

Carouge (CH)

REGENERATING CAROUGE GROUNDS: A CONNECTING URBAN ECOSYSTEM

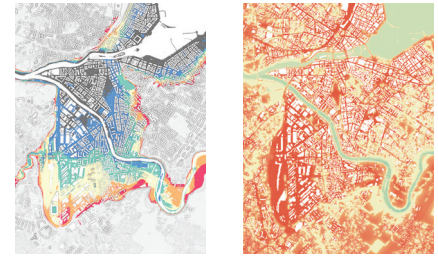
XL. GEOMORPHOLOGY: REACTIVATING CAROUGE FONTENETTE AS AN INHABITED LANDSCAPE IN THE GREATER GENEVA URBAN ECOSYSTEM

GENEVA BASIN, the Need for a Breathing and Thriving Space: Geneva and Carouge are located in the central part of the Geneva basin, surrounded by higher plateaus. This hollowed-out relief is entirely urbanized; therefore **concentrating environmental nuisances**, as illustrated by constantly rising day and nighttime temperatures. However, in the long historical time, the urban development of the Geneva metropolis was first carried out along a North-South axis (City of Geneva, Plainpalais, Carouge), bordered by the areas of La Praille to the west and La Fontenette to the east which were then covered by croplands and pastures. If la Praille is strongly marked by a railroad network, **the large amount of open spaces in la Fontenette offers a unique opportunity to regenerate an area of river divagation, cool atmosphere and leisure, essential to the most urbanized districts of the Greater Geneva.**

ARVE MEANDERS, a Place for Leisure and Water Infiltration: The sinuous limit between the historical center of Carouge and the Fontenette marks exactly the eastern contour of the Genevan water table. The intersection between the outcropping water table and the Arve river which feeds it defines three meanders (Fontenette, Bout-du-Monde, Vessy) characterized by a lower topography. **These former marshes are now used for extensive purposes:** sports activities and recharging of the water table, the level of which has dropped due to overexploitation. The Fontenette meander had a particular destiny: entirely dedicated to local market gardening until the 20th century, it was then completely covered by a patchwork of modernist housing and logistics developments, some of which have already disappeared in favor of a partial re-naturation. **The soils of the Fontenette have been completely transformed by man on several occasions and thus constitute a palimpsest: its future must be re-imagined and re-modeled in relation to the water table and the river.** With the most important sports activities moved to the many existing facilities in the following meander, and with a relatively increased housing density accompanied by reinforced leisure and social programs, **the Fontenette neighborhood is destined to become a large inhabited landscape and ecological infrastructure.**

VALLEY SECTION, Reactivating the Urban Metabolic Fluxes: The Fontenette district is framed by a specific valley section: between the morainic and glacio-lacustrine plateaus of Champel (north) and Pinchat (south), several layers of soil formed by fluvial sedimentation and human action cascade in successive terraces towards the river and the layer of ancient alluvium of the water table. **This particular geomorphology directs the main metabolic fluxes of the site:** fresh air and runoff water flow down from the plateau to the river. In the valley, fresh air also flows along the river, while grey waters are generated in the inhabited areas. Similarly, the flows of organic matter are distributed between the plateau, where food is produced, and the inhabited areas, where food is consumed generating organic waste. Interrupted by modern technological devices, these metabolic cycles must be reactivated in order to move towards a sustainable urbanism in the face of climate and other environmental changes. **According to the potentialities of the site, three main objectives are targeted for regenerating the Carouge Fontenette grounds as an ecological infrastructure:**

- **A/ (IN)FILTERING WATERS:** To avoid groundwater contamination risks, the current regulation prohibits any infiltration in the area. The project proposes an alternative strategy: demineralizing soils to ensure a **slow drainage, filtration-depollution and infiltration of waters**, thus limiting flood risks.
- **B/ COOLING THE URBAN ATMOSPHERE:** The cool zones are currently very localized at the foot of the plateau and along the river, with acute temperature differences. The project aims at improving **fresh air flows** and creating cooling zones by **evapotranspiration**.
- **C/ TOWARDS CARBON NEUTRALITY:** To contribute to the ecological transition, the project promotes **local food production and recycling of organic matter** (domestic waste), as well as massive **biomass production and carbon sinking** in extensive grasslands and wetlands.



