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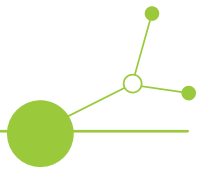
D.1.3.1 Local plan for the city of Osijek



Final version

October 2025

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Abbreviations

AF	Application form
DRT	Demand-responsive transport
KPI	Key Performance Indicator
PT	Public transport

1. Introduction

This document presents a plan for the development of public transport in the City of Osijek, aligned with the objectives of the OPTI-UP project, implemented under the EU Interreg Central Europe programme.

The Osijek Local Plan is based on:

- The **Comprehensive Strategy for a Sustainable and Efficient Public Transport Network in Central Europe** (providing a set of goals, measures, KPIs, stakeholders, etc.) (D.1.3.2), and
- An in-depth analysis of public transport (PT) needs in Osijek, derived from demand, operational, and policy data as documented in:
    - **Comprehensive Data Report on Existing Public Transport Networks and Best Practices** (D.1.1.1)
    - **Unified Database of Collected Public Transport Data** (D.1.1.2)
    - **Osijek Transport Model**, developed from existing baseline transport models (D.1.2.1)

The local plan is designed not only to support the implementation but also the monitoring and evaluation of public transport improvements and future pilot initiatives, including the OPTI-UP pilot project in Osijek.

Through collaboration with associated project partners (APs) and by fostering knowledge exchange with other stakeholders, the Osijek Local Plan aims to contribute to local and regional development objectives. Additionally, it is intended to serve as a replicable model for other municipalities in Europe and to support future cross-border cooperation.

2. Background and Context

This chapter outlines the background and context in which the Local Plan operates. It summarizes the main findings from the territorial, demographic, and transport analyses—with a specific focus on public transport supply and usage—and provides a review of objectives set by higher-level policies and plans on mobility. Together, these results establish the knowledge base for the strategic choices developed in the following chapters.

2.1. Context overview

The information presented in this chapter constitutes a core set of baseline inputs relevant to the development of the Local Plan and derives from the in-depth analysis carried out by Opti-Up in Deliverable D.1.1.1.

Osijek is the fourth-largest city in Croatia and economic and cultural centre of the eastern Croatian region of Slavonia. The settlement of Osijek has a population of 75,535 while the administrative area (Osijek + 10 other urban settlements) has the population of 96,313. It is one of the six case study areas with specific PT improvement strategies that will be piloted during the OPTI-UP project. It will be in a form of a network optimisation regarding adjustments to the routes and schedules of the existing PT system.

City of Osijek sustained an overall population decline in the past three to four decades, especially after 2000. By 2021, Osijek had a decline of over a quarter of its population in the early 1990s. Also, it has a high share of old population, with ⅓ of it being older than 60 years, and a median population age above European average. The population density of Osijek is around 550 pp/km^2.

Osijek has a long history of Public Transport services. It adopted tramways more than 100 years ago while the buses have been implemented in the other half of the 20th century. First tram system was introduced in 1884, using horse-drawn carriages, making it the first city in Croatia to have a tram. The system was electrified in 1926, replacing horse-drawn trams with electric ones. Modernisation of the tram system started in this century, with a new tram line being opened in 2009. Since then, the priority had been the optimisation, expansion and modernisation of tram and bus PT services. Since 2019 to 2023, new low-floor buss has been added to the fleet, and 2022 marked the start of large tram infrastructure modernisation so that new low-floor trams can be introduces from 2025.

PT offer in Osijek consists of 8 bus lines and 2 tram lines with a total length of 154 km and a median line length of 9.5 km in one way. Turnaround time is 81.5 minutes on average and average speed is 20.6 km/h. Osijek also has the third highest numbers of service runs in all case study areas, with 465 departures on weekdays and more than 320 departures on weekends. Osijek also has the highest ratio of population to weekday departures and the second highest ratio of population density to weekday departures.

Additionally, considering the size and structure of the city, Osijek has a relatively small number of bus lines of above-average lengths, which makes it more difficult to maintain a reliable and accurate timetable.

Annual bus-and tram-kilometres (BKM) are 3,229,226 in total, with an average per line being 93,566 and daily BMK being 8,847. Osijek's PT systems in one that serves the highest numbers of population per line in the study area. Population density/line ratio is also relatively high compared to other cities, but the ratio Population/daily BKM is second lowest.

In Osijek, the current bus fleet consists of 49 diesel buses as well as 18 electric tram vehicles. The capacity of the PT vehicles is usually on the larger side at around 80-150 passengers per vehicle making the Total PT daily static capacity 6,602 and average daily static PT capacity utilisation of 2.5. The tram vehicles in Osijek were refurnished in 2006-2007, making them to be around 17 years old by the end of 2023, while the diesel buses are around 7-8 years old.

With its PT Services, Osijek serves close 10 million trips per year. With that in the consideration, average PT trips per person per year equals to 64 or 0.18 per day, and the ratio of annual ridership/total line length of 39,725 passengers per line km. Also, it is estimated that there are around 6,500 passengers during the morning peak or the afternoon peak on a typical working day.

