



## Local Diagnosis Report for each Frontrunner City

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# 1 Executive summary

URBiNAT aims for an inclusive and sustainable regeneration of deprived urban areas through the co-creation and co-implementation of a Healthy Corridor that features Nature-based solutions with the intrinsic involvement of the local citizens and institutions. Complex realities and needs have to be very well understood to build robust and indeed adapted strategies that can touch three main dimensions - social, economic, and environmental with the participation from a wide range of different partners and local actors. Only then it is possible to develop and implement multi-dimensional solutions that can be appropriated and upscaled.

A fundamental feature of this project is its multidisciplinary approach since it considers the city as an entity with many connected aspects. The analysis of the local context is performed by the elaboration and the description of data provided by the cities during two stages of local diagnostic. The considered data are classified into three main categories: territorial, social, and economic.

Each variable conveys essential detail and information that adds to the plurality of observations that is essential for building an understanding of the actual situation within the city, given its complex and multi-dimensional nature as a municipality inhabited by real people while also structured around different kinds of formal as well as informal dividing lines. To obtain the richness of information required, the project URBiNAT has requested adequate responses from each city department, its related offices, and other institutions.

The first stage of the diagnostic, at the city and parish level, relied on a deep literature review of the existent but scattered data available for five relevant thematic areas for URBiNAT- territorial, social, economic, social housing, and NBS. The approach was performed for the strategically defined study area through the development of innovative methodologies, uniquely designed by the URBiNAT Consortium during the second stage of the local diagnostic. And these methodologies are here implemented for the first time in the cities, allowing for a detailed analysis of participatory local culture, use, and interaction with the urban space, urgent needs that ultimately unveiled the local challenges and opportunities.

This report describes the variables explored in the first and second stage of the Local Diagnostic. In the first stage, it is requested that the cities provide secondary information of use to framing their specific relevant conditions. Such information will be helpful for further identifying the location and wider context for the implementation of healthy corridors, with the prospect of enabling real improvement of the quality of life for citizens.

The Local Diagnostic stage 2 focuses on over the study area where the Healthy corridor will be implemented. This separate report informs mostly on new data, produced especially for URBiNAT and the target area to identify local real needs and expectations to be integrated in the following phases of the project.

It included participatory activities, territorial mapping studies, and behavioural mappings. To identify, study, mobilize and prepare different actors for the following phases of the project, various participatory methods were applied and reported at this stage - observation, focus groups, face-to-face interviews, culture mapping, walkthrough, and photovoice. The findings from all of the methods applied are summarized in "Baseline for the development of the healthy corridor" that will support all further activities for the development of the Healthy corridor in all target districts.

The active participation of citizens paves the way for a detailed and objective-oriented analysis of the study area that will adequately support the ensuing steps of co-creation and co-implementation of individual NBS as well as the wider concept of Healthy Corridors. Furthermore, the baseline analysis will allow for further comparison of the project's impacts after implementation, compared to the initial state of affairs, along with the scope for meaningful continued monitoring and evaluation during and beyond the project's life.

## 2 Introduction

The URBiNAT project aims for an inclusive and sustainable regeneration of deprived urban areas through the co-creation and co-implementation of a Healthy Corridor composed by Nature-based solutions with the intrinsic involvement from the local citizens and institutions. The NBS are “solutions that are inspired and supported by nature, which are cost effective, simultaneously provide environmental, social and economic benefits and help build resilience” (see the EU website: <https://ec.europa.eu/research/environment/index.cfm?pg=nbs>).

The Local Diagnostic (Task 2.1) represents an important building block for the continued project work. The partners involved in this task are: ICETA-CIBIO, CES, CMP, Domus Social, ITEMS, CNRS, NMCU, UASG, SOFIA MUNICIPAL, IULM, FGF, COMUNE DI SIENA, UANTWERPEN, STAD BRUSSEL, UNG, NOVA GORICA, DTI, HTK, SLA A/S, IKED, IAAC, ICCIMA, NSCJL. Each of the front-runner cities is analyzed with consideration taken to its specific characteristics. An important objective is to identify and characterise deprived areas, with a view to the greater aim of working out the means of addressing their specific challenges, as well as healing and rebalancing the city as a whole.

At the start, all front-runner cities introduced their principal characteristics, covering each of the study areas involved in the project. This included analysis and explanation of the city's position as a front runner with regard to NBS, and also in what sense selected study areas are considered deprived.

The first part of the document gives context to the different subjects covered by the report. An essential issue is the definition of deprivation and the characteristics owned by an area referred to as deprived. A substantial literature have set out to create measures of composite indices for the purpose of capturing deprivation as a multidimensional concept, at national, regional and community level. (<http://www.oecd.org/regional/regional-policy/50587193.pdf>). One of the most recent measures introduced is the English Indices of Deprivation 2019 (IoD2019) ([https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/835115/IoD2019\\_Statistical\\_Release.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/835115/IoD2019_Statistical_Release.pdf)). The IoD2019 is based on 39 separate indicators, organized across the following seven distinct domains of deprivation, which are then combined and weighted to calculate the Index of Multiple Deprivation 2019.

- income
- employment
- education, skills training
- health, deprivation and disability
- crime
- barriers to housing and services
- living environment

This index was developed as a useful measure of the relative deprivation applicable at local level in the United Kingdom. Despite this specific purpose, it is of more general interest as one of relevant frameworks for examining deprivation more generally.

The front runner cities subsequently indicate expectations for the development of the selected study areas, of relevance to the URBiNAT project. For instance, these have to do with the provision of conditions for the construction of housing at reasonable prices,

security and quality of life, improved mobility, entrepreneurial activity, social innovation, initiatives that improve the situation of disadvantaged groups, and so forth.

The multidisciplinary approach is of high importance throughout. A city is inherently reflective of issues and developments that require the consideration of various distinct, yet interconnected, dimensions. It is of high importance to explore diverse aspects and sectors, with a view to working out the best means of defining solutions that are capable of managing complex processes and situations. A multidisciplinary approach involves drawing from multiple disciplines to redefine problems beyond the scope of boundaries to the thought that are delimiting and counterproductive. For this purpose, the tools required for completing this task will draw on diverse competences and actors: urbanists, architects, economists, sociologists, statisticians, legal expertise, engineers, a range of other scientists, and practitioners.

The analysis of the local context is performed by the collection and description of existing and new information about the specific characteristics of each city: these can regard wide spatial description of the city from a geographical and administrative perspective as strategic policies to the improvement of the city and its reaction to contemporary challenges. The collection of existing information is useful in order to make an overall description of the city, the intervention area where the project is located, local policies and future investments.

The considered data are classified in three main categories: territorial, social and economic. The territorial allow drawing a detailed picture of the physical and morphological details of the areas of the cities. The study area mustn't be seen or studied as isolated but rather as part of a dynamic urban environment. Data regard, among other things:

- spatial description of the biophysical characterization of the city, focusing on its natural or semi-natural characteristics;
- spatial description of the transportation network, in order to inform about the city's dynamics and main challenges about connectivity;
- spatial description of the green spaces of the city, focusing on public green spaces and local policies for the improvement of the green infrastructure.

The multidisciplinary analyses include and evaluate social data. The social description of the city aims to define the social profile of the urban agglomeration and the related context, so as to determine possible links between problems and solutions of relevance to the URBiNAT NBS catalogue combinations. A central element in URBiNAT is the assessment and amendment of social conditions through participatory processes as a basis for selecting, creating and implementing NBS as well as, from thereon, the creation of healthy corridors. Moreover, URBiNAT engages in hands-on parallel exercises of this sort in different cities, undertaking comparative analysis, drawing lessons and translating them so as to draw more general conclusions and recommendations, to be translated and diffused. For this purpose, the social data must delineate between general conditions, on the one hand, and context-specific weaknesses and threats on the other, for meaningful

support of diverse strands of analysis how the combination of the two play out in a particular urban environment, as well as more broadly.

The set of social data ranges from an overall assessment of society as transmitted per traditional statistical information, spanning from gender, life expectancy, degree of education, demographics, income distribution, social inclusion, etc., to more qualitative information such as cultural belonging, trust in institutions, justice access, etc. Data of both kinds are required.

Data is further collected to depict the state of the economy in each city. The economic data relate to numerous economic indexes (average familiar income, employment rate, educational facilities, short-term contract rate, no-profit sector, etc..), so as to enable analysis of economic structures and processes. This includes enabling a reasonably complete characterisation of the cities' capability to create, maintain and distribute wealth. This in turn requires addressing the determinants of productivity, the returns to investment as well as labor, technical progress, innovation, entrepreneurship, and the issues of competitiveness.

Each of the variables involved in the three main categories lays the basis for particular insight of importance to enabling an understanding of both the real and the perceived situation of the city, with consideration to its specific characteristics: in various ways, the information collected can help identifying study areas where healthy corridors can be implemented, improving the quality of life of citizens. Once collected, all data have been organized and structured so as to lend support for the various tasks addressed in the project. This report describes the variables explored in the first and second stage of the Local Diagnostic.

The main purposes of the Local Diagnostic, to be fulfilled in conjunction with other Working Packages throughout URBiNAT, may be summarized as follows:

- 1) the determination of a baseline of local social, environmental and economic challenges, with particular attention paid to spatial planning responses (relating to, e.g, public space, housing, social inclusion);
- 2) the mapping of community assets along with physical and social capital in the urban context, including positive externalities;
- 3) the identification of specific context at city level, pertaining to legal, political, long-term agreement/commitment, cultural, governance frameworks, physical features of the site, urban patterns, and so forth. The aim is to determine challenges along with associated risk management (or mitigation measures), as well as the prospective opportunities at hand through the adoption of Nature Based Solutions (NBS), and how they relate to special groups ranging from champions to disruptive groups;
- 4) the identification and mapping of relevant perceptions, needs and expectations as expressed by inhabitants and stakeholders;
- 5) the characterisation and evaluation of existing NBS in the city;
- 6) the behavioral mappings by monitoring the space and also through e-data;
- 7) the identification of indicators for the assessment and planning of expected impacts. Moreover, the definition how to apply (at mega as well as micro level) data to provide

indicators such as accessibility, integration, security, poverty, mobility, health of children/primary schools;

8) the building of a baseline for market analysis, including the potential for clustering, including through e-solutions (as for example, e-participation, e-planning, e-government);

9) the consideration of human rights and gender in the Local Diagnostic, through the mapping of the mechanisms in place to recognize and promote rights (such as health services, spaces and initiatives for socialization, alternative care centers, etc.) by public/political authorities. "Living law" for multi-material inclusion: access to employment, socialization of law, right to housing, right to decent life, citizenship;

10) the assessment of potential risks for the environment (risk-benefit analysis) and for human health, including mitigation measures, compliance with applicable international, EU and national law, in particular, precautionary principle, and if necessary and applicable, environmental authorizations.

With reference to each point above, moreover, it should be kept in mind that the analysis underpinned by the data needs to meet with local demands of relevance and efficiency, as well as enable comparative analysis and the deduction of more generally valid conclusions.

For operationality and optimization, the local Diagnostic has been divided into two stages. The first is basically about the design, planning and collection of data by the cities, with focus on already existing data. Their compilation has primarily been performed by Official Institutions, Municipality Departments or third parties. In the second stage, the cities are obliged to collect new, not already available data, with the help and supervision of the URBiNAT partners involved.

## REFERENCES

Tom Smith, Michael Noble, Stefan Noble, Gemma Wright, David McLennan and Emma Plunkett (2015) "The English Indices of Deprivation 2015". Technical report of the Department for Communities and Local Government (2)

Raymond, C.M., Berry, P., Breil, M., Nita, M.R., Kabisch, N., de Bel, M., Enzi, V., Frantzeskaki, N., Geneletti, D., Cardinaletti, M., Lovinger, L., Basnou, C., Monteiro, A., Robrecht, H., Sgrigna, G., Munari, L. and Calfapietra, C. (2017) "An Impact Evaluation Framework to Support Planning and Evaluation of Nature-based Solutions Projects".

Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Centre for Ecology & Hydrology, Wallingford, United Kingdom.

## 3 Methodologies

### 3.1 The first stage of the Local Diagnostic

In Stage 1 of the Local Diagnostic, following a process of consultation and discussion aimed to generate an appropriate common understanding and the basic coordination required for acceptable commonality and comparability in the approach of each city, the Front Runner cities assembled and organized a data set judged as sufficiently comprehensive for meeting the future needs of the project. The result represents a model and set of common reference points for all partners to take account of. The Followers in particular, while not expected to emulate any of the front-runners, have gained familiarity through the process, which lead cities they may share certain commonalities with in key respects, and thus are best placed to learn from in that regard. Later on, they will prepare their own Local Diagnostic using the experience of the project partners.

The data collection has been performed by the municipalities, their related offices and other institutions and organizations and it regarded data already existent.

The data requested for the diagnostic analysis are divided into three main categories, in order to catch more aspects as possible of the real situation of the cities. These three categories of data allow to obtain for each city:

- a **Territorial** description;
- a **Social** description
- an **Economic** description.

The **Territorial** data are basically necessary for drawing a picture of the physical and morphological details of the relevant city areas. They consist of satellite imagery, aerial pictures, orthophoto maps which provide morphological information of the area of the considered city. For example, in this first category, data is collected so as to enable a city-wide description of the climate and urban environment, focusing on climate resilience and the main challenges facing each city. Further, a city wide spatial description of the relation between the biophysical characteristics and the anthropic component, along with many other variables, has been undertaken in order to provide adequate information on existing infrastructures.

The main topics covered by the Territorial data include:

- the land use;
- the terrain characterization, with a particular attention to
  - the geology,
  - the geomorphology structure,
  - the altimetry,
  - the slopes,
  - the hydrography,
  - the watercourses;
- the urban environment, with a focus on:

- the air quality,
  - the water quality,
  - the soil quality,
  - the level of noise;
- the green spaces and biodiversity, with an analysis on:
    - the green space typology,
    - the vegetation,
    - the presence of trees,
    - the species richness,
    - the green and ecological infrastructures;
  - the climate, (with its modifications);
  - the natural risks, such as:
    - thermal anomalies,
    - the vulnerability to heat stress,
    - the wind circulation,
    - the flooding areas,
    - the hydrological risks;
  - the built infrastructures, divided into:
    - the water distribution network (the wastewater systems, rainwater drainage systems),
    - the energy distribution network (the electricity distribution network, the gas distribution network),
    - the road system and the public transportation network (the road network, the railway network, the subway network, the bicycle paths' network, the traffic data),
    - the facilities (including equipment to enable access by people with functional diversity),
    - the housing (with an important focus on the social housing).

The requested Territorial data address five of the first six challenges described in the Eclipse Framework (cfr 1). More specifically, the challenges:

- the Contribution of NBS to Climate Resilience (Challenge 1),
- the Water Management (Challenge 2),
- the Coastal Resilience (Challenge 3),
- the Green Space Management (including enhancing/conserving urban biodiversity) (Challenge 4),
- the Urban Regeneration (Challenge 6),

The **Social** data allow for a social characterisation/description of the city. These data can be used, essentially for the following four purposes:

1. to provide a scientific knowledge as complete as possible about the social dynamics and about an urban trend, which may highlight issues not depending from the neighborhood but on historic contingencies, climate conditions or policy orientations;



2. to draw a framework of comparison between the urban scale and the specific neighborhood, which may show positive or negative scenarios for the adopted case study;
3. to contribute to the adequacy of project responses to local needs;
4. to contextualize the picture of the areas provided by the analysis, because such picture is situational, meaning that it is limited to a certain time and space defined previously in the methodological framework.

It is important to remark that the trend of the social data (for example the results of a comparison of the official statistics of two different periods, or two different social Censa) could be determined based on an understanding of potential negative as well as positive social changes, thereby allowing for ad-hoc improvements along the way. Another aspect to be considered is that the social issues may not be fully related to the neighborhood itself, but might be caused by larger dynamics or external factors (for example, higher percentage of deaths for cancer can be caused by the presence of poisoned smokes, due to particular situations related to the winds breathing from industrial districts).

Given the intrinsic difficulty to analyze social phenomena, the availability of the local data and support of local stakeholders, may facilitate the analysis and the comparisons with more specific urban data.

The set of Social data requested are mainly divided into the following four macro-categories:

- demography, divided into the topics:
  - the general demographic data (as the age pyramid with focus on the quantity, the density, the dynamics, gender dynamics, and generational divides),
  - the presence of vulnerable groups in the area,
  - the cultural and the ethnic diversity,
  - the education levels,
  - the housing conditions (as the houses availability, the distribution of families in the houses, the recent trends in housing, the comparison between center area and peripheric area, the percentage of the homeless),
  - the migration rate and migration graphs,
  - the cultural rate,
  - the religion,
  - the family description (like number of members, and number of children per family);
- safety and health, with a relevant focus on:
  - the health and well-being rate,
  - the causes of death,
  - the reproductive health,
  - the health services (e.g., number of hospitals and the number of doctors per capita),
  - the number of crimes in the area,
  - the security issue,
  - the right claims by populations of social housing neighborhoods,
  - the mechanisms available and used by citizens to access justice;
- participation level, with a particular attention on:

- the political participation, and the voting rates,
  - the trust in the local public institutions,
  - the presence of voluntarism and of the associative movements,
  - the social connections in the area,
  - the social inclusion rate;
- perception of the public services, as
- the public transportation,
  - the schools,
  - the hospitals, the health services, and the alternative care centers,
  - the civil protection,
  - the post offices,
  - the public offices,
  - the police stations,
  - the cultural services and the recreational and amusement activities,
  - the libraries and any cultural, creative, artistic and entertainment activities,
  - the spaces and the initiatives for socialization.

The requested Social data can approach the challenges 7, 8 and 9 of the Eclipse Framework (cfr. 1). These three challenges are:

- the Participatory Planning and Governance (Challenge 7);
- the Social Justice and Social Cohesion (Challenge 8)
- the Public Health and Well-being (Challenge 9).

The **economic** data provide information about the economic development of the city.

The economic data collected allow to take into account also the degree of competitiveness in the cities and the wealth distribution among the own inhabitants.

An important focus of these data is on the labor, the workforce and the conditions of workers in the different sectors. The Local Diagnostic also consider the innovation level, the research of innovative procedures and the amounts of the investments related to modernization as fundamental information on the cities.

The topics covered by the economic data basically are:

- Income and poverty, with many indicators about:
  - the average family income,
  - the current expenditures for the electricity, the gas, and the food,
  - the living conditions,
  - the housing affordability: the prices of houses, the prices of the rents, and of construction,
- the employment, through some indicators about:
  - the competitiveness,
  - the activity and the employment rate,

- the unemployment rate per economic and no-profit sector,
  - the industrial plants concentration rate in the social housing districts;
- the innovation level, by considering indexes on:
- the number of patents, the number of startups, the number of developed mobile apps,
  - the research and development level, as the expenditure for Research & Development project, the amounts of financing to the research facilities, the amount of the facilities for investment in Research & Development,
  - the businesses and the workers, as the number of employed by business size, the classification of the enterprises by business kind, the classification of the enterprises by productive sector,
  - the trust degree in businesses;
- activity sector, in particular:
- the agriculture production,
  - the cultural and creative industries,
  - the stores and the commercial activities;
- the facilities with several indicators about:
- the cultural facilities (as the number of: museums, cultural centers, historical societies, libraries operated by a public, private, or non-profit organization, universities, cultural offices, theatres, cinemas, radio, recreational facilities),
  - the educational facilities (as the number of: kindergartens, schools, higher education centers),
  - the recreational and leisure spaces (as the number of: sports facilities, recreational spaces, users of sport facilities).

The Challenges of the Eklipse Framework (cfr 1), approached by the considered economic data are basically two:

- the Social Justice and Social Cohesion (Challenge 8)
- the Potential for Economic Opportunities and Green Jobs (Challenge 10).

For the Local Diagnostic – Stage 1 the cities gave data at two different levels:

- **City-Level Data**
- **Small-Scale-Level Data**

The data at the city-level are very useful to provide an overall description of the city and of all its features: they can help to understand the situation of the cities, the real living conditions of inhabitants, and to make comparisons among the different cities involved in the URBiNAT project.

However, the data at the City level do not allow to perform comparisons among different areas of the city: for this reason, the data at a smaller level should be considered.

The data at the Small-Scale level are very useful for the statistical analysis since they allow for the comparison between areas, as manifested in the patterns of variation observed

throughout the city. Such comparisons with the spatial component, can be very informative on the real situation of the city.

The data at small scale level are evaluated in different areas of the same city. Each frontrunner cities identified a small area unit to play the role of study area were the Healthy corridor will be implemented. In details:

- the city of Porto identified the *sub-seçção*;
- the city of Nantes identified the IRIS;
- the city of Sofia identified the electoral districts.

The data to be collected at parish and neighbourhood level are almost the same collected at the city level with a closer loop on the selected case study. The idea is to verify and assess if the urban profile is confirmed in the area or shows a better or worse performance in the selected neighbourhoods. Social data could be good in certain aspects, bad in others, offering a different scenario for the development of the NBS solutions as per URBINAT catalogue.

The purpose is to have data at lower level, for assessing areas in the city. These data will be also useful for the study of the corridors, the contextualization of specific city areas in the wide city context.

The analysis over a restricted area consent to achieve a level of detail that would influence the community whose life's can be improved by URBiNAT's goals and lines of action. This part of the report collects mostly new data, produced specifically for URBiNAT in order to identify local real needs and expectations to be integrated in the following phases of the project.

## **3.2 Design of the research plan for the second stage of the local diagnostics**

After the mentioned Stage 1, the Stage 2 of the Local Diagnostic has been designed, planned and performed.

Stage 2 consists of many activities performed by the other Working Packages, with the purpose to collect new data on the processes related to the URBiNAT project. That data is collected in the study area, that is the area where it is planned to build the healthy corridor, and eventually in the close areas around it.

The reason to concentrate in these areas all these activities is that the implementations of NBS have more relevant impacts in a quite restricted area: outside such area it becomes hard to detect modifications related to them.

The partners involved in the Stage 2 of the Local Diagnostic set up a list of activities and methods to conduct the analyses. The list is the following one:

1. Cultural mapping
2. Walkthrough
3. Photovoice
4. Focus group

5. Face-to-face interviews
6. Questionnaire
7. Behavioral mapping
8. Laboratory analyses
9. Territorial Mapping.

For the proposed methods a protocol has been implemented, in order to coordinate and to make homogenous the activities in all the involved cities.

URBiNAT's working group on participation has contributed to the design and planning of the 2nd stage of the fornt-runner cities' local diagnostic. As reported in deliverable D3.1, submitted in month 12 of the project, on the strategic design and usage of participatory solutions and relevant digital tools in support of NBS uptake, the URBiNAT team created a research plan following a specific scientific protocol:

→ *All work package leaders were asked to fill out a table with the following parameters:*

- short description of the task;
- indication of the issues to be analysed and addressed;
- indication of the dimensions of analysis;
- proposal of units of measurement;
- proposal for methods of collecting information;
- frequency indication and data monitoring process;
- expectation of results.

→ *URBiNAT's working group on participation created an analysis matrix to match the work package leaders' information with possible participatory categories, processes and tools to use in order to gather the requested information / data. The matrix crossed each indicator with the following parameters:*

- types of research methods applicable for use (initial feedback to the work package leaders);
- distribution of each indicator within predefined approaches and methods:
  1. cultural mapping
  2. walkthrough
  3. photovoice
  4. focus group
  5. face-to-face interviews
  6. questionnaires
  7. behavioural mapping
  8. laboratory analysis
  9. territorial mapping
- clustering into four types of participatory and qualitative interaction needs of the local diagnostics, aiming at learning more about citizens and cultures in the designated city areas, and focusing on the self, us and perspective sense:
  - 'Perceptions' - listening of the territory / expectations / needs
  - 'satisfaction' - personal / quality of life
  - 'relations' - intimacy / personal judgement / sense of belonging
- 'prospective' - sense of community / desires and dreams / ambitions for the territory / opportunities and new business models

METHODS			Responsible Partner	Porto	Expected results	Sofia	Expected results	Nantes	Expected results
Participatory - Territorial	<b>Method 1</b>	Cultural mapping	CES	R	R3	R	R3	I	M20
Participatory - Territorial	<b>Method 2</b>	Walkthrough	CES	R	R3	R	R3	P	M20
Participatory - Territorial	<b>Method 3</b>	Photovoice	CES	R	R3	R	R3	R	R3
Participatory - Self-Reported	<b>Method 4</b>	Focus group	CES + GUDA	P	M20	R	R3	P	M20
Participatory - Self-Reported	<b>Method 5</b>	Face-to-face interviews	CF	P	M20	R	R3	I	M20
Self-Reported	<b>Method 6</b>	Questionnaire	OWL	R	R3	P	M20	I	M20
Observation	<b>Method 7</b>	Behavioural mapping	OWL + UACEG	R	R3	R	R3	I	M20
Analysis - Territorial	<b>Method 8</b>	Laboratory analyses	IRSTV/CNRS	P	M24	P	M20	R	R1
Analysis - Territorial	<b>Method 9</b>	Territorial Mapping	CIBIO	R	R3	R	R3	R	R1

		Results (inputs/data processed) that will be ready by the end of September 2019, according to the waves/stages of application of each method		
		Preliminary results - 1	Complementary results - 2	Complete results - 3
<b>Design</b>	method still being designed			
<b>Planning</b>	method being planned in logistic terms			
<b>Implementation</b>	method being or already applied in the intervention areas			
<b>Results</b>	inputs/data from application being processed	R	R1	R2

Figure 1 Methods of Local Diagnostic

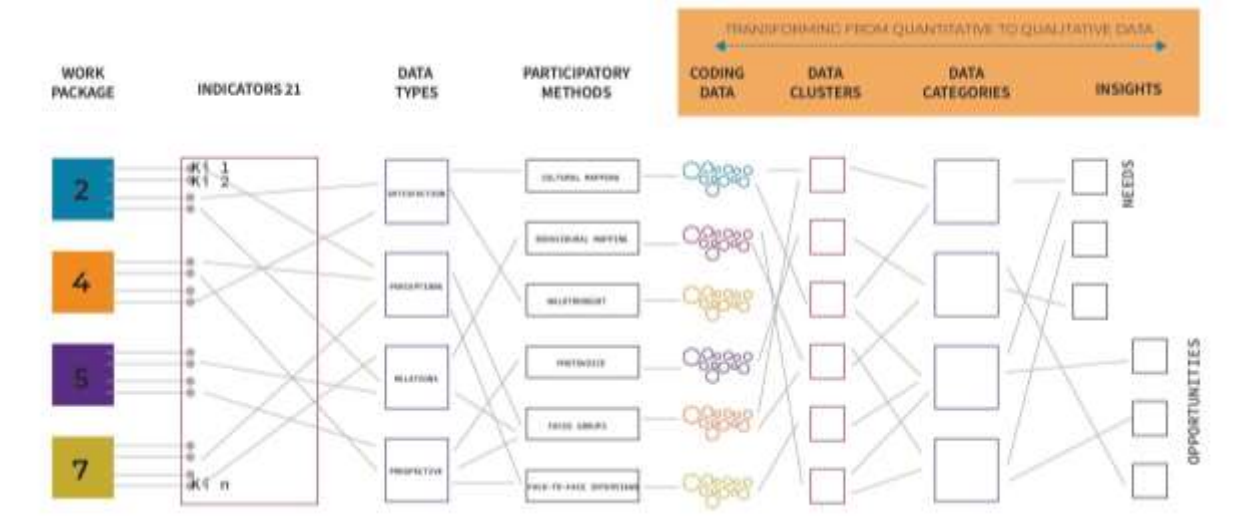


Figure 2 Data collection & analysis - Overall methodology - Participatory Design System PDMS

Following the previous deliverable D3.1 where we presented the PDMS principle and fundamentals, it was necessary to deepening the process, the flow and the sequence of information regarding the collected data from the Participatory Design actions & activities.

The Initial Matrix needed to be extended from transforming the work packages partners identified indicators (21) into data collecting types (Satisfaction, Perceptions, Relations and Prospective). After, the Participatory Design experts (wk3) defined the cross-methods approach regarding each data type (indicator needed).

The focus was then on making sense of the gathered information, also aiming to feed the overall data observatory with data units to run cross content analysis and insights for URBiNAT project.

Based on our experience of previous participatory Design projects, we created a sequence of steps to transform qualitative data into quantitative data:

- ❑ *Step 1* - Coding the data units, based on the gathered results analysis it was possible to define Data clusters or groups of information across the different tools and methods.
- ❑ *Step 2* - Using the internal WK3 co-creation approach we were able to propose data categories that express in a better sense the citizens given information on perceptions, sense of belonging and community, dreams for the neighbourhoods for example.
- ❑ *Step 3* - Creating a citizen participatory action & activity to ask for their categories validation converging in URBiNAT connected Needs and Wants.
- ❑ *Step 4* - Generate the main emergent insights from the Participatory Design process to share with the other's Work packages and the observatory.

The results presented in the local diagnostic of Porto illustrate this transformation of qualitative data into quantitative data.

### **Participatory activities for a qualitative data collection**

All qualitative inputs from participatory activities contribute to the quantitative inputs of the local diagnostic stage 1 related to:

- mapping of NBS in the city and intervention area;
- physical characterization of the city and intervention area;
- social cohesion;
- local participatory culture and opportunities
- social and solidarity economy.

The implementation of the participatory activities is always guided by the double goal of participation In URBiNAT, which is considered both as a means (dialogue between different kinds of knowledge) and as an end (introduction and reinforcement of local participatory cultures).

In the scope of work package 3, a methodological approach is applied to map the local participatory culture, including several methods and techniques that aim to design participatory activities for setting the adequate environment for community-driven processes: motivational interviewing, design thinking, cultural mapping, culture, photovoice, walkthrough, collective action.

These methods and techniques were applied to the design of the participatory activities described in the following sections, which fed the second stage of the front-runner cities' local diagnostics. The initial protocols of cultural mapping, photovoice, walkthrough and focus groups, as included in the annexes of deliverable D3.1, were reviewed on the occasion of the implementation of these activities, namely regarding the analysis of results.

In this context, some predefined methods will continue to be applied or are still to be applied, such as in the case of focus groups in Porto, which will be included in the design

of upcoming participatory activities in order to collect qualitative data, being some of them directly related to the socio- legal dimensions of health.

The upcoming participatory activities are also intended to present the results of the local diagnostics to the citizens and stakeholders of the intervention areas, in order to confirm the improvements that the development of the healthy corridors will focus, which will support the co-selection of NBS.

This will be combined with the results of mapping the local participatory cultures performed under tasks 3.1 and 3.2, as reported in the deliverable D3.2 on the community-driven processes to co-design and co-implement NBS, to be submitted at month 18, together with the present deliverable D2.1.

### Engaging citizens and stakeholders in participatory activities to build on their visions and perceptions for a co-diagnostic

This section is dedicated to describe the set of participatory activities used to perform the co-diagnostic and feed the following phases of co-design and co-selection of NBS. All the activities were proposed and validated within the collective work in the workshops/community meetings, as a way to build the co-creation environment, as well as to build on the visions and perceptions of citizens and stakeholders, as further detailed in deliverable D3.2.

- by producing the foundational elements for designing, selecting and implementing NBS that reflect the needs and ambitions from the communities; and
- by simultaneously framing the collaboration environment in which those actions will take place in the coming phases of so-designing and co-selecting NBS.

In practice, the final results of the co-diagnostic stage will feed the main topics to guide the co-design and co-selection phases of the most adequate NBS. Some of the participatory activities will be used again at this stage, combined with other according to participatory local culture and the topic/NBS addressed, as illustrated in the figure below, presenting the information flow and sequence of the participatory design metric system (PDMS).

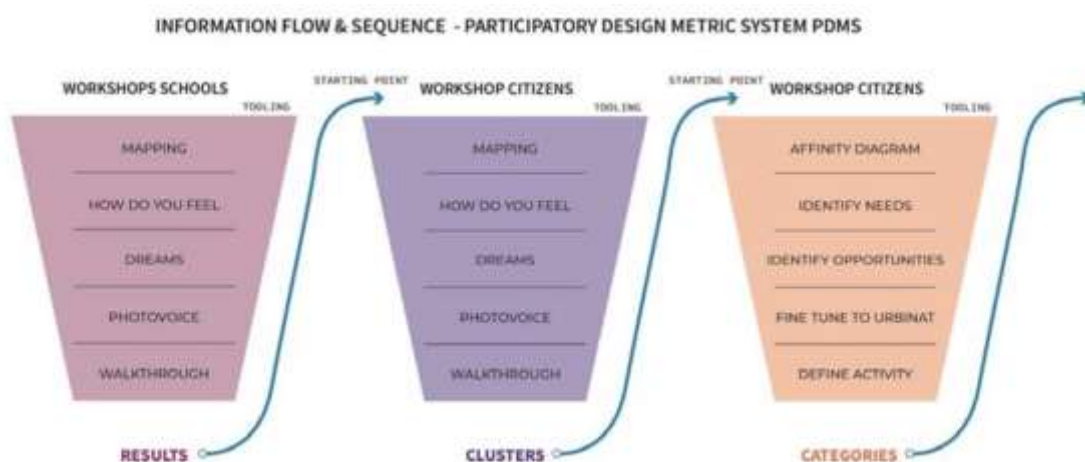


Figure 3 Information flow and sequence - Participatory design metric system (PDMS)

The following subsections detail each participatory activity in terms of a general description, objectives and an implementation script.



### 3.2.1 Cultural mapping (Mapping, dreaming, feeling, gaming)

The combination of cultural mapping, motivational interviewing and participatory design can be identified in participatory activities that URBiNAT's working group on participation has developed with the local task forces of Porto and Sofia in the process of approaching and engaging citizens and stakeholders. These approaches are further detailed in deliverable D3.2.

Cultural mapping can be defined as a field of interdisciplinary research and a methodological tool in participatory planning and community development. The URBiNAT's approach to cultural mapping aims to catalyze processes for actively connecting people and deepening knowledge of a locality. It is a process of collecting, recording, analyzing and synthesizing information in order to describe the cultural resources, networks, links and patterns of usage of a given community or group in a specific locale.

Extending from the experience of psychology focusing on addressing behavioural risk factors, such as drinking, smoking or other forms of substance abuse, **motivational interviewing** has evolved to form a methodology and technique for wider efforts to promote behavior-change in extended communities. The core originally took the form of dialogue for the purpose of building understanding about outstanding needs.

**Participatory design** started from the simple standpoint that those affected by a design should have a say in the design process. One might say that two types of values strategically guided participatory design. One is the social and rational idea of democracy as a value that leads to considerations of conditions that enable proper and legitimate user participation—what we refer to here as “staging” and “infrastructure” design Things. The other value might be described as the idea affirming the importance of making participants' tacit knowledge come into play in the design process—not just their formal and explicit competencies, but those practical and diverse skills that are fundamental to the making of things as objects or artifacts.

#### ❑ Workshops with stakeholders

##### *Objectives*

- mapping of stakeholders;
- identify profiles, activities and participatory experience;
- engagement, recruit participants / co-developers.

*Assumptions:* each person has brought a picture or an item: “For this meeting, please bring an illustration or an object representing where and how you work locally, what you feel and would like to convey about it. We would also like you to share with us an experience of participation or involvement with citizens in the project's intervention or in another area of the city”.

##### *Discussions:*

- What do you like about the area? (a tree, a community centre, a shop, people, a road, an old friend, a bar, etc.)

- What would you like to change?
- How can you contribute and who should help?

*Examples of workshops and results:*



Workshop with technicians of Porto municipality  
11 March 2019



Workshop with stakeholders  
27 March 2019



**PRESENTATION OF PARTICIPANTS**  
Results of workshop

Information provided by participants in Porto-ru unit  
Compiled and organized by URBINAT

URBINAT-METTING	
<b>AMBIENTE</b>	...
<b>JARDIMÓLIO</b>	...
<b>EDUCAÇÃO</b>	...
<b>TURISMO</b>	...
<b>DOMUS</b>	...



**PRESENTATION OF PARTICIPANTS** Results of workshop

Participant	Organization	Address	Contact	Phone	Email	Website
1	...	...	...	...	...	...
2	...	...	...	...	...	...
3	...	...	...	...	...	...
4	...	...	...	...	...	...
5	...	...	...	...	...	...
6	...	...	...	...	...	...
7	...	...	...	...	...	...
8	...	...	...	...	...	...
9	...	...	...	...	...	...
10	...	...	...	...	...	...

**TOGETHER IN URBINAT** Local stakeholders

**HOW DO YOU SEE THE INVOLVEMENT OF YOUR ORGANIZATION IN THE DIFFERENT PHASES OF THE CO-CREATION PROCESS?**

- 1 Most relevant**  
+ your name and org.
  - 2 Secondary**  
+ your name and org.
  - 3 You, as a citizen**  
+ your name and org.
- Gather first intuitions, close to your DNA  
→ No definite commitment



**URBINAT**

HEALTHY CORRIDORS AS DRIVERS OF SOCIAL HOUSING NEIGHBOURHOODS FOR THE CO-CREATION OF SOCIAL, ENVIRONMENTAL AND MARKETABLE NBS

www.urbinat.eu | contacts@urbinat.eu | @URBINAT

## WORKSHOP WITH LOCAL STAKEHOLDERS IN SOFIA

Working Group on Participation | Parallel session - Day 3 - Sofia meeting | January 25th, 2019

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 776783



*Idea Factory - Forum theatre*





## ❑ Mapping of what is most liked and done in the territory



### General description

Demonstrate to participants a map of the project's intervention zone (A1 format) to identify specific zones (which they like best, that they like least, where they identify problems or value) with the help of stickers or the possibility of draw / write a custom sticker.

In this way it will be possible to identify priority zones in the study area.

### Implementation

1. Ask each participant to contemplate the map of the area, explaining the provenance of the elements already mapped.
2. Explain that the objective is to understand the relationship that the inhabitants have with the different areas, either by the activities they develop, or by affective or familiar relations.
3. Also identify the existence of stickers that come from interactions with other participants and which may be complementary.
4. The customizable sticker is the privileged element because it allows the introduction of new concepts in city mapping.
5. Make the participant aware of the importance of this activity, because it will allow to understand the flows of each area and the specificities in its relationship with the different public spaces.
6. If participants find it difficult to identify associated areas and activities, the facilitator should help to recall moments such as local festivities, home holidays, long weekends, family picnics, childhood memories, etc.

- ❑ **Subjective geography**  
[www.geographiesubjective.org](http://www.geographiesubjective.org)



On the occasion of URBiNAT's partners' meeting organized in Nantes by the local task force (Nantes Métropole, Ville de Nantes andIRSTV/CNRS), in July 2019, a series of field visits and workshops enabled the members of the consortium to know the tools and initiatives put in place by Nantes to support citizens' participation.

One specific tool inspired the working group on participation for the development of its mapping activities: a map made with children to understand how they see and envision the city.

This map is the result of the project 'What is my map of Nantes?', that is, Nantes seen by the children of the Manufacture and Bellevue districts.

It is to answer this question that a 'wacky pseudo geographical project' was born: to propose to the children of two districts to create their own map of Nantes.

The goal was not to show how the city is, but rather to give an account of how it is for the children of these districts, by giving to see what lives there, their way of perceiving and imagining it: a subjective vision.

Subjective Geography is the name of a project that wishes to give full rights to a truant and collective geography, as rigorous as distorted, by means of a map. The so-called "subjective" map is made by a group of inhabitants with the help of facilitators (Catherine Jourdan, artist and Pierre Cahurel, graphic designer). It is then printed and made public in the cities' billboards.

Since 2008, thirteen European cities, including Nantes, Rennes, Luxembourg, Brive, Charleroi, have lent themselves to the game of this collective creation: to create their map of the city seen by its inhabitants.

## ❑ Dreaming



### General description

This activity is intended to challenge participants to write or draw the dreams they have for the project's intervention area, that are then hung on ropes.

### Implementation

1. The facilitator should help participants not to be inhibited, as people tend to have concerns about writing or drawing as they are exposing themselves.
2. Demonstrating that this is a time of sharing, leave it to the persons at their discretion to best express their ideas with whatever means and creativity they choose.
3. Moment of liberation and a return to childhood, where what matters is the capture of that dream, either by word or drawing or both.
4. Ask participants to record the location of their dream and their age on the A5 sheet where they draw or define their dream.

## ❑ Feeling



### General description

In this activity, there are 3 structures of 5 tubes.

Each pipe structure corresponds to a question that is asked to each participant (e.g. if they like / dislike the area) and they have to answer by placing a marble from pipe 1 (e.g. do not like)



to pipe 5 (e.g. they like it a lot).

The methodology is repeated for the remaining 2 pipe structures, which will have different questions (e.g. feeling close to nature and enjoy living with people from the area).

At the end of the activity, it will be possible to see the response trends according to the number of marbles placed in each tube for each response.

### Implementation

1. The facilitator should explain the objectives of the 3 questions, leading participants to reflect on their opinion, quantifying their perception of feelings, people and places.
2. There may be some tendency to respond according to the higher number of answers given, but it is up to the facilitator to interpret the “signs” of doubt or discomfort by exposing the answer the person will give.
3. Here the facilitator should also get feedback on these concerns and additionally have an observer note these behaviors.

#### 3.2.1.1 Gaming and performance



This activity is intended to develop a dynamic or performance to introduce to participants the concepts around NBS, through the use of NBS pictures hanging on trees or on ropes. The interaction between the facilitators and participants during the presentation is key in order to create the narrative and generate a “performing” presentation.

The facilitators need to circulate in the middle of participants to get more attention from them when they are losing it. Facilitators need to be very attentive to participants who are not participating or apart from the dynamic, offering help when they are feeling uncomfortable (tired or not feeling well in a noisy environment), giving a special attention in helping to understand and to enter the dynamic of choosing the NBS, but without being insistent. Participants, whose attention is more difficult to catch, can be recruited to help in explanations.

Presentations and interactions can start focusing on Health (as an objective of URBiNAT, of having the city of participants even more healthy and friendly), on what it means for them and after for URBiNAT, expanding from the physical dimension to the social and mental well-being. On what makes them Healthy and Happy.

Once the participants are involved, the facilitators have an interactive talk about the NBS, giving them:

- a “flower” shape post-it to be placed on an NBS that they already knew about;
- a “like” shape post-it to be placed on an NBS they would like to see implemented near their area.

Concepts around NBS are very dense, and we need to focus on the dimensions of URBiNAT’s catalogue of NBS, how these dimensions interact and how it relates to the “real life” of participants, since it is for most of them their first contact with the concept of NBS and with many of the solutions of the catalogue. The objective is to instigate interest. E.g.:

i) *technology* - computer, cell phone, but also related to nature like solar panels and wind turbines;

ii) *territorial* - land, rain, territory;

iii) *participation* - inspiration on animals, how they collaborate, like ants, but also being together to build things, or discuss and know each other like what we experience together at that moment;

iv) *social and solidarity economy* - focus on solidarity and sharing resources, friendship ties, also a possible connection with bees (their generous collaborative work from which we benefit).

However, giving explanations about each NBS is much easier when manipulating posters with participants, going around with them and asking them what they see and understand, and completing their understanding with more details about the solution. Many participants call facilitators from a poster to another to show what they choose or ask what is represented in the poster, in order to help them to choose.

Concerning specificities of groups and individuals, they can be addressed starting with the different accents and origins of the facilitators, and that each of us as individuals, even sounding strange, need each part of our origins and differences to be Happy, that is, complete and Healthy (physically, socially and mentally).

This can more easily lead the facilitator to focus on diversity, that even in URBiNAT we are people from different countries and different backgrounds, and that it helps us to build a project with contributions and solutions from all of us, that we want to share it with them and expand this construction with them.

During the application of this activity in schools of Porto, children (independently of ages) had a very receptive reaction when confronted with the fact that they are citizens of TODAY (not only for the future), and that today any decision related to their living environment should be taken with them, that they should be part of the decisions that have an impact on their lives (ex.: parks, playgrounds that they use on a daily basis). A promising field of empowerment and dialogue on children’s rights.

Participants can also be receptive and curious about other places, other cities of the project. This includes sometimes to guess from which country the cities are, or even getting the name of local soccer teams. Playing with words in different languages and accents, like explaining the English name of URBiNAT or pronouncing the name of URBiNAT’s cities is also catchy.



### *Board game (Jogo da Glória)*



This activity is intended to develop a performance to introduce to participants the concepts around NBS, through the use of an interactive game.

The facilitator asks two or three volunteers to roll a die, and advance in the board game accordingly. If the die falls on a number, the participant can ask a question about the project and NBS he/she knows or to which he/she was introduced in another activity, such as having watched a video on URBiNAT's project. If the participant

doesn't have a question, the facilitator can ask: why is URBiNAT in this area? what do we want to do together? what is a healthy place? what does nature have to teach us?

If participants fall into a picture, the facilitator does not give the NBS name or illustration, but just asks the corresponding questions. If the picture is URBiNAT's logo: what does URBiNAT mean? For all other images: what does this image represent and inspire you? The facilitator can provide further indications if needed to help feed responses. E.g.:

- *Bread house*: concept of solidarity - Naturally we are collaborative and so are the bees! How can we harness this natural resource of ours to increase well-being and solidarity in the community?
- *Green rooftop garden*: concept of reused space - There are too many empty and gray spots to recolor! In what urban spaces can we reintroduce nature for the benefit of all?
- *Modeling*: concept of drawing and imagining together - We are all creative, yes! How to unleash our imagination and creative energy together?
- *Urban garden*: concept of using natural spaces to produce resources together - It is not only in the supermarket that you get fruits and vegetables! Have you thought about farming in the city, close to home? *Watercourse recovery*: concept of rehabilitating nature in the city to help us with climate management - Cities hide many rivers! Did you know that they can help control floods and at the same time restore the flora of the region? Where in your area?
- *Ceramic lining* that holds rainwater, prevents flooding and feeds plants that clean the air: concept of introducing design and technology to empower nature - Technology is often seen as contrary to nature! How can art, imagination and innovation work simultaneously with nature?

This activity mainly enables to:

- broaden the perception on the existence of NBS in the city;
- expand the concept of NBS to immaterial dimensions, as well as on the opportunities to combine material and immaterial solutions;
- highlight key components of NBS for the participants;

- ❑ collect suggestions for participatory activities to be developed within URBiNAT, so further engagement of potential champions;
- ❑ map critical issues to be solved in the area of intervention;
- ❑ collect and answer questions about URBiNAT project for appropriation of and engagement in the project

### 3.2.2 Walkthrough

#### *General description*



A walkthrough is a participatory methodology that can be applied for both co-diagnostic and co-selection phases, in two connected phases.

For the *co-diagnostic phase* (phase 1) the walkthrough is a “focus group in situ”, that is a method of analysis that combines observation with an interview simultaneously. It creates an accepting environment that puts a small number of participants at ease allowing them to thoughtfully answer questions in their own words and add meaning to

their answers, allowing the evaluation of negative and positive aspects of the analyzed environments.

It also allows identifying the residents’ perception of the place where they live. In this technique, residents are invited to appropriate the neighbourhood and evaluate the territory, its inadequacies, surplus or missing furniture, barriers and potentialities, among other important elements. This technique dispenses with the verbal formalization of concepts so it can be applied with groups with difficulties for verbal constructions of concepts.

For the *co-selection* (phase 2), the walkthrough is also called “NBS in situ” and combines walking around in the intervention area with a visioning participatory methodology. For applying this phase, you have had collected information about positive and negative aspects and deep insights about values and attitudes in the intervention area. It can be done applying phase 1 for the walkthrough or another participatory methodology for diagnostics, such as cultural mapping. But it is important to point out, you should not apply the phase 2 without a previous co-diagnostic and a previous NBS presentation (see the next topic “important recommendations”).

The *NBS in situ* applies a visioning methodology while walking in the intervention area. The use of a non-static visioning activity allows the residents to better identify the most suitable NBS for a specific place, considering the territory and doing a scenario evaluation.

It is a valuable resource to be used to develop with the citizens a shared vision to promote short, medium or long term interventions, and also allow integrating multiple visions from

different stakeholders. It results in a “shared commitment to a future vision and an energised team focused on what needs to be done to achieve that vision.”

### ***Implementation for the co-diagnostic phase***

#### **□ Step 1 - Before the walkthrough**

- Define the conduct of the researchers (see the role of the researcher);
- Prepare a work plan that explains who does what, when and where (eg which researcher conducts the questions and who is responsible for the photographs);
- Define whether the group will take researchers onsite spontaneously or whether the visit will be guided by questions from the researcher’s questions;
- In the latter case, define the places to be visited and the questionnaire to be applied;
- Search on the place to be visited to help in the elaboration of the questions, in the contextualization and - perception of residents’ emotions and feelings;
- Groups up to 10 people;
- Define the time the visit may take;
- Check to visit limitations and impediments (dates, time, attends, weather);
- Plan the route to be visited (in case it is not a spontaneous visit), to save time, and prepare information that can be consulted during the course to feed the debate and discussions;
- Give a title to the task, for example: “Discover our streets and co-produce a shared vision”;
- Material: maps in scale 1/50 in A4 or A3 format. Since the area is very large, it should be fractionated; card with structured questions to note the answers; maps for residents (when so decided); a clipboard to take notes on the fiche.

#### **□ Step 2 - During the activity**

- If the route is planned by the researcher, ask the participants to add their parallel paths (when compatible with the objective);
- If the route is not planned by the researcher, ask the participants what places they would like to present/visit and plan the best route before starting. Route deviations are acceptable;
- Before starting the tour, making an introductory meeting to inform the participants and clarify doubts about i) objectives; ii) benefits for residents; iii) on the registration of comments, photos and other observations;
- Suggested questions to motivate the discussion: What do you like in this place? What could work better or different? (eg, lighting, green spaces, connections between neighbourhoods, pedestrian paths, etc.) Why? How do people use the square/garden/street/outer space of the neighbourhood? What usually happens in the square / in the garden / in the street / outer space of the neighbourhood? Where do you live? (when applicable);

- Observations (about the place, about the participants' comments, etc): make photographs to illustrate questions and answers; you can join the group at the end of the walkthrough to share the results;

- The role of the researcher: there may be a critical distancing, in which the researcher merely notes the results provided by the residents, without resorting to their own considerations of the place; OR there may be a critical positioning, in which the researcher also notes his reactions and emotions about the place.

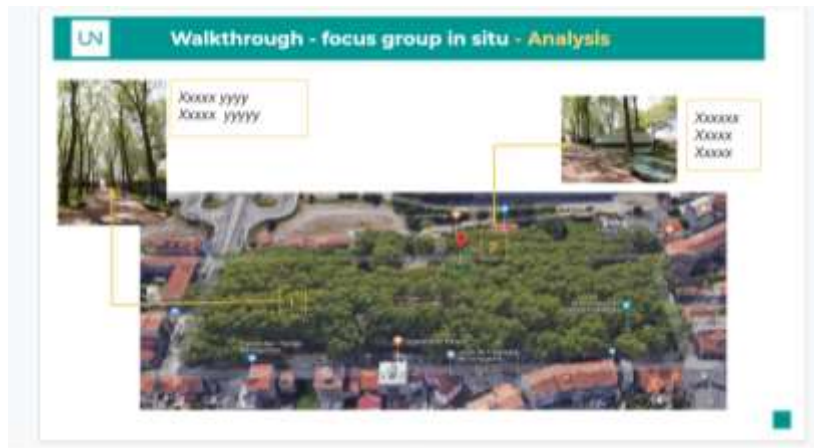
- Step 3 - Analysing results

- They must be placed in a matrix, with the map, photographs and comments;

- Record the words, avoid making interpretations;

- Check the frequency of topics covered and connection to spaces;

- The result can be checked in graphic form for better visualization of recurring themes.



Example of visualization

- Step 4 - Reporting results

- Write a report following URBiNAT template (including purpose, process, outcomes and findings) - it is already included in the analysis template;

- Schedule a meeting to discuss results (highlighting main themes, issues, problems, etc, that arose in the session);

- Discuss how to proceed for the next steps with the community, especially for NBS selection (applying the NBS in situ protocol).

### 3.2.3 Photovoice

#### *General description*

The participatory activities that use photos to activate the dialogue with citizens can be divided into two methods: Photo Elicitation and Photovoice.

*Photo elicitation* involves the use of photos to extract information from the studied reality. Photos allow a co-construction of reality through the interaction of 3 elements: the researcher, the photos and the interviewee.

Photo elicitation i) allows to explore the complexities and specificities of the individual situation and of the context and ii) facilitates the problematization and the conceptualization of identity through the interaction between the respondent and the researcher in the co-construction process of the theory.



The *photovoice* seeks to emphasise the perspectives of those who live their lives in a totally or radically different way from those who have the power to construct and affirm the meanings of normality in the context of the production and application of public policies.

In socially disadvantaged or marginalized communities the photos used for the interview are carried out by

the interviewees themselves. It is a technique (called photo voice) that works well to engage children and young people in research.

The photo voice aims to give voice, through photography, to those who are usually silenced. It is also known as "participatory photography".

#### ***Impact on selected indicators:***

##### Direct impact:

- perception of physical barriers: walls, stairs, highways, declive;
- memories of happiness/fear in the area;
- qualities of: the houses, public space, neighbourhood and the urban area

##### Indirect impact:

- use of space in the healthy corridor area: private/public; walking / playing / resting area;
- existing social and commercial cultivation activities (defining the types of culture);

- relations with neighbourhoods, education facilities, health facilities, public spaces

**Scalability:** Photovoice / Photo elicitation can be used in any territorial context and can host no more than 15 participants. If you have more, then you should create more groups.

### ***Technical Description***

In this sense, when we think of the strategies that we can use to analyse photo interviews, we have to give importance to:

- i) the interviewees' gaze (what do the interviewees point out in the photo?);
- ii) the context (in what context did that photo appear?);
- iii) to listen (listen what is said, listen the silence and above all the way the narratives are hierarchized);
- iv) juxtaposition and relations between photos (for example, how the oral discourse and the visual component of the photo become absolutely obvious or not?);

The elaboration of sociological portraits implies:

- (1) the accomplishment of a biographical interview script adequate to the research objectives, but also developed to questioning the actors about his position concerning diverse spheres of life;
- (2) performing two to three interview sessions, preferably with an interval of days or weeks between them, in order to promote the reflexivity of the actor;
- (3) interviews transcription;
- (4) editing the interviews in order that the final result is a speech in the first person of the interviewee;
- (5) construction of the portrait, articulating theoretical resources and empirical material, that is, inserting a superficial interpretive slope;
- (6) production of a title that highlights the interpretive guideline of the story, a summary of the life trajectory and a detailed body of the trajectory.

The scheme of the portraits presentation, described in the last phase of elaboration, allows three ways of reading the portrait: by title (ultrafast), by summary (fast), by the main body (more detailed).

### ***Implementation of the activities in URBiNAT***

#### Phase 1 - Before the Photovoice

- identify purpose and expected outcomes of the Photovoice
- determine how many photovoice workshops will be conducted (multiple photovoice allow comparison and complementarity of gathered information);



- identify the participants (how many? Ideal between 20 to 25, to be divided in groups of 6-8);
- identify participants, their name and contact details and send invitations;
- identify a set of topics (maximum 5-6 relevant for the purpose): what I like most in my...; what I would like to do here...; what is the big challenge/opportunity for my...;
- develop a script (plan the phases of the session: from welcome to closure);
- identify the facilitators and train them. One facilitator per each group of 6-8 people.
- choose a location (easy access, comfortable);
- create local conditions (p.e, create conditions that every participant sees all others);
- set a time (depending on the time consider food and/or drinks);
- provide materials (notebook, computer, audio or video recorder, flip chart, list of participants, script, name tags, clock for time control, etc).

#### Phase 2 - How to select the photos

- send a message to the participants to bring images (2-3), according to the theme of the session - my neighbourhood (house, family, friends, open areas, public space); NBS (NBS that I like most), old photos/ new photos, photos from magazines about their neighbourhood/city;
- any photo can be good, if the interviewee can talk about it. An image in a photo has several layers of meanings;
- it can be colour or black & white. It should be sharp;
- you can use existing images from the archive of the interviewee or from the interviewer. you can also ask the interviewee to do new pictures or you can do a walkthrough to collect images. You can also pick images from websites. The important thing is to use one criteria.

#### Phase 3 - During the Photovoice

- arrive before participants to set room;
- welcome and introduction of facilitator (and note taker, if exists);
- ask participants to introduce themselves;
- obtain informed consent;
- ask participants to say their name everytime they make a comment during the session;
- conduct the session according to the script;
- audio or video record the session;
- monitor the time closely;
- to finish, thank participants and tell them the next steps, including devolution of results.

Phase 4A - Implement the Photovoice (kick-off for children/adults) - 20 minutes per group

- 5 minutes - Explain briefly the goal of the session according to the theme and how it will happen. Divide the participants in small groups of pairs 6-8 people

- 5 minutes - each pair will present the picture to the person on their side

- 10 minutes - each person talks about his/her picture, according to the goal (see questions below)

- 5 minutes - conclusion

Phase 4B - Implement the Photovoice (kick-off for children with grandparents)- 20 minutes per group

- 5 minutes - Explain briefly the goal of the session according to the theme and how it will happen. Divide the participants in small groups of pairs 6-8 people;

- 5 minutes - each grandparent will present the picture to the children on their side;

- 10 minutes - each grandparent talks about his/her picture, according to the goal (see questions below);

- 5 minutes - conclusion - children explore the conclusions: a) identify the themes discussed as positive, as opportunities, as proposals - use a A2 to register with a table; b) use diamond ranking to identify the most relevant and less relevant images for the group, according to the theme.

Phase 5 - Analyzing results

- after the session, the facilitator should write up a summary of impressions; according to the methodology used for the conclusion - table or diamond ranking;

- transcribe the audio recording of the session, as soon as possible;

- read the impressions, the transcriptions and write down themes and trends, relevant comments and emotional responses;

- interpret the results: what are the major findings?

Phase 6 - Reporting results

- write a report following URBiNAT template (including purpose, process, outcomes and findings);

- schedule a meeting to discuss results (highlighting main themes, issues, problems, etc, that arose in the session);

- discuss how to proceed.

Phase 7 - Transfer to Observatory Platform (GIS and Mymaps)

The process for creating the map:

With the ultimate goal of allowing the visualization of the results of photovoice and walkthrough activities performed in Corujeira and Falcão elementary schools, a practical and accessible mapping platform was selected: MyMaps

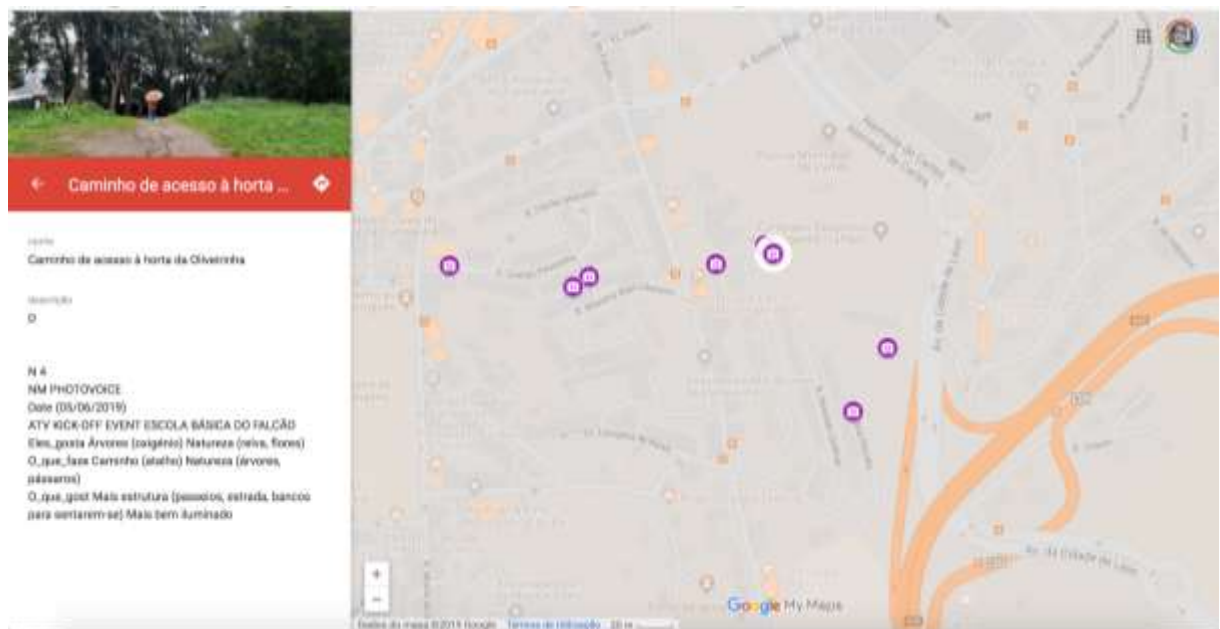


The first step was to gather the information on each of the points: briefly, each location has one or more associated images and a textual response obtained during the activities. The text information, along with the coordinates of each point, were organized in excel table format so that the information could be entered into the ArcGis program to generate a file in KML format. The KML file contains the georeferenced sites already with the associated text and can finally be inserted into the MyMaps platform for final formatting.

At this time, the location information is already entered: Finally, the images are submitted individually at each point, as well as the necessary textual corrections. The platform also allows the editing of the icons of each location and the creation of paths between them, so that the information to be exposed can be as understandable as possible.

This tool will support the urban planners to integrate the students view in the healthy corridor plan.

*Presentation of the results through a GIS platform (ARCGIS) and a GIS Visualisation Software (MYMAPS)*



SHORTENED LINK: [shorturl.at/rsBT6](https://shorturl.at/rsBT6)

COMPLETE:

<https://drive.google.com/open?id=1vHIBfCII6buKAf9PgsEluo6MTGGgdXos&usp=sharing>

### ***Photovoice table***

#### ***1. Divide the participants in groups***

- Each participant tells a story about one image or answers to the facilitator questions about it.
- In the table, the facilitator organizes the topics that were mentioned in order to establish links.
- All the photos should have a number to relate it with the topics

## 2. Diamond Ranking

- Choose the most and less relevant themes for URBiNAT project.
- You can start by the diamond ranking and then explore the topics, mainly when the pictures were brought by URBiNAT facilitator.

<b>THEMES</b>				
<b>LIKE</b>	1 - trees			
<b>DO</b>	1 - ride bike			
<b>PRESERVE</b>	1 - sculpture			
<b>CHANGE</b>	1 - more trees			

		+ important		
		- important		

### 3.2.4 Focus groups (observation)

A focus group is a method for collecting qualitative data that combines interview and observation of a group of individuals that share a particular experience or knowledge. In a focus group, the researcher poses a series of predetermined questions to the group aiming to explore their perceptions, meanings and experiences on diverse topics. The interactions established between participants during the session are also important sources of information that require the researcher's attention.

- Phase 1 - Before the focus group
  - identify the purpose and expected outcomes of the focus group;
  - determine how many focus group will be conducted (multiple focus group allow comparison and complementarity of gathered information);
  - identify the participants (how many? Ideal between 6 and 10);

- identify a list of key attributes of participants (relevant for the purpose);
- identify participants, their name and contact details and send invitations;
- identify a set of questions (maximum 5-6 questions relevant for the purpose);
- develop a script (plan the phases of the session: from welcome to closure);
- select a facilitator (someone able to keep the discussion going, making sure all participants are heard; someone who does not actively participate in the dialogue);
- choose a location (easy access, comfortable);
- create local conditions (p.e, create conditions that every participant sees all others);
- set a time (depending on the time consider food and/or drinks);
- provide materials (notebook, computer, audio or video recorder, flip chart, list of participants, script, name tags, clock for time control, etc).

Phase 2 - During the focus group

- arrive before participants to set room;
- welcome and introduction of facilitator (and note-taker, if exists);
- ask participants to introduce themselves;
- obtain informed consent;
- ask participants to say their name every time they make a comment during the session;
- conduct the session according to the script;
- audio or video record the session;
- monitor the time closely;
- to finish, thank participants and tell them the next steps, including devolution of results.

Phase 3 - Analyzing results

- after the session, the facilitator should write up a summary of impressions;
- transcribe the audio recording of the session, as soon as possible;
- read the impressions, the transcriptions and write down themes and trends, relevant comments and emotional responses;
- interpret the results: what are the major findings?

Phase 4 - Reporting results

- write a report following URBiNAT template (including purpose, process, outcomes and findings);
- schedule a meeting to discuss results (highlighting main themes, issues, problems, etc, that arose in the session);

- discuss how to proceed

### 3.2.4.1 Observation

#### *Objectives*



Identify potential interlocutors / champions / interested in continuing to participate in the project as nodal points and satellites of a local collaborative network:

- as facilitators of the project: people who know the region (or part of it) and the residents well, and will be able to organize, along with the URBiNAT team, routes, direct observation practices, mappings, and other forms of territory recognition and also collaborate in the organization of participatory

activities in the various co-creation stages of the project;

- as storytellers / memory activators: people who know the history of the area well and can be interviewed, or participate in conversation rounds and other events that will be organized in the near future;

- as trainers / multipliers: people who have experience or interest in delving into the issues covered by the project (such as environment, sustainability, health, food, cultivation, recycling, culture, inclusion, nature, public space, etc.); and

- other forms of participation that may arise from the contact with these people.

Produce content for event videos that gather audio, video, photo and possibly participant testimonials. The idea is not to make a "long movie" with people during the event, but to gather insights, perceptions, desires or needs.

Collect inputs for Action Research.

#### *Implementation*

Be aware of the people who show the most interest during the event.

Circulate and be in regular contact with those responsible for activities so that they can also indicate stakeholders and alert points.

Approach people and start an informal conversation with questions such as: *What are you thinking about the event? Do you live / work / around here? Do you like*

*living / working / attending this region of Porto? Do you think a project like this could be good for the region? Would you have any suggestions / comments?*

- ❑ Once a person with some potential participation in the project is detected, a mini-interview can be made: record with audio from the phone, asking them to start with their name, phone, email, what brought them to the event and then let her make the statement she wants. All with careful information on how the data will be used in accordance with ethical principles and guidelines.
- ❑ If a person with a high potential for participation in the project is detected, it would be interesting to contact the person responsible for the research team immediately.
- ❑ When not directly addressing people, team members can also make short videos and general photos of the event, always focusing on people's participation and involvement.
- ❑ Edition of a video to gather the participants' views, comments and contributions, showing the multilayered approaches and reinforcing some of the common ideas shared by the participants, as detecting some of the main words that arise from the citizens' voices.
- ❑ Beyond the citizens' voices, which can be heard in the video, it is important to highlight a few comments to think of future activities in the co-creation process. This kind of more informal approach to people enables very sincere comments from some of the participants.



❑ **Example of video produced:** *Observation Research – URBiNAT Porto's public kick-off event / 12 Oct. 2019*

### 3.2.5 Behavioural mapping

Behavioural mapping (BM) is based on observation and various techniques for documentation, including mapping of activities performed by people passing and occupying a defined space in chosen moments of time. The results can be visualized by thematic maps of the space depending on the categories of behaviour and overall characteristics of people which are documented in the separate time intervals. The following aspects have to be considered in the observation: At which places do the users appear? Which types of use exist? How often and with what time reference are these? Which areas are preferred and which ones are avoided? To what extent the built environment and the available equipment are presupposing flows, dynamic and stationary activities? Do conflicts of use occur and if so where?

Behavioural mapping, as all direct observation techniques, is useful when relevant research information cannot be collected through participants' verbal or non-verbal self-reports (e.g., interviews and photographs). Unlike observation techniques, personal accounts depend on the respondent's willingness and ability to provide information to the researcher (Günther, Elali, & Pinheiro, 2008; Klein, C. et al., 2018). In many cases perceptions of behavior are subject to the influence of the respondent's memory, knowledge, beliefs, values and aspirations (Corral-Verdugo & Pinheiro, 1999). In addition, people are rarely aware of how they act toward the environment and they can hardly reveal many of the aspects involved in this relationship (P Klein, C. et al., 2018). Observation of behaviour in its natural environment is also an alternative to address topics that can make both research participants and observed people feel embarrassed in direct interviews (Creswell, 2010). Observation methods can avoid exaggerations and underestimations of actions and situations fuelled by the bias of social desirability.

The combination of different techniques (e.g., direct observation, interviews and the quasi-experiment) allows a comprehensive investigation of person-environment interactions. Thus, through the observation methods (as BM), the objects to the person and the aspects of physical space can be highlighted and understood in a reciprocal relationship. Observation methods are also viewed as a way to build the interdisciplinarity desired in people-environment studies as it combines research methods that are characteristic of different academic fields, such as Psychology, Architecture, Landscape design, Geography, Design. (Günther, Elali, & Pinheiro, 2004)

One of the major observational instruments used in person-environment studies is BM. It is an empirical document (data set), whose graphical representation of use and occupation of space allows the association between attributes of the environment, occurrence of observable behaviors and the time when they occur (Cosco, Moore, & Islam, 2010; Goličnik & Thompson, 2010; Marušić & Marušić, 2012; Pinheiro et al., 2008). The complexity of BM varies in accordance with the objectives of the research regarding the focus on occurrences in a specific space - behaviours versus place (Pinheiro et al., 2008). Recently, with the increased options that ICT, more complex forms of mapping have been developed in search of integrating and crossing data about behaviors, gender and approximate age, time of the day of occupancy, time of the week of occupancy, movement directions and even weather conditions (Marušić & Marušić, 2012).

BM is based on the concept of behavior setting and is understood as a natural environmental setting that organizes the occurrences of daily life within the limits of space and time. The understanding of behavior setting implies that behaviors occur within a somewhat specific pattern and are repeated in a reasonably stable pace with regards to

the environment in which they occur (Carneiro & Bindé, 1997; Cosco et al., 2010; Scott, 2005). In addition to observations, BM design can be based on data from interviews, database searches or conversations with informants. BM can be used as an empirical document in research about concentration and flows of social groups, preferences and avoiding of urban spaces, child development and school environment, in studies on the use of leisure areas in and around public and residential buildings.

BM as a tool can also be used to compile data in order to design proposals for intervention in environments. Behavioural maps record people's behaviour in real spatial settings and, by that, talk the language of research in a design manner. They offer great potential to represent behavioural patterns as visual data, and as such act towards the reconciliation between design and research in the field of planning and design. BM is a specific technique, developed with environment-behaviour studies to register, analyse and present data about the behaviour of people in direct relation with their physical environment. (Van Anel, Joost, 1994) The typical application of BM is contributing to spatial planning, place design and decision-making on changes in the urban environment. Depending on the design stage, in which behavioural maps are elaborated, they could be used as a check-list for quality of places, as a check-list of tacit knowledge of designers, and as the key input data for comprehensive spatial simulations (Marušić & Marušić, 2012).

BM relies on direct observation of behaviour coupled with a map of the geographical space on which the behaviours are recorded, analysed, and displayed. The design of a BM instrument implies preliminary observations that clearly define what is recorded, the map of the area, and the schedule of observations, in order to create a system to identify, codify and analyse the data (Van Anel, Joost, 1994; Marušić & Marušić, 2012).

Stages of observation:

- Defining the geographic location of the observed human presence on a map of the space.
- Collecting data in relation to the behaviour observed in that location/locations
- Display and analyse in an iterative manner that allows researchers to explore relationships between the spatial setting and the observed behaviour.

**The results from the implemented BM in the URBiNAT cities** are expected to provide in-depth knowledge of the users' dynamics at specified places in the study area that should be taken into consideration for the design of URBiNAT's Healthy Corridor and the implementation of selected NBSs. The data sets collected via BM and integrated with the data from the URBiNAT "Neighbourhood Survey – Assessing health and wellbeing of the local population" and other quantitative techniques will contribute to the process of comparing changes in terms of preference and liveability of the observed sites after the implementation of the NBSs and the Healthy corridor. During the co-diagnostic phase BM will outline the distribution of people and activities in the open space identify the "empty places" and the existing competing uses and conflicts, to evaluate relationship between existing/missing inventory and public works and activities/absence of activities. The latter will be included as a criteria in the territorial analysis and identification of the potential plots for the co-selection and co-design URBiNAT phases when the matching between plots/sites and NBSs and selection of NBSs will happen.



The methods are adapted and slightly modified for the purposes of URBiNAT from a combination of tools or survey protocols developed by Gehl and Gehl institute as well as RAND Health Care:

- From Gehl's tools: Place inventory (PI); People moving count + Age&gender tally tool (PMC&AGT); Stationary activity mapping (SAM)
- System for Observing Play and Recreation in Communities (SOPARC) from RAND's surveys.

The methods for database management, analysis and visualization are developed by the URBiNAT team on the basis of previous experience and the general technological and visual framework of the project.

The definition of the places of interest which will be areas and points of observation and documentation within the URBiNAT study areas are chosen on the basis of several criteria:

- They are along/in close proximity to the future Healthy corridor,
- They include or are next to potential vacant plots included in the future Urban plan for the implementation of the NBS catalogue through the co-selection and co-creation process,
- They may be subject to change (directly or indirectly) due to implementation of one or several NBS solutions or other opportunities created by the implementation of the Corridor and parallel local actions.
- 

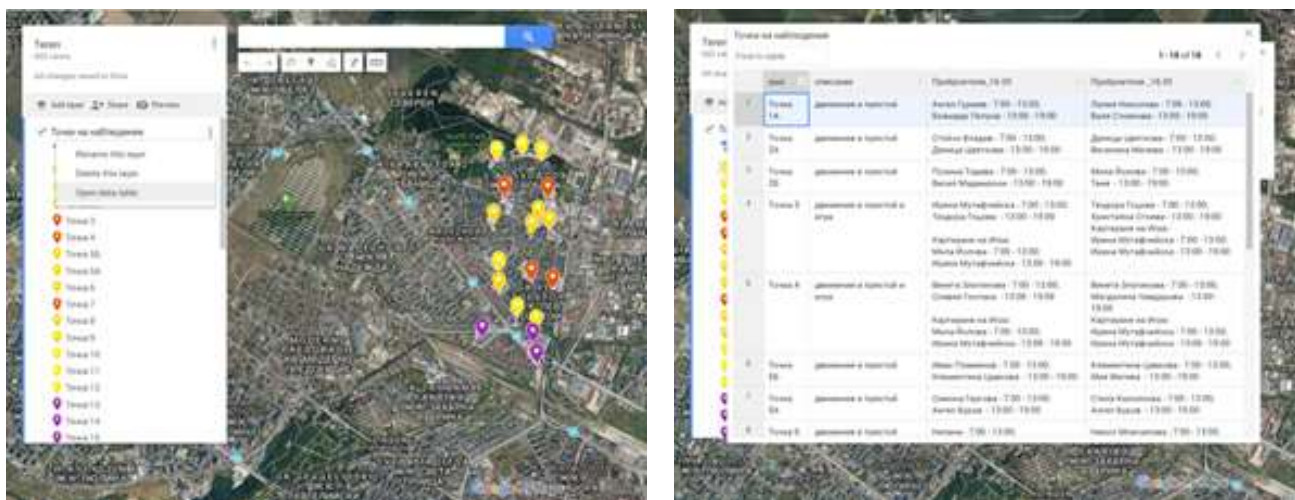


Figure 3 Map for scoping (source: UACEG on the basis of Google maps)

### How BM is applied in URBiNAT cities

The statistical representation of observations in time is guaranteed by systematic random sampling based on equal time intervals (momentary time sampling technique).



The seasons for mapping in the European climatic zones are Spring and Autumn as during this period of the year there are usually more open space activities throughout the day.

The weekly timing includes minimum two days of observation – one day in the workweek and one in the weekend (e.g. Thursday and Saturday). Days with celebrations are avoided as they are not representative for the everyday routines of places.

Throughout the days of observation the minimum periods of counting and mapping of play and recreation are in four periods - morning (7.30-8.30), lunchtime (12.30-13.30), afternoon (15.30-16.30) and evening (18.30-19.30) which are originally defined in the SOPARC protocol. The observation of movement and stationary activities is throughout the more active time of the day (e.g. 7-19 or 8-20 o'clock) every hour by 10 minutes counting for each direction (up to 2 directions which takes 20 minutes overall) and mapping after that for another 10 minutes along with recording activities (e.g. writing down the sum of pedestrians and taking photographs, switching between forms and base maps) of up to 15 minutes in between.

**There are basic and additional categories which will be observed and documented in the URBiNAT cities:**

- ❑ Categories of behaviour – activities related to moving, staying and playing (physical and intellectual activities) as well as other activities and habits (gambling, smoking, drinking, taking drugs, fast food eating), usage of media and communication devices (smart phones, TV), socialization (talking, music playing, collective games) and wellbeing;
- ❑ Categories of people – general age and gender groups and specific groups of interest;

Different categories are described in the Public Life Data Protocol (PLDP) (Gehl Institute & Gehl, 2019) as well as in the System for Observing Play and Recreation in Communities (SOPARC) Protocol (RAND Health Care, 2019). These categories are adopted in the forms and legends for the purposes of URBiNAT. The documentation of these categories is accomplished through the symbols (icons) in the legends and the records in the forms.

Method: Rand Health Care		Place No:	Date:	Period:		Names of observer:						Weather:			
System for Observing Play and Recreation in Communities (SOPARC)				Hour	Minutes							Temp.	Wind		
Gender	Age 0-14	Age 15-24	Age 25-64	Age 65+	Su m	Bulgarians	Chinese	Roma	Arabic	African	Su m	Sedentary	Walking	Aggressive	Su m
Primary (from the list of categories).....															
Female															
Male															
Secondary (from the list of categories).....															
Female															
Male															
Third (from the list of categories).....															
Female															
Male															
Observation (spectators).....															
Female															
Male															
Other roles (trainers, inspectors, security).....															
Female															
Male															

Activities	Icon	Activities	Icon	Activities	Icon	Activities	Icon
Physical exercises		Tennis on court		Cycling		Playing cards	
Strengthening exercises (push-ups, sit-ups, sit-ups with alternate arm)		Table tennis		Skateboarding		Lying on stomach	
Yoga		Football		Inline roller skating		Lying in hammock	
Archery		Dancing		Badminton		Phone	
Walking (sport)		Climbing		Hula and hula		Reading books / magazines	
Football		Swimming (open / shallow)		Playing chess		Other	
Basketball							
Handball							

Figure 4 Basic form for counting of recreation and play (Source: UACEG adapted from SOPARC protocol) and Basic legend for mapping of recreation and play

### Implementation of BM – technical description

Preliminary technical preparation of materials prior to instructions and field work is performed. Instructions to the participants in the field studies are given that include general orientation and preparation, safety, comfort, technical support, time schedule, space and places of observation, individual roles and relevant tasks.

The recording of the observations is through paper maps and forms and additional digital forms for counting.

The archivation of original analogous data gathered through maps and forms (tables) is related to its proper scanning and storage. There is an organization of files and databases for the digitalization of that analogous data. Other techniques may be used if recording is completely based on new digital technologies.

The data formats used include:

- GIS database file – Raster (\*.geoTIFF) and Vector (\*.shp) and attribute data (\*.dbf) as well as additional symbology and template files which depend on the specific GIS software (e.g. QGIS, ArcGIS)
- Folder of photographs for sceneries and silhouettes of people moving, staying, recreating or playing (\*.jpg, etc.)
- Document with data analysis and interpretation (\*.odt, \*.docx, etc.)

Processing of the different categories mapped and filled in the forms (tables) happens through digitalization. It may include:

- Scanning of sheets (maps and forms), Georeferencing (maps), Vectorization as points, lines and polygons with attribute data (numbers (integer) and text

(string)) of the observed phenomena recorded on the paper maps and forms, GIS database creation, or

- ❑ Direct filling of the database through web, cloud or desktop apps, platforms and digital forms based on the chosen techniques of recording (counting, mapping and note taking).

Metadata description of the vector files and database is also part of the operations.

The analysis of the data includes preparation of thematic maps for every mapped space by separate, combined or overall categories, including: Categories of behavior; Overall characteristics of people (gender, age); Time interval; Sequence of time intervals. More specific analysis of separate categories may include:

- ❑ Number of people moving as pedestrians and cyclists differentiated by their age groups and gender
- ❑ Concentration of people with their posture and activities
- ❑ Concentration of people at playgrounds performing various physical and recreation activities

The basic analysis can be crossed with schedules of kindergartens, schools, major employment and entertainment centers, and transport services, as well as cultural and sports calendar.

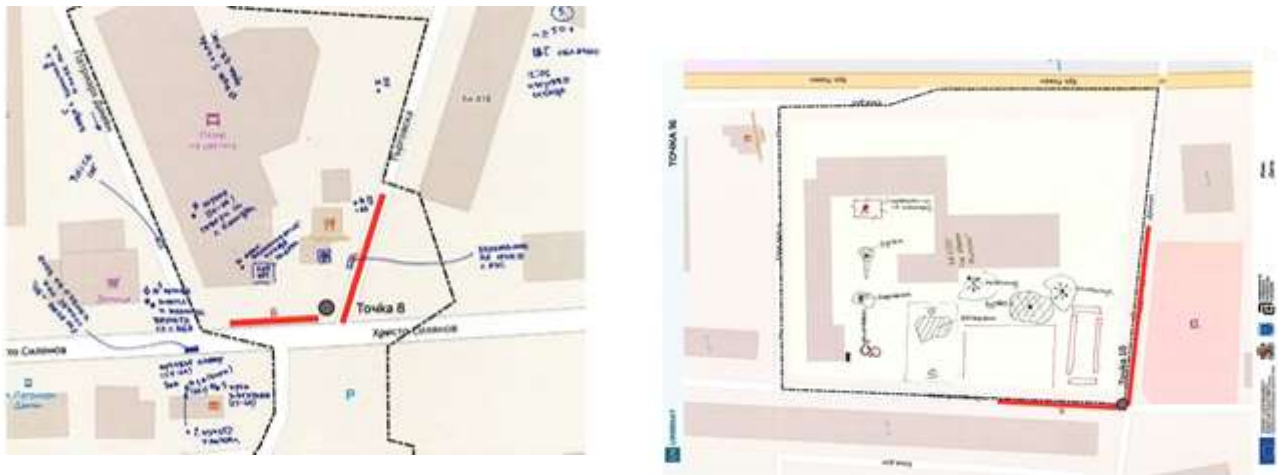


Figure 5 Mapping stationary activities (left), Mapping play and recreation, including site inventory mapping (right)

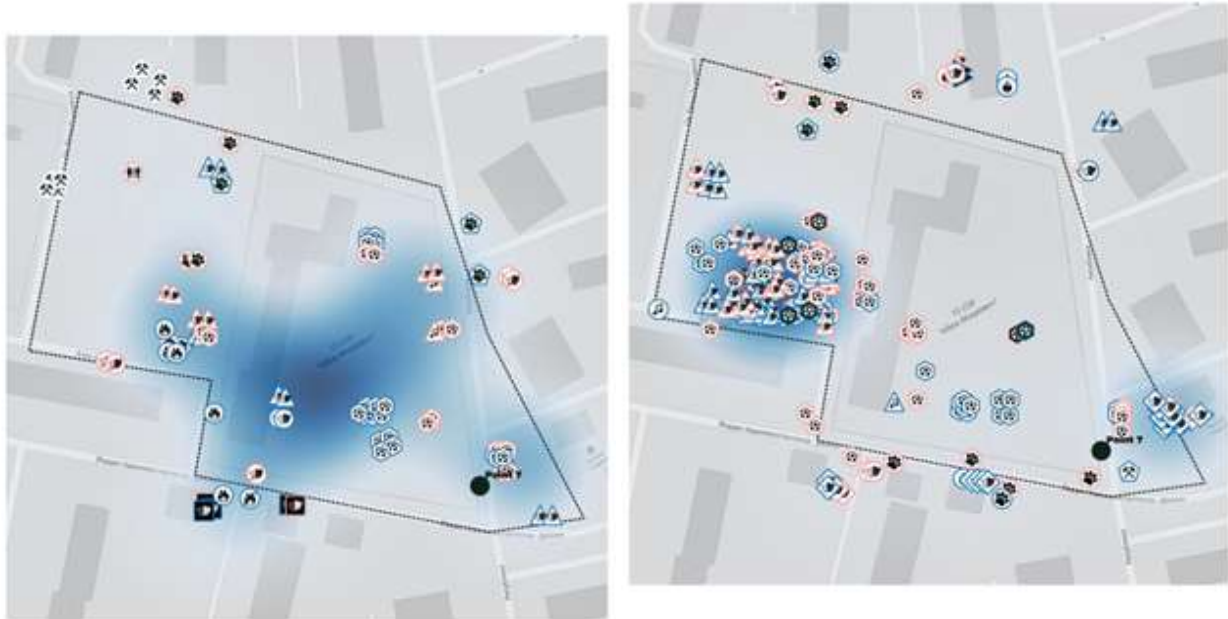


Figure 6 All stationary activities at working (left) and non-working (right) day (point 7, Nadezhda district, Sofia)

The map layers of the public transportation stations/stops and other assets along with the place inventory in relation to recreation, sport and cultural activities can be very good ground for interpretation of the mapped behavioral patterns.

Further on the output can be combined with other data and information in order to qualify or quantify related indicators, including:

- Access - demographic diversity of users; presence of vulnerable groups; intensity and modes of mobility;
- Territoriality - land use and occupation; quality of public services;
- Segregation - missing groups and possible reasons by emergent behavior;
- Participation - social connections, social inclusion rate, safety and criminality phenomena if outcropping.

The visualization through symbols (pictograms) representing the basic analysis of the movement can be lines or bi-directional arrows that have width categorized on the basis of the numerical attributes for the counted number of pedestrians or cyclists. The pictograms used for representation of stationary activities and the ones related to specific recreation and play may include categorized symbols with the help of geometric markers (circles, squares, triangles) and pictograms (associative icons (\*.svg or other supported formats)). The overall concentration of all or sub groups differentiated by gender, age, etc. can be visualized by heat mapping with varying size of the radius (e.g. 10-100 m) depending on the detail and scale of the maps. The cartographic products from the analysis can be visualized by static or interactive maps.

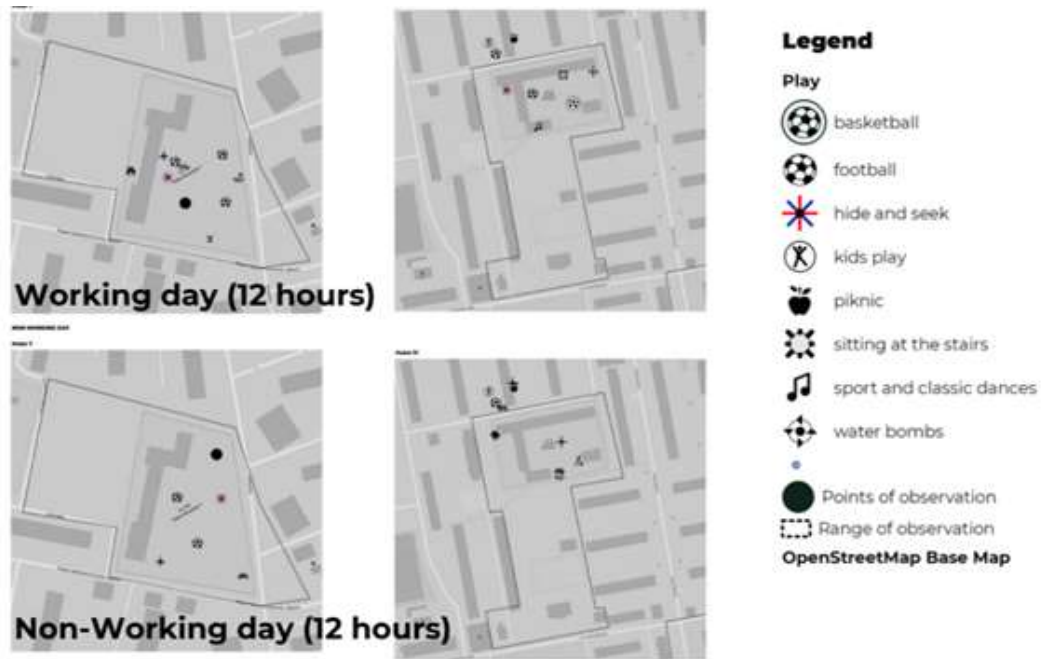


Figure 7 Play and recreation at working and non-working days for all 4 periods in the 12 hour observation

#### References:

Van Anandel, Joost. "Behavior Mapping and Urban Design: Graphic Versus Non - Graphic Information About Environment - Behavior Relations." In *The Urban Experience - A People-Environment Perspective: Proceedings 13th International Conference of the IAPS*. IAPS. Manchester, UK: E&FN Spon, 1994.

Ittelson, W.H., Rivlin, L.G. & Prohansky, H.M. (1970). The Use of Behavioural Maps in Environmental Psychology, In *Environmental Psychology: Man and his Physical Setting*, Prohansky, H.M., Ittelson, W.H. & Rivlin, L.G. (Eds.), pp. (658-668). Holt, Rinehart & Winston, New York..2.5. Face-to-face interviews

Marušić, B & Marušić, D. (2012), *Behavioural Maps and GIS in Place Evaluation and Design*, licensee InTech., <http://dx.doi.org/10.5772/47940>

Klein, C. et al., 2018, Place-Centered or Person-Centered? Considerations about the Behavioral Mapping Approach, *Trends in Psychology*, vol.26 no.2 Ribeirão Preto Apr./June 2018, On-line version ISSN 2358-1883, <http://dx.doi.org/10.9788/tp2018.2-03pt>

Gehl institute and Gehl's Public Life Data Protocol, <https://gehl.institute.org/tool/public-life-data-protocol/>

Place inventory tool (Gehl institute, 2019), <https://gehl.institute.org/tool/place-inventory/>

People moving count + Age&gender tally tool (PMC&AGT), <https://gehl.institute.org/tool/people-moving-count/>

Stationary activity mapping (SAM), <https://gehlinstitute.org/tool/stationary-activity-mapping/>;

System for Observing Play and Recreation in Communities (SOPARC) from RAND's surveys, [https://www.rand.org/health-care/surveys\\_tools/soparc.html](https://www.rand.org/health-care/surveys_tools/soparc.html).

### 3.2.6 Face-to-face interviews

In order to analyse the business models of sustainability-driven companies and organisations in the intervention cities, a series of face-to-face interviews were conducted in Sofia and Nantes. Interviews with green and social businesses in Porto are in the planning process. The goal was to identify the enabling factors that spur the creation and growth of social and sustainability-driven businesses

	A	B	C	D	E	F	G	H	I
1	Business/Type	Type	Business idea/concept	Contact person	Email ady	Appointment	Website	Address	
2	Stevinar	business	Drives a, AI (AI); for efficient infrastructure projects		same delara@stevinar.com	18.09.19	https://www.stevinar.com		
3	Evoleta	business	Eco drives; smart mobility		evoleta@evoleta.com		https://evoleta.com		
4	Greenproject	business	software eng-design to track energy consumption		greenproject@greenproject.com	18.09.19			
5	Aerostrack	business	global air quality sensors		aerostrack@airstrack.fr	18.09.19	https://aerostrack.fr/en/index.html		
6	Acopost	business	AI smart resource management		acopost@acopost.com	18.09.19	https://www.acopost.fr/en/about		
7	Proovette	private	Zero-Waste & Upcycling				https://www.proovette.fr		
8	Winevit		Resource optimising thanks to connected mobile meteorological monitoring devices				https://www.winevit.com		
9	Greeners Nantes	non-profit	Guided tours; human experience, cultural exchange				greeners-nantes.com		
10	Air quality de Loire	public	air quality surveillance a. information in a. for the region pays de la Loire; commissioned by the ministry of ecologic transitions						
11	Beate	business	Smart appliances for electricity production at home		https://www.beate.fr/contacter-beate/	18.09.19	https://www.beate.fr/		
12	Le Petit Moulin	business	loop from recycled plastic; made in France				https://www.petitmoulin.fr		
13	Vite max marche	business	delivery service for locally produced food				https://www.vitemarche.fr/		
14	Compassi	not for profit			contact@compassi.fr	18.09.19	https://www.compassi.fr/		
15	Velox	business	screenless navigation system for bikes; plug play, universal				https://velox.bike/fr/		
16	Lutetechop	non-profit, social	toy library	Denise Gibault?	lutetechop@lutetechop.fr	18.09.19	https://www.lutetechop.fr/		
17	Physiclab	business	launches a. environment planning agency with focus on biodiversity, urban public spaces, greenery etc.		contact@physiclab.fr	18.09.19	https://www.physiclab.fr/		
18	Accoport	non-profit, social	initiation for public, education, educational centres		https://www.accoport.fr/contact	18.09.19	https://www.accoport.fr/association-accoport/		
19	Le SolLab	not cooperative	Tapscams of social and industry economy		https://www.sol-lab.com/		https://www.sol-lab.com/		
20	L'Echo realite	referred	accompanies participatory housing projects		contact@lecho-realite.com	18.09.19	https://lecho-realite.com/		
21	Greenhouse Ecohouse	business	engineering and consulting (specialty specializing in environmental related issues and sustainable development on building and city scale)		info@ecohouse.com		https://www.greenhouse-eco.com/en/		
22	Le Net	financial business	financial cooperative that offers savings and credit solutions oriented towards projects of social, ecological or cultural benefits.		le.net@le.net	18.09.19	https://www.le.net/		
23	Velocompas	non-profit	The association's mission is to promote and encourage		contact via facebook?		https://www.velocompas.net/fr/velocompas/		

### Web-based Survey

Prior to sending requests for interviews to the social and green businesses, we designed a short survey to be filled out in order to generate an overall picture of the company (figure below). The main characteristic of this methodology is that the design is highly structured and administered to all the participants in the same way. In this case, a web-based survey was used as it shows clear advantages when compared to other survey modes in that web-based surveys save significant time and money for researchers by allowing a fast data collection and analysis. Data processing is therefore the main advantage of web-based surveys.

### Pre-Analysis of Interview Participants
















The below figure was used to collect the data of the companies in an excel sheet, including name, company type (non-profit, for profit), business idea/concept, contact person, email,



website, and the status of contact. This overview allowed all researchers to be informed on the ongoing processes and to create a database of all social and green businesses identified. This database was shared with URBiNAT partners and the municipalities in the intervention cities to further future collaboration and engagement with these businesses. In preparation of conducting interviews, we analysed all companies listed in the database based on their business proposition (mission statement), their eco-social benefit and eco-social cost to society and environment. In this process, we designed a template and used the method of the Sustainable SWOT Business Model Canvas (see 3.2.X Sofia and below figure). SWOT stands for strengths, weaknesses, opportunities, and threats. The idea behind this form of analysis is to identify what strengths can decrease the companies weaknesses and how is this process impacted by internal threats and external opportunities

### Interview Guidelines

The interview guidelines were semi-structured, which allowed both interview partners to develop pressing questions along the way. In this process, although the interviewer prepares a list of predetermined questions, semi-structured interviews unfold in a

Sustainable SWOT Business Model Canvas				
<b>Problem</b>  List 1-3 problems that you want to solve	<b>Solution</b>  Outline a possible solution for each problem	<b>Unique Value Proposition</b>  Clear and compelling message that states why this solution is different and worth paying attention to	<b>Unfair Advantage</b>  Something that cannot easily be bought or copied	<b>Customer Segments</b>  List your target customers and users
<b>Existing Alternatives</b>  List how problems are solved today	<b>Cost Structure</b>  List your fixed and variable costs	<b>Revenue Streams and Upscaling</b>  List your sources of revenue	<b>Channels</b>  List your path to customers (inbound or outbound)	<b>Early Adopters</b>  List the characteristics of your ideal customers
<b>Eco-Social Benefit (Strength)</b>  What ecological or social benefits is the business model generating? Who are the beneficiaries? Are they potential customers?	<b>Eco-social Costs (Weakness)</b>  What ecological or social costs is the business model causing? Which key resources are non-renewable? Which key activities use a lot of resources?	<b>External &amp; Internal Obstacles (Threats)</b>  What are external threats that could prevent the green business from being successful [e.g. policy restrictions or competitors]?	<b>Enablers (Opportunities)</b>  What are your suggestions for the local government to make it easier for green organizations to grow? What are your hopes and wishes for the URBiNAT project?	<b>Additional Information</b>  Name aspects that are crucial, but haven't been covered yet.

conversational manner offering participants the chance to explore issues they feel are important. This interview format allows for a more open discussion between interviewer and interviewee while at the same time guiding the conversation towards addressing the most pertinent topics. Therefore, we mainly used open-ended questions that were adjustable to each different company and representative.

The interview guideline was structured as follows:

General Information:

1. What is the name of your organisation?
2. What is your position in the organisation?
3. How old is your organisation?
4. How big is your organisation (number of locations, employees etc.)?

Ambition and future perspective:

5. Who are your main customers/target group?
6. What is your organisation's ambition/mission/goal?
7. What do you want to accomplish in the next 12 months?

Business model:

8. What is your business model (not-for-profit or for profit)?
9. Do you generate profit? If yes, how? If no, could you generate profit with a different model?
10. Is your business focussed on buying and selling?
11. How do you approach your customers (marketing strategy)?

Social and Solidarity Economy:

12. Does your organisation contribute to the improvement of socio-environmental challenges, such as climate change, water security, water pollution, food security and human (mental) health? Please describe how.
13. Do you know other companies that develop technologies or offer services that are based on the concept of nature-based solutions? If yes, please name a few.
14. Are there online knowledge-sharing platforms and physical innovation hubs in Sofia where you can connect with other organisations that base their business model on improving the environment or social inclusion?



### Green Local Policies in Sofia:

15. Does your local government incentivize the creation of businesses that aspire to improve socio-environmental challenges (green organisations), e.g. by offering tax incentives?

16. Does your local government offer programmes or initiatives that help create more green organisations?

17. What are your suggestions for the local government to make it easier for green organisations to grow?

### URBiNAT:

18. What are your hopes and wishes for the URBiNAT project? What is a specific action that you would like to be implemented in the very near future?

### **Target Group**

We targeted the CEOs or founders of an organisation, because they were able and allowed to answer questions regarding, among others, revenue-streams, stakeholder engagement, resource management, sustainability policies, customer acquisition, competitive advantage, and policy recommendations that could support their business to grow.

### **Mixed Methods**

Qualitative, empirical research is often conducted through face-to-face interviews due to the advantage of not only being able to hear how the person in question is feeling and acting, but to be able to notice the non-verbal forms of communication. Body-language is the most crucial advantage of face-to-face interviews, because it can add significant information about the person's initial reaction to certain issues and indicate the relation and associations the interviewee holds towards the topic in question.<sup>1</sup> In this way, it was possible to make notes on the reactions and non-verbal behaviour of all interview participants. These notes were combined with the interview answers and played a significant role when developing lessons-learned and key results of all interviews.

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<sup>1</sup> Berkowitz, J. (1995) *A Comparison of computer-assisted personal interviewing and paper-pencil interviewing on responses to open-ended questions*, Michigan State University

To summarize, the overall approach was to combine two empirical research methods - quantitative and qualitative research. The survey, database, and Sustainable Business Model Canvas (quantitative), combined with the face-to-face interviews (qualitative) complemented each other by matching numeric with explanatory data<sup>2</sup>. Mixed methods are used to draw inferences from the results of both research forms.<sup>3</sup> In this sense, the intention was to apply a quantitative methodology and complement it with the qualitative face-to-face interviews.

The goal of this research was to formulate specific action-steps that enable and support social and green companies to network, build their product, offer their service, research, and enter the market in the intervention cities. All results were shared with URBiNAT partners and especially with the local municipalities. Local municipalities are crucial in the adoption of new policies that foster the creation and implementation of nature-based solutions.

### **3.2.7 Neighbourhood Survey – Assessing health and wellbeing of the local population**

One of the key questions of the project is to investigate the effects of healthy corridors (clustered NBS) on health and well-being (Challenge 9 EKLIPSE[1]). Together with facades and grey spaces, NBS and green space in general form different settings in our urban habitat, which are described as macro level in the explanatory model of health determinants by Dahlgren & Whitehead[2]. These settings (physical environment) are regarded as causes of the causes (living and working conditions, housing conditions) of reduced health, well-being and illness[3]. The impact assessment of this complex interdependencies is a current problem in research. While improvements for society through spatial changes can be proven in retrospect, the research situation on effects of certain anthropogenic elements (such as green spaces) in our cities is less clear. In addition, large discrepancies between research findings on the interactions between humans and the built environment are a persistent problem. The causes often lie in the deficient study design[4], monodisciplinary approaches and simply the difficulty in isolating individual effects in the complex urban system, such as the missing recording of the influence of subjective perception on objective indicators[5]. Besides this, neighbourhood research often compares different neighbourhoods with each other, which might suggest that omitted variables bias obscure the research results. Choosing a place to live is a very segregating process that leads to different milieus in the cities that may not be comparable. Thus, there is still a great need for robust results in this field of research that attribute valid long-term effects to public spaces in particular in order to make their value for health and well-being visible. That is why URBiNAT decided to take advantage of the rare opportunity in URBiNAT to measure the same population before and after the intervention in the three European frontrunner cities Porto, Nantes and Sofia. The impact assessment for health and wellbeing is therefore designed as a random intervention study (controlled urban experiment) based on self-reported data through a survey. Collected data pre-ante and ex-post will allow to measure changes in behaviour,

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<sup>2</sup> Watkins, D. and Gioia, D. (2015) *Mixed Methods Research*, Oxford University Press, Oxford

<sup>3</sup> Teddlie, Ch. and Tashakkori, A. (2009) *Foundations of Mixed Methods Research*, Sage, Los Angeles

wellbeing, health as well as a social activity and link them to the actual territorial intervention.

### 3.2.7.1 Neighbourhood Survey Design

The URBiNAT Neighbourhood survey has been developed to assess various key factors that are correlated to green spaces and nature-based solutions through the perspective of the people (self-reported data). These include indicators that are mentioned in the EKLIPSE report like wellbeing, health and physical activity, but also extend the research framework to social activity and satisfaction/dissatisfaction with the environment to get a more holistic picture of health and wellbeing of the residents.

The questionnaire creates a quantitative and reliable data basis and is founded on existing validated short form surveys of the identified topics and indicators:

- (1) physical activity (Reference: International physical activity questionnaire [6])
  - a. Vigorous (frequency and duration)
  - b. Moderate (frequency and duration)
  - c. Walking (frequency and duration)
  - d. Relaxing (frequency and duration)
- (2) social activity (adapted from IPAQ)
  - a. Socializing (frequency, duration, type)
  - b. Network (size and intensity)
- (3) wellbeing (Mental health continuum Survey[7],[8])
  - a. Hedonic, Emotional Well-Being
  - b. Eudaimonic, Social Well-Being
  - c. Eudaimonic, Psychological Well-Being
- (4) health (One-Item survey by WHO[9])
  - a. General self-reported Health
- (5) satisfaction with the environment (Quality of Life Survey[10])
  - a. Satisfaction
  - b. Discomfort
- (6) Personal information (including the address)

In total the questionnaire consists of 64 items and is built up with validated questionnaires in the different fields of expertise. This methodology does not only help with the validity

and reliability of the answers given. Its combination will also allow to find linkages between the different topics. In addition, addresses have been collected to allow the visualisation of area of effects of NBS (ex-post conduction).

After the designing phase a preliminary version of the questionnaire was tested by the local partners with small samples to erase flaws in spelling, translation and order of the questions. In addition, they were asked to answer the following questions:

- How much time did the survey take on average?
- How many people had to be addressed to get the 10 tests?
- How high was the dropout rate?
- How long did it take to complete the 10 tests in total?
- How much time does a single question take relative to the other questions?
- Are the questions accepted?
- Are all questions understood?
- Does the filtering work?
- Are there any contextual effects that make a previous question affect others?
- Which questions are productive for the research purpose?

With the help of the testing results a final version of the URBiNAT neighbourhood survey could be finalized in July 2019.

### **Sample size and target groups**

The aim is to reach a data set large enough to be statistically representative for the whole study area. The needed sample size for each city with a confidence level of 95% and a margin of error of 5% (industry standards) lead to a requested sample size of:

- 400 respondents from the study area for every city (no children, randomly chosen)

In addition, a control group is necessary to isolate societal changes in the total population that are not in origin an effect of the implemented healthy corridor. Several effects are possible which lead to the urban population feeling more active or comfortable (winning the Champions League or World Cup, particularly long-lasting mild weather, etc.).

- 50 respondents as a control group from the main city and outside the study area (no children, randomly chosen).

Frequency of conduction

The questionnaire will be collected before (pre-ante) and after the implementation (ex-post) of the Healthy

Corridor:

1. At the local Diagnostic stage, to support the design of the Healthy Corridor. Results available end of November 2019 in D2.1 Local Diagnostics
2. After some first month of use of the Healthy corridor for impact evaluation of the territorial change.

Estimated in late summer 2022 (1 year before the end of the project) and to be conducted in the same season/with similar weather conditions.

Consequently, the changes in behaviour, social networks, personal well-being and satisfaction with the neighbourhood can be identified. The final result will allow a deeper understanding of the effectiveness, impact and area of effect of the nature-based solutions and URBiNATs Healthy Corridor.

### **Data collection**

Data Collection should be done in the evening hours between 6pm-9pm. The survey should take around 20 minutes to complete.

### **Data analysis and interpretation (preview)**

The analysis of the data is carried out by WP5 within the project. Some of the possible correlations that the data can provide are:

- Wellbeing and health status related to location
- Wellbeing and health status related to available green space
- Wellbeing and health status related to satisfaction with the neighbourhood
- Neighbourhood satisfaction related to location
- Neighbourhood satisfaction related to available green space
- Neighbourhood satisfaction related to social activity or network
- Level of discomfort in the neighbourhood related to location
- Area of effect of healthy corridor (GIS)
- Physical activity – duration and frequency related to available green space (GIS)
- Social activity – duration and frequency related to quality of open space (GIS)
- Social network – range and intensity related to quality of open space (GIS)

A first diagnostic can be seen in the case study of Porto .The full analysis will be the report of T5.3 Health and wellbeing (M60, OWL).

### **3.2.7.2 Implementation**

A protocol for the conduction of the survey has been handed out in addition to ethical guidelines. It was recommended to conduct the survey via phone because of the low costs, efficiency and low bias. A conduction in the public space was possible, but certain criteria had to be met to obtain accurate data. If only a survey in the public space was possible, it had to be ensured that the guidelines from the handout (see below) were strictly followed as the risk of producing false or inaccurate data was high. For example asking people using the open space would cause bias in the research results, because only a subgroup of the neighbourhood that is already active would be targeted. The impact of the Healthy Corridor could therefore not be verified. It is to be ensured to target the whole neighbourhood, f.e. by asking people at the entrance door.

To avoid further bias in the research results the cities where asked to choose only one of the methodologies and use it throughout the life of the project.

Guidelines for approaching the citizens:

- [only when in field] It is not allowed to measure in parks (there are only people who are already active). The survey must be carried out at the entrance to the house, apartment door or nearby.
- [only when in field] The target group are only adult residents: Make sure to ask early if the person is living in the study area
- The control group is composed of adults outside the study area.
- [only when in field] It has to be ensured that the questionnaires (especially W01-W14) can be filled out in private because of the personal questions. An interview form will create bias.
  - e.g. when using a tablet, make sure that no one is looking on it when the asked person is entering the data by themselves.
  - e.g. in the case of paper questionnaires, make sure that the self-filled questionnaire is directly placed in a box or envelope
- The survey ID needs to be linked to each informed consent, so that data requests can be handled.
- The results are delivered in 2 separate files (1. Name and ID) (2. ID and Data)

It was recommended to use professional survey companies for the implementation. It had to be ensured that the companies not only follow the handout above, but also the ethical guidelines of the project. The companies were only asked to collect the data. The analysis is performed by WP5 within the project.

#### Tools provided

In order for the work to be carried out the following supporting documents were provided:

- [Code of Ethics and Conduct](#)
- Informed Consent (D8.4)
- Handout Phone / Handout Field - in local language (PDF)
- Survey – in local language (Excel)

#### **Results**

For first results of this methodology please see the case study of Porto.

[1] Raymond, Christopher & Berry, P. & Breil, Margaretha & Nita, Mihai & Kabisch, Nadja & de Bel, Mark & Enzi, Vera & Frantzeskaki, Niki & Geneletti, Davide & Cardinaletti, Marco & Lovinger, Leor & Basnou, Corina & Monteiro, Ana & Robrecht, Holger & Sgrigna, Gregorio & Munari, Laura & Calfapietra, Carlo. (2017). An impact evaluation framework to support planning and evaluation of nature-based solutions projects. 10.13140/RG.2.2.18682.08643.

[2] Dahlgren G, Whitehead M. (1991). Policies and strategies to promote social equity in health. Institute for Future Studies. Available from: <https://core.ac.uk/download/pdf/6472456.pdf>; 1991.

[3] Richter & Hurrelmann (2018). Determinanten von Gesundheit – BzGA Leitbegriffe der Gesundheitsförderung. doi: [10.17623/BZGA:224-i008-1.0](https://doi.org/10.17623/BZGA:224-i008-1.0), [Online, retrieved 17.07.2019]

[4] Diez Roux, A.V. & Mair, C. (2010). Neighborhoods and health. *Annals of the New York Academy of Sciences*, 1186, 125-45.

[5] Bucksch, J., Gruber, J. & Schneider, S. (2011). Die Wohnumwelt und ihr Einfluss auf Gesundheitsverhalten – Versuch eines Erklärungsmodells. *Prävention – Zeitschrift für Gesundheitsförderung*, 34, 71-74.

[6] International physical activity questionnaire. Available from: <https://sites.google.com/site/theipaq/home>

[7] Keyes, C. L. M. (2009). Atlanta: *Brief description of the mental health continuum short form (MHC-SF)*. Available: <http://www.sociology.emory.edu/ckeyes/>. [Online, retrieved 20.12.2018].

[8] Brief description of the mental health continuum short form. Available from <https://www.aacu.org/sites/default/files/MHC-SFEnglish.pdf>

[9] Health Status Single-Item questionnaire f.e. used by WHO (How is your health in general?)

[10] Fleury-Bahi, G., Marcouyeux, A., Préau, M. et al. *Soc Indic Res* (2013). Development and Validation of an Environmental Quality of Life Scale: Study of a French Sample. 113. 903. <https://doi.org/10.1007/s11205-012-0119-4>

### 3.2.8 Laboratory analysis

#### Observation and modelling of interaction processes in the urban environment

The local diagnosis considers the urban physical environment as a fully integrated component of the implementation of NBS within the healthy corridor, in the sense that it should contribute to the well-being and health of the inhabitants (thermal comfort, silence zone, clean air, water and soil (no pollution)). The physical environment represents all the physical elements that make up the urban environment (built and natural environment): buildings, infrastructure, air, water, soil and subsoil, vegetation and the results of their interactions, such as sealed surfaces, microclimate, water/air/soil quality, noise pollution, specific biodiversity.... In the local diagnostic (stage 1 city and quarter level), the urban environment is described within the territorial analysis section, in three sub-sections: climate & urban environment, biophysical characterisation and water management associated with various indicators :

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Climate & urban environment	climate zones, temperature, precipitations, air/water/soil pollution, noise
Biophysical characterization	geology, pedology, geomorphology, altimetry, slopes, vegetation, tree survey, species richness
Water management	natural and artificial waterbodies, watercourses (diagnostic provided in LD1 city reports)

## **What do we mean by laboratory analysis in the Urbinat project and why do we need LA?**

The diagnostic stage 1 made it possible to gather data on the physical environment at the scale of the city and of the district. The laboratory analysis is part of the stage 2 of the LD and will be conducted at the scale of the NBS or the defined area around the NBS. In this step the territorial mapping allows to describe the land cover, the laboratory analysis aims to qualify the public spaces.

A consultation was carried out between the partners responsible for the acquisition of physical data (ICETA-CIBIO/Porto municipality, Sofia,IRSTV/NM) on the scale of work required for the implementation of the NBS. It quickly became apparent that the scale of the neighbourhood was not relevant, i.e. mapping parameters would be very costly in terms of time and budget. It was therefore decided collectively to set up a methodology better adapted to the implementation of the corridor and to carry out laboratory analysis only when it would be necessary for the implementation of NBS. The methodology adapted to the site conditions city per city will then be planned during the co-design phase of the healthy corridor implementation. However, some laboratory analysis was already conducted in the LD stage 2, for Nantes for example, and first results are presented in the stage 2 report of Nantes.

Different laboratory analysis is proposed to characterize the compartments of the environment, either as part of diagnostic before implementation of NBS or for the evaluation ante/post of the NBS impact. They are classified according to the local diagnostic report.

### **Climate and urban environment**

#### Aerial and ground air temperature measurements

The air (or surface) temperature, together with air humidity, are basic parameters for the characterization of urban climate. Aerial measurements of air temperature (or surface temperature) by the mean of a drone coupled with ground measurements at the same time, in a few points over the studied area, are proposed in order to help for the drone data post-treatment, or to validate the aerial measurements. For participation and education issues, measurements performed by school students or citizens using smartphones are foreseen as participatory NBS to enrich or extend the field campaigns.

IRSTV and CEIS20 (Coimbra university) have planned to collaborate on such measurements. CEIS20 partner would be responsible for aerial drone measurements. After some post-treatments, a 3D field of the air temperature could be constructed from data obtained at different altitudes. The ground measurements will be based on the methodology applied and data available in the data base of ONEVU (urban observatory over Nantes). Data on precipitations and wind are also collected in the ONEVU database.

Participatory measurements involving volunteer people from the district (citizens and/or scientists, pupils) would be planned. Two types of measurement could be proposed both using mobile devices (smartphone). Volunteers will contribute with their own smartphone or with a special (augmented) smartphone provided by the project. In the first case, sensors (air temperature or air humidity) are installed at the top of a couple of buildings or at geolocated focal points. The measurement, displayed on a screen in a building will be transmitted by the citizen or student (with Q-R code connected to an online form) thanks to his smartphone. In the second case, a high-performance



smartphone like the Trekker-x4 could be provided to citizens. Such a smartphone, in addition to a precise GPS, has his own integrated accurate sensors for outdoor temperature and air humidity (and many others). Volunteers will acquire data located along a pre-defined path or route. A dedicated apps directly connected to the database of the measurements will be used. These two approaches (in-situ and nomad modes) will be combined for measurements.

The field campaigns would take place before and after NBS implementation. As Urban Heat Island issues are season dependent, ideally, two field campaigns should be organized (one in winter and one in summer) leading in total to 4 field campaigns.

### Water and soil pollution

**Water quality-** Beside the data collected to conform to the European regulation on the monitoring of the aquatic environments, data on quality of water and soil can be necessary according to the type of NBS implemented and for the follow-up of the impact of the NBS (ante-post evaluation).

Some physicochemical parameters of water must be acquired in-situ: pH, temperature, redox potential, conductivity, dissolved oxygen. Involvement of volunteers (association, pupils) will be considered for the follow-up of these parameters in the field. Laboratory measurements will be conducted on samples for pH and conductivity.

Samples are taken for laboratory analysis of the contents of nutrients (phosphorus, nitrogen, organic carbon), major elements and trace elements, as well as the bulk physicochemical parameters (water hardness, suspended solids...). The concentrations in pollutants frequently met in urban zone will be evaluated: trace metals, pesticides, polycyclic aromatic hydrocarbons. The work completed by IRSTV on the evaluation of stormwaters, within the framework of the project H2020 Nature4Cities will be made profitable for Urbinat.



Figure 8 on-site measurement of water bulk physicochemical parameters

**Soil quality**– The characterization of the soil quality can relate to physical, physicochemical and biological properties including the presence of pollutants such as trace metals and sanitary products. The first step consists of an analysis of historical land-uses using aerial pictures, cadastral database, national databases on polluted sites or potentially polluted soils...

The choice of the parameters to be evaluated will be defined as a function of the type of NBS and the results of the document analysis. One site samplings and in-lab analyses or/and one site measurements will then be defined. Table 1 lists the categories of parameters and the methods which can be implemented to acquire the data. For Nantes for example, in comparison with the stake “urban Agriculture”, the focus will be put on the characterization of the agronomic properties, the biodiversity and the pollution of the soil. Data on quality of the soil for two allotment gardens in the North Nantes district were collected before Urbinat project and are presented in the local diagnosis stage 2.



On-site measurement of heavy metals concentrations by XRF-fluorescence

Table 1. Indicators and protocols to characterize soils

Unit measurement of indicators	Methods & tools for data collection	Indicators	Protocol for on-site implementation
Physical properties	Infiltration tests	Soil infiltration water	either on site by Beerkan tests or in lab (to be confirmed)
		Soil macroporosity	In lab
		Soil water reservoir for plants	In lab

		Soil crusting (if relevant)	In lab
Chemical properties	Topsoil sampling for laboratory analysis		Depending on the historical analysis of the site and the potential spatial distribution of contaminants, a sampling methodology will be chosen for soil (random or systematic sampling within specific zones). 20-30 cm depth samples will be taken off with a hand auger.  Preparation of samples : sieving at 2 mm after taken off stones and vegetation residues
		Chemical fertility of soil	P, N, organic carbon, cationic exchange capacity, pH, electrical conductivity, major elements (K, Ca, Na, Mg, Fe...)
		Soil organic matter	Measurement of volatile matter
		Soil contamination	Analysis : heavy metals (Pb, Cu, Zn, Cd, Cr, Ni, As) + sanitary products
	On site XRF measurement (for heavy metals)		On site analysis of topsoils by Xray fluorescence : mesh random sampling strategy, i.e., in a garden for example, each plot is considered as a mesh and the sampling point is located randomly in each plot. For each sampling point, a cube of 20 cm side of topsoil, is homogenised with a spade before on site measurement. Control topsoils should also be sampled outside of the area (as less impacted by human activity as possible). All samples are localized by using a Differential Global Positioning System (DGPS).  Such measurement could also be performed on soil profile.  To assess the measurement by XRF, about 1 sample per 3 will be kept apart to be analysed at lab.
Biological characterisation	Sampling and laboratory measurement	Microbiological soil biodiversity  Soil respiration	Analysis of RNA to determine the abundance of microorganism  Global parameter (CO <sub>2</sub> /O <sub>2</sub> exchange) to evaluate the microbiological activity

	Sampling and laboratory measurement	Soil ecotoxicology factor	Evaluation of impact of pollutant level on microorganisms
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**Air quality**– Not foreseen in Urbinat due to budget limitations for the moment. During healthy corridor design phase, if local air quality appears to have a potential impact on the well-being of citizens, competences within the project could be mobilized, in function of the budget available.

If the local diagnosis includes the data of noise gathered by the cities to conform to the European regulation, the characterization of the noise along the healthy corridor could not be planned for budgetary reasons in URBINAT. However, on a purely exploratory basis, a series of measurements could be carried out on North Nantes district, by collaboration between IRSTV and teachers in geography at the university. This campaign was carried out in March 2019 by groups of students using a NoiseCapture application installed on Smartphone and gauged. Two courses in the Urbinat zone of the northern district were traced and three courses in limit. The whole of the work of the students fell under a going? sector of the old center of Nantes at the zone of transition spaces urban rural-space, the northern district comprising this limit. It was a question of crossing measurements of noise, perceptions and the urban forms. The details of this experimentation are provided in part LD Stage 2 Nantes.

### **Biophysical characterization**

#### Pedology

The characterization of the type of soil is complementary to the qualification of soil. Specific samplings and soil profile should be conducted to determine soil classification and ability to support vegetation. The parameters are color, texture, abundance of stones, traces of oxydes, and so on. A methodology was developed for soil mapping of the North district of Nantes during a master internship at IRSTV. A summary of this study is presented in the LD2 report of Nantes city.

Geomorphology, altimetry, slopes– If needed these parameters could be determined at local scale by specific campaigns of levelling.

Vegetation, tree survey, species richness– Experts of green area services of cities could be able to provide a diagnostic of vegetal species present in the study districts if necessary.

### **3.2.9 Territorial Mapping**

The territorial analysis aim to support T2.1 on describing local conditions of the identified deprived areas. This analysis will focus on territory, land management and local dynamics mainly from the citizens perspective. All the activities proposed aim to feed the local project team for the next phase of URBiNAT, the design of the Healthy Corridor. For that it is important to observe the study area from the users perspective and map all territorial happening that influence social, environmental and economic features. The territorial analysis helps the identification of possible spatial planning response to local constraints,

without neglecting ongoing or future projects, commitments or other territorial strategies. The territorial analysis also can identify possible connections and articulation where URBiNAT can make a difference in a collaborative perspective over an independent one. The proposed methodologies will also identify local territorial needs and expectations by observing local use and appropriation of public space.

For the territorial analysis, are proposed three activities to be implemented as part of the Local Diagnostic of each city:

- A. Mapping existing pedestrian networks
- B. Identification of vacant lots
- C. Synthesis map

These activities include the production of original data that should be analysed in the context of other environmental and territorial data collection. The cities were provided with individual protocols for each proposed activity describing the indicators, methods and tools for data collection, suggestions of data analysis and interpretation and other information about timings and monitoring, if applicable.

These analysis are to be applied to the study area that has been previously outlined. In general, satellite imagery and *street view* databases can be used as a starting point for data collection and mapping. The process should also include on site observation for a more accurate data collection.

### **A. Mapping existing pedestrian networks**

This activity intends to study pedestrian mobility network. The analysis aims at understanding how people move and use the outdoor public space, by mapping informal (IP) and formal paths (FP). Informal paths are not formalized (paved) and are established as a result of people's use of the space. They are a reflection of connection breaches proved by the users experience. Formal paths (FP) include formalized (paved) connections, designed specifically for pedestrian walking. The study of pedestrian mobility networks also includes an analysis with public transportation routes, in order to fully understand movement flows across the study area. The final result will allow a deeper knowledge of the users dynamics along the study area, that should be taken into consideration for the design of URBiNAT's Healthy Corridor.

### **Methods for data collection**

#### **1. Map Informal pedestrian paths**

- Using GIS, create a line for each informal path (IPP) and name them sequentially: "IPP1", "IPP2", "IPP3" (...)
- Using GIS, create an attribute for each path that can include the following data:
- Extension (meters)
- Average slope (very high > 11%, high 6-11%, medium 2-6%, low 0 - 2%) | combined analysis with the contour map

- Create a photographic record



Figure 9. Examples of informal paths and aerial view of informal paths (yellow lines) (source: ICETA-CIBIO adapted from Google Earth)

## 2. Map Formal pedestrian paths

- Using GIS, create a line for each linear/contiguous formal path (FPP) and name them sequentially: "FPP1", "FPP2", "FPP3" (...).
- Formal paths are to be classified into 5 categories:
  - Sidewalks - correspond to segregated circulation axes, where there is a formal sidewalk for pedestrians
  - Shared streets - where the car and pedestrians share the same space for circulation, for example: roads with no sidewalks between buildings



- Pedestrian paths - paths exclusive for pedestrian circulation, for example: paths in parks and gardens
- Crosswalks - formalized pedestrian crossing paths between sidewalks. It may include central stopping areas between sidewalks



Figure 10. Example of formal paths - shared roads (pink lines) - without sidewalks, where cars and pedestrians share the same space (source: ICETA-CIBIO adapted from Google Earth)



Figure 11. Example of formal paths - shared roads (pink lines) - without sidewalks, where cars and pedestrians share the same space (source: ICETA-CIBIO adapted from Google Earth)



Figure 12. Example of formal paths - shared roads (pink lines) - without sidewalks, where cars and pedestrians share the same space (source: ICETA-CIBIO adapted from Google Earth)

- Using GIS, create an attribute table for each path that must include the following data:
  - Extension (meters)
  - Average slope (very high > 11%, high 6-11%, medium 2-6%, low 0 - 2%)  
(combined analysis with the contour map)

### 3. Map Public transportation stations/stops

To understand the connection of public transportation with pedestrian mobility network the next step should be crossed with bus stops and subway station

Using GIS, map all Bus stops (violet pins), Subway stations (blue pins) relevant inside the study area

### 4. Cross with land register

Using GIS, cross the formal paths (FP) and Informal Paths (IP) with land register municipal survey. Add land register as a new attribute, in the related attribute table. Proposed structure for the attribute table:

ID	CATEGORY	EXTENSION	AVERAGE SLOPE	LAND REGISTER
FP1	Formal path	200m	medium	Public
FP2	Formal path	75m	low	Private
(...)	(...)	(...)	(...)	(...)
IP1	Informal path	12m	high	Private
IP2	Informal path	150m	low	Public
(...)	(...)	(...)	(...)	(...)

### Data Analysis and Interpretation

- Extension of Informal Paths (Km)
- Extension of Sidewalks (km)
- Extension of Shared roads (km)
- Extension of Pedestrian roads (km)
- Reflection on the informal path network as a demonstration of a need, expressed by the citizens



- Reflection on the pedestrian networks and land register
- Reflection on pedestrian network and public transportation (bus and subway stops)
- Reflection of pedestrian connection with parks and gardens, cultural and sports centers, public services and facilities (etc.)
- Reflection about urban fragmentation from a pedestrian point of view



Figure 13. Case study of the application of the methodology in Porto (source: ICETA-CIBIO adapted from Google Earth). Legend: Sidewalks (Light blue lines); Shared roads (Pink lines); Pedestrian roads (blue lines); Informal Paths (Yellow lines); Bus stations (Bordeaux dots); Stage 2 study area polygon (red polygon); Crosswalks (green lines)

## B. Identification of vacant lots

This activity aims the identification of vacant lots along the study area. These abandoned and neglected spaces are opportunities for the design of the Healthy Corridor and for the implementation of Territorial and Technological Nature-Based solutions. In URBiNAT context these elements can act as connection possibilities between strategic points of the territory.

### Methods for data collection

#### 1. Map Existing Vacant Lots

- Using GIS, create a polygon for each vacant lot (VL) and name them sequentially: "VL1", "VL2", "VL3" (...).
- Using SIG, create an attribute table for each polygon that can include the following data:
  - Area (square meters)
  - Level of maintenance (Medium, low, really low)
  - Create a photographic record

The following methodology aims for the identification of the terrains available for URBiNAT, inside the study area. Most of the areas correspond to undeveloped lots or traces of previous land uses, lost in the urban mesh. With URBiNAT, they face a chance to hold territorial nature-based solutions and be part of the Healthy corridor. The geospatial analysis resulted from a combination of the following data:

- “Vacant Lots”, “Urban woodlands”, “Green spaces associated with circulation axes” and “Green spaces associated with roads”, from Green structure mappings.
- “Municipal private domain” and “Municipal public domain” from Land register
- Undeveloped terrains (or “free” and “available”) from any local masterplan

From the previous sample some terrains can be excluded:

- Unaccessible terrains
- Terrains already reserved for ongoing and future projects
- Small terrains, in the context of the study area, with low social impact
- Isolated/low connectivity with other terrains and to the core of the Study area
- Private terrains
- Areas allocated for future urbanization by the Municipality

But also some new elements can be included:

- Terrains between key points of the green structure and services
- Strategic terrains between social housing neighbourhoods



Figure 14. Examples of Vacant Lots (VL) (source: ICETA-CIBIO and Google Earth)

## 2. Cross with land register

- Using municipal databases classify the previous collected polygons into public or private land. Add land register as a new attribute, in the related attribute table. Proposed structure for the attribute table:

ID	Land register	Land register description	City Master Plan information	Area (Km <sup>2</sup> )	Level of maintenance

VL1	Private	...	...	250	Low
VL2	Public	...	...	78	Medium
VL3	Private	...	...	122	Really low
(...)	(...)	...	...	(...)	(...)

### Data Analysis And Interpretation

- Area of public vacant lots (m<sup>2</sup>)
- Area of private vacant lots (m<sup>2</sup>)
- Reflection on priority interventions
- Reflection on relation with polarizer points

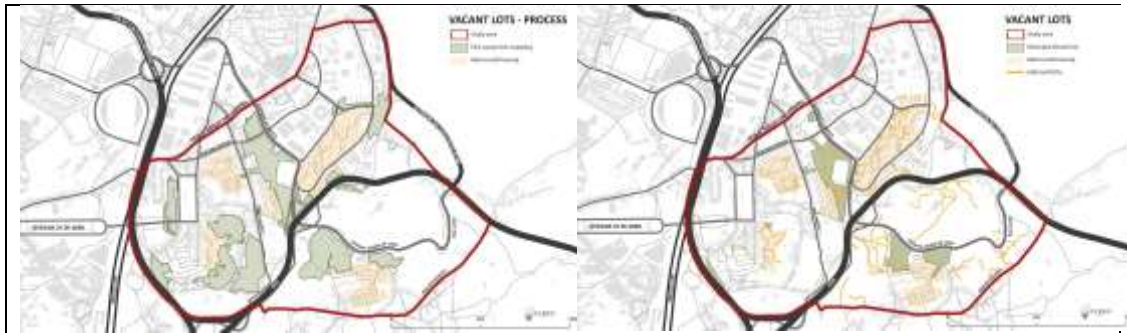


Figure 15. Example of Vacant lots from Porto (source: ICETA-CIBIO)

### C. Synthesis map on the study area

This activity intends for the identification of opportunities and constraints along the study area. It should be a synthesis of pre-existing data, highlighting the most important information, according to local characteristics, needs and expectations. It can work as a baseline document for the design of the Healthy Corridor.

#### Methods for data collection

Given the wide spectrum of this analysis it should be applied in a study area that has been previously outlined. Satellite Imagery and Street View analysis can be a starting point for data collection and mapping (For example: Google Earth Pro). However, the process should include direct observation on site for a more experienced and realistic data collection.

Using GIS, identify:

- Administrative boundaries (parish, municipality boundary and other municipal studies boundaries)
- Social housing neighbourhoods
- Main housing neighbourhoods
- Main road networks



- Secondary road networks
- Main crossing passages
- Relevant services and facilities (including: Schools; Public sports equipment; Street markets; Shopping Centers; Subway/Train stations; Relevant public buildings)
- Green spaces of public access
- Public Vacant lots
- Relevant informal paths
- Waterlines (main rivers)
- Future projects that will be implemented, that could have an influence over the study area (Including: Architecture, Urban and Landscape Architecture projects)
- Other elements can be added according to each city characteristics

### Data analysis and interpretation

- Reflect on space fragmentation, including main features responsible for local fragmentation
- Reflect on isolation level of the social housing
- Reflect on green structure continuity/discontinuity and the role of the current green structure to support the development of the Healthy Corridor
- Reflect on strategic points that would benefit from linkage

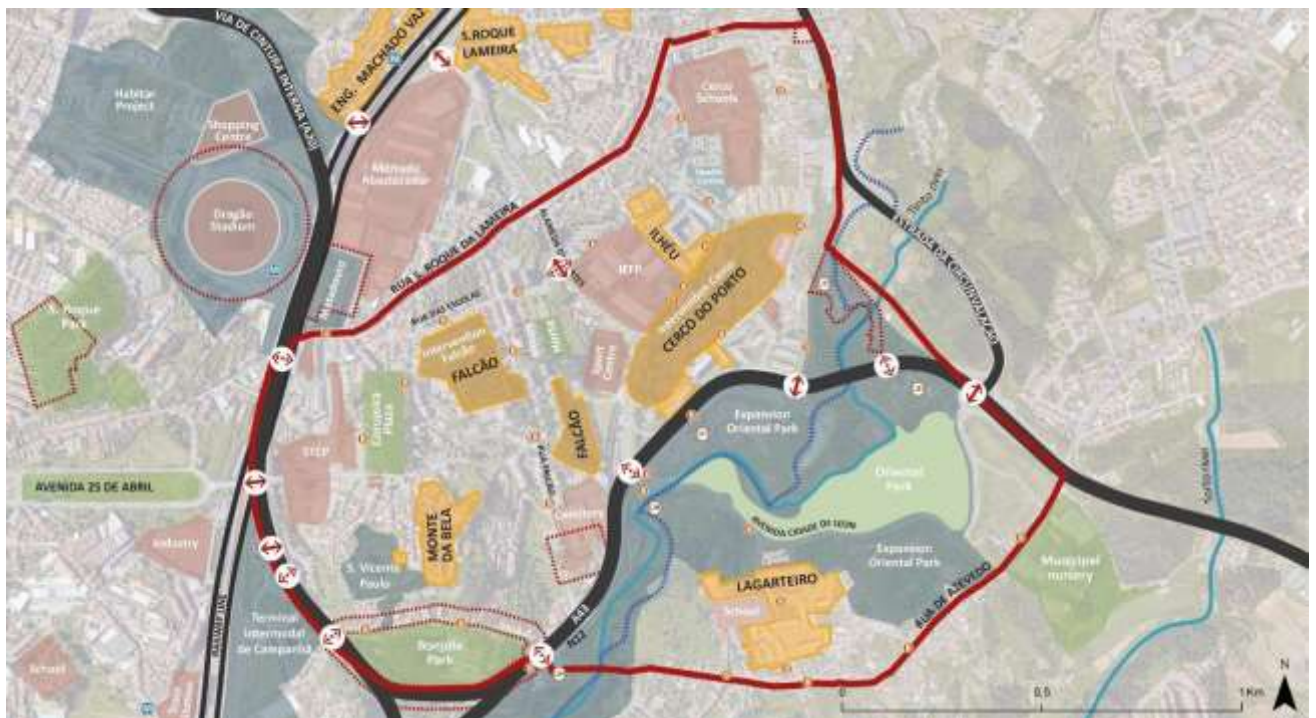


Figure 16. Example of synthesis map from Porto (source: ICETA-CIBIO)



# 4 Porto

## 4.1 Introduction

The local diagnostic is a task of the URBiNAT project<sup>4</sup>, in which the cities develop an analytical process to better inform the development and design of the Healthy Corridor and Nature based solutions. This document reflects the different phases of the diagnostic. The first part of the document synthesizes and reflects on existing information about the city of Porto (Figure 17) and Campanhã parish where the intervention area of the project is located. This first chapter was produced based on existing reports in order to make an overall description of the city, local policies and future investments.



Figure 17. Porto Municipality orthophoto map. Source: CMP/DMU, 2017

The second chapter zooms towards the study area where the Healthy Corridor will be implemented. This part of the report collects mostly new data, produced specifically for URBiNAT in order to identify local real needs and expectations to be integrated in the following phases of the project. This chapter results from intensive work produced by a multidisciplinary team that implemented local and targeted activities and analysis in order to feed the local diagnostic with exclusive and original information about the study area. It included participatory activities, territorial mapping studies, social and economic analysis at the subsection level, behavioural mappings and a wellbeing analysis through a survey applied to the local community.

The third chapter focuses on mapping Nature-Based Solutions (NBS) in the city, not only to show the great advances and investments that the city has made in this matter, but also as an important strategy to identify possible synergies with URBiNAT, leveraging its effects. Porto is committed on the implementation of NBS, as proven by the role of front-runner city in URBiNAT project.

The fourth, and last chapter, is an important summary of all the data collected and produced in order to present a Baseline that will support all further activities for the development of the Healthy corridor through specific guidelines.

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<sup>4</sup> Funded by the European Union's Horizon 2020 research and innovation programme under grant agreement number 776783

## The Study area

Porto's municipality has made public its interest and priority to invest in Campanhã in order to promote its social, environmental and economic improvement and inclusion. Campanhã is one of the seven parishes (Figure 18) that compose the City of Porto that is located in the most eastern side and characterised for having the most rural landscape.



Figure 18. Administrative boundaries and parishes of the municipality of Porto | Source: ARU Campanhã-Station (SPI, based on CAOP 2014)

It is a parish full of opportunities but also with some serious constraints that need political attention. Given the dimension of the Parish, and for URBiNAT to achieve its goals, it was imperative to select an operative study area inside Campanhã Parish. The definition of the study area (Figure 19) ensures the effective development of the defined Stage 2 activities - behavioural mapping, participatory activities, territorial analysis, resident's survey - although they are not mandatory.

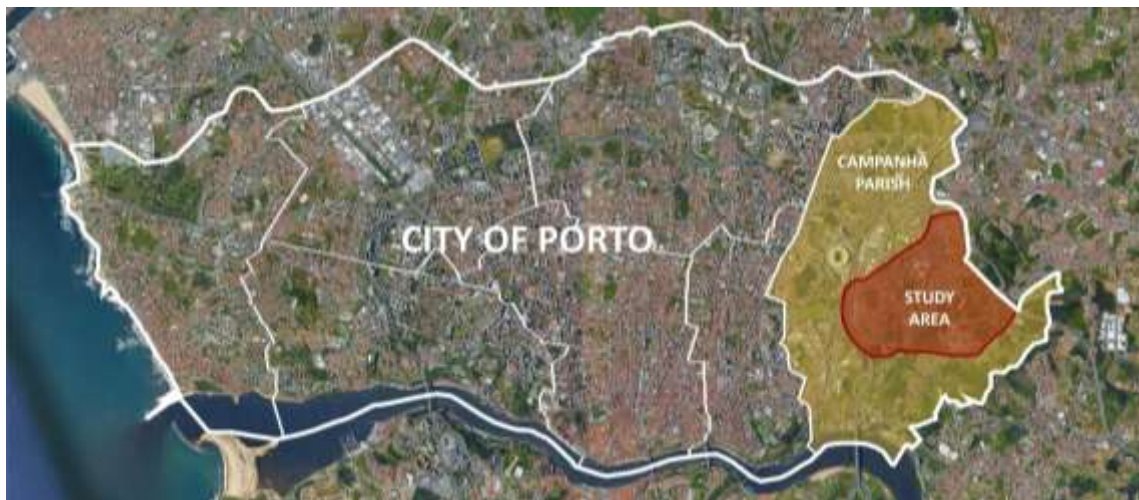


Figure 19. The city of Porto, parishes, Campanhã (yellow) and the Study area (red) | Adapted from Google Earth. Source: CIBIO (2019)

The proposed study area has 2.1km<sup>2</sup>, while the parish has 8.05 km<sup>2</sup>. The delimitation criteria will be further described in 4.1 in more detail, which was mainly related with the relevant presence of **Social Housing** neighbourhoods. Campanhã is the civil parish in Porto with the greatest number of municipal dwellings for social rental (as further described in 3.4.2.) along 13 municipal neighbourhoods, 6 of which are located within the study area limits:



- Cerco do Porto (1963, 1991): 804 + 88 dwellings;
- Ilhéu (2001): 127 dwellings;
- Lagarteiro (1973, 1977): 248 + 198 dwellings;
- Falcão (1973, 1981, 2000): 231 + 166 + 165 dwellings;
- Monte da Bela (1970): 236 dwellings;
- São Vicente de Paulo (1951): 18 dwellings.

Among these neighbourhoods, Cerco do Porto, Lagarteiro and Falcão have been elected due to their preponderance regarding the number of dwellings (and residents) and associated socio-economic challenges, aggravated by connectivity issues with the surrounding urban fabric (topographic and road network barriers). Each of these neighbourhoods present site-specific challenges that should be accounted for the implementation of URBiNAT and will be described in more detail below.

### Cerco do Porto



Figure 20. Cerco do Porto municipal housing, Campanhã, Porto. Both pictures: on the left side the original buildings (refurbished in the late 1990s), and on the right side the buildings under refurbishment. Source: Domus Social / J. Restivo archive (2019)

Cerco do Porto (1963) (Figure 20) was built in the course of the Plan of improvements for the City of Porto, a ten-year plan to build 6 000 municipal dwellings (1957-1966) that implemented 11 of its 13 housing estates in the peripheral “areas of expansion”. Within this plan, rents affordability and minimum number of dwellings in the scheduled time justified the much-reduced areas and restraint in construction costs of the elected house typology (four-storey buildings, type-designed). Despite the scale of the sets (depending on the available land), site plan strategies (minimum earthmoving or slope treatment though accurately urban designed) and local construction methods adopted made the image of the housing estates quite recognizable.

Mainly located dispersedly in the outskirts of the city, these monofunctional and socially homogeneous sets were conceived as rather “detached” from the surroundings. Nowadays, some of these housing estates became part of the inner city, most frequently presenting a generous ratio regarding green space area per resident, corresponding to low population density areas (despite the eventual high occupancy density of the dwellings, with much reduced areas). When compared to e.g. Lagarteiro and Falcão neighbourhoods, Cerco do Porto presents lower population density (see [4.4.2](#)). Nevertheless, it is still today one of the largest housing in the city, with 32 buildings and 804 dwellings.

Later, in 1991, a second development of this neighbourhood added two other buildings with 88 dwellings to the original set. In the end of the 1990s the municipality requalified Cerco do Porto development from 1963, the interventions were directed not only to the building’s envelope and common circulation areas (i.e. partial refurbishment), but also to the public space that has been equipped with several facilities (social, recreational and sports amenities), densifying the neighbourhood that already counted on a basic school since its origin.



An urban project recently developed has taken public space and housing aside to a more effective urban regeneration of the area. The ongoing works on buildings (a 'second' partial refurbishment) will be followed by the renovation of the public space that previews the demolition of some facilities and buildings of the set, therefore reducing the population density of the area. Furthermore, the neighbourhood will be crossed by two new roads (see [3.1.8.](#)).

The public space intervention comprehends its landscape and urban redesign for circulation improvement and mobility organisation regarding present regulations and living standards (e.g. fire safety, accessibility, parking). Infrastructure networks and systems – gas, domestic wastewater, rainwater, water supply, telecommunications, public lightning – are therefore reformulated or created.

### Falcão



Figure 21. Falcão municipal housing, Campanhã, Porto. Left side: first development (1973) recently refurbished (2018). Right side: second development (1981) to be intervened soon. Source: Domus Social / J. Restivo archive (2019)

The 5-year extension to the Plan of Improvements (1967-1971) built only 1 674 dwellings from the expected 3 000, after which the municipality carried on building council housing for social rental. Regarding previous municipal experiences, the neighbourhoods built in the early 1970s evolved some characteristics, e.g. dwellings area (not so reduced standards) and construction methods (improved solutions), at the same time recalling vernacular elements to the architectural language. The 1980s council experiences on housing followed that time construction standards, adopting type-designed solutions that on the other hand seemed to eventually disregard the accuracy in the public space design of former experiences.

Falcão housing (1973) (Figure 21), with 9 buildings and 271 dwellings, was extended by a second development (1981) with 6 buildings and 166 dwellings. Subsequently, within the scope of the "Special Re-housing Program" (1993/4-2003), the neighbourhood has been extended (2001) to 8 buildings and 173 dwellings (8 of which have been sold to the occupants, therefore being privately owned).

Recently, the first development of Falcão housing (1973) has been refurbished (2018), the interventions being directed to the building's envelope and common circulation areas (i.e. partial refurbishment). The same strategy of a partial refurbishment is currently being operated since 2019 in Falcão third development (2000). Still in the design stage, a partial refurbishment of the second development of this neighbourhood (1981) is being prepared.

The public space of Falcão housing (1973, 1981) will be renovated (see [3.1.8.](#)), the works concerning the first development area (1973) being in contract stage. The intervention comprises the neighbourhood landscape and urban redesign for circulation improvement

and mobility organisation regarding current regulations and living standards (e.g. fire safety, accessibility, parking). Infrastructure networks and systems – gas, domestic wastewater, rainwater, water supply, telecommunications, public lightning – will then be reformulated or created.

### Lagarteiro



Figure 22. Lagarteiro municipal housing, Campanhã, Porto. Left side: original buildings and works in public space. Right side: after buildings refurbishment and public space renovation (2016). Source: J. Restivo archive (2011, 2017)

Regarding the typo-morphological characteristics of the set (extension and site-plan) and buildings (four-storey, type-designed), Lagarteiro is very similar to Falcão, as contemporary neighbourhoods. Due to its location (the fringe of the city) extremely peripheral, Lagarteiro housing “detachment” from the surrounding urban fabric has not evolved in time as positively as other cases.

The first development (1973), with 9 buildings and 248 dwellings, was extended by a second development (1977) with 4 buildings and 198 dwellings. Regarding road infrastructure, two accesses in *cul-de-sac* enabled to arrive to each development, but not to cross the neighbourhood.

Recently, the first development has been refurbished (2013) (Figure 22), the interventions being directed to the building’s envelope and common circulation areas (i.e. partial refurbishment). The same strategy of a partial refurbishment was pursued in the second development (2016).

The public space of Lagarteiro housing has also been renovated (2016), street layout and existing facilities have been revised, being nowadays possible to cross the neighbourhood. The intervention comprised landscape and urban redesign for circulation improvement and mobility organisation to comply with current regulations and living standards (e.g. fire safety, accessibility, parking). Infrastructure networks and systems – gas, domestic wastewater, rainwater, water supply, telecommunications, public lightning – were reformulated or created.

Following the three main geographical levels (City, Parish and Study Area), specific information was acquired to build the present document that will be a crucial guideline and tool for the development of the next steps of the Project in a perfectly adapted manner for effective and sustainable results.

## 4.2 The city

### Location in the country

Located in the northwest of Portugal, in the “Porto Metropolitan Area” sub-region, Northern Region, composed by 17 municipalities adding up to about 1 759 524 inhabitants (INE, 2014) (Figure 23). Porto is a municipality whose size does not reflect its regional importance, resulting in a territorial area of 41.42 km<sup>2</sup>, spread over 7 parishes, had a population of 214 000 inhabitants (2018). The municipality of Porto is bordered to the north by the municipalities of Matosinhos and Maia, the south by the municipality of Gondomar, the east by the Douro River and the municipality of Vila Nova de Gaia, and the west by the Atlantic Ocean.



Figure 23. Regional framework of the city of Porto. Source: ARU Campanhã- Station (SPI/CMP, 2017)

### Regional framework of the city of Porto

As indicated in the Northern Region Regional Plan of Spatial Planning (PROT-N, 2009), the urban system of the Porto Metropolitan Agglomeration is a relevant nucleus in the polycentric structure of the Northern Region (Figure 24).

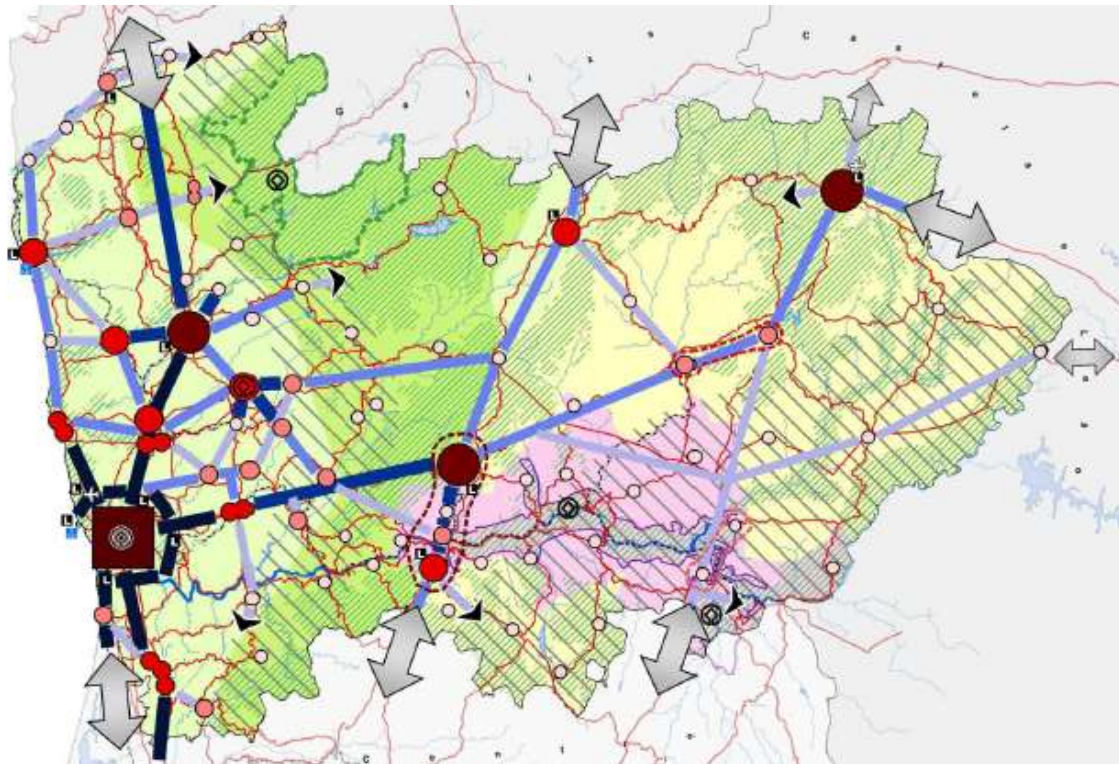


Figure 24. Northern Region Territorial Model. Source: PROT-N (2009)

The defined urban system intends to deepen relationships between urban areas, with a view to promote complementarities and developing synergies between urban strategies, generating relational density, cohesion and regional competitiveness. In this context, we

highlight the strong connections with the cities of regional balance, Braga and Vila Real (Urban Douro Axis) and the regional cities Póvoa de Varzim / Vila do Conde, Vila Nova de Famalicão / Santo Tirso / Trofa and Santa Maria da Feira / São João da Madeira / Oliveira de Azeméis.

The geographical location and size of the city of Porto, the close proximity to the airport (Maia) and seaport (Matosinhos) supported by a multimodal transport system that gives it good accessibility, make Porto the main destination and hub of international and intraregional tourist flows. Porto's strong international image, closely linked to the "Port Wine" brand and reinforced by its connection to the Alto Douro Wine Region, has helped to design the city.

In addition to the tourist attraction, Porto has a university complex with a formative offer of great attractiveness and research areas of great prestige (especially health). Accessibilities and infrastructures supporting economic development (airport, seaport with cruise terminal and logistics) as well as cultural facilities and other facilities in various fields (contemporary art, architecture and music, among others) are being strengthened and integrated.

Porto is also a territory marked by its past, identifying in its urban landscape marks and heritage elements of high historical value. The Historic Centre, a UNESCO World Heritage Site, preserves in itself much of the city's history of evolution and a strong identity of the local community, ensuring in the city centre a built park available to effect the transformation and capable of hosting an important tourist potential. In the tourist area, the Douro River also stands out, a landscape element of great relevance to the city, a huge tourist attraction whose maritime-tourist exploration increased a large number of visitors.

### **The historical evolution of the territory**

For strategic and defensive reasons, the city of Porto originated at the top of Penaventosa hill, overlooking the Douro River. Traces of the ancient proto-historic settlement of the late Bronze Age prove its importance in trade links with the Mediterranean basin. The site of Cale and its Portus was during the Roman Empire an important place in controlling the passage of the road that connected Olissipo to Braccara Augusta. In 1330, the labyrinthine medieval port of narrow, winding streets was a cornerstone of mercantile activity with northern Europe. It was urgent to build a new wall belt to protect the rapidly growing city from all enemy advances. Recognizing the defensive weaknesses of the city in the face of the growth of the bourgeois houses and businesses, extramural to the old fence "Cerca Velha", and external threats, King D. Afonso IV decides to carry out the construction of a second wall of wall that would protect against more effectively the larger space of the city.

During the eighteenth century, the city underwent a new impetus for urban and architectural development, expanding beyond the wall, the result of the continuous dynamism of commercial activity resulting from the growing importance of the international trade of Porto Wine (*Vinho do Porto*). After the creation of the company of the Alto Douro vineyard agriculture, "Companhia Geral da Agricultura das Vinhas do Alto Douro" the Porto Customs had a vital role in the "*Vinho do Porto*" trade, customs control and the authentication seal.

In the second half of the 18th century, the city was undoubtedly marked by the introduction of new urban concepts of enlightenment, such as urban regularity, the introduction of new programs, new stylistic currents, the systematization of architectural and aesthetic elements and the building system. These new ideas were implemented by João de Almada e Melo, appointed by D. José I to the position of Governor of Relations, and



created the Public Works Board in 1763, with the aim of coordinating the city's modernization interventions with resources to financing through the Port Wine Tax.

The nineteenth century of Porto was marked early on by political instability - the French Invasions in the first decade and the liberal wars that culminated with the Siege of Porto in 1832-33, causing destruction in the old city, especially in the lower riverine and on the surrounding slopes.

Porto city map by George Balck (1813) is the oldest known city plan, was designed by the military during the second French invasion. It represents in some detail the urban development of Porto reflecting the dynamics of interventions of the Public Works Board. In the second half of the nineteenth century, the modernization of Lisbon and Porto gathered references from Paris by Haussmann (large avenue geometry and boulevards), or from Barcelona, the Ensanche de Cerdà, (lattice system of structural roads). In Portugal, Decree-Law No. 10 of 19 January 1865 created the figure of a General Improvement Plan, to be implemented by the government, with provisions relating to streets and buildings within the cities, towns and villages of the Kingdom.

In 1881, the Mayor of Porto, José Augusto Corrêa de Barros, presented an improvement plan of the City “Plano de Melhoramentos da Cidade do Porto” composed of a text of general intentions and some budgetary frameworks, without any cartographic support. For the first time, there was a global city structuring vision that identified the city's problems and the need for infrastructure, especially sanitation and water supply. The programmatic objectives were the reformulation of the road communications system through the opening of streets and new buildable spaces; the construction of new markets; the provision of a sanitation network and the improvement of the home water supply network and the reorganization of municipal cleaning and fire-fighting services.



Figure 25. Carta Topographica da Cidade do Porto, 1892, by Augusto Gerardo Telles Ferreira. Source: Arquivo Municipal do Porto

The 1:500 scale map of the City of Porto, concluded in 1892 under the direction of the military engineer Augusto Gerardo Telles Ferreira (Figure 25), presents in great detail and rigor the entire municipality of Porto at a time of generalization of scientific urban cartography, elaborated as support for urban planning actions.

The first half of the twentieth century is characterized by a marked demographic growth accompanied by the expansion of urbanized areas, progressively subordinated to the new

demands of the car. Urban planning is an instrument of political decision materialized in multiples, studies, projects, plans and regulations developed over the century. It stands out for its importance, the Regulatory Plan (1952) by Antão de Almeida Garrett, the Robert Auzelle's Master Plan (1962) and the Municipal Master Plan of 1993.

It is however in the centre of Porto that manifests the biggest urbanistic transformation. Indeed, the social and economic development resulting from the strong industrialization and dynamism of commerce, determine the need for the reconfiguration of the city's financial centre, providing it with ample spaces, reflecting its economic and social strength.

In 1932, engineer Ezequiel de Campos elaborates the Prologue to the Porto City Plan, which establishes for the first time a methodology for the elaboration of a global plan, aiming to reflect on the state of the city's development and how to plan its expansion. It proposes a greater number of connections in the city, in the context of its concentric structure, transposing the city limits to the peripheral municipalities. Due to the topographic constraints of the eastern zone, the expansion of the city should be made with greater incidence in the western zone. The plan proposed a global vision of the city by creating renewed spaces urban structures - streets, railways, gardens, parks and urban centres, financial, commercial, social and public activities.

Antão de Almeida Garrett, urban planner (1896-1978), presented in 1954 the Porto City Regulatory Plan, the first global study of the city from the perspective of urban planning. It addressed city issues in an integrated and long-term manner, proposing solutions for the structuring, internal and long-distance communication routes. Land use was organized by zones in which urban functions were assigned. The Plan's studies comprised the detailed analysis of urban spaces and their evolution, the population's aspirations for the future of the city were assessed and forecasts for the demographic increase and the economic and cultural evolution of the city were projected. It proposed the existence of four specific zones: residential, special, green and rural. The execution of this Plan is an important urban framework for the city, once its proposals have consolidated the urban morphology and functions with coherence and repercussion on the quality of life of the populations.

Robert Auzelle's Port City Master Plan (Figure 26) was in fact the first master plan of the city, as it defined the essential functions of the city and their likely evolution, providing for a port with a decisive role at the metropolitan level as an administrative centre, business, commercial, intellectual, artistic and tourism. However, financing problems for road infrastructure projects and pressure from the real estate market led to the non-completion of this Plan.



Figure 26. Plano Diretor da Cidade do Porto by Robert Auzelle (1962). Source: CMP

The Municipal Master Plan by Duarte Castel-Branco (Figure 27), designated “*projecto Porto cidade nova*” which originated in the General Plan of Urbanization elaborated in the 80's, which advocated the creation of a new directional centre that would constitute the centrality of the metropolitan area with 1.6 million inhabitants. The new road scheme stood out, with the creation of the internal beltway (VCI), the proposed division of the city into 19 town planning units, for the development of urbanization and detail plans, and the definition of the central areas as tertiary vocation zones. In the regulatory aspect it defined volumetric parameters and buildability indices for the buildings.



Figure 27. Plano Diretor Municipal, 1993 by Duarte Castel-Branco. Source: CMP

The elaboration of the Porto Municipal Master Plan (PDM) published in 2006 (CMP), currently in force, constituted a new planning process for the 21<sup>st</sup> century. The new Plan intended to adapt to the condition of a circumscribed territory, whose dynamics were increasingly regulated by the force field of the “enlarged city” and constituted a frame of reference to support the decisions needed to fulfil its role in a larger territorial system. Eminently physical plan, regulating the conditions of use and suitability of the soil.

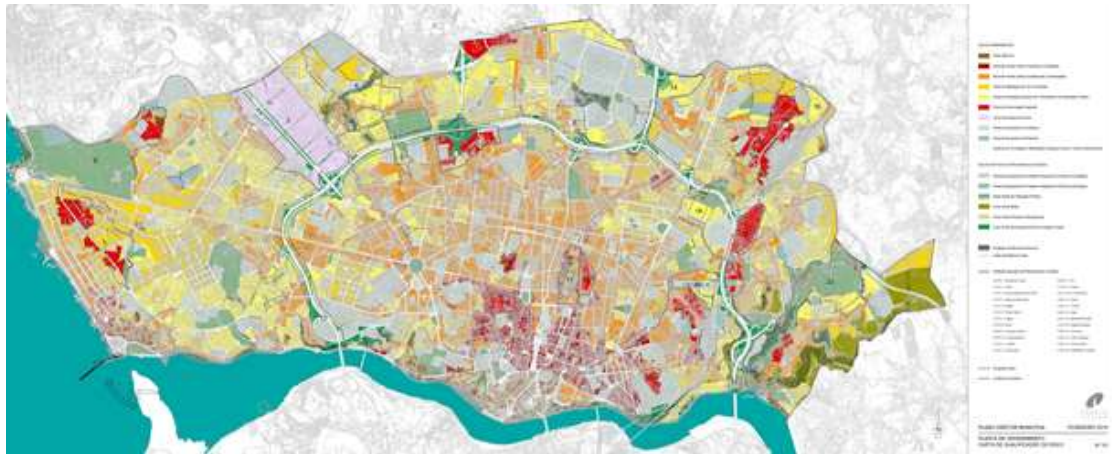


Figure 28. Plano Diretor Municipal, Soil Qualification map. Source: CMP (2006)

### **Brief Notes on the Eastern Expansion of the City**

The parish of Campanhã, located in the eastern end of the municipality of Porto, is characterized by being an area with a great functional and morphological diversity, as a result of the numerous physical and social changes suffered over time. The shape and urban structure found today in Campanhã are nothing more than a reflection of its historical course, as a result of a fusion of residential and industrial areas in articulation with the remains of old farms and agricultural land.

In 1750, the territory of Campanhã was characterized by being a rural space, occupied by several farms. This area benefited from the agricultural suitability of the soils as well as the proximity to waterways, the Tinto and Torto river, and its soft relief valleys, leading to the affirmation of agricultural practice directed mainly to subsistence, being a population dedicated exclusively to agricultural practice.

During the nineteenth century the parish of Campanhã underwent profound changes, witnessing an expansion from the centre of Porto to the eastern part of the city, a space until then considered as peripheral. The transport revolution that took place in Oporto greatly contributes to this, where the completion of the Maria Pia Bridge in 1877 and the Campanhã railway station stand out. Campanhã station became the terminus of the Lisbon railway line (until now the line ended in Vila Nova de Gaia in the Devesas), boosting trade between Porto and the south of the country and the concentration of industrial activity in this location, largely based on facilitating the access of new factories to raw materials and on the speed and speed of the flow of finished products.

The late nineteenth century was marked by the development of transportation and an industrial boom that promoted urban and population growth in the eastern part of the city.

On the other hand, also in the late nineteenth century, there was a set of urban operations that created profound changes in the still rural structure of the parish of Campanhã, essentially at the highest levels near the station, namely the construction of the street of Pinto Bessa (Figure 29).





Figure 29. Pinto Bessa Street after opening in the late 19th century | Source: Jorge PINTO (2007), O Porto Oriental no final do século XIX. Um retrato urbano (1875-1900) in ARU Campanhã - Station (SPI/CMP, 2017)

### **Recent developments of the city - 2<sup>nd</sup> revision of the Municipal Master Plan (2015)**

Porto City Council decided in 2015 to start the preparation of the 2<sup>nd</sup> revision of the Municipal Master Plan (PDM), and on March 6, 2018 (CMP), approved the extension of the deadline by another 36 months. This revision, in addition to being a legal imposition, will allow this territorial management instrument to be adapted to the multiple normative and conceptual changes, as well as to the economic, social, cultural and environmental changes that have occurred since 2016, which justify a new urban management model that responds to the picture of challenges and opportunities facing us today.

### **Urban Rehabilitation Areas**

The urban rehabilitation legal regime (Portugal, 2012) refers “the form of integrated intervention on the existing urban fabric, in which the urban and real estate heritage is maintained, in whole or in substantially, and modernized through remodelling or upgrading of urban infrastructure systems, urban or green spaces and equipment for collective use and construction, reconstruction, extension, alteration, conservation or demolition of buildings”.

Urban rehabilitation is promoted by the municipalities through the delimitation of areas (ARU) and the approval of a rehabilitation operation (ORU) to be developed in the delimited areas (Figure 30), with the following effects on the delimited territory:

- It requires the municipality to define the tax benefits associated with municipal property taxes, such as the municipal property tax (IMI) and the municipal property tax (IMT), in accordance with the applicable legislation;
- Gives owners and owners of other rights, burdens and burdens on buildings or fractions therein the right to access to tax and financial support and incentives for urban regeneration, in accordance with applicable law, without prejudice to other benefits and incentives relating to cultural heritage.



Figure 30. Map with the limits of the urban rehabilitation areas of Porto. Source: CMP/DMU

Currently, in addition to the ARU of the Historic Centre of Porto, 8 further urban regeneration areas are delimited, with four located in the central area of the city (Baixa, Massarelos, Lapa and Bonfim), two on the western side (Lordelo e Foz Velha) and three on the eastern side (Campanhã, Corujeira and Azevedo).

Integrated strategies for each of the ARUs set the framework for their operation in order to promote the improvement of the urban and environmental conditions in this area of the city, generating a territory with a reinforced, more cohesive identity and able to attract opportunities that boost its economic, social and cultural fabric, contributing to the creation and affirmation of a new urban development pole in the eastern part of Porto.

## 4.2.1 Territorial description

### 4.2.1.1 Climate and Urban Environment

#### National climate regions

According to Köppen's global climate types classification, Porto is located on the region of a temperate Mediterranean climate, with rainy winter and dry and warm summer (Csb) at the Iberian Peninsula, on the NW of Portugal, in the Atlantic coastal zone (Figure 31) (IPMA, 2018). However, Porto region is under the influence of the zonal current of the W that, after crossing the rock mountains, has a long sea route, having here its first contact with a continental area. The characteristics of this airflow, when arriving at the Portuguese coast, depend on the positioning and the momentary attributes of an important barometric device - the Azores Anticyclone - that influence (facilitating or hindering) the characteristics that this airflow has acquired in its long oceanic path. In addition to these two factors, the contiguity to two continental masses - the Iberian Peninsula and North Africa - promotes the frequent formation of barometric devices of diverse thermal origin in the hot season and in the cold season, and makes that Porto, presents a thermo-hygro-anemometric conditions of comfort much distinct, depending on the present synoptic situation (Figure 31).

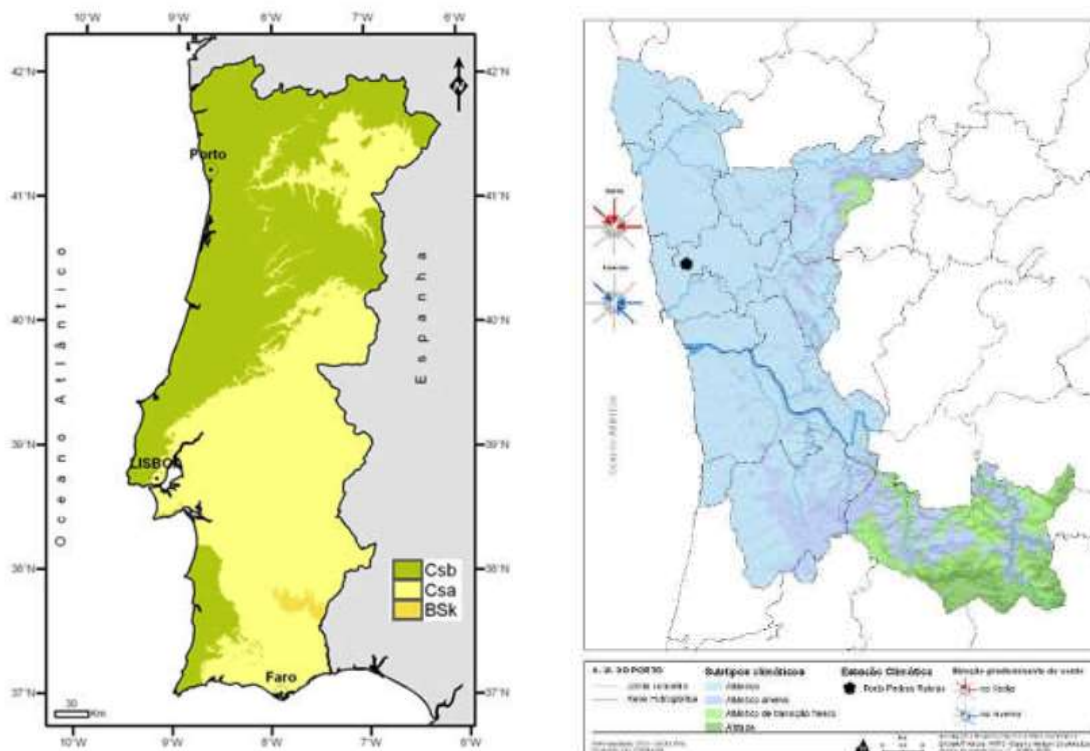


Figure 31. Left: Climate of Portugal Continental, according to Koppen's global classification of climate type. Source: IPMA, 2018 | Right: Climate framework of the metropolitan area of Porto. Source: Monteiro *et al.*, 2018a

## Temperature

The knowledge of Porto's climate context is supported on a rare series of records with more than 100 years (official station of Porto - Serra do Pilar - Figure 31; data registered from 1880 to 2007) and on the results of several national and international projects that have been developed in the last 4 decades. Over the last 40 years (1978-2016), data indicates that: i) summer days with maximum temperature above 25°C were frequent in June, July and September (25% of days) and very frequent in August (45% of days); ii) days with a minimum temperature above 20 °C were rare and occurred only between May and September, being more frequent in August (3% of days); iii) days with a minimum temperature between 2°C and 7°C (probable frost) are frequent between November and April (25% of the days) and very frequent in January and February (50% of the days); iv) the rainy season of the year occurred frequently between October and December; vi) the prevailing wind in the winter is of NW, E and SE quadrants and in the summer of N, NW and E (Monteiro *et al.*, 2018b).

## Precipitation

Precipitation occurred in any month of the year, although it is more frequent and more intense in the coldest season. Relative humidity is very high (> 70%) on most days, and frequent advection fogs by the coast and radiation fogs by morphologically rugged areas, either by tectonics or watercourses (Monteiro *et al.*, 2018b).

## Winds

In general, in Porto the prevailing summer winds are from NW, N while in winter from NW, NE and SE. The average wind speed is around 20-25 km/h (5.5 m/s - 6.9 m/s) and the presence of both the sea breeze and the valley-top breeze are very common (Monteiro *et al.*, 2018b).

### **Climate main changes at Porto**

Although there is not a sufficient set of weather stations to understand all the expressive climate nuances in the municipality of Porto, the available data confirm a seasonal rhythm characterized by a moderately fresh winter and a moderately warm summer often influenced by NW winds and morning advection fogs along the coast in the areas closer to the sea (Monteiro *et al.*, 2018b), as the city of Porto (Figure 31).

The secular climatological data also shows that there is consistent evidence of rising temperatures, the occurrence of a greater number of extremes of heat and cold, a change in the distribution of precipitation especially on extremes episodes (extreme rainfalls and drought), as well as an increasingly clear seasonal disorganization and an increased frequency of extreme wind episodes (Monteiro *et al.*, 2012; Monteiro *et al.*, 2018a), especially intensifying the occurrence of warmer and drier summers and accentuating a continued rise in mean sea level (Pombeiro & Ribeiro, 2016).

### **Climate changes projections**

The main climate changes projected until the end of the XXI century for the municipality of Porto show: i) decrease of the mean annual precipitation, which may vary between 3% and 25%, with no clear trend in the winter months (between -19% and + 17%) and more frequent and intense droughts, reducing the number of days with precipitation between 12 and 29 days a year; ii) rise in annual mean temperature (between 1°C and 4°C), increase in maximum temperatures in autumn and summer (between 2°C and 5°C), increase in the number of days with very high temperatures ( $\geq 35^{\circ}\text{C}$ ) and of tropical nights, with minimum temperatures  $\geq 20^{\circ}\text{C}$ , and more frequent and intense heat waves; iii) average sea level rise between 0.17m and 0.38m by 2050, and between 0.26m and 0.28m by the end of the XXI century; iv) increase of extreme events, in particular in extreme rainfalls and more intense winter storms, accompanied by extreme rain and wind (Pombeiro & Ribeiro, 2016).

### **Intraurban climate context of Porto**

Substantive changes in temperature and wind direction are typical in urban centres. These naturally results from urban factors related to the intensity of artificialization of the territory with profound changes in the micro-morphology (road network, building, green spaces, etc.) and territory factors related to the internal physiology of the city (altitude, distance to the sea and to the river, sun exposure, slopes, relief, ...).

Looking to understand the intraurban climate context of Porto, the study of shape and amplitude of urban heat and cool islands was made based on itinerant measurements of temperature. It shows that positive thermal anomalies are evident in practically the entire urban grid and can reach 6°C (Figure 32). These anomalies seem to coincide with additional contributions of artificial energy that feed the climate subsystem from numerous anthropogenic activities, artificial materials, impermeable soil, vegetation scarcity, sky view factor and, of course, the chemical composition of the atmosphere, which tends to facilitate energy retention and make it more difficult to lose energy through radiation to the atmosphere (Monteiro *et al.*, 2018b). It is also noticeable that mainly at East of the city, in the parish of Campanhã, thermal anomalies can reach -2°C (Figure 32).



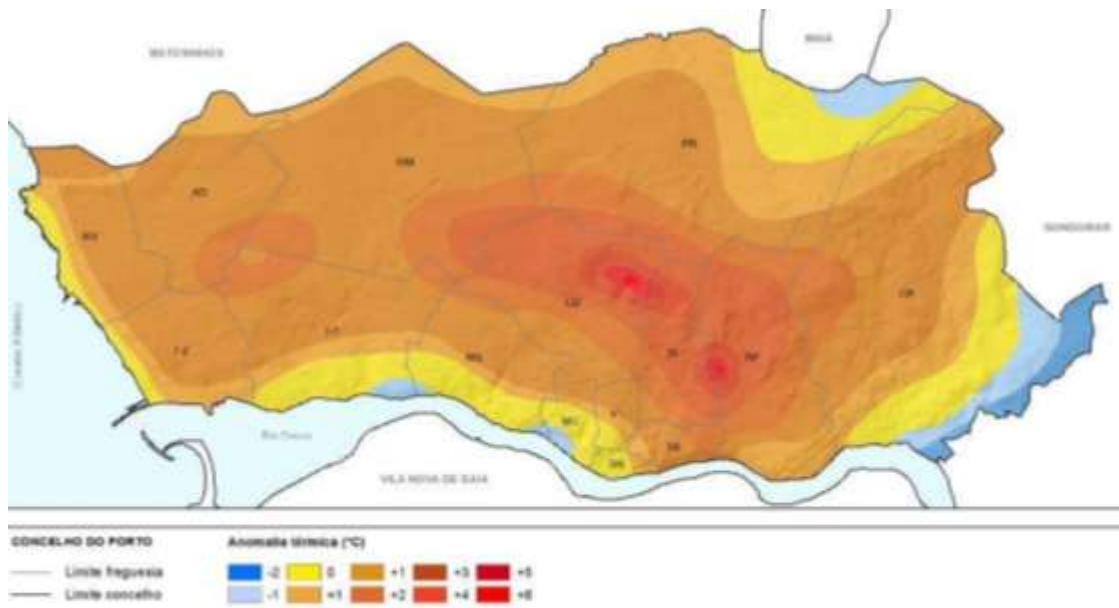


Figure 32. Probable thermal anomalies at Porto, based on itinerary measurements. Source: Monteiro *et al.*, 2018b

These data and thermal image analysis point to the possibility that there are areas of the city with high risk of extreme heat practically in the whole city (Figure 33) and extreme cold throughout the eastern area of the city, covering the parish of Campanhã (Figure 34).

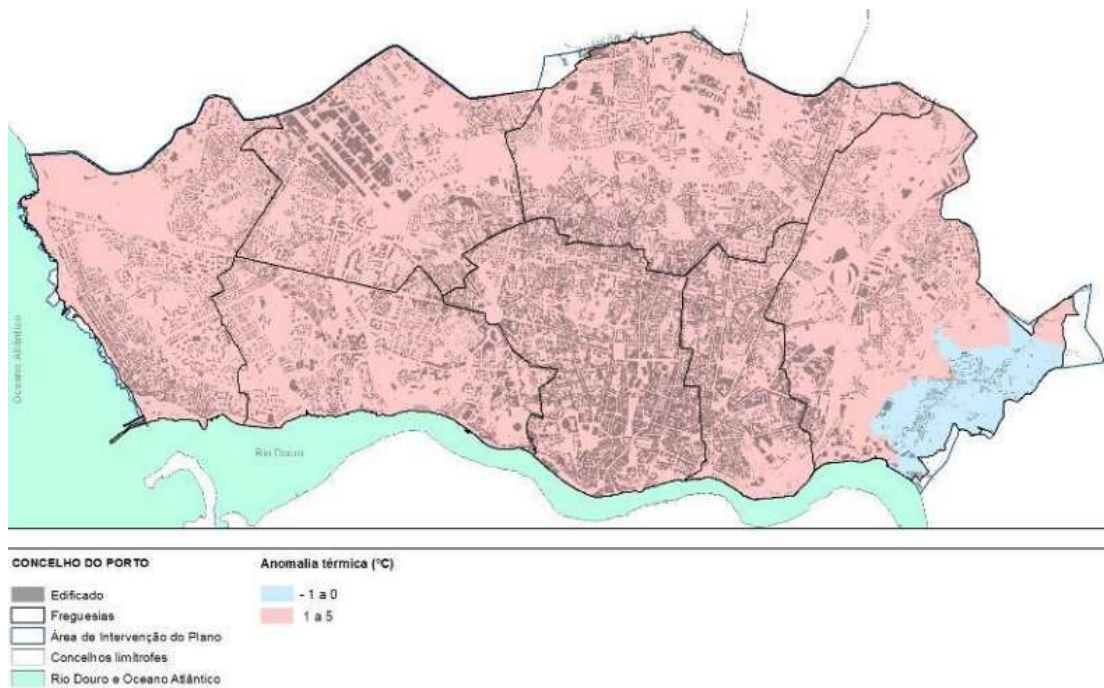


Figure 33. Probability of extreme heat in summer. Source: Monteiro *et al.*, 2018b

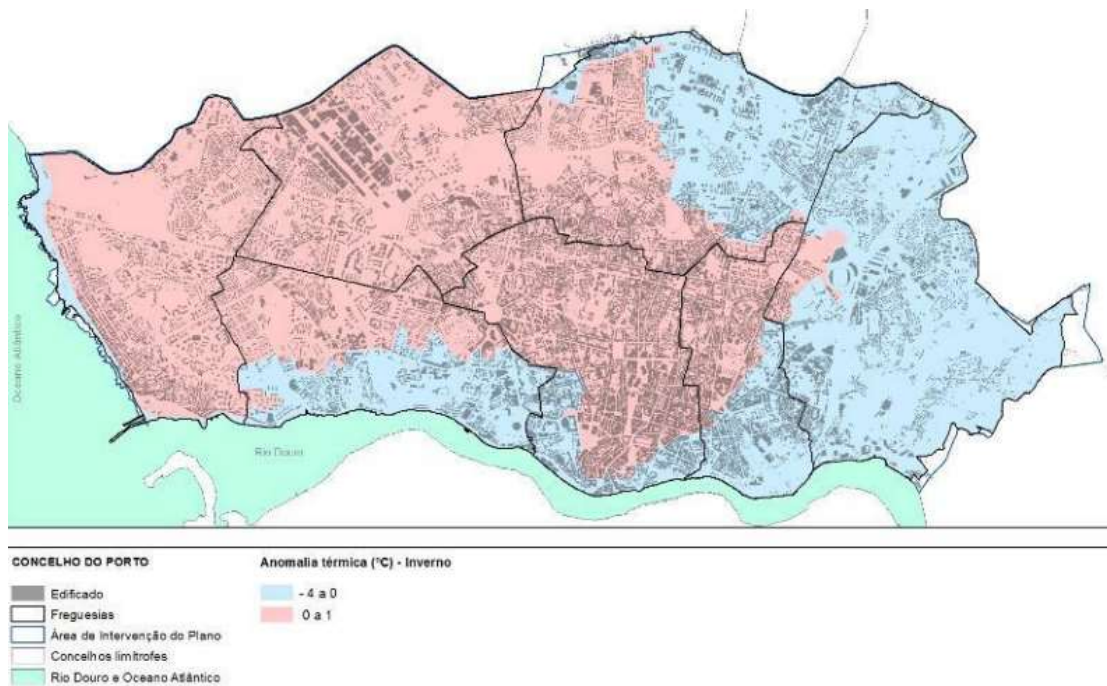


Figure 34. Probability of extreme cold in winter. Source: Monteiro *et al.*, 2018b

### Air Quality

With regard to air quality, only two air quality monitoring stations in Porto are currently operating: FSC Campanhã (traffic type - mainly influenced by road traffic emissions) located at W in the parish of Campanhã, and SL Ouro (background type - initially not influenced by specific source), at SW (Figure 35). The monitoring information available was for PM<sub>10</sub>, NO<sub>2</sub> and CO until 2014. Considering the limits established by law, only the annual limit values for nitrogen dioxide (NO<sub>2</sub>) have been annually exceeded since 2001 in Campanhã (Figure 36, Figure 37, Figure 38). There were no limit values exceeded on the other pollutants monitored.

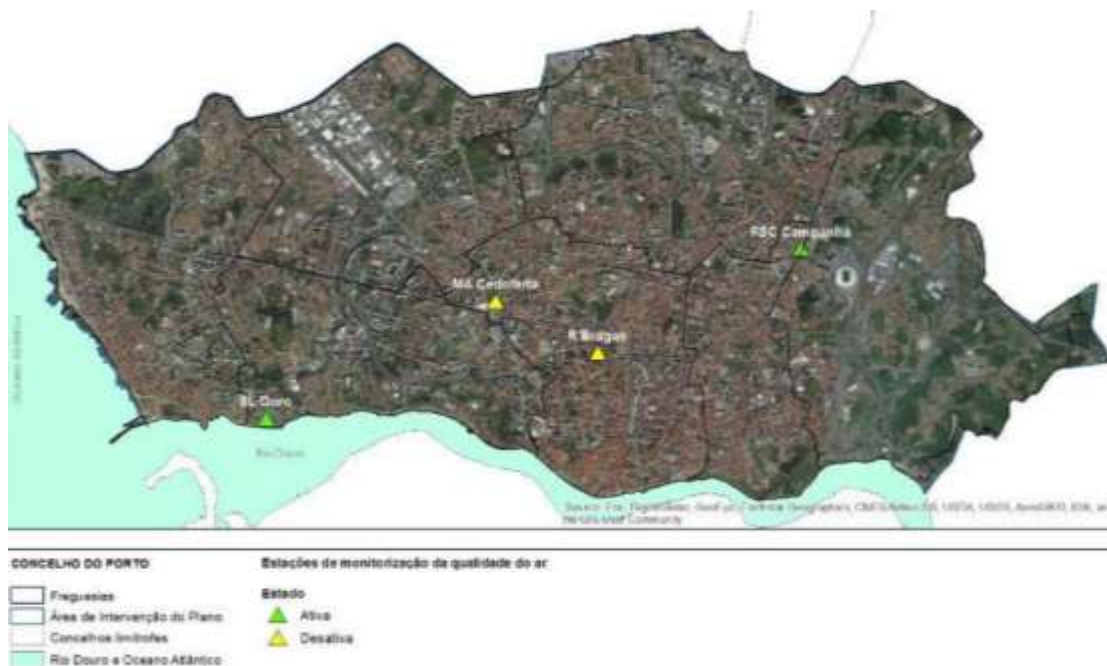


Figure 35. Air quality monitoring stations in the city of Porto. Source: Monteiro *et al.*, 2018b

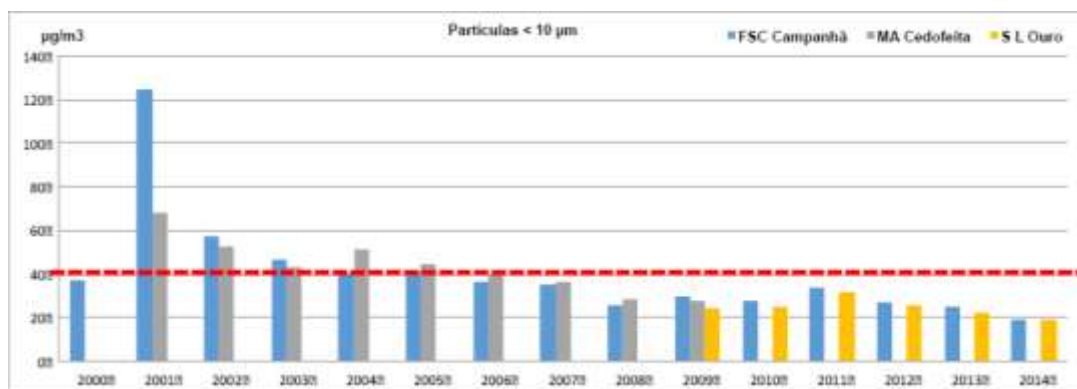


Figure 36. Concentration of particles <10 µm in Porto (2000-2014). Source: Monteiro *et al.*, 2018b

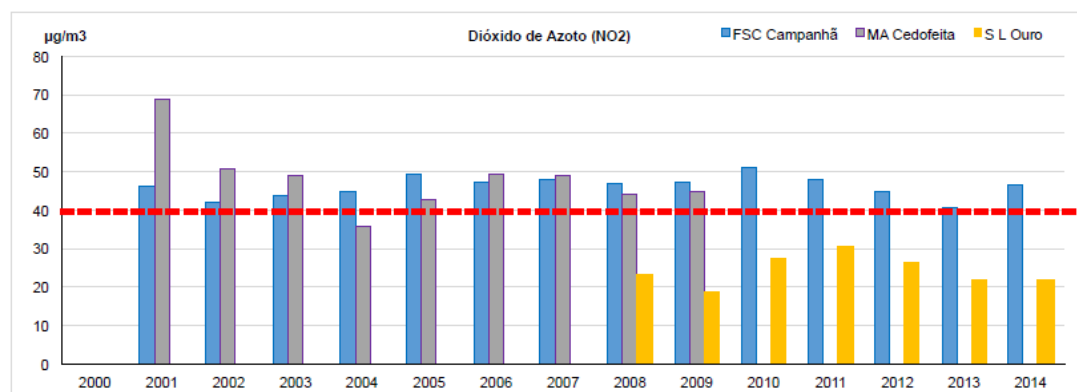


Figure 37. Concentration of nitrogen dioxide in Porto (2000-2014). Source: Monteiro *et al.*, 2018b

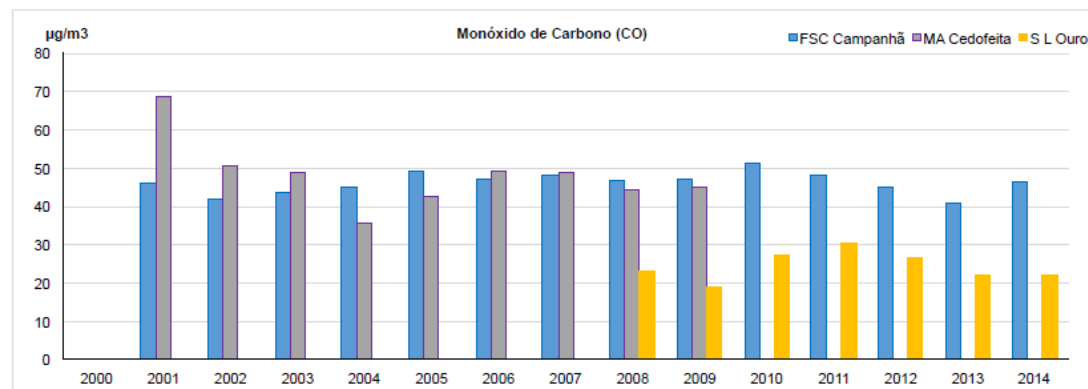


Figure 38. Concentration of carbon monoxide in Porto (2000-2014). Source: Monteiro *et al.*, 2018b

It should be noted that in 2007 road transport sector was identified as the main sources of NO<sub>x</sub> and CO emissions and the industrial and energy sector responsible as the main sources of SO<sub>x</sub> (Monteiro *et al.*, 2018b).

In 2011, Air Quality Plan of the Northern Region (of Portugal) - NO<sub>2</sub> indicated that Porto had the highest emissions values associated to industrial and residential combustion sector, as well as associated to mobile fonts. Road traffic is identified as one of the most important sectors in terms of atmospheric emissions, and Porto is also one of those with the highest emission values. At Porto were also pointed out highest emissions associated to the city centre where most of the traditional commerce and services are located, and on the routes that give access to central areas of Porto where the traffic volume is higher (Monteiro *et al.*, 2018b).

The parish of Campanhã is crossed by two major roadways to access the city, being one of the main sources of air quality degradation in this area of the city. Porto presents an action plan to reduce mainly car traffic emissions with six measures to reduce pollutant emissions from car traffic (Monteiro *et al.*, 2018b, annex X): i) to encourage the use of public transport (bus, train and subway); ii) to create a zone of reduced emissions “ZER” in the ring delimited by the Internal Beltway and Douro river; iii) to increase the number of hybrid or electric vehicles in the municipal fleet by 70% by 2017; iv) to intensify the partnership with University of Porto for the installation of environmental sensors, in several streets of the city centre; v) to promote self-control tests and screening of gaseous emissions from the municipal crematorium; vi) to provide information to the population in a timely manner; vii) to create and disseminate a carbon footprint calculation program.

### Climate Resilience

To increase the resilience capacity to climate change impacts and to the emerging challenges associated to a cosmopolitan city as Porto with an urban dynamic which directly affects the municipal territory as well as its natural and human systems, the city adopted a Municipal Strategy for Adaptation to Climate Change<sup>5</sup> in 2016 (Pombeiro & Ribeiro). This strategy counted on the contribution of key local actors or with relevant intervention in the municipality to define a set of 52 priority strategic options of different types, scopes, key sectors and scales, not only to increase resilience to impacts of potential extreme climate events but also to respond to different effects already observed.

The priority options, presented in Table 2, were based on the identification and prioritization of current climate vulnerabilities and risks and their projections until the end of the XXI century and on the application of those actions at various territorial and temporal scales and levels (green and grey infrastructure and non-structural) to enhance adaptive capacity, reduce vulnerability and/or provide opportunities across sectors such as energy, biodiversity, water resources, industry and health. Many of these measures are already in place, of which can be highlighted the Asprela Central Park: in 2020, a new green area with 6 ha at the heart of the university campus, will be 98% permeable and able to contain 10.000 m<sup>2</sup> of rainwater (flood level). The expected consequence is a reduction of the flooding pressure over the Metro rail as well as pedestrian, bike lanes and roadways.

It also should be emphasized the efficient and fast current public services response (or adaptation), resulting from an effort and joint action of multiple public entities (municipal departments, especially the municipal department of civil protection and municipal police, fire department, Directorate-General for Health, Red Cross, among others).

ID	Priority strategic options of Adaptation
<b>IMPROVING ADAPTIVE CAPABILITY OF PEOPLE AND GOODS TO SEA LEVEL PHENOMENA AND COASTAL GALGATION</b>	
1	To condition the fixed occupation of the most vulnerable coastal zones, designing and implementing incentive and compensation conditions for the progressive relocation and / or seasonal mobilization of structures at risk, with a view to reducing vulnerability and enhancing the seafront due to less urban pressure on water resources
2	Develop and implement a Coastal Planning Plan (under preparation by the Portuguese Environment Agency)
3	Develop coastal protection and defence plan to prevent sea level rise and higher frequency of coastal overtopping
<b>IMPROVING ADAPTIVE CAPABILITY OF PEOPLE AND GOODS TO EXCESSIVE PRECIPITATION PHENOMENA THAT MAY RESULT IN FLOODS AND LAND MOVEMENTS</b>	
4	To condition fixed occupation of the most vulnerable riverside areas, designing and implementing incentive and compensation conditions for the progressive relocation of at-risk structures, with a view to reducing vulnerability and enhancement of waterways due to less urbanistic pressure on water resources
5	To condition urban occupation in risk areas of terrain movement on slopes

<sup>5</sup> Strategy developed under the ClimAdaPT.Local project, retrieved from: <https://apambiente.pt/index.php?ref=16&subref=81&sub2ref=118&sub3ref=395>



6	Promote involvement of the River Basin District and neighbouring municipalities in adaptive water management
7	Develop and implement Strategic Plans / Directors of Water Supply and Drainage (Domestic Wastewater, Stormwater, Streams and Beaches) for hydraulic adaptation to climate change flows and improvement of structural and runoff conditions in critical areas (bridges, aqueducts and other bottlenecks)
8	Develop and implement the Waterworks restoration and Rehabilitation Plan of the Municipality of Porto using the best natural engineering practices
9	Develop a Water Sensitive Urban Design Good Practice Guide, encouraging the use of a set of infrastructures and practices that combined form a smart and naturalized perspective of the urban water cycle (increased permeable surfaces, creation of retention basins, urban afforestation, roofing and bioretention, biofiltration and raingardens units) and implementing incentive and compensation measures - green economy - at the public and private level
10	Develop a drainage network maintenance and operation plan (domestic wastewater, rainwater and streams)
11	Develop a Technology Platform for Urban Water Cycle Monitoring
12	Promote the visual and landscape requalification of the escarpment landscape - tourist business card
<b>PROMOTING RATIONAL USE OF NATURAL RESOURCES</b>	
13	Implement a groundwater utilization program in municipal management operations (cleaning and irrigation) using wells and wells
14	Develop a Plan for Rainwater Use and Treated Wastewater Reuse for Multiple Uses (irrigation, garden cleaning)
15	Implement a program for the automation of irrigation systems to reduce water consumption
16	Maintain a water supply system for the city of Porto in a gravitational manner (Porto Gravítico Project)
17	Maintain Unbilled Water Reduction Plan
18	Adopt a water-efficient tariff system
<b>DEVELOPING A NEW PARADIGM FOR ECOLOGICAL STRUCTURE THAT IS ACTIVE ON CLIMATE CHANGE ADAPTATION SOLUTIONS</b>	
19	Increase the permeable surface area of the municipal territory (through a riparian ecosystem renaturation program, raingardens, drainage paving solutions, etc.)
20	Implement afforestation and blue infrastructure program to CO2 reduction and effective minimization of heat island phenomena
21	Implement a native vegetation cover expansion program in selected areas of the urban context (Porto Green Belt and Porto Biolab / Native Forest in Quinta de Salgueiros)
22	Extend the network of community gardens as a way of ensuring the progressive permeabilization of the territory
23	Mapping climatic phenomena at the county level, the "heat islands" in particular
24	Develop diagnostic study and control plan for invasive / exotic species
<b>IMPROVING ADAPTIVE CAPACITY AT THE ALERT, SURVEILLANCE AND EMERGENCY MANAGEMENT SYSTEMS</b>	
25	Develop a Special Natural Hazard Emergency Plan for the protection of people, property and natural heritage, producing risk mapping (most vulnerable arboreal heritage, urban flooding, coastal overgrowth, sloping land movement / slopes, heat / cold waves)
26	Promote the clarification of the functional responsibilities and area of action of each of the entities in an emergency context, under the coordinating sphere of municipal Civil Protection services, through the elaboration of Prior Intervention Plans for different risk situations (PPI) for conditions adverse weather
27	Invest in an autonomous weather forecasting and monitoring network to increase the reliability of forecasting of extreme local weather phenomena in collaboration with other entities (e.g. IPMA)
28	Develop a contingency plan to cope with extreme temperatures - hot wave and cold waves
29	Implement a monitoring and evaluation program for the evolution of each extreme events and by each of the entities involved for the definition of alert and warning situation
30	Support and enhance formal and informal support networks for the vulnerable population to extreme events (homeless and isolated elderly)
31	Elaborate the Plan of Control and Monitoring of the Phytosanitary State of the Arboreal Heritage of the City
<b>IMPROVING ADAPTIVE CAPACITY OF HEALTH EQUIPMENT AND INFRASTRUCTURE</b>	
32	Implement a program for improving thermal comfort conditions in hospitals, nursing homes, nursing homes and nurseries
33	Ensure responsiveness and organization of hospitals and complementary social support network to cope with abnormal population access to emergency services due to extreme events

34	Promote the study of the risk of potential increase in vector-borne disease / outbreaks (mosquitoes, sandflies, ticks and fleas) or others that are potentiated by climate change.
35	Implement a prevention and / or contingency program to address vector-borne infectious disease / outbreaks (mosquitoes, sand-flies, ticks and fleas) or others that are enhanced by climate change.
<b>INCREASING THERMAL COMFORT IN THE MOST VULNERABLE BUILDING, MINIMIZING RESOURCE TO CONVENTIONAL POWER SOURCES TO ADAPT TO CLIMATE CHANGE</b>	
36	Integrate energy sustainability measures and building adaptation strategies for Municipal Spatial Planning Plan and municipal regulations in the form of recommendations / incentive system / binding regulation through positive hierarchy / discrimination over the most vulnerable building park
37	Map the indicators of "thermal behaviour", "adaptive capacity", "potential impact", "current and future vulnerability" on buildings to the statistical subsection scale
38	Create a municipal guide with information on measures / recommendations / incentive system / binding regulation
39	Ensure that new or rehabilitated municipal buildings (services and social housing) are models of energy sustainability and tend to be autonomous. Buildings should ensure and exceed legislation, meeting future challenges
<b>PROMOTING LESS CARBONIC MOBILITY</b>	
40	Reconvert the municipal fleet of cars up to 70% with electric vehicles
41	Implement mobility program and prioritize access to emergency vehicles / means
42	Pedestrianize streets
43	Expand cycling network
<b>PROMOTING CIVIL SOCIETY AWARENESS, TRAINING AND INVOLVEMENT</b>	
44	Promote platforms for greater involvement and progressive empowerment of civil society around climate change adaptation
45	Implement an information and awareness program for the prevention of vector-borne infectious diseases (mosquitoes, sand-flies, ticks and fleas)
46	Implement an allergy prevention information and awareness program
47	Implement an information and awareness program for sun exposure and melanoma prevention
48	Continue the information and awareness program to promote tap water consumption
49	Implement an Information and Awareness Program for introducing climate change concerns into the educational process of the school community, focusing on water education (urban water cycle)
50	Implement an information and awareness program for sectoral emergency plans
51	Implement an Information and Awareness Program for the distinction of invasive species and prevention of the release of exotic animals in the wild
52	Implement an information and awareness program for planting native species in private gardens through the provision of trees

Table 2. List of adaptation actions to impacts of climate extreme events for the municipality of Porto, divided into 9 thematic domains. Source: adapted from Pombeiro & Ribeiro, 2016

### Carbon storage by vegetation

To increase resilience to climate change, the Municipality of Porto is also implementing and supporting several initiatives.

Since 2014, Porto integrates and supports the FUTURO project – 100 000 trees project in the Porto Metropolitan Area (CRE.Porto, n.d.) - whose mission is to rehabilitate burnt, degraded or underused areas through to ecological practices on appropriate management, plantation and maintenance of native trees and shrubs at the region, promoting various environmental benefits including rainwater regulation, carbon sequestration and air pollutants removal. Until 2018, 8 167 native trees have been planted in Porto, which when adults they will have the capacity to remove various air pollutants such as carbon monoxide (24kg of CO), ozone (943kg of O<sub>3</sub>), nitrogen dioxide (268kg of NO<sub>2</sub>), sulfur dioxide (72 of SO<sub>2</sub>) and particles, in particular those most dangerous to human health (16g of PM 2.5). Furthermore, when these trees reach maturity several environmental benefits are expected, namely: i) 1 861 m<sup>3</sup>/year of avoided rainwater run-off in the amount of 16

711 €/year; (iii) 248 tonnes/year of carbon sequestration in the amount of €26 604/year; v) 1. 324 kg/year of total removal of air pollutants in the amount of €9 853/year (Pinto, 2018).

In addition to this project, the municipality develops the Native Urban Forests in Porto (FUN Porto), a project that reinforces the city's green infrastructure with the citizens' involvement, as well as intends to evaluate and optimize ecosystem services and to continue to propagate native plants in the municipal nursery, located on the parish of Campanhã (with an annual production of around 600 000 plants) to export to all metropolitan territory. This program includes the 'If you have a garden, we have a tree for you' initiative which aims to plant 10 000 (mostly native) trees and shrubs in the city's private gardens by 2020. With this initiative 5 966 trees and shrubs have been planted in 1 022 city deprived spaces (with the collaboration of the citizens). There are other two FUN Porto project initiatives, the Biospots Network that has already two intervention areas (4 hectares) with 1 308 trees planted and the BioLab to be installed at the parish of Campanhã (Pinto, 2018) whose effects are expected to be felt especially to improve the quality of the ecosystem: air, climate change adaptation, carbon sequestration and biodiversity support.

Quinto Alçado project is also another initiative that proposes a model for the development of green infrastructure at the level of roofs and facades and to evaluate their impact and benefits for the city<sup>6</sup>. The future Intermodal Campanhã Station located at the parish of Campanhã will integrate a wide green coverage to expand the resilience capacity of the city.

### **Local climate policies/Action Plans**

The previously mentioned Municipal Strategy for Adaptation to Climate Change (Pombeiro & Ribeiro, 2016) is aligned with the medium and long-term Municipal Strategy for the Environment focused to respond to the most emerging challenges of the three pillars of sustainability (environmental, economic and social) along five key axis: axis I) Porto, a conscious city committed to a sustainable future; axis II) Porto, a green city, Invicta but resilient; axis III) Porto, a city moving towards an energy revolution; axis IV) Porto, an analytical and transparent city; axis V) Porto, a laboratory city<sup>7</sup>.

Besides these two strategies, the ongoing Municipal Master Plan (MMP) review is a great opportunity to accommodate climate political measures. One example is the recently proposed methodologies and tools, suggesting the creation of the Porto Bioclimatic Index (IBP), encouraging the creation of disruptive regulatory measures on the reviewed MMP to contribute to increase residents' bioclimatic comfort and to reduce their vulnerability to extreme weather events, especially to the most vulnerable population (CMP, 2019).

### **Carbon savings and Articulation with European policies**

In 2006 the municipality of Porto also signed the “Aalborg Charter” and in 2009 the “Covenant of Mayors” on sustainable energy, which objectively implied the commitment

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6 <https://www.greenroofs.pt/pt/pqap> and <http://www.porto.pt/noticias/porto-quer-ser-a-cidade-das-coberturas-verdes>). Associação Nacional de Coberturas Verdes [ANCV]. (n.d.). *GreenRoofs*. Retrieved from <https://www.greenroofs.pt/pt/pqap>

Porto quer ser a cidade das coberturas verdes. (2017, April 7). Porto - o portal de notícias do Porto. Retrieved from <http://www.porto.pt/noticias/porto-quer-ser-a-cidade-das-coberturas-verdes>

7 A Estratégia para o Ambiente. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/ambiente/cmp-da-atencao-especial-ambiente>

of Porto City and its key actors to reduce by 45% its CO<sub>2</sub> (carbon dioxide) emissions between 2004 and 2020.

Committed to reduce GHG emissions by 50% by 2030 from 2004 and to be carbon neutral by 2050, Porto has been working over the recent decades resulting in a 26% reduction from 2004 to 2016, 16% through decarbonising energy production (national policy) and 10% through local policies.

Transport is one of the main sector consumers of energy (about 60%), followed by the building sector (about 45%), and at the same time, the main responsible for the city's carbon emissions (39% of total emissions in Porto) and the city is focusing significant efforts on the sector - modernizing the transport infrastructures, focusing on intermodal transport networks in collaboration with metropolitan municipalities looking to improve access to the city by public transport, and electrifying the municipal fleet. In 2018, the city replaced 70% of its diesel-powered light vehicles with large number of electric vehicles and plug-in hybrids. This has decreased annual CO<sub>2</sub> emissions by 542 tonnes. Between 2002 and 2018, Porto's metro enabled 12 983 individual vehicles to be taken off the roads and 45 000 tonnes of CO<sub>2</sub> to be removed annually from the atmosphere. Presently, the metro network is being expanded between more two busy areas of the city and was introduced concessionary travel pass schemes to encourage its use. The city is also renewing 81% of the public bus company fleet. This will see 276 diesel buses gradually replaced with electric and natural gas-powered vehicles. The first 50 of these cleaner buses entered service last year.

### **Urban plans related with climate change resilience**

At local level, the Strategic Masterplan for the Oriental Zone of Porto, applied to areas on the parish of Campanhã, also considers concerns about the response of urban planning to the potential effects of climate change and includes guidelines for territorial management, particularly the implementation of a Porto's Eco-district as the laboratory of a sustainable city model com effects on environment, social and economic level (Quatenaire, 2019).

### **Participation on national and European platforms**

Porto city also participates on diverse national and international networks to improve knowledge and share the best practices that simultaneously contribute to increase local resilience and to respond to the challenges related to the effects of climate change:

- Porto is a partner in the Urban Agenda for the Circular Economy since 2018, a working group that is developing an action plan to inspire the EU to develop better legislation, better funding and better knowledge-sharing to encourage the application of the natural circular principles to the current economic model;
- At 2018, Porto was the Portuguese city chosen by the Ellen MacArthur Foundation (EMF) as one of four “focus cities” for the “Cities and the Circular Economy for Food” study. This initiative looks for new approaches to apply circular economy principles to the food urban system based on a regenerative system maximising economic, environmental and social benefits. Since then Porto was selected to be a participant city on EMF's Food initiative working group to mobilize the various local and national actors to realize the vision of a circular economy on food system. Porto was also invited by EMF to join CE100, a global network promoted by the EMF to stimulate the circular economy by sharing knowledge and co-creation between public and private organizations, to act collectively and apply circular principles adapted to local reality;
- Porto has been a member of the Eurocities network since 1990 and has been actively involved in environmental issues and on the food working group. The recognition of

Porto Municipality's commitment to develop and apply nature-based solutions in the various environmental projects to a green, healthy and resilient city, led to the election of Municipality of Porto to the Eurocities environment forum presidency, for a two-year mandate from October 2018;

- From 2018, Porto is working on two national working groups, on food and on construction and demolition waste, promoted by Smart Waste Portugal Association to reduce waste production and to explore ways of turning waste into resources, looking to influence public policy, strategies and measures on the transition to a circular economy.

#### 4.2.1.2 Biophysical characterization

##### Geology and lithology

Based on the Porto Geotechnical Chart (Figure 39), three types of lithological formations are distinguished: the sedimentary cover formations, the metamorphic formations and the igneous formations, being these last ones more extensive, especially the granite rock formations from hercynic age (340 to 270 Ma). In the eastern zone of the city, in the parish of Campanhã, the rocks of Grauvachic-Schist Complex predominate with outcrops of granitic material. Alluviums, corresponding to river deposits, occupy the valleys of the rivers and streams of Campanhã and are mainly composed of clayey sediments and sands that form the river runoff channel and the flood bed (Figure 39). In Campanhã, these rock formations essentially originate to medium compact metamorphic residual soils (G4-X). Associated with the main present water lines in this parish, Torto and Tinto rivers, there are alluvial and colluvial soils (G2), defining small terraces in their slopes (Figure 40) (CMP, 2018f).

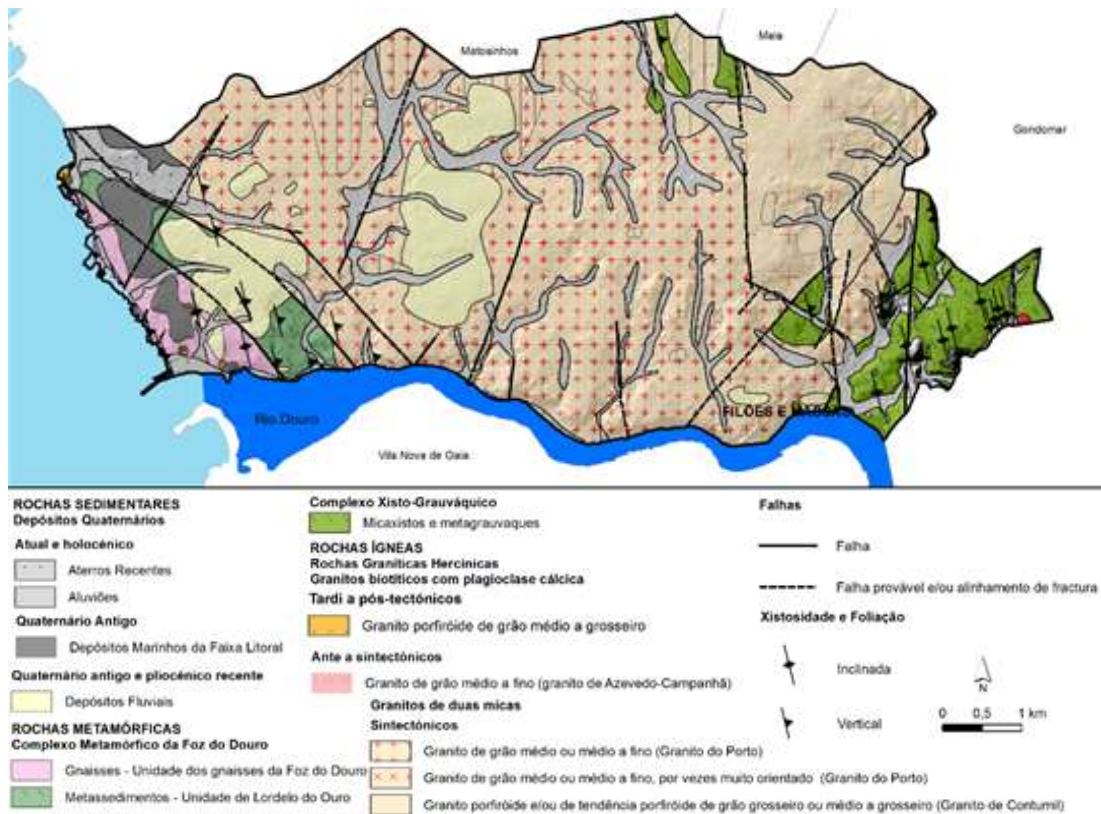


Figure 39. Lithology of municipality of Porto. Source: CMP, 2018f



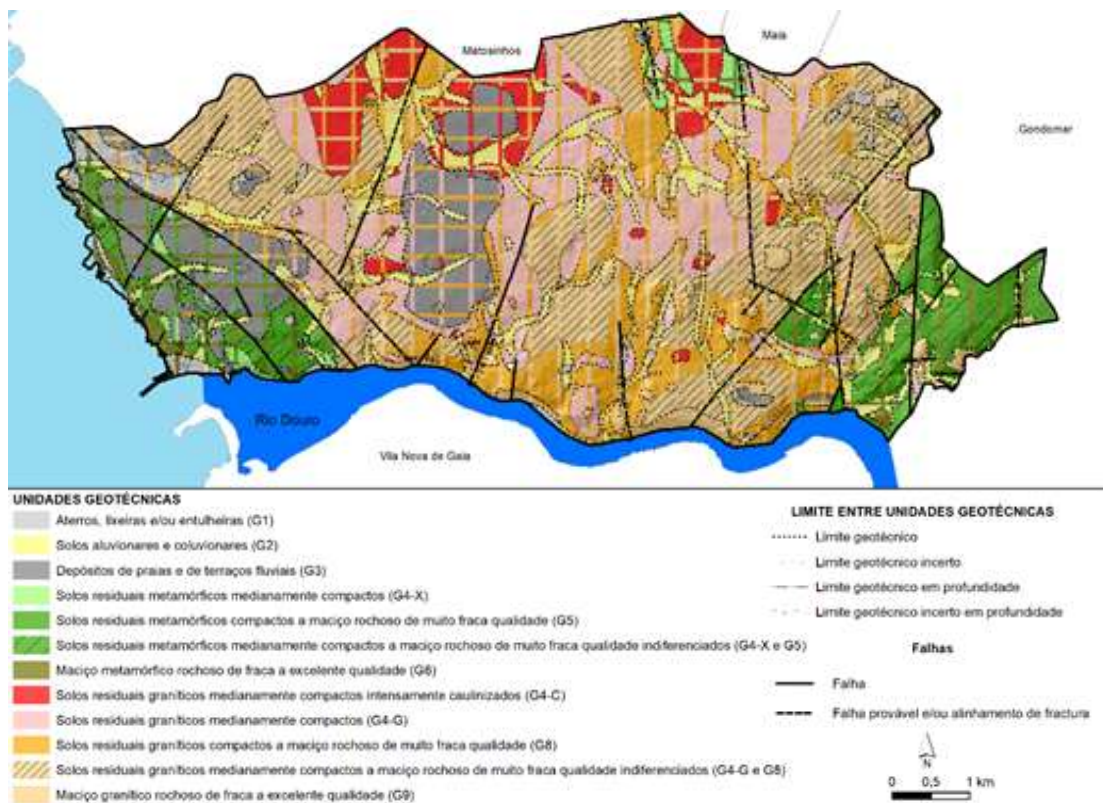


Figure 40. Geotechnical Units present in municipality of Porto. Source: CMP, 2018f

### Altimetry/Hypsometry

The territory of Porto presents a homogeneous hypsometry, with altitudes between 0 and 160 m, so there is no great altimetric diversity. Porto is dominated by altitudes between 30 and 90 m (51%) (Figure 41) and slopes below 5° (65%) (Figure 42). In general, the territory descends smoothly towards West to the Atlantic Ocean to lower altitudes and flattened areas. Strongly delimiting the city, the Douro River defines an embedded valley with steep slopes (above 40°, 0.3% of the territory) at the South. In Campanhã there are the highest altitudes, reaching 160 m, and the greater heterogeneity in terms of slopes, where flattened and moderated slopes contrast with slopes between 17° and 32° due to the influence of the Tinto and Torto rivers, tributaries of Douro river (CMP, 2018f).

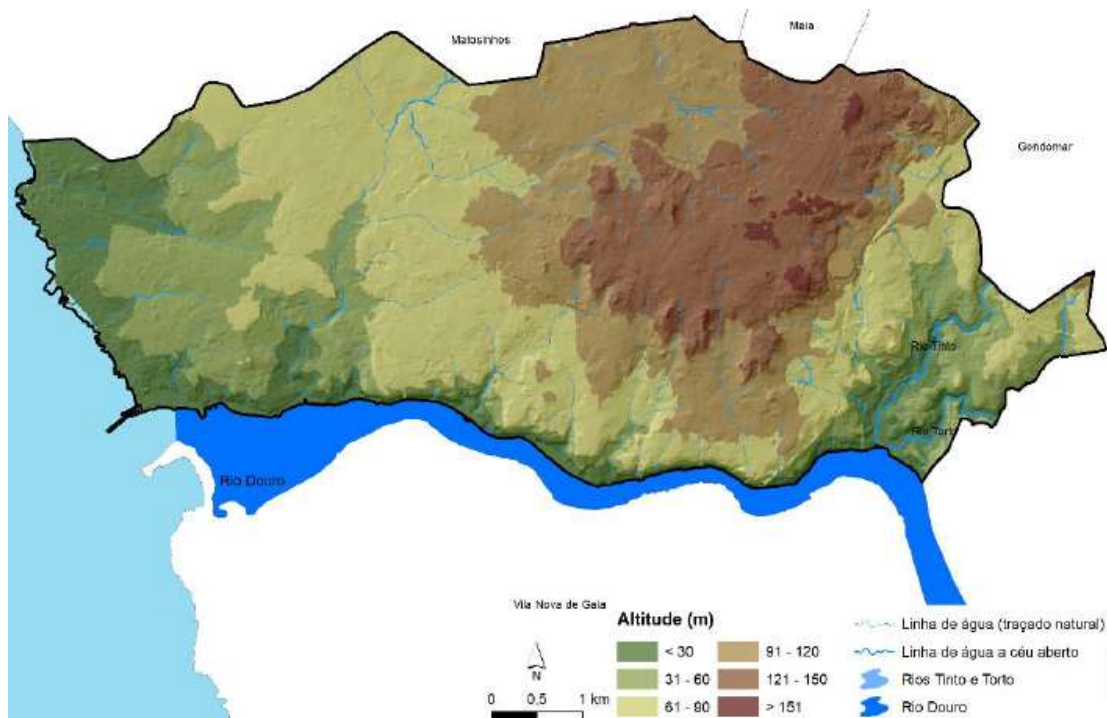


Figure 41. Hypsometry in the municipality of Porto. Source: CMP, 2018f

It should be noted that exposure of the slopes is determinant on comfort factors, namely the quality and quantity of sunlight and the ability to use the soil. North and Northeast exposures are the least represented, while the South, Southwest and West orientations dominate (46.5% of the area of the municipality). At the South, the slopes are exposed mainly to South, Southeast and Southwest. Although Southwest orientations predominate in the parish of Campanhã, locally there are modifications produced by small elevations that condition solar orientation, resulting in an area where North, Northeast and Northwest orientations predominate between the Tinto e Torto rivers (Figure 42) (CMP, 2018f).

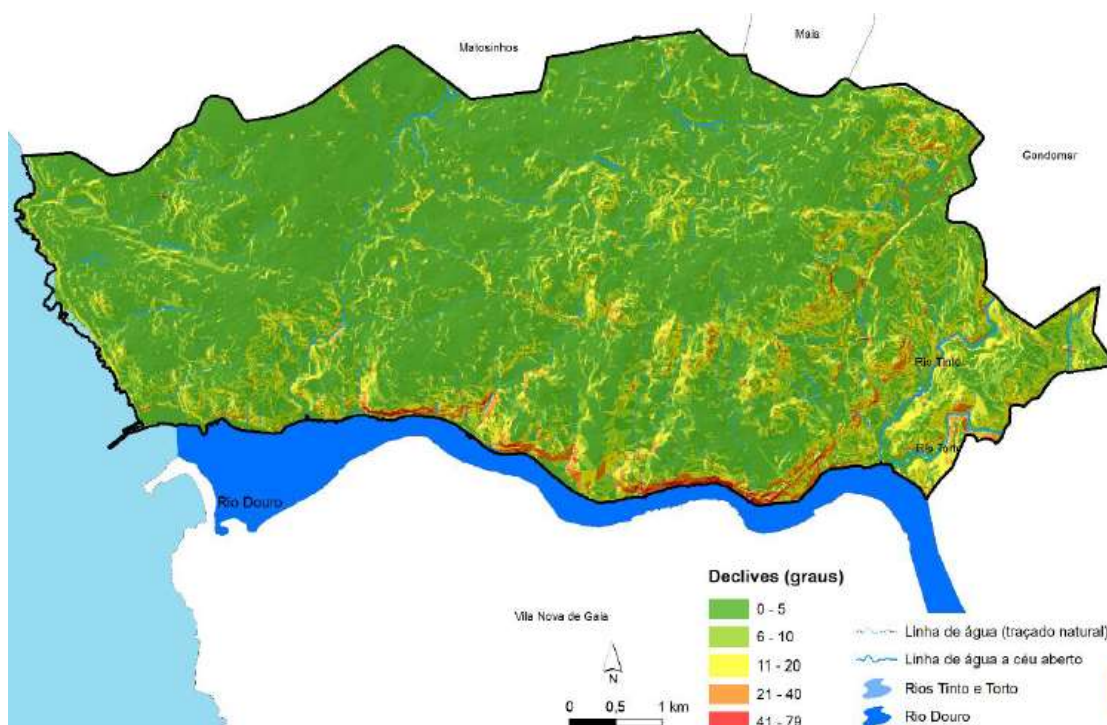


Figure 42. Slopes (°) in the municipality of Porto. Source: CMP, 2018f



## Hydrography and artificial waterbodies

The hydrographic network of the municipality of Porto (Figure 43) has a high density of watercourses, with a length of 66 km covering 16 water lines. Although its topographic structure remains unchanged, it is strongly impermeable, and their water lines are mostly channelled. There are very punctually river sections that run on the surface, as happens, for example, in the Asprela stream, which flows to the Leça river (running near Matosinhos municipality). The Torto and Tinto rivers, located in the parish of Campanhã, are the only ones that keep their open sky riverbeds and flow into the Douro river. The Douro River<sup>8</sup> is the most significant hydrographic element in Porto, corresponding to the southern limit of the municipality, about 10 km of Porto. This is the river to which it drains most of the territory of the municipality of Porto. Most of the city has impermeable surface. The strong urbanized territory of the municipality reflects varied impacts, such as the alteration of the hydraulic regimes. Only the Torto, Tinto, Nevogilde, Ervilheira and Asprela rivers' basins have non-urbanized sections with presence of agricultural areas.

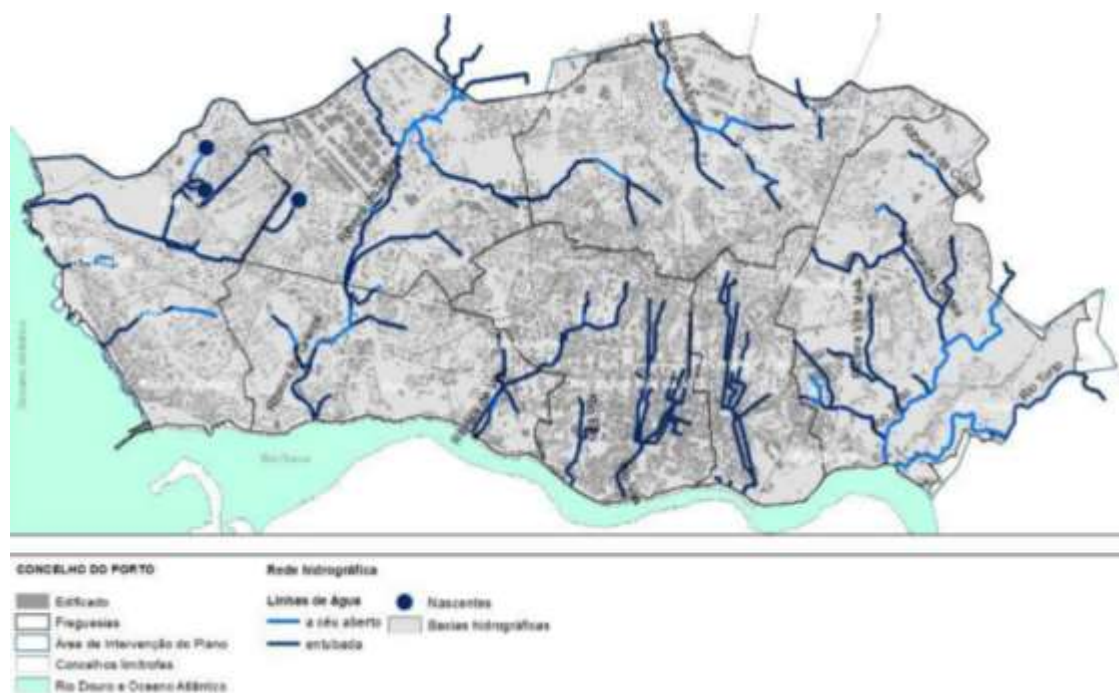


Figure 43. Rivers, streams and headwaters of the municipality of Porto. Source: CMP, 2018g

The main artificial water bodies, such as lakes and fountains, are found in the 14 public managed parks and gardens of Porto. Here we highlight the two main parks of the city:

- The Western Park of the City has 5 lakes and several ponds (Figure 44, Figure 45), powered by the existing groundwater levels and by natural local water sources and surrounded by meadow and wooded areas. Integrated in the urban fabric, it has great fauna and floristic diversity.
- The Eastern Park of the City is distributed along the final course of the Tinto river, in the parish of Campanhã, accompanied by fields integrated in a natural continuum and in the urban network. It has a diversity of fauna and flora and some small ponds.

<sup>8</sup> The Douro River basin has an area of approximately 79 000 km<sup>2</sup>, 19 000 km<sup>2</sup> of which in the national territory (corresponding to 20% of the total area), involving seven districts, being Porto the one with the largest number of inhabitants.



Figure 44. Map of the Western Park of the City, where lakes and the connection to the Atlantic Ocean can be seen. Source: CMP (2019)



Figure 45. Example of a lake at the Western Park of the City. Source: CMP

### Coastal areas

The Atlantic Ocean (Figure 46) is one of the most influential one in the country, constituting a fundamental resource for the environmental balance of the cities. In Porto city, at the interface between the sea and the terrestrial surface there are beaches with an approximate length of 4 km arranged in a small amphitheatre over the sea. This area features puddles and small natural pools, among the rock outcrops of granite, which are rich natural habitats, subjected to tidal variations, particular to the shorelines. It is bounded by a consolidated urbanized area, linking the coast to the inner city, with the particularity of the presence of the Douro River at the Southwest that flows into the sea. The richness of the landscape is reflected in the presence of an area integrated in the National Network of Protected Areas - the Local Natural Estuary Reserve of Douro River (ICNF, n.d.) - which, although not under the management of Porto, has great natural and

scenic value to the city, and the Metamorphic Complex of Foz do Douro<sup>9</sup>, with great pedagogical and scientific value. It extends along the coast of the municipality and functions as an open-air teaching and study room, having been classified in 2001 as a Municipal Natural Heritage and created the Foz do Douro Geological Tour in 2005.

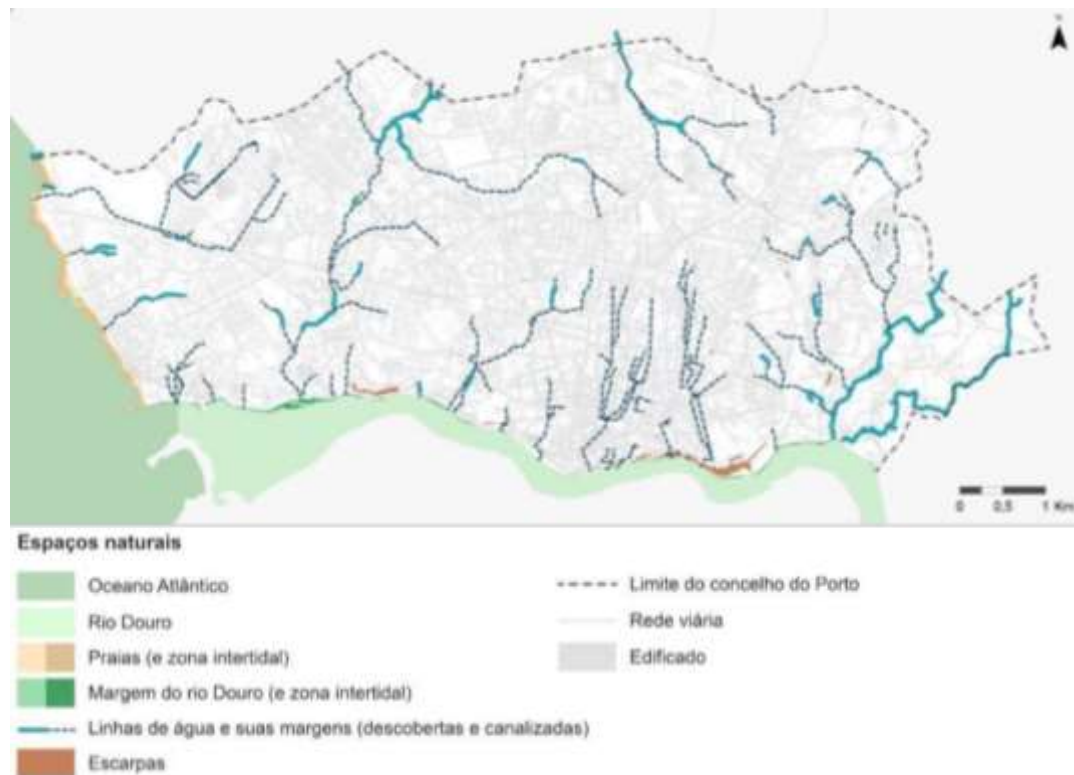


Figure 46. Natural areas of the municipality of Porto. Source: CMP, 2018h

Some erosive events have been manifesting since the early XX century, a tendency to force the regression of the coastal strip. The rise in the average sea level is highlighted, by a rise in the sea level itself and the construction of dams in the course of the rivers, which began in the middle of the last century (APA, 2018). The main climate changes projected until the end of the XXI century for the municipality of Porto reflects a continued rise in the average sea level between 0.17m and 0.38m by 2050, and between 0.26m and 0.28m by the end of the XXI century (Pombeiro & Ribeiro, 2016). Although there is uncertainty about how much the global average sea level will increase by the end of the XXI century, it is very probable to exceed 0.5m and may reach 1m (APA, 2018). These trends cause greater coastal erosion and allow waves to burst closer to the seashore, transferring more energy to the coast and becoming a very important factor in worsening overtopping, flooding and coastal erosion, showing a strong vulnerability of the coastal section. Due to the distance to the coast, these events will have no direct impact on the parish of Campanhã.

### Local policies on coastal resilience

To increase resilience on coastal area, Porto applies:

- POOC-CE - The Coastal Planning Plan (POOC) of Caminha – Espinho (APA, 2018), approved by Council of Ministers Resolution no. 25/99. It is the territorial management instrument that regulates the different uses and specific activities of the coast, defines the classification of beaches and the regulation of their beach use,

<sup>9</sup> Complexo Metamórfico da Foz do Douro (n.d.). *Câmara Municipal do Porto*. Retrieved November 28, 2019, from <http://www.cm-porto.pt/patrimnios/complexo-metamorfoico-da-foz-do-douro>

consecrates the valuation and qualification of beaches considered strategic for environmental and tourist reasons and defines the orientation for the development of specific activities on the coast and for the defence and conservation of nature. It covers the coast of Porto and is in current jurisdiction until the approval of the POC-EC. In 2014 the territorial management system was changed, and the POOC were renamed by Coastal Program (POC)<sup>10</sup>;

- POC-CE - The Coastal of Caminha - Espinho, corresponds to the revision of POOC-CE currently under approval establishes exclusively the protection of resources and natural values regime, through measures that establish actions that are allowed, conditioned or prohibited according to a framework of principles to be considered in coastal management: intergenerational sustainability and solidarity; cohesion and equity; prevention and precaution; subsidiarity; participation; co-responsibility; operational. Its area of intervention covers 122 km of the coastline of 9 municipalities, extending to its entire coastline, comprising the areas of port jurisdiction. This implies the inclusion of the entire coastal strip of the municipality of Porto and prevails over the territorial plans of intermunicipal and municipal scope, in this case the Municipal Master Plan of Porto.
- PDM - The Municipal Master Plan of Porto, referred to in *Local Masterplan* Chapter (4.2.1.7), considers the guidelines of the POC-EC. Its review is an opportunity to reinforce mitigation and adaptation measures to anticipate the advances of the sea impacts.
- EMAAC - The Municipal Strategy for Adaptation to Climate Change, referred to on *Climate and Urban Environment Chapter* (4.2.1.1), also reinforces a progressive adaptation including not only protection actions but also relocation and accommodation options, based on an adaptive spatial management, allowing greater sustainability of social, economic and environmental options to respond to potential climate change on the coast (APA, 2018; Pombeiro & Ribeiro, 2016).

### **Articulation with European policies**

The POC-EC is framed by a set of European territorial and sectoral development policies, articulated with:

European Parliament and Council recommendation on the implementation of Integrated Coastal Zone Management in Europe, European Landscape Convention 2000, European Charter for Sustainable Tourism; Maritime Strategy for the Atlantic Region; Action Plan for a Maritime Strategy in the Atlantic Region - Towards smart, sustainable and inclusive growth and Marine Strategy Framework Directive (APA, 2018).

#### **4.2.1.3 Land Use/Land Cover**

Porto's territory is, in its majority, covered by urban areas and industrial areas (creating a total of 75% of waterproofed soil) (light purple and pink areas in Figure 47). The remaining area is composed by a more permeable soil scattered through the territory, such as green areas (gardens, parks) (in light green in Figure 47), forests (dark green in Figure 47), farming areas (orange in Figure 47) and coastal areas (blue in Figure 47).

As for Campanhã Parish, it is possible to note that although most of the territory is composed by urban and industrial areas (this was one of the main industrial areas in

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<sup>10</sup> The new Law of the General Basis of Public Policy on Land, Spatial and Urban Planning (LBPSOTU) - Law No. 31/2014, May 30, 2014, retrieved from: <https://data.dre.pt/eli/lei/31/2014/05/30/p/dre/pt/html>



Porto). Nevertheless, it is one of the areas with great number of green areas, showing some permeability (CMP, 2018g).

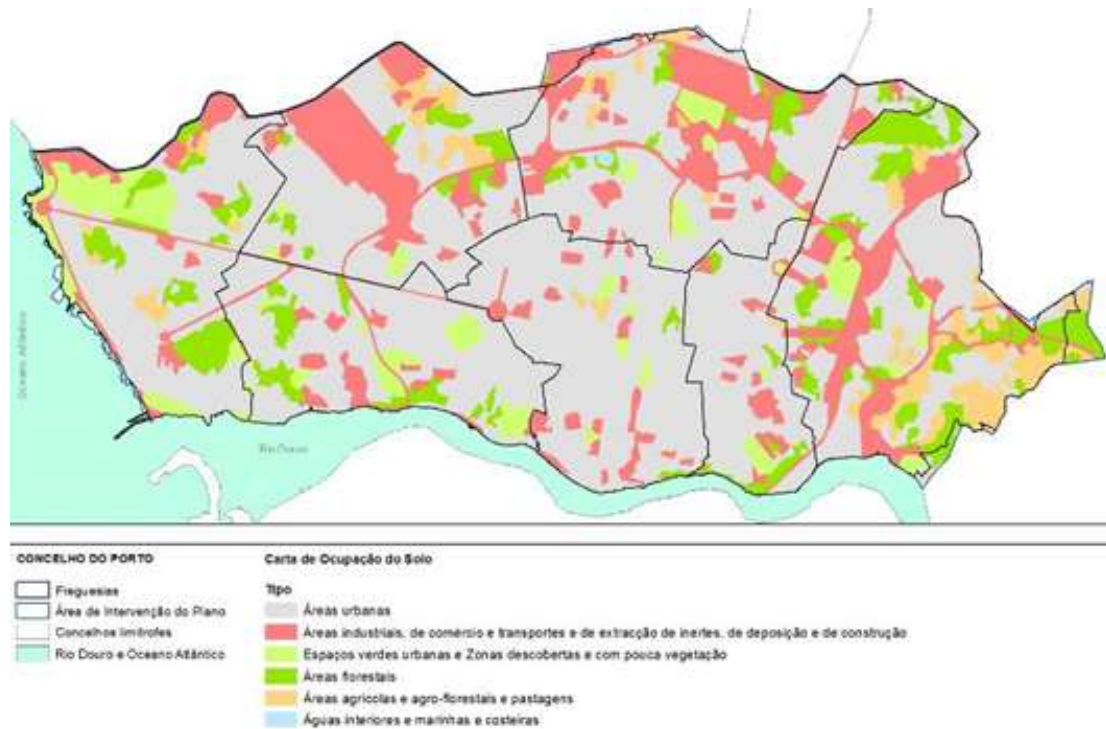


Figure 47. Land Use (soil occupation) in 2017. Source: CMP (2018), COS N2, 2007 (adapted)

Looking to the territory of the city in more detail, we can see that the whole municipality is divided in 11 main Units (From A to K) according to its typology: A- Historical areas; B- Areas of linear development; C- Expansion areas; D- Areas of isolated edification with prevalence of collective housing or single family housing; E – Disperse edification; F- Economic activities; G- Natural areas; H- Green areas; I – Equipment and Infrastructure; J- Staying areas and pedestrian walking; K – Vacant or abandoned lots (Figure 48) (CMP, 2018i).

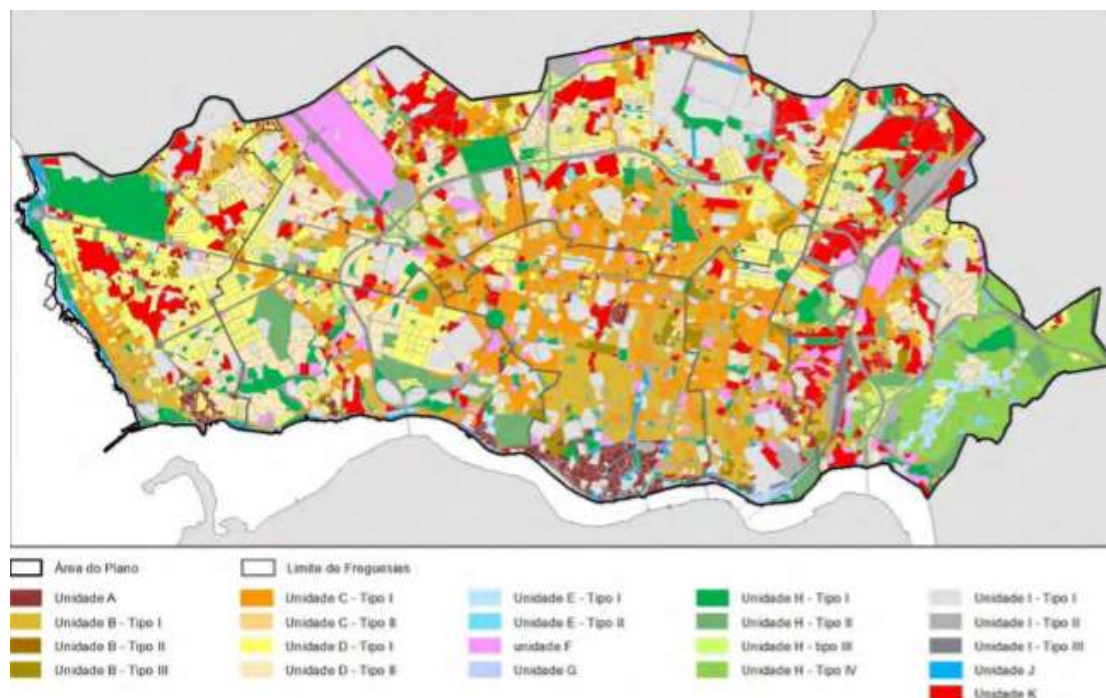


Figure 48. Distribution of Units per typology. Source: CMP, 2018i

In this distribution it is very clear that for the Campanhã Parish, the total area of natural and green areas is much higher when compared with the remaining territory. Also, the number of vacant or abandoned lots is considerable, which can be considered, together with the green and natural areas, as opportunities for the implementation of URBiNAT. Moreover, Campanhã parish is also composed by a significant area of units I due to the relevant occupation of roads, train rails and two train stations (Campanhã and Contumil) (Figure 49).

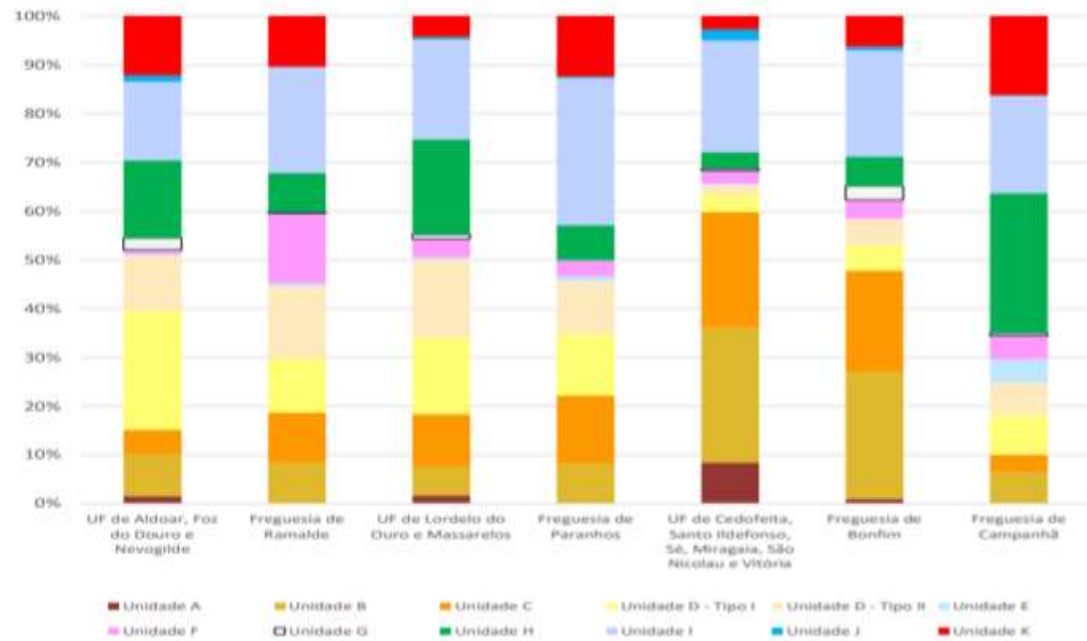


Figure 49. Percentual distribution of the Morphological Units per Parish. Source: CMP, 2018i

As for available municipal areas, which constitute great opportunities for territory qualification, it is important to note that the Campanhã parish is one of the parishes in Porto with the highest number of available municipal areas (43%). In the total of these municipal areas, 78.3% correspond to vacant or abandoned lots (Category K).

## Noise

In Porto City, besides the reactive fiscalization to noise related activities, the work developed extends to the analysis of the noise levels to which the population is subjected to and to look for a better land use planning and management to mitigate it. For this objective, noise maps are commonly developed by the Municipality as valuable planning tools, for prevention, according to different indicators: Lden (day-night fall- night noise indicator, for a period of 24 hours) (Figure 50) and Ln (nocturnal noise indicator) (Figure 51).





Figure 50. Lden (day-night fall-night noise indicator, for a period of 24 hours). Source: CMP, 2018i



Figure 51. Ln (nocturnal noise indicator). Source: CMP, 2018i

As it is possible to observe, the main sources of noise are highly correlated with the proximity of roads. As the Campanhã parish is under an elevated pressure due to the presence of some of the main roads in the city (such as the VCI), most of the territory is under a highly elevated noise pressure (higher than 60.0 dB (A)), when compared to the remaining areas of the city<sup>11</sup>.

#### 4.2.1.4 Transportation network (urban dynamics)

<sup>11</sup> Planeamento estratégico da Gestão do Ruído. (n.d.) *Câmara Municipal do Porto*. Retrieved November 25, 2019, from <http://www.cm-porto.pt/gestao-de-ruído/planeamento-estrategico>.

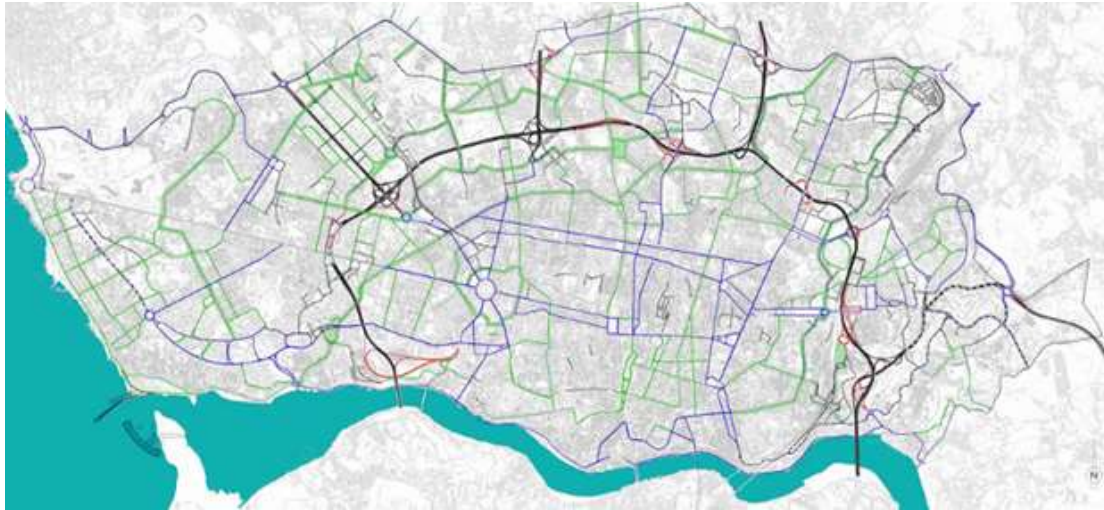


Figure 52. Road and transport hierarchy plan. Source: Plano Director Municipal do Porto. CMP, 2006

The strategy in the city of Porto in terms of mobility is to achieve a polynucleated centrality and can be summarized by the need for investment in public transportation opportunities, alternatives for parking needs, qualification of public space, road network management supported in hierarchy concepts, organization of urban supply and the development of safety plans.

The Plan's mobility strategy (Figure 52) advocates at a first level of importance the hierarchy of the different multimodal transport interfaces, distributed by various nodal points:

- First Order Interfaces - Campanhã, Boavista (Av. França, Rotunda and Campo Alegre);
- Second Order Interfaces - S. Bento; Camellias; Guindais and Areosa (Hospital S. João);
- Third order Interfaces - Campo 24 Agosto, Trindade, Marquês, Dragão, Castelo Queijo, Viso, Prelada and Contumil.

In a second level, there is the importance of road hierarchization, that is constituted as follows (Figure 52):

- Urban structuring and Intermunicipal Articulation Axes (main road system) that connect the main sectors of the city and these to national road network. This category corresponds to the blue axes. It is visible their concentration in the central part of the city, that is limited by Via de Cintura Interna (VCI). In Campanhã parish, Alameda 25 de Abril, Avenida Fernão Magalhães and Alameda de Cartes are examples of this category and play an important role in local dynamics;
- Internal level channels (red lines) connect the most important urban axes and some complementary ones to national IP and IC network. Their role is to allow the entrance and/or exit in the urban fabric. In Porto, they occur mostly associated with VCI and other axes that connect with neighbour cities. As visible, Campanhã parish suffers from the high concentration of this kind of axes, that is associated to the close presence of the VCI and A43, whose combination act as a strong physical barrier;
- Complementary urban axes (green lines) correspond to a secondary level of road network that link structural axes. Compared to previous categories, these ones are characterized by an intermediate traffic intensity. In Campanhã parish, this category includes three of the most important axes in terms of local mobility, Rua São Roque da Lameira, Rua do Falcão and Rua das Escolas;
- Local province streets are the ones responsible to serve areas uses such as housing and other activities;
- The streets and shared platforms, that may serve both pedestrian and cyclable circulation with other motorized traffic.

#### 4.2.1.5 Green structure and Biodiversity

*Green structures are vital landscape components for promoting and preserving biodiversity in urban areas. Landscape architects, architects, urban designers and environmental managers should be prepared to develop integrated approaches promoting urban green structures according to current social needs, supported by an in-depth of urban ecosystems.*

Farinha-Marques *et al.* (2014), in *Morphology and Biodiversity of Green Spaces in the City of Porto*

#### Vegetation characteristics and distribution

The city of Porto is located in the North of Portugal. It is influenced by the transition from a temperate climate to the Mediterranean region, which influences local vegetation and its distribution. The northwest region landscape presents moderate temperatures throughout the year, high humidity values, and abundant rains in winter and short periods of drought during summer. *Quercus robur*, *Prunus lusitanica*, *Pyrus bourgaeana*, *Arbutus unedo*, *Ilex aquifolium*, *Pinus pinea*, *Corylus avellana*, *Crataegus monogyna* and *Ulex* are some of the spontaneous species that grow in this climatic region (Telles & Cabral, 1999).

Porto's climatic conditions, combined with close cultural relation with gardening, justify the high values of species richness in the city. In the 19th century, Porto was considered a green city, not only due to the rural belt that surrounded it but also to the green spaces in the interior of the blocks and public gardens. According to Madureira *et al.* (2011), in 2000, the decrease in green areas was clear. While one century ago green areas occupied more than 75% of the city (3044 ha), in 2000 they occupied less than 30% (1164 ha), representing a decrease of approximately 60% (*idem*).

#### Distribution of public green spaces and Green Infrastructure

According to Farinha-Marques *et al.* (2018a), the total area occupied by urban green spaces (permeability value) is 13.14 Km<sup>2</sup> around 31.27% (Figure 53).



Figure 53. Natural spaces and urban green spaces from the city of Porto. Source: adapted from Farinha-Marques *et al.*, 2018a



Figure 53 provides the spatial distribution of permeable areas in Porto, relating urban green spaces with natural spaces. It is possible to observe that the central part of the city lacks urban green spaces, mainly due to the densified urban mesh that characterizes Porto's historical city centre. In contrast, the oriental part of the city, mainly Campanhã parish, holds a significant concentration of urban green spaces, highly influenced by the presence of the natural spaces that develop along Torto and Tinto's rivers.

The same study also identifies a set of eleven green space typologies (Figure 54), defined and mapped according to Porto's environmental and cultural reality. Their spatial distribution reflects Porto's uneven urban development.

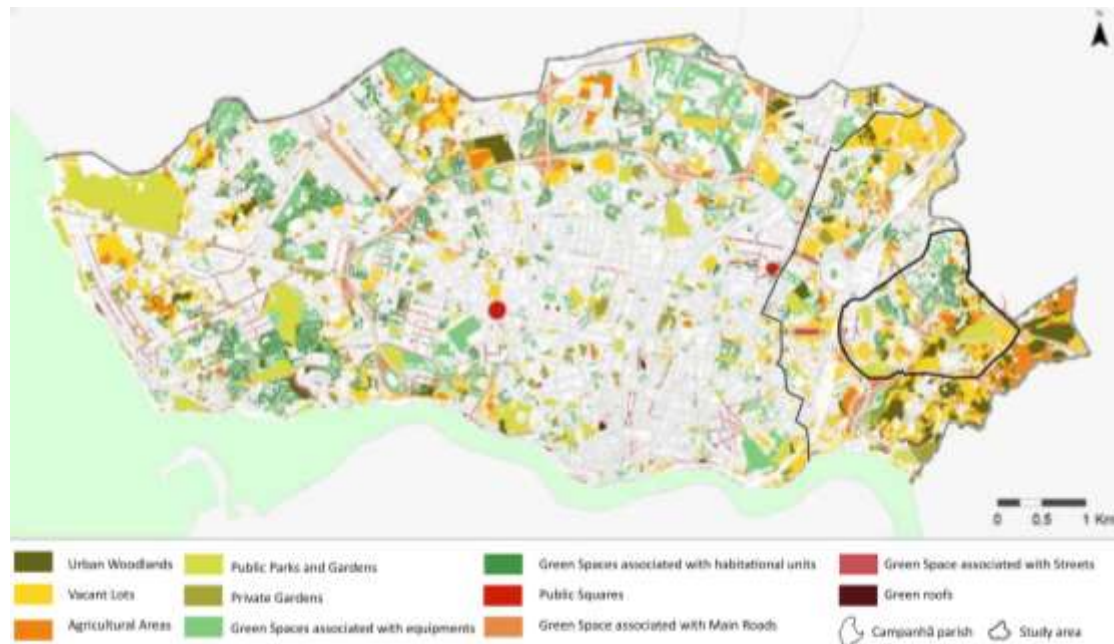
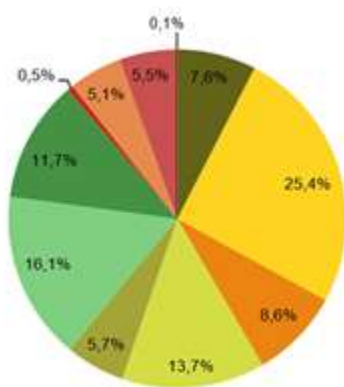


Figure 54. Urban green spaces from the city of Porto (map and circular graphic). Source: adapted from Farinha-Marques et. al., 2018a



There is an asymmetric distribution of the green spaces between the city centre and its surroundings, but also between the oriental and the occidental parts of the city. The central part of the city lacks on urban green spaces, mainly due to the densified urban mesh that characterizes Porto's historical city centre. In contrast, the parish of Campanhã, located in the oriental part of the city holds a significant concentration of urban green spaces, highly influenced by the presence of the natural spaces that develop along Torto and Tinto's rivers and its rural landscape.

The dominant typology in Porto is "Vacant lots" (25.4%) followed by Green spaces associated to facilities (16.1%), Parks and Gardens of public access (13.7%) and Green spaces associated with habitational units (11.7%).

This data translates in 55.3 m<sup>2</sup> of green spaces per capita. Analysing only the value concerning green spaces with direct public use the value drops to 7.9 m<sup>2</sup> per capita. Due to their accessibility, although not having direct public use, by including the area of the

green spaces associated with habitational areas, the final value of green spaces per capita rises to 14.3 m<sup>2</sup>.

The same study also provides the following values for some relevant indicators to monitor Porto's green structure:

Area of natural spaces (excluding Atlantic Ocean and Douro River)	0.98 Km <sup>2</sup>	Number of habitats (from urban green spaces)	18
Superficial waterlines	14.64 Km	Number of vascular plant species	628
Total green areas	13.14 Km <sup>2</sup> (31.72%)	Number of bird species	69
Total public green areas for recreational use	1.87 Km <sup>2</sup> (4.51%)	Number of amphibian species	7
Green area per citizen	55.3 m <sup>2</sup> /hab.	Number of reptile species	7
Total Public green area for recreational use per citizen	7.9 m <sup>2</sup> /hab.	Number of small mammals	6

Table 3. Biodiversity values. Source: adapted from Farinha Marques et al., 2018a

When analysing the Urban Green structure, some special attention should be given to *Parks, Gardens* and *Plazas*, but also to *Tree lined streets*. Together, these group of urban green spaces, represent the most relevant typologies for direct public use.

In terms of public Parks and Gardens, Farinha-Marques *et al.* (2014) identifies 74 units, followed by 21 plazas, whose distribution is visible in Figure 55.

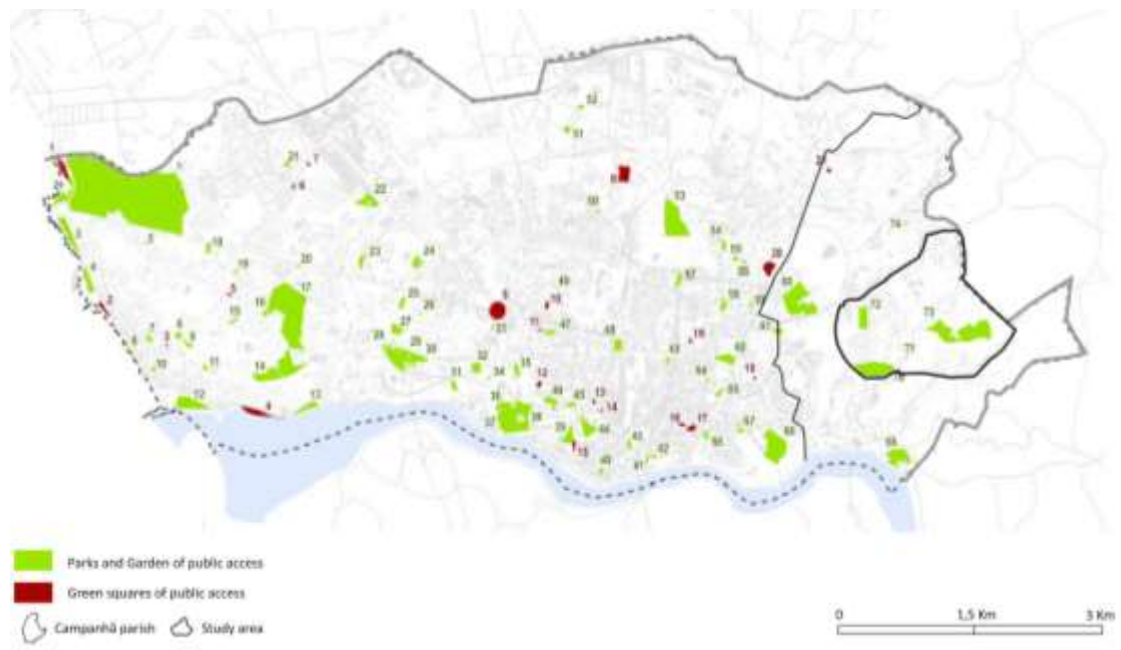


Figure 55. Map of parks and green squares. Source: adapted from Farinha Marques et al., 2014

In terms of their spatial distribution, the highest concentration occurs in the central area of the city, given that most of these units are small spaces attached to the densified urban mesh. The biggest areas can be found in less densified parts of the city, namely the western and eastern limits of the municipality. On the west, identified with number 1, is the City Park, the biggest park of the city, (opened in 2002), with about 80 ha, considered the largest urban park in the country, extending to the Atlantic Ocean, particularly worldwide, followed by Serralves Foundation (number 17), Pasteleira Park (number 14). Near the central part of the city is Crystal Palace (numbers 38) a public garden with high

historic value, given that it was built to hold the first International Exhibition in 1865, the fourth in the world. The parish of Campanhã holds the Oriental Park (number 73), Quinta da Bonj6ia (number 70), Corujeira Plaza (number 72), S6o Roque da Lameira (number 60), that will be further described in the chapter dedicated to the study area.

The value of Tree lined streets for urban's green infrastructure has been vastly proven. However, and according to Martins & Santos (2003), in 2002 the distribution of Tree lined streets was highly uneven. In Porto city, a clear gradient can be observed from the west, with higher concentration, to the east, where none of these streets were considered Tree lined. In this study, updated in 2011 (Martins & Santos, 2012), the authors identify 151 Km of tree lined streets, 22% of the total value of streets in the city (Figure 56). Although the unbalance s still visible between different areas of the city, the eastern part holds already 20 Km of Tree lined streets, being the second area with the higher value. From 2002 to 2011 the parish of Campanh6a invested in Tree lined streets, becoming one of the parishes with the highest values in this matter.

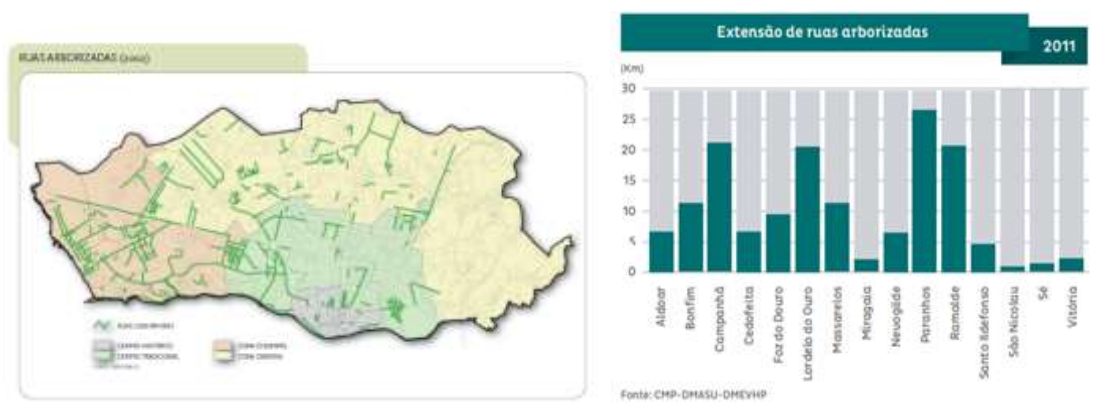


Figure 56. Left: Tree lined streets in the City of Porto in 2002. Source: Martins & Santos, 2003 | Right: Extension of Tree lined streets in 2011. Source: Martins & Santos, 2012

The municipal investment towards the public green spaces of the city is clear by the evolution of the analysed values, over the recent years. The same effort is being done to assure the connectivity among green spaces, towards an efficient urban ecological structure.

Analysing the report Urban Quality of Life Monitoring System (Martins & Santos, 2003), in 2002 Porto presented 7m<sup>2</sup> of public green spaces per capita. This value falls short of medium values of European cities, however it includes parks and gardens of extreme relevance and high patrimonial and historical value, such as City Park, Crystal Palace and Serralves Foundation. In terms of spatial distribution, the western area held the highest value of green spaces per capita, whereas the eastern area has less than 5m<sup>2</sup> per capita.





Figure 57. Left: Green public areas according to typologies, in 2011 | Right: Public Green spaces, in 2011. Source: Martins & Santos, 2012

The updated version of this study (Martins & Santos, 2012), using data from 2011, presents a significant rise on public green spaces per capita. Campanhã was the third parish of the municipality with the highest values of public green spaces (Figure 57).

According to Farinha-Marques *et al.* (2018), in 2018 Porto presented 7.9m<sup>2</sup> of public green spaces per inhabitant, and a total area of green spaces of 55.3 m<sup>2</sup> per inhabitant.

### Green spaces management

The city of Porto has a municipal department responsible for Green spaces management, whose responsibilities includes public habitational units, such as the ones owned by Domus Social. Porto's municipality has currently identified and evaluated in detail 33 000 specimens of urban trees, distributed along streets, schools, cemeteries, plazas and gardens. Local investment is being made to contribute annually for the development of Porto's Urban forest.

Any pruning decision must comply with specific criteria namely health and safety of the tree, balance between form and the urban context desired and finally the architectural-landscape style. The department works daily to preserve the quality of municipal grove. In terms of logging, each decision is made after evaluating all alternatives, capable of maintaining local safety but also the specimen's dignity.

Given recent developments, the city of Porto has implemented a program for prevention and control of the palm weevil (*Rhynchophorus ferrugineus*) that as threaten local gardens, inclusivity and historical gardens.<sup>12</sup> Porto municipality is also part of the eradication of *Xylella fastidiosa* a bacteria that is currently dispersing in national territory. In terms of individual tree management, Porto has implemented a status of "Trees of public interest" that identifies trees of unusual characteristics that deserve special protection. The municipality already identified 252 trees.<sup>13</sup>

#### 4.2.1.6 Water management

In the City of Porto, the urban water cycle is managed by a Private Municipal Company - Águas do Porto, EM - which is responsible for managing water distribution, draining of residual urban water discharge and pluvial waters. Águas do Porto, EM is also responsible for managing the urban water bodies, streams and maritime coastlines (Águas do Porto, n.d.; CMP, 2018g).

Porto holds also an important network of natural and artificial small water bodies in gardens and parks under Porto Municipality responsibility, managed by this entity (Figure 58).

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12 <http://www.cm-porto.pt/pragas-e-doencas/escaravelho-da-palmeira>. Escaravelho da palmeira. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/pragas-e-doencas/escaravelho-da-palmeira>

13 <http://www.cm-porto.pt/arvores-de-interesse-publico> Árvores de Interesse Público. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/arvores-de-interesse-publico>

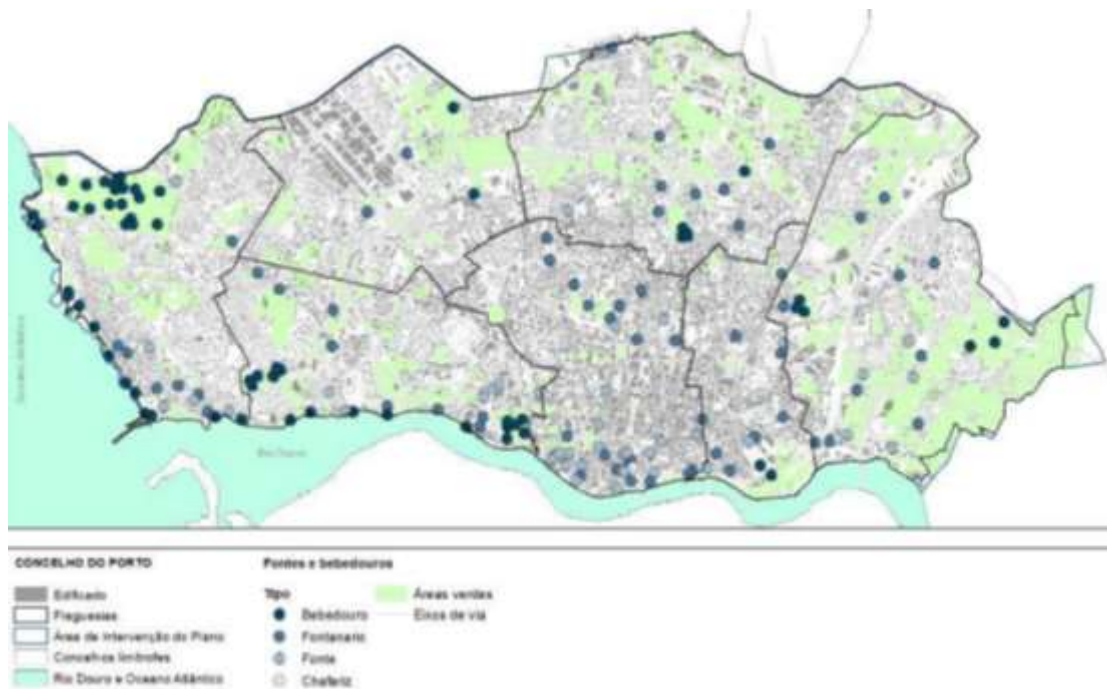


Figure 58. Decorative and drinking fountains of Porto. Source: CMP (2016)

### Water collection and Drinking water supply network

According to Águas do Porto, EM, the water distribution system in the city of Porto aims to distribute potable water to the entire population within the city, assuring a covering range of 100%. The distributed water has its main origin from the Águas do Douro e Paiva, S.A. With a total storage capacity for 125 450 m<sup>3</sup>, which corresponds to over 2 days of consumption, the main supply networks have now an extension of more than 760 km, with approximately 67 400 domiciliary extensions. Currently, gravitic distribution holds for practically the whole city, without the need for elevator stations. Besides this extensive hydrographic network, local drinking and non-drinking fountains, streams and ponds/small water bodies are also important components for the quality of the urban environment (CMP, 2018g).

### Wastewater and rainwater collection/ Water supply and pricing

As for the draining system for the domestic residual domestic waters in the city, a separative system is applied, meaning that it is separated from the rainwater draining system. The restoration and drainage of residual waters is done by superficial (gravitic) water drainage and is supported by Wastewater Treatment Plants (WWTP) from Freixo and Sobreiras, with its final effluent in the Douro River, according to all National and European regulations. On the other side, the draining system for rainwater is supported by aqueducts and streams that converge into the river and maritime fronts (Águas do Porto, n.d.). In 2018, Águas do Porto, EM registered a total of 17344637 m<sup>3</sup> of water supplied to its clients, which is the equivalent of to a daily average of 47 520 m<sup>3</sup>, which showed a decrease of 0.94 %, when compared to 2017 (representing a decrease in daily consumption of 450 m<sup>3</sup> and annual of 164 340 m<sup>3</sup>, when compared to 2017). Also in 2018, Águas do Porto, EM had a total of 156 920 clients, among them domestic (127 103, 81%), social (440), enterprises (27 908), public (341), autarchic (1 081) and own consumption (47), representing a total increase of 0.80% compared to 2017. Regarding water pricing, Porto holds third place of most economic water invoice per family, with a decrease in pricing of 2% (with an average value of 13.93 € per family). During 2018, the total volume of treated effluents in both existing WWTP mentioned above was of 20 664 252 m<sup>3</sup>, which represented an increase of 10.4% comparing to the previous year. This increase is mostly

related to the increase in rainfall improper inflows. Moreover, considerable investment (3 539 914.00 €, 13.1%) was directed in 2018 to optimize the drainage of stormwater through sensibilization of private and public owners to solutions that promote reintegration of rain flow into the soil, increasing the rehabilitation of existing streams and other infrastructure, and decreasing the number of improper affluence occurrences (Águas do Porto, 2018).

### Water quality

Regarding water quality of the water bodies in Porto City, Águas do Porto, EM guarantee regular quality analysis to the distribution network, ensuring a 99,9% of cases of good water quality in 2018, compared with 80% in 2000. Nevertheless, it's important to note that cartography showing the monitoring of water quality in the Municipality between 2011 and 2014 in three main classes (excellent/good; reasonable; bad/very bad) for two main parameters - oxygen demand (mg/L O<sub>2</sub>) and faecal coliforms (NMP/100 mL) (Figure 59; Figure 60; Figure 61; Figure 62). From the obtained results, it is important to highlight the overall good quality regarding oxygen demand, except in some streams (Granja, Asprela, Vilar e Massarelos) and a greater abundance of faecal coliform contamination, with a clear hotspot of bad/very bad classification in the Tinto River, in Campanhã Parish (CMP, 2018g).

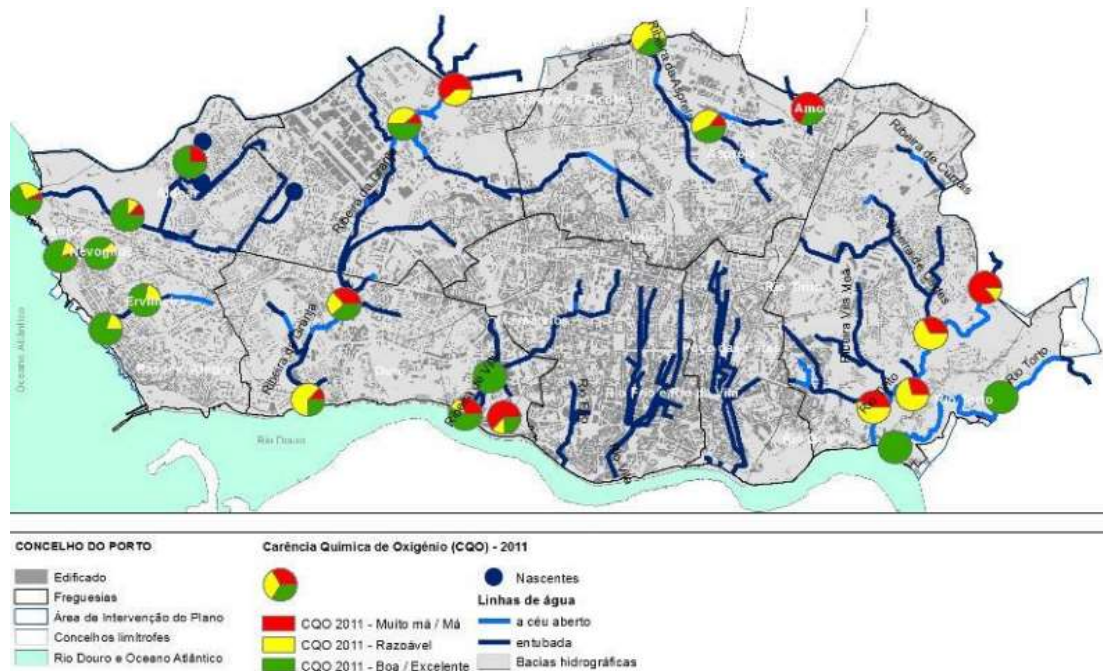


Figure 59. Water quality classification - Chemical Oxygen Deficiency (CQO), 2011. Source: CMP, 2018g



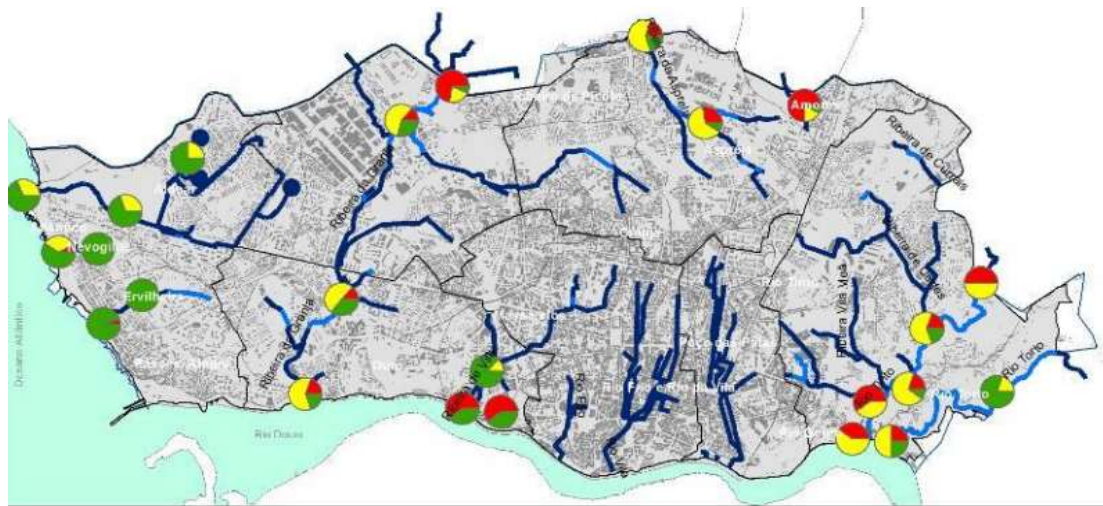


Figure 60. Water quality classification - Chemical Oxygen Deficiency (CQO), 2014. Source: CMP, 2018g

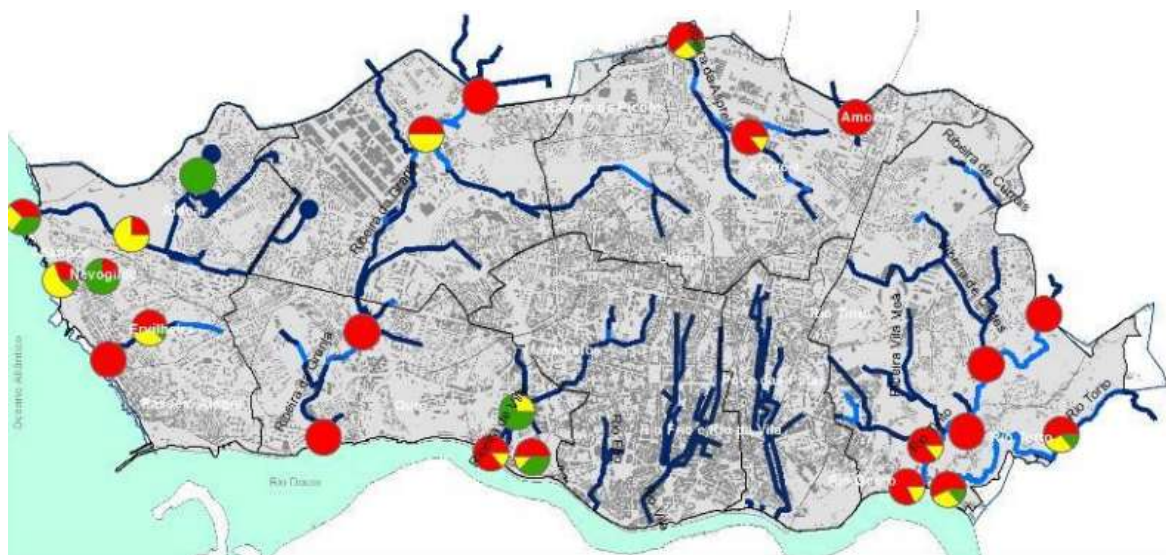


Figure 61. Water quality classification - Faecal Coliforms (E.coli), 2011. Source: CMP, 2018g

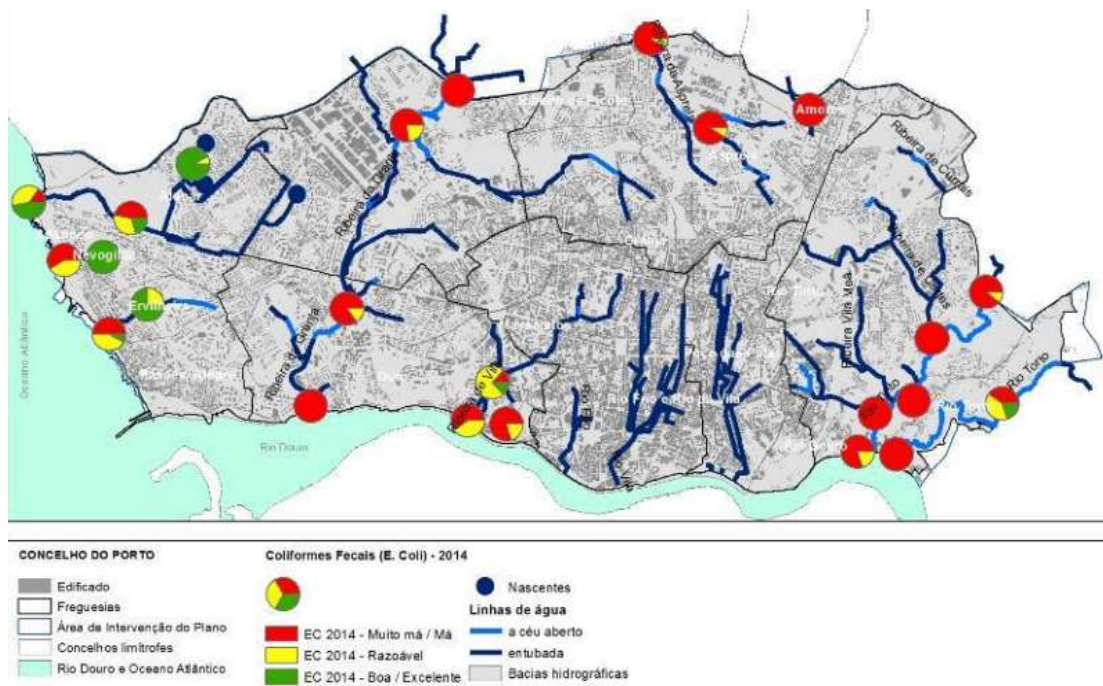


Figure 62. Water quality classification - Faecal Coliforms (E.coli), 2014. Source: CMP, 2018g

Still in Campanhã parish, when compared with the remaining territory, it is possible to observe a greater abundance of contamination sources, such as septic tanks, scrap yards and heterogeneous farm land (Figure 63), with high contamination probability (Figure 64). Also, it is possible to note that by associating water contamination degradation hotspots with areas of greater socioeconomic deprivation (Figure 65), it is possible to note that in Campanhã Parish most of the area is considered as a hotspot for socioeconomic deprivation while experiencing high levels of water contamination (in Rio Tinto and Rio Torto) (CMP, 2018g)

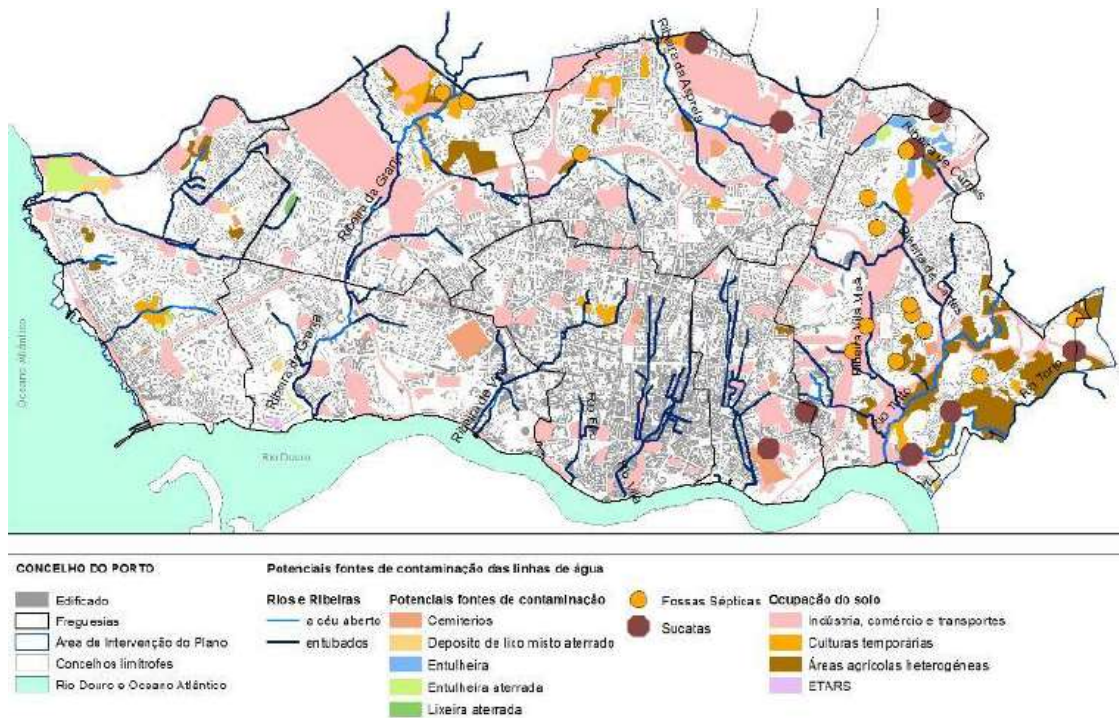


Figure 63. Watercourses, contamination sources. Source: CMP, 2018g



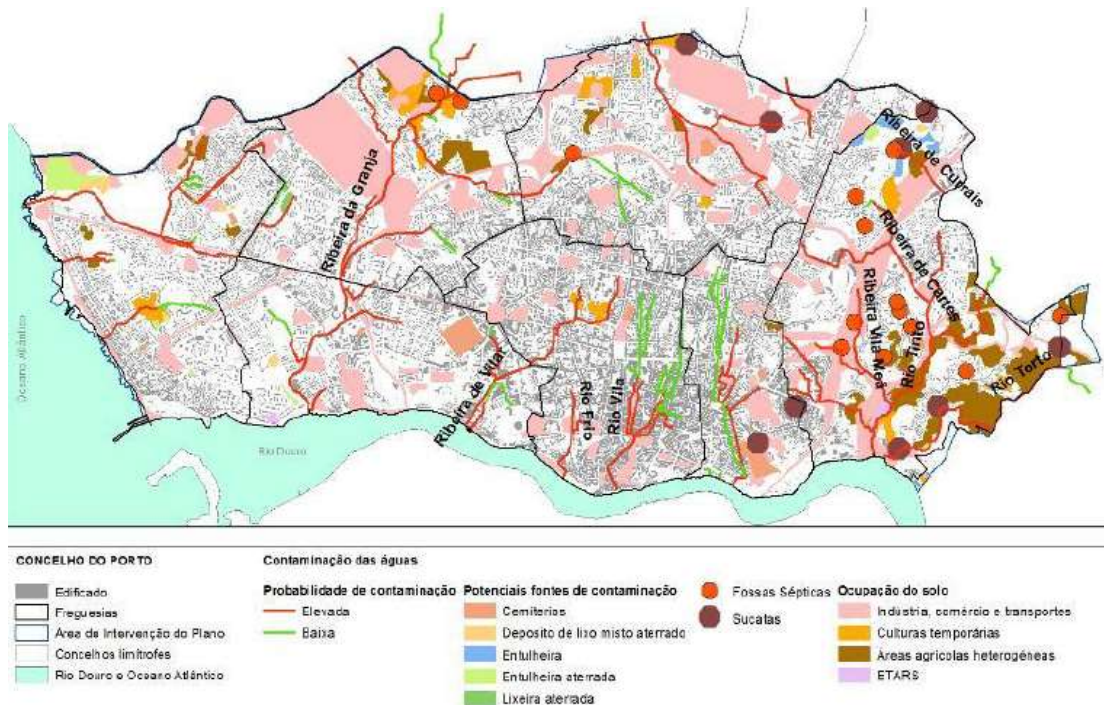


Figure 64. Contamination probability. Source: CMP, 2018g

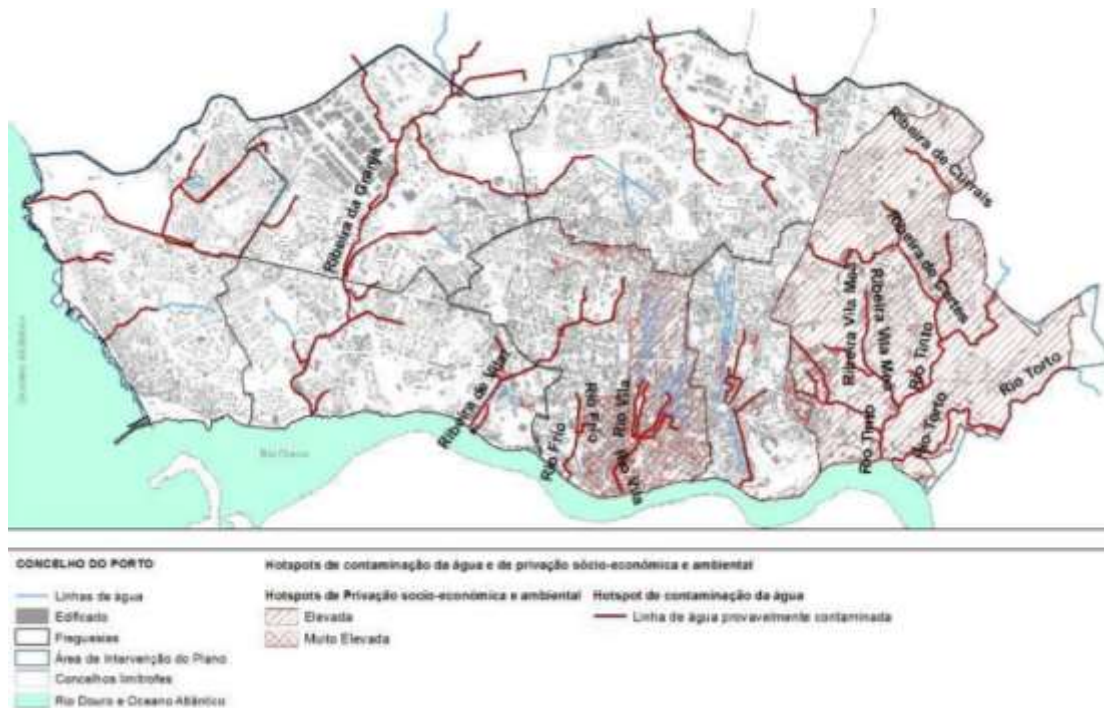


Figure 65. Hotspots of water contamination and social-economic and environmental privation. Source: CMP, 2018g

### Ground permeability

Around 80% of the territory presents medium to low permeability and the remaining 20% presents medium permeability, sometimes high. The latter is composed of silts and deposits along natural water streams and rivers (especially along the Tinto and Torto Rivers). This means that, overall, the city presents a low permeability (Figure 66) (CMP, 2018f).



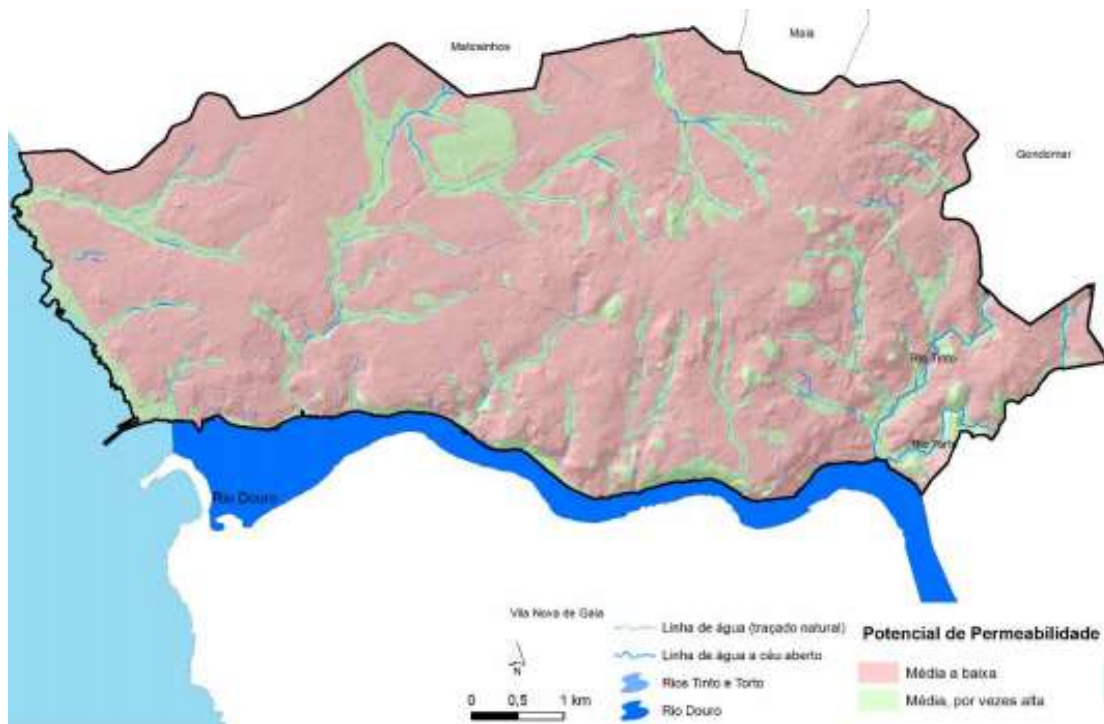


Figure 66. Permeability Potential. Source: CMP, 2018g

As for the Campanhã parish, it follows the overall city trend, with the advantage of including in its territory both rivers mentioned above. Moreover, by observing the impermeable area per subsection, it is possible to conclude that a great part of the Campanhã parish is classified with a low percentage of impermeabilization (Figure 67) (CMP, 2018g).

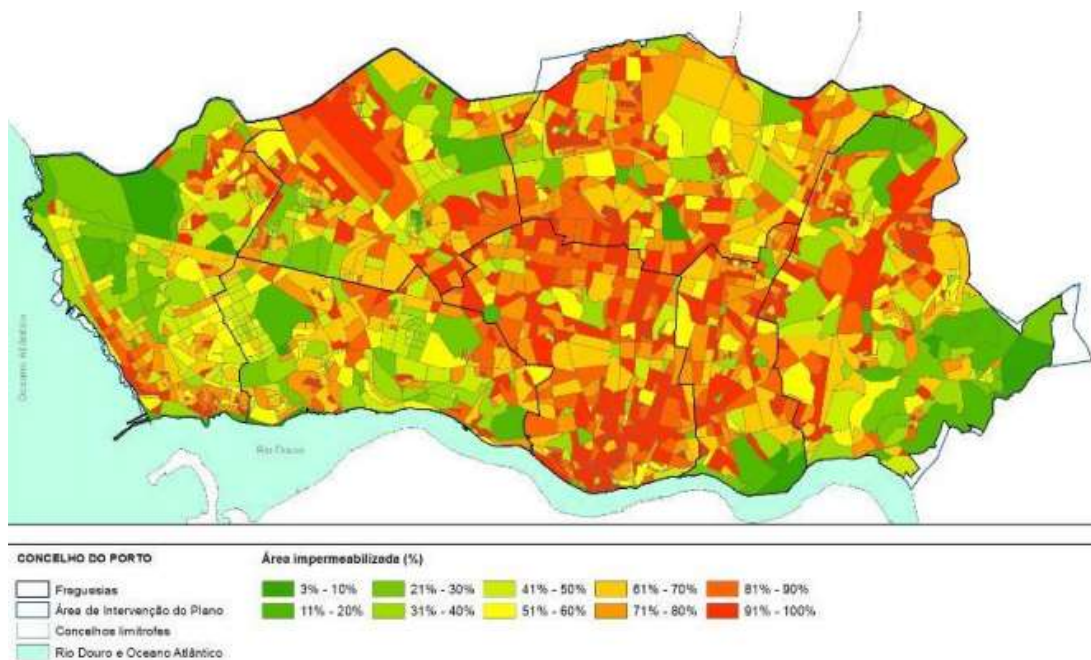


Figure 67. Impermeabilized area per statistic subsection. Source: CMP, 2018g

## Flooding risk

Porto City, due to its high soil permeability, topography and precipitation regime that it is commonly subjected to, gathers favourable conditions for the occurrences of urban floods, which can happen after a few minutes of rainfall due to artificial drainage systems overload.

Based on the study developed to identify susceptible areas of urban floods (Oliveira, 2015), a total of 1 407 occurrences were spatially identified from 1974 to 2014. As expected, the months of October, November and December present the higher number of occurrences. As it is possible to observe on Figure 68, most of the occurrences are in the city centre, an area that is highly permeable with very little green areas that could favour water infiltration. Moreover, these processes develop mostly in areas of greater waterflow concentration associated to lack of maintenance of the rainwater flow systems (CMP, 2018f).

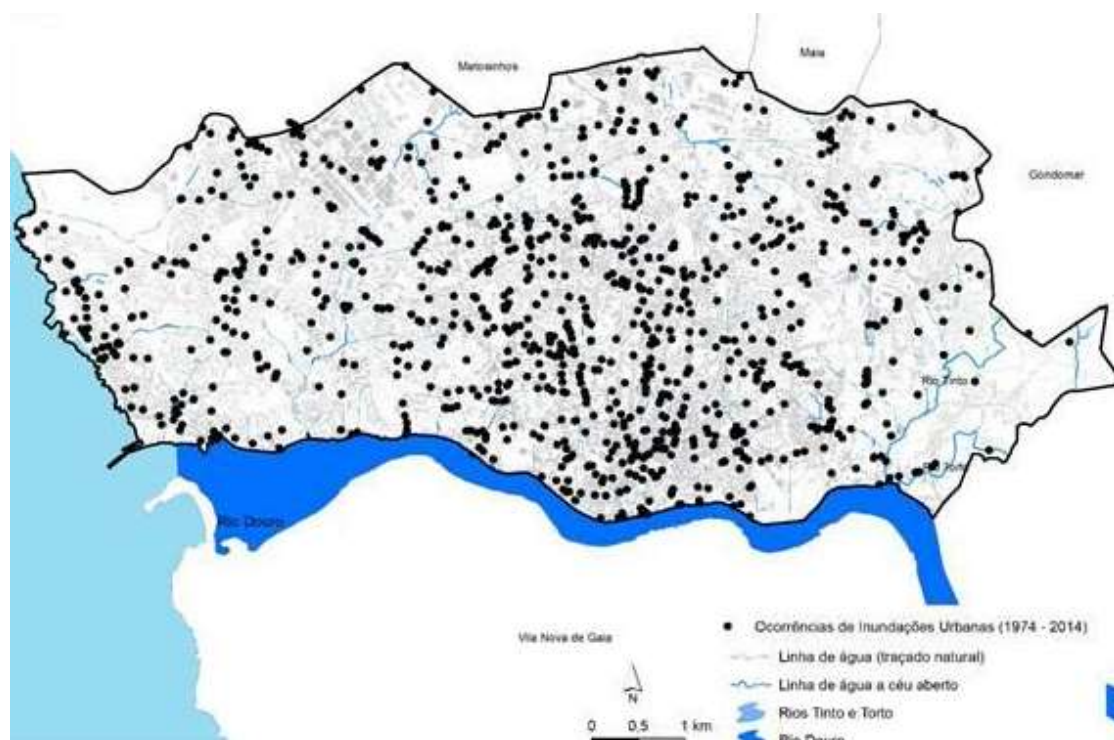


Figure 68. Occurrence of urban floods, between 1974 and 2014. Source: Oliveira, 2015

In Campanhã Parish fast flood occurrences are common due to the existence of intense precipitation in a small area and short time in rivers with small to medium watersheds, such as the Tinto and Torto rivers. An example of this was the fast flood that occurred in January 4, 2016. Both these rivers don't present great extensions of flood area, except near the limit with Gondomar Municipality. However, it is important to stress the buildings along the margins, in the final stream of both Tinto and Torto rivers, which is more urbanized in the Campanhã Parish (Figure 69) (CMP, 2018f).



Figure 69. Maximum flood quotas in Porto Municipality. Source: CMP, 2018f

### Droughts risk and Water quality

According to IPMA (Portuguese Institute for Sea and Atmosphere), Porto City territory is characterized as a moderate drought area (-2.99 a -2.0 according to the Palmer Drought Severity Index, registered in July 2019) to a weak drought area (-1.99 a -0.5 according to the Palmer Drought Severity Index, registered in August 2019) (IPMA, n.d.).

As measures to reduce the occurrence of droughts, the Municipality is committed to increase the infiltration areas in the city to promote recharging of the aquifers (ground water) by naturalizing water bodies and implementing sustainable drainage systems for rainfall resorting to permeable pavements, green coverage, infiltration ditches and retention basins (Águas do Porto, n.d.).

### Local policies and actions

Other actions for renaturing/restoring/creating urban water bodies in the city have also been promoted, such as:

- Renaturalization of Granja watercourse (with retention basins to mitigate floods) - Quinta do Rio section;
- Rehabilitation of Granja watercourse - Viso section;
- Rehabilitation of Granja watercourse (with retention basins to mitigate floods) - Ramalde do Meio section;
- Rehabilitation of Granja watercourse - Requesende section;
- Rehabilitation of Asprela watercourse - Outeiro section;
- Rehabilitation of Asprela watercourse (with retention basins to mitigate floods) - Central Park of Asprela;
- Renaturalization of Asprela watercourse - Campus da Asprela Park;
- Construction of the Intersector of Tinto River, partially inside the Campanhã Parish, which included the rehabilitation of the riverbeds and margins through all the river (Águas do Porto, n.d.).

### Articulation with European policies

Águas do Porto, EM actions are fully aligned with the EU Water Framework Directive:

- Avoiding the deterioration of water bodies;
- Protect, depollute, improve and recover water bodies, aiming at their good ecological status;
- Constant monitoring of streams. (Águas do Porto, n.d.).

Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks: “Mitigate the risk and effects of floods”.

Porto Declaration on Urban Water Agenda 2030. “It is an initiative to encourage, support and enable local governments and their water utilities to take voluntary action for complementing Member States' efforts to meet EU water policy” (Águas do Porto, n.d.).

### **Participation on national and European platforms**

Águas do Porto, EM have been participating in national and European platforms, such as:

Global and European Platforms:

- IWA – International Water Association;
- WssTP – Water Supply and Sanitation Technology Platform;
- Eurocities (Águas do Porto, n.d.).

Portuguese Platforms:

- BCSD Portugal – Business Council for Sustainable Development;
- APDA – Portuguese Water Supply and Wastewater Association (Águas do Porto, n.d.).

Awards and distinctions

Águas do Porto, EM won the Best Digital Strategic Tools award by H2PORTO technological platform for their innovative solutions on digital tools for continuous water monitoring. (Águas do Porto, n.d.).

#### **4.2.1.7 Local Masterplans**

The legal tool imperative for municipal land management is the Municipal Master Plan of Porto, (PDM), elaborated under the Legal Regime of Territorial Management Instruments (RJIGT) in force, establishes the rules and guidelines to be followed by the occupation, use and transformation of the soil for the territory of the municipality of Porto.

PDM aims at the following objectives:

- a) Valorisation of the urban identity of Porto through the dynamic conservation of existing fabrics and the design of new coherent and the control of urban densities and volumes as well as the safeguarding and promotion of the built heritage and the image of the city;
- b) Requalification of public space and enhancement of ecological, environmental and landscape components through its systemic and minimization of key environmental impacts;
- c) Rationalization of the transport system with a view to improving intra-urban mobility, giving priority to collective transport and individual modes of transport, with emphasis on pedestrian, cycling and interface functions;
- d) Reduction of existing urban asymmetries, fostering the equity of the location of public investments and strengthening social and territorial cohesion, with special emphasis on social housing with priority intervention;



- e) Affirmation of the historical centre and the central area as irreplaceable references of the urban development of the entire metropolitan area of Porto, enhancing and strengthening its revitalization and animation.

### Constraints map



Figure 70 Constrains map. Source: adapted from CMP, 2018

In the territory covered by the PDM, the provisions regarding administrative easements



Figure 70 and public utility restrictions are observed and identified in the legislation

a) classified building or in the process of classification; b) Public buildings; c) Highways; d) Railways; e) Water domain; f) Distribution infrastructures; g) Approach to Sá Carneiro Airport; h) Maritime signs; i) Equipment; j) National defence; k) Geodetic vertices; (l) mixed and sensitive acoustic zones; (m) classified or protected tree species; n) Critical area of urban regeneration and reconversion (revoked normative); o) Areas threatened by floods / Protection of flooded areas.

### Land use planning

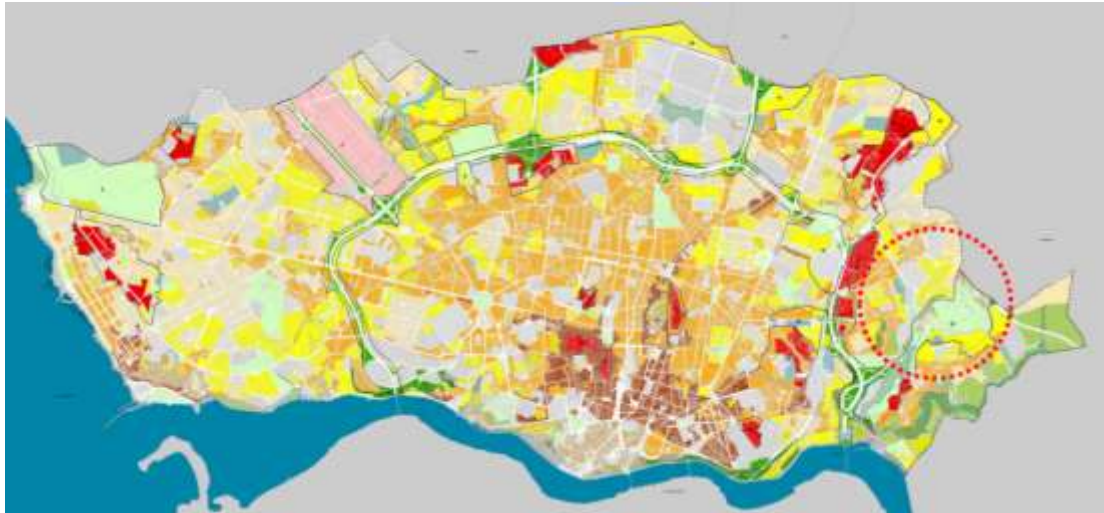


Figure 71 Spatial planning map - land-use planning map (PDMP). Source: adapted from CMP, 2018

In the area covered by the PDM, the following space categories and subcategories are considered (Figure 71 and Figure 72):

1 - Urbanized land: a) Historical areas; b) Consolidated continuous urban front area; c) Continuous urban front area in consolidation; d) Single-family housing area; e) Isolated building area with prevalence of collective housing; f) Special urbanization area; g) Business area of Porto; h) Equipment area: h1) Existing; h2) Proposed; i) Circulation and mobility systems;

2 - Soil affected for the ecological structure: a) Area of integrated equipment in ecological structure: a1) Existing; a2) Proposed; b) Green area of public use; c) Mixed green areas; d) Private green area to be safeguarded; e) Green area of space-channel framing.

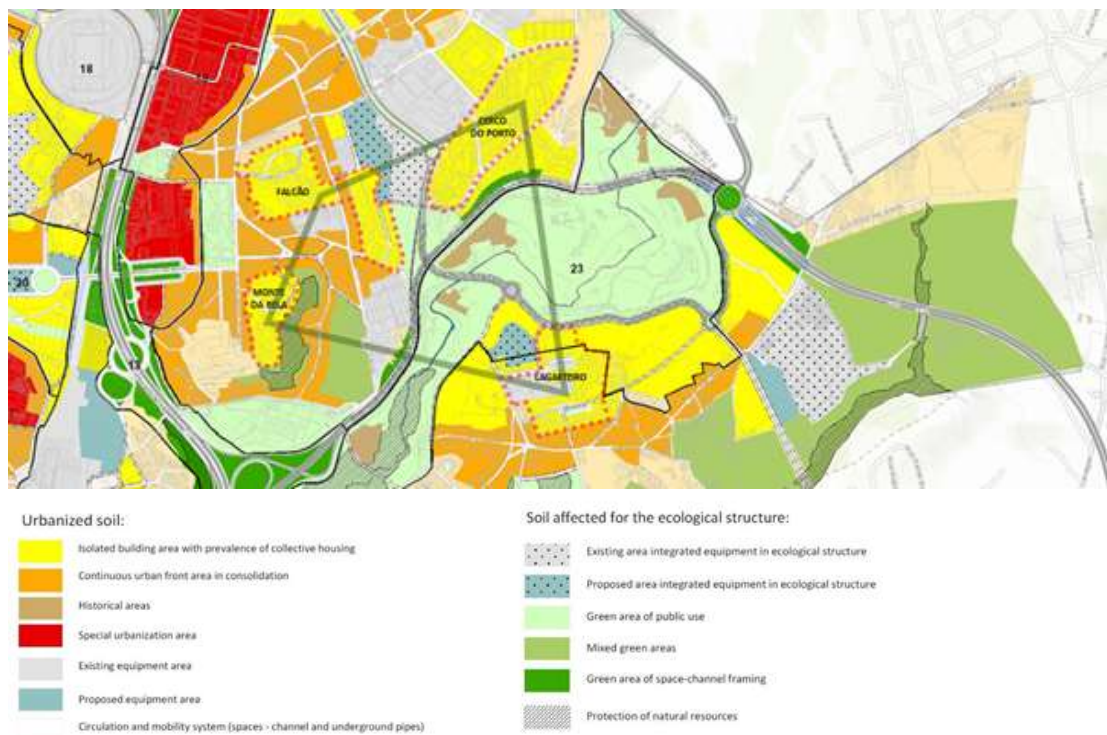


Figure 72. Land-use planning map (PDM) - with social housing localization (parish of Campanhã). Source: adapted from CMP, 2018



Isolated building area with prevalence of collective housing - Scope and objectives:

- Correspond to the areas of the city of recent formation, dominated by isolated buildings of collective housing or mixed use resulting from allotment operations or interventions of significant size and that, for the most part, do not currently define regular meshes nor constitute a continuous urban front, often resulting from quantitative criteria;
- In these areas is intended to maintain and consolidate the buildings and urban fabric that, due to their urban and architectural characteristics, contribute to the valorisation of the city's urban environment and image and the restructuring or conversion of those that are disqualified from an urbanistic and functional perspective.

