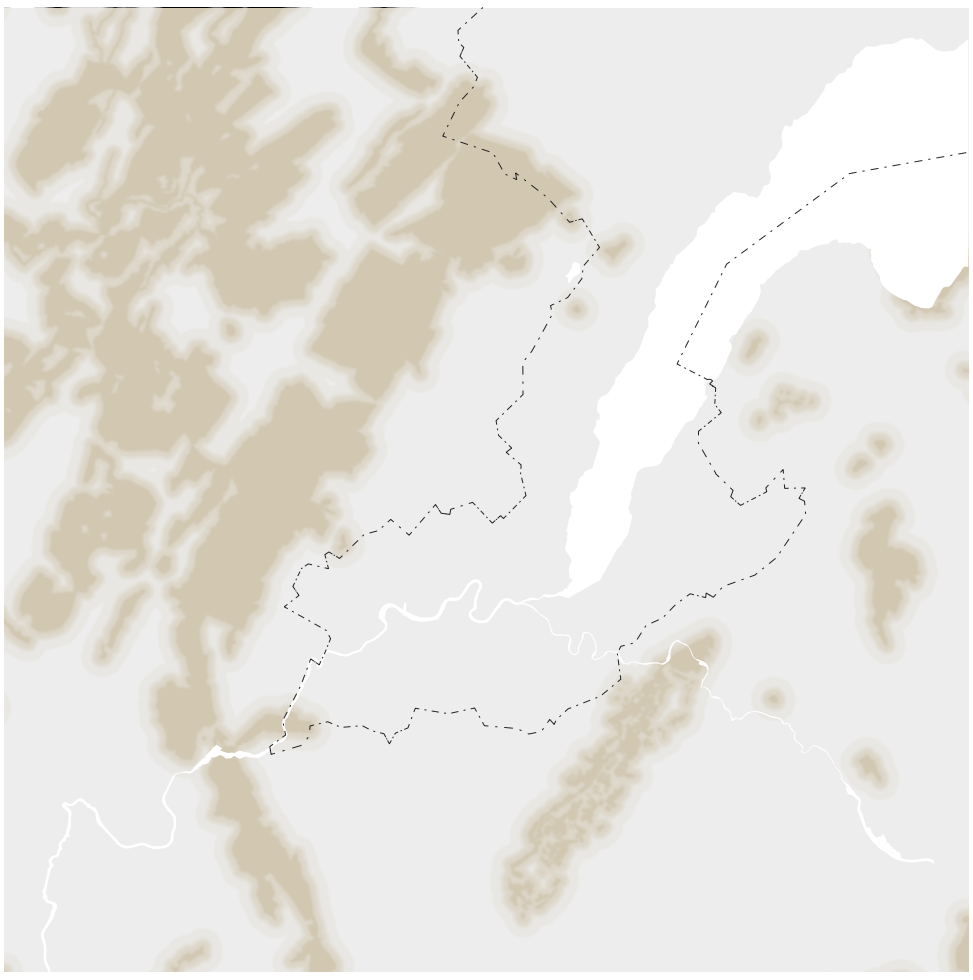
Mountain Parks. Located at the edge of the Metropolis they provide components of leisure and wilderness



1 Distance to pastures and cattle grazing areas

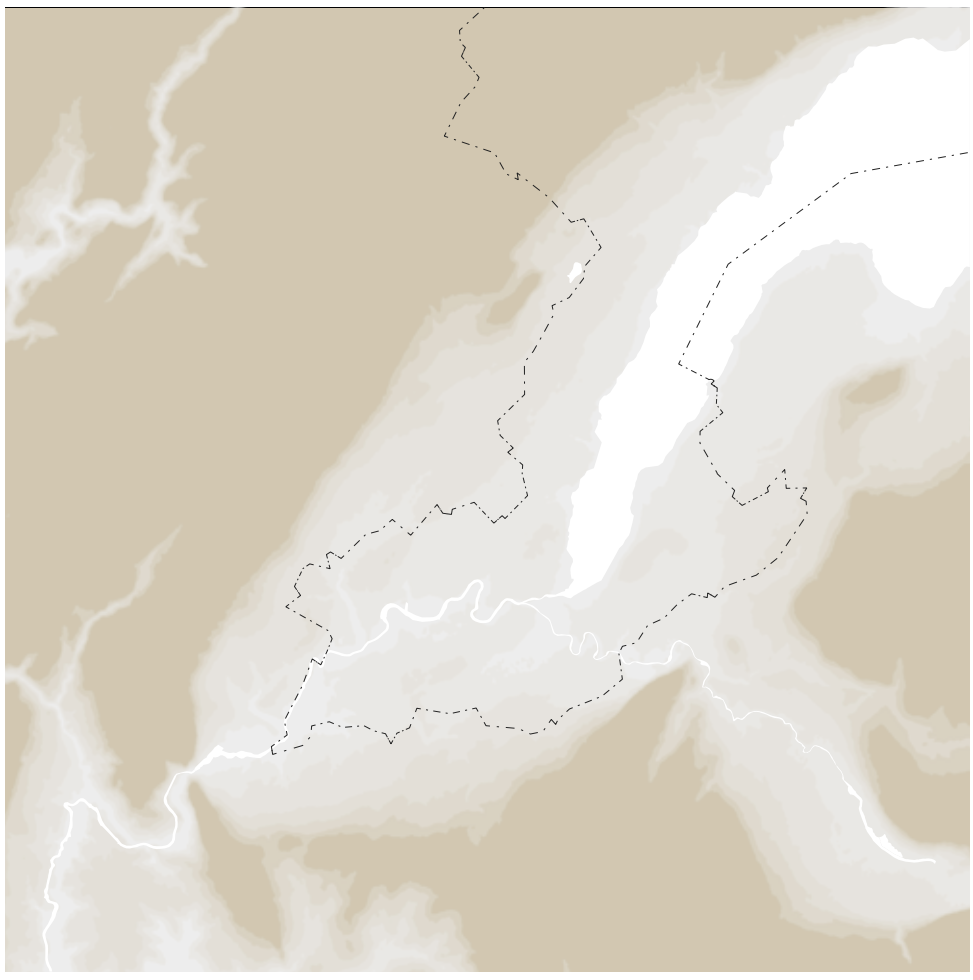
Distance in meters from dark to light (0, 5, 10, 50, 100, 200, 300, 400, 500 and more)

2 Location of coniferous forest



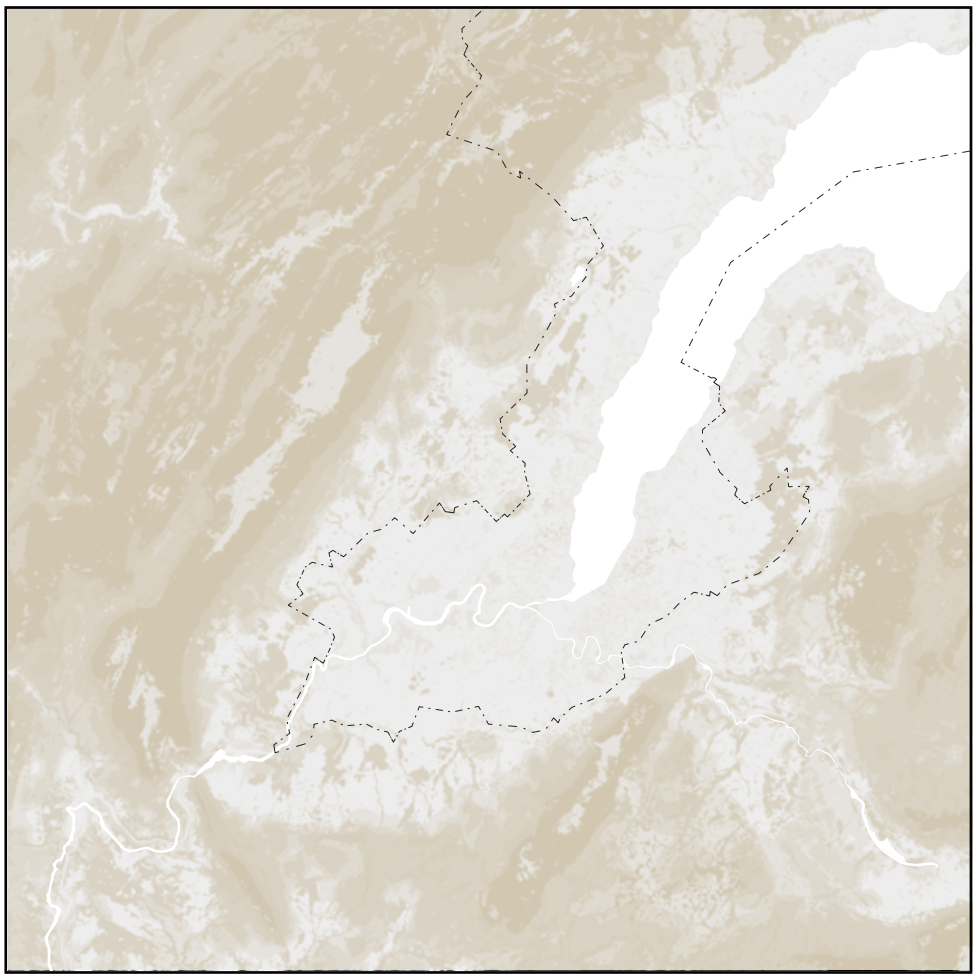
3 Distance to NATURA 2000 biodiversity areas

Distance in meters from dark to light (0, 5, 10, 50, 100, 200, 300, 400, 500 and more)



4 Topography

in meters from light to dark (400, 450, 500, 550, 600, 650, 700, 750, 800 or more)



Composite figure for Agri-Landscape Rooms based on the indicators 1-4

Low **High potential**

Notes on Modeling the Territories of Urban Potentials
by Nikolaos Katsikis

From a methodological perspective, the Territories of Urban Potentials approach is largely based upon a long history of studies on Landscape Suitability (LSA), and the construction of a composite geospatial apparatus through Multicriteria Evaluation Analysis Methodologies (MCEA). Following McHarg (1969) and Steinitz (2012), LSA approaches suggest that the ability of the landscape to support a particular land use varies according to combinations of the physical, biological, and cultural resources that are distributed over a geographical area. Moreover, the main idea behind MCEA is that the spatial dimensions of social and ecological processes can be associated with a series of layers of geospatial information, which when combined can direct decision making. In contemporary methodologies this process is done through GIS and thus, the project heavily relies upon the construction of an extensive geospatial apparatus and the subsequent modeling of selected attributes into a set of indicators.

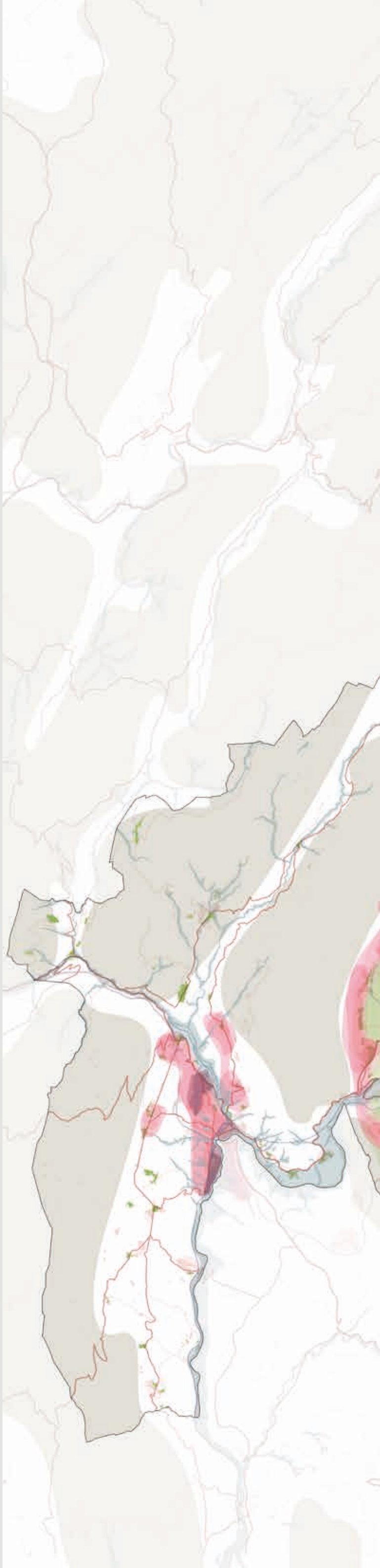
However, unlike typical LSA and MCEA approaches, in which the final outcome is largely a direct outcome of the combination of criteria and can be conceived as a proposed land use plan, in the Territories of Urban Potentials approach, the outcome of the combination of criteria is meant to construct a series of evaluation envelopes, in which potentials are presented not as a land use plan, but as a platform for negotiation, since we recognize the subjective, and necessary political process of the production of space.