For Osijek, total cost (in €, not including the amortisation cost) of PT services equals to 9,272,827 or 2.56 per BMK and 1.36 per passenger.

2.2. National and regional mobility Plans goals

The goals and measures defined within a local public transport plan should not be developed in isolation. Instead, they must align with the broader strategic objectives established at European, national, regional, and local levels. For small and medium-sized cities, this alignment is especially important: it ensures

consistency with overarching policy directions, facilitates access to funding and technical support, and enhances the strategic coherence of local actions.

A comprehensive understanding of these higher-level frameworks allows cities to build their local strategies on a robust foundation, ensuring that local choices actively contribute to shared goals such as climate neutrality, improved public health, digitalization, and social equity in transport systems.

At the national level, the key document guiding strategic transport development is Transport Development Strategy of the Republic of Croatia 2017-2030 from 2017.

The Transport Development Strategy of the Republic of Croatia 2017-2030 is a key document that defines guidelines and objectives for the development of the transport system in Croatia during the specified period. This strategy encompasses all types of transport, including road, rail, maritime, air, and inland waterway transport, and aims to improve transport infrastructure, increase safety and efficiency of transport, and reduce negative environmental impacts by creating an efficient and technologically advanced transport system. The strategy includes several general and specific goals that directly or indirectly relate to public transport, among others:

- Change the distribution of passenger transport in favor of public transport and zero-emission transport modes, which includes public transport in agglomerations and local regional contexts (trams, local bus lines, etc.), regional and long-distance bus transport, as well as pedestrians and cyclists.
- Reduce the impact of the transport system on climate change.
- Reduce the impact of the transport system on the environment (environmental sustainability).
- Increase the safety of the transport system.
- Increase the interoperability of the transport system, including public transport, as well as improve the integration of transport modes in Croatia.
- Develop the potential of road public transport (regional and state) where other forms of public transport are not viable.
- Increase the attractiveness of public transport by improving management concepts and modernizing the vehicle fleet.
- Increase efficiency and reduce the economic impact of managing and organizing public transport.

Based on the analysis of the current state and with the aim of achieving the defined general and specific goals, a complete set of measures has been established, and those relevant to this Local plan are:

- G.12 Reduction of negative ecological impacts of transport.
- G.13 Adaptation to climate change and its mitigation.
- U.2 Development of infrastructure – focusing infrastructural investments on public transport and low/zero emission levels of harmful gases.
- U.3 Development of stations and stops – identifying needs for the renovation/upgrading of existing stations and stops or establishing new ones.
- U.4 Separation of transport modes – determining priorities in public transport, eliminating bottlenecks – increasing the efficiency of public transport by constructing dedicated lanes for public transport and/or corridors intended for public transport (for trams and buses) and implementing measures aimed at increasing the primacy of public transport through traffic management systems such as traffic lights.
- U.5 Increasing intermodality (park & ride, etc.).
- U.14 Introduction of on-demand public transport services – introducing services in sparsely populated or hard-to-reach areas.

- U.15 Synchronization of timetables (coordination) – creating common timetables for all modes of public passenger transport.
- U.17 Procurement of new vehicle fleets – modernization of the public transport vehicle fleet, ensuring the highest standards of quality, safety, and environmental protection, and accessibility for persons with reduced mobility.
- U.18 Traffic reorganization - reorganization and integration of traffic to give priority to public transport and low-emission modes compared to personal cars.

The strategy for bus transport also plans for the modernization and renewal of bus stations and infrastructure to improve service quality. The goal is to increase the efficiency and reliability of bus transport by introducing intelligent transport systems (ITS) for better traffic management and passenger information. Promoting the use of environmentally friendly buses, such as electric vehicles, is a key element in reducing harmful gas emissions. The strategy also anticipates optimizing driving schedules and introducing real-time bus tracking systems to increase the accuracy and reliability of services. Increasing the availability and accessibility of bus transport for all citizens, including persons with disabilities, and ensuring regular services in rural areas are also priorities.

The "Transport Development Strategy of the Republic of Croatia for the period 2017–2030" also addresses tram transport as a key component of urban public transport development, with a primary focus on the modernization of infrastructure and the acquisition of new vehicles to expand the capacity of PT. The strategy specifically mentions the renewal of tram infrastructure in **Osijek**, with plans to procure new trams for the city. This is also in line with measures for improving the sustainability of public transport, including the transition to more environmentally friendly vehicles. Trams are recognized as a sustainable mode of transport because they help reduce CO2 emissions and alleviate traffic congestion in urban areas.

Financial support for these initiatives is expected to be secured through EU funding, including a tender valued at approximately €39.8 million (including one more city), which could potentially be expanded to include the procurement of trams. Furthermore, trams are seen as integral to the development of an intermodal public transport system, which will integrate buses and other modes of transport. The document also emphasizes the need for further analysis of specific objectives and measures concerning tram transport, as well as the implementation timelines for these projects.

Furthermore, the strategy plans the modernization and improvement of both intercity and urban transport networks, which includes the development of integrated public transport systems. Here, trams play a key role in connecting various parts of cities and facilitating intermodality between different transport modes.

