



D4.1_Report on the set-up of 6 European Living Labs

July 2025

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Executive Summary

This report has been developed as part of the FORTHCOMING project to describe the set-up of the six Urban Living Labs (ULLs) in the case study areas of the project: Las Rozas (Madrid MA, Spain), Altona (Hamburg, Germany), Alverca do Ribatejo (Lisbon MA, Portugal), Kertvaròs (Debrecen, Hungary), Küçükçekmece (Istanbul MA, Turkey), and Settimo Torinese (Turin MA, Italy).

Since the project objective is to develop and test data-driven and user-centric 15-minute city models for suburban contexts, learning from central city best practices, this deliverable focuses on both the core city and its suburban pair (e.g., core city of Madrid and the suburban municipality of Las Rozas).

The report aims to provide a comprehensive overview of the main characteristics and features of the selected case studies. For the sake of consistency and comparability among different case studies, common open data sources (like OECD database) were used. For all six case studies, the report provides for both the core city and the ULL the following information: demographic and socioeconomic characteristics, urban planning and land use characteristics, transport and mobility characteristics, governance and policy framework, concluding with key challenges.

ULL included in FORTHCOMING share several common characteristics: in most cases, these areas are experiencing population growth, thus are prone to sprawl. Also, in 4 ULL transport infrastructure resulted in spatial barriers and fragmentation. Some ULL have specific challenges, like scarcity of green spaces which is particularly relevant in Altona.

1. Introduction

This report was developed as part of the FORTHCOMING project to provide the description of the set-up of the 6 Urban Living Labs (ULLs) in the project case study areas: Debrecen (Hungary), Hamburg (Germany), Istanbul (Turkey), Lisbon (Portugal), Madrid (Spain), and Torino (Italy). In each study area, the final goal of FORTHCOMING is to foster successful transfer of central city strategies to the suburbs, boosting the transition to climate-neutral, liveable, and inclusive cities. For this reason, a specific focus is placed on suburban areas of the six cities: Kertváros (Debrecen), Altona District (Hamburg), Küçükçekmece (Istanbul), Alverca do Ribatejo (Lisbon), Las Rozas (Madrid), and Settimo Torinese (Torino). This allows to make a comprehensive analysis accounting for the diversity of selected suburban areas. Four types of case study are included according to the type of core-city and metropolitan area: (1) mega-city example: Istanbul, with over 15 000 000 inhabitants in its metropolitan area, a historically rich city with large industrial developments too; (2) large capital cities and metropolitan areas Madrid (6 800 000) and Lisbon (3 000 000), both capital cities and administrative centres, as well as touristic destinations; (3) large industrial cities Hamburg (1 800 000) and Turin (2 200 000) known for their industrial and productive activity, (4) small city Debrecen (202 000) which combines industry with large low-rise residential areas.

The ULLs allow to define a common approach for all 6 Case Studies as well as define a methodology for testing innovations and involving citizens and stakeholders like public authorities, transport operators, technology providers, community associations. In addition to that, ULLs will feed co-creation, knowledge exchange and stakeholders' engagement, enabling close follow-up on the FORTHCOMING development and continuous validation of the results. Thus, ULLs set-up is crucial for project's development, monitoring and evaluation of the results, and stakeholders' engagement.

Within FORTHCOMING, ULLs set-up is included in work package (WP 4) "6 EU 15minC Urban Living Labs".

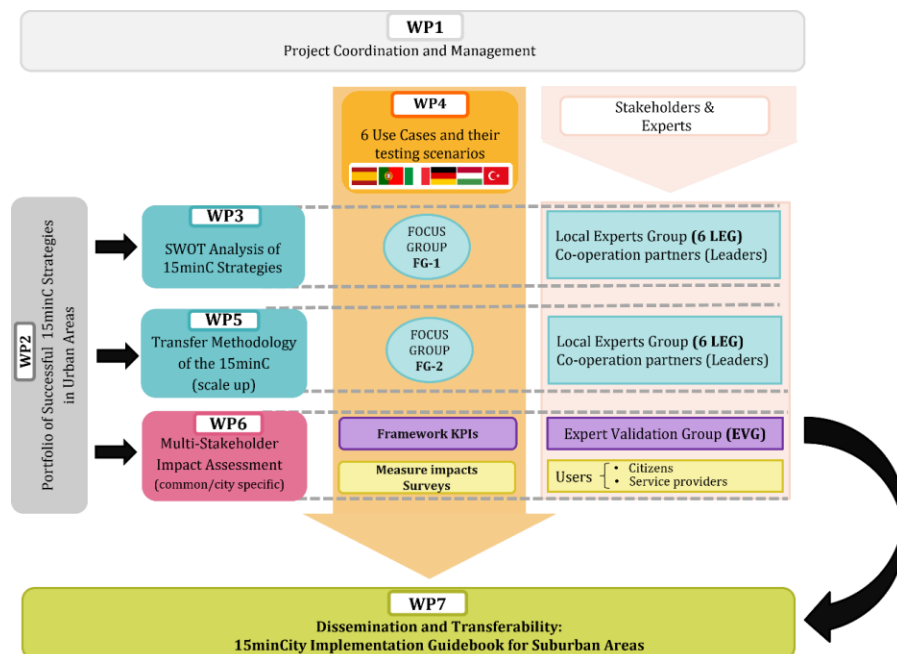


Figure 1 - Forthcoming Work Package Logic

Task 4.1 is dedicated to the ULLs set-up. Participants in ULLs shoulder the role of co-creators to explore, examine, experiment, and evaluate ideas, scenarios, processes, systems, concepts, and creative solutions in complex everyday life settings. The output of this task will feed Tasks 4.2 “Screening 15minC Dimensions in 6 European Urban Living Labs” and 4.3 “Cross-sectional Analysis”.

1.1 Purpose of the Deliverable

The purpose of this deliverable is to provide a thorough description of the set-up of the six ULLs in the selected case studies. For each ULL set-up, the deliverable describes in a uniform and consistent manner:

1. the background and general information
2. demographic and socioeconomic characteristics
3. urban planning and land use characteristics
4. transport and mobility characteristics
5. governance and policy framework
6. key existing challenges in relation to the 15minC.

Thus, this deliverable is an initial attempt to systematise, structure and homogenise available information of the six ULLs. It will thus serve as a baseline working document for further tasks to be developed in WP4, WP5 and WP6.

1.2 Structure of the Document

Following the introduction section, section 2 of the present document describes the definition of a common approach for the coordination of the six ULLs, detailing their role in the project and framework for the set-up. In the next section the set-up of the 6 ULLs is covered, providing essential information on all case study areas and characterising and comparing both the core city and its respective suburban area that is the focus of the project. Finally, conclusions and next steps are provided in the last section 4.

2. Common Approach for the coordination of the ULLs

2.1 Role of the ULLs

The case studies focus on low-to-mid-density areas and are either within the metropolitan regions of Mission Cities partner cities—Madrid, Turin, Lisbon, and Istanbul—or in secondary cities that, despite being overshadowed by capital cities or economic hubs, remain significant (such as Hamburg and Debrecen). These case studies span Europe’s diverse geography, encompassing different climates, cultures, and economic conditions. Each case study includes a core city where 15-minute city strategies are already in place or planned, along with either a peripheral area or a suburban city where these measures will be replicated.

Notably, the selection of case studies—particularly suburban cities—was conducted in close collaboration with local stakeholders, municipal, and metropolitan authorities. These partners have been involved from the project's inception, contributing to the formulation of its objectives.

The six case studies were chosen based on a consistent framework: a core city actively implementing 15-minute city measures and a suburban area within the metropolitan region requiring improvement, where

Urban Living Labs (ULLs) will be established (see Figure 22). The ULLs will facilitate a unified approach across all six case studies, providing a methodology for testing innovations and engaging stakeholders such as public authorities, transport operators, technology providers, and community organizations.

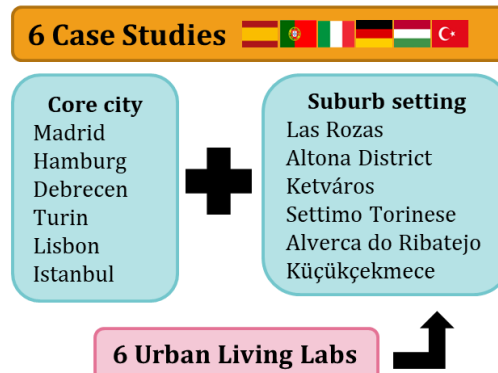


Figure 2 - Case studies' logic

The case studies fall into four categories based on the type of core city and metropolitan area:

- Mega-city example – Istanbul, a historically rich city with a population of over 15 million and significant industrial development.
- Large capital cities and metropolitan areas – Madrid (6.8 million) and Lisbon (3 million), both of which serve as capital cities, administrative centers, and major tourist destinations.
- Large industrial cities – Hamburg (1.8 million) and Turin (2.2 million), both recognized for their strong industrial and productive sectors.
- Small city example – Debrecen (202,000), which combines industrial activity with extensive low-rise residential areas.

2.2 Framework for ULL set-up

To set-up the ULL in each suburban setting of the core city (CC) it is necessary to characterize them. This involves providing a comprehensive definition of both the CC and the ULL. While it is vital that these descriptions cater to the CCs and ULLs specificities they must also follow a common framework that allows for future comparison.

In the first place, the following categories were established due to their interest and relevance to the project's goals:

- Introduction and description of the CC and ULL. The aim of this section is to provide a brief description of both CC and ULL, addressing their characteristics, such as location, population, and economy.
- Demographic and socioeconomic characteristics. This section delves deeper into the population related data, providing a more comprehensive description in terms of demography (gender, age, nationality) as well as economy (unemployment, dominant industries)
- Land use and urban planning. This section explains the planning and land-use mix which characterise both the CC and ULL.

- Transport and Mobility. The mobility system is described, first, from an infrastructural point of view, detailing the services available, as well as their pricing. Second, the mobility patterns are described, addressing the main type of trips of each area.
- Governance framework. This part describes the governance structure and competences in each CC and ULL, as well as addressing citizen participation, and the main urban and mobility planning documents in charge of establishing regulations.

As mentioned previously, in addition to providing a comprehensive description of the ULLs, it is vital that they can be compared, as this task's outputs will feed into upcoming tasks in the project, such as the cross-sectional analysis. To this end, a set of indicators was defined, that capture and illustrate the CC and ULLs. For the data collection, internationally available databases were mainly employed, such as the OECD Local Data Profile Database, and Eurostat. When necessary, each CC and ULL made use of national, regional or local databases.

Finally, for each ULL the main challenges and issues are detailed

3. Set-up of the 6 European Living Labs

3.1 Las Rozas

3.1.1. Introducing the Core City and the Living Lab

The Spanish case study in FORTHCOMING is made up of Madrid as the core city, and Las Rozas as the Living Lab in the metropolitan area of Madrid.

Madrid is the **capital and most populous city of Spain**, and of the Community of Madrid. It is made up of 21 districts, that are home to **3.4 million** people, and covers **604.45 km²** of land, with an average density of **5400 persons/km²** (National Institute for Statistics, 2024), although in some parts of the city it can reach 29000 persons/km² (Madrid City Council, 2021). It is located in the centre of the Iberian Peninsula, at approximately 660m above sea level. Regarding the climate, it is characterised by hot summers and cool winters, and it is also the sunniest capital in Europe.



Figure 3 - Panoramic view of Madrid

As the capital of Spain, it serves as the political and economic centre of the country. Its economy is driven by **the services sector**, which accounts for 86.9% of the GDP, followed by industry and construction (9.2%) (Madrid City Council, 2023). The information and Communications Technology sector has gained great relevance in recent years.

Culturally, Madrid is known for its world-class museums, theatres, and vibrant entertainment scene. The city is also a key commercial centre, with a dense network of retail businesses, shopping centres, and markets. Over the past few years, tourism has seen substantial growth, with over **5 million international visitors** in 2023 (Madrid City Council, 2024a).

Madrid **faces several urban challenges**, including housing affordability, traffic congestion, and air quality concerns. In response, the city has been **investing in sustainable initiatives**, such as improving public transport infrastructure, expanding cycling networks, and implementing low-emission zones, with the goal of enhancing urban liveability and reducing environmental impact.



Figure 4 - Madrid

Madrid is also the **core of the Madrid Metropolitan Area**, which has a population of approximately **7.1 million people**, and is the **3rd largest metropolitan area in Europe** (Eurostat, 2024). It is made up of **166 municipalities**, located within the Metropolitan ring, shown in Figure 55 (National Institute for Statistics, 2024).

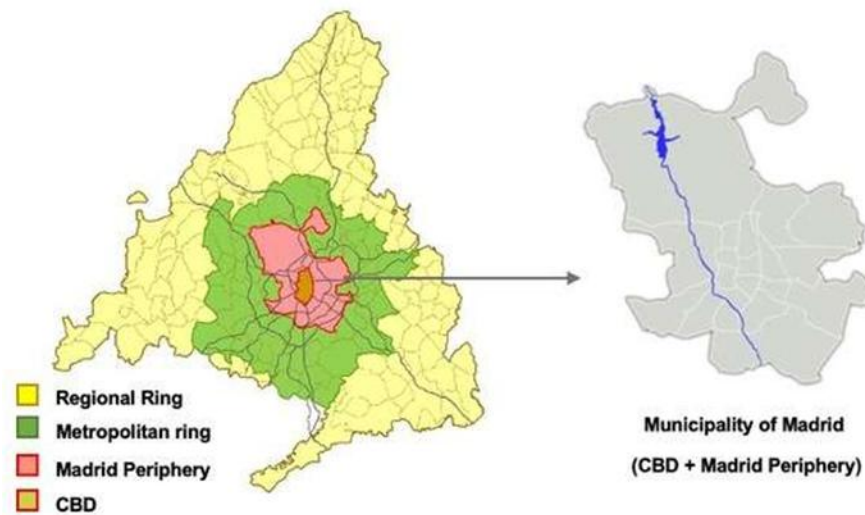


Figure 5 – Madrid's administrative and functional boundaries

Las Rozas de Madrid (or Las Rozas) is one of the municipalities that make up Madrid's Metropolitan Area. Located in the **northwest of the Community of Madrid**, it is approximately **20 km away from the city of Madrid**. It is the **second largest municipality** in the Community of Madrid in terms of area, covering **59 km²** (Madrid Open Data, 2024). It has a population of 98590 people (National Institute for Statistics, 2024). The average population density of the municipality is **1631 inhabitants/km²** (OECD, 2022). With an average elevation of 718m, it is slightly higher than Madrid. Figure 7 shows Las Rozas' location in relation to Madrid, and Las Rozas plan.



Figure 6 - Panoramic view of Las Rozas

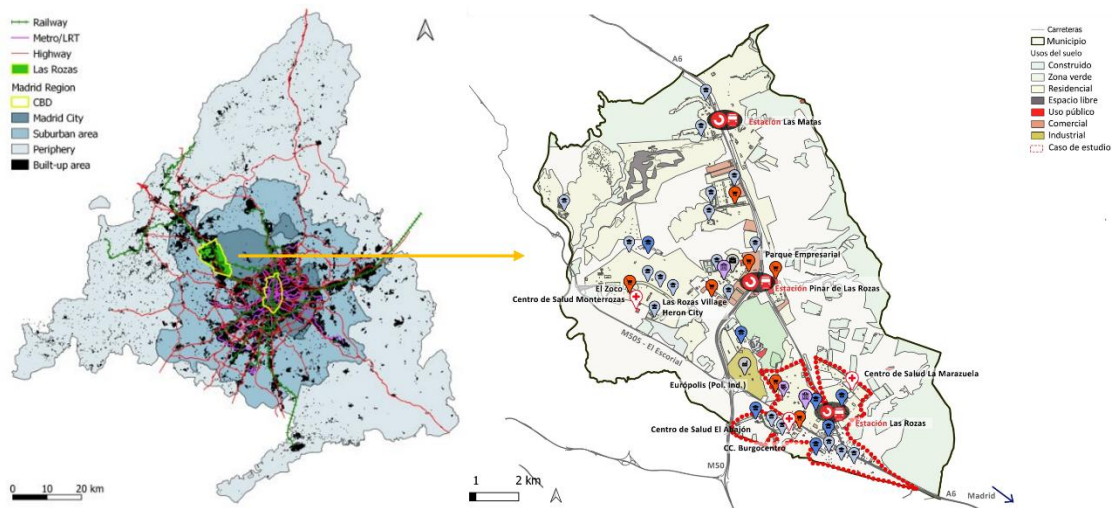


Figure 7 – (a) Las Rozas in relation to Madrid (b) Las Rozas

In recent years, it has **grown significantly in a sprawl-like style**, with low-density and middle and upper-class residential areas. The main economic activities in the municipality belong to the **services sector**, like in Madrid. It is worth mentioning that it has two very important **shopping hotspots**, boasting **five million annual visitors**. The municipality also hosts a technology and business park.

Three main highways run through Las Rozas (**A-6, M-505 and M-50**) resulting in a car-dependent, fragmented setting with great challenges for the management of the mobility in the municipality, especially for the promotion of active mobility and internal mobility.



Figure 8 – Las Rozas

In FORTHCOMING, we have defined a part of Las Rozas as a **detailed section of the LL** which will be used as testing ground and specific case study (see Figure 9). It encompasses the **historic centre**, and **2 newer residential areas** separated from the historic center by the existing transport infrastructure. On the one hand, to the west, we can find **Burgo-Centro, Cornisa and Yucatán neighbourhoods**, with mid-density (small apartment block) and low-density developments (detached and semi-detached housing) and an important shopping center (Burgo Centro). On the east, separated by the A6 motorway and the railway is **La Marazuela**, a mainly residential area with little services available, except for a health center.

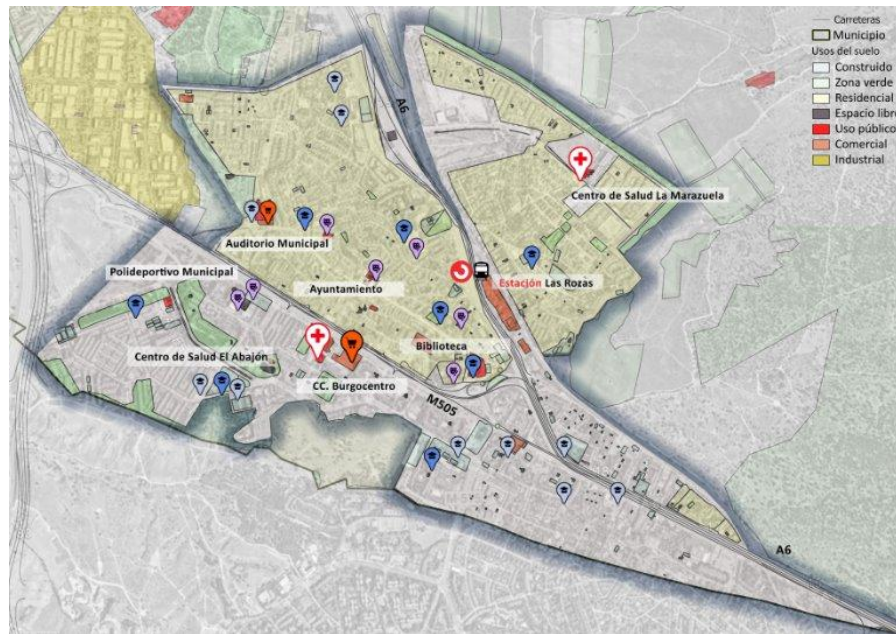


Figure 9 - Detailed section of the LL

3.1.2. Demographic and socioeconomic characteristics

Madrid is the most populous city in Spain, with 3.4 million inhabitants (National Institute for Statistics 2024a). The median age is **44.4 years** (Madrid City Council, 2024b), with 67% of population between 15-64 years old, 20.3% over 65, and 12.7% under 14 (OECD, 2022). Regarding gender, there are **87.52 males per 100 females** (OECD, 2021). The city has experienced significant demographic changes over the past decades, receiving a significant amount of immigration, domestic and international, with **23.4% of foreign-born population** (OECD, 2021). Madrid has seen an overall increase in population over the last 20 years, due to immigration and economic development, with an increase of **19% since 1996**, and of **2.5% in the last 5 years** (National Institute for Statistics, 2024a).

Las Rozas, although geographically close, has some differences in terms of demography. It has **98580 inhabitants as of 2024** (National Institute for Statistics 2024a), and in terms of gender distribution it is similar to Madrid, with **93.41 males per 100 females** (OECD, 2022). The median age is slightly lower, being **41.9** (National Institute for Statistics, 2024a). This is explained by the larger share of under 14s (17.6%), and the lower share of over 65s (14.8%). The largest group is 15-64 years of age, in the same share than in Madrid 67.7% (OECD, 2022). Regarding population growth, Las Rozas has grown substantially over the past years, more than doubling its population **since 1996 (117% increase)**, and 2.6% in the last 5 years (National

Institute for Statistics, 2024a). This rapid growth, especially in the late nineties, has also resulted in the rapid expansion of the municipality.

When it comes to the economy, Madrid's role is vital, being the economic powerhouse of the region and the country. It is based on the **services sector**, responsible for 86.9% of the city's GDP. The **unemployment rate is of 9.6%** (OECD, 2022). Madrid has a median disposable income PPP of **34 966 USD (OECD, 2021)** which is higher than the Spanish average. However, the **Gini Coefficient** shows moderate inequality within the city, reaching a value of **0.4** (OECD, 2022).

In Las Rozas the service sector is also highly relevant for the local economy. Las Rozas has a business park which encompasses large international enterprises such as Hewlett & Packard, Oracle or banking services such as ING or Caixa Bank. The **unemployment rate is lower than in Madrid (6.3%)** (OECD, 2022), and the median disposable income is substantially higher than Madrid's, being **51 484 USD PPP (OECD, 2021)**. It has a **lower Gini Coefficient than Madrid, of 0.3** (OECD, 2021).

The following table summarises the key indicators addressing demography and socioeconomic conditions in the core and the LL.

Table 1 - Demographic and socioeconomic indicators in Madrid and Las Rozas

	Core City: Madrid	Living Lab: Las Rozas	Source
Total Population (inhabitants)	3416771	98590	National Institute for Statistics, 2024
Median Age (years)	44.4	41.9	Madrid City Council 2024 National Institute for Statistics, 2024
Age Distribution (%)	0-14: 12.7% 15-64: 67% 65+: 20.3%	0-14: 17.6% 15-64: 67.7% 65+: 14.8%	OECD Local Profile Database
Sex ratio (males per 100 females)	87.52	93.41	OECD Local Profile Database
Foreign Born Population (%)	23.4	15.43	OECD Local Profile Database
Median Disposable Income PPP (USD)	34,966	51,484	OECD Local Profile Database
Social Inequality – Gini Coefficient	0.4	0.3	OECD Local Profile Database
Dominant industries	Services sector	Services sector	Madrid City Council Las Rozas City Council
Unemployment rate (%)	9.6	6.3	OECD Local Profile Database

3.1.3. Urban Planning and Land Use

Madrid's spatial structure is shaped by its natural features, historical growth, and major roadways. It covers an area of **605.49 km² with an average density of 5400 persons/km²**. The Manzanares River runs northwest to southeast through the western part of the city. At 600-700 meters above sea level, Madrid is one of Europe's highest capitals, with higher areas in the north (Chamartín, Fuencarral-El Pardo) and lower, flatter terrain in the south. The land cover in Madrid is split into the following shares: forest or semi-natural lands take up 60.7%, followed by built-up land at 34.3% and the remaining being cropland (4.4%) and water (0.5%) (OECD, 2022). Meanwhile, the ratio of **built-up land per capita** is of **19.6 m²**, while there are **95m² of green space** per capita (OECD, 2022).

The **city's layout reflects its historical expansion**. The historic core around Sol, La Latina, and Lavapiés dates back to medieval times, with narrow streets and an irregular layout. In the 19th century, the Ensanche by José María de Castro introduced a grid system in Chamberí, Salamanca, and Argüelles, bringing wide avenues and bourgeois architecture. The 20th century saw the growth of working-class areas like Tetuán, Carabanchel, and Vallecas, while more recent developments like Las Tablas, Montecarmelo, and Sanchinarro feature modern high-rises and large roads. This can be appreciated partly in Figure 10. **The M-30, the city's first ring road, encloses the central areas making up the Central Business District' also known as Central Almond (Almendra Central)** (see Figure 5), marking the boundary of the historic and denser urban fabric.



Figure 10 - (a) Madrid's historic core (b) Madrid outskirts

Madrid's **inner city** is **dense and mixed-use**, with historic neighborhoods featuring a mix of residential, commercial, and cultural spaces. Narrow streets, small plazas, and extensive public transport make it highly walkable. In contrast, **newer suburbs outside the M30** have a more planned, **lower-density layout with distinct residential, commercial, and office zones**. Wide streets, larger apartment complexes, and more green spaces define these areas, but they are more car dependent. On average, the **closest school in Madrid is 387 m away**, and the closest **pharmacy is approximately 242m away** (OECD, 2022).

When it comes to the environment, it is worth noting that **Madrid has struggled with air quality in the past years**. The average population exposure to nitrogen dioxide (NO₂) is **14.8 µg/m³**, which **exceeds the WHO guideline by 48.4%**. Similarly, the mean exposure to fine particulate matter (PM_{2.5}) is 10.1 µg/m³, 103% above the WHO recommendation, while coarse particulate matter (PM₁₀) averages 16.8 µg/m³—11.9% over the WHO guideline (OECD, 2022).

Las Rozas is the **second largest municipality in the Community of Madrid**, after Madrid, covering an area of 59 km² and maintaining an average population density of 1631 persons/km². Las Rozas' land cover is split into the following shares: forest or semi-natural lands make up 69.3% of the land, followed by built-up land at 24.8% and the remaining being cropland (5.8%) and water (0.1%). There are **56.6 m² of built-up land per capita**, significantly higher than Madrid, as well as **green space**, with **380m² per capita** (OECD, 2022).

Over the past 30 years, the **town has experienced significant population growth** that has driven urban expansion. The municipality is composed of **diverse urban fabrics**: its **historic centre** features narrow, organically arranged streets that reflect its rural origins. It is the most **compact and walkable part**, featuring a mix of housing, local shops, and services along narrow streets. The surrounding areas have **developed under urban planning regulations into lower-density residential neighbourhoods**. Neighbourhoods like La Marazuela offer mid-rise residential developments with green spaces and transport links, while Burgo-Centro, Cornisa, and Yucatán combine **housing with commercial centres and services**. Further out, areas like Monterrozas and Punta Galea consist mainly of **low-density residential developments with semi-detached or detached single-family homes** and private amenities. Thus, the **closest school** on average in Las Rozas is **626m away** (OECD, 2022). The nearest pharmacy on average is almost 900 m away.

The city has also **well-defined commercial and industrial zones**, mainly concentrated along **major transport corridors like the A-6 and M-50 highways**. Retail and entertainment hubs such as Las Rozas Village and Heron City serve both residents and visitors, while business and industrial parks in Európolis and Pinar de Las Rozas accommodate offices, technology firms, and light industries.



Figure 11 - (a) Las Rozas historic centre, Burgo Centro and La Marazuela (b) Las Rozas' residential area of Monterrozas

To the southwest, Las Rozas forms a **continuous urban fabric** that merges with the neighbouring municipality of Majadahonda, creating a larger integrated area. Meanwhile, the rest of the town's development has been **shaped** and, in some cases, **limited** by its transport infrastructure. On the eastern side, the **railway and A6 motorway** run parallel, serving as key connections with Madrid and beyond, whereas the **M50 ringroad and M505 road introduce important divisions** that influence land use and urban connectivity. Administratively speaking, Las Rozas is divided into 3 districts. Figure 12 illustrates the primary land use throughout the different parts of the municipality.

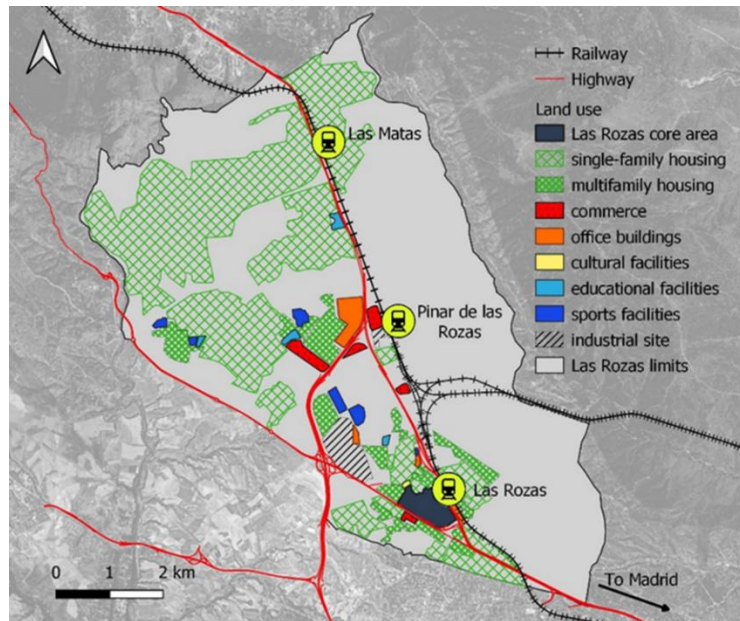


Figure 12 - Las Rozas Key Land Use Zoning

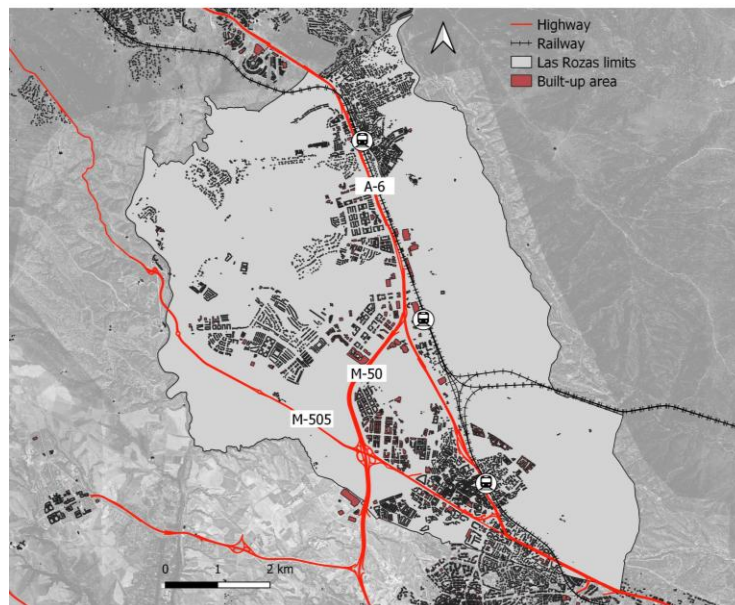


Figure 13 - Spatial barriers caused by transport infrastructure

In Las Rozas, **air quality is better than in Madrid**. The average population exposure to nitrogen dioxide (**NO₂**) is **10.3 µg/m³**, lower than in Madrid which but still **3.2 % higher than the WHO guideline**. Exposure to fine particulate matters (PM_{2.5}) averages 8.4 µg/m³, which is 68.6 % higher than the WHO guideline, while exposure to coarse particulate matter (PM₁₀) is equal to 14.2 µg/m³ and -5.6 % lower than the WHO guideline (OECD, 2022).

All the data described in this section is collected in Table 2.

Table 2 - Land Use and environmental indicators in Madrid and Las Rozas

	Core City: Madrid	Living Lab: Las Rozas	Source
Area (km ²)	605.53	58.40	OECD Local Profile Database
Population Density (persons/km ²)	5 418	1,639	OECD Local Profile Database
Land Cover Distribution (%)	Forest or semi-natural: 60.7% Built up: 34.3% Cropland: 4.4% Water: 0.5%	Forest or semi-natural: 69.3% Built up: 24.8% Cropland: 5.8% Water: 0.1%	OECD Local Profile Database
Built-up surface (m ² /PPP)	19.6	56	OECD Local Profile Database
Green space (m ² PPP)	95	380	OECD Local Profile Database
Average distance to the closest school (m)	387	626	OECD Local Profile Database
Average distance to the closest pharmacy (m)			OECD Local Profile Database
Average population exposure to NO ₂ (ug/m ³))	14.8	10.3	OECD Local Profile Database
Average exposure to fine particulate matters (PM _{2.5})	10.1	8.4	OECD Local Profile Database
Average exposure to coarse particulate matter (PM ₁₀)	16.8	14.2	OECD Local Profile Database

3.1.4. Transport and mobility

Madrid has an **extensive and well-connected transport system** that includes both public and private options. The **metro network** features 12 lines and covers the city and surrounding areas. Complementing this are the **city's buses**, which are managed by **Empresa Municipal de Transportes (EMT)**, as well as the **Cercanías** commuter trains that connect the city to nearby towns and regions. Additionally, Madrid's **light rail system** offers limited coverage, particularly in the southern neighbourhoods outside the M30. For private transport, there are **taxis and ride-hailing** services like Uber, Cabify, and Bolt. **Car-sharing services**, such as Car2Go and Zity, are also popular for short-term rentals. In addition, the city's **bike-sharing program Bicimad**, in place since 2014, has just undergone a recent expansion rendering it available in all the 21

districts of the city. Shared **electric scooters** used to serve as alternatives for short trips, however they were withdrawn for safety and regulatory concerns. Private scooters are still allowed. Madrid also prioritizes pedestrians with expanding walkable areas, particularly in the city centre. Madrid also has the **Aparca-T park and ride scheme** in place (Madrid City Council, 2021) and **Demand Responsive Transit and Bus Rapid Transit services**. Madrid has overall **good radial connectivity**, being easy to reach the city centre from the outskirts (Madrid City Council, 2022). Madrid has **14 multimodal hubs**, 6 intermodal areas, and 77 interchange points that allow users to switch from one mode to another with ease. Regarding cycling infrastructure, Madrid has **340 km of exclusive bike lanes**. EMT has developed a **MaaS type app** (MadridMobility360) however it only includes Madrid city, leaving out the rest of the metropolitan area. The Madrid Regional Transport Consortium has a MaaS under development (YOVOY), having launched a pilot scheme for 2 months last 2024. There are many privately developed travel planning apps which can be used although the information they provide is limited, such as Moovit or Waze, and Google Maps. **Real-time information on EMT buses** is reliable in the city.