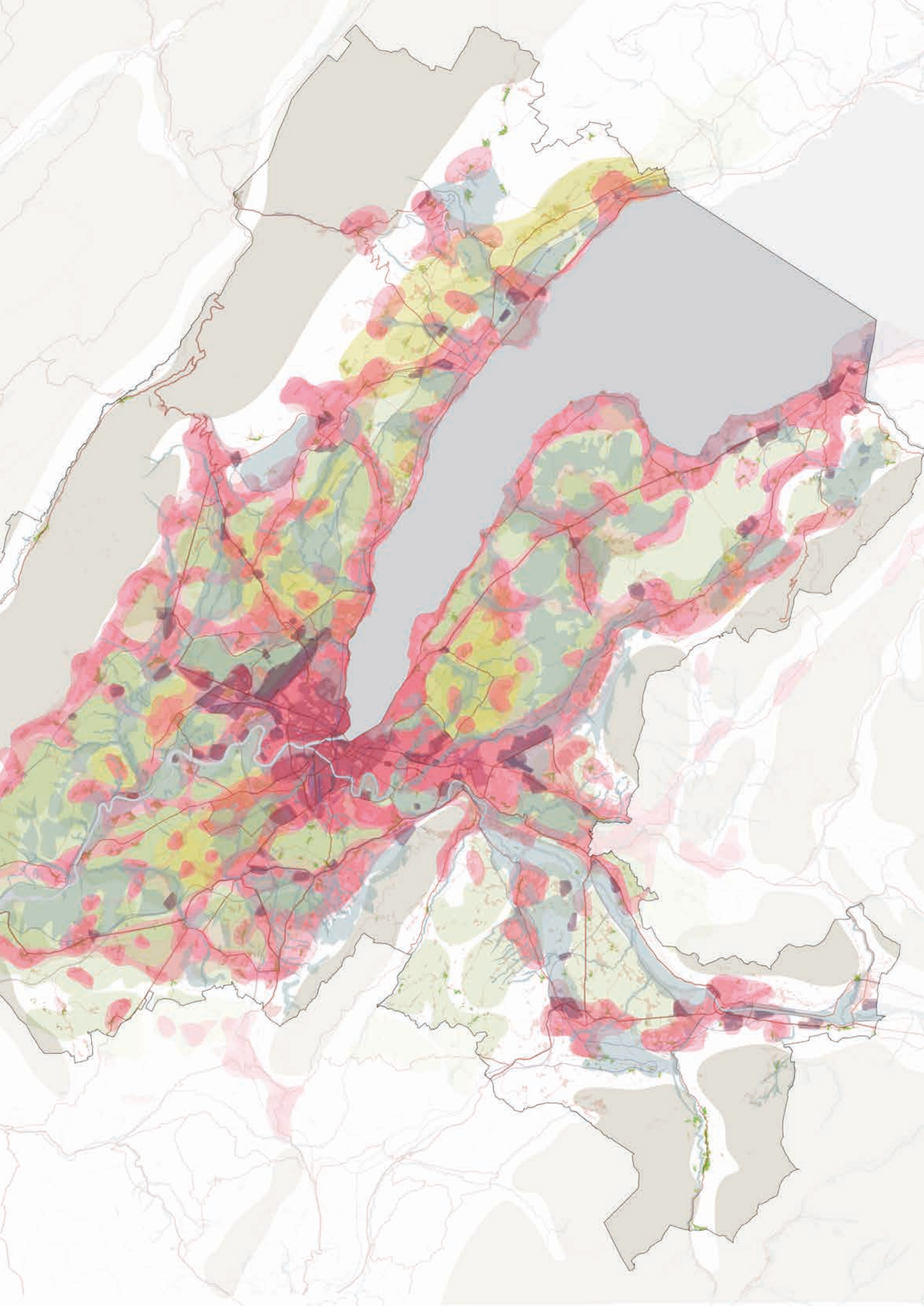
From a more technical methodological perspective, there are two major challenges associated with this approach: First not all social and ecological processes that are of interest can be translated into geospatial information. Second, even if they can this information might be difficult to compile, or not available. In this we faced both challenges. For the first problem, whenever possible we used proxies for information that could not be directly spatialized. For the second problem we had to depend upon the institutions that have constructed the data and there was a major challenge homogenizing information between Swiss and French sources. As a result, we often had to trade between resolution and homogeneity of data, often using less detailed data which were however constant across the whole region.

The Region as the New Urban Figure

From the intertwining of urban potentials and the values of Ecological Transition, a figure for 2050 emerges, on which the development of the Grand Genève can be oriented from now on. This figure dissolves the centre—periphery dichotomy, and thus the dichotomy between Geneva and the Other Geneva, giving form to territorial equity and justice. Today's peripheral communities, fields and infrastructures are now seen as part of the Grand Genève. Nature and culture articulate themselves in a sustainable, polycentric and regenerative city-landscape, which, in contrast to a rigid master plan, is able to respond to demographic growth as well as to shrinkage. While its external boundaries are clearly defined by the form of the cuvette genevois, an internal development takes place within the figure, placing the Unbuilt and the built in an intensive synergy.

The Region as the New Urban Figure





Design Case Studies

Design Case Studies

1 Post-Fossil Infrastructures.
The Urban Boulevard

2 Global - Local Protagonists.
CERN Experimental Campus

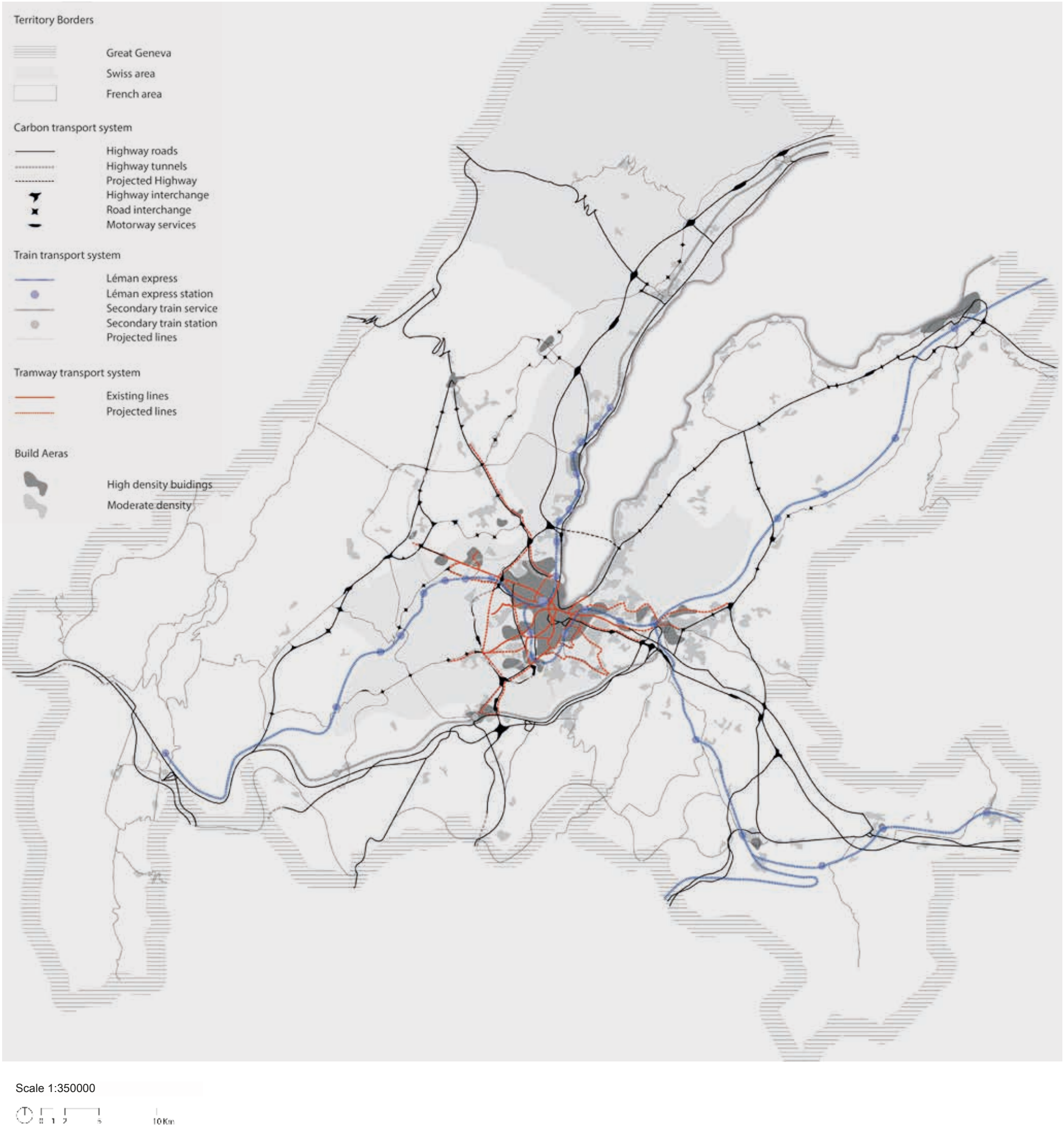
3 Agri-Landscape Rooms.
Metropolitan Gardens

1 Post-Fossil Infrastructures. The Urban Boulevard

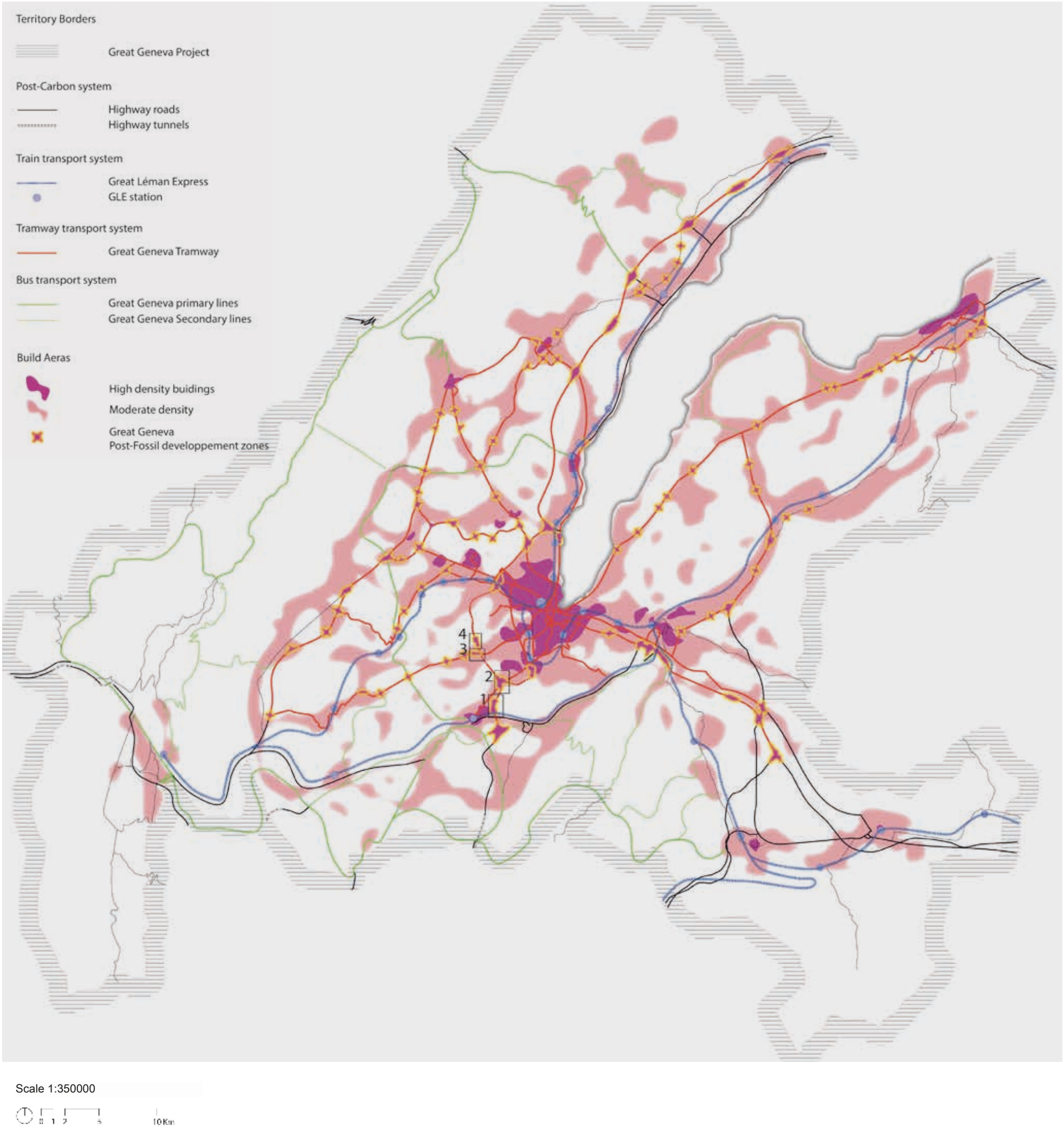
Today, Geneva's public transport system is condensed in the core city, with few regional lines such as the Léman Express. In the periphery, the infrastructures mainly consist of express roads and motorways, some of which lead directly into the city. If we were to perceive, plan and develop Grand Genève as a metropolitan region where the centre-periphery dichotomy should be reduced, then we must plan and develop a multi-modal network of regional infrastructures instead of the existing radi-al-centric system. We therefore propose to extend the tramway system along the motorway and expressway corridors, thus turning them into urban boulevards. The space gained though this conversion can be transformed into urban structures, gardens and ecological zones and connections. In other words, if we transform the fossil infrastructures into post-fossil urban boulevards, then the needs of future Geneva — the required housing units and space for nature — can be realized without sealing even one additional square meter, without cutting down a single tree, and without converting agricultural fields into building land. At four sites of current intersections and parking lots, new intermixed urban nodes would be created, contributing to territorial equity. The territory would become less fragmented, better interconnected. Slow transport routes and ecological continuity could be easily re-established.

Such a project would realize André Gorz's understanding of an ecolog-ical city: "One can imagine that these new cities will be federations of municipalities (or neighborhoods), surrounded by green belts, where city dwellers [...] will spend several hours a week growing the fresh products necessary for their livelihood. For their daily journeys, they will have at their disposal a full range of means of transport adapted to a medi-um-sized city: municipal bicycles, trams or trolley buses, electric taxis without drivers. For larger trips in the countryside, as well as for the transport of guests, a pool of municipal cars will be available to all the garages in the neighborhood. The car will no longer be needed." (1)

8 Design Case Studies

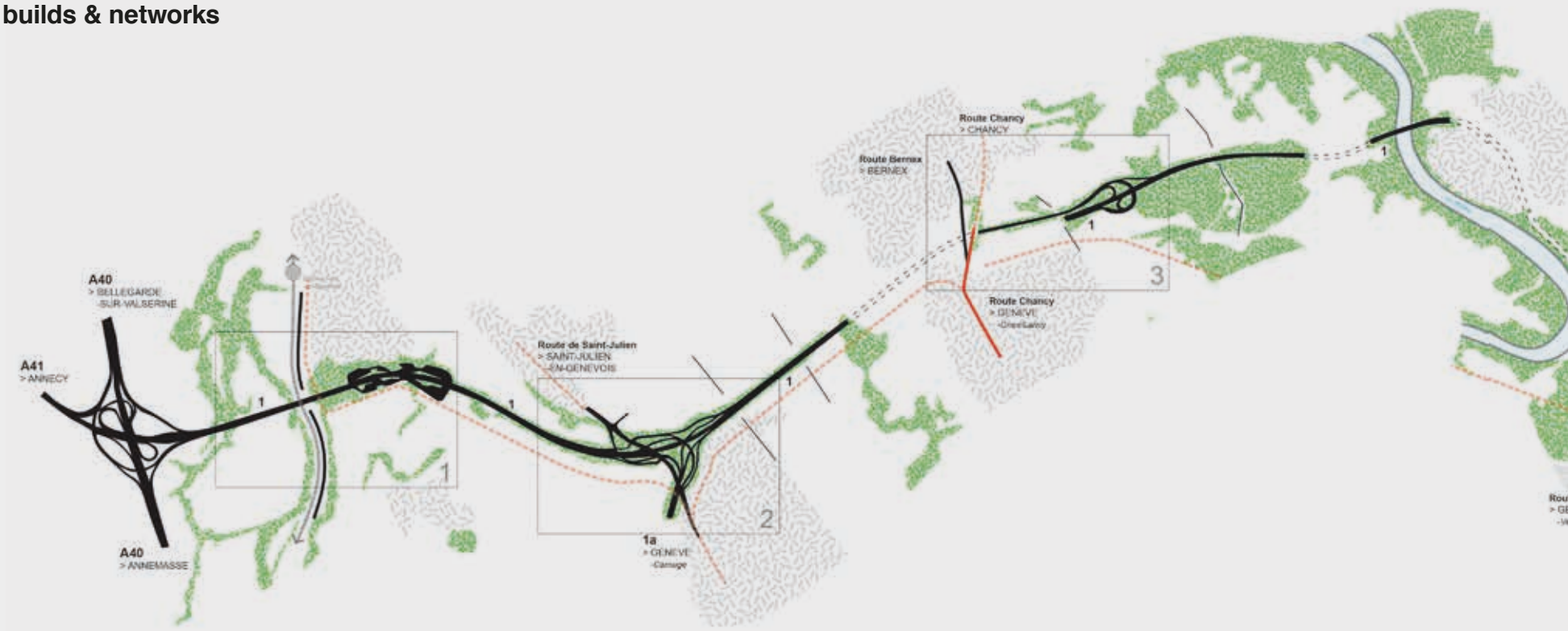


Great Geneva Area 2020. Current Situation.
Existing E62 motorway, which cuts through the Great Geneva at great expense of land consumption.