At the regional level, two documents provide guidelines for creating a sustainable transport system in the City of Osijek, Osijek-Baranja County, and the rest of the functional region of Eastern Croatia: The Transport Master Plan for the Functional Region of Eastern Croatia and The Master Plan for the Transport Development of the City of Osijek and Osijek-Baranja County

The Transport Master Plan for the Functional Region of Eastern Croatia

The Transport Master Plan for the Functional Region of Eastern Croatia, adopted in December 2020, is a strategic document covering five counties in Eastern Croatia: Virovitica-Podravina, Osijek-Baranja, Brod-Posavina, Požega-Slavonia, and Vukovar-Srijem. The aim of this plan is to develop a sustainable and efficient transport system that will meet the needs of the economy and the population of the region, as well as ensure conditions for the long-term development of transport infrastructure and improve the region's connectivity with the rest of Croatia and Europe.

The document identifies several key challenges in the region's transport infrastructure. These include insufficient connectivity between urban and rural areas, poor intercity and international transport

connections, and outdated infrastructure that does not meet modern standards. It also highlights the lack of integrated transport systems, low levels of road safety, and inadequate connectivity with key economic zones and neighboring regions.

The objectives of this master plan include the modernization and expansion of transport infrastructure, increasing traffic safety, developing integrated and multimodal transport systems, and enhancing energy efficiency while reducing CO_2 emissions. Specific measures to achieve these goals include the modernization of the road and railway networks, the development of intermodal hubs and terminals, the introduction of smart transport solutions (ITS), and increased investment in maintaining existing infrastructure. Additionally, the plan envisions the development of infrastructure for alternative energy sources in transport.

To achieve these objectives, priority projects have been defined, including the construction and modernization of expressways and highways, modernization of railway lines, and the introduction of new vehicles. Moreover, the plan foresees the development of intermodal terminals and logistics centers, improvements to infrastructure for cycling and pedestrian traffic, the development of infrastructure for electric vehicles, and the implementation of smart transport systems to increase efficiency and safety.

The document also mentions the city of Osijek as a key urban area in the region, highlighting its importance in the context of public transport development. It mentions the modernization of Osijek's tram network, including the reconstruction of tram tracks and stations. Osijek is recognized as a center where the capacity of public transport is planned to be increased, along with the modernization of the public transport system to reduce harmful emissions and increase energy efficiency.

Furthermore, the document emphasizes the importance of developing bus transport and an integrated public transport system, which would connect trams, buses, and railways in Osijek, thus improving connectivity within the city and to surrounding areas. The plan also includes the improvement of timetables and increased accessibility to public transport for all citizens.

The Master Plan for the Transport Development of the City of Osijek and Osijek-Baranja County

The Master Plan for the Transport Development of the City of Osijek and Osijek-Baranja County, adopted in July 2018, is a strategic document covering the entire Osijek-Baranja County, including the city of Osijek and other major towns and settlements such as Beli Manastir, Belišće, Donji Miholjac, Đakovo, Našice, and Valpovo. The aim of this plan is to create a sustainable transport system that optimizes transport connectivity and mobility within Osijek and the county, enabling better access to economic, cultural, and educational centers. The plan also provides guidelines for the modernization and improvement of infrastructure, increasing energy efficiency, and reducing environmental impacts by cutting CO_2 emissions.

In the context of public transport, the document recognizes Osijek as the central city in the region, whose transport needs require urgent modernization. The goal is to create an integrated system that covers all forms of public transport, from trams and buses to cycling lanes and infrastructure links. Special attention is given to the modernization of the tram infrastructure, including the reconstruction of tram tracks and stations, as well as the purchase of new, environmentally friendly trams. The plan also envisions the construction of new tram lines that will connect key city zones and facilitate access to major transport hubs.

As part of this plan, bus transport also plays an important role. In addition to improving the existing bus network and introducing more environmentally friendly vehicles, the plan proposes the introduction of an integrated timetable system between trams and buses, which will increase the capacity of public transport and reduce congestion. The integration of all transport modes will enable simpler and faster connectivity within Osijek and surrounding areas, improving the quality of life for citizens.

Furthermore, the plan foresees improvements to infrastructure for pedestrians and cyclists, encouraging sustainable transport methods. The development of cycling lanes and the expansion of pedestrian zones will reduce dependence on private vehicles and decrease traffic congestion in the city center. Investments in electric vehicles and the infrastructure for charging these vehicles are also planned, promoting the use of sustainable technologies in transport.

Key measures to achieve the objectives of this plan include:

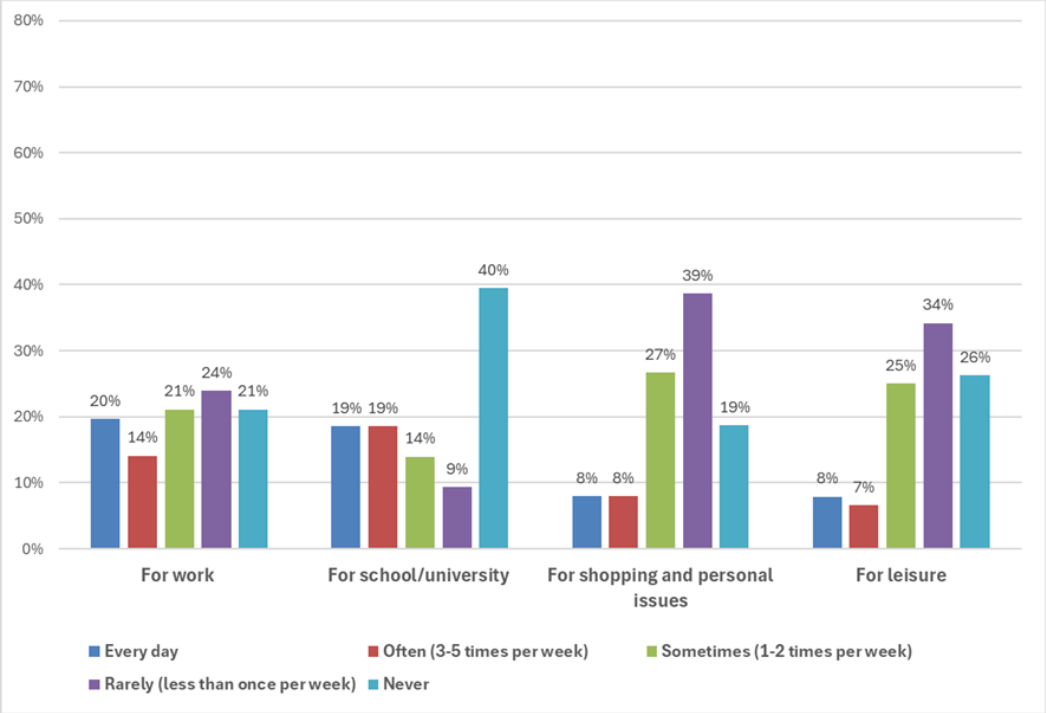
1. Modernization of the tram network: the reconstruction of tram tracks, construction of new tram lines, and the purchase of new, energy-efficient trams.
2. Development of an integrated public transport system: connecting trams, buses, and railways to ensure better connectivity between all modes of transport in the city and the county.
3. Increasing energy efficiency: the use of environmentally friendly vehicles, including electric trams and buses, as well as the implementation of smart traffic management systems.
4. Improvement of infrastructure for cyclists and pedestrians: the expansion of cycling lanes and the development of pedestrian zones to reduce traffic congestion and improve air quality.
5. Enhancing road safety: the implementation of modern technologies for better traffic regulation and the reduction of accidents, especially in urban areas.

Ultimately, this plan aims to create a modern, safe, and environmentally sustainable transport infrastructure that will meet the needs of the citizens of Osijek and Osijek-Baranja County, while also reduce environmental impacts and improve the overall quality of life.

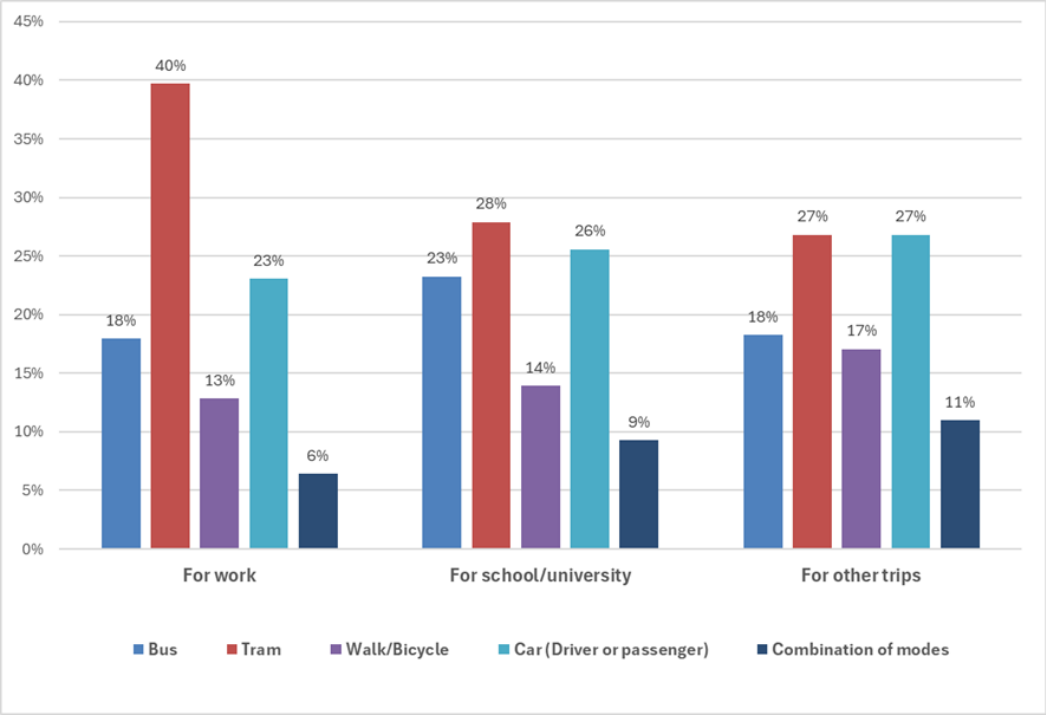
2.3. Results of survey

The goal of the survey is to find out what the current level of citizen satisfaction is, considering various aspects, such as the coverage of the transportation system relative to the city, reliability of schedules, vehicle capacity, and cleanliness, and what can be improved. Users' input can serve Transportation operators as well as the Public Administration or Municipalities, Regions that manage public transportation, as a basis for future improvements and to create a public transportation system that is more efficient, comfortable, accessible for all, and takes into account the real needs of citizens.