Madrid and Las Rozas share an integrated public transport fare system managed by the **Madrid Regional Transport Consortium (CRTM)**, based on zonal divisions. The **monthly transport pass (Abono Transporte)** allows unlimited travel across different zones, with discounted rates for **youth (under 26, €8/month for all zones)** and **seniors (65+, €1.60/month for all zones)**. These prices also include a 60% discount subsidized by the Spanish State and the Community of Madrid. Children under 4 travel for free. Other options include **10-trip tickets (Metrobús/Bonobús)**, **single tickets**, and **return tickets**, with fares varying by mode and distance. The system integrates **metro, buses (urban & interurban), and Cercanías trains**, though Las Rozas relies mainly on **Cercanías and intercity buses**, as it lacks metro service. All fares are loaded onto a **contactless transport card (TTP)** for easy access. Only the 10-trip tickets are available digitally (on Android devices) (Madrid Regional Transport Consortium, 2024)..

On a weekday, there are on average approximately **7 700 000 trips** in the city of Madrid (Madrid Regional Transport Consortium, 2018a). **75.6%** of these trips take place within the city of Madrid. In terms of modal split, within the Central Business District of the city of Madrid, walking accounts for 39% **of trips, public transport for 36% and cars for 20%**. The remaining 5% is done in other modes. However, when trips take place in districts outside the M30, walking, public transport and driving account for a third each (Madrid Regional Transport Consortium, 2018a). Regarding private vehicles, in Madrid there are **452 cars per 1000 people** (OECD, 2022). The average trip takes **28.5 minutes** (Madrid Regional Transport Consortium, 2018a).



Figure 14 - Urban bus, intercity bus, metro and commuter rail.

Source: Various

Regarding Las Rozas, there is a **wide range of transport offer available**. It has **3 commuter rail stations** located in 3 different parts of the municipality: Las Rozas (Figure 15), Pinar de Las Rozas, and Las Matas. **Four lines** provide connections to Madrid and other municipalities in the Community of Madrid. There are **15 intercity bus lines**, most of which provide a connection **to Madrid**, and 2 others to **the hospital in Majadahonda and Pozuelo**. There is also a nighttime service, and **24 other layover lines** that pass through Las Rozas. Regarding private vehicles, it is worth noting that Las Rozas is located at one end of the **HOV lane to Madrid**, providing a quicker and less congested way to Madrid to public transport, clean vehicles, or vehicles with more than 2 passengers. **Car-sharing** is also available, with **2 operators currently deployed in the area**. There is also one company providing a **car-pool service**. In relation to active modes, it is worth mentioning that Las Rozas has **27 km of segregated bikelanes** (Las Rozas Innova, 2022). As mentioned previously, The Madrid Regional Transport Consortium launched a pilot MaaS scheme last year, however there is not yet available an official MaaS platform including Las Rozas. Real-time information on the intercity buses is not always accurate. Citizens in the area may make use of privately developed travel planning apps, such as Moovit, Waze or Google Maps.

As explained previously, there is an integrated public transport fare system in the metropolitan area of Madrid. In Las Rozas, public transport operates within **Zones B1 and B2**, with **Cercanías (commuter rail)** (C-3, C-7, C-10) and **intercity buses** as the main travel options. The monthly transport pass remains the most cost-effective choice for commuters, while the Bonobús (10-trip ticket) is available for intercity buses. Single-ticket prices vary by distance, and while fares can be recharged online, a physical TTP card is required for most purchases (Madrid Regional Transport Consortium, 2024).

331 253 daily trips take place in Las Rozas of which **39% are within the municipality**, and 61% start or finish in another municipality. Of these **61%**, 47% are **from/towards Madrid**, with the remaining **53% starting or finishing in other nearby towns in the metropolitan area of Madrid** (Las Rozas Innova, 2022). The modal split of all these trips is significantly different to Madrid, with **70% of trips being done by private vehicles**, **16% by public transport**, and only **11% on foot** (Madrid Regional Transport Consortium, 2018a). In consequence, the motorization rate is also higher than in the capital, with **536.8 cars per 1000 people** (OECD, 2022). In Las Rozas, the average time per trip is considered for each mode. The average **walking trip is 17 minutes long**, the **average PT trip is 23 minutes**, by car the **average trip lasts 44 minutes** and in other modes, 28 minutes (Madrid Regional Transport Consortium, 2018b).

All the data described in this section is shown in Table 3.

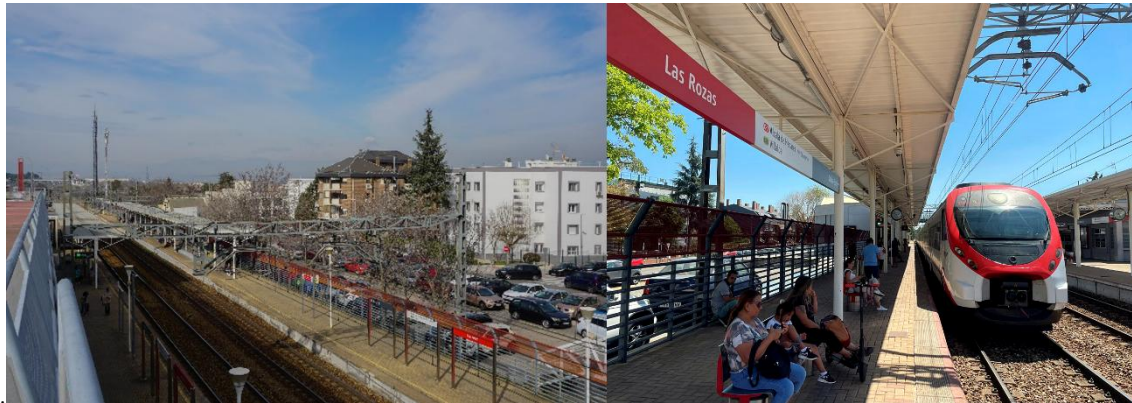


Figure 15 - Las Rozas Station



Figure 16 - Intercity bus service to Las Rozas from Madrid in HOV Lane

Table 3 - Mobility indicators in Madrid and Las Rozas

	Core City: Madrid	Living Lab: Las Rozas	Source
Cycling infrastructure (km)	340	27	Madrid SUMP Las Rozas SUMP
Park & Ride scheme (yes/no)	Yes	Yes	Madrid SUMP Las Rozas SUMP
Demand responsive transport offer (yes/no)	Yes	No	Madrid SUMP Las Rozas SUMP
Public transport offer	Metro Commuter Rail Light Rail Urban bus Intercity bus Motorbike	Metro Commuter Rail Urban bus Intercity bus	Home Mobility Survey 2018 Las Rozas SUMP
Shared mobility modes available & Ride-hailing	Taxi – VTC Bikesharing Carsharing Shared mopeds	Taxi – VTC Carsharing	Home Mobility Survey 2018 Las Rozas SUMP
Availability of PT card that combines all PT modes (Yes/No)	Yes	Yes	Madrid Regional Transport Consortium
Digitalized PT card (Yes/No)	Only 10-trip tickets on Andorid Devices	Only 10-trip tickets on Andorid Devices	Madrid Regional Transport Consortium
Modal split (%)	Inside CBD: W: 39% PT:36% C:20% Other:5%	W:11% PT: 16% C:70% Other:3%	Home Mobility Survey 2018 Las Rozas SUMP
Motorization rate (nº of vehicles per 1000 people)	452	536.8	OECD Local Profile Database
Number of trips on a workday	7,728,632	331 253	Home Mobility Survey 2018
% of trips within the municipality	75.6	39	Home Mobility Survey 2018 Las Rozas SUMP
% of trips with origin or destination in another municipality	39.4	61	Home Mobility Survey 2018 Las Rozas SUMP
Average travel times (minutes)	28.5	W: 17 PT:23 C:44	Home Mobility Survey 2018

3.1.5. Governance and Policy framework

Governance structure and competences

In Spain, **urban planning and transport competencies** are distributed across different levels of government. At the national level, the central government, through the **Ministry of Transport, Mobility, and Urban Agenda**, establishes broad policies, regulations, and funding mechanisms. It is responsible for major infrastructure, including highways, high-speed rail (AVE), airports, and ports. **Urban planning** is specifically overseen by the **Ministry of Housing and Urban Agenda (Ministerio de Vivienda y Agenda Urbana - MIVAU)**, which sets guidelines for land use, housing policies, and sustainability initiatives. **Autonomous communities** (such as the Community of Madrid) hold significant **authority over urban planning and regional transport** within their territories. They regulate **land use, housing policies**, and environmental guidelines while also managing **regional transport systems** such as the commuter trains like Cercanías. At the local level, municipalities play a **crucial role in zoning, public transport management, and mobility policies**. Regarding urban planning, each city council is in charge of developing the General Urban Plan (Plan General de Ordenación Urbana), which must comply with regional and national planning laws. It is the main urban planning instrument used by Spanish municipalities to regulate land use, zoning, and urban development. In regard to mobility, each city council develops its **Sustainable Urban Mobility Plan** (if population exceeds 50 000 people) and oversees buses, trams, bike-sharing programs, parking regulations, and pedestrian initiatives. In larger metropolitan areas specialized transport authorities coordinate services across multiple municipalities. In Madrid, the authority is the Madrid Regional Transport Consortium.

In the case of Madrid, the relevant actors involved in the management of urban planning and mobility are the following:

- **At metropolitan scale** (involved in Madrid and Las Rozas): Madrid Regional Transport Consortium and the Community of Madrid.
- **At city level**
 - o Madrid: Madrid City Council and the Municipal Transport Company EMT (Empresa Municipal de Transportes)
 - o Las Rozas: Las Rozas City Council and Las Rozas Innova (Public Innovation Company)

Table 4 summarises all the information detailed in the previous paragraphs.

Table 4 - Policy level and relevant actors for mobility and urban planning

Policy level		Core City: Madrid	Living Lab: Las Rozas
Mobility	National	Ministry of Transport, Mobility, and Urban Agenda	Ministry of Transport, Mobility, and Urban Agenda
	Regional	Madrid Regional Transport Consortium (CRTM)	Madrid Regional Transport Consortium (CRTM)
	Local	Municipal Transport Company EMT (Empresa Municipal de Transportes)	Las Rozas Innova (Public Innovation Company)
Urban planning	National	Ministry of Housing and Urban Agenda	Ministry of Housing and Urban Agenda
	Regional	Community of Madrid	Community of Madrid
	Local	Madrid City Council	Las Rozas City Council

Public participation related to urban planning and mobility decisions varies between Madrid and Las Rozas. In Madrid, citizen involvement is more institutionalized through participatory budgets and public consultations. For example, **Decide Madrid is a platform**, where residents can propose and vote on mobility initiatives. The city also organizes **public hearings and workshops** on major projects like new metro or bus routes. In Las Rozas, a smaller municipality, **participation is more localized**, with **community meetings, surveys, and consultations** on mobility and urban development plans. While Madrid relies on structured and **tech-driven engagement**, Las Rozas fosters **direct interaction with local authorities**, ensuring residents have a say in transport policies at a more community-focused level.

Mobility policy: SUMP & aligned strategies

Madrid introduced the Madrid 360 Sustainability Strategy in 2019. This was followed by the implementation of the Sustainable Mobility Ordinance in 2021, which focuses on improving air quality, road safety, multimodal transport, and public space usage while prioritizing citizen health. The city also enforces additional regulations on noise, thermal pollution, and air quality to support these goals. In 2022, Madrid approved the “Plan de Movilidad Sostenible Madrid 360” (Madrid Sustainable Urban Mobility Plan 360), aiming to significantly reduce travel times, traffic congestion, CO₂ emissions, and road fatalities by 2030. Since its adoption, various measures have been introduced to align with its objectives (Madrid City Council, 2022). Some of the most relevant measures regarding FORTHCOMING’s objectives are collected in T3.1. The following are some of the most important:

- **Major pedestrianisations:** Zero Emissions Zones in each of the districts
- **Shared e-bike system expansion** to cover the whole city: Bicimad
- **Park and Ride scheme:** Aparca-T

- **Mobility hubs for last-mile delivery** and e-mobility services
- **Safe parking for bikes:** Bicipark
- **Developing MaaS at city level:** Madrid Mobility 360 App
- **Free bus rides** on high mobility days
- **Optimizing Last Mile Delivery** by using real-time cargo monitoring, booking sensors, expanded ones/schedules, to mention a few.
- **Digital Twin** development for mobility management and urban planning



Figure 17 - Madrid's mobility measures, from left to right: Pedestrinaisation, Bicipark, Canalejas Mobility Hub 360 and Digital Twin visor

In Las Rozas, the SUMP dates back to 2022. It combines the promotion of traditional measures (bike lanes, pedestrian paths, etc.) with innovative and technological initiatives that support the city's smart, efficient, and connected growth. It aims to enhance social cohesion and improve road safety, all while respecting the environment. The plan includes 9 key action plans with over 30 specific measures, covering the short, medium, and long term, aimed at transforming mobility to be more sustainable, connected, multimodal, safe, accessible, and tailored to the needs of Las Rozas (Las Rozas Innova, 2022). Some of the most relevant planned measures are:

- **Street redesign** for higher pedestrian quality
- **Bike Network improvement and extension** Refurbishing existing lanes and building new ones.
- **Multimodal areas.** Creation of multimodal areas in the vicinity of the railway stations. Car-park will be transformed into multimodal area, including safe Bicycle and PMV lockers, and charging points.
- **Digital Twin.** To manage LEZ. Will be an inventory that will include every urban element (street furniture, infrastructure, etc. and will ease mobility management.

Urban planning framework

In Madrid, urban planning and land use is regulated by the General Urban Plan of the city, which dates back to 1997. Since then, it has been revised and updated adding new amendments. Some of its key objectives were to control and organise the growth of the city, decentralise services to avoid and reduce congestion in the centre. In recent years, the amendments made have brought it up to date, regulating for instance new housing models like co-living, or introducing the "Factor Verde". The **"Factor Verde"** (Green Factor) is a new urban planning parameter that aims to promote environmental sustainability by ensuring a minimum level of green infrastructure in new developments and urban renovations (Madrid City Council, 2024).

In Las Rozas, a new General Urban Plan (Figure 188) was approved at the end of 2024. Its main axis are (1) limiting the growth of the municipality to preserve nature, and (2) proposing a mixed-use city ensuring

citizens can carry out all their needs within the municipality. The plan stresses the need to improve inner city connectivity and infrastructure. However, the plan also states it will maintain the current density standards while boasting it to be one the lowest in the region of Madrid (19,57 housing units/ha) (Las Rozas City Council, 2024).

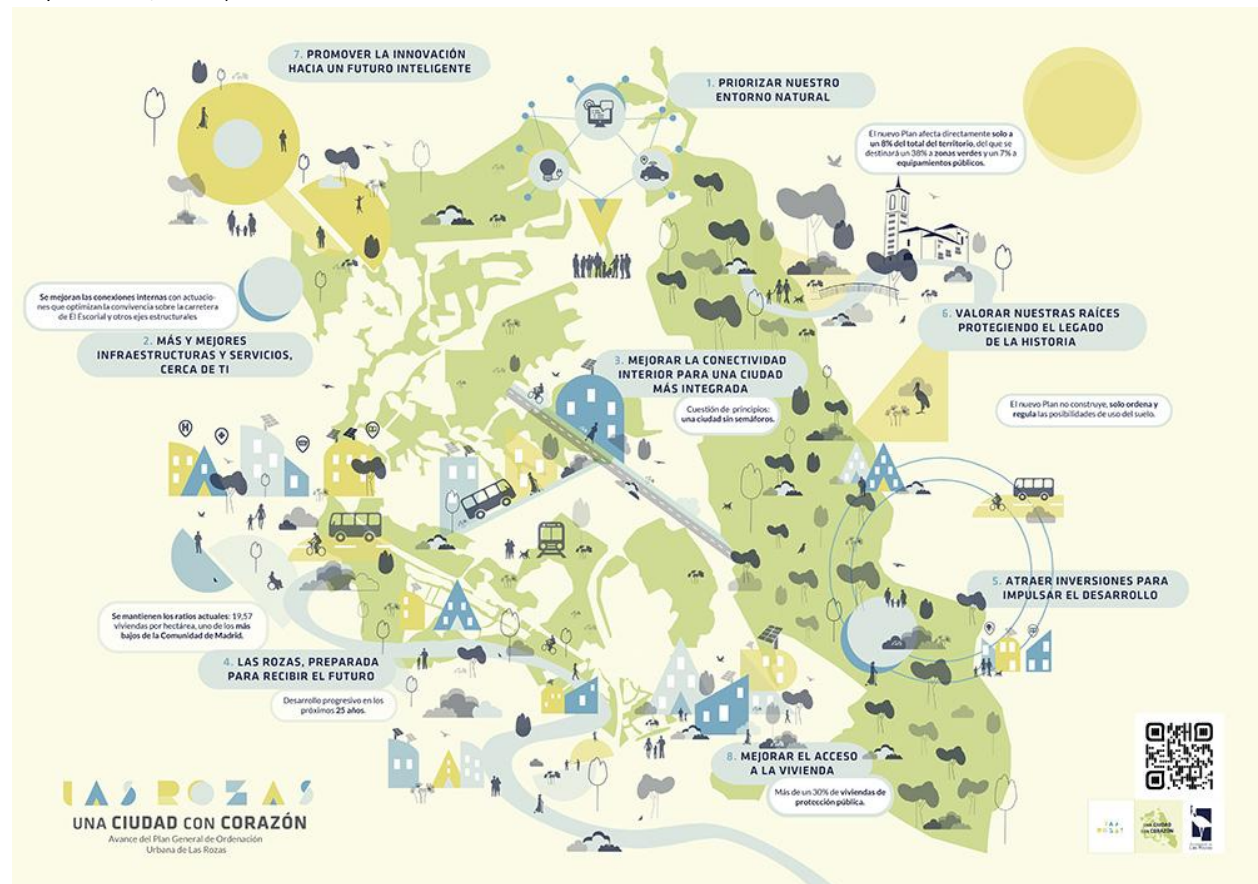


Figure 18 - Las Rozas new General Urban Plan key axis

Source: Las Rozas

3.1.6. Key challenges and conclusions

In conclusions, the Spanish case study is made up of a core city which is Madrid City, and a municipality in the metropolitan area of Madrid, which is Las Rozas.

They have a series of common characteristics, some due to their neighbouring location (i.e elevation, climate). Their demography is also **similar** in terms of **age** and **gender distribution**. In addition, they are both dependent on the **service sector**.

However, they have many differences, especially concerning the project's objectives. On the one hand, **Madrid** presents a **denser** and **more compact** urban planning model, especially in central areas, and boasts a **well-connected and complex public transport system**, that allows users to move around with ease and in a sustainable way, especially radially. Also, as core of the metropolitan area, **most of the trips are within**

the city. On the other hand, Las Rozas presents itself as a **higher income (on average) municipality** in the metropolitan area, that has experienced a quick **increase in population** in recent years, and a **rapid sprawl-like expansion**. Its **density** is significantly **lower**. Many **trips are done to/from other municipalities** like Madrid or other neighbouring ones. At the same time, the serious **spatial barriers** caused by **transport infrastructure** in addition to the vast distances caused by the **low-density development** in the newer areas act as a barrier for sustainable mobility, as can be inferred from its modal split.



Figure 19 - (a) A typical street in central Madrid (b) A typical street in a residential area of Las Rozas

3.2 Altona

3.2.1. Introducing the Core City and the Living Lab

The German case study in FORTHCOMING is based in **Hamburg**, which serves as the **Core City (CC)**. Hamburg is a city-state located in **northeastern Germany**, in the region bordering **Schleswig-Holstein** and close to **Denmark**, covering an area of approximately **755.3 km²** (Statistik Nord, 2023). It is the **second-largest city in Germany**, with nearly **1.9 million inhabitants** and a population density of about **2,500 inhabitants per km²** (DW, 2023). In 2019, Hamburg ranked as the **sixth richest city in Germany** (Statistisches Bundesamt, 2019), reaching a **GDP of 150.6 billion euros by 2023**.

The city is located along the **Elbe River**, which flows into the **North Sea**, approximately 100 km downstream. This connection has facilitated the development of the **Port of Hamburg**, which is the **third-largest port in the European Union** (Statista, 2022) and one of the **most important container ports globally**. Hamburg's economy has been strongly shaped by its status as a harbor city, with core industries including **maritime trade, logistics, shipbuilding, and port-related services** such as warehousing, freight forwarding, and customs handling.



Figure 20 - Hamburg in Germany's territory and its relation with Schleswig Holstein.

Source: cinema-advertising-germany.com



Figure 21 - Elbe River crossing Hamburg.

Source: City of Hamburg, n.d.

The **Elbe River** bisects the city and connects it to a broader inland waterway network, reinforcing Hamburg's role as a hub for both **maritime and inland trade**. The river has also influenced the city's urban morphology, with a landscape characterized by **numerous bridges, canals, and integrated drainage systems**. Given the city's low elevation and proximity to the sea, **flood protection** is a key component of Hamburg's urban planning. Accordingly, the city has made substantial investments in **adaptive infrastructure**, including **elevated promenades, locks, and a comprehensive dike system**.

Hamburg's spatial planning policy is shaped by its **dual status as both a city and a federal state**, granting it greater autonomy compared to other German municipalities. The city is administratively divided into **seven districts (Bezirke)**—Altona, Eimsbüttel, Hamburg-Mitte, Hamburg-Nord, Harburg, Bergedorf, and Wandsbek—which are further subdivided into **104 sub-districts (Stadtteile)**. While each district has its own local administration responsible for select municipal services, overarching **urban and transport planning decisions are centrally coordinated** by the city-state government.



Figure 22 - Hamburg's administrative limits and seven districts.
Source: Wikimedia Commons, 2013

The suburban district of **Altona** was selected as the urban living lab (ULL) in focus. Located in the western part of the city, the district is one of the most populated in Hamburg. The district used to be an **independent city until 1938**. Therefore, it has the structure of a small city with a main shopping street, a main town square, a town hall, a central station, a dense city center, and extensive residential suburbs. The suburbs of Altona are especially interesting for being a sample of Hamburg's fabric, and the innovations tested in these areas can be easily replicated in Hamburg and most German cities. Altona is also very active in developing state-of-the-art urban mobility policies. The district can be generally characterized by a stronger bicycle adoption as a transportation mean, counting with about 70 percent of the population moving by walking, biking or public transportation (Forthcoming T3.1, 2024).



Figure 23 - Altona's streetscape.

Source: bildarchiv-hamburg, 2020 (21.1) / Hamburg City, n.d. (21.2)

Altona is, nevertheless, a large district, composed of **thirteen sub-districts** with divergent core characteristics. Considering the peculiarities of each sub-district, the study focuses in one specific area in the district: the sub-district **Lurup**, which will be from here on called the selected urban living lab (ULL).



Figure 24 - Altona's sub-district: Lurup.

Source: Lurup.info, n.d. (22.1) / foerdernundwohnen.de, n.d. (22.2)

The sub-district is directly at the **border of the core city**, neighboring the Schleswig-Holstein region, directly connected to Schenefeld. Its **connection to the centralities of Hamburg** is hindered by the limitations of its

public transportation options; with the district relying on bus and train services that connect it to the rest of Hamburg (HVV, n.d.).

Despite its shift towards a **residential zone**, Lurup faces challenges remnant of its **historical industrial character**, such as aging infrastructure, older housing estates, and integration into the broader urban fabric of the city. The northwest of Altona, including the sub-district, presents a modern urban fabric, with isolated large blocks, towers and **mid-low density** post-war residential areas, connected by **wide streets**. **Green spaces in Lurup are rather sparse**, and much of the district's urban environment is dominated by older buildings and commercial areas.



Figure 25 - Lurup's urban landscape and streetscape.

Source: bildarchiv-hamburg.de, n.d.

3.2.2. Demographic and socioeconomic characteristics

Hamburg is the second most populous city in Germany, with approximately **1.89 million inhabitants** (OECD Local Profile Database, 2023). The median age is **41.7*** years (Statistik Nord, 2023), with 67.5% of the population between 15 and 64 years old, 17.9% aged 65 and over, and 14.6% under the age of 14. The gender distribution is relatively balanced, with **95.77 males per 100 females**** (OECD Local Profile Database, 2023). The city has undergone significant demographic changes in recent decades, primarily influenced by international migration, with **foreign-born residents accounting for 25.11%** of the population (OECD Local Profile Database, 2023). Between 1990 and 2023, Hamburg's population increased by approximately 200,000 inhabitants, rising from around 1.69 million to 1.89 million, which represents a **growth of nearly 12% over three decades** (Statista, 2024a). Although comprehensive annual data is limited for earlier years, this upward trajectory—alongside rising economic output—indicates a sustained pattern of demographic and economic expansion.

Altona, one of Hamburg's seven districts, is located in the western part of the city and plays an important intermediary role between the urban core and peripheral neighborhoods such as Lurup. As of 2023, Altona has a population of approximately **280,838 inhabitants** (Statistik Nord, 2023). The median age is slightly higher than the city average, at **42.5 years**, with **93.4 males per 100 females**. The age distribution is relatively balanced, with 17.8% under 18, 63.7% between 19 and 65, and 18.5% aged 65 and over. The **foreign-born population accounts for 18.5%**, lower than the Hamburg city average (OECD Local Profile

Database, 2023) Between 1990 and 2023, Altona's population grew from 239,231 to 280,838 residents, marking an increase of approximately **17.4%**. This growth reflects both natural population increases and migration trends within the region.

The demographic scenario in Altona and Lurup was another important argument considered for the choice of the sub-district. When compared to other districts in western Altona, Lurup portrays a rather distinct demographic profile, with a larger population of **children and foreigners, lower income**, lower rate of motorization in comparison to the Altona district—at 329 and 359 cars per 1,000 inhabitants, respectively—, and a **younger population**.

Lurup has also experienced gradual and consistent population growth over the past two decades, contributing directly to its **social and economic contrast**. In 1999, the neighborhood recorded approximately 31,000 residents. By 2019, this number had increased to 36,610, **representing a growth of nearly 18%** (CityPopulation.de, 2024). As of 2023, the area is home to **37,451 inhabitants** (Statistik Nord, 2023). The current population suggests a continued upward trend. The median age in Lurup is slightly lower than Hamburg's, at **41.3 years** (Statistik Nord, 2023). The gender ratio closely mirrors that of the city, with **95.7 males per 100 females** (OECD Local Profile Database, 2023). The age structure indicates a relatively young population, with 20.6% under 18 years, 61.3% between 19 and 65, and 18.1% over 65. The share of **foreign-born residents stands at 24.5%**, reflecting a comparable level of diversity to the wider city (Statistik Nord, 2023). The district also struggles with **social disparities**, with some areas facing higher unemployment rates and lower levels of educational attainment.

These developments point to a dynamic and heterogeneous local population, shaped by both internal development and broader urban demographic shifts. Considering the general goal of Hamburg if tackling the **lack of social cohesion** and need for an **improved local diversity and representativity**, mentioned by local partners, Lurup gains more relevance as an appropriate urban living lab for FORTHCOMING's Hamburg case study.

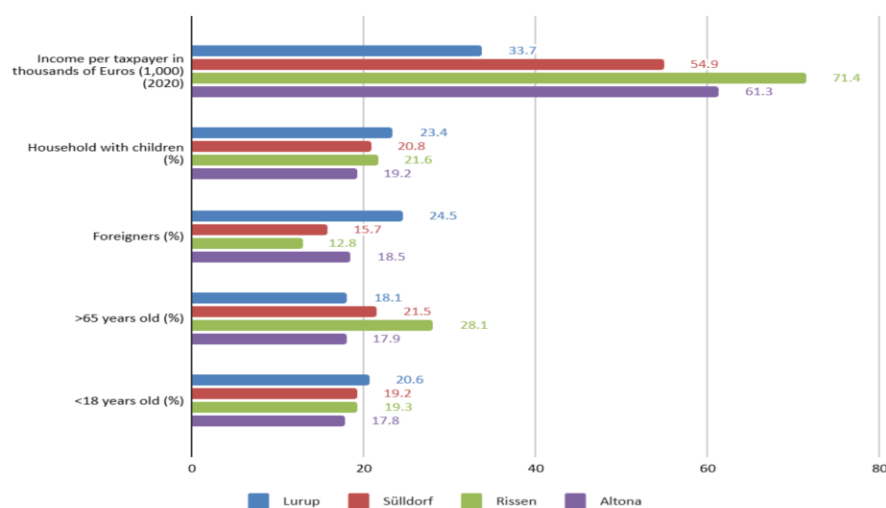


Figure 26 - Demographic profile of Altona, Lurup, Sölldorf, and Rissen.
Source: Authors, 2025 (Data from Statistik Nord, 2023)

Economically, Hamburg serves as a central driver of regional and national growth. The city's economy is predominantly based on **services and maritime industries**, with the Port of Hamburg playing a key role in international trade and logistics. The **unemployment rate is relatively low, at 4%** (OECD Local Profile Database, 2023). Median disposable income figures are not available for Hamburg, Altona or Lurup in the OECD Local Profile Database. Instead, income per taxpayer is used as a proxy indicator. In Hamburg, **the income per taxpayer is 40,595 EUR**, exceeding the national average, while income distribution reflects moderate inequality, with a **Gini coefficient of 0.32** (Statistik Nord, 2023; Federal and State Statistical Offices, 2025).

Altona's economy is primarily driven by its **maritime and port-related industries**, benefiting from its proximity to the Port of Hamburg, one of the largest and busiest ports in Europe, which plays a crucial role in regional trade, logistics, and employment. The unemployment rate in the district stands at **6.1%**, which is higher than the citywide average but still lower than in Lurup (OECD Local Profile Database, 2023). **The income per taxpayer in Altona is 61,260 EUR**, which is notably higher than the average in both Hamburg and Lurup, reflecting a more affluent socioeconomic profile for the district (Statistik Nord, 2023). This suggests that Altona enjoys a strong economic position within Hamburg, with its residents benefiting from higher income levels and greater access to economic opportunities.

In contrast, Lurup exhibits a more modest economic profile. Employment in Lurup is primarily concentrated in **small-scale manufacturing and service sectors**, with limited presence of the high-value economic activities characteristic of the central city. The neighborhood's unemployment rate stands at **7.6%**, notably higher than that of Hamburg as a whole (Statistik Nord, 2023). The average **income per taxpayer is 33,734 EUR**, significantly lower than in both Hamburg and the Altona district (Statistik Nord, 2023)

Table 5 - Demographic and socioeconomic indicators in Hamburg, Altona and Lurup

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Total Population (inhabitants)	1,892,122	280,838	37,451	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023 (ULL)
Median Age ¹ (years)	41.7	42.5	41.3	Statistik Nord, 2023

¹ Median age values were calculated using an interpolation method for grouped data, as outlined by Statistik Nord (2023). The formula used estimates the median within the age interval that contains the 50th percentile (P_{50}), and is expressed as:
 $\text{Median} = L + [(N/2 - F) / f] \times h$, where L is the lower boundary of the median age class, N is the total population, F is the cumulative frequency before the median class, f is the frequency within the median class, and h is the width of the age interval. This standard approach allows estimation of the median when age data is presented in intervals rather than as individual values.

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Age Distribution (%)	0-14: 14.6% 15-64: 67.5% 65+: 17.9%	0-18: 17.8% 19-65: 63.7% 65+: 18.5%	0-18: 20.6% 19-65: 61.3% 65+: 18.1%	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023 (ULL)
Sex ratio ² (males per 100 females)	95.77	93.4	95.7	OECD Local Profile Database 2023/ Statistik Nord 2023 (ULL)
Foreign Born Population (%)	25.11	18.5	24.5	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023(ULL)
Income per taxpayer (Euro) (ULL) ³ (Median Disposable Income PPP (USD) (CC))	40,595	61,260	33,734	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023 (ULL)
Social Inequality – Gini Coefficient ⁴	0.32	N.A.	N.A.	Federal and state statistical offices (CC) 2025 /
Dominant industries	Maritime industry.	Maritime and Port-Related Industries	Small-scale manufacturing	Hamburg municipality website
Unemployment rate (%)	4	6.1	7.6	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023 (ULL)

3.2.3. Urban Planning and Land Use

Hamburg's spatial structure is shaped by its natural features, historical development, and key transportation corridors, with an average density of approximately **2,530 persons/km²**. The **Elbe River** runs from southeast to northwest through the city, dividing it into northern and southern parts. At **sea level** to approximately **116 meters** above sea level, Hamburg - one of Germany's largest port cities - is characterized

² The sex ratio (males per 100 females) was calculated using the formula: the number of males divided by the number of females, then multiplied by 100. This calculation was based on the population data provided by Statistik Nord (2023).