Great Geneva Area 2050. Post-Fossil Prospective.
By 2050, the motorway will have given way to an urban boulevard that will allow the city and nature to regenerate. Mixed urban districts have been created on the former lanes.

Section 2020.
Existing builds & networks



Section 2050.
Post-Fossil Prospective

Carbon transport system

- Highway roads
- Highway tunnels
- Highway interchange

Train transport system

- Léman express
- Léman express station
- Secondary train service
- Secondary train station

Tramway transport system

- Existing lines
- Projected lines

Current space occupation

- Forests & Trees
- Moderate density buildings
- Fossil Fabric & transports

Scale 1:50000

0 0.5 1 2 Km

Post-Carbon system

- Highway roads

Train transport system

- Great Léman Express
- GLE station

Tramway transport system

- Great Geneva Tramway

Bus transport system

- Great Geneva primary lines
- Great Geneva Secondary lines

Prospective space occupation

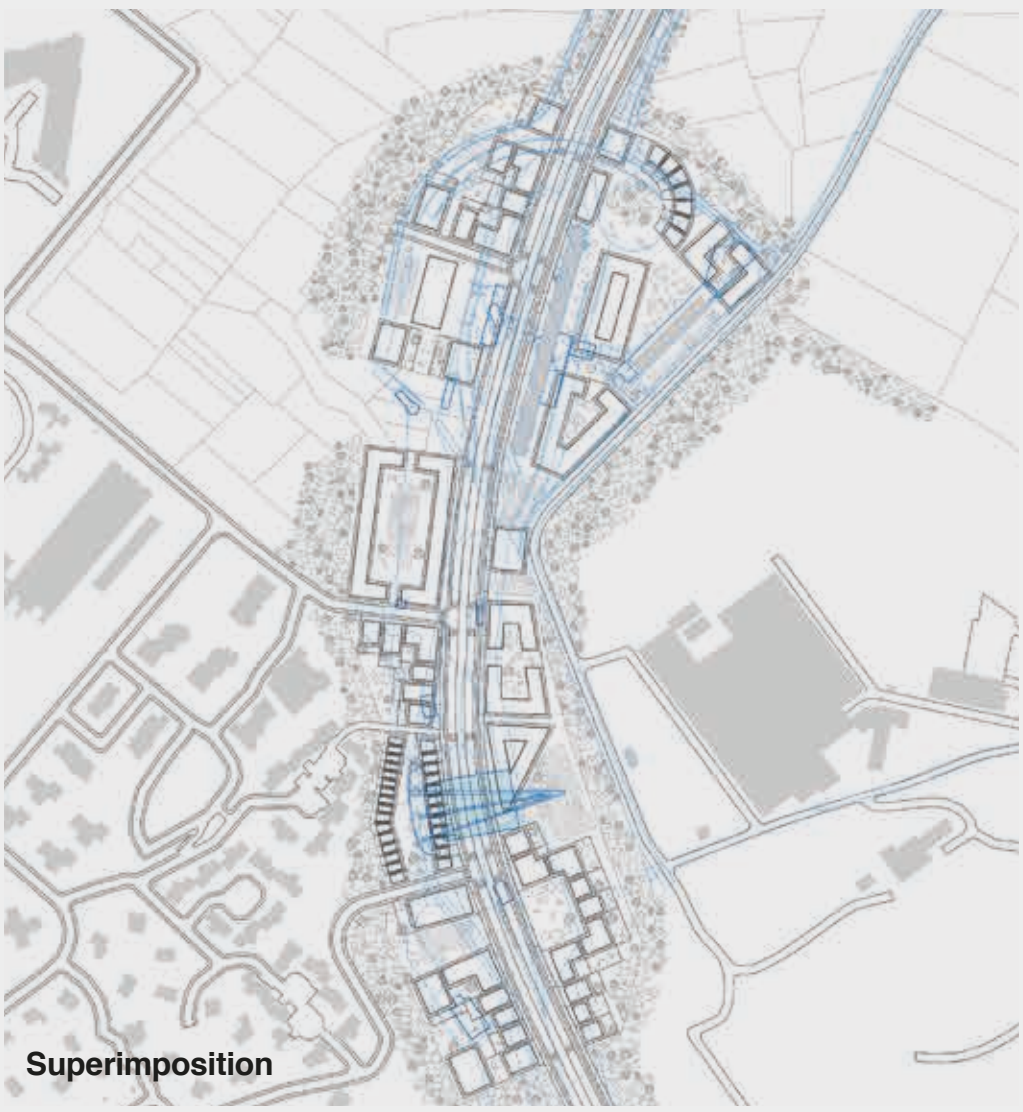
- Forests & Trees
- Great Geneva Post-Fossil developpement zones:
  - -High density buildings
  - -Local Agriculture
- Prospective developpement zones
- Moderate density buildings

Scale 1:50000

0 0.5 1 2 Km

0
50
100
200
500

Existing infrastructure



Superimposition

Garden city Bardonnex. In 2050 there will no longer be any national borders. On the former border crossing of Bardonnex, a mixed district with more than 1200 apartments, different spatial typologies for working and many complementary facilities will appear. The area has a balanced ratio of cooperatives, self-building complexes, social housing and privately financed buildings. The development plan calls for the construction of 30m^2 of vegetable garden per housing unit and two bicycle stands per room. Facing the boulevard are the public and commercial facilities, from which the existing neighbouring residential areas will also benefit. Three tram stops extend across the district, which means that no apartment is more than 300 metres away from a bus stop.

0
50
100
200
500

Existing infrastructure

Superimposition

Urban district Perly. To the north of Bardonnex, following the same motorway, there is today a gigantic junction between the E62 and A1a motorways. When the motorway has been dismantled, a district for 1000 inhabitants will be created here, with small-scale blocks consisting of rental buildings and building communities that open up to the landscape. On the ground floor, towards the street, there are shops and towards the courtyard there are various rooms for working. One or two cooperatives are connected to the rear of each block. Here too, the district is bordered to the west and east by a strip of individual and community gardens and as well as a strip of woodland.

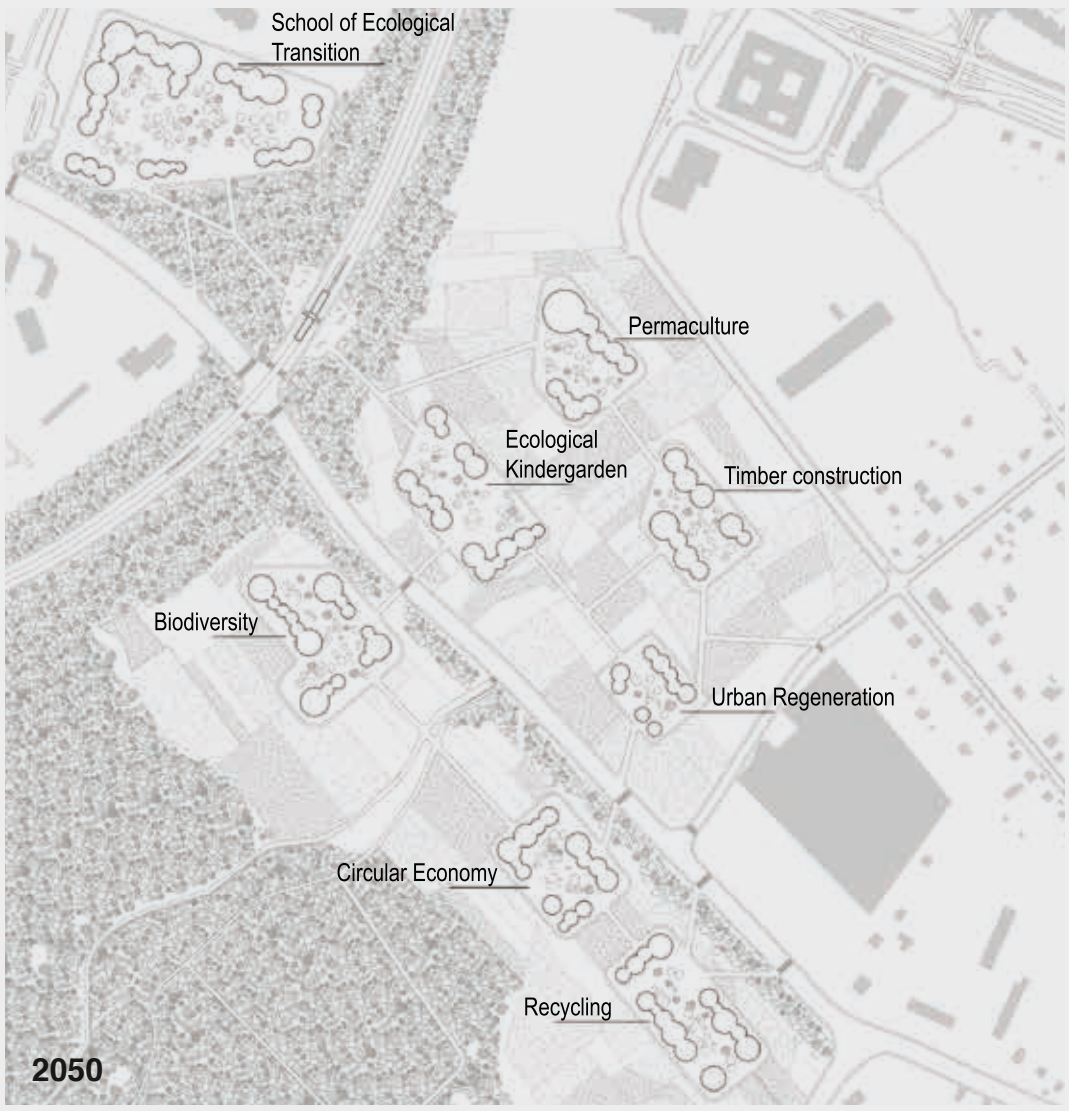
0
50
100
200
500

Existing infrastructure

Superimposition

Garden city Les Bains de Cressy. To the north of Cressy and Bernex there is now a large motorway junction which, after the motorway has been dismantled, will be developed into a garden city for 800 inhabitants, divided into small blocks. Here the tram stops at a central public square, which is surrounded on the ground floor by various shops, cafés and restaurants. Here too, the structure allows for a variety of housing typologies, from smaller to larger cooperatives and mainly self-building complexes. In the Garden city, in the tradition of Voltaire, enthusiasts come together to live a lifestyle that is self-sufficient in terms of nutrition.

Existing infrastructure

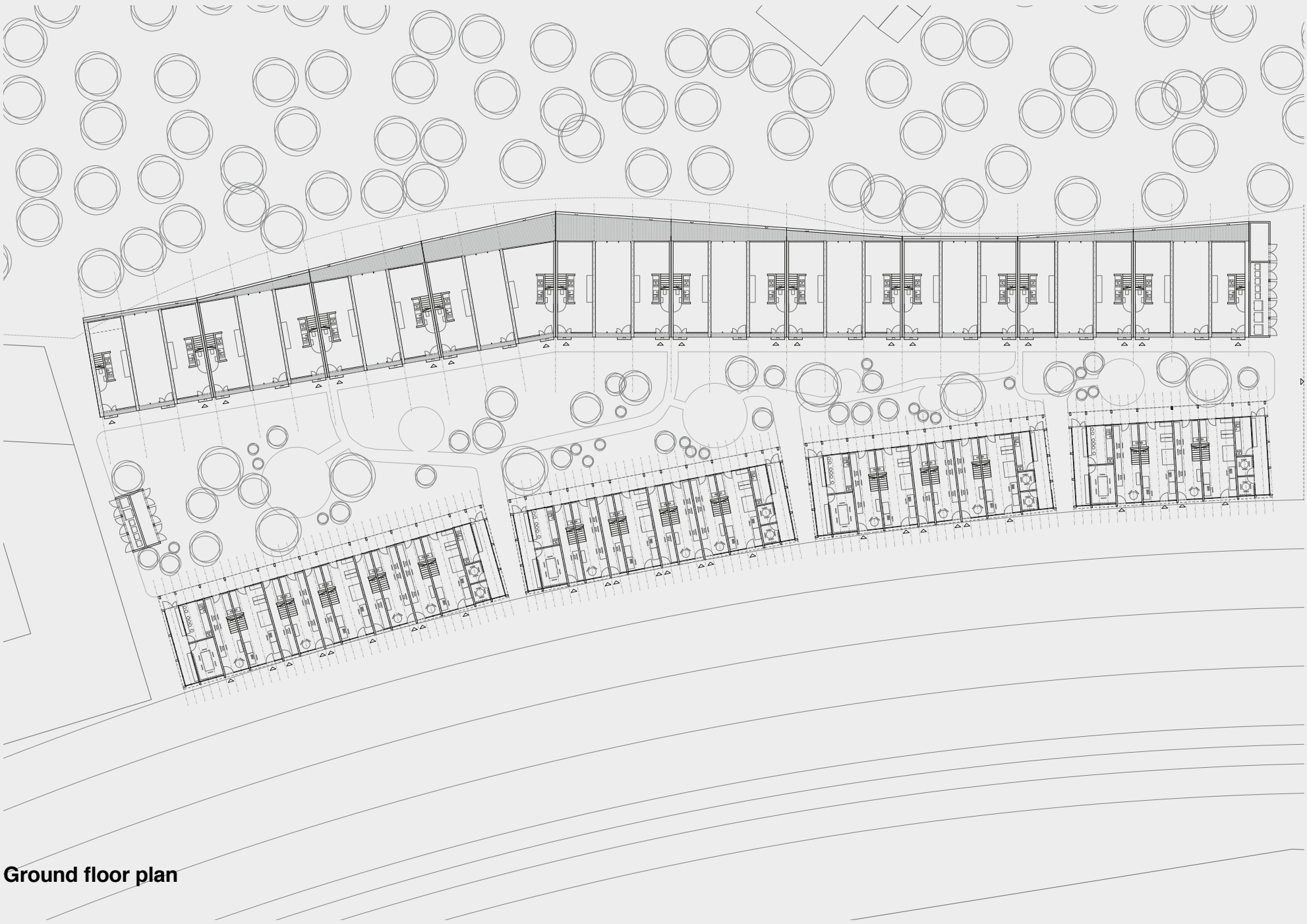


Learning Center for Ecological Transition. At Les Avanchets, around the junction between the E62 and the Route de Meyrin, there are today gigantic oil silos that will soon no longer be needed. Symbolically, a Learning Centre for the Ecological Transition will be built at this very location, with schools for children, pupils and students, real laboratories, research institutes and exhibitions organised according to the priorities of the Ecological Transition: permaculture, biodiversity, urban regeneration, circular economy, recycling ...