Continuous urban front area in consolidation - Scope and objectives:

- Correspond to the areas structured in block with buildings located, predominantly, in front of the streets, in which the public space is defined and in which the constructed urban fronts are in process of constructive transformation and of use; we intend to maintain and restructure the meshes and consolidate the type of relationship between the building and the existing public space.

Historical areas - Scope and objectives:

- The historical areas correspond to the oldest consolidated fabrics of the city and the reminiscences of the primitive rural core that still structure and the initial morphological elements with significant urban and architectural representativeness, which is important to preserve and requalify, and comprise: a) Historic centre of Porto; b) Foz Velha; c) Historical centres, namely the following ones, identified in the planning plan - Heritage Charter: A — Nevogilde; B — Passos; C — Aldoar; D — Vila Nova; E — Ouro; F — Regado; G — Campo Lindo; H — Paranhos; I — Lamas; J — Vila Cova; K — Pêgo Negro; L — Parque Oriental.

Especial urbanization area - Scope and objectives:

- Correspond to areas of housing expansion or urban redevelopment, for which it is indispensable to define detailed description of their design and form of occupation with urban design, being inserted in operational planning and management units (UOPG);
- Its execution shall be carried out in accordance with the programming to be established by the CMP, considering the priorities indicated by regulation.

Equipment area - Scope and objectives:

- Correspond to the parcels affected or to affect the installation of equipment or infrastructures of public interest and with character structuring in the planning and functionality of the city;
- Depending on the equipment or infrastructure already installed or proposed by the PDMP, the following subcategories are considered: a) Existing equipment area; b) Proposed equipment area.

Circulation and mobility systems - Scope and objectives:

- Circulation and mobility systems are those which serve as a transport channel or as an element of connection and correspondence between different modes and means of transport and communications, facilitating the relationship between urban sectors and between city and city's metropolitan area or other points of the national and international space;
- The ordering of the local components of the systems to be implemented through plans, subdivisions, public or private building projects, urbanization projects and



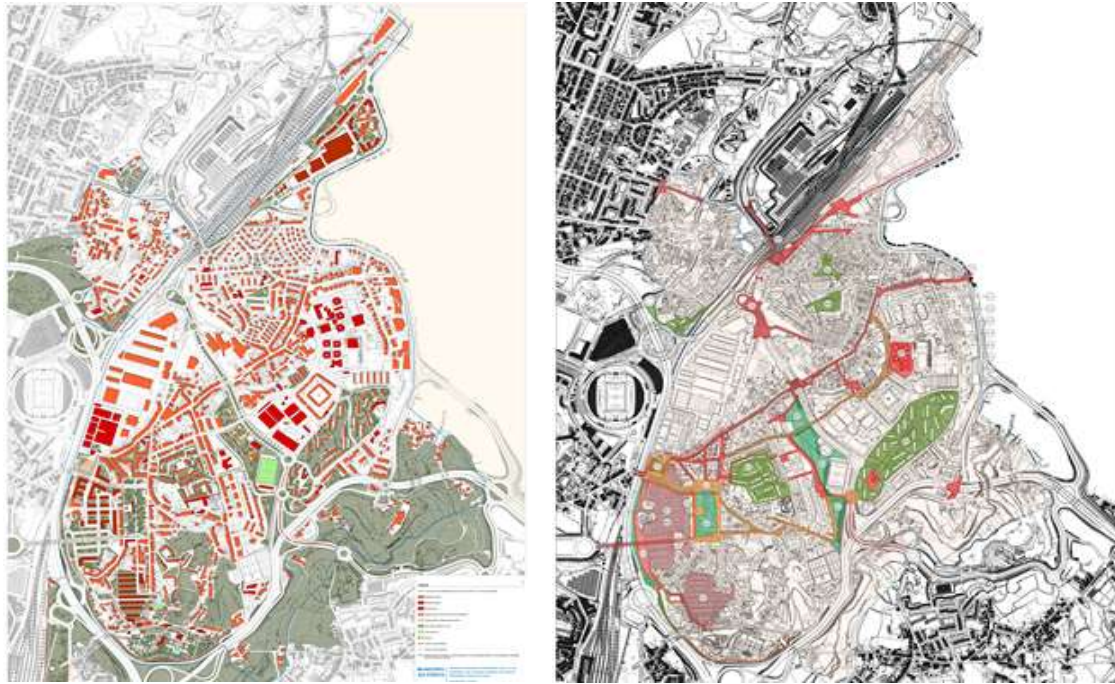


Figure 74. Territorial strategy map and Action plan map. Source: ARU Corujeira (SPI/CMP 2019)

The Strategic Urban Rehabilitation Program (PERU) is the legal programming tool of the ORU, to be promoted in accordance with the goals associated with formalizing the demarcation of the ARU da Corujeira (Figure 74):

- To qualify and make this territory more inclusive, by improving living conditions and well-being of the resident population and enhancing their ability to attract and new inhabitants, users and visitors;
- Promote territorial, socio-economic and cultural interaction with the rest of the city, nullifying the effects of spatial segregation and stigmatization;
- Attract economic, social and cultural activities, creating a new functional pole;
- Involve local actors around a clear action strategy and foster complementarities and synergies between interventions.

#### Urban Rehabilitation - Area of Azevedo (ARU de Azevedo)

The urban rehabilitation area of Azevedo (Figure 75) is also in the process of delimitation with the purpose of extending to all the eastern area of Porto the instruments necessary for the revitalization of this territory. The criteria underlying the delimitation assume the following nature: Spatial; Functional; Socioeconomic; Opportunity.

The place of Azevedo is embedded in the valley of the Tinto and Torto rivers, away from the main population centres, marked by its rural origins, by settlement in dispersed settlements, by winding paths and by deficient or non-existent basic infrastructure. Surrounded by natural barriers and road structures, the narrow urban cluster of Azevedo de Campanhã does not attract functions that support an economic base that complements the existing weak residential fabric. The reduced supply of public transport creates difficulties for the population in accessing the central places where there is employment, equipment and services essential to urban life. Also, the opportunity to diffuse the effects of urban regeneration strategies already underway in the broader territory of Campanhã has already been identified, with the main goal of applying an integrated intervention model to address common problems based on a complementarity logic.

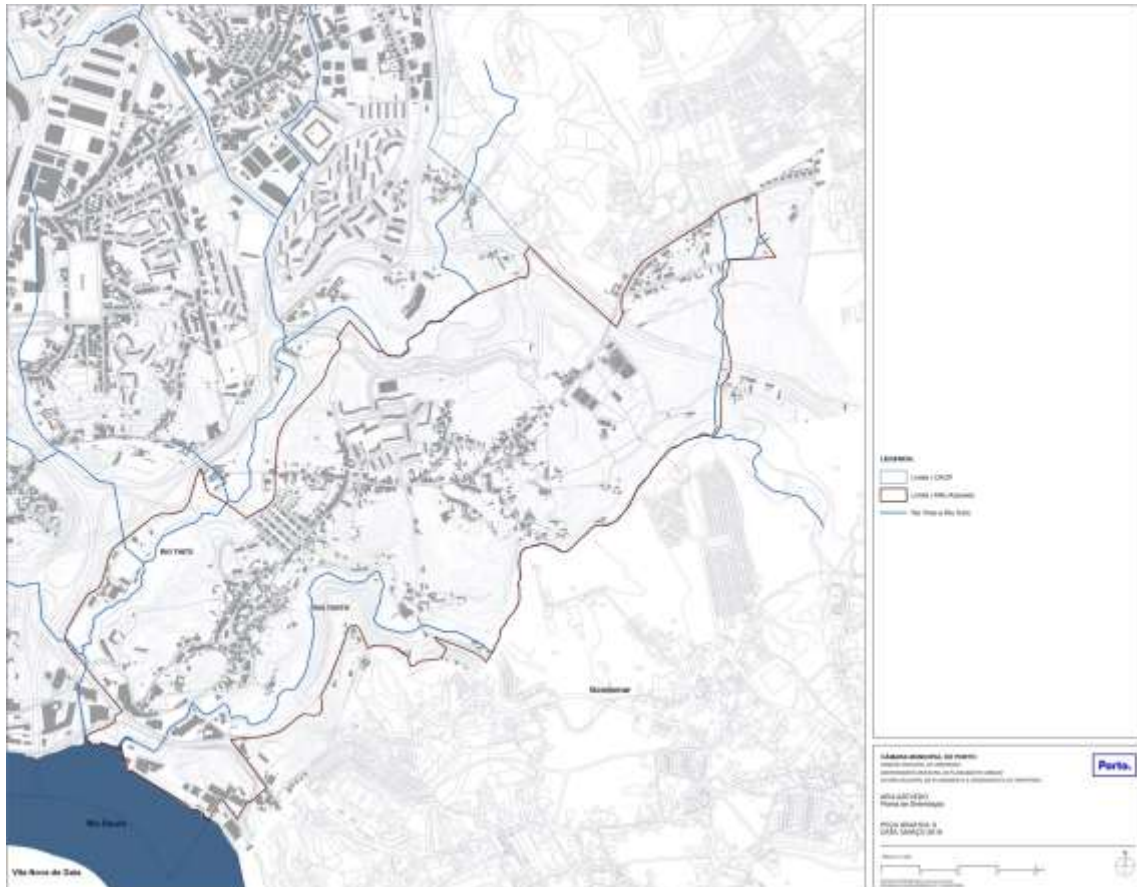


Figure 75. ARU Azevedo delimitation map. Source: CMP (2019)

In view of the criteria for delimitation, these are the following objectives to be pursued:

- Qualify the territory, ensuring the physical interventions necessary for an effective regeneration of urban and rural fabrics, considering the identity, landscape, natural environment and local culture;
- Promote the valuation of local communities and their greater integration, socioeconomic and cultural valuation in the City, eliminating the effects of spatial segregation and stigmatization;
- To create conditions for the attractiveness of new residents, new functions and economic, social and cultural activities, through improvement of the urban environment and accessibility and mobility, creation of identity equipment and urban reference, improvement of the visual quality of the urban landscape and promotion of multifunctionality of urban spaces;
- Involve local actors in participatory processes defined by the urban regeneration strategy.

#### 4.2.1.8 Future and relevant projects for URBiNAT

For the study area 11 relevant urban projects were identified. Seven of which include urban intervention with construction and 4 are initiatives that involve population participation.

New Intermodal Campanhã Station (ongoing)



The new Intermodal Station of Campanhã project (Figure 76) is underway since last October, to be completed in 2021, with 24 000 m<sup>2</sup> of building total gross area and 46 000 m<sup>2</sup> of green surface (green roof and surrounding), with water retention basins and biodiversity promotion areas (Figure 77), focus on life-quality and congregating a train station and the city park, being a carbon absorption hub of the city. It will comply with the international LEED norm - Leadership in Energy and Environmental Design.



Figure 76. Intermodal station general base plan. Source: CMP



Figure 77. Water retention basins and biodiversity promotion areas of the intermodal station general plan. Source: CMP

### Enlargement of Eastern Park of the City (concluded)

In October 2019, the enlargement of the Eastern Park of the City was concluded (Figure 78), supported by the decontamination and restoration of the banks of the Tinto River, through the construction of connections for wastewater treatment plants. The project



resulted from the articulation between the municipality of Porto and the neighbour municipality, Gondomar. The park, which opened in 2010 with 8ha, grew to 18ha, with stabilization and requalification of Tinto riverbanks, regularization of river flows and rehabilitation of riparian gallery. It is a green structure of great importance for the eastern zone of the city, Campanhã in particular, not only from an environmental, recreational and cultural point of view but also as a potential framework for economic and urban development.



Figure 78. Eastern Park of the City base plan. Source: CMP

#### Decontamination of Tinto River (concluded)

The decontamination and restoration of Tinto River has resulted from a joint intermunicipal action (Valongo, Gondomar, Maia and Porto) to clean up its banks from 2016 to 2019. It included the construction of more than 6km of tubes, connected to the near Wastewater Treatment Plants (Tinto River and Freixo), in order to reduce Tinto River pollution. This project resulted in the connection between Rio Tinto Urban Park (at Municipality of Gondomar) and Eastern Park of Municipality of Porto.

#### Refurbishment of Matadouro (former slaughterhouse) of Campanhã (near future)

The refurbishment of the Matadouro (industrial former slaughterhouse) of Campanhã will articulate a multifunctional space (Figure 79) with accessibility to other future infrastructures, such as the New Intermodal Campanhã Station and the new bridge that will connect the eastern part of Porto to Gaia, in the neighbour municipality of Vila Nova de Gaia. It will serve the installation of companies, services, commercial spaces, as well as art reserves, museums, exhibition spaces, auditoriums and social cohesion projects and facilities in a space open to the city. It is expected to be a dynamic economic, social, cultural and demographic hub of the most eastern parishes of the city (Campanhã is currently one of the most deprived areas of Porto) with creation of employment, intensification of flows from city-users from outside to this area of the city, spill over effect to attract new residents and new economic activities and urban functions, urban regeneration and revitalization of neighbour areas, mitigation of negative impacts of infrastructure's density of the area and with the increase of external projection of the eastern zone.



Figure 79. Simulation of future multifunctional space of the former Slaughterhouse. Source: CMP

### Municipal kennel – Animal Official Recovery Centre (ongoing)

The new Municipal Kennel will allow to enlarge the actual complex with increase the capacity of boxes. The project of the centre arises under the Municipal Plan of Control and Welfare of the Animating Populations of Dogs and Cats, launched in 2015 to respond to legal obligations in this area, as well as to the general recommendations of zoophilic associations and the General Directorate of Food and Veterinary.

### Maceda neighbourhood (completion of the original project)

The project comprises the construction of three buildings (with 16 dwellings) missing since the original construction stage in the 1970s, therefore aiming at the completion of the neighbourhood (Figure 80). Simultaneously, the original set of two-storey row houses (6 buildings with 33 dwellings) will also be refurbished, bringing the set to its initial situation, for which the annexes that have been constructed along the years will be removed.



Figure 80. Maceda neighbourhood. Source: CMP (n.d.)

### FUN Porto - Floresta Urbana Nativa do Porto (ongoing)

A project that intends to reinforce the city's green infrastructure with the citizens' involvement, as well as to evaluate and optimize of ecosystem services and to continue to propagate native plants in the municipal nursery (Figure 81), located on the parish of Campanhã (with an annual production of around 600 000 plants) to export to all metropolitan territory. Its program includes the initiatives:

- 'If you have a garden we have a tree for you' (Figure 81) which aims to plant 10 000 (mostly native) trees and shrubs in the city's private gardens by 2020. So far, 5 966 trees and shrubs have been planted in 1 022 city deprived spaces (with the collaboration of the citizens);



Figure 81. Activity of municipality gardeners at municipal nursery14 and trees from the initiative "If you have a garden, we have a tree for you"<sup>15</sup>

- Biospots Network with already two intervention areas (4hectares) with 1 308 trees planted (

Figure 82);

- BioLab, native urban woodland (

Figure 82) whose effects are expected to improve ecosystem quality, climate change adaptation, carbon sequestration and biodiversity;



14 10.000 árvores plantadas. (2014, November 21). *Porto - o portal de notícias do Porto*. Retrieved from <http://www.porto.pt/noticias/10-mil-arvores-plantadas>

15 Se tem um jardim, temos uma árvore para si. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/fun-porto/se-tem-um-jardim-temos-uma-arvore-para-si->



Figure 82. Biospots Network intervention area located on wayside slope of the inner-city beltway<sup>16</sup> and existing vegetation where BioLab area will be installed, in the parish of Campanhã<sup>17</sup>

### FUTURO project (ongoing)

FUTURO project - 100 000 trees project in the Porto Metropolitan Area (CRE.Porto, n.d.), whose mission is to ecologically rehabilitate burnt, degraded or underused areas, through appropriate management, plantation and maintenance of native trees and shrubs at the region, promoting various environmental benefits including rainwater regulation, carbon sequestration and air pollutants removal. Porto's municipal nursery (Figure 83) is one of the places where trees and shrubs for reforestation are being produced.



Figure 83. Future project's nursery at the Municipality of Porto's nursery. Source: CMP<sup>14</sup>

### Quinto Alçado (concluded)

Quinto Alçado<sup>18</sup> was a project developed, between 2016 and 2017, by the National Association of Green Roofs (ANCV) with the Municipality of Porto which proposed a model for the development of green infrastructure at the level of roofs and facades and to evaluate their impact and benefits for the city. The existing green roofs and facades and potential spaces of their installation throughout the city were identified. The future New Intermodal Campanhã Station will integrate a wide green coverage to expand the resilience capacity of the city.

### My building is green, a Life project (ongoing)

The project consists on implementing urban Nature Based Solutions (NBS) in public education pilot buildings to assess and monitor the effectiveness of selected NBS in improving the bioclimatic comfort of school buildings, as well as increasing resilience and adaptation to climatic extremes (hot and cold waves) that are expected in the coming years in three distinct climatic regions (Porto, Badajoz and Évora). The pilot building selected in Porto is the school of Falcão (Figure 84), in Campanhã, and the solutions to be applied may include a green roof or wall prototype, as well as the redefinition of existing green space, but also the exploitation of the viability of collecting water from rain for seasonal irrigation of the municipal vegetable garden of Oliveira plots, adjacent to the building and used by the school community.

16 Rede de biospots do Porto. (n.d.). *Câmara Municipal do Porto*. Retrieved from [http://www.cm-porto.pt/fun-porto/teste\\_224](http://www.cm-porto.pt/fun-porto/teste_224)

17 Porto BioLAB. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/fun-porto/porto-biolab>

18 Associação Nacional de Coberturas Verdes [ANCV]. (n.d.). *GreenRoofs*. Retrieved from <https://www.greenroofs.pt/pt/pqap>



Figure 84. Falcão school, part of Life Project. Source: CMP

### Environmental Education Centre of S. Roque Park

It is part of the network of Environmental Education Centres in the municipality of Porto, whose sustainability education strategy unfolds into multiple projects that look to actively engage and mobilize the population different target segments. The "backbone" of this strategy is based on the decentralization of activities by the Municipality, through the dynamization of a daily program of actions that take place in a municipal network of 5 environmental education centres, located in privileged natural spaces of the City. The Environmental Education Centre of S. Roque Park (Figure 85) is in a privileged area of the eastern zone of the city, in Quinta da Lameira, today known as Parque de S. Roque, in the parish of Campanhã, with more than 40 000 m<sup>2</sup> of green space, an authentic 'lung' regenerator of the eastern part of the city.



Figure 85. Environmental Education Centre building of S. Roque Park. Source: CMP<sup>19</sup>.

In what concerns the neighbourhoods under Domus Social management, currently there are two ongoing interventions in Cerco do Porto and in Falcão:

<sup>19</sup> Centro de Educação Ambiental do Parque de S. Roque. (n.d.). *Câmara Municipal do Porto*. Retrieved from <http://www.cm-porto.pt/rede-de-centros-de-educacao-ambiental/centro-de-educacao-ambiental-do-parque-de-s.-roque>



### Cerco do Porto Urban Project (buildings refurbishment and public space renovation)

Following a previous study – *Estratégia de Intervenção Integrada para o Cerco do Porto* (EIICP, 2017) –, the intervention comprehends the whole neighbourhood: 32 buildings from 1963 (804 dwellings, 1 850 residents) and 2 buildings from 1991 (88 dwellings, 186 residents).

Housing buildings - Will include the demolition of 8 buildings (loss of 208 dwellings), but also the exterior refurbishment of buildings envelope and common circulation area in 26 buildings. The 1<sup>st</sup> stage (Figure 86) is being coordinated by Virginio Moutinho Arquitecto Unipessoal, Lda (under construction) and the 2<sup>nd</sup> stage by José Gigante Arquitecto, Lda. (contracting stage).



Figure 86. Cerco do Porto under refurbishment: before and after. Source: J. Restivo archive (2017); V. Moutinho archive (2018)

Public space - Will include the demolition of 8 housing buildings and vacant facilities, construction volume reduction (effect on occupation density of the urban area). A new central green area is proposed, as well as two new roads (design stage), authored by José Soares - Arquitecto, Lda. (Figure 87).



Figure 87. Cerco do Porto public space proposal: before and after. Source: José Soares - Arquitecto, Lda. archive (2017)

### Falcão neighbourhood (buildings refurbishment and public space intervention)

The intervention tackles the three developments of the neighbourhood: 15 buildings from 1973 and 1981 (397 dwellings, 888 residents) and 8 buildings from 2000 (165 dwellings, 397 residents.).

Housing Buildings - Exterior refurbishment of buildings envelope and common circulation area: 15 + 8 buildings (Figure 88): 1<sup>st</sup> stage (1973) – Castro Calapez Arquitectos, Lda. (concluded); 2<sup>nd</sup> stage (2000) – João Rapagão - Arquitecto, Lda. (under construction); 3<sup>rd</sup> stage (1981) – Cprata Arquitetos e Serviços Unipessoal, Lda. (design stage).



Figure 88. Falcão neighbourhood, first development from 1973, under refurbishment. Source: DomusSocial archive (2017)

Public Space - Castro Calapez Arquitectos, Lda. (design stage) and Xscapes (Landscape Architecture) (Figure 89).



Figure 89. Falcão public space proposal. Source: Castro Calapez Arquitectos, Lda. archive (2017)

## 4.2.2 Social description

### 4.2.2.1 Demography

#### Demographic description

In 2017, the Municipality of Porto accounted with a total of 214 587 residents (compared to 237 591 in 2011), with an average of 5 686.9 individuals/km<sup>2</sup> (2011) (AMP, n.d.), a value that decreased to 5 560 individuals/km<sup>2</sup> in 2012<sup>1</sup> and 5 180.7 individuals/km<sup>2</sup> in 2017 (INE, 2018) (96 545 men and 118 042 women), showing that the city has been experiencing a progressive demographic loss. According to the Census, between 1991 and 2011, the resident population in the county decreased by 21% (estimates of the resident population indicate that between 2011 and 2015, decreased by 10%), thus showing a population decrease that is higher than the national context and the Metropolitan Area of Porto (AMP). This is mostly influenced by a negative migratory rate, which has been increasing between 2011 and 2013.

Porto population is also aging, with an increasing proportion of the elderly population (with 75 years old and more), and young population decrease (between 0-4 years old). According to estimates of resident population, in 2017 about 12.70% were 0-14 years old, 8.90% were 15-24 years old, 50.26% were 25-64 years old and 28.14% were 65 or more years old. The aging and longevity index determined for 2017 was of 221.6 (165.13 for men and 280.19 for women) and 49.3%, respectively. In 2011, the total number of vulnerable groups identified in the area (population with at least one difficulty) was of 42 575. Consequently, this decrease of young individuals with an active age made it impossible to assure a proper renovation of the active population in the Municipality, increasing the total dependency levels (6 percentual points between 2001 and 2011).

According to projections developed between 1990 and 2040, for Porto Municipality, there is a predicted decrease at a slighter lower rate. Moreover, for the 50 year's estimation, it is visible the increase of the older population (from 8% to 30%, which surpasses the younger age groups (that decrease from 22% to 13%), a common structure of an aging population. The age structure obtained for these estimations clearly shows an aging population with very little difference between the different applied scenarios (Figure 90) (CMP, 2018b).



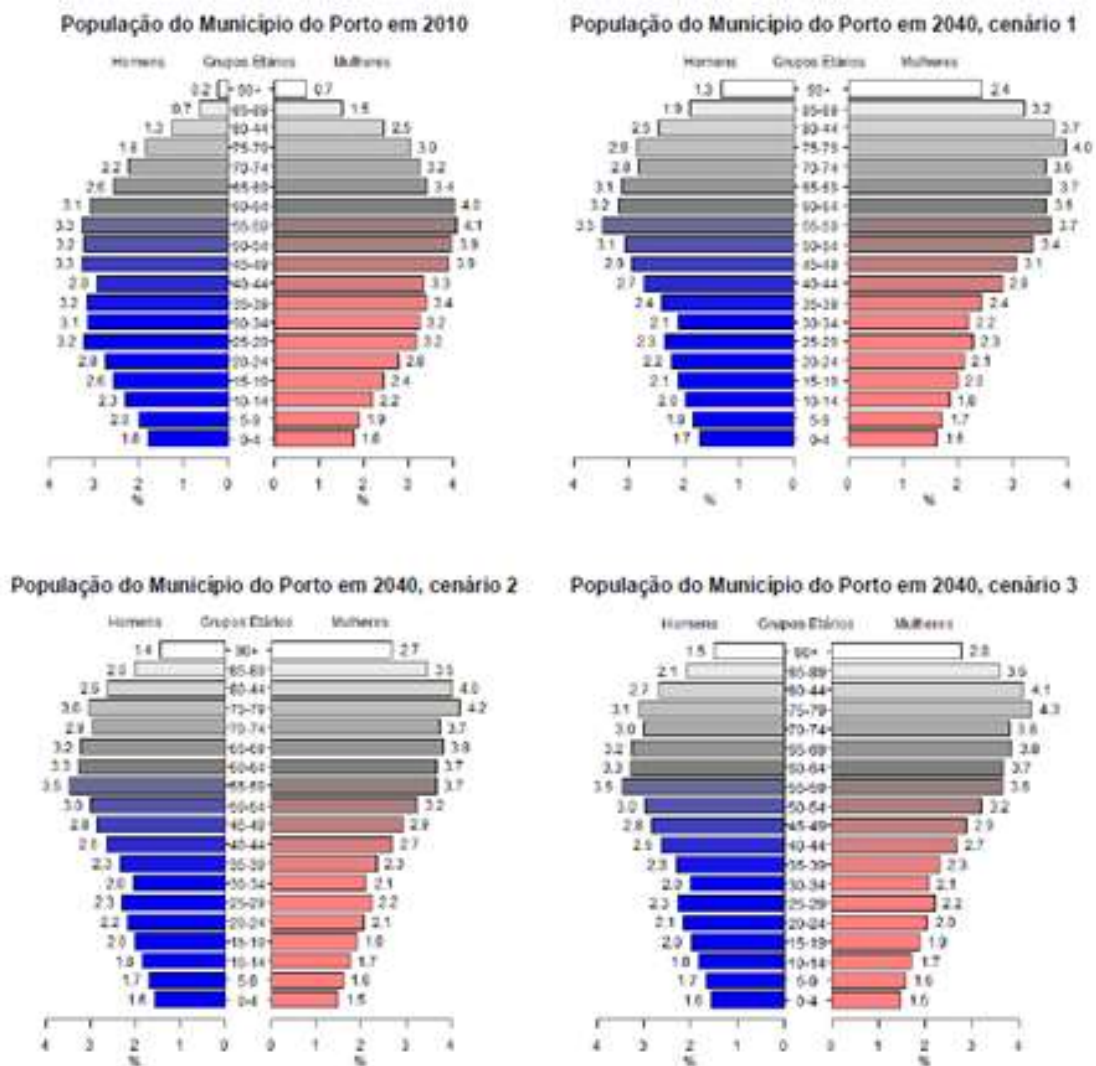


Figure 90. Age structure for Porto Municipality in 2010 and projections for 2040 according to 3 different scenarios. Source: CMP, 2018b

Regarding family dimensions, there is a decreasing trend in the dimension of families towards a single-person family, which accounted for  $\frac{1}{3}$  of all classical resident families in 2011. Among these single-person families, the age group that clearly stands out is 75 years old and above. Among these, the number of single parent families have also been increasing, representing in 2011 22% of all families, with feminine single parenthood a dominant trend (88%).

For Campanhã parish, in 2011 there was a total population of 32 659 residents (15 130 women and 17 529 men). Among these, 4 009 were 0 to 14 years old, 3 735 were 15 to 24 years old, 17 391 were 25 to 64 years old and 7 524 were 65 years old or more. In terms of variation, there has been a higher negative variation in the 15-24 age group, and a positive variation towards the 65 or over age group (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019). Estimations for 2 040 foresee a decrease in population (Figure 91). As for the resident population structure, it presents a high degree of variability with very young population in some areas, such as in Cerco do Porto and Ilhéu, and an aged

population in Falcão and Monte da Bela. In Cerco, more specifically, 22% of residents are under 20 years old and 18% are 65 or more. There, the percentage of isolated families is of 27.3% and feminine single parent families of 20.4% (Quatenaire, 2019).

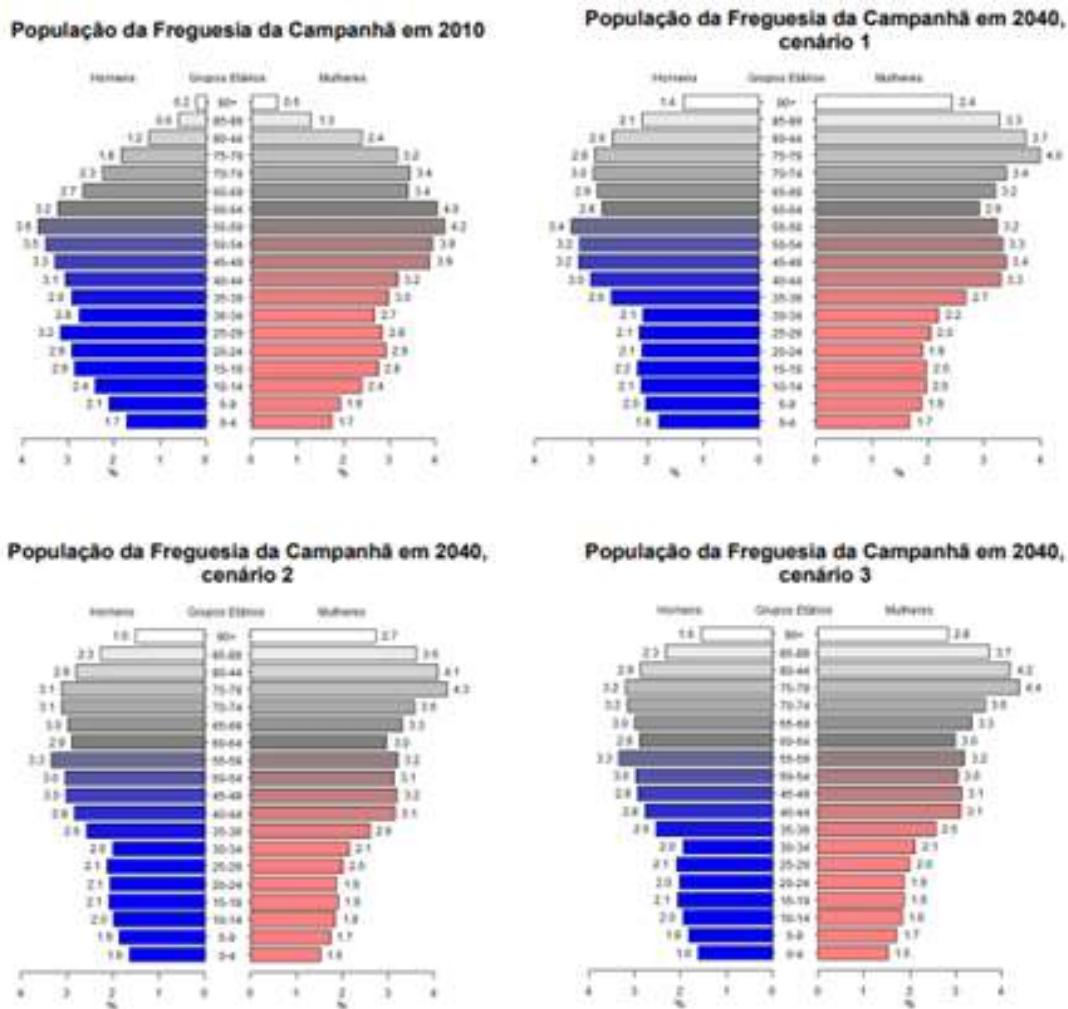


Figure 91. Age structure for Campanhã Parish in 2010 and projections for 2040 according to 3 different scenarios. Source: CMP, 2018b

Between 2009 and 2015, Porto Municipality pre-schooling levels (139%) remains much higher than the numbers at metropolitan (94%) and national levels (91%). The same trends can be observed, for equal period, for the basic school education levels - 183% for the municipal level, 109% for the metropolitan area and 112% for national level - and for the secondary level - 364% for the municipal level, 118% for the metropolitan area and 115% for national level. The most recent data for Porto Municipality (2017) shows the percentages for the different levels of education: Basic education - 49.44%; Secondary Education - 15.16%; Higher Education - 27.19%. Nevertheless, and despite significant improvements over the last decades, Portuguese municipalities continue to have low levels of education and qualification in comparison with European averages. It is not only necessary to continue working towards the increase of the population qualifications, but attention must also be paid to the people with low or no schooling levels, which still constitute to be a contemporary reality. According to the 2011 Census, in the municipality of Porto, 6.6% of the residents don't have any level of schooling and the number of



residents (over 10 years old) characterized as illiterate was of 6 245. For Porto, drop-out rates in the basic-education level have been slightly decreasing between 2014-2016, following both the metropolitan and national trends. The most recent data, from 2017, shows that the municipality holds a drop-out rate of 1.72%. For the secondary level of education, the rate of conclusion has been increasing between 2010 to 2015 for the Porto city level (87.8%), the metropolitan level (86.8%) and national level (84.5%). According to the last census developed, in 2011, the percentage of residents in Porto City that hold superior education is high (27%) when compared to the metropolitan area of Porto 81 659 and national level (15%) (CMP, 2018b).

For the Porto Metropolitan Area, the total number of schools in 2017/2018 was 783 public and 413 privately owned, while for Porto City a total of 79 public schools and 116 private schools were registered (*Regiões em números 2017/2018 - Educação Volume I - Norte*, 2019).

In territorial terms, the situation of low schooling or non-schooling is alarming in the socially most vulnerable areas of the Campanhã parish, in the Historical Centre and in the confluence of the social districts scattered especially in Paranhos, Ramalde and Lordelo do Ouro. In 2011, Campanhã Parish registered a rate of school drop-out of 2.4%, way above the city level (1.7%) (Figure 92).

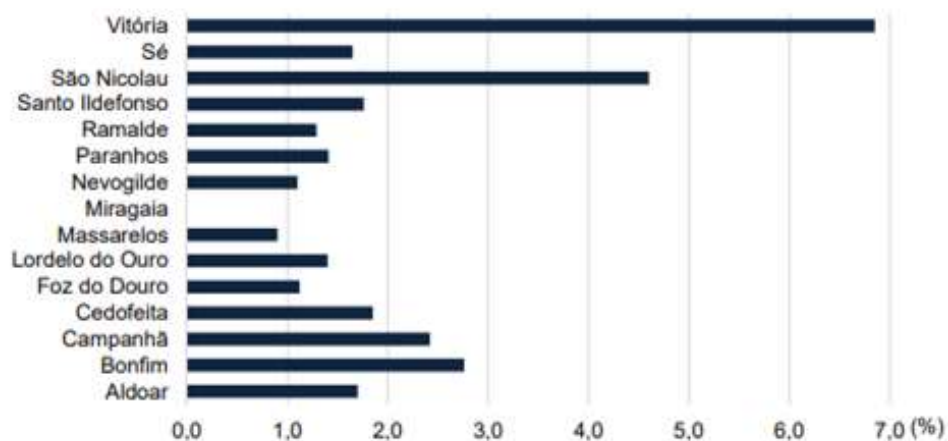


Figure 92. School drop-out rate by parish (2011). Source: INE, 2012a

Regarding the population holding a superior education, in Campanhã parish only 11% of the resident families (in 2011) hold such a degree (the lowest, when compared with other parishes and the city level), being this one of the great vulnerabilities in this area. In terms of schooling facilities, in Campanhã parish the number of schools is lower when compared with all other parishes in Porto, with a total of 18 schools (13 for 1<sup>st</sup> cycle, 2 for 2<sup>nd</sup> cycle, 2 for 3<sup>rd</sup> cycle and 1 for secondary schools) (Figure 93) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

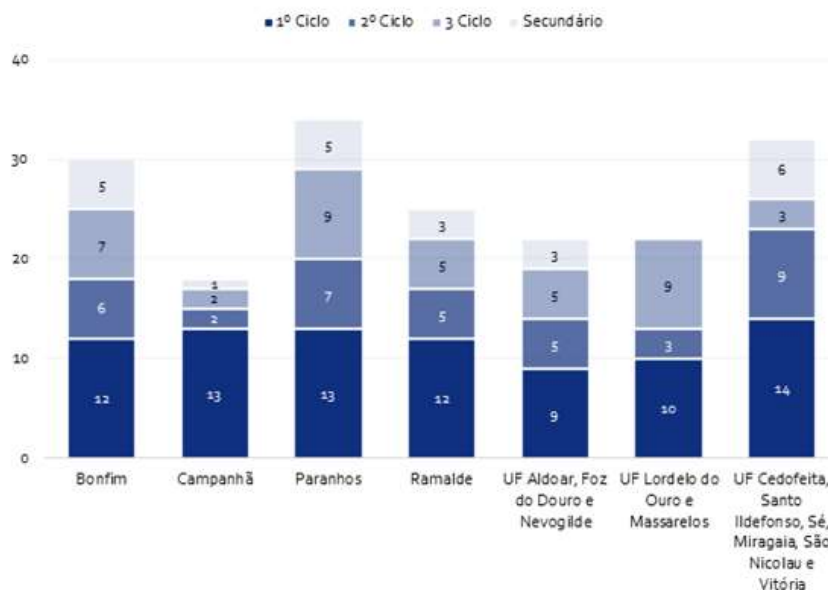


Figure 93. Number of schools by teaching level and parish in Porto City, for 2015/2016. Source: Infoescolas

### Housing conditions

In Porto city, 3% of the buildings are classified as very degraded and 43% as in need of repair, when compared to the Porto Metropolitan area (2% and 32%), showing a clear and worst position. In terms of accessibility by wheelchairs, Porto city presents a total of 69% of buildings identified that are not adapted for this kind of accessibility. As for comfort conditions, in Porto city 99,7% of housing are connected to a water supply system (metropolitan area level - 99,7% and national level - 99,5%), 98% have bath installations (same value registered for both the metropolitan area and national level).

In 2017, the National Survey for Housing Resettlement Needs (IHRU, 2018) developed a diagnostic of the housing difficulties in order to implement the Housing Support Program. In Porto the identified situations show spatial differences, with more intense expression in three main parishes, among them Campanhã, where an island effect is common (CMP, 2018c).

In terms of housing access, in recent years, a significant part of the population, mainly composed of young adults with insufficient earning, has been experiencing difficulties in housing access. The main reasons rely on financial crisis that decrease access to housing loans; rapid increase in interest from foreign buyers, inflating prices; renting fees increased without a matching adaptation from governmental support systems. All these factors have pushed the population to peripheral areas of Porto Metropolitan area (CMP, 2018c).

For Campanhã Parish, the main problems are related to the quality of the housing, being in private or social public housing, despite the municipal investments for rehabilitation of a considerable number of neighbourhoods. Census developed in 2011 revealed that 0.7% of the housing in Campanhã Parish don't have basic infrastructure (water/sanitation), 3.8% don't have bath installation and 0.5% only have access to water. In this area, there are also persistent habitational problems related to the presence of municipal neighbourhoods, islands (which include slums) and rural areas (Figure 94) (Quatenaire, 2019). Until 2011, 56% of the buildings were built until 1970 (compared to Porto, which were barely 50%), 1/5 of these buildings were much degraded or in need of medium or great changes (*Idem*).

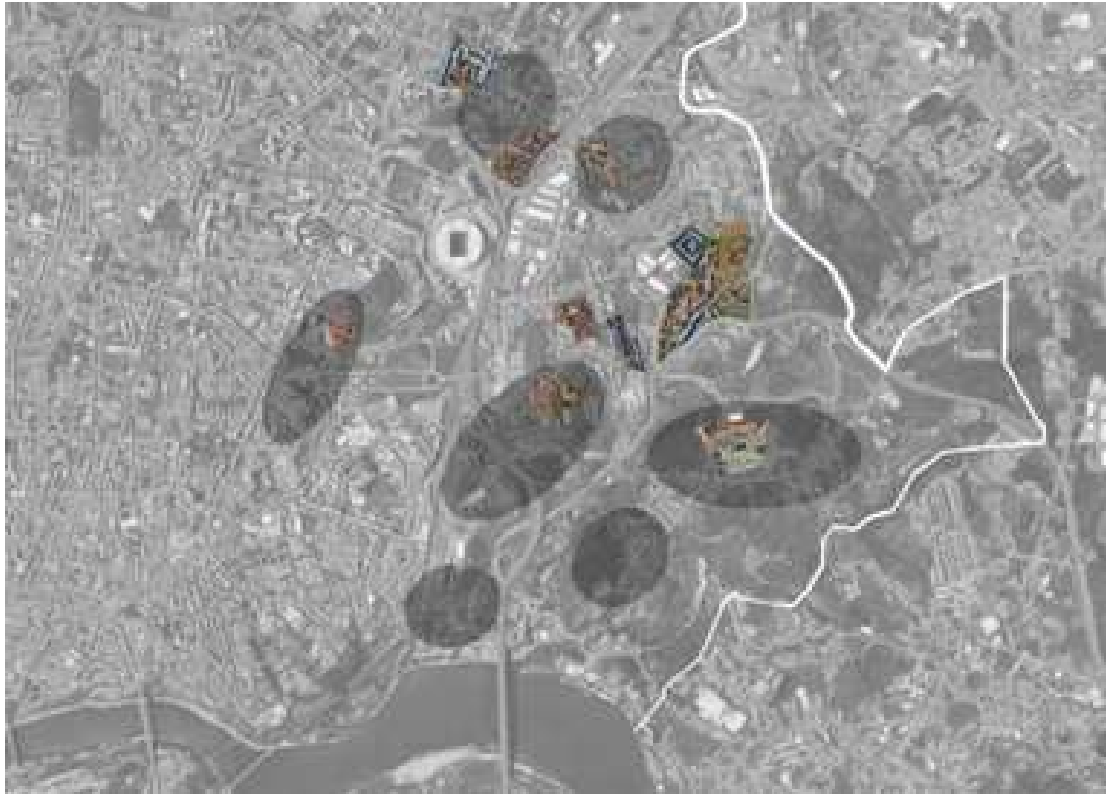


Figure 94. Social neighbourhoods and critical areas with "islands". Source: Breda-Vazquez & Conceição, 2015

In the whole city, Campanhã is the parish with the higher number of housing in municipal neighbourhoods, concentrating 30% of all the residents of the Parish in municipal housing. The neighbourhoods with greater dimensions are: Cerco do Porto (892 houses, 2 087 residents); Lagarteiro (446 houses, 1 194 residents); S. Roque da Lameira (435 houses, 925 residents); and Falcão (397 houses, 896 residents). In the last few years, there were many rehabilitation initiatives in the buildings of municipal neighbourhoods alongside with specific social actions to tackle the existing challenges. Nevertheless, degradation of these areas has perpetuated in time and new planned interventions aim to mitigate the most fragile habitational contexts. In Campanhã Parish, there were identified around 133 of habitational precariousness (404 families that need to be relocated) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019)

### **Migration rate**

In a migration model conducted by the economic dynamism, migrations of particular interest include the ones from an active age group (20 to 65 years old). In different projected scenarios developed, between 2015 and 2040, show a quite constant rate for that age group between 2015 and 2020, reflecting simulated budget constrictions (Figure 95) (CMP, 2018c).

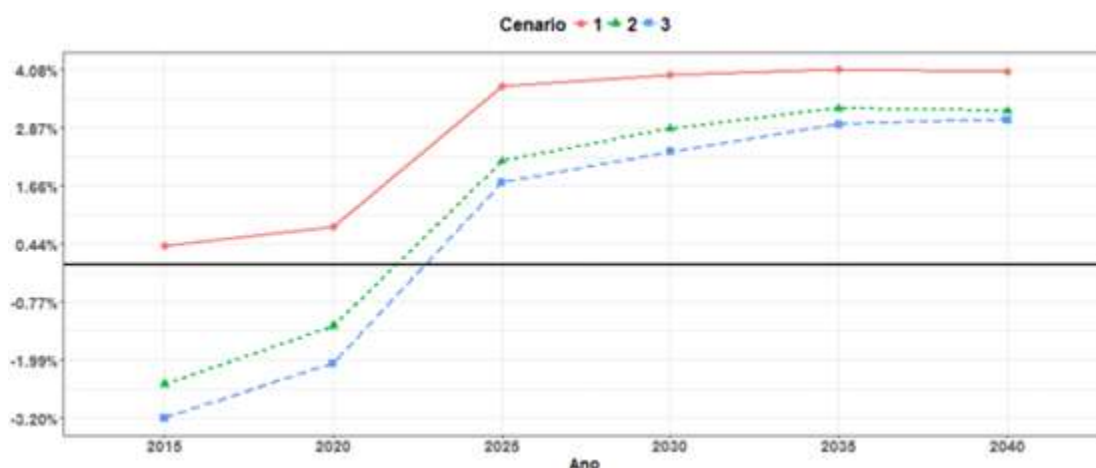


Figure 95. Migration rate for Porto Metropolitan Area (2015-2040). Source: CMP

For the Campanhã parish, population migration was also projected between 2015 and 2014 by sex, showing for all the three scenarios a decrease through the years.

### 3.2.2. Safety and health

#### Health and well-being rate

The life expectancy at birth has been increasing for the country, northern area and for Porto Metropolitan area. Between 2008 and 2016, life expectancy at birth increased over one year (CMP & ARSN, 2014). The absolute mortality rate in Porto has been increasing, with values registered for the Municipality, in 2016, of 13.6‰, above the ones registered for the Metropolitan area (9.3‰) and the country (11‰) (Figure 96). In 2018, the registered rate was of 13.9‰, with the child mortality rate reaching 5.1‰. (CMP, 2018c).

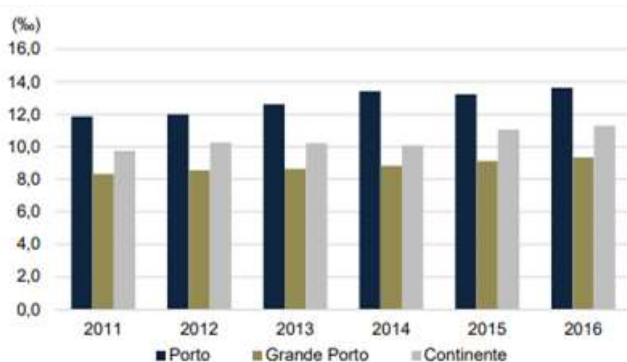


Figure 96. Mortality Rate for Porto (dark blue), Metropolitan Area of Porto (brown) and the country (grey). Source: INE

Estimation for mortality rates per age group between 1990 and 2040 shows that for the younger groups, mortality rate decreased. In the older groups it is observed an accentuated decrease although followed by an expected increase. In Porto City, the main causes of death in 2016 were, in first place, tumours (40.04 %), followed by diseases of the circulatory system (13.20%) and in third place by diseases of the respiratory system (5.81%) (CMP, 2018c).

## Health services

The city of Porto has a good coverage in the health area, with a high concentration of equipment and human resources. The number of medical professionals practicing in public hospitals and health centres in Porto has been stable in recent years.

In 2010, there were operating in Porto 23 health local centres, which translates into a coverage rate of about 0.1 units per 1000 residents. The creation, in 2008, of the Groupings of Centres has led to the reconfiguration of these equipment at local level, particularly with the initial expansion of family health units and, more recently, health care units. These functional units, integrated in health centres and articulated in a network logic, have as their mission the provision of personalized health care with quality and efficient manner, ensuring access to them by all citizens (CMP, 2018c). Last data obtained in 2017 indicates a total number of 22.2 medical doctors per 1000 inhabitants, 16.7 curative beds per 100 inhabitants, 15 974 health personnel (INE, 2018). Regarding the network of hospital equipment, a total of 19 were identified, of which 12 are private and 7 are public. In the Eastern part of the city, there are three main health centres in 3 main parishes (Bonfim, Paranhos and Campanhã) distributed through 7 buildings, with a total staff of 275 elements (75 doctors, 84 nurses, 60 clinic secretary, 11 superior technicians, 6 superior health technicians, 13 diagnostic therapeutic technicians and 26 operational assistants), for a total of 101 222 estimated habitants. In Campanhã specifically there are 3 buildings (S. Roque da Lameira, Ilhéu and Azevedo) serving a total of 19 328, 14 169 and 3 543 users. For these three areas, the average ratio between doctor/user is: S. Roque da Lameira – 1579.6; Ilhéu – 1668.3; and Azevedo – 1511.0 (CMP&ARSN, 2014).

## Safety and criminality

According to data provided by the Police of Public Security, the value of the crime rate in the city of Porto, in 2010, was 101.6 crimes per 1 000 inhabitants. Until at least 2014, number of participations increased significantly the pace of growth reached the 17.9% per annum between 2006 and 2010. Analysing the breakdown of registered crime by the broad categories of crime that the great majority of the occurrences to PSP is invariably against patrimony. This category has been one whose progression is more noticeable, representing about 70% of all crimes in 2010. The last data obtained for criminality, between 2010 and 2015, shows a slight increase in criminality occurrences, especially between 2014 and 2015 with an average of 75 crimes per 1 000 inhabitants. In 2016, Porto city showed a criminality rate of 67 crimes per 1 000 inhabitants. According to the types of crimes, between 2010 and 2015, most crimes were committed against the patrimony.

In the eastern part of the city there is a higher occurrence of behavioural problems related to criminality such as drug use and alcoholism, when compared to other areas of the city (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019). For this area, a total of 826 drug users were identified (CRI-Porto, n.d.). Data from 2008, indicates 2 386 crime occurrences for Campanhã, the second highest value when compared with the remaining parishes of Porto (Figure 97) (Azevedo *et al.*, 2009).



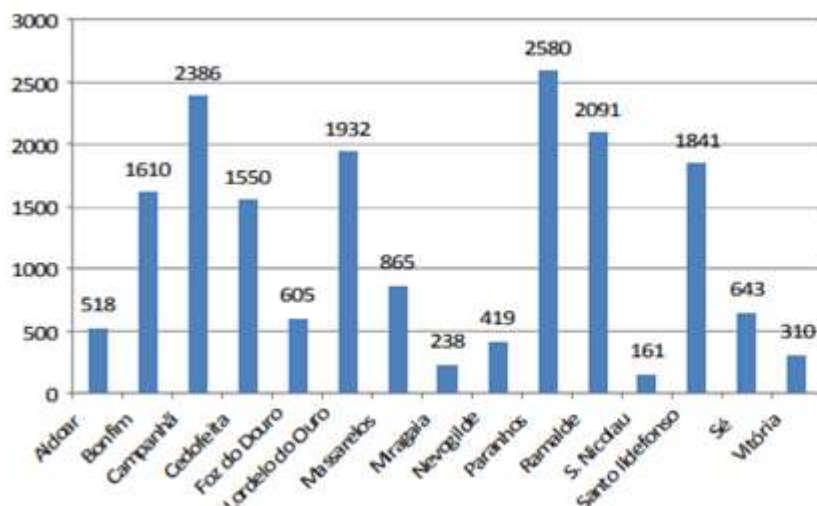


Figure 97. Total number of crimes registered for Porto Municipality in 2008, per parish. Source: UCP/FEP

In the parish of Campanhã, it is also important to note that for domestic violence, this area was the one that showed higher number of occurrences when compared with other parishes of Porto Municipality, with 299 occurrences in 2008 (Figure 98) (Azevedo *et al.*, 2009).

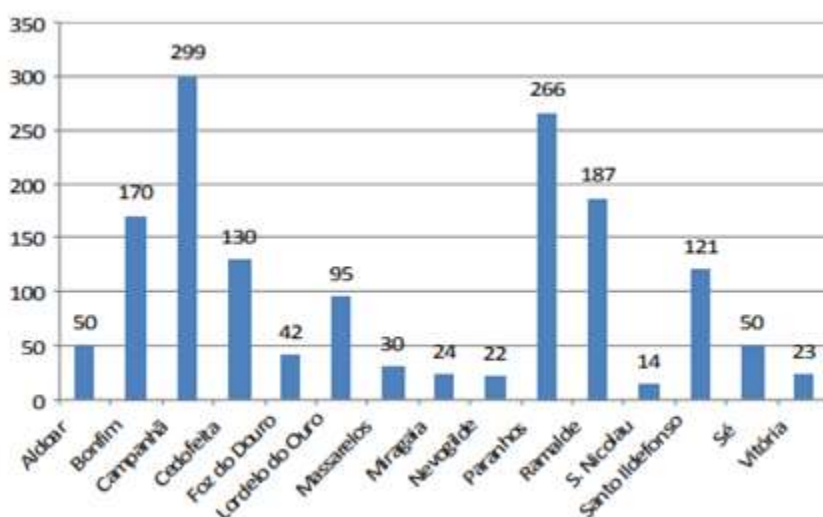


Figure 98. Number of domestic violence events in Porto City Parishes in 2008. Source: CMP

### 3.2.3. Participation

#### Social connections

Besides the support from the social municipal buildings, the Project *Porto Solidário - Fundo Municipal de Emergência Social* (Solidarity Porto Project - Social Municipal Fund) was created to support people of families with economic difficulties and in serious state of habitation emergency. For Campanhã Parish, more specifically, it's possible to note a considerable increase between 2016 and 2017, reaching the second position among the parishes with more support provided. This clearly shows the social difficulties that the residents are living in (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

## Social inclusion rate

Regarding social difficulties, and according to the 2011 census, 6 main typologies were defined: 1) difficulties in seeing; 2) difficulties in hearing; 3) difficulties walking or climbing steps; 4) difficulties in memory or concentration; 5) difficulties in showering or getting dressed; 6) difficulties understanding others or being understood. According to these categories, Porto city showed the highest percentage of resident population with difficulties, with 17.5% of the population in those conditions (more than 41 000 people), especially within the age group of 65 and more. Among the difficulties registered, the most common ones are related to walking, vision and memory. Approximately 5% of the resident population with disability or incapacity is under 24 years old (~2 000 children and youngsters). Almost 25% of the population with active disabilities are unemployed (~2 384 adults) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

In Campanhã parish, it's possible to note the highest percentage of people showing difficulties (21.9%) (Figure 99).

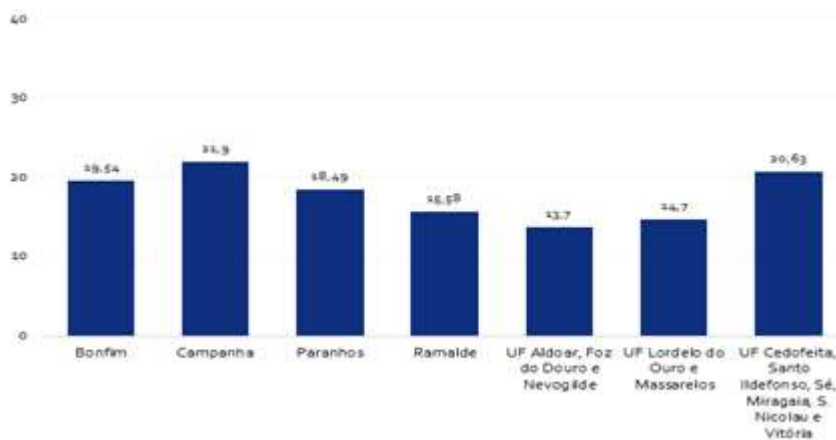


Figure 99. Resident population with disabilities by parish, Porto, 2011 (percentage). Source: INE

Upon these results it's important to note that in less than 50% of the buildings in every parish had an elevator and didn't had entrance for wheelchair.

To support this population, for the younger age groups, there are three early intervention services: 2 in Paranhos parish with capacity for 299 users (with 100% occupation rate) and another one in Aldoar, Foz do Douro and Nevogilde parish for 106 users (with 145.3% of occupation rate). In Campanhã parish there is a support home with capacity for 14 users (with 92.86% of occupation rate). These facilities are answering to needs of 419 users for a total universe of almost 1 000 children and youngsters with disabilities or incapacities.

As for social support to adults with disabilities and incapacities there were 4 main types of centres: three Service Centres, Monitoring and Social Rehabilitation for People with Disabilities (occupation rate of 95.11%); four Occupational Activities Centres (occupation rate between 92.31% and 97%), one in the historical city centre and three in Campanhã parish, with total capacity to answer the needs of 500 users; nine Residential Homes (total capacity for 183 users, with occupation rate of 97.3%), among them six are located in Campanhã parish (total capacity for 91 users, and used by 81); and People Transportation Service, of which only 2 parishes (Paranhos and Cedofeita, Santo Ildefonso, Sé, Miragaia, S. Nicolau and Vitória) benefited from this service, with a maximum capacity for 42 users, with a usage rate of 86%. Altogether, these services could give support to 1 190 people, directed at a population of over 39 000 adults with disabilities and incapacities. Therefore, there are relevant reasons for this population segment to receive special attention, so

proper strategies and initiatives contribute to increase quality of life, integration and equality in the society (Azevedo *et al.*, 2009).

### 3.2.4. Public services

#### Mobility

In Porto City, for 2011, there is an average of commuting movements (min) of 20.25. A total of 63 387 residents use the automobile in the displacements (51.42%), 26647 uses pedestrian modes (21.62%), 32 120 uses public transportation (26.06 %) (AMP, n.d.; INE, 2018). Focusing on public transportation, it is important to note that the bus network provided by STCP operates in Porto and nearby municipalities. This network is composed by a total of 72 lines with an extension of 480 km, with a total fleet of 474 buses and 6 electric cars. Besides this, there is a total of 1 283 other lines (municipal, inter-municipal and inter-regional), registered by 34 companies. The total extension of the network is of 35 808 km and 72 018 stops. Porto Metro serves, beyond Porto Municipality, other 6 surrounding Municipalities, with a total of 81 stations. Per year the metro is used by 56 923 million passengers that reside mostly in Porto (27.1%) (MobilidadePT, 2015).

Campanhã parish has a good external accessibility conjugated with a weak internal structure due to deficiencies in the complementary road network in the interface between structural urban axis and urban network market with a severe discontinuity due to natural barriers (topography) and infrastructural (railways/motorways). In this area, there are strong interventions being implemented to improve the connectivity of the territory, but there are still missing important links. Figure 100 it's possible to observe the interventions already implemented and the ones to be implemented (MobilidadePT, 2015).



Figure 100. Plan for the interventions in the road network in the PDM 2006 – already built infrastructure in continuous yellow and infrastructure to be implemented in dashed yellow. Source: CMP

Statistical data from the eastern area of Porto City reflect a distinct pattern from the rest of the city. The total of commuting movements (house - work/school) is very significant, based on the 2011 Census. There is a high dependency for the motorized individual transport, as walking or biking is generally compromised due to lack of favourable urban design. The duration of the movements is above the average for the city ( 4) (MobilidadePT, 2015).

Parish	Total number of movements	Motorized individual transport	Public Transport	Walking/ Cycling	Duration of movements (minutes)
	2011 (INE)				
Campanhã	15 224	41%	37%	20%	23.03
Bonfim	11 870	42%	26%	31%	20.41
(All) Porto	123 273	52%	25%	22%	20.25

Table 4. Mobility of the resident population. Source: INE, 2012a

### 4.2.3 Economic description

The Metropolitan Area of Porto (AMP), where Porto is inserted, represented, in 2015, almost 16% of the National GDP (GDP at current prices). Between 2007 and 2012, the wealth created by the AMP decreased (almost -5%), but from 2012 to 2015 (provisional data), there has been a reversal of the trend, with an increase of 7.9%.

The investment capacity of companies in 2015 was lower than in 2008, both at national and regional level. From 2008 to 2012 there was a sharp drop in the companies in the North (-51%) and in the Porto Metropolitan Area (-54%), following the national trend. Since 2012, there has been a greater dynamism of the regional economy and metropolitan area, supported in part by the acceleration of gross fixed capital (+ 32% in the North Region, and + 35% in the MPA). In 2015, the Metropolitan Area of Porto concentrated 15% of the productive investments of the companies, while the economic fabric of the Metropolitan Area of Lisbon managed to generate 45% of the value of national fixed capital gross formation. This corporate dynamism is also reflected in the number of incorporated companies, which increased progressively from 2009 to 2016 (except for 2012) at the regional level and metropolitan areas. In 2016, the municipality of Porto concentrated 28% of the AMP incorporated companies and was the second county in the country with the largest number of constitutions (5% of the total), following the municipality of Lisbon (16%). Despite this, the number of dissolutions increased from 2009 to 2016 in the municipality of Porto, as in AMP and North Region. The economic fabric of the council demonstrates a degree of resilience towards the effects of the crisis, reflected by a progressive increased survival rate of enterprises (an indicator that measures the proportion of firms that survived two years after being created). Thus, Porto went from a survival rate from 50% in 2 000 to 58% in 2015 (more than half of the companies survive beyond the two years of existence), while the country went from 49% to 61%.

The evolution of gross added value, which translates in the wealth generated in production, discounting the value of the goods and services consumed to obtain it, such as raw materials, demonstrates the effects of the economic crisis. In the period between 2007 and 2012, the value of the gross added value generated in the municipality of Porto registered a sharp drop (-21%), above national (-18%) and regional (-14% in the North Region and -18% in the Metropolitan Area). Since 2012, wealth creation has increased and in 2015 Porto was the county with the largest capacity to generate wealth in the Metropolitan Area representing 23% of the total value of the gross added value generated.

At the national level, Porto was the third municipality of the country with the greatest wealth created, exceeded by the municipality of Lisbon and Oeiras.

Between 2007 and 2015, the value of exports of goods at national and regional level have been positive, with a fall in 2009 as a consequence of the effects of economic and financial crisis. From that year onwards, there was a growth of exports (above 50%). Although there was a positive variation of its exports between 2007 and 2015, the exports of the municipality of Porto present a distinct behaviour. By 2012, exports generated by the economic base of Porto increased by 123%, but from 2013 to 2015 exports decreased. In 2015, Porto only generated 2% of national exports and 10% of the Metropolitan Area, behind the municipalities of Maia (14%), Vila Nova de Gaia (14%) and Santa Maria da Feira (13%).

#### 4.2.3.1 Income and poverty

##### Average family income

Between 2011 and 2015, the average monthly income increased for Porto (3%) and the country (1.2%), with values registered in 2015 of 1 318.3 € and 1 096.7€, respectively. The same numbers vary greatly between each parish in Porto, with Campanhã parish showing an average yearly income of 8 008 €/year per resident, for a total number of 9 907 residents that declared their earnings (Fig.1).

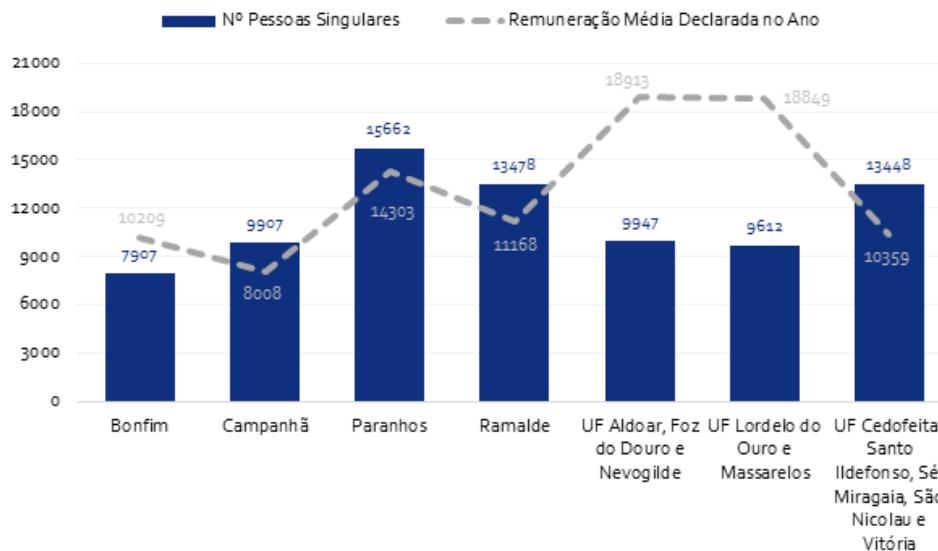


Figure 101. Singular people with declared income, per parish/union of parishes and average income per year, Porto, 2017 (in number and euros; Source: Sistema de Estatísticas da Segurança Social (SESS/GR))

##### Ownership of durable assets

In 2017, the number of new family housing renting contracts was of 3 177 in Porto, of which 8.15% corresponded to Campanhã parish. As for social municipal housing, which will be discussed in more detail further ahead in this report, in 2018 the average number of neighbourhoods and available housing was 26.53 and 29.03 respectively (the highest values registered when compared with other parishes in Porto) (Figure 102) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).



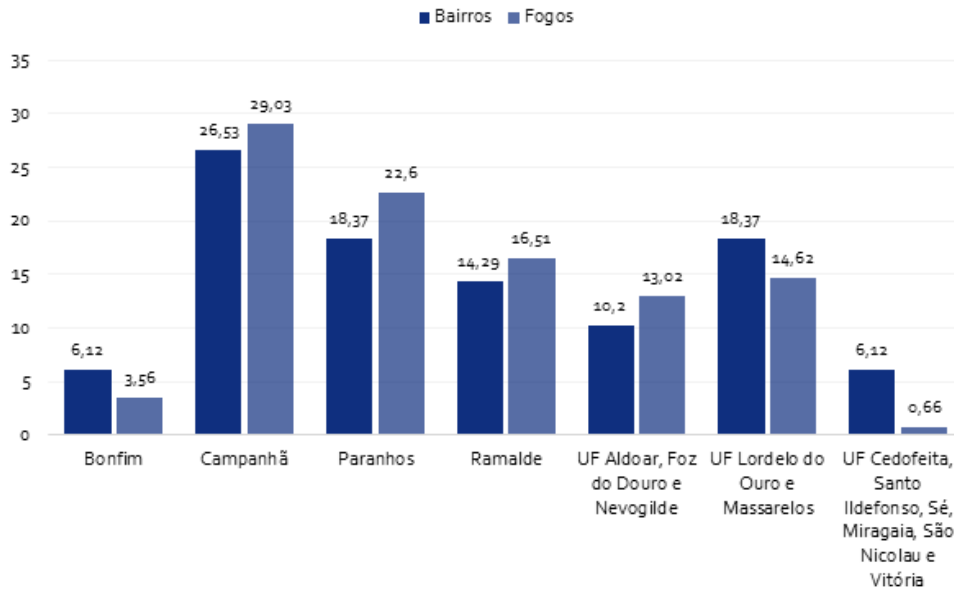


Figure 102. Neighbourhoods (dark blue) and available social housing (light blue), per parish/union of parishes, Porto, 2018 in percentage. Source: Domus Social

The average sale per square meter of family housing in apartments, in Campanhã parish, was of 963€/m<sup>2</sup>, one of the lowest values when compared to the results obtained for the remaining parishes of Porto City (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

### Poverty (index, rate, percentual)

In Portugal, during 2015, the at-risk-of-poverty threshold was 5 269€, a living situation of at least 16.16% (809 422) of national families were living in poverty and 32.24% (614 701) were living in risk of poverty (earning between 5 000€ and 10 000 €). As for the families in Porto, for 2015, the declared gross income for different categories, the most common one was from 5 000 € to less than 10 000 €, accounting for 28.14% of the sample (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

In 2011, a total of 35 203 children and youngsters (underage) were living in Porto City and in 2017 this total reached 36 744 and, having as indirect indicator of income the residency in social housing, it is possible to note that in 2018 of the 28 972 residents in social housing, 13.97 % (4 037) were children and youngsters until 18 years old. This means that around 115 of the children and youngsters that lived in Porto were living in municipal housing, an indirect indicator of poverty. Of these, mono-parental families in social housing were, in 2018, 25.54% of the total number of families. Of these, 91.19% where children living with their mothers (CMP, 2018d).

The Insertion Social Earning (*Rendimento Social de Inserção - RSI*) is a support directed at protecting people from families facing extreme poverty, to promote a better social and professional integration. Globally, in Porto, there were (in 2017) 18 695 beneficiaries of this support, earning a monthly total of 117.85 €. After an increase until 2010, the number of people dependent on this support decreased until 2015 and stabilized until 2017, with the most common age group receiving such support being under 25 years old. As for the number of residents per parish benefitting from this support, it is possible to note that Campanhã parish was the one presenting much higher and increasing values for 2015 (4 810), 2016 (4 946) and 2017 (4 977), when compared with the other parishes in Porto (Figure 103) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

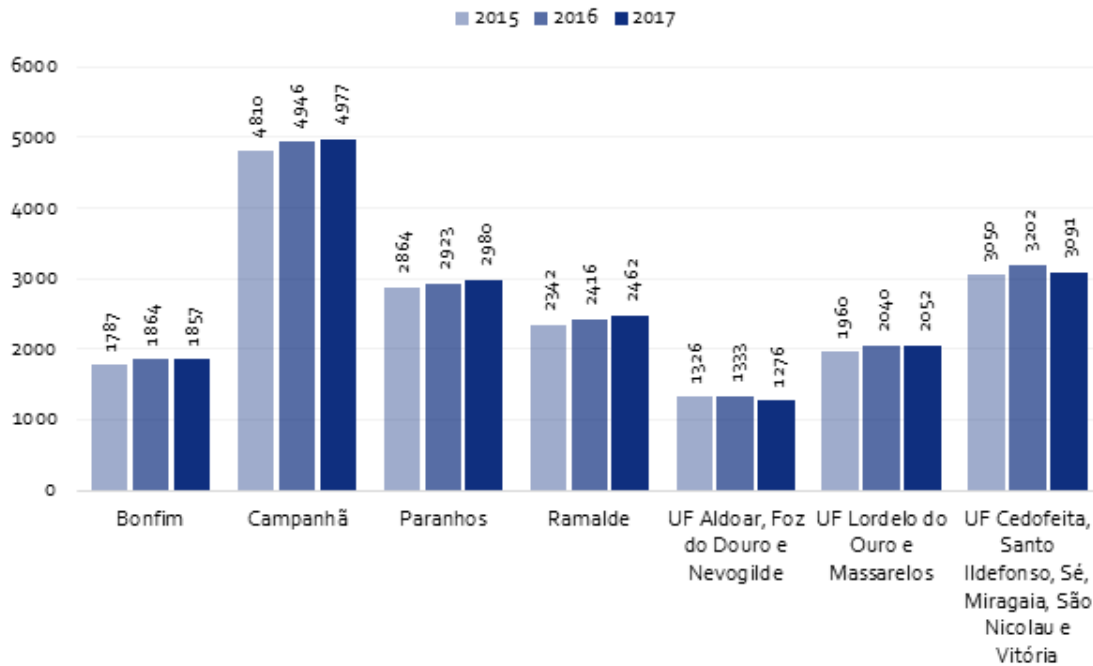


Figure 103. Recipients of the RSI, per parishes/union of parishes, Porto, 2015-2017 in number. Source: Sistema de Estatísticas da Segurança Social (SESS/RSI)

As for the variation on the number of beneficiaries of the RSI support, per sex and between 2015-2017, it's possible to note that for Campanhã parish the number of men was superior (3.7%) when compared to the women (3.27%), for a total variation of 3.47%. As for the value provided, for Campanhã parish in 2017, the number reached 112.23 € for an average of 26.47% beneficiaries, the highest value registered for Porto parishes that year (Figure 104) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

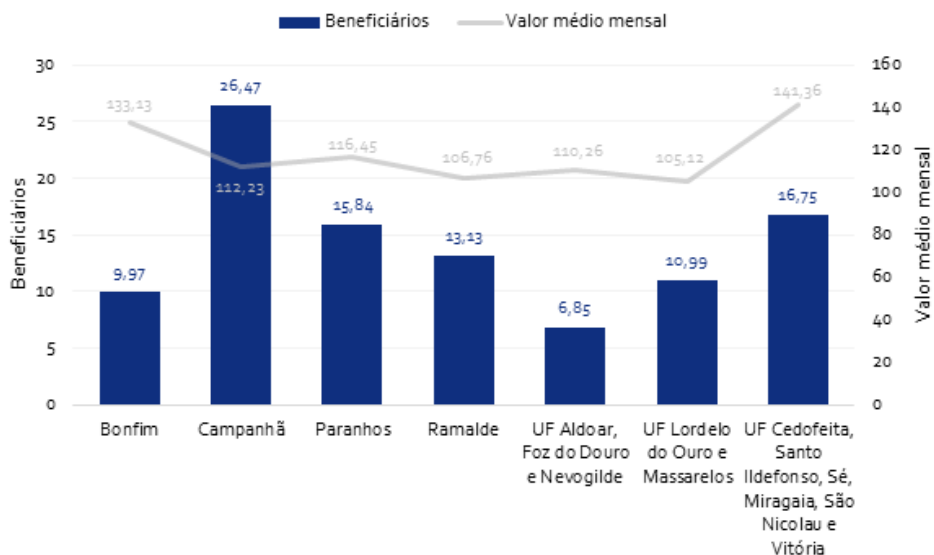


Figure 104. Recipients of the RSI, per average monthly value and per parish/union of parishes, Porto, 2017 in percentage. Source: Sistema de Estatísticas da Segurança Social (SESS/RSI)

This represents an increase from the initial registered values for both 2015 and 2016 – 90.14€ and 109.03€, respectively. Such numbers reflect an increased need for this kind of support, suggesting an increase in poverty for Campanhã (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

#### 4.2.3.2 Employment

The analysis of the qualifications of human capital, in the municipality of Porto, reveals an increase of higher education skilled employees (between 2007 and 2015, the increase was 31%), following the regional and national trend (up 33% in AMP and 30% in Portugal). By 2015, one-third of the Porto City staff had higher education, which represented 37% of the Metropolitan Area total and 7% of the national value (the municipality of Lisbon represent 24% of the staff employed with higher education in the country). The municipality of Porto had about 12 thousand establishments created after 2006 and until 2015, representing 50 thousand employees. Nevertheless, it should be noted that the Bonfim and Campanhã parishes show a more unfavourable situation in the urban context under analysis. At the parish level, establishments that started operations after 2006 were distributed in the following manner: the parish that presents the greatest representation is the Union of Parishes of Cedofeita, Santo Ildefonso, Sé, Miragaia, São Nicolau and Vitória, with 32% of the total verified to the city, followed by the Union of Parishes of Lordelo do Ouro and Massarelos, representing 15% of total. The least representative parish is Campanhã, which registers 5% of the total number of establishments (CMP, 2018a).

#### Activity and Employment rate

The municipality of Porto, despite a decrease in the number of staff employed between 2007 and 2015 (-9%) represented, in 2015, 22% of the Metropolitan Area staff and 4% of the national value. Based on the 2011 census, the activity rate per parish is between 41% and 47%, with the Campanhã parish showing a value of 41.3% (Figure 105) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

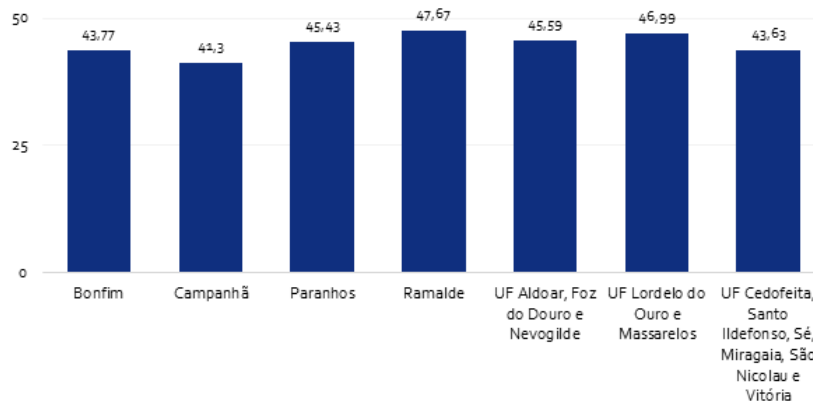


Figure 105. Activity rate per parishes/ union of parishes, Porto, 2011, in percentage. Source: INE

In 2014, the number of people employed was higher in the centre of the city (43 695, 39.3%), while in Campanhã, the total number of employed people was of 8 022 (6.6%). As for the number of people employed, according to the level of educations, it's possible to note that 36.93% (31 505) had an education degree equal or superior the 3<sup>rd</sup> cycle, that is, below the compulsory education level. For both the secondary (28.41%, 24 233) and superior education level (34.50%, 29 435) these were the two levels showing the highest number of employed people (62.91%) (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

### Employment rate per economic and no-profit sector rate

In 2011, the number of workers in Porto city was of 118 440. Primary sector (323); Secondary sector (23 741); Economic services (78 399); Social services (79 630). To these, almost 64 000 are added as public workers, with a total of 182 093. As in most urban contexts, it is in the city centre where a higher concentration of jobs can be found in Porto. In 2014, the central Parish represented almost 40% of jobs. For Campanhã, this percentage was very different (7.2 %), representing a total of 8 022 jobs (CMP, 2018d).

### Employees in the agriculture, social, services, industrial sectors

Between 2008 and 2015, one of the periods that includes some of the worst years for the Portuguese Economy of the last decades, the evolution in Porto employment by activity sector was unequal, with the increase in some and decrease in others. Among the most dynamic fields of expertise was the information and communication, consulting and technical activities, transportation and storage and energy. The primary sector, connected to agriculture, presented a significant evolution in recent years, maybe as a consequence of the growing developments in this sector that resulted in the creation of farming companies in urban contexts, showing an increase of employed people from 27 in 2008 to 1 222 in 2015. Figure 106 shows the number of employed populations in agriculture, livestock, hunting and forestry in terms of percentage and number, respectively, for Porto Municipality and Campanhã Parish (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

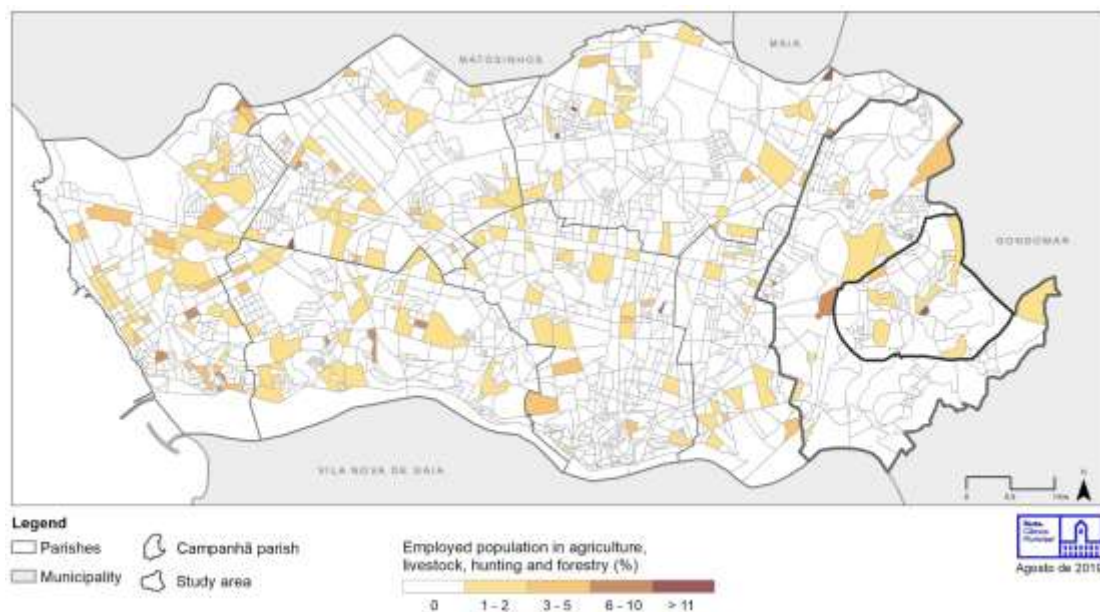


Figure 106. Employed population in agriculture, livestock, hunting and forestry, in percentage. Source: INE

In the opposite, construction, commerce and transforming industries arise as the fields most severely damaged by the crisis.

As for the people working in services, Figure 107 shows the number of employed population in services in terms of percentage and number, respectively, for Porto Municipality and Campanhã parish.

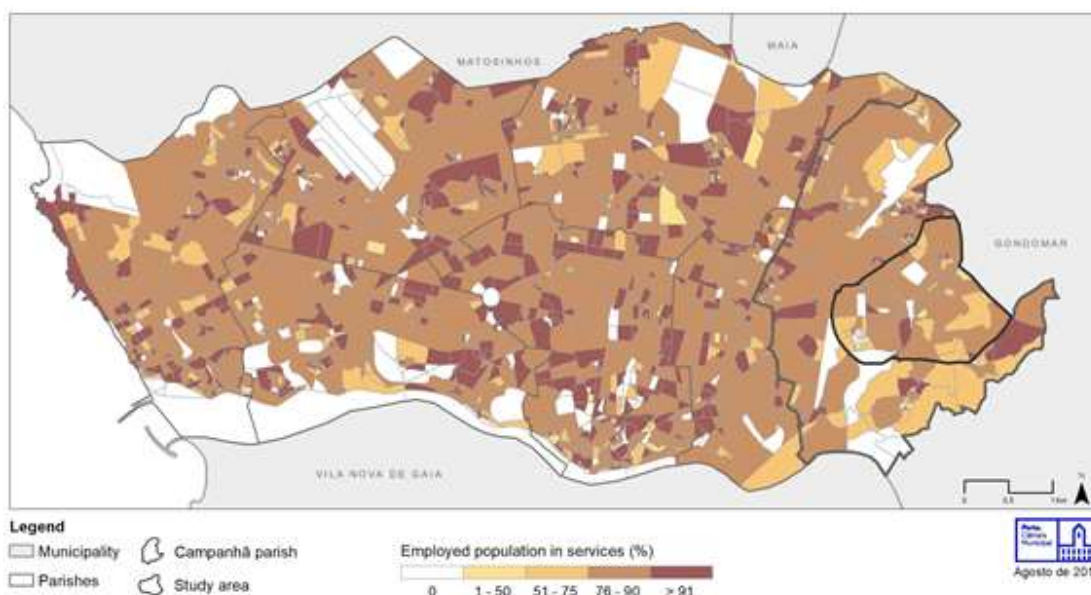


Figure 107. Employed population in services, in percentage. Source: INE

As for the people working in the industry, Figure 108 shows the number of employed population in the industry in terms of percentage and number, respectively, for Porto Municipality and Campanhã parish.

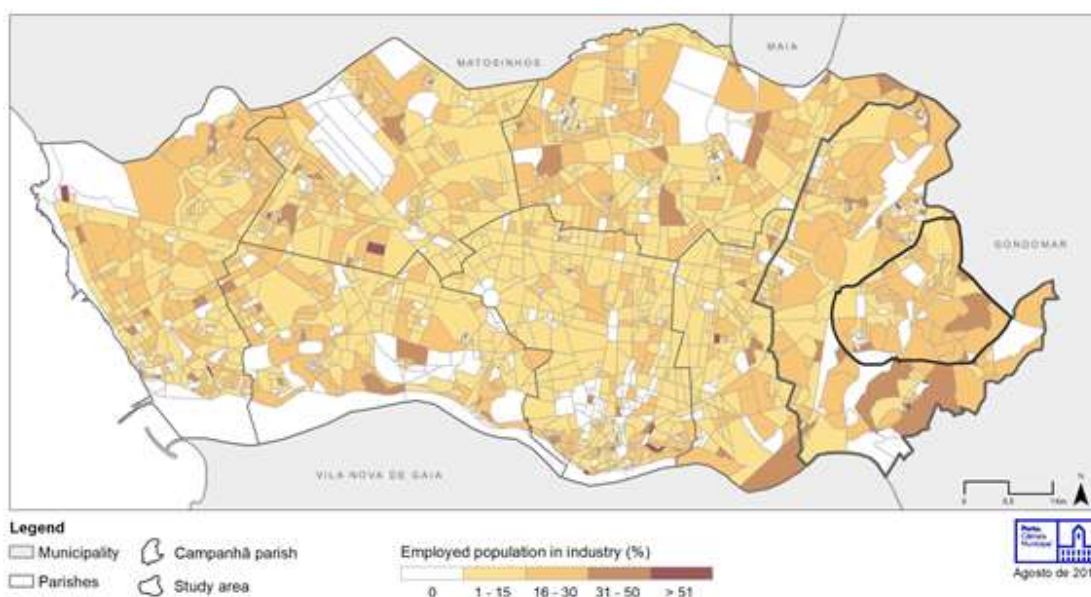


Figure 108. Employed population in industry, in percentage. Source: INE

### Unemployment rate per economic and no-profit sector

In 2018, in Porto, the total of unemployed people was 14 278, of which 6 782 (47.20%) were men and 7 496 (52.50%) were women. Among these, the most common age group of unemployed people was between 34 and 54 years old (45.43%). As for the unemployed people, according to the education level, it's possible to note that 60.47% of registered unemployed people (8 634) didn't had compulsory education (secondary degree). In fact, 4.96% (708) has an education inferior to the 1st cycle, 20.04% (2 862) had the 1st cycle, 17.27% (1 466) had the 2nd cycle and 18.20% (2 598) had the 3rd cycle. The group of unemployed with a complete secondary cycle was 23.08% (3 295) and the ones with



higher education represented 16.45% (2 349) of the total unemployed people in Porto. In Porto, the number of unemployment allowances recipients, in 2016, was of 10 538, of which 49.42% (5 208) were men and 50.58% (5 330) were women. In Campanhã, the number of unemployment benefits was 1 708, 1 525 and 1 299 for 2015, 2016 and 2017, respectively. As for unemployment allowance, in Campanhã in 2017, there was a total of 1001 unemployment allowances provided with an average value of 3 015 €/year. In 2016, 61.78% (6 511) of unemployment allowance recipients were equal or below 40 years old, and 24.86% were 55 years old or above. For the age groups between 30 and 39 and equal or below 29, the values were 24.15% (2 545) and 14.06% (1 482), respectively (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

#### **Short-term contracts rate**

As for the types of contracts, the majority of workers (72.54%) had a permanent contract in 2002, a number that slightly decreased to 71.6% in 2013. As for the temporary contracts a slight increase was observed between 2002 and 2013, from 2.81% to 3.28%, respectively (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

#### **4.2.3.3 Innovation**

All domains of smart specialization identified in the North 2020 strategic document are present in the territory of the city of Porto. These correspond to more than one third of the companies headquartered (37.8%) and / or with establishment (38.7%) in the municipality of Porto. They represent 41.3% of employment and the volume of sales corresponds to 31.7% of the total for the Municipality. By themselves, the fields of intelligent expertise are responsible for a significant parcel of the total value of exports originating in the city of Porto (43.8%) and almost half of the wealth produced in the municipality (47.81%).

However, not all eight domains of smart specialization defined by the strategy have the same contribution. There are three areas of smart specialization that constitute the group with the greatest weight in most indicators. These domains are:

- The field of Life Sciences and Health, which accounts for 19.4% of company headquarters and 19.1% of establishments integrated in RIS3 and located in Porto, generating a share of 36.3% of employment in RIS3 activities in the municipality and contributing 42.7% of the sales volume, 9.7% of the volume of exports and 40.5% of the gross added value produced by the total RIS3 activities located in Porto;
- The domain of Symbolic Capital, Technologies and Tourism Services, which totals 30.3% of the head offices of companies and 29.2% of the establishments integrated in RIS3 and located in Porto, generating 23.5% share of employment in the RIS3 activities of the county and contributing 21% of the volume of sales, 26.8% of the volume of exports and 17.6% of gross added value produced by the total RIS3 activities located in Porto;
- The field of Human Capital and Specialized Services, which totals 35.6% of the companies and 34.7% of the establishments within RIS3 located in Porto, generating a 23.3% of employment in the RIS3 activities of the county and contributing 17.3% of the volume of sales, 24.3% of the volume of exports and 23.9% of gross added value produced by the total RIS3 activities located in Porto.

These are followed by a group of three more domains, whose weight in all activities framed in RIS3 located in Porto is significant in some of the analysed indicators:

- The field of Culture, Creation and Fashion which totals 9.9% of the headquarters of companies and 13.7% of establishments located in Porto, generating a 12.5% share of employment in the RIS3 activities of the municipality and contributed with 10.8% of the volume of sales, 11.3% of the volume of exports and 9.3% of GVA produced by the total RIS3 activities located in this city;
- The field of Advanced Production Systems, which accounts for 6.6% of company headquarters and 6.5% of the establishments integrated in RIS3 located in Porto, generating a slice of 9.5% of RIS3 activities in the municipality and contributing 9.9% of the sales volume, 17.2% of the volume of exports and 11.1% of GVA produced by the total RIS3 activities located in the city;
- The field of Agro-environmental Systems and Food, which accounts for 4.5% of the headquarters of companies and 4.4% of the establishments integrated in RIS3 located in Porto, generating a share of 3.9% of employment in RIS3 activities of the municipality and contributed with 4.4% of sales volume, 23.7% of volume of exports and 8.3% of GVA produced by the total RIS3 activities located in the city.

Finally, there is a group composed of two domains whose weight in the totality of the RIS3 activities located in Porto are very residual:

- The area of the Resources of the Sea and Economy, which totals 1.9% of the headquarters of companies and 1.9% of the establishments located in Porto, generating a share of 1.4% of employment in RIS3 activities of the municipality and contributing 1.9% of the sales volume, 0.7% of the volume of exports and 0.8% of the GVA produced by the total RIS3 activities located in the city of Porto;
- The field of the Mobility and Environment Industries, which accounts for 0.6% of the 0.6% of the establishments integrated in RIS3 located in Porto, generating a share of 0.8% of employment in RIS3 activities in the municipality and contributing 1% of sales volume, 0.6% of volume of exports and 0.5% of GVA produced by the total RIS3 activities located in the city of Porto (CMP, 2018a).

### **Innovation (i.e. patents)**

In 2018, Portugal submitted a record number of patents of 220 European requests, of which 17 from the University of Porto, mainly in the areas of transportation technology, chemistry and pharmaceutical products (EPO, 2018).

### **Research and development**

The University of Porto integrates 51 Research units (including 9 Associated Laboratories), with the majority classified as “Excellent” or “Very Good” in the international scientific evaluation provided by the Fundação Ciência e Tecnologia (FCT). Approximately 23% of the Portuguese research articles published in top peer review magazines come from Porto University (*Plano de Desenvolvimento Social do Porto - 2019-2021*, 2019).

#### **4.2.3.4 Activity sectors**

In terms of activities, considering the number of establishments, total employment and volume of business, the following main percentages were obtained for the Municipality of Porto (Table 5):

- Establishments: retail and restaurants (22.5%), services (15.4%), and business services (11.4%);
- Employment: collective services (31.6%), retail and restaurants (15%) and construction and engineering (10.6%) and business services (10%);

- Business volume: wholesale trade (20.6%), infrastructure services (17.2%), construction and engineering (11.5%), retail and restaurants (11.2%) and the collective services (10.3%) (CMP, 2018a).

Type of activities	N° of Establishments	% of Establishments	N° of Employees	% of Employees	Business Volume	% of Business Volume
Wholesale trade	2 439	8.6	8 718	6.1	2 293 222 404 €	20.6
Infrastructure Services	108	0.4	1 393	1	1 916 375 820 €	17.2
Engineering and Construction	1 943	6.8	15 252	10.6	1 280 826 406 €	11.5
Retail and restaurants	6 374	22.5	21 486	15	1 247 947 017 €	11.2
Collective services	4 365	15.4	45 296	31.6	1 146 564 782 €	10.3
Commerce and auto repair	623	2.2	3 415	2.4	610 961 081 €	5.5
Company services	3 249	11.4	14 326	10	469 703 788 €	4.2
Tourism	792	2.8	3 456	2.4	342 499 988 €	3.1
Technology, Information and Communication, Industry and services	690	2.4	5 263	3.7	303 387 520 €	2.7
Transportation and logistics	572	2	3 403	2.4	239 025 603 €	2.1
Real-estate activities	2 343	8.3	2 724	1.9	238 860 101 €	2.1
Agriculture/Agrofood and fish/conserves	491	1.7	2 311	1.6	213 510 238 €	1.9
Creative industries	828	2.9	3 040	2.1	212 284 048 €	1.9
Foundry, steel and metallurgy	20	0.1	92	0.1	150 077 445 €	1.3
Sports and Leisure Activities	577	2	2 221	1.5	120 153 026 €	1.1
Textile, clothes and shoemaking	269	0.9	2 354	1.6	54 064 430 e	0.5
Financial services	393	1.4	1 731	1.2	39 512 411 €	0.4
Personal services	897	3.2	1 580	1.1	27 636 039 €	0.2
Others	1 407	5	5 265	3.7	232 558 542 €	2.1
TOTAL	28 380	100	143 316	100	11 139 170 702 €	100

Table 5. Economic activities, number of establishments, total employment and volume of business,

If we analyse the economic fabric present in the municipality of Porto in terms of its exportation capacity in 2015, we can highlight:

- Wholesale trade, which accounts for 33% of Porto's exportations;
- Trade in products linked to the so-called traditional industry, such as agri-food industry and wine (which generates 20% of exportations of this activity) and the textile, clothing, footwear, fur and leather (10%);
- Followed by activities related to Agriculture, Agri-food, Fisheries and Preserves, with 13% of the county's exportations, and Tourism with 12%.

It is important to highlight the importance of tourism as a driving force for the internationalization of the municipality and, consequently, its economic dynamism.

In the economic base of the municipality of Porto, in 2015, 28 380 establishments were registered which were associated with about 144 thousand employees. Of the total, both establishments and employees, the highest percentage weight (48%) refers to establishments that started their activity before 2006, with 58% of employees. The importance of Porto's economic fabric in recent years is expressed in its strong representativeness, with 41% of companies and 34% of employment. The crisis that affected the economic base of the city of Porto is expressed in the number of companies in insolvency, dissolution or inactivity, which is reflected in 10% of establishments and 7% of employment.

In terms of commercial activity, in recent years, the economic and financial crisis has had great impacts, reflected, for example, in the large number of commercial empty / abandoned or in danger of closure establishments. On the other hand, the new tourism dynamics had consequences in this sector, creating new opportunities, but also some threats. At the same time, the popularization of the so-called alternative activities, trade oriented to tourism, the location of multinational stores in city centres (in the 'street' context), and the modernization of some spaces with a strong identity as the old markets, have been generating a wave of recovery in the sector, strengthening and innovating or (re) creating centralities, which cannot be neglected, even by their potential for contagion and animation with more traditional ones. In terms of services and logistic activities, it should be noted that in metropolises and areas, the sector has a strong presence in terms of employment, and attractiveness (movements). These centralities, with a strong urban presence (movements) and decisive for the smooth functioning of the economy and the urban mobility, should therefore be worked out in analytical and strategic terms.

### **Tourism characterization**

By 2015 the capacity of accommodation in hotel establishments reached 15 thousand individuals with an annual average increase of 6.2% over 10 years. The number of guests was almost 1.5 million, with an average increase of 10.8% over the same period (2006 - 2015), while the number of guests reached almost 2.9 million, with an annual average increase of 12.1%. The most significant increase, however, was registered in the number of hotels, reaching, in 2015, the 71 with an increase of more than 150%. The transition from 28 hotels to 71, between 2006 and 2015, is an important quantitative increase. According to the National Register of Tourist Enterprises, in April 2017, there were 87 units in the various types of tourism enterprises, with a capacity of accommodation of 11 801 (in 2015 there were 11 437 places). This, together with the projects that obtained a favourable opinion from Turismo de Portugal, constitute strong evidence of the continued growth of the tourist properties in Porto, justifying the existence of regulatory mechanisms.

Since 2013, with a special focus between 2015 and 2016, there is a new phenomenon in the supply of accommodation in the municipality: the "local accommodation". A "local accommodation" offer of 12 292 users was recorded, a value that exceeds the offer of accommodation in tourism enterprises. The huge vitality, revealed as well as the growth rates, gave a great deal of visibility to this modality created in 2008. The territorial incidence is particularly relevant in the centre of Porto, concentrating the most significant number, even if it is possible to find "local accommodations" in several other areas of the municipality.

### **Restaurant and catering services / Café, bars and pubs**

Several other tourism-related activities (catering, trade and support services) have emerged, particularly after 2012, as can be seen in the trend of "constitution of legal persons and similar institutions of accommodation and catering". The settlement of the

centre by restaurants and, generally, by establishments of food and beverages, constituted one of the anchors of the process of revitalization in course.

On the catering sector specifically, a total of 8 000 people worked in Porto during 2014 in activities related to catering. Of these, restaurants represented 50% of the jobs in the sector, bars and cafes represented 34%, event catering 2% and “other activities”, mainly canteen and domiciliary meals, corresponded to 14%.

As for the distribution of employment in the catering sector, it is far more dispersed than the accommodation sector, even though the most central parishes account for 39% of employment. In Campanhã parish there were, in 2014, 285 restaurants, 142 beverages establishments (cafes and bars) and 15 establishments dedicated to “other activities” (e.g. canteens and domiciliary meals) (CMP, 2018d).

### Cultural and creative industries

Regarding Cultural and creative industries, it is estimated that in 2012 these activities represented, together, 1.7% of the gross value added and 1.9% of employment in Portugal. In Porto, it is possible to observe a great dynamism in recent years regarding cultural dynamics. The number of museum visits grew almost 46% between 2012 and 2015, reaching 2.4 million, 18% of the national results. Still far from the museum visitors of Lisbon (4 million visits), Porto has been growing at a faster pace than the capital (39%) and the country (35%). In Porto City there were, in 2015, 61 art galleries (from the 59 in 2012), corresponding to 6% of the galleries in Portugal. Regarding cinema, the majority of the offer is located in neighbouring municipalities, with Porto registering in 2015 less than 200 000 viewers (1.3% of the registered for the country), a decrease from the beginning of the decade - 300 000. As for the number of live shows, Porto followed the growing trend of the country. For Porto the “creative jobs” corresponded to 5 268, around 4.7% of the private employment in the city and 3.5% of total employment. Data from 2014 show that creative activities (in red, Figure 109) have the highest representability, followed by cultural industries (in blue) and nuclear cultural activities (in green) (CMP, 2018d).

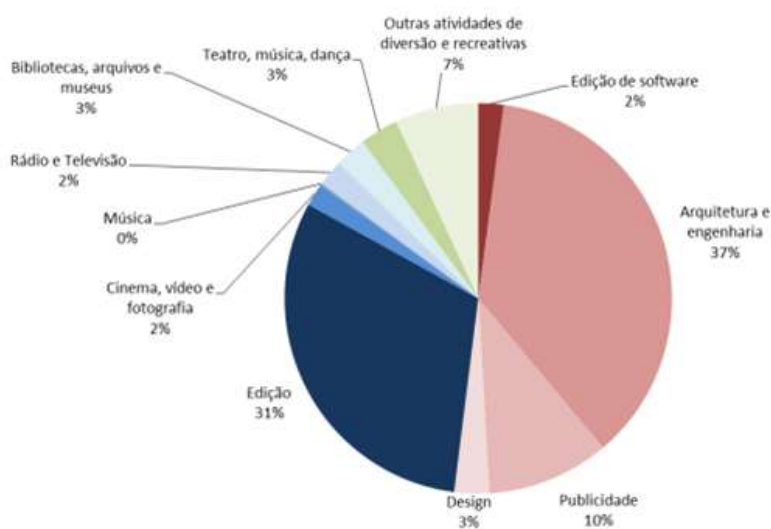


Figure 109. Employment in the creative and cultural activities by area of activity, in Porto (2014). Source: MTSSS (Quadros de Pessoal)

As for the number of people working in cultural and creative activities, by field activity per parish, it is possible to observe that for Campanhã parish the numbers registered in 2014 were: 211 in creative activities (114 in architecture; 89 in publicity; 8 in Design); 95 in



creative industries (51 in Edition; 31 in Cinema, Video and Photography; 9 in Radio, Television and Photography; 4 in Libraries, archives and museums); and 7 in nuclear cultural activities (3 in theatre, music and dance; 4 in other fun and creative activities) (CMP, 2018d).

#### 4.2.3.5 Facilities

##### Cultural facilities

At a macro level, the key actors and equipment have a driving role in affirming the city of Porto. The territorialisation of its cultural, creative, tourist and leisure activities have been changing markedly in recent years in the sense of diversification of supply and the emergence of key equipment that has had a significant impact on international affirmation of the city of Porto - as for example, *Centro Português de Fotografia*, *Casa da Música*, *Fundação de Serralves* and *Universidade do Porto*, among others. It matters to refer that their dynamics, their audiences, their projects, their resources, their mobilization capacities and their programming have been intensified by synergies and even a contagion with this playful dynamic that has been ravaging Porto. At a second stage, at the macro level, we must highlight the actors that develop a territorial anchorage intense from the regional point of view - Soares dos Reis Museum, Museum of Romantic, Planetarium, Rivoli Theatre, Campo Alegre Theatre, among others - where its activities, projects, lines of intervention, programs, organizational and functional dynamics have an important role in the creative, cultural and playful dynamism of the city (Figure 110). At a micro level, intensive and daily life, it is important to focus on the set of initiatives of consumptions and cultural, artistic and creative creation that cross the city ranging from bars, nightclubs, to restaurants and artist shops, and fashionable places that bring together all the informal and artistic creativity of the city. Thus, their agendas, projects, publics, consumptions, or temporalities, have been determinants for the emergence of a "new" city (CMP, 2018a).

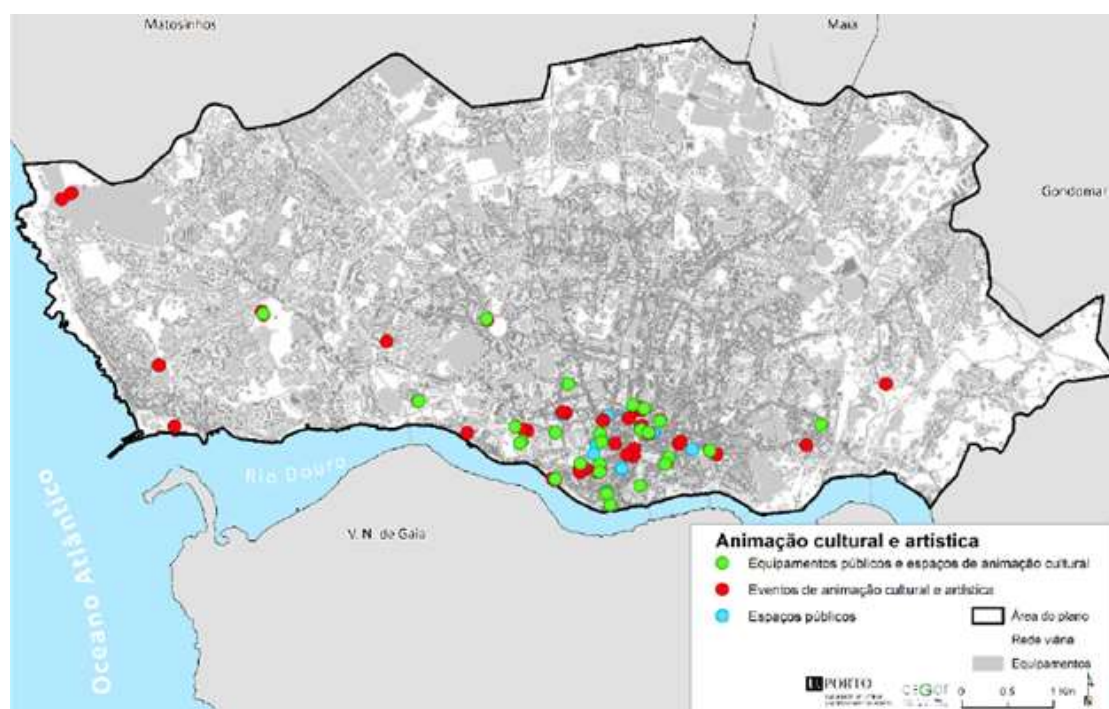


Figure 110. Equipment, events and public spaces in the cultural and creative sector, Porto, 2017. Green – public equipment and spaces for cultural animation; Red – Cultural and artistic animation events; Blue – Public spaces. Source: GEGOT.UP, CMP (2017)

Addressing supply and demand, but also cultural and artistic mediation, it is still a whole set of events that have marked the cultural, artistic and creative agenda of the city - and which go from the broad to the microscale - and contribute decisively to the plural affirmation of the city (examples are Serralves in Festa, Primavera Sound, D'Bandada, flea markets, Days of Dance, Almada in Festa). All these events / festivals show well their decisive role in several plans: in the programming and diffusion of culture and leisure; in modelling and sharing cultural tastes / fruition; in the articulation between experiences and aesthetic, recreational and friendly in its assumption as a factor of local development and logics of fruition associated with the well-being and quality of life (and its impacts, i.e. tourism), and local / global; and its centrality in the context of local development policies, as well as cultural policies and identity restoration.

In this cultural, playful and creative dynamism of the city have assumed important and renewed the city's public spaces as they are scenery and cultural, playful and creative sociability. There is thus a return to the streets manifested in Miguel Bombarda Streets at the time of the art galleries inaugurations, at night in the Galleries of Paris, Lions' Square and Leitao's Parade, to fairs and markets on the Promenade of Virtues and in Flores Street, among others (CMP, 2018a).

**Educational facilities, kindergartens, schools, higher education facilities (public and private)**

For the Porto Metropolitan Area, the total number of schools in 2017/2018 was 783 public and 413 privately owned, while for Porto City a total of 79 public schools and 116 private schools were registered.

In terms of schooling facilities, in Campanhã parish the number of schools is lower when compared with all other parishes in Porto, with a total of 18 schools (13 for 1<sup>st</sup> cycle, 2 for 2<sup>nd</sup> cycle, 2 for 3<sup>rd</sup> cycle and 1 for secondary schools) (Figure 111) (CMP, 2018d).

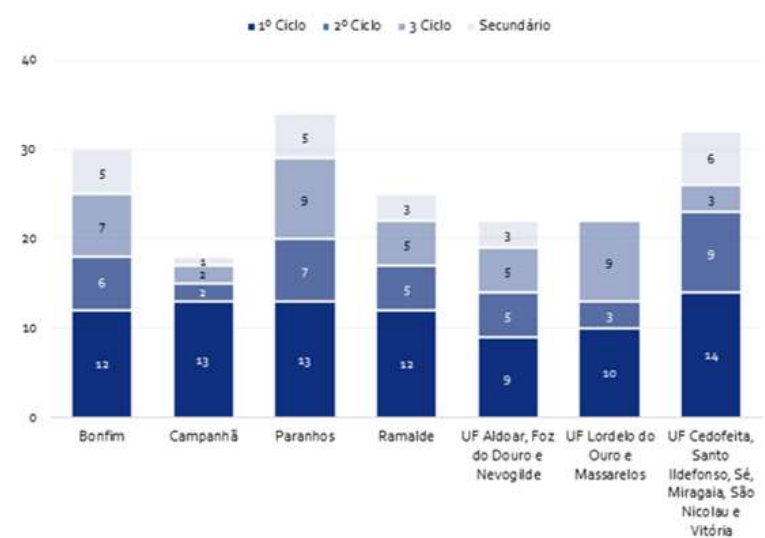


Figure 111. Schools per level of education and parishes/ union of parishes, Porto, 2015/2016. 1st cycle (darker blue) to secondary cycle (lighter blue) in number. Source: Infoescolas

The University of Porto is one of the biggest in the country with more than 30 000 students, distributed by 14 faculties and a business school, with almost 300 graduation courses, integrated master's degree, master's degrees and PhDs (CMP, 2018d).

## 4.2.4 Social housing

### 4.2.4.1 Portugal in Europe

Different theories explain the emergence and evolution of social housing systems and models in European countries, and many authors have been presenting proposals for its interpretation and comparison. An attempt to systematize such complexity may result in a simplistic vision, though enabling a general picture of the big differences or similarities between countries.

Given the “genetic proximity” between the housing policies and the social welfare regimes in each European state (Conceição, 2002), the social housing sector reveals a great heterogeneity (being symptomatic the absence of a common definition of the term “social housing” across states) in what concerns tenure, providers, beneficiaries and financing schemes.

The typology of approaches to social housing provision in the member states of the European Union being adopted by the CECODHAS European Social Housing Observatory is illustrated in Figure 112. This “classification” takes into account two axes of analysis: allocation criteria (distinguishing two models) and size of social rental housing sector (XS to L).

		TAMANHO			
MODELO	SUBMODELO	L (≥ 20%)	M (11 - 19%)	S (5 - 10%)	XS (0 - 4%)
CRITÉRIO DE ALOCAÇÃO	Universalista (Unitário)	HOLANDA DINAMARCA SUÉCIA			
		Generalista	ÁUSTRIA	REPÚBLICA CHECA FINLÂNDIA POLÓNIA	ITÁLIA
	Focalizado (Dualista)			FRANÇA	ALEMANHA BÉLGICA
		Residual	REINO UNIDO		ESTÓNIA IRLANDA MALTA

Fonte dos dados: CECODHAS Observatório da Habitação Social, 2007, 2012

Figure 112. Typology of approaches to social housing provision in the member states of the European Union adopted by CECODHAS. Source: adapted from Braga and Palvarini 2013, 13, Czischke and Pittini 2007, by Restivo 2014, 31

This “classification” enables to better understand that Portugal fits into the ‘targeted’ model, more precisely the ‘residual’ sub model, meaning we have an extra-small social housing sector, in which live the people most in need.

Regarding housing situation, tenure in particular, Portugal is much closer to the South European countries than to other Western countries in Europe, as shown in Figure 113.



Figure 113. Tenure split in the 27 EU member states as a percentage of the total housing stock. Adapted from Pittini and Laino 2011, by Restivo 2014, 33

Furthermore the 2011 national census shows that there were close to 133 000 dwellings lacking, while close to 735 000 were empty (INE, 2012), which leads to the conclusion that dwellings are not balanced enough nor equally distributed.

More recently, the national Institute for Housing and Urban Rehabilitation (IHRU - *Instituto da Habitação e da Reabilitação Urbana*), following a previous auscultation and inquiry to the municipal councils in 2017, issued in February 2018 an unprecedented National Housing Needs Survey (IHRU, 2018). This study provides statistical data on the number of constructions with no adequate conditions and of families in need of rehousing, grounding some recent measures to tackle the most serious housing needs within the “New Generation of Housing Policies” (*Nova Geração de Políticas da Habitação*, NGPH). The NGPH was approved by the Government in May 2018<sup>20</sup> after a public consultation period, answering to the need for an integrated approach in sectoral policies, territory and actors, unveiling a changing in the traditional approaches to conceiving and implementing housing policies (Portuguese Ombudsman, 2018). Aiming at guaranteeing access to adequate housing for all and to develop the supported housing sector, namely by encouraging rehabilitation, the “New Generation of Housing Policies” foresees, as a middle-term goal, to increase the weight of housing with public support, opening up an opportunity to redefine the social housing model in Portugal in what concerns allocation criteria and size of social rental housing sector.

#### 4.2.4.2 Public housing in Porto

Within the national context, Porto is the municipality in which the weight of social housing is more representative (near 14.1% against 2.9% in Portugal)<sup>21</sup>. Most of these dwellings are city property, near half of which corresponding to the housing settlements built by the Plan of Improvements (1957-66) with very limited areas, as building conception had to be highly optimized. In the last two decades, these housing estates that had become very degraded have been refurbished by the municipality, the interventions being mainly directed to the building’s envelope and common circulation area. In some cases, the public

<sup>20</sup> Council of Ministers Resolution’s no. 50-A/2018, of May 2.

<sup>21</sup> Conventional dwellings of usual residence (%) from the national census. In what concerns social dwellings supply, 2011 Census (INE 2012) shows that 14.1% of total conventional dwellings then occupied as usual residence in Porto was of public property (2.4% central administration and 11.7% local administration), which represents a high percentage when considering that in Portugal only 2.9% of total housing was of public property (0.8% and 2.1% respectively).

space has also been improved. Currently, the neighbourhoods that were intervened firstly are being operated a “second” refurbishment, while a more systematic public space intervention is getting started.

Domus Social, EM manages around 12 600 dwellings in 560 housing buildings along 49 neighbourhoods of city property<sup>22</sup>, with approximately 28 250 inhabitants (near 12% of the population in Porto municipality in 2011, according to the national census). The location of the municipal housing neighbourhoods in the city is illustrated in Figure 114.

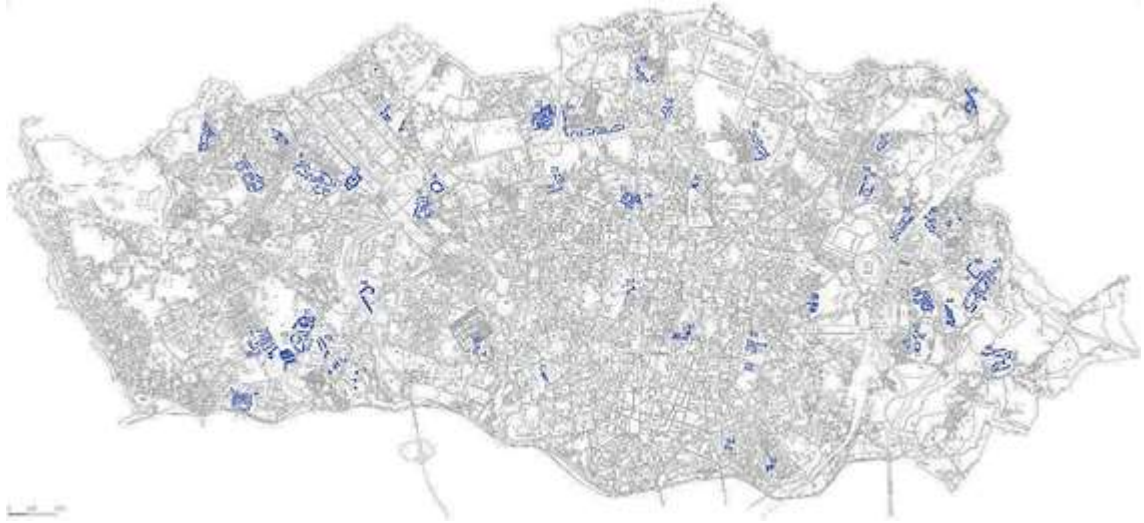


Figure 114. Public municipal housing neighbourhoods in Porto. Source: Domus Social database (11-2018)

Information on these neighbourhood’s state of conservation is gathered in a recent study (Simões *et al.*, 2015), providing housing buildings characterization and its physical condition diagnosis. Figure 115 shows the distribution of these neighbourhoods by the year of construction, unveiling a higher percentage of municipal buildings built from 1957 to 1966.

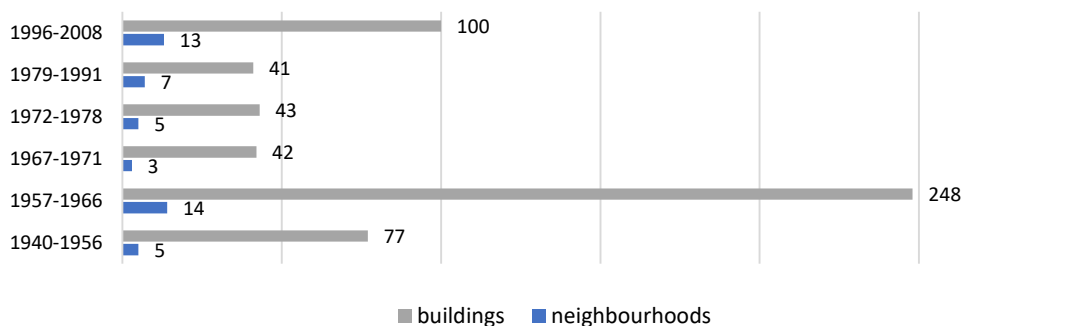


Figure 115. Municipal housing stock in Porto by construction date. Source: adapted from Simões et al., 2015

<sup>22</sup> Corresponding to 11.7% of the usual residence conventional dwellings in Porto in 2011 (INE 2012) indicated in the previous note.



Figure 116 shows the number of municipal neighbourhoods, dwellings and residents by civil parish, in Porto, revealing a higher number of municipal housing (dwellings and residents) in Campanhã parish.

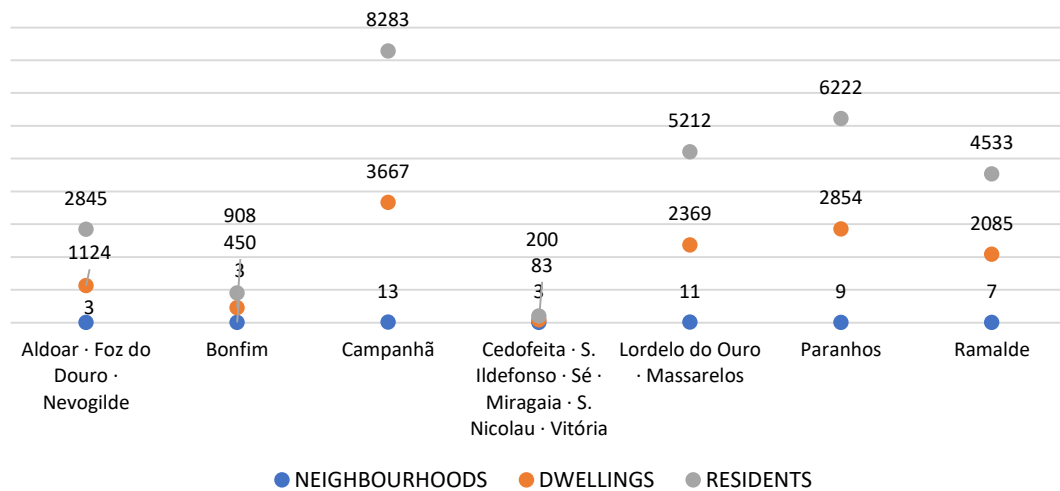


Figure 116. Public municipal housing in Porto: number of neighbourhoods, dwellings and residents by civil parish. Source: Domus Social (BI Domus, 01-03-2019)

In what concerns the resident population of the 49 municipal neighbourhoods in Porto, data on dwellings and residents is as follows in Figure 117:

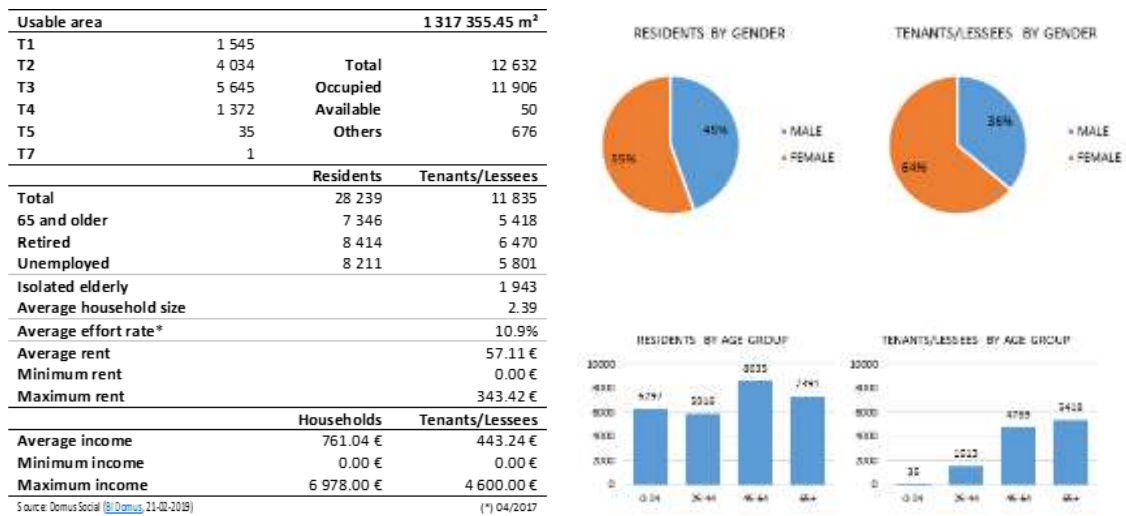


Figure 117. Characterization of the resident population of the 49 municipal neighbourhoods Source: Domus Social (BI Domus, 21-02-2019)

A municipal study from 2012 – *Bairros Municipais do Porto: Caracterização Socioeconómica* – based on the triennial registry of the concessionaires and households from 2010/2011 shows general indicators for a demographic and socioeconomic characterization of the population in Porto, focusing the population then living in municipal housing. There has not been an update of this diagnosis from 2012 as in the meanwhile the Business Intelligence system from Domus Social has been implemented: BI

Domus is operational since October 2015 and enables to extract current data (constantly updated).

## Campanhã

The city of Porto is divided into 7 civil parishes. Campanhã is the civil parish in Porto that has the greater number of municipal dwellings for social rental (near 3 700, meaning 29% of the municipal dwellings in the city). Along 13 neighbourhoods, these dwellings house near 30% of the residents in municipal housing in Porto.

In what concerns the resident population of the municipal neighbourhoods in Campanhã parish, data on dwellings and residents is as follows, in Figure 118:

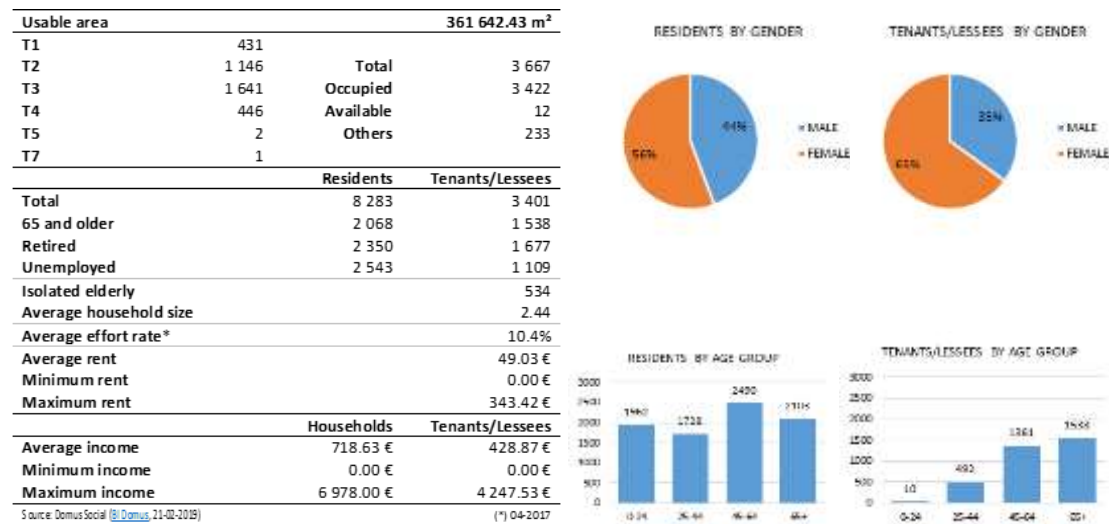


Figure 118. Public municipal housing stock in Campanhã civil parish, Porto: socioeconomic general indicators. Source: Domus Social (BI Domus, 28-02-2019)

As indicated previously, after a municipal study from 2012 *Bairros Municipais do Porto: Caracterização Socioeconómica* (based on the triennial registry of the concessionaires and households from 2010/2011), the Business Intelligence system from Domus Social – BI Domus, a constantly updated database – provides general indicators for a demographic and socioeconomic characterization of the population living in municipal housing, by civil parish.

## 4.3 The study area

### 4.3.1 Delimitation criteria



Figure 119. The study area and the social housing neighbourhoods. Source: CIBIO adapted from Google Earth (2019)

The outline of a study area (Figure 119) was developed by the Local Taskforce of Porto, according to the previously established commitment by the municipality of Porto to develop the project URBiNAT in this area (Grant agreement number 776783). The first criteria were to ensure the inclusion of Cerco, Falcão, Lagarteiro, and other social housing neighbourhoods nearby.

In order to answer strategic goals of connecting Campanhã to the city centre and contiguous municipalities, the study area should also include the main connections and entrances to those territories. This intention aims to suppress spatial fragmentation and overcome psychological distances.

Given the intention of implementing new healthy corridors, the study area includes the most relevant strategic green spaces (Oriental Park, Corujeira Plaza, Quinta da Bonjónia, municipal nursery), services (schools, industry, health centres, local associations) and also future projects that will soon take place in Campanhã, (Expansion of Oriental Park, New Matadouro, Monte da Bela). The design of the Healthy Corridor should articulate as many existing strategic areas as possible, in order to be inclusive, reach more users and suppress local fragmentation and disconnections.

URBiNAT focuses on the public space aiming for an inclusive urban regeneration. For this reason, it was also important to include important and strategic streets, such as Avenida Cidade de Lyon, Alameda de Cartes, São Roque da Lameira and Rua de Azevedo.

Once all criteria were defined, the study area boundary was finally adjusted to the sub-section statistical units (INE, 2012a) to allow a combined analysis between socio-economic and territorial data (Figure 120). The final version of the study area has a perimeter of 6.1Km and a total area of 2.1km<sup>2</sup>. The definition of the study area ensures the operability of Stage 2 activities, although they are not mandatory.



Figure 120. Statistical subsections units that compose the Study area. Source: CIBIO adapted from Google Earth (2019)

### 4.3.2 Territorial analysis

The subchapter dedicated to the territorial analysis includes studies conducted exclusively for the Study Area. Most of them include new data produced to feed directly the phase of Co-design of the Healthy Corridor. These analyses include the data produced according to the Territorial mapping protocols.

#### 4.3.2.1 Green structure mapping

The green structure mapping produced by Farinha Marques (2018) for the Revision of Porto's City Masterplan, maps all green spaces with more than 600 m<sup>2</sup>, and divides them according to 11 categories whose definitions fit Porto's characteristics in terms of green structure composition.



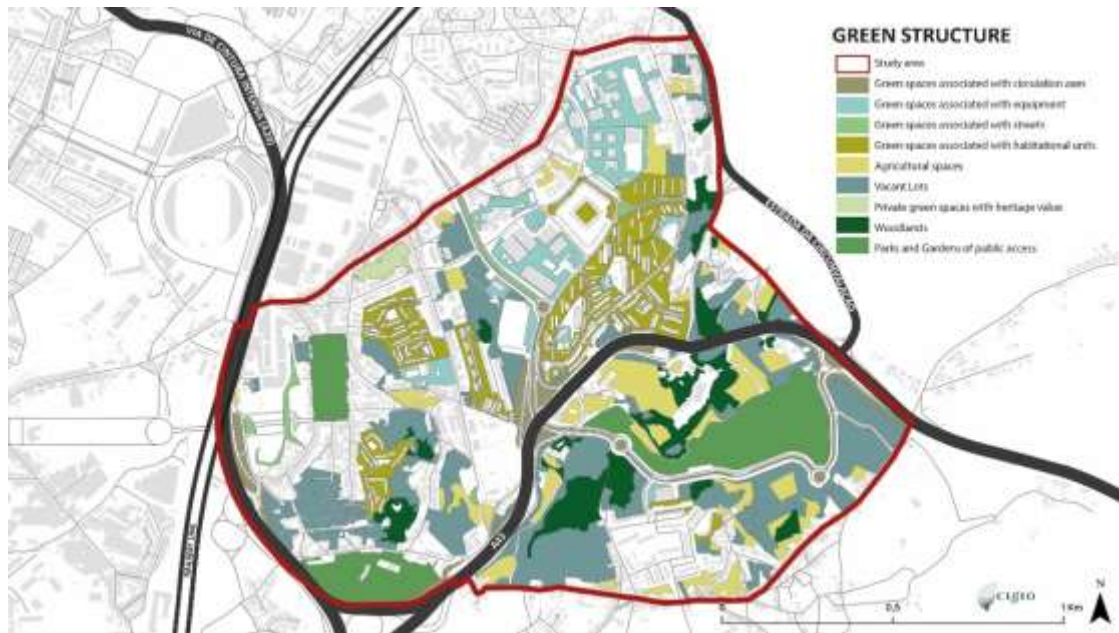
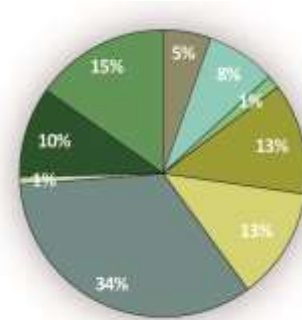


Figure 121. Green structure map. (Note: Minimum area mapped: 600 m<sup>2</sup>). Source: adapted from Farinha Marques et al., 2018a

Analysing the distribution of green spaces inside the study area (Figure 121), it is visible the relevance of permeable spaces, occupying 1 040 204m<sup>2</sup> (1.04 Km<sup>2</sup>), corresponding to 50.01% of the total study area. This value translates into, approximately, 82m<sup>2</sup> of green spaces per capita.



The most dominant category is Vacant Lots, with 33.81% dispersed along the urban mesh. In the study area, one of the most representative terrains of this category are the terrains of Monte da Bela neighbourhood, which are now empty spaces waiting for a new future. Other relevant expectant spaces are located between Cerco and Falcão neighbourhoods, and along the Tinto River (currently under intervention for the expansion of the Oriental Park).

The second most dominant category is Parks and Gardens of public access that correspond to 15.16% of the total green structure area. Some of the most relevant parks are Oriental Park (Figure 122), Corujeira Plaza (Figure 123) and Quinta da Bonj6ia (Figure 124).



Figure 122. Views of Oriental Park, in Campanh6. Source: CIBIO (2019)

The Oriental Park, designed by the Landscape Architect Sid6nio Pardal and inaugurated in 2010, has been expanded this year to 18 ha and soon will be the second largest park in



Porto. The next phase of the park is under construction, revamping vacant lots and abandoned agricultural areas. It develops along Tinto river and offers a wide possibility of paths and recreational areas. Gradually municipal events, namely “Domingos em forma”, are taking place in Oriental Park, whose characteristics, in terms of dimension, accessibilities and quality of the green spaces has proven its potential. The most recent event was UNITE with Tomorrowland, in June 2019, that gathered over 15 000 participants, in a first edition in Portugal<sup>23</sup>.



Figure 123. On the left: Recent view from Corujeira Square. Source: CIBIO (2019); On the right: View of Feira do Gado Source: GisaWeb

Corujeira Square is currently a central area in terms of local circulation and services. Its historical value is deeply related with Campanhã and its population, who still remember the times when the garden was the historical centre of the parish and held “Feira do Gado” and “Feira dos Moços”. Since its origin it was a meeting and gathering point, nowadays is a garden of proximity, used mainly as a crossing area between the surrounding neighbourhoods. The garden works as a distribution axe allowing the connection with the subway, the different neighbourhoods and the school. It also receives and distributes the traffic coming from Avenida 25 de Abril, one of the main entrances in Campanhã. The heart of the garden holds a civic centre, managed by a local association.



Figure 124. Views of Quinta da Bonjónia, in Campanhã. Source: CIBIO (2019)

Another important Park is Quinta da Bonjónia, a living example of the ancient rural properties that characterized Campanhã during the XVIII century. Nowadays this property is protected given its historical value but allows public access during the day. One of the most recent buildings inside Bonjónia is the Department of Social Cohesion of Porto’s Municipality.

<sup>23</sup> Parque da Cidade Oriental. (n.d.) *Câmara Municipal do Porto*. Retrieved November 20, 2019, from <http://www.cm-porto.pt/jardins-e-parques/parque-oriental-da-cidade>



Figure 125. Views of rural landscapes, in Campanhã. Source: CIBIO (2019)

The ancient rural landscape that once dominated Campanhã is still visible by the traces of agricultural areas that represent 13% of the green structure (Figure 125). Campanhã holds the largest agricultural areas in Porto, even though their gradual neglect or conversion for habitation purposes. Pego Negro, Azevedo and Tirares are the three most characteristic historical agglomeration. The remaining areas, such as Pego Negro, are deeply connected to Tinto River, but nowadays are surrounded by the transportation network that broke apart Campanhã's rural landscape. In Pego Negro and Tirares there are protected heritage like ancient bridges and watermills. Porto's municipality is devoted to preserve these historical rural areas, as described in ARU of Corujeira, a recently published strategic plan. Also inside the Study area is located the Municipal Plant Nursery (Figure 126) where plants for the public gardens of the entire city and streets are raised and taken care of.



Figure 126. Views of Municipal nursery, in Campanhã. Source: CIBIO (2019)

Even though it has a humble size, Horta da Oliveira plays an important role as an agricultural space and community garden, built in the heart of Campanhã, between Cerco and Falcão. The garden is owned by the Municipality but used by the citizens and students from Corujeira School throughout its 95 plots.



Figure 127. Views of Green spaces associated with housing units, in Campanhã. Source: CIBIO (2019)

Also occupying 13% of the green structure of the study area are the Green spaces associated with housing units (Figure 127). This value reflects the presence of several



housing neighbourhoods that compose the study area, such as Cerco, Ilhéu, Falcão, Lagarteiro, S. Vicente Paulo, Maceda and Monte da Bela. Most of these green spaces are under recovering works, as a strategy to value the parish itself.

Given the dominance of habitation units it was important to develop a mobility study composed by pedestrian network analysis and proximity analysis on the study area.

#### 4.3.2.2 Urban fragmentation analysis

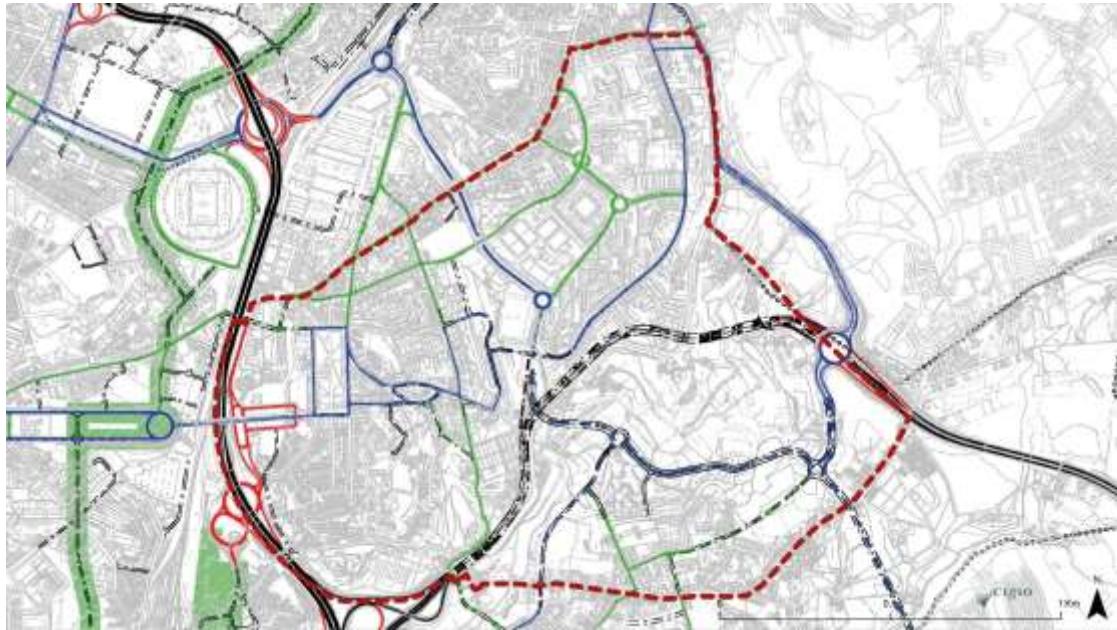


Figure 128. Circulation axes and hierarchy in the study area. Source: adapted from CMP (2018)

The territorial impact of the large circulation axes is obvious and influence territorial dynamics and local development. As visible in Figure 128, the railway line and Via de Cintura Interna (VCI) isolate the parish and the Study Area itself from the rest of the city. In the western part of the study area, it is visible the concentration of circulation axes that perform the transition from the highways to local circulation axes, represented by red lines. These transition axes together with the highway behave as physical barriers that isolate Campanhã parish. The study area is also split by the motorway (A43/N21) that creates two distinct areas. North from the motorway the territory is highly densified, mainly by social housing neighbourhoods (Monte da Bela, Falcão, Cerco, Ilhéu and Maceda). South from the motorway the landscape is way more rural and less densified. It is occupied by Lagarteiro habitational units and by isolated historical urban centre, that show traces of ancient rural landscapes that once dominated in Campanhã and are still deeply connected to Tinto River.

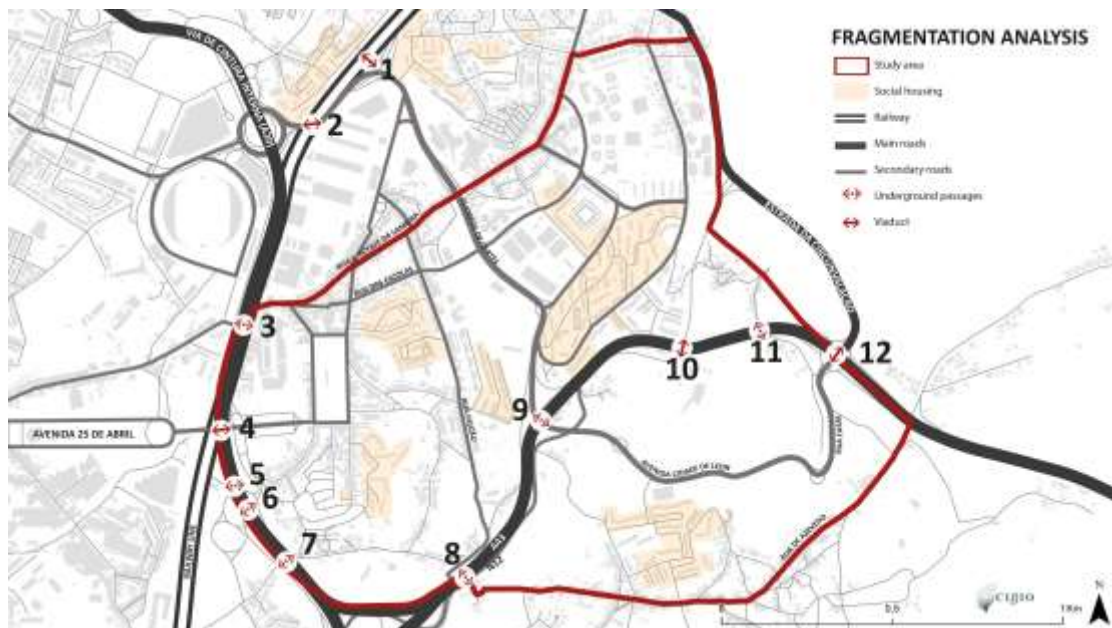


Figure 129. Fragmentation analysis of the Study area. Source: CIBIO (2019)

In Figure 129 it is clear that, almost every pedestrian path crosses underground passages as a consequence of the urban fragmentation created by the highways built along Campanhã. These passages have narrow or non-existent sidewalks, as visible in the following images. This environment influences public space perception and restricts pedestrian circulation.

The connection to the western part of the city is only possible through (Figure 129):

- Viaduct number 1 that connects to Contumil. It is not pedestrian friendly due to high concentration and speed of vehicles;
- Access to/from VCI, represented by number 2 exclusive for car circulation;
- Underground crossing in Rua São Roque da Lameira, number 3. Both for pedestrians and cars, with narrow sidewalks and almost no light;
- Viaduct of Avenida 25 de Abril (number 4), both for pedestrian and for cars, with a central sidewalk;
- Underground crossing (number 5) only accessible by car, however near Vila Meã property there is a pedestrian viaduct to cross to the western side of the railway. Still, there is no safe crossroad for pedestrians to get there, or from there do the study area;
- Highway junction (number 6);
- Underground passage for both cars and pedestrians (number 7) that allows the connection to the train station.

Inside the study area other passages (Figure 130) are visible given the presence of the Highway that connects Porto to Gondomar (A43), creating three underground passages, numbers 8, 9 and 11.

The most relevant transportation services, subway and train station are both outside the study area separated by VCI. To reach them by walking it is mandatory to cross at least one underground passage to overcome this physical barrier.



Figure 130. Underground passages in the Study area. Source: CIBIO (2019)

Inside the study area some discrepancy can be found between local streets. Rua São Roque da Lameira, Rua de Azevedo and Rua de Bonjónia are ancient circulation axes with narrow, steep profiles deeply related with Campanhã's history and culture. On the other hand, recent axes have been constructed with larger profiles, such as Avenida Cidade de Léon and Alameda de Cartes, followed by new services and facilities. Together they shake local dynamics but on the other side they also behave as fragmentation and pedestrian obstacles for they size and car circulation speed.

#### 4.3.2.3 Pedestrian network analysis

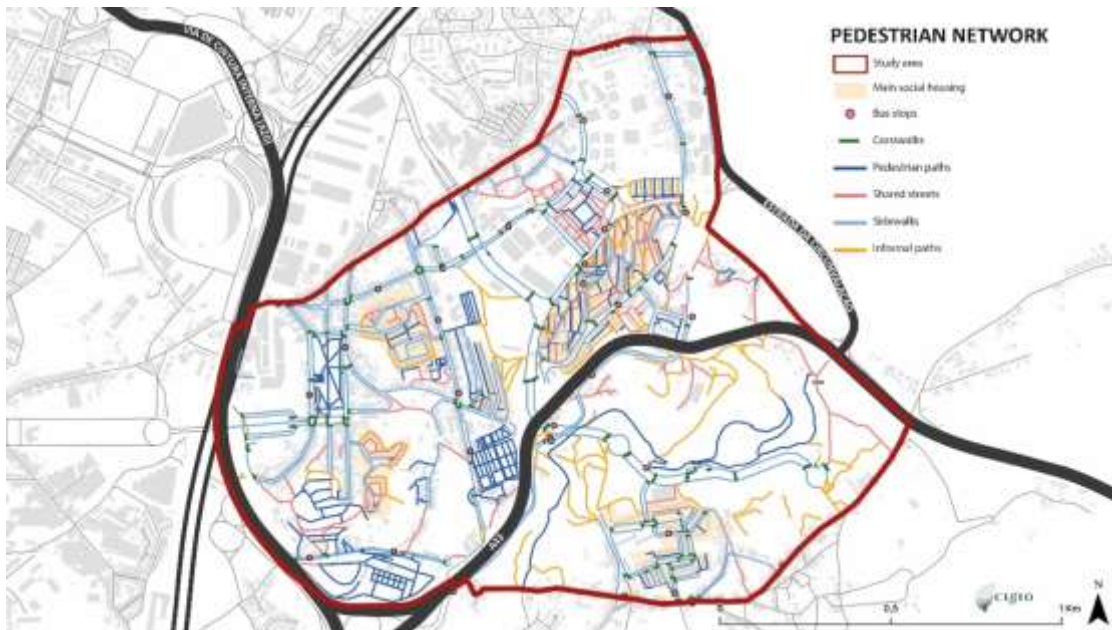


Figure 131. Pedestrian Network analysis mapping. Source: CIBIO (2019)

The pedestrian network analysis was an important study to be conducted given the impact of the circulation axes and local traffic over pedestrian circulation (Figure 131). The study identified 5 types of paths: *Crosswalks*; *Shared roads*; *Pedestrian paths*; *Sidewalks* and *Informal Paths*.

- *Crosswalks* are formalized pedestrian crossing paths between sidewalks;
- *Shared Roads* correspond to areas where the car and pedestrians have to share the same space for circulation (there are no sidewalks);
- *Pedestrian paths* are exclusive for pedestrian circulation;
- Sidewalks correspond to segregated circulation axes, where there is a formal sidewalk for pedestrians;



- *Informal paths* are not formalized (paved) and are established as a result of people's use of the space. They are a reflection of connection breaches proved by the user's experience.

In the study area 87% of the pedestrian circulation represents formal paths over 13% of informal paths, whose distribution can be observed in Figure 132. However, if we analyse the value of the informal paths (13%) plus the value of Shared roads, where pedestrians don't have an exclusive circulation axe, the value of non-friendly axes for pedestrian rises to 26,2%.

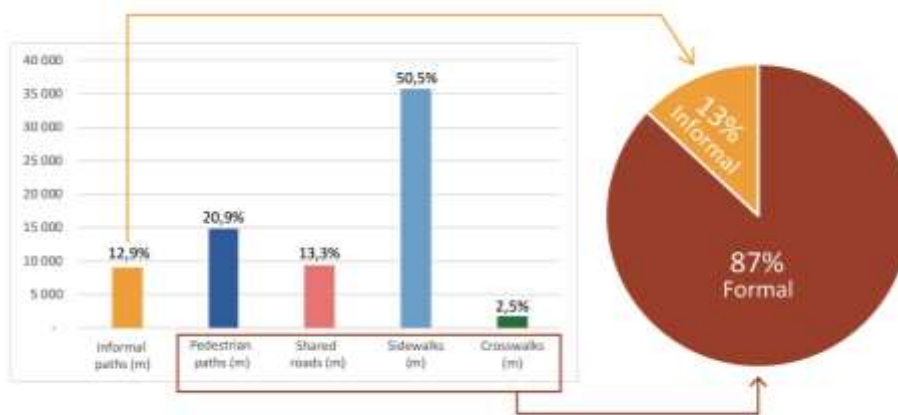


Figure 132. Results of pedestrian network mapping. Source: CIBIO

Analysing the results it is clear the difference of pedestrian networks concentration between the areas in the north from A43 compared to the ones in south. The northern area dominated by habitational units has a higher concentration of all types of pedestrian circulation. The southern area, more rural, has fewer pedestrian connections however has more informal paths.



Figure 133. Example of Sidewalks in the study area. Source: CIBIO (2019)

About 51% of the pedestrian network is represented by sidewalks whose distribution is directly related with habitational areas, given that areas dominated by residential units are more likely to be served by sidewalks (Figure 133). In some cases, such as in Rua Roque da Lameira, the sidewalk is extremely narrow for a street with such pedestrian movement. In contrast, the most recent circulation axes, such as Alameda de Cartes, Rua Peso da Régua and Avenida da Cidade Leon have comfortable sidewalks. However, in these large streets, the car traffic reaches high speed values, which compromise pedestrian circulation/crossing security.



Figure 134. Example of Pedestrian paths in the study area. Source: CIBIO (2019)

The pedestrian roads represent 21% of the total pedestrian network. This category includes mainly the paths inside public spaces, such as Quinta da Bonj6ia, Oriental Park, Corujeira Square, Horta da Oliveira, the Cemetery but also inside some habitation units (Figure 134 ). In the public green spaces the majority of these paths have comfortable dimensions and are well maintained. On the other side, the pedestrian paths located in residential areas show signs of poor maintenance and improper use in terms of trash and graffiti traces.

One of the most important and recent pedestrian paths is the linear walkway that goes along Tinto River, launched in October 2019, but is already a success for the citizens as an excellent opportunity for walking, running and cycling while immersing in a natural environment.



Figure 135. Example of shared roads in the study area. Source: CIBIO (2019)

The category of shared roads also represents 13% of the network, but its distribution is directly connected with the habitational units (Figure 135). In most of them the conflict between pedestrian circulation and cars is visible, as well as low quality of the pavements.

In term of Crosswalks, their distribution is more relevant that its absolute value. In some cases it is visible a clear relation between the informal paths and the location of the crosswalks. In other cases, the existence of informal paths in large roads prove the need for more or relocation of existing crosswalks.



Figure 136. Example of Informal paths in the study area. Source: CIBIO (2019)

In terms of informal paths, their presence is undeniable, reaching 13% of the total network survey, proving the need of expansion of the formal network (Figure 136). It is clear the concentration of informal paths near densified areas, connecting the several entrances of the habitational units to main formal paths.

The area between Cerco and Falcão is clearly lacking from formal and safe connection, given the concentration of informal paths mapped. From *in situ* observations, these informal paths are highly used by people from these neighbourhoods that need to cross to the cemetery, the School, or towards Corujeira Square and its surroundings. These informal connections are putting citizens, including children, in danger, when they cross Alameda de Cartes in unregular locations.

Another area with high concentration of informal paths is around Lagarteiro habitational units. Their connection to Avenida Cidade de Leon, N12 and the new Walkway along Tinto River, lacks on formal paths which results in informal and unsafe paths along an ancient cork-oak agglomeration and other vacant lots.

In general, the distribution of informal paths overlaps with unused plots dispersed along habitational units, used as shortcuts, proving connection breaches between relevant services/areas of the study area.



The distribution of bus stops is highly related with pedestrian network mapping. In the study area can be found 37 bus stops, covered by 12 routes from the local transportation company, STCP. The distribution of these infrastructures is not even, inside the study area. North from A43 the concentration of bus stops is higher compared to the southeast area. In the Northern area the majority of bus stops are located in Rua São Roque da Lameira, Rua das Escolas and Rua do Falcão. In the Southeast area the higher concentration of bus stops is located along Avenida Cidade de Leon and Rua de Azevedo.

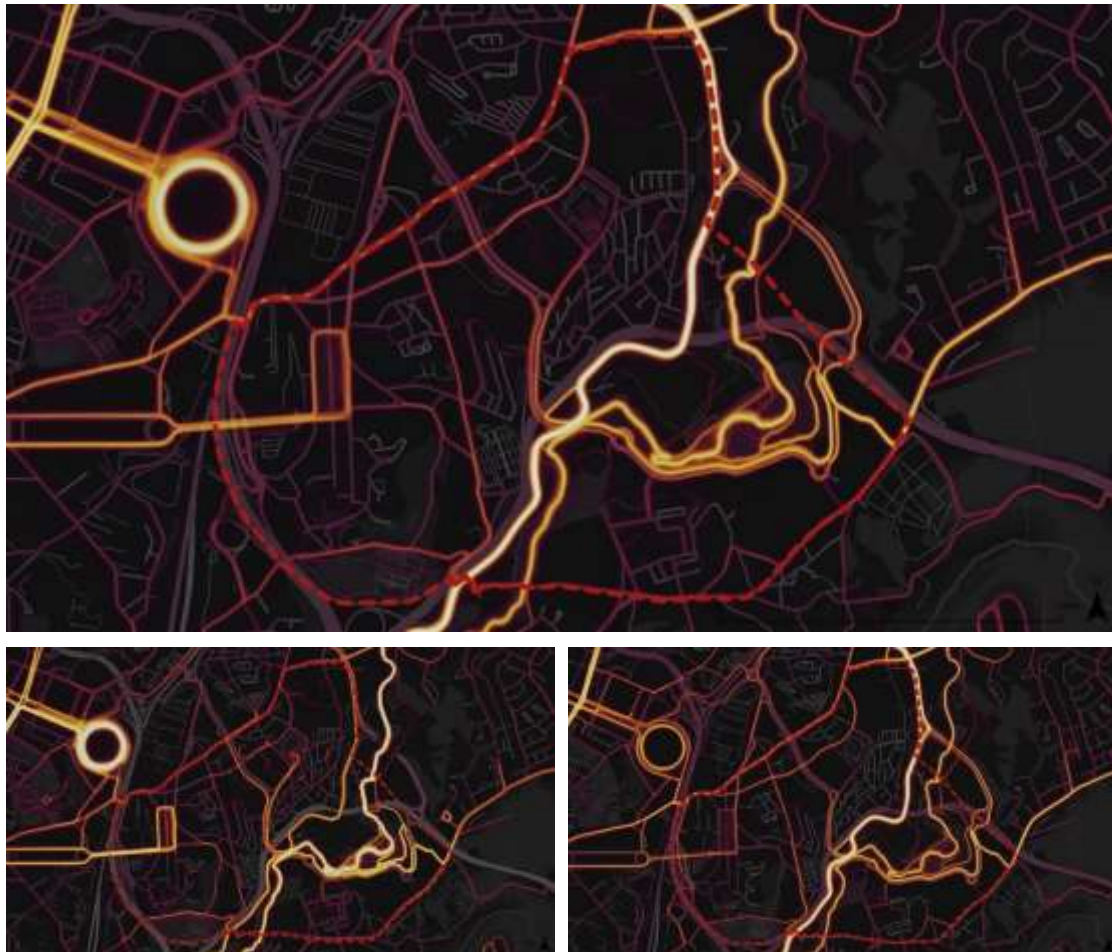


Figure 137. On top: Global tracking analysis in the Study area; On the left: Running tracking analysis; On the right: Cyclable tracking analysis. Source: Adapted from Strava platform (2019)

To support the analysis of urban mobility in the Study area, the previous study of the pedestrian network was also crossed with data from Strava Platform (Figure 137). This tool tracks cyclable and running circuits on a heat map. Analysing the data concerning the study area, N12 stands out as the path most suitable for this kind of activities, mostly for cyclable circuits. The paths inside Oriental Park are also communally chosen proving the impact of the Park in the local community. The recently inaugurated Walkway along Tinto River has already proven its success by standing out as the most used circuit for running activities. It is also visible the relevance of Avenida 25 de Abril, as an entrance in Campanhã and its close relation with Corujeira that works as distributive element. Most of these circulation axes correspond to pedestrian roads or paths with sidewalks (identified in the pedestrian network study).

#### 4.3.2.4 Proximity to green spaces, services and facilities

Another indicator to be analysed on a city's diagnostic is the proximity between the most relevant components of the area, such as parks and gardens, equipment and services, transportation platforms/stations and habitational units.

Table 6 collects the walking distance between main social housing distributed in the study area (Cerco, Falcão, Lagarteiro and Monte da Bela) and different polarizing areas, such as:

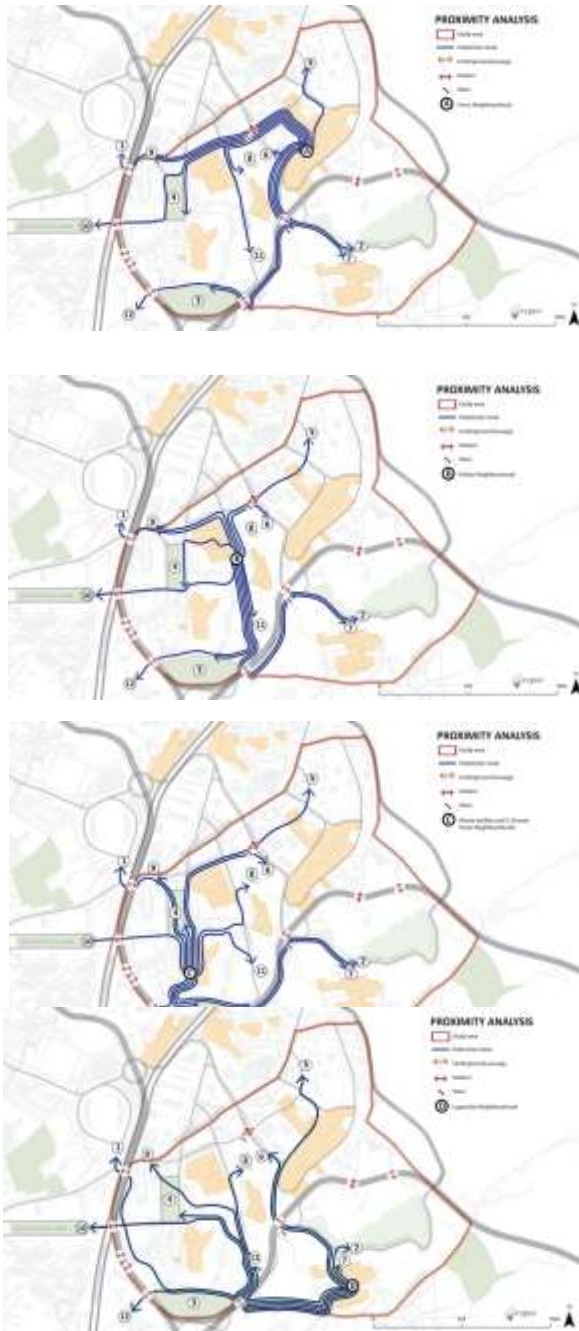
1. The subway - The closest subway and train station that allows the connection with the rest of the city and contiguous cities
2. Oriental Park - Public park under expansion
3. Quinta da Bonjóia - Historical garden of public access
4. Corujeira Square - Historical and cultural centre of Campanhã, where the primary school is located
5. Cerco High School - The main cluster of schools in the Study Area
6. Complexo Desportivo de Campanhã and Municipal Pool - Sport centre
7. Pavilhão Municipal do Lagarteiro - Sports centre
8. Horta da Oliveira - Community Garden used by citizens and Falcão School
9. Matadouro - Future project that will bring new dynamics to Campanhã
10. 25 Avenue - One of the most important entrances in Campanhã. The Avenue holds Feira de Vandoma
11. Cemetery and Church - The most relevant religious element in the study area
12. Terminal Intermodal de Campanhã - Future project that will redefine local public transportation network.

	<b>A. Cerco (and Primary School)</b>	<b>B. Falcão (and Falcão School)</b>	<b>C. Monte da Bela/S. Vicente Paulo</b>	<b>D. Lagarteiro (and Lagarteiro School)</b>
Bus stops	6 units (up to 300m)	4 units (up to 100 m)	5 units (up to 100 m)	1 (at 200m)
1. Subway station (Dragão station and entrance in Campanhã)	1.7 Km (23min) Through Rua Emílio Biel, Rua das Escolas and S. Roque da Lameira (1 viaduct and underground passage)	1.1Km (15min) Through Rua do Falcão and S. Roque da Lameira   (1 underground passage)	1 Km (13 min) Through Corujeira Square and Rua S. Roque da Lameira (1 underground passage)	2.4 Km (33 min) Through Rua Azevedo, Rua de Bonjóia and Rua da Fábrica "Invencível"   (1 underground passage)
2. Parque Oriental and Walkway along Tinto River	1.1 Km (13 min) Through Alameda de Cartes and Avenida Cidade de Léon (underground passage)	1.8 Km (23 min) Through Rua do Falcão and N12   (1 underground passage and stairs - Not accessible for all citizens)	1.7 Km (28 min) Through Rua de Bonjóia and N12   (1 underground passage and stairs -Not accessible for all citizens)	550m (7 min) Through Avenida Cidade de Leon
3. Quinta da Bonjóia	1.7 Km (22min) Through Alameda de Cartes and N12 (2 underground passages)	750m (9 min) Through Rua Alto da Bela	350m (5 min) Through Rua Alto da Bela	1.2 Km (17 min) Through Rua Azevedo   (1 underground passage)
4. Corujeira Square and Corujeira Primary School	1.4 Km (17min) Through Rua Emílio Biel, Rua das Escolas and Rua Ferreira dos Santos (1 viaduct)	550m (7 min) Through Rua Camilo Passanha	300m (4 min) Through Rua Monte da Bela	1.9 Km (26 min) Through Rua Azevedo, Rua Falcão and Rua Corujeira   (1 underground passage)
5. Cerco High School	550 m (7min) Through Rua Nossa Senhora do Rosário	1 Km (13 min) Through Rua Emílio Biel and Rua Nossa	1.5 Km (19 min) Through Rua Monte da Bela, Corujeira,	1.8 Km (24 min) Through Alameda de Cartes and Rua



		Senhora do Rosário   (1 viaduct)	Rua das Escolas and Emílio Biel   (1 viaduct)	Peso da Régua   (1 underground passage)
6. Complexo Desportivo de Campanhã and Municipal Pool (Sports centre)	450m (6 min) Through Alameda de Cartes	530m (7 min) Through Rua Emílio Biel and stairs to Alameda de Cartes   (not accessible to all citizens)   or 1.2 Km (15 min), if accessible	1Km (13 min) Through Rua Monte da Bela, Corujeira, Rua das Escolas and stairs to Alameda de Cartes   (not accessible to all citizens)   1.8 Km (21 min), if accessible	1.3 Km (16 min) Through Avenida Cidade de Leon and Alameda de Cartes   (1 underground passage)
7. Pavilhão Municipal do Lagarteiro   (Sports centre)	1.1 Km (13 min) Through Alameda de Cartes and Avenida Cidade de Léon (underground passage)	1.8 Km (23 min) Through Rua do Falcão and N12   (1 underground passage)   (Stairs - Not accessible for all citizens)	1.6 Km (27 min) Through Rua de Bonjónia and N12   (1 underground passage and stairs -Not accessible for all citizens)	400m (5 min) Through Avenida Cidade de Leon
8. Horta da Oliveira   (Community garden)	1 Km (13 min) Through Rua Emílio Biel and Rua do Falcão (1 viaduct)	200m (3 min) Through Rua do Falcão	950m (11 min) Through Rua Monte da Bela and Rua Falcão	1.8 Km (24 min) Through Rua de Azevedo and Rua Falcão   (1 underground passage)
9. Matadouro   (Future project)	1.2Km (16 min) Through Rua Emílio Biel and Rua das Escolas	700m (9 min) Through Rua do Falcão and Rua das Escolas	750m (10 min) Through Rua Monte da Bela and Corujeira	2.2 Km (30 min) Through Rua de Azevedo, Rua de Falcão and Corujeira   (1 underground passage)
10. Avenida 25 de Abril   (Entrance in Campanhã parish and Feira de Vandoma)	1.9 Km (26 min) Through Rua Emílio Biel, Rua do Falcão and bridge (2 viaducts)	1.1 Km (15 min) Through Rua do Falcão, Corujeira and bridge   (1 viaduct)	800 m (10 min) Through Rua Monte da Bela and Corujeira and bridge   (1 viaduct)   800m (10 min)	2.4 Km (30 min) Through Rua de Azevedo, Rua de Falcão and Corujeira   (1 underground passage)
11. Cemetery and Church	1.5 Km (18 min) Through Rua Emílio Biel and Rua do Falcão (1 viaduct)	400 m (5 min) Through Rua do Falcão	800 m (10 min) Through Rua Monte da Bela and Corujeira de Baixo	1.3 Km (17 min) Through Rua de Azevedo and Rua de Falcão   (1 underground passage)
12. Terminal Intermodal (Future Project) and connection to Campanhã train and subway station	2.2 Km (28 min) Through Alameda de Cartes, N12 and Rua de Bonjónia (stairs and 2 underground passage - not accessible to all citizens)	1.3 Km (17 min) Through Rua Alto da Bela, Rua de Bonjónia (1 underground passage)	650 m (9 min) Through Rua de Bonjónia   (1 underground passage)	1.8 Km (25min) Through Rua de Azevedo and Rua de Falcão   (2 underground passages)

Table 6. Proximity analysis between relevant points of the study area. Source: CIBIO (2019)



The study area has a great concentration of areas in a comfortable walking distance (Figure 138). Most of the services/equipment/gardens are under 1 Km away from the neighbourhoods. The subway station is the most distant one, while the sports centres at Alameda de Cartes are the most accessible equipment.

Rua Emilio Biel, Alameda de Cartes, Avenida Cidade de Leon, Rua Peso da Régua, N12, Rua da Corujeira and Rua do Falcão, are the most used roads in terms of pedestrian network. They connect the most relevant areas and happenings. However from *in situ* observations Rua São Roque da Lameira represents one of the most relevant streets in terms of local dynamic. This street is deeply related with Campanhã's historical evolution, gathers a high concentration of local commercial units and bus stops. Nowadays its profile, narrow and irregular is not able to respond to local needs, such as high pedestrian fluxes and lack of parking spaces.

In terms of connection to the rest of the city, Corujeira Square is a strategic and unavoidable plaza to reach both the underground passage to Dragão stadium but also to Avenida 25 de Abril, two of the most important entrances in the Study Area. This urban centrality is also confirmed by the concentration of services, commercial units and parking spaces around Corujeira Square.

Figure 138. Proximity analysis. Source: CIBIO (2019)

The informal paths occur in the study area as shortcuts from relevant points, proving the need for formal connections. The informal paths visible between Cerco and Falcão and between N12 and Lagarteiro allow the significant decrease of walking distances. For example, when analysing carefully the different connection possibilities and real path used by pedestrians, it is clear that an easier and formal connection between Corujeira and Alameda de Cartes is mandatory. Nowadays people use an informal and uncomfortable path to connect these two points of the study area, instead of going all around, over Avenida Emilio Biel.

#### 4.3.2.5 Underdeveloped areas

In the study area, over 34% are occupied by plots abandoned or with no use. It may include vacant lots or green spaces undeveloped in terms of biodiversity (not contributing to the green structure, as they could) (Figure 139). Most of these spaces are private, however, the public ones may have great potential to be redesigned by URBiNAT and incorporated in the Healthy Corridor.

- In Porto, the identification of the terrains available for URBiNAT, followed URBiNAT's methodology, with some adjustments according to local framework and characteristic. Most of the identified areas correspond to undeveloped lots or traces of previous land uses, lost in the urban mesh. With URBiNAT, they face a chance to hold territorial nature-based solutions and be part of the Healthy corridor. The geospatial analysis resulted from a combination of the following data:
  - Categories "Vacant Lots", "Urban woodlands", "Green spaces associated with circulation axes" and "Green spaces associated with roads", from the Green structure mapping published in the report "Caracterização e Diagnóstico da Estrutura Ecológica e Biodiversidade", published in April 2018, for Porto's Master Plan revision (PDM);
  - Some elements of the category "Green areas for public use" from "PDM - Planta de Qualificação do Solo";
  - Categories "Detached lands", "Municipal private domain" and "Expectant terrains" from Land register, provided by DMPAG;
  - Some elements from ZOP - Land register provided by DMU;
  - Category "Free terrains" from the Study "Definição da Operação de Reabilitação Urbana";

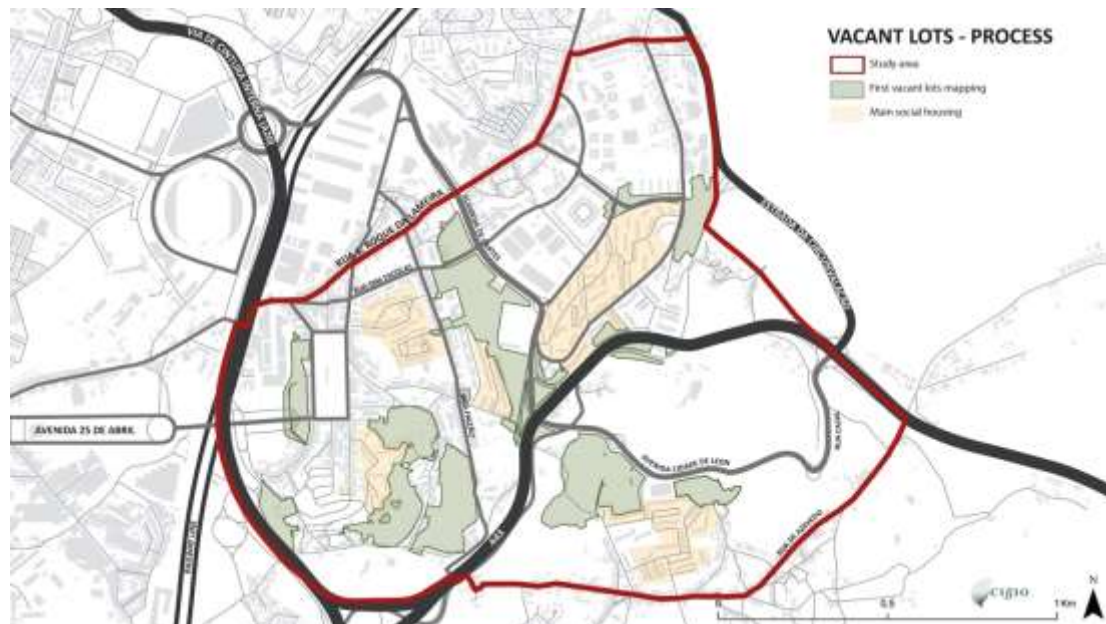


Figure 139. First version of Vacant lots mapping. Source: CIBIO (2019)

From the whole sample some terrains were excluded:

- Inaccessible terrains;
- Terrains that will be part of the Oriental Park expansion;
- Small terrains, in the context of the study area, with low social impact;

- Isolated/low connectivity with other terrains and to the core of the Study area;
- Private terrains (that CIBIO knows about) (the possible inclusion of private terrains needs to be analysed case by case further on the decision process);
- Areas allocated for future urbanization by the Municipality (PDM).

But also included some new elements, proposed by the task force:

- Key points of the green structure and services;
- Strategic terrains between social housing neighbourhoods;

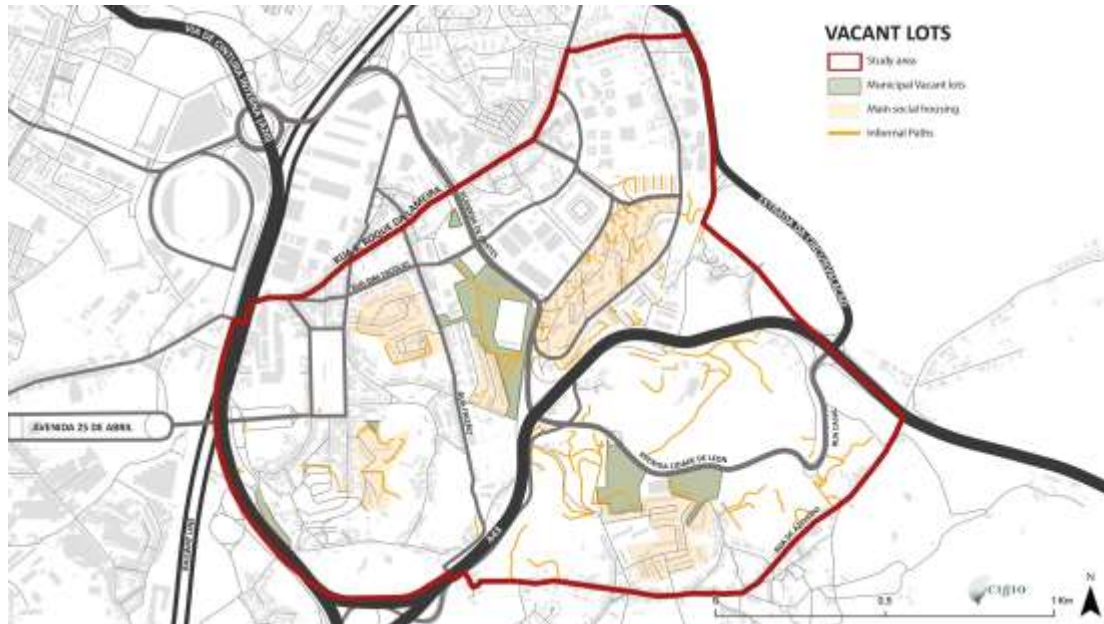


Figure 140. Public vacant lots. Source: CIBIO (2019)

The final result of this methodology identified public terrains available for URBiNAT project (Figure 140). These are public terrains, that together contribute to the urban green structure but also for citizens quality of life, that are waiting for a new purpose inside this urban mesh. Some terrains previously identified may be reconsidered after a case by case analysis, namely the private lots.

When crossing this analysis with the previous pedestrian network mapping, namely the informal ones, it is visible that they overlap with some of these undeveloped terrains, proving that even though they are vacant or abandoned, they already perform an informal function and are part of pedestrian appropriation. In most cases, such as between Cerco and Falcão, pedestrians use the vacant lots as part of their daily routine.



### Landscape Evolution in recent years

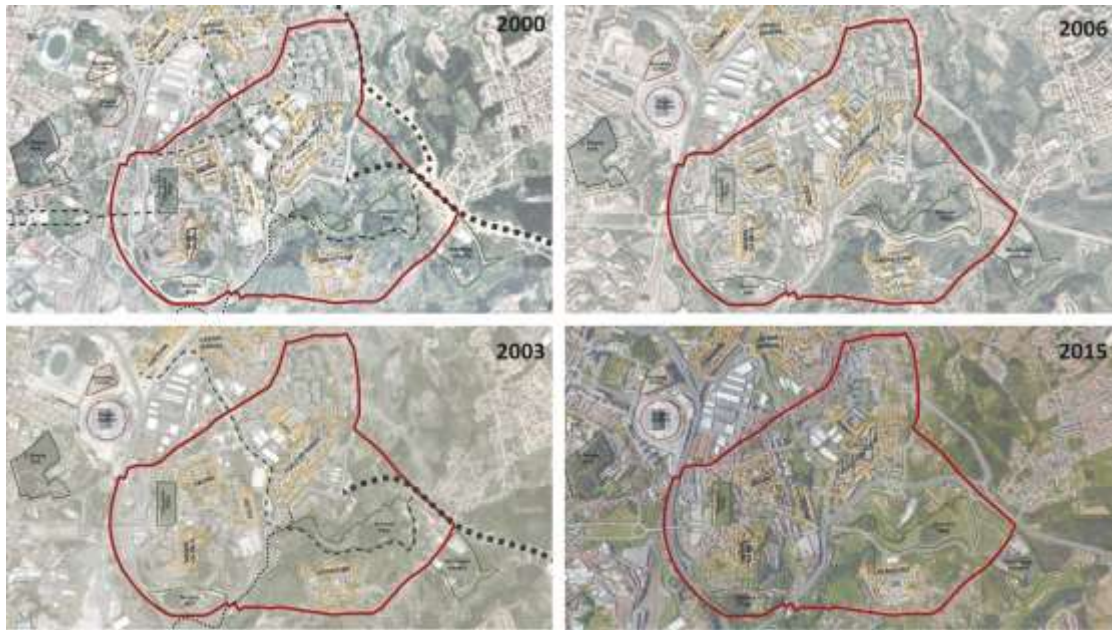


Figure 141. Landscape recent evolution analysis. Source: CIBIO (2019), adapted from google Earth

The landscape of Campanhã suffered many changes as consequence of the Industrial Revolution, losing most of its rural landscape that gradually had been replaced or abandoned (Figure 141). When observing the evolution of the landscape between 2000 and 2015 some big changes stand out. Between 2000 and 2003 the most relevant change was the construction of Avenida 25 de Abril, one of the main entrances in the study area, the relocation of Football stadium, but also the interventions in Estrada da Circunvalação and Rua das Escolas. Between 2003 and 2006 deep interventions occurred near the future city park namely Avenida de Cartes and Cidade de Léon, the largest municipal roads that compose local transportation network in the study area. Around this time the interventions in A43, to Gondomar, also have their impact in local fragmentation by introducing a new physical barrier. Until now, the biggest change in the study area has been the expansion of the Oriental Park and the renaturalization of Tinto River.

#### 4.3.2.6 Synthesis map

The territorial analysis produced for the Study Area culminates on a synthesis map that collects, summarizes and highlights the most relevant characteristics (Figure 142):

Fifty percent of the study area are permeable spaces, while the other half is occupied by circulation axes and housing units. Social housing neighbourhood is the most representative residential typology inside the study area, represented by Cerco do Porto, Falcão, Lagarteiro, Ilhéu and also very close to Contumil and São Roque da Lameira.

The territorial impact of the large circulation axes is undeniable, isolating the study area from the rest of the city but also breaking the study area apart, creating two distinct landscapes, north and south of the motorway (A43). As a consequence of the presence of heavy circulation infrastructures the study area has several underground passages, and while some work as entrances in this territory, others allow for internal circulation. However, most of these passages are not pedestrian friendly.



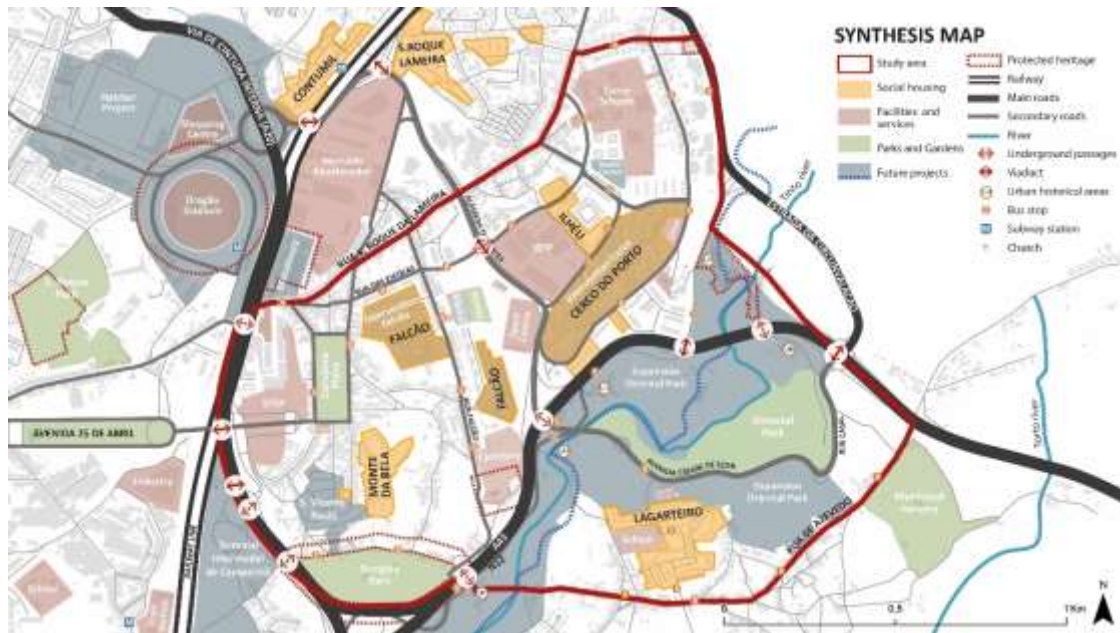


Figure 142. Synthesis Map. Source: CIBIO (2019)

The permeable spaces are mainly associated to vacant lots but also to public green spaces such as Quinta de Bonjónia that stands out for its historical area, Oriental Park for its size and recreational opportunities and also Corujeira Square for its role in local dynamics and cultural meaning.

The study area is rich in public services and equipment: two municipal sports centres, five schools, one educational centre, the parish council, recreational and social association, health centre, religious heritage (Capela de Nossa Senhora do Calvário, Igreja Evangélica Vida Nova, Igreja de Santa Maria de Campanhã, and its related cemetery) and many others.

The concentration of future plans on the study area prove municipal efforts to focus on Campanhã and its public space. The project for Matadouro, the expansion of Oriental Park and Terminal Intermodal de Campanhã will change local and municipal dynamics, bringing Campanhã closer to the rest of the rest of the city.

### 4.3.3 Behavioural mapping

The report provides the localization of the study areas, a basic understanding of the behaviour mapping method and other methods of analysis, reports on the overall results, compares variables areas and summarizes specific results per area.

#### 4.3.3.1 Observation areas

The behaviour mapping is focused on five areas of observation in Porto, within the limits of the district of *Campanhã* (Figure 143). The areas were previously selected and mapped by the Municipality of Porto, based on the needs of further work under the Project URBiNAT. As this consists of an exploratory approach of areas relatively confined in space, considering the existing city layout, and also not very expressive in terms of urban continuity, the behaviour settings were not initially delimited.



Figure 143. Localization of the five areas of observation. Source: UTAD

Area 1 corresponds to the east street of *Corujeira* Square and it is referred as “*A1 Corujeira*”;

Area 2 is part of secondary urban connection that links *Falcão* street to the *Cidade de Leon* Avenue, through the *Pêgo Negro* neighbourhood. This area covers the west end of the shortcut and it is referred as “*A2 Corujeira/Falcão*”;

Area 3 follows area 2 connecting *Pêgo Negro* to the *Cidade de Leon* Avenue, which also confronts with the south end of the *Cerco* neighbourhood. It is referred as “*A3 Falcão/Cerco sul*”;

Area 4 consists of the intersection of three streets (*St. Dr. José António Marques*, *St. Vila Nova de Foz Côa* and *St. Peso da Régua*), at the northeast end of *Ilhéu* neighbourhood and northeast end of *Cerco*. It is referred as “*A4 Cerco norte*”;

Area 5 connects *Cidade de Leon* Avenue to the *Lagarteiro* street. It is referred as “*A5 Lagarteiro*”.

#### 4.3.3.2 Methods used and implementation

The survey was carried out using a method of observation of occupation, with the objective of recording the activity and behaviour mapping of the five contracted areas. The observations and behaviour mapping were conducted during second half of past October. The fieldwork was organized by sets of two observation sessions per four periods of the day (morning, noon, afternoon and evening). This has resulted in eight sessions per each of the five areas of observation and one round per session. Eight rounds of 18 to 25 minutes were carried out in each of the five areas, corresponding to 40 rounds of observation in total (20 weekdays’ rounds and 20 weekend rounds).

The data recording system makes use of a digital *Microsoft Surface*<sup>TM</sup> tablet to operate the geographic information, generated in *QuantumGIS*<sup>TM</sup>. The input of data is facilitated by a user interface form, developed in *Qt designer*<sup>TM</sup> programming application. The computer allows operating onsite, in tablet mode, using a pen. An analogic backup of the recording technic was also prepared, making use of printed maps of the sites and recording sheets. The backup method proved to be very important, due to climate and social conditions.

Activity and behaviour mapping are described by a set of variables grouped by gender and age group of users; type of social interaction; level of physical activity; type of associated behaviour; type of limitation in terms of mobility; date, day of week, time of day, duration of observation rounds; and type of weather conditions in terms of temperature, wind conditions, sunlight and atmospheric humidity.

This document reports on the results of the observation and behaviour mapping process, contributing with the reading of the frequencies of those variables and sets of variables. The data is presented in tables and maps (Figure 144) and illustrates the distribution of users in order to understand the occupation patterns of the five observation areas. The data analysis makes use of *QuantumGIS*<sup>®</sup> software, for a more geo-statistic view, and of *IBM Statistical Package for Social Science*<sup>®</sup> (SPSS), for the general frequency analysis.

#### 4.3.3.3 Results of the observation and behaviour mapping

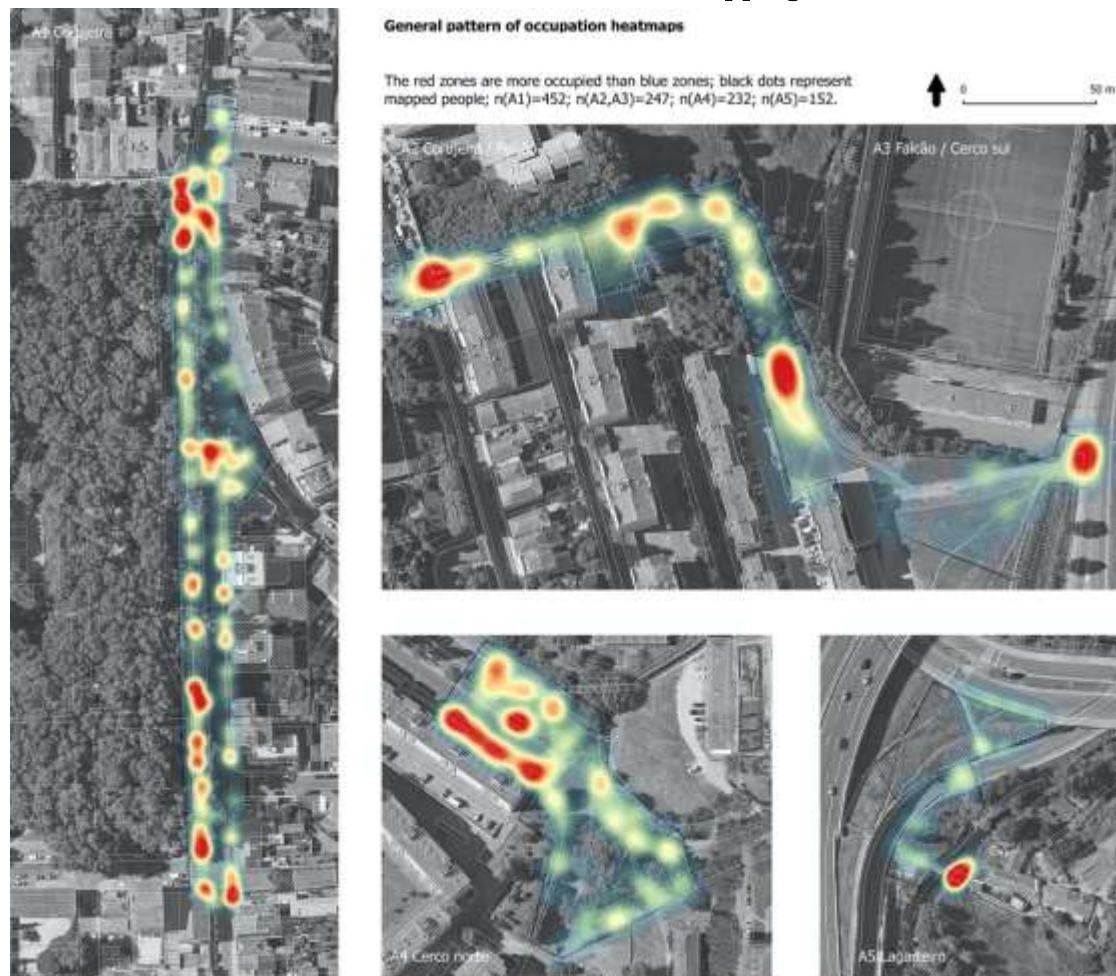


Figure 144. Heat maps of the general pattern of occupation. Source: UTAD

## General results

At this point the results are presented, in general, for the five observation areas (Table 7). Through this generalization we intend to draw the demographic profile of the total observations and to further establish comparative data between areas.

	Frequency	Percentage	Valid percent	Cumulative percent
Corujeira	452	41,7	41,7	41,7
Corujeira/Falcão	144	13,3	13,3	55
Falcão/Cerco sul	103	9,5	9,5	64,5
Cerco norte	232	21,4	21,4	86
Lagarteiro	152	14	14	100
<b>Total</b>	<b>1083</b>	<b>100</b>	<b>100</b>	

Table 7. Behaviour mapping: Total number of users mapped by watch area. Source: UTAD

Observations conducted in the five areas returned 1083 users, mapped and characterized by gender, age group, social interaction, activity level and type of behaviour. Although the same procedure was implemented in all cases, the results reveal significant differences in the total numbers of mapped users. Table 7 shows that *Corujeira* is the busiest ( $n = 452$ ), followed by the *Cerco norte* ( $n = 232$ ). The remaining three areas recorded less than two hundred observed users, with the lowest frequency recorded at *Falcão/Cerco sul* ( $n = 103$ ). *Corujeira/Falcão* and *Falcão/Cerco sul* together sum 247 mapped users.

Observed areas show no tendency for preferential occupancy by time of day, although overall occupancy during lunch is slightly lower than the quarter of total users observed (22.2%). Figure 145 and Figure 146 illustrate the frequency of occupancy by time of day: in *Corujeira* and *Corujeira/Falcão* seems to increase slightly throughout the day. The fact that it is a record in a relatively mild period is important for the more even distribution. The *Falcão/Cerco sul* is the one that reveals a more intense relative occupation in the morning. Instead, the *Lagarteiro* reveals greater occupancy in the afternoon.

Regarding the distribution by day of the week (Figure 147 and Figure 148), it was found that the areas of *Falcão/Cerco sul* and *Lagarteiro* have the highest proportion of occupancy during the weekend, 64.5% and 63.1%, respectively.



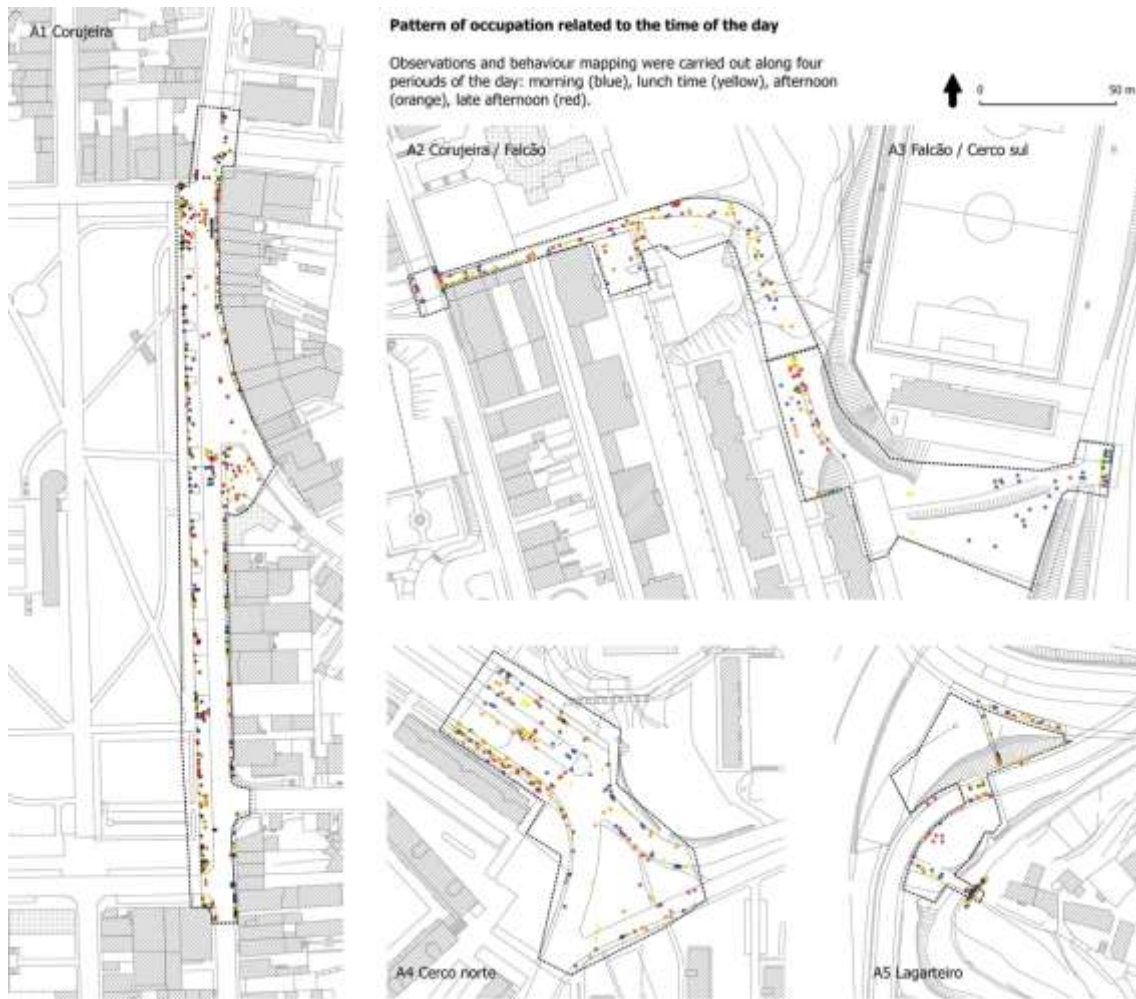


Figure 145. Pattern of occupation related to the time of the day. Source: UTAD

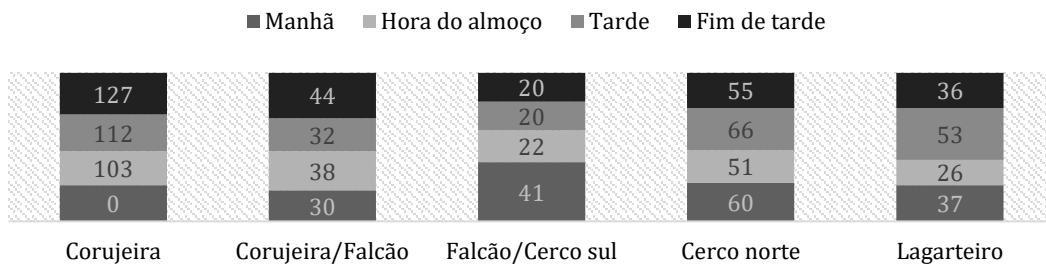


Figure 146. Number of users mapped by time of day, in the five observation areas. Source: UTAD

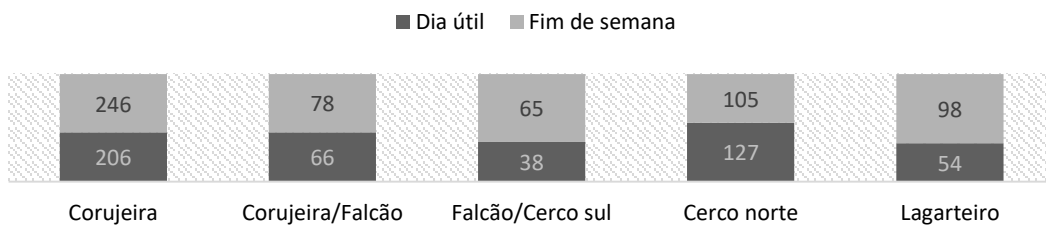


Figure 147. Number of users mapped by type of day of the week, in the five observation areas. Source: UTAD



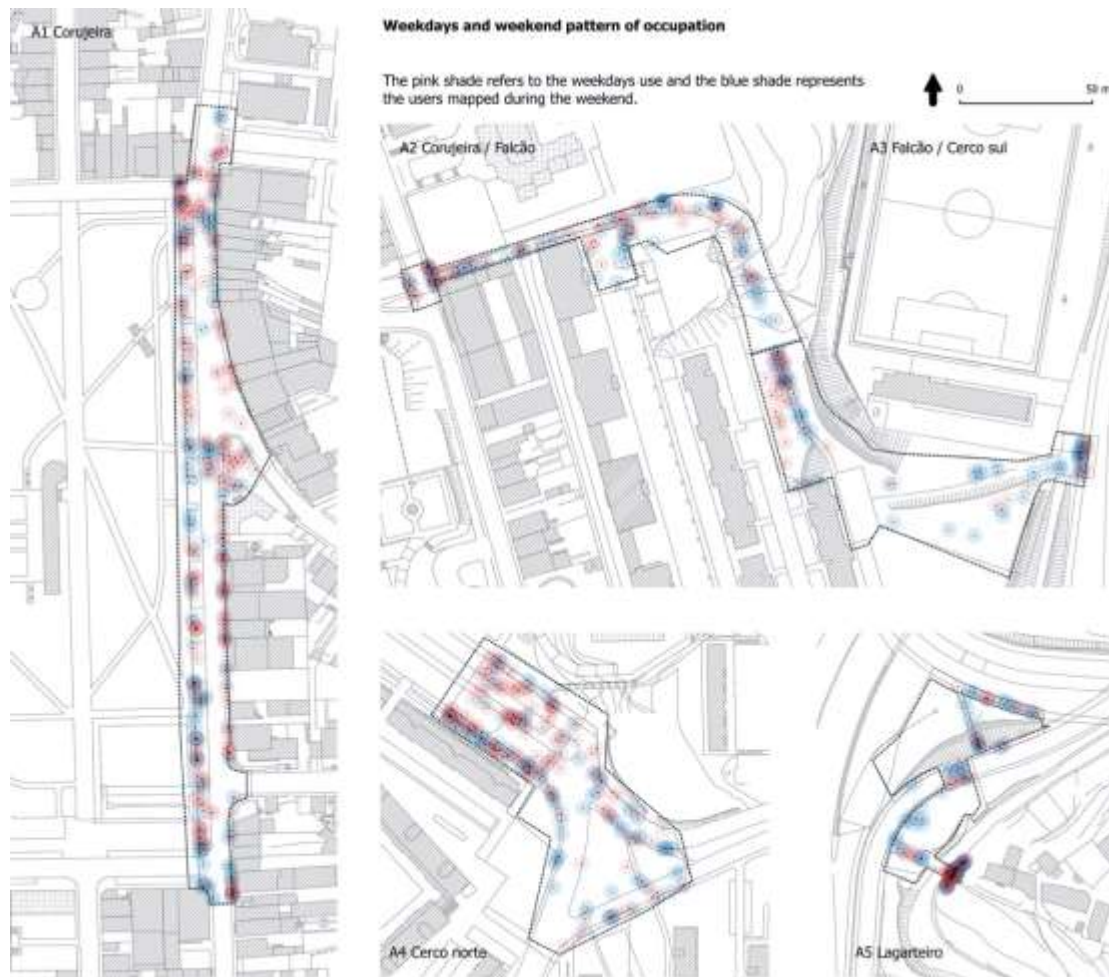


Figure 148. Weekdays and weekend pattern of occupation. Source: UTAD

On the subject of the level of physical activity, global data show that active use represents about 90% of the total mapped. Considering the 6 variables that describe users' physical activity (Figure 149 and Table 8), data reveal a very expressive frequency of the “walking” activity being the most dominant, within that group of variables, in all areas. In all cases there are favourable scenarios that justify this behaviour: the street in the cases of *Corujeira* and *Cerco norte* and the pedestrian trails in the cases of *Corujeira/Falcão*, *Falcão/Cerco sul* and *Lagarteiro*. Sedentary use (corresponding to those recorded in the variables “sitting” and “standing”) is not significant, which still reveals the absence of stay and sitting spaces. Similarly, active use related to play and recreation is not significant, as the observed areas also do not reveal scenarios supporting collective use activities, formal or informal play.

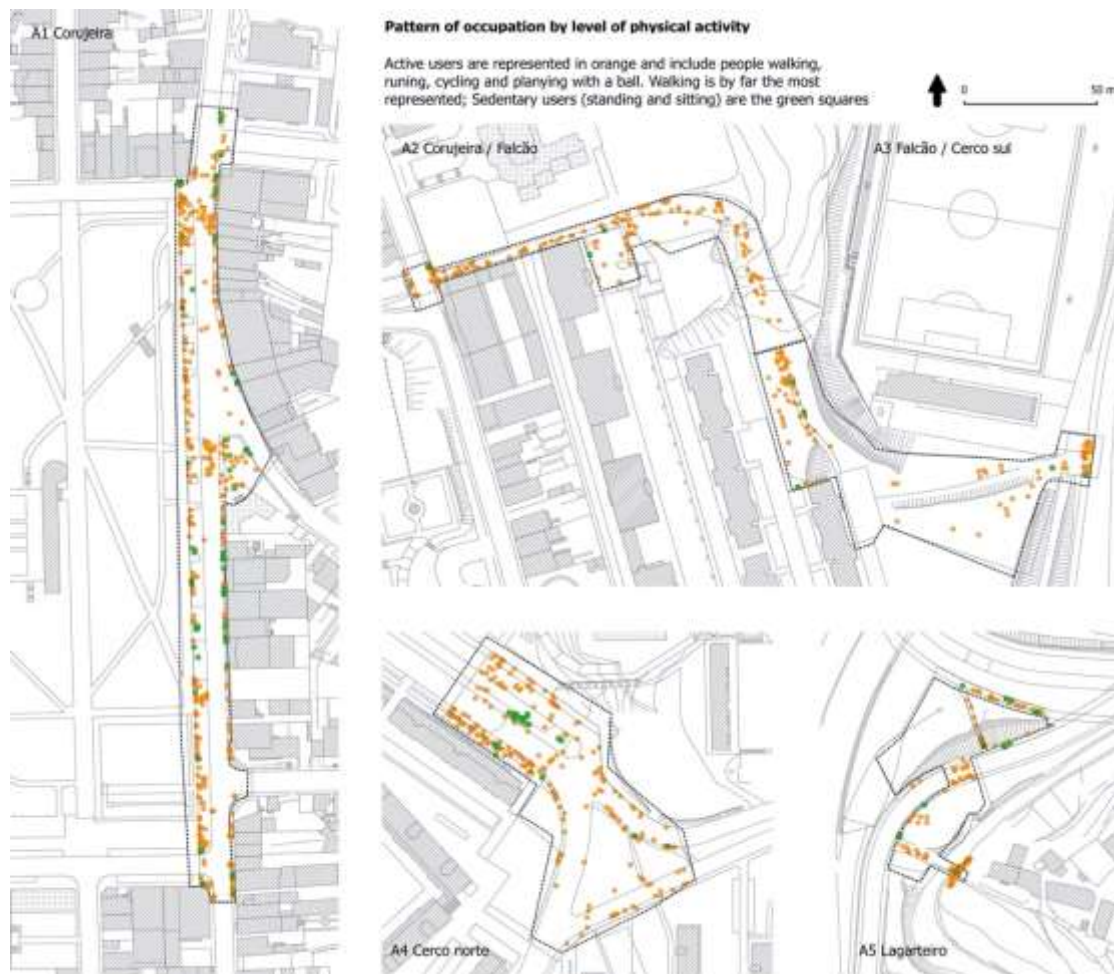


Figure 149. Pattern of occupation by level of physical activity. Source: UTAD

	Frequency	Percentage	Valid Percent	Cumulative percent
Seating	11	1	1	1
Standing	100	9.2	9.2	10.2
Walking	890	82.2	82.2	92.4
Running	22	2	2	94.5
Cycling	59	5.4	5.4	99.9
Playing with ball	1	0.1	0.1	100
<b>Total</b>	<b>1083</b>	<b>100</b>	<b>100</b>	

Table 8. Behaviour mapping: frequency of activity level for the total number of users observed. Source: UTAD

Table 9 and Figure 150 show that the most frequently observed behaviour is talking (“talking” 63.4%,  $n = 346$ ). “Using a mobile phone” and “walking an animal” follow the list, although both are under 10%. The relationship between activity levels and observed behaviours shows not to be very significant. The only noteworthy cases are: “watch” behaviour ( $n = 18$ ), registered almost exclusively in “standing” users; and the fact that the vast majority of the “talking” users are “walking” (85.8%), which reveals (as in many similar studies) that walking is a social act, even when, as seems to point in these cases, it is a passing by walking use and not recreational. It should be noted that of the total users walking ( $n = 890$ , see table) only about one third (33.4%) was mapped “talking” ( $n = 297$ ). Also worthy of mention, in the data analysis phase, two new variables were added: the “smoking” and “working” cases. These were initially mapped as “others” as they were not included in the observation key.

Associated behaviour		Frequency		Percentage of cases
		N	Percentage	
Associated behaviour	Observe	19	3.50%	3.80%
	Talk	346	63.40%	69.10%
	Using mobile	51	9.30%	10.20%
	Playing	3	0.50%	0.60%
	Walking a pet	45	8.20%	9.00%
	Eating	6	1.10%	1.20%
	Reading	4	0.70%	0.80%
	Listening Music	13	2.40%	2.60%
	Dating	18	3.30%	3.60%
	Smoking	37	6.80%	7.40%
Working	4	0.70%	0.80%	
<b>Total</b>		546	100.00%	109.00%

Table 9. Frequency of behaviours for the total number of users observed. Source: UTAD

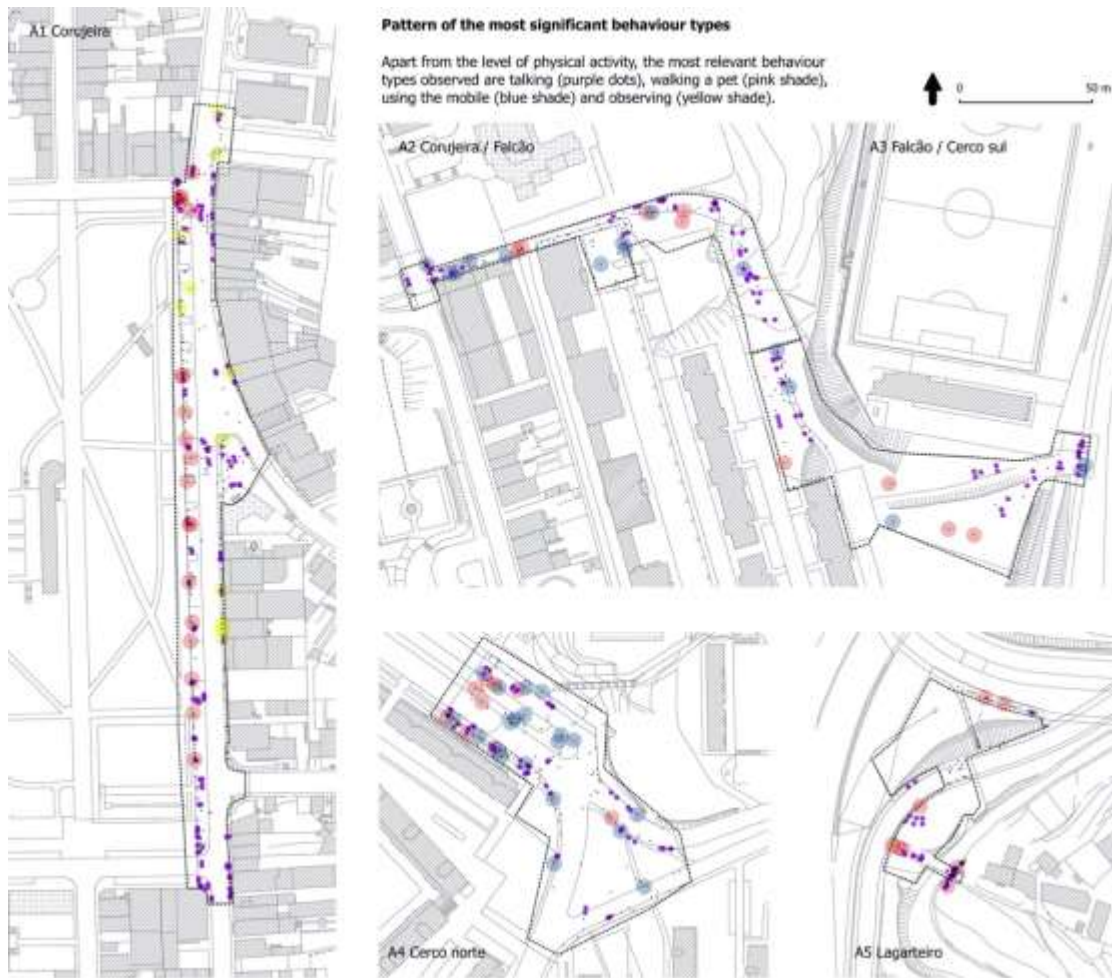


Figure 150. Pattern of the most significant behaviour types associated. Source: UTAD

Concerning the aspects related to the type of social interaction and demographic data, the results expressed in Figure 151 and Figure 152 indicate a strong tendency for users to be “alone” (57.2%, n=619), which is consistent across all observed areas. In the *Cerco norte*, this is where this number is most significant reaching 70.7% (n = 164). *Lagarteiro* shows the highest proportion of users “with another person” (37.5%) and in *Falcão/Cerco sul* the highest proportion of users “in a group” (20.4%).



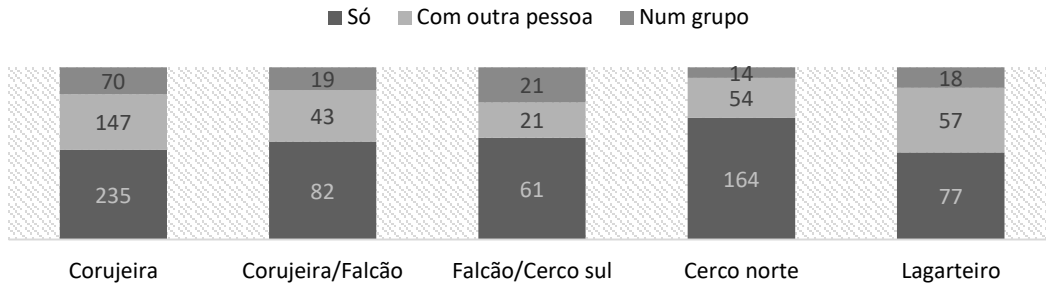


Figure 151. Frequency of type of social interaction for total observed users. Source: UTAD

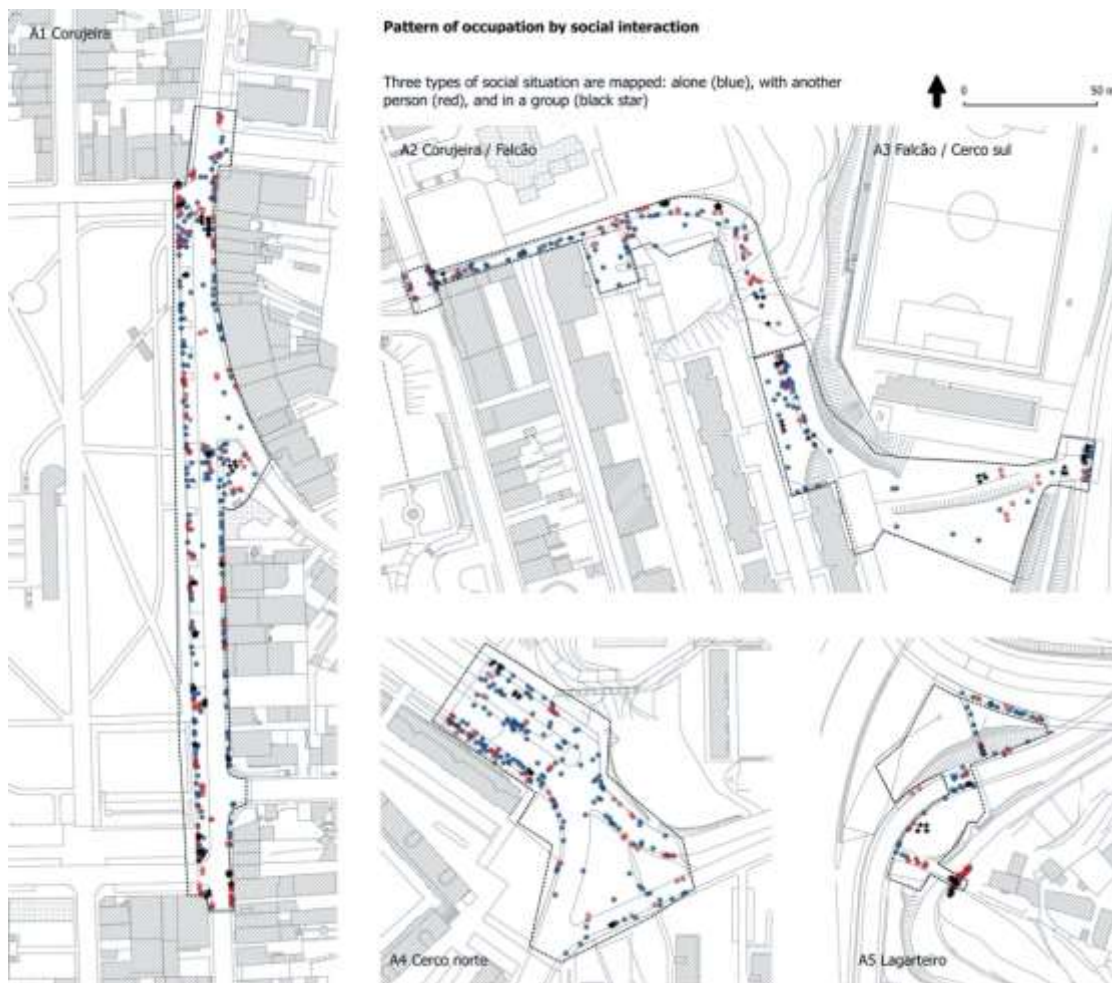


Figure 152. Pattern of occupation by social interaction. Source: UTAD

Figure 153 and Table 10 show that, for the total of the five areas, 54.2% of the mapped users are male ( $n = 587$ ), with no significant differences in gender distribution. The most frequent age group is the “adults” (50.1%), followed by the “elder” (24.7%), and the least represented group is the “children” (5.7%).

Regarding demographics by area of observation, data shows a slight male predominance use, except at A4 *Cerco norte*, where female users are about 53,8% ( $N = 232$ ). A1 *Corujeira*, is the case with the highest number of users mapped and there are 55.8% of male observed ( $N = 452$ ). A5 *Lagarteiro* reveals the biggest difference.

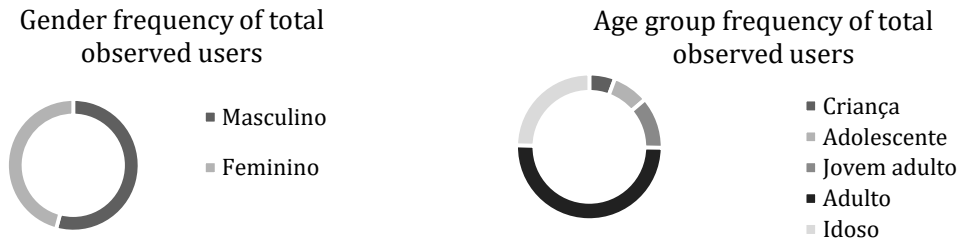


Figure 153. Gender and age group frequency of total observed users

		Age group					Total
		Children	Teenager	Young adult	Adult	Elder	
Gender	Male	38	46	69	303	131	587
	Female	24	41	55	240	136	496
Total		62	87	124	543	267	1083

Table 10. Frequency crosstab between gender and age group, of total observed users. Source: UTAD

However, there was no significant difference in the pattern of spatial occupation (Figure 154 and Table 11), i.e. the distribution of both cases is identical in terms of dispersion across the area. The only exceptions are in *A1 Corujeira*, where it can be found a slight predominance of women in the corner with the *Corujeira de Baixo* street, and in *A4 Cerco norte*, which shows also a slight prevalence of women along *St. Dr. José António Marques*. The pattern of use by men tend to be more disperse, which is consistent with many similar studies.

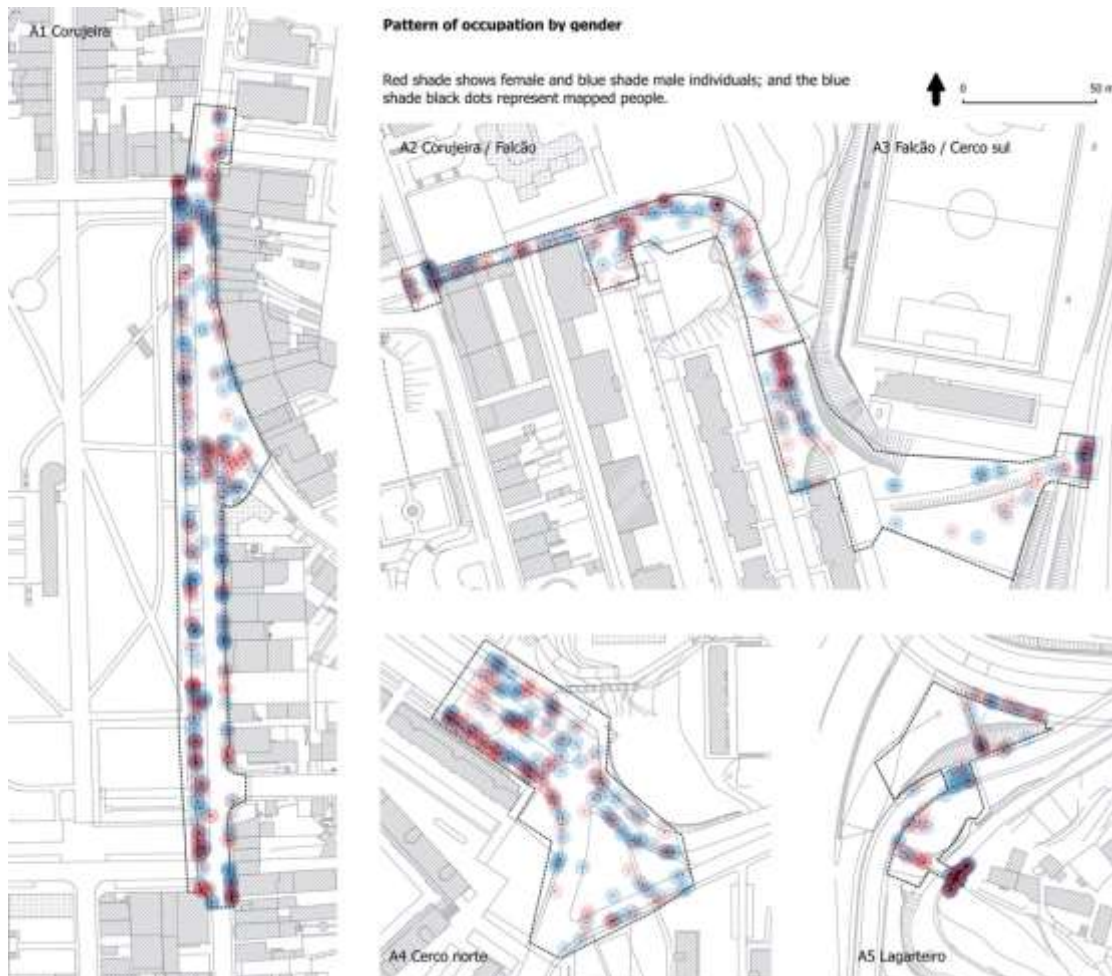




Figure 154. Pattern of occupation by gender. Source: UTAD

		Observation area					Total
		Corujeira	Corujeira/ Falcão	Falcão/Cerco sul	Cerco norte	Lagarteiro	
Gender	Male	252	78	56	107	94	587
	Female	200	66	47	125	58	496
Total		452	144	103	232	152	1083

Table 11. Frequency crosstab between gender and area of observation. Source: UTAD

In the case of the age group (Table 12 and Figure 155), as the frequencies by class are rather unbalanced, it is harder to read significant differences in the pattern between age groups. The most relevant, in every case, is the tendency for teenagers to group in specific spots or along street crossings.

		Observation area					Total
		Corujeira	Corujeira/ Falcão	Falcão/ Cerco sul	Cerco norte	Lagarteiro	
Age group	Children	27	6	8	14	7	62
	Teenager	26	21	7	25	8	87
	Young adult	50	12	14	28	20	124
	Adult	229	65	58	110	81	543
	Elder	120	40	16	55	36	267
Total		452	144	103	232	152	1083

Table 12. Frequency crosstab between gender and age group, of total observed users. Source: UTAD

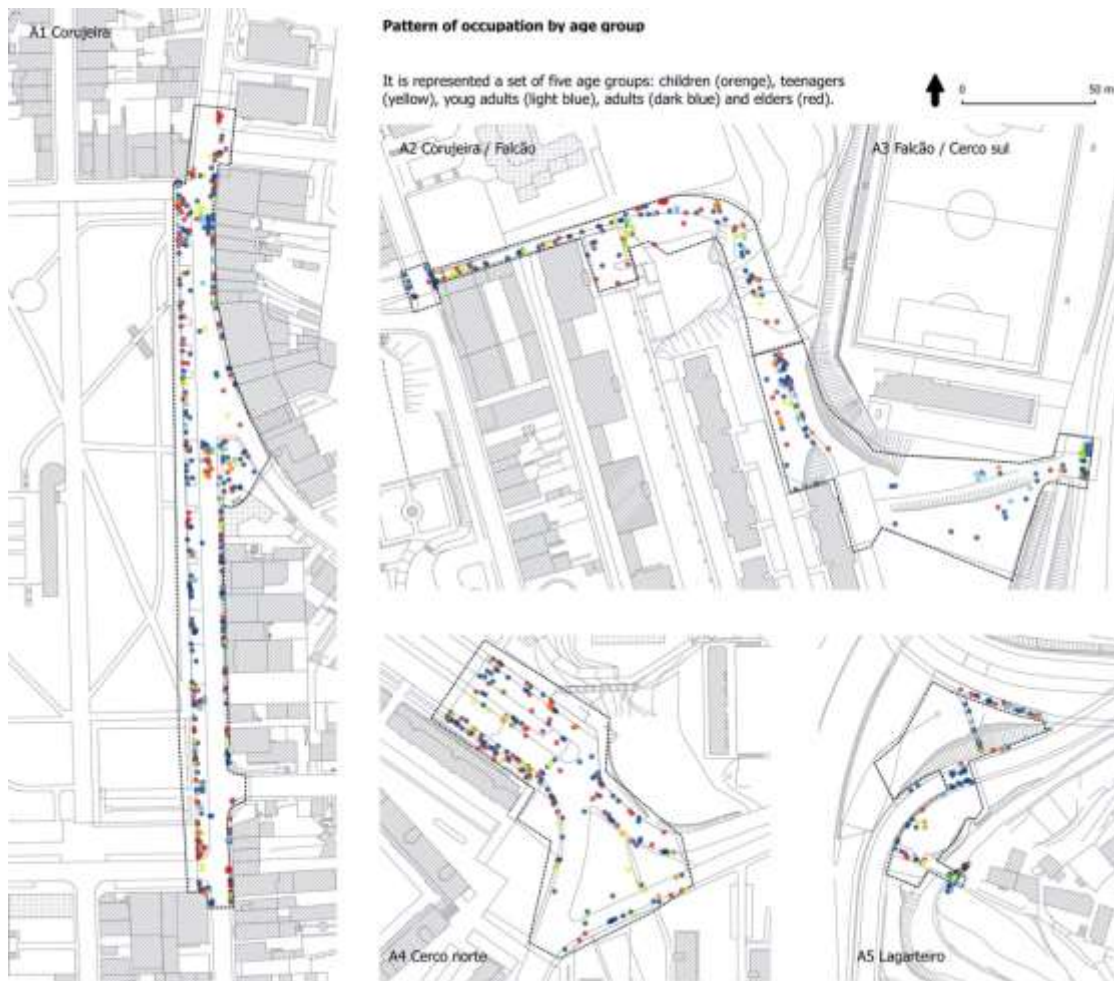


Figure 155. Pattern of occupation by age group. Source: UTAD

		Observation area					Total
		Corujeira	Corujeira/ Falcão	Falcão/ Cercosul	Cercosul norte	Lagarteiro	
Mobility	No limitation	377	116	81	169	141	884
	Bags and weights	56	25	22	53	10	166
	Physical disability	9	0	0	3	0	12
	Wheelchair	1	0	0	2	0	3
	Blind	0	0	0	1	0	1
	With baby	9	3	0	4	1	17
<b>Total</b>		452	144	103	232	152	1083

Table 13. Frequency crosstab between mobility and area of observation. Source: UTAD

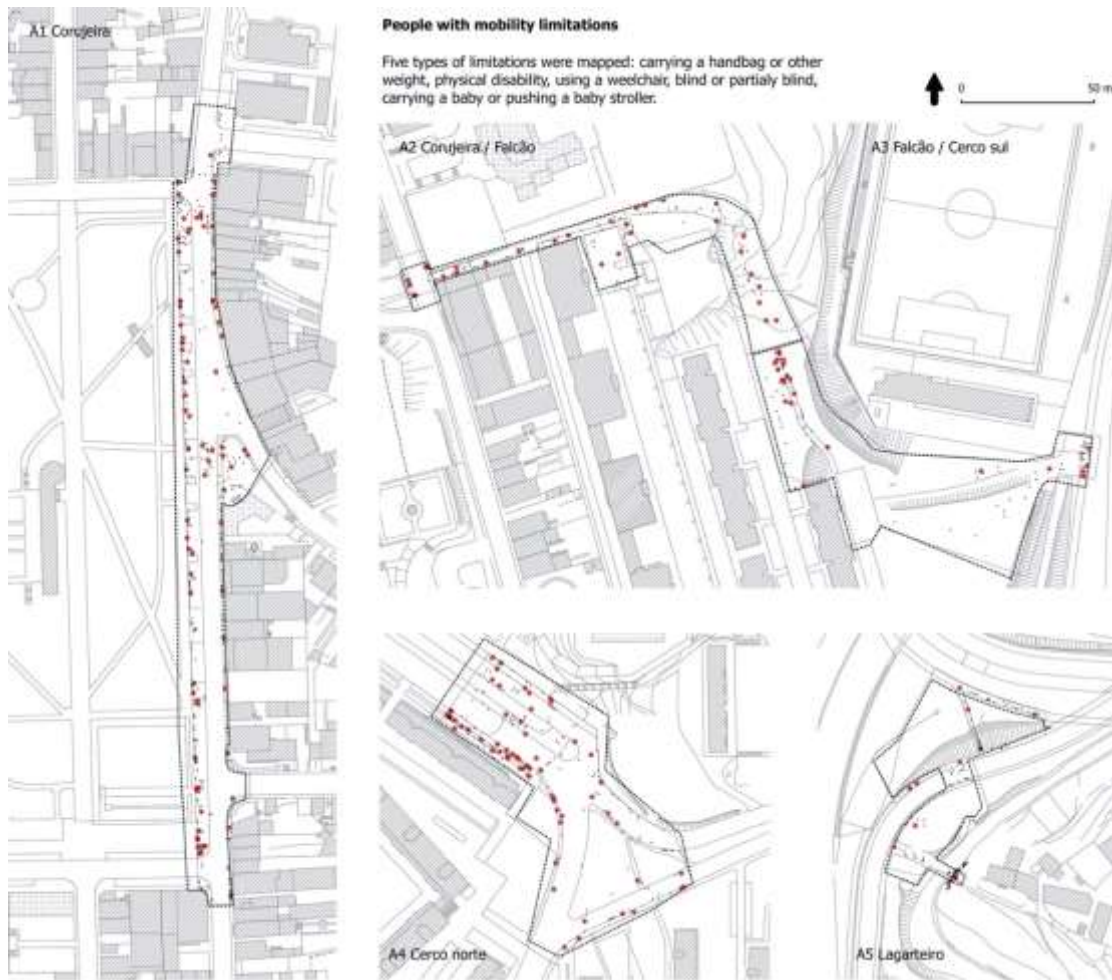


Figure 156. Pattern of occupation of people with mobility limitations. Source: UTAD

The last subject reports to mobility (Table 13 and Figure 156), which evidences the mapped users that revealed some sort of limitation. The great majority (81,6%) were not limited at all; and the second most relevant variable relates to people carrying bag or other weights. Every other are under 2%. Both in *Corujeira/Falcão* and *Falcão/Cercosul*, the proportion of people carrying weights is much higher than in the other cases (the proximity of a supermarket, the school and the urban allotment garden, might be the reasons).

### 3.2 Synthesis per area

- *A1 Corujeira*

The general pattern of occupation, as presented in Figure 145, reveals the major concentration of users on every corner of the square. The northern corner of *Corujeira* is the most occupied and along the street there are three more hotspots. The corner with *Corujeira de Baixo* street, close to the *Campanhã* district office, further south close, around the bus stop; and at the corner with the south street of *Corujeira* square.



Figure 157. Site photography. Left: sidewalk along the Corujeira square, showing a dog walker; right: street view, showing the availability of parking lots and the lower level commercial use of the buildings. Source: UTAD

Along the sidewalk, adjacent to *Corujeira* square, the significant visible inflow is due not only to the garden uses, but also to the services and commerce that are on the other side of the street (Figure 157). Also, because of the large number of parking lots, it was noticed that people tend to migrate there, either to go in or out of the parked cars. As it is one of the more diverse streetscapes among the five areas of observation (garden / street / services / commerce / housing), it is also worth noting that, apart from the general walkers, it is a place where there were several people walking a pet. All in all, most of the use is related with street crossings, going out/in to the parked cars, going in the park, going to the services and commerce along the street, or related to walking a dog.

- *A2 Corujeira/Falcão and A3 Falcão/Cerco sul*

In the general view, the use of the upper part of the corridor (*A2 Corujeira/Falcão*), tends to be influenced by the access to the inner neighbourhood of *Falcão*, to the allotment gardens, as a shortcut leading towards the *Cerco* and *Lagarteiro* regions, and walking is by far the major mean of mobility. The lower part of the corridor (*A3 Falcão/Cerco sul*) is also used majorly to access the neighbourhood, as a shortcut, although there are signs of recreational walking, has it is a wither views site that permits prospect (Figure 158).





Figure 158. Site photography. Left: shortcut, showing the access from Falcão neighbourhood to the allotment gardens and to the school; right: shortcut linking Falcão neighbourhood to the Cidade de Leon Av., which also permits views towards the sports fields. Source: UTAD

Figure 145 shows the general pattern of occupation, which shows that people migrate more intensively close to the urban crossings of *Falcão St.* and *Av. Cidade de Leon*, with the exception of the central hotspot northeast of the *Falcão* neighbourhood. At this place there is a complex urban landscape, which seems to attract people (edge of the forest, sufficient open space and views, parking, good access from housing area). In fact, it seems that connections with housing areas or with other equipment (such as the allotment garden, views towards the school), favour concentration of people, whereas excess of open space, lacking composition and some compartmentation, seems to favour dispersal.

Overall in these areas, the use is mostly related with shortcutting between the neighbourhoods, and, although rare, it was possible to observe sports and recreational walking.

- ***A4 Cerco norte***

The major type of occupation found is related to the use of the street, walking along the sidewalks closest to the *Ilhéu* neighbourhood, accessing the stop and waiting for the bus, walking in or out the car park, and accessing housing areas.



Figure 159. Site photography. Parking lots along the St. Dr. José António Marques, and view towards the bus stop. The white buildings on the right are the northern façade of the Ilhéu neighbourhood. Source: UTAD

The *Dr. José António Marques* street is rather large and flat, and provides rather good accessibility conditions, thus resulting in a variety of different crossing points (Figure 159). The bus stop, although with not much area to stay, it seems to be conveniently placed. The green space, serving as crossing between the three streets is rather unoccupied which is consistent with the major pattern functional use of the site. In fact, the green space is not very appealing for recreational use as it is confined by traffic ways.

All and all, due to the predominant housing character in this area, people tend to migrate to the bus stop, street crossings and neighbourhoods' accesses. Although not very relevant it was also observed some people exercising and walking a pet.

- *A5 Lagarteiro*

Considering the occupation by people, the *Lagarteiro* area is very much polarized two distinct parts: a more rural setting (along N12 road, *Lagarteiro* street, that connects the greenway leading to Oriental park) which is intensively used by pedestrian and cyclists (it can be observed a very active use); and a rather urban setting (related to the *Cidade de Leon Av.*, in the northern end of the area), where the scenery is dominated by traffic roads and a steep slope, and people tend to migrate towards the bus stops and crossings, although the pattern of occupation is quite disperse (Figure 160).



Figure 160. Site photography. Left: shortcut, showing the access from Falcão neighbourhood to the allotment gardens and to the school; right: shortcut linking Falcão neighbourhood to the Cidade de Leon Av., which also permits views towards the sports fields. Source: UTAD

In the southernmost area, it is noteworthy the greenway added a new feature to the structural design. In the cartography taken to the field was not yet drawn that path along waterline.

Over all, these areas are where the active use is more diverse, which is related to the recently built greenway that connects to the park (recreational walkers, people jogging and cyclists are all seen here).



## 4.3.4 Socio-economic statistical analysis

### 4.3.4.1 Statistics Portugal: data from the national institute (INE)

The data to be collected at parish and neighbourhood level are almost the same collected at general, city level with a closer loop on the selected case study. The idea is to verify and assess if the urban profile is confirmed in the area or shows a better or worse performance in the selected neighbourhoods. Social data could be good in certain aspects, bad in others, offering a different scenario for the development of the NBS solutions as per URBINAT catalogue.

#### Demographic

When analysing indicators related to population density (Figure 161), we observed in some neighbourhoods DomusSocial, that there is a value above the normal one compared to the values of the study area. In these neighbourhoods we observe a higher population density, which is proportional to the number of residents living in these places given the types of housing that are located in these sections with a smaller area at the level of statistics.

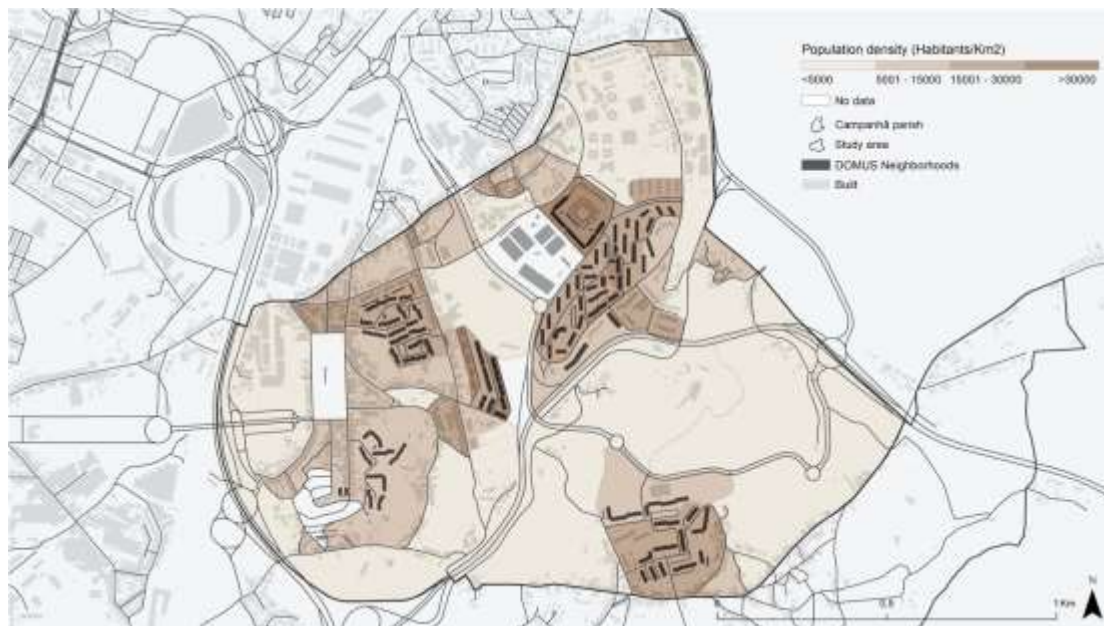


Figure 161. Demographic data and age pyramid: Population density (Habitants/Km2). Source: INE adapted by CEIS20

When analysing indicators related to the resident population, there is a great correlation for the highest rates of resident population for males and women in the social neighbourhoods of DomusSocial (Figure 162), so we can still see that the indices for both genders are similar. We still observe, that in the majority there is a greater concentration of population in the DOMUS neighbourhoods compared to the other residential area in the study area.

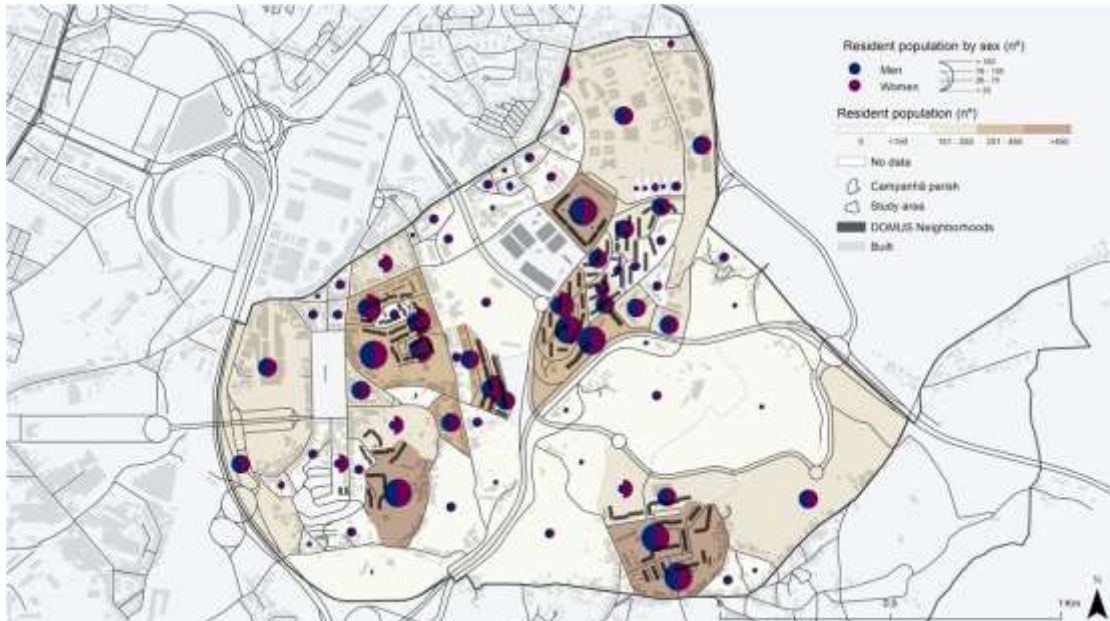


Figure 162. Demographic data and age pyramid: Resident population by sex: men and women. Source: INE adapted by CEIS20

Based on the resident population (Figure 163), in the age group of the resident population between 0 and 14 years of age, we found that the study area has a population of at least 15% of the population among these age groups. In the DomusSocial neighbourhoods we see a bigger growth of resident population with the values being between 16% and 30%.

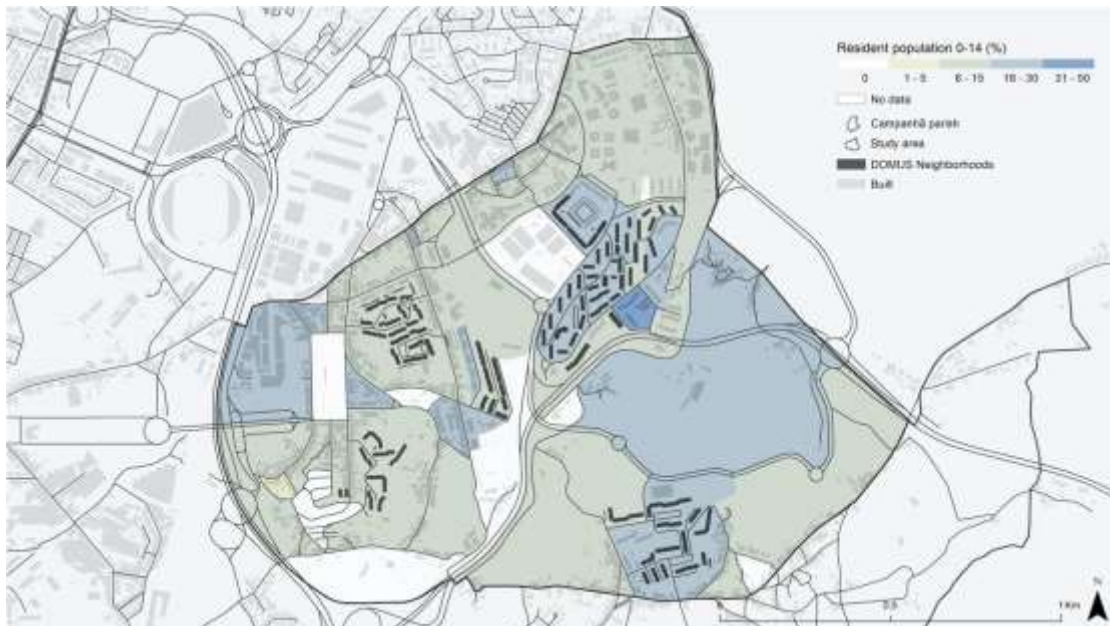


Figure 163. Demographic data and age pyramid: Resident population by age groups: 0-14 years. Source: INE adapted by CEIS20

Based on the resident population (Figure 164), in the age group of the resident population between 15 and 24 years of age, we found that the study area has a population of at least 15% of the population among these age groups. In the DomusSocial neighbourhoods we see a bigger growth of resident population with the values being between 16% and 30%.



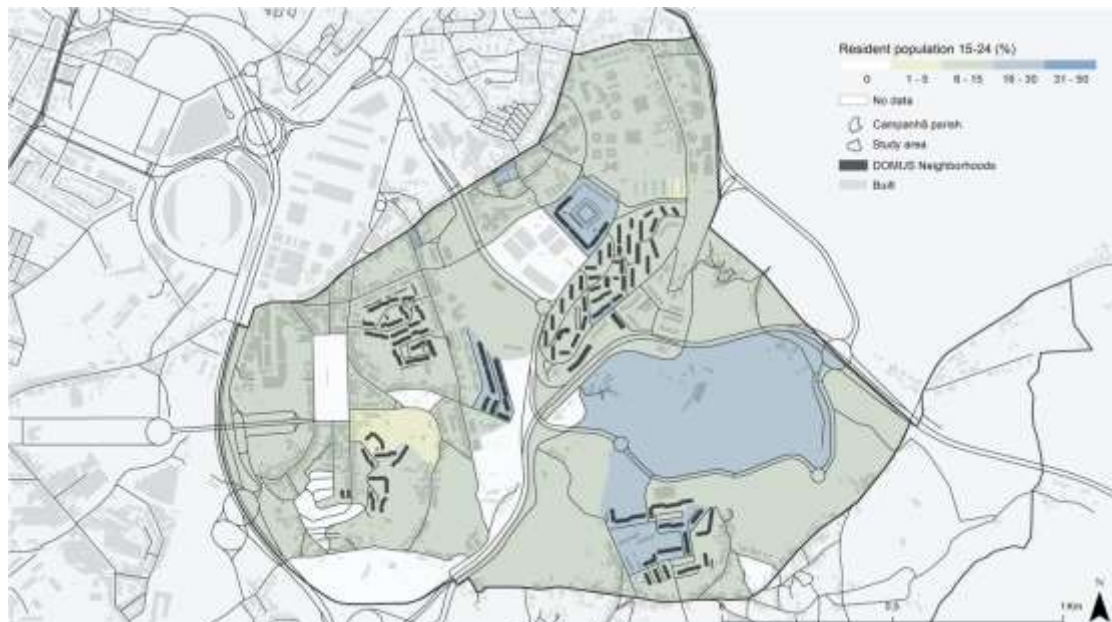


Figure 164. Demographic data and age pyramid: Resident population by age groups: 15-24 years. Source: INE adapted by CEIS20

Based on the resident population (Figure 165), in the age group of the resident population between 25 and 64 years of age, we found that the study area has a population of at least 50% of the population among these age groups. In the neighbourhoods DomusSocial we see a normal growth of the resident population, we no longer see a big difference of younger population.

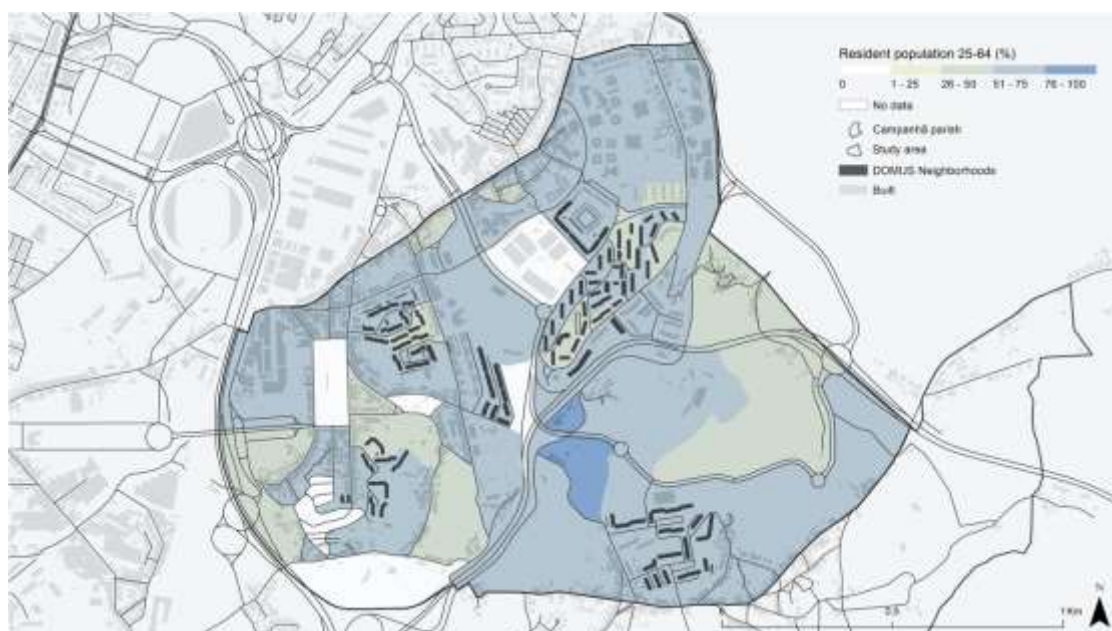


Figure 165. Demographic data and age pyramid: Resident population by age groups: 25-64 years. Source: INE adapted by CEIS20

Based on the resident population (Figure 166), in the age group of the resident population above 65 years of age, we found that the study area has a population of at least 26% of the population among these age groups. In the neighbourhoods DomusSocial we verify the existence of a population predominantly younger in relation to the normal growth of the resident population, we do not observe another great difference of population more aged.

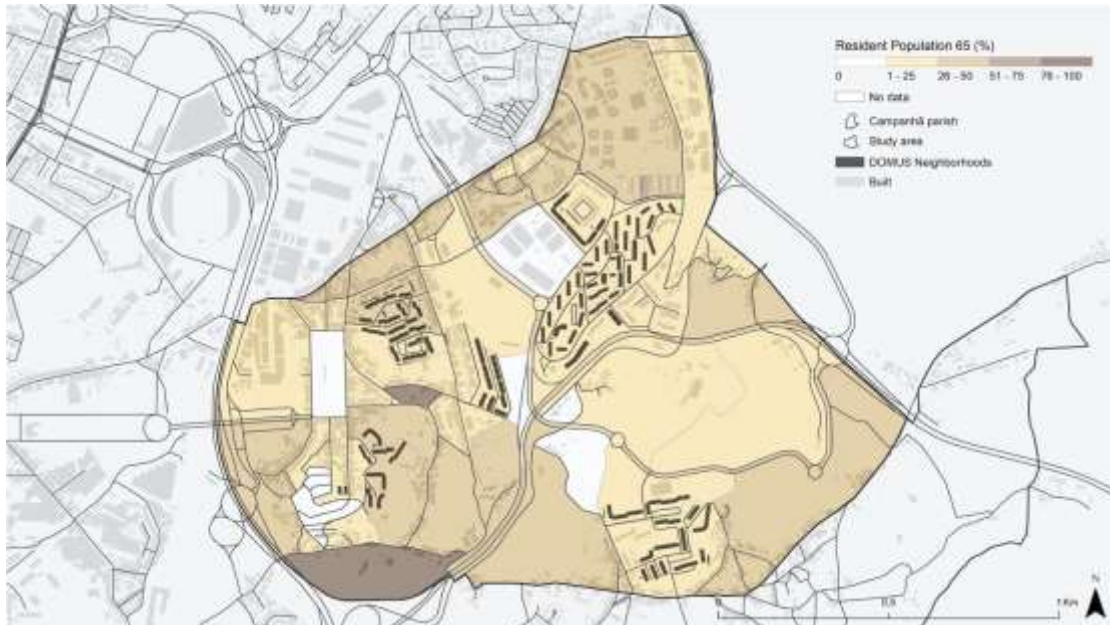


Figure 166. Demographic data and age pyramid: Resident population by age groups: 65 years above. Source: INE adapted by CEIS20

The growing trend towards the ageing of the population (Figure 167), is evident with the transformation of the characteristics of the population, due to improvements in living conditions, health care and health care, demonstrating important reflexes in the process of reducing mortality and progressively extending average life expectancy, resulting in an increase in age classes at the top of the pyramid. In the DomusSocial neighbourhoods, men have a higher rate of aging in some sections when compared to women. On average there are more women than men. In order to summarise the previous maps, we observe the indicator of the ageing index that has as average 287 elderly for 100 young people, a value that leads to an aging population.

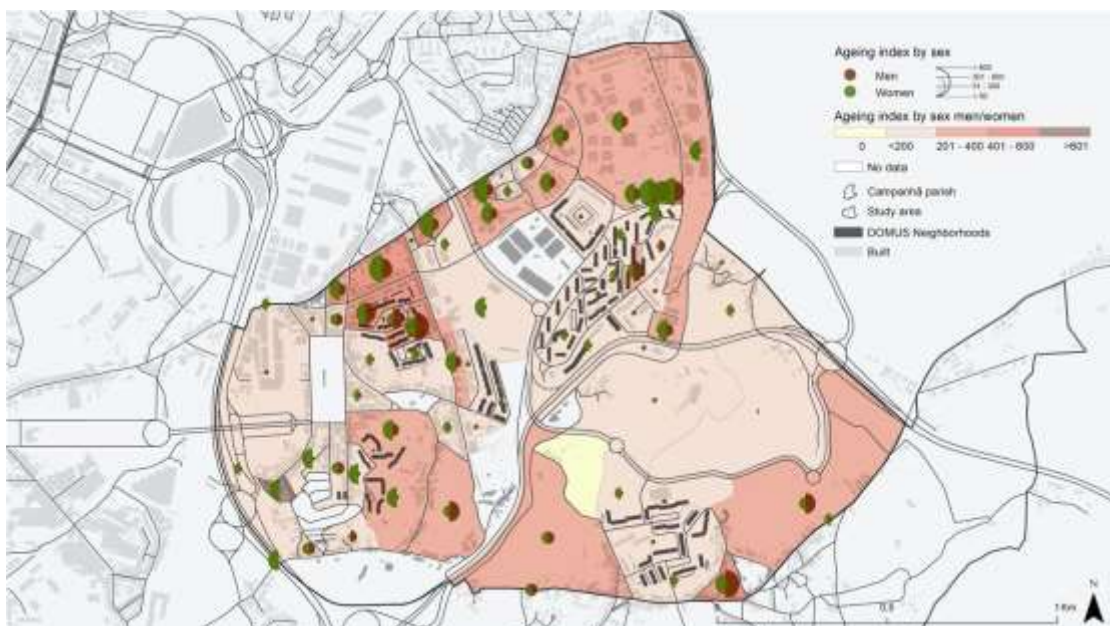


Figure 167. Demographic data and age pyramid: Ageing index by sex. Source: INE adapted by CEIS20



Reading the results of the dependency index (Figure 168), also helps to reflect on the need to define active policies with respect to the population. Looking specifically at the DomusSocial neighbourhoods, it is remarkable that there are more dependent on men than women, with an average of 51% to 75%.



Figure 168. Demographic data and age pyramid: Age dependency ratio by sex. Source: INE adapted by CEIS20

### Cultural/Ethnic diversity

As noted by Alves (2017), “Portuguese constitution allegedly does not allow citizens to be accounted for according to race, colour, or religion”, and therefore census data from Statistics Portugal (INE) are not broken down by ethnicity. Though not existing official statistics, findings of studies conducted in Portugal give relevant information, estimating 40 570 individuals of Gypsy/Roma origin in Portugal, of which near 40% living in non-classical housing (Castro 2013 *apud*. Alves 2017).

### Education/Literacy

In the case of the illiterate population (Figure 169), we observe a small number of residents who are illiterate, at most this value lights up to 25%. As we can observe in green, the value of 0% represents something very positive, demonstrating that in this area there are sections where all individuals are literate.



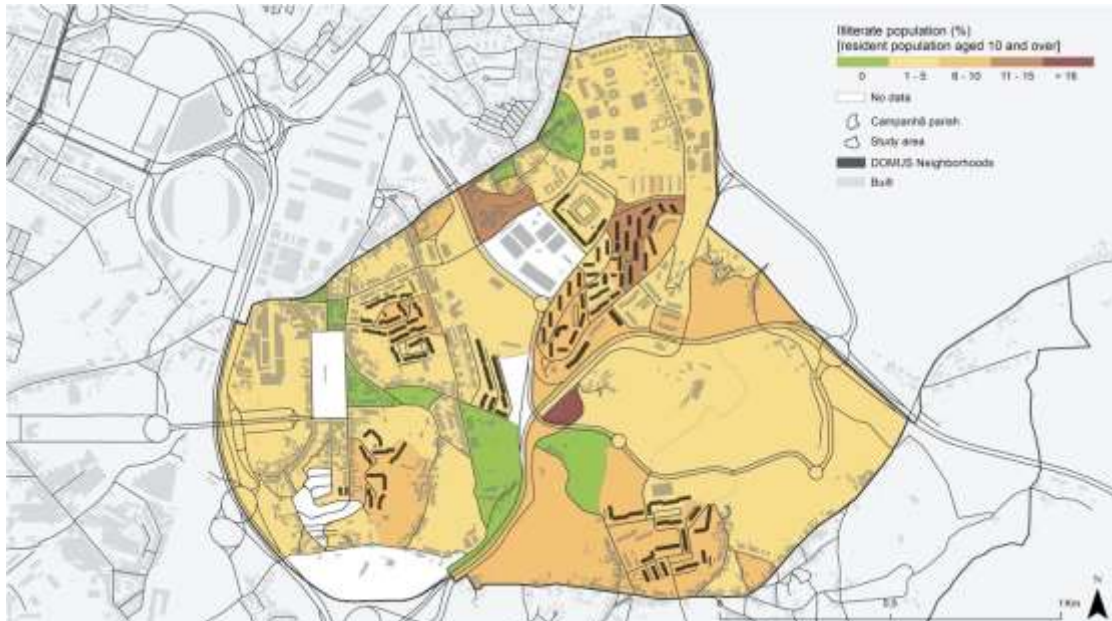


Figure 169. Education/Literacy: Illiterate population [resident population aged 10 and over]. Source: INE adapted by CEIS20

For the study area, based on the level of education, we found population with basic education (Figure 170) to be around 50% in its majority and some sections with values above 75%. The blank values represent the absence of data given the type of land occupation.



Figure 170. Education/Literacy: Population with Basic Education. Source: INE adapted by CEIS20

For the study area, based on the level of education, we found population with secondary education (Figure 171) to be around 30% in its majority and some sections with values below 10%. The blank values represent the absence of population who did not attend secondary education.

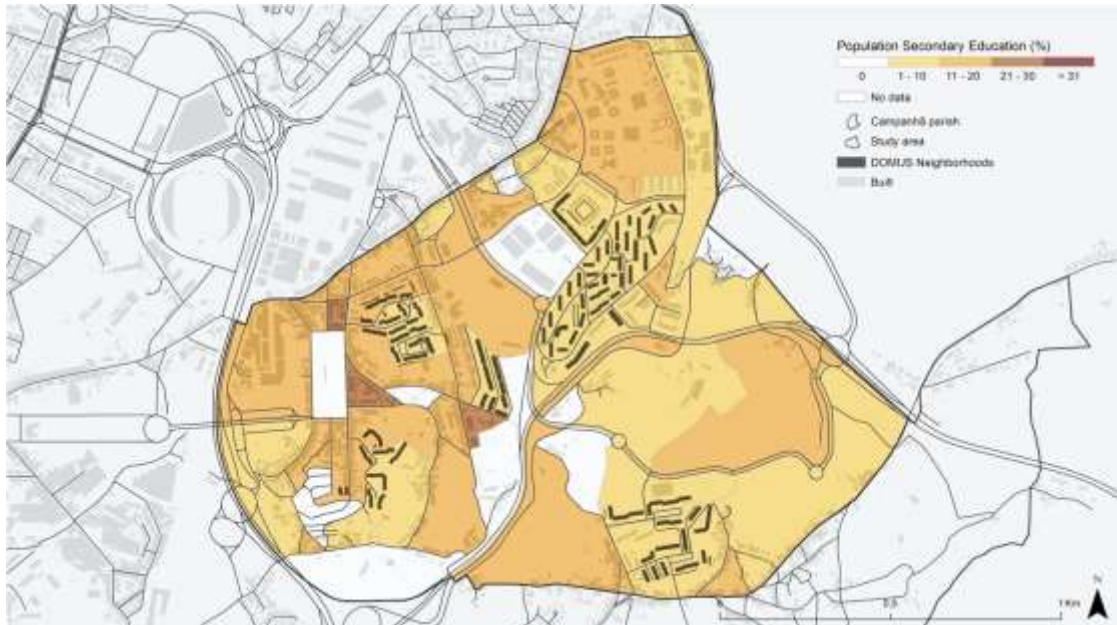


Figure 171. Education/Literacy: Population with Secondary School. Source: INE adapted by CEIS20

For the study area, based on the level of education, we found population with higher education (Figure 172) to be around 30% to 50% in its majority and some sections with values below 15%. The blank values represent the absence of population who did not attend higher education. On the other hand, we observe in some sections that there is a resident population with all levels of education complete, that is, from the basic to the higher education.

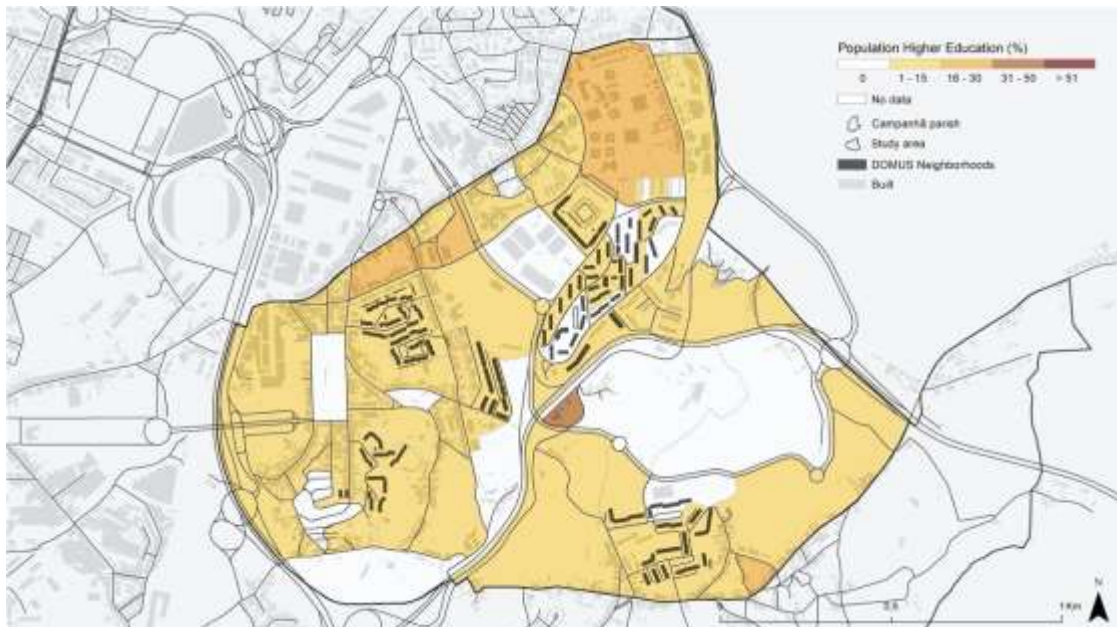


Figure 172. Education/Literacy: Population with Higher School. Source: INE adapted by CEIS20



## Housing conditions

The buildings that were built up to 1919 represent old farmhouses or small dwellings (Figure 173). Occupation in space is limited to small buildings scattered in the study area without any organization in space. Only in four small subsections do buildings occupy more than 75%.

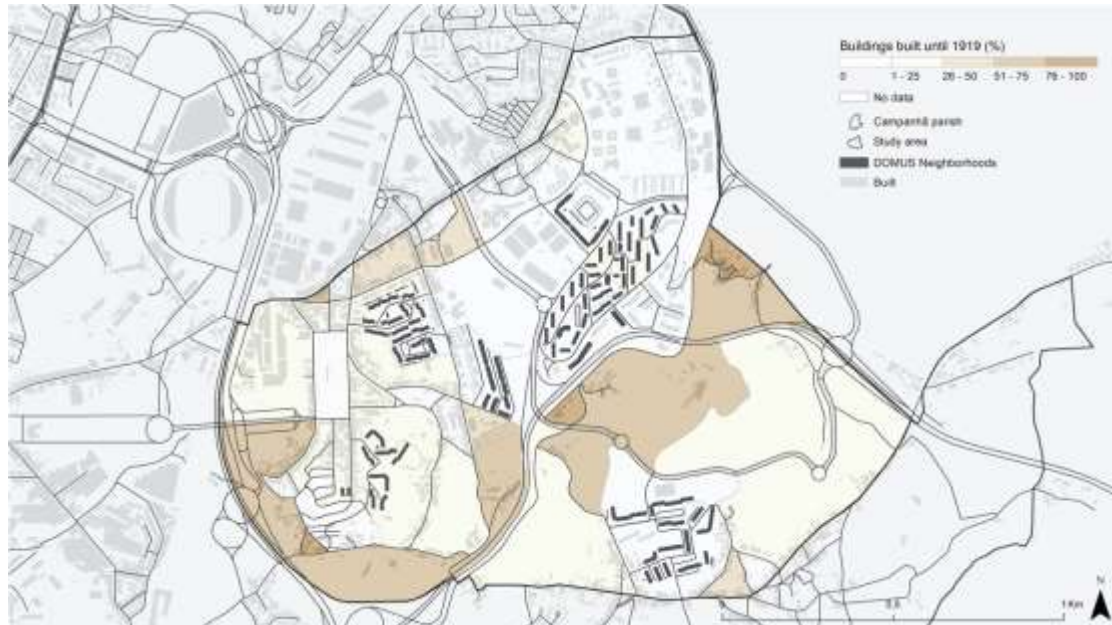


Figure 173. House conditions: Buildings built until 1919. Source: INE adapted by CEIS20

Between the years 1919 and 1960 several buildings were built (Figure 174), during 61 years there was a more significant evolution in the surrounding areas of the DomusSocial neighbourhoods, where there was an increase of built in the order of 75% to 100%.

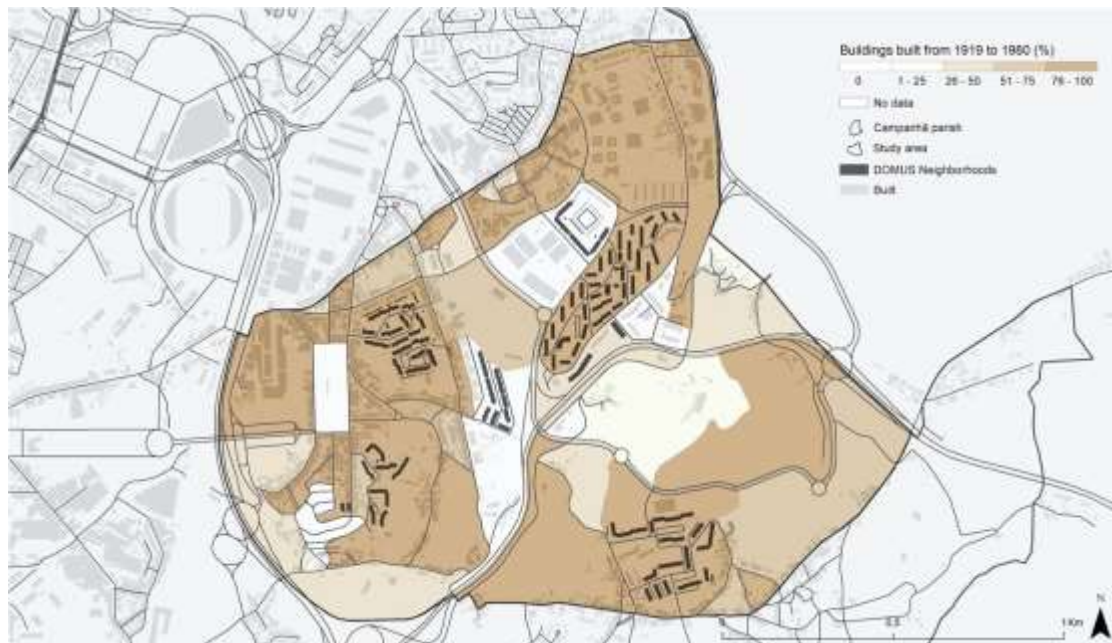


Figure 174. House conditions: Buildings built until 1919 to 1980. Source: INE adapted by CEIS20

Between 1981 and 2000 few buildings were built (Figure 175), in this period the great part of the built was already built. Again, in the areas closest to the DomusSocial neighbourhoods there was construction in those sections above 50%.

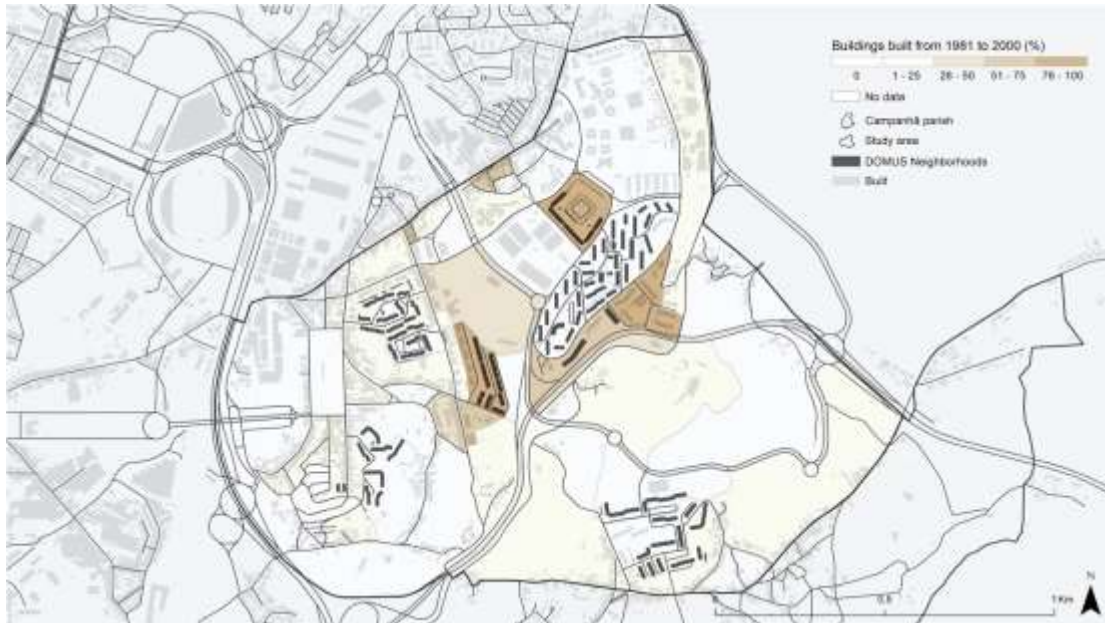


Figure 175. House conditions: Buildings built until 1981 to 2000. Source: INE adapted by CEIS20

After the year 2000 (Figure 176), following the logic already mentioned above, less and less we see some kind of construction. In this case, we see a reinforcement of construction in only a few places, where the development of that section did not exceed 50% of buildings built.

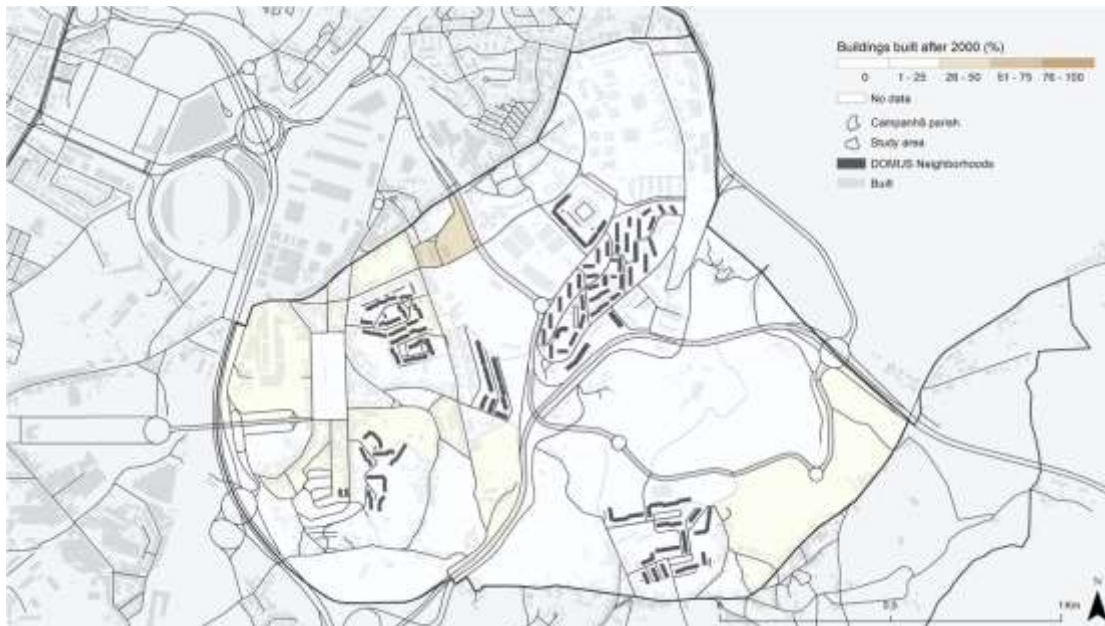


Figure 176. House conditions: Buildings built after 2000. Source: INE adapted by CEIS20

In the case of buildings that are exclusive for residence (Figure 177), we observe that in our study area (almost all sections have an occupation above 75%, and some of them are 100% occupied by residences) we are clearly in a large residential area.



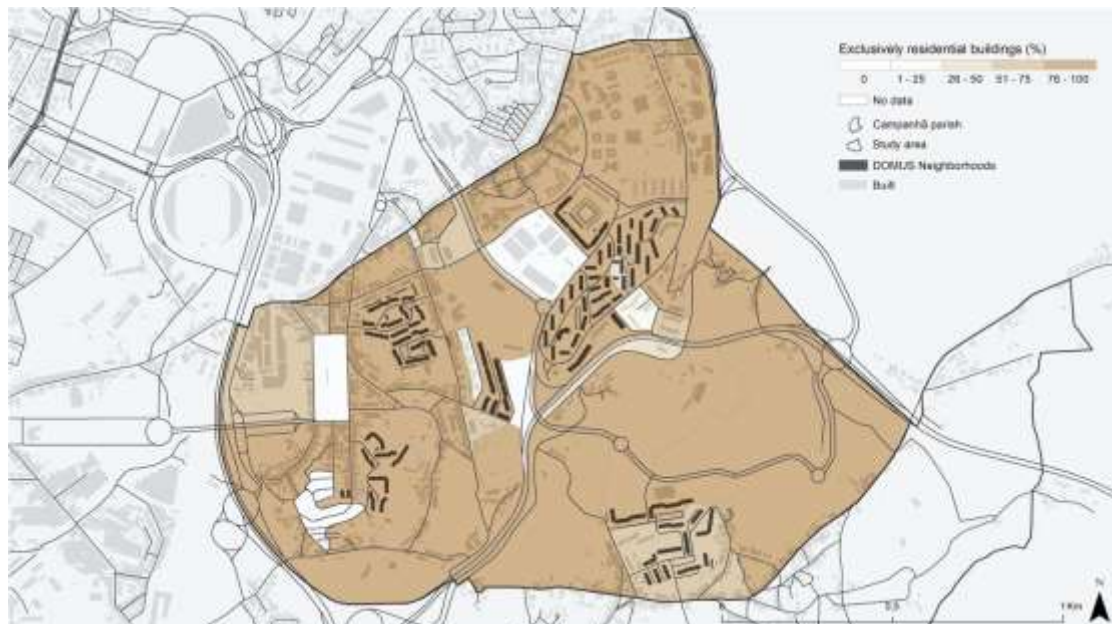


Figure 177. House conditions: Exclusively residential buildings. Source: INE adapted by CEIS20

There is a clear opposition when comparing the mainly non-residential buildings (Figure 178) with the previous image. In this case we observe a representation of only some sections with some buildings dedicated to services or with another type of occupation different from the residential one.

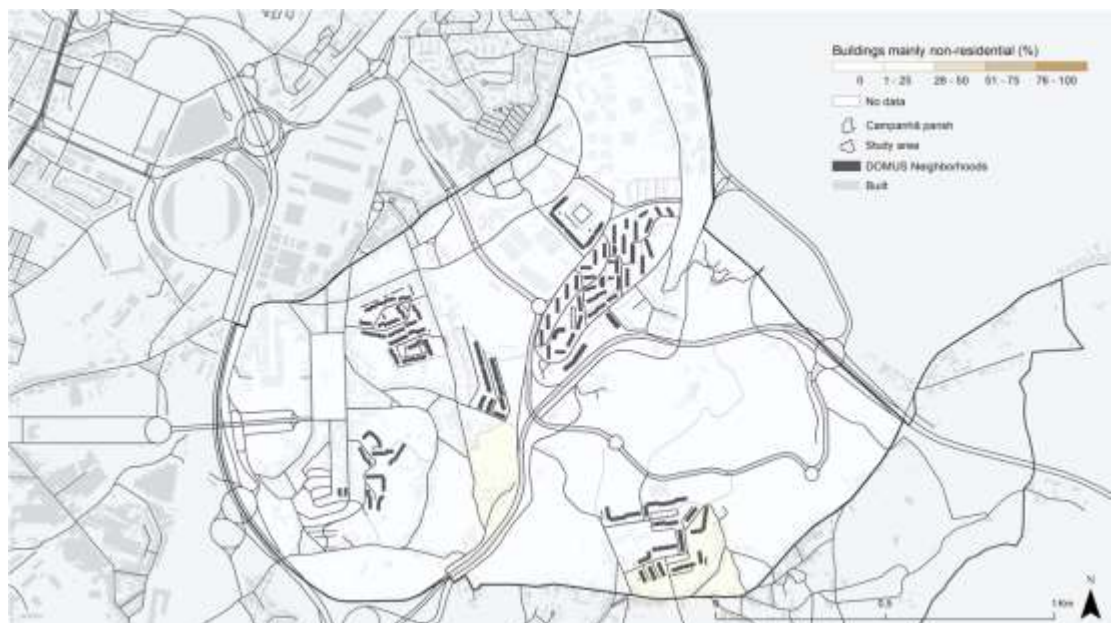


Figure 178. House conditions: Buildings mainly non-residential. Source: INE adapted by CEIS20

When we discuss the conditions in the dwellings (Figure 179), it is possible to observe a high number of residences without bathtub or shower facility. When we relate to the conditions of the residences without a toilet or piped water, we verify in these data the percentages in most of the indicators are between 0%, or less than 25%. In this case, the data were collected through the national census for the year 2011, where we observed many old constructions in the study area. With the data update, the new census of 2021 is expected a new reality, in addition to which the Housing Bases Act of 2019 (Portugal, 2019) defined the minimum requirements for housing qualification and many of these problems will disappear.



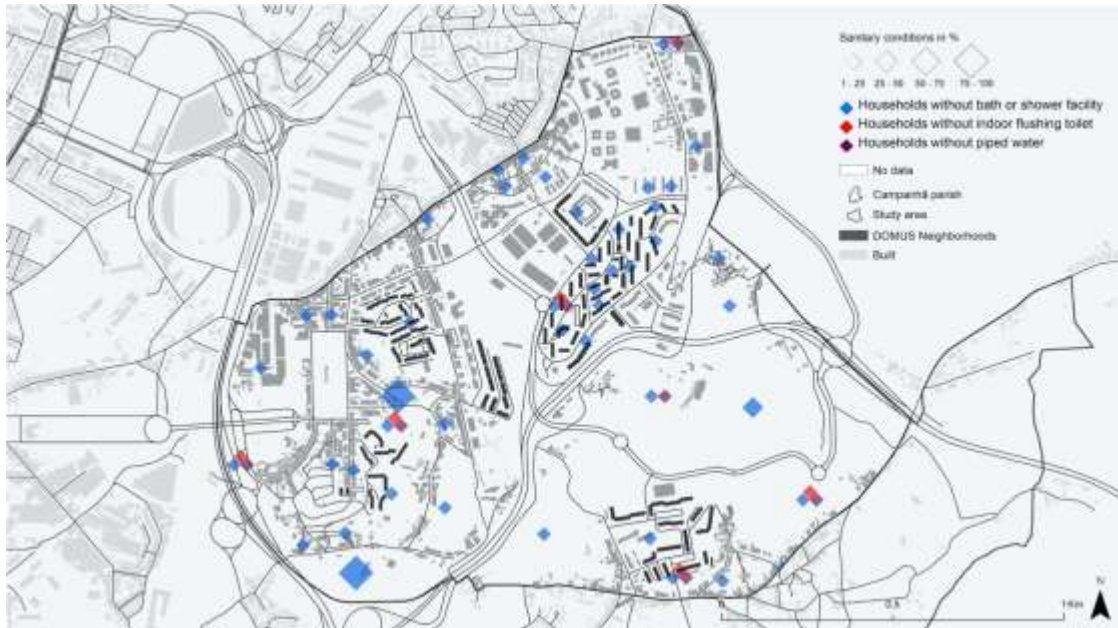


Figure 179. House conditions: Households without bath or shower facility, indoor flushing toilets and piped water. Source: INE adapted by CEIS20

When we discuss the density of accommodation (Figure 180), the density values vary according to the size of the section area and in smaller areas it is expected that there is a higher density of residential buildings. On the other hand, compared to the sections that have larger areas, these present a lower density as one would expect. In the DomusSocial neighbourhoods, we did not observe different analysis patterns, corroborating with the analysis that was described above for the general study area.

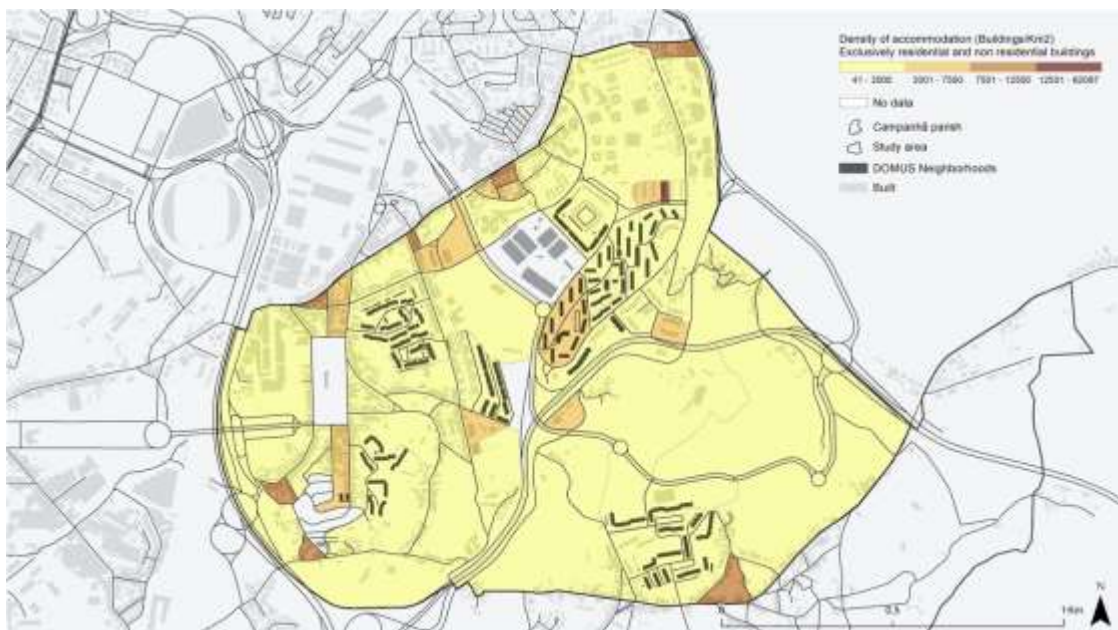


Figure 180. House conditions: Density of accommodation. Source: INE adapted by CEIS20

### Migration rate and migration graphs

Pendulum movements (Figure 181), are of strategic importance in terms of the territorial dynamics and the quality of life of populations, with visible impacts on network management and transport systems, accessibility, labour market, social responses, reorganisation of collective equipment, and environmental quality of the territories. As regards the DOMUS neighbourhoods, the movements are in the average of 16 to 30

minutes, there are sections where these take 30 to 60 minutes and others longer than one hour.

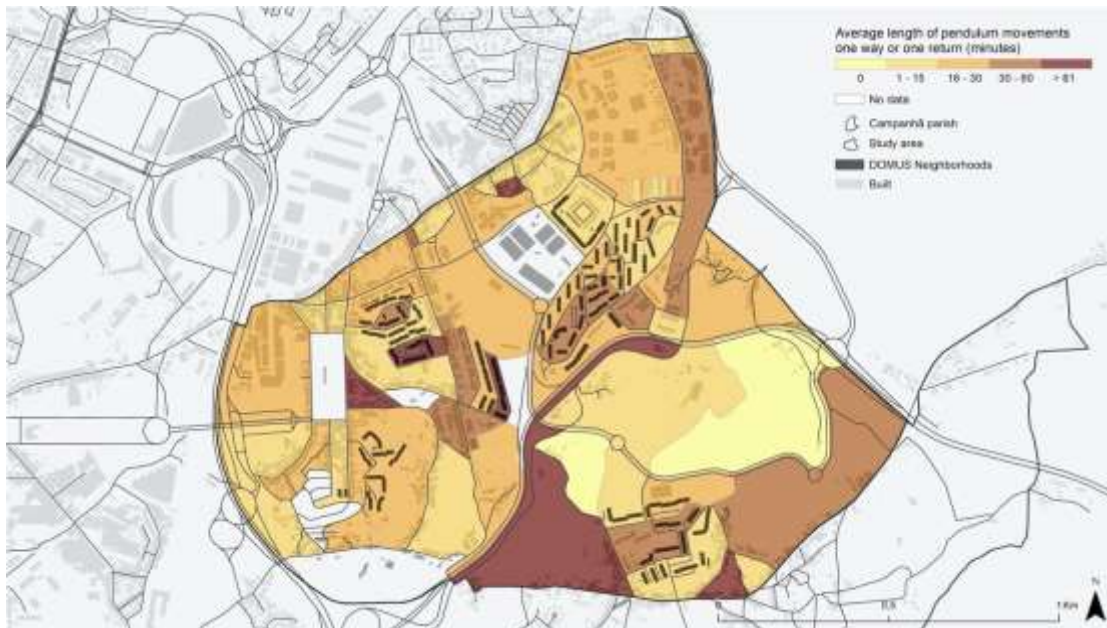


Figure 181. Mobility: Average length of pendulum movements. Source: INE adapted by CEIS20

In the indicator, populations that uses the automobile in the displacements, the use of individual transport (Figure 182), is now dominant in travel due to work or study, and most people in the study area (between 76 and 100%) use the car when travelling as a driver.

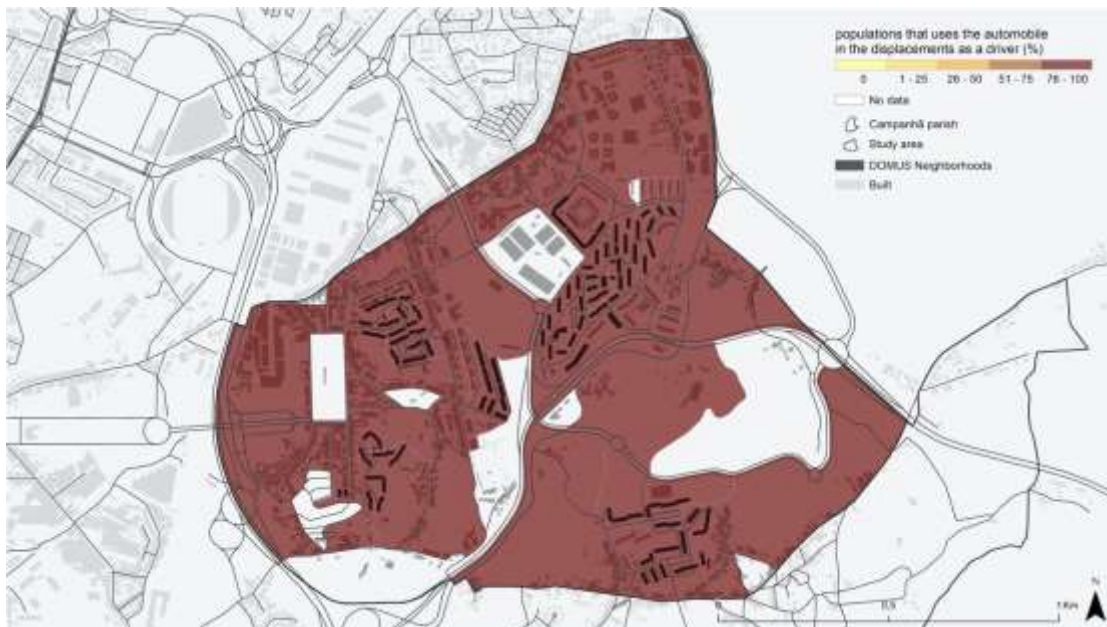


Figure 182. Mobility: Populations that uses the automobile in the displacements. Source: INE adapted by CEIS20

Analysing the existing population in the DomusSocial neighbourhoods, it is concluded that between 76 and 100% of the individuals use the car when traveling as a passenger (Figure 183). In turn, in the study area, the number of individuals moving in this way ranges from 1 to 50%.



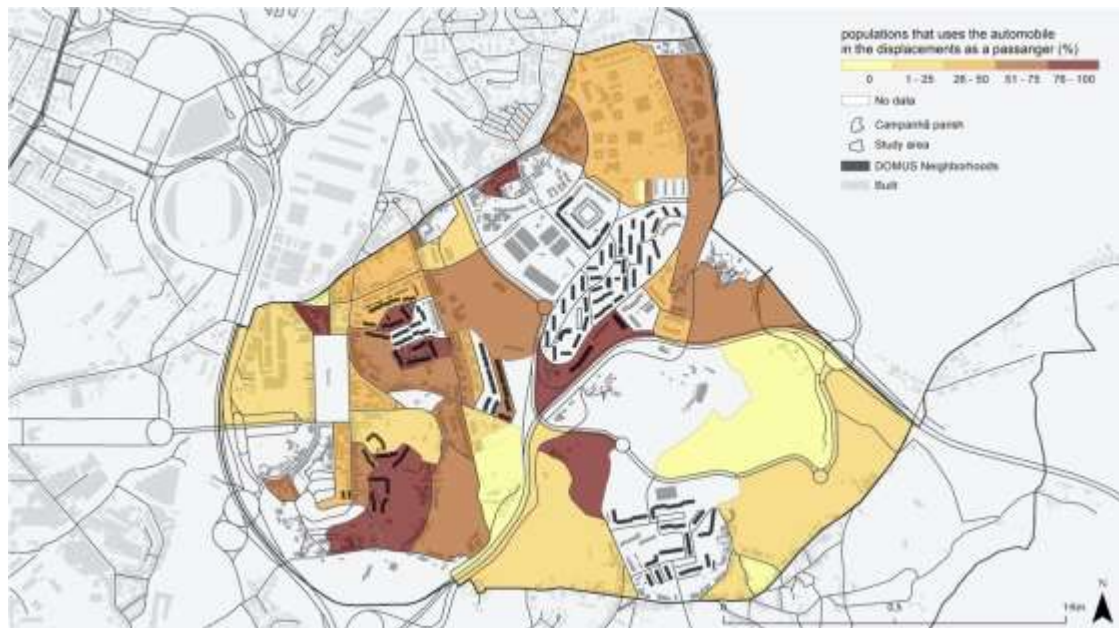


Figure 183. Mobility: Populations that uses the automobile in the displacements as a passenger. Source: INE adapted by CEIS20

Based on the analysis of the population using the mode of travel on foot in the study area, about 16 to 30% of people use this medium to the detriment of others (Figure 184). In more detail in the DomusSocial districts, in most sections only 16-30% use this mode of travel, and there are also sections where about 31-45% of people travel on foot.

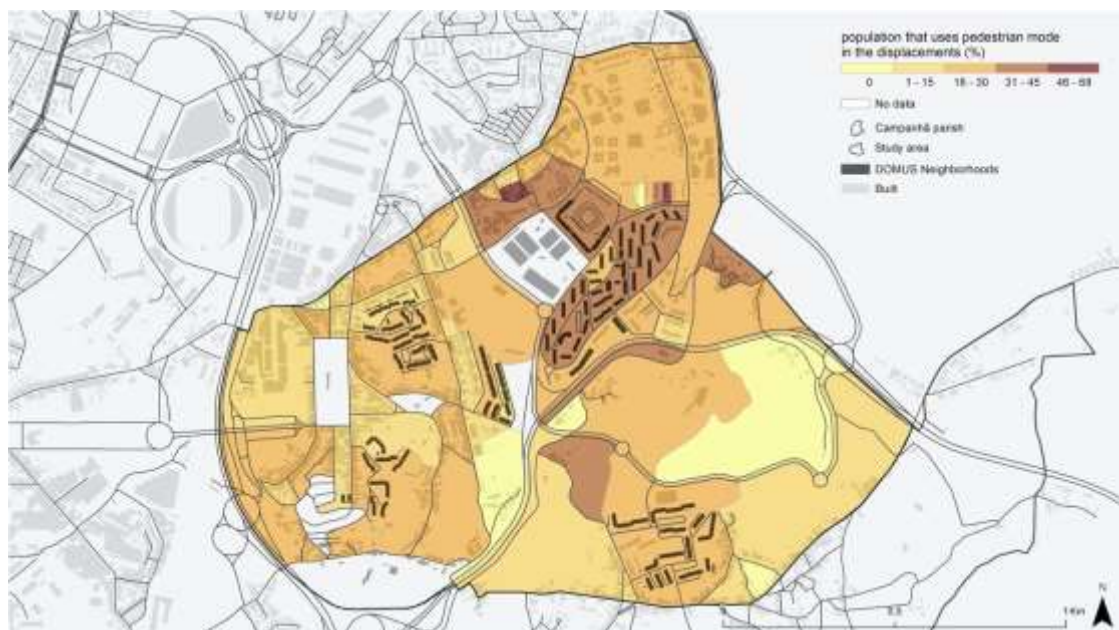


Figure 184. Mobility: Population that uses pedestrian mode in the displacements. Source: INE adapted by CEIS20

### Families' description

In the case of institutional households (Figure 185), much of this information remains under statistical secrecy. This indicator shows the set of persons resident in a collective accommodation which, regardless of the relationship between them, observe a common discipline, are beneficiaries of the objectives of an institution and are governed by an entity within or outside the group.

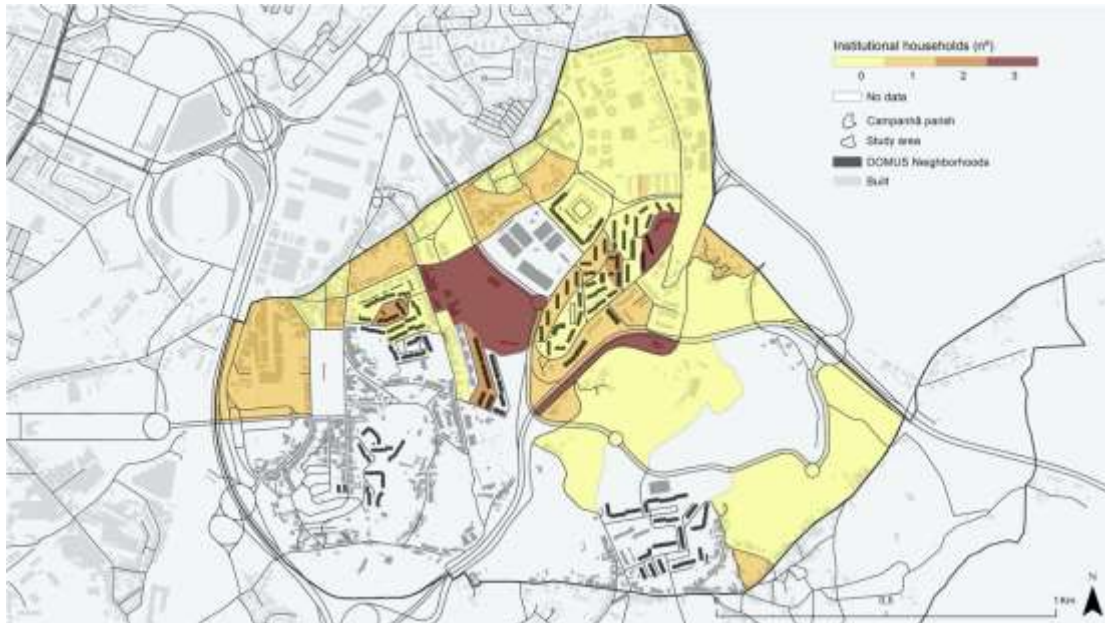


Figure 185. Families' description: Institutional households. Source: INE adapted by CEIS20

In the indicator of families with children (Figure 186), for the study area, we observed values that are on average higher than 50%, in this case in the areas of the DomusSocial neighbourhoods, these values may be above 75%.

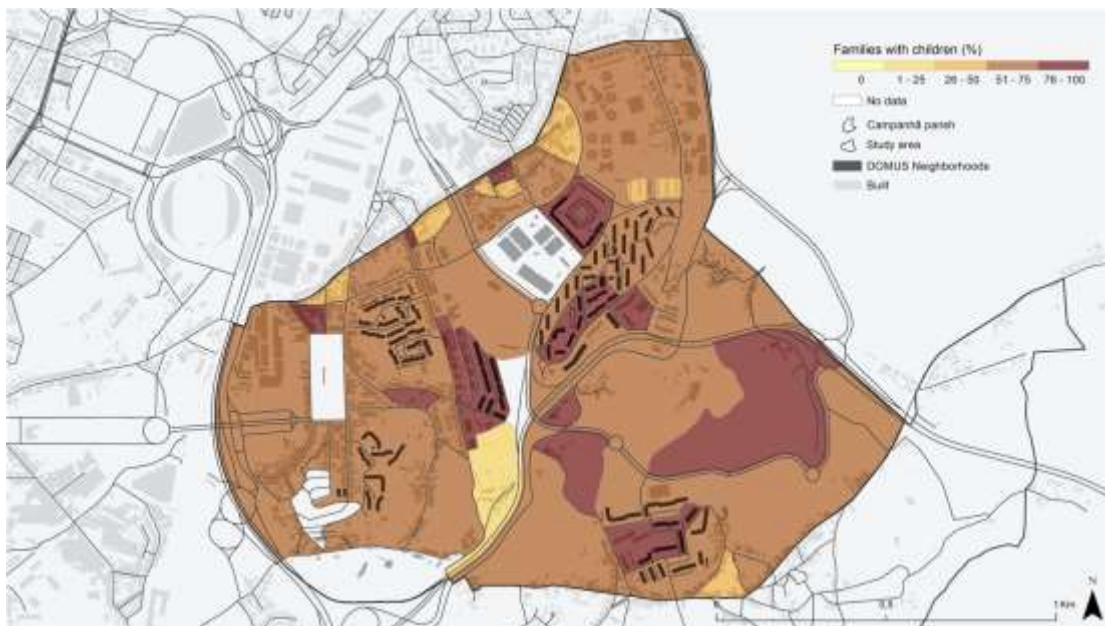


Figure 186. Families' description: Families with children. Source: INE adapted by CEIS20

In the indicator of single-parent families (Figure 187), we observed a family nucleus that integrates only one parent, parent or mother, with child(s), in which for the study area the values are represented between 1% and 25%. In the case of DomusSocial neighbourhoods, these values increase, being represented between 26% and 50%, demonstrating that there is some kind of need that must be considered.



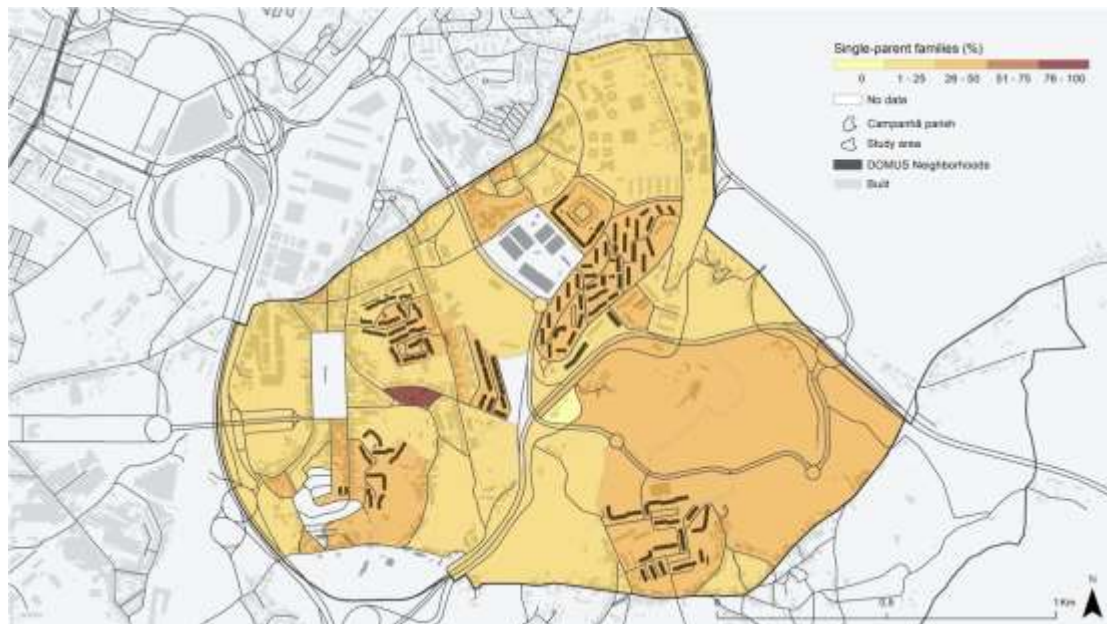


Figure 187. Families description: Single-parent families. Source: INE adapted by CEIS20

In the indicator of reconstituted families (Figure 188), we observe a family nucleus that consists of a couple "of law" or "de fact" (terms of marriage in Portugal) with one or more natural or adopted children, being at least one of them a child, only, of one of the members of the couple. In general, both in the study area and in the DomusSocial neighbourhoods, the values are concentrated between 1% and 10%.

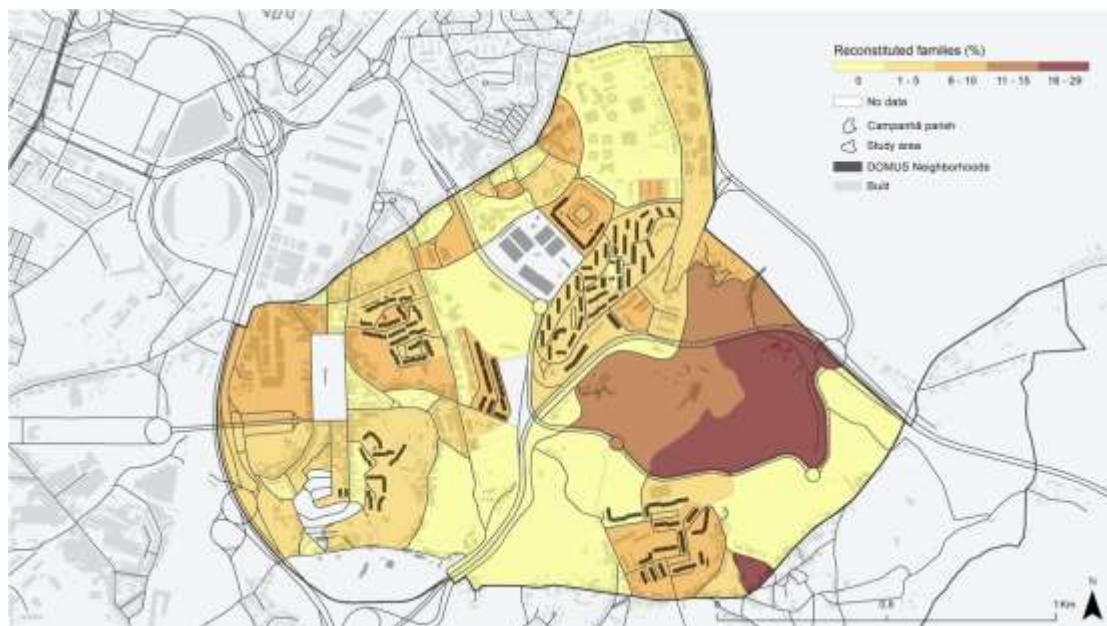


Figure 188. Families' description: Reconstituted families. Source: INE adapted by CEIS20

In this indicator we observe a proportion of one person private households with 65 years old or over (Figure 189), We observed the proportion of families of 1 person aged 65 years or older (%) in which the values in some cases do not exist because of statistical secrecy and in this case. In the part where the data is visible, we can find values on average between 5% and 15%.



