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Planning for the Global Urban Agenda

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CONTEMPORARY URBAN GREEN BELT

A proposal for the revision of Rivoli's land use plan

Relatrice:
Prof. Arch. Ombretta

Candidato:
Marco Cazzuola

Summary

ABSTRACT

Recent crises show the weakness of global equilibrium stability and manages to change economic and social relations with consequences all over the world. Today, western cities must deal with new problems and with those of the past that have not yet been solved. Innovations in technology, economy, society, and the come up of the climate change are leading to different and not easily predictable evolution of cities.

This thesis aims to analyze the main examples of "Green Belts" and look for parallelism, similarities, and differences between the existing plans and the one designed for the city of Rivoli. Preliminary surveys have been conducted, revealing a territory that has been plagued for decades by sprawl, little attention to cultural heritage and the environment caused by the rapid and poorly planned expansion. To address these issues, the new plan has been imagined to be a tool able to better organize space, land uses, and livability; mending the urban voids left by the past, limiting soil consumption, and encouraging, when necessary, renovation with demolition and reconstruction.

The fulcrum of this research is the implementation of a tool that aim to design green wedges through the research developed around the curricular internship carried out in an urban planning studio in charge of drafting a land use variant – variante generale - at the Land Use Town Plan (Piano Regolatore Generale - P.R.G.) of Rivoli in the Metropolitan City of Turin. The plan preparation was supported by the studied of international and national examples; the first is the "Greater London Plan" made by Abercrombie in 1944, a vanguard project, which was extremely successful in creating an optimistic outlook for the people of London post WWII. Then, the plan of Copenhagen "The Fingers Plan" drawn in the 1947 design the city in fingers separated by green wedges which are kept free from urban development. Moreover, the P.G.T. (Piano di Governo del Territorio - Territory Government Plan) of Bergamo and the P.S.C. (Piano Strutturale Comunale - Municipal Structure Plan) of Modena, well-performed

plans with two main objectives, updating the prestigious urban tradition and introducing new elements of flexibility, participation, and subsidiarity like green wedge border with a vast array of beneficial effects.

The Urban Green Belt originated in the late 1930s to guide spatial design on a regional scale has had many applications and variations in past decades and despite the positive spin-offs of this policy, it has been little used in Italy, this thesis aims to know if its contemporary application on a local scale can limit land consumption and have good spillover on the local territory; The new local spatial dimension makes it close to or far from the original model? And due the different challenges of today's cities are UGB still a spatial image valid for 2022?

Gathering some of the most relevant examples was useful to understand the array of possible applications and management to plan a valid infrastructure for the city of Rivoli. These comparisons from a theoretical point of view show the green wedges methodology applied in different contests and policies. Translated into the real world the long-time need to plan and realize the project can make lose the initial sprint; Excessive bureaucracy, makes these tools excessively complicated and slow, the municipality must have qualified personnel capable of pursuit at best these types of policies and leading the project from paper to reality.

1 - INTRODUCTION

In the difficult time that we have are passing, it has been clear to us that the economic, environmental, and social balances are very unstable. Our societies and governments are not ready for sudden shocks. In the future, a more stable balance will be always more important, because exceptional events will be increasingly in frequency and intensity. Urban planning can play a key role in facing and reducing this phenomenon, which are becoming harshly day-by-day.[1]

Cities will face inevitable changes and it is already happening. Starting from the alteration of global climate that will modify the balance of ecosystems our season going to modify a vast region of the globe and not only in our backyard. Every country in the world will be affect by the different outcomes from climate changes but Italy, which is a great producer of excellence on the whole agriculture production, is very dependent on the climate. The Euro-Mediterranean Center on Climate Change (CMCC) made a report about the climate changes risk analysis, and state this about the agriculture consequences:

"Agricultural systems can undergo an increased variability of productions with a tendency to reduce yields for many cultivated species, accompanied by a probable decrease in the qualitative characteristics of the products, with highly differentiated responses according to geographical areas and crop specificities…" (Spano D., et. al., 2020)

Even just a small difference of about 1 or 2 c° can create dangerous imbalances in the fertility of the soil. Therefore, it is important to think about cities as places that must mitigate the negative impact on the environment they made, by reducing consume, increasing efficient, and moving away from the consumer culture.

[1] Climate adaptation, mitigation, and urban design. Analyzing how community design can impact various phases of climate change response, both local and global. (https://www.cnu.org/publicsquare/2021/11/03/climate-adaptation-mitigation-and-urban-design#:~:text=Urban%20design%20can%20also%20impact,significant%20source%20of%20carbon%20emissions.) last seen 18/11/2022

The Wester economy is already in crisis, after the pandemic, the new conflicts in Eastern Europe show how the balances that governed the world, as we knew it before 2020 were fragile.

The city of today need to be aware of all problems and threat that are about to coming and start to act to become the city of tomorrow, capable of facing new problems and providing services and a good standard of life for all the people. With joint work between politics, business, stakeholders and good planning it is still possible to limit the damages.

This final work of master thesis will face the dynamics in a mid-size city in the metropolitan city of Turin and the current Italian urban planning situation. The city of Rivoli's new P.R.G. will be a good way to learn how urban planning mechanisms, actors and process works. Apply all the good practices learned in all these years and touch with my very hands how it is the entire process collides with the real world, which does not always respect the rules.

The fulcrum of this research is the implementation of a tool that aim to design green wedges through the research developed around the curricular internship carried out in an urban planning studio in charge of drafting a land use variant – variante generale - at the Land Use Town Plan (Piano Regolatore Generale - P.R.G.) of Rivoli in the Metropolitan City of Turin. The representations of the maps "Tavole Tecniche di Indagine" and attachment from the Piano Regolatore Generale are by the Urbanistica Maria Sorbo's studio in collaboration with arch. pianificatore Lucio De Benedictis, arch. pianificatore Andrea Martinelli and arch. pianificatore Denis Ligammari.

2 - GREEN BELT and WEDGE MODEL

Outside the cities there are a non-urban area that lie outside the urban growth often unused and seen as an expansion area for future urban development. Cities nowadays needs to promote more sustainable communities, the utilization of green spaces within urban areas is receiving greater attention than ever before. Urban areas produce a lot of pressures to the environment and the atmosphere. There's a model that has been used consistently since the beginning of the 20th century and it had positive impact on access to green spaces, air quality, increasing ecological habitats, promotion of active recreation, in mitigating the climate change effects and in promotioning sustainable cities. Green wedges (GW) areas can be useful strategy to relieving the urban impact to the environment. GW containing a mix of agriculture and low-density activities.

During the past decades, enormous progress has been made in urban planning. New theories and old practices have been implemented such as new urbanism which is an old urban planning re-invention promoting walkable neighborhoods that contain mixes of urban uses, or the stormwater management model to make our cities more resilient. Nowadays it is possible to improve urban environment studying the great models of the past and merging with the today's model and create a new spatial image of the Green Belt.

This chapter will show the projects and programs that have inspired a new way of planning cities worldwide.

2.1 - London Plan

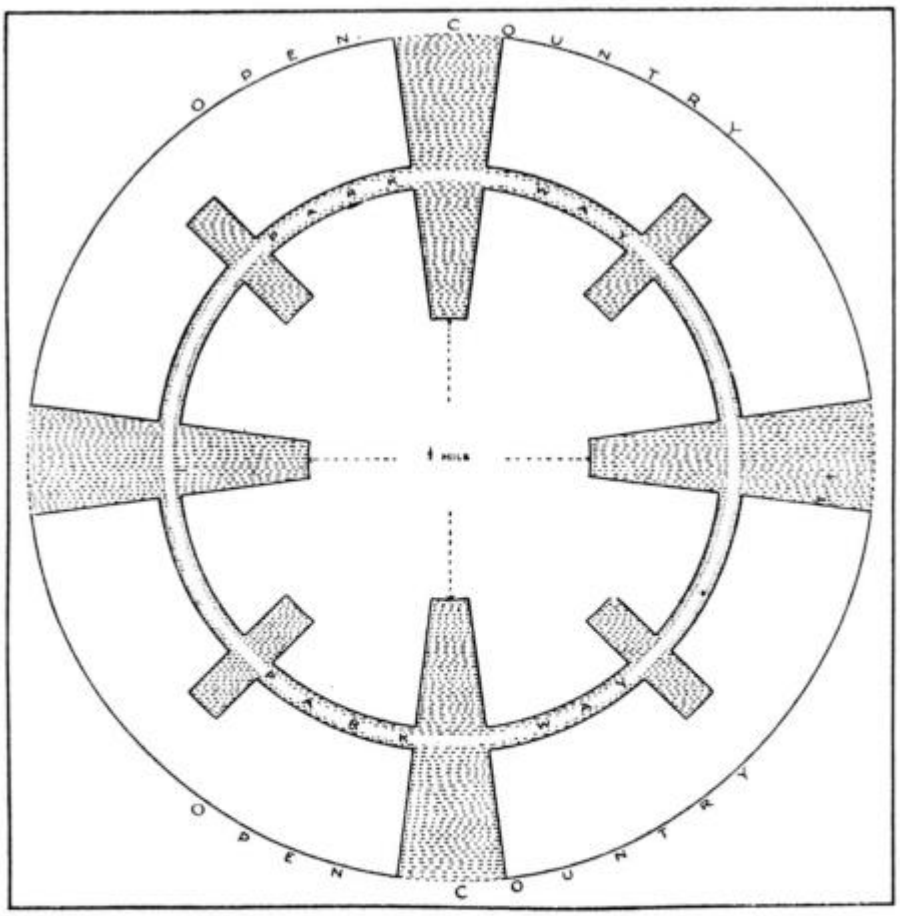
2.1.1 - Prewar reconstruction

The vast phase of city expansion that essentially took place at the turn of the 60s and 70s is preceded by one of the most catastrophic events in the history of mankind. The second world war broke out in Europe in 1939 and soon spread

like wildfire all over the world involving all the most advanced states. The war lasts until 1945, leaving behind millions of dead and destroyed cities and nations.

In Britain, the planning discourse about cities and green has its roots well before post-World War II. Already in 1912 Sir Leslie Patrick Abercrombie in the article "Town Planning in Greater London: the need for co-operation" called for coordination among the local authorities for a conjoined effort to plan London and its surrounding areas and for the implementation of wedges of greenery. Comparable to ideas already developed by Geddes.

Another important step was in 1918 (at the end of World War I) when "The London Society Development plan" was published. This plan fostered the regional planning power and the promotion of greenery with the two green wedges starting from the outskirts and aiming towards the city center.



2. *Diameter of Large Circle,* 1½ *miles; Area,* 1,131 *acres; estimated Population,* 45,240.

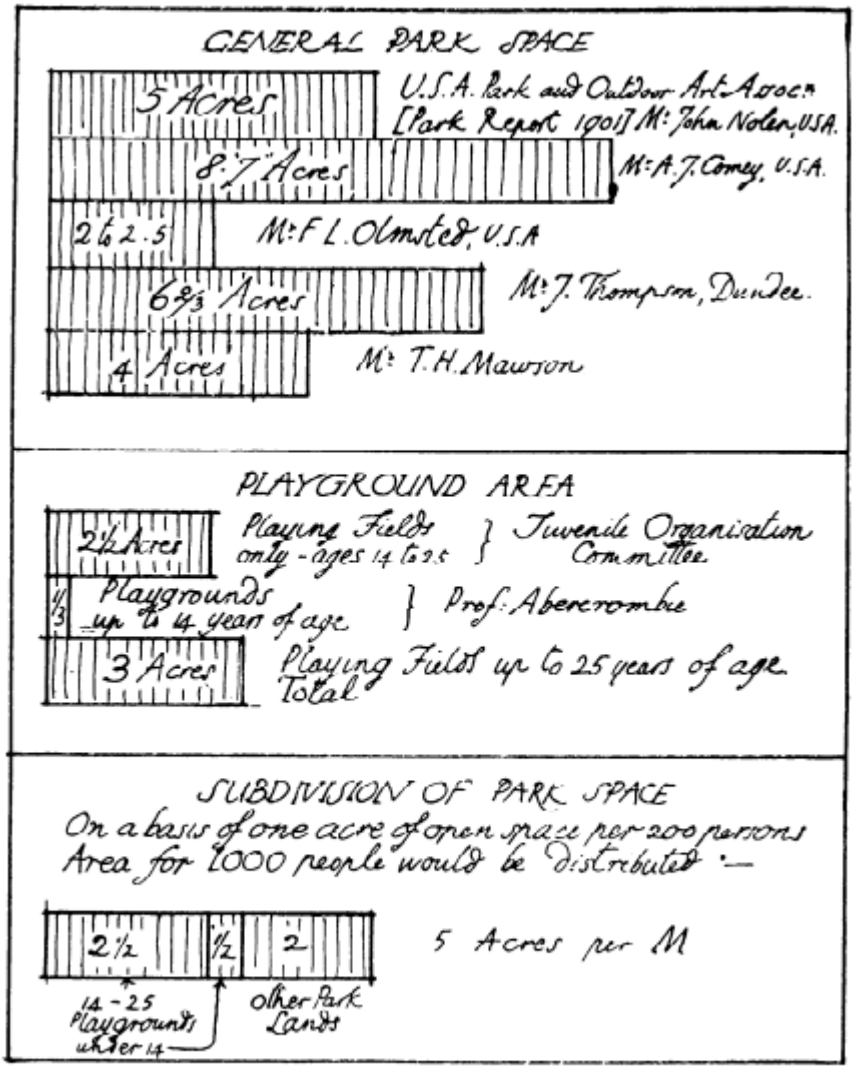
Area of each Park Wedge (exclusive of Parkway)	=	152
Area of Pleasaunce in Circular Parkway	=	38
Area of oblong Playgrounds (exclusive of Parkway), 9 acres each	=	36
		226, *or*

1/5*th of Large Circle, or*
1 *acre per* 200 *persons.*

Figure 1 - Diagram of green wedge distribution. (PEPLER, G. (1923), Town Planning Review)

Pepler said that "…a function that it has been suggested should be fulfilled by open spaces, is that they should form ventilating ports into the centers of cities. As in many towns building development has followed the main radial roads, there are often wedges of open land that might be reserved for this purpose, and economically because owing to lack of existing communications, such land has not as a rule much present building value… On the whole, it seems that the best general criterion for the apportionment of public open space is in proportion to population rather than any fixed proportion of area, and as town planning schemes will determine the general character of buildings, and density of houses

over particular areas, it will be comparatively easy to calculate the population that will have to be catered for in each part". (PEPLER G., 1923)



The upper space gives various Standards of the number of acres per thousand of the population for general open spaces.

Figure 2 - This figure gives various standards of the number of acres per Thousand of the population for general open spaces. (PEPLER, G. (1923), Town Planning Review)

Figure 2 it's showed an evaluation of the standard quantity needed to satisfy the green needs in a big city such as London. This quantity it's been outgo by modern standards but it's interesting to see the afford those architects set on the green belt cause, in the promotion of healthy environments increasing fresh air and open space inside cities.

The Diagram in Figure 1 - Diagram of green wedge distribution. (PEPLER, G. (1923), Town Planning Review) it's been then integrated into the more famous "Town and Country" by Abercrombie as a model for future park planning.

In these first years of the new planning school, there was a controversy about what was better between Green Wedges and Green Belts, after numerous publications and debates they concluded that the joint use of both solutions would have been the best implementation and repercussions on the well-being of the city.

With these new premises for planning, Britain was nearing the end of the terrible bombing of London shortly after the Second World War.

2.1.2 - The post-war reconstruction dilemma

Germany started to use more disruptive and advanced weapons in 1944. One of them was the frightening Vergeltungswaffen "retaliatory weapons", which were the first long-range missiles. They comprised the V-1, a pulsejet-powered cruise missile, and the V-2, a liquid-fueled ballistic missile. An estimated 2,754 civilians were killed in London by V-2 attacks with another 6,523 injured[2] which is two people killed per V-2 rocket. At the end of "the Blitz", All this destruction led to a vast part of destroyed London giving space to new discourse about the reconstruction of it'll be better to rebuild likewise before or reshape the city by integrating new knowledge about urban planning. The second scenario bringing in the people a wind of hope and enthusiasm to plan the future.

[2] "Air Raid Precautions – Deaths and injuries". Archived from the original on 8 March 2007. The National Archives (https://www.nationalarchives.gov.uk/) Last see 03/09/22

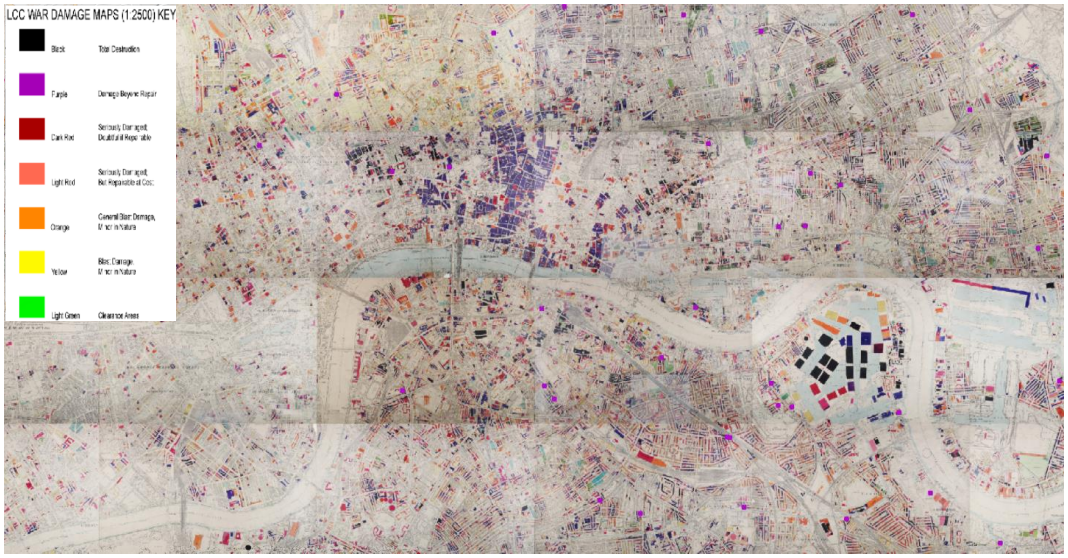


Figure 3 - Map of London bombed building during WWII (https://www.layersoflondon.org/map)

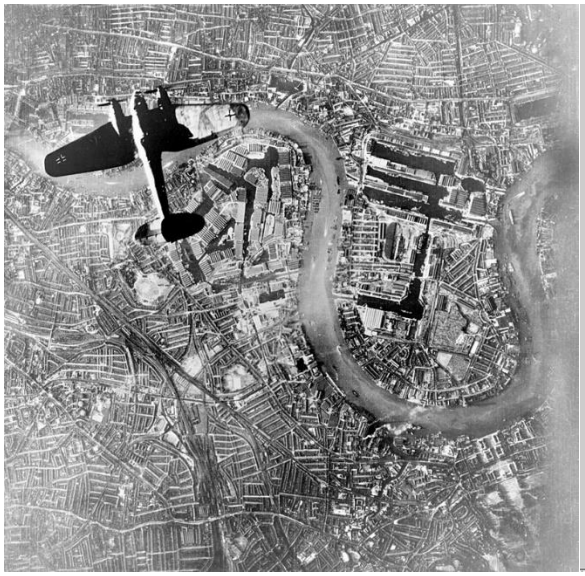


Figure 5 - German Luftwaffe Heinkel He 111 Bomber Over the Docks in London. (https://en.wikipedia.org/wiki/The_Blitz#/media/File:Heinkel_He_111_over_Wapping,_East_London.jpg)

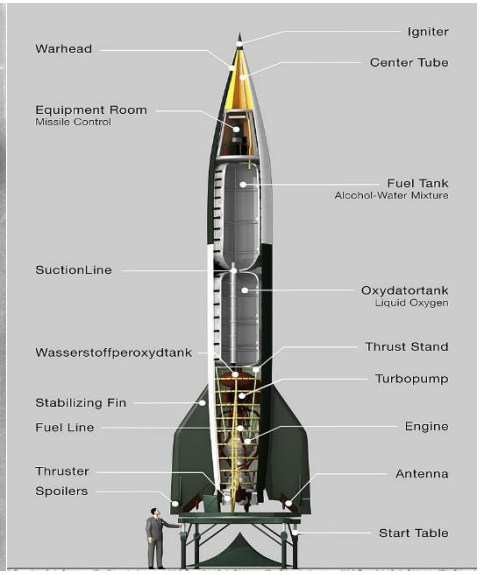


Figure 4 - Layout of a V-2 rocket (https://en.wikipedia.org/wiki/V-2_rocket#/media/File:Aggregat4-Schnitt-engl.jpg)

Figure 6 - Ruined buildings at Whitechapel, London, left by the penultimate V-2 to strike the city on 27 March 1945; the rocket killed 134 people. The final V-2 to fall on London killed one person at Orpington later the same day. (https://en.wikipedia.org/wiki/V-2_rocket#/media/File:Damage_Caused_by_V2_Rocket_Attacks_in_Britain,_1945_HU88803.jpg)

London administration choose to involve bombed as well non bombed areas that were perceived as in decay in the huge post-war reconstruction.

Immediately arose some difficulties, one was about the land property, in fact in 1941, well before the end of WWII the Uthwatt Committee, formulated a legal framework to support the compulsory purchase of areas needed for reconstruction plans.

"Whatever way the problem is regarded, it seems impossible to be fair to the community so long as private property in land persists … acquisition of the freehold of the land by the State … must be accepted as a prerequisite of planning control' (Abercrombie P., 1930).

After the State action came to the real dilemma of how to plan wounded cities. Multiple lines of thought clashed, from those seeking city densification and centralization of supply and demand for jobs and labor and those preaching to decentralize population and industries from congested areas. Eventually, the

idea developed that a more decentralized city presented greater opportunities and greater efficiency.

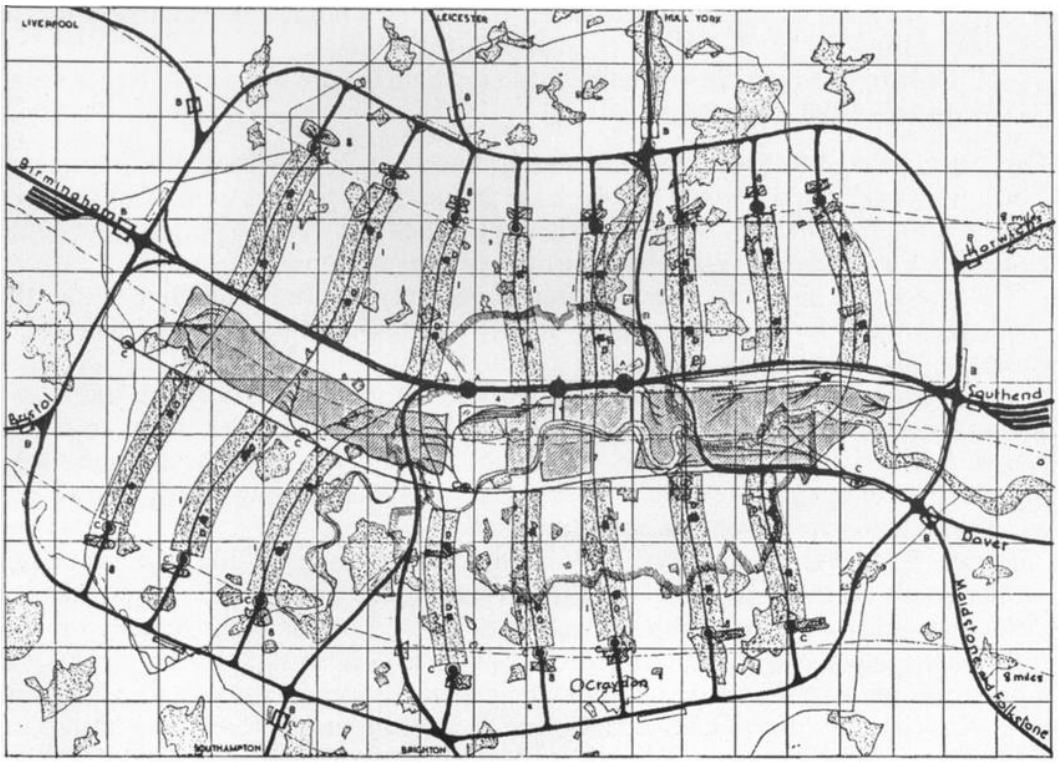


Figure 7 – In this Master Plan for London made in the MARS (Modern Architectural Research) plan it's evident the green wedge from the external ring pointing to the center, 1942 (source: Korn and Samuely [1942, 150])

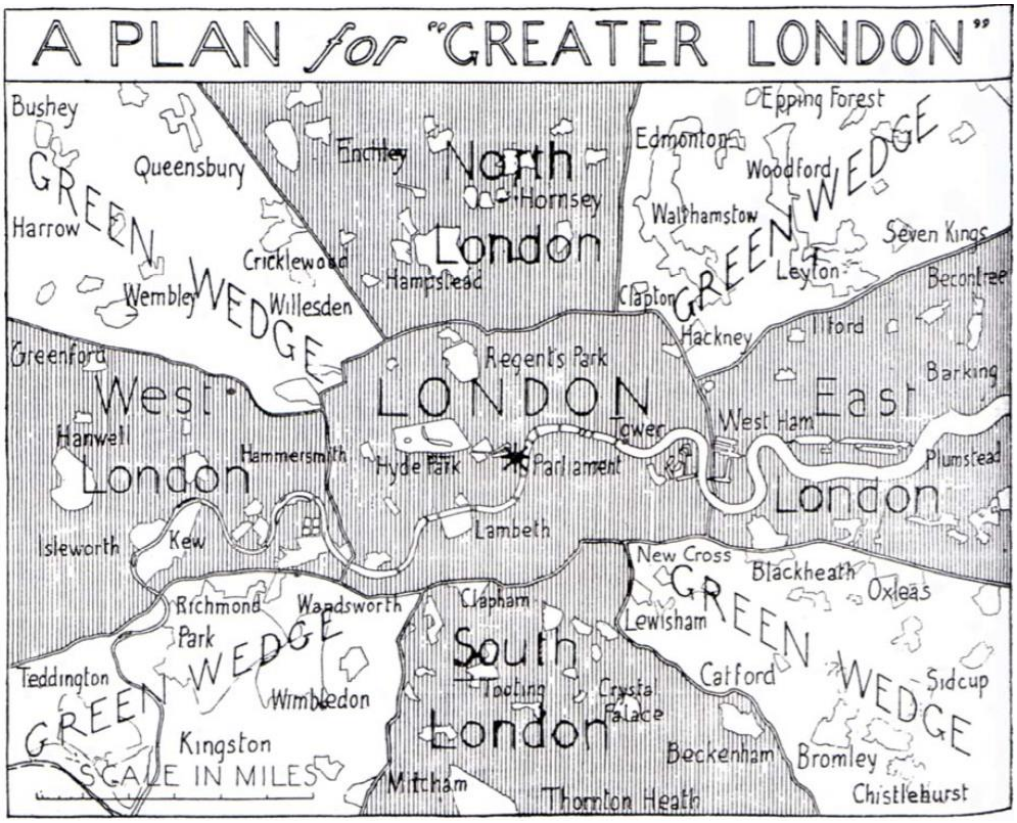


Figure 8 - A Plan for Greater London - Trystan Edwards of the Hundred New Towns Association 1943

Figure 7 and Figure 8 showed some plans drawn at the end of WWII by which the hope and enthusiasm for the reconstruction reached their peak. In Figure 7 the general scheme of the MARS (Modern Architecture Research) Group Plan of 1942 was characterized by high-speed transport to enhance the flow in and out of the city, but most Londoners were expected to work locally due to the integration of residence and industry along the transit arteries within the districts. In both, the example is immediately recognizable as the natural component in the form of a green wedge that gives a strong imprint on the future structure of the city.