³ Median Disposable Income (PPP, USD) was not available at the CC and LL level. As a comparable indicator, we used Income per Taxpayer (in Euros) for the ULL as a proxy.

⁴ Data on social inequality – Gini Coefficient is not specified in available sources for Lurup and Altona.

by its relatively flat terrain, with green spaces and urban areas integrated along the riverbanks and within its various districts.

The land cover in Hamburg is distributed as follows: **forest or semi-natural areas** take up **64.8%**, followed by **built-up land** at **23.5%**, and the remaining land is covered by **water bodies** (6.5%) and **cropland** (4.8%) (OECD Local Profile Database, 2023). The ratio of **built-up land per capita** is approximately **15.8 m²**, while the city provides about **65 m² of green space per capita** (OECD, 2023), promoting a balance between urban development and environmental preservation.

Hamburg's layout reflects both its historical growth and modern urban planning. The **historic core** around **Speicherstadt** and **St. Pauli** dates back to medieval times, with narrow streets and irregular layouts typical of older urban centers. In the **19th century**, the city expanded, with new districts such as **St. Georg** and **HafenCity** introducing more organized urban planning. More recent expansions, including districts like **Barmbek**, **Wandsbek**, and **Hohenfelde**, feature low-density residential developments, large green spaces, and modern infrastructure.

Hamburg's inner city is dense and mixed-use, with residential, commercial, and cultural spaces integrated into a walkable environment. This dense urban core is characterized by narrow streets, historical buildings, and a high level of pedestrian traffic, creating a vibrant atmosphere. The city is well-served by public transport, offering **easy access to key amenities** and **cultural hotspots** such as **Speicherstadt**, **St. Pauli**, and the **Alster Lakes**. The presence of smaller parks and plazas contributes to the city's walkability, making it easy for residents to navigate without the need for a car.

In contrast, the **newer suburban areas** of Hamburg, such as **Barmbek**, **Wandsbek**, and **Hohenfelde**, have a more planned, lower-density layout. These districts feature **larger residential complexes**, often consisting of mid-rise buildings and detached homes, as well as **spacious green spaces** that are more spread out compared to the compact city center. Suburban areas have been developed under modern urban planning guidelines, with **wider streets**, **shopping malls**, and **larger residential complexes**. However, these areas are more **car-dependent**, with a greater reliance on **private transportation** for commuting. Though these districts still incorporate **parks**, **recreational areas**, and **public spaces**, they lack the dense, integrated urban fabric found in the inner city, making them **less pedestrian-friendly**.

Hamburg's most significant transportation infrastructure is its **A7 highway** (often referred to as **M-30**), which functions as a major **ring road** around the central district, effectively marking the boundary between the dense historic core and the suburban districts. The road system within the **M-30 ring** is highly connected, with multiple **avenues** and **arterial roads** that allow for efficient movement within the city center. In contrast, the **outer suburbs** are connected primarily by **highways** and **motorways**, such as the **A1** and **A24**, which cater primarily to car traffic and support long-distance travel to neighboring regions. These **suburban zones**, including **Altona** and **Lurup**, are more **car-centric**, with limited access to public transport compared to the inner city. Though Hamburg is increasingly working on improving **public transport** and **cycling infrastructure** in these suburban areas, they remain more reliant on **private vehicles**, contributing to higher traffic congestion during peak hours.

When it comes to the environment, Hamburg has made significant strides in improving air quality in recent years. However, challenges remain. The average population exposure to nitrogen dioxide (NO₂) is **9.0**

$\mu\text{g}/\text{m}^3$, which is below the World Health Organization's (WHO) recommended guideline of $10 \mu\text{g}/\text{m}^3$. Similarly, the mean exposure to fine particulate matter ($\text{PM}_{2.5}$) is $6.4 \mu\text{g}/\text{m}^3$, which is **28% above** the WHO recommendation of $5 \mu\text{g}/\text{m}^3$ for annual exposure. Coarse particulate matter (PM_{10}) in Hamburg averages $14.2 \mu\text{g}/\text{m}^3$, which is **-5.6% below** the WHO guideline of $15 \mu\text{g}/\text{m}^3$ (OECD, 2023). However, specific data on **average population exposure to NO_2 , $\text{PM}_{2.5}$, and PM_{10} for Altona or Lurup** is not available in the OECD Local Profile Database. Nevertheless, for **Hamburg**, the available data shows that the **average population exposure to NO_2 is $13.8 \mu\text{g}/\text{m}^3$, the average exposure to fine particulate matter ($\text{PM}_{2.5}$) is $11.4 \mu\text{g}/\text{m}^3$, and the average exposure to coarse particulate matter (PM_{10}) is $17.2 \mu\text{g}/\text{m}^3$** . Overall, Hamburg's air quality is relatively good, with exposure to major pollutants (NO_2 , $\text{PM}_{2.5}$, PM_{10}) remaining within or close to the WHO's guidelines. Despite the generally **positive air quality**, further efforts are needed to reduce pollution levels in some parts of the city, particularly **related to vehicular emissions and industrial activity**.

Altona, located in the western part of Hamburg, is one of the city's major districts. Covering an area of **77.9 km^2** and maintaining an average population density of approximately **3,605 persons/ km^2** (OECD, 2023). The district is characterized by **densely built, mixed-use neighborhoods** that integrate residential, commercial, and recreational spaces. It benefits from abundant **green areas**, such as **Großflottbek** and **Altonaer Volkspark**, which provide residents with ample outdoor spaces. Altona features a blend of **high-density urban areas** and **suburban-style neighborhoods**, making it one of the most diverse districts in terms of **land use**. Over the years, Altona has evolved from a small fishing village into a vibrant, modern district, with substantial urban development and regeneration projects transforming it into one of Hamburg's most sought-after areas.

Table 6 - Land Use and environmental indicators in Hamburg, Altona and Lurup

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Area (km^2)	755.1	77.9	6.3	Statistik Nord 2023
Population Density (persons/ km^2)	2,601	3,605	5,952	OECD Local Profile Database 2023 (CC) / Statistik Nord 2023 (ULL)
Land Cover Distribution (%)	Forest or semi-natural: 64.8% Built-up: 23.5% Water: 6.5% Cropland: 4.8%	N.A.	Forest or semi-natural: 9.2% Built-up: 87.5% Water: 1% Cropland: 2.3%	OECD Local Profile Database 2023 (Lurup, Esri Living Atlas 2024)

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Built-up surface (m ² /PPP)	58.7	N.A.	167.99 ⁵	OECD Local Profile Database (Lurup, Aino)
Green space (m ² PPP)	269	N.A.	31.81 ⁶	OECD Local Profile Database (Lurup, Aino)
Average distance to the closest school (m)	N.A.	N.A.	N.A.	OECD Local Profile Database
Average distance to the closest pharmacy ⁷ (m)	759	N.A.	N.A.	OECD Local Profile Database
Average population exposure to NO ₂ (ug/m ³) ⁸	13.8	N.A.	N.A.	OECD Local Profile Database
Average exposure to fine particulate matters (PM _{2.5})	11.4	N.A.	N.A.	OECD Local Profile Database
Average exposure to coarse particulate matter (PM ₁₀)	17.2	N.A.	N.A.	OECD Local Profile Database

⁵ Original surface area values—1,191,410 m² of green space was calculated using the Aino Platform based on geospatial data for the Lurup sub-district.

⁶ Original surface area values—6,291,435 m² of built-up land was calculated using the Aino Platform based on geospatial data for the Lurup sub-district.

⁷ Data on the average distance to the closest hospital is not available at the district level. However, information on the average distance to the closest pharmacy is available for Hamburg as a whole and is used here as a proxy to estimate local accessibility to basic healthcare services.

⁸ The exact indicators—such as average population exposure to NO₂, PM_{2.5}, and PM₁₀—are not available at the district level for Altona or Lurup. However, specific data for these indicators is accessible for Hamburg as a whole. According to the OECD Local Profile Database, the city-level data provides average annual exposure levels, which can offer contextual insight but may not reflect local variations within the urban living lab.

Lurup covers an area of **6.3 km²**, with a population of 37,451 (Statistik Nord, 2023), giving the subdistrict a **population density of 5,952 persons/km²** (OECD, 2023) - nearly double of Altona's population density. Nevertheless, the neighborhood has a relatively low-density layout compared to Hamburg's more urbanized areas, and a **medium density** when compared to the Altona district context. There is a clear division of the district's sub-districts by the range of the population density, as part of the sub-districts stay within a range between 900 and 6,000 inhabitants per km², on an average of approximately 3,000 persons/km², while the other part is all above 10,000 persons/ km².

Although Lurup has apparently the highest density of the lower-density sub-districts, the portion of regional land is not considered and can hinder the density assessment. The following calculation of **population density in relation to the built-up area** (i.e., built-up area/total population) is therefore useful to understand its profile and conformity with the general profile of Altona. If only the population per square kilometer is observed, each km² in Lurup holds about six times the amount of people of the least dense area in Hamburg (i.e., Rissen). When further investigating the density in relation to the built-up area, the least dense area becomes Blankenese, where each person can access about 399.5 m² of built-up surface area – only 2.4 times the figure for Lurup, which stands at approximately **167.99 m² of built-up area per person**. In Hamburg this indicator is at **58.7 m² per person**, indicating **Lurup as nearly three folds less dense than the core city**. This characterizes Lurup as a low-mid density area, highlighting it as relevant to the Hamburg case study in the FORTHCOMING's context.

Table 7 - Density indicators in relation to built-up area in Altona's subdistricts

	Population density (ppp/km ²)	Built-up area (m ²)	Total population	Built-up surface per capita (m ² /ppp)
Sternschanze	14,063			
Altona-Altstadt	10,933			
Ottensen	12,689			
Altona-Nord	12,087			
Lurup	5,952	6,291,435	37,451	167.99
Iserbrook	4,311	2,247,318	11,512	195.22
Osdorf	3,637	4,962,906	26,370	188.2
Bahrenfeld	2,982	6,237,936	31,051	200.89
Othmarschen	2,802	3,609,509	16,662	216.63
Groß Flottbek	4,752	2,104,631	11,319	185.94
Sülldorf	1,636	1,879,214	9,387	200.19

	Population density (ppp/km ²)	Built-up area (m ²)	Total population	Built-up surface per capita (m ² /ppp)
Blankenese	1,748	4,039,923	13,487	399.54
Nienstedten	1,606	2,612,556	7,034	371.42
Rissen	987	4,960,487	16,494	300.74

Lurup is a **suburban sub-district**, characterized by a quieter and greener environment compared to the more urbanized areas in **Altona** and central Hamburg, containing **quiet streets**, **local shops**, and **recreational areas**. **Lurup** is connected to **Altona** and **Hamburg's city center**, with limited public transport options and major roads, such as the **A7 motorway**, linking it to the rest of the city for cars and buses. The **car-oriented** aspect of its mobility infrastructure generates **spatial and visual barriers** to urban use, alongside the **railway** to the northeast of Lurup.

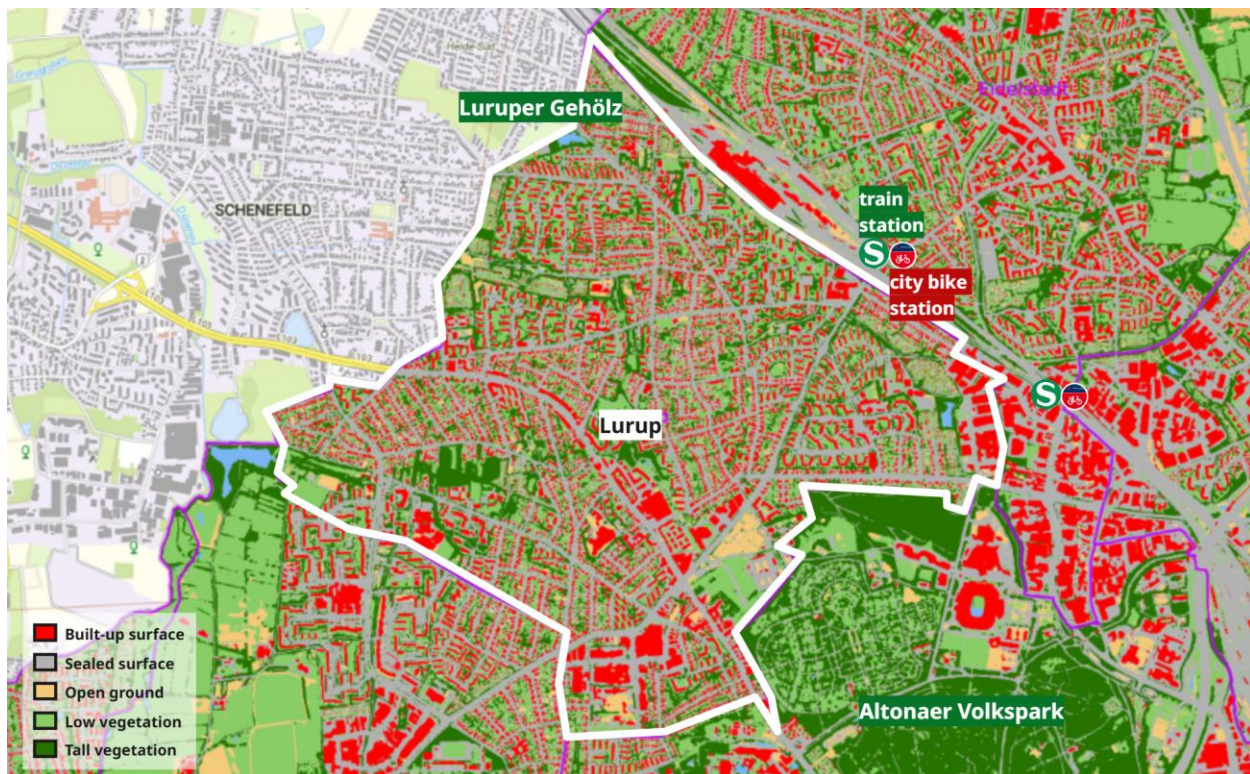


Figure 27 - Land cover and green infrastructure aerial perspective.

Source: Authors, 2025 (Adapted from Geoportal, 2025).

Despite Lurup being a calmer **residential and suburban area**, it is increasingly becoming a significant neighborhood for those seeking affordable housing with access to urban amenities. Over the past few decades, Lurup has experienced gradual population growth, driven by **ongoing developments** and the



*Figure 29 - Urban fabric diversity in Lurup, Altona.
Source: Authors, 2025 (Image from Google Maps, 2025)*

Lurup's land cover is divided into the following shares: forest or semi-natural areas make up **9.2%** of the land, followed by **built-up land at 87.5%**, with the remaining area consisting of **cropland at 2.3%** and **water at 1%**. The district has approximately **175 m² of built-up land per capita**, which is significantly higher compared to more compact areas of Hamburg, contributing to its residential aspect. More in recent years: the sub-district is composed of diverse urban fabrics: its residential neighborhoods feature a mix of **low-density housing**, such as **single-family homes** and **mid-rise apartment complexes**, that reflect its more suburban nature. The area is characterized by **quiet streets**, **local shops**, and **recreational areas**.

However, development is underway to increase housing supply and **public amenities**. Newer developments providing **mid-rise residential buildings** with improved **transport links** start to rise in the neighborhood, alongside urban development strategies for its main roads. The direction contributes to the commercial areas in **Lurup** combining housing with **local businesses**, offering convenience for residents without the intensity of city center life.

The surrounding areas have developed under urban planning regulations that emphasize **affordable housing** and **green spaces**, while maintaining a balance between **residential** and **commercial areas**. The area has about **31.8 m² of green space per capita** with intra urban green areas, connecting the neighboring ample **green spaces** such as **Luruper Gehölz** and **Altonaer Volkspark**, which contribute to its livability.

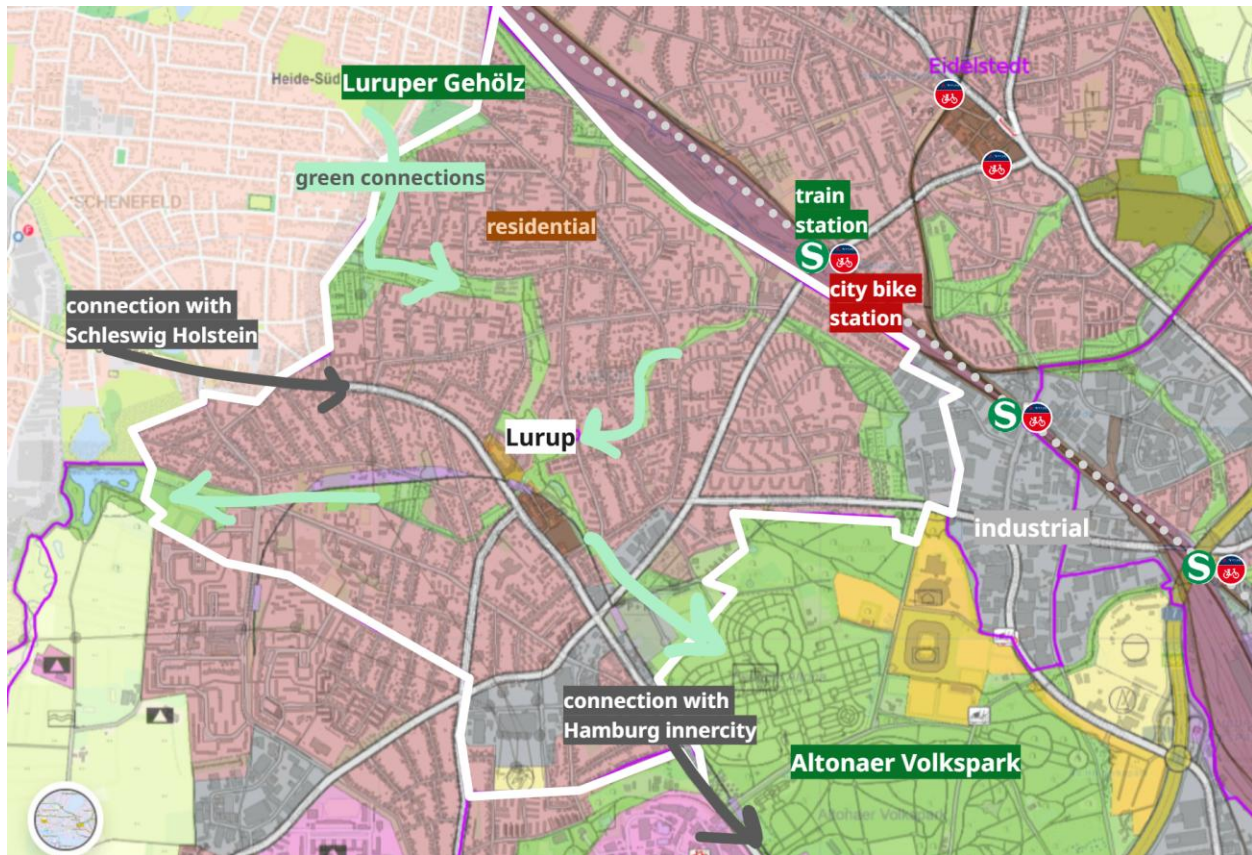


Figure 30- Lurup sub-district land use and main mobility connections.
Source: Authors, 2025 (Adapted from Geoportal, 2025).

The sub-district also has **well-defined commercial zones**, primarily along major transport corridors like the **A7 motorway** and **public transport routes**. Small retail hubs such as **Luruper Markt** serve local residents, while business parks and light industries near **Bahrenfeld** offer employment opportunities. Lurup's connectivity to the rest of Hamburg is facilitated by **public transport** such as **bus lines** and **S-Bahn** services, which link the district to **Altona** and **Hamburg's central areas**. To the **southwest**, Lurup forms a continuous urban fabric that merges with neighboring areas like **Bahrenfeld**, creating a broader, more integrated urban space. Meanwhile, the development of Lurup continues to be influenced by its **transport infrastructure**. Administratively, Lurup is part of the larger **Altona district**, which guides development strategies in the area.

3.2.4. Transport and mobility

Hamburg boasts a comprehensive and well-connected transport system that includes both public and private transport options. The city's public transport network is centered around its **U-Bahn** (subway), **S-Bahn** (commuter rail/train), and **bus** systems, all operated by the **Hamburger Verkehrsverbund (HVV)**. The metro system features **4 U-Bahn lines**, while the S-Bahn network consists of **6 lines**, covering the city and surrounding regions. Complementing these are Hamburg's extensive bus services, which include **city buses**,

night buses, and **express buses** that serve local neighborhoods and connect the city to surrounding towns. Additionally, Hamburg has **ferry services** that provide transport across the Elbe River, offering a scenic and functional alternative to road-based travel.

The city's **bike-sharing program** has expanded significantly, offering bicycles across Hamburg for residents and tourists. The city counts on a robust public bike-sharing system, called **StadtRAD Hamburg**, with over **3,700 bikes** and over **313 stations** across the city (Hamburg City, n.d.). The system requires registration and a fee lower than ten euros per year to use any bike in the city for free for 30 minutes. **Hamburg has approximately 584 km of dedicated cycling infrastructure**, including protected cycle paths and bicycle priority streets. This figure rises to approximately **629 km when including the additional 45 km of designated cycle routes within the port area** and continues to expand its network through strategic investments and mobility programs (Hamburg.de, 2023). In addition, **shared electric scooters** are available, providing an alternative for short-distance trips, although there have been concerns about safety and regulation. Private transport options are also widely available, with **taxis** and **ride-hailing services** like **Uber**, **MOIA**, and **Bolt** operating in the city. **Car-sharing services** such as **Share Now** and **Cambio** are also popular for short-term rentals.

Hamburg has made strides in promoting **sustainable mobility**, with investments in **pedestrian infrastructure** and efforts to create more walkable neighborhoods, particularly in the city center. Furthermore, **Park & Ride** schemes are available at **31 locations across Hamburg**, allowing commuters to leave their cars in designated lots and use public transport to travel into the city center.

Hamburg's overall **average travel time** is **25 minutes and 24 seconds per 10 km** (Tomtom Traffic Index), and while **Lurup** is connected to the city, the long distances between bus stops and the reliance on **bus connections** to access the **S-Bahn network** create barriers that hinder **quick mobility**. To improve the situation, further integration of **bus stops**, **higher-frequency buses**, and better **cycling routes** are essential to enhance **accessibility** and **reduce dependence on private cars**, fostering a more **sustainable** and **efficient** transport system in the district.

Altona is heavily reliant on train (**S-Bahn**) services that link the district to **central Hamburg** and surrounding areas, as it does not count with any subway (**U-Bahn**) connection. **Altona Station** serves as one of the key **S-Bahn hubs** in the city, providing access to multiple S-Bahn lines, ensuring a longer-distance connectivity. Nevertheless, the **reduced number of stations in the district** and **lack of a subway connection** results in a large share of the population being underserved by the railway connection and hinders the mobility development of the area. Public transport in **Altona** is further complemented by **local bus services**, **metrobus**, and **ferry services**, diversifying travel across the district and beyond. **Altona** is part of **Hamburg's** broader cycling network, with **381.6 km of dedicated bike lanes** (Geoportal Hamburg), supporting cycling as a viable and sustainable mode of transport. The district also has **4 Park & Ride stations**, providing convenient parking options for those transitioning from private cars to public transport (Hamburg City, 2023).

In addition to traditional public transport, **Altona** offers a range of **shared mobility services** such as **public and private bike-sharing**, **scooter-sharing**, **car-sharing**, and **ride-hailing platforms** like **Uber**, **MOIA**, and **Bolt**, offering residents flexible and eco-friendly alternatives to car ownership. **Altona** also benefits from

demand-responsive transport services, such as **loki**, providing on-demand mobility solutions that are integrated into the city's public transport framework (loki, Hamburg City, HVV).

The **modal split** for **Altona** indicates a balanced transport usage, with **public transport** accounting for **19%**, **private car use** at **22%**, **cycling** at **22%**, and **walking** at **28%** (Geoportal Hamburg, 2023). The **motorization rate** in **Altona** is **321 cars per 1,000 people** (OECD, 2023), lower than the city average of **430 cars per 1,000 people**, reflecting the reliance on public transport and sustainable mobility options. The reliance on bicycles is also higher than the city's figures, having its share in the areas' modal split at 22 and 15 percent, respectively. The average travel time in Hamburg is **25 minutes and 24 seconds per 10 km** (Tomtom Traffic Index), making the city's transport system relatively efficient, with **Altona** benefiting from its proximity to central Hamburg and surrounding districts.

Lurup, located within Hamburg's **Altona** district, is heavily reliant on **bus services** for public transport, with stations typically spaced **15 minutes walking distance** apart. This distance means that much of the district, especially in the **southern parts**, is not well-served by buses within **15 to 30 minutes walking distance**, making it difficult for residents to access public transport without a longer walk. Despite the **bus frequency** ranging from **10 to 20 minutes** during the day in the major roads, these long distances between bus stations create a barrier to quick mobility, particularly for those living in less central areas. **Lurup's** transport system also heavily depends on **connections to the S-Bahn**, as the district lacks direct **S-Bahn** stations. The **S-Bahn** connections are provided mainly through buses that link **Lurup** to nearby **Altona** and **Hamburg's central areas**. This **indirect access** can lead to delays and inconvenience during peak hours.

In terms of cycling infrastructure, **Lurup** benefits from approximately **39.4 km of dedicated cycling paths**, including routes along major streets such as **Elbgaustraße** and **Luruper Chaussee**, as well as bicycle-friendly designs on many secondary roads. The area counts with a **StadtRAD** (city bike) station by both **S-Bahn** stations only (see Figure 31), leaving roughly over 60 percent of the area underserved by city bike stations. While the present network makes **cycling an increasingly preferred transportation mode** for many residents, the lack of public bike sharing stations increase the demand for an own bike and hinder the viability of cycling as a mean of commuting—especially in areas where public transport options, such as bus stops or **S-Bahn** stations, are less accessible or involve longer travel times.

While neighborhood-level inequality data is not available, income levels suggest comparatively greater socioeconomic vulnerability. This context can also suggest a higher adoption of public and active transportation, possibly reflecting in the rather low car density of the region, measured at **322 private cars per 1,000 inhabitants** in **Lurup**. Nevertheless, coherently with the population count, the car-count alone is the highest of the observed neighborhoods, reaching up to 12,072 private cars in the area (Statistik Nord, 2023).

Lurup is served by three major roads: **Elbgaustraße/Rudenbarg**, **Luruper Hauptstraße**, and **Farnhornweg**. These roads not only provide essential transport links but also act as physical and psychological barriers, separating **Lurup** from surrounding areas. The **volume of traffic** and the **number of lanes** on these roads contribute to a sense of **isolation**, especially in the **southern parts** of the district, where the disconnection from key transport links is most noticeable.



Figure 31 -Lurup's streetscape and bicycle infrastructure.

Source: PlankonntorHamburg.de, n.d.

Despite these challenges, **Lurup** still offers a variety of **shared mobility services** like **bike-sharing**, **scooter-sharing**, **car-sharing**, and **ride-hailing services** such as **Uber** and **MOIA**, which help mitigate some of the transport issues. The district also benefits from **demand-responsive transport services** such as **Ioki**, which offer flexible, on-demand mobility solutions (Ioki, Hamburg City, HVV). Moreover, **Park & Ride** facilities are available at **1 location in Lurup** (Hamburg City, 2023), encouraging commuters to park their cars and switch to public transport, making travel to central Hamburg more efficient.

The **modal split** in **Altona** shows a balanced use of transport options, with **public transport** accounting for **19%**, **private car use** at **22%**, **cycling** at **22%**, and **walking** at **28%** (Geoportal Hamburg, 2023). Despite the **low car density** of **322 cars per 1,000 people** (OECD, 2023), which is lower than the Hamburg average of **430 cars per 1,000 people**, the reliance on **buses** and the **S-Bahn connection** means the neighborhood still faces challenges in **mobility efficiency**. The **motorization rate** in **Lurup** reflects this, as the **low car density** suggests that many residents are opting for **public transport** and **cycling** over private car use.

Table 8 - Mobility indicators in Hamburg, Altona and Lurup

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Cycling infrastructure (km) ⁹	584 km ¹⁰	381.6 km ¹¹	39.4 km ¹²	Geoportal Hamburg, layer "Radwegenetz", GIS calculated
Park & Ride scheme (yes/no)	Yes, 31	Yes, 4	Yes, 1	Hamburg City (Hamburg.de)
Demand responsive transport offer (yes/no)	Yes	Yes	Yes	Ioki, Hamburg City, HVV
Public transport offer	Public Bike-sharing; Bus (metro, express, city, night); Subways; Commuter trains; Regional trains; Express long-distance trains; Ferries	Public Bike-sharing; Local Bus, Metrobus; Commuter trains, Ferries	Public Bike-sharing; Local Bus, Metrobus; Commuter trains, commuter light-rail trains	HVV, Google Maps, StatRad Hamburg
Shared mobility modes available & Ride-hailing	Private Bike-sharing; Scooters-sharing; Carsharing; Ride-Hailing (Uber, MOIA, Bolt, etc.); Taxis	Private Bike-sharing; Scooters-sharing; Carsharing; Ride-Hailing (Uber, MOIA, Bolt, etc.); Taxis	Private Bike-sharing; Scooters-sharing; Carsharing; Ride-Hailing (Uber, MOIA, Bolt, etc.);	Uber, MOIA, Bolt, Tier, Voi

⁹ Cycling infrastructure includes dedicated and protected facilities: bicycle lanes, cycle roads, separated cycle paths, and green space routes. Mixed-traffic streets and protective strips are excluded unless explicitly designated as part of the cycling network.

¹⁰ This estimate includes Hamburg's 560 km of general cycle paths and over 24 km of bicycle priority streets (Fahrradstraßen). While long-distance cycling routes and shared roadways are present, they are not included in this total. An additional 45 km of cycle routes in the port area may also be counted as dedicated infrastructure, depending on their design and accessibility (Hamburg.de, 2023).

¹¹ This figure refers specifically to the district of Altona and includes the following components: bicycle lanes (30.2 km), bicycle roads (4.6 km), separate footpath/cycle paths (165.7 km), and cycling paths in green spaces (181.1 km), based on data from the Hamburg Geoportal (2023).

¹² This figure refers specifically to the district of Lurup and includes: bicycle lanes (2.0 km), bicycle roads (0.24 km), separate footpath/cycle paths (24.5 km), and cycling paths in green spaces (12.7 km), based on data from the Hamburg Geoportal (2023).

	Core City: Hamburg	Altona	Living Lab: Lurup	Source
Availability of PT card that combines all PT modes (Yes/No)	Yes	Yes	Yes	HVV
Digitalized PT card (Yes/No) ¹³	Yes	Yes	Yes	HVV
Modal split (%)	PT: 24% Private car/ Carsharing/Ride- railing/Taxis: 32% Bike: 22% Walking: 22%	PT: 19% Private car: 22% Carsharing/Ride- railing/Taxis: 9% Bike: 22% Walking: 28%	N.A.	Bürgerschaft HH, Geoportal Hamburg
Motorization rate (n° of vehicles per 1000 people)	430	321	322	OECD Local Profile Database (CC) / Statistik Nord 2023 (ULL)
Number of trips on a workday	5.3 million trips per day	N.A.	N.A.	Hamburg Business 2023
% of trips within the municipality	PT: 24% Cycling: 22% Walking: 22% PMVs: 32%	N.A.	N.A.	Hamburg Business 2023
% of trips with origin or destination in another municipality	N.A.	N.A.	N.A.	
Average travel times (minutes) ¹⁴	25min 24s/10km	N.A.	N.A.	Tomtom Traffic Index

¹³ The digitalized public transport card used in Hamburg is the Deutschlandticket, introduced on May 1, 2023. It offers unlimited access to local and regional public transport across Germany for a monthly subscription fee. In Hamburg, the Deutschlandticket is available digitally via the HVV switch App or as a chip card.

¹⁴ Average travel times referenced here are calculated based on the formula: total travel time in minutes per 10 kilometers of distance (min/10 km), providing a standardized measure for comparing accessibility across modes and areas.

3.2.5. Governance and Policy framework

Governance structure and competences

In Germany, urban planning and transport responsibilities are distributed across three main levels of government: **national**, **state (Länder)**, and **local**. Hamburg occupies a unique position as one of Germany's three **city-states**, combining both municipal and state-level authority. This centralization enables a high degree of vertical integration in urban and mobility policy implementation.

At the **national level**, the **Federal Ministry for Digital and Transport (BMDV)** provides the overarching legal and policy framework for transport infrastructure, mobility innovation, and strategic coordination. In parallel, the **Federal Ministry for Housing, Urban Development and Building (BMWSB)** develops and supports national urban planning frameworks and funding programs. It plays a proactive role in promoting new planning models such as the **15-minute city** and **Superblocks**, as evidenced by its funding of 14 pilot projects from 2024 to 2026 that test innovative, crisis-resilient district structures (BMWSB, 2023).

At the **state level**, Hamburg's Senate oversees both urban planning and transport through two key ministries:

- The **Ministry of Urban Development and Housing (BSW)**, which manages **spatial planning, zoning (Bebauungspläne)**, and integrated district development through programs like **RISE (Integrierte Stadtteilentwicklung)**.
- The **Ministry of Transport and Mobility Transition (BVM)**, responsible for developing the city's **Mobility Transition Strategy (VEP 2023)** and implementing the **Hamburg-Takt**, an initiative to ensure access to a mobility service within five minutes citywide (BVM, 2023).