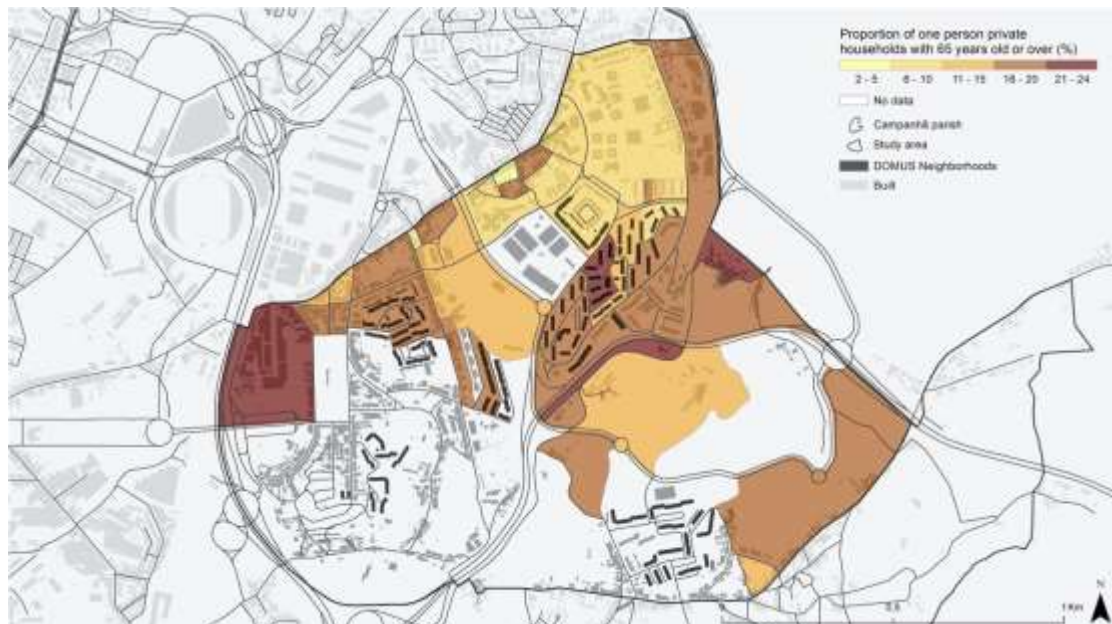


Figure 189. Families' description: Proportion of one person private households with 65 years old or over. Source: INE adapted by CEIS20

In the indicator of average number of children per couple (Figure 190), we observed a value of children greater than 2 in almost the entire study area, and the value in the DomusSocial neighbourhoods increases to 3 or 4, depending on the location of each statistical section.

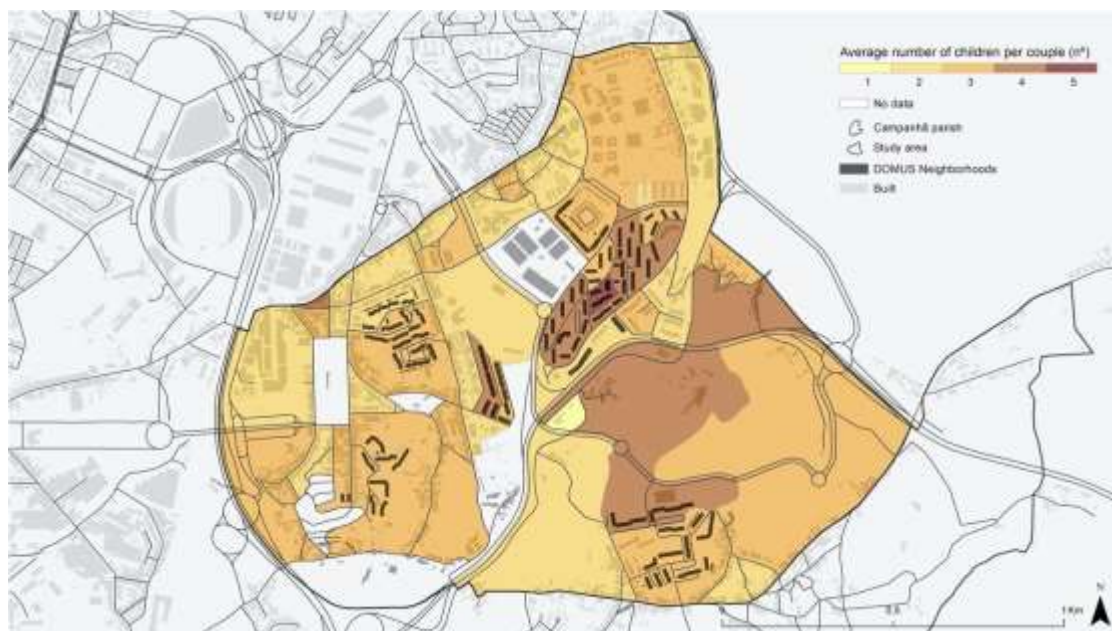


Figure 190. Families' description: Average number of children per couple. Source: INE adapted by CEIS20

In the indicator of families with 3 and more children (Figure 191), we observed in the DomusSocial neighbourhood, Cerco do Porto, we observe the greatest values of families that have 3 or more children in their family nucleus, this value can be higher given the most peculiar characteristics of this neighbourhood and the way it was constituted.

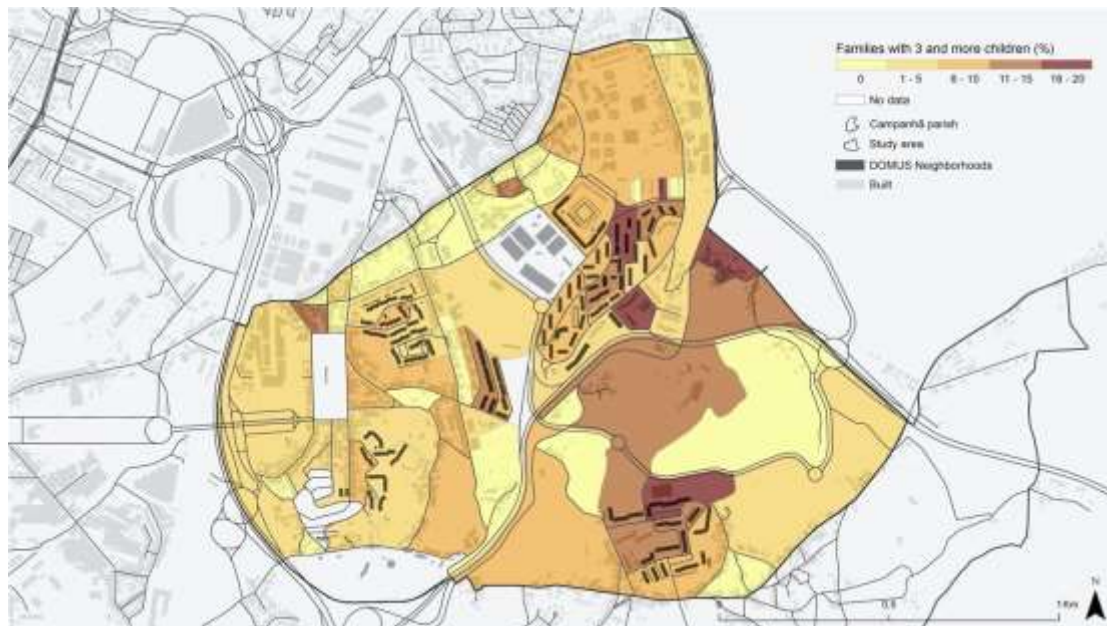


Figure 191. Families' description: Families with 3 and more children. Source: INE adapted by CEIS20

In the indicator of families in which an element of the couple is unemployed (Figure 192), we observed in some neighbourhoods DomusSocial, a higher value of one of the members of the couple who is unemployed, in some sections this value can reach up to 40%.

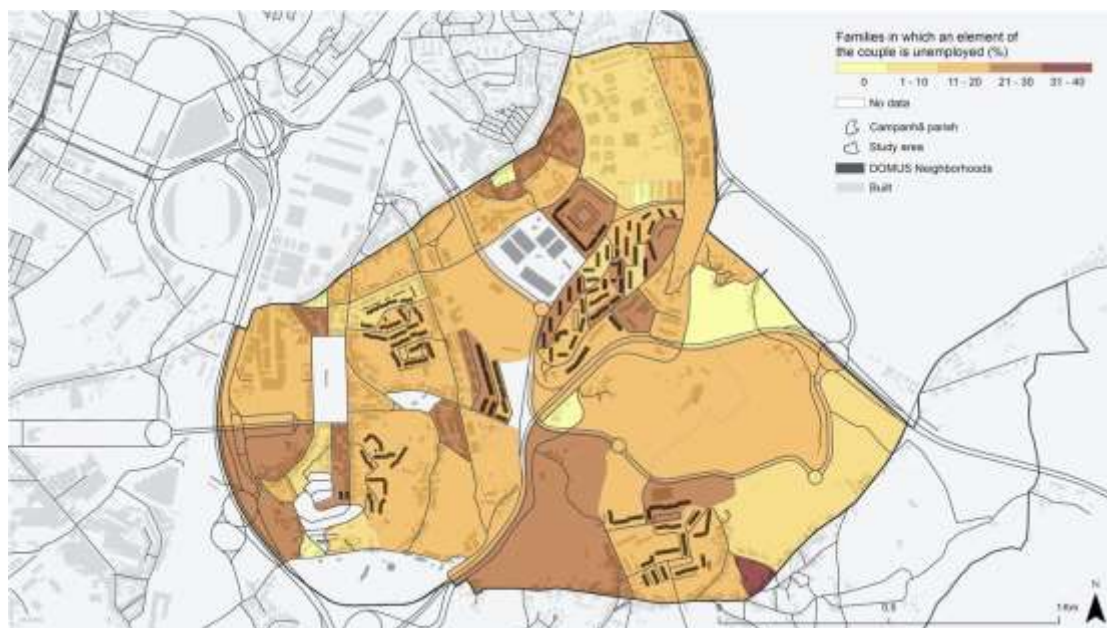


Figure 192. Families' description: Families in which an element of the couple is unemployed. Source: INE adapted by CEIS20

## Employment

From the map of the percentage of employees and unemployed (Figure 193), it is possible to verify a dynamic within the DomusSocial neighbourhoods, which translates into values between 50% and on average values of up to 80%. On the same neighbourhoods, when faced with unemployed data the situation is not positive, the area got generally high percentages of jobless people. However, in the general balance, the number of employees is higher than the unemployed.



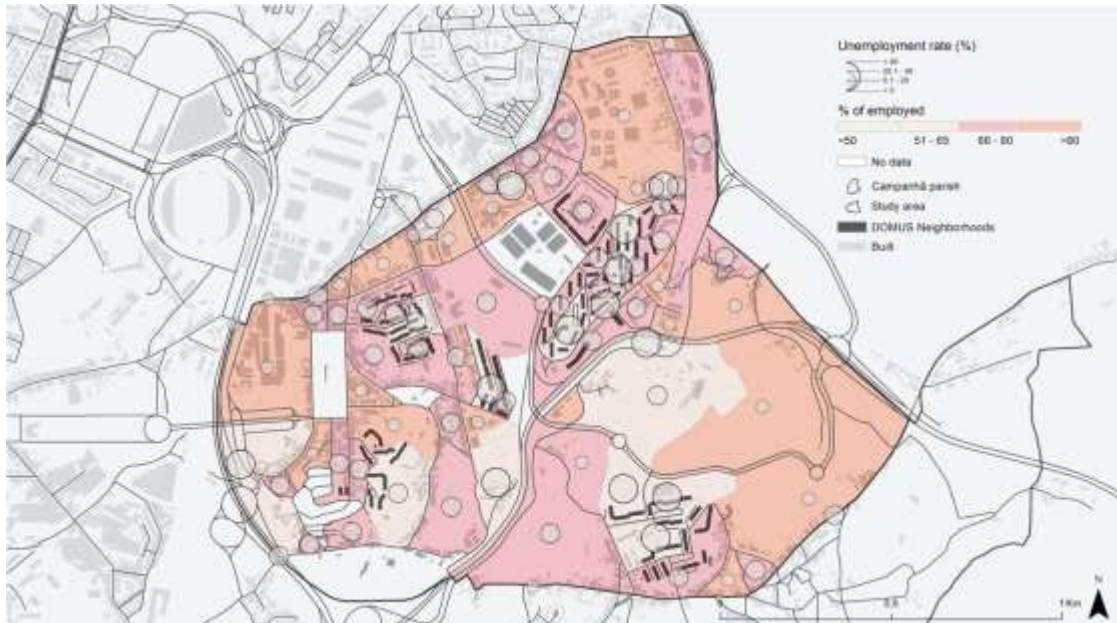


Figure 193. Employment: % employed and unemployed. Source: INE adapted by CEIS20

### Employees in the agriculture, social, services, industrial sectors

The resident population employed in the sector of agriculture, livestock, hunting and forestry (Figure 194) is little significant, we see that there are few residents working in this sector, because the values do not exceed 10%. A lot of the population living in this area works in other sectors of activity because there are many values with 0%.

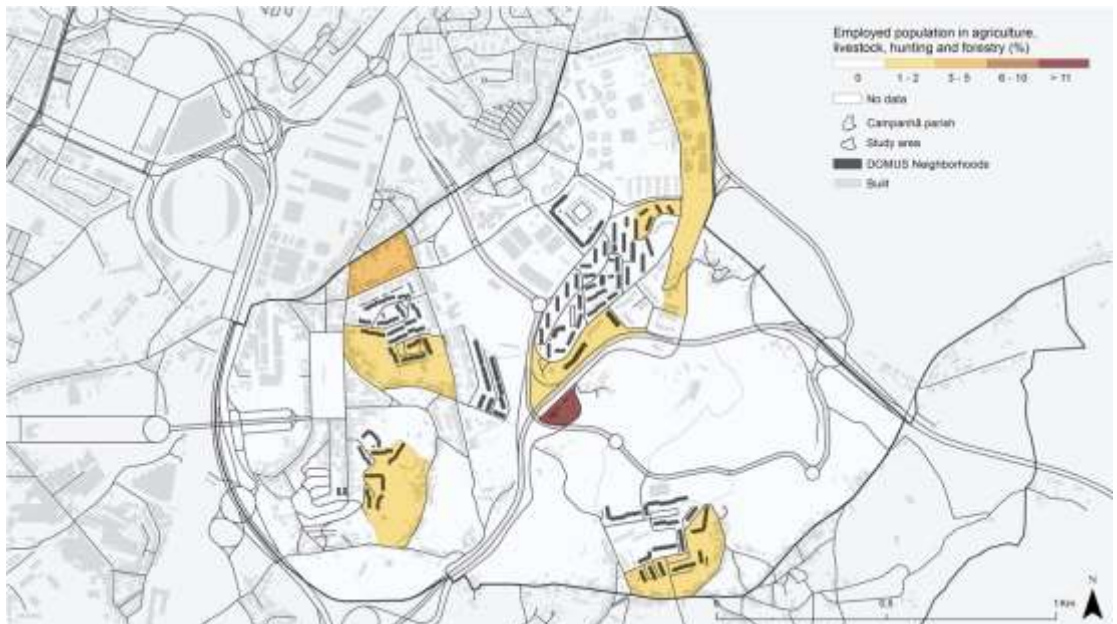


Figure 194. Employed population in agriculture, livestock, hunting and forestry. Source: INE adapted by CEIS20

The resident population employed in the industry (Figure 195) is more significant, we see that there are some residents working in this sector, because the values exceed 30% in general.

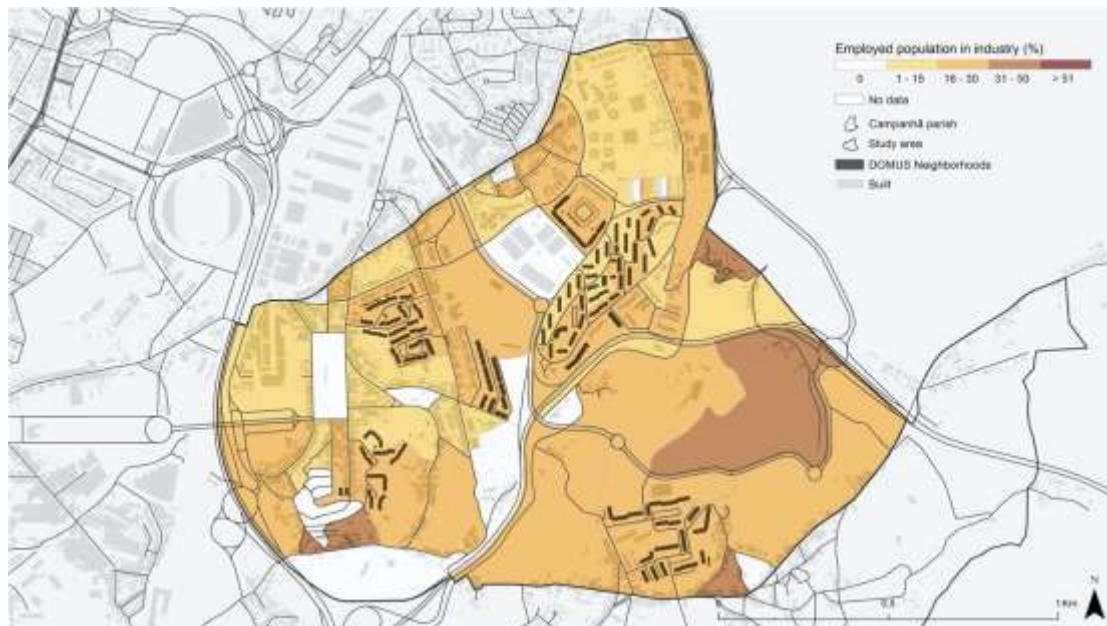


Figure 195. Employed population in industry. Source: INE adapted by CEIS20

The resident population employed in the services (Figure 196) is the most significant, we see that almost all of the residents are working in this sector, because the values exceed 75% in general. The diversification of the population employed is present in the study area, and the services are the ones that gather the most occupation.

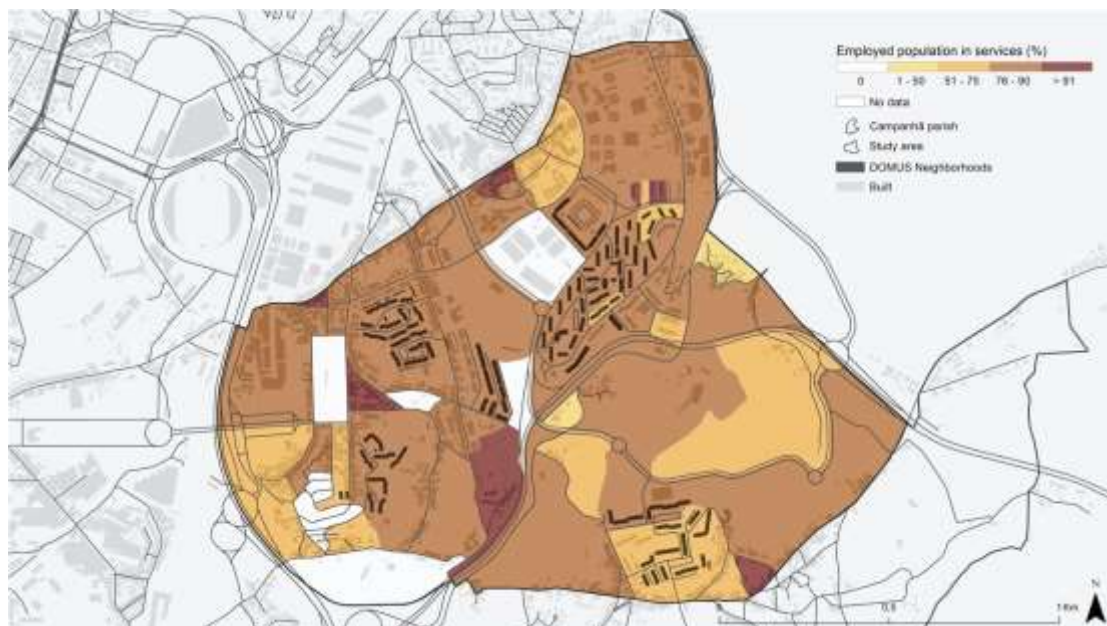


Figure 196. Employed population in services. Source: INE adapted by CEIS20

### Unemployment rate

In the indicator of youth unemployment rate (Figure 197), we observed in some DomusSocial neighbourhoods, a trend similar to that in the study area, where the values are usually between 30% and 50%. But there are exceptions, in some DomusSocial neighbourhoods these values differ and can reach values between 50% and 100%.



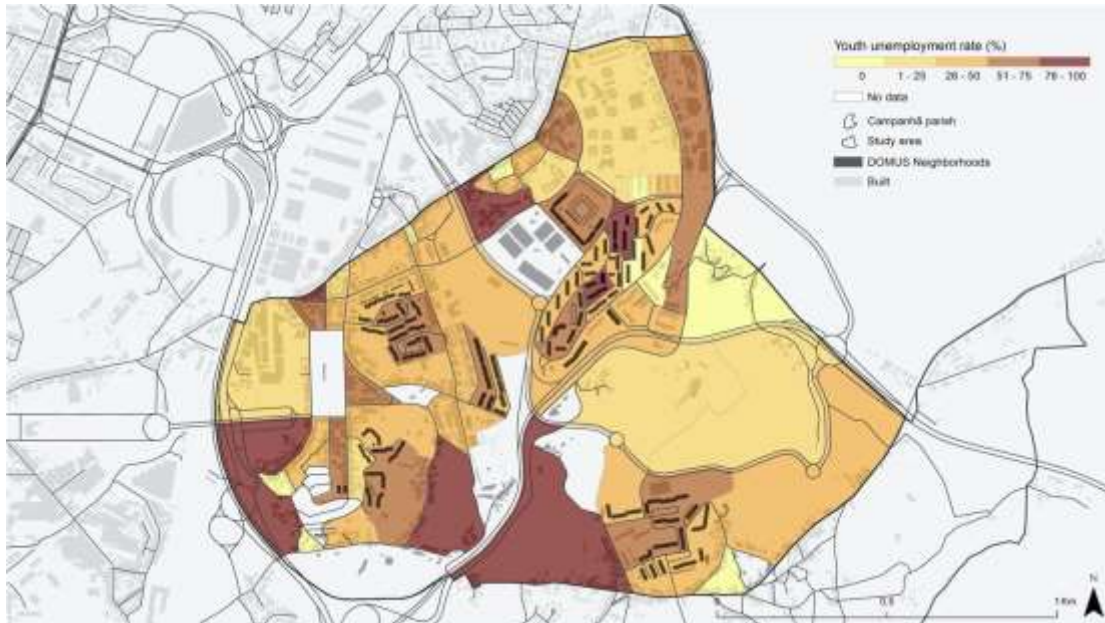


Figure 197. Unemployment rate: Youth unemployment rate. Source: INE adapted by CEIS20

Domus Social: data from the municipal housing company

## Demography

### ○ Demographic description

Lagarteiro, Falcão and Cerco do Porto neighbourhoods, in the parish of Campanhã, represent 15.4 % of the municipal dwellings for social rental in the city, corresponding to 15.3 % of the municipal tenants and 15.7 % of the residents in public municipal housing in Porto.

Regarding the three neighbourhoods focused in this project, population density is as follows in Table 14.

Cerco do Porto	0.088 km <sup>2</sup>   2 036 residents   23 136 inhabitants per km <sup>2</sup>
Falcão	0.050 km <sup>2</sup>   1 285 residents   25 700 inhabitants per km <sup>2</sup>
Lagarteiro	0.048 km <sup>2</sup>   1 173 residents   24 438 inhabitants per km <sup>2</sup>

Table 14. Population density in the three neighbourhoods. Source: DomusSocial database (30-06-2019)

About population dynamics, data on the three municipal neighbourhoods in the study area unveils an ageing population, as shown in Figure 198 and Figure 199.

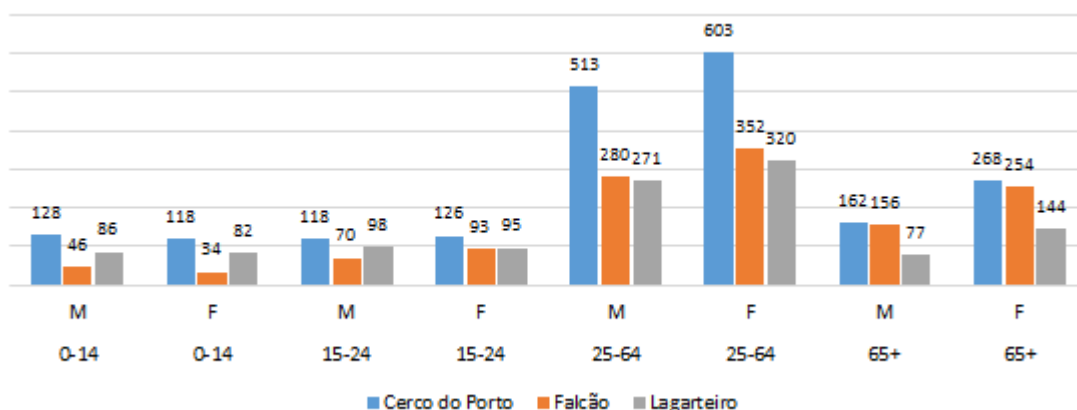


Figure 198. Cerco do Porto, Falcão, Lagarteiro: number of residents by age group and gender. Source: DomusSocial (BI Domus, 30-06-2019)

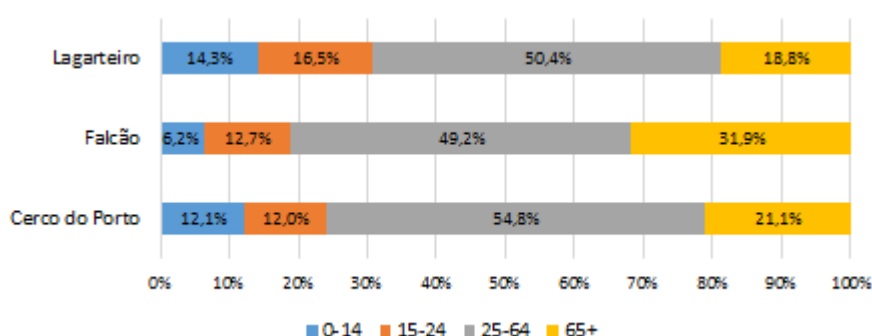


Figure 199. Cerco do Porto, Falcão, Lagarteiro: residents age group distribution (%). Source: DomusSocial (BI Domus, 30-06-2019)

In what concerns genders, same data shows more women (55.4 %) than men (44.6 %) living in the three municipal neighbourhoods (Figure 200). No data available regarding generations and life expectancy of the population living in municipal housing.

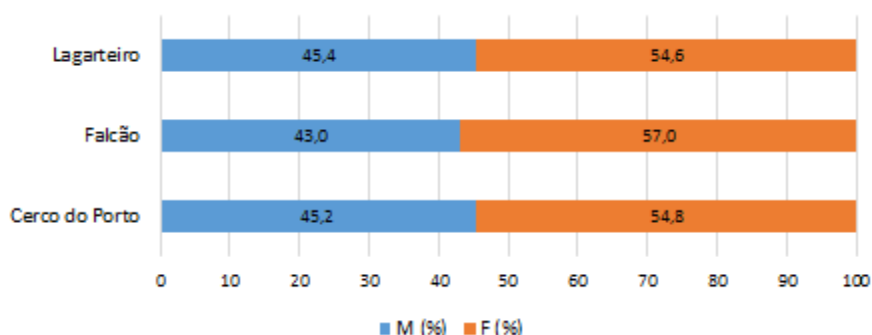


Figure 200. Cerco do Porto, Falcão, Lagarteiro: residents gender distribution (%). Source: DomusSocial (BI Domus, 30-06-2019)

#### ○ Presence of vulnerable groups in the area

The ongoing project *Porto Importa-se*, with the support of *Instituto Superior de Serviço Social do Porto* (ISSSP), is undertaking an ageing population survey in some social housing neighbourhoods in the area. Though not concluded, it has so far identified 206 residents isolated over 70 years of age and 39 couples over 75 years of age (05/2019).

Information on vulnerable groups (e.g. isolated elderly people, one-parent families or disabled people) may also be provided by DomusSocial data. Among this information, relevant data for the characterization of vulnerable groups rely on lone parent families,

isolated people and grandparents with children, taken as more vulnerable to the risk of poverty than other groups (Table 15).

Cerco do Porto	Lone parent families: 193   Grandparents with children: 11   Isolated people: 236
Falcão	Lone parent families: 195   Grandparents with children: 8   Isolated people: 92
Agrup. Habit. do Falcão	Lone parent families: 45   Grandparents with children: 4   Isolated people: 31
Lagarteiro	Lone parent families: 108   Grandparents with children: 9   Isolated people: 92

Table 15. Families' description. Source: DomusSocial database (05/2019)

For further information see also "Families description".

○ **Cultural/Ethnic diversity**

Regarding municipal housing, DomusSocial has no data available on ethnic groups. Only recently information concerning tenant's nationality is being collected for the records updating, meaning it will be available in the future.

○ **Education/Literacy**

DomusSocial data on the three municipal neighbourhoods unveils a resident population with few educational qualifications, as shown in Figure 201, Figure 202 and Figure 203, by gender and by age group. A comparison between the three neighbourhoods demands a careful analysis as Lagarteiro presents a higher number of non-applicable (N/A) classified data from origin.

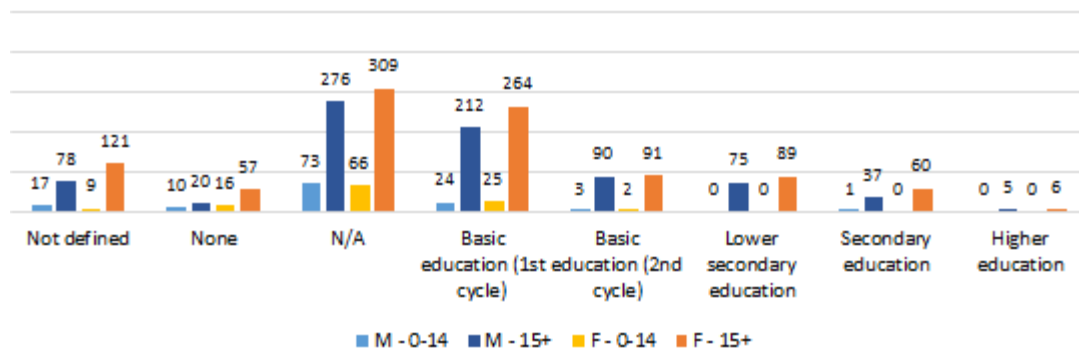


Figure 201. Cerco do Porto: number of residents by level of education, age group and sex. Source: DomusSocial (BI Domus, 30-06-2019)

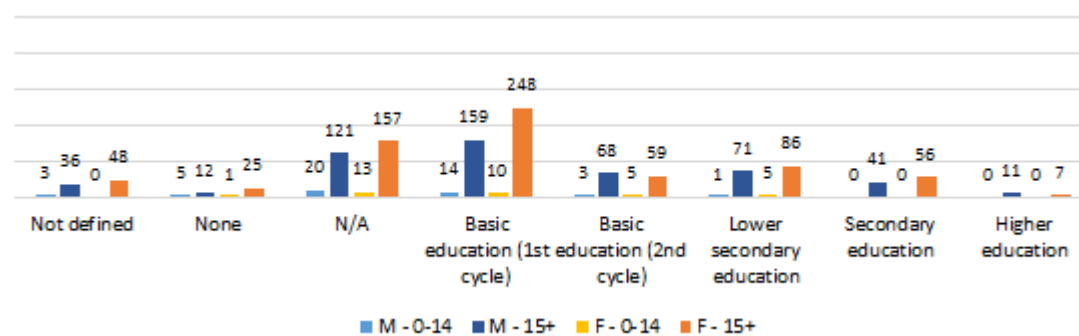


Figure 202. Falcão: number of residents by level of education, age group and sex. Source: DomusSocial (BI Domus, 30-06-2019)

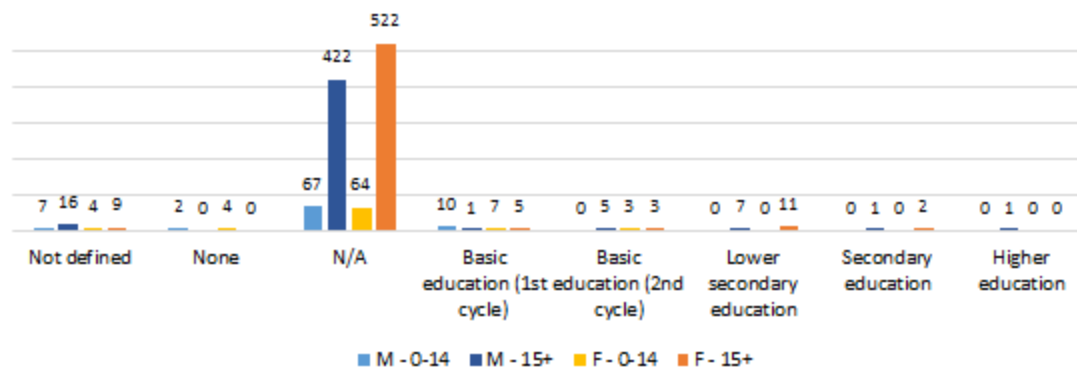


Figure 203. Lagarteiro: number of residents by level of education, age group and sex. Source: DomusSocial (BI Domus, 30-06-2019)

○ **Housing conditions**

Municipal census data from 2006 and 2010/2011<sup>24</sup> reveals an ever-growing percentage of under-occupied public accommodations in Porto, exceeding that of the decreasing over-occupied ones (Table 16).

	1999		2006		2010/11	
	N.º	%	N.º	%	N.º	%
<b>Porto (município)</b>						
Fogos considerados	12 551		12 735		12 618	
Universe do estudo / agregados recenseados	11 334		11 970		11 560	
Pessoas	40 204		31 799		28 362	
Dimensão média do agregado familiar	3,71		2,66		2,45	
Alojamentos eventualmente sobreocupados*	1 132	10,0		2,7	118	1,0
Alojamentos eventualmente subocupados*	1 836	16,2		34,0	4 154	35,9

Fontes: Recenseamento municipal de 1999 (Pimenta, Ferreira, e Ferreira 2001). Recenseamento municipal de 2006 e de 2010/2011 (informação cedida por DomusSocial, E.M.)

(\* Os dados apresentados resultam apenas de análise quantitativa (baseada somente no número de elementos que constituem o agregado familiar, não entrando em linha de conta com outros fatores, designadamente a idade e o sexo das pessoas que ocupam os alojamentos)

Table 16. Municipal dwellings possibly over-occupied or under-occupied. Source: Restivo 2014, 67

Occupancy data refers, however, to the dwelling type (defined by the number of bedrooms). If habitable 'area per person' (occupancy density) is considered instead, density might be higher depending on the dwellings much reduced area (Restivo *et al.* 2012). This effect on density must not be disregarded, demanding caution on data interpretation. Occupancy data update could be provided, if needed.

Regarding the average number of people by dwelling type (depending on the number of bedrooms - Type 1. from 1 to 2 occupants | Type 2. from 2 to 4 occupants | Type 3. from 3 to 6 occupants | Type 4. from 4 to 8 occupants | Type 5. from 5 to 10 occupants), data may be analysed in Figure 211Figure 204.

24 In: Bairros Municipais do Porto: Caracterização Socioeconómica 2010-2011 (2012).



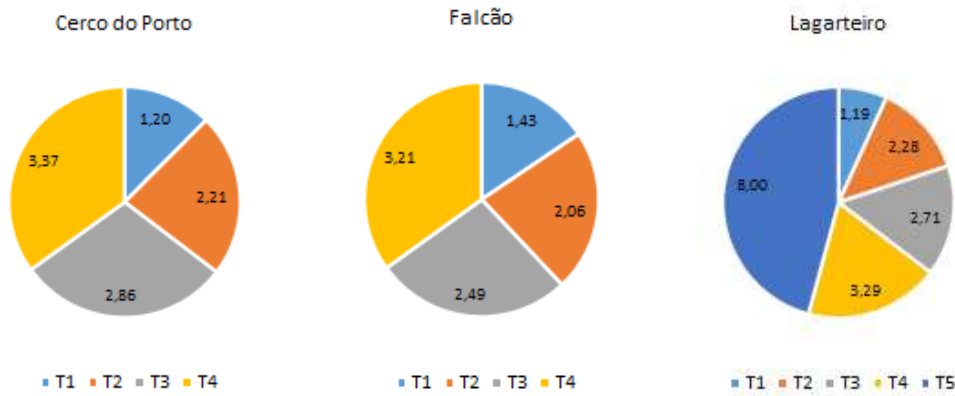


Figure 204. Cerco do Porto, Falcão, Lagarteiro: number of residents by dwelling typology. Source: DomusSocial (BI Domus, 30-06-2019)

### Migration rate and migration graphs

Regarding the three municipal neighbourhoods being analysed, it is possible to measure the number of families that have been rehoused between 2014 and 2018 (Figure 205).

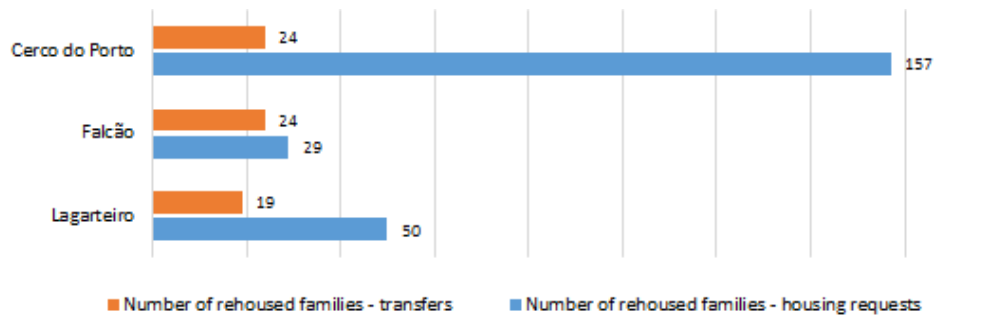


Figure 205. Cerco do Porto, Falcão and Lagarteiro: movements in-out neighbourhood (2014-2018). Source: DomusSocial (01-2019)

### Families description

Concerning the three municipal neighbourhoods, data available evidences diverse family structures as follows, prevailing the households with one person (25.2%), nuclear families with children (23.6%) and single-mother families (22.0%) (Figure 206).

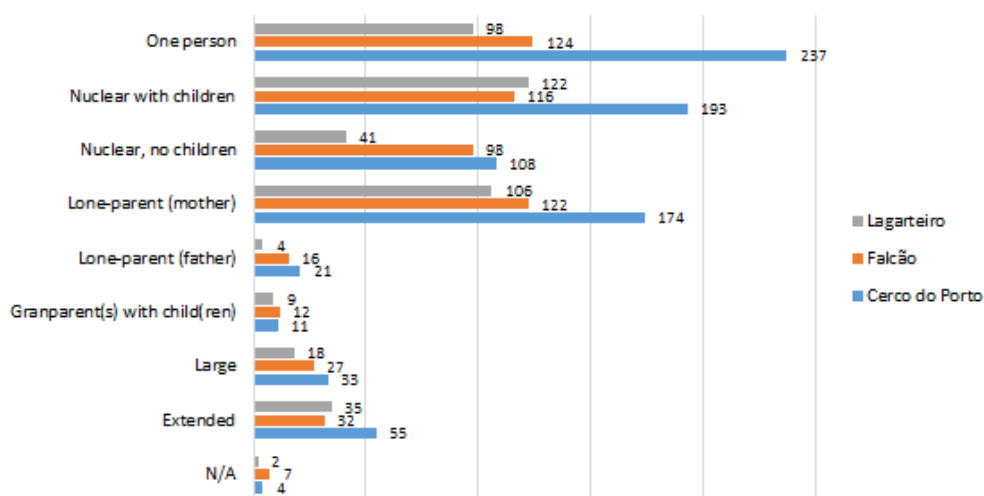


Figure 206. Cerco do Porto, Falcão, Lagarteiro: number of households by type of family structure. Source: DomusSocial (BI Domus, 30-06-2019)

It may also be observed the weight (%) of one-person households, nuclear families with children and lone-parent mothers in each neighbourhood ( Figure 207).

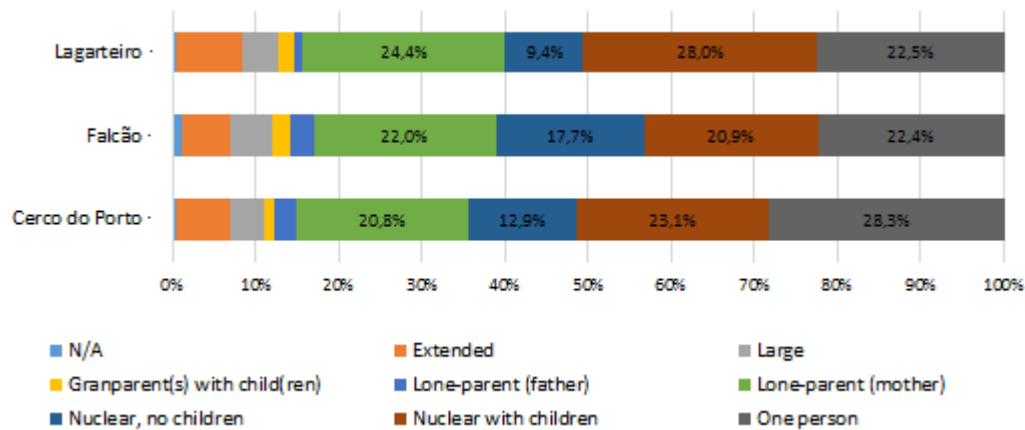


Figure 207. Cerco do Porto, Falcão, Lagarteiro: households (%) by type of family structure. Source: DomusSocial (BI Domus, 30-06-2019)

○ **Media representations**

No data available (DomusSocial) regarding municipal neighbourhoods. Concerning social housing stigmatization, Cerco do Porto and Lagarteiro neighbourhoods in particular are negatively perceived by the population of the city.

**Participation**

○ **Social connections**

In what concerns support mechanisms for vulnerable populations, and beyond the associations (that promote movement of people from outside the neighbourhood), other organizations/institutions provide support to resident populations, namely: *Obra Diocesana de Promoção Social* (nursery and childcare centre) both in Cerco do Porto and in Lagarteiro; Associação TODOS (gerontology, young people and disabled, consultations practice) in Cerco do Porto; by Campanhã Parish Council and in Cerco do Porto, the provision of rooms for use *rent free* for youth organizations and employment development; by Campanhã Parish Council as well, the Social Assistance bureau in Lagarteiro; *Associação de Educação e Desenvolvimento Social* in Falcão for education and social development activities.

The following (Table 17) shows the organizations located in the three municipal neighbourhoods being analysed, to which the folk music group based in *São Vicente de Paulo* housing has been added.

Municipal neighbourhood	Organization / Association
Cerco do Porto	Clube de Pesca do Bairro Cerco do Porto
Cerco do Porto	Obra Diocesana de Promoção Social
Cerco do Porto	DMDS (Sede CLS)
Cerco do Porto Novo	Cerporto
Cerco do Porto Novo	Ass. Portuguesa de Pais e Amigos do Cidadão com Deficiência Mental - APPACDM
Cerco do Porto Novo	Associação dos Atletas Veteranos do Norte "As Árvores Morrem de Pé"
Cerco do Porto Novo	Confederação Nacional dos Organismos de Deficientes
Cerco do Porto Novo	Associação Portuguesa de Deficientes

Cerco do Porto Novo	Asas - Associação de Solidariedade e Ação Social de Ramalde
Cerco do Porto Novo	Junta Freguesia de Campanhã
Cerco do Porto Novo	Associação TODOS
Falcão	Associação Cultural e Desportiva do Bairro do Falcão
Lagarteiro	Obra Diocesana de Promoção Social
Lagarteiro	Junta de Freguesia de Campanhã
Lagarteiro	AEDS – Associação de Educação e Desenvolvimento Social
S. Vicente de Paulo	Rancho de Danças e Cantares de Campanhã

Table 17. Organizations located in the three municipal neighbourhoods. Source: DomusSocial (10/2018)

Within the scope of AIIA Porto - *Abordagem Integrada para a Inclusão Activa* (Integrated Approach for Active Inclusion) (CMP, 2017a), a municipal program that promotes urban arts “by involving youth into cultural projects thus thriving creativity and offering the opportunity to bring together mass culture, and helping shape the city's identity” - DomusSocial, EM is also developing activities. In particular, a new edition of the artistic residency programme in disadvantaged communities - Oupa! (since 2015) is expected, which will necessarily include activities in Campanhã valley area.

#### o Social inclusion rate

In what concerns the three municipal neighbourhoods in the study area, the multi-storey housing buildings (ground floor plus 3 floors) have no lift.

### Income and poverty

#### o Average family income

Regarding the three municipal neighbourhoods, information on average family income and other related data available is as follows (Figure 208, Figure 209 and Figure 210).

Average household income	Cerco do Porto: 704.76 €   Falcão: 809.16 €   Lagarteiro: 590.95 €
--------------------------	--

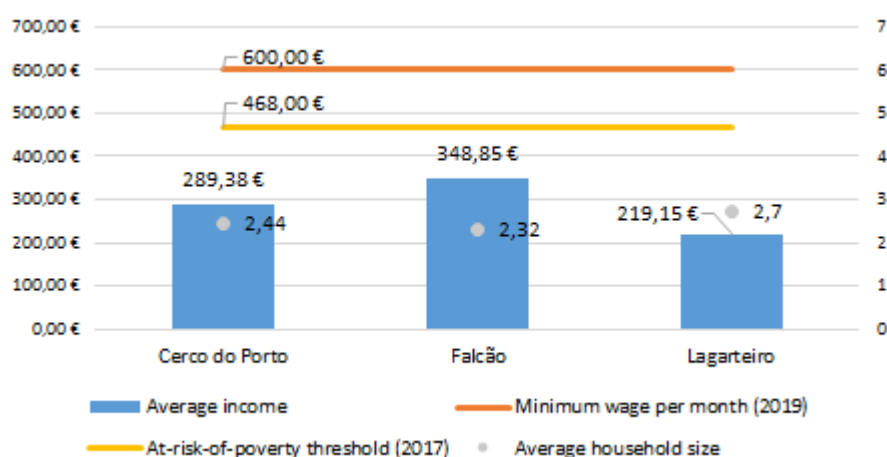


Figure 208. Cerco do Porto, Falcão, Lagarteiro: residents average income and household size. Source: DomusSocial (BI Domus, 30-06-2019)

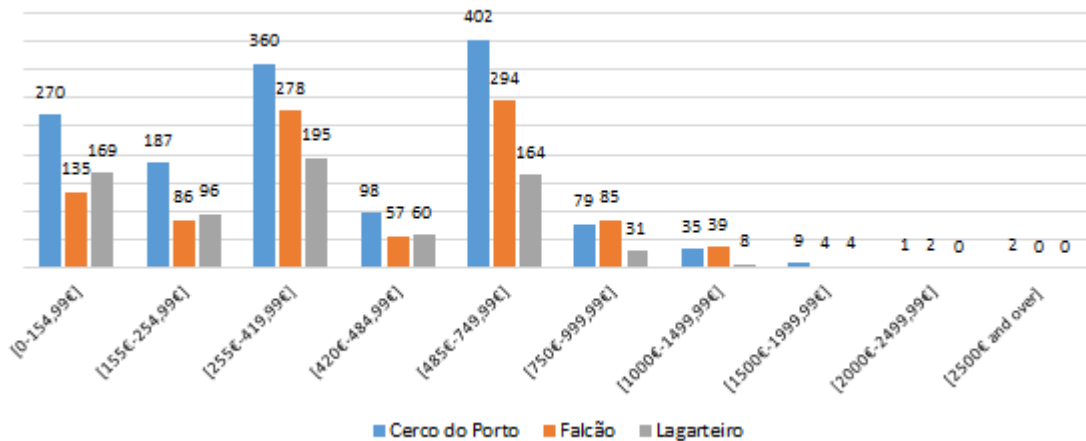


Figure 209. Cerco do Porto, Falcão, Lagarteiro: number of residents by income group. Source: DomusSocial (BI Domus, 30-06-2019)



Figure 210. Cerco do Porto, Falcão, Lagarteiro: number of residents by type of income. Source: DomusSocial BI Domus, 30-06-2019)

### ○ Ownership of durable assets

The three municipal neighbourhoods being studied - Cerco do Porto, Falcão and Lagarteiro - are entirely owned by the municipality with exception of Falcão. The third development (from 2000) of this latter neighbourhood has 173 dwellings, 8 of which have been sold to the occupants (privately owned). Hence, considering the total number of dwellings in Falcão neighbourhood (570), 1.4 % are of private property.



- **Housing affordability**

When applying for municipal housing, different income groups are considered (from “0” to “1 801.0 € and over”). Every application is sorted by a classification matrix, being accepted if weighting 40 % at least. Municipal data (DomusSocial: 11/2018) reveals a waiting list of 1 416 families, 1 083 of which do wait for a council house while 333 (already in municipal tenancy) are waiting for a transference.

- **Houses without central heating**

Regarding the municipal housing stock, there are no dwellings with central heating (its interpretation demands however comprehension of the heating needs at the local context).

- **Prices (houses, rents, construction costs, etc.)**

In what concerns the municipal housing stock, rent values are in accordance with Table 18, being the average rent value of € 56.57, with a default rate of 4.44 % (debtors) and 3.65 % (value).

	Minim. rent	T1	T2	T3	T4	T5
<b>Group I</b>	11.40€	29.64 €	34.79 €	39.91 €	45.04 €	---
<b>Group II</b>		57.13 €	67.73 €	78.35 €	88.94 €	99.55 €
<b>Group III</b>		101.04 €	120.41 €	139.80 €	159.18 €	178.56 €
<b>Group IV</b>	28.49€	165.23 €	191.96 €	236.36 €	269.54 €	---
<b>Group V</b>		138.63 € - 217.69 €	160.86 € - 257.57 €	202.95 € - 328.03 €	257.95 - 347.18 €	---

Table 18. Municipal housing rent values. Source: DomusSocial database (10/2018)

It is also possible to gather information on minimum rent amounts for the three neighbourhoods, as well as information concerning the default rate:

	Minim. rent	T1	T2	T3	T4	T5
<b>Cerco do Porto (1-31)</b>	11.40 €	57.13 €	67.73 €	78.35 €	88.94 €	---
<b>Cerco do Porto Novo (33, 34)</b>		101.04 €	120.41 €	139.80 €	159.18 €	---
<b>Falcão – Agrup. Habit.</b>	28.49 €	183.73 €	236.45 €	283.18 €	328.29 €	---
<b>Falcão (1-9)</b>	11.40 €	57.13 €	67.73 €	78.35 €	88.94 €	---
<b>Falcão (10-15)</b>		101.04 €	120.41 €	139.80 €	159.18 €	---
<b>Lagarteiro</b>		57.13 €	67.73 €	78.35 €	88.94 €	99.55 €

Table 19. Minimum rent amounts for the three neighbourhoods. Source: DomusSocial database (10/2018)

	Average default rate 2018 (Jan-Nov)	
	Debtors	Rent amount
<b>Cerco do Porto</b>	6.92%	6.28%
<b>Cerco do Porto (novo)</b>	0.51%	0.32%
<b>Falcão – Agrup. Habit.</b>	2.67%	3.55%
<b>Falcão</b>	3.05%	1.96%
<b>Lagarteiro</b>	6.75%	3.97%

Table 20. Average default rate for the three neighbourhoods. Source: DomusSocial database (12/2018)

## Employment

### ○ Activity and unemployment rate

Figure 211 shows information on occupational status regarding the three municipal neighbourhoods being focused. Other data aggregation might be provided.

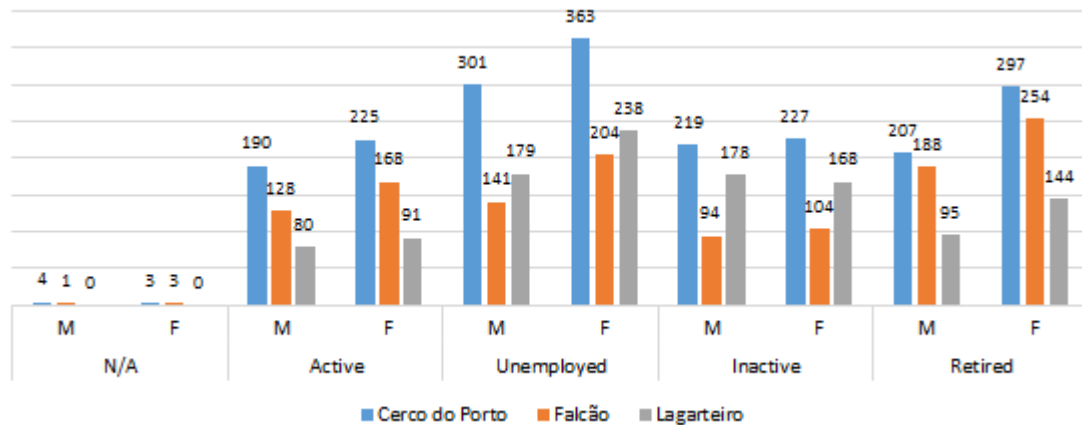


Figure 211. Cerco do Porto, Falcão, Lagarteiro: number of residents by occupational status and sex. Source: Domus Social (BI Domus, 30-06-2019)

### 4.3.5 Neighbourhood Survey

The collection of responses from the entire sample, as the study recommended, included 'Domus Social' (composed by residents in public municipal housing for social rental, inside the study area), Non-'Domus Social' (residents in private housing, inside the study area), and Control Group (residents outside the study area), was only possible due to the close articulation between all entities: CMP, DomusSocial, CES-UC, Dynargie and local Associations and many other informal key social elements in the field.

#### Satisfaction with neighbourhood environment

Globally we may say that the total sample is happy and satisfied with daily life:

- Control Group is more satisfied, in general, when compared with Domus and Non Domus sample. Special highlight goes to the reputation and level of safety of their neighbourhood;
- Domus respondents are more satisfied with the buildings' look in their neighbourhood;
- The main intervention areas concern the need to make real local interventions looking to unpleasant smell, lack of cleanliness, lack of aesthetics of buildings, especially in Non Domus sample;
- Most respondents (64%) are experiencing at least moderate inconvenience with the environment in their neighbourhood. Only a small proportion of respondents (6 to 19%) don't report inconveniences with their neighbourhood environment;
- People are mostly disturbed with the household garbage, odours and air pollution. The least intense disturbance is caused by the rainwater disposal, noises and thermal comfort.

#### The International Physical Activity Questionnaire

- Looking to all sample, most respondents report that their health is good (39%) or fair (32%). Comparing Control Group with Domus and Non Domus Sample, this

percentage is higher in the Control Group (40 and 48%), and it is lower in Domus and Non Domus Sample (43 and 31%);

- Domus respondents reveal more health problems (“bad or very bad”). At the same time, the highest proportion of respondents reported a very good health. In our perspective this segmentation is due to the profile of the sample interviewed (very young and very elderly people);
- The data reveals that there is no vigorous physical activity in the last 7 days and most of the sample haven’t done moderate physical activities. Nevertheless:
  - Most of the respondents (58%) reported that they had a walk for more than 10 minutes in the last 7 days;
  - Among them, majority (60%) walked every day during the week (7 days per week);
  - Most of the respondents usually spent 1 to 2 hours walking on these days.

However, there is a big amount of people who has longer walks (20%), so the average time of walking is higher and equals to 4 hours.

Note: Almost all the walking people do it outside in their neighbourhood (90%)

### **Social activity & Wellbeing**

- Neighbourhood common spaces are used for socialization among Domus and Non Domus sample;
- Most respondents indicated socializing and entertainment as the main purposes of meetings with friends. Other types of activities are relatively rare;
- Almost half of the respondents from Bairros (47%) and Control (58%) have met with their friends in the last 7 days. Among them, respondents from all neighbourhoods have a higher percentage of people who met their friends;
- Most respondents from all neighbourhoods have met their friends every day (42%), while people from the Control Group mostly met their friends over 5 days per week (46%);
- Most respondents have spent 1 - 2 hours per day relaxing during the last week. However, there is a large number of people, who relaxed for a longer period (almost 10% relaxed for 7 hours and more). In average, people spend more time relaxing in the Control Group (3.6 hours), and in Domus (3.3 hours). The lowest average relaxing time is in the Neighbourhoods group (2,78 hours);
- Most respondents prefer to rest inside their homes, 80% reported that they didn't rest outside in their neighbourhood at all. Respondents from the Control Group spend more time relaxing outside.

This study aimed to:

- Explore the residents’ experience of living in the neighbourhoods (‘bairros’ area);
- Identify the main difficulties and opportunities of the neighbourhood’s residents;
- Create conditions to develop and improve the neighbourhood environment.

#### **4.3.5.1 Materials and Methods**

Urbinat Questionnaire, Portuguese online version, included the following dimensions of assessment:

- Satisfaction with neighbourhood environment based on (Fleury-Bahial, 2012)
  - Image of the neighbourhood
  - Shops and services
  - Traffic and state of the public road network
  - Annoyances and pollutions
  - Greenery
- The International Physical Activity Questionnaire, modified short form (IPAQ-SF)

- Social activity
- Wellbeing (MHC)
- General personal information

NOTE: a Confidentiality Agreement (recycled paper) was included to increase the comfort of residents to participate

## Methods

- Questionnaire pilot test was run 1<sup>st</sup> of August to validate the translation (language adequacy) and to confirm survey functionality (both in terms of interviewed perspective and of technical support used);
- Data was collected in municipal social housing – ‘DomusSocial’ (1 month) and in non-municipal social (private) housing – non ‘DomusSocial’ (1,5 month). The extended period needed with ‘Non Domus’ was due to the need of finding alternatives to overcome the challenges of gaining the residents trust and willingness to participate in the survey;
- The data was collected at the 4 main areas (Cerco, Lagarteiro, Falcão and Corujeira) between August 2 and October 14, 2019 through a dedicated team of interviewers with whom Dynargie has kept a close coordination;
- All data was collected in person, at the door of residents or at several local institutions with whom we had to bridge (with the support of CMP, DomusSocial and CES-UC) to reach out ‘local influencers’;
- All data was collected on a digital survey platform to allow a rigorous control of the answers and their geo location;
- The decision of creating a raffle draw of a voucher for buying first necessity goods (one per area) to motivate participation did have a positive impact on the willingness of the majority of inquiries to respond. All prizes were already attributed to the winners.

### 4.3.5.2 Results obtained

#### Demographics

- **Sample Distribution by Neighbourhoods, Domus and Non Domus**

NEIGHBOURHOODS	NON DOMUS	DOMUS	TOTAL	%
<b>Campanhã</b> (CONTROL)	52	0	<b>52</b>	<b>11.4%</b>
<b>Cerco</b>	44	81	<b>125</b>	<b>27.3%</b>
<b>Corujeira</b>	100	0	<b>100</b>	<b>21.8%</b>
<b>Falcão</b>	37	51	<b>88</b>	<b>19.2%</b>
<b>Lagarteiro</b>	30	54	<b>84</b>	<b>18.3%</b>
<b>Other</b> (PERIPHERICAL)	1	8	<b>9</b>	<b>2%</b>
<b>Total</b>	264	194	<b>458</b>	<b>100</b>

Table 21. Sample distribution by neighbourhoods, Domus and Non Domus. Source: Dynargie (2019)



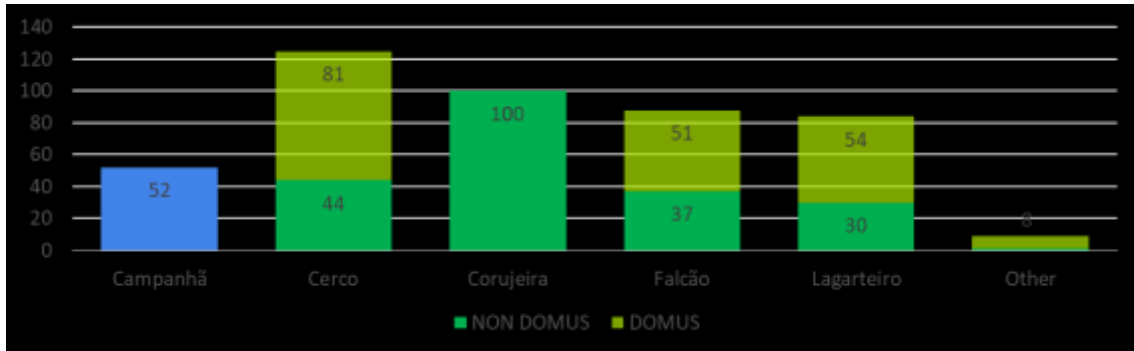


Figure 212. Visual sample distribution by neighbourhoods, Domus and Non Domus. Source: Dynargie (2019)

○ Years of living in the neighbourhood

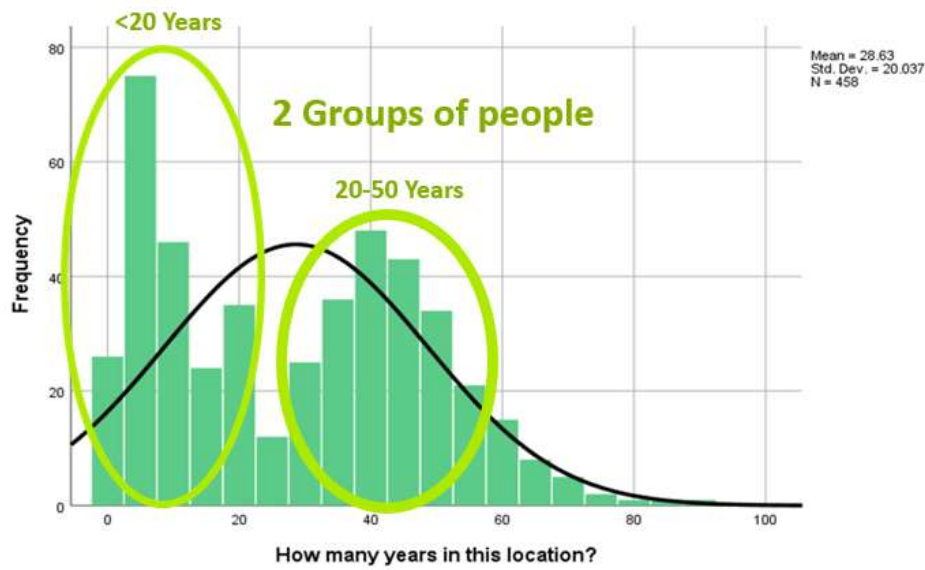


Figure 213. Years of living in the neighbourhood. Source: Dynargie (2019)

○ Gender, Age and Origins

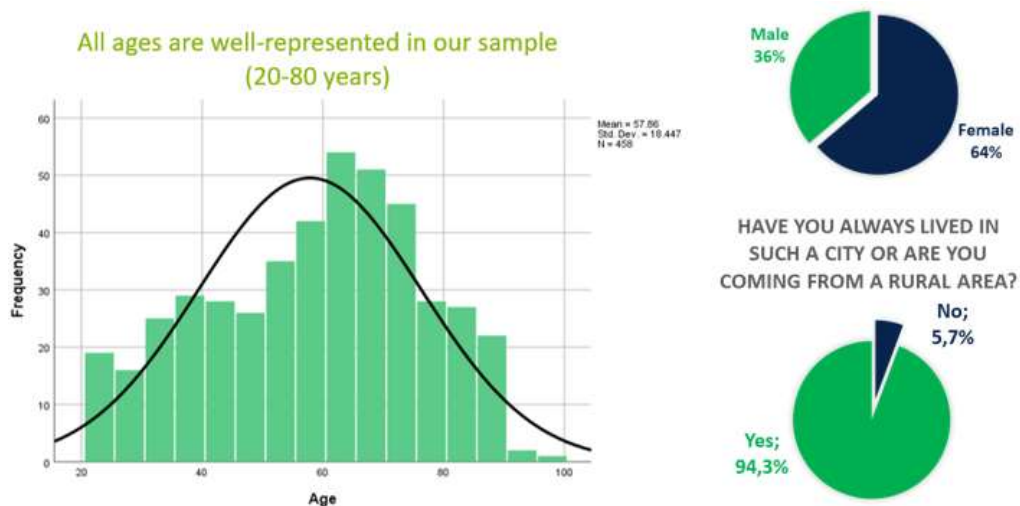


Figure 214. Left: Age analysis | Top right: Gender analysis | Bottom right: Origins analysis. Source: Dynargie (2019)

○ Level of Education and Occupation

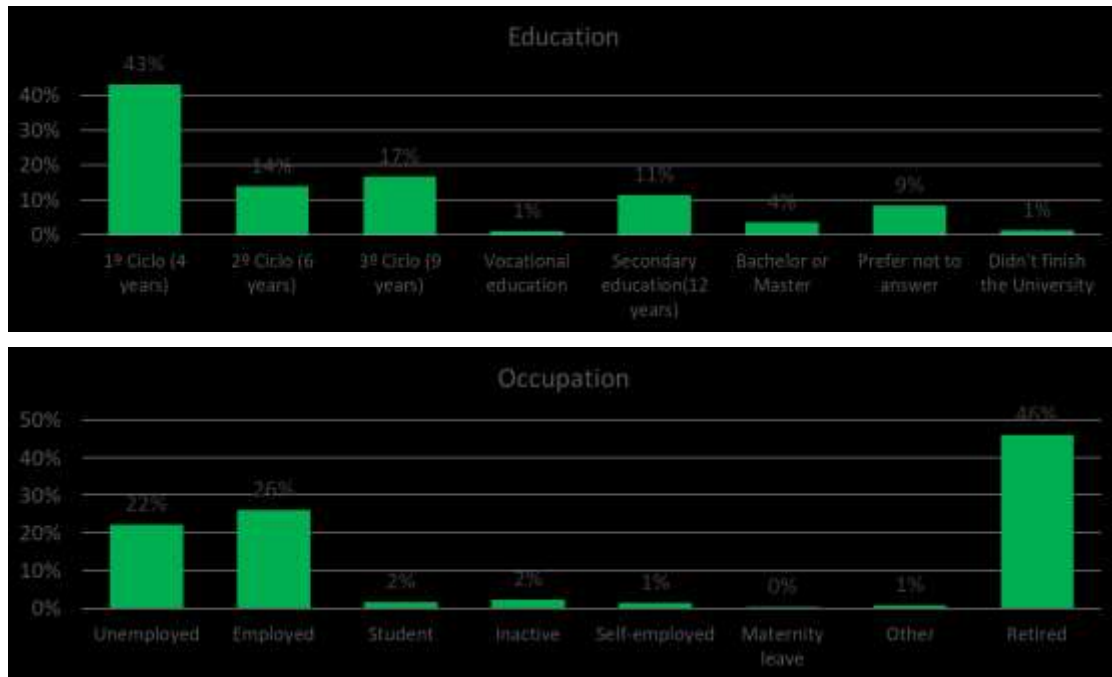


Figure 215. Level of occupation. Source: Dynargie (2019)

○ Health Specificities

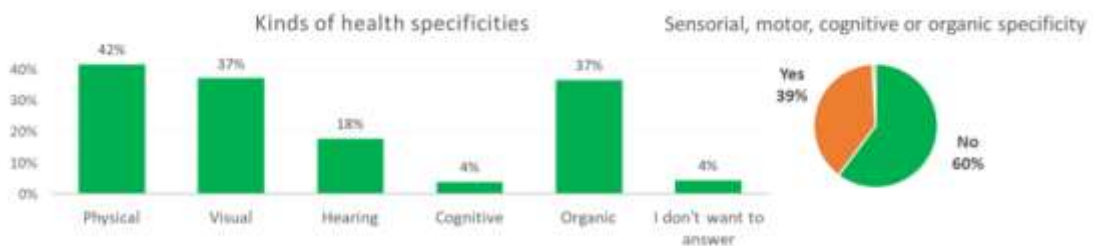


Figure 216. Left: Kind of health specificities | Right: Sensorial, motor, cognitive or organic specificity. Source: Dynargie (2019)

○ Monthly Net Income (does not include welfare or other social benefits)

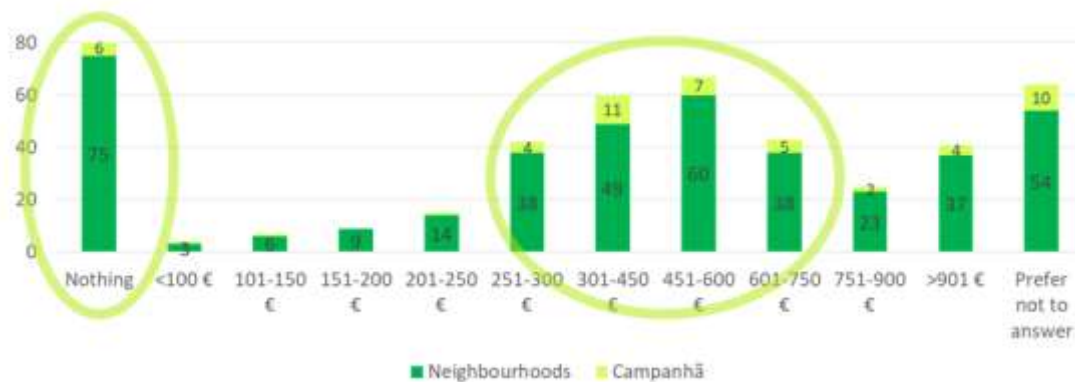


Figure 217. Monthly Net Income (does not include welfare or other social benefits). Source: Dynargie (2019)

○ Household size

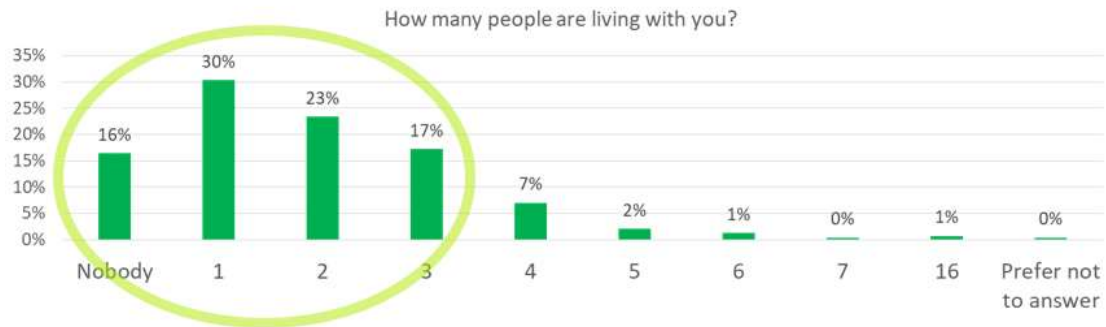


Figure 218. Household size. Source: Dynargie (2019)

Neighbourhood Image Satisfaction

○ Global Output

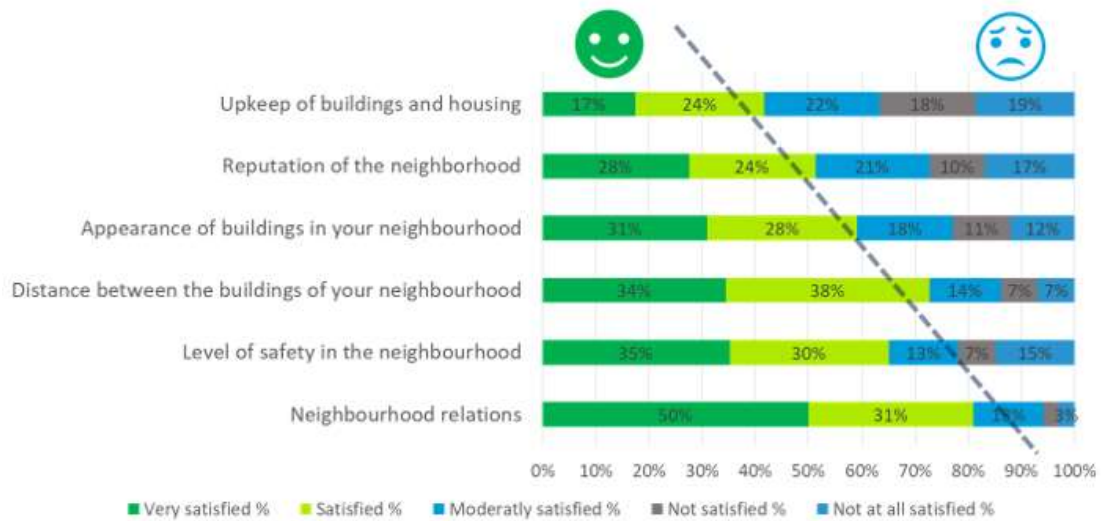


Figure 219. Neighbourhood Image Satisfaction. Global output. Source: Dynargie (2019)

○ Comparative Analysis

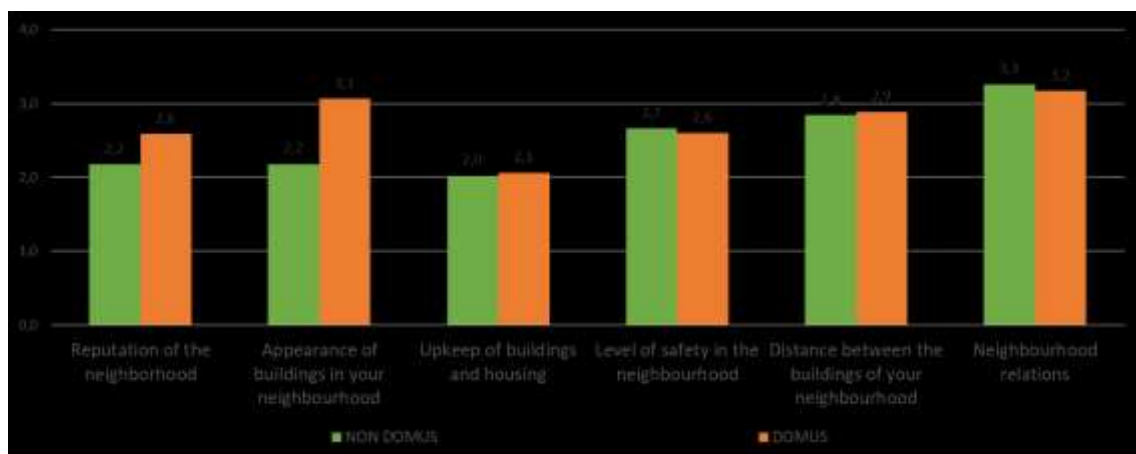


Figure 220. Neighbourhood Image Satisfaction. Comparative analysis between Non Domus and Domus residents. Source: Dynargie (2019)

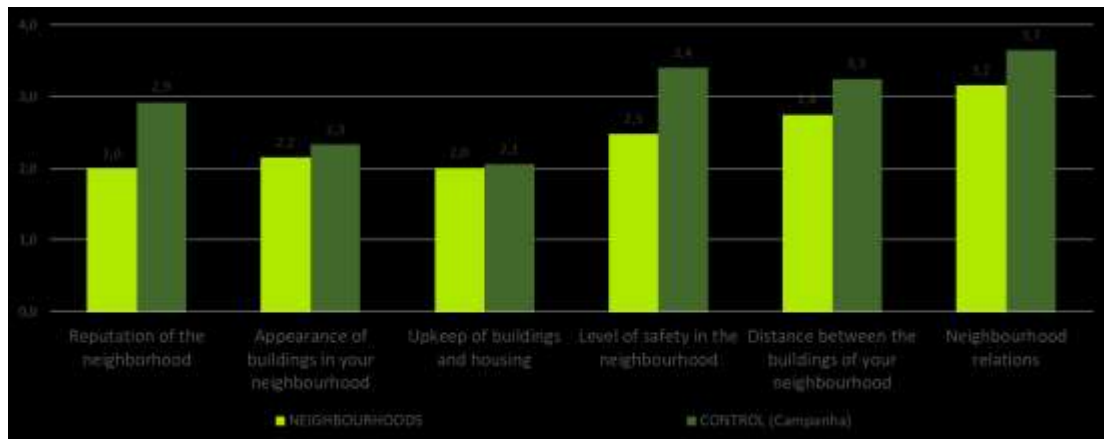


Figure 221. Neighbourhood Image Satisfaction. Comparative analysis between Neighbourhoods and control residents. Source: Dynargie (2019)

### Satisfaction with neighbourhood environment

- Global Output

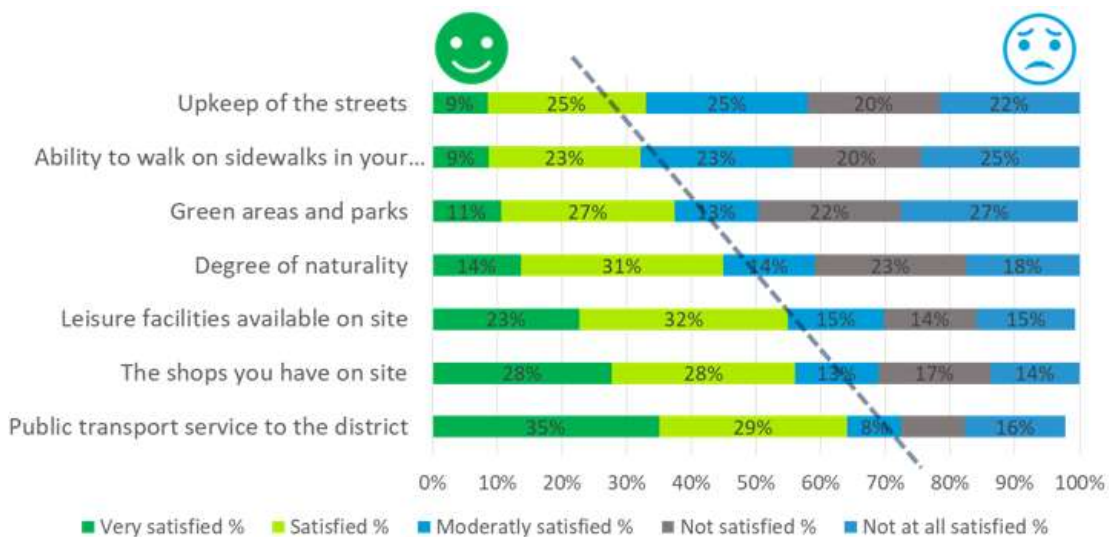


Figure 222. Satisfaction with neighbourhood environment. Global output. Source: Dynargie (2019)

- Comparative Analysis

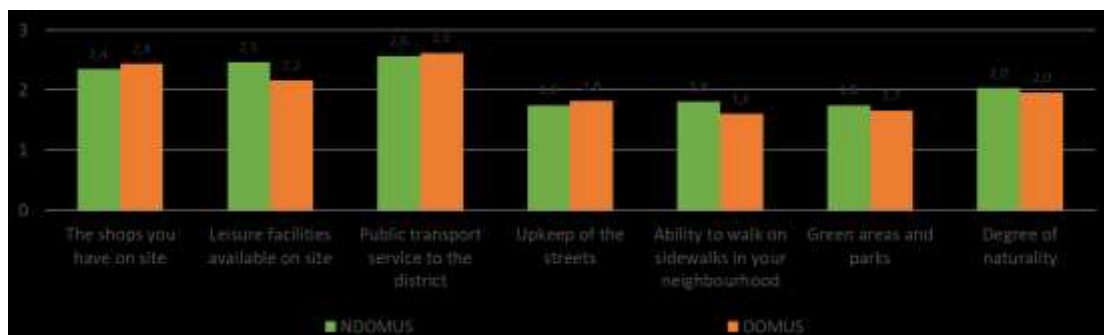


Figure 223. Satisfaction with neighbourhood environment. Comparative analysis between Non Domus and Domus residents. Source: Dynargie (2019)



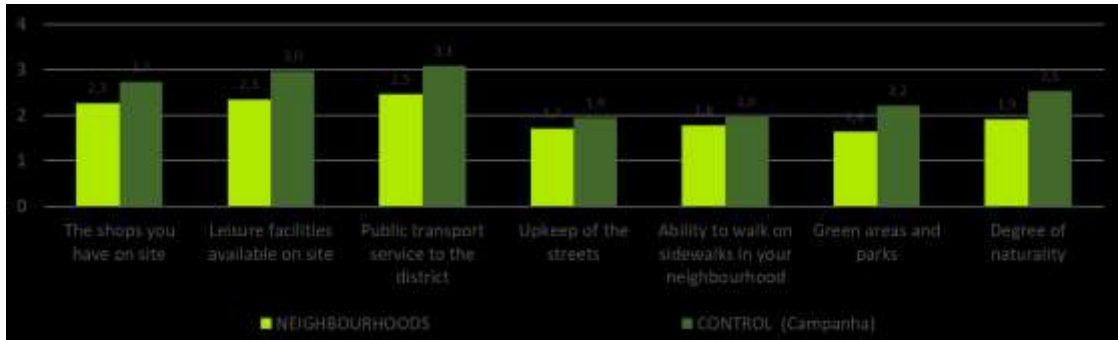


Figure 224. Satisfaction with neighbourhood environment. Comparative analysis between Neighbourhoods and control residents. Source: Dynargie (2019)

### Factors of Discomfort

- Global Output

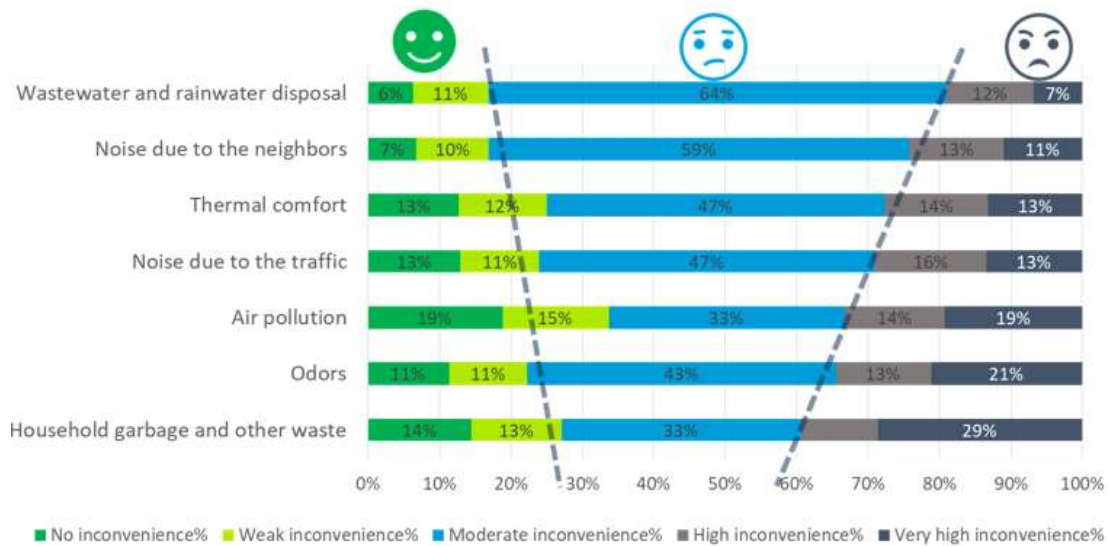


Figure 225. Factors of discomfort. Global output. Source: Dynargie (2019)

- Comparative Analysis



Figure 226. Factors of discomfort. Comparative analysis between Non Domus and Domus residents. Source: Dynargie (2019)

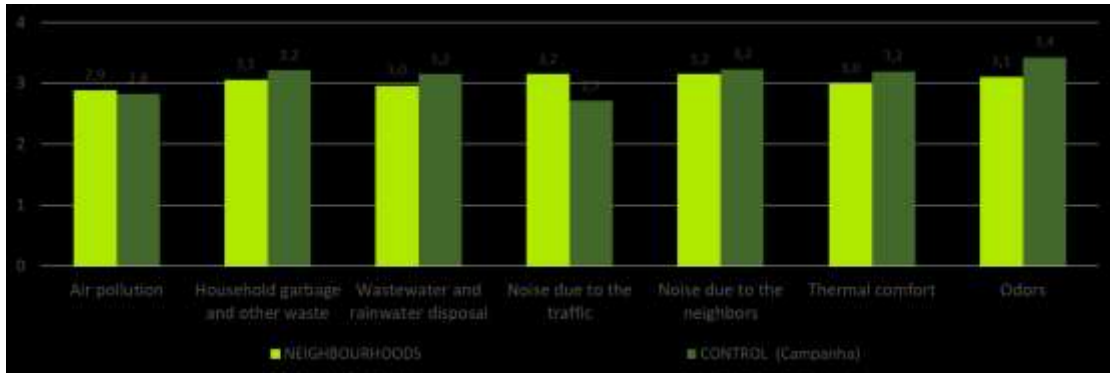


Figure 227. Factors of discomfort. Comparative analysis between Neighbourhoods and control residents. Source: Dynargie (2019)

## Vigorous Physical Activity

### Global Output

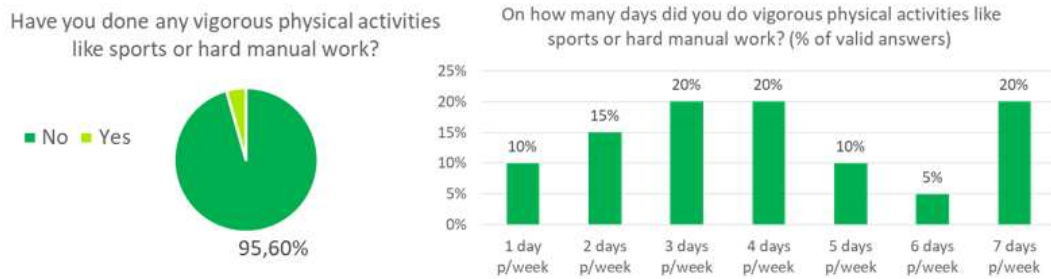


Figure 228. Vigorous physical activity. Source: Dynargie (2019)

## Moderate Physical Activity

### Comparative Analysis

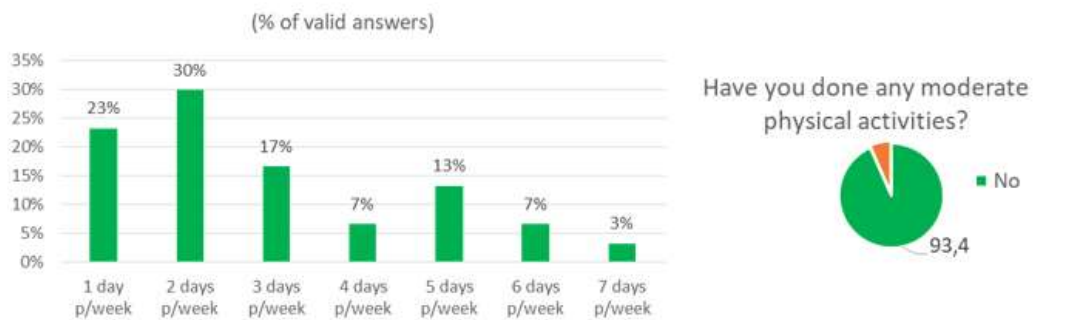


Figure 229. Analysis Moderate physical activity. Comparative analysis. Source: Dynargie (2019)

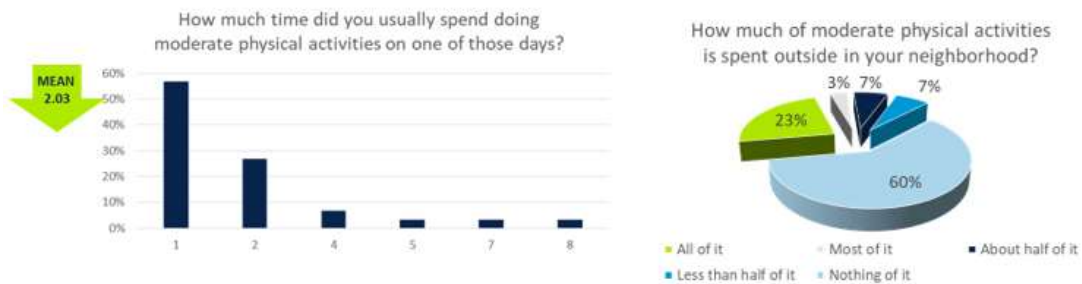


Figure 230. Analysis Moderate physical activity. Comparative analysis. Source: Dynargie (2019)

## Walking Activity

- Global output

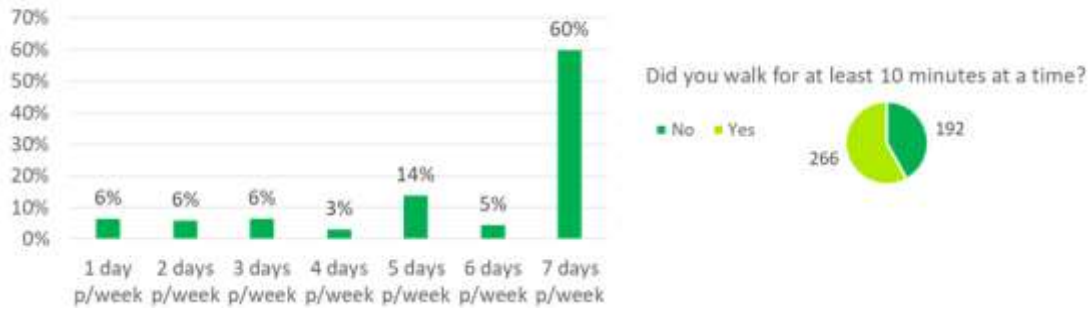


Figure 231. Walking activity. Global output. Source: Dynargie (2019)

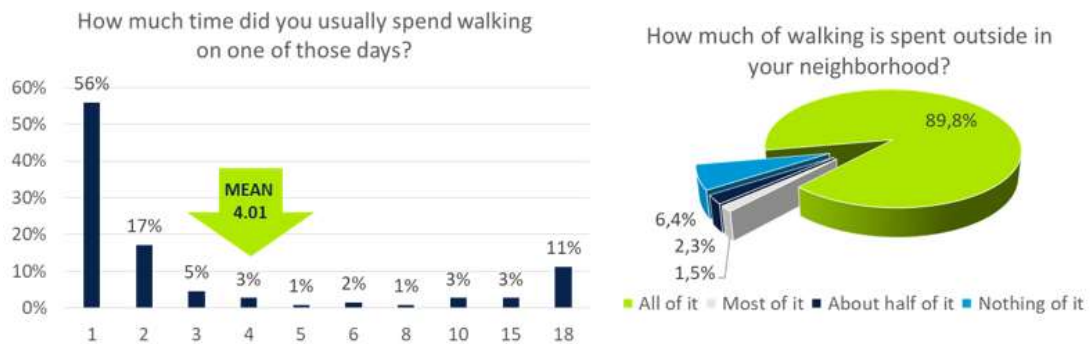


Figure 232. Walking activity. Global output. Source: Dynargie (2019)

- Comparative Analysis

Walking	Values	NDOMUS %	DOMUS %	NEIGHBOURHOOD %	CONTROL %
During the last 7 days, did you walk for at least 10 minutes at a time?	No	46%	37%	47%	40%
	Yes	54%	63%	53%	60%
On how many days did you walk for at least 10 minutes at a time?	1 day p/week	5%	8%	5%	3%
	2 days p/week	5%	7%	6%	0%
	3 days p/week	5%	8%	4%	10%
	4 days p/week	2%	4%	2%	3%
	5 days p/week	13%	15%	14%	10%
	6 days p/week	6%	3%	5%	10%
	7 days p/week	64%	55%	64%	65%
How much of walking is spent outside in your neighborhood?	All of it	85%	96%	84%	87%
	Most of it	3%	0%	3%	3%
	About half of it	4%	1%	3%	7%
	Less than half of it	0%	0%	0%	0%
	Nothing of it	9%	3%	11%	3%
How much time did you usually spend walking on one of those days?	Mean	1.77	6.64	1.79	1.7
	SD	2.11	7.21	2.31	1.06

Table 22. Walking activity. Comparative analysis. Source: Dynargie (2019)

○ Relaxing activity (total and comparison)

	TOTAL %	NDOMUS %	DOMUS %	NEIGHBOURHOOD %	CONTROL %
1	41	47%	34%	50%	35%
2	20.4	16%	26%	16%	17%
3	7.7	5%	11%	6%	0%
4	7.4	7%	8%	5%	15%
5	5	5%	6%	5%	2%
6	8.6	12%	4%	11%	17%
7	1.7	0%	3%	0%	2%
8	5	6%	3%	5%	10%
9	0.2	0%	0%	1%	0%
10	0.7	0%	2%	0%	0%
12	1	1%	1%	1%	2%
15	0.2	0%	1%	0%	0%
20	0.2	0%	1%	0%	0%
24	0.7	0%	1%	1%	0%
Total	100				
Mean	3.1	2.95	3.3	2.78	3.6
SD	3.14	2.79	3.54	2.77	2.78

Table 23. Relaxing activity (total and comparison) Source: Dynargie (2019)

	TOTAL %	NDOMUS %	DOMUS %	NEIGHBOURHOOD %	CONTROL %
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
12					
15					
20					
24					
Total					
Mean		81%	81%	86%	6%
SD					

Table 24. Relaxing activity outside (total and comparison) Source: Dynargie (2019)

Socializing Activity

○ Global Output

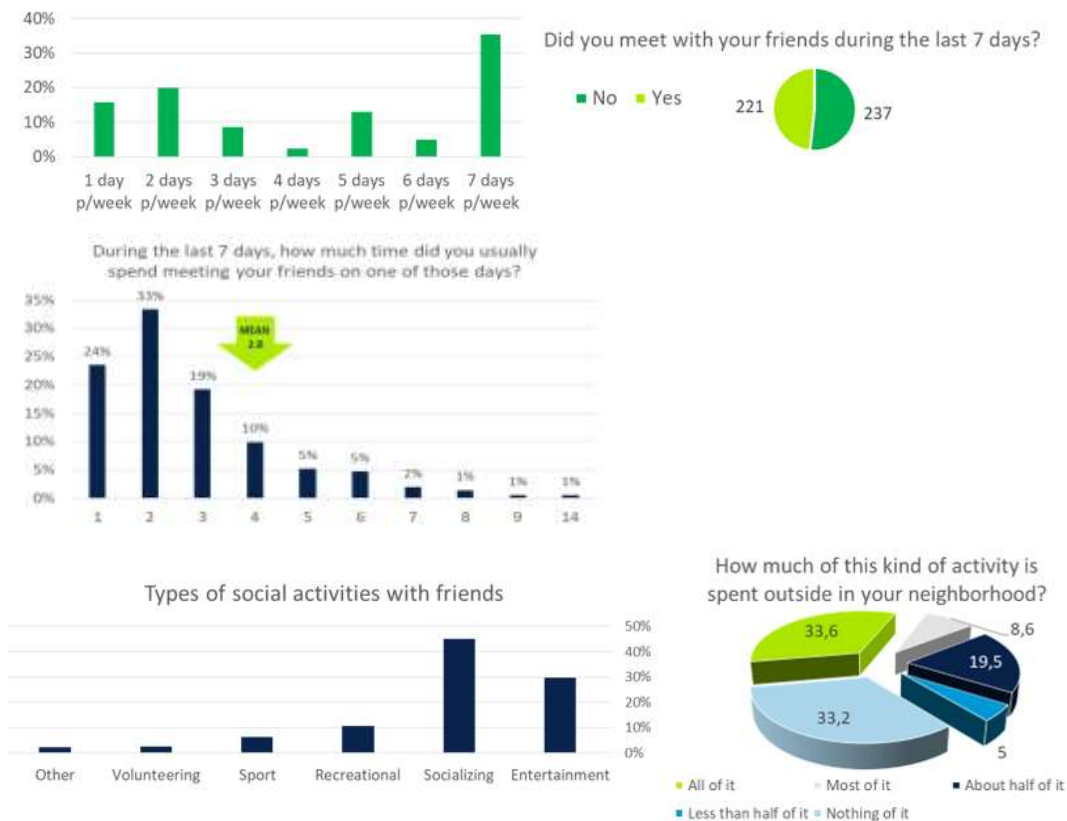


Figure 233. Socializing activity. Global output. Source: Dynargie (2019)



○ Comparative Analysis

Socializing		Values	NDOMUS %	DOMUS %	NEIGHBOURHOOD %	CONTROL %
During the last 7 days, did you meet your friends?	No		49%	56%	47%	58%
	Yes		51%	44%	53%	42%
During the last 7 days, on how many days did you meet your friends?	1 day p/week		16%	16%	19%	0%
	2 days p/week		18%	23%	21%	0%
	3 days p/week		5%	14%	4%	9%
	4 days p/week		2%	2%	2%	5%
	5 days p/week		14%	12%	8%	46%
	6 days p/week		6%	4%	4%	14%
	7 days p/week		39%	29%	42%	27%
	Entertainment		42%	13%	43%	35%
	Socializing		47%	42%	49%	42%
	Recreational		11%	10%	9%	21%
	Sport		6%	6%	7%	6%
	Volunteering		4%	1%	4%	2%
	Other		3%	1%	4%	2%
How much of this kind of activity is spent outside in your neighborhood?	All of it		30%	39%	33%	18%
	Most of it		10%	6%	10%	14%
	About half of it		23%	14%	21%	32%
	Less than half of it		3%	8%	4%	0%
	Nothing of it		33%	33%	33%	36%
How much time did you usually spend meeting your friends?	MEAN		4.56	3.97	4.39	5.45
	SD		2.41	2.34	2.54	1.22

Table 25. Socializing activity. Comparative analysis. Source: Dynargie (2019)

○ Social Network (total and comparison)

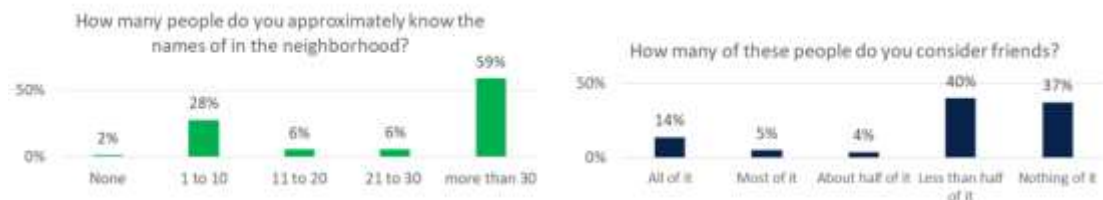


Figure 234. Social network. Source: Dynargie (2019)

Social network		Values	NDOMUS %	DOMUS %	NEIGHBOURHOOD %	CONTROL %
How many people do you approximately know the names of in the neighborhood?	None		2%	1%	3%	0%
	1 to 10		19%	41%	19%	17%
	11 to 20		6%	5%	6%	8%
	21 to 30		6%	5%	5%	14%
	more than 30		67%	49%	68%	62%
How many of these people do you consider friends?	All of it		16%	11%	12%	33%
	Most of it		6%	4%	6%	4%
	About half of it		4%	4%	4%	4%
	Less than half of it		35%	47%	35%	37%
	Nothing of it		39%	34%	43%	23%

Table 26. Social network (total and comparison). Source: Dynargie (2019)

## Factors of wellbeing

### ○ Global Output

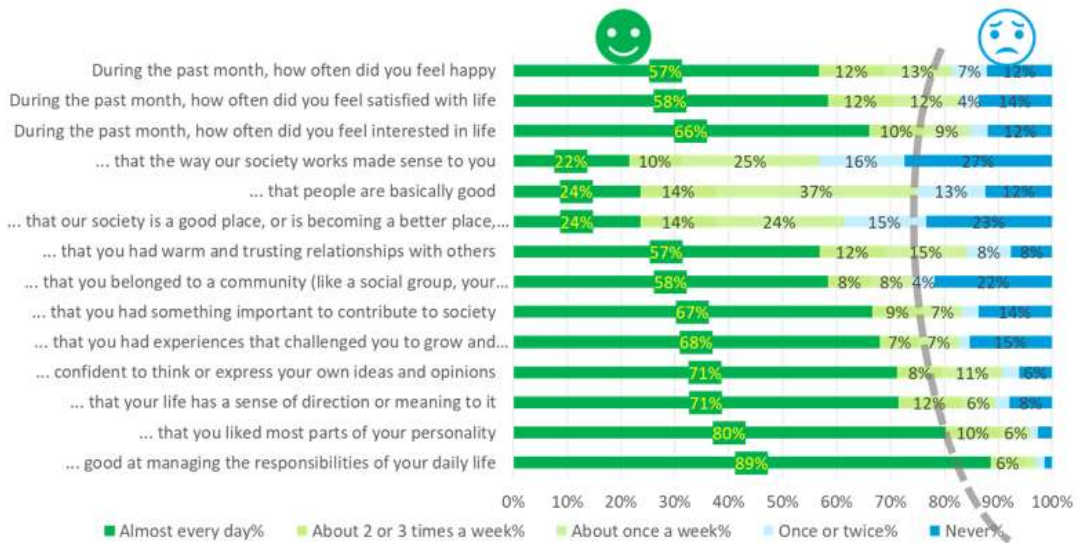


Figure 235. Factors of wellbeing. Global output. Source: Dynargie (2019)

### ○ Comparative Analysis

% of respondents, who NEVER experienced this during the past month	NDOMUS	DOMUS	NEIGHBOURHOOD	CONTROL
Happy	12%	13%	12%	8%
Interested in life	13%	11%	13%	12%
Satisfied with life	14%	14%	14%	14%
... that you had something important to contribute to society	10%	18%	12%	4%
... that you belonged to a community (like a social group, your school, or your neighborhood)	13%	35%	12%	14%
... that our society is a good place, or is becoming a better place, for all people	27%	19%	27%	23%
... that people are basically good	13%	11%	14%	12%
... that the way our society works made sense to you	31%	23%	31%	29%
... that you liked most parts of your personality	2%	4%	2%	0%
... good at managing the responsibilities of your daily life	2%	1%	2%	2%
... that you had warm and trusting relationships with others	6%	11%	6%	6%
... that you had experiences that challenged you to grow and become a better person	14%	18%	16%	4%
... confident to think or express your own ideas and opinions	7%	5%	9%	2%
... that your life has a sense of direction or meaning to it	9%	6%	9%	12%
MEAN	12%	13%	13%	10%

Respondents from the Control Group are more satisfied with their lives, smaller percentage of them have NEVER experienced these factors in the last month, and therefore in average their wellbeing is better: they feel happy more often, they feel like they contribute to the society, and they feel better almost in every other aspect of well-being, except the last one (meaning of life).

DOMUS respondents more often feel like they don't belong to the community, but they feel more often that people are basically good and that the way society works makes sense to them.

Table 27. Factors of wellbeing. Comparison analysis. Source: Dynargie (2019)

## Health (total and comparison)

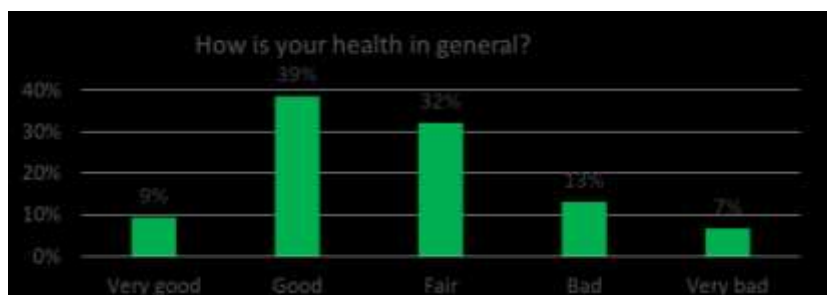


Figure 236. Health self-perception. Source: Dynargie (2019)

How is your health in general?	NEIGHBOUR			
	NDOMUS %	DOMUS %	HOOD %	CONTROL %
	44%	31%	43%	48%
	33%	31%	31%	40%

Table 28. Health (total and comparison). Source: Dynargie (2019)

#### 4.3.5.3 Conclusions

- Most respondents are happy, satisfied and interested in the life they have probably because they are resigned with daily life. Residents seem to have developed a local identity and maybe because they don't have other comparison terms, they are resigned. As an impact there is global residential satisfaction, and, apparently, no need to live differently;
- Most respondents know their neighbours in cordial terms, but there is no relationship of intimacy | friendship. This relationship is perceived as closer inside the Control Group;
- Most respondents when looking to spaces to socialize usually use their neighbourhood common spaces (cafes...);
- Most of the sample has physical, visual and other health limitations (ex.: diabetes, breathing difficulties...);
- Most respondents do not practice almost any physical activity and those who do it, do not use their area of residence;
- There are many discomforts with the physical environment of the Non DOMUS neighbourhoods: unpleasant smells, lack of cleanliness, lack of aesthetics of buildings. This discomfort in Domus neighbourhoods and Control Group buildings is less evident.

Analysing the data obtained through the field work, the following areas as being the main priorities in the perspective of the residents:

- Regular maintenance of streets, sidewalks and household waste (specially in Non DOMUS area);
- Environmental Education - preserving parks, common social physical places for all the sample area;
- Community education - living socially, education on civic principles, developing community living skills for all the sample area
- Health Education – promoting regular physical activity for all the sample area in order to install new habits and routines;
- Involvement of local entities (ex.: Parish Council) in joint efforts should result in a more consistent and coherent approach with a broader impact for all the sample area.

## 4.3.6 Participatory activities for qualitative data collection

### 4.3.6.1 Mapping the local participatory culture and engaging citizens and stakeholders in participatory activities to build on their visions and perceptions

In Porto, approaching and engaging citizens and stakeholders both covered mapping the local participatory culture and developing an attractive common vision for the co-development and implementation of a healthy corridor, through workshops, formal and informal meetings and semi-directional interviews, as well as developing collective actions, namely around introducing URBiNAT to a wider audience, ranging from public institutions to local organisations, agents and residents.

Beyond formal and informal meetings that have been conducted since September 2018, the fieldwork performed by the local task force (Porto municipality, DomusSocial, CIBIO, University of Coimbra, GUDA and CES-UC) resulted in a series of workshops aiming at creating synergies with existing initiatives, and kick-off events to launch the co-creation process in the intervention area, from February to October 2019.

- one meeting with councillors and municipal directors;
- one workshop with technicians of Porto municipality;
- three workshops with non-profit organizations and local associations;
- two workshops with schools;
- three kick-off events in schools
- one public kick-off event in a central and emblematic square.

Regarding the mapping of the local participatory culture, culture of participation is a complex analysis, once it has multi-forms of manifestation depending always on local culture and interactions as a whole. In this sense, we are not doing an exhaustive analysis, and are not only counting different practices, thus it is also more qualitative analysis from the field research done in Campanhã area. URBiNAT's goal is to explore what came from the territory, looking for strategies to better use it in the community-driven process that will promote the co-creation process.

From the information gathered, we could see that Campanhã has an active community that enjoys and cares about their place and enjoys being involved in the promotion of local traditions and values, also they are active when discussing territorial interventions. The local organizations are diverse, covering social, cultural and sports support and activities from children to older adults, including people with diversity. They are very active, organizing theatre, dancing and music projects, for example, also with inclusive formats, and are willing to get involved in URBiNAT invitations to engage the project.

Participatory practices promoted by the City Hall in Campanhã area assume, in general, consultive formats. In our view, it is a usual practice from municipalities that are still looking for creating news forms to relate with the citizens, doing a step ahead of the traditional models.

The residents living in Campanhã area demonstrated interests and energy to being involved in many activities, from fairs to territorial intervention, manifesting deep knowledge about the territory and its potential. They also are able to spend time and energy to be involved in URBiNAT's activities planning and co-creation process.

In sum, there is an extensive participatory activity in the community' life, mainly promoted by formal and informal organisations or public institutions that create engaging spaces and activities, following the residents' needs. However, these practices do not include the citizens "doing together with" in the idealization and/or creation of urban processes and interventions. It means that there is a huge human and creative potential present in Campanhã area that, within an appropriate engagement environment, could lead to new approaches of participation within urban regeneration.

Within the broader methodology of mapping participatory culture, a set of methodologies, techniques and approaches were applied, including:

- semi-directive interviews;
- exploratory interviews;
- direct observation;
- motivational interviewing;
- design thinking;
- cultural mapping;
- photovoice;
- walkthrough;
- other participatory activities that emerged from co-creation by the local task force, used in the kick-off events, such as:
  - gaming and performance (posters and discussion around a tree or a hanger of NBS posters, board game to introduce the concepts of nature-based solutions);
  - sharing visions and drawing (dreams hanger);
  - subjective geography (mapping of what is most liked and done in the territory);
  - measurement of perceptions (feelings about the place, nature and people).

All qualitative inputs from participatory activities contribute to the quantitative inputs of the local diagnostic stage 1 related to:

- mapping of NBS in the city and intervention area;
- physical characterization of the city and intervention area;
- social cohesion;
- local participatory culture and opportunities
- social and solidarity economy.

The upcoming participatory activities are also intended to present the results of the local diagnostics to the citizens and stakeholders of the intervention area, in order to confirm the improvements that the development of the healthy corridors will focus, which will support the co-selection of NBS.

This will be combined with the results of mapping the local participatory cultures performed under tasks 3.1 and 3.2, as reported in the deliverable D3.2 on the community-driven processes to co-design and co-implement NBS, to be submitted at month 18, together with the present deliverable D2.1.

#### 4.3.6.2 Kick-off events with schools

The objectives of kick-off events in primary schools were to:

- mobilize, make known and generate interest in the project;



- co-create, involving schools in the first activities of the project, namely to experiment participatory activities and co-diagnosis.

The possible scenarios were elaborated among the members of the local task force (CMP, Domus, CIBIO, CES and GUDA), based on the results of workshops and meetings held with local stakeholders and schools. The challenge was to create a simple event with a narrative that valorises and makes local assets and resources visible around four questions:

- What do you like about the area? What exists and happens here?
- What are your visions and dreams for the area?
- What would you like to change?
- How can you contribute and should help?

The staff of the local task force facilitated the activities, which were promoted by the schools and developed under the responsibility of their teachers. There was also the involvement of organisations already collaborating with the project. It resulted in three kick-off events, being two similarly organised and the third one integrated in an event already organised by the school.

#### 4.3.6.2.1 *Kick-off activities in Corujeira primary school*

The event was held on the 31st of May 2019, from 9.30 am until 3.30 pm, on International Children's Day. The program developed for the Corujeira primary school resulted from the co-creation process involving the URBiNAT team, the school coordinator, teachers and representatives of the parents' association.

The activities were carried out in six groups, who circulated through six stations, with 30 minutes for each activity. It involved six classes, about 160 children, nine teachers, the representative of the parents' association and the school coordinator.

#### **Walkthrough**

This activity was carried out in the Corujeira square, an area located in front of the school, which is also a garden and leisure place for people of any age. The walk started in front of the school and went through the garden, with six stops: 1. the gathering place; 2. sidewalk/street/parking; 3. the monument/bridge; 4. street to Falcão housing; 5. pathway into the garden; 6. social centre of Soutelo. The activity was organised in six different groups, accompanied by the teacher responsible for the class. The facilitators lead the groups to each stop, asking key questions that they answered spontaneously.

In order to capture the visions and perceptions of the students of the primary school, they were asked: 1. what they like?; 2. what they do not like?; 3. what could be better or different here? Why?; 4. how people use the garden / street / outside area?; 5. where do they live?

As main results, we can highlight that the children of this primary school who participated in this activity like the Corujeira square/garden as a place to play, riding a bike, meeting friends, or simply to enjoy nature. Moreover, they mentioned that it could have a playground, more places to have picnics and be a colourful place with flowers. They also referred often that the place is not clean.

## Mapping board: let's map together!

### VAMOS MAPEAR JUNTOS/AS .....

O que mais gostas? Que actividades fazes?



Figure 237. Let's map together activity. Source: CES/GUDA (2019)

### Objective

This activity consisted of showing participants a map of the intervention area (A1 format) in order to identify specific areas they like most and least, leading to identify critical issues or added values with customized stickers, as well as with the possibility of drawing / writing on a plain sticker. As a result, it was also possible to identify priority zones in the study area.

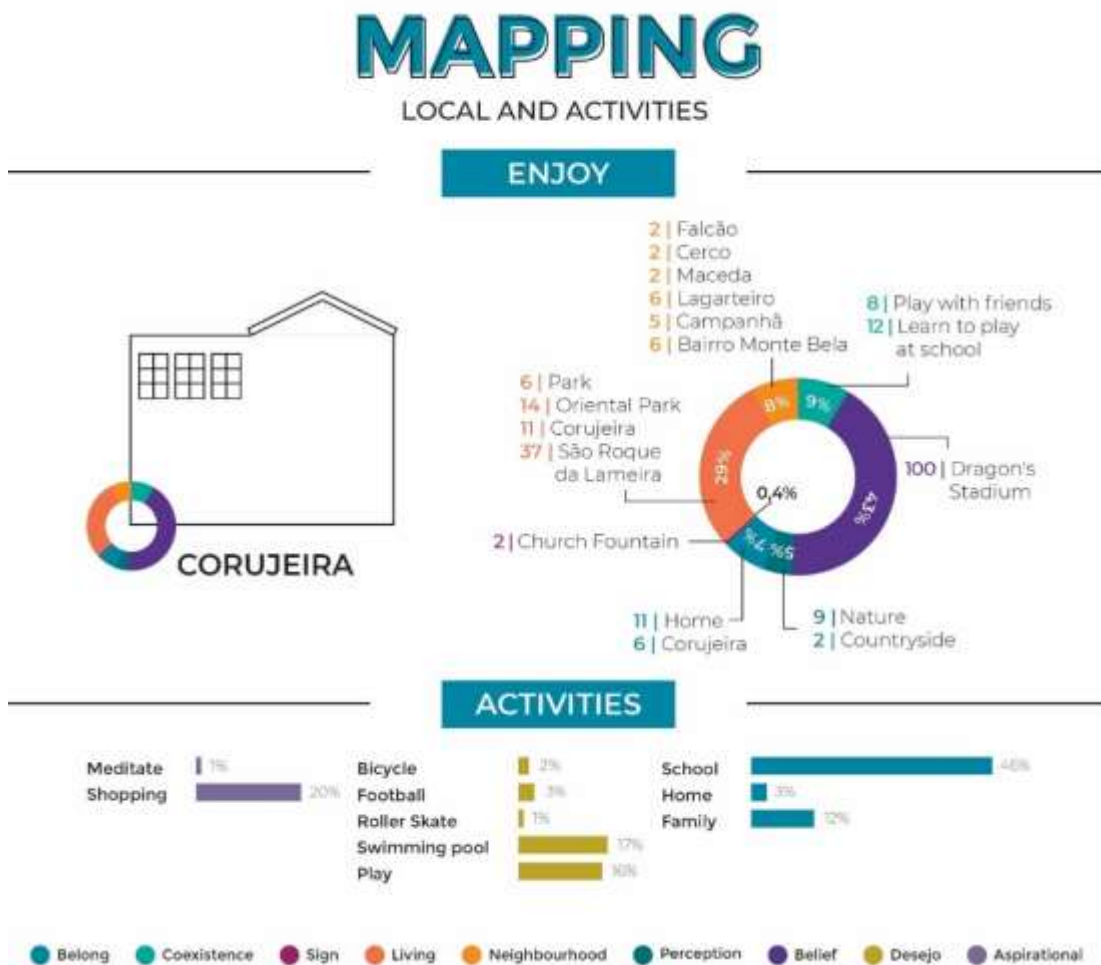


Figure 238. Mapping - Local and activities results. Source: CES/GUDA (2019)

## Main Results

The main results identified in the mapping, are characterized by a strong expression of the school environment, as a community aggregator, beyond sports and culture (Figure 238). Activities in family spaces are considerably functional for building a sense of belonging and coexistence.

### **Feelings (tube board): how do you feel? (positive and negative)**

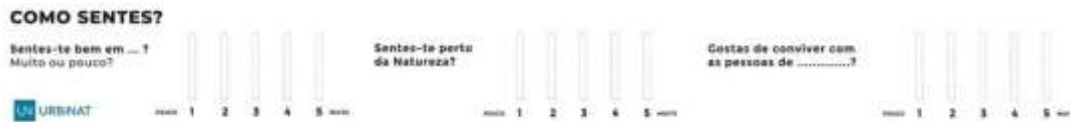


Figure 239. "How do you feel" activity. Source: CES/GUDA

### Objective

This station is composed of 3 structures of 5 pipes. Each structure corresponds to a question that is asked to each participant (if they like / dislike the area), who answer by placing marbles in pipe 1 (do not like) to the pipe 5 (like a lot) (Figure 239). The methodology is repeated for the remaining 2 structures with different questions (feeling close to nature and enjoying living with people from the area). At the end of the activity, it is possible to see the response trends regarding the number of marbles placed in each tube for each response.

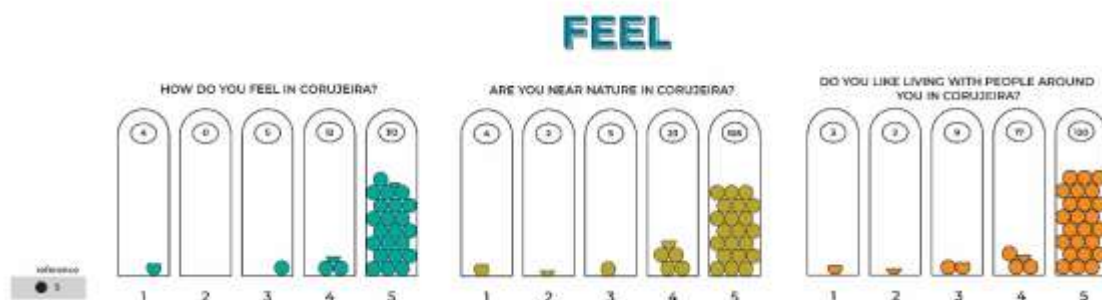


Figure 240. Results of "How do you feel" activity. Source: CES/GUDA

## Main Results

Positively, there is a sense of belonging and a sense of well-being with the locality. It is quite interesting and clear that nature is important for the community. In less positive assessments, the references made by participants show there is still a need to strengthen the relationship with non-national communities and cultures (Figure 240).

### **Dreams (tags): what are your dreams? (sketching and write)**

Objectives: this station was intended to challenge participants to write or draw the dreams they have for the intervention area, to be hung on ropes between trees.



Figure 241. Results of “What are your dreams” activity. Source: CES/GUDA

### Main Results

If the challenge is to verify a child's ability to dream, the sense and need for children to play has been reinforced. The public spaces are insufficient and poorly diversified to meet these needs. It is noteworthy that children of the age of participants (primary schools) also behave by mimesis, which may result in a lack of diversity of opinions (Figure 241).

### **NBS around the trees**

The children who participated were very excited and did not pay attention to the differences between the two post-its (the “flower” shape post-it was to be placed in an NBS that they already knew about; the “like” shape post-it was to be placed in an NBS they would like to see implemented near their school). However, analysing the results (Figure 242) and observing the children, they mixed up the post-its, placing both on the same NBS or placing the “flower” one on an NBS that it would not be possible for them to know about (ex: Super Barrio). Thus, the application of this methodology with children provided us an inaccurate data.

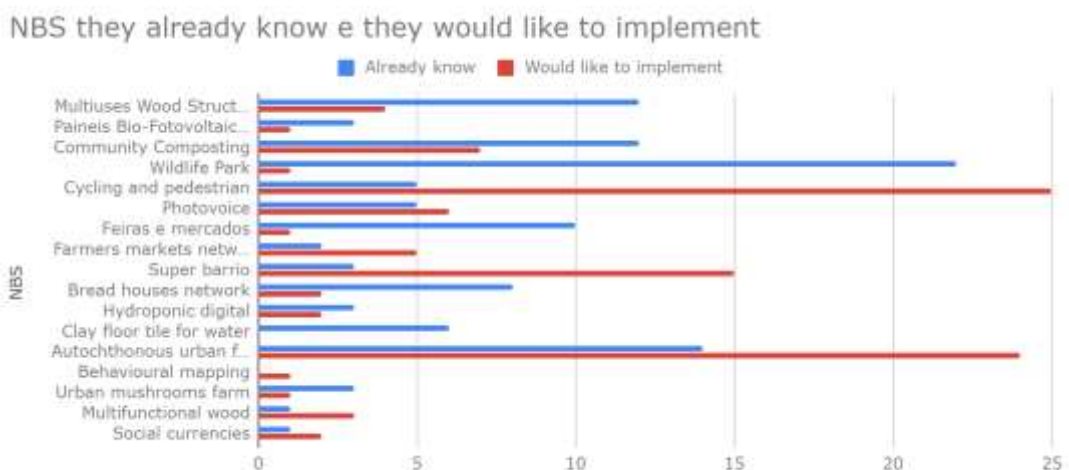


Figure 242. Results of “NBS around the trees” activity. Source: CES/GUDA

## Photovoice

Participants demonstrated<sup>25</sup> (Figure 243) that they enjoy school very much, that they use the Corujeira square/garden as a passage and leisure space (playing, cycling, rollerblading, skating, walks, and sometimes picnics), and that they know the surroundings (Parish Council, CTT, commerce), some of them residing nearby. They enjoy the trees and the contact with nature very much, they like to hear the birds singing and to be in the shade. They complained about the scattered dirt, the lack of rubbish bins (although around 25 bins were counted at the site). They would like to have a cleaner, more flowery space there, more living spaces, such as more suitable picnic tables. They talked a lot about the lack of a playground for children. Some participants mentioned also the need for lighting at night to enable them to play.

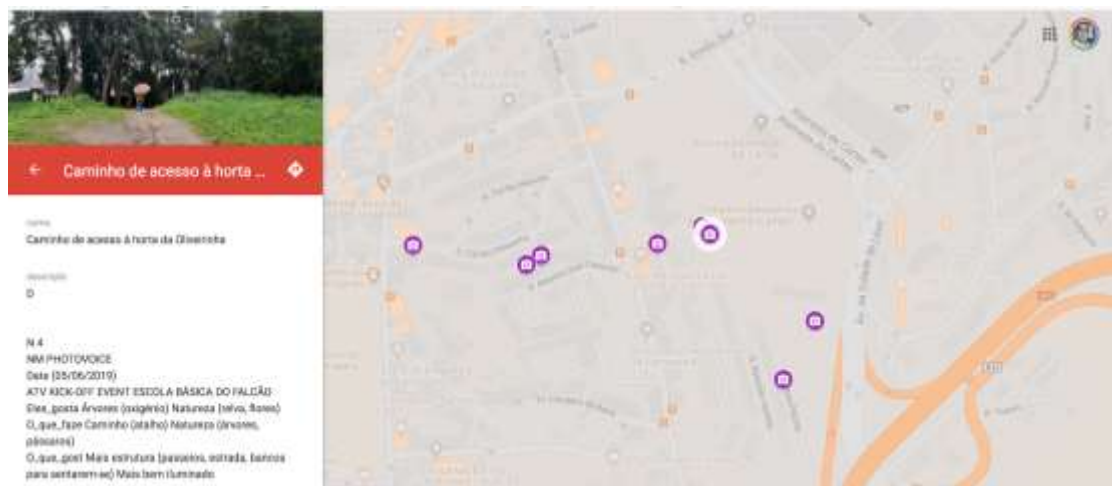


Figure 243. Application of “Photovoice” activity. Source: CES/GUDA; link: <https://drive.google.com/open?id=1vHIBfClI6buKAf9PgsEluo6MTGGgdXos&usp=sharing>

### 4.3.6.2.2 *Kick-off activities in Falcão primary school*

The event was held on the 5th of June 2019, from 9.30 am until 3.30 pm, on the occasion of the International Children’s Day. The program developed for the Falcão primary school resulted from the co-creation with the coordinator, teachers and representatives of the parents’ association.

The activities were carried out in six groups, who circulated through stations, with 30 minutes for each activity. It involved nine classes, about 200 students, teachers and assistants, and the school coordinator.

## Walkthrough

The local task force prepared three routes (blue, red and pink) nearby the school, involving three groups each (Table 29 and Figure 244). The facilitators planned stops and asked the children the following key questions regarding the place: 1. what they like the most?; 2. what they do not like?; 3. what could be better or different here? Why?; 4. how people use the garden / street / outside area?; 5. where they live?

<sup>25</sup> Mapping of “Photovoice” activity by CES and GUDA, retrieved November 20, 2019, from <https://drive.google.com/open?id=1vHIBfClI6buKAf9PgsEluo6MTGGgdXos&usp=sharing>



Description of the routes	Main results
<p><b>Blue</b></p> <p>The shortest route around the school area, and the most appropriate for preschool children, aged between 3 and 4, as well as for the children with functional diversity.</p> <ol style="list-style-type: none"> <li>1. a small garden between buildings;</li> <li>2. a recreation place, which is used by the resident to play sports;</li> <li>3. a nearby small garden and car parking;</li> <li>4. behind the buildings, in an area between New Falcão and Old Falcão;</li> <li>5. to a car parking and garden between old buildings.</li> </ol> <p>The route crosses two developments of Falcão housing: the first development of this municipal neighbourhood from 1973 (refurbished in 2018) and its extension from 1981 (which refurbishment is being prepared by the municipality).</p>	<p>In a group, the children answered spontaneously, despite some of them are from nearby neighbourhoods (Cercó, Corujeira, Francos, São Roque, Lagarteiro, Ilhéu) and have no daily life in the area. They come to Falcão walking, by bus or subway, and the most part only visited Falcão with the school. Sometimes, the children who actually live in Falcão were most active to answer and it was interpreted by the facilitators as a natural situation.</p> <p>It is noteworthy that when the first child answers a question, there is a high possibility for having it repeated by the others, or to remain in the same kind of topic (e.g., when one said she/he does not like a fly, the colleagues added small animals as bees, earthworms, ants, and spiders). Therefore, many answers are induced by the first answers.</p> <p>Children who live in Falcão like the place. They would like a cleaner and greener place, with more leisure place, such as a playground. They also said the recreation place could have a better structure and, in general, they pointed out the lack of gardens, with flowers and plants, to play and relax.</p> <p>In a group, five of them mentioned they do recycling at home.</p>
<p><b>Red</b></p> <p>Course on the right side of the school, done with students from the 1st to the 3rd year school, aged between 6 and 9.</p> <ol style="list-style-type: none"> <li>1. side of school;</li> <li>2. old wall;</li> <li>3. path between Falcão and the soccer field;</li> <li>4. stairs.</li> </ol> <p>The route is formed by three sets of buildings, built by Domus Social in the 70/80's. In 2001, the neighbourhood was extended, and, in 2018, some buildings started to be refurbished. It comprises the "Oliveira vegetable garden", which is used by Porto residents to plant vegetables and fruits. The red route also went near the municipal stadium, where many students play soccer.</p>	<p>Children answered spontaneously, despite some of them are from nearby neighbourhoods (as Cercó, Valongo, Antas) and have no daily life in the area but have been many times in part of the route because it is near the school, and it is a path to the urban garden.</p> <p>We noticed two different behaviour. In one group, when one child answered a question for first, there was a high possibility for the others to simply repeat the answer, or to keep it around the same topic, while in another group the answers were contradictory.</p> <p>Children who live in Falcão like the place. They would like a cleaner, greener and recovered place, with more leisure options, such as a playground. They also have concerns with transport and car parking.</p> <p>In a group, five of them said they have a plot in the urban garden.</p>
<p><b>Pink</b></p> <p>The course on the right side of the school, done with students from the 3rd to 4th year school, aged between 8 to 10.</p> <ol style="list-style-type: none"> <li>1. Old Falcão (neighbourhood entrance)</li> <li>2. Corujeira Garden</li> <li>3. Parish Council</li> <li>4. Nun'Alvares of Campanhã Association</li> </ol> <p>The route crosses two developments of Falcão municipal housing: the first from 1973 (refurbished in 2018) and its extension from 1981 (which refurbishment is being prepared). From there, it reached the Corujeira square (a central green structure in Campanhã), then passing in front of the Parish council building. On the way back to the school, a final stop was made at the starting point of the walk, summing up the ideas (for an overall view, having the entire route in mind).</p>	<p>In a group, the children answered spontaneously, despite some of them are from nearby neighbourhoods (as Ariosa, Bairro do Cercó, Campanhã, Celorico, Bairro Monte da Bela, Bairro de São Roque, Vilar Costa Cabral, Vilar Andorinho, Fernão Magalhães) and have no daily life in the area, but have been many times in part of the route because it is nearby the school. They come to the school walking and by bus.</p> <p>Children who live in Falcão like the place. They would like a cleaner, greener and recovered place, with more leisure options, such as a playground.</p> <p>They also have concerns with transport and car parking.</p>

Table 29. Results of the walkthrough. Source: CES/GUDA

# WALKTHROUGH

FALCÃO

## SMALL GARDEN

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 3 responses

COULD BE BETTER OR DIFFERENT



In 3 responses

## RECREATION PLACE AND GARDEN

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 7 responses

COULD BE BETTER OR DIFFERENT



In 3 responses

HOW THEY USE THE PLACE



In 7 responses

Affection, Built up, Clean, Noise, Park, Playfulness, Cultural/Artistic, Family, Religion, Street, Safety, Service, Healthy, Peace, Political, Public Institution, Community space, Wellbeing, Reference, Type

## BETWEEN NEW AND OLD FALCÃO BUILDINGS

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 3 responses

COULD BE BETTER OR DIFFERENT



In 14 responses

HOW THEY USE THE PLACE



In 1 responses

## OLD FALCÃO BUILDINGS AND GARDEN

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 2 responses

COULD BE BETTER OR DIFFERENT



In 3 responses

HOW THEY USE THE PLACE



In 1 responses

Affection, Built up, Clean, Noise, Park, Playfulness, Cultural/Artistic, Family, Religion, Street, Safety, Service, Healthy, Peace, Political, Public Institution, Community space, Wellbeing, Reference, Type

## SIDE OF THE SCHOOL

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 7 responses

COULD BE BETTER OR DIFFERENT



In 10 responses

HOW THEY USE THE PLACE



In 3 responses

## OLD WALL

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 7 responses

COULD BE BETTER OR DIFFERENT



In 10 responses

HOW THEY USE THE PLACE



In 3 responses

Affection, Built up, Clean, Noise, Park, Playfulness, Cultural/Artistic, Family, Religion, Street, Safety, Service, Healthy, Peace, Political, Public Institution, Community space, Wellbeing, Reference, Type

## PATH BETWEEN FALCÃO AND THE SOCCER FIELD

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 4 responses

HOW THEY USE THE PLACE



In 5 responses

## STAIRS

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 4 responses

HOW THEY USE THE PLACE



In 3 responses

Affection, Built up, Clean, Noise, Park, Playfulness, Cultural/Artistic, Family, Religion, Street, Safety, Service, Healthy, Peace, Political, Public Institution, Community space, Wellbeing, Reference, Type

## OLD FALCÃO

WHAT THEY LIKE



In 7 responses

WHAT THEY DO NOT LIKE



In 14 responses

COULD BE BETTER OR DIFFERENT



In 10 responses

HOW THEY USE THE PLACE



In 3 responses

## CORUJEIRA GARDEN

WHAT THEY LIKE



In 3 responses

WHAT THEY DO NOT LIKE



In 14 responses

COULD BE BETTER OR DIFFERENT



In 10 responses

HOW THEY USE THE PLACE



In 14 responses

Affection, Built up, Clean, Noise, Park, Playfulness, Cultural/Artistic, Family, Religion, Street, Safety, Service, Healthy, Peace, Political, Public Institution, Community space, Wellbeing, Reference, Type

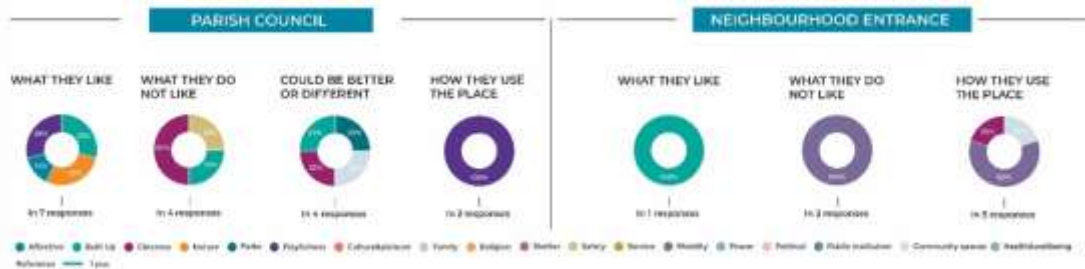


Figure 244. Results of “Walkthrough” activity in Falcão. Source: CES/GUDA

### Mapping the neighbourhood

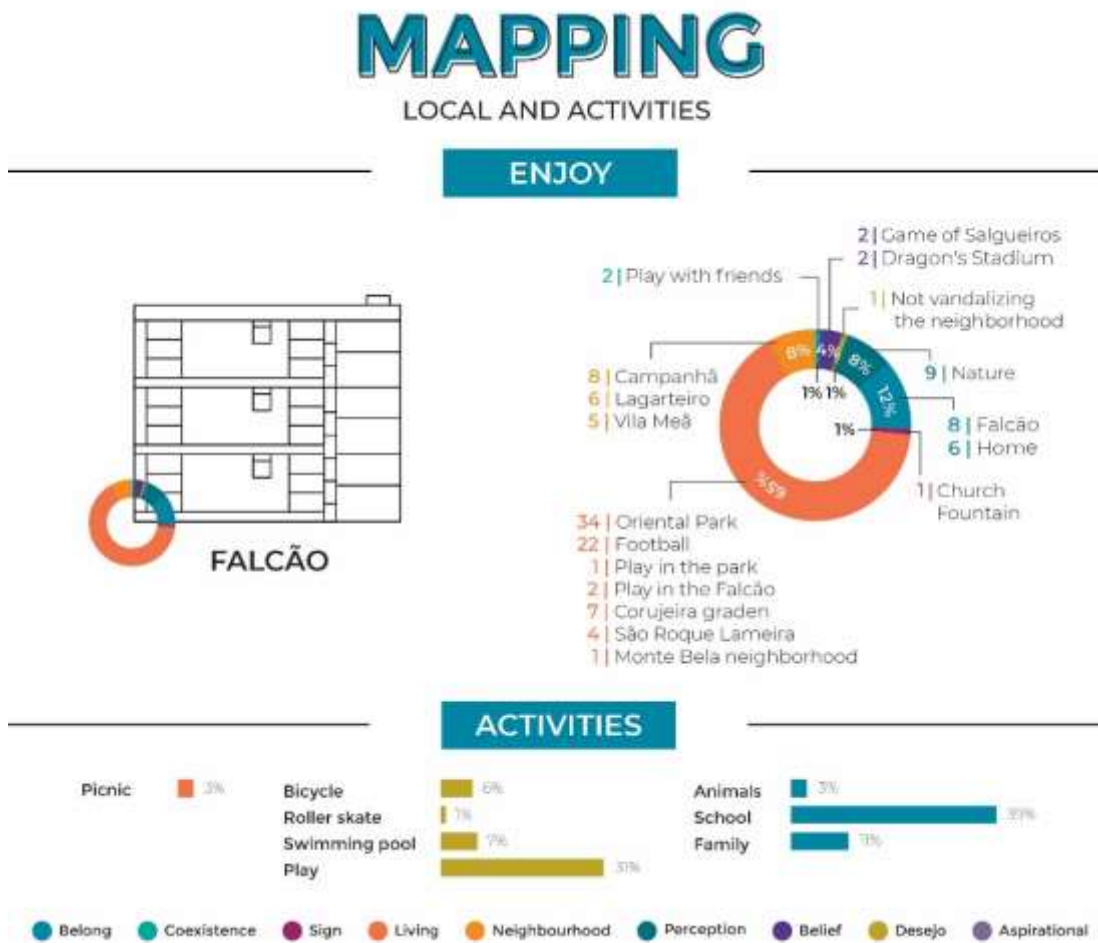


Figure 245. Results of “Mapping” activity in Falcão. Source: CES/GUDA

### Main Results

The main results identified in the mapping are characterized by a strong expression about the school environment, as a community aggregator, beyond sports and culture (Figure 245). Activities in family spaces are considerably functional for building a sense of belonging and coexistence.

## Feelings (tube board)

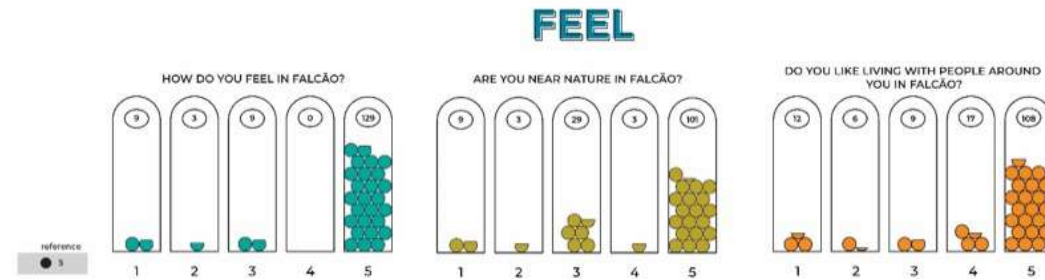


Figure 246. Results of “Feel” activity in Falcão. Source: CES/GUDA

### Main Results

Positively, there is a sense of belonging and a sense of well-being with the locality (Figure 246). It is quite interesting and clear that nature is important for the community. In less positive assessments, the references made by participants show there is still a need to strengthen the relationship with non-national communities and cultures.

## Dreams (tags)



Figure 247. Results of “What are your dreams” activity. Source: CES/GUDA

### Main Results

If the challenge is to verify a child's ability to dream, the sense and need for children to play has been reinforced (Figure 247). The public spaces are insufficient and poorly diversified to meet these needs. It is noteworthy that children of the age of participants (primary schools) also behave by mimesis, which may result in a lack of diversity of opinions.

## NBS around the trees

This activity as planned needs to focus on the dimensions of the catalogue, how these dimensions interact and how it relates to the "real life" of participants, since it is the first

contact with the concept of NBS and with many of the solutions from the catalogue.

### NBS they would like to implement

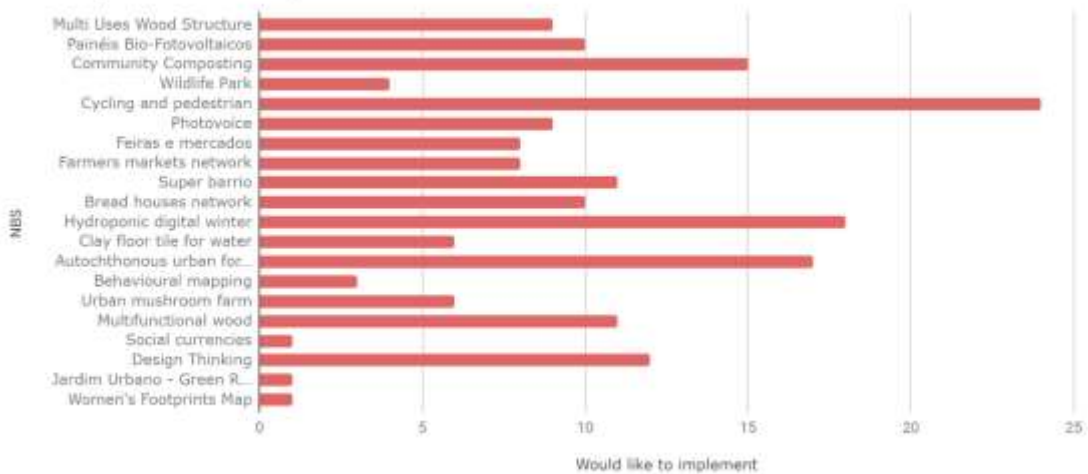


Figure 248. Results of “NBS around the trees” activity. Source: CES/GUDA

In the case of children, the challenge is to catch their attention with very dense contents. Yet, we improved the accuracy of the results from the previous workshop with explanations about each NBS, walking around posters and asking what they see and understand, as well as completing their understanding with more details about the solution (Figure 248). Many children were calling us from a poster to another to show us what they choose or ask us what was represented in the poster, in order to help them to choose.

### Photovoice





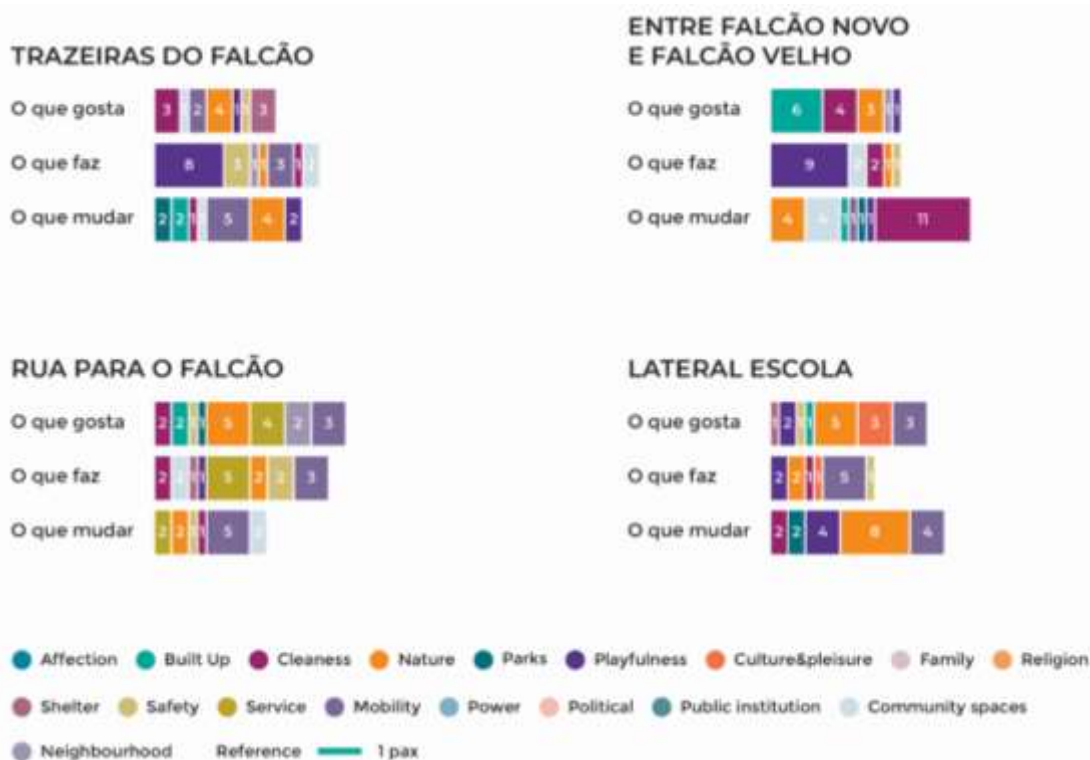


Figure 249. Results of “Photovoice” activity. Source: CES/GUDA

Students showed that they occupy many of the areas of Bairro do Falcão as a place to play (even if improvised) and use the highlighted paths in their daily lives (Figure 249). They complained about dirt, lack of dustbins, degraded spaces, sometimes noisy and unsafe - for lack of lighting.

They would like to see the space in which they live cleaner and well maintained in general, with more offers of toys (swings, slides), and expressed a desire to have a water park. They also would like to see the well-kept streets with rides and street furniture.

#### 4.3.6.2.3 *Kick-off activities in Cerco primary school*

The event was held on the 17th of June 2019, from 3.00 pm until 5.30 pm, on the occasion of the school fair to celebrate the end of the school year, where URBiNAT presented the project to students and their families. The program developed for the Cerco School resulted from the co-creation with the coordinator and teachers.

It involved nine classes, about 120 students, adults in charge of the children, teachers and assistants and the school coordinator. There was no group or specific duration for each activity, since the participants walked freely and when they moved near the map and the NBS we talked to them about the project and Cerco neighbourhood.

## Mapping the neighbourhood

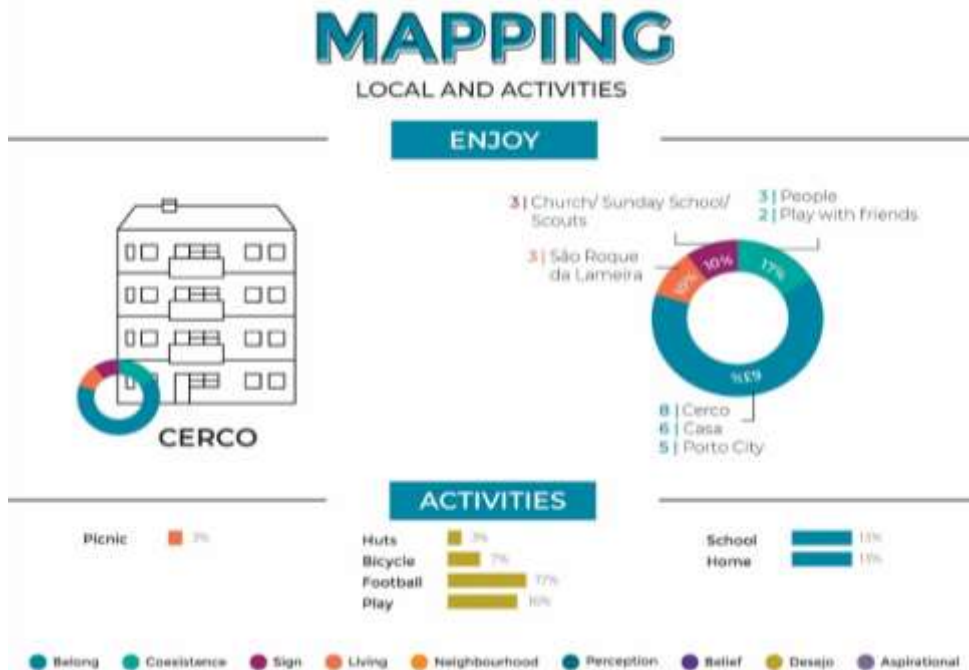


Figure 250. Results of “Mapping” activity in Cerco. Source: CES/GUDA

### Main Results

The main results identified in the mapping are characterized by a strong expression about the school environment, as a community aggregator, beyond sports and culture (Figure 250). Activities in family spaces are considerably functional for building a sense of belonging and coexistence.

It is noteworthy that the activity was conducted in the middle of another initiative of the school initiative, and the working groups were not organized in the same way as the Corujeira and Falcão schools.

The flows were individualized, and the children were accompanied by their parents.

### **Dreams (tags)**



Figure 251. Results of “What are your dreams” activity in Cerco. Source: CES/GUDA

### Main Results

In this school we had a reversal, as children focused more on other needs linked to their community (Figure 251). It may have been by the way they were geared to respond to the tool, but in fact they demonstrated overall needs, focused on their neighbourhood and everyday problems.

Nature and happiness are aspects that stand out in the way children characterized their dream. It is noteworthy that the activity was developed in the middle of another school initiative, and the working groups were not organized in the same way as the Corujeira and Falcão schools.

The flows were individualized, and the children were accompanied by their parents.

### **NBS around the trees**

This activity, planned as part of a circuit in the activities at schools, did not work well when out of the circuit. It was not easy to explain the NBS for children and adults when they did not come in a group, beyond the limitations pointed before as a result of this activity. However, the activity was able to attract curiosity for the pictures. So, it was a good way to invite the participants to join the other activities done in Cerco, namely the mapping and dreams.

#### **4.3.6.3 Kick-off activities in Corujeira square**

According to our Information Flow and Sequence (Figure 252), transformation / transposition is critical to the sequence of workshops at each stage of development. As Kick-Off in Campanhã is an opportunity to expose some of the results achieved, it was considered that it would be fundamental in the mapping tool to expose the preliminary results of the school's workshops. The aim will be to confront the participants with the first results and validate them. Potentially we will also get more new, secondary indicators to complement the previous data.

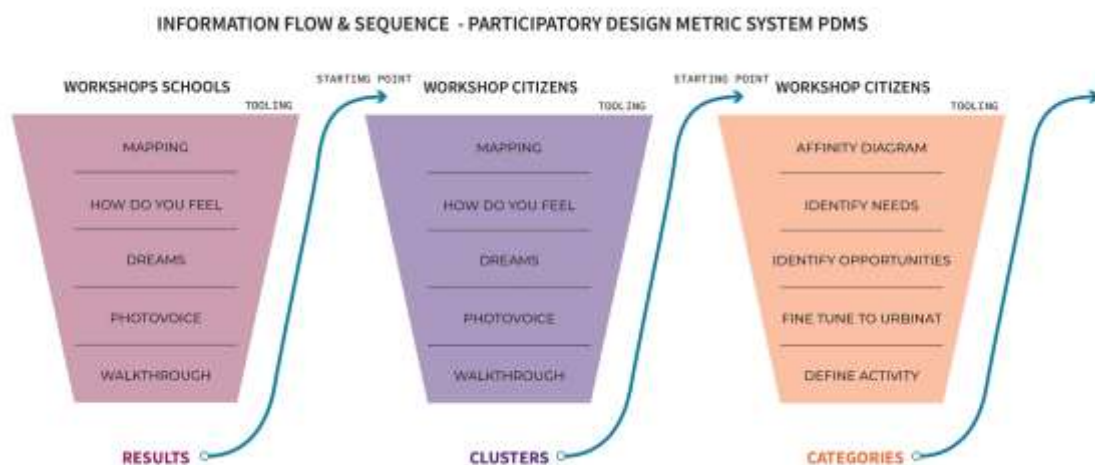


Figure 252. Information flow & sequence. Source: CES/GUDA

The event was held on the 12th of October 2019, from 09.30 am until 6.00 pm, or, when the URBiNAT Project was presented to the residents of Campanhã area. The program was developed for Corujeira square as a result of co-creation with the URBiNAT team, local entities and associations. 32 people were involved from the members of the local task force, working in the organization and facilitating the activities.

#### 4.3.6.3.1 **Presentation of event**

*Objective* - this event intended:

- mobilize the population through the official communication of the URBiNAT Project;
- empower the population for the meaning of nature based-solutions;
- start the co-creation process involving the population in the first participation and co-diagnosis activities;
- create recreation moments and dissemination through the local Organizations / Associations involvement.

*Expected results* - It is anticipated that this event will allow to:

- create a more active participation in the Project and take the first steps in creating a participatory culture;
- identify facilitators and ambassadors that facilitate the link between URBiNAT and the local population, optimizing their implementation and amplifying their impact; These actors are expected to play an important role in extending the effects of URBiNAT beyond its implementation period;
- collect preliminary data to feed into the Local Diagnostic Report to be delivered to the EC in November 2019 and allow for necessary adjustments to ensure the success of future participation sessions;
- reporting on community-led processes;
- the re-definition of methodologies and protocols to support future participation actions.

#### 4.3.6.3.2 **Activities**

The main objective of the event is to generate empathy and recognition between the URBiNAT project and the citizens in general. Smiling was the main instrument and narrative!

In order to involve the entities already involved in the project activities, seven participant groups up to 15 people from these organisations were organised from 10am to 4.30pm. Residents and passers-by who come to the event venue were also invited to join the groups or form a new group. All participants were invited to accomplish a circuit in which they could try out various participation activities, bringing them to know the URBiNAT project and its concepts better.

The circuit was organized in 9 stations, which received guided groups of participants (around 15 per group, with a minimum of 7-8 people). Each participant received a circuit postcard, to be stamped in each station. At the end of the circuit, they were also invited to get involved in the next project activities, including the planning/organization. Once the circuit was complete, the participants received a graphic diary that materializes the co-creation message to which they are invited to continue.

The circuit activities follow a sequence of positive inquiry in order to make visible and value the people, places and resources existing in the project's intervention area, before

the challenges specific to this area or inherent to any other area of the city. The mindset is positive for active co-creativity. It is the reverse of an approach to problems and needs.

The venue also hosted a “local talent fair” where entities, associations and collective, or individual initiatives were invited to exhibit their activities and productions. The “recreation area” also made it possible to exhibit these local talents. The goal was to strengthen ties with the different stakeholders of the locality.

### **Fishing area (participants mobilization)**

*Objective:* invite people to participate in the event. Facilitators responsible for this task moved along the area of the event to invite potential participants, pitch and refer them to the check-in or to the support zone (if necessary).

*Main results and outputs:* this area was dedicated to engaging participants interested to know better the project. Many of them joined the groups in the circuit. The facilitators also managed the participation of two men with walking difficulties, one of them also blind, bringing them the activities, in the sense that they explained all stations activities and received their contributes that after were written in the adequate stations.

### **Support area**

The objective of this area was provided support to colleagues who were developing the other stations on the circuit and also to participants who pass or are recommended by colleagues in the fishing area. Also, it was a reference point for an observation/investigation team.

### **Check-in**

This was the station to register and welcome the participants. The responsible for this station briefly explained the project and the activities of the event to participants, registered their names and gave the postcard circuit. Once the groups were organised, a guide started the circuit with the participants. In order to involve the entities already participating in the project activities, seven participant groups up to 15 people from these organisations were organised from 10am to 4.30pm. Residents and passers-by who came to the event venue were also invited to join the groups or form a new group. In total, around 60 new participants were registered.

### **URBiNAT video**

This station presented a 3' minutes video animation that explained what are NBS and the co-creation and co-implementation process. Participants could also ask questions about the project.

### **Nature-Based Solutions**

This station was intended to develop a performance to explain to participants the theme of NBS, using an interactive board game. This activity mainly enabled to:

- broaden the perception on the existence of NBS in the city. E.g.: yes, there are more than 100 green rooftops in Porto! Trindade station is one of them;



- expand the concept of NBS to immaterial dimensions, as well as on the opportunities to combine material and immaterial solutions;
- highlight key components of NBS for the participants. E.g.: include more than the intervention area residents for a broad inclusion in the city as a whole; urban gardens are places for socializing and sharing experiences; earth and nature give us everything; bread is the first source of life;
- collect suggestions for participatory activities to be developed within URBiNAT, so further engagement of potential champions;
- map critical issues to be solved in the intervention area. E.g.: visibilize and valorise existing places, such as Jardim da Corujeira; need to link Lagarteiro with leisure areas of “passadiço” (gangway) to ensure accessibility; improve accessibility in public transportation for functional diversity; attract people to the area, which is losing residents;
- collect and answer questions about URBiNAT project for appropriation of and engagement in the project. E.g.: benefits, concrete actions to be developed.

### Let's map together! (locations)

This station was intended to demonstrate to participants a map of the project's intervention area (A1 format) to identify specific areas (which they like best, what they like least, where they identify problems or added value), and understand the relationship that the inhabitants have with the different areas, either by the activities they develop, or by affective or familiar relations (Figure 253).



Figure 253. Let's map together activity, in Kickoff. Source: CES/GUDA

The participants put a customized sticker or a plain sticker that they customized by drawing or writing. It enabled to identify priority areas in the study area. It was important to sensitize the participants to the importance of this station, because it will allow to understand the flows of each area and the specificities in its relationship with the different public spaces.

# MAPPING

LOCAL AND ACTIVITIES

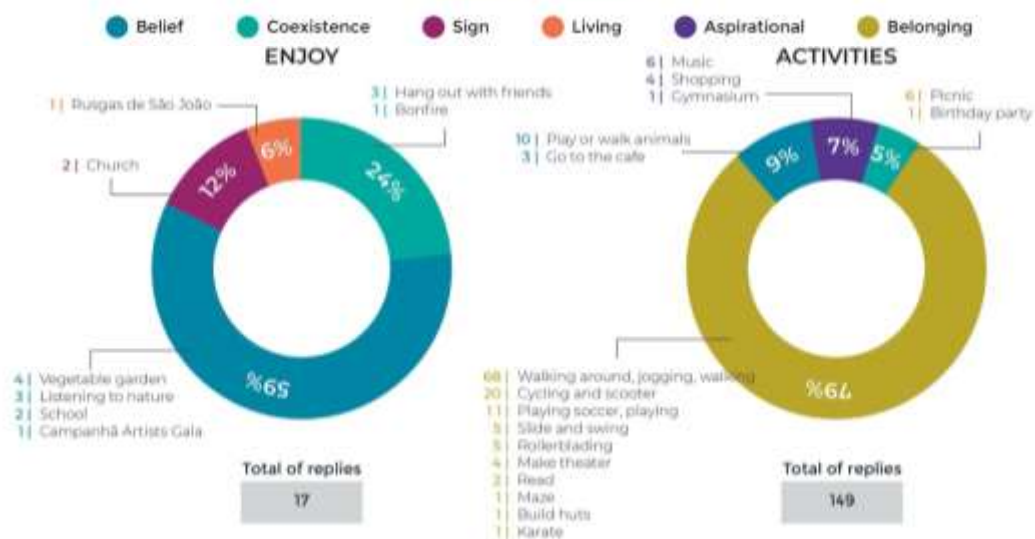
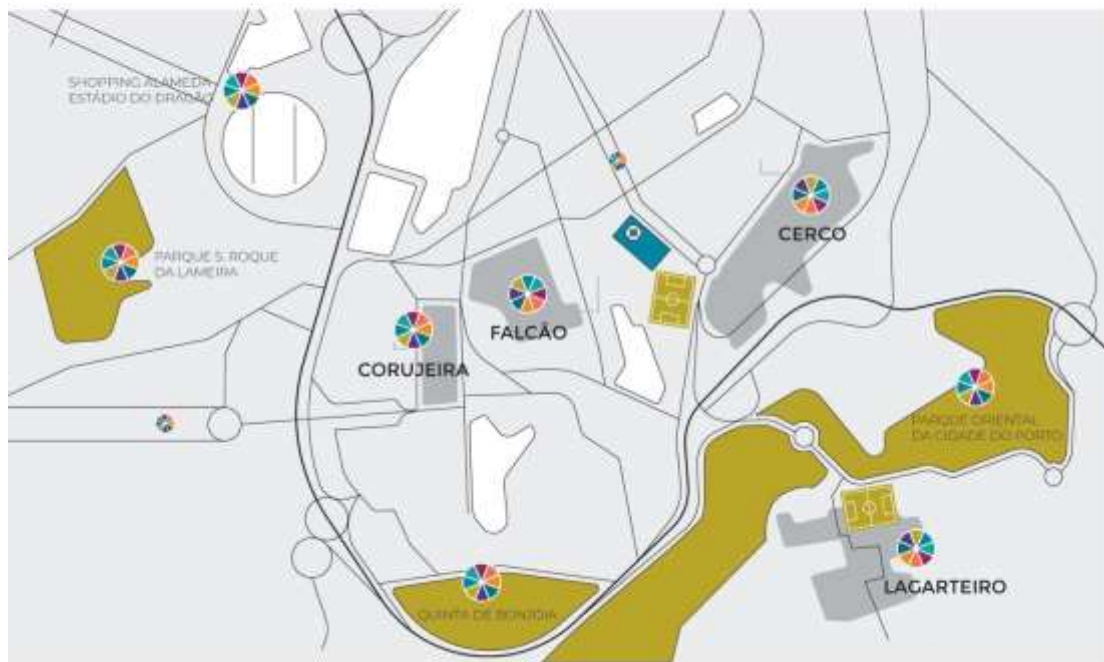


Figure 254. Results of “Mapping” activity in Kickoff. Source: CES/GUDA

## Main Results

The mapping results mostly validated the initial collected data for actions and activities that people like and do at the neighbourhoods of Campanhã, such as enjoying the green spaces areas, to walk and play, as well as the signs of their system of beliefs e.g. schools, traditional events, cultural spaces, commercial areas (Figure 254). The described activities also demonstrate a strong sense of belonging.

### *How do you feel? (contrasts - positive to negative scale)*

This station was formed by three structures of five pipes in polycarbonate. Each tube structure corresponded to a question asked to each participant (e.g. if they like/dislike the Corujeira area). The answer was given by placing a coloured ping-pong ball in the pipe, from one (dislike) to five (like a lot). The methodology was repeated for the remaining two pipe structures, which had different questions (feeling close to nature and enjoying living with people from Corujeira). At the end of the event, it was possible to see the response trends with the number of ping-pong balls placed in each pipe for each response.

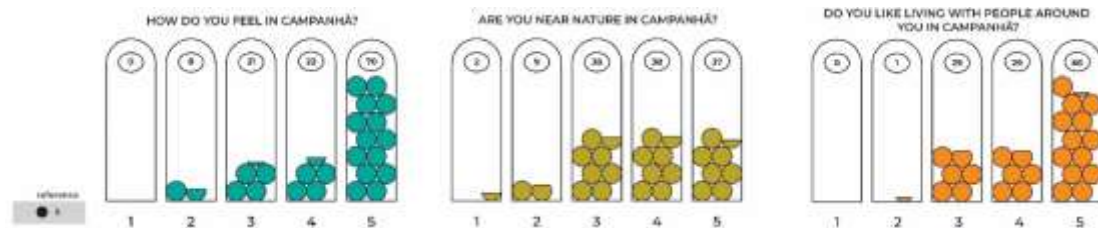


Figure 255. Results of “Feel” activity, in Kickoff. Source: CES/GUDA

### Main Results

The scale tool results are clear regarding the strong sense of belonging, relations and community living (Figure 255).

The experts also would like to stress that the more negative appreciations were demonstrated by specific groups of participants such as: disabled and ethical based citizens. This information is signalled to the researchers of work package 3 as information to be crossed with deep motivational interviews and citizens focus groups to go deeper on the full understanding of the Why’s for their voting on this tool.

We also highlight the more neutral voting for the topic “live near nature”. Even if we were surrounded by nature in Corujeira, the stakeholders clearly understood that need to express negative issues like lack of maintenance, investment of good research regarding the type of trees planted for example.

### **What are your dreams? (mapping and sketching)**

In this station the facilitator asks the participants what are their dreams for the area. This station was intended to challenge participants to write or draw the dreams they have for the intervention area of the project, to be hung on ropes between the trees.

# DREAM

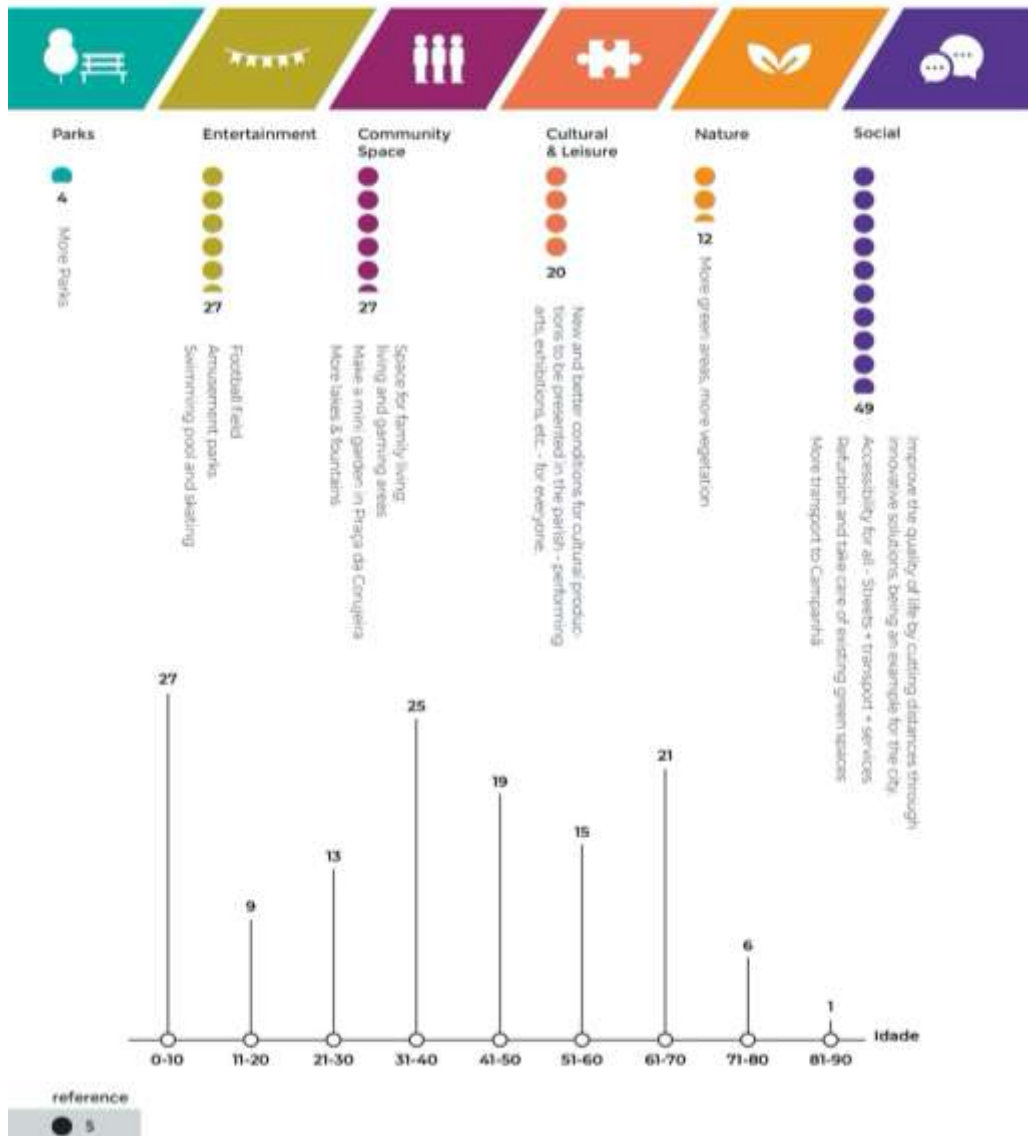


Figure 256. Results of “What are your dreams” activity, in Kickoff. Source: CES/GUDA

## Main Results

The results of this tool indicate a clear evolution from the results obtained in the schools’ workshops (Figure 256). Participants were more informed and expressed deeper insights connected with real URBiNAT concerns, such as: social issues and needs (access, mobility, social spaces) and also community spaces, such as: darning, shared gaming areas for examples.

## Observation research – URBiNAT Porto’s Kick-off even

This observation research at URBiNAT Porto’s kickoff event aimed to produce audio-visual information and gather participants’ testimonials for an informal video. It was planned as a way to identify potential interlocutors/ champions interested in continuing to participate in the project as nodal or satellite points of an evolving local collaborative network. It was also a way to investigate possible methodological opportunities for the

project's Action Research design and operation (notably as the understanding of how it may begin, or how to co-organize co-design activities). The specific objective was to find people interested in participating more actively at URBiNAT after the event. Such participation can take different forms:

- as facilitators of the project, for those more familiar with the neighbourhood (or part of it), who would be able to collaborate in the participation process design and co-creation of activities (such as mappings, walks, and direct observation practices, as well as other ways to explore and recognize the territory);
- as storytellers/memory activators, or people who know the history of the area well and can be interviewed or participate in conversation rounds and other events to be organized shortly.
- as trainers/multipliers, or people with experiences and interests in delving into URBiNAT main issues such as environment, sustainability, health, food, cultivation, recycling, culture, inclusion, nature, public space, etc.); and other forms of participation that could arise from this closer contact with people.

With a more qualitative than quantitative approach, the team had to be alert to find people who seemed more interested in the event, either at some particular stations or at checkout. Once detected, an informal conversation started, with questions about the event, whether they were enjoying themselves, what they knew about the project, whether they lived / worked / strolled around the neighbourhood, which could improve, if they thought a project like this could be good for the region, and finally if they would have suggestions or comments. These brief interviews were recorded while people made their statements freely, providing a real gathering of ideas, perceptions, desires and demands. Team members, when not addressing people directly, also made short videos and photos of the event, always focusing on people's participation and involvement.

It was indeed a fruitful process to gather the participants' views, comments and contributions that were then edited in an 11 minutes video<sup>26</sup> (Figure 257). The video shows how these multi-layered approaches make sense and reinforce some of the common ideas shared by the participants, whether referring to a missing playground for children in the neighbourhood's main square, or to the changes the region has gone through in the last few years, pushing old residents farther due to the high cost of living. The video also enabled to detect some of the main words that arise from the citizens' voices.

Beyond the citizens' voices, which can be heard in the video, it is important to highlight a few comments to think of future activities in the co-creation process. This kind of more informal approach to people enabled very sincere comments from some of the participants. One of the champions, a Psychologist from an association who brought along a group of children and teenagers, mostly from the gypsy origin, said that he felt that the activities at the event were "useful for understanding URBiNAT's message and information". However, he added:

"I felt that, concerning our children and young people, the way information was passed on, the type of language, was perhaps not the best fit. This is something I say as a constructive criticism, to improve in a future process, because I think that the vision of children, who are the future of this zone, the future of the world and the future especially here, can bring a completely different kind of information and vision of things as seen by adults, without stereotypes, without a previously marked influence from the world we live in. It can bring a fresh approach. I feel that if you can improve this aspect, you will be able to derive much more information from this population".

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26 Kick-off event video -by CES and GUDA retrieved November 20, 2019, from: <https://www.youtube.com/watch?v=ru7NafWyKmk&feature=youtu.be>





Figure 257. Frames from the video. Link. Source: CES/GUDA

At the event’s closure, an informal (recorded) talk with Professor Giovanni Allegretti (CES), who also approached many different people during the day, is also revealing as he concluded that “the transformation of this space should not happen two years from now, it can be an evolutionary project, every three months... a project that can be implemented in parts (...) I think the possibility of a plan that is already shattered by small modular additions is likely to determine an effect on the ability to produce greater confidence, far more than planning wonderful things to be done in four years”. Allegretti complemented that when he asked a senior neighbour if he had to split the project’s actions into two parts, two categories, which categories would be. The neighbour then “thought for a moment and answered: there is a ‘new construction’ category and a ‘maintenance’ category, I would start with maintenance because it proves that there are people who are interested in us and our point of view”.

In sum, this investigation, although preliminary and experimental in many aspects, revealed the need to rethink participation methods and tools, and the projects’

implementation in parts, focusing on potentializing and connecting existing resources and initiatives.

## 4.4 Nature Based Solution

In an ever more urbanised world, there is a growing awareness that some of the properties and intelligence of nature have been lost in the way that spaces are managed. Many green (vegetation) and blue (water) surfaces have been transformed over time into grey (impermeable) surfaces. This has serious implications for residents' quality of life and increases environmental risks. Attempts are currently being made to return some of that natural engineering to cities, so as to ensure sustainable, economical, multi-purpose and flexible solutions to various environmental challenges. This movement recognises that it is more advantageous - ecologically and economically - to work with nature than against it.

With a view to territorial improvement, the Municipality of Porto has been developing and supporting different projects to implement nature-based solutions with the aim of promoting biodiversity, respecting the city's natural water cycle, increasing carbon storage capacity, making the best use of soils, reducing energy consumption, and making the city a more pleasant and more comfortable place for residents and visitors.

The Municipality of Porto has designed a medium and long-term strategy for the Environment, which intends to meet the most important challenges of the 3 pillars of sustainability (environmental, economic and social). This strategy is based on 5 fundamental structuring axes, which corresponds to a dynamic plan with goals and actions, naturally subject to continual improvement and updating.

Some of the axes focus on turn Porto an even more conscious city and committed to a sustainable future, a greener city and resilient and a lab-city, to create sustainable products that solve real problems and result in an increased quality of life, and replicating the process so that solutions may arise for other cities.

### 4.4.1 NBS policy in Porto

Nature-based solutions adopted in Porto include planting more examples of trees of native or local species; expanding the network of municipal vegetable gardens with the introduction of aquaponic techniques and self-watering beds; studying the potential for green roofs in the city (through the Fifth Facade Project) and installing them in municipal buildings; renaturalisation of water courses and integrated management of the whole water cycle; and conducting research into cleaning up water bodies by means of phytoremediation.

Some nature-based solutions can easily be implemented at home: these include storing rainwater for watering plants or starting home composting in small composting units which turn organic waste into an excellent natural fertilizer for gardens and plant pots. Here are some of the main NBS projects in the city.



Figure 258. Map with the location of some NBS implemented in the City of Porto (Urban parks, green roofs, urban gardens and biospots sites). Source: CMP and map image from Google (2019)

#### 4.4.2 Territorial Nature Based Solutions

##### East Park of the City of Park (Parque Oriental da Cidade do Porto, Campanhã)

The East Park of the City of Porto (Figure 259) is an urban natural park designed by the landscape architect Sidónio Pardal. It will be one of the largest urban parks in the country and the second largest in the city of Porto. This NBS focused on the transformation of a derelict, depressed urban area into a green space. The first part of the park was inaugurated in July 2010 with 9ha, and in October 2019, the park was enlarged from 9 to about 20 hectares. The project of clean and requalification of the River Tinto banks allowed the park to double the area and permitted the creation of new habitats for vertebrates: fish and amphibians have already been spotted. Regular monitoring of the fauna of the River Tinto is one of the Municipality's ambitions for the next few years. With this enlargement the city has solved one of the region's biggest environmental liabilities, and now the actual park contributes to the river management and flood control, and with its new footpaths and cycle paths was definitively establishing it as a green structure promoting development and qualification of the surrounding urban area, giving a new dimension and importance to this "green lung" of Porto located in Campanhã.<sup>27</sup>

One of the most important impacts of this NBS was that it helped transform a neglected area that was seen as lifeless into a touristic point. It also increased access to green space and allowed visitors to engage with the environment through the many species conserved in the park and as such it became a learning experience. It regenerated a large portion of land in an area that was not seen as pleasant as well as allows river management and flood control due to the river bank requalification.

<sup>27</sup> A promessa tinha décadas e hoje o Porto passou a ter um verdadeiro parque oriental. (2019, November 20). *Porto - o portal de notícias do Porto*. Retrieved from <http://www.porto.pt/noticias/a-promessa-tinha-decadas-e-hoje-o-porto-passou-a-ter-um-verdadeiro-parque-oriental>



Figure 259. East Park of the City of Park. Source: Miguel Nogueira, CMP

The park also improves air quality and facilitate access to green public areas, as well as promote the creation of new habitats and biodiversity (Naturvation, n.d.).

### **Network of Vegetable Gardens (Rede de Hortas Municipais - Horta à Porta)**

The Municipal Vegetable Gardens project (Figure 260) promotes conversion of vacant areas into cultivated land available to residents who would like to try their hand at organic agriculture. The Municipal Vegetable Gardens project makes allotments available to people interested in growing organic produce in Porto city. When they take on an allotment, these future farmers also get training in agriculture and composting. This network of NBS is a group of 13 vegetable gardens widespread across the city. This vegetable gardens, are a part of the Horta à Porta (allotments at the door) programme which enhances the economic, environmental and social dynamics of the Porto region through the creation of community organic gardens and the promotion of active involvement which empowers local people and institutions. The program is led by the Greater Porto Metropolitan Waste Management Company, LIPOR, but 5 of the 13 vegetable gardens are managed by the Municipality of Porto. The implementation of vegetable gardens began in 2003, with the first having only 650m<sup>2</sup> and 14 allotments available. Now, the entire network allows 400 composters installed on the four hectares of municipal vegetable gardens (13 vegetable gardens spread across the city) and thanks to them 120 tonnes of organic material are returned to the soil annually<sup>28</sup>. Scattered across the city covers 4 ha.



Figure 260. One of the 13 Municipal Vegetable Gardens - Horta da Oliveira. Source: CMP (2019)

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<sup>28</sup> Hortas. (n.d.) *Câmara Municipal do Porto*. Retrieved November 20, 2019, from <http://www.cm-porto.pt/hortas>



The Municipal Vegetable Gardens network distributed 4 ha of allotments which represents 560 users trained and better prepared to accomplish their tasks on organic farming, and more balanced and stronger to cope with economic and social adversity. The adults and young people are more aware and more active on environmental and citizenship issues. The territories became greener and more responsive to quality of life criteria (Naturvation, n.d.).

### **Native Urban Forests of Porto (Florestas Urbanas Nativas do Porto)**

The FUN Porto project promotes knowledge about and expansion of urban forests in Porto, and focus on the ecology value of native trees, such as improving air quality, reducing the city's temperature in heat peaks, carbon sequestration, water regulation, soil conservation, and promoting biodiversity. At the same time, each tree increases memory, attention and concentration, and reduces the stress levels of city dwellers. The project's main goal is to expand the city's green structure using native species and to promote the connection between residents and naturalised spaces essential to the city's sustainability. This project is promoted by the Municipality of Porto and counts on the specialized advice of the Environmental Studies Group of the Porto Regional Centre of the Portuguese Catholic University. It is framed and contributes to FUTURO - project of 100,000 trees in the Porto Metropolitan Area, an initiative of the Regional Centre for Education for Sustainable Development of the Porto Metropolitan Area.<sup>29</sup>

Porto Biospots Network is a partnership of the Municipality with "Infraestruturas de Portugal", and is a network of urban forest areas that aims to allow the reforestation of adjacent transit routes, major highway nodes, and routes of circulation within the city, transforming environmentally poor lands into green areas that provide multiple ecological services (Figure 261). This initiative foresees the reforestation of 14 areas and the planting of 10,000 trees by 2021. Since the beginning of the project 1,953 native trees and shrubs have been planted at the Regado, Francos, Areias, Falcão, Paranhos and Freixo junctions.

Scattered around the city, the implemented locations are Regado, Francos, Areias, Falcão, Paranhos and Freixo junctions in Porto, Portugal.

The 10,000 trees to be planted by 2021 will offer "invisible" services to the city of Porto, such as retention of air pollutants and carbon storage, estimated at € 500,000 per year (as adults). In addition, they have the potential to store approximately 50 ton of carbon per year, contributing to the measures set out in the Municipal Strategy for Adapting to Climate Change. Almost 2000 specimens of native trees and shrubs have been planted in 6 nodes and junctions<sup>30</sup>.

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29 FUN Porto. (n.d.). *Câmara Municipal do Porto*. Retrieved November 20, 2019, from [http://www.cm-porto.pt/fun-porto/fun-porto\\_2](http://www.cm-porto.pt/fun-porto/fun-porto_2)

30 Porto biospots network. (n.d.). *Naturvation*. Retrieved November 20, 2019, from: <https://naturvation.eu/nbs/porto/porto-biospots-network>





Figure 261. Trees being planted at one of the first Biospot sites – Francos junction. Source: Filipa Brito (CMP)

### **Projeto Quinto Alçado do Porto (PQAP – Fifth Façade Project)**

The Quinto Alçado do Porto (Fifth Facade Project) is a partnership between the Municipality of Porto and the National Green Roofs Association (Associação Nacional de Coberturas Verdes - ANCV). Its main goal was to define the model to follow to include green roofs in the city's strategy. Green roofs are natural roofs with plants that improve the thermal insulation of buildings, retain water during rainfall peaks, store carbon, promote biodiversity and improve the urban landscape. This project aims to identify green roofs scattered on the city, and create a set of recommendations towards the development and improvement of a green roofs municipal policy.

One of the more relevant green roof of Porto is the Jardim das Oliveiras, an oasis of 50 olive trees and lush grass on top of a semi-open gallery of shops, restaurants, and cafés with an underground parking garage. It's an urban park escape for city workers, tourists, and university students. Located on top of Praça de Lisboa (Figure 262), this is a fantastic idea of urban planning gone right: green space co-existing with commerce, and vehicles below street level. This project was completed in 2013 as an effort to improve an area in decline in the middle of Porto by creating a space for community. There are more green roofs projects to be implemented in the future, across the city and in various buildings, but the PQAP have identified 131 green roofs in 2017 with a total area of 11ha.



Figure 262. Aerial view of the green roof at Praça Lisboa. Source: ANCV31

The green roofs allows a variety of benefits and impacts, like enhancing city attractiveness, regulating air quality, increasing property value, offering recreation and a healthy lifestyle, CO<sub>2</sub> sequestration, enhancing soil protection with CO<sub>2</sub> and NO<sub>2</sub> sinking, maintaining humidity, lowering temperatures, reducing stormwater runoff and ground drainage<sup>32</sup>.

### **Park of Asprela<sup>33</sup>** (Parque da Quinta de Lamas, Asprela)

The Park of Asprela is an Urban Park, located in the Asprela Campus Park of the University of Porto, and was intended to promote the requalification of the green spaces located between the Faculties of Engineering (FEUP) and Economics (FEP) of the U. Porto in Paranhos, Porto (Figure 263). The full set of plots considered covers an area of approximately 3 ha, which at the beginning of the intervention comprised abandoned and cultivated spaces, farm buildings, most of which uninhabited and in an advanced state of degradation, university buildings, the remains of an old alley, an improvised parking lot and a channelled and covered running stream. The requalification project, coordinated by Paulo Farinha Marques (landscape architect and professor at the Faculty of Sciences of the University of Porto), stands out for the wide tree-lined alley that makes the visual and physical connection between faculties, the large grassy clearing and the "uncovering" of Ribeira da Asprela, which used to be intubated and now runs in the open, with naturalized beds and banks<sup>34</sup>.

31 Associação Nacional de Coberturas Verdes [ANCV]. (n.d.). *GreenRoofs*. Retrieved from <https://www.greenroofs.pt/pt/pqap>

32 Fifth Façade Urban Rooftop Garden. (n.d.). *Naturvation*. Retrieved November 20, 2019, from <https://naturvation.eu/nbs/porto/fifth-facade-urban-rooftop-garden>

33 Landscape Architecture Project for the Park of Asprela, Porto. (n.d.). *CIBIO - Research Centre in Biodiversity and Genetic Resources*. Retrieved November 20, 2019, from <https://cibio.up.pt/people/details/pfmarque/projects/301#prettyPhoto>

34 Novo parque verde na Asprela. (2015, July 2). *Porto - o portal de notícias do Porto*. Retrieved in November 20, 2019, from <http://www.porto.pt/noticias/inaugurado-novo-parque-verde-da-asprela>



Figure 263. Parque of Asprela. Source: Paulo Farinha Marques

The implementation of this NBS allowed the expansion of the green area of public access in the surrounding area, promoting better use, improving the quality of life of residents and users, especially the university students. The Asprela Park also contributed to better water management, namely by acting as a rainwater retention basin, and the consequent economic valuation of properties located in the park's surroundings<sup>35</sup>.

#### **Wild Garden** (University of Porto - Faculty of Sciences)

The Wild garden of the Faculty of Sciences is the result of experimental designed applied on a previously impervious surface (Farinha-Marques *et al.*, 2016) (Figure 264). The landscape design project coordinated by Paulo Farinha Marques (landscape architect and professor at the Faculty of Sciences of the University of Porto). According to the author, it is an area that has been intervened with the guidance of dynamic design, testing autochthonous plants, natural aesthetics, and “controlled randomness”. Also the management strategy adopts natural succession as the main driver of change. This approach is an opportunity for occupying uninteresting spaces between buildings, without any previous planning or soil improvement, exploring its potential as part of urban green structure.

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<sup>35</sup> Creation of the Park of Asprela. (n.d.). *Naturvation*. Retrieved November 20, 2019, from <https://naturvation.eu/nbs/porto/creation-park-asprela>





Figure 264. Wild garden in Faculty of Sciences. Source: Paulo Farinha Marques

### 4.4.3 Technological Nature Based Solutions

#### Aquaponic Urban agriculture

Porto Municipality has been developing smart design aquaponic systems based on plants and vegetables growing in a closed and dynamic system allied to a fish tank where the nutrients released by the fish will nourish the plants (Figure 265). On the other hand, the plants filter the water, so the fish grow healthier. Through an intelligent design, the system uses the principles of the aquaculture and hydroponics to solve problems with residues from both methods in an integrated biological system that can be applied to many situations<sup>36</sup>.



Figure 265. Aquaponic Urban agriculture. Source: CMP

#### Citizen sensing

The CitizenSensing app, with pilots being developed in Porto City, allows citizens to enhance urban resilience, both as providers of locally situated data (e.g. bacteria levels in drinking-water, infrastructure damage or ecological changes) and as receivers of specific recommendations of how to respond to climate-related challenges (e.g. extreme

<sup>36</sup> Agricultura Urbana - Aquaponia. (n.d.). *Câmara Municipal do Porto*. Retrieved November 25, 2019, from [http://www.cm-porto.pt/agricultura-urbana/dicas-\\_2](http://www.cm-porto.pt/agricultura-urbana/dicas-_2)

temperatures, precipitation, flooding, water and air pollution and their impacts), which are most often managed without clear knowledge of locally specific conditions<sup>37</sup> (Figure 266).



Figure 266. Citizens sensing app. Source: Citizens sensing

### NoocityGrowbed

Noocity Growbed is a system of sub-irrigation easy to assemble and maintain, allowing for an efficient, autonomous and productive vegetable garden with less water used, less maintenance time consumption and increased production (Noocity, n.d.) (Figure 267).



Figure 267. Noocity Growbed example. Source: Noocity Growbed

### FabLab Porto

The FabLab Porto is an interdisciplinary space for knowledge sharing and creative collaboration for students, entrepreneurs and enthusiasts to materialize their ideas with the support of machines and tools (Figure 268). One example is the Permaculture Lab - Permalab - with a set of tools and concepts that support diverse challenges related to economy, politics, construction and agriculture. It is focused on the solution of urban challenges and its main scope is the production of food in urban context, generation of energy through renewable sources, environmental education, consumption decrease and carbon print reduction (FabLab Porto, n.d.).

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<sup>37</sup> Citizen Sensing. (n.d.). Retrieved November 25, 2019, from <https://citizensensing.itn.liu.se/#project>





Figure 268. PermacultureLab. Source: CMP

#### 4.4.4 Participatory NBS

The main projects implemented, or with direct positive impacts to Porto, which apply methodologies of population active participation are here presented. They can be municipal or civil society initiatives.

##### **Municipal Strategy for Adaptation to Climate Change (EMAAC) on ClimAdaPT.Local project**

The development of the strategy began in 2015 with the participation of Municipality Porto in the ClimAdaPT.Local project, under which a methodology called ADAM (Decision Support in Municipal Adaptation) was followed and guided the elaboration of this strategy throughout a set of specific steps and tasks. The methodology included the involvement of key local actors (central, regional, local Administration/public services, economic agents, business and socio-professional associations, civil society organizations, media, local leaders, among others) in the development and follow-up process of the strategy, including the definition of 52 climate change adaptation options. Throughout the project, a workshop was held with key local actors to assess the relevance, enablers and obstacles to the implementation of adaptation options previously reviewed by the municipality team and to gather varied suggestions and contributions to complement and enrich the strategy (Pombeiro & Ribeiro, 2016) (Figure 269).

A methodology type of participatory processes and a systemic approach were applied in the elaboration of the strategy.



Figure 269. Key stakeholder engagement workshop. Source: CMP

##### **Circular Economy RoadMap - Porto Circular 2030**

The preparation of the first version of the "Circular Economy Roadmap" of Municipality of Porto, completed in 2017, aimed to identify opportunities and guidelines for the

construction of a long-term vision and, subsequently support a program of concrete actions of the Municipality in order to transform Porto into a circular city in 2030. The process included (1) mapping the key stakeholders of Porto, (2) a workshop with 30 external stakeholders to identify trends, opportunities and challenges to apply circular economy (CE) in Porto until 2030, using a cenarization methodology (Figure 270), (3) a questionnaire to stakeholders about Municipality of Porto's role in the CE of the city, (4) listening to internal stakeholders to identify ongoing initiatives that were promoting CE, (5) the definition of four strategic axes of action for Porto until 2030 and development of a roadmap based on these axes, (6) a workshop with external stakeholders to validate the defined strategic axes and identify potential actions to implement the vision (Lorena *et al.*, 2017).

A methodology type of participatory processes and a systemic approach were applied in the elaboration of the roadmap.



Figure 270. Workshops with the local key actors. Source: CMP

### Redesign 3 de Fevereiro Square and Redesign Dr. Tito Fontes Square

To reformulate two public spaces in the city - 3 de Fevereiro Square<sup>38</sup> and Dr. Tito Fontes Square<sup>39</sup>, civic participation actions - October 2018 and March 2019, respectively - were carried out to actively involve citizens in public space design processes and to find proposals that make these spaces more attractive and fit their needs. These actions are part of the new municipality strategy for the development of citizen-focused projects, using creative and analytical methodologies based on co-creation, optimizing resources and developing a more efficient and inclusive projects. Actions can be tracked at their websites<sup>38 39</sup> and where residents can refer to follow all stages of the process and sign up for various initiatives that run along it. Participatory methodologies are applied to design public space (Figure 271).



Figure 271. Collection of citizens' contributions to redesign the public space. Source: CMP

### Cidade Mais

<sup>38</sup> Redesenhar o Largo 3 de Fevereiro. (n.d.). Retrieved November 20, 2019, from <https://largo3defevereiro.splashthat.com/>

<sup>39</sup> Largo Dr. Tito Fontes. (n.d.). Retrieved November 20, 2019, from <https://largodrtitofontes.splashthat.com/>



It is an annual and free festival, launched in 2014, with conferences, workshops, open classes, ecological market and artistic program dedicated to sustainability and social transformation. This event is promoted by the Project Mais (Plus) of the civil society organization, Moving Cause. It takes place in July for 3 days at Porto, as a “meeting point” and a “great civic platform” bringing together municipalities, universities, institutions, companies, non-governmental organizations and people to share and debate the themes of environment and citizenship by applying methodologies such as community workshops, world coffee, open space technology, participatory processes, social learning concerning urban ecosystems and their functions/services<sup>40</sup> (Figure 272). The main goal is to influence urban public policies and to change collective behaviours to more sustainable ways of living. The municipality of Porto is the main partner of the initiative.



Figure 272. Initiatives of the 6th edition of Cidade Mais at 2019. Source: Cidade Mais<sup>41</sup>

### Porto Innovation Hub

Porto Innovation Hub (PIH), launched in 2016, is an initiative of the Municipality of Porto which aims to be a platform for the reinforcement of the city’s innovation and entrepreneurship ecosystem. The purpose of the Porto Innovation Hub (PIH) is to bring together all the innovation agents of the city and the region, and to involve citizens more and more in the process of continuous evolution and improvement of the city, thus calling for more active civic participation (Figure 273). PIH also plays a key role in the development of the innovation strategy in the internal context of the Municipality of Porto, involving its employees in the transformation and optimisation of strategies, processes and services. Through the organisation of actions and activities of “positive contamination”, PIH seeks to facilitate the design of experiences and interactions with potential to connect and generate significant value for the citizen and for those who manage the city. In addition to pretending to be a catalyst for creativity and innovation, PIH challenges everyone to use the office space as a means of experimenting and exploring new ideas, concepts, services or products for the city<sup>42</sup>.

Several participatory methodologies are applied, highlighting the social learning type concerning urban ecosystems and their functions/services.



40 Cidade Mais. (n.d.). Retrieved November 20, 2019, from <https://cidademais.pt/>

41 Cidade Mais. (2019). Retrieved November 20, 2019, from [https://www.facebook.com/pg/cidademais/photos/?ref=page\\_internal](https://www.facebook.com/pg/cidademais/photos/?ref=page_internal)

42 Porto Innovation Hub. (n.d.). Retrieved November 20, 2019, from <https://portoinnovationhub.pt/en/home-page/>

Figure 273. Type of public environment in different sessions at PIH. Source: PIH<sup>42</sup>

### City Café

The Porto Innovation Hub (PIH) is promoting (started this year) a new initiative called City Café, which proposes to create in PIH an informal moment of collaborative dialogue between speakers and guests (Figure 274). This coffee break-inspired activity is participatory in nature and is intended primarily to encourage collaboration among its participants once a month<sup>43</sup>.



Figure 274. Examples of citizen's participation at City Café. Source: Porto innovation Hub<sup>45</sup>

### FUTURO project - 100,000 trees project in the Porto Metropolitan Area

This project referred to *Future and relevant projects for URBiNAT Chapter (4.2.1.8)* applies an active participatory process for citizens in ecological recovery processes. Thus a volunteer scholarship has been created and interested citizens are invited to participate in specific actions where their work is useful and valued, framed in a medium-long term plan for each intervention area (Figure 275). At Municipality of Porto, within the framework of the FUTURE project and in coordination with the managers of the areas to be planted (municipalities, owners, Institute for Nature and Forests Conservation), between 2001 and 2018 were organized 137 volunteering activities of weed control, planting native trees and shrubs, maintaining, monitoring and propagating plants in which 926 volunteer participations (2739 volunteer hours) were accounted. To this work offered by the citizens of the region is added the work of countless professionals from the various partners of the project. With these activities were already planted 8167 native trees in Porto (Pinto, 2018).

On this project several participatory methodologies are applied, highlighting the social learning type concerning urban ecosystems and their functions/services.



Figure 275. Examples of citizens participation on Futuro projects initiatives<sup>44</sup>

### FUN Porto - Floresta Urbana Nativa do Porto and

This project also referred to in *Future and relevant projects for URBiNAT Chapter (4.2.1.8)* applies active citizen participation in processes to reinforce the city's green infrastructure, as well as to continue to propagate native plants in the municipal nursery, located in the parish of Campanhã (with an annual production of around 600,000 plants) (Figure 276). This project integrates the 'If you have a garden we have a tree for you' which aims to plant

<sup>43</sup> Porto Innovation Hub. (n.d.). Retrieved November 20, 2019 from <https://portoinnovationhub.pt/en/city-cafe-2/>

<sup>44</sup> 100 mil árvores. (n.d.). Retrieved November, 20, 2019, from <https://www.100milarvores.pt/>

10,000 (mostly native) trees and shrubs in the city's private gardens by 2020. With the collaboration of the citizens 5,966 trees and shrubs had already been planted in 1,022 city deprived spaces (Pinto, 2018).



Figure 276. Examples of citizens participation at FUN Porto. Source: CMP<sup>45</sup> <sup>46</sup>

### Condominium Manager project

Concerning the municipal housing neighbourhoods, since 2008 DomusSocial has been putting into practice a municipal program that aims at organizing a manager (among residents) for each entrance hall, after buildings refurbishment. In 49 neighbourhoods with around 1200 entrance halls, the project has been implemented in approximately 1000 entrances (83%), for which 737 meetings have been held in 2018 (data update: 11/2018) (Figure 277).



Figure 277. Citizen's participation at a condominium manager's meeting in Porto. Source: DomusSocial (2016)

## 4.4.5 Social and Solidarity economy NBS

Especially in the last decade, there are several projects, movements or groups of civil initiative that have been applying and persisting on the social and solidarity economy, either by conviction aiming for higher quality of life and sustainability or by the economic crisis installed in the last decades. There is no mapping where these initiatives are represented yet, however here are referred those initiatives that are having more visibility in the city.

### Urban Markets

<sup>45</sup> O biospot do Nó de Francos recebeu centenas de árvores e arbustos nativos. (2018, March 21). *Porto - o portal de notícias do Porto*. Retrieved November 20, 2019, from <http://www.porto.pt/noticias/o-biospot-do-no-de-francos-recebeu-centenas-de-arvores-e-arbustos-nativos>

<sup>46</sup> Viveiro Municipal espalha o verde e ajuda a reflorestar toda a Área Metropolitana. (2017, November 8). *Porto - o portal de notícias do Porto*. Retrieved November 20, 2019, from <http://www.porto.pt/noticias/viveiro-municipal-espalha-o-verde-e-ajuda-a-reflorestar-toda-a-area-metropolitana->



There are currently about 34 street markets and fairs, of which 28 are held throughout the year, with different periodicity, characteristics and locations (Figure 278). The remaining 6 fairs have different frequencies: 2 of them are annual and the other 4 are seasonal. They are distributed throughout the city and have place outdoor at streets, gardens or squares or in their own places and make available a direct business relationship (sale, purchase or exchange) between the seller and the customer, various types of products (food, clothing, animals, books, old goods, jewelry, vinyls, etc). Some of them sell used products. These street markets or fairs are a fairer trade alternative to the city's large-scale business. Here are highlighted 3 markets and 1 fair: (1) Portobello Market, a weekly market inspired on the famous London Portobello Market with a vintage, trendy and design-oriented concept. It was one of the first street markets taking place at Porto. Here can be found vinyls, books, old toys, clothes, handmade stationery and jewelry, bio food<sup>47</sup>; (2) FleaMarket, a monthly market with only used products, such as clothing and footwear, accessories, furniture, home furnishings, vintage products, books, cd's. Sometimes it is used the Car Boot Sale format, where the merchants sell directly from car trunk<sup>48</sup>; (3) Biological Market of City Park, a weekly market of varied biological products of the Western park of the city, attended by more than 20 certified organic farmers from different regions of the North. It is managed by the farmers themselves<sup>49</sup>; (4) Vandoma fair, a weekly fair in the parish of Campanhã where used and diverse articles such as clothing, tableware, furniture and decorative goods, records, books, electrical and / or electronic appliances, household or work tools are sold<sup>50</sup>.



47 Mercado Porto Belo anima sábados na Carlos Alberto. (2017, October 23). *Porto. Ágora - Cultura e Desporto*. Retrieved November 20, 2019 from <http://www.agoraporto.pt/noticias-porto-lazer/sabado-e-dia-de-mercado-porto-belo?p>

48 Mercados urbanos povoam diferentes locais da cidade. (2017, November 17). *Porto - o portal de notícias do Porto*. Retrieved November 20, 2019, from <http://www.porto.pt/noticias/mercados-urbanos-povoam-diferentes-locais-da-cidade?lang=pt>

49 Feira de Produtos Biológicos do Porto: Mercado biológico. (n.d.). *Simbiotico.eco*. Retrieved November 20, 2019, from <https://www.simbiotico.eco/ecospot/feira-de-produtos-biologicos-porto>

50 Regulamento da Feira da Vandoma é revisto para dar resposta à elevada procura. (2019, July 21). *Porto - o portal de notícias do Porto*. Retrieved November 20, 2019, from <http://www.porto.pt/noticias/regulamento-da-feira-da-vandoma-e-revisto-para-dar-resposta-a-elevada-procura>

### Ecosol - Social currency

Ecosol was the social currency - exclusively virtual - created in 2014 <sup>51</sup> as a result of the Ecosol movement (an informal collective created in 2013) will, to reflect, practice and develop the solidarity economy in Porto (Figure 279). The social currency was intended to generate abundance, enhance and bring the community closer, give priority to local and ecological products, strengthen self-organization and make the community more resilient and less dependent on the current economic system. The network has grown to 300 members and had hundreds of products and services, from clothing, food, toiletries and musical instruments, dance and language lessons, babysitting, massage, carpentry, sewing, transportation, etc. In 2015 the circulation of the currency ended with the end of Porto's solidarity economy network, which due to several factors (lack of practices, members emigration, unavailability of members, saturation of voluntary work) was unable to ensure its functioning<sup>52</sup>.



Figure 279. Meetings to reflect on and apply solidarity economy. Source: various <sup>51 52</sup>

### Repair-café Porto

Several initiatives emerged in the city of Porto applying the repair-coffé methodology (Figure 280). Circular Economy Portugal<sup>53</sup> (organization committed to the transition to a circular economy in Portugal) in partnership with OPO'Lab<sup>54</sup> (multidisciplinary centre and the first FabLab in Portugal dedicated to think and explore the creative use of new technologies in architecture, engineering, design and other artistic fields, by promoting research, education and cultural activities [34]) created the first repair café events in Porto in 2018 as independent, public and free events organized by volunteers, where volunteer repairers teach and share knowledge with visitors, who arrive with objects for repair (electronic or household appliances, sewing, carpentry and / or bicycles). Meanwhile, Lipor (Intermunicipal Waste Management of Greater Porto is responsible for the management, recovery and treatment of the Municipal Waste of Porto and other 7 municipalities) celebrated in 2018 a collaboration protocol with ERP Portugal (Waste

51 Communities Cyclos. Retrieved November 20, 2019, from <https://communities.cyclos.org/ecosolporto> and from <https://eco.nomia.pt/pt/exemplos/amep>

52 A economia nas nossas mãos – Epílogo à Rede de Economia Solidária do Porto. (2018, October 31). *Mapa: Jornal de Informação Crítica*. Retrieved November 20, 2019, from <http://www.jornalmapa.pt/2018/10/31/a-economia-nas-nossas-maos/>

53 Circular Economy. (n.d.). Retrieved November 20, 2019, from <http://www.circulareconomy.pt/>

54 OpoLab. (n.d.). Retrieved in 20 November, 2019 from <http://www.opolab.com/>

Management Entity of Portugal) for the creation of Waste Electrical and Electronic Equipment Recovery Centres<sup>55</sup> (CREW). This collaboration, beyond the field of education and the promotion of technical skills in the area of repair and maintenance of electrical and electronic equipment, will allow joint participation and training in projects for the recovery of electrical equipment of the students and include repair café sessions to allow other citizens to participate.



Figure 280. Different moments of repair-café organized at Porto. Source: Simbiotico.eco<sup>56</sup>

### Vintage for a cause - Recycling Exchange

Vintage for a cause is a sewing club founded in Porto to transform used clothing into excellent vintage clothing for market (Figure 281). The transformation is done by women over 50, in isolation and vulnerability, supported by designers, and clothes to transform are obtained by themselves, third parties or the textile industry. The project aims to generate revenue that enables their self-sustainability while contributing to a fairer, more cooperative and sustainable society<sup>57</sup>.



Figure 281. Workshops promoted under the sewing club. Source: Ideias à moda do Porto<sup>58</sup>

55 LIPOR and ERP sign protocol for the development of CREW Centers. (2018, December 12). *Lipor*. Retrieved November 20, 2019, from <https://lipor.pt/en/news/lipor-and-erp-sign-protocol-for-the-development-of-crew-centers/>

56 Repair Café Porto: Diga não ao desperdício! (n.d.). *Simbiotico.eco*. Retrieved November 20, 2019, from <https://www.simbiotico.eco/ecospot/repair-cafe-porto>

57 Vintage for a Cause. (n.d.). Retrieved November 20, 2019, from <https://vintageforacause.pt/>

58 Ideias a moda do Porto. Retrieved November 20, 2019, from <http://www.ideiasamodadoporto.com/blog/2015/03/11/vintage-cause/>



### Fair trade store of City Park

Located in the Western park of the city, this Fairtrade shop functions as an alternative to traditional commerce by selling products that benefit those who buy, but also those who produce (Figure 282). It contributes to the establishment of solidary business practices and sustainable development by offering better trade conditions, taking into account the rights of marginalized producers and workers, especially in the South of the world. Food, decoration and clothing can be found<sup>59</sup>.



Figure 282. Type of products found at the Fairtrade store. Source: various<sup>60</sup>

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59 Lojas de Comércio Justo. (n.d.). *Visit Porto*. Retrieved November 20, 2019, from <http://www.visitporto.travel/visitar/paginas/descobrir/DetalhesPOL.aspx?POI=497>

60 Loja Comércio Justo – Parque da Cidade Porto. (2012, March 31). Retrieved November 20, 2019, from <https://www.facebook.com/lojacomerciojustoparque/photos/a.374448075928207/374601712579510/?type=3&theater>

## 4.5 Baseline for the development of the Healthy Corridor

### The city of Porto

The city of Porto has a great regional and international influence, capable of attracting population and private investment. The eastern part of the city, the parish of Campanhã used to be an area of great relevance for its industries, and the gateway to the food supply of the city. Currently, Campanhã is served by a transportation network that connects this territory from north to south and from east to west. Nevertheless, even though this road and railroad network promotes a good external accessibility, it is also the main cause of the urban fragmentation of the area. Because of this, Campanhã shows a weak internal structure that should be strengthened with measures to promote mobility within the territory, in particular those of soft mobility (walking and cycling).

Such conditions, together with the existence of physical and social isles in the territory, is aggravated by poor housing conditions (despite the recent investments made) and the lack of infrastructures (e.g. schools, health services, social services). Moreover, the area has specific and variable socio-economic challenges through its territory, reflected in an aging population, a high level of criminality (the second parish with more criminal occurrences), cultural differences and severe poverty (the highest, when compared to all other parishes in Porto). Campanhã is the parish in Porto with the greatest number of municipal dwellings for social rental in Porto.

The existing infrastructure, such as schools and social/sports-related institutions are the social connective tissue of this territory, they have the potential to promote the cohesion of the local population and an important support to a population living in a serious state of housing emergencies and social difficulties. To address these problems, the municipality of Porto has promoted the development of several projects, by promoting the rehabilitation of the public space of the social housing areas, and by developing.

There have been several both urban plans and participatory activities developed for this territory, but with insufficient articulation between them. There is an unexplored potential for collaboration between the different actors in the field. There are opportunities for the development of adapted and articulated strategies that can properly tackle these complex challenges to promote better life-quality, integration, security and equality in this population and provide the best living conditions for its inhabitants and users.

### The study area

The study area is marked by the presence of social housing neighbourhoods. In what concerns the 13 municipal housing neighbourhoods in Campanhã, 6 are located within the study area boundary limits. Among these, Cerco do Porto, Falcão and Lagarteiro are preponderant regarding the number of dwellings and residents, while at the same time unveil connectivity issues with the surrounding urban fabric.

The study area is crossed and surrounded by natural topographic barriers and heavy road structures that create a series of connection and mobility challenges between them, isolating it from the rest of the city. This fact translates not only on a physical barrier but also a psychological one that have deeply influenced local dynamics through the years. These physical barriers create difficulties for the population in accessing the more central places where there is employment, equipment and services essential to urban life. Over time, the social and economic weaknesses of this territory became evident and aggravated



by the stigmatization that is felt in an area that does not produce enough income for its population.

Demographic and socio-economic characterization of the three neighbourhoods reveal Cerco do Porto as the largest in number of dwellings and inhabitants. Falcão, is the neighbourhood with better connections with the surrounding urban area and shows higher residents' average income, despite having an ageing population with lower household size. On the other hand, Lagarteiro evidences lower average income, a less ageing population and higher average household size. Being the more peripheral municipal housing of the city, it may also be considered the more "detached" or disconnected one regarding the adjacent urban fabric, even after recent renovation that partially reversed this situation.

Campanhã has an active community that enjoys and cares about their environment and is interested in being involved in the promotion of local traditions and values. They are also active when discussing territorial interventions. Extensive participatory activity in the community's life are mainly promoted by formal and informal organisations or public institutions, that create engaging spaces and activities, following the residents' needs. The human and creative potential that is present in Campanhã area, could lead to new approaches to the participatory processes in urban regeneration. Concerning well-being, in general the citizens use their neighbourhood's public spaces for socializing although some discomfort about their quality and maintenance is general.

From a territorial perspective, the study area holds three very different but relevant urban green spaces namely: Oriental Park, the second largest park in the city; Corujeira Square; Quinta da Bonjória. Public green spaces perform a key role for the citizens, and for the city's green structure. The study area is also marked by undeveloped terrains scattered along the urban mesh. There are several undeveloped terrain that are use for pedestrian circulation, as shortcuts on their daily routine, for example to walk children to school, to visit the cemetery, or event to reach the closer metro station or bus stop to the city centre. These paths prove the need for reflecting on the efficiency of formal pedestrian network and local real needs.

#### **Strategic objectives for the next steps of the URBiNAT Projet:**

The study area, is characterized by problems of urban decline, associated with a fragile social fabric. Nevertheless, it reveals a huge potential in the natural and landscape values present, shaped by the residents' life and use of the public space in this urban area. The next steps for the development of the URBiNAT healthy corridor of Porto should:

- Take into consideration the different realities, necessities and specificities of the social housing neighbourhoods inside the study area, making sure all participatory activities include this diversified source of important inputs;
- Make the most of the identified strategic areas of the territory, such as the Corujeira Square, as important areas of this territory;
- Enhance the quality of the public space, including maintenance and accessibility to all citizens;
- Aid in the formalization of pedestrian and cycling paths, according to the needs expressed and demonstrated by the citizen. In new axes of mobility using pedestrian mobility as a key element for urban regeneration;
- Integrate new business models that make the active population, community goods and local capital sectors profitable;
- Preserve the local identity by maintaining elements or spaces that the local community relates to such as parks and common places throughout the study area;

- Assume a collaborative, integrated and systematic model that involve local actors in the process of co-creating healthy corridors and implementation of NBS;
- Promote regular physical movement, to promote new habits and routines;
- Work closely with local governmental entities for joint efforts that should result in a more consistent, coherent and sustainable approach with a broader impact
- Present the results of the local diagnostic to the citizens and stakeholders, in order to confirm the focus of the project development through the perspective of the 'real people' in their 'real life' and the voices of citizens;

## 4.6 Conclusion

The work developed was based on the search of existent information and the development of new and original information, surveyed according to the specific needs of the URBiNAT project. This required the interaction and close collaboration between different actors, cultures and areas of expertise. Such work created the needed trust and knowledge that will be the base to build the next steps of the URBiNAT Project. Besides this, the work accomplished allowed to obtain unique information and the development of innovative methodologies that proved to be useful and effective to translate the existent realities and that can now be replicated by the Municipality of Porto in other contexts of the city, enlarging its capacity to analyze its territory.

For the first time, all scattered and new information, at economic, social and environmental level, were analyzed together for Porto City, Campanhã Parish and URBiNAT's study area, representing an unprecedented and study, which allowed for a detailed and objective-oriented analysis that will properly support the following steps for co-creation and co-implementation of the Healthy Corridor. Furthermore, such baseline analysis will allow for further comparison of the project's impacts after implementation and its monitoring during, and beyond, the Project's life.

## 4.7 Index according to the EKLIPSE NBS framework

The following index is based on the EKLIPSE Expert Working Group report “An impact evaluation framework to support planning and evaluation of nature-based solutions projects”. It provides a reference between the descriptors used in the Local Diagnostic of URBiNAT and the structure and descriptors provided by the EKLIPSE working group.

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## 4.8 Bibliography

- Agência Portuguesa do Ambiente [APA]. (2018). *Programa da Orla Costeira Caminha-Espinho (POC-CE) - Relatório do programa*. Retrieved from [https://apambiente.pt/\\_zdata/Políticas/Agua/Ordenamento/POC/POC%20CE/2018-11-04\\_Relatorio\\_Programa.pdf](https://apambiente.pt/_zdata/Políticas/Agua/Ordenamento/POC/POC%20CE/2018-11-04_Relatorio_Programa.pdf)
- Alves, S. (2017). Ethnic Housing Segregation and the Roma/Gypsy population: a portuguese perspective. Retrieved February 21, 2019, from <http://hdl.handle.net/10451/29337>
- Área Metropolitana do Porto [AMP]. (n.d.). *Portal da Área Metropolitana do Porto*. Retrieved November 20, 2019, from <http://portal.amp.pt/pt/4/municipios/porto/stats/demografia/7/densidade-populacional/>
- Azevedo, J., Baptista, I., Vieira, I., Azevedo, A. S., Magalhães, P., Dias, S., & Martins, F. (2009). *Porto Solidário-Diagnóstico Social do Porto*. Fundação Porto Social, Universidade Católica Portuguesa – Centro Regional do Porto, Pólo da Foz. Retrieved from [https://jpn.up.pt/pdf/Porto\\_Social\\_diagnostico\\_final.pdf](https://jpn.up.pt/pdf/Porto_Social_diagnostico_final.pdf)
- Breda-Vazquez, I. & Conceição, P. (coords.). (2015). *Ilhas do Porto: levantamento e caracterização*. Porto: Município do Porto. Retrieved from <http://www.domussocial.pt/noticias-domus/estudo-ilhas-do-porto-consulte-aqui>
- Câmara Municipal do Porto & Administração Regional de Saúde do Norte [CMP & ARSN]. (2014). *Equipamentos de cuidados de saúde primários do Porto*. Retrieved from [http://www.cm-porto.pt/assets/misc/Carta%20de%20Equipamentos%20de%20Cuidados%20de%20Saude%20Pri-marios%20do%20Porto.pdf](http://www.cm-porto.pt/assets/misc/Carta%20de%20Equipamentos%20de%20Cuidados%20de%20Saude%20Primarios%20do%20Porto.pdf)
- Câmara Municipal do Porto [CMP]. (2006). *Plano Director Municipal do Porto*. Porto: CMP
- Câmara Municipal do Porto [CMP]. (2011). *Relatório do sistema de monitorização da qualidade de vida urbana do Porto*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2011/SMQVU\\_Relatorio\\_2011.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2011/SMQVU_Relatorio_2011.pdf)
- Câmara Municipal do Porto [CMP]. (2017a). *Abordagem Integrada para a Inclusão Ativa. Programa Integrado de Inovação e Experimentação Social e de Animação Territorial do Porto* [AIIA Porto]. Porto: CMP
- Câmara Municipal do Porto [CMP]. (2017b). *ARU da Corujeira - Área de Reabilitação Urbana*. Porto: CMP. Retrieved from [https://balcaovirtual.cm-porto.pt/PT/cidadaos/guiatematico/PlaneamentoOrdenamento/AreasReabilitacaoUrbanaARU/%C3%81rea%20de%20Reabilita%C3%A7%C3%A3o%20Urbana%20da%20Corujeira/Documents/Relat%C3%B3rio\\_ARU\\_Corujeira.pdf](https://balcaovirtual.cm-porto.pt/PT/cidadaos/guiatematico/PlaneamentoOrdenamento/AreasReabilitacaoUrbanaARU/%C3%81rea%20de%20Reabilita%C3%A7%C3%A3o%20Urbana%20da%20Corujeira/Documents/Relat%C3%B3rio_ARU_Corujeira.pdf)
- Câmara Municipal do Porto [CMP]. (2018a). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Pessoas e Atividades – Ocupação Funcional – Dinâmicas Territoriais e Centralidades*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/54\\_PDMP\\_ECD\\_Ocup\\_Func.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/54_PDMP_ECD_Ocup_Func.pdf)
- Câmara Municipal do Porto [CMP]. (2018b). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Pessoas e Atividades – Cenários Demográficos 2015-2040*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/55\\_PDMP\\_ECD\\_Cen\\_Demog.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/55_PDMP_ECD_Cen_Demog.pdf)
- Câmara Municipal do Porto [CMP]. (2018c). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Pessoas e Atividades – Demografia e Desenvolvimento Social*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/51\\_PDMP\\_ECD\\_Demog\\_Desenv\\_Soc.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/51_PDMP_ECD_Demog_Desenv_Soc.pdf)
- Câmara Municipal do Porto [CMP]. (2018d). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Pessoas e Atividades – Dinâmicas Económicas*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/53\\_PDMP\\_ECD\\_Din\\_Eco.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/53_PDMP_ECD_Din_Eco.pdf)
- Câmara Municipal do Porto [CMP]. (2018e). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Sistema de Mobilidade e Transportes*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/Fase3/71\\_PDMP\\_ECD\\_Sist\\_Mob\\_Transp.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/Fase3/71_PDMP_ECD_Sist_Mob_Transp.pdf)
- Câmara Municipal do Porto [CMP]. (2018f). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Suporte Biofísico e Ambiente - Caracterização Biofísica*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/21\\_PDMP\\_ECD\\_Caract\\_Biofisica.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/21_PDMP_ECD_Caract_Biofisica.pdf)

- Câmara Municipal do Porto [CMP]. (2018g). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Suporte Biofísico e Ambiente - Clima e Ambiente Urbano*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/22\\_PDMP\\_ECD\\_Clima\\_Amb\\_Urb.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/22_PDMP_ECD_Clima_Amb_Urb.pdf)
- Câmara Municipal do Porto [CMP]. (2018h). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Suporte Biofísico e Ambiente - Estrutura Ecológica e Biodiversidade*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/23\\_PDMP\\_ECD\\_Estrut\\_Eco\\_Biod.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/23_PDMP_ECD_Estrut_Eco_Biod.pdf)
- Câmara Municipal do Porto [CMP]. (2018i). *Revisão do Plano Diretor Municipal do Porto. Relatório de Caracterização e Diagnóstico. Ocupação do Solo*. Porto: CMP. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/Fase2/40\\_PDMP\\_ECD\\_Ocup\\_Solo.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/Fase2/40_PDMP_ECD_Ocup_Solo.pdf)
- Câmara Municipal do Porto [CMP]. (2019). *Bases para um futuro regulamento bioclimático para a cidade do Porto. Departamento Municipal de Planeamento e Gestão Ambiental*
- Centro de Respostas Integradas do Porto Central, Ocidental e Oriental [CRI-Porto]. (n.d.). *Resumo do Diagnóstico Analítico das Dependências do Concelho do Porto*. Retrieved from [http://www.sicad.pt/BK/Concursos\\_v2/Documents/N\\_PO\\_154.pdf](http://www.sicad.pt/BK/Concursos_v2/Documents/N_PO_154.pdf)
- Centro Regional de Excelência em Educação para o Desenvolvimento Sustentável da Área Metropolitana do Porto [CRE.Porto]. (n.d.). *FUTURO – projeto das 100.000 árvores na Área Metropolitana do Porto*. Universidade Católica Portuguesa e Área Metropolitana do Porto. Retrieved from <http://www.100milarvores.pt/projeto/nos>
- Citizen Sensing. (n.d.). Retrieved November 25, 2019, from <https://citizensensing.itn.liu.se/#project>
- CMPEA - Empresa de Águas do Município do Porto, EM [Águas do Porto]. (n.d.). Retrieved November 15, 2019, from <http://www.aguasdoporto.pt>
- CMPEA - Empresa de Águas do Município do Porto, EM [Águas do Porto]. (2018). *Relatório & Contas 2018*. Retrieved from <https://www.aguasdoporto.pt/assets/misc/PDF%27S/Relat%C3%B3rio%20e%20Contas/Relato%CC%81rio%20%26%20Contas%202018.pdf>
- CMPH - DomusSocial, Empresa de Habitação e Manutenção do Município do Porto, EM. [DomusSocial]. (2012) *Bairros Municipais do Porto: Caracterização Socioeconómica 2010-2011*. Porto: DomusSocial. Retrieved February 21, 2019, from <http://www.domussocial.pt/assets/misc/img/Habitacao/Bairros%20-%20Dados%20Gerais.pdf>
- CMPH - DomusSocial, Empresa de Habitação e Manutenção do Município do Porto, EM [DomusSocial] (2015). *BI Domus - Business Intelligence system from Domus Social*. Porto: DomusSocial. Retrieved February 21, 2019, from <http://www.domussocial.pt/domussocial/caracterizacao-sociodemografica>
- Conceição, P. (2002). *Modelos de Produção e Gestão de Habitação Social: estratégias locais de habitação e sistemas de bem-estar social num contexto de mudança* (Doctoral dissertation). Faculdade de Engenharia, Universidade do Porto.
- Comissão de Coordenação e Desenvolvimento Regional do Norte [CCDR-N]. (2009). *Plano Regional de Ordenamento do Território do Norte* [PROT-N].
- IIICP - *Estratégia de Intervenção Integrada para o Cerco do Porto*. (2017). Porto: Domus Social, EM.
- European Patent Office [EPO]. (n.d.). *Annual Report 2018*. Retrieved November 20, 2018, from <https://www.epo.org/about-us/annual-reports-statistics/annual-report/2018.html>
- FabLab Porto. (n.d.). Retrieved November 25, 2019, from <https://fablabporto.pt/> [14] TECHNOLOGICAL NBS
- Farinha-Marques, P., Fernandes, C., & Guilherme, F. (2016). Experimental Design and Maintenance of FCUP “Wild Garden”: Researching and Learning Urban Nature. In *Bridging the Gap*. ECLAS Conference 2016, Rapperswil, Switzerland (No. 14, p. 465).
- Farinha-Marques, P., Fernandes, C., Guilherme, F., Lameiras, J.M., Alves, P., Bunce, R. (2015). *Morphology & Biodiversity in the Urban Green Spaces of the City of Porto. Book II - Habitat Mapping and Characterization*. Vairão: CIBIO, UP. ISBN 978-989-98732-4-7.
- Farinha-Marques, P., Fernandes, C., Lameiras, J.M., Silva, S., Guilherme, F. (2014). *Morfologia e Biodiversidade nos Espaços Verdes da Cidade do Porto - Livro 1. Seleção das áreas de estudo - 2ª Edição, revista e aumentada*. Vairão: CIBIO, UP. ISBN 978-989-98732-2-3. Retrieved from <http://biodiv.city/morphology-biodiversity-in-urban-green-spaces/book-i-selection-of-the-study-areas-portuguese-2nd-edition/>

- Farinha-Marques, P., Guilherme, F., Fernandes, C., Gonçalves, C. (2018a) *Plano Diretor Municipal do Porto / Relatório de caracterização e diagnóstico: Suporte Biofísico e Ambiente; Estrutura Ecológica e Biodiversidade* | Vila do Conde, Vairão: Centro de Investigação em Biodiversidade e Recursos Genéticos (Cibio-InBio). Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/23\\_PDMP\\_ECD\\_Estrut\\_Eco\\_Biod.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/23_PDMP_ECD_Estrut_Eco_Biod.pdf)
- Farinha-Marques, P., Lameiras, J. M., Andrade, G., Guedes de Carvalho, L., Guedes de Carvalho, F., Costa, N., Maia, R. (2018b). 'Projeto de execução do Parque Central da Asprela'. Porto. FCUP – Faculdade de Ciências da Universidade do Porto. ISBN: 978-989-99306-7-4.
- Farinha-Marques, P., Lameiras, J.M., Guedes de Carvalho, L., Andrade, G. (2014). Parque do Campus Universitário da Asprela, Área Nascente – Universidade do Porto. Projeto de Execução – Arquitetura Paisagista. Porto: FCUP. ISBN 978-972-96076-8-4.
- Instituto da Conservação da Natureza e das Florestas [ICNF]. (n.d.). *Instituto da Conservação da Natureza e das Florestas: Reserva Natural Local do Estuário do Douro*. Retrieved November 28, 2019, from <http://www2.icnf.pt/portal/ap/amb-reg-loc/res-natur-local-estuar-douro>
- Instituto da Habitação e da Reabilitação Urbana [IHRU]. (2018). *Levantamento Nacional das Necessidades de Reajustamento Habitacional*. Retrieved February 21, 2019, from [https://www.portaldahabitacao.pt/opencms/export/sites/portal/pt/portal/habitacao/levantamento\\_necessidades\\_habitacionais/Relatorio\\_Final\\_Necessidades\\_Reajustamento.pdf](https://www.portaldahabitacao.pt/opencms/export/sites/portal/pt/portal/habitacao/levantamento_necessidades_habitacionais/Relatorio_Final_Necessidades_Reajustamento.pdf)
- Instituto Nacional de Estatística [INE]. (2012a). *Censos 2011. XV Recenseamento Geral da População*. Retrieved from: [https://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=ine\\_censos\\_publicacao\\_det&contexto=pu&PUBLICACOESpub\\_boui=73212469&PUBLICACOESmodo=2&selTab=tab1&pcensos=61969554](https://censos.ine.pt/xportal/xmain?xpid=CENSOS&xpgid=ine_censos_publicacao_det&contexto=pu&PUBLICACOESpub_boui=73212469&PUBLICACOESmodo=2&selTab=tab1&pcensos=61969554)
- Instituto Nacional de Estatística [INE]. (2012b). *Evolução do parque habitacional em Portugal: 2001-2011*. Retrieved March 14, 2019, from [https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine\\_publicacoes&PUBLICACOESpub\\_boui=149380925&PUBLICACOESmodo=2&xlang=pt](https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=149380925&PUBLICACOESmodo=2&xlang=pt)
- Instituto Nacional de Estatística [INE]. (2018). *Anuário Estatístico da Região Norte – 2017*. Retrieved November 15, 2019, from [https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine\\_publicacoes&PUBLICACOESpub\\_boui=320468948&PUBLICACOESmodo=2](https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=320468948&PUBLICACOESmodo=2)
- Instituto Português do Mar e da Atmosfera [IPMA]. (2018). *O Clima, Normais climatológicas*. Retrieved from <https://www.ipma.pt/pt/oclima/normais.clima/>
- Instituto Português do Mar e da Atmosfera [IPMA]. (n.d.). Retrieved November 15, 2018, from <https://www.ipma.pt/en/oclima/observatorio.secas/>
- Lorena, A., Santos, E., Palha, M., Santos, S. (2017). *Roadmap para a cidade do Porto circular em 2030*. Retrieved from <http://www.cm-porto.pt/economia-circular>
- Madureira, H., Andresen, T., & Monteiro, A. (2011). Green structure and planning evolution in Porto. *Urban Forestry & Urban Greening*, 10(2), 141-149.
- Martins, I. & Santos, L. (Coords.). (2003). *Sistema de monitorização da qualidade de vida urbana*. Porto: Câmara Municipal do Porto. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2003/01\\_Apresentacao.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2003/01_Apresentacao.pdf)
- Martins, I. & Santos, L. (Coords.). (2012). *Sistema de monitorização da qualidade de vida urbana- Relatório 2011*. Porto: Câmara Municipal do Porto. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2011/SMQVU\\_Relatorio\\_2011.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/SMQVU/2011/SMQVU_Relatorio_2011.pdf)
- Mobilidade e Planeamento do Território [MobilidadePT]. (2015). *Plano de Ação de Mobilidade Urbana Sustentável da Área Metropolitana do Porto - Relatório Final*. Retrieved from [http://portal.amp.pt/media/documents/2016/12/06/relatorio\\_final\\_pamus\\_amp\\_MuztqgN.pdf](http://portal.amp.pt/media/documents/2016/12/06/relatorio_final_pamus_amp_MuztqgN.pdf)
- Monteiro, A., Fonseca, L., Almeida, M., Sousa, C., Velho, S., & Carvalho, V. (2012). *Atlas da saúde e da doença-vulnerabilidades climáticas e socioeconómicas na Grande Área Metropolitana do Porto e Concelho do Porto. Volumes I e II*, 167
- Monteiro, A., Madureira, H., Fonseca, L., & Gonçalves, P. (2018a). *Plano metropolitano de adaptação às alterações climáticas* [Metroclima]. Área Metropolitana do Porto / MAPIS – Mapping Intelligent Solutions, Lda / Departamento de Geografia da Faculdade de Letras da Universidade do Porto. ISBN: 978-989-96291-2-7. Retrieved November 28, 2019, from <https://repositorio-aberto.up.pt/handle/10216/115665>

- Monteiro, A., Madureira, H., Fonseca, L., & Velho, S. (2018b). *2.ª Revisão do PDM do Porto - Suporte Biofísico e Ambiente/ Clima e Ambiente Urbano: Relatório de Caracterização e Diagnóstico*. Retrieved from [http://www.cm-porto.pt/assets/misc/img/PDM/ECD/22\\_PDMP\\_ECD\\_Clima\\_Amb\\_Urb.pdf](http://www.cm-porto.pt/assets/misc/img/PDM/ECD/22_PDMP_ECD_Clima_Amb_Urb.pdf)
- Naturvation. (n.d.). Retrieved November 20, 2019, from <https://naturvation.eu/nbs/porto/creation-eastern-park>
- Noocity. (n.d.). Retrieved November 25, 2019, from <https://www.noocity.com/pt-pt/>
- Oliveira, A. (2015). *Inundações Urbanas no Município do Porto (1974-2014): Base de Dados Geográfica, Distribuição Espacial das Ocorrências e Modelação Hidráulica do Escoamento Superficial da Rua de Entrecampos* (MSc dissertation). Retrieved from <https://repositorio-aberto.up.pt/bitstream/10216/81586/2/37366.pdf>
- Pinto, M. (Coord.). (2018). *Oito anos e 100.000 árvores nativas depois*. Centro Regional de Excelência em Educação para o Desenvolvimento Sustentável da Área Metropolitana do Porto (CRE.Porto). Universidade Católica Portuguesa e Área Metropolitana do Porto. Retrieved from [http://www.100milarvores.pt/wp-content/uploads/2018/11/Relat%C3%B3rio\\_Vers%C3%A3o\\_Digital\\_final.pdf](http://www.100milarvores.pt/wp-content/uploads/2018/11/Relat%C3%B3rio_Vers%C3%A3o_Digital_final.pdf) CLIMATE AND URBAN ENVIRONMENT /
- Plano de Desenvolvimento Social do Porto - 2019-2021*. (2019). Sinclab – Social Inclusion Laboratory, Faculdade de Psicologia e de Ciências da Educação, Universidade do Porto.
- Pombeiro, P. & Ribeiro, A. (Coords.). (2016). *Estratégia Municipal de Adaptação às Alterações Climáticas - Município do Porto* [EMAAC Porto], on ClimAdaPT.Local projet. Porto: Município do Porto. Retrieved from [http://www.cm-porto.pt/assets/misc/documentos/Ambiente/Alter%C3%A7%C3%B5es\\_clim%C3%A1ticas/EMAAC\\_Porto.pdf](http://www.cm-porto.pt/assets/misc/documentos/Ambiente/Alter%C3%A7%C3%B5es_clim%C3%A1ticas/EMAAC_Porto.pdf)
- Pordata - Base de Dados Portugal Contemporâneo [PORDATA]. (2018). Retrieved November 21, 2019, from <https://www.pordata.pt/Municipios/Taxa+bruta+de+mortalidade-367>. SOCIAL DESCRIPTION
- Portugal. (2018). *Resolução do Conselho de Ministros n.º 50-A/2018*, May 2. Diário da República, Série I, 1º Suplemento, N.º 84. Retrieved from <https://dre.pt/web/guest/pesquisa/-/search/115211109/details/maximized>
- Portugal. (2012). *Lei n.º 32/2012*, August 14. Diário da República, Série I, N.º 157. Retrieved November 20, 2019, from <https://dre.pt/application/dir/pdf1sdip/2012/08/15700/0445204483.pdf>
- Portugal. (2019). *Lei n.º 83/2019*, September 3. Diário da República, Série I, N.º 168. Retrieved November 20, 2019, from <https://dre.pt/application/conteudo/124392055>
- Portuguese Ombudsman. (2018). *Informal Settlements and Human Rights. Submission to the Questionnaire of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living*. Retrieved November 12, 2019, from <https://www.ohchr.org/Documents/Issues/Housing/InformalSettlements/ProvedorJusticaPortuguesaOmbudsman.pdf>
- Quatenaire Portugal [Quatenaire]. (2015). *PEDU - Plano Estratégico de Desenvolvimento Urbano do Porto*. Versão da candidatura submetida ao Programa Operacional Regional Norte 2020 (Setembro 2015).
- Quatenaire Portugal [Quatenaire]. (2019). *Masterplan Estratégico da Zona Oriental do Porto - Relatório Final, versão preliminar*. Retrieved from [http://www.cm-porto.pt/assets/misc/documentos/MPE%20Porto%20Oriental\\_RF%20preliminar.pdf](http://www.cm-porto.pt/assets/misc/documentos/MPE%20Porto%20Oriental_RF%20preliminar.pdf) CLIMATE AND URBAN ENVIRONMENT /
- Raymond, C. M., Breil, M., Nita, M. R., Kabisch, N., de Bel, M., Enzi, V., ... & Basnou, C. (2017). An impact evaluation framework to support planning and evaluation of nature-based solutions projects. Report prepared by the EKLIPSE Expert Working Group on Nature-based Solutions to Promote Climate Resilience in Urban Areas. Centre for Ecology and Hydrology.
- Regiões em números 2017/2018 – Educação Volume I – Norte*. (2019). Direção-Geral de Estatísticas da Educação e Ciência (DGEEC), Direção de Serviços de Estatísticas da Educação (DSEE), Divisão de Estatísticas do Ensino Básico e Secundário (DEEBS). Retrieved from [http://www.dgeec.mec.pt/np4/96/%7B\\$clientServletPath%7D/?newsId=145&fileName=ReNE2018\\_Vol\\_I\\_Norte.pdf](http://www.dgeec.mec.pt/np4/96/%7B$clientServletPath%7D/?newsId=145&fileName=ReNE2018_Vol_I_Norte.pdf)
- Restivo, J. (2014). *Habitação pública no Porto: Intervir para requalificar* (Doctoral dissertation). Faculdade de Engenharia, Universidade do Porto. Retrieved March 1, 2019, from <https://hdl.handle.net/10216/78721>



- Restivo, J., Alves, F. B., Mendonca, P., & Ferreira, J. A. (2012). Public housing renovation in Porto: Typology versus occupancy density. *International Journal for Housing and Its Applications*, 36(1), 9-16.
- Simões, A., Costa, A., Rodrigues, F., Varum, H., Matos, M. J., & Vicente, R. (2015). *Gestão e Manutenção preventiva de bairros de habitação social municipal*. Edições Afrontamento. Aveiro. ISBN: 978-989-20-5494-0.
- Sociedade Portuguesa de Inovação [SPI]. (2018). *Município do Porto - Definição da Operação de Reabilitação Urbana, de tipo sistemático, para o território a delimitar como Área de Reabilitação Urbana da Corujeira* (2018, March). Porto: Município do Porto. Retrieved from [https://balcaovirtual.cm-porto.pt/PT/cidadaos/guiatematico/PlaneamentoOrdenamento/AreasReabilitacaoUrbanaARU/operacaodereabilitacaourbanadacorujeira/Documents/R01\\_0Relat%C3%B3rio\\_caracteriza%C3%A7%C3%A3o\\_diagn%C3%B3stico.pdf](https://balcaovirtual.cm-porto.pt/PT/cidadaos/guiatematico/PlaneamentoOrdenamento/AreasReabilitacaoUrbanaARU/operacaodereabilitacaourbanadacorujeira/Documents/R01_0Relat%C3%B3rio_caracteriza%C3%A7%C3%A3o_diagn%C3%B3stico.pdf)
- Telles, G., & Cabral, F. (1999). *A árvore em Portugal*. Assirio & Alvim.
- Território XXI (2017a). *Diagnóstico Social e Plano de Ação para a Zona do Cerco e área envolvente - Relatório de Diagnóstico* (2017, May 26). Porto: Câmara Municipal do Porto.
- Território XXI (2017b). *Diagnóstico Social e Plano de Ação para a Zona do Cerco e área envolvente - Plano de Ação* (2017, June 27). Porto: Câmara Municipal do Porto.



# 5 Sofia

## 5.1 Introduction

URBiNAT aims for an inclusive and sustainable regeneration of deprived urban areas through the co-creation and co-implementation of a Healthy Corridor composed by Nature-based solutions with the intrinsic involvement from the local citizens and institutions. In order to achieve this, a complex realities and needs have to be properly understood in order to build adequate and truly adapted strategies that are able to touch three main dimensions - social, economic and environmental – while activating effective participation of a wide range of different partners and local actors. Only then, it is possible to develop and implement multidimensional solutions that can be further appropriated and upscaled.

As a first step towards the implementation of URBiNAT, the partner teams of Sofia Municipality and UACEG, in line with the projects methodology, conducted a comprehensive analysis of the current territorial, social, economic and environmental situation at three levels – city, Nadezhda district, and the study area. This process and the outputs are divided into two stages with their respective reports.

Focused on the city level and the district of Nadezhda, the local Diagnostic Stage 1 Report describes the wider context in which URBiNAT is being implemented and builds a common baseline for comparing the frontrunner and follower cities. The performed and documented comprehensive literature review, the integration of information and data from different sources and institutions, and the performed analysis and research especially for the purposes of the URNiNAT project, helped to set up a database with baseline parameters for monitoring and evaluation of the impacts of the implementation of the project activities within the area of Tolstoy, Nadezhda 2, Nadezhda 1, Svoboda and Triagalnika neighbourhoods and Park Nadezhda.

local Diagnostic Stage 1 Report follows the URBiNAT project methodology that Integrates the ECLIPSE indicators, thus providing Introduction, General information (Chapter 2) a summary of the territorial, social, and economic description of Sofia and Sofia Municipality (Chapter 3) and of Nadezhda district and the URBiNAT study area (Chapter 4).

The introduction (Chapter 2) presents the main arguments for selecting Sofia as a frontrunner city and the existing strategies for international replication, the local stakeholders involved in the project, the arguments behind the selection of the study area and the expectations of the URBiNAT to the study area.

Chapter 3 contains general information about the city and its main challenges, the location and access to the city and to Sofia municipality, brief history of the city, territorial, social and economic description. Main aspects of the territorial description include climate and environment, biophysical characteristics, land-use, green structure and biodiversity, land-use, water management. Demography, safety and health issues, local participatory culture and public services are discussed in the subchapter “social description”. The Economic

Description presents information and data on poverty, employment, innovations, activity sector and facilities.

After this, in Chapter 4, similar analysis were performed for the district of Nadezhda and the strategically defined study area. Except the zooming in into the biophysical characteristics, the green structure, the biodiversity, and the land-cover, the territorial description further explores in details the transportation network and services, the local masterplans, and the urban/landscape design projects. The social description explored the demographic data and research on safety and health, summarized the described perceptions and demonstrated participatory culture, and compiled a description of the public services in the district. Income, employment, activity sectors and available facilities are part of the economic description of Nadezhda district.

The performed analysis on the city and the study area allowed for a detailed and objective-oriented analysis that, together with the data collected on site and focus on the study area (Local Diagnostic Stage 2) will support the co-creation and co-implementation of the Healthy Corridor and allow for further comparison of the project's impacts after implementation and its monitoring during, and beyond, the Project's life.

The Local Diagnostic Part 2 zooms in over the study area where the Healthy corridor will be implemented. This separate report informs mostly on new data, produced especially for the purposes of URBiNAT and the target area in Nadezhda district in order to identify local real needs and expectations to be integrated in the following phases of the project. This zooming in over the area and communities of Tolstoy, Nadezhda 2, Nadezhda 1, Svoboda and Triagalnika neighbourhoods and Park Nadezhda is based on the project ambitions to achieve a level of detail that would influence the community whose life's can be improved by URBiNAT's goals and lines of action.

The Local Diagnostic Part 2 report results from intensive work produced by a multidisciplinary team that implemented local and targeted activities and analysis in order to feed the local diagnostic with exclusive and original information about the study area. It included participatory activities, territorial mapping studies, and behavioural mappings. In order to identify, study, mobilize and prepare different actors for the following phases of the project, various participatory methods were applied and reported at this stage – observation, focus groups, face-to-face interviews, culture mapping, walkthrough, and photovoice. The findings from the all of the methods applied are summarized in Chapter 9 “Baseline for the development of the healthy corridor” that will support all further activities for the development of the Healthy corridor in Nadezhda district.

The last chapter of The Local Diagnostic Part 2 report is dedicated to NBS policy in Sofia Municipality, as proven by the role of front-runner city. The subchapters there contain description, pictures, spatial references and evaluation of 41 NBS-s divided by the defined by URBiNAT four types of NBS-s categories: territorial, technological, participatory and those based on social and solidarity economy. The variety of NBS-s, but also the wide range of actors and mediators implementing them in Sofia reveal not only the traditions and great investments and advances in policy development that the Municipality city has made, but also outlines the meeting points, baseline for future actions and possible synergies with URBiNAT.

## Why the city is a front runner

Sofia is a green city with action plan and many activities involving NBS. Many strategic projects, projects and activities (implemented and ongoing) with significant territorial footprint and impact on the quality of life:

- The General Spatial Plan of Sofia envisages to provide 71m<sup>2</sup> green areas per inhabitant in the municipality by 2030;
- Active network of volunteers with the support of Sofia Municipality are preparing and organizing the application for the Initiative “Green Capital of Europe”.
- Brand new green park Vazrazhdane (5.2 ha) opened in 2016, shall be extended by 2.5 ha with recreational and sports facilities, involving water, over 420 new trees, 9800 bushes and many flowers.
- Currently there are ongoing works for renewal of 14 ha in North park (Nadezhda)
- Green Sofia Program of Sofia Municipality gives small grants that allow citizens to receive assistance in landscaping and upgrading spaces between blocks of flats in residential areas (there are already implemented projects in Nadezhda)
- “The New Forest of Sofia” is long-term campaign for planting 125 000 trees in Suhodol region near Sofia, started 2017, volunteers work as partners of the municipality.

Planned projects and projects under development:

- Green tramway tracks as part of reconstruction and modernization of Sofia tram lines
- New linear green park planned to replace the car traffic along Makedonia boulevard;

Periodically Sofia joins different International and national initiatives as well unique local events. Some of them are already part of the city calendar.

- Sofia City Spring Cleaning, 26 – 28 April 2018 – traditional campaign of Sofia Municipality. Over 13 900 volunteers took part in the cleaning of the urban spaces in 2018.
- Sofia supported the European Week for Waste Reduction (November 2018) with an initiative promoting the implementation of awareness-raising actions about sustainable resource and waste management and collecting old textile to prevent its getting burned for heating and polluting the air;
- In October 2018 a two days hackathon “CLIMATHON” focused on improving Sofia City air quality through smart technologies and human behaviour;
- Clean Air Day, 16 November 2018 - campaign to promote alternative ways of transport in the city, such as public transport, bicycles or walking.

Programs and mainly investment projects for improving energy efficiency and renewable energy use are organized and implemented. In the recent years Sofia municipality managed to implement 24 projects for improving the energy efficiency of 24



kindergartens (financed by Kozloduy energy fund) and other 9 kindergartens and 15 schools under Sofia ERDF (incl. schools in Nadezhda).

Soft and infrastructure measures aiming the behavioural change are also under development and are already being implemented:

- Permanent improvement and expansion of public transport incl. new metro line construction, tramway network reconstruction, new and better quality public transport vehicles incl. low platforms for ease of access, buses on gas, reduction of harmful emissions, first electric power bus of new generation economizing energy, providing access to the Vitosha nature park by rented electric bikes;
- Intelligent system for traffic management – first stage completed, makes part of Sofia plans for integrated public transport and sustainable mobility, reducing traffic congestions & time for trips;
- Green and white tickets – reduced price or free for public transport in days with higher air pollution;
- Home composters delivered for free by the municipality to homeowners/homeowners associations (appr. 1000 in 2018, some of them located in Nadezhda district);
- Programmes and projects for optimization of municipal waste recycling (waste separation and decreasing waste quantities)
- Green walking itineraries,
- Children’s workshops in the park for knowledge about birds and birdhouses adorning.

**Expectation of the URBiNAT to the study area** (example: better living conditions for all, reduced crime and security costs, increased green infrastructure and biodiversity, improved air and water quality, enhanced human health and wellbeing, reduced health costs, improved mobility conditions, opportunities for urban farming)

Through URBiNAT a Healthy corridor linking the North Park to Sofia centre encompassing Nadezhda neighbourhoods will be designed and implemented; as a result , healthier and nature inspired urban environment will be created; pedestrian and bike friendly area with intensified greenery and improved street scale landscape applying innovative and smart technical solutions will be constructed; new sports facilities based on local natural assets will be created; all these improving nature and healthy life understanding and better personal habits for local pupils – regarding food growth and preparing in combination with increasing physical activity; smart approach to create healthy life ‘green fashion’ for community young people will be promoted.

### Map of the study area in relation with the city

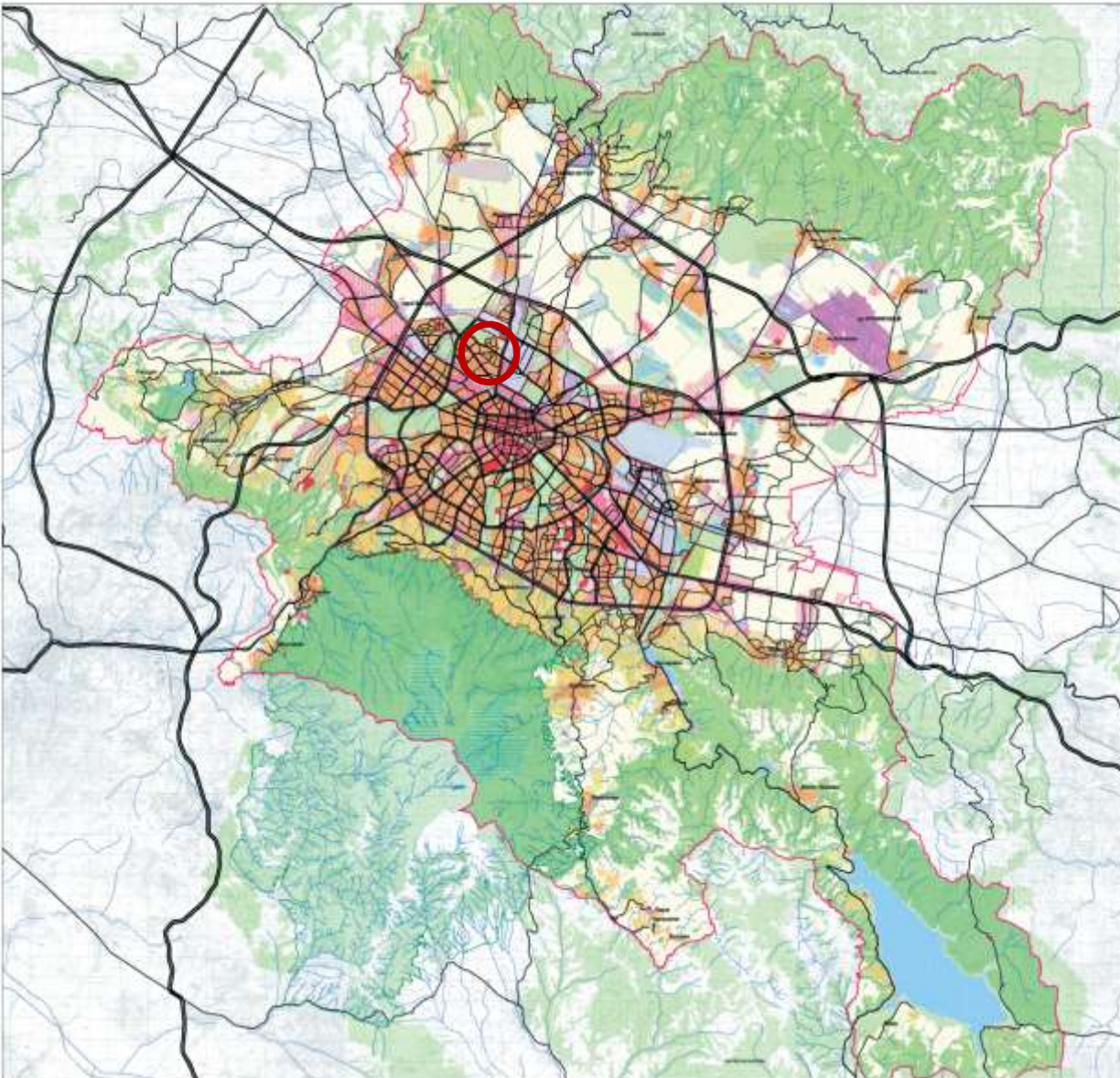


Figure 283. Study area in relation with the selected city

### Reasons for the selection of the study area

The study area falls in Area S1 (target area for urban regeneration with focus on social issues) of the Integrated Plan for Urban Regeneration and Development of Sofia 2014-2020 (IPURD). The Municipality has been implementing the IPURD, mainly through projects for improving energy efficiency of buildings (housing and public buildings – schools, kindergartens, etc.), construction of new buildings, development of infrastructure, public works, and rehabilitation of the green areas and spot facilities.

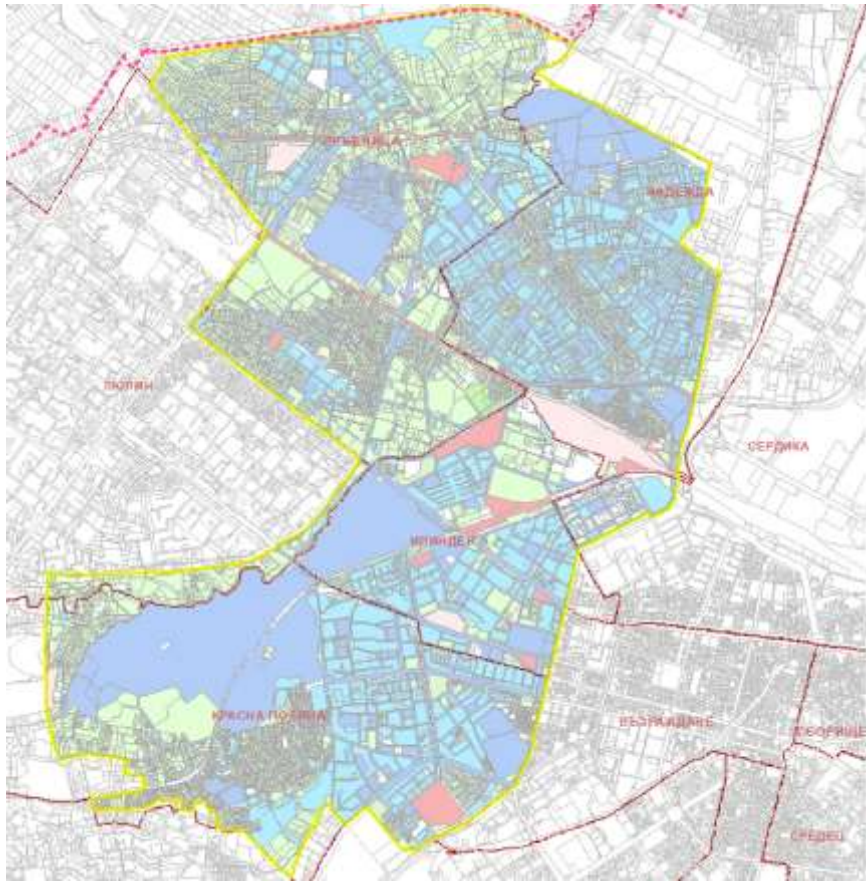


## ЗОНИ ЗА ВЪЗДЕЙСТВИЕ



Зона за въздействие	Територия	Население	
C1	Зона с преобладаващ социален характер Северозапад - Запад	2189 кв	194 604
C2	Зона с преобладаващ социален характер Северозток	868,72 кв	77 954
I1	Зона с потенциал за икономическо развитие - Изток	1167,77 кв	NA
I2	Зона с потенциал за икономическо развитие - Север	1225,26 кв	NA
O1	Зона на планиране, ориентирана с висок обществен значимост - Център	1623,43 кв	104 686
O2	Зона на планиране, ориентирана с висока обществен значимост - Студентски град	327,00 кв	25 792

Figure 284. Target areas for intervention in the Integrated Plan for Urban Regeneration and Development (IPURD)



Area C1 of the IPURD of Sofia. Ownership of plots as from 2018

Figure 285. Ownership as from 2018 in target area C1 of IPURD, Areas marked in blue colour are owned by Sofia Municipality.

Source: Elaborated for the purposes of URBiNAT analysis and selection of the location of the Corridor on City level

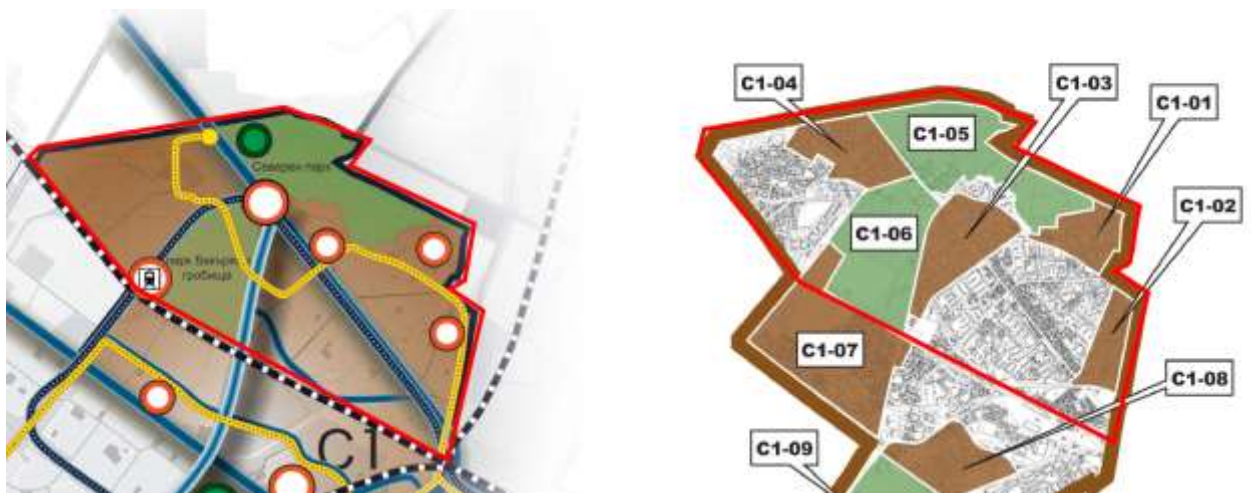


Figure 286. Spatial concept for the regeneration of Nadezda district. Generators and transport infrastructure (left). Group of projects (right)



**ЗОНА С ПРЕОБЛАДАВАЩ СОЦИАЛЕН ХАРАКТЕР С1 СЕВЕРОЗАПАД - ЗАПАД**



**ОПИСАНИЕ НА ЗОНАТА:**

**ПЛОЩ:** 367,80 дка

Займа източната част на зоната – между бул. Ровни и ж.к. „Надежда 2“. Съдържа само жилища (3100 бр. със 6700 обитатели) и елементи на първично обслужване – 2 училища и детски градини. Тук са първите експериментални панелни сгради – „Толстой“ (1960 г.). Пленето от остривите са същар панелни и са на възраст над 40 години. Характерно е присъствието на пунтови сгради с монолитна конструкция (10 бр. на 14 и 16 етаж). Необходимо е цялостно обновиране на сградите, средата и инфраструктурите. В особено лошо състояние са улчните настилки и осветлението. Кварталът не предлага терени резерви за ново застрояване, но може да ползва мрежа с велосипеди и детски



**ГРУПА ПРОЕКТИ С1-02: ТОЛСТОЙ**

1/23

**ТРАНСПОРТНО-КОМУНИКАЦИОННА ИНФРАСТРУКТУРА**

- С1-02-01 Реконструкция и рехабилитация на улчната мрежа, тротоари, пешеходни алеи и създаване на достъпна среда в ж.к. „Толстой“  
Стойност: 7956293 лв. Финансирани: ОПРР 1.2

**ИНЖЕНЕРНО-ТЕХНИЧЕСКА ИНФРАСТРУКТУРА**

- С1-02-02 Обновиране на инженерната инфраструктура в ж.к. „Толстой“
  - Рехабилитация на водопровод и канал  
Стойност: 3 135 690 лв. Финансирани: ОПОС
  - Улично осветление с енергоспестяващи технологии  
Стойност: 772 048 лв. Финансирани: ОПРР 1.2
- \* Обновиране на всички останали елементи на подземната инфраструктура в координация с ИПУРБ, експлоатационни дружества и Столична община

**КУЛТУРНО НАСЛЕДСТВО И КУЛТУРНА ИНФРАСТРУКТУРА**

- С1-02-03 Обновиране, внедряване на мерки за енергийна ефективност, оборудване и обзавеждане на ОКИ „Надежда“  
ЗП 1250 кв.м., 18 000 куб.м., 2 ет.  
Стойност: 565 969 лв. Финансирани: ОПРР 1.3/JESSICA

**ЗЕЛЕНА СИСТЕМА И СПОРТ**

- С1-02-04 Хидрогеоложко обследване на сондаж С-6г от находище за минерални води „София-Надежда“ и изграждане на инсталации за отопление и плуван басейн на 15 СОУ „Адам Мицкевич“  
Стойност: 2 127 600 лв. Финансирани: JESSICA/ПЧП

**ОБИТАВАНЕ И ЖИЗНЕНА СРЕДА**

- С1-02-05 Обновиране и внедряване на мерки за енергийна ефективност на многофамилни жилищни сгради  
РЗП сгради: 152 580 м<sup>2</sup>, бр. жилища: 2178  
Стойност: 15 629 772 лв. Финансирани: ОПРР 1.1
- С1-02-06 Обновиране на зелените площи в междублоковите пространства и изграждане на детски площадки  
Детски площадки - 7бр.  
Стойност: 488 348 лв. Финансирани: ОПРР 1.2

Figure 287. Spatial concept for the regeneration of Nadezda district. Generators and transport infrastructure (left). Group of projects (right)

**ЗОНА С ПРЕОБЛАДАВАЩ СОЦИАЛЕН ХАРАКТЕР С1 СЕВЕРОЗАПАД - ЗАПАД**



**ОПИСАНИЕ НА ЗОНАТА**

**ПЛОЩ:** 422,75 дка

Займа северозападния край на зоната. Граничи със Свободен парк (от запад), спорови Ботеви Извици (от север), стадион „Левски“ и околдо-промишлената зона „Военна ривал“ (от изток) и ж.к. „Надежда 4“ – от юг. Съдържа около 3100 жилища (със 7000 обитатели) в предимно панелни сгради по над 40-годишна възраст. Освен елементи на първично обслужване, кварталът не съдържа обекти с общеградско значение. Необходимо е цялостно обновиране на сградите, средата и инфраструктурите. Потенциалът за функционално обзавеждане е в изграждането на спортна зала, етажнен пазарен, търговски комплекс, детски площадки и велосипеди.



**ГРУПА ПРОЕКТИ С1-01: СВОБОДА**

1/23

**ТРАНСПОРТНО-КОМУНИКАЦИОННА ИНФРАСТРУКТУРА**

- С1-01-01 Реконструкция и рехабилитация на улчната мрежа, тротоари, пешеходни алеи и създаване на достъпна среда в ж.к. „Свобода“  
Стойност: 10 917 858 лв. Финансирани: ОПРР 1.2
- С1-01-02 Изграждане на етажен паркинг в ж.к. „Свобода“  
Стойност: 1 505 000 лв. Финансирани: JESSICA/ПЧП

**ИНЖЕНЕРНО-ТЕХНИЧЕСКА ИНФРАСТРУКТУРА**

- С1-01-03 Обновиране на инженерната инфраструктура в ж.к. „Свобода“
  - Рехабилитация на водопровод и канал  
Стойност: 1 866 370 лв. Финансирани: ОПОС
  - Улично осветление с енергоспестяващи технологии  
Стойност: 1 076 887 лв. Финансирани: ОПРР 1.2
- \* Обновиране на всички останали елементи на подземната инфраструктура в координация с ИПУРБ, експлоатационни дружества и Столична община

**ЗЕЛЕНА СИСТЕМА И СПОРТ**

- С1-01-04 Проектиране и строителство на спортна зала в ж.к. „Свобода“  
Стойност: 3 135 900 лв. Финансирани: JESSICA/ПЧП
- С1-01-05 Хидрогеоложко обследване на сондаж С-4г от находище за минерални води „София-Свобода“ и изграждане на инсталации за отопление и плуван басейн  
Стойност: 2 127 600 лв. Финансирани: JESSICA/ПЧП

**ОБИТАВАНЕ И ЖИЗНЕНА СРЕДА**

- С1-01-06 Обновиране и внедряване на мерки за енергийна ефективност на многофамилни жилищни сгради  
РЗП сгради: 163 440 м<sup>2</sup>, бр. жилища: 2192  
Стойност: 15 719 928 лв. Финансирани: ОПРР 1.1
- С1-01-07 Обновиране на зелените площи в междублоковите пространства и изграждане на детски площадки  
Детски площадки - 7бр.  
Стойност: 506 715 лв. Финансирани: ОПРР 1.2

**ПЕШЕХОДНИ И ПУБЛИЧНИ ПРОСТРАНСТВА**

- С1-03-08 Изграждане на стоково тържище за цветя  
Площ на мястото - 3705 м<sup>2</sup>, ЗП - 1300 м<sup>2</sup>, РЗП - 1900 м<sup>2</sup>  
Стойност: 2 913 551 лв. Финансирани: JESSICA/ПЧП

Figure 288. Group of projects in Svoboda neighbourhood. Area S1 of IPURD. Source: IPURD of Sofia



Table 30. Comparative analysis between the sub-areas in area S1 in the IPURD of Sofia falling in Vrbnica, Ilinden, Krasna polyana and Nadezhda district. Thematic domains and criteria correspond to URBiNAT's goals, key fundamentals and implementation strategy. Source: Elaborated for the purposes of URBiNAT (UACEG)

No	URBiNAT Thematic domains	Criteria/ /Characteristics/ needs	Vrbnica district	Ilinden district	Krasna polyana district	Nadezhda district
1.	Resources/assets available for the co-creation of the healthy corridor and the specific investment projects along the corridor	ENERGY		✓	✓	✓✓
		WATER (thermal)	✓			✓✓
		Green infrastructure and NATURE	✓✓✓	✓✓✓	✓✓✓	✓✓✓✓✓
		FOOD AND NATURE Urban agriculture potentials	✓✓✓	✓	✓✓	✓✓✓✓
2.	Objective needs related to the physical environment	Infrastructure upgrading and development	✓✓✓	✓	✓	✓✓✓
3.	Availability of approved and up-to-date plans and project ideas/projects	Detailed Urban plans for different urban units(residential areas /communities)	✓✓	✓	✓✓	✓✓
		Projects already planned/approved by Sofia City Council	✓			✓✓✓✓
		Existing pre-investment and feasibility studies				✓✓
4.	Public space	Availability and size of municipal plots	✓			✓✓
		Possibility (within the built public space and existing functions) to connect the municipal plots	✓			✓
5.	Possibility to integrate the Corridor projects with other projects on the territory of Zone S1 in the IPURD and with	Creating new connections and links	✓			✓✓
		Building upon existing/implemented projects and synergy	✓✓	✓	✓✓✓✓	✓✓✓✓✓

	strategic projects implemented on city level	between the implemented and URBiNAT projects				
		Development of “soft” measures in the framework of URBiNAT project	✓	✓	✓	✓
6.	Potential beneficiaries and citizens	Number of population within the scope of the district (and within the boundaries of zone C1 of the IPURD)	40 348	36 798	54 280	57 793
		Population growth for the period 2011-2015	n/a	0,7 %	-1,8 %	2 %
7.	Citizen participation	Projects implemented through citizen participation	5	8	1	9
		Number of registered Condominium associations	6	31	15	29

#### **Why it is considered a deprived area (neglected or abandoned)**

The study area is part of zone S1 in the IPURD. The selection of the zones for intervention in the plan grounded on a profound multi-criteria analysis of the neighbourhoods (morphological units) based on expert opinion. According to this analysis, the selected study area was assessed as deprived in terms of two groups of criteria: social-economic and physical and economic characteristics of the housing stock.

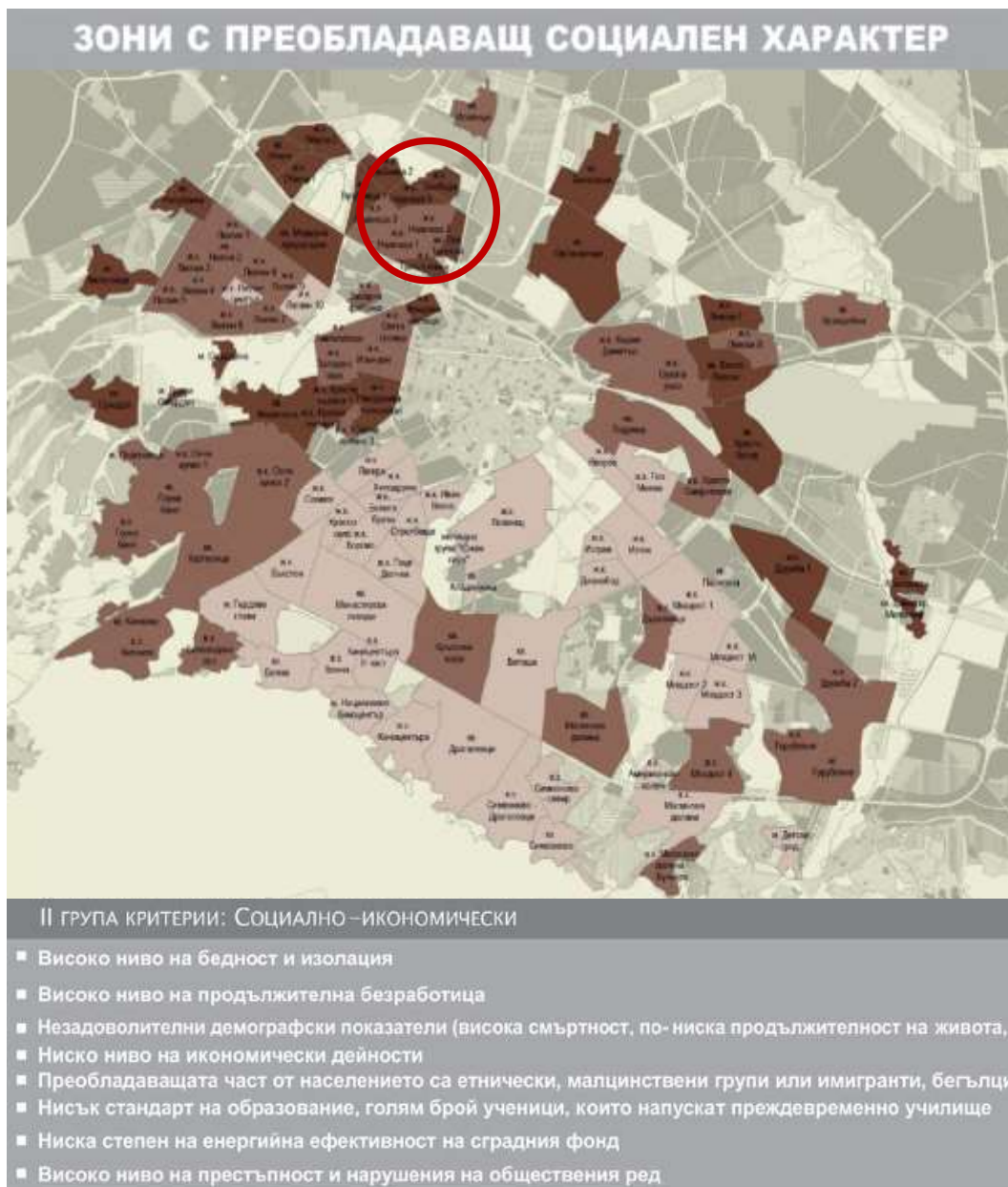


Figure 289. Socio-economic group of criteria for the assessment of residential neighbourhoods for the purposes of IPURD (not necessarily all of them apply to the study area, The assessment was conducted in order to define area S1): High levels of poverty and isolation; High long term unemployment rates; poor demographic characteristics (high death rates, lower life expectancy compared to other neighbourhoods); low level of economic activities; concentration of minorities and underprivileged social groups; Lower level of school attendance and lower share of citizens with higher than secondary education; Low energy efficiency of buildings; higher crime levels.

Source: IPURD 2014-2020

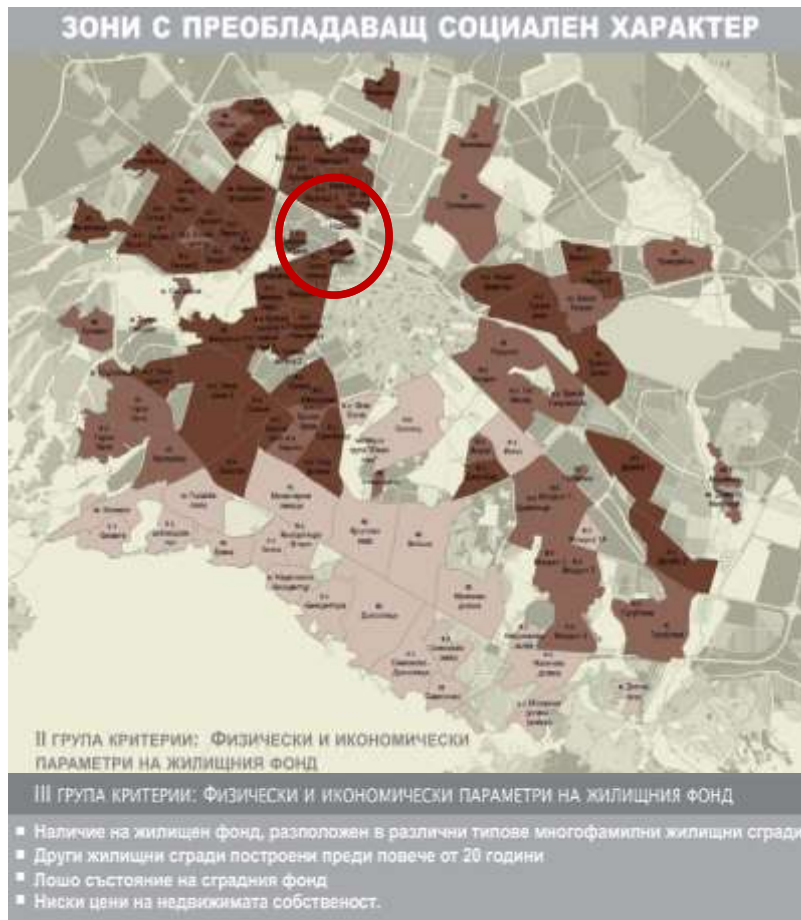


Figure 290. Group of criteria “physical and economic characteristics of the housing stock” for the assessment of residential neighbourhoods for the purposes of IPUDR (not necessarily all of them apply to the study area, The assessment was conducted in order to define area S1): share of the housing units in multifamily buildings; other housing stock aged 20 years and more; poor condition of the housing stock; low levels of property prices.

Source: IPUDR 2014-2020

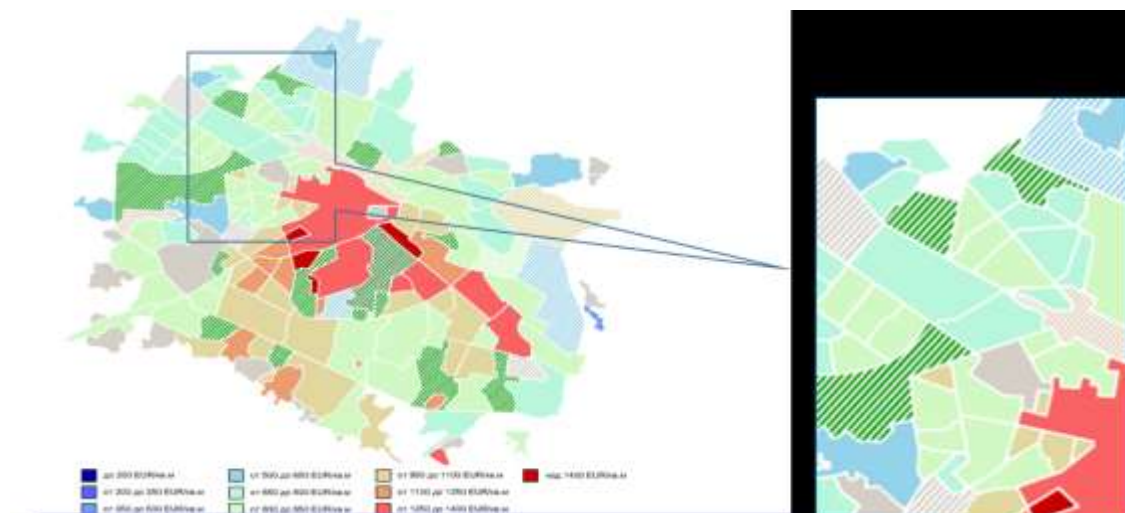


Figure 291. Tolstoy, Svoboda and Nadezhda 2 neighbourhoods' property levels (of 20 and more years old housing stock) sustain comparatively lower than the average property price levels for Sofia city in the long run. Source: Preliminary studies for the preparation of the Update of Sofia masterplan, Source: Sofproect OGP (2018)

## **Local and regional authorities involved and their roles/responsibility**

Sofia Municipality is an administrative and territorial unit. Its management is a mixture of the self government of the citizens and the operation of the state policy for the development of the capital. Sofia is divided into 24 districts. Sofia Municipality is responsible for all administrative and operational activities related to ensuring different types of services to its citizens – education, health care, public transport, waste and water management and others. These activities are provided with public activities and infrastructure through municipal enterprises or public private partnership (e.g. concession). Sofia Municipality is responsible for all administrative and operational activities related to ensuring different types of services to its citizens – education, health care, public transport, waste and water management and others. These activities are provided with public activities and infrastructure through municipal enterprises or public private partnership (e.g. concession).

On Behalf of the Sofia Municipality, the following municipal structures are involved in the URBiNAT project:

- Sofia Municipality with its political body (leading figure and deputy –coordinator for the Sofia Municipality URBiNAT team is the vice Mayor), responsible for coordinating and facilitating the final political decisions. The Chief Architect is the coordinator of the project for Sofia Municipality. Experts from different Municipal departments are responsible for administering and coordinating the procedures, advising on the appropriateness, feasibility and approval of the different actions and solutions in the co-creation process within the administrative, planning and investment design and implementation. Specific role is assigned to the Directorate directly subordinated to the Chief architect and the departments within the Directorate as well as to the European programmes and projects Directorate
- Nadezhda District Administration with the leading figure of the District Mayor involved in all activities during the implementation of the project.
- The Municipal Company Sofproect OGP is responsible, together with UACEG for the co-design of the Local action plan of the Green Corridor.
- Municipal Green systems company

UACG is the local partner providing methodological support throughout the whole co-creation process (co-diagnosis, co-selection, co-design, co-implementation and co-monitoring). The UACEG team is responsible for the implementation of the research activities, providing support for the design of the Healthy Corridor concept and strategy, promoting workshops in the cities' living labs to support the co-design process of the Healthy Corridor. The team will work for the data provision, analysis, evaluation and simulations, which will be the main tasks of the established UBRiNAT Observatory for Urban Inclusive and Innovative Nature. UACEG will take part in the activities related to the dissemination of publications and the NBS Catalogue. The team will be part of the networking and will participate in events and conferences.

## **Local community groups, enterprises and academics involved and their roles/responsibility**



Zaedno (NGO), Bread Houses (NGO), Hrankop (farmers markets network) bring practices recognized as social and solidarity economy.

Local actors: schools and kindergartens (teachers and parents, classes), parents boards at schools, pupils' parliaments at schools, mothers; local NGOs; Nadezhda Municipal Cultural Centre; Nadezhda Social services office; Locomotive sports club; Sofia Agency for Energy Efficiency, Sports Sofia 2000, business providing innovative technical solutions. Previous experience with international cooperation.

Sofia Municipality and the EU Programmes and Projects Directorate in particular, have experience in management and implementation of a series of international and EU funded projects. The municipality was a Lead Partner and a project partner within projects under URBACT II, INTERREG IVC, 6th and 7th FP, Intelligent Energy, and the National Operational programmes. Sofia's Departments on Environment and on Waste management has also sound experience in the management of environmental projects as well as interregional cooperation in the implementation of: INTERREG IVC CCIC project for enhancing innovation in the public sector; South-East Europe EnVision 2020 project aimed at EU energy policy developments; INTERREG IVC: R4R – Regions for Recycling project for optimization of municipal waste recycling; INTERREG IVC: "PreWaste" project aimed to improve waste prevention policies in EU territories; INTERREG III B: Greenkeys project for development of urban green spaces, 7th FM "WASTEKIT" project aimed at sharing knowledge and integration to create Transnational economic development and waste management; etc.

Previous projects or activities, connected to URBiNAT:

- AQUA-ADD (Added Value of Water in Local and Regional Development) - is a 3-year co-operation of 11 partners from 8 EU regions aiming to share knowledge and experience between the project partners, to better deploy the potential of 'water' (economically, socially and environmentally) in urbanised landscapes. The project was co-financed by the European Regional Development Fund and made possible by the INTERREG IVC programme.
- TURaS (financed by 7FP for research, technological development and demonstration) is a five year project that develops visions, feasible strategies, spatial scenarios and guidance tools to help cities address the urgent challenges of: climate change adaptation and mitigation; natural resources shortage; unsustainable urban growth. TURAS enabled adaptive governance, collaborative decision-making and behavioural change in order to facilitate local authorities and communities in the transition process. The Project researched, demonstrated and disseminated transition strategies and scenarios to enable European cities and their rural interfaces to build vitally-needed resilience. TURAS demonstrated to city communities, businesses, planners, policy-makers and managers mechanisms for transition that may be created and implemented as we strive to move to more sustainable urban living.
- The team of LEAP (Leadership for Energy Action and Planning) project consists of ten organisations from six European Union (EU) countries and one applicant country. The project has been set up to help its partner local authorities meet the EU's challenging energy and climate change targets for 2020 by embedding sustainable energy policy within their operations and practices. It is co-financed by the Intelligent Energy – Europe programme, which is managed by the Executive

Agency for Competitiveness and Innovation (EACI) on behalf of the European Commission.

- The Smarter Together (Smart and Inclusive Solutions for a Better Life in Urban Districts) project is a partnership of 30 organizations from 8 EU countries. The project aims to deliver 5 clusters of co-created smart and integrated solutions: living labs for citizens' engagement; district heating and renewable energy sources (RES) for low energy districts; holistic refurbishment for low energy districts addressing public and private housing; smart data management platform and smart services; e-mobility solutions for sustainable mobility. The project will demonstrate how the European 20-20-20 targets on energy and climate protection can be achieved in an integrated way in three specific urban districts with different contexts by using modern technologies and fostering cross-sectorial governance approaches and learning. The project has received funding from the European Union's Horizon 2020 research and innovation programme and is still being implemented (2016-2021).

### **Strategies for international replication**

Sofia is the capital city of Bulgaria with almost 1.3 million (2011) inhabitants which is around 18% of the country's population. Sofia contributes about 30% to the national GDP, which makes the city a social and economic metropolitan centre with a leading position in policy making. As such, it has the potential to make much progress in the implementation of EU2020 objectives toward sustainable development and lead the way for other big cities in Bulgaria.

In 2011 Sofia Municipality joined the Covenant of Mayors initiative and committed to reduce with 22% the CO2 emissions by 2020 compared to the baseline year 2007.

The Municipality participates is a member of the following local, national and international networks:

- Covenant of Mayors for Climate & Energy
- EUROCITIES - the network of elected local and municipal governments of major European cities
- EUROPEAN SOCIAL NETWORK <http://www.esneu.org>
- METREX, the Network of European Metropolitan Regions and Areas for sustainable development
- ACR+ -the international network of cities and regions for sustainable resource management
- INNOVAge - regional development policies in eco independent living for the elderly <http://www.innovageproject.eu/>
- Regions for Recycling (R4R);
- TURAS project family
- UNESCO Creative Cities Network – City of Cinema
- SMART CITIES initiatives – yearly events

## Strategic challenges of the city

The vision of Sofia is to be “The green and smart capital of Bulgaria – model of sustainable development”. Some of the main priorities of Sofia Municipality are to provide conditions for the construction of housing at reasonable prices; reliable and convenient public transport and road network; clean environment and others related to the social aspects, security and quality of life. In 2011 Sofia Municipality joined the Covenant of Mayors initiative and committed to reduce with 22% of its CO2 emissions by 2020 compared to the baseline year 2007.

The “Sofia – a city for the people” report is the result of a one-year work on a project that aims at building and implementing a strategy for development of public spaces in Sofia. Sofia is among cities such as Zurich, London, Stockholm, Copenhagen, New York, Istanbul, Moscow, Shanghai and Bern, which have also worked with Prof. Jan Gehl in the last 10 years. The report describes in details the challenges Sofia municipality has to deal with and prescribes sets of measures in order to transform city’s public spaces into a well functioning people friendly network. Five of these measures are currently being implemented: pedestrian zone expansion and the introduction of traffic restrictions of small streets in the historical centre of the city; discovering and exhibiting the cultural and historical heritage and its transformation into well-used public spaces well integrated into the life of the city centre; connecting bicycle lanes into a common network; removing transit traffic from the city centre – this means finishing both the inner city ring and the ring road; amendments to the Building and Construction Act of Sofia Municipality, which should provide good solutions for both citizens and investors. (<http://investsofia.com>)

Sofia plays strategy proposes the implementation of a system of measures that will create the preconditions for healthy and socially engaged development of children, for the formation of sustainable local communities and for the implementation of flexible financial models for the construction and maintenance of playgrounds. Sofia Plays is a strategy for building, maintaining the 1,770 playgrounds and adapting them. The strategy has been initiated by the Green System, Ecology and Land Use Directorate and commissioned by the Chief Architect of the Sofia Municipality. (<https://sofproect.com>)

## 5.2 The City

### Location in the country

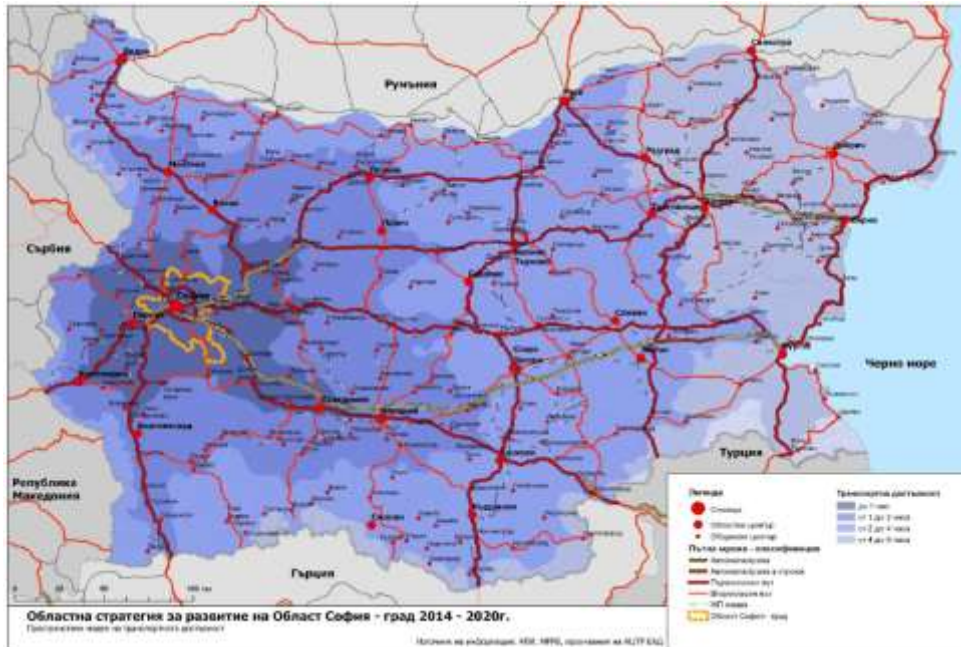


Figure 292. Spatial model of accessibility of Sofia municipality, Source: Strategy for the Development of Sofia Province 2014-2020

Sofia is located at the heart of the Balkan Peninsula in the western mountainous part of Bulgaria at the crossing of many historical routes and currently important elements of the Trans-European Transport Network.



Figure 293. Geographic map of Bulgaria., Source: By Ikonact - File: Bulgaria-geographic map-bg.svg, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=24850742>

Sofia Municipality is located in the Sofia Valley with an altitude of about 550 meters on a territory of 1,311 sq. km, of which populated areas and urbanized territories occupy 245.5 sq. km, agricultural land - 509 sq. km, forest areas - 466.5 sq. km, mining areas - 40.5 sq. km, territories for transportation and infrastructure - 20.6 sq. km and watercourses and water areas - about 40 sq. km.

Sofia Valley is rich in iron ores, building materials and lignite. The building materials are sand, gravel, hearting stone, limestone and clays. The region is rich in mineral waters. A number of low rivers cross the territory of Sofia. Their beds within the bounds of the city were corrected. Bigger are Iskar, Vladayska, Perlovska, Suhodolska, Slatinska, Boyanska, Bistarska and Bankyanska rivers. The main drainage artery is the valley of the Iskar River located along the meridian. Hydro-mineral resources on the territory of Sofia occupy a significant share of those of the country (15 fields with total mineral water consumption - 130 litres per second). Black-earth troughs, alluvial-meadow and colluvial -meadow soils predominate in the plains of Sofia Valley. Cinnamon and brown forest soils are typical of the middle-mountain areas.

(Source: <https://www.sofia.bg/en/web/sofia-municipality/geographical-feature>)

The city is the governmental, financial and cultural centre of Bulgaria, and the centre of the Southwestern NUTS2 Planning region (Yugozapaden Rayon za planirane, BG 41) and the NUTS3 Region of Sofia (Sofia Municipality, BG411).

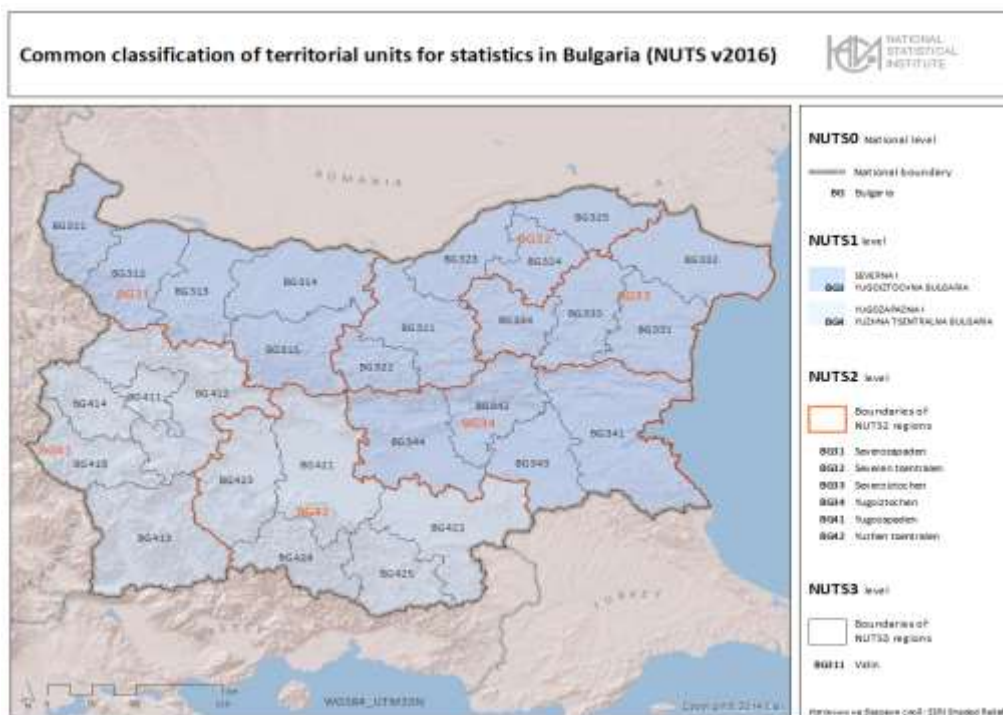


Figure 294. Common classification of territorial units for statistics in Bulgaria (NUTS v2016)

Source: National Statistical Institute, [http://www.nsi.bg/sites/default/files/files/pages/Classifics/NUTS\\_v2016\\_EN.png](http://www.nsi.bg/sites/default/files/files/pages/Classifics/NUTS_v2016_EN.png)



Sofia Municipality is identical to Sofia City Province, which is distinct from Sofia Province that surrounds but does not include the capital itself. Besides the city, the 24 districts of Sofia Municipality encompass three other towns and 34 villages. Districts and settlements have their own governor who is elected in a popular election. The assembly members are chosen every four years. The common head of Sofia Municipality and all the 38 settlements is the mayor of Sofia.

Sofia Municipality spreads on 1151km<sup>2</sup> and besides the city of Sofia comprises 3 other towns. The total number of population outside within the Municipality residing settlements beyond Sofia city boundaries is 0.09 million inhabitants. The urban network of the Municipality is composed of lower level settlements (according to the national settlement hierarchy), characterized by slow population growth rates.

Sofia CITY population is 1,31 million and it is continually and fast growing. The territory within the city boundaries is 209,56 km<sup>2</sup> - too big and compact compared to other Bulgarian cities.

Nadezhda district population is 67 905, which is 5.3% of the city's population. There are about 2113 ha urban and rural areas within the boundaries of Nadezhda district.

#### Sofia Municipality. District administrations



- |                          |                               |
|--------------------------|-------------------------------|
| 1 Район "Средец"         | <b>13 District "Nadezhda"</b> |
| 2 Район "Красно село"    | 14 Район "Искър"              |
| 3 Район "Възраждане"     | 15 Район "Младост"            |
| 4 Район "Оборище"        | 16 Район "Студентски"         |
| 5 Район "Сердика"        | 17 Район "Витоша"             |
| 6 Район "Подуяне"        | 18 Район "Овча купел"         |
| 7 Район "Слатина"        | 19 Район "Люлин"              |
| 8 Район "Изгрев"         | 20 Район "Връбница"           |
| 9 Район "Лозенец"        | 21 Район "Нови Искър"         |
| 10 Район "Триадица"      | 22 Район "Кремиковци"         |
| 11 Район "Красна поляна" | 23 Район "Панчарево"          |
| 12 Район "Илинден"       | 24 Район "Банкя"              |

Figure 295. District administrations of Sofia Municipality. Source: <https://www.sofia.bg/en/adresi-rajoni>

Area of the city (within the city boundaries) 209,56 km<sup>2</sup>

Aerial view of the city with administrative boundaries



Figure 296. Aerial view of the city with administrative boundaries Source: <http://gis.mrrb.government.bg/2011>

### **Brief history description**

In its centuries-long development, Sofia has always played an important role in the history of the Bulgarian lands as a centre, a natural intersection of the roads linking the East with the West (Western Europe with Asia Minor), as well as the countries north of Bulgaria to that south of it. The capital of the Republic of Bulgaria, a unique city that grows yet not getting old, has more than 7000 years of history. Before Sofia, the city was named Serdica, Sredets and Triaditsa.

## Sofia before 1878. Timeline of major events and processes

Table 31. Timeline of the history of the city of Sofia, Bulgaria. A chronology of key events until the end of the XIX century

Sources: Compiled from: [https://en.wikipedia.org/wiki/Timeline\\_of\\_Sofia](https://en.wikipedia.org/wiki/Timeline_of_Sofia);

CENTURY	KEY EVENTS, YEARS/PERIODS
VI-V c. BC	New Stone Age (Neolith). The closest one to the city centre among the numerous prehistoric settlements in Sofia Valley is today's neighbourhood of Slatina
IV-III c. BC	Copper-stone age (Chalcolith). Remnants were discovered much closer to today's metropolitan centre, at the now lowered terrace near "Knyaz Alexander Battenberg" square
	The Thracian town came into being around the preserved until today thermal springs, called "the town of the Serdi", named after the inhabiting it Thracian tribe.
Ist	45 AD - the territory inhabited by the Serdi passed to the newly formed Roman province of Thrace
II	Serdica founded by Trajan 176-180, the city was fortified with a wall. The hot mineral spring was capped and the public baths (thermae) were built around it.
III	At the end of the century - Serdica became the capital of the newly established province of Dacia Mediterranea.
IV	Church of St. George and Amphitheatre of Serdica built 311 - Emperor Galerius, together with the emperors Licinius and Constantine, issued the Edict of Toleration, legalizing Christianity in the Roman Empire. Thus Serdica became a kind of first Christian capital of the Roman Empire before Constantinople 343 - Council of Serdica convenes attended by delegates from all over the Empire, and for a long time it was designated as Ecumenical.
V	447 - Town burned by Huns
VI	527-565 - the last period of the city's flourishing in antiquity. At that time the fortification walls of the city were rebuilt and the imposing basilica of Saint Sofia Church was built.
VII	the Slav tribes had settled in the Serdica region and the city continued to exist as Triaditza in a Slavic environment within the borders of the Eastern Roman Empire, Byzantium (end of the VI and beginning of the VII century)
IX	809- Conquered by the Bulgarian Khan Krum (803-814). 814-831 - the reign of Khan Omurtag. The city became part of the First Bulgarian kingdom and was named Sredetz, thus reflecting its geographic location
X	972 - Byzantians conquer the north-eastern Bulgarian lands, Sredets became the temporary capital of the state and the Bulgarian Archbishopric
XI	Boyana Church built near town 1018 - fell under Byzantine rule

XII	Under Byzantine rule. The city was the temporary seat of the Byzantine governor of the "thema (region) of Bulgaria", called the "Duke of Sredets". 1194 - Town renamed "Triaditsa"
XII – IV	During the Second Bulgarian kingdom (1194 – 1382) - a time of prolonged economic and cultural prosperity for Sredets. The city grew and finally took the look of a typical medieval city. The streets narrowed, appeared buildings with a characteristic brick - stone structure, new small churches were erected, and in the vicinity many monasteries appeared - mostly on the slopes of Vitosha and Stara Planina 1329 - Town renamed "Sofia." 1382 – Ottomans conquer Sofia and stay until 1878
XV	1443 - Town occupied by Hungarian forces
XVI	Sofia was a thriving trade centre inhabited by Bulgarians, Romaniote, Ashkenazi and Sephardic Jews, Armenians, Greeks and Ragusan merchants.
XVII	The city was the largest marketplace of the Balkans 1610 - Catholic See of Sophia established
XVII	A stone-paved road linked Sofia with Europe and Asia Minor.
XIX	Sofia became the administrative centre of a sandzak, large administrative unit of key importance to the Ottoman Empire. 1874 - The first railway crossing the Balkans reached Sofia as part of Orient Express 1878 - Town occupied by Russian forces. Liberation of the city from the Ottoman rule 1879 – The capital of Bulgaria relocated to Sofia from Veliko Tarnovo. 1888 - Sofia University founded; Sofia Central Station and Sofia Zoo open.

### Sofia after 1879

Though there is historical evidence that the city dates back to 29 BC and some recent excavations prove the existence of a settlement dating from the bronze, iron and Hellenic ages, it is only in the last 100-140 years that the contemporary city has been developed.

A year after the Liberation of the city from the Ottoman rule (1879), the First Constituent National Assembly unanimously voted Sofia for the capital of the restored Bulgarian state. Sofia's advantages for a capital city were several: it is situated in the centre of the Bulgarian lands and has an important strategic location, lies on the most important route on the Balkan Peninsula that connects Europe with Asia. The city is located in a large valley, which provides convenient terrain for expansion. Close to Sofia is the Pernik coal mine, which immediately after the Liberation began easily and quickly to supply coal for industry, transport and heating.

In 1878 new borders of Sofia were determined. An urban sanitary commission and a fire-fighting service were established. For hygienic reasons, the horse- and cattle-markets were moved outside the city borders. The first public garden was opened – now – the City Garden. A technical service at the Sofia Municipality was established and the city was

divided into districts. In 1879, the first urban (zoning) plan of Sofia was drawn by the urban engineer S. Amadiet. It transformed the city's skyline and to a large extent shaped the outlook of today's city centre. The intensive zoning and public works carried out and the real ardour in the young capital, transformed it in just two or three decades from a typical oriental place into a city with the ambition to have a face with European dimension. An urban development commission was set up, consisting of Council members, the city engineer and the city doctor. This commission was in charge of street repairs and lighting, as well as of the construction of the sewerage system. A major part of the currently existing central city squares, boulevards and streets were constructed. The old water mains were replaced, the Central Sofia Cemetery was established at its current place and rules for burial services were put in place. At the time when Sofia was liberated from Ottoman rule (4th January 1878), the city had a population of only 12 000 and in a couple of years (after being proclaimed as capital city), the population increased nearly tenfold.

At the end of the XIX century and the beginning of the XX century, the central parts of the city were shaped. Together with the appearance of original buildings, the capital was electrified, in 1901 the first tram was launched, the number of telephone subscribers increased. After 1908 the city quickly outgrew its old boundaries, incorporating the neighbouring villages. Many new public municipal schools and baths were built, iconic public buildings in the city were constructed, and the development of the central streets and squares began. The laying of the ceramic pavement - the yellow paving blocks (imported from Austria-Hungary), together with the implemented social policy and carried out public works until 1912 and the subsequent construction of the Rila Water Main in the late 1920s and early 1930s, ranked Sofia among the most advanced cities in Europe. The growing middle class started building modern apartment blocks, and the population discovered the benefits of public transportation and a central sewage and water supply.

Sofia did not manage to entirely escape the political turmoil of the 20th century. In 1918, as the army on the Western front was beaten, the conscript soldiers revolted and marched on the capital, to be defeated with much bloodshed on its outskirts, near the sugar factory. Seven years later, in 1925, Sofia became the scene of the world's biggest (until the 1995 Oklahoma City bombing) terrorist act as militants blew up the St. Nedelya Church during a crowded funeral service for a general they had killed previously for this purpose. (Dainov, E. at al, 2006)

The bombing of Sofia in World War II (1943 and 1944) by Allied forces resulted in the death of 1,374, with an additional 1,743 being injured. The numbers of buildings damaged were 12,564 (not excluding the 2,670 completely destroyed buildings). (Kiradzhiev, S., 2006)

In 1934 the City becomes seat of Sofia Oblast and 4 years later, in 1938, the most widely discussed master plan of Sofia before WWII was prepared by the German architect Adolf Muesmann and adopted. Bulgarian authorities at that time believed that the existing density of Sofia's population was very low and would not allow for an efficient development of the street network and public utilities. The World War II was the main reason for the failure of the implementation of Musman's plan.

### **Sofia from 1945 to 1989**

After World War II the new socio-economic conditions required a new policy of development, so in only a year another master plan was prepared by L. Tonev and approved (State Gazette, December 1945). By that time the number of the population of



Sofia had grown by 100 thousand inhabitants and reached half a million. For the first time Tonev's plan introduced the ideas of a polycentric system of the urban structure.

From 1945 to 1961 the city experienced crisis caused by damages of a considerable part of the housing stock resulted by the bombings, and the drastic change in the social and political system of the state. The first post-war Sofia development plan imposed the necessitated rapid measures for control of the situation. In the 1950s, housing construction is limited. Several housing estates were built on some empty terrains – Lagera, Krasna Polyana, Zaharna Fabrika, where the buildings have 3-4 stories.

“The changing political system and the rapid industrialization of the country accelerated the urbanization process. Migration flows from rural areas to industrial centres resulted in an urgent demand for large scale housing provision and industrially produced prefabricated panels and large housing estates first appeared in the early 1960s as the optimal economic but also social solution to the housing crisis”. “After WWII, the capital city of Sofia was the fastest growing city in the country - its administrative, but also industrial, educational and cultural centre. Despite administrative restrictions on population growth it experienced a continual flow of incoming population with residential needs that were difficult to meet”. (Andersen, H.T., et al, 2013)

By the mid-1960s, due to the rapid development of heavy industry, the city expands with with the first major (currently – mid-sized) residential districts, such as Vladimir Zaimov, Lenin, Deveti septemvri, Zapaden park, Hipodruma. (Dainov, E. et al, 2006)

The population of the capital grew by another 220 thousand by 1956, when the Council of Ministers decree the preparation of a new general plan. The work and discussions of two teams continue until 1960 when two projects are presented. In theory, both projects tried to promote the vision of polycentric development, but in practice, the importance of one main city centre was confirmed.

The plan of Neikov was approved and adopted in 1961. The Neikov plan envisaged an increased growth of the population and accommodation of 1 050 000 inhabitants (prognosis for 1980) within the compact city of Sofia by densification of the urban fabric. While the number of inhabitants was to grow, the territory was to remain the same and even to shrink in some locations. During the discussion and comparison of the competition projects in the early 1960-s, the one that imposes the concepts of control of the demographic and territorial growth was chosen. Ultimately, the attempts to control the size of the city fail as in only 5-6 years the parameters and the limits of the project are exceeded. The capital actually begins developing according to the second, rejected project, which necessitates the construction of large housing macro-regions on vacant territories. By 1968, the unexpected continued growth of the city leads to the call for another development plan. (Dainov, E. et al, 2006). In 1969 a special team makes a detailed research, creates a new information basis and contemporary methods for project design. On this basis, in 1971-1972, a detailed preliminary project ('conception') is completed, consisting of three parts: urban hypothesis for the Sofia agglomeration; outline project for urban structure; and a communication and transportation project. The research in this project has abundant ideas and radical suggestions, and soon is considered to be too avant-

garde and theoretical. In 1972 the state assesses them as 'unrealistic', because of the stated

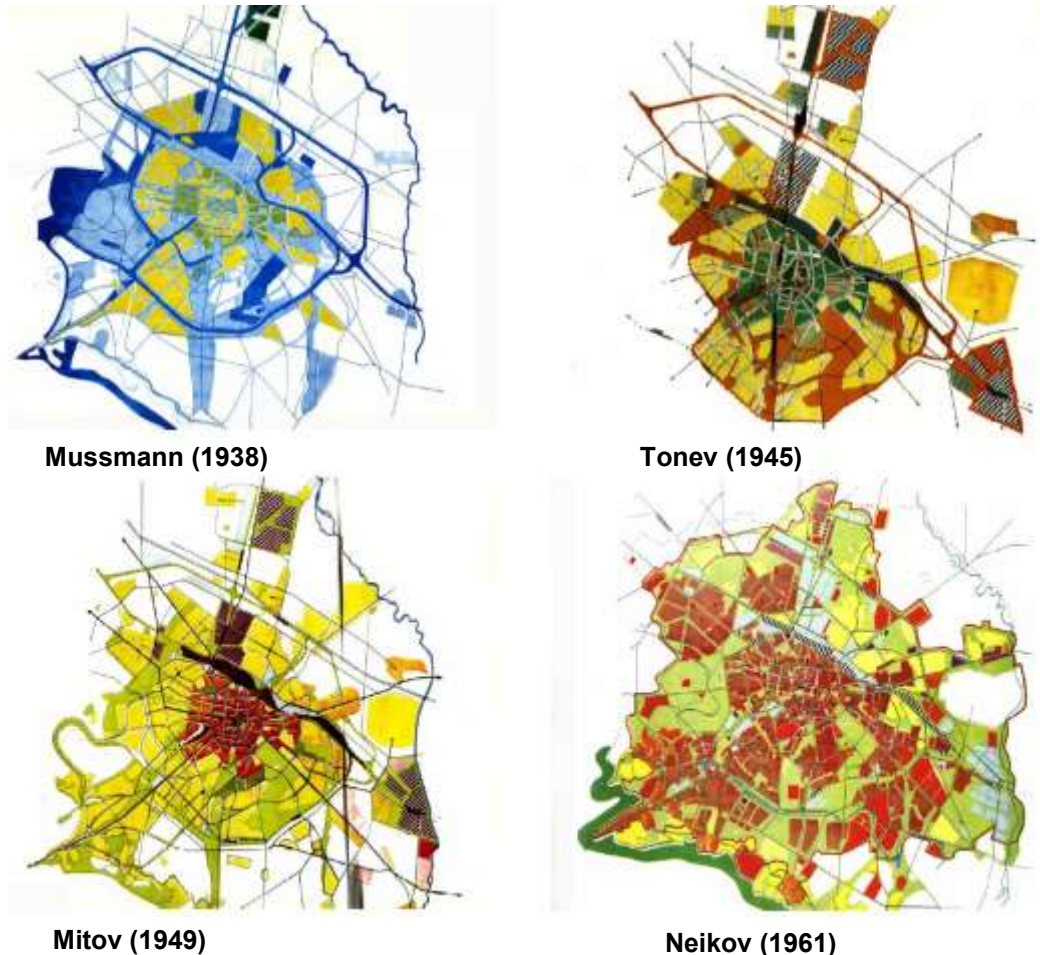


Figure 297 Historic Master plans of Sofia featuring its fast growth demographic and territorial over-growth, and sends them back for revising. (Dainov, E. at al, 2006)

In 1975 the package of three projects: regional territory organisation; general urban planning, communication and transportation, is revised by the team of 'General Planning' Directorate and set out as General Development Plan of Sofia in 1978. A public and professional discussion was opened on the proposed development - 70sq. miles urbanized areas and a population of 1,200,000 to 1,250,000 people by the year 2000. In 1979 the project is approved by the metropolitan authorities and the government, and a draft Act is prepared for its ratification but not approved on political level. Instead, in 1980 the Government decides to begin large-scale housing construction on vacant terrains: 'Drujba' 2, 'Ovcha Kupel' 2, 'Levski' G, 'Obelya' 2, 'Mladost' 1A, 'Malinova dolina' and 'Gorubliane' 2.