2.1.3 - The County of London Plan 1943

The County of London Plan, produced in 1943, was the first of two ambitious documents for the post-war improvement of the capital. It and the subsequent Greater London Plan (1944) have become known collectively as the

Abercrombie Plan, due to the central influence of Patrick Abercrombie, professor of town planning at the University of London.[3]

Abercrombie was a professor of town Planning at University College in London a person who in those years began to make himself known for having worked on many regional plans given to him together with other architects such as JH Forshaw the big job of redesigning the city of London.

County Plan proposed to emphasize the identity of existing communities and provide to each community their services such library, shops, open spaces, schools, and administrative buildings. The communities would be divided themselves into smaller neighborhood units self-sufficient from the recreational and social points of view. Each Neighborhood can host between 6000 and 10000 people with its own open spaces, civic center, shopping center, industry, and commerce. With these modalities, people can build a stronger social fabric and have everything they need a few steps from their homes.

The County of London Plan aimed at reorganizing London into a series of self-sufficient communities, to separate conflicting land, and uses, update the housing stock, improve the traffic system, and 'provide a properly coordinated system of parks throughout the whole County with continuous green wedges or parkways leading out to the Green Belt and linked at the center by an inner "Green Ring" (Forshaw J., Abercrombie P., Latham L., 1943).

Abercrombie and Forshaw strongly believed the future of London will be through the implementation of neighborhood units interspersed with green wedges connected to be able to pass from park to park. Luckily for them, the London expansion pre-WWII sank its foundations by creating long concrete corridors in the countryside, leaving long wedge-shaped strips of green at the edges. The planners used this feature of London's sprawl to bring more space into the city,

[3] The Guardian – London plan for a proud city, 1943 (https://www.theguardian.com/uk-news/davehillblog/2014/mar/22/london-county-plan-abercrombie-forshaw) last see 15/05/2022

which means more light and fresh air, creating a modern and safe recreational environment.

Its function is multiple, it is an ideal space that can be lived in everyday life for a run or a walk, it can be used as a means of communication by bikes bypassing traffic by pedaling in a safe environment; as well as being used in the past as a method to prevent epidemiological events, it was a very important boundary for the construction. These green wedges form an impassable barrier for soil consumption, a barrier that instead of dividing unites bringing biodiversity, absorbing dangerous substances, and maintaining a certain ecological balance. In this light, the plan set out to provide four acres of open space per 1,000 inhabitants in the inner areas and three more in the outer zones, reaching a standard of seven acres. This would have at least doubled the number of green spaces in the capital (Oliveira F., 2015)

This plan was aware of green as well for the society, in Figure 9 it's showed the Social and Functional Analysis "is a graphic representation of abstract ideas presented on a map. It is not a plan in the sense of a statement of intent. It is a step on the way to a strategy, and part of the process that Geddes summarized as a 'survey-analysis plan'. It comes from the County of London Plan of 1943 which, together with its sibling the Greater London Plan of 1944, set the framework for London's development for the next few decades. Plate 1 is grandly titled Social and Functional Analysis and is at the opening of Chapter One of the plan. It sets the scene for the whole document." And again, what we can learn from it "Shows how communities' step over boundaries, and that in plan-making we should not be constrained by them. Perhaps the most important lesson is not to be learned from this drawing alone: it is that, however deep the thinking or the analysis, a strategic plan is only as good as its means of implementation. Some elements of the plan were achieved: the satellite towns were built, but little of the subsequent restructuring of the inner urban area.

Individual communities still struggle to retain their special character." (Dick Cole, 2020)[4]

A large amount of open space within a city means that there is less space for homes, factories, and shops. In this way, many people and industries that made up the demographic and financial fabric of the city had to move a little further from the center, and so did the people and companies who came later, always a little further away going to consume more and more land and maintaining a low density. Part of this space was also acquired by the administration from private individuals, opening an interesting chapter on the acquisition of private land by a public body but without an extensive demolition program.

Despite the good intentions of the plan, for those years it received numerous complaints criticizing its economic feasibility

The proposal made by the architects to provide 7 acres - 28,000 square meters of green per 1000 people seems impractical for the city coffers, in fact, A.R. Wood, the Comptroller of the Council, in a report from 31 May 1943, argued that the realization of the plan would be an "impossible achievement".

In 1944 Forshaw proposed lowering the standard toll-free number for 1000 people from 7 to 2.5 acres – 10117 square meters, so the administration and planners finally reached an agreement, which was accepted by the London County Council Town Planning Committee. The County of London Plan was the precursor to the Greater London Plan 1944; this plan was fundamental to opening the way to green wedge and green belts creating a plan that made schools.

[4] Urban Design Group, County of London Plan, J H Forshaw and Patrick Abercrombie (https://www.udg.org.uk/publications/articles/county-london-plan-j-h-forshaw-and-patrick-abercrombie#top)

Figure 9 - The County of London Plan 1943, colored plate 1, Social and Functional Analysis. Source (https://www.udg.org.uk/publications/articles/county-london-plan-j-h-forshaw-and-patrick-abercrombie#top)

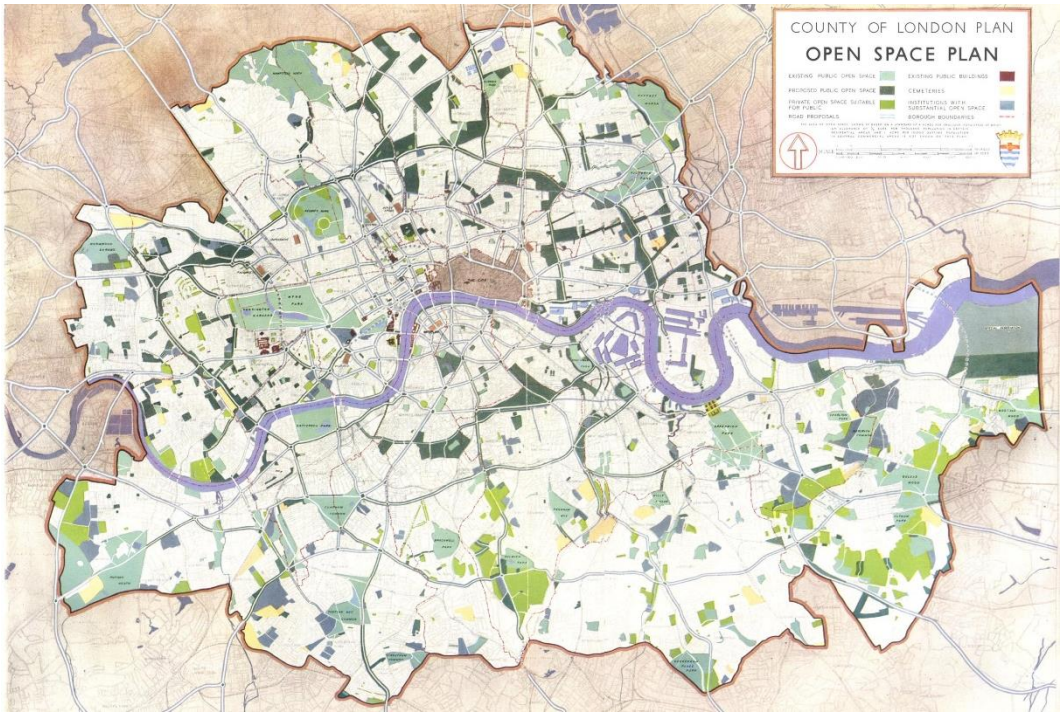


Figure 10 - The County of London Plan 1943, colored plate 3, Open Space Plan. Source (https://municipaldreams.wordpress.com/2014/07/15/the-county-of-london-plan-1943/)

2.1.4 - The Greater London Plan 1944

After the government decided to avoid a large local decentralization plan in 1941, thinking it was a better solution to commit the realization of the greater London Plan to a few people that they do just that so that they have the complete vision of the project in mind. The choice fell on Abercrombie and his team.

The realization of this newer plan focused more on the park system, the control of London's growth, and the improvement of the city's standards. Most of these ambitious goals have been prosecuted by the implementation of a Green Belt on the Urban fringe. To contain the already sprawled city Abercrombie suggested encircling the city within four Green Rings, with different uses and mixed destinations. Abercrombie also, thought that the institution of self-sufficient communities was a solution to provide enough services to all the scattered population far away from the inner city.

In Figure 11 - The four Rings. Greater London Plan, Patrick Abercrombie, 1944. It's the four rings; In the first, The Inner Ring includes areas that, due to the high density and lack of sufficient open spaces, require decentralization: there is not enough undeveloped land to accommodate the overcrowding within their borders.

The second one corresponds with the "London Suburbia" with an approximate ray of 19 km (12 miles) it's the great sprawled expansion of the city. For Abercrombie, these areas no longer had to increase the number of citizens to not raise the density that had to max 50 people per acre. (Errore. Il segnalibro non è definito.)

The Third ring includes most of the purchased terrain according to the Green Belt Act of 1938. Here it's where it was decided to find the open space needed by the inner part of the city such as the County. From here starts the wedges that slip into the city, for this massive ecological value, for this reason, it is necessary to stop the expansion of a hundred of the little village and preserve the agricultural land.

The last ring is the External Rural Ring, it's open and mostly agricultural territory, scattered with small villages. It is intended to allow within this ring a more generous expansion of the existing centers, and to foresee the locations for new satellite cities. So, it can be described as the main reception area for overcrowded London, but it should not be regarded as a homogeneously suitable location for these purposes.

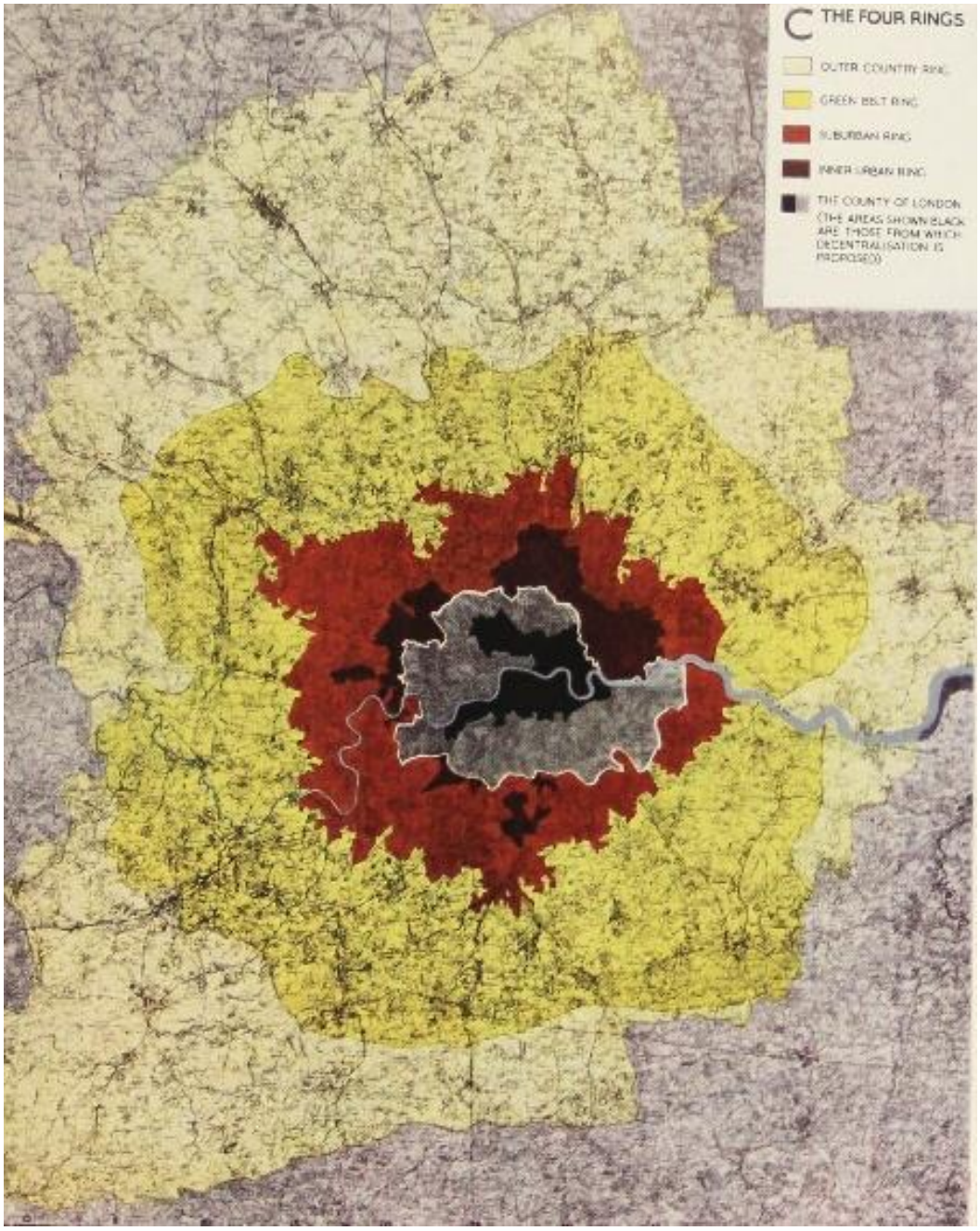


Figure 11 - The four Rings. Greater London Plan, Patrick Abercrombie, 1944.

This new plan finally prescribed standards of 4 ectaras (10 acres) to 1000 habitants a big step forward in comparison to the last County plan which only foresaw almost 3 ectaras (7 acres) per 1000 people. The plan was an example of how to design a city it is necessary to have a multiscale vision therefore to have a vision of interconnectivity from the smallest to the largest scale, would consist of a set of typologies from the small scale of playgrounds to the large scale of green wedges and green belts.

Despite a large amount of greenery available to each person, a criticality that Abercrombie found in his project was the connectivity between the parks. The parks located in the central area of the city were surrounded by the built city making it impossible for the designers to connect these areas with the largest green lungs located in the countryside.

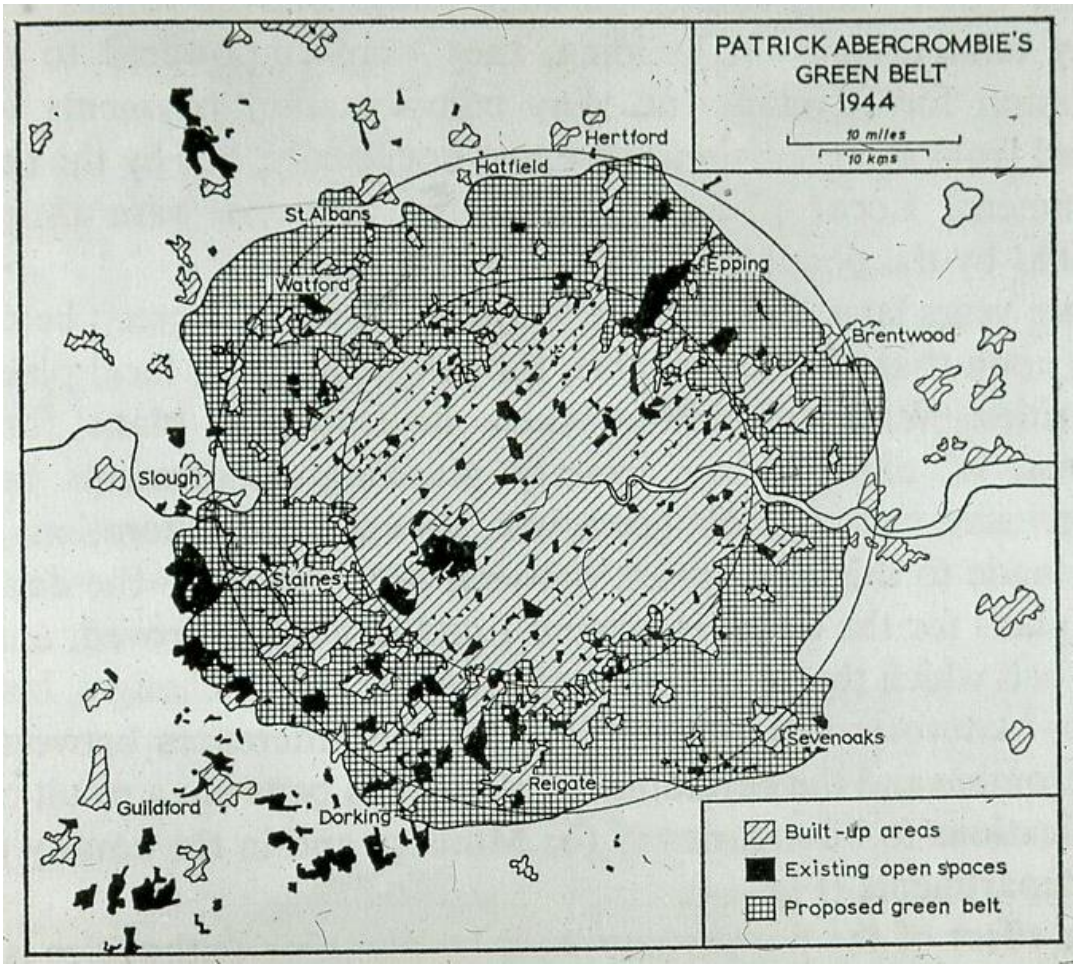


Figure 12 - Green Belt Proposal. The Greater London Plan, Abercrombie. 1944

The new PRG of Rivoli tread and share in the intent that Abercrombie and his office and assistant staff place in the effort for planning and then realizing a successful green belt. Abercrombie in the Greater London Plan 1944, by Patrick Abercrombie, His Majesty's Stationery Office, London 1945 says: "The grandiose conception of a Green Belt around London, persistently cultivated by the London Society for many years and actively taken up by Raymond Unwin in his Open Space Report, published as part of the Greater London Regional Planning Committee, began to take shape in the following years. to 1931; the initiative for a Green Belt Scheme in 1935 was due to the London County Council, and in 1938 the Green Belt Act became law. If the objective of the legislator was mainly aimed at recreational use, in the present state it was provided for the continuous protection, of land used for agriculture, recognizing its value by keeping large tracts of territory open for visual enjoyment and at the same time

safeguarding agricultural areas from construction. This first glimpse of cooperative planning in the London surrounding region was jointly undertaken by the County Councils concerned. The two million pounds voted as a share by the London County Council, along with the shares subscribed by the other councils, are already paying beautiful dividends in health and happiness, as well as other probable returns in monetary terms." (Abercrombie Patrick, 1945)

Abercrombie's interventions can be questionable, but certainly, in his plan for London, there are many ingredients that today a planner must know how to use to ensure that cities become places capable of absorbing the effects of climate change but at the same time it must be a livable city and with a human measure. Today's cities face difficult challenges but elements such as the Green Belt can be tools that together with other solutions can make life in cities better.

2.1.5 - Abercrombie experience

The greater London area comprises a high infrastructure territory, with settlements sprawling along major routes. An important reference for Abercrombie's new plan is the satellite towns, already proposed by Howard in 1898, and the greenbelt, structured by a network of park streets protected by a special administrative body. The plan provides to block the residential settlements in the central area, residential and industrial decentralization, and greater physical control of planning and land value. The Abercrombie experience marks an important moment in urban planning history with a plane that made school. The knowledge matured in London bears Abercrombie's green approach to other cities, in Figure 13 - Extent of Green Belt as of 31/03/17 – (OS Boundary Line, DCLG AGB1 return it's possible to see the green belt extension in England. All the major cities adopted the same core philosophy with really good results achieved in the past decades. In the year 2017, it was estimated at 16.347 Km2,

around 13% of the land area of England.[5] The same planning idea and necessity drove the authority of many cities to adopt the green belt solution in England. Figure 14 presents all the authorities in England that have a green belt solution. The "Local Planning Authority Green Belt: England 2016/2017 Statistical Release" did a great job mapping and measuring the extent of these works. In the list, Figure 14 it is possible to see the green surface repartition in hectares and their performance from 2014 to 2017. Fortunately, no losses were measured in the period examined, this suggests that 90 years after the green belt and green wedges were conceived, they are still today considered essential works for English cities.

One critical move toward this plan was made by Giuseppe Campo Venuti when express his thoughts on the transportation system:

"I remember the criticism for not having the Bolognese urban planning strategy indicated an explicit morphology for spatial planning, while -for example- for the Milanese Intermunicipal Plan (the famous PIM) Giancarlo De Carlo suggested a radio-centric "turbine-like" design, which in some ways recalled London's green belt. I am convinced, however, that the most serious defect of those distant metropolitan operations, was instead -in Milan, as in Bologna- the general one of the Italian urban planning cultures, which culpably neglected the decisive role of mass rail transportation, in determining both the forms and the contents of territorial systems. The main defect, of the whole Bolognese urban planning operation of the 1960s; that of having aimed de facto at mass motorization, considered as such a goal of "social emancipation," and thus neglected to pay attention to the rail transport network, favoring only the road network for road traffic. To have tried to reverse this defect, without succeeding, was my defeat, within a general framework of successful" (Campos V., 1967)

[5] Local Planning Authority Green Belt: England 2016/17 Statistical Release (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/642684/Green_Belt_Statistics_England_2016-17.pdf)

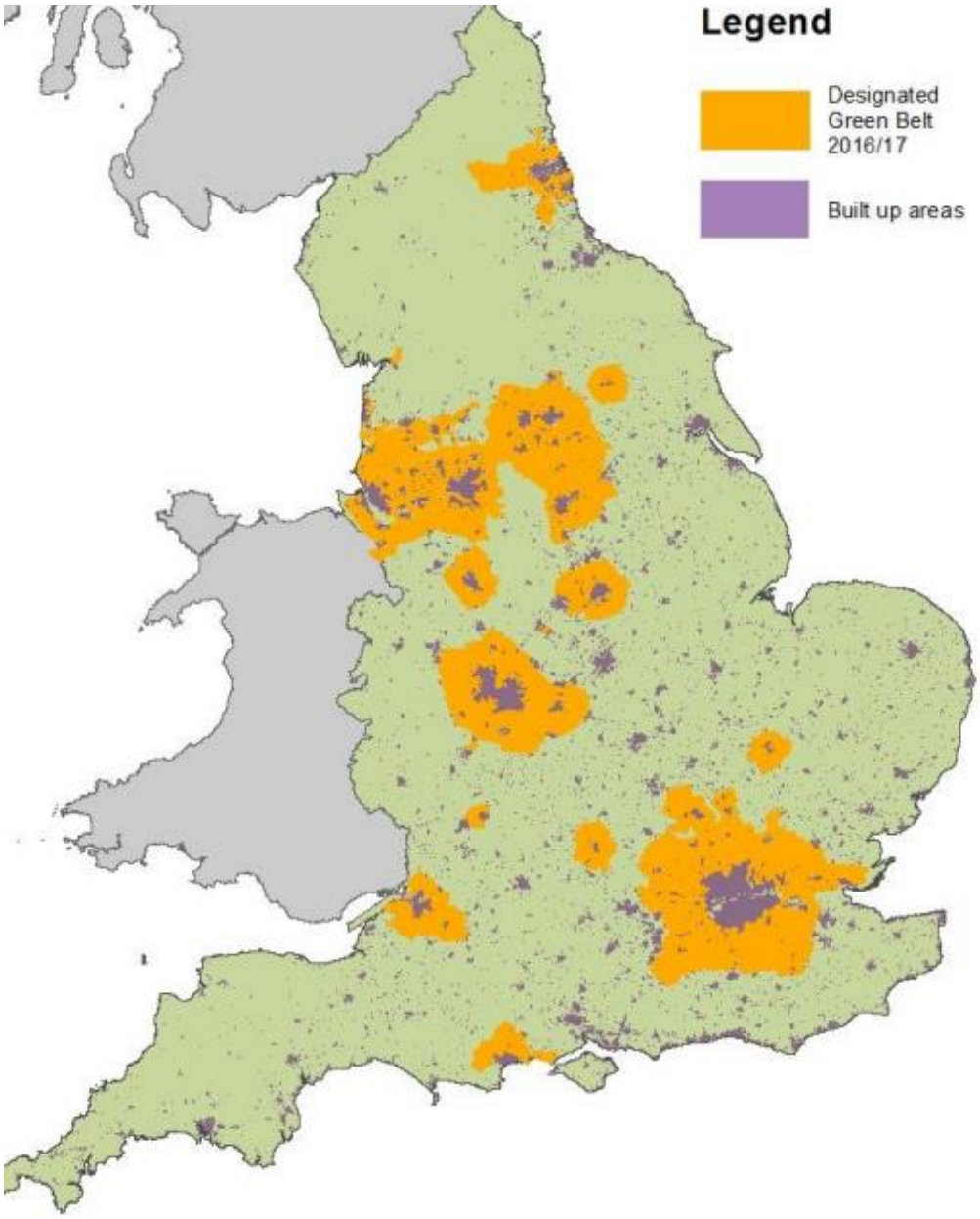


Figure 13 - Extent of Green Belt as of 31/03/17 – (OS Boundary Line, DCLG AGB1 return, 2017)

	2014	2015[R]	2016[R]	2017	% change 2014-17
England	1,638,630	1,636,500	1,635,490	1,634,700	0
Urban core					
Birmingham	231,350	231,250	231,230	230,580	0
Blackpool	2,600	2,600	2,600	2,600	0
Bournemouth	36,380	36,000	36,000	36,000	-1
Bristol and Bath	71,730	71,630	71,630	71,630	0
Burton upon Trent	730	730	720	720	-1
Cambridge	25,100	25,100	25,180	25,180	0
Derby and Nottingham	61,400	60,700	60,700	60,700	-1
Gloucester	7,500	7,500	7,500	7,500	0
Liverpool, Manchester and West Yorks.	504,570	504,400	503,410	503,410	0
London area	514,200	514,080	514,080	514,030	0
Morecombe	1,740	1,740	1,740	1,740	0
North East	73,060	72,490	72,430	72,430	-1
Oxford	34,990	34,990	34,990	34,910	0
Stoke	44,440	44,440	44,440	44,440	0
York	27,940	27,940	27,940	27,940	0

[R] Revised since the original estimate was published.

Figure 14 - Trend in the area of Green Belt land as of 31 March 2014, England. (Local Planning Authority Green Belt: England 2016/17 Statistical Release)

2.2 - Copenhagen Finger Plan

After the Abercrombie experience we can find all around the world, different applications and interpretations of green belts and green wedges, one of the most famous and functional is the green infrastructure surrounding Copenhagen. In a country of 5.5 million people, the population of Greater Copenhagen is around 1,890,000 inhabitants and has been increasing moderately at a rate of about 7.5% for the past decade (Næss P., et al. 2010). Due to the city capital status and the presence of an articulated administrative machine, it was necessary to give Copenhagen a well-planned organization.

Figure 15 – Copenhagen framework (The Finger Plan - A Strategy for the Development of the Greater Copenhagen Area. Danish Minister of Environment, Denmark, 2015)

The Copenhagen original "Finger Plan" was drawn up in 1947 inspired by the Abercrombie's Greater London Plan 1944. The city of Copenhagen plan has been organized based on a regional structure where urban development is condensed along the fingers connected by a capillary public transport such as a railway allowing city fingers to be separated by green wedges. Thanks to this solution all the greater Copenhagen has easy access to recreational areas, as well as easy access into central Copenhagen from the farthest county area.