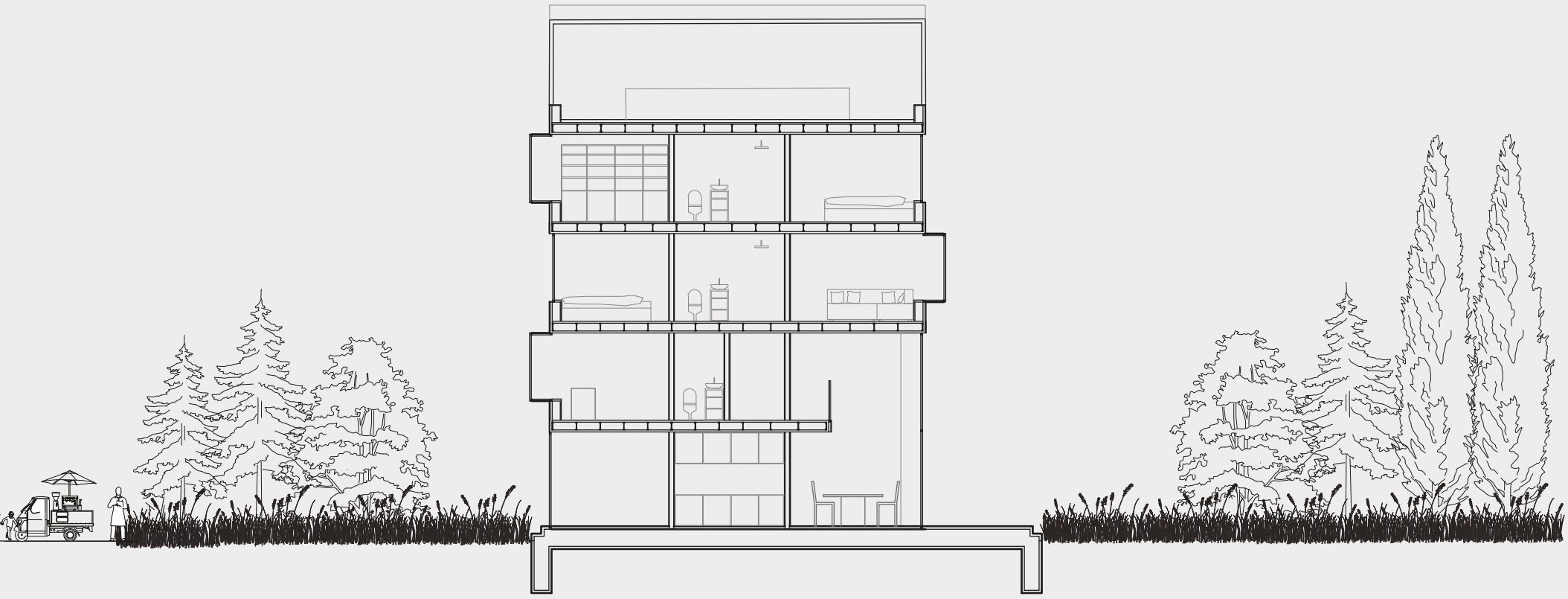
8 Design Case Studies

Project models
Master in Architecture, University of Luxembourg, 2019

Section

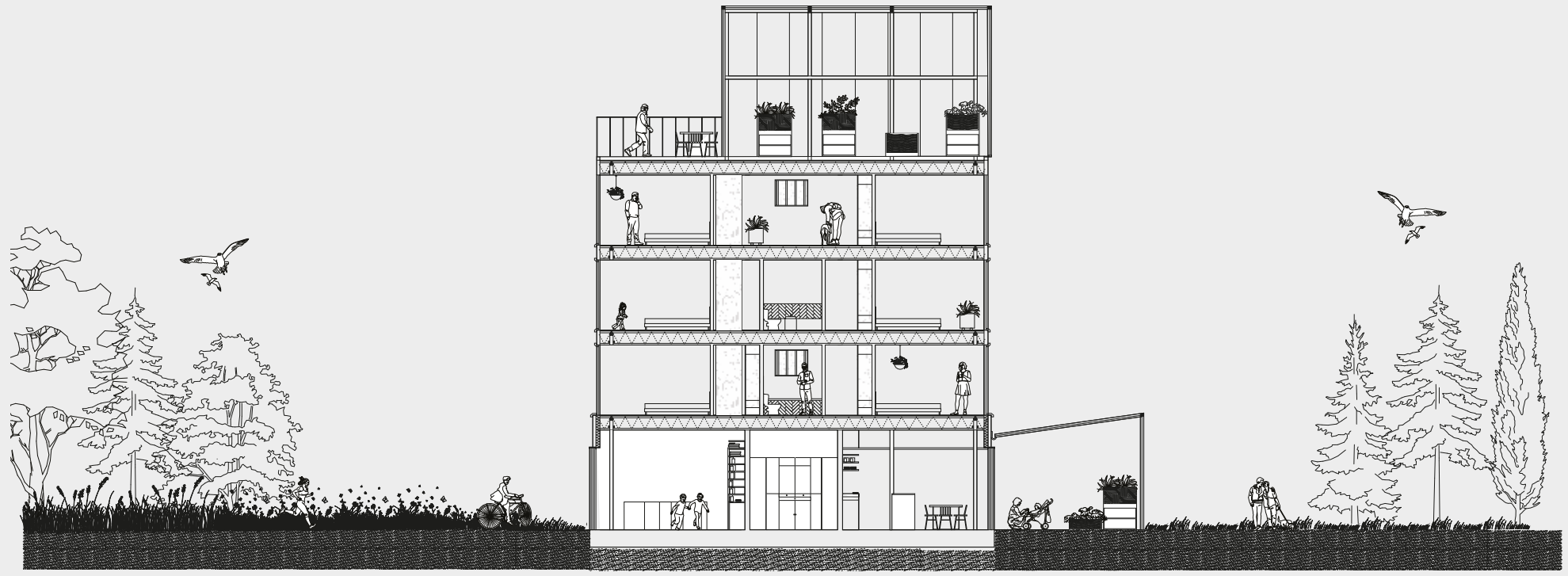


Ground floor plan

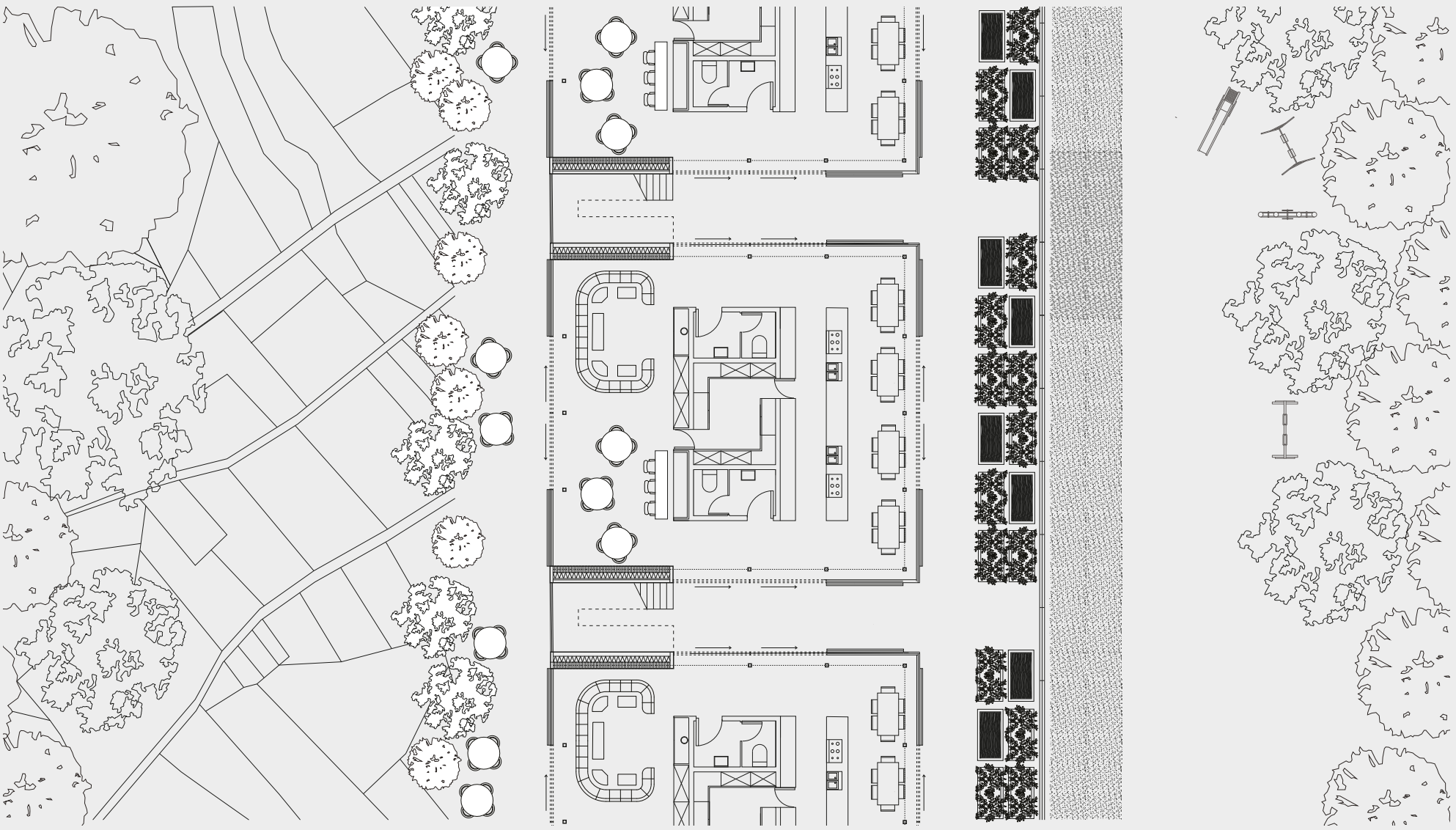


Start-up apartments and evolutive self-building housing.
This neighbourhood is made up of two typologies that are strung together: Towards the boulevard there are small maisonettes of a width of 1.80, 2.70 to 3.60, which the municipality rents cheaply to young start-ups, who can work and sell on the ground floor and live on the first floor. One of the conditions of subsidised rent is the maintenance of the rooftop greenhouse which all inhabitants of this slab share. The slab in the backyard consists of two row houses each, built by best friends or several generations, with a space in the middle that can be expanded flexibly over time depending on the development of the relationship.

Project by Nora Hammelmann
Master in Architecture, University of Luxembourg, 2019



Hydrocollective
section 2050



Ground floor plan

Internal water cycle

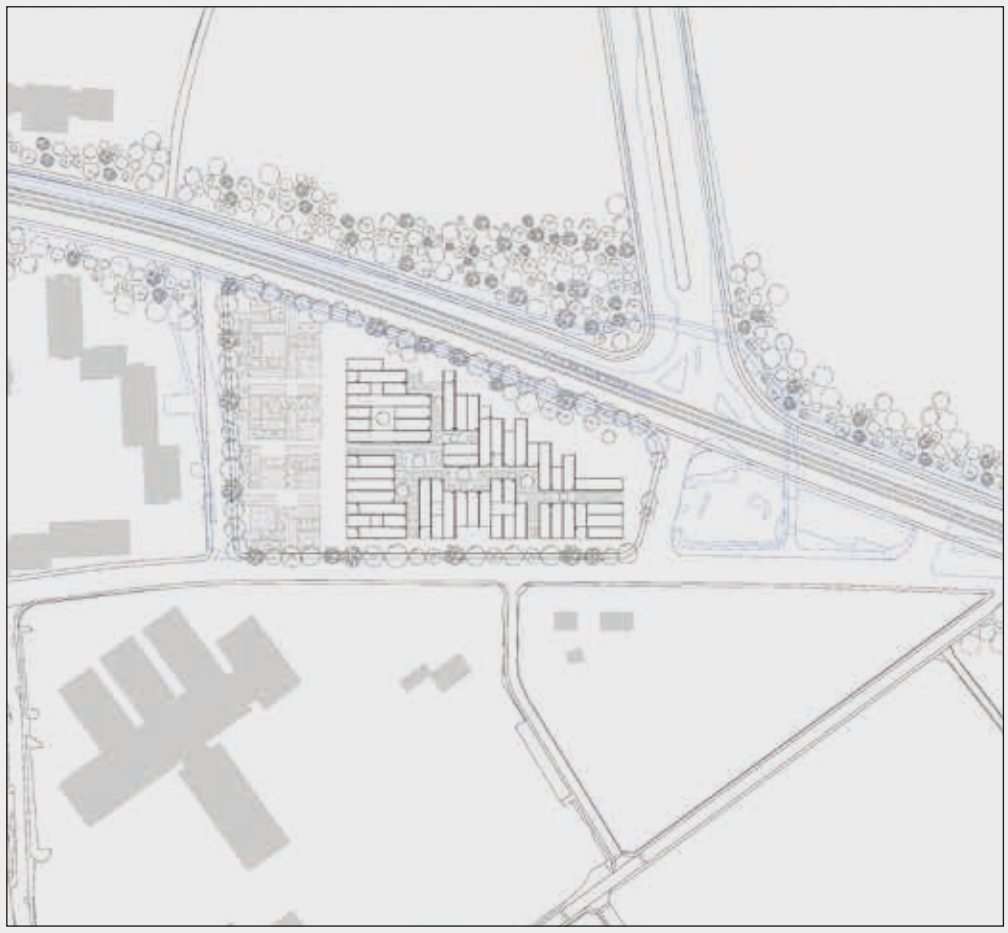
Hydrocollective. An aquaculture cooperative.
This architectural typology is designed for communities that prefer a self-sufficient, garden-based lifestyle. It fuses living and working spaces with greenhouses articulated by an internal water cycle that water the patches and allows for minimised water usage within each unit. On the shared ground floor of the cooperative are both living and workspaces for communal meals and collaborative work. Modular units offer a range of solutions for families of all sizes. Prefabricated Timber construction allows for a user-guided design.