In 1985 the team of 'General Project' Directorate makes another draft of the project without changing the main concept and space composition, but further steps for its ratification are not taken.

## Sofia after 1989

The first 10 years (1990 – 2000) of the Transition in Bulgaria were characterized with a) the development of democratic political system and market economy; b) on-going privatization, land restitution, economic restructuring; c) deindustrialization and increasing social differentiation; d) rapid change of the socio-economic conditions, cultural context and the physical appearance of cities; e) overall policy for territorial development and private sector-led urban regeneration. Property market has been quickly established in Bulgaria at the very beginning of the transition. The residential areas in decline, the low rate of availability of vacant plots and significant amount of the privatized buildings were subjected to or in need for refurbishment and renovation. (Tasheva-Petrova, M., 2016)

As a result of almost 50 years of centralized planning and little governance that was responsive to local demands; in the late 1990-s Sofia had a spatial development pattern that is quite distinct from that of cities in market economies, and even from that of other cities in the region. Sofia showed a mixed pattern of high and low densities at all distances from the city's centre. Industrial areas were dispersed quite near to the Core City and at the same time large patches of very low-density settlement in close proximity to the centre could be identified. ((Tasheva-Petrova, M., 2003, SDS, 2002)

The total area used for transport and communications, including the railroads was 7.8% from the total city area. The level of motorization was as high as in the European cities – 406.4 cars registered within the city boundary per 1 000 population. In 2002 there were more than four times as much land allocated for industrial use as in West European cities. The 26 industrial areas formed 20% of the total area of the city and their reconstruction capacity varied between 20 and 40%. (SDS, 2002)

Transition economy, decentralization, democratization and entrepreneurship reflected infrastructure and nearby territories, housing production, and social life. The political, social, and economic changes brought about new housing developments and increased homelessness; fostered inequalities, made possible the coexistence of proliferation of historical and cultural sites and their tired environment; the construction of new boulevards next to neglected housing areas; created new entertainment and recreation zones and left deserted parks. The uncontrolled development replaced children's playgrounds with parking lots, no one's open spaces and gardens were occupied by markets and housing. The city developed predominantly to the south, on the foot of Vitosha Mountain. (Tasheva-Petrova, M., 2003)

Sofia's growth and development during the period of nearly three decades of continuous attempts to create new, up to date master plan, was marked by "development according to plan, which in reality was a chronic, long sustained midway between plans." (Alexandrov, A., 1992) The accumulated problems in housing policy, technical and transport infrastructure, and ecology coincide with the emergence of new heuristic methods in planning worldwide. In 2003, the future of the city has been discussed in the City Development Strategy (CDS), Comprehensive Development Plan (CDP finalized at a preliminary stage, final stage approved in 2006), Environmental Impact Assessment of CDP, and Program "Local Agenda 21 - Sustainable Sofia". The strategic spatial policies and planning mechanisms for Bulgaria's capital city and its adjacent suburban area have involved more than 400 professionals from the city, the country and from abroad. (Tasheva-Petrova, M., 2003)

Due to the dynamically changing socio-economic conditions, the burst of construction industry and real estate business in the pre-accession period (2002-2007), the need to update the CDP rose soon after its approval and in 2009 the plan was updated/amended.

If in the early 1960s the built-up urban area is about 120 - 130 km<sup>2</sup>, by 2009 it is over 190 km<sup>2</sup>. On the periphery of the city, the industrial and commercial areas (to the west and to

the east) are still growing. The average radius of Sofia's current territory is 6.22 km, and it is drawn to the southeast along the axis and reaches 12 km.

### **Large housing estates in Sofia and public space: history, processes, challenges**

Large housing estates in Sofia were built in the period of intensive industrial development and were usually located on ex-agricultural land or pastures on the urban periphery. In order to meet the high housing demand some 15 housing estates (with more than 10 000 inhabitants each) were planned and built at the city periphery - about 575 000 inhabitants (47% of the city population) presently live there. Nearly half - 47.3% - of the housing stock existing today in Sofia had been built in the 20 years between 1970 and 1990 (NSI, 2012)). (Andersen, H.T., et al, 2013)

The housing estates built under centralized planning are structured into residential micro-regions, with small service centres. According to the urbanisation theory and practice at the time, these micro-regions are a basic structural unit with a population of 15,000-20,000 residents; they have to provide a set of services, in which the main criteria is the school catchment area. The micro-region is divided into housing groups with a population of 2,000 to 3,000, where the criterion is a kindergarten catchment area. Later, in the 1970s, this system deals with much larger numbers: a housing district of 40,000 to 50,000 residents, complete with medical facilities, cinema, etc.; a planning region of 100,000 to 200,000 residents complete with a hospital. (Dainov, E. et al, 2006)

“With the societal changes and the economic crisis of the early 1990s the large housing estates became a major urban challenge because of several interrelated processes: (i) the legal changes concerning urban property ownership; (ii) the bad conditions of the building stock and technical infrastructure as a result of insufficient and inadequate maintenance and management; (iii) the general retreat of the public sector from responsibility for maintenance and the rising social and economic vulnerability of the flat-owners in parallel with increasing unemployment.” (Andersen, H.T., et al, 2013)

Their technological and construction, financial and legal, sociological and psychological, architectural and operational problems raised controversial proposals for reconstruction and demolition. In the late 1990-s researches proved that, only 40% of the buildings in these estates could be subjected to reconstruction and modernization. Another major shortcoming of the construction of these urban districts is the time lag between the construction of housing blocks and the related public buildings, thus demonstrating underprovision of the norms that were initially supported to ensure local parity service. The land allocated for public services in the prefabricated housing estates and their adjutant areas has been subjected to entrepreneurial pressures, which would most often seek short-term profit and affected the quality of life, public space, architectural and urban aesthetic and environment. (Tasheva-Petrova, M., 2003)

Among the most serious challenges, which housing estates faced in the two post socialist decades was also related to the Restitution of Nationalized Real Property Act adopted in 1992. “The Act set the basis for returning non-built plots of land to former owners or their successors. Thus all non-built urban land in the large housing estates was given back to the ancestors of the former owners of this rural land that had been nationalised in the 1950s and subsequently urbanized. As this was agreed upon at a constitutional level, all other regulations at the local level were overridden. Rapid changes in legislation, resulting gaps in new acts and regulations, and suspected corruption provided the possibility for chaotic building of new houses and facilities on ‘restituted’ land in the large housing estates (public greenery, transport infrastructure, etc.) and the emergence of enormous conflicts in some of the estates (e.g. Mladost) between the inhabitants and the new land owners.” (Andersen, H.T., et al, 2013)

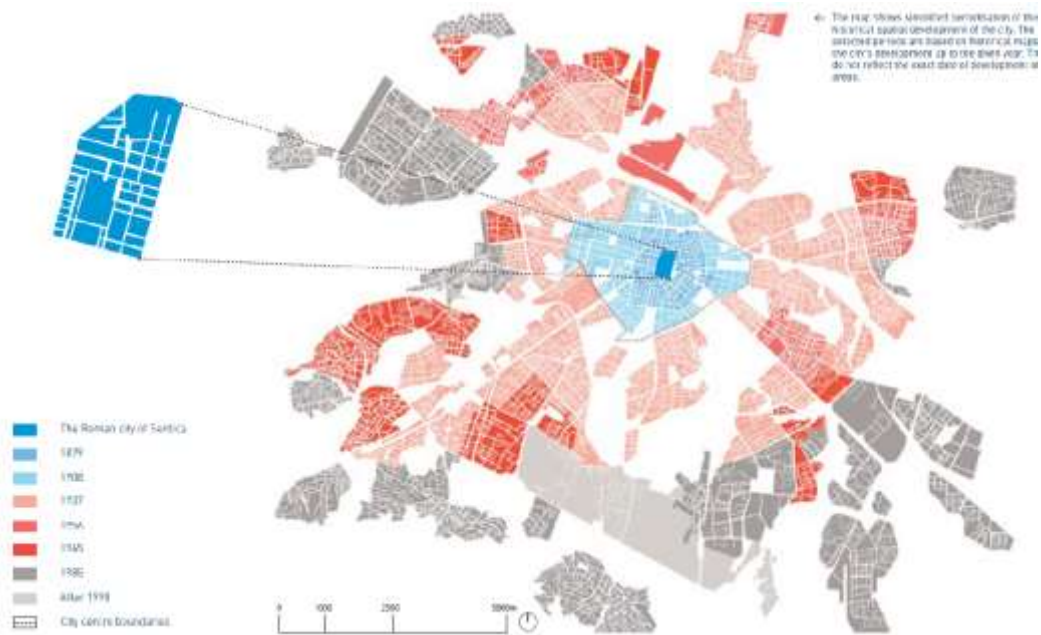


Figure 298. Spatial development of Sofia by historic periods.

### Recent developments of the city

The city of Sofia has experienced the long transition period after the Fall of Socialism. The city (and the country) experienced several social-economic crises in the 1990s and started recovering in the new Millennium during the period of pre-accession to the EU.

Strong and fragmented market development forces before and after the accession to the EU have made its citizens more aware about the commons and their rights to the city. The General development plan (2009), the integrated plan for urban regeneration and development (2013) and the Municipal programme for the development 2014-2020 are being implemented. Among the main priorities of Sofia Municipality stated in these documents, are the provision of conditions for the construction of affordable housing, reliable and convenient public transport and road/street network, clean environment and others. Indicated as priority topics are related to the social aspects, security and quality of life.

The municipality of Sofia has been trying to recover major public infrastructure and with the help of EU funding to develop the subway (the construction of the third metroline is on-going and the urban schemes for the extension of the second metroline were recently approved by the Municipal Council).

Basic assets and public works are contributing to the upgrading the urban environment in many areas across the city. Currently the urban policy agenda of the city comprises initiatives such as: Vision Sofia 2050; the Sustainable urban mobility plan (under development) and the actualization/update of the General Development Plan 2030 (forthcoming, preparations underway). "Sofia - City for people", "Sofia - green capital of culture" and "Green Sofia" are initiatives focused around improvements of public spaces, non-motorized mobility and various ecological issues such as air pollution with particulate matter, waste management, etc. Many joint initiatives with business and the civic sector for innovation, smart specialisation and others are underway. Sofia takes part in the Digital transition as a participant in EU project.



Strategic documents related to URBiNAT thematic focuses are: Youth strategy (2017-2019); Education Strategy (2016-2023); Sport strategy; Strategy for the utilization of the thermal water (2017); The Energy efficiency Action plan of the Municipality, the Programme for encouragement of the use of renewable energy sources 2017-2019.

## 5.2.1 Territorial description

### 5.2.1.1 Climate and Urban Environment

#### National climate regions

There are five climate regions in the country: Temperate continental; Transient-continental; Transitional Mediterranean; Black Sea and Mountainous. Major part of Sofia falls into the temperate continental region, whereas the southern part of it falls into the Mountainous region.

The Sofia valley falls into the European-continental climate area, a temperate continental sub-district, a climatic region of the high fields of Western Central Bulgaria.

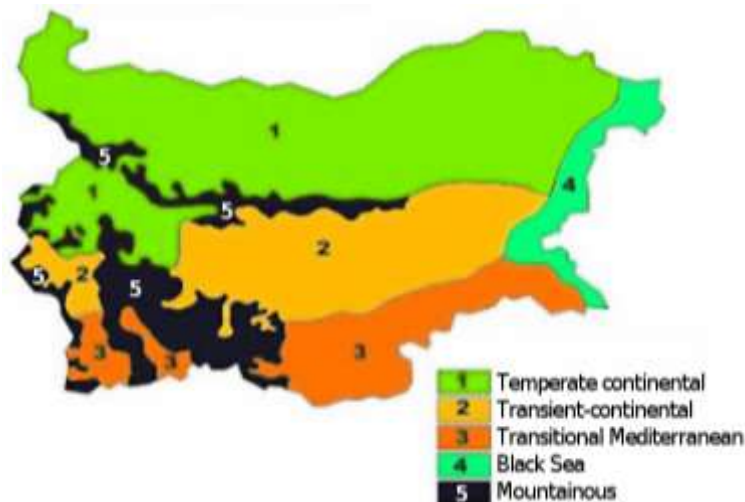


Figure 299. Climate regions (adapted from “Climate in Bulgaria”, [http://disasters-in-europe.blogspot.com/2017/05/blog-post\\_11.html](http://disasters-in-europe.blogspot.com/2017/05/blog-post_11.html))

#### Climate through seasons

The character of the valley, in which the city is located, presupposes the specific climatic conditions in the Municipality. Due to the transformation of passing/circulating air masses of different origin, the area is characterized by a greater frequency of western and southwest winds, thermal inversions, radiation fog and inversion clouds during the cold half of the year.

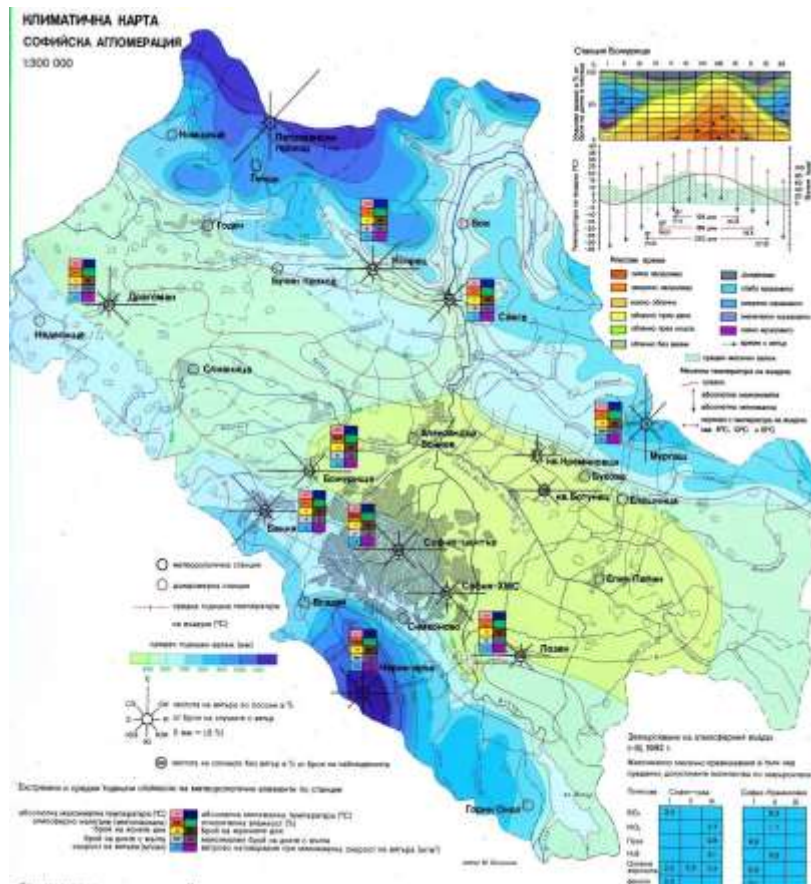


Figure 300. Climatic map showing temperature, precipitation, wind and other meteorological indices (NAG, 1993)

### Temperature

The average annual air temperature in Sofia for the period 1897-1996 (20th century) is 10.1 °C. The coldest month is January. The average monthly minimum temperature during this 100-year period is -2.5 degrees with an absolute minimum of -23.1 °C. The highest temperatures are in July and August. The average monthly maximum air temperature in July is 25.9 degrees, and in August - 25.7 degrees. The annual air temperature amplitude is 22.2 degrees and the climate is typical continental. The air temperature regime in Sofia (the built up area) is significantly different from that in its surroundings due to the influence of the city complex. The average annual temperature of the built up area in the city is about 0.7 - 0.8 degrees higher than that of its surroundings.

Table 32. Trends in the mean daily average, maximum and minimum temperatures for the period 1960-2005, Source: Engelen, Tank, Schrier & Klok, 2008; Stolichna obshtina, 2016

INDEX	TREND
Mean daily average temperature (TG)	0.23 ° C / decade
Mean daily maximum temperature (TX)	0.24 ° C / decade
Mean daily minimum temperature (TN)	0.28 ° C / decade
Length of the vegetation period (GSL)	No data available

Table 33. Trends in the change of hot weather indexes for the period 1960-2005, Engelen, Tank, Schrier & Klok, 2008; Stolichna obshtina, 2016

INDEX	TREND
Maximum of daily maximum temperature - TXX	0.50 ° C / decade
Maximum of daily minimum temperature - TNX	0.67 ° C / decade
Percentage of days with maximum temperatures (TX) greater than the 90th percentile (hot days) - TX90P	6.75% of all days / decade
Days of hot waves - WSDI	2.53 days / decade
Percentage of days with minimum temperatures TN greater than the 90th percentile (hot nights) - TN90P / decade	8.58% of all days
Number of summer days - SU	4,24 days / decade
Number of tropical nights - TR	0.46 days / decade

### Precipitation

The annual precipitation course in Sofia has a pronounced continental character, with a maximum in May and June and a minimum in January and February. The average annual precipitation in Sofia (1897 - 1997) is 601.8 mm.

Table 34. Trends for the precipitation indexes for the period 1960-2005, Source: Engelen, Tank, Schrier & Klok, 2008; Stolichna obshtina, 2016

Index	Trend
Precipitation sum - RR	15.28 mm / decade
Number of wet days - RR1	-1,45 days / decade
Simple daily intensity index - SDII	0.28 (mm / day) / decade
Number of very heavy precipitation days - R20mm	0.66 days / decade
Total precipitation on very wet days - R95P	20.22 mm / decade
Maximum length of dry periods - CDD	-0.31 days / decade
Maximum length of wet periods - CWD	-0.11 days / decade

### Climate Resilience

#### Air Quality

The names of the official air quality monitoring stations of the Executive Environment Agency (ExEA), their European codes are as follows: Yana Station (BG0024A); Nadezhda (BG0040A); Druzhba (BG0052A); Orlov most (BG0054A) moved to Mladost in 2015 due to the construction of station along the third line of the underground; Hipodruma (BG0050A); Pavlovo (BG0073A); Kopitoto (BG0070A).

There are several other official monitoring stations of the Stolichna Regional Health Inspection (SRHI) and many (several hundred) unofficial civic monitoring stations part of the platform Luftdaten with its Bulgarian representative platform AirBG.info.

Table 35. Official air quality monitoring stations in Stolichna obshtina and Sofia city, Source: Luftdaten, AirBG

№	Station	Managing authority	Operational type	Monitoring type	Measured pollutants and time series
1	Yana Station	ExEA	Hand sampling(HS)	Suburban background	NO <sub>2</sub> – 2000-2007; SO <sub>2</sub> – 2000-2010; As – 2006-2008; Cd – 2006- ongoing; Ni – 2006-2008; Pb - 2000- ongoing; PAH – 2006- ongoing; PM <sub>10</sub> – 2001, 2006- ongoing
2	Nadezhda	ExEA	Automatic measurement (AM)	Suburban background	NO <sub>2</sub> – 2003-2004, 2006- ongoing; SO <sub>2</sub> – 2003-2004, 2006- ongoing; CO – 2006; PM <sub>10</sub> – 2003-2004, 2006- ongoing
3	Druzha	ExEA	AM	Suburban background	NO <sub>2</sub> – 2004, 2006- ongoing; SO <sub>2</sub> – 2003-2004, 2006- ongoing; Benzen – 2006-ongoing; CO – 2003, 2004, 2006; PM <sub>10</sub> – 2004, 2006- ongoing
4	Orlov most	ExEA	AM	Urban traffic	NO <sub>2</sub> – 2003-2004, 2006-2014; SO <sub>2</sub> – 2003-2004, 2006-2014; Benzen – 2006-2014; CO – 2004, 2006-2015; As – 2006-2007; Cd – 2006-2007; Ni – 2006-2007; Pb - 2006-2007; PAH – 2006-2007; PM <sub>10</sub> – 2003, 2006-2014
5	Hipodruma	ExEA	HS / AM	Suburban background	PM <sub>2.5</sub> – 2009- ongoing; NO <sub>2</sub> – 2003-2004, 2006-ongoing; SO <sub>2</sub> – 2003-2004, 2006-ongoing; Benzen – 2006-ongoing; CO – 2003, 2004, 2006-ongoing; PM <sub>10</sub> – 2005-2007 r. (HS), 2003, 2008- ongoing. (AM)
6	Pavlovo	ExEA	AM / HS	Suburban background	PM <sub>2.5</sub> – 2005-2008; NO <sub>2</sub> – 2002-2008 (HS), 2009-2016 (AM); SO <sub>2</sub> – 2009-2016; Benzen – 2006-2008 (HS), 2009-2014, 2016 r. (AM); CO – 2009-2016; As – 2006-2008; Cd – 2006-2008; Ni – 2006-2008; Pb - 2002-ongoing; PAH – 2006-2016; PM <sub>10</sub> – 2004-2008 r. (HS), 2009-2016 (AM)
7	Kopito	ExEA	AM	Extra urban background	PM <sub>2.5</sub> – 2008-ongoing; NO <sub>2</sub> – 2008-2013, 2015- ongoing; SO <sub>2</sub> – 2008- ongoing; Benzen – 2009-2014, 2016-ongoing; CO – 2008- ongoing; As – 2008- ongoing; Cd – 2008-ongoing; Ni – 2006- ongoing; Pb - 2008- ongoing; PAH – 2008- ongoing
8	Mladost	ExEA	AM	Suburban background	NO <sub>2</sub> – 2016- ongoing; SO <sub>2</sub> – 2016- ongoing; Benzen – 2016- ongoing; CO – 2016-ongoing; PM <sub>10</sub> – 2016- ongoing
9	The station	SRHI	HS	-	NO <sub>2</sub> – 2005-2015; SO <sub>2</sub> – 2005-2015; Pb - 2005-2015; H <sub>2</sub> S – 2005-2015; Dust – 2005-2015; Fenol – 2005-2015
10	Lyulin	SRHI	HS	-	NO <sub>2</sub> – 2005-2014; SO <sub>2</sub> – 2005-2014; Pb - 2005-2014; H <sub>2</sub> S – 2005-2014; Dust – 2005-2014; Phenol – 2005-2014
11	Tsar Simeon	SRHI	HS	-	NO <sub>2</sub> – 2005-2007; SO <sub>2</sub> – 2005-2015; Pb – 2005-2015; H <sub>2</sub> S – 2005-2015; Dust – 2005-2015; Phenol – 2005-2015; PM <sub>2.5</sub> – 2005-2015; PM <sub>10</sub> – 2005-2015
12	Kremikovtsi	SRHI	HS	-	NO <sub>2</sub> – 2005-2012; SO <sub>2</sub> – 2005-2012; Pb - 2005-2012; H <sub>2</sub> S – 2005-2012; Dust – 2005-2012; Phenol – 2005-2012
13	Grekov base	SRHI	HS	-	NO <sub>2</sub> – 2015; SO <sub>2</sub> – 2015; Pb – 2015; H <sub>2</sub> S – 2015; Dust – 2015; Phenol – 2015 r.

### Local climate policies/Action Plans

“A strategy for adaptation to climate change of Sofia Municipality” (2016) has been developed in accordance with the requirements of the Covenant of Mayors initiative and the action plan is currently being prepared. There are seven groups of measures oriented towards the following domains: Urban design, Health, Energy, Transport, Water management, Environment and Tourism.

### Articulation with European policies (commitments/goals)

The strategy demonstrates strong relation of the EU policy agenda on energy efficiency, sustainable urban mobility, minimization of drinking water loss and ensuring its quality.

## **Participation on national and European platforms**

Membership in the Covenant of Mayors since 2011

## **Urban plans related to climate change resilience (mobility, public transportation...)**

The action plan based on the Strategy for adaptation to climate change is under preparation;

The Sustainable urban mobility plan (under development); and

The report “Sofia - City for people” and the Action plan for improving the network of walkable public spaces within the city.

### **5.2.1.2 Biophysical characterization**

#### **Geology**

The major geological formations in Sofia agglomeration (agglomeration defined by physical geography):

- Alluvial, proluvial and lake sediments – prevail in the compact city
- Holocene and quaternary river terraces – found in the north-eastern periphery of the compact city
- Quaternary alluvial cones – found in the southern part of the compact city at the foot of the Vitosha mountain

There are several predominant types of groundwater in quaternary, proluvial deposits of the quaternary, as well as in alluvial sediments of the holocene (gravel, sands and clays), as well as pliocene above the coal aquatic horizon (clays, sands and coal) and senon effusive with water in the weathering zone and tectonic disturbances (andesites).

Most of the city’s area is a sedimentary geomorphological surface, surrounded by three floodplain terraces along the rivers Iskar, Kakach and Vartopo (Suhata reka) and interrupted by low and high mixed and accumulating terraces along the Dragalevska, Boyanska (Perlovska), Vladayska and Suhodolska river. There is also a footstep, landslides and a concave surface in the southern part of the city at the foothills of Vitosha mountain.

There is a great variety of hydro-mineral resources across the city’s territory. They have been utilized from prehistoric, ancient and medieval times and there has been a big network of modern balneological centres which nowadays are reconsidered and valued, nevertheless that some of them declined after 1989 due to poor maintenance, lack of efficient studies and need of technological improvements.



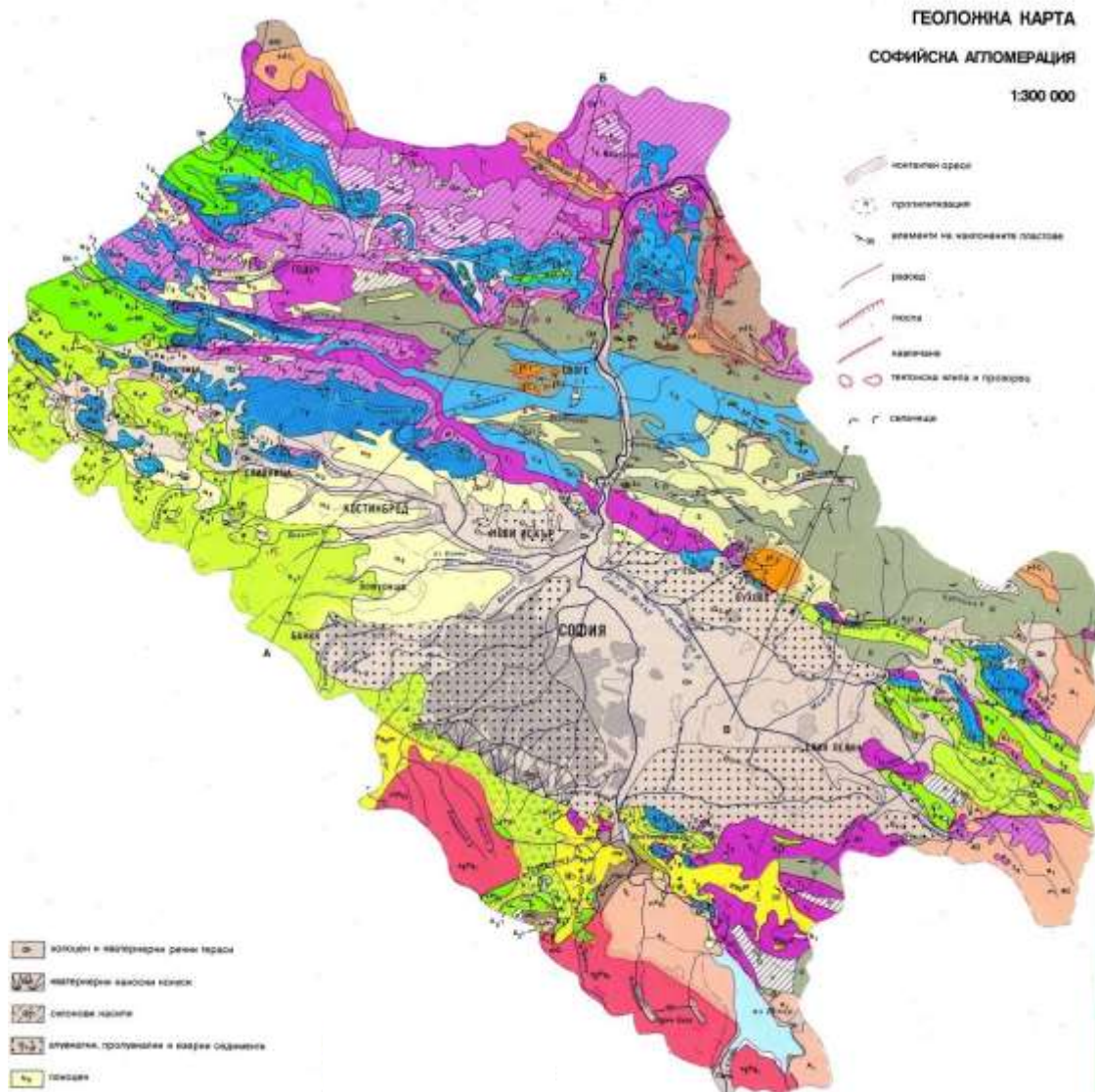


Figure 301. Geological map of the agglomeration of Sofia, Source: NAG, 1993

### Alimetry/Hypsometry

The relief of the municipality and the region varies from flat, low-, medium- to high-mountainous. The municipality's territory falls within the Western Stara Planina, Sofia valley, Liulin, Vitosha and Plana mountains and Ihtiman Sredna gora. The lowest altitude is around 500 m above sea level. The city occupies the middle, flat and lowest part of the Sofia Valley, with an altitude of 550 to 650 m above sea level. The highest altitude in the municipality is Cherni vrah peak with - 2290 m above sea level.

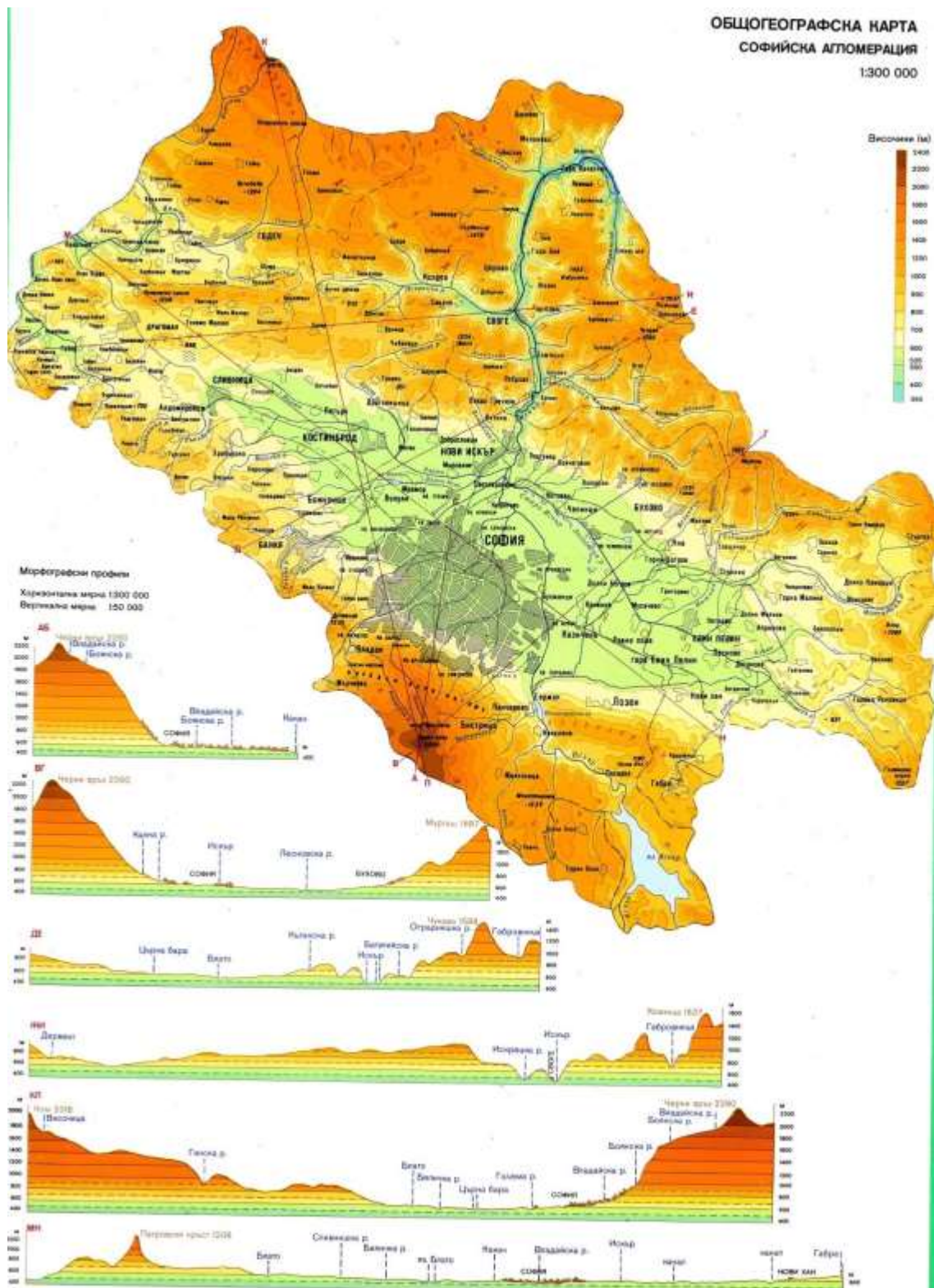


Figure 302. Altimetry of Sofia agglomeration (NAG, 1993)

### Hydrography and artificial water bodies

Many small rivers flow through and outside the city, namely Iskar, Kakach, Suhodolska, Vladayska, Boyanska (Perlovska), Dragalevska and Vartopo (Suhata reka). Most of the natural riverbeds have been corrected in the last 70 years. There are few artificial water



bodies, the biggest one of which is the Pancharevsko ezero dam which is part of the Iskar Cascade for conditionally clean water, satisfying the industrial, public, hygienic and recreational needs of Sofia and other settlements in the Sofia agglomeration. Artificial irrigation systems built before 1989 and unutilized nowadays are available in the flat part of the valley.

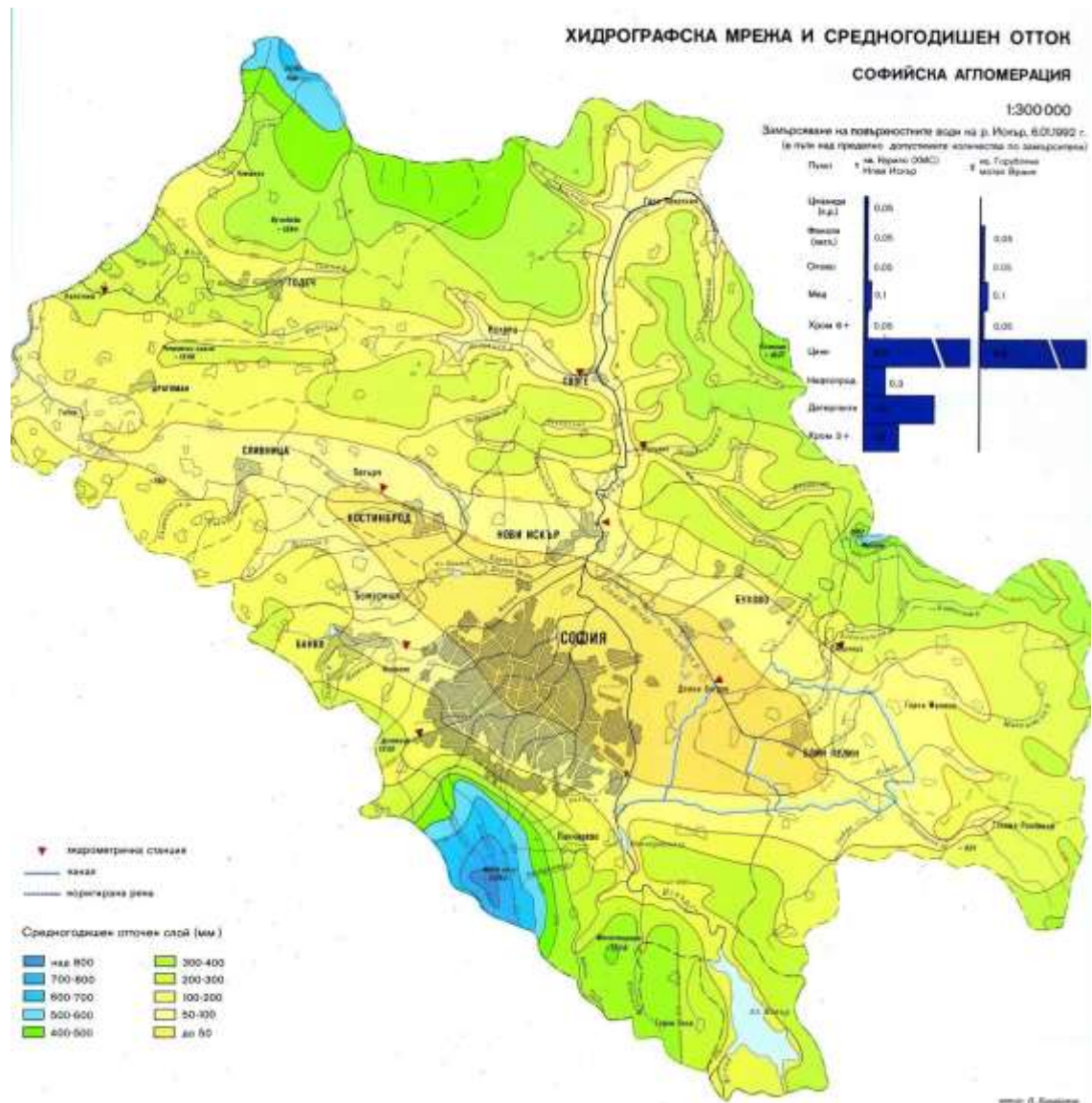


Figure 303. Hydrography and artificial water bodies of the agglomeration of Sofia (NAG, 1993)

### 5.2.1.3 Land use/ land cover

#### Land Cover

The land cover in the extents of the city building limits is heterogeneous but follows similar patterns (gradient and distribution) from the city towards the periphery.

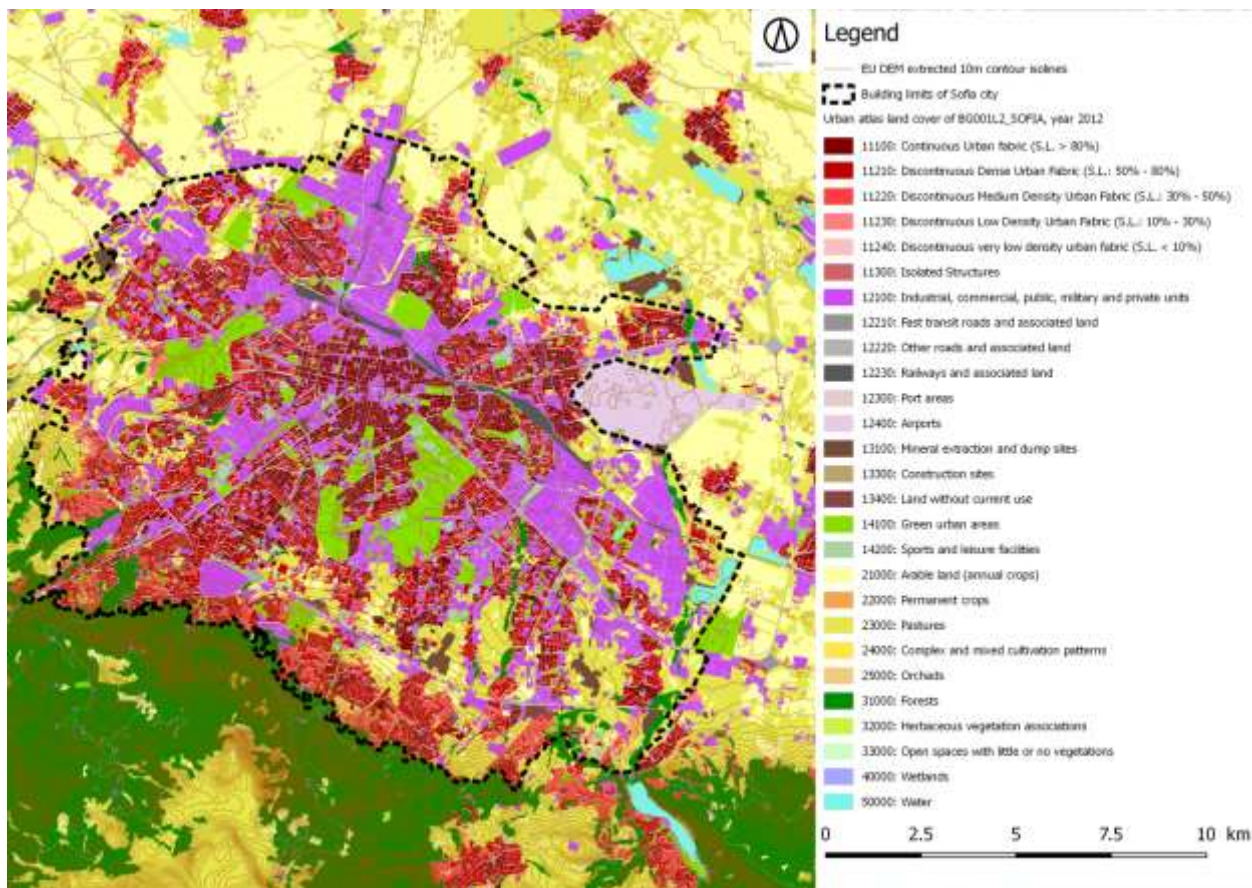


Figure 304. Landcover within the construction boundaries of Sofia.

Source: European Union, Copernicus Land Monitoring Service, European Environment Agency (EEA), 2018; Sofprotect OGP, 2009

The urban land cover is characterized by already established, compact and continuous urban fabric in the historic city centre which shifts predominantly to medium density discontinuous urban fabric towards the periphery where the large housing estates sprawl along and around the major radial axes. Large-scale industrial, commercial, public, military, private structures as well as several major green urban areas considered as wedges interrupt them. The arable land without annual crops (abandoned and in succession) in the southern periphery between the housing estates and lower density discontinuous urban fabric has been built up intensively in the last two decades.

Major transformations have been undergoing along the main transport corridors and axes connecting the core city to its surrounding area and to the big Bulgarian cities for the last 15 years. The development and construction of commercial and service sector' private assets and the related public infrastructure forced the major (in scale and intensity) spatial transformations, which were mainly concentrated in the south-eastern part in the immediate vicinity to Mladost housing estate, along Bulgaria blvd., and Tsarigradsko shosse blvd.

## Land Use

The predominant land use in the city is for housing. There are also vast territories used for public and commercial services and open public space (big parks).



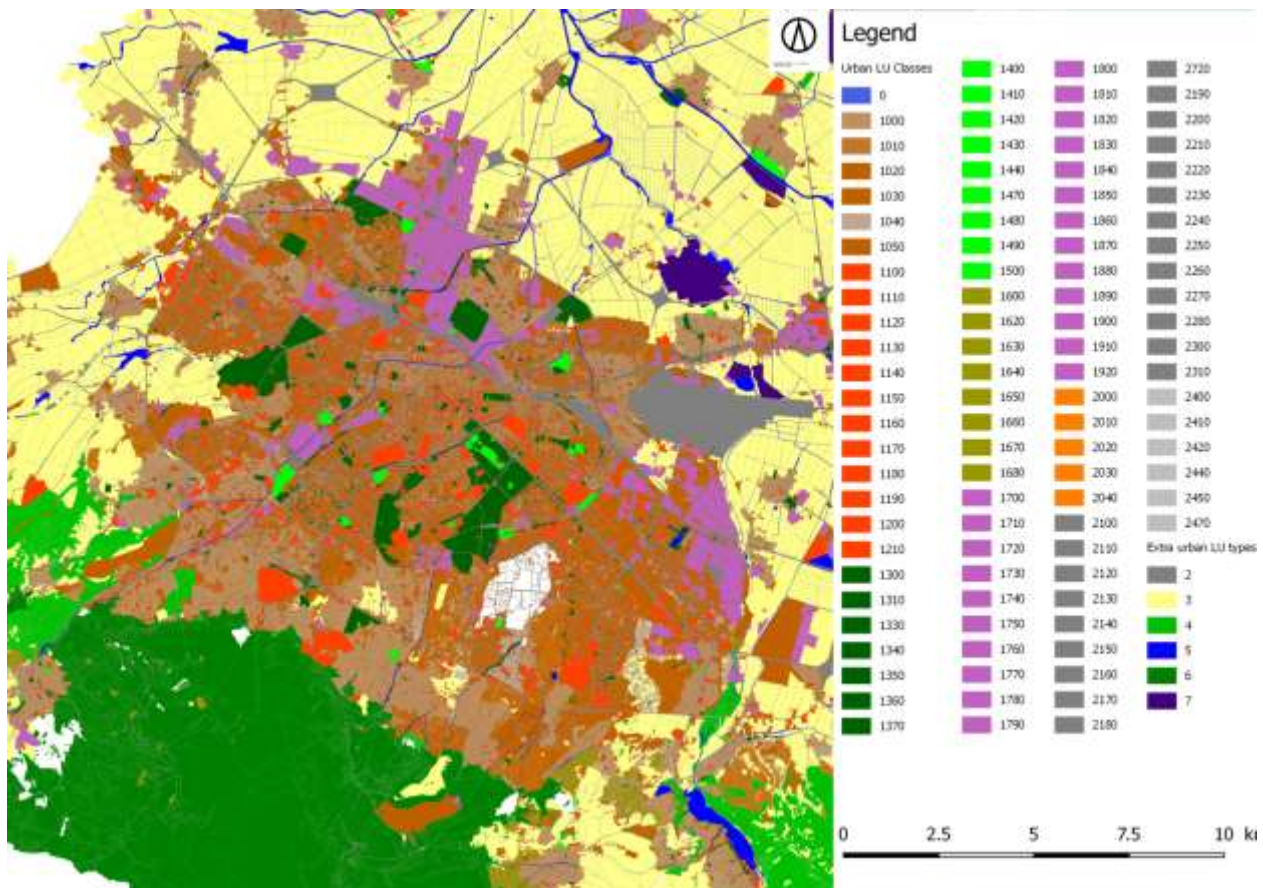


Figure 305. Predominant land use in Sofia city, Source: Geodesy, Cartography and Cadastre Agency, 2018. <https://kais.cadastre.bg/bg/Map>

Major land use changes occurred in previously industrial areas and military barracks which started to change and their functions. These brownfields were converted into commercial, leisure, service and offices areas. Among the largest areas transformed is the Sofia Tech Park (which was previously a military site the Business Park Sofia (built on green fields on the city southern borders). Since 2000 processes of intensification of low rise quarters and allotments to mid-rise and from detached to attached housing have been unlocked. Meanwhile further urbanization (mostly development of housing areas on Greenfield) has been undergoing in the southern parts of the city. Dispersion of many smaller light industries and services out of the city borders around the major roads and next to existing settlements and technical infrastructure already built could be observed.

### 3.1.4. Transportation network (urban dynamics)

#### Transportation network (and hierarchy)

Primary roads and street network are being rehabilitated and extended in relation with the TEN-T network elements. Main entrances and connections with the continental, Balkan and national networks (counter clockwise) are the boulevards Tsarigradsko shosse (south-eastern axe), Botevgradsko shosse (north-eastern axe), Lomsko shosse (north-western axe), Evropa (western axe), Tsar Boris III (south-western axe) and other city boulevards connecting the city with the towns and villages in the region and the



municipality. There are two parallel functional rings of boulevards around the historic city core and partially constructed third and fourth rings, which are crossing more densely built-up urban structures or missing in (thus penetrated by) natural environments. The capacity of the southern part of the existing circular external ring road (built before 1989), was increased a decade ago, the northern tangent has been fully constructed recently, and the eastern and western tangents are at different development phases.

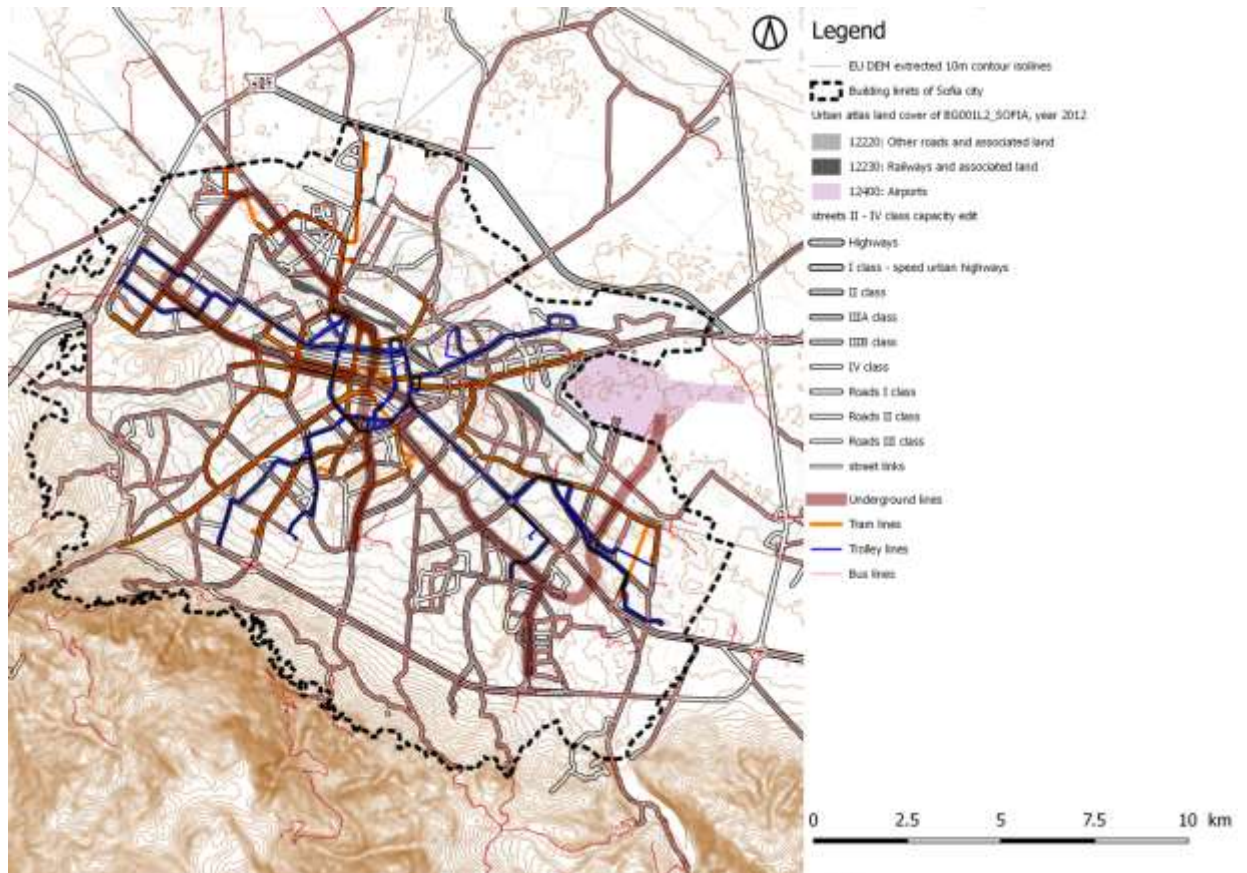


Figure 306. European Union, Copernicus Land Monitoring Service 2018, European Environment Agency (EEA); GIS Sofia, 2018; Open street map and contributors, 2019

There are various networks of public transport services – subway, tram, trolley, extensive bus lines which are well established in the older urban structures and scarce in the newly developing ones. Along with the two diameters of the subway (called ‘metro’) connecting major housing estates with the center, secondary centers and the international airport, the construction of the third one is underway. The rail (train) transport services are not well integrated with the urban public services and the railway infrastructure areas are perceived as major dividers between the southern and the northern part of the city. Many of the old secondary and underused rail lines in the city have been disassembled in the last two decades.

#### 5.2.1.4 Green structure and Biodiversity

##### Vegetation characteristics and distribution

The primary forest in the Sofia valley was dominated by the following species - *Quercus pedunculiflora*, *Quercus cerris*, *Acer campestre*, *Carpinus betulus* and *Ulmus minor*. Nowadays there are several species dominating mainly along the streets (*Aesculus hippocastanum*, *Fraxinus angustifolia*, *Acer platanoides*, *Tilia* spp., *Quercus rubra*) and city forest parks (*Carpinus betulus*, *Fraxinus angustifolia*, *Quercus rubra*, *Pinus sylvestris*) some of which were planted/afforested. A rich diversity of decorative species from the Temperate but also from the Mediterranean zones is available in the city gardens and squares. Many *Populus* spp. And *Salix* spp., *Alnus glutinosa* and others could be found in the industrial areas, and especially around the lower riparian areas.

Invasive species such as the *Ailanthus altissima*, *Robinia pseudoacacia* and others are settling around infrastructure and abandoned ruderal sites.

### Distribution of public green spaces

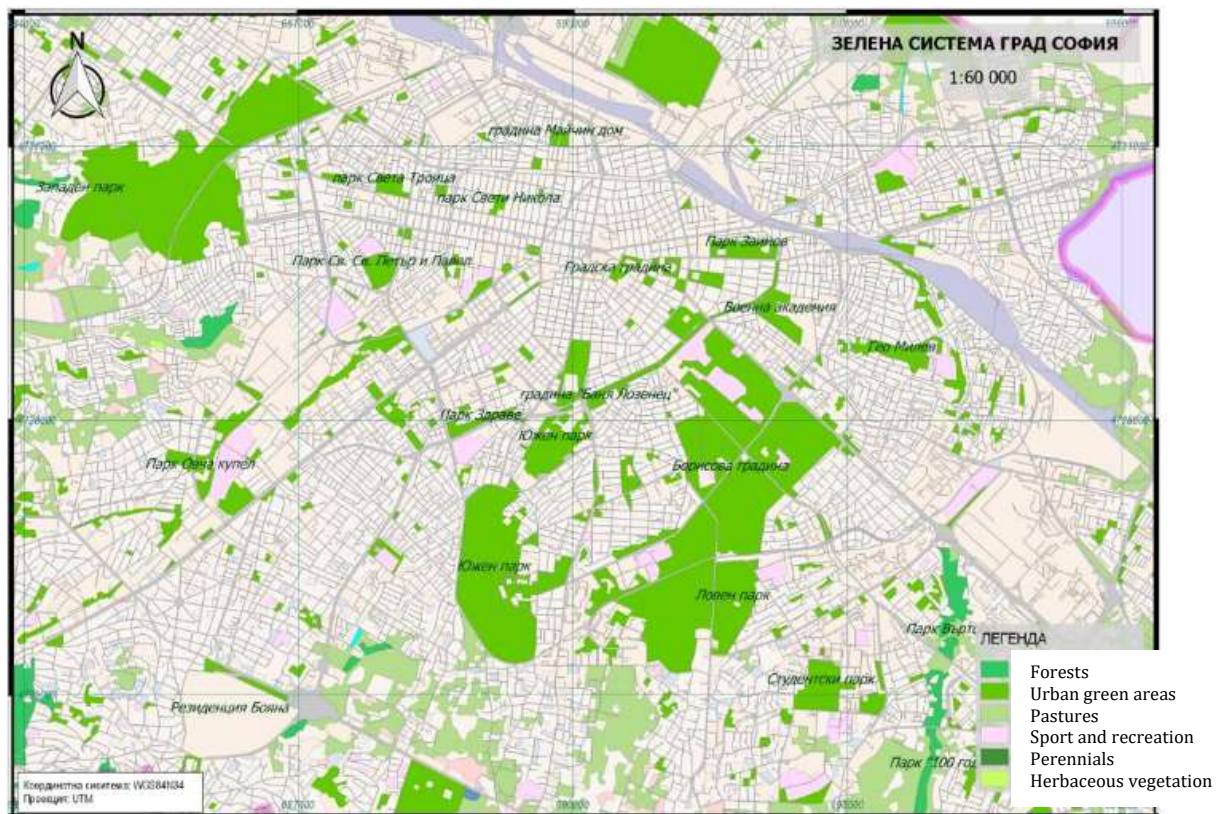


Figure 307. Green system of Sofia. Source: Burov, A., Naydenov, N. (2017) Green atlas of Sofia and the region: methodological issues and development guidelines. International Jubilee Scientific Conference "75th Anniversary of UACEG", Sofia, Bulgaria based on data from European Union, Copernicus Land Monitoring Service 2017, European Environment Agency (EEA); Open street map and contributors, 2017

Public green spaces are abundant around the green wedges of the city. There are four major city parks existing today (built before 1989) – Tsar Borisova gradina and Loven park (the oldest and biggest public green area), Yuzhen park, Zapaden park and Severen park. Other big public green areas with restricted/specific access are Park Vrana, the Botanical Garden of the Bulgarian Academy of Sciences and others.

The adjacent mountains that start at the edge of the city - Vitosha, Lyulin, Lozenska have major role as public green intensively visited at the weekends. Some of the other important features of the public green areas include: 1) The historical city centre and the "Green memory" complex of gardens and squares with abundant greenery and venerable



trees; 2) The open space in the housing estates, perceived and used as public green; 3) The green areas along the number of small rivers connecting the mountains with some of the big parks or passing around and through the housing and other areas. Today there are 48.3 m<sup>2</sup> of green areas per capita; of which 14.4 m<sup>2</sup> are "urban green areas" (parks and gardens for wide public use).

In the last 15 years, there were series of campaigns and social unrests opposing the negative effects of the restitution and privatization processes on the green system of Sofia and claiming the safeguard of neighbourhood local gardens and the structure and continuity of the city parks. The green wedges, which are crucial for the microclimate and ventilation of the city, have been gradually narrowed, especially in the southern part of Sofia. The General development plan envisages the development of new and extension of existing parks but many of these are not yet designed/implemented. Such provisions are the Vartopo Park, the extension of Severen Park, the development of the Eastern Park, and Hydropark Iskar, which is just outside the construction boundaries of the city. Recently one new district park was constructed on brownfield land near the city centre in Vazrazhdane district.

### Green infrastructure

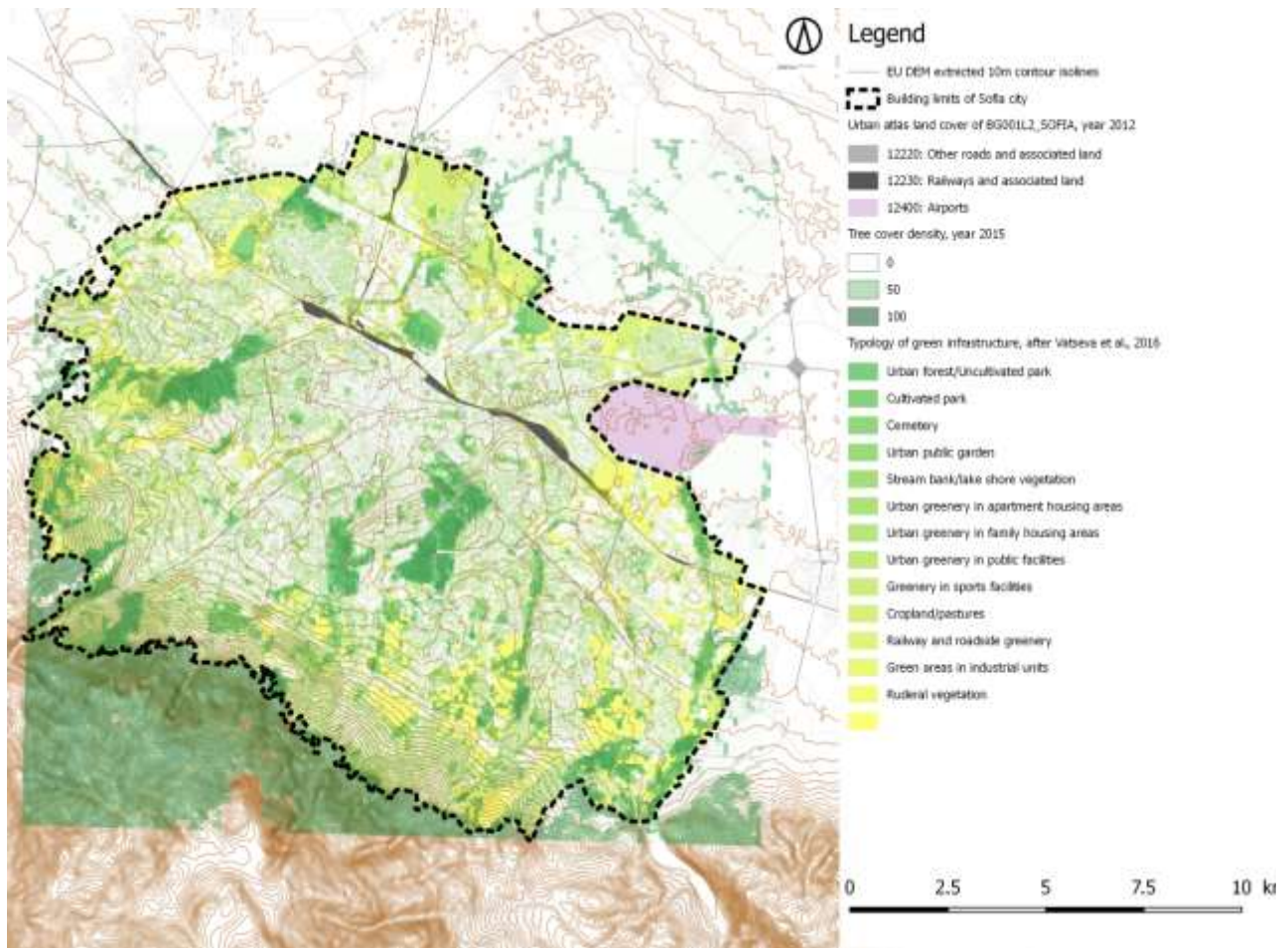


Figure 308. Typology of green areas in the city limits. Source: Naidenov, N.(2018). Oporno-sravnitelnen plan za stepenta na izpūlnenie na iziskvaniyata za ozelenyavane spryamo ustroĭstvenite zoni po Obshtiya ustroĭstven plan za teritoriyata v stroitelnite granitsi na gr. Sofiya. Stolichna obshtina, typology after Vatsveva R., et al., Mapping Urban Green Spaces based on Remote Sensing Data: Case Studies in Bulgaria and Slovakia. Proceedings, 6th International Conference on Cartography and GIS, 13-17 June 2016, Albena, Bulgaria. Eds: Bandrova T., Konecny M., 2016; European Union, Copernicus Land Monitoring Service 2018, European Environment Agency (EEA); Open street map and contributors, 2019, data from multi-spectral satellite image (scene) provided by Sentinel-2A at <https://scihub.copernicus.eu/dhus/>

## Protected areas

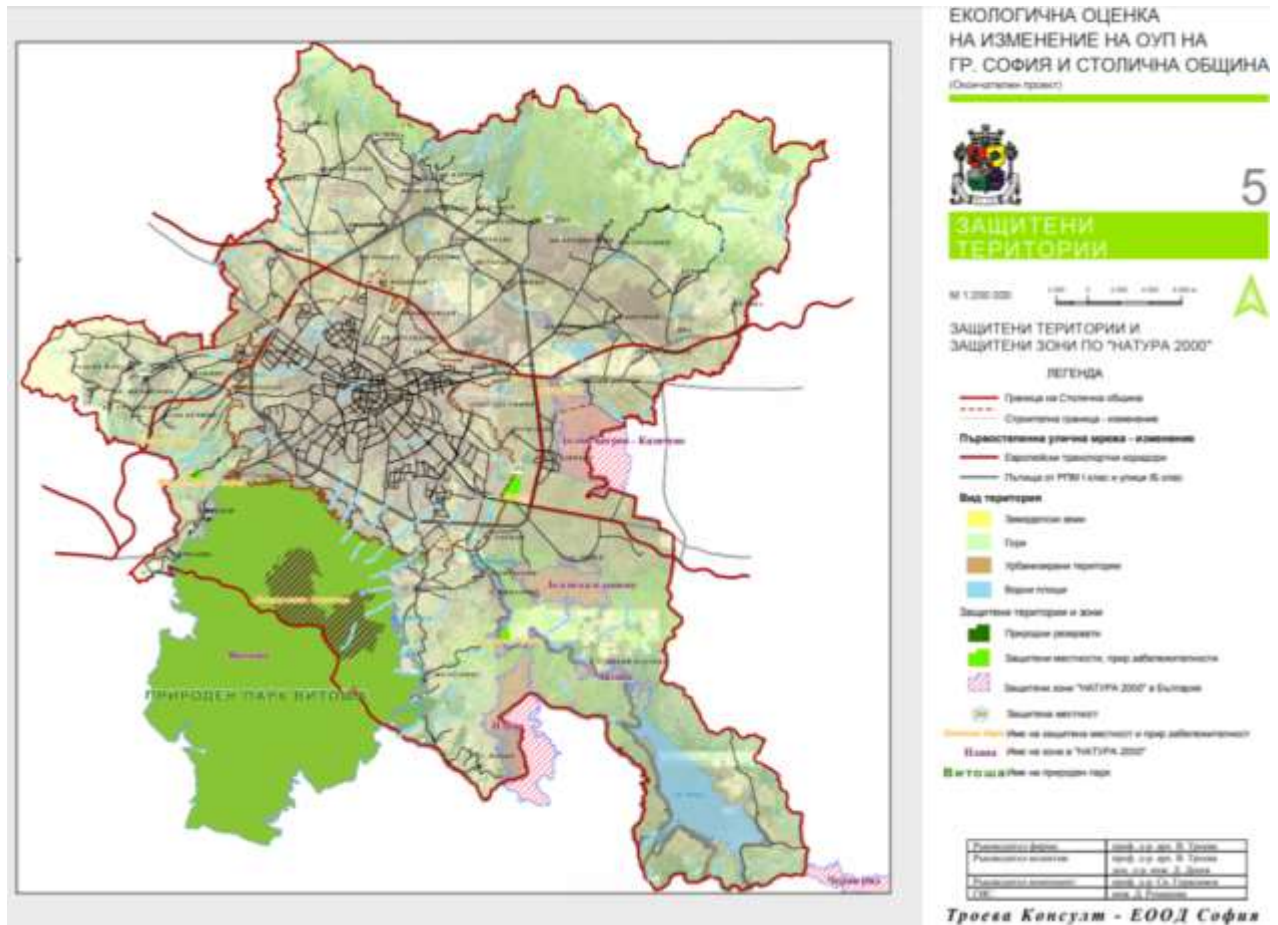


Figure 309. Protected areas and Natura 2000 sites.

Source: Troeva Consult (2009) Strategic Environmental Assessment of the General Development Plan of Sofia Municipality: [http://www.sofproect.com/OVOS\\_26052009/VOLUME\\_IV\\_schemes/5.pdf](http://www.sofproect.com/OVOS_26052009/VOLUME_IV_schemes/5.pdf)

There are various types of protected areas, including NATURA 2000 sites near the city. The biggest and most complex one is Vitosha mountain which is both Natural park and Natura 2000 site for protection of many birds and habitats. There are also several wetlands (natural and artificial – ex- and still functioning gravel and sandpits) in the northern lowest part of Sofia valley, which nowadays accommodate many birds along the Via Aristotelis migration route. Small patches of protected historical and natural landscapes can be found close to the city limits. Few sections of the rivers in Sofia valley are protected Under the Habitats directive. With very few exceptions, the major active protection activities are oriented towards the natural park Vitosha, which has its own management body (Directorate). The rest of the protected areas within the boundaries of the municipality are managed by Directorate “National Nature Protection Service” in the Ministry of Environment and Waters as well as the Regional Inspectorate of Environment and Water - Sofia. The last mentioned Institutions are responsible for the control of the activities within the territorial boundaries of these protected areas.

### Infiltration area/ground permeability

The percentage of permeability in the municipality varies from 4,35% in Pancharevo urban district to 71,27% in Oborishte urban district. The ratio in the districts which fall



completely within the construction limits of the city varies between 35 to 71 % (Vision for Sofia, 2019).

### Local policies/Actions

Most of the actions in the last decade have been focused on the improvement of the maintenance of public green through own municipal enterprise and external services. The Department “Green System” (part of the Directorate “Green system, ecology and land use” of Sofia Metropolitan Administration) is responsible for a) management and safeguarding of the green system and b) for development and monitoring of the green system and project implementation. Among the day to day activities of the department are the rehabilitation of the vegetation (as removal of ill and dangerous trees), the public works in the parks and gardens, activities related to soil and vegetation recovery, management of the public register of trees and green areas. The Department is one of the active actors organizing and implementing the Municipal Programme “Green Sofia” (funded by the Municipality’s budget), which has steadily supported bottom-up initiatives for restoration of green areas around collective housing estates in the whole city for more than 5 years. Most of the rehabilitation and recovery actions in public space and in the city parks were undertaken thanks to the availability of EU funding. In the recent years, ambitious efforts have been dedicated to the improvement of the existing tools and techniques for registration of trees over public and private property. Overall concepts about the planning, management and development of the green system and infrastructure are emerging in relation to the development of overall long term “Vision Sofia 2050” project and the development and update of framework planning instruments as The General spatial plan (the Masterplan).

The design and the implementation of plans for green infrastructure development are usually delegated to private sector agents (as design or construction companies), selected through public procurement procedure.



Figure 310. Green infrastructure small scale projects, Source: <https://maistorplus.com>



Figure 311. Green infrastructure small scale projects, Source: <http://mladost.bg>

### Articulation with European policies – commitments/goals

The key issues in the policy agenda of Sofia Municipality for the next years and the commitments in the strategic planning documents altogether with ambitions for application in the EU Green Capital award, are: a) To improve access to urban green public and private areas through: the provision of better access to existing green, improvement of green areas’ ecosystem services in terms of multifunctionality; b) To provide efficient



protection of the existing natural green in the areas under development/transformation; c) To secure the planned and regulated urban design parameters by providing funding for implementation of the designated by the Masterplan new green areas; d) To take actions in the regulation and provision of ecosystem services.

### 5.2.1.5 Water management

#### Urban water management

The urban water management is under the responsibility of the municipality but also of several ministries (Ministry of the environment and waters, Ministry of regional development and public works, Ministry of agriculture, food and forests, Ministry of energy) and their regional subsidiaries, as well as the concessionaire for water and sewage utilities 'Sofiyska voda' (In 2000, the water supply of the city of Sofia was commissioned for a period of 25 years). The water sources of drinking water for Sofia are the Iskar dam, the Beli Iskar dam, Vitosha water reservoirs and alternative water sources. Sources of conditional clean water from "Pancharevo" dam (transmitted through the north-eastern part of the city) serve the industrial areas in the eastern and south-eastern part of the city ("Gara Iskar", "Sofia-Iztok", "Sofia") and the industrial enterprises in the northern part of the city including Iliyantsi and the areas next to Lev Tolstoy and Svoboda residential areas by means of separate water supply system. In some districts of the city the rainwater runoff collection is separated from the wastewater collection, which is treated in Kubratovo wastewater treatment plant, situated to the north of the city at one of the lowest points in Sofia valley. The water supply and wastewater treatment networks have been designed with big economy in scale and they work efficiently although the arising challenges for transformation towards other alternative approaches. There has been a prolonged process of rehabilitation of the existing network, catching up with the new urban development and small resources left for innovation and experiments.

Water pricing is regulated by the State commission and because of the good availability of mountain springs in the region; the water price is relatively low in comparison to other parts of the country. The network covers more than 99% of the households and it is mostly gravity one.

#### Water availability

The total number of dwellings is 464,865, 99.2% (460,993 dwellings) of which are served by public water supply, 0.5% rely on mixed/combined water supply, 688 dwellings (0.15%) are not connected to public water supply and rely on their own water source (drilling or others), and the dwellings without any water supply are 864 (0.18%) (NSI, 2011).

Clusters and waste accumulated at certain critical points of the combined sewerage network sometimes cause clogging, which in case of stormwater events accelerate the process of demolition in existing pipes and sometimes cause structural problems. (Vision Sofia 2050, 2017) For the year 2015, the concessioner "Sofiyska voda" reports no flooding of properties, due to insufficient pipe diameter (Sofiyska voda, 2016).

#### Flooding risk

Flood risk management has been recently addressed through the relevant mapping, evaluation and management plans that were prepared for the river basins in the country in compliance of Directive 2007/60/EC of the European Parliament and of the Council on

the assessment and management of flood risks. Sofia with the flowing Iskar River and its catchment falls into the Danube river basin.

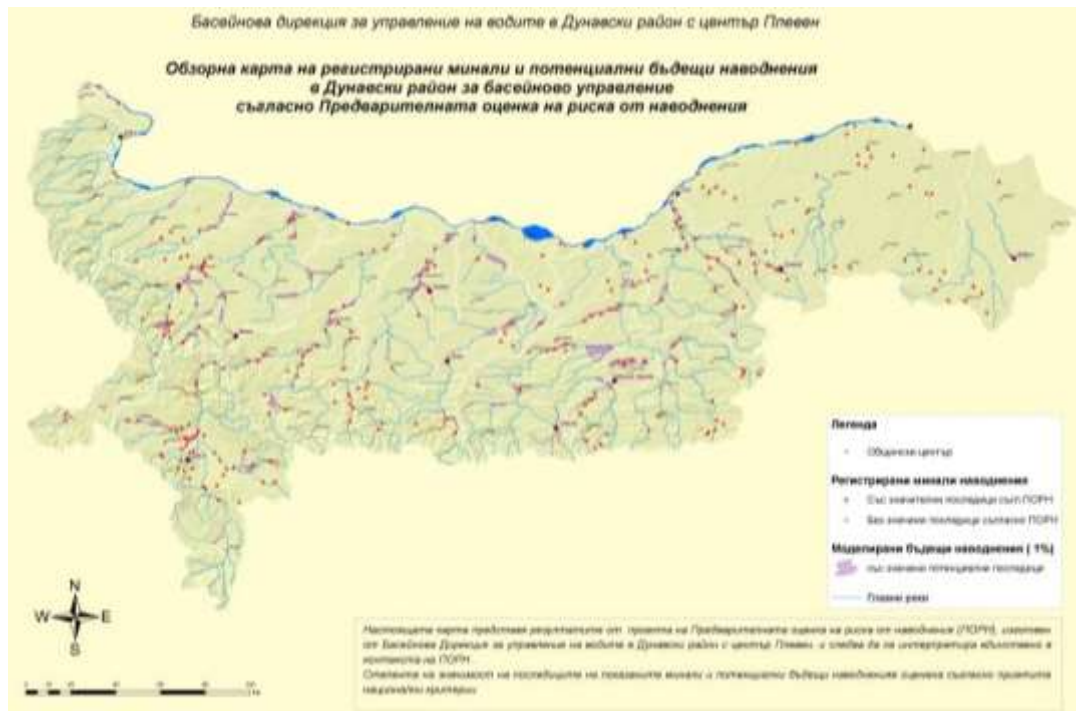


Figure 312. Basin Directorate "Danube Region". (2016). Preliminary Flood Risk Assessment in the Danube Region



Figure 313. Preliminary Flood Risk Assessment in the Danube Region - Areas with significant potential flood risk (red)

### **Droughts risk/water scarcity**

Drought has always been part of the climate cycle on the Balkan Peninsula, including Bulgaria. Due to drought and mismanagement of water resources, there was a severe water crisis in Sofia region in the period 1982-1994. Iskar dam, the main water source for Sofia, was close to depletion, water supply cuts were inaugurated, and water prices rose by more than 100%. (European Drought Centre)

On national level, drought periods are recorded (as part of the global climate cycles) in 2000, 2007 and 2011. Assessments of the drought hazard on national level give the following estimations for Sofia municipality: moderate risk of atmospheric drought, low to moderate risk of soil draught, and no risk of soil-atmospheric draught. (Knight, C. et al, 2004)

### **Water quality**

The main pollutant of surface water bodies with organic substances on the territory controlled by the Regional Inspectorate of Environment and Water - Sofia, are the sewerage systems of the settlements without built up purification facilities for water treatment. A significant share of the small settlements lack sewage networks and wastewater is most often discharged into the ground or in adjacent gullies and rivers. In the network of the settlements without sewage treatment plants production wastewater is discharged from enterprises with local wastewater treatment plants. The wastewater quality of these plants has characteristics that comply with the standards for discharge into urban sewers rather than for discharge into a surface water body. The allowed individual emission on discharge into the Iskar River is not exceeded in the recent years.

### **Local policies/ actions**

The most important and detailed document related to the development of these types of infrastructure is the Strategy for Development of the Engineering Infrastructure on the territory of Sofia Municipality - parts: water supply, sewerage, correction of river beds 2017-2025. Its territorial scope is Sofia Municipality, and the document describes the water supply, water supply and sewerage networks, the related facilities and the implemented projects for the period 2009-2016. Apart from the analytical part, the strategy provides guidance and identifies specific projects for development of water and sanitation on the territory of Sofia Municipality.

### **Articulation with European policies (commitments/goals)**

Most of the actions in the water management field in Bulgaria are preceded and transposed by EU legislation. A significant share of the EU funding for environmental improvements in Bulgaria is related to waste water treatment and other water management issues.

## **5.2.2 Social description**

This section outlines the social profile of Sofia Municipality, thus aiming to identify possible links between problems and solutions in the URBINAT NBS catalogue combinations. Given that the URBINAT project is targeting the improvement of social conditions through the creation of healthy corridors, this set of data indicate the general

and local weaknesses and threats related to the urban environment. In this perspective, the general data in this chapter are essential as they provide:

- knowledge about the social dynamics and about an urban trends, which may highlight issues arising from the historic context, climate conditions or policy orientations;
- a framework of comparison between the urban scale and the specific neighbourhood, which may show positive or negative scenarios for the URBiNAT study area.

### 5.2.2.1 Demography

#### Quantity

As of 31 December 2016, the population of Bulgaria is 7 101 859 persons thus representing 1.4% of the EU population. Compared to 2015, the country's population is decreasing by 51 925 persons or by 0.7%. The distribution of population by municipalities is not uniform. The highest number of population is in Sofia Municipality - 1 323 637 persons or 18.6% of the country's population. Male population in Sofia Municipality is 633 596 and female – 690 041, or 1 000 males correspond to 1 089 females. Males prevail among the population aged up to and around 50 years. Compared to the total number of population, the number and share of females is increasing among the elderly.

#### Gender

For Sofia Municipality the male-female ratio is 48% to 52% on average, without significant deviation by region.

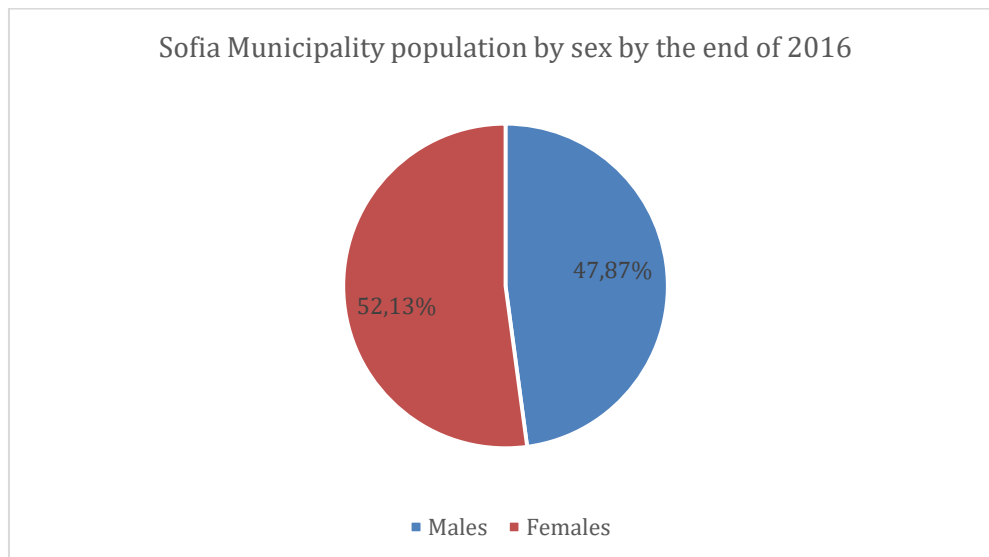


Figure 314. Population by sex in Sofia Municipality as of the end of 2016, Source: NSI



## Density

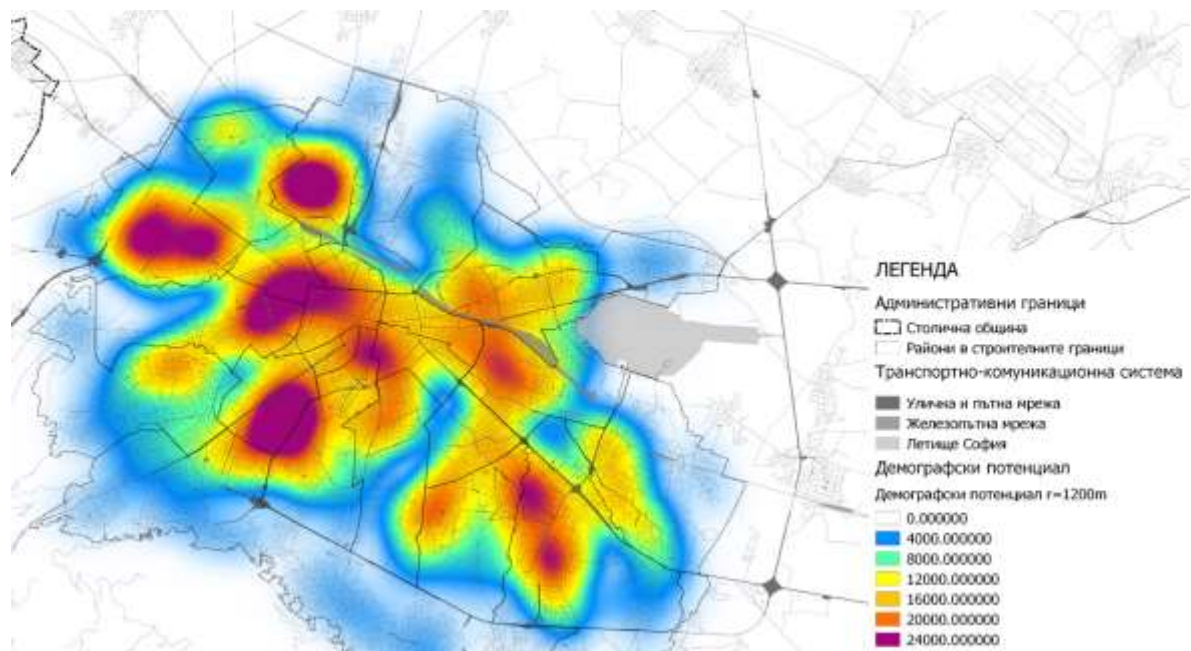


Figure 315. Territorial distribution and concentration of the population, reference “pixel” demographic potential  $R = 1200m$ , Source: Spatial analysis elaborated by UACEG team for the purposes of URBiNAT, Population data are based on 2011 Census (NSI, 2011)

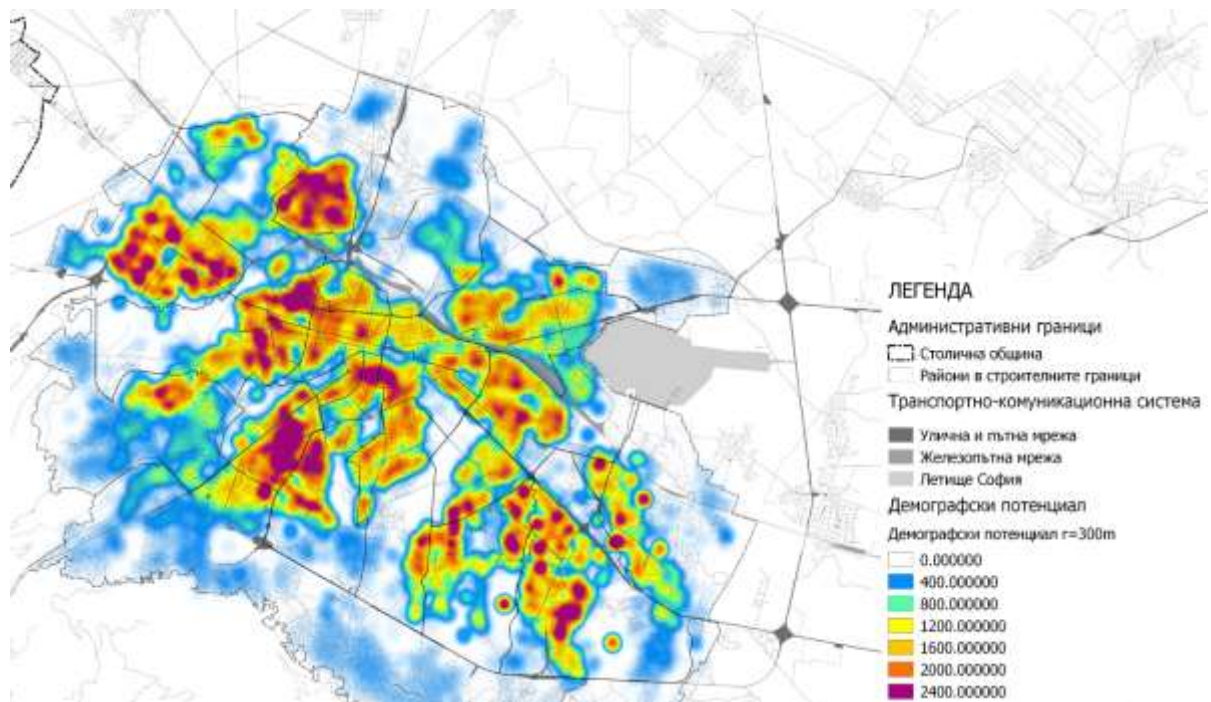


Figure 316. Territorial distribution and concentration of the population, reference “pixel” demographic potential  $R = 300m$ , Source: Spatial analysis elaborated by UACEG team for the purposes of URBiNAT, Population data are based on 2011 Census (NSI, 2011)



## Population dynamics

Table 36. Population dynamics 1985-2011. Source: NSI 2011

Population growth according to the censuses				
Census years	1985	1992	2001	2011
Bulgaria	8948649	8487317	7928901	7364570
Sofia Municipality	1201719	1190126	1170842	1291591
Sofia City	1120900	1114900	1091800	1202761

The largest country's population number is counted in the 1985 census and a population decline is reported in the subsequent censuses. There is a negative growth rate -5.44% in the period 1985-1992 (1985 is the reference year for the population growth rate calculation), and in the periods between the next two censuses the negative growth is increasing: during the period 1992-2001 it is -7.04% respectively during the period 2001-2011, it is -7.66%.

The population growth rate of Sofia Municipality suggests better figures: it is decreasing to -1.65 during the 1985 – 2011 period, whereas during the 2001-2011 period it is increasing thus reaching at 9.35%. Sofia Municipality population growth rate and Sofia City population growth rate are following similar trends for the period 1985-2011.

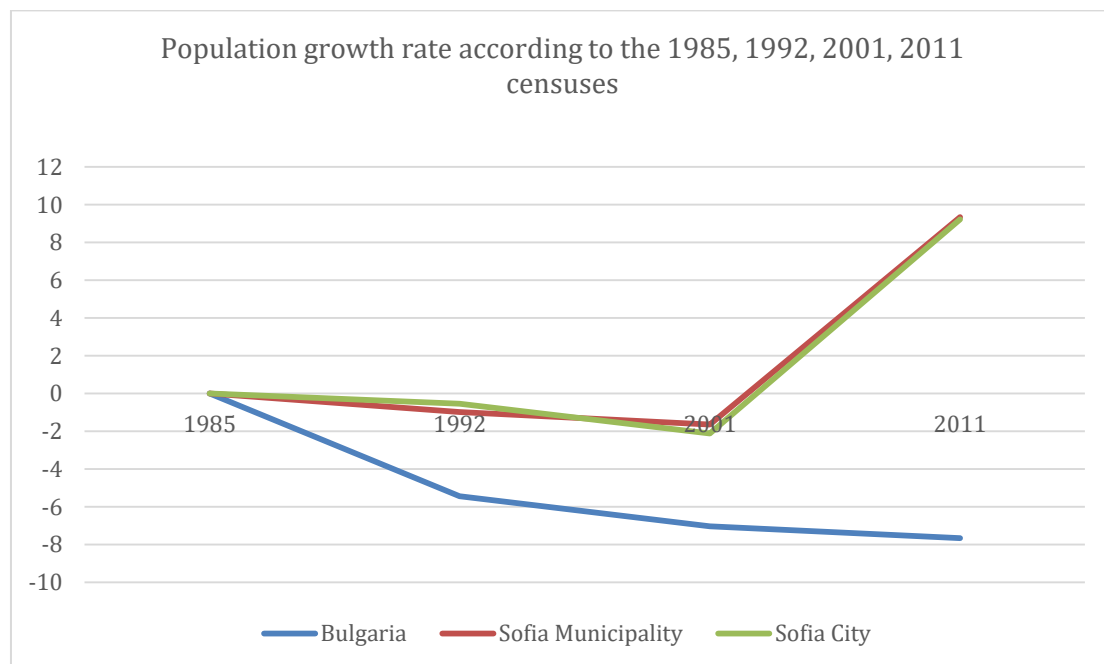


Figure 317. Population growth rate of Sofia City, Sofia Municipality, and Bulgaria for the period 1985-2011. Source: NSI

## Urban population

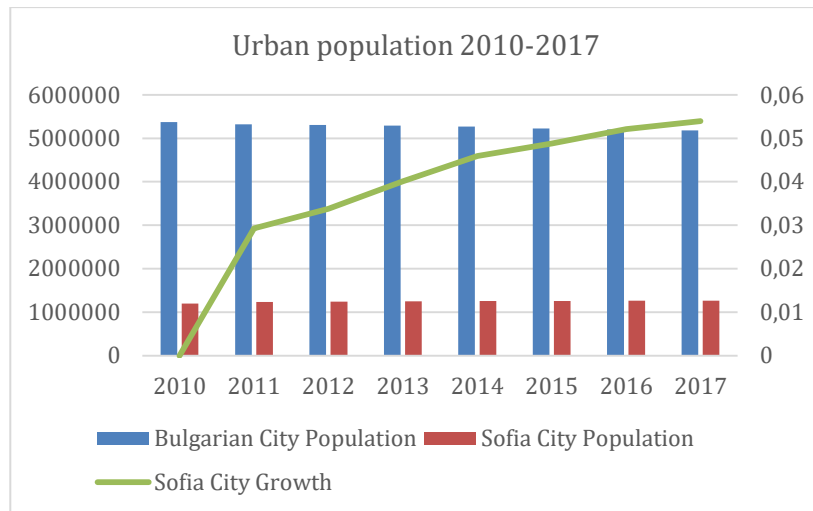


Figure 318. Urban population growth rate of Sofia City, Sofia Municipality, and Bulgaria for the period 2010-2017. Source: NSI

## Generations

The age structure of the population is a distribution of the population in the different age groups. Population age limits for breakdown by categories under, in and over working age are fixed according to the accepted instruction with Decree of Council of Ministers No. 30 (State Gazette No. 21/17.03.2000)

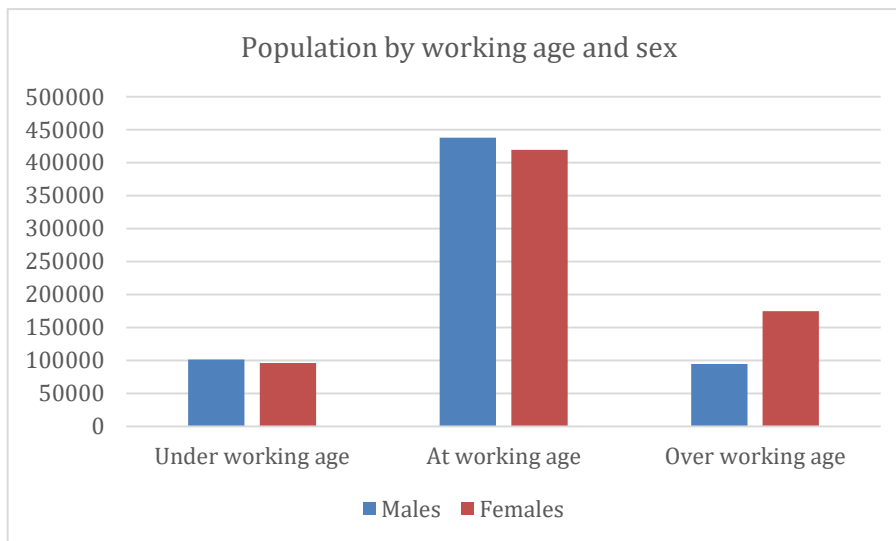


Figure 319. Population in Sofia Municipality by working age and sex as of 31 December 2017. Source: NSI

The process of population ageing continues at national level. Towards the end of 2016 the number of persons aged 65 and over is 1 472 116, or 20.7% of the country's population. Compared to 2015, the share of population aged 65 and over is increasing by 0.3 percentage points and compared to 2001 - by 3.8 percentage points.

The level of Sofia Municipality population ageing is stable. By the end of 2016 the number of persons aged 65 and over is 269186 or 20.34% of the Sofia Municipality population which is lower than the share of the population aged 65 and over by the end of 2015 (20.40%). Compared to 2011, the share of the population aged 65 and over is decreasing by 0.3 percentage points.

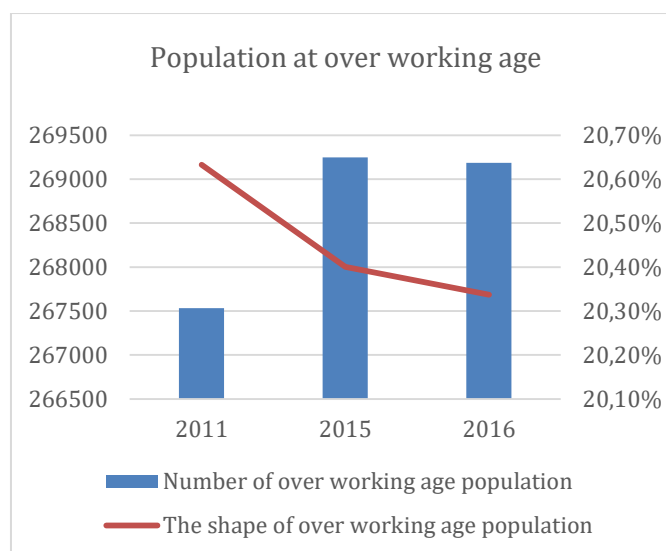


Figure 320. Population at over working age in Sofia Municipality as of 31 December 2016. Source: NSI

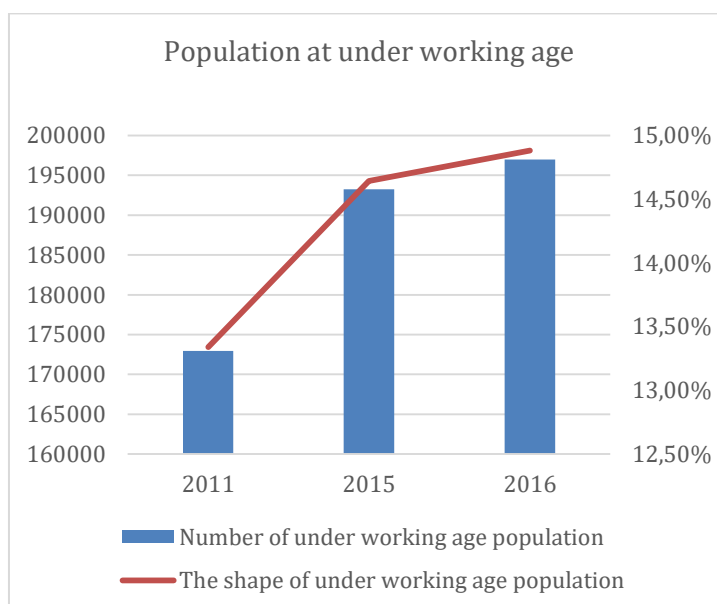


Figure 321. Population at under working age in Sofia Municipality as of 31 December 2016. Source: NSI

The number of the population under working age in Sofia municipality as of 31 december 2011, is 172958 which is 13.34% of the total population of the municipality, whereas this number as of 31 december 2016 is 196 985 or 14.88%. The share of the population under working age in the municipality is increasing by 1.54 percentage points during the period 2011-2016.

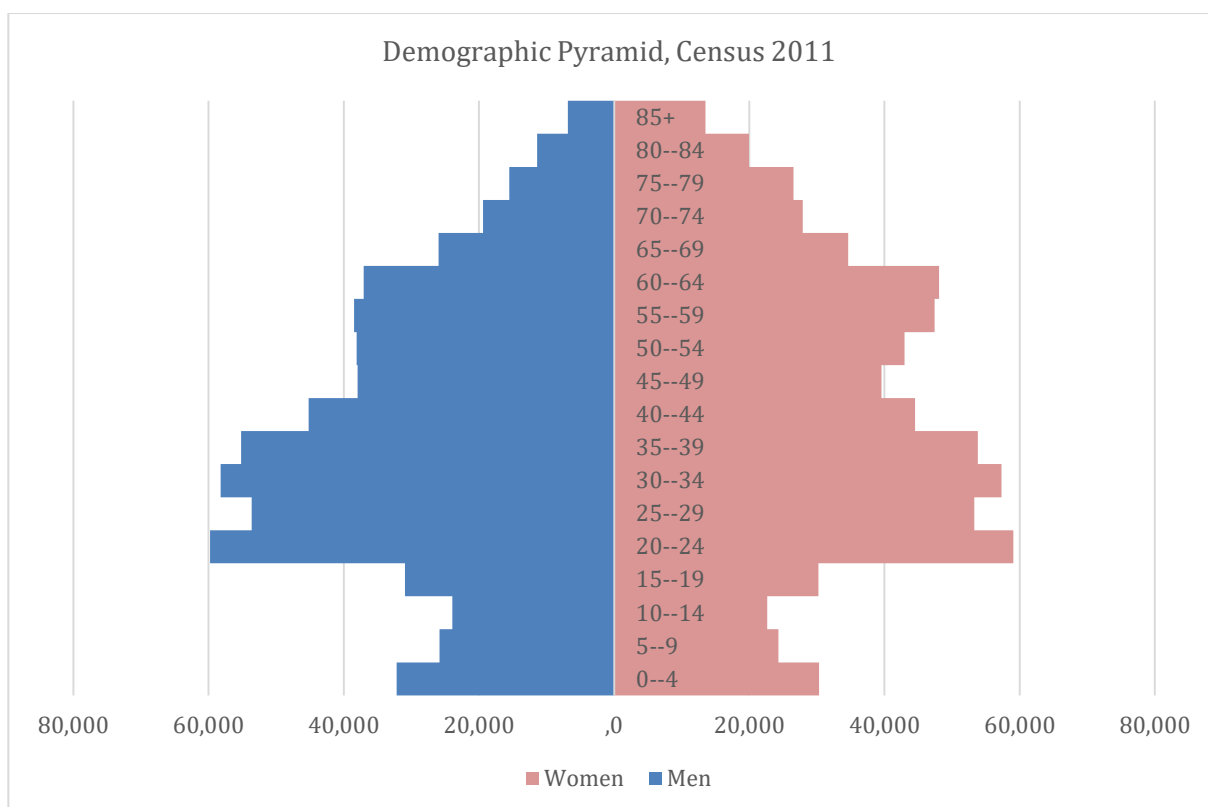


Figure 322. Demographic pyramid of the population in Sofia Municipality as of 2011 Census. Source: NSI

### Education/Literacy

Table 37. Population in Sofia city, Sofia Municipality and Bulgaria aged 7 and more by type of completed education as of 01.02.2011. Source: NSI

	Total	Tertiary education	Upper secondary education	Lower secondary education	Primary education	Uncompleted primary education	Never visited school	Children
<b>Bulgaria</b>	6891177	1348650	2990424	1591348	536686	328803	80963	14303
<b>Sofia Municipality</b>	1207983	445058	542051	134237	39308	41908	3263	2158
<b>Sofia City</b>	1124890	431576	498208	116493	34919	38674	3024	1996

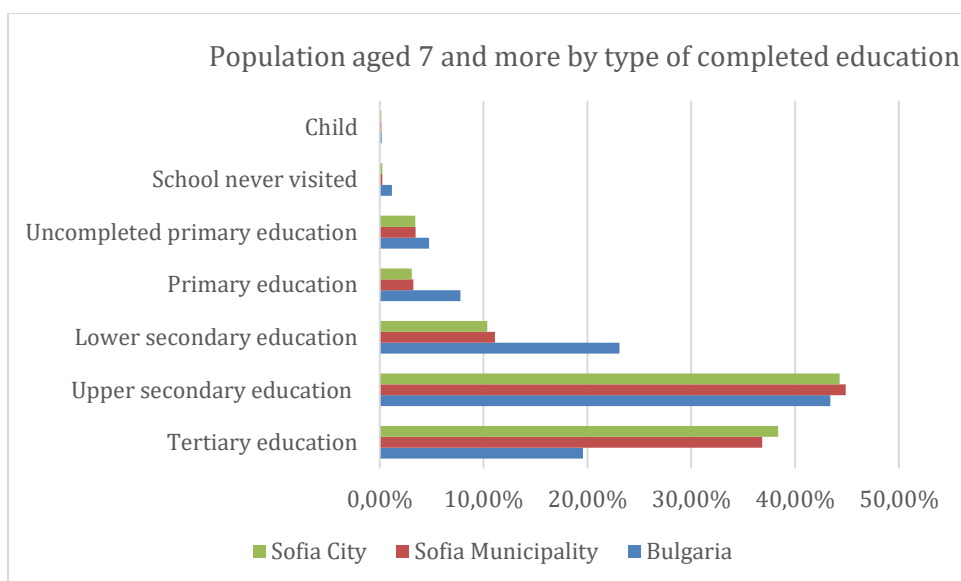


Figure 323. Population aged 7 and more in Sofia city, Sofia Municipality, and Bulgaria by type of completed education. Source: NSI, 2011 Census

According to data from 2011 census, the educational structure of the population of Sofia Municipality is in favour of residents with secondary (43%) and higher (37%) education. Compared to the country's average shares, these shares are higher. Compared to Sofia Municipality and the country's average shares, the share of the population with higher education in Sofia city is higher. The share of the population that has never attended school (0.27%) and the population that has not finished elementary school in Sofia city is significantly lower compared to the country's average (3.44%).

Table 38. Number of students by level of International standard classification of education (ISCED 2011) in 2016/2017 school year. Primary education and Lower secondary education Source: NSI

Students by level of International standard classification of education (ISCED 2011) in 2016/2017 school year							
	Primary education (I - IV grade, ISCED - 1)			Lower secondary education (V - VIII grade, ISCED - 2)			
	Total	General schools	Special schools	Total	General schools	Special schools	Vocational training classes after VI and VII grade (first level professional qualification)
<b>Bulgaria</b>	264503	263218	1285	217553	213488	1685	2380
<b>Sofia Municipality</b>	48035	47747	288	33518	33174	296	48



Table 39. Students by level of International standard classification of education (ISCED 2011) in 2016/2017 school year. Upper secondary education. Source: NSI

	Upper secondary education (IX - XIII grade, ISCED - 3)							Post secondary non-tertiary education (ISCED - 4) (fourth level professional qualification)
	Total	General schools	Special schools	Art schools and sport schools	Vocational gymnasiums (third level professional qualification)	Vocational gymnasiums and training schools (second level professional qualification)	Vocational training classes after VIII grade (first level professional qualification)	
<b>Bulgaria</b>	256009	129023	227	8134	90221	28404	1036	1261
<b>Sofia Municipality</b>	46177	28855	71	2663	13034	1554	50	481

Table 40. Number of students by level of International standard classification of education (ISCED 2011) in 2016/2017 school year. Tertiary education. No data for Doctoral/PhD degrees. Source: NSI

	Educational-qualification degree 'Professional bachelor' (ISCED - 6)	Educational-qualification degree 'Bachelor' (ISCED - 6)	Educational-qualification degree 'Master' (ISCED - 7)
<b>Bulgaria</b>	10335	155237	77627
<b>Sofia Municipality</b>	3232	60237	38035

### Ethnic groups

The major ethnic groups in Sofia City are Bulgarian, Turkish and Roma. (Table 13) The largest ethnic group, the Bulgarians, counts 1056738 persons or 96.3% of Sofia City population. The share of the Turkish people in Sofia City (0.6%) is lower than the average country share (8.8%). The situation with share of the Roma population in Sofia city is similar: 1.6% against 4.9% county's average share of Roma population.

Table 41. Population distribution by ethnic group In Sofia City, Sofia Municipality and Bulgaria as of 01.02.2011. Source: NSI

Population by ethnic group as of 01.02.2011					
	Bulgarian	Turkish	Roma	Other	Not stated
<b>Bulgaria</b>	5664624	588318	325343	49304	53391
<b>Sofia Municipality</b>	1136433	6526	18284	9848	7240
<b>Sofia City</b>	1056738	6149	17550	9569	6993

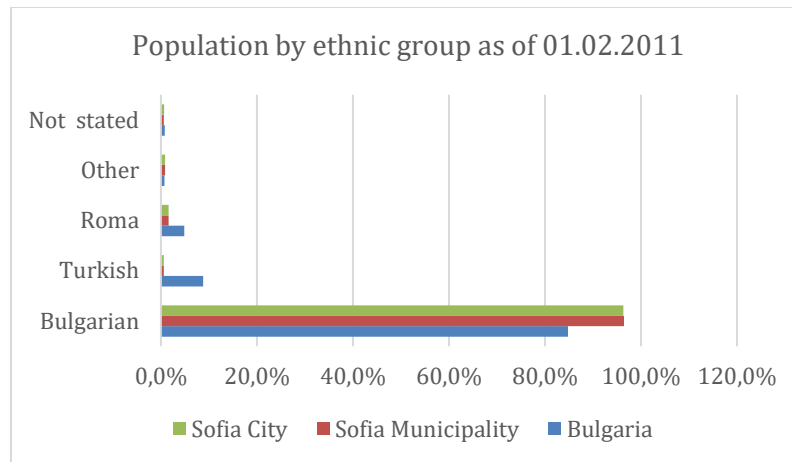


Figure 324 Population by ethnic group in Sofia City, Sofia Municipality and Bulgaria as of 01.02.2011.

Table 42. Population by education and ethnic group in Sofia Municipality as of 01.02.2011, Source: NSI

Population by education and ethnic group in Sofia Municipality as of 01.02.2011								
	Total	Tertiary education	Upper secondary education	Lower secondary education	Primary education	Uncompleted primary education	Never visited School	Child
<b>Total</b>	100%	36.80%	44.90%	11.10%	3.30%	3.50%	0.30%	0.20%
<b>Bulgarian</b>	100%	38.20%	45.30%	10.30%	2.90%	3%	0.10%	0.10%
<b>Turkish</b>	100%	21.80%	44.90%	22.70%	5.50%	4.10%	0.80%	0.20%
<b>Roma</b>	100%	1%	12.80%	40.50%	20.90%	15.20%	8.40%	1.10%
<b>Other</b>	100%	53%	37.30%	5.60%	1.50%	2.20%	0.30%	0.10%
<b>Not stated</b>	100%	23.90%	30.80%	12.60%	5.00%	25.70%	1.10%	0.90%

According to the 2011 census, the people who never visited school in Sofia municipality are 3 263 persons (0.3%), of which 47% are from the Roma population. This ethnic group of 18 284 persons or 1.6% of the population has the most unfavourable educational structure. Only 183 persons (1%) have completed higher education, persons graduated from upper secondary school are 2340 (12.8%), students graduated from lower secondary school count 7405 persons (40.5 %) and persons with primary education are 3821 (20.9%).

### Housing conditions

#### General information

Table 43. Residential buildings, dwellings, useful floor space and population in Sofia Municipality and Bulgaria as of 31.12.2016, Source: NSI

Residential buildings, dwellings, useful floor space and population as of 31.12.2016				
	Residential buildings	Dwellings	Useful space	Population
<b>Bulgaria</b>	2073445	3943989	288690003	7101859
<b>Sofia Municipality</b>	101922	609858	45215742	1323637

## Residential buildings

Table 44. Residential buildings by material of external walls of the buildings in Sofia Municipality and Bulgaria as of 31.12.2016, Source: NSI

Residential buildings by material of external walls of the buildings as of 31.12.2016					
	Total	Panel	Steel-concrete	Brick-built	Other
<b>Bulgaria</b>	2073445	21735	59290	1650530	341890
<b>Sofia Municipality</b>	101922	3466	7590	88024	2842

Table 45. Residential buildings by usage in Sofia City, Sofia Municipality, and Bulgaria as of 01.02.2011, Source: NSI

Residential buildings by usage as of 01.02.2011						
	Total	Inhabited residential building	Uninhabited residential building	Country house	Building of institutional /government household	Home for temporary accommodation of homeless
<b>Bulgaria</b>	2060745	1365228	554229	140577	694	17
<b>Sofia Municipality</b>	101696	73046	13964	14610	72	4
<b>Sofia City</b>	61365	49497	7050	4761	54	3

Table 46. Residential buildings by type as of 01.02.2011, Source: NSI

Residential buildings by type as of 1.02.2011									
	Total	Type of building							
		House	Block of flats	Mixed (over 60% living space)	Hostel	Summer house	Country house	Building of institutional household	Home for temporary accommodation of homeless
<b>Total</b>	2060745	1773216	69397	7704	408	68732	140577	694	17
<b>Sofia (stolitsa)</b>	101696	70717	15152	794	72	275	14610	72	4

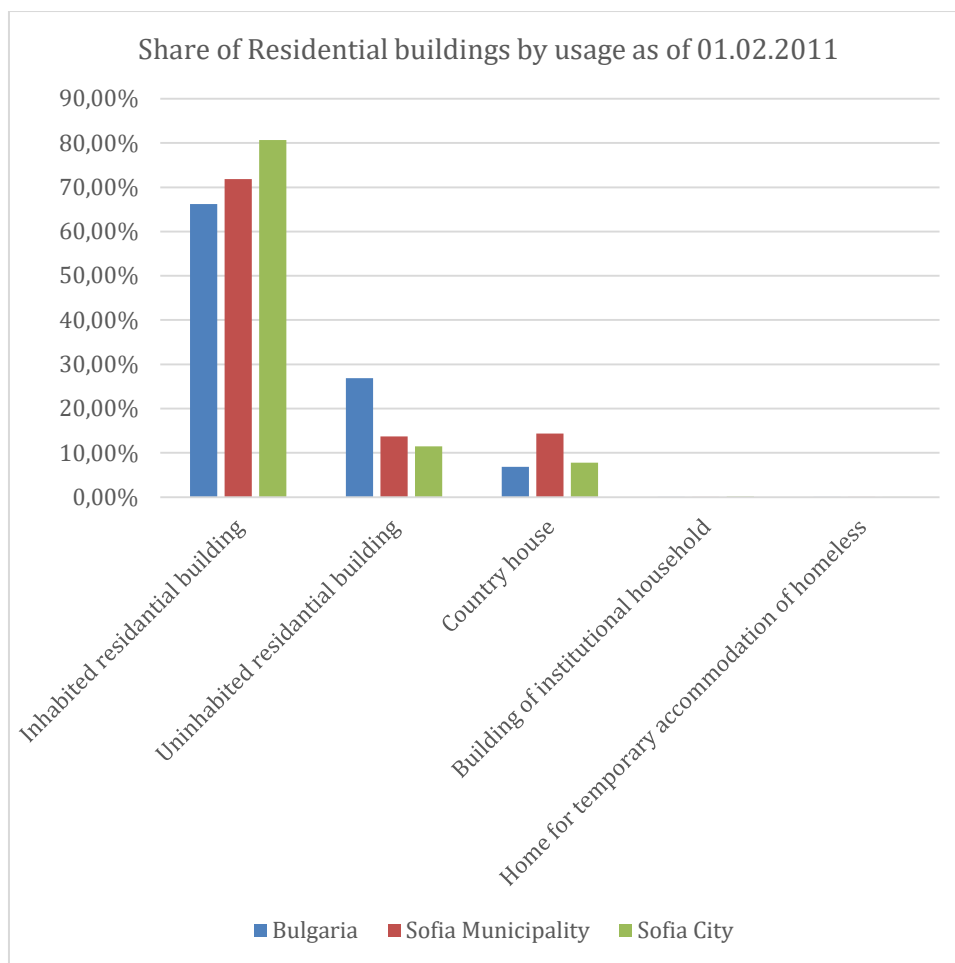


Figure 325. Share of residential buildings by usage as of 01.02.2011. Source: NSI

## Dwellings

Table 47. Dwellings by type of ownership as of 31.12.2016, Source: NSI

Dwellings by type of ownership as of 31.12.2016				
	Total	State and municipal	Private, owned by juridical persons	Private, owned by physical persons
<b>Bulgaria</b>	3943989	92553	62275	3789161
<b>Sofia Municipality</b>	609858	35007	7673	567178

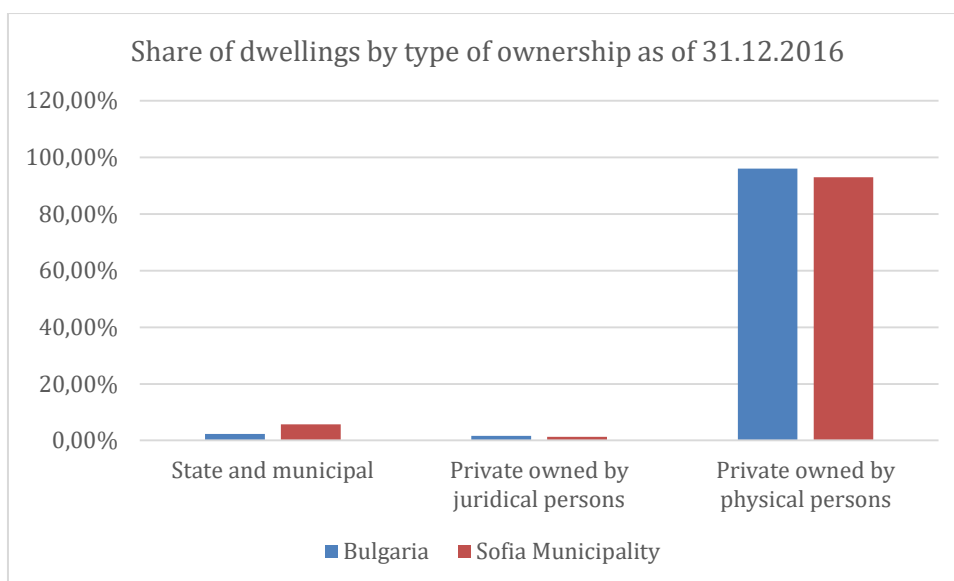


Figure 326. Share of dwellings by type of ownership as of 31.12.2016. Source: NSI

Table 48. Dwellings by year of construction as of 31.12.2016, Source: NSI

Dwellings by year of construction as of 1.02.2011									
Districts	Total	Year of construction							Unillustrated
		Until the end of 1949	From 1950 to 1959	From 1960 to 1969	From 1970 to 1979	From 1980 to 1989	From 1990 to 1999	From 2000 to 2011	
<b>Bulgaria</b>	3887149	497827	429479	666166	804807	810624	301898	372696	3652
<b>Sofia Municipality</b>	607473	39551	35265	84678	128611	158580	57916	102623	249
<b>Nadezhda District</b>	29376	992	537	7311	8209	9127	757	2437	6

Table 49. Dwellings by number of rooms as of 01.02.2011, Source: NSI

Dwellings by number of the rooms as of 1.02.2011							
Districts	Total	Number of rooms					
		One	Two	Three	Four	Five	Six and more
<b>Bulgaria</b>	3887149	353657	1266796	1296533	612867	192510	164786
<b>Sofia Municipality</b>	607473	83093	249015	207476	47166	10802	9921



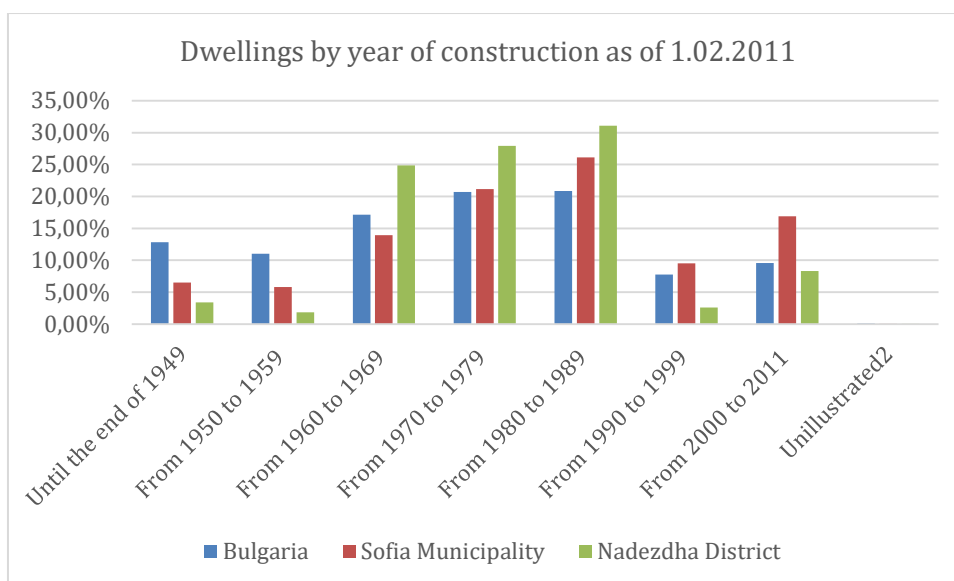


Figure 327. Share of dwellings by year of construction as of 01.02.2011. Source: NSI

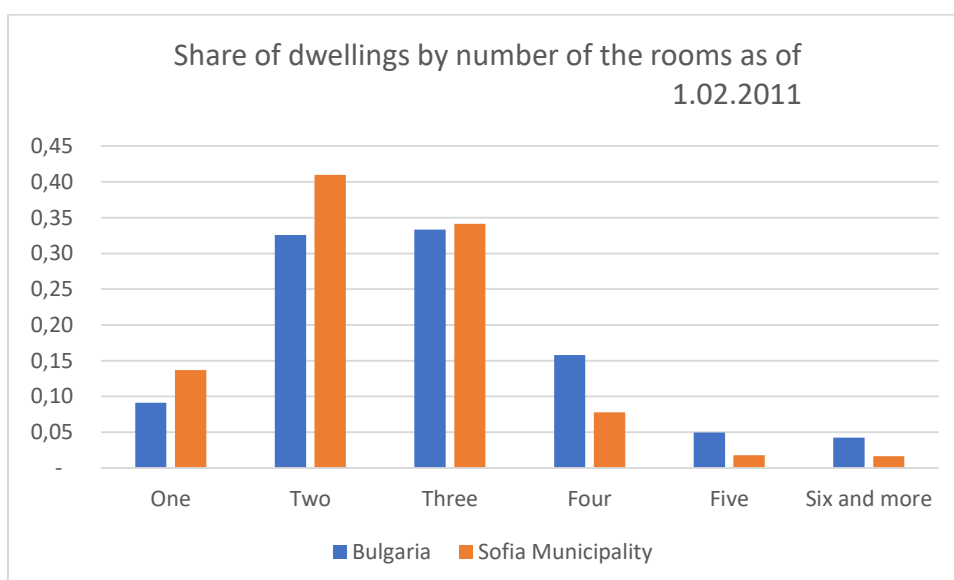


Figure 328. Share of dwellings by number of rooms in Sofia Municipality and Bulgaria as of 01.02.2011. Source: NSI

Table 50. Dwellings, rooms and useful floor space in Sofia City and Nadezhda District as of 01.02.2011, Source: NSI

Dwellings, rooms and useful floor space as of 01.02.2011						
	Dwellings	Rooms	Useful floor space		Average useful floor space per dwelling	Average living floor space per dwelling
			Total	Living floor space		
<b>Sofia City</b>	607473	1532455	44986671	33760910	74.1	55.6
<b>Nadezhda</b>	29376	67498	1990504	1456216	67.8	49.6

## Useful floor space

Table 51. Useful floor space of the dwellings in Sofia Municipality and Bulgaria as of 31.12.2016, Source: NSI

Useful floor space of the dwellings as of 31.12.2016				
	Total	Living floor space	Service floor space	Kitchens
<b>Bulgaria</b>	288690003	218881315	42703465	27105223
<b>Sofia Municipality</b>	45215742	33854409	6956092	4405241

According to the latest report on housing (Sofia Municipality, 2018), new service and/or office buildings are being constructed and replacing the residential buildings in the city centre. Many new residential buildings have been erected along with newly established service areas in the area between the city centre and the large-scale residential complexes in the periphery. The construction process in the south, southwest and southeast areas of the city are more intensive than in the other parts of the city. More warehouse and industrial than residential buildings have been built within the municipal boundaries, and on the urban fringe.

## Migration rate and migration graphs

### Internal migration

According to NSI's publication on Population and demographic process (2016), 96 014 persons changed their residence within the country in 2016. Among the migrants within the country, 44.5% are male and 55.5% - female. The highest share is for internal migrants aged 20 - 39 years (35.6%), followed by persons below 20 years of age (26.7%) and 40 - 59 years old (17.2%).

The share of 'town-to-town' flow is the highest one (44.4%), followed by the 'village-to-town' flow - 24.7% and 'town-to-village' flow (21.5%). Significantly lower is the number and share of the 'village-to - village' flow (9.4%).

Regarding the internal migrants, the number of people who migrated to Sofia Municipality is the highest - 18 397. The highest shares of migrants to Sofia Municipality are coming from the municipalities around Sofia (9.4%), and Blagoevgrad (7.0%) and Plovdiv (6.0%) districts. The lowest shares of migrants to Sofia Municipality are from Razgrad (0.9%) and Targovishte (1.0%) district.

### International migration

In 2016, 30 570 persons (50.4% of which male) changed their current address in Bulgaria with an address abroad. Every second emigrant (53.5%) is aged 20 to 39 years. The youngest emigrants (under 20 years) are 14.3% of the total number and the emigrants over 60 years of age - 8.7%. Most preferred destination countries are Germany (21.7%), the United Kingdom (15.5%), and Spain (12.1%).

Persons who changed their address abroad with an address in Bulgaria, or the immigration flow, includes Bulgarian citizens who have returned to Bulgaria and citizens of other countries granted residence permit or citizens status in Bulgaria. There are 21 241 persons who have changed their address abroad with an address in Bulgaria in 2016. Male represent 51.5% of the total number of immigrants and female - 48.5%.

Among the immigrants to Bulgaria, 33.8% are aged 20 - 39 years and 30.5% - 40 to 59 years. The youngest immigrants (under 20 years) are 16.7% and the oldest, over 60 years

of age - 18.9%. The highest share of immigrants is from Turkey (22.5%), the Russian Federation (15.3%) and Ukraine (7.4%).

There are five districts with a positive migration growth in 2016. Sofia (Municipality) - (4.4‰), Varna (2.8‰), Plovdiv (2.6‰), Burgas (0.8‰) and Kardzhali (0.1‰). The highest share of population decrease due to the negative migration growth is registered in Smolyan (-11.8‰), Vidin (-9.4‰) and Vratsa (-9.0‰) districts.

Table 52. Mechanical movement of the population in Sofia City, Sofia Municipality and Bulgaria in 2016, Source: NSI

Mechanical movement of the population in 2016									
	Immigrants			Emigrants			Migration increase		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
<b>Bulgaria</b>	117255	53688	63567	126584	58140	68444	-9329	-4452	-4877
<b>Sofia Municipality</b>	22563	11046	11517	16696	8049	8647	5867	2997	2870
<b>Sofia City</b>	20767	10177	10590	15178	7377	7801	5589	2800	2789

### Cultural rate

Table 53. Theatres in Sofia Municipality and Bulgaria in 2016, Source: NSI

Theatres in 2016							
	Theatres - in numbers	Stages - in numbers	Seats - in numbers	Performances - in numbers		Attendance - in numbers	
				Total	Per theatre	Total	Per performance
<b>Bulgaria</b>	75	106	29090	15162	202	2295343	151
<b>Sofia Municipality</b>	22	30	7047	4810	219	796695	166

About one third of the Bulgarian theatres and scenes are located in Sofia. The share of performances played in Sofia compared to all performances in the country is 31% and the attendances to the theatres in Sofia are 35% of all attending theatre performances in the country.

Table 54. Museums in Sofia Municipality and Bulgaria in 2016, Source: NSI

Museums in Sofia Municipality and Bulgaria in 2016					
	Museums -in numbers	Visits - in thousands	Exhibits - in thousands	Personnel - in numbers	
				Total	Of which: Local budget
<b>Bulgaria</b>	195	5230	7360	3150	2442
<b>Sofia Municipality</b>	25	1085	2586	715	108

There are 25 museums with 1085 visits registered in 2016 in Sofia Municipality. In 2016, the number of museum exhibits in Sofia Municipality are 2587 or 35% of all museum exhibits.

Table 55. Cinemas in Sofia Municipality and Bulgaria in 2016, Source: NSI

<b>Cinemas in 2016</b>			
	<b>Cinemas - in numbers</b>	<b>Places - in numbers</b>	<b>Attendances - in thousands</b>
<b>Bulgaria</b>	59	35467	5548.4
<b>Sofia Municipality</b>	16	17649	2856.6

In 2016, more than half of all cinema attendances in the country are in Sofia.

Table 56. Libraries with collection over 200 thousand units in Sofia Municipality and Bulgaria in 2016, Source: NSI

<b>Libraries with collection over 200 thousand units in 2016</b>				
	<b>Libraries with collection above 200 thousand</b>			
	<b>Total - in numbers</b>	<b>Library fund - in thousands</b>	<b>Readers - in thousands</b>	<b>Borrowed library fund - in thousands</b>
<b>Bulgaria</b>	47	33823	239	6816
<b>Sofia Municipality</b>	9	18868	69	2384

More than 55% of the national library fund is concentrated in Sofia due to the location of all significant libraries as the Bulgarian National Library, the Central Library of The Bulgarian Academy of Sciences and a lot of university libraries.

There is a large number of libraries with collection under 200 thousand units in Sofia Municipality. Sofia is the centre of books and pamphlets printing industry. More than 65% of the volumes are published in Sofia during 2016, including 64% of books and 76% of pamphlets.

Table 57. Books and pamphlets printed in Sofia Municipality and Bulgaria in 2016 Source: NSI

<b>Books and pamphlets printed in 2016</b>						
	<b>Books and pamphlets production</b>					
	<b>Total</b>		<b>Books</b>		<b>Pamphlets production</b>	
	<b>Titles - in numbers</b>	<b>Circulation - in thousands</b>	<b>Titles - in numbers</b>	<b>Circulation - in thousands</b>	<b>Titles - in numbers</b>	<b>Circulation - in thousands</b>
<b>Bulgaria</b>	8530	4507	7416	3475	1114	1032
<b>Sofia Municipality</b>	5585	3586	4743	2667	842	919

## Religion

According to Census 2011, the question referred to religion has received the lowest number of answers. The people who responded to this question are 5758301 or 71.8% of all respondents. Persons, who self-determined themselves as East Orthodox are 76%

from those who answered the question. Catholics were 48 945 persons (0.8%) and 64 476 were protestants (1.1%).

The people who are self-determined themselves as Moslems are 577139 persons, of which: 546 004 Moslem – sunity, 27 407 Moslem – shiity and 3 727 just Moslem. Persons that confessed other religions are 11 444 (0.2%).

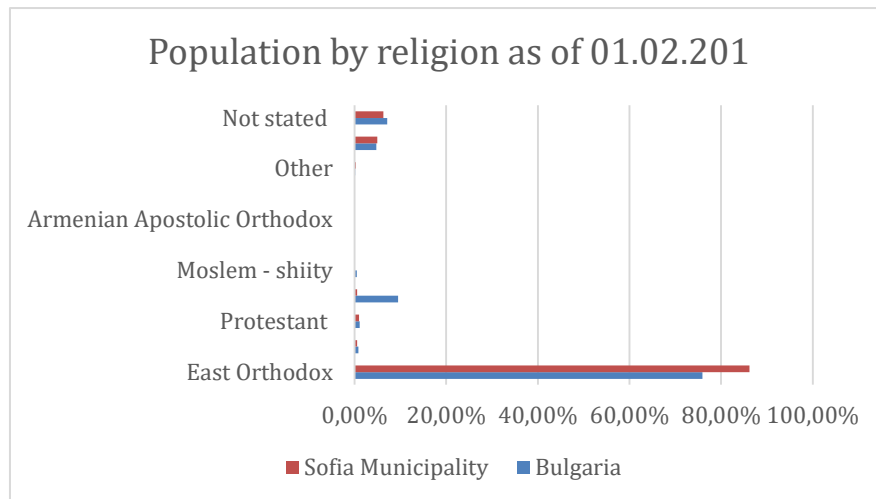


Figure 329. Population by religion in Sofia Municipality as of 01.02.2011. Source: NSI

The share of persons, who self-determine themselves as East Orthodox (86.22%) in Sofia Municipality is higher by 10 percentage points compared to the average country share. The share of persons, who were not stated or declared themselves as atheists is 11.2%.

Table 58. Population by religion and age in Sofia Municipality as of 01.02.2011, Source: NSI

Sofia Municipality population by religion and age as of 01.02.2011										
	Total	Age								
		0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 +
<b>Total</b>	1 035 176	74 019	82 035	180 252	181 854	138 102	137 807	121 993	75 425	43 689
<b>East Orthodox</b>	892 511	53 911	68 668	152 344	155 576	121 210	121 788	110 123	69 126	39 765
<b>Catholic</b>	5 572	266	355	987	1 025	823	858	655	395	208
<b>Protestant</b>	10 256	809	1 093	1 772	2 357	1 527	1 176	822	456	244
<b>Moslem - sunity</b>	5 829	381	630	1 796	1 301	921	497	182	98	23
<b>Moslem - shiity</b>	760	47	98	208	147	141	68	34	13	4
<b>Moslem</b>	178	10	13	53	40	37	18	6	..	-
<b>Armenian Apostolic Orthodox</b>	439	20	22	46	51	55	70	76	61	38
<b>Judaism</b>	482	16	19	57	70	43	75	91	39	72
<b>Other</b>	3 089	117	249	789	816	486	292	195	96	49
<b>No religion</b>	51 026	4 449	4 520	10 080	9 500	6 323	6 547	5 076	2 652	1 879
<b>Not stated</b>	65 034	13 993	6 368	12 120	10 971	6 536	6 418	4 733	2 488	1 407



## Families description

Up to 1965 till the present days, nuclear family, including two and more persons, connected by kinship or as a result of marriage/partnership or adoption is observed at Censuses. In contrast to the biologic family, covering the whole generation of the spouses, the nuclear family includes never married children, living with their parents only, no matter their age. There are three basic types of families: husband-wife family (in juridical marriage or cohabitation without marriage) without children; husband-wife family (in juridical marriage or cohabitation without marriage) with never married children and lone parent with never married children.

Table 59. Number of families and family types in Sofia Municipality and Bulgaria as of 01.03.2001 and 01.02.2011, Source: NSI

Number of Families family type as of 1.03.2001 and 01.02.2011				
Census	Bulgaria		Sofia Municipality	
	1.03.2001	1.02.2011	1.03.2001	1.02.2011
<b>Total</b>	2 369 100	2 123 224	335 931	350 442
<b>Couple without / with never married children</b>	2 079 072	1 810 441	278 343	285 547
<b>Couple without children</b>	875 853	813 995	100 326	113 700
<b>Couple with never married children</b>	1 203 219	996 446	178 017	171 847
<b>Lone parent with never married children</b>	290 028	312 783	57 588	64 895
<b>Mother with never married children</b>	240 239	251 325	49 743	55 246
<b>Father with never married children</b>	49 789	61 458	7 845	9 649

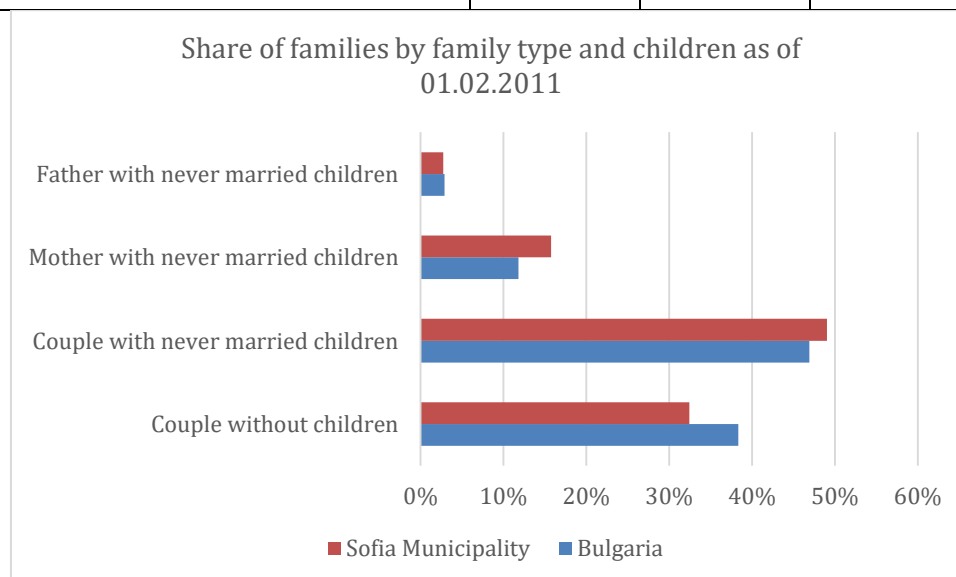


Figure 330. Share of families by family type and children in Sofia Municipality and Bulgaria as of 01.02.2011. Source: NSI

Table 60. Families by family type and children in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Families by family type and number of children as of 01.02.2011								
Family type	Families	without children	one	two	three	four	five	six and more
<b>Bulgaria</b>	<b>2123224</b>	<b>813995</b>	<b>829161</b>	<b>424051</b>	<b>41789</b>	<b>8950</b>	<b>3200</b>	<b>2078</b>
Couple without children	813995	813995	x	x	x	x	x	x

In marriage	711830	711830	x	x	x	x	x	x
In consensual union	102165	102165	x	x	x	x	x	x
Couple with never married children	996446	x	589685	360530	34530	7277	2689	1735
In marriage	808718	x	487698	297940	18969	2648	872	591
In consensual union	187728	x	101987	62590	15561	4629	1817	1144
Lone parent with never married children	312783	x	239476	63521	7259	1673	511	343
Mother with never married children	251325	x	191524	51465	6081	1491	457	307
Father with never married children	61458	x	47952	12056	1178	182	54	36
<b>Sofia Municipality</b>	<b>350442</b>	<b>113700</b>	<b>157179</b>	<b>73061</b>	<b>5499</b>	<b>703</b>	<b>178</b>	<b>122</b>
Couple without children	113700	113700	x	x	x	x	x	x
In marriage	88810	88810	x	x	x	x	x	x
In consensual union	24890	24890	x	x	x	x	x	x
Couple with never married children	171847	x	106717	60042	4379	501	126	82
In marriage	143239	x	87198	52400	3265	276	59	41
In consensual union	28608	x	19519	7642	1114	225	67	41
Lone parent with never married children	64895	x	50462	13019	1120	202	52	40
Mother with never married children	55246	x	42775	11197	1005	182	51	36
Father with never married children	9649	x	7687	1822	115	20	1	4

Table 61. Families by number of children under 18 years in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Families by number of children under 18 years as of 01.02.2011						
	Families	Families by number of children under 18 years				
		without children under 18 years	one	two	three	four and more
<b>Bulgaria</b>	2 123 224	1 367 278	478 550	239 880	27 068	10 448
<b>Sofia Municipality</b>	350 442	219 047	90 399	37 505	2 941	550

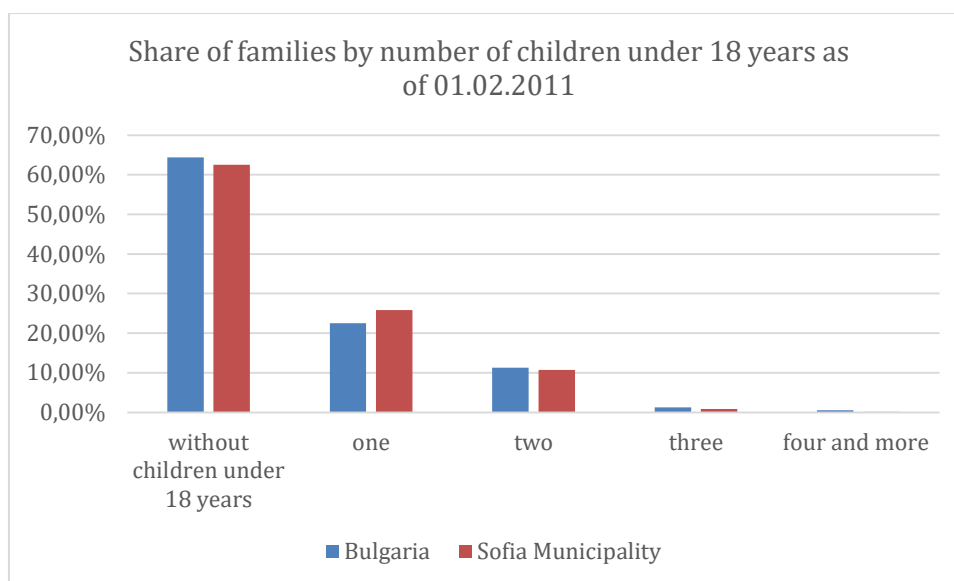


Figure 331. Share of families by number of children under 18 years in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Table 62. Number of Households and families in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Number of Households and families in Sofia Municipality and Bulgaria as of 01.02.2011						
	Households	Persons in the households	Average number of members per household	Families	Persons in the families	Average number of members per family
<b>Bulgaria</b>	3005589	7296459	2.4	2123224	5802005	2.7
<b>Sofia Municipality</b>	572510	1281208	2.2	350442	960307	2.7
<b>Sofia City</b>	538362	1193004	2.2	324903	888727	2.7

A regular household for the purpose of NSI's surveys is:

- One person living alone, having meals separately and having his/her separate budget.
- Two or more persons who live in one dwelling or part of a dwelling, having their meals together and having a common budget irrespective of the fact whether they are relatives.
- Persons who are temporarily absent are considered members of the household - children, students, as well as persons treated in hospitals, sanatoria and other health establishments.
- Persons who have left the household and have formed a new household and those who have left for an institutional housing are not members of the initial households.

Table 63. Number of households by number of persons in the household in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Households by number of persons in the households as of 01.02.2011						
	Total	One person	Two persons	Three persons	Four persons	Five persons and more
<b>Bulgaria</b>	3005589	925385	853735	606613	401517	218339
<b>Sofia Municipality</b>	572510	208998	149346	118765	71005	17340

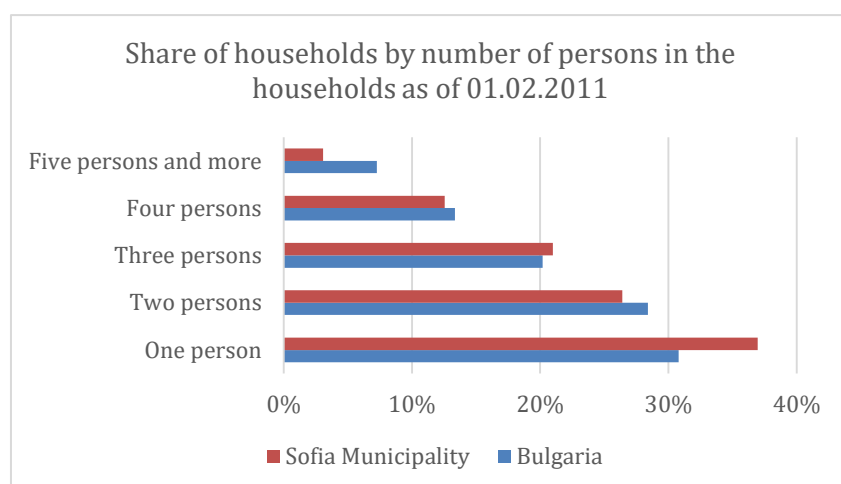


Figure 332. Share of households by number of persons in the household in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Table 64. Number of Households by number of children, persons in households and average number of persons per in Sofia Municipality and Bulgaria as of 01.02.2011, Source: NSI

Households by number of children, persons in households and average number of persons per household as of 01.02.2011										
	Total	Households by number of children							Persons in the households	average number of members per household
		Without children	One child	Two children	Three children	Four children	Five children	Six and more children		
<b>Bulgaria</b>	<b>300589</b>	<b>2302265</b>	<b>445282</b>	<b>218701</b>	<b>26812</b>	<b>7521</b>	<b>2872</b>	<b>2136</b>	<b>7296459</b>	<b>2.4</b>
Household of relatives	2050057	1351650	441817	217590	26602	7451	2838	2109	6271551	3.1
Household of relatives and non-relatives	15965	11048	3465	1111	210	70	34	27	67410	4.2
Non-relatives, not members of a family	14182	14182	x	x	x	x	x	x	32113	2.3
One-person household	925385	925385	x	x	x	x	x	x	925385	1
<b>Sofia Municipality</b>	<b>572510</b>	<b>448294</b>	<b>86028</b>	<b>34689</b>	<b>2814</b>	<b>450</b>	<b>134</b>	<b>101</b>	<b>1281208</b>	<b>2.2</b>
Household of relatives	350830	227608	85285	34479	2788	440	131	99	1036238	3
Household of relatives and non-relatives	3795	2801	743	210	26	10	3	2	15490	4.1
Non-relatives, not members of a family	8887	8887	x	x	x	x	x	x	20482	2.3
One-person household	208998	208998	x	x	x	x	x	x	208998	1

## 5.2.2.2 Safety and health

### Health and well-being rate

Based on published data from a survey on the quality of life in Sofia and Sofia Municipality (Vision Sofia 2050, 2019), the following conclusions about the perception of health and satisfaction with the quality of living in Sofia can be cited:

*“34% of the citizens of Sofia are totally satisfied with their health condition. Another 45% are partially satisfied. On the opposite pole, one fifth of the capital's population is more critical in the assessment of the current personal health status (17% - partly dissatisfied and 3% - completely unsatisfied). It is more likely that among this second group of respondents there are less well-off citizens who are also willing to benefit from various types of medical care and clinical and laboratory health services. The same group gives lower grades when asked to assess the healthcare services at district level and for Sofia as a whole.”*

### Causes of death

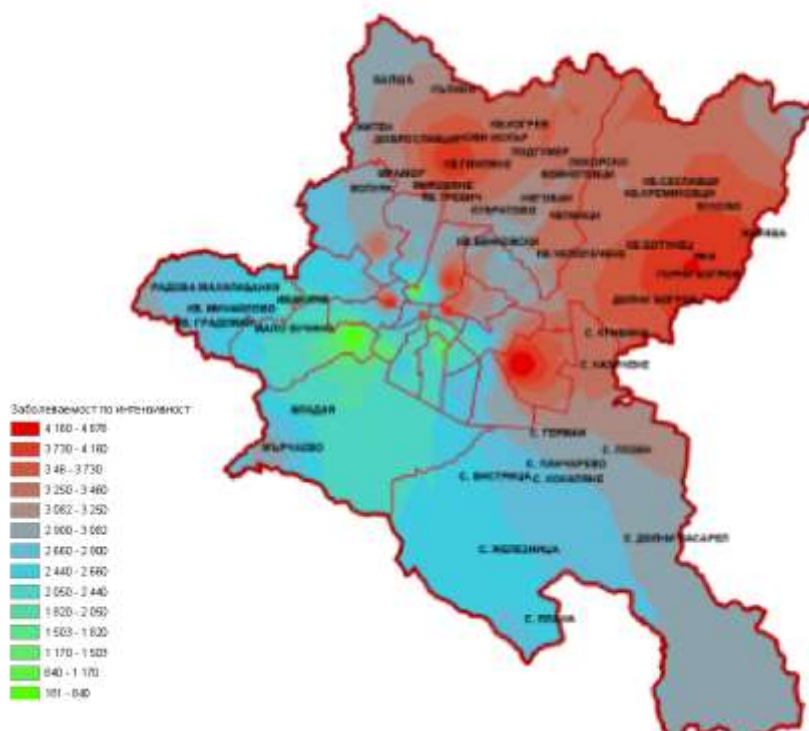


Figure 333. Health status - intensity, Source: EIA of The Amendments of the General Development plan of Sofia (2009), scheme elaborated in 2003 with data before 2000, when still some of the heavy industry enterprises and mine works were in operation

Mortality and causes of death are described in the paragraph hereafter (Vision for Sofia, 2018):

*“The mortality rate during 2015 is 11.8 in the urban areas and 14.2 in the rural areas of Sofia. Compared to 2008 data, mortality rates have decreased both in urban areas of Sofia - from 12.1 to 11.8, and in rural areas - from 14.3 to 14.2. The city of Sofia records the*



*lowest mortality rate in the country, comparable to the values only in areas like Kardzhali and Varna."*

*"The statistics about deaths by sex and administrative regions(districts) in the capital show relatively stable trends of the death rate in the period 2010-2016 - about 15 000 per year. In Sofia, excessive number of male deaths is still observed, although the death rates of men and women are not as pronounced as in other parts of the country - in 2016, men's deaths are 1204.9 per 100,000, and women's deaths - 1146.5."*

"On the causes of death, statistics show relatively stable trends for the period 2010-2016.

The leading causes of death are diseases of the circulatory organs (cardio-vascular diseases) - the figures of these diseases are 753.0 / 100 000 people (ischemic heart disease - 118.4, other forms of ischemic disease - 83.8, other heart diseases - 392.8, cerebrovascular diseases - 126.0, other diseases of the blood circulation - 115.8). Contrary to trends across the country, in Sofia women die from these diseases comparatively more often than men, with differences in values mostly coming from the greater incidence of diseases in the category "other heart diseases" - 373.5 (116.1 males versus 135.1 in women) and other circulatory diseases (99.8 males versus 130.4 in females). The changes in numbers and share since the beginning of the 2010 period are minimal, while in 2010 these diseases occurred less frequently among men than among women.

Second significant cause of death in terms of frequency among the causes of deaths are the neoplasms. In 2016, the mortality rate decreased to 186.0, for the first time after a prolonged period between 2011 and 2015, when the figures did not fall below 200 cases per 100,000 people. Contrary to trends in vascular diseases, in Sofia the mortality rate among men due to neoplasms is significantly higher than that among women - 202.9 vs. 170.9, and this trend is sustained throughout the 2010-2016 period.

Diseases of the respiratory system rank as third in terms of cause of death in the capital. In 2016, the mortality rate is therefore 62.9 cases / 100,000 people, the highest value in the period discussed, most of them moving around 30-31 cases per 100,000. There is a pronounced gender gap in the values of this cause of death throughout the period - in 2016 men have 71.5 cases versus 55.1 for women."

## **Reproductive health**

### **Fertility**

In Bulgaria there are 65 446 children born in 2016, of which 64 984 (99.3%) live born. The number of live births is decreasing by 966 children or 1.5% compared to the previous year. The crude birth rate (Number of live born children per 1 000 persons of the average annual population during the year) in 2016 is 9.1‰, compared to 9.2‰ in 2015. The number of children born in 2016 in Sofia Municipality is 13489, of which 6977 males and 6512 females. The Sofia Municipality crude birth rate is 10.2 ‰ and there is just one more Bulgarian municipality with higher crude birth rate - Sliven where municipality crude birth rate is 12.2 ‰.

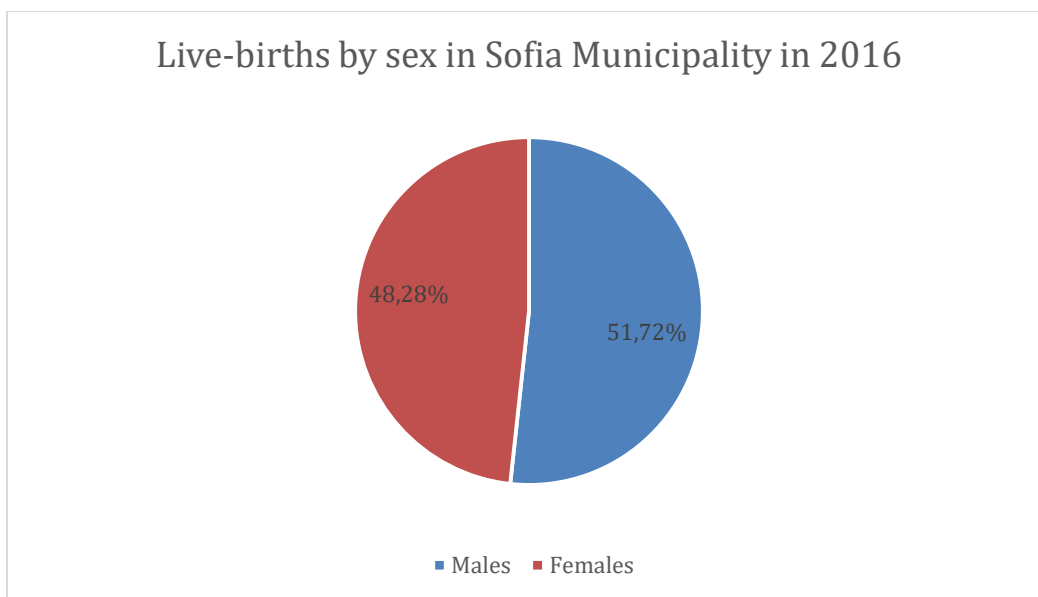


Figure 334. Live-births by sex in Sofia municipality, Source: NSI

The “People” report from the 2nd step of the Vision Sofia 2050 outlines the following figures about the causes of death from diseases of the genitourinary system:

- Sofia District 2008 and 2015 - 28.2 per 100 000 and 37.5 per 100 000
- Sofia city 2008 and 2015 - 17.2 per 100 000 and 18.1 per 100 000

In terms of illnesses, there is a high incidence of malignant neoplasms of:

- the mammary gland in women, with Sofia values - 932.5 / 100 000 - being considerably higher than the national average - 719.1; there is also a trend towards an increase in the incidence of reported cases of this disease - from 803.7 in 2008 to 932.5 / 100,000 in 2015;
- a higher frequency than the average for the country are observed in the diseases of the male genital organs - in Sofia they are 719.1 / 100 000, the average for the country is 563.4. The monitoring of the data from the period 2008 - 2015 shows that there is a dramatic increase in the incidence of this type of illness in Sofia - in 2008 the registered diseases were 534.0.

Every fifth young person under the age of 29 has a child, of which persons with one child are 13 %, and persons with two children - 6 %. The desired family model today corresponds to the traditional Bulgarian family with two children - 59%, every fifth person states that he/she would like to have one child (21%) and for 13% of the respondents three children are the best option.

### Health services

A detailed picture of the health services, including hospitals, health specialists, etc. is described as follows (Vision Sofia 2050, 2018):

*“In Sofia there were 68 hospitals with 10,045 beds and 412 outpatient care institutions (of which 220 are medical-diagnostic and medical-technical laboratories) in 2015. In the period 2008-2015 there was an increase in the number of hospitals, in 2008 they were 61 with 9315 beds, with the general hospitals increasing from 15 to 25; hospitals for outpatient care were 271 in 2008 (101 medical-diagnostic and medical-technical laboratories).”*

*“Sofia has a higher index with beds than the average for the country - the average for the country is 63.5 beds per 10 000 people, for Sofia this indicator is 75.4 or 9950 beds. Compared to 2008, this indicator has been improved by adding around 1000 beds to the number of 8975, or 72.0 per 10,000. Although Sofia has always had higher than average values over the eight-year period 2008-2015, the current highs come after a short decline in the number of beds in 2011 and 2012 to 70.5 / 10 000 - probably due to the restructuring of hospitals in the area, as well as or insofar as its release a few relatively large private hospitals at the end of the period. Another characteristic change for the period is the almost complete disappearance of the "curing and long-term treatment" beds, which in 2013 fall from more than 11.1 per 10 000 to 1.3, a trend common for healthcare establishments across the country.”*

*“For the country, the provision of pediatric beds is 3.2 per 10 000 people, in Sofia this indicator is almost double lower - 1.8 per 10 000. The provision of beds for treatment of internal diseases is also slightly lower than the average for the country - 2.4 vs. 3.4 / 10 000. Sofia's assurance of almost all other significant diseases is higher or significantly higher than the average for the country.”*

*“In 2015 there are 6485 doctors in total, including 187 specialists in internal diseases, 362 specialists in cardiology, 114 specialists in pneumatology and phthisiology, 268 pediatricians, 350 surgeons, 241 orthopedists and traumatologists, 113 specialists in urology, 390 obstetricians and gynecologists, 220 specialists in ocular diseases, 140 specialists in ears, nose, throat, 272 specialists in nerve diseases, 96 psychiatrists, 115 specialists in skin and venereal diseases, 217 specialists in imaging diagnostics, 102 physicians and rehabilitation specialists medicine, 150 clinical laboratories, 3,116 specialists in other fields, of which 838 general practitioners.”*

*“Between 2008 and 2015, the number of doctors in Sofia has grown by about 500 people. The number of almost all specialists has grown, drops are observed only in statistics for internal medicine specialists - which have dropped by almost half from 306 to 187 - and paediatricians - have dropped from 286 to 268.*

*Dentists in Sofia in 2015 are 1838. Since 2008, their number has grown from 293 to 1545.*

*The medical specialists in Sofia in 2015 are 10 052, among which: 116 paramedics, 825 midwives, 6436 nurses, 1436 technicians, 551 dental technicians, and 688 in the group "other" health care professionals. The number of medical specialists in 2008 was 9562. During the eight years period their number has increased by 490 people, with more significant changes in the number of paramedics - from 47 to 116, and dental technicians - from 280 to 551.”*

*“The availability of doctors in Sofia, measured by the number of doctors per 10,000 people, is 49.1/ 10 000 in 2015 which is higher than the country's average (40.6/10 000). The value of this indicator in Sofia is the highest for the whole country, only Plovdiv (48.1), Varna (46.9) and Stara Zagora (44.0 / 10 000) provide close values. Since 2008, this indicator has been improved - from 47.8 to 49.1, falling between 2009 and 2012 when its value dropped to 44.1.”*

*“Dentists' availability in Sofia, measured by the number of dentists per 10,000 of the population, is also higher in 2015 than the average for the country - 13.9 vs. 10.5. By this indicator, Sofia ranks second in the country after Plovdiv, where there are 16.6 dental specialists per 10 000 of the population; similar to Sofia are the values in Smolyan (12.8), Pernik (12.5), Varna (12.0). In the period 2008-2015, this indicator has been improved from 12.4, going through the same period of temporary decline 2009-2012.”*

*“The availability of medical specialists in Sofia in 2015, measured by the number of medical specialists per 10 000 of the population, is again higher than the average for the*

*country - 76.2 compared to 66.3, the nursing provision is 48.8 compared to 43.9. According to this indicator, Sofia ranks second after Pleven, where there are 82.9 medical specialists per 10 000 and the values are similar in Gabrovo (76.1), Stara Zagora (73.4), Vratsa (73.0). By number of nurses Sofia again ranks second after Pleven (55.4 / 10 000), Vratsa (51.6), and Stara Zagora (50.7). In the period 2008 to 2015 for Sofia this indicator remained almost unchanged. An exception to this is the nursing index, which shows quite dynamic values over the years - relatively sensitive drops and recoveries, and a slight negative downward trend in the number of nurses has been observed since 2013 - at 52.4 / 10,000 in 2013 2014 - 49.6 and finally in 2015 - 48.8."*

### **Safety and criminality**

On the territory of the city of Sofia in 2015, 86 children were victims of violence, including domestic violence - 3; physical violence - 61; sexual violence - 7; and other types of violence - 15. (SMDI, 2015). Other 198 children were victims of crime in 2015. According to the Regional Social Assistance Directorate in 2015 there were no registered children, victims of trafficking in Sofia and the number of registered homeless children was 25.

The number of children in conflict with the law and anti-social acts in 2015 for the different groups at risk was: juvenile offenders registered in Children's Pedagogical Room - 70; juvenile offenders registered in Children's Pedagogical Room - 64; minors who committed crimes - 294.

In 2014, 7% of the young people were subjected to crime. The share of young people detained in the police during the 2013 insignificant - 1.9 %. About 9 % worry and carry with them self-defense devices when they get late in the evening. The number of women, victims of violence and trafficking for 2015, is 78 and the total number of women victims of violence is 151. (SMDI, 2015)

The results of the survey show that young people in the metropolitan schools are significantly more likely to become victims of drug traffickers than pupils in other settlements. The annual report for 2015 of the National Focal Point for Drugs and Drug Addictions mentions a methadone program that serves over 1,500 clients/addicted. Indirectly, these data provide an insight about the scale of heroin addicts in Sofia.

The Crisis centre for children victims of violence for Sofia Municipality can shelter 22 children and is located in "Nadezhda" housing estate (address "Svobodna" Street №30). The Centre provides adequate conditions and environment for raising and educating children aged 3 - 18 who have experienced different types of violence inside or outside the family. The Centre is managed by the Children and Adolescents Association.

The number of persons leaving prison facilities and persons sentenced to probation in 2015 was 1045.

Almost 91% of all crimes for 2017 are criminal and 9% economic. Larger share of the economic ones was observed in the 4th Precinct Police Department (PPD) (12%), serving the Triaditsa and Lozenets regions. The largest share of registered crimes is within the boundaries of 6th and 1st PPD, while the largest share of crimes per 100 people is registered in 1st and 4th PPD. Among the major types of crimes, thefts account for 50%, followed by drug possession (9%) and misappropriation of vehicles (5%). (Capital.bg, 2017)

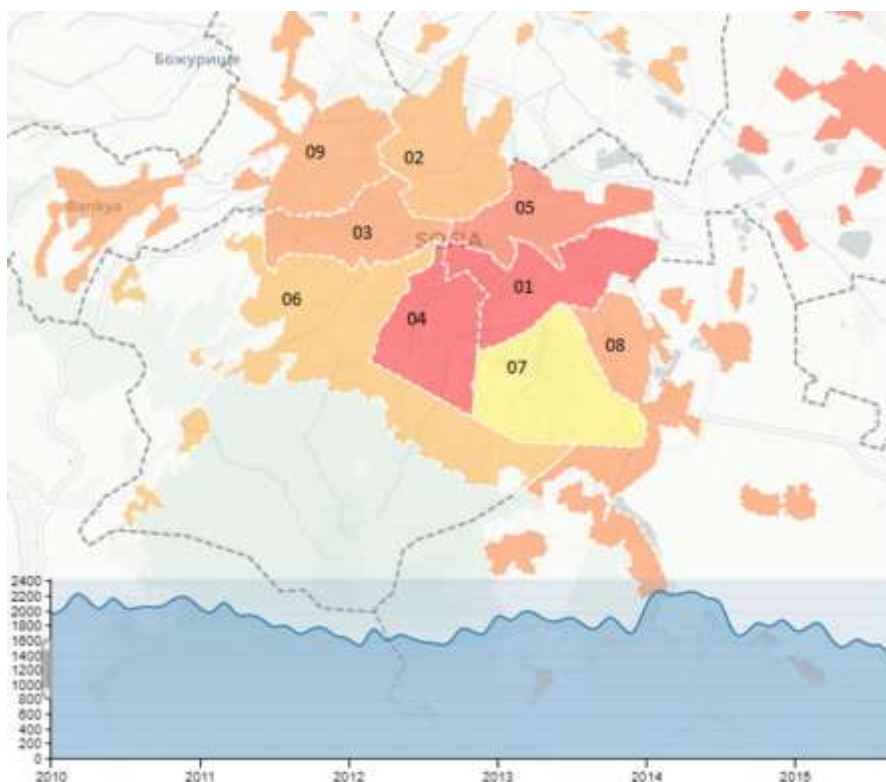


Figure 335. Levels of crime in the Precinct Police Departments according to study of Capital.bg based on data for the period 2010 - 2016.

Table 65. Criminal activities by type and by Precinct Police Department for 2017, Source: Capital.bg

Type	01PPD	02PPD	03PPD	04PPD	05PPD	06PPD	07PPD	08PPD	09PPD	Total
<b>Total</b>	3104	2451	2654	2857	2663	3369	2544	1497	2213	23352
<b>Criminal</b>	2757	2278	2418	2514	2485	3055	2353	1397	1092	21349
<b>Economic</b>	347	173	236	343	178	314	191	100	121	2003
<b>Population number</b>	126 810	143 028	127 640	118 136	128 303	204 499	206 711	90 333	171 244	1 316 704
<b>Criminal activities per 1000 people</b>	24	17	21	24	21	16	12	17	13	18

### Security

According to a study on the values and attitudes of the Bulgarians by RC Trend, 53% of the residents of the capital are afraid that they may become victims of crime (Vision Sofia 2050, 2018).

The recent study of the quality of life in the Sofia Metropolitan area (Vision Sofia 2050, 2019) states that security and crime prevention is a matter that separates the citizens of Sofia - 51% of them are totally or partially unsatisfied in this respect, while 47% are satisfied. Citizens, who are satisfied with the implemented security measures and



criminality, are mostly high-income university graduates living in the southern neighbourhoods and the city centre. The opposite is for the residents of Lyulin, Obelya, the residential areas to the east of the city centre and the villages around the city.

There is a widespread opinion that places inhabited by larger minority groups are more dangerous. In addition, the focus group mentions that they are worried about drug addicts who often commit robbery, street dogs, and football hooligans during matches. Nonetheless, the subjective feelings of security demonstrated by citizens in Sofia are drawing a more optimistic picture. The majority of them feel fully or partially safe in their neighbourhood (61% vs. 38% who do not share that feeling) and in Sofia as a whole (54% feeling fully or partially safe vs. 45% who do not share that feeling).

The residents living in the city centre, Druzhba residential area and those in the southern neighbourhoods of the city feel more secure. The feeling of safety is caused to a large extent by patrolling police cars, which respect citizens. They also share the view that the city has become safer than a decade ago. Security issues, however, bother residents from the eastern, western and north eastern districts, as well as residents of the northwest large-scale panel housing estates.

### 5.2.2.3 Participation

#### **Political participation**

According to the Central Election Commission (SEC) the turnout of voters during the first round of the Local government and Mayor elections in October 27th 2019 in Sofia Municipality was 42,82 % (compared to the country average turnout of 49,76 %). During the second round (November 4th 2019) the turnout of voters in Sofia was 40,02 % (compared to the country average turnout 42,1%). These rates are similar to the official voter turnout figure in previous scheduled municipal elections in 2015 - 41,25% for the first round (compared to country average 53.6 % in the first round that year) and more than two times higher compared to those of the second round in 2015 - 17,89 % (compared to 40.83% country average). The total number of citizens with voting rights in Sofia was 1 064 772, compared to the total number of 6 227 901 people with voting rights in Bulgaria in 2019.

Traditionally the competition among the candidates for taking the position of Mayor of Sofia is high. During the 2019 Mayor elections, the largest number of candidates for municipality mayor, 20, has been registered in Sofia, followed by Plovdiv (14), Blagoevgrad (14) and Shoumen (13 each), and Varna (11). There was a single candidate for mayoralty mayor in 397 mayoralties. (CEC, 2019, BTA, 2019) During the 2019 Mayor elections there were 21 registered candidates for Mayor of Sofia. (CEC, 2015)

#### **Trust in local public institutions**

Public hearings and open discussions on spatial plans and urban design competitions are the traditional tools (since the early 1990s) legitimizing participatory process and partially defening of the citizens/public interest (responsibility usually left to the public authorities) after the project is being finalized or the competition closed. Since 2002 it is required that plans, programmes and projects within the scope of the legislation on the Environmental Impact Assessment and Strategic environment assessment should implement consultations with the stakeholders since the very beginning of the project. The introduction of a new planning instrument - the "Integrated Urban Regeneration and development Plan" (IURDP) in 2012 required for the first time, under the social domain,

the implementation consultation processes since the very beginning and bottom-up approach in the strategic process and representation of citizens in setting vision, goals, priorities, and establishing a wide pool of projects (initiated or requested) by different stakeholders (business agents, heads of the homeowners associations in residential districts, champions, cultural centres, NGO-s, etc.). The following forms of activating participation and inclusion have been implemented in the process of the development of the IURDP of Sofia: over 80 meetings, 4 social surveys, 10 focus groups, 14 publications, 8 public forums, 4 exhibitions and 5 public discussions. (Troeva, V., 2014)

In 2017, after a 10 years period of discussions, the regulations on the procedures of public hearings in the sphere of spatial and territorial planning of Sofia Municipality has been adopted. Two of the districts' administration in Sofia Municipality have established Citizens Councils as a pilot test of empowerment and transparent procedures on decision making. (Regulations on public hearings, 2017)

Sofia Municipality has introduced and already established several programmes funding citizens' projects (as legally established organizations / NGO-s): Programme Europe, Green Sofia programme and Programme Culture. Each of the programmes is funding different activities: Europe – capacity building, development of methodologies and testing approaches for citizens inclusion and sharing/implementation of best practices: Culture – cultural and art activities and infrastructure; Green Sofia provides planting materials and park furniture and assists landscaping activities with the participation and active implementation of citizens. Since 2011 (until 2018) under this specific form of participatory budgeting, 890 have been implemented (an average 37 projects per administrative region) 63 projects have been implemented in Nadezda district for the same period or 9,3 projects per 10000 people (higher than the average for SM - 7,4). The general shortcoming of all these programmes is the missing long-term interaction between the administration and the projects' agents, although some (but few) of the projects proved their sustainability.

Apart from that, many NGO-s relying on their own funding, volunteering or other sources implement different activities related to the URBiNAT main topics, incl. NBS, creating register of green areas, register of heritage (monuments of culture).

During the recent 7 years, facilitated or supported by Sofia Municipality, many bottom up initiatives, placemaking projects and temporary use happened. Volunteering activities in mapping and observation of urban environment have been initiated as parts of Share Yavorov (Project funded under Europe Programme) and the development of Ghel's report on public life in Sofia (2017).

During 2015-2016, around 50 citizens (professionals) and NGO representatives sustained the initiative committee for urban development, which main aim to initiate structural changes in Sofia Municipality (and especially the Directorates Territorial planning and Investment planning and design), to discuss and define the responsibilities of the chief architect and to improve the effectiveness of the procedures. The process supported the elections (on competition basis) of the new chief architect and the reforms implemented after the end of the competition.

The Forum for urban development was initiated in 2017, which was widely opened for interdisciplinary professional and citizens' debate on the topic of who owns the city, which is the better city and for whom; who guides spatial development of the city and how. Among the results from the work of this forum was the initiation of "Vision Sofia 2050" process and the establishment of the Laboratories for urban development. The laboratories have the mission to raise the debate and to identify the necessary characteristics, content and form of the Master Plan of Sofia and prepare the forthcoming amendment of the plan.

The “Long term development strategy for Sofia and the region” is one of the recent, one of a kind, initiatives of Sofia Municipality. The initiative has its own budget for implementing different methods (meetings, questionnaires, research, and consultations) in order to elaborate a shared idea about the future of Sofia and the steps necessary to get there. “The Vision is being shaped by facilitating involvement and stimulating informed decision making. The former means involving all interest groups from the very beginning in the decision making process: public administration, NGOs, investors, researchers, experts, entrepreneurs and citizens. The latter means structuring the decision making process on data analysis that covers all aspects of city life. The end result is to be a shared idea of a common future of the city, which has been developed through an informed dialogue and a resilient system of interaction.” One of the recent researches in the framework of the Vision reports on the possibilities for improvement of the efficiency of the public consultations in the capital. According to this report, in only 12% of the cases, the citizen’s opinion is taken into consideration by the administration. Public hearings are attended by 15 people (average). In 45% of the cases the public hearings are held during inconvenient time slots without the use of ICT. Regarding the publicity of the projects discussed, it appeared that only in 58% of the cases the information is published on-line. Face-to-face consultations comprise 64,2%, and the written consultations - 35,8%. Another important conclusion is that „the administration of Sofia Municipality is not flexible enough in terms of communication with citizens both in traditional and on-line forms of interaction. Digital channels are used in analogue mode, rather sharing than leading dialogues. (Vision Sofia 2050, 2018)

The last thirty years have been marked by a dynamic resurgence of civil society. More than 90 % of all civil society organizations were founded after 1989. In 2009, there were more than 30,000 organisations registered, divided into the following groups: registered for public and private benefit, trade unions, religious associations and community centres. ( NSI: Non-Profit Institutions)

The recent historical background of civil society in Bulgaria marks the following periods: 1) Rebirth of Bulgarian civil society as a concept: 1988 – 1989; 2) The ‘gentle’ anti-communist revolution: late 1989 – 1990; 3) The institutionalisation of the NGO sector: 1992 – 1996; 4) The civic revolution – the overthrow of the third communist government: January – February 1997; 5) The ‘normalisation’ period: 1998 – 2006; 6) EU Membership: 2007 – ongoing. The last period is characterised by diversified activities in the arena of civil society. Foreign donors accepted a phasing-out strategy by reducing the funds available for the CSOs in Bulgaria and another level of decision-making was added. This period saw re-organisation and diversification of the civil sector, the appearance of various informal civic movements, and the rise of social networking, blogging and online mobilisation as an efficient tool for opinion making and citizen activity (OSI, 2011).

Civil society works for the citizens rather than with the citizens, without a clear mandate from the citizens themselves. This emphasises critical questions regarding civil society’s representativeness: who is the legitimate voice of civil society, and what sources of legitimacy do the organisations have. The shifting political environment since joining the EU makes these questions, pertinent in the context of state-civil society relations, even more important. Civil society in Bulgaria in 2010 was characterised by low levels of engagement, a problematic public image, limited internal consolidation, and a lack of sustainable influence on policy-making. Despite these deficiencies, in this phase of the civil society institutionalization, a new phenomenon is observed - the generation of social energy under informal civic initiatives, through which civil society manages to influence public debate and societal changes. Further, many civil society organizations managed to build capacity thus developing stronger organisational cultures by taking part in various international and EU projects and programmes. Though still underdeveloped, civil society

organizations realise the need to cooperate in order for their advocacy activities to significantly impact on decision- and policy-making. (OSI, 2011)

Data from the last edition of the EVS show that 81.5% of citizens do not partake in the activities of any organisation. (Fotev et al, 2010) However, a new trend in civic engagement deserves attention. Some types of informal activism seem to enjoy larger public support than the traditional CSOs. The new faces of civil society (activist groups, such as students and environmentalists) and the faces of the transition (such as pensioners) represent a significant percentage of the whole. The percentage of those not participating in these areas is above 90%, reaching up to 99% for human rights and peace movement organisations. The sectors attracting more than 1% participation are the ones targeting education, social policies and activities for young people. The extent of socially-based engagement is measured by the percentage of those engaged in organisations playing a role in community building. Spiritual, religious, educational, artistic, musical and cultural institutions, in addition to sports teams and clubs, are considered to be community organisations. (OSI, 2011)

Special efforts are currently made to promote volunteering in Bulgaria through various initiatives, which include tree planting, working with disadvantaged and institutionalised children, and cleaning parks and nature sites. Various EU programmes also aim to improve this aspect of civic engagement.

In 2015 "citizen participation" defined as "actions and initiatives by citizens, civic groups and organizations that lead to policy changes and influence governance decisions at various levels." Has been measured 3.39 out of 6. (CPI, 2015) Among the recommendations are : Increase the consultation period and introduce an obligation to provide feedback by institutions on citizens' proposals, with specific explanation on the acceptance or rejection; Establish a clear mechanism for the selection of members of the Public Councils and a clear mechanism for publicity of their activities and the implementation of their decisions; Establish and support the operation of strong civil society organizations and networks that can assign resources and competently participate in the processes of decision making and are able to involve and inform the public and the media.

Domain	Indicators	Score
1. Environment of citizen participation	1.1. Legislation.	3.46
	1.2. Institutional environment	3.12
	Overall score: 3.29	
2. Practices/manifestations of citizen participation	2.1. Initiatives of citizen participation at national and local level.	3.62
	2.2. Active citizens	3.55
	Overall score: 3.59	
3. Effect/changes resulting from citizen participation	3.1. Result from citizen initiatives.	3.28
	3.2. Changes in the environment	3.42
	Overall score: 3.35	
<b>Index 2015 of citizen participation in Bulgaria: 3.39</b>		

Figure 336. Citizen Participation Index, 2015, source: Index of Citizen Participation in Bulgaria Developed using the methodology of the Citizen Participation Forum and The Bulgarian Centre for Not-for-Profit Law

Sofia Municipality has been permanently at the forefront of the ranking in the period 2015-2017 and for the year 2017 it occupied the second position with an index of 3.69 points in the ranking of the Local Integrity System after the municipality of Burgas (3,74) and

compared to the country average index 3,29. In 2017 Sofia is top ranked for civil society domain with grade 3,98 compared to the average for the county 3.

*“This place is due to the sustainable capacity, good practices and effective interaction between the mayoral institution (4.78) and other important pillars such as the municipal council (3.69) and the administration (4.32), civil society structures (3.98) and media (3.61).*

*Significant contributions in this respect are the high degree of e-services provided, the improved control activity of the municipality with regard to incorrect external contractors, the introduced new mechanisms for counseling citizens in formulating new urban policies.*

*The transparency of the work of the Sofia Municipal Council, whose index for 2017 also registered improvement and values above the national average, was also improved.*

*The effective work of a local public mediator is an additional pillar in the functioning of the local integrity system. Above average estimates for contributions to the local system of integrity are received by the Police (with an improvement of the index from 2.92 points in 2016 to 3.47 in 2017), the political parties (3.34) and the business (3.4).”(LIS, 2015)*

### Index 2017

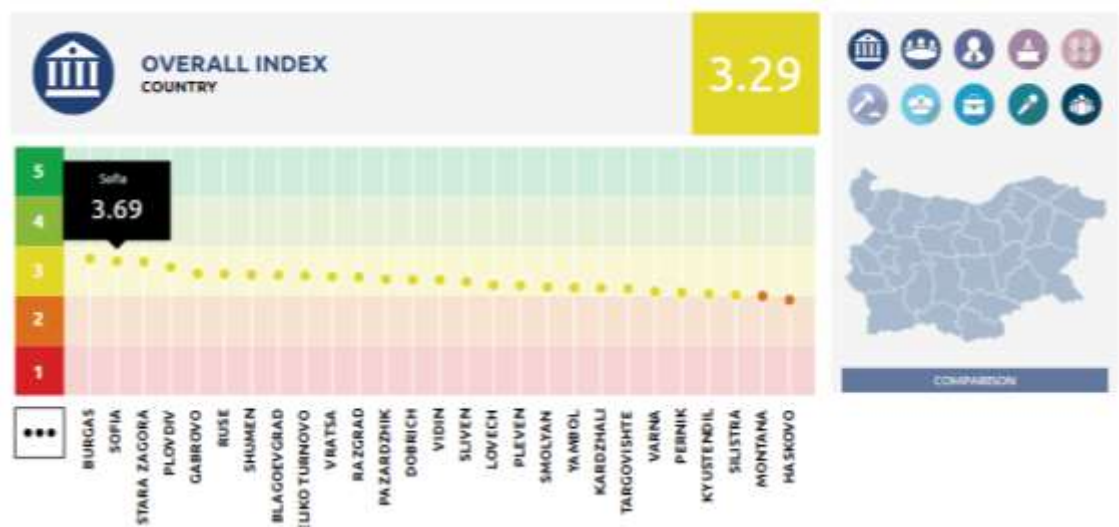


Figure 337. Sofia Municipality takes second place with an index of 3.69 points in the ranking of the 2017 Local Integrity System at National level. Source: Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>



## Index 2017



Figure 338. Indexes by pillars of Sofia Municipality according to the Local Integrity System, 2017, Source: Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>

### INDEX VALUES BY PILLAR

MUNICIPAL COUNCIL	3.39	MAYOR	3.89	MUNICIPAL ADMINISTRATION	3.79
POLITICAL PARTIES	2.99	COURTS	3.53	POLICE	3.29
BUSINESS	2.80	MEDIA	2.78	CIVIL SOCIETY	3.00

Figure 339. Index values by pillar of Sofia Municipality according to the Local Integrity System, 2017, Source: Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>

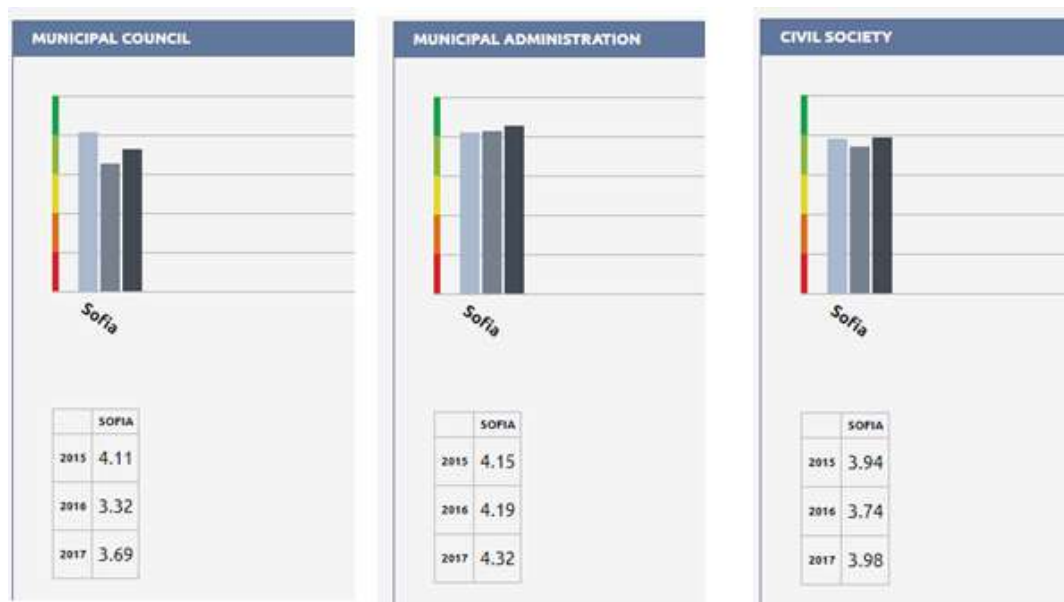


Figure 340. Evaluation of the local integrity pillars Municipal Council, Municipal Administration, and Civil Society for Sofia Municipality 2015-2017, Source: Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>

Table 66. Values of civil society indexes for Sofia municipality, Source: Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>

<b>VALUES OF CIVIL SOCIETY INDEXES FOR SOFIA MUNICIPALITY</b>	<b>SCORES</b>
<b>CAPACITY</b>	3.60
<b>CAPACITY OF LOCAL CIVIL SOCIETY ORGANIZATIONS</b>	3.45
Local civil society organizations have access to municipal funding for financing activities with a high impact on local development	3.00
Local business has the practice of providing donations for civil society organizations	2.76
Local civil society organizations mobilize experts, persons with authority and citizens for their initiatives	4.33
Local civil society organizations receive support from local media	3.70
<b>INDEPENDENCE</b>	3.75
Over the last year there are media publications on employing pressure over civil society organizations	4.28
Over the last year there are media publications on dependencies between civil society organizations and a) local authorities; b) political parties; c) business	3.22
<b>ROLE</b>	2.16
<b>EFFECTIVE CIVIL SOCIETY OVERSIGHT FOR GOVERNANCE ACCOUNTABILITY</b>	2.16
Civil society organizations regularly request information from local authorities	2.35
Over the last year civil society organizations have revealed cases of misuse and irregularities	1.96
<b>ANTICORRUPTION POLICIES AND REFORMS</b>	2.16
Over the last year civil society organizations have organized or participated in forums and initiatives towards streamlining the anticorruption activities of civil society organizations and institutions	2.78
Over the last year civil society organizations have participated in the development of anticorruption strategies and recommendations	1.70
Over the last year civil society organizations have provided number of positions to the local authorities in relation to the issues of good governance	2.00
<b>GOVERNANCE</b>	3.25
<b>TRANSPARENCY</b>	3.35
The websites of civil society organizations provide information regarding the members of their boards	2.96
Civil society organizations provide information regarding their projects and initiatives, including activities, results and finding	3.74
<b>ACCOUNTABILITY</b>	3.03
The websites of civil society organizations provide information and reports on their activities	2.19
Civil society organizations have the practice of organizing pre-conferences, publication of information materials and giving interviews on their projects and initiatives	3.87
<b>INTEGRITY</b>	3.37
Local civil society organizations have established ethical codes, practices and standards of conduct	3.30
Local civil society organizations monitor and evaluate the implementation of established ethical rules	3.28
Local civil society organizations are part of networks that create and monitor ethical rules connected to the work of the civil sector	2.93
There are media publications on unethical/unprofessional behavior of civil society organizations? representatives and their connection with local business interests, local authorities and political parties	3.98

Table 67. Number of complaints and alerts to the local ombudsman of Sofia municipality for the period 2015-2018, Source: <http://www.sofiaombudsman.bg/>

<b>COMPLAINTS AND ALERTS</b>	<b>NUMBER</b>			
	2015	2016	2017	2018
Received	205	224	170	232
Completed	190	206	165	228
Non completed	15	18	5	4

From them:				
Individual complaints	-	-	129	212
Complaints from Bulgarians living abroad	-	-	4	11
Collective complaints	-	-	17	2
Complaints to legal entities	-	-	13	9
NGO complaints or initiative committee	-	-	7	6
By type				
Written	94	65	48	51
With recorded oral reports	57	99	59	50
Received electronically:				
Through the website	15	44	14	124
By mail	39	16	49	7

Table 68. Number of complaints and alerts according to their classification registered at the office of the local ombudsman of Sofia municipality for the period 2015-2018, Source: <http://www.sofiaombudsman.bg/>

Complaints and Alerts by type and by year	Number			
	2015	2016	2017	2018
Territorial development and illegal construction	20	33	32	112
Housing	20	27	9	7
Municipal property Management and disposal	8	2	11	4
Administrative services	50	41	21	14
Condominium property management	7	13	8	12
Public works	18	31	28	15
Ecology	9	10	2	6
Public transport, parking	11	11	8	10
Social services	1	1	4	1
Local taxes and fees	7	5	4	6
Advertisement	1	0	1	0
Funeral activities	3	4	0	0

Public order, security and noise	6	1	6	2
Commercial activities	1	6	3	3
Restitution, compensation	4	7	3	0
Children's and health institutions	3	4	1	2
Agricultural land	3	6	6	2
Alternative issues	12	4	1	3
Out of authority	21	18	22	28
Education				5

### Social connections

In 2011 Open Society Institute studied and reported on the characteristics and the level of engagement of the civil society organizations (OSI, 2011):

- A low level of civic engagement in various organisations and voluntary activities;
- Citizens' lack of willingness to get involved in addressing social issues;
- Inability of civil society organizations to empower constituencies
- Problematic community-building due to a lack of sustainable social linkages between individuals, displayed through low trust of each other and low civic involvement;
- The limitation of citizens' social contacts primarily to family members (based on population survey) Strains in the social fabric that impede building of social capital, which inhibits civil society development in Bulgaria;
- Energy for potential mobilisation around certain causes events/issues supported by informal movements.

Those who are engaged vary by gender, ethnic background, age and geographical locations. Citizens tend to get 'encapsulated' within their family circle and their closest family members, which serve as a sort of safety net, but limit any social contact outside that circle. This is coupled with low trust in representative institutions and fellow citizens. Low levels of engagement and trust in social processes indicate a sustained trend, as confirmed by the three editions of the "State of Society" report. (OSI, 2008)

According to the NGOs Information Portal, there are 13991 NGO registered, 5267 of which registered on the territory of Sofia Municipality. About 6% (317) are acting for private benefit, and the rest – for public benefit. From those registered for public benefit, 4840 are registered in the Central Register, and 71 are not registered in the Central Register. The last update of around 779 NGO-s is 5 and more years ago. Significant amounts of registered NGOs are active in the sphere of arts and culture (1695), education (1175), sport (1632). (NGOs Information Portal)

Table 69. Number of NGO-s by prevailing activity (one NGO could be registered as operating in several different domains/activities, Source: NGOs Information Portal, <https://www.ngobg.info/en/index.html>)

PREVAILING ACTIVITY OF NGOs	NUMBER REGISTERED NGOs
Branch organizations	75
Ethic issues	36
Legislation, advocacy, public policies	477
Protection of human rights	140
Healthcare, patients' rights	418
Interest clubs	52
Arts and culture	1695
International and European issues, policies and research	192
Local initiative groups	45
Youth issues, policies and research	163
Promotion of philanthropy, volunteerism	109
Economic development	117
Education	1175
Environment	155
Children	133
Gender issues	39
Professional organizations	85
Development of local communities	49
Social	249
IT development	44
Local cultural centres	19
Sport	1632
Grant making	26
Other	155

#### 5.2.2.4 Public services

##### **Mobility (buses, trains, cars, bikes, etc.)**

The modal split of Sofia is available for 2011 and 2017 from two representative surveys conducted by MottMacdonald Ltd. (2011) and Vision for Sofia (2018).



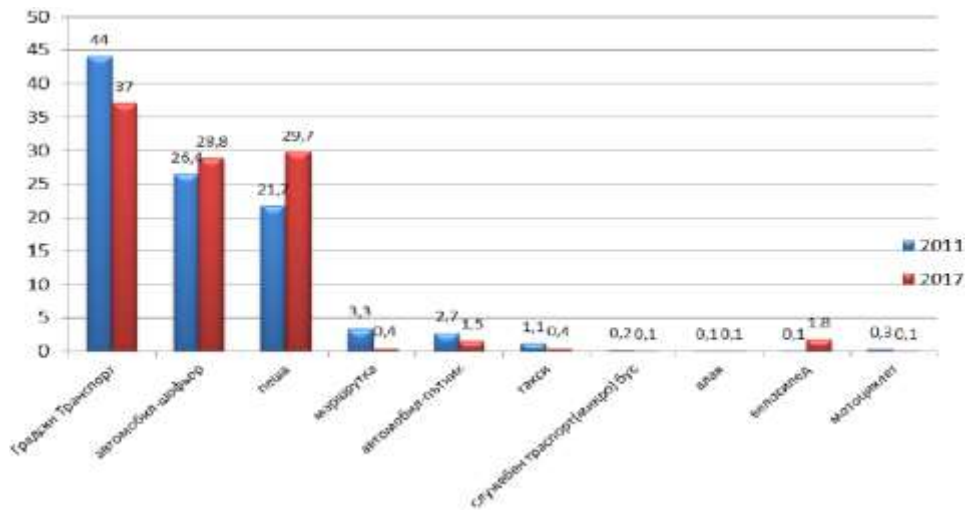


Figure 341. Modal split of Sofia in 2011 and 2018, Source: MottMacdonald,(2011); Inframobilplan/Vision for Sofia, (2018)

The most commonly used public transport is the bus (58%) and the subway (42%) and more than 29.7% of the citizens walk. The share of those that usually walk has increased significantly, compared to this share in 2011 - 21.7%. One out of three respondents do not have to make choice between different means of transport while traveling. A significant share of citizens (40%) changes once the mode of transport while travelling on a daily basis, and 28% - two or more times. Citizens in need, at distant residence locations and/or with worse choice of transport mode, travel by car; others choose the private automobile in order to avoid crowded public transport. At present, the motorization rate in Sofia is quite high - it exceeds 500 vehicles per 1000 people, which is higher than in many European cities. The average age of the fleet of buses and trolleys is among the highest in the EU countries and in comparison to the other metropolitan areas. The municipality has been investing intensively in new fleet of the public transport during the last years.

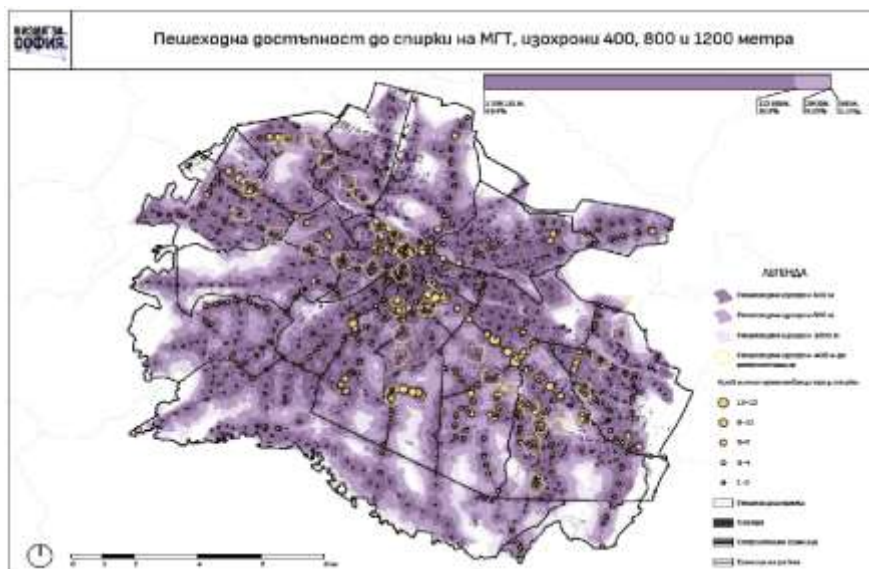


Figure 342. Pedestrian access to public transport stops with 400, 800 and 1200 m isochrones (Vision Sofia 2050, 2019)

## **Subjective well being**

The largely representative survey shows that, in general, Sofia citizens like the city, despite the clear sensitivity to its problems. Around 91% of the respondents are satisfied with the fact that they live in the city, among them about 50% are fully satisfied.

*“By this general indicator, the data show a slight improvement over the large comparative Eurobarometer survey conducted in 2015 ...(...)... - most people were satisfied with the fact that they live in the city and those that are completely satisfied was slightly over 40%.”* At present, the share of those who are fully and partially satisfied is equal. In terms of status and demographics, the data reveal no peculiarities except that the younger and wealthier the people, the more satisfied they are with their lives as a whole, and thus with the place they live.

The levels of satisfaction, however, differ significantly in different urban areas. The share of those who are fully satisfied more than twice than those who are partially satisfied are residents of the city centre, the eastern and southern districts (Dianabad, Krasno Selo, Lozenets, Gotse Delchev, Yavorov, Geo Milev, Prodouane, Smirnenski, Malinova dolina, Manastirski livadi, Pavlovo), as well as the residents of the northern suburban zone. The other respondents are far more moderate while reporting their level of satisfaction. This prudence is especially strong in the western districts (Krasna Polyana, West Park, Residential Residential Estate, and Razsadnika), where only 14% are fully satisfied. The fully satisfied residents of Ovcha Kupel, Slavia, and Faculteto neighbourhoods comprise around - 20% of the respondents, while the share of those fully satisfied residents in Nadezhda, Orlandovci, Svoboda, Lyulin, and Obelya is about 30% ". (Report "People", Vision Sofia 2050, 2019)

## **Public services available inside the Urban agglomerate**

Vision Sofia 2050 studied the concentration of buildings offering public services and visualized the indicator % of built area dedicated buildings of the social infrastructure. The mapping of this indicator is using urban units adopted for the purposes of the General Development Plan (quarters, neighbourhoods or localities defined by many criteria, mainly various borders and urban morphology criteria). Major concentrations of public infrastructure are unevenly distributed over the territory of the city. They represent concentration of hospitals, universities and schools built mostly during the Socialist period under the state led provision of both services and assets. In almost every urban district (21 covering parts of the city), there is at least one urban unit where the concentration of such infrastructure is higher than in the neighbouring ones. This is due to the localization strategies for standardized public services based on past urban development plans dependent on the availability of space at the relevant phase of development of the city and its different central and/or peripheral areas. In several distinctive units the concentration of such assets and services is higher due to the concentration of national centres, similar to the complex situated south-west from the city center around the Medical University and the Military Medical Academy.

Within the Sofia Municipality, there are 247 medical centers, which are highly concentrated in the central districts: Triaditsa 18%, Oborishte 9%, Serdica 8% and 7% Krasno Selo. The outermost quarters are characterized by the lowest number of hospitals/healthcare services. There are no medical facilities in the town of Novi Iskar. The number of doctors per urban district ranges from 130 in Liulin district to less than 10 in Bankya district, which is linked to the size of those districts but also other factors related to the localization of the healthcare infrastructure.

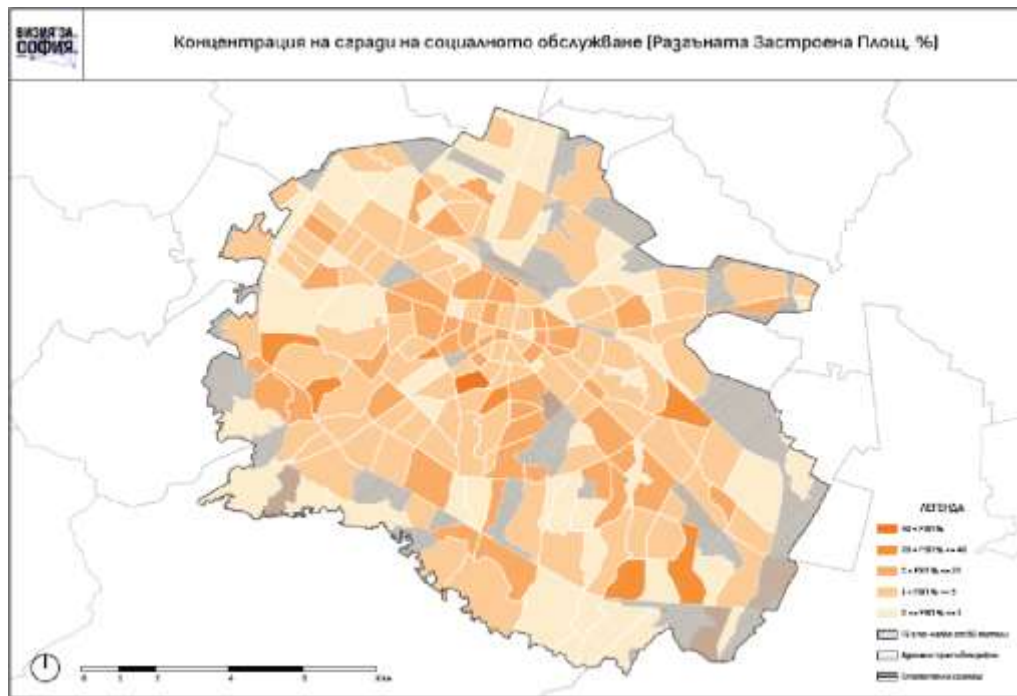


Figure 343. Concentration of buildings for social services (built up area, %), Source: Vision for Sofia, 2019

Table 70. Number of medical centres per urban district, Source: Vision Sofia 2050

District	Number of medical centres	Share of the medical centres per district. %
Triaditza	44	18
Oborishte	23	9
Serdica	20	8
Krasno selo	18	7
Vazrajdana	16	6
Mladost	15	6
Sredetz	13	5
Studentski	12	5
Poduyane	11	4
Izgrev	9	4
Lulin	9	4
Lozenetc	8	3
Vitosha	8	3
Obcha kupel	8	3
Slatina	6	2
Nadezhda	6	2
Krasna poliana	5	2
Ilinden	4	2
Iskar	4	2

Kremikobci	3	1
Vrabnica	2	1
Bankya	2	1
Pancharevo	1	0
Total	247	100

**Satisfaction with public services based on the sociological survey on the quality of life conducted by Vision Sofia 2050. (Report “People”, Vision Sofia 2050)**

Most satisfaction with the educational institutions in the neighbourhood is shown by the residents living in the centre, as well as in more prestigious neighbourhoods that have good transport connections and are rapidly and dynamically developing in recent years (Dianabad, Geo Milev and Mladost) More critical in their assessment of neighbourhood schools are residents of the more peripheral northern urban and suburban areas. The study found relatively high ratings from the health services offered as a whole at the neighbourhood and city level. Around 74% is the overall satisfaction with the level of healthcare services offered in the neighbourhood, while the health services in Sofia are even more appreciated - around 85% of the city's residents fully or partially are satisfied with the level of healthcare in the capital. While there are no significant disparities among the social groups in terms of neighbourhood health establishments, the socio-demographic breakdowns in Sofia regions show that the highest is the assessment of the inhabitants of these neighbourhoods, where the quality and supply of health services are larger (The city centre, Dianabad, Geo Milev and Druzhba). The residents from the urban fringe, who live in areas with poor transport connections and/or fewer health establishments (Hadji Dimitar, villages to the North and the South of the city), give lower ratings of the health services in the neighbourhood.

Around 59% of respondents believe that there are well-developed paid sports facilities in their neighbourhood compared to 40% for which such facilities are missing. Regarding the free sports facilities (municipal gymnasiums), almost the same share of Sofia citizens are in both positions (47% think there are similar sites compared to 52% for which free sports facilities are missing in the neighbourhood). The availability of paid sports facilities in the city centre and areas neighbouring large city parks (as West Park, the park in the Geo Milev district, etc.) is better appreciated, because of the availability of sports facilities in the immediate vicinity to the neighbourhoods Krasna Polyana, West Park, Geo Milev, Levski, Hadji Dimitar. Higher number of paid sports facilities is located close to prestigious neighbourhoods such as Boyana, Bistritsa and Dragalevtsi, which are characterized by higher purchasing power of their residents. Lack sports facilities with free access is identified in the northern neighbourhoods of the city (Nadezhda, Levski), in the central city districts, as well as in the emerging and dynamically developing areas such as Malinova dolina and Manastirski Livadi. There is still unmet demand for paid sport halls that would serve 5% of Sofia residents at neighbourhood level, and still large gap in the provision of sport facilities with free access that would serve about ¼ (26%) of Sofia population. Around 65% of the citizens of Sofia are satisfied with the sports facilities, playgrounds and halls in their neighbourhood (among them 25% - fully satisfied and 40% - rather satisfied). The share of partially or totally dissatisfied residents with the opportunities for sport near place of residence is 33%.

Regarding the available infrastructure for cultural activities and leisure, the neighbourhoods are best secured by community centres - 62% of Sofia residents say that they are available in their neighbourhood. According to the respondents, next follows the satisfaction with the distribution and reach to libraries in the neighbourhoods (36%), spaces for outdoor cultural events (34%), spaces for indoor cultural events (22%).

Cinemas in the area of residence are available near the residence for 1/5 of the citizens of Sofia, while museums /galleries are close to only 15% of the residents in the different areas (mostly mentioned by the residents of the city centre). Residents of neighbourhoods most express the need to fill the gap in the provision/access to open spaces for cultural events (27%), indoor spaces (18%) and cinemas (18%). The need for outdoor cultural events is stated by the residents of the northern and southern parts of Sofia, the suburban areas, as well as the distant neighbourhoods as Druzhba, Lyulin, Obelya, Krasna polyana, Razsadnika and others. The need for indoor space for cultural events is more pronounced again in the above-mentioned areas, as well as among the residents of Nadejda, Svoboda and Orlandovci neighbourhoods.

### 5.2.3 Economic Description

Data about the economic development of the city are collected at the scale of the city and they usually are related to standard economic indexes but also to new indicators which can help to evaluate the real situation of the city from an economic perspective.

#### 5.2.3.1 Income and poverty

##### Average family income

According to the Household budgets in the Republic of Bulgaria 2017 Report, the total average income per capita increases 1.6 times during the 2008 - 2017 period – from 3 502 BGN in 2008 to 5 586 BGN in 2017. (HBR 2017, NSI)

The amount of the Sofia Municipality population total income figured out at 11 billion BGN in 2017. The average monthly income per capita on Municipal level was 1312 BGN. The average monthly income per capita for population from 14 districts in Sofia Municipality is lower than 1312 BGN, and for the population of 10 others is higher. The lowest income is registered in Nadezhda and Novi Iskur Districts – 36% percentage points lower than the average. (Economic report, Vision Sofia 2050, 2019))

Table 71. The average monthly income for 2017, Source: The Economic report, Vision Sofia 2050

Period	Taxable income, per Sofia region tax office, BGN	Average annual income, BGN	Average monthly income, BGN
Districts	2017	2017	2017
Triaditsa	1887889	21670	1806
Lozenets			
Sredets			
Oborishte	287967	18676	1556
Krasno selo	743210	17921	1493
Mladost	1339849	17420	1452
Studentski			
Vitosha	1226621	17355	1446
Ovcha kupel			
Bankya			
Slatina	1607121	15721	1310



Iskar			
Izgreve			
Pancharevo			
Vazrazhdane	292786	15104	1259
Serdika	295138	12678	1057
Krasna polyana	343366	12581	1048
Vrabnitsa	518778	12197	1016
Ilinden			
Lyulin	725748	12088	1007
Poduene	603585	11884	990
Kremikovtsi			
Nadezhda	535714	10834	903
Novi Iskar			

Table 72. Total average income per household and per capita by source in 2016, Source: NSI

Total income average per household and per capita by source in 2016									
				Bulgaria	Sofia Municipality		Bulgaria	Sofia Municipality	
Total income - BGN	Of which :	Total		<b>12112</b>	16283		<b>5167</b>	7349	
		Wages and salaries	Average per household	<b>6579</b>	10439	Average per capita	<b>2807</b>	4711	
		Other earnings		<b>352</b>	454		<b>150</b>	205	
		Self-employment income		<b>749</b>	1187		<b>319</b>	536	
		Property income		<b>84</b>	81		<b>36</b>	37	
		Unemployment benefits		<b>47</b>	53		<b>20</b>	24	
		Pensions		<b>3357</b>	3039		<b>1432</b>	1372	
		Family allowances		<b>94</b>	49		<b>40</b>	22	
		Other social benefits		<b>279</b>	455		<b>119</b>	205	
		Regular transfer from other households		<b>152</b>	157		<b>65</b>	71	
		Receipt sale		<b>72</b>	7		<b>31</b>	3	
		Miscellaneous		<b>345</b>	362		<b>147</b>	163	
		Drawn savings - BGN			<b>419</b>		722		<b>179</b>
Loans and credits - BGN				<b>135</b>	161			<b>57</b>	73
Total - BGN			<b>12666</b>	17165		<b>5404</b>	7747		

Sofia Municipality's households earned more money than Bulgarian households in general. The total average household income in Sofia Municipality exceeded by more than 4400 BGN (2260 € or 35%) compared to total Bulgarian household income.

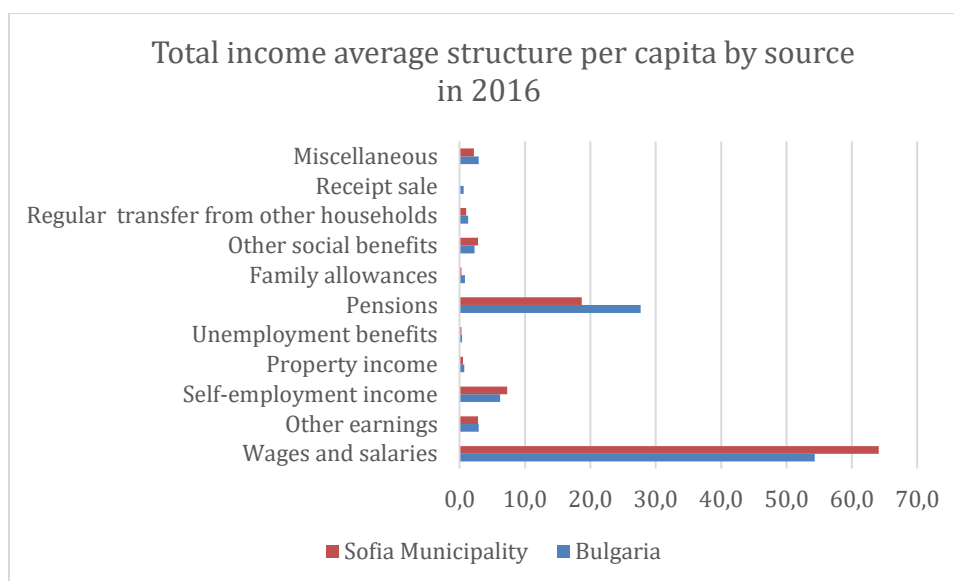


Figure 344. Total income average structure per capita by source in 2016, Source: NSI

Table 73. Total income average per household and per capita by source and by Sofia Municipality, Source: NSI

<b>Total income average per household and per capita by source and by Sofia Municipality</b>								
		<b>2007</b>		<b>2015</b>		<b>2016</b>		
		per household	per capita	per household	per capita	per household	per capita	
<b>Total income - BGN</b>	<b>Of which:</b>	Total	9 099	3 873	16724	7061	16283	7349
		Wages and salaries	5 063	2 155	10440	4408	10439	4711
		Other earnings	711	303	564	238	454	205
		Self-employment income	440	188	1705	720	1187	536
		Property income	183	78	41	17	81	37
		Unemployment benefits	8	3	43	18	53	24
		Pensions	1 953	831	2812	1187	3039	1372
		Family allowances	14	6	63	27	49	22
		Other social benefits	183	78	370	156	455	205
		Regular transfer from other households	38	16	263	111	157	71
		Receipt sale	45	19	54	23	7	3
		Miscellaneous	461	196	369	156	362	163
	Drawn savings - BGN	292	125	689	291	722	326	
	Loans and credits - BGN	368	156	148	62	161	73	
	<b>Total - BGN</b>	<b>9 759</b>	<b>4 154</b>	<b>17561</b>	<b>7414</b>	<b>17165</b>	<b>7747</b>	

**Ownership of durable assets (e.g. rate of owners of their residence, rate of renters, shared accommodation, free accommodation)**

The high proportion of private housing (about 87%) inherited from the transition has been steadily increasing (94.4% in 2011), but the downward trend in the public rented sector is at odds with increasing social stratification and vulnerability. Public rented sector comprises 5.6% - only 25,900 housing units, half of which are student dormitories. The

public rental housing stock is mostly old, depreciated and heavily dispersed among condominiums, which makes it less manageable and increases the need for budgetary resources to maintain it. The emerging private rental housing is increasing, which contributes to housing mobility, but high price levels do not allow mass overall solutions, and much of this stock (especially in the city centre) is used for other purposes different from housing. (Report "People", Vision Sofia 2050, 2018)

### *Ownership*

Most occupants are homeowners (about 85%), with only about 5% of them having a mortgage, but over 50% of homeowners not having enough income to cover their running costs. Over 5,000 dwellings have no legal status (mainly Roma). There are many threats due to the reduced solvency of the owners, which calls for search for alternatives to free choice: social housing against one's own or subsidies for renovation and maintenance of the existing housing stock. (Report "People", Vision Sofia 2050, 2018)

### *Municipal and social housing*

The municipal dwellings in the compact city are 10426. The district housing policy is currently implemented only within the scope of the available municipal housing. The right to purchase / privatize and the absence of a sustainable mechanism for reproducing the municipal housing stock results in a permanent reduction of the number and to deterioration of the social housing stock. The social housing sector in Sofia is becoming increasingly inaccessible to young families. The insufficient municipal housing stock is a prerequisite for setting certain criteria for citizens in need that regulate the access to municipal housing. For the same reason, the problem of the homeless is still unresolved. (Report "People", Vision Sofia 2050, 2018)

Table 74. Dwellings by kind of ownership as of 31.12.2016 and 31.12.2017 , Source: NSI

<b>Dwellings by kind of ownership as of 31.12.2016 and 31.12.2017</b>					
	Statistical zones and Districts	Total	State and municipal	Private owned by juridical persons	Private owned by physical persons
<b>2016</b>	Bulgaria	<b>3951806</b>	<b>92524</b>	<b>64785</b>	<b>3794497</b>
	Sofia Municipality	609899	34991	7715	567193
<b>2017</b>	Bulgaria	<b>3943989</b>	<b>92553</b>	<b>62275</b>	<b>3789161</b>
	Sofia Municipality	609858	35007	7673	567178

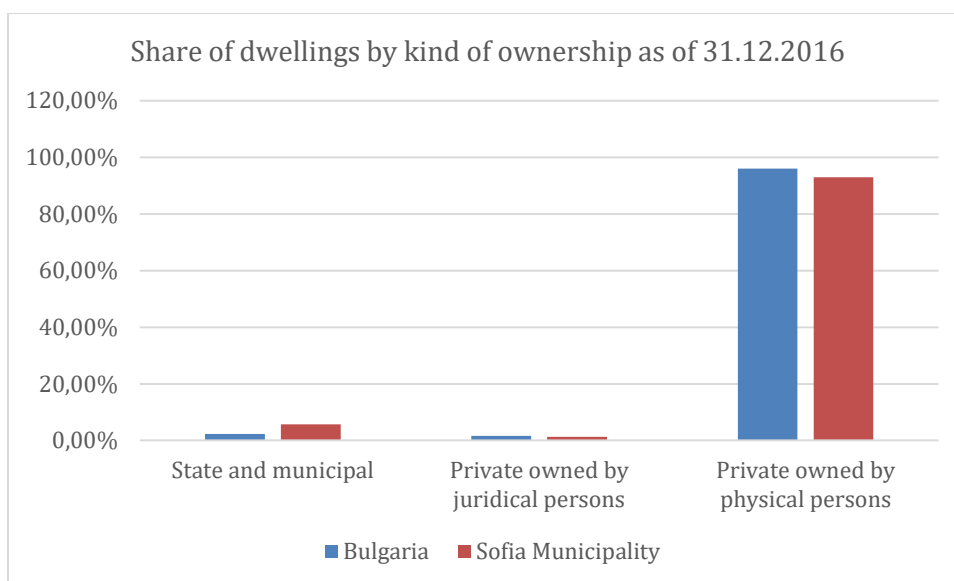


Figure 345. Dwellings by kind of ownership as of 31.12.2016, Source: NSI

### Current expenditures (electricity, gas, food, etc.)

Table 75. Total average expenditure per household and per capita by group in 2016, Source: NSI

Total expenditure average per household and per capita by group in 2016							
		Average per household		Average per capita			
		Bulgaria	Sofia Municipality	Bulgaria	Sofia Municipality		
Total expenditure - BGN		Total	11146	14934	4755	6740	
		Total	9203	12100	3926	5461	
	Consumer total expenditure - BGN	Of which:	Foods and non-alcoholic beverages	3432	4267	1464	1926
			Alcoholic beverages and tobacco	484	682	206	308
			Clothing and footwear	402	525	172	237
			Housing, water, electricity, gas and other fuels	1595	1808	681	816
			Furnishing and maintenance of the house	411	375	175	169
			Health	616	626	263	282
			Transport	764	1296	326	585
			Communications	494	650	211	294
			Recreation, culture and education	530	1134	226	512
			Miscellaneous goods and services	473	737	202	333

Taxes	579	981	247	443
Social insurance contributions	727	1224	310	552
Regular transfers to other households	130	103	55	47
Other expenditure	507	526	216	237
Saving deposits - BGN	457	1015	195	458
Debt paid out and loan granted - BGN	365	536	156	242
Total - BGN	11968	16486	5106	7440

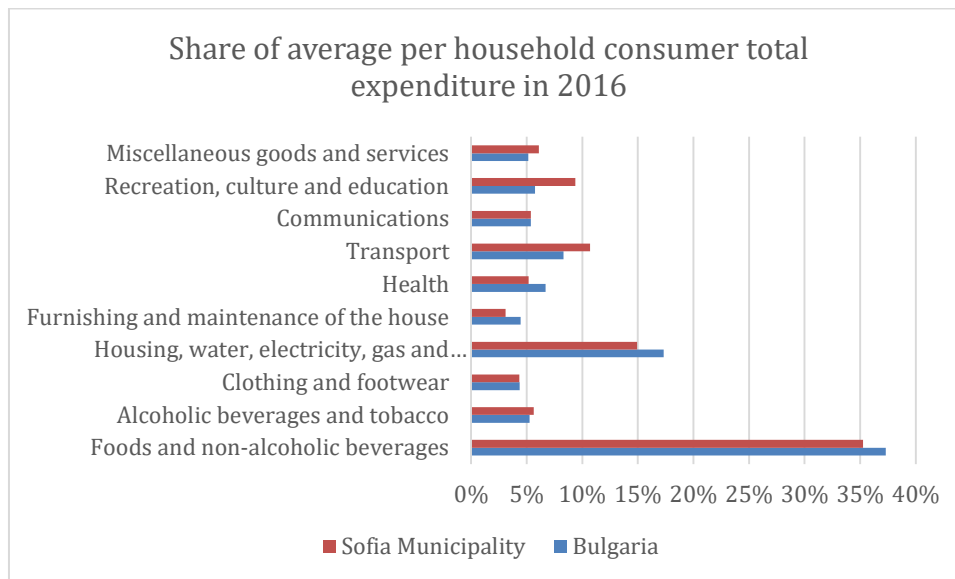


Figure 346. Share of average per household consumer total expenditure in 2016, Source: NSI

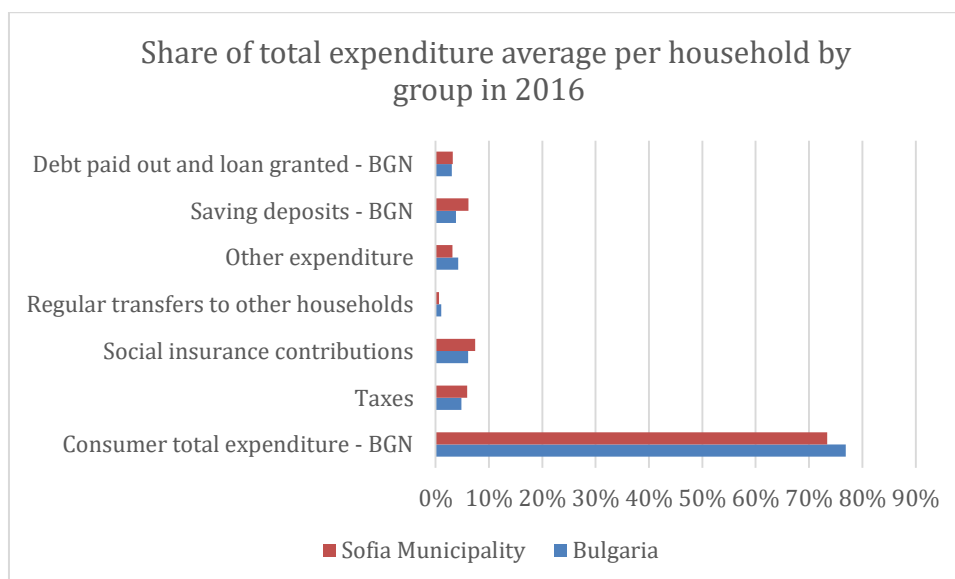


Figure 347. Share of total expenditure average per household by group in 2016, Source: NSI



Table 76. Total average expenditure per household and per capita by group, Sofia Municipality in 2007, 2015 and 2016, Source: NSI

Total expenditure average per household and per capita by group									
		2007		2015		2016			
		per household	per capita	per household	per capita	per household	per capita		
Total expenditure - BGN	Total	8 676	3 693	16241	6857	14934	6740		
	Consumer total expenditure - BGN	Total	7 281	3 099	13295	5613	12100	5461	
		Of which:	Foods and non-alcoholic beverages	2 960	1 260	4600	1942	4267	1926
			Alcoholic beverages and tobacco	342	146	740	313	682	308
			Clothing and footwear	302	129	613	259	525	237
			Housing, water, electricity, gas and other fuels	1 098	468	2037	860	1808	816
			Furnishing and maintenance of the house	286	122	527	222	375	169
			Health	451	192	694	293	626	282
			Transport	587	250	1432	605	1296	585
			Communications	456	194	716	302	650	294
			Recreation, culture and education	404	172	1042	440	1134	512
			Miscellaneous goods and services	395	166	894	377	737	333
	Taxes	454	193	953	403	981	443		
	Social insurance contributions			1284	542	1224	552		
	Regular transfers to other households			122	52	103	47		
	Other expenditure	941	401	586	247	526	237		
	Saving deposits - BGN	243	103	752	318	1015	458		
Debt paid out and loan granted - BGN	426	182	711	300	536	242			
Total	9 345	3 978	17705	7475	16486	7440			

#### Poverty (index, rate, percentual...)

The poverty threshold in Sofia Capital District is the highest compared to those of other Bulgarian districts and much higher than national poverty threshold. (NSI, 2017)

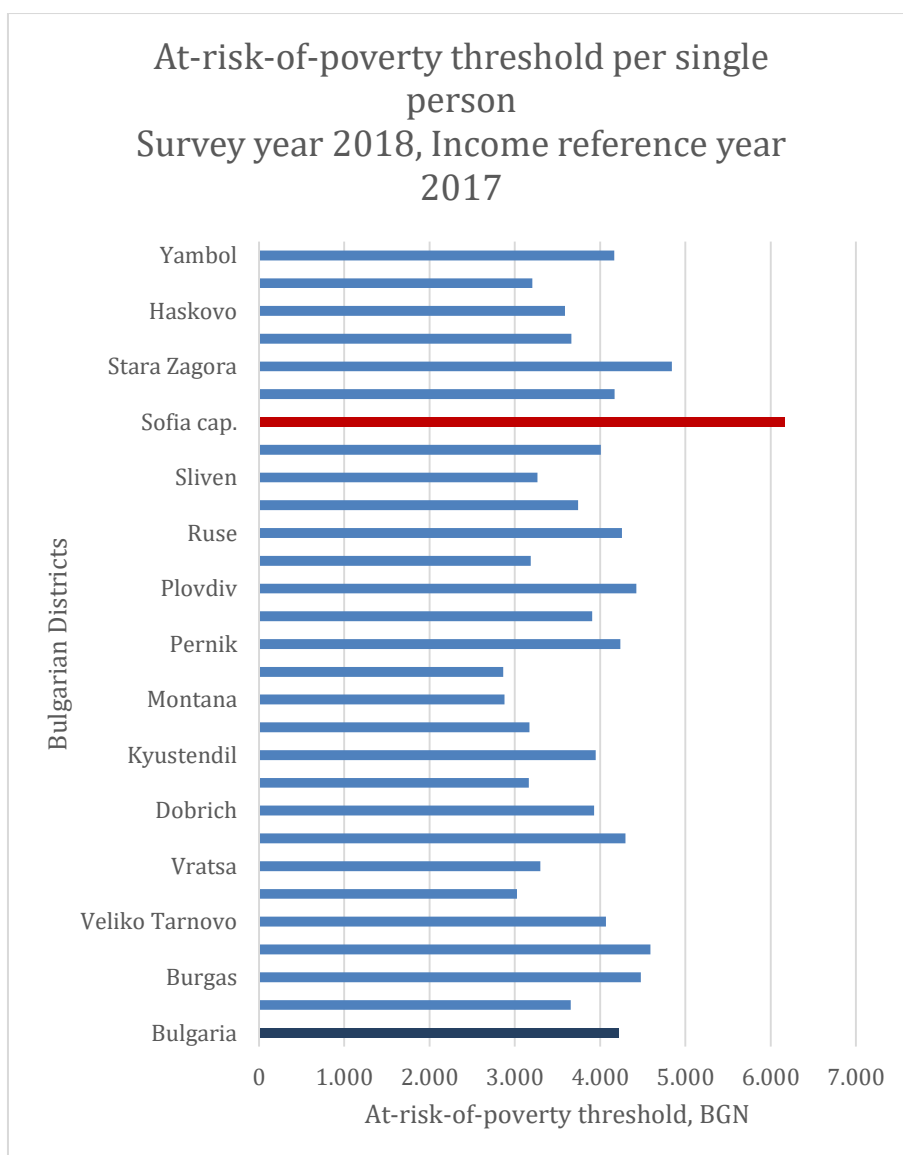


Figure 348. At-risk-of-poverty threshold per single person; Survey year 2018, Income reference year 2017, Source: NSI

Table 77. At-risk-of-poverty threshold (illustrative values of the region), Bulgaria and Sofia Cap., survey years: 2014, 2015, 2016, 2017 and 2018, Source: NSI

At-risk-of-poverty threshold (illustrative values of the region), Bulgaria and Sofia Cap.,										
<b>Survey year</b>	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018
<b>Income reference year</b>	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017

	Single person					Two adults with two children younger than 14 years (2As, 2Ch<14)				
<b>Bulgaria</b>	3 885	3 910	3 698	4 213	4 213	8 159	8 210	7 765	8 848	8 848
<b>Sofia cap.</b>	5 918	6 046	5 671	6 126	6 158	12 429	12 696	11 909	12 864	12 932

As presented on Figure 352, despite differences between the amounts, the At-risk-of-poverty threshold per “Single person” and “Two adults with two children younger than 14 years” at National and Sofia Capital level keep the same line.

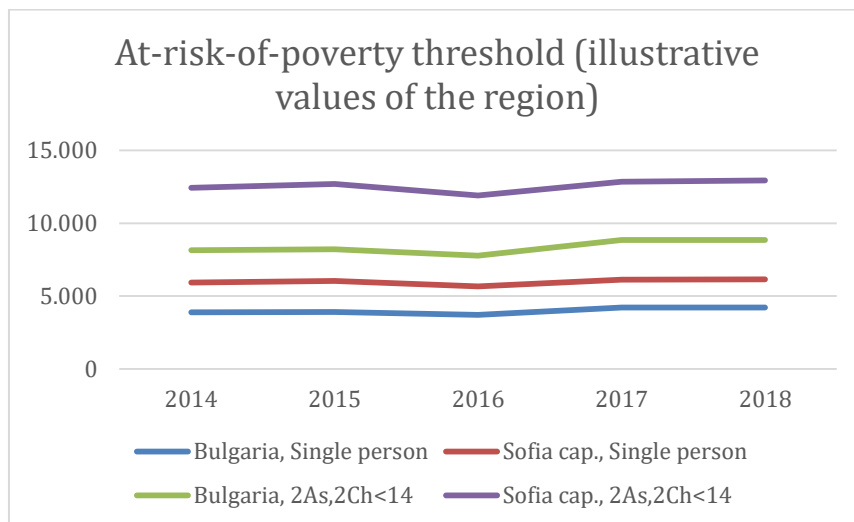


Figure 349. At-risk-of-poverty threshold (illustrative values of the region), Source: NSI

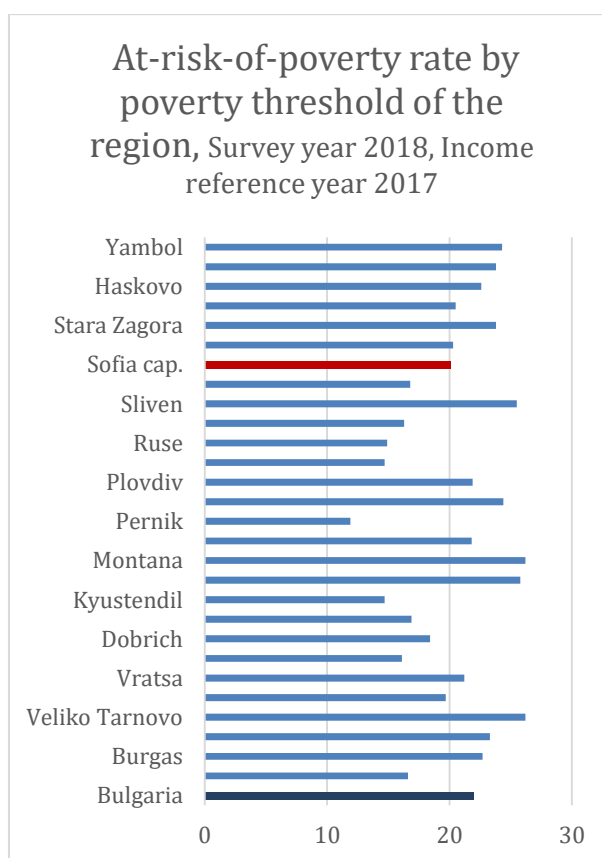


Figure 350. At-risk-of-poverty rate by poverty threshold of the region, Survey year 2018, Income reference year 2017, NSI

The Sofia Municipality relative share of poor is 20.1%, but the relative share of poor women is bigger (21.9%) than the share of poor men (18.1%). According to NSI data, Inequality of income distribution S80/S20 income quintile share ratio for Sofia Capital (Sofia Municipality) is 9 and Inequality of income distribution Gini coefficient is 44.3.

Table 78. Poverty and social inclusion indicators, Bulgaria and Sofia Cap., survey years: 2018, Income reference year 2017, Source: NSI

Survey year		2018		
Income reference year		2017		
Indicators	Level	total	male	female
[OV-C11] At-risk-of-poverty rate before social transfers (by gender)	Bulgaria	45.2	42.5	47.8
	Sofia cap.	36.6	32.9	40.1
[SI-C6] At-risk-of-poverty rate before social transfers, by gender (except pensions)	Bulgaria	29.5	27.5	31.2
	Sofia cap.	25.1	22.9	27.1
[SI-P8] Percent of population lacking at least 4 items in the economic strain and durables dimension by gender	Bulgaria	20.9	19.4	22.3
	Sofia cap.	12.2	10.2	13.9

The number of people living in households with very low work intensity in Sofia Municipality is 26.3 per 1000 persons or 3.3% of the population, which is much more favourable than the national level 331.2 per 1000 persons or 8.6% of the population.

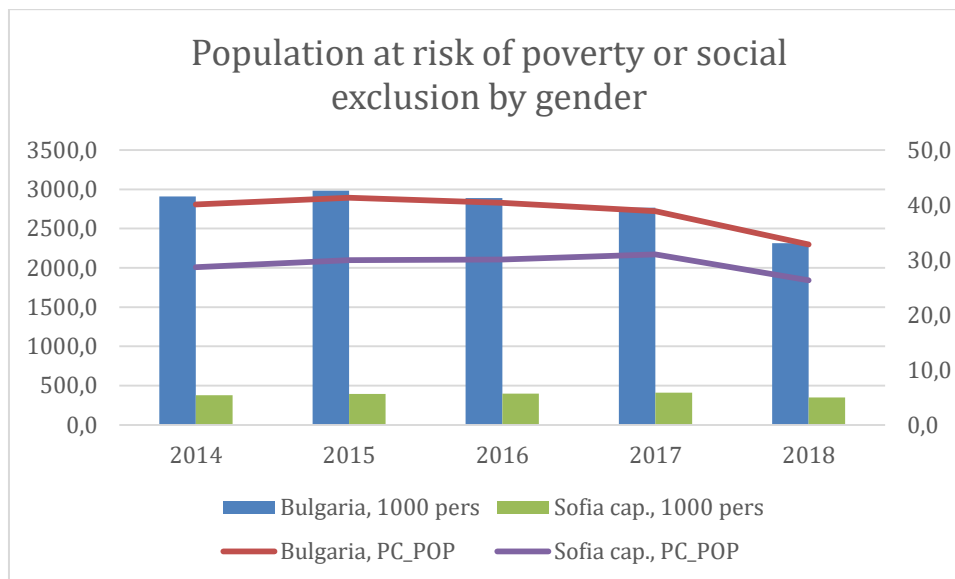


Figure 351. Population at risk of poverty or social exclusion by gender [PEPS01], Survey year 2014, 2015, 2016, 2017, 2018, Income reference year 2013, 2014, 2015, 2016, 2017, Source: NSI

Table 79. Inequality of income distribution Gini coefficient, Bulgaria and Sofia Capital, survey years: 2014, 2015, 2016, 2017 and 2018, Income reference year 2017, Source: NSI

Survey year	2014	2015	2016	2017	2018
Income reference year	2013	2014	2015	2016	2017
GINI					
Bulgaria	35.4	37.0	38.3	40.2	39.6
Sofia Municipality.	33.0	36.6	36.7	42.3	44.3

## Poverty assessment

Compared to the previous year, the poverty line as of 2016 decreased by 6.2% and the relative share of the poor decreased by 0.9 percentage points. The social protection system is essential to reducing poverty. Data for 2016 show that if household income includes pension income but excludes other social transfers (benefits, social and family benefits and allowances), the poverty rate increases from 20.2 to 22.4%, or by 2.2 percentage points. Accordingly, excluding pensions and other social transfers, the poverty rate increased to 38.5%, or 18.3 percentage points. The major factor increasing the risk of being poor for the majority of the population is their economic activity and their participation in the labour market. (Report "People", Second step of Vision Sofia 2050)

Table 80. Main indicators of poverty in Sofia municipality for 2016, Source: Report "People", Second step of Vision Sofia 2050

Poverty Line- Monthly Average - BGN	472,6
Persons below the poverty line - thousand	266,7
Proportion of poor -% of population	20,2
Relative share of the poor before receiving social transfers -% of the population	38,5
Proportion of poor before social transfers, including pensions -% of population	22,4
Income ratio of the poorest and richest 20% of the population (S80 / 20)	6,9
Gini coefficient	36,7

## Indicators of material deprivation in Sofia Municipality in 2016

The largest number of persons experience limitations in terms of home heating (66.1%) and the ability to meet unexpected costs (for urgent home or car repairs, laundry or refrigerator replacement, sudden illness, etc.) with their own funds (64.2%). At the same time, 3.2% of people could not afford a phone, including mobile, 0.2% - color TV, 4.6% - automatic washing machine, and 38.6% said they could not afford to eat meat, chicken or fish every day." (Report "People", Second step of Vision Sofia 2050)

Table 81. Indicators of Material Deprivation in Sofia Municipality:

Household questions related to limitation	Number of persons with disabilities	Relative share of population%
Has the household had difficulties in paying the following home expenses on time: - Loan for the purchase of the dwelling in which the household lives - Renting the dwelling in which the household lives - Current costs of electricity, water, heating (excluding telephone costs) - Loan repayments	75 558	31.9 %
Can the household afford a one-week vacation outside the home	143 885	60.7%
Can a household afford to eat meat, fish or their vegetarian equivalent every second day	91 552	38.6%



Can the household meet with its own funds unexpected financial expenses	152 215	64.2%
Does the household have a telephone	7 529	3.2%
Does your household own a color TV	443	0.2%
Does the household have an automatic washing machine	10 964	4.6%
Does the household own a car	50 577	21.3%
Is the household limited in heating the home due to lack of funds	156 631	66.1%

### **Living conditions**

A representative survey shows that, citizens of Sofia like the city, despite their sensibility for some issues. Around 91% of the respondents were satisfied with living here, and almost half of them were completely satisfied. However, the level of satisfaction differs significantly in different urban areas thus shaping three different combinations of factors and features shaping city life and everyday activities (Report "People", Vision Sofia 2050):

- Commercial and retail network and stores, opportunities for culture, educational opportunities and public transport are the features of urban life that citizens are satisfied with and fully satisfied.
- Public and green spaces, work and business opportunities, as well as income levels, housing and access to social services, nature and quality of drinking water are features of urban life that are acceptable to a broad majority of respondents. However, for these features the level of satisfaction is average to partial.
- Air quality and noise level, clean urban environment and city hygiene, the condition of the streets and buildings, the cost of living and security are features of urban life, of which the citizens of Sofia are critical.

### **Housing affordability**

Based on market research (2017), the following tendencies in residential area development are outlined:

- The most popular area for investment as of 2017 is area around Paradise mall, because of combination of metro station, big park and commercial centre;
- In some neighbourhoods (as Gotse Delchev residential area) property prices are very high (higher than 1000 euro/sq. m) due to the high demand and low supply;
- There are few new developed neighbourhoods (Manastirski livadi, Vitosha), which are well connected and have good ecological parameters. There is variety of apartments, including more spacious ones. Demand and property prices there are increasing (750-800 euro/sq. m);
- Studentski grad is outlined as completely different neighbourhood from the rest. There are a lot of new residential buildings and plots for investments, available infrastructure and specific public services. There is a large number of apartments, mostly small, for sale or rent. The property prices are comparatively low – around 700 euro/sq. m;

The most expensive neighbourhoods are the city centre and Lozenets (with property prices ranging 1200-1500 euro/sq. m), followed by Ivan Vazov and Iztok.

### **Houses without central heating**

According to the Census conducted in 2011, 61.2% of the dwellings in Sofia Municipality are heated by central heating. The data is confirmed by a survey of the quality of life in Sofia and Sofia Municipality (Vision Sofia 2050, 2019). *“The most common method of heating for households in Sofia is the TPP. Two in three respondents say they use steam in the heating season. One in five households (19%) relies only on electricity. Solid fuels - entirely or used in combination with electricity, one of the main air pollutants in Sofia, are used by 15% of the households.”*

### **Prices (houses, rents, construction costs, etc.)**

Based on data from the survey on the quality of life in Sofia and Sofia Municipality (Vision Sofia 2050, 2019) people's satisfaction about housing and housing affordability is presented in the next paragraphs:

- *“In general, the citizens of Sofia are satisfied with their private lives, the centre of which is the dwelling. It can be said that the population of the capital correlates to relatively enough housing stock. The predominant model is the nuclear family, which usually occupies 2-3 rooms. The typical resident of Sofia wants and owns the roof over his head, and has reduced his efforts to maintain the landscaping around it.*
- *Most of the respondents live in their own or co-owned properties (63%) or in properties that have been provided free of charge (26%).*
- *Only 9% occupied dwellings at free market rents, and tenants of municipal housing are a negligible number. The survey once again found the insufficient municipality's capacity to provide municipal housing stock and to intervene through such resource on the ground of social justice.*
- *The housing issue in Sofia is solved entirely privately and commercially.*
- *Some categories of Sofia citizens do not have the financial resources to exercise market choice and remain anchored in the homes they inherit. Expectedly, the higher the household income, the more claims people made when choosing. Two-thirds of the respondents whose monthly income per household member is up to BGN 500 have no choice, although they have already established themselves as occupiers. For everyone else, location is the leading factor.*
- *The largest share of tenants is in the 18-30 and 31-40 age segments. Expectedly, most homeowners aged 31-40 and income over \$ 1,000 per household member, have mortgages. These are the people who make careers and plan families.”*

The indices collected by NSI are presented as follows:

Table 82. House price index for Sofia City, previous quarter=1006162, Source: NSI63

Cities		Sofia		
Code		H.1.	H.1.1.	H.1.2.
Type of purchase		Total HPI	New dwellings	Existing dwellings
2015	I	8.6	9.1	5.1
	II	8.4	10.2	4.7
	III	4.8	7.4	1.5
	IV	8.7	10.5	6.2
2016	I	6.7	8.9	5.4
	II	11.4	5.5	14.1
	III	14.4	10.5	16.2
	IV	11.6	4.6	15.1
2017	I	12.6	13.3	12.3
	II	10.6	13.5	9.4
	III	11.3	6.8	13.3
	IV	9.2	4.7	11.3
2018	I	8.3	-2.5	13.5
	II	8.3	4.4	10.1
	III	7.0	8.1	6.5
	IV	6.6	7.5	6.3

Table 83. Annual average Consumer Price Indices (CPI), previous year = 100, (Since 2013 NSI applies detailed Classification of individual consumption by purpose (COICOP-5) for CPI construction and calculation) Source: NSI,

<http://www.nsi.bg/en/content/6063/annual-average-cpi-previous-year-100>

<sup>61</sup> Data refers to new and existing dwellings (apartments), purchased by households

<sup>62</sup> In compliance with Regulation (EC) No 2015/2010 since first quarter of 2017 the base year for House price indices (HPI) has been changed and the all indices have been calculated and published in 2015 as a base year. The change of reference year causes revisions to a number of previously published annual and monthly rates of change because of rounding effects. Thus, previously published annual and monthly rates calculated from the 2015=100 series can differ from the rates calculated from the 2010=100 series.

<sup>63</sup> <http://www.nsi.bg/en/content/5799/hpi-six-cities-population-more-120-000-inhabitants-previous-quarter-100>

COICOP Code	Commodity groups	2010	2011	2012	2013	2014	2015	2016	2017	2018
	<b>Total CPI</b>	2.4	4.2	3.0	0.9	-1.4	-0.1	-0.8	2.1	2.8
01	Food and non-alcoholic beverages	-0.4	6.9	3.0	2.8	-1.0	0.3	-0.2	4.0	2.2
02	Alcoholic beverages and tobacco	25.1	5.2	0.1	0.8	1.1	0.8	2.0	1.5	3.4
03	Clothing and footwear	-1.6	2.0	-0.2	-0.3	-1.1	0.6	-0.5	-1.4	-1.4
04	Housing, water, electricity, gas and other fuels	0.5	2.2	7.4	-0.6	-2.0	3.4	0.0	3.2	4.6
05	Furnishings, household equipment and routine household maintenance	-0.7	-0.1	-0.5	0.1	-1.1	-0.4	-1.5	-0.3	1.6
06	Health	3.2	2.3	1.1	-2.5	-3.4	-1.6	-0.2	0.2	0.2
07	Transport	8.1	8.2	5.7	-0.6	-3.4	-9.1	-6.4	3.7	4.9
08	Communication	-0.8	-0.9	-0.8	0.0	-3.5	-3.1	-3.7	-2.6	2.6
09	Recreation and culture	2.0	-1.9	-2.6	-1.4	-0.7	2.8	-0.5	-2.5	3.5
10	Education	5.7	2.6	6.3	3.0	1.7	2.7	2.7	4.5	3.0
11	Restaurants and hotels	1.8	2.7	3.0	3.6	1.2	1.1	1.4	2.5	4.5
12	Miscellaneous goods and services	4.5	3.0	1.3	0.7	-0.2	-0.2	-1.2	0.3	2.0
	<b>Foods</b>	-0.3	6.8	2.9	2.8	-0.9	0.4	-0.2	3.8	2.1
	<b>Non-foods</b>	6.5	3.5	2.1	-0.7	-1.8	-2.6	-1.4	1.7	2.5
	<b>Catering</b>	2.9	3.0	3.2	3.6	1.3	1.1	1.7	2.5	3.6
	<b>Services</b>	1.2	1.6	3.9	-0.4	-2.1	2.0	-1.1	0.5	3.9

Table 84. Average prices and purchased quantities of main food average per household, National level, Source: NSI

Average prices and purchased quantities of main food average per household, National level							
	Measure	2016		2017		2018	
Foods and beverages		quan-	average	quan-	average	quan-	average
		tity	price	tity	price	tity	price
			BGN		BGN		BGN
Rice	kg	14	2.36	13.8	2.32	13.5	2.33

Flour1	kg	22.3	1.01	21.7	1.02	22.9	1.03
<b>Bread</b>							
White bread	kg	115.7	1.28	114.5	1.31	110.3	1.43
Dobrudzha bread	kg	54.2	1.23	47.8	1.24	40.6	1.34
<b>Bakery products</b>							
Pasta products	kg	8.3	2.55	8.5	2.62	8.2	2.69
Bakery products	kg	6.1	6.57	5.2	6.86	5.1	7.34
Other bakery products	kg	5.8	2.9	5.9	2.93	5.8	2.91
Pastry-cook products	kg	13.7	7.41	14.1	7.6	13.5	7.91
<b>Meat</b>							
Pork	kg	21.3	6.89	21.1	7.31	23	7.25
Lamb	kg	2.2	11.67	2.2	11.32	2.5	11.74
Mutton and goat meat	kg	0.3	6.76	0.3	7.5	0.2	7.17
Minced meat	kg	15.7	5.98	16.2	6.25	15.5	6.36
Poultry meat	kg	22.7	4.58	23.4	4.54	24	4.53
Edible offals	kg	6.4	3.33	6.5	3.4	6.4	3.44
Bacon	kg	0.2	4.97	0.3	5.04	0.3	4.93
<b>Meat products</b>							
Dry meat	kg	3	9.96	2.9	10.64	2.8	11.37
Perishable sausages	kg	16.3	5.72	16.7	5.93	15.9	6.01
Non-perishable sausages	kg	5.6	12.85	5.7	13.47	5.8	13.97
Meat cans	kg	0.7	7.15	0.8	7.05	0.8	7.16
<b>Fish and fish products</b>							
Fresh and frozen fish	kg	10.1	6.31	9.6	6.54	9.9	6.99
Dried, smoked and salted fish	kg	0.1	11.87	0.1	11.36	0.1	11.04
Canned fish and seafood	kg	0.7	9.19	0.7	9.12	0.7	9.75
<b>Milk and milk products</b>							
Milk	litre	41.8	1.42	41.1	1.46	36.8	1.52
Yoghurt	kg	54.9	2.03	55.1	2.08	55.9	2.18
White cheese	kg	25.9	6.33	24.6	6.82	24.4	7.27
Other kind of cheese	kg	1.4	8.4	1.7	8.1	1.9	8.12
Yellow cheese	kg	9	11.15	9	11.8	9.2	12.15
Other milk products	kg	3	4.11	4	3.99	3.8	4.12
<b>Eggs</b>	<b>number</b>	<b>254</b>	<b>0.21</b>	<b>256</b>	<b>0.24</b>	<b>255</b>	<b>0.25</b>
<b>Vegetable oils</b>							
Sunflower oil	litre	30.8	2.29	31.9	2.22	30.8	2.12
Margarine	kg	2.5	4.99	2.3	5.22	2	5.61
Other vegetable oils	litre	1.2	10.06	1.1	11.43	1	12.12
<b>Animal fats</b>							
Butter	kg	2.3	11.81	2.2	14.36	2.2	17.19
Lard	kg	0.1	3.53	0.1	3.94	0.1	4.56
<b>Fresh and frozen fruit</b>							
Apples	kg	24.1	1.32	23.4	1.38	21.5	1.51



Pears	kg	1.1	2.25	1.3	2.42	1.3	2.44
Plums	kg	2.8	0.84	2.1	0.88	1.8	1.09
Cherries and morellos	kg	1.8	3.24	2.2	2.96	2.3	2.83
Peaches and apricots	kg	8	1.64	10	1.51	7.1	1.81
Strawberries and raspberries	kg	1.8	3.61	1.7	3.92	1.9	3.91
Grapes	kg	7.8	1.45	10.2	1.38	7.1	1.63
Olives	kg	5	6.07	5.5	6.2	5.5	6.39
Watermelons and melons	kg	29	0.66	29.4	0.61	22.8	0.72
Pumpkins	kg	2.7	0.63	2.8	0.61	2.7	0.63
<b>Dried fruit and nuts</b>							
Dried fruit	kg	0.3	9.65	0.3	9.57	0.3	10
Nuts	kg	1.9	11.16	2.3	11.39	2.2	11.27
<b>Canned fruit</b>							
Compotes	kg	0.2	2.9	0.1	2.33	0.3	3.05
Jam, preserves and marmalade	kg	0.4	5.78	0.5	6.62	0.5	6.66
Juices, syrups and nectars	kg	11.1	1.89	11.2	1.94	11	1.95
<b>Fresh and frozen vegetables</b>							
Tomatoes	kg	42.9	1.86	40.1	1.95	42.3	2.08
Cucumbers	kg	22.3	1.81	22	1.84	22.1	2.02
Cabbage	kg	26.9	0.73	25.2	0.78	25.9	0.87
Onions	kg	15.3	0.92	15.6	0.87	14.7	0.97
Garlic	kg	0.7	5.42	0.6	5.6	0.7	5.23
Green onions, garlic and leek	kg	2.7	2.11	2.8	2.15	2.9	2.28
Fresh vegetable spices	kg	0.9	3.89	0.8	4.03	1	4.12
Dried vegetable spices	kg	0.7	11.09	0.7	11.21	0.7	11.74
<b>Dried bean and seed</b>							
Dry beans	kg	7.7	3.76	7.8	3.89	7.3	3.89
Lentil	kg	4.5	3.06	4.8	3.32	4.6	3.33
Other dried bean and seed	kg	0.1	8.74	0.1	7.65	0.1	9.81
<b>Canned vegetables</b>							
Canned vegetables	kg	6.2	3.89	6.9	3.96	7.3	3.99
Vegetable juices and nectars	litre	0.1	1.87	0.1	2.06	0.1	2.21
Pickled vegetables	kg	0.4	3.46	0.4	3.09	0.4	3.12
Sauerkraut	kg	0.6	1.69	0.6	1.59	0.8	1.69
<b>Mushrooms</b>							
Fresh mushrooms	kg	2.3	4.41	2.4	4.51	2.5	4.47
Dry and canned mushrooms	kg	0.1	5.33	0.1	4.82	0.1	7.06
Potatoes	kg	50.7	0.89	51.4	0.89	50.5	0.89
<b>Sugar and sugar products</b>							
Sugar	kg	28.4	1.6	31.7	1.6	29.8	1.25
Sugar products	kg	1.8	7.39	1.9	7.92	1.8	8.07
Chocolate products	kg	3.3	14.52	3.3	15.11	3.5	15.41

Honey	kg	1.9	8.92	1.9	8.98	1.9	9.33
<b>Coffee, tea and cocoa</b>							
Coffee	kg	3.9	15.69	4	16.73	4	17.56
Tea	kg	0.2	23.2	0.2	23.01	0.1	22.86
Cocoa	kg	0.1	10.68	0.1	12.07	0.1	13.14
<b>Other foodstuffs</b>							
Salt	kg	7.7	0.67	7.9	0.68	7.8	0.69
Vinegar	litre	4.2	1.53	4.2	1.66	3.9	1.78
Spices	kg	0.2	19.43	0.2	22.1	0.2	21.79
<b>Non-alcoholic beverages</b>							
Soft drinks	litre	130.3	0.56	141.8	0.55	140	0.59
Millet-ale	litre	3.2	0.93	3.6	0.91	3.8	0.93
<b>Alcoholic beverages</b>							
Beer	litre	62.2	1.31	66.3	1.3	52.7	1.31
Wine	litre	4.7	4.13	5.3	4.17	5.1	4.28
Spirits	litre	1.5	15.7	1.5	15.93	1.5	17.12
Brandy	litre	1.6	9.55	1.6	10.06	1.5	10.23
Cigarettes	number	1497	0.23	1508	0.24	1508	0.25

Table 85. Average prices and purchased quantities of main non-foods average per 100 households, National level, Source: NSI

Average prices and purchased quantities of main non-foods average per 100 households, National level							
		2016		2017		2018	
Non-foods	Measure	quantity	average price - BGN	quantity	average price - BGN	quantity	average price - BGN
Lighting, heating, water							
Firewood	cubic metre	386.2	63.67	458.7	66.75	328.7	71.53
Coal	kg	15000	0.26	18300	0.28	10100	0.32
Liquid fuels	litre	13.3	1.41	29.3	1.59	4.9	1.59
Electricity	kWh	400012	0.18	423788	0.18	402776	0.19
Gas	litre	1479.1	0.95	1297.5	1.05	1140.4	1.11
Electricity appliances							
Refrigerators	number	2.8	567.21	2.9	540.32	2.2	586.16
Freezers	number	0.3	267.54	0.4	527.34	0.4	427.52
Washing machines	number	1.7	531.19	3.3	517.09	3.1	613.69
Vacuum cleaners	number	3	113.42	3.9	145.21	4	165.48
Water heaters	number	4.5	215.28	3.1	212	2.9	236.83
Laundry soap	kg	6.6	3.31	6.3	2.87	3.6	3.9
Garments for men							
Overcoats	number	25.5	58.76	25.3	59.45	23.1	61.35
Costumes	number	1.9	171.23	2.5	168.15	2.8	181.15

Jackets	number	0.9	65.42	1.3	64.09	0.9	62.72
Trousers	number	67.2	29.03	68.2	30.34	69.7	30.25
Shirts	number	29	22.25	25.9	21.02	32.8	24.31
Garments for women							
Overcoats	number	28	60.98	31.8	56.27	31.1	58.21
Costumes	number	5.4	81.08	4.9	76.32	3.7	82.12
Dresses	number	26.4	41.34	29.4	44.67	35.3	45.33
Blouses	number	152.5	16.89	140.3	17.48	136	17
Garments for children							
Overcoats	number	21.5	35	21.6	36.89	20.7	38.49
Clothing fabrics <sup>1</sup>	metre	3.6	6.99	2.7	6.44	2.6	9.68
Footwear for men							
Leather shoes	pair	109.5	46.88	116.4	47.65	103.9	49.82
Other kind of shoes	pair	50.9	8.01	47.9	8.37	52.8	9.32
Footwear for women							
Leather shoes	pair	159	39.17	151.1	40.99	147.8	41.29
Other kind of shoes	pair	78.3	7.25	80.9	7.58	73.1	8.15
Footwear for children							
Leather shoes	pair	62.1	27.01	68.3	28.02	63.3	28.7
Other kind of shoes	pair	11.7	9.05	11.1	8.41	10.4	9.32
Equipment for recreation and education							
Television sets	number	5.4	571.6	4.5	497.87	4.1	488.16
Radio sets, tape and cassette players	number	0.4	77.72	0.6	46.33	1.1	63.17
Fuels for vehicles							
Fuels	litre	24674.8	1.63	25112.4	1.76	29864.8	1.86

### **Tourism/Leisure/culture/sport expenditure**

Based on Sofia Municipality data shown in Table \$4, (Total expenditure average per household and per capita by group in 2016, Source: NSI), Recreation, culture and education average expenditure is 512 BGN per capita and 1134 BGN per household, which is 9% of the consumer's total expenditure.

### **Trust of consumers**

According to the Consumer Survey, conducted by NSI in April 2019, the following important facts should be highlighted  
([http://www.nsi.bg/sites/default/files/files/pressreleases/Consumer2019-04\\_en\\_SSTANJP.pdf](http://www.nsi.bg/sites/default/files/files/pressreleases/Consumer2019-04_en_SSTANJP.pdf)) "In April 2019, the total consumer confidence indicator decreases by 0.7 percentage points in comparison with January, which is entirely due to the decreased confidence among the urban population. (Figure 70)

Regarding the economic situation in the country over the last 12 months, certain deterioration in the assessments of the quality of life in the cities is observed. Meanwhile,

the rural inhabitants are less negative in their attitude compared to the previous survey (Figure 71). However, the forecasts of both urban and rural population over the next 12 months are more unfavourable, as a result of which the total balance indicator decreases by 2.1 percentage points (Figure 72).

In comparison with 3 months ago, the consumers' opinions about the financial situation of their households over the last 12 months (Figure 73) and the expectations over the next 12 months (Figure 74) are more negative. Concerning the unemployment in the country over the next 12 months the forecasts are shifting towards more moderate opinions, as a result of that the balance indicator decreases by 4.4 percentage points (Figure 75).

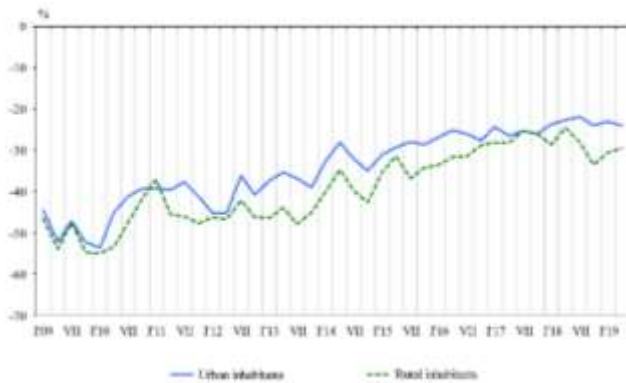


Figure 352. Consumer confidence indicator for urban and rural inhabitants for the period , Source: NSI, 2019

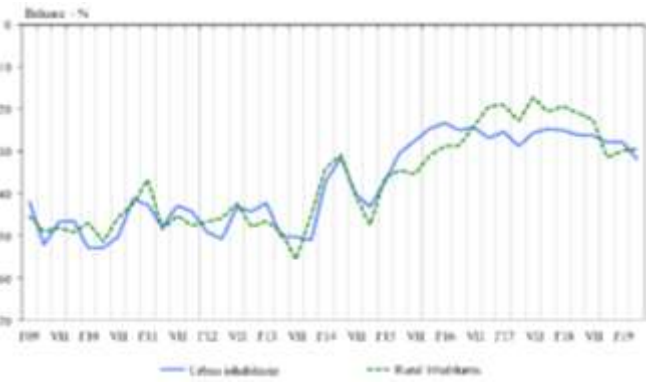


Figure 353. Assessment of the general economic situation in the country over the last 12 months, Source: NSI, 2019

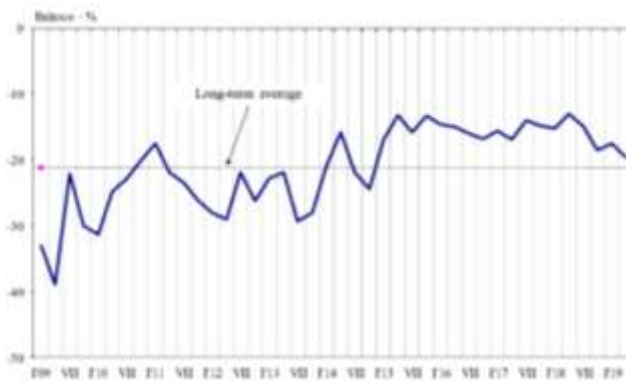


Figure 354. Expectations about the general economic situation in the country over the next 12 months, Source: NSI, 2019

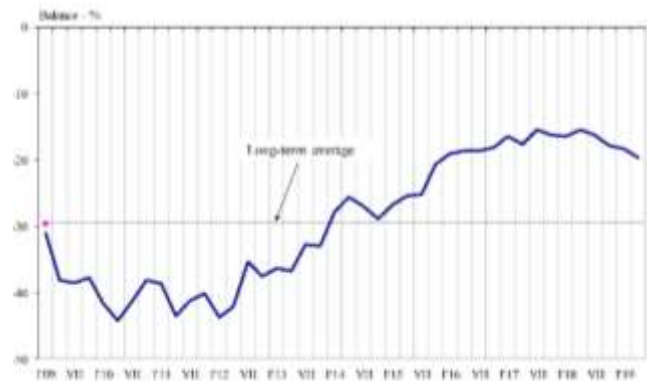


Figure 355. Assessment of the financial situation of households over the last 12 months, Source: NSI, 2019



Figure 356. Expectations about the financial situation of households over the next 12 months, Source: NSI, 2019

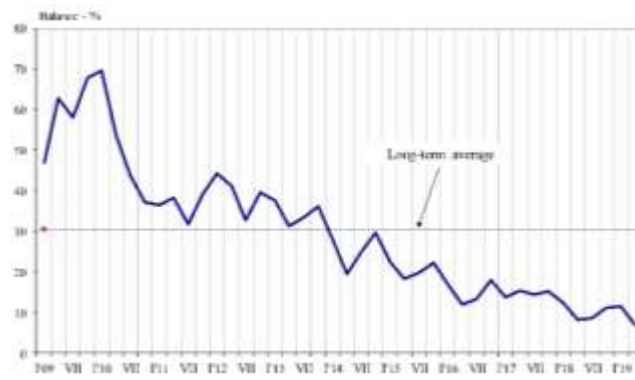


Figure 357. Unemployment expectations over the next 12 months, Source NSI, 2019

The consumers continue to consider that over the last 12 months there has been an increase of consumer prices, but at a lower rate, compared to the assessments registered in January. At the same time, their inflation expectations about the next 12 months are less intense (Figure 76).

The last inquiry reports some improvement (by 2.0 percentage points) in the total assessment of the present situation for making major purchases of durable goods<sup>1</sup>, as the consumers' intentions to make such expenditures over the next 12 months are favourable. The rural population' opinion on the intentions to make expenditures on 'buying a car' over the next 12 months is also slightly more positive (Figure 77).

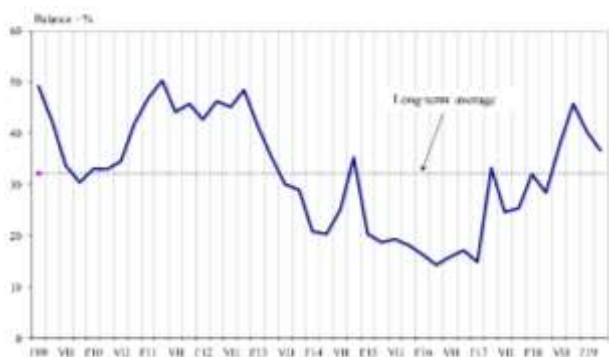


Figure 358. Expectations about inflation over the next 12 months, Source: NSI,2019



Figure 359. Intentions of buying a car over the next 12 months, Source: NSI, 2019

### 5.2.3.2 Employment

#### Competitiveness

Summarised results of a conducted Quantitative analysis of the economy of Sofia Municipality are part of the Report "Economics", 2nd step, Vision Sofia 2050 (2018). The analysis is based on the economic activity of the enterprises registered in the geographical



scope of Sofia Municipality as for 2015. The following indicators are examined with reference to stratification of the economic activities:

**The Three-Dimensional Indicator: Revenue - Profit - Employees (S-P-E)** shows where the sectors in Sofia are in terms of revenues and profits in absolute terms, as well as those employed in the respective sector. From the figure it is easy to conclude that Trade, being in the top right quadrant, has the largest share of the total revenue (49.7%), the amount of registered profit (37.8%) and the number of employees (25.8 %). According to Nace Rev.'s used nomenclature 2, non-wholesale, retail and repair activities are included in this sector.

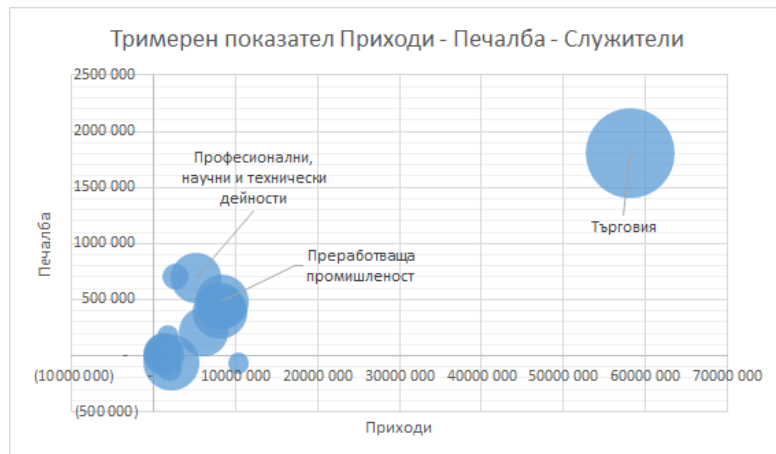


Figure 360. S-P-E by Economic activity groupings in 2015, Source: Report Economy, Vision of Sofia 2050(2018)

When trade is excluded from data representation, more detailed analysis and visualization of the other sectors is possible. The following findings can be made from the figure below:

In the upper left quadrant are Finance and Insurance (14.7% of profit and 2.3% of revenue) and Professional activities and research (14.5% of profit and 4.4% of the total profit and lower revenue share). The number of employees for Finances and Insurance are smaller (2.3% of the employees in the registered companies in the CA), while in the Professional and scientific activities the number is higher (8.1%). Manufacturing, Construction and ICT have similar profiles (Fig 79)

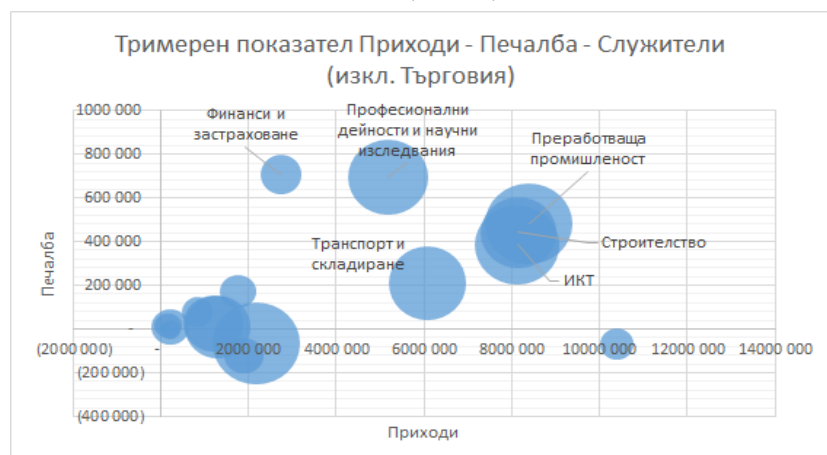


Figure 361. S-P-E by Economic activity groupings in 2015 (without Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)), The size of the "bubble" represents the number of employees, Source: Report : "Economics" , 2nd step, Vision Sofia 2050 (2018)

The Two-Dimensional Indicator ( $S/E - P/E$ ) measures how much revenue ( $S/E$ ) and profit ( $P/E$ ) one employee makes across sectors. It aims to reveal how efficiently the human resource is used by sector or how much revenue and profit a single employee generates.

The sectors Finance and Insurance have the highest employee/earnings ratio, where more than BGN 40,000 per employee earnings per year is generated. Other sectors with a relatively high  $P/E$  ratio are the Creative and Recreational Industries and Professional Activities and Research. (Fig80)



Figure 362.  $S/E - P/E$  by Economic activity groupings in 2015, Source: Economic Report from the 2nd step of the Vision of Sofia (2018)

Unsurprisingly, the highest revenue per employee ratio is observed in the Trade sector with over BGN 300,000 generated per employee revenue. It should be borne in mind that there are other factors that influence this indicator, such as the level of application of ICT in operational activities, the degree of process automation, and others, for which no information was available at the time of developing this report.

Some indicators and detailed data about labour productivity at National Level are presented in Table 57.

Table 86. Labour Productivity, GDP, National level, Source: NSI, <https://nsi.bg/en/content/5525/labour-productivity-total-economy>

Year	GDP per employed-current prices, levs	GDP per hour worked-current prices, levs	Volume indices** of GDP per employed at previous year = 100 (%)	Volume indices** of GDP per hour worked, corresponding quarter of previous year = 100, (%)
2010	20747	12.61	105.4	105.4
2011	22913	13.9	104.2	104.3
2012*	23874	14.52	102.6	102.6
2013*	23926	14.55	100.9	100.9
2014*	24389	14.83	101.5	101.5
2015*	25702	15.63	103.1	103.0
2016*	27179	16.54	103.4	103.5

2017*	28662	17.44	102.0	102.0
2018*	30646	18.63	103.2	103.1

Table 87. Labour Productivity, Total of Economy, National level, Source: NSI

		Year	Year	Year	Year	Year	Year	Year	Year	Year
		2010	2011	2012*	2013*	2014*	2015*	2016*	2017*	2018*
<b>GDP per employed</b>	current prices, levs	20747	22913	23874	23926	24389	25702	27179	28662	30646
	previous year prices, levs	20520.1	21620.7	23508.4	24095.8	24276.8	25147.4	26581.8	27718.5	29575.9
	at 2010*** prices, levs	20747.4	21620.7	22182.2	22388.3	22716.1	23422.4	24224.1	24705.0	25493.1
	Volume indices****, previous year = 100 (%)	105.4	104.2	102.6	100.9	101.5	103.1	103.4	102.0	103.2
	Volume indices, 2010 = 100 (%)	100.0	104.2	106.9	107.9	109.5	112.9	116.8	119.1	122.9
<b>GDP per hour worked</b>	current prices, levs	12.6	13.9	14.5	14.6	14.8	15.6	16.5	17.4	18.6
	previous year prices, levs	12.5	13.2	14.3	14.7	14.8	15.3	16.2	16.9	18.0
	at 2010*** prices, levs	12.6	13.2	13.5	13.6	13.8	14.2	14.7	15.0	15.5
	Volume indices****, previous year = 100 (%)	105.4	104.3	102.6	100.9	101.5	103.0	103.5	102.0	103.1
	Volume indices, 2010 = 100 (%)	100.0	104.3	107.0	107.9	109.6	112.9	116.9	119.2	122.9
<b>GVA ** per employed</b>	current prices, levs	16354.0	18249.7	18814.9	18773.1	19470.9	20485.1	21707.1	22944.0	24334.1
	previous year prices, levs	16224.9	17049.3	18568.4	18834.8	19236.7	20003.0	21067.6	22191.1	23495.9
	at 2010*** prices, levs	16354.0	17049.3	17346.9	17361.1	17805.3	18297.6	18815.8	19230.6	19667.8
	Volume indices****, previous year = 100 (%)	105.8	104.3	101.7	100.1	102.6	102.8	102.8	102.2	102.3
	Volume indices, 2010 = 100 (%)	100.0	104.3	106.1	106.2	108.9	111.9	115.1	117.6	120.3
<b>GVA ** per hour worked</b>	current prices, levs	9.9	11.1	11.4	11.4	11.8	12.5	13.2	14.0	14.8
	previous year prices, levs	9.9	10.4	11.3	11.5	11.7	12.2	12.8	13.5	14.3
	at 2010*** prices, levs	9.9	10.4	10.6	10.6	10.8	11.1	11.5	11.7	12.0
	Volume indices****, previous year = 100 (%)	105.9	104.3	101.7	100.0	102.7	102.8	102.9	102.2	102.2
	Volume indices, 2010 = 100 (%)	100.0	104.3	106.1	106.1	109.0	112.0	115.2	117.7	120.3

### Activity and Employment rate

The population in the most economically active age of 15-64 years in the Sofia Municipality is 72.1% of the total population, compared to the national average - 68.1%. This share for the Of the age group 15-64 (economically active persons) of CO is around 71.5% and 28.5% is the share of economically inactive persons. The national average is 65.3/34.7. From the group of the active persons, the employed are 91.7% and the unemployed 8.3%, compared to the ratio at country level (85.0%: 15.0%). (Report "Economics", Vision Sofia 2050, 2019, based on data from 2011)

Comparing the data on employed people aged 15 to 64, provided by NS for the years 2014 to 2018, confirms the rule evident from the census data, namely that the share of employees in Sofia Municipality Employment rates exceeds that in the country. Another stable rule is that the proportion of employed women should be lower than that of employed men. (NSI, 2019)

Table 88. Employed and employment rates of population of 15 - 64 years of age in 2014, 2015, 2016, 2017 and 2018, Source: NSI

Periods	National Level and Sofia Municipality	Employed - thousands			Employment rates - %		
		Total	Male	Female	Total	Male	Female
2018	Bulgaria	3068.9	1636.6	1432.2	67.7	71.5	63.9
	Sofia Municipality	682.6	346.0	336.6	75.6	77.5	73.8
2017	Bulgaria	3073.4	1638.6	1434.8	66.9	70.6	63.1
	Sofia Municipality	676.6	344.6	332.0	74.6	77.0	72.3
2016	Bulgaria	2954.3	1569.3	1385.0	63.4	66.7	60.0
	Sofia Municipality	660.5	335.3	325.3	72.5	74.7	70.3
2015	Bulgaria	2973.5	1571.7	1401.8	62.9	65.9	59.8
	Sofia Municipality	655.8	329.8	326.0	71.7	73.4	70.1
2014	Bulgaria	2927.4	1543.3	1384.1	61.0	63.9	58.2
	Sofia Municipality	636.6	320.4	316.2	69.2	71.0	67.5

Based on NSI publications Regions, districts and municipalities in the republic of Bulgaria 2016 and 2017, the difference between the employment rates of population of 15 - 64 years and employment rates of population 15 years of age and over is observed. When the pensioners are included the activity rate and employment rate go down.

Table 89. Labour force 15 years of age and over activity rate, employment rate and unemployment rate by National Level and Sofia municipality in 2016 and 2017, Source: NSI

Periods	National Level and Sofia Municipality	Labour force - in thousands			Persons not in labour force - in thousands	Activity rate - %	Employment rate - %	Unemployment rate - %
		Total	Employed	Unemployed				
2017	Bulgaria	3357.2	3150.3	206.9	2707.7	55.4	51.9	6.2

	Sofia Municipality	714.5	694.8	19.7	418.8	63.0	61.3	2.8
2016	Bulgaria	3264.0	3016.8	247.2	2856.3	53.3	49.3	7.6
	Sofia Municipality	704.1	677.2	27.0	429.8	62.1	59.7	3.8

Table 90. Employed persons by level of education, by National Level and Sofia municipality in 2016 and 2017, Source: NSI

Periods	National Level and Sofia Municipality	Total	By level of education			
			Higher	Upper secondary		Lower secondary or lower
				Total	Of which: Vocational	
2017	Bulgaria	3150.3	989.6	1819.7	1091.1	340.9
	Sofia Municipality Level	694.8	359.5	320.2	196.5	15.1
2016	Bulgaria	3016.8	979.3	1725.1	1073.5	312.3
	Sofia Municipality Level	677.2	360.3	303.4	187.3	13.4

Table 91. Employed persons by sex and professional status by National Level in 2016, 2017 and 2018, Employment and Unemployment - annual data 2018, Source: NSI

	Years	Total	Professional status					
			Employers	Self employed	Employees			Unpaid family workers
					Total	In private enterprises	In public enterprises	
Total	2016	3016.8	107.3	228.3	2662.9	1981.8	681.1	18.4
	2017	3150.3	114.8	235.3	2775.4	2101.8	673.6	24.7
	2018	3152.7	117.2	226.6	2785.4	2113.5	671.9	23.5
Male	2016	1607.6	77.4	143.8	1379.6	1097.7	281.8	6.8
	2017	1682.6	82.5	150.8	1440.4	1166.1	274.2	9
	2018	1685.3	85.8	146.3	1444.3	1176.5	267.8	8.9
Female	2016	1409.2	29.8	84.5	1283.3	884	399.3	11.6
	2017	1467.7	32.3	84.6	1335	935.7	399.4	15.7
	2018	1467.3	31.3	80.3	1341.1	937	404.1	14.6



Table 92. Employed by occupational class and sex, by National Level, in 2016, 2017, 2018, Source: NSI, <https://nsi.bg/en/content/6500/employed-and-employment-rates-national-level-statistical-regions-districts>

Occupational classes	2018			2017			2016		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
	3152.7	1685.3	1467.3	3150.3	1682.6	1467.7	3016.8	1607.6	1409.2
<b>of which:</b>									
<b>Managers</b>	174.3	107.1	67.2	181.4	110.3	71.1	182.6	113.5	69.2
<b>Professionals</b>	524.8	181.4	343.4	507.6	169.6	337.9	511.9	170.0	341.9
<b>Technicians and associate professionals</b>	296.9	160.3	136.7	299.8	163.5	136.2	284.3	147.4	136.9
<b>Clerical support workers</b>	193.7	53.3	140.4	193.8	52.6	141.1	178.1	50.4	127.7
<b>Service and sales workers</b>	668.9	262.4	406.5	666.6	261.3	405.4	635.2	255.4	379.8
<b>Skilled agricultural, forestry and fishery workers</b>	100.2	65.4	34.8	109.7	71.9	37.8	104.9	67.8	37.1
<b>Craft and related trades workers</b>	408.9	303.6	105.3	414.5	310.0	104.5	393.6	296.4	97.2
<b>Plant and machine operators, and assemblers</b>	405.2	308.8	96.5	409.9	308.6	101.3	389.4	292.9	96.5
<b>Elementary occupations</b>	356.6	223.9	132.7	342.7	215.0	127.7	311.6	192.4	119.2

Table 93. Employees, by National Level, in 2016, 2017, 2018, Source: NSI

Sex/Place of residence/Type of working time Type of contract with the employer Kind of ownership/ Permanency of job	Number - thous.	Number - thous.	Number - thous.
Years	2018	2017	2016
Total	2785.4	2775.4	2662.9
By sex			
Male	1444.3	1440.4	1379.6
Female	1341.1	1335.0	1283.3
By place of residence			
Urban	2219.8	2223.4	2157.2
Rural	565.6	552.0	505.7
By type of working time			
Full-time employees	2738.3	2722.9	2615.3
Part-time employees	47.1	52.5	47.6
By type of contract with the employer			

Labour or civil service contract	2697.7	2686.6	2584.1
Civil or other	25.3	26.1	22.9
Without contract	62.4	62.7	55.9
By kind of ownership			
Private sector	2113.5	2101.8	1981.8
Public sector	671.9	673.6	681.1
By permanency of job			
Employees with permanent job	2671.2	2650.5	2552.0
Employees with temporary job	114.3	125.0	110.9

### Employment rate per economic and no-profit sector rate

Bulgarian National Statistical Institute provide data about employment rate by kind of ownership, for example employed persons in private sector and in public sector but does not provide data about employed persons in no-profit sector. The other data providing limitation is the lack of information at regional and municipal level. Based on NSI publications Employment-and-unemployment-annual-data, employed persons data by type of working time, sex and kind of ownership. (Table 65)

Table 94. Employed persons by type of working time, sex and kind of ownership, by National Level, in 2016, 2017, 2018 Source: NSI, <https://nsi.bg/en/content//employment-and-unemployment-annual-data-2016>; <https://nsi.bg/en/content/employment-and-unemployment-annual-data-2017>; <https://nsi.bg/en/content/employment-and-unemployment-annual-data-2018>

		By sex			By kind of ownership	
		Total	Male	Female	In private sector	In public sector
2018		Number - in thousands				
	total	3152.7	1685.3	1467.3	2480.8	671.9
	Full-time employed	3088.1	1654.5	1433.5	2431.5	656.6
	Part-time employed	64.6	30.8	33.8	49.3	15.3
	of which: because no full-time jobs available	31.1	17	14.1	21.9	9.1
		Average actual working hours per wee				
	total	39.9	40.2	39.5	40.2	38.6
	Full-time employed	40.2	40.5	39.9	40.5	39
	Part-time employed	20.2	20.6	19.9	20.5	19.6
	of which: because no full-time jobs available	21	21.4	20.7	21.5	20.2
2017		Number - in thousands				
	total	3150.3	1682.6	1467.7	2476.6	673.6
	Full-time employed	3073.9	1646	1427.9	2415.5	658.3
	Part-time employed	76.4	36.6	39.8	61.1	15.3
	of which: because no full-time jobs available	46.6	25.8	20.8	35.6	11
	Average actual working hours per wee					

	total	40	40.3	39.6	40.3	38.6
	Full-time employed	40.4	40.6	40.1	40.7	39.1
	Part-time employed	20	20.6	19.7	20	20.1
	of which: because no full-time jobs available	20	20.2	19.8	20.1	19.8
<b>2016</b>		Number - in thousands				
	total	3016.8	1607.6	1409.2	2335.7	681.1
	Full-time employed	2950.4	1577	1373.4	2284.2	666.1
	Part-time employed	66.4	30.6	35.8	51.5	15
	of which: because no full-time jobs available	37.3	17.9	19.4	27.8	9.5
		Average actual working hours per wee				
	total	40.2	40.5	39.8	40.6	38.9
	Full-time employed	40.6	40.8	40.3	41	39.3
	Part-time employed	19.5	19.9	19.3	19.6	19.5
	of which: because no full-time jobs available	20.6	20.4	20.8	21.2	19.1

Most of the active NGOs are small organizations with limited budget and resources. About 46% of the investigated NGO-s declared annual budgets for 2016 under 20000 BGN and 27% of the NGO-s have a budget ranging 20 000 BGN - 60 000 BGN. As a result, about 60% of NGO-s, included in a survey, pointed out that most of their team members work as volunteers. Half of the people who work for remuneration also work on a civil contract, while one third are with permanent employment contract. (OSI, 2017)

### Employees in the agriculture, social, services, industrial sectors

Table 95. Employees under labour contract by economic activity groupings, by National level and Sofia Municipality in 2016 and 2017, Source: NSI

	Periods	2017		2016	
	National level and Sofia Municipality	Bulgaria	Sofia Municipality	Bulgaria	Sofia Municipality
<b>Economic activity groupings</b>	Total	2308129	739542	2277345	723290
	Agriculture, forestry and fishing	71340	1836	71637	1889
	Mining and quarrying	21624	596	23687	699
	Manufacturing	521444	61830	514260	60595
	Electricity, gas, steam and air conditioning supply	30205	8614	30574	8824
	Water supply; sewerage, waste management and remediation	36732	8521	36182	8345
	Construction	127493	43347	124379	42476
	Wholesale and retail trade; repair of motor vehicles and motorcycles	379830	148843	375525	146223

Transportation and storage	148623	50484	146236	49384
Accommodation and food service activities	119137	31699	114838	30700
Information and communication	90854	75121	85082	69876
Financial and insurance activities	56997	41031	56970	41512
Real estate activities	24035	11326	23383	11046
Professional, scientific and technical activities	79533	51481	76876	49630
Administrative and support service activities	112810	64884	111803	63670
Public administration and defence; compulsory social security	111624	38110	111572	38098
Education	162697	37339	163905	36796
Human health and social work activities	138636	35808	138016	35376
Arts, entertainment and recreation	36911	12803	35332	12270
Other service activities	37604	15869	37088	15881

Table 96. Employees under labour contract by economic activity groupings - inflows and outflows by National level in 2016 and 2017, (Data refer to firms with double entry accounting), Source: NSI, <https://nsi.bg/en/content/6460/employees-under-labour-contract-%E2%80%93-inflows-and-outflows>

Economic activity	2017		2016	
	Inflows	Outflows	Inflows	Outflows
Total	1153768	1076697	1129082	1049750
Agriculture, forestry and fishing	47613	45748	47733	46446
Mining and quarrying	3126	3989	3469	5098
Manufacturing	210075	197220	207195	193244
Electricity, gas, steam and air conditioning supply	3790	3581	3736	4057
Water supply, sewerage, waste management and remediation activities	14093	13013	13636	13564
Construction	120776	111663	106275	103193
Wholesale and retail trade; repair of motor vehicles and motorcycles	203953	190698	204735	188059
Transportation and storage	67532	61456	65364	59653
Accommodation and food service activities	164765	155593	157414	147876
Information and communication	32552	27039	34114	27336
Financial and insurance activities	15808	14771	15706	15346
Real estate activities	10962	11252	10240	10537
Professional, scientific and technical activities	35522	31366	33593	28937
Administrative and support service activities	84961	77822	90210	80839

Public administration and defence; compulsory social security	18965	17837	20591	19313
Education	41019	40007	37256	38015
Human health and social work activities	34465	33167	35925	30851
Arts, entertainment and recreation	25689	23940	24050	21963
Other service activities	18102	16535	17840	15423

Table 97. Average annual wages and salaries of the employees under labour contract by economic activity groupings, by National level and Sofia Municipality in 2016 and 2017

	Periods	2017		2016	
	National level and Sofia Municipality	Bulgaria	Sofia Municipality	Bulgaria	Sofia Municipality
<b>Economic activity groupings</b>	Total	12448	17199	11379	15658
	Agriculture, forestry and fishing	9983	10769	9260	9689
	Mining and quarrying	18461	14590	16676	13986
	Manufacturing	11159	14961	10038	13335
	Electricity, gas, steam and air conditioning supply	21411	19142	20076	17196
	Water supply; sewerage, waste management and remediation	10551	14817	9792	13288
	Construction	10044	12323	9289	11029
	Wholesale and retail trade; repair of motor vehicles and motorcycles	11211	16072	10292	14630
	Transportation and storage	11181	15368	10421	14206
	Accommodation and food service activities	7328	8061	6733	7383
	Information and communication	29945	32616	27535	30201
	Financial and insurance activities	21525	24234	20126	22525
	Real estate activities	12058	15144	10838	13680
	Professional, scientific and technical activities	17564	21365	16307	19890
	Administrative and support service activities	9996	11790	8988	10469
	Public administration and defence; compulsory social security	13881	17975	12909	16549
	Education	12104	13596	10784	12523
	Human health and social work activities	12723	15881	11769	14426
	Arts, entertainment and recreation	10437	11777	9669	10527
Other service activities	8244	9982	7437	9079	



## Unemployment rate

Table 98. Unemployed and unemployment rates, by National level and Sofia municipality, in 2014, 2015, 2016, 2017 and 2018, Source: NSI

Periods	National Level and Sofia Municipality	Total		Of which aged 15 - 64	
		Unemployed - thous.	Unemployment rates - %	Unemployed - thous.	Unemployment rates - %
2018	Bulgaria	173.3	5.2	170.8	5.3
	Sofia Municipality	14.5	2.0	14.4	2.1
2017	Bulgaria	206.9	6.2	204.1	6.2
	Sofia Municipality	19.7	2.8	19.4	2.8
2016	Bulgaria	247.2	7.6	245.3	7.7
	Sofia Municipality	27.0	3.8	26.7	3.9
2015	Bulgaria	305.1	9.1	302.5	9.2
	Sofia Municipality	30.5	4.3	30.0	4.4
2014	Bulgaria	384.5	11.4	381.3	11.5
	Sofia Municipality	43.8	6.3	43.5	6.4

Table 99. Registered unemployed persons at the labour offices and level of, by National level and Sofia Municipality in 2016, 2017

		Registered unemployed persons - in numbers			
		Total	Of which:		Level of unemployment - %
			Not older than 29 ages	Registered more than one year	
2017	Bulgaria	232066	32995	74117	7.07
	Sofia Municipality	14305	1936	463	2.15
2016	Bulgaria	261015	37667	99098	8.0
	Sofia Municipality	15246	2113	866	2.3

Table 100. Unemployed and unemployment rates of population aged 15 years and over by National level in 2016, 2017 and 2018, Source NSI

Sex Place of residence Age Level of education	2018		2017		2016	
	Unemployed - thous.	Unemployment rates - %	Unemployed - thous.	Unemployment rates - %	Unemployed - thous.	Unemployment rates - %
Total	173.3	5.2	206.9	6.2	247.2	7.6
By sex						
Male	101.7	5.7	114.2	6.4	141.7	8.1
Female	71.6	4.7	92.8	5.9	105.6	7.0

By place of residence						
Urban	107.9	4.2	133.3	5.1	160.5	6.3
Rural	65.4	8.9	73.6	10.0	86.8	12.4
By age						
15-24	18.9	12.7	22.1	12.9	27.7	17.2
25-34	44.5	6.2	51.6	7.0	62.9	8.6
35-44	41.6	4.6	50.0	5.4	57.9	6.4
45-54	37.3	4.4	44.8	5.3	54.3	6.6
55 and over	31.1	4.4	38.4	5.6	44.4	6.9
By level of education						
Higher	23.6	2.3	30.9	3.0	34.1	3.4
Upper secondary	85.0	4.5	101.0	5.3	124.2	6.7
of which: secondary vocational	50.8	4.6	60.1	5.2	74.6	6.5
Lower secondary	48.6	14.0	53.8	15.4	63.8	18.8
Primary or lower	16.1	22.5	21.2	31.8	25.1	40.4
Dispersion of regional unemployment rates - %	49.4		42.2		24.4	

Table 101. Unemployed and unemployment rates of population aged 15 years and over by National level in 2016, 2017 and 2018, Source NSI

	2018			2017			2016		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total</b>	173.3	101.7	71.6	206.9	114.2	92.8	247.2	141.7	105.6
Unemployed with previous employment experience	142.4	83.0	59.3	172.0	94.2	77.8	208.8	118.1	90.7
By reason of leaving the last job:									
Redundancy (Job losers)	43.9	24.9	19.0	56.3	30.7	25.6	72.3	40.6	31.7
Seasonal or temporary job has ended	44.0	26.4	17.6	52.9	29.3	23.6	66.8	40.7	26.1
Unsatisfied with working conditions	15.3	9.6	5.7	17.1	10.4	6.7	18.1	11.1	7.0
Personal or family reasons	7.7	(3.5)	4.2	9.1	(3.7)	5.4	8.4	(3.0)	5.4
Others	7.5	4.0	(3.5)	10.1	4.7	5.4	10.4	4.9	5.5
Unknown (incl. non-working during the last 8 years)	24.0	14.8	9.3	26.5	15.5	11.1	32.8	17.7	15.0
Unemployed looking for their first job	31.0	18.7	12.3	34.9	19.9	15.0	38.5	23.6	14.9
of which:									
Looking for a job after leaving school or university	16.8	11.2	5.7	18.5	11.1	7.4	22.4	15.0	7.4

( ) - due to a small sample, figures in brackets are not reliable

Table 102. Unemployed by methods of job search and sex, by National level in 2016, 2017 and 2018, (One or more methods are shown by a person), Source NSI

Methods of job search	2018			2017			2016		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	173.3	101.7	71.6	206.9	114.2	92.8	247.2	141.7	105.6
of which searching job by:									
Contact with a public employment office	70.8	35.8	34.9	81.8	39.8	42.0	96.3	47.0	49.2
Direct contact with employers	86.1	52.6	33.5	99.6	59.5	40.2	122.7	73.4	49.3
Participating in competitions, taking tests or interviews	25.2	14.2	11.0	30.8	16.6	14.2	39.8	23.9	16.0
Seeking assistance of friends and relatives	118.7	70.7	48.0	148.0	83.5	64.5	176.7	103.0	73.7
Placing or answering newspaper advertisements	44.4	24.9	19.6	53.3	30.2	23.1	72.3	41.7	30.6
Studying of job advertisements in newspapers, magazines, etc.	72.7	41.0	31.7	90.7	50.5	40.2	106.2	59.7	46.5

Table 103. Unemployed by duration of unemployment and sex, by National level in 2016, 2017 and 2018, Source NSI

Duration of unemployment	2018			2017			2016		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	173.3	101.7	71.6	206.9	114.2	92.8	247.2	141.7	105.6
Up to 5 months	46.1	26.3	19.8	59.6	32.5	27.1	65.2	37.8	27.4
6 - 11 months	25.7	14.3	11.4	33.5	17.1	16.5	35.9	20.0	15.9
12 - 23 months	36.9	21.2	15.7	38.3	23.0	15.3	47.4	27.1	20.3
2 and more years	64.7	40.0	24.7	75.5	41.5	34.0	98.8	56.8	41.9

Table 104. Long-term unemployment rate by sex, by National level in 2016, 2017 and 2018, Source NSI

Sex	2018	2017	2016
	Long-term unemployment rate - %	Long-term unemployment rate - %	Long-term unemployment rate - %
Total	3.1	3.4	4.5
Male	3.4	3.6	4.8
Female	2.6	3.2	4.1

### Industrial plants concentration rate in social housing districts

The location of manufacturing, logistics and infrastructure buildings are concentrated mainly in the periphery of the city. As in most cases, similar types of structures are located in specialized for the purpose of the production territories. The ratio between the percentage of the total built area of these structures and the area occupied by the plots of the enterprises (the urban units) is different. High levels of total built up area (in absolute figures) and high levels of concentration of such large economic assets are observed in the northern part of the city (the industrial area to the east of Nadezhda district), the north western and western peripheral territories of the city. Some smaller in size and intensively built up areas are located close to the city centre and even bordering it. (Fig 81; 82) (Report “Morphology”, Vision Sofia 2050, (2018))

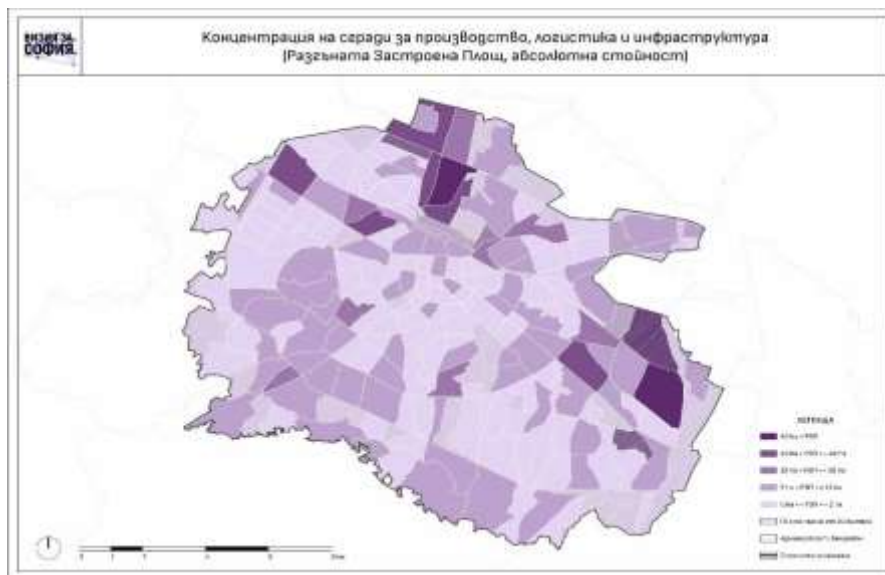


Figure 363. Total built up area of the Industrial plants, logistic and transport infrastructure in Sofia City, Source: Report “Morphology”, 3tdStep, Vision Sofia 2050, 2018

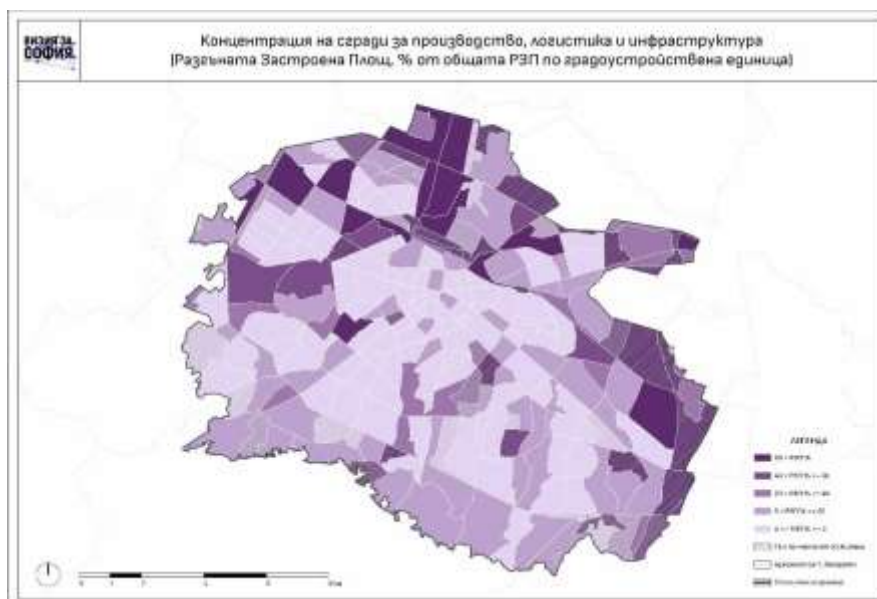


Figure 364. Industrial plants concentration logistic and transport infrastructure rate in Sofia City, Source: Report Morphology, 3tdStep of Vision for Sofia, 2018

### 5.2.3.3 Innovation

#### Innovation (i.e. patents)

There are several reports, based on different studies, presented start-up's ecosystem and ecosystems in another innovation fields. The main statements can be summarised as follows:

**The InnovationShip 2018 survey** presents the most comprehensive and detailed mapping of the Bulgarian digital ecosystem for the third time in a row. The data in the 2018 edition is based on the results of a survey conducted among 213 different companies. The detailed questionnaire prepared and administered by MOVE.BG's digital platform EDIT.BG. The sample was almost evenly split between established companies (50%) and start-ups (45%), with 5% of the respondents comprising other players in the ecosystem – NGOs, public units, and academia. (MOVE.BG, 2018)

The geography of the digital ecosystem broadly follows the geography of the overall economy, with high concentration in larger cities. In the case of the digital companies, there is massive over-concentration in Sofia – around 71% of all respondents report that they are located in the city of Sofia. By their very definition, SMEs and start-ups are small in size, with the lean teams prevailing - - 27% of all companies have 3 or less employees, and another 34% of them employ up to 10 people. One quarter of the companies asked (25%) offer only products. The rest three quarters provide either combine product and service provision (39%) or exclusively provide services (35%). About two in three companies report that the unique selling proposition contains an innovative component. Of these 21% provide an innovation which is specific for the local market, 7% - to the regional, and 6% - to the European. A total of 29% of the companies offer a global innovation and seem ready to disrupt the international markets with it. For the first time the survey probes how important the social impact is for the digital SMEs and start-ups. About 45% of all respondents agree that the social impact is important for their organization. The largest number of companies operates in platform building (46%), big data analytics (25%) in the field of machine learning and AI (23%), and cloud computing (19%). Those fields of specialization underlie the fundamental technologies for a burgeoning fintech cluster. The largest growing type of technological specialization is now in the block chain field - up 25% as of 2017.

**The report Artificial intelligence ecosystem in Bulgaria gives insight both on the companies and communities.** The research identified a total of 47 Bulgarian companies developing AI technologies, classified by AI technology focus and by product type (for use within the company's group or for external clients). In terms of AI technology focus, the fields are: Big Data; Predictive Analytics; Data Science; Chatbots; Other/Mix of two or more.

Sofia is outlined as the country's AI centre with 43 of the companies being headquartered in the city. AI developers are also located in Burgas, Plovdiv and Petrich. In terms of the number of companies by industry focus, the leading sectors are retail, finance and media. More than 30 companies develop AI solutions for these industries. Other major industries are telecommunications, healthcare and the government sector.

The number of start-ups, established in the 2016-2018 period, or companies that have received start-up funding make up for more than 60% of all AI developers in Bulgaria. Two communities are mapped: Sofia AI and data Science Society. Sofia AI is a community of start-ups, corporates and academics in the AI sphere focusing on understanding the current state of these technologies, its added value for businesses, and prospective for the near future. Data Science Society (a volunteer organization) develops friendly environment where data enthusiasts are able to learn, share and experiment with real data cases.



**Bulgaria: PROPTECH & CONTECH Mapping Report** presents the Proptech and Contech companies distributing to lifecycle's stages both to Construction and Real estate. (Figure 83, Figure 84)

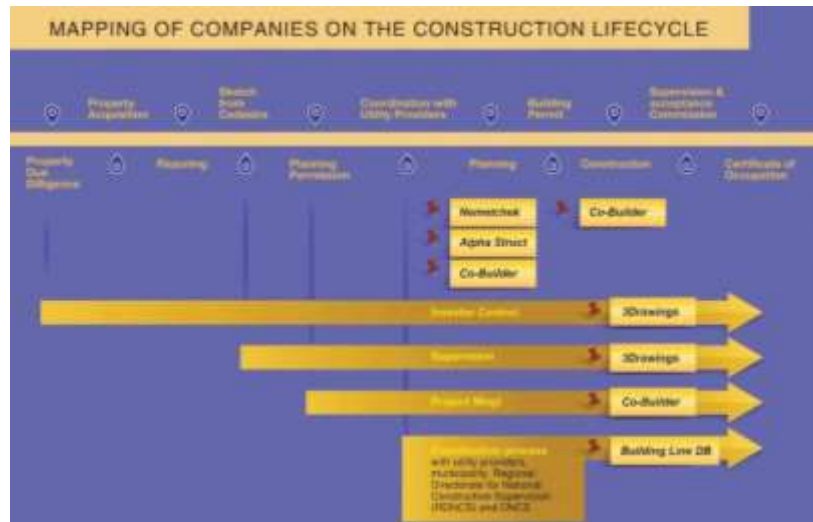


Figure 365. Contech companies distributing to Construction lifecycle; Source: Bulgaria: PROPTECH & CONTECH Mapping Report



Figure 366. Proptech companies distributing to Real estate lifecycle; Source: Bulgaria: PROPTECH & CONTECH Mapping Report

**The Start-up and Innovation Ecosystem in Sofia Report** provides details about the opportunities and advantages of Sofia as a start-up and innovation hub. Detailed analyses and insights are provided about VC funds (Table76), business angels, the co-working space in Sofia, and the accelerators and incubators.

Table 105. VC Funds, Source: Report "The Start-up and Innovation Ecosystem in Sofia", <http://investsofia.com/wp-content/uploads/2019/04/Overview-of-The-Start-up-and-Innovation-Ecosystem-in-Sofia-May-2019.pdf>

VC Funds	Characteristics, activities
BlackPeak Capital	Co-investment growth equity fund focused on investing in high-growth Southeast European small and medium enterprises.
Empower Capital	EUR 21m private equity fund, providing access to equity and quasi-equity funding to growing Bulgarian companies.
LAUNCHub Ventures	Early stage VC Fund, based in Sofia and investing in digital start-ups in the wider South-eastern Europe region.
Postscriptum Ventures	Early-stage venture capital fund with a broad portfolio of investments in start-up and niche situations, primarily in the renewable energy and technology sectors.
Eleven Ventures	Early-stage investment fund based in Sofia, which also supports more mature companies that have already built a product and are looking to scale
NEVEQ Capital Partners	The oldest VC fund manager in Bulgaria and one of few in CEE to manage more than one VC fund. NEVEQ has made investments in enterprise applications software, infrastructure software and industry vertical applications, web and mobile businesses.
NEVEQ II Fund	Supports growth and performance in such sectors as enterprise software, analytics, health, energy efficiency, etc.
Rosslyn Capital Partners	Private equity and investment management firm based in Sofia investing in various industries and sectors such as manufacturing, food and beverage, telecommunications, IT, renewable energy, agriculture, and real estate development.
BrightCap Ventures	Entrepreneur-led, globally-supported and tech-focused VC fund, Bright Cap invests in accelerator (up to €200,000 per company) and early-stage (up to €3.5m per company) businesses in the software and applied engineering fields that address global market needs.
Morningside Hill	The manager of the VCF of the Fund of Funds. The fund is expected to accumulate BGN 67m. The resources will be used for equity and quasi-equity investments in innovative high-tech SMEs at the early stage of their development. Investment per company will range from BGN 1.7m to BGN 7m.
Innovation Accelerator	EUR 15.6m fund, providing access to equity and quasi-equity funding to Bulgarian startup companies. Key priority sectors include Healthcare, Education, Care for the elderly, FMCG, Transport and Logistics, Media and Enterprise Software

Alongside the early-stage and seed funds, a growing community of **business angel** investors backs idea-only or early-stage companies as the one identified:

- The Bulgarian Business Angel Association aims to provide a connection and interaction between entrepreneurs and Business angels.
- The CEO Angels Investment Club is a group of senior executives and entrepreneurs related to Bulgaria, investing their own money in early stage start-ups in return for equity.

There are 25+ *co-working spaces in Sofia*, with several new ones due to open by the end of 2019. Most popular among them are: Puzl CowOrKing, Betahaus, Work&Share, 1HUB, init Lab, SOHO, Cosmos Coworking Camp, NGO House, MOVE Together.

Sofia Tech Park (opened in 2016) is one of the few dedicated science and technology parks in the region. The Park includes a vast laboratory complex, an innovation forum, an interactive children's centre TechnoMagicLand, and an incubator for innovative companies.

The co-innovation hub Resonator (expected to open in 2019) will provide 800 sq.m. of creative workplace with labs, equipped with state-of-the-art technologies, devices and prototyping gear to spark co-innovation, applied learning and collaboration opportunities for start-ups and innovative companies.

MISSIA23 (expected opening in April 2019) is a creative hub for design, visual arts, advertising, gaming, media, music and movies.

Accelerators and incubators can play a crucial role in the growth of start-ups as they have a lot to offer for their development: know-how, expertise, mentorship, networking opportunities and seed capital. (Table 77)

Table 106. Accelerators and Incubators in Sofia, Source: Report “The Start-up and Innovation Ecosystem in Sofia”, <http://investsofia.com/wp-content/uploads/2019/04/Overview-of-The-Start-up-and-Innovation-Ecosystem-in-Sofia-May-2019.pdf>

Accelerators incubators and	Characteristics, activities
CampusX	One of the leading incubators for tech companies and talent in South-East Europe, Campus X supports innovative ideas and accelerates on their path to growth.
Founder Institute Sofia	3,5-month pre-seed start-up accelerator, helping start-ups to build an enduring company by establishing a support network of local start-up experts and providing a structured business-building process that has helped our alumni raise over \$700M.
Climate-KIC Accelerator Bulgaria	Climate-KIC Accelerator is Europe’s largest green tech accelerator for early stage start-ups. In Bulgaria the Accelerator is managed by Cleantech Bulgaria. Its programme is suitable for young companies, spin-offs and non-incorporated teams of entrepreneurs focusing on sustainable business solutions, clean technologies and climate innovation. During its three editions the programme has invested in 24 teams which have attracted over 1 mln BGN external investment and have launched a number of innovative products on the market.
Eleven Ventures	Bulgarian innovative accelerator and venture fund that offers a wide range of support for early-stage European start-ups, providing mentorship and critical initial capital to entrepreneurs and their ideas.
Start it Smart	Intensive 10-week pre-accelerator, offering a mentorship program of over 40 trainings and a coworking space. One of the oldest incubators in Bulgaria, Start It Smart has helped more than 300 start-ups, has around 150 partners in this field, and has built a great community around its events.
Strategy+Business Lab PrEXCEerator	Pre-accelerator supporting idea-stage start-ups in their validation stage, pivoting, search for appropriate funding, and expanding to proper international markets. The programme of the PrEXCEerator expands to 15+ industries, 13+ digital technologies, and takes place in cooperation with 5 Bulgarian universities and 100+ industry experts and mentors in 15 Advisory Boards.
Sofia Tech Park and Source Institute program	The programme (starts in 2019) will be focused on applied science and commercialization of research developments.