This plan is a great example of Transit Oriented Development (TOD) that "is the exciting fast-growing trend in creating vibrant, livable, sustainable communities. Also known as TOD, it's the creation of compact, walkable, pedestrian-oriented, mixed-use communities centered around high-quality train systems. This makes it possible to live a lower-stress life without complete dependence on a car for mobility and survival. Transit-oriented development is regional planning, city revitalization, suburban renewal, and walkable neighborhoods combined. TOD is rapidly sweeping the nation with the creation of exciting people places in city after city. The public has embraced the concept across the nation as the most desirable place to live, work, and play. Real estate developers have quickly followed to meet the high demand for quality urban places served by rail systems. Transit-oriented development is also a major solution to the serious and growing problems of climate change and global energy security by creating dense, walkable communities that greatly reduce the need for driving and energy consumption. This type of living arrangement can reduce driving by up to 85% (http://www.tod.org/). "

Figure 16 - The Finger Plan (Andersen 2008; Knowles 2012) denotes five fingers to serve as corridors for urban development, along existing or planned railway lines to provide rapid rail transit to Copenhagen's Central Business District (Knowles 2012).

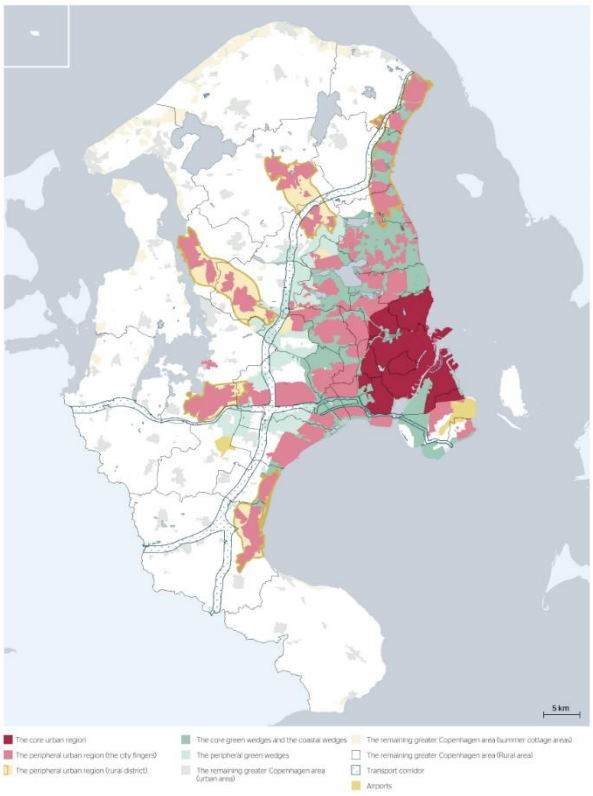


Figure 18 - The 4 geographical areas. (The Finger Plan, Ministry of the Environment, Denmark, 2015)

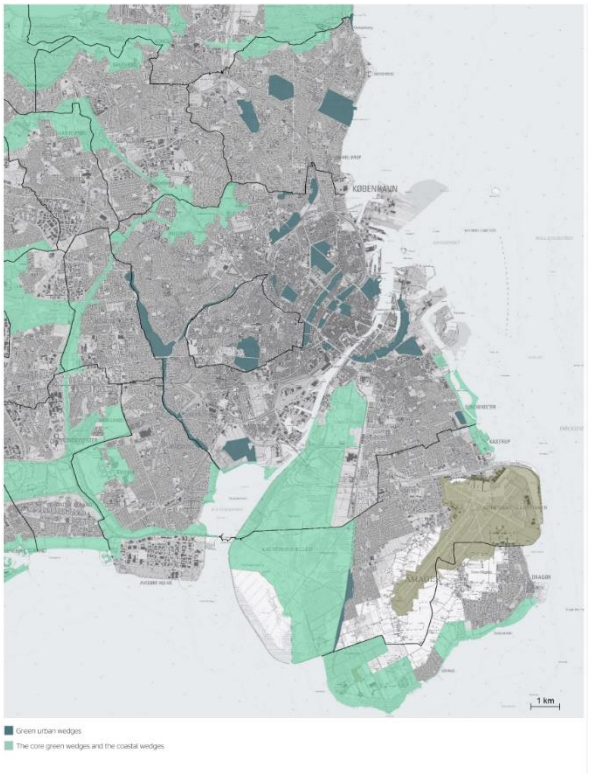


Figure 17 - The Green Urban Wedges. (The Finger Plan, Ministry of the Environment, Denmark, 2015)

As it is possible to see from Figure 17 and Figure 18 Copenhagen green wedges begin from the rural and coastal pointing to the center along the city fingers. Different regulations apply for placing facilities for recreational purposes in the core and peripheral wedges.

The Green Urban wedges aim to ensure large, green areas in the inner city located in the palm, as almost all public regional outdoor areas for the entire Greater Copenhagen population. This solution made it possible to link all the most attractive and popular parks as well as major green areas which, together with green paths form an overall structure up to the central part of the city.

The municipality plan for the coastal, the finger to the inner part to ensure that areas will mainly reserve for agricultural use. The areas are kept clear of buildings and facilities for urban recreational purposes and additional establishment expansion of large areas and building-demanding facilities. NA special attention was made to acoustic pollution noisy recreational facilities are

not placed in the areas unless these areas are already exposed to noise and cannot be noise proofed. In cases of extreme changes in the climate balance, there is an adaptation plan to let facilities establishment in the parts of the green wedges not covered by area reservations for transport corridors

For the most peripheric green wedges mainly reserved can allow new building demand to expand but considering the landscapes and the natural and cultural values of the area.

The Copenhagen Municipality establish a very wide and interconnected green system allowing its citizens to enjoy large green outdoor areas, maintaining a housing density consistent with daily challenges, and providing an impeccable transportation system by giving a viable alternative to automobile use.

2.3 – Italian Model

Italy is also experimenting an increase in harsh weather phenomenon causing damage and endangering lives. Decades late, compared with other European examples, Italy is start understanding the importance of planning for the people's well-being and not only for the income but.

The first traces of these practices in the Italian panorama are during the '90 when Italy experienced a new type of urbanism that seeks to reform urban planning going beyond the limiting of sectorial planning. This methodology limited to a single-issue planning tool, regulate land use with reference to a specific sector (environment, soil defense, mobility, resources, etc.). Urban planners like Campos Venuti, Federico Oliva, Piergiorgio Vitillo, Paolo Galuzzi, etc. have been key players in the creation of urban plans and good practices. Their works is still visible in city's General Plans such as Bologna, Modena, Bergamo, and more. Laying the foundation for rigorous and reformist planning capable be heard by politics and changing many aspects of urban planning.

Traditionally in Italy urban planning and environment affairs are two separate things is now essential integrate all the matters in a proper way. The spatial image of the green belt intersects important theme of the national context, namely the inclusion of environmental issues in planning. Starting from the creation of a UGB we can lay the basement for a future cooperation between different municipal departments capable of handling urban and environmental issues across the board.

2.3.1 - Territory Government Plan of Bergamo

The Green Belt is design as a strategic priority by the Bergamo's PGT (Territorial Master Plan). The Plan gives concrete implementation to the environmental project of the Green Belt outlined in the Plan Document: through the transformation, areas for which the equalization model is proposed to be implement. The areas of the "Green Belt" and large parks will be acquired, equipped and enhanced to adequate respond to the demand for open spaces, sports leisure, within an integrated system of environmental and ecological connections that shape open space and rethink the relationship between the city and its urban system. (Micelli E., Sbetti F., 2021)

Figure 19 - GB representation on Land Use Plan of Bergamo. (https://cinturaverdebergamo.noblogs.org/)

The Green Belt is much more than a public park system. It is an existing ecological corridor, linking the "Parco dei Colli" and the agricultural plain of the province, a natural wedge of penetration into the city and a belt of ecological continuity with the "Prealpi Orobie". The UGB, with its urban farms and its reservoir of wildlife, is the connecting element between the countryside and the city: a glimpse into another possible Bergamo based on ecological integration rather than the consumption of nature. (Russi N., 2021)

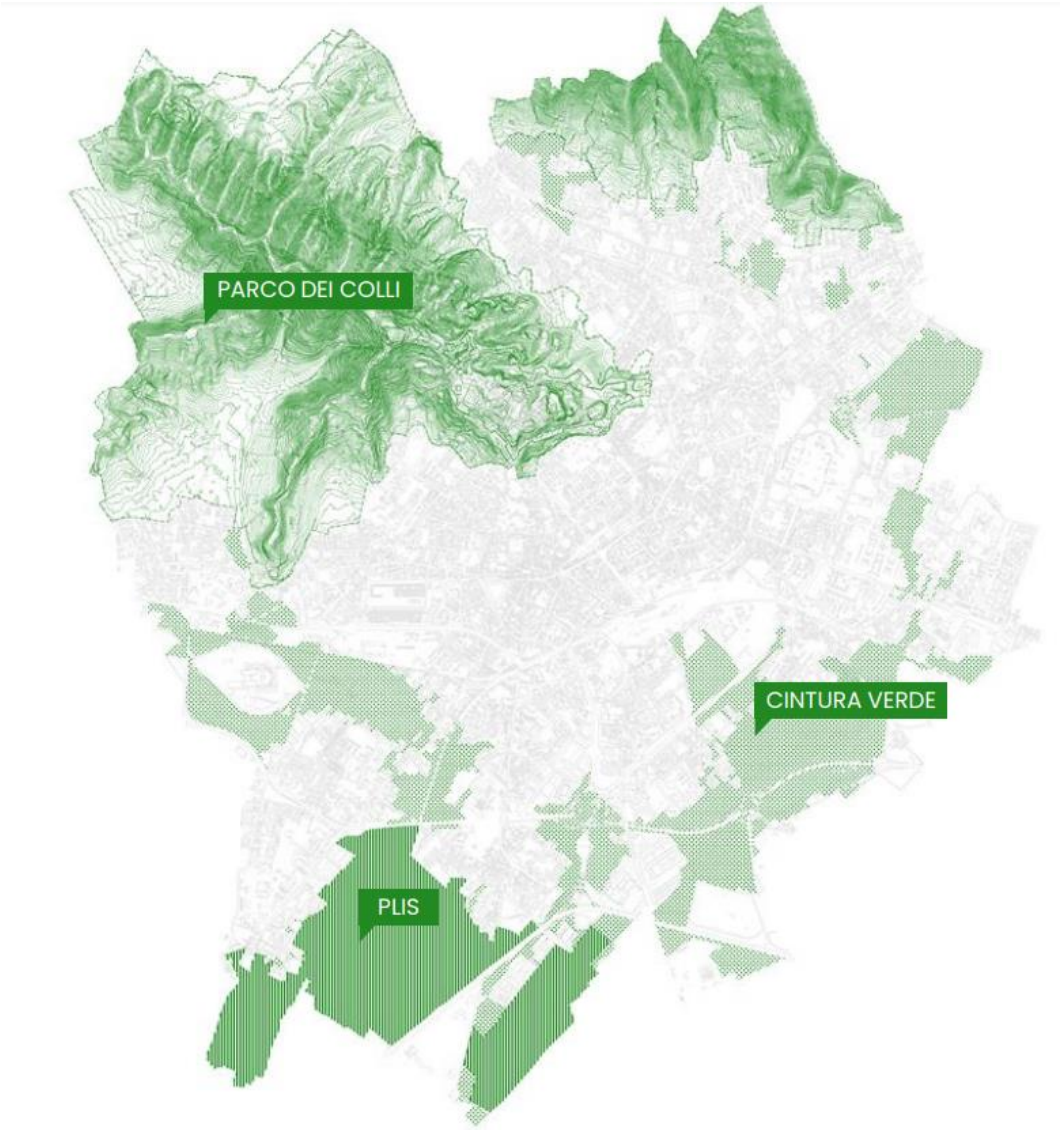


Figure 20 - Bergamo UGB current status

The UGB is therefore not just reducible to a question of quality of recreational greenery, where the issue a UGB can relieve food security starting urban agriculture; public health, environmental justice, and the extension of ecological connections in the city from which depends on the preservation of biodiversity and the air quality improvement in the heart of the most polluted region of the European Union. The UGB debate is not 'just' a matter of urban democracy: the UGB is now the laboratory by which to design Bergamo's contribution to the fight against climate change and the strategy that will lead the city out of environmental emergency.

How reported in "The new plan rules" (Le nuove regole del piano) by Micelli Enzio and Sbetti francesco, the green belt project consists of the linear park and the Green Rooms:

- The Green Belt is a linear park with agrarian-forestry characteristics, specially designed to realize the ecological connection between disunited areas of special naturalistic interest and meanwhile promote the tourist and environmental enjoyment of the rural sub-urban area.
- The Green Room A: "Parco della Trucca" an area with a naturalistic vocation characterized by extensive green areas, with agronomic environmental connotations and rural maintenance, in which the prevailing image refers to the system of meadows, hedges, field rows, with a rural-type use of open spaces.
- The Green Room B: "Parco Martinella" is a natural area with an ecological vocation characterized by the presence of the Gardellone Stream, with bank vegetation of naturalistic interest, in which the prevailing image refers to the system of meadows, hedges, field rows, with the enjoyment of open spaces of a recreational-playing type. The South Gate Green Room A large urban park, characterized by green spaces usable for recreational sports activities, relating to the urban context, interpenetrated with the school Campus, the green square, and open green spaces with a fruitive vocation and new gardens.
- The Green for Sports and Leisure, which integrates the environmental system consisting of the linear park of the Green Belt and the PLIS (Local Parks of Supra-municipal Interest), into the overall project of enhancing public green

spaces and public use at the urban scale, concerning green spaces equipped for sports and leisure.

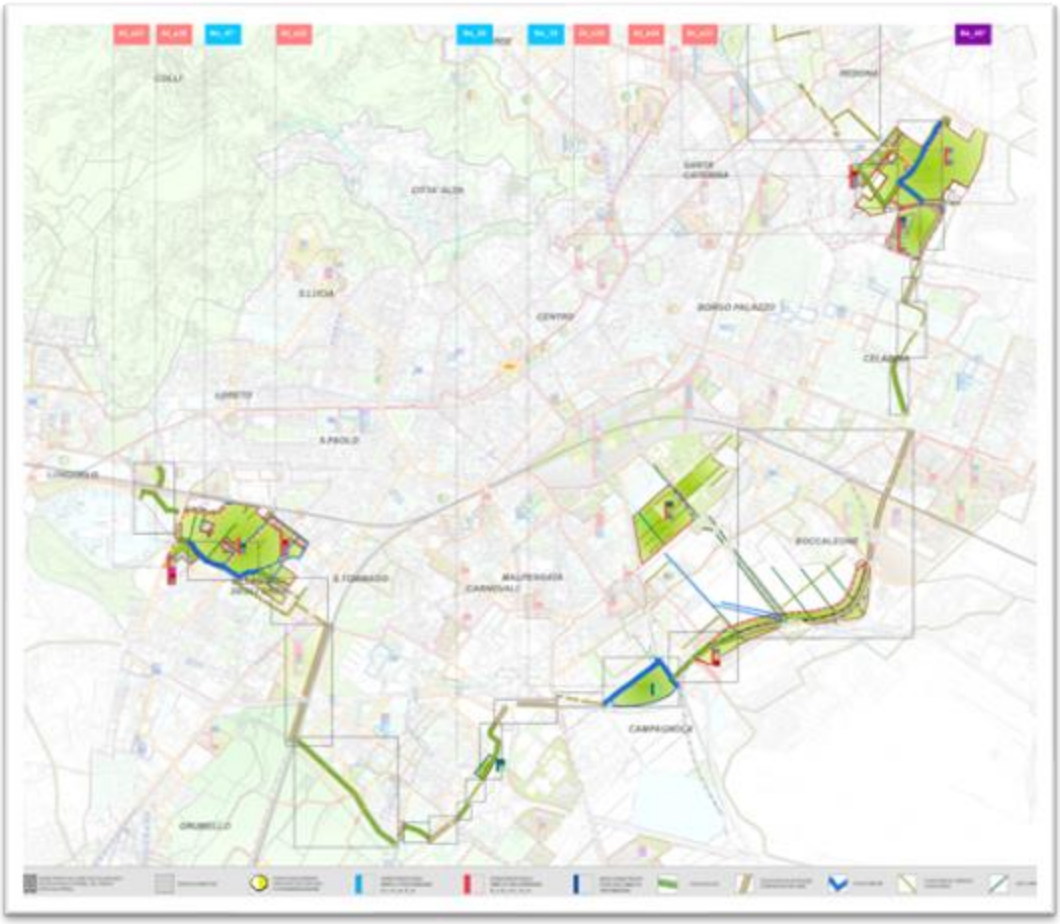


Figure 21 - Out-of-scale extract from the map "PS3.10 - AS10_The Green Belt"

Services Plan seek the protection, improvement, and development of mobility, consistent with the objectives and strategies indicated in the Urban Mobility Plan and in coherence with the infrastructural framework outlined in the Plan Document, which promotes connections between infrastructures of different categories and hierarchies, from international-level Intermodality (airport-South Gate node) to the interchange of road-rail/private-public and from this to the bicycle-pedestrian routes, which are developed within the built fabric and along the urban margins. The set of mobility services should contribute to improving urban livability and quality through the design of services integrated with the environmental system.

Figure 22 - UGB, Bergamo PGT 2020

Together with the Green Belt project, which redesigns peri-urban open spaces and relations with suburban neighborhoods, the strategic areas, acting mainly on the most densely built-up part of the city, build the overall design of the Plan.

The Services Plan (Piano dei Servizi) contributes to the characterization of strategic areas of the PGT through a plurality of interventions aimed at the morphological and functional redesign and the enhancement of strategic role each of them assumes in the relationship with the city open to its urban system, about the design of the public city, providing for specific actions of intervention in the implementation of its strategic lines.

The strategic areas, in their various characterizations become an opportunity to reconnect parts of the city through a network of green spaces/pathways and sustainable mobility that can improve not only accessibility to the public areas, but also help build existing and planned service chains; they also become an opportunity to guide the redevelopment of transformation areas directly involved in the strategic areas or complementary to it.

The UGB in Bergamo is design as a strategic priority by the PGT and intercepts municipal agricultural and forested areas of high nature value. However, the actions identified for its implementation remain largely unfinished, while the intercepted areas most often have an uncertain destination, if not already encumbered by building interventions.

More than connections and related bicycle and pedestrian paths (more often projects that have remained on paper), the very 'environmental facts' that they are supposed to integrate, in two decades, have gradually lost dimensional relevance, burdened by vast building hypotheses or more insidious fringe interventions. This is the case of Martinella Park, threatened by a stadium-building proposal signed 3,000 by 177,000 cubic meters already in 2006, from Gorle, by a 30,000 cubic meters project hypothesis in 2012, and from Torre Boldone, with several minor interventions. Then, there is the case of the airport mitigation areas, whose unsustainable development erodes its extent. The case of the Ecological Agricultural Park, which, although constituted as a local park of supra-municipal interest, has been, in part, eroded by the Kilometro Rosso project a Science and Technology Park that houses companies, hi-tech manufacturing activities, research centers and laboratories. Green that was subtract from protective constraints via change of use from 'agricultural green' to potentially buildable areas. Another example in the Benaglia promontory, where in 2019 began the construction of a luxury hotel in violation of the promises of the Green Belt project. Moreover, the case of the West Park, artificially divided into two sectors, and now encumbered on both fronts by building projects that insist on a substantial share of the park itself.

The Bergamo case study show us as often, remunerative development can suppress the environmental direction gave from the Plans.

2.3.2 –Municipal Structure Plan of Modena

Both the PRG of Modena and that of Reggio Emilia were drafted by Giuseppe Campos Venuti and Osvaldo Piacentini. They share the same territorial strategy, aimed at reversing the natural tendency of the city's growth along the axis of the Via Emilia, with the definition of a design open to the district, supported by a new road scheme with a north-south development direction, represented by an "equipped axis," which organizes the nodal elements of the forecasts and in the urban section supports the new directional functions.

The innovative aspects are:

- Initiation of the policy of containment of forecasts of residential development, with the explicit goal of limiting land rents.
- The focus on economic and social housing, with the provision of very extensive, proposing a model of development untethered from rents.
- A strong trend toward the rehabilitation of historic centers, envisaging the first hypotheses of “pedestrianisations”.
- A revealing public services policy, especially in the new suburbs

Even before the regional legislative formalization, the cultural and political orientation and experimentation that had already begun in Bologna in the early 1970s characterized the 1975 General Variant to Modena's PRG. A new plan anticipating regional standard, signed by numerous experts including Osvaldo Piacentini, for the inter-district framework, and Pier Luigi Cervellati, for the revision of the historic center.

From more than 27,000 residents at the beginning of the century, the historic center had emptied down to about 11,000. In continuity with the 1965 Plan, the General Variant aims to develop other important strategic goals:

- Establish new city-countryside relations.
- Enhance the role of local public transport.
- Consolidate the polycentric development of Modena and the province.
- Qualify residential and services.

- Govern the use of natural resources as "finished goods"
- Ensure as a priority the redevelopment and recovery of the existing and only later proceed with new expansions.

The proposed project confirms the open to a polycentric spatial layout of the city, which has exceeded 175,000 inhabitants. It is aim at limiting expansion, with a residential share downsized to about 17,000 rooms planned for the next decade and the deletion of areas designated for manufacturing settlements and returning to agricultural land. The Plan also draws a green belt around the urban area, which in the following years will become one of the cornerstones of the territorial "ecological network." The quality and quantity of public spaces are further consolidated and strengthened, including through a specific "plan of services", raising urban standards.

Figure 23 - Modena PSC2 Green Belt. (https://www.comune.modena.it/salastampa/archivio-comunicati-stampa/2015/7/psc-3-2013-gli-assi-di-lavoro-e-le-principali-direzioni#prettyPhoto)

The urban form was confirmed, with the new settlements strongly integrated into the open spaces in the greenery. However, it is above all in the environmental strategies that the General Variant introduces important elements of innovation,

with elements of protection, control parameters, and evaluation of the sustainability and livability of the city, among the first tested in Italian urban planning.

Luckily, things are changing, and more and more organizations worldwide are realizing that it is time to act together. Different policies were made by an array of important institutions, such as the "The Habitats Directive" which ensures the conservation of a wide range of rare, threatened, or endemic animal and plant species, or the "Birds Directive" and establish the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments. The European Union are on the frontline to face the loss of biodiversity, global climate changes, and other huge problem made by bad human habit.

Other important institutions have produced documents to inform and give indications to States, administrators, experts, and professionals. The New Urban Agenda produced by the United Nation and adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III) in

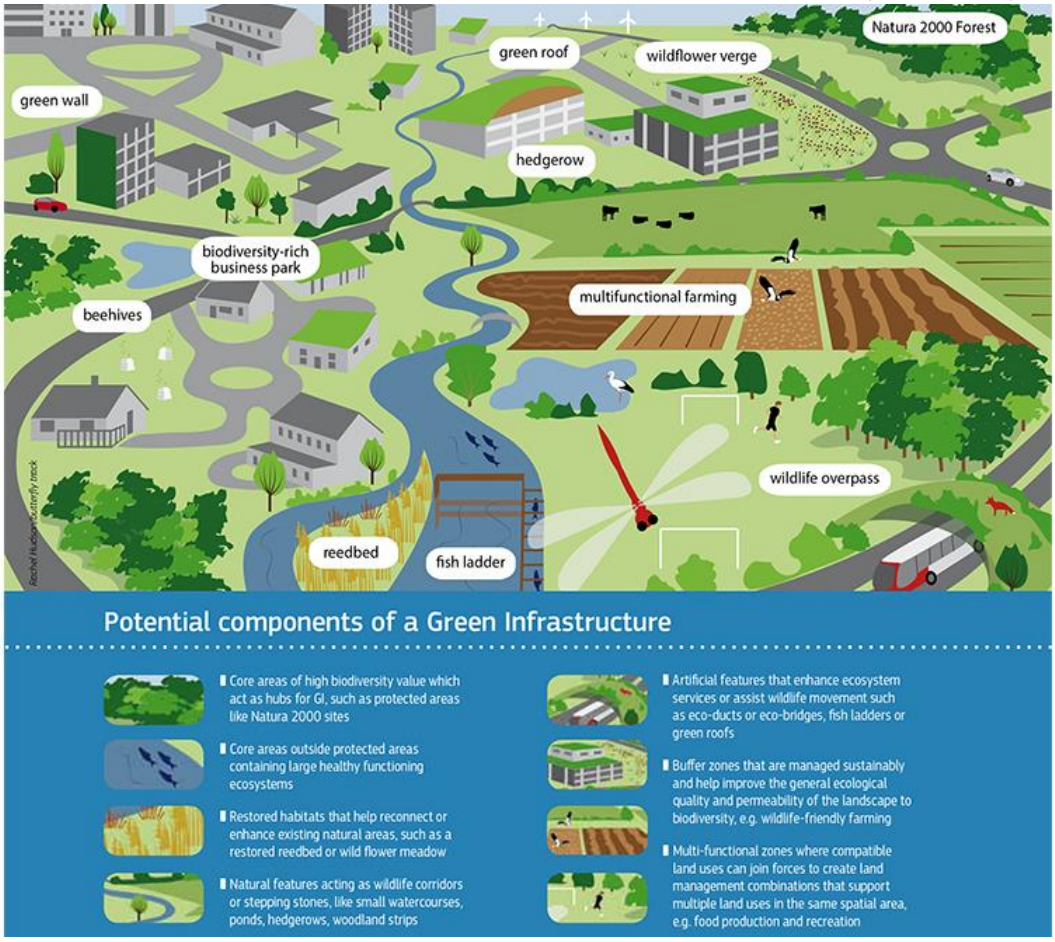


Figure 23 - Potential components of a Green Infrastructure - Source: https://www.coronaverde.it/wp/infrastruttura-verde/

Quito, Ecuador, on 20 October 2016 represents a shared vision for a better and more sustainable future. If well planned and well managed, urbanization can be a powerful tool for sustainable development for both developing and developed countries.

In the previous chapters we have dealt with the study of very different GB models. The time of implementation, size and type of governance can cause the results to vary. The next table summarized the main features of the plans and governance of each model.

City	Country	Spatial Governament system	Green Belt Plan	Vertical Coordinatio	New development	Partnership
London	UK	Performative	Metropolitan Green Belt	Over-county	Allowed	Private
Copenhagen	Denmark	Neo-Performaive	"Fingers' Plan"	National	Allowed	Public- Public State
Bergamo	Italy	Conformative	Territorial Government Plan	Local	Not Allowed	None*
Modena	Italy	Conformative	Municipal Structural Plan	Local	Allowed	Private-Public
Rivoli	Italy	Conformative	General Land use Plan	Local	Not Allowed	None*

Table 1 - Green belt models summary

In the table along with the nation to which it belongs, the governance of its land-use system is also reported. Three types are found, the most common is of the "conformative" type, that is designed to pursue a "correspondence in form, manner or character" and actions "in accordance with a specific standard or authority" (Rivolin J., 2008). In technical terms, the model makes use of prior binding zoning of the planned area. The model implemented in Uk can be called "performative" since it is aimed at achieving, rather than formal compliance, the "execution of an action" and the "fulfillment of what was claimed, promised or demanded" (Rivolin J., 2008). In technical terms, the model makes use of an indicative and non-binding zoning of the planned area, such that the public strategy is transposed into a map of non-binding addresses, thus binding in political terms but without legal implications in the allocation of land use and transformation rights and properties. The third model that emerged can be called "neo-performative" because, while it continues to hinge on binding zoning, it succeeds in neutralizing its "preventive" effectiveness by ensuring that spatial transformation rights are allocated-as according to the performative model - after transformation projects (at least the most relevant) have been submitted to public scrutiny (Rivolin J., 2016).