How often do you use the Public Transport?



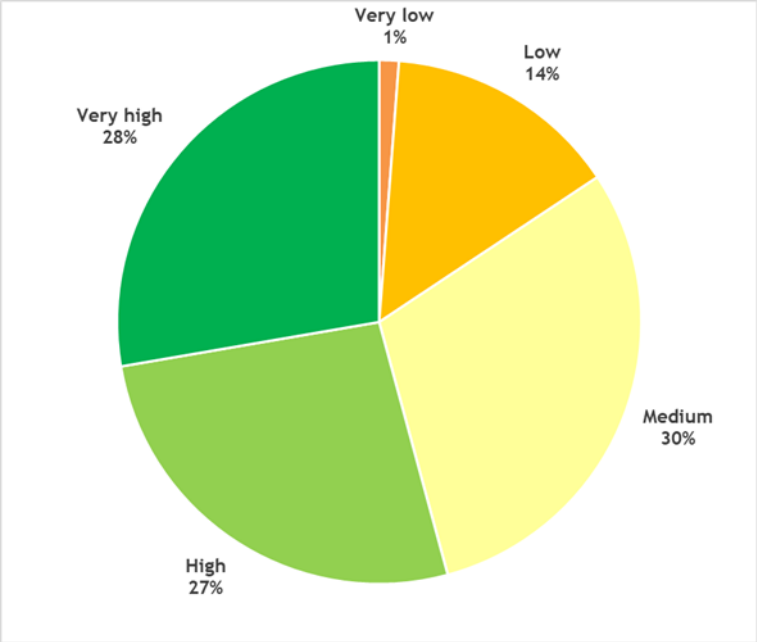
Which mode of transport do you use most often?



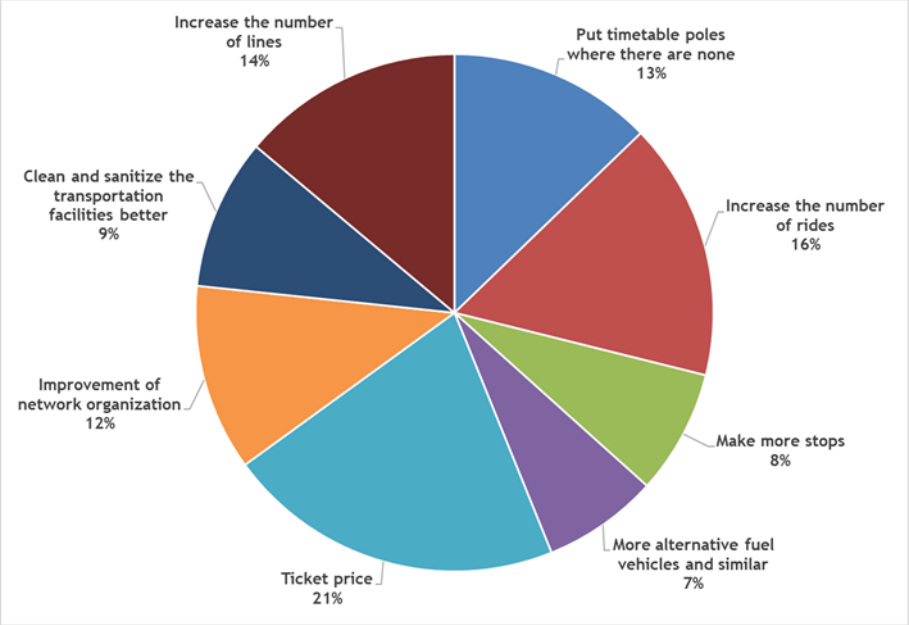
Grade the satisfaction and the importance of the following characteristics about the public transport.

[Grades from 1= very low to 5= very high]

Rate your satisfaction with the public transportation you use most frequently?



What would you suggest improving the public transport? (max 3) *



What improvements would you suggest that were not mentioned in the previous question?

Passenger information systems need to be updated and modernized

Ticketing system needs to be modernized

More new buses

Higher frequency on important bus lines

Better equipment (benches) on stops

Higher frequency on tram lines

New app

Extend tram network

Extend bus network

Put bike stands on important terminals and on buses

Get buses with higher capacity

Most respondents do not use public transport regularly, with many using it only occasionally. While non-essential travel (not for school or work) is common, public transport is used infrequently compared to essential travel. This suggests that the transport network and schedule are mainly designed for necessary trips, but there is significant potential for improving non-essential travel.

Among the respondents, trams are the most commonly used mode of public transport.

Overall, respondents are fairly satisfied with public transport services. They are particularly pleased with safety (3.95), cleanliness (3.90), and the simplicity of the network (3.90). This indicates that respondents prefer using single lines rather than making transfers or combining different modes of transport. However, they are less satisfied with information availability (3.20), ticket prices (3.45), and frequency (3.58). These areas are important starting points for potential improvements.