## Research and development

The national Statistical Institute regularly provides data about expenditure on research and development. Sofia Municipality relevant data is shown in table 78.

Table 107. Research and development indicators, Sofia Municipality level, Source: NSI, <http://www.nsi.bg/en/content/11442/district-sofia-stolitsa>

Domains	Indicators	Years				
		2013	2014	2015	2016	2017

<b>R &amp; D</b>	Expenditure on research and development (R & D) (thousand Levs)	420 521	539 243	620 071	503 181	520 427
	Staff engaged in research and development (R & D) (number)	13 004	14 616	16 227	18 770	17 587

### Businesses and workers

Table 108. Main economic indicators of non-financial enterprises in Sofia Municipality, Source: NSI, <https://nsi.bg/en/content/11442/district-sofia-stolitsa>

Indicators	Years				
	2013	2014	2015	2016	2017
Turnover (thousand Levs) ***	97 006 318	103 163 203	112 588 741	110 133 836	120 852 064
Output (thousand Levs) ***	48 654 185	50 199 774	57 014 406	55 541 798	61 021 153
Value added at factor cost (thousand Levs) ***	17 046 864	17 757 810	20 955 694	22 517 348	25 244 483
Relative share of enterprises with up to 9 persons employed in total number of enterprises in the district (%)	92.1	92.3	92.4	92.5	92.3
Relative share of enterprises with 10-49 employees in total number of enterprises in the district (%)	6.4	6.2	6.2	6.1	6.3
Relative share of enterprises with 50-249 employees in total number of enterprises in the district (%)	1.2	1.2	1.2	1.2	1.2
Relative share of enterprises with more than 250 employees in total number of enterprises in the district (%)	0.3	0.3	0.2	0.2	0.2

Table 109. Main economic indicators of non-financial enterprises by statistical zone, statistical region and by district in 2016 and 2017, Source: NSI

		Enterprises - in numbers	Employed persons - in numbers	Net sales income - thousand BGN	Tangible fixed assets - thousand BGN	Effectiveness of the sales - %	Operative effectiveness - %
2017	Bulgaria	406310	2193508	269812838	124351492	7.0	106.9
	Yugozapaden	159644	921451	142572273	59275316	6.4	106.2
	Sofia Municipality	117401	720089	119885990	51059895	6.1	105.9
2016	Bulgaria	404937	2156511	245059668	121633211	6.2	106.1

	<b>Yugozapaden</b>	158286	901603	128308678	58390351	5.6	105.4
	<b>Sofia Municipality</b>	116578	702745	109245275	50227787	5.3	105.1

Table 110. Main economic indicators of non-financial enterprises by size in terms of employed, statistical zone and statistical region in 2016 and 2017, Source: NSI

	<b>Statistical zones and statistical regions Size class of enterprises</b>	<b>Enterprises - in numbers</b>	<b>Net sales income - thousand BGN</b>	<b>Tangible fixed assets - thousand BGN</b>	<b>Effectiveness of the sales - %</b>	<b>Operative effectiveness - %</b>
<b>2017</b>	Bulgaria, Total	<b>406310</b>	<b>269812838</b>	<b>124351492</b>	<b>7.0</b>	<b>106.9</b>
	Micro (up to 9 employed)	375754	62861595	36231974	9.8	109.4
	Small (10 - 49 employed)	25211	62190586	20168503	6.6	106.5
	Medium (50 - 249 employed)	4601	65097738	18072224	5.7	105.7
	Large (250+ employed)	744	79662919	49878791	6.2	106.1
	Yugozapaden, Total	<b>159644</b>	<b>142572273</b>	<b>59275316</b>	<b>6.4</b>	<b>106.2</b>
	Micro (up to 9 employed)	147768	31719221	16406864	9.7	109.1
	Small (10 - 49 employed)	9753	31034726	7570402	5.6	105.6
	Medium (50 - 249 employed)	1779	33439069	6639761	5.7	105.7
	Large (250+ employed)	344	46379257	28658289	5.1	105.0
<b>2016</b>	Bulgaria, Total	<b>404937</b>	<b>245059668</b>	<b>121633211</b>	<b>6.2</b>	<b>106.1</b>
	Micro (up to 9 employed)	375123	57681474	36057594	8.1	107.7
	Small (10 - 49 employed)	24500	57543110	18841619	6.0	105.9
	Medium (50 - 249 employed)	4586	59631521	18075592	5.3	105.2
	Large (250+ employed)	728	70203563	48658406	5.8	105.7
	Yugozapaden, Total	<b>158286</b>	<b>128308678</b>	<b>58390351</b>	<b>5.6</b>	<b>105.4</b>
	Micro (up to 9 employed)	146754	28569004	16226318	7.5	106.9
	Small (10 - 49 employed)	9407	28893535	7135477	5.3	105.3
	Medium (50 - 249 employed)	1787	29671830	6627904	5.3	105.3
	Large (250+ employed)	338	41174309	28400652	4.6	104.5

Table 111. Main economic indicators of non-financial enterprises by economic activity groupings, statistical zone and statistical region in 2016 and 2017, Source: NSI

	<b>Statistical zones and statistical regions Economic activity groupings</b>	<b>Enterprises - in numbers</b>	<b>Net sales income - thousand BGN</b>	<b>Tangible fixed assets - thousand BGN</b>	<b>Effectiveness of the sales - %</b>	<b>Operative effectiveness - %</b>
<b>2017</b>	Bulgaria, Total	406310	269812838	124351492	7.0	106.9
	Agriculture, forestry and fishing (section A)	19880	6851468	8054367	18.2	114.5
	Industry (sections B, C, D and E)	34719	83344796	51665423	7.5	107.4



	Construction (section F)	20370	13249493	5075973	7.1	106.7
	Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)	142174	115542017	13476654	4.0	104.1
	Transport and storage (section H)	23355	14746335	12155743	6.4	106.0
	Accommodation and food service activities (section I)	27299	4770465	6079559	7.7	107.5
	Others (sections J, L, M, N, P, Q, R и S)	138513	31308264	27843773	14.5	113.6
	Yugozapaden, Total	159644	142572273	59275316	6.4	106.2
	Agriculture, forestry and fishing (section A)	2493	474173	823611	11.1	108.0
	Industry (sections B, C, D and E)	10959	32419377	18158252	6.5	106.3
	Construction (section F)	9051	7448060	2768746	5.4	105.0
	Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)	49717	69316322	8143031	4.3	104.3
	Transport and storage (section H)	9521	8001706	9558326	4.6	104.2
	Accommodation and food service activities (section I)	9019	1856537	1841854	7.0	106.7
	Others (sections J, L, M, N, P, Q, R и S)	68884	23056098	17981496	13.4	112.4
2016	Bulgaria, Total	404937	245059668	121633211	6.2	106.1
	Agriculture, forestry and fishing (section A)	19908	6706252	7554021	14.1	110.9
	Industry (sections B, C, D and E)	35112	74423781	50859564	6.9	106.8
	Construction (section F)	20533	11260618	4957003	4.8	104.3
	Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)	142830	106211479	13114337	3.8	103.8
	Transport and storage (section H)	23006	13510505	12184665	7.7	107.4
	Accommodation and food service activities (section I)	27456	4353205	6016738	5.9	105.6
	Others (sections J, L, M, N, P, Q, R и S)	136092	28593828	26946883	11.8	110.9
	Yugozapaden, Total					
	Agriculture, forestry and fishing (section A)	2508	460671	793365	7.6	105.5
	Industry (sections B, C, D and E)	11150	28190472	18006966	6.2	106.0
	Construction (section F)	9081	6350731	2611566	4.0	103.5
	Wholesale and retail trade; repair of motor vehicles and motorcycles (section G)	50128	63458943	7951707	4.0	104.1
	Transport and storage (section H)	9290	7216545	9534972	5.6	105.2

Accommodation and food service activities (section I)	8967	1699516	1872990	2.1	102.0
Others (sections J, L, M, N, P, Q, R и S)	67162	20931800	17618785	10.1	109.2

### Trust in businesses

*“The industrial confidence indicator in Bulgaria fell to 24.7 in July 2019 from 26.4 (compared to the previous months). It was the lowest in December of 2018, as expectations over the next three months regarding production (13.4 from 17.1 in June) and employment (-3.1 from -0.7) deteriorated while prospects for the business situation over the next six months declined to 15.3 from 17.2. Meanwhile, prospects for selling prices over the next three months rose to 4.0 from 3.7. Business Confidence in Bulgaria averaged 21.67 Index Points from 1997 until 2019, reaching 50.30 Index Points (the highest ever) in July of 2007 and the lowest recorded Index points in February of 1997 - 20.90 Index Points.” (TRADING ECONOMICS, 2019)*

#### 5.2.3.4 Activity sectors

About 86% of companies operate in industries serving the local market, 30% of the companies are in Wholesale and retail trade; repair of motor vehicles and motorcycles where the highest turnover is generated. These are all retail and wholesale companies, including major international and local chains that are growing every year. About 20% of the companies are in the professional, scientific and technical activities, including industries as: legal and accounting activities, head office activities, management consultancy activities, advertising and market research, architectural and engineering activities; technical testing and analysis, research and development, veterinary activities. The third sector by number of companies (8%), is the Real Estate sector due to the active construction of both residential and commercial buildings on the territory of the capital. The first sector with export potential “Information and communication” ranks fourth in number of companies (7%) and includes the following industries: information technology services/activities, information services, film and television production, sound recording and music publishing, publishing, telecommunications, radio and television activities. Among them, the first two industries are leading due to the active stimulation and dynamic development of the IT sector in Bulgaria. (Table 83) (Report “Economics”, Vision Sofia 2050 (2019))

Table 112. Number of companies by economic activity groupings in intervals based on the generated turnover in 2016; Source Vision for Sofia, 2019

Economic activity groupings	Export potential	Number of companies in interval groups by generated turnover in 2016								Total	%
		0 - 50	51 - 100	101 - 500	501 - 1000	1001- 4000	4000- 20000	20001- 97500	> 97501		
		Thousand levs									
Wholesale and retail trade; repair of motor	Local		4	3		18	148	700	33793	34666	29.59

vehicles and motorcycles											
Professional, scientific and technical activities	Local	13	5	151	42	400	4732	12656	5159	23158	19.77
Real estate activities	Local			10	9		996	2961	4889	8865	7.57
Information and communication	Export potential	17	13	62	21	251	1214	2602	3789	7969	6.80
Construction	Local	2		9		23	359	3972	2605	6970	5.95
Manufacturing	Export potential	61	36	179	189	1127	2387	1366	414	5759	4.92
Other service activities	Local	10	4	46	56	929	4550			5595	4.78
Accommodation and food service activities	Local	8	2	16	14	94	367	4326	273	5100	4.35
Administrative and support service activities	Local	14	7	24	62	501	1934	1723	374	4639	3.96
Transportation and storage	Local	3	7	38	36	120	262	1946	1685	4097	3.50
Human health and social work activities	Local	14	12	60	50	87	652	1403	852	3130	2.67
Financial and insurance activities	Export potential	13	3	10	20	214	455	442	947	2104	1.80
Arts, entertainment and recreation	Local	16	3	81	58	362	1337	167	52	2076	1.77
Education	Local	2	2		31	418	838	288		1579	1.35
Agriculture, forestry and fishing	Export potential	13	13	24	17	170	322	106		665	0.57
Public administration and defence; compulsory social security	Subsidized	13	5	7	6					31	0.03
Electricity, gas, steam and air conditioning supply	Local	1		2		33	14	15	343	408	0.35
Water supply; sewerage, waste management and remediation	Export potential	17	5	11	18	26	58	121	1	257	0.22
Mining and quarrying	Dependent on natural resources	47	5	9		14	17	1		93	0.08
<b>Total</b>		264	126	742	629	4787	20642	34795	55176	117161	100.

*"...The turnover generated by companies operating in the Sofia Municipality amounts to nearly BGN 110 billion, an increase of 15% compared to 2013 and 28% growth compared to 2010. The compound annual growth rate for the period 2010-2013 is 3.5%, rising to 4.8% for the period 2013-2016." (Report "Economics", Vision Sofia 2050 (2019))*

Table 113. Generated turnover in 2010 and 2016 by companies split by administrative districts, Source: Report "Economics", 3rd step, Vision Sofia 2050 (2019) based on NSI data)

Districts	Turnover		Growth		Compound annual growth rate	Share 2016
	2016	2010	absolute	%		
	million BGN	million BGN	million BGN		%	
Mladost	14576	8018	6558	82%	10%	1335.0%

Lozenets	8621	8967	-346	-4%	-1%	7.9%
Triaditsa	8453	5486	2967	54%	7%	7.7%
Vazrazhdane	8266	7966	300	4%	1%	7.5%
Sredets	7972	8539	-567	-7%	-1%	7.3%
Vitosha	7359	3486	3873	111%	13%	6.7%
Iskar	6778	4144	2634	64%	9%	6.2%
Izgreve	6398	3736	2662	71%	9%	5.8%
Oborishte	6323	5570	753	14%	2%	5.8%
Krasno selo	6050	6439	-389	-6%	-1%	5.5%
Slatina	4800	4294	506	12%	2%	4.4%
Serdika	4227	3039	1188	39%	6%	3.9%
Poduene	3418	3073	345	11%	2%	3.1%
Nadezhda	2636	2148	488	23%	3%	2.4%
Luilin	2608	3592	-984	-27%	-5%	2.4%
Ilinden	2036	2108	-72	-3%	-1%	1.9%
Studentski	2011	1319	692	52%	7%	1.8%
Ovcha kupel	1869	1688	181	11%	2%	1.7%
Pancharevo	1778	100	1678	1678%	61%	1.6%
Kremikovtsi	1414	867	547	63%	9%	1.3%
Krasna polyana	947	742	205	28%	4%	0.9%
Vrabnitsa	828	444	384	86%	11%	0.8%
Novi Iskar	102	34	68	200%	20%	0.1%
Bankya	38	16	22	138%	16%	0.0%
<b>Sofia Municipality</b>	<b>109506</b>	<b>85813</b>	<b>23693</b>	<b>28%</b>	<b>4%</b>	<b>100.0%</b>

### Agriculture production

Agricultural territory in Bulgaria amounts to 64234755 hectares (58% of the whole territory) as of 31.12.2011, and in the Sofia Municipality - 567895.47 hectares (43%). (NSI, "Regions, districts and municipalities in the republics of Bulgaria" 2016 and 2017)

The share of agricultural territory in the Sofia Municipality it is much smaller in comparison to the average country figures. On the contrary – the share of the urbanized area in Sofia municipality (17 %) is much higher than the average for the country (4%). (Figure 85)

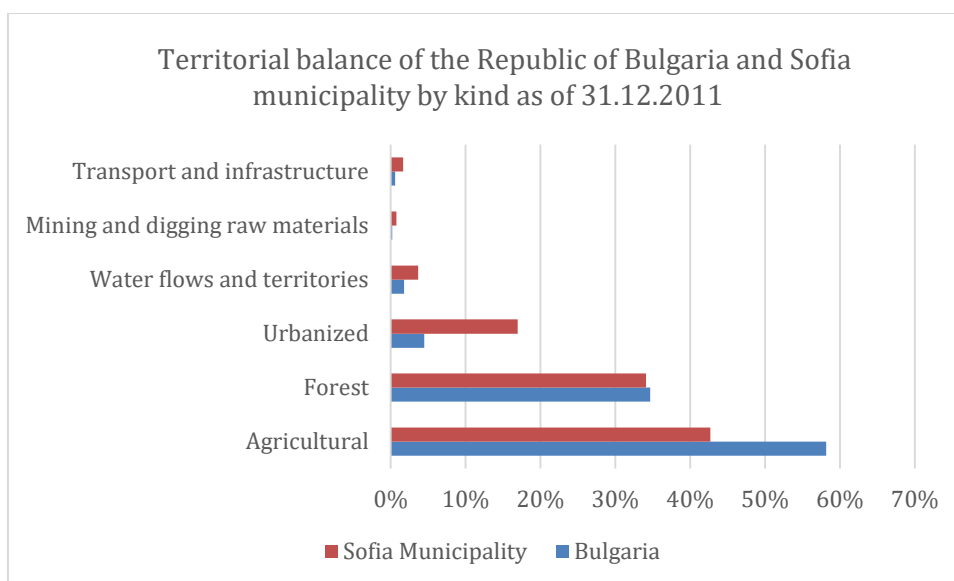


Figure 367. Territorial balance of the Republic of Bulgaria and Sofia municipality by kind of territory as of 31.12.2011, Source: NSI

In 2017, the arable land in Sofia Municipality accounts for 63.2% from agricultural area. The permanent crops occupy minor share of the agricultural land (0.43%), permanent grassland and meadows and orchards are 28.57%, and the group of other categories land accounts for 7.79%. Arable land increased in absolute terms but decreased in relative share in 2017 compared to 2016. (Table 85)

Table 114. Agricultural area by type in Bulgaria and Sofia Municipality as of 2016 and 2017, Source: NSI

	Statistical zones, statistical regions and districts	Total	Arable land	Permanen t crops	Permanent grassland and meadows-orchards	Other category land
		Hectares				
2017	<b>Bulgaria</b>	<b>5224402</b>	<b>3473825</b>	<b>148094</b>	<b>1392352</b>	<b>210131</b>
	Sofia Municipality	45387	28686	197	12968	3536
2016	<b>Bulgaria</b>	<b>5021412</b>	<b>3480991</b>	<b>140966</b>	<b>1384088</b>	<b>15367</b>
	Sofia Municipality	40672	27802	196	12674	-

The largest share of utilized agricultural area in the Sofia Municipality in 2017 is occupied by Cereals, followed by Oleaginous, respectively 40% and 23%. Permanent grassland and meadows orchards also have a large share - 31%. Other cultures have a negligible share.

Table 115. Agricultural area by group of crops in Bulgaria and Sofia Municipality as of 2016 and 2017, Source: NSI

Statistical zones and districts	2016		2017	
	Bulgaria	Sofia Municipality	Bulgaria	Sofia Municipality
	Hectares			



Cereals (incl. for green)	<b>1866944</b>	16210	<b>1920578</b>	16308
Oleaginous	<b>1115782</b>	10512	<b>1084803</b>	9234
Industrial	<b>69354</b>	-	<b>69074</b>	-
Vegetables and flowers	<b>126130</b>	98	<b>91983</b>	295
Grassland and annual fodder crops (excl. maize)	<b>135656</b>	982	<b>123016</b>	491
Fallow land	<b>159959</b>	884	<b>191537</b>	1474
Kitchen gardens	<b>15258</b>	-	<b>15367</b>	-
Permanent grassland and meadows orchards	<b>1392352</b>	12968	<b>1384088</b>	12674
Permanent crops	<b>148094</b>	197	<b>140966</b>	196
Utilized agricultural area	<b>5029529</b>	41851	<b>5021412</b>	40672
Agricultural area	<b>5224402</b>	45387	<b>5214640</b>	45092

Table 116. Collected and processed milk by location of the milk-processing enterprises in Bulgaria and Sofia Municipality as of 2016 and 2017, Source: NSI

Statistical zones, statistical regions and districts	Total	Cow	Sheep	Goats	Other
	Thousand litres				
<b>Bulgaria</b>	<b>600914</b>	<b>561932</b>	<b>26857</b>	<b>9361</b>	<b>2764</b>
Sofia Municipality	27542	27476	..	..	-
<b>Bulgaria</b>	<b>543844</b>	<b>508772</b>	<b>21745</b>	<b>10354</b>	<b>2973</b>
Sofia Municipality	25512	25457	..	..	..

The total number of companies in Agriculture, forestry and fishing is 665. Most of them (48%) generate a turnover between 4000 and 20000 thousand BGN. (Table 83 and Figure 86)

Agriculture, forestry and fishing employees under labour contract in Sofia Municipality in 2017 were 1836 (0.25% of all employees under labour contract), compared to 9689 in 2016 (0.26% of all employees under labour contract). (Figure 86) The average annual wages and salaries of these employees were lower than the average salaries in Sofia Municipality - 10769 BGN in 2017, compared to 17199 BGN (Table 68).

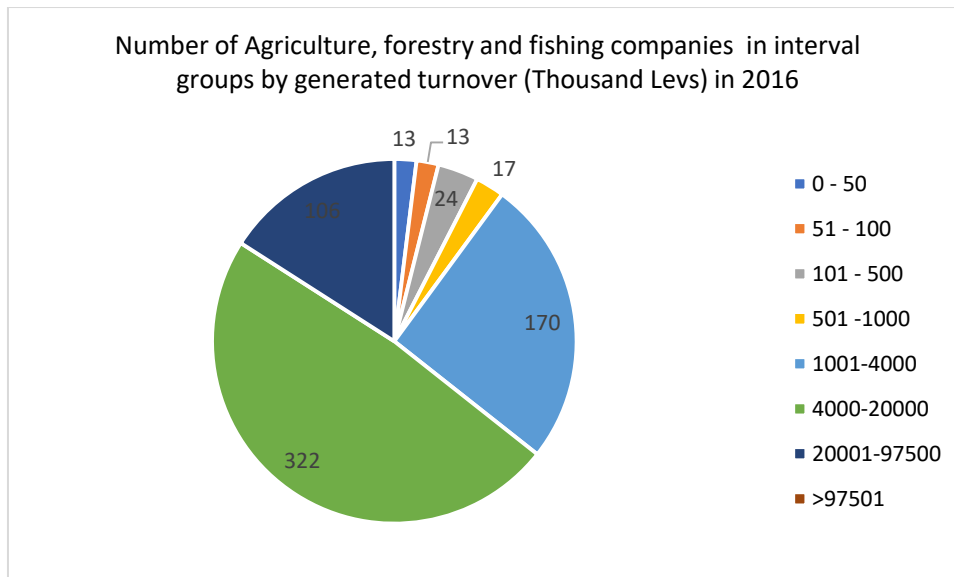


Figure 368. Number of agriculture, forestry and fishing companies in interval groups by generated turnover for Sofia Municipality as of 2016, Source: NSI

### Cultural and creative industries

Over 60% of the companies, involved in the so-called creative industries<sup>12</sup>, are concentrated in Sofia. The share of their output in the local economy was more than twice higher than the country average in 2016. For the period 2012-2016, the companies, the number of employees and the output of the creative industries in the Sofia are growing significantly and a further growth can be expected in the future. (SOAPI, 2018)

The main source of information for presenting the cultural and creative industries is the indicators, provided for the Information and communication category<sup>64</sup>. Not all activities classified as cultural and creative industries are included in it, and there are other activities that could not be classified as such (e.g. telecommunications), but the content of the category thoroughly cover the understanding of the cultural and creative industries. It includes: publishing (books, newspapers, magazines, reference books and pointers), publishing of computer products (games and other computer products); production of motion picture and television production, sound recording and music publishing; radio and television activities; telecommunications (telecommunication through fixed networks, wireless and satellite); activities in the field of information technology (computer programming, information technology consultancy, management and servicing of computer aids and systems); information services (data processing, hosting and related activities; web portals).

Other activities in the cultural and creative industries, such as performing arts, museums and heritage are included in the arts, entertainment and recreation category, and activities such as design, architecture, and advertising fall in the category "Professional, scientific and technical activities".

The number of companies in field of Information and communication is 7969. In 2016 more than 47% of them had generated turnover bigger than 97501 thousand BGN, although there is not specific information how much of these companies are registered in the field of Telecommunications. (figure 87)

<sup>64</sup> Data is provided by NSI. Data on relevant indicators are assigned to grouped economic activities according to the Classification of Economic Activities - 2008, which is a Bulgarian version of NACE, Rev. 2. 2 - since 2008

The employees under labour contract in the field of ICT were 75121 (10.26% of all employees under labour contract) in 2017 and 69876 (9.66%) in 2016.

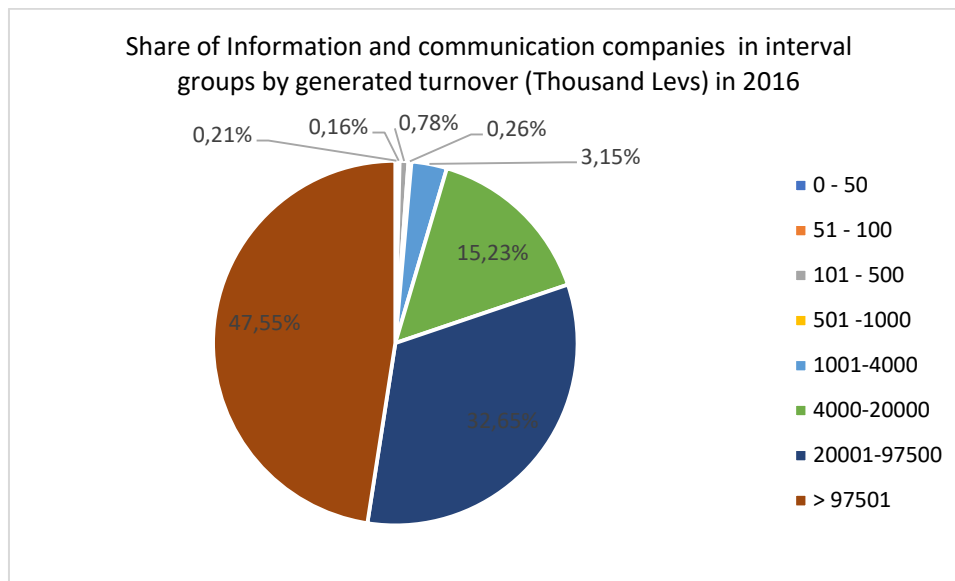


Figure 369. Share of Sofia Municipality Information and communication companies in interval groups by generated turnover in 2016; Source: Vision Sofia 2050, 2019

### Tourism characterization

In the recent several years Sofia became a much more popular and preferred tourist destination. Since 2009 the city has been experiencing a stable growth in tourism – approximately 13% in 2016 and 2017. It is expected that this stable growth will continue in the coming years, though at a lower rate. (Sofia Investment Agency, 2018)

The development of the tourism sector in Sofia was in line with the growth trend across Europe. In 2017 Europe was visited by 671 million visitors – an 8% increase, mainly due to the growth of 13% in the Southern and the Mediterranean regions. (UNWTO, 2017).

### Visitors

*“In 2017 Sofia was visited by 1 346 993 tourists. Around 65% of all people who visited Sofia in 2017 were foreigners. The number of foreign tourists in the city has increased from 640 621 in 2015, to 738 697 in 2016 and 882 142 in 2017. Most of the foreign visitors of Sofia in 2017 came from Italy (69 574), the UK (64 716), Germany (64 716), Greece (57 734) and Israel (51 472). The highest increase of visitors in 2017 was recorded among the tourists from the Netherlands (+57%), Spain (+51%), Ireland (+51%), China (+48%), Belgium (+40%) and Italy (+36%). The growth of Italian tourists can be partially attributed to the growing Italian diaspora in Bulgaria. Although China is not among the top 10 countries in number of visitors to Sofia, it is 4-th in terms of increase of visitors with a spectacular growth of 48% in 2017”.*

Table 117. Sofia visitors (2015-2017); Source: Sofia Investment Agency, based on Sofia Tourism Administration data, Source: Sofia tourism organization

Sofia Visitors (2015-2017)					
	Number of tourists	Number of nights spent	Growth of tourists (%)	Growth of nights spent (%)	Foreign tourists (%)
2015	1 061 522	1 872 978	9.7%	8.5%	60%
2016	1 197 564	2 126 462	13%	14%	62%
2017	1 346 993	2 444 684	13%	15%	65%



Figure 370. Money and time spent by Sofia visitors; Source: Sofia Investment Agency

## Accommodation

The hotel market in Sofia has been demonstrating a stable growth in the number of arrivals, the number of nights spent and the revenues from nights spent since 2009. The trend was particularly notable in 2016-2017 and is expected to continue in 2018-2020.

The average occupancy of all hotel segments in Sofia reached 39% in 2017 according to Sofia Tourism Administration – a 7% increase compared to 2016. In comparison, the analysis of the full-service real estate company MBL based on NSI data shows that the average occupancy for all hotel segments in Sofia was somewhat higher - 46%. Despite the significant growth in the tourism sector in the last 2 years, Sofia's RevPAR and occupancy indicators remain among the lowest in Europe. An increase in RevPAR is expected by 2021 mainly due to the implementation of the planned 4- and 5-star hotel projects and the entry of new global brands into Sofia's hotel market.

According to data by the National Statistical Institute, there were 125 accommodation establishments with more than 10-bed capacity in Sofia in 2017. Hotel establishments in Sofia represented 3.7% of the total accommodation base in Bulgaria. The number of 1, 2 and 3-star establishments in Sofia increased with 1.2% in 2017, while the 4- and 5-star decreased with 2.3%. In 2017, 34% of the accommodation establishments with over 10-bed capacity in Sofia were in the 4- and 5-star category, concentrating almost 65% of the room capacity of the city. According to data by Sofia Tourism Administration, there were

553 accommodation establishments in Sofia in 2017, including facilities with less than 10 beds. Around 88 of the facilities were hotels with approximately 72 rooms.

Table 118. Total Number of Accommodation Establishments in Sofia (with more than 10 beds); Source: Sofia Investment Agency, based on NSI

Total Number of Accommodation Establishments in Sofia (with more than 10 beds)				
	1-2*	3*	4-5*	Общо
2015	47	39	45	131
2016	45	37	43	125
2017	46	37	42	125

Source: NSI

Table 119. Types of Accommodation Establishments on the Territory of Sofia Municipality; Source: Sofia Investment Agency, based on Sofia Tourism Administration data

Types of Accommodation Establishments on the Territory of Sofia Municipality in 2017			
Type of categorized accommodation establishments	Number of establishments	Number of rooms	Number of beds
Guest suites	148	489	983
Bungalows	2	15	35
Guest houses	29	200	481
Motels	4	88	176
Boarding houses	13	340	661
Holiday houses	4	74	150
Family hotels	66	887	1 662
Guest rooms	167	445	937
Hostels	16	285	624
Hotels	88	6 306	10 982
Villas	2	24	45
Tourist bedrooms	2	59	145
Tourist chalets	12	134	433
<b>Total</b>	<b>553</b>	<b>9 346</b>	<b>17 314</b>

Source: Sofia Tourism Administration

### The Airbnb market in Sofia - a snapshot

*“Airbnb and other shared economy platforms are becoming increasingly important players in Sofia’s tourism market. Data from the platform AirDNA and the property management firm Flat Manager shows that the number of Airbnb rentals is increasing with more than 80% per year, while the number of deals – with almost 100%. The number of Airbnb listings has increased tenfold in the last 5 years. Three years ago, in August 2015, the number of active Airbnb rentals was 613. In July 2018 the number of rentals on the platform was 2 352. The growth of rentals was particularly visible in 2016-2017 when the*



number of rentals almost doubled – from 961 to 1 859. In 2018 the Airbnb market started to stabilize. 20% of the rentals are not entire homes, but either private or shared rooms. The average occupancy rate is 63%, but only 35% of the rentals are listed year-round. Furthermore, the Airbnb system doesn't account for the occupancy of the rentals that have never been reserved before and cannot be considered competitive. The average daily rate (ADR) of an Airbnb rental in Sofia is 35 Euro and the average revenue per property per month is 492 Euro. In comparison, according to different sources, the average yearly occupancy of all accommodation establishments in Sofia is between 39-46%. (Vision Sofia 2050, 2017)

The employees under labour contract in Accommodation and food service activities are 31699 (4.29%) in 2017 and 30700 (4.24%) in 2016. This figure includes both hotel and restaurant and catering staff and bar employees. Their average annual wages amount to 8061 BGN. The remuneration in the sector is among the lowest compared to those in other economic activity groups. (Table 68) (NSI)

### Stores and commercial activities

About 30% of the companies operating in Sofia Municipality are in the wholesale and retail trade; repair of motor vehicles and motorcycles, where the highest turnover is generated. These are all retail and wholesale companies, including major international and local chains that are growing every year. Their number is more than 34 600. (Report "Economics", Vision Sofia 2050, 2019)

Table 120. Shops for retail trade in Bulgaria, Yugozapaden region, and Sofia Municipality as of 31.12.2016 and as of 31.12.2017, Source: NSI, [shorturl.at/LLVY6](http://shorturl.at/LLVY6); [shorturl.at/aeH07](http://shorturl.at/aeH07)

	Statistical zones, statistical regions and districts	Total	Foods, beverages and tobacco	Durables and other consumer goods
		Number		
<b>2017</b>	<b>Bulgaria</b>	<b>112225</b>	<b>42300</b>	<b>69925</b>
	<b>Yugozapaden</b>	<b>35777</b>	<b>12310</b>	<b>23467</b>
	Sofia Municipality	22643	6630	16013
<b>2016</b>	<b>Bulgaria</b>	<b>113621</b>	<b>41685</b>	<b>71936</b>
	<b>Yugozapaden</b>	<b>35773</b>	<b>11871</b>	<b>23902</b>
	Sofia Municipality	22835	6491	16344

Table 121. Retail sales in Bulgaria, Yugozapaden region, and Sofia Municipality in 2016 and 2017, Source: NSI

	Statistical zones and statistical regions	Total	Foods, beverages and tobacco	Durables and other consumer goods
		Thousand BGN		
<b>2017</b>	<b>Bulgaria</b>	<b>39799367</b>	<b>14720371</b>	<b>25078996</b>
	Yugozapaden	22930583	7451438	15479145
<b>2016</b>	<b>Bulgaria</b>	<b>37164744</b>	<b>14067533</b>	<b>23097211</b>
	Yugozapaden	20984527	7118062	13866465

*"...Stores and commercial activities look more evenly distributed in the entire territory of Sofia. It seems that even at this large scale (city) the importance of shopping malls can be easily noticed as they influence strongly on the values of the respective urban units in*

which they are located.” (Figure 89 and Figure 90) (Report “Morphology”, Vision Sofia 2050)

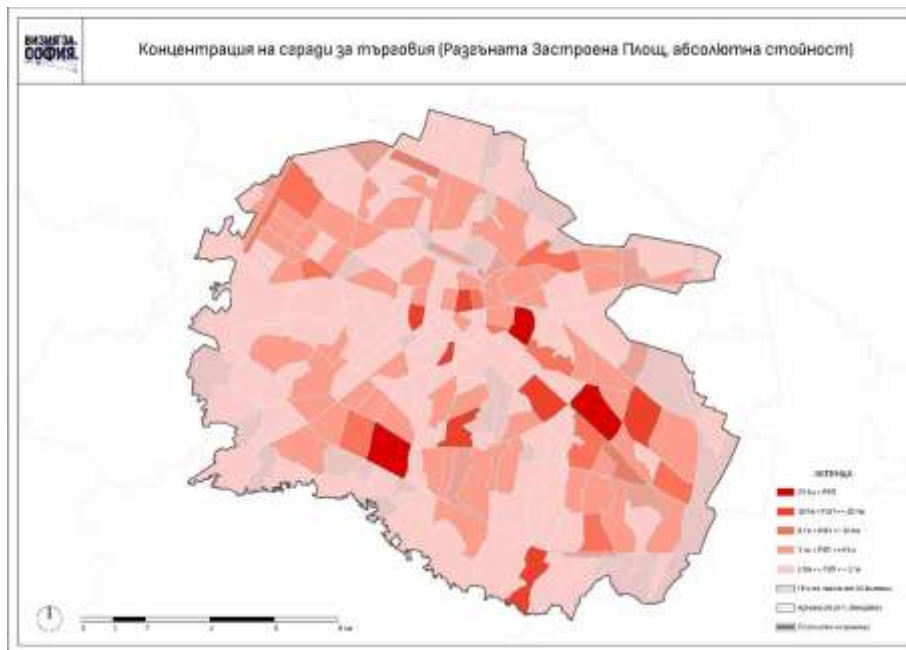


Figure 371. Stores and commercial activities (Total Built Area, Absolute Value), Source: Report “Morphology”, Vision Sofia 2050

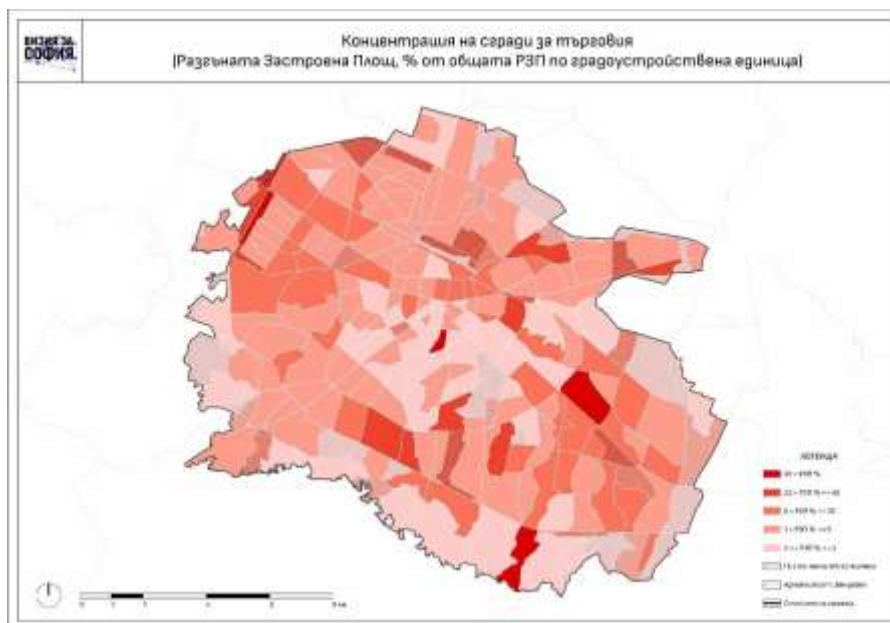


Figure 372. Stores and commercial activities concentration (The Ratio of Stores and commercial activities Total Built Area to The Urban Unit Area Total Built Area), Source: Report “Morphology”, Vision Sofia 2050

The employed under labour contract in Wholesale and retail trade; repair of motor vehicles and motorcycles are 148843 (20.13%) in 2017 and 146223 (20.22%) in 2016. This figure includes both those employed in the wholesale and retail trade, as well as those employed in the trade and repair of motor vehicles and other motor vehicles. (Table 68) (Source: NSI)

## Café, bars and pubs

The Entertainment activities, including Café, bars and pubs, are located predominantly in the city center and the southern and eastern quarters of the city. There is also a high concentration of activities in Lyulin District, a bit lower concentration is observed in Nadezhda and Mladost Districts. (Fig.91) (Functional Analysis, OP Sofprojekt OGP, 2019)

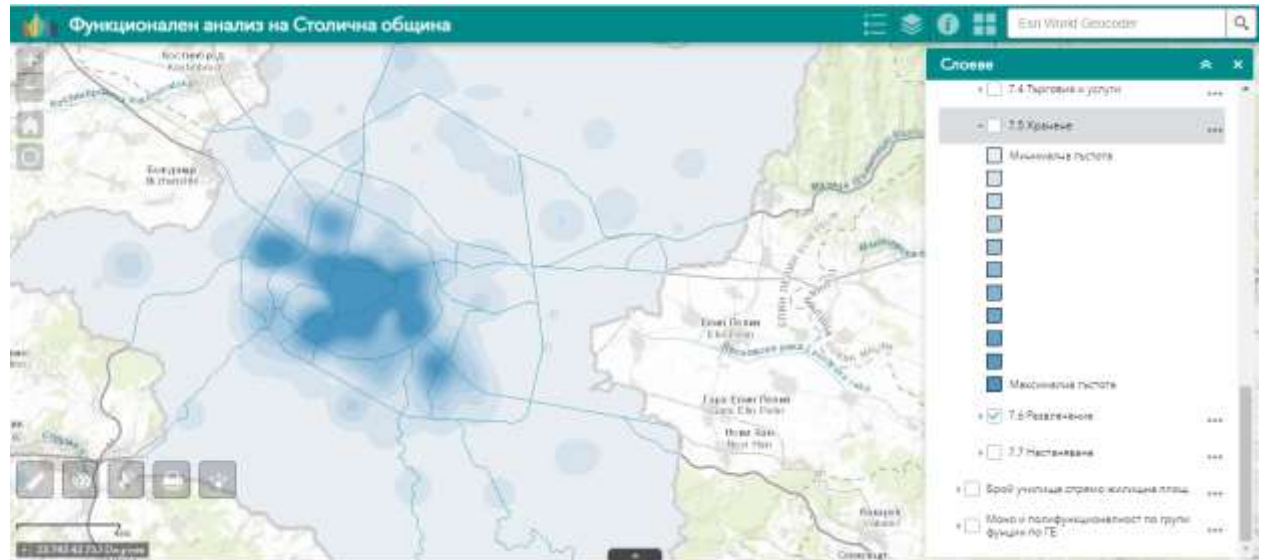


Figure 373. Entertainment activities, Source: Functional Analyse, OP Sofprojekt OGP, 2019, <https://gis.sofproect.com/portal/apps/webappviewer/index.html?id=2cef6214750540869c3ff8aa5eabe5e0>

The employees under labour contract in Accommodation and food service activities are 31699 (4.29%) in 2017 and 30700 (4.24%) in 2016. This figure includes both hotel and restaurant and catering staff and bar employees. (Table 68) (NSI, 2016, 2017)

## Restaurant and catering services

The high concentration of restaurants and catering providers is distinctive characteristic of a larger area of the city centre, where the concentration is higher than that of the entertainment activities. Less concentration of restaurants and bars is observed in the city periphery. (Functional Analysis, OP Sofprojekt OGP, 2019)

*“Visits to restaurants, pubs and bars are concentrated mainly near the place of residence. Entertainment activities such as visiting restaurants, bars, pubs, are performed in the neighbourhoods by 61% of Sofia residents, with most of them saying that they visit such places in their own neighbourhood (27%), 10% travel to an adjacent neighbourhood, 18% - to a further quarter. Just under 1/3 of the respondents visit bars and restaurants in the city centre.” (Study on quality of life, Report “People”, Vision Sofia 2050, 2019)*

The employees under labour contract in Accommodation and food service activities are 31699 (4.29%) in 2017 and 30700 (4.24%) in 2016. These figures include hotel, restaurant and catering staff and bar employees. (Table 68) (Source: NSI)

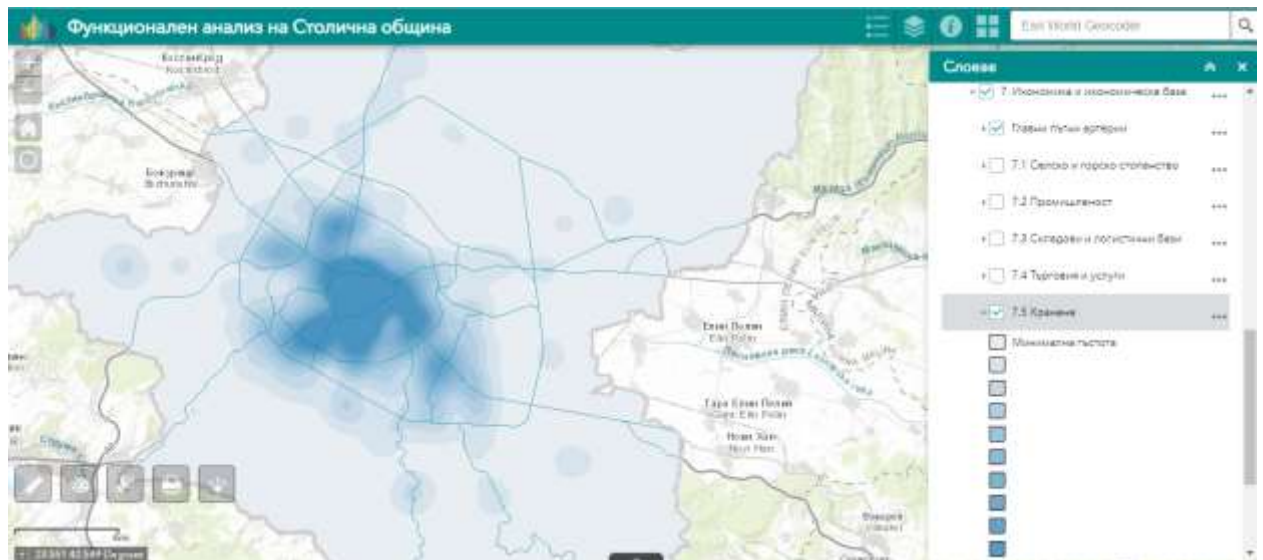


Figure 374. Restaurant and catering services, Source: Functional Analysis, OP Sofprojekt OGP, 2019, <https://gis.sofproect.com/portal/apps/webappviewer/index.html?id=2cef6214750540869c3ff8aa5eabe5e0>

### 5.2.3.5 Facilities

#### Cultural facilities

Cultural facilities are concentrated in the centre of the city although many smaller community and cultural centres exist around secondary centres in the older neighbourhoods and housing estates. Cultural life is much more intensive in the historical core of Sofia and there were minor efforts in recent years to de-concentrate cultural facilities and activities to the periphery. De-concentration of activities needs more persistence and support of social and economic models that can sustain such efforts.

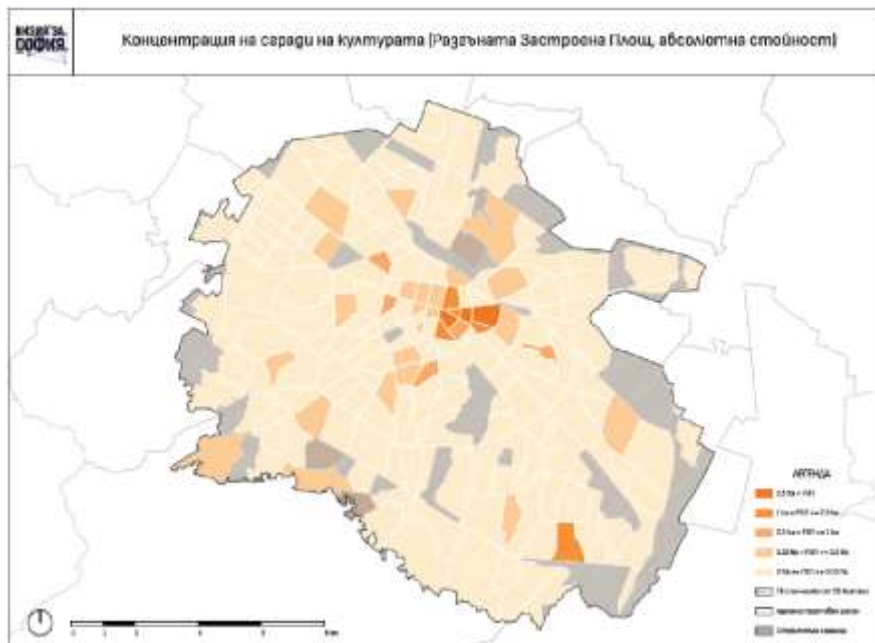


Figure 375. Concentration of buildings providing cultural services (absolute built up area) (Report "Morphology", Vision Sofia 2050, 2019)

### Educational facilities, kindergartens, schools, higher education facilities (public and private)

There are 66 higher education institutions (including adjoining faculties) on the territory of Sofia Municipality. The highest levels of concentration of educational institutions and number of buildings are in the following districts: Studentski (23), Sredets (12), Slatina (7), Oborishte (6) and Ovcha Kupel (6).

About 5 150 classes are distributed in 275 schools. The largest number of schools is located in the following districts: Vitosha (21), Triaditsa (18), Vazrazhdane (18), Mladost (17) and Lozenets (17), while the largest number of classes are in the following districts: Lyulin (432), Mladost (377), Triaditsa (347), Vazrazhdane (343) and Slatina (316).

Taking into account the number of population in 2016 in the age group 10-19 and dividing the classes by districts, it is evident that the lowest ratio is in Studentski (61 people in a class), followed by the districts of Kremikovtsi, Iskar, Novi Iskar and Poduyane. The highest number of classes per inhabitant are observed in the districts of Sredets, Vazrazhdane and Oborishte.

Table 122. Higher schools/universities in Sofia Municipality by urban district (columns (from left to right): district code, district, type of ownership, number, number of students, % of all students).

Район код	Район	Вид	Брой	Брой студенти	Дял студенти
1	Средец	Държавно	12	21,393	22%
2	Красно Село	Държавно	1	450	0%
4	Оборище	Държавно	6	4,660	5%
7	Слатина	Държавно	7	2,350	2%
8	Изгрев	Държавно	1	-	0%
9	Лозенец	Държавно	4	8,300	8%
10	Триадитца	Държавно	3	2,862	3%
10	Триадитца	Частно	1	50	0%
11	Красна Поляна	Държавно	1	600	1%
15	Младост	Държавно	2	2,340	2%
16	Студентски	Държавно	23	44,220	45%
18	Овча Купел	Държавно	3	-	0%
18	Овча Купел	Частно	2	11,950	12%
<b>ОБЩО</b>			<b>66</b>	<b>99,175</b>	<b>100%</b>

Table 123. Schools in Sofia Municipality by urban district (columns (from left to right): district code, district, number of schools, number of classes, % of all classes, population at age 10-19 by 2016, classes per capita, residents 10-19 per class).



Район код	Район	Брой училища	Брой паралелки	Дял паралелки %	Население между 10-19 г. 2016	Паралелки на жител 10-19г.	Жители 10-19 г в паралелка
1	р-н Средец	8	246	5%	1,487	0.17	6
3	р-н Възраждане	18	343	7%	2,505	0.14	7
4	р-н Оборище	11	214	4%	1,680	0.13	8
10	р-н Триадица	18	347	7%	3,874	0.09	11
8	р-н Изгрев	6	162	3%	1,844	0.09	11
9	р-н Лозенец	17	262	5%	3,171	0.08	12
7	р-н Слатина	13	316	6%	4,681	0.07	15
17	р-н Витоша	21	254	5%	3,948	0.06	16
12	р-н Илинден	10	142	3%	2,399	0.06	17
15	р-н Младост	17	377	7%	6,934	0.05	18
24	р-н Баня	4	56	1%	1,079	0.05	19
13	р-н Надежда	12	259	5%	5,202	0.05	20
20	р-н Връбница	10	191	4%	3,941	0.05	21
19	р-н Люлин	14	432	8%	9,026	0.05	21
11	р-н Красна поляна	10	221	4%	4,670	0.05	21
2	р-н Красно село	12	230	4%	4,939	0.05	21
5	р-н Сердика	10	158	3%	3,553	0.04	22
23	р-н Панчарево	11	109	2%	2,497	0.04	23
18	р-н Овча купел	10	163	3%	3,932	0.04	24
6	р-н Подуле	11	244	5%	6,149	0.04	25
21	р-н Нови Искър	7	92	2%	2,520	0.04	27
14	р-н Искър	9	170	3%	4,835	0.04	28
22	р-н Крежаковци	7	84	2%	2,396	0.04	29
16	р-н Студентски	9	78	2%	4,792	0.02	61
	<b>ОБЩО</b>	<b>275</b>	<b>5150</b>	<b>100%</b>	<b>87,262</b>	<b>0.06</b>	<b>17</b>

Table 124. Vocational schools in Sofia Municipality by urban district (columns (from left to right): district code, district, number of schools, number of classes, % of all classes in vocational schools).

Район код	Район	Брой училища	Брой паралелки	Дял паралелки %
1	р-н Средец	1	0	0%
3	р-н Възраждане	5	80	13%
4	р-н Оборище	3	34	6%
5	р-н Сердика	2	0	0%
7	р-н Слатина	2	29	5%
8	р-н Изгрев	2	67	11%
9	р-н Лозенец	6	96	16%
10	р-н Триадица	3	70	12%
11	р-н Красна поляна	1	0	0%
12	р-н Илинден	4	58	10%
13	р-н Надежда	1	0	0%
14	р-н Искър	1	16	3%
15	р-н Младост	2	24	4%
16	р-н Студентски	1	0	0%
17	р-н Витоша	3	36	6%
18	р-н Овча купел	4	41	7%
20	р-н Връбница	2	22	4%
24	р-н Баня	1	25	4%
	<b>ОБЩО</b>	<b>44</b>	<b>598</b>	<b>100%</b>

The accessibility varies and it is well illustrated by the following maps for the precise isochrones of pedestrian access around kindergartens and schools in the whole city and the overall number of inhabitants living in the relevant isochrones. Both maps show better access in the central part of Sofia which has its historical reasons but also needs more attention. (Report "Morphology", Vision Sofia 2050, 2019) (Figure 94, Figure 95)

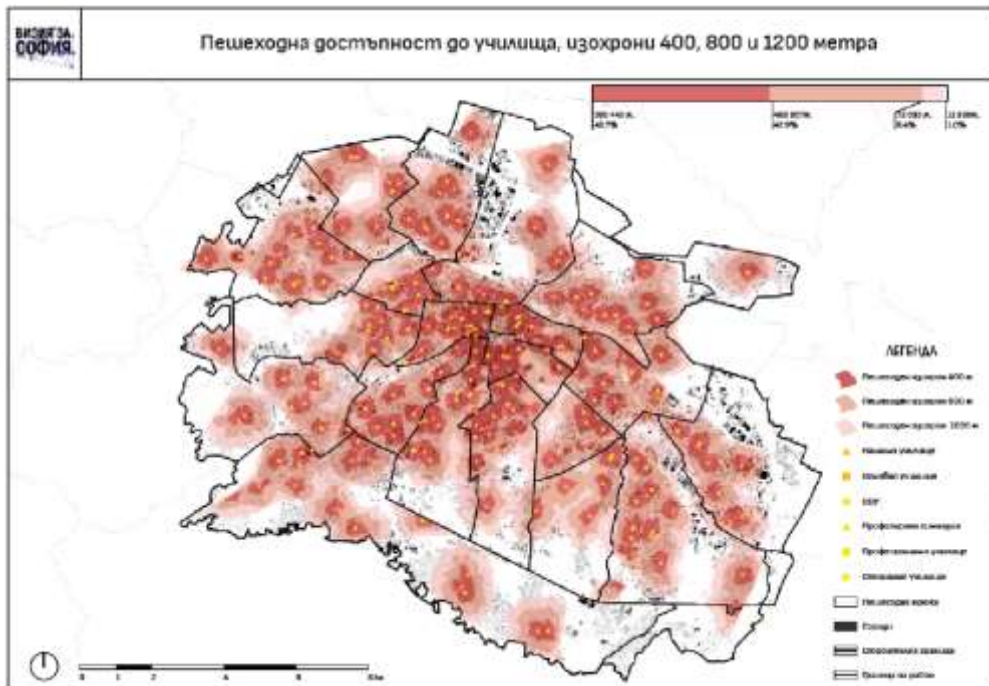


Figure 376. Pedestrian access to schools with 400, 800 and 1200 m isochrones, Source: Report “Morphology”, Vision Sofia 2050, 2019

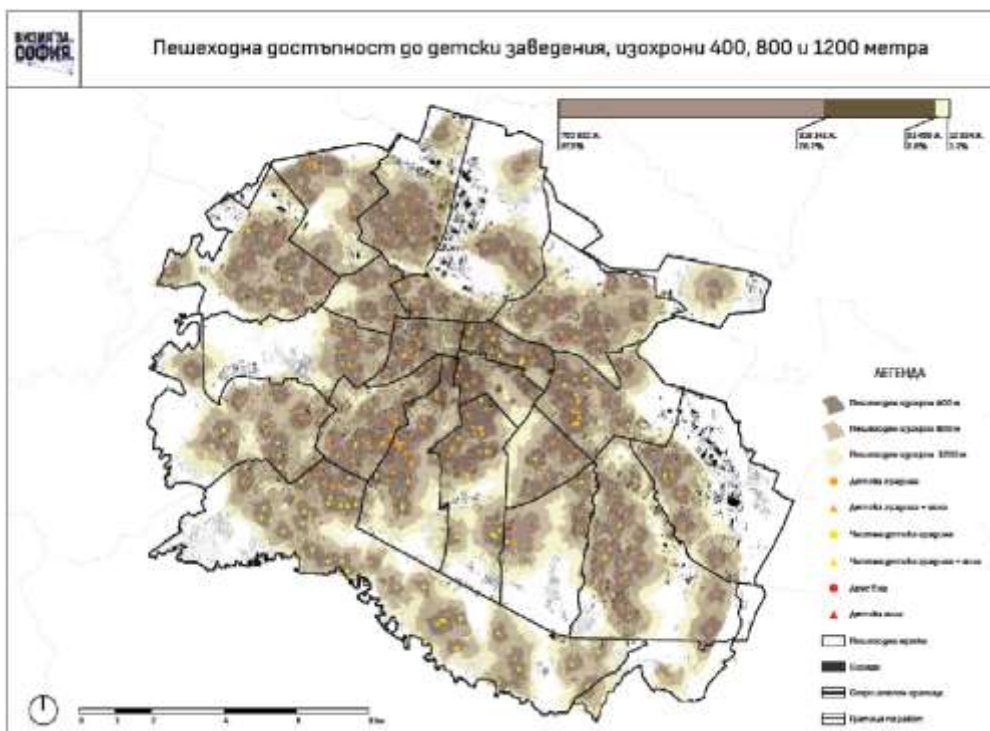


Figure 377. Pedestrian access to kindergartens with 400, 800 and 1200 m isochrones, Source: Report “Morphology”, Vision Sofia 2050, 2019

### Recreational and leisure spaces, sports facilities (public and private)

Except for the raw data from registers about the specific recreational spaces such as designated green areas, there have been no precise studies about other leisure and sports

facilities neither public nor private. The satisfaction with the availability and quality of sports facilities as well as the participation in sport activities is described in the section “Social characteristics of the city”.



Figure 378. Public register of the public green areas by urban district of Sofia Municipality (Sofia Municipality, 2019)

The recent study of the pedestrian network in the city has provided a clear picture of the access to green areas with area more than 3 ha as well as the proportion of inhabitants falling into the different isochrones (Report “Morphology”, Vision Sofia 2050, 2019). (Figure 97)

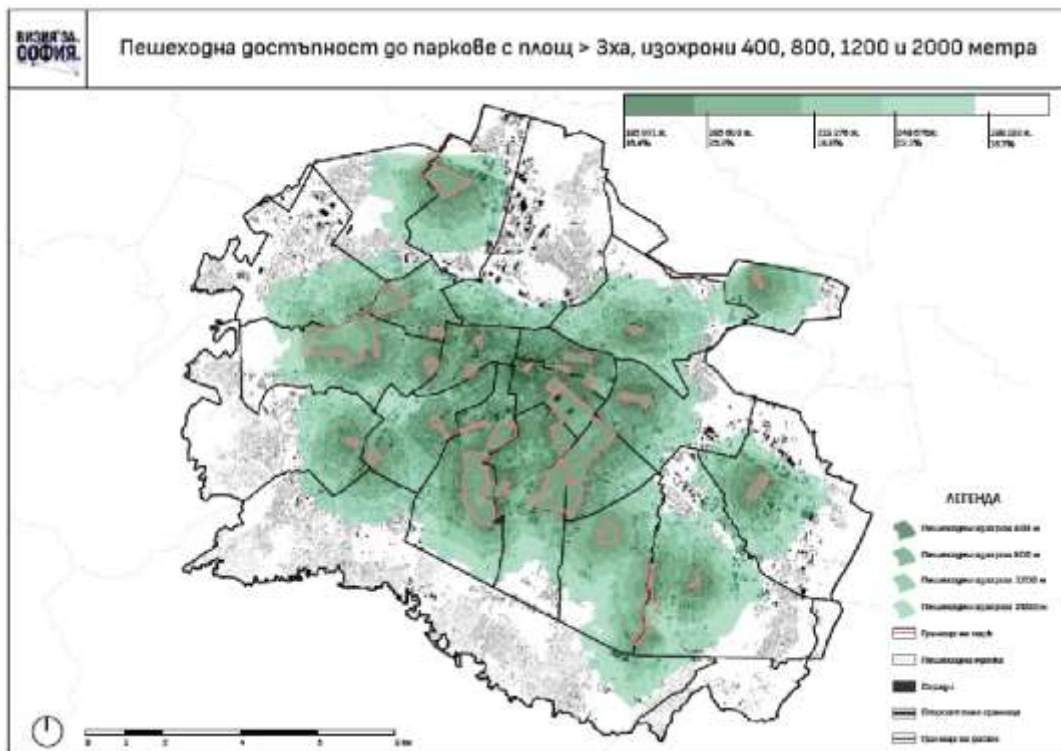


Figure 379. Pedestrian access to parks with area > 3ha with 400, 800 and 1200 m isochrones, Source: Report “Morphology”, Vision Sofia 2050, 2019

## 5.3 Nadezhda district and URBiNAT study area

### Delimitation criteria

The URBiNAT study area comprises of several urban units that could be morphologically and geographically identified: Triagalnika, Nadezhda 2, Nadezhda 4, Tolstoy and Svoboda. These units are influenced by different factors thus undergoing fast or slower transformations during the last century.

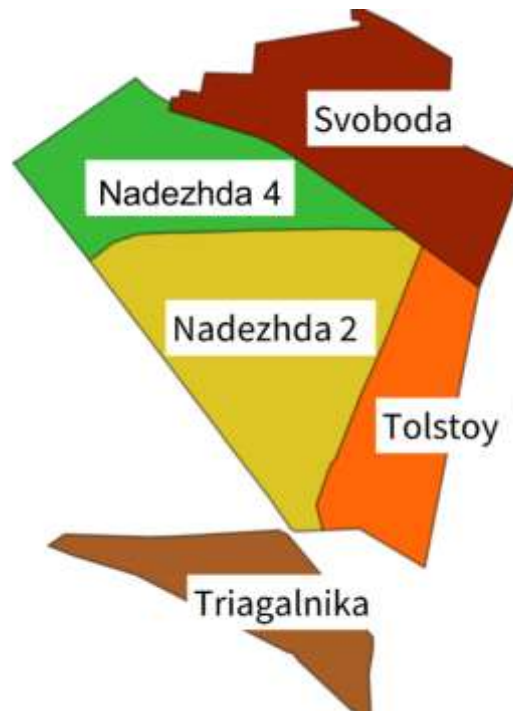


Figure 380. The URBiNAT study area: scope and urban units

### Historical overview of the development of URBiNAT study area and Nadezhda district

#### Neighbourhoods in Nadezhda before 1970-s

After 1906 railway workers started to settle in the field of Vrabnitza village along one of the main roads leading to Sofia and near the main railway lines. About 30-40 railway workers had been already settled there in 1908. Gradually the neighbourhood grew sheltering apprentices, merchants, clerks and agricultural workers. The settlement was declared a separate village named Nadezhda in 1923. It derived its name from Tsar Boris III youngest sister, Nadezhda. The name "Nadezhda" is symbolic in that it is also the name of one of the three daughters of the city's patron saint - Saint Sophia (the three daughters were called Faith, Hope and Love). In 1924 r. Nadezhda is declared an independent administrative unit and in 1934 it became a centre of compound commune which included several villages: Vrabnitza, Iliyantsi, Obelya (along with Moderno predgradie neighbourhood). At the beginning of 1936 these villages were separated from Nadezhda.

Triagalnika got its name after the shape of the neighbourhood during the WWI. It is located to the south of Nadezhda and Tolstoy neighbourhoods, to the north of Fondovi jilishta neighbourhood, and to the east of Zaharna fabrika. During the development of the large scale residential estate of Nadezhda and the transformation of the housing stock there, the urban structure of Triagalnika neighbourhood remained unchanged until the late 1990.



Figure 381. Nadezda district over the general development scheme of Sofia, Plan Musman (1938), Source:



Sofia Municipality, Architecture and Planning Directorate, <https://www.sofia-agk.com/Pages/Render/964>



Figure 382. UBRiNAT area over the scheme of Sofia according to Plan Musman (1938). Zoom at the areas to the North of the city Centre. Source: Sofia Municipality, Architecture and Planning Directorate, <https://www.sofia-agk.com/Pages/Render/964>

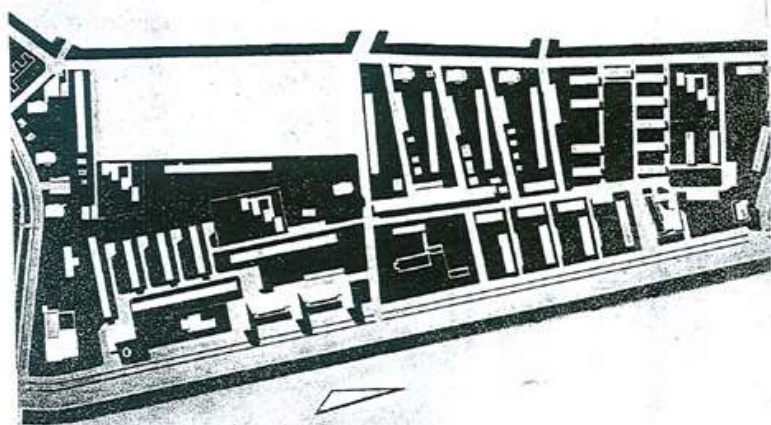
Lev Tolstoy also called "Tolstoy" and named after the Russian writer Lev Tolstoy, is part of the Nadezhda district. The neighbourhood is located on the west side of "Rozhen" Blvd., near Sofia-Sever railway station and "Nadezhda" transport junction. The masterplan of



Tolstoy provided vast green areas between the block of flats, most of which are still preserved nowadays. In 1960 the first residential area of panel blocks in Bulgaria provided 216 (210) housing units (flats) in 9 four storey buildings with two and three sections (entrances). (Figure 101)

Tolstoy is one of the oldest residential estates planned and constructed in 'the new complex manner'. After the erection of the first panel building in the city centre (on a plot located at 192 Naicho Tzanov blvd.) in 1959, a pilot project for its mass implementation started in the area of Tolstoy neighborhood. A team from the Institute for Unification and Industrialization of Construction was leading the development process of unified construction technology Bs-2-63 (also known as Al. Tolstoy, after the name of the residential area where it has been systematically implemented for the first time) was thus developed for 4 and 6 storey blocks of flats with a minor longitudinal wheelbase of 3.60 m and a cross of 2x5.10 m. (Atanasov, H. et al, 1968) These oldest panel blocks of flats do not have balconies, but later modifications of Bs-2-63 allows execution of balconies or with continuous loggia on the south (or east) façade, depending on the internal distribution of the sections. The roof is slightly sloping. The underlying space is low. The facade and the side-outside panels are covered with plaster and their main advantage is the outside plaster made of wall-board that has very good thermal insulation property. (NPRRB, 2005) These buildings have been experimentally implemented in Tolstoy neighbourhood under two variations (Tolstoy 1 and Tolstoy 2). After the end of the experimental stage, the mass production of the elements for the structure started. Most of these structures have been implemented on the territory of Nadezhda residential area. (NPRRB, 2005; Sofia magazine, 1972; Grekov, P et al, 1968) Small modifications of these two variations of construction systems lead to a third modification, which pilot stage was again tested in the located in the vicinity of Tolstoy (today Nadezda II) along Traen mir street. The modification named after the street "Traen mir" was replicated in 5 four storey residential buildings finished in 1960.

Figure 383. Tolstoy residential area plan as from 1960, Source: Tashev, P. (1972)



Between 1963 and 1964 the urban plan for Svoboda neighbourhood was developed by arch. P. Tashev. The first residential structures, located along Hristo Silyanov blvd., were constructed for a very short time period (from January to December 1961) and comprised of 8 four storey blocks with 184 apartments. Later, in 1962 the construction of blocks started in Momkova mahala. Nowadays "Svoboda" is one of the most northern districts of Sofia. To the north

and west it borders the North Park. To the northeast - with the Iliyantsi Bazaar of Commodities, in the East - with SKK Locomotive 1929, to the south - with Nadezhda 2 Nadezhda 4. In Svoboda there are 47 panel houses from the series Bs-2-63. (Tashev, P., 1972; Atanasov, H. et al, 1968, Grekov, P et al, 1968)

### **Nadezda neighbourhood and the Development of Sofia in the 1970-1989**

Between 1967 and 1968 a decision has been made that new developments should be allocated to the north of the historic city and the planning for the new residential areas of Nadezhda, Obelya and Vrabnitza was initiated and led by arch. M. Pindev. (Tashev, P., 1972) The allocated land for the new Nadezhda residential area comprised the areas around Bakarena fabrika, Vrabnitza, Nadezhda and the recently constructed and already inhabited residential areas: Momkova mahala, Svoboda, Traen mir and Tolstoy. (Sofia magazine, 1972)

“The urban plan for Nadezhda residential area provided 9 372 apartments, green areas and services for 80 000 inhabitants within an area of 150 ha. It was planned that 79% of the apartments would be in eight story blocks and 21% - in eighteen story (floor) multifamily buildings of monolithic structure. Land was preserved for the construction of underground parking which had to meet the needs of increasing levels of motorization. (Sofia magazine, 1972)

According to the administrative district boundaries set in 1971, Sofia was divided into 7 administrative districts with population 160 000 people each. Later on, due to the suburbanization, new districts were added and until 1989 the number of districts grew to 9. The district boundaries follow the historically shaped and already morphologically and functionally established macro urban areas. Each of the districts had one main street that served as a spine connecting the district to the city centre and the rural area around the city, linking the neighborhoods (the micro regions) and supporting the main commercial activities thus serving as linear secondary city centres. The boundaries of Nadezda district remained unchanged during the period 1971-1989 and the main spine for the whole districts were Maria Louisa boulevard (then Georgi Dimitrov blvd) along with its continuation to the north of Nadezhda junction – Lomsko shosse boulevard (then Stanke Dimitrov blvd.). The planned parameters of the sine boulevard then were 150 m width with separate green lanes. The width of the boulevard would allow the panoramic view towards the residential areas both sides and the city Centre. It was planned that until 1980 all the green areas between the blocks and the North park would be constructed. The projects within the scope of 150 ha had to provide housing for 80 000 inhabitants. Within these boundaries, there was land reserved for the construction of a large sports complex with stadium, playgrounds, swimming pool and athletic facilities. Apart from that, the already started construction of Locomotive stadium with seats for 35 000 visitors, had to be completed. There were plans for construction of a swimming pool on the Territory of The Nord Park. Street greenery along Lomsko Shosse Boulevard would acts as a green link between the greenery in the city centre and the North park. The western microregions would be planned in a park environment, while the eastern neighbourhoods would be easily connected to the North park. (Tashev, P., 1972)

It was planned that the whole variety of basic services would be provided in Nadezhda-starting from the micro-regional centres (secondary service centres) and cultural centre, to the small shops and offices on the ground floor of the residential buildings. Kindergartens and schools had to serve 70-80% of the children, and in addition there were plans to provide “places for childcare” - one in each residential group, three in each of the microregions in Nadezhda. Two schools with 28 classrooms have been planned. The service area planned along Lomsko shosse had to provide mix of functions as hotel,

polyclinic, commercial and administrative centre, cultural centre and museum, cinema, youth cultural centre. (Tashev, P., 1972)

During the late 1960s and the beginning of 1970s, the neighbouring to Tolstoy residential structure, Nadezhda 2 was again used as a test ground for mass implementation of the further developed and updated variation/nomenclature of prefab panel blocks - Bs-3-61. This time the elements were produced in the governmental construction company specialized in the industrialized construction technologies for provision of mass housing. Almost all blocks in Nadezhda 2 have been constructed with elements of this nomenclature.

The last big portion of prefab concrete blocks of flats was built in the late 1980s. Most of the dwellings before 1989 were built and allocated by the state according to rules for social housing. Even then, most of them were straight sold to the inhabitants and thus financed next constructions. After the end of the main construction activities, developed in less than 20 years, Nadezhda district was structured into 6 micro-regions: Nadezhda-1, Nadezhda-2, Nadezhda-3, Nadezhda-4 (also known as Momkova mahala), Nadezhda-5 and Nadezhda-6. Subsequently, however, the last two parts (Nadezhda-5 and Nadezhda-6) fell within the boundaries of the administrative district of Vrabnitza and have been renamed to Vrabnitsa-1 and Vrabnitsa-2. At present day, the residential district of Nadezhda occupies 19 300 dka and shelters 80 000 inhabitants in its four micro regions. The prevailing types of large scale housing structures are Bs-VIII-Sf, Bs-2-69 и Bs-69-Sf.

The preliminary design for the North park (eng. Kozuharov) was finished in 1976, and the detailed design – in 1984 (eng. Radoslavov). The park was constructed in 1985, thus forming the Northern hedge which had to act as a buffer between the Northern industrial areas and residential areas. The design of the park respects the existing green infrastructure and compact vegetation and introduces minimal interventions without introducing new species. The interventions are related mainly with shaping the main accents of the landscape composition, organization of recreation activities, locating children's playgrounds and construction of alleys. (Kovachev, A., 2005)

The club stadium „Locomotive“ was first (1930-s) located not far from the Central Railway station, at the place of the today's Thermal power station. In the 1950-s the club moved to a stadium in Zaharna fabrica and after 1969 the club settled to the northeast of Svoboda residential area and actively hosted sports activities there. Today there are 22 seats, of which almost 80 % covered by the canopy. Recently (2015-16), after the last reconstruction, the capacity was reduced to 6000 seats along with the upgraded luxurious VIP with 64 covered seats.

The buildings constructed in the 1980s are mainly the high-rise buildings with more than 8 floors and located in the residential areas to the east of Lomsko shosse. Small houses with or without yards were left in the neighbourhood and along the eastern street line of Lomsko shosse blvd. due to the changes of the political and social-economic system in 1989.



Figure 384. Housing structures built in the period 1960-1980s. Source: Scheme elaborated for the purposes of URBiNAT

### Nadezhda neighbourhood after 1989

The changes in the 1990 overtook the unfinished structures, mainly those along Lomsko shosse. The neighbourhood was connected to the city by tram and bus transport and these were the main mobility options for Nadezhda residents until the decision for the construction of the second metro diameter was made. The project was funded by Operational Programme Transport and Transport Infrastructure 2014-2020 and was part of the General plan for the development of Sofia Metropolitan. The public procurement procedures for the construction of the lots were finalized in 2009 and the construction started in 2010. This section of the metro diameter was officially put into operation on August 31, 2012. Lot-1 "Obelya - Nadezhda", one of the two independent lots in terms technical and geographical point of view, has 4.19 km length, of which 1.3 km are above the ground and 2.9 km underground route, and includes four new Metro stations: "Lomsko shosse", "Bely Dunav", "Nadezhda" and "Khan Krum". Under the boulevard "Lomsko shosse" buffer parking lot with 600 parking spaces was constructed.

### 5.3.1 Territorial description

#### **Aerial view of the Study area with administrative boundaries and identification of the deprived areas**

**Area (km<sup>2</sup>)** 2,57 km<sup>2</sup> (256,778 ha)

The URBiNAT study area is located to the north of the city of Sofia and the south-eastern part of Nadezhda administrative district. The terrain is predominantly flat as the altitude varies between 530 – 550 m. The terrain displacement is insignificant and its level falls in northern direction. Suhodolska River flows through its artificial canal-like river bed on the southern part of the territory, from west to east.

The housing estates occupy an area of 115,16 ha. They are represented by collective mid-rise (from 10 – 15 m height) and high-rise (over 15 m height) apartment buildings. The number of dwellings accounts for 17 069 and the number of their inhabitants reaches 37 770. Most of the buildings were built in the period between 50-80s.



Figure 385. The study area in Sofia municipality, part of Nadezhda district and within the city limits



Figure 386. The study area over the basic Open Street Map





**Studied area**

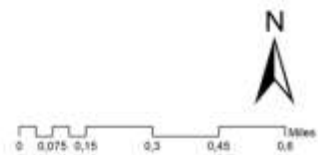


Figure 387. URBiNAT study area

### 5.3.1.1 Biophysical characterization

#### Geology

The dominant geological category within the scope of the study area is alluvial, proluvial and lake sediments.

In terms of hydrogeology the area falls in the type of groundwater in the quaternary - gravel, sands and clays.

The hydro-mineral resources in the district and in the study area are represented by two drills, one in Nadezhda 2 in the courtyard of 15<sup>th</sup> school and the other at the edge of Lokomotiv stadium next to Svoboda neighbourhood. These resources fall into local Zone III - Thermal zone in Late Cretaceous sandstones and marshes with deposited over them layers of Neogene graves and sandstones. It is an Artesian zone with thermal mineral waters with increased bicarbonate (soda) mineralization.



Figure 388. Geology and mineral water in Nadezhda, Source: [http://www.sofproect.com/Images/web\\_maps19112009/\\_8.pdf](http://www.sofproect.com/Images/web_maps19112009/_8.pdf)

**Geomorphology** The study area is predominantly a sedimentary geomorphological surface, framed from the north-west by the floodplain terrace along the Kakach river and flanked from the south-east by the low, mixed and accumulating terrace of Suhodolska river.

#### Altimetry/Hypsometry

The terrain is predominantly flat as the altitude varies between 530 – 550 m. The terrain displacement is insignificant and its level falls in northern direction. (Fig. 107)

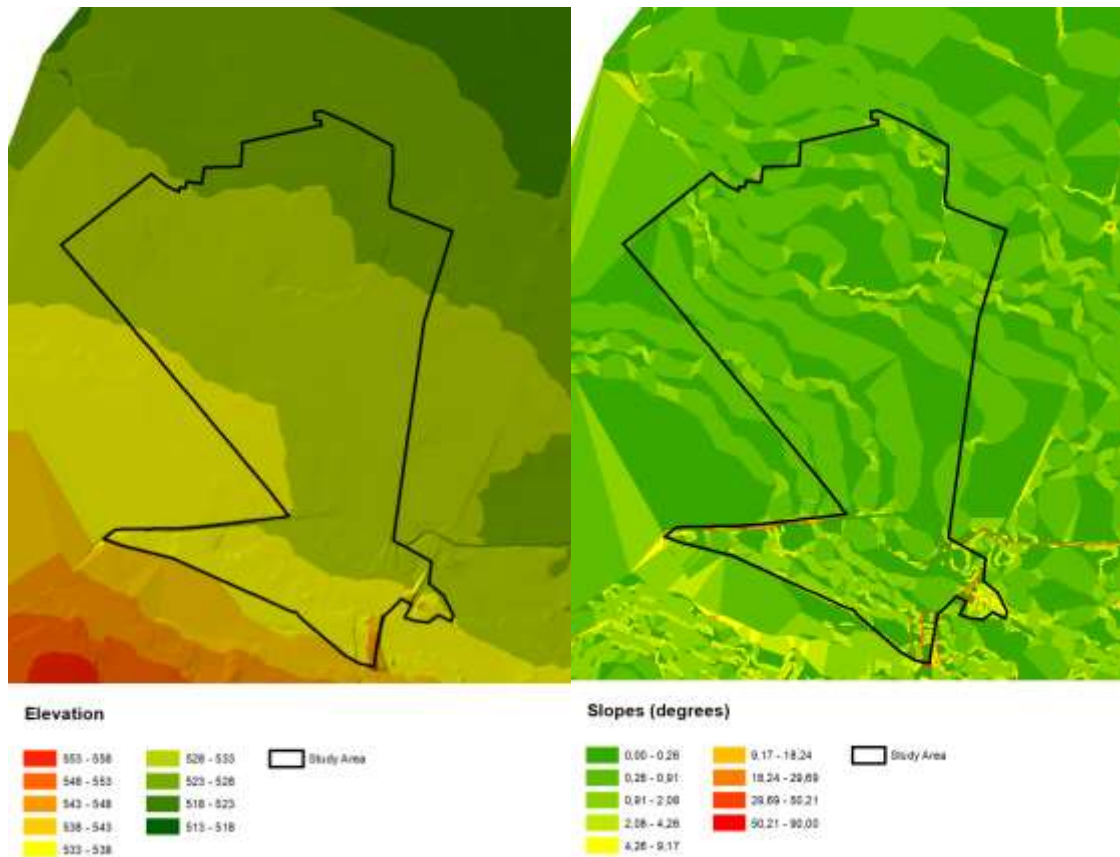


Figure 389. Hypsometry of URBiNAT study area and the neighbouring areas

Figure 390. Slopes within the URBiNAT study area and the neighbouring areas

### Slopes

There are no significant slopes except the artificial ones around Nadezhda junction. (Fig. 108)

### Landslide risk

There is no risk from land slides. (Source: Register of Landslides, Ministry of Regional Development and Public Works, <http://gz-pernik.mrrb.government.bg/map/352/>)

### Slopes aspect

The aspect is slightly north-eastern and there are many surfaces which are almost flat.





Figure 391. Slopes aspects

### Hydrography and artificial waterbodies

Suhodolska river flows through its artificial canal-like river bed in the southern part of the territory, from south-west to north-east.

### Wind circulation

Wind patterns in the northern part of Sofia city are less influenced by the local regimes defined by Vitosha Mountain. The predominant winds are north-western. In times of Atlantic cyclones the wind is stronger than the more southern parts of the city. In times of inversion and still weather there is less ventilation during the nights than the southern counterparts.

### 5.3.1.2 Land use/ land cover

#### Land Cover

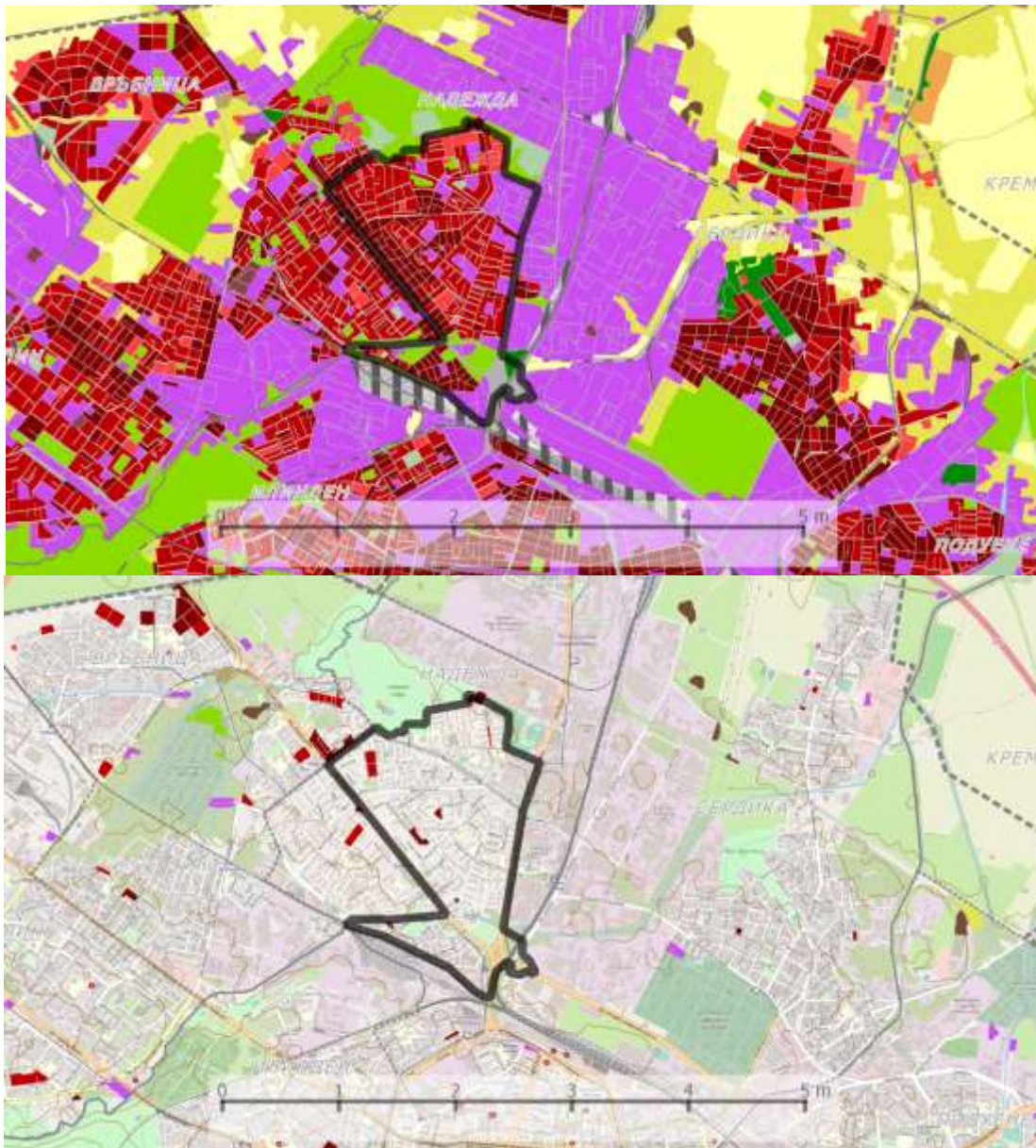


Figure 392 . Urban Atlas land cover from 2012 (top) and change between 2006 and 2012 (bottom). Source: Urban Atlas, <https://land.copernicus.eu/local/urban-atlas>

No significant land cover changes are observed during the last 15 years except the intensification along and in proximity to “Lomsko shosse” boulevard where the change is from discontinuous to continuous urban fabric.



## Land Use



Figure 393. Land Use map with the local categories within the URBiNAT study area

Картиране и оценка на нивоти в обхвата на здравословния коридор - разширен списък  
М 1 : 7 500



Figure 394. Location of vacant lots, Scheme elaborated for the purposes of URBiNAT(Sofproect, UACEG)

Table 125. Land use by land use groups (percentage of each category)

Land use group	Part of the study area, %
Housing	44,7
Transport	29,28
Public uses	8,93
Green areas	8,63
Industrial	2,52
River	0,67
Sport	0,64
Tech infrastructure	0,01
Other	4,61
All groups	100

There is moderate variety of land uses in the study area with overall dominance of the housing land use.

The housing estates occupy an area of 115,16 ha within the URBiNAT study area. They are represented by collective mid-rise (from 10 – 15 m height) and high-rise (over 15 m height) apartment buildings. The number of dwellings accounts for 17 069 and the number of their inhabitants reaches 37 770. Most of the buildings were built in the period

between 50-80s. Inside the housing estates there is large proportion of unutilized open space.

### Land register (private/public)

Around 75% of the plots within the scope of the study area are municipal property. Most of them are occupied by collective (each apartment within the collective is private ownership) apartment buildings, small green open spaces or are used for transportation (local streets). Merely 20% of the plots are privately-owned. The latter are concentrated along “Lomsko shose” Blvd. due to unrealized urban reconstruction. They are occupied by small scale buildings for commerce and different types of services which mainly cluster along the main boulevard and benefit by the proximity to the underground metro stations.



Figure 395. Ownership map. Elaborated for the purposes of URBiNAT, Source: Sofproect OGP, 2019

### 5.3.1.3 Transportation network and services

#### Road network (and hierarchy), Railway, Subway network

“Rozhen” and “Lomsko shosse” Blvds are two of the entrances/exits of the city and major access roads to the centre and the rest of Sofia. “Lomsko shosse” Blvd was reconstructed in 2011 after the construction of the underground line beneath. Moderate traffic jams are formed during the peak hours at working days on both boulevards. Such moderate congestions outward of the city (on Friday evening) and inward (on Sunday evening) due to weekend travel to the north-west of the country.

“Nadezhda” junction is a connector for the car travellers and divider for cyclists and pedestrians.

The railway lines going north-west and north from the city, with their adjacent areas, act as city divider and even stronger barrier and a major constraint for pedestrians and cyclists to go in or out of the area.

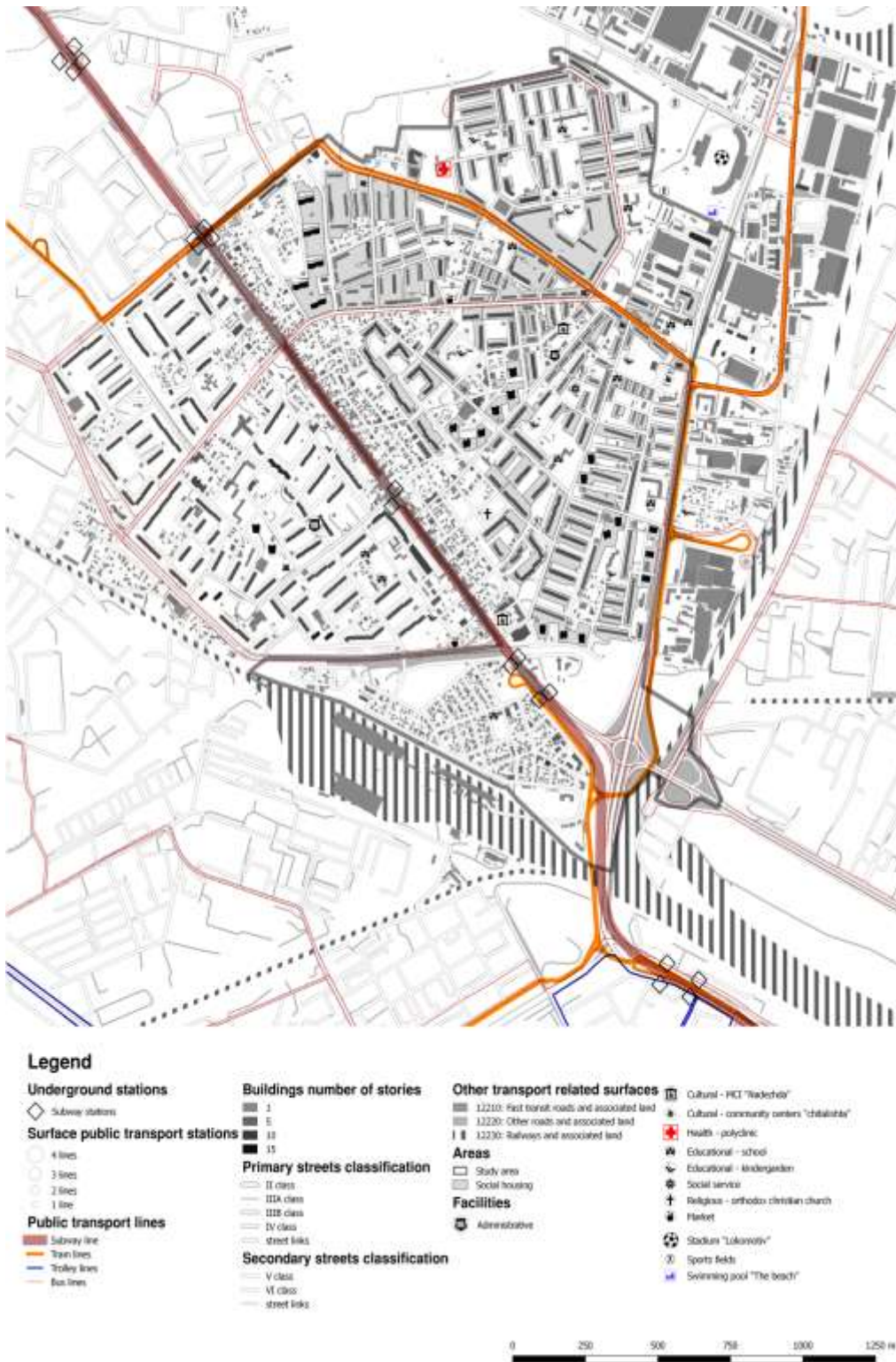


Figure 396. Primary land and infrastructure dedicated to transport as well as public transport lines and public facilities. Scheme elaborated for the purposes of URBiNAT(UACEG)



## Bicycle paths network

The bicycle paths network is in early stages of development. One of the first longer trails is along “Lomsko shosse” Blvd organized as part of the whole reconstruction of the boulevard. It starts from the neighbouring Vrabnitsa district and reaches the edge of the historical city centre at Lavov most square (Lion’s bridge) passing through the steep junction “Nadezhda”. Additional primary path envisaged for realisation along “Rozhen” boulevard was planned to be implemented (2017-2018) but it is not realized yet. Another cycling path with recreational purpose is envisaged for the Northern Park as part of its reconstruction in two stages, one of which has finished and the other is being implemented.

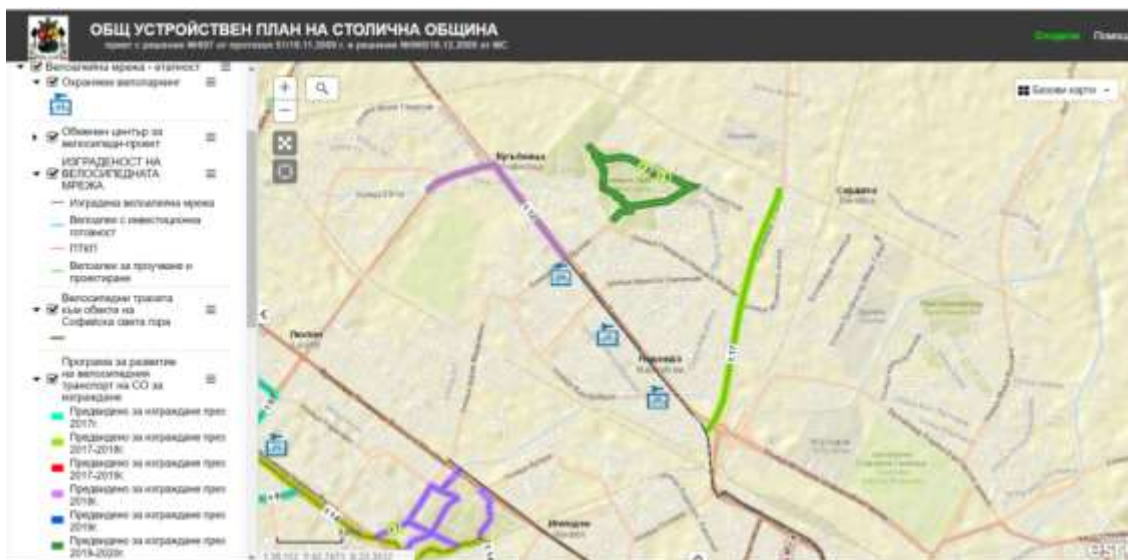


Figure 397. Cycling network in the study area, <https://maps1.sofproect.com/oup>

## Facilities (cultural, Health, Educational, Sports, Religious, Administrative, Justice and Citizens protection)

There is variety of facilities with good localization and distribution of kindergartens and schools. The health facilities are few and the major one (the polyclinic) is located at the far most northern end of the area making it less accessible form most of the residents.

The sports facilities are concentrated around “Lokomotiv” stadium with the exception of a sports field in the central southern part. The religious temple “Sveti Duh” (Saint spirit), an orthodox Christian church is at the heart of Nadezhda 2 neighbourhood which was earlier established low rise housing area in the first half of the 20<sup>th</sup> century and later reconstructed thus replacing traditional quarters with prefab multifamily housing. The administrative services are dispersed in several locations (one in the territory of Nadezhda II) and the major one being in Nadezhda 1 (out of the study area). There are plans for moving the main office of the District administration close to the church (in

Nadezhda II). There are no specific facilities for justice and citizens protection but they are integrated with some of the administrative functions and the facilities mentioned above.

### Land devoted to roads

About 29,28 % of the study area is occupied by roads. The high percentage is related to the inclusion of Nadezhda junction in the urban units shaping the extents.

**Land devoted to pedestrians.** There is no precise data about the surface area as a recent study of the pedestrian network is in linear form without attributes for the width yet.

### Built areas

The ratio between open spaces and the built environment is close to 4.1 as visualized in the map and the graphic.

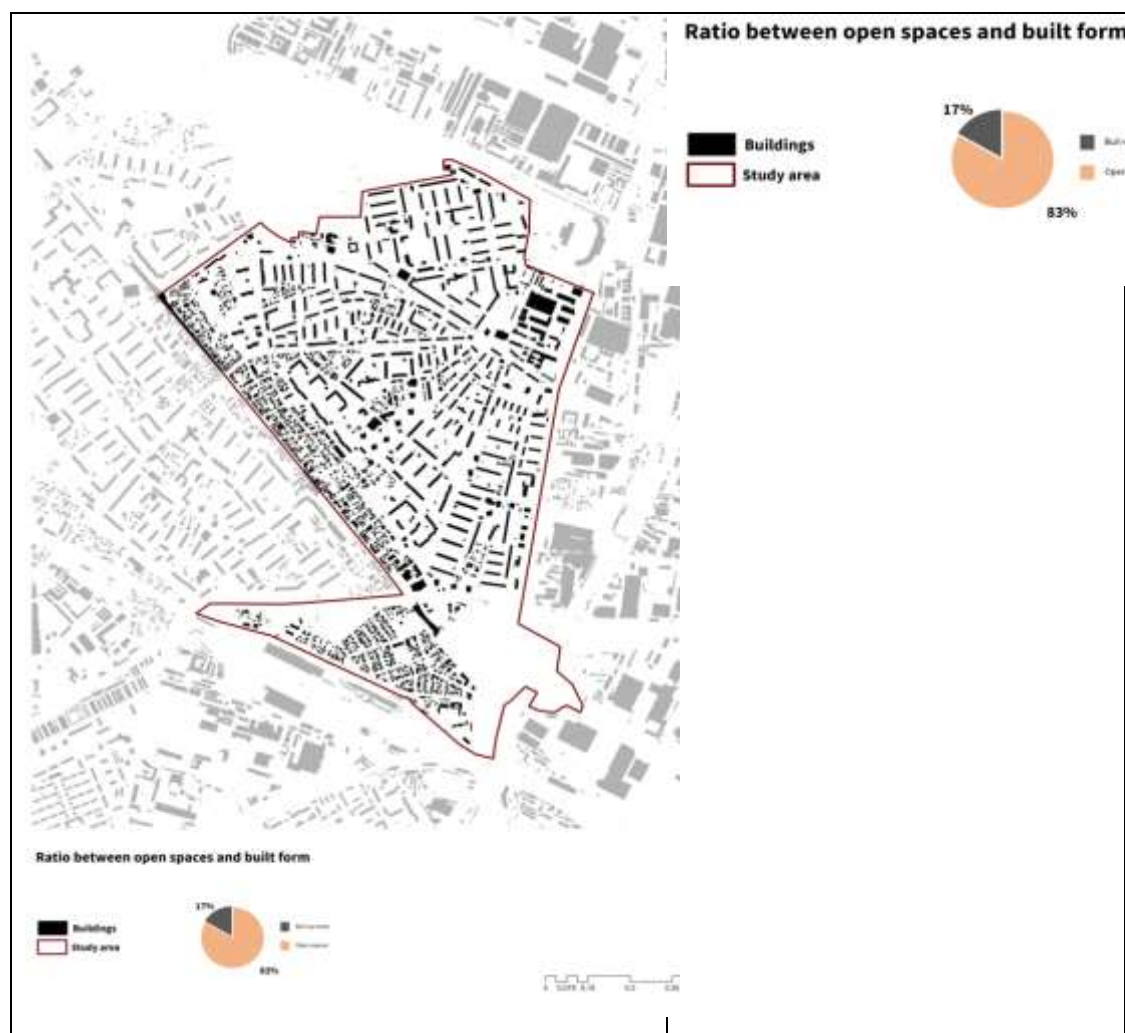


Figure 398. The ratio between open spaces and the built environment. Scheme elaborated for the purposes of URBiNAT (UACEG)

### Public transportation links

More than half of the population in the URBiNAT study area lives in buildings more than 300 m from the transport stops and more than 500m from the stops of the underground.



Most of these buildings were built in the Socialist era (before 1989). There are various advantages and disadvantages among the different parts of the area in terms of access to various facilities.

### Access to cultural facilities

The average journey time is between 5-10 minutes but it can vary according to the concrete cultural facility. For instance the Municipal cultural institute “Nadezhda” situated almost at the southern end of the area is less accessible for the northern part of it. The Centre for Arts, Culture and Education "Sofia" - Nadezhda branch situated at the central northern part of the area is less accessible for the southern one. The four community centres established between 1919 and 1957s and distributed evenly in Nadezhda 2, Tolstoy, Svoboda and Triagalnika quarters are best accessible locally for the relevant neighbourhood.

### Safety

Lighting in Sofia and Nadezhda in particular has been evaluated in a scale of 5 degrees by an external service provider for Vision Sofia 2050. There is a relatively high number of undefined and missing data. This is the case for the northern part of Nadezhda 2 and for Triagalnika quarters.



Figure 399. Lighting in Sofia – condition (from left to right: excellent, very good, good, bad, very bad, undefined, no data), Source: Vision Sofia 2050, <https://vizia.sofia.bg/urban-environment/#lights>

There is no publicly available official data about the access control but there is some unofficial crowdsourcing evidence mapped.

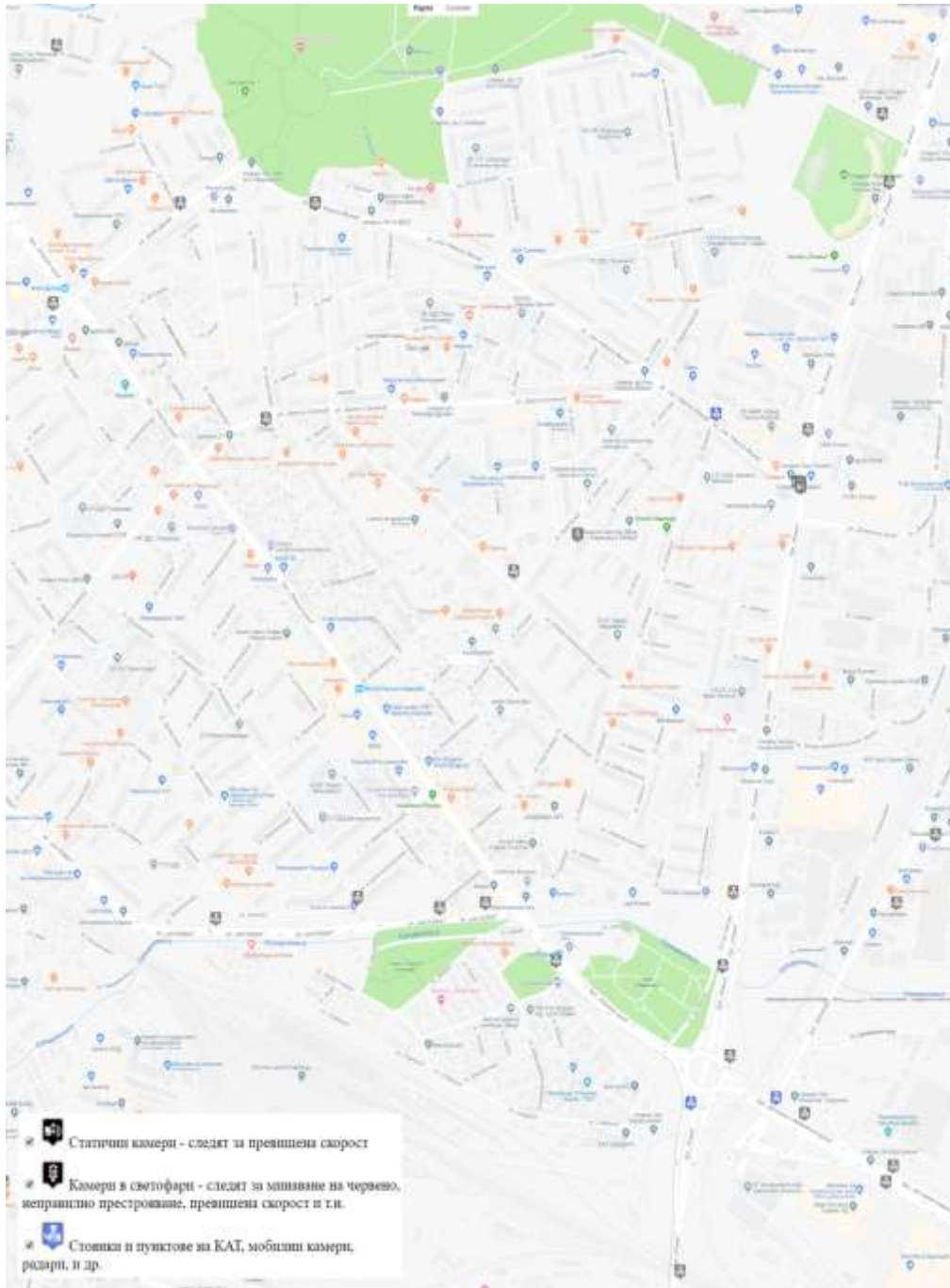


Figure 400. Traffic and access control cameras and points of manual regulation observed by citizens (from top-down in the legend: Static cameras for monitoring of exceeded speed limits; Cameras and traffic lights for observation of driving rules; Stationary points of traffic and access control), Source: <http://antiradar.braindumpz.com/>

Nadezhda district is part of the 2nd police department in Sofia. There are 8 police inspectors working in the study area with division of 4 groups or separate inspectors for Triagalnika, Nadezhda 2, Nadezhda 4 and Svoboda, Tolstoy. North from the area and Severen (Northern) park, in Iliyentsi industrial zone, are located the headquarters of the 2nd service fire safety and citizens protection.



## Noise

Noise levels in the quarter are much above the normatively defined limits for residential areas - 55 dB for the day, 50dB for the evening and 45dB for the night.



Figure 401.Noise levels from all sources for full day (Key: ten positions from green low levels(30 dB) to yellow, orange, red, violet- high levels (8dB and higher0), Source: <http://www.isofmap.bg/>, <http://www.gis-sofia.bg/bg/projects/gis-sofiya-eood-razrabotva-strategicheska-karta-na-shuma-v-stolitsata>

Several small areas in Nadezhda 2 and Tolstoy, enclosed among the blocks and protected by mid and high rise buildings, are exposed to the lowest levels. The exposure to the highest levels of noise is along Rozhen Blvd as well as Lomsko shose Blvd. The widest dispersion of noise is around Nadezhda junction due to its elevation above the terrain which affects the adjacent and relatively small park Nadezhda.

## Fragmentation analysis

There are plenty of semi-public spaces represented by the areas around the blocks of flats but few fragmented real spaces dedicated for such functions and provided to be publicly accessible. There are three small green areas situated in the southern part of the area. The optimized street network is relatively narrow both for cars and pedestrians. Moving and parking space provide options only for moving and very few options for staying.

#### 5.3.1.4 Green Infrastructure and Biodiversity

##### Vegetation characteristics and distribution

The species dominating the green areas and streets in the study area include *Fraxinus angustifolia*, *Aesculus hippocastanum*, *Tilia* spp., *Abies* spp. most of which were artificially planted and *Fraxinus angustifolia* can be considered native. There are single trees like *Populus* spp. and *Salix* spp. around the Suhodolska River and at many spots among the housing estates most of which spread in the industrial sites and along the rivers. Invasive species such as the *Ailanthus altissima*, *Robinia pseudoacacia* and others are settling around infrastructure and abandoned ruderal sites.

There is analogous register of street and decorative trees which is outdated and currently digital local trees survey is on-going for the city as a whole, although some areas had been already mapped by a pilot project in 2018. All of the decorative (ornamental) trees are protected under national and local regulations. There are no specific rare or vulnerable trees found in the area.



Figure 402. NDVI for Nadezhda and surrounding areas from 2018-09-26, source: [https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3\\_NDVI&datasource=Sentinel-2%20L1C](https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3_NDVI&datasource=Sentinel-2%20L1C)





Figure 403. NDVI for the extents of the study area from 2018-09-26, Source: elaborated for the purposes of URBiNAT, based on own calculations and visualization(UACEG)

### **Distribution of public green spaces**

The Northern park which is just at the borders north from the study area is one of the 5 major urban parks established in the city limits of Sofia.

In the study area there are 3 green areas which serve as urban gardens – park “Nadezhda”, park “Gorska kultura” and the three small green squares around the church “Sveti Duh”. Altogether with the greenery around Nadezhda junction they comprise 8,63% of the area. Due to inconsistencies of the data from the Cadastral map, the Public register of green areas and the provisions of the General development plan different calculations can be made. For instance in the public register there are only three green areas for public use with area of 1,669 ha while in the General development plan the zones with land area dedicated to public green is 16,679 ha of which 49,74% are provisioned as urban gardens with local significance and 48,72 are provisioned as linear green links along streets, rivers,



channels, etc. The data about the land use is often incomplete especially about the urban green areas some of which are described as “Other” urban land use. There are many vacant plots of land in the housing estates which are covered by vegetation or soil and are public property (municipal private or municipal public) with overall surface area of 9,561 ha whereas the municipal private is 2/3rds and the municipal public is 1/3rd of these allotments. Usually in the detailed urban development and design plans they are provisioned as small local urban green pockets, kinder and sports playgrounds.

### **Green roofs**

There is only green roof (brown roof) in Nadezhda district, the same being within the scope of the URBiNAT study area, is on the roof of the Municipal Flowers’ market in Nadezhda 4.



Figure 404. Green roof on the top of the Municipal Flowers’ Market, Source: Google

### **Green infrastructure**

The typology of the green infrastructure consists of green open areas around the multifamily buildings, sport fields and smaller sport areas, local gardens with playgrounds for children. The studied area is bordering some bigger green areas that are part of the municipal register of green spaces. These are Nadezhda Park and Gorska Kultura Park on the south and Severen Park on the north

In the last 15 years there were no significant changes in terms of vast areas with newly appearing or disappearing vegetation. Soil trampling and sealing has happened at smaller scales due to intensive car parking or growth of penetrating pioneer/ invasive trees and other vegetation. The latter happened at spots with no significant activity. Generally the canopy of the trees has generally grown but beneath the tree crowns many regular or irregular activities have contributed to the poor quality of the soil.

“Green in housing estates” built up with apartment housing and having plenty of open space in between comprises 61% of the areas with vegetation with surface more than 100 m<sup>2</sup> (NAG, 2018). There are relatively similar ratios for around 8% of the areas with vegetation classified as “Gardens”, “Green in separate housing allotments” and “Vegetation along railways and roads”.

Table 126. Area and percentage of the different categories of greenery by classes. In brackets: the corresponding classes from the map “Urban green structure map”, indicating a slight difference in the definitions of classes.

Urban forests (Urban forest/Uncultivated park)	0	0%
Parks (Cultivated parks and urban gardens)	21550,76	2%
Gardens (Green and sport open spaces)	80728,66	8%
Riparian vegetation (Stream bank/shore vegetation)	8713,39	1%
Green in housing estates (Urban greenery in apartment housing areas)	639495,09	61%
Green in separate housing allotments (Urban greenery in family housing areas)	85931,81	8%
Green in public areas (Urban greenery in public facilities)	57627,07	6%
Green in sports areas (Greenery in sports facilities)	715,42	0%
Vegetation along railways and roads (Railway and roadside greenery)	82796,89	8%
Green areas in industrial zones (Green areas in industrial units)	68769,66	7%
All	1046328,75	100%

In terms of connectivity the well grown mature groups of trees provide relatively good conditions for connectivity from the perspective of biodiversity corridors. Yet the building morphology and street pattern at places is such that disrupts some opportunities for deeper interconnectivity between the specifically shaped and divided urban blocks and separate neighbourhoods.



Figure 405. Urban green structure map. Elaborated for the purposes of Urbinat.(UACEG)

### Protected areas

There are no protected areas in the study area and the ones protected by the ecological network Natura 2000 are in a distance of more than 12 km with Ribarnitsi Chelopechene (BG0002114) being the closest one and designated as important for the protection of birds.

### Infiltration area/ground permeability

The concentration of impermeable areas in the scope of the study is along its western and south-western edges that is related with the low- and mid-rise housing along “Lomsko shosse” Blvd and in Triagalnika neighbourhood.

Permeability in %	Area, m	% of all
0-20%	159327,17	6%
20-30%	3424,01	0%
30-40%	5410,08	0%
40-50%	110397,32	4%
50-60%	379578,03	14%
60-70%	955180,42	36%
70-80%	576820,43	22%
80-100%	480284,94	18%
<b>Overall</b>	<b>2670422,4</b>	<b>100%</b>



Figure 406. The ratio of impermeable areas (based on the urban atlas polygons), Source: Copernicus, 2018; Vision Sofia 2050, 2019

### Green spaces management

The annual budget for housing, public works, and utilities (incl. green areas management and development) of Sofia Municipality is increasing from 24 006 (2015) to 38.139 (2019) for the period 2015-2019. (Figure. 125). The approved 2019 budget for maintenance of

the elements of the green system (parks, greenery along streets, gardens) is 19 080 000 leva, from which around 8 600 000 were distributed among the 24 districts. From these around 600 000 leva were spent for the Green Sofia Programme (distributing funds among all 24 districts).

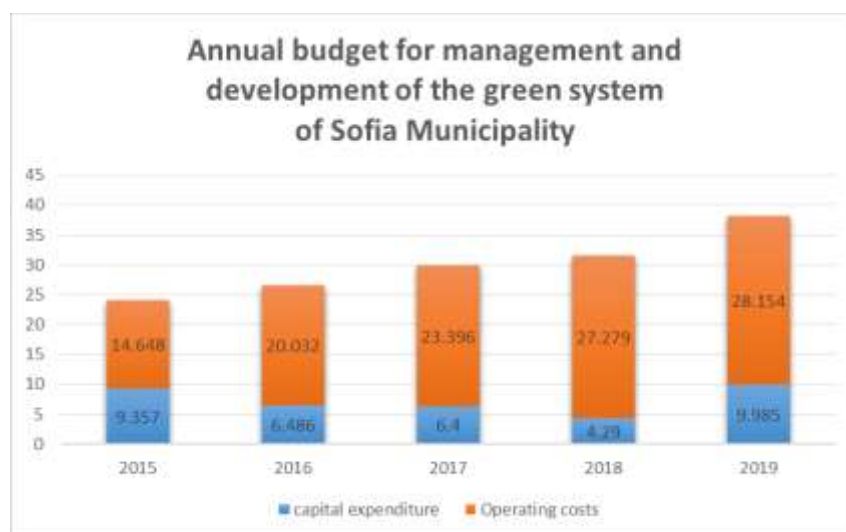


Figure 407. Annual budget (in mln. BG Leva) for green areas management and development of Sofia Municipality (2015-2019), Source: [www.sofia.bg](http://www.sofia.bg)

Table 127. Budget for green system by type and by year, Source: Nadezhda district administration

Year	Total budget	Budget for maintenance and development of the Nord Park and park Nadezhda	Budget for maintenance of the inter-block spaces	Projects funded by Green Sofia Programme	Number of projects financed by green Sofia Programme
2019	1 010 000	660 000	350 000	-	15
2018	907 000	600 000	260 000	47 000	15
2017	866 500	600 000	244 000	22 500	9
2016	735 300	500 000	225 000	10 300	4
2015	347 500	160 000	157 000	30 500	11
2014	434 670	203 670	217 000	14 000	5

According to the local ordinance for building, maintaining and preserving the green system of Sofia Municipality, there are criteria for differentiated intensity of maintenance. The ones which are relevant to the existing types of green areas in the scope of the study are listed on Table 99.

Table 128. Percentage of the varying intensity of maintenance of green areas within the scope of URBiNAT study area

№	Type of green area	Intensity of maintenance % from the whole area			
		Representative max/min	Optimal max/min	Medium max/min	Partial max/min
3	District level significance park	5/0	35/20	40/60	20/20
4	Urban garden	8/0	22/20	55/60	15/20
5	Green areas in housing estates	-	20/5	40/50	40/45
9	Green along streets, boulevards and transport nodes	-	10/-	70/80	20/20

The observed recreation patterns in the green areas are strongly influenced by the continental climate and the seasons. Most of the outdoor activities are during spring and early summer months (April - July) as well as in summer and early autumn months (September – October). During August many citizens of Sofia travel out of the city for longer vacations and the peak demand for urban green spaces is in May-June and in September. This fully applies for the study area and its dwellers. Some of the most persistent users of the green spaces are the dog keepers and the growing number of joggers who are all seasons round. Great diversity of groups can be found at the peak times with more intensive presence of users in the small green areas around the housing estates. That is also a prerequisite for conflicts between different age and lifestyles along with the otherwise pleasant socialization happening.

#### **Accessibility of urban green spaces by population**

The accessibility to the urban green areas in Nadezhda in terms of distance is relatively good due to the availability of the Northern Park. Along with the large urban park (serving the Nadezhda and Vrabnica districts but sometimes visited by more distant communities), the residents of the envisaged neighbourhoods have access to the already described smaller gardens and public green areas which are concentrated in the southern part of the area. The abundance of the semi-public green in and around the housing estates provides a third (local) level of direct access. Still the capacity of the gardens and the peripheral location of the Northern Park make the true experience less convenient and not that satisfactory in terms of budget of time, mobility patterns, etc. The structural connectivity patterns are not expected to change significantly due to the already intensively built up urban tissue in the district



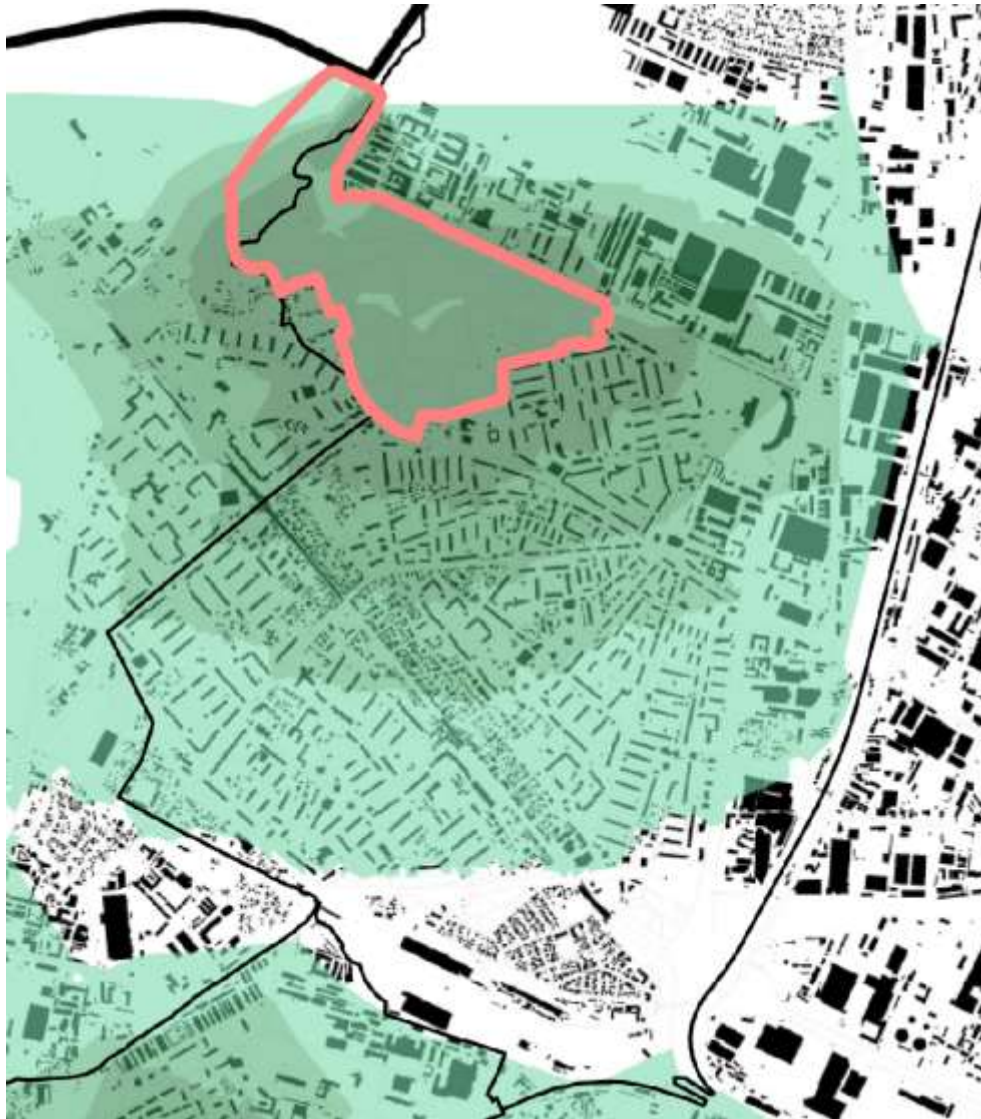


Figure 408 Pedestrian access to the Northern park, 400, 800, 1200 and 2000 m isochrones, Source: Vision Sofia 2050, 2019

The extension of the Northern Park can be considered as a good opportunity but it will be more beneficial for the residents of the neighbouring Vrabnica district and useful and accessible for residents of Liylin district. The ecological restoration of Suhodolska River along with the future possibilities for mixed-use development of the neighbouring areas in Voenna rampa (Serdika district) and Orion (Ilinden district) may redefine the structural and functional connectivity in the area. This depends on higher level integration of national, metropolitan and local level policies and incentives for private investment in these post-industrial areas with varying levels of urban decay. More accents for the short and medium turn can be put on the functional connectivity of already existing elements, structures and developments in the area. The specific data about the number of visitors, cultural events, the average journey times and medium distances have to be analysed further at this level of diagnostics.

### **Biodiversity**

There has been a recent more complex study about the urban biodiversity in several natural or semi-natural features in and around the city which are bio corridors, stepping

stones and as a whole hotspots of biodiversity. One of these stepping stones is the Northern Park. More in depth studies are needed for the study area.

### 5.3.1.5 Local Masterplans

#### Constraints map

From the perspective of the General Development Plan of Sofia and Sofia Municipality (GDPSSM), there are few legal constraints in the territory. They are related to the civil engineering standards regarding seismic and hydrological requirements for buildings and construction works. (Figure 126, Figure 127)

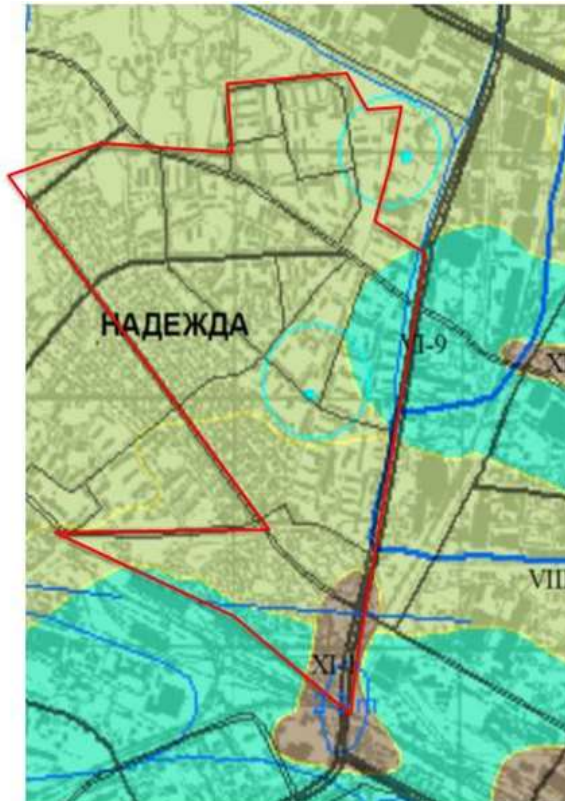


Figure 409. Engineering- geological and hydrogeological zoning (light blue circles – Its protection belt (zona A) around thermomineral sources; blue-green background - alluvial clays and gravel (VI-8&9); green - alluvial clays and gravel from Suhodolska river terrace (VIII-2); brown - technogenic embankments in particular construction soils (XI-1)), Source: General Development Plan of Sofia and Sofia Municipality, Sofproect OGP



Figure 410. Micro-seismic zoning (intensity after MSK-64. green - VIII\_IX; orange – IX; red - IX+ with acceleration (g) 0,30), Source: General Development Plan of Sofia and Sofia Municipality, Sofproect OGP

#### Land use planning

The excerpt from the GDPSSM shows the dominant land use and urban design zone of the housing estates with complexes of apartment buildings, the linear zones of mixed use along the main boulevards, as well as the smaller patches of public services and various urban green areas (parks, gardens, riverine green, green with public services (a church)) as well as the protection belt around the two thermal mineral springs.



Figure 411. Excerpt from the General Development Plan of Sofia city, Source: General Development Plan of Sofia and Sofia Municipality, Sofproect OGP

### **Thematic zoom of the study area**

The supplementary schemes of the GD plan describe thematic issues regarding the housing areas with their different land use and urban design regimes in regard to height, morphology and degree of mixing with other functions. (Figure 129)





Figure 412. Land use and urban design regimes of the housing areas, Source: Masterplan of Sofia and Sofia Municipality, Sofproect OGP



Figure 413. Primary street network - classification; Source: Masterplan of Sofia and Sofia Municipality, Sofproect OGP

The transport specific schemes outline the existing and planned indicative routes and parameters of the primary street network, the junctions with multilevel crossings as well as the separated rail lines with electrified public services (metro and trams). (Figure 130)

There are several significant transport elements which are either in operation (the metro line and stops along Lomsko shosse) or are under technical preparation for design and implementation (e.g. 'Rozhen' Blvd expansion, reorganization and reconstruction).



Figure 414. Electro rail public transport, Source: General Development Plan of Sofia and Sofia Municipality, Sofproect OGP



Figure 415. Detailed urban design plan of Svoboda housing estate; Source: Sofia Municipality, Directorate for Architecture and urban planning





Figure 416. Detailed urban design plan of Nadezhda-4 housing estate; Source: Sofia Municipality, Directorate for Architecture and urban planning



Figure 417. Detailed urban design plan of Nadezhda-2 housing estate; Source: Sofia Municipality, Directorate for Architecture and urban planning

The major change envisioned Detailed urban design plan of Nadezhda-2 housing estate is the shift from detached houses along 'Lomsko shosse' Blvd to mid (10-15 m) and high-rise mixed use buildings, mostly attached in a block structure following the borders between the separate quarters with private allotments and the public realm of the streets and the boulevard.



Figure 418. Detailed urban design plan of Tolstoy housing estate; Source: Sofia Municipality, Directorate for Architecture and urban planning

### 5.3.1.6 Urban/landscape design Projects

#### Urban/Landscape design projects in the Study area

There are no significant urban/landscape design projects in the study area, except the groups of individual attached housing and mixed use buildings in Nadezhda 2 and 4 along 'Lomsko shosse' Blvd. Some of the small scales green areas landscape improvements are described as NBSs under the umbrella of the 'Green Sofia' program (part 5 of this Report).

Future projects that could influence the study area are included in the IPURD and the Operational plan for Development of Sofia municipality are:

- Refurbishment, insulation and energy efficiency improvement of 3 schools, 6 kindergartens, Nadezda cultural centre (ongoing works in Nadezhda district);
- Renewal of North park and open air playgrounds between blocks of flats;
- Restoration of mineral water drilling (planned yet not financed/started);
- Construction of two Swimming pools next to schools (design not started yet);
- Construction of new bicycle lanes to form uninterrupted internal network;
- Civil society initiatives on greening and food growing in the neighbourhoods.

#### **Urban/Landscape design projects in neighbouring areas**

The reconstruction of the Northern Park has been organized and scheduled in several stages. The first two stages have been released and the realization of the third one is in its early implementation. The project is funded by the Specialized Municipal Privatization Fund.



Figure 419. Bird's eye view of the reconstructed area at the major entrance of the Northern park, Source: <http://infrastructureawards.bg/bg/buildings/view/353/Remont-i-vazstanovyavane-na-Severen-park-Sofiya.html>





Figure 420. Large newly refurbished playground in the Northern viewed from an artificial hill, Source: <https://www.facebook.com/severenpark/posts/-кметът-на-район-надежда-инж-димитър-димов-вече-работи-по-проекта-за-възстановяв/911375865584990/>



Figure 421. Large newly refurbished playground in the Northern park viewed from the bottom of the transformed smaller part of the artificial lake, Source: <https://www.facebook.com/severenpark/posts/-кметът-на-район-надежда-инж-димитър-димов-вече-работи-по-проекта-за-възстановяв/911375865584990/>



Figure 422. Public works during the second stage of the Northern parks's reconstruction, Source: <http://so-nadejda.com/gallery/Other/severen-park-ul-narodni-buditeli-sche-bde-obnoven-do-kraya-na-2019-g/126.html>

### 5.3.2 Social description

The data to be collected at parish and neighbourhood level are almost the same collected at general, city level with a closer loop on the selected case study. The idea is to verify and assess if the urban profile is confirmed in the area or shows a better or worse performance in the selected neighbourhoods. Social data could be good in certain aspects, bad in others, offering a different scenario for the development of the NBS solutions as per URBINAT catalogue.

#### 5.3.2.1 Demographic

##### Demographic description, namely

The population dynamics of Nadezhda District is following the same trend as the population dynamics of Sofia Municipality. The highest number of the population was in 1985, and according to the data from the subsequent two censuses, it is decreasing except. The figures from the last census in 2011, indicate a slight increase.

Table 129. Population dynamics 1985-2011. Source: NSI 2011

	Census 1985	Census 1992	Census 2001	Census 2011
<b>Sofia Municipality</b>	1201719	1190126	1170842	1291591
<b>Nadezhda District</b>	73891	70837	67847	67905



The population growth rate of Nadezhda District suggests better figures: it is decreasing to -4.31% during the 1985 – 1992 period, and – 4.4% during the 1992-2001 period, whereas during the 2001-2011 period it is increasing thus reaching 35%. Considering the data from the Report “Economics” (Third Step, Vision Sofia 2050, 2019), in 2016 Nadezhda District population is counted 69052 people.

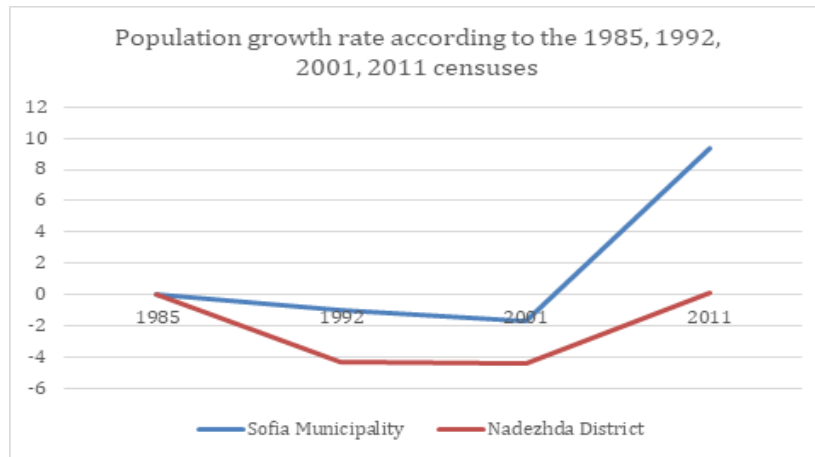


Figure 423. Population growth rate of Nadezhda District and Sofia Municipality for the period 1985-2011. Source: NSI

According to Census 2011 and population data from 2016, Nadezhda District male-female ratio is 47.4% to 52.6% on average.

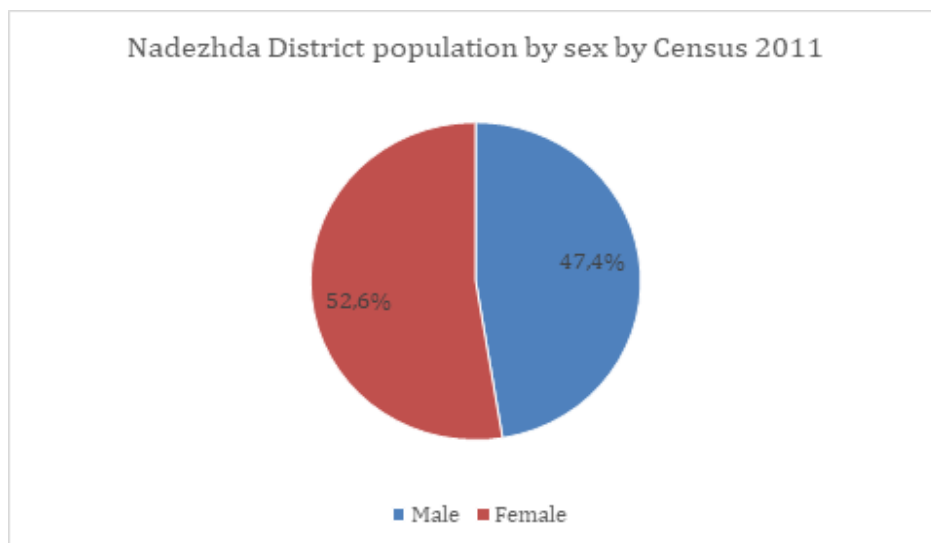


Figure 424 Nadezhda District population by sex by Census 2011. Source: NSI

Based on Census 2011 data, the distribution of the Nadezhda district population by working age is less favourable compared to the Sofia municipality population for the age group over 65+ (21.82% compared 20.42%).

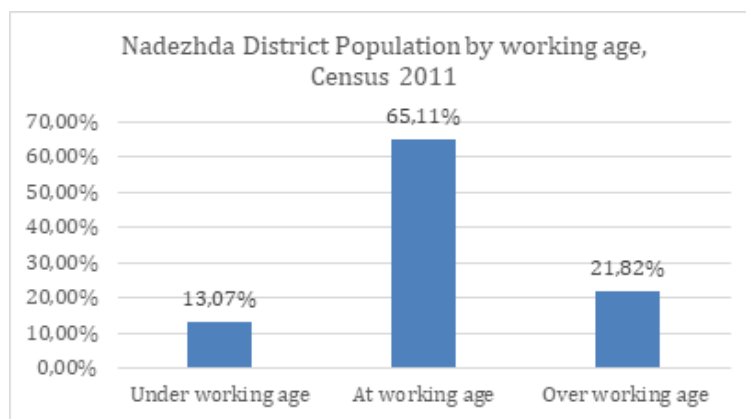


Figure 425 Population in Nadezhda District by working age, Source: NSI 2011

Table 130. Population in Nadezhda District by working age and sex as of Census 2011. Source: NSI 2011

	Nadezhda District	Under working age	At working age	Over working age
<b>Total</b>	67905	8875	44211	14819
<b>Male</b>	32184	4539	22488	5157
<b>Female</b>	35721	4336	21723	9662

Men have a slightly higher share than women at under working age, at working age they take almost equal shares, and in over working age women take a significant share. This trend is similar to the country average.

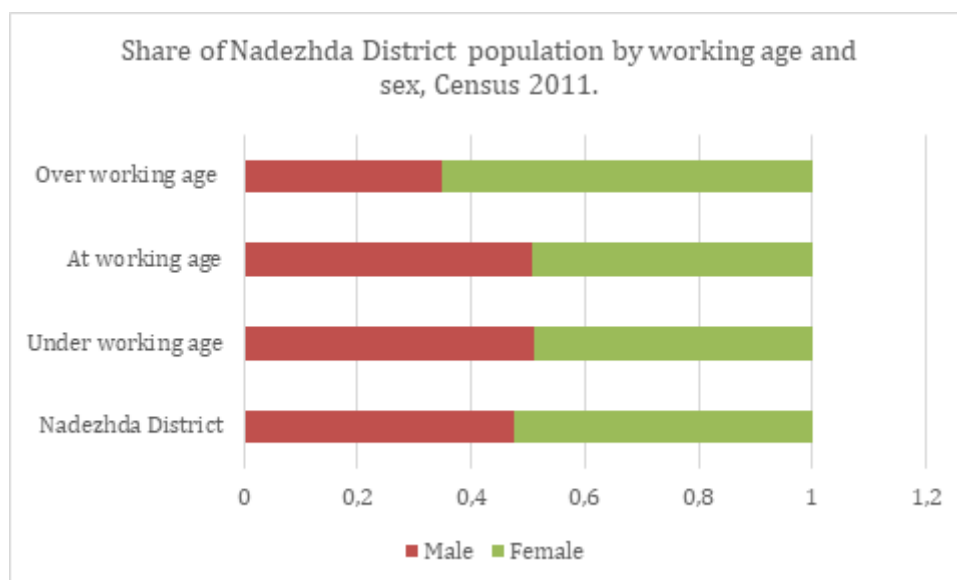


Figure 426. Share of population in Nadezhda District by working age and sex as of Census 2011. Source: NSI 2011

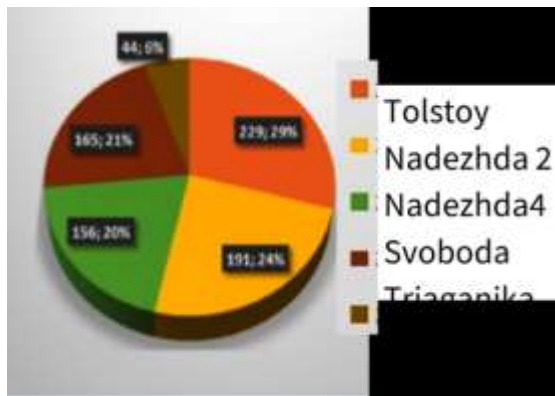


Figure 427. Population number the URBiNAT study area neighbourhoods as of Census 2011. Source: NSI 2011

Figure 428. Population working age by the URBiNAT study area neighbourhoods as of Census 2011. Source: NSI 2011

### Cultural/Ethnic diversity

Extremely high share of Nadezhda District population is representing the Bulgarian ethnos - more than 97%. Population shares of Turkish and Roma people are equal.

Table 131. Nadezhda District Population by ethnos and age as of Census 2011. Source: NSI 2011

	Total	Age							
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
<b>Total</b>	67905	5719	5707	9121	12466	9497	9241	8528	7626
<b>Responded to this question</b>	<b>61929</b>	<b>4917</b>	<b>5065</b>	<b>8217</b>	<b>11404</b>	<b>8662</b>	<b>8553</b>	<b>7975</b>	<b>7136</b>
<b>Bulgarian</b>	60240	4717	4881	7991	10982	8336	8360	7897	7076
<b>Turkish</b>	314	35	27	62	106	40	30	9	5
<b>Roma</b>	312	56	52	45	85	31	27	12	4
<b>Other</b>	896	92	76	95	189	229	121	48	46
<b>Not stated</b>	167	17	29	24	42	26	15	9	5

### Education/Literacy

Nadezhda District population is characterized as a district with a large number of upper secondary educated people (52.44%). The share of tertiary educated in Nadezhda District people is lower compared to Sofia Municipality.

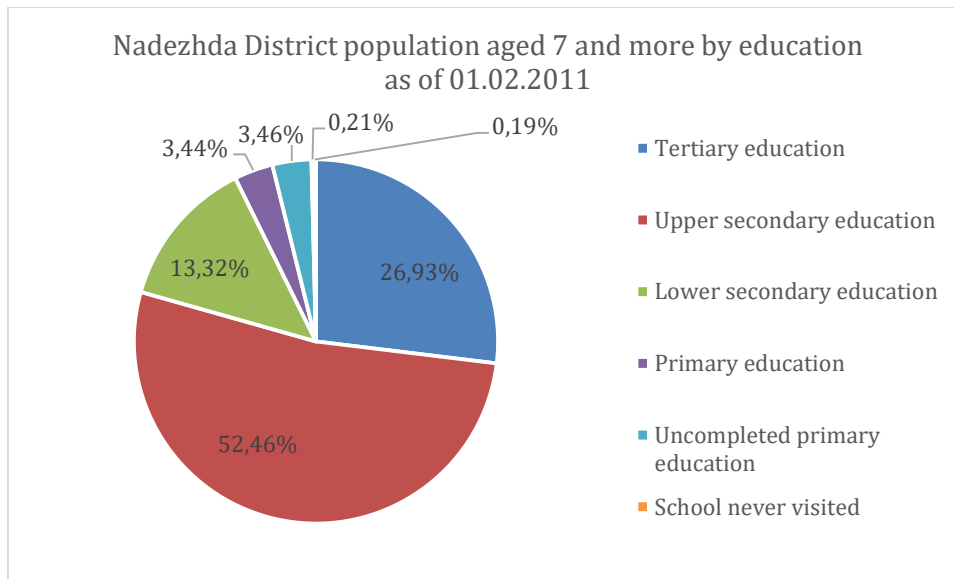


Figure 429. Nadezhda District population aged 7 and more by age, education and sex as of 01.02.2011

Table 132. Nadezhda District population aged 7 and more by age, education and sex as of 01.02.2011

Nadezhda District population aged 7 and more by age, education and sex as of 01.02.2011								
	Total	education	Upper secondary education	Lower secondary education	Primary education	Uncompleted primary education	School never visited	Child
<b>Nadezhda District</b>	<b>63710</b>	<b>17155</b>	<b>33421</b>	<b>8485</b>	<b>2192</b>	<b>2203</b>	<b>136</b>	<b>118</b>
7 - 14	4176	-	-	413	1523	2103	19	118
15 - 19	3055	-	652	2294	90	11	8	-
20 - 29	9121	2480	6012	542	50	15	22	-
30 - 39	12466	4565	7096	715	37	21	32	-
40 - 49	9497	3240	5714	505	19	4	15	-
50 - 59	9241	3108	5440	642	28	5	18	-
60 - 69	8528	2381	4979	1115	36	7	10	-
70 and more	7626	1381	3528	2259	409	37	12	-
<b>Men</b>	<b>30013</b>	<b>7005</b>	<b>16666</b>	<b>4175</b>	<b>940</b>	<b>1101</b>	<b>62</b>	<b>64</b>
7 - 14	2100	-	-	216	750	1061	9	64
15 - 19	1572	-	316	1202	43	6	5	-
20 - 29	4480	911	3186	335	29	8	11	-
30 - 39	6499	1793	4180	478	21	12	15	-
40 - 49	4771	1361	3079	313	..	..	7	-
50 - 59	4099	1212	2488	374	..	..	11	-
60 - 69	3692	1006	2131	530	17	..	..	-
70 and more	2800	722	1286	727	59	..	..	-

<b>Women</b>	<b>33697</b>	<b>10150</b>	<b>16755</b>	<b>4310</b>	<b>1252</b>	<b>1102</b>	<b>74</b>	<b>54</b>
7 - 14	2076	-	-	197	773	1042	10	54
15 - 19	1483	-	336	1092	47	5	3	-
20 - 29	4641	1569	2826	207	21	7	11	-
30 - 39	5967	2772	2916	237	16	9	17	-
40 - 49	4726	1879	2635	192	..	..	8	-
50 - 59	5142	1896	2952	268	..	..	7	-
60 - 69	4836	1375	2848	585	19	..	..	-
70 and more	4826	659	2242	1532	350	..	..	-

Women in Nadezhda District are more educated than men in the age group 20-29 and the age groups over 50. The number of tertiary educated women is higher than the number of tertiary educated men. (Census 2011)

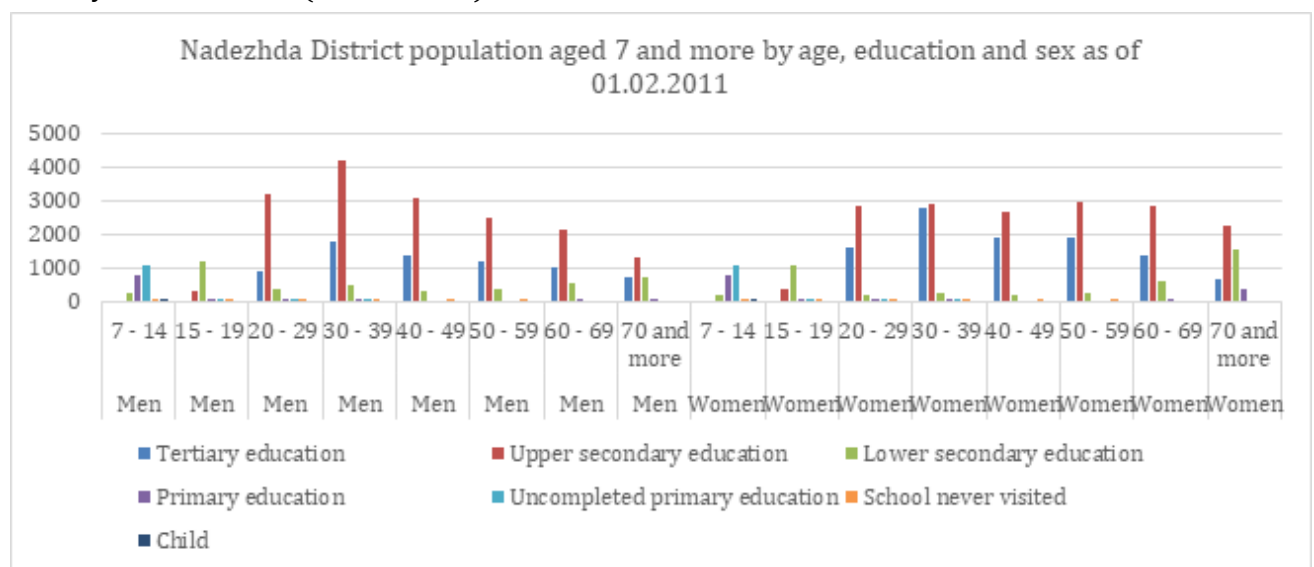


Figure 430. Nadezhda District population aged 7 and more by age, education and sex as of 01.02.2011. Source: NSI 2011

### Housing conditions

At the end of 2011 there were 2581 residential buildings in Nadezhda District, which contained 29376 dwellings. The largest number of dwellings, 9127 distributed in 343 industrial blocks of flats, were built during the period 1980 – 1989. This period is preceded by two 10-year periods of similar construction activity. In 1960-1969, 504 buildings with 7311 dwellings were built, and in 1970-1979 - 324 buildings with 8209 dwellings. It is noticeable that the number of dwellings per building is increasing, which brings to an increase in the height and intensity of living.

Table 133. Buildings and dwellings in Nadezhda District by year of construction as of 1.02.2011, Source: NSI, 2011

		<b>Nadezhda District Buildings</b>	<b>Nadezhda District Dwellings</b>
<b>Total</b>		<b>2581</b>	<b>29376</b>
<b>Year</b>	Until the end of 1949	536	992



	From 1950 to 1959	383	537
	From 1960 to 1969	504	7311
	From 1970 to 1979	324	8209
	From 1980 to 1989	343	9127
	From 1990 to 1999	194	757
	From 2000 to 2011	297	2437
	Unillustrated <sup>1</sup>		6

Around 83.30% of the buildings in Nadezhda District were inhabited in 2011. The number of non occupied residential buildings was 429, most of them being single houses. It is unlikely uninhabited residential building to be industrial blocks of flats. (Table 104) There were 67498 rooms in 29376 residential buildings. The Average useful floor space per dwelling was 67.8 m<sup>2</sup> and the average living floor space per dwelling was 49.6 m<sup>2</sup>.

Table 134. Buildings in Nadezhda District by type as of 1.02.2011, Source: NSI, 2011

		Total	Inhabited residential building	Uninhabited residential building	Country house	Building of institutional household	Home for temporary accommodation of homeless
Buildings	N	2581	2150	429	-	2	-
Buildings	%	100%	83.30%	16.62%	0.00%	0.08%	0.00%

There are 6 different types of prefab building types on the territory of URBiNAT study area, which are almost fully representative of the variety of structures of that type in Nadezhda district (7 different variations/nomenclatures found in the District). The location of the pre-fab buildings is related to the historical development of the territory, with the oldest (experimental structures) located in Tolstoy, along Traen mir. str ,and Svoboda.

Table 135. Dwellings by rooms and useful floor space in Nadezhda District as of 1.02.2011, Source: NSI, 2011

	Dwellings	Rooms	Useful floor space		Average useful floor space per dwelling	Average living floor space per dwelling
			Total	Including living floor space	Average useful floor space per dwelling	Average living floor space per dwelling
<b>Nadezhda</b>	29376	67498	1990504	1456216	67.8	49.6



Figure 431. Types of pre-fab residential buildings by structure (industrialized) in Nadezhda district. Scheme modified for the purposes of URBiNAT. Source: Municipal programme for refurbishment and implementation of energy efficiency measures in the residential buildings in Sofia, Subregion 13 Nadezhda district.

## Religion

Based on Census 2011 data, more than 86.5% of Nadezhda District population are Eastern Orthodox Christians. As atheists are stated 5% of Nadezhda population and 5.9% did not state anything.

Table 136. Nadezhda District population by Religion and age as of 01.02.2011, Source: NSI

	Total	Age							
		0-9	10-19	20-29	30-39	40-49	50-59	60-69	70+
Total	67905	5719	5707	9121	12466	9497	9241	8528	7626

Given the answer	54325	3681	4247	7176	10138	7739	7646	7248	6450
East Orthodox	47209	2827	3570	6113	8640	6769	6783	6585	5922
Catholic	239	9	11	33	58	34	41	33	20
Protestan	354	19	30	49	81	69	46	30	30
Moslem	425	39	31	64	158	76	41	10	6
Other	206	9	17	31	54	41	24	15	15
No religion	2736	227	261	410	545	383	375	301	234
Not stated	3156	551	327	476	602	367	336	274	223

### Families description

According to the 2011 Census, there were 28281 households in Nadezhda District. The average number of members per household is 2.4. More than 75.5% of households are households without children, 17% with one child. Nearly 30% are one-person households.

Table 137. Nadezhda District Households by number of children as of 01.02.2011, Source: NSI

		Nadezhda District Households	Household of relatives	Household of relatives and non-relatives	Non-relatives, not members of a family	One-person household
	<b>Total</b>	<b>28281</b>	<b>19470</b>	<b>222</b>	<b>121</b>	<b>8468</b>
<b>Households by number of children</b>	Without children	21443	12706	148	121	8468
	One child	4828	4775	53	x	x
	Two children	1874	1856	18	x	x
	Three children	106	104	2	x	x
	Four children	22	21	1	x	x
	Five children	4	4	-	x	x
	Six and more children	4	4	-	x	x
Persons in the households		67708	58065	920	255	8468
Average number of members per household		2.4	3.0	4.1	2.1	1

Around 30% of the 19515 families were presented by families without children, 49% were families with never married children and 20% were families with lone parents with never

married children. More than 84% from lone parents families were only with mother. (Source: 2011 Census data, NSI)

Table 138 Nadezhda District families by number of children as of 01.02.2011, Source: NSI

	Total	Families by number of children						
		Without children	one	two	three	four	five	more
Total	19515	5957	9086	4196	236	28	6	6
Couple without children	<b>5957</b>	<b>5957</b>	x	x	x	x	x	x
Couple with never married children	<b>9585</b>	x	<b>6005</b>	<b>3374</b>	<b>176</b>	<b>20</b>	<b>5</b>	<b>5</b>
Lone parent with never married children	<b>3973</b>	x	<b>3081</b>	<b>822</b>	<b>60</b>	<b>8</b>	<b>1</b>	<b>1</b>
Mother with never married children	3367	x	2599	707	52	7	1	1
Father with never married children	606	x	482	115	8	1	-	-

### 5.3.2.2 Safety and health

#### Health and well-being rate

The self-reported satisfaction with life they have among people living in Sofia show that 15% are very satisfied, 65% are fairly satisfied, 14% - not very satisfied, 5% - not at all satisfied, and 1% have answered "I don't know". The responses on the level of citizens' satisfaction with life rank Sofia 67th out of 83 cities included in the survey. Around 35% of the respondents are very satisfied and 56% fairly satisfied with the place where they live in the case of Sofia against 8% not very satisfied and 1% not at all satisfied. The level of self-reported satisfaction with the place of occupation ranks Sofia at a higher position - 56th. (EU, 2016)

A recent local study, at the level of Sofia municipality, focuses on similar wellbeing perspectives in a slightly different way from this EU perception survey. Two questions on satisfaction with life are included – one about the level of satisfaction with life in Sofia and another one about the level of satisfaction with life in the neighbourhood. Regarding the satisfaction with life in Sofia, the URBiNAT study area falls in the structural unit that ranks 11th position. The distribution of the levels of satisfaction of the respondents are: 28% fully satisfied (against the average 44%); 61% partly satisfied (against the average 47%); 4% partly unsatisfied (against the average 7%); 7% fully unsatisfied (against the average 11%).(Figure 148) (Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019)

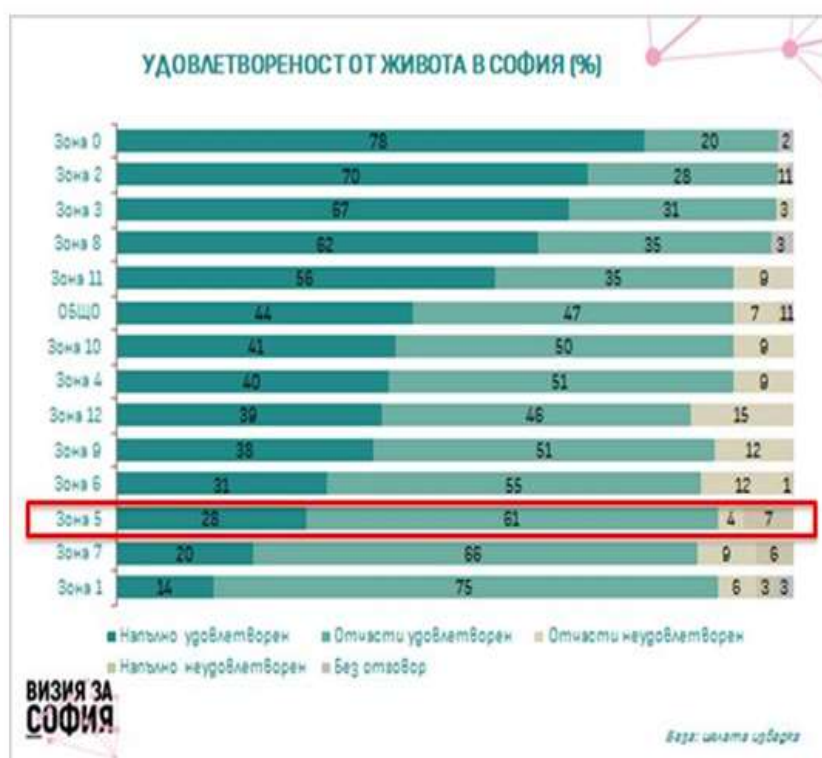


Figure 432. Satisfaction with life in Sofia (%), Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019

### Causes of death

No data about the causes of death publicly available for lower levels than the district Sofia-stolitsa (NUTS3) which overlaps with the municipal level discussed in part 3 of this report. Some of the environmental preconditions which could have (had) negative impacts on health in the neighbourhoods are the concentration of industrial pollution in the recent past, relatively high levels of air pollution due to dispersion at present, as well as high levels of noise and other nuisances by heavy vehicles and transit traffic along “Lomsko shosse” and “Rozhen” Boulevards.

### Health services

The level of satisfaction with health services in the neighbourhood (being part of the larger zone 5) ranks the URBiNAT study area 5th (out of 13 studied macro zones in the city). The distribution of the levels of satisfaction among the respondents is as follows: 37% are fully satisfied (against the average 33%), 44% are partly satisfied (against the average 41%), 13 % are partly unsatisfied (against the average 21%); 6% are fully unsatisfied (against the average 4%). (Figure 149) (Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019)



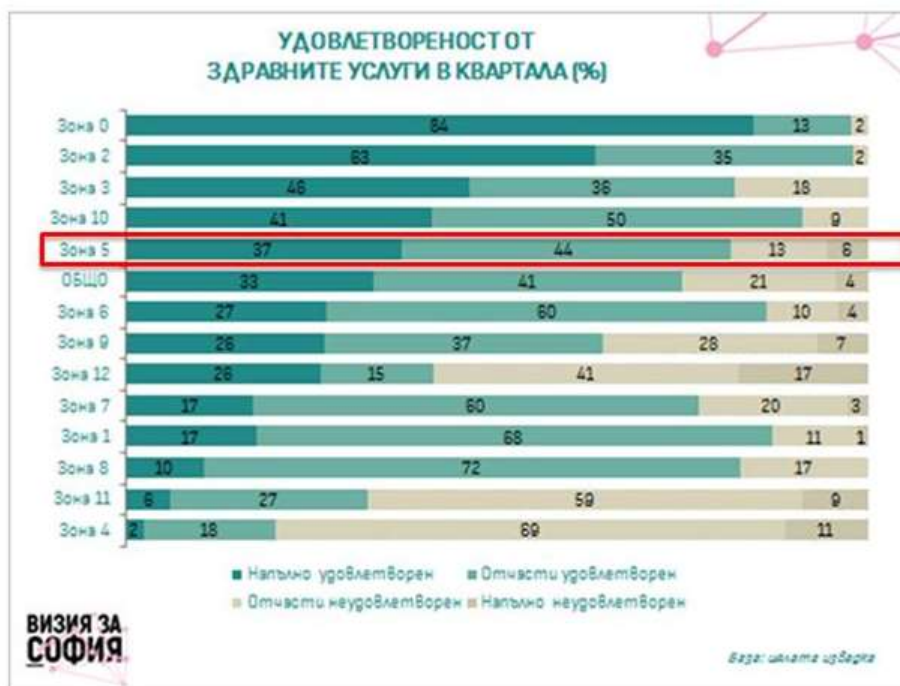


Figure 433. Satisfaction with health services in the neighbourhood (%), Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019

There are 6 medical institutions (2% of all in the city) in Nadezhda district and 53 medicians per 10 000 people. (Vision Sofia 2050, 2019). In the URBiNAT study area there are 2 private health centres (a medical and dental centre) and one hospis. There are around 10 individual practices for medical care and around 20 individual practices for dental care.

### Safety and criminality

As mentioned in part 4.1.3 Nadezhda district is part of the 2nd police department in Sofia. There are 8 police inspectors working in the study area with division of 4 groups or separate inspectors for Triagalnika, Nadezhda 2, Nadezhda 4 and Svoboda, Tolstoy. There is no disaggregated data about crimes reported about the level of detail needed for the study area. The overall statistics for 2nd police department are presented in table 111.

Table 139. Overall statistics on crimes by type. Source: 2nd police department, Sofia

Crimes	year	Registered in the period		Revealed from the registered in the period		Perpetrators from the revealed crimes, registered in the period			Registered in previous periods	
		Total number	Per 100 000 persons	Total	% of revealing	Total number	from which		Revealed	Perpetrators
							Wo-men	Men		

<b>All types</b>	2017	2527	0.00	631	24.97	586	149	62	19	99	102
	2018	2455	0.00	596	24.28	553	122	54	14	117	119
<b>Overall criminal</b>	2017	2340	0.00	621	26.54	579	147	62	19	76	79
	2018	2242	0.00	573	25.56	534	120	54	13	103	105
<b>Crimes against the property</b>	2017	1617	0.00	353	21.83	345	120	34	11	29	31
	2018	1515	0.00	279	18.42	270	89	16	6	30	33
<b>Possession of drugs</b>	2017	146	0.00	62	42.47	56	10	27	2	11	11
	2018	169	0.00	73	43.20	71	19	33	1	16	16
<b>incl. possession, production, distribution, transportation</b>	2017	145	0.00	61	42.07	56	10	27	2	11	11
	2018	168	0.00	72	42.86	69	19	33	1	16	16
<b>incl. growing of plants</b>	2017	1	0.00	1	100.00	1	0	0	0	0	0
	2018	1	0.00	1	100.00	2	0	0	0	0	0

The reported data was not estimated per 100 000 persons although the column is present in the tables which are made public. The district and the neighbourhoods in the study area have an image as places with high levels of criminal activity.

In a study for previous years it becomes obvious that in more privileged areas in the southern part of the city covered by other police departments more crimes are observed at the level of these reporting units. (Capital, 2016)

A more detailed look at the different types of crimes can be more informative.

The drug presence is relatively high compared to the other departments but it again has to be further estimated against the number of residents or per 100 000 persons.

There is a Crisis centre for children victims of violence in "Nadezhda" housing estate which capacity is 22 children. In March 2016, the number of real users of the service was 12. The Centre provides adequate conditions and environment for raising and educating children aged 3 - 18 who have experienced different types of violence inside or outside the family. The Centre is managed by the Children and Adolescents Association (Vision Sofia 2050, 2017).

The only reported data about the number of road accidents (218 accidents for 2016) is along one of the major boulevards passing by the study area - "Lomsko shosse". This number is similar to other streets from the same class but here again more detailed look is needed based on places of concentration, regarding factors as the impact of the surrounding environment, presence of people and prevailing driving patterns.

## Security

The levels of satisfaction with crime prevention among the citizens of Sofia rank the rank the URBiNAT study area neighbourhoods (being part of the larger zone 5) 4<sup>th</sup> out of 13 zones. The distribution of the levels of satisfaction is: 9% fully satisfied (against the city average 12%); 37% partly satisfied (against the city average 35%); 20 % partly unsatisfied (against the city average 39%), and 33% fully unsatisfied (against the city average 13%). (Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019)

Despite the high ranking position of zone 5, further research is needed in order to find the reasons of the trend for polarization of the perceptions. The comparatively high share of those who are fully unsatisfied deserves more detailed studies of the interrelation between territorial distribution of the different levels of satisfaction with crime prevention within zone 5 and between the different districts and neighbourhoods.

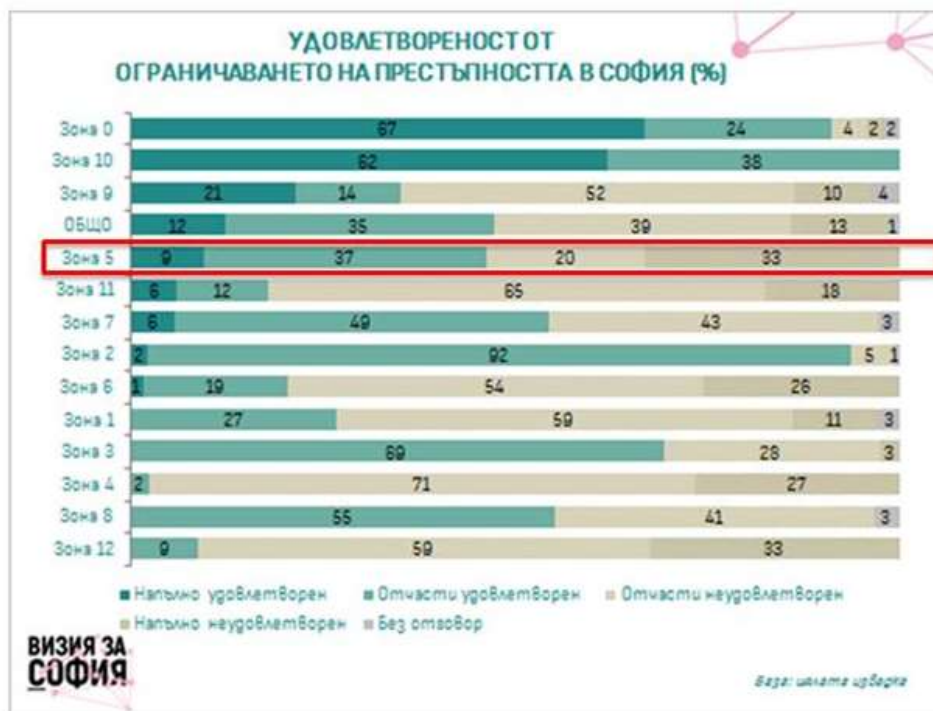


Figure 434. Satisfaction with crime prevention in Sofia (%), Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019

### 5.3.2.3 Participation

#### Rights claims by populations of social housing neighborhoods

There is no clear data about right claims except the one published yearly by the Ombudsman of Sofia which are not that much differentiated by issues at the sub city (district) level.

**Mechanisms available and used by citizens to access justice (both individually and collectively).**

The Ombudsman institution can be mentioned as a mechanism that provides overall mediation. In Sofia, there are 1012 registered mediators in the Unitary register of the mediators, whose role and contributions are not arranged and little studied. Various NGOs serve and protect citizens against various types of crime. Sofia municipality and Sofia City Council have approved several local acts about public consultations and participation in the policy making and planning process (e.g. spatial planning) with the aim to prevent the need for resolving cases with conflicting interests in the court.

In 2015, an application called “the citizens” was set as an experimental project of group of young people. In 2017 the mayor of Sofia officially declared that the district administrations in Sofia would communicate with citizens via this application that records the location and visualize the complaints and alerts by type. Claims about accessible urban environment, condition of public spaces, unfixed covers of the pits of the underground infrastructure, parking, and pavements. One can even join a collective claim or take action to solve the problem at the individual level (e.g. parking issue) after a complaint on his action. (<https://grajdanite.bg/home>). There are possibilities for uploading a picture or a film in one of the following 9 categories: traffic, driving and parking; streets and pavements; pollution; parks and playgrounds; buildings and facilities utilities; security and public order; citizens’ rights and society; others. Since 2015 for the whole city there have been registered 82193 complaints and alerts, from which 19 % (155030) being solved. Around 16476, are related to the urban environment, 28 (4631) of them were solved. The dynamic platform shows all the registered cases and visualizes them with the picture submitted. There is no mechanism to get the data by district or smaller area.

#### **Existence of specific mechanisms and initiatives to recognize and promote access to rights and justice.**

Currently several large scale national projects are under implementation: the project "Effective access to justice" funded by the Operational program "Good Governance" 2014-2020, priority axis “Transparent and Effective Judicial System” and part of the procedure “Strategic projects in implementation of the Updated Strategy for Continuing Judicial Reform and the Strategy for the Introduction of e-Governance and e-Justice in the Justice Sector 2014-2020” with main beneficiary the Ministry of Justice and partner the Supreme Judicial Council. The project includes two actions in this direction - "Judicial Satisfaction Assessment" (Action 1) and "Model for Assessing Access to Justice for Citizens and Business" (Action 3). There are many other NGO driven initiatives and projects, usually funded by external donors (e.g. the EEA grants) who were or are currently dedicated to the recognition and promotion of rights and justice. It is hard to estimate an exact number, as deeper screening is needed. Some of these projects are targeted to more narrow groups, localities and types of rights. Others are broader, providing input and advocacy regarding the framework legislation and governance practices.

#### **Voluntarism (volunteering, associative movement)**

Undoubtedly, willingness for participation in Nadezhda district neighbourhoods is proved in sport activities; music and cultural events; and campaigns for promotion of healthy lifestyles.

"YOU ARE HOPE ON THE ROAD" is an educational campaign in which nearly 250 children from 8 kindergartens took part. They participated in racing games, demonstrated

knowledge of the theme through songs and poems, received certificates and a special surprise - a reflective element for better visibility on the road. It is planned that all 500 first-graders in Nadezhda will receive a light reflector with the message "You are Hope on the Road".

School games are a major feature in school sport – they provide opportunities for the formation of school teams through voluntary participation in sports competitions, as well as opportunities for the designation of school teams for participation in international competitions - World Student Championships organized by the International Federation of School Sports.

On the eve of the festive September 17th, 2019 (the day of Sofia), the North Park hosted the traditional Hope and Friends rock marathon. The main message of the music event (on behalf of the organizers of the Nadezhda District and the cultural centre "Saznanie" (Consciousness) was the prevention of drug use, and mainly through rising awareness as part of the consistent health policy.



Figure 435. The Chinese pavilion of friendship in the North Park, Source: <https://www.vesti.bg/galerii/foto/zimen-den-v-severen-park-7254>

The Bulgarian-Chinese chamber of commerce and "Confucius" Institute are keeping good relations with the district administration and the Mayor of Nadezhda District, where the biggest Chinese community in Sofia lives. Recently a Chinese pavilion was donated and located in the regenerated area in the North park. The Chinese-Bulgarian chamber of commerce supports the Chinese language education in 102th Elementary school, different activities in some of the kindergartens, the fundraising for new children's' playground in the private kindergarten "Eduard Siegen". During the years the Chinese Orthodox church (located in Nadezhda 4) gathers Chinese community and provides different activities for the members. A volunteer teacher is giving lessons in Chinese to the 200 (and more) children with Chinese origin that enrolled in 101th school.

People living and working in Nadezhda district are also active in providing signals and complaints to the platform for direct communication run by Sofia municipality. Figure 152 illustrates the location of the claims by subject and their spatial distribution within the URBiNAT study area.



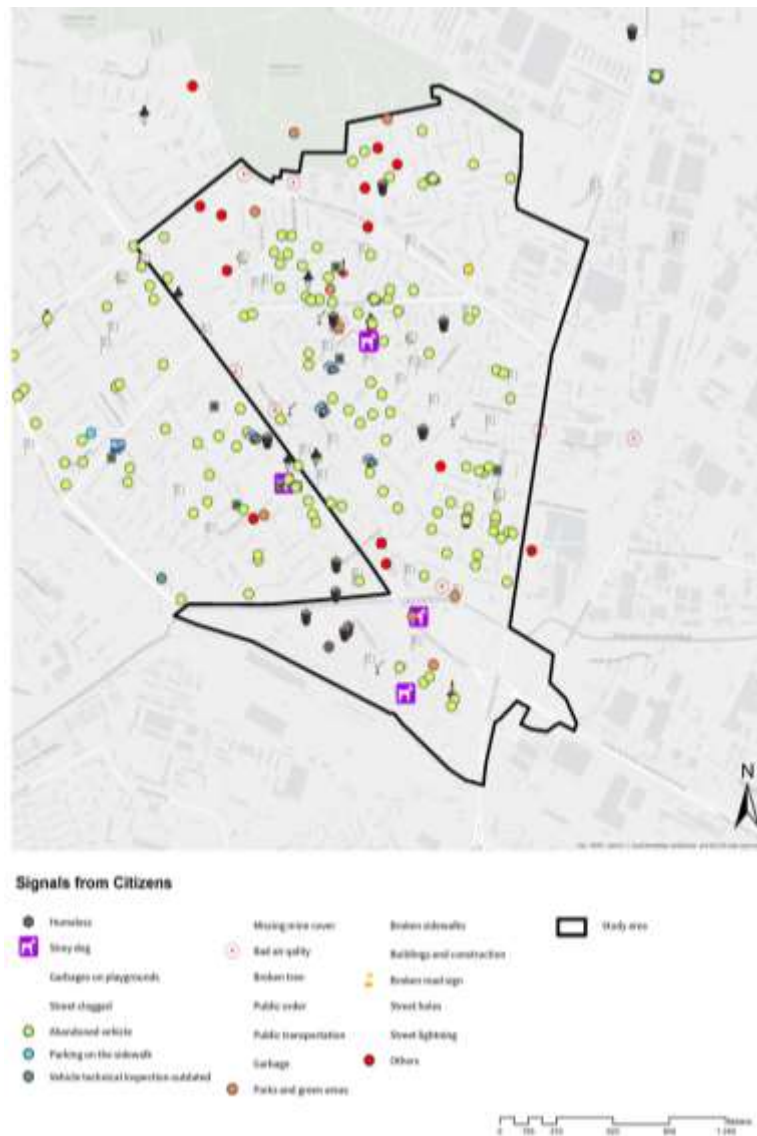


Figure 436. Complaints and alerts by citizens. Source: Platform for submitting complaints and alerts. Source: elaborated for the purposes of URBiNAT (UACEG)

### Social connections

There are 24 registered condominium associations in Nadezhda district<sup>65</sup>. In 2019 a total number of 15 condominium associations successfully applied and received grants from “Green Sofia” programme<sup>66</sup>. The number of all granted projects for the Municipality is 184 and the average per district ratio is much higher than the average for the municipality (7.6)

There are 2 NGO-s officially promoting themselves as based in Nadezhda District (Source: Internet search) and 10 NGO-s with corresponding addresses in Nadezhda and Svoboda, without taking in mind the local cultural centres<sup>67</sup>. Being registered in other districts, however, does not exclude active initiatives and work on territory of Nadezhda of all other NGOs registered on the territory of Sofia Municipality.

<sup>65</sup> <http://www.so-nadejda.com/administrative-services>

<sup>66</sup> [Sofia.bg/documents/20182/4805673/Списък+одобрени+проекти+Зелена+София+2019.pdf/81e15ff3-18a4-486e-9045-258956233410](http://Sofia.bg/documents/20182/4805673/Списък+одобрени+проекти+Зелена+София+2019.pdf/81e15ff3-18a4-486e-9045-258956233410)

<sup>67</sup> <https://www.ngobg.info/>

**A Facebook group of people from Nadezhda, Tolstoy, Triagalnika and Svoboda** for communication, and mainly sharing information, seeking/giving advice or willing to help or assist in the solution of local problems was created 8 years ago. The group consists of 2029 members and for the last 30 days (as of 01.November 2019) was visited by 295 members. Most often the moderated posts concern the following topics: advertisement of local small businesses (mainly services), employment opportunities at local level, lost pets, and utilities (repair of electricity connections, water supply), lost and found.

Comments on urban environment are mentioned many times with reference to issues of city but also local importance – they vary from air pollution to comments on issues, pavements, greenery. These have more informative content but sometimes they reflect the decision making process and the local government. Information about rentals (mainly inquiries by people seeking to rent accommodation) and rarely selling property is shared in the posts. General post on health from personal perspective (and human –nature relations), air pollution (and health risks)

Some posts in the network demonstrate a strong sense of community belonging and place attachment: *“We live in Nadezhda for 40 years; our children have grown up here. They bought homes in the area, although they are leading professionals and can afford the “elite” neighbourhoods”* (of Sofia). (A) Evidences about community belonging are also the posts related to reuniting classmates, anniversaries of graduation from secondary school, and news about teachers.

Pride with the local assets, level of public works, people and peaceful life in the neighbourhood are also part of the posts: *“Nadezhda has survived from invasion by people coming from the countryside, property appetites and luxury second-hand cars. We have a park, wide inter-block spaces, food hypermarkets representing all big commercial chain, playgrounds, etc. We have no malls and business centres and this saves us so far! Not to mention that many other modern neighbourhoods in the capital have no sewerage and central heating. Well, they call us the Chinese neighbourhood. But the Chinese are hardworking people, they buy big homes, and have children who are well-educated, learn, and obey public order”*. (B)

#### **5.3.2.4 Public services**

##### **Mobility (buses, trains, cars, bikes, etc.)**

The territory of Nadezhda District (and the URBiNAT study area) is well served by different types of public transport – metro, bus and tramlines. Figure 153 illustrates the routes of public transport services that pass through or by the study area or in close proximity. There are two types of services – reaching the internal part of the compact city and directed towards the northern periphery of the municipality.

The travel modes are known only for the city wide level although relatively detailed studies have been elaborated recently. They can serve as sources for more in depth information along with additional references to registers and operational data.

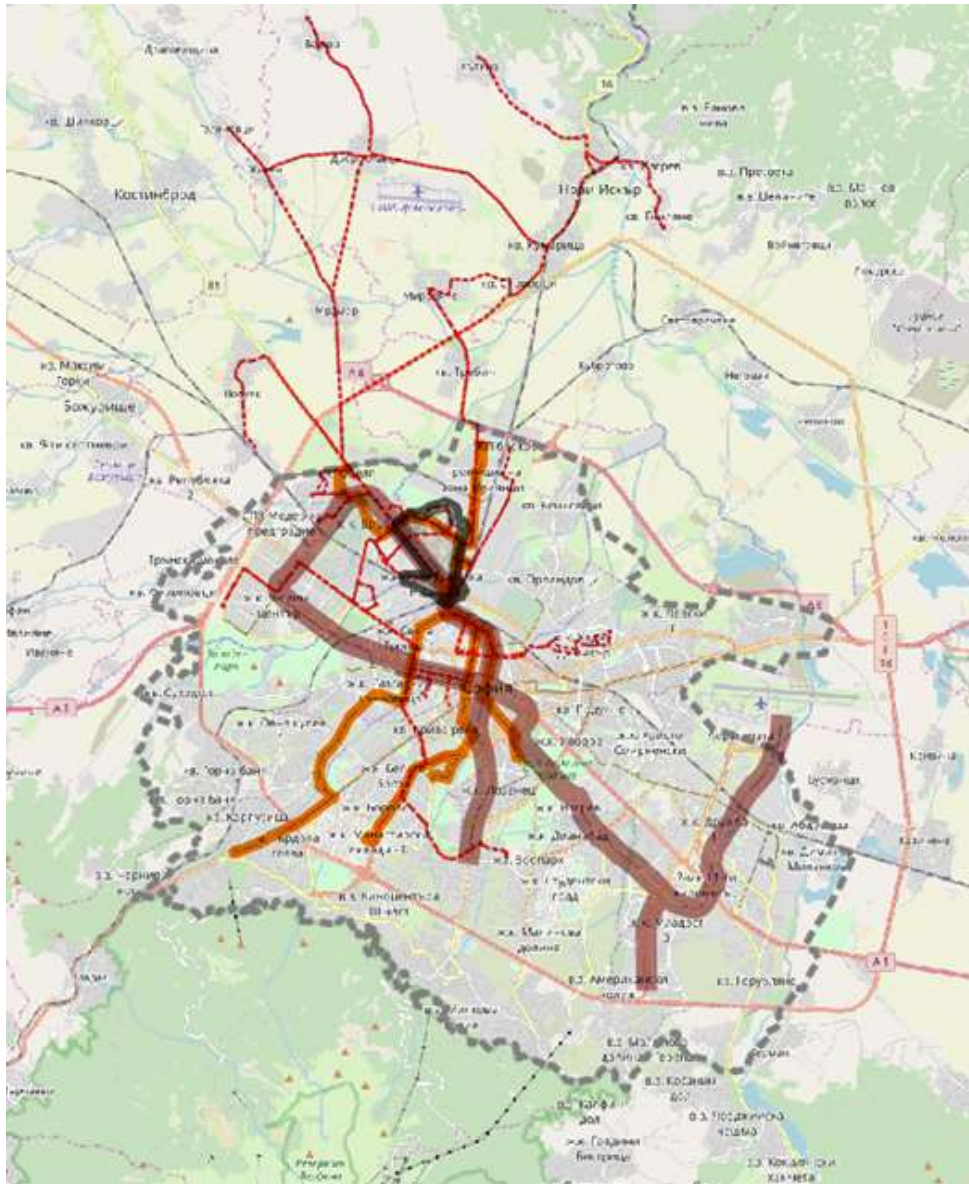


Figure 437. Mix of public transport lines (Underground – thick light red; Trams – medium width orange; Buses – narrow dashed red) serving and connecting the study area with other destination within the municipal boundaries. Source: elaborated for the purposes of URBiNAT

### Subjective well being

The satisfaction with life in the neighbourhood (being part of zone 5) ranks 8th among 13 structural units. The distribution of the levels of satisfaction is the following: Fully satisfied are 28% of the respondents (versus the city average 38%); Partly satisfied are 50% respondents (versus the city average 52%); Partly unsatisfied are 13% of the respondents (versus the city average 8%); Fully unsatisfied are 9% (versus the city average 11%) .(Figure 154) (Vision Sofia 2050, 2019)

These findings indicate that the study area (and the district of Nadezhda) is part of a bigger city zone with relatively lower levels of satisfaction with life both in the city and in the neighbourhood.

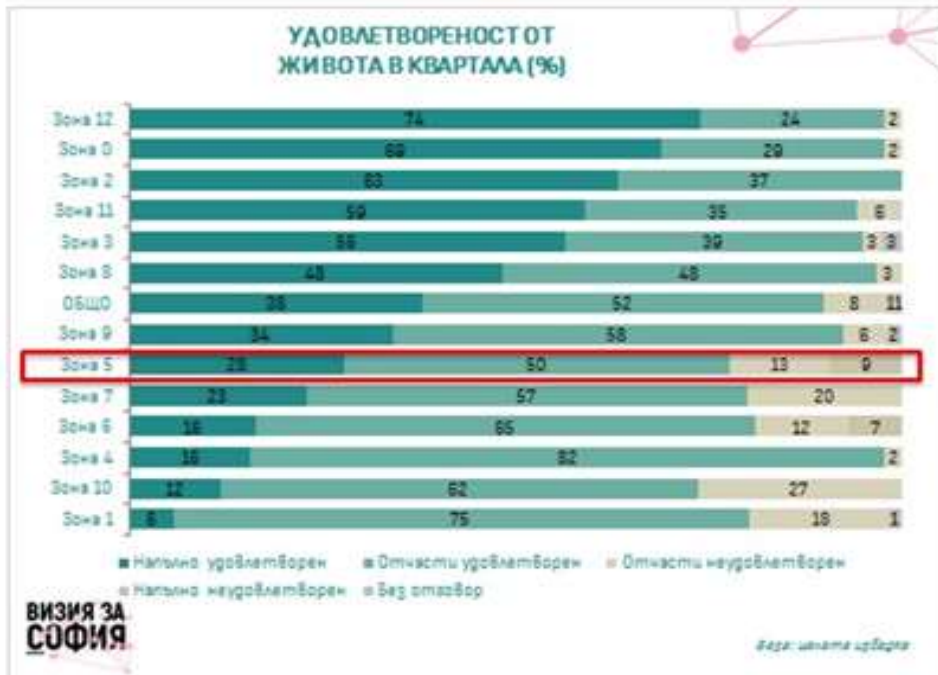


Figure 438. Satisfaction with life in the neighbourhood (%), Source: Sociological survey on the quality of life in Sofia, Vision Sofia 2050, 2019

### Public services available inside the Urban agglomerate

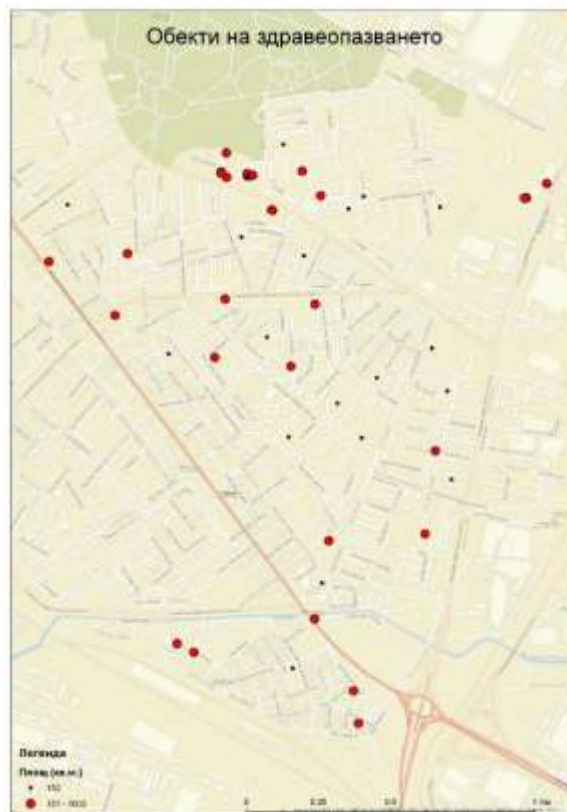


Figure 439. Healthcare facilities within the URBiNAT study area. Key: small black dot – facilities with total built up area less than 150 sq. m.; red circle - facilities with total built up area less between 150 -1000 sq. m.; Source: Sofproect OGP



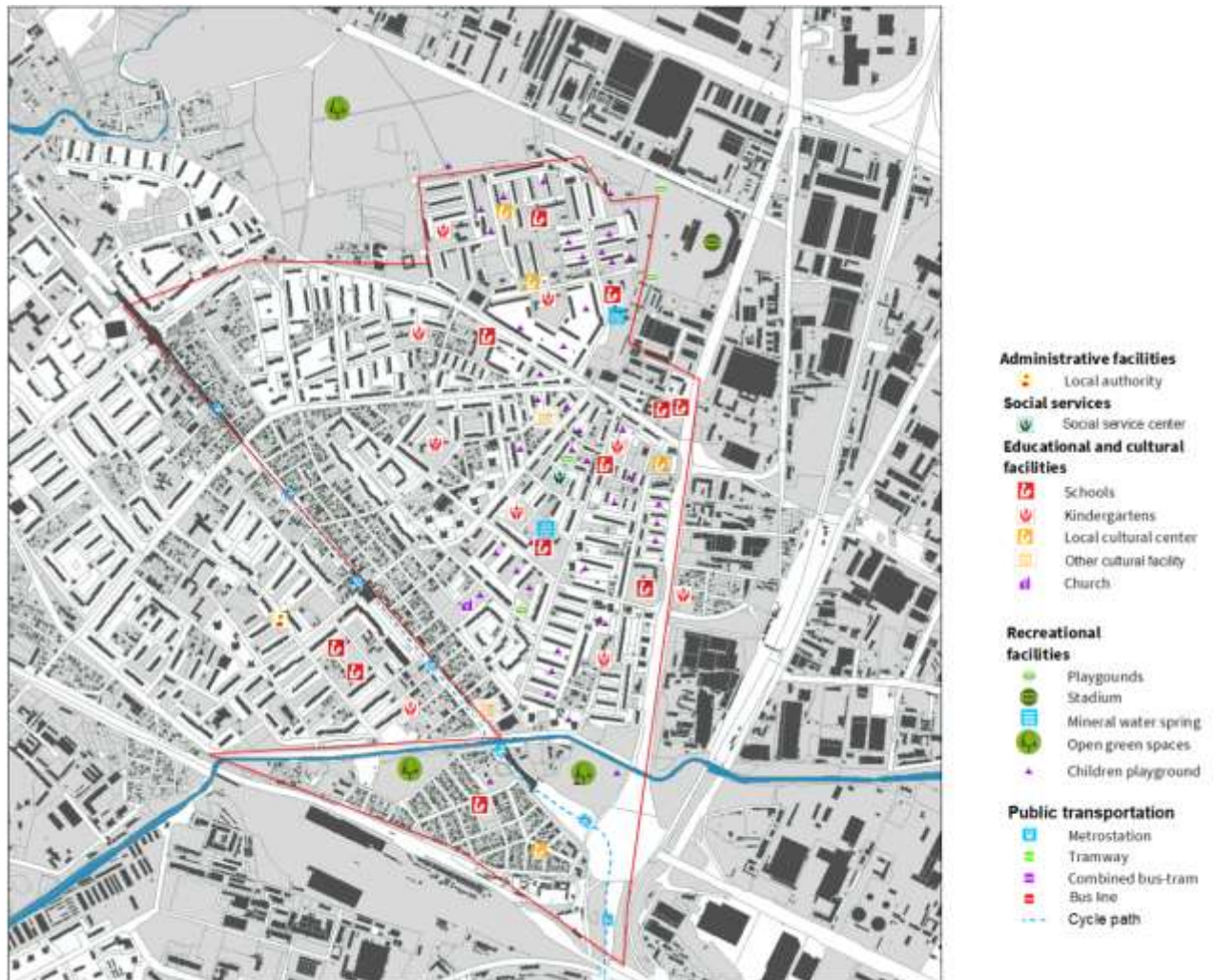


Figure 440. Public services. Source: Elaborated for the purposes of URBiNAT (Sofproect OGP)

### 5.3.3 Economic description

The data to be collected at parish and neighbourhood level are almost the same ones collected at the city level. The purpose is to have data at lower level, for assessing areas in the city. These data will be also useful for the study of the corridors, the contextualization of specific city areas in the wide city context.

#### 5.3.3.1 Income and poverty

##### **Ownership of durable assets (e.g. rate of owners of their residence, rate of renters, shared accommodation, free accommodation)**

The extremely high share of owned dwelling, typical for the Bulgarian context, does not make a difference in Nadezhda District.

##### **Prices (houses, rents, construction costs, etc.)**

Property prices in Tolstoy, Svoboda and Nadezhda 2 neighbourhoods are lower than the city average (around 80 % from the country average). The housing market is represented



mainly by buildings aged 20 years and more. Average prices of housing in Nadezhda range 650-950 Eur (the highest levels - above 1450, and the lowest - 500-600).(Figure 156)

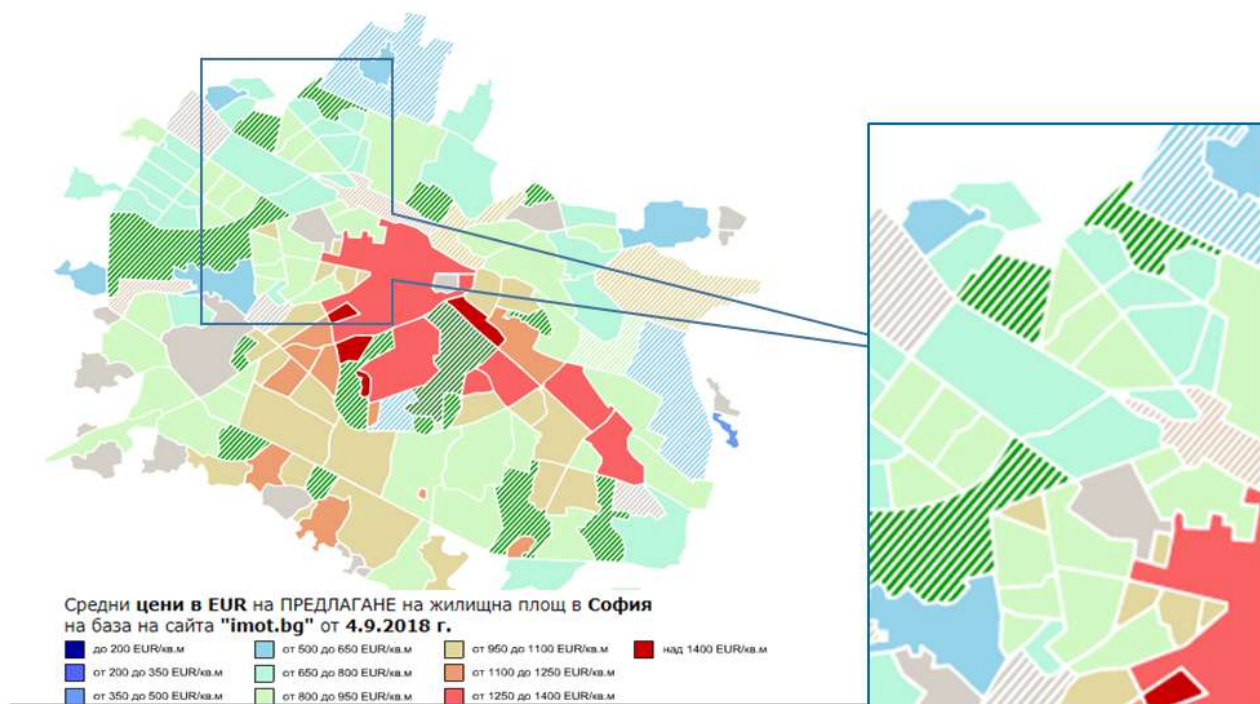


Figure 441. Average housing property prices in Sofia. Source: Sofproect OGP, research based on data from "imoti.bg", 2018

### 5.3.3.2 Employment

#### Activity and Employment rate

According to the 2011 Census data, population aged 15-65 was 48376. Around 74% of them were economically active and 26% - economically inactive. Significant share of the economically active population was employed (91%) and comparatively small share was unemployed (9%).

Table 140. Nadezhda district population aged 15 - 64 by economic activity as of 01.02.2011, Source: NSI

	Total	Male	Female
<b>Nadezhda District</b>	48376	23589	24787
<b>Economically active</b>	35852	18122	17730
<b>Employed</b>	32522	16314	16208
<b>Unemployed</b>	3330	1808	1522
<b>Economically inactive</b>	12524	5467	7057

### Employees in the agriculture, social, services, industrial sectors

The highest share of Nadezhda district employees are employed in “Wholesale and retail trade; repair of motor vehicles and motorcycles” economic activities (more than 25%). About 12% worked in Manufacturing, and 7% - have in Public administration, defence and compulsory social security.

Male employees rates compared to female employment rates are higher in Manufacturing (13.57% vs 10.58%), Transportation (10.26% vs 4.62%), Administrative and support service activities (8.15% vs 3.03%) and Construction (10.42% vs 2.16%). A greater proportion of women work in Education (6.76% vs 1.55%) and Human health and social work activities (7.78% vs 1.55%).

Table 141. The Nadezhda District employees under labour contract by economic activity groupings as of 01.02.2011, Source: NSI, 2011

<b>Nadezhda District population</b>	<b>Total</b>	<b>Male</b>	<b>Female</b>
Total	32522	16314	16208
Agriculture, forestry and fishing	117	69	48
Mining and quarrying	39	26	13
Manufacturing	3896	2194	1702
Electricity, gas, steam and air conditioning supply	321	215	106
Water supply; sewerage, waste management and remediation	216	142	74
Construction	2032	1684	348
Wholesale and retail trade; repair of motor vehicles and motorcycles	8116	4008	4108
Transportation and storage	2401	1659	742
Accommodation and food service activities	1679	711	968
Information and communication	1293	698	595
Financial and insurance activities	1284	409	875
Real estate activities	436	201	235
Professional, scientific and technical activities	1863	720	1143
Administrative and support service activities	1804	1317	487
Public administration and defence; compulsory social security	2343	926	1417
Education	1337	250	1087
Human health and social work activities	1501	250	1251
Arts, entertainment and recreation	597	293	304
Other service activities	1247	542	705

### Industrial plants concentration rate in social housing districts

There are no industrial plants within the scope of the study area, but few warehouses and logistic, operating with total built up areas less than 1000 sq. m. each and located on the periphery of the study area and in close proximity to the city boulevards Rozhen and Lomsko shosse. (Figure 159)

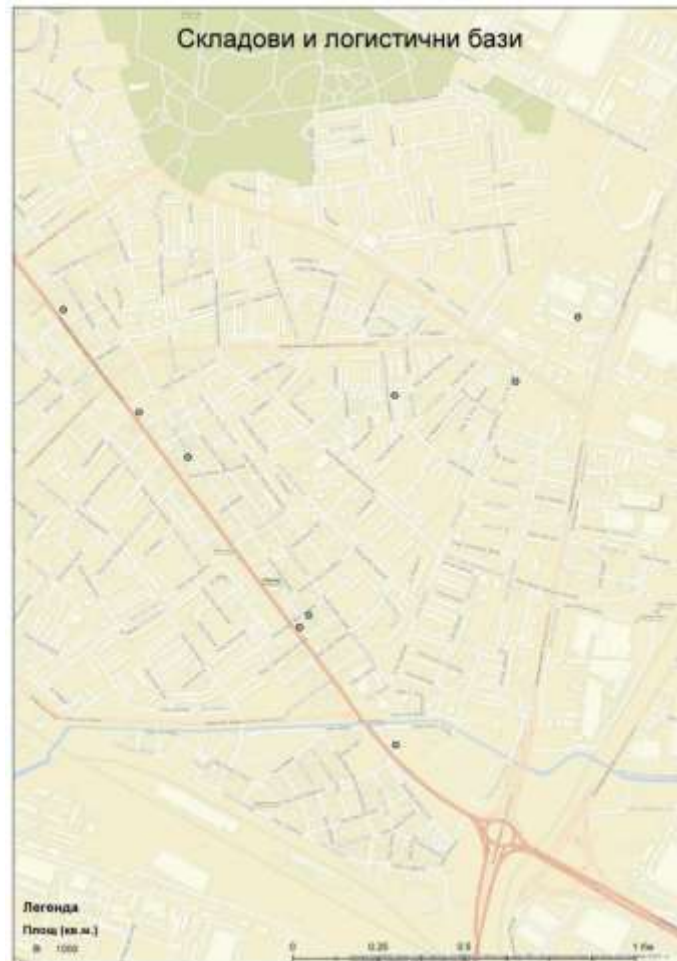


Figure 442. Warehouses and logistics within the URBiNAT study area, Source: Sofproect OGP

#### 5.3.3.3 Innovation

**Businesses and workers** There are large multinational companies in adjacent to the residential areas industrial zone within the boundaries of Nadezhda district - e.g. Hyundai Heavy Industries, Sopharma, Aroma.

#### 5.3.3.4 Activity sectors

**Restaurant and catering services** Commercial activities (stores, cafes, bars, bars and catering services) and the corresponding facilities within the URBiNAT study area are unevenly distributed. Small commercial objects with usually small number of employed are clustered along Lomsko shosse blvd. The commercial buildings with comparatively

high total built up areas are located along the entrances to the neighbourhoods. Lack of any commercial buildings/activities is identified in the northern part of Svoboda neighbourhood, nord-east part of Nadezhda 4 and along Republica street. (Figure 159). Underused commercial space in the second (service) entrance of the residential buildings was identified. In the cases when such premises are used, the income is collected by the Condominium Association of residents and further used for day to day needs and maintenance of the common parts of the buildings.

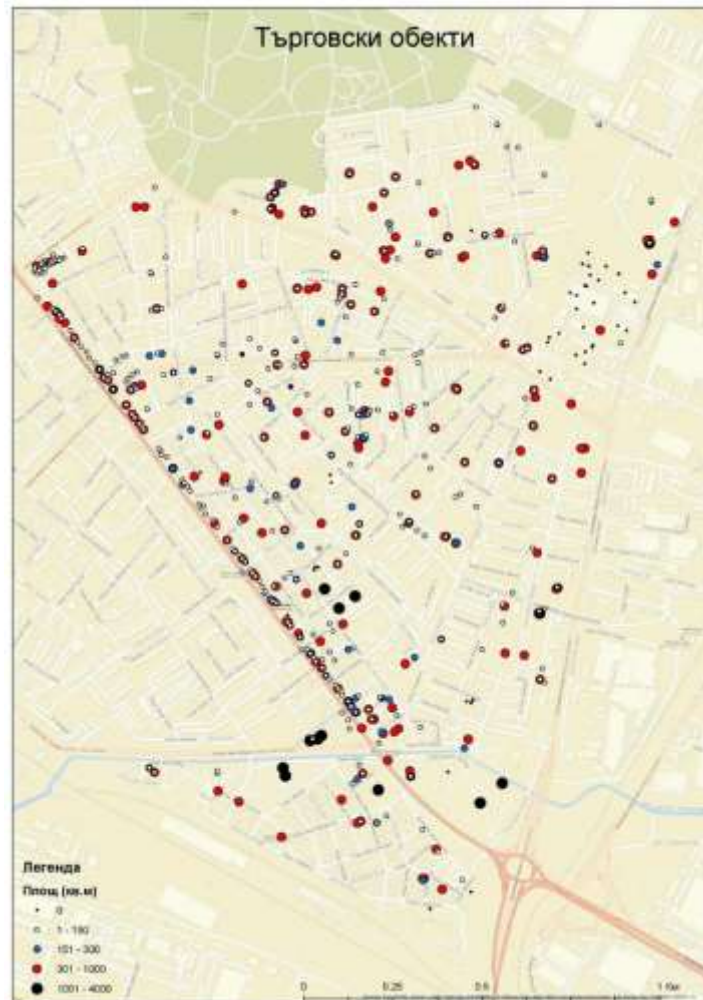


Figure 443. Commercial activities by size of the total built up area of the commercial buildings within the URBiNAT study area. Key: black dot – 0 (non operating); circle with black countour – from 2 to 159 sq.m; blue circle- from 151 to 300 sq.m., red circle – from 301 to 1000 sq.m., from 1001 to 4000 sq.m. Source: Sofproect OGP

### 5.3.3.5 Facilities

#### Cultural facilities

Four smaller community centres (2 in Svoboda, 1 in Tolstoy and 1 in Triagalnika) provide some general educational and cultural activities for the local people and their children. There are two cultural facilities located in Nadezhda 2 that are of greater importance and serve the whole district area. These are the Centre for arts, culture and education for

children and the Municipal centre for culture. Both places support the cultural life providing space, training and events in the sphere of applied art, theatre, music and dance.



Figure 444 . Centre for arts, culture and education for children      Figure 445 .Municipal centre for culture

**Educational facilities, kindergartens, schools, higher education facilities (public and private)**

There are eight schools and one college on the territory of the studied area. Six of all nine public schools in Nadezhda district are located within the studied area. Two private schools are located there too.

Table 142. Schools in the study area by neighbourhoods. Number of classes, number of students, grades. Source: Official web pages of the schools

Educational institution	Location/Neighbourhood	Public/private	Number of students	Number of classes	Grades
15 Hightschool Adam Mitskevich	Nadezhda-2	Public	450	32	1st – 12 th
54 Hightschool Ivan Rilski	Tolstoy	Public	1293	55	1st – 12 th
102 Elementary school Panayot Volov	Svoboda	Public	450		1st – 8 th
141 Elementary school Narodni Buditeli	Svoboda	Public		21	1 st – 7 th
153 Sport School Neofit Rilski	Svoboda	Public	100	25	4th - 7th
Veda German Language School	Triagalnika	private			
Professional College ISPS	Svoboda	private			
3th Auxiliary School "Eduard Segen"	Nadezhda – 2	Public			1 st – 8 th
Palestinian Elementary School and High School Avitsena	Tolstoy	private			



**15 Highschool Adam Mitskevich** provides public education for children from 1<sup>st</sup> to 12 grade. Its profile is foreign languages (English, German, and Spanish) and computer science. The number of students taught there is around 450 from all ages, distributed in 32 classes from all grades. It is located in Nadezhda-2 housing estate.

**54 Highschool Ivan Rilski** provides public education for children from 1<sup>st</sup> to 12 grade. Its profile is foreign languages (English, German, and Russian), computer science and technologies. The school participates in the national programme for healthy food in schools, and it is active in the development of different educational projects in cooperation with foreign partners. The number of classes is 55 of all grades. It is located in Tolstoy Housing estate.

**102 Elementary school Panayot Volov** provides public education for 450 children from 1<sup>st</sup> to 8<sup>th</sup> grade. It has vocal group, a football team, taekwondo classes as well as English language classes. It is located in Svoboda housing estate.

**141 Elementary school Narodni Buditeli** provides public education for the children from 1<sup>st</sup> -7<sup>th</sup> grade. It is specialized in foreign languages education and it has special linguaphone equipped rooms. It has 21 classes with students from all grades. It is located in Svoboda housing estate.

**153 Sport School Neofit Rilski** is a public school that provides education and special training in the following disciplines: basketball, volleyball, football, boxing, judo, athletics, table tennis and gymnastics. The school provides admission tests after graduation of 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> grade of elementary school. The number of students admitted every year is around 100. As it is of national importance, the facility includes a small dormitory for the children coming from the countryside. The dormitories are situated next to the main building of the school. Students from all grades are educated in 25 classes. It is located in Svoboda housing estates.

**Veda German Language School** is a private school which educational programme is focused on German language and culture. It is part of a bigger facility integrating school, kindergarten, elementary school and high school. It is licensed by the German Ministry of Culture. It is located in Triagalnika neighbourhood.

**Professional College ISPS** is a private college in the sphere of International Services for Security.

After graduation, students receive professional qualification certificate for: Paramedic, Sport Shooting Coach, Karate Coach, Jiu Jitsu Coach, Fitness Instructor, Massage Therapist, Security Management, Taekwondo Coach. Admission requires a diploma from high school. It is located in Svoboda housing estate.

**3th Auxiliary School "Eduard Segen"** is specialized in the education of children with intellectual and cognitive disabilities from 1<sup>st</sup> to 8<sup>th</sup> grade. Most of the students suffer from autism, epilepsy, cerebral palsy, Down syndrome, hyperkinetic syndrome, etc. It is located in Nadezhda – 2 housing estate.

#### **Palestinian Elementary School and High School Avitsena**

The Palestinian School and High School Avitsena are private educational institutions that provide education in English and Arabian language. The school is not licensed by The Ministry of Education in Bulgaria and it is not listed in the municipal network of educational institutions and facilities.

#### **Kindergartens**

There are 7 kindergartens in the study area. They are public and provide nursery and kindergarten services altogether. Four of them provide facilities for 10 groups (from nursery to preschool) The number in each group vary from 25 to 30 children. These are: 38 Kindergarten Dora Gabe, 15 Kindergarten Chuchuliga (Lark) 171 Kindergarten

Svoboda, 137 Kindergarten Kalina Malina, 115 Kindergarten Osmi Mart, 6 Kindergarten Valsheben Sviat.

Table 143. Public kindergartens in Nadezda district. Capacity (number of children enrolled) and number of groups, source: Municipal system for the management of kindergartens in Sofia, <https://kg.sofia.bg/isodz/dz/by-region/13>

<b>KINDERGARTENS IN NADEZHDA DISTRICT</b>	<b>CAPACITY, NUMBER OF CHILDREN AGED&lt;3 YEARS</b>	<b>CAPACITY, NUMBER OF CHILDREN AGED 3-7</b>	<b>NUMBER OF GROUPS</b>
Half day kindergarten in 16th school		26	2
Kindergarten №24	50	234	10
Kindergarten №27	52	168	8
Kindergarten №27 (Second building)	46	111	5
Half day kindergarten in 63th school		24	2
Kindergarten №83	23	57	3
Kindergarten №83 Second building		27	1
Kindergarten №90	75	177	12
Kindergarten №90 Second building	23	75	5
Half day kindergarten in 101 school		25	2
Kindergarten №170	46	82	5
Kindergarten №170 (second building)		83	4
<b>KINDERGARTENS WITHIN THE BOUNDARIES OF URBINAT STUDY AREA</b>			
Kindergarten №6	50	195	9
Kindergarten №6 (second building)		53	2
Kindergarten №15	46	191	9
Half day kindergarten in 15 th school		57	1
Kindergarten №38	52	236	10
Kindergarten №115		110	4
Kindergarten №115 Second building	10	78	4
Kindergarten №115 Third building		74	3
Kindergarten №137 two buildings	46	122	8
Half day kindergarten in 141 school		41	2
Kindergarten №171	70	258	11
Kindergarten №171 (second building)	50	179	9



Figure 446. Public kindergartens in Nadezhda district. Source: Municipal system for the management of kindergartens in Sofia, <https://kg.sofia.bg/isodz/dz/by-region/13>

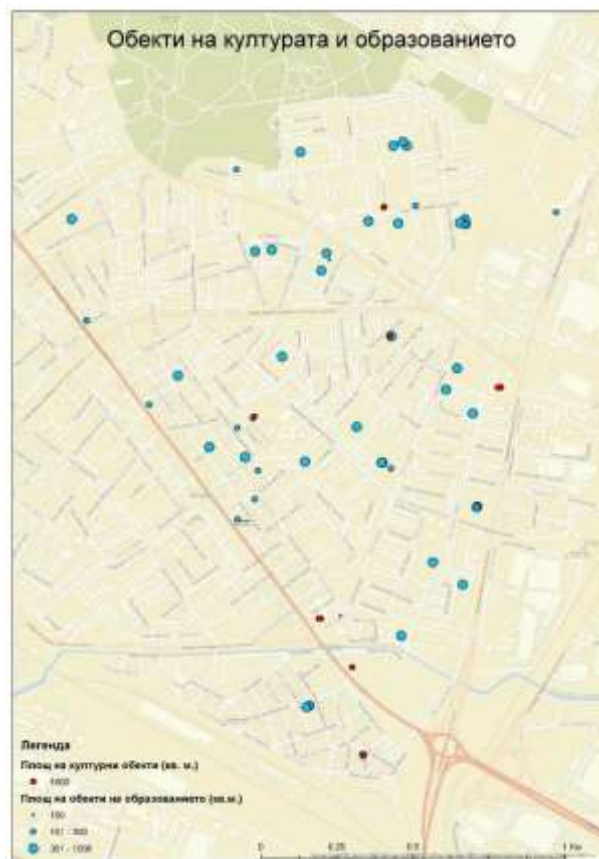


Figure 447. Cultural and educational facilities within the URBiNAT study area. Key: red circles – cultural facilities; educational facilities (top to bottom) – less than 150 sq. m. total built up area; total built-up area between 151-300 sq. m., total built up area between 301-1000 sq.m, Source: Sofproect OGP

**Recreational and leisure spaces, sports facilities (public and private)**

The study area is provided with sport facilities of district and local importance. The Locomotive Stadium is located in the north-eastern part of the territory. It is a big facility that has capacity for 22 000 seats. The stadium is of local importance as it hosts different sports and cultural events. It has full size football playground, running tracks and smaller sports halls for other different activities. It also has an open swimming pool that is a popular place in the summer.

There are three other facilities that represent smaller football playgrounds that are a popular place for many young people. Also, there is one outdoor fitness facility that has been recently installed and gained popularity among the inhabitants. There are a couple of private fitness clubs that are popular among many young people.



Figure 448. Lokomotiv Stadium

Source: <http://bgclubs.eu/stadiums/Lokomotiv-Sofia>



Figure 449. Outdoor Fitness Facility in Tolstoy

Source: UACEG

There are many smaller and bigger public spaces within the boundaries of the URBiNAT study area. All of them are used for recreation and everyday leisure activities. There are three parks that serve the territory – Severen Park (The Northern Park), Park Nadezhda, Park Gorska Kultura (Forest Culture Park). They provide space for everyday leisure including – sport in the outdoor, outdoor fitness, walking pets, children play, picnic, etc.

Park Nadezhda is situated very close to the metro station and that is one of the reasons for its popularity among people in the area. Due to its remoteness to the main transport connections, Severen Park (The Northern Park) is mainly used during the weekends.

The planning structure of the study area provides many small open spaces between the buildings that are used mainly by the elderly people, mothers with little children and youngsters. Some of the spaces are equipped with self-made (by the residents) furniture.





Figure 450. Severen Park (The Northern Park), Source: <https://cutt.ly/UeUFl6s>



Figure 451. Gorska Kultura (Forest Culture Park), Source: [shorturl.at/svzx7](http://shorturl.at/svzx7)

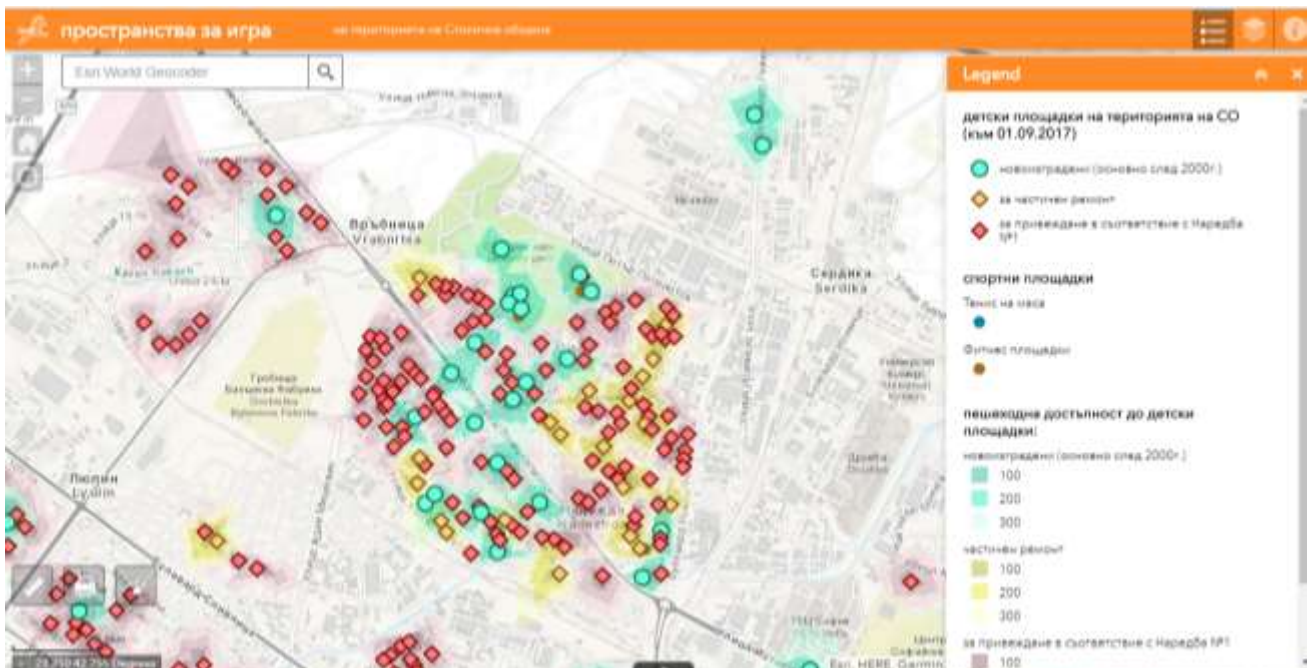


Figure 452. Concentration of sport and open air fitness playgrounds in public space. Access to playgrounds. Source: Sofia plays interactive map, Sofproect OGP



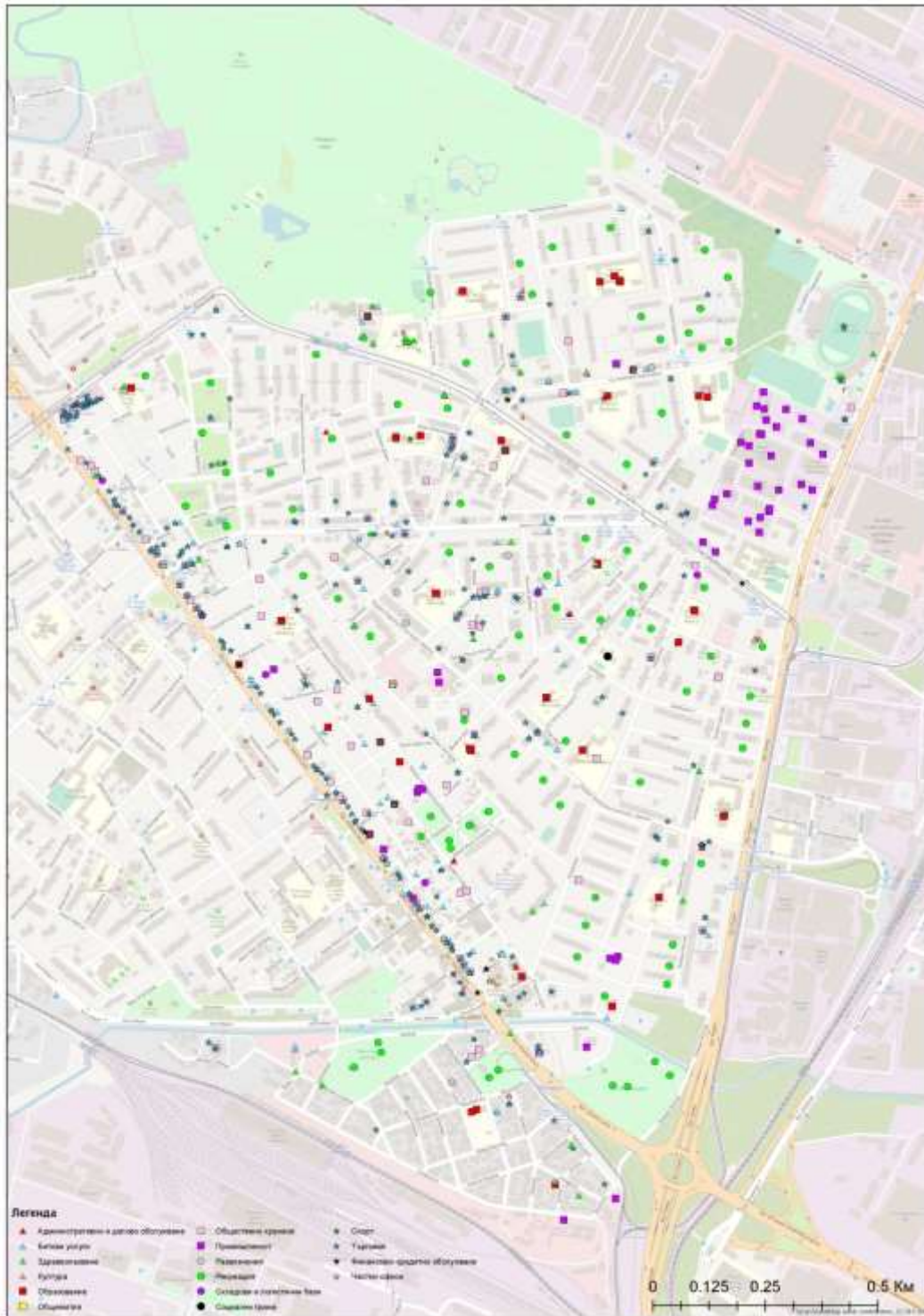


Figure 453. Facilities by type within the URBiNAT study area. Key: First column (top down): administrative services, services (private sector), healthcare, culture, education, other public services; Second column (top down): catering (restaurants and cafes), production, entertainment, recreation, warehouses and logistics, social services; Third column (top down): sport, commercial, financial, private offices., Source: Functional Analysis, Sofproect OGP

## 5.4 The second stage of Local Diagnostic

### 5.4.1 Mapping the local participatory culture and engaging citizens and stakeholders in participatory activities to build on their visions and perceptions.

The initial steps of approaching of citizens, organizations and institutions in Sofia by the two local URBiNAT teams was aimed at promoting the project while identifying potentially interested actors and stakeholders who would be interested in benefiting from the project but also capable for contributing to its future development. The mapping of the local participatory culture and the activities undertaken for building a shared vision for the co-development and implementation of a healthy corridor included workshops, formal and informal meetings and semi-directional interviews.

Important steps were undertaken from the very beginning of the project for the engagement of policy decision makers as well as administrative staff from Sofia Municipality and Nadezhda district at the earliest possible moment. It was considered strategically important in order to minimize further risks related to bureaucratic barriers, to shorten procedures timeframes and to reduce potential misunderstandings at the operational level.

The first working meetings with the Deputy Mayor of Sofia Municipality (SM), the mayors of the administrative districts covered by the adopted Integrated Plan for Urban Regeneration and Development of Sofia (IPURD), 2014-2020 and representatives of various departments of the local administrations in charge for the project, were held in October and November 2018. They were aimed at receiving a formal approval on the territorial location and scope of the URBiNAT Healthy Corridor.

The next steps of the project teams were aimed and establishing effectively working collaboration with the mayor and the administration of Nadezhda district, who were considered key stakeholders in the project. As according to the active legislation in the country the district administrations depend on the budget of Sofia municipality and cannot independently apply for investment projects, the Mayor and the District administration of Nadezhda District had been very collaborative and enthusiastic since the very beginning of URBiNAT project. The practice established of organizing regular working meetings twice a month between the teams of Subproject, Nadezhda District administration and UACEG proved operational in creating a trustful collaborative environment. It contributed to building a common vision on the project aim, methodological approach and on-site activities, and provided the frame of the further participatory process.

Beyond the formal and informal meetings conducted since January 2019, the fieldwork conducted by the local task force (UACEG, members of the administration of Sofia Municipality and representatives of Nadezhda district administration) resulted in a series of workshops aimed at creating synergies with other ongoing initiatives, and kick-off events to launch the co-creation process in the intervention area, from January to October 2019.

- Three workshops with non-profit organizations, local associations and representatives from the local administration (during the Consortium meeting in Sofia in January 2019);
- Five observation visits to the study area during different seasons;
- One public kick-off event at the Nadezhda Municipal Institute of Culture.

Within the broader methodology of mapping participatory culture, a set of methodologies, techniques and approaches were applied, including:

- Three focus groups on-site,
- One focus group discussion on the potential use of thermal water;
- Culture mapping activity and subjective geography mapping;
- In-depth semi-structured interviews;
- Walk-through activity combined with motivational semi-structured interviews and photo voice activity;
- Motivational interviewing;

Survey on the

Two mini-task forces (TF) were established focused on the topics of “Work with pupils” and “Thermal water”.

The “Work with pupils” TF organized meetings with the headmasters and deputy headmasters of the schools and kindergartens and the Pupils’ Parliaments of the four schools located within the URBiNAT study area. An exhibition was organized in each of the schools in order to activate their pupils and teachers as horizontal partners. The exhibition panels presented URBiNAT concept and future activities relying on citizens’ engagement; they motivated a discussion on the options and opportunities for teachers and pupils for joining in further activities aimed at the co-creation of the Healthy corridor. The “Thermal water” TF focused on the opportunities to integrate NBS and to utilize the thermal water available within the scope of the study area.

Local participatory culture was estimated as a complex feature with possible multiple forms of manifestation and multiple interpretations. Mapping participatory culture within the initial stage of URBiNAT was aimed at exploring local people’s current interaction and joint practices in order to estimate the potential for effective community-driven processes that would further promote co-creation. Through the implemented methods for analysis, it was revealed that the people in Nadezhda district value their community life; they are interested in ongoing social processes and enjoy being involved in joint actions; people were very active when discussing the peculiarities of the built environment and the possible interventions in it; they shared their respect for traditions but also demonstrated their creative potential and their openness to innovations. There was, however, certain initial reluctance observed among the citizens for discussing welfare, public goods and the

quality of the urban environment. Grasping citizens' attention in the different actions organised was possible when we designed the event explicitly for the specific URBiNAT topic. The identified people's attitude to undertaking joint action in the neighbourhood varied from directly refusing to "ready for action right now" and to "open for discussion and eager to understand". Although participatory approaches are not broadly applied yet within Nadezhda district, the representatives of the administration shared their vision for going beyond top-down approaches and opening further for communication, consultations and the establishment of practices that would enable closer communication interactions with citizens.

## **5.4.2 Cultural mapping**

Cultural mapping in Sofia has been used to create opportunities for dialogue between a community and local authorities, thus offering "diverse sources of information that can overcome the limitations of expert opinions" during the co-diagnostic process. Through this method information was gathered on local assets; values, beliefs, perceptions and attitudes; relationships, traditions, identities, and shared sense of place. This opens up new perspectives on mapping results and local development by gathering information that does not necessarily indicate 'final answers' or 'end results' but, instead assisting the process of mapping of the participatory culture during the first meeting with citizens from the URBiNAT study area.

### **5.4.2.1 Cultural mapping 1 at UACEG during the Consortium Meeting in Sofia, Sofia**

#### **Implementation of the method**

Participants were divided into groups of 4-5 persons with a mix of backgrounds and there was one person fluent in English to coordinate the group and report on findings. A large picture map of the area was used in order to keep track of the results of the discussions at the end of the workshop. After a brief introduction to workshop method and purpose (10 Minutes), the workshop started by introductions of participating organisations/citizens using the map to locate themselves and their interests (20 minutes) and followed by a Group discussion (45 minutes) on the potential resources/"assets"/potential in the area that could create a healthy corridor through NBS. Each coordinator produced English notes from discussions, while the other participants produced post-it to place on the map of the corridor for inspiration to the further processes (15 minutes). The questions to the participants in the course of the discussion were: What do you like about the area?; What would you like to change?; How can you contribute and who should help?.



Figure 454. Cultural mapping. The process in Sofia during URBiNAT Consotcium meeting in January 2019

#### 5.4.2.2 Cultural mapping 2 at Nadezhda Cultural Institute, Sofia

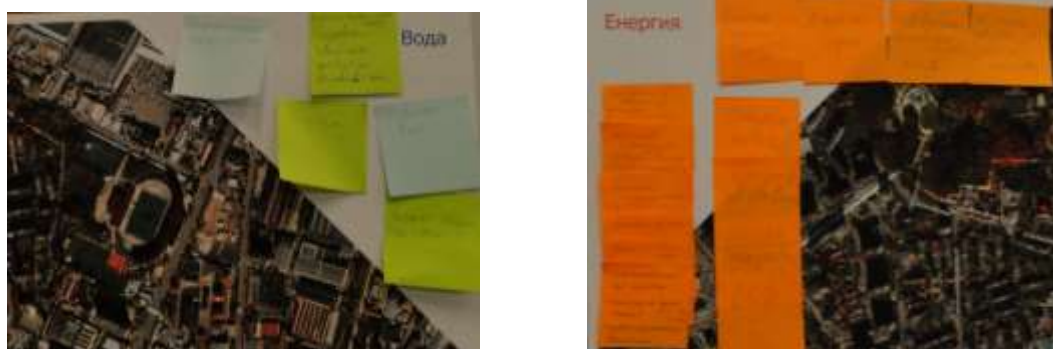
##### Implementation of the method

The mapping was organized as part of the Kick-off event of the Participatory process on 20.04.2019 at the Nadezhda Cultural Institute. Forty participants were distributed in groups of 5 to 9, each with one mediator and one rapporteur; they were asked to share their experience and perception about the current state of their neighbourhood – the physical environment but also the community life there; their appreciation about needed changes and their visions about what could be practically done and by whom.



Figure 455. Cultural mapping. Mini focus-groups organized during the Kick-off event of the Participatory process on 20.04.2019 at the Nadezhda Cultural Institute(left)

At the end of the mini-focus groups, participants were invited to leave their comments (by posting anonymous key words in the “URBiNAT box”) or something that they were feeling uncomfortable to share face to face. Then, in a more relaxed atmosphere, they were asked





to leave post-it-notes messages that would things of the study that they would like Participants were post-it-notes either thus referring either within the study area specific locations) or “energy”, “water”,



with key words or name the positive area and the things to change. invited to stick the on the Board map specific locations (in order to refer to the categories

Figure 456 Cultural mapping. Board map for referencing territories or categories (key words)

### 5.4.2.3 Cultural mapping 1 and 2 – results and discussion

#### Results from the cultural mapping activity 1 and 2

Figure 457. Cultural mapping. What participants like – comparison between kick-off participatory process and Sofia meeting results

	<b>Kick-off</b>	<b>Sofia meeting</b>
<b>People</b>	Many children; Neighbours	Kids and families,
<b>Green space and natural assets</b>	North park and greenery; Inter-block spaces	Green areas, thermal water sources
<b>Access and mobility</b>	Access and transport connections	Metro access
<b>Buildings and build-up environment</b>	The quarters with the low-rise housing; low-rise housing in Triagalnika; Wide inter-block spaces	Renovated educational facilities, space between buildings
<b>Leisure and recreation</b>	Playgrounds, sport facilities, children's playgrounds	
<b>Social and market infrastructure</b>	Shopping small shops and hypermarkets; Kindergartens and other social infrastructure; Cultural facilities (OKI)	Shops access, church, cultural centre, safe for children
<b>Identity</b>	The name of the district; The holiday of the district; Morphology; Gathering with the neighbours in front of the block,	People stay in the district for long time – sense of continuity and community

Figure 458. Cultural mapping. What participants dislike – comparison between kick-off participatory process and Sofia meeting results

	<b>Kick off – dislike</b>	<b>Sofia meeting- dislike</b>
<b>People</b>	Gypsy carriages	Criminal situation, drug addiction and drug addiction among teenagers, street gangs, Low level of community activism No culture of cleaning after pets when spending time together outdoors
<b>Access and mobility</b>		Rough sidewalks
<b>Leisure and recreation</b>	Lack of place for sport and play - Playgrounds, sport facilities, children's playgrounds	Unsatisfactory quantity and quality of facilities for children to play, insufficient facilities for children
<b>Public space (incl. maintenance)</b>	Pavements – uneven, in decline, Pavements – uneven, in decline, Insufficient greenery	Parking on the grass, many spaces occupied by cars Poor condition of inter-block spaces
<b>Environment components condition</b>	Air pollution, noise	Air pollution, air quality,
<b>Buildings and built environment</b>		Grey schools (color of the façades) Appearance/quality of the built environment
<b>Waste management</b>	Dogs' waste, waste along the street and within the inter-block space, stray dogs	Dirt in the streets, dog poops, garbage in the inter-block space

Figure 459. Cultural mapping. What participants would like to change – comparison between kick-off participatory process and Sofia meeting results

	<b>Kick-off</b>	<b>Sofia meeting</b>
<b>Change people</b>		Respect what people think Change mentality of people (about throwing garbage), build awareness and activate kids and communities around nature, Empower people More sense for community, make people love their neighbourhood Motivate young people to be more responsible and to take care of the community Introduce solidarity economy Activate citizenship by uniting people around ideas Better connection and understanding between generations Educate forest culture for those coming in the North park Make people responsible for the garbage
<b>Better waste management</b>	Cleanliness – river and inter-block spaces, better waste management (incl. bins), streets, composters; To see cleaner Park Gorska kultura	Make people responsible for the garbage
<b>Better open and green space maintenance</b>	More green space well maintained, More local trees and vegetation, To preserve the green inter-block spaces, Tasty gardens in each kindergarten	
<b>Better environment components condition</b>	Clean air, less noise, use renewable energy sources	Make inter-block spaces cleaner and safer Improve air quality

<b>Expanded bicycle and pedestrian infrastructure</b>	Pavements repaired, improved walkability, access for pedestrians Tolstoy, Han Kubrat stop, Bike lane	Safe, wide, and actively used bicycle lanes, Improve accessibility within the neighborhood Stop parking in the green Improve the quality of pavements
<b>Expanded, improved and well managed car park infrastructure</b>	Parking system improved. More parking spaces. Better control over parking. Multi-story parking free of charge for the residents	Make use of the thermal water
<b>Improved infrastructure and buildings</b>	Improve the bus schedule	Renovate old buildings and façades of the panel buildings, improve space between buildings Improve the appearance/vision of the stadium, Lomsko shosse Blvd.
<b>Innovation</b>	Wi-Fi free areas, introduce Lighting (solar panels) along streets and in front of blocks, Tasty gardens in each kindergarten, innovative use of the thermal water, open air free library	
<b>More sport, leisure and recreation spaces</b>	More space for play for children and sport, More spaces for recreation and leisure, cafes, Thermal water swimming pool	Lack of equipment to exercising, jogging, sports, places to relax
<b>More community, cultural and social centres and places</b>	New community centre - socializing old and young, covered space to meet under unfavourable weather conditions, for family meetings; Creative space for residents and children; Better space for pets and kids all together (multifunctional public space); More kindergartens, Improved public libraries, open air free libraries, museum	More meeting places for interaction between ethnic groups More public space for meetings
<b>New or varied economic activity in the territory</b>	New Office buildings, New market fruit and vegetables, creative space for residents and children; museum, public library, cafes	
<b>Identity</b>		Improve image and reputation of the area (periphery)

## Results from the mini-focus groups

### *What do you value most in your neighbourhood and community?*

Most of the participants shared their personal attachment to their neighbourhoods, some of them mentioned that the traditional spirit of the place is still kept alive. Nadezhda district was described as 'green' and 'spacious', the place with the best name in Sofia ('Nadezhda' being the Bulgarian word for hope); it was estimated as a better place for living than the overbuilt prestigious parts of the city (mentioned several times, one of the participants had been explicitly advised by her friends to buy an apartment here and not in the southern periphery of Sofia). The features liked best were the small-scale urban

structure (with single family houses and small shops still preserved), the abundant greenery between the blocks of flats, the several large parks, and the numerous cafes.

Participants explicitly mentioned the opportunities existing for children's leisure and entertainment in the renovated part of the Northern park and the newly built cycling track linking the neighbourhoods to the park. The Northern park was repeatedly mentioned as a favourite place by representatives of all age groups. A lot of community sports and cultural events had been organized there (a significant change due to the efforts of the local administration was explicitly acknowledged as the place had been previously perceived as a dangerous one). Nadezhda Park was also mentioned as a favourite place by some participants. The neighbourhood was considered well organized - with a lot of shops, services and open-air markets for fruit and vegetables. There was a consensus among the participants that the quarter is very well connected to the city by public transport (mainly metro and tram) and that the living conditions are very good - with enough kindergartens, schools, polyclinics, pharmacies. The metro was many times mentioned as a very important element for the life of the neighbourhood. The urban environment was considered calm and friendly. Participants mentioned the children playgrounds in the public space between the blocks of flats as very good ones. Participants from outside the quarter were impressed by the large number of children in the streets. The local cultural centre and the Children's Centre were mentioned as some of the most important focal points in the quarter. A kindergarten with a new swimming pool was pointed out as a wonderful one.

#### *What would you change?*

The discussion in response to that question regarded two groups of issues: the need for undertaking a variety of practical steps aimed at achieving higher safety and improving the living comfort in the neighbourhood and the need for motivating a visible change in the culture and the behavioural models of the residents and visitors of the neighbourhood.

The practical steps proposed included providing a pedestrian crossing close by a kindergarten; it was complemented by a proposal to improve the existing street lighting, which was considered unsatisfactory. Identifying inhabitants' perception of their own safety and security in the neighbourhood was considered a very important initial step in defining the measures for improving the environment. Some proposals comprised building more cycling tracks and sports facilities (basketball and volleyball); more children's playgrounds in the residential areas (better to be smaller and dispersed ones than concentrated in one place) and in the Northern Park; more places for pets, new cafes and confectionaries; improving the public libraries in the local cultural centres, providing public toilets in the parks, etc.

Adding some new functions in the neighbourhood public space was also proposed, e.g. places for children's workshops, playgrounds for adults, space for creative activities and socialization of the elderly people, etc. Organizing 'tasty' gardens (for growing vegetables, herbs, etc.) in all the kindergartens in the neighbourhood was proposed in order to develop children's sensitivity and respect to Nature. The more effective use of available mineral water was a key issue in the discussion; it was several times raised by different participants. Ideas were also shared about organizing places for listening to good music, exchanging and discussing books or dancing (not only for young people).

Considerable concern was expressed about the quality of the physical environment – participants claimed the need for guaranteeing cleaner air and regular cleaning of the streets and pavements in the neighbourhood. Air pollution in winter was explicitly mentioned as a big problem cause by the single-family houses along one of the boulevards, where poor households were claimed to burn waste, old clothes and tyres for heating purposes. Perceived dangers to people's health were also related to the rats inhabiting the space along the river and the enormous quantity of mosquitoes and ticks in the two large parks. The visible traces of drug addicts' presence in the parks was mentioned as another negative factor to be urgently addressed.

'Dogs in public space' was another issue of concern among the participants. The increased population of homeless dogs in the streets and the public greenery (often fed by local inhabitants themselves) were perceived as a threat to strolling parents with children that had been the reason for avoiding the parks. The fencing of some space especially designated for pet dogs in the Northern Park and providing relevant cleaning facilities was considered a way to solving the problem.

Transport and parking issues received considerable attention in the discussions. Several suggestions were made on possible ways of improving the traffic organization in the area in order to reduce traffic jams along the surrounding boulevards; increase the effectiveness of the cycling tracks, guarantee pedestrians' safety by adding relevant traffic lights and make pavement surfaces appropriate for children's skateboarding.

A system of one-way car use of the streets was recommended because of the narrow streets in the neighbourhood; the further use of horse carts was considered inappropriate because of creating dangers; loading the big stores was outlined as blocking the traffic and the establishment of a proper time schedule for that was requested.

The need for a buffer parking area close by one of the metro stations was claimed as many inhabitants from close by and far quarters used to park in front of the residential buildings. Parking places were considered insufficient in front of some schools and at the main access point to the Northern Park.

The need for strengthening the control and imposing strict sanctions for parking on cycle paths, green spaces and sidewalks was claimed as according to participants' observations they used to hamper the movement of pedestrians, mothers with prams and disabled people.

Needed changes in inhabitants' behaviour and culture were also considered urgent: A greater personal responsibility and care for the environment by everybody in the quarter was claimed to be important. A generally prevailing destructive behaviour compared to initiatives for improving the urban environment was mentioned several times. Children and teenagers were blamed for improper behaviour causing a lot of damages to the facilities in public space, yet participants expressed their anxiety about the lack of adequate reaction by parents as well as other adults in such cases.

Some troublesome tendencies were mentioned concerning people's perceptions of their responsibilities in using public space – some people throwing garbage from their balconies or not cleaning up after their pet dogs. A major reason for the changing culture of solidarity that had existed in the neighbourhood in a previous period and for the increasing cases of



vandalism, was seen in the growing share of tenants among the inhabitants who took no responsibility for the quality of the living environment in the neighbourhood.

*Who should change it/ who should help (with what)? What have you personally done?*

The participants in the mini focus groups also shared their experience in undertaken joint initiatives and their personal efforts made for improving the environment in the neighbourhood. They spoke about their memories of previous community initiatives for maintaining the playgrounds between the blocks of flats. Some of the inhabitants have been cleaning the pavements and planting flowers; others have built a sports facility or had contributed for a better accessibility of public space for disabled people. Some participants described their joint initiatives undertaken for maintaining the greenery and shared their pride with the hedges planted in front of their building. Inhabitants from Nadezhda 4 neighbourhood have organized by themselves some permanent control over the space around their block of flats. Yet, the need for stricter control on behalf of specialized institutions and the municipality with the active support by all the citizens was claimed necessary and urgent. Financial support by the municipal administration was also expected in providing some basic facilities for restoring a playground in front of a residential building.

### Results from the Board map and “URBiNAT” box

The results from the mini-focus groups were almost confirmed, with many topics falling in several sub categories.

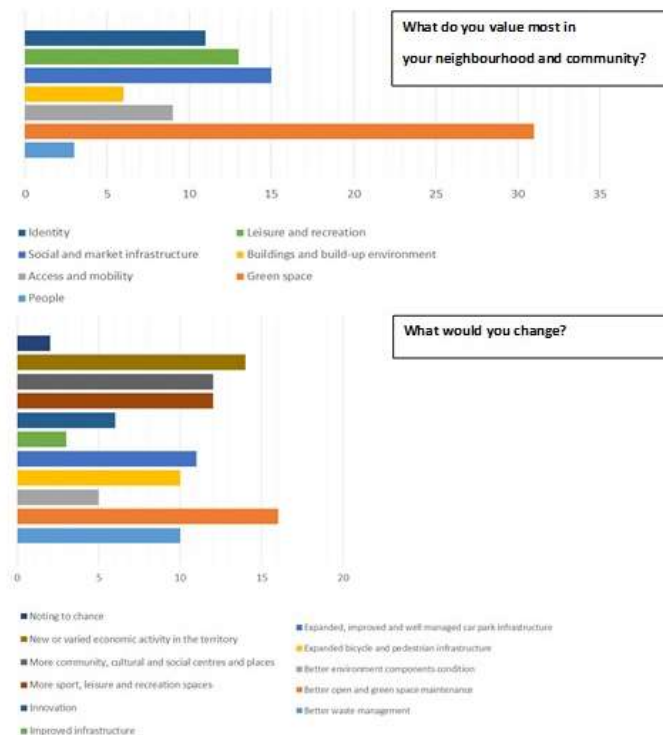


Figura 464. Cultural mapping. Results from The Board map and “URBiNAT” box

### 5.4.3 Behavioural mapping

The report provides information about the localization of the selected sites for observation, the implementation of the general Behaviour mapping methodology in Sofia, the general result, summary on the comparison between the different areas observed and the specific results per area.

#### 5.4.3.1 Results

##### General results

The general results for the 17 observation areas returned the sum total of 7685 users, mapped in working (3362) and non-working (4323) day and characterized by gender, age group, social interaction, activity level and type of behaviour. (Tables 1, 2, 3)

Table 144. Behaviour mapping: Total number of users on working and non-working day mapped by watch area

Places (points) of observation	Frequency			Percent age	Valid percent	Cumulative percent	Area , ha	Mean concentration, p/ha/observation
	Working day	Non-working day	Sum					
Point 1, Entrance to Severen Park 1	55	276	331	4,3%	4,3%	4,3%	0,86	14
Point 2A. Entrance to Severen Park 2	78	108	182	2,4%	2,4%	6,7%	1,35	4
Point 2B. Iliyantsi bazaar connection	71	112	204	2,4%	2,4%	9,1%	0,92	6
Point 3. 153rd Sports school „Neofit Rilski“	127	406	533	6,9%	6,9%	16,0%	1,91	7
Point 4. 102nd Primary school „Panayot Volov“	403	416	819	10,7%	10,7%	26,7%	1,23	19
Point 5A. „N. Zhkov“ Blvd, „H. Stilyanov“ & „Narodni buditeli“ Streets	102	201	303	3,9%	3,9%	30,6%	0,74	13
Point 5B. „Nikola Zhkov“ Blvd and “Republika” Street	113	148	261	3,4%	3,4%	34,0%	1,21	8
Point 6. Center for arts culture and education	72	86	158	2,1%	2,1%	36,1%	0,41	13
Point 7. 15th Primary School “Adam Mickiewicz”	198	313	511	6,6%	6,6%	42,7%	2,18	7
Point 8. Flowers market	139	256	395	5,1%	5,1%	47,9%	0,74	17
Point 9. “Sveti Duh” church and the garden	74	265	339	4,4%	4,4%	52,3%	1,31	10
Point 10. NCh “Saznanie” cultural center	192	286	478	6,2%	6,2%	58,5%	1,61	9
Point 11. Post office at “Republika” and “Ekzarh Stefan” Streets	171	240	411	5,3%	5,3%	63,9%	1,19	8
Point 12. Block 65 in “Lev Tolstoy” housing estate	52	162	214	2,8%	2,8%	66,6%	0,82	11
Point 13. Nadezhda Park	692	441	1133	14,7%	14,7%	81,4%	3,43	14

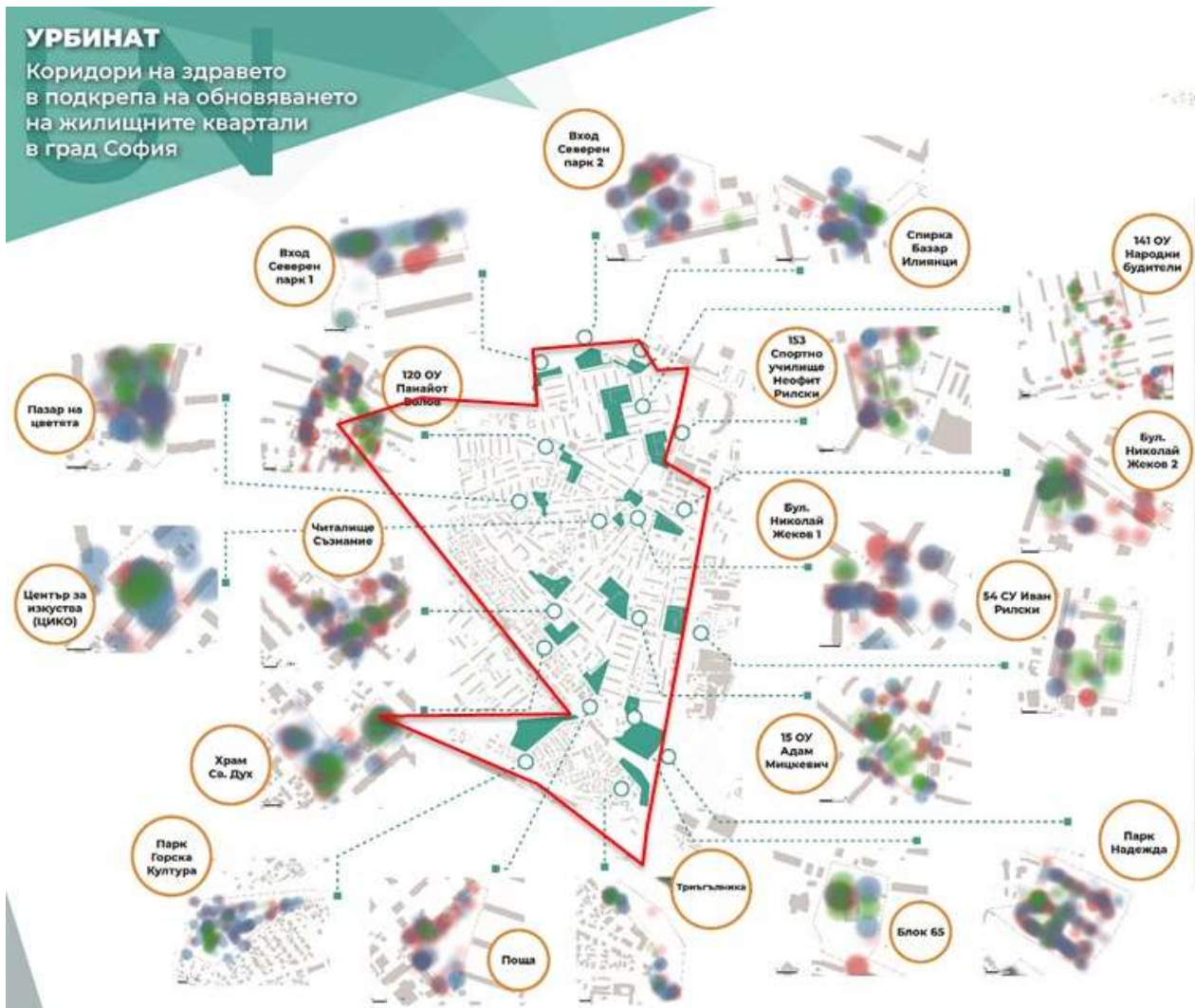
Point 14. Triagalnika neighborhood at Nadezhda junction	195	168	363	4,7%	4,7%	86,1%	1,6	7
Point 15. Gorska kultura Park	126	167	293	3,8%	3,8%	89,9%	3,27	4
Point 16. 54th Secondary School „Ivan Rilski“	227	39	266	3,5%	3,5%	93,4%	1,65	4
Point 17. 141st Primary School “Narodni buditelji”	275	233	508	6,6%	6,6%	100,0%	3,25	2
Total	3362	4323	7685	100,0 %	100,0 %			

Table 145. Behaviour mapping: Total number of stationary activities and non-motorized on working and non-working day mapped by watch area

	Stationary Activities				Non-motorized flows			
	Working day	Non-Working day	Total	Share	Working day	Non-Working day	Total	Share
	frequency	frequency	frequency	percentage	frequency	frequency	frequency	percentage
Point 1	55	276	331	4.3%	2388	9564	11952	9.7%
Point 2A	77	105	182	2.4%	486	1146	1632	1.3%
Point 2B	92	112	204	2.6%	3426	5046	8472	6.9%
Point 3	127	406	533	6.9%	3150	2328	5478	4.4%
Point 4	403	416	819	10.6%	4188	8448	12636	10.2%
Point 5A	102	201	303	3.9%	2676	2748	5424	4.4%
Point 5B	113	148	261	3.4%	3162	2730	5892	4.8%
Point 6	72	86	158	2.1%	2550	1956	4506	3.7%
Point 7	198	313	511	6.6%	3894	3366	7260	5.9%
Point 8	139	256	395	5.1%	5706	5556	11262	9.1%
Point 9	74	265	339	4.4%	1368	1806	3174	2.6%
Point 10	192	286	478	6.2%	3144	3936	7080	5.7%
Point 11	171	240	411	5.3%	6084	6270	12354	10.0%
Point 12	52	162	214	2.8%	1692	2766	4458	3.6%
Point 13	692	441	1133	14.7%	3384	3432	6816	5.5%
Point 14	195	168	363	4.7%	930	840	1770	1.4%
Point 15	126	167	293	3.8%	296	672	968	0.8%
Point 16	227	39	266	3.5%	8088	2436	10524	8.5%
Point 17	275	233	508	6.6%	750	930	1680	1.4%
<b>Total</b>	<b>3382</b>	<b>4320</b>	<b>7702</b>	<b>100.0%</b>	<b>57362</b>	<b>65976</b>	<b>123338</b>	<b>100.0%</b>

Many of the sites observed are moderately lively during the spring season (time of observation), and although they do not offer many amenities, the residents of the neighbourhood have adapted to them and make them liveable in many different ways. Some places offer limited conditions for staying and stationary activities. People’s

presence is registered in separate points around entrances of buildings, playgrounds and other furniture. There are significant discrepancies between the areas in which children,



women and men concentrate at some sites, while in others these gender groups are mixed. Several sites are underused and almost thoroughly abandoned, probably due to their location but also due to a shrinkage of functions and absence of daily occupiers.

Figure 460. Behaviour mapping. Heat maps of the general pattern of occupation by sex: children (in green), women (in red) and men (in blue)

The **movement count** recorded between 54 and 4788 people who walked through the observed directions in the working day with an average of 1,512 people moving. The three busiest sites are along 54th Secondary School 'Ivan Rilski' (P16), the post office at "Ekzarh Stefan" street (P11), and "Targovska" street with the Flowers Market (P8). Movements in separate directions, all of which in east-west direction with more than 2000 people counted, are around 102nd Primary School "Panayot Volov" (P4), 15th Secondary School "Adam Mickiewicz" (p7), and in Park Nadezhda (P13). The least busy areas are in the southern and northern periphery of the study area - Triagalnika neighbourhood and Nadezhda junction (P14), Park Gorska kultura (P15), the eastern entrance of Park Severen

(P1B) and some internal peripheries in the area of 141 "Narodni Buditeli" primary school (P17) and the garden around the church "Sveti Duh" (P9).

Between 126 and 5700 people passed through the observed direction in the non-working day, with an average of 1,744 people. The most busiest sites are at the entrances of Park Severen around the turnabout of Bus 86 (P1A), the area around 102<sup>nd</sup>, Primary School "Panayot Volov" (P4), at "Ekzarch Stefan" and "Republica" streets next to the post office (P11), the area around the Flower Market with "Targovska" street (P8) and the area around the connection to Iliyantsi Bazaar and the stop of 86 in "Svoboda" housing estate (P2B). The least busy directions with a displacement of their positions are again in Triagalnika neighborhood and Park Gorska kultura (P14)) and the area around 141st Primary School "Narodni buditeli" (P17) and the eastern entrance of Severen Park) in "Svoboda" housing estate (P1B).

The most livable places with highest concentration of **stationary activities** are around 102nd Primary School "Panayot Volov" (P4) and the Flowers market (P8). They attract more than 15 people/ha with stationary posture registered as a mean number for all of the 24 moments of observation. These two places are followed by the Entrance to Park Severen at the turnabout of bus 86(P2A), Park Nadezha (P13), the Center for arts, culture and education (P6) and the junction at "Nikola Zhekov" Blvd with "Hristo Stilyanov" and "Narodni buditeli" streets (P5A), Block 65in "Lev Tolstoy" housing estate at the pedestrian bridge across Suhodolska river (P12) and "Sveti Duh" church with the garden (P9). All of these places attract an average between 10 and 15 people/ha. The least occupied, with less than 5 people staying, are the areas around 54<sup>th</sup> Secondary school "Ivan Rilski" (P16), the Entrance to Park Severen 2 from "Narodni buditeli" Street (P2A), Gorska kultura Park (P15) and the area around 141 Primary School "Narodni buditeli"(P17).

Table 146. Behaviour mapping: Total number stationary activities observed by gender of the registered people and watch area

Stationary activities								
	Women	Men	Children	Non-defined	Women	Men	Children	Non-defined
	Frequency				Percentage			
Point 1	122	113	11	85	37%	34%	3%	26%
Point 2A	39	50	7	86	21%	27%	4%	47%
Point 2B	32	126	9	37	16%	62%	4%	18%
Point 3	166	307	59	1	31%	58%	11%	0%
Point 4	317	281	128	93	39%	34%	16%	11%
Point 5A	154	136	9	4	51%	45%	3%	1%
Point 5B	102	133	15	11	39%	51%	6%	4%
Point 6	58	60	31	9	37%	38%	20%	6%
Point 7	133	177	148	53	26%	35%	29%	10%
Point 8	134	176	61	24	34%	45%	15%	6%
Point 9	155	113	62	9	46%	33%	18%	3%
Point 10	249	194	20	15	52%	41%	4%	3%
Point 11	178	212	10	11	43%	52%	2%	3%
Point 12	82	88	11	33	38%	41%	5%	15%



Point 13	429	263	341	100	38%	23%	30%	9%
Point 14	174	147	24	18	48%	40%	7%	5%
Point 15	119	123	49	2	41%	42%	17%	1%
Point 16	98	71	77	20	37%	27%	29%	8%
Point 17	234	226	34	14	46%	44%	7%	3%

The places where the most **children** are passing-by are Park Nadezhda (P13), 153rd Sports school “Neofit Rilski” (P3) and 54<sup>th</sup> Secondary school “Ivan Rilski” (P16). On the contrary, the places where the least number of children are passing-by are Triagalnika neighborhood at Nadezhda junction (P14), the Flowers’ market (P8) and the connection to Iliyantsi bazaar (P2B). The places where children and youngsters as primary group are staying is again the 54<sup>th</sup> Secondary School “Ivan Rilski” (p16), Block 65 in “Lev Tolstoy” with the bridge (P12), and 15th Primary School “Adam Mickiewicz” (P7). The places where the share of children among the people staying is smaller, are the Entrance to Park Severen 2 from “Narodni buditeli” street (P2A), Triagalnika neighborhood at Nadezhda junction (P14) and 141st Primary School “Narodni buditeli”(P17). Two different (almost opposite) approaches of public policy (funding) are illustrated with two of the observed schools: stimulating and supporting schools as centers of community (54th Secondary School „Ivan Rilski“ (P16)) and withdrawal of funding for maintenance (141st Primary School “Narodni buditeli” (P17)). The primary school, with very few children and restrictive practice of the non-rehabilitated schoolyard, co-exists within a relatively small city area with the rehabilitated one with the help of EU funding and the support of the Integrated plan for urban regeneration and development. Last but not least important reason for the results registered in terms of people’s presence in P16 and P17 is the overlapping of the mapping period with the summer vacation.

There is no overlapping between the places where **women** are passing-by and where they are staying. Their prevailing routines include passing through “Republika” and “Ekzarh Stefan” streets along the front façades of the Post office (P11), through the area of “Sveti duh” church and the garden (P9), and “Nikola Zhekov” Blvd at the junction with „Hristo Stilyanov“ and „Narodni buditeli“ streets (P5A). The smallest share of woman passing-by is observed in Park Nadezhda (P13), Triagalnika neighborhood at Nadezhda junction and Gorska kultura Park (P14). The places attracting the highest share of stationary activities among women are Triagalnika neighborhood at Nadezhda junction (P24), The local cultural centre “Saznanie” (P10) and the Center for arts culture and education (P6). The sites where women are the least represented among the persons staying are the connection to Iliyantsi bazaar (P2B) and the entrance to Severen Park 2 from “Narodni buditeli” street (P2A), as well as the area around Block 65 in “Lev Tolstoy” with the bridge above “Suhodolska” river (P12).

**Men’s** places are slightly overlapping in terms of the shares of least moving and staying among all. Along with Park Nadezhda (P13), the other two places where men are the smallest group of passers-by are the Center for arts culture and education (P6) and 54th Secondary School „Ivan Rilski“(P16). The directions where highest proportion of moving

men were observed are the Triagalnika neighborhood at Nadezhda junction and Gorska kultura Park (P14) and the area around the Post office at “Republika” and “Ekzarh Stefan” streets (P11). Men as a predominant group among the staying are observed in the schoolyard of 54th Secondary School „Ivan Rilski“(P16), the connection towards Iliyantsi bazaar (P2B), and 153rd Sports school „Neofit Rilski“(P3) Along with Nadezhda Park (P13), the numbers of men performing stationary activities are registered at the entrance to Severen Park 2 from “Narodni buditeli” street (P2A) and around “Saznanie” cultural center (P10).

The mapping of the **play** in May allowed a closer observation of school-specific practices during the school year. In Nadezhda district, all pupils are taught in the morning shift throughout the whole school year (organized in two terms). This brings together pupils of different ages and grades all together at one and the same time at school. In the afternoon, only the primary school pupils stay at school and prepare their homework. During the **working day**, the courtyards of the schools, except for 153rd Sports school “Neofit Rilski” (P3), were used during the breaks (5-10 minutes) and especially during the long-long break (15-25 minutes depending on the school schedule). As this was the time for breaks from educational activities, the children from the lower classes (7-11 years old) organized themselves in different games – “hide and seek”, football, basketball, etc. The students (12-18 years old) migrated to points of interest outside the schools' yards for eating, sitting informally in well-equipped inter-block places. In the afternoon of May 16, the school yards were empty because of the rain (despite the high temperatures). This confirms the hypothesis generated by previous observations about the habits of the Bulgarian people to limit activities or even avoid being involved in any outdoor activities under bad or unfavorable weather conditions (occurrence of rain, higher humidity, fog, snow, wind).

It was found that in the morning no one was **playing** in the observed sites on a **non-working day**. During the rest of the day, although the poor condition of the pavements and sports facilities, P4 (120th Primary School “Panayot Volov”), the most active and continuous use was observed. One of the most significant reasons for that is the free access to the schoolyard, unlike the case with P7 (15th Secondary School “Adam Mickiewicz”) and P16 (54th Secondary School “Ivan Rilski”) where the restricted access prevents yards and their facilities from being used. Despite this fact, in the evening there were people who had overcome the barriers and played or accompanied the players in the schoolyard of the 15th Secondary School “Adam Mickiewicz” (P7). No one occupied the schoolyard of the 54th Secondary School ‘Ivan Rilski’ (P16). Although the playgrounds in the schoolyard of the 153rd Sports school “Neofit Rilski” were accessible, the rate of the activities mapped there was also relatively low.

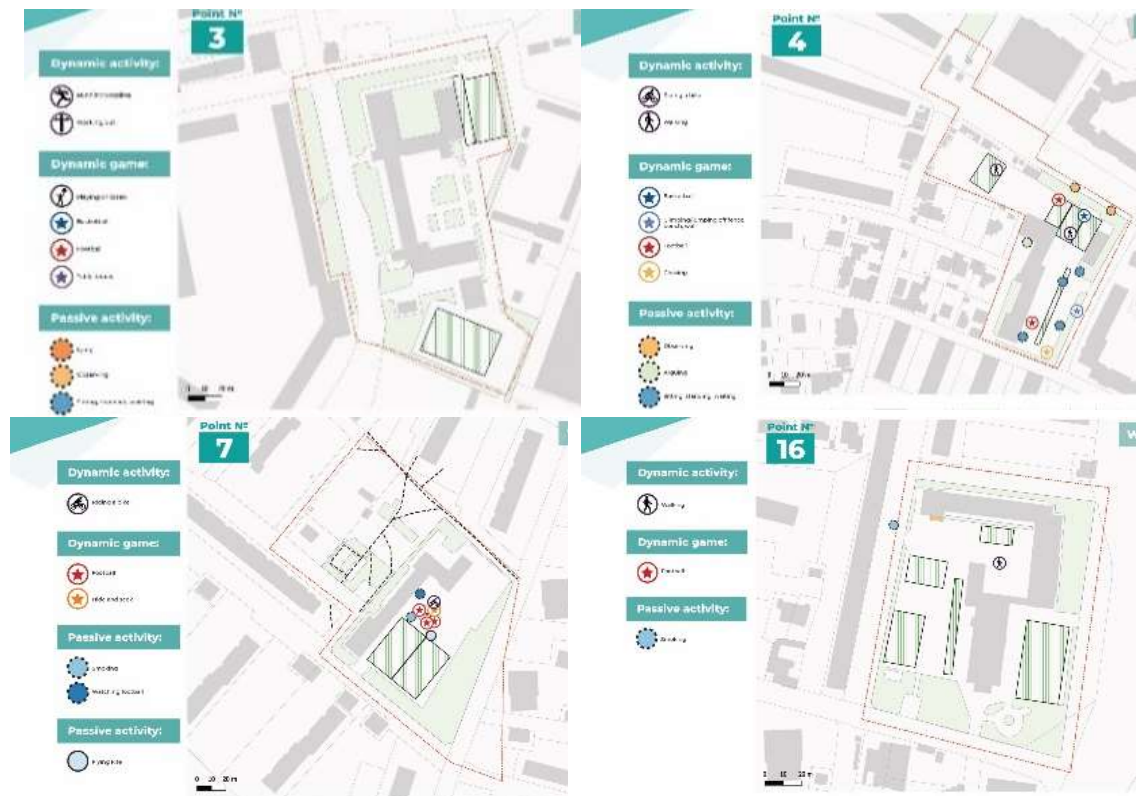


Figure 461. Behavioural mapping. Mapping Play on working day at Points 2, 4, 7, 16.

**Playing** games in the early hours on the **working day** was not observed in the schoolyards. Unsurprisingly, as the schoolyards are directly exposed to the sun throughout the day, most of the outdoor activities were registered in the time span before noon. Playing was represented by cycling and/or playing football by toddlers and children accompanied by their parents. The cool hours in the evening and the shaded yard attracted families with children. The kids were playing a ball and cycling while the parents were talking and drinking beer. In the afternoon, the only teenagers that were having fun, were throwing water bombs.

The children that attended the childcare service provided by the school did not play outside. They were playing indoor games in the gym, where according to the sports teacher, the climate was better. According to him, the conditions (rough asphalt pavements) in the yard are too risky for children, and therefore, even in more favorable weather conditions, he prefers that they play indoors. The place for informal games is in the western part of the yard, where a few trees make some shadow. Running, chasing and playing “hide and seek” was supervised by a passive teacher.

Sports dancing courses were organized for children and teenagers at the school gym in the evenings of the working days. Mothers usually waited for the end of a rehearsal close by. The hall of the gym was rented by outside company in order to provide and organize dance classes.

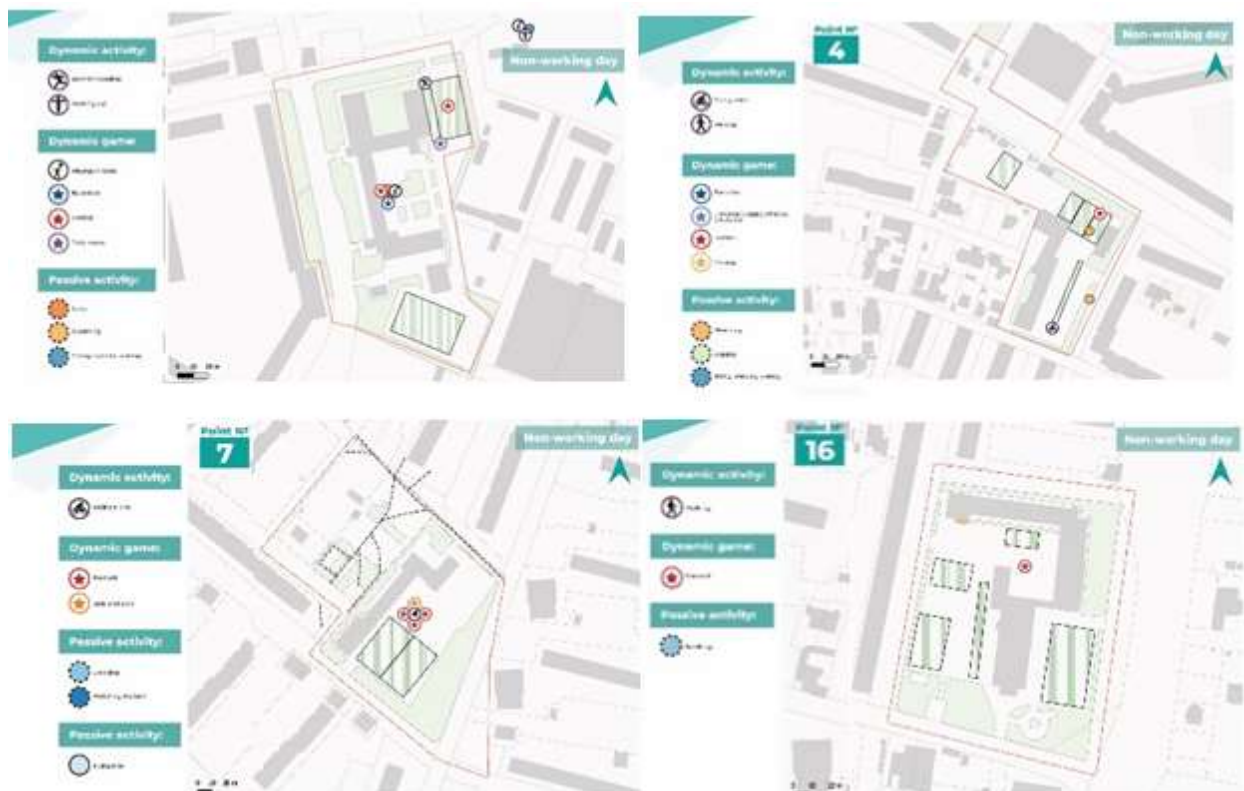


Figure 462. Behavioural mapping. Mapping Play on working day at Points 13, 15, 17

Comparing the game in the two parks observe, it could be concluded that Nadezhda Park attracts significant cluster of people and various activities during the working and the non-working days. The typical games performed on the working day were football, volleyball, badminton, table tennis, hide and seek. These games also included groups of children and pupils who were part of organized activities. Children, accompanying their relatives also played in the park. At the same time, walking, biking, running, bodybuilding training and dancing could be observed. Teens were a small proportion of all players and were represented by cyclists, dancing and playing cards. The adults were playing with their children, and at the same time they were also walking, riding bicycles and reading books.

No organized games were observed in the Park Gorska kultura during the working day. Few visitors to the park were running, riding a bicycle and playing at the children's facilities.

There were many dogs walking with their owners in Nadezhda Park and visiting the specialized garden for pets there. A cyclical pattern of visiting the park was observed – the highest share of people walking and playing with pets was registered in the morning and



in the evening. Similar patterns, but on a smaller scale (there is not a dog playground there), were registered in the Park Gorska kultura.

In terms of age and gender, the observed **playing actors** were predominately children. It was observed that adults mainly play as partners and/or trainers of children. Their most frequent role of parents at the sites of dynamic activities as playing, was this of the “sitting observer”. Most of the playing children at the age of 14 and older, were male. Girls over the age of 14 and women were almost completely absent in the groups of players. The only exceptions were the mothers who assist their children.

Figure 463. Behavioural mapping. Mapping Play on non-working day at Points 2, 4, 7, 16.

Parallel to the observation of the playing and games in the selected locations, sport activities were also mapped for the sites with playgrounds. The most frequently observed non-formally organized **sports** in the school yards are football, basketball and other ball games. Few of the observed were running and playing badminton. Games in the schoolyards usually used the specialized facilities - basketball courts, football doors and tennis tables. For toddlers and young children, parents usually provide the necessary movable and easy to carry facilities for playing: balls, bicycles, kites. Football and basketball, organized as different trainings or events, were practiced mainly by male children, youths and adults. There were usually observant peers and adults. At the time of the observation, on a no-working day (May 18<sup>th</sup>), a children's soccer tournament was held on the newly constructed playground in the Svoboda neighborhood. The event lasted about 8 hours and was attended by parents and relatives of the players. During the other URBiNAT observation days, the playground remained closed.



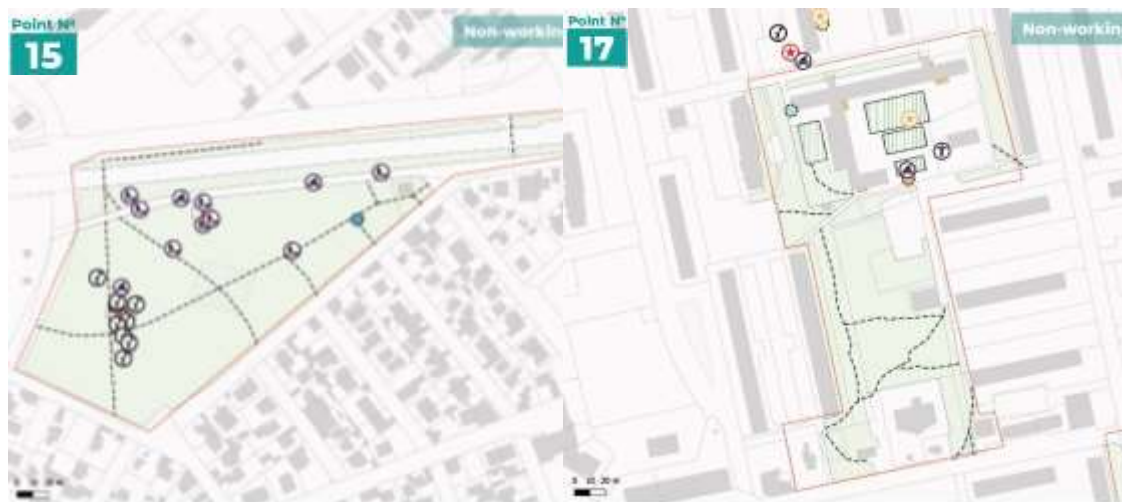


Figure 464. Behavioural mapping. Mapping Play on non-working day at Points 13, 15, 17.

The types of dynamic activities and the number of people involved on sites P13, P15 and P17 were almost insignificant during the nonworking day. The big difference was observed in Nadezhda Park, where the dynamic activities (especially playing games) were very fragmented and did not include large groups of players. Another feature was observed: passive activities were more than active ones. Activities as running, biking and walking and playing with pets were observed, while playing ball games or other intensive games were absent. On non-working days, sitting and lying down and at the same time drinking beer or eating ice cream, were common ways of spending leisure time. The games in the Park Gorska kultura were concentrated around the children's playgrounds and the most of the players were children.

In the schoolyard of 141 Primary School “Narodni buditeli”, the game was observed on (Saturday) mornings and evenings, when the weather was relatively cool. Except playing football and cycling, many of the visitors of the park were actively using the outdoor fitness facilities. The observation revealed that the yard served as a direct link to North Park. Parents with children and playing kids on the road to the park were mapped.

Another factor for the low concentration of playing citizens in the schoolyard is the established and widespread practice of setting spots for gathering, sitting and communicating in front of each entrance of the multi-family buildings. Because large

common spaces are formed and landscaped in between the blocks, these spots are well aired and shadowed. Parents, grandparents and other inhabitants were gathered at these spots while children were playing nearby.

### Synthesis per area for moving count and stationary activities

#### Point 1. Entrance to Severen Park 1 at the turnout of bus 86, bus stop number 0686

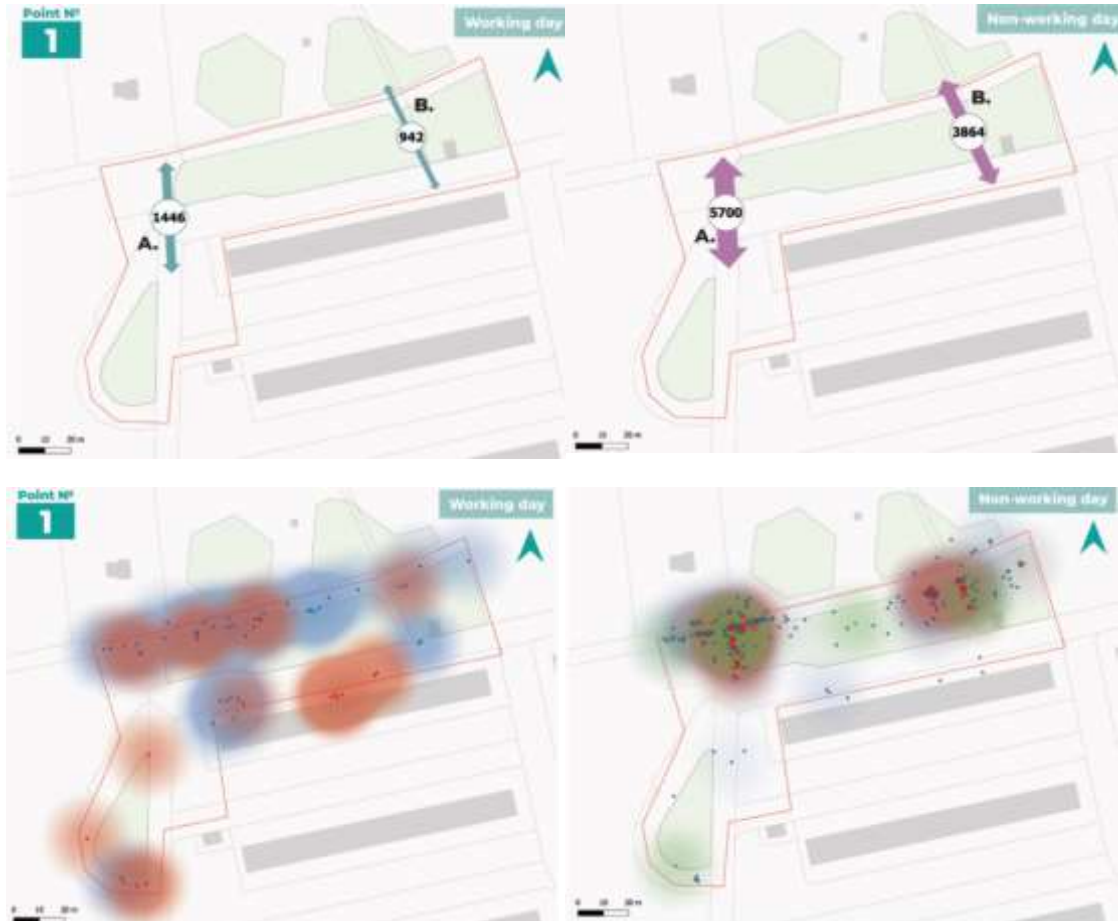


Figure 465. Behavioural mapping. Point 1. Entrance to Severen Park 1. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).

The people moving through the two entrances in this middle part of Severen Park are four times more on weekends than on the workdays. This can be attributed to the peripheral location of the park and its major function to serve as recreational site for the district. P1A is almost twice more used compared to the couple of entrances at the eastern part of Park Severen. This partially may be explained with its proximity to the last stop of bus 86 and the major axe connecting Nadezhda 4 and Svoboda thus reaching this entrance through the shortest but not the most convenient and pedestrian friendly way. The stationary activities at this site are logically more intensive during the weekend when they concentrate at the cross points between the two entrances with one of the major alleys of the park in the east-west direction. Scattered, yet still prevailing are men on working days, while on non-working day a more balanced situation between men, women and children is observed.

#### Point 2A. Entrance to Severen Park 2 from “Narodni buditeli” Street

The people moving through the two entrances in this eastern edge of Severen Park are almost two times more during the weekends than on a weekday. This observation is relevant for the peripheral location of the park and the two entrances. The western part of this observation area is three times more used, whereas the eastern one is being used less than 1.5 during the weekend and even more during the weekday. This can be explained with the proximity of the first entrance to the center of the large block of flats which on its own can provide rather big number of visitors to the park.

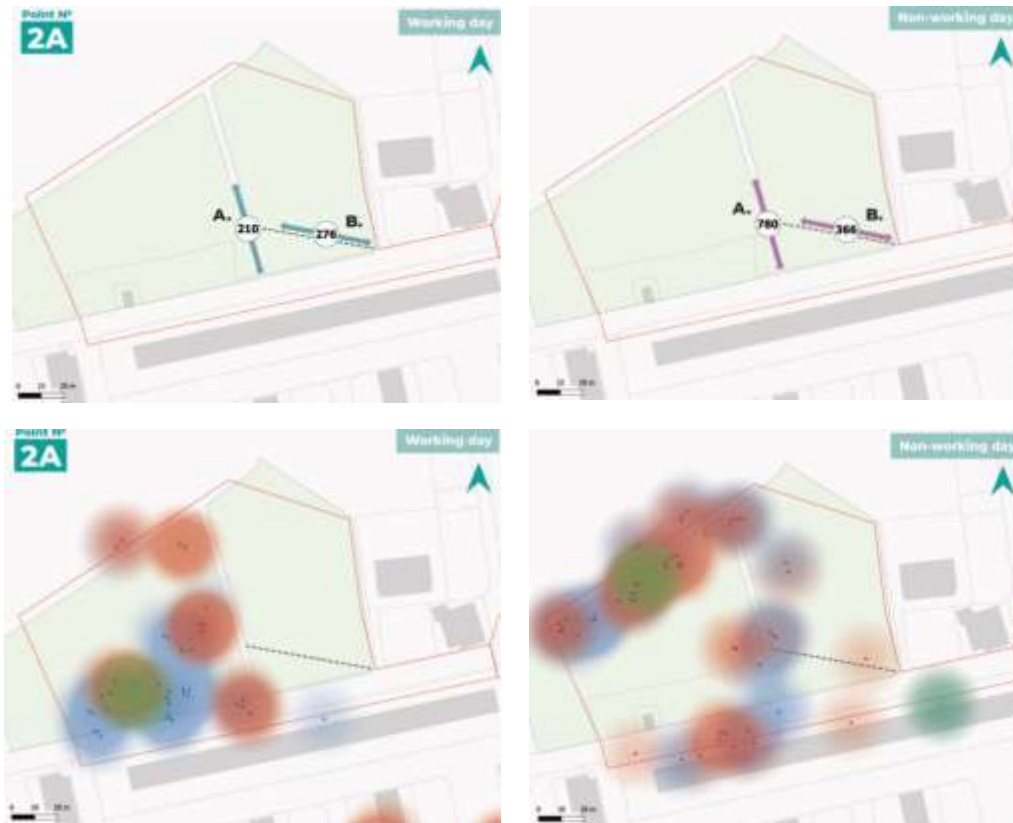


Figure 466. Behavioural mapping. Point 2A. Entrance to Severen Park 2. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

The stationary activities take place at the western part of the observed area with slight differences in their distribution between working and non-working days along the major alley of the park. Around 1.5 times more activates are registered during the weekend. The shift from domination of men on a working day to the balance between men, women and children during the weekend is observed again.

#### Point 2B. Iliyantsi bazaar connection around bus stop number 0485 of bus line 86

The picture of the mobility pattern at this site shows rising of the intensity on non-working day. There is also a shift from the more intensive direction during the weekdays towards the bazaar slightly to the direction from the core of Svoboda neighborhood towards the park where more passers-by during the weekend were observed.

The stationary activities in both days are concentrated around the stop of bus 86 and the adjacent commercial facilities and again there is at least 1,5 times higher amount of such activities in the weekend. Part of their distribution is related to intensification around the blocks of flats as part of the dwellers spend their free time around.

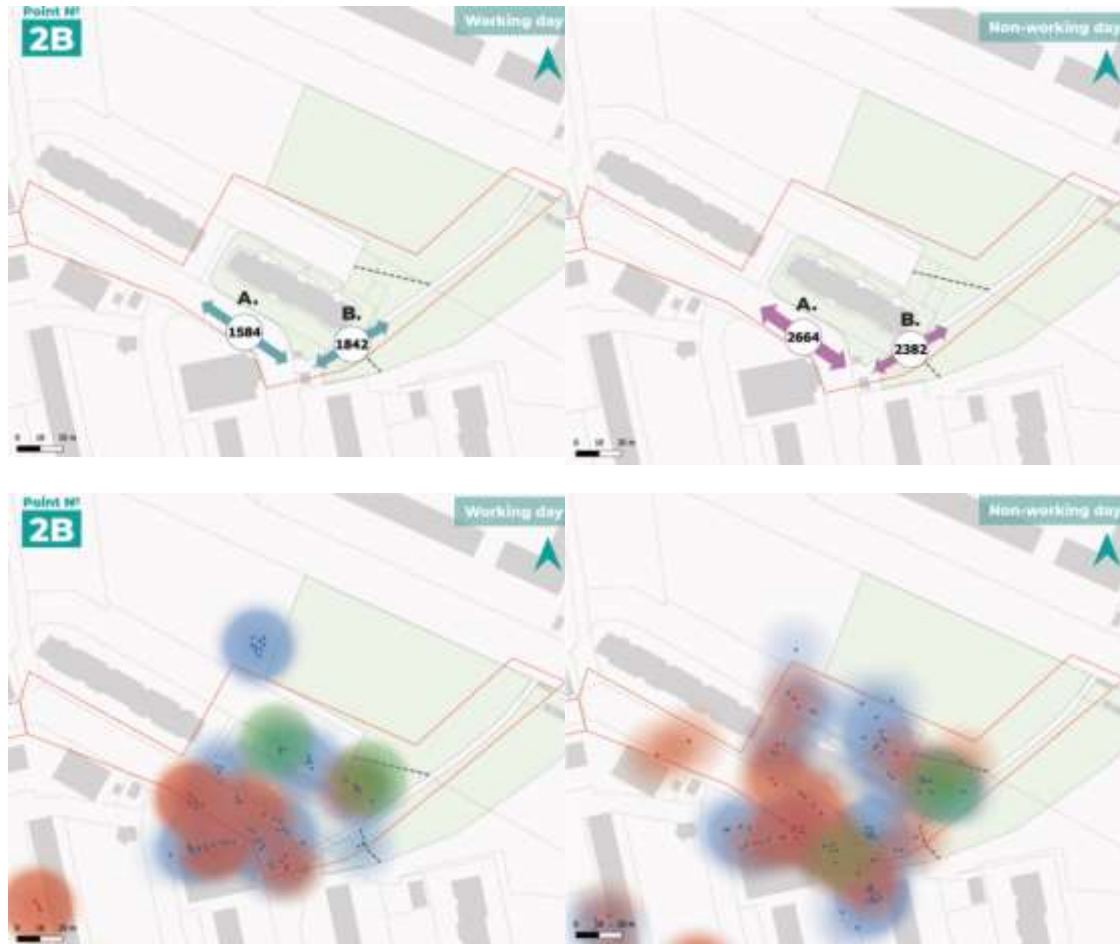


Figure 467. Behavioural mapping. Point 2B. Iliyantsi bazaar connection. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

### Point 3. 153rd Sports school „Neofit Rilski“

The size of the flows of people entering the school almost equals on working and nonworking days. This can be explained with the position of the dormitory in the school yard and the attractiveness of the playgrounds inside during the weekend. Due to the more intensive movements of the occupiers during the working days, the weekday flow along “Narodni buditeli” Street is two times bigger than this on a weekend day. The stationary activities represented on working and non-working day are predominantly linked with the bus stop of line 86. During the non-working day, activity in the school yard is rising due to the youngsters’ gathering at the playgrounds and at other locations at the back of the school. Some illegal activities, attractive for teenagers and young adults were observed there.



The specific organization of the learning process at 153rd Sports school “Neofit Rilski” provides for development of skills in one or more sports. Established as training school of young athletes associated with the sports club Lokomotiv Sofia and after a long period of transformations, at the moment an agreement signed by Sofia Municipality, the school and the Lokomotiv Sofia Sports Club formalizes the use of the club facilities thus compensating the lack of proper facilities in the school property. This, along with the peculiarities of the training schedules for each sport, is probably among the main reasons for the lack of play on the observed site during the working day.

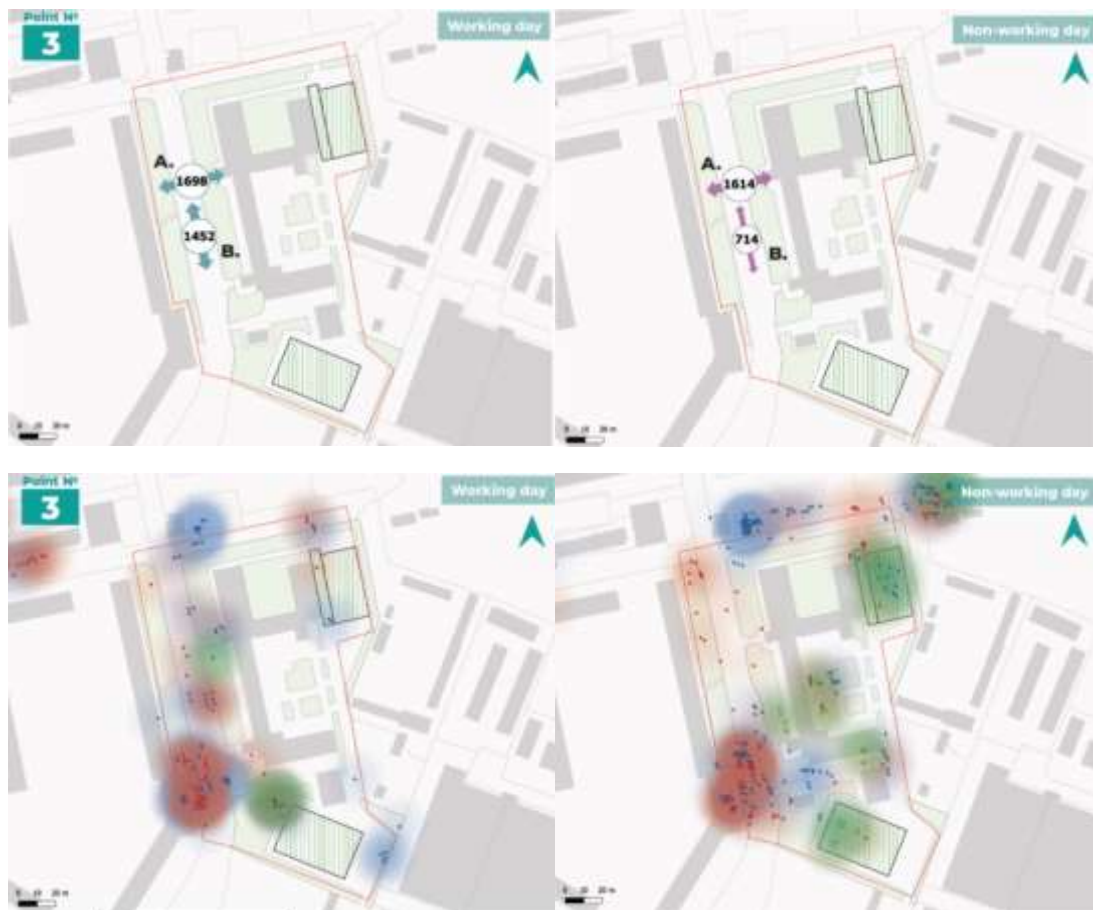


Figure 468. Behavioural mapping. Point 3. 153<sup>rd</sup> sports school “Neofit Rilski”. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

#### Point 4. 102nd Primary school „Panayot Volov“

A big difference between the number of passing-by in a working and a non-working day was registered for the both directions observed. The rising numbers on a weekend prove the significance of Park Severen and the local commercial facilities along “Targovska” street. The size of the flow along „Nikola Zhekov“ Blvd is at least 1.5 times bigger in a non-working day, while the number of the passing-by along “Petko Petkov” street is almost 3 times bigger in a non-working day. The latter is the most significant quantitative difference between the working and the nonworking day’s pattern of movement among all directions observed within the URBiNAT study area. (fig.6)

The sedentary uses show both intensification and extensification when comparing the working and the non-working day. Activities are evenly distributed at the front of all



commercial facilities along “Targovska” street. The concentration at the bus and tram stops at both sides of “Nikola Zhekov” blvd. during the working day becomes more dispersed on the non-working day. The intensity of activities during working and non-working days at the schoolyard is preserved, while the different pattern around the spaces, corners, edges and some available facilities is being transformed and reconfigured. (fig. 6)

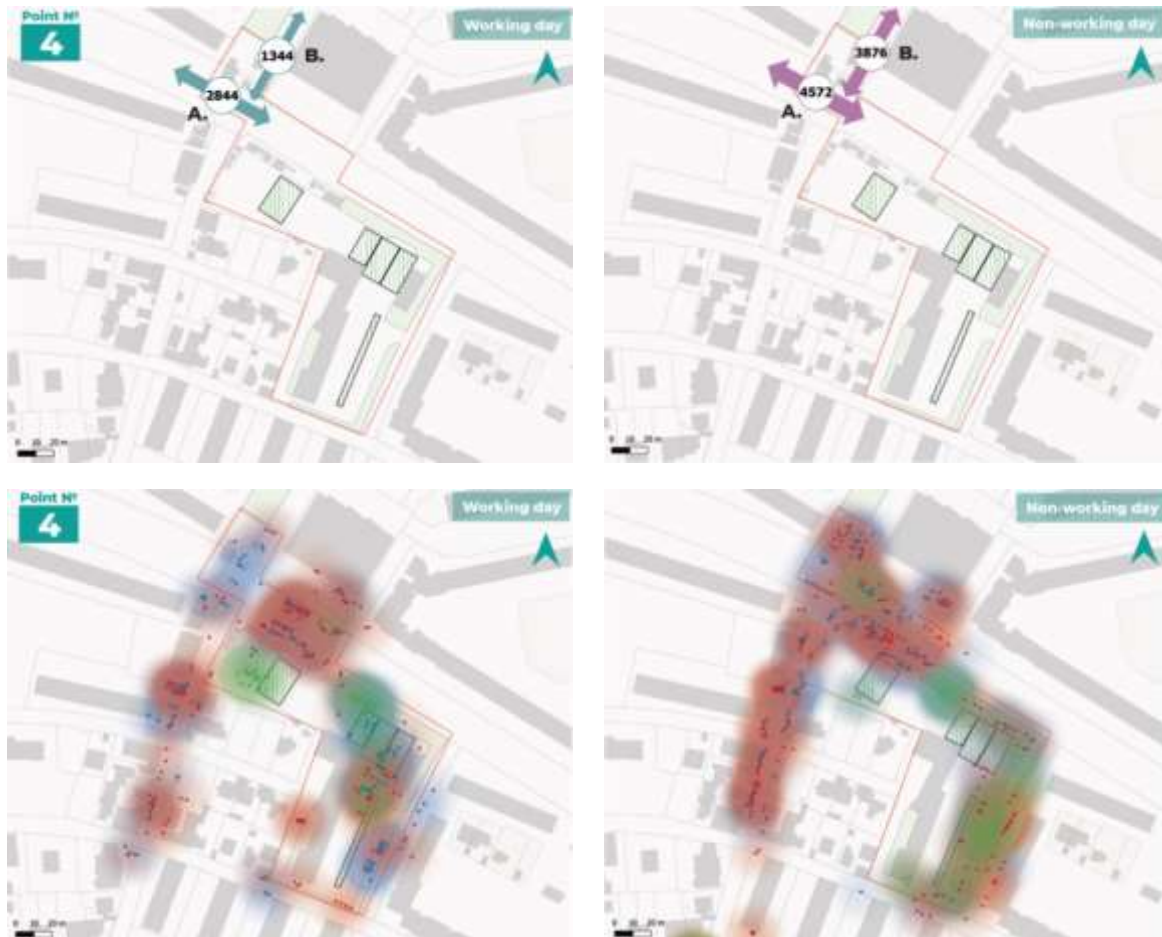


Figure 469. Behavioural mapping. Point 4. 102nd Primary school „Panayot Volov“. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

**Point 5A. „Nikola Zhekov“ Blvd at the junction with „Hristo Stilyanov“ and „Narodni buditeli“ Streets**

The registered number of passers-by is almost equal during the working and the non-working with an outlined strong shift from direction A to direction B. Direction A is along the main boulevard with a public transport stop as a focal point, while direction B connects the inter-block spaces in the eastern part of “Svoboda” housing estate along “Narodni buditeli” street. Yet not recorded during the observation as it goes beyond the two directions preliminary defined, but worth considering for the co-design of safe and convenient crossing, is the comparatively high share of nonregulated crossings of “Nikola Zhekov” blvd. (fig.7)

The stationary activities in this area are clustered entirely around the public transport stops. Big number of people waiting at the stops and more people spending their free time around the blocks of flats were registered in the non-working day.



Figure 470. Behavioural mapping. Point 5A. „Nikola Zhekov“ Blvd., „Hristo Stilyanov“ and „Narodni buditeli“ Streets. Moving count summed up for 12 hours on working and non-working day.(top) Stationary activities accumulation for 12 momentum pictures on working and non-working day. (down)

#### Point 5B. „Nikola Zhekov“ Blvd at the junction with “Republika” Street

An explicit shift from more intensive movement during the working day towards the calmer pattern of movement during the non-working with few people passing-by is observed at Point5B. This is one of the sites providing evidence that the movement within the whole study area is more internalized at the weekend when less movement and activities are recorded along “Rozhen” blvd – the eastern edge of the observed site and border of the URBiNAT study area.

A significant number of people spend their free time out, especially at the neighborhood café at the end of “Republika” street during the non-working day, whereas more people cluster around the shop during the working day. The open space to the south-east of the café is relatively empty regardless of the day of the week, while the bus stop at “Nikola Zhekov” Blvd. is less attractive on non-working days.

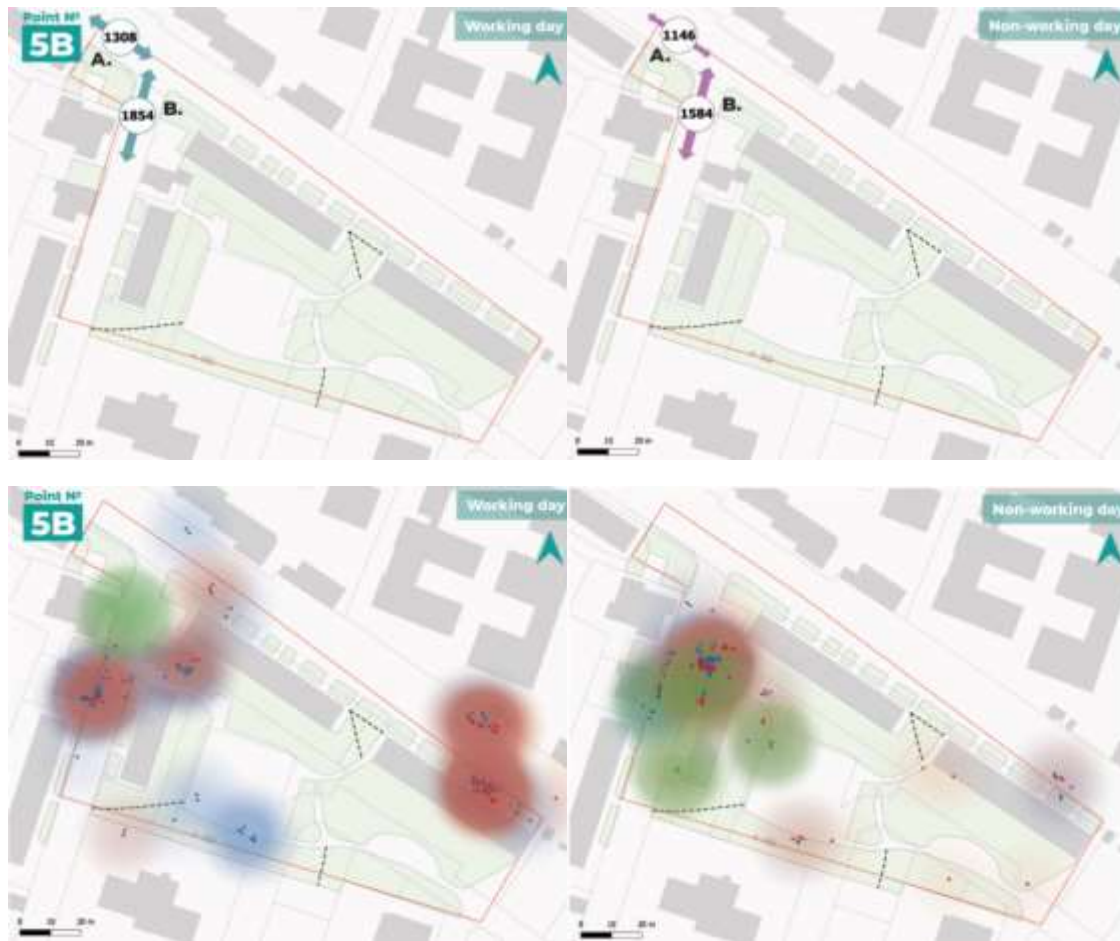


Figure 471. Behavioural mapping. Point 5B. „Nikola Zhekov“ Blvd. and „Republika“ Street. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

#### Point 6. Center for arts culture and education “Sofia” – branch “Nadezhda”

The moving count indicates slightly increased number of people (660) entering the Center on the non-working day compared to one-third less migrants along “Traen mir” street. Along with the higher number of visitors of the center on the non-working day, more people are staying there on the non-working day compared to those staying on working day. Naturally, their concentration is in the courtyard of the Center where the landscaping and the furniture are of high quality and well maintained. The mapping of children shows different preferences for one playground (equipped with slides) or another (equipped with swings) during the working and the non-working days. This may be due to the wet slides that lead to increased occupation around the swings at the time of observation during the working day. The observation during the dry non-working day registered higher turnover and bigger groups of children.

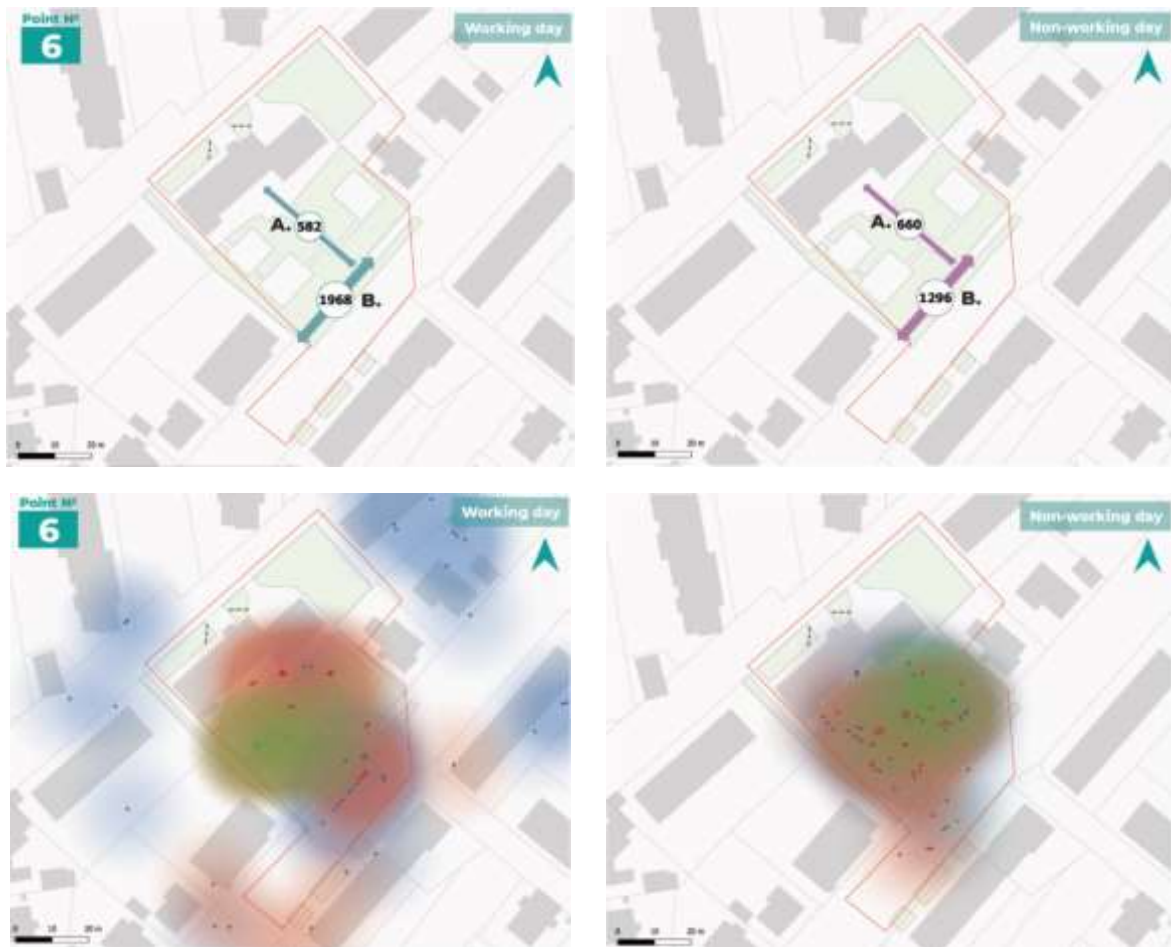


Figure 472. Behavioural mapping. Point 6. Center for arts culture and education. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

### Point 7. 15<sup>th</sup> Primary School “Adam Mickiewicz”

The major direction for the passers-by is along the pavement of “Yordan Hadzhikonstantinov – Dzhinot” street and the entrance of the school. Less number of migrating people in the both directions observed was registered on the non-working day.

The western part of the observed P7 (around the playground and the do-it-yourself elements and furniture added by the residents) is more saturated with users on non-working day. Children's spaces are represented by two main areas - in the schoolyard and in the immediate vicinity of the playground, extending to the north behind the school border. On the working day, there are peculiar spots preferred only by women and only by men, while during the non-working day the children are the main users clustered in the different spots.



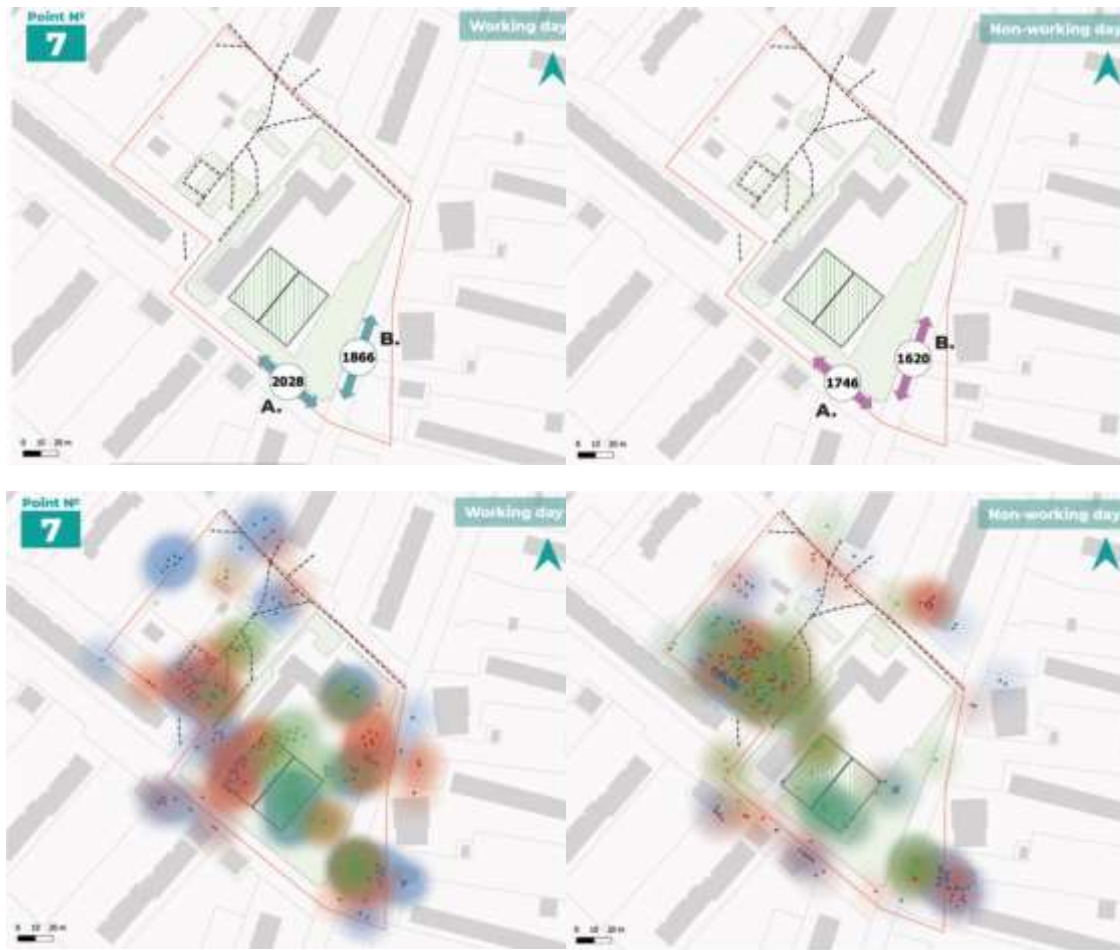


Figure 473. Behavioural mapping. Point 7. 15th Primary School “Adam Mickiewicz”. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

### Point 8. Flowers market

The migration pattern shows stable numbers of passers-by in both directions. Nevertheless its poor physical condition and partial occupation of temporary commercial structures, it seems that “Targovska” street serves as a major significant connector between the three neighborhoods – Nadezhda 2, Nadezhda 4 and Svoboda.