The characteristics of these land governments and the extent of the plans are directly related to “new development”. Generally, performative land governments allow new development on the GB but must also consider the great extent of the Copenhagen and London plans as also evident from the "vertical coordination". The last item in the table shows the type of partnership, that is, which actors can develop new projects within the GB. In Bergamo and Rivoli since new consumption of soil in not allowed, private and public cannot develop any interventions.

3 – RIVOLI'S URBAN GREEN BELT

Going into the merits of Rivoli's Urban Green Belts it is important to know also what over national institution such Europe says about green infrastructures. The Europe Commission's site defines the forms and functions of green infrastructure as "a strategically planned network of natural and semi-natural areas with other environmental elements, designed and managed in such a way as to provide a broad spectrum of ecosystem services. This includes green (or blue, in the case of aquatic ecosystems) and other physical elements in the land (including coastal areas) and marine areas. On the mainland, green infrastructures are present in a rural and urban context ".[6]

Our perspective for a better future cannot deny the importance of a live and healthy environment. To achieve this result, we must work side by side with the city, metropolitan city, region, and the competent Minister because we cannot think to act independently, a wider goal with common action and solution it is the only solution to better address the problem.

Another important example can be found very close to Rivoli, the plans produce by the Metropolitan city of Turin, the municipalities that were part of the consortium, the Piedmont Region, and the Ministry of Economy and Finance; we find the plan called "Corona Verde". Inspired by the Crown of Savoy Delights (Corona di Delizie), which is the whole system of Royal Residences, historically desired by the royal family to surround themselves with sumptuous masons de Plaisance that makes up the architectural design called Crown of Delights born between the sixteenth and seventeenth centuries around the city of Turin.

[6] European Commission web site: (https://ec.europa.eu/environment/nature/ecosystems/benefits/index_en.htm#:~:text=Green%20infrastructure%20is%20a%20strategically,and%20climate%20mitigation%20and%20adaptation.) Last see 15/05/2022

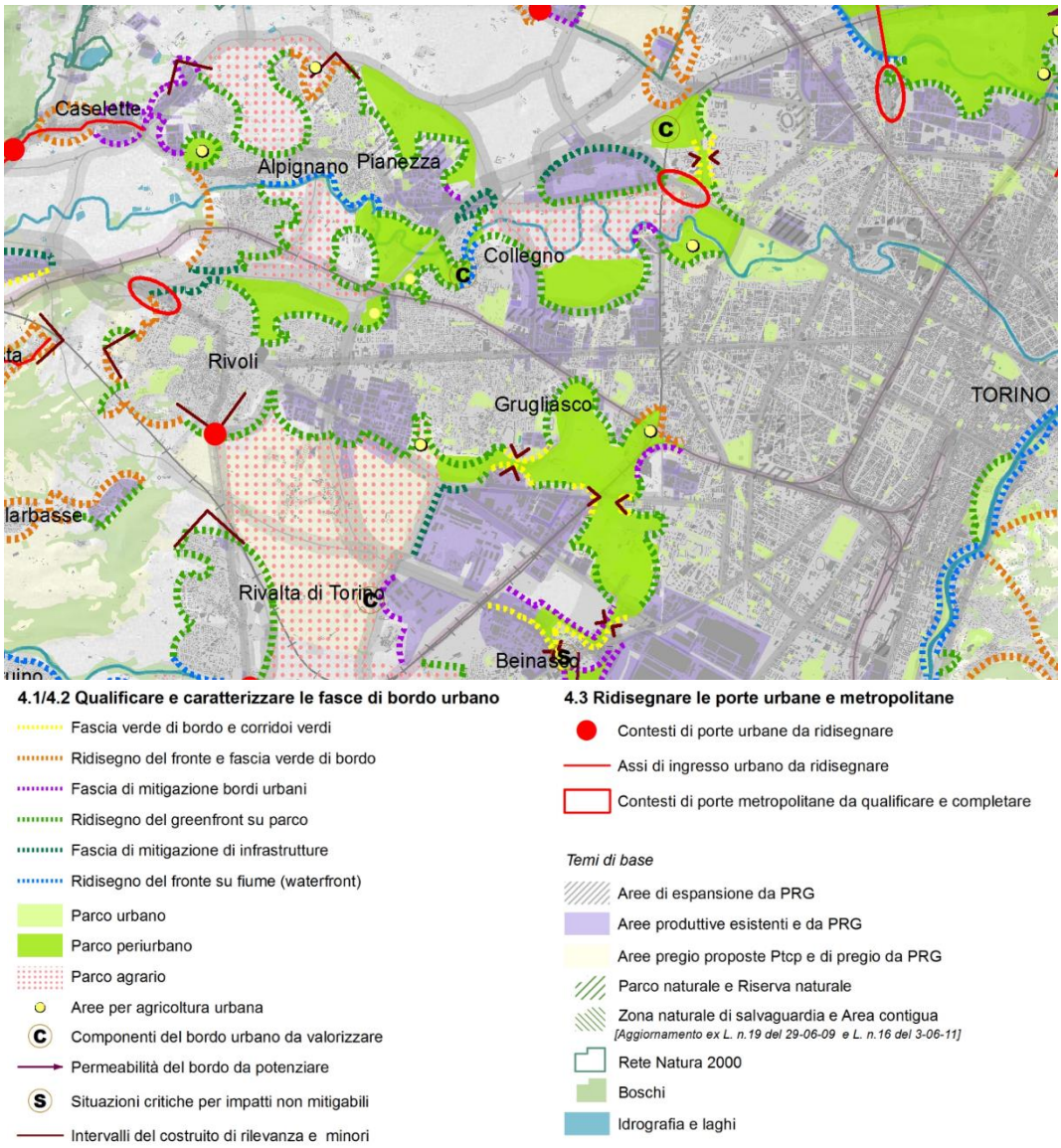


Figure 24 - "Corona Verde" Masterplan, Door and Edges Strategy. Piedmont Region 2013

As possible, see Figure 24 - "Corona Verde" Masterplan, Door and Edges Strategy. Piedmont Region 2013, this plan also highlights the urban edges by creating a green belt along the entire fringe.

The "Corona Verde" Plan also establishes some non-prescriptive strategies The strategy called Green edge band and green corridors says to establish: "Band, at least 50 meters deep, mainly free from constructions and public use, to be built and safeguarded in the PRG to keep the settlements with green separation corridors distinct, to qualify landscape the urban border and to house the equipment technological, for urban environmental sustainability or leisure

activities with minimal impact, conditioning agricultural uses to the design of trees and public areas and interesting with new one's construction less than 20% of the range." (Corona Verde, 2013)

Expressing itself later also on the green bands with trees for masking or redesigning the image of built edges and creating with compensations and mitigations, optimizing the aspects of permeability and environmental quality useful for the widespread ecological network.

Following the European directives, the vast study from abroad and Italian studies, the urban planning studio in charge to draft the new Land Use regulatory plan for Rivoli decided to full embracing the creation of a green ring around the city to bring new strategies and action to address the urban sprawl problem and mitigate the effects of climate change. All these strategies are large-scale, when it comes down to the municipal level it is important to know how to change the scale of the methodology and to know how to implement these strategies in a territory that is much more complex than how it is reported on the maps. The studio of Maria Sorbo, the administration, and I are committed to the implementation and consequence of all the strategies given by the environmental priorities that today more than ever must be at the center of our strategies and movements, in the next chapters we will go into even more detail to better understand how these actions were planned and drawn up on the map.

I would like to mention that the work of the preliminary draft variant to the municipal land use plan of Rivoli is still a work in progress, so some data and elaborations are missing, as well as there is a possibility of future changes and additions.

3.1- TERRITORIAL FRAMEWORK

3.1.1 - The city of Rivoli

The city of Rivoli is located 7 km West of the city of Turin, in Piedmont and it extends for 29.5 km2, with a population of 47.318 inhabitants (ISTAT, 2020)[7] is one of the most populous cities in the Turin conurbation after Moncalieri 56.522 (ISTAT, 2020)[1] and Collegno 49.099 (ISTAT, 2020)[1].

In the 1980s, the recovery of the historic center and the restoration of the main buildings began, and this kicked off a new season of culture and tourism, also thanks to the renovation of Rivoli Castle.

The City of Rivoli is located at the west end of Corso Francia, one of the main arteries of Turin, acting as a backbone for Rivoli that orbits around the city of Turin, which acts as an economic, cultural, and social center. This union physically appears before our very eyes as a conurbation that, like an outstretched arm, unites the different municipalities of the metropolitan area of Turin in an East-West direction. According to the Treccani vocabulary:

> ***conurbazióne*** *s. f. [dall'ingl. conurbation, comp. del lat. con- e urbs urbis «città»]. – Agglomerazione urbana formata dalla fusione di un centro metropolitano con centri minori, inizialmente autonomi, oppure sorti in funzione del centro maggiore per scopi residenziali, industriali, sportivi, ecc. Anche, la connessione opportunamente programmata di centri urbani, di pari o circa pari importanza, attraverso il territorio fra essi compreso.*
>
> *Urban agglomeration formed by the merger of a metropolitan center with minor centers, initially autonomous, or which arose as a function of the major center for residential, industrial, sporting purposes, etc. Also, the appropriately*

[7] ISTAT, Popolazione Comuni italiani (http://dati.istat.it/Index.aspx?DataSetCode=DCIS_POPRES1)

planned connection of urban centers, of equal or approximately equal importance, through the territory between them. [8]

Therefore, the dependence that has been created over the centuries with the city of Turin is particularly important. Projects are also being developed for the extension of line 1 of the Turin underground, which will soon arrive at Cascine Vica, but which could then later reach the castle of Rivoli and beyond.

3.1.1 – History of Rivoli

The Rivoli's area occupies the head of the Morainic Hill born from the glaciations of 130-355,000 years ago. Some findings of axes and rock carvings allow us to date the first settlements as early as the Middle Neolithic (5500-4700 BC), but the first known occupation is that of the Taurini, a Celtic-Ligurian group that created embryonic forms of urbanization. Hannibal's army besieged the villages in 218 BC and later Romans took control of the area and began the real urbanization given the strategic importance of accessing the Alpine passes on one side and the Po Valley on the other.

The "Strada delle Gallie" passes through Rivoli, a Roman consular road built by Augustus which leads from Turin to France, and which constitutes one of the main routes of the Via Francigena, a road historically traveled by pilgrims, merchants, and armies, still today a destination for religious tourism.

During the period of the barbarian invasions that followed the fall of the Western Roman Empire, the strategic position along the Via delle Gallie exposed the area to numerous looting and destruction. After the dissolution of the Carolingian Empire and the feudal conflicts for the domination of Piedmont, the first settlement of the Revolese took place (996 AD). The area was controlled by the clerical political-economic system that had as its epicenters the bishopric of Turin, the abbey of Novalesa, and the monastery of San Michele della Chiusa. A small fortification was developed on the top of the hill and a village at its foot.

[8] Conurbazione Treccani: https://www.treccani.it/vocabolario/conurbazione/

From the thirteenth century began the rise of the Savoy, who, following the weakening of the bishop's power and the consequent formation of the representative bodies of the Municipality, were recognized as lords of the Castle in 1247 by Emperor Frederick II of Swabia. In the following century, however, Amedeo VI of Savoy (1334-1383), known as the "Green Count" for the color of the clothes used during tournaments and battles, Rivoli experienced a period of economic prosperity and urban redevelopment. Walls surrounded the border; the local nobility built rich turreted dwellings and in 1310 was built the Bealera di Rivoli, an important irrigation canal.

In 1559, the famous castle of Rivoli was built as a temporary residence for Duke Emanuele Filiberto I of Savoy. The works of the Castle were continued and modified by the will of Carlo Emanuele I who decided to transform the ancient medieval fortress into a sumptuous noble residence, at the hands of the architects and engineers Carlo and Amedeo di Castellamonte. These works were completed in 1644 with the addition of the building called "Manica Lunga". The complex suffered severe damage during the repeated sieges inflicted by the French during the War of the Spanish Succession in the early 18th century.

Once the conflicts with the French ended, Vittorio Amedeo II entrusted Filippo Juvarra with the reconstruction of the Rivoli Castle, already connected since 1711 by the "Stradone Reale di Francia" (now Corso Francia), one of the longest straights in Europe (12 km).

Between the end of the 1800s and the first half of the 1900s, Rivoli was one of the privileged places of the summer residence of the Turin nobility and upper middle class: this led to the construction of elegant villas of considerable architectural value. With the economic boom of the second post-war period, Rivoli transformed itself from an agricultural center into an industrial and manufacturing vocation with a significant increase in the population, which today has about 49,000 inhabitants.

3.1.2 - Rivoli's Castle

The hill of Rivoli, certainly since the Roman period, has seen a human presence thanks to its strategic position near the Strada delle Gallie. Of a fortified building, the "Castrum Riuollum".

Property of the Bishops of Turin, the Castle became part of the Savoy dominions in 1247 and would follow the fate of the dynasty until 1883, when it was sold to the City of Rivoli.

When Emanuele Filiberto chose Turin as the new capital of the Duchy since the city was still in French hands, he settled with his court in Rivoli, and his heir Carlo Emanuele was born in the Castle on January 12, 1559, under the care and good auspices of Nostradamus, summoned to follow the pregnancy of the Duchess Margaret of Valois. For this reason, the architects Francesco Paciotto and Domenico Ponsello modernized the building.

The new duke Carlo Emanuele I commissioned the architects Castellamonte, father and son to transform the ancient medieval manor into a residence of loisir, as we see it in the two tables of the Theatrum Sabaudiae, a celebratory narrative through images of cities, fortresses, residences and all the beauties of the Duchy.

Figure 25 - Rivoli's Castle in a Theatrum Sabaudiae representation

The construction site will be completed in 1670, the only example of that period that remains today is the room of Amedeo VIII, on the second floor, the only one that survived after the passage of the French troops of Marshal Catinat, who put the building to fire and iron in 1690 and 1693. Seeing it burn from Turin, the young duke, Vittorio Amedeo II, promised himself to rebuild and make even more beautiful that residence so intricately linked to the history of the Savoy and much loved by him. It was in Rivoli that he announced both his ascent to the throne and his abdication in 1730.

After the winds of war, Rivoli must rise again, the architects of the Sun King are consulted, and the first projects are drawn up by the architect Michelangelo Garove, who traces the Stradone del Re, now Corso Francia, the scenic artery leading to the new Palace.

The building is enlarged, the damaged towers are knocked down and in those at the head, a system of double flights is created, which still today leads from the ground floor to the top, without entering the rooms. It will be with Filippo Juvarra, who arrived in Turin in 1715, to take shape, starting from the work of Garove, who died in the meantime, the grandiose project of the palace, a new symbol of the absolute power of Vittorio Amedeo II, who became king of Sicily. A place capable of rivaling other European residences, a dream never fully realized, to be appreciated in its entirety only thanks to the magnificent wooden model of Ugliengo, the canvases painted by the best landscape painters of the time, and the projects.

A sumptuous, scenography building, without the Manica Lunga, destined to be demolished, with an imposing central body surrounded by two mirrored wings, all crowned by balustrades and statues in full Juvarra style. Inside, refined apartments decorated by painters from all over Italy, with precious furnishings, now completely lost.

In the Napoleonic period, the Castle was closed, like most of the other residences, many pieces of furniture were no longer present, and more was brought to Turin; the emperor decided to donate the complex to Marshal Ney, the new prince of Moscowa, as the titular commander of a cohort of the Legion of Honor.

With the Restoration work was resumed by Randoni, but by now the Castello di Rivoli had lost importance. To cover the costs, it was split up and rented to the Municipality, which used it to house an army battalion. In this regard, it was decided to build a link between the Castle and the English Channel.

After 5 centuries, in 1883, for the sum of 100,000 lire the Castle passed from the House of Savoy to the City of Rivoli, and from this rented to the army, the soldiers, who until 1909 occupied the structure, devastated and damaged it, bringing modifications suited to them, but which were heedless of the building.

In 1909 and 1911 the ancient splendor returned, but briefly, thanks to two exhibitions, but then nothing more, more looting and occupations during the Second World War, including the German one.

The bombings left deep wounds in the buffered building in 1948, with the first emergency interventions by the Civil Engineers.

With the Centenary of the Unification of Italy for the Castello di Rivoli, up to that moment a silent and cumbersome presence for some, the important sum of 1 billion and 120 million was allocated, inadequate for the recovery of the entire building and thus destined to other residences waiting for better times.

In 1969 the proposal was made to open a casino, as had already happened for only two months in 1945, but the proposal did not have the hoped-for credit.

With the end of the 60s, hope for Rivoli is rekindled, the first funds arrive, the architect Andrea Bruno, whose name the rebirth of the complex is linked to, provides the first reliefs, and the almost total disappearance of the external windows is recorded, the damage of rain and humidity to stuccoes and paintings, the few tattered tapestries, wooden parts by now rotten. The first collapse, however, announced, took place in 1978, giving way was the turn of the large hall on the second floor.

The Piedmont Region, after numerous reports, decided to intervene and the complex was entrusted to it with a 29-year loan, to use the Castle for public and cultural functions. Here, the Marquis Panza di Biumo, an important collector of contemporary art, appears to help Rivoli, looking for a place where he can set up part of his collection

August 1979, the restoration site for the Castle alone opens, which will last until 1984, when it reopens its doors as a Museum of Contemporary Art. A work that has considered its entire history, respecting its architecture and where it stopped. With modern insertions such as the elevator, the large suspended staircase, the

footbridge on the ribbed vault of the late eighteenth century, and the panoramic projection on the third floor.

From 1984 to 1986 Andrea Bruno began to work, but unfortunately, the lack of funds closed the construction site, which reopened only in 1996. It was not until February 2000 that the building, created to house the art gallery of Carlo Emanuele I, was splendor. Here, too, the structure is maintained by inserting parts such as the steel roof in the shape of an inverted hull of the vault, or the steel and glass stairs attached to the seventeenth-century structure.

The large open windows at the head light up the rooms in the cafeteria, which has also become a treasure trove of art with works from the collection, and other museum services.

3.2 - Rivoli's Land Use Plan

The development of a UGB it is part of a bigger work for the creation of a new land use plan. It's essential for the UGB updated regulatory rules to integrate in the context and provide an efficient outcome. In this chapter will be briefly show the workflow from the beginning to the concretization of the UGB.

"The task of the urban planning discipline is to study the city and its functioning to plan its development and regulate its transformation to improve and make the urban space more livable.

The planning and design purposes of the new city expansions, which prevailed in the past, have now been replaced by greater attention to the redevelopment and enhancement of already compromised, marginal, or no longer used urban spaces and to the environmental and social sustainability of the transformations.

Through the coordination of different knowledge, deriving from different disciplines such as Architecture, Engineering, Ecology, Sociology, Law, and Economics, urban planning focuses on the past and present scenarios of the city, outlining the great options for the future organization of space, to improve the conditions of human settlements with a correct relationship between private functions, public services, and protection of environmental and natural resources."[9]

Starting from the words of the Urban Planning section of the municipality of Rivoli, we are going to describe the current land use plan.

The current land use plan of the Municipality of Rivoli was approved by the Piedmont Region by Regional Council Resolution No. 11 - 3288 of June 25,

[9] Sito del Comune di Rivoli https://www.comune.rivoli.to.it/aree%20tematiche/urbanistica/

2001. Consisting of the following documents: The P.R.G.C. in force of the Municipality of Rivoli was approved by the Piedmont Region with a resolution of the Regional Council n ° 11 - 3288 of 25 June 2001. Consists of the following documents:

- Illustrative documents:
  A. Illustrative Report, which are contained the objectives and criteria adopted by the City Council in the programmatic resolution, and placed at the basis of the elaboration of the plan, specifying the relative time frame of reference; retrospective demographic and socio-economic analyzes, referring to a period of at least 20 years, with an indication of the development hypotheses assumed over the reference time frame adopted; the quantitative data, relating to the forecasts for the recovery of the existing building stock of new settlements and the finding of the areas, for the services and equipment, necessary to meet the previous needs and foreseen concerning the standards set by this law; the criteria for the general structuring of existing and planned settlements;
  B. Technical annexes
     1. Socio-demographic analysis.
     2. Service charter – according to art. 21 L.R. 56/77
     3. Quantitative sheet of urban data.
     4. document containing the criteria for the recognition of commercial settlement areas and the issuance of permits for the exercise of retail trade in a fixed location in private areas (according to Regional Law 12.11.1999 No. 28).
- Prescriptive papers:
  A. Technical annexes
     1. Geological survey and hydrogeological study
     2. Definition of areas of current executive plans
     3. Environmental analysis and Green Plan
     4. Analysis of buildings and areas of environmental and cultural interest

5. Constraints and bands of respect

B. Plan maps

1. Summary plan of the Plan: actual situation and forecasts of the P.R.G.C. of the neighboring municipalities (n° 1 map, 1: 25.000)
2. General structure of the P.R.G.C. (n° 1 map, 1: 10.000)
3. Developments of the P.R.G.C. relating to the entire municipal area (n° 19 maps, 1: 2.000)
4. Developments of the P.R.G.C. relating to the Historic Center (n° 1 map, 1: 1.000)
5. Classification table of commercial activities, types of distribution structures, and commercial settlement areas (n° 1 map 1: 10.000)

C. Implementation Rules and related Regulatory Sheets.

The list of documents that make up the P.R.G. was provided by the Implementation Notes document with City Council resolution no. 47 of 15/04/2005.

To implement the P.RG.C. the municipal area is divided into Urban Areas according to the general use destinations and according to the building capacities expressed by the Territorial Index. The urban areas are represented in Table 2 of the P.R.G.C. 1: 10,000 scale consisting of a single sheet. The urban areas are in turn divided into regulatory areas represented in Table 3, on a scale of 1: 2,000 and divided into 19 sheets.

The Regulatory Areas of P.R.G.C. represent boundaries of the territory within which the same requirements indicated in the Regulatory Sheets apply: each Regulatory Area, therefore, has a one-to-one correspondence with a single Regulatory Sheet. From the point of view of the geometric representation, the constraints and the buffer zones intersect the regulatory areas, integrating their prescriptive contents. The Sheets relating to the individual Regulatory Areas define the main and secondary destinations, the methods and types of intervention, and any specific notes.

Territorial area (Superficie territoriale) (St):

The territorial area is defined as the surface of an intervention area with homogeneous use, including the surfaces necessary for primary urbanization and those for secondary urbanization, both existing and planned.

Land area (Superficie fondiaria) (Sf):

Land area is defined as the surface of an intervention area measured net of areas intended for public roads and public spaces. It can also be defined as a lot of relevance, as it coincides with the plot of land serving the buildings, as resulting from the documentary documents, for existing buildings, or from the project, for buildings still to be built. The pertinent lot may include one or more adjacent cadastral parcels, belonging to one or more owners and includes, in addition to the covered surface of the buildings, also the spaces free from homes and green areas of private relevance.

Territorial building capacity index (Indice di capacità edificatoria territorial) (It):

The territorial building capacity index: It, is the unit value of the gross area, expressed in sq / sq m, buildable on top, of the intervention area.

Land density index (Indice di densità fondiaria) (If):

Land density index: If, is the maximum gross floor area, expressed in square meters, which can be built on top, for each square meter of land area.

Covered area (Superficie coperta) (Sc) and Coverage ratio (Rapporto di Copertura) (Co):

The covered area is defined as Sc, the area of the maximum encumbrance of the above-ground constructions. The coverage ratio: Co, expresses as a percentage the ratio between the maximum permitted covered area and the land area about the intervention.

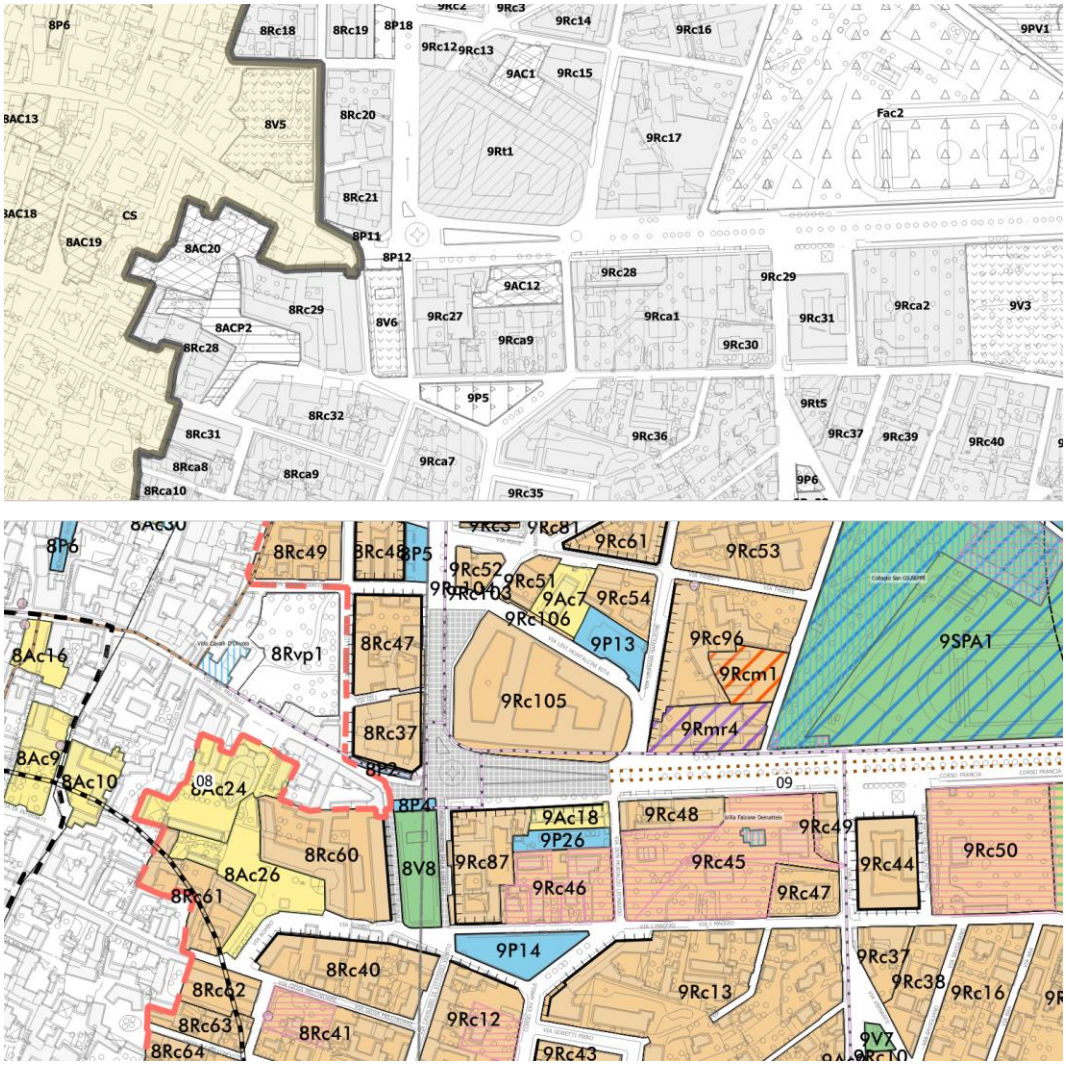


Figure 26 - In the upper image an extract from the current PRG. In the bottom image an extract from the proposed PRG. The new graphic vest it's more understandable and helps in the reading process.

The new PRG brings a vast array of innovations. From a technical point of view, deep work in the GIS file allowed us and in the future the administration to precise control of territory.