The most important aspects of public transport for respondents are punctuality (4.78), frequency (4.75), and reliability (4.71). In contrast, the least important aspects are environmental sustainability (3.95) and occupancy (4.05).

Regarding satisfaction with public transport in Osijek, 28% of respondents rated it as very high, 27% as high, 30% as medium, 14% as low, and 1% as very low.

When considering improvements to public transport services, most respondents suggested lowering ticket prices and increasing the frequency and number of lines. While ticket prices are an important factor for the public, it is essential to remember that even free public transport will not attract users if it is unreliable, infrequent, or does not connect key areas of the city effectively.

3. SWOT and Best Practice Analysis

The following chapter is structured in two parts: the first regarding the SWOT Analysis and the second one regarding the selection of Best Practices that could be useful for the Local Plan and Pilot Action.

3.4. SWOT Analysis

The SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) is a strategic tool that helps small and medium-sized cities assess their current public transport landscape and develop a forward-looking plan for improvement. This methodology enables the city of Osijek to systematically evaluate its transport systems from economic, environmental, and social perspectives, ensuring a balanced and sustainable approach to future development. The analysis incorporates and summarizes all findings from the previous qualitative and quantitative work and is enhanced by engagement with stakeholders.

Table 1: SWOT definition

Strengths	What is currently working well in your LPT system, or what characteristics of your city support a good LPT service?
Weaknesses	What is NOT working well in your LPT system, or what characteristics of your city make it difficult to provide a good LPT service?
Opportunities	Are there any future developments in your city (not necessarily related to transport) that could improve the LPT service?

Threats	Are there any future developments in your city that could negatively impact the LPT service?

Strengths (S)
Existing tram and bus network system for PT.
Significant recent investments in fleet modernization.
Existing infrastructure that may be sufficient for most transport organisation needs.
Good road infrastructure that forms the basis for PT services.
Integrated monthly pass for HŽ (rail transport operator) + GPP Osijek (public transport service operator).
Compact urban layout in the centre makes public transport routes more efficient.
Services are relatively concentrated, making route planning easier.
Weaknesses (W)
Limited financial resources to expand or improve services and unsuitable models of public transport financing.
Relatively poor public transport infrastructure (terminals, stops).
Lack of micro-transit (on-demand transport).
Lack of coordination between municipalities, cities, counties, regions, and the state.
Inadequate public railway transport.
Uneven service coverage of suburban areas.
Dependence on private cars due to cultural habits or lack of awareness (PT is not competitive compared to private cars).
Limited availability of late-night or weekend services.
Poor integration with rail, regional or intercity transport networks.
Insufficient passenger information and communication.
Complex route structure and service variability.
Lack of modern ticketing options (app, web shop, card payment…).
Opportunities (O)
Osijek is important transportation, economic, and industrial centre of the international importance.
Existing and planned investments in the development and modernization of the transport network at the county, regional, and national levels.
Introduction of eco-friendly solutions (electric buses, bike-sharing integration).
Government or EU funding for sustainable mobility initiatives.
Growing demand for alternative transport modes (e.g., carpooling, on-demand minibuses).
Collaboration with local businesses to support public transport use.
Development of smart mobility apps for real-time information and route optimization.
Threats (T)
Rising operational costs (fuel, maintenance, wages).
Competition from private transport services (ride-sharing apps, taxis).
Demographic challenges (aging population might need more accessible services).
Resistance to change from local policymakers or residents (e.g. persistent use of private vehicles).
Economic downturns that could reduce public funding.

3.5. Best Practices

In this section, a selection of best practices is presented. They are the most valuable insights can be drawn in relation to the pilot action planned for this project.

Table 2: Best Practices

Best Practice	City	Relevance to Actions
Public transport reorganization in the city of Šibenik	**Šibenik, Croatia**	• Organization and integration of public transport • Creation of a modern, efficient, and accessible public transport system • Reduction of car dependency • Efficient integration of new buses • Strategic planning and engagement with the community and multiple stakeholders
Pula Public transport new lines	**Pula, Croatia**	• Direct consultation with users and the city • Collaborative approach between the municipal administration and public transport operators • Tailoring public transport services to community needs • Clear communication using informative flyers
Implementation of an Intermodal Junction in Kaposvár	**Kaposvár, Hungary**	• New intermodal hub • Joint platform between various transport branches • Public safety with cameras • Coordination of needs among the three transport companies
Development of public transport by purchasing electric buses in Győr and its economic zone	**Győr, Hungary**	• New buses • Eco-friendly new transport options • Involvement of citizens
Adjustment of Public Transport Routes in Strakonice	**Strakonice, Czech Republic**	• Revision and optimization of existing public transport routes • Increasing the efficiency and accessibility of public transportation • Engaging and coordinating with various stakeholders
Citizen-oriented planning of public transport system in Rezekne city	**Rēzekne, Latvia**	• State or regional policies can harm local PT development • Design the service to overcome physical and cultural barriers • Receiving feedback from passengers via questionnaire • Needs new infrastructure • Needs investment/financial • Preparation of staff • E-bus operation proved successful
Zielona Góra public transport reorganization	**Zielona Góra, Poland**	• Failure to deliver some of the ordered vehicles • Ensure infrastructure readiness, particularly charging stations, to support electric buses • Resistance to change from drivers and a reluctance to drive electric buses • Invest in driver training and engagement • Optimize battery range and charging strategies
Mobility on demand	**multiple cities**	• Sustainable business model • Need public financial support and well-established governance • Areas where there is a shortage of easily available public transport