Urban development and transport planning follow Germany's planning hierarchy, which includes **state spatial planning (Landesentwicklungsplanung)** and **municipal land-use planning (Bauleitplanung)**, structured through instruments like **Fachplanungen** and **binding land-use plans (Bebauungspläne)**.

At the **local level**, **district offices (Bezirksämter)** are responsible for implementing planning and mobility strategies tailored to local contexts. In the **Living Lab area of Lurup**, this falls under the **Bezirksamt Altona**, which works in coordination with the Senate, civil society, and local service providers to implement urban improvements, particularly through the **RISE framework**. Responsibilities include managing local zoning applications, public space upgrades, small-scale mobility interventions, and coordinating with schools and housing associations.

Public transport operations are led by **Hamburger Hochbahn AG**, a 100% city-owned operator, and coordinated under the **Hamburg Transport Association (HVV)**, which integrates various service providers across the region.

Table 9 - Policy level and relevant actors for mobility and urban planning

Policy level		Core City: Hamburg	Living Lab: Lurup
Mobility	National	Federal Ministry for Digital and Transport (BMDV)	Federal Ministry for Digital and Transport (BMDV)
	Regional	- Hamburg Transport Association (HVV) and Ministry for Transport and Mobility Transition (BVM)- - Behörde für Verkehr und Mobilitätswende (BVM) – Transport and Mobility Transition	Integrated into Hamburg's broader strategy; supports smart mobility pilots
	Local	- Hamburg Senate Chancellery - District offices (Bezirksämter) - Public transit company: Hamburger Hochbahn AG	- Hamburg Authority for Transport and Mobility Transition (BVM), District Office of Altona
Urban planning	National	- Federal Ministry for Housing, Urban Development and Building (BMWSB)	- Federal Ministry for Housing, Urban Development and Building (BMWSB)
	Regional	-Behörde für Stadtentwicklung und Wohnen (BSW) – Urban Development & Housing Hamburg	-Behörde für Stadtentwicklung und Wohnen (BSW) – Urban Development & Housing Hamburg, Lurup under BSW's spatial planning scope
	Local	Hamburg City Planning Department	District Office of Altona, local stakeholders, community-led initiatives

Public participation is a central element in Hamburg's approach to urban development and mobility planning. Engagement occurs through both **formal mechanisms**, such as consultations and statutory hearings, and **collaborative, bottom-up formats** that empower citizens to shape their neighborhoods.

At the city level:

- **Statutory consultations** accompany land-use planning processes (Bauleitplanung), ensuring transparency and legal compliance.
- **Participatory budgeting (Bürgerhaushalt)** initiatives in several districts allow residents to influence small-scale urban investments.
- The **DIPAS** platform (Digital Participation System) facilitates online engagement, allowing citizens to comment on mobility and planning proposals and co-develop ideas for urban transformation (DIPAS, 2022).

Innovative participatory practices include:

- **PlanWorkshop2030**, a citywide participatory visioning initiative, which invited residents, planners, and experts to co-create ideas for the future of Hamburg's neighborhoods and mobility system (PlanWorkshop2030, 2021).
- The **Stadtwerkstatt Hamburg**, which acts as an urban lab and participation hub, organizes workshops, forums, and community audits that feed directly into city policy.

At the district level:

- In **Lurup**, the **Bezirksamt Altona** holds **neighborhood forums (Stadtteilbeiräte)** and **community workshops** where residents co-shape decisions related to urban space, mobility infrastructure, and local service needs.
- The **RISE program**¹⁵ requires inclusive participatory formats as a condition for funding, ensuring that the voices of underrepresented groups (e.g., migrants, youth, seniors) are included in planning processes (BSW, 2023).
- Participation also includes **surveys, walking audits, and site-specific design sessions**, especially in coordination with schools and social centers.

Participation is not only a legal requirement but a **planning principle** in Hamburg. It ensures that initiatives such as the **15-minute city model** are implemented with sensitivity to social equity, spatial justice, and local knowledge.

Mobility policy: SUMP & aligned strategies

Core City: Hamburg

Hamburg has developed a set of interlinked mobility strategies aligned with Sustainable Urban Mobility Planning (SUMP) principles, centered on improving accessibility, climate resilience, active mobility, and digital integration. While Hamburg does not explicitly brand its central strategy as a "SUMP," it closely

¹⁵ The RISE framework (Integrierte Stadtteilentwicklung) is Hamburg's integrated district development program aimed at improving social cohesion, infrastructure, and quality of life in disadvantaged neighborhoods. It combines physical urban renewal with participatory planning and cross-sector collaboration between residents, local authorities, and service providers (BSW, 2023).

follows SUMP methodology, especially through its **Verkehrsentwicklungsplan (VEP) / Mobility Transition Strategy**.

1. Verkehrsentwicklungsplan / Mobility Transition Strategy (2023)

This is Hamburg's core mobility development plan, guiding the city toward a sustainable, inclusive, and efficient transport system.

- **Goal:** By 2030, **80% of all trips** in Hamburg should be made by **walking, cycling, or public transport** (BVM, 2023).
- **Key initiative:** the **"Hamburg-Takt"**, which aims to provide access to a mobility service (bus, rail, shared modes) within **5 minutes** across the city.
- **Actions:**
 - Significant investment in **pedestrian and cycling infrastructure**.
 - Improved frequency, speed, and coverage of public transport services.
 - Integration of shared and on-demand mobility options into the public system.
 - More **space and safety** for active mobility and low-emission modes.

2. ITS Strategy – "Digitising Transport"

Hamburg is a pioneer in integrating digital technologies in transport, using ITS (Intelligent Transport Systems) to promote user-centered, efficient, and sustainable mobility (ITS Hamburg, 2022).

- **Key Features:**
 - Development of **mobility platforms** (e.g., **hvv switch app**) integrating public and private providers (MOIA, MILES, TIER, etc.).
 - **Real-time information systems** at stations and through apps.
 - Pilots on **autonomous shuttles**, digital signage, and intermodal trip planning.
 - Infrastructure support for **mobility hubs**, where users can switch between bikes, e-scooters, buses, and trains.

3. Green City Plan Hamburg (2017–2020)

Developed within the federal **"Clean Air Immediate Action Programme,"** this plan addresses emission-free mobility and sustainable urban space use (BSW, 2018).

- **Measures:**
 - Fleet electrification (buses and city logistics).
 - Prioritization of **cycling, walking, and public transport** infrastructure.
 - Establishment of **EcoMobility zones** and urban greenery integration.

4. Hamburg 2040 – Standortstrategie

This long-term economic and urban development vision ties mobility into spatial resilience and accessibility.

- **Key concept:** All essential contact points and services (schools, shops, administration) should be reachable within **15 minutes**, either physically or digitally Handelskammer (Hamburg, 2021).
- **Supports** the idea of **digitally augmented proximity**, tying e-government to transport access.

Living Lab Area: Lurup

The **Lurup** district, in Hamburg-Altona, serves as a **Living Lab** where the 15-minute city approach is being

locally applied. The area reflects **social diversity**, **low to mid dense residential fabric**, and existing **mobility gaps**, making it a strong test case for community-based, multimodal accessibility.

1. HVV switch Point Expansion

Located strategically in neighborhoods — near housing, schools, and shopping — to ensure that residents can access essential services and transport options within **15 minutes** (Hochbahn AG, 2023).

- As a part of the **Hamburg-Takt** vision, envisions expansion of **multimodal mobility hubs** offering shared cars, bikes, e-scooters.

2. Pedestrian & Cycling Infrastructure Improvements

New and refurbished **bike lanes**, especially along school routes and main roads.

- Safer **pedestrian crossings**, resting areas, and lighting improvements.
- Encourages short-distance trips and improves safety for all users (BVM, 2023).

3. RISE Program Integration – Local Services and Urban Quality

As part of the RISE (Integrierte Stadtteilentwicklung) framework, Lurup receives targeted investment in mobility, social infrastructure, and service access.

- Infrastructure development is linked to housing, education, and public realm improvements.
- Participatory planning is built into the process (BSW, 2023).

4. PlanWorkshop2030 Participation Outcomes

In Lurup, residents participated in **co-creation processes** to identify everyday barriers, suggest new mobility interventions, and help shape planning outcomes.

- Local knowledge helped inform decisions on the placement of **switch points**, **green spaces**, and **safe pedestrian zones** (Stadtwerkstatt Hamburg, 2021).

Urban planning framework

Hamburg's urban planning approach is grounded in principles of **sustainability**, **inclusivity**, **compact development**, and **resilience**, and it is increasingly guided by the strategic vision of a **15-minute city**. The city integrates land use, mobility, digitalization, and public participation into a holistic framework aimed at improving local quality of life and climate performance. While overarching strategies such as the **Mobility Transition Strategy (VEP 2030)**, the **Green City Plan**, and **RISE** guide citywide priorities, they are applied and tested in diverse spatial contexts — including the **district of Lurup**, which serves as a **Living Lab** for applying these ideas in lower-density and socially diverse neighborhoods.

1. Integrated Urban and Mobility Planning

Hamburg's urban development strategy is increasingly shaped by the integration of **transport and land-use planning**, following a transit-oriented development model. High-density housing is concentrated along public transport corridors, while new development plans must align with existing or upgraded mobility infrastructure. This principle is embedded in the **Mobility Transition Strategy** and implemented through spatial instruments such as the **Fachplan Mobilität**, **Bebauungspläne (binding land-use plans)**, and local **framework development plans** (BVM, 2023).

In **Lurup**, this approach is taking shape through the **planned extension of the S-Bahn (S32 line)** to Osdorfer Born and Lurup. This investment aims to **connect the periphery more efficiently with the urban core**, supporting modal shift and facilitating the delivery of new housing and public services near stations. The integration of land-use development and new transport infrastructure is expected to **enhance service proximity**, particularly for underserved parts of the neighborhood.

2. Green Urban Development and Climate Resilience

Hamburg is positioning itself as a **climate-neutral city by 2045**, and green urban development is central to that ambition. The **Green Network Project** and **Green City Plan** (BSW, 2018) aim to create an interconnected landscape of parks, green corridors, and multifunctional public spaces that support both environmental performance and local recreation.

In urban regeneration and district development, this means integrating green infrastructure into the public realm and new construction. In **Lurup**, where some areas are marked by **fragmented green space and wide car-dominated roads**, RISE-funded projects are being used to **reconnect green pockets, redesign open spaces**, and make them more functional and accessible for everyday use. These upgrades also serve as cooling zones, encourage biodiversity, and provide inclusive social space for youth, seniors, and families.

3. Smart Planning and Digital Integration

As part of its **Smart City Strategy** and ITS Hamburg initiatives, the city is using digital tools to optimize urban planning, service delivery, and public participation. The **DIPAS digital platform** enables citizens to actively participate in planning processes, comment on proposals, and submit suggestions during planning consultations (ITS Hamburg, 2022).

Lurup has already benefitted from this digital engagement model during the **PlanWorkshop2030** initiative, which collected local knowledge on mobility barriers, desired improvements, and social infrastructure needs (Stadtwerkstatt Hamburg, 2021). The feedback from this process has influenced planning decisions around **pedestrian safety, green space design, and mobility hubs**, ensuring that strategies are **locally adapted** to residents' lived experiences.

4. Mixed-Use and Neighborhood-Centered Development

Mixed-use and proximity-based development are fundamental to Hamburg's 15-minute city vision. Urban planning aims to **reduce the need for long-distance travel** by clustering daily needs — housing, childcare, retail, health services, and cultural spaces — in local centers that are walkable or bikeable from home (Handelskammer Hamburg, 2021).

This approach is particularly relevant in Lurup, where some residential areas follow **Radburn-inspired suburban layouts** or **modernist high-rise blocks** that lack integrated services. Through the **RISE program**, Lurup is undergoing **district-level regeneration** that focuses on reactivating underused spaces, consolidating decentralized services into **neighborhood hubs**, and creating multifunctional public

buildings. These centers aim to host libraries, medical clinics, educational facilities, and community kitchens — all within a short walking distance of housing.

5. Active Mobility and Cycling Infrastructure

The expansion of **cycling and pedestrian infrastructure** is an essential feature of Hamburg's urban planning. The city is building out its **Veloroute network**, prioritizing safe, well-lit, and continuous cycling connections between residential zones, workplaces, and service centers (Geoportal Hamburg, 2023).

In Lurup, where wide arterial roads and disconnected sidewalks have long prioritized car use, the city is introducing **traffic calming, improved bike paths**, and safer pedestrian crossings — especially around schools and shopping streets. These interventions support short-distance travel and are essential for **inclusive mobility**, particularly for children, the elderly, and people with reduced mobility.

6. Affordable Housing and Socially Inclusive Planning

Affordable housing remains a key priority in Hamburg's urban planning, especially in socially diverse areas like Lurup. Through the city's **housing development program** and policies that require a percentage of subsidized units in all new projects, Hamburg aims to prevent displacement and promote socially mixed neighborhoods (BSW, 2023).

The **Mehr Altona – Zukunftsplan** (2011) serves as a reference for Altona's sub-districts, including Lurup, emphasizing flexible housing types, affordable rents, and integrated living environments that meet the needs of families, elderly residents, and migrants. RISE projects in Lurup further combine housing upgrades with improvements to local education and employment access, reinforcing the link between **spatial justice and planning**.

Lurup exemplifies the **complexity of applying 15-minute city principles in peripheral, car-oriented, and socially heterogeneous neighborhoods**. As Hamburg's Living Lab in the Forthcoming project, it serves as a real-world case for testing how urban planning can transform such areas into resilient, walkable, and connected communities.

Key planning actions underway in Lurup include:

- **Implementation of RISE neighborhood projects**, improving social infrastructure and upgrading public space
- **Mobility access initiatives**, including expansion of **hvv switch points** and planning for future **S-Bahn** extension
- **Green space revitalization**, making local parks safer, more attractive, and socially inclusive
- **Participatory planning processes** through **PlanWorkshop2030**, shaping development priorities based on resident feedback

Together, these measures position Lurup as a pilot area for demonstrating how the **15-minute city concept can be adapted to suburban urban fabrics** — with the goal of achieving equitable access to services, active mobility, and community resilience.

3.2.6. Key challenges and conclusions

In conclusion, the German case study consists of a core city—Hamburg—and a sub-district within the Altona borough, called **Lurup**, which **serves as the designated Urban Living Lab (ULL)**.

These two areas share several characteristics, partly due to their administrative connection and physical proximity. Both are influenced by Hamburg's overarching urban and spatial planning framework, which benefits from the city's unique status as a city-state.

On one hand, Hamburg—especially its core urban areas—offers a dense, well-connected environment, marked by high population density and an extensive public transport network. This supports efficient, sustainable mobility and enables access to a wide range of services and opportunities.

In contrast, **Lurup presents a quieter, greener setting**. It is a post-war **residential area** facing **socio-economic challenges and infrastructural limitations** compared to the more urbanized parts of Altona and central Hamburg. While Lurup is connected to Altona and Hamburg's city center, its **public transport options are more limited**, relying primarily on **buses** and **road access** via major arteries like the A7 motorway.

Lurup has a diverse population with generally **lower income** levels and **reduced access to services within walking distance**. The public transport infrastructure is less developed compared to central Hamburg, and the urban fabric—dominated by **isolated blocks and functionalist housing**—reflects its industrial heritage and rapid post-war development. Issues such as **social inequality, aging infrastructure**, and a relative **scarcity of green spaces** further differentiate Lurup's urban dynamics from those of Hamburg's core.

Overall, while Hamburg and Lurup operate under shared structural and planning frameworks, their differences in density, accessibility, socio-economic conditions, and urban form underscore the need for tailored approaches in metropolitan-scale interventions.

3.3 Alverca do Ribatejo

3.3.1. Introducing the Core City and the Living Lab

The Portuguese case study in the FORTHCOMING project includes **the city of Lisbon as the core city and Union of Parishes of Alverca do Ribatejo and Sobralinho in the municipality of Vila Franca de Xira (VFX) as the designated Living Lab** within the Lisbon Metropolitan Area (Área Metropolitana de Lisboa, AML).

The capital and largest city of Portugal, Lisbon is located at the western edge of Europe along the Atlantic coast and the Tagus River. The city covers an area of approximately 100 km² (DGT, 2024) and is home to **around 567,000 residents** (INE, 2023). The broader **metropolitan area** encompasses 18 municipalities and **around 2.9 million people** (INE, 2023), making it the most populous metropolitan area in the country (INE, 2024). The city plays a crucial role in Portugal's economic, cultural, administrative, and political life. It serves as the center of national government, key institutions, and a significant hub for international business and tourism.

The city's urban fabric is characterised by a diversity of historical neighbourhoods, including Alfama, Baixa, and Bairro Alto, juxtaposed with modern developments such as Parque das Nações. The city features a **compact, walkable centre with efficient public transport and a variety of residential, commercial, and cultural amenities**. The city enjoys a Mediterranean climate, with mild, rainy winters and warm, dry summers, and its topography includes steep hills and coastal plains



Figure 32 - Lisbon central area.

Source: Pixabay

Economically, Lisbon is driven by the **services sector**, which includes finance, real estate, tourism, ICT and creative industries. It is also focused on being a key player in innovation, smart cities and green transition initiatives. In recent years, Lisbon has undergone significant **urban regeneration efforts**, including the improvement of public spaces, **the redevelopment of the waterfront** and the **modernization of the mobility system**.

As a capital city, Lisbon also faces typical urban **challenges** such as **housing affordability**, **traffic congestion**, **social inequality**, and **environmental concerns**. Despite this, the city has been at the forefront of sustainability initiatives, including the expansion of cycling infrastructure, the introduction of low emission zones, and investments in public transport. In 2020, Lisbon was awarded the title of European Green Capital in recognition of its commitment to environmental sustainability (European Commission, 2024).



Figure 33 – Lisbon.
Source: Pixabay

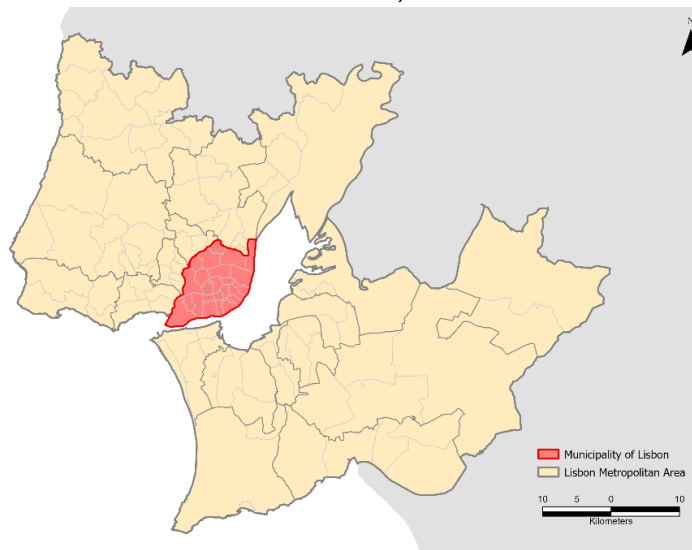


Figure 34 - Lisbon Municipality and Metropolitan Area administrative boundaries

The city is at the centre of a wider **polycentric urban network** within the AML, connected by commuter rail, road infrastructure, and river transport. One of the municipalities within this network is Vila Franca de Xira.

Situated approximately 30 km north of Lisbon along the northern bank of the Tagus River, **Vila Franca de Xira** has a population of around **139,000** (INE, 2024) and it covers an area of 318 km² (DGT, 2024). The

municipality comprises a variety of urban and rural areas, including Alverca do Ribatejo, Póvoa de Santa Iria, and the municipal seat of Vila Franca de Xira. The **Union of Parishes of Alverca do Ribatejo and Sobralinho** has a population of **more than 36,000 inhabitants** (INE, 2021) an area of almost 24 Km² (CAOP, 2024).



Figure 35 - Vila Franca de Xira.
Source: Pixabay

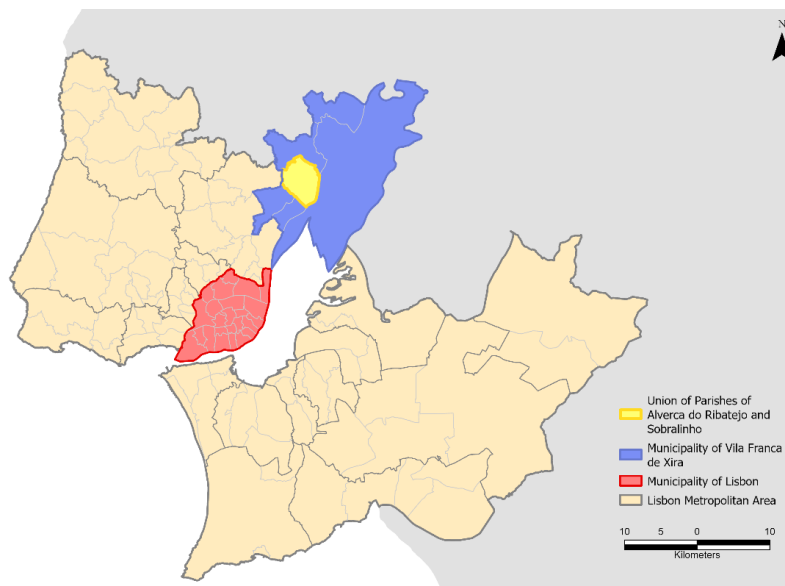


Figure 36 - Lisbon and Vila Franca de Xira Municipalities and Union of Parishes of Alverca do Ribatejo and Sobralinho

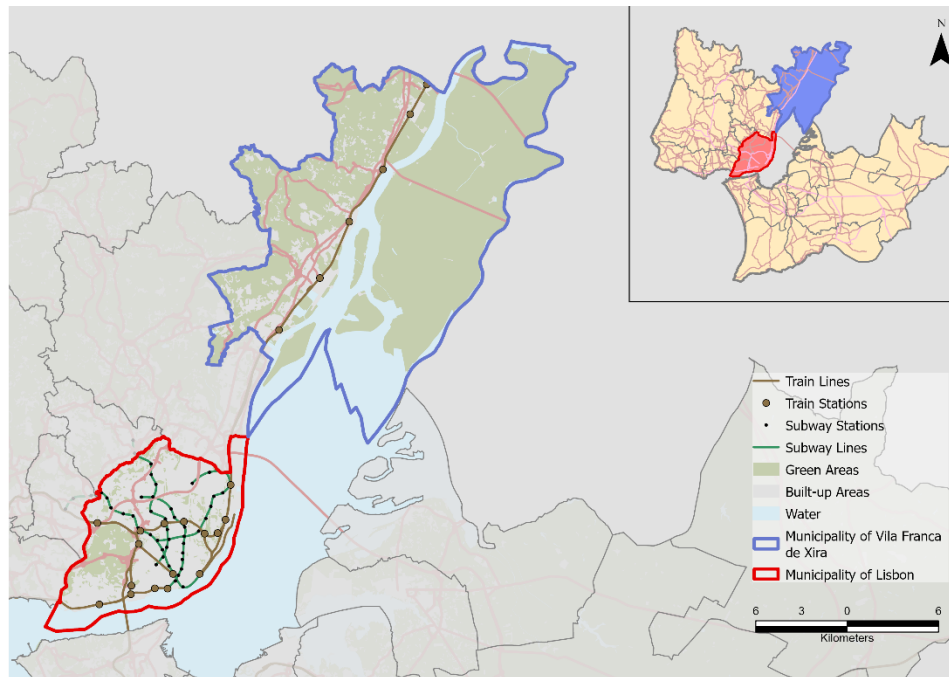


Figure 37 – Lisbon and Vila Franca de Xira main transport axes

The territory of VFX is characterised by **a combination of land uses**, including **consolidated urban areas**, **large-scale industry**, **agricultural fields**, and **natural protected areas**. Of a particular note is the **Tagus Estuary Nature Reserve**, which is partially located within the municipality's boundaries, thus contributing to both environmental conservation and the development of eco-tourism.

The municipality's strategic location, with **easy access to the Lisbon-Porto railway and the A1 motorway**, has historically contributed to its development as an **important logistics and industrial centre**. The municipality is also an important **commuter municipality**, with thousands of residents travelling to Lisbon for work or study every day. However, **internal mobility** within the municipality **remains a challenge**, with some municipalities less well served by public transport and more **dependent on private vehicles**.

In the context of the FORTHCOMING project, Union of Parishes of Alverca do Ribatejo and Sobralinho in the municipality of Vila Franca de Xira has been identified as a promising Living Lab due to its urban diversity, strategic location and political interest in sustainable mobility and community well-being. The municipality is currently working on **regeneration projects** in key areas, including the **riverfront** and the **town centre**, and is considering measures to improve the **quality of public spaces** and **transport accessibility**, particularly for **young people and vulnerable groups**.

3.3.2. Demographic and socioeconomic characteristics

The capital of Portugal, Lisbon, is characterised by a **heterogeneous population** that is **ageing**. According to the latest estimates, the population of the municipality was approximately 567,000 inhabitants in 2023 (INE, 2023). The city exhibits a relatively **high population density**, approximately 5600 persons/km² (INE,

2023), influenced by **internal migration from other regions of Portugal** and an increasing proportion of **international migrants**. Approximately **28% of the population is foreign-born** (INE, 2023). The sex ratio is slightly female-dominant, with an approximate ratio of 88 males for every 100 females.

While the city's population has declined in recent decades, recent urban regeneration, infrastructure improvements and a surge in tourism and the digital economy have reversed this trend (INE, 2023). Nevertheless, concerns regarding affordability and inequality persist. The city **exhibits a relatively high Gini coefficient (48.5%)**, indicative of moderate-income inequality, with a **median disposable income of 13,809€** (INE, 2022) and a **PPP estimated at around 23,475 USD** (OECD, 2021).

By contrast, Vila Franca de Xira, has a population of approximately 139,000 residents (INE, 2023) and a density around 430 persons/km² (INE, 2023). The population of **Vila Franca de Xira** has grown slowly and steadily in recent years (INE, 2023), especially in urban centres such as Alverca do Ribatejo and Póvoa de Santa Iria. The municipality is **attractive to young families due to more affordable housing**, despite a greater **dependence on commuting**. The **foreign-born population** represents a smaller proportion of the total population, estimated **at around 9%** (INE, 2023), compared to the city of Lisbon.

The gender ratio in the municipality is of 90 males per 100 females (INE, 2023), and the distribution across age groups shows a younger population when compared to Lisbon (OECD, 2023). The local economy of VFX is **predominantly industrial and logistics-focused**, though services and retail sectors are also significant. The **unemployment rate is marginally lower than in Lisbon: 6.5%, compared to Lisbon with 7%** (OECD, 2021); and the **Gini coefficient** of household income inequality is lower, standing **at approximately 37.9%** (INE, 2023). The **median disposable income is slightly above 12,000€** (INE, 2023) and the **PPP is of 21.115 USD** (OECD, 2021).

With specific reference to the **Union of Parishes of Alverca do Ribatejo and Sobralinho**, it has a population of more than 36,000 inhabitants (INE, 2023), which represents **around 26% of the municipality's population**. The parish's **population density** is around 1,500 people/km², **higher than the average density for the municipality** (INE, 2023).

Table 10 - Demographic and socioeconomic indicators in Lisbon and Vila Franca de Xira

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Total Population (inhabitants)	567131	139452	32273	National Institute of Statistics, 2021 BGRI 2021 (LL)
Median Age (years)	from 37 to 47	from 37 to 47	N.A.	INE Regional Statistical Yearbooks, 2022

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Age Distribution (%)	0-14: 13.6% 15-64: 63.3% +65: 23.1%	0-14: 15.1% 15-64: 65.2% +65: 19.7%	N.A.	OECD Local Profile Database, 2023
Sex ratio (males per 100 females)	88.91	90.98	91.69	National Institute of Statistics, 2023 BGRI 2021 (LL)
Foreign Born Population (%)	28.61%	9.83%	N.A.	OECD Local Profile Database
Median Disposable Income PPP (USD)	23,475	21,115	N.A.	OECD Local Profile Database, 2021
Social Inequality – Gini Coefficient	48.5%	39.9%	N.A.	National Institute of Statistics, 2022
Dominant industries	By number of companies: Manufacturing industries	By number of companies: Manufacture of metal products, except machinery and equipment	N.A.	National Institute of Statistics, 2023
Unemployment rate (%)	7%	6.5%	N.A.	OECD Local Profile Database, 2021

3.3.3. Urban Planning and Land Use

The urban fabric of Lisbon has evolved over historical periods, which has created a compact and diverse city. The city is divided into several distinct neighbourhoods, each with its own unique characteristics. Historic districts such as Alfama, Baixa, Chiado and Bairro Alto are characterised by narrow, walkable streets and dense, mixed-use development, while newer areas such as Parque das Nações are examples of modern, planned neighbourhoods with residential, commercial and leisure facilities (Figure 38).



*Figure 38 - Above, Lisbon historic districts. Below, Parque das Nações, a newer part of the city.
Source: Pixabay and Parque das Nações Civil Parish*

The city's land use is **predominantly urban**, with significant areas dedicated to **housing, commercial, public services and green space**. Lisbon covers an area of 100.05 km² with an **average density of 5668.47 persons/km²**. The **built-up areas account for** more than half of the land cover distribution (**61.8%**), while forest and semi-natural areas make up approximately 30% (36.8%). Croplands and wetlands represent less than 2% of the municipality's land cover, with 0.6% and 0.8% respectively. The ratio of built-up land per capita is of 32.6 m² (OECD, 2020).

Significant renewal projects have been undertaken to revitalise older neighbourhoods and brownfield sites. Green infrastructure, exemplified by prominent urban parks such as Monsanto Forest Park and Eduardo VII Park, is a key component of the city's environmental strategy. These green areas provide approximately 53 m² of green space per capita (OECD, 2021).

When it comes to the air quality, it is worth noting that the average population exposure to nitrogen dioxide (NO₂) is 8.2 µg/m³, which is -17.9 % lower than the WHO guideline. However, the exposure to fine particulate matters (PM_{2.5}) averages 11.9 µg/m³, which is 138.2 % higher than the WHO guideline, while exposure to coarse particulate matter (PM₁₀) is equal to 20.6 µg/m³ and 37.4 % higher than the WHO guideline (OECD, 2021).

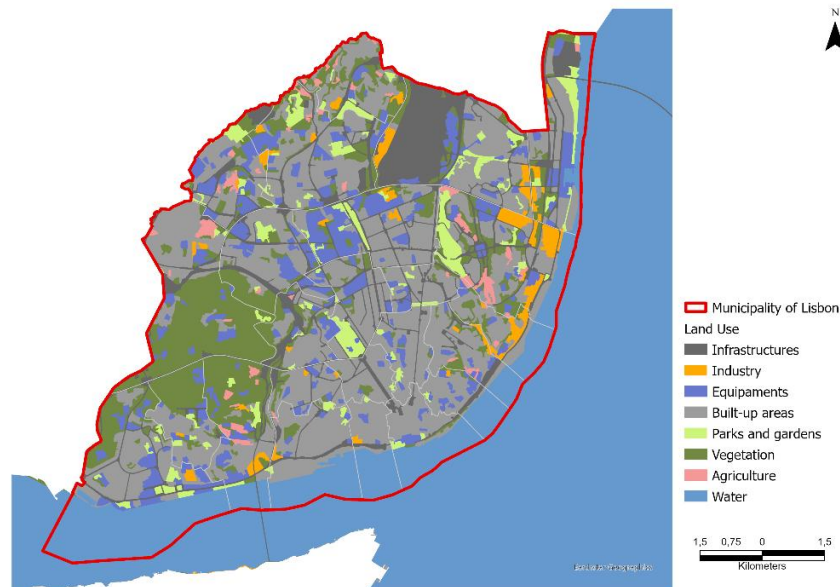


Figure 39 - Lisbon's Land Use



Figure 40 - Monsanto Forest Park and Eduardo VII Park locations

Vila Franca de Xira, on the other hand, has a distinct land-use pattern, characterised by the **coexistence of urban centres, agricultural areas and protected natural areas**. The municipality covers an area of 318.19 km², and the Union of Parishes of Alverca do Ribatejo and Sobralinho 23.92km². While the municipality has an average density of 438.26 persons/km², the parishes have a slightly higher density, with 1 524.5 persons/km². In Vila Franca de Xira's land cover is split into the following shares: **forest or semi-natural lands make up 39.7% of the land, followed by built-up land at 8.7% and the remaining being cropland (43.2%) and water (8.3%)**. There are 63 m² of built-up land per capita (OECD, 2020), proximally twice as

much as Lisbon. Regarding green spaces, in Vila Franca de Xira there is 710m² per capita (OECD, 2021), which is significantly higher than Lisbon. Regarding Alverca do Ribatejo, the land cover split shows a concentration of built-up areas, accounting for 42% of the total land, while forest and semi-natural areas make up approximately 29%. Croplands and wetlands represent 18% and 11% of the land cover respectively. The main urban settlements, such as Alverca do Ribatejo, Póvoa de Santa Iria and the historic centre of Vila Franca itself, have residential, commercial and industrial areas linked by transport corridors. The outskirts of the municipality are characterised by the predominance of agricultural and natural landscapes, particularly in the vicinity of the Tagus Estuary Nature Reserve, which contributes significantly to the area's biodiversity (Figures 41 and 42).