AREE NORMATIVE RESIDENZIALI - R :: Elementi Totali: 881, Filtrati: 881, Selezionati: 0

	ID	COD_UN	AREENORM	AREEURBA	AREA	IT	IF	SUPMAXCOP	HMAX	PERIMETER
1	5850	AC	10AC1	R2	2499,517	0,25	NULL	NULL	NULL	201,195
2	5860	AC	10AC2	R1	24723,978	0,16	NULL	NULL	NULL	835,619
3	5880	AC	10AC3	R5	4253,368	0,45	0	0	0	262,825
4	5890	AC	10AC4	R5	2111,302	0,45	NULL	NULL	NULL	188,916
5	5910	AC	10AC5	R2	3993,087	0,25	NULL	NULL	NULL	251,227
6	5920	AC	10AC6	R6	2543,394	0,5	NULL	NULL	NULL	202,687
7	6429	ACP	10ACP1	R2	3334,206	0,25	NULL	NULL	NULL	268,236
8	6430	ACP	10ACP2	R2	1908,092	0,25	NULL	NULL	NULL	197,149
9	6431	ACP	10ACP3	R6	3929,578	0,5	0	0	0	249,982
10	6432	ACP	10ACP4	R6	3204,366	0,5	0	0	0	223,480
11	6420	ACV	10ACV1	R6	20742,845	0,5	NULL	NULL	NULL	789,860
12	6421	ACV	10ACV2	R5	20594,275	0,45	0	0	0	615,685
13	5930	i	10i1	I	4939,039	0	1,00	60	16,0	433,361
14	5940	i	10i2	I	1471,839	NULL	1,00	60	16,0	250,420
15	5950	i	10i3	I	2344,419	NULL	1,00	60	16,0	344,459
16	5960	i	10i4	I	23955,622	NULL	1,00	60	16,0	640,559
17	5970	i	10i5	I	1163,124	NULL	1,00	60	16,0	530,936
18	5980	i	10i6	I	16395,075	NULL	1,00	60	16,0	664,262
19	5990	i	10i7	I	14888,015	NULL	1,00	60	16,0	488,507
20	5995	i	10i8	I	2450,534	NULL	1,00	60	16,0	218,122

Figure 27 - Current PRG Attribute table

500101 - AN - Aree normative Marco - corretto copy :: Elementi Totali: 1104, Filtrati: 1104, Selezionati: 0

	fid	PREVA	liv.1	liv.2	liv.3	liv.4	ix edil	ertur	ità fo	à terri	istica	ativa	ogres	ree N	erficie territoriale (	Foglio	ea Urbanistica (Vigent	AREA	IT	IF	SUPMAXCOP	HMAX	PERIMETER	Area Normativa (Vigente)	FID_MARCO
1	1592	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,50	SIL	V	9	9V9	13699	9	R6	13693,221	0,5	NULL	NULL	NULL	1145,771	9V16	1015
2	1544	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	8	9V8	1428	9	R2	1427,830	0,25	NULL	NULL	NULL	189,886	9V21	988
3	1429	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	7	9V7	377	9	R2	376,869	0,25	NULL	NULL	NULL	81,036	9P6	986
4	1525	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,16	SIL	V	6	9V6	835	9	R1	834,228	0,16	NULL	NULL	NULL	215,999	9V5	981
5	1539	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	5	9V5	1189	9	R2	1188,573	0,25	NULL	NULL	NULL	148,271	9V23	980
6	1538	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	4	9V4	2111	9	R2	2110,133	0,25	NULL	NULL	NULL	232,238	9V11	978
7	1537	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	3	9V3	616	9	R2	616,037	0,25	NULL	NULL	NULL	123,316	9V12	975
8	NULL	070...	SE...	SER...	SER...	NULL	12	NULL	0,15	NULL	SIL	V	26	9V26	58752	9	Fs	58726,513	0	0,15	0	12,0	1947,279	Fs2	1048
9	NULL	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,50	SIL	V	25	9V25	3448	9	R6	3446,896	0,5	NULL	NULL	NULL	238,814	9V1	1047
10	1874	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	24	9V24	4608	9	R2	4606,062	0,25	0	0	0	509,624	9V6	1046
11	1866	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,45	SIL	V	23	9V23	38223	9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1045
12	1865	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,45	SIL	V	22	9V22	38223	9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1044
13	1625	070...	SE...	SER...	SER...	SER...	NULL	NULL	NULL	NULL	SIL	V	21	9V21	570	9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1040
14	1536	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	20	9V20	14345	9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1037
15	1576	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,50	SIL	V	2	9V2	7710	9	R6	7707,174	0,5	NULL	NULL	NULL	468,668	9V13	974
16	1243	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,16	SIL	V	19	9V19	35835	9	R1	35819,069	0,16	0	0	0	1317,140	9ACV2	1035
17	1558	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	18	9V18	4608	9	R2	4606,062	0,25	0	0	0	509,624	9V6	1034
18	1499	070...	SE...	SER...	SER...	SER...	NULL	NULL	NULL	0,16	SIL	V	17	9V17	15460	9	R1	15453,586	0,16	0	0	0	1055,119	9PV5	1033
19	1557	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	16	9V16	3743	9	R2	3741,032	0,25	0	0	0	394,148	9V9	1032
20	1503	070...	SE...	SER...	SER...	NULL	NULL	NULL	NULL	0,25	SIL	V	15	9V15	13545	9	R2	13539,139	0,25	0	0	0	472,553	9PV4	1031

Figure 28 - Proposed PRG Attribute table

In the new proposed PRG, there are 240 new fields. These new fields are the result of the "de-simplification" made necessary in the revision because in the current PRG many regulatory areas have been merged even if they had different physical characteristics. Furthermore, by separating these areas it will be possible to give more specific indications of the urban planning data numbers such as land area, territorial area, Land density index, and more.

Numerous additional regulatory areas have been identified. These new areas will be able to describe and regulate the urban fabric in a more orderly manner.

The new normative areas organization is more coherent with the real city fabric. For example, in the current PRG, the residential normative areas were only five defined as:

- Consolidate
- Consolidated environmental interest
- Consolidated redevelopment
- Transformation
- Transformation for popular economic housing

We used the same system to codify all the normative areas typology, in this way residential, productive, and touristic have the same graph symbol and color.

In the next image are compared a legend extract from the current PRG and our PRG. We decided to divide the areas into 5 categories:

- Consolidate
- Mixed reordering
- Completion
- New plant
- Unitary plans

This division will be used also for the other different normative areas because this solution it's enough general to cover all the possibilities, we can find everywhere a consolidated fabric. Mixed reordering means an area with two or more intended use. The completion areas are areas that can host more covered areas, to sew the fabric city. New plants are used less it's possible focusing on closing the holes rather than consuming new soil. Unit plans are instead those projects that cover large areas and must therefore be organized according to different data, this category also includes economic and public housing residences.

The rural residential has been identified in the hamlets of Tetti Neirotti which deserves different management from the dense city.

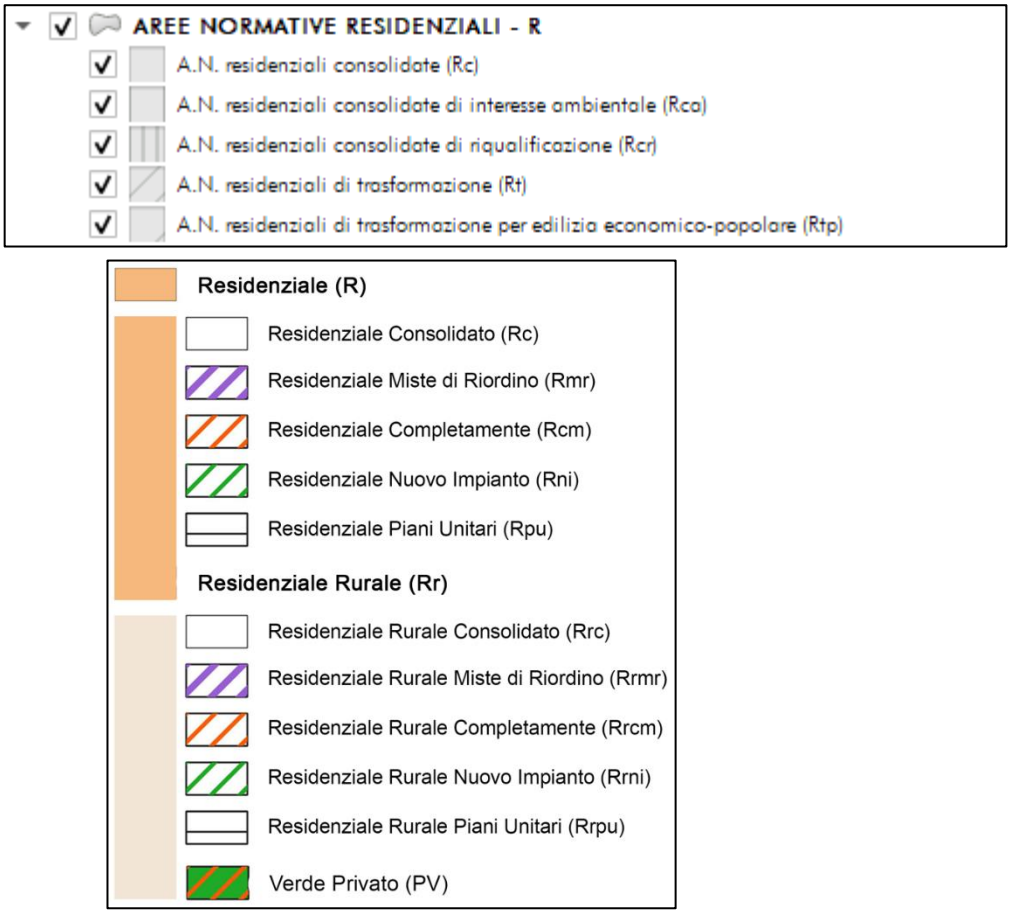


Figure 29 - Comparison between current Residential legend on top and new PRG Residential legend below

3.2.1 – Land Use Plan Adoption

To be approved, the plan must first go through a very long bureaucratic process, in Piedmont regional planning it is law 56/77, and its subsequent amendments that regulate this procedure which will be summarized below.

1. The City Council preliminarily adopts a programmatic resolution which, based on the contents of the Territorial Plan and a first fact-finding survey on the local situation and the dynamics in place, identifies the general objectives to be achieved and outlines the criteria for setting the Land Use Town Plan.

2. The programmatic resolution, which has become enforceable by the law, is immediately sent to the province and any other person identified by the statutes and municipal regulations. Anyone can submit observations and proposals with the methods and times indicated in the resolution itself.
3. Based on the elements acquired, the Municipality draws up the preliminary draft Plan Regulator and adopts it within 180 days of the programmatic resolution.
4. The preliminary project must include the outline of the explanatory report referred to in the technical annexes, the plan tables, and the implementation rules.
5. Municipalities that have a population not exceeding 5,000 resident inhabitants can adopt the programmatic resolution at the same time as the adoption of the preliminary draft plan.
6. The Preliminary Project is filed with the Municipal Secretariat; is published for extracted from the praetorian notice for 30 consecutive days, during which anyone can view it; it is made available to the Bodies and Bodies. In the following 30 days, anyone can submit comments and proposals in the public interest.
7. Within 180 days from the filing, the City Council adopts the General Town Plan giving reasons for the acceptance and rejection of the observations and proposals presented. Changes are not subject to publication or new comments introduced in the Land use Town Plan following acceptance of observations.
8. The adopted Town Plan is filed with the secretariat and is simultaneously published on the municipal notice board for 30 consecutive days. Of what happened filing is also given in the press.
9. The Land use Town Plan is sent to the Regional Council for approval.
10. The Land use Town Plan is approved by the resolution of the Regional Council. The regional decisions are made within 180 days of receipt of all the additional documentation requested in addition to the constitutive

documents of the Plan, acquired by the opinion expressed by the Urban Planning Technical Commission.

11. With the act of approval, the Regional Council can make changes to the Land use Town Plan ex officio regarding corrections of errors, clarifications on individual prescriptions, and adjustments to the law.
12. As part of the preliminary investigation, the President of the Regional Council, or the Councilor delegate, having acquired the opinion of the Urban Planning Technical Commission where appropriate, can ask the Municipality for changes that do not change the essential quantitative and structural characteristics of the Plan and its setting criteria.
13. The requests for changes referred to in the previous paragraph are communicated by the President of the Regional Council or by the Delegated Councilor, to the Municipality which, within 60 days, takes its decisions with a resolution of the Municipal Council, to be sent to the Regional Council within 15 days from the affixing of the executive visa. The receipt of the modification requests binds the Municipality to immediately safeguard them from the observations made by the Region.
14. Where the deadline for the adoption of the municipal resolution runs in vain, the changes are introduced ex officio in the Town Plan by the Regional Council.
15. The modification proposals which, on the advice of the Urban Planning Technical Commission, change partially the characteristics of the Town Plan are communicated by the President of the Regional Council, or by the Delegated Councilor, to the Municipality which provides within 90 days from receipt to partial re-elaboration of the Plan.
16. The Town Plan thus amended is filed with the Secretariat and is simultaneously published on the municipal notice board for 30 consecutive days. Notice of the filing is also given through the press.
17. In the following 30 days, anyone can submit comments and proposals to the public interest limited to the modified parts. Within 90 days of publication, the City Council adopts the amended Town Plan, giving

reasons for the acceptance or rejection of the observations and proposals presented. The Plan is sent to the Regional Council for approval after a hearing, where appropriate, from the Urban Planning Technical Commission.

18. The Land use Town Plan comes into force with the publication of the approval resolution of the Regional Council and is displayed in public and continuous viewing in the headquarters of the Municipality concerned
19. The Regional Council, having heard the opinion of the Urban Planning Technical Commission, deliberates the return to the Municipality, for the re-elaboration, of the Plans that require substantial quantitative, structural, and distributive changes.

After this step and years of work, the PRGC can be published and enter power replacing the old plan.

3.2.2 - Plans and tools for planning

The new millennium has seen a series of industrial and technological revolutions, which have brought substantial changes in the methods and timing in the broader discipline of territorial planning, starting not only from the greater diffusion but also from the production of geographical information and cartographic representations. (Melfi, 2018)[10].

In the evolution of urban planning tools in Italy, three different models can be distinguished, based on the legislation that produced them: the oldest one, the nineteenth-century one of the laws of 25/06/1865 n. 2359; the one from the

- [10] Melfi, J. (2018). Il contributo degli Open Data dei GIS per la pianificazione territoriale: confronti operativi tra le fonti ufficiali e l'Informazione Geografica Volontaria. Tesi magistrale, Politecnico di Torino.

urban planning law of 08/17/1942 n. 1150 is still in force and the contemporary one, due to regional laws.

The nineteenth-century model develops in the second half of the nineteenth century with the l. 2359/1865, the first Italian town planning law. Municipalities with more than 10,000 inhabitants can draw up a building master plan for the rehabilitation of the existing city and an expansion master plan for the new development. Expropriation for public utility is introduced, with compensation commensurate with the market value of the properties to be acquired. These are Regulatory Plans concerning the city alone, often some parts of it and not the entire municipal area, essentially based on the identification of a new road network to be expropriated, which cuts out new urban blocks, within which private individuals create its interventions in compliance with specific building regulations, while the Municipality must create the roads, service, and subservience provided. In the blocks, the functional destinations are not indicated, except for some rare public services and some new parks. Over the years, the original nineteenth-century building typologies centered on the closed block of the block or isolated buildings, more or less large, surrounded by fences aligned on the edge of the block, have been replaced by the new typologies of rationalism, with buildings oriented according to the specific criteria, or, maintaining the alignment of the block, but with taller and more consistent buildings. The same demolition interventions carried out during fascism were managed in the same way, except for some interventions managed by special rules.

The evolution of the new law 1150/1942 it's completely different. The new law introduces a very new tool, the Piano Regolatore Gerenale (P.R.G.), Land use Town Plan. In this case, the tool covers all the municipal territory, and its implementation for the new expansion areas and urban restructuring interventions is mandatorily entrusted to the more detailed instrument of the Piano Particolareggiato di Esecuzione (PP) Detailed Execution Plan in English, where the public spaces, such as streets and service areas like in the past

normative, must expropriate by the municipalities. For all the other areas, the PRG is implemented by direct building intervention, i.e., through a building permit (then "concession to build", "permit to build", "declaration of the start of activity", and "certified notification of the start of activity").

To sum up what a P.R.G. was with the 1150 law:

"The PRG has an indefinite validity, it is prescriptive and conforming to building rights: it is, therefore, a legally binding, rigid instrument, which can only be modified with a variant with complex approval procedures of the same PRG and can only be replaced by a land use variant or a new PRG. These characteristics have made its application problematic in many municipalities without an adequate technical management structure, while the long approval times have discouraged the necessary adaptation."[11]

In the past, there have been numerous attempts to change the regulation of expropriations and to pay compensation. But today, after the definitive sentence of the Constitutional Court of 24.10.2007, n. 348, the indemnities are again commensurate with the market value and this makes it very difficult to resort to expropriation in urban planning, as well as due to the growing financial limitations imposed on municipalities.

Following a top-down policy, the urban planning matter in Italy goes from a framed law drawn at national and then filled by region which exercises its functions in the field of territorial planning by governing. In the Piedmont region the planning matter it's codified with law 56/77 which grant the protection and control of land use and the conservation and transformation of the territory for residential and productive settlement destination, with the following purposes:

- The growth of the sensitivity and urban planning culture of local communities.

[11] Oliva F., TEKNORING il portale delle professioni tecniche, https://www.teknoring.com/wikitecnica/urbanistica/pianificazione-strumenti-di/, Last seen 19/04/22

- knowledge of the territory and settlements in all aspects, physical, historical, social, and economic.
- the safeguarding and enhancement of the natural heritage in general and of the environmental and cultural heritage.
- the full and rational use of resources, with particular reference to the agricultural areas and the existing settlement and infrastructural heritage, avoiding any unjustified land consumption.
- overcoming territorial imbalances through quantitative and qualitative control: of housing and production settlements, the infrastructural network, and transport of plants and equipment of public interest.
- a widespread and balanced endowment and distribution of public social services on the territory and settlements, also for an effective and unified organization e management.
- the achievement of the general public interest, with the subordination to it of any particular and sectoral interest.
- democratic participation in the decision-making and management process of the use of urban and extra-urban land.
- the implementation of responsible management of the transformation processes of the territory at the various levels of the local government, within the framework of the principles of autonomy that govern them.
- the planning of investments and public spending on the territory, at the level local and regional.
- the periodic verification and continuous adjustment of public plans and programs at various levels, for effective and coherent integration between local initiatives and decisions regional specifications, and general guidelines.

Law 56/77 identifies the subjects of territorial planning that are the Region, by the competencies sanctioned by article 117 of the Constitution; the provinces and, were established, the Metropolitan City, for what is attributed by articles 15 and 19 of the law of 8 June 1990, n. 142; the Municipalities, single or united in a consortium, and the Mountain Communities.

It is at the municipal level where most of the work start, the Art.11 explain the finality for municipal PRG who must exercise their skills in the area of planning and management of the territory through the formation and implementation of the Land use, municipal and inter-municipal Regulatory Plans, aimed at satisfying the needs of local communities and with specific objectives for a balanced relationship between residences and services, in relation to the jobs identified; the recovery of the existing building and infrastructural heritage for the social use; the active defense of agricultural heritage, natural resources and historical, artistic and environmental heritage; the redevelopment of peripheral and marginal building tissues and recently formed isolated nuclei; the balanced expansion of inhabited centers on the basis of demographic forecasts and occupational; the satisfaction of the previous and foreseen needs of social services and public equipment; the planned implementation of public and private interventions.

Regional law 56/77 also regulates the contents of the Land use Town Plan which assesses the development needs of production activities, residential settlements, services, and equipment; specifies the areas to be subjected to special regulations for the purposes of soil defense and environmental protection, or to be used for the construction and protection of facilities of public interest; identifies the areas suitable for hosting the hypothesized population increase; identifies and regulates on the basis of the agricultural zonal plans where the areas operate intended for agricultural activities and those intended for settlement, residential, productive, commercial and tourist uses, services and leisure by defining the areas intended for the standards, referred to articles 21 and 22 of this law, or by identifying the tools executives who must provide for this specification; defines the organization of the territory in relation to the infrastructural system of transport and traffic; identifies buildings and complexes of historical, artistic and environmental importance and delimits the historic centers, guaranteeing their protection and their social use, as well as the qualification of the urban environment as a whole; can identify within the residential settlements, in the event that the Municipality is obliged to form the

plan referred to in the following art. 41, the building areas economic and popular to be built according to the real local needs; indicates the guidelines for the planned implementation of public and private interventions, as well as the criteria for the permissible transformations concerning the endowments of urbanization works, primary and secondary, actually usable; establishes the general and specific rules for the application of the provisions and the administrative management of the Plan;

Today, society lives completely in the digital age, where social networks have become real places, where people exchange opinions, ideas, and above all images. The last few years, especially following the Covid-19 pandemic, have shown us the importance of modern technologies, communication through them, and images that are increasingly used as a means of communicating.

It is therefore clear that the importance of communication through the use of visual tools such as images has increased dramatically and in the field of spatial planning, this cannot fail to be different. The cartographic representation used in planning depicts geographical entities and geostatistical information and can express data in descriptive or analytical form, and it is in the latter field where the GIS (Geographic Information System) performs its main function.

Planning uses maps to express ideas and projects, but the maps are different from the territory. The map is used to summarize the territory that would be impossible to reproduce on a 1: 1 scale. The map, therefore, is a model of reality that must be shaped and modeled according to the need, to convey information, meanings, and languages directly. Who produces this type of visual support, therefore, has a great responsibility and importance, because once produced the cards acquire a self-referential character and make the map able to communicate distorted information in the case of people in bad faith (or who simply misinterpret the data).

Private initiative tools in planning

The "Sportello Unico per l'Edilizia" or S.U.E. identifies a service of the Italian legal system that is provided by the Italian Municipalities according to Presidential Decree 380, the so-called Consolidated Building Act. This service is set up to act as an intermediary between the P.A. and the private citizen who needs to implement a building intervention, creating a single "place" in which to present all the requests.

They are urban planning acts provided for by Article 32 of the L.R. 56/77 and subsequent amendments allow the harmonious organization of the territory, to be drawn up before the application for the Building Permit, in all cases provided for by the N.d.A. (see art.5.2) elaborated D1 and by the Regulatory Areas Sheets of the P.R.G.C. elaborate D2. They require intermediate territorial planning between the general urban planning instrument (PRGC) and the building project.

The most widespread Executive Urban Planning Tools are substantially those of private initiative, namely:

Recovery plans (I piani di recupero) (PdR)

Private iniziative executive plans (I piani esecutivi convenzionati di iniziativa privata) (PEC)

The Executive Plans agreed in Rivoli are mandatory whenever interventions are configured that involve the construction of building quantities exceeding 1200 square meters of GFA or involve the construction of Urbanization Works and consequent divestments.[12]

The recipients of these tools are:

The holders of a real right on the property for productive use on which the intervention will be conducted (eg. owners, usufructuaries, etc.)

[12] Sito del comune di Rivoli: https://www.comune.rivoli.to.it/strumenti-urbanistici-esecutivi-s-u-e-in-itinere/

Owners of companies with a personal right compatible with the intervention to be carried out (e.g., a manager with the consent of the landlord)

3.2.3 - Adaptation to the regional landscape plan (PPR)

A Land Use Plan to be approved need to be coherent to the indication provided by the Region, this chapter will address the issue of external coherence with the instrument of the PPR - Regional Landscape Plan. Specifically, the consistency check is the basis of the adaptation of the Rivoli PRGC with the Regional tool. The chapter will also address the issue of adaptation by specifying the actions carried out and the influences on the land use variant of the PRGC.

The Piedmont Region launched 2005 a new phase of planning for the entire regional territory, which involves the formation of the Regional Landscape Plan (PPR), according to the Code of Cultural Heritage and Landscape (Legislative Decree 42/2004) and the European Landscape Convention (Council of Europe, 2000).

The Code confers on the P.P.R. a strategic role within the framework of landscape protection and enhancement tools, extending their effectiveness to the entire regional territory. The PPR of the Piedmont region, already adopted in 2009, in the light of the observations, received following the publication and consultation procedures, of the requests for a reasoned opinion on environmental compatibility as well as the requests made by the Ministry of Cultural Heritage and Activities and of the tourism, has been subjected to an in-depth re-reading which involved a process of revision and integration of the contents. The set of changes made to the PPR made it appropriate to proceed with a new adoption. The Regional Landscape Plan is called upon to perform a triple function:

- cognitive: aimed not only at guiding the choices of protection, management, and enhancement but also at increasing awareness of the values and interests at stake at all levels.

- regulatory: aimed at translating the recognition of value into regulatory provisions that directly or indirectly affect the transformation processes.
- strategic: aimed at proposing far-sighted and spatially extended visions, objectives, and lines of action to a wide audience of institutional subjects and stakeholders.

The P.P.R. constitutes an act of general regional planning based on the principles of sustainable development, conscious use of the territory, less consumption of agropastoral soil, safeguarding of landscape characteristics, and an act of promotion of landscape values coherently inserted in the individual environmental contexts. The P.P.R. defines methods and rules aimed at ensuring that the landscape is adequately known, protected, valued, and regulated. To this end, it promotes the safeguarding, management, and recovery of landscape assets and the creation of new coherent and integrated landscape values.

From the five great strategies, common between P.P.R. and P.T.R., descend 26 general objectives, which are common to the Landscape Plan and Territorial Plan. The purposes and operational strategies for landscape-environmental aspects are instead largely different from the territorial ones, concerning the specific themes and diversified interests that the two instruments address: the framework of specific objectives while maintaining mutual coordination, it is different for the PPR compared to the PTR. This framework constitutes the reference for the aspects of landscape quality to be identified in each landscape area.

The coherence with the regional landscape instrument is assessed by examining the tables that make up the P.P.R., highlighting the presence of any landscape prescriptions or indications.

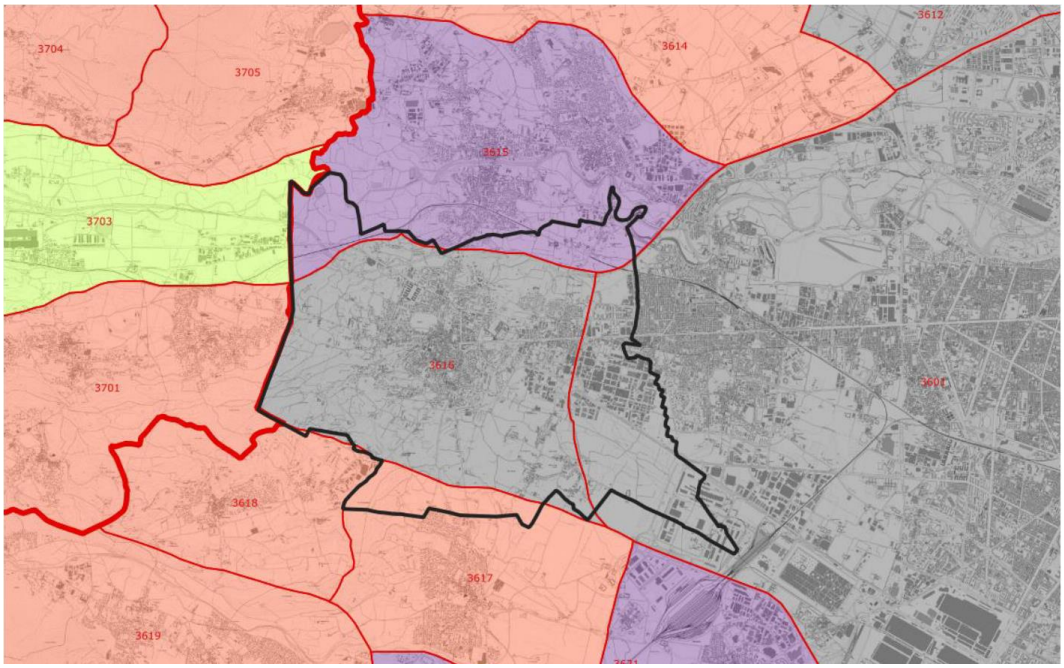


Figure 30 - excerpt from table P3 - Areas and Unity of Landscape

As highlighted by the excerpt from Table P3, the territory of the Municipality of Rivoli falls within Landscape Area no. 36 called "Torinese".