4. Vision and Goals

The vision represents the overarching, long-term aspiration for the evolution of the local transport system. It provides a unifying direction that guides decision-making and serves as a reference point for all subsequent planning choices. Defining a clear and shared vision helps ensure coherence in the strategy, aligning individual measures with a broader transformative goal.

The goals translate this vision into concrete ambitions, outlining what the local public transport plan aims to achieve through its intervention measures. These goals encompass mobility, social, economic, and environmental aspects. The integration of goals referring to different dimensions is a crucial moment in the planning process, as it is often necessary to pursue conflicting goals simultaneously.

In this chapter the city of Osijek lists its vision and goals based on:

- The results of the SWOT Analysis
- The results of the survey on LPT
- The political view

4.6. Vision

"The vision for the further development and optimisation of public transport in Osijek is to create a sustainable, efficient, inclusive, and affordable mobility system that ensures accessible and reliable transportation for all citizens. The goal is to optimize the existing network while modernizing infrastructure and services to better respond to current and future mobility needs. Public transport will be environmentally responsible, accessible to people of all abilities, and seamlessly integrated with other forms of mobility to enable easy, safe, and cost-effective travel across the city and surrounding areas. By reducing dependence on private vehicles, the system will help improve air quality, decrease carbon emissions, and promote more liveable urban spaces. Innovation will play a key role—through smart technologies, digital ticketing, and data-driven service improvements—to enhance user experience and operational efficiency. This transformation will support economic growth, social inclusion, and long-term environmental sustainability. Through active collaboration with stakeholders and continuous citizen engagement, public transport will become the preferred and trusted mode of everyday mobility in Osijek."

4.7. Goals

The following Goals are related to at least one of the four main dimensions:

- Mobility
- Economic
- Social
- **Environmental**

Table 3: List and descriptions of Local Plan's Goals

Goal	Description

Optimise 100% of public transport routes by 2028. (Mobility, Economic)	Public transport routes will be comprehensively optimised to enhance operational efficiency and service coverage.
Increase the average operating speed of buses on the busiest urban routes by 25% by 2028. (Mobility, Economic)	Bus operating speeds on key urban corridors will be improved to significantly reduce travel times.
Equip 80% of bus stops and 90% of vehicles to be fully accessible for people with disabilities and other mobility challenges by 2030. (Social, Mobility)	The majority of stops and vehicles will be upgraded to ensure full accessibility for individuals with disabilities and mobility challenges.
Increase the frequency of departures on major public transport corridors by 25% by 2028. (Mobility, Economic)	Service frequency on major corridors will be increased to better accommodate passenger demand.
Reduce the average public transport vehicle delay by 50% by 2028. (Mobility, Economic)	Vehicle delays will be substantially reduced to improve service reliability and punctuality.
Implement seamless ticketing and scheduling integration with shared mobility services (e.g., bike-share, railway system, etc.) in all major hubs by 2030. (Mobility, Economic)	Ticketing and scheduling systems will be fully integrated with shared mobility services to enable seamless multimodal travel.
Ensure that 100% of public transport stops are upgraded and properly equipped by 2030. (Social, Mobility)	All public transport stops will be modernised and equipped to meet contemporary service and accessibility standards.
Modernize 70% of the bus and tram fleet and key infrastructure by 2026. (Mobility, Environmental, Economic)	A significant share of the fleet and critical infrastructure will be modernised to improve sustainability and performance. Upgrade vehicles, stations, and systems to meet modern standards of efficiency, comfort, accessibility, and safety.
Increase the number of public transport passengers by 35% by 2030. (Mobility, Economic, Environmental)	Overall ridership will be increased through targeted improvements in service quality and user experience.

Reduce public transport-related greenhouse gas emissions by 60% by 2030 through electrification and efficiency improvements. (Environmental, Economic)	Greenhouse gas emissions from public transport will be significantly reduced through electrification and energy-efficient technologies.
Increase the modal share of public transport in daily mobility by 50% by 2030. (Mobility, Environmental)	Public transport will capture a greater share of daily mobility, contributing to a more sustainable transport ecosystem.
Deploy smart ticketing, real-time tracking, and real-time monitoring systems across 100% of the network by 2030. (Mobility, Economic)	Network-wide deployment of smart ticketing, real-time tracking, and monitoring systems will support efficient service management.
Ensure 100% of users have access to real-time travel information via mobile apps and signage by 2028. (Mobility, Social)	Real-time travel information will be made universally accessible through digital platforms and on-site displays.
Conduct biannual stakeholder forums and reach 10,000+ citizens annually through engagement campaigns to support collaborative decision-making. (Social, Economic)	Ongoing public engagement will be facilitated through structured forums, outreach initiatives, and promotional campaigns to support participatory planning and raise awareness.