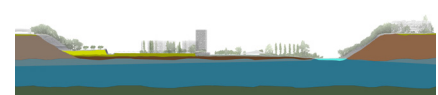
Left: Topographic map of Geneva and Carouge: a hollowed-out relief entirely urbanized; Right: Map of highest temperatures: a concentration of nuisance



Fontenette at the hinge between the historical North/South development of the city and the Genevan water table



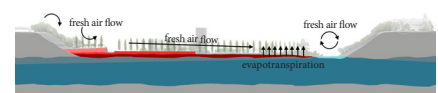
The Fontenette soil palimpsest: in the 1930s, a fully productive gardening surface; in the 1970s, a patchwork of modernist developments



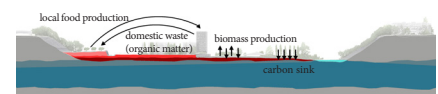
VALLEY SECTION, Reactivating the Urban Metabolic Fluxes



A/ (IN)FILTERING WATERS



B/ COOLING THE URBAN ATMOSPHERE



C/ TOWARDS CARBON NEUTRALITY

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L. GEOMORPHOLOGY: MAIN STRATEGIES AND MORPHOLOGIES FOR A CONNECTING ECOLOGICAL INFRASTRUCTURE

Based on a profound and radical evolution of the ways of transport, life and production, the project aims at establishing a connecting ecological infrastructure in the Fontenette district. The urban landscape will be gradually transformed throughout the 21st century according to three main strategies generating the three main morphologies of the project.

1. ECOLOGICAL CORRIDORS, Demineralization, Soft Mobility and Metabolic

Exchanges: The project establishes a **drastic reduction of automobile traffic** which is maintained almost exclusively on the perimeters of the site. Access to clean vehicles inside the site on small permeable tracks is limited to deliveries, public and on-demand transport, and firefighter. The reduced number vehicles are parked in the existing underground parking lots. **This strategy allows for a systematic demineralization, reopening and regeneration of the asphalt surfaces:** the old roadways and grey water sewage are transformed into ditches. **With their hollow and linear topographies and their specific soils and vegetation, the ecological corridors ensure metabolic exchanges between the different parts of the project:** fresh air descends from the plateau, water is drained and conveyed towards the Arve, pedestrians and bicycles circulate in a soft mobility network.

2. THREE SOILS, Circular Economy of Materials:

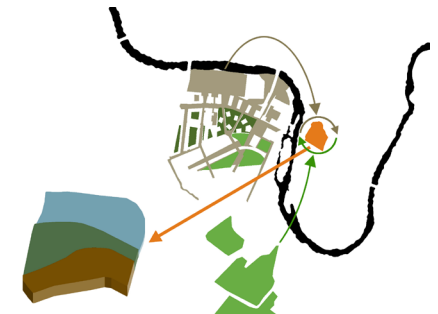
Synthetic sport fields, mineral public spaces and logistic areas are respectively turned into wet- and grasslands, community gardens and urban permaculture farming. Organic matter from dwellings and cultivated surfaces (green and domestic waste) is systematically collected and composted on the former logistic site of the Bout-du-Monde, then mixed with mineral materials produced by the remodeling of the topography, in order **to recreate functional soils** on site over time. **This transitional and circular processes generate three soil levels, the reliefs, materiality and specific uses of which shape the whole project:** respectively dedicated to food production, housing and leisure, the substrate of these three terraces of decreasing thickness are less and less draining as approaching the Arve in order to slow down the infiltration in the water table.

3. CONNECTING PUBLIC SPACES, the 'Re-Invention' of Carouge:

The project extends and updates the proto-modern urbanization that makes Carouge unique: the central courtyard building block typology is systematized to unify existing building bars to the west of the site and complemented by open typologies to the east echoing the towers of Carouge. **The tree-lined mall crossing the historic center from the old market is extended and pedestrianized through the entire inhabited park, overlooking the Arve banks.** This backbone of public space leads to an esplanade lined with a new market and urban farm located in the former buildings of the automobile center, the modern heritage character of which is maintained. In this new heart of the district, **the West/East mall intersects with a new South/North trail that connects the 'pénétrante de verdure' on the Pinchat plateau to the Champel plateau** over the Leman Express bridge by a pedestrian promenade completed by stair ramps.