The air quality in Vila Franca de Xira seems to be slightly better than in Lisbon. The average population exposure to nitrogen dioxide (NO₂) is 7.2 µg/m³, which is -28.4 % lower than the WHO guideline. Similarly, exposure to fine particulate matters (PM_{2.5}) averages 10.7 µg/m³, which is 114.5 % higher than the WHO guideline, while exposure to coarse particulate matter (PM₁₀) is equal to 18.5 µg/m³ and 23 % higher than the WHO guideline (OECD, 2021).

Urban expansion in VFX has historically been influenced by its proximity to major transport infrastructure (railway and motorway), leading to a **fragmented urban pattern with isolated neighbourhoods**. Recent municipal planning efforts have concentrated on the **creation of integrated, sustainable neighbourhoods and the enhancement of internal connectivity and mobility**.

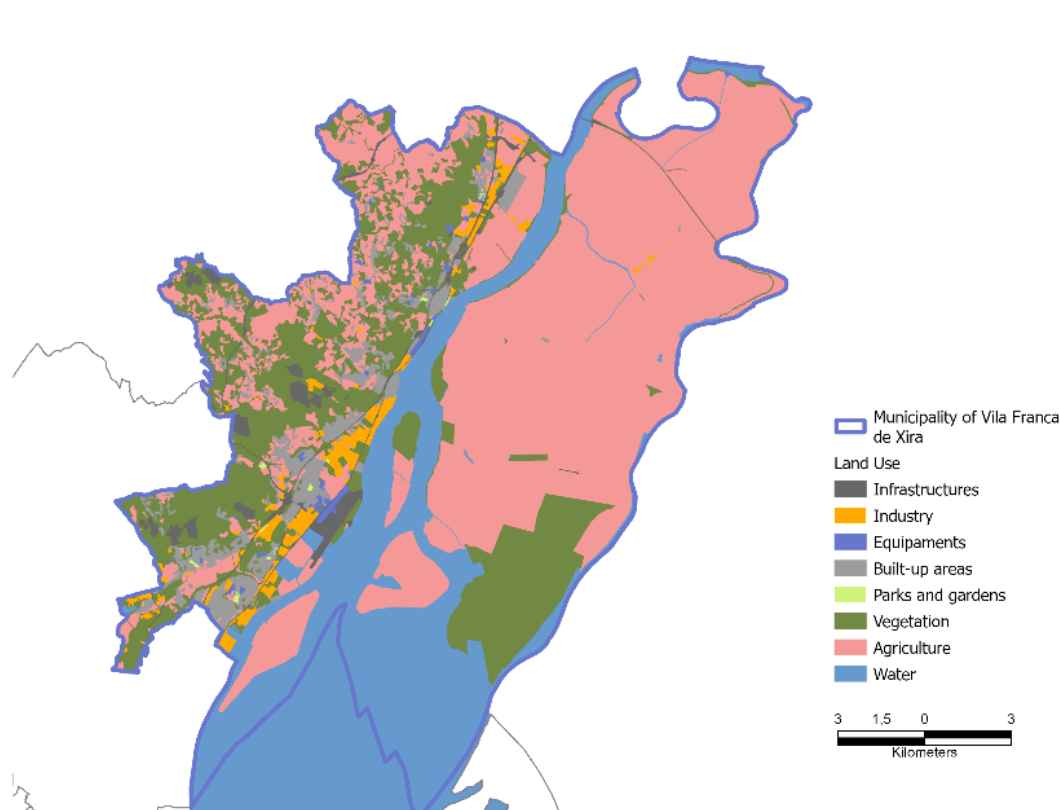


Figure 41 - Vila Franca de Xira's Land Use



Figure 42 - Tagus Estuary Nature Reserve in Vila Franca de Xira



Figure 43 - Vila Franca de Xira municipality different urban patterns

In the Union of Parishes of Alverca do Ribatejo and Sobralinho, the A1 national highway that crosses the municipality divides the residential area. The side closer to the river is characterized by a higher concentration of industrial zones, while the opposite side presents more agricultural areas (Figure 45). The main services concentrate in two different urban areas, where previously were two different parishes (Figure 46). There can be found different urban patterns (Figure 47) and from mid-density (small apartment block) to low-density developments (detached and semi-detached housing) (Figure 48).



Figure 44 - Alverca do Ribatejo divided by the national highway.

Source: Vila Franca de Xira Municipality

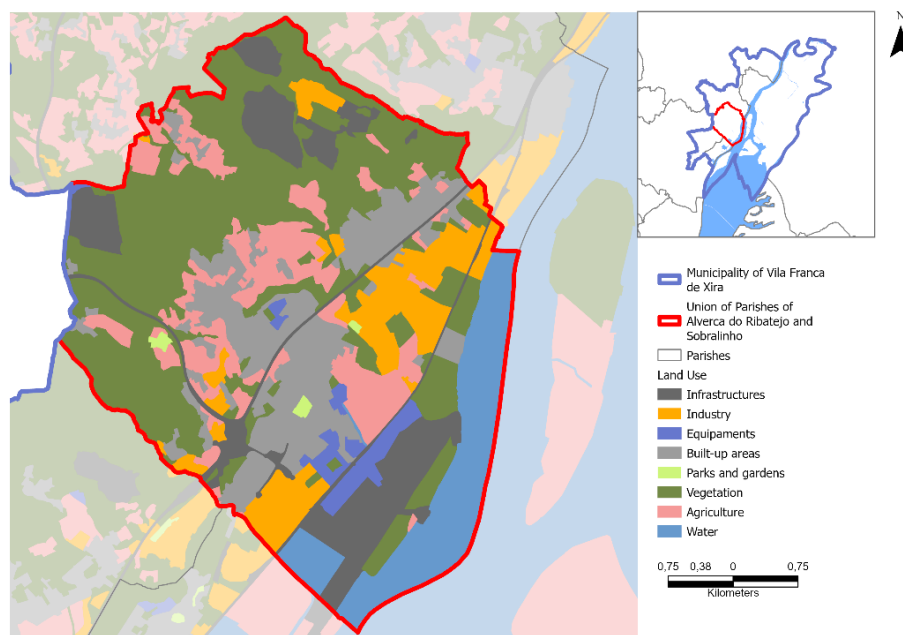


Figure 45 - Union of Parishes of Alverca do Ribatejo and Sobralinho's Land Use

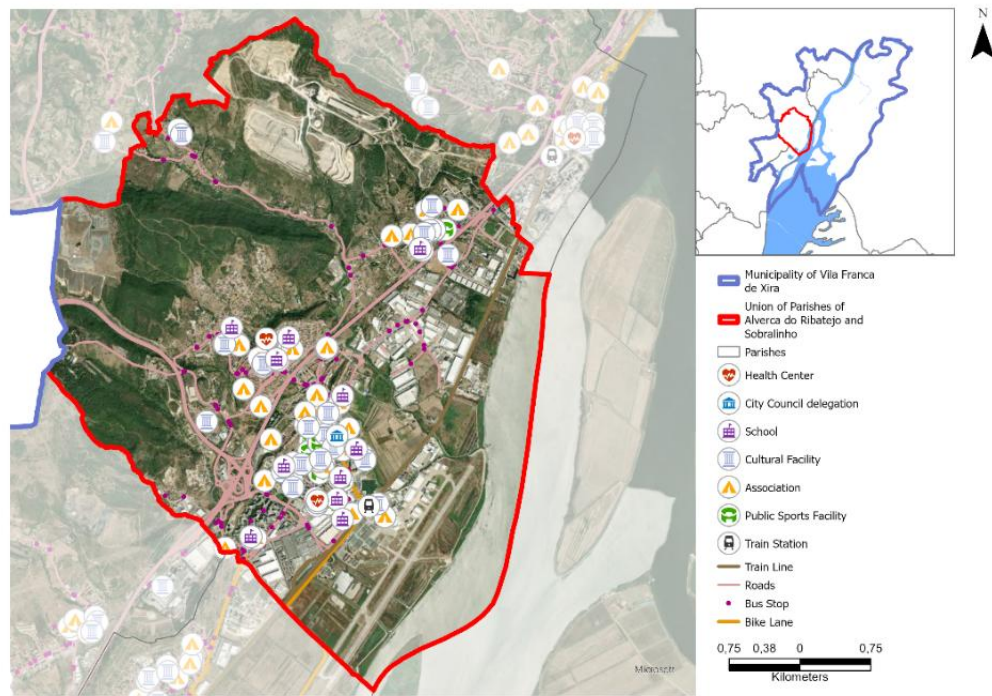


Figure 46 - Union of Parishes of Alverca do Ribatejo and Sobralinho main services



Figure 47 - Union of Parishes of Alverca do Ribatejo and Sobralinho urban patterns



Figure 48 - Union of Parishes of Alverca do Ribatejo and Sobralinho
Source: Google Street View

Table 11 - Land Use and environmental indicators in Lisbon and Vila Franca de Xira

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Area (km ²)	100.05	318.19	19.35	Directorate-General for Territory, 2024 BGRI 2021 (LL)
Population Density (persons/km ²)	5668.47	438.26	1667.8	National Institute of Statistics, 2021 BGRI 2021 (LL)
Land Cover Distribution (%)	Forest or semi-natural: 36.8% Built-up: 61.8% Cropland: 0.6% Water and wetlands: 0.8%	Forest or semi-natural: 39.7% Built-up: 8.7% Cropland: 43.2% Water and wetlands: 8.3%	Forest or semi-natural: 29% Built-up: 42% Cropland: 18% Water and wetlands: 11%	OECD Local Profile Database, 2021 COS 2018 (LL)

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Built-up surface (m ² /PPP)	32.6	63	252.4	OECD Local Profile Database, 2020 BGRI 2021 (LL) COS 2018 (LL)
Green space (m ² /PPP)	53	710	286.2	OECD Local Profile Database, 2021 BGRI 2021 (LL) COS 2018 (LL)
Average distance to the closest school (m)	N.A.	N.A.	N.A.	
Average distance to the closest hospital (m)	2136	8168	N.A.	OECD Local Profile Database, 2023
Average population exposure to NO ₂ (ug/m ³)	8.2	7.2	N.A.	OECD Local Profile Database
Average exposure to fine particulate matters (PM _{2.5})	11.9	10.7	N.A.	OECD Local Profile Database
Average exposure to coarse particulate matter (PM ₁₀)	20.6	18.5	N.A.	OECD Local Profile Database

3.3.4. Transport and Mobility

Lisbon has an integrated transport network comprising **4 metro lines, trams, buses and lifts operated by Carris, commuter rail lines (operated by Comboios de Portugal), ferries across the Tagus River and extensive pedestrian and cycling infrastructure.** The metro network covers major areas of the city and is complemented by the tram network, which serves historic and tourist routes. Bus routes provide extensive coverage of the city and suburbs.

In Lisbon, the cycling infrastructure has been significantly expanded, with almost **200 km of cycle paths currently available.** Despite this, an online survey carried out by the city council revealed that 2/3 of those asked feel unsafe at junctions and the majority see **Lisbon's network as discontinuous** (Lisbon City Council, 2024). In addition, the Lisbon Mobility Survey results (INE, 2017) shows that **less than 1% of journeys made in the municipality are by bicycle.**



Figure 49 - Cyclepath in Lisbon
Source: Lisboa Para Pessoas

There are also several **shared mobility services** available in Lisbon, including **electric scooters**, **shared bicycles (GIRA)** and **car sharing services**. Although there are two **Park & Ride** facilities in the metropolitan area, none are in the city of Lisbon or Vila Franca de Xira.

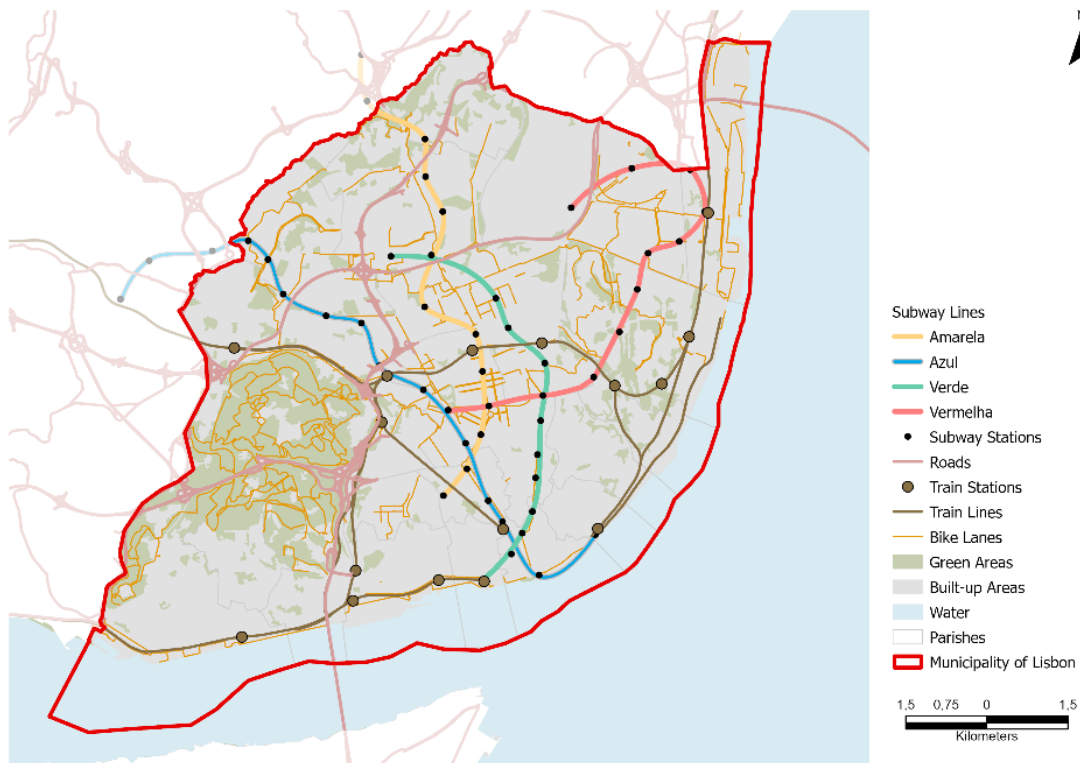


Figure 50 - Lisbon main transport infrastructure

Lisbon and Vila Franca de Xira share an **integrated public transport fare system** coordinated by Transportes Metropolitanos de Lisboa (TML) which offers a **single ticketing system** through the 'Navegante' card. The system **integrates metro, buses (urban & interurban), ferries, trains, trams and lifts**, though Vila Franca de Xira **relies mainly on the train and buses**, as it lacks metro service. All fares are loaded onto a contactless transport card for easy access.

The system includes single tickets, with fares varying by modes, and two types of unlimited monthly travel passes: the municipal (Navegante Municipal) and the metropolitan area one (Navegante Metropolitano). Both passes offer significant **discounts for low-income individuals**, reducing the cost of the metropolitan pass to a maximum of €20 and the municipal pass to a maximum of €15. Also, both passes offer discounts for **families living in the metropolitan area**, ensuring that the household pays for a maximum of 2 passes. **People over 65 years** old have 50% discount on the passes, and since 2022, 65+ residents of Lisbon municipality benefit from free transport inside the council. Additionally, since 2024, **students up to 23 years** old enjoy **free travel** across the Lisbon metropolitan area (CARRIS METROPOLITANA, n.d.).

Mobility as a Service (MaaS) initiatives are actively promoted, with **pilot programmes** offering integrated and digital travel planning and ticketing.

Vila Franca de Xira's transport infrastructure is **dominated by the suburban railway**, which connects the municipality to Lisbon. It has **6 commuter rail stations** located in different parts of the municipality: Carregado, Castanheira do Ribatejo, Vila Franca de Xira, Alhandra, Alverca e Póvoa. This mode of transport is particularly important for **daily commuters**. Stations such as Alverca and Vila Franca de Xira are particularly important transport hubs. Three lines provide connections to Lisbon and other municipalities in the metropolitan area of Lisbon. Intercity and local buses improve connectivity, although coverage is less than in Lisbon.

On a typical workday, 935,253 trips take place in Lisbon, with 63.4% of these trips occurring within the municipality and 45.9% involving origins or destinations in other municipalities (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017). The modal split shows a diverse range of transportation modes. In Lisbon, **30% of trips are made on foot, 21% by public transport, 46% by car, and 3% by other modes** (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017). Lisbon has a **motorization rate of 685 per 1000 people** (Insurance and Pension Funds Supervisory Authority, 2023). On **average**, a trip in Lisbon lasts **25.9 minutes** (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017).

In Vila Franca de Xira, 262,914 trips occur daily on a workday. Compared to Lisbon, a higher proportion of these trips—**74.9%—take place within the municipality**, while only 14.7% involve origins or destinations in other municipalities (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017). Of the **intercity journeys originating in the municipality, 61.8% have Lisbon as their destination** (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017). The modal split reveals a **strong dependence on cars, with 61% of trips made by car, 18% on foot, 18% by public transport, and 2% by other modes** (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017). The **motorization rate** in Vila Franca de Xira is slightly lower than in Lisbon, with **609 registered mopeds, motorbikes, and light vehicles per 1000 people** (Insurance and Pension Funds Supervisory Authority, 2023). The **average trip time** in Vila Franca de Xira is

slightly lower than in Lisbon: **23.5 minutes** (Mobility Survey in the Metropolitan Areas of Porto and Lisbon, 2017).

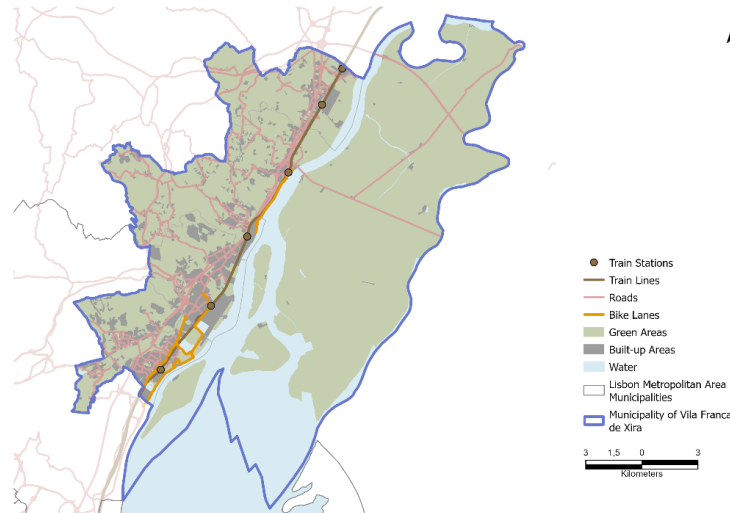


Figure 51 - Vila Franca de Xira main mobility infrastructure

Vila Franca de Xira faces notable **mobility challenges**, including **high car dependency** and previously **fragmented public transport services**. The Lisbon Metropolitan Area, which includes Vila Franca de Xira, has historically suffered from **unequal accessibility** and strong reliance on private vehicles (Martinez & Viegas, 2017). To address these issues, Carris Metropolitana was launched in 2023 to **unify and improve bus services across the region**, including in Vila Franca de Xira (Lisboa Para Pessoas, 2022). Local authorities are currently focusing on **improving cycling and pedestrian infrastructure** and **improving connections between commuter rail stations and residential areas**.



Figure 52 - Vila Franca de Xira train station

Source: Vila Franca de Xira Municipality

Table 12 - Mobility indicators in Lisbon and Vila Franca de Xira

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Cycling infrastructure (km)	173	19.55	2.67	Lisbon City Council Vila Franca de Xira City Council
Park & Ride scheme (yes/no)	No	No	No	Portal VIVA
Demand responsive transport offer (yes/no)	Yes - Only for people with reduced mobility	No	No	CARRIS
Public transport offer	Metro; Commuter Rail; Tram; Urban bus; Intercity bus; Intercity Fluvial transport Lifts	Commuter Rail Urban bus Intercity bus	Commuter Rail Urban bus Intercity bus	CARRIS Lisbon City Council Vila Franca de Xira City Council
Shared mobility modes available & Ride-hailing	Taxi – VTC Bikesharing Carsharing	Taxi – VTC	Taxi – VTC	Lisbon City Council Vila Franca de Xira City Council
Availability of PT card that combines all PT modes (Yes/No)	Yes	Yes	Yes	Portal VIVA Lisbon Metropolitan Transport Company
Digitalized PT card (Yes/No)	No	No	No	Lisbon Metropolitan Transport Company
Modal split (%)	W:30% PT: 21% C:46% Other:3%	W:18% PT: 18% C:61% Other:2%	N.A.	Mobility Survey in the Metropolitan Areas of Porto and Lisbon - 2017
Motorization rate (nº of vehicles per 1000 people)	685 (Mopeds, motorbikes and light vehicles)	609 (Mopeds, motorbikes and light vehicles)	N.A.	Insurance and Pension Funds Supervisory Authority, 2023 National Institute of Statistics, 2021

	Core City: Lisbon	Vila Franca de Xira	Living Lab: Alverca do Ribatejo	Source
Number of trips on a workday	935,253 (trips/day by municipality of residence)	262,914 (trips/day by municipality of residence)	N.A.	Mobility Survey in the Metropolitan Areas of Porto and Lisbon - 2017
% of trips within the municipality	63.4	74.9	N.A.	Mobility Survey in the Metropolitan Areas of Porto and Lisbon - 2017
% of trips with origin or destination in another municipality	45.9	14.7	N.A.	Mobility Survey in the Metropolitan Areas of Porto and Lisbon - 2017
Average travel times (minutes)	25.9	23.5	N.A.	Mobility Survey in the Metropolitan Areas of Porto and Lisbon - 2017

Lisbon's main **mobility challenges** include managing **traffic congestion**, promoting **active mobility** and maintaining the **quality of infrastructure**. Vila Franca de Xira needs to **reduce car dependency**, **improve public transport connections** and **develop active mobility infrastructure** to improve sustainable mobility.

3.3.5. Governance and Policy framework

Governance structure and competences

In Portugal, the governance of urban planning and transport is distributed across national, regional, and local levels.

The **Ministry of Environment and Climate Action** is responsible for policies and regulations related to **mobility, transport infrastructure, environmental protection and climate change mitigation**, from a perspective of sustainable development and social and territorial cohesion. The **Ministry of Infrastructure and Housing** is responsible for **urban development and housing policies**. Amongst other things, its scope includes regulating, supervising and **planning the mobility, land and maritime transport sectors at national level**.

The **Lisbon Metropolitan Area (AML)** is responsible for coordinating cooperation between municipalities, planning the use of space, integrating public transport, and planning how people will move around. The AML is also responsible for managing big projects and investments in the area, as well as making sure that public transport works well together (Área Metropolitana de Lisboa [AML], n.d.).

The **Lisbon Municipality (CML)** is responsible for urban planning, land use, local mobility initiatives, and transport infrastructure within the city boundaries. The local bus and tram company is Carris. Lisbon Mobility and Parking company (EMEL) oversees parking, mobility hubs, and cycling infrastructure.

In **Vila Franca de Xira**, the **municipal government** is responsible for local urban planning, zoning, infrastructure development, and mobility improvements. Collaborations are maintained with AML on inter-municipal connectivity, integrated transport systems, and environmental sustainability initiatives.

Public participation processes in Lisbon are well-established. These include **participatory budgeting, community consultations, and digital engagement platforms** like "Lisboa Participa." Vila Franca de Xira uses more local methods, like **community meetings, parish councils, and surveys**, to directly involve residents in planning and decision-making about mobility.

Table 13- Policy level and relevant actors for mobility and urban planning

Policy level		Core City: Lisbon	Vila Franca de Xira - Living Lab: Alverca do Ribatejo
Mobility	National	Ministry of Environment and Climate Action Ministry of Infrastructure and Housing	Ministry of Environment and Climate Action Ministry of Infrastructure and Housing
	Regional	Lisbon Metropolitan Area	Lisbon Metropolitan Area
	Local	Lisbon City Council	Vila Franca de Xira City Council
Urban planning	National	Ministry of Infrastructure and Housing	Ministry of Infrastructure and Housing
	Regional	Lisbon Metropolitan Area	Lisbon Metropolitan Area
	Local	Lisbon City Council	Vila Franca de Xira City Council

Mobility policy: SUMP & aligned strategies

As of early 2025, the **Lisbon Metropolitan Area (AML)** is in the process of developing a **new Metropolitan Sustainable Urban Mobility Plan (PMMUS)**, which was initiated in 2024 (Urban Mobility Observatory, 2024). The objective of this plan is to identify needs and propose measures to enhance mobility across Lisbon and its 18 municipalities, promoting sustainable, safe, and efficient transportation for both citizens and goods. The formulation of this plan commenced in December 2023 and is anticipated to be concluded within a 20-month timeframe.

Concurrently, **Lisbon** has been implementing various sustainable mobility initiatives. These include the **expansion of cycling infrastructure, the introduction and expansion of bike-sharing programs, and investments in public transportation infrastructure and services**. These endeavours are in alignment with Portugal's overarching objectives of reducing carbon emissions and fostering sustainable urban mobility.

In this sense, Lisbon presented the 24-25 Action Plan for Cycle Networks in May 2024. The plan aims to **increase the cycling network by 50 per cent**, expanding its current 173km length to 263km by 2025 (Lisbon City Council, 2024a). In addition, the plan also includes an increase in the number of stations and bike-sharing, with **more than 40 new stations and more than 400 new bicycles** (Lisbon City Council, 2024a).

In summary, while the comprehensive metropolitan Sustainable Urban Mobility Plan (SUMP) is in development, Lisbon continues to pursue sustainable mobility strategies through targeted initiatives and projects.

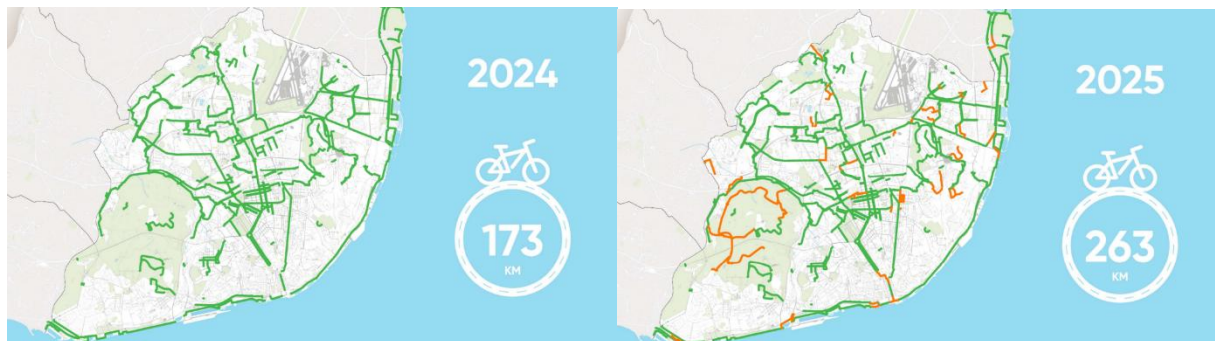


Figure 53 - Lisbon 24-25 Action Plan for Cycle Networks.

Source: Lisbon City Council, 2024a

The Strategic Accessibility, Mobility, and Public Transport Plan for **Vila Franca de Xira**, developed in 2022 as part of the revision of the Municipal Master Plan, sets out key guidelines for a comprehensive mobility strategy. Its goal is to prepare the municipality for future transport challenges through integrated proposals covering **soft mobility, public transport, interfaces, individual transport, and parking** (Vila Franca de Xira City Council, 2022).

The plan prioritizes **improving local bus services**, and **enhancing walking and cycling infrastructure, particularly around train stations**. By reducing car dependency and making public transport more accessible and reliable, the municipality aims to promote a more efficient and sustainable urban mobility system.

With a vision of transforming Vila Franca de Xira into a more accessible and environmentally friendly territory, the document outlines strategic measures to support this transition, including:

- Reorganising the road network by (i) reclassifying roads to optimise urban traffic and reduce congestion and (ii) improving connectivity between urban centres;
- Encourage active mobility by (i) expanding the cycling network with new safe and interconnected cycle paths, (ii) improving the pedestrian infrastructure, ensuring accessibility and safety and (iii) integrating modes of transport, encouraging intermodality;
- Encourage the use of public transport by (i) expanding supply and (ii) improving accessibility to transit interchanged;
- Manage parking to balance supply and demand by (i) redeveloping and reorganising parking supply, (ii) creating parking spaces for bicycles and electric vehicles, and (iii) adopting policies that discourage the excessive use of private cars.

Urban planning framework

The **Municipal Master Plan** (Plano Diretor Municipal - PDM) of Lisbon, revised in 2022, outlines a strategic approach with a focus on urban sustainability, resilience, and socio-economic development. The overarching objectives of the plan include the **creation of a compact urban structure, the improvement of mixed-use and transit-oriented developments, and the enhancement of quality public spaces**. The strategic projects under this framework include:

- The revitalization of historical city centres is to be achieved through urban regeneration initiatives, with a focus on preserving cultural heritage while modernizing infrastructure.
- The development of transit-oriented districts around key transport nodes, such as Sete Rios, Oriente Station, and Entrecampos, aims to promote high-density, mixed-use neighbourhoods.
- The expansion and enhancement of green and blue infrastructure is also a key objective, with riverside parks and green corridors being a particular focus, aiming to connect urban parks to natural landscapes.
- Finally, climate resilience measures are to be implemented, focusing on flood risk mitigation, urban heat island effects, and adaptation infrastructure.

Also important in the city's urban planning structure is the “Uma Praça em cada Bairro – intervenções em espaço público” (A Square in Every Neighbourhood - interventions in public spaces) Programme. Presented in 2014 and still in force, it aims to upgrade urban micro centralities to strengthen community life and stimulate the installation of local shops and collective equipment, promoting public spaces of quality. Starting from an existing or planned square, street, shopping area or public facility, the programme prioritises soft modes of transport and organises meeting points for the local community.

Duque de Saldanha Square



Campolide Square



Figure 54 - Comparison between before (left) and after (right) in two examples from A Square in Every Neighbourhood Programme

Source: Google Street View, 2024

The **Municipal Master Plan of Vila Franca de Xira**, which was revised and subsequently approved in 2024, places significant **emphasis on sustainable territorial management**, seeking a **balance between urban growth and environmental preservation**. The document's primary objectives are as follows:

- The promotion of compact urban growth around major transport hubs, particularly in the vicinity of Alverca and Vila Franca de Xira train stations.
- The plan also seeks to protect and integrate natural landscapes, such as the Tagus Estuary Nature Reserve, into urban development plans, with a view to fostering biodiversity and recreational spaces.
- The enhancement of local infrastructure in rapidly developing residential areas through public amenities, social services, and improved mobility connections is also a key objective.
- Regeneration projects targeting older urban areas and industrial zones are intended to boost local economic development, improve housing quality, and create vibrant public spaces.
- Finally, sustainable construction practices and energy efficiency standards must be encouraged for new developments and renovation projects.

3.3.6. Key challenges and conclusions

In conclusion, the Portuguese case study consists of a **core city, Lisbon**, and a **municipality within the Lisbon Metropolitan Area, Vila Franca de Xira**. Within Vila Franca de Xira this work **focus on the Union of Parishes of Alverca do Ribatejo and Sobralinho**.

Both Lisbon and Vila Franca de Xira share several characteristics, some due to their proximity (e.g., elevation, climate). Their demographic profiles are also **similar** in terms of **age** and **gender distribution**. However, they exhibit significant differences, particularly in relation to the project's objectives.

Lisbon's status as both a **compact** and **polycentric urban hub** provides **an advanced transport system and planning framework**, supporting a **variety of mobility options** and a **relatively high rate of non-motorised transport use**. The city's commitment to sustainable mobility strategies is evident through initiatives such as the expansion of cycling infrastructure, the incorporation of mobility platforms, and ambitious plans for low-carbon transport. Although, Lisbon benefits from a **well-connected and complex public transport system** that enables users to move around in a more sustainable way, the city remains confronted with considerable challenges, including **ongoing traffic congestion**, the **necessity for enhanced continuity within its cycling infrastructure**, and the **persistent socio-spatial inequalities**, notably concerning **housing affordability** and **access to services in peripheral regions**.

By way of contrast, **Vila Franca de Xira** is a municipality that benefits from its **proximity to the capital and access to regional transport infrastructure**. Even though it experiences **lower levels of inequality** when compared to Lisbon, it struggles with the **internal fragmentation of its urban fabric**. The town's **population is growing**, **households seeking affordable housing**, which places **pressure on local services, public transport systems, and mobility infrastructure**. The municipality's **lower population density, spatial constraints imposed by major infrastructures and terrain characteristics**, and the prevalence of **car-oriented development** have contributed to **high levels of car use and reduced public transport utilisation**. Despite the municipality's commitment to enhancing active mobility and public transport accessibility, particularly

through its Strategic Accessibility, Mobility and Public Transport Plan, the implementation of these initiatives remains uneven across its urban settlements, creating **insufficient pedestrian and cycling infrastructure**, as reflected in its modal split, which predominantly favours the use of private car.

The dynamics of governance and policy frameworks are further shaped by a range of factors. Lisbon benefits from stronger institutional capacity, due to a larger staff, and more solid mechanisms for public participation, including digital platforms and participatory budgeting. Conversely, **Vila Franca de Xira** relies on **more conventional forms of engagement** and is constrained by **limited human and financial resources** to support ambitious transformation agendas. Despite these challenges, both municipalities demonstrate a strong **political commitment to the principles of sustainable urban development** and play an active role in regional cooperation initiatives within the framework of the Lisbon Metropolitan Area.

3.4 Kertváròs

3.4.1. Introducing the Core City and the Living Lab

The Hungarian case study in FORTHCOMING is made up of **Debrecen as the core city** and the **Debrecen-Kertváros area as the Living Lab** within the area of Debrecen.