The place under the canopy of the building of the Flowers market, which currently is not accommodating the market as planned, attracts many children playing under the coverage of the market.



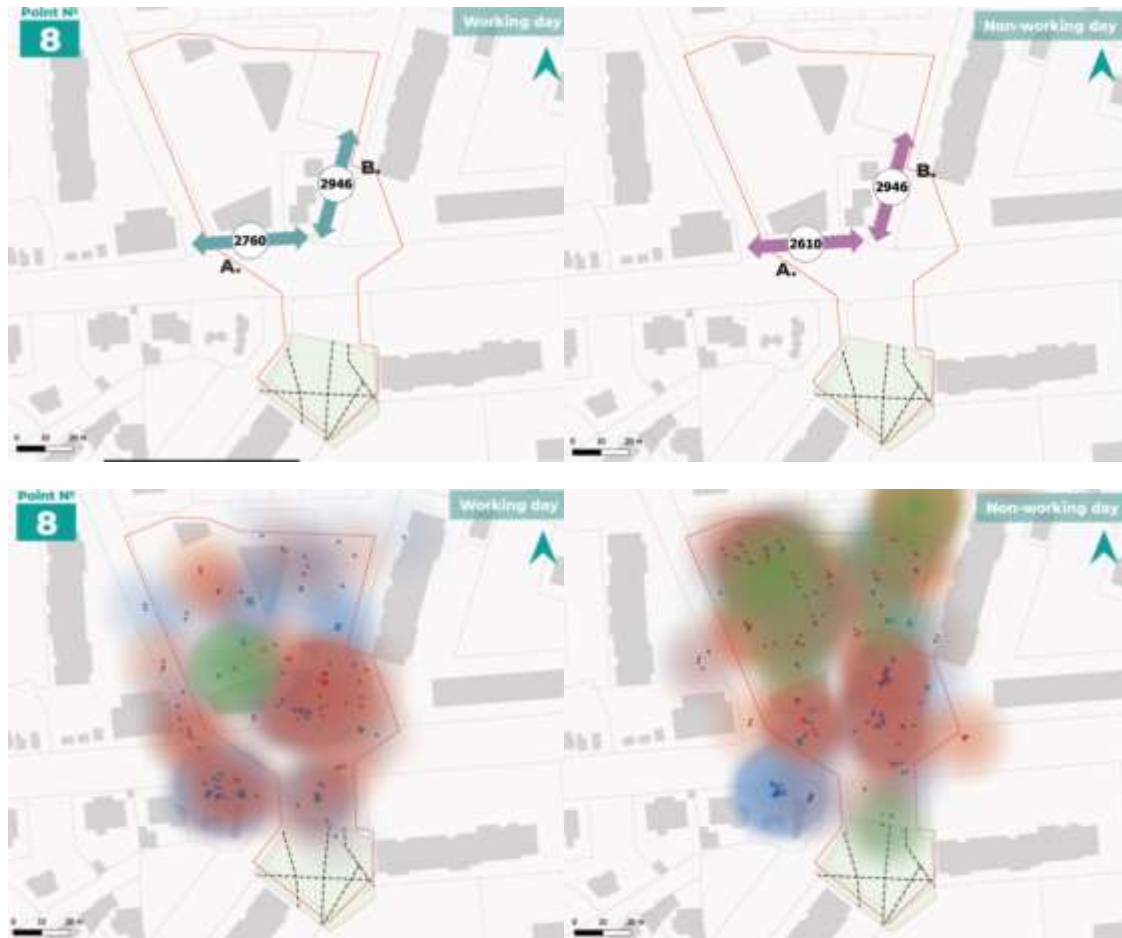


Figure 474. Behavioural mapping. Point 8. Flowers market. Moving count summed up for 12 hours on working and non-working day (up). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

### Point 9 “Sveti Duh” church and the garden

The number of people migrating through this area increases almost 1.5 times during the non-working day. Although the central location of the site (at the heart of Nadezhda 2 housing estate), a relatively small (absolute) number of passing-by were observed. This is to some extent due to the poor conditions for connectivity around.

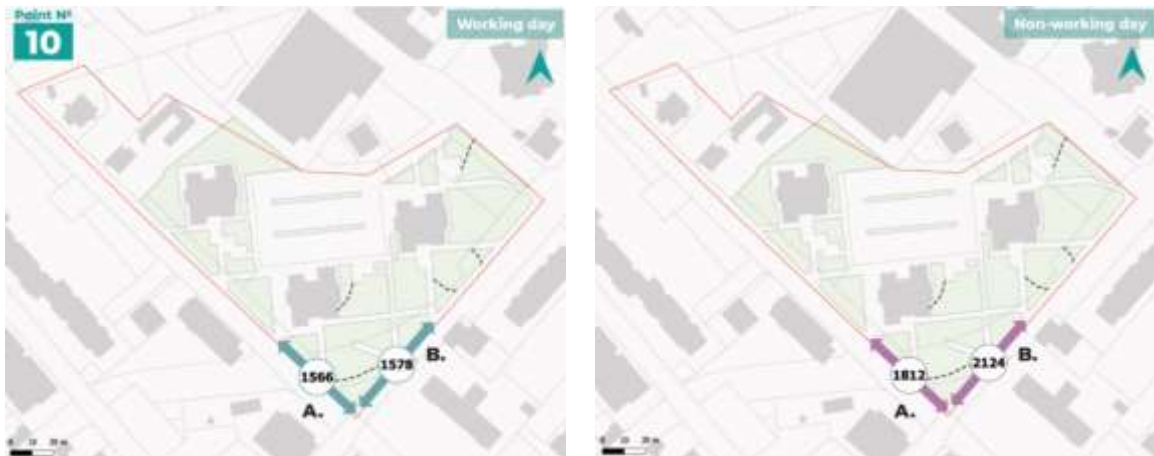
The number of occupants staying at this green pocket during the non-working day increases almost 4 times, thus being the site with the highest amplitudes in terms of concentration of people among all points of observation.



Figure 475. Behavioural mapping. Point 9. "Sveti Duh" church and the garden. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

#### Point 10. NCh "Saznanie" cultural center

A slight difference between the number of migrating people during working and non-working day proves again, that during the non-working days there is much more diverse and intensive community life than during the working day. A higher number of passing-by people along the "Dravski boy" street was registered by the movement count on non-working day.



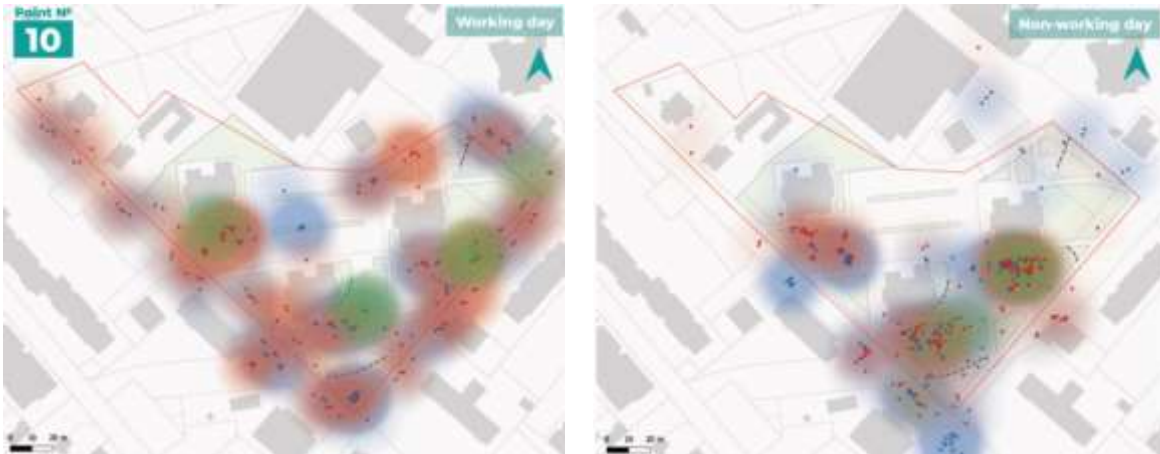


Figure 476. Behavioural mapping. Point 10 NCh "Saznanie". Moving count summed up for 12 hours on working and non-working day (top). Momentum pictures on working and non-working day (down)

### Point 11. Post office (20-1220) at "Republika" and "Ekzarh Stefan" Streets

It seems that this small area has transit oriented character and is one of the busiest from all of the sites observed. Regarding the number of the passing-by people, "Ekzarh Stefan" street is one of the top directions.

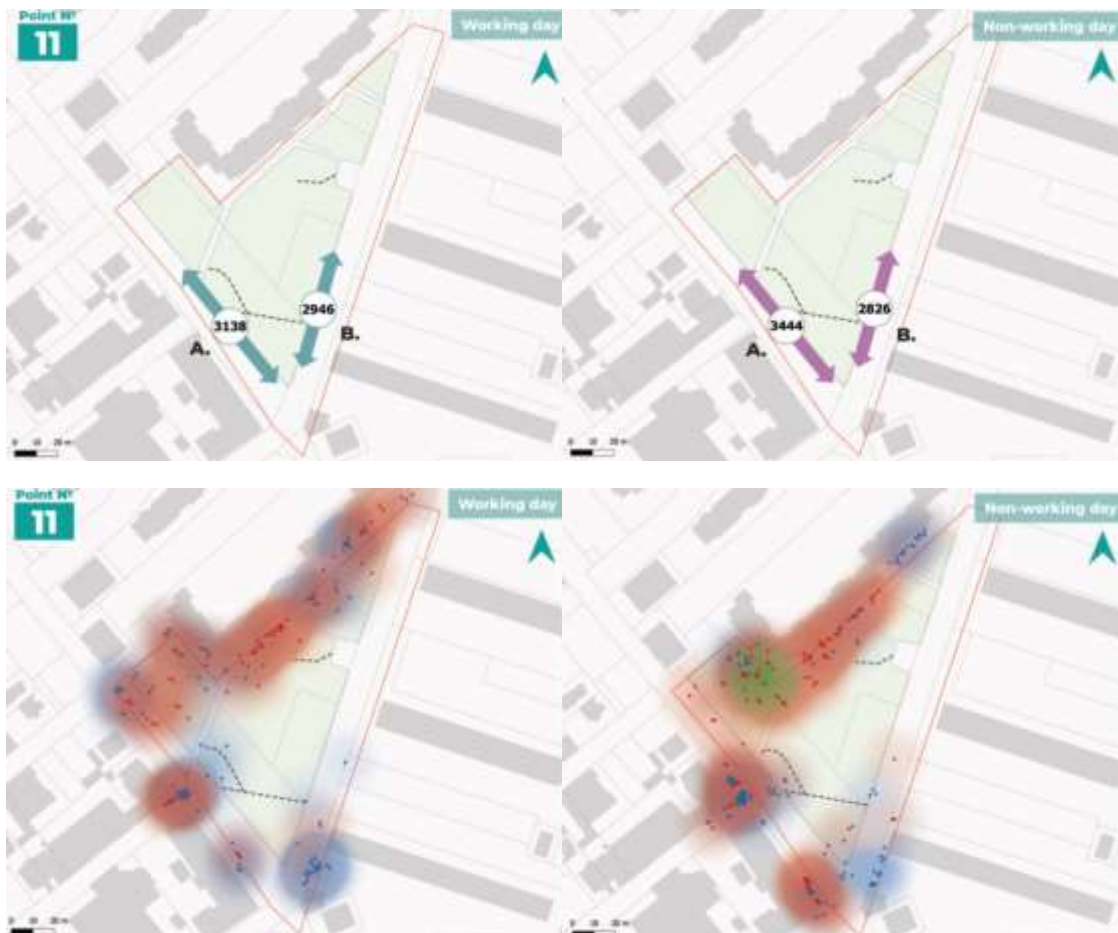


Figure 477. Behavioural mapping. Post office at "Republika" and "Ekzarh Stefan" streets. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

**Point 12. Block 65 in “Lev Tolstoy” housing estate and the pedestrian bridge across Suhodolska river**

Due to the fact that this is the only decent connection between Lev Tolstoy housing estate and Nadezhda Park, a significant increase of the number of passers-by along “Budintsi” street through the bridge above Suhodolska River is observed during non-working days. The other direction observed is preferred by relatively constant number of people both on working and on non-working day.

The three fold bigger number of stationary points of all groups at the non-working day, and especially young men around the fitness facility at the north-eastern part of the area can be explained again with the proximity to the park.

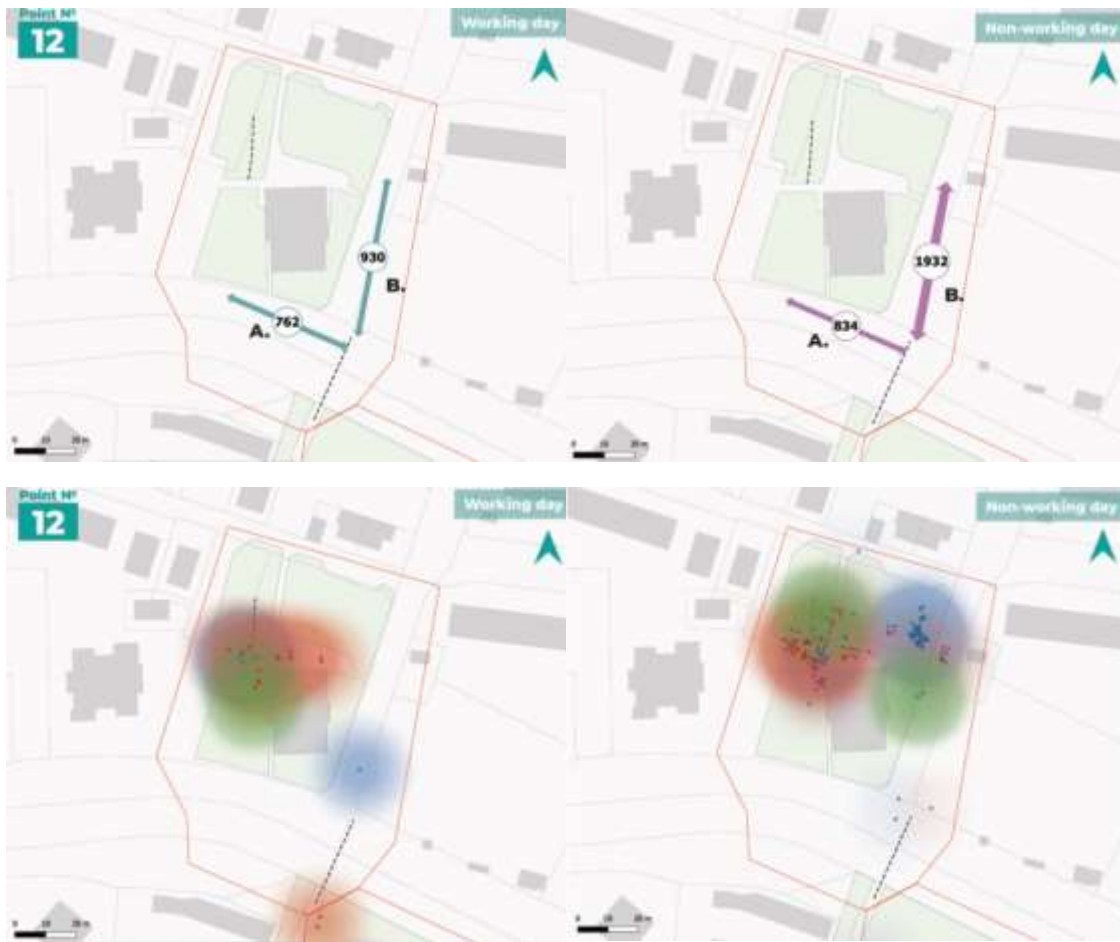


Figure 478. Behavioural mapping. Block 65 in “Lev Tolstoy” and the bridge. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).



### Point 13. Nadezhda Park

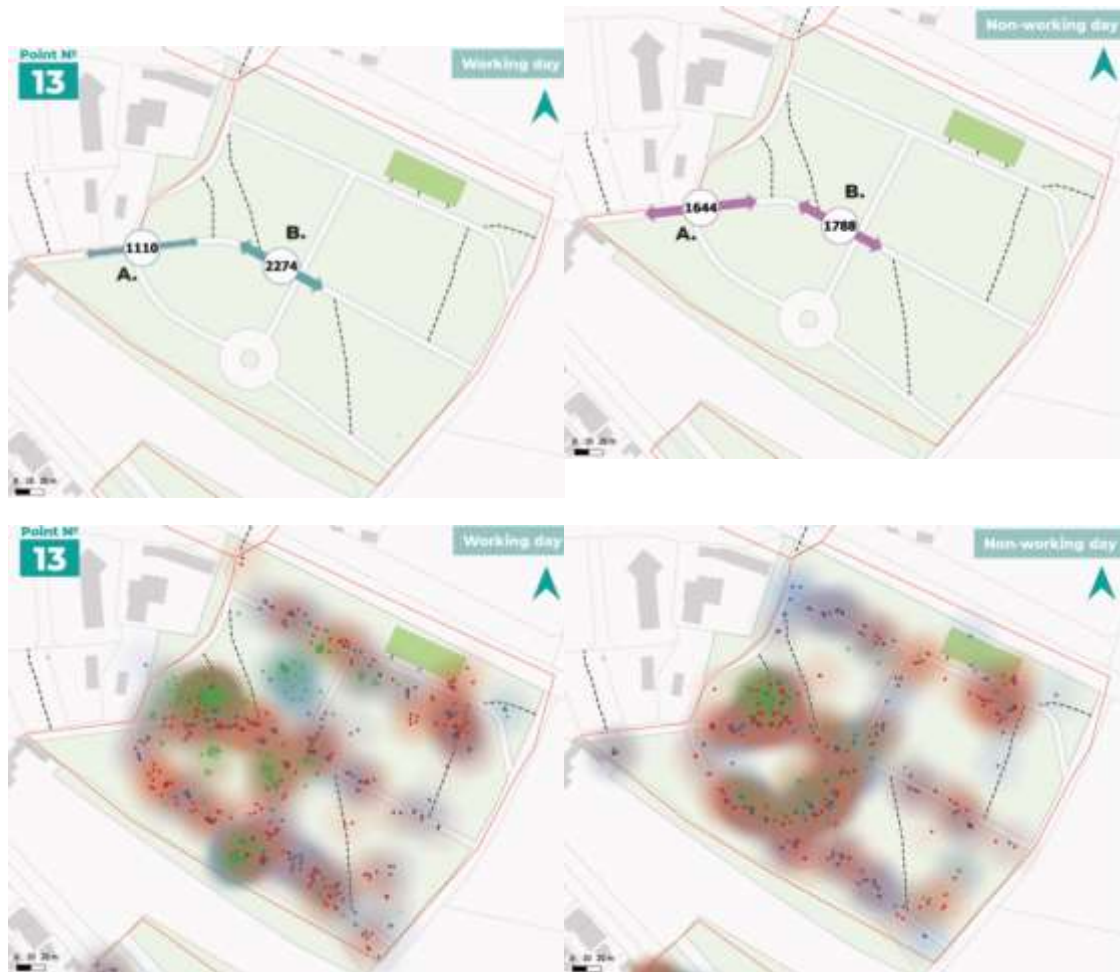


Figure 479. Behavioural mapping. Nadezhda Park. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).

The significantly higher number of crossings along the central alley than those along the alley leading to the Khan Kubrat Metro Station is partly due to the repeated routine in both directions of the same visitors walking in the park.

The west part of Nadezhda Park is much more used. Main spots of concentration of people are those around the playground and the two central perpendicular alleys which are saturated with many visitors performing both sedentary activities and migrating/passing-by. Accordingly, children's space is strongly concentrated around the playground, while the spaces of men and women are largely overlapping, partly due to the family nature of the visits.

### Point 14. Triagalnika neighborhood at Nadezhda junction

The transport node Nadezhda junction does not relate much to the adjacent neighborhood and there are opposite tendencies for the migrants in both directions, either increasing or decreasing.

The stationary activities are concentrated at the tram stops, where people working in the industrial area (Voenna rampa) to the east of Nadezhda junction, are changing the tram



lines which cross under this particular transport node. There is light concentration of mixed group composed by men, women and children at the north-western edge of the observed area, next to a small scale commercial service areas at the ground floor of a mid-rise housing buildings.

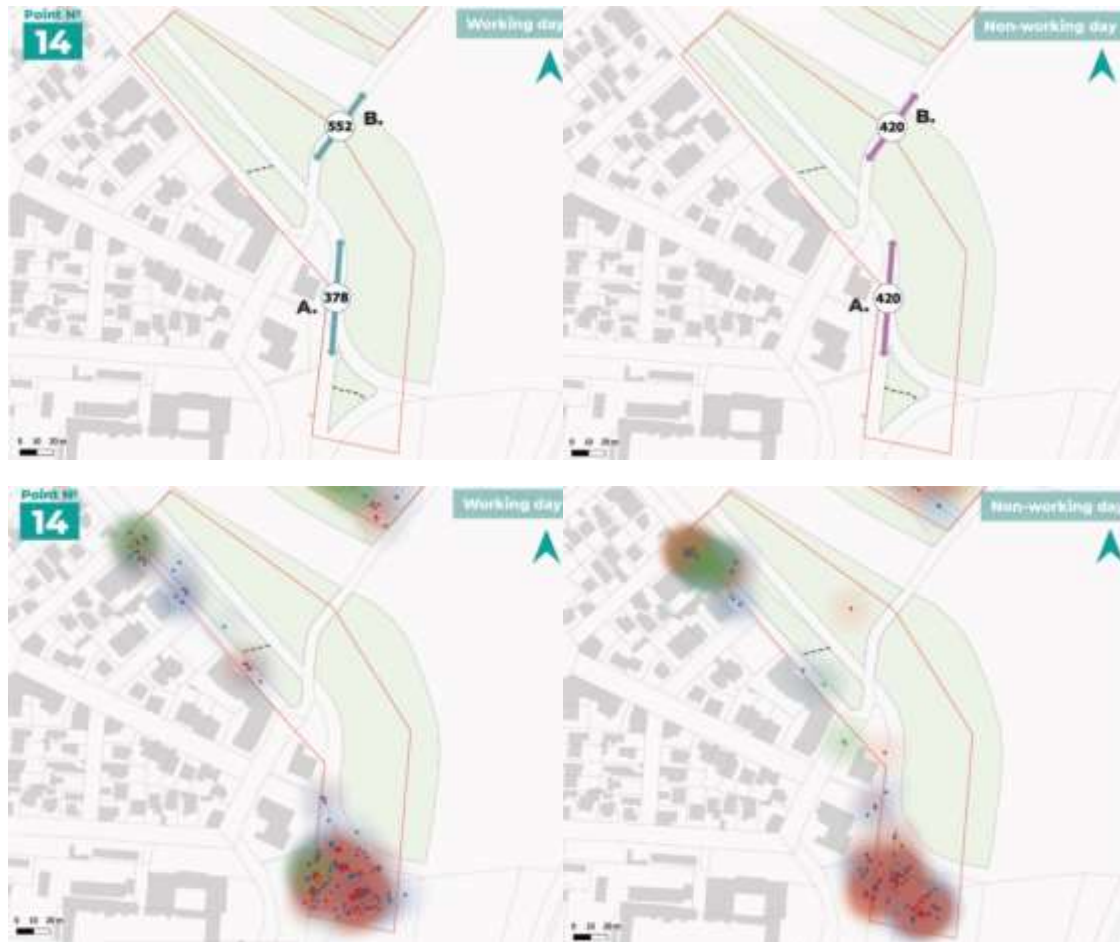


Figure 480. Behavioural mapping. Point 14. Triagalnika neighborhood at Nadezhda junction. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down)

### Point 15. Gorska kultura Park

At this place the observed number of passers-by at the non-working day is more than twice bigger than number of the observed on a working day. The direction connecting Triagalnika neighborhood with the bridge over Suhodolska River towards Nadezhda 1 is also more busy on the non-working day than on the working day. .

The dispersed and contemplation oriented stationary activities during the working days are shifting towards more socializing forms of grouping of people throughout the non-working day. Children occupy the playground. Under the shadow of the forest canopy youngsters, and especially men occupy some of the few benches. There is also an area at the mid-northern part of the park, where the concentration of people with dogs is observed.

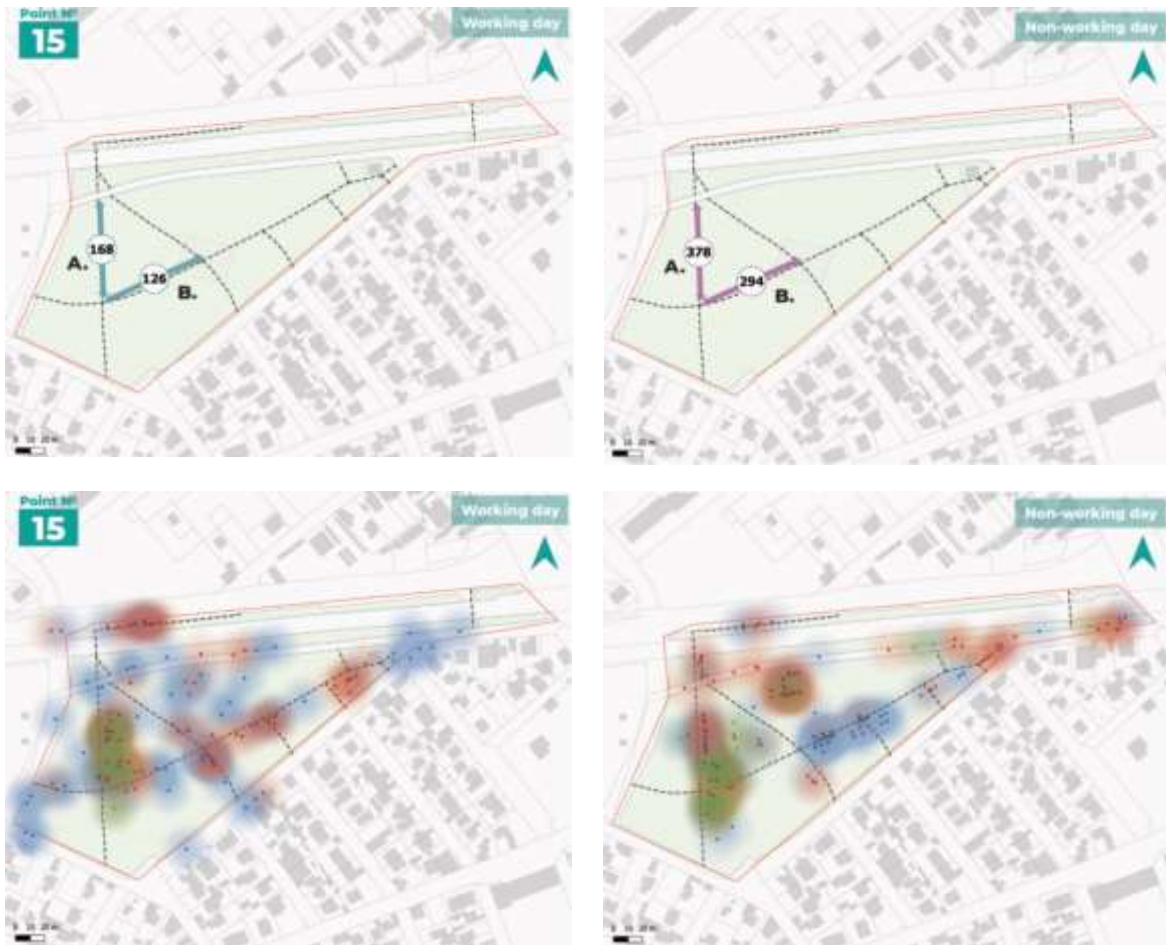


Figure 481. Behavioural mapping. Point 15. Gorska kultura Park. Moving count summed up for 12 hours on working and non-working day (up). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).

### Point 16. 54th Secondary School „Ivan Rilski“

The previously discussed biggest numbers of people moving around this school during the working day are diminishing between three and four times during the non-working day. Here again the east-west direction along “Yordan Hadzhikonstantinov – Dzhinot” street at this part of the study area is more busy.

The schoolyard is not attractive and at some extent not accessible for children at the weekends. During the non-working day it is almost empty with few children that managed to enter inside. Otherwise the mid southern part of the yard is more occupied by stationary activities and play.

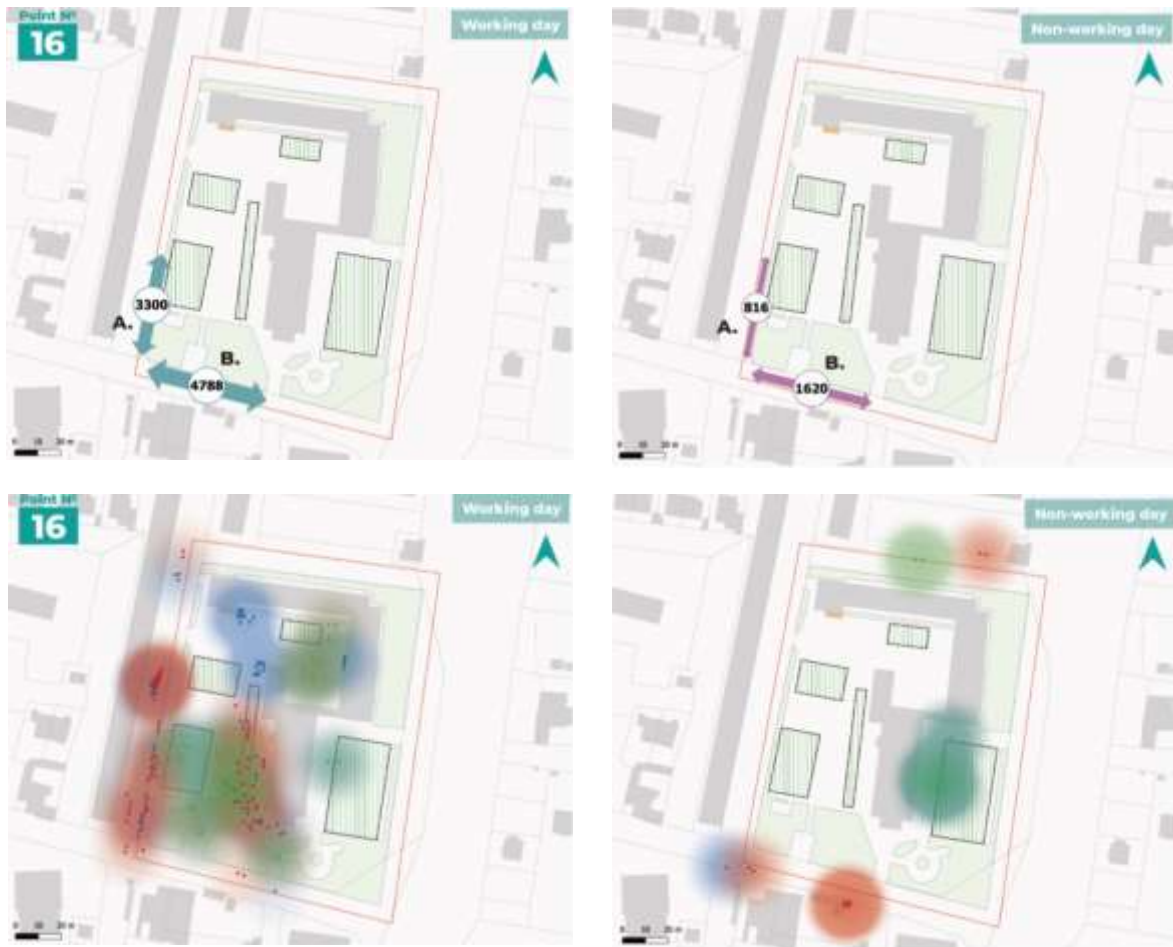


Figure 482. Behavioural mapping. Point 16. 54th Secondary School „Ivan Rilski“. Moving count summed up for 12 hours on working and non-working day (top). Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).

### Point 17. 141st Primary School “Narodni buditeli”

The yard and the surroundings of this more or less neglected school are part of an area with plenty of vacant and hardly accessible lots of land, which is not attractive for passers-by. The slight increase of the the passing-by people during the non-working day was observed. On the working days, most of the stationary activities are located at or around the entrances of the multifamily residential buildings and ground floor commercial and public facilities. During the non-working day the occupational pattern is scattered, with a clearly dominating sites occupied by women and children.

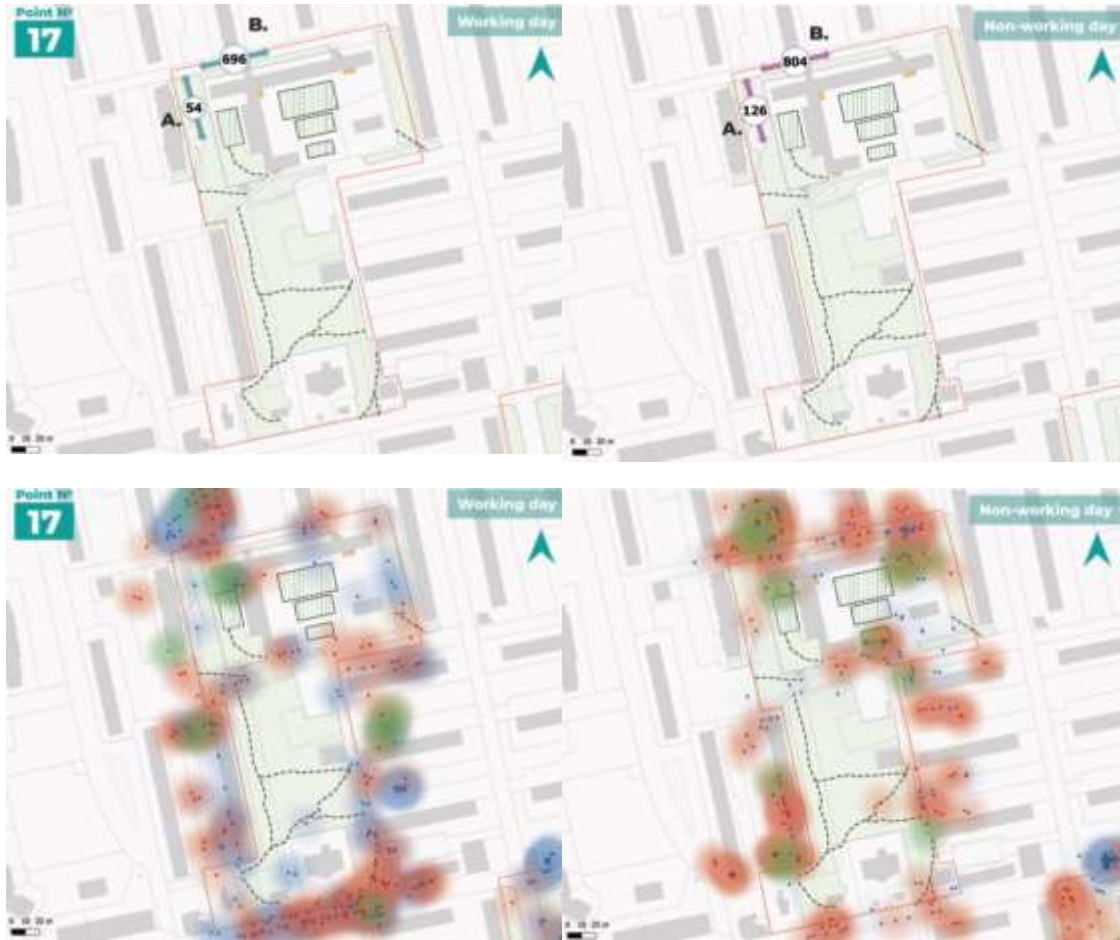


Figure 483. Point 17. 141st Primary School “Narodni buditeli”. Moving count summed up for 12 hours on working and non-working day. (top) Stationary activities accumulation for 12 momentum pictures on working and non-working day (down).

#### 5.4.3.2 Sites observed

The behavioural mapping (BM) of URBiNAT study area in Sofia is focused on 19 sites of interest. Some of these are major public spaces for recreation and play, others serve as key transitional spaces between public transport stops, street intersections and service point and facilities. Another group of sites represents underused or less utilized areas with considerable potential.



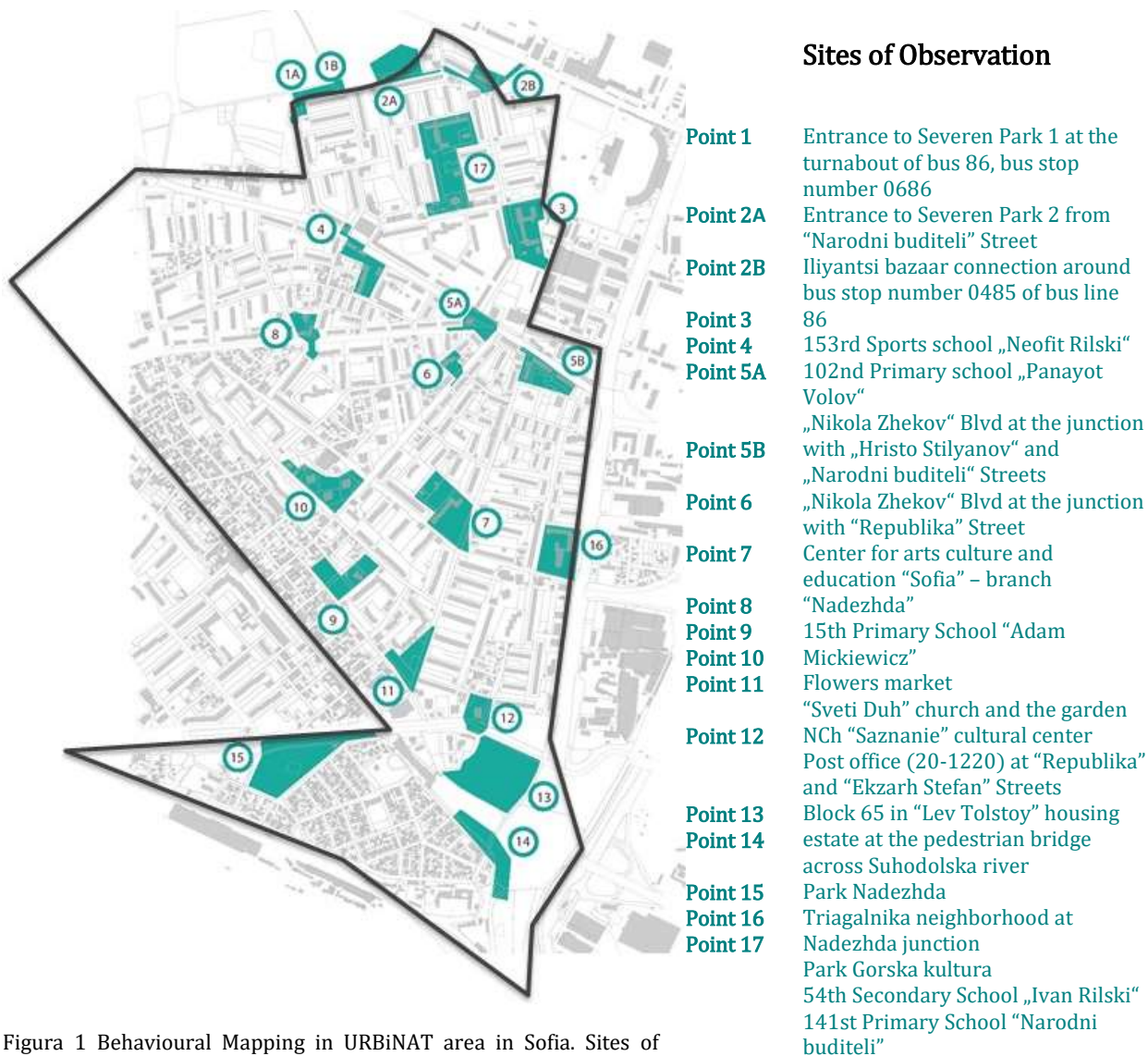


Figura 1 Behavioural Mapping in URBiNAT area in Sofia. Sites of observation, Source: UACEG (2019)

#### 5.4.3.3 Implementation of the Behaviour Mapping methodology in Nadezhda district, Sofia

The survey was carried out using the methods of observation, recording of stationary and dynamic activities in the 19 sites. The observations were conducted within 12 hours during one working and one non-working day in May/June 2019 with the participation of numerous assistants - students in urbanism, architecture, landscape architecture and others, as well as recent graduates and experienced specialists, some of them assisting the research process by coordinating the data collection, digitalization, processing and summarizing the results.

The fieldwork was organized by sets of two observation sessions per four periods of the day - morning (7.30-8.30), lunchtime (12.30-13.30), afternoon (15.30-16.30) and evening (18.30-19.30). The movement and stationary activities were observed throughout the



more active time of the day (e.g. 7-19 or 8-20 o'clock) every hour by 10 minutes counting for each direction (up to 2 directions which took 20 minutes overall) and mapping after that for another 10 minutes along with recording activities (as writing down the sum of pedestrians and taking photographs, switching between forms and base maps) of up to 15 minutes in between.

Main characteristics of people observed were general (approximate) age, gender group, general pattern of stationary occupation, major areas and types of play, and key directions of non-motorized flows of movement through or along the sites. The following categories were observed and documented: types of behaviour, categories of people and place inventory. Main categories of the observed behaviour include activities related to moving, staying and playing (physical and intellectual activities) as well as other activities and habits (gambling, smoking, drinking, taking drugs, fast food eating), usage of media and communication devices (smart phones, TV), socialization (talking, music playing, collective games) and wellbeing.

The play activities and game were observed at Points 3, 4, 7 and 16 on May 16th (working day) and May 18th (non-working day). Additional observation at Points 13, 15 and 17 was organized on June 13th (working day) and June 15th (non-working day). According to the adopted methodology, the mapping was performed four times a day: morning (7.30-8.30), lunchtime (12.30-13.30), afternoon (15.30-16.30) and evening (18.30-19.30). Five of the points represent the courtyards and surrounding spaces of the schools along the Future Healthy Corridor, and the rest are two small parks that might be connected to the Park Severen. Two of the schools and their yards, P7 and P16, have been upgraded under the Integrated plan for Urban Regeneration and Development. For this reason, the access to the yards was restricted as the schoolyard's doors are locked at the time when there were no school activities.

Although the unfavourable weather conditions in the afternoon of May 16 (heavy rain combined with high temperatures), the observations were not interrupted. During the second observation phase, (June 13th and 15th) the weather was sunny and hot. The period coincides with the last days of the school year for primary school students, while the school year for the 1-4 grade pupils had already finished in the end of May and various holiday activities had been organized for them at that time integrated into half-day or full-day childcare services. These included artistic and creative workshops, games and sports, and educational activities. Such services were provided both by the schools and by some private entities.

The recording of the observations was on paper maps and forms, while counting was performed with digital applications. The different categories mapped and filled in the forms (tables) were digitalization, georeferenced, vectorised. GIS database was created in Quantum GIS.

The visualization of the data collected and processed for all sites and sub-categories covered by the mapping are illustrated in detail in Appendix 1. The dataset is going to be part of the overall URBiNAT database and visualization platform.

## 5.4.4 Walkthrough

### 5.4.4.1 Implementation of Walkthrough, Photovoice and Motivational interview methodologies in Sofia

A walkthrough with a combination of Photovoice were carried out in Nadezhda, Sofia in May, 2019. The goal behind this activity was 1) to establish a connection with young people (students) who lived and studied in the territory of Nadezhda and 2) to collect information about their: knowledge, subjective perceptions, emotional attachment, ideas for change and motivation for future participation 3) to get information about how people who work for the territory see it and what their personal perceptions as citizens were.

The combination of these two methods was used in order to stimulate active participation turning students and administrative workers into “co-creators” or “co-researchers” in the process of exploring and sharing information through photography. The process of taking pictures increased students’ interest in the activity as it was a tool for “breaking the ice” and for creating more friendly and positive environment in the group. At the end of the walkthrough, all participants showed particular interest in the results and the URBiNAT projects as a whole which was undoubtedly triggered by their personal contribution.

#### **Preliminary preparation**

The process of preliminary preparation included the following activities: making contact with participants; planning the number of participants and the number of accompanying teachers (in case with the Walkthrough with pupils), recruiting and instructing facilitators, and planning the routes. The additional materials that had been prepared were: Walkthrough protocols (questionnaires), provided by URBiNAT project; tablets/mobile phones with cameras; maps of the territory; participation agreement that had to be signed by every participant in the day of the activity (for the pupils aged 16 years and more)

Two rows of integrated implementation of the three methodologies was scheduled – one with pupils, and one with civil servants at Nadezhda local administration.

The URBiNAT team decided to conduct the implementation of the three methodologies with pupils from 153rd sports school “Neofit Rilski”. The reasons behind this decision were related to 1) the focus on URBiNAT’s main concept of active life and healthy lifestyles in sport education on health; 2) the location of the school on the way of the potential trajectory of the Healthy corridor, between the two parks in Nadezhda; 3) the interest and the engagement of the Pedagogical Adviser at the school, who saw the interest, curiosity and readiness to participate among the members of the Pupils Parliament at the school during an awareness rising meeting about URBiNAT(organized by the Mini Task force “Work with pupils”).

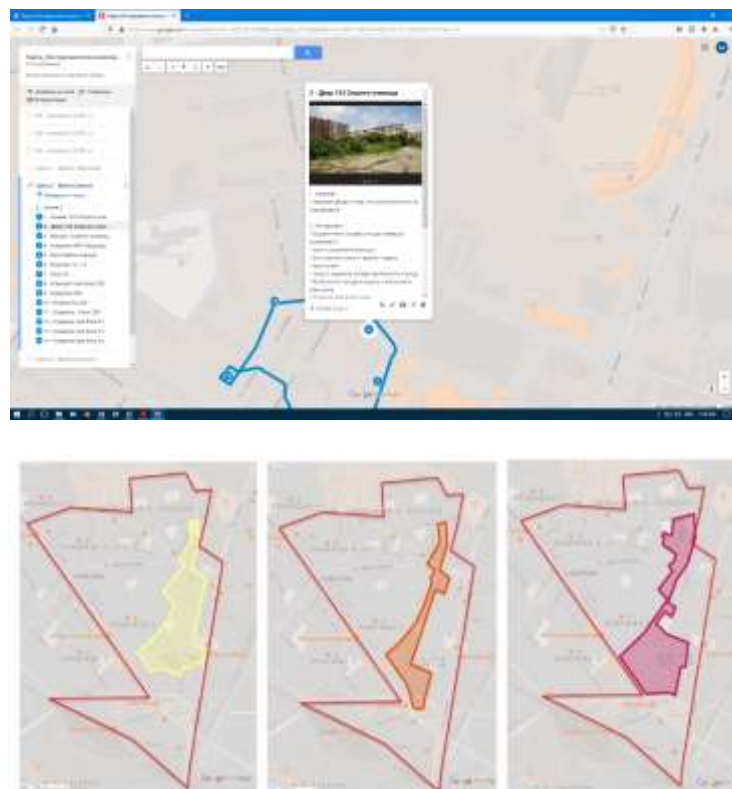
The contact points from the school were: the school principal, the pedagogical advisor and the Pupils’ Parliament. The planned number of participants was 30 students (divided into 3 groups with up to 10 students); 6 facilitators - 2 for each group (1 leading the conversation and 1 for taking notes), 3 teachers - 1 for each group with accompanying purpose (required according to the local legislation related to children’ rights). Teachers were not participants and they didn’t took place in the discussions.

## Planning the routes

Three routes were discussed and planned for three groups **of students** by the research team. They had the same starting and ending point but different trajectories in between. Stopping places were not planned in advance but most of them were spontaneously chosen by the participants and the facilitators during the conversations. There were also some stops intentionally picked by the research team, as well. The routes were planned and drew by My Maps application by Google and further elaborated via QGis for the work “in situ”. The duration of the walkthrough with pupils was planned not to exceed 2 hours and all routes were around 4 km in length.

The walk with experts from the District administration was half the length of the walks previously made with the students. This was mainly because of the intense schedule of the participants. The walk took an hour and it almost reached 2 km in length.

The **results** from the conversations from all groups were analysed and organized in the following topics: 1) general knowledge of the place and transportation habits; 2) general impression on buildings, public space, schoolyard, dangers, things they didn't like, things they liked; 3) Ideas for change.



Route 1

Route 2

Route 3

Figure 484. Walkthrough, photovoice and focus groups in situ. Mapping, taking records and referencing pictures (up) Preliminary designed routes for the participants from 153rd sports school “Neofit Rilski” (down).

#### 5.4.4.2 Conducting the Walkthrough, Photovoice, and Motivational interviews. Main results by groups and routes



##### Group 1 - Route 1

The two-hour walk on Route 1 had 21 stops that were observed and discussed along the way.

Group 1 consisted of 2 two girls and 2 boys, all of them students in 10th grade from the sport school.

##### General knowledge of the place and transportation habits

From all the participants only one boy was local, whereas the others were not living in Nadezhda.

For the need of their everyday journeys to school, students said they used public transportation (metro and bus).

The territory along the route was quite familiar to them because 1) one of the students was a resident of the territory 2) they (those who were not locals) used the same route on their way to school when.

Figure 485. Walkthrough, Photovoice, Motivational interviews. Route 1

<b>General Impression. Group 1 - Route 1</b>	
<b>Buildings</b>	Students' general opinion about the collective panel buildings was that the environment is not very inspiring. According to them it was monotonous and grey, like "every other housing estate with panel buildings in Sofia". They pointed out some peculiar buildings and their entrances for their bad appearances calling them "places for tramps or bums"
<b>Public spaces</b>	The participants didn't share general opinion about the public spaces, but they were quite precise about some peculiar ones. Their first comments were on the street bordering their schoolyard on the north and making the connection with Locomotive stadium (the sport facility they visited every day to train). The students assessed negatively the sidewalk physical condition, as well as the missing street lights. They said that during the winter period, the street is dark and there were gypsies passing by who talked to students and made them feel inconvenient. They also shared that the green area around the sport facility was not maintained, the greenery was overgrown, there were no lights, and there was mud and dirt. Another alley on the route received the same negative assessment. Students mentioned that the ex-industrial buildings and their plots situated along the Rozhen Boulevard were the worst places in the whole district because these were places for drug dealers and homeless people. Other types of public spaces mentioned were two playgrounds for children (1 new and 1 old) and two football playgrounds (1 new and 1 old). In both cases participants noticed and commented on their contrasting characteristics. The positive assessments were given to those that were newly installed and renovated. All public spaces between buildings were highly addressed. Children praised every attempt for improvement and maintenance – street furniture (do-it-yourself), landscaping and design.
<b>Schoolyard</b>	Special attention was paid to the schoolyard as it was the starting point for all the routes. The students described the problems behind the bad physical condition linked to budget shortages and vandalism. Students shared that people from the territories surrounding the school were also using the schoolyard – mainly people with little children and dogs. They said it did not bother them at all.
<b>Dangers</b>	As dangerous places, the participants pointed out the ex-industrial buildings and the plot of the former army barracks. According to them, the latter had been burned intentionally for it had been a place for drug dealers and sex workers. Students also shared that even though these places were considered dangerous, they were also somehow interesting, and they go close by from time to time.

Things they liked. The participants marked as appealing every attempt of improvement in the environment, especially everything that was new – from street furniture to building rehabilitation and new constructions. They also mentioned the river and the park Nadezhda, but still, hygiene and maintenance were among the major problems. They liked the biodiversity there as well.

Places they liked and visited on a regular basis were: Pulse café, the outdoor fitness facility close to the Billa supermarket.

Things they did not like. All elements and characteristics that participants assessed negatively were results from the lack of maintenance and care. They also complained about the level of mentality of their peers living in the area calling them “Neanderthals”. One of the students shared his opinion that vandalism was a huge problem saying that nowadays parents were more focused on their children outfits instead of their behaviour. He had already one unsuccessful attempt to build a small gazebo, a shelter for him and his friends to watch football games. After several months it had been ruined by local vandals.



Figure 486. Walkthrough, Photovoice, Motivational interviews. Route 1. Synthesis

Ideas for change. The participants shared that even small improvements would make a big difference and they were all connected to maintenance and proper care. The propositions that were given were as follows: 1) Improvement of streets, sidewalks and alleys surfaces; 2) Maintenance of the greenery - from gardens with flowers to the riverbed; 3) Cleaning



of public spaces and green areas; 4) Provision of garbage bins streetlights and street furniture. Especially the plot of the ex-army barracks and the green area between the school and the stadium; 5) Renovation of the schoolyard. 6) Creation of classroom in the outdoors; 7) Renovation of the panel buildings' facades. 8) Safety improvement.

The participants expressed their will to participate in activities such as: cleaning public spaces, building street furniture. They said they needed someone to guide them and to tell them what to do.



Figure 487. Walkthrough, Photovoice, Motivational interviews. Route 2

Most of the students (except those living in the district area) admitted that their knowledge about the neighborhood was scarce.

In this first conversation they said they preferred spending their free time somewhere else because there was nothing to do in Nadezhda, except school. There was one boy who shared he liked his neighborhood and spent time in the green areas in front of his home. One other mentioned he had a girlfriend living close by the school and because of this fact, he

### Group 2 - Route 2

Route 2 had 14 stops for observation and discussion. There were 8 students altogether, 7 males and 1 female at different ages, ranging from 16 to 18. The sports they practiced were football, judo, athletics, swimming and volleyball.

There were two boys from other towns of the country that were living in the newly built dormitory of the school (situated next to the school building), 1 boy that was local and all the rest were not residents of Nadezhda district.

### General knowledge of the place and transportation habits

The walk started with short conversation in which participants and facilitators presented themselves. Students were asked to share deliberately where they lived and how they traveled to school everyday. Only 3 boys were living close to the school, whereas the rest had to travel everyday.

Five of the students said they were travelling by car. Most of them were driven by their parents and just one or two driven by themselves.

got acquainted with Nadezhda in general.

### General Impression. Group 2 - Route 2

During the talks, students said they found the urban environment in the neighborhood as "quite depressing" mainly because of the old buildings in bad conditions, the lack of interesting places and the lack of proper general maintenance.

<b>Buildings</b>	Buildings were very old and some of the facades were ruining. There were empty apartments and many apartments of old or very poor people. The visible signs
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	were newspapers on the windows, old stuff and waste collected in their balconies that can be seen from the outside.
<b>Public spaces</b>	<p>Public spaces (green areas between buildings) were considered boring. The main arguments were that they were “empty” and “not interesting”, “one has nothing to do here.” The greenery was overgrown, and the grass was not mowed. Some of the students shared that there were too many basketball playgrounds in the neighbourhood. According to them, the playgrounds stayed unused because basketball was not that popular sport in Bulgaria as football.</p> <p>The beautiful flower gardens spotted during the walks were highly assessed due to their aesthetics. Some of the students said that even though the gardens were beautiful they were not welcoming visitors. There were no benches, or they were privatized - guarded with fences. Students shared that usually old people were taking care of them and they were often unfriendly and even hostile.</p> <p>Streets and sidewalks were said to be in bad condition. Students shared there were holes, broken pavement and dirt. Sidewalks were often occupied by parked cars, as well. Sometimes crossing was also a problem, especially when one tried to reach the school by foot from the metro station. One of the boys said that it would have been different if there had been more crossing zebras. The students shared that dirt and overloaded waste containers were a problem for pedestrians because of the unpleasant smell and the garbage littered around. The greenery was not maintained, and it was overgrown. Latter made them feel insecure because of insects (ticks) but also in the dark hours as a condition for crimes and abuse.</p>
<b>The schoolyard</b>	<p>The students said that they rarely used the schoolyard because they were busy. They were trained outside the school, in the Locomotive stadium located in close proximity. The main problems that bothered them were: The worn-out paint of the outdoor playgrounds that stayed unused, the sink that had been turned into a pot with flowers, the broken pavement, mud and puddles. Students were not happy with other people from the buildings nearby coming to walk their pets on their football playground. Also, the fact that its flooring had breaks made it unusable. They said, they also felt unsafe because of the dogs that lived in car service station next to the school’s fence. Some of the students didn’t like the dormitory. Although it was colourful and new, students didn’t find it attractive. These were the boys living there. They felt it offensive to be “put to live in a container”. They said the dormitory was “nasty”.</p>
<b>Places of interest</b>	<p>When asked which their places of interest were and what they liked to do in their free time, 90% of the students mentioned only indoor places of commerce where they can buy food, drinks, get training or else. Only one of the boys mentioned he was also going to some of the green spaces to “hang out with some friends”. The places were as follows: 1) Lidl supermarket, 2) Fast-food booths (Pizza, Gyros, Sandwiches), 3) Fitness Club, 4) Cafes (there were 2 they visited), 5) “The green space where all the cool people go”, 6) “the football playground next to my building”.</p>
<b>Dangers</b>	<p>Students shared that they felt generally safe in the neighbourhood although “it is said there are drug addicts, dealers and aggressive locals”. The overgrown greenery bothered them because of an aesthetic reason, threats of insects (ticks), stray dogs and chances of crime and abuse against them.</p>

**Things they liked.** When asked for their favourite things in the neighbourhood students pointed out all the places of interest mentioned above, as well as every attempt of “refreshing” the environment: the newly renovated buildings, graffiti, newly replaced benches and tables. Some liked the fruit trees and the fact that the neighbourhood is a quiet place.

**Things they didn't like.** Students agreed that the things they didn't like were all marks of decay such as: broken street furniture, old buildings without maintenance, overgrown greenery, dirt and litter. The lack of interesting places to go was also among the given answers.

**Ideas for change.** This was the last topic in the conversation and compared to the others previously discussed, was more difficult. Students were asked to describe how they would change the neighbourhood if they had the needed resources. One of the students said he would start with the buildings' facades because he found them the most depressing. Afterwards he would change the pavements and refurbish the children' playgrounds and put more zebra crossings. When they were asked what they would do for people on their age (teenagers),

no answer was received. One boy said that people on their age had no business in the outdoors. They were supposed to be in schools, gyms or if they wanted to meet their friends - in a café or club. Other one mentioned they might needed a cinema or some more interesting place for meetings, but it wasn't described any further.



Figure 488. Walkthrough, Photovoice, Motivational interviews. Route 2. Synthesis



### Group 3 - Route 3

Route 3 had 13 stops and it took 2 hours. The number of participants was seven - 7 boys and 3 girl. All of them were pupils from the 10th grade in the sport school. Two of the students were locals and the rest were living outside Nadezhda administrative district. One of the boys was champion in boxing, another two boys were training judo. One of the girls was training basketball and working as a model.

### General knowledge of the place and transport habits

Most of the participants were quite well familiar with the route and its surroundings. There were more students in this group who spent their free time in the areas around their school. Two boys and one girl were living in Nadezhda 2. Most of the participants left the Walkthrough earlier, as they had to attend trainings.

Figure 489. Walkthrough, Photovoice, Motivational interviews. Route 2

General Impression. Group 3 - Route 3	
<b>Buildings</b>	<p>The mutual perception of the area could be generalized as “depressive”, mostly due to the old panel prefabricated buildings around. Other signs that contributed to the given statement was the lack of maintenance and the feeling of “getting old” and in decline. Some of these almost ruined buildings are occupied by big populations of homeless cats. Nearby, there is an abandoned but dangerous commercial building (pavillion) that is almost being self-destroyed because of decay.</p> <p>Some temporary buildings (in yard of Locomotive sport club) are unnecessary.</p> <p>The “forbidden entrance to the bunker” has been mentioned by a girl who lives in the neighbourhood</p> <p>There are new buildings (houses) with well-maintained yards</p> <p>One of the boys liked the high-rise residential buildings next to the river (bl. 65)</p> <p>The facilities in the sports club are not accessible for everyone.</p> <p>The pupils were very much interested to see some of the other school in the district. They liked the newly painted and renovated building of 15th Primary School “Adam Mickiewicz”.</p> <p>The corporate buildings along Rozhen blvd. are not friendly</p>
<b>Public spaces</b>	<p>Most of the public spaces that were discussed shared negative common characteristics and qualities.</p>

	<p>Students mentioned the following: bad surfaces, dirt, lack of streetlights, presence of homeless people and stray dogs and cats.</p> <p>Participants said that it was very unpleasant that there were mothers with strollers who had to share space with stray animals and homeless people.</p> <p>Many waste around the garbage collection containers was observed by the pupils.</p> <p>One of the boys asked about the benefits of separating waste. The design of the new waste bins in the yard of 15 primary school was qualified as wired but also praised as better than the one of the “old fashioned” bins.</p> <p>Some of the pupils had never reached the river. They liked the river, regardless its unpleasant smell.</p> <p>Well shadowed open spaces in the inter-block space opposite the school entrance were pointed as valuable site for spending free time.</p> <p>Two of the boys mention that there is tension on behalf of the owners of flats who had made do-it-yourself semi-covered benches and the pupils. Pupils tend to occupy these spaces during the breaks.</p> <p>A lady who has privatized the public space in front of the block by putting a fence around a small garden was mentioned as unsuitable and annoying fact.</p> <p>The attention of one of the boys was caught by a father with a child’s carriage spending his leisure time among lush grass in the inter-block space</p>
<b>The schoolyard</b>	<p>Students shared that they liked their schoolyard because of the trees and greenery. They complained about the high grass that was a home of different insects, snakes and stray dogs. They said the swimming pool was in a bad condition too and that it was used by children who were not studying at the school.</p>
<b>Places of interest</b>	<p>When asked which their places of interest were and what they liked to do in their free time, more than 50% of the students mentioned only indoor places of commerce where they can buy food, drinks, get training, socialize while eating (usually with their parents) or else. One girl mentioned that she often goes to the park and even spends her leisure time in the inter-block spaces or walks around the residential area.</p> <p>The places were as follows:</p> <p>1) Lidl supermarket, 2) restaurants and kiosks selling food, 3) the café in the basement, where the teachers usually go to buy handmade food and fresh vegetables, 4) the Cafe with the billiards in the inter-block space opposite the school.</p>
<b>Dangers</b>	<p>The site next to the school in the urban forest on the way to the stadium and the facilities for training was pointed as dangerous, as many suspicious people are often clustering there and the disturbing the passing-by pupils;</p> <p>Students shared that it was quite dangerous to ride a bike to the school and in the area around it. There were no bike lanes and paths, cars were driving very fast and they felt insecure.</p> <p>The overgrown greenery was also pointed dangerous because it was a home for insects and wild animals.</p>

Figure 490. Walkthrough, Photovoice, Motivational interviews. Route 3. Synthesis





Figure 491. Walkthrough, Photovoice, Motivational interviews with pupils. Synthesis for Routes 1, 2, and 3. Key: like (green), dislike (red). Yellow (opportunity), grey (other), I (critical point)

Things they liked. Participants liked the most the fact that the area was quiet and people knew each other. They liked the living nature: 1) The biodiversity in the green area between their school and the stadium; 2) the beautiful trees in their schoolyard; 3) the presence of street lights around the buildings of the two local residents 4) the little gardens with flowers around some panel buildings.

Things they didn't like. Students shared that they didn't like the stray animals, as well as the illegal hotel for cats and dogs that they showed. They didn't appreciate that some people had put dogs' houses along the street just in front of the fence of their house. They also mentioned that Rozhen Boulevard didn't have enough trees to make shadow for pedestrians during the hot sunny days. They didn't like the fact they were chased away from one of the playgrounds they liked to hang out, close to Lidl supermarket.

Ideas for change. All ideas for change were linked to the removal of all the things they didn't like. Most of the activities proposed were in the sphere of the physical environment improvement and maintenance. All of the participants that stayed till the end of the walk declared their interest for participating in future activities.



Figure 492. Walkthrough, Photovoice, Motivational interviews. Route 4

#### Group 4 - Route 4

##### Participants

The participants that took place were 4 females from different administrative wards. Among them only one was local, whereas the others were living in other housing estates in Sofia. Their age varied between 30 and 40. The walk started from the square in front of Nadezhda cultural centre, it had to follow the direction of the corridor without preliminary defined route and ending point. The sites visited and defining the route was left to the participants.

##### General knowledge of the place and transport habits

Nevertheless, that most of the participants were not living in Nadezhda, they were aware of the territory and especially of the places where the municipality had already started or finished projects. Related to their transport habits 2 of the women said they were using public transportation, one was traveling by car and one was walking as she was living nearby.

<b>General Impression. Group 4 - Route 4</b>	
In contrast with the others, this group of participants were kind of laconic about their personal feelings and perceptions about the environment. Their reactions were more in the spectrum of approving/disapproving citizens' behaviour, habits and attitude towards the environment.	
<b>Buildings</b>	Although buildings' condition was not directly mentioned, there were several situations in which participants used different comparisons stating that something is old, not aesthetic or give them bad memories ( " it is like in the 90s", "it's soc", or "it's like in the countryside," "it's old" ) They agreed that some renovation was needed. The corporate buildings along Rozhen blvd. are not friendly
<b>Public spaces</b>	Participants admitted that there were sidewalks and zebra crossings but not everywhere and that made it hard for mothers with strollers and people with disabilities. Dirt and garbage were also mentioned but with a sense of disapproval of citizens' behaviour and habits. Abandoned old cars were pointed as barriers
<b>Places of interest</b>	The main places of interest pointed out in this group were the green areas – The Northern Park, Park Nadezhda and the Local cultural centre because of the events that they randomly attended. Two of the participants were aware of the recently implemented building renovation projects and were proud to show them
<b>Dangers</b>	Participants said that environment in the neighbourhood was quite safe.

**Things they liked.** Participants' general impression of the territory was predominantly positive because of the following characteristics: presence of open green spaces, a territory well served with public transportation, sense of belonging and community spirit.

**Things they didn't like.** One of the ladies said that she didn't like the open market close to 54 High School. She found it was an unattractive place that could be different if it had been more organized and cleaner. Other thing that they didn't like but said it was not possible for the District administration to control it was the parking in the green areas and on sidewalks.

**Ideas for change.** The participants shared many ideas for change. Most of them were in the sphere of aesthetic improvement and they included: more flowers, benches, energy efficient street lights, parking regulations and playgrounds for children. They said that the environment needed more colour to become joyful and vibrant.

Talking about change they shared that the biggest challenge was working with the citizens. They mentioned they needed educational campaigns to raise awareness about the quality of the environment among the youngsters in order to become active in the future.



Figure 493. Walkthrough, Photovoice, Motivational interviews. Route 4. Synthesis

### 5.4.5 Photovoice

A walkthrough with a combination of Photovoice were carried out in Nadezhda, Sofia in May, 2019. Details on the organization and conduct of the integrated methodology are available in section 6.4.1. After the end of the walkthrough and the participatory photography activity, the images taken by the participants have been analysed by the research team. The most relevant pictures to URBiNAT themes were selected, then arranged by topic and ranged by number of appearance in different pictures.





Figure 494. Photovoice. Participatory photographs relevant to URBiNAT topics. Things that pupils like



Figure 495. Photovoice. Sample of participatory photographs relevant to URBiNAT topics. Things that pupils dislike

The relevant to URBiNAT general topics and scenes that have impressed the pupils and gave them positive emotions were; nature, biodiversity, well-arranged and maintained



built environment, public spaces, do-it-yourself furniture (also gardens and equipment), and street art. (Fig.41)

Figure 496. Photovoice. What pupils liked. General categories grounded on the associative images taken by pupils and transformed by the research team into key words.

<b>What Pupils LIKED</b>		
	<b>General category</b>	<b>Key words and associations to the images in the photographs</b>
	Nature	Trees, bushes, grass, river, water, greenery, green canopies that trees offer in the hot summer
	Biodiversity	Animals, birds, pets,
	Well-arranged built environment	Quality design, good quality, well-maintained public urban furniture, beautiful, well maintained equipment and gardens, flowers
	Public spaces	Parks, playgrounds, open spaces, streets
	Do-it-yourself urban furniture, equipment and gardens	Well design, well prepared and well-maintained do-it-yourself urban furniture, equipment and gardens
	Street art	Graffiti, sculpture

The main issues related to what they do not like are clustered around the key words waste management, unsafety of the built environment, physical barriers, and compromised public space an urban environment, Do-it-yourself urban furniture, equipment and gardens, and built environment with negative visual and aesthetic impact. (Fig. 42)

Figure 497. Photovoice. What pupils liked. General categories grounded on the associative images taken by pupils and transformed by the research team into key words.

<b>What pupils DISLIKED</b>		
	<b>General category</b>	<b>Key words and associations to the images in the photographs</b>
	Waste management	Spilled over garbage around the containers, in the middle of the inter-block spaces and in the river
	Unsafe built-up area	Risks and dangers – worn out and depreciated buildings, poor condition of building structures, declining industrial and sport infrastructure, unattended construction sites and buildings, dilapidated buildings, abandoned construction site that attract antisocial activities, vegetation (shrubs) that provoke the feeling of unsafety
	Barriers	Elements of the built environment that create and act as physical barriers
	Compromised public space and urban environment	Poor maintained elements of the public space and the built environment – uneven pavements, decline, dilapidated, half-demolished buildings, poor condition of the facilities for children, lack of pavements and sidewalks.
	Do-it-yourself urban furniture, equipment and gardens	Low-quality design, poor implementation, poor-maintenance, do-it-yourself urban furniture, equipment and gardens (aesthetics)
	Built environment with negative visual and aesthetic impact	Aggressive landmarks (visual, aesthetic impact and barriers) – construction sites, waste and garbage, construction and industrial materials, buildings in poor condition, new buildings, sealed plots (asphalt instead of soil)

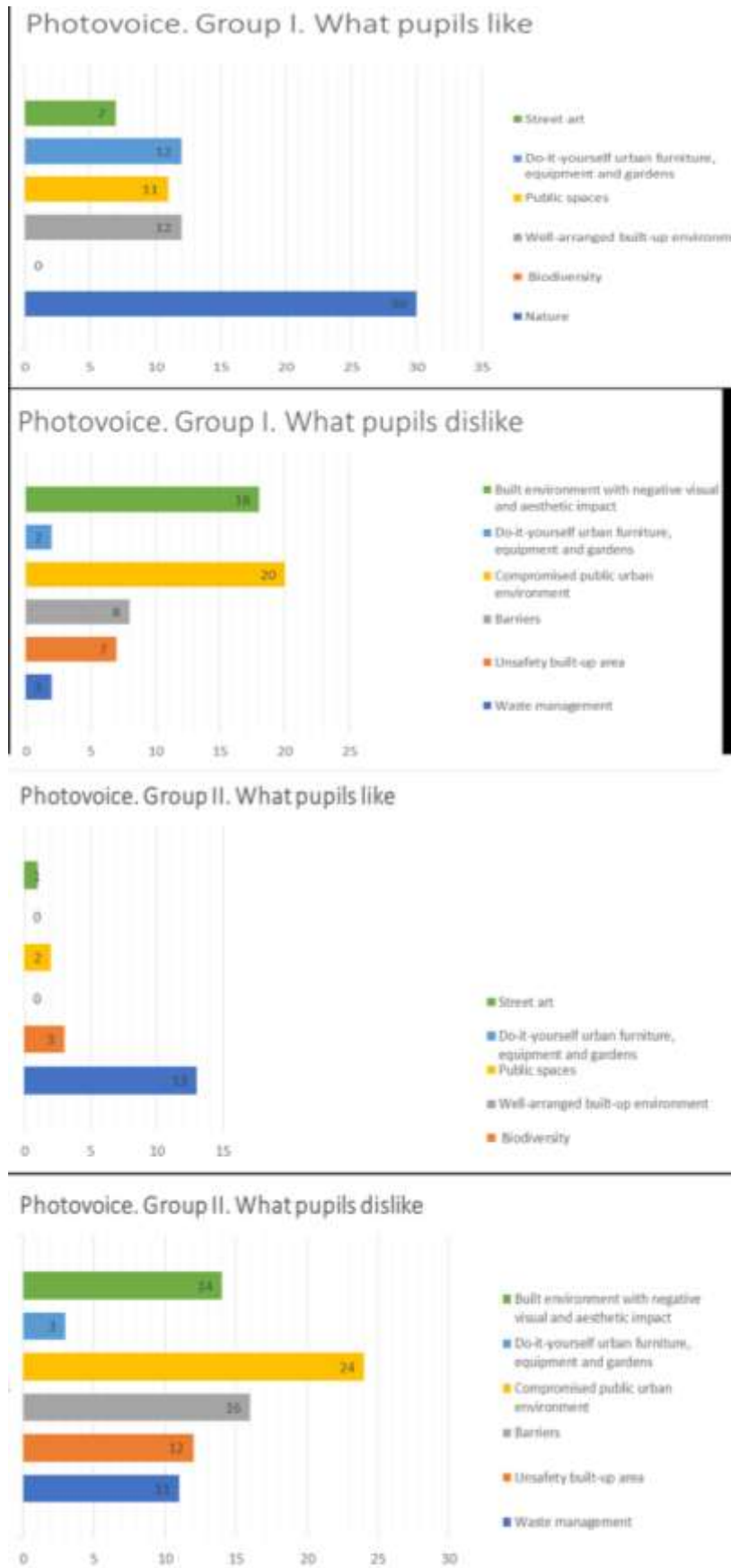


Figure 498. Photovoice. What pupils from Walkthrough groups I and II like and dislike.

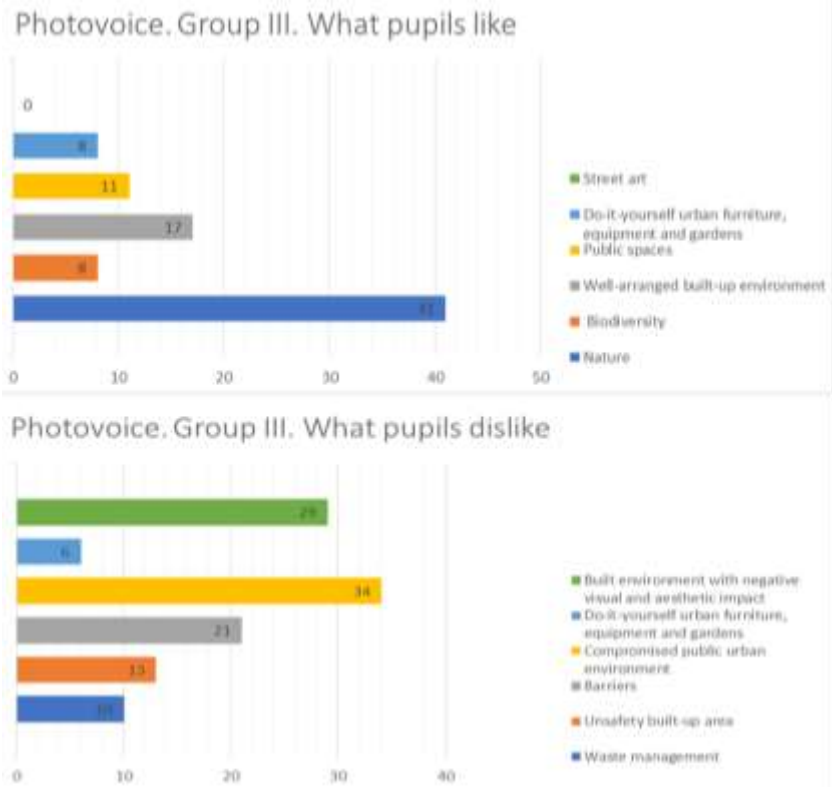


Figure 499. Photovoice. What pupils from Walkthrough group III like and dislike.

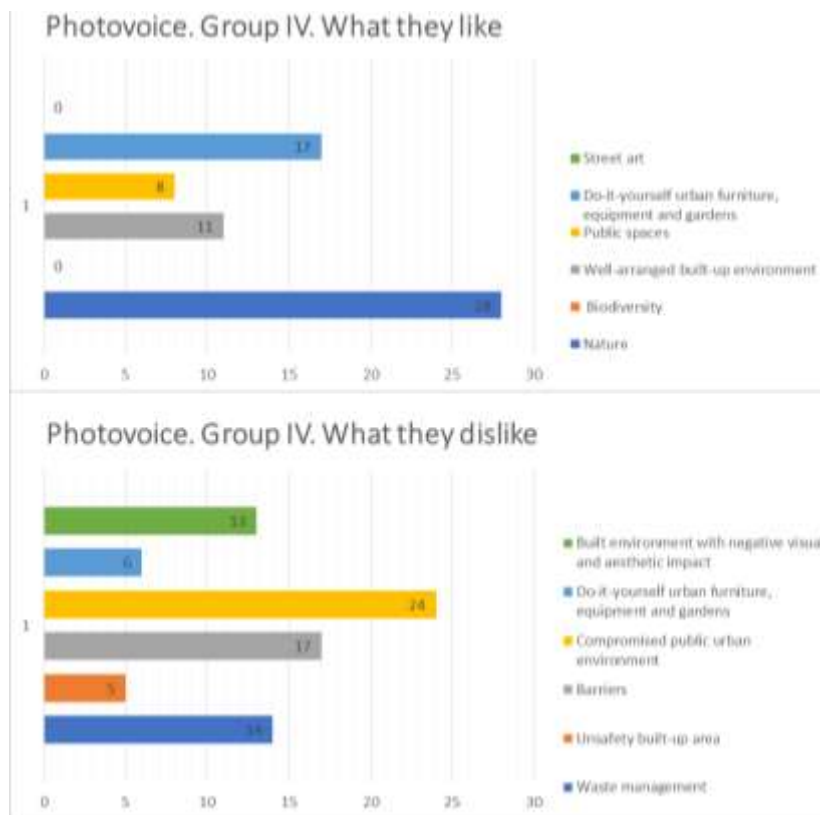


Figure 500. What participants from Walkthrough group IV like and dislike.

## 5.4.6 Focus group

### 5.4.6.1 Implementation of the method in Sofia

A total of three Focus Groups (FG) were organised during the co-diagnostic phase. They were designed to involve representatives of diverse social and professional groups inhabiting and/or living on the territory of the target neighbourhoods in Nadejda District, namely:

- district administration (7 participants – all females);
- parents and teachers of students participating in organised forms of extracurricular art (performing arts), musical and language/ groups (clubs) – 5 parents and headmistress of the Centre for Work with Children Nadejda (4 females and 1 male);
- parents of children from and staff of Kindergarten 171 in Svoboda District (5 females, of which 2 staff and 3 parents and/or other relative of children. The group has involved 1 sole parent).

All participants in the FG-s have been provided an overview of the URBiNAT project, they have given their consent for voluntary participation and for recording the discussion by means of a digital voice recorder.

Main themes explored at the FG have been:

- Aspects of the environment (physical and natural, infrastructure and social/community) in the target area, which they like and dislike;
- Citizens participation – interest, motivations and degree of participation of the residents;
- District administration – degree of satisfaction with mode of management of the district, communication and interaction with citizens;
- Potential and ideas for changes in the corridor (what people would dream to see changed, made in all environmental aspects – social, physical and/or natural environment, administrative management, etc.)

### 5.4.6.2 Discussion of results

The analysis integrates the feedback of the participants in all FG-s. Where relevant, individual remarks and opinions, relate to the affiliation of the participants, i.e. citizen/administrative local government involvement, this has been outlined. It should be noted that some of the representatives of the district administrations are not residents of the target districts and/or live out of the target area. They gather impressions and opinion based solely on their professional relationship/tasks.

**Aspects of the environment** (physical and natural, infrastructure and social/community) in the target area, which respondents like and dislike:

All residents of the target areas have a strong belonging to their neighbourhoods. Severen Park (North Park) is undoubtedly the one place which all mention as “the thing they like most”. It creates part of their belonging and relationship to the district. They visit it with friends and/or family and it is the preferred space, where everyone goes for recreation -

rest, access to fresh and clean air, spaces to practice sports/other leisure time activities (meeting with friends, organising birthday parties, festive events, etc.).

People would like to have and see a more comprehensive, harmoniously and aesthetically visually “designed” and/or developing urban environment (incl. physical buildings: size, colours and shapes and the natural green spaces). However, people realise that given the diversity of the inhabitants in terms of social and economic background, this is difficult to achieve.

**Waste** is discussed in terms of litter in public space, publicly provided street cleaning services, and dog littering.

Litter in public spaces, incl. interblock spaces, parks, etc. is an explicitly outlined concern of all. It is attributed to one or more of these factors: a) Personal behavioural patterns of the residents; b) Poor management and control by the responsible administration (incl. unaesthetically, and unhygienic surrounding spaces around container bins); Open access of street dogs and cats to container bins (homeless people also rummage big container bins); Lack of control or initiative for change; Lack of concern/participative change by the people in the community – the state of affairs is taken as the status-quo, which cannot be changed.

A dissatisfaction has been expressed with the fact that public cleaning services are limited to the “pavement area” only, not practically including inter-block spaces (bushes, unkept green areas, front of buildings), which enables litter to be abundant and shift from one area to another mainly to open air public space (streets, parks, etc.)

Many dog owners do not take care of the litter from excrements of their pets.

Regarding **minorities**, there are no conflicts and problems between the locals and the newcomers from abroad. Even some of the communities are seen as “better” and more conscientious and disciplined citizens and neighbours in their attitude towards the environment and the community. Romas were not explicitly mentioned. People live very easily and on friendly neighbourly terms with various communities – e.g. Chinese, Armenians, Arabs, etc.

All participants express content with the **public transport connections and diversity of transport modes** in the corridor. The metro, public bus transport all ensure very good and fast access to other places. Parking, incl. green spaces and pavements, is an expressed concern - a major one.

**Trees**, as valuable elements of the green system, are commented in terms of maintenance and safety. Generally people report that green areas/trees are not maintained on ongoing basis, which creates more shadowy, branchy areas/street/inter-block spaces – this is partially an issue of comfort and friendliness of the environment, partially – a safety concern as this contributes to lack of openness and visibility. Combined with lack of lighting reported this creates a feeling of not being safe. Several concerns about tree cutting have been shared. People notice and dislike such actions.

At the same time, the administration is concerned about maintaining safe environment and obliged to preserve trees for their ecosystem functions. Maybe there is potential to improve the two-way dialogue and information regarding tree care and actions/plans/communication of the municipality in seeking balance between ecological concerns and safety of people.



Municipal administration representatives are of the opinion that **safety** in general is not an issue. The level of unsafety does not differ from that of other city areas.

**Noise** is a reported issue at 2 levels: street noise by traffic, and noise nuisance especially in inter-block spaces in late evening hours.

Municipal representatives determine availability of good **lighting** of playgrounds in inter-block spaces to create a 50%/50% problem with noise nuisance. While young people or neighbours who would like to stay out late and chat/play/etc., do stay when the space is well lit up, and they do not see their activities as problematic, the residents (esp inhabitants at the lower levels) do have problem and are disturbed, thus would not encourage well lit-up and encouraging such behaviour environment. No universal solution or approach to resolving this problem was suggested.

Poor quality of **public infrastructure (pavements and streets)** is reported by the residents. "Targovska" street is given as an outstandingly bad example, which people avoid. Another example of an important transport link connecting Nadezhda 2 and Svoboda neighbourhoods ("Dravsky boi" str.), is also in poor condition.

Maintenance should be well-planned and good condition of the road surface and pavements should be ensured (e.g. after renovations of Lomsko shosse, Yordan Konstantinov Str, which was used as an alternative – was not repaired to normal condition).

People would like to have their neighbourhoods remain greener, thus preserving the **open space and the greenery** between the blocks and other buildings. Although currently people have not reported/complained from overly dense construction, a concern of such phenomenon has been expressed.

Some one-way streets (the restriction has been recently introduced), are reported to make the length of driver's journey home longer. The **access to the blocks** is lengthier and more time-consuming. Better connections between all parts of the neighbourhood in Nadezhda 2 is an issue of discussion as the introduced one-way traffic prolongs a lot access to the neighbourhood for drivers. Better connections and solutions are recommended in order to improve access to the residential blocks.

Diverse opinions on maintenance of **public space around the residential buildings** (in the inter-block spaces) were identified among different people and motivations behind them. Representatives of the administration attribute untidy spaces (littered, grassy, unkept) to the lack of initiative and good organisation of the people, with reported concern about vandalism which creates problem for maintenance of playgrounds.

The level of **keeping nicely the areas and taking care of the public infrastructure** is reported to be partially dependent on the existence of active and conscientious citizens, and also on the level of care secured and effectively managed by the district government. However, ideas as to how vandalism can be prevented have not been abundant. Most often video monitoring has been mentioned and also increase of sanctions and "control by the responsible institutions". Sanctions, however, have been discussed as hard to impose and implement. It is agreed that sanctions do not lead to the expected educational or blocking vandalism effect. Also the lack of an enforcement mechanism of "penalty" in cases of

polluting public spaces has been reported as a major factor for the condition of inter-block areas – i.e. littered and unkempt.

As a reason **why people would not intervene sometimes in cases of vandalism** (i.e. report it to authorities or directly address the aggressors), people shared explicitly a concern and fear of being physically bullied or attacked. In addition to video monitoring of public space areas, improved and working street lighting systems were identified as necessary.

Municipal experts also complained that vandalism of public space infrastructure creates an ongoing pressure in their daily work and an unnecessary spending of public funds for renewing the places.

## The Future

What people would still like to see there as (an)other space/leisure time activities and what type of environment they wish to have **dedicated and integrated as infrastructure spaces for performances** (could be an amphitheatre) of individual people and/or groups – a possibility to show one’s talents and provide access to cultural and art products. These should be well-designed and constructed – e.g. have dressing rooms, lavatories, etc. Chemical toilet cabins are not perceived as a good solution in parks or serving such facilities, due to their aesthetic and clashing with the “natural environment” solutions. Examples from other city parks of constructed lavatory buildings with running water, collected fee for service, were given.

Spaces for individual, independent artists’ or people’s **dances in public space** (e.g. for folk dances in open air, tango dance, breakdances, etc.) were envisioned as important places for active living and socializing. People also declared need to have more places to practice sport/fitness activities in the open air or/and adults to play games (e.g. archery, petanque, fitness, etc.).

**Public space**, according to the participants in the focus groups. Should be safe, open (visible and well-trimmed bushes and trees) and maintained safer physical environment. There should be signs and posters, **informing and motivating good civic attitude and care** for the public spaces and infrastructure, including the reminders to keep clean and avoid littering. This should be done in an entertaining and influential way, not just as bans and obligations, in order to bring about impact. Various sport spaces for free practice are recommended as options in the parks and/or inter-block spaces (specific ideas to be presented in the next stage of co-creation).

It was outlined that **citizens’ participation** (including the interest, motivations and degree of participation of the residents) is low and that people are not very active and interested. People would like to be informed at their local/neighbourhood which is closely related to the residence (the quarter, the inter-block space, the block) – by posters at their blocks/nearby shops, etc. As a recommended solution “shorter links/connections” to get to them should be sought. Parents of pupils/at schools/ and kids/at kindergartens/ should be encouraged and involved to participate and motivate other friends and parents to join. Kids are seen as a “channel to bring impact and motivate participation”.

Very often a problem is the why-me-syndrome of participation. People would tend to associate participation as an additional effort for others, who are practically not getting

involved, just standing by. One block manager, however, insisted that “When people see that things happen (change), they join - trust me on this!”. Therefore **motivators need to be identified and encouraged**. Even the team of URBiNAT was identified at one of the focus groups as the potential motivating agent for such change.

Regarding the **degree of satisfaction with the mode of management, communication and interaction with citizens of the district**, people would like to see a more holistic and good in terms of performance care of the environment – incl. waste collection, maintenance of spaces, etc. Some people (a manager in a block) have expressed full satisfaction with the response rate and action of the administration when approached on various issues. People would also like to be informed and participate in things (meetings, discussions) related to their neighbourhood at a lower/closer to them level - i.e. be informed by notices disseminated at the blocks or closer by and have meetings/discussions held nearby (not 1 discussion for the whole district, but several ones near the people).

The ideas and people’s dreams for changes in the corridor comprise all environmental aspects – social, physical and/or natural environment, administrative management, etc. In addition to the ideas presented under the “environment” discussion above, people would like to see more activities and spaces adapted/provoking activities in their neighbourhoods and the park/s. They would like to have more meaningful design and management of spaces (e.g. the Market near CBA shop is half empty, and in the other part low quality clothing is being sold) with strict regulations and minimum requirements set and their implementation monitored. A recommendation for control and enforcement of sanctions has been made by several participants.

#### **Comments that may be useful in scheduling and drafting next URBiNAT activities and motivating a long term involvement and active participation**

Next project steps need to pay careful attention to the mechanisms of motivating and involving the citizens, if longer term involvement at all stages is to be ensured. Potentially some key agents (citizens and representatives of the culture institutions) should/could be considered to form some sort of an activist nucleus, which could design and take care of spreading wavelike the spirit until a larger active core is created.

Interventions, messages and events should be provoking interest, should be catchy and fun-bringing. Young people could/should be involved and educated through involvement (e.g. design, organisation of events, etc.) - they would ensure motivation and spread out to other groups of the population. Pensioners, with their good organisational skills, culture and wisdom, are another group which could be very well integrated in the process if clear ideas and tasks are set.

## 5.4.7 Face-to-face interviews

### 5.4.7.1 Semi-structured face-to-face interviews with citizens from the URBiNAT area

#### 7.1.1. Implementation of the method in Sofia

Semi-structured interviews have been conducted for the URBiNAT study area. A total of 11 respondents have taken part in 10 interviews (1 interview had 2 interviewees), out of which: 10 Bulgarians (9 female and 1 male), and 1 Chinese (male) respondents; 10 people living in Nadezhda District area, 1 person commuting from Pernik and working in the target area; 1 representative of the District Administration (environmental expert), 4 representatives of municipal structures (i.e. Centre for Work with Children – 3, Municipal Culture Institute – 1), 2 22-25-year-old young people (employed, working in other central city districts), 3 retired people (2 self-employed and owning businesses locally, and 1 mother of a young person with physical disabilities), 5 people working at municipal entities; 1 self-employed entrepreneur.

The interviews have been conducted at the business location or workplace of the respondent (in Nadezhda 2 and Svoboda residential areas) and in city locations (non-project territory), convenient for a meeting for the respondent. The main themes explored through the interviews focused on: a) level of attachment of the respondent for his/her neighbourhood – identity with places, atmosphere; b) things in the territory the respondents like/dislike, c) identified potential for change.

The things in the territory the respondents like/dislike were categorized as follows:

- Aspects of the environment (physical and natural, mobility patterns, infrastructure and social/community) in the target area, which they like and dislike;
- Communal environment and communication patterns;
- Citizens participation – interest, motivations and degree of participation of the residents;
- Attitudes to district government and management of the district (respondent's residential area) - degree of satisfaction with mode of management of the district, communication and interaction with citizens;

The identified potential for change focuses on the areas of desired change; change agents (participants in the process); modes of informing, motivating, and sustaining interest and reactivity to sustain the process.

#### 7.1.2 Discussion of results

##### **Attachment and attitudes to the territory of the project**

All respondents, residing in the URBiNAT study area, have reported and demonstrated very strong and deep identification and affiliation with their neighbourhood. For most of them it is the place they grew up in, formed friendships, studied, etc. They are happy with their place of living, like their neighbourhood and especially Severen Park as an area which provides a space for relaxing, practising sports, socializing, celebrating events with

friends/family. Only one person (around 25 years) has shared a plan to move out of the area and find a place to live in the city centre. As a motivation vicinity to places of residing and work of the friend circle has been reported.

### **What people like**

“Severen Park” is the answer that unifies all respondents, unanimously. Some have also mentioned Nadezhda Park. All respondents have expressed satisfaction with the current renovation of Severen Park. The park is a main element of their identification with their place of residence. They even seem to be proud that it is visited and used for recreation by all Sofia residents. It has the element of being a valued asset for all Sofia citizens (like other bigger park areas). People are happy with the improved condition of the park – lighting, benches, and summer cinema sessions in the open air. There is no dog-human conflict with regard to use of park areas.

People also like the excellent transport network (bus, metro, trolleys) and ease and speed of moving around and getting to all points of the city, both in the target project territory and the city in general. The mobility social service provided by Sofia municipality for people in wheelchairs (a special minibus for transportation of people with wheelchairs to all points of Sofia) has been appreciated by the interviewed. Price of this service is perceived as accessible and easy to be arranged.

The friendly and efficient partnership collaboration with the district administration has been mentioned by the representative of the Chinese community. Based on an initiative of the Chinese-Bulgarian Chamber of Commerce, a gazebo has been constructed and donated to Severen Park. This initiative is well-accepted by the local people (not only by Chinese living and working in Nadezhda district, but by all park visitors).

It is interesting to note, that even though the respondents (respectively citizens residing URBiNAT target area) have the benefit of living close by big park and of having ample green inter-block spaces, they would still express a wish to see “more green spaces”.

### **What people dislike**

The most disliked in the target area are the aspects of the environment (physical and natural, infrastructure and social/community), communal environment and communication patterns, and degree of citizens’ participation.

#### ***Aspects of the built environment***

Regarding the physical and natural environment, trees, playground noise, waste, noise, state of pavements and streets, parking and pet infrastructure are among the most topics discussed. Roma citizens with carts, who gather recyclable waste and the management of shop supply logistics, are among the most disturbing everyday life of the neighbourhoods. The issues of the organization and the functioning of the market place in Svoboda neighbourhood and the expectations about the social role of the Centre for Work with Children reflected the insufficiency of social services and facilities.

Many respondents mention the state of **tree care** as a concern, and especially that they are not trimmed and maintained. This somehow threatens their people physical safety (e.g. due to potentially broken tree branches damaging cars, creating risk of injuries for people)



and the neighbourhood physical and natural environment. People also express a wish to have unsafe trees removed, but expect to have new, replacements. i.e. they do want to see back the trees around and have the greenness and freshness of the environment preserved.

Several respondents mentioned noise generated by traffic along bigger, busier streets as a serious problem. One respondent has expressed a concern that frequently **playground noise-based conflicts** arise. It was reported that recently a new playground infrastructure has been put to fire, suspected reason being noise until late evening to the blocks around. Also in some places, people have noticed that users of benches and playground infrastructure do not use it with care and do not clean waste after they have been around and used the area. The municipal environmental expert has reported that there have been cases of benches, which have been intentionally taken out of their fixed position (acts of vandalism). As a result, additional budget and human effort was needed to recover the damage.

Similar to the focus group discussions, the interviewed reported that **waste** is a serious issue as people are said to not clean and care enough for litter in public spaces (i.e. negligence with regard to throwing or leaving litter when using them). Dog owners fell in another group of public space users, who according to the interviewed, do not take care of the dogs and their excrements when spending time outdoors. Another respondent commented that this issue is partially exacerbated by the trends of shrinking green spaces (resulted by approved plans for construction of new buildings).

The **pavements and street surfaces** are qualified as being in decline and not maintained and/or renovated on an ongoing basis. Pavements are not adapted for use by wheelchair users (i.e. people with disabilities and also mothers with baby trolleys). This is perceived as an impediment for people with physical disabilities to have a wholesome social life and access to their living area.

According to all interviewed, the practice of **car parking on pavements** (due to lack of parking spaces) has led to breaking up of pavement tiles. A respondent reported that people would tend not to use existing parking lots (as opposed to parking in green areas or on pavements) due to the distance (i.e. people do not have the culture of walking for 5-10 minutes from a parking lot to their residence).

Most respondents, who are residents or business owners in the target neighbourhoods, incl. the representative of the Chinese community, indicate the poor **condition of the streets** as the main problem of the built environment. Targovska street has been pointed out as an especially poorly maintained and managed place – e.g. greengrocer shops occupying pavements thus providing limited walkability (incl. because of trees and their state of maintenance). Even if someone would like to shun this street, however, there is no other option to get to the bus stop. In Tolstoy neighbourhood blocks 42 and 44 are also mentioned as especially unpleasant places with very bad pavement/street state around them.

**Roma citizens with carts, gathering recyclable waste** and other recyclable materials deposited at containers (usually circulating in Svoboda neighbourhood), are mentioned as an issue, creating disturbance in the neighbourhood. The Roma people are considered

as non-local-residents, coming to the area and also spending some of their leisure time in green areas (parking carts and socializing during the day occasionally).

The **transport scheme for shop supply** (entrance and exit schemes) for CBA supermarket is also reported to create disturbances and traffic jam along the nearby street. Previously two entrances/exits were used, which had enabled faster entry and exit from the premise, while currently only one is open and this creates commotion and traffic jam.

Representatives of **the Centre for Work with Children** report that there are cases of parents, who would consider and expect the Centre to act as a place for daily care and upbringing of children. There are cases where parents rely on the social role of the centre – they expect that the Centre would act not only as a talent/skill/language building entity, but also as a social service provider and educational institution, which bridges the gap in needs at family level.

One respondent has pointed out that **the municipal market place in Svoboda neighbourhood** a very inefficient market place (i.e. rarely attended by 1-2 sellers), with poor looks and image (lower quality and price clothes sold at 1 out of 4-5 stools). The stools are said to be located on the site of a green area (interviewer's note: they are rather on the pavement by the street, next to CBA shop) and not functioning in autumn and winter, due to the choice of stools (open-air ones, which prevent sellers to use them in cold weather). The only stool is managed by a retired person. This may be good ground for the municipal officers to revise their policy and approach on this specific "municipal market". There have been occasions when the stools were used by alcoholics as places to stay overnight (as their temporary accommodation sites). The location and management approach of the municipality of this market is worth to be revisited to ensure that the image of the place and its function are not affected by malpractice.

#### ***Communal environment and communication patterns.***

There is mix of opinions expressed about the neighbourly/community relations in the area where the respondents live. Most of the respondents seem to be content with the block space and relations on joint care and co-living, some even get together with their neighbours. One of the respondents has identified the area in front of CBA Supermarket (in Svoboda neighbourhood) as "the only place with benches to get together". Though not communicated directly, the lack of organized space for communities is an important issue to be addressed by URBiNAT project but also by municipal policy.

Although respondents interviewed seem to be caring for the environment citizens, most (incl. the municipal expert) report that in general people do not care about the environment. There are individual citizens who more actively take care of the environment and inter-block spaces, but these are seen as exceptions. The municipal administration does not identify the residents as a reliable group of citizens, who not only live in the area, but also acts a responsible owner.

People from Svoboda neighbourhood (incl. young people) would go to "Lomsko Shosses" area in their leisure time when they would like to socialize, visit a pub, etc. as the Svoboda area does not have such places.

A respondent, who works in the target area, but is not a resident there, suggested that there is a need to change the “greyness” of the neighbourhood and to also ensure that its green areas are not affected by demand for construction of new buildings (residential and/or business ones).

*Citizens’ participation – interest, motivations and degree of participation of the residents.*

Both municipal administration and citizens-respondents confirmed that “**people expect someone else to do the things, which they would like to see happen/in the environment, public spaces**”. This creates a need to consider and plan more active work with identified locally active or having the potential to become involved citizens also for the next stages of the URBiNAT project. Some ideas about motivating and provoking involvement through events targeting participation of children have surfaced (incl. through use of arts, workshops for visioning of public spaces and relations for better communities).

### 7.1.3. Conclusions

**Citizens interviewed could be classified in three main categories:** active and caring; observing, potentially dormant participants; observing, yet unlikely to join.

The active and caring citizen take part in the process of shaping of the living environment and participate in activities and/or work with children and their parents. Activities focus on community events or living environment, or on cultural and educational work with children. e.g. respondents from the Centre for Work with Children reported that the yard of the Centre is open for access to the people from the community (as visitors – i.e. retired people from the neighbourhood, young mothers with children, etc. who use the area for recreation and social meetings with friends). One of the respondents was an active participant in the Retired People Club (Pensioners’ Club), which organises trips out of town for its members as a social activity.

The observing, potentially dormant participants are usually young people, who have lived in the neighbourhoods and are currently employed (working out of the district, but residing there). Potentially there are other people like this, not only in the age range of young people. However, they need to be mobilized by means of communication channels and specific activities, which respond to their interests. They have an active attitude and – if adequately addressed and motivated, would contribute – either with ideas or also with participation. One respondent mentioned that if there were online channels of communication and providing feedback and ideas, she would gladly join.

It is likely that the “observing, yet unlikely to join” respondents of the neighbourhood form an amalgam of non-coherent group which still has to be explored and approached. The diversity in backgrounds of the respondents makes it impossible to generalise around just a couple of approaches that could result in optimal motivation for participation. They prompt rather a need to remain flexible and diversify the tools and methods of approaching and motivating the citizens to participate along several target groups, e.g. students (at schools); young people (at universities or with jobs – up to 30, no children yet); young people/families with children; retired people. These groups along with active citizens, who do not fall in any of them, have the potential to be the core of people who could contribute in the next stages of the URBiNAT project.

The interviews point out to the following aspects which could/should be considered by the URBiNAT project Sofia team in the next stages of project implementation.

In terms of citizen participation people may be interested and willing to participate if organised by someone (institution or active and trusted citizens amongst them). A process of ongoing communication and work with the target communities to get them involved and understand the importance of their contribution and involvement for the desired outcome (i.e. the change/improvement in their living environment). Young people should be approached also via appropriate web-based channels. However, adults should be reached via other channels – posters at places of their interest or residence (esp. for retired people – face to face or phone contact could be even more efficient).

The Municipal Culture Institute is a place that has the institutional history of providing space and content for activities locally, which should/could be supported as a “natural centre” to provide space for children and/or citizens to express and implement their ideas for improving the neighbourhoods in the target areas. These activities would have to be in line with the focus of the Institute. This can be achieved through various activities planned well with the Institute’s management (to ensure availability of space, moderators/tutors, materials, etc.)

Process of designing a joint vision for the target area interventions (incl. shared aesthetics of inter-block spaces, facades of buildings, activities, availability and maintenance of small garden plots in front of blocks, park furniture – benches, tables for social activities, etc.)

Motivation of people is closely related to availability of resources (funds, materials) for making the change and to one’s inner (individual) contact with/interest in an idea. Therefore, the URBiNAT project team could consider ways to better integrate children as motivators of participation (of their parents/grandparents) in the next stages of the project, proposing ideas for the change/improvement of the living environment.

The representatives of the Chinese community have a sense of belonging to the neighbourhood, which mingled with their cultural background and participation patterns, leads to their readiness to participate and financially support specific initiatives, if they respond to their expressed needs and interests in improving the environment.

All of the above reflect a need to design a process for the next project stages, which has clear and concrete objectives; expected outputs and their impact on each potential “creator”/ user of the public good; and clearly defined amount of effort and expertise needed, and sources, which will provide these - e.g. through citizen participation, institutional commitments and tasks, management and responsibility in the process, owners and users of the products, etc.). There is some potential, which can be tapped into at citizen level, e.g. Chinese community members, and/or other residents – to ensure financial and/or material contribution for actions, which people would like to see implemented. Responsibilities should be tied up with material/financial resources available for their implementation, within the timeline of tasks. Throughout the whole process, a clear and efficient communication plan should ensure timely and adequate feedback to all participants in the process.

### 5.4.7.2 Face-to-face interviews: market assessment and empirical research with green and social businesses in Sofia

#### 7.2.1. How was the method implemented in Sofia

The empirical research in Sofia was conducted in a 4-stage process, as illustrated in the figure below. Firstly, it was important to establish contact with local green and social businesses. This was accomplished by communicating with the local municipality and other partners from the URBiNAT project. The most fruitful occasion was a physical meeting with green and social companies as well as citizens living in the intervention area in January 2019, on the occasion of the partners' meeting. In this participatory workshop, all participants shared their challenges and hopes for the intervention area. Several participants wanted to create their own green start-up or grow their green and social business further by receiving support from the national and local governments as well as the URBiNAT project.



Figure 501. 4-stage process of the market assessment and empirical research with green and social businesses in Sofia

After creating a compilation of all the green and social businesses in Sofia and conducting a market assessment analysis, the founders were contacted and qualitative face-to-face Skype interviews were conducted. The interview answers were used to fill in a Sustainable SWOT Business Model Canvas (see figure below). This model helped to identify the eco-social benefit and the eco-social costs the companies are creating or causing. By evaluating the eco-social benefit and weighing it against the eco-social cost, it was possible to create an assessment of the overall objective and solutions the business model is thriving towards.

Sustainable SWOT Business Model Canvas				
<b>Problem</b> List 1-3 problems that you want to solve	<b>Solution</b> Outline a possible solution for each problem	<b>Unique Value Proposition</b> Clear and compelling message that states why this solution is different and worth paying attention to	<b>Unfair Advantage</b> Something that cannot easily be bought or copied	<b>Customer Segments</b> List your target customers and users
<b>Existing Alternatives</b> List how problems are solved today	<b>Cost Structure</b> List your fixed and variable costs	<b>Revenue Streams and Upselling</b> List your sources of revenue	<b>Channels</b> List your path to customers (inbound or outbound)	<b>Early Adopters</b> List the characteristics of your ideal customers
<b>Eco-Social Benefit (Strength)</b> What ecological or social benefits is the business model generating? Who are the beneficiaries? Are they potential customers?	<b>Eco-social Costs (Weakness)</b> What ecological or social costs is the business model causing? Which key resources are non-renewable? Which key activities use a lot of resources?	<b>External &amp; Internal Obstacles (Threats)</b> What are external threats that could prevent the green business from being successful (e.g. policy restrictions or competitors)?	<b>Enablers (Opportunities)</b> What are your suggestions for the local government to make it easier for green organisations to grow? What are your hopes and wishes for the URBiNAT project?	<b>Additional Information</b> Have aspects that are crucial, but haven't been covered yet

Figure 502. Sustainable SWOT Business Model Canvas



In the course of this analysis, 10 for-profit and 14 not-for-profit organisations were analysed. The 24 organisations were working in very different areas (education, food, innovation, social, consultancy, advocacy). Interestingly, most of the organisations worked within the field of education (8). Their goal was to educate people, especially children, on the impacts of climate change and how to improve the personal way of living towards a more balanced approach between consumption and protecting the environment, e.g. through growing organic vegetables in private gardens. Only 3 companies were working in the field of innovation, which can be explained by the lack of networking platforms and hubs for companies with a sustainability focus, the lack of support by the national and local government to invest into the research of new technologies, and the general lack of knowledge in the field of nature-based solutions amongst Bulgarians.

We can mention two examples of green and social companies from Sofia. The first one is called ZAEDNO ('Together'), which is a not-for profit organisation that aims at educating citizens and especially children aged 3-12 years on how to apply Permaculture Design in order to regenerate waste urban land by creating intensive small-scale ecosystems (edible gardens). The organisation is providing workshops for local communities, kindergartens and schools on how to design, plant and maintain their own edible gardens. Participants learn how to apply Permaculture Design ethics and principle in order to grow organic food but also how to respect and protect Nature.

Mr Green Walls is another example of an innovative business that is building and selling vertical walls for the interior and exterior in order to improve microclimate, reduce the heat island effect and energy consumption. Its main struggle lies in adhering to the strict requirements and building regulations when implementing vertical walls or gardens. This process can often take several months, which is making it difficult to sell products. In this case, the local government could try to ease the building approval procedures and also create financial (tax) incentives for green and social companies in order to spur the growth of these businesses.

### **7.2.2. Results**

What obstacles, opportunities and enabling activities did the interviewees mention in bringing forward their green and social business?:

*Obstacles:* the green business owners and founders were disappointed with the lack of funding and support for their projects on behalf of the local and national levels of government. There is also a general insufficiency of encouraging initiatives, e.g. workshops or events, to educate people in Sofia on environmental challenges and how these can be tackled through nature-based solutions. Another missing point was the lack of innovation hubs or platforms for green businesses to cooperate, co-create or co-design NBS and to learn from each other.

*Opportunities:* many of the interviewees acknowledged a slow shift in people's perception on the importance of protecting the environment. They also recognized more and more sustainable and social organisations that were being established. Interviewees also said that the general acceptance and willingness of Bulgarians towards complying with European Union regulations is very high and they have a lot of hope in European Union funded projects, such as URBiNAT.

*Enablers*: the following enabling activities that can spur green and social business growth in Sofia, that can be pushed forward by the local government, include:

- increase taxes on green-house gases and align them to the European strategies and regulations;
- explore options but also impacts of reducing taxes/introducing compensations for renewable energies and nature-based solutions;
- research possibilities and assess mechanisms for stimulating more public-private entities that own land and buildings to offer them temporary to NGOs;
- create platforms for idea exchange and business growth (connecting different NGOs, networking and creating a social innovation hub for young people);
- encourage communal identity by creating communal spaces to overcome cultural differences and stereotypes;
- create financial incentives for green businesses. Local government could support NGOs that give jobs to unemployed people, e.g in the areas of urban gardening in the deprived neighborhood, water collecting and purification system, air purification strategy;
- educate people on environmental issues, and offer guidelines on how to live in balance with the environment, e.g. vegetable gardens, compost toilets, biking;
- explore mechanisms to stimulate the implementation of green facades;
- provide alternatives to car ridership - create cycling infrastructure, provide reliable public transport, provide intermodality and optimize car parking space.

## 5.4.8 Territorial Analysis

This chapter includes territorial analysis, conducted exclusively for the Study Area. Most of them include new data produced to feed directly the phase of Co-design of the Healthy Corridor. The data and their visualization strictly follow the protocols for the analysis of the pedestrian network, the terrains available for URBiNAT, and the synthesis map.

### 5.4.8.1 Green structure mapping

Natural spaces comprise a modest share of the green structure, whereas urban manmade green spaces dominate. The natural spaces (around 3% of the total green structure surfaces) are represented by the patches of “natural vegetation” which has grown at the edges of the study area next to Severen Park and Lokomotiv sports complex. The “freshwater elements” are around 2% of the total green structure. They are along the concrete riverbed of Suhodolska, which although the flowing water, is far from being natural. Pioneer and invasive shrubs and trees part of which are being cut periodically dominate the natural vegetation along the riverbanks. (table 4, fig. 52)

The second category “manmade green spaces” consists of predominantly “green spaces associated with collective housing development”- it comprises almost half of all green structure spaces. “Tree-lined streets” and “Green spaces associated with main transport routes” are altogether 14 %. The pattern of the “tree-lined streets” (9%) could be characterized as a tree coverage, which is often scattered as many trees had grown on their own at places with missing pavement or previously planted trees were cleared after they died due to activities such as parking over the roots at the sidewalks, winter street cleaning and the resulting salination of the soils or other air or soil mediated plant diseases.

Table 147. Green structure of the study area based on the categories and types from the protocol

CATEGORY	TYPE	AREA, ha	SHARE
Natural spaces	Freshwater elements	1,96	2%
	Natural vegetation areas	2,83	3%
Urban green spaces	Public parks and gardens	6,94	6%
	Green squares / plazas	3,64	3%
	Green sports fields	0,08	0%
	Green spaces associated with multi-family residential buildings	54,21	48%
	Green spaces associated with public facilities, institutions and corporation buildings	7,61	7%
	Green spaces associated with main transport routes	6,05	5%
	Tree-lined streets	10,56	9%
	Private residential green spaces with public interest	9,35	8%
	Vacant lots	9,25	8%
	<b>Total</b>		<b>112,48</b>



Figure 503 Territorial analysis. Green structure of the study area based on the categories and types from the URBiNAT protocol

Vacant lots” covered with vegetation are only 8% of the green surfaces but there are plenty of collective housing green spaces which are to some extent abandoned and vacancy. Such areas were included in the territorial mapping and analysis of vacant lots. “Public parks and gardens” (6%) and “Green squares / plazas” (3%) are altogether 9% of the green in the study area and there is a general lack of green sports fields. The state of public green is relatively poor due to lack of maintenance and the need for their partial or full reconstruction. The share of the “Private residential green spaces with public interest” is 8% and their share is still decreasing due to the intensification of the quarters along “Lomsko shosse” Blvd that are being turned into densely built-up mid-rise housing structures of apartment blocks with ground floor services. The “green spaces associated with public facilities, institutions and corporation buildings” (7%) are partially in good condition and maintained.

No „green spaces used for agriculture and forestry”, “camping areas”, “green cemeteries” and significant “green spaces in buildings” which are part of the urban green spaces category are found in the study area. From the natural spaces category the “coastal areas” and “inland rocky formations” are missing.

There is good ground for improved connectivity of the green structure, especially through restoration of greenery in the vacant lots and abandoned public or semi-public green (especially the inter-block green spaces associated with collective housing). Significant number of spaces lack high quality natural vegetation, while others are gradually being transformed into richly vegetated spots are not properly maintained in terms of accessibility and are not arranged and perceived as providers of quality cultural ecosystem services with their relevant benefits and value for the communities of Nadezhda district and the neighbourhoods of the study area.



Figure 504 Park area (UACEG)

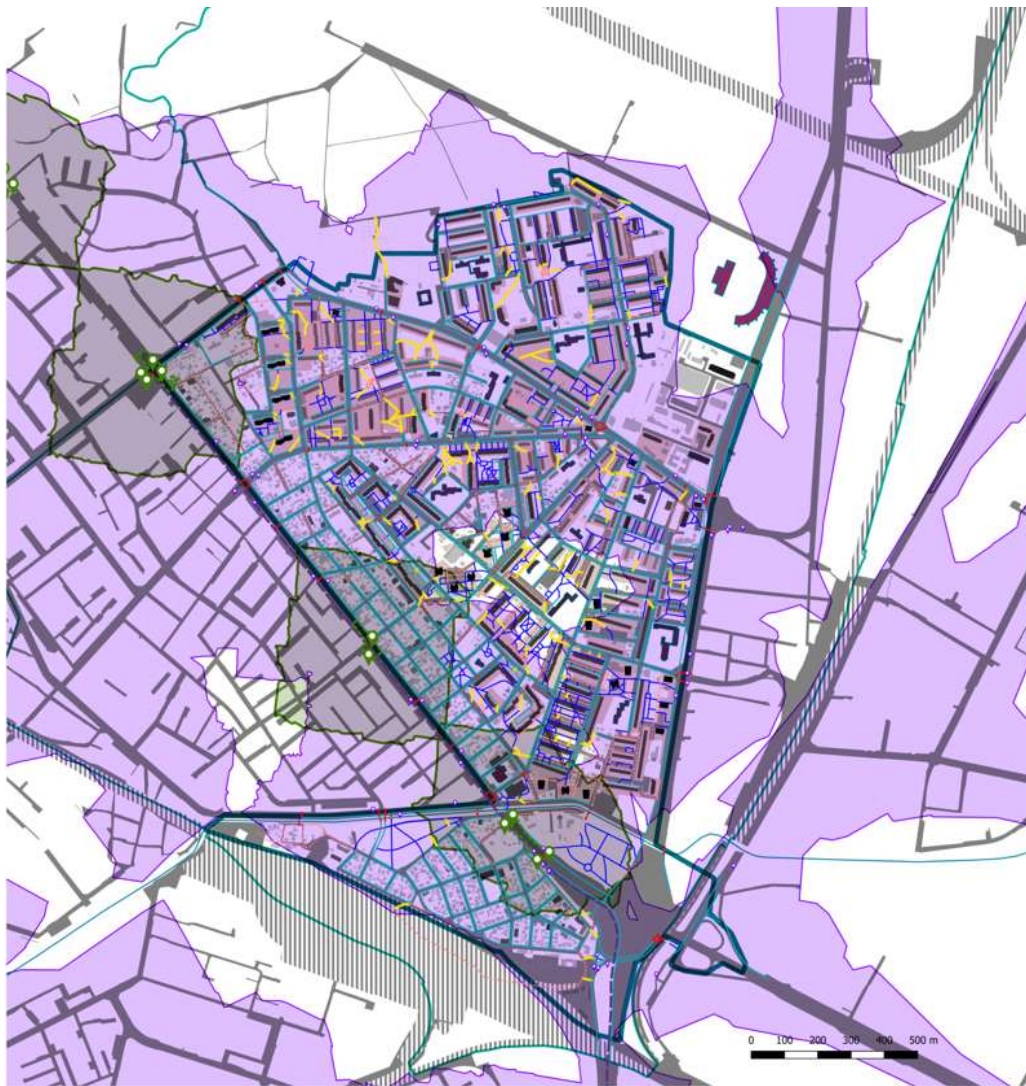


Figure 505 Inter-block greenery (UACEG)

#### 5.4.8.2 Pedestrian paths

The complex type of housing estates development has led to a non-continuous urban structure with many options for movement in space. Part of these directions were not initially supported both due to unforeseen needs by the planners and designers of the





**Pedestrian paths, cycling and public transport**



Figure 506 Pedestrian paths in the study area based on the categories and types from the protocol

estates but also due to changed modes of travelling and movement. The attempts for length and surface optimization of pedestrian alleys and the relevant savings has led to less construction of alleys and pathways and many unpaved walkways. The planned orientation of the walkways were never fully revised and reconsidered neither after the changes from 1989 when the economic and political restructuring led to rapid changes in the accessibility and mobility patterns nor prior or after the construction of the underground which attracted users of other public and private transportation modes.



The crosswalks in the area are many and various types. The bridges over Suhodolska River are fewer than needed, they are hardly accessible, narrow and dimly lit. Better accessibility, higher capacity and safety are the main issues connected to those existing bridges. The zebra paths are very few compared to the big number of unregulated crossings where safety is under question both due to poor visibility and because of the missing traffic calming measures. Some of the crossings at traffic lights are very inconvenient for pedestrians. Subways are mostly organized for access to the metro stations and more rarely for crossing of the two boulevards (Lomsko shosse and Rozhen) and the large junction Nadezhda. Generally crossing the borders between neighborhoods and beyond the district is a big challenge especially at some of the locations where high speed traffic flows or physical barriers exist.

Table 148. Pedestrian paths in the study area based on the categories and types from the protocol (the share of the length for the separate types is the % of the category and the share of the categories is % from the full length of pedestrian ways)

CATEGORY	TYPES	Length, m	Share, %
Crosswalks	Bridges and approaches to them	174	2%
	Zebra paths	333	5%
	At traffic lights	498	7%
	Subways and approaches to them	378	5%
	Unregulated	5839	81%
	Total crosswalks	7222	6%
Formal pedestrian paths	Alleys and paths	23158	22%
	Shared streets (car parking)	7328	7%
	Shared streets (car movement)	8878	9%
	Sidewalks	64345	62%
	Total formal pedestrian paths	103709	89%
Informal pedestrian paths		5572	5%
Total		116503	100%

Formal pedestrian paths are the dominant group of pedestrian ways. The biggest contribution in this overall category comes from the sidewalks. They are surrounding most of the quarters and in many cases, they are on both sides, which make their length much bigger. Most often, their physical condition is very poor and they are partially occupied by illegally parked cars. Thus, the dominant group of formally delivered space for pedestrians was transformed into very fragmented sections, which in some situations are useless. At a few places thanks to EU funding, their condition is much better, for example the sidewalks along “Lomsko shosse” Blvd above the metro line and in vicinity to the newly rehabilitated schools, kindergartens and other public services.

Formal alleys and paths are the second type in this group in terms of length. Their condition is even worse except for the short sections in front of the block of flats and some adjacent alleys and paths that have been repaired or cleaned by residents with their own resources, with materials and funding from the municipal program “Green Sofia”, or (rarely) by the district with its very scarce financial resources for public works. Sometimes these alleys and paths are hardly found and can be called “contemporary urban

archaeology” because of their poor drainage, muddy cover and even slight soil formation and vegetation cover formed during the last 20-30 years.

Shared streets were partially designed as such with the concept of residential area slow and winding ways for access and parking next to the blocks of flats. The very low motorization rate in the past is in strong contrast to the current rate, which goes above the EU average. Today these shared residential spaces are often crowded with tightly parked cars. Their condition is also very poor and at the same time, they partially provide access to pedestrians, although it is both unsafe and discouraging due to the aggressive and impatient behavior of many of the car drivers, also frustrated by their everyday experiences. The shared spaces in front or behind many of the blocks which are dedicated to car parking are much inconvenient to pass through as a pedestrian and the lack of designated spaces makes it very difficult for impaired or for parents with strollers.

The informal paths are almost evenly spread among the housing estates of Nadezhda 2 and 4, Tolstoy and Svoboda. Usually most of them are shorter but there are also very long ones passing through vacant or abandoned lots. During the seasons, they may look as taiga, steppe or desert where there are traces and signs that people are passing by. Sofia municipality has extended the basic mowing and cleaning of many of the spaces around the housing estates in the recent years. In this way, some of the informal paths have become more accessible throughout the year. At other locations, due to the diminishing number of dwellers and their aging such paths almost disappear. Many shorter informal paths, which are parallel or cross the formal ones, are not mapped in that level of detail but their existence shows that either unregulated car parking or lack of capacity for pedestrians to pass makes them go out of or cut off the tracks. A much denser pedestrian network is needed to answer the diverse needs of local residents and to make walking convenient in that densely inhabited part of the city.

With few exceptions, most of the informal paths are over municipal private land. This means that there are no obstacles for the improvement of their condition and configuration in order to answer to the local needs that have been neglected for three or more decades. Eventual provision of more advanced distribution of property rights and shared responsibilities in these semi-public spaces between the municipality and the collective owners of the blocks of flats can result to some transformations and maybe to better maintenance and stewardship of the access and safety. The formal paths and crossways are almost completely part of the street space, which is municipal public property. The improvement of their condition is necessary and it has to follow more strict quality and design standards, especially about road safety, traffic calming and universal design for inclusive access. More strict regulations of the right of way and permeability should be advocated at some of the few cases where restitution or privatization of municipal land was realized or is being realized. This would avoid the additional hindrance of pedestrian movement if not taken into account.

The accessibility of the public transport is an issue not only due to the poor condition of most of the pedestrian ways but also due to the longer distances at some of the neighborhoods. For instance one of the big and densely built and populated areas in Nadezhda 2 and smaller part of Tolstoy are beyond 400m from public transport stops. This has to be taken as a chance for the healthy corridor which can provide alternative connectivity. This is especially true for the rich life of the neighborhoods at non-working days but also for the ordinary working days when most of the dwellers try to get outside

of the district for their work or other occupation. The south-western parts of Nadezhda 2 and 4 and the most southern part of Tolstoy are well served by the metro line and the other bus and tram lines. The other parts of the study area, and especially Svoboda housing estate, are less frequently and straight served. A corridor between the entrances from Severen park at the edge of Svoboda towards park Nadezhda which goes through Nadezhda 2 and makes two parallel axes through Nadezhda 4 and Tolstoy can be very beneficial for both recreation and work trips. It can follow both formal and informal pedestrian paths, backed by secondary (feeding and recreational) cycling alleys and lanes, altogether crossing at reorganized points through “Nikola Zhekov” Blvd, Suhodolska river and Nadezhda junction. This is the needed approach and direction for provision of the healthy corridor’s backbone.

#### **5.4.8.3 Vacant lots**

The approach for mapping and analysis of the vacant lots builds upon the protocol and adds several other criteria for evaluation. The reason for this is that a big number of lots (107) have been identified. All of them have varying degrees of vacancy and abandonment, quality of the open space and its maintenance, as well as prescriptions and provisions of the plans in regard to their type of property. Many of them have potential to be part of the healthy corridor. So the analysis attempts to be more comprehensive in order to avoid subjectivity and to try to evaluate the suitability of the lots for the corridor through multi criteria assessment. Furthermore, cooperative decision making on the subject has been applied between the local partner UACEG which introduced the criteria and their evaluation and the political and administrative bodies of Sofia municipality and Nadezhda district which had the opportunity to give feedback twice before and after the local elections.

The bases for the outlying of the lots were both the cadastral map and register but also the detailed urban plans in place which predefine the precise development regimes of disposition. The latter are the final scope and borders at which the evaluation was performed in relation to their regulative role when intervening in the city environment and space. In addition to the protocol the mixed ownership was included. It was inevitable because co-ownership of cadastral lots and various owners of parts of the regulative lots defined by the detailed plans is sometimes the case. Beyond the property ownership, the provisions of the plans and the level of maintenance, other criteria were included such as the public investments in the last and the forthcoming years, the proximity to major axes of the corridor, the observed behavior and the local development and the municipal property policy.

The major property types – public and private were enriched with the mixed category. The public property includes municipal public and municipal private, as well as state public and state private.

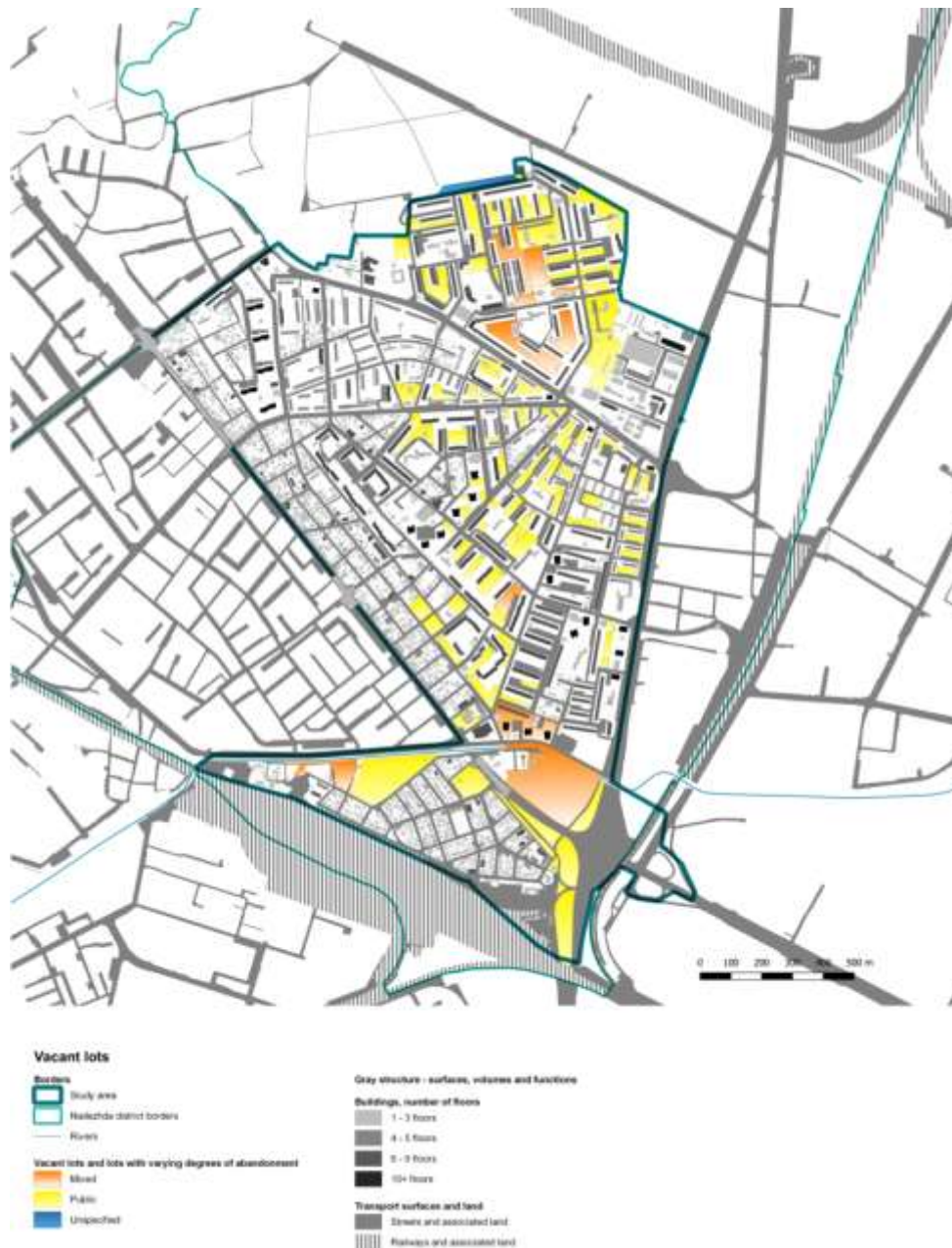


Figure 507 Vacant lots property

The other types of property include private, co-ownership (public and private) as well as unspecified land which is not enacted as any type. In the study area there is overall domination of the municipal private type (fig. ..., table ...). Even in the cases of mixed ownership the municipal private is the predominant one in terms of surface area. No completely private lots were included in the analysis due to the fact that there are too many public ones to be addressed. One important public lot at the edge of Nadezhda 2 with Nadezhda 4 housing estates is planned to be privatized and it is included in the evaluation due to its key location. In few of the cases there is a very big cadastral or regulated lot with municipal private property where collective housing ownership is in place with specific configuration of the buildings. These lots were selected because of their condition and also their role in terms of connectivity at the southern part of Svoboda and Lev Tolstoy housing estates.

Table 149. Land register and description of the property of vacant lots

Land register	Land register description	Area, m2
<b>Mixed</b>	Co-ownership	6436
	More municipal private & co-ownership and less private	7359
	More municipal public & less municipal private, private and unspecified	47102
	More municipal public & less private	3722
	More municipal private & private	8651
	Municipal private partially privatized	2453
	Municipal private with collective ownership of the buildings	28070
<b>Mixed total</b>		<b>103793</b>
<b>Public</b>	More municipal private & less municipal public	3974
	More municipal private & less state private	2171
	More municipal private & less unspecified	1280
	More municipal public & less municipal private	25637
	More municipal public & less unspecified	9687
	Municipal private	116152
	Municipal private planned to be privatized	1311
	Municipal public	86440
<b>Public total</b>		<b>246652</b>
<b>Unspecified</b>	Unspecified	<b>5865</b>
<b>Total</b>		<b>356310</b>

The Bulgarian spatial planning system at the local level and especially in urban environment has two interlinked instruments in place - the city masterplan but also the detailed urban design (regulative order) plans. Both have their implication of form and function. The masterplan prescribes more broad development regimes in terms of zoning with built up and functional parameters and requirements. The detailed plans of separate urban units (neighborhoods, public spaces, groups or individual allotments) have obligatory character and their proceeding relies on the consent of all directly interested stakeholders which are defined by the spatial development act and by another linked environmental legislation. In the last 10 years up-to-date plans for most of the territory in the study area have been produced.

For every housing estate they have been prepared as separate products, namely the plans for Nadezhda 2, Nadezhda 4, Svoboda, Lev Tolstoy, etc. The variety of strict provisions can be seen in the next table 3. Local green areas dominate the scene, followed by car parking facilities, public services and more rarely housing and others. Even in the cases where buildings exist or are planned, the predominant areas of the lots stay as open spaces. Another issue is the accessibility through or to them, which sometimes is granted or can be part of next level of definition of property rights through amendment of the detailed plans or through solutions in future investment design.

Table 150. City masterplan and detailed plans prescriptions for vacant lots

City masterplan information	Detailed plan information	Area, m2
<b>Complex housing</b>	For bicycle parking station	871
	For cooperative market	4794
	For greenery	1626
	For housing	3764
	For housing and parking	12451



	For kindergarten and nursery	7359
	For local garden	92385
	For local garden and playground	9368
	For local garden and sport	1280
	For multi-storey car park	4397
	For multi-storey car park and greenery	1286
	For parking	724
	For parking and semi-underground garage	1837
	For parking and underground garage	1400
	For parking with greenery	18708
	For sport	1990
	For sports hall and swimming pool	4117
	For sports playground	744
	For sports playground and greenery	9716
<b>Complex housing total</b>		<b>178817</b>
<b>Green around infrastructure</b>	For greenery	7530
	No prescription	32721
<b>Green around infrastructure total</b>		<b>40251</b>
<b>Local garden</b>	For greenery	507
	For local garden	8130
	For park	24378
<b>Local garden total</b>		<b>33015</b>
<b>Local garden &amp; Mixed use</b>	For local garden	<b>47102</b>
<b>Low-rise housing</b>	For local garden	<b>3415</b>
<b>Mid-rise housing</b>	For greenery	553
	No prescription	322
<b>Mid-rise housing total</b>		<b>875</b>
<b>Mid-rise housing &amp; Green around infrastructure</b>	No prescription	<b>1047</b>
<b>Mixed use</b>	For youth house	3508
<b>Mixed use &amp; Complex housing</b>	For local garden and playground	<b>1413</b>
<b>Park</b>	For greenery	189
	For social housing	5543
<b>Park total</b>		<b>5732</b>
<b>Public services</b>	For school	9687
	No prescription	23971
<b>Public services total</b>		<b>33658</b>
<b>Sport and attractions &amp; Mid-rise housing</b>	For greenery and sport	<b>7477</b>
<b>Total</b>		<b>356310</b>

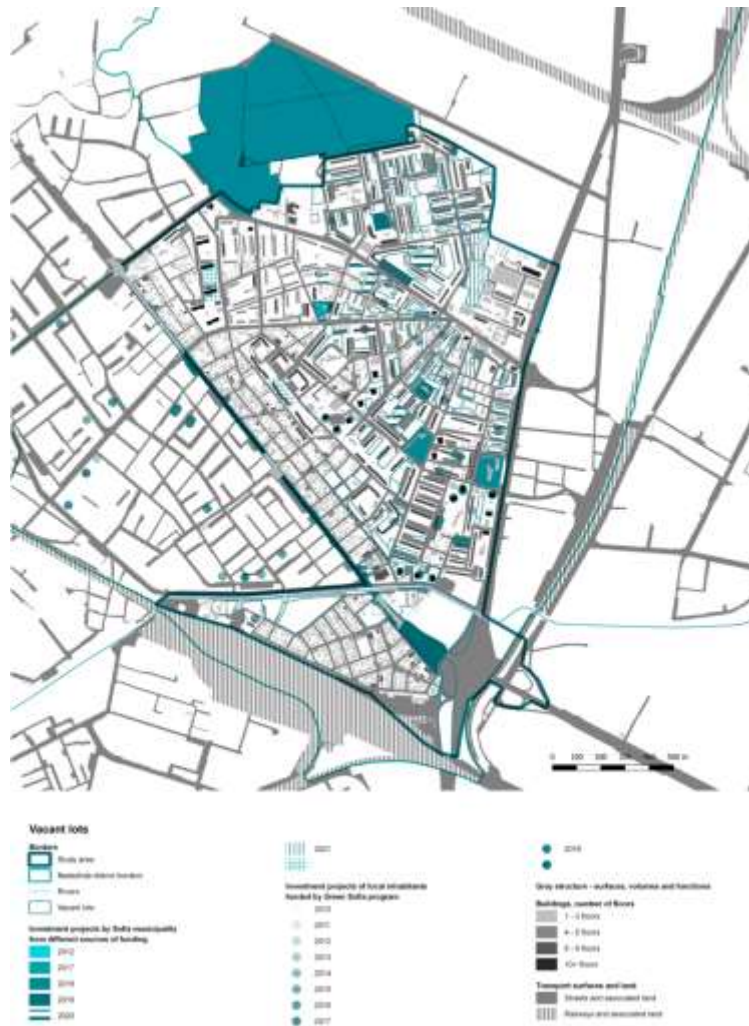


Figure 508 Vacant lots and investment patterns

The patterns of investment in the last 5 and more years have been mapped (fig. 57) and analyzed. The most significant investment projects in the period after the reconstruction of the underground and “Lomsko shosse” Blvd until present day have been the schools and kindergartens with an accent on energy efficiency measures.

Table 151. Level of maintenance of vacant lots

Level of maintenance	Area, m2
very high	3974
high	2446
medium	127197
low	148703
very low	73990
<b>Total</b>	<b>356310</b>

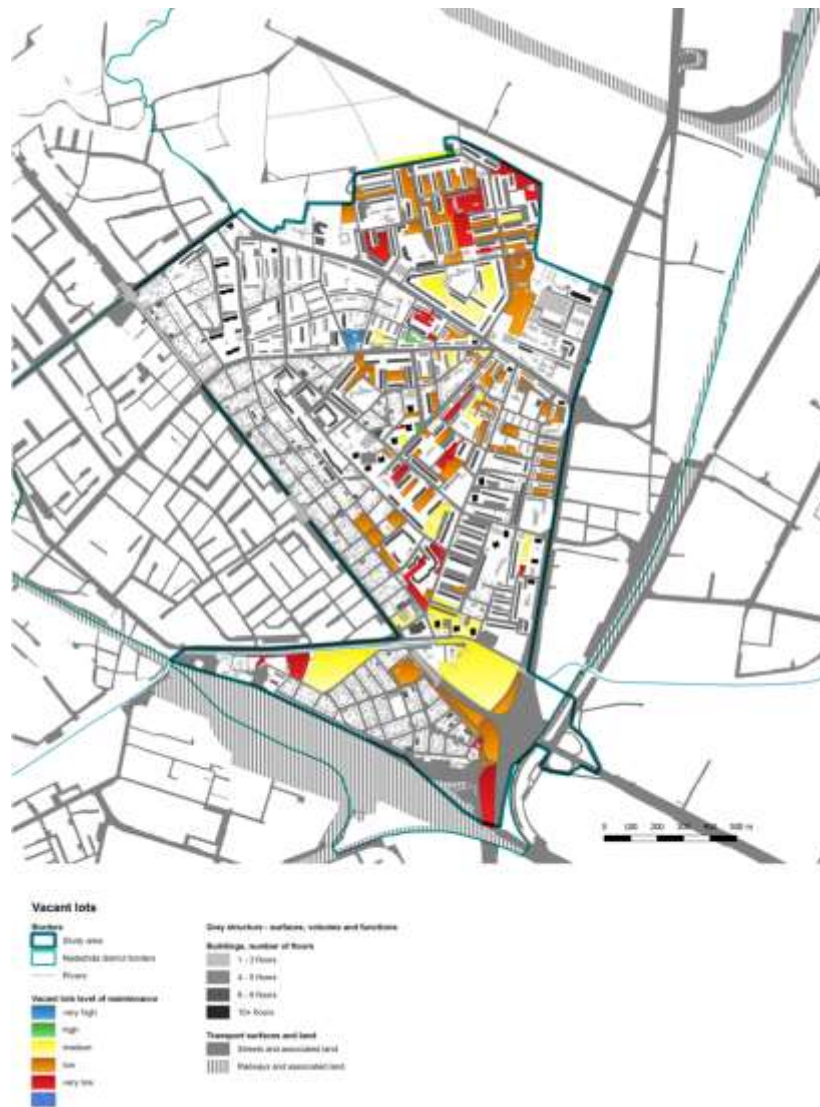


Figure 509 Vacant lots level of maintenance

The level of maintenance of the evaluated lots but also their equipment and the condition of past public works was also mapped and analyzed (table 4, figure 58). The low, medium and very low level of maintenance is the dominant state of all studied lots. It has started to improve after almost a quarter century of full or very minimal resources for maintenance and lack of public investment. The whole area needs more complex physical recovery but this can be said for most of the big housing estates in Sofia. It is a challenge which has to be addressed not only by cutting edge innovation in terms of NBS but also in terms of environmentally friendly, timely, cost efficient and durable reconstruction of the built environment. This means that the small amount of NBS investment from the project has to be coupled with larger municipal or district program for physical rehabilitation in order both to have higher impact for the quality of the environment and the overall quality of life of the neighborhoods.

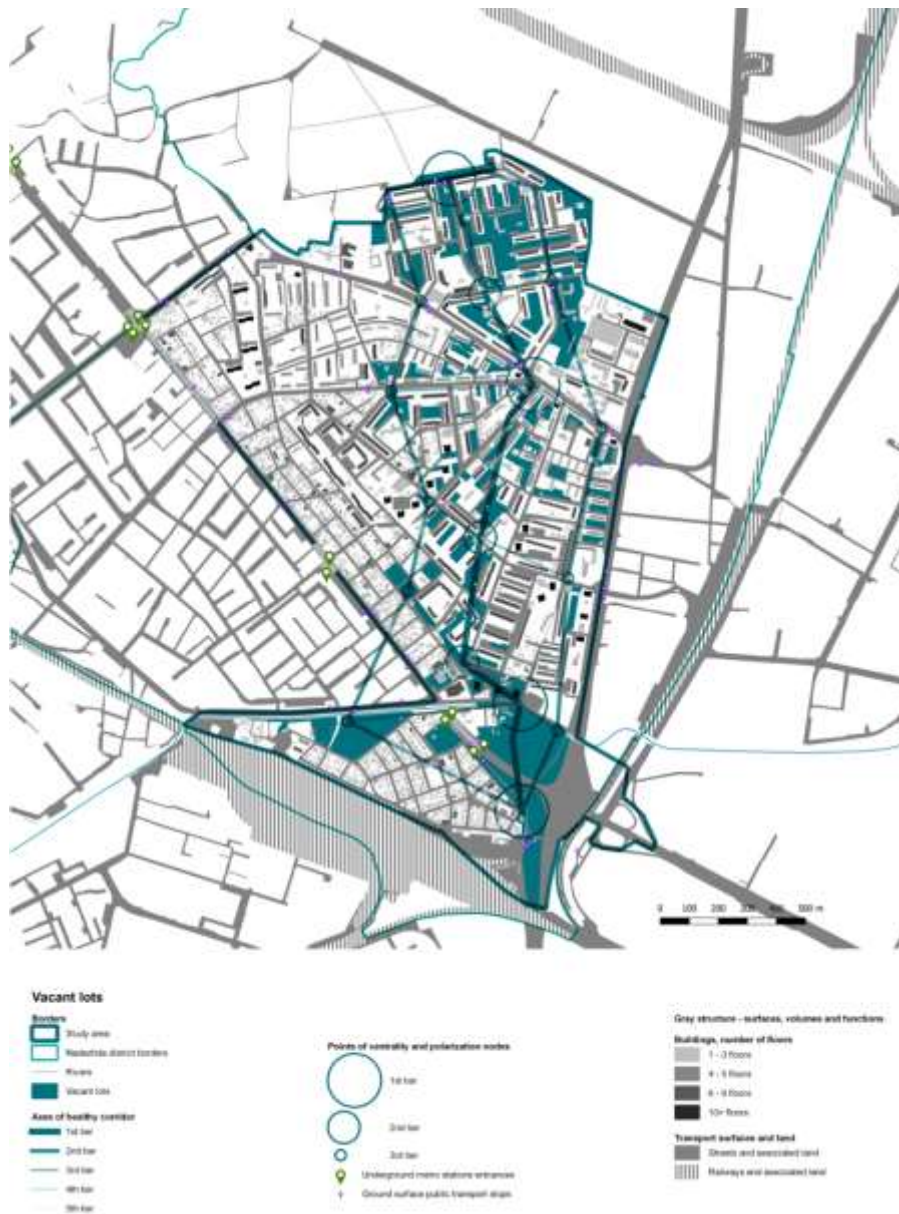


Figure 510 Vacant lots polarization points

The polarization points in space have been mapped and analyzed in terms of proximity to the corridor, parallel and transversal secondary corridors connecting the bigger parks and gardens, the major public and commercial services, the transport hubs and nodes. It is a complex picture (fig. 59) that can be looked very differently from the perspective of various residents and visitors. Yet the cumulative practices and the logical link from the northern periphery towards the city center to the south in terms of occupational travel, the options to go either towards the Northern park or Nadezhda park for recreational purposes have been the major reasons behind the proposed axes. The particular routes and their short buffer areas along these axes altogether with the vision for the crossing points at certain nodes and bottle necks will be decisive for the final trajectory and scope of the Healthy corridor.

Finally the observed and mapped behavior which includes the understanding of the overall patterns of presence of people – moving or performing stationary activities as well as playing is important consideration especially for the place based tactics, adoption and

design of nature based solutions from Sofia mini-catalogue as well for others NBS-s which can be implemented through the participation and co-creation of local actors.

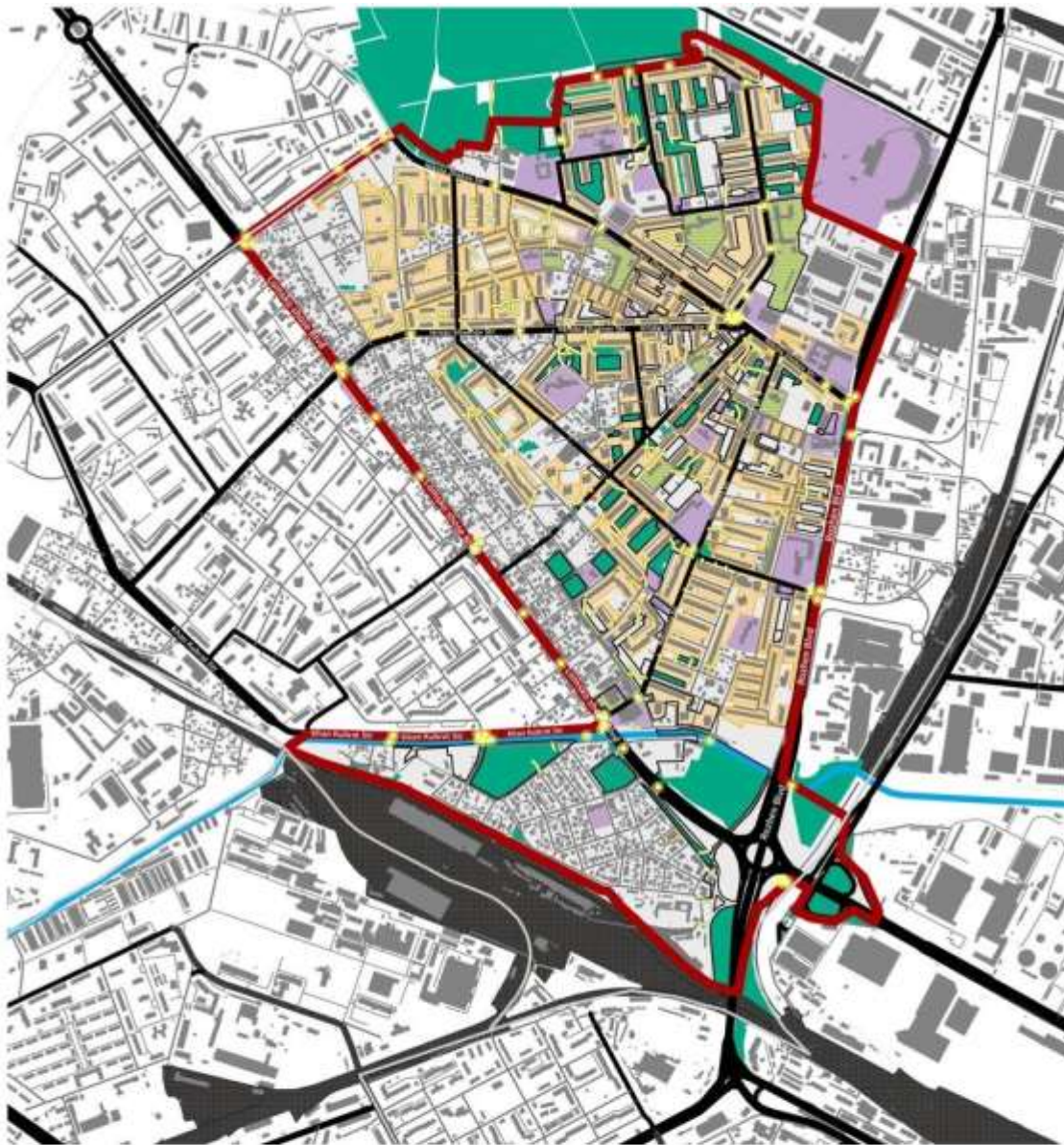
Yet, the municipal property policy is a very contested area where the provision of kindergartens, parking facilities or the expropriation, exchange, concession, ceded building rights, restitution, and privatization of land have their role in supporting, constraining or opposing some of the ideas for regeneration of lots along the corridor. This has to be communicated and decided after more intensive collaboration with the local stakeholders, the district authorities and the municipal ones in an attempt for reaching consensus.

Table 152. Complete description for all types of vacant lots

Land register	Land register description	City masterplan information	Detailed plan information	Level of management	Area, m2
<b>Mixed</b>	Co-ownership	Complex housing	For local garden	low	6436
	Municipal private & co-ownership and private	Complex housing	For kindergarten and nursery	very low	7359
	Municipal public & municipal private, private and unspecified	Local garden & Mixed use	For local garden	medium	47102
	Municipal public & private	Complex housing	For local garden	medium	3722
	Municipal private & private	Complex housing	For local garden	very low	1174
			Sport and attractions & Mid-rise housing	For greenery and sport	very low
	Municipal private partially privatized	Complex housing	For housing	low	2453
	Municipal private with collective ownership of the buildings	Complex housing	For housing and parking	medium	12451
			For local garden	medium	5903
			For sports playground and greenery	medium	9716
<b>Public</b>	Municipal private & municipal public	Complex housing	For cooperative market	very high	3974
	Municipal private & state private	Complex housing	For local garden and playground	low	2171
	Municipal private & unspecified	Complex housing	For local garden and sport	low	1280
	Municipal public & municipal private	Complex housing	For local garden	high	1259
			Local garden	For park	medium
	Municipal public & unspecified	Public services	For school	very low	9687
	Municipal private	Complex housing	For bicycle parking station	low	871
			For cooperative market	medium	820
			For greenery	low	1043
			For local garden	low	30902
			For local garden	medium	6647
			For local garden	very low	24956
			For local garden and playground	low	5922
For local garden and playground	medium	1275			



			For multi-storey car park	low	4397
			For parking	very low	724
			For parking and semi-underground garage	medium	1837
			For parking and underground garage	low	1400
			For parking with greenery	low	9021
			For parking with greenery	medium	1233
			For parking with greenery	very low	8454
			For sport	medium	1990
			For sports hall and swimming pool	low	4117
		Green around infrastructure	For greenery	low	7530
		Mid-rise housing	For greenery	high	553
		Mid-rise housing & Green around infrastructure	No prescription	very low	1047
		Mixed use & Complex housing	For local garden and playground	low	1413
	Municipal private planned to be privatized	Complex housing	For housing	low	1311
	Municipal public	Complex housing	For greenery	low	583
			For local garden	high	634
			For local garden	low	9548
			For local garden	medium	883
			For local garden	very low	321
			For multi-storey car park and greenery	very low	1286
			For sports playground	low	744
		Green around infrastructure	No prescription	low	21216
			No prescription	very low	11505
		Local garden	For greenery	low	507
			For local garden	low	8130
		Low-rise housing	For local garden	low	3415
		Mixed use	For youth house	medium	3508
		Park	For greenery	medium	189
		Public services	No prescription	low	23971
<b>Unspecified</b>	Unspecified	Mid-rise housing	No prescription	low	322
		Park	For social housing	medium	5543
<b>Total</b>					<b>356310</b>



**Synthesis Map**



Figure 511 Synthesis map

## 5.5 Nature Based Solution

### 5.5.1 NBS policy in Sofia Municipality

The Sofia Municipality does not have a specific policy for implementing nature-based solutions, but there are other broader objectives for environmental protection and sustainable urban development. These objectives are formulated in several municipal documents such as The General Master Plan of Sofia Municipality, The Municipal Development Plan of Sofia Municipality, The Integrated Plan for Urban Regeneration and Development, as well as several sectoral strategic documents.

In relation to territorial development, in the sphere of green infrastructure, The General Master Plan of Sofia Municipality proposes protection and improvement of green system elements and the formation of seven new thematic parks. Latter are expected to provide additional value to the quality and economy of the urban environment, promoting four main themes - "nature", "cultural heritage", "water", "sport and attraction". The parks are designed to stretch around the city, occupying urban and suburban land, territories with mountainous relief, along rivers, with thermal springs and such with great sport potential due to existing infrastructure. In relation to the green areas located in the compact city, a "hot topic" is the management of green spaces in the housing estates. Many of them are lacking proper maintenance because of budget shortages. In other cases, claimed as state property during the socialist period, today they are returned to their owners (due to restitution law) and afterwards sold to investors and developing companies.

The implementation of new developments in these plots lead to higher population density and further aggravates the quality of the environment. Sofia Municipality is trying to compensate owners and investors in order to preserve the green areas in the housing estates but often unsuccessfully. In order to provide proper maintenance and improve aesthetics in the living environment, the Municipality launched the "Green Sofia Programme". Its overall aim is to assist citizens in the implementation of landscape and construction projects, replacement or anesthetization of park furniture in open green spaces (municipal property) in the housing estates. Additional goals of the programme are the stimulation of citizen partnership and cooperation in activities for the improvement of living environment. The successful applicants are supplied with flowers, shrubs, greenery and park furniture.

The parameters regulating the green roofs, as all other green system elements are defined in the Building and Construction Act of Sofia Municipality (ZUZSO). Although that they are mentioned, so far green roofs and walls are not statutory elements and their parameters are not strictly regulated and required. They can be voluntarily selected and implemented by owners/entrepreneurs. Yet, the green roofs in Sofia were first integrated within representative public buildings (National Palace of Culture), underground parking (Park around the National Palace of Culture) and large scale experimental building structures in the 1980s. After the accession to EU (2007), the maturing of real estate market, the internationalization and increased competition in the real estate sector led to the implementation of the green roofs in mega projects – commercial, mix-use, and office. After 2010, the saturation of some segments of the real estate markets boosted the investors' interest towards the issue, increased the number of voluntarily BREAM/LEEDS certificated buildings. All this brought to the increased sq.m. green roofs implemented in private project. Though these green roofs vary in size (from 30 to 7000 sq.m.) and take different share from the total built up area of the building/complex, the greenery on the roof comprises very low share of the buildings' built up areas. Most of the implemented green roofs are not accessible for the public. The implemented projects with

green roofs are scattered and are not dependent on the location (central or peripheral) of the building and are not sensitive to the morphology of the urban structure. During the last five years, some small scale living walls and vertical greening were implemented – some as part of demonstration projects, others requested by owners/entrepreneurs. Until 2009 several small areas along and over the metro line were executed as green roofs.

Since 2016, the Municipality has been rebuilding four of the main urban parks, investing in new infrastructure, furniture and greenery maintenance. Also, different initiatives and competitions have been organized: design competitions for landscaping projects in individual households, competition for innovative ideas for the green future of Sofia.

In 2010 Sofia City Council established Sofia Development Association aiming to support permanent dialogue between different stakeholders (civil society, business, government and local administration) and to promote sustainability as a leading value for future urban development. Six years later the Green Sofia Project initiative was launched by the Mayor of Sofia. The Green Sofia Project represents a sub-structure of the above-mentioned association. Its main activities are in the sphere of coordination of all municipal policies related to sustainable development. Projects and initiatives that have been undertaken since then are related to air quality improvement, introduction of alternative non-motorized modes of transportation, organization of public discussions for urban innovations, restoration and creation of green areas and urban parks.

Vision for Sofia is an initiative of the Sofia Municipality that was started in 2017 and is still in process. Its aim is to create a shared and long-term strategy for the development of Sofia and its suburbs by involving citizens, non-government organizations, businesses, institutions, researchers and experts in the process of formulating the common future of the capital of Bulgaria. Some of the tasks that are part of The Vision of Sofia are information collection, analyses and discussions about the current state of city in seven main themes: Urban environment, Economy, Natural Environment, Transport, Identity and Culture, Management and People. Some of the information that has been digitized and visualized via maps and diagrams include: Possibilities for Urban Farming, Data for Environmental Components and Factors in Sofia, Research on the Possibilities for Implementing the Green Wedges of Sofia, Map of the Trees in Sofia, Inventory of Biodiversity, Air Quality, etc. A Vision for Sofia will serve as the basis for all future strategies for the development of the city by 2050, and for the elaboration of the amendments /update of the General Development plan of Sofia.

In accordance with the goals of the strategic documents in the sphere of ecology, Sofia Municipality is running different projects and campaigns. Most of them are under the Waste Management Programme. Since the beginning of 2019 the municipality has installed permanent containers for textile and mobile stations. The mobile stations are intended for different types of waste – electronic devices, chemical and hazardous substances (drugs, paints, aerosols etc.) automobile tyres. There are also permanent street containers for separate waste collection (paper, plastic and metal, and glass.) In relation to organic waste, in 2010 the Municipality started the so called “Compost at home” campaign. Its aim is to encourage citizens and public institutions to reduce final household food and green waste. Since its beginning there have been distributed more than 8000 containers to individual households and institutions in different parts of the city.

In the sphere of waste collection, in 2019 the Sofia Municipality became part of the project “Benefit as You Safe - Stimulating citizens’ participation to recycle processes”. The project focuses on the development of an Action plan for packaging and food waste separate collection through active citizen participation and involvement in the process of collection, recycle and reuse of materials.

For years, citizens of Sofia have been exposed to high levels of air pollution. The main pollutants - PM10, CO2 and SO2 and NO2 are emitted from the burning process of solid fuel (burning of coal and wood) heating devices that are still in use and the increasing % of motorization in the city. In line with the programme for Air Quality Management, Sofia Municipality started a project campaign called "Improving the Air Quality in Sofia Municipality by Replacing Solid Fuel Heating Devices with Environmentally Friendly Alternatives".

In relation to air quality management and sustainable mobility, Sofia Municipality launched three services for shared vehicles – electric cars, scooters and bikes. Two of them are considered to be successful in terms of the number of everyday journeys made by citizens. Free of charge parking scheme has also been launched for all electrical vehicles in the city centre.

Another initiative of Sofia Municipality in relation to NBS is the development of the Plan for Green City of Sofia. The plan is still in process of preparation, but its goal is to give a general overview about the main problems of the urban ecology and to formulate several topics for the implementation of key projects. The plan is financed by the European Bank for Reconstruction and Development.

The municipal administrative departments responsible for the implementation of the above-mentioned policies, and related directly and indirectly to promotion and implementation of NBS-s are outlined on fig. 52.

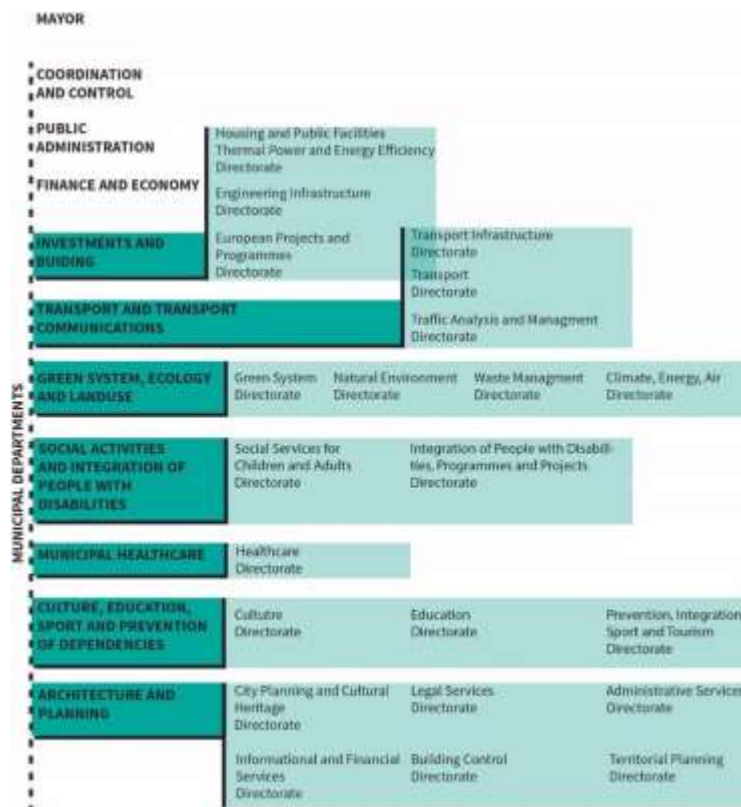
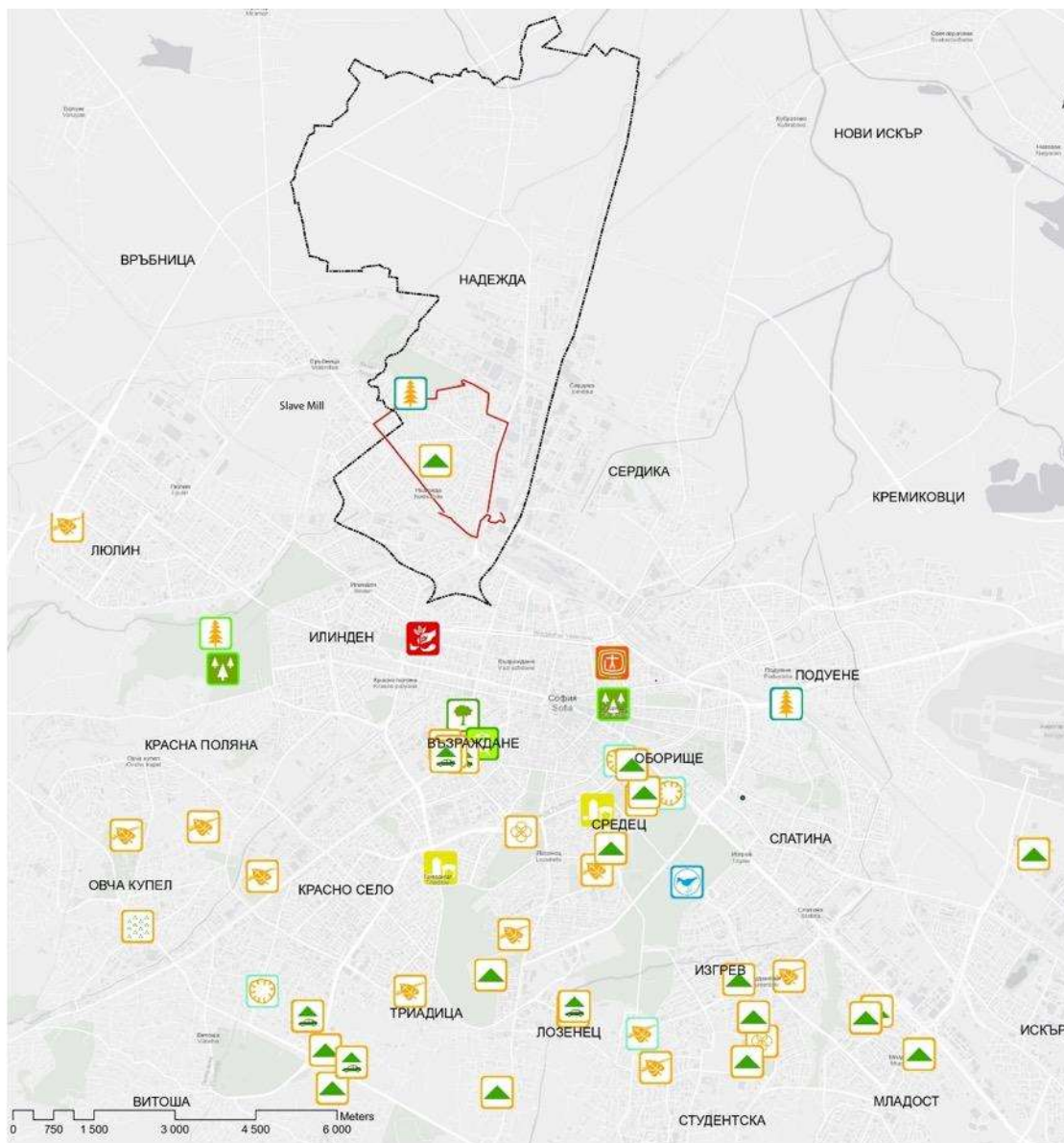


Figure 512 Sofia Municipality's Departments and Directorates in Relation to NBSs and NBS Policy

The map of the initiatives and projects qualified as NBS-s, including those financed by "Green Sofia programme" in the period 2011-2018, indicates that most of them are located to the south of the city centre and few of them in the centre and Lyulin residential estate (1), Zapaden park (2), Poduene (1), Druzhdha (1). The two NBS-s in Nadezhda district are the only in the northeast part of the city.





### Nature Based Solutions in Sofia

Map: H. RE. Games. © OpenStreetMap contributors, and the GIS



Figure 513. NBS in Sofia, Source: Green Sofia programme, own resources, (UACEG)

Table 153. List of the presented in Chapter 8 NBSs by type

N	Section in Chapter 8	Name of NBS	NBS Type (primary)	NBS Type (complementary)
1.	10.2.1.	Afforestation of Park Zapaden	T	
2.	10.2.2.	Restoration of Park Zapaden	T	
3.	10.2.3.	Newly created park Vazrazhdane	T	
4.	10.2.4.	Reconstruction and restoration of Park Severen	T	
5.	10.2.5.	Planting greenery on degraded land (The new Forest of Sofia initiative)	T	P
6.	10.2.6.	Green tram lines	T	
7.	10.2.7.	Garden for Druzhiba (community garden)	T	P, S&S
8.	10.2.8.	Vitosha Community Bio-Garden	T	P, S&S
9.	10.2.9.	The Organic Gardens of Learning in kindergartens	T	P, S&S
10.	10.2.10.	Green Sofia Programme of Sofia Municipality	T	P
11.	10.2.11.	Extensive green roofs over underground parking built before 1989	T	Tech
12.	10.2.12.	Extensive green roofs, private buildings, built after 2000	T	
13.	10.2.13.	Vertical gardens - Green wall and living wall	T	
14.	10.2.14.	Green extensive roof, Metrostation "Vasil Levski Stadium"	T	
15.	10.2.15.	Green roof of the Children's museum Muzeiko	T	P
16.	10.2.16.	The Bee (and beehive provision) Museum	T	P
17.	10.2.17.	Green line Sofia	T	
18.	10.2.18.	Brown roof, Municipal Flowers's market in Nadezhda 2	T	
19.	10.3.1.	Spark Bulgaria – electric car sharing (Urban mobility sharing)	Tech	T, P
	10.3.2.	High-tech benches in Sofia Tech Park	Tech	T
	10.3.3.	Sofia urban agriculture interactive map	Tech	T, P
22.	10.3.4.	Benefit as you save Project	Tech	T, P
23.	10.3.5.	"Improving the Air Quality in Sofia Municipality by Replacing Solid Fuel Heating Devices with Environmentally Friendly Alternatives"	Tech	T, P
24.	10.4.1.	Forum Theatre	P	S&S
25.	10.4.2.	DesignThinking.bg	P	S&S, T
26.	10.4.3.	Culture map of Sofia	P	T
27.	10.4.4.	Social circus	P	S&S
28.	10.4.5.	Blok Kino (Cinema )	P	T
29.	10.4.6.	Starling on the Doorstep	P	T
30.	10.4.7.	The Urban Culture Festival Sofia Breathes	P	T, S&S
31.	10.4.8.	I have a bee Initiative	P	S&S, T
32.	10.4.9.	Share the Neighborhood Project	P	T, Tech
33.	10.5.1.	Hrankoop – solidarity food cooperative	S&S	T, S&S
34.	10.5.2.	Bread House Network	S&S	P
35.	10.5.3.	Hippocampus	S&S	P
36.	10.5.4.	Social Economy Development in South Eastern Europe network	S&S	P
37.	10.5.5.	Social enterprise "Rozhdestvo Hristovo"	S&S	P
38.	10.5.6.	Baba residence, Project initiated by IDEAS Factory	S&S	T, P, Tech
39.	10.5.7.	Bon Appétit at Maria's World Foundation EOOD	S&S	P
40.	10.5.8.	Thermal water swimming pool	S&S	T, Tech, P

## 5.5.2 Territorial Nature Based Solutions

### Name and Type of the NBS: Afforestation of Park Zapaden

**Location:** 42°42'06.9"N 23°16'34.1"E

**The NBS:** The afforestation of Park Zapaden (Western Park) in Sofia was an initiative implemented on a territory of 7 decares by 500 volunteers with the support of the Sofia Municipality. The aim of the project was “making the city cleaner, greener, and more beautiful” simultaneously supporting the biodiversity and air quality improvement in the city. An additional goal of the project was the compensation for the illegal logging registered in the park by local gypsy minorities. The afforestation activity took place on 22 April 2012 and it was realized as a crowdsourced funding project. The citizen organisation “When we Become 100 000 - we will Plant a Forest” and the Sofia Municipality successfully partnered up in initiating and managing the project. All the volunteers were supplied with materials and tools to plant trees in Park Zapaden.



Figure 514. Zapaden park. Source: <http://gorata.bg/content/sofiya-zasazhda-3-000-drveta-s-dobrovolci>

**Opportunities:** Popularization of good practices; Multiplication of good practices; Citizen participation activation; Citizen initiation and management; Improvement and preservation of biodiversity; working with gypsy minorities.

**Constraints:** Budget, Poor communication strategy and approach for citizen involvement, illegal logging.

### 10.2.2. Name and Type of the NBS: Restoration of Park Zapaden

**Location:** Park Zapaden, Sofia; 42°42'06.9"N 23°16'34.1"E

**The NBS** The restoration of Park Zapaden ((Western Park)) is a large-scale project started in 2018 that is still in process. It covers an area of 53 ha. The activities include restoration of green areas, restoration of rock gardens and renovation of artificial lakes, rivers and waterfalls, planting flowers and greenery. The project also includes restoration and creation of playgrounds, alleys, lighting, cameras, irrigation systems, campgrounds. The total cost of the projects is 4 000 000 EUR and is funded by the EU funds (Operational programme “Regions in Growth”) and the municipality budget.



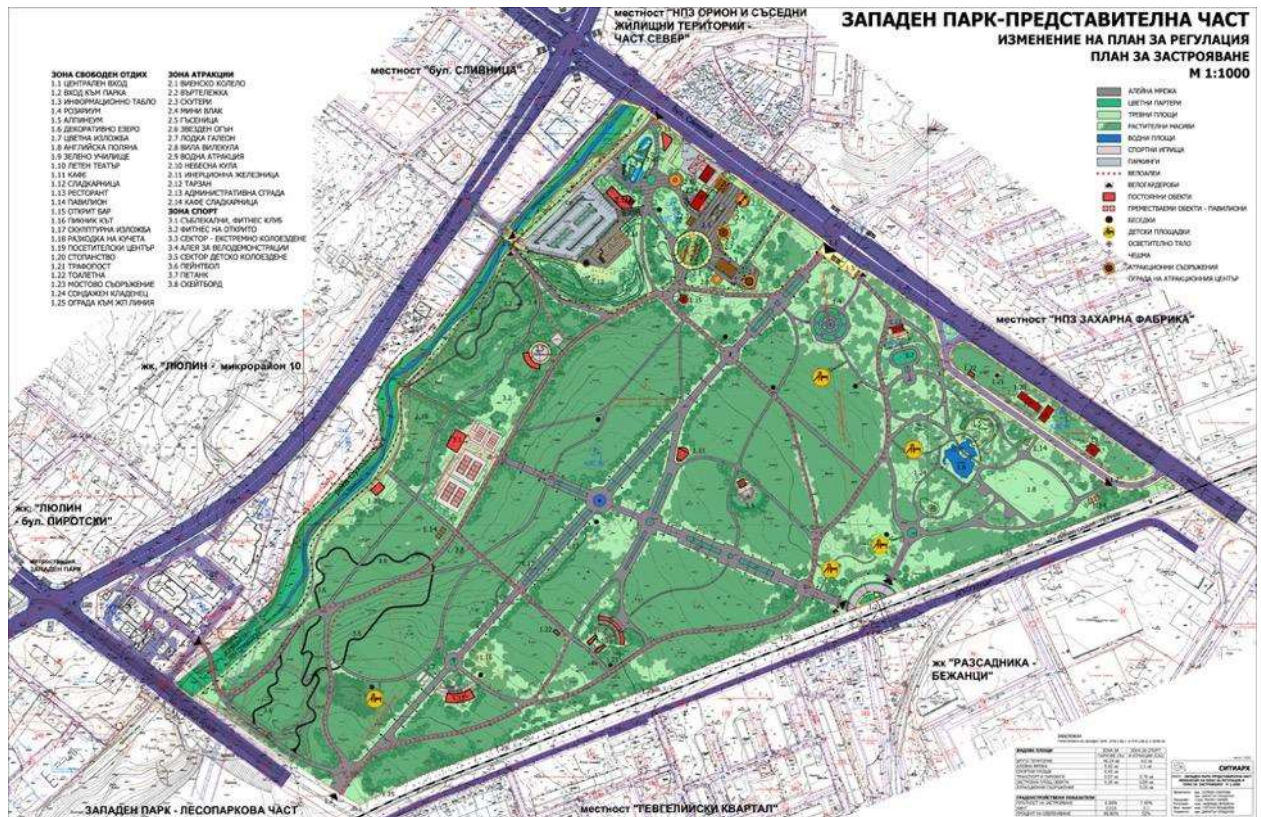


Figure 515. Detailed landscape plan of Park Zapaden, Representative part, Source: <http://www.cityarch.bg/a/nav/projects/item/34>

**Opportunities:** Renovation and transformation of the park into a popular destination for leisure and outdoor activities; Preservation of biodiversity; Activation of citizen participation.

**Constraints:** Budget shortages, Poor communication strategy an approach for citizen involvement.

**Name and Type of the NBS:** newly created park Vazrazhdane

**Location:** Park Vazrazhdane, Sofia; 42°42'06.9"N 23°16'34.1"E

**The NBS:** Park Vazrazhdane is the newest park in Sofia. The project is a restoration of previously degraded urban land. Its aim was to improve the environment and the image of the area through creation of public space for sport and recreation. The park has an area of 29 399 m<sup>2</sup> and it was planted with trees, shrubs and flowers. Picnic zones were created, as well as playgrounds, amphitheater, sports playground and space for circus facilities. Park Vazrazhdane was financed through the European Union's JESSICA funding instrument.

**Opportunities:** Popularization of good practices, Multiplication of good practices, Citizen participation activation, Development of the green system in the city

**Constraints:** Budget shortages, Poor communication strategy an approach for citizen involvement.



Figure 516. Park Vazrazhdane

Sources: [https://issuu.com/tcmgbg/docs/infra\\_br5\\_175dpi/37?e=19480525/40220214](https://issuu.com/tcmgbg/docs/infra_br5_175dpi/37?e=19480525/40220214),  
[https://issuu.com/tcmgbg/docs/infra\\_br5\\_175dpi/37?e=19480525/40220214](https://issuu.com/tcmgbg/docs/infra_br5_175dpi/37?e=19480525/40220214)

**Name and Type of the NBS:** Reconstruction and restoration of Park Severen

**Location:** Park Severen, Sofia; 42.740448, 23.299146

**The NBS;** The reconstruction and restoration of Park Severen (Northern Park) took place in 2014 and 2015. The aim of the projects was the improvement of the living environment through creation of places for rest and sport. The old infrastructure as alleys and fountains was reconstructed and new playgrounds were created. The bank of the river running along the park, together with many green areas were restored with new plants and greenery. The project was initiated and fully funded by the Sofia Municipality.

**Opportunities:** Renovation and transformation of the park into a popular destination for leisure and activities in the outdoors; Preservation of biodiversity; Activation of citizen participation.

**Constraints:** Budget shortages; Poor communication strategy an approach for citizen involvement.





Figure 517. Park Severen

Source: <https://www.skyscrapercity.com/showthread.php?t=1029381&page=242>

**Name and Type of the NBS:** Planting greenery on degraded land

**Location:** St. Troitsa quarter, Sofia; 42°42'17.6"N 23°18'03.8"E

**The NBS:** This project is part of the ongoing activities of the initiative group “When we Become 100 000 – we Will Plant a Forest”. Its overall aim was to improve the living environment and air quality. The project included adding compost from processed food to the soil, planting greenery (grass, trees, shrubs, and flowers) on muddy spots previously used for illegal parking - sources of dust particles in the air. The project was supported by the local authorities but organized and managed by the group mentioned.

**Opportunities:** Popularization and promotion of good practices; Multiplication of good practices; Citizen and NGOs participation activation; Improvement and preservation of biodiversity.

**Constraints:** Budget; Poor communication strategy and approach for citizen involvement.

**Name and Type of the NBS:** Green tram lines

**Location:** Russian monument square; 42°42'17.6"N 23°18'03.8"E

**The NBS:** The project for green tram lines in Sofia was initiated in 2015 by a grassroots initiative called “Green Rails in Sofia” and implemented by the Sofia Municipality during the process of reconstruction of the existing tram lines. The arguments behind the project were in support of future benefits such as heat and noise reduction, natural water retention and drainage, and lower costs of maintenance.

**Opportunities:** Popularization of good practices, Multiplication of good practices, Citizen and NGOs participation activation, Support to the green system of the city

**Constraints:** Budget, Poor communication strategy.



Figure 518. "Green Rails in Sofia", Source: <https://www.facebook.com/zelenirelsi/>

**Name and Type of the NBS:** Garden for Druzhba

**Location:** Druzhba quarter, Sofia; 42.644337, 23.417824

**The NBS:** "Garden for Druzhba" is a project implemented in 2018 as a grassroots initiative. The idea for building a community garden dated seven years ago when a small group of local citizens decided to start the urban farming in Sofia. In 2018 they were supported by the municipal enterprise "Municipal Markets" (managing the open markets in Sofia) by providing them security for 6 decares of land where to start the garden. With the help of NGOs and volunteers the garden is already producing fruit and vegetables.



Figure 519. Garden for Druzhba, Source: <https://www.urbangardening-sofia.com/gallery/>

**Opportunities:** Popularization of good practices; Multiplication of good practices; Citizen and NGOs participation activation; Strengthening communities; Provision of locally grown food.

**Constraints:** Budget; Poor communication strategy for popularization and citizen involvement; Air and soil pollution; Weather hazards.

**Name and Type of the NBS:** Vitosha Community Bio-Garden

**Location:** Vitosha district, Sofia;

42.656482, 23.337235

**The NBS.** Vitosha Community bio-garden was created in 2014 by residents of the quarter, gathered around the idea for permaculture urban gardening. They decided to turn a municipal degraded green area into an “island of biodiversity”. The garden contains herbs, vegetables, and flowers, dwelling places for useful insects, and a compost bin. Since its creation it has helped the development of other activities such as bringing community together, providing educational and volunteering events for children and Syrian refugees. The community bio-garden initiative was supported by “Green Sofia” programme of Sofia Municipality.



<https://www.facebook.com/groups/1376719802613896/photos/>

Vitosha Community bio-garden , Source:

**Opportunities:** Popularization of good practices; Multiplication of good practices; Citizen and NGOs participation activation; Strengthening communities; Provision of locally grown food.

**Constraints:** Budget; Poor communication strategy for popularization and citizen involvement; Air and soil pollution; Weather hazards.

**Name and Type of the NBS:** The Organic Gardens of Learning

**Location:** Courtyards of kindergartens and schools in Sofia

**The NBS:** The creation of the Organic Gardens of Learning is an initiative that was started in 2012 by the local NGO Zaedno (Together). Their main activity is the co-creation of natural and green classrooms in kindergarten yards where children can learn, work, observe, create and study the principles of living nature. The project started with 10 state kindergartens and 1 school where teachers, parents and children created the gardens themselves. This approach was crucial for reaching the goals of the project – building communities, promoting awareness and education among children about environmental issues and healthy way of living.

**Opportunities:** Popularization of good practices; Multiplication of good practices; Citizen and NGOs participation activation; Strengthening communities; Provision of locally grown food, Education improvement

**Constraints:** Budget; Poor communication strategy for popularization and citizen involvement;





Figure 520 The Organic Gardens of Learning, Source: <https://www.facebook.com/groups/gradinka/photos/>

**Name and Type of the NBS:** Green Sofia Programme

**Location:** Open spaces between buildings in housing estates in Sofia

**The NBS:** Green Sofia Programme started in 2010 as a pilot project of the Sofia Municipality that was elaborated in accordance with the main priorities and goals of the municipal plan for development in the sphere of green infrastructure. The programme supports civil initiatives in their attempt to improve the aesthetics of the green areas around buildings through providing different plants and furniture (benches, bins, pots, etc.)

Green Sofia Programme is an instrument that aims to improve the quality of urban environment, to encourage active communities and initiatives for better living conditions. Since the beginning of the programme 890 green spaces have been improved and renovated. The total number of the awarded grants for Nadezhda district is 63.



Figure 521. Planting shrubs, Projects financed by Green Sofia Programme . Source: Sofia Municipality

**Opportunities:** Popularization of good practices; multiplication of good practices; citizen and NGOs participation activation; strengthening communities.

**Constraints:** Budget; Poor communication strategy for popularization and citizen involvement.

**Name and Type of the NBS:** Extensive green roofs over underground parking (municipal/state ownership)

**Location:** See Table 5

Table 154. Extensive green roofs over underground parking by type, function of building, location and year completed. (municipal/state ownership), Source: Google maps

Type	Name of Building/structure	Function	Location/coordinates	Year completed
Extensive green roof	National Palace of Culture	Underground parking	42.683014, 23.317259	1980
Extensive green roof over underground parking	Zona B-5	Residential Service, commercial	42.698729, 23.304813	1980-s
	Zona B-5		42.697287, 23.307801	1980-s
	Zona B-5		42.698007, 23.305819	1980-s
	Zona B-5		42.697392, 23.304920	1980-s

**The NBS;** The green roofs in Sofia were first integrated within representative public buildings (National Palace of Culture), underground parking (Park around the National Palace of Culture) and large scale experimental building structures in the 1980s.

The construction of the Zona B-5 neighbourhood started in 1973 as an elite and modern neighbourhood in the city centre and almost finished in 1985. It has been designed mainly to meet the housing needs of the then artistic and creative intelligentsia. Built with the newest contemporary technology and implementing technological innovations it served as an experimental site that recently has been recognized as “the pinnacle of socialist



construction” and good practise examples from the architecture of Modernism. There are 16 high rise 16 and 17 storey residential large scale buildings with high quality concrete structure and brick walls.

Although its extremely densely built up structures, the neighbourhood has very good amenities, accessible wide inter-block green spaces at different levels, underground garages, tunnels, passages. Almost all inter-block spaces are extensive green roofs with, where playgrounds and landscaping are arranged.

**Opportunities:** provide accessible public green space in intensively built up central city area

**Constraints:** maintenance of the green area (during summer months), limited number of trees, prices for using the underground parking by residents imposes pressures to invasive parking in the inter-block spaces

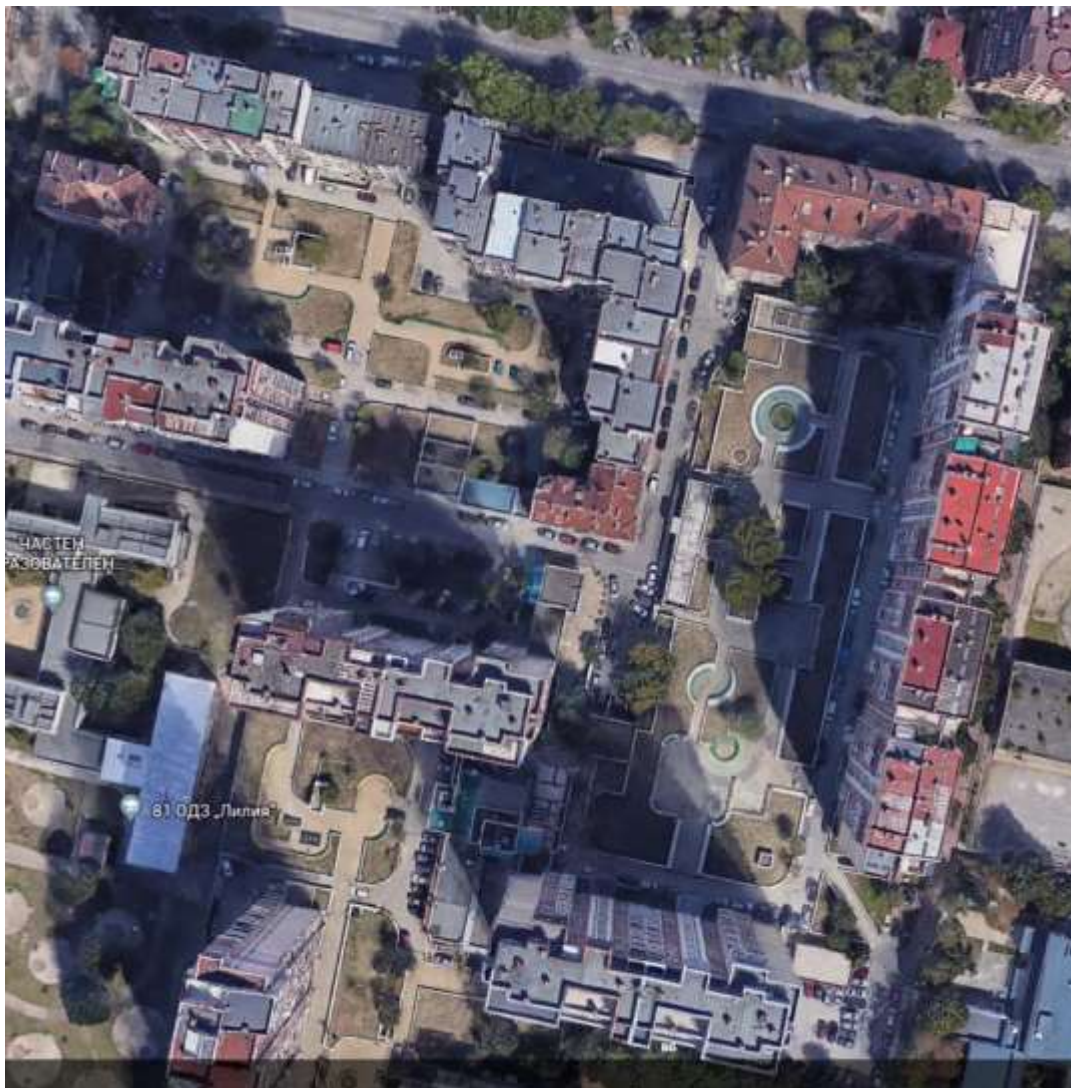


Figure 522. Zona B-5 neighbourhood with the green roofs over underground parking, Sources: Google; <https://www.bulgarianproperties.bg/statii-ot-bulgaria/zona-b5-eksperiment-i-moderna-arhitektura-7905.html>

**Name and Type of the NBS:** Extensive green roofs of privately owned buildings, constructed after 2007

**Location:** see Table 152

Table 155. Extensive green roofs of privately owned buildings, by type, function of building, location and year completed after 2007, Source: Google maps

Type	Name of Building/structure	Function	Location/coordinates	Year completed
Extensive green roof (1200 sq. m.)	Walltopia	Multifunctional public hall, office	42.665374, 23.374814	2017
Extensive green roof	Expo 2000 Office park	Office, events, parking	42.666781, 23.326337	2008-2017
Extensive green roof	San Stefano Plaza	Office, residential, commercial	42.661444, 23.284861	2016
Extensive green roof	Flora park	Residential, parking	42.659942, 23.289234	2015
Extensive green roof (7000 sq.m.)	Sopharma Business Towers	Office, retail	42.665496, 23.356146	2011
Extensive roof (300 sq.m.)	Astral business centre	Office	42.685430, 23.402799	2011
Extensive green roof	Vertigo Business Tower	office	42.656768, 23.286030	2011
Extensive green roof	Este Home & Spa	commercial, office, residential	42.670056, 23.353693	2007-2011
Extensive green roof	The mall	Commercial, office	42.660926, 23.383694	2010
Extensive green roof	Serdica centre mall	Commercial, office	42.692280, 23.354343	2010
Extensive green roof	Benchmark Business center	office	42.647212, 23.397924	2009
Extensive green roof	SofiaCentral Park	office	42.692978, 23.337893	
Extensive green roof		residential	42.656260, 23.313465	
Extensive green roof	DXC Technology Bulgaria	office	42.666182, 23.376664	
Extensive green roof		Residential, parking	42.665613, 23.281912	
Extensive green roof		Restaurant, services	42.661379, 23.284945	
Green roof	South park structure	Mixed, residential	42.670648, 23.312386	
Extensive green roof		Underground parking, housing	42.655570, 23.292200	
Extensive green roof	Hayat hotel	hotel	42.696400, 23.335868	Under constr.

**The NBS:** Extensive green roofs, varying in size (from 30 to 7000 sq.m.) and share from the total built up area of the building/complex. The greenery on the roof comprises very low share of the buildings' roof total area. Most of the implemented green roofs are not accessible for the general public.



The green roof of Walltopia building in Sofia Tech Park, Source: <http://www.the-building.eu/proekti/uchebni-zavedeniya/1074-collider-activity-center-v-sofiya-teh-park>



Green roof over the two storey service space of a residential building in Lozenets neighbourhood, Source: Google street view



The green roof over the low volume attached to the Vertigo Business tower, Source: <http://en.vertigo.bg/>



Green roof over office building in the city centre, source: Google earth



Green roof of Sopharma Business Towers, Source: Google Earth

Figure 523. Green roofs of office buildings in Sofia, Sources: Source: <http://www.the-building.eu/proekti/uchebni-zavedeniya/1074-collider-activity-center-v-sofiya-teh-park>; Google street view Google Earth, <http://en.vertigo.bg/>





Green roof of Serdica mall, Source: Google earth



Green roof of Expo 2000 Office park, Source: Google Earth



Green roof of an office building in the urban fringe, Source: Google Earth



Green roof of an underground parking of residential structure, Source: Google Earth



Green roof of Este Home & Spa Source: Google Earth

Figure 524. Green roofs of office and residential buildings, Source: Google Earth

**Opportunities:** Compensate the lack of green areas in the city centre, better stormwater management, better microclimate and mitigation of the heat island effect in the city centre, better thermal insulation of the building, better connection to the environment

(especially when integrated in the low-rise structures and buildings), better environment and recreation options for people working and inhabiting the building.

**Constraints:** enlarged budget for maintenance, limited access for the general public, watering usually provided from the drinking water supply system.

**Name and Type of the NBS:** Vertical gardens/greenery

**Location:** See table 13. Traditional green walls are not localized. Most of them are located in the city centre.

Table 156. Vertical gardens by type, function of building, location and year completed, Source: Google maps

Type	Name of Building/structure	Function	Location/coordinates	Year completed
Green wall with a support system	Raiffeisenbank Hladilnika	office	42.666159, 23.326101	
Green wall with a support system		office	42.693483, 23.352463	
Green wall with a support system		office		
Living wall (private)	The school restaurant	Restaurant	42.676573, 23.253602	2014

**The NBS:** The Green walls represented in Sofia are two types: the traditional green façade with direct greening and green facade with indirect greening by using additional support system to ensure air gap between the vegetation and the wall. Specific tradition for most of the Bulgarian cities, including Sofia and Nadezhda district is the “vertical vineyard” – either creeping on over the façade of the block of flats, or being organised as a separate structure.

The living wall (vertical garden) incorporate vertical layer of growing media in planter boxes and modules.

**Opportunities:** provide important ecosystem services in areas with sealed urban structure with no space for conventional urban greening thus providing improved air quality, heat island effect reduction, energy cost reduction, noise level reduction, increased biodiversity by creating habitats for birds and beneficial insects etc.; vertical garden systems cover a wide range of scales; vertical greenery provides visual benefits and better image and attractiveness of the site; relatively easy to implement and there are no special qualifications needed; owners and citizens can take part in the co-creation process by choosing plant species, planting, taking care and harvesting when planted with vegetables

**Constraints:** living walls need of additional resources for maintenance and funds for the design and implementation; the additional support systems should be calculated and proofed (not self-made)





Green wall on the blind façade of an office building with additional support system, Source Google street map



Green wall / Living wall, The school restaurant, Source: Mr. Green



Traditional vertical “vineyard” at the entrance of a block of flats in Nadezhda neighbourhood, Source: UACEG



Green traditional wall on the façades of a building located in the city centre, Source: UACEG

Figure 525. Samples of vertical greening in Sofia

**Name and Type of the NBS:** Metrostation “Vasil Levski Stadium” – Green extensive roof

Location: Metrostation “Vasil Levski Stadium”; 42.686119, 23.332411

**The NBS:** The Metro Station “Vasil Levski Stadium” was built and open for citizens of Sofia in 2009. It is located in the city center, at one of the entrances of the city’s biggest park “Borisova Garden”.

The station is 22 meters deep and has 5 underground levels: two levels for service spaces, an underground vestibule and a sub-level. The vestibule roof is planted with grass, flowers and shrubs. It also has four domes that let the sunlight in the station.

**Opportunities:** Good connection with the park, provide important ecosystem services, popularization of green roofs; citizen and NGOs participation activation; creation of roof gardens.

**Constraints:** Budget for construction and maintenance; poor communication strategy for popularization and citizen involvement.



Figure 526. The roof of the metro station “Vasil Levski Stadium”, Source: Google Maps, 2019

**Name and Type of the NBS:** Muzeiko - Green roof

**Location:** 42.660007, 23.355079; year: 2015

**The NBS.** Muzeiko is a science museum for children. It was built in 2015 and is the biggest scientific center for kids in Eastern Europe. The building has a total area of 2,000 m<sup>2</sup> and received a LEED Gold certificate from US Green Building Council.

Muzeiko’s green roof serves as insulation, which is necessary to reduce the energy needed to heat and cool the building. It also features a climbing wall and a space for open-air events. Muzeiko was initiated and funded by the America for Bulgaria Foundation.



Figure 527. The green roof of the Childrens’ museum “Muzeiko”, Source: Muzeiko.bg

**Opportunities:** Popularization and promotion of green roofs; Citizen and NGOs participation activation; Creation of roof gardens.

**Constraints:** Budget; Poor communication strategy for popularization and citizen involvement.



**Name and Type of the NBS:** The Bee Museum (Beehive provision)

Location: Metro station G.M Dimitrov; 42.662535, 23.357543

### The NBS

The Bee museum was opened in 2017. It is located next to Muzeiko science museum for children. The museum represents a small house in the shape of beehive module made from clay with a green roof. Behind a glass window, visitors can observe life of real bees and receive information from pictures and posters. The aim of the project is to raise awareness about the importance of bees for the environment and humans as well as to improve biodiversity and bee breeding in the urban environment. The project was implemented after collaboration between the Sofia Municipality, NGO Bio grad and America for Bulgaria Foundation.



Figure 528. The Bee Museum, Source: <https://museum-of-zoology-8.business.site/#gallery>

**Opportunities:** Popularization of good practices; Multiplication of good practices; NGOs participation activation; Improvement and preservation of biodiversity.

**Constraints:** Budget; Poor communication strategy and approach for citizen involvement; Environmental pollution.

**Name and Type of the NBS:** Green line Sofia

**Location:** various

**The NBS.** “Green line Sofia” is a project for the adaptation of more than 20km obsolete railroads in Sofia as an element of Sofia’s green infrastructure. *“The idea is to connect all former railway infrastructure with the existing/future bicycle lanes and to transform them into a 32 km loop of pedestrian and bicycle zone, isolated from traffic and linking both central and peripheral neighbourhoods, all main parks in the city and many sports facilities.”* It is expected that this process would lead to better connections between the revitalized urban areas along the line and to conversion of former train stations and supply buildings.

*“The goal is to unite our city and revive abandoned spaces and neglected neighborhoods by creating a common ground for the citizens - a public space, which can be used for ...(...)...alternative transportation, leisure, recreation and tourism as well as a stage for public cultural, sports and educational events”.*

The project idea is recognized at political level, and since February 2019 it has been announced that a detailed plan has been developed for a bicycle lane that will connect the higher transport school in Slatina with Boris’s gardens and Pioneer station.(thus linking southern and south-eastern part of the city periphery). As a result, a system of multifunctional communicative public spaces will be functioning, thus attracting new businesses, developers. These spaces may accommodate many sports and cultural facilities and events, may stimulate public and community initiatives, and in the long-run may serve as magnets for future investments. Some of the possible benefits are related to the south border of the URBiNAT study area.



Figure 529. The green line circle – options for development, Source: <https://www.greenlinesofia.com/north?lang=en>



Figure 530. Major elements of the green system and sport facilities connected by the green line, Source: <https://www.greenlinesofia.com/north?lang=en>

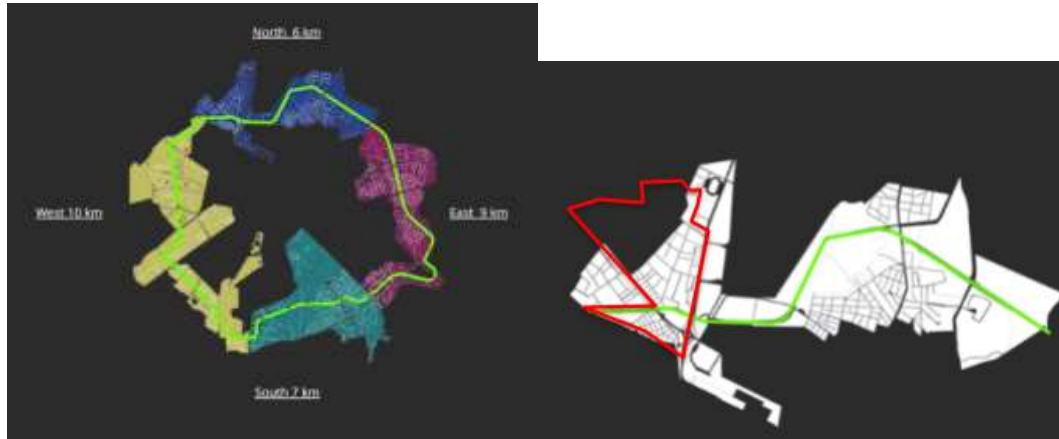


Figure 531. Sections of the green line with the potential areas for transformation(left), The north 6 km section of the green line that would possibly affect URBiNAT study area, Source: <https://www.greenlinesofia.com/north?lang=en>

**Opportunities:** Connecting the neighborhoods, sport facilities and the big parks of Sofia; improving the neglected and declined urban areas in the city periphery and regeneration of the industrial areas; improving the environmental conditions – including cleaner air, rivers and soil; new route for alternative transportation and recreation; creating new public spaces for diverse cultural and other outdoor activities; creating employment and attracting small and medium businesses, boost tourism and increasing of the attractiveness of Sofia as a tourist destination; promote new lifestyles and support behavior changes and development of value system of future generations

**Constraints:** Budget; large scale of the project and extensive time frame; poor communication strategy and approach for citizen involvement; polluted sites and contaminated land along some of the segments.

**Name and Type of the NBS:** (Description) Municipal Flowers’s market in Nadezhda district - Brown roof

Location: Nadezhda 2 neighbourhood, 42.733573, 23.303215

**The NBS.** Designed and implemented as green roof on top of the flowers’ market, but poor maintenance transformed it to a brown roof. The initial aim was to compensate for the large share of sealed soil. The green roof is not accessible.



Figure 532. Municipal Flowers’s market in Nadezhda district - Brown roof, Source: Google Earth



**Opportunities:** Compensate the big share of non-permeable pavement, provision of ecosystem services (including better microclimate and mitigation of the heat island effect), better thermal insulation of the building.

**Constraints:** enlarged budget for maintenance, poor maintenance, no access, watering usually provided from the drinking water supply system, impact is blurred due to the small scale of the green area and the fact that it is a single example in the district of Nadezhda

### 5.5.3 Technological Nature Based Solutions

**Name and Type of the NBS:** Spark Bulgaria – electric car sharing (Urban mobility sharing)

**Location:** City Centre of Sofia

**The NBS.** 'Spark Bulgaria' is an electric car sharing system that started operating in Sofia in 2018. It provides different types of vehicles (transport and cargo) that run on electrical energy and cause less air and noise pollution. The vehicles can be booked via mobile application that also localizes the closest place from where the car can be taken. The mission of the company is to promote zero-emission transportation solutions and to contribute towards the responsible energy consumption. The service provides free parking in the city center.



Figure 533. Source: <https://www.volkswagen.bg/novini-1/5809-novi-25-volkswagen-e-up-poplvat-flotata-na-spark-bulgaria-electric-car-sharing-proektt-za-spode>

**Opportunities:** Awareness rising of the benefits and promotion of shared trips and vehicles; Stimulation of electric vehicles usage.

**Constraints:** Higher price, Poor communication strategy and approach for citizen involvement; Vandalism.

**Name and Type of the NBS:** High-tech benches

**Location:** Sofia Tech Park, Location: 42.668037, 23.372929; Date: 2015-present

**The NBS.** The country's first science and technology park acts as a link between science and entrepreneurship and supports start-ups and innovative ideas. One of the initiatives of the park management was to provide new "smart" benches for the park. Ideas from other places around the world have been drawn and a competition has taken place. The call for the competition required the following characteristics and elements of the benches: contemporary design, to allow multiple functions, unique technology that uses natural resources to generate power for the mobile chargers placed on it. The winning

project provided full integration of the technology into the structure of the furniture. Made of fully recyclable materials, the bench can be located in the grassed areas in the park environment, as well as in the area adjacent to the buildings in the complex. New generation organic photovoltaic panels are laid out. The main element in the bench is the so-called "honeycomb" where all most important outputs are laid - USB inputs, contacts, and more. There is also a built-in speaker for users who want to listen to music.



Figure 534. The prototypes of the winning project for "smart" benches, placed in Sofia Tech Park, Source: [https://computerworld.bg/it\\_liders/2015/07/30/3465272\\_prikljuchi\\_konkursut\\_za\\_inovativna\\_peika\\_na\\_sofia\\_teh/](https://computerworld.bg/it_liders/2015/07/30/3465272_prikljuchi_konkursut_za_inovativna_peika_na_sofia_teh/)

**Opportunities:** Awareness rising of the benefits and promotion of energy from alternative sources; creating multifunctional liveable public space; accessible to the general public, thus leaving room for integrating social groups; good perspectives to implement the bench through co-creation process.

**Constraints:** Higher price, poor communication strategy for awareness rising and informing citizens; vandalism.

**Name and Type of the NBS:** Sofia urban agriculture interactive map

**Location:** covers the built up area of Sofia

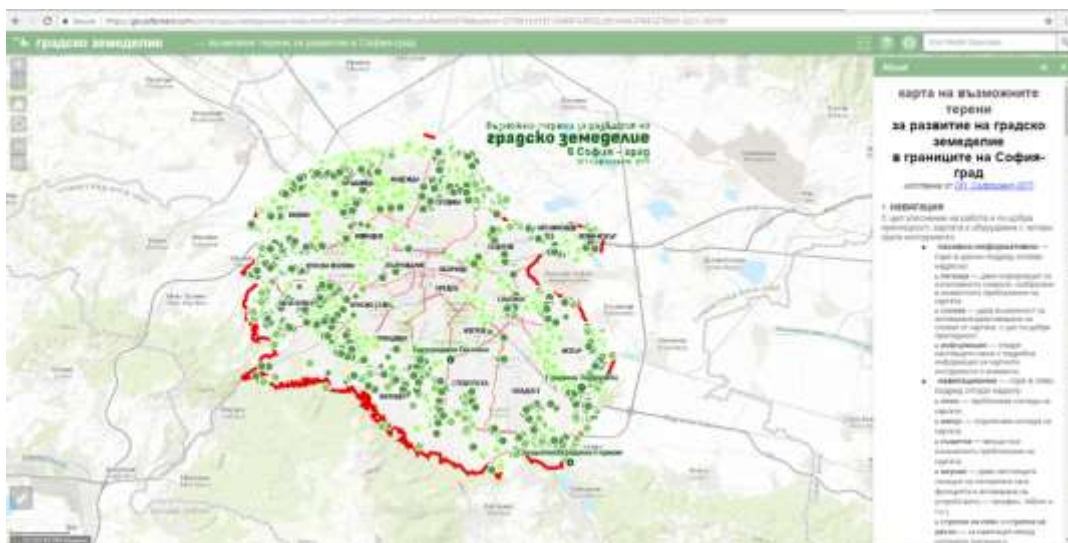


Figure 535. Interactive map of possible sites for urban agriculture showing levels of appropriateness. Source: <https://sofproect.com/portfolio/градско-земеделие>



Figure 536. Interactive map of possible sites for urban agriculture showing levels of appropriateness and mapping different spatial and environmental factors. Source: <https://sofproect.com/portfolio/градско-земеделие>

**The NBS.** The map was developed in order to support the development of urban agriculture as a type of activity within the borders of Sofia-city. The idea for it came from the community - Urban Agriculture Development Initiative in Sofia, who approached the Municipal Company Sofprotect OGP and asked for help to find suitable land for shared gardens. The team of Sofprotect OGP, together with participants in the initiative, has identified a list of criteria to be used in identifying suitable terrains. The end result, after the application of a deductive method, is a map depicting areas designated as possible for the development of communal-type urban agriculture. The ambition of the project is that in the future the map will cover all types of urban agriculture, thus facilitating communication between all stakeholders.

**Opportunities:** Awareness rising of the benefits and promotion of energy from alternative sources; creating multifunctional liveable public space; accessible to the general public, thus leaving room for integrating social groups; good perspectives to implement the bench through co-creation process.

**Constraints:** Higher price, poor communication strategy for awareness rising and informing citizens; vandalism.

**Name and Type of the NBS:** Benefit as you safe (BAS) Project

**Location:** Nadezhda district, Nadezhda -1 Location: 42.730088, 23.296060

**The NBS.** The common challenge to be tackled by **BAS project** is implementation of European Directive 2008/98/EK introducing: the “polluter pays principle” and the “extended producer responsibility”

including two new recycling and recovery targets to be achieved by 2020. 50% preparing for re-use and recycling of certain waste materials from households and other similar origins. According to an initial survey in the seven project target areas, the most important observation was low participation of citizens in the recycling process. Therefore the core element of a common strategy to achieve EU recycling targets is to increase citizens’ participation.



These are three 7- and 8-storey blocks participate in the pilot initiative for separate collection. The direct target group of the pilot initiative is the sample of households that have declared their willingness to participate following general meetings of the residents in the pilot area blocks. Under the pilot scheme, there are no conditions for tracking and providing incentives at an individual household level. Therefore, incentives are provided on the basis of results at the enclosure level. It is recommended that each enclosure should serve clearly and strictly defined households, and each household should have access to only one closest enclosure. Each household can be given the opportunity to choose which enclosure to use, as long as balanced utilization is ensured for each of the five proposed locations. The participants are aware that the contents of the common containers in the enclosures will be regularly checked to identify gaps and problems related to separation. For individual reporting, it would be necessary for each of the common containers in the enclosure to be equipped with a chip capable of not only reporting (the change in) the fullness of the container but also identifying the household generator. At the enclosure / entrance level (about 60 households with 5 enclosures), monitoring is performed on the number of container usages or the number of times the participants have entered the enclosure that can be unlocked using a chip.

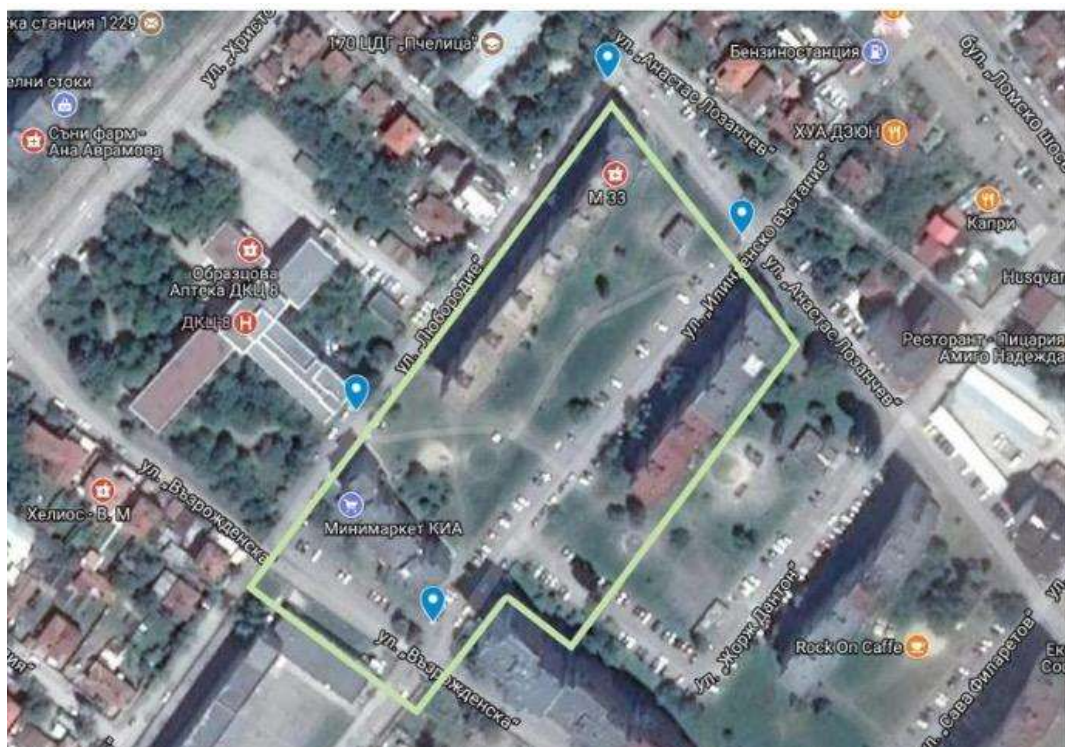


Figure 537. BAS project area in Nadezhda-1 neighbourhood, Source: <https://benefit-as-you-save.eu/>

**Opportunities:** Awareness rising of the benefits and promotion of separation of waste and minimizing waste, changing behaviour and lifestyles, potentials to implement on city level after fine-tuning

**Constraints:** funding, involving citizens

**Name and Type of the NBS:** project campaign called "Improving the Air Quality in Sofia Municipality by Replacing Solid Fuel Heating Devices with Environmentally Friendly Alternatives"

**Location:** different neighborhoods at the urban fringe

**The NBS.** After a two years long consultation and research period, the project was launched in the middle of 2019 and was about distributing eco-friendly alternatives to stoves on wood and coals, such as pellet heating stoves, electricity heating devices or re-connection to central heating supply from thermal power plant or gas. The project is funded under financial mechanisms of the EU – Life Programme and Operational Programme Environment. It is expected that in three years all the solid fuel heating devices will be replaced. The estimated number of households that this programme is going to reach is 15 000.

The definition of the eligible households grounds on empirical studies and studies of the geographical and morphological characteristics of the urban structure. More than 400 stations in Sofia measure the level of particulate matter (PM10 and PM 2.5) and visualize data on a real time map. Data have been gathered at independent stations by volunteers and financially supported by citizens' donations. First steps undertaken by the municipality were related to stimulating people to use public transport instead of cars on days with high levels of air pollution. Municipal funding is planned for replacing coal-burning stoves in the residential areas with the strongest pollution with ecologically friendly alternatives. In order to design the measures and properly allocate/elaborate funding, a survey focused on citizen's liability and preferences to switch to another mode of energy sources for heating was conducted.

**Opportunities:** Awareness rising of the benefits and promotion of ecologically friendly alternatives to heating through coal-burning; cleaner air

**Constraints:** funding, involving citizens

#### 5.5.4 Participatory NBS

**Name and Type of the NBS** Forum Theatre

**Location of the workshop** Ideas Factory, Sofia, 42.686252, 23.328510

**The NBS.** 'Forum Theatre' is one of the techniques and tools used by the 'Ideas Factory Sofia' – local NGO that actively explores how to catalyze a positive change in attitudes in Bulgarian society towards inclusion in decision-making, social entrepreneurship, civic education and innovative solutions to critical issues. They used 'Forum Theatre' to involve people in active discussion and decision finding in some hot topics for the local context, such as aggression in schools, the reconstruction of the Women's market (symbolic place for the city of Sofia). In these events, actor from the organization recreated the main problem while the audience actively watch and participate in giving opinions, making strategies and building alternatives in the solution finding process.





Figure 538. Forum Theatre, Source: <https://ideasfactorybg.org>

**Opportunities:** Integrating the method into future municipal communication strategy; Adoption of the method in citizen involvement.

**Constraints:** Budget; Education; Effectiveness.

**Name and Type of the NBS DesignThinking.bg (Design thinking)**

**Location of the workshop** Belovodski pat Str, 42.649063, 23.254877

**The NBS.** Design Thinking.bg is the first company in Bulgaria, Sofia providing services in the field of design thinking. Since its creation they have implemented multiple projects and consulted small and big businesses located in the country. DesignThinking.bg provides Innovation Training Programmes, Innovation Project Facilitation and Innovation Spaces Design. The main activities are related to establishment of clear steps of problem solving, innovation and collaboration through empathy. DesignThinking.bg supports the annual Sofia Service Jam Initiative for design innovations.



Figure 539. DesignThinking.bg team,  
Source: <https://www.facebook.com/launchlabs.sofia/photos/pcb.2218666584855377/2218662944855741/?type=3&theater>

**Opportunities:** Integrating the method into future municipal communication strategy; Adoption of the method in activities for citizen involvement.

**Constraints:** Budget; education; effectiveness.

### Name and Type of the NBS Culturemap of Sofia (Cultural mapping)

#### Location of the workshop Sofia

The NBS. 'Culturemap' is an interactive platform for existing and potential places for culture in the city. It was created in 2013 – 2014 as a collaboration between Sofia Culture and Art Foundation, Transformatori (NGO) Sofia Architecture Week Festival and the Sofia Municipality. The initiative was implemented with the support of many volunteers who walked the city to map all kinds of existing and possible places for culture. The information collected was organized according to the categories of the objects, their location and potential to be transformed and used for cultural activities.

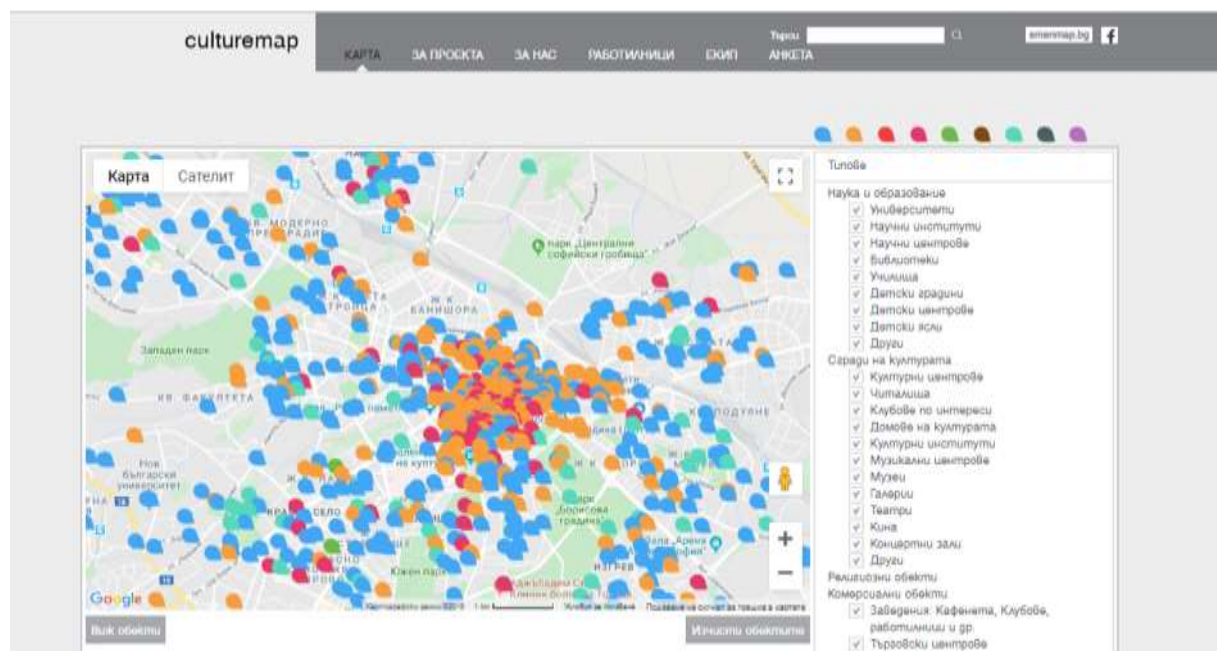


Figure 540. Culturemap of Sofia, Source: <http://www.culturemap.transformatori.net/>

**Opportunities:** Further development of the platform; Citizens and NGOs participation activation.

**Constraints:** Budget; Time resource; Private property of plots and buildings; Information update.

### Name and Type of the NBS Social circus

**Location of the workshop** Sofia, implementation by Mini Art Foundation in Nadezhda district, started in march 2018

**The NBS.** Social circus aims to build bridges and break down barriers between people and groups, using circus as a physical and pedagogical tool to bring people together.

Social Circus is a process of training in a variety of skills as it is performing and building support networks for further developments that can change the position of the kids & youth from different backgrounds or lifestyles, to incorporate and connect them in the society of Sofia and include the sustain a joyful culture and tradition of practicing circus. The focus is on discovering and improving physical, artistic and social abilities of the children and creating different platforms for them to express themselves as individuals as well as in teams, with different circus disciplines as Acrobatic, Unicycle and Juggling. Under this program, the Team assists the children to develop a full show for performance and presentation at the Mini Art Festival.

**Opportunities:** Development of circus practice for everyone in this society; awareness rising for the potential of “education through circus”; creating an environment of communication and social relations; fun for all ages and offers a lifetime of challenges and friendship; means for social change at the individual level; develop circus practice for everyone in the society of Sofia; most of the activities are a great way to improve one’s physical fitness through this balance sport

**Constraints:** Budget; need of time resources and facilitators with specific skills



Figure 541. Unicycle offers for all ages a lifetime of challenges and friendship, Source: <https://www.facebook.com/SofiaUnicycleClub/>

### **Name and Type of the NBS Blok Kino**

**Location of the workshop** Sofia, inter-block space in the residential areas, since 2015

**The NBS.** The team of Blok Kino (Cinema) believes that the new cultural centers in the big cities are the neighborhoods which are often perceived as a periphery. That is why during the summer months, projections are organized in order to allow the citizens to meet the new Bulgarian cinema. Projections are organized in front of the block, in the neighborhood park or in the courtyard of the nearby school. Thus, with these outdoor free of charge



events, transformation and dialogue on Bulgarian cinema and the rhythm of urban life are provoked. Blok Kino is an independent project for outdoor screenings of new Bulgarian films in the summer that runs since 2015. The program unfolds in three panels - Block A (for Bulgarian Animated Cinema), Block D (Bulgarian Documentary Cinema) and the main program - Block Kino in July and August.

During these events, children' corners with different workshops are organized and sponsored by IKEA, Workshop Lilly & Joe. In addition to its main program, the Block Kino team also organizes special film events with different focus - social, educational, entertaining. They work with municipalities and universities, social assistance centers, refugee centers, non-governmental organizations, private companies.

**Opportunities:** Inter-cultural and cross-cultural interactions and inclusion; creating an environment of communication and social relations; fun for all ages and offers a lifetime of friendship; means for social change at individual and group level;

**Constraints:** Budget; weather conditions



Figure 542. Block Kino in the inter-block space (top left) in the North park (top right), in the school yard (bottom left) and in the quarter (bottom right), Source: [https://www.facebook.com/BlokKino/?eid=ARANhYg-30MoSSEoypeALBvh8\\_Zlo-ryLPdOGnlH154bcUK5ZqbAcg6A2-S4kRBReFZ-GW7-TVBx03h3](https://www.facebook.com/BlokKino/?eid=ARANhYg-30MoSSEoypeALBvh8_Zlo-ryLPdOGnlH154bcUK5ZqbAcg6A2-S4kRBReFZ-GW7-TVBx03h3)

**Name and Type of the NBS** Starling on the Doorstep

**Location of the workshop** Faculty of Biology, Sofia University; 42.683391, 23.333368

**The NBS.** “Starling on the Doorstep” is a project initiated and implemented by students and staff from the Faculty of Biology at the Sofia University. Its aim is to promote knowledge and awareness among citizens and children about urban biodiversity and its conservation. The ongoing activities include creating habitats for different species through planting shrubs and trees, placing bird houses and homes for invertebrate organisms, organizing educational events. The project started in 2015.

**Opportunities:** Popularization of good practices; Multiplication of good practices; NGOs participation activation; Improvement and preservation of biodiversity.

**Constraints:** Budget; Poor communication strategy and approach for citizen involvement.



Figure 543. Creating habitats for different species through planting shrubs and trees (left), placing bird houses (right), Initiative “Starling on the Doorstep”, Source: <http://archive.zazemiata.org/v1/Skorec-pred-praga.537.0.html>

**Name and Type of the NBS** Sofia Breathes Festival (The Urban Culture Festival Sofia Breathes)

**Location of the workshop** Faculty of Biology, Sofia University; 42.683391, 23.333368

**The NBS.** Initiated and implemented by Sofia Breathes Foundation and Sofia Municipality (2010-2014) various national institutions and organizations such as the Ministry of Foreign Affairs and Sofia Airport. (2016-2019) The festival popularizes Sofia's central streets in a new way, helping to develop their own image, setting the direction of their realization as a trademark of the capital. It is also an opportunity to promote car free days along a selected historical streets. The closing of the central streets in the city for vehicles open space for art and culture on Saturdays and Sundays in June and August. The programme of the Cultural Events Calendar combines visual and stage arts, literature, socio-educational initiatives, ecology, bio markets, hand-made stuff markets and sports. Sofia Breathes Festival offers to its visitors an unusual and intriguing way to get to know the richness of the Bulgarian capital's cultural life, and to its participants - an opportunity for expression. Since 2011, Sofia Breath enters Sofia's official cultural calendar as a project to support the city's bid for the European Capital of Culture in 2019. When the idea for the festival was born, the leading motive was to provide entertainment in the most seaside month of August for those residents of Sofia who remain in the city. However, after the successful start and after the institutional support of Sofia Municipality, the project is growing and includes the following events: Folk colour Sofia Breathes (April), Sofia Breath



Recycler (June), Summer Sofia Breaths (August), Quarter Fest Sofia Breathe (September), Winter Sofia Breaths (December).

**Opportunities:** Meeting and sharing between participants and citizens in cultural exchange; NGOs participation activation; promotion of car-free areas and days that might lead to behavioural change and change of mind-sets; contribution to better environment (cleaner air) through culture. Potential to be applied in all phases of the URBiNAT co-creation process

**Constraints:** Budget; Poor communication strategy and approach for citizen involvement.

**Name and Type of the NBS** I have a bee Organization (Beehive provision)

**Location of the workshop** National Palace of Culture; 42.685019, 23.318835

**The NBS.** 'I have a bee' (IHAB) is an organisation whose mission is to contribute to a sustainable and long-term solution to the bee colony collapse providing them homes in the urban environment. It was founded by 3 hobbyist beekeepers back in 2015 and since then they have been putting bee homes on rooftops, terraces and in the backyards around the city. Their focus is not of honey production but keeping bee colony safe in the city instead. They promote top bar hives, which are less efficient at producing honey, but very effective for beekeeping (and breeding). These hives have a window through which the development of the colony can be observed. The business sells the top bar hives complete with bees, delivery, settlement, work clothes and accessories, and a year of guidance. The initiative, which has fostered the installation of a number of beehives on roofs in Sofia, is gaining popularity and has an active following on social media.



Figure 544. Sources:

[https://naturvation.eu/sites/default/files/result/files/international\\_comparison\\_of\\_nbs.pdf](https://naturvation.eu/sites/default/files/result/files/international_comparison_of_nbs.pdf),

<https://www.facebook.com/ihaveabee/>

**Opportunities:** Popularization of good practices; Multiplication of good practices; NGOs participation activation; Improvement and preservation of biodiversity. Urban beekeeping is growing, yet detached from global ecosystem disruption. Beekeeping as a form of “helping” and “owning” nature at the same time, has grown in urban environments not only driven by clearly educational or environmental goals, but also as a hobby that can be learnt and practiced.

**Constraints:** Budget; Poor communication strategy and approach for citizen involvement; Environmental pollution; allergies and fear in people.

**Name and Type of the NBS** Share the Neighborhood Project

**Location of the workshop** Sofia, "Tsar Ivan Asen II" street and "Yavorov" housing estate, 42.688490, 23.345413

**The NBS.** A relatively small demonstration project addressing an urban area located close to the historic city centre of Sofia - "Tsar Ivan Assen II" street and part of "Yavorov" residential estate (44 ha and 6620 inhabitants). It was led by the Association of Bulgarian Urban and Regional Planners in a broad collaboration with other partners and local citizen groups. An alternative model for shared neighborhood development was developed and tested. Among the main topics were the community sensitive urban analysis, mixed methods studies, action planning and street level design with wider public participation and integration of the healthy and active way of living. The continuity of the process led to valuable methodological developments, which were promoted at many occasions as suitable practice for co-design and place making. Several practical measures and projects included in the action plan were implemented such as small scale rehabilitation of the major public space "Portugalia" square, the extension of the regulated short term parking for the whole neighbourhood, the rising of the awareness about the cultural value and identity of the area as well as its promotion as alternative cultural place with its rich public life and human scale.



Figure 545. "Share the neighbourhood" project, Co-design, Source: [https://issuu.com/bgplanning/docs/share\\_yavorov\\_2016](https://issuu.com/bgplanning/docs/share_yavorov_2016)

**Opportunities:** The wider distribution of the model for shared development at the neighbourhood level throughout the city and other cities in the country and beyond where similar planning and design framework exists.

**Constraints:** Reliance on higher level decisions for distribution of public finances and lack of neighbourhood budget for allocation to priority interventions.

### 5.5.5 Social and Solidarity economy

**Name and Type of the NBS** Hrankoop – solidarity food cooperative

**Location** Farmers Market Roman Wall – Sofia, 3 Stara stena Str, GPS: 42.683928, 23.330249

**The NBS.** Hrankoop – solidarity food cooperative is a non-formal group of people who seek for “clean” food and its fair trade. Their main goal is to create and sustain direct contact between producers of organic, bio and locally grown food and their potential customers. Creating a network, the organization works for

selection of clean products, as well as education on the true value of good, reasonably grown food and the system of social assistance. They organize open markets on a regular basis in three different locations in the city of Sofia.



Figure 546. Hrankoop – solidarity food cooperative, Source: <https://www.hrankoop.com/hrankoop/sofia/>

**Opportunities:** Strengthening communities; Support of locally grown and clean food.

**Name and Type of the NBS** Bread House Network, Sofia

**Location** Ekzarh Yosif Str, GPS: 42.701997, 23.332740

**The NBS.** The Bread House Sofia is part of the International Bread Houses Network. Their main goal is through collective bread-making to contribute for community-building, boosting creativity, and social entrepreneurship cooperation across all ages, professions, gender, and ethnic backgrounds. Their main activities include programmes tailored to different groups from such with therapeutic effect to team building parties, food education programs for children, development of a local grain bank. ‘NadEzhko bakery’ is part of the



Sofia Bread House and it is a social franchise that employ and train low-income people, orphans and others with special needs as bakers.



Figure 547. Bread house network activity with children, Source: Source: <https://www.bread.bg/news/nadezhko-furna-sofia-29-nov-2014/>

**Opportunities:** Integrating the method into future municipal communication strategy; Adoption of the method in activities for citizen involvement.

**Constraints:** Budget; educational activities are time consuming and need staff with special training; effectiveness.

#### Name and Type of the NBS Hippocampus

Location N/A

**The NBS. Hippocampus** is a Bulgarian organization with four years' experience in working with visually impaired people. Recently they started a project which provides to sightless people the opportunity to work, communicate and achieve better lives. The project is offering an attractive touristic service by creating jobs for sightless people who undertake training as part of a mixed crew with capable-to-see captains. The idea is to have a good time together by rowing and sailing boat at Pancharevo lake.



Figure 548. Mixed crews supported by Hippocampus,  
Source: <https://www.facebook.com/HippocampusBG/photos/a.1621698377964972/1621698701298273/?type=3&theater>

**Opportunities:** Unique experience both for visually impaired and tourists, inclusion of disadvantaged groups, potential to involve various disadvantaged groups after proper adoption. This practice could be adopted for other modes of mobility and recreation.

**Constraints:** Budget; additional specific individual's skills/potentials are required and need to "fit" the activity, specific recourse needed (water and equipment).

**Name and Type of the NBS** Social Economy Development in South Eastern Europe - network

**Location** N/A

**The NBS.** The network for Social Economy Development in South Eastern Europe is a joint initiative of eight Caritas organizations on the Balkans, including Caritas Bulgaria. The activities aim at raising awareness about the social economy on the Balkans and building a favourable environment for the development of social enterprises in the region. The initiative is supported by Caritas Italy, Caritas Spain, Caritas France and Catholic Charities. Since June 2018 one of the new social enterprises of "Caritas" is CARITArt at the "Blagoveshtenie" Centre, in which greeting cards with a cause are being manufactured. This initiative focuses on turning attention to the problems of people with disabilities, giving publicity to their abilities and talents and also aimed at restoring the "live communication" among people through the possibility to communicate by means of paper greeting cards that are sent by post. The enterprise relies on high quality materials, unique ideas and good workmanship, performed by the young people with disabilities who attend the centre as well as on their parents on the principle of group and home-based work. The social enterprise at the "Blagoveshtenie" Centre is being implemented within the framework of the activity "ELBA 2. Development of the Social Economy in Southeast Europe".



Figure 549. Greeting cards with a cause, Source: <https://caritas.bg/en/causes/se/activities/>

**Opportunities:** to give young people with disabilities and their parents the opportunity to show their talents, to build and upgrade working and social skills, to become confident that they are needed by society and to receive financial support.

**Constraints:** need of training, lack of effective distribution channels

**Name and Type of the NBS** Social enterprise "Rozhdestvo Hristovo"



#### **Location** N/A

**The NBS.** Since 2005 in support of disadvantaged women in Sofia, the social enterprise “Rozhdestvo Hristovo” has been functioning at the Center for Social Rehabilitation and Integration of “Caritas Sofia”. Felt and textile souvenirs are manufactured in the social enterprise by hand with custom design. The social enterprise provides for a supportive environment and gives disadvantaged women the opportunity to be included in the work activities of manufacturing of souvenirs and helps them build, develop and restore work skills, work habits and responsibility while at the same time receive financial support for the work done. Another goal of the enterprise is to provide earnings by the sales of the manufactured souvenirs. These earnings are then reinvested in the maintenance of the social center that provides for a complex support of A part of the earnings is also used for financing the rest of the activities of the Social Center that supports single mothers, socially disadvantaged women, women who are victims of domestic violence, women with mental and physical disabilities and refugee women. The souvenirs manufactured are sold at bazaars, in art galleries, hotels, on site in the workshop as well as online.

**Opportunities:** opportunity is given to women who are in vulnerable situations to provide themselves income with their own labour, potential to scale the practice at other locations in Sofia

**Constraints:** the workshop has limited capacity to provide working space for many women, need of initial funding for purchase of the equipment.

#### **Name and Type of the NBS** Baba residence Project initiated by IDEAS Factory

#### **Location** N/A

**The NBS.** “Ideas Factory” is a platform that unites active people in the country and abroad, who create threads of connection at places where they are scarce – among generations, among disciplines, between the city and the village, between citizens and municipal authorities, between “center” and “periphery”. The aim of the initiative Baba Residence connects urban youth and elderly from different villages across Bulgaria in an innovative socially entrepreneurial model which combines design thinking, ethnographic fieldwork skills and the simple wisdom of a rural lifestyle with a granny (baba) for a period of 3 to 5 weeks. All the participants whose applications have been approved, firstly, go through an intense training on methods like human-centred design, social entrepreneurship and ethnographic fieldwork skills. After their 1-month co-living with the elderly, the residents become a part of our Incubator for Baba-innovations. Then they can start working on individual or group social or cultural entrepreneurial ideas to help the villages and their dwellers – with the support of trust-worthy mentors. New initiatives, products, services and events which draw cultural and economic potential to those forgotten parts of the countryside are born. Another significant result from the interaction between young urban people and elderly from the villages is the seed of solidarity – between generations, between urban and rural communities and culture. Among the resulted initiatives in and for the villages together with the local people include: professional studio recording of a CD with folklore songs from Dryanovo village in the Rhodope mountains that are about to become extinct; a social enterprise for export of products woven by the grannies from the villages; a new church bell in one of the villages; a small grant from Google, won by residents for software training of children in Laki town; an educational game called Igralo, which entwined programming and Bulgarian embroidery into one, etc.

**Opportunities:** to bring forward traditions and cultural/social practices that are about to become extinct, to strengthen urban-rural and intergenerational connections by sharing

knowledge, skills and stories. Baba Residence goes beyond the attempt to preserve the precious traditions, crafts, personal and folklore stories of local people, but also seeks to inspire their reintegration into cultural and social entrepreneurial solutions in aid of Bulgarian villages.

**Constraints:** limited capacity to include many people, need for specific training before being placed in the village.



Figure 550. Products and experiences resulted from Baba residence Project, Source: <https://ideasfactorybg.org/en/our-impact/>

### **Name and Type of the NBS Bon Appétit at Maria's World Foundation EOOD**

**Location** N/A, located in Nadezhda district

**The NBS.** Maria's World Foundation aims at improving the quality of life of people with intellectual disabilities and the lives of their families and help them achieve their full potential as individuals by providing access to high-quality services, developmental training and possibilities for gainful employment that suits their needs. The project 'Social enterprise Bon Appétit at Maria's World Foundation' has been funded The project 'Social enterprise Bon Appétit at Maria's World Foundation' is funded by OP Human Resources Development and is co-financed by the European Union through the European Social Fund.

Source: <http://www.mariasworld.org/en/za-nas.html>

**Opportunities:** facilitate access to employment and support the social inclusion of vulnerable groups by providing appropriate conditions for their social integration in the social economy domain

**Constraints:** limited capacity to include many people, need for training and initial funding.

### **Name and Type of the NBS Thermal water swimming pool**

**Location:** Sofia

**The NBS.** The thermal mineral water swimming pool relies on the use of a local geothermal resource - mineral water, to provide a healthy environment for physical education and

training as well as recreational activities of school children. It also aims at the revival of the millennia-long regional cultural tradition of living in close contact with mineral water.

Sofia is famous for the abundance of mineral springs in the area; the ancient city of Serdica originated close by the mineral spring in the historic core of contemporary Sofia and the ancient tradition of Roman *termi* can still be traced in the archaeological reserve there; the spring is one of the four main elements in coat-of-arms of the capital city. Public baths have been among the important buildings in the Balkan region for centuries. Public baths with pools were built in different parts of Sofia after the establishment of the modern Bulgarian state in 1878; several of them are nowadays protected monuments of culture. Sofia Central Bath was opened in 1890 and functioned till early 1980s (the building, which is a national monument of culture, is nowadays sheltering the museum of Sofia).

The active educational system in the country had acknowledged swimming as an important element of school physical education and swimming pools were required by the national building regulations on school buildings updated in mid-1970s; yet it was impossible for the State to provide the financial resources for all the needed facilities – only a couple of large school complexes in the country had their functioning swimming pools and several large sports complexes were built by the late 1980s. Some of the public bath pools in operation were used for primary school physical training purposes in Sofia by that time, yet due to lack of funding for maintenance of the municipal mineral water pools were gradually closed and abandoned. Thus, the healthy tradition of using a valuable natural resource was interrupted.

**Opportunities:** Restoration of the interrupted regional culture-based practice alongside re-conceptualizing and prioritizing school physical training; bringing direct health/healing as well as socializing effects; contributing to the psychological and emotional comfort of the school children in the neighbourhood and help them in building a closer cultural link to Nature. The participatory process of the NBS is a social innovation of a complex character – it could be an opportunity for introducing and testing innovative approaches to programming, planning and design, and operation management, which will enable a greater sensitivity and adaptability to users' needs and preferences while stimulating the active involvement of various stakeholders taking responsibilities in all the stages of the process. There is also a high potential for integrating various NBS in the project through the participatory process during the co-creation process.

**Constraints:** complex interactions, budget, time span of the implementation (due to long sequence of procedures and validations)

## 5.6 Baseline for the development of the healthy corridor

The Strategic objective for the next steps of the URBiNAT Project is to co-design the Healthy corridor as a spatial link between Park Nadezhda and North Park and as a network connecting different nature-based solutions, as socio-economic network uniting different communities and different possibilities to realize the market-based potentials and synergies arising from the implementation of NBS, as an arena for changing perceptions, attitudes, mindsets, behaviors, lifestyles and life philosophies. This should respect the assets as existing initiatives and already implemented projects, established communications among actors, the plenty of public open green spaces and the landscape assets, the existing socio-cultural practices and community life.

The next steps for the development of the URBiNAT Healthy corridor in Nadezhda district, Sofia should:

- Co-design the Healthy corridor by building upon the general provisions of the Integrated plan for Urban regeneration and development, extending the territorial scope of the already started process of promoting the city as a “City for people”, take into consideration the forthcoming rehabilitation project of Rozhen boulevard;
- Communicate and arrive to decision on behalf of the local stakeholders, the district authorities and Sofia municipality in the attempt for reaching consensus on the municipal property policy in a complex context and contested areas/lots for regeneration along the Healthy corridor;
- Take into consideration the diverse needs of the communities and the specific target groups within the neighborhoods of Triagalnika, Nadezhda 1, Nadezhda 2, Tolstoy and Svoboda, through participatory process;
- Seek to promote pedestrian mobility as a key driver of urban regeneration by reconsidering and formalization of pedestrian (cycling) paths, according to the needs expressed and demonstrated by the citizen;
- Reveal the potential of the identified strategic (target) areas of the territory, and to implement NBS-s through participatory processes thus making these small areas significant focal points along the Healthy corridor;
- Enhance the quality of the public space, including public works, maintenance, improved accessibility for all citizens, and providing options for multifunctionality through the tools offered by urban design, landscape architecture and architectural design;
- Preserve the local identity by maintaining elements or spaces that the local community relates to such as inter-block spaces and common places throughout the study area;
- Develop and establish a collaborative, integrated and systematic model that involve local actors and stakeholders from the city (NGO-s, institutions, networks) in the process of co-creating healthy corridors and implementation of NBS;
- Integrate new business models that make the active population, community goods and local capital sectors profitable;
- Promote regular physical movement, active living, and concern about the quality of food thus enhancing the transition to healthier lifestyles;
- Work closely with local governmental entities for joint efforts that should result in a more consistent, coherent and sustainable approach with a broader impact

- Present the results of the local diagnostic to the citizens and stakeholders, in order to confirm the focus of the project development through the perspective of the 'real people' in their 'real life' and the voices of citizens;
- Make the transition to the next stage of the co-creation process by grounding on the knowledge, data, energy, inspiration and relationships accumulated during the co-diagnostic phase.

## 5.7 Conclusion

The report documents a great effort and necessary step of identifying, gathering, systematizing, visualization and integrating information and human resources. A complex picture that can be looked very differently from the perspective of various actors – politicians, local administration, professionals, researchers, citizens, students, children, representatives of different social groups, residents and visitors, NGO-s, and other stakeholders.

The work on the local diagnostic established relations between the actors and created the needed trust and knowledge that will be the base to build the next steps of the URBiNAT Project. Besides this, the work allowed to obtain unique information through the implementation of participatory methods, to mobilize and meet different actors, and to thoroughly revise the approach to studying municipal and area-based NBS policy. The development and implementation of innovative and complementing methodologies allowed gathering diverse information and analysing citizens' needs and state of the territory thus enlarging the capacity to study similar areas elsewhere.



## 5.8 Index according to the EKLIPSE NBS impact evaluation framework

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## 5.9 Bibliography

- Dainov, E. et al (2006). "The Sofia City-Region Development Path and Current Situation" in "Accommodating Creative Knowledge – Competitiveness of European Metropolitan Regions within the Enlarged Union, Amsterdam, 2006; AMIDSt, Faculty of Social and Behavioural Sciences, University of Amsterdam"
- Open Society Institute – Sofia (2011), Civil Society Index 2008–2010 Civil Society in Bulgaria: Citizen Actions without Engagement ISBN 978-954-2933-01-4
- Andersen, H.T., E. Dimitrova, K. Schmeidler (2013). Urban Knowledge and Large Housing Estates in Europe. In Andersen, H. T., R. Atkinson (eds). Production and use of Urban Knowledge. European experiences. Springer, pp. 103-132.
- Atanasov, H. et al. The architecture image of panel residential buildings, Bulgarian Academy of Science, Sofia 1968 (Atanasov, H. et al, 1968)
- Burov, A., Naydenov, N. (2017) Green atlas of Sofia and the region: methodological issues and development guidelines. International Jubilee Scientific Conference "75th Anniversary of UACEG", Sofia,
- Citizen Participation Index, 2015, source: Index of Citizen Participation in Bulgaria Developed using the methodology of the Citizen Participation Forum and The Bulgarian Centre for Not-for-Profit Law, <http://index.fgu.bg/data/files/09038f29eb6a5eeaa7c75fdd86e952a4.pdf> (CPI, 2015)
- EVS 2008-2009 Bulgaria: <http://info1.gesis.org/DBKSearch/SDESC2.asp?no=4774&DB=E> performed by a team of Prof. Georgi Fotev, Prof. Georgi Dimitrov, Prof. Pepka Boyadzhieva, Assoc. Prof. Petya Kabakchieva, Mario Mairinov, Vladimir Vladov, Diana Nenkova.
- Kiradzhiev, S. (2006). Sofia 125 Years Capital 1879-2004 Chronicle (in Bulgarian). Sofia: IK Gutenberg. p. 196. ISBN 954-617-011-9;
- Knight, C. et al, 2004, Drought in Bulgaria: A Contemporary Analog for Climate Change, 1st Edition, Routledge, eBook ISBN9781351159524, <https://doi.org/10.4324/9781351159524>,
- Naidenov, N.(2018). Oporno-sravnitelnen plan za stepenta na izpūlnenie na iziskvaniyata za ozelenyavane spryamo ustroistvenite zoni po Obshtiya ustroistven plan za teritoriyata v stroitelните granitsi na gr. Sofiya.
- National Atlas of Geography (NAG), 1993
- State of Society, 2008, OSI – Sofia presents expert analysis of three representative public opinion surveys conducted in 2002, 2006 and 2007 exploring major social and political trends in Bulgarian society, <http://www.osf.bg/downloads/File/State%20of%20Society%202008.pdf>.
- Tashev, P. "Sofia architecture and urban development: stages, achievements, problems", Technica State Publishing House, Sofia 1972 (Tashev, P., 1972)
- Tasheva-Petrova, M. (2016), "Retail gentrification and urban regeneration of the city of Sofia: Retrospective and perspectives" Working paper series (iv-4a). International conference Contested Cities, stream 4. gentrification wpcc-164018, ISSN 2341- 2755, <http://contested-cities.net/working-papers/2016/retail-gentrification-and-urban-regeneration-of-the-city-of-sofia-retrospective-and-perspectives>
- Tasheva-Petrova, M.(2003). "Growing yet not sprawling: Towards efficient, balanced and sustainable land-use pattern of Sofia and Sofia Municipality", seminar paper at "Myths of Metropolis - Urban Density versus Spatial Sprawl": The Process of Concentration in European "Reformed Countries" revisited; Seminar "Spatial and Environmental Planning in Central and Eastern Europe", 03.04.2003 - 04.04.2003, Technische Universität Wien
- Trends in the mean daily average, maximum and minimum temperatures for the period 1960-2005 (Source: Engelen, Tank, Schrier & Klok, 2008;
- Vatseva R., et al., Mapping Urban Green Spaces based on Remote Sensing Data: Case Studies in Bulgaria and Slovakia. Proceedings, 6th International Conference on Cartography and GIS, 13-17 June 2016, Albena, Bulgaria. Eds: Bandrova T., Konecny M., 2016
- Греков, П. и др. „Жилищни сгради. Из опита на проектантските организации“. София, Техника, 1968 г; (Grekov, P et al, 1968)
- Ковачев, А. „Зелената система на София“, Пенсофт 2005, ISBN 9789546422163, (Kovachev, A., 2005)
- Когато се строеше Надежда, сп. София 12-1972, (Sofia magazine, 1972) M<https://www.sandacite.bg>

Проблеми на индустриализираното жилищно строителство в България, С., НИ, 1962

### **Strategic policy documents, regulations and city plans**

- 2017 Report "Active NGO in Bulgaria", Open Society Institute Sofia,  
<https://www.ngobg.info/images/messages/108913/activengos.pdf>
- A strategy for adaptation to climate change of Sofia Municipality" (2016)
- Action plan for improving the network of walkable public spaces within the city.
- Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks
- Education Strategy (2016-2023);
- Integrated Plan for Urban Regeneration and Development of Sofia 2014-2020,
- Local integrity system, transparency International Bulgaria, <http://lisi.transparency.bg/en/years/2017/>
- Comprehensive development plan of Sofia and Sofia Municipality / Masterplan of Sofia Municipality / general Development Plan of Sofia as of 2006, <http://www.sofproect.com>
- Operational Programme on Transport and Transport Infrastructure 2014-2020, (OPTTI, 2004-2020)  
<http://www.optransport.bg/en/print.php?lang=en&c=32&d=1506&print=yes>
- Regulations on the procedures of public hearings in the sphere of spatial and territorial planning of Sofia Municipality (Regulations on public hearings), 2017,  
<https://web2.apis.bg/sofiacouncil/p.php?i=3206222&b=0>
- Sofia – a City for the People Report, Gehl Architects & Placemake, 2017,  
<https://drive.google.com/file/d/1cNSchrBMb6bxeQ4zIslrd8J25W7qyctM/view>
- Sofia - European Capital of Sport strategy (2014);
- Sofia Plays strategy, [www.soproect.bg](http://www.soproect.bg)
- Soproect, The General spatial plan of Sofia and Sofia Municipality (Sofia Masterplan), 2009,
- Strategy for the utilization of the thermal water (2017)
- Strategy for the Development of Sofia Province 2014-2020
- The Energy efficiency Action plan of Sofia Municipality, the Programme for encouragement of the use of renewable energy sources 2017-2019.
- Troeva Consult (2009) Strategic Environmental Assessment of the General Development Plan of Sofia Municipality: [http://www.sofproect.com/OVOS\\_26052009/VOLUME\\_IV\\_schemes/5.pdf](http://www.sofproect.com/OVOS_26052009/VOLUME_IV_schemes/5.pdf) (SEA of Masterplan of Sofia)
- Troeva, V, Presentation for IPURD [https://www.b2match.eu/system/danubeinconet-jiurbaneurope/files/IPGVR\\_SOFIA\\_en.pdf?1488817374](https://www.b2match.eu/system/danubeinconet-jiurbaneurope/files/IPGVR_SOFIA_en.pdf?1488817374)
- World bank group, Strategy for Development of Sofia, 2002
- Youth strategy (2017-2019)

### **Long term development strategy for Sofia and the region" (under development, (Vision Sofia 2050), <https://vizia.sofia.bg/vision-sofia-2050/>**

- Study on the values and attitudes of the Bulgarians by RC Trend, Vision Sofia 2050, 2018
- Vision Sofia 2050, Modal split of Sofia: representative survey, 2018.
- Report Urban Environment, Vision Sofia 2050, 2019
- Report "Morphology", Third step of Vision Sofia 2050, (2018))
- Report "People", step 3. Sociological survey on the quality of life in the Sofia Metropolitan area, Vision Sofia 2050, <https://vizia.sofia.bg/wp-content/uploads/2019/05/Изследване-за-Качество-на-живот.pdf.pdf>
- Report "Economics", 3rd step, Vision Sofia 2050



## **Spatial data:**

GIS Sofia, 2018;

Open street map and contributors, 2019

Geodesy, Cartography and Cadastre Agency, 2018. <https://kais.cadastre.bg/bg/Map>

Stolichna obshtina, 2016

European Environment Agency (EEA), 2018

Copernicus Land Monitoring Service, Urban Atlas, <https://land.copernicus.eu/local/urban-atlas>

[https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3\\_NDVI&datasource=Sentinel-2%20L1C](https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3_NDVI&datasource=Sentinel-2%20L1C)

[https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3\\_NDVI&datasource=Sentinel-2%20L1C](https://apps.sentinel-hub.com/eo-browser/?lat=42.73246&lng=23.28734&zoom=14&time=2018-09-26&preset=3_NDVI&datasource=Sentinel-2%20L1C)

Sofia plays interactive map, Sofproect OGP

## **Institutional data, reports and studies**

Atlas of Sofia (1994)

Basin Directorate "Danube Region". (2016). Preliminary Flood Risk Assessment in the Danube Region, <http://www.bd-dunav.org/content/upravlenie-na-vodite/upravlenie-na-riska-ot-navodneniia/predvaritelna-ocenka-na-riska-ot-navodneniia-v-dunavski-rayon-za-baseynovo-upravlenie/porn-v-dunavski-rayon/>

Bulgarian National Statistical Institute: Financial statistics for Non-Profit Institutions: <http://www.nsi.bg/otrasalen.php?otr=52>.

Central Election Commission (SEC) 2015, <https://results.cik.bg/minr2015/tur2/aktivnost/index.html>

Central Election Commission (SEC) 2019, <https://results.cik.bg/mi2019/tur1/aktivnost/index.html>

Employed by occupational class and sex, by National Level, in 2016, 2017, 2018, Source: NSI, <https://nsi.bg/en/content/6500/employed-and-employment-rates-national-level-statistical-regions-districts>

Employment and Unemployment - annual data 2018, NSI, <https://nsi.bg/en/content//employment-and-unemployment-annual-data-2018>,

European Drought Centre, [http://www.geo.uio.no/edc/droughtdb/edr/DroughtEvents/\\_1991\\_Event.php](http://www.geo.uio.no/edc/droughtdb/edr/DroughtEvents/_1991_Event.php)

Functional Analysis, OP Sofprojekt OGP, 2019, <https://gis.sofproect.com/portal/apps/webappviewer/index.html?id=2cef6214750540869c3ff8aa5eabe5e0>

General development scheme of Sofia, Plan Musman (1938), Source: Sofia Municipality, Architecture and Planning Directorate, <https://www.sofia-agk.com/Pages/Render/964>

Geodesy, Cartography and Cadastre Agency, 2018. <https://kais.cadastre.bg/bg/Map>

Historical review of the construction of large scale panel residential buildings in Bulgaria, in "National programme for renovation of residential buildings in Republic of Bulgaria", Sofia 2005 (in Bulgarian), (NPRRB), (<https://www.mrrb.bg/static/media/ups/articles/attachments/3cf6a30b863d0aa2198b012b7db3dc2c9.doc>)

Household budgets in the Republic of Bulgaria 2017 Report, Source: <http://www.nsi.bg/sites/default/files/files/publications/Btdom2017.pdf> (HBR 2017, NSI)

<http://www.gis-sofia.bg/bg/projects/gis-sofiya-eood-razrabotka-strategicheska-karta-na-shuma-v-stolitsata>

<http://www.isofmap.bg/>

<http://www.nsi.bg/en/content/6500/employed-and-employment-rates-national-level-statistical-regions-districts>

<http://www.so-nadejda.com/administrative-services>

<https://commons.wikimedia.org/w/index.php?curid=24850742>

<https://en.zonebulgaria.com/sofia/history/>;

<https://nsi.bg/en/content//employment-and-unemployment-annual-data-2016>; <https://nsi.bg/en/content/employment-and-unemployment-annual-data-2017>; <https://nsi.bg/en/content/employment-and-unemployment-annual-data-2018>

<https://www.ngobg.info/>

<https://www.sofia.bg/en/web/sofia-municipality/geographical-feature>)

<https://www.sofia.bg/en/web/sofia-municipality/history>

<https://www.sofia.bg/en/web/sofia-municipality/history>;

<https://www.sofia.bg/en/web/sofia-municipality/mayors-of-sofia>

<https://www.sofia.bg/en/web/sofia-municipality/the-yellow-paving-blocks>;

MottMacdonald Ltd, Modal split of Sofia: representative survey, 2011

MOVE.BG, The InnovationShip 2018 survey, <http://edit.bg/wp-content/uploads/2018/11/innovationship-2018-en-pdf.pdf> Quality of Life in European Cities 2015 survey, (EU, 2016),

Municipal system for the management of kindergartens in Sofia, <https://kg.sofia.bg/isodz/dz/by-region/13>

NGOs Information Portal, <https://www.ngobg.info/en/index.html>

NSI nequality of income distribution, <http://www.nsi.bg/en/content/8298/poverty-and-social-inclusion-indicators-district>

NSI, "Regions, districts and municipalities in the republics of Bulgaria" 2016 and 2017

NSI, <https://nsi.bg/en/content/6460/employees-under-labour-contract-%E2%80%93-inflows-and-outflows>

Poverty and Social Inclusion Indicators by Districts, <http://www.nsi.bg/en/content/8298/poverty-and-social-inclusion-indicators-district>

PROPTECH & CONTECH Mapping Report, The Start-up and Innovation Ecosystem in Sofia Report, <http://investsofia.com/wp-content/uploads/2019/04/Overview-of-The-Start-up-and-Innovation-Ecosystem-in-Sofia-May-2019.pdf>

Regions, districts and municipalities in the republics of Bulgaria 2016 and 2017 editions, based on data from the Ministry of Agriculture and Food

Register of Landslides, Ministry of Regional Development and Public Works, <http://gz-pernik.mrrb.government.bg/map/352/>

Report "The Start-up and Innovation Ecosystem in Sofia", <http://investsofia.com/wp-content/uploads/2019/04/Overview-of-The-Start-up-and-Innovation-Ecosystem-in-Sofia-May-2019.pdf>

Report Artificial intelligence ecosystem in Bulgaria, [https://reports.seenews.com/wp-content/uploads/Artificial\\_intelligence\\_ecosystem\\_in\\_Bulgaria\\_2019-SeeNews\\_and\\_Vangavis%5B2415%5D.pdf](https://reports.seenews.com/wp-content/uploads/Artificial_intelligence_ecosystem_in_Bulgaria_2019-SeeNews_and_Vangavis%5B2415%5D.pdf)

SOAPI's Report Sofia: Economic and Investment Profile, <http://investsofia.com/wp-content/uploads/2018/12/Economic-and-Investment-Profile-Sofia-ENG-2018.pdf>

Sofia Investment Agency, Sofia tourism and air transport market report (2018), <http://investsofia.com/wp-content/uploads/2018/09/Sofia-Tourism-and-Air-Transport-Market-September-2018.pdf>

Sofia Metropolitan Directorate of Interior (SMDI), 2015

[sofia.bg/documents/20182/4805673/Списък+одобрени+проекти+Зелена+София+2019.pdf/81e15ff3-18a4-486e-9045-258956233410](http://sofia.bg/documents/20182/4805673/Списък+одобрени+проекти+Зелена+София+2019.pdf/81e15ff3-18a4-486e-9045-258956233410)

Sofiyska voda, 2016

TRADING ECONOMICS, 2019, <https://tradingeconomics.com/bulgaria/indicators>), The survey of companies operating in Sofia Municipality, Report "Economics", 3rd step, Vision Sofia 2050 (2019)

United Nations World Travel Organisation (UNWTO), 2017

Geographic map of Bulgaria., Source: By Ikonact - File: Bulgaria-geographic map-bg.svg, CC BY-SA 3.0,  
<http://gis.mrrb.government.bg/> 2011

**Other sources (web addresses):**

Capital, 2016 <http://labs.capital.bg/201601/csi-sofia>, Capital.bg, 2017

<http://www.bta.bg/en/c/DF/id/2095362>

<http://bgclubs.eu/stadium><http://www.so-nadejda.com/administrative-services/>Lokomotiv-Sofia

<http://antiradar.braindumpz.com/>

(<https://grajdanite.bg/home>)

<https://maistorplus.com>

<http://mladost.bg>

<https://cutt.ly/UeUFl6s>

[https://en.wikipedia.org/wiki/Timeline\\_of\\_Sofia](https://en.wikipedia.org/wiki/Timeline_of_Sofia)

<https://en.wikipedia.org/wiki/Sofia>

<https://en.zonebulgaria.com/sofia/history/>



# 6 Nantes

## 6.1 Introduction

Nantes Métropole, the city of Nantes (third party) and IRSTV are part of the Urbinat task force of the front runner city Nantes with the aim of developing a healthy corridor within the district of Nantes Nord, a district that counts 5 out of the 15 priority districts of the city of Nantes. A priority district is a mechanism of the French city policy which aims to reduce the complexity of the mesh of socially disadvantaged areas. The inhabitants of these districts are confronted with more deteriorated economic and social situations than those of the rest of the agglomeration: standard of living, poverty, access to employment, housing conditions, living environment, academic success, etc. These topics meet the challenges of the Urbinat project.

The following local diagnostic of the city of Nantes is divided in three parts. The first part is dedicated to the presentation of the city which gives context to the different subjects covered by the report. The second part is a zoom within the district Nantes Nord with important data from previous reports and diagnostics that were necessary for the application to the National Agency for Urban Renewal scheme. Indeed, the district Nantes Nord will be profoundly transformed by 2030 by the global project, a project co-financed by the State, social landlords and Nantes Métropole. The last part of the local diagnostic correspond to the stage 2 as defined in the Urbinat project and corresponds to new data that will be used to assess the impact of the Nature based solutions implemented within the healthy corridor.

### **Why is the city a front runner?**

Nature is a key element of Nantes environment and of the development strategy of the city. With 61 % of natural areas and farmed environment, 1000 hectares of green spaces, 101 parks, gardens or squares, 150 km of accessible rivers, Nantes was elected EU green capital in 2013 and second greenest city of France in 2016. Based on its exceptional natural heritage, the city intends to develop a so called green star that spreads all over the territory. Nature is also a key factor of the urban development of the metropolitan area and one of the guiding principles in urban regeneration. The city invested 16 M€ for the creation of new green spaces in 2016, plans the creation of 200 new family gardens and the planting of 1000 camellias and magnolias by the end of 2020.

Nantes also aims to embody the renewal of political practices based on citizen dialogue and co-construction of public policies, enhancing participatory democracy through citizen-driven innovation. The city integrates and uses the expertise of all users in all its



decision, from the renovation of a square to the definition of a strategy for the energy transition. Nantes participation culture aims to create a tailored and innovative city that is conceived by and for its residents, along with their needs, their uses and their solutions. The recent award of 2019 EU capital of innovation rewarded Nantes for putting the inhabitants at the centre of designing new projects and policies for the city. Companies, experts and citizens come together at meetings and 'Great Debates' to discuss and develop new initiatives. Co-construction of the city can now only be conducted with the citizens and all parties of the territory, at each stage, from the creation of a cycling path, to the set-up of a strategic scheme.

The city has the potential to share and replicate an experience conducted within the metropolitan area in all the municipalities of Nantes Métropole. Indeed, the metropolitan area is made of 24 municipalities with its core city Nantes. URBiNAT actions will take place in the district Nantes Nord of the city of Nantes, but the nature-based solutions deployed could be replicated in the other cities of the metropolitan area.

At the European level, Nantes has a longstanding and active commitment in major European and International networks. The city is member EUROCITIES, Chair of the Economic Development Forum for 2 years (October 2018- October 2020), member of the International Association of Francophone Mayors (AIMF) and Chair of the Innovative Cities Committee; board member of the Council of European Municipalities and Regions (CEMR) and its French branch (AFCCRE) and Chair of the Environment and Sustainable Development Committee; board member and spokesperson for Climate of United Cities and Local Government (UCLG); signatory of the Covenant of Mayors ; member of the Worldwide Network of Port Cities (AIVP). Nantes' participation in these networks, but also its dynamic within European research projects and competitions (Nantes: Europe's green capital in 2013), represent an opportunity to share with other European cities the Urbinat experience of co-creation and co-designing. Furthermore, Nantes has a longstanding tradition of hosting national and international delegations, representing other occasions to share the results of Urbinat.

### **Why Nantes Nord?**

The study area selected for Urbinat focuses on "Nantes Nord", a district situated in the North of Nantes municipality. It is particularly heterogeneous in its socio-demographic characteristics and in the representation of different ways of "living". It comprises several priority districts, residential districts that are gentrifying over time of population renewal, a campus.

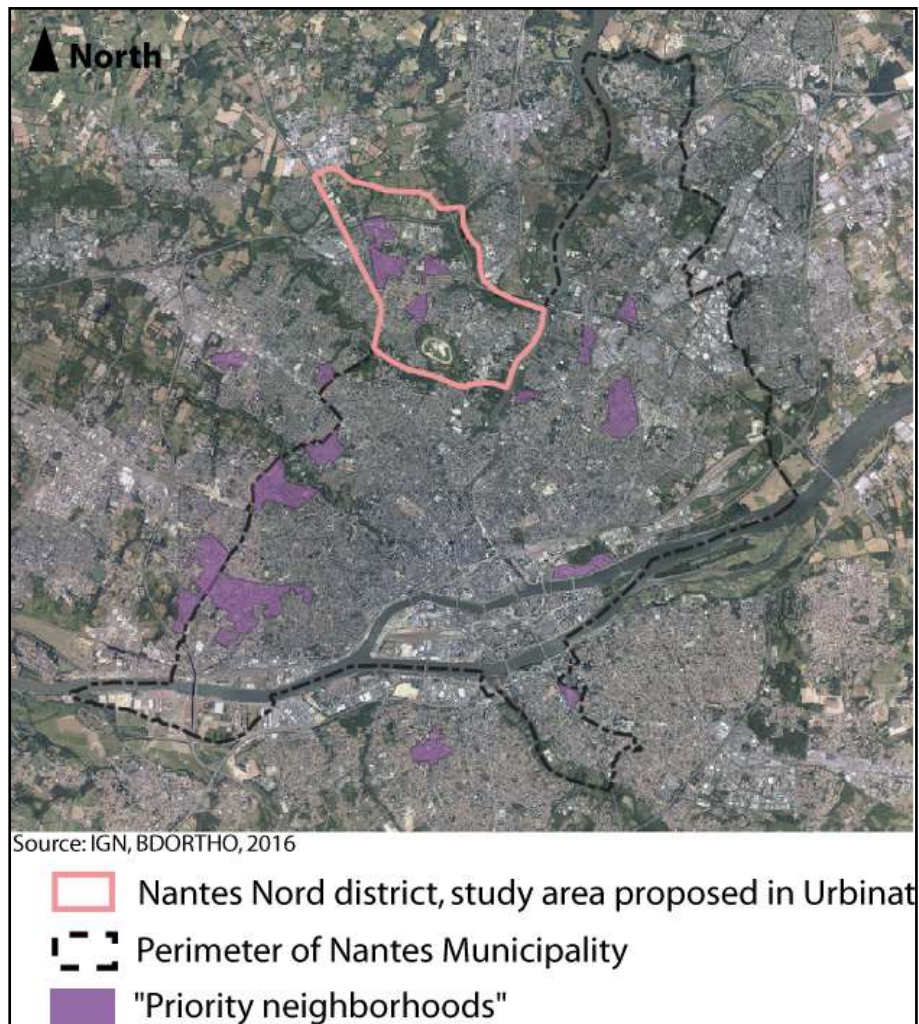


Figure 551: Nantes, Nantes Nord district and the "Priority neighborhoods" (map: Bodénan, 2019)

A deprived area...

Nantes Nord is the district with the highest concentration of social housing with 37% of tenants in social housing.

This district and especially 3 of its 9 micro district, concentrate the challenges socio-economic, security, and health challenges. Several indicators are thus bad compared to the rest of the city: poverty rate, high unemployment, high rate of single-parent family, and health issues. Studies in Nantes showed the link between disadvantaged social conditions and overweight and obesity, especially on children. Inhabitants also share their increasing sense of insecurity. As for several multi-ethnic districts in France, Nantes has been the theatre of urban violence that has been covered by the press. The district is also subject to drug dealing.

... nevertheless, a district with a high potential

With nearly 62 m<sup>2</sup> of green space per inhabitant, the district Nantes Nord is often presented as the greenest district of the City of Nantes. There are many spaces for walking, conviviality spaces which benefits to the inhabitants: playgrounds, wading pools,

community gardens, squares of proximity are scattered on the whole of the territory. The presence of the Erdre river as well as the Cens river, strengthen the environmental quality of the district. Nevertheless, this green wealth is not always known or/and appropriated by the citizens.

All these elements can be a lever to help improving quality of life in the district.

### What does Nantes Métropole expect from Urbinat ?

URBiNAT will support the ambitious urban renewal project implemented by Nantes Métropole in Nantes Nord through “Projet Global Nantes Nord”. As a final objective, it will therefore contribute to increase the quality of life, wellbeing and the health of inhabitants.

Urbinat's support will be particularly useful for the development of a better knowledge of the natural environment of the district in connection with its many green spaces. This will be used to integrate and use these natural resources in the development of nature-based solutions. But Nantes Métropole also has an interest in the transversal and integrative approach of the NBS concept. Indeed, in the urban renewal project for the Nantes Nord district, Nantes Métropole aims to break down an overly compartmentalized vision of urban development, operating in a sectoral manner and to develop a "Global" project combining the living environment, social cohesion and the economy (employment) (Figure 552).

Nantes Métropole is also interested in the aspects of citizen participation of Urbinat. Nantes already has some experience in this field and wishes to promote and improve it. Currently, a one year co-diagnostic with citizens took place in Nantes Nord, from June 2016 to June 2017 with 11 workshops, 3 walkthroughs and 1 participative gardening project gathering together more than 900 inhabitants on public space and 1000 participants in public events, allowing inhabitants and local stakeholders to underline the assets and the problems they face daily and sharing their vision for their district.

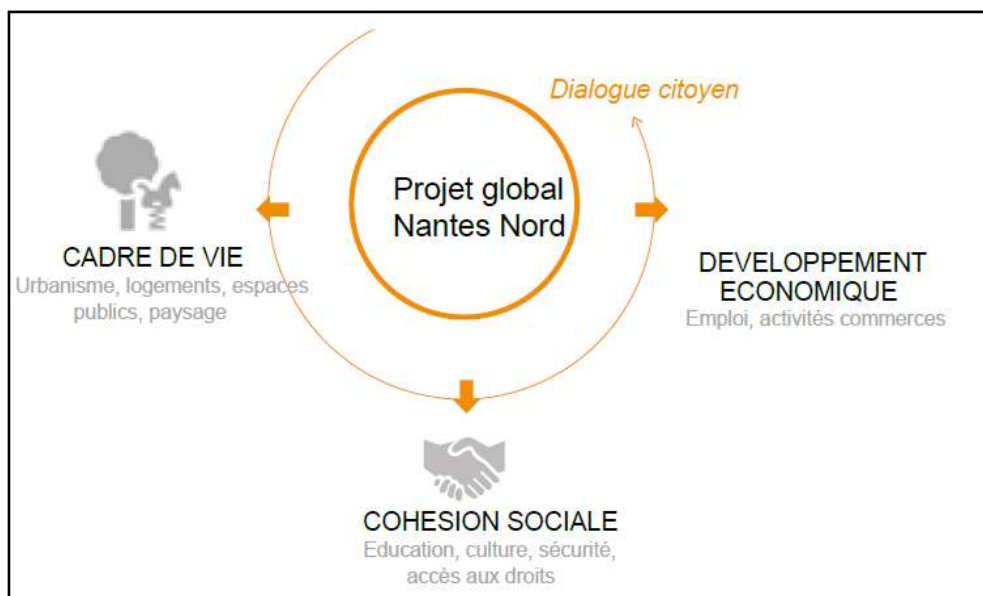


Figure 552 : A global project (source : Ville Ouverte 2016)

## **Which actors are involved in URBINAT ?**

**Nantes Métropole** is the metropolitan authority for the Greater Nantes area and brings together 24 municipalities including the core city Nantes, representing 638.000 inhabitants, has a 3.750 staff and is responsible for: Urban development; Mobility and transport; Public spaces, roads, public lighting and cleanliness; Waste; Environment and energy; Water and sanitation; Housing; Economic development; Higher education, research and innovation; Employment; Europe and international attractiveness. In the Urbinat project, the staff from the urban development department and the proximity pole (entity in charge of the follow up of the works on public space) are member of the Urbinat team.

**The city of Nantes** is in charge of several policies. The departments of green spaces and public health are part of the project team. The district team of Nantes Nord in charge of the implementation of the participation process will have a key role in the organization and conduction of workshops with citizens and actors. The department of education, of sport and of elderly will also be requested for very specific part of the project.

**The Institute for Research on Urban Sciences and Techniques (IRSTV)**, is a research federation of the CNRS (FR 2488) created on January 1, 2006. It is organized as a cluster of 20 labs gathering around 100 researchers from 14 organizations in the Pays-de-Loire region: CNRS, Centrale Nantes, IFSTTAR, AgroCampusOuest, the Universities of Nantes, La Rochelle and Le Mans, Nantes architecture school (ensa), IMT Atlantique, École Supérieure des Géomètres et Topographes (CNAM Le Mans), CEREMA, BRGM, CSTB and Air Pays de Loire. IRSTV is represented in URBINAT with CNRS as Partner and the others (IFSTTAR, Université of Nantes, AgroCampus-Ouest) as linked third parties. The entities of IRSTV collaborate to carry out an interdisciplinary research in the field of urban environment and sustainable urban development. Its research program concerns the development of knowledge, models, tools and methodologies for the management, design, decision-making and the evaluation of city planning policies. As local scientific partner of Nantes Métropole in URBINAT project, IRSTV offers knowledge, models, tools and methodologies for the observation, monitoring and reporting of NBS considering the environmental processes and perception.

**Local associations, stakeholders and all the inhabitants of Nantes Nord** are also key actors. The city of Nantes counts on the NGO's and the community centre of the district to mobilize the citizens in the workshops. L'EclectiC is an association of young people bringing up innovative initiatives in the district. La MANO is the community centre of the district, hosting 5 associations including l'EclectiC, an association of senior apartment sharing and an association to help people facing financial issues.

Childminders, staff and residents of the retirement home (EHPAD) and the CCAS (community social action association) are regularly involved in actions in the district.

### **Nantes Métropole -IRSTV research partnership**

IRSTV has developed a privileged partnership with Nantes Métropole and the city of Nantes in several national research projects, such as VegDUD (vegetation and microclimat vs vegetalisation scenarios, ANR); Eval-PDU (evaluation of environmental impacts of transport urban planning, ANR), JASSUR (urban agriculture, ANR) and currently, and COOLPARKS (impact of vegetation in parks on microclimat, ADEME).

The two partners are also involved in their own projects. Nantes is currently involved in several EU projects as '[MySMARTLife](#)' (H2020 programme), an innovative European project on smart solutions for urban transition and 5 bridges, a project aiming at creating bridges between homeless and local communities (Urban Innovative Action). The IRSTV is currently involved in Nature4Cities (evaluation of Nature-Based-Solutions, H2020) and was recently partner of two COST actions on urban allotment gardens and modelling of urban sub-soils. It is also member of the UERA (European Alliance for Urban Research).

All these projects are in line with Urbinat objectives.

The current urban project developed by Nantes in Nantes Nord is especially favourable for a research partnership because some sites of the district were already case studies for IRSTV within projects (Renards stream, two urban allotment gardens). This includes some experiences where inhabitants were associated. As IRSTV is located on Nantes Campus in the Quartier Nord district, the geographical proximity of the study area also offers the opportunity for IRSTV to suggest the district as study site for other research projects. In a future perspective of the implementation of the healthy corridor, the location of IRSTV is especially favourable for monitoring and medium/long term assessments.



## 6.2 The City

### Location in the country

Nantes is a North-western French city, located 55 km east from the Atlantic Ocean and 386 km southwest of Paris.



Figure 553 : Nantes in the Pays de la Loire region and in the Loire Atlantique department (source: Idé )

Nantes is the administrative capital of the Pays de la Loire region and of the Loire-Atlantique department (Figure 553). Nantes is also the main municipality of “Nantes Métropole” (the metropolitan institution) that gathers 24 municipalities (Figure 554). Nantes (municipality area) extends over 65.19 km<sup>2</sup> and it is the 6th largest city in France in terms of population.



Figure 554: The 24 municipalities of Nantes metropolitan area (“Nantes Métropole”)

## Brief historical description<sup>68</sup>

Located at the bottom of the estuary, Nantes, a city-port, has ensured its development thanks to the Loire. Condevicnum (from Condate: confluence), Portus Namnetum (Nannètes's harbour): the first written references refer to this privileged relationship between the city and the river.

### A enclosed city (3rd - 17th centuries)

- *A fortress from Antiquity to the Middle Ages (3rd - 15th centuries)*

In the 1st century, the Cité des Nannètes, a Gallic territory located north of the Loire, became part of the Roman Empire. Its capital, Condevicnum, was then an open and extensive city, but its limits are still poorly known.

Threatened in the 3rd century by the Barbarians, destroyed in the 9th century by the Normans, the city withdrew and protected itself behind its ramparts. Thus, until the end of the middle Ages, the military function remained predominant. From the first Gallo-Roman enclosure, only a few visible remains remain (as at the foot of the Saint-Pierre gate). As for the fortifications of the Upper Middle Ages, no evidence of them has been found to date.

At the end of the 11th century, thanks to the return of peace, the expanding city emerged from its ramparts, giving birth to suburbs such as that of Saint-Nicolas. In the 13th century, Duke Pierre de Dreux, followed by Guy de Thouars, supervised the construction of a second, larger enclosure, defended by four gates, two of which remained: the Saint-Pierre gate and the Sauvetout gate.

- *Nantes, residence of the Dukes of Brittany (15th - 16th centuries)*

In the 15th century, under the impetus of Jean V, François II and then Anne of Brittany, Nantes became the capital of Brittany, seat of political power and court life. The construction of two new buildings, symbols of ducal power, the castle of the Dukes of Brittany and the cathedral of Saint-Pierre and Saint-Paul, began (Figure 555).

The castle then fulfilled a double function: (i) a fortress integrated into the fortification line and capable of repelling enemy attacks (as in 1487), (ii) a princely residence where 600 people lived side by side and which cultivated an art of living influenced by the Renaissance.

- *The rise of the commercial port (13th - 17th centuries)*

From the 13th century onwards, Nantes opened up to the world through its maritime and river routes linked to Spain, Portugal and Holland. Connected to the hanseatic cities and ports of Portugal and Spain, Nantes relies on the products of the Nantes region (fish, wine and especially salt) to control part of the maritime traffic.

The commercial vocation of the port is increasing while port activities are concentrated between the Bouffay district and the Place du Port-au-vin (now Place du Commerce). From 1671 onwards, the first exchanges with the "islands" heralded the rise of transatlantic slave trade.

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<sup>68</sup> Source: <https://www.nantes.fr/home/a-nantes-et-pas-ailleurs/decouvrir-nantes/nantes-dhier-a-aujourd'hui/histoire-de-nantes.html>



Figure 555 : Nantes in the 15th century (artist view: <https://jeanclaudegolvin.com/de/nantes/>)

### **An open city (18th century - around 1830)**

The 18th century, a century of growth Nantes was then an active port, frequented each year by some 2000 ships and boats. Its prosperity was mainly based on the slave trade: loaded with barter goods, the ships of Nantes reached the African coasts to exchange their cargo for captives. They are taken by force to America to be sold as slaves to work on the plantations. Back to Europe, the ships brought back the precious colonial goods (sugar, coffee, indigo).

In the 18th century, Nantes became France's leading slave port, accounting for 42% of French slave trade shipments. This painful history, long hidden, is now presented in the rooms of the Nantes History Museum and symbolically commemorated through the Memorial to the Abolition of Slavery.

- *The Feydeau complex and the 18th century embellishments*

Driven by its economic and demographic growth (the population doubles in one century to 80,000 inhabitants), the city is expanding (Figure 556).

The first urban construction site of this century was on Île Feydeau. In 1723, this island, located opposite Le Bouffay, was divided according to a regular plan drawn up by the engineer Goubert. Faced with unstable and floodable terrain, work is delayed. The first buildings were built around 1740. The project was only completed on the eve of the French Revolution. In the 1930s, Feydeau lost his insularity when the arms of the Loire were filled. Around 1750, it was decided to demolish the fortifications that had become an obstacle to urban expansion. At the location of the ramparts, major embellishment work was undertaken: a view of the Cours Saint-Pierre and Saint-André, a majestic front of buildings on the quays by Jean-Baptiste Ceineray.

Further west, new districts were created from scratch, such as the one initiated by Jean-Joseph Graslin, who entrusted Mathurin Crucy with the creation of the new theatre and its place. These projects are based on a programme architecture that combines unity, repetitiveness of façades and staging of urban space.



Figure 556 : Nantes in 1757-59 by Cacault François (1743-1805, Mapmaker) (source: gallica.bnf.fr)

### Urban changes (from 1830 to the present)

- *A bourgeois and working class city*

After the French Revolution, the business bourgeoisie, which came from the trade and industry sectors, played a major role in Nantes society. Its concern for representation is manifested through a few symbolic places: the Pommeraye passage, inaugurated in 1843, is the place where the notability meets and strolls. Its decoration evokes trade and industry symbolized by the allegories of Arts and Sciences. The use of iron and glass in the structure reveals the bias towards modernity.

From the second half of the 19th century, Nantes became industrialized (Figure 557). New activities related to the port are developing: sugar refineries, canneries, biscuit factories, distilleries, breweries. At the turn of the century, shipbuilding became the driving force behind the regional economy and the development of metallurgy.

Industrial growth led to the massive arrival of a labour force, especially a poor population from Brittany, which crowded into unhealthy habitats around the factories.

Along the Quai de la Fosse and on the other side, the intense port activity accompanies this change. Born in Nantes, Jules Verne (1828-1905) was marked by this show: "I see the Loire again, with a league of bridges linking the multiple arms, its platforms cluttered with cargo, under the shade of elms, and the double railway line, the tramway lines were not yet criss-crossed. Ships were docked in two or three rows; others went up or down the river" (Memories of Childhood and Youth, 1890).



Economic change is accompanied by a transport revolution. Nantes is developing the first tramway network in France. In 1851, it was the trains that entered the heart of the city via the banks of the Loire to join the port's industries.

- *Traumatisms*

In the inter-war period, the Municipality undertook the filling of the arms of the Loire (Figure 558) and the Erdre. The decision of such a site is motivated by the problem of silting up the main bed of the Loire, the silting up of the secondary arms, traffic difficulties and insalubrity. These works, which lasted more than 20 years, profoundly modified the city and its landscapes.

But the consequences of the Second World War were even more violent. On 16 and 23 September 1943, Nantes, occupied by the Germans, was seriously affected by Allied bombardments. 700 buildings were destroyed, 1463 people died. After the war, the reconstruction effort partly erased these consequences: identical reconstruction of the Stock Exchange, Place Royale, new architecture of Place Bretagne, Calvaire street and Hôtel-Dieu.

Despite rapid recovery in the 1950s and 1960s, the successive economic crises of the 1970s caused the decline of industry and the departure of some activities from the city. Symbol of this crisis, the closure of the shipyards (1987) marks the end of a long history of the "Navale" closely linked to the port of Nantes. From now on, Nantes is moving towards a higher tertiary economy, focusing on high technologies and innovation.

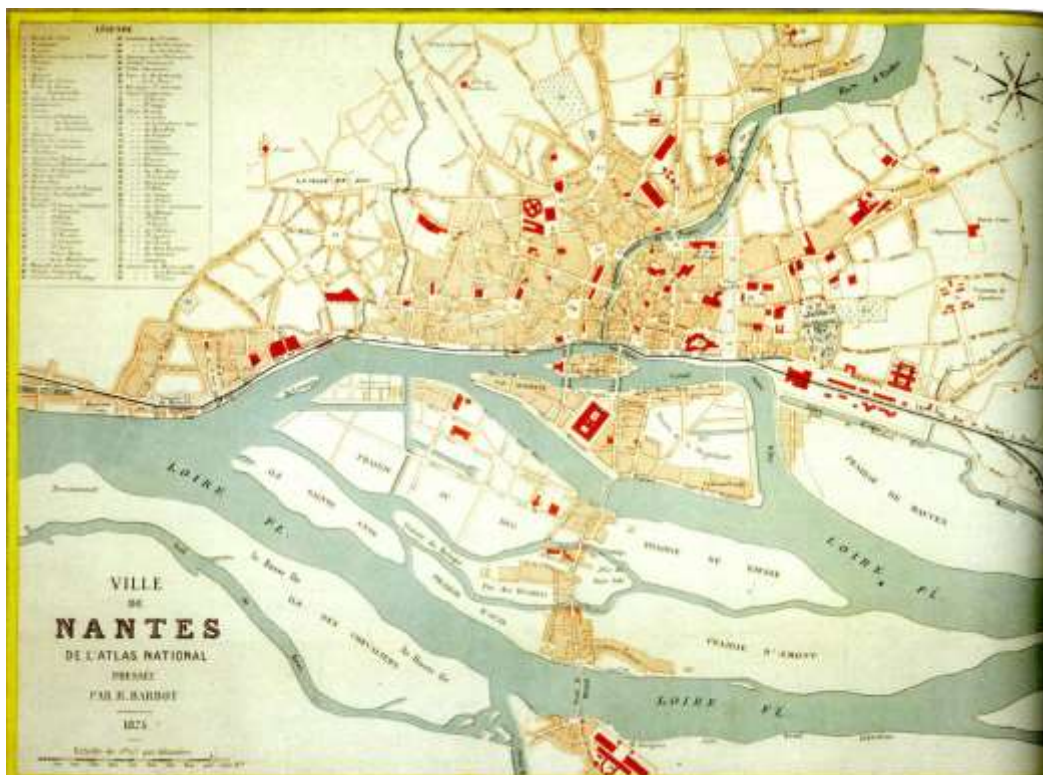


Figure 557: Nantes in 1875





Figure 558: Nantes in 1888, before the filling of the Loire arms (Collection du Musée du Château des Ducs, Nantes)

- *Urban renewal*

From the 1970s onwards, the Nantes centre became the focus of the renovation project. Since 1972, the project of a large business centre in the heart of the city, of which the Tower of Brittany is said to be the symbol, has been strongly contested. It is following this controversy that the City is taking sustainable action in favour of heritage by acquiring a protected area.

Since the 1990s, urban development has focused on restoring the city's anchorage points and often forgotten landmarks: in the old centre, Île Feydeau has regained its insularity through the development of new "quays", evocative of the memory of water.

New districts have combined heritage and contemporary architecture, such as the Madeleine Champ-de-Mars district, where the former LU factory, which became a national stage, was rehabilitated in 2000, or the island of Nantes, which relies on its industrial heritage to propose new uses, such as the promenades at the Chantiers site.

Inaugurated in 2012, the Memorial to the Abolition of Slavery, conceived as a new public space open to the Loire, invites us to cross past and present, through a commemorative and meditative journey involving the question of Freedom and Human Rights.

### **Current strategic challenges of the city**

Very attractive, the metropolitan area is gaining 5 000 inhabitants every year, which contributes to increasing a number of difficulties in the daily lives of the inhabitants: saturated traffic in the metropolitan area and its surroundings, a shortage of housing for new inhabitants, increased pressure on a fragile and remarkable environment...

Nantes Métropole has set itself the objective of meeting 3 challenges to support its development until 2030 (

Figure 559).

### 1-Developing a metropolitan area of well-being and solidarity

The metropolitan way of living well together will have to meet everyone's needs in terms of housing, mobility, access to employment and everyday services, while preserving breathing spaces, nature in the city and quality public spaces.

The metropolitan area being a territory of confluences, each municipality has an intimate relationship with water, the Loire and its tributaries that must be preserved.

### 2- Make the metropolitan area a reference territory for ecological and energy transition

The urgency of climate change and the limitation of global warming to +2°C or even +1.5°C require rapid and effective actions by taking very concrete measures in the field of urban development for a sustainable and resilient territory. The Nantes metropolitan area is, on its scale, a territory of solutions.

Sustainable spatial planning will be considered as a major element of the city's action to combat climate change and reduce greenhouse gas emissions.

By 2030, these transitions will also be a vector for the evolution of urban uses at all stages of life.

Ways of moving, ways of working, consumption, personal aspirations in terms of leisure, sports, culture, local tourism, the desire to return to a relationship close to nature, the forms of habitat, all this is changing. The aim is to adapt the city to different lifestyles, and to reconcile uses according to the different times of life and everyone's aspirations.

### 3- Act for an innovative, creative, attractive and radiant metropolitan area

In addition to these ecological and energy transitions, there is also the digital transition. All three are also crucial in the areas of employment and economic development. Reducing our greenhouse gas emissions and promoting local and non-relocatable activity are new job-creating sectors that the region must seize. Affirming the economic identity of the metropolis, highlighting and supporting its specific assets and skills (diversity of activities and jobs, attractiveness of sectors of excellence, quality of training and engineering, culture of entrepreneurship, wealth and networking, competitiveness of the service offer), means increasing the economic potential of the region by focusing on new growth drivers: innovation, creativity, digital, circular, social and solidarity economy. It is to strengthen the attractiveness and promote the development of job-creating companies.

It also means stimulating and supporting the potential for cross-innovation and the creation of new projects that generate added value.

The Local Urban Plan drawn up on a metropolitan scale is the basic document that governs the building rights of the entire territory of the 24 municipalities of the metropolitan area. He translated these objectives by integrating the following values into his writing:

- *Build a metropolis of solidarity and justice:*

To this end, PLUM promotes links between the various districts and the municipalities that compose it, develops the urban qualities of the districts by affirming that everyone has the right to a quality urban environment and must be able to flourish there.

- *A diverse metropolis:*

From one municipality to another, from one district to another, the city's opportunity lies in its diversity in its forms of housing, its urban fabrics. This must be maintained and reinforced in a logic of mixed urban functions.

- *A natural metropolis:*

Encourage more nature in the city, a reduction in nuisances and pollution through greening, the creation of parks and gardens, the networking of nature spaces between them, reconciling both ecological and ecological continuity of bicycle and pedestrian networks.

- *A sober metropolis*

Take action against global warming and adapt to its early effects by promoting in particular the development of soft and low-polluting mobility, renewable energies, the circular economy and the recycling of building materials.

- *A peaceful and local metropolis*

Replace the centralities at the heart of the daily movements of the inhabitants by offering them the right conditions for access to employment, education, training, public services and culture, to shops and leisure activities.

- *An active metropolis*

The economic diversity of the metropolis is an opportunity that must be preserved, in particular by contributing to the requalification of old industrial sites and the renewal of the existing offer of accommodation.

- *A creative metropolis*

Innovation, in all its social, technological and user dimensions, cultural and creative, ecological and energy, and digital, is the other challenge that the city of tomorrow will have to face.

a metropolis that is turning its past into a wealth for the future

The landscapes, the Loire, the ports, the marks of the industrial past, forge the identity of the metropolis and must be preserved. But it is also true of the small architectural and urban heritage in each commune or district, which must be an assumed component of the projects that support them.

- *A metropolis linked in a logic of alliance of territories:*

Because the dynamism of Nantes Métropole is rooted in a much larger territory, because today the development of a metropolis is as much or more dependent on the networks it weaves as on its size, the metropolis builds alliances with its neighbouring territories.

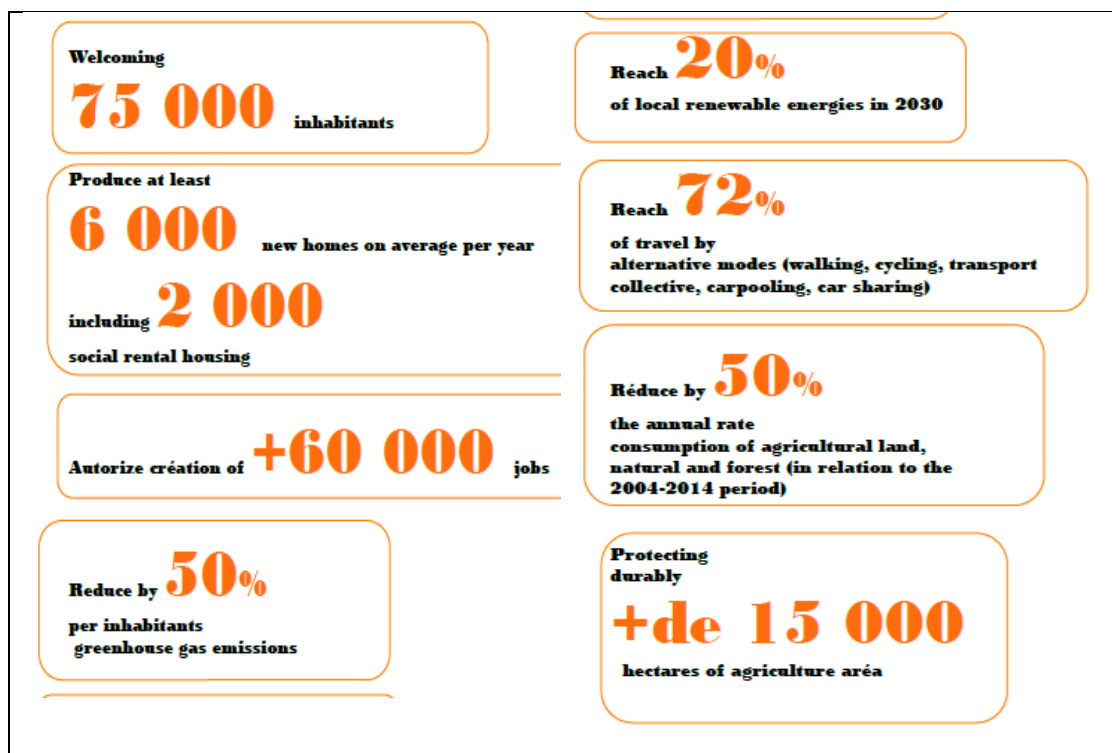


Figure 559 : Objectives by 2030 for a sustainable development of Nantes Métropole

## 6.2.1 Territorial description

### 6.2.1.1 Climate and Urban Environment

France has a temperate climate that is usually declined into 5 main climate types (Mountain, Mediterranean, oceanic, altered oceanic and altered continental climates). Joly et al (2010) have detailed a bit more by considering 8 climate types (Figure 560).

Nantes is located in the oceanic climate zone according to Joly et al. climate type classifications. Thus, annual temperatures are in average less than 13°C, with limited annual amplitude. Winters are then mild whereas summers are not very hot.

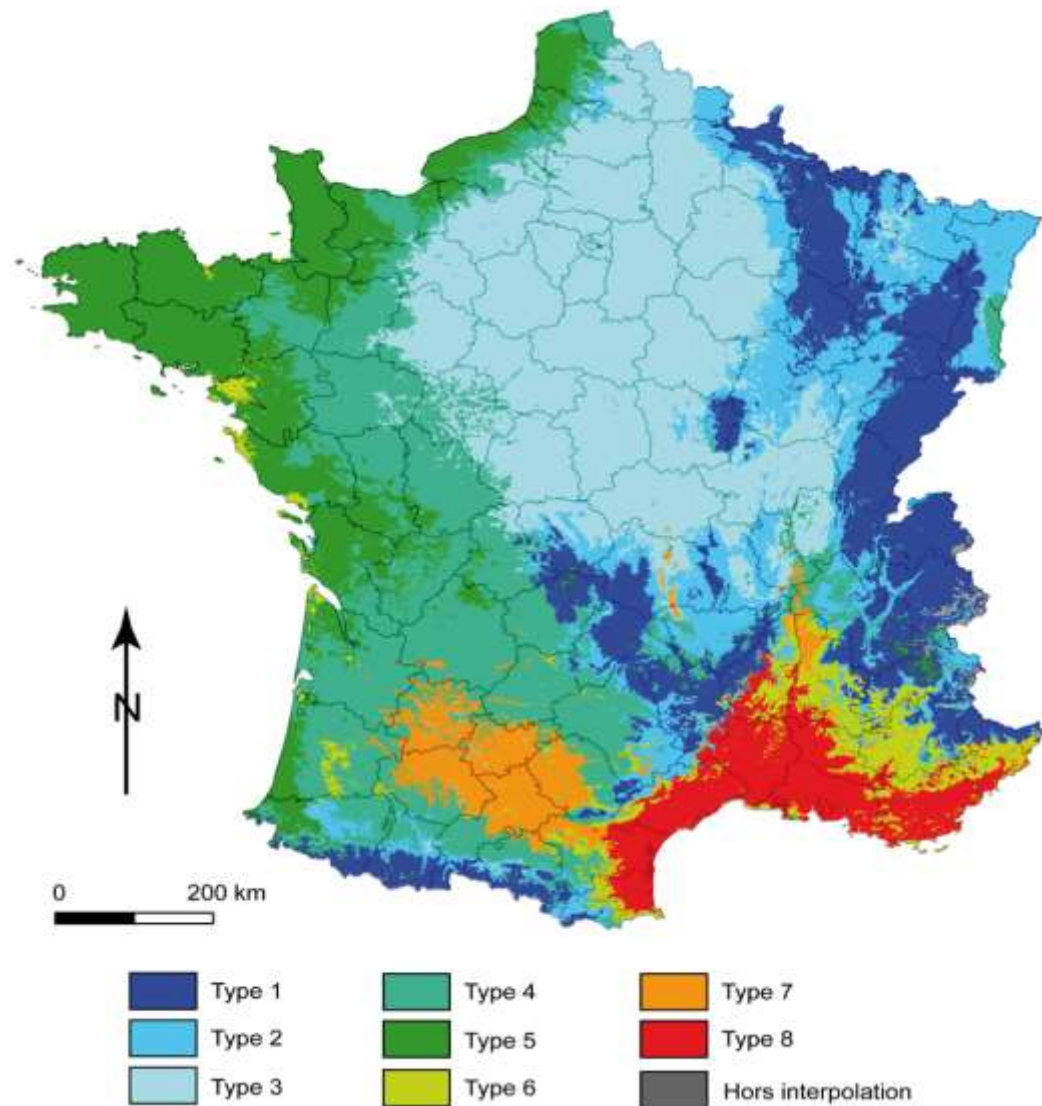


Figure 560: Map of the 8 climate types over France Type 1 mountainous; 2 semi-continental and mountainous margins, 3 degraded oceanic of central and north flat lands, 4 altered oceanic, 5 oceanic, 6 altered Mediterranean, 7 south-west basin and 8 Mediterranean (Joly et al, 2010<sup>69</sup>).

Over 1981-2010 period, climate normal temperature is 8.3°C for minimal, whereas the maximal one is 16.7°C (Figure 561). Rainfalls are quite abundant with climate normals equals to 819.5mm (Figure 562). Nevertheless, rainfalls are usually not heavy, with an annual average number of rainy days around 119 (Météo-France, 2019<sup>70</sup>).

<sup>69</sup> <https://journals.openedition.org/cybergeogeo/23155#tocto3n5>, visited on February the 26th 2019.

<sup>70</sup> <http://www.meteofrance.com/climat/france/nantes/44020001/normales>, visited on the 27th of February 2019



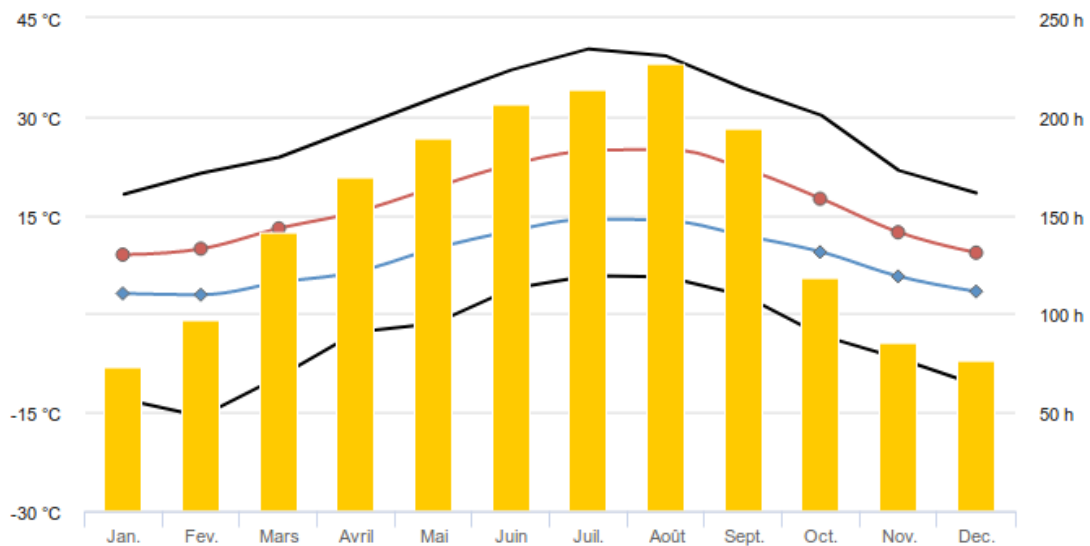


Figure 561: Climate monthly normals (1981-2010) for minimal (blue line) and maximal (red line) temperatures and for shining duration (1991-2010). Record temperatures are drawn with black lines. (Source: Météo-France<sup>71</sup>)

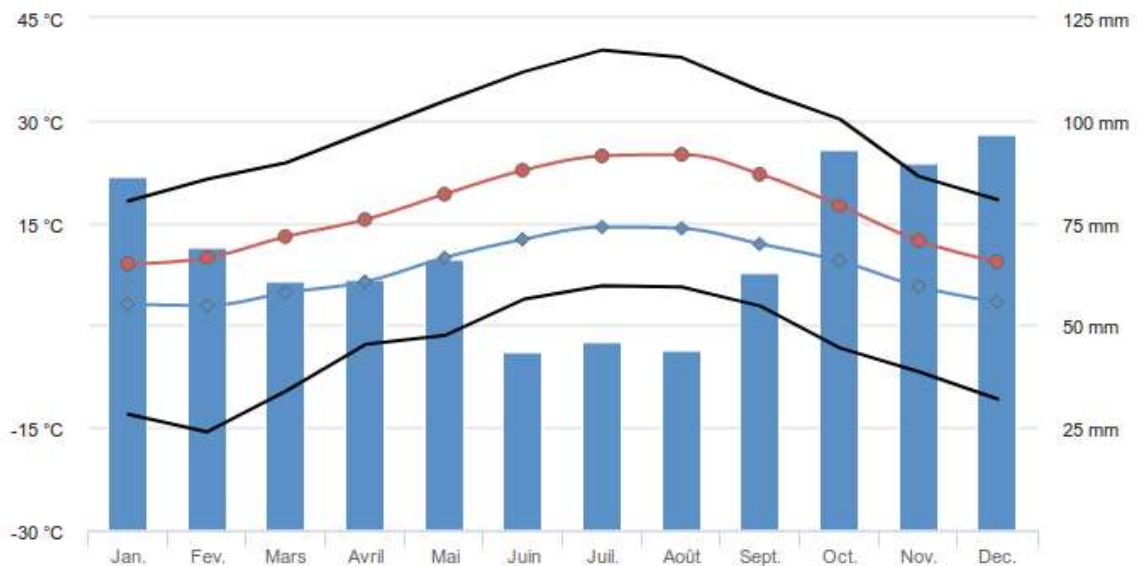


Figure 562 : Climate monthly normals (1981-2010) for minimal (blue line) and maximal (red line) temperatures and for monthly rainfall totals. Record temperatures are drawn with black lines. (Source: Météo-France<sup>72</sup>)

### Climate through seasons

Nantes enjoys the hotter temperatures in summer and the colder ones in winter (Table 157). Negative temperatures in winter are not very frequent (the climate normal for minimal temperature is positive) but can happen. The largest rainfall monthly totals are in fall and winter. Summer months are less wet.

<sup>71</sup> <http://www.meteofrance.com/climat/france/nantes/44020001/normales>, visited on the 27th of February 2019.

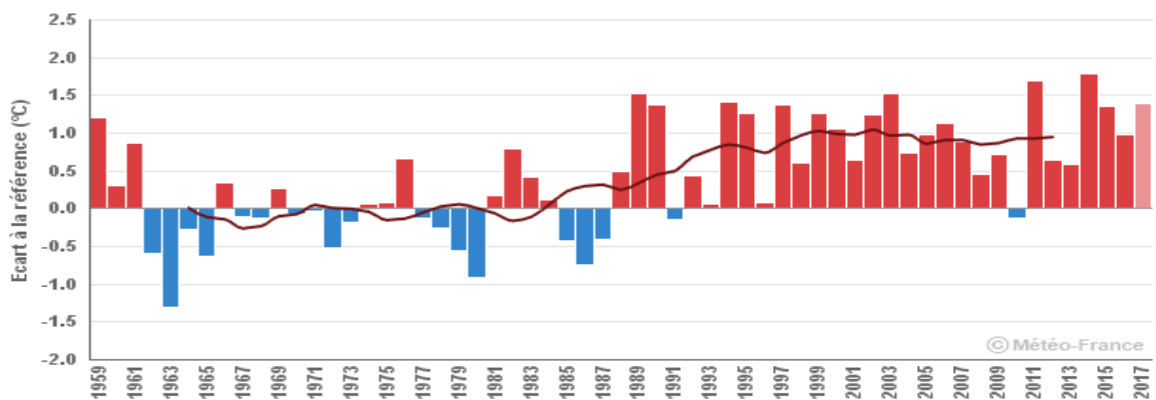
<sup>72</sup> <http://www.meteofrance.com/climat/france/nantes/44020001/normales>, visited on the 27th of February 2019.