1. ECOLOGICAL CORRIDORS, Demineralization, Soft Mobility and Metabolic Exchanges



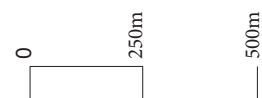
2. THREE SOILS, Circular Economy of Materials



3. CONNECTING PUBLIC SPACES, the 'Re-Invention' of Carouge



Master plan of the Fontenette inhabited landscape and connecting ecological infrastructure



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M. SOILS: REMODELING THE TOPOGRAPHY, MATERIALITY, ECOLOGICAL FUNCTIONS AND SOCIAL USES OF THE FONTENETTE GROUNDS

THE ARVE COMMONS: The existing elevated banks supporting a linear promenade leave little room for a direct relationship with the water and sublime landscape of the Arve. Along with sports grandstands and garage buildings, these **longitudinal obstacles** also prevent the fresh air of the river from entering laterally over the monofunctional sports fields. These synthetic surfaces on impermeable slabs – which are redundant to the numerous facilities of the Bout-du-Monde complex – are therefore removed and **excavated to progressively shape a spatial and topographic sequence alternating transversally between two types of commons.**

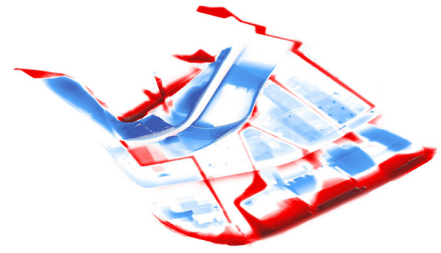
The lower, wild and cool wetlands invite reappropriation of the Arve banks. The higher, drier and less densely vegetated grasslands are directly accessible from the mall and favor multiple informal relaxation and sports uses. A footbridge connects wetlands and grasslands allowing a faster circulation through the commons from one end of the Arve banks to the other. Some of the commons support more specific programs associated with multifunctional leisure facilities: **the redeveloped public baths extend to a beach along the Arve River, while the boulodrome opens onto a meadow hosting an outdoor workout.** Alternating relaxation activities in nature during the day and recreational activities (bars, restaurants) in the evening, such semi-public establishments are typical of Switzerland.

THE INHABITED GARDEN: The vast asphalt surfaces of the parking lots and the monotonous roadways offer a low open space quality and are therefore **systematically demineralized.** Conversely, as they embody a significant amount of grey energy, **the existing residential buildings are mostly preserved, moderately densified and progressively transformed** to allow for ecological sanitation and air cooling. **The reopening of the grounds allows for the implementation of two functional and landscape devices.**

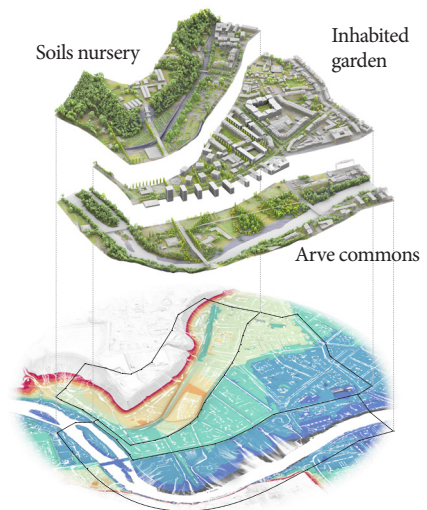
The streets are transformed into vegetated ditches, bordered on both sides by a network of permeable pedestrian and bicycle paths, ensuring light logistical service. The open spaces on the ground floor are entirely reprogrammed in a grid of semi-public spaces alternating between individual and community gardens, small meeting places, children play-ground and proximity services (e.g. recycling and composting points). The relationship between gardens and buildings vary according to the typological strategies chosen for densification. When the existing buildings bars are extended to form closed building blocks, the gardens are located inside the central courtyards. Conversely, the semi-public spaces frame the outer edges of the open compositions of buildings to give them spatial coherence. **The inhabited garden terrace is bordered by a mall extending the historic axis of Carouge, punctuated by a new row of towers the spacing of which let the air flow and the view open over the Arve commons.** At the intersection with the South/North trail, **the mall expands onto a central esplanade lined with public facilities:** a market distributing products from local urban agriculture and located in the former modernist building of the automobile center, the recently built school of music and a new mixed-use service building hosting catering and leisure activities.

THE SOILS NURSERY: Historically dedicated to logistical functions (former automobile center, greenhouses and municipal services building), **the higher part of the site is meant to meet future challenges of urban ecology: the creation of new soils, in particular for urban agriculture.** The anthropic soils of the cemetery are gradually extended by a **series of terraces forming an ephemeral and evolving topography.**

Operated by the urban farm hosted in the former technical hall, **the orchards associating fruit trees and gardening in permaculture are accessible to the public.** The terraces of the soil nursery give access to the network of paths running through the wooded slopes of the moraine to the 'penetrante de verdure' on the Pinchat plateau, completed by the more direct South/North axis of the 'trail of the plateaus'. The important road is preserved but semi-buried between the raised terraces to facilitate crossing and to decrease visual and noise nuisances.