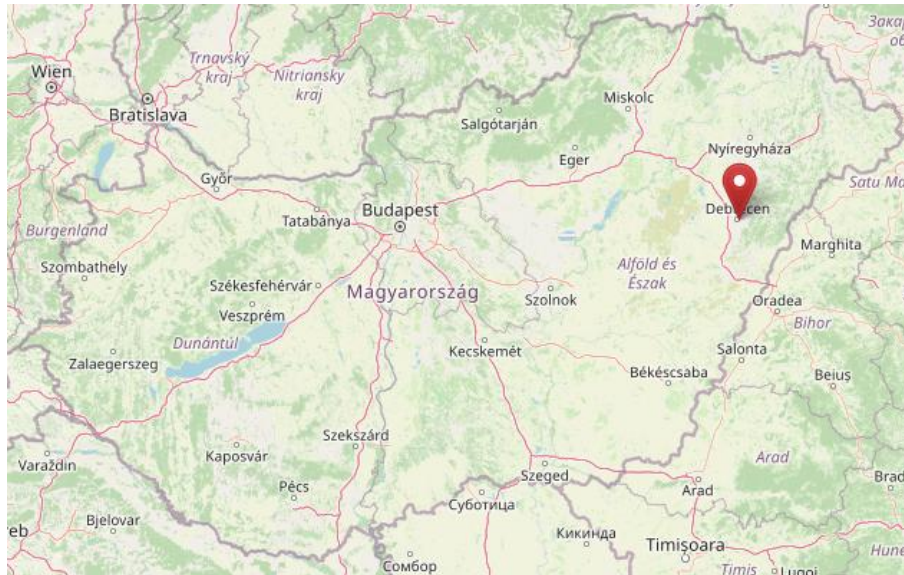


Figure 55 – Debrecen's location in Hungary

Source: osm.org

Debrecen is located in **eastern Hungary** and is the **second-largest city** in the country following Budapest, with approximately **202,000 inhabitants** and 436 inhabitants per square kilometre population density. It serves as the Northern Great Plain region's regional centre and is Hajdú-Bihar County's seat. Debrecen plays a crucial regional role not only concerning the dozen or so settlements of the agglomeration but also due to the commuting traffic of the settlement, which comes from a much larger region, approximately 850,000 people.



Figure 56 – Panoramic view of Debrecen

Known as the "Calvinist Rome", Debrecen has a deep religious and cultural history. It is famous for its Great Church (Nagytemplom), a symbol of the city and a significant landmark. The city is an educational hub, hosting the **University of Debrecen**, one of Hungary's oldest and most prestigious universities. This institution attracts students worldwide – it is one of the universities with the highest number of international students in Hungary – contributing to the city's youthful and dynamic atmosphere and has a significant external traffic-attracting effect.

Regarding tourism, with continuous development aimed at an annual passenger traffic of one million people, Debrecen's **international airport** is essential. Debrecen offers a variety of attractions for visitors, including Hortobágy National Park, a UNESCO World Heritage site known for its stunning landscapes and unique wildlife, the Great Church (Nagytemplom) mentioned above, and Specialty Museums showcasing local art, history, and culture.



Figure 57 – Some landmarks of Debrecen and its region: Great Church, University of Debrecen, Nine-holed bridge of Hortobágy, Small Church

The city has a diverse economy, with key industries including **automotive manufacturing, electronics, pharmaceuticals** and **logistics**. Major companies like automaker **BMW** and battery manufacturer **CATL** are establishing operations here (manufacturing is planned to begin in 2025), enhancing the city's economic landscape. The establishment of industrial parks further supports this development.

Debrecen **faces several urban challenges**, including housing affordability – which is affected by (among others) the new industrial sites – and traffic congestion. These – among others, like strengthening the economy and improving public services and environment – are addressed in the strategic goals of the recent study of the Sustainable Urban Development Strategy of Debrecen for 2021-2027.

In FORTHCOMING, the **Kertváros** part of Debrecen is defined as a **detailed section of the LL**, which will be used as a testing ground and specific case study. It **surrounds the historic centre** and functions mainly as a **residential area**, with a population of approximately **70,000 inhabitants**.

3.4.2. Demographic and socioeconomic characteristics

Debrecen, one of the largest cities in Hungary with **201 582 inhabitants**, is a major urban centre in the region. **Kertváros**, on the other hand, is a smaller but vibrant green belt, a suburban community of around **70,000 inhabitants**, which is part of the Integrated Urban Development Strategy. Many demographic data

are also only available for urban level, with **13.2% of the population of Debrecen and Kertváros aged 0-14 years, indicating a youthful demographic composition**. Meanwhile, **66.6%** of the population falls within the 15-64 age group, which represents the **working-age group** that drives the local economy. In addition, **20.2% of residents are 65 years of age or older**. The sex ratio is also on city level data source, as 89.68 men per 100 women in both locations. Furthermore, the median age is the same in Debrecen and Kertváros, both 38.8 years.

There is no disaggregated data available when looking at the **foreign-born population** either, with international residents accounting for 7.34% of the total population in both municipalities, but it is assumed that this is a **lower proportion in Kertváros**, given the significant foreign student community that presumably resides in non-family housing zones.

Only national-level data is available to illustrate the economic context, illustrated by the median disposable income of \$32,978.33 calculated at purchasing power parity (PPP), as OECD Data Explorer states. In addition, the Gini coefficient of 29.2% is also a national value by the World Population Review, indicating a moderate level of social inequality within the country.

In terms of industry, Debrecen's economy is sustained primarily by agriculture and the automotive industry is complemented by a strong university presence. Agriculture is the traditional one, while automotive industry is recent development. In contrast, the economic activities of Kertváros are predominantly concentrated in retail trade, serving the local population and the surrounding areas. Debrecen and Kertváros both have unemployment rates of 5%, according to city-level data sources.

Table 14 - Demographic and socioeconomic indicators in Debrecen and Kertváros

	Core City: Debrecen	Living Lab: Kertváros	Source
Total Population (inhabitants)	201 582	70 000	OECD Local Profile Database, Debrecen, Integrated Urban Development Strategy
Median Age (years)	38.8	38.8	Check availability in your case study
Age Distribution (%) 0-14, 15-64, 65+	13.2%, 66.6%, 20.2%	13.2%, 66.6%, 20.2%	OECD Local Profile Database
Sex ratio (males per 100 females)	89.68	89.68	OECD Local Profile Database
Foreign Born Population (%)	7.34 %	7.34 %	OECD Local Profile Database
Median Disposable Income PPP (USD)	32 978.33	32 978.33	OECD Data Explorer
Social Inequality – Gini Coefficient	29,2%	29,2%	World Population Review
Dominant industries	Agriculture, Automotive	Retail	Check availability in your case study

	Core City: Debrecen	Living Lab: Kertváros	Source
Unemployment rate (%)	5%	5%	Hungarian Statistical Office

3.4.3. Urban Planning and Land Use

According to the OECD Local Profile Database (OECD 2022), Debrecen's **population** is **201,582**. The **population density** is **436** inhabitants per square kilometre, which is moderate for a similarly populated city. The reason is that Debrecen covers an administrative area of approximately 460 square kilometres, containing vast uninhabited lands around the core areas. Despite its lowland metropolitan character, this results in a high territorial share of forests at approximately 30%, with an additional 25% semi-natural areas – **56.4% overall rate for green area** –, providing a liveable and healthier urban climate and recreational opportunities. **Croplands** also have a **1/3 share** of land use. This substantial area assures space for extensive infrastructure. Debrecen's economic situation is strengthened by expanding industrial parks, covering more than 1,800 hectares of economic territory. Built-up areas cover 9.4% of the city; other land types have a lower share than 1%.

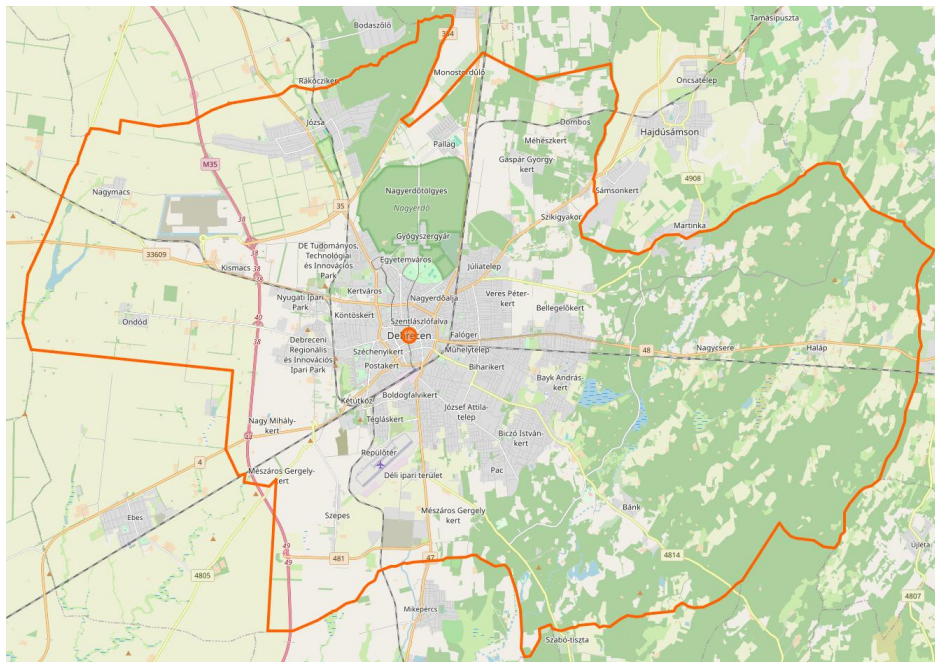


Figure 58 – Administrative area of Debrecen.

Source: osm.org

Around the historic centre of Debrecen, mainly residential areas – including Kertváros – are located, except for the northern part, where the green spaces of the Great Forest (“Nagyerdő”) can be found. Most industrial areas – including the new factories of BMW and CATL under construction – are on the peripheries, more than 5 km far from the centre.

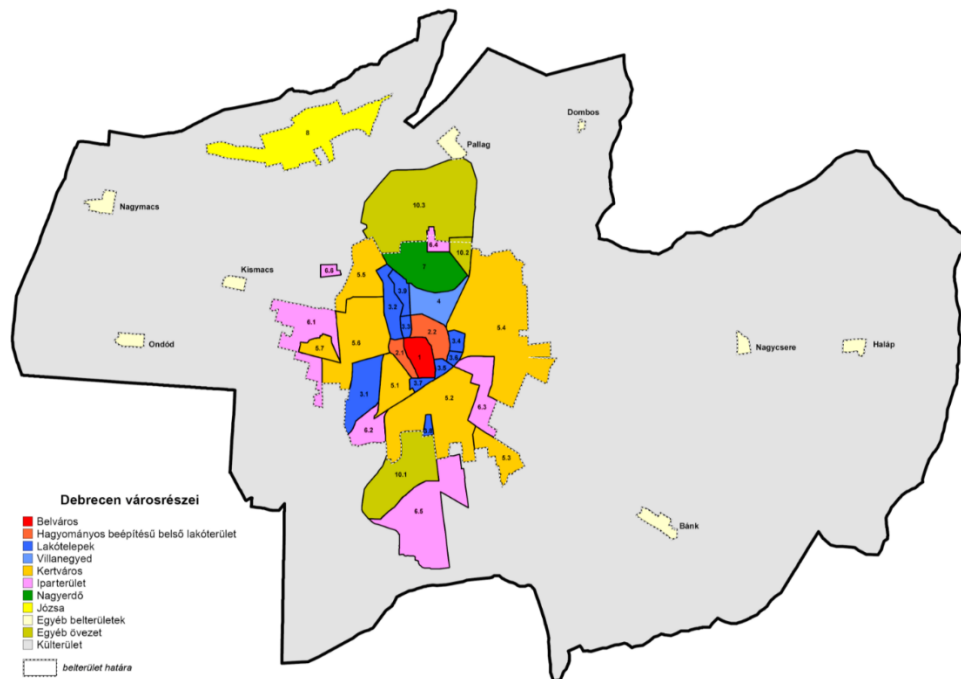


Figure 59 – Parts of Debrecen (Kertváros is marked with sunflower yellow)

Kertváros has a **population** of approximately **70,000**, with a population density of **2539 inhabitants per square kilometre**. The reason for the higher value than the core city is that the area of Kertváros only consists of populated parts. Therefore, its area is much more limited than the whole city, only 27.57 km². Kertváros's land use is mainly dominated by **single-family housing areas**, but some large **housing estates** with up to 11-storey buildings are also located in the area.

As Kertváros is a part of Debrecen City, its specific values are unavailable in the OECD Local Profile Database, so these measures can be estimated as Debrecen's values.

Debrecen's **built-up surface area** is **99.2 m² per capita**. Regarding **green space**, the city boasts an impressive **1,302 m² per capita**. This ample availability of greenery is vital for enhancing the quality of life for residents, as it provides natural areas for recreation and relaxation, supports biodiversity, and contributes to urban cooling. However, as mentioned above, the majority of these green spaces are located **on the peripheries** of the city, further from residential areas.

While Debrecen offers various services, residents have an average distance of **1,411 meters to the nearest pharmacy**, indicating that access to essential healthcare services is relatively accessible but may still require a short walk or drive. (The same measure for schools is unfortunately not available.)

Environmental health is another critical aspect when evaluating urban living conditions, and in Debrecen, the average population exposure to nitrogen dioxide (**NO₂**) is measured at **3.4 micrograms per cubic meter**. This low level of NO₂ suggests that air quality in Debrecen is relatively good (66,5% below the WHO guideline), potentially contributing to lower respiratory issues among the population. Furthermore, residents experience an average exposure to fine particulate matter (**PM_{2.5}**) of **10.5 µg/m³** and coarse particulate matter (**PM₁₀**) of **15.9 µg/m³**. These measurements indicate that while Debrecen does face

some challenges related to air pollution (PM_{2.5} is about double the WHO guideline, PM₁₀ is only 6.2% higher), the levels are within a range that suggests efforts in air quality management may be effective. Overall, the city appears to promote a healthy living environment through its green spaces and relatively low air pollution levels, but it needs further improvements.



Figure 60 – Satellite views of (a) Debrecen historic centre and (b) typical area of Kertváros
Source: Google

Table 15 – Land Use and environmental indicators in Debrecen and Kertváros

	Core City: Debrecen	Living Lab: Kertváros	Source
Area (km ²)	461.2	27.57	OECD Local Profile Database
Population Density (persons/km ²)	436	2539	OECD Local Profile Database
Land Cover Distribution (%)	Forest or semi-natural: 56.4% Cropland: 33.7% Built up: 9.4% Wetland: 0.4% Water: 0.2%	Forest or semi-natural: 56.4% Cropland: 33.7% Built up: 9.4% Wetland: 0.4% Water: 0.2%	OECD Local Profile Database
Built-up surface (m ² /PPP)	99.2	99.2	OECD Local Profile Database
Green space (m ² PPP)	1302	1302	OECD Local Profile Database
Average distance to the closest school (m)			OECD Local Profile Database
Average distance to the closest pharmacy (m)	1411	1411	OECD Local Profile Database
Average population exposure to NO ₂ (µg/m ³)	3.4	3.4	OECD Local Profile Database
Average exposure to fine particulate matters (PM _{2.5})	10.5	10.5	OECD Local Profile Database
Average exposure to coarse particulate matter (PM ₁₀)	15.9	15.9	OECD Local Profile Database

3.4.4. Transport and mobility

According to Debrecen's 2023 Sustainable Development Strategy, the total number of daily trips is 643,000 on a workday basis. 80.6% of these take place within the city borders; the other 19.4% have an origin or destination in another municipality. For Kertváros, the number of daily trips can be estimated as 224,000. (As Kertváros is not a separate municipality, trips crossing its boundaries cannot be differentiated.)

Debrecen has shown dynamic growth of private car traffic in recent years, with the number of vehicles per thousand inhabitants reaching 419.5 in 2022 (OECD 2022), signifying an increase of 75 cars per thousand inhabitants in five years. This trend is expected to continue, with the anticipation of one passenger vehicle for every second resident. This resulted in an overall modal split share of 36% for private cars (Sustainable Development Strategy 2023). Regarding Kertváros, motorization rate can be estimated as 356 vehicles per thousand capita.

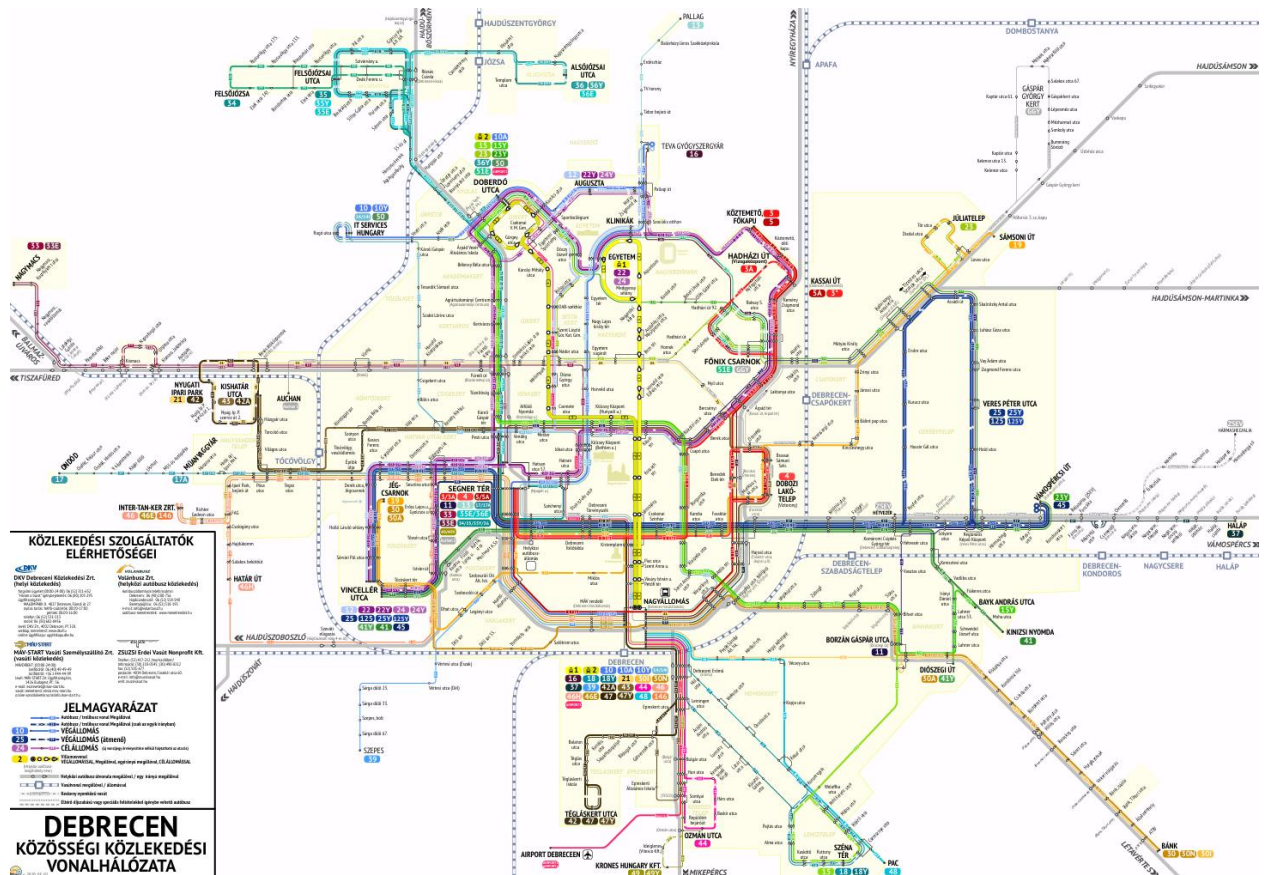


Figure 61 – Public transport network of Debrecen.

Source: DKV

The operator of the **local public transport** is Debrecen Transport Ltd. (DKV). The most important elements of the system are the **two tram routes**, which form a Y-shaped network of 19.2 km total length, with a common terminus at the main railway station. Additionally, there are **three trolleybus** and approximately **40 bus routes** (excluding partial services). Many local routes' termini are organized into four major transport hubs. A **demand-responsible service** was operating on a short section of bus route 46, but it affected only a few departures and **doesn't exist** anymore.

For local trips, **public transport** has a share of 35%, which is very close to the **overall modal split share** of **36%**. The share of **walking and cycling** can be estimated as 27%, while other modes cover less than 1%.

Regional public transport is operated by MÁV Passenger Transport Company Ltd, a subsidiary of Hungarian State Railways Company (MÁV). **Railways** have a share of 10% of suburban transport trips (Sustainable Development Strategy 2023). Efforts to increase the role of the railway in the development of suburban transport are underway. However, the railway currently cannot take advantage of its full potential due to the limited number of stops within the city. **Regional buses** are the determining mode of suburban public transport (30% of trips crossing the city's borders), connecting the city area with the agglomeration. The remaining **60% of suburban trips are covered by private cars**.



Figure 62 – Public transport in Debrecen: Urban bus, tram, regional train and trolleybus.

Source: various

Although most parts of Debrecen historic centre have parking control on public spaces, currently there is **no Park & Ride scheme implemented** within the city; only plans for such a service are under consideration for the next years. The main reason behind this is presumably the city size: attractive public transport services cover a relatively small part of Debrecen; therefore, they can gain only a short time compared to cars. However, this service would have a much greater perspective in the agglomeration.

Local public transport has a unified fare system, and suburban modes also have combined passes, but a **PT card that covers both local and regional services doesn't exist**. On the other hand, **all PT providers offer digital passes** (regional providers also have digital tickets); in most cases, they also have a 4-5% discount. For example, a paper-based single journey ticket for local transport is 500 HUF (approx. 1.25 €), while the digital one is 480 HUF (1.2 €); for monthly passes, the discount rate is similar: 9600 HUF (24 €) vs. 9200 HUF (23 €). (On the other hand, local daily passes have the same price, 1700 HUF or 4.25 €.) Regional prices are distance-based (the price of a 20-km travel, for example, is 500 HUF or 1.25 €) and also have a 5% discount for digital tickets. County passes cost 999 HUF (2.5 €) for 24 hours and 9450 HUF (23.5 €) for a month, but they do not have a digital discount.

Debrecen's **cycling infrastructure** has seen significant development in recent years, with nearly 80 km of bicycle lanes available in 2020, expanding to **108 km** by the beginning of 2023 due to ongoing developments (SUMP 2024), **21.6 km** of which takes place in **Kertváros**. The popularity of cycling has steadily increased in recent years. In Debrecen, considerable attention is paid to pedestrian safety, with traffic calming measures in several areas, along with the designation of residential and recreational zones and 30 km/h zones.

Public shared mobility systems currently **do not operate** in the city, but the University of Debrecen has a bike-sharing system for academic citizens, with 8 stations and 90 bicycles (University of Debrecen, Unibike).

A recent (February 2023) survey supporting the SUMP found that 19% of Debrecen residents and 14% of commuters from the agglomeration have less than 15 minutes **daily travel time**, while the overall **average** is **45 minutes**.

Table 16 - Mobility indicators in Debrecen and Kertváros

	Core City: Debrecen	Living Lab: Kertváros	Source
Cycling infrastructure (km)	108	21.6	Sustainable Urban Mobility Plan 2024
Park & Ride scheme (yes/no)	No (only planned)	No (only planned)	
Demand responsive transport offer (yes/no)	No	No	
Public transport offer	Tram Trolleybus Urban bus Railway Regional bus	Trolleybus Urban bus Railway Regional bus	
Shared mobility modes available & Ride-hailing	No (The university has a bike-sharing system, but only for academic citizens)	No	University of Debrecen – Unibike
Availability of PT card that combines all PT modes (Yes/No)	No	No	
Digitalized PT card (Yes/No)	Yes	Yes	Debrecen Transport Ltd.
Modal split (%)	36% Car 36% PT 28% Walking & cycling 1% other	36% Car 36% PT 28% Walking & cycling 1% other	Sustainable City Development Strategy 2023
Motorization rate (nº of vehicles per 1000 people)	419.5	356	OECD Local Profile Database
Number of trips on a workday	643,000	224,000	Sustainable City Development Strategy 2023
% of trips within the municipality	80.6	-	Sustainable City Development Strategy 2023

	Core City: Debrecen	Living Lab: Kertváros	Source
% of trips with origin or destination in another municipality	19.4	-	Sustainable City Development Strategy 2023
Average travel times (minutes)	45	45	Sustainable Urban Mobility Plan 2024

3.4.5. Governance and Policy framework

Governance structure and competences

Debrecen and Kertváros have the same governance and policy framework. **The Ministry of Construction and Transport (ÉKM)** plays a pivotal role in responsible **mobility planning, encompassing not only strategic and policy aspects of mobility but also at all levels: national, regional, and local**. At the operational level, the Ministry of Construction and Transport (ÉKM) **orders services from Hungarian Railways (MÁV), both rail and bus public services**. Due to this, Hungarian Railways (MÁV) also strongly influences mobility policy and strategy.

Even though travel passes are valid for interurban journeys within a county, the county level in Hungary is not considered particularly significant regarding mobility services policies. It is important to note that considerable infrastructure developments, which are crucial for enhancing connectivity and transportation efficiency, are also overseen by the Ministry of Construction and Transport at all governance levels.

On a more localized scale, the **City of Debrecen organizes mobility, with the operational responsibilities lying with DKV Debrecen Transport Ltd.** This local management ensures that the transportation needs of residents are effectively met. Urban planning in the region is significantly shaped by the policies set forth by the Ministry of Construction and Transport, which serves as the sole responsible entity at the national level. Hajdú-Bihar County has some words but limited influence on urban planning. However, the Debrecen City Municipality emerges as the primary stakeholder at the local level, playing a crucial role in addressing the specific needs and preferences of the community while aligning with broader local objectives.

Table 17 - Mobility indicators in Debrecen and Kertváros

Policy level		Core City: Debrecen	Living Lab: Kertváros
Mobility	National	Ministry of Construction and Transport	Ministry of Construction and Transport
	Regional	Ministry of Construction and Transport	Ministry of Construction and Transport
	Local	Ministry of Construction and Transport, City of Debrecen, DKV Debrecen Transport Ltd.	Ministry of Construction and Transport, City of Debrecen, DKV Debrecen Transport Ltd.

Policy level		Core City: Debrecen	Living Lab: Kertváros
Urban planning	National	Ministry of Construction and Transport	Ministry of Construction and Transport
	Regional	Ministry of Construction and Transport, Hajdú-Bihar County	Ministry of Construction and Transport, Hajdú-Bihar County
	Local	Ministry of Construction and Transport, City of Debrecen	Ministry of Construction and Transport, City of Debrecen

In both locations, **advanced participation schemes**, such as a community budget, **are missing**, and there is **no institutionalised form of co-creation for development**. Public participation takes the form mainly of **information forums, public hearings, and partnership consultations**. Although these provide an opportunity to express opinions, direct public involvement in decision-making is limited.

Mobility policy: SUMP & aligned strategies

Among the **goals of the Debrecen SUMP in 2024 is the 15-minute city concept**, which aims to transform urban planning to reduce the travel time for services such as shopping. According to a recent survey (February 2023) supporting the SUMP, 19% of Debrecen residents and 14% of commuters from the agglomeration have a **daily travel time** of less than 15 minutes, compared to an **overall average of 45 minutes per day**.

A proposed project takes into account the **uneven distribution of services and residential areas in the city**. Currently, most **jobs and services are located in West Debrecen**, while the eastern part of the city is mainly residential. New housing developments and residential reconstruction and revitalization projects should be designed to support 15-minute access to the city. This would allow residents to carry out their daily activities and shopping close to their homes, thus reducing a significant proportion of evening rush hour traffic on public roads.

However, **the Urban Development Strategy does not mention the 15-minute city principle**. Instead, the "principle of small distances" is used. Both **aim at creating a compact urban structure to manage resources efficiently and to fight urban sprawl**. The **development of urban sub-centres** and the **promotion of mixed land use** can help to implement the principle of small distances, reducing the need for motorized transport and mitigating environmental impacts.

The development of urban de-concentrations and related services can create appropriate building intensity and mixed land use, which will help to achieve the "small distances principle", i.e. where places of daily life are close together, there is no need for motorized transport to reach them. There is also **a scope to promote cycling and walking**, which will improve congestion and reduce environmental pollution.

The concept of 15-minute cities is explicitly mentioned in the SUMP, while other documents refer to the "compact city" and the "principle of small distances". However, **none of these documents contain specific implementation guidelines**. The term "15-minute city" only appears in recent policy documents, not before 2020. There is currently **no active expert discussion on how this concept could be applied to the city of Debrecen**, but there are indications of this in the strategic objectives. According to the SUMP, Debrecen's **mobility development goals are based on four main areas: digitalisation, development of public transport, modernisation of infrastructure and strengthening non-motorised transport**. In addition to introducing

digital and smart solutions, an important objective is to increase the use of public transport and reduce journey times. Attention will also be paid to improving conditions for cycling and walking. These objectives are covered by 23 complex actions, which can be further broken down into specific projects and project proposals.

Urban planning framework

Debrecen's Sustainable Urban Development Strategy has recently been finalized and has identified a number of key strategic objectives aimed at improving the city's overall infrastructure and community well-being. One of the **primary objectives is to improve transport conditions within and across the city boundaries and to improve accessibility to the city**. There is also an **emphasis on strengthening the local economy by creating an internationally competitive environment that supports entrepreneurship**. In order to adapt to the demands of the modern economy, the strategy emphasizes the **need for improvements in education and research to ensure that the city develops a skilled workforce** ready for the challenges of the future.

Another critical aspect of the strategy is the development of **an efficient urban fabric** that prioritizes the **preservation of the built heritage** while adapting to contemporary needs. The plan aims **to create a healthy and green urban environment** supported by **effective urban management practices**. It also seeks to improve the quality of services, including education, health, social support and cultural offerings. Finally, ensuring access to **affordable housing** is a vital objective, aimed at promoting a diverse and inclusive community that can thrive in a sustainable urban environment.

Strategic goals are defined as follows:

- S1. Improving the city's external and internal traffic conditions and accessibility
- S2. Strengthening an internationally competitive economy, entrepreneurial environment development
- S3. Creating a service environment that adapts to the needs of the modern economy requires education, higher education, and research in development.
- S4. Creating an efficient urban structure that preserves the built heritage.
- S5. Healthy, green, value-preserving urban environment and city management
- S6. Improving the quality of educational, health, social and cultural services
- S7. Providing affordable housing

3.4.6. Key challenges and conclusions

More challenges are present in **Kertváros**. The **low population density** would lead to **long walking distances** to mobility hubs, and there are **gaps in the road network**: road infrastructure is mainly developed towards the city centre. The **lack of sub-centres** is also a challenge. The **growing population in suburban areas** is also a problem, making inadequate traffic management, increasing traffic conflicts and uneconomic operation of transport services a growing challenge.

A **lack of decentralization** is also identified, with many services available only in Debrecen and not in Kertváros, and the same is true for employment opportunities. At the same time, if they change their function, suburban areas can be counterproductive, as residents have moved there to avoid such

conditions. If significant decentralization were to occur, there would be a risk of segregation if residents could meet all their needs locally. **Lack of facilities supporting last mile mobility** is also a challenge.

In Kertvaros, elements of the 15-minute city concept have already been implemented, as the entire city of Debrecen can be reached by bike in just 15 minutes. However, the comfort of micromobility options can be improved, and there is significant potential for enhancement in walking, public transport, and a combination of both.

3.5 Küçükçekmece

3.5.1. Introducing the Core City and the Living Lab

In alignment with the FORTHCOMING project concept, **Istanbul** has been designated as **the core city**, where the **Küçükçekmece district** is identified as the primary area for hosting the **Urban Living Laboratory (ULL)**. Istanbul is **the most populated and developed city** of Türkiye. It consists of **39 districts** and covers an area of **5,712 km²**, housing approximately **15.6 million people**. The city has a coastline that stretches for **657 kilometers**. Istanbul is uniquely situated on two continents, **Asia and Europe**, and is connected by three bridges and one underwater tunnel that link the two continents. Additionally, Istanbul is bordered by the **Black Sea** to the north and the **Sea of Marmara** to the south. The city includes **nine islands**, all located in the Sea of Marmara. Istanbul has approximately **2.5 million decares of forest area**, accounting for 44% of the total area. Regarding the climate, Istanbul has a transitional climate influenced by the Black Sea and the Mediterranean, ranking high in precipitation within the Marmara Region. Temperatures range from -11 degrees Celsius to +40 degrees Celsius, with an average relative humidity of around 75% (Governorship of Istanbul, n.d.). The satellite view of Istanbul is illustrated in the Figure 63.



Figure 63. The general view of Istanbul.

Istanbul, with origins dating back 8,500 years, was founded as Byzantium by the Greeks around 700 BC and later became Constantinople, the capital of the Roman Empires. After being conquered by the Ottoman Empire in 1453, it was named "İstanbul." Today, Istanbul is Türkiye's largest city, located along the Bosphorus Strait, connecting Asia and Europe. Its rich cultural identity is reflected in its skyline and key sites, including the Ayasofya Mosque, Topkapı Palace, and the Grand Bazaar (Istanbul Directorate of Culture and Tourism, n.d.). In 2024, Istanbul welcomed over **18 million tourists**, reflecting a 6.98% increase compared to the previous year (Istanbul Directorate of Culture and Tourism, 2024).