Project by Sara Werbinska
Master in Architecture, University of Luxembourg, 2019

First floor plan

Ground floor plan

Existing Infrastructure



Superimposition

Self-building complex combining new labour and housing.
This self-building complex picks up on the structuralist carpet concepts of the 1970s, which, despite their low height, have a high density. The ground floor offers new typologies for the makers movement, free-lancers, craftsmen, digital production, etc., with common spaces for exchanges and meetings, and the possibility to sell products towards the street. Above this, there are courtyard apartments, which are accessed via a public level that offers them communal outdoor spaces. To the west of the complex, individual and communal gardens are avail-able to all residents. Today there is a car park at this location.

Project by Eldin Babic
Master in Architecture, University of Luxembourg, 2019

2 Global - Local Protagonists. CERN Experimental Campus

Aligned to one of the significant mobility axes of Geneva, the Route de Meyrin, and situated in between the Jura mountain and Lac Leman, the site is bound by the Geneva Airport in the east and CERN main site to the west. A campus landscape where vast agriculture fields, dense forest patches, wetlands and mountain streams compose the natural fabric in which diverse hiking trails, leisure and sports facilities are embedded. The area is not only used by local residents of the surrounding villages but also offers a retreat to many international employees of CERN and other global institutes that settled around the area.

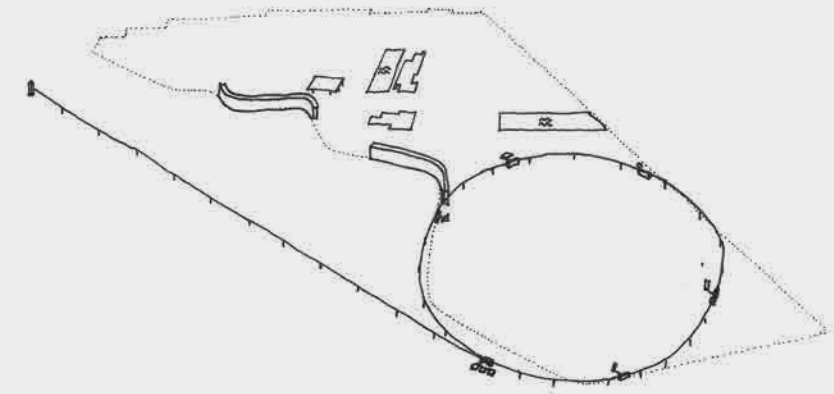
Since the establishment of ICRC (International Committee of Red Cross) in 1863, Geneva is home to 37 international organizations, 399 NGOs, and 179 permanent missions; CERN being one of them. Initially based in the Swiss Communes of Meyrin close to the French-Swiss national border around the 1960s, CERN has expanded its territory across the border to France.

With the increasing influx of high-profile global employers to the area, massive pressure was put on the French communes. Many international people reside in the affordable and well-connected French countryside, while at the same time being employed by the international bodies in Geneva. The French communes of Saint Genis Pouilly and Prevessin along the fringe of the site have now developed into residential towns with little public spaces and lacking social services. Ferney Voltaire, another French commune originally home to the writer and philosopher Voltaire is now paving the way to developmental housing projects. On the other side of the border, Meyrin, once an agricultural village settlement overtime, has sprung into a modernist satellite town with dedicated public and commercial spaces within.
The continuing “growth” has threatened to destabilize the cross-border balance. While central Geneva has revelled in its status as a location of global finance and international institutions, the pressure of housing supporting these activities has been absorbed in the French countryside. Here, in the so-called “Other Geneva“, decades of haphazard construction have produced a sprawling urban agglomeration, in which heavy traffic, lack of public services, and eroding landscape features have become a reality.

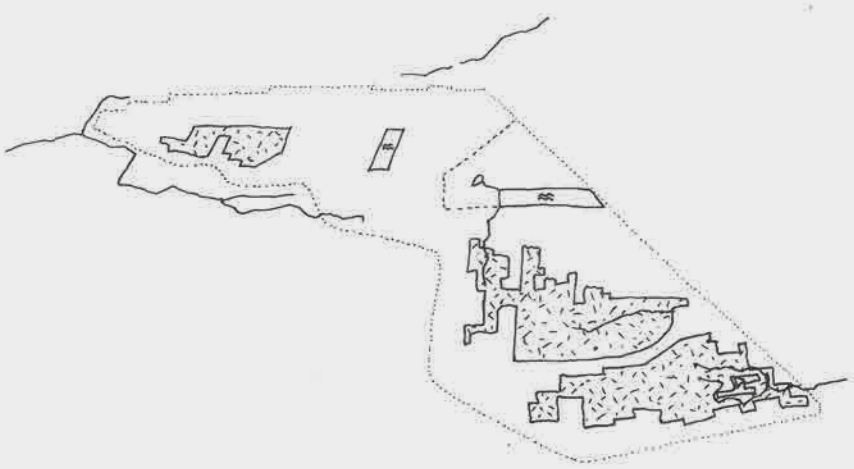
It’s also a reality of different jurisdictions and unequal administration regimes, which offers the possibility for many of the global protagonists to actively engage in the preservation and coordination of the location they are settling in. In the Metropolitan Region, global institutions will take responsibility as active agents in the local fabric. Dormant loops will surface, and the Global-Local Territories will turn into interactive territories of synergies between the global and the regional.

1 **Mixed agriculture lined by bocage**
2 **Ecological corridors and habitats interspersed in the fields**
3 **Monorail and public infrastructure**
4 **New building zones along the fringe**
5 **Preserved villages cores**
6 **Redirected fast traffic around the Agri-Room**

CERN Agri-Landscape Room. A distinctive landscape and experimental garden. A campus-like landscape of knowledge in which knowledge is exchanged and cultivated.

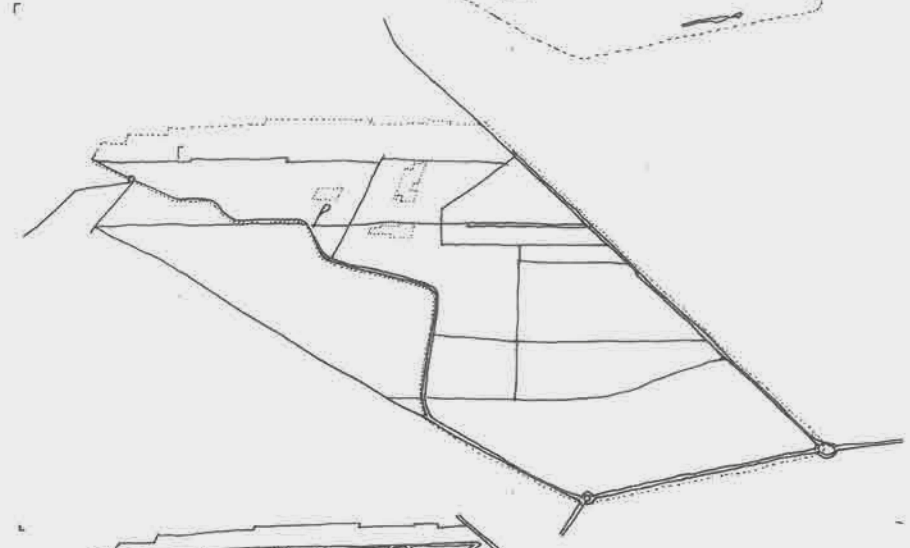


Metropolitan commons (housing, water basins, market, monorail between CERN and Ferney-Voltaire etc.)

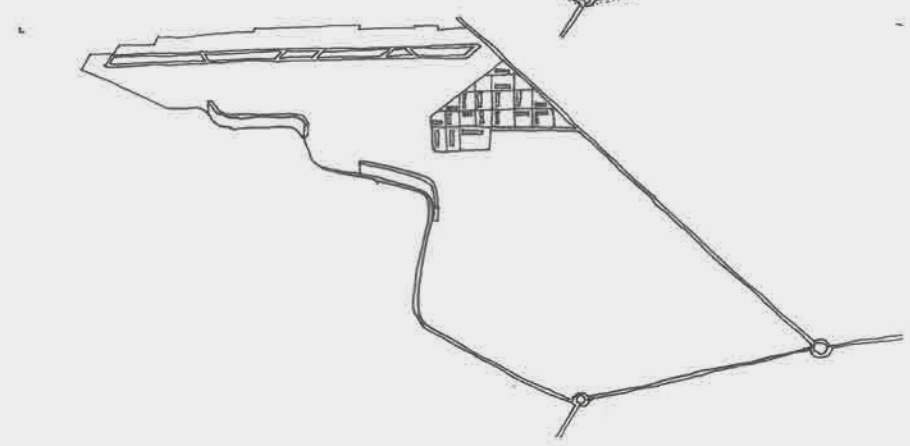


Large-scale natural networks of protected forests and water bodies (existing/new)

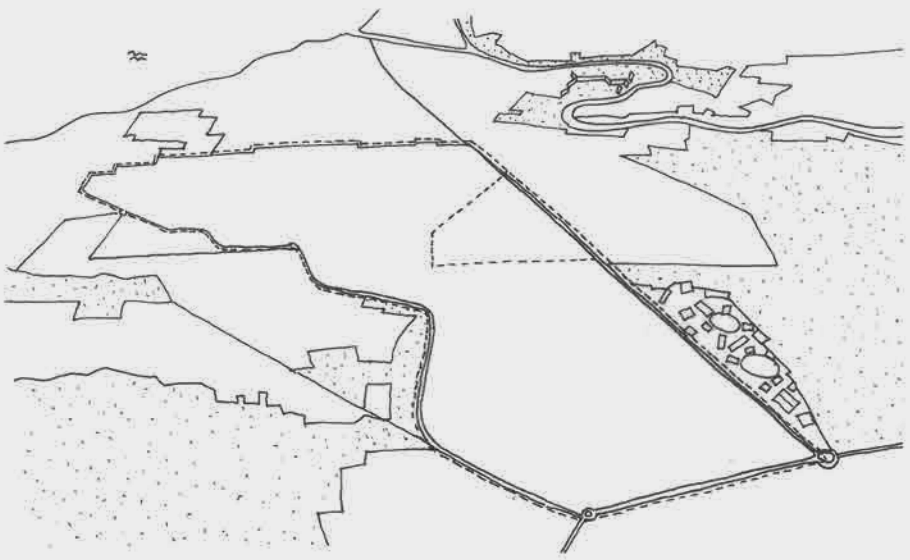
Agro-ecological production in diverse fields lines by bocage