Table 157: Climate monthly normals for minimal and maximal temperatures and rainfall totals, over the period 1981-2010.

Months	Min temperature	Max temperature	Rainfall totals
January	3.1°C	9.0°C	86.4mm
February	2.9°C	9.9°C	69.0mm
March	4.8°C	13.0°C	60.9mm
April	6.4°C	15.5°C	61.4mm
May	9.9°C	19.2°C	66.2mm
June	12.6°C	22.7°C	43.4mm
July	14.4°C	24.8°C	45.9mm
August	14.2°C	25.0°C	44.1mm
September	11.9°C	22.1°C	62.9mm
October	9.4°C	17.5°C	92.8mm
November	5.7°C	12.4°C	89.7mm
December	3.4°C	9.3°C	96.8mm

## Temperature

Temperature rise can be observed in Nantes, since the beginning of 80's (Figure 563). Over the period ranging from 1959-2009, the mean annual temperature increases between 0.2°C and 0.3°C by decade. This increase is higher for summer (+0.4°C) and lower for fall (+0.1°C-0.2°C). In number of hot days, an increase tendency can be observed as well. A hot day is defined with the maximal temperature higher than 25°C. In Nantes, the number of hot days has increased by 2 days per decade (Figure 564).



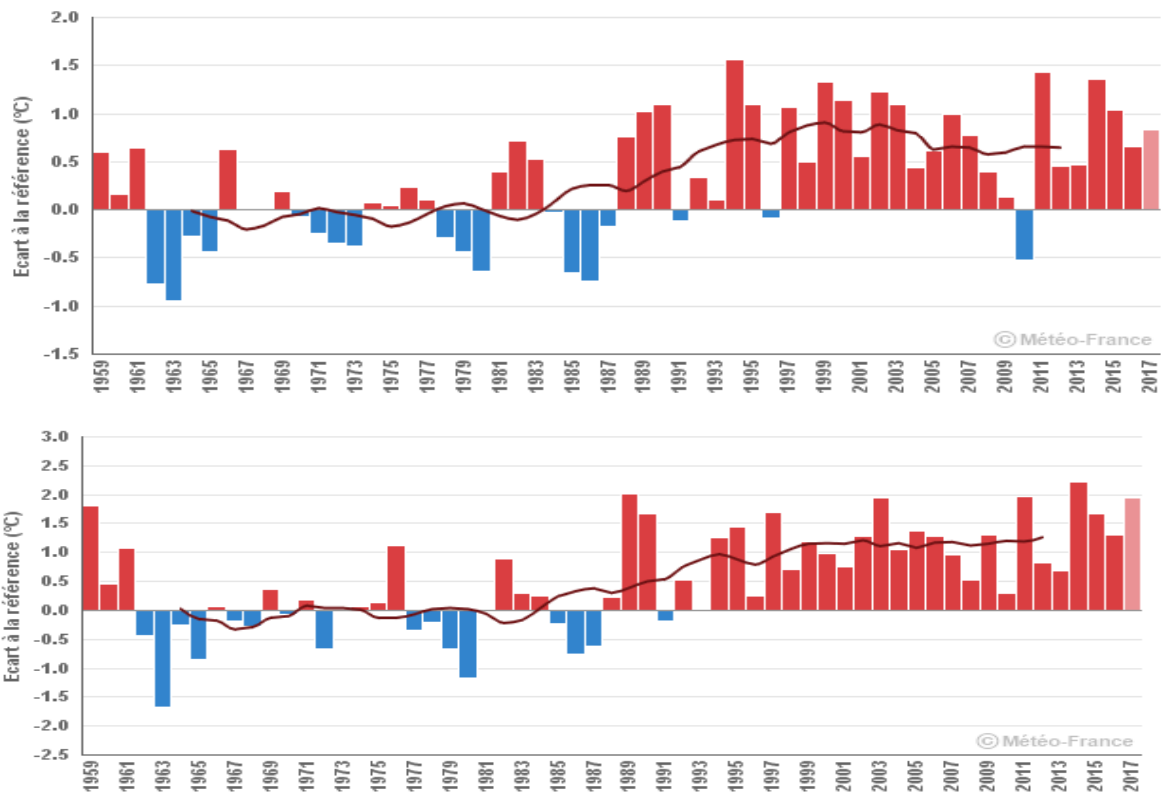


Figure 563 : Mean (top), min (middle) and max (bottom) temperature anomalies (reference period 1961-1990) from 1959 to 2017. The corresponding 11-yr moving average is drawn with red line. (Source : Météo-France)<sup>73</sup>

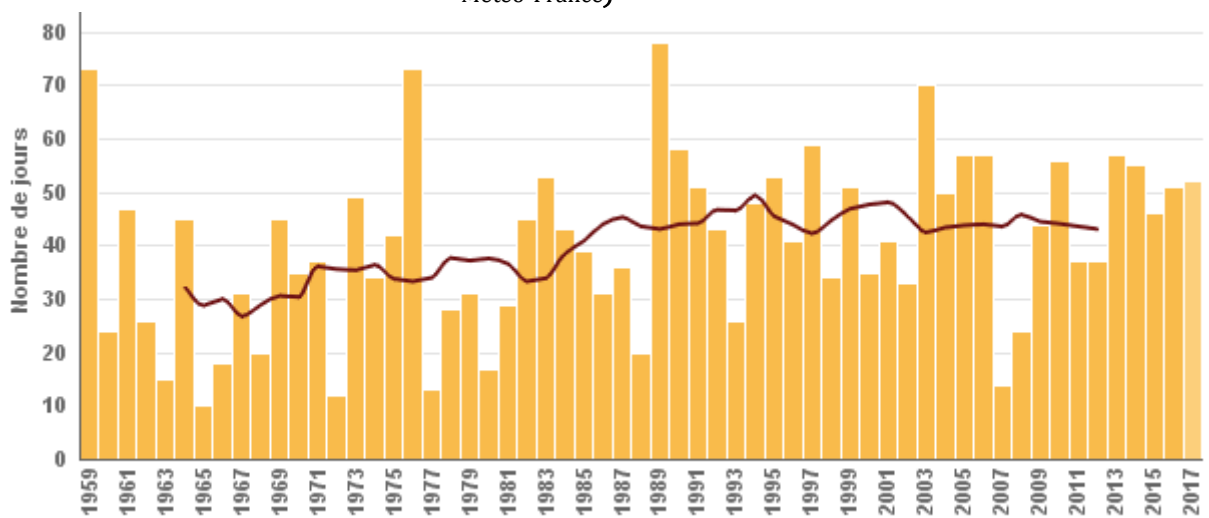


Figure 564: Number of observed hot days per year from 1959 to 2017. The 11-yr moving average is drawn with red line. (Source: Météo-France)

<sup>73</sup> <http://www.meteofrance.fr/climat-passe-et-futur/climathd>

## Precipitation

Annual precipitations in Nantes are very variable from one year to another. Figure 565 shows a slight tendency of increase since 1959, especially in winter and summer (Figure 566).

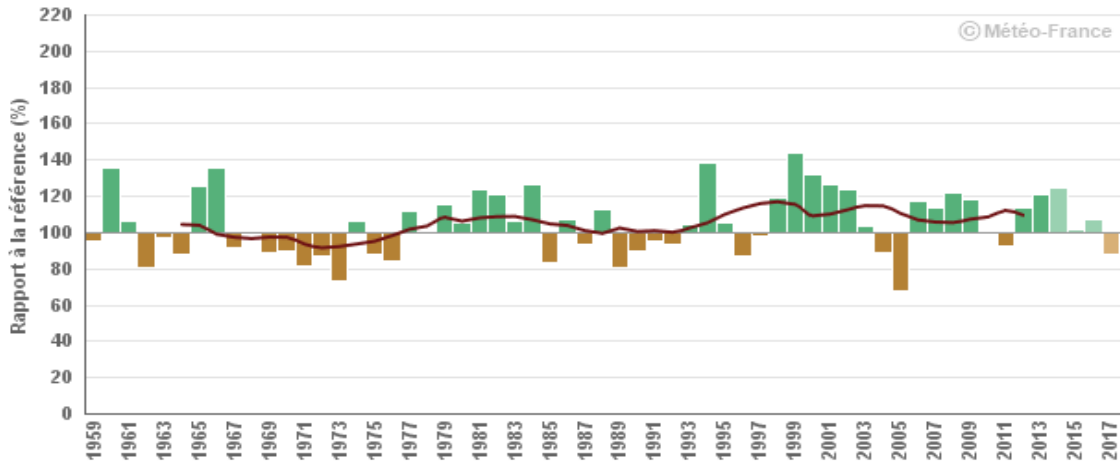
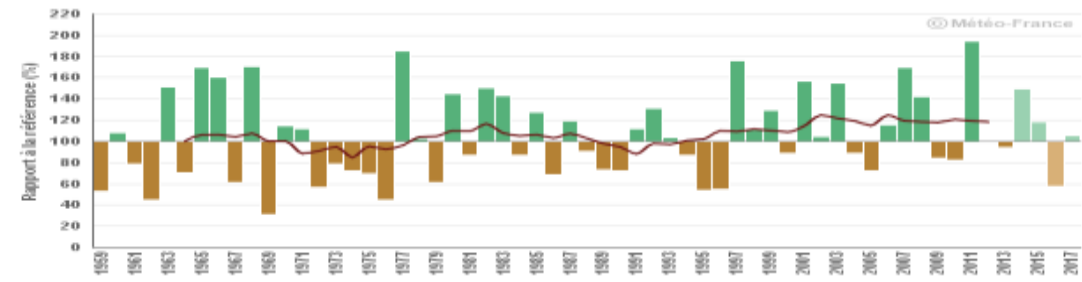
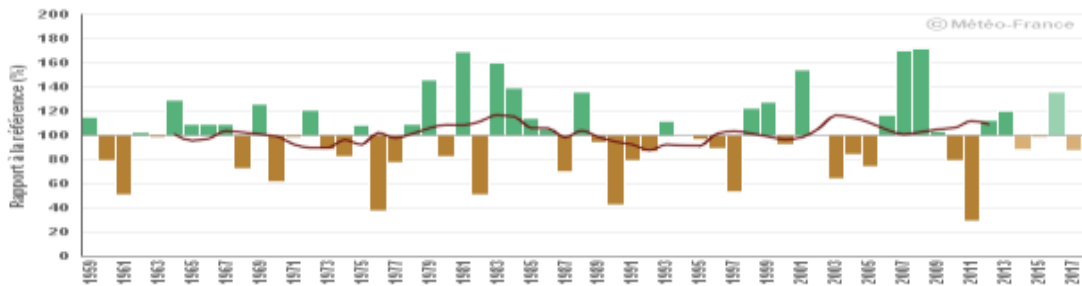


Figure 565: Annual rainfall total ratio (reference period 1961-1990) from 1959 to 2017. The 11-yr moving average is drawn with red line. (Source Météo-France)



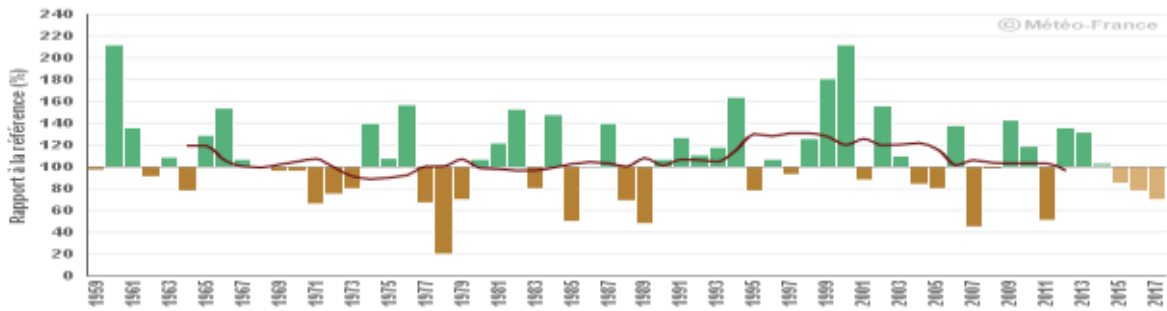


Figure 566: Seasonal rainfall total ratios (reference period 1961-1990) from 1959 to 2017. Winter is on top, spring is top middle, summer is bottom middle and fall at the bottom. The 11-yr moving average is drawn with red line. (Source Météo-France)

## Climate Resilience

### A Stabilized energy consumption

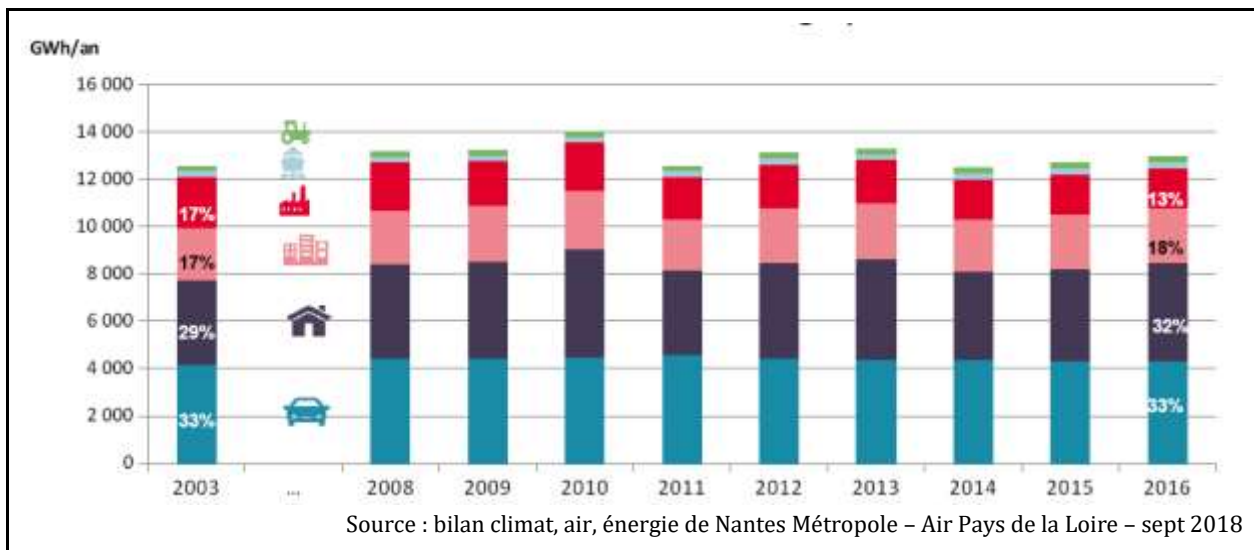
Between 2003 and 2016, energy consumption per capita decreased by 13%, despite the continuous increase in the number of inhabitants over the period (+19%), energy consumption in absolute terms increased by only 3% between 2003 and 2016 (Table 158).

Table 158: Evolution of energy consumption

	Energy consumption (GWh)	Energy consumption (MWh/inhab)	Inhabitants (1000 inhabitants)
2003	12 554	23,4	536
2016	12 948	20,3	637
Evolution (%)	+ 3%	- 13%	+ 19%

Source: bilan climat, air, énergie de Nantes Métropole – Air Pays de la Loire – sept 2018

The Figure 567 shows the evolution since 2003 for 6 sectors: road transport, residential, tertiary, industry, non-road transport and agriculture.



Source : bilan climat, air, énergie de Nantes Métropole – Air Pays de la Loire – sept 2018

Figure 567: Evolution of energy consumption by sector



Road transport is the most energy-consuming sector in Nantes Métropole. Its energy consumption is stable over the period 2003-2016 while road traffic continues to increase within the urban area (21% increase in traffic between 2003 and 2016). This observation is mainly due to technological improvements in vehicles, enabling them to consume less fuel, and the measures implemented by Nantes Métropole through its Urban Mobility Plan (PDU) to contain this increase in traffic.

The residential sector consumption follows climatic rigour variations rigour and population growth. The share emissions from heating within the consumption of this sector is 69% in 2003 compared to 62% in 2016 (The year 2016 is very close to 2003 in terms of climatic severity while the population has continued to increase between these two dates (+19%)). The increase in the price of energy, the strengthening of thermal regulations and incentives for the insulation of housing has therefore led to a decrease in consumption in the residential sector.

Consumption of tertiary sector increases by 5% in absolute terms between 2003 and 2016. The development of this activity in the agglomeration explains this growth: increase in the number of 20% of the workforce between 2003 and 2016. In terms of the number of employees, energy consumption emissions from the tertiary sector have actually decreased by 13%. The distinction of energy consumption by use allows observing a decrease in energy consumption related to heating (-9%), while the specific electricity and air conditioning consumption increased sharply (+27%).

Energy consumption in the industry sector (excluding the energy branch) decreased over the period: -23% between 2003 and 2016. This decrease is mainly associated with the decrease in energy consumption related to the natural gas (-20%) and petroleum products (-28%), which represented 45% and 20% respectively in 2003 energy consumption. Coal consumption has also almost completely disappeared.

Non-road transport and agriculture accounted for 3% of energy consumption in 2003 and 4% in 2016.

#### Decreasing greenhouse gas (GHG) emissions

Although the population is increasing (+19%), GHG emissions are decreasing over the period (-5% in absolute value). As a result, GHG emissions per capita are down by 20% ( **Table 159**). Due to the high proportion of GHG emissions from energy sources (more than 90%, compared to 60% in the regional level), changes in GHG emissions are very strongly correlated with changes in energy consumption: climatic rigour, technological improvements, building insulation, etc.

Table 159: Evolution of GHG emissions

	Emissions (kteqCO2)	Emissions (kteqCO2/inhab)	Inhabitants (1000 inhabitants)
2003	2 733	5.1	536
2016	2 585	4.1	637
Evolution (%)	- 5%	- 20%	+ 19%

The Figure 568 shows the evolution since 2003 for 8 sectors: road transport, residential, tertiary, industry, non-road transport, agriculture, energy and waste management.

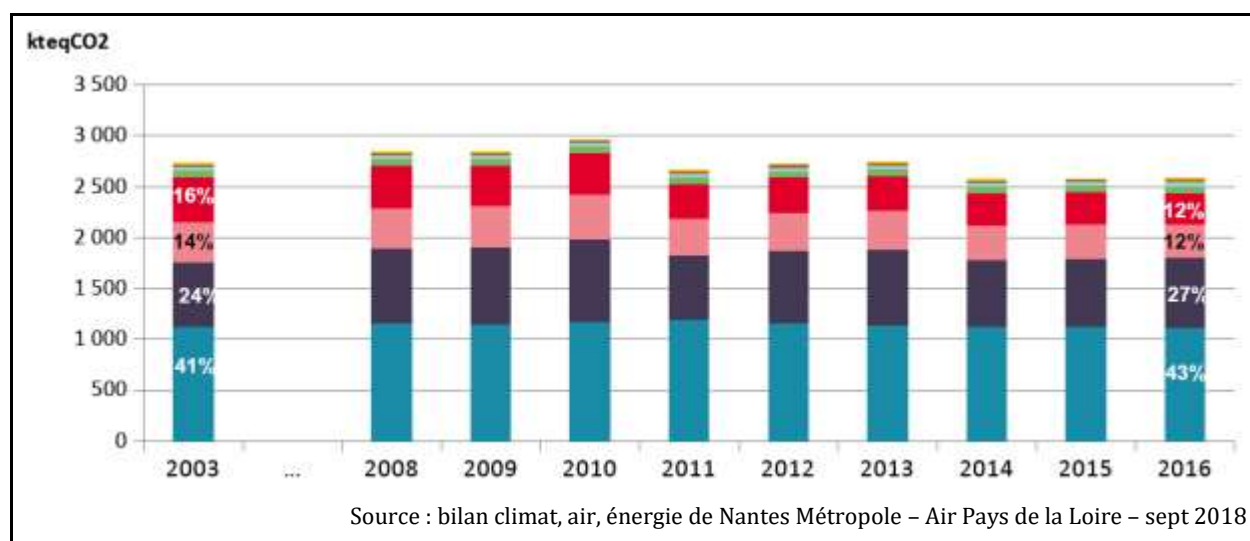


Figure 568: Distribution of GHG emissions by sector

As a predominantly urban territory, Nantes Métropole is committed, by combining its public policies on urban planning, housing, the environment and agriculture, to maintaining and then increasing the areas that will ultimately contribute to the creation of significant carbon sinks (protection of wetlands, conservation of wet grasslands and development of urban forests).

## Air Quality

### Air pollutant emissions: key data

The pollutants considered in annual emissions are as follows: sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), fine particles (PM<sub>10</sub> and PM<sub>2.5</sub>), ammonia (NH<sub>3</sub>) and non-methane volatile organic compounds (NMVOC). These pollutants come from various sources and have an impact on the environment (rainfall acids, indirect contribution to global warming) and on health (respiratory, cardiovascular disorders and carcinogenic effects).

Overall, air pollutant emissions decreased between 2003 and 2016 except the ammonia (Figure 569).

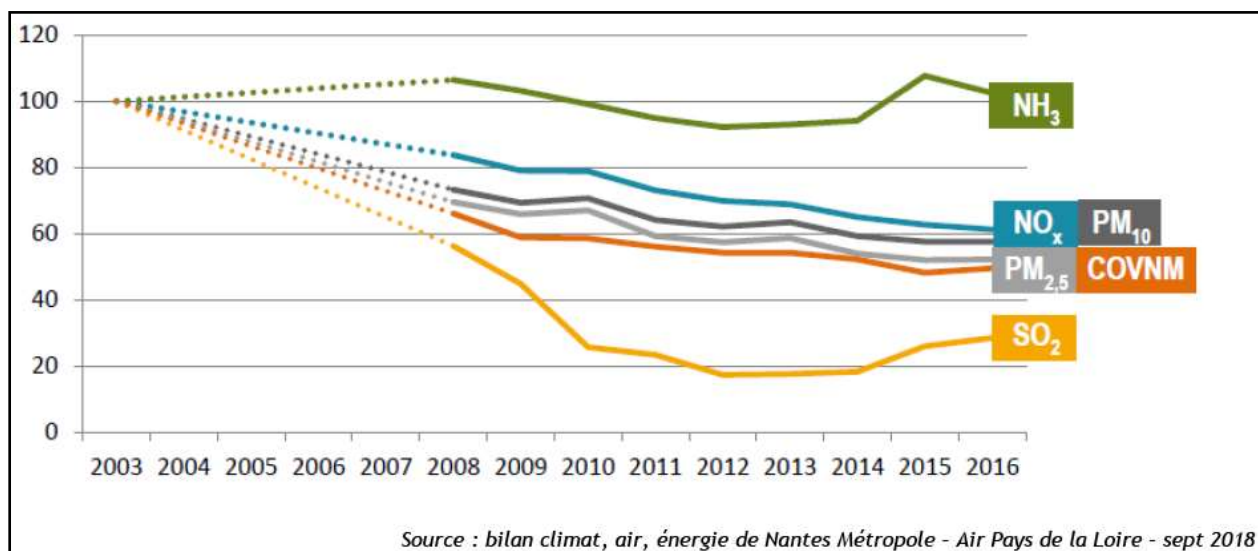


Figure 569: Air pollutants emissions between 2003 and 2016

### Air quality monitoring and modelling

The maps of annual pollution indicators for the Pays de la Loire region are produced each year as part of European reporting (Figure 570). Concentrations are estimated in accordance with the recommendations of the “Laboratoire Central de Surveillance de la Qualité de l’Air” (LCSQA), in compliance with the regulatory requirements in force.

To produce this information, Air Pays de la Loire relies on the ESMERALDA inter-regional air pollutant dispersion modelling platform, which implements a daily pollutant concentration forecasting system based on a meteorological model (MM5 V.7.3) using NCEP GFS weather forecasts and a dispersion model (CHIMERE V2014b) based on data from the BASEMIS® regional inventory and other partner regions.

The annual indicators were calculated in 2018 on the following 7 pollutants: NO<sub>2</sub>, O<sub>3</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, SO<sub>2</sub> and C<sub>6</sub>H<sub>6</sub>. The calculation of annual statistics is based on the coupling of large-scale regional information provided by the high-resolution model of the ESMERALDA platform with detailed modelling of the main regional pollution sources including motor traffic, industries, quarries and boiler plants through the ADMS-urban software.

The information layer is produced at a resolution of 3.5 km and is available for exploitation at a scale ranging from 1/1 150 000th to 1/25 000th for a Lambert 93 projection.

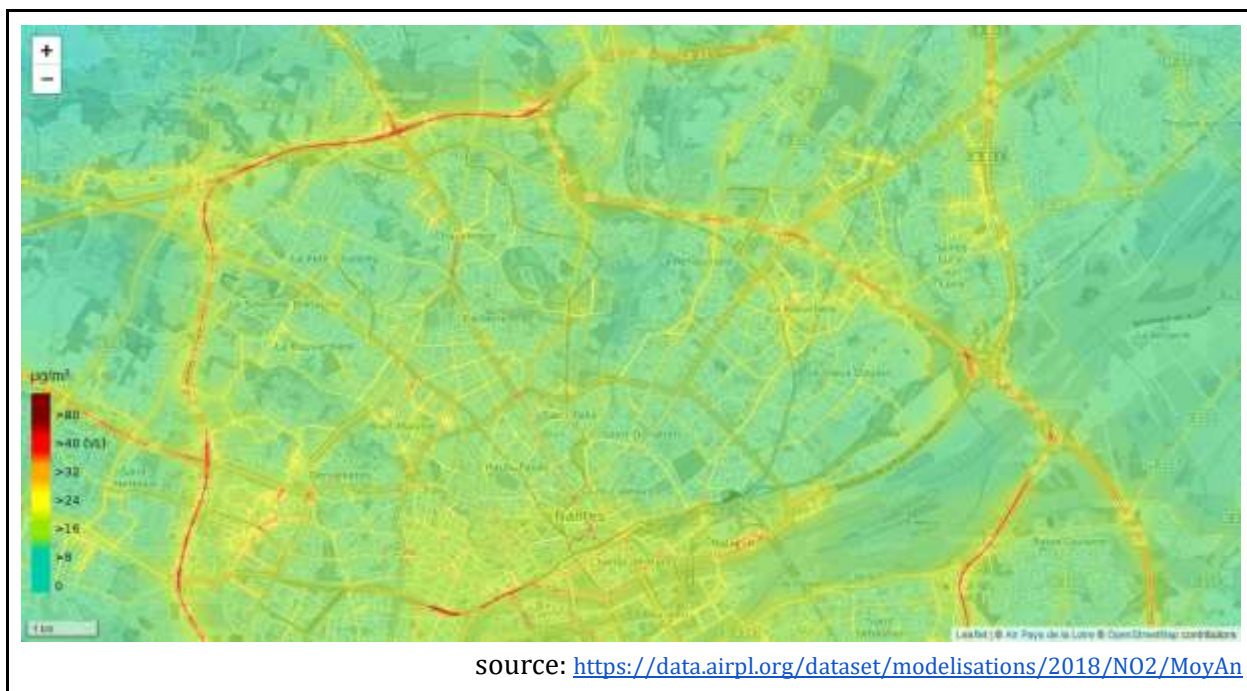


Figure 570: Modeling 2018 - Annual average - NO2 Nantes North

## Local climate and air policies

### Territorial Air Energy Climate Plan (PCAET)

The territorial plan for climate and energy transition aims at fighting against the climate change with a mitigation part aiming the reduction of 30 % by 2020 and of 50 % by 2030 of the annual greenhouse gas in comparison to the 2003 levels and a part dedicated to the adaptation to climate change with a role on information, awareness rising and adaptation of the territory to a changing climate. It constitutes a framework for the territory's commitment.

In a logic of linking "Air-Energy-Climate" topics, the "air quality" component irrigates the two components of the Climate Plan.

### Territorial Urban Mobility Plan (PDU)

On 7 December 2018, the Metropolitan Council approved the draft Urban Mobility Plan (PDU) 2018-2027 Outlook 2030. This strategic document defines the principles of travel organization, sets the objectives, strategy and development prospects of travel services for the next 15 years. It also provides for the 2018-2027 action program for all modes of transport and in particular actions to promote the development of walking, cycling and public transport. After a phase of consultation and public inquiry, this document will be proposed to the Metropolitan Council for final adoption.

The 2018-2027 PDU, 2030 outlook, is part of the continuation of the travel policy implemented over the past thirty years, aimed at: "Contribute to the dynamics and attractiveness of the region by offering the conditions for sustainable mobility for all". Three main statements are made by the PDU:

1. Facilitate plural uses at all levels of the territory, by broadening the range of travel services and facilitating the transition from one service to another.

2. Maintain the performance of travel services, particularly for public transport
3. Fostering local mobility that is gentle and peaceful and develops

#### 6.2.1.2 Biophysical characterization

##### **The geology and pedology governed by igneous and metamorphic rocks and the alluvial formations of the Loire**

The Nantes region is crossed from east to west by the Loire River and has a low relief (from 0 to 80 m). Morphologically, this area is made up of two plateaus located on either side of the river and notched by numerous rivers forming valleys. The geological context of the territory is guided by the establishment of the Loire (clayey to stony deposits) on basement units constituting the substratum. This is locally covered by pliocene sands (sedimentary deposits). The diversity of the rocks composing the substratum is explained by the complexity of the regional geological history, which is part of the Armorican massif and the Poitou threshold. Based on the local 1:50 000 geological map of Nantes, three types of lithological formations are distinguished in the area of Nantes (Ters et al. 1969; Béchenec 2007) (Figure 571): i) the metamorphic formations and the igneous formations; ii) alteration and alluvial materials as superficial deposits and iii) quaternary eolian deposits (mainly silt) on terraces. In the north and south-east part of the city, micaschists and altered micaschists are predominant (before -540 MA). Gneiss with more or less mineralized veins (e.g. pegmatite, aplite, quartz...) and granite as parent material (paleozoique) are present in the west part of the city. The alluvium of the Loire deposited during the last glaciation (Würm) covers the rocky bed of the river everywhere. The quartier Nord district is underlaid by various parent materials, mostly granite and altered gneiss, and granodiorites and micaschistes. The map scale is not adapted to get a description of the lithology at the parish level.

The soil map of Nantes Métropole (Figure 572) is produced from the regional pedological database, constituted within the framework of the IGCS program (inventory, management and preservation of soils). The main part of the metropole is described as artificial surfaces and doesn't belong to the sampling program. The old center of the city is surrounded by soils formed from the igneous and metamorphic rocks, especially for the Quartier Nord. Some hydromorphic soils are also present in the far limit of the Nantes Métropole territory.



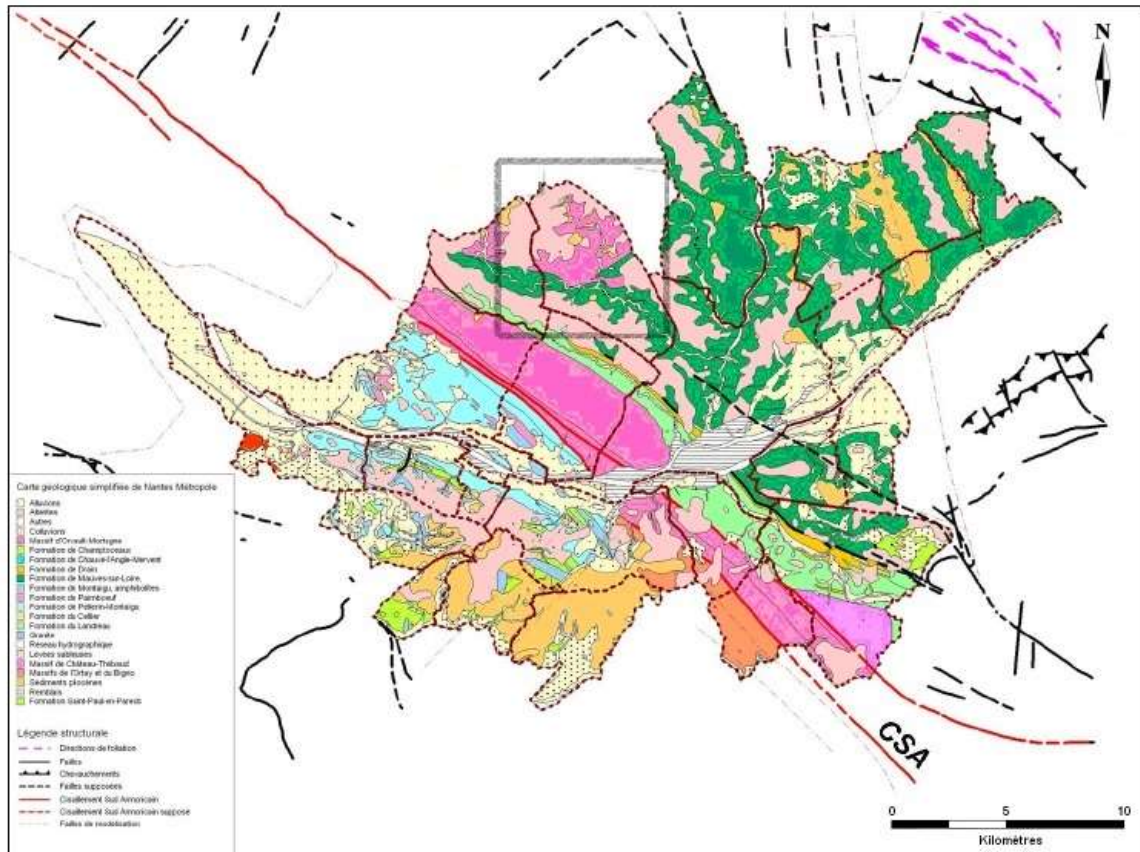
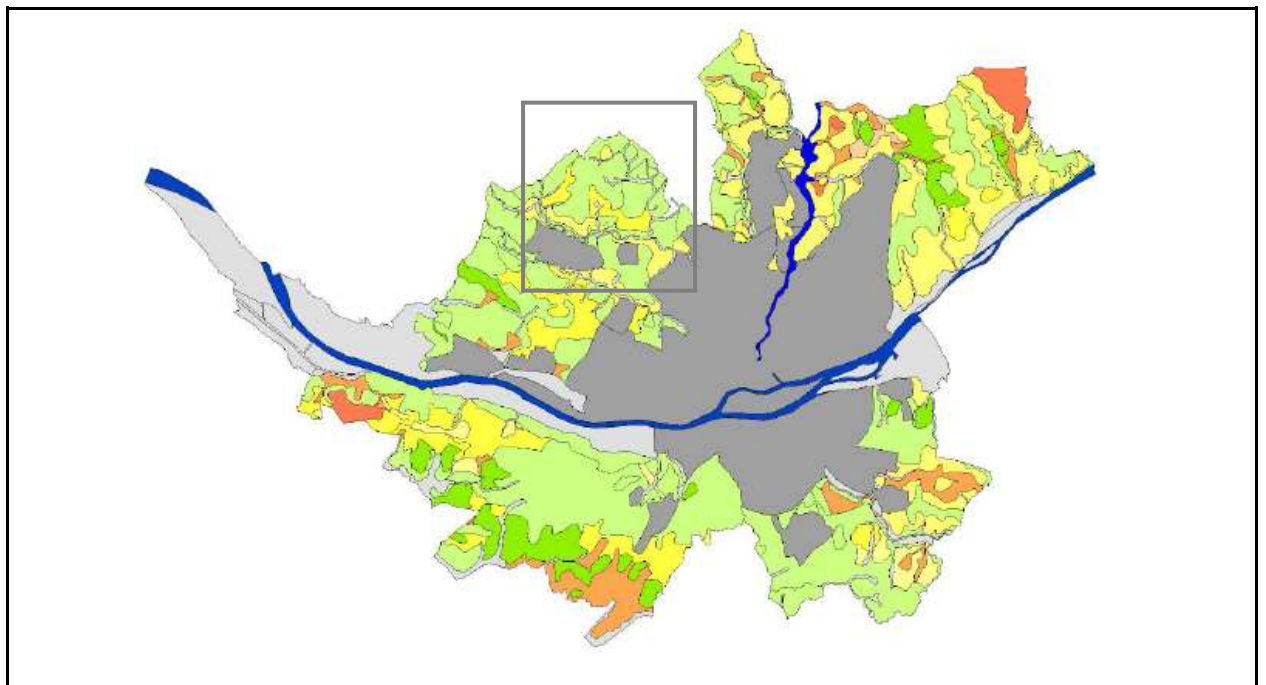


Figure 571: Geology of Nantes Métropole. (Source : Conil P. et Plat E. (2015))



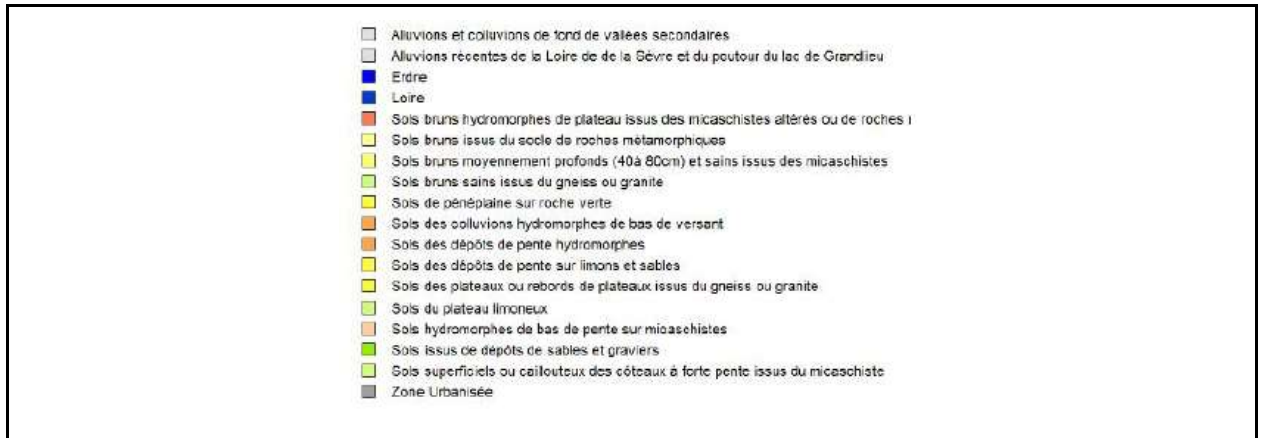


Figure 572: Soil mapping of Nantes (IGCS data)

### Altimetry/Hypsometry

The territory of Nantes presents a quite heterogeneous hypsometry, but with very low altimetry. The higher altitude is lower than 90m and the lowest is about at sea level. Slopes are generally low throughout its territory, even if there are steeper slopes, particularly on the banks of the Loire. The relief is punctuated by a network of dense and shallow valleys. It is mainly drained by the Loire but also by smaller rivers such as the Gesvres, the Erdre or the Sèvre Nantaise (Figure 573).

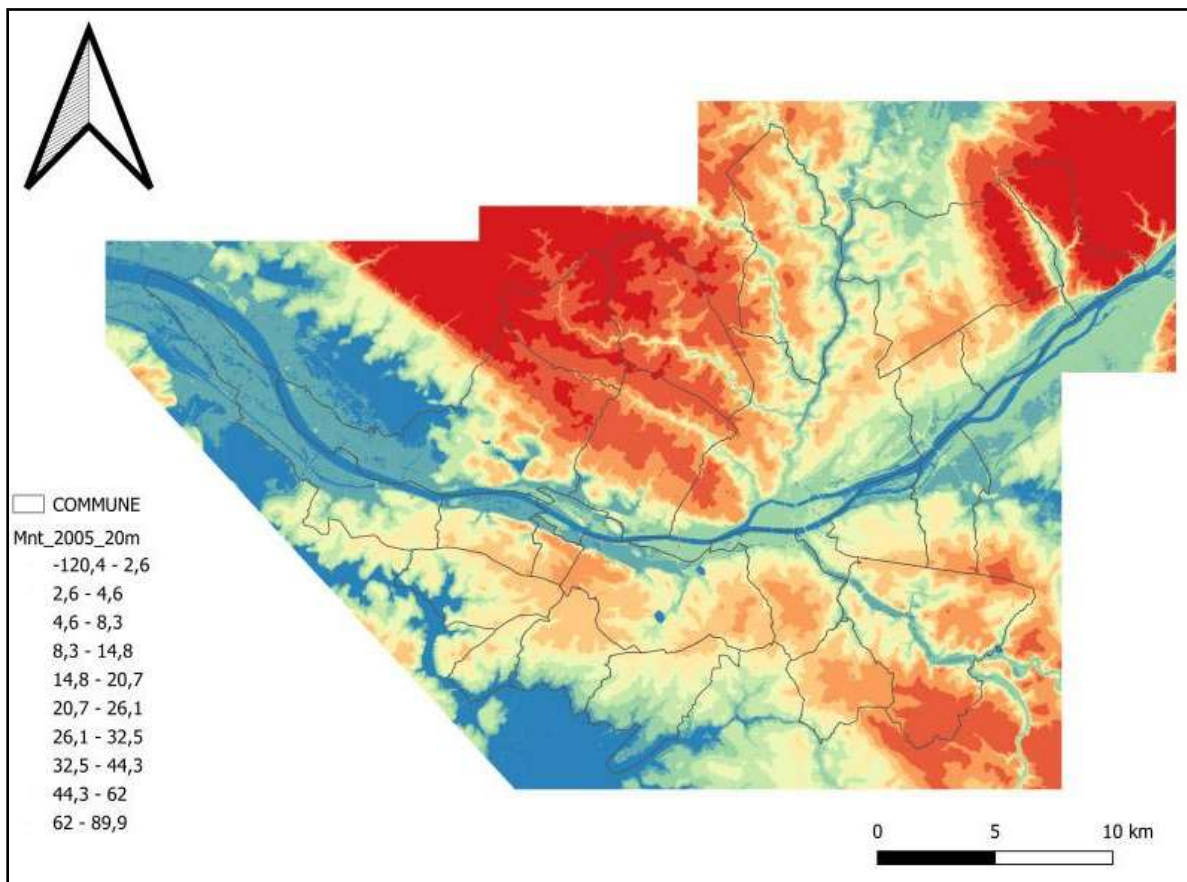


Figure 573: Hypsometric map centered on Nantes (IGN BD Topo, 2005)

## Hydrography and artificial water bodies

The hydrographic network of Nantes Métropole has a high density of watercourses, with the Loire that crosses the city from west to east, and with its numerous tributaries (Figure 574). The metropolitan area also includes large wetlands, with 6 main rivers (Figure 575)

:

### *The Loire River*

Loire has a drainage basin that covers about 1/5 of the national territory. From Nantes, the bed of the Loire gradually widens to draw the estuary itself. The hydrographic network over the territory is then submitted near to the Loire the hydraulic regime estuarine dynamics under the influence of the rise of the saline front and a sedimentary dynamic complex, with the presence of a plug muddy:

- Until Ancenis, the current is irregular, often very fast, with a depth of varying from 0.50 to 5 meters.
- Up to the upstream part of Nantes, the profile is approximately the same but the level varies under the combined effect of the tide and the river flow.
- When low water flows are very low, the muddy plug can go back far upstream to Oudon.

The Loire drains two main tributaries into the territory on the right bank (Erdre and Chezine) and three main tributaries on the left bank (the Goulaine Canal, the Sèvre-Nantes, Acheneau-le Canal de la Martinière).

### *L'Erdre*

L'Erdre that has its source in Maine-et-Loire, has a very low flow rate (2.5 m<sup>3</sup>/s on average), as well as a shallow slope and depth. Its hydraulic regime is modified in the metropolitan territory by the Saint-Félix lock in Nantes, the apparent more willingly to that of a reservoir than to that of a watercourse. Before joining the Loire at Nantes, l'Erdre crosses, the municipalities of La Chapelle-Sur-Erdre and Carquefou.

### *Le Gesvre*

Le Gesvres, takes its source in Temple de Bretagne. It then crosses the municipalities of Vigneux-de-Bretagne, Treillières and La Chapelle-sur-Erdre to get throw in L'Erdre where it constitutes the municipal boundary with Nantes. Its total length is about 25 kilometres. The Gesvres which flows on a flat and slightly flat bottom deep, forms many meanders, some of which are almost able to regroup. It is a river presenting very low flow rates.

### *Le Cens*

The Cens, a tributary of the Erdre, is a 23 km long river of length which takes its source in Vigneux-de-Bretagne. It then crosses the municipalities of Sautron, Orvault and Nantes before flowing into the Erdre at the level of the intersection of Nantes and the southwestern boundary of La Chapelle-sur-Erdre. Its low water flow rates are very low and the river is sometimes dry. Among the fish population present, are counted the Eel, Pike and Fario Trout.

### *La Sèvre Nantaise*

La Sèvre Nantaise has its source in the department of the Deux-Sèvres. After a 142 km journey, it flows into the Loire at Nantes. Its flow regime is normal of river type with long profiles never having slopes greater than 0.5%.



### *La Chézine*

The Chézine is a 21 km long river that rises from its source in Saint-Etienne-de-Montluc. It then crosses the municipalities of Sautron, Couëron, Saint-Herblain, then from Nantes where it flows into the Loire at the level of the Quai de la Fosse. Chézine is covered from Nantes to its confluence with the Loire.

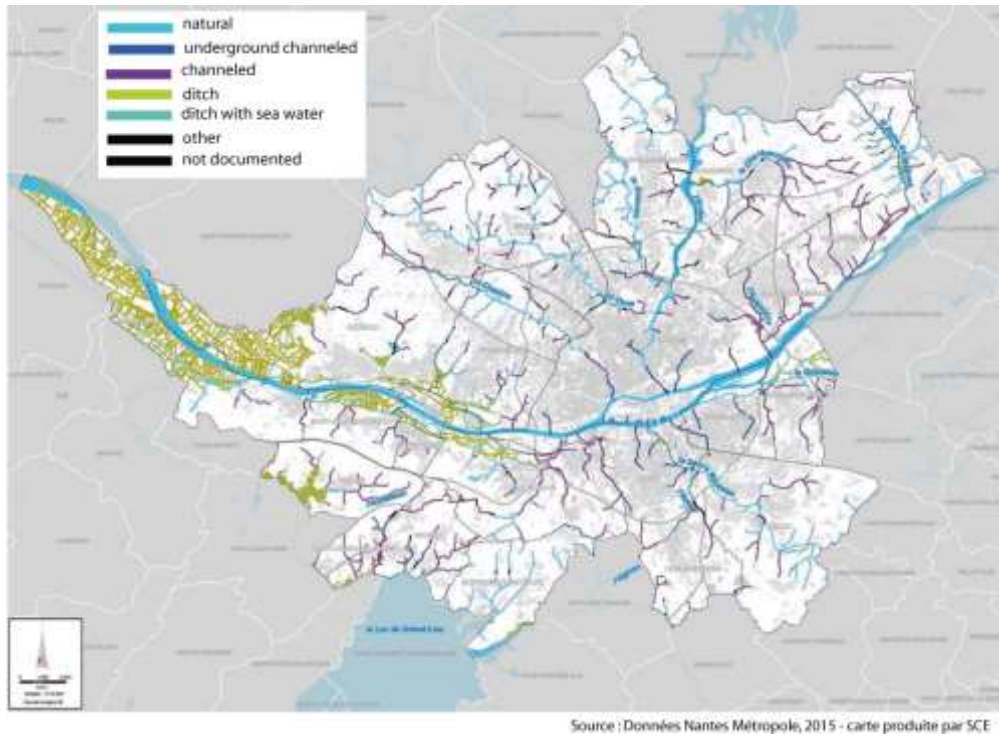


Figure 574: Inventory of watercourse in Nantes - 2014 (metropolitan level) (map: PLUM, 2019)

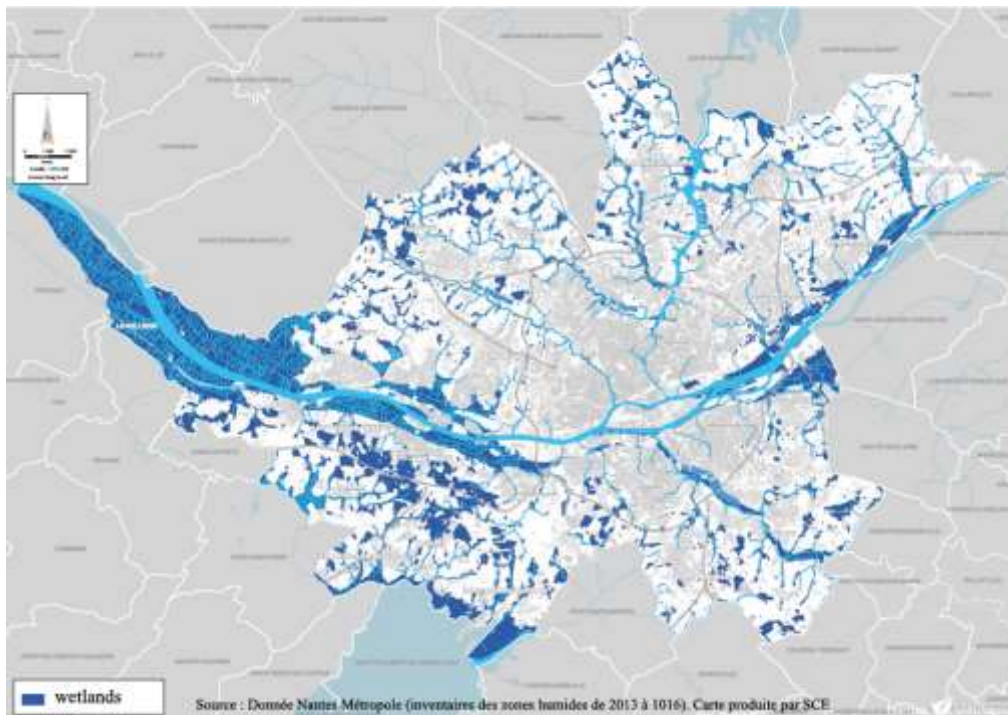


Figure 575: Inventory of wetlands in the metropolitan area - 2013-2015 (map: PLUM, 2019)

## Coastal areas

Nantes is located around 40 km as the crow flies from the Atlantic Coast (Figure 576). The tide, on the Loire is observable to the east side of the city. It can then have an impact on downstream part of the Loire tributaries flowing in the city.

The geometry of the Loire has been profoundly transformed since the 19th century to allow navigation. Over a hundred years, this has led to the rise of the estuary's limits by about thirty kilometres (salt, tide, amplification of the tidal range in Nantes, etc.), so that today Nantes is located in the heart of the estuary.

The tidal range is regularly higher than 6m, more important than in Saint-Nazaire. It has never exceeded 6.30m since 1989.

The muddy plug, formed by fine sediments transported by the Loire and maintained in the estuary by the rising tide, forms at the meeting of fresh and marine waters. This zone of maximum turbidity now extends as far as Mauves-sur-Loire. But, by high flow and low tidal coefficient, the muddy plug can descend the estuary until it is ejected into the ocean.

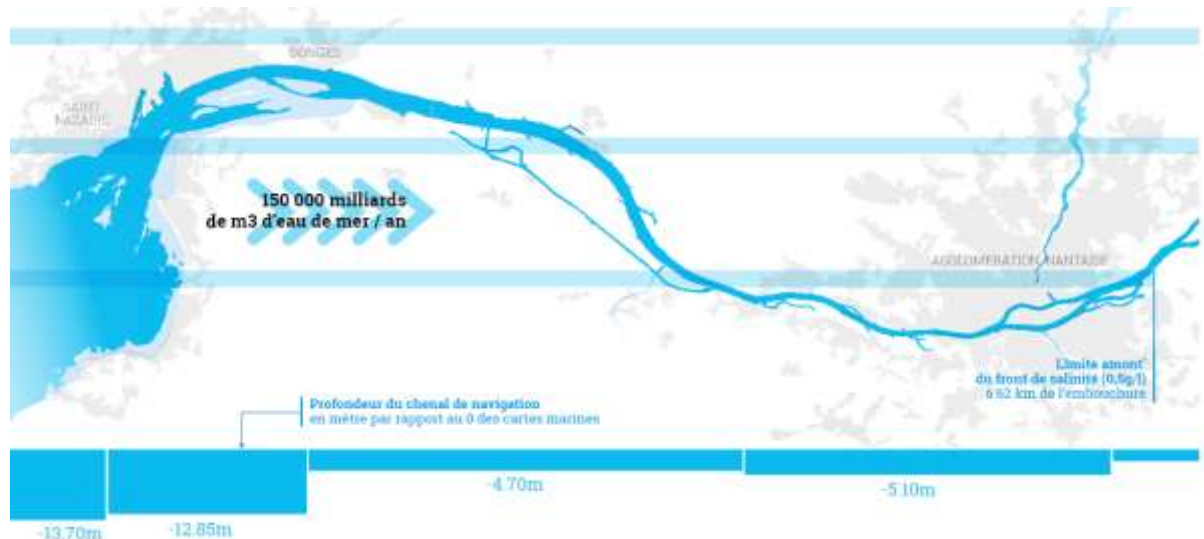


Figure 576: The Loire estuary (AURAN, 2014)

### 6.2.1.3 Land use/ land cover

Land use in Nantes Métropole (Figure 577) is comparable to other major French cities, with significant artificialization within the ring road. Habitat areas are mainly concentrated in Nantes and in the centres of the other municipalities of Nantes Metropole, while the activities are located mainly on the banks of the Loire and on the outskirts of the municipality of Nantes. Land use is heterogeneous according to the municipalities. Indeed, large disparities in occupancy soils exist within the territory of Nantes Metropolitan, especially between municipalities with a high degree of artificialized from the heart of the metropolis and those mainly agricultural and/or natural areas located more in periphery.

Urbanized and/or artificial spaces represent 42% of the total surface area of Nantes Métropole, with respectively 23.7% for habitat, (including 75% for constitutes the residential habitat) 14.9% for equipment and activities (including 3.7% for Spaces artificial green spaces and 1.8% for "Other Spaces artificialized"), and 3.3% for transports.



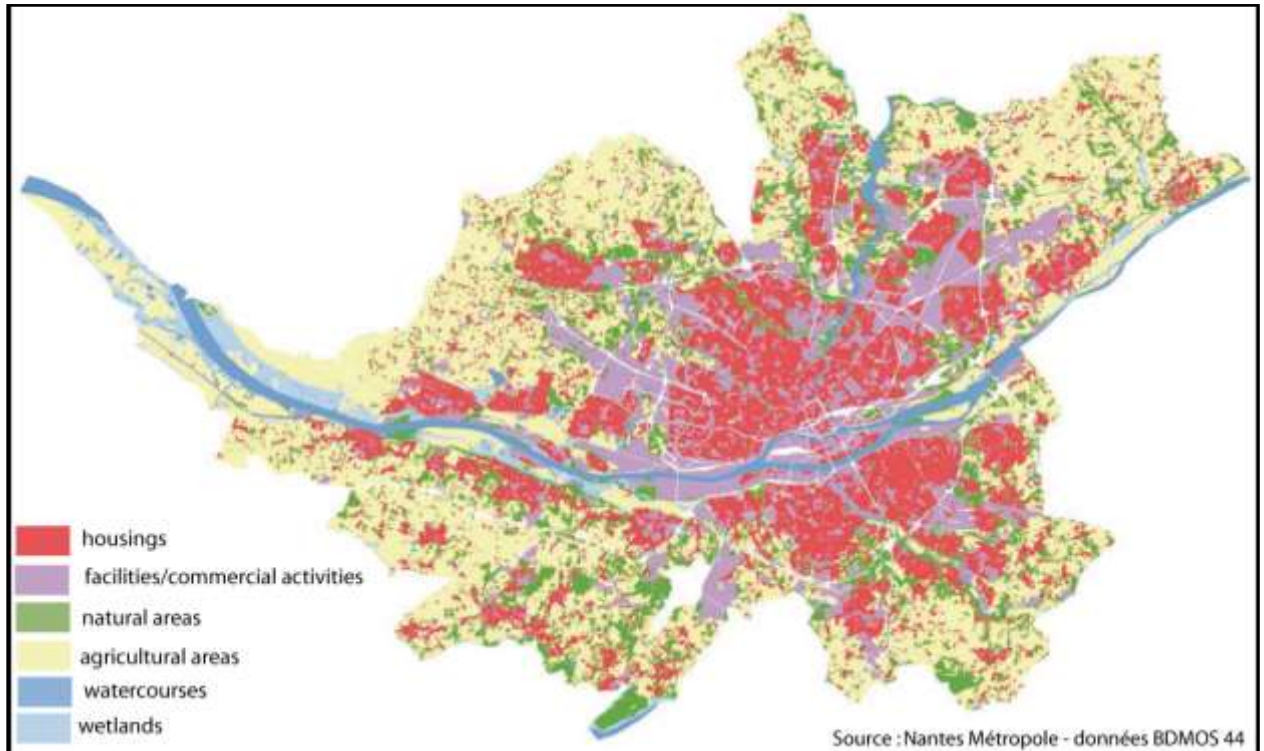


Figure 577: Land Cover of the metropolitan area in 2014 (map: PLUM, 2019)

## Transportation network and hierarchy

### Communication network

The metropolitan area has a dense communication network (Figure 578). The ring road around Nantes (42 km) corresponds more or less to the boundaries of Nantes. Despite the construction of several bridges, the crossing of the Loire remains a challenge in the metropolitan mobility (Figure 579). Nantes was the first French city to reintroduce the tramway in 1985. There are currently three tramway lines within the metropolitan area.

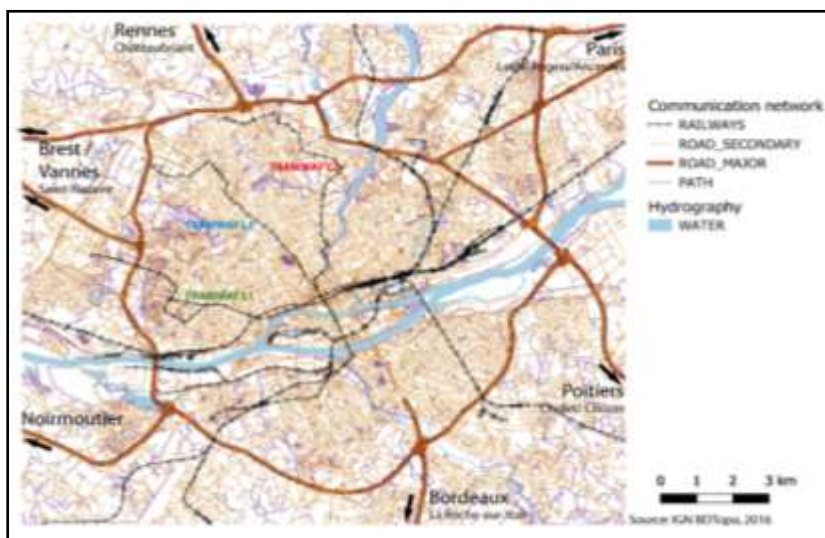


Figure 578: Communication network (map: Bodéan, 2019)

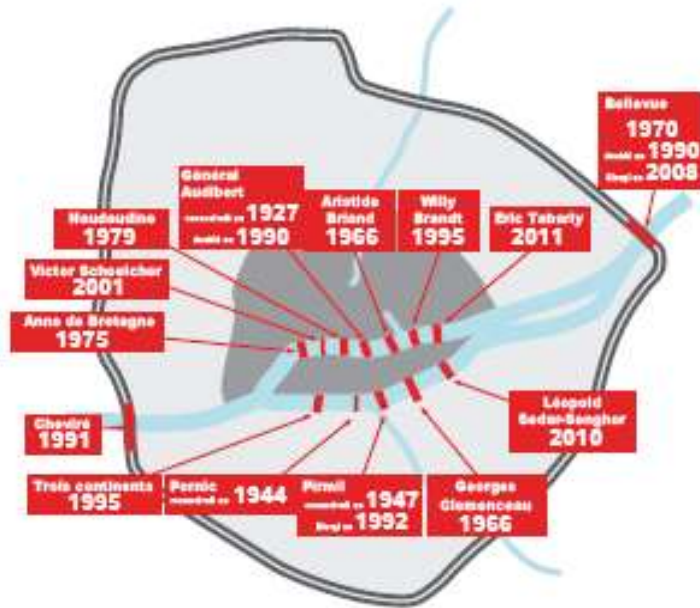


Figure 579: Crossing the Loire, a challenge for the metropolitan mobility (source: Nantes Métropole, 2012)

**A dynamic territory that generates an increase in the number of trips throughout the territory**

The dynamism of the metropolitan area generates a constant increase in the number of trips throughout the territory. Since 2002, the volume of daily trips by the population of Nantes Métropole has increased from 1,940,000 to 2,351,000. In addition to this increase, there has been an increase in the number of trips made by residents residing outside the city. There are nearly 290,000 daily entries and exits in the territory (Figure 580). 86% of these exchanges are carried out by car and 53% are carried out during peak hours.

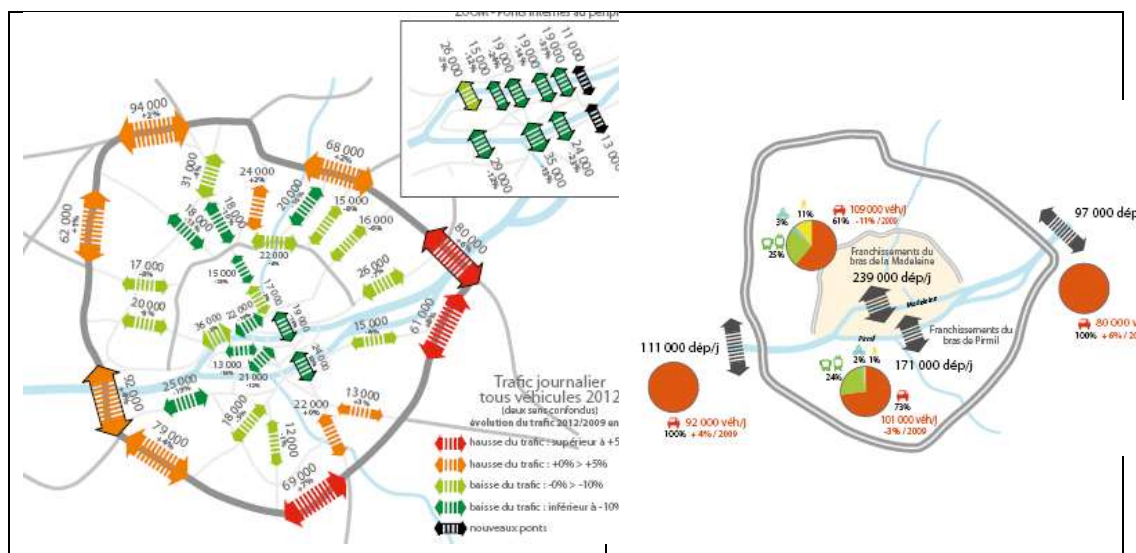
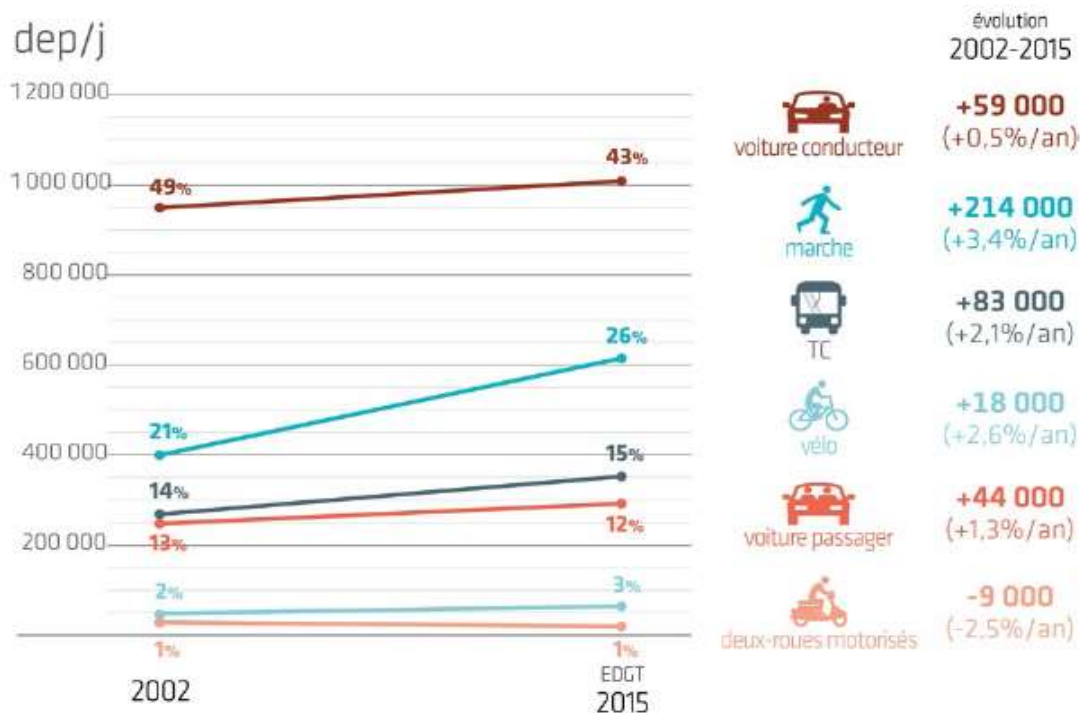


Figure 580: Car traffic in the metropolitan area (2012) (source: Nantes Métropole 2009-2012)

The Figure 581 shows the travel mode rates and dynamics between 2002 and 2015.



Legend, in order: Car as driver/ Walking / Public transport / Cycling / Car as passenger / Motorised two-wheels

source : Enquête Déplacement Grand Territoire 2015 - in PDU, 2018

Figure 581: Travel mode rates and dynamics

### Reasons for travel are more and more diversified, but professional activity remains the main one

These trips take place for different reasons (Figure 582). If we observe an increasing proportion of travel (leisure, visits, shopping), work and the training remain the most common reasons for travel structuring. Although their share is relatively small in decrease (1/3 of daily trips), it remains the first pretext for leaving his commune of residence and distances travelled to get there are on average twice as high as for other reasons. These trips are concentrated in time (2/3 of rush hour trips on morning) and in space. 67% of these trips are doing by car. In addition, deliveries to private individuals, in constant increase of about 12% each year, induce both travel needs less for individuals, but also a multiplication of delivery locations that weighs also on the increase in the daily number of travel.

Persons travelling to the metropolitan centre but not living there	Reasons of trips	Residents of the metropolitan center and who move through it
	Work	
	Personal business	

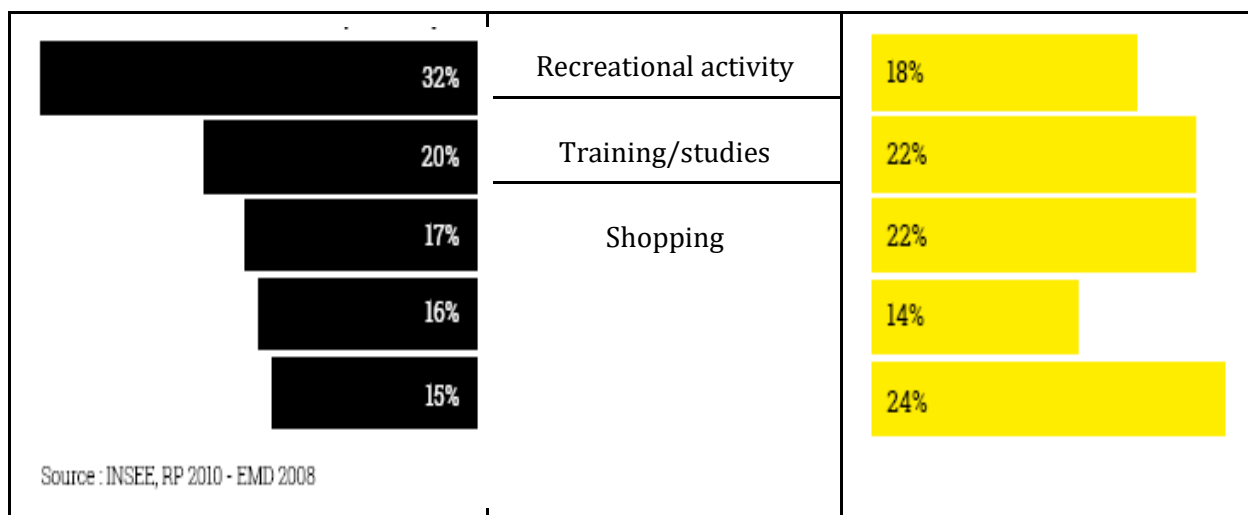


Figure 582: Reasons of trips from and to the metropolitan center

#### 6.2.1.4 Green structure and Biodiversity

##### A botanical and gardening culture

As a port city, Nantes has a very rich botanical history. At the request of King Louis XIV, ship owners brought exotic plants to Nantes, from where they were to be taken to the Royal Gardens in the French capital. After a long ocean crossing, the plants were cared for in Nantes and acclimatised and multiplied before being sent on to Paris. This tradition is the origin of great horticultural expertise and heritage of parks, both bequests and acquisitions. Thanks to enthusiastic and expert gardeners, these gardens host recognized collections of magnolias, camellias and remarkable trees.

##### Green spaces areas

The public green spaces in the City of Nantes include more than 100 parks and gardens (**Errore. L'origine riferimento non è stata trovata.** Figure 584 and Figure 585) and are constantly expanding. In 1984, the city managed 480 ha. By 2000, this area had doubled, to 900 ha. And the growth continues, making it possible to maintain a ratio of 37m<sup>2</sup> per inhabitant (**Errore. L'origine riferimento non è stata trovata.** and Figure 587).

The Nantes green spaces statistics (2016)

1095 ha of green spaces maintained by the Green spaces and Environment department of Nantes, distributed over 1458 intervention points.

340 ha of protected public and private trees, i.e. 4.7% of the commune's surface.

213 ha of natural areas: *Natura 2000* areas (Little Amazonia), natural areas.

3 ha of flowered areas and nearly 650 000 plants.

46 allotment garden sites (1079 plots) including 12 community garden, 46 km of walks.

37 m<sup>2</sup> of green areas per inhabitant. A park less than 500 m from each home and a green space less than 300 m.

Nearly 300,000 trees listed in public and private spaces in Nantes, including 103,000 in parks and gardens and 38,000 trees along the 110 km of roads.



Budget: 25.5 million euros including 22.2 million euros in operating costs including 19.3 million euros for staff and 3.3 million euros for investment.



Source: Nantes botanical garden  
Figure 583: Nantes botanical garden



source: SEVE  
Figure 584: Isle of Versailles garden



Figure 585: Public green spaces in Nantes (municipality area) (Source & map: City of Nantes)



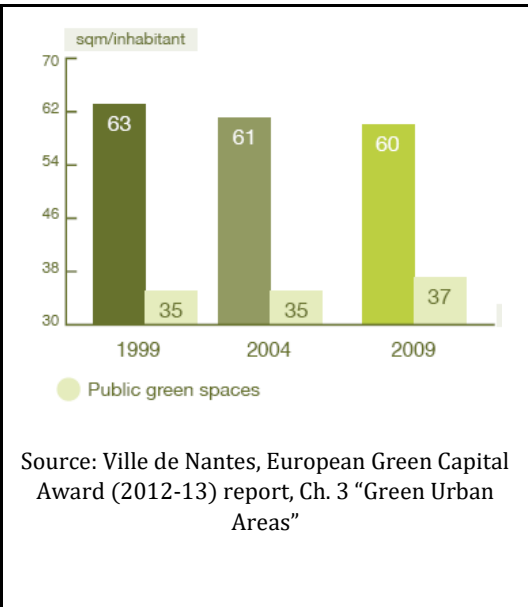
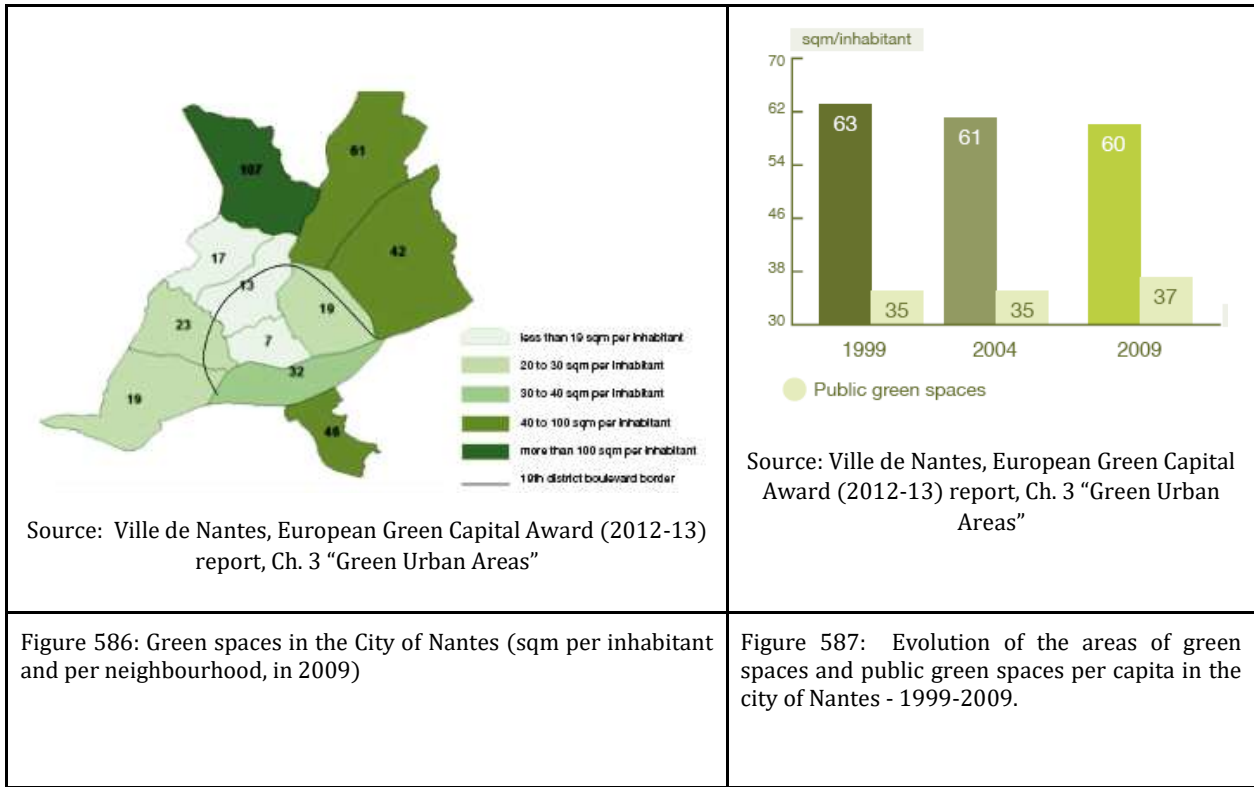


Figure 586: Green spaces in the City of Nantes (sqm per inhabitant and per neighbourhood, in 2009)

Figure 587: Evolution of the areas of green spaces and public green spaces per capita in the city of Nantes - 1999-2009.

The green spaces managed by the city must also be compared - in terms of surface area and distribution in the various districts - with the large surfaces resulting from private spaces (residential areas, commercial spaces, co-ownership). These plant surfaces have been highlighted by satellite images and teledetection analysis conducted by the AURAN (Figure 588).

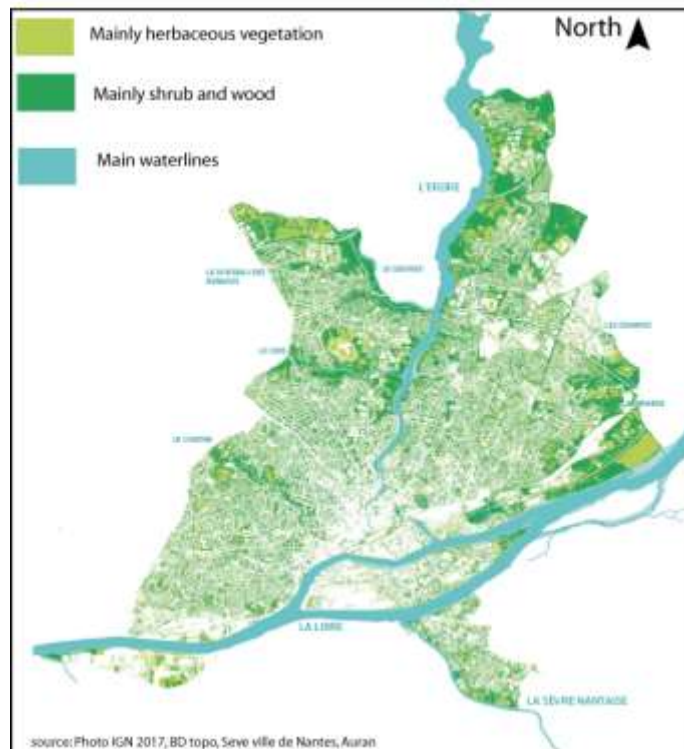


Figure 588: Vegetation mapping of Nantes municipality (map: AURAN, 2018)

## **An eco-responsible management**

Differentiated environmental management is practised on all of the sites maintained, making it possible to improve biodiversity. This makes it possible to optimise maintenance by taking into consideration the territory's diversity - ecological, landscape-related, social and cultural - making it a key part of sustainable development. Within this context, input-consumption reduction indicators are monitored (water, phytoproducts, etc), in order to improve the service's environmental assessment.

- All of the cities of the metropolis apply a pesticide reduction charter in connection with water quality.
- In Nantes, a Tree Charter provides the tools for protecting and developing trees in the city.
- The adoption of differentiated environmental-management provides techniques that improve the management of green waste : limitation at source, pulping and use in situ by mulching so as to preserve the fertility of the soil and limit watering.
- The city has been a pioneer in the use of integrated biological protection in exterior green space: it has been using beneficial insects against aphids since 2000. It has participated in the setting up of the "Plant and City" network to experiment with and improve practices. It is a founding member of the network of local authorities set up to establish a green-space ecological-management label.

## **Engaging inhabitants in urban greening**

The City has 50 collective garden sites, including 26 allotment garden sites and 24 community gardens. Thanks to the 35 associations that run and manage them with the support of the Green Spaces and Environment Department, they offer residents the opportunity to actively participate in the creation of the landscape, the conservation of the green heritage and offer valuable social interactions.

The "Ma rue en fleurs" (My flowering street) (Figure 589, left) operation has confirmed its success year after year: 3,000 bags of seeds have been distributed to brighten the sidewalks of more than 800 streets in Nantes. To promote the deployment and sustainability of this initiative, the Green Spaces and Environment Department runs a program to raise awareness of plant recognition and participatory action among services that work in public spaces, for development, maintenance and cleaning.

The participatory approach around "nature in the city" was amplified with the call for projects "Ma rue est un jardin" (My street is a garden) (Figure 589, right) launched at the end of 2016. By responding to this call for projects, participants can take concrete action to introduce vegetation to the public space through three possible entrances:

- a collective entrance: "we have a gardened street or collective garden project" ;
- an individual entrance: "I green the foot of my façade and I maintain it" ;
- an entrance via the Green Spaces and Environment Department: "I locate a site to beautify".

In total, 189 projects submitted: 42 collective garden street projects or shared gardens (16 selected), 62 facades at the foot of individual walls (32 selected), 85 site requests to be

vegetated by the City (9 first sites selected), the others to be further developed or reoriented). The selected projects were implemented gradually from the end of 2017 and throughout 2018



Figure 589: Posters of the two operations “Ma rue en Fleurs” (left) and “Ma rue est un jardins”

### Nature in city: integrate nature in the urban developments to improve quality of life and biodiversity

The existence of a natural green and blue framework, composed of a diversity of landscapes, natural, agricultural and forest spaces, urban nature, rivers and wetlands is widely integrated in urban planning policies. Nature is both an entity to protect and preserve, and a resource for the development of the city guaranteeing a quality living environment for the inhabitants.

#### The Local Urban Plan: the PLUM (the basic document that governs the building rights of the metropolitan area).

In this regulatory tool, the main innovations implemented are:

1/ The introduction of a thematic planning and programming orientation Green and blue grid and landscape  
It explains how each new project must contribute to the development of biodiversity and nature, respect for the natural water cycle, regulation of the microclimate, and the creation of a quality landscape.

## 2/ A more proactive regulation in favour of nature in the city

The PLUM urban plan introduces a significant reduction in the spaces reserved for future urbanization, reducing them by 40% compared to the previous urban planning document in favour of maintaining or returning them to spaces with an agricultural or natural vocation.

=> the introduction of a biotope coefficient per surface area

This system requires the maintenance or creation of surfaces favourable to nature, the water cycle and the regulation of the micro-climate for any land undergoing new construction. This tool has many advantages: it makes it possible to reconcile urban densification and nature in the city, it is adapted to the urban context (city center versus peripheries) in which it applies, it gives the builder the freedom to choose how to meet this objective without necessarily generating additional costs by integrating it from the design stage.

=>Strengthening the protection of any plant element of heritage value

- the protection of urban nature spaces that fulfil social, landscape, recreational and resourcing functions (parks, squares, allotment gardens, etc.)
- the systematic protection of hedges and alignment trees with high heritage value.
- the systematic protection of remarkable trees and forests
- the protection of the hearts of green islets

=> A more proactive rule in favour of the visual perception of nature in the city

- promote the urban quality of the blocks, including the presence of nature and the limitation of the place of the car by imposing the obligation to integrate parking in buildings,
- contribute to improving the quality of the street atmosphere, including visual transparencies towards natural spaces and the best complementarity with public space.

### Landscape architects to lead urban projects at the large city scale

Nantes attaches a particular importance to the involvement of landscape architects in major urban projects, in particular by trusting them as leaders of design/planning teams in large urban projects. There are two emblematic projects in Nantes:

- The Island of Nantes and the “plan guide” planning plan

After the shipyards' closure at the end of the 1980's, Nantes was confronted with a vast area of industrial wasteland on the island on the Loire facing the downtown of Nantes. In 1999, the city selected the landscape architect team Chemetoff-Berthomieu to manage the urban renewal project. The project is based on flexibility to adapt to the movements of urban dynamics. The master plan (called “Plan Guide”) (Figure 590) allows an interpretation of the existing territory and an evolving projection of the future. The pragmatic approach aims at a global transformation that allows a diversity of uses and populations to be accommodated while respecting environmental balances. The urban

plan is based primarily on a reconfiguration of public spaces, which constitute a founding framework.

The urban project has been pursued till now with different landscape architect teams: Smets-Uaps (2010-2017), Osty-Schorter (2017- now).

- The « l'étoile verte des vallées nantaises » (“the green star of Nantes’ valleys”)

The aim of this project is to connect different parks and gardens of Nantes (**Errore. 'origine riferimento non è stata trovata.**). This planning plan was first presented in December 2018, after a two years study conducted by the Campo landscape architecture agency and the green spaces department of the municipality. The project combines the challenges to create recreational areas for people and to preserve and enhance natural spaces.

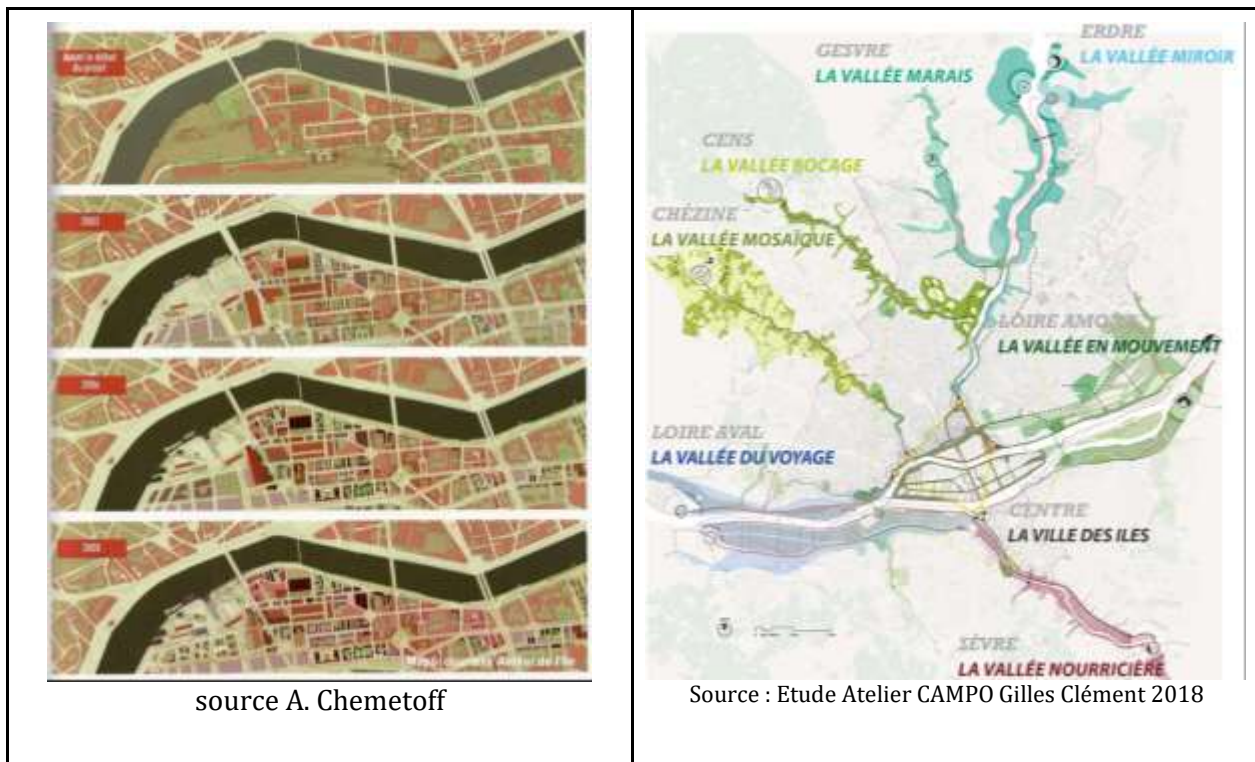


Figure 590: “Plan Guide” 2000-2010

Figure 591: “L’Etoile Verte”

### Natural Green infrastructure

The territory of Nantes Métropole has a rich and diverse natural environment (Figure 592). With its vast wetlands and artificial agricultural or urban environments, the Metropolitan area has a low proportion of natural land areas. The main characteristics of ecological continuities are based on:

- The Loire Valley and its estuary, a structuring axis of several continuities: birds, aquatic species, singular open environments,
- a dense hydrographic network and a multitude of associated small wetlands,
- a land use that forms a mosaic of artificial or natural spaces,



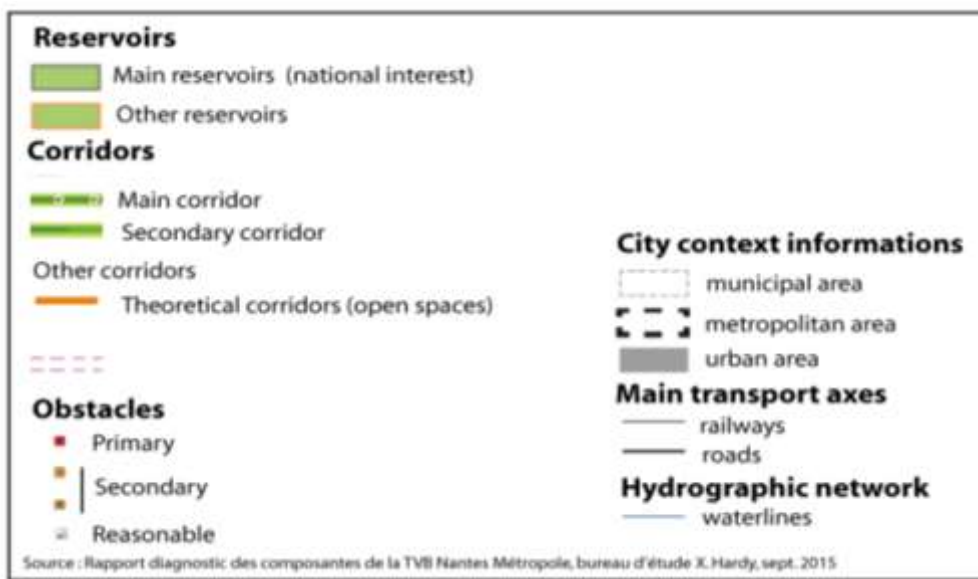
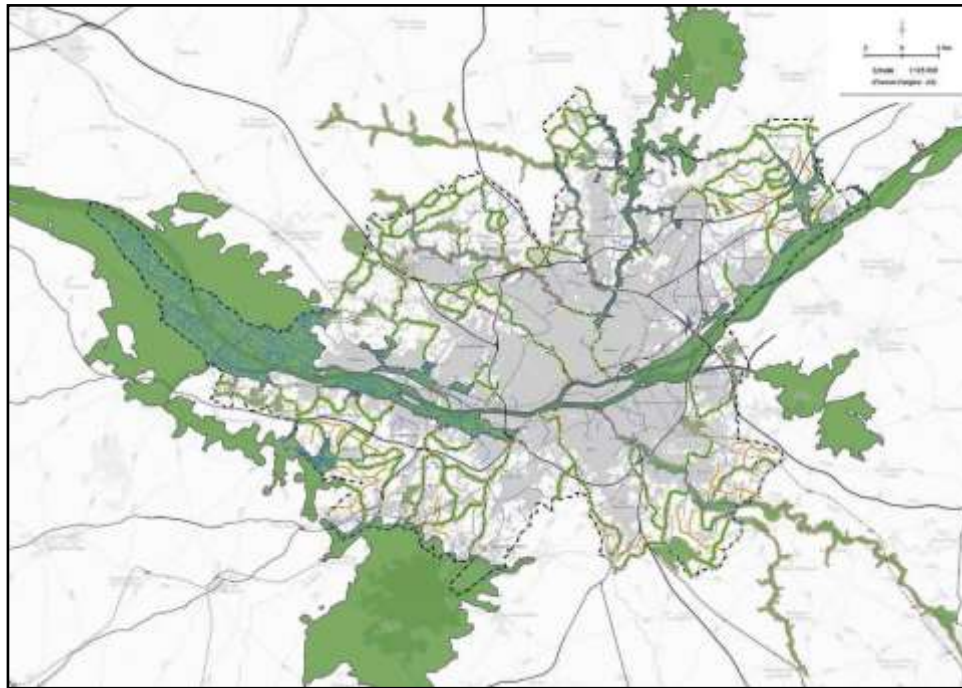


Figure 592: Ecological network in the metropolitan area of Nantes (map: PLUM, 2019)

### Protected areas

A little bit more than 10% of the territory is protected in the metropolis (Figure 593). This includes European Natura 2000 areas and national protection areas (figure 592). It is noticeable that Nantes counts a Natura 2000 area in the heart of the city, called “la Petite Amazonie” (the little amazonia), which is a unique case in Europe.

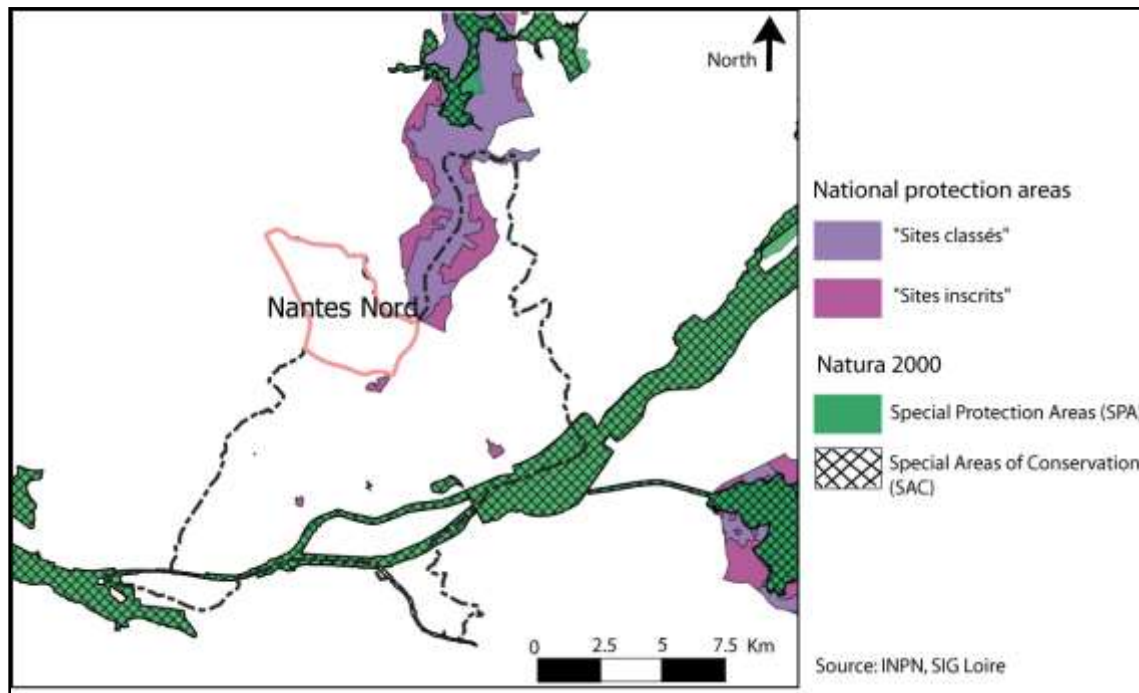


Figure 593: National and European protected areas. (Map: Bodénan, 2019)

### Inventory areas

Beyond regulatory zoning, the territory metropolitan area has also been the subject of numerous inventories to characterize the fauna, flora and fauna remarkable habitats (Figure 594):

- “Znieff” types 1 and 2 inventories (Natural Areas of Ecological Interest, Fauna and Flora)(figure)
- Rivers and Wetlands - Since 2010, significant work has been carried out on the inventory of wetland areas and watercourses led by the metropolis on its territory. It aims to locate and qualify the wet and aquatic habitats within the metropolis.
- Hedges - An important census work and hedge characterization was carried out by the metropolis. This recognition of the bocage specifies the condition of hedges and highlights their ecological interests, hydrological, landscape and economic.

Nearly 2,400 km of hedgerows have been identified, which means a density of 75 linear metres of hedges per non-urban hectare - knowing that the average density in Pays de la Loire is around 55 linear metres per hectare (ml/hectare).

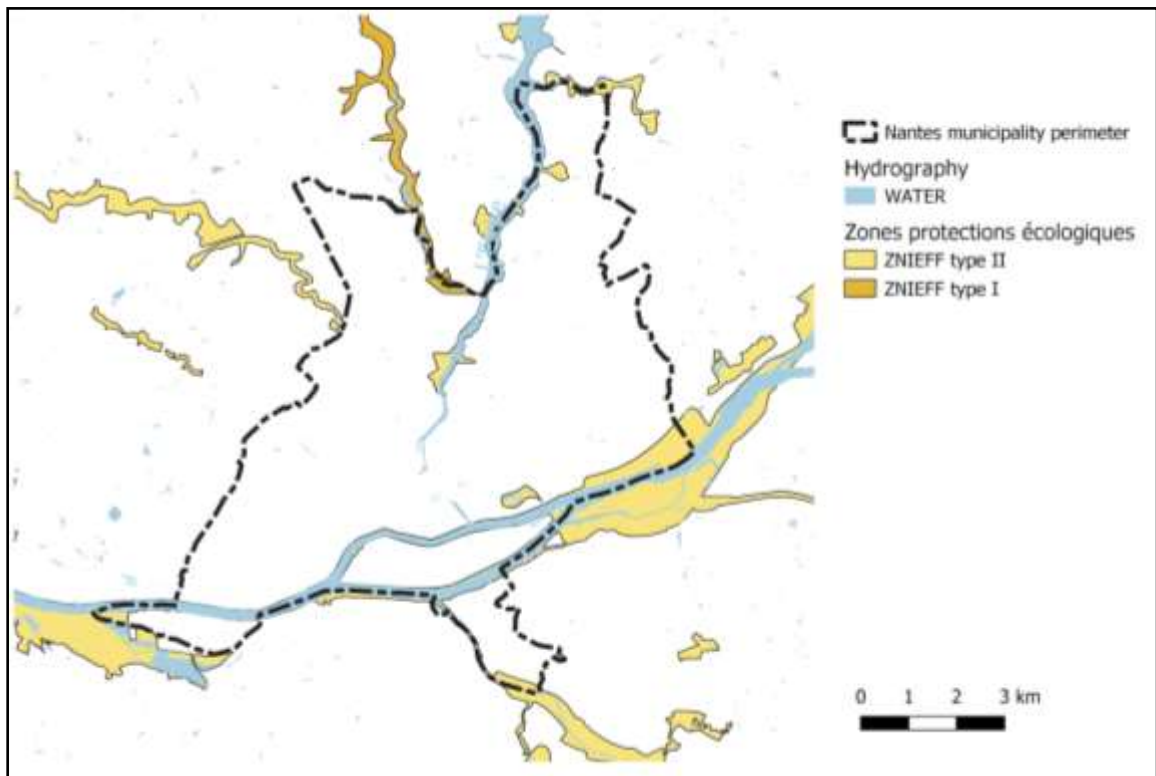


Figure 594: Inventory areas (source: INPN, SIG Loire/ map: Bodénan, 2019)

### **A medium soil suitability for infiltration**

The ability of soils to allow rainwater infiltration is an important parameter for defining the management of rainwater in urban and peri-urban planning. Indeed, if it is favourable, there is a set of potential drainage systems (swales, basins...) that can manage the flows from storm sanitation. In this context, Nantes Metropole orders an urban-wide mapping to identify areas where stormwater infiltration would need to be preferred. A methodology has been developed by the BRGM and Nantes Metropole to prioritize the ability to manage stormwater by infiltration in community territories (Figure 595).

The methodology used is based on the use of mapping data corresponding to the main criteria contributing to the assessment of a terrain's ability to infiltrate: slope, groundwater depth, dripping/infiltrating character indirectly defined from the Network Persistence and Development Index (RPRI), geology/pedology. A multi-criteria analysis was carried out from all of these data.

The analysis is reproduced in the final map with a ranking of the territory according to 3 classes of aptitude: "a priori unfavourable", "a priori moderately favourable" and "a priori favourable". Important information (slopes, protective perimeters, etc.) is also represented.

Given the validity scale of the data used, the map should be considered indicative and not used on a scale below 1/50 000.

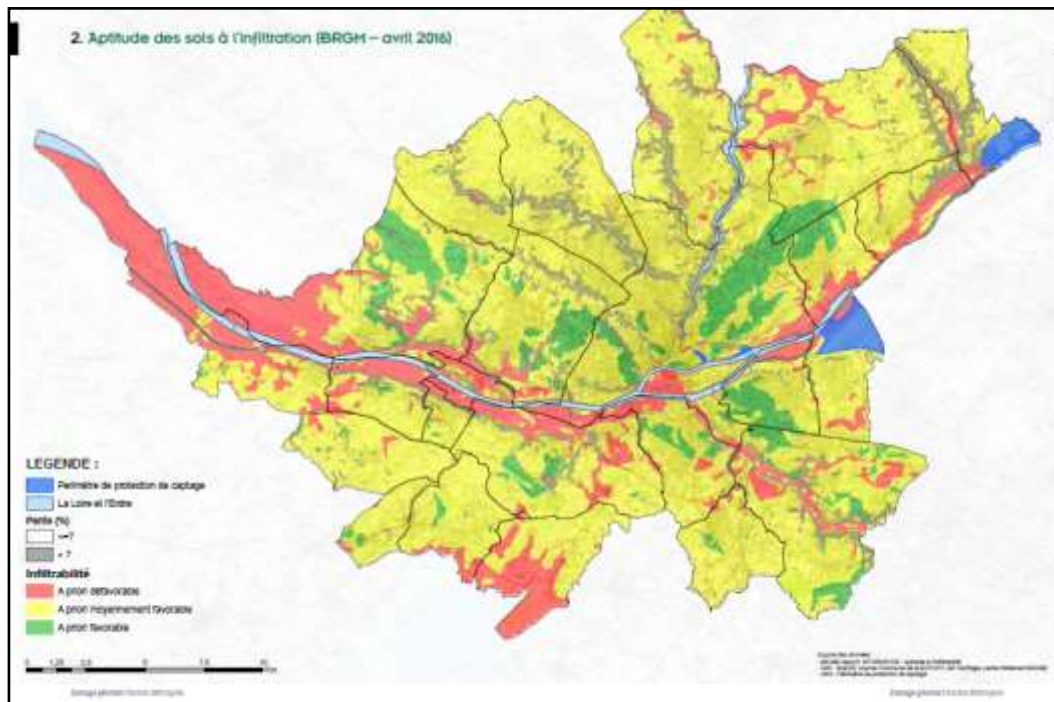


Figure 595: Soil suitability for infiltration (Source: BRGM, 2015)

The infiltrability map was used in a document of the PLUM dedicated to the territory zoning for rainwater management. The objectives of stormwater zoning are to develop integrated stormwater management at the urban planning level, including requiring the search for alternatives to "all-pipe" management to: i) limit the risk of flooding, protect people and property; ii) preserve the quality of aquatic environments, reduce pollution and the impacts of urban releases in rainy weather; iii) continue urban development of the agglomeration, reconcile water and the city and enhance rainwater.

Rainwater zoning defines the specific rules imposed on the territory of Nantes Metropole regarding the discharge of stormwater to the natural environment and, if necessary, to the metropolitan public network. Technical solutions should be implemented as regards the rain level expectations (Figure 596).

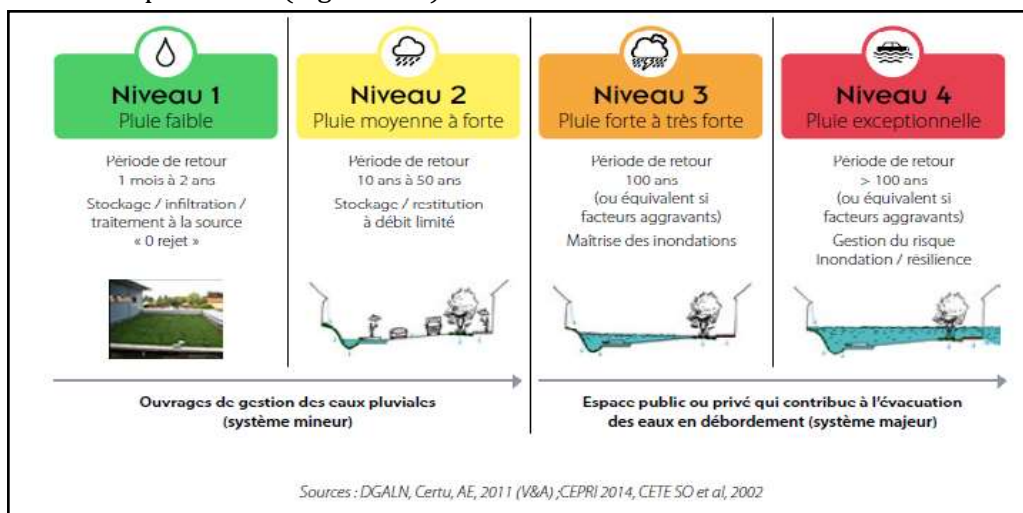


Figure 596 : Water management objectives following four levels of rain intensity



## Noise map

The European Directive 2002/49/EC aims to establish a common approach at the European Union level in order to prevent and reduce the harmful effects of exposure to environmental noise (transposed into French law and codified in Articles L. 572-1 to L. 572-11 of the Environmental Code), Nantes Métropole, has produced strategic noise maps (CBS) in 2015 (Figure 597). Noise level maps are based on the Lden indicator. This indicator is calculated by considering the emission, the propagation and the reception of noise. The outside of building is only considered. It is calculated by time steps. In Nantes Metropole, road noise is the sound source responsible for the exposure of the largest proportion of the population to noise, as reflected by the middle to very high level of dB along roads and ring-roads.

This issue is already integrated into public policies on travel and public space: it is reflected in the "ville apaisée", with the creation of public spaces designed on the scale of pedestrians and bicycles and access to an ever more efficient public transport network, which promotes the harmonious coexistence of the various modes of transport, and has a positive impact by reducing noise pollution, particularly from road noise. The increase in quiet areas with new pedestrian zones and limited speed zones 30km/h also contributes to this improvement. The action programme to anticipate, reduce and correct the effects of noise is the Environmental Noise Prevention Plan (PPBE).

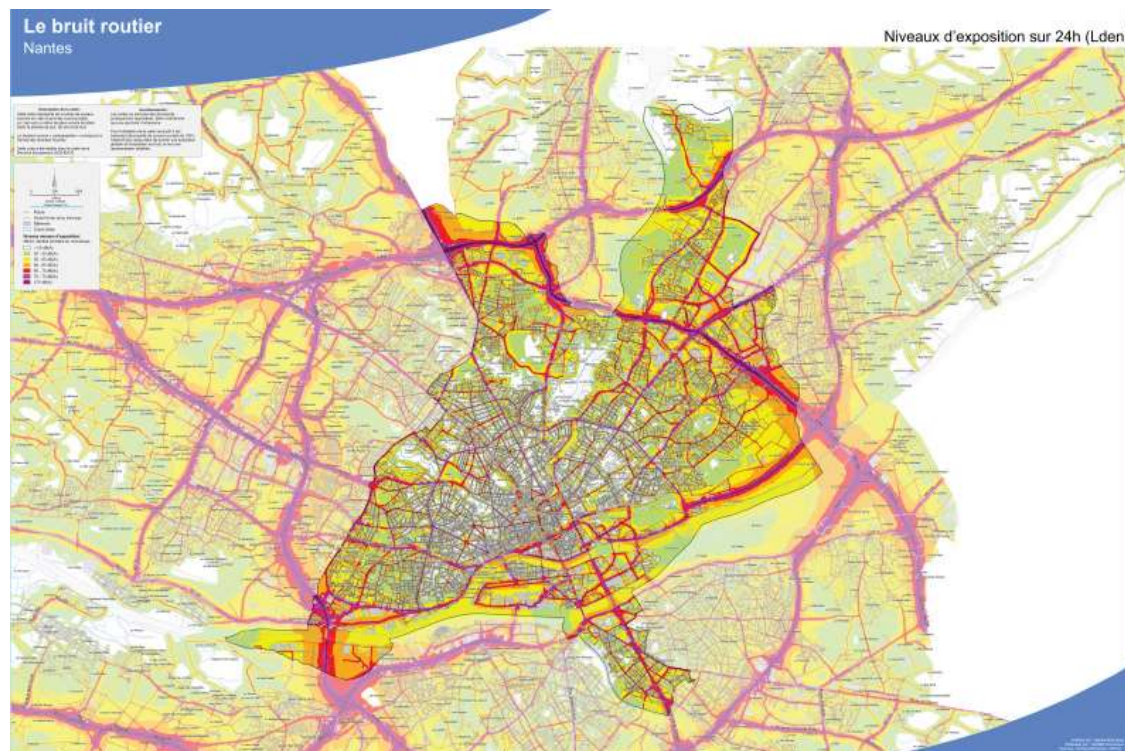


Figure 597: Map of exposure level to noise (over 24 hours)(data collected in 2015)



## 6.2.1.5 Water management

### Urban water management

The volume of water consumed by domestic customers and non-domestic are between 29,400,000 m<sup>3</sup> and 30,400,000 m<sup>3</sup> per year (between 2010 and 2014)(Figure 598). Since 2008, daily domestic consumption is stable and stands at 121 litres/day/ inhabitant in 2014. Due to the progress made on control of consumption, individual consumption emissions decreased by 1% per year between 2003 and 2007.

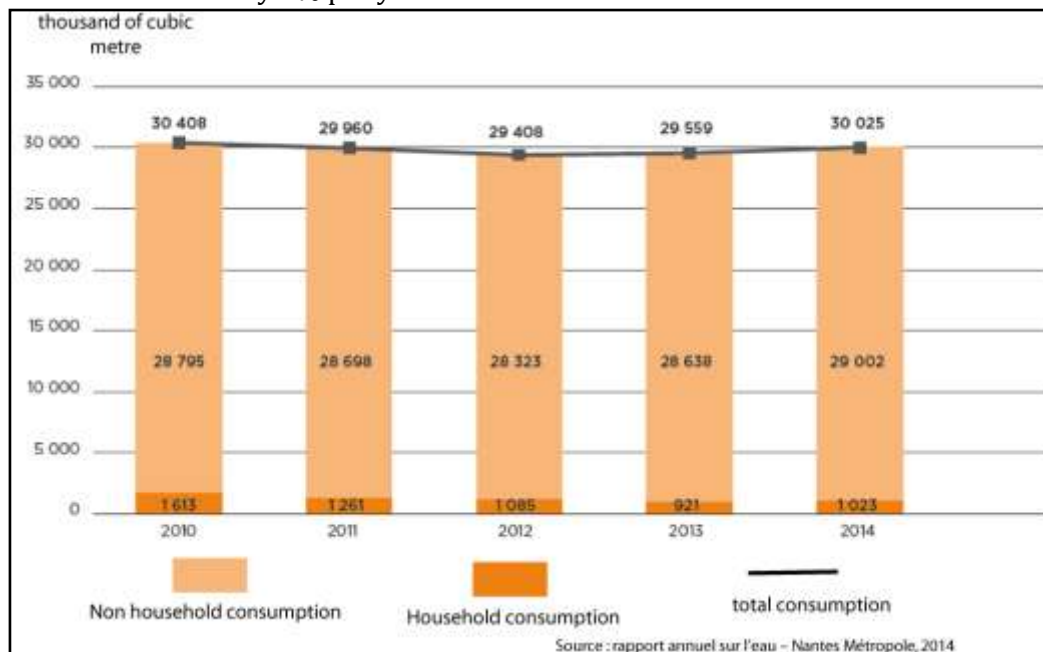


Figure 598: Freshwater consumption (metropolitan level) from 2014 data.

## Collective sanitation

### Management

A part of the sanitation service is managed by municipal services and another part of it by private operators. Thus the sewer networks of the municipalities of Nantes, Orvault, Bouguenais, Rezé, Les Sorinières, Vertou, Saint-Sébastien-sur-Loire, Basse-Goulaine are managed by municipal services. The networks of the other municipalities in Nantes Métropole are managed by private operators.

Each year nearly 51 million cubic meters of wastewater, rainwater and industrial water are treated by the 22 wastewater treatment plants in the agglomeration, including 9 that are greater than 2,000 population equivalents, unit defined as the biodegradable organic load with a biological oxygen demand (BOD5) of 60 grams of oxygen per day (EH).

The historic center of Nantes is equipped with combined pipes whereas around (more recent) the system is separative (Figure 599). In the combined sewer system both waste and storm waters are collected in the same pipes, to be drained to the sewage treatment plants. The combined system is equipped with many sewer overflows (CSO: Combined Sewer Overflows) that may reject effluents through the natural hydrographic network in case of strong rainfalls. Nevertheless, only few CSO are open during each year. In the separative sewer system waste and storm waters are not collected in the same pipes: storm water is then rejected in the natural hydrographic network while waste water is

drained directly to sewage treatment plants or to downstream combined sewers (Figure 599).

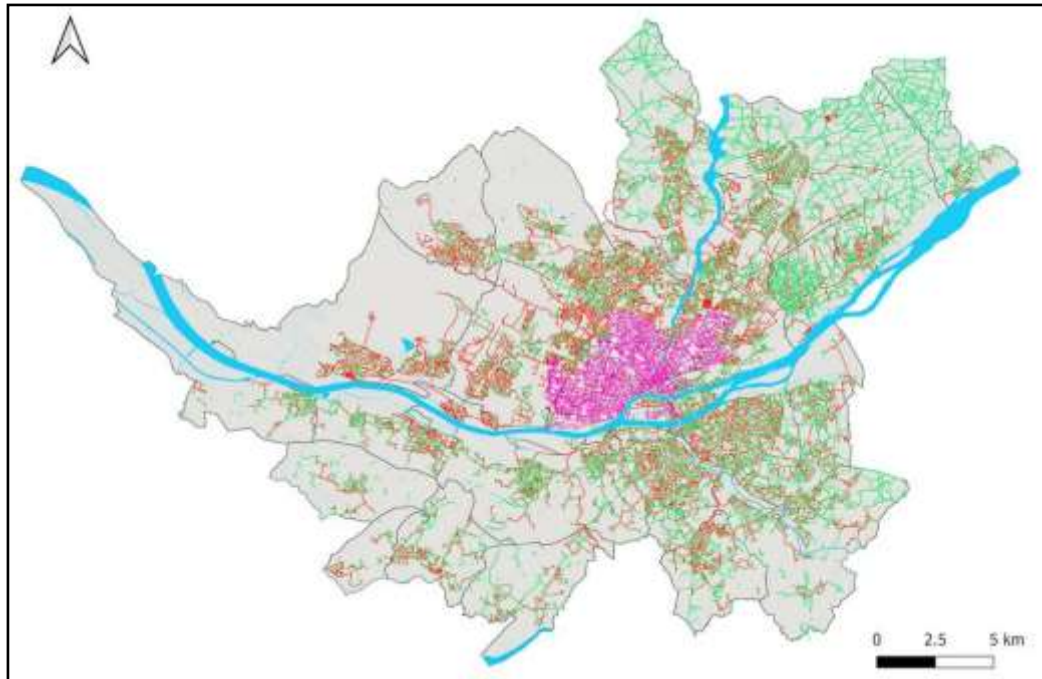


Figure 599: Sewer network with combined (pink), stormwater (green) and wastewater (red) pipes at the metropolitan scale.

### **Sewage treatment plants**

Nantes Métropole has:

■ **Two intermunicipal wastewater treatment plants:**

- Tougas in Saint-Herblain - 600 000 p.e., ensuring the treatment of the majority of northern part Loire of Nantes Métropole ;
- Petite-California to Rezé-Bouguenais - 180 000 EH, which handles some of the effluents from the south of the Loire.

These two stations processed on average more than 500,000 p.e. per day in 2014.

■ **Ten municipal wastewater treatment plants - from 1,000 to 20 000 P.E.:**

- North-Loire : Mauves ;
- South-Loire : Basse-Goulaine, Bouaye, Brains, La Montagne, Le Pellerin, Saint Aignan de Grand Place, Saint Jean de Boiseau, Thébaudières and Pégers sur Vertou.

These units are rather recent, their realization being spread out since 1997 for the oldest one (Saint-Jean-de-Boiseau) to 2011 (Little California).

### **Flooding risk**

**i/ The risk of flooding by floods of major watercourses (Nantes Métropole, 2017)**

The Loire, the Sèvre Nantaise, the Erdre and the Acheneau are covered by official documents (PPRI, AZI) allowing implement risk management of flooding. Thus, with the

exception of the municipalities of Orvault, of Sautron and Sorinières, all the municipalities in the territory are affected by the flooding risk by surface water (Figure 601). The others watercourses are not currently subject to any requirements even if there are flood risks exist and have been identified in various steps to capitalize on experience, such as the floodplain mapping study carried out in 2016 by Nantes Métropole.

Description of the watercourses identified as a source of major risks:

**La Loire** has three types of floods:

■ **Oceanic floods:** the downstream basin of La Loire is particularly concerned by this type of flooding. These are rainy fronts of varying importance from the ocean that can cover the whole thing. of the basin, The floods that have marked the region The following are the ones in Nantes: January 1843, June 1856, December 1872, February 1904, November 1910, April 1919, January 1936, December 1982, January 1994 ;

■ **Cévennes floods:** they are brutal and result from original storm precipitation Mediterranean. They mainly concern the upper basins of the Loire. In principle, these floods are quickly reduced if they are not supported downstream by flood inflows oceanic;

■ **Mixed floods:** they result from the conjunction of Oceanic and Cévennes floods.

The municipalities of the agglomeration are essentially concerned by oceanic floods or even mixed floods.

**L'Erdre** which joins La Loire in the heart of Nantes, has an extremely low average slope, causing known difficulties in the flow of water. The water level is controlled downstream by the lock Saint-Félix, in Nantes. La Loire has an influence consequent on the levels of the Order and considerably disturbs the evacuation of the water from the latter during floods. Major floods occurred in 1839, 1856, 1910, 1936 and 1995. The municipalities concerned by the floods of this river are La Chapelle sur-Erdre, Carquefou and Nantes.

**La Sèvre-Nantaise** has an irregular hydrological regime, sometimes torrential in nature. The response from the watercourse in case of winter rain events is fast and important. Downstream of Vertou, and up to the confluence with La Loire, the coast of flooding is largely dependent on the flow of the Loire. The main floods of the Sèvre Nantaise recorded since the 18th century took place in 1770, 1872, 1922, 1960, 1983, 1988, 1990 and 1995. The municipalities that are affected by the floods of these rivers are Vertou, Rezé and Nantes.

**ii/ The risk of flooding by rainwater runoff (Nantes Métropole, 2017)**

Urbanization of the territory leads to soil sealing which prevents water infiltration during rainy events, and both concentrate and increase the water volumes and flows into the sewerage network and the hydrographic network. During the most intense rainy events, runoff may extend to overflows in sewerage networks (sized for a 10 year-return period rainfall) and the hydrographic network (for small streams strongly influenced by the sealing of their catchment), and create of the floods. These events can be summer storms or prolonged rains in winter.

This was the case, for example, on 7 July 1977 in Nantes, on June 7, 2013 in Carquefou, July 27, 2013 in Couëron, Le Pellerin and Sautron, on 9 July 2017 in Nantes (Figure 600).

Although these events are relatively rare and localized, they constitute a significant risk of flooding in an urbanised area such as Nantes Métropole area, where the presence of factors of existing runoff (surface soil sealing), vulnerable constructions when they are carried out in areas of passage or accumulation water (dry talwegs, flow axes, basins topographical features, major river beds...), and the development of urbanization.



Figure 600: The Commerce square flooded on July 9th 2017 Twitter/@laurentmaillot)

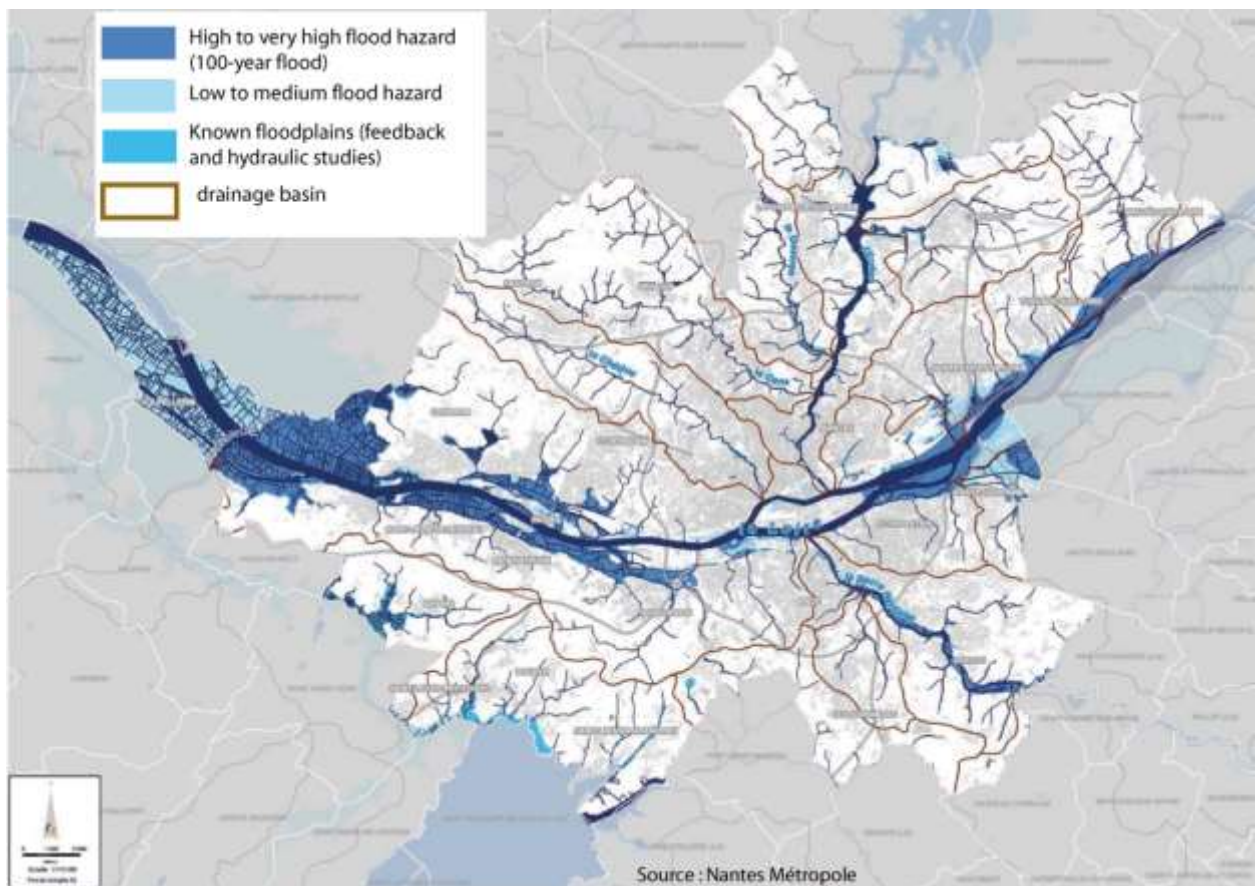


Figure 601: Flood risk in the metropolitan area (map: PLUM, 2019)

## **Management and local policies regarding flooding risk**

In line with the EU Directive 2007/60/EC on the assessment and management of flood risks (November 2007), several flood prevention tools exist: TRI, SLGRI, PPRI.

### **'Territoire à risques importants d'inondation' (TRI)/ A territory of high risk flooding**

The Nantes urban area has a high concentration of population and economic issues and the territorial area is potentially exposed to flooding. It was designated, by prefectural decree as a territory at high risk of flooding (TRI) with consequences of national scope in the event of a major flood and the need to seek an appropriate level of protection by consequence (11 municipalities concerned) (Figure 602)

### **'Stratégie locale de gestion des risques d'inondation' (SLGRI) /Strategy local risk management Flooding**

In 2017, Nantes urban area developed, with the State, a local strategy based on three levels of risk:

- The analysis of vicennial floods makes it possible to organize the most frequent crisis interventions by mobilising all the services concerned.
- The 100-year risk is taken into account by the Flood Risk Prevention Plan (PPRI).
- The consideration of the very rare millennial flood aims to preserve the essential functions of the agglomeration, even in the presence of water.

In order to ensure safe, long-term development, 100-year and millennial floods taken into account in Nantes because if the risk is now low, this level of risk will become more frequent in future, due to global warming and the restoration of the bed of the Loire.

### **'Plan de prévention des risques d'inondation' (PPRI)/ The prevention plan of the flood risk**

PPRI is a government decision. It is annexed to the local urban planning plans of the municipalities concerned. It avoids exposing new populations to a risk of flooding: limiting construction in highly floodable areas, urbanization compatible with flooding where the risk is high moderate, reducing the vulnerability of existing buildings.



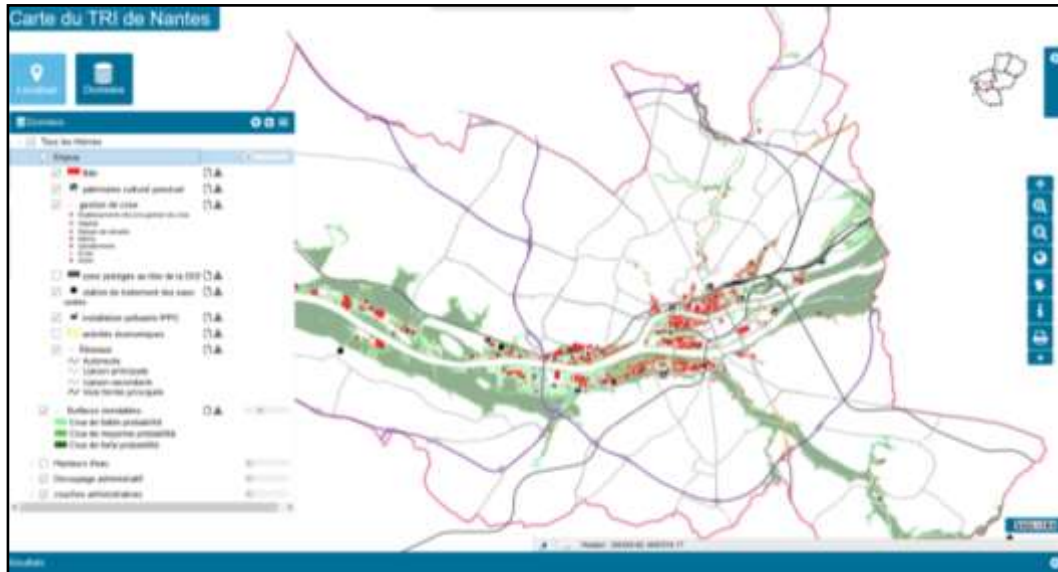


Figure 602: TRI map (DDTM44/Dreal PDL/ BDTopo IGN)

### Droughts risk and local policies

This drought risk has been low so far, but it could become significant with climate change. The drought risk is managed at the Loire-Atlantique department level. The regulation provides for 4 levels of alert, with specific measures for each:

- **Vigilance:** Users are encouraged to voluntarily restrict their water consumption.
- **Alert:** restrictions or prohibitions for certain uses.
- **Enhanced alert:** Restriction and/or prohibition measures are strengthened.
- **Crisis:** only water withdrawals for priority uses (drinking water, public health and safety, civil security) are authorized.

Note that restrictions apply when using surface water such as the drinking water network.

### Water quality

In the metropolitan France, the water management is divided into seven major river basins, coherent territories for water uses : Seine-Normandie, Loire-Bretagne, Adour-Garonne, Rhône-Méditerranée, Corse, Rhin-Meuse, and Artois-Picardie. These basins are composed of several sub-basins at the local level. Commissions are composed with all the territory actors using common water resource to meet different needs, management plans are therefore proposed for the various water-uses. The SDAGE, at the basin level, and the SAGE, at the local level, are the two planning tools to achieve the objective of good water quality.

Nantes is part of the Loire-Bretagne major basin, and locally of the Loire estuary sub-basin (Figure 603). With unfavourable hydrological conditions, a very high human

presence and economic activity, it is the most degraded sector of the Loire-Brittany basin.

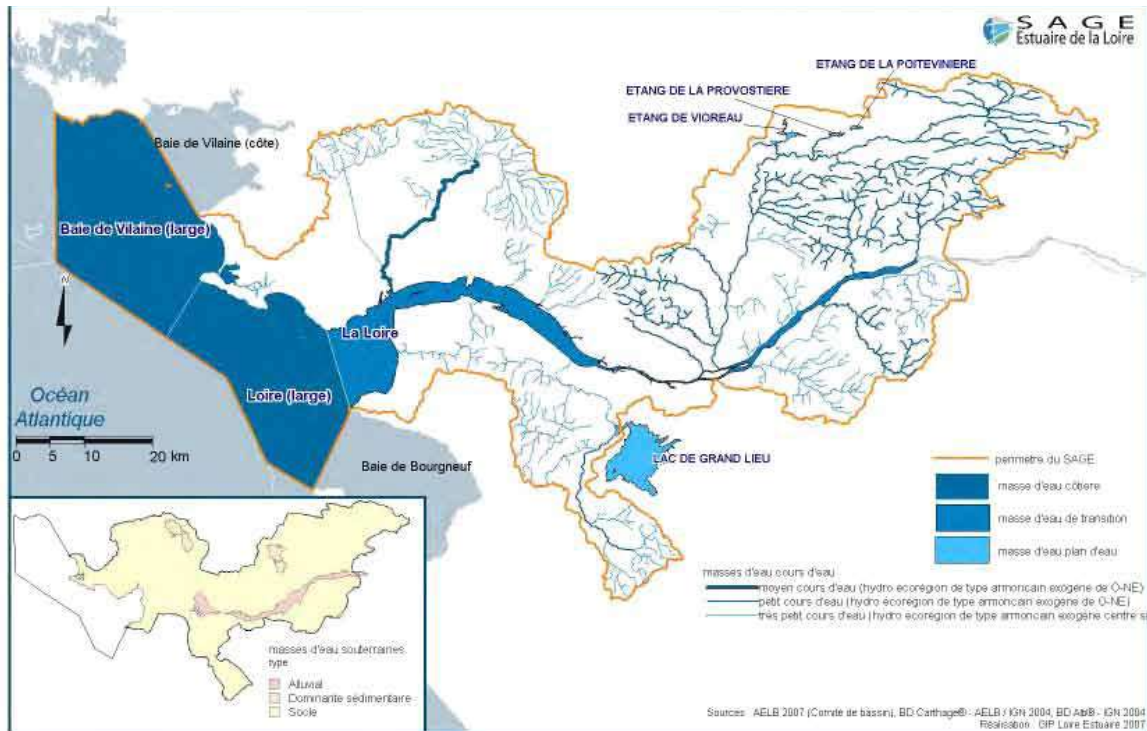


Figure 603: The sub-basin “Loire estuary” (SAGE level)

The 2015 data confirm the 2013 assessment of water quality: only 4% of rivers are in good conditions and 43% are in average conditions. This territory is subject to naturally severe low water levels, which have historically been compensated by numerous developments: dams, water bodies, withdrawals, drainage, stream rectification. Biological indices reflect these issues (Figure 606). The fish index is the most penalizing with only 10% of the measures in good conditions. But pollution is also expressed more strongly, particularly in downstream areas marked by eutrophication (Figure 604). Thus the physico-chemical indicators are only 18% good. These bad results are most often due to nutrients and in particular phosphorus releases. None of the 18 water bodies are in good conditions; all of them have eutrophication problems related to excess nutrients. Despite efforts in recent years (changes in agricultural practices), pollution is also due to pesticides (Figure 605).



Figure 604: Surface waters quality – organic and oxidable matter (2006 -2008)



Figure 605: Surface waters quality – pesticides (2006-2008)

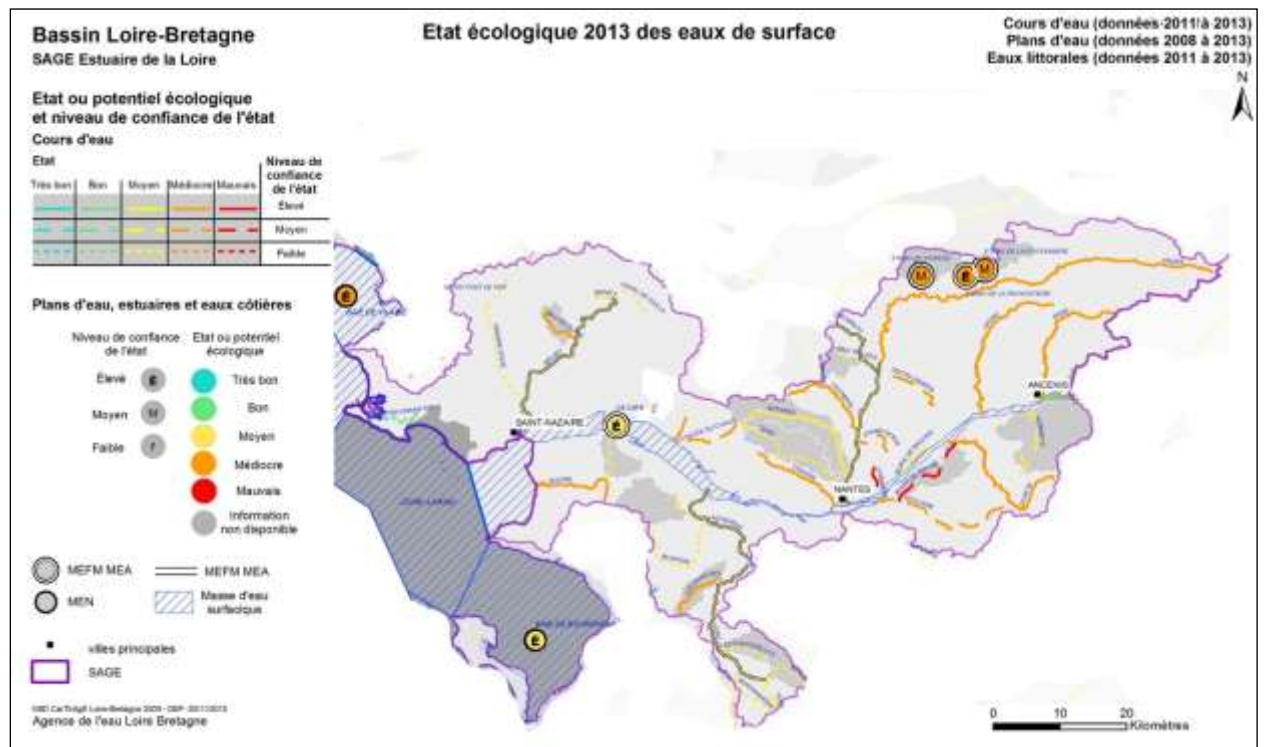


Figure 606: Ecological quality of surface waters (2013)

### Drinking Water quality (Source : DOPEA of Nantes Métropole on produced water)

The water distributed by Nantes Métropole is called "soft" water, i. e. water with low mineral content. The results of the health checks show good microbiological and physico-chemical quality, meeting the quality requirements set by the regulations.

For example, in 2014, the average compliance rates were 99.9% for bacteriological parameters and 100% for physico-chemical parameters. Water contains some naturally occurring compounds (sodium, sulphates and chlorides) whose levels remain well below the maximum reference values set by the regulations. The 2013 quality results show that the distributed water has a relatively low nitrate content, below the limits imposed by the regulations and that the average aluminium content is almost ten times lower than the regulatory limit value. No traces of pesticides were found in 2014 in the water distributed, exceptionally, a trace of pesticides from the Basse-Goulaine production plant was detected in early January 2013. However, this overrun did not require any restriction on water consumption.

With regard to lead, the risk of lead dissolution that may be present on the private network, as lead connections have been removed from the public network, is relatively limited in view of the non-aggressive nature of the water distributed.





Figure 607: Example of public information on tap water quality under the supervision of the Regional Health Agency

## 6.2.2 Social description

This section is meant to define the social profile of the urban agglomerate and of the case study context to determine possible links between problems and solutions in the URBINAT NBS catalogue combinations. Given that the URBINAT project is targeting the improvement of social conditions through the creation of healthy corridors, this set of data (which we consider flexible being the project methodology still in progress) must indicate the general and local weaknesses and threats and connect them with the urban environment. In this perspective, the general data are essential for 2 main reasons:

- to give a scientific knowledge about the social dynamics and about an urban trend, which may highlight issues not depending from the neighbourhood but on historic contingencies, climate conditions or policy orientations;
- to give a framework of comparison between the urban scale and the specific neighbourhood, which may show positive or negative scenarios for the adopted case study
- It contributes to the adequacy of project responses to local needs.
- It is also emphasized that the diagnosis is situational, and therefore limited to a certain time and space defined previously in the methodological framework

It must be said that the trend of social data (for example comparing the official statistics of 2 different periods, 2 different social *Censa*, could be determinant in understanding the social negative or positive changes and consequently act for ad-hoc improvements. It must be also said that social issues may not be linked fully to the neighbourhood itself, but provoked by larger dynamics (i.e higher percentage of lung cancer provoked by wind taking industrial smokes).

The availability of local data may facilitate the analysis and the comparison with general urban data.

The set of Social data ranges from an overall assessment of the society as per traditional statistical information, as gender, life expectancy, degree of education, population distribution, social inclusion, etc., which offer a general scenario on the expectations of the local population, to more specific information, as the cultural rate, the trust on institutions,



justice access, etc. that may on the opposite offer perspective on the potential contribution of citizens to the URBINAT actions.

Reference can be made to <http://www.europeansocialsurvey.org/data/#>

### 6.2.2.1 Demography

#### Demographic description

Nantes is the 8th largest urban area in France and the 4th in terms of population growth (+1.5%)(Table 160). The urban area of Nantes increased its dynamism between 2006-2011 and 2011-2016, from +1.0% to +1.5%. Each year between 2011 and 2016 on average, the urban area has an additional 13,234 inhabitants (Figure 608). The Nantes metropolis is the driving force behind the demographic dynamism of the urban area, generating 67% of the population growth between 2011 and 2016.

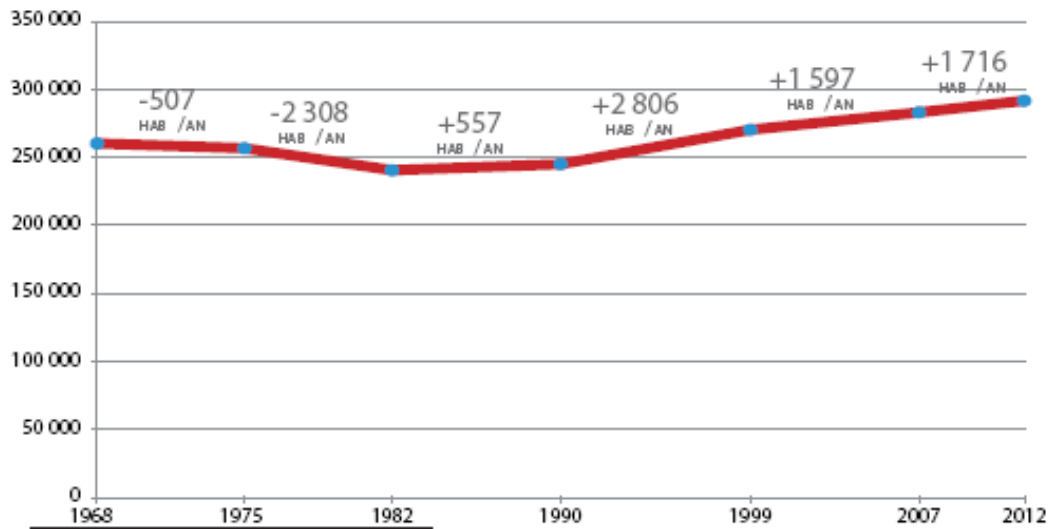
The demographic dynamics of the Nantes urban area, which is strong and sustainable for the coming years, is a structuring element that must be taken into account in the public policies.

To support it, a major construction effort is essential. The aim is to preserve the mobility of all households, but also to be able to accommodate a larger population (Table 161) while limiting the tension in housing markets. A slowdown in the effort to construction would inevitably result in increased real estate tensions: increase in rents, increase in selling prices (including in the old one) and its social, economic and geographical consequences. Finally, residential dynamics remain closely linked to the economic performance of the territory. In an attractive territory where vacancy rates for the housing stock and vacancy rates for unemployment are lower than the national average, an insufficient number of housing hinders the ability of companies to set up assets and recruit new employees. This would make it more complex for job seekers to access the labour market.

Table 160: Number of inhabitants in 2016 and demography dynamics (1999-2016)

	Population	Annual evolution		
	2016	1999-2007	2007-2012	2012-2016
<b>Nantes Municipality</b>	<b>306 694</b>	<b>+0.6%</b>	<b>+0.6%</b>	<b>+1.3%</b>
Metropolitan area	638 931	+0.6%	+0.8%	+1.5%
Urban area	961 521	+1.1%	+1.1%	+1.5%
Loire-Atlantique	1 380 852	+1.2%	+1.0%	+1.3%
Pays de la Loire (regional area)	3 737 632	+1.0%	+0.8%	
France	66 695 000	+0.7%	+0.5%	
Average of the 12 first french cities	-	+0.6%	+0.4%	

source: Sources : INSEE, Nantes Métropole, AURAN



Sources : INSEE, Nantes Métropole, AURAN

Figure 608: Evolution of the number of inhabitants in the municipality of Nantes since 1968

Table 161: Evolution of the population density (1968- 2015) in Nantes municipality area

	1968	1975	1982	1990	1999	2010	2015
<b>Population</b>	260 244	256 693	240 539	244 995	270 251	284 970	303 382
<b>Average density (inhab/km<sup>2</sup>)</b>	3 992,1	3 937,6	3 689,8	3 758,2	4 145,6	4 371,4	4 653,8

Sources : Insee, RP1967 à 1999 dénombremments, RP2010 et RP2015

Table 162: Aging of the population (%)

	15 and younger	15-29	30-44	45-59	60-74	75+
<b>Nantes Municipality</b>	<b>15.7</b>	<b>29.3</b>	<b>20.0</b>	<b>16.7</b>	<b>10.6</b>	<b>7.7%</b>
Metropolitan area	17.4	23.1	19.6	19.3	12.7	7.9%
Urban area	19.6	20.5	20.8	19.3	12.4	7.4
Loire-Atlantique	19.5	18.7	20.2	19.5	13.8	8.3
Pays de la Loire (regional area)	19.4	17.5	19.4	19.6	14.6	9.5
France	18.4	18.1	19.7	20.0	14.7	9.2
Mean of the 12 first french cities	15.4	26.0	21.2	17.2	12.2	8.0

source: Sources : INSEE, Nantes Métropole, AURAN

As elsewhere, the population is aging: the number of people over 60 is growing faster than the rest of the population (Figure 609).

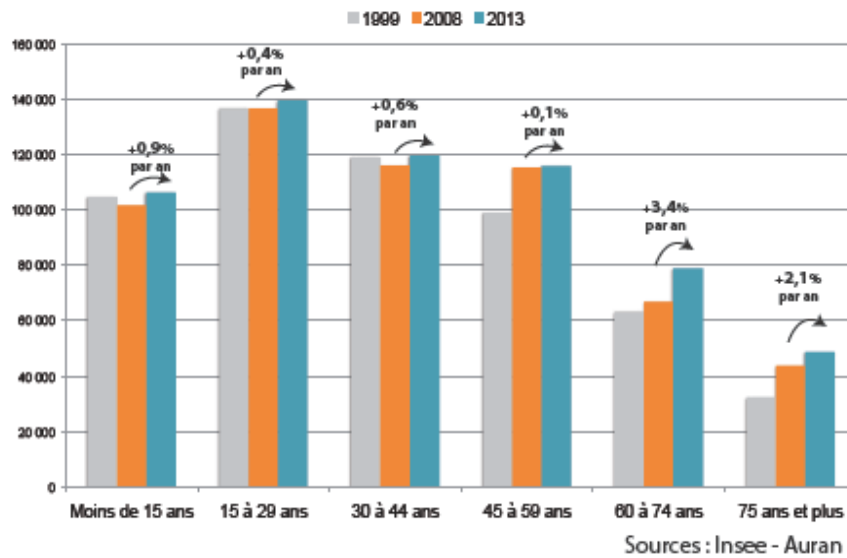


Figure 609: Nantes Metropole: Evolution of the population by age group

## Education

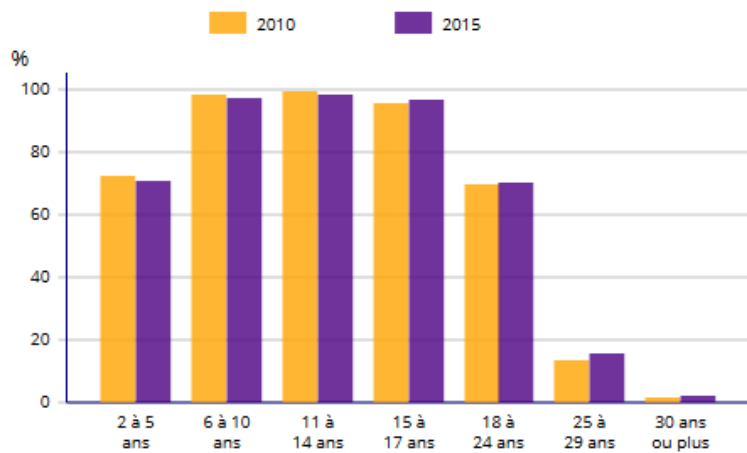


Figure 610 School enrolment rate by age (in %)

Table 163: Highest diploma by gender in 2015

	Women and men	Men	Women
<b>Non-school-going population 15 years of age or older</b>	204 121	96 644	107 477
No diploma or no more than secondary school (11-15 years old) diploma	20,4	17,5	23,0
Professional certificate	17,2	18,6	16,0
A-level, high school diploma	15,9	15,9	15,9
University degree	46,4	47,9	45,1

Source : Insee, RP2015

## Housing conditions

Nantes Municipality had 177 160 housing units on its territory in 2016. 90.1% of these dwellings are principal residences.

With about 6 000 housing units built each year in the metropolitan area, the number of constructions is sustained.

The ageing of the population leads to an increase in under-occupation dwellings, especially in the fabric post-war pavilion. 138 000 dwellings are under-occupied and welcome 266,000 people in Nantes Métropole. On the other hand, over-occupation concerns 9,000 housing that accommodates 40,000 people.

Table 164: Number of rooms in principal residences (municipal area)

	2016	%	2011	%
<b>Total</b>	159 634	100	148 568	100
1 room	22 938	14.4	22 108	14.9
2 rooms	37 525	23.5	33 979	22.9
3 rooms	39 935	25	35 589	24
4 rooms	28 034	17.6	28 037	18.9
5 rooms and more	31 202	19.5	28 855	19.4
<b>Average</b>	<b>3.2</b>		<b>3.2</b>	
Average for houses	5.2		5.1	
Average for apartments	2.7		2.7	

Table 165: Housing categories in Nantes municipality in 2016 (municipal area)

	2016	%	2011	%
<b>Total</b>	177 160	100	163 101	100
Main residence	159 634	90	148 568	91.1
Second residence	6 777	3.8	4 719	2.9
Vacant housing	10 749	6.1	9 814	6.0
Houses	34 946	19.7	34 687	21.3
<b>Apartments</b>	<b>140 193</b>	<b>79.1</b>	<b>126 732</b>	<b>77.7</b>

Sources : Insee, RP2011 et RP2016, exploitations principales, géographie au 01/01/2019.

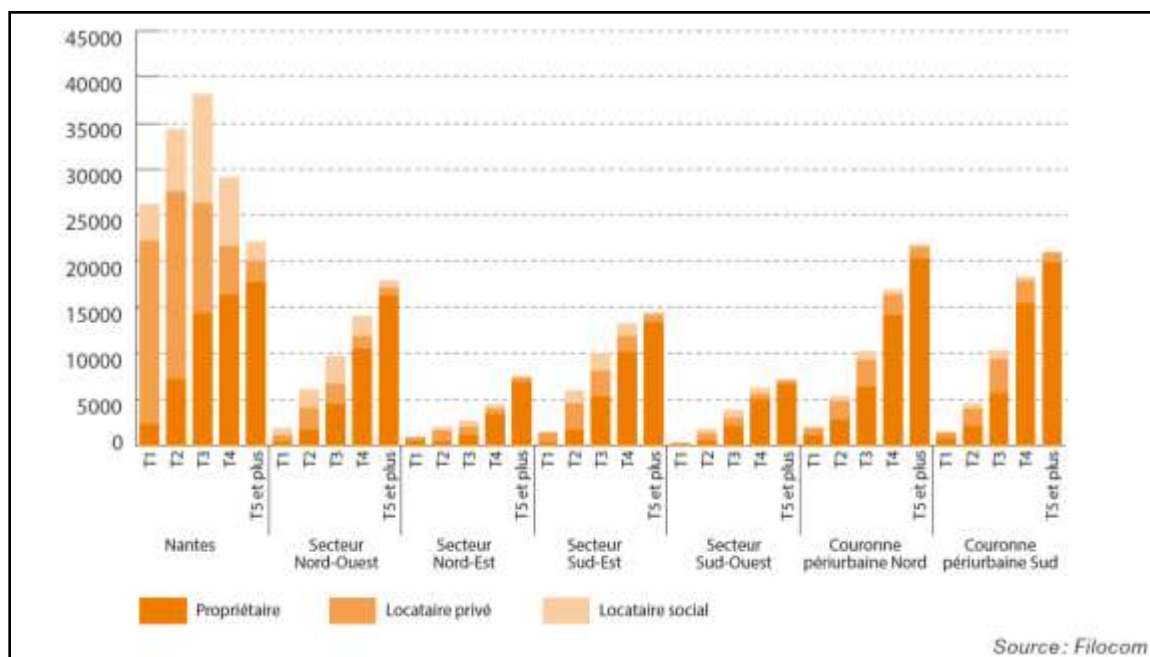


Figure 611: Principal residences by occupancy rate in 2013 (Municipality, metropolitan and urban areas)

Figure 611, Figure 612 and Table 166: Principal residences by occupancy status (municipal area).

Table 166: Principal residences by occupancy status (municipal area)

	2016			
	Number	%	Number of people	average years of residence
<b>Total</b>	<b>159 634</b>	<b>100,0</b>	<b>297 623</b>	<b>9,8</b>
<b>owners</b>	59 972	37,6	127 107	16,3
<b>tenants</b>	97 166	60,9	166 108	5,8
<b>Social housing tenants</b>	30 490	19,1	64 712	10,8
<b>Free accomodation</b>	2 495	1,6	4 408	7,0

Sources : Insee RP2016, exploitations principales, géographie au 01/01/2019



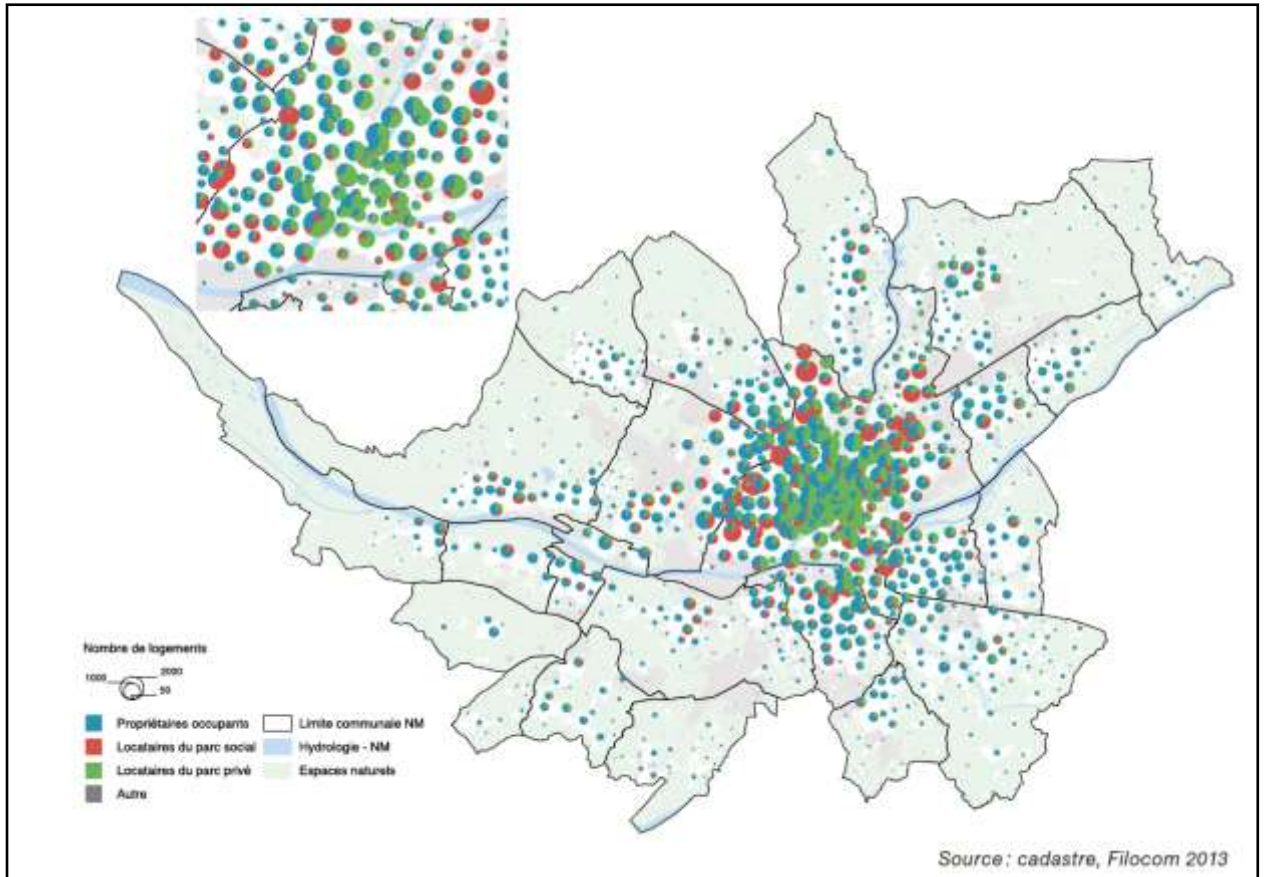


Figure 612: Spatial distribution of residences by occupancy status (in blue home owners, in red tenants of the social park, in green tenants of the private park, in grey other, at the metropolitan level).

## Social housing

19.6% of the city's main residences are social housing.

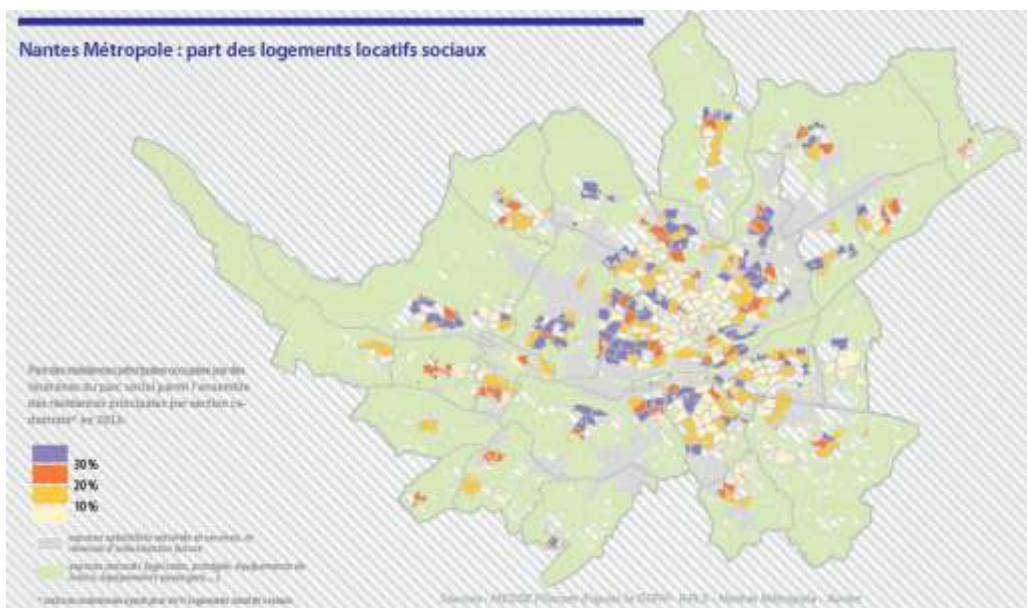


Figure 613: Rate of social housings in the different districts of the metropolitan area (2013)

## Housing comfort

Table 167: Equipment of main housing (municipal area)

	2016	%	2011	%
<b>Total</b>	<b>159 634</b>	<b>100,0</b>	<b>148 568</b>	<b>100,0</b>
Bathroom with bath or shower	154 650	96,9	144 446	97,2
Collective central heating	41 530	26,0	38 649	26,0
Individual central heating	63 895	40,0	58 458	39,3
Individual "all-electric" heating	53 152	33,3	50 009	33,7

Sources : Insee, RP2011 et RP2016, exploitations principales, géographie au 01/01/2019

The deployment of the housing stock impacts the attractiveness of the existing stock. Older housing is below the standards of new housing stock and recent production weakens the attractiveness of old housing stock: in terms of energy performance, the challenges of adapting to ageing and disability, but also in terms of meeting housing needs and expectations.

### An energy improvement challenge

The analysis of energy performance diagnoses clearly shows this phenomenon: the share of category A or B diagnoses is much higher among recent dwellings than in the stock built between 1949 and 1974 (Figure 614).

The existing fleet is more than 35% in energy label D, 40% in E, F, G and only 25% in A, B, C against 48% of A and B labels in the constructed fleet since 1990.

The social rental stock has a higher energy performance than the private stock with 75% of labels A, B or C, 23% of labels D labels and 2% E, F, G labels reflecting on-going maintenance efforts and improvement of their fleets by donors (Figure 615).

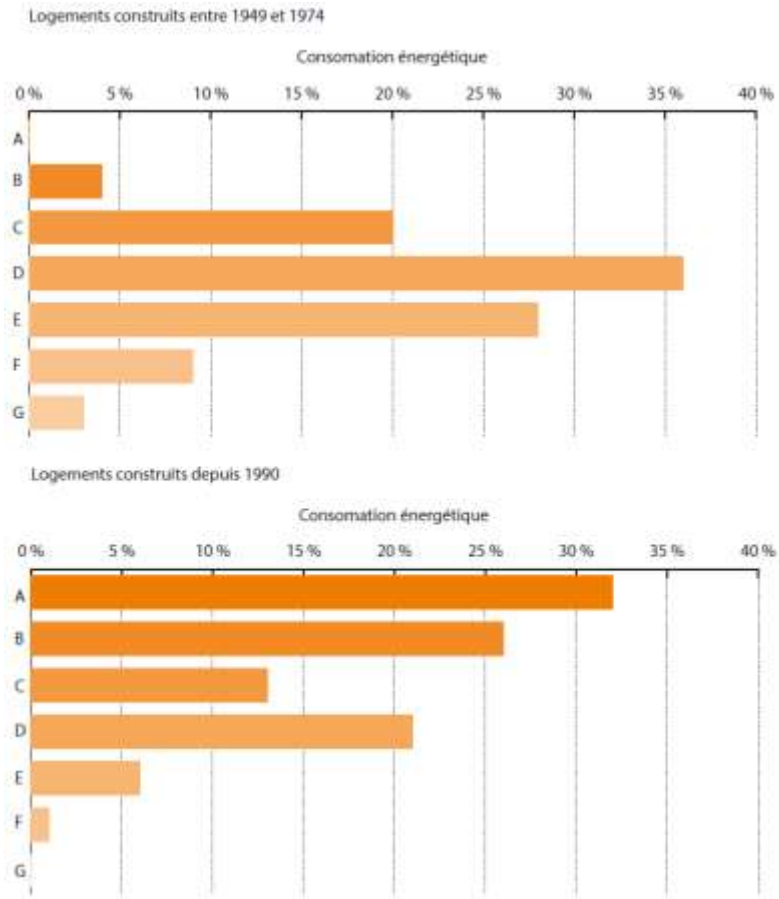
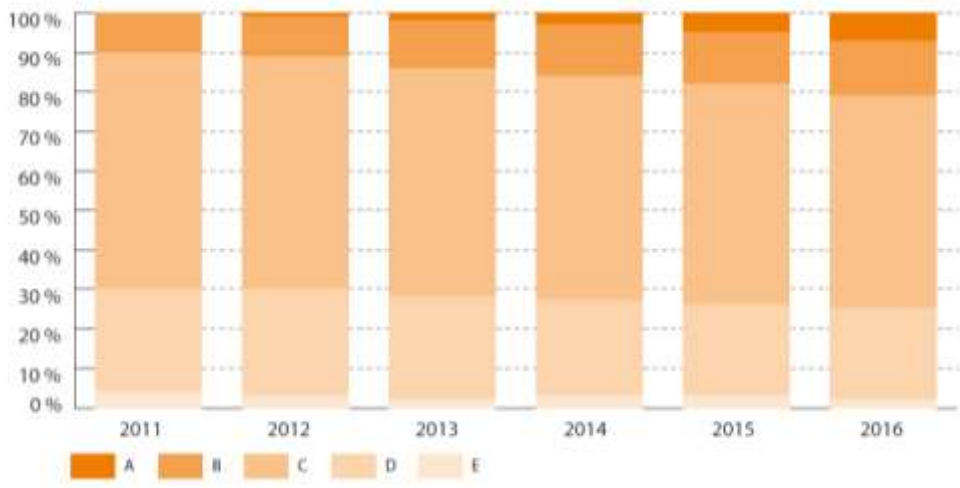


Figure 614: Energy diagnosis of housing in the Loire-Atlantique department (PLH 2019 Nantes Métropole)



Source: Ush-Rpls

Figure 615: Diagnosis of the energy performance of social housing

**Migration rate**

The significant migratory flows on a territorial scale are attributable to various factors, they nevertheless illustrate the attractiveness of the territory of Nantes Métropole, particularly because of the strong growth in employment observed over the past few years in the urban area. They also reflect the major role of the higher education centre,

particularly in welcoming a young population. The dynamics of housing construction is also a driver of population growth.

The attractiveness of the Nantes urban area is reflected in the arrival on the territory of Nantes Métropole of nearly 100,000 new inhabitants since 2001.

- An attractiveness that can be considered beyond the borders of the urban area: 80% of these new inhabitants come from other French departments (Figure 617).
- These new inhabitants are mainly young, working people and a large proportion of managers.

At the same time, there is an almost equivalent movement of people from Nantes Métropole towards the outside:

- These migrations are mainly directed from the territory of Nantes Métropole to the urban area of Nantes and mainly concern populations of young households with intermediate and modest incomes.

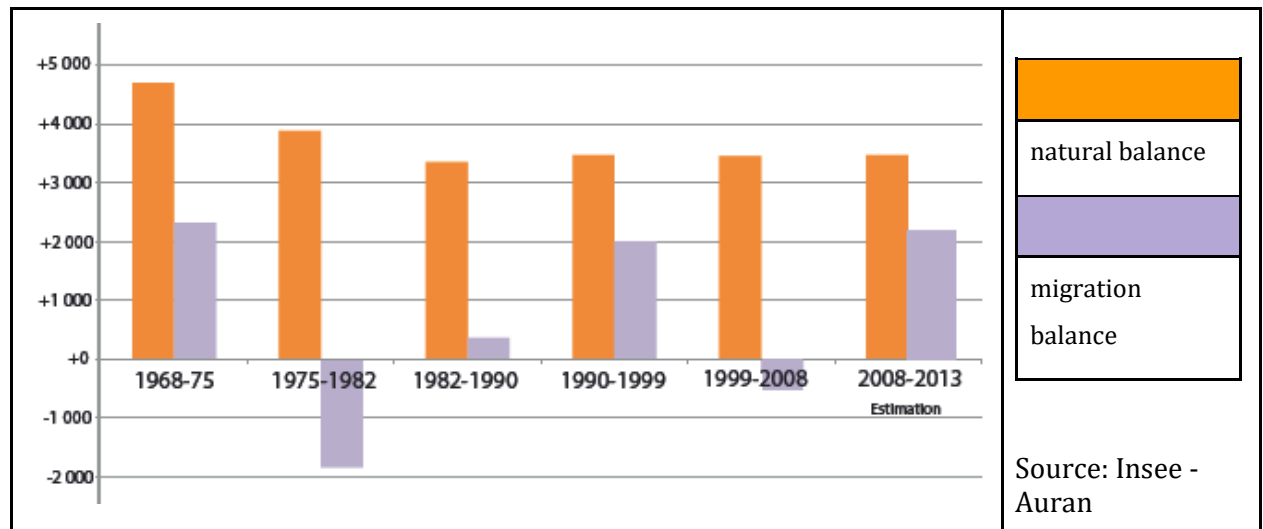


Figure 616: Natural and migratory balances (source: Auran, 2019)

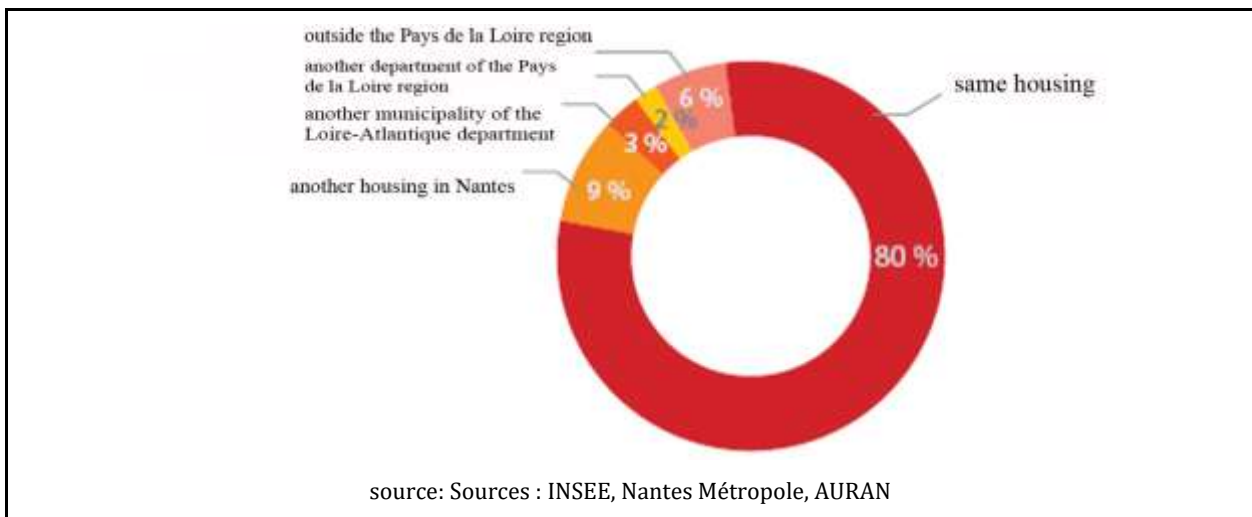
During the period of the 2006-2011, growth was exclusively driven by the natural balance (Nantes then recorded a migration deficit) (figure). Today, its migratory contribution represents almost half of its growth.

Nantes Métropole is the 4th largest, behind Lyon, Bordeaux and Toulouse, with a high long-distance net migration (+11,300). These changes in urban areas are mainly motivated by the economic and academic attractiveness of the city. Indeed, 42% of arrivals in Nantes Métropole concern 15-24 year olds and 27% concern young workers (25-34 years old).

Table 168: Since how long do people are in their housing? (main house- in 2016)

	Household number	Household ratio (%)	Household population	Average number of rooms per	
				Housing	person
<b>Total</b>	<b>159 634</b>	<b>100,0</b>	<b>297 623</b>	<b>3,2</b>	<b>1,7</b>
Less than 2 years	37 747	23,6	60 917	2,4	1,5
From 2 to 4 years	44 561	27,9	83 913	2,8	1,5
From 5 to 9 years	26 644	16,7	58 196	3,4	1,6
10 years and more	50 682	31,7	94 598	4,1	2,2

source: Insee, RP2016



source: Sources : INSEE, Nantes Métropole, AURAN

Figure 617: Where do Nantes people lived one year before?

## Religion

There is no statistic on this issue in France

## Families description

Population growth has been accompanied by an increase in the number of households due to the decrease in the average number of persons per household. This phenomenon is one of the drivers of growth in housing needs. The number of households is growing faster than the population: +1.4% per year compared to 0.6%, due to two cumulative phenomena:



- A socio-demographic evolution (ageing, breakdowns, decohabitation, etc.), which leads to the growth of small households (Figure 619 and Figure 620) and generates a need for additional housing.
- A decrease in the number of family households, due to the departure of some of them in accession outside the agglomeration. Residential migration, but also ageing (children leaving), the increasingly late entry into family life and the greater fragility of these family structures explain the generalisation of this phenomenon to the whole population.

The result is a decrease in the average household size: 2.1 persons per household in 2013 compared to 3.2 persons per household in 1968. This decrease generates a growing need for housing to maintain the same population.

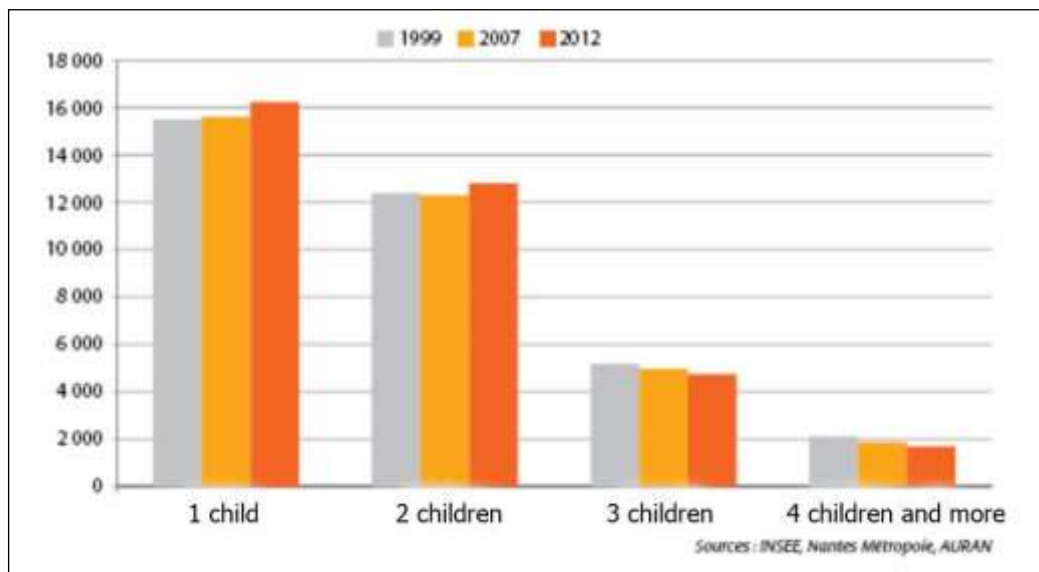
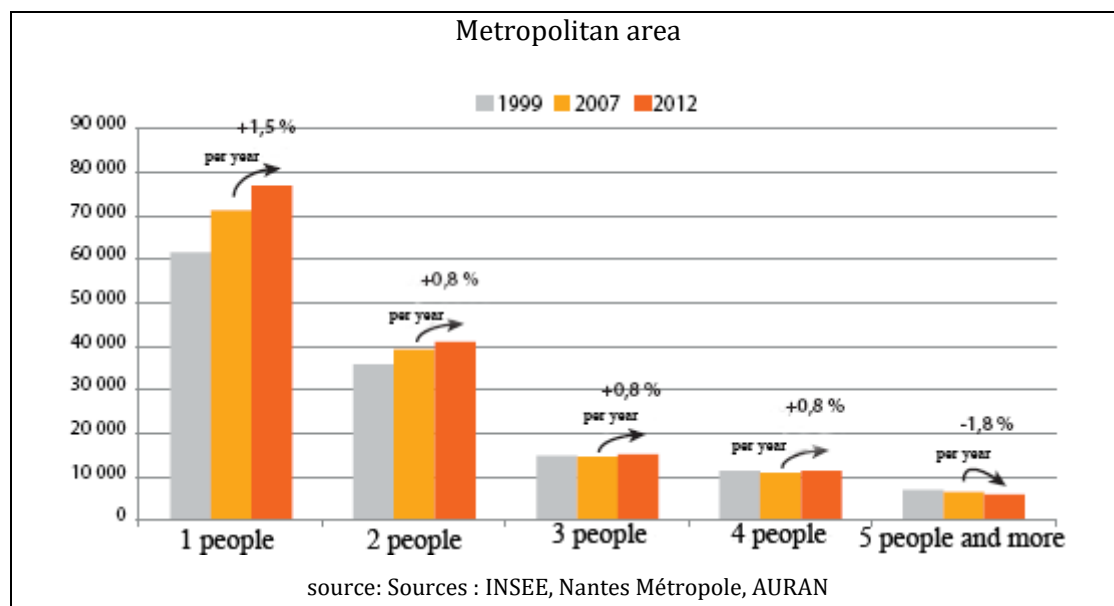


Figure 618: Evolution of the number of children in families (1999-2012)



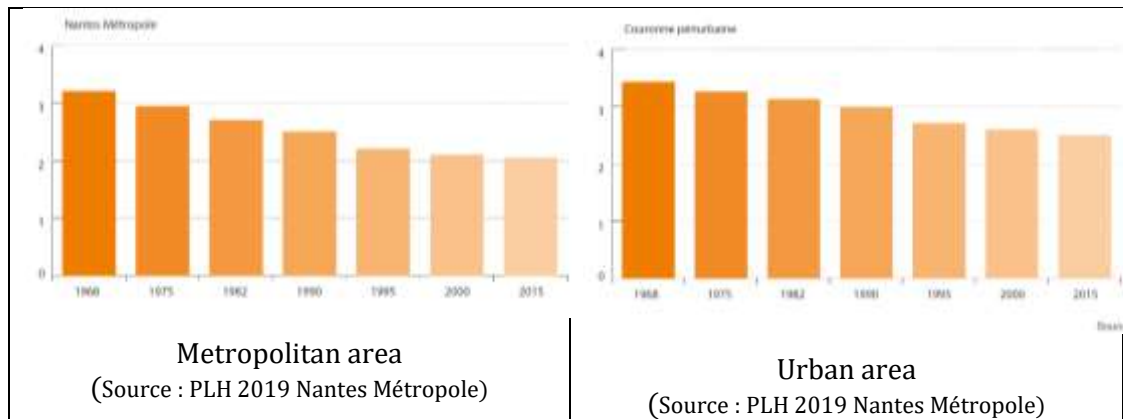


Figure 619: Evolution of the household size

Residential migration at work in the territory and changes in lifestyles (aging population, separation, family reconstitution), modify the family structure of the metropolitan population. Today, 31% of households in the urban area are families with children (38% of the population), compared to 46% in the peri-urban crown.

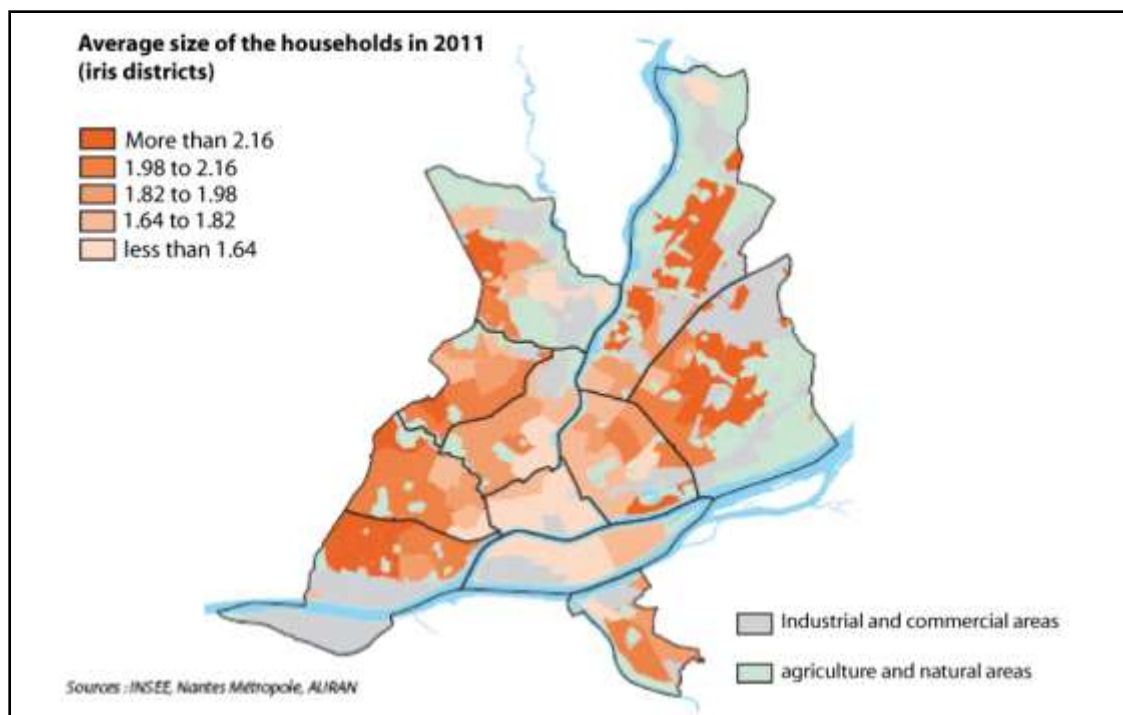


Figure 620: Mapping of the average size of the households in 2011 (municipality area)

### 6.2.2.2 Safety and health

Nantes municipality has a public health department, composed of a population health unit and the global child health service, which operates within Nantes' schools. It contributes to reducing social and territorial inequalities in health through the following missions:

- Ensure a quality municipal public health service and access to health rights
- Take into account territorial inequalities in health

- Promote health education
- Acting for a healthy environment
- To promote the autonomy of the people of Nantes in the construction of their physical, psychological and social well-being

To build its action for the inhabitants of Nantes, the Public Health department relies on the following studies and data:

- health assessments carried out by the City of Nantes in the last class of kindergarten (5 years old children) and CE2 (8 years old) in public and private schools, with information on the oral health of children and their weight status
- the study on the health of Nantes inhabitants of the ORS Pays de la Loire (ORS Pays de la Loire. (2018). The health of the people of Nantes. 162 p.)
- the complementary study of researchers from the AAPRISS platform (Learning and Acting to Reduce Social Inequalities in Health) in Toulouse with which the Public Health Department collaborates (Charlie Marquis, Cyrille Delpierre, Diem Vuillemenot: Aapriss Platform: 2018 - La santé des Nantais, les inégalités sociales de santé. The study is based on the EDI, the european index of social disadvantage.

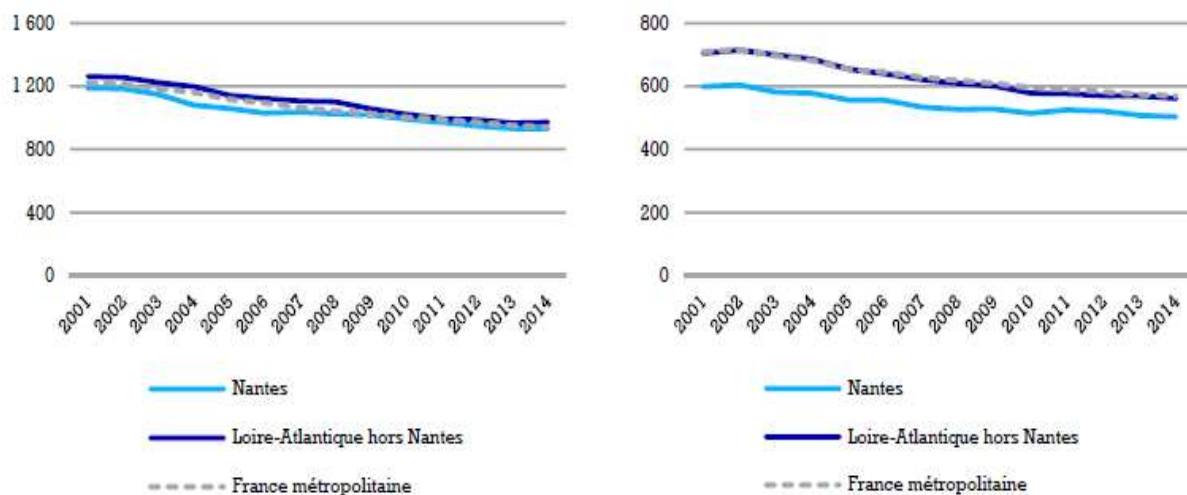
=> Focus on the Study on the health of Nantes inhabitants of the ORS Pays de la Loire (ORS Pays de la Loire - (2018) - the health of the people of Nantes. 162 p.)

This study provides a city-wide perspective on "a recent snapshot of the main health problems of the Nantes people, and their practices in using city care. It also offers a precise look at social and territorial health inequalities at the level of the city of Nantes, as well as on their evolution over the last few years". It cross-references data from different partners such as the CPAM Loire Atlantique, the health assessments carried out by the school health service of the city of Nantes, and indicators established by the ORS based on the operation of the National Health Data System (SNDS).

These include mortality rates, chronic diseases, certain pathologies such as cancers (breast, colon-rectum, lung, upper respiratory tract, prostate), respiratory, circulatory, diabetes, tuberculosis, health consequences of excessive alcohol consumption. It also focuses on mental health and suicides, accidents (everyday life and traffic) and children's health, health coverage and health care use (including medical gynaecology or obstetrics).

"Mortality in Nantes remains below the national average for women and close to the national average for men. Compared to the national average, the situation in Nantes is generally more favourable.

Overall mortality among Nantes residents is 10% lower than the national average. However, this masks a different situation by gender and by districts (Figure 618 and Figure 622).



Sources : Inserm CépiDc, SNDS-BCMD, Insee - exploitation ORS Pays de la Loire  
Taux pour 100 000, moyenne sur 3 ans, standardisé sur la population française (RP 2006).  
Note : les échelles des graphiques sont différentes.

Figure 621 Evolution of the standardised general mortality rate

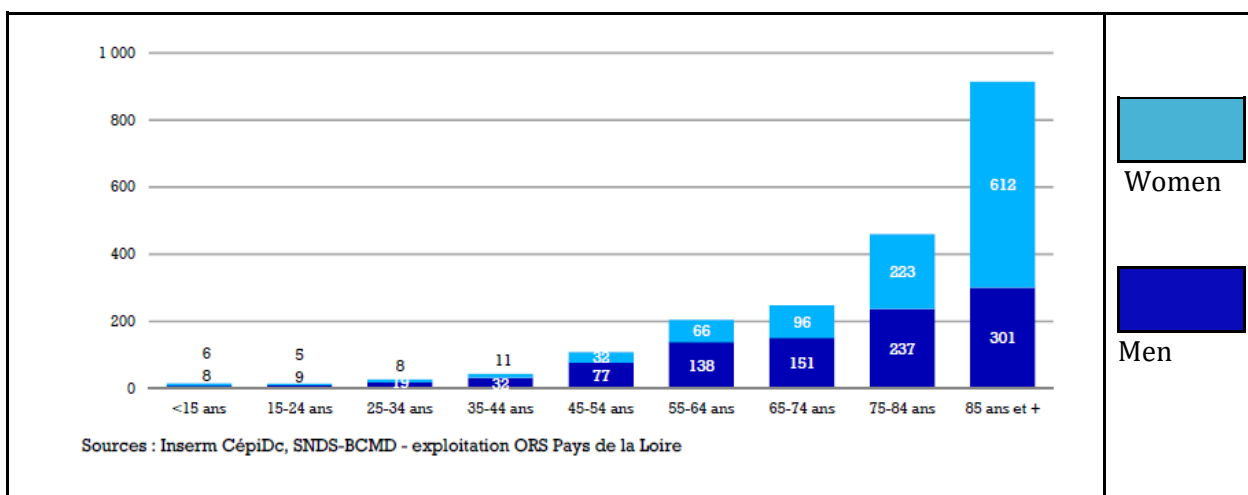


Figure 622: Average annual number of deaths, by age and gender - Nantes (average 2013-2015)

The study explains that the increase in life expectancy has an impact on the statistics of medical causes of death, which are therefore less relevant for prevention and health promotion. This is why indicators of "premature mortality" (before age 65) are increasingly used (Table 170 and Figure 623).

Table 169: Main causes of death - Nantes (averages 2013-2015, 2008-2010)

	Hommes		Femmes		Total		Total	
	(moy. 2013-2015)		(moy. 2013-2015)		(moy. 2013-2015)		(moy. 2008-2010)	
	Effectif	%	Effectif	%	Effectif	%	Effectif	%
<b>Ensemble des cancers*</b>	313	32 %	260	25 %	573	28 %	583	30 %
Cancer du poumon	76	8 %	41	4 %	117	6 %	112	6 %
Cancer du côlon-rectum	31	3 %	28	3 %	59	3 %	55	3 %
Cancer de la prostate	31	3 %	-	-	31	2 %	30	2 %
Cancer du foie et voies biliaires intrahépatiques	19	2 %	9	1 %	28	1 %	38	2 %
Cancers des VADS** et œsophage	28	3 %	9	1 %	37	2 %	27	1 %
Cancer du sein	-	-	44	4 %	44	2 %	51	3 %
<b>Maladies de l'appareil circulatoire</b>	205	21 %	294	28 %	499	25 %	496	26 %
Cardiopathies ischémiques	64	7 %	83	8 %	117	6 %	126	6 %
Maladies vasculaires cérébrales	38	4 %	70	7 %	108	5 %	128	7 %
<b>Traumatismes et empoisonnements</b>	67	7 %	54	5 %	121	6 %	137	7 %
Accident de la vie courante	37	4 %	42	4 %	79	4 %	81	4 %
Suicide	20	2 %	6	1 %	26	1 %	35	2 %
Accident de la circulation	-	-	-	-	10	< 1 %	14	1 %
<b>Pathologies liées à une consommation excessive d'alcool***</b>	35	4 %	12	1 %	47	2 %	48	2 %
Autres causes	352	36 %	440	42 %	792	39 %	676	35 %
<b>Toutes causes</b>	922	100 %	1 059	100 %	2 031	100 %	1 940	100 %

Sources : Inserm CépiDc, SINDS-BCMD - exploitation OMS Pays de la Loire  
 \* Ensemble des tumeurs malignes. \*\* Voies aérodigestives supérieures : lèvre, cavité buccale, pharynx et larynx.  
 \*\*\* Maladies alcooliques du foie et cirrhose du foie sans précision, troubles mentaux et du comportement liés à l'utilisation d'alcool.

This indicator can be measured very precisely at fine geographical scales, making it a particularly relevant tool for studies of territorial health inequalities. It should be noted that France is in an average position for female premature mortality among the 28 EU countries and rather poorly placed (19th place) for male premature mortality.

Table 170: Main causes of premature death (before 65) - Nantes (averages 2013-2015, 2008-2010)

	Hommes		Femmes		Total		Total	
	(moy. 2013-2015)		(moy. 2013-2015)		(moy. 2013-2015)		(moy. 2008-2010)	
	Effectif	%	Effectif	%	Effectif	%	Effectif	%
<b>Ensemble des cancers*</b>	97	34 %	64	50 %	161	39 %	179	38 %
Cancer du poumon	34	12 %	14	11 %	49	12 %	52	11 %
Cancer du sein	-	-	12	9 %	12	3 %	18	4 %
Cancers des VADS** et œsophage	-	-	-	-	16	4 %	12	3 %
Cancer du foie et voies biliaires intrahépatiques	-	-	-	-	6	1 %	11	2 %
Cancer du côlon-rectum	6	2 %	5	4 %	11	3 %	9	2 %
<b>Traumatismes et empoisonnements</b>	35	12 %	12	9 %	47	11 %	69	14 %
Suicide	16	6 %	5	4 %	21	5 %	28	6 %
Accident de la vie courante	10	4 %	4	3 %	15	4 %	25	5 %
Accident de la circulation	-	2 %	-	-	9	2 %	11	2 %
<b>Maladies de l'appareil circulatoire</b>	37	13 %	9	7 %	46	11 %	51	11 %
Cardiopathies ischémiques	-	-	-	-	15	4 %	17	4 %
Maladies vasculaires cérébrales	7	2 %	4	3 %	11	3 %	13	3 %
<b>Pathologies liées à une consommation excessive d'alcool***</b>	21	7 %	5	4 %	26	6 %	34	7 %
Autres causes	93	33 %	38	30 %	131	32 %	137	29 %
<b>Toutes causes</b>	283	100 %	128	100 %	412	100 %	465	100 %

Sources : Inserm CépiDc, SINDS-BCMD, Insee - exploitation OMS Pays de la Loire  
 \* Ensemble des tumeurs malignes. \*\* Voies aérodigestives supérieures : lèvre, cavité buccale, pharynx et larynx.  
 \*\*\* Maladies alcooliques du foie et cirrhose du foie sans précision, troubles mentaux et du comportement liés à l'utilisation d'alcool.



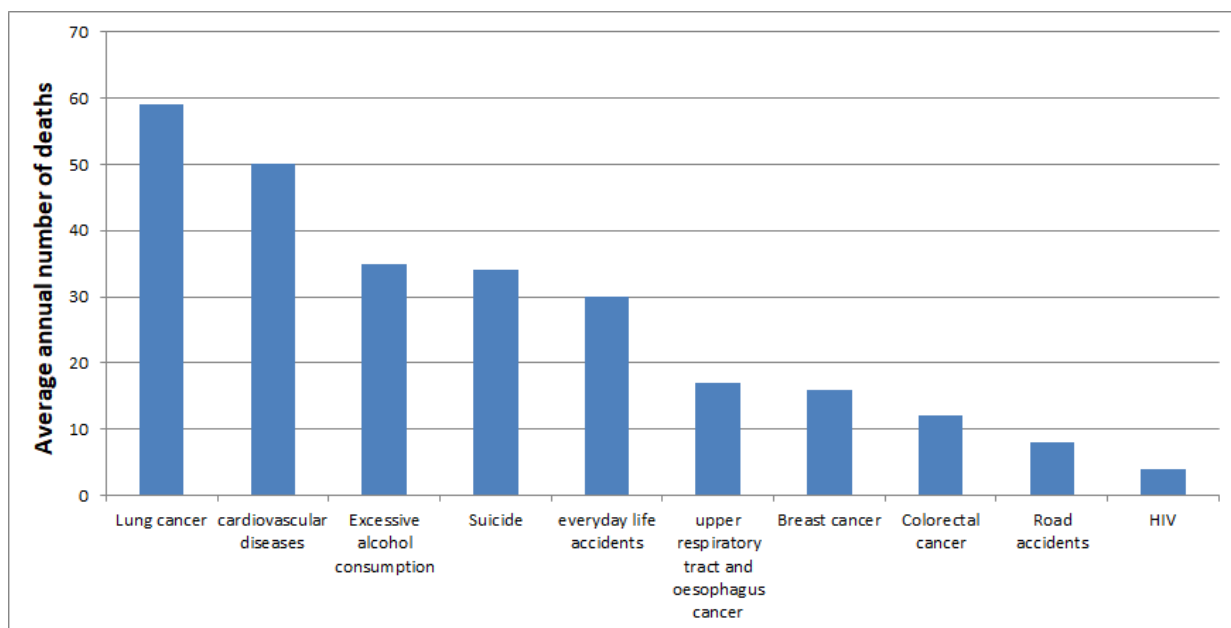


Figure 623: Causes of death of people dead before 65 years old (Nantes municipality area)

For the Public Health Department of the City of Nantes, data on premature mortality make sense at the intra-communal level, at the district level. In particular, the study showed a significant gap between the city's poorest districts and other districts in Nantes: over the period 2011-2016, 35% of deaths among residents of priority districts concerned people less than 65 years of age compared to 19% of deaths among residents of other districts (Figure 624).

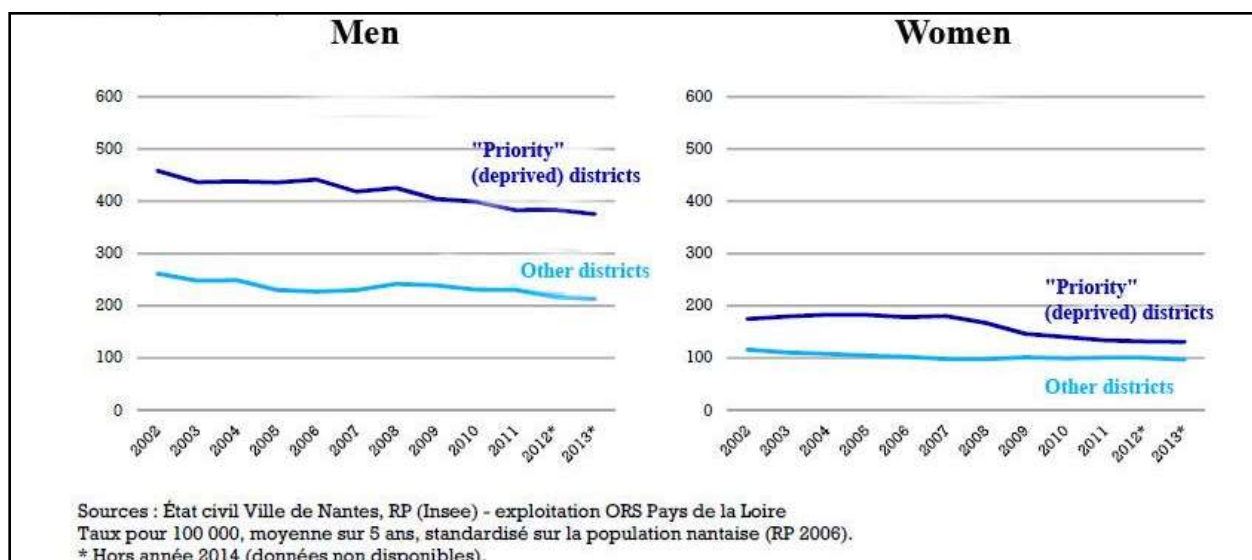


Figure 624: Evolution of the standardised general premature mortality (before 65) rate, by gender and type of housing district (Nantes, 2000-2016)

## Health services and equipments

### Health equipment (hospitals and clinics)

The metropolitan health centres are mainly located in Nantes and inside the area delimited by the ring road (overall capacity: 4,270 beds). Nantes Métropole has 7 establishments that constitute the Nantes University Hospital and the public offer. Most of them are located in Nantes municipality area:

■ Saint-Jacques Hospital, located south of Nantes, is a hospital complex that has 972 beds and extends over 97,900 m<sup>2</sup>. It includes functional re-education, rehabilitation services, and psychiatry and geriatrics, as well as the plateau logistics of the University Hospital of Nantes.

■ The Hôtel-Dieu, located in the centre of Nantes, has 827 short stay medical and surgical beds. The SAMU, the emergency department, and the Centre 15 are located on the site, which extends over more than 12 ha. It was commissioned in 1967 and today suffers from many problems related to obsolescence and the insalubrity of the premises. He'll move with the Nord Laennec hospital by 2025 to set up on the island of Nantes;

■ North Laennec Hospital, located in Saint-Herblain, has 489 beds and short stay places, medical and surgical. It is the second medical and surgical site of the University Hospital of Nantes;

■ The women's, children's and adolescents' hospital, located near the Hôtel-Dieu in the centre of Nantes, has 300 beds and includes gynaecological and obstetrical services and those intended for the care of the child;

■ Bellier Hospital, located near the railway station of Nantes, has 135 rooms divided into three units: multi-purpose geriatric medicine, follow-up care and geriatric rehabilitation, centre outpatient clinical gerontology clinic in Nantes;

■ La Seilleraye, located in Carquefou, is a 192-bed structure that accommodates, for long stays or permanently, from dependent elderly people;

■ The Beauséjour residence, located northwest of Nantes, has 115 rooms and welcomes dependent elderly people to long-term care.

The private offer includes about fifteen clinics that complement the care offer and also contribute to

the influence of hospital centrality of Nantes:

■ The Jules Verne clinic has more than 400 beds. Located in the north-east of Nantes, it includes activities of medicine, surgery, surgery, and oncology, obstetrics and follow-up care and of rehabilitation;

■ Located in Saint-Herblain, the polyclinic de l'Atlantique offers a range of care services multidisciplinary (maternity, different specialties in surgery). She represents one of the the largest ophthalmological centres in France and is the first private maternity hospital in France with

nearly 5,000 births each year. She has nearly 250 beds;

■ "Les Nouvelles Cliniques Nantaises" is a an establishment specialising in surgery, surgery

medicine and emergency medicine that offers a wide range of medical and medico-technical services. It has a close capacity of 350 beds.

Other establishments complete the private offer, such as the Jeanne d'Arc clinic in Nantes, specialized in hand surgery, the Brétéché clinic, in the city centre of Nantes, which has 180 beds and operates in the fields of surgery, medicine, obstetrics and follow-up and rehabilitation care, or the Park clinic in Nantes which is specialized in psychiatry and has about sixty members of beds.

## Safety and criminality

Table 171: Number of crimes and delinquency in Nantes city area

	<b>Police</b> « Circonscription de sécurité publique »	<b>Gendarmerie</b> « Compagnie »	total
<b>Voluntary attacks on physical integrity</b>	<b>4 212</b>	<b>537</b>	<b>4 749</b>
Non-sordid physical violences	2488	315	2803
Sordid physical violences	828	78	906
Sexual violences	203	44	247
Threats of violence	693	100	793
<b>Property offences</b>	<b>25 793</b>	<b>4 226</b>	<b>30 019</b>
Armed robberies (firearms)	20	1	21
Robberies with violence without firearms	808	77	885
Thefts with trick entry	89	11	100
Burglaries	3422	970	4392
Car and motorcycle robberies	6969	1402	8371
Simple theft to the detriment of private individuals	7699	1034	8733
Other simple thefts (shoplifting, construction sites, etc.)	2146	357	2503
Destruction and damage to property	4640	374	5014
<b>Fraud and economic and financial offences</b>	<b>1 830</b>	<b>531</b>	<b>2361</b>
<b>Organised crime and specialised crime</b>	<b>98</b>	<b>16</b>	<b>114</b>
<b>Offences revealed by the action of the services</b>	<b>2 004</b>	<b>329</b>	<b>2 333</b>
Possession of stolen goods	270	71	341
Drug use and trafficking	938	92	1030
Carrying or possessing prohibited weapons	343	116	459
Other	453	50	503

Source : Direction Centrale de la Police Judiciaire, 2012

### 6.2.2.3 Participation

Over recent decades, citizens' trust in representative democracy has weakened as shown in abstention in polls all over Europe. At the same time, urban challenges are more acute and cannot be solved only by public sector interventions any more. Nantes Metropole responded to these new democratic aspirations and major urban transitions issues (democratic, energy, ageing, digital, social inclusion) by developing new ways of building the city based on citizen participation and innovation by all and for all.

#### FROM PARTICIPATORY ASSESSMENT TO CITIZEN ASSESSORS

Nantes is committed to develop participatory assessments and provide volunteer citizens with the tools, methods, data and resources needed to become assessors. This method enables the city's experts to reexamine users needs and expectations (including non-users) on specific topics/ public policies, to confirm or rebut their views and strategic options and to report results with transparency.

The citizen assessment process on mobility at night was identified by the French Parliament in 2018 as one of six successful and innovative cases of public policy assessment.

#### OPEN GOVERNANCE FOR BETTER PUBLIC POLICIES

Half of Nantes' municipal and metropolitan public policies are brought to life in an open and collaborative mode through a continuous dialogue and are developed in collaboration with citizens, associations and/or experts brought together regularly in dedicated committees moderated by the City.

A wide range of innovative methods are used in those committees: citizen assessment, public hearings, nudge workshops, etc. but they all aim at implementing actions towards objectives that are discussed and shared. The public interest is built on the back of the wide range of viewpoints and in a continuous dialogue between elected officials, stakeholders, technical experts and citizens.

#### GREAT DEBATES TO COLLECTIVELY TACKLE MAJOR SOCIETAL ISSUES

Made in Nantes, the Great Debate is an ambitious participatory approach implemented for strategic issues at the metropolitan level. It enables to raise a major topic of transition at the top of the agenda, to produce a shared forward-looking vision and roadmap for the future, with co-responsibility.

Three Great Debates have been organized since 2014. «Nantes, the Loire and us», «Energy transition is up to us !» and «Longevity, let's open up the possibilities for all».

#### Focus on the Great DEBATE on energy transition

This second Great Debate on energy transition included an unprecedented and innovative participation method called «the action debate». It aimed at responding to the democratic challenges of a greater citizen ownership of local energy issues. Citizens had highlighted

that the climate challenge was not enough in itself to prompt action, that there was a need to instill a desire to act by clearly communicating the weight of experience and examples, in a practical and targeted

way, but also and above all through human contact. Nantes wanted them to have the opportunity to have a direct hand in behavioural changes and solutions. To do this, a number of citizen groups received direct guidance in order to take action on their individual and collective “pathways”.

In practical terms, 6 communities were formed (volunteer appeal, random draws etc.) offering 500 citizens the opportunity to experience transition for themselves.

This Great Debate resulted in a shared roadmap on energy transition signed by the Metropolitan council in 2018, that sets up Nantes collective ambition based on three unique features: an energy transition that benefits 100% to citizens, that makes use of 100% of local renewable resources and that is 100% citizen led. These commitments are now monitored by an independent commission for energy transition, the COTE, set up by Nantes Metropole after the debate. The commission is made of 30 volunteers (citizens, experts, NGO members etc), along with two elected officials responsible for the roadmap. They meet every two months and are responsible for the development of independent metrics of success.

The first results of the shared roadmap include an ambitious 100M€ plan for thermic renovation of social and private buildings, the doubling of renovation projects to tackle fuel poverty, one billion investment planned to reduce by 30 % car use by 2030, the creation of « the Office of the Earth» to support the development of 500 new projects by 2025, the involvement each year of 500 citizens in energy transition challenges (energy, waste, food). For example, Nantes Metropole supported a citizen investment project of a 500 kWp PV plant opened in 2019 financed thanks to the funding of 600 citizens. The whole process provided major opportunities for citizens and stakeholders to innovate and improve the resilience and sustainability of Nantes.



Figure 625: The fifteen main challenges of the Energy plan



## USER EXPERIENCE AS STARTING POINT OF URBAN PLANNING

Citizens are involved in major urban renewal projects allowing enriching the project with their expertise as user of the public space. Nantes also involved citizens in a tenders procedure: 25 citizens were selected at random to form an independent panel associated to the tender procedures for two flagship projects for urban centrality in Nantes - the «Ile de Nantes» and «Loire au coeur».

## A TAILORED MADE PROCESS

Citizen dialogue is considered as a political innovation in itself, and was implemented in Nantes according to a tailored-made process, where the rules of the game are clearly established and guaranteed. The public policy sets the course, creates the conditions for debate and encourages

the diversity of opinion according to clear and transparent rules. The elected officials make the final decision and commit to reporting on the proposals made by the citizens.

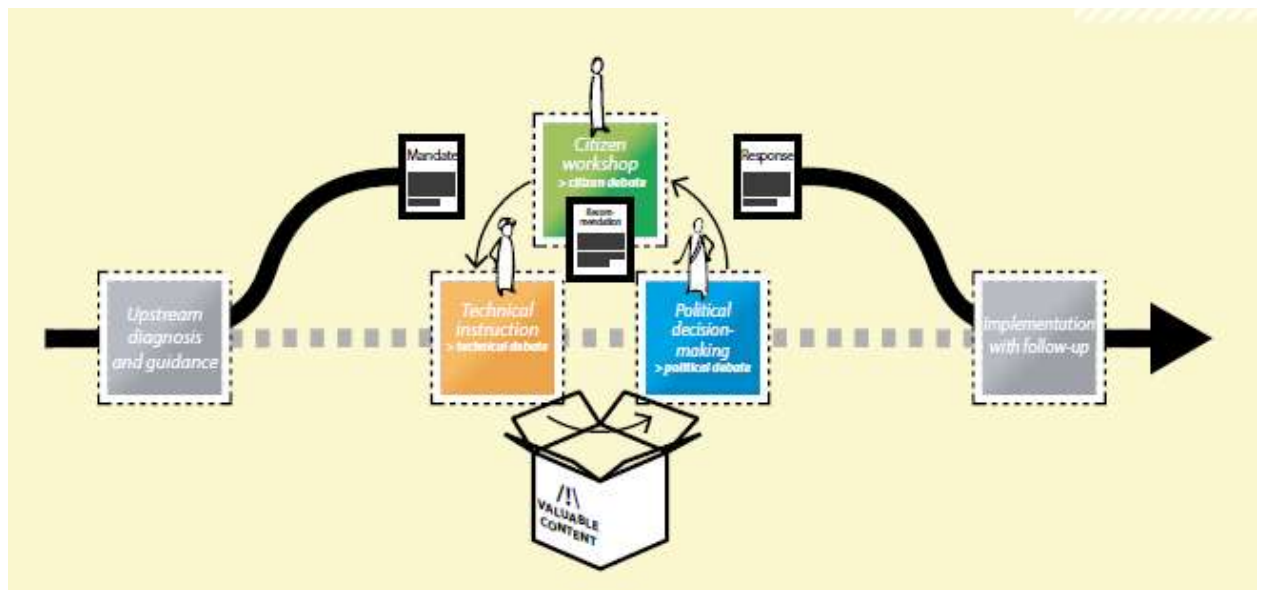


Figure 626: Citizen Dialogue process

Nantes also supports innovation in the private, non-profit and academics sectors through collaborative approaches and innovative mechanisms: “Creative factory” for cultural and creative industries, “French Tech Capital” for the digital ecosystem, “Ecosolies” for social economy, “COTE” for energy transition actors, are examples of hubs for innovation. Innovative projects are boosted through initiatives such as eco-innovation and social economy “factories” or Nantes City Lab which facilitates the test of new solutions in real life.

## Political participation

Table 172: Last election statistics - national and local levels (Nantes municipality area)

Abs: Abstention

Reg.: Registered voters

Vot: Voters (number of)

	Registered voters	Abs/Reg %	Vot/Reg %	Blank	Blank/Reg %	Blank/Vot %	Null	Null/Reg %	Null/Vot %	Expressed	Exp/Reg %	Exp/Vot %
Presidential election 2017 (2sd round)	187771	25,09	74,91	11178	5,95	7,95	2749	1,46	1,95	126723	67,49	90,1
Presidential election 2017 (1st round)	187820	19,07	80,93	1942	1,03	1,28	606	0,32	0,4	149462	79,58	98,32
				Blank & null	Blank & null /Reg %			Blank & null /Vot %				
Municipal election 2014 (2sd round)	181888	46,18	53,82		5402		2,97		5,51	92480	50,84	94,48
Municipal election 2014 (1st round)	181897	45,50	54,49		2899		1,59		2,92	96218	52,90	97,07

source: <https://www.data.gouv.fr/fr/posts/les-donnees-des-elections/>

## Trust in local public institutions

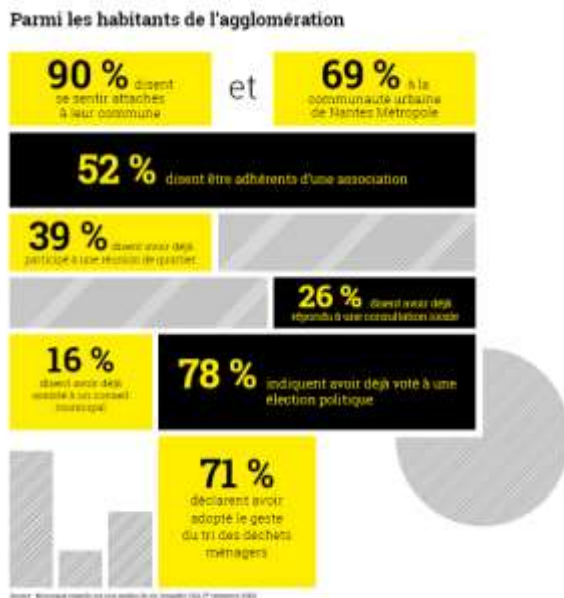


Figure 627: Main results of a survey (2010) on “New perspectives on our way of life”

## Voluntarism (volunteering, associative movement)

### A dense associative network

There are many associations in the urban area: more than 10,000, including 7,500 in Nantes. They represent a total of more than 140,000 volunteers and 24,000 employees. Their economic and social role is well established, and they play an essential role in the exercise of citizenship through the voluntary work they generate. They contribute to the well-being of the community by contributing to the development of local and social cohesion. And if traditional associative forms remain largely predominant (cultural, sporting, solidarity, childhood...), we see the emergence of innovatives structures (fablab, think tank, business support systems of the social and solidarity economy such as Solilab...). Community gardens, beyond their utilitarian side, also participate in preserving and strengthening the social link.

#### 6.2.2.4 Public services (transports)

The accessibility of metropolitan centrality is essential to its attractiveness. But the preservation of a quality environment and living environment in the metropolitan area pleads today for an increasingly urbanization oriented towards the alternative transport to the car. :

- as stronger use of public transports
- a stronger use of walking and cycling
- car sharing

Nantes Métropole has set ambitious objectives for the next 10 years in the urban mobility plan: “*Plan de déplacements urbains 2010-2015 perspectives 2030*”.

#### Public transport network and offer (Nantes Métropole, PDU 2018)

The metropolitan territory has a good coverage by the public transportation network (Figure 628 and Figure 629).



Figure 628: The public transport offer (source: Semitan, 2018)

The development of the public transport network has continued over the past 10 years. The combined TAN and TER networks now serve 27% of the territory, 78% of the population and 80% of jobs. 14% of the territory, 53% of the population, 58% of jobs are even covered by the structuring network (TER stations, tramways, busways,

chronobuses). The commissioning of 7 new Chronobus lines, conventional buses with high frequency and extended time slots, has helped to improve performance and extend public transport coverage, at a lower cost than tramways.

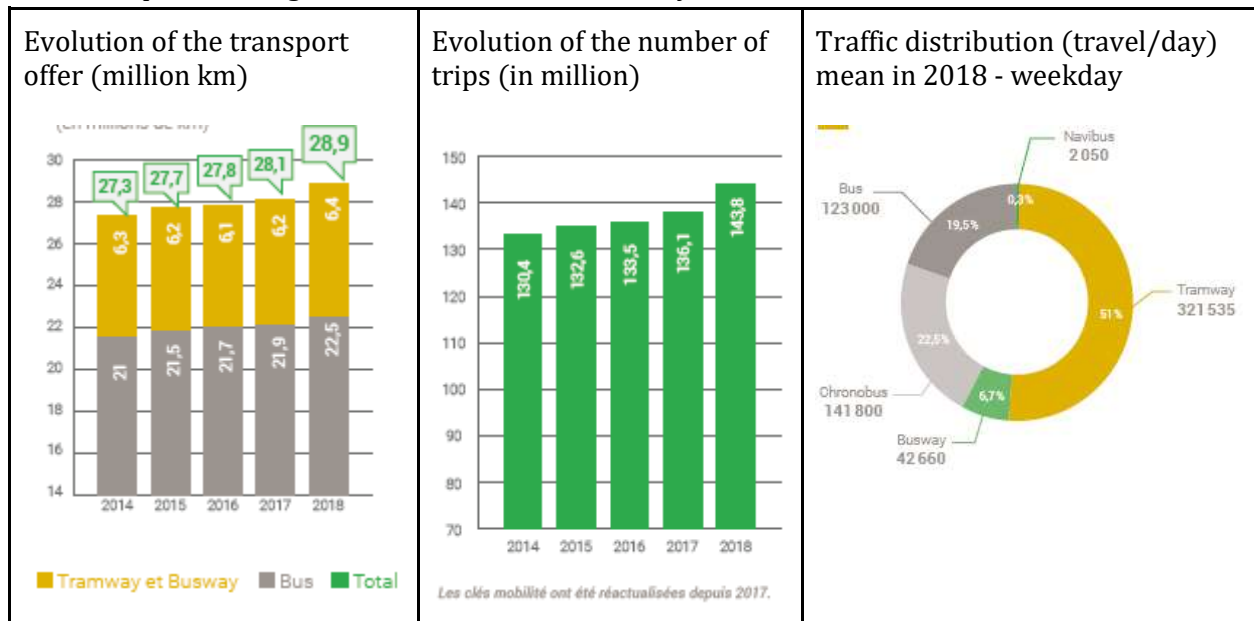


Figure 629: Public transport statistics (source: Semitan, 2018)

**Many actions focused on the development of the bicycle** (Nantes Métropole, PDU 2018)

The bicycle has focused a number of efforts to facilitate its use. Thus, the work of developing cycling continuity has continued, with the creation of east-west and north-south axes (Figure 630). There were 470 km of cycling facilities in 2015, 82 km more than in 2009 (+20%). The bicycle parking offer has also increased (Table 173). 1,341 spaces have been created in the central car parks and at the station. In addition, more than 1100 sheltered and secured spaces have been built since 2010, including 432 in collective boxes. The "Bicloo" bike share service, created in 2008, has also been strengthened with the installation of 14 new stations created to accommodate 90 additional bicycles. The offer of medium and long term bicycle rental has also tripled, with 600 bicycles now available to the general public and students (NGE, Effia, Vélocampus). This commitment was made concrete in 2015 with the organization of Vélo-city, an international congress on urban cycling.

**Providing facilities for pedestrians** (Nantes Métropole, PDU 2018)

To encourage walking, several developments have been carried out in all the municipalities of the city. The pedestrian zone of the Nantes hypercentre has been extended to Place Royale (2011), Crébillon, Santeuil and Boileau streets, Graslin (2014) and Feydeau-Est (2015) squares, to the foot of the Château des ducs. A master plan for road access and public spaces in Nantes Métropole was also drawn up in 2015. It is a strategic tool for identifying and classifying the priority places and routes to be treated throughout the territory.

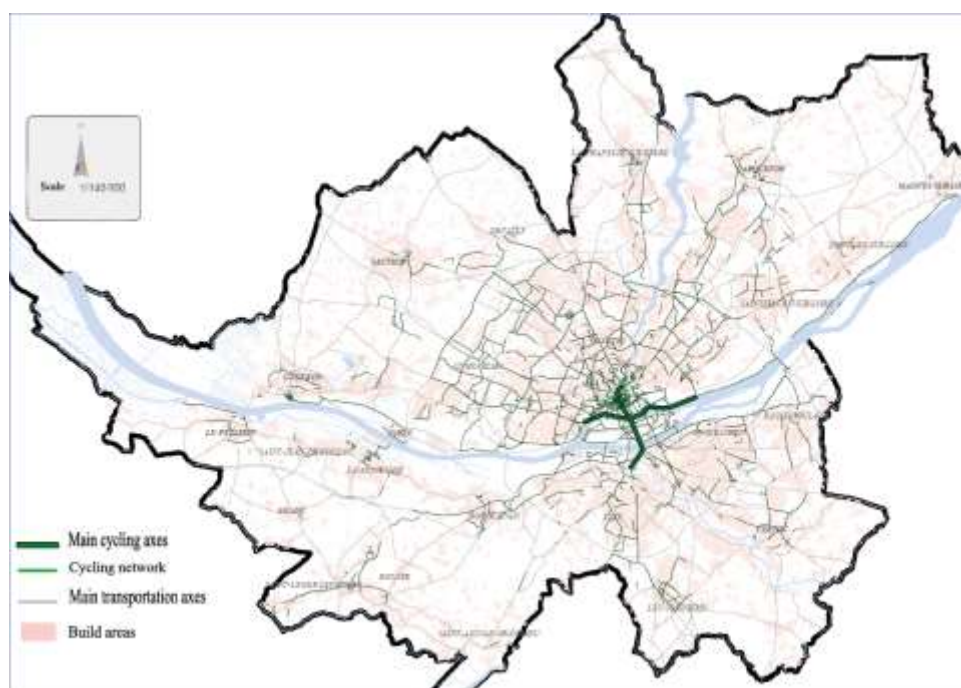


Figure 630: Cycling path network (metropolitan area)

Table 173: Bike parking in the metropolitan area - evolution 2009-2013

Bike parking	Number of places in 2013	Number of places in 2009	Evolution 2009-2013
In public space (outside)	6500	3300	+97%
Indoor public parkings (city center and train station)	800	50	+1500%
P+R (Terminal stations of public transports)	930	43	+2225%
Indoor and protected parkings	800	0	ND

source: Nantes Métropole, AURAN stationnement

### 6.2.3 Economic description

In this Category, the data collected aim to provide information about the economic development of the city. Such data are collected at the scale of the city and at the scale of the study area. Data are related to standard economic indexes but also to new indicators which can help to evaluate the real situation of the city from an economic perspective.

The data collected by the cities allow to depict a picture of the economic situation of the city. Beyond many standard economic indexes (like average familiar income, employment rate, educational facilities, etc..), other more actual indicators are investigated and evaluated (like short-term contract rate, the importance of no-profit sector, the competitiveness, etc..).



All this information can help to identify study areas where healthy corridors can be implemented, improving the quality of life of the people.

The investigations are based on some wealth indicators related to income, current expenditure and living conditions.

The data collected allow to take into account also the degree of competitiveness in the city and its capability to create, maintenance and redistributing the wealth among its inhabitants. An important focus is on the labor, the workforce and the conditions of workers in the different sectors.

In a such analysis also the innovation, the research of innovative procedures and amounts of the investments related to modernization are approached and give important information on the “state of health” of the city.

Some indicators regarding the degree of educational facilities, kindergartens, school and in general cultural facilities provide fundamental insights to better evaluate the real situation of citizens.

### 6.2.3.1 Income and poverty

#### Average family income

In a context of economic and social crisis, and under the effects of residential migration, the structure of the population of Nantes Metropole is changing heterogeneously. While the average net income level of households has increased overall, it must be noted that income gaps have widened between the different household statuses.

Table 174: Median income per consumption unit in 2015 and comparison with national level

	NANTES (2015) Municipal area	FRANCE (2016) National level
Number of tax households	132 311	
Number of persons in tax households	266 596.0	
<b>Median income per Consumption unit<sup>74</sup> (euros)</b>	<b>21 263</b>	<b>20 520</b>
1st decile	10 303.5	11 040
9th decile	41 308.0	37 570

source: Source : Insee-DGFIP-Cnaf-Cnav-Ccmsa, Fichier localisé social et fiscal (FiLoSoFi)

<sup>74</sup> Consumption unit (UC) is the most commonly used benchmark (known as the OECD) currently uses the following weighting:

- 1 CU for the first adult in the household;
- 0.5 CU for other persons aged 14 or over;
- 0.3 CU for children under 14 years of age.

**Ownership of durable assets (e.g. rate of owners of their residence, rate of renters, shared accommodation, free accommodation)**

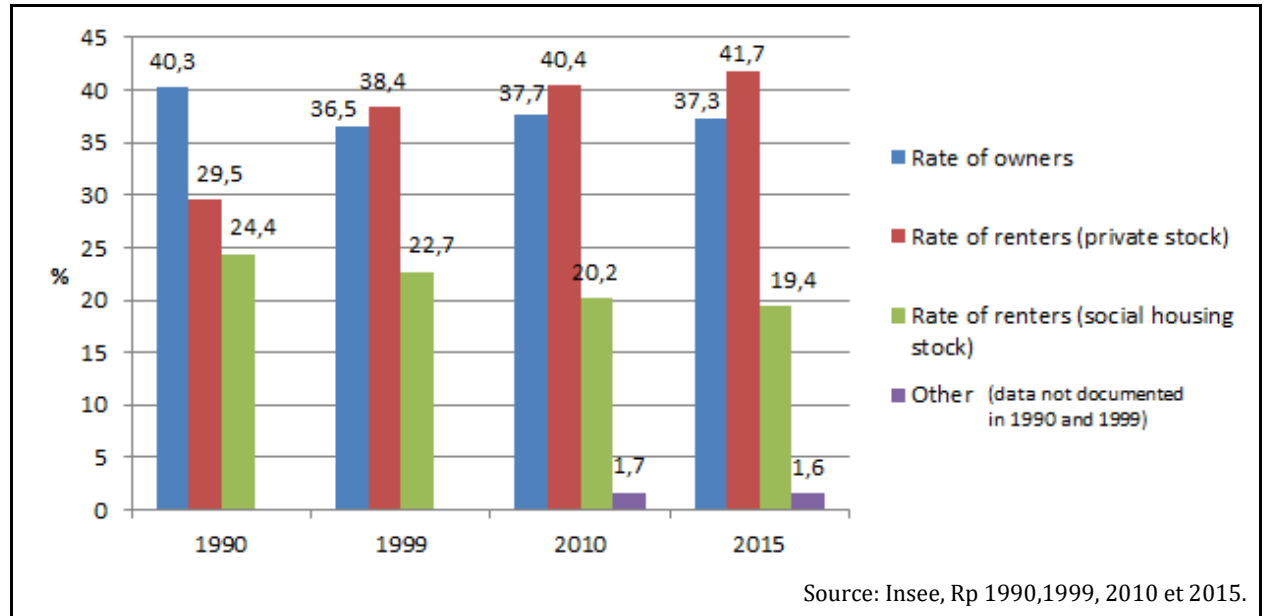
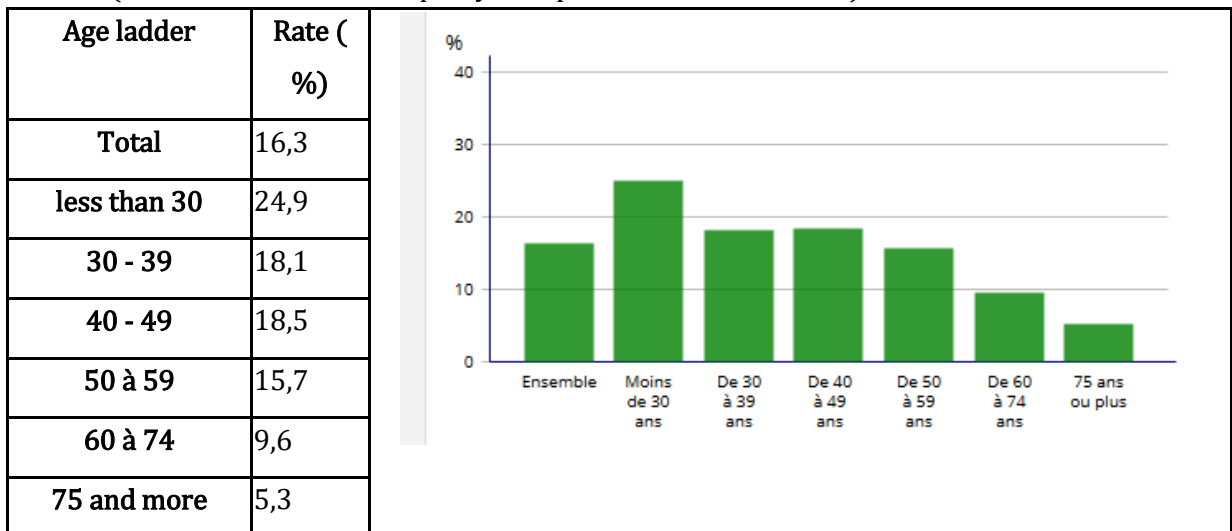


Figure 631: Housing occupancy status in Nantes - evolution (1990-2015)

**Poverty (index, rate, percentual...)**

In the Nantes metropolitan area, approximately 38,000 households are living below the poverty line in 2013 (income 50% below the median of net income per consumption unit, or €786 per month). They represent 14.5% of all households in Nantes Metropolitan France (18.9% in Nantes Municipality, compared to 17% in France).



Source : Insee-DGFIP-Cnaf-Cnav-Cmsa, Fichier localisé social et fiscal (FiLoSoFi) en géographie au 01/01/2016.

Figure 632: Poverty rate by age group of the tax referent (2015)

## **Living conditions**

### **Housing policy in Nantes**

Housing is one of Nantes Métropole's priority areas of action. The Metropolitan area works daily to ensure that all residents of the agglomeration have access to housing adapted to their needs and resources. Nantes Métropole has an ambitious and proactive policy, the objectives and principles of which are defined in its Local Housing Programme (PLH).

The 2019-2025 local housing program is the tool that Nantes Métropole and its 24 municipalities are using to meet this ambition of a supportive territory that will enable everyone to find housing, whatever their situation.

The ambition is to offer everyone the opportunity to find a place to live easily, at every stage of life, by meeting the needs of the inhabitants and their means, in all their diversity. This is why the PLH sets the ambitious target of building 6,000 housing units per year. Families, singles, seniors, couples... Each personal situation is unique and must be addressed with an increasingly diversified housing offer.

The city is also continuing its strong commitment to social housing, which should represent a third of total construction, or 2,000 units per year. Social housing is at the service of all. There are several types of social housing depending on income, and all types will benefit from this overall construction effort (Figure 633). A particular effort will be made for the most modest households, those for whom new social housing remains too expensive, by creating a "stock of accessible social housing" within the social stock, with lower rents.

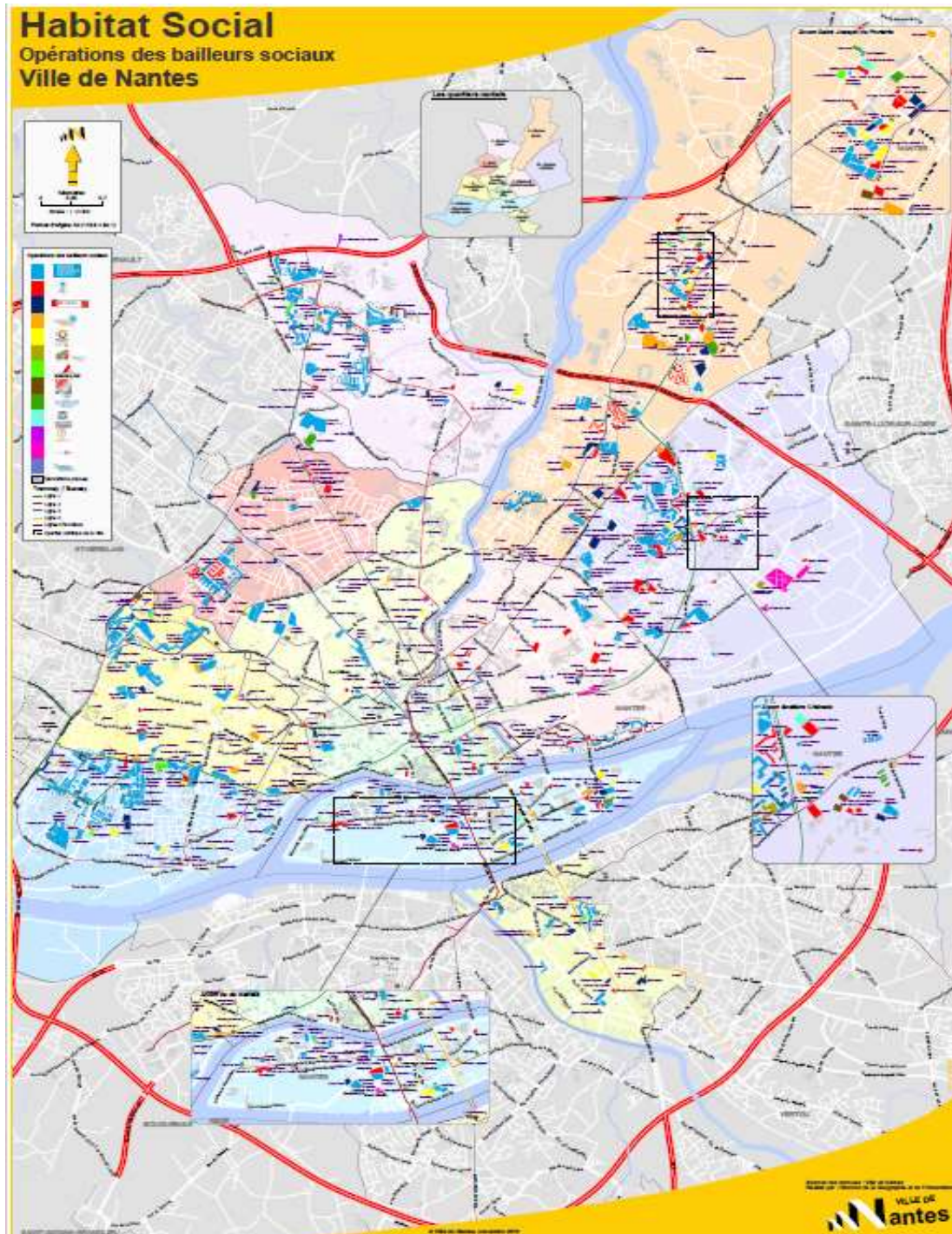


Figure 633: Distribution of social housing on the city of Nantes by social landlords

### Housing affordability

Nantes is welcoming 2 000 new inhabitants each year creating an increasing pressure on real estate leading to an increase in prices. To counterbalance this effect, Nantes is conducting an ambitious construction policy with an annual objective of 3000 to 3100 new dwellings until 2025 and 800 to 1000 social housing dwellings representing 25% of the production.

Table 175: The property Market in Nantes and the metropolitan area between the 1st July 2016 and the 30 June 2017

	NANTES		METROPOLITAN AREA	
	Nb of transactions	Median price per m <sup>2</sup>	Nb of transactions	Median price per m <sup>2</sup>
New built flats	2366	4 518,00 €	4010	4 199,00 €

Source : OLOMA - (01/07/2016- 30/06/2017)

Table 176: Monthly rents excluding charges for private rental housing

	Urban area of Nantes		Metropolitan area		Nantes municipality	
	Median renting €/m <sup>2</sup>	Statistical sample	Median renting €/m <sup>2</sup>	Statistical sample	Median renting €/m <sup>2</sup>	Statistical sample
Total	10.0	10 332	10.4	9871	11.0	7169
Apartments	10.6	9 396	10.8	9241	11.0	6947
Houses	8.2	936	9.4	630	10.2	222
1 room	14.0	1923	14.0	1902	14.1	1683
2 rooms	11.0	4014	11.2	3912	11.2	2835
3 rooms	9.3	3011	9.9	2848	10.0	1931
4 rooms	8.4	938	9.0	841	9.2	510
5 rooms and more	8.2	446	8.7	368	9.0	210

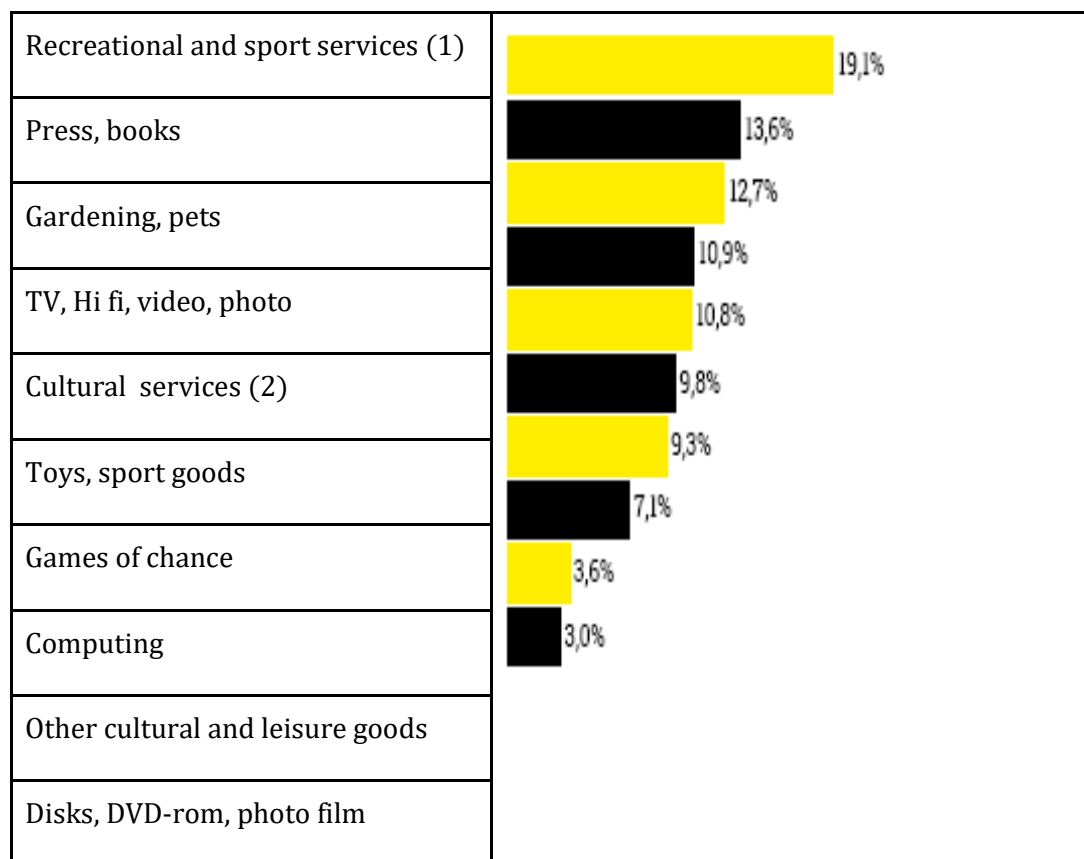
Source : Observatoire des loyers de Nantes - Méthodologie nationale - Observatoire locatif privé - Cina-Auran // Transmission de données par les professionnels et enquête sur les logements en gestion directe

### Tourism/Leisure/culture/sport expenditure

In France, in 2009, cultural and leisure spending represented 9.1% of household consumption expenditure (Figure 634). After an increasing by 1 point in the years 1990, this proportion decreased by 0.4 percentage points between 2002 and 2009.

The share of the budget devoted to leisure and culture varies greatly depending on the standard of living. So, in 2006, the 20% of the wealthiest households spend 11% on it of their budget compared to 7% for the 20% of households with more modest.





(1) Sport, rental of sports equipment, fairgrounds, amusement parks, package tours, weekends, etc.

(2) Cinema, live shows, museums, audiovisual subscriptions (including TV licence fee), photo printing

Source : INSEE, comptes nationaux - base 2000.

Figure 634: Cultural and leisure expenditures in France (2009)

### 6.2.3.2 Employment

#### Competitiveness

The Nantes urban area has managed to preserve a diversity of tertiary activities (IT services, biotechnology, financial activities, etc.) and industrial activities (aeronautics, agri-food, mechanical materials, etc.) that make up the richness of the region. As a sign of this economic vitality, four competitiveness clusters directly involving the Nantes Saint-Nazaire metropolitan area have been certified by the State: Atlantic Biotherapies, Civil engineering and Eco-construction, EMC2 cluster, Images et Réseaux.

Nantes Metropole has become a major centre of higher education. The territory offers a considerable range of training in many areas and constitutes a real asset for students and a recognized pool of skills for local companies. A land of innovation, the Nantes metropolis also has a high research potential, based in particular on the region's centres of excellence. With the development of the tertiary offer of the urban core, symbolized by the Euronantes business centre, the capital of the Great West is already one step ahead.

## Activity and Employment rate

Table 177: Employment by age and gender (2015)

	Population	Working-age adult (15-64 years old)		Working-age adults with an employment	
<b>Men + women</b>	212 377	151 968	71,6%	126 159	59,4%
<b>15 - 24</b>	57 914	21 377	36,9%	15 432	26,6%
<b>25 - 54</b>	125 056	113 393	90,7%	95 439	76,3%
<b>55 - 64</b>	29 406	17 198	58,5%	15 288	52,0%
<b>Men</b>	104 508	77 788	74,4%	64 385	61,6%
<b>15 - 24</b>	27 712	10 955	39,5%	7 849	28,3%
<b>25 - 54</b>	63 401	58 455	92,2%	49 146	77,5%
<b>55 - 64</b>	13 395	8 378	62,5%	7 389	55,2%
<b>Women</b>	107 869	74 180	68,8%	61 774	57,3%
<b>15 - 24</b>	30 202	10 422	34,5%	7 583	25,1%
<b>25 - 54</b>	61 655	54 939	89,1%	46 292	75,1%
<b>55 - 64</b>	16 011	8 820	55,1	7 899	49,3

Source : Insee, RP2015

Table 178: Employment status and conditions of 15 years of age or older by gender in 2016  
(Metropolitan area)

	Men	%	Women	%
<b>Total</b>	<b>137 649</b>	<b>100</b>	<b>134 763</b>	<b>100</b>
<b>Employees</b>	<b>119 294</b>	<b>86,7</b>	<b>122 693</b>	<b>91,0</b>
<b>Public jobs and permanent contracts</b>	<b>100 159</b>	<b>72,8</b>	<b>102 355</b>	<b>76,0</b>
<b>Short-term contracts</b>	<b>9 289</b>	<b>6,7</b>	<b>14 420</b>	<b>10,7</b>
<b>Temporary jobs</b>	<b>4 287</b>	<b>3,1</b>	<b>1 416</b>	<b>1,1</b>
<b>Subsidized jobs</b>	<b>835</b>	<b>0,6</b>	<b>1 137</b>	<b>0,8</b>
<b>Traineeship - Internship</b>	<b>4 723</b>	<b>3,4</b>	<b>3 364</b>	<b>2,5</b>

Non-employees	18 355	13,3	12 070	9,0
Self employed workers	9 524	6,9	8 502	6,3
Employers	8 722	6,3	3 355	2,5
Family assistant workers	110	0,1	213	0,2

Source : Insee, RP2016 exploitation principale, géographie au 01/01/2019.

### Employment rate per economic and no-profit sector rate

Table 179: Employments by economic sectors (2015)

	Number	%	Women proportion (%)	employees proportions (%)
<b>Total</b>	181 665	100,0	52,1	89,4
<b>Agriculture</b>	268	0,1	40,9	76,5
<b>Industry</b>	9 306	5,1	31,7	90,5
<b>Construction - building</b>	7 846	4,3	16,2	80,8
<b>Trade, transport, other services</b>	99 878	55,0	47,0	87,5
<b>Public administration, education, health, social work</b>	64 366	35,4	67,3	93,3

Sources : Insee, RP2010 (géographie au 01/01/2012) et RP2015 (géographie au 01/01/2017)

### Unemployment rate (youth rate, women rate...)

The unemployment rate in Loire Atlantique is the lowest rate in France with 7,0% of the active population ( 8,2 % on national level, 2nd trimester 2019 ). For the city of Nantes, the rate is 6.5 % (2sd trimester 2019) (Table 180).

The unemployment by gender is relatively equivalent, but it is much high for young people (Figure 635).

Table 180: Unemployment rate in 2019 and evolution on 1 year.

	2sd trimester 2019	Evolution on 1 year
<b>Nantes</b>	<b>6.5</b>	<b>-0.4</b>
Loire-Atlantique	6.8	-0.4
Region	7.0	-0.4
France (without overseas territories)	8.2	-0.6

SOURCE: [http://pays-de-la-loire.direccte.gouv.fr/sites/pays-de-la-loire.direccte.gouv.fr/IMG/pdf/note\\_tx\\_de\\_chomage\\_2019\\_t2.pdf](http://pays-de-la-loire.direccte.gouv.fr/sites/pays-de-la-loire.direccte.gouv.fr/IMG/pdf/note_tx_de_chomage_2019_t2.pdf)

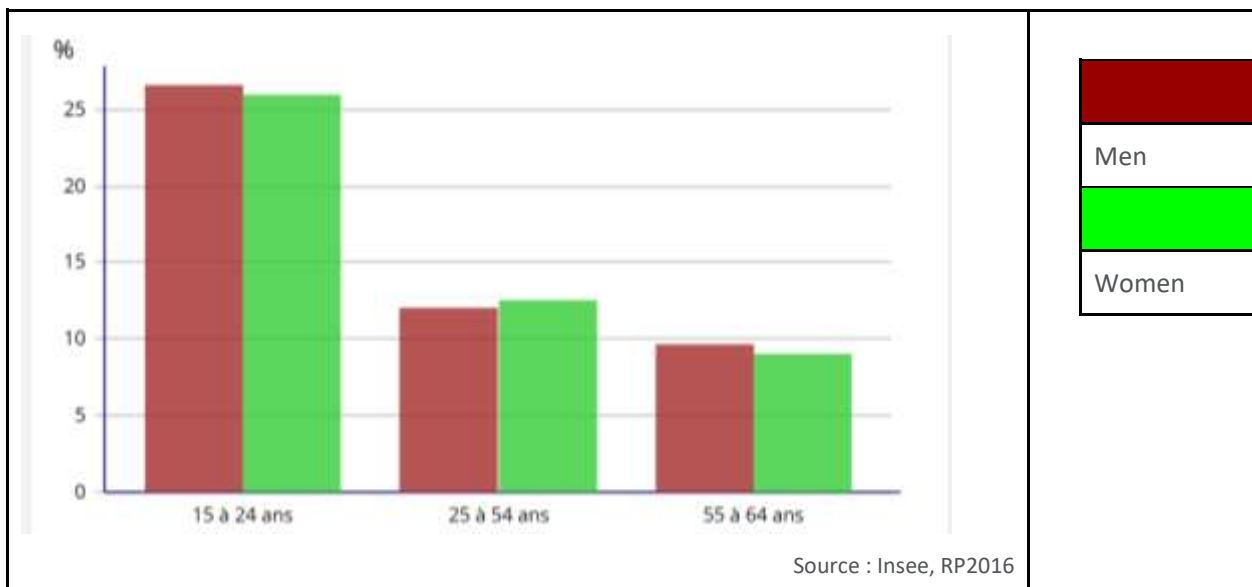


Figure 635: Unemployment rate by age and gender (2016)

### Short-term contracts rate

Table 181: Short-term contracts (Metropolitan area - 20116)

	Total number	%	Men	Women
Fixed term contracts	9 289	6.7	14 420	10.7
Temporary jobs	4287	3.1	1 416	1.1
Traineeship/internship	4 723	3.4	3 364	2.5

### 6.2.3.3 Innovation Innovation (i.e. patents)

The innovation strategy of the city of Nantes is based on a favourable environment (Figure 636) and strategic sectors (digital, manufacturing, health, food, shipping and creative and cultural industries). Some of the key actions are:

- the CityLab: Nantes City Lab is a programme to enable experimentation for innovative collaborative projects of new urban services. Its target is to gain financial, technical or user feedback from life-size tests in a dedicated playground. The Lab's public is wide: from start-ups to associations, SME's or academics.
- Help to develop the entrepreneurial culture and especially the student entrepreneurial culture by financing and helping academic incubators in their first year of development, focusing on engineering and business schools.
- Nantes Métropole also created its own programme called "Maia Mater" shared with the city of Saint Nazaire. This intensive training camp is dedicated to young local, national or international start-ups in the fields of digital and tech projects.



Figure 636: A territory of innovation (source Nantes Métropole)

The creation of the development agency "Nantes Saint-Nazaire Développement" aims to support the current dynamic that makes the Nantes metropolitan area the second largest metropolis for the growth of digital employment (+21% between 2012-2017, Source Insee) and the leading metropolitan area for the growth of industrial jobs (+ 10 219 jobs created between 2009-2017, source Trendeo Juin 2017). 81 companies were created with the help of the development agency in 2018 (source Nantes-Saint Nazaire Développement).





Source : AURAN 2018 "Un nouveau cap pour l'écosystème des start-up"

Figure 637: Start-up statistics in Nantes Métropole

Regarding the creation of start-ups precisely, their number is stabilizing since 2017, after 2 years of euphoria following the launch of French Tech and the multiplication of structures and support systems to entrepreneurship (Figure 637).

In 2018-2019, 24 start-up creations are registered when there were 30 in 2017-18 and a little more than 50 in 2016-17 as in 2015-16. This slowdown is a phenomenon felt in all the French ecosystems and shows a fallout of the soufflé of creation.

Technological platforms and test sites also contributes to make of Nantes Metropole an innovative area to live and work, and therefore attracts innovative project holders.

Some examples below:

- Technocampus is a set of mutualised technological research platforms dedicated to advanced manufacturing on strategic sectors (Technocampus Composites, Technocampus Ocean and Technocampus Smart Factory). Inaugurated in February 2018, the latest Technocampus food brings together a set of skills, equipment and regional resources on the theme of food to facilitate innovation
- SEM- REV is the first European multi-technology offshore testing site connected to the grid which have tested the first offshore wind turbine in France since April 2018
- ARRONAX is a particle accelerator (cyclotron) for research in radiochemistry and oncology.

## Businesses and workers

Table 182: Company creation by sector of activity (Nantes municipality area - 2018)

	Companies created		of which individual companies	
	Number	%	Number	%
Total	<b>4 382</b>	<b>100,0</b>	<b>3 259</b>	<b>74,4</b>
Industry	145	3,3	103	71,0
Construction	204	4,7	110	53,9
Trade, transport, accomodation, restaurant	1 232	28,1	967	78,5
Services for companies	1 858	42,4	1 229	66,1
Services for private individual	943	21,5	850	90,1

Source: Insee

Table 183: Number of establishments by sector of activity (Nantes municipality area - december 2017)

	Number	%
Total	28 708	100
Industry	1 224	4.3
Construction	1 629	5.7
Trade, transport, accomodation, restaurant	7 179	25.0
Services for companies	11 838	41.2
Services for private individual	6 838	23.8

Source: Insee, Répertoire des entreprises et des établissements (Sirene) en géographie au 01/01/2019.

#### 6.2.3.4 Activity sectors

##### **Agriculture production**

The agricultural context is based on the assets and constraints characteristic of peri-urban areas (access to land, fragmentation, movement of agricultural machinery, consumption basin, etc.), which result in strong pressure on land and in "urban/rural" relations that are sometimes conflictual but often interdependent. Some framing elements:

- 2/3 of the Nantes metropolitan area (51,000 ha) have an agricultural (16,000 ha) or natural (15,000 ha) vocation (Table 184),
- the professional agricultural activity directly enhances 13,500 ha, the rest being made up of areas that are fallow or dedicated to other uses (parks and gardens, afforestation, protected natural areas, riparian areas and unproductive wetlands, etc.),
- Most of the products of the great west coexist (Figure 638) , with the exception of pig farming; little known, this great diversity is based on structured sectors (milk and meat, market gardening, viticulture) and on exceptional products with strong heritage connotations (lamb's lettuce, thrush, muscadet, plants in heather soil).
- 1,400 direct jobs in the urban area,
- The Loire-Atlantique department's agricultural land is rather poor from an agronomic point of view, and is mainly farmed, the result of a long trade union tradition; it is among the cheapest in France (€1,500 to 2,000 per hectare for polyculture/dominant livestock), while urbanisable land reaches spectacular prices,
- land pressure and agricultural decline combine "naturally" to push back agriculture and allow wastelands and other para-agricultural activities to develop.

Despite its rapid urban expansion, Nantes Métropole has ensured the sustainability of these areas through the Local Urban Plans (PLUM), ensuring that urban sprawl is limited, and is pursuing a genuine policy of development and support for peri-urban agriculture. In this context, Nantes Métropole has set itself several objectives:

- guarantee the sustainability of agricultural areas,
- maintain the agricultural use of land and business premises,
- set up an agricultural observatory, with specific work to be continued on land,
- strengthen economic activity and the city/country balance with the development of direct sales and short circuits,
- support the clearing of land that can be recultivated,
- support quality agriculture that respects the environment, in line with water policy and the preservation of aquatic environments
- promote climate-contributing agriculture, by promoting the energy recovery of resources and the production of renewable energies

- Link agriculture production and local healthy food. This led to the adoption of a strategic metropolitan plan for agriculture and local food, the “Plan Alimentaire Territorial- PAT”. The goal is to develop local and sustainable food, available for everyone.

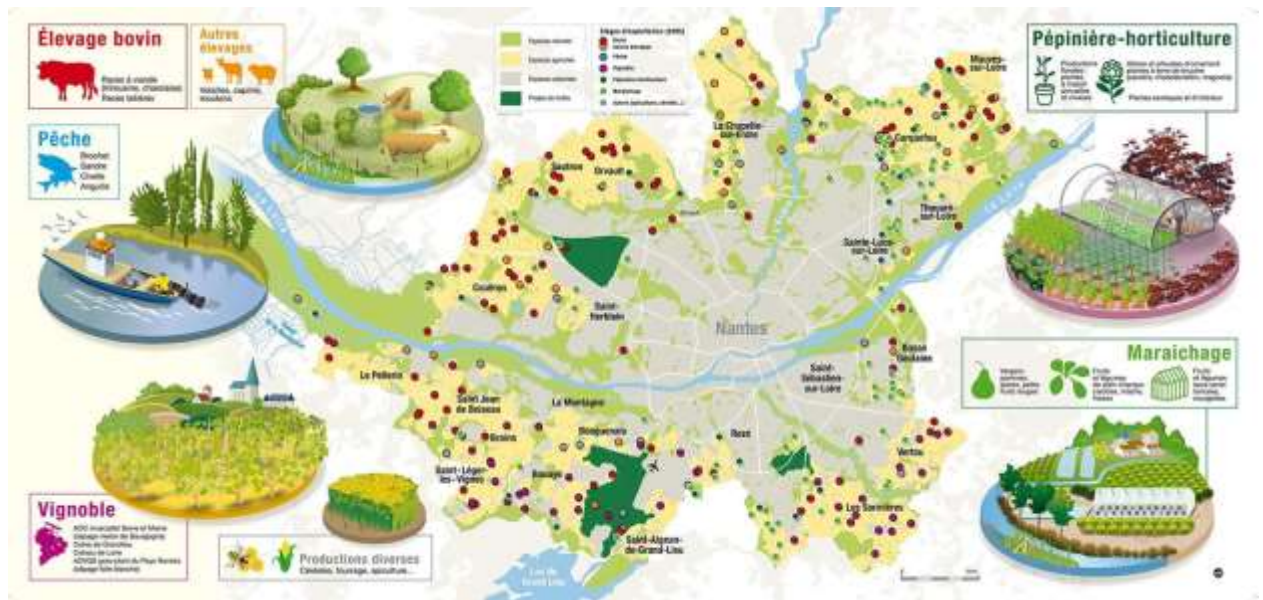


Figure 638: A diversity of productions in the metropolitan area (source: Barreau, 2014)

Table 184: Agriculture statistics in Nantes municipality area (evolution 1988-2010)

s. : non-public data

Agricultural holdings having their headquarters in the municipality			Work on farms in annual work units			Cultivated area in hectares			Livestock in livestock units, all feeds		
2010	2000	1988	2010	2000	1988	2010	2000	1988	2010	2000	1988
2	21	61	22	75	211	83	87	221	0	6	141

Cropland area in hectares			Permanent cultures area in hectares			Grazing area in hectares			Technical and economic orientation of the municipality	
2010	2000	1988	2010	2000	1988	2010	2000	1988	2010	2000

									Flowers and various horticulture
s	20	65	s	39	38	0	s	38	

source: Recensement Agricole 2010 - Agreste. Ministry of the Agriculture

## Cultural and creative industries

Tourism in Nantes is intimately linked with culture. Indeed, Nantes had to reinvent itself after the declining of its industry. The municipality decided to merge different cultural entities ( Tourism office, nantes culture and heritage, teams of the “Lieu Unique”, centre for contemporary arts and music) to create the “Voyage à Nantes”, a local and public company which role is to implement the touristic policy of the metropolitan area and the organisation of the summer event “Voyage à Nantes” . The first edition, “the city upside down by art”, took place in 2012 and attracted 605 000 visitors and generated 48.5 millions of euros of direct economic benefits. The summer edition of 2013 attracted 1 350 million visitors with a benefit of 52,3 millions of euros (+3,8 millions euros compared to 2012 and + 12,8 millions euros compared to 2011).

The ambition of the city is also to create an international centre by 2020, at the crossroads of culture, research, training and the economy. The economic development agency “Creative Factory” (Figure 639) offers a support programme designed to structure companies or projects with strong economic potential, innovative uses or technologies, operating in the field of cultural and creative industries (CCI): architecture, design, visual arts, fashion & accessories, crafts, publishing, performing arts, audiovisual, digital, communication, media and heritage. Projects are supported for 6 months (administrative, economic, communication, legal...) with professionals, expert coaches and create group dynamics during and between the workshops. In 2018, 6 projects have been selected.

The poster for Creative Factory Selection features a vibrant yellow background with various icons and text elements. At the top left, the Creative Factory logo is displayed with the text "CREATIVE FACTORY by samoa Selection". In the center, a stylized cloud icon is connected to a large speech bubble on the right that reads "INTÉGREZ L'ACCÉLÉRATEUR DES INDUSTRIES CULTURELLES ET CRÉATIVES >>> SUR 9 MOIS". Below this, a banner states "ACCÉLÉRER VOTRE PROJET 30 000 € D'ACCOMPAGNEMENT". At the bottom, a call to action reads "CANDIDATEZ AVANT LE 21 MAI 2019 SUR WWW.CREATIVEFACTORY.INFO". The bottom right corner lists supported sectors: ARCHITECTURE / DESIGN / ARTS VISUELS / MODE & ACCESSOIRES, MÉTIERS D'ART / ÉDITION / SPECTACLE VIVANT / AUDIOVISUEL, and NUMÉRIQUE / COMMUNICATION / MÉDIAS / PATRIMOINE. A small note at the bottom left indicates "VALEUR DE CRÉDIT FINANCIER : COACHING, FINANCEMENT, COMMUNICATION PAR LIVREAU".

Figure 639: The creative factory



Nantes' urban transformation also gives artists new opportunities of experimentation. After the relocation of the slaughterhouses of Rezé located 10 minutes away from the city centre of Nantes and before the start of the urban project in 2032 with the construction of buildings, artists have been invited to experiment on 3 hectares of the 15 hectares that count the vacant lot. The cultural experimentation plans to infuse the urban project and question the way to make the city of tomorrow. A laboratory has been created to work on the following topics:

- **Being together.** How to provoke people of different backgrounds to meet: culture lovers, worried inhabitants, curious visitors, Roms families living next to the site? What are the brakes or leverages to hospitality, mixity and accessibility?
- **Living together.** How to transform a vacant place in a public place through culture ? What are the effects and impacts : urban life, uses, mobilities?
- **Acting together.** How to build the “us” and act on the terms of the making of the city? Can we cross the knowledge: for example the freedom of the artists and the safety standards of the construction firms? how to “make together” up to “let make” ?

“Transfert” is a seasonal event taking place every summer proposing live spectacles, open air games, concerts, bars, mixing living spaces with learning places and places of conviviality. The aim is for everyone to find a place, envy, idea and if it doesn't exist, to suggest it.

Culture at Nantes is also the crossing of science, technique and art as at the “Les Machines de l’Ile” (Figure 640), the Maker Faire or Nantes Digital Week.

At the city level, the annual city budget dedicated to culture is around 85 millions euros, with 442 Full Time Equivalents, of which 355 work in the publicly owned companies as the VAN (Voyage à Nantes).

Art is also strongly linked to nature in Nantes and takes place in the parks and gardens of the city:



Figure 640: “Les Machines de l’Île” Source : Nantes Métropole 2019

Nantes has shown inventiveness in its development by initiating the Machines de l’Île on a former industrial wasteland.

While preserving traces of this industrial past, the city has developed an innovative and eclectic cultural offer combining both tourist cultural activities that contribute to the city's development and a local cultural offer for its inhabitants.

The Island of Nantes has thus become a district of life and culture that gives this industrial site a new vocation while preserving the traces of its past.

### Tourism characterization

The City of Nantes has a long history with many heritage traces. From its medieval past to its rich maritime past, the City then developed a new form of tourism based on imagination and enchantment with the “Machine de l’Île”, which makes it possible to develop a rich and diversified tourist offer (Figure 641 and in 2019, Nantes counts 51 hotels with an offer of 2719 rooms (INSEE).



Figure 642).



Figure 641: “Le Château des Ducs de Bretagne” (XV<sup>e</sup> century) (source Nantes Métropole)



Figure 642: Le passage Pommeraye -1843 Source Nantes Métropole

In 2016, Nantes welcomed 1 735 000 visitors (+ 4.2 % compared to 2015) with tourists mainly from France. 43 % slept at least one night in Nantes, 57 % spent only the day. 38 % of the annual visits take place during summer. One visitor out of 5 is a senior or retired. Since 2013, the number of overnights (exclusive of AirBnB) increased by 17.7 %.

Every year the City of Nantes offers a cultural tour through the City proposed by the "Voyage à Nantes" and allowing to develop the cultural attractiveness of the City (Figure 643).



Figure 643: One of the art form of the 2018 edition of the "Voyage à Nantes"

### Restaurants and cafés

The statistics available on this theme are only available at the departmental level.



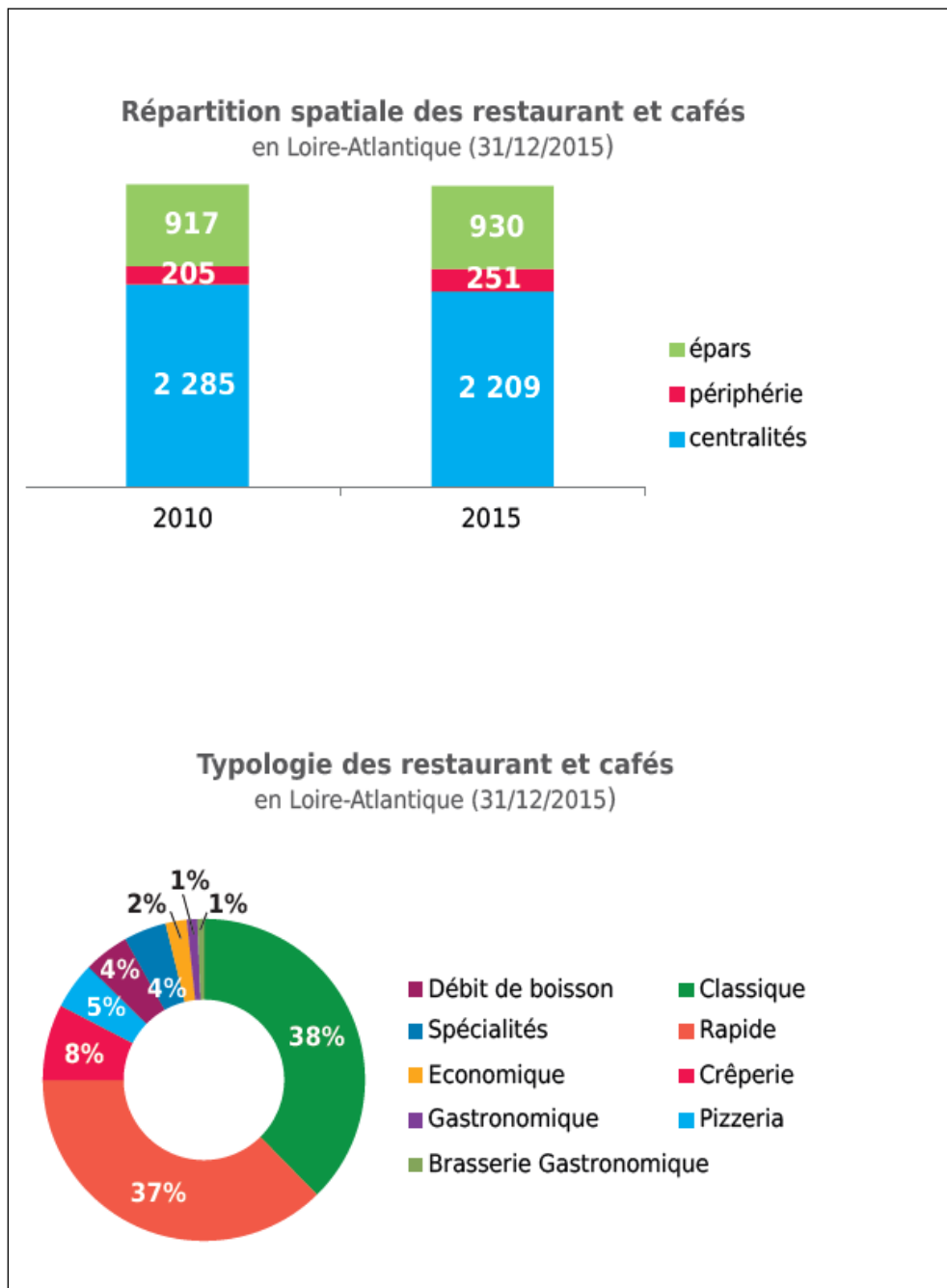


Figure 644: Spatial distribution and typology of restaurants and cafés in Loire Atlantique

The catering sector is an integral part of the territory's commercial landscape. Between 2010 and 2015, the department lost 17 establishments or barely 0.5% of its workforce. It is at the level of the that the sector has become poorer (-76) and in the peripheries that he gained the most units (+46).

Geographically "isolated" institutions, in other words "scattered" are numerous (27%) unlike what is observed in the traditional trade (13%).

The 3390 cafés and restaurants in the department are identified according to a classification into 9 types. On the department, there is a predominance of classic restaurants (traditional, brasserie) and (fast food, kebab, sandwich shop,...) which to them two represent 75% of the total number of establishments.

The structure of the catering offer has changed with, for example, a very significant increase of fast food, specialities or even "gastro" breweries, unlike catering which loses many units.

#### 6.2.3.5 Facilities

##### Cultural facilities

As stated before, Nantes had to reinvent itself with the decline of its industry and has taken, among others, the cultural path to give a strong identity to the city. The Sunday Times named Nantes "the loopest city in France". Indeed, Nantes counted on culture to transform its territories with major projects but also with art in everyday life, to create a unique and plural cultural identity, open to any form of creation.

There are several cultural infrastructures:

- 9 museums and more than 20 exhibition venues
- More than 25 theatres dedicated to performing arts
- 32 libraries
- 47 festivals et cultural events
- 70 cafés concert / cafés culture
- 121 protected structures, among them 23 classified as historical monuments

The municipal library network is composed of 8 equipments:

- a central media library: Jacques Demy (9,000 m<sup>2</sup>),
- three neighbourhood media libraries: Luce Courville (1,000 m<sup>2</sup>), Lisa Bresner (1,500 m<sup>2</sup>) and Floresca Guépin (2,000 m<sup>2</sup>),
- four neighbourhood libraries: Breil-Malville (120 m<sup>2</sup>), Chantenay (400 m<sup>2</sup>), Halvêque (300 m<sup>2</sup>), Manufacture (600 m<sup>2</sup>) spread throughout the city.

The network has been structured around the network of public transport lines: three of the media libraries (Jacques Demy, Luce Courville and Lisa Bresner) are immediately served by a tramway station; the Floresca Guépin media library is located less than 10 minutes walk from a station; the libraries are also located near a bus station to facilitate access.

Membership of the municipal library also allows you to borrow documents from three associated libraries: the library of the École supérieure des Beaux-Arts Nantes Métropole and the media libraries of the Conservatoire and the Muséum de Nantes, whose specialized collections complement and enrich the documentary offer. There are 53 316 users of public libraries in 2015 (+15% since 2010).

The Art Museum opened in 2017 contributes to cultural attractiveness of the city with 10 000 artworks from ancient art to contemporary,

##### **Educational facilities, kindergartens, schools, higher education facilities (public and private)**

###### Kindergartens, schools

- 22 municipality owned kindergartens



- 43 associative kindergartens
- 4 company kindergartens
- 14 private kindergartens

Nantes counts 113 primary schools for 20 000 pupils. The schools have difficulties to absorb the increase of population. An ambitious plan has been set up with the project of building 6 new schools and 21 extensions or rehabilitations before 2024.

### Higher education

Nantes Métropole represents half of the student population in Pays de la Loire.

Except the faculty of Medicine (approx. 5000 students), the major university sites in Nantes are not located in the city center (Figure 645). However, the vast majority of the 52 600 students are located inside the ring road.

The University of Nantes alone occupies 90 hectares of land space on Nantes Metropole. The Nantes Campus organisation map clearly shows that it is not the Loire that structures the campus, but the Erdre river. The five university sites gather more than 30 500 students of the University, as well as the major schools such as Audencia Business School, Centrale, Les Mines, Oniris, l'École du Bois...

The development of the "Quartier de la création", with the upcoming structuring of Médiacampus, the arrival of the School of Fine Arts and the School of Design, the presence the school of architecture, the graphic arts centre... will strengthen the training offer near the Loire.

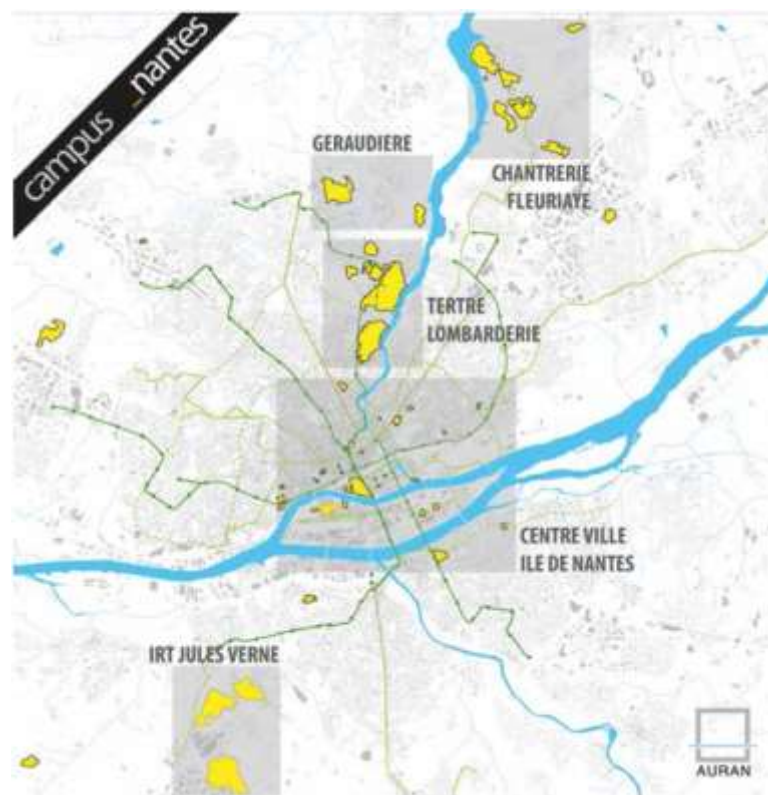


Figure 645: Nantes campus sites (source: AURAN, 2014)

## **Recreational and leisure spaces, sports facilities (public and private)**

The municipality implements the public policy of sport, including high performance sport. The city counts 350 sport clubs (120 sport disciplines) and 7 high performance sport club supported financially by the city. The city wants also sport to be accessible to each and everyone, and developed a “white card” giving access to reduced prices to access sport and cultural facilities. “Free sporting activity” (roller skating, jogging, fitness, biking ...) have also their place in Nantes. They invest the public space, streets, walkways, banks, parks ... experiencing new ways of practicing. 67 % of French people practice a sport in an autonomous way, outside, at home or in a municipal facility. In Nantes, one person practicing sport out of 2, is not member of a club. It is a trend even more acute for women and young people. To promote the practice of free sport, Nantes has launched a co-construction workshop with citizens called “Nantes as a playground” from March to September 2016 gathering together 80 inhabitants, which resulted in the identification of 12 issues related to accessibility, cohabitation and information.

67% of French people practice sport autonomously, outside, at home or in a public infrastructure, without affiliation to a sport club. In Nantes, one sportsperson out of two has no affiliation to a sport club, a tendency more marked for women and the youth. To adapt to this new trend, Nantes launched in 2016 the participative project: “Nantes as a playground” to build the public policy on sport.

To set up the diagnostic of the free sport practices in Nantes, several workshops were organized with citizens, professionals who contributed to a technical report, and specific workshops with children and teenagers. Following those workshops, a 10 actions plan was voted with the implementation of facilities, the organisation of events on public space, the support of gatherings of free sport, the creation of the conditions for the optimal sharing of public space.

On the professional side, Nantes benefits from the reputation of its football club “FC Nantes” evolving in the first league of the French championship and its linked training centre. Nantes also counts three clubs in basketball, handball and volleyball evolving at the european level.

Figures in Nantes:

- 60 000 people are enrolled in sport clubs
- 115 sport disciplines
- 157 sport facilities
- 6 swimming-pools representing 1 million admissions each year
- 1 nautical centre with 10 500 people who practice each year
- 1 rink with 85 000 admissions per year
- 384 funded associations and 108 school or university associations

From June to mid-September, 16 free paddling pools are opened in Nantes' parks and gardens for the youngest children under the supervision of an adult (Figure 646 and Figure 647). Daily water controls are carried out by SEVE (Municipal green spaces department) and an external company. Emptying is carried out twice a week (Monday and Friday) for those that are not automated and as many times as necessary in the event of

accidental pollution (contamination by animals, glass breakage, spillage of various products, etc.).



Figure 646: A paddling pool in Nantes  
Photo of Jacques Soignon, Ville de Nantes

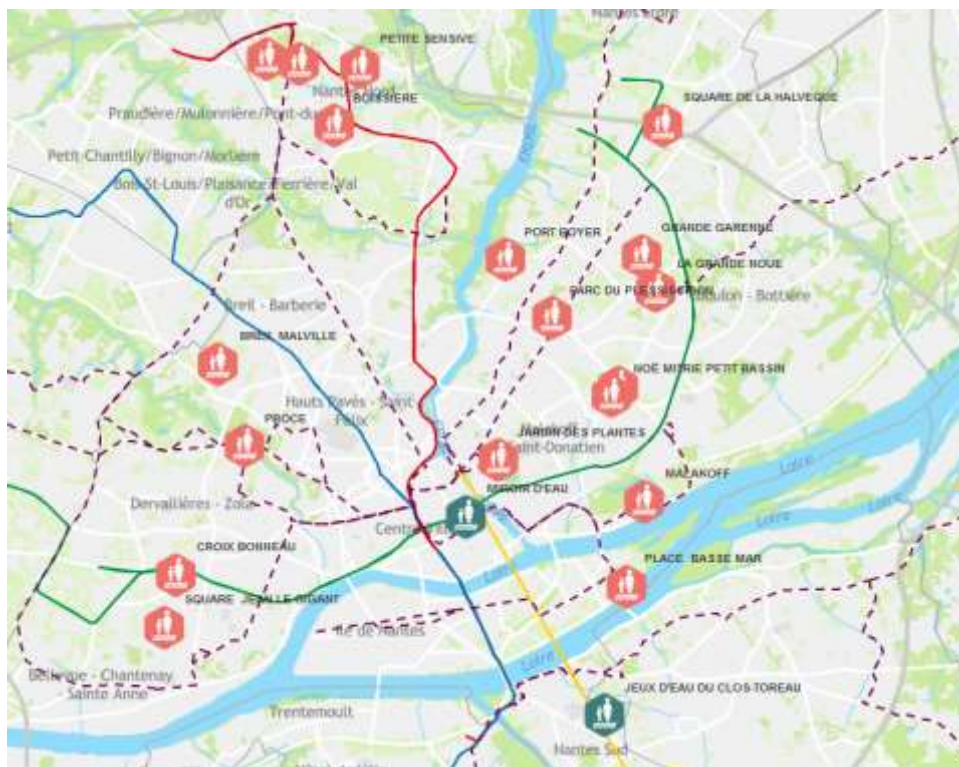


Figure 647: map of the paddling pools in the city of Nantes

## 6.3 District level - Nantes Nord

Located in the northwestern part of the city, between the town Orvault (westside) and the Erdre river (eastside), the "Nantes Nord" district (one of the 11 districts of Nantes municipality) is bordered by the Cens to the south and extends to the neighbouring communes of Treillières and La Chapelle sur Erdre to the north. Nantes Nord is itself subdivided in 9 micro-districts (Figure 648).

The greenest district of Nantes has typical valley morphology with its 7 rivers that constrain the mobilities. The Cens river is only crossed at two points to reach the city centre. This district located at the north entrance to the city is home to many transport infrastructures.

Nantes Nord therefore has the particularity of being "in a dead end" but also very well served by public transportation and road infrastructures.

The Nantes Nord district is also particularly heterogeneous in its socio-demographic characteristics and in the representation of the different modes of "living".

It can be seen as the juxtaposition of several territories: a very large priority district in the archipelago in the northwestern part of the district, with micro-districts with a very strong social housing focus (Bout des Pavés - Chêne des Anglais, Bout des Landes, Santos Dumont - Petite Sensive, Boissière) which was built on land reserves.

The four priority areas of Nantes Nord (Bout des Landes, Bout des Pavés/Chêne des Anglais, Petite Sensive and Boissière) constitute the largest social housing district in Nantes (Figure 649).

The priority territory alone has 11,600 inhabitants and is made up of nearly 68% of social rental housing (approximately 4,500 units).

Residential districts are gentrifying as the population renews. They are located between the working class districts, along the Rennes road and districts with a very favorable natural situation: Jonelière, located between the Gesvre and Erdre valleys. The districts located between the racecourse and the Cens valley are also very popular. Jonelière sub-district includes a campus that attracts up to 30,000 students every day. More than 4,000 students live in the subdistrict, mainly in university and private service residences, but also in the broadcast sector. This potential student dynamic is perceived by the district's population as a disadvantage: empty areas for 3 months, parking problems or noise at night, etc. A High-tech and expanding activity zones in the micro-district of les Hauts de Gesvre, around the Géraudière and Rivière are also present.



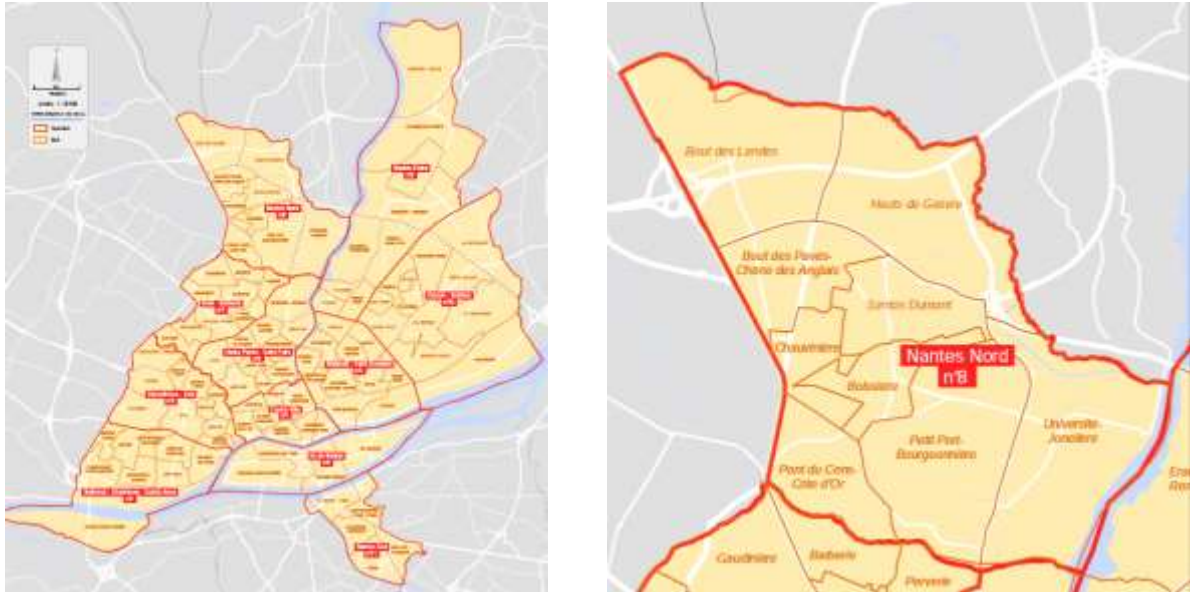


Figure 648: Administrative limits of “Nantes” municipality with its 11 districts (left) and “Nantes Nord” district with its 9 subdistricts (right).

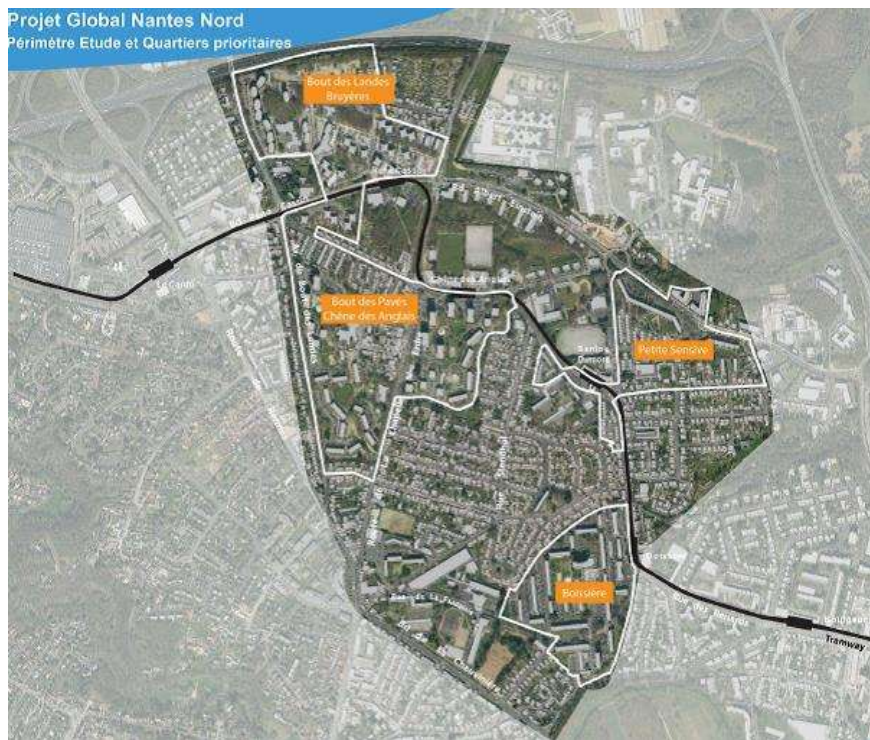


Figure 649: The Nantes Nord district and its 4 “Priority neighborhoods” (QPV)

### 6.3.1 Territorial description

#### Aerial view and administrative boundaries of Nantes Nord

Nantes Nord district is around 7.6 km<sup>2</sup> (760 ha) (Figure 650).





Figure 650: Aerial view of Nantes Nord district and its 9 subdistricts (source: IGN, orthophoto, 2012)

## History of urban transformations of the district since 1950s'

### A leisure and agricultural place

Until the 1950s, the area remained rural but was a leisure area for people of Nantes. At the end of the 19th century, they could enjoy in the Jonelière's "guinguettes" or watch horse races at the Petit Port, a racecourse opened in 1875 to host a racecourse, manoeuvres, shooting for the army and a public promenade.

### A mosaic district

After the Second World War, the district underwent a major transformation (Figure 651). Agricultural land is giving way to residential complexes, such as La Boissière. Urban planning based on the single-family house is shifting towards large complexes.

However, after subsidizing the construction of single-family houses, the government has to rethink the allocation of its credits to meet housing demand. The evolution of housing policy is based on the 1956 framework law, which restricts credits allocated to private house ownership and favours multi-family buildings. It was therefore necessary to imagine a much denser collective housing, composed of buildings. The aim was to be able to accommodate a larger number of families in a smaller space while optimizing the floor area. This marks the beginning of the large ensembles. The main contractor for the construction of social rental housing in Nantes, the public housing office for moderate rents (which became Nantes-Habitat in 1990), has therefore embarked on a major construction project for major complexes, including those of Nantes Nord. H.L.M. buildings are the result of financial opportunities offered by the State, which are often accompanied by technical constraints. After the acquisition of agricultural land by the city, the projects in the Nantes Nord sector will be spread over some twenty years. They were implemented over two main periods: 1957-1962 and 1969-1976. The Boissière complex (Figure 652 and Figure 653) was the first to be built, followed by the

Petite Sensive in 1970. Then, follow the developments of Bout-des-Pavés in 1972, Chêne-des-Anglais in 1974 and Bout-des-Landes in 1978 (Figure 654) resulting from the circular of the Minister of Housing Albin Chaladon who initiated a policy to industrialize the construction sector. Nearly 1200 houses were built at La Boissière, 717 at Bout des Pavés and 526 at Bouts des Landes in 1975. All these buildings make Nantes Nord one of the city's main social housing districts.

A significant part of the district is also occupied by dedicated spaces: the university campus and the grandes écoles built in the 1960s, the municipal campground opened in 1971, the leisure complex swimming pool bowling opened in 1984 but also the cemetery park and the prison centre.

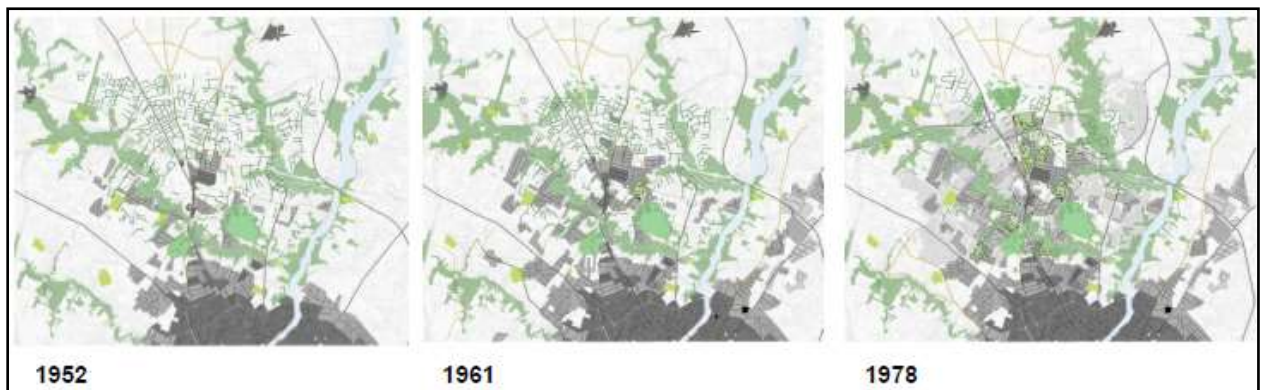


Figure 651: A district built in the second half of the XXth century (Germe & Jam, 2017)

A district in the process of renewal

The arrival of the tramway in the district in 1994 created a common thread through all of these subdistricts connected then to the city centre. Today, the district continues to evolve through projects such as the ongoing renovation project in the Bout des Landes - Bruyères sector, residential and commercial building programmes in the university sector or the construction of the regional covered athletics stadium



Figure 652: Aerial view of "La Boissière" in 1960 source: Archives municipales de la Ville de Nantes





Figure 653: Construction of the neighborhood of La Boissière 1959 © Archives municipales de la Ville de Nantes



Figure 654: Neighborhood of Bout des Landes in 1975 © Archives municipales de la Ville de Nantes

Since 2009, there have been no significant transformations in the district in terms of land cover (Figure 655).



Figure 655: Aerial views of Nantes Nord district in 2009 (top) and 2018 (bottom).

### **Three priority micro-districts in Nantes Nord**

In France, the policy of urban cohesion and solidarity towards the most disadvantaged districts aims to restore republican equality and improve the living conditions of the inhabitants by mobilizing all public policies. A reform of this policy was initiated in 2014 to allow efforts to be concentrated on the territories with the greatest difficulties.

Based on a single criterion, the income, the method used to identify new priority districts made it possible to identify areas of urban concentration of low-income populations from a fine grid of territories. Low income has been defined by an approach combining two references:

- the dropout in relation to the income of the urban area in which the district is located
- in relation to income in metropolitan France.

This new approach represented a turning point compared to previous approaches, since it does not include any explicit reference to the shape of the building, or to difficulties relating to housing (except in certain overseas territories).

The National Agency for Urban Renewal selected 200 ‘Priority districts’ in December 2014 on the basis of an assessment of their dysfunctions: state of the housing stock, housing diversity, functional mix, neighbourhood openness and mobility, land condition and urban quality.

Three ‘Priority districts’ were selected in Nantes Nord:

- Bout des Pavés/ Chêne des Anglais and Bout des Landes
- La Petite Sensive
- La Boissière

Priority districts are targeted as a priority by the new national urban renewal programme and benefits from national subsidies for their renovation.

#### **6.3.1.1 Biophysical characterization**

##### **Topography and slopes**

Nantes Nord district, as well as the City, has a quite flat topography. As the rivers limit the district on the southern and eastern parts, the highest elevations are then on the Northwestern side of the area (Figure 656 and Figure 657).

Its geography marked by the valleys of Cens, Gevres and Erdre and their tributaries. This peculiar topography, which qualifies the territory, has gradually been made invisible and sometimes inaccessible by urbanization.

France has at its disposal a national elevation data base, free at the 75m resolution. But Nantes Metropolitan has a more detailed data base, at a resolution of 25m, the highest elevation is lower than 60m above sea level.

The social housing districts were all built on the plateaus that line the district, just like the racecourse, built in the 19th century on a plateau.

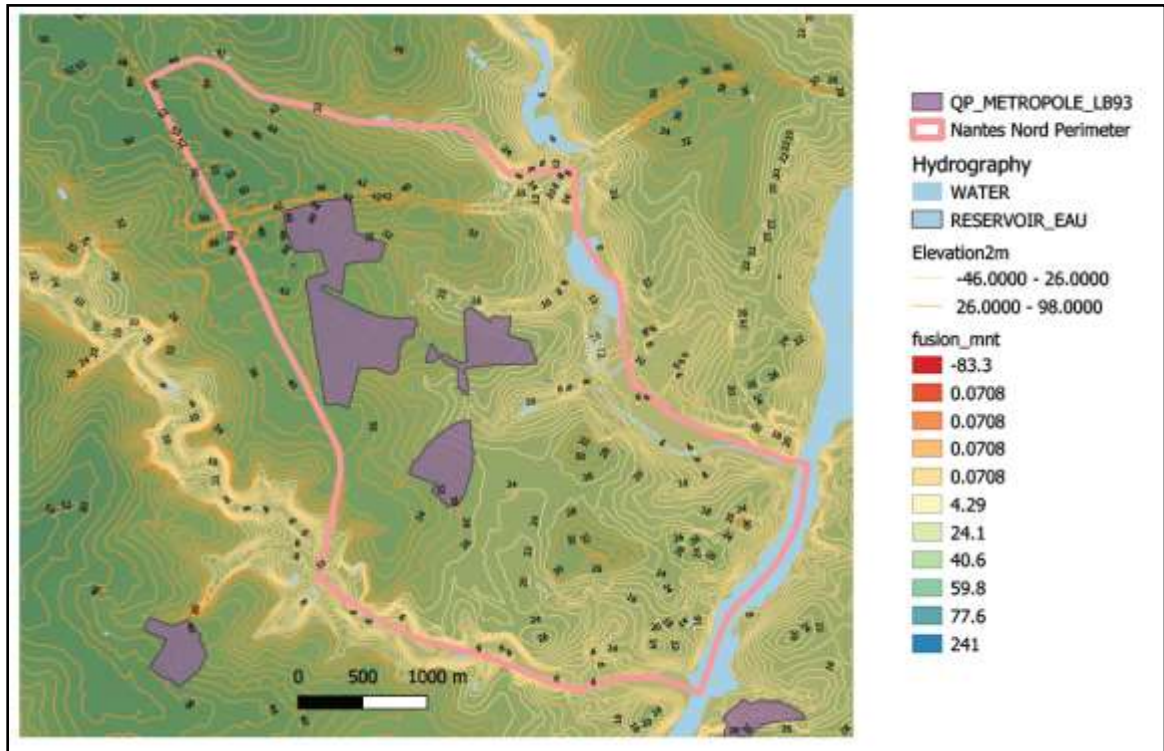


Figure 656: Topography in Nantes Nord (map: Bodéan, 2019 based on IGN BDAIlti)

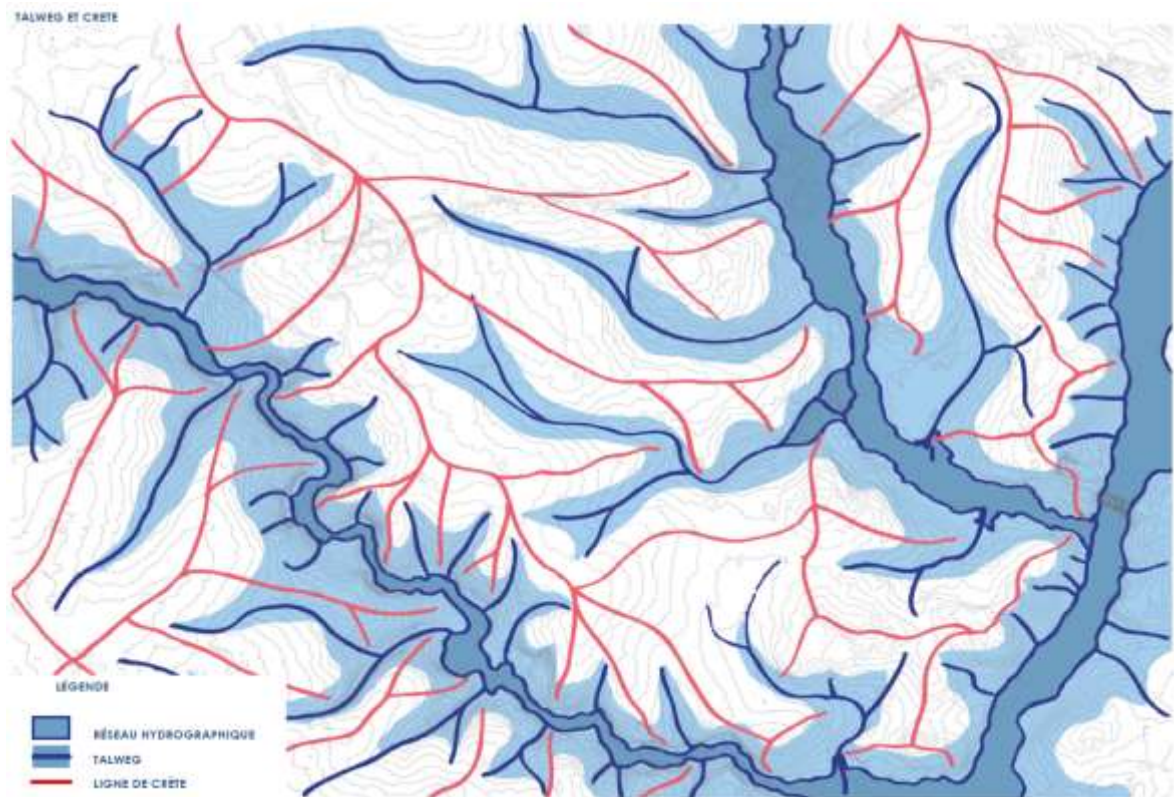


Figure 657: Hydrographic network and slopes in Nantes Nord (source: germe & Jam, 2017)



## Hydrography and artificial waterbodies



Figure 658: Hydrography in Nantes Nord (map: Bodéan)

The district is crossed by two main rivers, from west to east, the Gesvres and the Cens, tributaries of the Erdre river. The Gesvres and Cens rivers have numerous tributaries that have been subject of busages or even sometimes diversions depending on the development of the district (Figure 658). La Botardière river (Figure 661)(northern part of the district) is calibrated upstream, in a pipe for only a few meters before getting its natural state back, downstream. The Renards stream (Figure 660), center of the district, is calibrated on one third of its course, upstream and downstream to cross the roads, the river is in pipes. Censive river (southern part of the district) is mainly a calibrated stream except downstream where it flows in a pipe before reaching the Cens river (southern limit of the district). Ménérais river (northern limit of the district) is also mainly calibrated.

Boutinardiere water basin, and Renards water basin are the catchments of the small rivers (Figure 659). The rest of the area is drained into Le Cens and Erdre rivers.

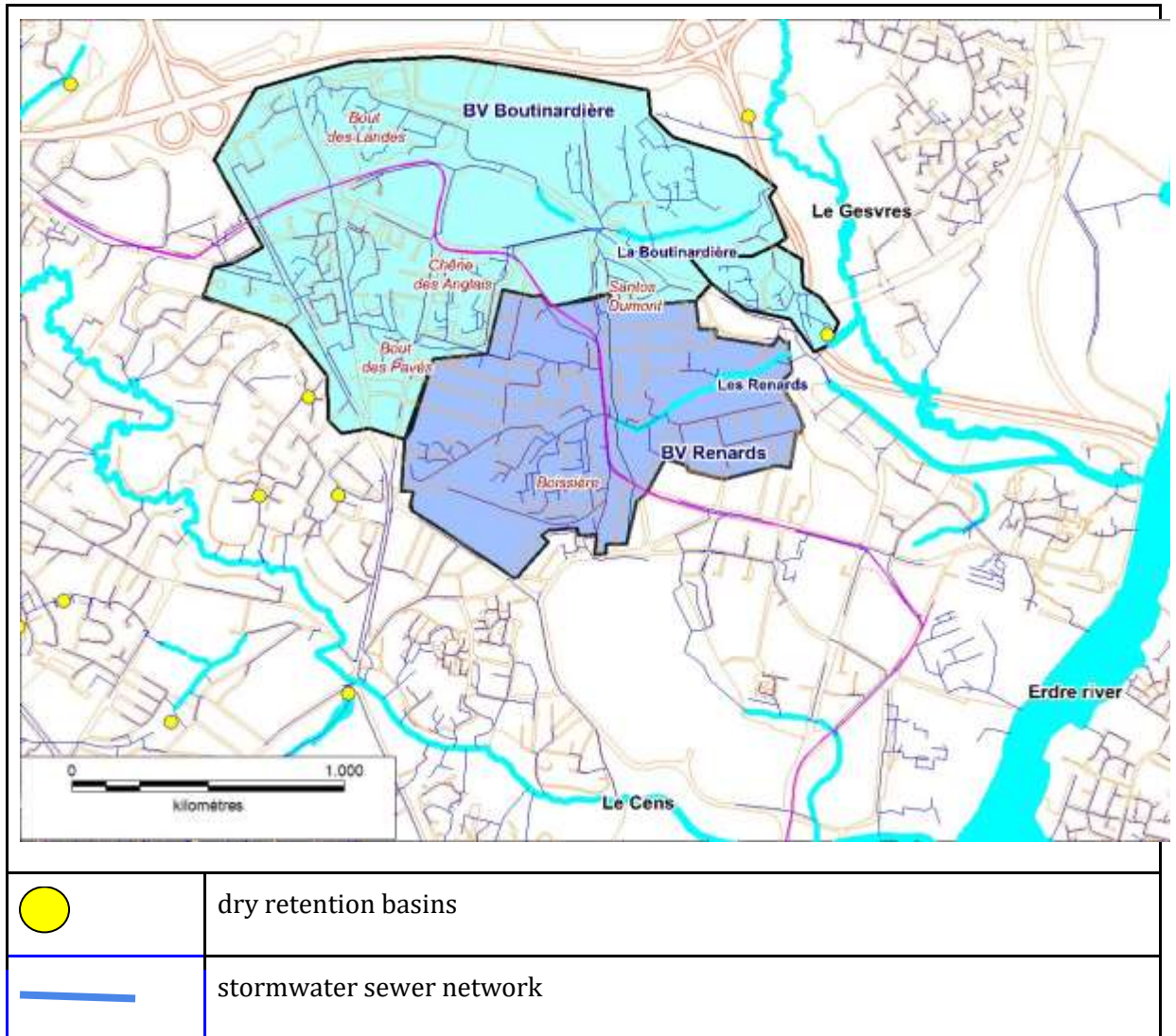


Figure 659: Map of the main catchments located on Nantes Nord



Photo: Bodénan, 2019

Figure 660: The Renard stream in its channelled part



Photo: Bodénan, 2019

Figure 661: The Bottardière stream



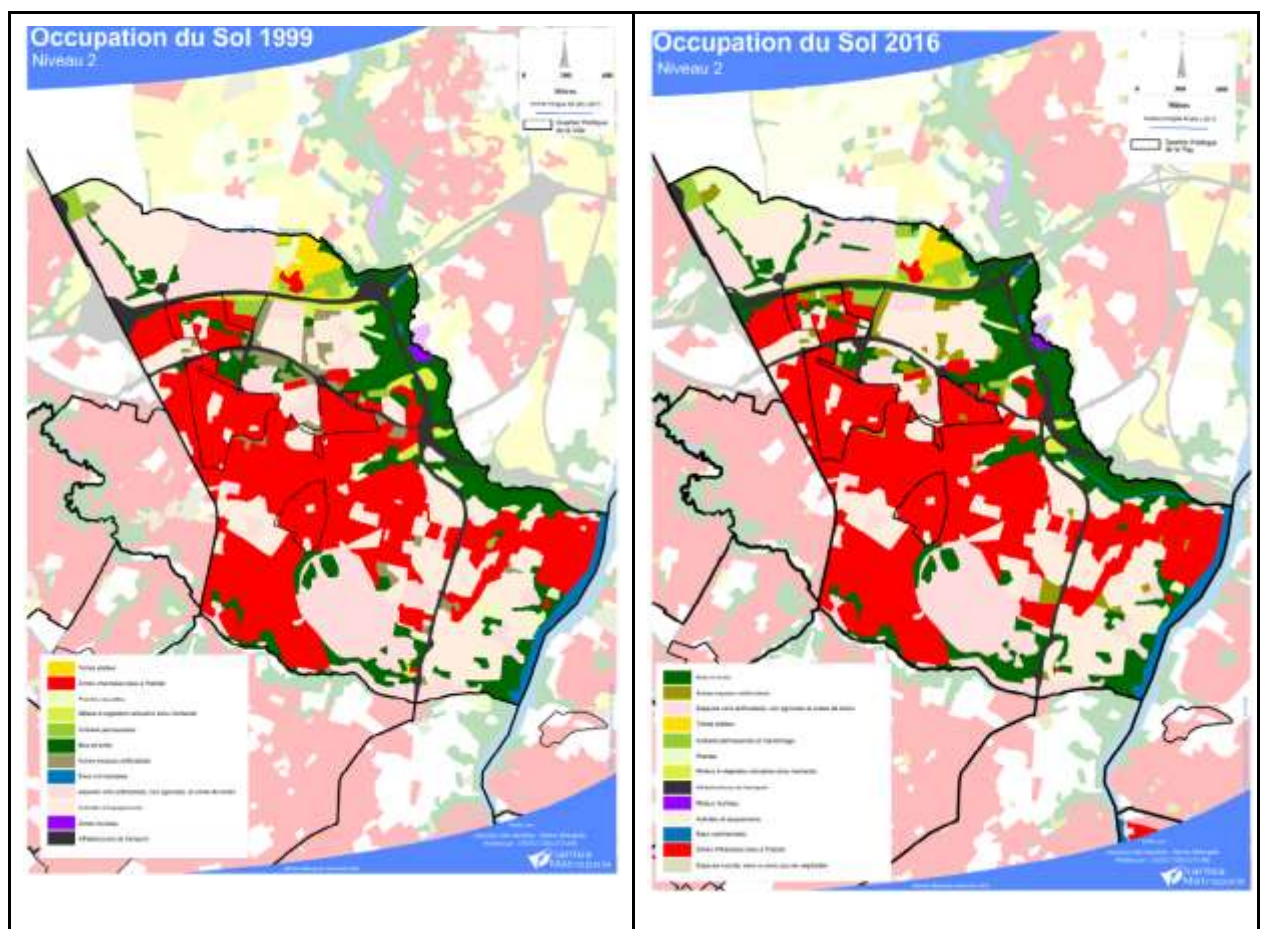
### 6.3.1.2 Land cover/use - urban morphology - land status

#### Land Cover

As can be seen by comparing these two maps showing land cover of Nantes Nord district in 2009 and in 2016 (Figure 662) , there were only a few changes.

The major transformations of the territory happened earlier (see historical part of this document), thus, between 2009 and 2016, most of the transformation focused on the densification of former residential districts.

The presence in the district of many green spaces, but also of the university and public transport has encouraged the transformation of residential areas along the main roads into areas where buildings are located.



	Arable land		Other artificial spaces
	Urbanized areas linked to housing		Inland waters
	Meadows		Artificial, non-agricultural green spaces and recreational areas
	Shrub and/or herbaceous vegetation environments		Activities and equipment

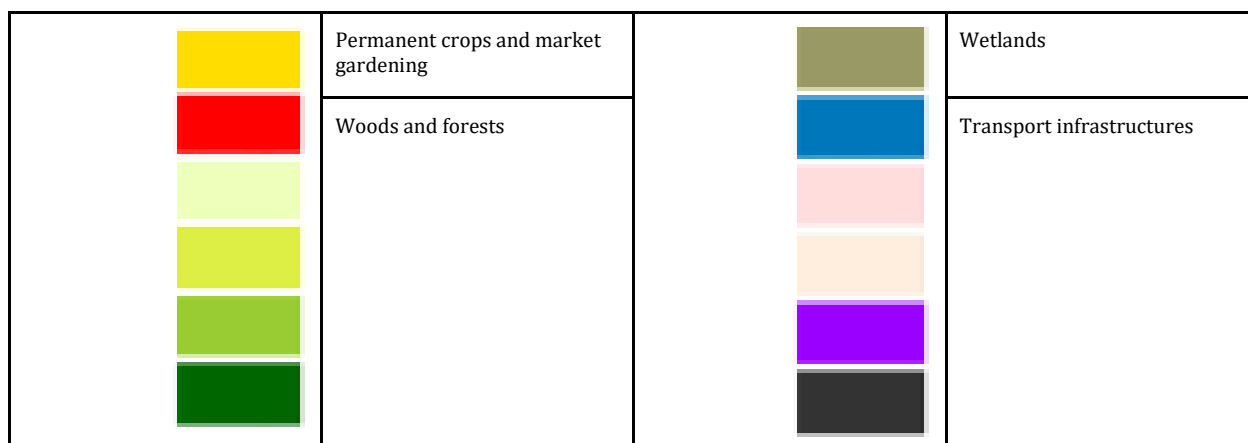


Figure 662: Land cover in 1999 and 2016

The territory of Nantes Nord is strongly marked by the presence of woods and forests, which represent more than 22% of the district's surface, while artificial green spaces and recreational areas represent more than 23% of the district's territory, with a racecourse, a cemetery park and numerous sports facilities (Table 185 and Figure 663).

While urban areas linked to housing represent only 13%, the sectors of activity and equipment cover more than 30% of the district.