The scope concerns the Turin metropolitan area "Torinese"; heterogeneous in morphology, from flat to hilly and mountainous, and above all in the results of transformative dynamics. The relations of this area with the surrounding ones are very dynamic so there are large overlaps and blurred limits with the adjacent areas of plains and hills. The extension and consistency of the Turin urbanization have effects on the historical-landscape structure of a very large scale, since they polarize a territory between the last alpine ridges towards the plain and the ridge of the Turin hill beyond the Po, with northern and southern margins in which the rural landscape of the plains asserts itself. The large area includes a plurality of landscapes that have been stratified on different, sometimes contradictory, historical matrices. However, numerous local identities have been recognized, rooted despite the historical "shadow" effect exerted by the capital, articulating the area into 23 landscape units, characterized in any case by the more or less decisive influence of metropolitan transformative processes, prevalent concerning the local dynamics of transformation endogenous.

The PPR, in art. 46 of the implementing rules, provides that "the provinces, the metropolitan city, the municipalities or their associative forms that perform the function in urban planning, and the managing bodies of protected natural areas conform or adapt the urban planning tools or territorial within twenty-four months from the approval of the Ppr. The adaptation takes place in a coordinated manner between local authorities at different levels; if this is not possible, each entity adapts its instruments to the provisions of the Ppr independently, making the information available to the superordinate or subordinate entity; the provincial or metropolitan city plans during adaptation recognize the contents of the urban planning instruments already adapted to the Ppr.

The implementation results in the creation of different projects:

- Illustrative Report: it can be a specific chapter accompanied by tables or cartograms that illustrates the relationship between the contents of the PRG and those of the Ppr within the explanatory report of the variant to the PRGC. The chapter will have to frame the variant in the context of the strategies and objectives of the Ppr, demonstrating its coherence and the intention to promote and pursue its aims starting from the recognition of the landscape areas and the belonging landscape units. Furthermore, it is necessary to describe how the legislation for goods and components dictated by the Ppr is implemented.
- Landscape assets table: table relating to the identification of all landscape assets referred to in Articles 136, 142, and 157 of the Code falling within the municipal area; brings back to the municipal scale the assets represented by the Ppr in Table P2 and the Catalog of landscape assets.
- Landscape components table: in-depth table on the knowledge and state of the territory and landscape, which shows the landscape components identified by the Ppr in Table P4, specified at the scale of the urban planning tool and integrated by the Municipality about the analyzes carried out in consideration greater knowledge of the territory, with particular reference to the specification of the settlement morphological

components. The territory represented must be characterized by at least one landscape component with full areal symbology, to which specific legislation is associated, therefore there cannot be portions of the territory without adjectives.

- Visual perception table: table aimed at implementing the directives of Article 30 of the NdA ("Lookouts, scenic beauties, scenic and aesthetic sites") addressed to the Municipalities in whose territory the perceptual identity components identified by the Ppr are relevant; the table identifies the territorial areas most visible from the privileged places of observation of the landscape indicated by the Ppr and specified by the Municipality itself about its territory, as well as any visual areas to protect the usability of the panoramic beauties.
- Comparison table: table aimed at demonstrating the consistency between the urban planning forecasts of the variant and the contents of the Ppr; in it, the forecasts of the variant described and adequately motivated in the Explanatory Report are superimposed on the elements of knowledge resulting from the analysis carried out and reported in the previous tables (of the landscape assets and the landscape components), both those not yet implemented by the Prg in force and those introduced from the adaptation variant, with particular reference to the forecasts that involve new land commitments, differentiating the different intended uses (residential, productive, commercial, public services, etc.).

The adaptation to the PPR is a fundamental part of the drafting of a PRG in the previous pages some excerpts of the paper will then be delivered to the Piedmont Region. In the past months, we did an array of meetings with the region functionary to prepare in the right way the documents and maps. In this phase, it's fundamental the utilization of specific files to build the maps. For example, the cartography base, the forest, and landscape shapes need to be coherent with each other's and with the PRG. At this very moment in which I am finishing the thesis, we are working on these papers which are not yet completed.

3.2.4 – Cartography of the historical center of Rivoli

The main strategy and steps we went through to accomplish our task concern the arrangement of the situation with the definition of a new historic center which to existing laws is subjected to special protection regulated by Article 24 of the 'implementing rules of the Piedmont region allowing us to enlarge the historic center to also integrate the Antonielli Park.

The "Old Town"

During the implementation of the Land use Variant of the Municipal Master Plan of the city of Rivoli, the need for its spatial-temporal redefinition emerged with a view to re-measuring the historic center, the oldest formed municipal territory subjected to special protection to ensure the preservation of historical, artistic, environmental testimonies. In the current plan, the historic center is bounded according to a reference from 1855, the cartography of which was not found in the municipal offices or the historical archives of the city. Therefore, the perimeter of the historical center in force does not belong to any cartography that can be consulted, thus making it necessary to search for other sources.

The current perimeter does not conform to the situation mapped by the Napoleonic cadaster of 1809, therefore before 1855 nor to the more recent Rabbini cadaster of 1859. By consulting the temporally closest cartography or that of the Rabbini cadaster, some similarities were found with what it is today perimeter as the historic center and the ancient settlement nucleus.

Under the above premises, it was decided to re-measure the Historic Center using the Rabbini Cadaster of 1859 as a cartographic basis. The cadaster takes its name from the surveyor Antonio Rabbini, appointed by Cavour in 1853 as the general manager of the cadaster at the ministry of finance. The survey operations, which began in 1857, associate, for the first time, the cadastral parcels with a precise mapping of the buildings, starting from the province of Turin and subsequently extending to that of Novara until 1870.

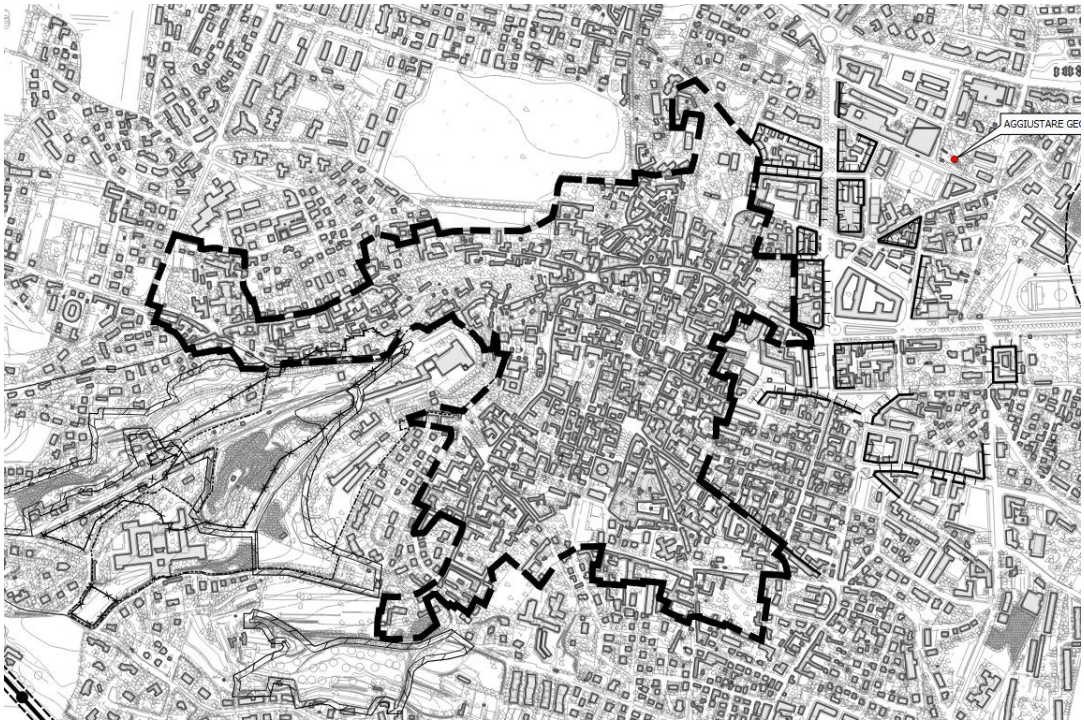


Figure 31 - Current Historical Center. (Elaborated by the author)

In **Errore. L'origine riferimento non è stata trovata.** the historic center is h ighlighted as reported in the current Municipal Land use Town Plan. With this perimeter, some structural elements of the historical and cultural heritage of the City of Rivoli are excluded, in particular those located in the area of the moraine hill: the Castello di Rivoli, Villa Melano, and the Romero and Darwin school.

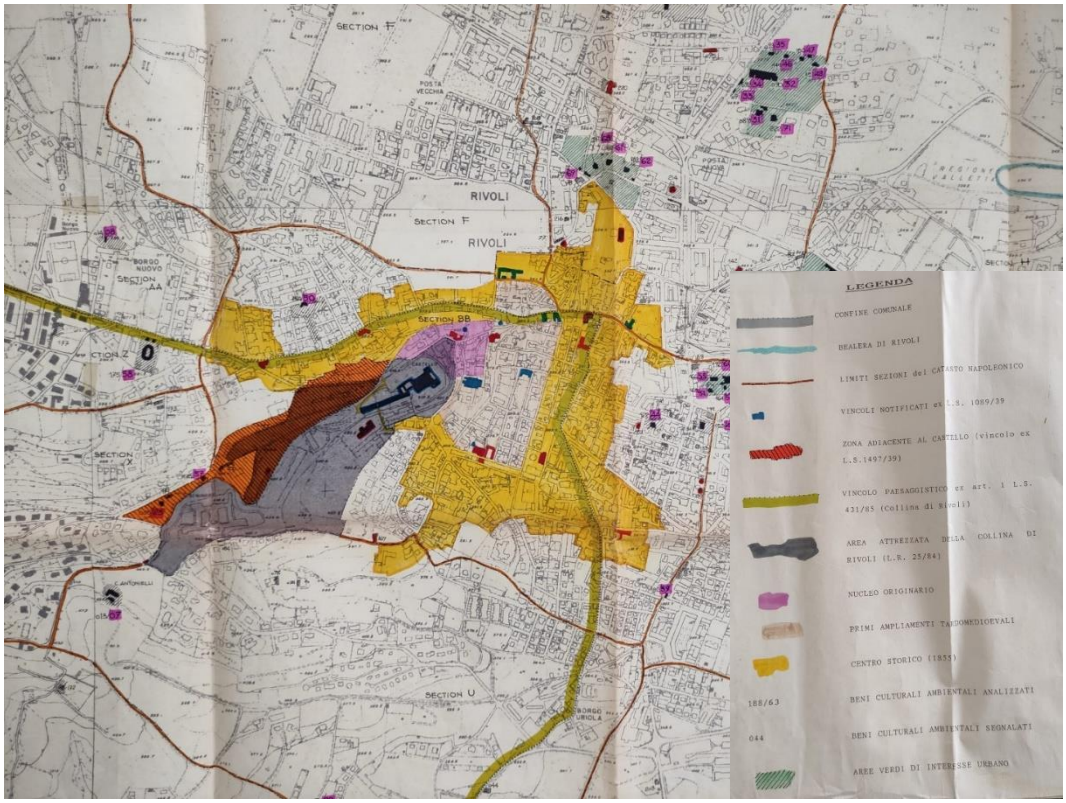


Figure 32 - Cartography on which the current historical center has been defined Analisi e catalogazione degli edifici e delle aree di interesse culturale ambientale, 1995)

Errore. L'origine riferimento non è stata trovata. is shown above as cartography a ttached to the report "Analysis and Cataloging of buildings and areas of environmental cultural interest" drawn up in 1995 by the architect Giuliano Mario Becchi in which the diachronic evolution of the historic center is highlighted.

In the cartography, the "original nucleus" dating back to the 12th century can be found in purple (Volume II, Landscape and historical environmental heritage, Revision of the Municipal Master Plan, Arch. Fabio Minucci, 1996), the late medieval expansion phase is shown in gray and in yellow the areas of fringe to 1855.

In the cartography, the Rivoli hill area where the Castle, Villa Melano, and the Romero and Darwin school are located are bounded as separate entities, thus providing an incorrect and decontextualized reading.

New "Old Town" perimeter.

Based on these premises it was deemed necessary to provide for a new perimeter of the historic center to include the aforementioned elements and additional areas.

After a careful investigation of the historical archives of the city of Rivoli, it was considered appropriate to use the maps of the Rabbini Cadaster (1859), in particular the one represented in Errore. L'origine riferimento non è stata trovata..

Figure 33 - Reconstruction of the city of Rivoli based on the Rabbini Cadastre, (Elaborated by the author).

From Errore. L'origine riferimento non è stata trovata. below it is possible to see t he overlap of the new perimeter of the historic center (in red) with the perimeter of the historic center of the current PRG (in black).

This new perimeter is based on what was the "compact" city of Rivoli in 1859, with the addition of the Antonelli Park which still today represents a testimony of the historical rural heritage preserved to this day; the hill's area with the Castello

di Rivoli, a symbol of the city and a significant landscape element concerning the Basilica of Superga and the relative perspective view; Villa Melano, whose structure is currently in a state of semi-abandonment.

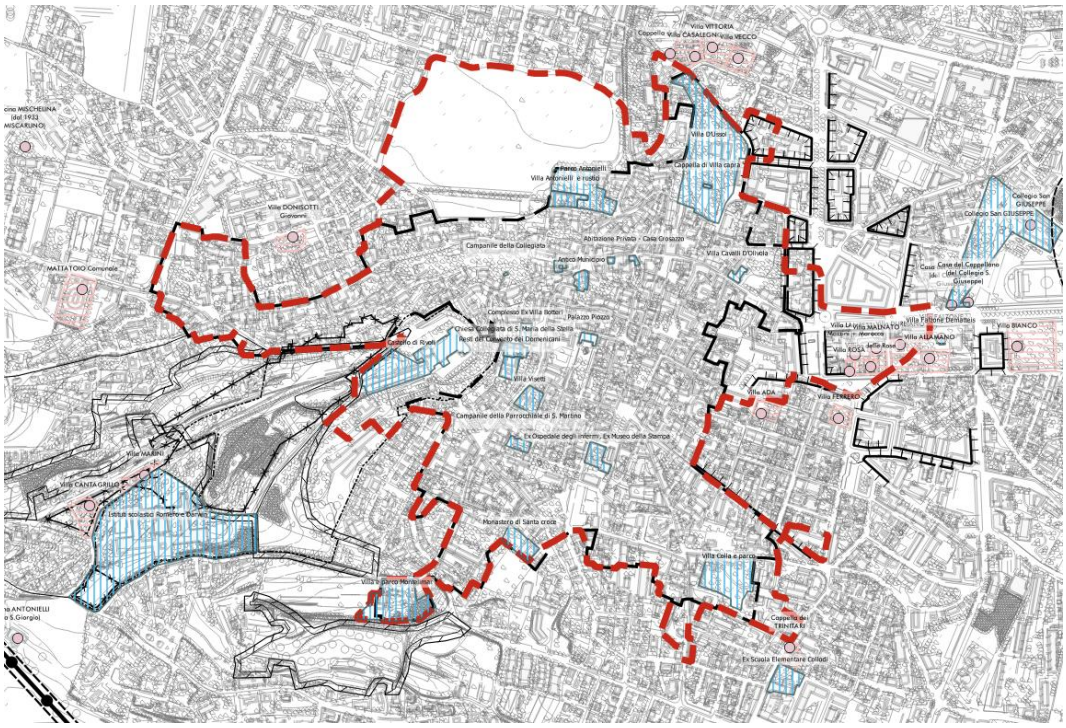


Figure 34 - Overlap of the new history center on a Rabbini cadastral basis (RED) with the historic center of the current PRG (BLACK). (Elaborated by the author).

Following the perimeter of the new historic center, other areas with intrinsic characteristics relevant from the landscape and historical-cultural point of view have been identified, such as to be able to integrate them into a new proposal for a historic center.

The aforementioned areas identified are two:

- Istituto scolastico Romero e Darwin (1935)
- Tetti Neirotti hamlet

The Romero and Darwin Institute, also known as "the Seminary," is a listed property under Ministerial Decree 1089/1939 located south of the Castello di Rivoli on the crest of the moraine hill. The complex is not represented in historical maps (Napoleonic and Rabbis) since its construction dates back to the first decades of the last century.

As far as the hamlet of Tetti Neirotti is concerned, we have recognized its importance from the point of view of the historical-rural heritage, which is still well preserved today. Although the identified area is separate and far from the rest of the historic center, it has such characteristics that it can be recognized as an area worthy of protection (Article 24 of Regional Law 56/1977).

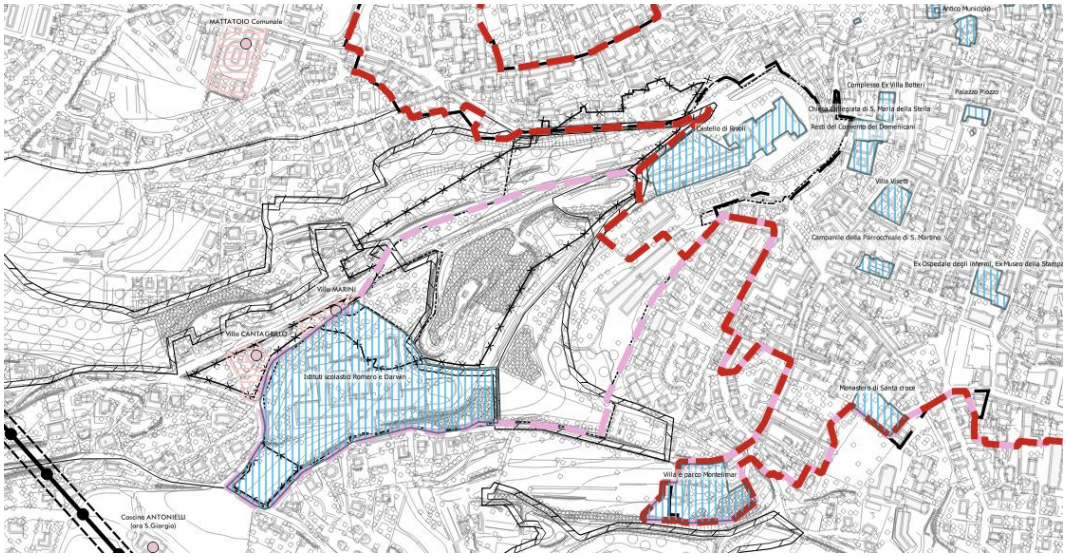


Figure 35 - Proposed integration of the historic center of Rivoli hill and the Romero and Darwin institute. (Elaborated by the author).

Figure 36 - Proposal for integration of the historic rural center, Tetti Neirotti hamlet. (Elaborated by the author).

3.3 – The current criticalities

The contemporary Italian city is the daughter of the golden years of construction, As is well known, the Italian territory has been hit by strong economic growth and technological development since the Second World War. The "economic boom" given by the growth of economic activities has centralized millions of people who emigrated from southern Italy to the north, attracted by the new jobs created by industries in the area that at the time was identified as an "industrial triangle" corresponding to cities of Turin, Milan, and Genoa, where groups such as FIAT, Ansaldo, Breda made their respective cities grow, transforming them into industrial metropolises.

With the arrival of a new phase of well-being, the construction sector has also entered fibrillation, with some problems resulting in excessive urbanization:

"The wildfire expansion of cities has not been adequately governed by planners, architects, and local administrations. Municipalities have carried out urbanization works that have transformed what used to be agricultural land into building areas: speculators bought the land at agricultural prices and then waited for the electrical connections and the construction of sewers and roads; at that point the value of the land, meanwhile urbanized, grew consistently, so that they could be sold to those interested in building, guaranteeing a substantial income."13 As Professionisti.it sites state.

[13] Sito Professionisti.it http://www.professionisti.it/enciclopedia/voce/936/Cementificazione , last seen 28/06/21

3.3.1 – Soil consumption

This phenomenon of indiscriminate construction that seeks profit as the maximum goal is still very present today. Although Italy is not in a period of economic expansion like that of the 50s and 60s, overbuilding and the loss of soil continue to transform the territory at a high rate.

According to l'Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) (Higher Institute for Environmental Protection and Research): "In the last year, the new artificial coverings covered another 57.5 km2 or, on average, about 16 hectares per day ... The speed of transformation of the territory recorded between 2017 and 2018 is maintained, i.e., two square meters of soil are irreversibly lost every second. "14, "a phenomenon associated with the loss of a fundamental environmental resource due to the occupation of originally agricultural, natural, or semi-natural soil. The phenomenon refers to an increase in artificial ground cover, linked to settlement and infrastructure dynamics"[15] The concept of land use so, can be defined as a variation from a non-artificial cover (unused soil) to an artificial ground cover (consumed soil) and not able to perform its function anymore

The soil provides ecosystem services on which our survival is based and performs many vital functions for the well-being of the environment:

- biomass production and support for agricultural and forestry activities
- regulation of the hydrological cycle (water storage, reduction of washout, recharge of groundwater)
- habitat for living organisms and support for biodiversity
- climate regulation through high thermal inertia

[14] Il consumo di suolo in Italia https://webgis.arpa.piemonte.it/secure_apps/consumo_suolo_agportal/index.html, last seen 28/06/2021
[15] Site – Green Planner Magazine https://www.greenplanner.it/consumo-di-suolo/, last seen 29/06/2021

- accumulation and recycling of nutrients and carbon storage
- source of raw materials
- mechanical support for organisms and structures
- geological, archaeological, and cultural heritage

However, this resource is non-renewable, as pedogenesis - that is the process that leads to the formation of the soil thanks to the action of physical, chemical, and biological factors - is extremely slow: at least 500 years are required for the formation of 2.5 centimeters of soil (Pileri, 2015).

Therefore, once the land has been sealed for roads, houses, or other human activities, all its functions are lost and are not enough to remove the cover to restore the soil, consequently, it becomes essential to protect it and limit its consumption.

Land consumption is mainly due to the increase in settlements, and industrial, commercial, and infrastructure areas. In Italy this phenomenon is strictly linked with urban sprawl: instead of using the spaces available in the built environment cities and towns develop in a disaggregated and dispersed way, with low-density expansion and high consumption of soil per capita. This led to the incentive use of private vehicles, even for small trips, and the need for new infrastructure and services development which involves further construction and soil consumption. Furthermore, a large part of Italian municipality's revenues came from urbanization costs, so the municipalities have never had a real interest in limiting land consumption and urban planning has always been done with a demographic growth view that is now no longer sustainable.

The ongoing land consumption causes a constant change in agricultural landscapes, flanked by the occupation of hydrogeological risk areas, which due to the fragility of the Italian territory can have important consequences for safety. The water not absorbed by the sealed soil goes directly into the rivers that swell and are no longer retained by the banks.

At the local level, the soil acts as a thermal regulator; in fact, already around 15-20 cm in depth, the temperature variations are very limited, and this allows the soil to act as a regulator. In addition, the areas where the soil has been consumed, cemented, or asphalted tend to store and release a lot of heat in the summer months, unlike those covered by vegetation, which, thanks to the evapotranspiration of the plants, guarantee a lowering of temperature.

In addition, the soil acts as an immense carbon store, through the accumulation of organic matter and the fixation of CO2 by plants: it contains about 1,500 billion tons of non-fossil carbon, second only to the ocean. Once sealed, the soil can no longer fix carbon, either through vegetation or from the air.

The following images Figure 37, Figure 38, and Figure 39 show how the impact of the overbuilding of the soil on the territory. The land consumption in Piedmont is shown in pink, from where you can also appreciate the comparison with the very extensive conurbation of the Metropolitan City of Milan which in 2019 had 3.25 million inhabitants (Eurostat, ISTAT)16.

The city of Turin, as seen in the second image, is squeezed between its hills and the Alps, significantly saturating the territory, covering 65% of its municipal extension with an urbanized surface. But there is a positive note, the City of Turin in 2018 managed to reverse the trend of increase per year of land consumed.

The cartography of land use at the municipal level was developed by the author during the internship carried out in Architect Maria Sorbo's Architecture and Urban Planning Studio. In the map concerning the Municipality of Rivoli, it can be seen that the most concreted areas are those of the compact historic center and the one on the Corso Francia axis towards the city of Turin. The expansion to the East is launched through the construction of a large industrial area located south of Corso Francia, while in the north we find a residential destination. In

[16] Eurostat:
https://datacommons.org/place/nuts/ITC4C?utm_medium=explore&mprop=count&popt=Person&hl=it
Last seen 30/10/2022

the municipality, a total of 100 hectares of land sealed, for a 0.295 % of the total.

The agricultural territory extends around the city, covering 1.613.77 hectares the remaining 54.24% of the municipal area, where scattered houses and small settlements such as Tetti Neirotti and Bruere shore up the landscape.

To the West of the city rises the moraine hill of Rivoli which is part of the larger morainic Amphitheater of Rivoli - Avigliana. Being an area of high environmental and naturalistic value, the moraine hills and the lakes of Avigliana are protected by specific laws for the protection of the territory and landscape such as the Regional Law 19 of 29 June 2009, to avoid excessive urbanization.

Figure 39 - Soil consumption in North Italy. (Arpa Piemonte, https://webgis.arpa.piemonte.it/secure_apps/consumo_suolo_agportal/index.html).