Istanbul is one of the **most important economic centers in the world**, making it a vital hub for the economy of Türkiye. As of 2019, Istanbul's gross domestic product (GDP) was **\$232 billion**, accounting for 31% of

Türkiye's overall economy. Therefore, Istanbul consistently plays a significant role in the country's economic landscape. In 2019, the most significant sector in the economy was the **services sector**. Notably, 58% of the financial and underwriting services and 65% of the information and communication services were based in Istanbul. Additionally, there are substantial industrial areas in Istanbul; however, the contribution of the industrial sector has decreased compared to 2004. In contrast, only 0.5% of agriculture services throughout Türkiye were conducted in Istanbul (Istanbul Planning Agency, 2021). In the Figure 64, some photos from Istanbul are presented.



a) Galata Tower



b) Ayasofya and Sultan Ahmet Mosques



c) 15 July Martyrs Bridge (Bosphorus) Bridge



d) Taksim Square

Figure 64 - Istanbul.

Istanbul **faces several challenges** related to climate change, urban sprawl, traffic congestion, and housing affordability. According to the Intergovernmental Panel on Climate Change (IPCC), Istanbul is located in a region highly vulnerable to climate change. The IPCC's Fifth Assessment Report indicates that temperatures across Türkiye are expected to rise between 2016 and 2100. In response, the Istanbul Metropolitan Municipality (IMM) **has conducted studies aimed at addressing climate change and other challenges in the city**, including reducing greenhouse gas emissions (Istanbul Metropolitan Municipality, 2024).

Küçükçekmece is a district situated in the southwestern region of Istanbul, located on the European side of the city. The district is roughly **15 km away from the historical center** of Istanbul. This area is characterized by its scenic **Küçükçekmece Lake**, which serves as a focal point for both recreational activities and urban development. The district features a diverse array of residential neighborhoods and commercial

establishments, providing a dynamic environment for both residents and visitors. The location of the Küçükçekmece District is illustrated in the Figure 65.



Figure 65 - Location of Küçükçekmece District.

Küçükçekmece is one of Istanbul's oldest settlements, with prehistoric evidence found in the Yarımburgaz Caves. Architectural remains from the Hellenistic, Late Roman, and Byzantine periods indicate its historical significance, particularly as the ancient city of Bathonea. After coming under Turkish rule, it was rebuilt by Fatih Sultan Mehmet, transforming into an important accommodation center. The Küçükçekmece district was officially established on July 15, 1988., after separating from the Bakırköy district (Küçükçekmece Municipality, 2023; Küçükçekmece Municipality, 2025).

Küçükçekmece, located on the western side of Istanbul, covers **37.65 km²**. It features gently undulating terrain and is bordered by Küçükçekmece Lake, the Marmara Sea, and the Transit European Motorway. The district has a **railway** extending from Sirkeci into Europe and is near **Atatürk Airport**, which now serves only **cargo and private jets**. In the Figure 66, some photos from Küçükçekmece are illustrated.

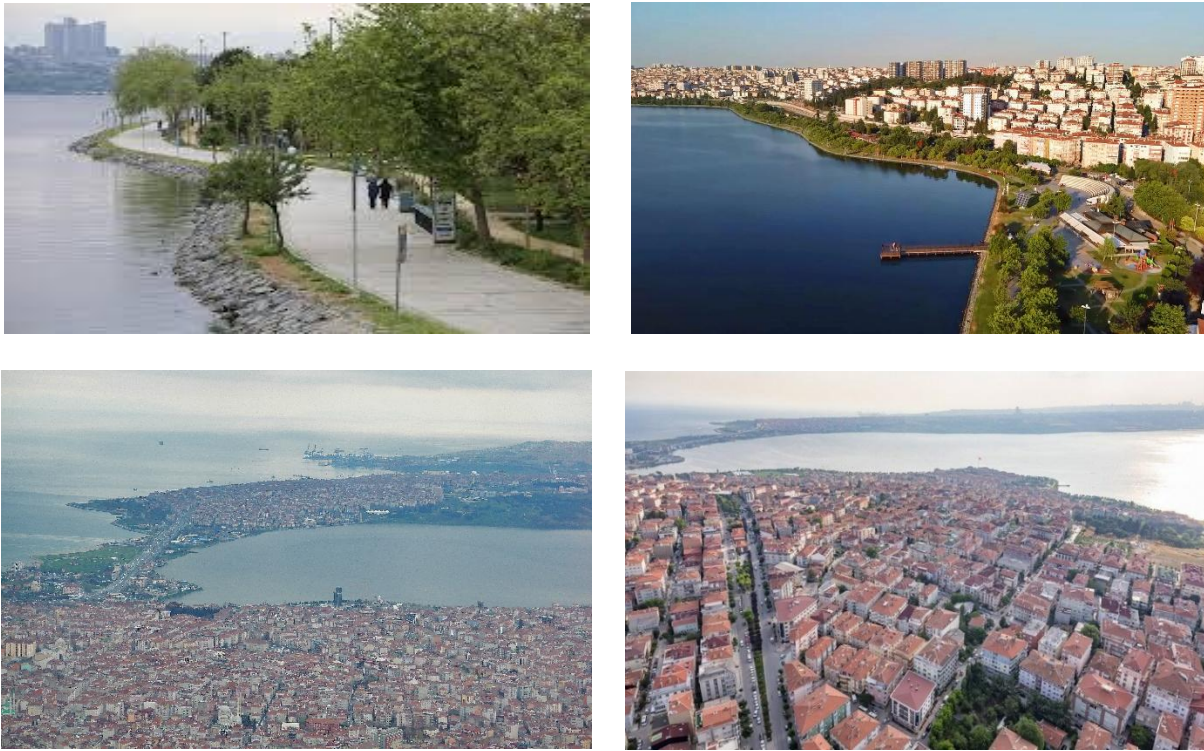


Figure 66. Some photos of Küçükçekmece.

3.5.2. Demographic and socioeconomic characteristics

Istanbul houses **15,655,924** people which accounts for **2,865.29 people/km²**. The population is consisted of **50.2% male and 49.8% female**. The age distribution is as follows: 35% of the population is young (aged 0–24 years), 53% is middle-aged (aged 25–59 years), and 12% is elderly (aged 60 years and older) (Istanbul Planning Agency , 2020; Endeksa, 2025f). The **median age is 34.5** in Istanbul (Istanbul Metropolitan Municipality, 2018).

64.1% of Istanbul's population lives on the European side, while 35.9% is on the Asian side. The population is declining in the city center and neighboring districts, whereas the peripheral districts are growing. Overall, Istanbul's population has decreased by 1.6%, with only eight peripheral districts showing an increase. This decline is not just due to return migration; a significant drop in birth rates also contributes (Koru, 2025). The geography of Türkiye has been shaped by various wars over the years, leading to significant immigration. As a result, many people have moved to cities in Türkiye, with Istanbul being one of the most prominent destinations. According to 2021 data, Istanbul is home to approximately **521,000 Syrian immigrants**, which represents about **3.37% of the city's population** (Küçükçekmece Municipality, 2018).

Istanbul serves as Türkiye's economic and commercial hub, contributing to one-third of the country's gross domestic product (GDP) and ranking among the cities with the highest GDP per capita. The per capita income is **16,720.00 Turkish Liras (approximately 384 Euros)**, while the per capita income for households is **52,501.00 Turkish Liras (about 1206 Euros)** (Endeksa, 2025f). Moreover, Istanbul has the highest mean

annual equivalised household disposable income with **124,723.00 TL (2863€)** according to TURKSTAT (Turkish Standards Institute. Income Distribution Statistics, 2023). Despite its substantial economic output, the city grapples with significant socioeconomic inequalities and pronounced income disparities. According to the Turkish Statistical Institute's (TURKSTAT) Income Distribution Statistics, **Istanbul has the highest Gini coefficient** for equivalent household disposable income, which indicates it faces the greatest levels of income inequality (Koru, 2025). Hence, Istanbul exhibits a diverse range of socioeconomic characteristics. Moreover, **unemployment rate is 12.3%** in Istanbul (Turkish Employment Agency, 2022).

Küçükçekmece has a population of **792,030** according to data from 2024. The population density is **17,976.82 people per square kilometer**. In this district, there are 397,387 women and 394,643 men. The population growth rate is -2.09%. The age distribution is as follows: 36% of the population is young (aged 0-24 years), 54% is middle-aged (aged 25-59 years), and 10% is elderly (aged 60 years and older) (Endeksa, 2025g; Küçükçekmece Municipality, 2025). The median age in Küçükçekmece is 32.09.

According to an analysis conducted between 2018 and 2019, Küçükçekmece is home to **66,801 foreigners**, which constitutes 8.33% of the total population in the area. The majority of these foreigners are Syrian immigrants, numbering 49,479, which makes up 74.1% of the overall foreign population in Küçükçekmece (Küçükçekmece Municipality, 2018). Hence, Küçükçekmece is one of the districts where a significant number of foreigners have settled. Moreover, the per capita income is **18,444.00 Turkish Liras (approximately 423 Euros / 474.66 Dollars)**, while the per capita income for households is **57,917.00 Turkish Liras (about 1329 Euros / 1,490.50 Dollars)** in Küçükçekmece. Lastly, the Gini coefficient was estimated at 0.413, a decrease of 0.007 points compared to the previous year in 2024 (Turkish Standards Institute. Income Distribution Statistics, 2024).

Küçükçekmece is one of five districts in Istanbul, home to approximately 700,000 residents. This high population density leads to various problems related to infrastructure, transportation, health, and education. Also, Küçükçekmece is one of the districts known for having higher household values (Koru, 2025). The general situation of Istanbul and Küçükçekmece ULL is summarized in the Table 18.

Table 18 - Demographic and socioeconomic indicators in Istanbul and Küçükçekmece ULL.

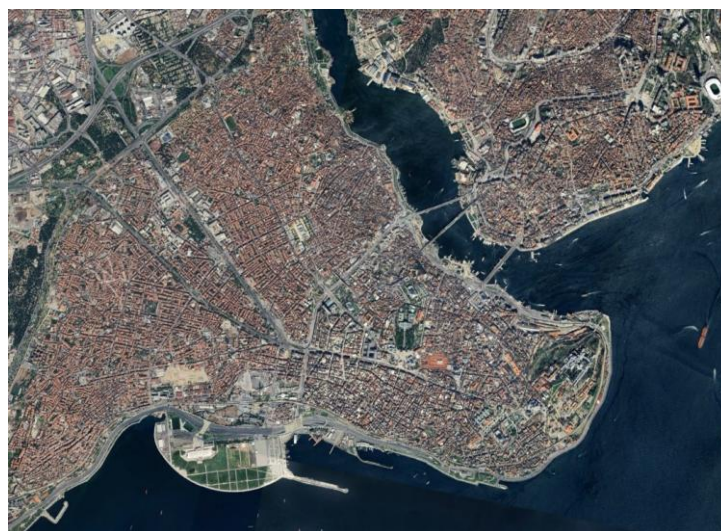
	Core City: Istanbul	ULL: Küçükçekmece	Source
Total Population (inhabitants)	15,655,924	792,030	Endeksa (2025g; 2025f)
Median Age (years)	34.50	32.09	Istanbul Metropolitan Municipality, 2018 Endeksa, 2025f
Age Distribution (%)	0-24 ages: 35% 25-59 ages: 53% More than 60: 12%	0-24 ages: 36% 25-59 ages: 54% More than 60: 10%	Endeksa (2025g; 2025f)
Sex ratio (males per 100 females)	99.9	99.9	OECD Local Database, 2022
Foreign Born Population (%)	N/A		

	Core City: Istanbul	ULL: Küçükçekmece	Source
Median Disposable Income PPP (USD)	9298	N/A	OECD Local Database, 2022
Social Inequality – Gini Coefficient	Gini coefficient of Türkiye is 0.413 according to 2024 data.		Turkish Standards Institute. Income Distribution Statistics 2024, 2024
Dominant industries	Services sector	Logistics	-
Unemployment rate (%)	12.3	N/A	Turkish Employment Agency, 2022

3.5.3. Urban Planning and Land Use

Istanbul is strategically located at the crossroads of Europe and Asia, divided by the **Bosphorus Strait**. This position makes it a vital hub for trade, migration, and cultural exchange. The built-up surface area is **164.6 m² per person**, while there are **7.20 m² of green spaces per capita** (YAYSIS Istanbul, 2025).

The city's first major ring road, O-1, encircles the central districts and serves as a boundary between the historic urban core and the more recent expansions. This central zone, often referred to as the "urban core" or "inner belt," remains the most densely populated and economically active area of the city. In Figure 67, the historical center and one of the urban outskirts of Istanbul is given.



a) Historical center



b) Urban outskirts

Figure 67 - (a) Historical center of Istanbul, (b) One of the urban outskirts of Istanbul

Istanbul's inner city is dense and multifunctional, particularly in historic districts such as Fatih, Beyoğlu, and Kadıköy. These areas showcase a **vibrant mix of residential, commercial, and cultural uses**, often intermingled within the same buildings or blocks. The **narrow** streets, small courtyards, and **extensive public transportation network**—which includes metro lines, trams, buses, and ferries—make these **central zones highly walkable and well-connected**. In contrast, the outer parts of the city, especially those developed after the 1980s such as Başakşehir, Kayaşehir, and certain areas of Pendik or Tuzla, tend to follow a more planned and lower-density urban model. These newer suburbs typically separate residential, commercial, and office functions into distinct zones. They are characterized by wide avenues, large-scale apartment complexes, shopping malls, and more abundant green spaces. However, these areas are more car-dependent and often less walkable compared to the compact inner city. This spatial contrast highlights the city's rapid expansion and evolving planning approaches over time. Moreover, according to Planned Areas Zoning Regulation, Urbanization and Accessibility of Türkiye, preschools must be built **500-meter distance** from residential areas. Also, in recent years, Istanbul has faced **challenges with air quality**.

The air quality is a struggle for Istanbul because of a combination of high vehicle density, industrial emissions, maritime traffic, and other factors. According to Istanbul Metropolitan Municipality last one year air data, the average exposure to fine particulate matter (**PM_{2.5}**) is **18 µg/m³**, **PM₁₀** is **35.1 µg/m³**, and **NO₂** is **38.3 µg/m³** (Istanbul Air Quality Monitoring Center, 2025).

To monitor land cover change in Istanbul, land cover data from ESRI for the years 2017, 2020, and 2023 were utilized. Regarding to analysis it is found that the city consists of **28% residential areas, 45% forest areas, 18% agricultural areas, 7% green areas, 1% bare ground, and 1% other classes**. When examining the changes in LCLU over the years, it is seen that transportation, residential, and industrial areas in Istanbul have gradually expanded. This growth has led to a decrease in green and agricultural spaces. Residential

zones are now extending further away from the central urban core. This urban expansion presents several challenges. The increased distance between residential areas and essential services, as well as employment centers, often results in a greater reliance on private vehicles. This reliance contributes to higher traffic congestion, increased environmental pollution, and greater pressure on existing infrastructure. Furthermore, the encroachment of residential areas into green spaces and agricultural land disrupts local ecosystems and reduces the amount of land available for farming, which ultimately impacts food security and environmental health.

Küçükçekmece covers 37.65 km² with 17,976.82 people per kilometer square. Hence, Küçükçekmece is **highly populated area** which could be seen from land cover analysis. The land cover of Küçükçekmece is predominantly characterized by urban development. According to land cover analysis, **residential areas account for 93%** of the district's total land use, clearly indicating its highly urbanized and densely populated nature. **Agricultural land makes up 3%**, while **forested areas comprise only 2%**, reflecting a significant reduction in rural and natural spaces within the district. **Green spaces represent just 1%** of the total land area, highlighting a limited amount of public open space and a relatively low share of greenery per capita. **Bare ground is virtually nonexistent at 0%**, and **other land uses constitute the remaining 1%**. This suggests that nearly all available land has been utilized, primarily for residential and urban purposes. Moreover, built-up surface is **13 m²/PPP** (OECD Local Data Portal, 2025), while green spaces **12.4 m²/PPP** (OECD Local Database, 2022). Moreover, the average distance to the closest pharmacy is 383 meter in Küçükçekmece (OECD Local Database, 2022).

The air quality of Küçükçekmece is same with Istanbul. According to OECD Local Database, the **NO₂ exposure is 17.1 µg/m³**. The average exposure to **PM_{2.5} is 21.4 µg/m³** and **PM₁₀ is 34.7 µg/m³** (OECD Local Database, 2022).



a) İkitelli Organized Industrial Zone



b) Halkalı Housing Project

Figure 68 - Organized industrial zone (a) and a housing project (b) in Küçükçekmece.

Küçükçekmece district is known for its numerous **mass housing projects**. The neighborhoods of Atakent, Halkalı Center, and İstasyon, located in the northern part of the district, are particularly prominent as areas for mass housing developments. Since the late 1990s, this region has experienced significant construction activity, contributing to its growth. Küçükçekmece, which boasts a variety of mass housing and industrial facilities, is also home to two shopping centers, with one located within the mass housing area (Koru, 2025). A photo from İkitelli Organized Industrial Zone and housing project in Küçükçekmece are presented in Figure 68.

Halkalı Center Neighborhood features various branches of **industry**, including **textiles**, **paper**, **automotive**, and **metal**. Additionally, the surroundings of the Atatürk Neighborhood in the northeast part of the district are another hub for industrial facilities. This area is home to the Marmara and İmsan Industrial Sites, which have become key centers for industrial operations (Koru, 2025). In Table 19, urban planning and land use properties of Istanbul and Küçükçekmece ULL are summarized.

Table 19 - Land Use and environmental indicators in Istanbul and Küçükçekmece ULL.

Indicators	Core City: Istanbul	Living Lab: Küçükçekmece	Source
Area (km ²)	5,712.00	37.65	Municipality
Population Density (persons/km ²)	2,865.29	17,976.82	Endeksa, 2025f Endeksa, 2025g
Land Cover Distribution (%)	Residential: 28% Forest: 45% Agriculture: 18% Green Areas: 7% Bareground: 1% Others: 1%	Residential: 93% Forest: 2% Agriculture: 3% Green Areas: 1% Bareground: 0% Other: 1%	Land Cover Analysis (Others: Flooded vegetation + clouds + water)

Indicators	Core City: Istanbul	Living Lab: Küçükçekmece	Source
Built-up surface (m ² /PPP)	164.6	13	Calculated OECD Local Data Portal, 2025
Green space (m ² /PPP)	7.20	12.4	YAYSIS Istanbul, 2025 OECD Local Database (2022)
Average distance to the closest school (m)	500	500	Planned Areas Zoning Regulation, Urbanization and Accessibility
Average distance to the closest pharmacy (m)	N/A	383	OECD Local Database (2022)
Average population exposure to NO ₂	38.3	17.1 µg/m ³	Istanbul Air Quality Monitoring Center, 2025 OECD Local Database (2022)
Average exposure to fine particulate matters (PM _{2.5})	18.0 µg/m ³	21.4 µg/m ³	Istanbul Air Quality Monitoring Center, 2025 OECD Local Database (2022)
Average exposure to coarse particulate matter (PM ₁₀)	35.1	34.7 µg/m ³	Istanbul Air Quality Monitoring Center, 2025 OECD Local Database (2022)

3.5.4. Transport and Mobility

Istanbul boasts a **well-developed infrastructure**, characterized by an **extensive network of highways** that connect various regions on both the European and Asian sides of the city. Complementing these roadways is a comprehensive public transportation system that includes an expanding network of **buses**, **rail systems**, the unique **metrobus (Bus Rapid Transit - BRT)** system, **ferries**, and **cable cars** which operates on dedicated lanes to effectively navigate the city's notorious traffic congestion. The public transportation is managed by two institutes in Istanbul: **Istanbul Electric Tramway and Tunnel Establishments (IETT)** and **Ministry of Transportation and Infrastructure**. The extensive road network includes major highways such as the European Route (E-5) and the Trans-European Motorway (TEM), connecting various parts of the city.

Critical transportation hubs like Yenikapı, Mecidiyeköy, Üsküdar, and Taksim serve as vital nodes for integrating different modes of transit, improving connectivity across Istanbul.

Istanbul boasts an extensive public transportation network, including buses, metro, tramway, BRT, cable cars and ferry services, all designed to connect key residential, commercial, and industrial areas while promoting sustainable mobility. Istanbul has more than **800 bus lines** with **6470 buses**, making buses one of the most commonly used forms of public transportation in the city. On average, around **55,000 bus trips** are taken each day. Each year, Istanbul's bus network serves approximately **1.25 billion passengers** (Istanbul Electric Tramway and Tunnel Establishment, 2023). The **rail system network**, spanning a total of 338.5 kilometers, relies heavily on underground rail systems to efficiently transport large numbers of passengers throughout the city. **Metrobus** system which is a Bus Rapid Transit, measuring **52 kilometers**, is designed to provide quick service along heavily trafficked routes. Metrobuses operate on dedicated lanes, allowing commuters to avoid traffic, particularly in areas where expanding the metro network is not practical. In addition, Istanbul's unique geography, straddling the Bosphorus, makes **ferry services** a vital component of the transportation system. Regular ferry services connect the European and Asian sides of the city, providing a scenic and efficient travel option. Additionally, the IMM has introduced a new transportation option called the **sea taxi**, which accommodates up to 10 passengers. Furthermore, there are two **cable car** transportation in Istanbul. Through these various modes of transport, Istanbul successfully integrates its metropolitan area while striving to enhance mobility and reduce congestion. Currently, there is **no official Mobility as a Service (MaaS)** application that fully integrates all transportation modes in Istanbul. However, several **mobile and web-based applications** are available that provide essential public transport information to users. These apps offer real-time data, including vehicle arrival times and current locations. Additionally, they allow users to top up their **Istanbulkart** — the city's unified smart transportation card **both physically and virtually**— which can be used across all public transport services, including buses, metros, trams, ferries, and more.



a) Metro



b) Tramway



c) BRT



d) Ferry services



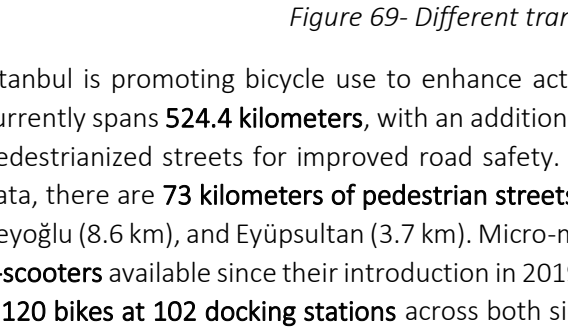
e) Bicycle



f) Scooter



g) Sea taxi



h) Cable car

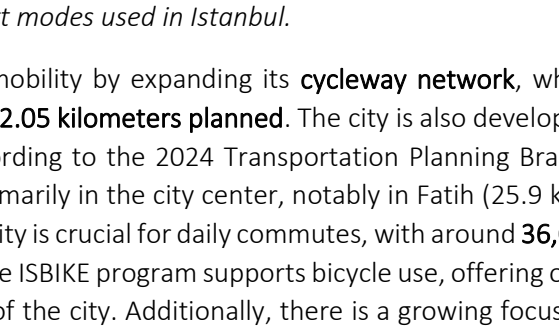


Figure 69- Different transport modes used in Istanbul.

Istanbul is promoting bicycle use to enhance active mobility by expanding its **cycleway network**, which currently spans **524.4 kilometers**, with an additional **192.05 kilometers planned**. The city is also developing pedestrianized streets for improved road safety. According to the 2024 Transportation Planning Branch data, there are **73 kilometers of pedestrian streets**, primarily in the city center, notably in Fatih (25.9 km), Beyoğlu (8.6 km), and Eyüpsultan (3.7 km). Micro-mobility is crucial for daily commutes, with around **36,000 e-scooters** available since their introduction in 2019. The ISBIKE program supports bicycle use, offering over **1,120 bikes at 102 docking stations** across both sides of the city. Additionally, there is a growing focus on **mopeds, scooters** and **electric bikes**, with a leading company launching its first electric moped model in 2021. Additionally, in the same year, a foreign micro-mobility company began operations in Istanbul (Gauquelin, 2022). Also, there are **taxi, carsharing** and **ride-hailing** services by different companies across the Istanbul. The some used transport modes in Istanbul are presented in the Figure 69.

Istanbul has developed a network of **Park & Ride** facilities to enhance public transportation accessibility, currently featuring **15 stations** throughout the city. These facilities are thoughtfully integrated with various urban transit options, including squares, BRT lines, and rail systems, facilitating seamless transfers for commuters between different modes of transport. However, there are currently no Park & Ride facilities available in the Küçükçekmece district. Furthermore, there are traditional **Demand-Responsive Transportation** across the city.

Istanbul's modal split reveals diverse urban mobility patterns, with **walking** accounting for **51%** of daily trips, followed by **public transportation** at **23%**. **Private car usage** is **18%**, and **other modes** make up the remaining

8%. This distribution highlights the dominance of non-motorized and public transit options, pointing to opportunities for sustainable transport policy development.

The total number of trips within the public transportation was **10,910,822** in July 2022 (Istanbul Metropolitan Municipality, 2022). Additionally, residents of Istanbul typically spend approximately **80 minutes** in traffic each day (Anadolu Agency, 2023). Lastly motorization rate is **230** in Istanbul.

Metro systems are among the most widely used modes of transportation in the daily lives of citizens in Istanbul. To promote sustainable and efficient transportation, the Istanbul Metropolitan Municipality (IMM) is working on **new metro lines**. Currently, new metro lines are under construction or project stage. Figure 70 illustrates the metro system of Istanbul.

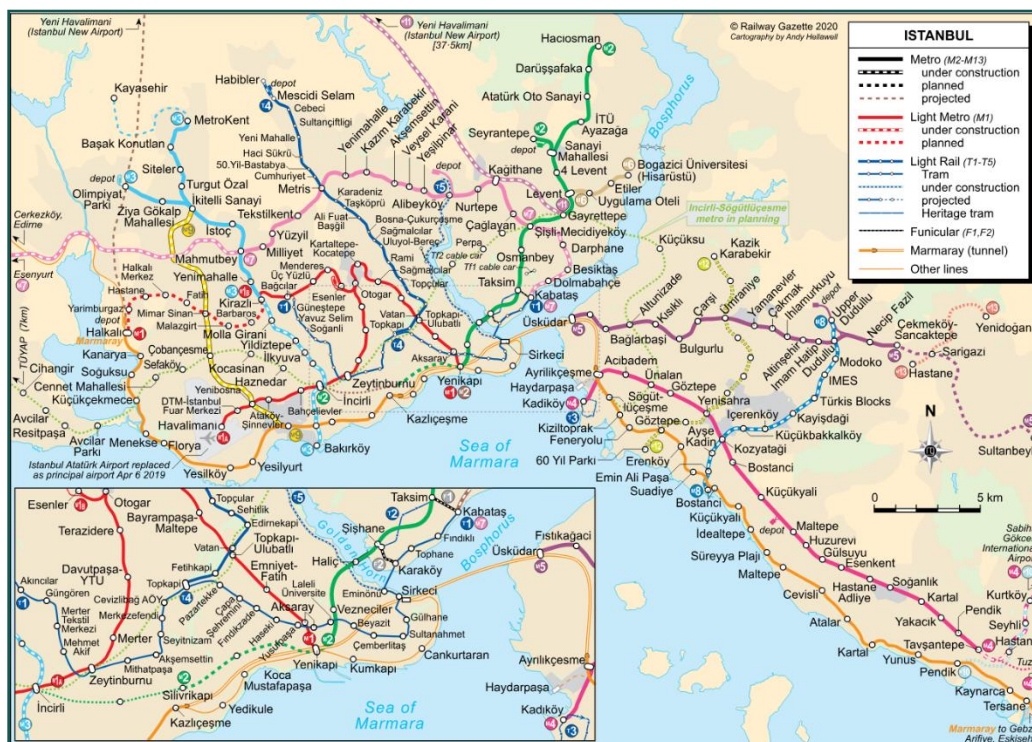


Figure 70 - Metro network of Istanbul (Metro Report International, 2024).

Küçükçekmece is strategically situated at the crossroads of essential transportation routes, making it an important hub in Istanbul. The **E-5 Highway**, one of the city's main thoroughfares, traces the southern border of the district, providing seamless access to the metropolitan area. Meanwhile, the **TEM Motorway**, known for facilitating long-distance travel, runs through the northern part of Küçükçekmece, connecting it to other major cities. To the east, the **Basin Ekspres** connection road enhances connectivity, particularly for commercial and industrial activities, reflecting the district's growing economic significance. In the Figure 71, the most crucial roads that is connected with Küçükçekmece District is shown.

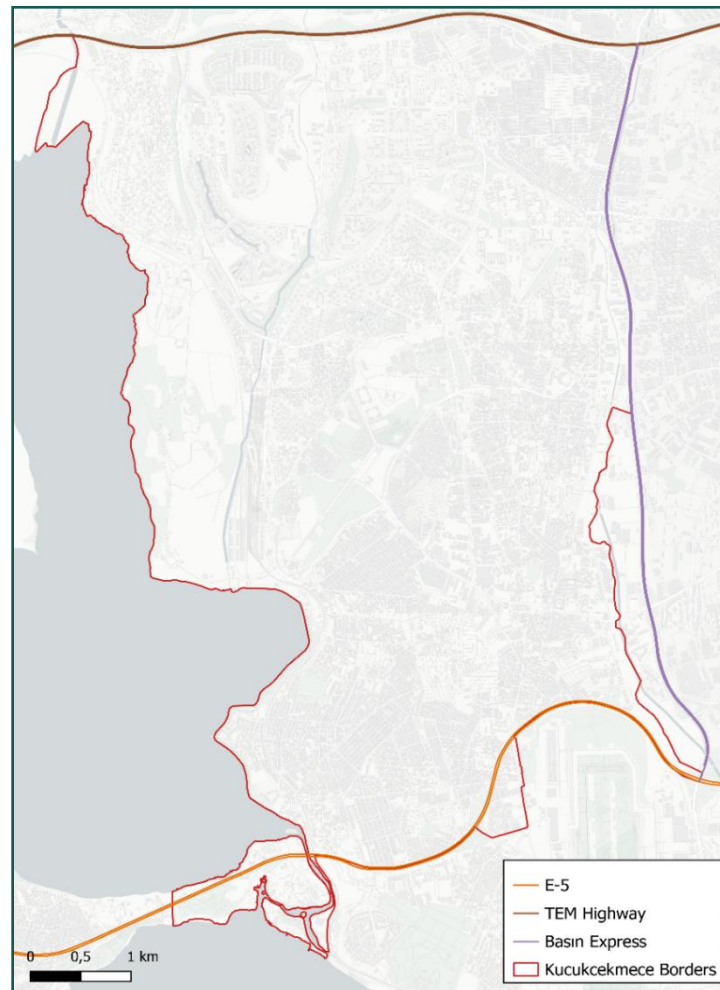


Figure 71 - Important roads within the Küçükçekmece District.

Küçükçekmece boasts a well-developed transportation network that offers a variety of options for easy movement throughout the area. Public transport includes an extensive **bus system with 440 stops and 566 routes**, including convenient round-trip services to various neighborhoods. The **Marmaray light rail system**, a crucial transportation link running along the southern coast of Istanbul, spans approximately 5 kilometers within this district, providing efficient access to key destinations. Additionally, the **Metrobus** operates on dedicated lanes, significantly reducing travel time and connecting the European and Asian sides of Istanbul, making it an essential choice for commuters. In addition to the current infrastructure, several rail system projects are either under construction or in the planning stages, aimed at further enhancing connectivity in the region. Micromobility options, such as **electric scooters** and **bicycles**, offer sustainable alternatives making it easier to navigate Küçükçekmece. The new projects include an expansion of the cycling network in Küçükçekmece, now extending to **24 kilometers**. In Figure 72, transportation modes in Küçükçekmece are illustrated.

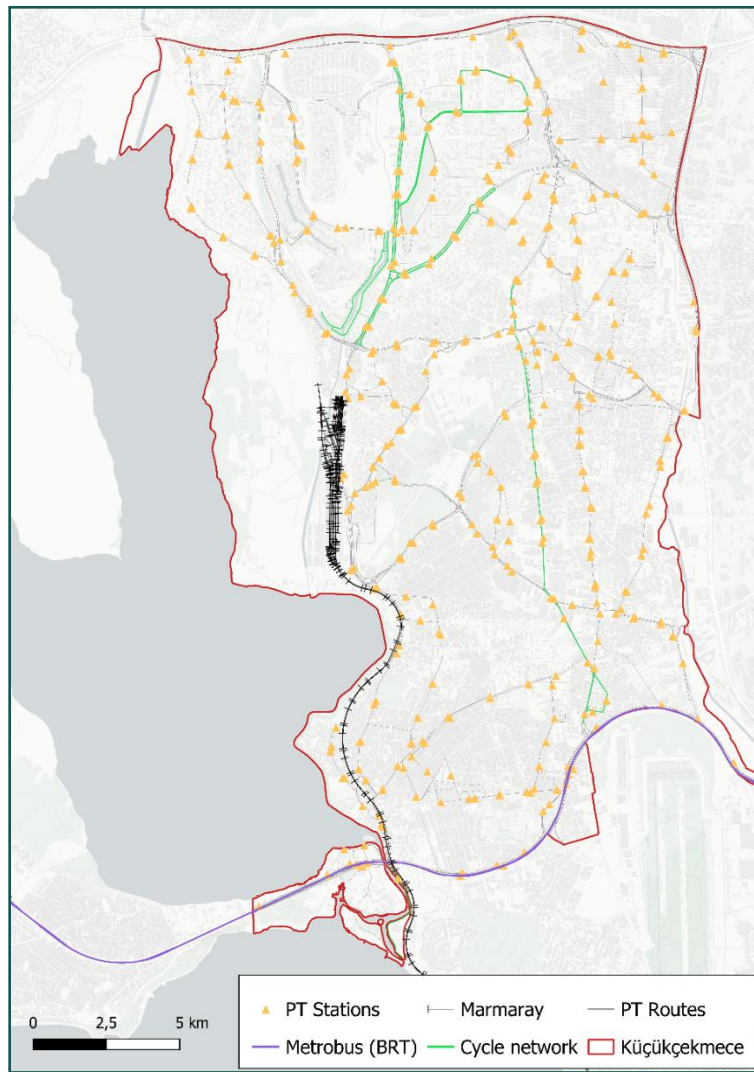


Figure 72 - Transportation modes in Küçükçekmece.