Table 185: Land cover: rates per category

Land cover categories	Surface areas (sq meters)	%
Urbanized areas linked to housing	697970	13,19 %
Activities and equipment	1594138	30,12 %
Other artificial spaces	165989	3,14 %
Artificial, non-agricultural green spaces and recreational areas	1228901	23,22 %
Arable land	59312	1,13 %
Permanent crops and market gardening	129113	2,44 %
Meadows	99107	1,87 %
Woods and forests	1196589	22,60 %

Shrub and/or herbaceous vegetation environments	67915	1,28 %
Wetlands	23214	0,44 %
Inland waters	31643	0,59 %
<b>TOTAL</b>	<b>5293891</b>	<b>100,00 %</b>

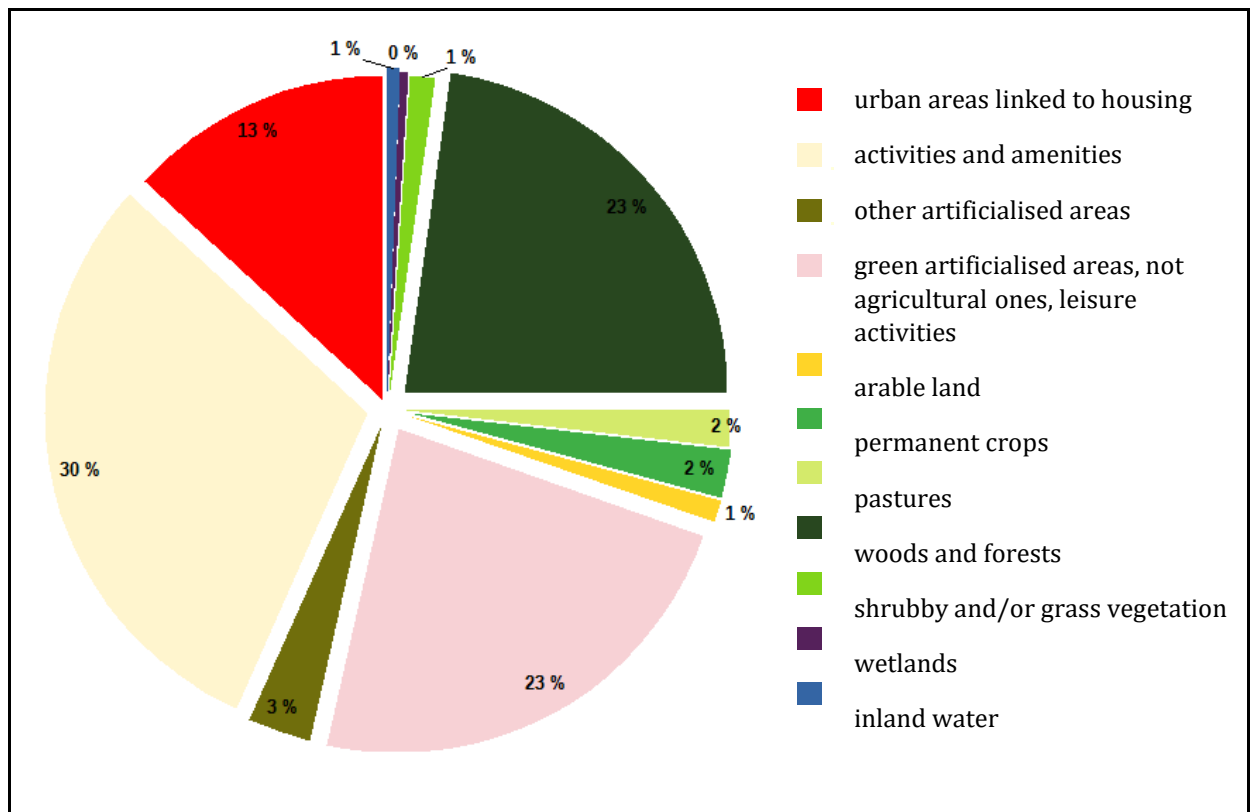


Figure 663: Land cover distribution over the Nantes Nord district.

### Urban morphology

The Nantes Nord district is composed of diverse urban forms resulting of the successive urban plans and development over time (Figure 664):

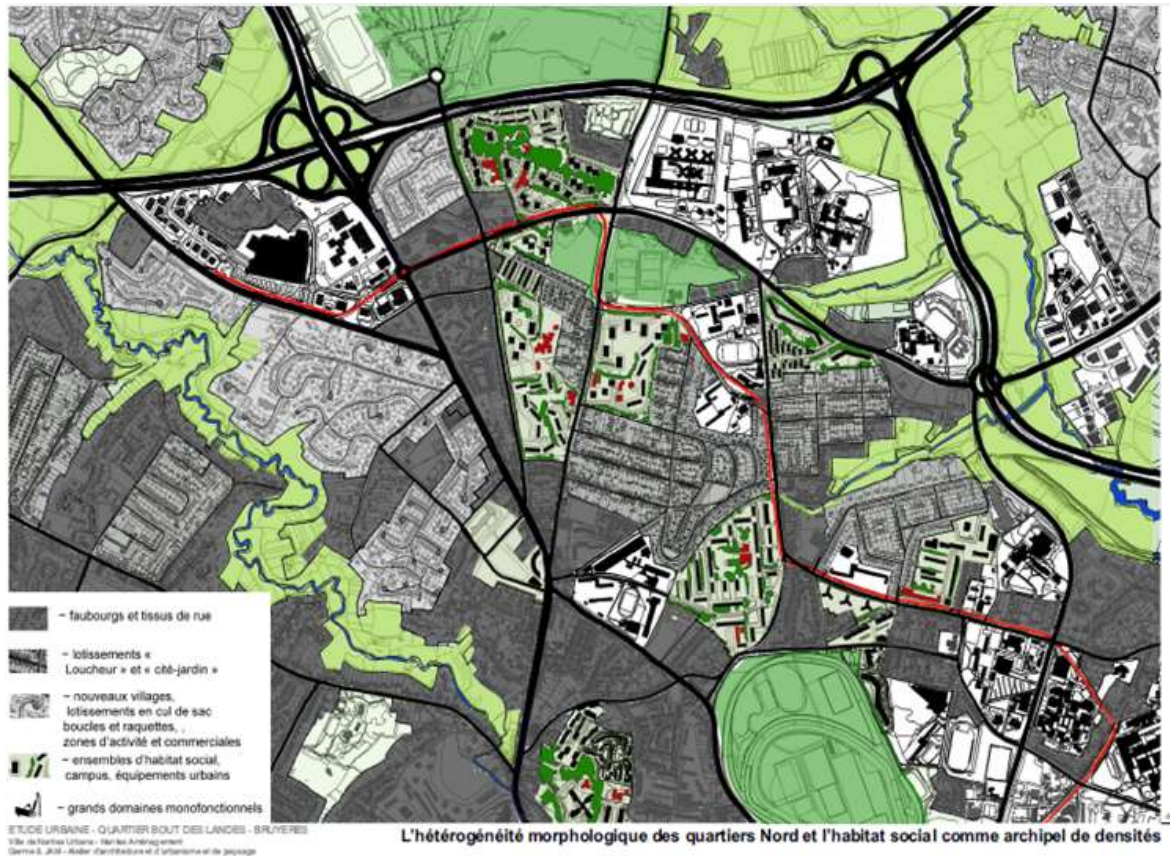
- low rise housing area or suburbs for the oldest parts (faubourgs);
- allotments (lotissements);
- New constructions, dead-end housing estates, business and commercial areas;
- Large social housing complexes, university campuses, urban facilities;
- Large monofunctional domains (prison, Géraudière technopole site, etc.),

The district results now in an archipelago. Social housing estates created in the early 1970s were built according to a sector and residential unit logic (separation of car and



pedestrian flows) leading to the reversal of the traditional block structure: in front the private residential parking lot, behind the green spaces.

The separation of social housing from the public streets, the introduction of residential landscaped spaces lead to the isolation of social housing. Nevertheless social housing is encompassed in an urban fabric meshed by roads, public transport and many facilities.



source: germ & Jam, 2017

Figure 664: “A mosaic district” gathering diverse urban forms

Several urban types can be identified:

- The suburbs (Figure 665 and Figure 666)
- The allotments (Figure 667 and Figure 668)
- The social housing (Figure 669 and Figure 670)

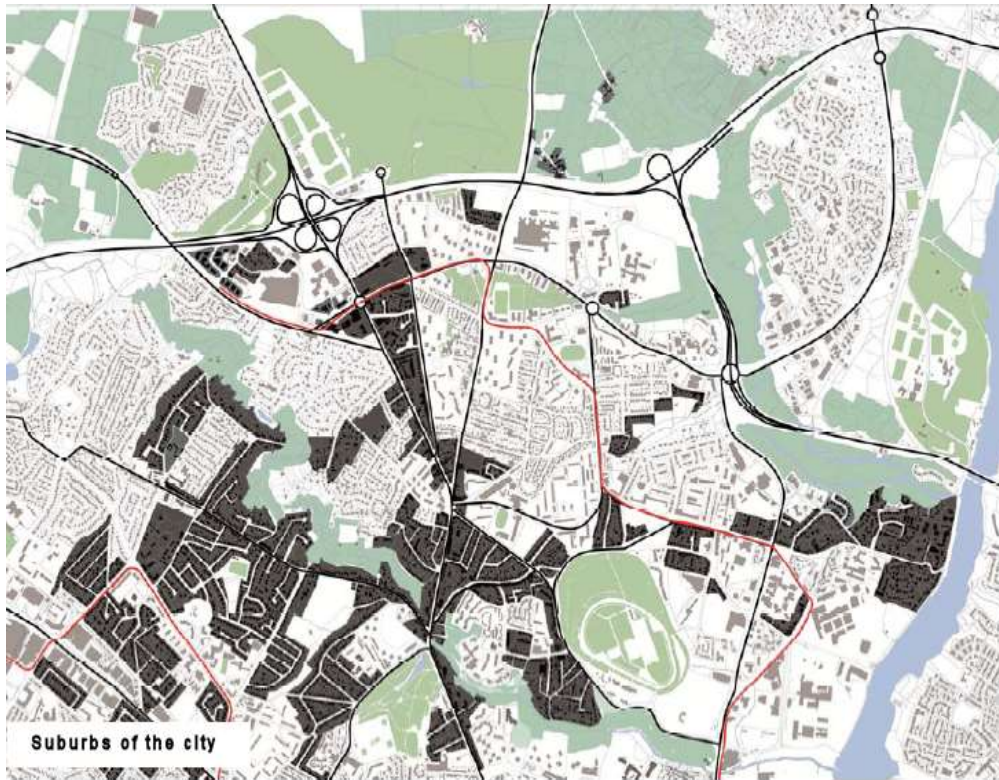


Figure 665: Suburbs of Nantes Nord. (Source: Germe and JAM 2017)



Figure 666: The Bourgeonnière street: an example of a suburb street in Nantes Nord



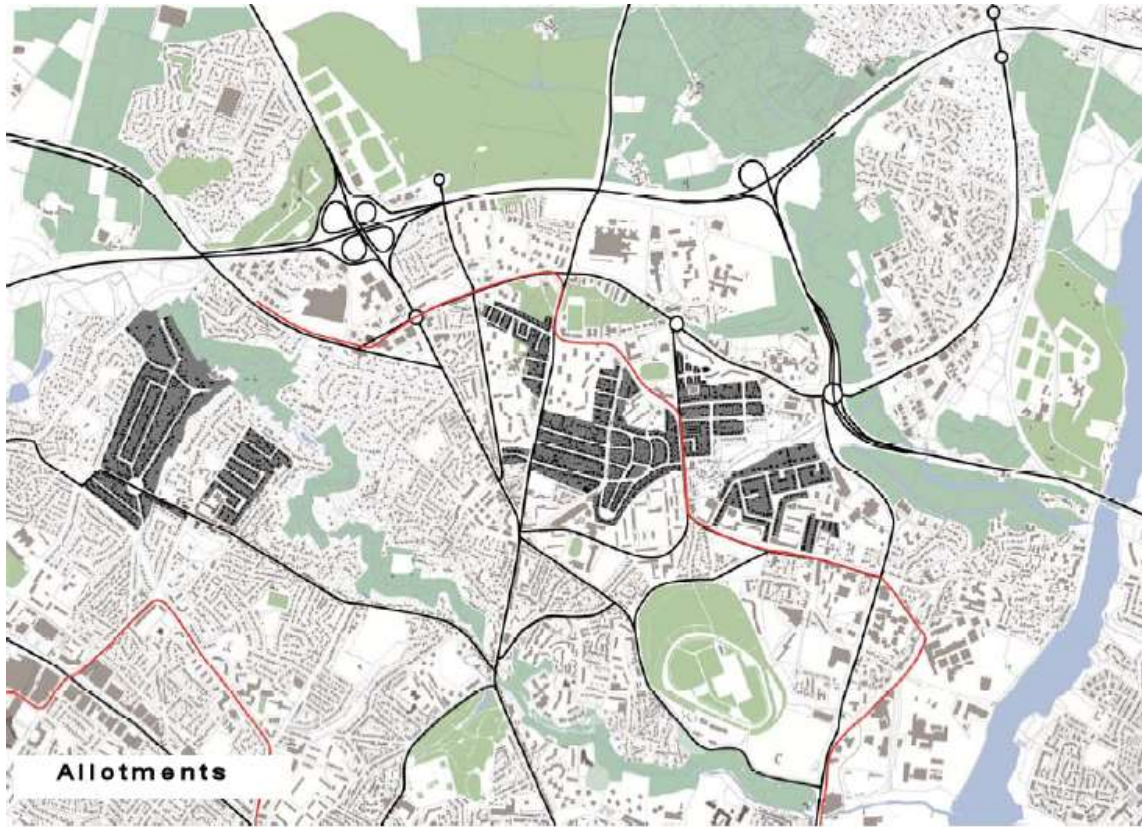


Figure 667: Allotments of Nantes Nord (Source : Germe and JAM 2017)



Figure 668: The Francis Jammes street: an example of individual houses allotment



Figure 669: Social housing estates of Nantes Nord (Source: Germe and JAM 2017)



Figure 670: Le Chêne des Anglais subdistrict. (Source Nantes Métropole Photo © baloon-photo.com 2015)



## Land register (private/public)

The current land composition of the territory is relatively simple today:

- Individual house areas are composed of private property.
- The large housing estates essentially comprise three major owners: the city, the metropolitan area and the social landlords.

Open spaces mainly belong to the city in particular all green spaces. Social landlords own generally a little land around their building when the metropolitan area owns the main roads (Figure 671).

As noted by G&J (2006), outdoor spaces of the social housing are widely open: roads and alleys, gardens are accessible to all. This apparent freedom masks a great lack of use and a powerful social control over space.

The elementary residential functions that are normally held in private spaces, whether collective or private (parking lots, common services, access and neighbourhood, games...) cannot develop or are confused with public uses. The space is private or public but there is no indication that allows people to know the information. The space is without explicit status. There is no way to know where and how it is legitimate to stand.

There are no actual vacancies in Nantes Nord. Indeed, each green space in the district is owned either by the state/region/city or by one of the owners of social housing (landlords). A project called "15 lieux à réinventer" (15 places to reinvent) taking place at the city level, identified the vacant lots in the city. One was identified in the district Nantes Nord. It is described in the participative NBS section.

However, there are spaces within the district, without any use or real allocation. Most often originally intended to be green spaces or recreational spaces, these spaces have no longer any use or, on the contrary, undesirable uses and generate difficulties for the district. They represent potential location for NBS implementation.



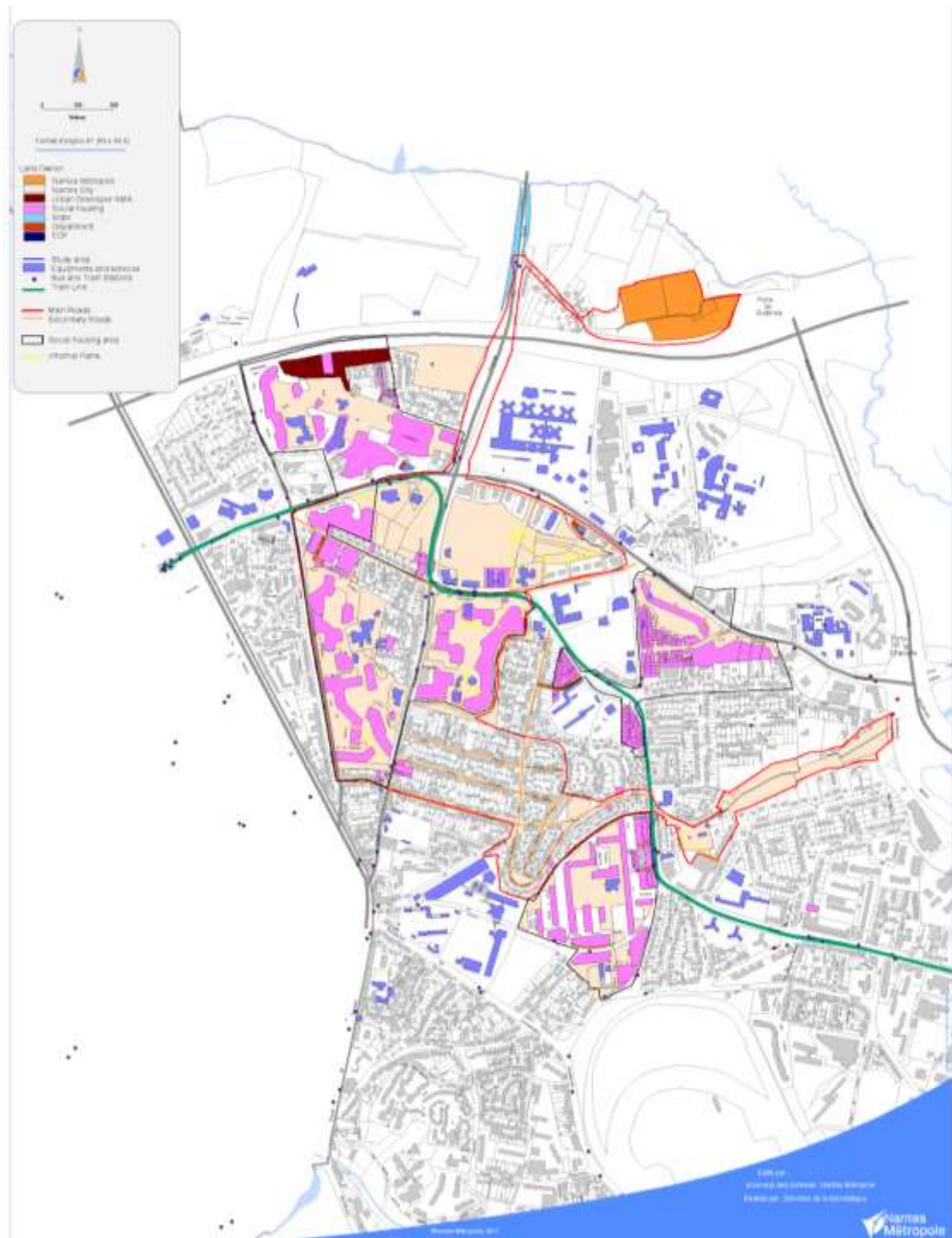


Figure 671: Land property map, Nantes Métropole

### 6.3.1.3 Transportation network and services

#### Road and railway networks

An entrance district, Nantes Nord benefits from very good road connection to the ring road and the motorway to Paris. The district benefits from great accessibility to road infrastructures (Figure 672), the various gates (Rennes gate, La Chapelle gate, Gesvres gate)

provide privileged access to the large territory via the A11 and 183 motorways (Germe & Jam, 2017).

The problem lies in the secondary road network within the district. Indeed, the district was built in islets, with several dead ends, making the crossing of the district difficult. As entrance door to the city of Nantes, the car is predominant. The challenge will be to secure the roads to allow the development of active mobility.

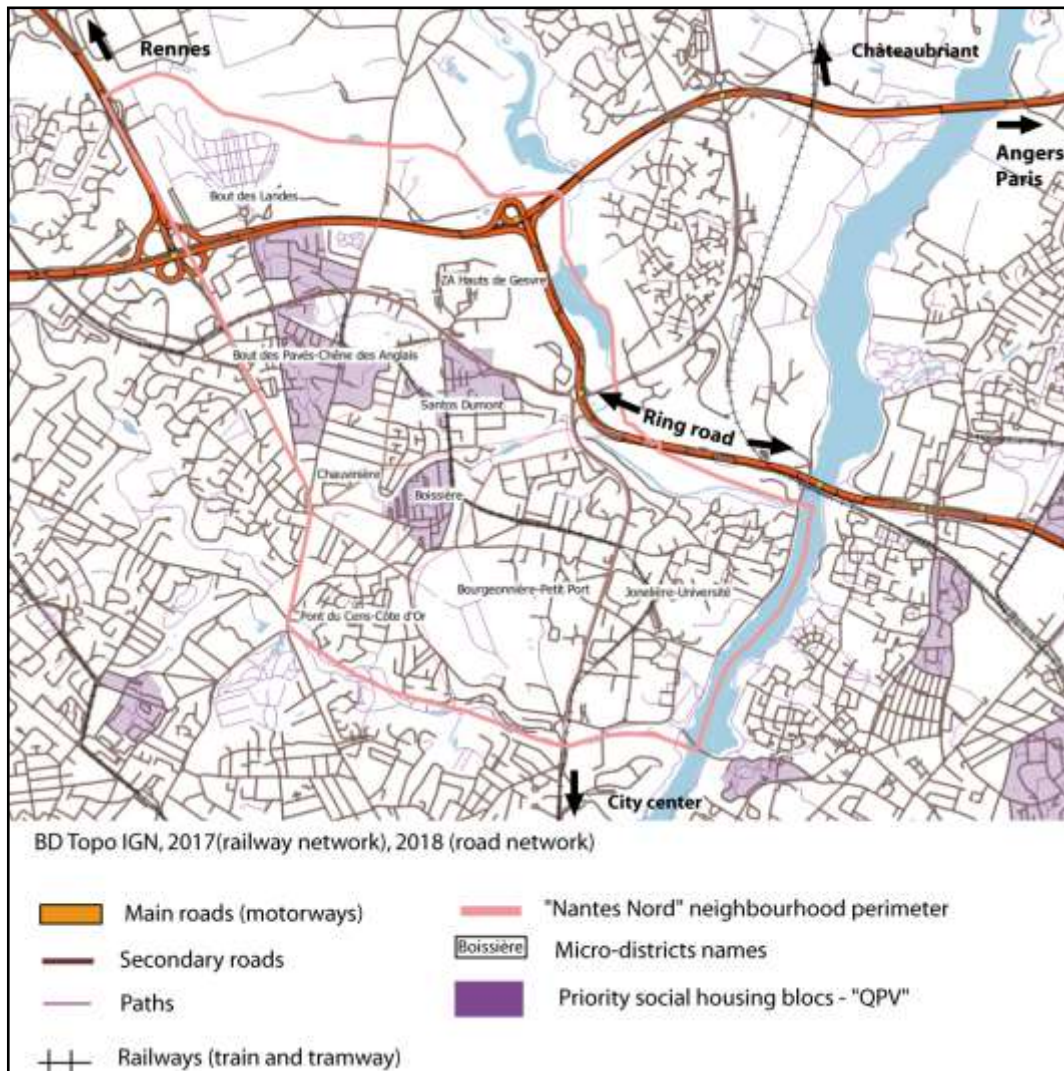


Figure 672: A district crossed by many means of transport (map: Bodénan, 2019)

### Bicycle paths network

Nantes Nord benefits from a network of cycling paths (Figure 673), not fully connected though. It represents an interesting challenge for the Urbinat project, since the municipality authorities wants to strengthen the active modes at the city and metropolitan level.

The self-service bicycle stations are located at the east of the district where the universities are located. It makes sense considering the population that represents the students and the people working in the area.

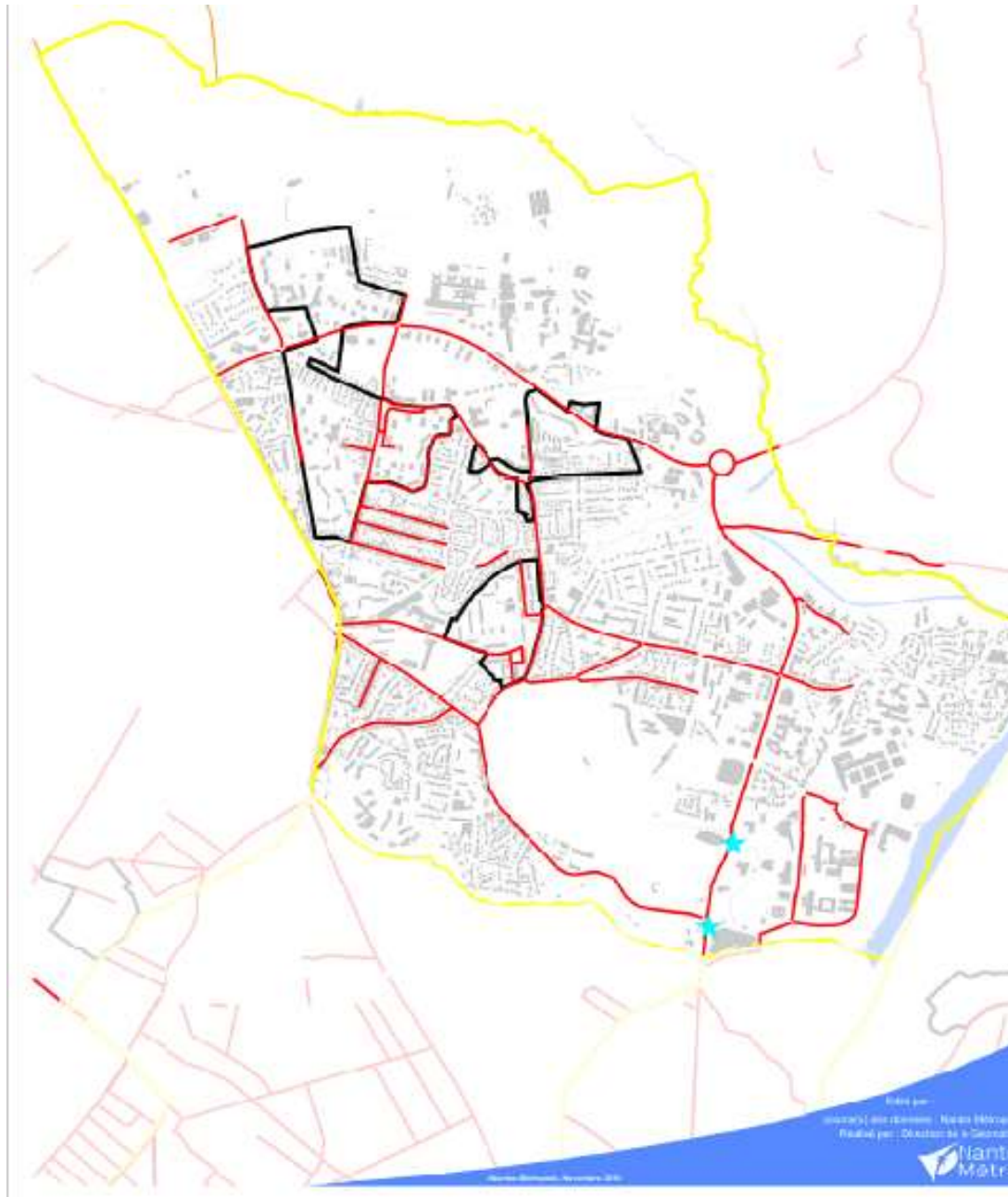


Figure 673: Map of the cycling paths in the Nantes Nord district, with in yellow, the limits of the district, in black the limit of social housing areas and in red the cycling paths. Blue stars represent the self-service bicycle stations. (Nantes Métropole, Sophie Pageot.)

An interesting data concerns the working people and their mode of transport to go to work. In Table 186 we can see that, in 2013, more than half of the active population uses a car (or similar) (56.9%) and the proportion of people using public transport is 33.1%.



Table 186: The distribution of active people by mode of transport 2008-2013

	Two-wheeled vehicle		Walking		No transport		Public transports		Cars or trucks	
	2008	2013	2008	2013	2008	2013	2008	2013	2008	2013
TP Bellevue Nantes	3,2	3,2	4,4	3,5	3,5	2,5	33,0	34,3	55,9	56,6
TP Dervallières	3,8	3,1	5,6	3,8	2,0	2,3	31,4	36,0	57,3	54,8
TP Malakoff	4,6	3,3	5,7	4,3	1,9	2,1	36,6	41,2	51,3	49,2
TP Breil-Malville	5,0	2,4	7,2	4,9	2,1	0,9	25,4	39,2	60,4	52,6
TP Quartiers Nord	4,6	4,1	4,1	4,2	2,3	1,7	30,5	33,1	58,5	56,9
TP Port-Boyer	6,7	7,0	4,1	6,6	2,7	2,5	25,8	29,4	60,6	54,5
TP Bottière Pin-Sec	5,4	4,1	3,7	3,4	1,0	3,5	36,5	38,6	53,5	50,4
TP Clos Toreau	8,3	8,3	7,0	4,2	2,1	3,3	31,7	32,3	50,9	51,8
TP La Halvêque	6,0	5,3	5,4	8,0	2,5	2,2	22,8	23,7	63,3	60,9
TP Bellevue St-Herblain	2,7	2,6	2,6	4,2	2,2	2,7	22,9	30,4	69,4	60,1
TP Sillon de Bretagne	2,1	3,3	3,1	8,2	4,7	5,0	35,3	30,3	54,7	53,3
TP Château	5,9	4,7	4,5	3,4	2,7	4,7	28,6	34,3	58,4	52,9
TP Plaisance	5,9	5,0	3,3	3,5	0,7	1,6	28,8	31,8	61,3	58,2
TP Ranzay-Grand Clos	7,9	7,4	5,7	5,8	4,4	3,2	21,4	26,7	60,6	56,9
TP Bellevue Nantes St-Herblain	3,0	3,0	3,7	3,7	3,0	2,6	29,2	32,8	61,1	57,9
TP Nantes Métropole	4,7	4,2	4,5	4,5	2,5	2,5	29,3	32,8	58,9	55,9
Territoires de veille	4,7	4,7	3,1	3,1	2,6	2,6	14,7	14,9	74,9	74,7
Nantes Métropole	5,6	6,3	5,9	5,8	2,9	3,2	18,4	20,0	67,2	64,7

Source: Insee RP 2008-2013 in Territorial diagnosis of the priority territories of Nantes Métropole - Compass October 2017

### Facilities (cultural, Health, Educational, Sports, Religious, Administrative, Justice and Citizens protection)

The Nantes Nord district is densely equipped on many fields including cultural and social animation, sports, children, or in terms of administrative services (Figure 674).

The territorial network is actually operating, in particular within priority micro-districts: each have a sociocultural centre, a toy library and crèches or even playgrounds and gymnasiums.

The vocations of the different equipment can be metropolitan, regional, or even national. A Prévert inventory makes it possible to cite both the district house 'La Mano' and the Escale, the University Theatre, the Metropolitan Stadium Pierre-Quinon, the pool and skating rink at Le Petit Port, the Luce-Courville Media Library, the association pool les Renards, the Nantes Nord Festive Hall, the CUB, the centre for do it yourself activities, the market of the Bourgeonnière, the nautical base and so on.

The district also counts 4 paddling pools, all located in the priority districts. They are free of charge and maintained by the city.

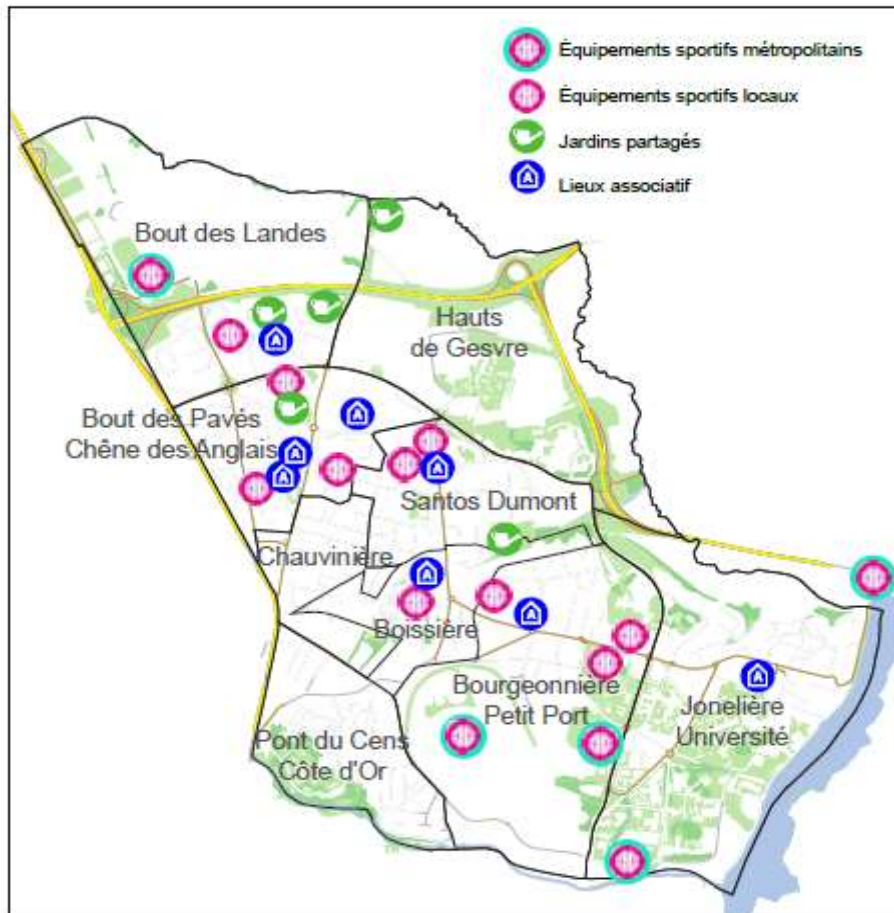


Figure 674: Mapping of sport facilities (managed by Nantes City (pink circle) or by Nantes Métropole pink circle with green ring), association headquarters (blue symbol) and community gardens (green symbol).

### Built areas

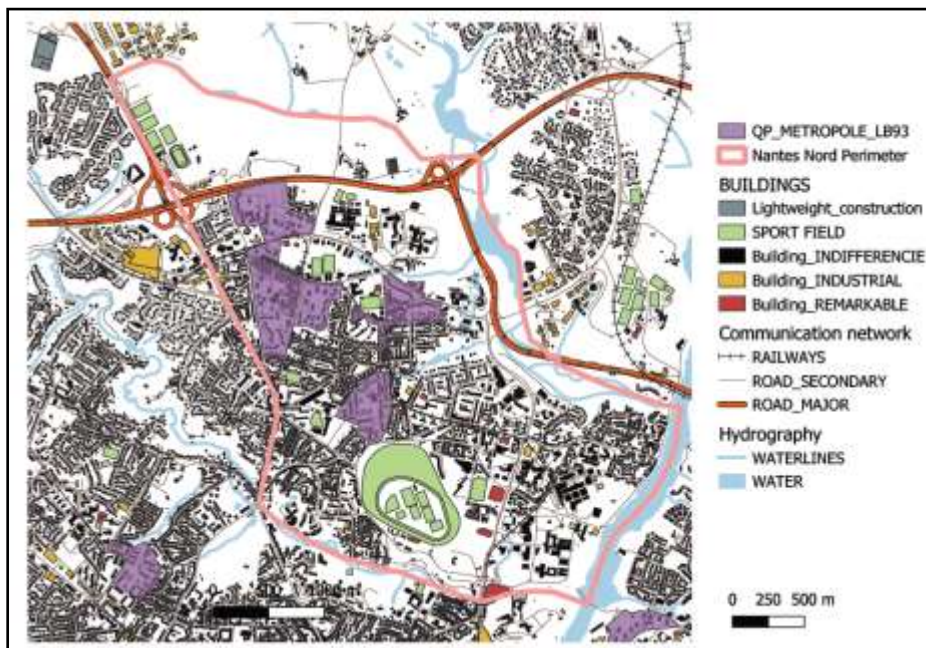


Figure 675: Built areas in Nantes Nord (map: Bodénan, 2019 based on IGN BDCarto)



## Public transportation links

Nantes Nord is connected to the rest of the metropolitan area by a highly developed public transport system that irrigates the area (Figure 676): the tramway No. 2, inaugurated in 1993, which links the south of the urban area to the north of the urban area; - the "Chronobus 2" (high-level service bus), which links the Cardo to the city centre in 25 minutes and serves the Chêne des Anglais and Bout des Pavés districts; - TAN bus lines that cross the district and the 'LILA' lines of the County Council.

The public transport connections (Tramway 2, Chronobus C2) have a high frequency during peak periods with a passage every 5 minutes approximately in both directions, and large time amplitude from 4.30 am to midnight.

Each priority micro- district of Nantes Nord is served by a structuring line of public transport (tramway, chronobus). Each inhabitant of the study area is less than 500 metres from a public transport.

The tramway was designed to irrigate priority districts and all the facilities located in the heart of the district. For example, the media library and MANO have a tram stop in front of the equipment. Each inhabitant has a public transport stop within 500m perimeter around its housing.

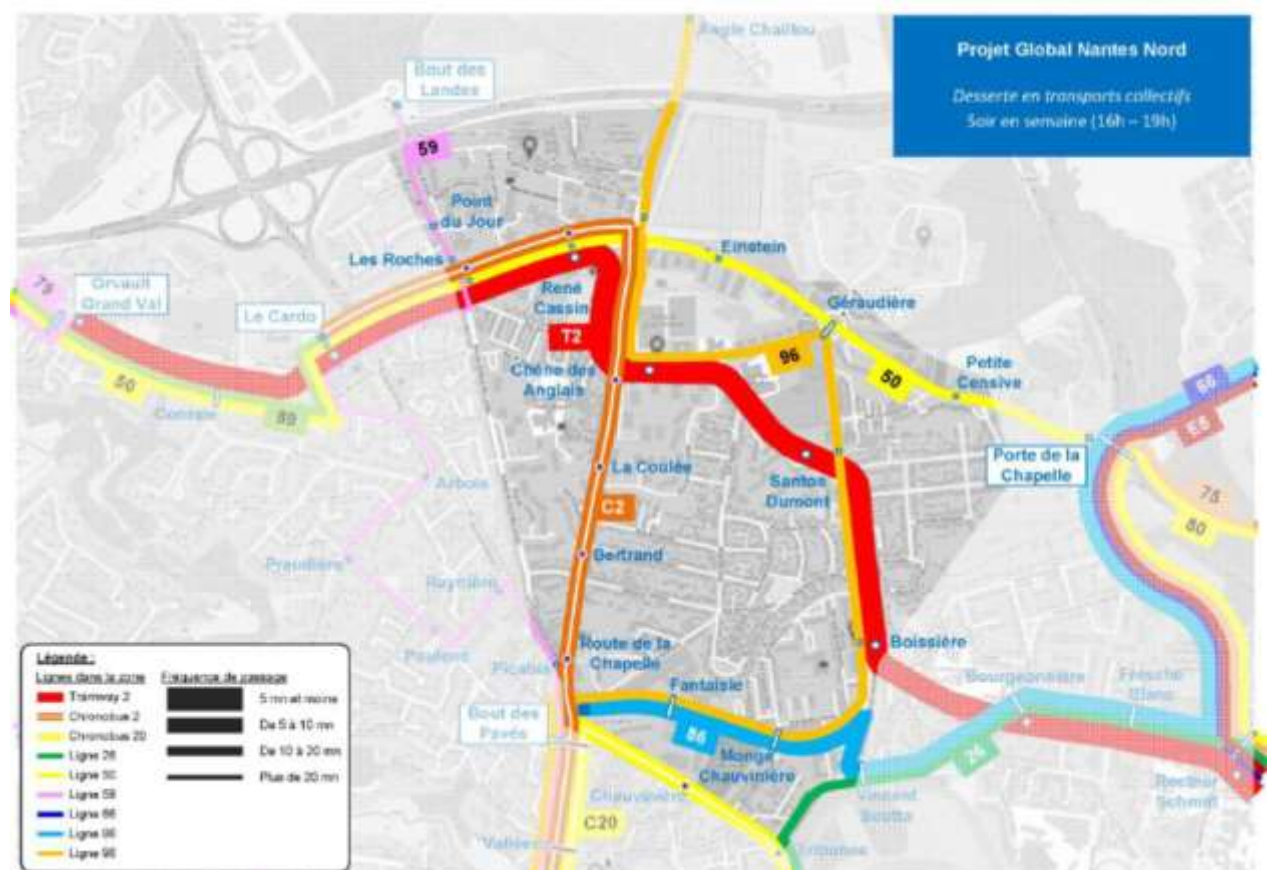


Figure 676: Public transport network and frequency in the district Nantes Nord (source: MAGEO study)

## Safety

Security is a major issue for the inhabitants of Nantes Nord where some areas are controlled by drug dealers. The deadends are especially appreciated for the drug trafficking that can be done in plain sight, that's why the city wants to open up the district by requalifying some deadends as secondary roads.

Nantes Métropole also created a centre for urban supervision with 200 cameras on the metropolitan territory (Figure 677). The information regarding the place where the cameras are located is confidential for obvious security reasons.



Figure 677: Centre for Urban supervision Nantes Métropole

Lighting also contributes to the safety (Figure 678) but it has to be managed in relation to the preservation of the biodiversity.



Figure 678: Lighting of the Nantes Nord district (Source Nantes Métropole - Alain Yvrenogeu 2019)

## Noise

Road noise is the main source of noise in the metropolitan area, while the Nantes Nord district is concerned with exceeding threshold values, exceptionally but also on a daily basis, during the night. Noise levels are above the threshold values for road infrastructure, particularly on major roads (A11, N814, etc.) (Figure 679).

As described at the city level, the specific programme developed to decrease noise impact will be also applied in the Nantes Nord district.

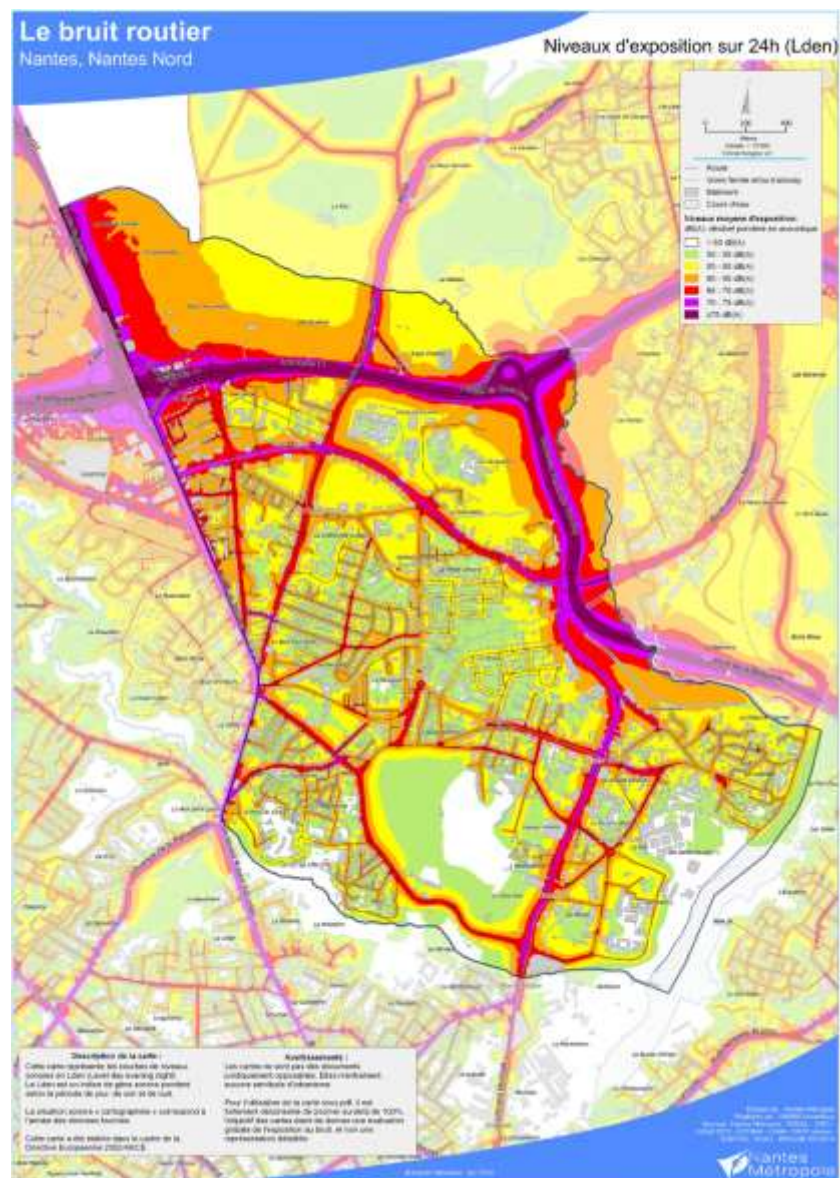


Figure 679: Road noise in Nantes Nord, Nantes Métropole

## Fragmentation analysis

The main elements of geography that define Nantes Nord district are generally inaccessible (Figure 680):

- North and East shores, infrastructures and large "closed" blocks draw a boundary;



- West bank, the islet Bout des Landes/ Route de Rennes is waterproof
- South Shore, the racecourse and university enclosures form a "plug" although it can be partially opened.

The low mesh size of the road network associated with the density of the enclosures equipment isolates the urbanized area from the open spaces "outdoor" landscaping. In this context, the open space of social housing neighbourhoods plays a major role in the "gentle" practice in Nantes Nord district.

As a result, the network of links remains highly discontinuous.

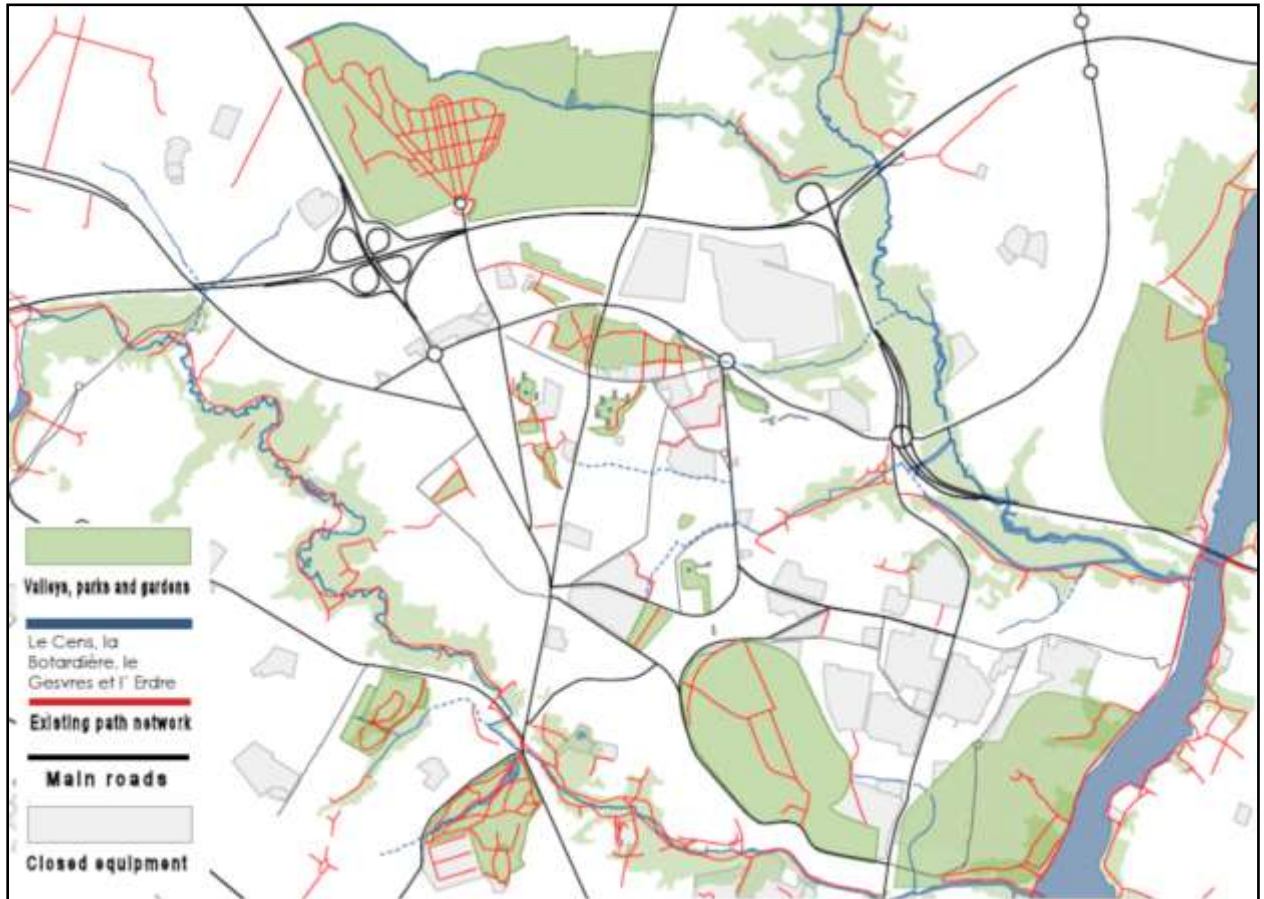
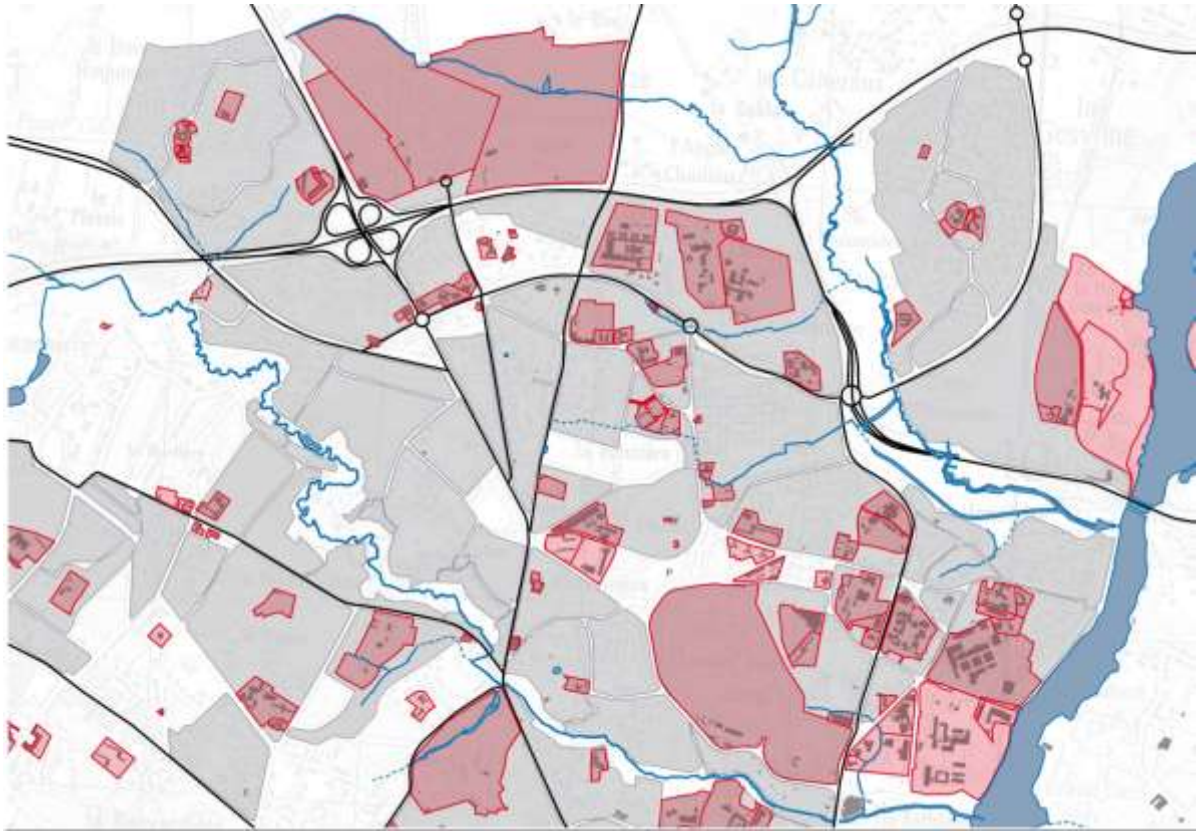


Figure 680: Localisation of valleys, parks and gardens (green) and natural hydrographic network (blue) in regards to existing path network (red), main roads (black lines) and closed equipment (light grey areas). (Source: Germe and JAM 2017)

The Nantes Nord district is characterized by the presence of large areas that cannot be easily crossed and which contribute to the isolation of social housing districts (Figure 681, Figure 682 and Figure 683).

The district needs to open up to itself and its fringes in order to promote territorial coherence; major roads need to be redesigned in order to reduce urban disruption and improving the attractiveness of the university sector to the rest of the district. It also represents a way to fight against no-go areas where public space is controlled by drug dealers. The discontinuity of the network for active modes also needs to be addressed.



source:

Germes & Jam, 2017

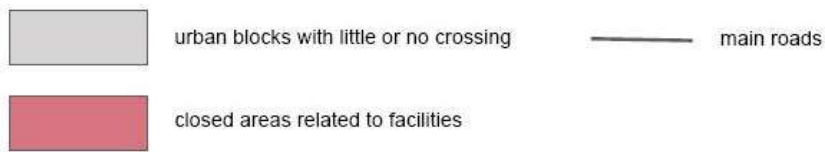


Figure 681: A district difficult to cross.



(Photos: Germe and JAM 2017)

Figure 682: The park cemetery - surrounded by a gate



(Photos: Germe and JAM 2017)

Figure 683: The enclosed racetrack



### 6.3.1.4 Green Infrastructure and Biodiversity

#### Green structure

A recent study of AURAN, the Urban Studies Agency of the Nantes Region (association) conducted a study on the vegetation cover of Nantes with a new method consisting in the mapping of the vegetation cover using very high resolution aerial image techniques to highlight the chlorophyll activity of vegetation in the city. Vegetated surfaces (low or high vegetation, public or private spaces) cover more than 60% of the district area (Figure 684), with a surface equals to 460 ha (Figure 685). Thus, Nantes Nord district offers an average of 185m<sup>2</sup> of vegetated area / inhabitant (Figure). The balance between high and low vegetation is in favour of high vegetation (shrubby and woods). Non vegetated areas represent 36% of the district surface.

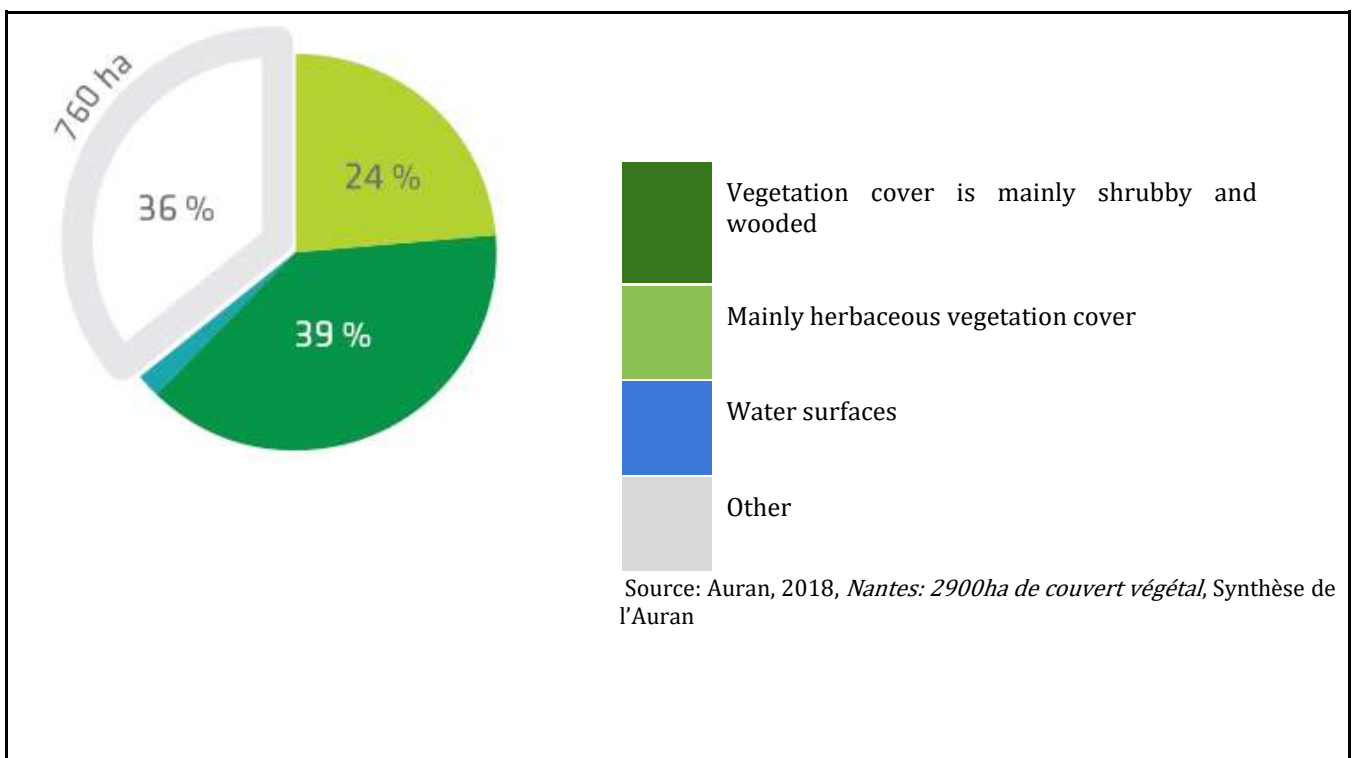


Figure 684: Distribution of vegetated areas over the district Nantes Nord. (From Auran, 2018)



Figure 685: Green structure mapping in Nantes Nord (Source Germe & JAM 2017)

## Public green spaces

At the district scale, parks cover an area equals to 70 ha, valleys and riverbanks 120 ha, facilities 54 ha, sport fields and lawns 30 ha.

Except the Amande park, public parks and green spaces are mainly located on the periphery of the Nantes Nord district and along the rivers (Figure 686).

- the racecourse (1)(Figure 687) is not very visible from La Boissière
- In the heart of the district, the Amande park (2)(Figure 688) remains little visible from Cassin or from le Chêne des Anglais
- the park cemetery (3) and the golf course (4)are located on the other side of the ring road
- the Jonelière sport park/Port Barbe (5) and the park of La Gaudinière (6) are at the southern and eastern extremities of Nantes Nord.
- Green spaces of social housing estates (7) constitute large, richly landscaped areas trees, but are withdrawn to their vast interiors islet
- The Nantes Campus combines the quality of an equipped park and the one on the banks of the Erdre. Its landscape continuity is hampered by the closure of many establishments (8).

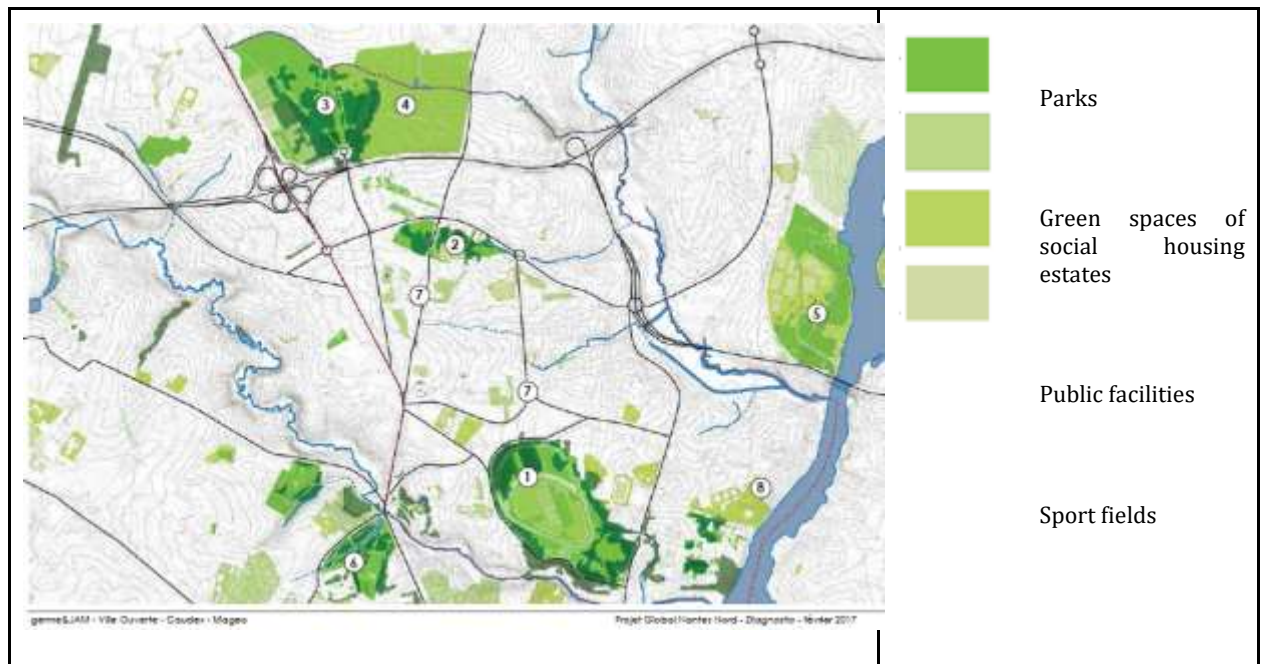


Figure 686: Parks and public green spaces of Nantes Nord (Map: Germe & JAM 2017 - Ville Ouverte - Caudex - Mageo)



Figure 687: The racecourse (Photo: Germe & JAM 2017 - Ville Ouverte - Caudex - Mageo)



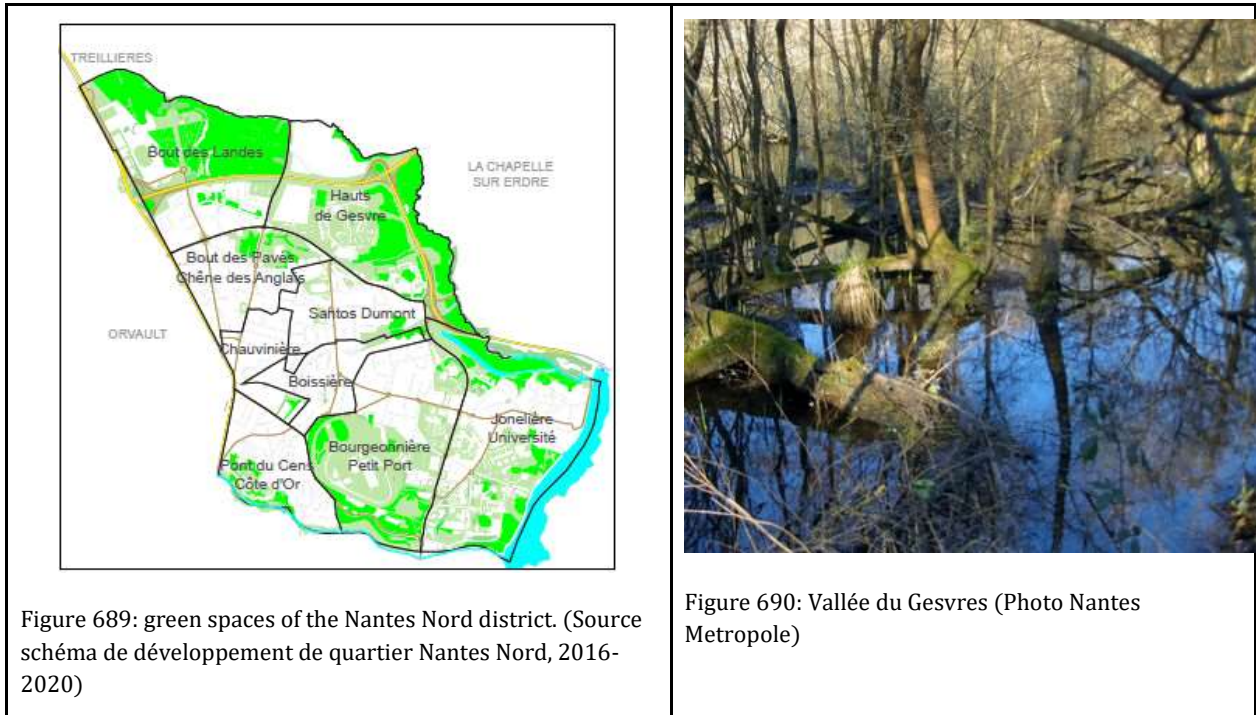
Figure 688: The Amande Park (Photo: Germe & JAM 2017 - Ville Ouverte - Caudex - Mageo)

### Accessibility of urban green spaces by population

As mentioned previously and expressed also with the map of the green spaces of Nantes Nord (Figure 689), the district benefits from various public pieces of equipment, green spaces (Figure 690). Moreover, an efficient public transport network makes the green



spaces and/or the public equipment very easy to access. Though, it has been observed that the green spaces are not very used or not even known by the inhabitants. The Urbinat project will help to identify the number of visitors of those green spaces through the behavioural mapping. The green spaces unit also invested in countering equipment to have a long-term vision of the number of visitors of specific parks in the district, especially the park “les Amandes”.



### Green roofs

The project of a green roof, Symbiose (Figure 691), financed by regional, national and EU funds, is planned in the district. Managed by the social landlord NMH, it aims to exploit the solar potential of roofs by installing bioclimatic greenhouses able to capture energy, pre-heat the sanitary water of the building and offer new spaces to the inhabitants. Symbiose consists of the installation of a greenhouse on the roof of a building of 24 homes built in Nantes North in the 70s. The goal is to recover the heat from the greenhouse to heat the domestic hot water. This greenhouse also offers tenants and residents a new space of 400 m<sup>2</sup> where new uses are to imagine and to develop. The tenants suggested vegetable-type activities, leisure and reception area for family meals, attics...

This object, original on a forty-five years existing building, breaks the monotony of the large ensembles and draws a new urban silhouette for the district.

The work site, including an elevator and the isolation of the building, will start in 2020.



Figure 691: Symbiose project, computing image

### **Infiltration area/ground permeability**

At the city level, a study was carried out to obtain soil suitability for infiltration map, but this information cannot be used at a scale below 1/50,000. Soil permeability is an intrinsic property, which is measured very locally, on a metric scale and will control the infiltration capacity of the soil. If we know the nature of the soil and subsoil, we can however estimate a permeability value for an area. The phase 1 of the local diagnostic showed that there were no data available on the nature of the soil, nor permeability data on the northern district. Only very localised data obtained for the soils of two community gardens are available, so this lack of soil data must be filled during stage 2 of the diagnosis, at least at the level of priority sub-districts.

Note that the EKLIPSE Ch1 criterion (% permeable and impermeable areas) is not calculated on the basis of permeability data but on the basis of land use.

### **Green spaces management**

The green spaces unit had in 2018 an operating budget of 328 000 € and an investment budget of 193 000 €, that does not include the operations for the development of public spaces.

Besides the maintenance of the green spaces, the green spaces team (Table 187) also supports garden projects in the districts. In partnership with local associations, the team is leading the reflection with the future users of the site as well as the consultation with the residents of the project. Finally, it proposes the development of the site according to the needs expressed.

Within Urbinat, a discussion has been started with inhabitants to develop a shared garden within the Canada park.



Table 187: Green spaces management statistics

Year	Surfaces maintained	Number of staff
1980	400 ha	412
2014	1200 ha	471
2018	1425 ha	468

## Biodiversity

### Fauna

A study by TBM Environnement has been conducted this summer 2019 and resulted in the observation of 2 protected species (Figure 692 left).

### Flora

A heritage species has been found with a stake to preserve its habitat located in a natural space, the undergrowth habitat of oak tree: Epipactishelleborine (Figure 692 right). The study also revealed the presence of hygrophilic vegetation. Soil surveys are planned to confirm the hypothesis.



Figure 692: A lizard and a longhorn beetle - 2 protected species (Photos: TBM Environnement, MAGEO study 2019)

### 6.3.1.5 Local Masterplans PLUM

**“Plan Local d’Urbanisme Métropolitain - PLUM” 2030.** the local planning regulations document at the metropolitan level was co-constructed with the citizens and stakeholders of the territory during one year in 2015. A dedicated website was created, 77 workshops were organized for a total of 3200 contributions. As explained previously in the city section of the report, the PLUM aims at finding the balance between the necessity of developing the city and preserving the green areas. It uses the coefficient “CBS”, a biotope coefficient created by the city of Berlin, to conciliate urban densification and urban nature. Concretely, a construction project, to be accepted, needs to indicate how it will achieve the minimum CBS coefficient. It can be achieved by the setting up of a green rooftop, the preservation of planted trees or by permeabilized parking lots, each solution being

affected by a different CBS score. A non permeabilized soil corresponds to a CBS score of 0, since not favourable to biodiversity.

### Constraints map

In France, a constraints map (Figure 693) has to be joined to the local masterplan. The constraints are divided in 4 categories:

- The constraints for the conservation of natural, cultural and sport heritage
- The constraints relating to the use of certain resources and equipment: energy, mining and quarrying, pipes, communications, telecommunications
- The ones related to national defense
- The ones related to health and public safety as submersible surfaces, risk prevention plans ...

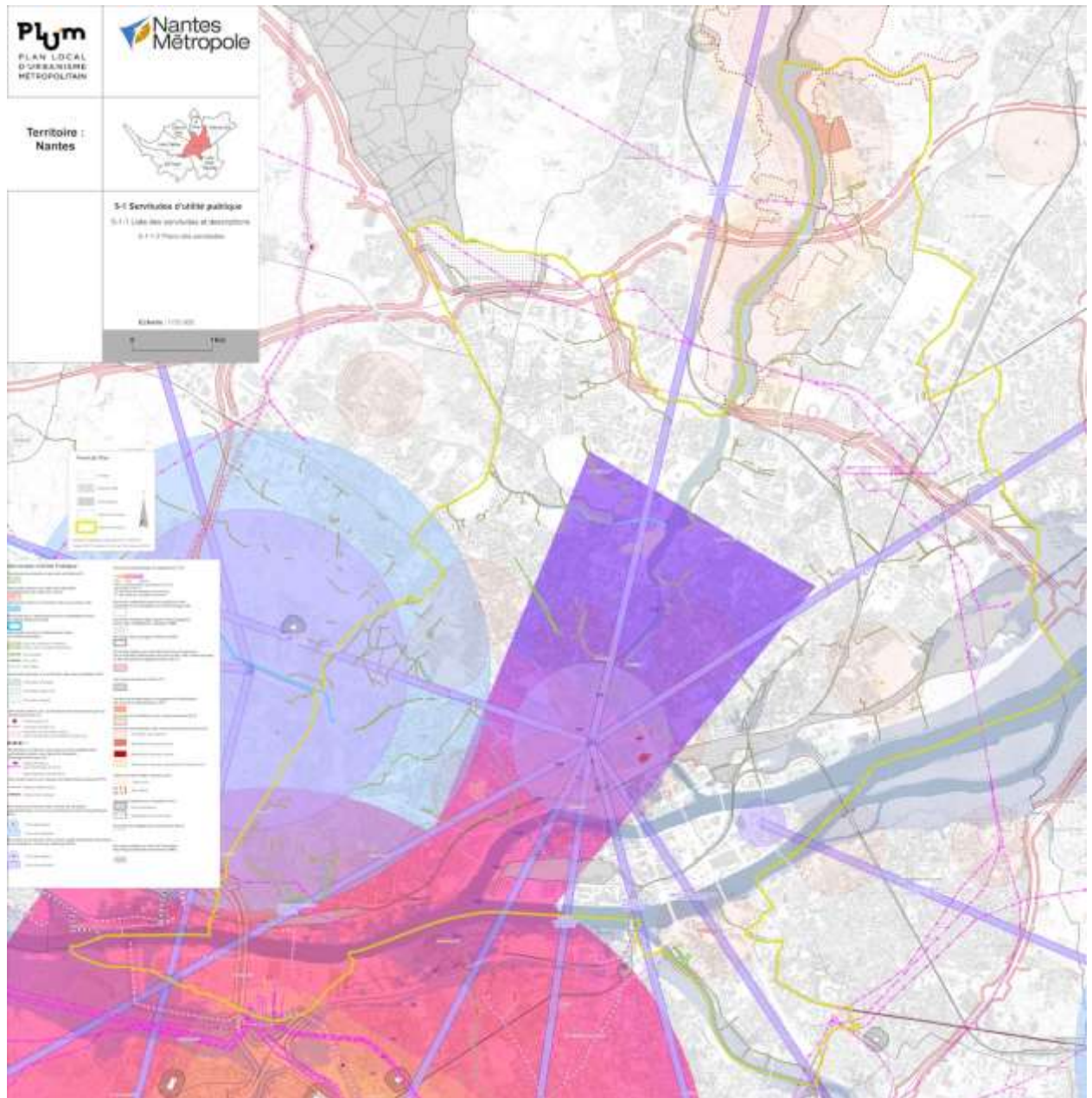


Figure 693: Constraints map, PLUM, Nantes Métropole

## Land use planning

The urban planning document of the metropolitan area includes three chapters answering the following questions:

- Where can I build?
- How can I build?
- How can I connect to the different networks?

### The different sectors of the PLUM:

The zoning that applies to the Nantes Nord district (Figure 694 and Figure 695) reflects its morphological composition.

The suburban, subdivision and major equipment and activity sectors have a specific zoning with different urban planning rules respecting their morphological characteristics.

In Nantes Nord, the new urban planning document that has just been voted by the elected representatives in 2019 has changed the zoning of the Chaillou Angle sector, which until now was a reserve sector for the extension of urbanisation, into agricultural zoning, thus strengthening urban agriculture in the north of the district. It underlines the commitment of Nantes Métropole to the development of urban agriculture.

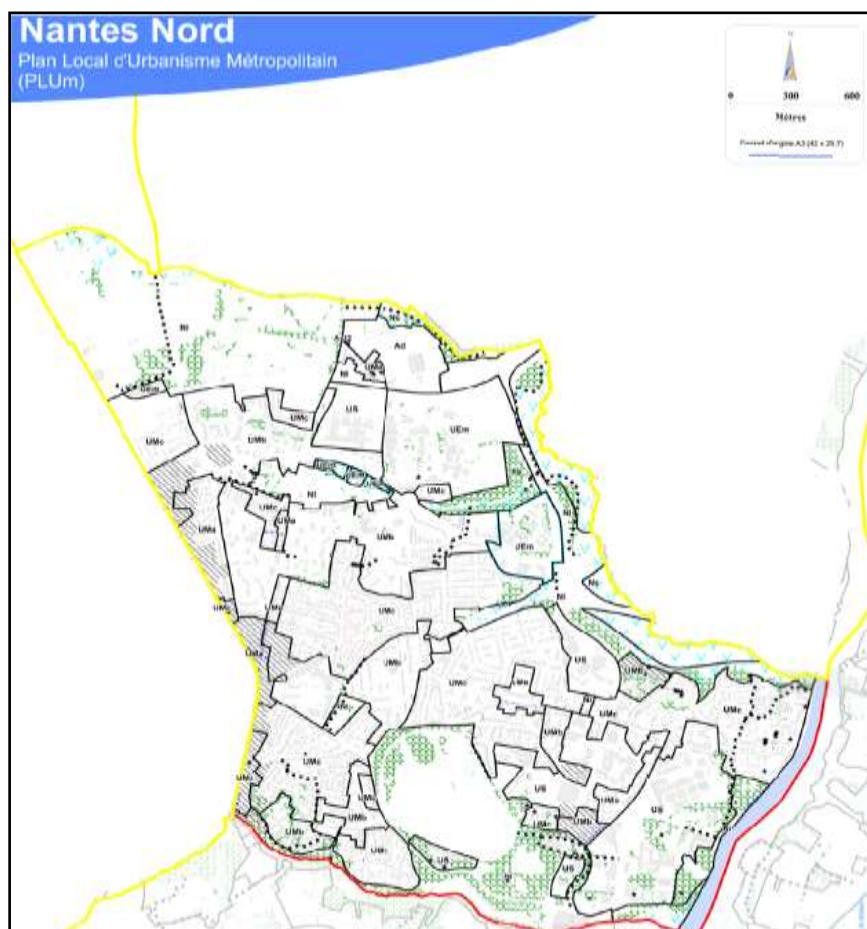


Figure 694: Map of the Nantes Nord district with PLUM zoning (source :Nantes Métropole, map Sophie Pageot)

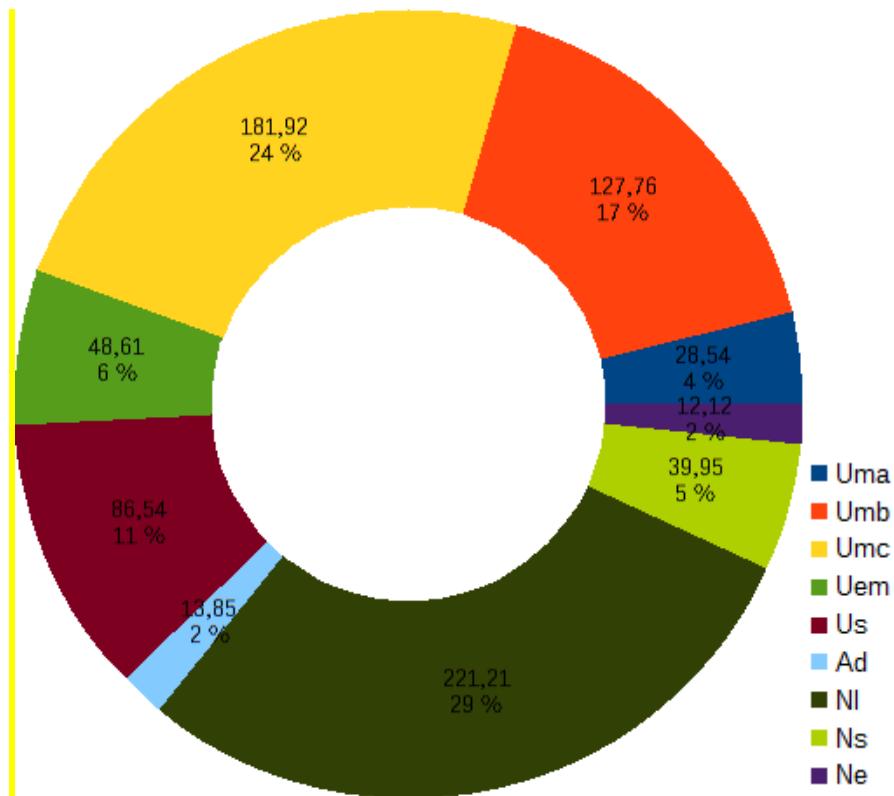
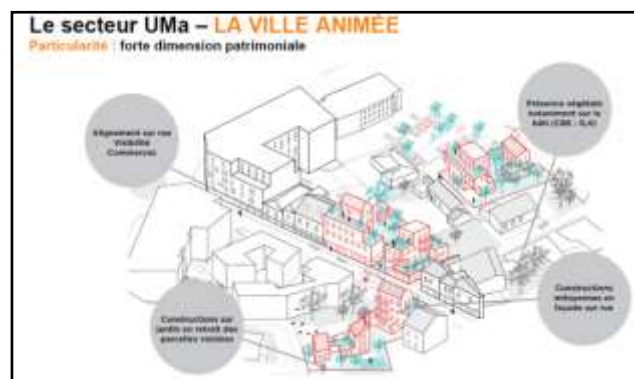


Figure 695: Percentage distribution of areas by zoning

Following are seven zones present in the study area:

- **UMa zone:** This zoning corresponds to the lively City with a strong heritage dimension



- **Umb zone:** It corresponds to the project city, districts with dominant collective or mixed housing, it is the zoning of social housing districts.





- **UMc zone:** This sector corresponds to the landscape city which are less dense suburban areas



- **EU zone** is dedicated to the hosting of economic activities in production, manufacturing or logistics to promote the maintenance and development of the economic fabric.
- **US zone** is dedicated to major facilities of collective interest and public services that contribute to the functioning of the metropolis (research, higher education, sport, culture, leisure, waste management, transport, energy, etc.) as well as to municipal or inter-municipal equipment centres.
- **A zone** corresponds to the areas to be protected because of the agronomic, biological or economic potential of the agricultural land within which agricultural activities can be developed. As a specialized area, it strictly limits any other use in order to preserve these spaces and limit their urban sprawl.
- **Ad zone in zone A** (sustainable agricultural areas) identifies areas with a sustainable agricultural vocation. Only new constructions related to an agricultural operation are permitted.

### 6.3.1.6 Urban/landscape design Projects

#### Urban/Landscape design projects in the Study area

The National Programme for Urban Renewal (PNRU), instituted by the Law of 1 August 2003 for cities and urban renewal, provides for an unprecedented national effort to transform the most fragile districts classified as Sensitive Urban Areas (ZUS), an effort that focuses on housing, public facilities and urban development. In Nantes Nord, 3 micro-districts are concerned.



The district will be subject to a global project of an amount of 125,1 million euros co-financed by the PNRU funds, the social landlords and the metropolitan area to make major changes to the district: in parallel of the renovation of housing and demolition, the first major step in the renewal process is a health centre, bringing together various health specialists, that will open in 2022. Work will start at the end of 2019. At Le Chêne des Anglais, a public facilities centre will also be built on rue Eugène-Thomas, bringing together the local centre, the town hall, the district team and office space to create an attractive business environment for all the inhabitants of the district.

Employment and economic development are also at the heart of the project. In January 2019, a business centre opened on boulevard Einstein, including offices for rent, coworking space, meeting room and a support offer for business project leaders proposed by "Dare to do business".

In 2021, work will begin on the restructuring of the existing La Boissière shopping centre. And from 2023 onwards, the extension and restructuring of the Camille Claudel-Georges Sand and de la Chauvinière school groups will be launched.

### 6.3.2 Social description

The data to be collected at parish and neighbourhood levels are almost the same collected as city level with a closer loop on the selected case study. The idea is to verify and assess if the urban profile is confirmed in the area or shows a better or worse performance in the selected neighbourhoods. Social data could be good in certain aspects, bad in others, offering a different scenario for the development of the NBS solutions as per URBINAT catalogue.

#### 6.3.2.1 Demographic

Table 188: Synthesis of socio-demographic statistics of Nantes Nord

Estimated unemployment index (all categories: A, B and C - 2013)	38.6%
Unemployment rate evolution (Cat. A, between 2010 and 2016)	+9.8%
Poor workers (2014)	19% of employed workers
Median income (2011)	846€ (per CU) +64€ (between 2006 and 2011)
Population below the low income threshold	46.4% of population under 66 years old
Single-parent families (2012)	41.1% of families with children
Unattached individuals (2012)	41.2% of households +7% between 1999 and 2012
Share of households benefiting from social minima (RSA) in 2014	26.9% +6.7% between 2009 and 2014

Foreign population (2011)

21.1% of population  
+61% between 2006 and 2011

Source: Insee

## Demographic description

The population of Nantes Nord is around 24 900 (Table 189) according to the latest census (2014) and has increased by only 2% between 2009 and 2014, half as fast as the period between 2010 and 2015.

Table 189: evolution of the population of the district Nantes Nord, Nantes Métropole

	1999	2009	2014	<u>Evolution</u> <u>2009-2014</u>
<b>POPULATION</b>	23 696	24 319	<b>24 860</b>	2%
Moins de 25 ans	7 400	10 144	10 446	3%
25-64 ans	11 671	11 410	11 630	2%
65-79 ans	3 090	1 932	1 789	-7%
80 ans et plus	935	834	904	10%
<b>MENAGES</b>	10 089	11 461	<b>12 734</b>	11%
<b>LOGEMENTS</b>	10 566	11 988	<b>13 790</b>	15%

Nantes Nord is the second youngest district of Nantes after the city centre. The average age of the population is 35 years, 2 years younger than the average of Nantes. But the district is aging faster than the city average. Though the part of the population above 60 years is less important than the average of the city of Nantes (15.5 % for the district, 18.9 % for the city), the part of the population above 75 years old has increased by 20 % (14 % for the city of Nantes).

The Nantes Nord district is also made up of 51 % of men, and 49 % of women. The deficit of women at the district level and especially in the “Haut de Gesvres” is explained by the presence of the prison for men in this sub-district.

## Presence of Vulnerable groups in the area

A diagnostic has been made on the district regarding the vulnerable population:

- 56 % of the households are made of only one person: this could be explained by the presence of the university and students living mostly alone (Bourgeonnières-Petit Port and Jonelière-Université) but as expressed in the graph below, all the micro districts are concerned. The average household size also decreased more sharply than all over the city.
- high rate of single-parent families (Figure 696): 33% of the children of the district are part of a single-parent family. As in the graph below, it goes up to 45 % for

the micro-district Bout des Pavés-Chêne des Anglais, the micro-district that is located on the study area.

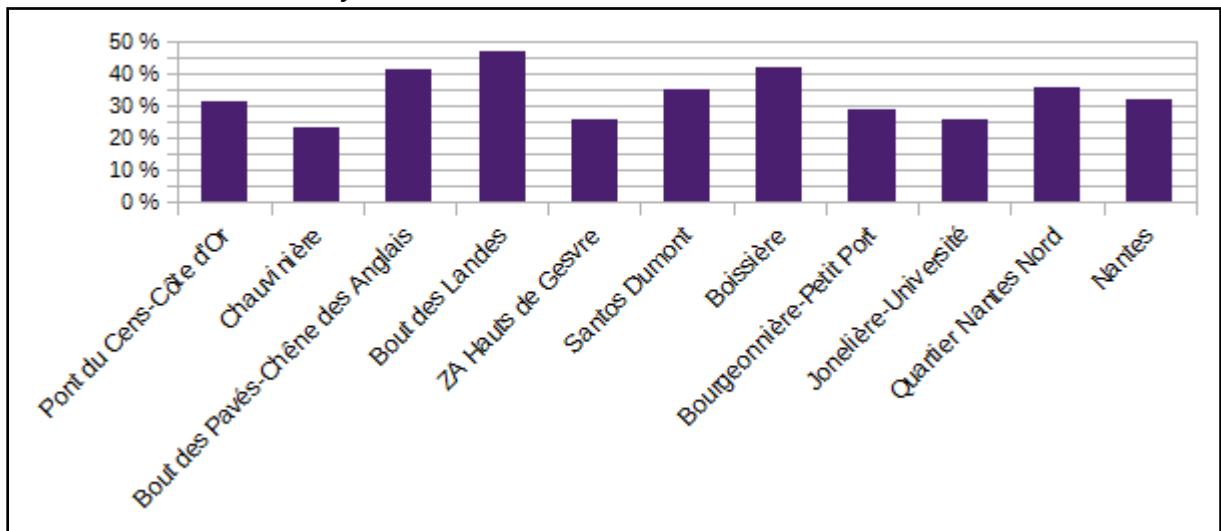


Figure 696 : Share of the single parent families in the 9 micro-district of Nantes Nord in 2014, Nantes Métropole

- Poverty rate (Figure 697). The concentration of the population living below the threshold of poverty\* is much higher in the priority micro-districts. This is all the more true since the available data take into account the scope of consolidation of IRIS, which is wider than the perimeter of the defined priority geography, which can have a tendency to "smooth" or even minimize reality lived. In the figure below, we can see that the poverty rate of people under 65 goes from 9.7 % in the Jonelière Université micro-district (university district) up to 45.4 % in Bout des Pavés- Chêne des Anglais where most of the Urbinat corridor will be implemented.

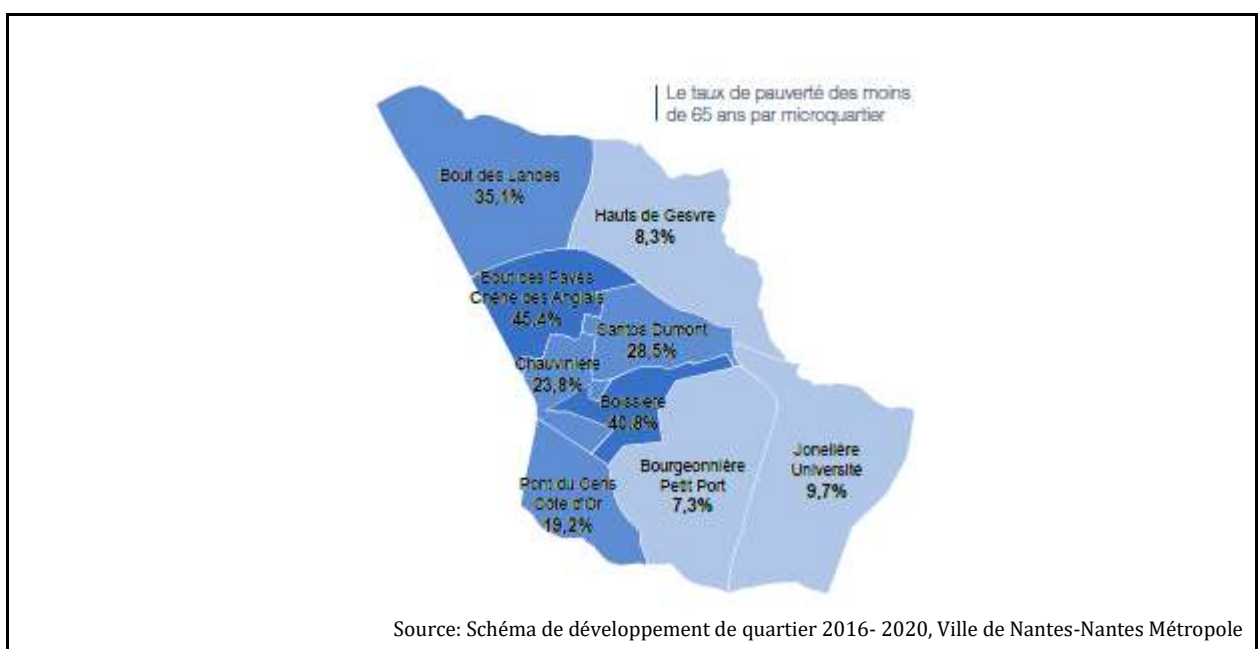


Figure 697 : Poverty rate of people under 65 in Nantes Nord

## **Education/Literacy**

95% of young people between 15 and 19 years old go to school.

41 % of the pupils at the last year of secondary school have a learning lag.

## **Housing conditions**

The Nantes Nord district counts 12,760 housing units in 2011, including about 4,500 social housing units.

The distribution of housing occupancy status between tenants of the social park, the private park and

owner-occupiers show a high proportion of social housing in the district. By comparison, there are twice as many as over the entire city of Nantes. The share of owner-occupiers is, for its part, largely lower than at the Nantes scale. Social housing is very clearly concentrated on priority districts and more generally on the micro-districts located to the west of the district.

This is all the more true since some micro-districts are almost exclusively composed of social dwellings (the Bout des Pavés has 89% of housing social) while others are totally deprived (the micro-district Bourgeonnaire - Petit Port has only 1% social housing on the whole of the housing stock).

Key figures of housing in Nantes Nord:

- 23 % of houses
- 77 % of apartments
- 92 % of the dwellings are the main residence of the inhabitants
- 25 % are owned by their inhabitants
- 35 % are tenants of private housing
- 40 % are tenants of social housing
- 1% are housed without any costs.

In the district, the problem of overcrowding is limited since it concerns only 5 % of the households (only 1% with a high rate of overcrowding and 4% for a light overcrowding). On the other side, 15 % of the households have a strong under-occupation rate and 18 % a light under-occupation rate.

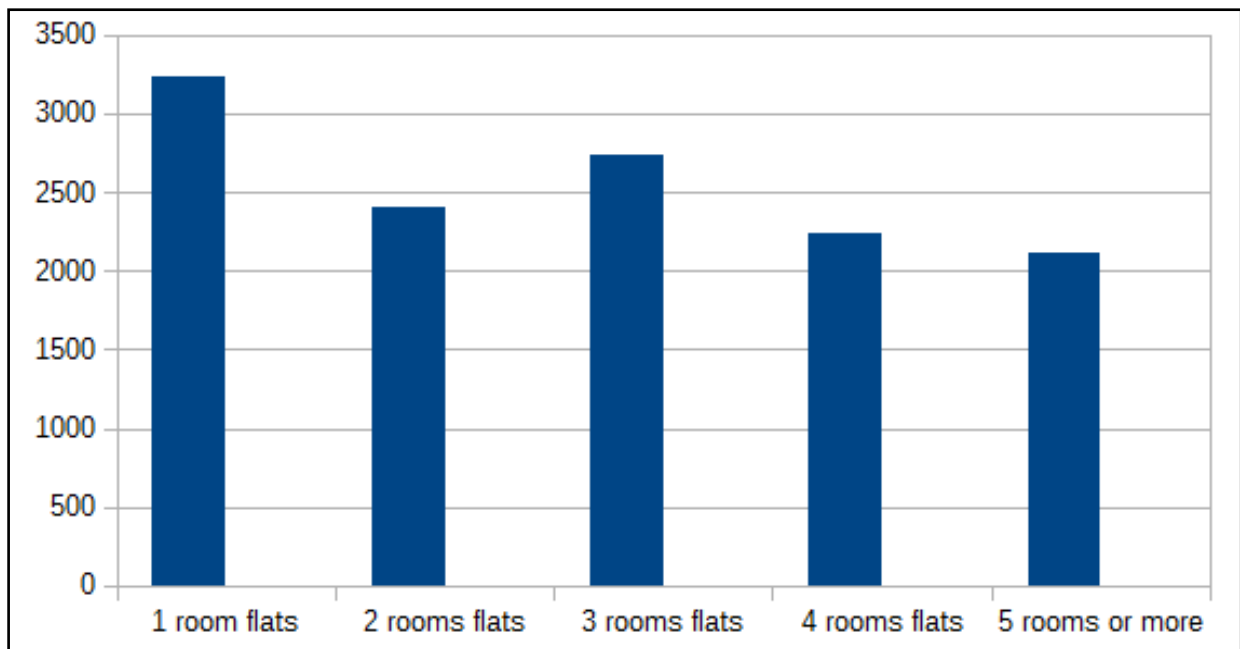


Figure 698: Dwellings size - Nantes Nord (source: Insee 2014)

### Migration rate

The 2014 census indicated that 12 % of the population in Nantes Nord is of foreign nationality (2 885 inhabitants) and that 14% have immigrant background (3530 inhabitants).

### Families description

Households made up of only one person are also predominant: 2/3 of the households are made up of one person with or without children, and single parent family represents 40% of the families (Figure 699). The district is getting older, even if it is the second youngest district of Nantes Nord. Attention has also to be given to the single parent family who represents up to 40 % in the priority districts of Nantes Nord. With children and teenagers, the elderly and single parent family correspond to the public that will be the target audience for the Urbinat project.



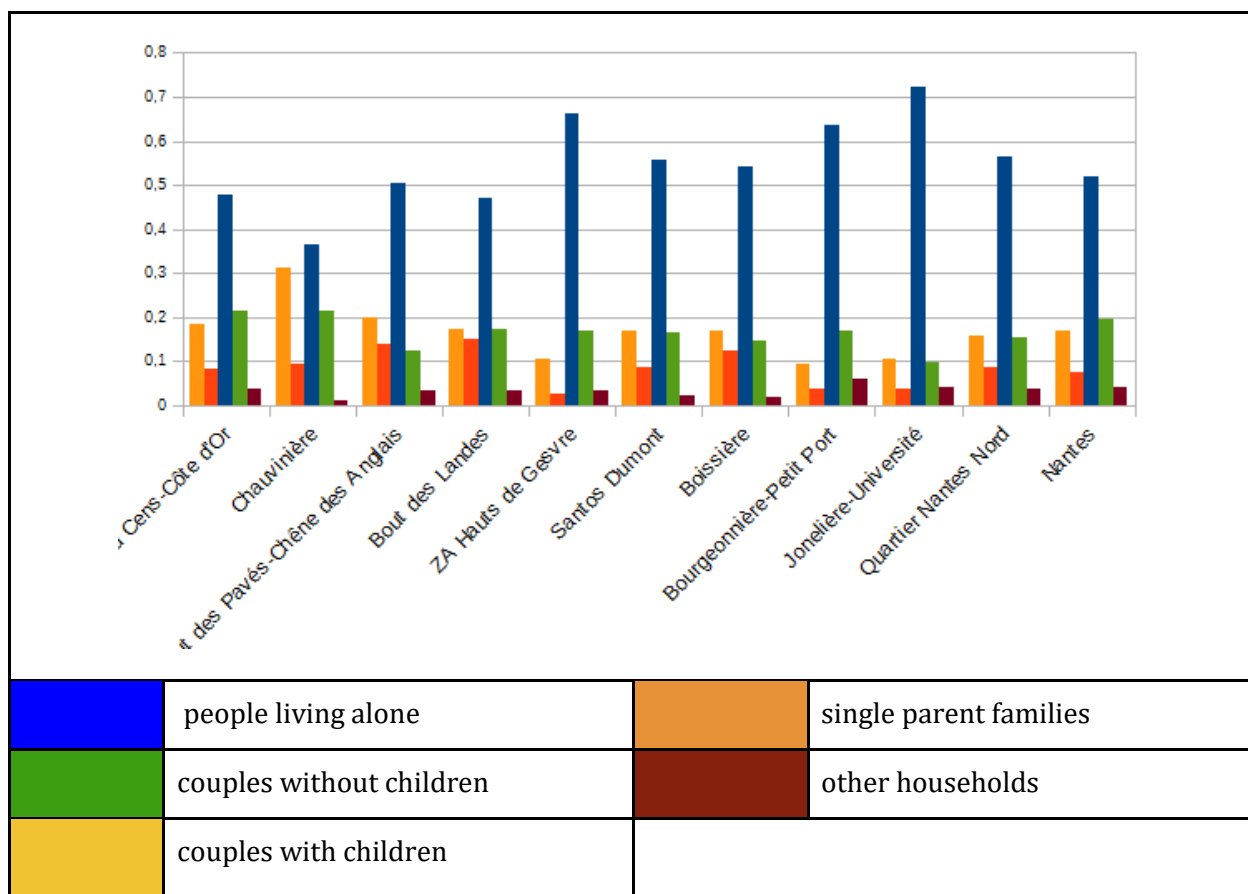


Figure 699: Household composition in 2014, in each micro district, then in the district Nantes Nord and in the City.

### 6.3.2.2 Safety and health

The ORS Pays de la Loire report on the health of the people of Nantes, produced at the request of the City of Nantes, confirmed that the Nantes Nord district has dropped out of favour on the main health indicators: health status, such as access to healthcare, or the use of preventive measures.

**For children.** Three to four times as many children are considered overweight (Figure 700) or have untreated cavities (compared to the average observed in the city). Children and youth in this district also use specialized care less often: dentist, orthodontic care, ophthalmologist, optical care.....

**For adults.** Similarly, inequalities in access to prevention are also observed for adults. For example, women residents are less likely to be involved in breast and cervical cancer screening. Premature mortality (before age 65) among men is also much higher than the city average.

The municipality public health department conducts medical examinations in all schools on the territory of Nantes, whether public or private. It gives crucial information on the health of children and made it possible to underline territorial inequalities in health as described in the city part.

The graph below shows the overweight rate and the obesity rate for children aged 5-6 years and 8-9 years. In Nantes Nord, 22% of children aged 8-9 years were overweight or obese (average Nantes 13%).

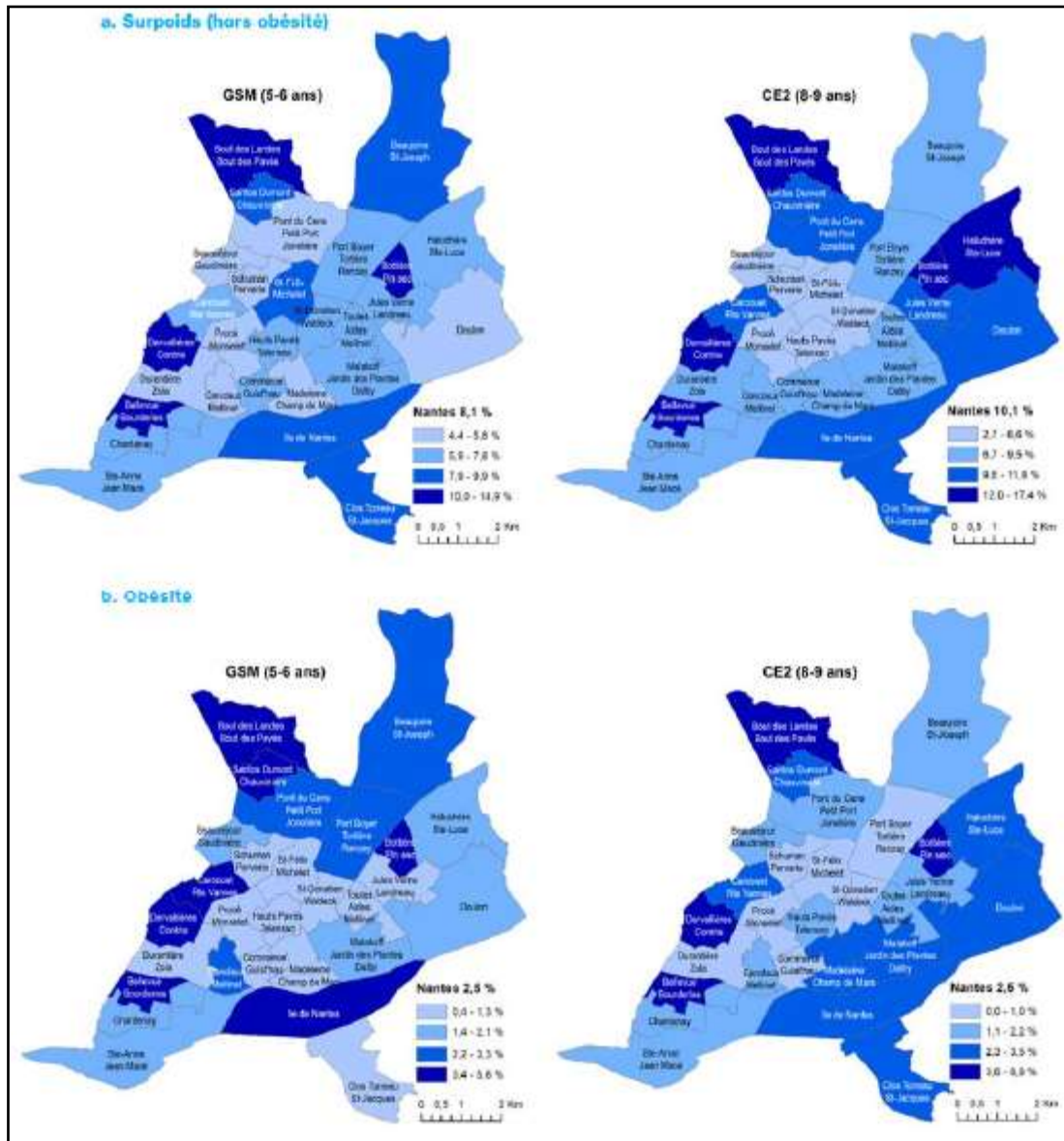


Figure 700: Proportion of overweight children (excluding obesity) and proportion of obese children by micro-district in Nantes among children aged 5-6 and 8-9 years 2012-2017, ORS Pays de la Loire

Like overweight and obesity, there is a wide disparity between districts in Nantes regarding oral health. Children in priority districts have 3 to 4 times more often than children in other districts in Nantes, two or more decayed teeth that have not been treated (Figure 701). Many studies have shown that oral health is an important marker of social inequalities in health, especially among children.

The study also highlights the importance of children's oral health status, which is a major factor in adult oral health. "But dental problems, especially cavities, can also cause children to have speech learning disabilities, malocclusions of permanent teeth and have an impact on maxillofacial growth...".

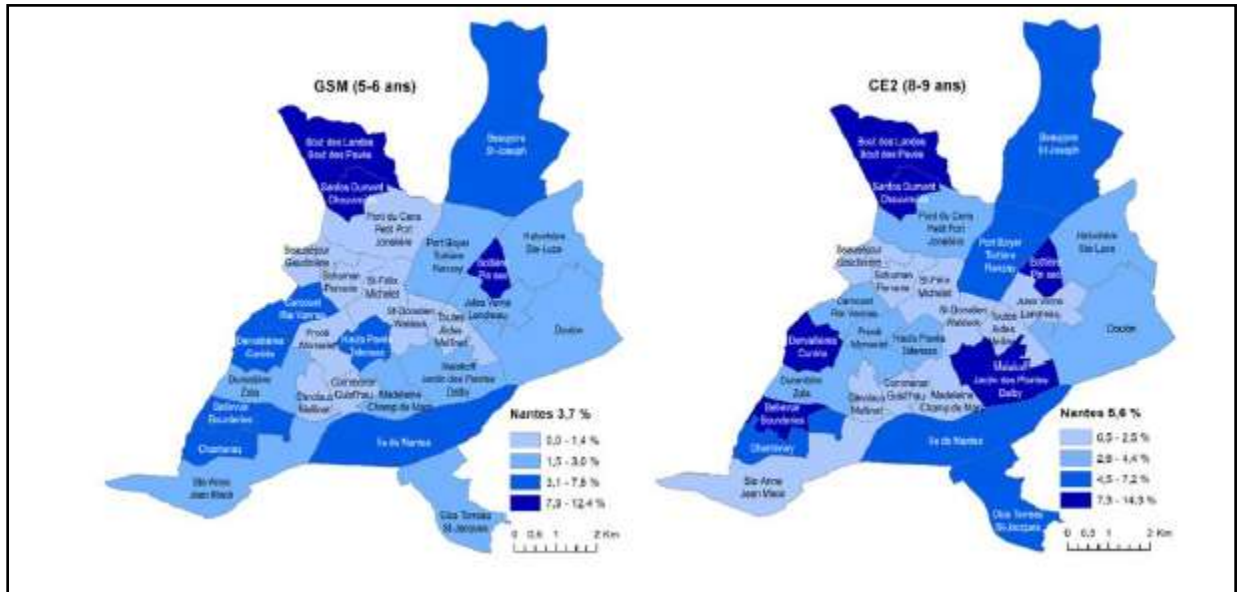


Figure 701: Proportion of children with at least two cavities in their teeth that are not treated (8-9 years old pupils - average 2014-2017)

**Premature mortality:** in the Nantes Nord district, there is a premature excess mortality (before age 65) that is 50% higher than the Nantes average for districts Bout des Pavés-Chêne des Anglais; Bout des Landes ; Chauvinière ; Santos-Dumont and Boissière. This is true for both men and women. (ORS report)

**Health coverage:** In France, low-income people (Less than €734 on average per month for a single person in December 2017.) who reside in France on a stable and regular basis may benefit from complementary universal health coverage. It allows covering, with no advance payment, expenses not covered by compulsory health insurance, within the limits of a basket of goods and services. It can be seen as an indicator of precarity.

There is a much higher gross proportion of beneficiaries of universal complementary health coverage (CMU-C) in the priority districts of Nantes Nord (28%) compared to the average observed in Nantes (13%) (Table 190). The rate of recipients of a certificate of assistance for the acquisition of a complementary health insurance is significantly higher (5.3%) compared to the rest of the City (2.1%)

Table 190: Influence of the place of residence on the ratio of beneficiaries of universal complementary health (population under 65)

	Number of beneficiaries of universal complementary health	%
<b>“Priority” neighborhood (QPV) at the city scale</b>	<b>12 591</b>	<b>33</b>
Outside “Priority” neighborhood (QPV)	13 402	8
Total Nantes	25 993	13

Source: ORS Pays de La Loire based on CPAM Loire Atlantique

### Medical demographics

With a density of 59 doctors per 100,000 inhabitants compared to 97 per 100,000 inhabitants for the city as a whole, the Nantes Nord district appears to have much less local access to general practitioners (see appendix). The population of Nantes Nord thus encounters difficulties in obtaining an appointment with a general practitioner within a reasonable time. 40% of the 108 people interviewed by the public health department in 2015 thought it was rather difficult to have an appointment with a general practitioner in this area, 55% with a dentist, and 60% of the women concerned with a midwife or gynaecologist. The difficulties are particularly encountered by residents who have recently arrived in the area, with several testimonies mentioning more than a week to obtain an appointment with a general practitioner. Concerns were also expressed by residents about retirements of doctors, who would probably not be replaced. The general practitioners installed today no longer accept new patients, and no longer travel to the homes of the inhabitants, which is a major challenge in terms of access to care for elderly people with loss of autonomy.

### Use of care and prevention

81% of residents over 16 years of age and residents of the priority district of Nantes Nord used a liberal general practitioner at least once a year in 2013, an average close to that observed for the City of Nantes (79%). However, this use of general practitioners is much more frequent in emergency situations, outside office opening hours (SOS doctors), particularly for consultations for people under 16 years of age (19% compared to 11% on average in Nantes). These figures can be partly attributed to the difficulties encountered in obtaining an appointment with a general practitioner in the area.

With regard to dental care, according to the study carried out by the ORS des Pays de la Loire, only 25% of those under 16 years of age had consulted a private dentist in the last 12 months, compared to an average of 36% in Nantes. However, according to the results of the health check-ups carried out by the Global Child Health Unit, twice as many children in the Nantes Nord district, compared to the rest of the city, had at least two untreated cavities in CE2 (12% vs. 6%). Inequalities in the use of care are therefore inversely proportional to the need for care.

The same inequalities are observed in access to prevention for adult women. It can be noted that only 32% of women in Nantes Nord had a smear in the last 24 months according to the same ORS study, compared to an average of 38% in Nantes. This gap widens further after age 40 with the lower frequency of mandatory pregnancy-related tests.

The specific work carried out on access to health and information for women in Nantes-Nord has shown that lack of information can lead to fears, and thus to a renunciation of care and screening. These fears could be allayed by encouraging exchanges. 94% of the 108 people questioned in the streets of Nantes Nord by the Public Health Department in 2015, thought it would be useful for the inhabitants of the district to be able to learn about disease prevention and screening campaigns. The inhabitants interviewed mentioned local actions that foster social ties and a need for information in a format adapted to the public.

### Promoting accessibility to health for all

The exchanges conducted in 2016 as part of the citizen workshop for the construction of the multi-professional health centre made it possible to qualify the needs and expectations of the inhabitants of Nantes Nord to promote access for as many people as possible to the

future equipment. Several principles have been formalised. The quality of the reception is of high importance since, according to the inhabitants, it must be personalised and humane, with agents capable of referring to other partners in the field of care, social services and prevention. The inhabitants also expect the structure's professionals to be trained in non-judgment and intercultural skills, taking into account the need for interpretation, with reasonable waiting times and appointments. According to them, professionals should also be able to support users in the provision of their care (mediation), working in particular with the association relays. Finally, to maintain the link between residents, prevention associations and health professionals, the governance of the equipment must, in their opinion, properly involve each of the stakeholders, particularly the inhabitants/users.

### Focus on the multi-professional health centre

In response to the needs of the inhabitants, the wishes of the liberal health professionals located in the district, and the wishes of the elected representatives of the City of Nantes, a multi-professional health centre is being set up in the micro-district "Chêne des Anglais", as part of the Global Nantes Nord Project, within the Urbinat study area. The project was co-constructed with the inhabitants, the local actors and the professionals of health. A citizen workshop, composed of 25 inhabitants, was mandated by the elected representatives to participate in the design of the project concerning the provision of care, the reception of users as well as the issues of patient support and access to prevention for the greatest number.

All the stakeholders concerned (health professionals, other interested local residents, local associations and institutional partners) were also involved in the process to enrich the recommendations during a district meeting in June 2016.

A Plural-professional Health House is a legal person constituted between medical professionals, medical auxiliaries or pharmacists, who provide care activities without accommodation. In France, health centres participate in public health, prevention, health education and social actions, as part of a health project developed collectively by the liberals who adhere to it. On Nantes Nord, the project could be developed in multi-site mode to work in collaboration with the liberals living further south of the district (Boissière, Bourgeonnière).

The expectations around this future equipment are diverse:

- Promote multi-professional practice, and make the area attractive for young health professionals to settle in.
- Facilitating access to care and the opening of related rights
- Develop prevention actions in partnership
- The City of Nantes supports the liberal health professionals who initiated this initiative in the implementation of their project. The inhabitants/future users were involved well in advance of the actual construction of the equipment, so that the founding decisions of the project would not be taken without them.

### **Health services**

In Nantes Nord, the ratio of the number of general practitioners per 1000 inhabitants is more than half of this one in the municipality (Figure 702). The map Figure 703 shows the place of establishment in three of the sub-districts of Nantes Nord.



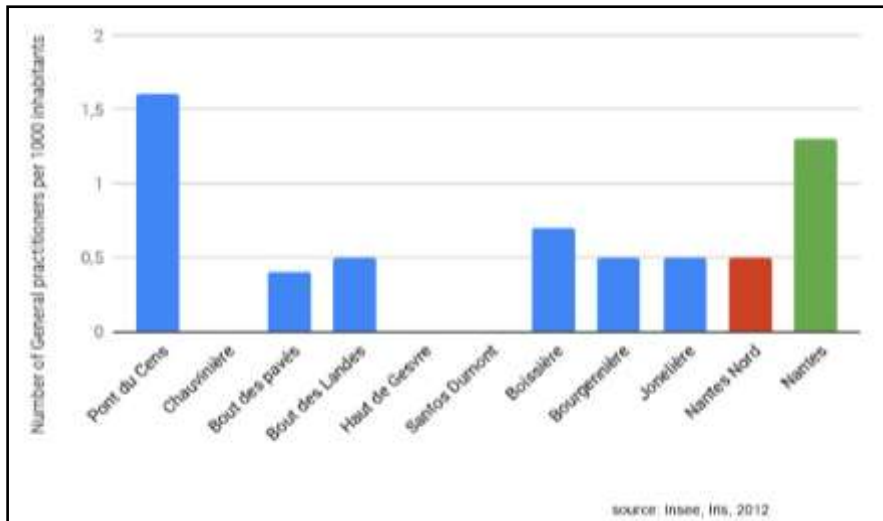


Figure 702: Number of general practitioners per 1000 inhabitants

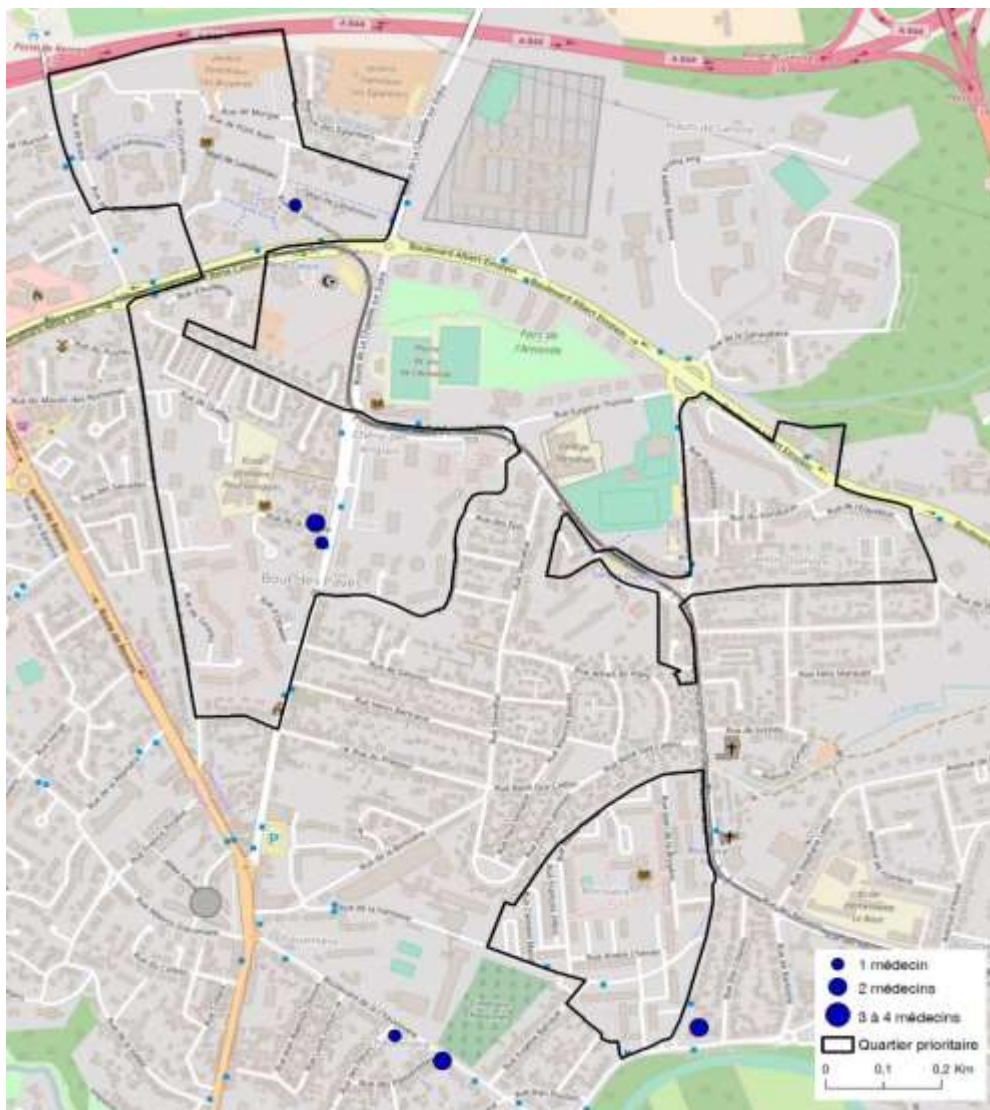


Figure 703: Establishment of general practitioners in priority districts : Bout des Landes/Bout des Pavés/Chêne des Anglais, La Petite Sensive, La Boissière (décembre 2016) - Source : RPPS (Asip Santé) - Exploitation ORS Pays de la Loire

**Safety and criminality** (extracts from germe&Jam, 2017, Diag2)

Questions relating to public security are central and have a significant impact on the living environment of the Nantes Nord district, and especially in the Urbinat study area.

The main nuisances that impact the living conditions of the inhabitants (Figure 704) are reflected in:

- Deals and trafficking, mainly drugs, that are facilitated by the urban design of certain locations, and which would have been structured, organized and professionalized in recent years;
- Youth groups, which generate nuisances and incivilities (rodeos, burned cars, aggression by maintenance staff and professionals ...), leading to a gradual privatisation of the public space;
- Continuous degradation of public spaces related to the deposit of waste, including by people who live outside the district;
- A generalized degradation of residential blocks on the common areas such as car parks, elevators, entrance halls, landings and stairwells, etc.

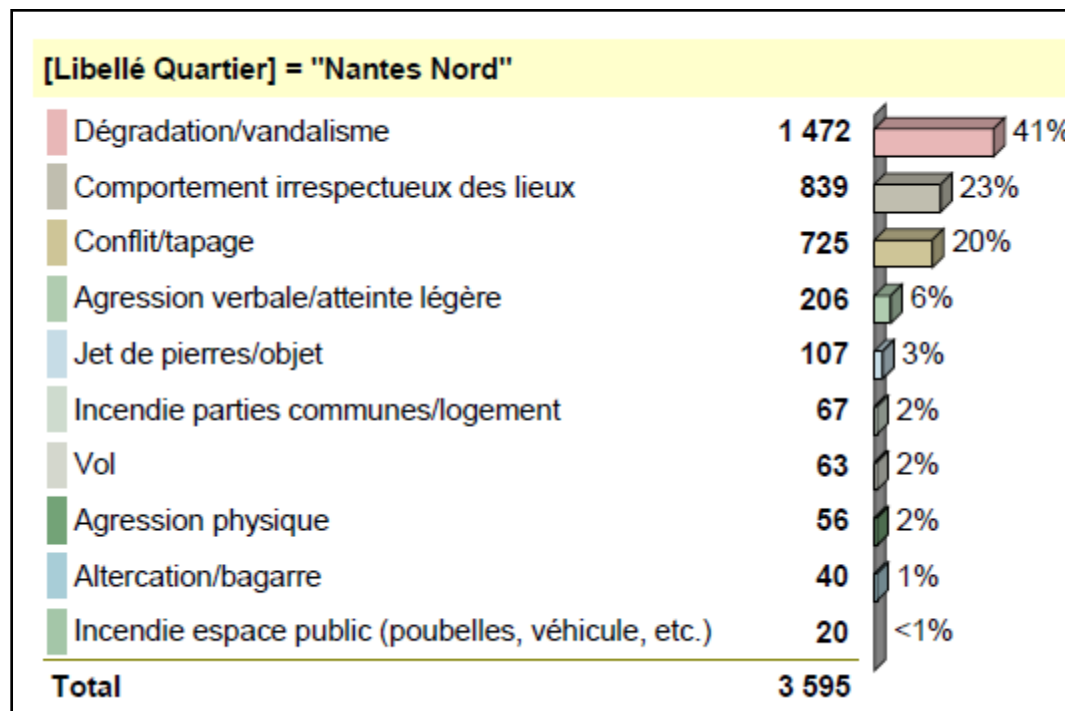


Figure 704: Record of violations of public tranquility from 2008 to 2013 (source: Ville de Nantes, 2013)

Supported by the City of Nantes and eight social landlords, the district mediators scheme meets the needs of Nantes residents for proximity and tranquillity. Nearly 30 mediators are present in eight district, 4 in the district Nantes Nord. Complementary to the interventions of the judiciary, the police and social actors, mediators are a privileged tool of social regulation for the City, within the framework of the annual territorialized contract of public tranquillity. They also facilitate the link between the inhabitants, the landlords and the different public authorities. The scheme is financially supported by the State, Semitan( the public transport company) and the social landlords.

Every week, the mediators report to the district teams and authorities on the safety of the district, the atmosphere, the major events and the points of vigilance. They also report the link they made with partners or organizations to help solving problems inhabitants shared with them.

### **Access to rights**

The municipality also organize rights access information point. Twice a month, different law experts are available at the community centre la Mano: lawyer, legal expert for women and family, legal expert for victim's assistance and a judicial conciliator. It is also possible to meet the Right defender (le Defenseur des droits) every week. It is an institution independent from State created in 2011, inscribed in the French Constitution, which role is to defend everyone whose rights are not respected and allow an equality of access to rights.

Data are only available on the national level: more than 140 000 requests of counselling or interventions and 91 316 cases processed. The staff is made of 226 persons at the headquarter and 501 persons on the territory. 874 Infopoints are distributed in France.

### **6.3.2.3 Participation**

The district was the scene of numerous co-concertation and co-construction actions from 2016 to 2019. Indeed, as previously indicated, the micro priority districts will be profoundly transformed by 2035 within the framework of the ANRU convention. Urbinat's activities are therefore part of a context where citizens have been and are already strongly mobilized.

The objectives of the first year of consultation were multiple:

- Involve the inhabitants from the beginning of the project
- Encourage ownership of a project that generates transformations in the district (pedagogy of issues)
- Manage waiting and maintain mobilization on a project long-term (15 years)
- Capturing a diverse audience

The approach aimed to implement an integrated territorial project approach, encompassing the 3 pillars of the Contract (social cohesion, economy/employment, living environment). The project was carried out on a double scale: the district and the 3 sectors.

→ Participation dynamics: Urban project based on use expertise

To achieve these objectives:

#### **1. THE PROXIMITY STRATEGY**

The presence of a permanent staff made it possible to meet the users of the territory where they are located and to respond to different degrees of involvement depending on the public. The three main approaches were door-to-door in micro-districts, interviews with resource actors, and interventions in meetings and events organized by associations or services.

## 2. MOBILIZATION IN THE PUBLIC SPACE

Interventions in the public space were both information times and times for collecting information.

Before the workshops, ground markings (Figure 705) and flyer distribution were carried out at the end of school times and in the various living areas of the district. Between the workshops meetings, walking diagnostics and trips with the three-wheeled bike made it possible to exchange with the inhabitants.

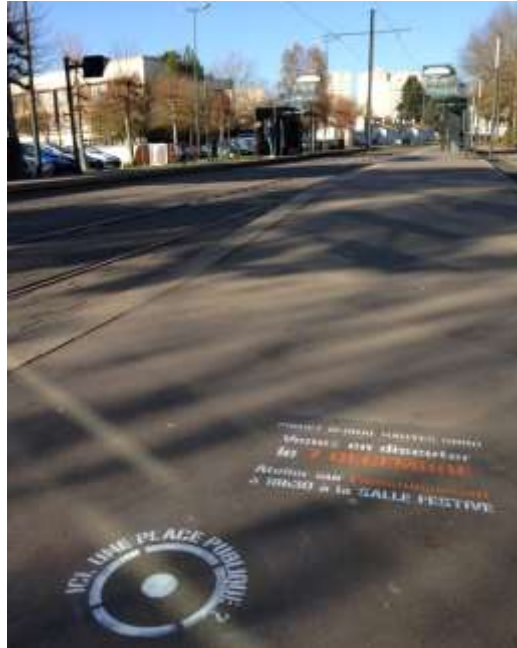


Figure 705: Communication by ground marking (Photo: Nantes Métropole)

## 3. PUBLIC MEETINGS

Public meetings are important events that provide a framework for the process and allow information to be updated. They take place in the presence of elected officials, who present the framework for intervention and the progress of the discussions.

Two public meetings have been held, one at the launch of the process in June 2016, which brought together about 250 people, and one year later, in June 2017, where 285 people came to review the past year.

## 4. THE RESIDENT WORKSHOPS

The workshops (Figure 706) are the heart of the project's co-development mechanism. They make it possible to share the project and formulate contradictory opinions that feed into the collective debate. These workshops were open to all, alternating between the North Nantes scale (3 workshops) and the micro-district scale (2 per sector), and allowing new participants to arrive along the way and share the first development intentions based on the diagnosis and take into account their comments.



Figure 706: Poster announcing participatory workshops (source: Nantes Métropole)

## 5. SPECIFIC AUDIENCES

Dedicated time has also been set up for specific audiences who rarely attend consultation workshops or who are privileged targets. Working sessions were held, in particular, with local businesses and shopkeepers, with youth associations and actors, with community workers who have in-depth knowledge of the field, and with members of socio-cultural centres as part of the reflection on the programming of a future facility.

## 6. GREEN BUILDING SITES

The projects with the inhabitants serve to prefigure the transformation of the district and to enhance the green spaces. The landscape designers of the project team supports plantations and light installations in the heart of the islets, and on actions to raise awareness among the inhabitants.

## 7. Spring of the global project (3 editions between 2017 and 2019)

May 15 to 20, 2017. The elected representatives put citizen participation at the heart of the development of the global project in Nantes Nord.

Since May 2016, exchanges with the inhabitants and users of Nantes Nord have multiplied in various forms led by the Open City consultation agency (global workshops, zooming workshops, door-to-door workshops, exploratory walks), under community control (citizen workshops, walking diagnostics, local projects, remote public workshops) or local actors (young citizen coffee, child participation kits, equipment advice from socio-cultural centres).

It is also a question of continuing to set the territory in motion, to make it sustainable and to make this project an accelerator of citizenship.



The “Spring of the project” takes place over a week and shows the abundance of approaches, audiences, in different forms by encouraging the move towards and dynamic forms (meals, citizen bus, questioning on the public space).

The 2019 edition (Figure 707) was also used to communicate around Urbinat. Several actions took place to set the ground for citizen engagement for the workshops that will start in 2020. The IRSTV team also made a presentation of the Urbinat project during the public meeting, after the presentation of the elected representatives, to raise the interest of the inhabitants to the project.



Figure 707: “Spring of the project” poster, (source: Nantes Métropole)

### Political participation

The following information corresponds to the rate of participation for the European elections that took place in 2019.

Table 191: Participation rate for two of the voting places in the Nantes Nord district

Ecoles	Bureau de vote	Participation
Chauvinière	661	43.22%
	662	44.87%
	663	26.58%
	664	40.34%
Françoise Dolto	671	34.21%
	672	42.36%
	673	41.89%

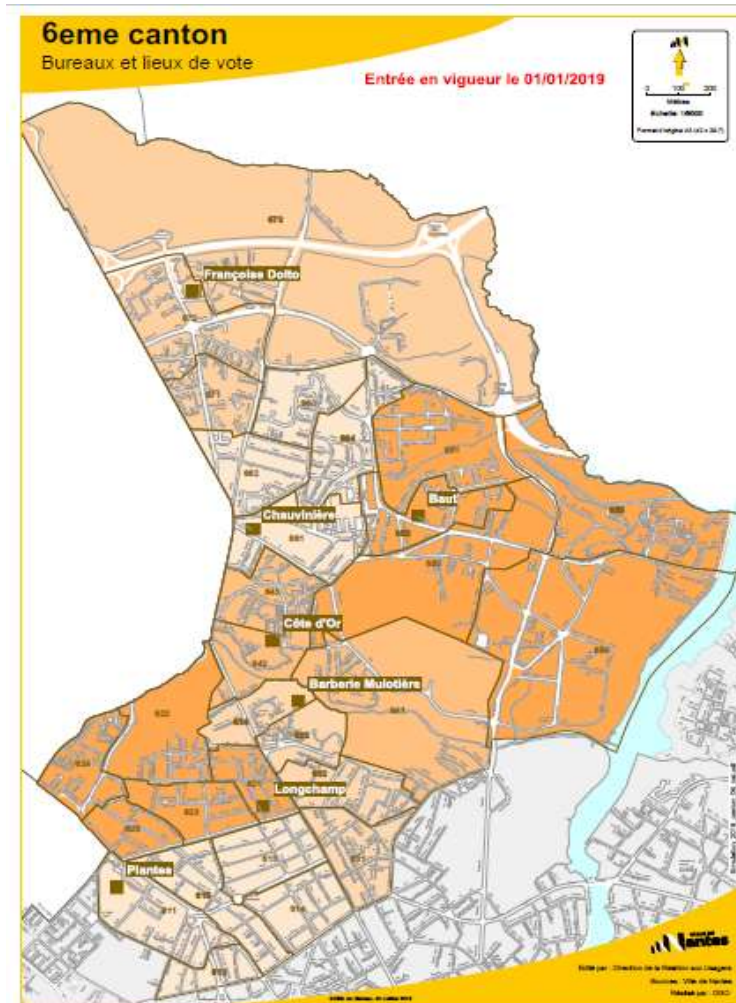


Figure 708: Map of the voting centres in Nantes Nord

### **A developed associative life, to be encouraged**

Several associations bring the district to life in Nantes Nord, and in particular within the micro-district where most of Urbinat corridor will be implemented.

In Figure 709 are mentioned the associations that are the most more structuring, with the organizations with headquarters in the district Nantes Nord on the left and associations having projects on the territory of Nantes Nord on the right :

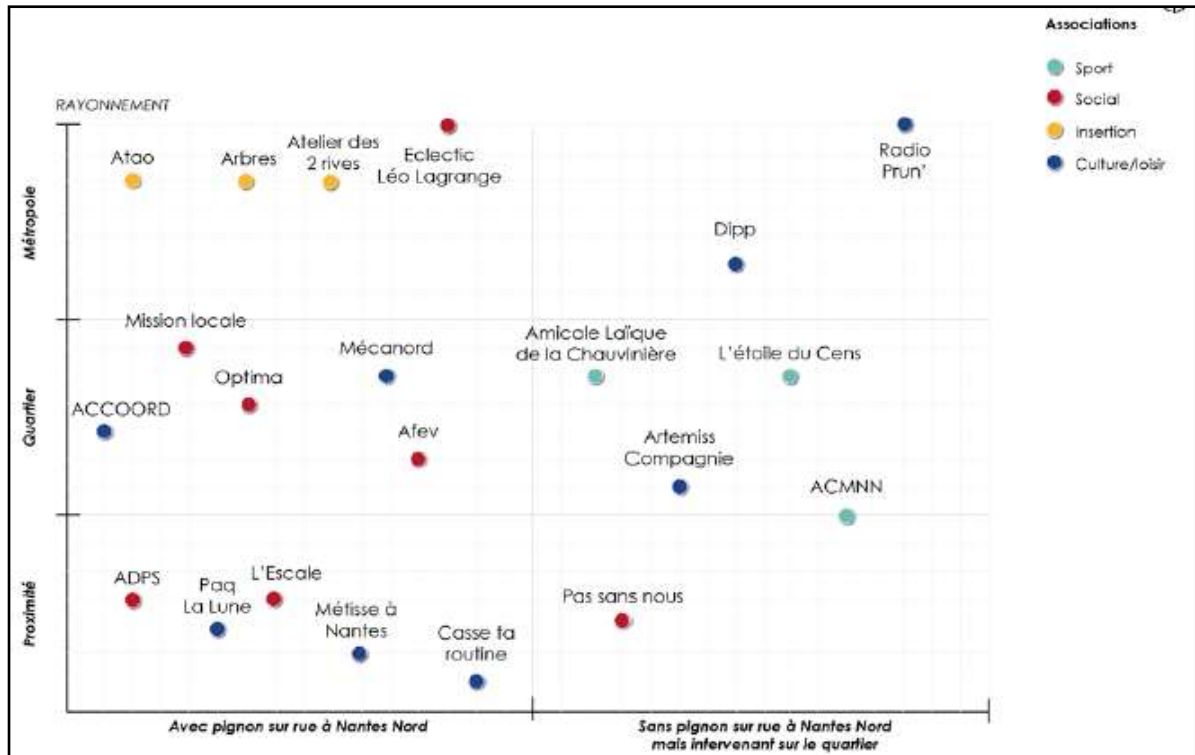


Figure 709: Associations in Nantes Nord, Germe & JAM 2017 - Ville Ouverte - Caudex - Mageo

### 6.3.2.4 Public services

As stated previously in the report, Nantes Nord benefits of several public equipment and is very well connected to the city centre by an efficient public transport network.

34 % of the households in the district do not own a car, 49 % own one car and 16% own two cars.

Means of transportation to go to work of the employed are between 15 to 64 years old. 59 % use a car or similar, 28 % public transports, 6 % bikes or similar, 5 % walk, and 2% do not need transportation (Figure 710).



Figure 710: Travel modes rates between Home-Work place in 2014

### Subjective well being - "Baromètre GUSP" survey

Since 2009, a survey on well-being and quality of life ("Baromètre GUSP") is conducted in Nantes. It focuses on the 15 "QPV" ("priority"/deprived districts) included in Nantes metropolitan area. It aims to find out how residents feel about their living environment, the image of their neighbourhood, improvements and dysfunctions.

It was conducted in March 2018 (but also in 2009, 2012 => to be confirmed) and in 2014. There are 150 people surveyed per QPV (It means a total of 450 people surveyed in Nantes Nord).

In the Urbinat study area (Nantes Nord), there are 3 QPV that approximately cover the half of the district. They have been slightly reshaped for the survey to get more details on certain areas, or to get more homogeneous districts regarding population size.

The survey was conducted by TMO Régions (a polling private institute). It is a phone survey with 63 questions (including personal information: gender, age, etc.)

Table 192 presents some of the results especially focusing on well-being regarding the urban environment.

Table 192: Result extracts of 2018 version:

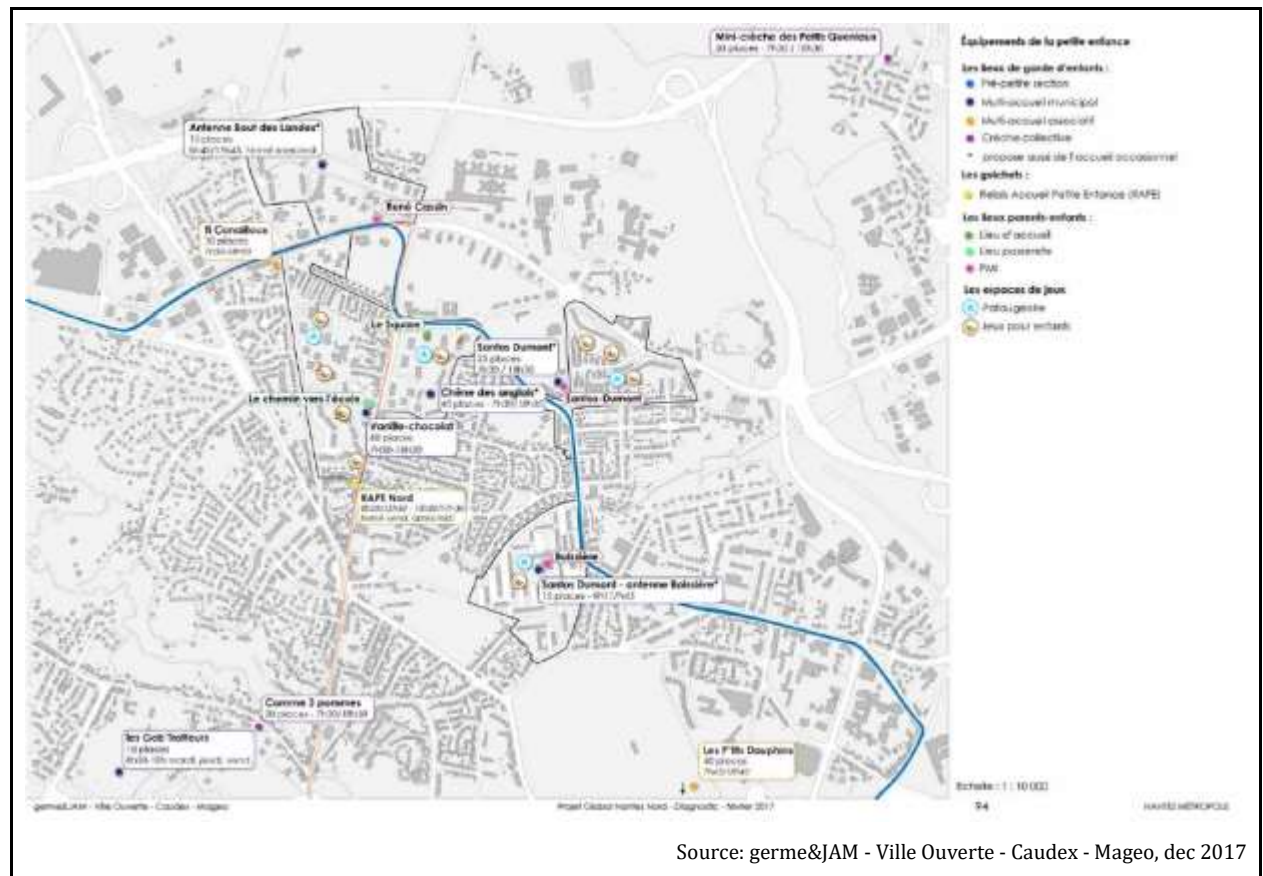
	Would you say your neighbourhood is very pleasant, quite pleasant, not very pleasant or not at all pleasant to live in?	You would describe your neighbourhood as a neighbourhood: Very safe, Quite safe, Not very safe, Not safe at all or Don't know	In general, would you say that the living environment in your neighbourhood tends: To improve, To deteriorate, No change, No opinion.														
Micro-districts	<p>Bout des Landes</p> <p>Bout des Pavés Chêne des Anglais</p> <p>Petite Sensive Boissière</p>	<p>Bout des Landes</p> <p>Bout des Pavés Chêne des Anglais</p> <p>Petite Sensive Boissière</p>	<p>Bout des Landes</p> <p>Bout des Pavés Chêne des Anglais</p> <p>Petite Sensive Boissière</p>														
Evolution (compared to 2014)	<p>●</p> <p>●</p> <p>●</p>	<p>●</p> <p>●</p> <p>●</p>															
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	No change, No opinion																
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## Public services available inside the Urban agglomerate:

### Childhood care and education

The high proportion of 0-14 and 0-30 years old people living in the perimeters of the micro-districts make them major public for the municipal public action. They must be the subject of particular attention. Studies have also showed the link between childcare and parents' return to work, which is important to consider in a district as Nantes Nord with high rate of unemployment.

On the scale of the Nantes Nord district, there are 5 establishments for the care of young children, including two associations (including one on the edge of the sector) and three city run establishments (Figure 711). They offer a capacity of 245 places, including community and municipal reception, for 2,453 children from 0-3 years old. The Nantes Nord district thus offers 10 places per 100 young children, which is less than the national average in 2014 (16.6 places). Some establishments allow childcare in very Small Section (2-3 years old).

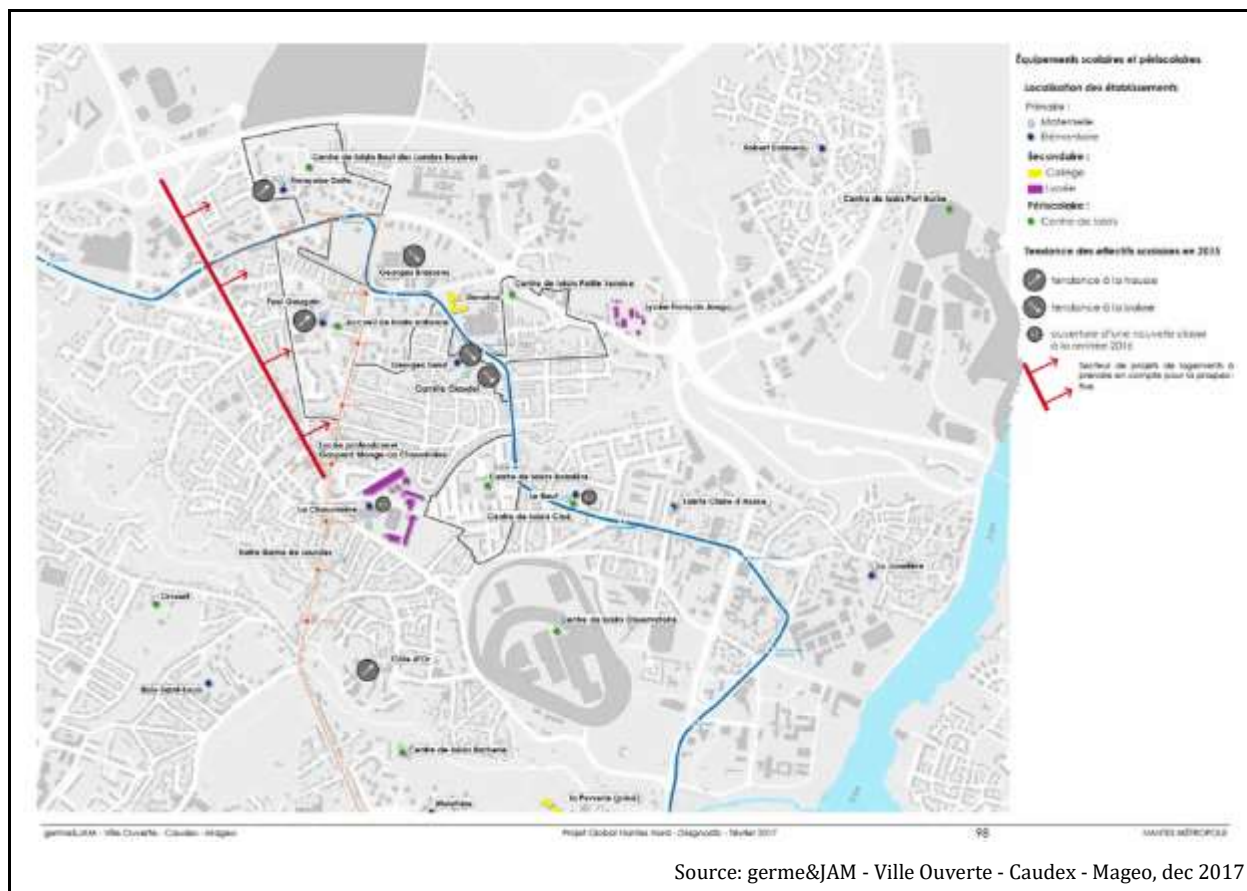


Source: germe&JAM - Ville Ouverte - Caudex - Mageo, dec 2017

Figure 711: Map of the equipment for early childhood: kindergartens (public, private, associations), playgrounds for children and paddling pool.

The educational offer (Figure 712) is also essential to meet the needs of the inhabitants, to make the Nantes Nord district an integration lock, especially for the most vulnerable populations, and develop the residential attractiveness of the district.





Source: germe&JAM - Ville Ouverte - Caudex - Mageo, dec 2017

Figure 712: Map of the schools, from primary to secondary schools, and leisure centres

The Nantes Nord district has 11 schools (kindergarten/elementary) and 2 private schools. The school population increased between 2010 and 2015, of nearly 7.7% in elementary and kindergarten.

To meet this increase, additional classes are regularly opened in existing equipment. Schooling needs are induced by the new housing operations (Route de Rennes, Bout des Landes) and the renewal of the pavilion population (arrival of young households with children). This dynamic is part of the context demographic growth of the City of Nantes, which is opening in average of the equivalent of a school group each year for 5 class levels.

### Sport infrastructures

Figure 713 shows the sport equipment located in the district and the Figure 714, the level of attendance of the sport equipment. It shows that most of them are very popular.

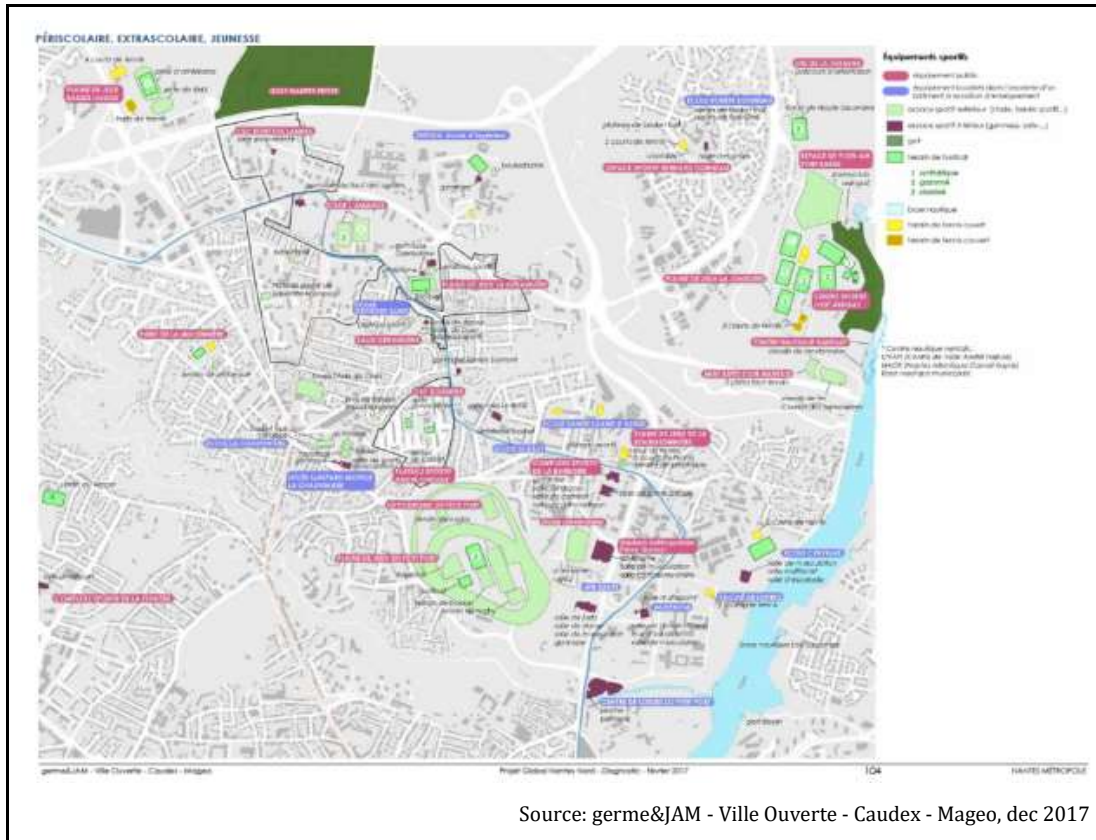


Figure 713: Map of the sport facilities, in pink the public ones, in blue the ones located within an educational institution

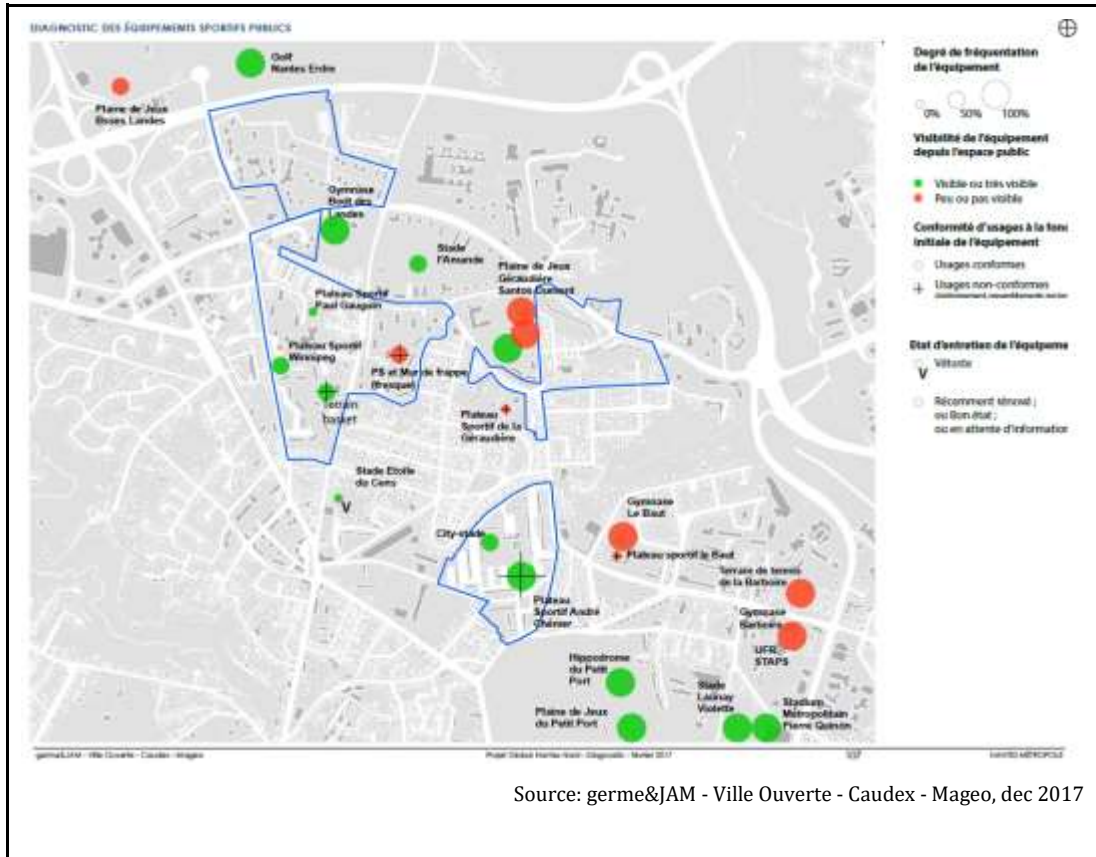


Figure 714: Map of the sport facilities, and their level of attendance (small circle, medium, large) and visibility from public space (green very visible, red not visible), in blue line the perimeter of social housing district (micro-district)

The district also offers 6 collective gardens on the territory with 205 plots (Figure 715) : l'Angle Chaillou (1), l'Amande (2), les Bruyères (3), les Eglantiers (4), la Cressonnière (5) et les Renards (6)



Figure 715: A collective garden plot in the Amande park (Photo: germe&JAM - Ville Ouverte - Caudex - Mageo, dec 2017)

**Satisfaction with public services**

GUSP survey (2018)

	<p>Would you say that the public authorities, (the municipality, the urban community and other institutions) are: Very attentive/ Fairly attentive / Not very attentive / Not at all attentive to the quality of life in the neighbourhood , No opinion</p>								
<p>Micro-districts</p>	<table border="1"> <thead> <tr> <th>Micro-district</th> <th>Satisfaction Level (%)</th> </tr> </thead> <tbody> <tr> <td>Bout des Landes</td> <td>46%</td> </tr> <tr> <td>Bout des Pavés Chêne des Anglais</td> <td>35%</td> </tr> <tr> <td>Petite Sensive Boissière</td> <td>49%</td> </tr> </tbody> </table> <p>Fairly attentive</p>	Micro-district	Satisfaction Level (%)	Bout des Landes	46%	Bout des Pavés Chêne des Anglais	35%	Petite Sensive Boissière	49%
Micro-district	Satisfaction Level (%)								
Bout des Landes	46%								
Bout des Pavés Chêne des Anglais	35%								
Petite Sensive Boissière	49%								
<p>Evolution (compared to 2014 and 2012)</p>	<p>-20 %</p>								

### 6.3.3 Economic description

Despite a very good network of local equipment and the presence of economic activity centres, the priority micro-districts do not benefit of the economic development. The indicators are worrying: unemployment, health, security, etc.

#### 4.3.1. Income and poverty

##### Average familiar income

In 2011, the median income was 1378 €/month in Nantes Nord and 1636 €/month for the average of the city of Nantes (Figure 716).

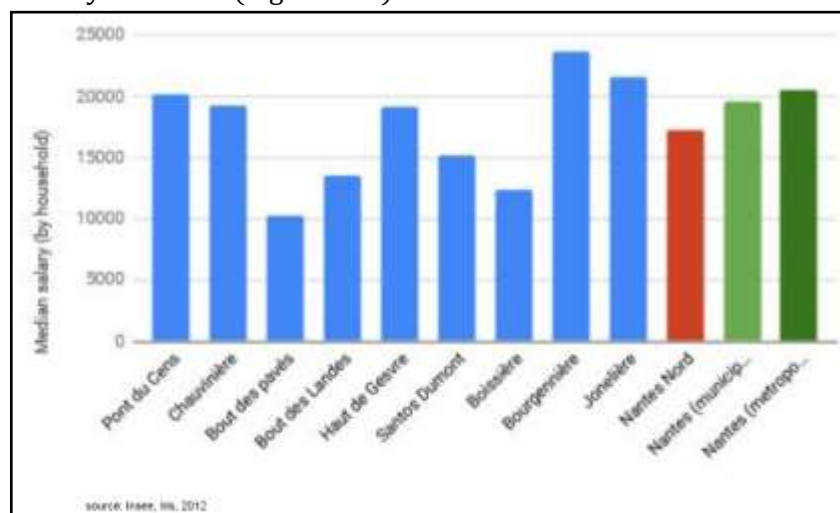


Figure 716: Median annual salary by household in the 9 sub-districts of Nantes Nord in 2012

Data provided by the family allowance fund (CAF) shows that Nantes Nord is the second district of Nantes for the number of beneficiaries of the RSA (Table 193), a French social benefit, that guarantee a minimum income, with a corresponding obligation to seek employment or to define and follow a professional project aimed at improving one's financial situation. The monthly amount of assistance for a single person without means is 550.93 euros per month, or 826.40 euros for a couple without children or 1,156.96 euros for a couple with two children. As indicated in the figure below, the rate for Nantes Nord is increasing (+ 36% from 2009 to 2016).

Table 193: evolution of the number of beneficiaries of the RSA (2009-2016)

	Number of RSA (a social security benefit) beneficiaries		Evolution (2009-2016)		Rate of households benefiting from the RSA (%)	
	2009	2006	Number	%	2009	2016
TP Bellevue Nantes	750	882	+132	+17,6	14,3	16,8
TP Dervallières	381	502	+121	+31,8	19,9	24,4
TP Malakoff	273	304	+31	+11,4	24,7	23,6
TP Breil-Malville	276	374	+98	+35,5	15,8	21,5
TP Quartiers Nord	684	930	+246	+36,0	11,9	16,3
TP Port-Boyer	149	198	+49	+32,9	13,4	17,9
TP Bottière Pin-Sec	369	540	+171	+46,3	14,9	22,2
TP Clos Toreau	93	166	+73	+78,5	9,8	12,2
TP La Halvêque	171	233	+62	+36,3	8,5	10,1
TP Bellevue St-Herblain	369	456	+87	+23,6	11,6	14,7
TP Sillon de Bretagne	199	227	+28	+14,1	21,8	28,1
TP Château	174	259	+85	+48,9	8,8	13,3
TP Plaisance	84	163	+79	+94,0	6,8	13,3
TP Ranzay-Grand Clos	81	137	+56	+69,1	5,8	10,2
TP Bellevue Nantes St-Herblain	1 119	1 338	+219	+19,6	13,3	16,0
TP Nantes Métropole	4 053	5 371	+1 318	+32,5	13,1	17,0
Territoires de veille	477	700	+223	+46,8	4,1	5,8
Nantes Métropole	12 957	18 073	+5 116	+39,5	4,8	6,3

\* Nombre de bénéficiaires du RSA en 2016 (le RSA activité n'existant plus)  
 Depuis le 1er janvier 2016, le RSA activité a laissé place à la prime activité. Il s'agit d'une nouvelle aide aux travailleurs possédant des revenus modestes. L'aide n'est pas automatique, il faut faire une demande de RSA.

Source: Caf de Loire-Atlantique in diagnostic territorial des territoires prioritaires de Nantes Métropole, Compas oct 2017

Table 194: Rate of beneficiaries of the RSA by family status. We can see that the two main categories are single men without children (37.5 %) and single parent families (32.7%).

	Single men without children (%)	Single women without children (%)	Single-parent family (%)	Couples without children (%)	Couples with children (%)
TP Bellevue Nantes	34,7	12,1	36,1	2,8	14,3
TP Dervallières	31,5	13,3	39,2	1,8	14,1
TP Malakoff	29,3	17,8	35,9	2,6	14,5
TP Breil-Malville	22,2	16,6	44,7	2,7	13,9
TP Quartiers Nord	37,5	15,1	32,7	2,4	12,4
TP Port-Boyer	33,3	14,1	39,9	0,5	12,1
TP Bottière Pin-Sec	39,8	12,2	33,7	1,3	13,0
TP Clos Toreau	24,1	13,3	52,4	3,6	6,6
TP La Halvêque	31,3	15,5	39,5	2,1	11,6
TP Bellevue St-Herblain	31,4	12,1	39,9	1,3	15,4
TP Sillon de Bretagne	41,0	13,2	25,1	2,2	18,5
TP Château	30,1	12,7	45,9	0,8	10,4
TP Plaisance	33,7	13,5	38,0	0,6	14,1
TP Ranzay-Grand Clos	31,4	17,5	36,5	3,6	10,9
TP Bellevue Nantes St-Herblain	33,6	12,1	37,4	2,3	14,6
TP Nantes Métropole	33,3	13,9	37,3	2,1	13,3
Territoires de veille	36,4	15,5	34,7	2,4	11,0
Nantes Métropole	41,4	17,6	28,6	2,6	9,8

Source: Conseil départemental 2016 in diagnostic territorial des territoires prioritaires de Nantes métropole, Compas oct 2017



Data is also available at a district level regarding the beneficiaries of the “Allocation Adulte Handicapé”, the disabled adult allowance, showing that Nantes Nord is the district of Nantes with the highest number of disabled adult allowance beneficiaries (Table 195).

Table 195: Beneficiaries of the disabled adult allowance 2009-2016

	Number of AAH (disabled adult allowance) beneficiaries		Evolution 2009-2016		Rate of households benefiting from the AAH (%)	
	2009	2016	Number	%	2009	2016
TP Bellevue Nantes	398	404	+6	+1,5	7,6	7,7
TP Dervallières	163	201	+38	+23,3	8,5	9,8
TP Malakoff	94	128	+34	+36,2	8,5	10,0
TP Breil Malville	112	149	+37	+33,0	6,4	8,6
TP Quartiers Nord	310	411	+101	+32,6	5,4	7,2
TP Port-Boyer	51	77	+26	+51,0	4,6	6,9
TP Bottière Pin-Sec	193	272	+79	+40,9	7,8	11,2
TP Clos Toreau	63	96	+33	+52,4	6,6	7,1
TP La Halvêque	86	154	+68	+79,1	4,3	6,7
TP Bellevue St-Herblain	145	192	+47	+32,4	4,6	6,2
TP Sillon de Bretagne	79	75	-4	-5,1	8,7	9,3
TP Château	107	147	+40	+37,4	5,4	7,5
TP Plaisance	46	59	+13	+28,3	3,7	4,8
TP Ranzay-Grand Clos	61	95	+34	+55,7	4,4	7,1
TP Bellevue Nantes St-Herblain	543	596	+53	+9,8	6,5	7,1
TP Nantes Métropole	1 908	2 460	+552	+28,9	6,2	7,8
Territoires de veille	298	419	+121	+40,6	2,6	3,5
Nantes Métropole	7 361	9 971	+2 610	+35,5	2,8	3,5

Source: Caf de Loire-Atlantique and INSEE RP 2013 in diagnostic territorial des territoires prioritaires de Nantes métropole, Compas oct 2017)

## Ownership of durable assets

Nantes Nord concentrates the highest rate of social housing in Nantes and counts:

- 25 % of owners
- 35% tenant of private housing
- 40% tenant of social housing
- 1% are housed free of charge

(data from census 2014)

We also have indications regarding the age of the main residence in the district (Figure 717). We can see that more than half of the dwellings were constructed before 1990 (36 % between 1971 and 1990, 26% between 1946 and 1970). We can also see that there are very few dwellings with strong heritage interest.

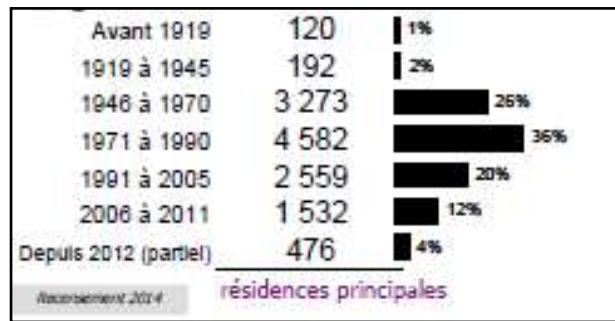


Figure 717 : Construction age of the main residence in Nantes Nord

### Houses without central heating

Data on the main fuel of main residences in the district: 11% district heating, 47 % mains gas, 2% fuel oil, 38 % electricity, 1% other.  
(data from census 2014)

### New construction and the new real estate market

The housing market in Nantes Nord is dynamic. The administrative district of Nantes Nord has an average of production of 313 new homes per year, but less than 10% of the production of the city of Nantes.

The selling prices (3682 euros/m<sup>2</sup> on average on North Nantes) are below the city average of Nantes (3979 euros/m<sup>2</sup>) and similar to the average of the metropolitan area (3702 euros/m<sup>2</sup>), and which have been declining since 2015 and continue to do so while prices are rising in the city of Nantes and the metropolitan area.

Other main characteristics:

- a significant proportion of sales to investors (90% of the sales in Nantes Nord compared to 63% in Nantes)
- a speed of commercialization of programs located on Nantes Nord on average lower than the one of Nantes (1.66 homes sold per month in Nantes)

### A strong price attractiveness of the existing market:

The selling prices of old homes in the Nantes Nord (2280€/m<sup>2</sup>) are largely below the Nantes average (2500€/m<sup>2</sup>), so is the average price of homes (€231,400 on average in the district against 286.300€ for the city).

The profile of home buyers: young families, involved in the rehabilitation of their housing and the future of their neighbourhood (people aged 25 to 39 (47%)) and 40-49 years (38%).

An endogenous market: 75% of buyers are essentially from Nantes.

The diagnosis of the PLH 2010-2016 ( the local housing plan) showed the growing difficulty of households in the metropolitan area to access housing in accession due to the rise in property prices, in dropout from income. The result is a blocking of residential routes, with forced maintenance of households in renting, and a departure of households towards areas of the urban area increasingly remote.

To counter this dynamic, the metropolitan area has an affordable housing policy that facilitates access to home ownership for households with limited financial resources, and improves the success of residential routes, in particular those of the inhabitants of the social rental stock. This policy is based on collective housing prices so-called "affordable", negotiated with operators, and capped at 2500 €/m<sup>2</sup> including VAT parking included against 3979 €/m<sup>2</sup> including VAT in average in the free market in Nantes.

### Rent

In the Nantes Nord district, the median rent is around 10.3€/m<sup>2</sup> for the northernmost part (Bout des Landes, Bruyères) which corresponds to the social housing area. It is higher in the south around Petit Port (11.5 €/m<sup>2</sup>).

### Poverty

The poverty rate reaching from 7.3 % to 45.4 % is increasing and hits children, teenagers, single parent families but also people living alone. The highest poverty rates of the inhabitants under 65 years old is concentrated in the priority districts of Nantes Nord: Bout des Landes, Bout des Pavés-Chêne des Anglais, Santos Dumont, Boissière where the poverty rate starts at 23.8% but goes up to 46.4 % (Figure 718). It is a very concerning rate that shows the vulnerability of the district.

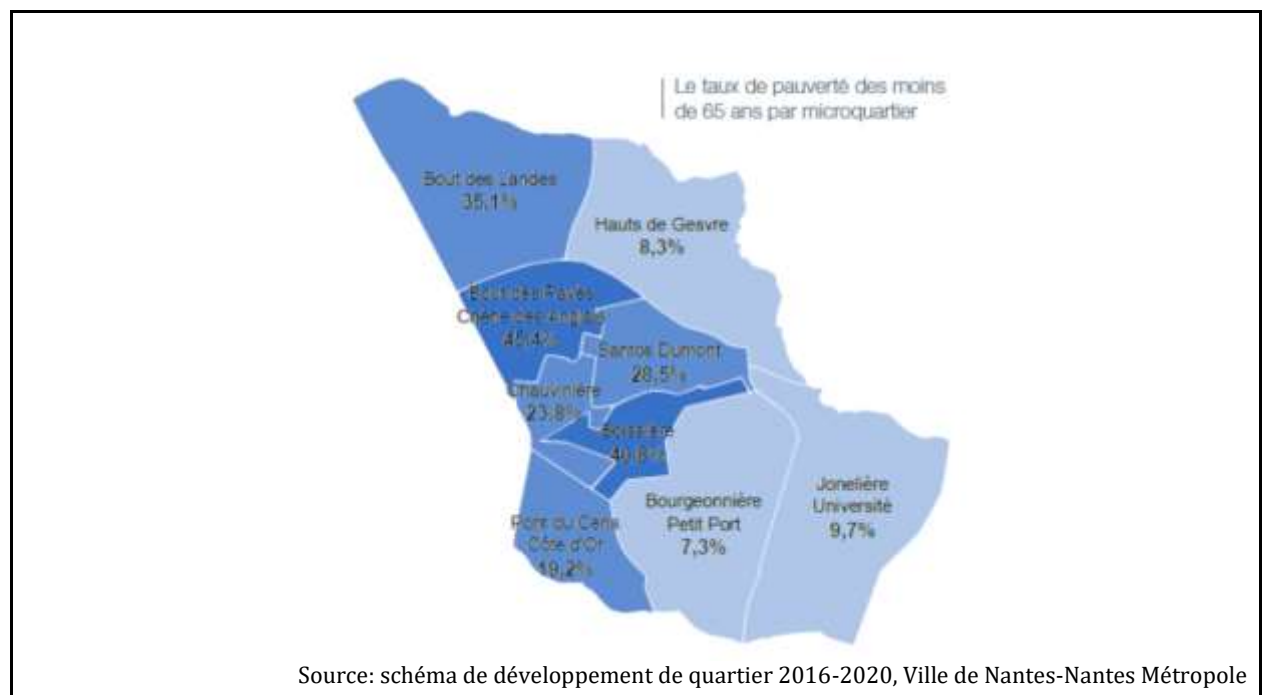


Figure 718: Poverty rate in Nantes Nord district

### 6.3.3.1 Employment

The agency for urban studies on the Nantes metropolitan area AURAN (Agence d'études Urbaines de l'Agglomération Nantaise), estimated the number of jobs in the district Nantes Nord district at 10,039 (AURAN 2015 data from INSEE SIRENE, commune-Iris-Carreau) Table 196 shows the distribution by sector.

Table 196: Distribution of employment by sector in Nantes Nord, Source AURAN

Sectors	Number of jobs
Agriculture, timber production and fishing	13
Industries	90
Construction	310
Commerce, transport and services	4638
Public administration, education, public health and social action	4988

But the employment and the activity sectors located within the district don't benefit to the inhabitants of the social housing district. .

### Unemployment rates

The latest indicators available on the unemployment indices (2015) must be analysed in terms of the priority micro-district to reveal an imperceptible situation if you position yourself at the district level.

As for all the indicators, high disparities exist within this patchwork district. The unemployment rate oscillates between 9 to 24.5 % within the micro-district of Nantes Nord. The micro-districts of the Bout des Landes, Bout des Pavés - Chêne des Anglais and la Boissière claim much higher unemployment indices (category A) than the indices of the district as a whole and those that apply to the city of Nantes (Figure 719).

Visibility regarding the Petite Sensive is more difficult because it is understood within a larger IRIS, not corresponding to the limits of the micro-district. .

The most vulnerable populations in terms of employment are seniors, women and young people (Table 197).

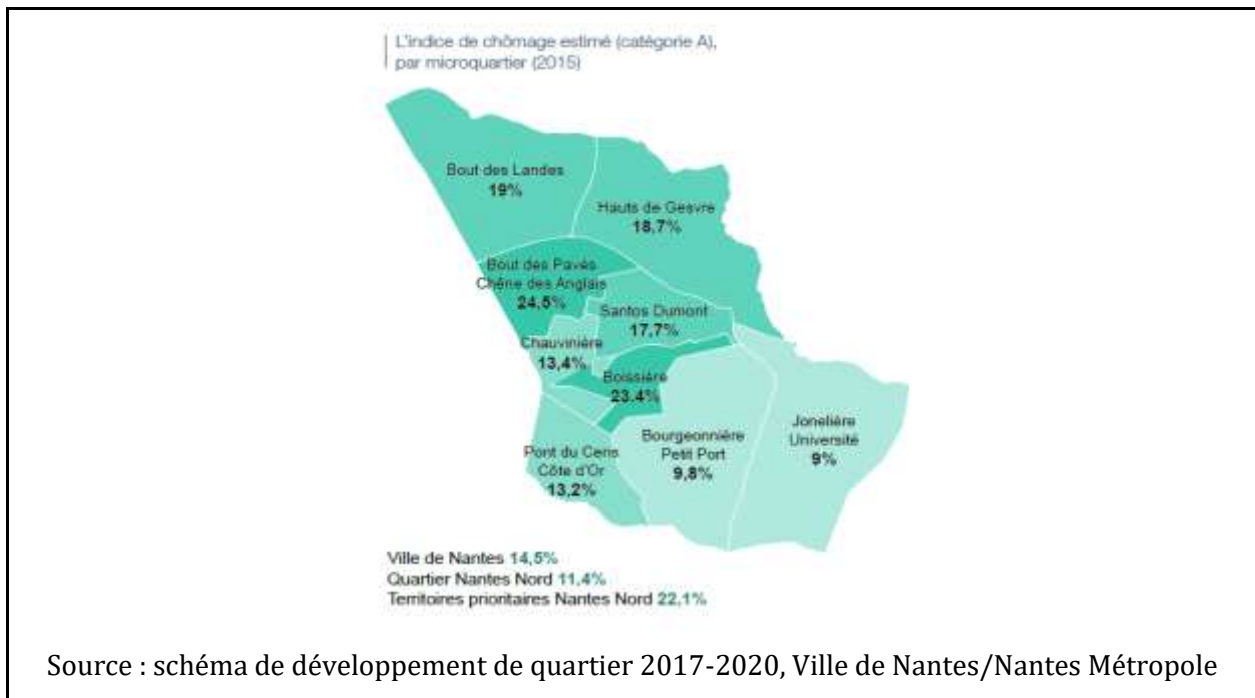


Figure 719: Unemployment rate by-micro-district, Nantes Nord

Table 197: Unemployment rates by gender and category

Nantes Nord sub-districts	ABC-Men	ABC-Women	ABC-Total	Category A	Category B	Category C
Pont du Cens-Côte d'Or	20,0	20,0	20,0	<b>13,6</b>	2,6	3,8
Chauvinière	25,8	25,9	25,9	<b>15,0</b>	3,6	7,2
Bout des Pavés-Chêne des Anglais	39,2	38,0	38,6	<b>27,5</b>	4,3	6,7
Bout des Landes	29,0	31,6	30,2	<b>18,2</b>	4,0	7,9
ZA Hauts de Gesvre	28,1	23,4	25,8	<b>14,8</b>	6,0	4,9
Santos Dumont	29,2	24,6	26,9	<b>17,8</b>	3,4	5,6
Boissière	37,5	34,9	36,2	<b>23,9</b>	4,3	8,0
Bourgeoynière-Petit Port	13,5	18,3	15,9	<b>10,7</b>	2,0	3,2
Jonelière-Université	12,4	16,5	14,2	<b>8,8</b>	2,4	3,1
<b>Nantes Nord</b>	<b>26,1</b>	<b>25,9</b>	<b>26,0</b>	<b>16,7</b>	<b>3,6</b>	<b>5,6</b>
Nantes	21,2	21,7	21,4	13,5	3,3	4,6
Unité Urbaine Nantes	16,3	17,1	16,7	10,2	2,6	3,9

CAT. A: people without any activity  
 CAT. B: part-time employees (78h per month max.)  
 CAT. C: part-time employees (more than 78h per month)

Table 198 shows the evolution of the distribution of job seekers by sector of activity in the district Nantes Nord. We can see that 26.2 % concerns the sector personal care and community services, 13.7 % the construction sector and 11.8 % the transport and logistics sector.



Table 198: Evolution (2010-2017) of the distribution of job seekers by sector of activity

	Number	%	Evolution 2010-2017 (%)
Agriculture, fishing	67	3.2	+109.4
Craftsmanship	13	0.6	+44.4
Banking, insurance, real estate	12	0.6	+140
Trade	225	10.8	+3.7
Communication	22	1.1	0
Construction	285	13.7	+5.2
Hotel trade, Catering, Tourism	175	8.4	+36.7
Industry	150	7.2	+158.6
Installation and maintenance	60	2.9	+3.4
Health	72	3.5	+1.4
People care	543	26.2	+17.8
Culture and art	24	1.2	+14.3
Business service	177	8.5	+12
Transport and logistic	245	11.8	+21.9
<b>Total</b>	<b>2 076</b>	<b>100</b>	<b>+13.2</b>

source: Pôle emploi 2010

Data on social or employment allowance at district level are also available (Source PLH, Nantes Métropole) and shows a high rate of beneficiaries. Though, field teams consider that the number is underestimated due to the complexity of administrative procedures.

- 37% of the households with a low income benefited from financial help of the Community Centre for Social Action in 2017

### 6.3.3.2 Activity sectors

The Nantes Nord district is characterised by a very high density of fringe economic activity zones as stated in the map below). Some of these activity zones are located within the perimeter of the district:

- Activity zone of the “Géraudière”
- Activity park of the “Rivière”
- University sector

and some of them on the immediate periphery of the district in neighbouring municipalities:

- Gesvrine activity zones in La Chapelle sur Erdre
- Orvault Grand Val business park in Orvault

-

The activities present in the heart of the district have very little visibility, and exchanges with the activity zones located on the fringes are very low or non-existent. Thus, the pole of agri-food excellence (Oniris, INRA, Cap alimentaire...) located in La Géraudière is invisible to the rest of the district.

The Nantes Nord district has many local shopping centres in the heart of the districts (route de la Chapelle, Boissière, Bourgeonnière), operating in a disparate way. Indeed, if the bud-breeding centre works very well, with high-quality premises and facades, the centre on the road to La Chapelle is more diluted, and includes ageing commercial premises. As for the Boissière shopping centre, it suffers from an advanced state of disrepair of the premises, and from a strong proximity to the Bourgeonnière centre, which raises the question of its maintenance on this site.

We can therefore observe the proven or future obsolescence of these commercial centres, which will require in the coming years, to modernise the commercial offer in order to maintain this vector of local animation in the district, which are also essential to the elderly living in the district.

Within the perimeter of the district (excluding the Gesvrine and Orvault Grand Val sectors), the most visible companies with the largest number of employees are located along Boulevard Einstein and Parc d'activités Rivière (Eurofins, KPMG, LCL, etc.) (Figure 720). These companies have little or no relationship with the economic fabric located in the heart of the district, composed mainly of shopkeepers and craftsmen. There is no business club or association of territorial traders.

The Nantes Nord district is also characterised by the presence on its territory of numerous universities (sites of the Géraudière and Le Tertre).

Particularities of the Géraudière site:

- Eurofins' location, which is expected to double its surface area and number of jobs in the coming years
- INRA location site
- ONIRIS location site (food and veterinary school)
- the future location of the Regional Platform for Research and Innovation (PRI) in the agri-food sector (CAP aliments)
- site of a CROUS student residence.

Particularities of the University site (Tertre campus):

- the University of Nantes is the 2nd largest employer in the metropolitan area
- the Tertre campus has nearly 25,000 students, representing 50% of the metropolitan area's student population
- presence of grandes écoles with business incubators in their premises (Audencia and Ecole Centrale).

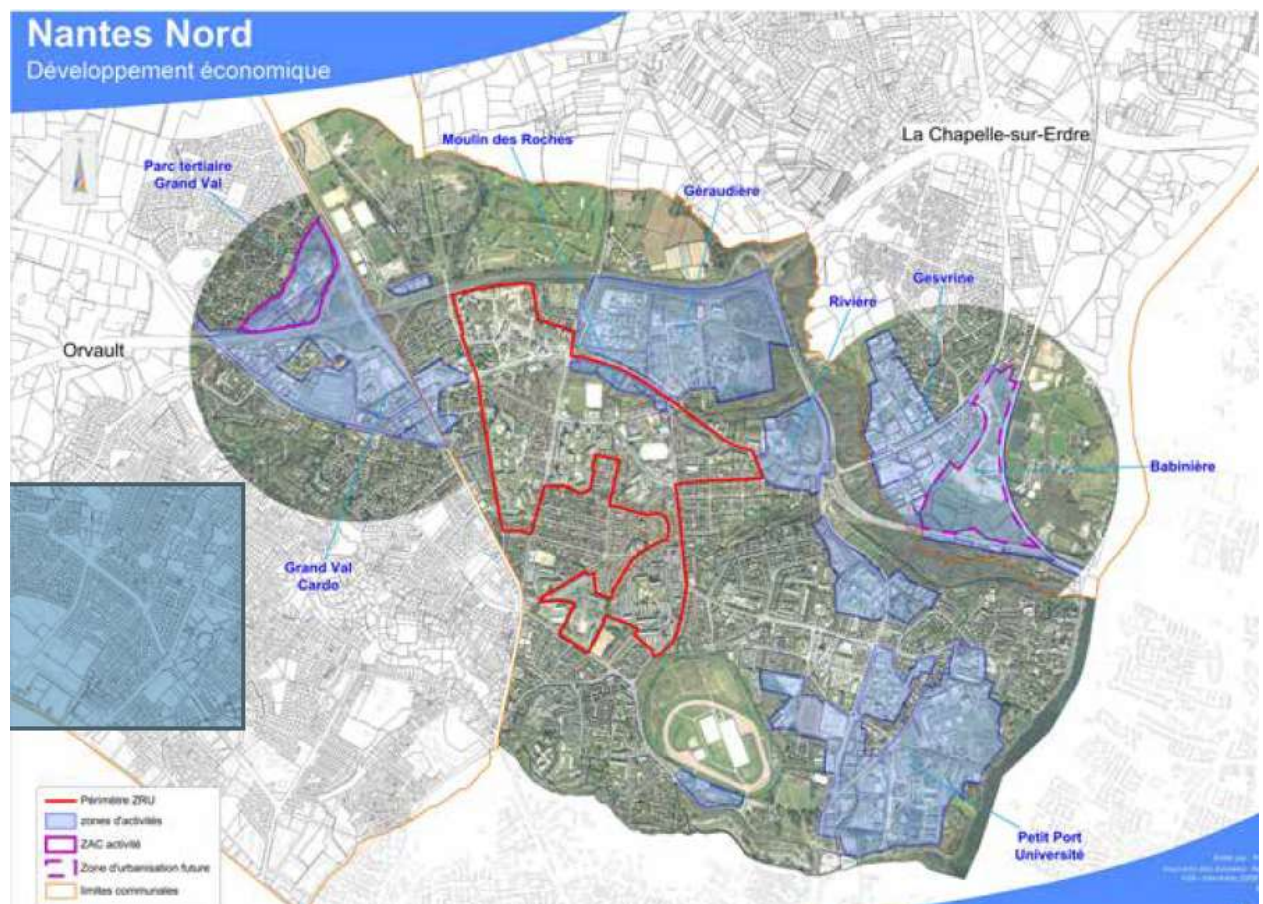


Figure 720: Map of the activity zones of Nantes Nord, Nantes Métropole, June 2016

The district has 200 commercial activities, the vast majority of which are run by shopkeepers without employees. In the 3 activities with 10 to 49 employees, we find Lidl route de la Chapelle, Super U Bourgeonnaire, and Matériel.net route de Rennes.

The district has 213 artisanal activities, nearly 50% of which are activities in the construction sector.

As with commercial activities, the vast majority of these activities have no employees (66% have no employees, 17% 1 or 2 employees, 10% 3 to 9 and 1.5% have more than 9 employees).

The district has 352 liberal professions, more than 90% of which do not employ any employees.

Table 199 : Source Economic diagnosis and employment, Nantes Métropole, June 2016

Activity sector	Number of companies
Construction	106
Personal care services	16
Food	41
Transport	14
Leisure	3
Car and motorcycles	23
Others	4

### **Agriculture production**

The Nantes Nord district, although very urbanized, has 9 farms.

The presence of these activities and their sustainability must be taken into account in the context of the urban renewal projects that will be carried out, but also in the implementation of the short circuit policy at the scale of the City and the Metropolitan area. It represents a very interesting asset for the Urbinat project.

### Stores and commercial activities

Nantes Nord is the second last district in terms of number of commercial premises, with a reduction of 5 % corresponding to the closing of premises on the district (Table 200).

Table 200: Number of commercial premises by district in Nantes in 2010 and 2017

Quartier	2010	2017	évolution 2010-2017
BELLEVUE-CHANTENAY	115	111	-3%
BREIL-BARBERIE	136	129	-5%
CENTRE-VILLE	1724	1729	0%
DERVALLIERES-ZOLA	172	172	0%
DOULON-BOTTIERE	181	182	1%
HAUTS PAVES-ST FELIX	319	324	2%
ILE DE NANTES	275	294	7%
MALAKOFF-ST DONATIEN	320	309	-3%
NANTES ERDRE	138	125	-9%
NANTES NORD	87	83	-5%
NANTES SUD	60	60	0%
Total quartiers	3527	3518	0%

Source: Observatoire des Locaux Commerciaux - CCI Nantes-Saint-Nazaire, AURAN report

### 6.3.3.3 Facilities

#### Cultural facilities

The Nantes Nord district has an offer of associative and cultural facilities (Figure 721).

In Nantes Nord, facilities allowing the diffusion of culture are of various sizes:

- **MANO:** It is the community center of the district, is a meeting place supporting the initiatives of the inhabitants. Born from a participatory project of associations, the community centre La Mano is a municipal facility with various public service functions: reception of community life with its many private rooms and offices; socio-cultural action with the socio-cultural centre Accoord "Bout-des-Pavés - Chêne des Anglais" and the multimedia space of EclectiC Léo Lagrange; social action of the Caisse d'allocations familiales. In the heart of the Nantes Nord district, La Mano revitalizes collective actions, the life of the district and contributes to the fight against isolation.  
15 associations are hosted by the community centre that offers training modules, convivial times, solidarity actions, cultural activities and exhibitions. Workshops, events and projects are organized all year long to create social links between the inhabitants.
- The Hangar Cassin, equipment that welcomes the company Cirkatomik Theatre and artist residencies, serves, on an ad hoc basis, as a place of dissemination. It is not very visible and not very identified by the inhabitants.
- The University Theatre plays an important role in cultural diffusion but remains little known and little frequented by the inhabitants of the Nantes Nord district, in particular the due to a lack of information from the inhabitants.



- The festive hall, located on boulevard Cassin, with a capacity of 900 people standing / 400 in conference / 250 in configuration meals, hosts occasional events. The room is not equipped with a sound control room. It is commercially managed by the city.
- Salle des Bruyères: located in the diffusion room that serves in particular to the hosting of the cultural programming of the "Bubble Machine". Managed during the week by the ACCOORD and the weekend by the City.

Although generously endowed with cultural facilities, a need for a place of diffusion between 200 and 300 seats intended for amateur practices is identified by the City.

The **media library** is located at the heart of the priority districts. Each priority district also has its own socio-cultural centre ( 4 in total) which organizes cultural events for the inhabitants. The youth is also at the heart of their projects with educational support, help to build the projects of the teenagers and sport activities.

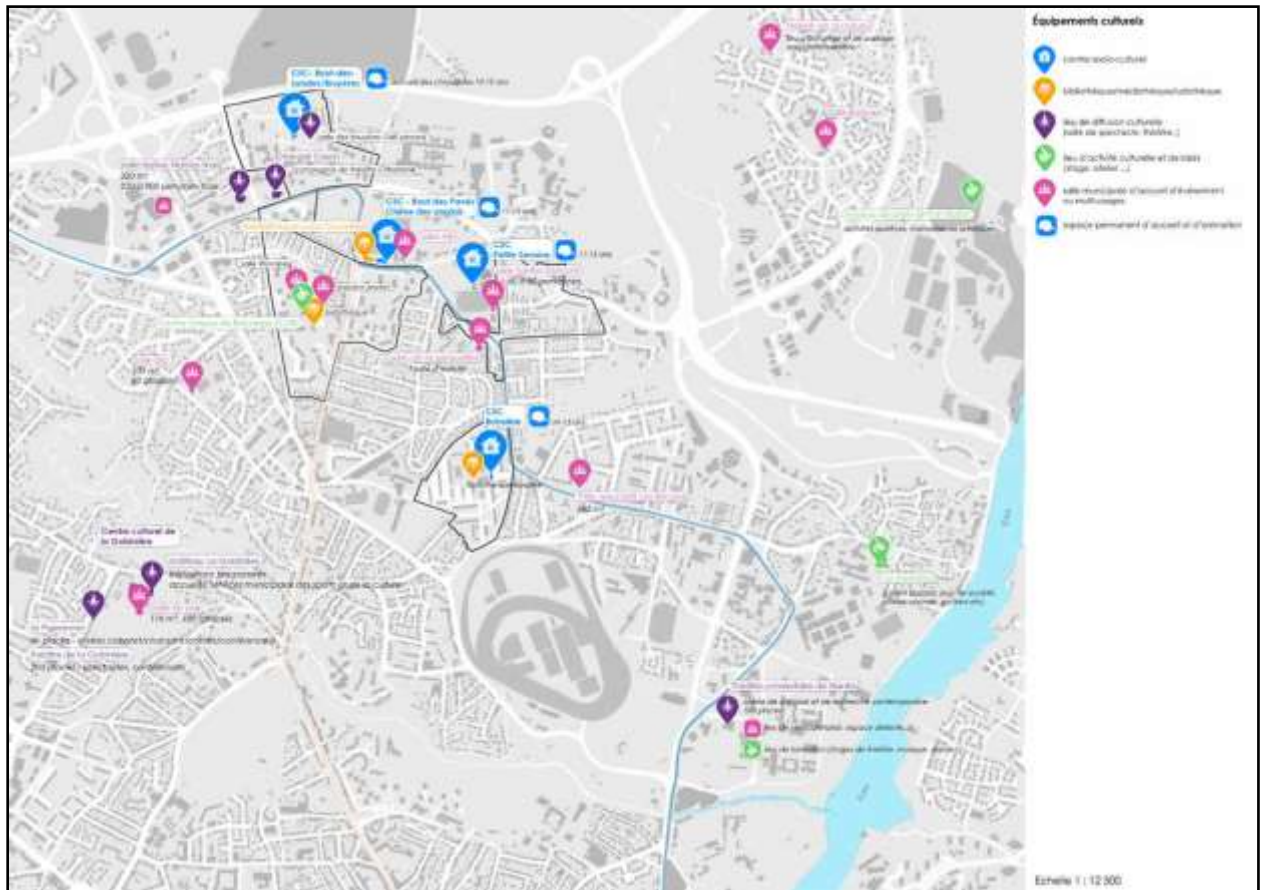


Figure 721: Cultural facilities in Nantes Nord (source: Ville Ouverte Etude Germe&Jam, 2017)

### Recreational and leisure spaces, sports facilities (public and private)

In Nantes Nord, inhabitants enjoy local sports platform that are highly integrated into their environment, known from young people in the district, but also equipment that attracts athletes from all over the city as the Pierre Quinon Metropolitan Stadium. The Nantes Nord district has an offer of sports facilities satisfactory and with a varied influence (**Figure 722**).

The most important racecourse in the Great West is located since 1875 in Nantes Nord, on the Petit Port site, over 35 hectares. About 250 races are organized every year, making the racecourse the most important of the great West. It has stands that can accommodate up to 2,000 people, a 600 m<sup>2</sup> restaurant and a parking of 1,500 spaces. In the heart of the racecourse, are installed several equipments (sports fields).

- The Nantes Nautical Centre (2013) built on the site of the former Jonelière nautical base houses three operators: the municipal nautical base, the Sailing Club Amitié Nature (CVAN), and the Nantes Atlantique Canoë Kayak (NACK)
- Pierre Quinon Stadium -2013. The Pierre Metropolitan Stadium Quinon, is equipped with a surface area of 10,208 m<sup>2</sup>. It includes an athletics room with a 200-metre track, a multisports hall and a weight room. With a capacity of 532 fixed seats, the Metropolitan Stadium houses regional and interregional competitions, as well as national youth, school and university championships.

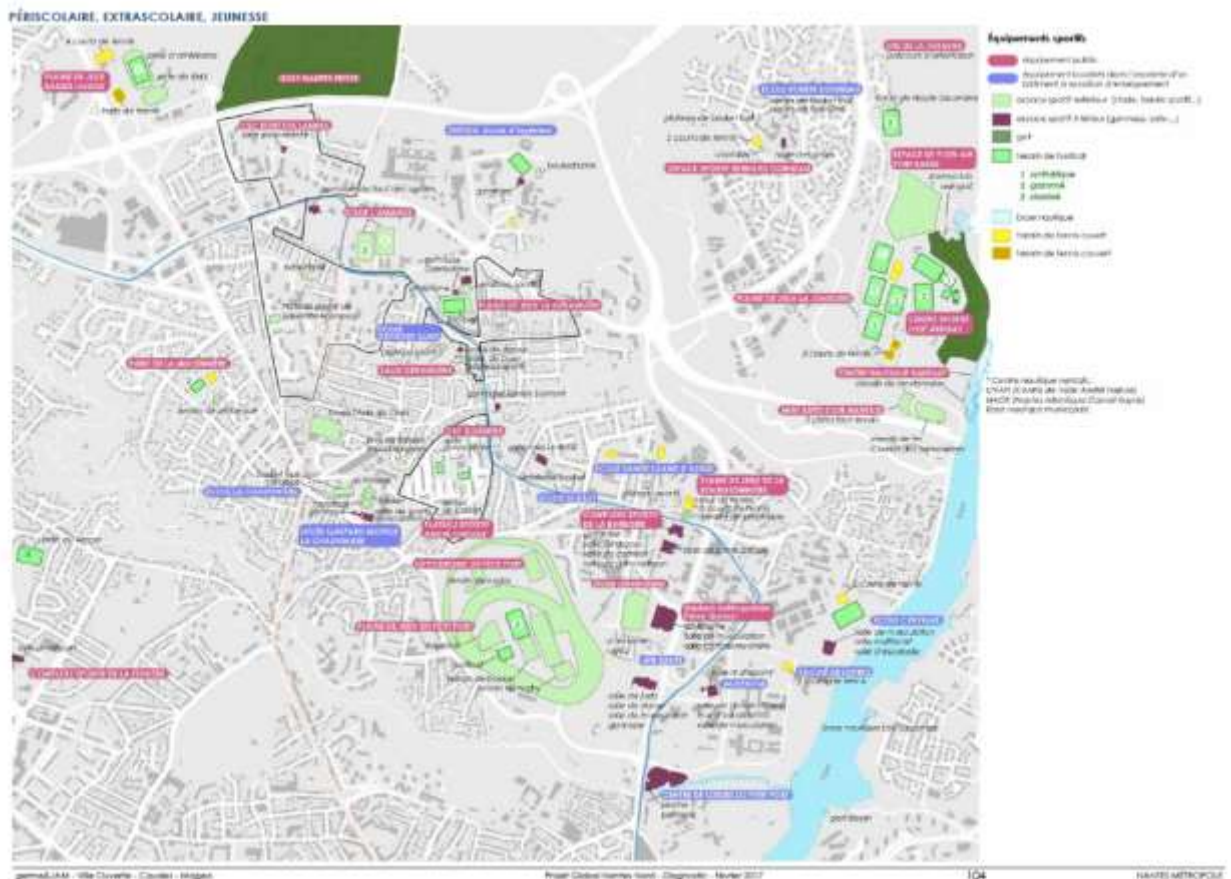


Figure 722: Map of the sport facilities, in pink the public ones, in blue the ones located within an educational institution (Source: germe&JAM - Ville Ouverte - Caudex - Mageo, dec 2017)

This part of the report has drawn the framework within which the Urbinat project will be developed. The district Nantes Nord bears its name of “mosaic district” well: a district with a natural environment of great richness, alternating micro-districts with concerning socio-demographic indicators and allotments, a student district and tertiary areas that are very dynamic.

## 6.4 The second stage of the Local Diagnostic

The following section present the results of the methodologies already applied in the Urbinat study area.

For Nantes, participative methodologies will have different objectives depending on the project and the public targeted. It is seen as a tool at the disposal of the municipality to engage citizens, to enable them to express their expertise in uses of the district.

Regarding the participatory methodologies, the photovoice methodology has been applied in the specific project of sharing the streets in the Urbinat study area that aimed to a shared co-diagnostic with the inhabitants regarding speed and road security. Walkthrough and cultural mapping will be applied during the first semester of 2020 for the NBS co-selection.

The behavioural mapping and the well-being survey have been delayed due to the organisation of the municipal elections in March 2020. Some laboratory analyses are available but, as for the other cities, the definition of this need for data will be done within the HC design phase.

### 6.4.1 Cultural mapping A

The cultural mapping will be conducted at the same time as the walkthrough in the project of co-construction a green loop with the inhabitants, starting in January 2020. The cultural mapping will allow the municipality to check if the current layout of the loop corresponds to the expectations of the inhabitants, or if the municipality is missing important points of interests in the study area. It will allow the inhabitants to underline the assets of the study area, make suggestions to enhance them with NBS selection.

### 6.4.2 Behavioural mapping

#### **Context**

Municipal elections will take place in March 2020 in France. This major event is preceded by a period called the “electoral silence”. To avoid mixing campaigning and communication, local authorities' communication in the pre-electoral period is particularly supervised. The Electoral Code (article L52-1) prohibits public authorities from carrying out propaganda actions during the six months preceding an election.

For municipal elections of March 2020, this prohibition applies from September 1<sup>st</sup> 2019. It concerns the communication of town halls but also that of the ministries and public institutions under their supervision as well as that of the independent administrative authorities. It also concerns the commissioning of studies or surveys on election campaign themes.

A lawyer hired by Nantes Métropole counselled the city regarding the Urbinat activities. In connection with the Urbinat coordinator, It has been decided to delegate the well-being study to IRSTV regarding the subjects of the study that may be controversial regarding the pre-electoral silence period. The behavioural mapping was authorized to be conducted by the city authority.

#### **Study locations for the behavioural mapping**

Five locations were targeted with the Nantes local task force, with precisions regarding the observation process for each place. Indeed, the district has reached a peak of insecurity recently, especially in some parts of the Urbinat study zone, that prevent observation all day long. For each place, a specific time frame has been set up:

- Parc de l'Amande : 8.30 am - 6 pm, in the park for optimal visibility of park traffic. Once dark, observers should be placed on the road side of la route de la Chapelle (no lighting in the park)

- Jardin du Canada : the data on this space is of great interest to the project but also present a major security issue, which prevents a continuous presence and prohibits the use of tablets. It is therefore proposed to position the observers 30 min maximum near the Gauguin school, at the end of school time on Wednesdays and to observe the space from the avenue bout des Landes, on the pavilion side. The observation of the Garden of Canada should be discussed and clarified prior to the observation.

- Park René Guy Cadou : observation between 8.30 am and 6 pm

- Renards stream (playground of la Coulée) : observation between 8.30 am and 6 pm

- La Mano, community centre : observation between 8.30 am and 6 pm, in front of the building. it is possible to observe the streets from inside the building if necessary.

Regarding the methodology proposed, Nantes will not identify people by their possible ethnic origin since it is prohibited in France.

#### **Coordination and conduct of the survey**

The contract has been notified to Qualivox, a company from Nantes. The observation will take place in December. The results will be given in January 2020.

### **6.4.3 Walkthrough A**

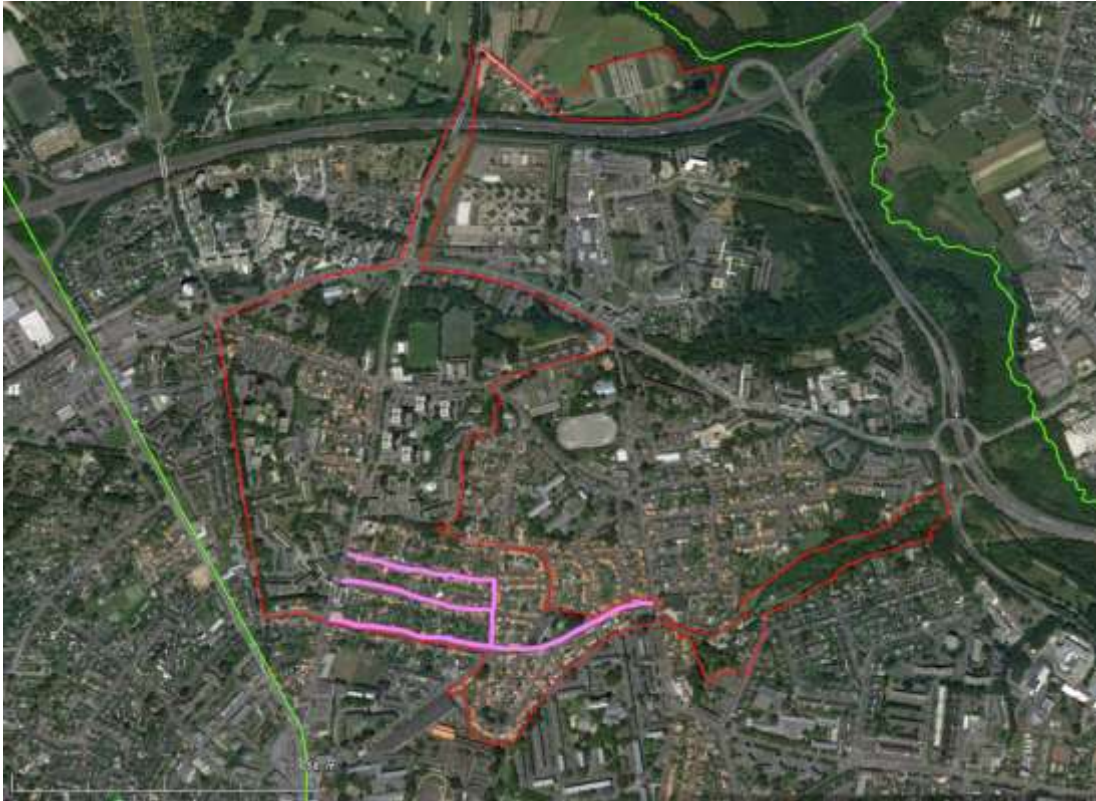
The walkthrough is a methodology that is well known and used very often by the municipality teams. One example of application of this methodology is the landscape and heritage plan described in the participatory NBS section. The walkthrough will also be used in the co-design of the Urbinat healthy corridor that will start in January 2020.

### **6.4.4 Photovoice A**

Photovoice has been used in the project on « sharing the streets » within the Urbinat corridor. This project aimed at reducing the speed and the insecurity in the streets on Nantes Nord and within the Urbinat corridor in particular. It is the continuity of a first consultation with the inhabitants on the communal scheme for soft mobilities that was held in 2011. This is the way in Nantes to conceive dialogue with the inhabitants. Consultation, once it has become a way of doing, never stops. It is a long-term process to continue to adapt projects to the passing of time and the needs of its inhabitants.

Inhabitants and municipality staff reported the growing insecurity on the roads in the North Nantes district, and in particular in the Urbinat corridor with car rodeos and inappropriate speed concentrated in particular in 3 streets of the corridor ( rue de Gesvres, rue du Pressoir, rue Henri Bertrand). Those 3 one way streets bordered with residential areas and linking two social housing areas were particularly conducive to speeding up.





About thirty inhabitants of the Nantes Nord district participated in the workshops. The approach sought to hear a diversity of points of view, by forming a group of inhabitants of Nantes Nord but also ensured that residents of the sectors particularly concerned by the road insecurity (people living near Guy Cadou, Pressoir, Bertrand and Gesvres streets) were associated. The whole dialogue approach was divided in 5 different workshops which goals were to identify in the district the points that were problematic and share a common vision of what is a shared street. Then the inhabitants were able to make suggestions of infrastructures to implement.

**The Photovoice methodology** was used during the first workshop of the project. It aimed to ask the participants to take the point of view of a pedestrian, a cyclist and a car driver and tell if she/he felt safe or in danger. The municipality team used photos of streets in Nantes (but not from the district). The aim was to make the participants share their vision of streets that are conducive to speed reduction and to sharing the space within the different modes.

The technicians of the municipality also wanted to underline the difficulty of pleasing everyone with specific street infrastructures, preparing the participants to the need of compromise in discussing the infrastructures to build at the end of the participation process.





Photo 1: a street with a 30 km limitation sign

**Comments of the participants :**

- « Pleasant view »
- "Convenient parking lots."
- "Pleasant space for the because there are sidewalks."



Photo 2 Trentemoult

**Comments of the participants :**

- "Not conducive to speed."
- "Pleasant, it's flowery, and that seems calm."
- "We don't know where to park."
- "Everyone can take ownership of the street »



Photo 3. Malakoff

**Comments of the participants :**

- “ Too much place, It is not pleasant”
- “ Pedestrians are not enough channelled”.
- “It is not secured for cyclists”



**Comments of the participants :**

“The unique coating of the street shows to the car driver that he has not the priority”

“The street seems more shared”

“ The urban furniture prevent parking”

Photo 4 Rue Fourré, Nantes center



**Comments of the participants :**

“Safe for cyclists”

“Not easy for the pedestrian to cross the street with the cyclists”

“ The car seems to be excluded, so it is not shared”.

Photo 5



**Comments of the participants :**

“ lot of place”

“ Incentive for the car to make whatever it wants”

“ Pedestrian have no marks”

“ There is enough place to share the street”

Photo 6. a large turning street



**Comments of the participants :**

"The pedestrian crossing is too close of the roundabout"

"Not easy space for the cyclists"

"It is a street for cars"

Photo 7.

The Photovoice in this particular workshop was used as group management tool to allow everyone to take the floor to speak up, so that everyone could share their point of view. It was also way to go into details with the photos as support. It was important to take photos from outside the district to avoid overly emotional bias.

For the staff, it was a way to get to know the group better. The opinions were quite different according to the different arrangements. This was due in particular to the fact that each person uses the roads for a different use (motorists, pedestrians, cyclists,...). This workshop revealed the diversity of the issues but also the difficulty in satisfying everyone, expectations being different from one user to another. It allowed though to move from an individual prism to initiate a collective point of view that was essential for the next workshops.

5 workshops were organized in total, each with a specific objective but with a common result: improving the cohabitation of the different modes of transport on the public space. As a result, speed reduction infrastructures in specific streets of the study area will be set up. In accordance with the participants, it has also been decided to reduce the speed in the whole district with the installation of signs reducing speed to 30 km per hour, except for the main roads, which remain limited to 50 km per hour.

### 6.4.5 Focus group

Focus group has not been mobilized at this stage in the Urbinat study area but will be during first semester 2020 for the NBS co-selection with the inhabitants.

### 6.4.6 Face-to-face interviews

The methodology developed by Urbinat is currently being implemented. One interview was possible with the company that designed the Urritroir whose founder is fluent English (description in the technological-NBS section). The language barrier is indeed still difficult to overcome and represents the main obstacle to carrying out the interviews. The municipality of Nantes suggested to use an online questionnaire, translated in French, that will be sent to the director of the Ecosolies, the incubator for social and solidarity companies in Nantes, which represents a network of 300 companies. The Ecosolies has been described in the social and solidarity NBS section of the report.

# Well-being

## 1. Study perimeter

The Urbinat research field in Nantes is the district of Nantes Nord, in the extreme north of the municipality. This district is itself subdivided in 9 micro-districts, according to the perimeters defined by the INSEE (French statistical institute of statistics and economic studies). The scope of the quality of life and well-being survey was refocused on 6 of these 9 micro-districts. Indeed, these 6 micro-districts concentrate the three priority districts (deprived districts) identified in Nantes Nord, and they also corresponds to the main social housing developments.

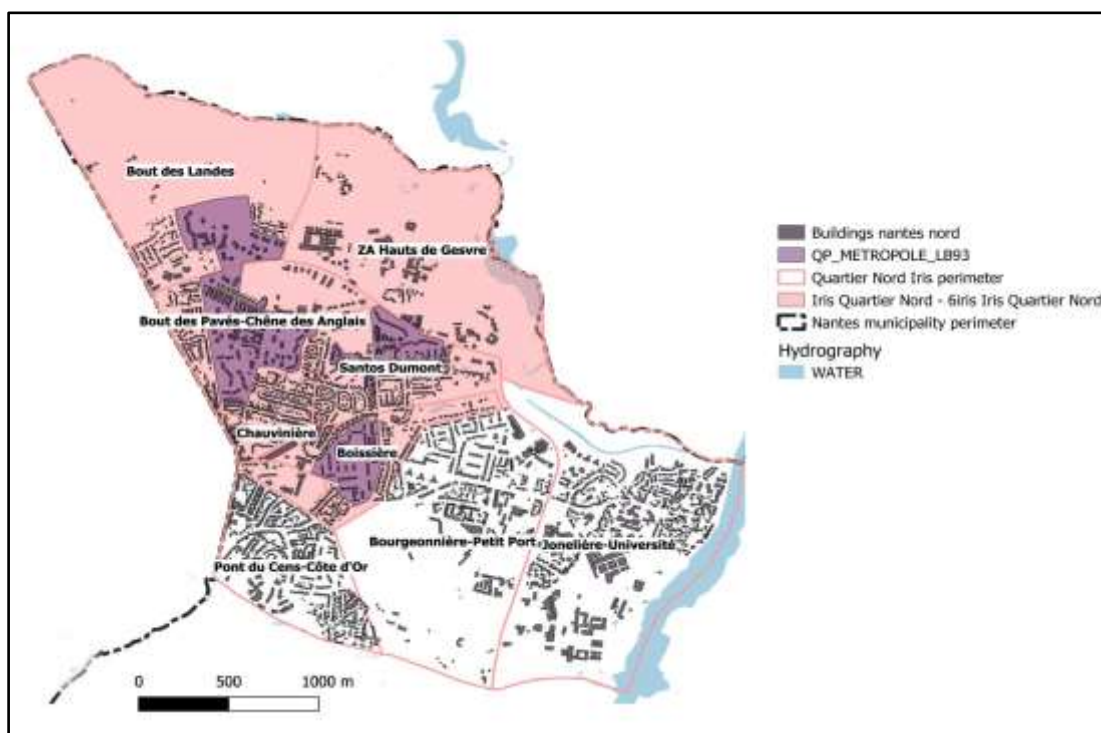


Figure 723 The Nantes Nord district and its 3 priority districts (“QPV”) in Nantes Nord (Bout des Landes-Bout des Pavés – Chêne des Anglais; Petite Censive; La Boissière)

## 2. Coordination and conduct of the survey

For Nantes, the survey is coordinated by the IRSTV.

It was difficult for the municipality to conduct the investigation at the beginning of an election period (municipal elections on 15 and 22 March). This is also more consistent with the content of the survey, which was based on a primarily scientific grid.

In Nantes, a survey institute conducts the survey in the field. TMO Régions -based in Rennes- is the contractor selected.

The survey will be **entirely conducted by phone**. Nevertheless, it was considered for a time to conduct part of the survey through face-to-face interviews given (i) the sample of 400 targeted responses, (ii) the relatively small number of contacts (telephone numbers) available in the 6 neighbourhoods and (iii) the high refusal rate expected (TMO expects 17 refusals for 1 completed questionnaire).



### 3. Sample (materials: telephone numbers files)

Table 201: Counting of telephone file - phone numbers available on the 6 districts

IRIS Districts	Home phone	Mobile phone	Total
CHAUVINIERE	262	334	596
BOUT DES PAVES-CHENE DES ANGLAIS	853	1523	2376
BOUT DES LANDES	435	727	1162
ZA HAUTS DE GESVRE	119	283	402
SANTOS DUMONT	472	660	1132
BOISSIERE	590	828	1418
<b>TOTAL</b>	<b>2731</b>	<b>4355</b>	<b>7086</b>

#### Progress of the work (1st december 2019)

The study is currently a little behind schedule. There are several reasons for this:

- The study was initially to be carried out by the municipality of Nantes. But in view of the upcoming municipal elections (elections on 15 and 22 March), and in particular after consultation with the city's lawyer, it was finally decided to transfer the conduct of the investigation to the local scientific partner (the Irstv).
- The selection process for the polling firm and public contracts took longer than expected.

According to the pool company, the survey is scheduled to be conducted among the residents in the first half of December. A restitution of the raw data to the Irstv is planned from 13 December 2019.

#### 6.4.7 Laboratory analyses

In this section of the report on Nantes, diagnostic data are provided at the sub-district or object level that were acquired during the Stage 2 diagnostic phase or before the beginning of the Urbinat project (background knowledge). A presentation by site or type of study is proposed according to the categories used in the report.

##### Climate and urban environment

##### Soil mapping in the Nantes North district and soil contamination

##### *Methodological development of urban soil mapping and application on the Nantes northern district.*



The objective of the work, carried out by Agrocampus Ouest Angers (third party of CNRS-IRTV) is to propose a soil mapping method adapted to urban environments, developed in the northern sector of Nantes (364 hectares including the district of the Urbinat project) and which reflects the spatial organization of the soil. Indeed, in France, no traditional soil map currently includes urban areas. The often anthropized soils no longer meet the expected types of existing soils and their mapping is therefore difficult. Moreover, their interest had often been limited to their function as physical infrastructure supports, but their in-depth study becomes now a major concern. Faced with the context of increasing artificialisation of soils, mainly linked to urban sprawl and limiting the soil ecosystem functions (infiltration of rainwater, carbon storage, climate regulation), the development of territorial NBS, such as those that are proposed in Urbinat catalogue, requires small-scale knowledge of the soil type and properties.

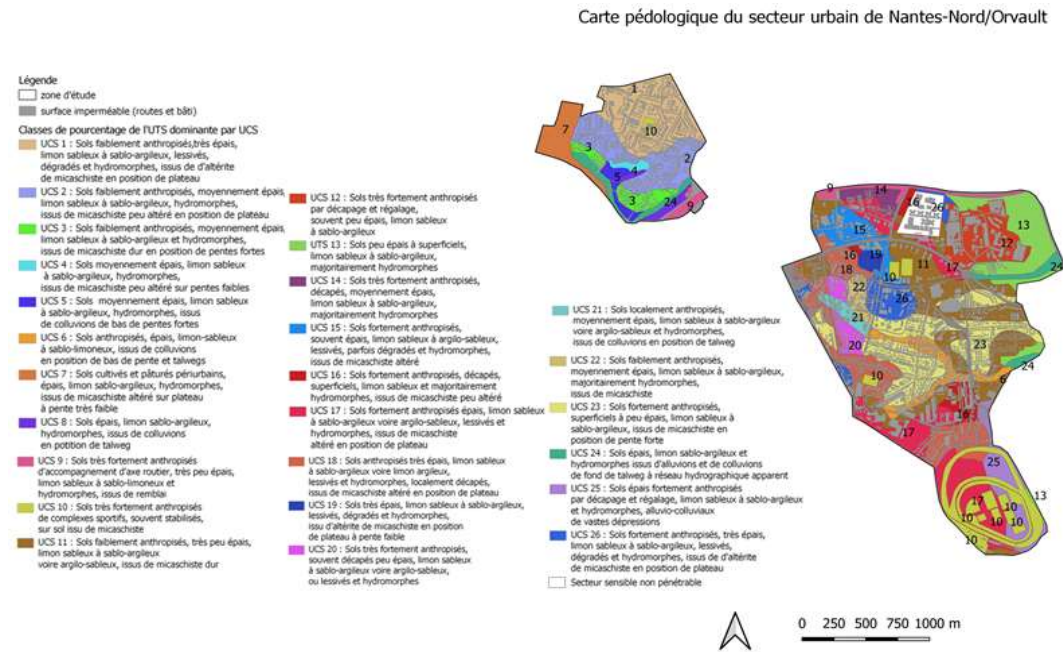
By means of an approach based on soil mapping concepts in rural areas and incorporating the specificities of urban areas, the new method consists in predicting soil units that integrate both the environmental factors involved in their constitution through the use of the Loire-Atlantique Regional Pedological Reference System, as well as their potential anthropisation through the analysis of the historical evolution of urban sprawl. These units are readjusted by comparison to the data collected in the field indicating a varying degree of anthropisation.

The soil map finally obtained (see Map 1) represents the basic layer of information for the operational characterization of urban soils, since it transcribes the lateral variability of their vertical organization, by horizons. What emerges from this study is the fact that the north Nantes district has a significant diversity of soils, combined with various types of anthropization processes. A total of 35 different soil types were identified, divided into four categories corresponding to four levels of anthropization. Once these soil types are grouped together, our study area counts 26 soil units (called UCS) for the most part complex, i.e. composed of several soil types.

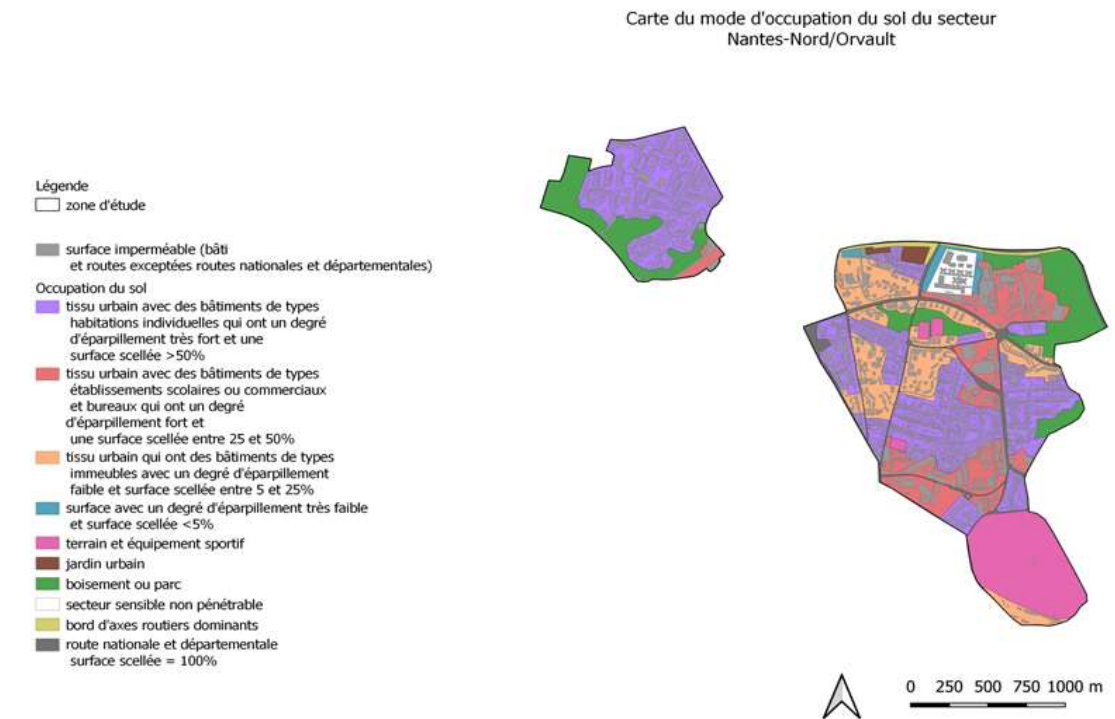
The development of a spatial, semantic and operational database helps to express the functions of the soils. In order to facilitate the interpretation of pedological information, a map of the land use pattern is produced (Map 2). Indeed, the soil map used in combination with a land use map is helpful in expressing the various features of the soils (organic matter content, agronomic potential, etc.) and thus better taking them into account when carrying out NBS development.

In addition, a soil denaturation map (Map 3) has been drawn up to estimate the discrepancy between the functionality of urban soils in the sector and natural soils before anthropisation. This shows that most of the soils in the study area are very slightly to slightly denatured. This approach is a first attempt to map soils in urban areas and aims to be an urban reference sector, reproducible by adaptation in other sectors.

**Map 1. pedological units of the Nantes northern district and the neighborhood Orvault city**



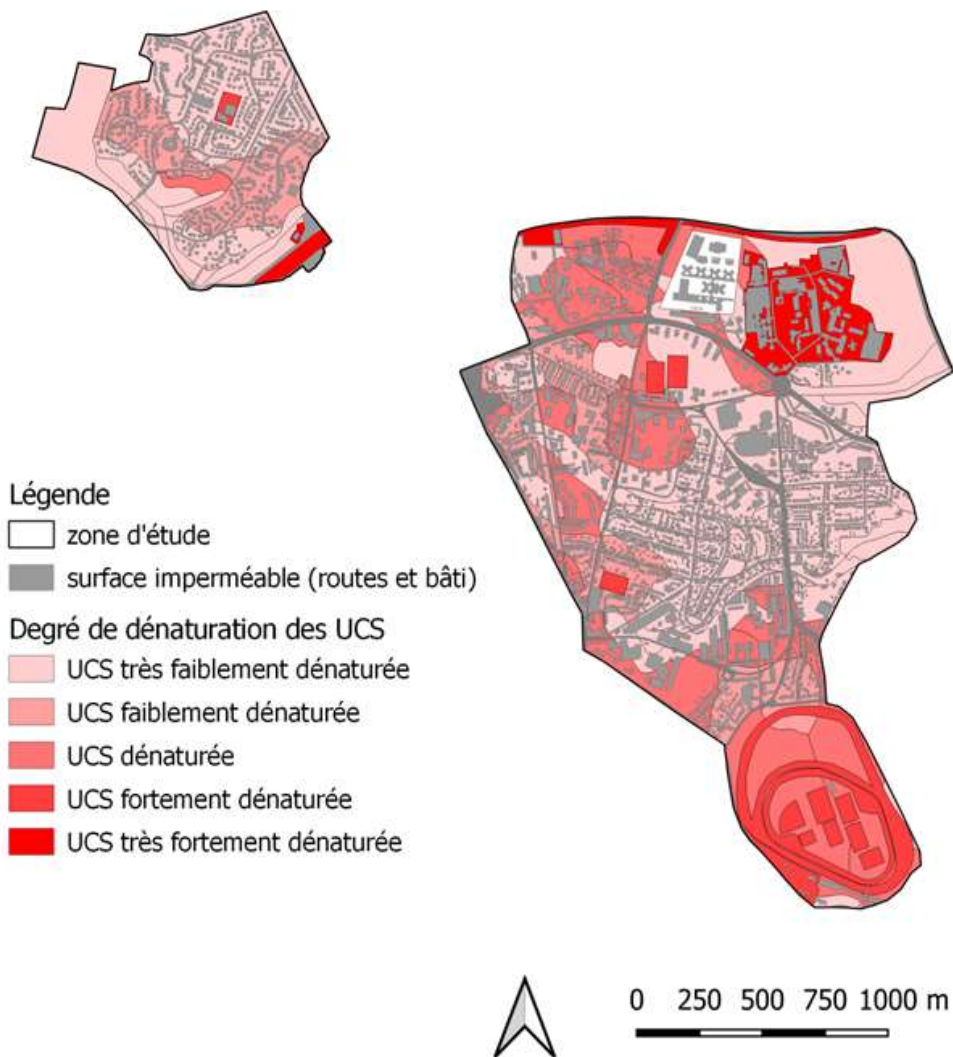
**Map 2. land-use of the Nantes northern district and the neighborhood Orvault city**



**Map 3. levels of denaturation (discrepancy between current soil properties and natural)**

## Contamination of soils in urban allotment gardens of the northern district

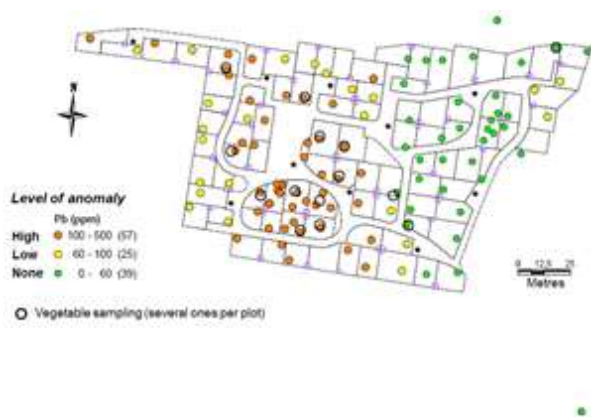
Carte de dénaturation des sols du secteur Nantes-Nord/Orvault



### ***Contamination of soils in allotment gardens***

The emerging concept of sustainable city encourages the expansion of allotment urban gardens. However, gardens may have been developed on areas where soil quality was not taken into account in urban planning. Attentive to the potential health risks associated with consumption of vegetables growing on contaminated soils, the city of Nantes has launched a program to assess the soil quality of its 24 collective gardens (one thousand plots) towards organic contaminants and trace elements and joined the french national research program JASSUR (ANR) on urban allotment gardens (2013-2016). The specific research objectives of the scientific teams in Nantes are : i) characterisation of soils (global parameters and contamination); ii) origin of contamination (geogenic, anthropogenic);

iii) mapping of trace metals contents in soils; iv) evaluation of translocation from soils to vegetables; v) biophytoremediation processes development; vi) advising local authorities for making-decisions and soil management. Such a methodology has been developed for 2 allotment gardens in the northern district : Eglantiers and Angle Chaillou gardens. A geogenic contamination of soils has been identified in Eglantiers garden. A soil management plan has been put in place. One third of the plots were kept for cultivation as they were, one third of the surface area was covered by a layer of healthy soil an return to cultivation and one third was transformed into an orchard. Four plots were transformed into a phytoremediation experimentation. No contamination was identified in Angle Chaillou garden.



Phytoremediation experimentation

Lead anomalies in soil

### First insight on the Ruisseau des Renards

Renards River is located in the hearth of a very dense urban area ; it is a green corridor inside a individual housing neighborhood, itself within a collection of several collective social housing of Nantes nord area. : Santos Dumont in the north, Boissiere in the west and south, and a very dense traffic road in the east. This river represents a natural thalweg collecting the stormwater coming from the separative sewer pipes draining a ~60ha urban catchment, with a 49 % impervious fraction. This catchment was equipped for a 1 year period in 1997 in order to provide hydrological data suitable for analysing the hydrological response of this catchment (Rodriguez et al., 2003<sup>75</sup>, Rodriguez et al., 2005<sup>76</sup>). The catchment Renards displays a high runoff coefficient (0,44 in average) and a very short response time, related to the high impervious fraction of the contributing area. Some wrong connections between storm- and waste- water systems have been noticed, leading

<sup>75</sup> Rodriguez F., Andrieu H., Creutin J.D., 2003. Surface runoff in urban catchments: morphological identification of unit hydrographs from urban databanks. *Journal of Hydrology*, 283 (1-4), 146-168.

<sup>76</sup> Rodriguez F., Cudennec C., Andrieu H., 2005a. Application of morphological approaches to determine unit hydrographs of urban catchments. *Hydrological Processes* 19(5), 1021-1035.



to possible organic pollution in the river, in addition to classical urban washoff runoff pollutants (trace metals and PAH). Due to the fact that this green corridor is a walking and jogging area, the ecological state of this receiving aquatic environment is a real question, that may affect citizens living in this area.

### Using smartphone application to describe sound landscape

As part of the degree in geography at the University of Nantes, groups of students worked on the sound landscape of Nantes Nord during workshops and field measurements (one week in March 2018). The pedagogical objective is to compare perceptions (visual urban landscape and sounds) and physical measures. The study area was defined on the scale of the city of Nantes with a gradient from the city centre towards more peripheral districts.

Students worked in groups of 5/6 (20 groups) on a defined field within Nantes. Their mission was to analyse about twenty listening points (listening, observation, recording, short interviews). In each group, a technical team of 2 people was be in charge of: recordings, sound measurements, geolocalizations, photos, elaboration of excel files, elaboration of the data file. The work of the week was presented at the Ecole Centrale de Nantes on the morning of Friday, March 15.

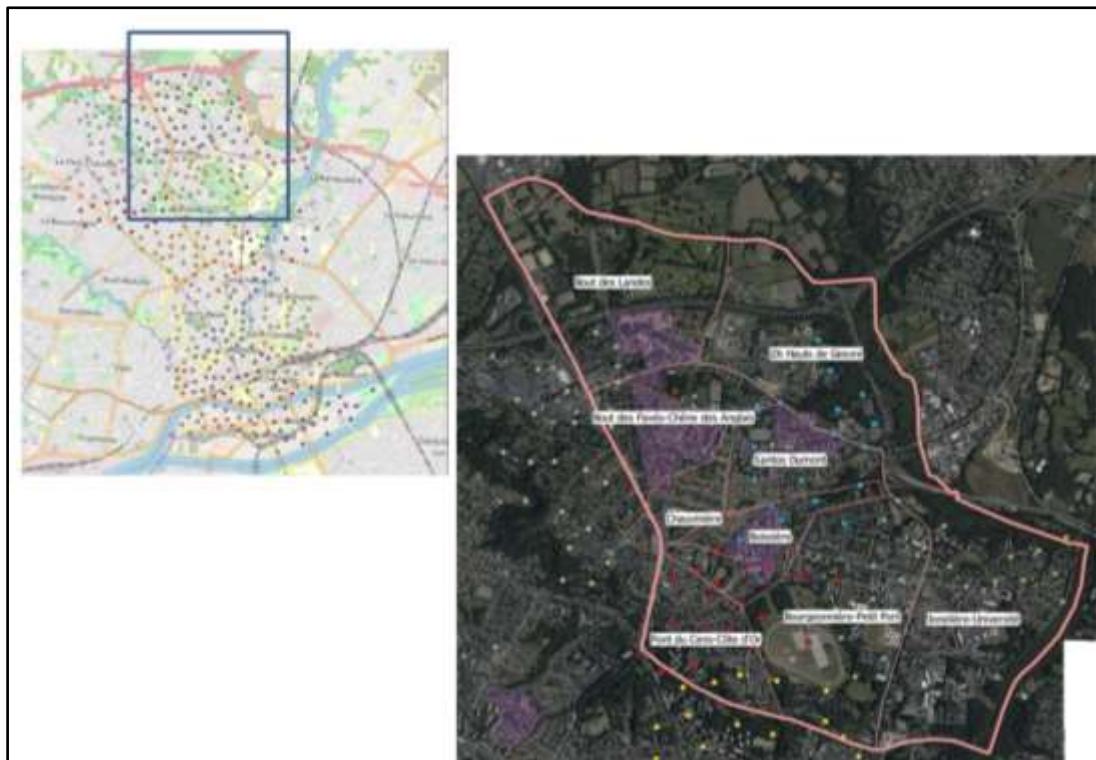


Figure 724: Localisation of measure points at city and Nantes Nord scales





Figure 725 A group of students in a social housing estate of Nantes Nord

### 6.4.8 Territorial Mapping

The following description corresponds to the results of the methodology and protocols developed by CIBIO.

#### **The delimitation criteria**

As described previously, the perimeter chosen to implement the Urbinat corridor within the North Nantes territory aims at linking the different green areas, connecting the social housing districts to their green environment. Between the "coulee des Renards" (valley housing the Ruisseau des Renards) located in the northeast of the district and the "Angle Chaillou" located in the north are to find residential areas and the social housing estates of "Le Bout des Pavés" and "Le Chêne des Anglais" and to the north of the district the agricultural zone of the "Angle Chaillou".

The chosen perimeter aims to connect these different heterogeneous fragments of the territory by creating a "real" healthy corridor of public spaces, enhancing even the green spaces without real uses located within the social housing districts.

This makes sense all the more so as the study area takes place largely in the micro-district Bout des Pavés Chêne des Anglais where socio-demographic data are particularly worrying, particularly in terms of health, as described in the district section of the report.

Connecting people to their environment, getting people to be more active by promoting active mobility such as walking or cycling, providing access to healthier food by promoting local agriculture, setting up farmers or creating shared gardens, these are the objectives of the healthy corridor. The corridor will be linked to the work planned as part of the global project co-financed by the state, the landlords and Nantes Métropole, which includes for example the renovation of social housing, the demolition of buildings, the opening of one-way roads and the creation of new public facilities such as the health centre.

### **Green structure mapping**

Nantes Métropole uses 6 categories to define the green structure of the city:

- the housing greenery corresponding to the greenery surrounding the buildings
- the woods
- green area dedicated to sport infrastructures
- gardens
- roadway ornaments
- parks

The two following maps show the percentage of each category, first at the district level, then focused on the study area.

At the district level, for a total surface of 7,6 km<sup>2</sup> (surface totale du quartier), greenery counts for 34 % (256 hectares in total).

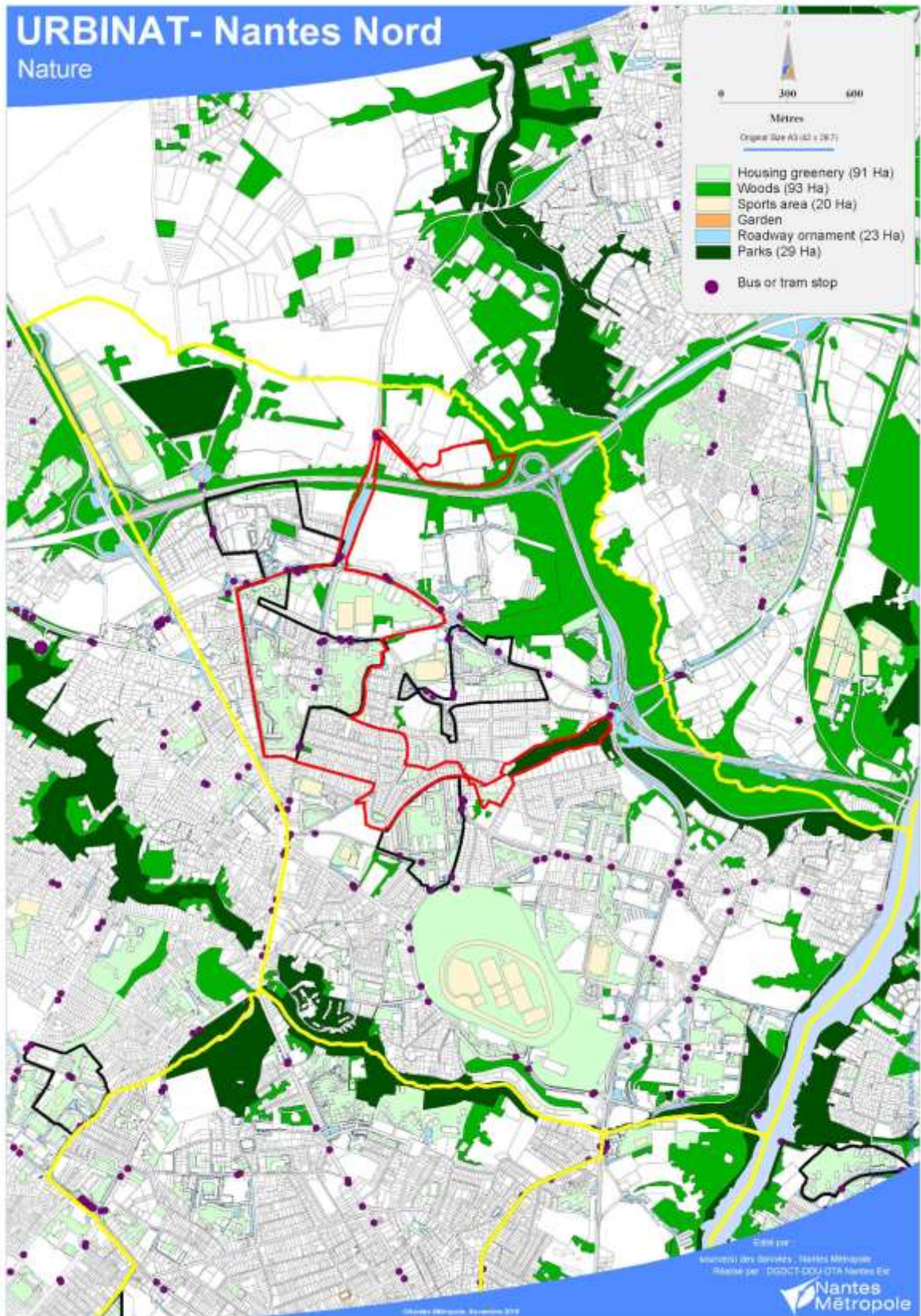


Figure 726 Green structure at the district level, Nantes Métropole, Sophie Pageot



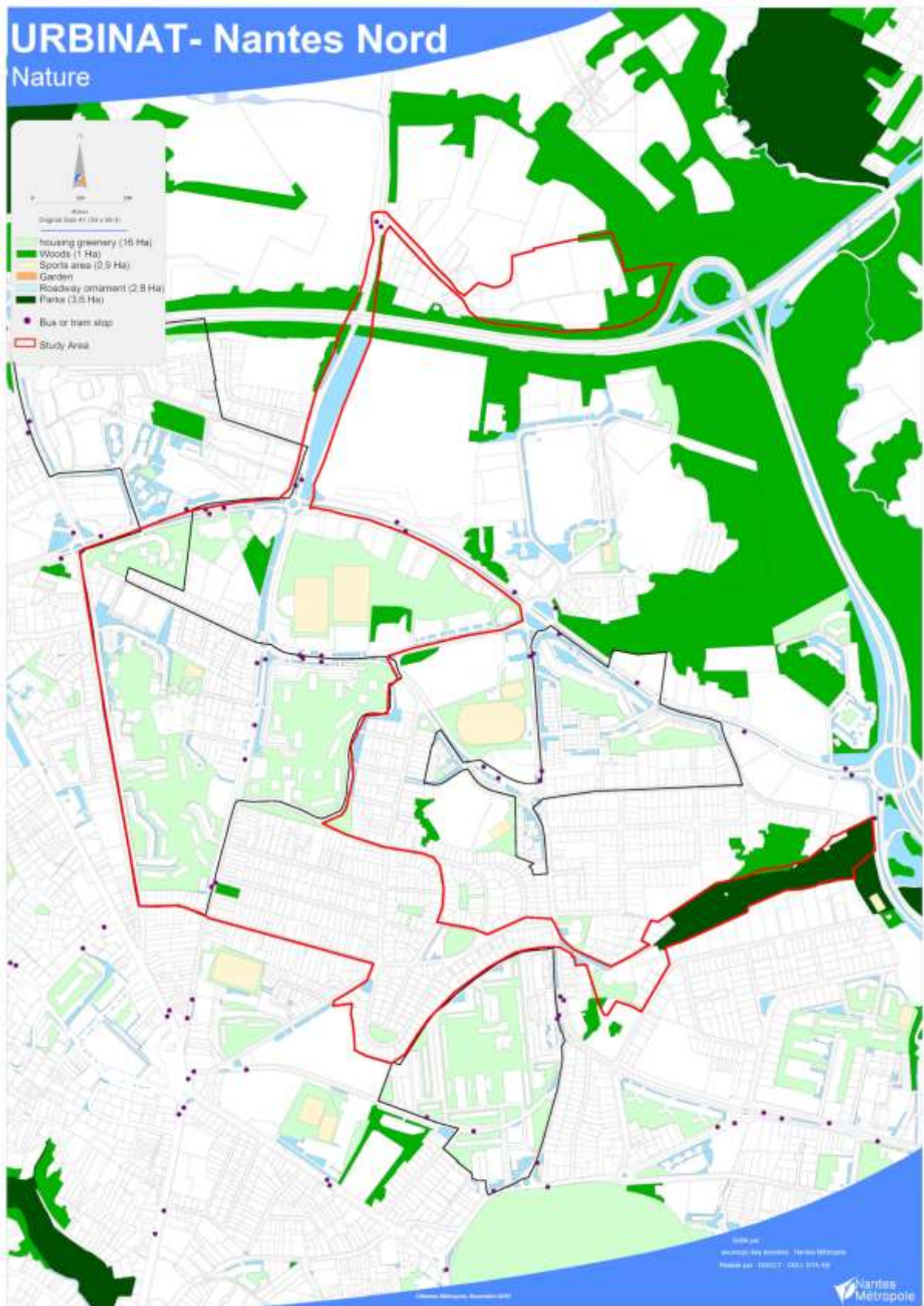








Figure 727 Green structure within the corridor, Nantes Métropole (Sophie Pageot)

The study area counts 24,3 hectares divided as following:

	housing greenery (18 Ha)
	Woods (1 Ha)
	Sports area (0,9 Ha)
	Garden
	Roadway ornament (2,8 Ha)
	Parks (3,6 Ha)

On the map, we can see that the large landscape elements and parks are on the periphery of the district and the corridor. Although easily accessible by public transport or on foot, they are little or unknown to the inhabitants. The urbinat project aims to make them more visible and better known.

Within the corridor, 65% of the green spaces are composed of housing greenery. These green spaces represent an excellent opportunity for the Urbinat project. Indeed, these green spaces are poorly qualified. They can be considered as vacant lots in the terminology of Urbinat and can be the subject of NBS implementations such as children's games, spaces conducive to social cohesion, and also agricultural production spaces such as shared gardens.



photo: Bout des Pavés, housing greenery



photo: Chêne des Anglais, housing greenery

### **Focus on the park “les Amandes”**

Nantes wants to submit the Parc de l'Amande to co-construction with the inhabitants within the Urbinat project.





Photo of the park “l’Amande”, divided in two by the street La Chapelle.

The park “l’Amande” is a very beautiful urban location, a major public space in the heart of the district. Though, the gradual construction of its edges gradually isolates it, reduces its dimensions, makes it lose its structuring potential. It is a fragmented park with little obvious access, particularly in its relationship to the social housing district to the south.

The park is interspersed with sports fields that divide the park, also reducing its open and free space.

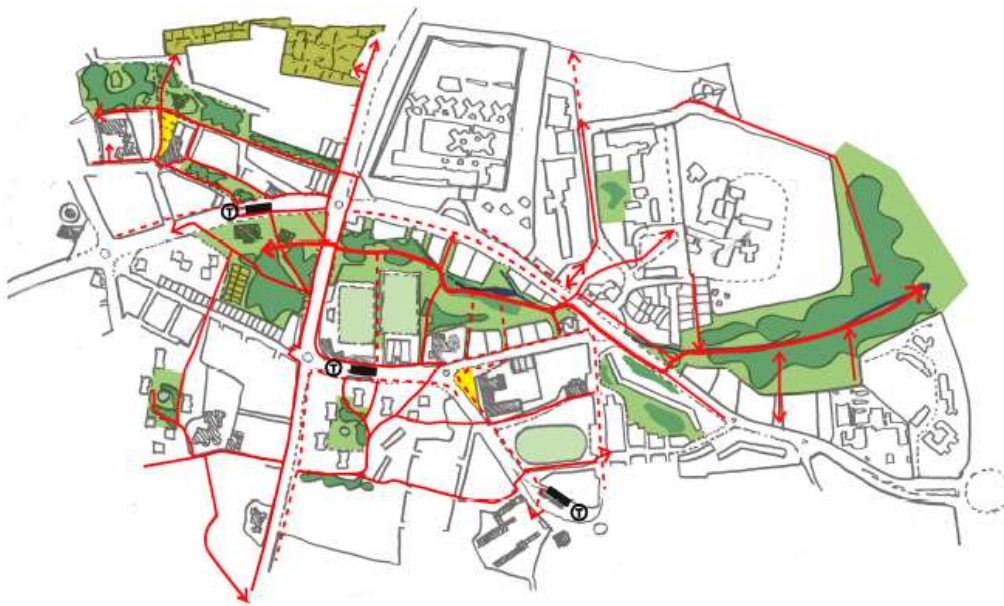


Figure 728 map of the parc de l’Amande, germe&JAM - Ville Ouverte - Caudex - Mageo, Juillet 2016

As can be seen on the photos below, the entrances of the Amande park are very confidential.



Access to the park from the street Eugène Thomas along the EHPAD, the elderly institution.



Confidential entrance from Eugène Thomas Street



Built and impermeable edge of the park along Einstein Boulevard

### **Urban agriculture**

The Amande park also accounts for two family gardens with 21 plots.

Created by the green spaces unit of the city of Nantes, the family garden has integrated from the outset the current concerns regarding water management and equipped the cabins with a rainwater harvesting system.



photo: family garden in the Amande park

It should be noted that the current typology of the green spaces in the Nantes Métropole GIS does not make it possible to identify the agricultural spaces in the district. However, to the north of the corridor is the Chaillou Angle farm, owned by a retired operator. Nantes Métropole, which already owns the land, wishes to buy back this farm and in particular the equipment belonging to the former farmer to rent it, as part of its territorial food plan, which aims to enhance urban agriculture. An operator has already been identified. He already has an organic farm in the neighbouring town of la Chapelle sur erdre. He is also already working on his link with the inhabitants of the district. The farm is located on the other side of the motorway, an difficult to access by active modes. Though, the demolition of the bridge is planned in connection with the work of the ring road managed by the state. The challenge for Nantes Nord is to facilitate a comfortable access to the Angle Chaillou. It was negotiated that the reconstruction of the bridge allows the integration of soft modes of mobility with a cycling lane and a pedestrian lane.

During the last spring of the project, a visit to the farm at La Chapelle sur Erdre was organised with a group of residents who decided to create an association to collaborate more closely with the operator. However, the project to buy back the operation of L'Angle Chaillou by the community is currently still under discussion with the former operator.



Photo of the Angle Chaillou farm



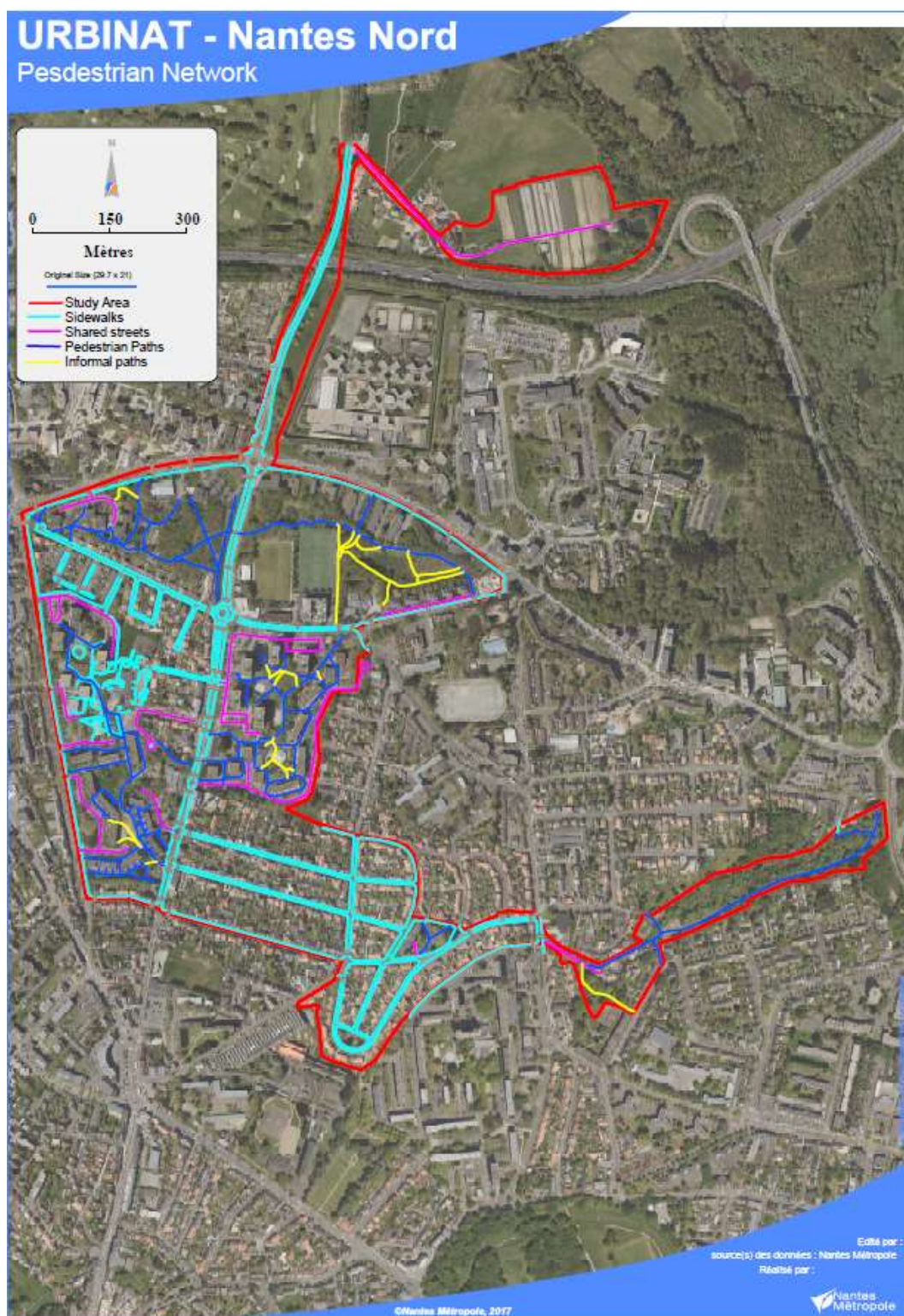


Figure 729 map of the pedestrian network, Nantes Métropole, Sophie Pageot, 2019  
 Our GIS calculates the linear roadway, i.e. all sidewalk edge surfaces, without specifically identifying the sidewalks. Moreover, since the study area includes highly urbanized areas, this calculation would give distorted and irrelevant indications.

It has been decided to concentrate on the calculation of the formal and informal paths and on shared roads, that were drawn one by one by the teams of Nantes Metropole.

Shared streets	3511.3
Pedestrian paths	6734.8
Unformal paths	1504.7

### Shared streets

The ratio of shared streets in the district may seem very high. But it must be put back in parallel with pedestrian paths, and above all, with the way social housing have been designed.



Photo : example of shared roads in the district: parking in front of the buildings, pedestrian path in front of the building and inside the islet of buildings.

The social housing district have been constructed as a district unit that reverses the spatial orientation of the traditional islets.

-- Outside, roads, services and car parking.

-- Inside, green and pedestrian areas, equipment of proximity.

It is contrary to usual urban guidelines. It divides the urban territory into sectors that do not communicate and isolates the equipment of proximity that are only reachable by foot or soft mobilities.

### Pedestrian network

The pedestrian network has been built in two ways:

- in the pavilion areas, the pedestrian network consists of sidewalks, each plot being served by a main road = a usual structure



- in the social housing district, the pedestrian network is the result of the creation of a neighbourhood unit with all the functions ((a building, a car park and a breathing zone for the walk, with paths) in a deadend



Photo : example of social housing configuration in Nantes Nord

The pedestrian network in the study area is dense, especially around each group of buildings, where it is separated from the secondary roads. It can be either in concrete or in beaten earth track for the informal paths.



photo : examples of formal path, Nantes Nord

The informal paths, as defined in the Urbinat methodology, are concentrated in the green spaces of the study area. It shows that this green spaces are only crossed and do not have a real use.



Photos : [Unformal paths](#), Chêne des Anglais “ Le Dragon” and parc de l’Amande, Source Google Maps

### Road plan and dead-ends

As explained in the district section, the social housing districts of Nantes Nord suffer from a dead-end road plan that isolates public facilities and penalizes urban operations. The landscape of the district has fostered this network, making the district difficult to cross from west to east, especially in the study area. The cul-de-sac access road is confused with the residential car parks that cross the pedestrian walkways.

In Nantes Nord in general, and in the Urbinat study area, the priority is rather to requalify the roads than to treat the pedestrian network to open up social housing areas, to link them to the public space, with paths to centres of interest.

Informal paths show that the green spaces are only crossed. It is necessary to give them use in co-construction with the inhabitants. The pedestrian network will be impacted by the modifications of the road network and may need to be addressed in a second stage.

### Synthesis Map

The synthesis map summarizes the main characteristics of the sector in the study area.

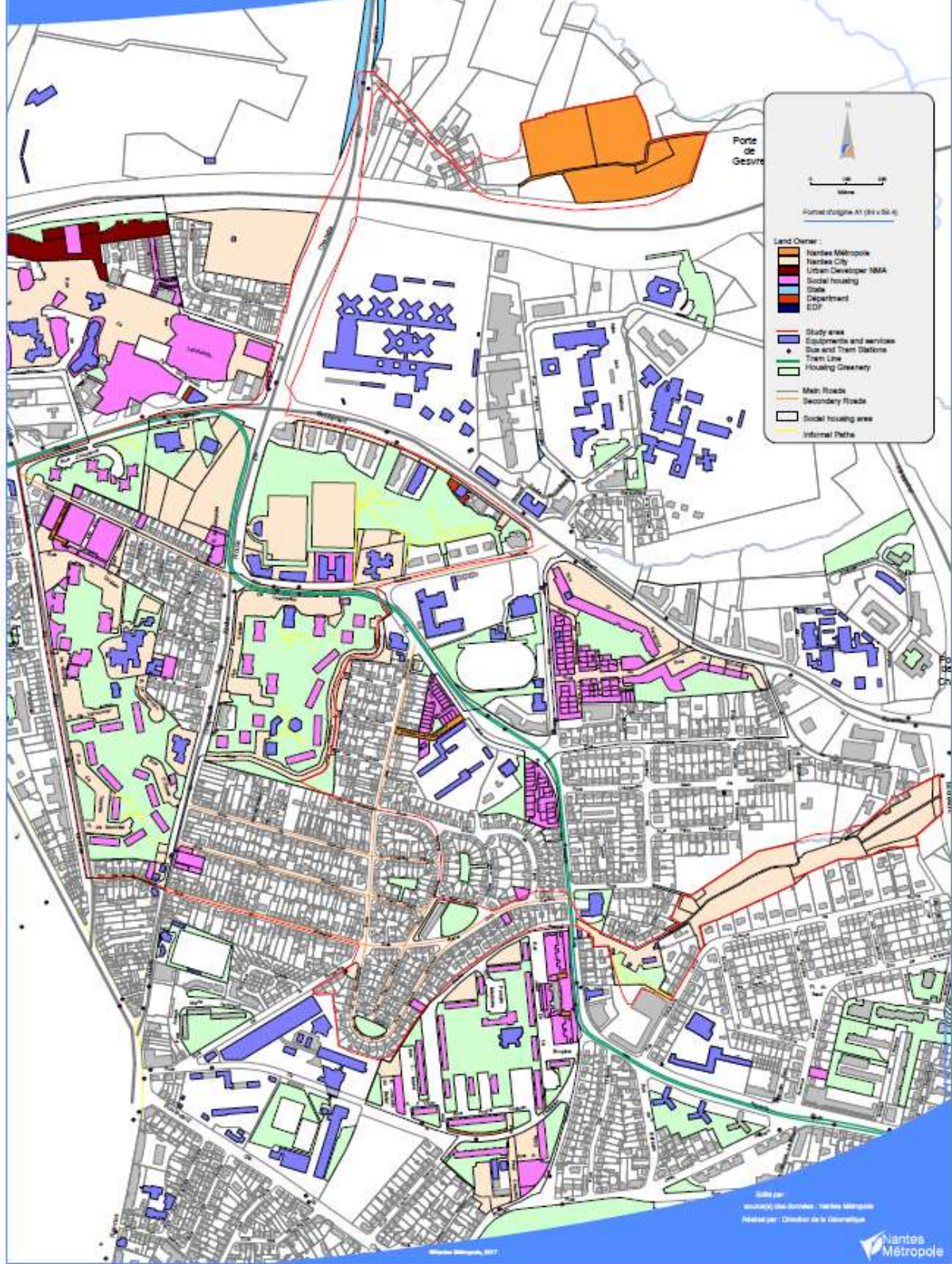
The study area includes many green and natural spaces that are not connected together with the northern sector of the study area and is separated from the rest of the territory by a highway within the study area. Different types of habitat coexist within the study area. The social housing neighbourhoods are surrounded by pavilion areas, forming real archipelagos. The dense social housing sector forms impermeable sectors.

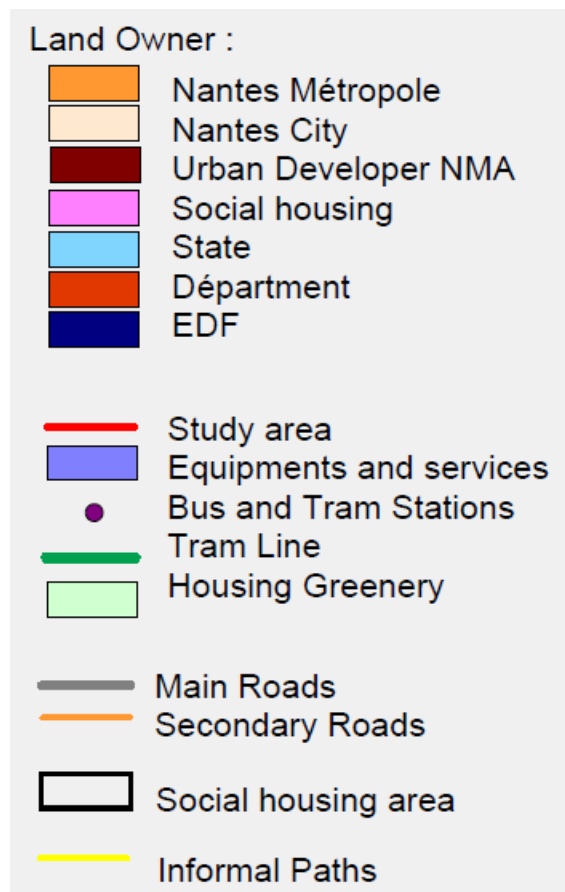
The spaces not built on the study area are composed of natural zones such as the valley of les Renards, or spaces around the social housing sectors which are low skilled spaces and without real uses.



# URBINAT

## SYNTHESIS MAP





The study area includes various public facilities and in particular a media library; the Maison de Quartier, a school, a kindergarten...

The Urbinat study area concentrates the assets and challenges of the district. The objective of the transformation of the study area is clearly to improve the permeability of this sector by addressing the hierarchy of the different public spaces and creating a real green corridor linking the different spaces.

The Urbinat study area will also be impacted by the works within the ANRU scheme with the creation of the multi-professional health centre, the demolition or renovation of social housing, the opening of dead-ends or the development of the Gesvres gate on the ring road and the bridge to access the farm of the Angle Chaillou.

## 6.5 Nature Based Solution

### 6.5.1 NBS policy in Nantes

Johanna Rolland, the mayor of Nantes, describes Nantes as a green city “by choice”. Nantes reinvents itself on a daily basis to build the green city of tomorrow, a city where nature plays a central role in all projects, a city turned towards the Loire and its rivers. Nature becomes a springboard for Nantes' singularity, for its unique way of life by inventing a city that is both intense, with a great ambition in terms of housing for all, and a less mineral city. Nantes innovates and find concrete solutions thanks to its natural heritage that represents leverage to act: 1 000 ha of green spaces, 101 public gardens and parks, each inhabitant living 300 m from a public green space.

The Municipality of Nantes puts nature at the heart of all the projects, from inspiration to the way to implement them, from daily projects as the creation of 200 lots of community gardens from 2014 to 2020 as for the urban project for which landscape architects have been chosen as pilot. But the ambition for nature has to be shared and developed with the citizens, to build from their wishes, their sensitivity and experiences.

Those different actions make only sense if they are included in a wider plan on ecological transition, inspired by nature and its preservation: protection of the biodiversity, improving air and water quality, reduction of greenhouse gas emissions.

Nantes implements various forms of participatory NBS to ingrain citizen dialogue and collaboration between stakeholders. Nantes also creates the right environment to promote creation and innovation, with the aim of developing new ways of building the city, by all and for all.



## 6.5.2 Territorial Nature Based Solutions

### Ephemeral tree nursery



Figure 730: Tree nursery on the quays of Loire



Figure 731: Localisation of the tree nursery

#### Description of the NBS:

Nantes decided in 2018 to create a tree nursery on the quays of Loire, a former parking with no trees and no shadow (**Figure 730** and **Figure 731**). The goals were multiple:

- to prefigure the future changes with the urban project along the river Loire where nature has a key place (**Figure 732**)
- create a green pathway to the district Bas Chantenay whose transformation has started with the opening of the 101 garden of Nantes and which will host in 2022, the heron tree, the most ambitious project ever undertaken by “Les Machines de l’île” and the Co La Machine, a giant and interactive sculpture made of steel, more than 50m (165ft) in diameter and 30m(100ft), which will become one of the major attractions of the city.
- promote the green policy of the city since 200 of the 1500 trees will be planted in the different districts of the city (with specific labels mentioning the future place of each tree)
- create a convivial place with relaxing areas, catering opportunities and cultural events

600 m of pathways, 1500 trees in 2019 (1000 in the 2018 edition), a vegetable garden for workshops, a “guinguette” (restaurant/café) (Figure 733) , activities as escape games, artistic workshops around gardening, open air games ...



Figure 732: Tree nursery (a) before, (b) after and (future project)



Figure 733: The guinguette (left) and activities with children

Evaluation:

- Budget: 340 000 € for the first edition (mainly works for water and electricity supply) and 160 000 € for the 2019 edition
- 350 000 visitors in 2018, during 6 months
- 35 000 persons ate or drank at the guinguette restaurant ( average of 400/persons a day) Figures of 2018.

- Educational activities: more than 1000 pupils during workshops with the gardeners
- Up to 4 degrees difference between the centre of the nursery and the quays without the trees.

## “Floating gardens”



Figure 734: The floating gardens



Figure 735: Floating gardens localisation

### Description of the NBS:

Floating gardens were created in 2019 on the river Erdre, North of the city centre, just before the Erdre enters the Loire, in a very dense urban area. The place was developed in 2013 to become a meeting place with the installation of a boat (guinguette) with various activities and concerts. In 2019, green rafts floating in the middle of the river were created aiming to restore the natural habitat of the fauna. The aim was not only aesthetic, but scientific. Indeed, the aim was to restore specific fauna and flora in the city centre. The project mimics the nature, since stumps and tree trunks are naturally present in the rivers. Saulnes and alders merge creating natural rafts for flora and fauna.

The floating gardens are full of indigenous plants common on the river Erdre.

Regarding fauna, each species need specific habitats that have been studied by the team of the green spaces of Nantes.

**Bats:** water is a perfect place for insects and the privileged hunting ground of bats. 8 specific nesting boxes have been installed on plane trees, at a minimum of 6m high.

**Birds:** trees and hedges on the Erdre banks are visited by numerous birds: athena owls, Motacilla cinerea, bullfinches, tawny owls and turtle dows (Chevêche d'Athéna, Bergeronette des ruisseaux, Bouvreuil pivoine, Chouette Hulotte et Tourterelle des bois). 14 nesting boxes were installed along the quays, near the hedges.

**Waterfowls:** specific research was conducted to help waterfowls to adopt the place. Tree branches were installed to allow cormorants and herons to land, 10 egg-laying baskets were installed to protect the eggs...

**Fishes:** fishes multiply in specific places called spawning grounds which protect the eggs and young fishes. 5 artificial spawning grounds have been installed in the river for the experimentation.

Various insect hotels were installed or naturally created to allow the proliferation of insects.





Figure 736: Bat box and spawning grounds



Figure 737: A natural environment at the heart of the city

**Evaluation:**

In 2019, a scientific inventory of the fauna took place during spring and summer to list the species and communicate on biodiversity with the greater public. Seven inventories took place from June to October, at different periods of the day, according to the specific species to inventory. The results are developed in a report with the conclusion that the experience is highly instructive on a scientific level proving a successful restoration of the environment. Indeed, ducks,

**Urban project Doulon Gohards - urban agriculture**

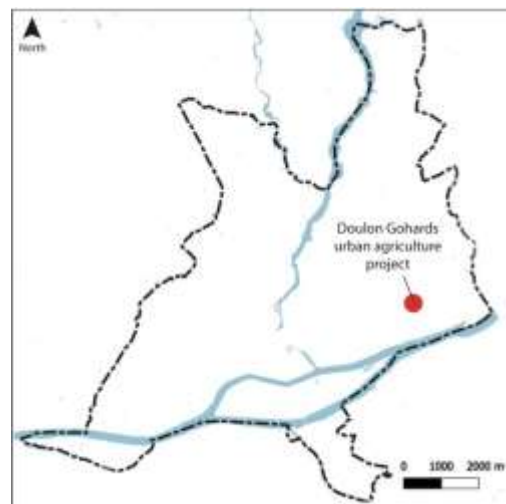


Figure 738: Localisation of Doulon Gohards urban agriculture project

**Description of the NBS:**

Located at the east of Nantes, the urban project takes place on 180 hectares of former market gardening lands where it is planned to build a new district combining urban agriculture, natural areas, housing and services. In the long term, Doulon-Gohards will accommodate 2500 to 3000 homes. Spread over five geographical areas, they will allow everyone to find housing with 25% social housing, 30% affordable housing and 45% free housing. The forms will be varied, mixing individual grouped housing and collective housing. The project also provides for the creation of a public facilities centre comprising

a school complex, a leisure centre and sports facilities. The project was co-constructed with the inhabitants from the beginning: consultation prior to the creation of the Concerted Development Zone (CDZ), participation in the definition of the overall project by 2035.

Today, the consultation continues. More operational, more concrete too, it is now focusing on the first phase of the project to 2022. The October 2017 citizen workshop made it possible to create several working groups that will feed into the dialogue with thematic workshops: history workshop, Maurice Macé school workshop, local support group for farmers, garden workshops with Ecos à la Papot, a house located in the Doulon-Gohards district made available by the urbanist to prefigure new uses and practices in the district around gardening in the city, and soon a workshop on water.

The workshops will be developed according to the aspirations of the inhabitants and the needs of the project.

Financed by the State, the Doulon-Gohards project will accommodate four urban farms on 8 hectares.

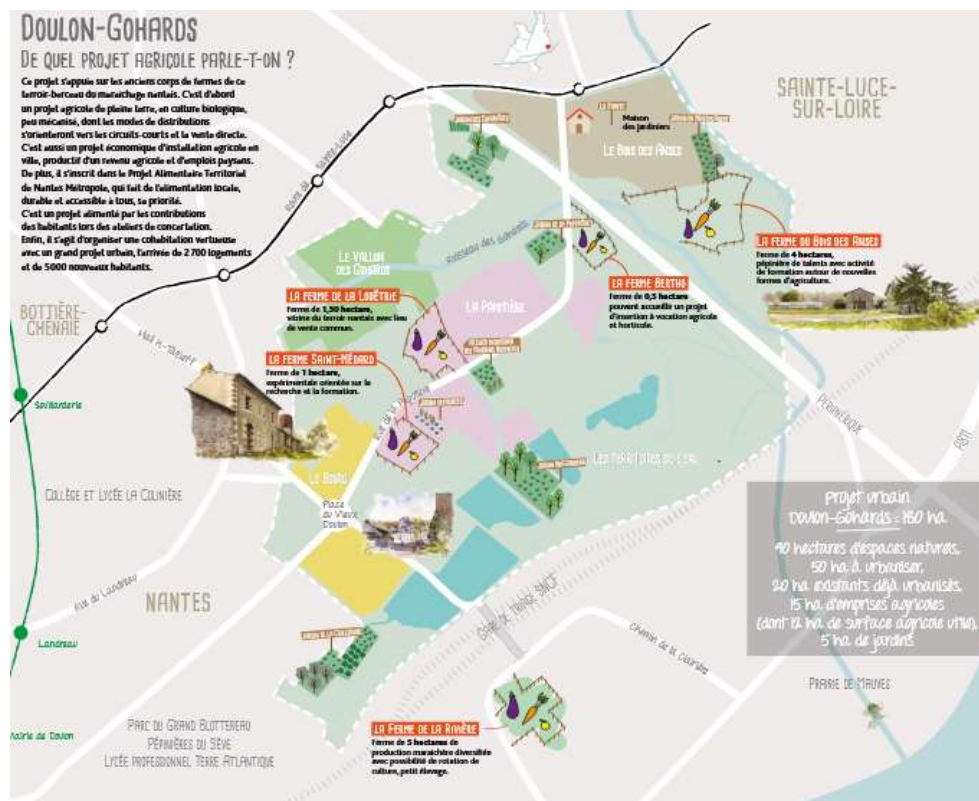


Photo : © D. Clarvreur, double mixte, DR, 2017  
Figure 739: Organisation of the agricultural establishment

The Cap 44 cooperative society for the promotion of peasant agriculture and the cooperative for the installation of peasant agriculture (CIAP) are working with the urbanist on the project of the five farms. CAP 44 carried out feasibility studies and measured the potential of the sites, then proposed different project development scenarios. CIAP, for its part, welcomes and recruits project leaders. She also assists them in their installation process and during the first few years. The idea is also to create a synergy between these five farms, which will have their own identity and project, by sharing equipment and storage spaces for example. the surface area that can be used to set up agricultural projects is approximately 12 ha spread over 5 sites. These areas make it possible to consider a wide variety of technical systems, from micro-farms to more



traditional organic market gardening operations. The immediate proximity of the heart of the district and more generally the proximity of the city centre of Nantes makes it possible to consider the full diversity of short marketing channels, directly from producer to consumer.

In 2019, the land of three of the five planned farms has been prepared. With 50 applications submitted and 20 projects selected, it remains to choose the future farmers that need habilitation.

Beyond its productive function, the aim is to create a whole network of federated actors to offer complementary services to city dwellers: cannery transforming production, sales space, restaurant, classroom at the disposal of teachers, third places, coworking, business incubator, etc.

The community gardens are part of the life of the neighbourhood. If the gardens are all different, some more framed, others more free, the gardeners themselves, share the same dynamic of exchanging know-how, sharing tools, and conviviality. They are very keen to establish links with the farmers who will come to settle, to help them in their practices for example. The creation of a place of exchange on a farm between amateurs and professionals is envisaged.

#### Evaluation:

Implementation phase goes on until 2035. The first farmer will start in 2020. The challenge of cohabitation between dense and dynamic urban areas and quality agricultural areas is what makes this project unique and will need to be assessed.

## **Stormwater management facilities inventory (city level)**

A survey of stormwater management facilities (classified as NBS) was made in 2016 within the Matriochkas project (Delamain et al., 2016). This survey deals with each facility used in the metropolitan area to manage stormwater runoff. Most of the facilities included in this survey are managed by the Nantes metropole services, but few of them are private.

Retention basins represent a large part of this inventory (~2/3), and many of them are dry retention basins, sometimes poorly permeable. Notice the significant part of « natural » stormwater storage basins, like rivers or ponds (nearly 20%), due to the very dense hydrographic network and the presence of wetlands. This statement may be related to the fact that the majority of facilities is located in periurban areas, and not on the city center. The part of source control NBS facilities like green roofs, rain garden or swales is small, but is currently increasing.

The number of SUDS is representative of the stormwater management policy of the metropole. Moreover SUDS are common elements of the urban landscape and may be a basic element within the implementation of the healthy corridor.

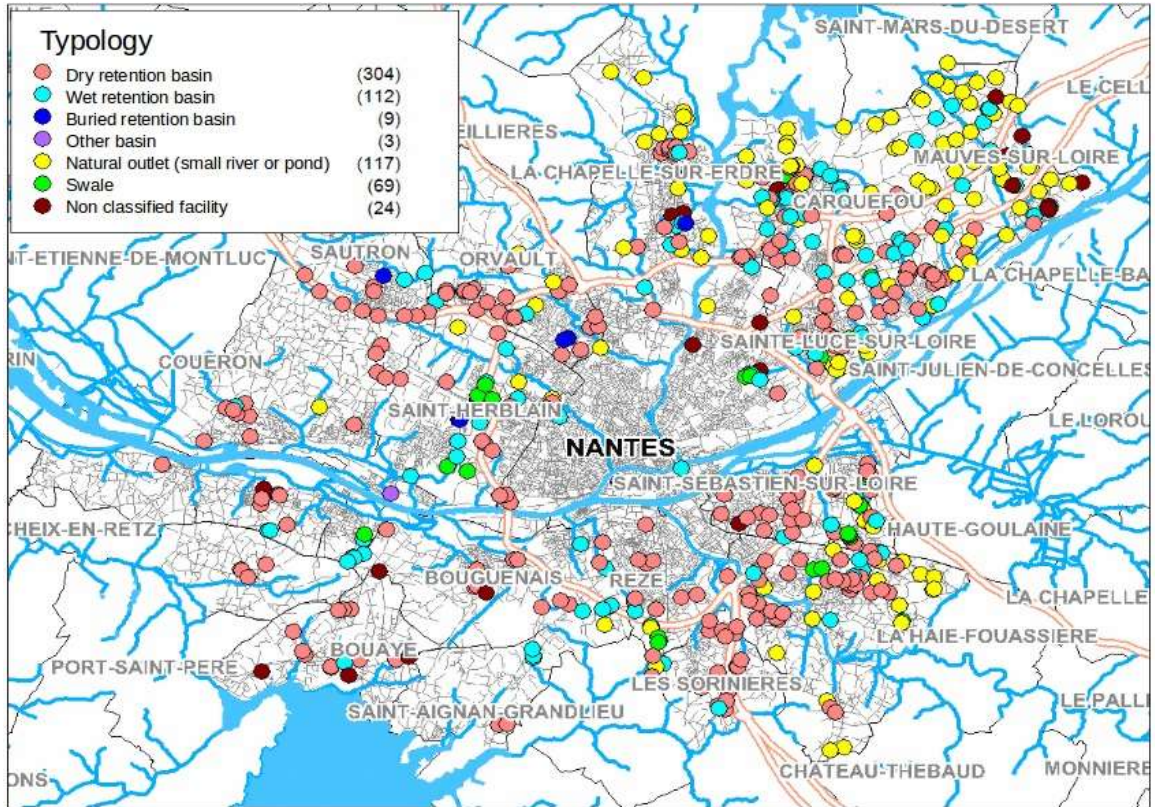


Figure 740: Inventory of stormwater management facilities in Nantes metropole (2016). NBS are mainly large centralized facilities (dry or wet retention basins)

### 6.5.3 Technological Nature Based Solutions

“Symbiose”, bioclimatic greenhouse on the top of a social housing



(Photo: NMH)

Figure 741: Computing image of the project



Figure 742: Localisation of the project

Description of the NBS:

The project is located in the Nantes Nord district. Managed by the social landlord Nantes Métropole Habitat, the project aims to exploit the solar potential of roofs by installing a bioclimatic greenhouse capable of capturing energy, pre-heating the building's domestic hot water and providing new spaces for residents. The objective is to recover the heat from the greenhouse to heat the domestic hot water. This greenhouse also makes it possible to offer tenants and residents a new 400 m<sup>2</sup> space to invest in uses to be developed jointly. The tenants suggested activities such as vegetable gardens, leisure and reception areas for family meals, attics, etc.

The aim is also aesthetic. The project will bring an added value by breaking the monotonous nature of the large complexes of buildings, introducing a new design to the urban area, symbolizing the transformation of Nantes' main social housing district.



Figure 743: Architecture plan and current state of the building

#### Evaluation:

The SYMBIOSE project is estimated at 300k€HT including the design, manufacture, installation of the greenhouse, and accessibility work to the roof, which does not take into account thermal insulation only from the outside, which is estimated at 150k€. The cost of the elevator option is still being built.

The project will start beginning 2020. After the construction, a phase of discussion with the inhabitants about the use of the greenhouse will start.

#### FARMBOT



Figure 744: Example of implementation of the Farmbot

### Description of the NBS:

Inspired by Californian Rory Aronson's "open source" solution, the founders of the Farmbot association in Nantes have developed the concept of an intelligent vegetable garden robot with the aim of reintroducing agriculture into urban areas.

The Farmbot vegetable garden robot is designed to reintroduce vegetable cultivation into city lives. It is an Open-Source robot designed to make a vegetable garden autonomous. The robot's technical features and software allow the user to program and manage his vegetable garden by optimizing space and reducing the supply of water and inputs. Farmbot brings another dimension to urban agriculture by allowing the design of connected and autonomous vegetable gardens or farms. It can be supplied by any renewable energy source and collects rainwater for watering

This Open-Source project was designed and distributed by the Californian startuper Rory Aronson and his teams to protect resources and stem intensive agriculture. The model is sold for \$3,150 in open source software and hardware. The vegetable garden robot, able to sow to water and to weed independently a "plot" of 3 by 6 meters. But American manufacturing was problematic for the French team since each change on the prototype would impose customs duties up to 500 euros.

In the pure Open-Source spirit, the international Farmbot community has allowed Farmbot France to support and develop a French community and a vegetable garden robot manufacturing with a French nomenclature. A scientific of the University of Nantes decided to entrust the project to seven students in mechanical and production engineering. Objective: to build a robot in kit form that can easily be assembled by the first urban gardener. The first prototype was ready in April 2018. It can be controlled from a smartphone, tablet or PC, it sows, waters, detects and pulls weeds. Offered at the same price as the American version (3800 euros), the Farmbot "à la française", available in two sizes (5 or 18 square metres) has already registered around twenty pre-orders.

Farmbot France's objective is also to propose:

- a French Farmbot nomenclature, i. e. from local suppliers and to European standards;
- a community of exchanges and referencing of projects in France around the Farmbot;
- Farmbot's group purchases from Rory and Farmbot to pool both financial and ecological costs.

### Evaluation:

The Farmbot is an example of successful replication. Invented in California, it has been adapted to the local needs, created a community of practice to share the development of the prototype. It also creates economic opportunities.



## Uritrottoir, “ urban ecological solution for civilizing «wild peeing»”



Source Uritrottoir website

Figure 745: Illustration showing the different elements of the Uritrottoir

### Description of the NBS:

Invented by the Nantes-based industrial design company Faltazi, the top of the upper bin is dressed in plants for better integration within the public space. The bottom tray is the receptacle for the urine. "It is filled with straw, according to the principle of dry toilets. A sensor notifies its manager when it is full. The straw is then recycled and transformed into fertilizer. It can be easily installed since there is no need to connect to the public sewage system.

The experimentation of the Uritrottoir in Nantes was made within the framework of the city council of the night, a council made of actors of the night, working to find the right balance for the city at night, between the city that sleeps, the one that has fun, the one that works but also the "invisible" city and the one of vulnerable people. Three Uritrottoirs were installed from June to December 2017, collecting 7700 L of urine.



Photo Ville de Nantes

Figure 746: Example of implementation in the Bouffay district

### Evaluation:

Everywhere, where communities have to deal with nuisances associated with the influx of people: city center, restaurants, events and facilities open to the public... the Uritrottoir offers an environmentally friendly, economical and efficient solution for wild peeing. It has been totally accepted by the Nantes inhabitants, but the implementation in Paris was not so well accepted by all inhabitants, depending on the place where the solution is implemented. For Nantes, it offers of a complimentary free public health



service with a low purchase price and represents a significant reduction of intensive cleaning. The city manages now 12 Uritrottoirs.

## 6.5.4 Participatory NBS

### Energy transition great debate



Figure 747: Inhabitants with the final report

#### Description of the NBS:

Implemented at the metropolitan scale, this second Great Debate on energy transition (first on the river Loire) included an unprecedented and innovative participation method called «the action debate». It aimed at responding to the democratic challenges of a greater citizen ownership of local energy issues. Citizens had highlighted that the climate challenge was not enough in itself to prompt action, that there was a need to instil a desire to act by clearly communicating the weight of experience and examples, in a practical and targeted way, but also and above all through human contact. Nantes wanted them to have the opportunity to have a direct hand in behavioural changes and solutions. To do this, a number of citizen groups received direct guidance in order to take action on their individual and collective “pathways”. In practical terms, 6 communities were formed (volunteer appeal, random draws etc.) offering 500 citizens the opportunity to experience transition for themselves.

This Great Debate resulted in a shared roadmap on energy transition signed by the Metropolitan council in 2018, that sets up Nantes collective ambition based on three unique features: an energy transition that benefits 100% to citizens, that makes use of 100% of local renewable resources and that is 100% citizenled. These commitments are now monitored by an independent commission for energy transition, the COTE, set up by Nantes Metropole after the debate. The commission is made of 30 volunteers (citizens, experts, NGO members etc.), along with two elected officials responsible for the roadmap. They meet every two months and are responsible for the development of independent metrics of success.

The first results of the shared roadmap include an ambitious 100M€ plan for thermal renovation of social and private buildings, the doubling of renovation projects to tackle fuel poverty, one billion investment planned to reduce by 30 % car use by 2030, the creation of « the Office of the Earth» to support the development of 500 new projects by 2025, the involvement each year of 500 citizens in energy transition challenges (energy,

waste, food). For example, Nantes Metropole supported a citizen investment project of a 500 kWp PV plant opened in 2019 financed thanks to the funding of 600 citizens.

The whole process provided major opportunities for citizens and stakeholders to innovate and improve the resilience and sustainability of Nantes.



Figure 748: The great debate container: an information meeting point

#### Evaluation:

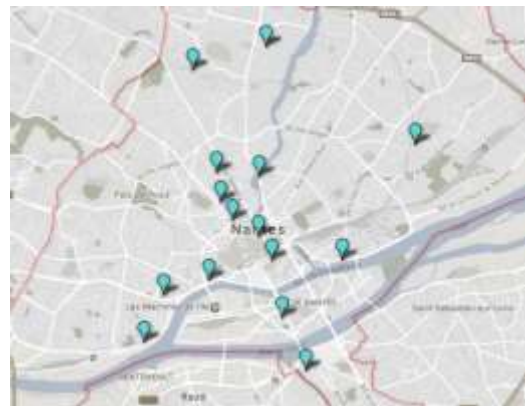
More than 55.000 people were involved in the great debate on energy transition, which ultimately generated a '2018 roadmap with 33 ambitious commitments, monitored by a commission of independent citizens and stakeholders'.

### “15 places to be reinvented”



Photo Nantes Métropole, dialogue citoyen

Figure 749: Flyer of the project



Source: bigcitylife

Figure 750: Localisation of the 15 sites

#### Description of the NBS:

15 abandoned buildings or places that belong to the city have been presented for a competitive selection of ideas submitted by citizens, associations and actors of the social and solidarity economy. The idea was to reinvent a use or a mission to the different places. The projects of the citizen and associations were built with the help of the technicians and experts of the municipality during almost one year. 81 projects were submitted in January 2018, 41 were declared admissible, it means technically feasible and corresponding to the specifications. In June 2018, during 2 weeks, inhabitants were then asked to vote online for their favourite project through the website dedicated to citizen participation. 7014 participants voted. 14 projects were laureate and resulted, for instance, in turning an unused chapel in a mushroom urban farm, in creating a zero-waste awareness hub in a former school art gallery as well as a solidarity canteen in a former restaurant where people voluntarily prepare meals for those in need. Other projects have a cultural orientation, as the former cinema room “sale bretagne” that has been transformed by the association Big City Life in a cultural centre named 23 that will open in 2020. The project was built with the inhabitants of the district and will propose concerts, yoga lessons, shows for young publics and also a shared garden.

In Nantes Nord, an unused land plot of 200 square meters located next to the university was proposed in the contest. A group of 5 students submitted a project to create a place to enjoy fruits and vegetables for free. 40 different trees and fruit bushes have been chosen together with a group of students and inhabitants and a specialist of permaculture. A garden shed and a water recovery have also been installed. Fresh'heure is a place of conviviality but above all a place of biodiversity.



Source: Nantes Métropole, 2018

Figure 751: Photo of the lot before the works of the students



(Source: Nantes Métropole, dialogue citoyen, 2019)

Figure 752: Photo of the students managing the “Fresh'heure” lot in Nantes Nord

### Evaluation:

Some of the projects resulting of the contest are still not implemented and some like Fresh'heure have just been starting. Regarding the one implemented in Nantes Nord, the question of maintenance and of the capacity of the students to renew the group after the end of their studies in Nantes is a major concern. The association that was helpful for the student consortium had in mind that this public (but closed) space should be appropriate by inhabitants of the neighborhood.



## Landscape Heritage Plan - Val de Cens Nantes Nord



Figure 753: Aerial view of the Val de Cens Nantes Nord

### Description of the NBS:

Launched in 2015 by the City of Nantes, the Landscape and Heritage Plan makes it possible to fight against the standardisation of the city, which is undergoing strong development. The initiative of this project gives a voice to the inhabitants, who have the support of a study team composed of urban architects, landscape architects and students in sociology, and the City of Nantes and Nantes Métropole. The aim is to understand how residents live and evolve within a district (travel, entertainment, etc.), to identify what makes a district charming and quality of life and to imagine the district in which residents wish to live daily in the future in terms of landscapes, services, places to live and cohabitation.

It aims for a city where life is good, that is to say:

- A sustainable and ecological city that renews itself without interruption;
- A local city (services, schools, shops, transport, associations, etc.);
- A friendly city with meeting places;
- An easy city where you can find the time to live;
- A quiet city with breathing spaces / green spaces.

The reflections, exchanges, proposals will take the form of a Sensitive Landscape Atlas that the Landscape Architects present with the group of citizens to the elected representatives at the end of the workshop. As soon as this work is submitted, the City of Nantes undertakes to implement the landscape objectives and actions identified in the Atlas. The joint work between experts and citizens should make it possible to develop landscape quality objectives and identify concrete follow-up actions, such as: feeding the revision of the Local Metropolitan Urban Plan, defining historical and heritage routes, programming micro interventions on public space and green spaces. In addition, the work will enrich the on-going or future reflections in the territory concerned and will be communicated to public or private professionals working in the district.

The workshop landscape heritage took place from April to November 2019 in Nantes Nord, at the Val de Cens, and was made of 5 different meetings. After a meeting dedicated to the presentation of the project, a walkthrough allowed exploring the district (Figure 754),

allowing the participants to share anecdotal or scientific knowledge on the history and state of the district, to exchange information and points of view on concrete situation. 2 meetings were dedicated to creativity to finalize the atlas that was presented to the elected representatives during the last meeting.



Figure 754: Photos of the walkthrough (Photos Nantes Métropole)

### 6.5.5 Social and Solidarity economy

#### EcoSolies, centre for cooperation and social innovation

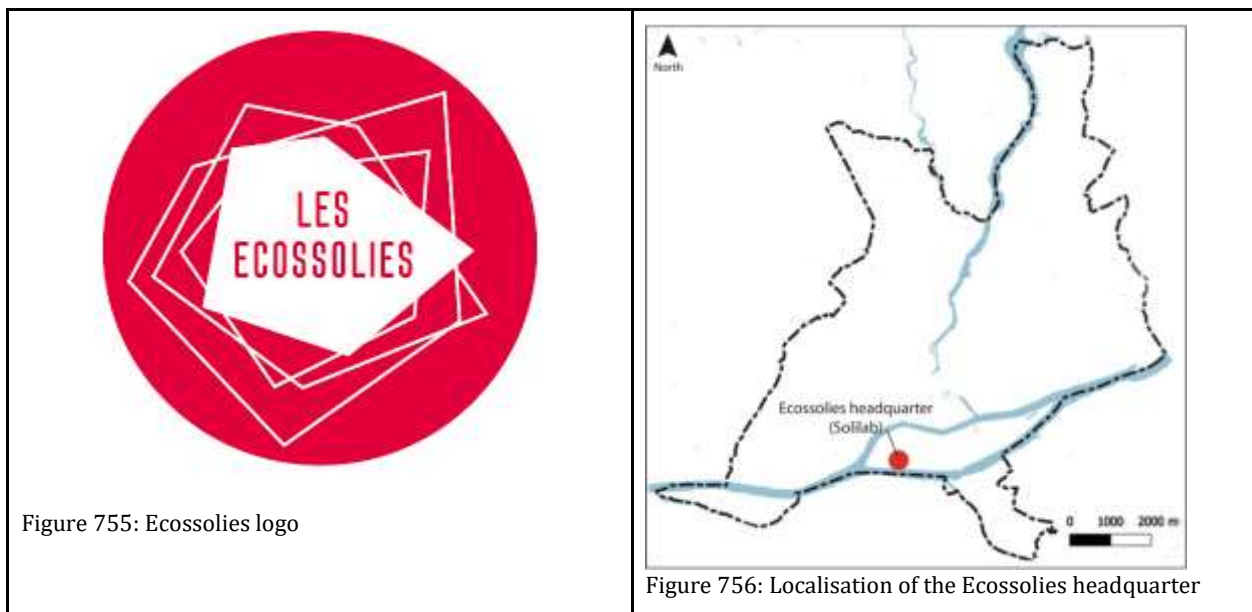


Figure 755: EcoSolies logo

Figure 756: Localisation of the EcoSolies headquarter

#### Description of the NBS:

Initiated in 2002 with Nantes Métropole, the association the EcoSolies was created in 2004. In 2006, it organized a major event hosting 560 SSE organizations and 30 000 visitors during 3 days. In 2008, the association chose to start to professionalize and decided to create a collective working place. 2014 is the year of up-scaling with the opening of the Solilab on former wasteland on the “Ile de Nantes”, near the “Machines de l’Ile”. The Solilab is an emblematic place of connection to facilitate the development, the promotion and the cooperation of the social and solidarity economy. This 9,000 m<sup>2</sup> multi-purpose site is made of:

- a second hand shop opened to the public



- the rental of offices, open-space workstations and storage spaces; and a total of nearly 200 people who invest in Le Solilab daily
- a canteen, to reheat its small homemade dish or to consume a menu purchased on site from street kitchen service providers who invest Le Solilab during lunchtime

The Ecosolies also propose an incubator, the Ecosolies Lab, for tailored support to develop existing social enterprises and create new ones. It can support the feasibility study and launch of the business. It also offers an intensive support program aiming to secure and accelerate the launch of 10 companies with a social and/or environmental impact on the territory every year. The company is supported for the mobilisation of potential partners and associated resources and the project is hosted for 6 months in a work or experimental space.



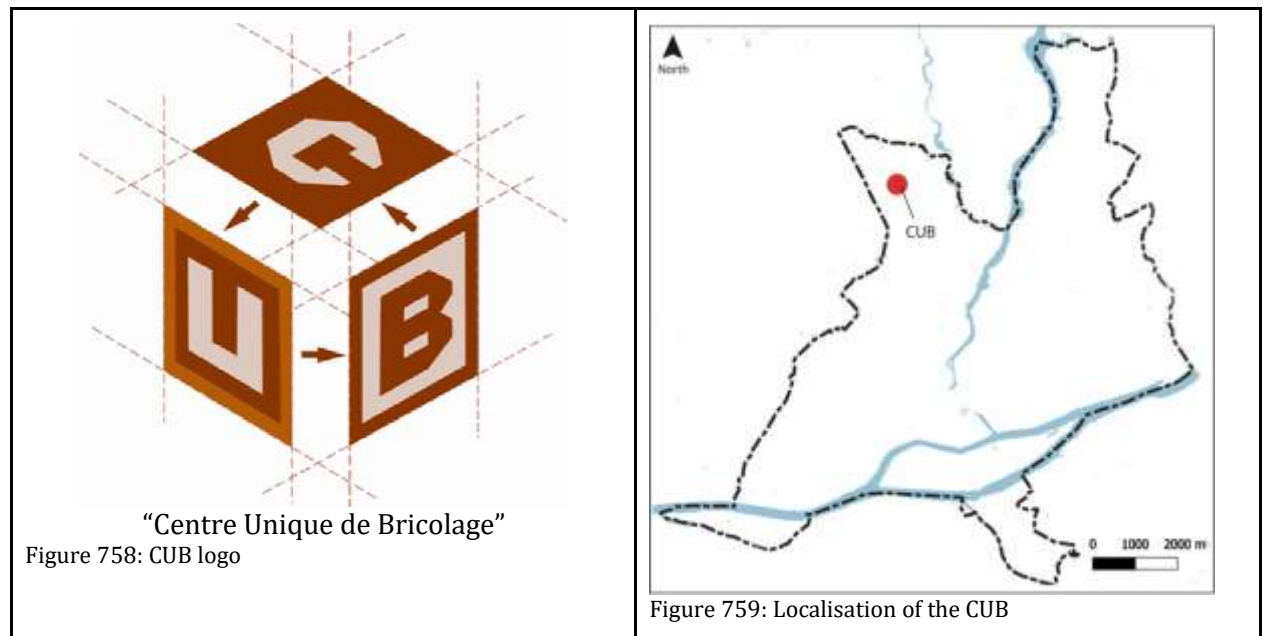
Figure 757: Ecosolies headquarter

The network of Ecosolies now counts 600 members of which 300 companies.

#### Evaluation:

The Ecosolies has managed to grow and adapt to the different challenges within 15 years. There was the need for the territory and SSE actors to promote, support and develop projects in the Social and Solidarity Economy. There was also a willingness of the actors to work together. In 2013, the SSE companies represented 16% of the private job of the metropolitan area (12% on the national level), 2 819 companies and 36 000 jobs.

## CUB, ("Do it yourself" center)



### Description of the NBS:

Originally, the project comes from an initiative by the inhabitants who wanted a place to do some tinkering. To give shape to their project, a petition of 500 signatures circulated. This originally enthusiasm is today confirmed by the permanent influx of residents or people from all over the city.

The association increased the surface area of its premises by recovering the space of the teen club: 220 m<sup>2</sup> with workshops equipped with professional machines and tools. The Cub is also a place to break isolation and create social cohesion.

Thanks to partnerships with social workers, solidarity between users is shared beyond DIY. The Cub offers a dozen permanent places to RSA beneficiaries (French social welfare for people unemployed, to guarantee a minimum income).

Opened 4 days a week, with 2 permanent staff (a cabinetmaker and a sociocultural animator), the CUB also offers training workshops on several topics. The last one: an "aquarelle" painting workshop with 8 participants.



Figure 760: CUB activities

### Evaluation:

The CUB was a clear product of the need of the inhabitants of the district but has an area of influence much larger than the district, contributing to a mixity of profiles that meet around a common interest.

## Ethiquette



source: Ouest France

Figure 761: Ethiquette event in the 'CUB' building

### Description of the NBS:

Every Thursday, dozens of women from the district Nantes Nord find themselves in the room of the association nestled between two building halls to exchange second-hand clothes. At the cash register, no credit cards, coins, or tickets. In Ethiquette, people barter: they bring what they no longer wear and, in return, they leave with new clothes. Ethiquette is both a place to get dressed, for families in difficulty, but also a meeting place. As stated by a volunteer, for some inhabitants, coming here is the only outing of the week.

### Evaluation:

Ethiquette respond to the need for cheap clothes in a district where the ratio of people leaving under the poverty line is very important. The concept of barter is also particularly adapted to a district with high insecurity rate: no exchange of money, less risk of theft. It also suits to a multicultural population since the barter exclude the necessity of counting the amount to be given or returned.

## 6.6 Baseline for the development of the healthy corridor

Nantes Nord has multiple facets: undeniable assets such as a nature to preserve and promote, economic activity sectors which link to the social housing districts is to create and dynamic and committed associative life that are valuable intermediaries to mobilize the inhabitants for the co-construction of the healthy corridor. But Nantes Nord also faces important and complex social challenges as a high rate of unemployment, insecurity, and globally significant precariousness that are to be tackled to improve the health and well-being of its inhabitants.

The inhabitants and stakeholders In Nantes Nord have a culture of participation with the 4 past years dedicated to the expression of their needs, co-diagnostic and discussion around the future of the district. They are now waiting for concrete solutions to be implemented. The urban project on the district will achieve in 2030. With €125.1 million state funding, it will profoundly redesign the face of the district, including the renovation of 1100 homes, the creation of a public facilities cluster and a business cluster. It is a long time project.

The Urbinat project will have a more concrete impact in a shorter time scale, which will for sure be an important leverage to mobilize inhabitants who are used but dissatisfied with this long administrative time before implementation.

In 2019, the presentation of the Urbinat project by the IRSTV team at the public meeting on the 16th May with the elective representatives of the district and the hosting of the Urbinat meeting that took place at the heart of the district, in the community centre la Mano in July 2019, raised attention of the inhabitants. Communication on the project will also be achieved through the installation of a large information board beginning 2020 helping to mobilize the inhabitants for the workshops that will take place during the first semester of 2020 to formalize the urban plan.

The co-selection and co-design of the NBS solutions will be efficient if we manage to mobilize various typologies of publics. With regard to the socio-demographic portrait of the district, the

health indicators and the social challenges, Nantes choose to target the children, the youth and the elderly with the help of intermediaries such as the residential facility for dependent elderly people "Parc de l'Amande", the associations working with youth and children and a walk group of inhabitants of the district. Schools and childminders could also be associated.

The goal is to design a healthy corridor that connects the different parks, gardens and green spaces, that encourages the inhabitants and actors of the territory to take possession of these public spaces, to make them living spaces and supports for social cohesion.



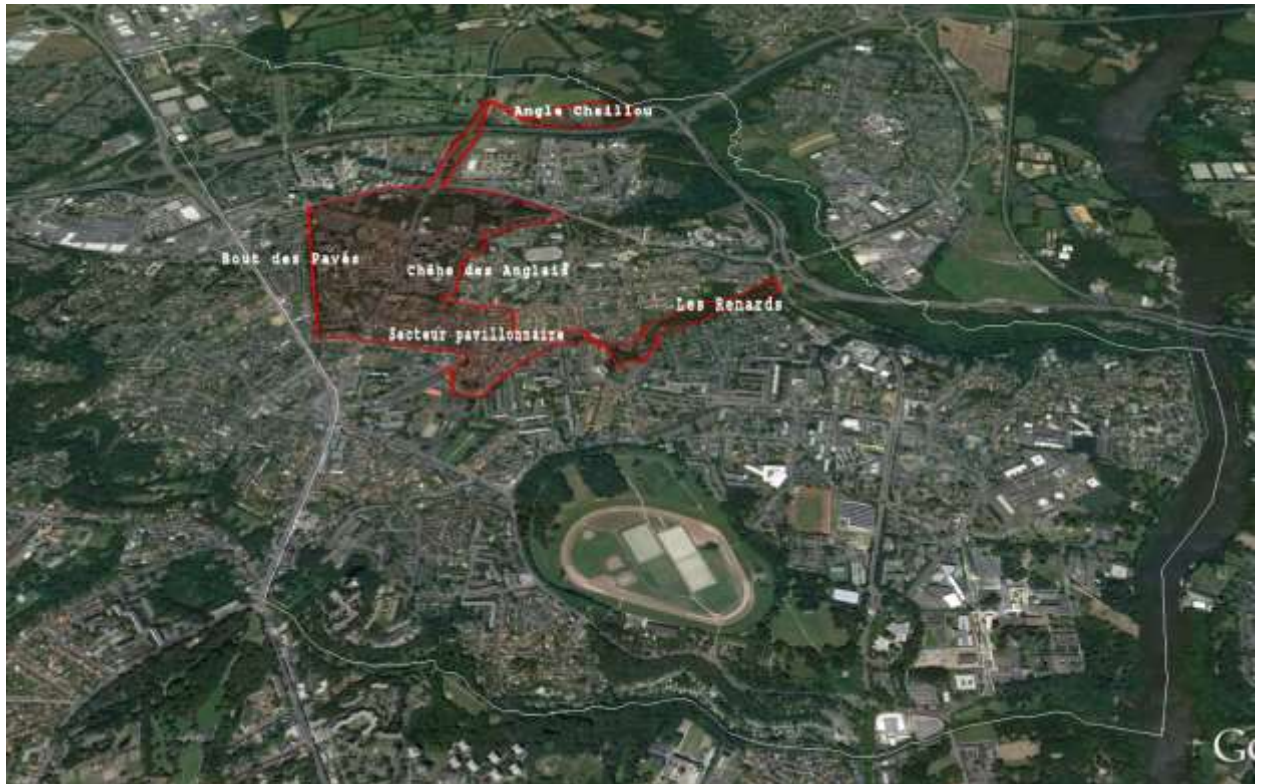


Figure 762: Délimitation of the district and of the corridor (Source : Nantes Métropole based on Google Map Alain Yvrenogeu 2019)

The perimeter chosen to implement a corridor within the North Nantes territory (Figure 762) complies with the principles of the Global North Nantes Project, a project co-financed by the state for the renovation and demolition of housing, the redesign of major roads in order to reduce urban disruption, and the revitalization of the district to promote its social and economic diversification. The area is around 24.3 ha.

Indeed, if the district has many green spaces, natural or agricultural, but they are not linked to each other and do not contribute to linking the various fragmented spaces of the territory.

Between the "coulee des Renards" (valley housing the Ruisseau des Renards) located in the northeast of the district and the "Angle Chaillou" located in the north are to find residential areas and the social housing estates of "Le Bout des Pavés" and "Le Chêne des Anglais" and to the north of the district the agricultural zone of the "Angle Chaillou".

The chosen perimeter aims to connect these different heterogeneous fragments of the territory by creating a "real" healthy corridor of public spaces, enhancing even the green spaces without real uses within the social housing districts.

## 6.7 Conclusion

Even if it is characterised by a certain fragility (worrying socio-economic indicators, a deteriorated living environment), the district benefits from qualities that will be enhanced and assets to be reinforced: a very good public transport service (Chronobus line, tramway, roads), green and natural spaces offering an exceptional landscape and



geography, activity zones on the edge of the district and dynamic economic area. The district also benefits from a rich cultural and associative life thanks to structuring local facilities that will help in mobilizing the inhabitants for the co-construction of the healthy corridor within URBiNAT.

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## 6.9 Bibliography

- AURAN, 2018, *Nantes : 2 900 hectares de couvert végétal*, Les synthèses de l'AURAN, décembre. [online]: <https://www.auran.org/publications/nantes-2-900-ha-de-couvert-vegetal-les-syntheses-de-lauran-36>
- AURAN, 2015, Nantes et ses quartiers - Population, Ménages, Actifs, Emplois, Logements... Chiffres et repères, rapport, 136 pages.
- AURAN, 2019, Aire urbaine de Nantes: une forte croissance démographique durablement installée!, synthèse de l'Auran, n°39, 4 pages [online]: [https://www.auran.org/sites/default/files/publications/documents/s39\\_demographie\\_v2.pdf](https://www.auran.org/sites/default/files/publications/documents/s39_demographie_v2.pdf)
- Béchenec F (2007) Carte géologique harmonisée du département de Loire-Atlantique. Report BRGM/RP-55703-FR, pp 369
- Béchet B., S. Joimel, L. Jean-Soro, A. Hursthouse, A. Agboola, T.E. Leitão, H. Costa, M. Cameira, C. Le Guern, C. Schwartz, T. Lebeau, 2018. Spatial variability of trace elements in allotment gardens of four European cities: assessments at city, garden and plot-scale. *Journal of Soils and Sediments*, 18(2), 391-406, DOI10.1007/s11368-016-1515-1
- Barreau Dominique, 2014, *Agir pour l'agriculture: Nantes Métropole*, Pour, n°224, pages 351-360.
- Conil P. et Plat E. (2015) - Aptitude des sols à l'infiltration des eaux pluviales sur le territoire de Nantes Métropole. Rapport final BRGM RP-65025-FR, 63 p.32 III, 2 ann.
- Direction Centrale de la Police Judiciaire, 2012, Criminalité et Délinquance constatées en France - Année 2012, 420 page. [Online]: <https://www.ladocumentationfrancaise.fr/rapports-publics/134000490/>
- Delamain, M., Rodriguez, F., Bocher, E., Puizillout-Lieppe, C., Petit, G., Fortin, N., Rouaud, J. M., 2016. Evaluation des sources de polluants susceptibles d'impacter les ouvrages de gestion des eaux pluviales-Diagnostic exhaustif à l'échelle du territoire nantais. In 9e Novatech 2016, 4p.
- Nantes Métropole, 2018, Plan de déplacements urbains 2010-2015 perspectives 2030, 87 pages, [online]: [https://www.nantesmetropole.fr/medias/fichier/nm-pdu-final-a4italienne-web-12-12-18\\_1545216248952.pdf?INLINE=FALSE](https://www.nantesmetropole.fr/medias/fichier/nm-pdu-final-a4italienne-web-12-12-18_1545216248952.pdf?INLINE=FALSE)
- Nantes Métropole, 2012, European Green Capital Award Nantes 2012 2013 report, 202 pages.
- Nantes Métropole, 2017, PLUM - Rapport de présentation "Le territoire", Tome1, 369 pages.
- AURAN, 2014, *Le document socle*, Le Grand Débat 'Nantes La Loire et nous', étude pour Nantes Métropole, 227 pages.
- SEMITAN, 2018, Rapport d'activité, 23 pages.
- Ters M, Barthélémy B, Marchand J, Richard R, Weecksteen G, Forestier FH, Lasnier B (1969) Carte géologique de la France / Geological map of France (1/50 000), feuille Nantes (481) – Edited by BRGM, Orléans, France

### Websites:

[https://carto.sigloire.fr/1/n\\_tri\\_nant2014\\_044.map](https://carto.sigloire.fr/1/n_tri_nant2014_044.map)