Figure 38 - Soil consumption in Turin. (Arpa Piemonte, https://webgis.arpa.piemonte.it/secure_apps/consumo_suolo_agportal/index.html)

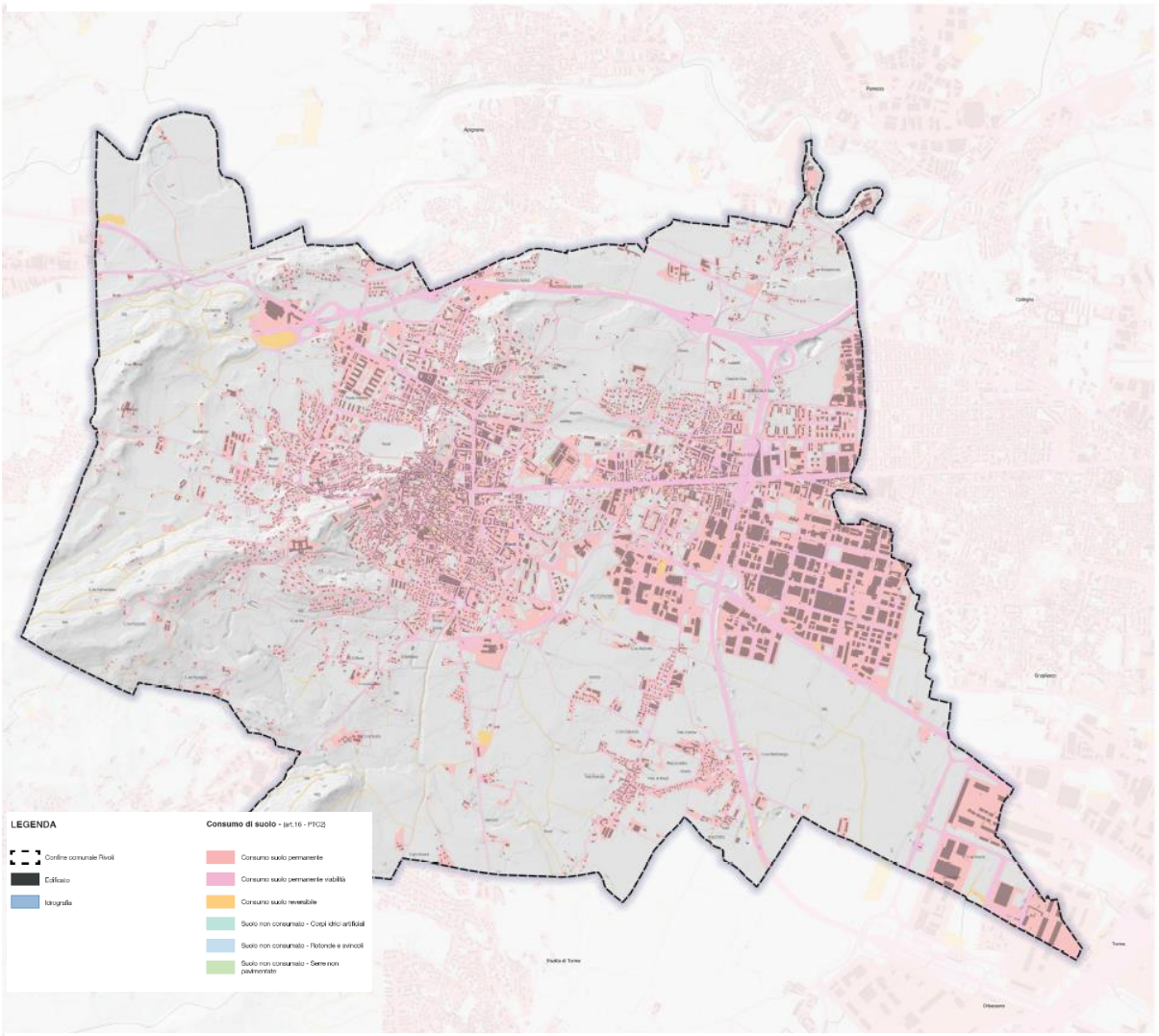


Figure 37 - Soil consumption in Rivoli, (Preliminary analysis maps, elaborated by the author).

Following the process of deindustrialization, which took place in Italy starting from the end of the nineties, the spectrum of the management of thousands of buildings and millions of square meters of former industrial buildings to be reclaimed, restored, restored to the community was aimed at this phenomenon will leave in inheritance. Especially in heavily industrialized cities such as Turin and Milan, these areas have over the years become heavy burdens on the public administration.

An urban and building reorganization is necessary for this important historical phase. A phase of transition and change that must lead us towards a future where we know how to use the resources made available to us, without compromising the resources that will be used by future generations.

With these considerations of transition ecology and environmental protection placed at the basis of the choices of public administrations, new plans and strategies will have to be drawn up.

3.3.2 – Normative weakness

In the past decades, urban planning calculations for buildings in the Municipality of Rivoli have been affected by a rotten interpretation of urban standards. Due to outdated regulations, in recent years has been possible, for those who wanted to build, to expand their construction surface available by purchasing building indexes from the municipality. This practice would be acceptable are also used in other plan all around the world, the criticism concerns the illicit origin of these additional indices and the related exceeding of the maximum construction indices established by the Technical Implementation Standards and the urban planning sheets.

This calculation is made using the Land density index (If) dictated by the urban areas and by the (It) regulated by the normative areas, the resulting surface must comply with the coverage parameter dictated by the regulatory sheets of each

area, nothing new up to this point, but during the drafting of the new plan in the first phase a simple check of all the documentation and measure on Qgis it was clear the data does not match. since the origin

Some areas have been the subject of index enrichment sold by the municipality from areas that could not have generated them, likewise these areas were "re-loaded". Therefore, in the past years been built more m2 / m3 than the plan allowed. This exceeded index recharge comes in part from a wrong perimeter and miscalculation of the roads which in all these regulatory areas were included in the urban planning calculations.

This decision, erroneous from the beginning, made it possible to use the surface of publicly owned roads to inflate the indexes for private interest and be able to build more square meters (m2/m2). The area coverage ratio seems to have been respected but the built volumes are much greater than those we tried to verify to calculate the validity of the indices. Even important road axes such as Corso Francia are part of this sick mechanism that has allowed for decades to inflate the urban indexes and build more.

The Studio had a different vision about what a plan needs to be to reach the goal proposed and to deliver the positive spillover effects for the population. The new plan tried to limit more than possible the bad habit of the past from the beginning. Immediately action was taken to limit new expansion areas and limitations to the interventions possible in a private building, going always for the restructuration and no more enlargement.

For buildings without cultural or landscape value in case of required renovation, it would be better to operate a policy of demolition and reconstruction. In this way, population density could be increased, reducing the cost of services. An occasion also to fix the on-street parking problem, from the excavations of the renovated building it can found the space needed for parking avoiding leaving automobiles in the street will also result in a reorganization of public space

Urban planning, when it was well applied, has been a discipline which led the governance of society in the phase of development and physical growth of the city. Urban planning must be an instrument of welfare and equitable distribution of resources and opportunities, with the creation of basic public services, providing homes to everyone, and access to sustainable mobility.

The spread of the built environment, without effective spatial planning, has created large urbanized areas which compromise the territories, attack landscapes, and charge future generations with the costs of these policies. It has come the time to move the land use plan towards a toolbox capable of keeping the economy running and become an instrument once again at the service of the communities. The implementation of policies should aim at the conservation of the landscape and the environment which must prevent the expansion of the urbanized areas; actions on the territory must mitigate the effects on climate, social and political changes' phenomena.

3.4 – New Urban Green Belt

To start the creation of a new urban green belt we need to resolve the conflict inside the green ring and then to define the urban border on which the Rivoli's green belt will be based. Some criticisms arise from conflicting land uses that generate tensions in the population and to which a solution must be found. And others are operational, and others are operational such as the identification of the best limes for UGB.

3.4.1 - Residential – Productive land use conflict

Rivoli present different critics areas, one of these areas generate a land use conflict close to the Collegno's border. To provide a better life quality to the people living there it is fundamental to solve the Internal criticisms given by the disorganized growth of the city that has led to different land uses being too close together and coming into conflict.

The city of Rivoli in the past decades saw a very big expansion thanks to the good running of the Italian economy of that time, the proximity to Torino, and the FIAT industry, but the newly built areas designed at that time were built without thinking too much.

Nowadays Rivoli has a huge critical situation between residential areas and Industry/productive areas were always to blame for the bad decision taken. In the following Image "Figure 40 - Satellite view of Rivoli's and Collegno's border "this conflict area it's higher. The administrative border is omitted on porpoise because to show the built continuity. In this border example, we have the "Terracorta" Collegno's neighborhood on the right and the "Tetti Blu" Rivoli's neighborhood on the South. The Via Vajont industry area it's drowned in a Residential area. Here it's very evident the disorder by which the Cities were planned in the past.

During the elaboration of the P.R.G.C. and new land use variant, we plan to move this critical area from the actual position to the most appropriate position.

Figure 40 - Satellite view of Rivoli's and Collegno's border in Via Vajont

The "Via Vajont" is the name which we refer to the whole industrial area situated on the eastern border, the one shared with Collegno; these areas host about twenty industries in 122.850 m^2 circa.

Via Vajont area seal completely the Collegno's sprawl expansion called "Terracorta" a neighborhood of 3000 people circa. Together with the administration, the Studio agrees to intervene in this critical area and decide to move the industry away. The aim was to change completely the urban destination making it more suitable with the surroundings and to use this area for the community, to create a connection with Collegno with biological equilibrator function.

In the proximity, in Terracorta, there are only residential for hundreds of meters without much service. In this type of neighborhood, people go in search of homes that are quiet and possibly away from the hustle and bustle of the city.

The new area of "Via Vajont" was initially conceived as a possible continuation of the Green Belt coming from the north but, following further discussions with the administration it was decided to create a strip of services and craft on the west side of the area and to continue with the same pattern as "Terracorta", creating a residential area to the west, bordering Collegno.

Between the new tertiary addition and the new residential areas will be created little more than a hedge to divide the new areas. A decision that will go to maintain and encourage a lifestyle dependent on cars and without too much considering that in the Municipality of Rivoli there are already many empty rooms and spaces that can be restructured and made more efficient and used, without consuming soil.

For the destination of the industrial area, we identified two new compatible areas.

Figure 41 - First hypothesis Via Vajont

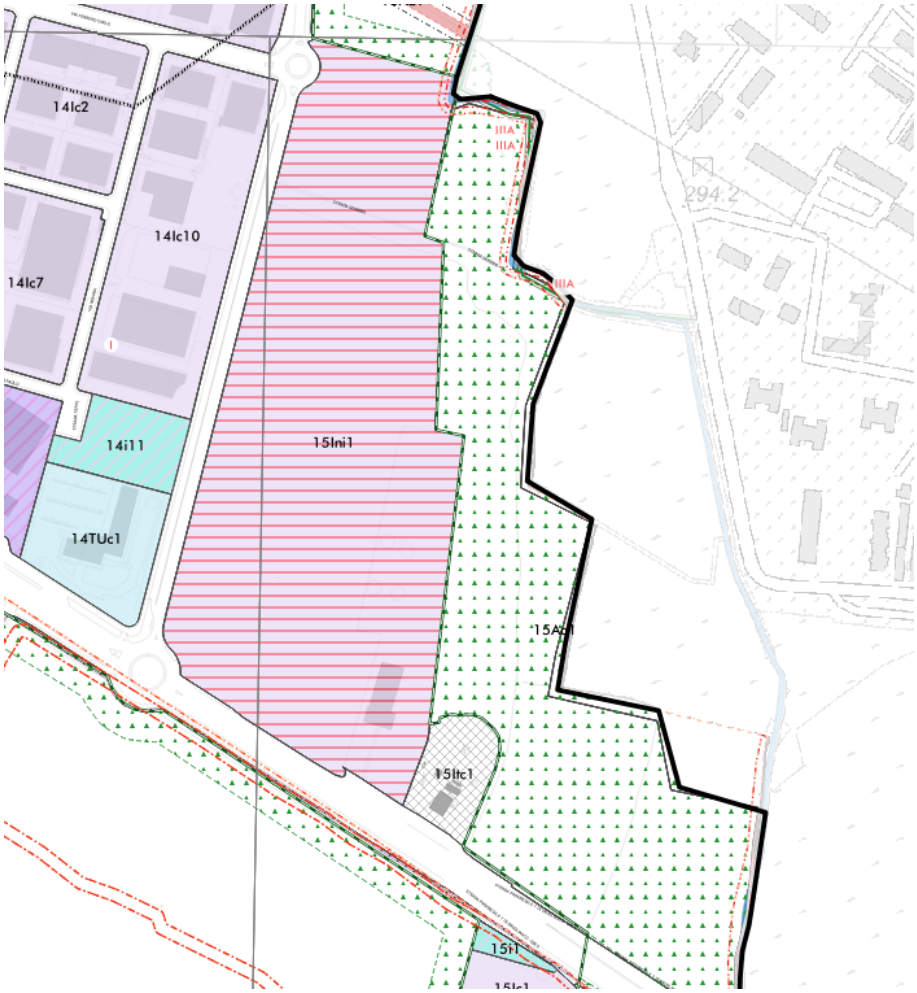


Figure 42 - Second and future hypothesis with PRGC destination

In “Figure 41 - First hypothesis Via Vajont” the image shows the first proposal made by us to the municipality, in this position the area will go to complete an already compromised area and use an impoverished agricultural soil and link to an existing industrial area. Unfortunately, this option was rejected.

So, together with the municipality, we identify a second area. This area is also located on the eastern border right where Collegno is, but further south compared to where it comes from.

This new area it will be served with a brand-new street, but needs to be widened, and will have the same urban destination on the west side. Unfortunately, this area looks like the situation we already had in Via Vajont. Some of Collegno’s residential is not far away from the new site, and the industry is again placed along the border of the municipality, creating discomfort in the homes of the other municipality, without a common plan with Collegno on how to use this green border that they have in common they are going to waste this occasion to change the bad habits. The green border that will be completely consumed if Collegno in the next few years will go to build in the free areas remaining, sealing completely also this part of the city, going to consolidate the conurbation between Turin and all its satellite cities, especially those along Corso Francia.

This step was fundamental for the design of the Green Belt, we need to know exactly where the suitable areas are or will be to design it more efficiently and durably possible. After the reallocation of “Via Vajont” and the recognition of the service areas, the Administration and we were ready to define the area, function, and normative regulation of the Green Belt.

Figure 43 - Green Belt and Urban Border Focus on via Vajont, Rivoli. Elaborated by the Author

The combined action taken starting with the relocation of the industrial district plus the institution of a Green Belt will have beneficial effects on this area of the city. As you can see in Figure 43 we identify the urban border with a dashed green line to which start the 25m buffer identifying the area that will be involved in the green belt, in this case, we are near an area that has been identified by PRG as an equipped area but today it is privately owned and used for agricultural purposes. Our idea is to provide that the area West of Via Vajont is used at least in part for public purposes while maintaining its agricultural characteristic. Here, therefore, the Green Belt area expands and incorporates the green facilities area. The Areas of Public Green Facilities are intended for public use, landscaping with suitable plantings and the provision of adequate facilities for rest and recreation where we want to expand the UGB area, to preserve and protect the free green areas from the expansion of settlement and buildings that for us are not compatible with the current fabric.

3.4.2 – Urban border

The urban border was used to estimate where the city limit is and where the UGB can be placed. Then, will be identify the urban edge of the city to understand the best measures to take near the fringes and what green areas and/or services areas to include within the UGB. Not without criticism the cooperation with the municipality was crucial, and a hesitant first phase was followed by a phase of cooperation thanks to which it was possible to complete the work. After these interventions and the correction to the urbanistic index calculations, it will be possible to start to design the UGB.

The Service Plan, in line with the strategies outlined in the Plan Document, promotes actions and interventions to enhance the green project and the urban environmental system through the upgrading of existing parks and the creation of the Green Belt.

The city as the urban areas can be considered a soiled surface, a not natural cover that produces damage to the ecosystem. This surface provides a good shelter for human living, where the community can grow, this led to an increment of the surface needed to host all the exceeded population. "In these terms, the city looks like cancer grows in the countryside enlarging day by day," says Abercrombie in *'the town planning review, planning of town and country the contrast of civic and landscape design'*.

Nowadays City represents the necessary condition for human growth and development and is where most of the global population lives. The New York Times has published a long article on this issue, collecting many testimonies from the American middle class, convinced that they are leaving the very expensive and small apartments of the metropolises to return to live in their cities of origin. The analysis is that the coronavirus could represent a historical caesura for urban agglomerations that often count, or tend to count, more than sovereign states in terms of gross domestic product, decision-making capacity, international

attractiveness, and geopolitical projection.[17] We don't have to demonize the city, cities indeed have problems, but we can plan measures to keep cities under limits to control, limit or deny more expansion in the countryside. One of these solutions can be the "Green belt",

"A strip of the countryside around a city or town where the building is not allowed" designed by Abercrombie for the city of London called Metropolitan Green Belt to prevent urban sprawl by keeping land permanently open where agriculture, forestry, and outdoor leisure are the preferred activity.

In the past decades, the green belts policy has been criticized for reducing the amount of land available for building and pushing up house prices, as 70% of the cost of building new houses is the purchase of the land (up from 25% in the late 1950s).[18] This data is referred to the Great Britain case but, a similar scenario can be expected in Italy's cities. The situation in our case study it's a little bit different, but we must keep in mind what we can learn from Abercrombie's experience.

As we can see in Figure 44 - Percentage of an empty house in Rivoli. (Preliminary analysis maps, made by the author), still has 2.378 empty houses sufficient to host more population and future growth. In addition, the city has areas that could be redesigned to accommodate more people by densifying the area instead of building scattered houses. The terrain inside the consolidated area it's already compromised from the ecological point of view, so, it would be better if we use all the space available inside the present city limit and densify it instead to waste another important surface. With more people hosted inside an already soiled soil, we'll have fewer people building in the countryside consuming soil for low-density sprawl forced to have car addiction mobility.

[17] Tervenise F., Mervosh S., New York Time – corona virus moving city to the future, https://www.nytimes.com/2020/04/19/us/coronavirus-moving-city-future.html last seen 05/03/2022

[18] Wiles C., https://www.insidehousing.co.uk/comment/its-land-stupid-36557, last seen 01/11/2022

To give a proper place in the future Rivoli, we must define and draw a green ring all around the city. First things first are to define the border of the city, seems like an easy task but it is more difficult than it could appear.

The problem to define where the city finishes is not new, so, how can we say where the city ends?

- Percentage of empty house in Rivoli.

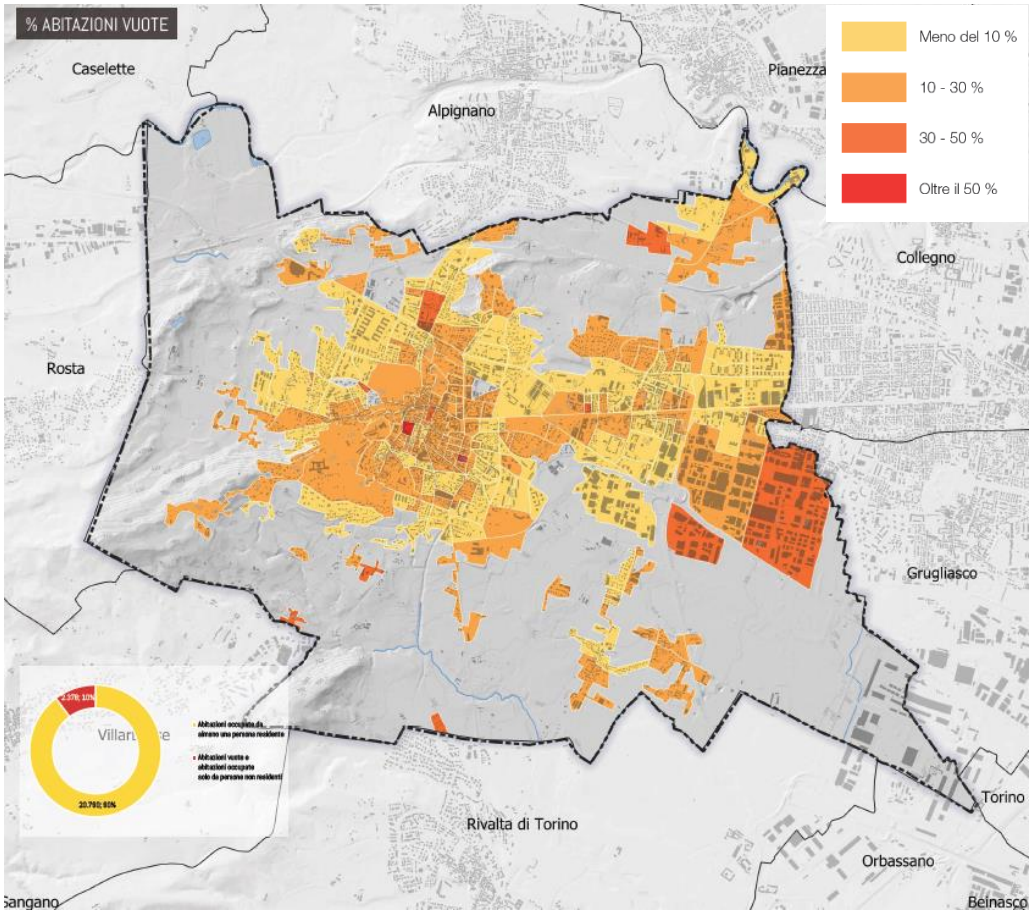


Figure 44 - Percentage of an empty house in Rivoli. (Preliminary analysis maps, made by the author)

To try to define a border we can check in Figure 45 - Dense, free, and transition areas in Rivoli (Preliminary analysis maps, made by the author), in this map we can see with the light red color the dense areas, which are the most extended and in yellow we have the transition areas that we find in the fringes of the city, it's possible to appreciate the behavior of this expansions. They try to insinuate into the countryside and on the agricultural land consuming soil and spaces. And

all the rest are free areas, the ones we need to preserve, where the biodiversity is and where is the “limes” to not invade to not worsen the ecological balance.

The goal is to rigorously contain the interventions in the territories still free from construction, to allow completion in the "transition" areas, and to direct the new interventions in the already defined "dense" areas. This action doesn’t mean that urban expansions are not practicable, but rather that every new forecast must be

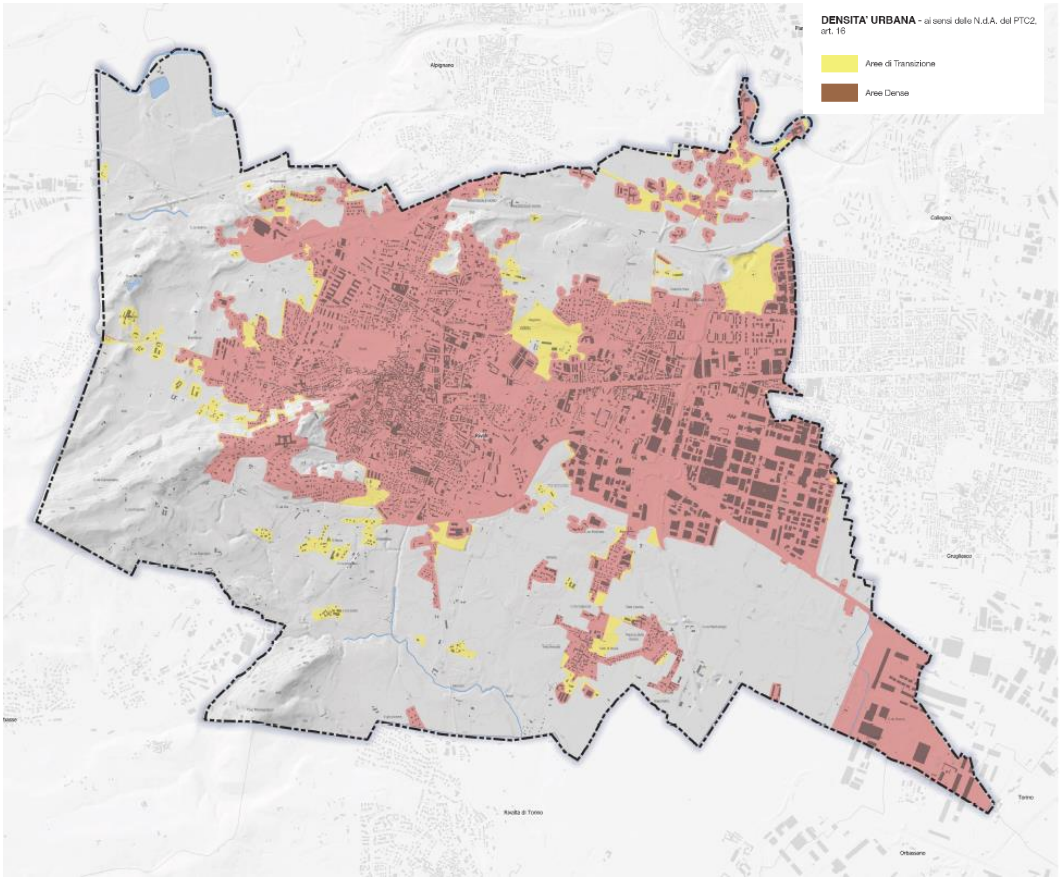


Figure 45 - Dense, free, and transition areas in Rivoli (Preliminary analysis maps, made by the author)

thought out, justified, and implemented in the best possible way, excluding new phenomena of sprawling and waste of agricultural areas, in the face of the possibility of growth, development, and requalification offered by redevelopment actions of the existing, densification, rationalization of spaces and functions, and relocation in their areas.

Figure 46 below it showed the urbanization area and the natural areas all around it. From this map, we can easily see the city surrender by the agricultural field which is the main area where the Green Belt will be created.

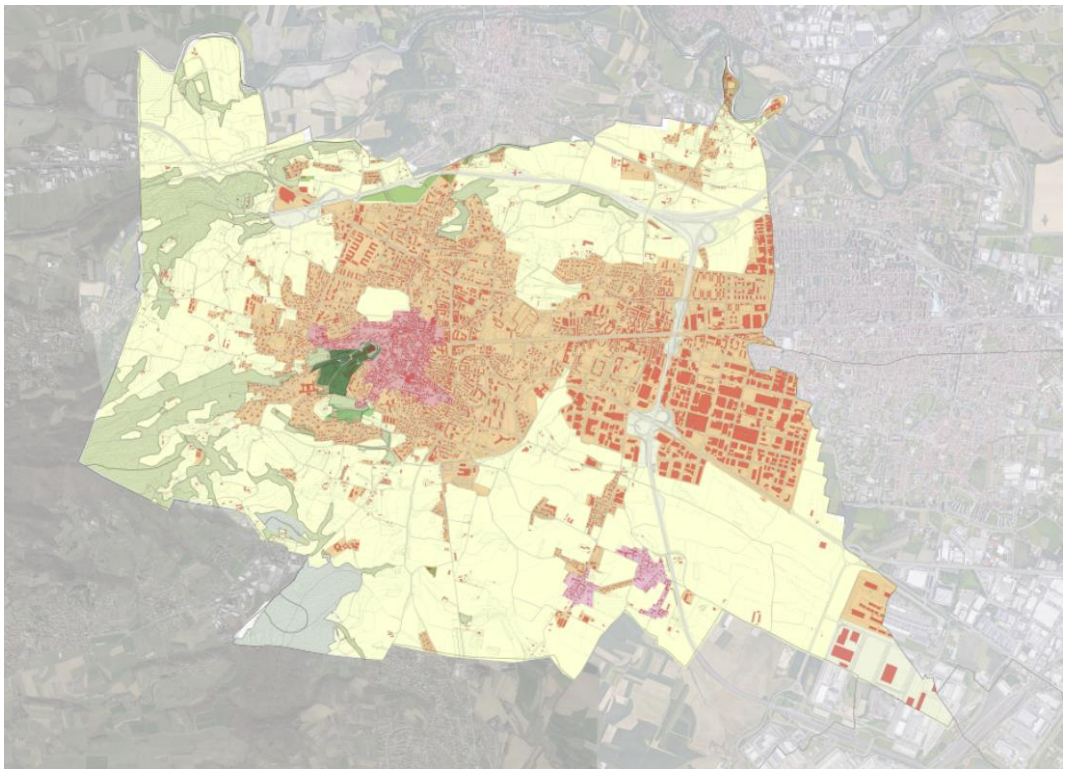


Figure 46 Current excerpt PRGC di Rivoli

As well as agriculture the Green Belt will pass through the whole of Rivoli's rural countryside territory meeting and integrating the hill forest at East, the "Area Attrezzata Collina di Rivoli" ("Rivoli Hill Facility Area.") a historical park on the major hill of Rivoli where the beautiful castle stands.