Küçükçekmece, situated on the European side of Istanbul, has emerged as a **key logistics hub** due to its strategic location and access to vital transportation networks. Major routes such as the **TEM Highway, D-100 (E-5) Highway**, and **Basın Ekspres Road** facilitate efficient land transportation. Its proximity to **Istanbul Airport** and **Ambarlı Port** further enhances its attractiveness for air and sea freight operations. Furthermore, the Marmaray line's connectivity between the European and Asian sides of Istanbul enhances intermodal transportation, reinforcing Küçükçekmece's significance in Türkiye's logistics landscape. Key logistics hubs and industrial areas in the region are illustrated in Figure 73.



Figure 73 - Küçükçekmece district and important logistics and industrial areas.

Estimated modal split figures for Küçükçekmece, reveal a significant reliance on non-motorized and public transportation. **Walking** constitutes **48%** of daily trips. **Public transportation** accounts for **31%** of travel, while **private car usage** is at **20%**. The remaining **1%** includes other transportation modes. Table 20 summarizes the mobility indicators of Istanbul and Küçükçekmece ULL.

Table 20 - Mobility indicators in Istanbul and Küçükçekmece ULL.

Mobility Indicators	Core City: Istanbul	Living Lab: Küçükçekmece	Source
Cycling infrastructure (km)	524.361	24.107	Data Analysis
Park & Ride scheme (yes/no)	Yes	No	News from ISPARK 2025
Demand responsive transport offer (yes/no)	Yes	Yes	IMM
Public transport offer	Rail systems BRT Ferry Sea taxi Buses Cable car	Marmaray (light rail system) Buses BRT	IMM

Mobility Indicators	Core City: Istanbul	Living Lab: Küçükçekmece	Source
Shared mobility modes available & Ride-hailing	Shared mopeds Carsharing Bikes haring Taxi Shared scooters Ride-hailing	Shared mopeds Carsharing Bikes haring Taxi Shared scooters Ride-hailing	IMM
Availability of PT card that combines all PT modes (Yes/No)	Yes	Yes	IMM
Digitalized PT card (Yes/No)	Yes	Yes	IMM
Modal split (%)	18% car 23% PT 51% walking 8% other	20% car 31% PT 48% walking 1% other	IMM
Motorization rate (nº of vehicles per 1000 people)	230	N/A	IMM
Number of trips on a workday	10910822	N/A	Istanbul Metropolitan Municipality, 2022
% of trips within the municipality	N/A		
% of trips with origin or destination in another municipality	N/A		
Average travel times (minutes)	80	N/A	Anadolu Agency, 2023

3.5.5. Governance and Policy framework

Governance structure and competences

Urban planning in Türkiye operates within a hierarchical structure. At the upper scale, there are environmental plans prepared at 1:100,000 and 1:25,000 scales by the **Ministry of Environment, Urbanization, and Climate Change**. These plans can encompass multiple provinces and **establish the general development strategies for cities, along with key land-use decisions**. At the lower scale, zoning plans are developed based on the directives from the upper-scale plans. These plans, which include scales of 1:10,000 and 1:5,000, dictate the development direction and size of settlement areas and outline the distribution of land uses, such as residential, commercial, and industrial zones, as well as the city's primary

transportation routes. Responsibility for these plans lies with **metropolitan municipalities and provincial special administrations**. Further refining these zoning decisions, the 1:1,000 scale implementation plans focus on specific developments, such as building plots, roads, and public spaces. These plans are managed by **local municipalities**. The legal framework for these planning processes is governed by various regulations that vary according to the type of plan being implemented.

In the context of urban planning in Istanbul, particularly in Küçükçekmece, several key stakeholders are involved. The **Ministry of Environment, Urbanization, and Climate Change is responsible for overarching planning at a national level**. The **Istanbul Metropolitan Municipality handles strategic and regional decisions**, while the **Küçükçekmece Municipality focuses on local planning and implementation**. Urban planners, architects, and engineers provide essential technical support for the development of various plans and projects. The **private sector** also plays a significant role in executing these projects. Additionally, civil society organizations and local residents contribute to the planning process through their participation. Regarding transportation planning, the **Istanbul Metropolitan Municipality oversees urban transportation infrastructure and public transport initiatives**. The **Ministry of Environment, Urbanization, and Climate Change sets regional transportation policies**. The Turkish State Railways (TCDD) is in charge of railway transportation, and the Ministry of Transport and Infrastructure supervises road and airport projects. Furthermore, Istanbul Electric Tramway and Tunnel Establishments (IETT) manages most public transportation modes, except for those organized by the ministry. Also, Transportation and Traffic Commission of conducts analysis on traffic safety. IMM Lastly, private companies and consulting firms assist in transportation planning efforts. In **¡Error! No se encuentra el origen de la referencia.**²¹, policy levels in Istanbul and Küçükçekmece is summarized.

Mobility policy: SUMP & aligned strategies

Istanbul has launched its first **SUMP** in response to increasing mobility demands, environmental concerns, and the need for an integrated transportation network. The SUMP Phase II – Implementation Plan Project began in June 2023, led by the IMM and co-financed by the European Union, with GIZ International Services as the main consultancy partner. The project's main goal is **to develop a comprehensive and resilient transportation system that is accessible to all citizens, promotes environmental sustainability, and enhances social inclusion**. It prioritizes public transit, non-motorized travel, and reduced environmental impact. Key initiatives include **establishing Low Emission Zones (LEZ), implementing traffic calming measures, expanding maritime transport networks, and developing pedestrian and cycling infrastructure**. The SUMP also focuses on **resilience against natural disasters and emergencies**. A participatory approach ensures that the needs of diverse groups, including women, children, and persons with disabilities, are incorporated to create a safer and more liveable urban environment. Preservation of the city's cultural and historical heritage is emphasized throughout the planning process. An Activity-Based Model is being developed for Istanbul's urban area to better analyze mobility patterns and inform data-driven decisions for transport policies (SUMP Istanbul, 2025).

Table 21 - Implemented policy levels in Istanbul and Küçükçekmece.

Policy level	Core City: Istanbul	Living Lab: Küçükçekmece
National	- Ministry of Environment, Urbanization, and Climate Change - Ministry of Transport and Infrastructure	- Ministry of Environment, Urbanization, and Climate Change - Ministry of Transport and Infrastructure
Regional	- Istanbul Metropolitan Municipality (IMM) - Turkish State Railways (TCDD)	- Istanbul Metropolitan Municipality (IMM) - Turkish State Railways (TCDD)
Local	- Istanbul Metropolitan Municipality (Urban Planning and Transportation Departments) - Istanbul Electric Tramway and Tunnel Establishments (IETT) - Transportation and Traffic Commission	- Küçükçekmece Municipality (Planning and Implementation Departments) - Local Public Transport Services

Urban planning framework

Urban planning in Istanbul is guided by the 1:100,000-scale **Istanbul Environmental Master Plan**, which has been in effect since 2009, along with the 1:5,000-scale Zoning Plans. These plans have been updated to **manage the city's growth, enhance transportation infrastructure, and promote environmental sustainability**. In recent years, **urban transformation and disaster risk management have become increasingly important**. Strategic goals are detailed in reports published every four years. In the Küçükçekmece district, the 1:25,000-scale Zoning Plan and the 1:1,000-scale implementation plans are essential for regulating settlement areas. **The district aims to strengthen transportation networks, increase green spaces, and undertake urban transformation projects**. These initiatives align with Istanbul's broader urban development strategies.

Also, IMM was launched a project namely "**Istanbul in 34 Minutes**" in 2022. The project aims to create a platform that **highlights accessible living spaces, allowing users to meet their daily needs through walking, cycling, and micromobility options**. This initiative focuses on enhancing urban service quality by identifying deficiencies in urban service areas and working to improve them. Additionally, it **encourages active citizen participation** in the process, ensuring that community voices are heard. Ultimately, this platform will serve as a valuable resource for decision-makers, providing them with essential data to guide improvements in urban living conditions (34 Dakika İstanbul, 2025). Moreover, it is aimed to develop an efficient city logistics system with small negative impacts within SUMP project. The **Ministry of Transport and Infrastructure is actively working on logistics and transportation initiatives**. They have published a report titled "2053 Transport and Logistics Master Plan," which outlines several projects. These projects include the development of a very high-speed rail line, improvements to railway systems, expansion phases for

airports, and the establishment of logistics centers (Republic of Türkiye Ministry of Transport and Infrastructure, 2022).

3.5.6. Key challenges and conclusions

The Turkish case study examines Istanbul as the primary city and Küçükçekmece as a representative municipality within its metropolitan area. These two urban entities share several similarities due to their geographic and administrative proximity. For instance, both areas experience **comparable demographic trends**, particularly concerning **age** and **gender distribution**. However, significant **differences** emerge when **considering sustainable urban mobility**. **Istanbul**, as a megacity and the economic center of Turkey, is characterized by a **dense, polycentric urban form that boasts an extensive and multimodal public transportation system**, including metro lines, metrobuses, buses, trams, and ferries. Despite challenges such as congestion and urban sprawl in peripheral regions, the core areas of the city support relatively high levels of public transport usage and walkability. Conversely, **Küçükçekmece**—though part of the Istanbul Metropolitan Municipality—exhibits characteristics typical of suburban municipalities. While it is served by key public transport routes like Marmaray and Metrobus, the district has experienced rapid **population growth** and horizontal expansion in recent decades. This development has resulted in **a high-density urban fabric in newer areas, leading to longer travel distances and increased spatial fragmentation**. The **transport infrastructure**, particularly highways and rail corridors, **serves as both connectors and barriers within the district**. As reflected in its modal split, a considerable portion of trips in Küçükçekmece is still made via private vehicles, indicating a heavier reliance on car-based mobility compared to central Istanbul. This **spatial and functional imbalance** presents challenges for advancing sustainable mobility strategies in Küçükçekmece and similar districts within the metropolitan region.

3.6 Settimo Torinese

3.6.1. Introducing the Core City and the Living Lab

The Italian case study in FORTHCOMING is made up of **Turin** (Torino in Italian) as the core city, and **Settimo Torinese** as the **Living Lab** in the metropolitan area of Turin.

Turin is the capital of the Piedmont region in northern Italy and one of the country's most prominent cities, being the fourth most populated municipality of Italy (after Rome, Milan and Naples). It is made up of 8 districts (circonsrizioni in Italian), **home to around 850,000 people**, and covers 130.17 km² of land, with an average population density of 6,900 persons/km² (Italian National Institute of Statistics, 2024). In some parts of the city, particularly in central areas, this density can reach up to 13,000 persons/km² (City of Turin, 2021). Located on the Po River and surrounded by the Alps, Turin is situated at an elevation of 239 meters above sea level (Fig. 1). The city experiences a climate marked by hot summers and cold winters, with moderate rainfall throughout the year.



Figure 74 - Panoramic view of Turin, source: *Cosa vedere a Torino: dal centro alla periferia della città.*

Source: *Vivere in Infradito*

As the **capital of the Piedmont region**, Turin serves as the political, cultural, and economic hub of the area. The city's economy is primarily driven by the **manufacturing and services sectors**, with a

focus on **automotive production, high-tech industries, and finance**. The automotive industry has historically been central to Turin's identity, home to the Fiat company and several other industrial giants. After the decommissioning of the automotive industry, which is way less important nowadays than it was in the 20th century, the **city is struggling to find a new identity in its post-Fordist age**. In recent years, Turin has developed into an important center for **innovation and startups, especially in the ICT sector**.

Culturally, Turin is renowned for its historic architecture, museums, and theatres, with attractions like the Egyptian Museum and the National Cinema Museum. The city is also a major commercial center, hosting numerous retail businesses and markets. **Tourism** has been steadily growing, with over 4 million international visitors in 2023 (City of Turin).

However, Turin faces several urban **challenges**, including **air pollution, traffic congestion, and the need for affordable housing** – albeit being one of the cheapest city in the country in terms of PPP. To address these issues, the city has invested in sustainable urban development, focusing on improving public transportation, enhancing green spaces, and promoting cycling infrastructure.

The Turin Metropolitan Area is part of the territory of the Metropolitan City of Turin, including 315 municipalities (~2.2 million inhabitants), divided into 11 homogeneous zones, four of which make up the metropolitan area. Turin is the capital of the Città Metropolitana and is also the core city of the Turin Metropolitan Area, which includes 39 municipalities and has a population of approximately 1.6 million people.

This makes it one of the largest metropolitan areas in Italy. The Turin Metropolitan Area has become a key economic region in the country, encompassing both the urban core and surrounding areas of industrial and residential importance.

The most important administrative body at the supra-municipal level, however, is the Metropolitan City of Turin, which substituted the former Province of Turin, retaining its borders.

Settimo Torinese, a municipality in the Turin Metropolitan Area, is located to the northwest of the core city, **about 10 km away**. With a **population** of around **46,000** (Italian National Institute of Statistics, 2024), Settimo Torinese is the third largest municipality in the metropolitan area by population. The municipality covers an area of 35.6 km², resulting in an average population density of 1,400 persons/km² (OECD, 2022). Settimo Torinese is situated at an elevation of approximately 230 meters, like Turin, and has seen significant urban growth in recent years, with expanding residential areas and industrial developments (Fig. 75).



Figure 75 – City of Settimo Torinese: on the left the historical city centre and on the right the industrial zone

Source: [foto di Settimo Torinese at DuckDuckGo](https://www.duckduckgo.com/foto-di-settimo-torinese)

The economy of Settimo Torinese is driven by **a mix of industrial and service sectors**. The municipality is home to several factories, logistics hubs, and retail centers. The area also benefits from **proximity to Turin's business parks and high-tech industries**. Settimo Torinese has a significant number of commercial establishments and has recently developed into a key shopping destination with **several shopping malls** attracting millions of annual visitors.

Settimo Torinese is well-connected to Turin by the **A4 highway and a regional railway line**. However, the heavy reliance on road transport has led to challenges related to **traffic congestion**, particularly during rush hours. The **urban layout** remains **fragmented**, which complicates efforts to improve public transport and promote active mobility.

3.6.2. Demographic and socioeconomic characteristics

Turin (Torino) is the capital city of the Piedmont region in northern Italy, with a population of **846,489 inhabitants** as of January 1, 2024 (ISTAT, 2024). The median age of the population is 47.3 years (ISTAT, 2024). The age distribution is as follows: **13.5% are under 15 years old, 63.2% are between 15 and 64 years old, and 23.3% are 65 years and older** (ISTAT, 2024). The gender distribution is nearly balanced, with approximately 91.8 males per 100 females (ISTAT, 2024). Turin has experienced a gradual population decline over the past two decades, with a decrease of approximately 5% since 2004 and 1.2% in the last five years (ISTAT, 2024).

Settimo Torinese, located just northeast of Turin, has a population of **45,693 inhabitants** as of January 1, 2024 (ISTAT, 2024). The **median age is higher than Turin's**, at 47.9 years (ISTAT, 2024). The age distribution is as follows: 11.2% are under 15 years old, 62.4% are between 15 and 64 years old, and 26.3% are 65 years and older (ISTAT, 2024). The gender distribution is similar to Turin's, with approximately 94.4 males per 100 females (ISTAT, 2024). Settimo Torinese has also experienced **a population decline**, with a decrease of approximately 4.5% since 2004 and 0.8% in the last five years (ISTAT, 2024).

Economically, **Turin** serves as a significant industrial and commercial hub in Italy, with a diverse economy that includes automotive manufacturing, aerospace, and telecommunications. The

services sector contributes significantly to the city's GDP. As of October 2024, Italy's national unemployment rate was 6.3%, reflecting a decrease of 2.0 percentage points since October 2023 (OECD, 2024). Specific unemployment rates for Turin are not provided in the available data. The **median disposable income in Turin is approximately €22,000 per year**, which is higher than the national average (ISTAT, 2023). The Gini coefficient, measuring income inequality, is 0.31, indicating moderate income inequality within the city (ISTAT, 2023).

Settimo Torinese has a local economy that is also diversified, with a mix of manufacturing and services sectors. The town hosts several industrial zones with companies specializing in logistics, manufacturing, and technology. Specific unemployment rates for Settimo Torinese are not provided in the available data. The **median disposable income is approximately €24,000 per year**, which is higher than Turin's average (ISTAT, 2023). The **Gini coefficient in Settimo Torinese is 0.28**, indicating a slightly lower level of income inequality compared to Turin (ISTAT, 2023).

Table 22 summarises key demographic and socioeconomic indicators for Turin and Settimo Torinese.

Table 22 - Demographic and socioeconomic indicators in Turin and Settimo Torinese (ISTAT 2023, 2024)

	Core City: Turin	Living Lab: Settimo Torinese	Source
Population (2024)	846,489	45,693	ISTAT, 2024
Median Age (years)	47.3 years	47.9 years	ISTAT, 2024
Age Distribution (%)	0-14: 13.5% 15-64: 63.2% 65+: 23.3%	0-14: 11.2% 15-64: 62.4% 65+: 26.3%	ISTAT, 2024
Gender ratio (males per 100 females)	91.8	94.4	ISTAT, 2024
Population Change Since 2004	-5%	-4.5%	ISTAT, 2024
Population Change in Last 5 Years	-1.2%	-0.8%	ISTAT, 2024
Unemployment Rate (Italy, Oct 2024)	6.3%	6.3%	ISTAT, 2023
Median Disposable Income	€22,000	€24,000	ISTAT, 2023
Gini Coefficient	0.31	0.28	ISTAT, 2023

3.6.3. Urban Planning and Land Use

Turin's spatial structure has been shaped by its natural features, historical growth, and infrastructure development. The city covers an area of approximately 130.2 km², with a population density of about 6,520 persons per km² as of 2021. Situated at an elevation ranging from 200 to 280 meters above sea level, Turin is traversed by the Po River, which flows from south to northeast through the eastern part of the city. The land cover distribution includes significant urban green spaces, with public parks and tree-lined avenues contributing to the city's greenery. The city has a 41.5% share of green areas (OECD)¹⁶.

The city's layout reflects its historical expansion. The historic core, including areas like the Quadrilatero Romano and Piazza Castello, dates to Roman times, characterized by a grid pattern with narrow streets and historic buildings. In the 19th century, the city expanded with the addition of districts such as San Salvario and Crocetta, featuring wider boulevards and elegant architecture. The 20th century saw further growth with the development of neighborhoods like Mirafiori, known for industrial facilities, and more recently, areas like Spina 3 have been redeveloped with modern residential and commercial complexes.

Turin's inner city is dense and mixed-use, with historic neighborhoods offering a blend of residential, commercial, and cultural spaces. Narrow streets, public squares, and extensive public transport make it highly walkable. In contrast, newer suburbs have a more planned, lower-density layout with distinct residential, commercial, and industrial zones. Wide streets, larger apartment complexes, and more green spaces define these areas, but they are more car-dependent.

Regarding the environment, Turin has faced challenges with air quality. Efforts have been made to monitor and improve air quality¹⁷, including the implementation of low-emission zones and promotion of public transportation. The city's green spaces play a crucial role in providing ecosystem services, such as air pollution removal and urban cooling.

Settimo Torinese, located northeast of Turin, covers an area of approximately 32 km². The town has a **lower population density compared to Turin**. The land cover includes residential areas, industrial zones, and agricultural lands. Settimo Torinese has experienced urban expansion, with the development of residential neighborhoods and industrial parks. **The historic center features a mix of residential and commercial spaces**, with narrow streets reflecting its historical roots. Surrounding areas consist of **planned residential developments with single-family homes**, apartment complexes, and green spaces.

The town also has **designated commercial and industrial zones**, mainly concentrated along major transport corridors, providing employment opportunities and contributing to the local economy.

¹⁶ [OECD Local Data Portal](https://localdataportal.oecd.org/profile.html?latitude=45.0845&longitude=7.7004&zoom=9.8486&code=ITA001272&georef=ita_sau3_2022)

¹⁷ For data of pollutants, refer to:

https://localdataportal.oecd.org/profile.html?latitude=45.0845&longitude=7.7004&zoom=9.8486&code=ITA001272&georef=ita_sau3_2022

Settimo Torinese has faced challenges with air quality, like Turin. Efforts are ongoing to monitor and improve environmental conditions to enhance residents' quality of life.

Table 23 summarises key land use and environmental indicators for Turin and Settimo Torinese.

Table 23 - Land Use and environmental indicators in Turin and Settimo Torinese

	Core City: Turin	Living Lab: Settimo Torinese	Source
Area (km ²)	130.2	31.5	https://localdataportal.oecd.org/
Population Density (persons/km ²)	6,522	1,464	https://localdataportal.oecd.org/
Land Cover Distribution (%)	Forest or semi-natural: 41.9% Built up: 52.8% Cropland: 3.5% Water: 1.7%	Forest or semi-natural: 40.6% Built up: 33.3% Cropland: 25% Water: 1%	https://localdataportal.oecd.org/
Built-up surface (m ² /PPP)	36.3	104.3	https://localdataportal.oecd.org/
Green space (m ² /PPP)	60	259	https://localdataportal.oecd.org/
Average distance to the closest school (m)	Data non available	Data not available	https://localdataportal.oecd.org/
Average distance to the closest pharmacy (m)	246	409	https://localdataportal.oecd.org/
Average population exposure to NO ₂ (µg/m ³)	19.9	20.8	https://localdataportal.oecd.org/
Average exposure to fine particulate matters (PM _{2.5}) (µg/m ³)	24.6	25.8	https://localdataportal.oecd.org/
Average exposure to coarse particulate matter (PM ₁₀) (µg/m ³)	36.7	38.3	https://localdataportal.oecd.org/

3.6.4. Transport and Mobility

The **city of Turin** offers an **extensive** and **well-connected transport system** that integrates both public and private mobility options. The city's public transport network is managed by Gruppo Torinese Trasporti (GTT) and includes a **metro system** (currently composed of 1 line with further extensions planned), an established **tram network**, and an extensive **urban bus system** that covers Turin and its surrounding areas. In addition to urban buses, **suburban rail** services provide

connections to outlying municipalities and regional hubs. Turin's **integrated fare system** enables seamless transfers across modes with a contactless transport card available to all users.

Turin supports a range of options including traditional **taxis, ride-hailing services, and several operators of car-sharing, bike-sharing, and e-scooter sharing**. Efforts to improve pedestrian infrastructure include ongoing initiatives to **enlarge pedestrianised zones**, as well as **park-and-ride** schemes at key entry points.

The modal split differs between core city (Torino) and Settimo Torinese with **more people walking and cycling in Torino while a very high use of car (80%) in the suburbs cities as Settimo Torinese** shows how car becomes predominant due to its flexibility and comfort where public transport is rarer and less frequent.

The **city of Settimo Torinese**, our living lab, has a tailored transport offer designed to support its role as a **commuter town**. The city is well served by the **rail station** that provides regular connections to Turin. Additionally, Settimo Torinese benefits from an **urban bus network and several intercity bus lines** that link it with neighboring municipalities.

The integrated fare system covers both Settimo Torinese and Turin, allowing passengers to transfer easily between different modes of public transport. It is a rechargeable personal subscription, available on a Bip card, usable on Turin's urban and suburban network (U+A zones of the integrated Formula area) and its cost is 68€/month. While the local transport service in Settimo Torinese is primarily focused on bus and rail, the **town also offers car-sharing services and traditional taxi options**. Unlike Turin, advanced demand responsive transit (DRT) services have not yet been implemented in Settimo Torinese. Digitalised ticketing is available while the unified PT card ensures that users can pay seamlessly across multiple transport modes.

Table 24 reports the main mobility indicators in both core city and living lab.

Table 24 - Mobility indicators in Turin and Settimo Torinese

	Core City: Turin	Living Lab: Settimo Torinese
Cycling Infrastructure (km)	150	20
Park & Ride Scheme	Yes	Yes
Demand Responsive Transit	Yes	No
Public Transport Offer	Metro, Tram, Urban Bus, Suburban Rail	Commuter Rail, Urban Bus
Shared Mobility Modes Available	Taxi, Ride-hailing, Bikesharing (ToBike), Carsharing, Shared Mopeds	Taxi, Ride-hailing, Carsharing
Availability of PT Card Combining All Modes	Yes	Yes

	Core City: Turin	Living Lab: Settimo Torinese
Digitalised PT Ticketing	Both digital and traditional (paper tickets) options	Both digital and traditional (paper tickets) options
Modal Split (Core Area)	Walking: 35%, Cycling: 8%; PT: 11%, Cars: 46%	Walking: 10%; Cycling: 3%; PT: 7%, Cars: 80%
Motorization Rate (vehicles per 1000 people)	610	650
Average Number of Daily Trips	~1,321,067	~82,795
% of Trips Within Municipality	57%	53%
% of Trips with Origin/Destination Outside Municipality	With destination outside Turin: 141,281* With origin outside Turin: 245,113* <i>* elaboration from origin-destination matrix of last IMQ2022</i>	Not available
Average Travel Time (minutes)	Not available	Not available

3.6.5. Governance and Policy framework

In Italy, urban planning and transport competencies are distributed across different levels of government. At the national level, the central government, through the **Ministry of Infrastructure and Transport** (Ministero delle Infrastrutture e dei Trasporti - MIT), establishes broad policies, regulations, and funding mechanisms. It is responsible for **major infrastructure, including highways, high-speed rail (TAV), airports, and ports**. Urban planning is overseen by the **Ministry of Environment and Energy Security** (Ministero dell'Ambiente e della Sicurezza Energetica - MASE) and the **Ministry of Culture** (Ministero della Cultura - MIC) in relation to **land use, environmental protection, and cultural heritage preservation**.

At the regional level, the **Piedmont Region** (Regione Piemonte) holds significant authority over urban planning and regional transport within its territory. It **regulates land use, housing policies, and environmental guidelines while managing regional transport systems**, including rail services operated by Trenitalia and regional bus services.

At the local level, **municipalities** play a **crucial role in zoning, public transport management, and mobility policies**. In urban planning, each municipality is responsible for its General Regulatory Plan (Piano Regolatore Generale - PRG), which must comply with regional and national planning laws. It is the primary urban planning instrument used by Italian municipalities to **regulate land use, zoning, and urban development**. Regarding mobility, **municipalities develop their Sustainable Urban Mobility Plan (Piano Urbano della Mobilità Sostenibile - PUMS)**, which is mandatory for cities exceeding 100,000 inhabitants.

The relevant actors involved in the management of urban planning and mobility, depicted in Table 25, are the following:

- at the metropolitan scale (involved in Turin and Settimo Torinese): Regional Transport Authority, called Agenzia Mobilità Piemontese (AMP), Metropolitan City of Turin.
- at the city level:
 - Turin: Turin City Council and Agenzia della Mobilità Piemontese (AMP). The Gruppo Torinese Trasporti (GTT) is the public transport company owned by the city that implements the decisions taken by public administration;
 - Settimo Torinese: Settimo Torinese City Council and the Agenzia della Mobilità Piemontese (AMP)

Table 25 - Policy Level and Relevant Actors for Mobility and Urban Planning

Main sector	Policy Level	Core City: Turin	Living Lab: Settimo Torinese
Mobility	National	Ministry of Infrastructure and Transport	Ministry of Infrastructure and Transport
	Regional	Agenzia della Mobilità Piemontese (AMP)	Agenzia Mobilità Piemontese (AMP)
	Local	Turin City Council	Settimo Torinese City Council
Urban Planning	National	Ministry of Ecological Transition, Ministry of Culture	Ministry of Ecological Transition, Ministry of Culture
	Regional	Piedmont Region	Piedmont Region
	Local	Turin City Council	Settimo Torinese City Council

Public Participation in Urban Planning and Mobility

Public participation varies between Turin and Settimo Torinese. In **Turin**, **citizen involvement** is more **institutionalised** through **participatory budgeting** and **public consultations**. The city also organizes **public hearings** and **workshops** on major projects like metro extensions or new cycling infrastructure. For example, the "Torino City Lab" initiative fosters co-creation processes with residents and businesses. In **Settimo Torinese**, **public participation** is more **localised**, with **community meetings**, **surveys**, and **direct consultations** with **local authorities**.

Transport Policy: SUMP and Aligned Strategies

Turin introduced its **Sustainable Urban Mobility Plan (SUMP)** in 2022, aiming to enhance multimodal transport, reduce emissions, and improve public space quality. Some of the key measures include:

- Expansion of pedestrian zones and Low Emission Zones (LEZs)
- Development of a shared e-bike system
- Strengthening park-and-ride schemes
- Implementation of MaaS (Mobility as a Service) through the BIP Card
- Free public transport days on high-pollution days
- Introduction of digital twins for real-time traffic and mobility management

Settimo Torinese, as part of its **2022 PUMS** update, integrates traditional mobility measures with innovative technologies, supporting its transition towards a smart, connected, and sustainable city. Key measures include:

- Expansion and improvement of bike lanes.
- Cycle parking at rail station.
- Implementation of a digital twin system to monitor urban mobility.

Urban Planning Framework

In Turin, urban planning and land use are regulated by the General Regulatory Plan (PRG), last updated in 1995 and revised through subsequent amendments. Recent updates introduced the "Green Factor" to integrate more green infrastructure into new developments (Turin City Council, 2023).

In **Settimo Torinese**, a new General Regulatory Plan was approved in 2024, focusing on **limiting urban sprawl**, enhancing **mixed-use development**, and improving **connectivity** while **maintaining low residential density** (Settimo Torinese City Council, 2024).

3.6.6. Key challenges and conclusions

In conclusion, the Italian case study is composed of a **core city, Turin**, and a municipality within its metropolitan area, **Settimo Torinese**.

These two locations share several characteristics, some of which are influenced by their geographic proximity (e.g., altitude). Their demographic structures are also **similar** in terms of **age** and **gender distribution**. Additionally, both cities have **economies largely driven by the service sector**, with Settimo Torinese also retaining an industrial legacy.

However, there are significant differences between the two; besides the city size, **Turin** follows a **denser** and **more compact** urban planning model, particularly in its central districts, and benefits from a **better public transport** system that facilitates sustainable mobility, particularly along radial

corridors. As the core of the metropolitan area, a large proportion of trips occur within the city itself.

In contrast, **Settimo Torinese** is a suburban municipality with a **higher average income** and has undergone **significant population growth** in recent decades. This has resulted in **urban sprawl** and a markedly **lower population density** than Turin. Many **trips are made to and from other municipalities**, particularly Turin. Furthermore, **major transport infrastructure**, such as highways and railway lines, creates **spatial barriers**, while the **long distances** between key urban nodes in newer developments hinder the adoption of sustainable mobility solutions. These factors are reflected in the city's modal split, which shows a **greater dependence on private vehicles** compared to Turin.

Figure 76 shows two different central contexts in Turin and Settimo Torinese, where the central role of public transport (e.g. tram) in Turin and the recent pedestrianisation intervention in the city centre of Settimo Torinese are shown.



Figure 76 - (a) A typical street in central Turin (b) A typical street in a central pedestrian area of Settimo Torinese

4. Conclusions and next steps

This document was prepared to provide the description of ULLs set-up in the six case study areas of FORTHCOMING. The diagnostics provided here provides brief yet detailed information on the essential characteristics of the case study areas including both capital city and suburban area, and different interdependent relationships between them. More precisely, for each case study area the deliverable summarized the background and general information, demographic and socioeconomic characteristics, urban planning and land use characteristics, transport and mobility characteristics, governance and policy framework. Furthermore, the analysis is complemented by critical assessment of key challenges in each case. Overall, the diagnostics reveals several context-specific factors that distinguish a particular case study (such as presence of highly demanded large commercial areas in Madrid) but also allows to detect certain similarities between them (for example, overall commitment of local stakeholders to lower transport-related pollution and promoting greater liveability in the suburbs). Table 26 systematizes different case study characteristics based on the key challenges identified in each ULL.

Table 26 – Summary of main characteristics and key challenges in the ULLs

	Las Rozas	Altona (Lurup)	Alverca do Ribatejo	Kertváros	Küçükçekmece	Settimo Torinese
Higher income (than core)						
Lower income (than core)						
Population growth						
Low density development						
Scarcity of green areas						
Majority of trips is to outer areas						
Spatial barriers caused by transport infrastructure						
Limited PT supply						
Limited walking/cycling infrastructure						
Low road network connectivity						

Based on these inputs, in the following Tasks within WP4 a more detailed screening of the 15minC dimensions is performed and a cross-sectional analysis is carried out.

The results provided in this deliverable are further discussed and validated in D1.9 - Validation of strategies on the horizontal upscaling approach 2.

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