Cutting and filling of the existing terrain



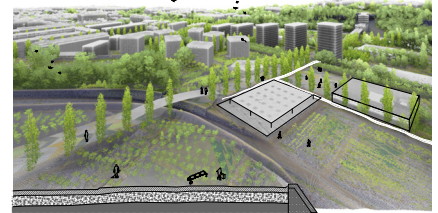
Axonometric model of the projected topography, with water runoff simulation and views of the three terraces

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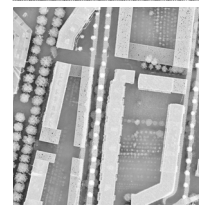
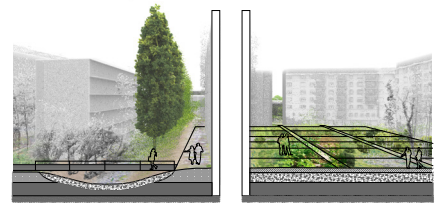
S. MICROTOPOGRAPHIES: REOPENING SOCIO-ECOLOGICAL URBAN LANDSCAPES: CONNECTING SPACES AND LIVING BEINGS

THE NEW FONTENETTE MARKET AND ESPLANADE, ORCHARD TERRACES: On the orchard terraces of the soil nursery, one takes a walk under fruit trees associated with low plantations according to a permaculture principle. From this high vantage point on the foothills of the forested moraine, from which the trail of the plateaux descends, the whole of the inhabited landscape and ecological infrastructure of Fontenette can be seen. Below, the esplanade with its permeable soil offers a large space for various events. It gathers the music school, a mixed-use service building, a market and an urban farm. Hosted in the former modernist buildings of the automobile center, these new facilities symbolize the transformation of the neighborhood's identity: the soils have become fertile again and produce food for the local population, which in turn generates waste that is composted away from the dwellings to avoid nuisance and then mixed with the mineral waste from the topographic remodeling to form the new soils of the nursery. Accompanying the gradual raising and enrichment of the urban soils, this process of circular economy helps in particular to mask, by stages, the route du Val-d'Arve, the only automobile roadway remaining in the district.



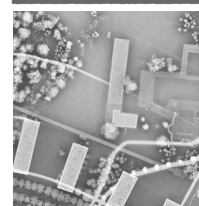
The new fontenette market and esplanade, orchard terraces

ECOLOGICAL CORRIDORS AND COMMUNITY GARDENS: The ground floor of the inhabited gardens of La Fontenette is covered by a carpet of vegetable gardens appropriated by the inhabitants. Punctuated by small meeting places for all generations, the garden grid pervades into the courtyards and between the isolated buildings. At the foot of the dwellings, everyone can drop their domestic waste, which will be systematically composted throughout the neighborhood. The organic matter will then return to the soils and fertilize them. Grey waters from roofs and renovated sanitation systems mix with runoff water drained and purified by the scrubby vegetation (phragmites and reeds) that grows in the ditches. Along these ecological corridors, a network of soft mobility crosses the neighborhood. People walk, ride a bike or, when necessary, use a clean and silent vehicle on demand. Channeled by poplar lines, the fresh air coming down from the plateau offers the most vulnerable populations good conditions to move around actively.



Ecological corridors and community gardens

THE BAINS DE LA FONTENETTE, GRASSLANDS AND WETLANDS: In direct relation with the Arve shore, the Bains and Buvette de la Fontenette open onto a vast common. This space of relaxation with a relatively draining soil, where an itinerant herd temporarily grazes, is covered by a permanent meadow the rapid growth of which performs an important sequestration of atmospheric carbon. The grassland is bordered below by a wetland, where water collected in the neighborhood accumulates before slowly infiltrating into the water table through a less permeable soil layer. More or less flooded according to natural cycles, this space of high biodiversity hosts a specific vegetation absorbing and regulating water (sphagnum). In this wet environment, the organic matter is strongly stabilized, providing another important carbon sink. The air currents along the Arve and the evapotranspiration from the plants provide a refreshing atmosphere.



The Bains and Buvette de la fontenette, grasslands and wetlands