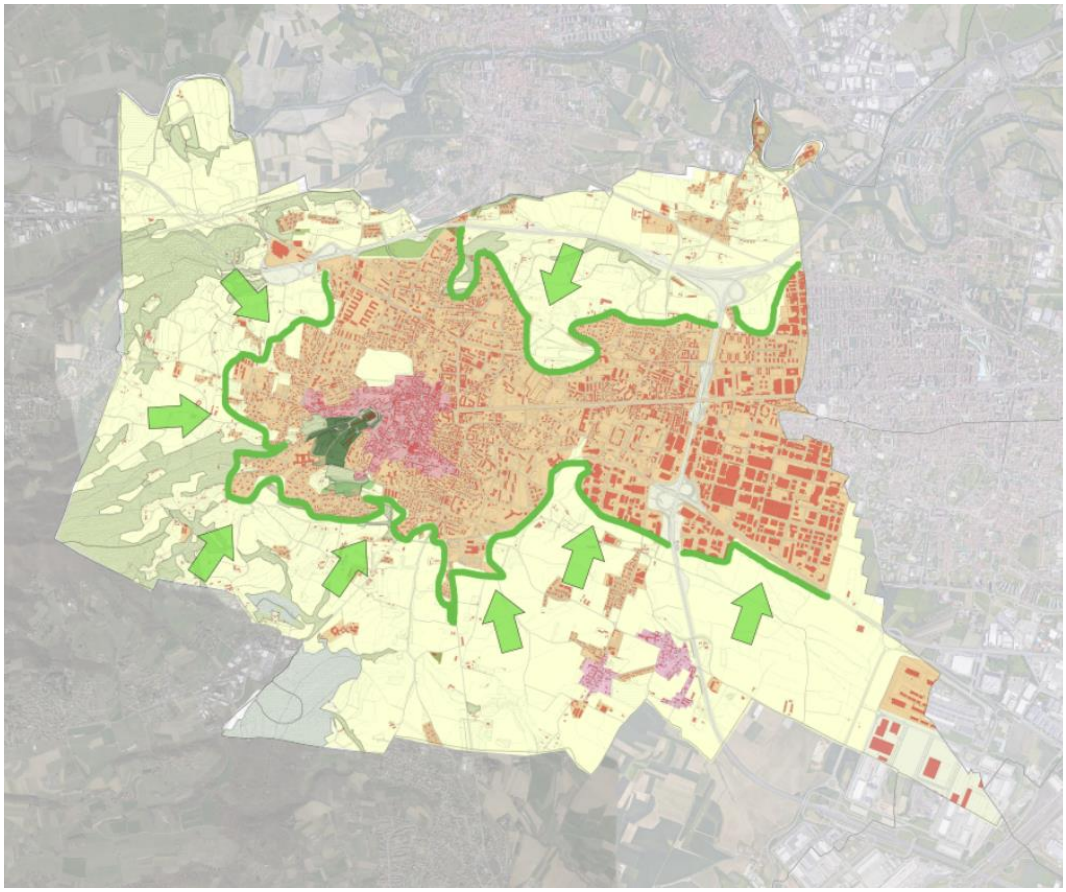


Figure 47 - Urban Border sketch for the Green Belt. The green arrows are the force needed to contrast urban expansion

To the North, the city encounters the "A32 Tangenziale di Torino" a ring road that connects the city of Rivoli with the major city of Torino. This infrastructure squeezed on the edge of the municipal border with Alpignano's municipality marks a big border line for Rivoli effectively preventing the city from expanding in that direction because it's physically impossible. This infrastructure creates also critical issues for the Green Belt because it splits the green continuity, decreasing its effectiveness.

Due to the huge grade of urbanization in the northern part of the municipality, the Green Belt will be more effective in preventing urban sprawl in the south try, however, to maintain the agricultural areas between the A32 and the city.

In Figure 47 it is showing the push UGB will try to do in relation to the urban areas.

The urban sprawl from the city pointing South like arms it's immediately recognizable. Unfortunately, there is not much a program like this can do to recover the situation shaped by a lack of governance and control.

When the urbanized part of the city is finished and the concrete leave spaces for the rural and agricultural landscapes it is possible to talk about the border, between the city and the rural. Important attention to the urban-rural border is needed to implement the best UGB project, it is necessary to have consciousness of the city borders situation. This "line" is very important for the UGB because it will physically work on this part of the territory and its efficiency will increase or decrease due to this characteristic. A very sharp and clear border it's advisable because we must divide more the natural from the urban areas.

Figure 48 - Freiburg urban border, from Google Earth

Figure 49 - Freiburg urban border bird view, from Google Earth

The previous image it's showed the Fribourg city border. A border like this it's perfect to fit in a Green Belt. From the "Figure 49 - Freiburg urban border bird view, from Google Earth" it's possible to recognize some important elements that constitute a Green Belt, such as the green screen and the bicycle path.

The green screen it's very useful to decrease the impact urban activity delivers on the natural area. Bushes and low trees are used to screen the light pollution from streetlamps, houses, and cars, and filter air pollution and noise.

Overall, the ideal solution is to divide the urban and natural areas to avoid bad interaction, and to preserve and enhance the wildlife in the natural area because lived soil it's what we need to compensate the absurd quantity of soil we stole from nature to the point that we have undermined the world's biodiversity with the wrong actions previously taken.

In the "Biodiversità a rischio, Biodiversity dossier 2019" from Legambiente it says:

> *"More than a third of human food - from fruits to seeds to vegetables - would fail if not there were the pollinators (bees, wasps, butterflies, flies, but also birds and bats), which, visiting the flowers, they carry the pollen of the male anthers on the stigma of the organ feminine,*

giving rise to the next fertilization. In Europe, about 84% of cultivated species and 78% of wildflower species depend on, at least in part, animal pollination." (Legambiente, 2019.)

For a better, greener, and more sustainable future we need to take care of the countryside as much as the cities. The livelihood of the large masses that inhabit the cities depends on the food produced in the countryside, and as also highlighted by the Largamente dossier, numerous cultures in Italy as in Europe depend largely on pollinating insects, which therefore play a very important role in the production of food.

In contrast to what was the example of Freiburg, the boundary between the urban and natural areas of Rivoli is a bad representation of what the boundary between urban and natural should be.

Figure 50 - Rivoli's urban fringes example. (Google Earth)

The previous image highlighted the tendency of Rivoli, like many other Italian cities, to sink "arms or fringes" from the city into the surrounding countryside. People who, looking for new areas with detached houses, garages, and gardens, have created an irrational and disordered expansion of the city over the years. Going inexorably to change the land and attracting more and more people close

to them until they urbanize strips of land that create barriers and caesuras in the bio habitats around the city.

Now we have inherited this situation from the choices of previous generations, and it is difficult to remedy it, but we can mitigate the effects thanks to the new management of the land and the implementation of new policies.

3.4.3 - The Municipal approach to the Green Belt Project

The administration, aware of the vast problems of the city and the existing master plan was consistent in admitting that a change of course in the approach of the plan on the territory was needed. The glory dreams of massive construction have been abandoned and milder overbuilding policies have been adopted. Both the political class and the municipality's technicians together with the design studio have decided that the plan should contain expansion on agricultural land as much as possible, focusing on mending the urban voids left by the disorganized and rapid expansion of the previous decades.

Depending on the fabric in which the urban voids are drowned, appropriate destinations of use have been chosen, consistent with the objectives of the plan. To encourage private and public investments, to fill the gaps within the city, a green belt on the perimeter of the urbanization is even more necessary, capable of containing expansion and thickening interventions in the consolidated city.

The UGB solution project was bounced for months by the administration requesting a long time to be completed. The very first idea of local UGB was proposed by the previous administration and following an all-Italian game; the current administration had difficulty embracing the idea of a "Green belt". But fortunately, the common good and the desire for progress won out over political bickering.

Officially the name of our intervention suggested is "Area di ribilanciamento ecologico" which is "ecological rebalancing area"

The Green Belt will rise at the urban limit of the city of Rivoli to prevent the city from further expanding and create a space between the city and the countryside. The areas near the city are essentially agricultural, especially on the southern border of the city, we can find in the west part a natural area of the moraine hill of Rivoli and some small woods to the north squeezed between the city and the highway. To make the green belt work at its best, we must connect all these green areas to make it a continuity infrastructure.

Having a green continuity in an area like the Po Valley is not easy at all. Urban areas have expanded tremendously over the years, they merged one each other creating a gigantic conurbation, making the Po valley a place where green corridors are very difficult to create through these concrete walls, isn't feasible. We as designers and planners must try to use all the tools at our disposal and try to convince the political panorama that these solutions are not just fine words for a handful of radical environmentalists or used to bring a few more votes for the next elections but must be adopted because our lives, ecosystem, economy, and future will be affected one way or another in the next years.

The process to decide the Green Belt area was preceded by the "recognition of the service areas". Long and repeated meetings were held to check every type of area and building present in the territory and therefore on the PRG. Areas such as residential, industrial, and ancillary areas like motorway respect areas. This recognition's very useful for us to know more about the territory by talking with people from this territory. In a normal scenario, the administration should already be aware of the situation of the different areas within its territory. And inform us of the ongoing situation. But in this case, it was different. The technical office had large gaps in multiple urbanistic and normative areas losing bits and relying only on the historical memory of staff members, losing the overall point of view. It was us as a planner studio to build a status quo of the regulatory areas and the municipal heritage.

The administration's main concern was to be able to easily accommodate the arrival of the metro, this great and fascinating project that will finally be able to connect the city of Rivoli with the city of Collegno and Turin, making it an important interchange point with the Susa valley to the north. To do this many areas to the northwest of the city of Rivoli have been converted from agricultural areas to parking areas, going to make the green belt project more difficult and less efficient. Feels like the UGB is designed not so much for the good of the community or to minimize the environmental impact of our communities but to "green wash" municipality attitude in front of the average population who have

a limited vision to their interests. A holistic vision does not even belong to the technicians who work at the Municipality who often find themselves disoriented when it comes to issues that go beyond the creation of parking lots, still anchored to image of plans that must aim to increase the coffers of the municipality. The only brake on these obsolete practices is done by the control bodies such as Region, which during the stages of control of the plans in the "technical tables" give very restrictive opinions on land consumption and new buildings.

Despite these questionable decisions of the administration, we still managed to model the Green Belt for what it was designed for.

3.4.4 - The Cartographic and Normative role in the Urban Green Belt project

In the architectonic and urban planning sphere, the importance of the line as a means of communication is very important. But it deserves to be emphasized again because in spatial planning the dividing line attributes different obligations and duties depending on the part of the division. So, in drawing every single line the designer must have in mind the importance of something that seems so insignificant but with a deep meaning behind it.

> *"Urban planning is primarily determined by the division of the land into areas which, with varying degrees of concretion, are earmarked for a certain purpose. As a result of this planning, each point of the territory belongs to a particular category, to particular land use. This land use expresses the circumstances of each area in relation to the general urban development process. This division of the territory into different land classifications is what we usually understand as urban land classification, and the assignment of the land in a certain area is what we understand as urban qualification. In urban planning, the city plan is defined through zonal delimitations that must be suitably accurate according to the different sense of each of the urban development systems." (GOMIS J., Carlos T., 2017)*

Therefore, the spatial definition of the Green Belt must be done carefully, aware that each drawn section of this new legislative area (like all) will attribute a constraint or an opportunity to the private owners of those areas that will fall within its perimeter.

The idea for the Green Belt is an area that surrounds the built areas to rebalance the border between urban and rural. An area where over the next few years it can be used to locate the environmental compensations and to create a useful area both for citizens and for nature paid essentially by private investors.

To map the new Green Belt area we begin from the starting point as in Figure 45 - Dense, free, and transition areas in Rivoli (Preliminary analysis maps, made by the author), from this analysis we build an urban border that shares a long path in common with the dense area but, in some point, we choose to be more generous, and draw a border close to the dens areas preferring to preserve the transaction areas. On this edge, it's been made a buffer of 25 meters outwards and that will be the area of environmental rebalancing

In the next map, it's possible to see the first sketch of the urban border (dark green line) and the environmental rebalancing area. Our strategy to greeter the performance and the good fall-out it's to expand the 25 m buffer to include when touched, all the service and wood areas. In this way, it's possible to link all these areas and create a green ring with more functions, permeable and public allowing citizens to live, move and enjoy the city from the outermost edge to the historic center.

Thanks to this interconnection of areas, we hope to be able to bring green areas from the countryside to the city center to have a fundamental natural continuity to mitigate the effects of climate change and improve the life experience of people in the city of Rivoli.

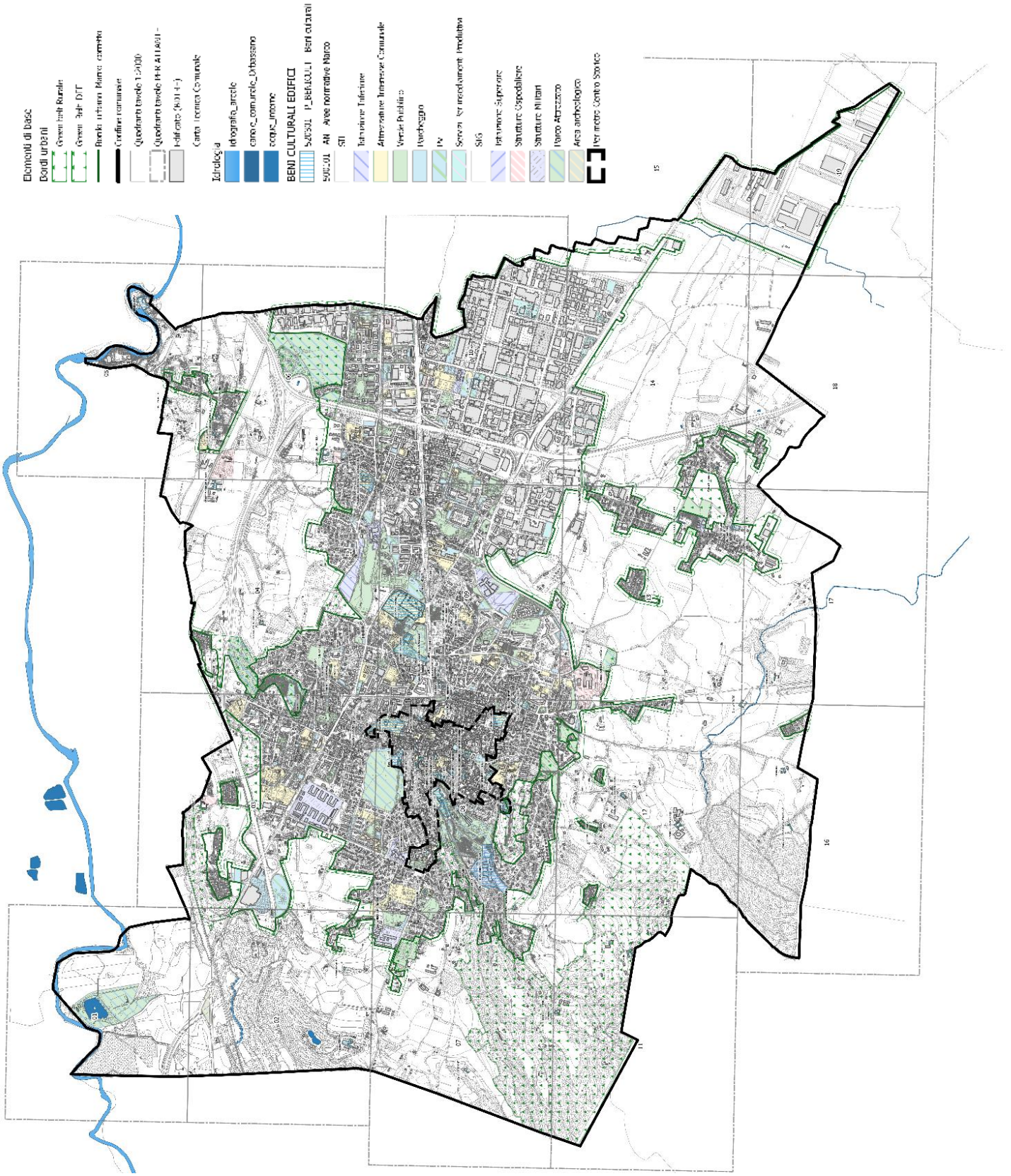


Figure 51 - This map is a built using the CTR on which it's draw the urban border (green line) and then the 25m buffer o1 rebalancing environmental areas and service areas to understand where the Green Belt will be extended

In the Figure 51 from the working in progress Land use Master Plan (Piano Regolatore Generale) It's possible to have a definition of the 'Area di Ribilanciamento Ecologico' namely Urban Green Belt.

The urban border was created by going to surround the last part of the building before meeting some free areas. with precision work, the entire urban edge of the city was sounded out to figure out which parts to integrate and which to keep in the rural part. The perimeter of the urban edge measures just over 60 kilometers. The shape and the scattering of urbanization make the definition of a clear boundary very difficult. To the east, the building continues in the nearby municipality of Grugliasco where it is therefore impossible to define an urban border that then coincides with the municipal border of the CTC (Municipal Technical Card) while to the north the buildings have gone as far as the highway making it difficult to identify efficiently. of the Green Belt.

Starting from the urban border, a 25-meter buffer was created which, as highlighted by the map, integrates all the areas that have been identified by PRG as green areas or at the service of the population. This model will allow to block the messy construction and allow good use of the fringe area. The Green belt grafting onto the already existing green areas will create a continuity of natural areas from the periphery to the innermost parts of the city covering 3.843 hectares.

In the model of Abercrombie and Cerdà, it is also important for us to be able to connect, integrate and form a single system between the new infrastructure and the existing ones. Thanks to this it will be possible to create green cones like those of London that will bring fresh air, and light and can be used for leisure and commuters.

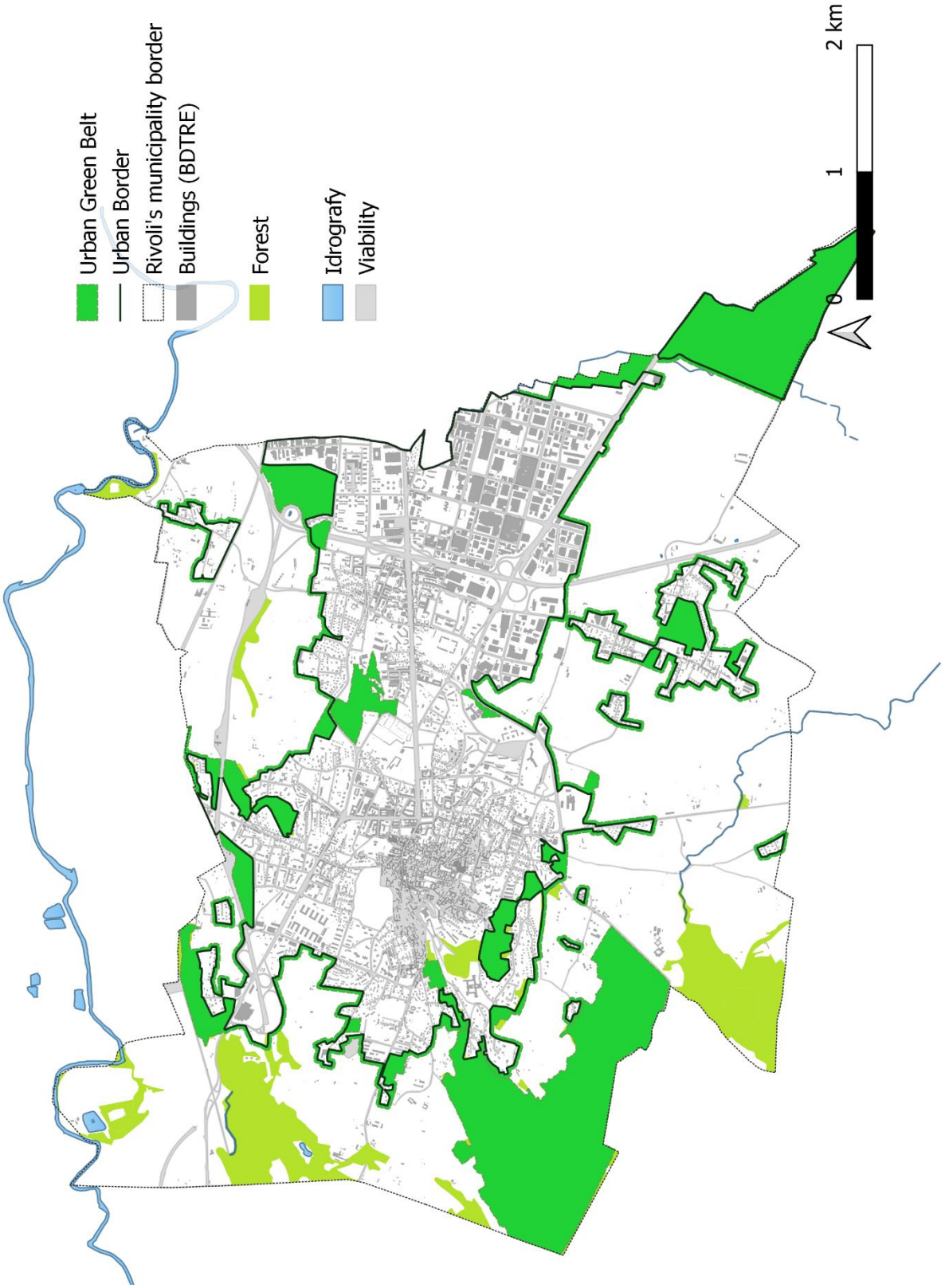


Figure 52 - Green Belt in detail. (Elaborated by the author)

4 – CONCLUSION

To plan the city of Rivoli we were inspired by the "great references", a heritage of ideas, techniques, and experiences that are cornerstones of the disciplinary imagination. The Greater London Plan and the Copenhagen "Finger Plan" are exemplary cases of rationalizing the concentric layout of the city by linking it to a system of satellite cities that, in their internal organization, echo the compositional criteria of neighborhood unity. Modena and Bergamo are the clear example that Italy can be a protagonist of such movement with a different approach to the territory, pointing the focus on the livability of the cities like the international cases analyzed.

In this project the spatial image of the Urban Green Belt has been modernized to face the new challenge and the old problems still unresolved. Merging the environmental matter in the spatial urban planning, that in Italy are traditionally dealt separately.

The thesis was developed during the internship at the Studio Sorbo, thanks also to the helpfulness of Rivoli's administration was possible to develop an Urban Green Belt suitable for the needs of Rivoli.

Despite the very good example it's unimaginable to translate the Great Plan to Rivoli's case. First, the dimensions are very different, the city of Rivoli with little less than 50.000 inhabitants it's way smaller than any London neighborhood but it can contribute to be a good example. Another important difference is in the administrative approach, the plan in London and Copenhagen included many different municipalities and administrations organized to improve the cities and people life. This cohesion made possible a UGB wider adoption, well integrated across the counties, and more stable and useful infrastructure for everyone.

The Rivoli areas certainly have some difficulties, one will be surely the small dimension of the UGB, the plan we are working on operates only within Rivoli's boundaries limiting our action at its perimeter. The UUGB policy was developed in the late 1930s to guide spatial design on a regional scale, a wider and longer

UGB that embraces not only Rivoli but also Collegno and Grugliasco can have a useful effect, mitigating the Corso Francia axis sprawl, and creating a border with rural spaces outsides the city, improving the capacity to absorb heat waves, extreme wheatear event and create a space for the population. A well-designed ring from Torino to Rivoli can offer unlimited opportunity to reuse abandoned sites, requalify fringes and give a green infrastructure for commuters and wildlife. So, the contemporary application on a local scale can limit land consumption but a regional-scale adoption is desirable.

In all the plans based on this model one important feature is the correlation between green wedges and the parks, made possible by linking the existing parks with green spaces and the UGB creating a very strong relation-system. For Rivoli's plan, the concept to link all the green surfaces has been the focus of attention to reach our goals, the Studio Sorbo made it possible Integrating parks, service areas, and open areas to create green corridors that would bring greenery, fresh air, and light from the outdoors to the city center.

The urban border was created by going to surround the last part of the building before meeting some free areas. With precision work, the entire urban edge of the city was sounded out to figure out which parts to integrate and which to keep in the rural. The perimeter of the urban edge measures over 60 kilometers embracing the whole city. Starting from the urban border, a 25-meter buffer was created and integrates all the areas that have been identified by master plan as green areas or service area, this will allow a better use of the fringe area. The UGB grafting onto the already existing green parks to create a continuity of natural areas from the periphery to the innermost parts of the city covering 3.843 hectares. The actions by which we created the Rivoli UGB make it similar to the original UGB but given its small size the effects will also be affected, and it will certainly not boast the same results as the original UGB.

With the benefit and the good impact provided by a UBG, it's possible to achieve a rebalance city's footprint, with the absorption of greenhouse gases by vegetation, limit the sprawl; going to focus within the green ring on new

construction and when possible, renovations to increase housing density; provide green space available for everyone and grant a green infrastructure feasible for the population needs. Increasing the density of today's cities instead of building far away in the countryside can make a huge difference in the now-going battle for the climate. Furthermore, a higher urban density can offer a better array of services due to the reduction of cost performance, time saved to reach the place needed, develop of a better public transport system. Another important element in a denser city concerns mobility, we must move from car-centric transport to other solutions such as soft mobility made by public transport systems, bicycling, and walking. To achieve so we must decrease the dispersion of people and focus services by centralizing them within a green-defined city perimeter.

Alongside the UGB the main features from this work are multiple, starting with the reformulation of the regulatory areas and buildability indices for a more balanced development of the city fabric. In the new plan, numerous environmental assets have been identified such as hedgerows and rows, mapping the wooded areas, and update the hydraulic hazard areas that were not present il previous plan. Numerous buildings of considerable interest have also been identified and mapped, both buildings identified by the administration at the municipal level, either building included in the lists of the Ministry of Culture, bound through the law 1089/39 which grants greater protection.

The Rivoli plan fully embraces the new techniques and philosophy of today's urban planning, there is a strong limitation to large areas of expansion, rather the plan is focused on mending the urban voids that have been left by the fast and disorganized expansion. Thanks to the collaboration within the Sorbo studio that undertook this experiment for a UGB for Rivoli, to my lecturer Professor Arch. Ombretta and to the study of the great references of the past and today, I can affirm that the UGB is still a valid model today, if applied correctly and systematically on the territory it can go to effectively counter land consumption and mitigate the effects of climate change.

What was useful in retracing the UGB model and plan was the passion with which the architects and their team's carried out their idea. The ability to dialogue with the city's administration to convey the importance of such actions that will be implemented in the following decades. The problem we see today in the public administration is the fear of change, the fear of making structuring decisions for the territory that can displease part of the population which is, then, the electorate. But through enterprising professionals a change of course might be possible.

Today more than ever in municipal planning needs administrations that are not afraid to act, we need administrations that know that the good of the community comes before the results of the next elections. Spatial planning at the municipal level is closely linked to politics, and it cannot be otherwise, but then, the political class must be aware of what spatial planning can do, which is not limited only to the "variants of the plan" but must become actively participates in political choices where it is related.

Rivoli's experience was an interesting example of how urban planning work in Italy, the knowledge learned during this path exceeds those learned in frontal lessons and even more those unfortunate during the distance period due to Covid-19 pandemic. Having a field approach allows us to fully understand the steps and dynamics of ongoing public works.

A message to Rivoli's administration but one that applies to all other cities as well as to keep these plans and programs up to date. What we have developed represents a snapshot of today's needs and opportunities but in the even short future, these needs may change. As time goes by, we will have data and opinions from the field and with the new changes such as the arrival of the subway and the challenges related to the implementation of the HST (high-speed train) in the next few years could be opportunities to get involved again and go to adjust and balance the plan and the new UGB.

In the end, the invitation to all metropolitan city of Turin and beyond to unite in the creation of a single project that have viable protection against uncontrolled sprawl, mitigation of climate change, to prepare cities to be more resilient to extreme weather phenomena.

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