Slow circulation of countryside roads and bicycle paths

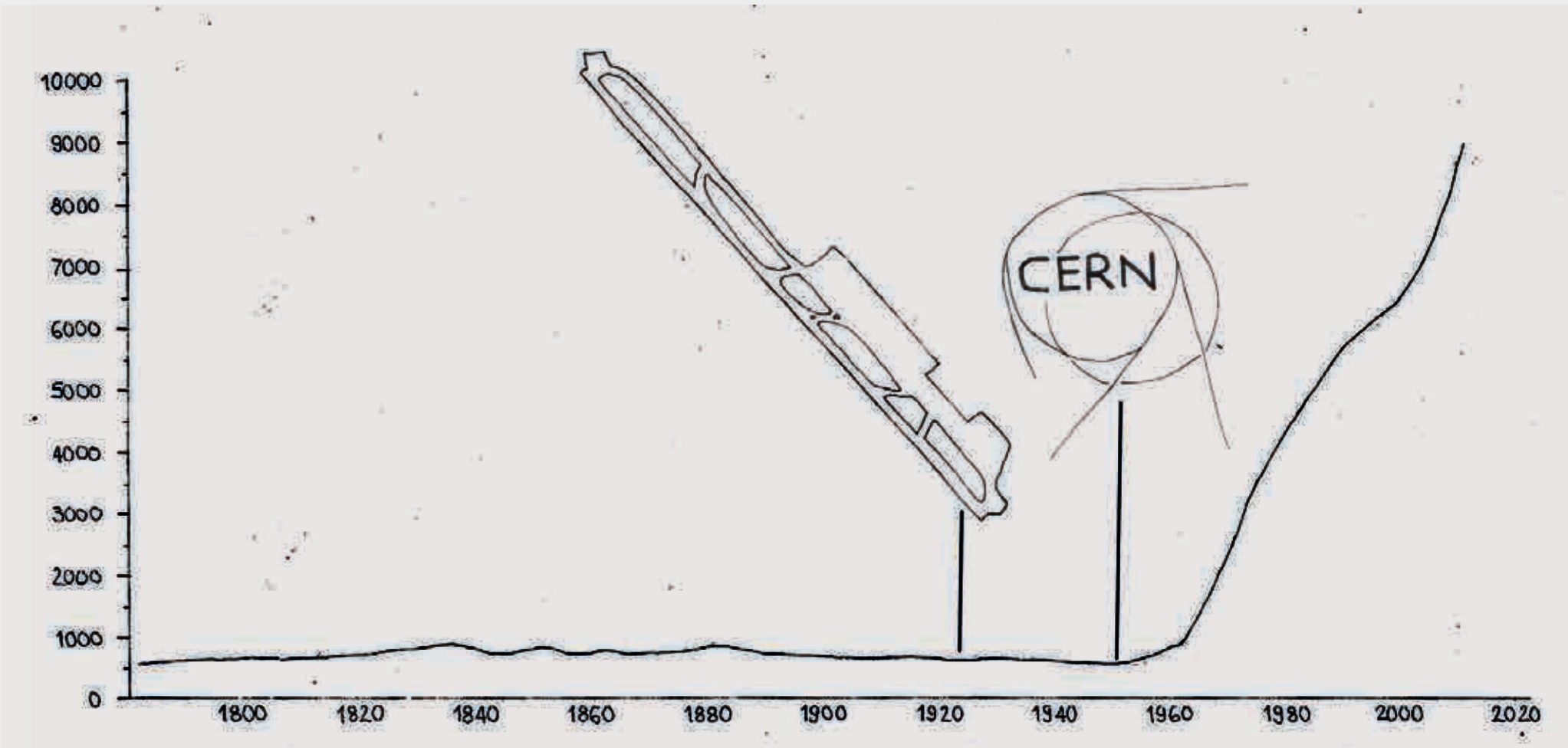


Setting the limits by redirected roads and new building zones

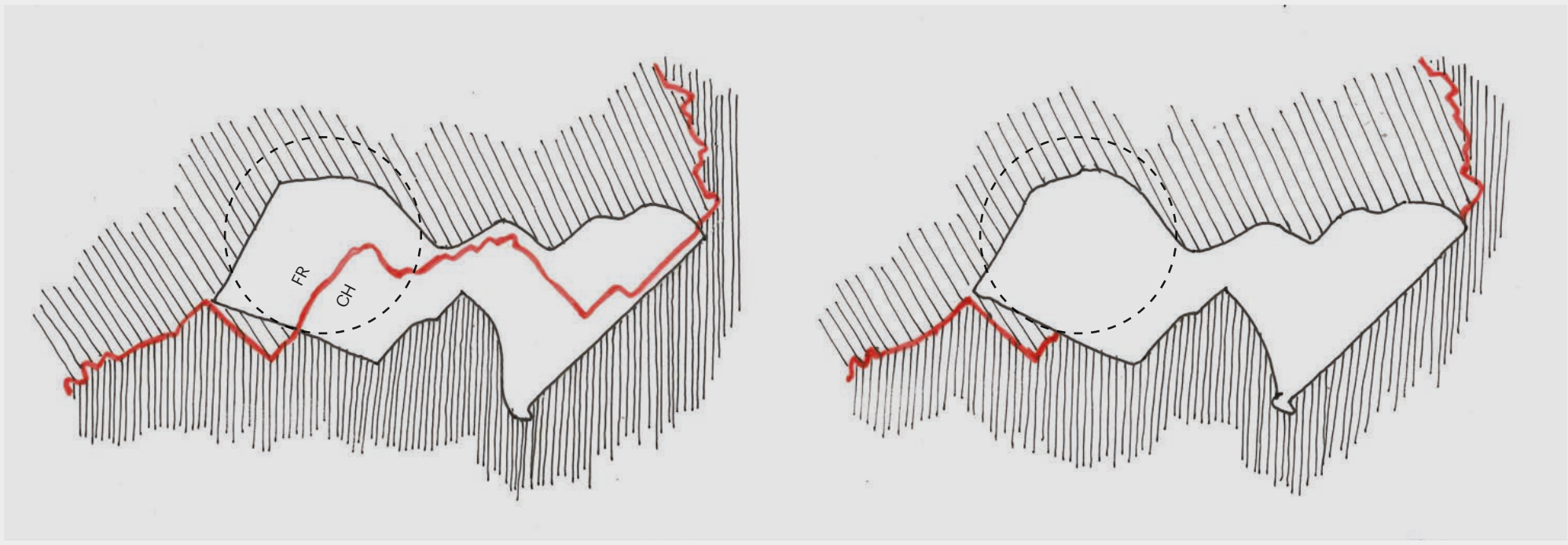


The new figure of CERN landscape room

CERN Meyrin Site
under construction, 1957



Population Growth of the French Commune Saint-Genis-Pouilly, Architecture of Territory ETHZ, 2017



CERN Experimental Campus.
The CERN Experimental Campus continues the legacy of nature and experimentation from the age of Voltaire into the present.
Integrated in the local residential fabric, new ideas are born and explored in the campus. The experimental campus inspires and educates, and puts the landscape on the international map. A borderless space on the border where people interact and benefit. The site would demonstrate how lost opportunities can be converted into new possibilities. It could pave way for new types of economies and farming with close links to the local culture and ecology. CERN would play a major role in achieving the vision.

Project by Sharan Goppenahalli, Khevna Modi and Lisa Therese
Architecture of Territory ETHZ, 2017

Agri-Landscape Room of Bardonnex. One of the many large productive plateaus in the Cuvette Genevoise, surrounded by the Bi-National Metropolitan fabric. In close vicinity to the city, agriculture performs productive and recreationally simultaneously.

3 Agri-Landscape Rooms. Metropolitan Gardens

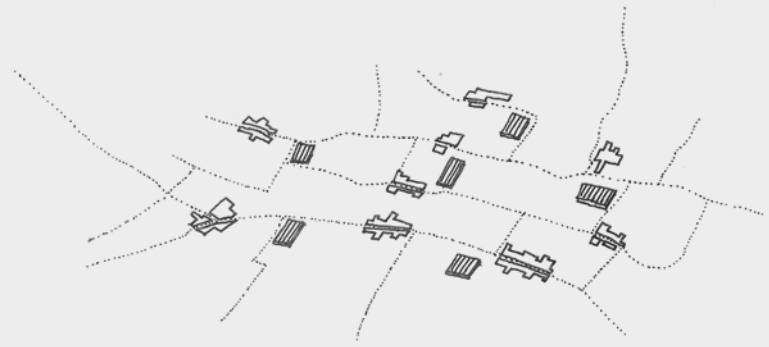
Located in the south of Geneva, the Agri-Landscape Room of Compesières presents one of the many historic productive plains and plateaus of the region. Since the Roman period have the farmers been growing both vegetables and cereals, leaving behind a field structure and road system that is still traceable.
With Geneva expanding beyond the city walls and the rise of the bourgeoisie, the idyllic countryside became the weekend destination for urban dwellers.

The City's former hinterland today represents a significant cultural landscape of heritage-protected villages, castles, churches, landmark watch- and water towers. Diverse preservation regulations for the heritage landscape and the conservation of arable land, plus attractive incentives and subsidies for environmentally friendly farming methods, preserved the landscape from large-scale spatial transformations. One of the most influential forces is the Swiss law on the preservation of crop rotation area. Almost the entire agriculture surface of the Canton Geneva is dedicated to staple food production through the legislation of the Surfaces d'Assolements (SDA). 8400ha of protected crop rotation area consisting of open land, artificial grassland, and arable grassland — a vast landscape of productive plateaus distributed in the fertile plain of the cuvette, often referred to as the "Green Belt", separating the city center from the French periphery.

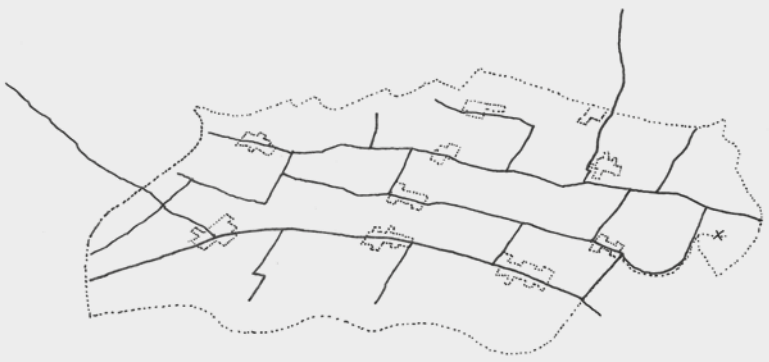
But more than just safeguarding Geneva's food supplies, this belt of land has become crucial for the cities exceptional exclusivity and high quality of life. Agri-Landscape Rooms not only host agricultural production, they also still carries the long tradition of non-agricultural coexistences. Many of the Agri-Landscape rooms serve the Metropolitan dweller as leisure retreat, rustic pathways that allow machinery access to the fields, offer an attractive network of pedestrian walkways. Agri-Landscape Rooms are social landscapes in the Metropolis. They form inherently holds the values of ecology, of identity, and of the common good for the metropolitan region. An urban territory imagined as a productive garden and ecological, social and political project.

1 Mixed agriculture lined by bocage
2 Ecological corridors and habitats interspersed in the fields
3 Glasshouses as public space for direct selling, seasonal worker dwelling or communal hall
4 New building zones along the fringe
5 Preserved villages cores
6 Reduced traffic along narrow roads through the fields
7 Redirected fast traffic around the Agri-Room

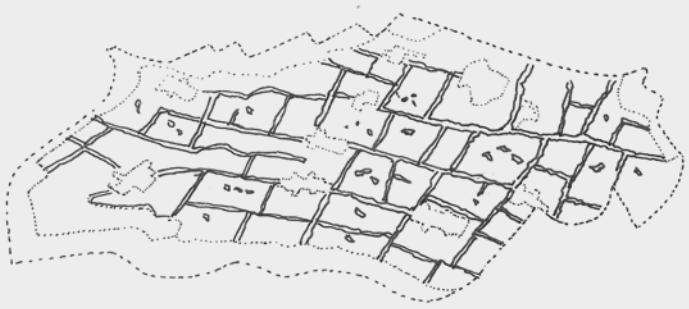
Agri-Landscape Room. A diverse agricultural landscape which promotes agro-ecological practices like mixed planting schemes, agro-forestry, organic farming and permaculture; at the same time it offers new public commons like direct selling points, markets in glasshouses and recreational hiking paths in the fields.



Metropolitan commons in the fields

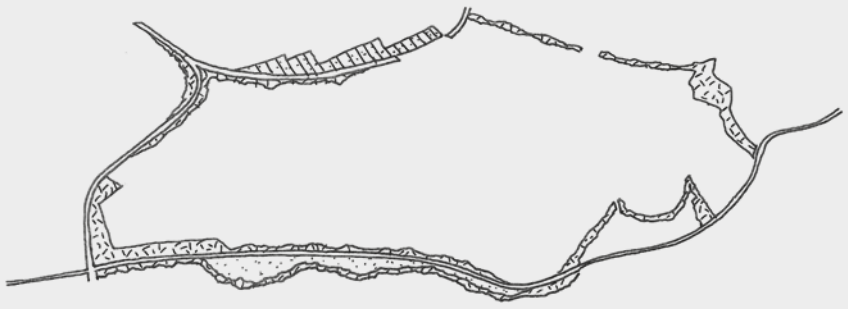


Slow circulation along countryside roads



Agro-ecological production in diverse fields lines by bocage

Networks of blue and green corridors and habitats



Setting the limits by redirecting roads, declaring new building zones and new areas for natural vegetation

The new figure of the Agri-Landscape Room

Communal hall and direct selling in the Glasshouse

The many Agri-Landscape Rooms surrounding Geneva

Avenues lining the local roads in the Agri-Landscape Room

Agripelago.
The agricultural islands in the Metropolis are essential areas for local food production. At the same time, they offer substantial green spaces in a strongly built-up area. Nevertheless, most parts of the territory do not provide enough public access or facilities for metropolitan residents. An opportunity to emphasize the publicness of the productive island is a dense network of pedestrian pathways. Additionally, rows of trees demonstrate both the public and the productive. They are strategically planted along the new path and create new lines (avenues and bocage) in the territory that tie between the agricultural islands and the surrounding cityscape. New metropolitan commons, hybrid infrastructures open to everyone, are introduced into the territory: abandoned greenhouses are renovated and partly replaced with structures that host facilities for the public realm. They offer access to the reality of locally produced vegetables and crops, and hosts markets and direct selling point.

Project by Oliver Burch and Sarah Stieger
Architecture of Territory ETHZ, 2017.

Additional
Design Case Studies

Additional design case studies to be found in the studio reports of the investigative design studios, conducted at the University of Luxembourg (GENEVA BUILT) and the ETH Zurich (GENEVA UNBUILT) during the spring and autumn semester 2019.

GENEVA UNBUILT Studio
ARCHITECTURE OF TERRITORY
Professor Milica Topalović
ETH Zurich D-ARCH

Gardening City and Land
GENEVA UNBUILT (1/2)
Design Studio
Spring Semester 2019

Student Projects and Sites
1 Arve Valley
2 Bardonnex Heritage Garden
3 CERN Experimental Garden

Ideas Take Root
GENEVA UNBUILT (2/2)
Design Studio
Autumn Semester 2019

Student Projects and Sites
1 La Praille Industries
2 Jardins des Nations
3 Cité Jardin d'Aïre
4 'Hausberg' Salève
5 River Rights Aïre
6 Slopes of Jura
7 Collex and Ornex

GENEVA BUILT Studio
MASTER IN ARCHITECTURE
Professor Florian Hertweck
UNIVERSITY OF LUXEM-BOURG

Architecture on Common Ground
GENEVA BUILT (1/2)
Design Studio
Spring Semester 2019

Student Projects and Sites
a Unfolding the City
b Figure of Proximity
c Loopspace
d Oasis Community
e Mosaic Cities

Architecture of Communities
GENEVA BUILT (2/2)
Design Studio
Autumn Semester 2019

Student Projects and Sites
f Live, Work, Interact
g Intergenerational Learning Center
h Academic Hub
i The Green Lab and the Food Lab
j Greenhouse Tower Grand Genève
k High Rise for Geneva 2050
l Transformation of Work Culture
m Food hall
n Hydrocollective
o From Car Park to Habitat
p Housing and Start Up Apartments
q Harvest Hof
r Framework of Diversity

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Notes

2 Project Outline
Grand Genève 2050— A Charter for the Socio-Ecological Transition of a Cross-Border Metropolitan Region

(1) For example, the Danish chemist Svante Arrhenius analysed the influence of CO_2 emissions on the climate as early as 1896. In particular studies from the 1970s such as Meadows et al., The Limits to Growth: A Report on the Club of Rome's Project on the Predicament of Mankind, Potomac Associates and Universes Books, New York 1972.
(2) Cf. Al Gores documentary An Unconvenient Truth from 2006 (directed by Davis Guggenheim); Nicholas Stern, The Economics of Climate Change, University Press, Cambridge 2006.
(3) Marlene Weiss, "CO_2-Emissionen steigen 2019 weniger stark an," in Süddeutsche Zeitung 4th December 2019. Last year, global CO_2 emissions amounted to 42.5 million tonnes.
(4) Hartwig Berger, Der lange Schatten des Prometheus. Über unseren Umgang mit Energie, Oekom, Munich 2009, 37.
(5) Peter Sloterdijk, "Stadt-Energetik," in Arnold Klotz et al. (ed.), Stadt und Nachhaltigkeit. Ein Diskurs, Springer, Vienna/New York 2002, 17.
(6) Emissions in the functional area of Grand Genève are very likely to be even higher, as this would have to include emissions due to commuter traffic and cement production.
(7) Sloterdijk 2002, art. cit., 21.
(8) Ibid.
(9) David Holmgren, Future Scenarios: How Communities Can Adapt to Peak Oil and Climate Change, Green Books, Cambridge 2009.
(10) https://www.ge.ch/document/rapport-geneve-2050
(11) https://www.are.admin.ch/are/en/home/sustainable-development/international-cooperation/2030agenda/un-_-milestones-in-sustainable-development/1987--brundtland-report.html
(12) John Bennett, The Ecological Transition. Cultural Anthropology and Human Adaptation [1976], Transaction Publishers, New Brunswick 2009, 5.
(13) Ibid., 6.
(14) Vance Packard, The Waste Makers, David McKay, Philadelphia 1960.
(15) Bennett [1976] 20019, op. cit., 11. Even if, in return, Garrett does not see the socialization of resources as a solution.
(16) Ibid., 6.
(17) Ebd., 311.
(18) Ibid.
(19) Bernardo Secchi, "Social Inequalities, the Urban Question, and Financial Crisis," in GAM, no 13/2019, 29.
(20) Charles Beer, Ce que cache le Grand Genève, Edition Favre, Lausanne 2013, 13.
(21) Thomas Sieverts, "Zeitbudget und Raumstruktur," in Klotz et al. 2002, op. cit., 163.
(22) Anne Pinno, "Es braucht eine positive Vision," in taz 2nd January 2020.
(23) Panos Mantziaras, La ville-paysage. Rudolf Schwarz et la dissolution des villes, Metispresses, Genève 2008.
(24) Werner Durth, "Vom Dialog zum Diktat. Erinnerung an Berliner Debatten," in Arno Brandlhuber/Florian Hertweck/Thomas Mayfried (ed.), The Dialogic City. Berlin wird Berlin, Walther König Verlag, Cologne 2015, 104. Durth also describes how this concept was used as a model by the National Socialists in the 1930s in contrast to the monumental redesign plans.
(25) Ibid, 105.
(26) Leberecht Migge, Der soziale Garten. Das grüne Manifest [1918], Gebr. Mann Verlag, Berlin 1999, 10.
(27) Jacques Herzog, Pierre de Meuron, Philip Urpsrung, Günther Vogt, Martino Tattara, "Kann man die Stadt anders denken … von der Landschaft her? Ein Gespräch," in ETH Studio Basel/ Jacques Herzog et al. (ed.), achtung: die Landschaft. Lässt sich die Stadt anders denken? Ein erster Versuch, Lars Müller Publishers, Zurich 2016, 36.
(28) Ibid.
(29) Sébastien Marot, "La permaculture est un pari pascalien," in espazium.ch published on 19/6/2019.
(30) Manfredo Tafuri, Progetto e Utopia [1973], hier zitiert aus der französischen Version Projet et utopie, Dunod, Paris 1979, übersetzt vom Autor, 95f.
(31) Cf. Brandlhuber/ Hertweck/ Mayfried (ed.) 2015, op. cit, 11.
(32) Ibid.
(33) Cf. Christian Schmid, Stadt, Raum, Gesellschaft: Henri Lefebvre und die Theorie der Produktion des Raumes, Franz Steiner, Munich, 2005, 90.
(34) Roger A. F. Smook, "Stadt und Nachhaltigkeit. Definitionen, Probleme und Lösungsansätze," in Klotz et al. 2002, op. cit., 81.
(35) Friedrich Schmidt-Bleek, „Faktor-10-Manifest," in Klotz et al. 2002, op. cit., 98.

3 Project Statement
The Relational Governance of Geneva+

These observations emerged in the context of the three-year research project GLOBAL, conducted at the University of Luxembourg (UL) between May 2016 and April 2019. The project investigated the processes that contributed to the rise of Luxembourg, Singapore and Geneva as (relatively) small but global cities, and also analysed the implications of globalisation on these city-state configurations. The project was funded by the Fonds National de la Recherche Luxembourg (C15/R/10352117GLOBAL); see also Hesse & Wong 2020. Special thanks to Michael J. Rafferty, UL, for English proof-reading and corrections.

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(3) BFS Bundesamt für Statistik, Sektion POP, 2018.
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Simplified Lifecycle Sustainability Assessment of Decarbonisation Strategies of the Grand Genève Region

Part of the data and preliminary calculations used to prepare this report are the result of elaborations carried out by our colleagues Elorri Igos, Mélanie Guiton and Alya Bolowich in the framework of previous studies. We wish to thank them for giving us access to those studies.

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6 Charter
Territories of Urban Potentials

1 Bi-National Metropolis

p.142 “Zone Franche. Pays de Gex” C. Schaeben, Diploma Project, Architecture of Territory, 2018

2 Global-Local Territories

p.150 “Jardin des Nations. Becoming an Ecological Role Model”, B.Khoo, Y. Hao Zheng, Geneva Unbuilt 2/2, Studio Report, Architecture of Territory, 2019

3 Post-Fossil Infrastructures

p.156 “La Praille. Latent Nature of Infrastructure”, C. Bekkering, C. Heininger, L. Vauthey, Geneva Unbuilt 2/2, Studio Report, Architecture of Territory, 2019

4 Metropolitan Countryside

p.162 “La Côte. Tax Haven Countryside”, A. Accardo, M. Ineichen, Metropolitan Countryside Lac Leman 1/2, Studio Report, Architecture of Territory, 2016

5 Agro-Landscape Rooms

p.168 “Campagne Rive Gauche. Agri-Gardencity” J. Andres, T. Häusermann, Metropolitan Countryside Lac Leman 1/2, Studio Report, Architecture of Territory, 2016

6 Vital Streams and Canopies

p.174 “Following the Aire. Leagal Rights of a River in Need”, J. Brenzikofer, S. Fontan, Geneva Unbuilt 2/2, Studio Report, Architecture of Territory, 2019

7 Mountain Parks

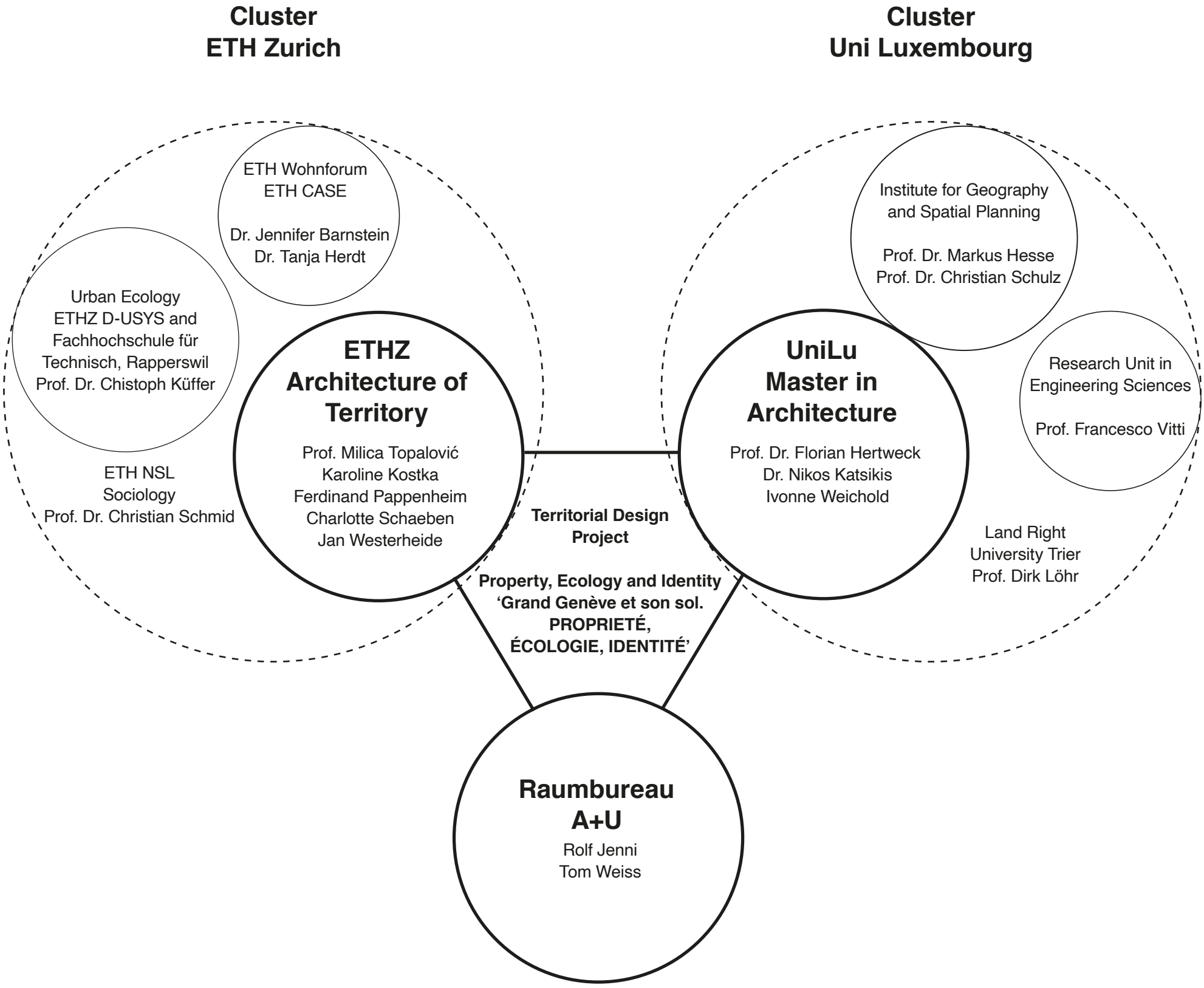
p.180 “500-725 masl. Foothills of Pay de Gex”, L. Andermatt, N. Dollie, C. Gloggner, Geneva Unbuilt 2/2, Studio Report, Architecture of Territory, 2019

8 Charter
Design Case Studies

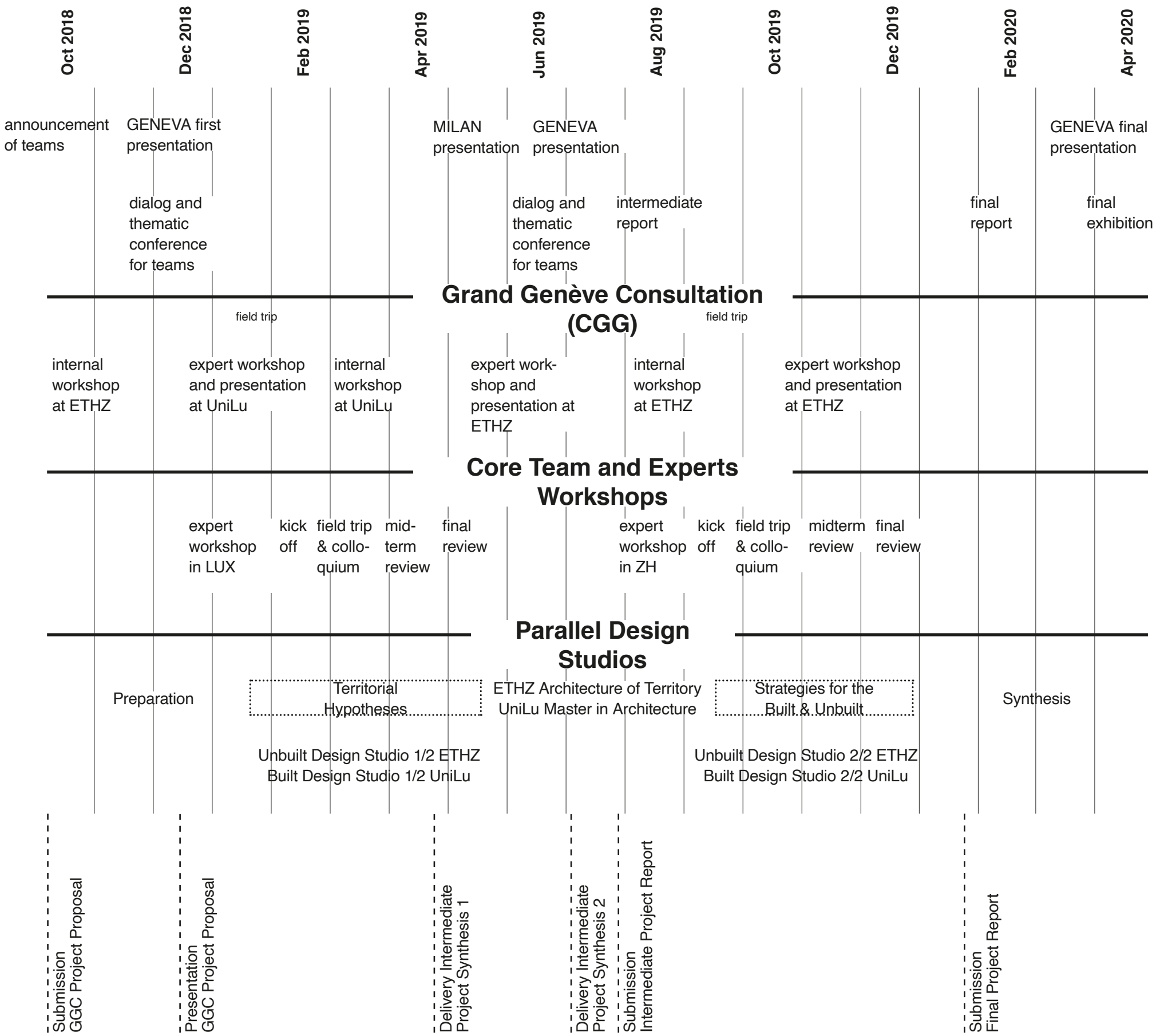
(1) Gorz 1975, op. cit., 5.

Appendix

Project Team



Project Organisation



Project Timeline

1 October 2018
Submission GGC Project Proposal

10-12 December 2018
GGC Conference and Project Presentation in Geneva

8 February 2019
Project Presentation and Expert Workshop in Luxembourg (with Markus Hesse, Ivonne Weichold)

19 February 2019
Opening Parallel Investigative Design Studios Spring Semester 2019. ETH Geneva Unbuilt (1/2) ‘Gardening City and Land’ and Uni LUX Geneva Built (1/2) ‘Architecture on Common Ground’

12 March 2019
Project Presentation and Expert Workshop in Luxembourg (with Markus Hesse)

16 - 23 March 2019
Fieldtrip I - Geneva Unbuilt/ Built

25 May 2019
GGC Conference and Delivery of Intermediate Project Synthesis 1 at Teatro Agora in the frame of XXII Triennale ‘Broken Nature’, Milano

28 May 2019
Final Review Parallel Investigative Design Studios Spring Semester 2019. ETH Geneva Unbuilt (1/2) ‘Gardening City and Land’ and Uni LUX Geneva Built (1/2) ‘Architecture on Common Ground’ at ONA Building, ETH Zurich

29 May 2019
Presentation and Expert Workshop in Zurich (with Panos Mantziaras, Anne-Laure Lepage, Nancy Couling, Tanja Herdt, Markus Hesse, Christoph Küffer, Peter Loosli, Tom Weiss)

03 July 2019
GGC Dialog, Conference and Delivery of Intermediate Project Synthesis 2 at Espace Omnisports du Salève, Geneva

17 July 2019
Submission GGC Intermediate Project Report

17 September 2019
Opening Parallel Investigative Design Studios Autumn Semester 2019. ETH Geneva Unbuilt (2/2) ‘Ideas Take Root’ and Uni LUX Geneva Built (2/2) ‘Architecture on Common Ground’

25 September 2019
Internal Project Workshop in Zurich

26 September 2019
Presentation and Expert Workshop in Zurich (with Panos Mantziaras)

28 November -2 October 2019
Geneva Fieldtrip II
Grand Genève Region

16 October 2019
Presentation and Expert Workshop in Zurich (with Christoph Küffer)

29 October 2019
Presentation and Expert Workshop in Zurich (with Elena Cogato Lanza)

31 October 2019
Presentation and Expert Workshop in Zurich (with Christoph Küffer)

20 November 2019
Presentation and Expert Workshop in Zurich (with Christian Schmid)

5 December 2019
Presentation and Expert Workshop in Luxembourg (with Luxembourg Institute of Science and Technology)

12 December 2019
Presentation and Expert Workshop in Luxembourg (with Francesco Viti)

19 December 2019
Final Review Design Studio ETH Geneva Unbuilt (2/2) ‘Ideas Take Root’ at ONA Building, ETH Zurich

19 December 2019
Final Review Design Studio Uni LUX Geneva Built (2/2) ‘Architecture on Common Ground’ in Luxembourg

22 Januaryr 2019
Presentation and Expert Workshop in Zurich (with Christoph Küffer)

27 January 2020
Submission GGC Final Project Report

Parallel Design Studios

Attached to this final report are the studio reports of four parallel investigative design studios conducted at the University of Luxembourg (GENEVA BUILT Studios) and the ETH Zurich (GENEVA UNBUILT Studios) in 2019.

Each studio represents a collective project, where students engage with individual sites, create design case studies, and work together towards building a shared metropolitan vision.

An extended investigative field trip in the region was part of each studio. Numerous experts and colleagues introduced and guided the student from 16.03.- 23.03.2019 and 28.09.- 02.10.2019 throughout the Grand Genève Region. Additionally, parallel expert workshops with guests and collaborators were held in March, May, and October 2019 in Luxembourg and Zurich.

Acknowledgements
We would like to thank all experts, colleagues, lectures and review guests who supported our research from October 2018 till January 2020, and gave valuable input.

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and GENEVA BUILT Studios:
Jacques Blumer, Mathias Heinz, Markus Miessen, Marc Berdet, Christine Muller, Philippe Schmit, Peter Swinnen

Special thanks to all collaborators and participants who helped to put together our exploration trough Genevas Metropolitan Region during the field trips to Geneva in March and September 2019.

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David Jean, La Ferme des Chavannes & Fromagerie Mobile, Thoiry
Alexandra Nievergelt, SBB Immobilien, Zürich
Xavier Patry, Director Union Maraîchère de Genève
Yves Richard, President Association Patrimoine Versoisien, Versoix
Jean-Robert Antoine, Ferme Vecchio, Geneva
Sabine Bally, Jardins de Cocagne, Geneva
Marcellin Barthassat, Architect and urbanist, Quatre— Architecture Territoire Geneva
Philippe Brun, Architect, Geneva 500
Renaud Ewa, Adjointe Scientifique Biologist, Horticulture De Lullier, Geneva
Sylvie Kuenen, Tour guide at the Château Voltaire
Jean-Jacques Imberti, Ferme Vecchio, Vessy
Jean-Paul Jaccaud, Jaccaud Spicher Architectes Geneva
Sonja Kleiner, CERN Environmental Protection
Peter Loosli, Co-constructor of the Grand Genève
Panos Mantziaras, Director Foundation Braillard Architect, Geneva
Joseph Meyer, Domaine du Crest, Jussy
Michael Poehler, CERN Urbanism
Patrice Prunier, Professeur Gestion de la nature, Horticulture De Lullier, Geneva
Jean-François Ravot, Mayor of Chevry

Unbuilt Studios
ARCHITECTURE OF TERRITORY
ETH Zurich D-ARCH
Professor Milica Topalović

Gardening City and Land
GENEVA UNBUILT (1/2)
Design Studio Spring Semester 2019

Teaching Team
Prof. Milica Topalović, Ferdinand Pappenheim, Jan Westerheide, Metaxia Markaki, Karoline Kostka

Students Projects
1 ARVE VALLEY
Flooding Gardens
Project by Androniki Prokopidou and David Tucker
2 PRODUCTIVE HERITAGE GARDEN
Gathering in the resistant countryside
Project by Romain Dupertuis, Janosch Eggenberger and Eric Niu
3 THE EXPERIMENTAL GARDEN
Cern meets Voltaire
Project by Sharan Goppenahalli, Khevna Modi and Lisa Therese

Studio report 242 pages,
www.Topalović.arch.ethz.ch/projects/geneva-unbuilt

Ideas Take Root
GENEVA UNBUILT (2/2)
Design Studio Autumn Semester 2019

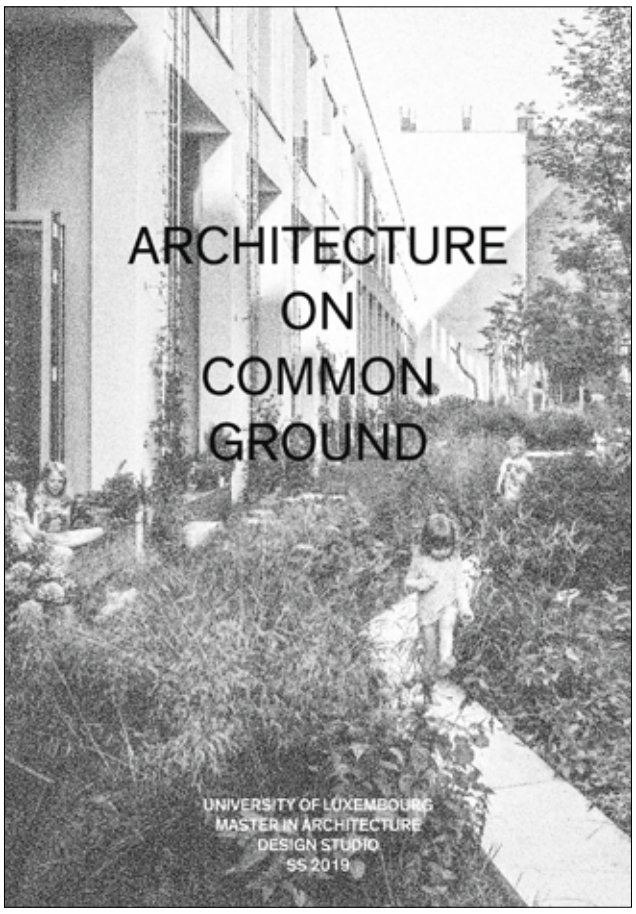
Teaching Team
Prof. Milica Topalović, Ferdinand Pappenheim, Jan Westerheide, Metaxia Markaki, Karoline Kostka, Nazlı Tümerdem

Student Projects
1 BUILDING The Unbuilt.
Latent Nature of Infrastructure
Project by Chantal Bekkering, Cyril Heiniger and Lucie Vauthey
2 JARDINS DES NATIONS.
Becoming an Ecological Role Model
Project by Benedict Khoo and Yip Hao Zheng
3 ENVISIONING NEW GARDEN CITIES —
Tools for Ecological Ways of Participation
Project by Edgar Gervason, Fatma Nur Topbas and Dylan Torri
4 NOTHING BUT FLOWERS.
A New Vision for the Foot of the Salève
Project by Natalie Caroll, Raphaela Dudler and Céline Ryffel
5 FOLLOWING THE AIIRE.
Legal Rights for a River in Need
Project by Janosch Brenzikofer and Sylvie Fontan
6 500 – 725 MASL.
Foothills of the Pays de Gex
Project by Lea Andermatt, Nadina Dollie and Cindy Gloggner
7 FRIENDLI NEUGHBOORS.
Parallel Urban Growth
Project by Florence Gilbert, Serena Neuenschwander and Moritz Schmidt

Studio report 368 pages,
www.Topalović.arch.ethz.ch/projects/geneva-unbuilt-2-2

Built Studios
MASTER IN ARCHITECTURE
UNIVERSITY OF LUXEMBOURG
Professor Florian Hertweck

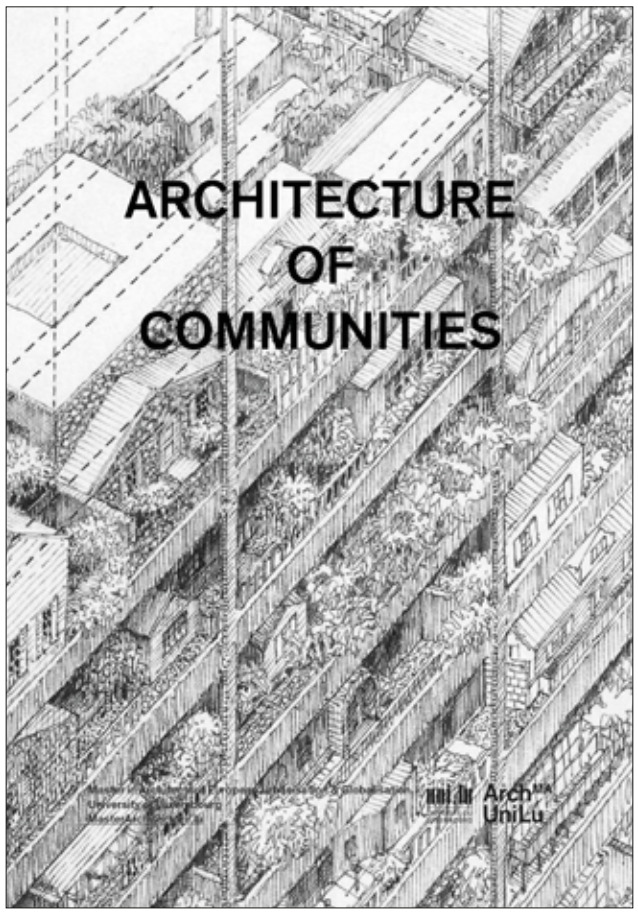
Architecture on Common Ground
GENEVA BUILT (1/2)
Design Studio Spring Semester 2019



Teaching Team
Prof. Florian Hertweck, Nikolaos Katsikis, Ivonne Weichold

Student Projects
1 UNFOLDING THE CITY
Eldin Babic and Christian Guama
2 FIGURES OF PROXIMITY.
Reimagining the Urban Edge
Project by Sara Werbinska, Srija Nadipineni and Scott Lang
3 LOOPCAPE.
Project by Koushik Radharkrishnan and Aleksander Zaremba
4 OASIS COMMUNITY.
Project by Amanda Dalmutt Ortiz
5 MOSAIC CITIES.
Project by Bujar Hasani and Natali Bezarashvili

Architecture of Communities
GENEVA BUILT (2/2)
Design Studio Autumn Semester 2019



Teaching Team
Prof. Florian Hertweck, Philippe Nathan

Student Projects
1 LIVE, WORK, INTERACT.
Project by Eldin Babic
2 THE INTERGENERATIONAL LEARNING CENTER.
Project by Natali Bezarashvili
3 ACADEMIC HUB.
Project by Amanda Dalmutt Ortiz
4 THE GREEN LAB AND THE FOOD LAB.
Project by Christian Guaman
5 GREENHOUSE TOWER GRANS GENEVE 2050.
Project by Bujar Hasani
6 TRANSLATING TRADITIONS. HIGH RISE FOR GENEVA 2050.
Project by Scott Lang
7 TRANSFORMATION OF WORK CULTURE.
Project by Srija Nadipineni
8 FOODHALL.
Project by Koushik Radharkrishnan
9 HYDROCOLLECTIVE.
Project by Sara Werbinska
10 MOBILITY 2050: FROM CAR PARK TO HABITAT.
Project by Aleksander Zaremba
11 BEST FRIENDS HOUSING AND START UP APARTMENTS.
Project by Nora Hammelmann
12 HARVEST HOF.
Project by Sofie Iommi
13 FRAMEWORK OF DIVERSITY.
Project by Eduardo Dugaich

Agriculture Diversification in Collex-Bossy, Field Trip September 2019

Experimental gardening at Château de Voltaire, Field Trip March 2019

Self–sufficent farm in the Jura Mountains,
Field Trip September 2019

River Renaturalisation at the Promenade de l’Aire,
Field Trip September 2019

Le Lignion,
Field Trip March 2019

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