4.8. Goals coherence analysis

The local objectives selected in this section must be consistent with the objectives defined at European level, as well as with national/regional objectives. The following table shows a verification of the consistency of the Local Plan objectives and indicates the level of consistency according to the following scale:

■ ■ Strong Coherence

■ Coherence

□ Weak coherence

Local Plan's Goal	European Strategies Priority	National Strategies on mobility and transport	National Strategies on Energy/Environment	Regional/Local Strategies on mobility and transport	Regional/Local Strategies on Energy/Environment
Optimise 100% of public transport routes by 2028. (Mobility, Economic)	Priority 1 and Priority 2	■ ■	■ ■	■ ■	■ ■
Increase the average operating speed of buses on the busiest urban routes by 25% by 2028. (Mobility, Economic)	Priority 2 and Priority 5	■	■	■	■
Equip 80% of bus stops and 90% of vehicles to be fully accessible for people with disabilities and other mobility challenges by 2030. (Social, Mobility)	Priority 1	■ ■	□	■ ■	□
Increase the frequency of departures on major public transport corridors by 25% by 2028. (Mobility, Economic)	Priority 2	■	■	■	■
Reduce the average public transport vehicle delay by 50% by 2028. (Mobility, Economic)	Priority 2 and Priority 5	■ ■	■	■	■
Implement seamless ticketing and scheduling integration with shared mobility services (e.g., bike-share, railway system, etc.) in all major hubs by 2030. (Mobility, Economic)	Priority 3 and Priority 4	■ ■	□	■ ■	□

Ensure that 100% of public transport stops are upgraded and properly equipped by 2030. (Social, Mobility)	Priority 1 and Priority 6	■	□	■	□
Modernize 70% of the bus and tram fleet and key infrastructure by 2026. (Mobility, Environmental, Economic)	Priority 2 and Priority 5	■ ■	■ ■	■ ■	■ ■
Increase the number of public transport passengers by 35% by 2030. (Mobility, Economic, Environmental)	Priority 2 and Priority 1	■ ■	■ ■	■ ■	■ ■
Reduce public transport-related greenhouse gas emissions by 60% by 2030 through electrification and efficiency improvements. (Environmental, Economic)	Priority 5	■ ■	■ ■	■ ■	■ ■
Increase the modal share of public transport in daily mobility by 50% by 2030. (Mobility, Environmental)	Priority 2 and Priority 3	■ ■	■ ■	■ ■	■ ■
Deploy smart ticketing, real-time tracking, and real-time monitoring systems across 100% of the network by 2030. (Mobility, Economic)	Priority 4 and Priority 3	■ ■	□	■ ■	□
Ensure 100% of users have access to real-time travel information via	Priority 1 and Priority 2	■ ■	□	■ ■	□

mobile apps and signage by 2028. (Mobility, Social)					
Conduct biannual stakeholder forums and reach 10,000+ citizens annually through engagement campaigns to support collaborative decision-making. (Social, Economic)	Priority 2 and Priority 5	■	□	■	■

5. Actions

This chapter introduces the first structured outline of possible actions that the city of Osijek may undertake to achieve its vision and goals. These actions are grounded in the results of the SWOT analysis and developed through participatory dialogue involving technical experts, political representatives, citizens, and relevant stakeholders.

At this stage, the actions are presented in a general and strategic form. They represent a preliminary list of intervention measures that address identified needs and opportunities and reflect the city's ambitions in improving its public transport system.

However, these proposed actions are not final. They will undergo a validation process through scenario-based assessments and modelling tools. This process will help refine the actions, add technical and financial detail, and establish a hierarchy of priorities based on impact, feasibility, and consistency with the overall strategy. In this way, the initial list becomes a foundation for informed decision-making in the subsequent phases of the plan.

Table 4: List of actions

Action	Brief description	Goal
Introduce new bus lines in underserved areas	Connection between Osijek and Bilje municipality and other low-access neighbourhoods to improve equity and connectivity.	1, 4, 9, 11
Bus route restructuring and optimization	Redesign existing routes based on demand, travel patterns, and performance data.	1, 2, 4, 5, 11
High-frequency bus corridors	Establish core corridors with high-frequency service (e.g., every 5–10 minutes).	4, 9, 11
Fleet electrification	Replace diesel buses with zero emission vehicles across the city.	8, 10

Real-time tracking system	Implement GPS-based arrival tracking available via mobile app and station displays.	12, 13, 5
Mobility hub development	Build integrated hubs where buses, bike-sharing, car-sharing, railway system intersect	6, 7, 11
Marketing campaign to boost ridership	Launch a public awareness campaign emphasizing benefits of public transport.	9, 14
Regional rail integration	Expand timetables and ticketing to coordinate with intercity trains.	1, 6, 11
Infrastructure upgrade program	Plan and execute 20+ targeted upgrades, including new tram and bus lines and station renovations.	3, 7, 8, 10, 12

6. Actions and Transport Models Scenarios

The use of transport and land use models support evidence-based decision-making and guide the prioritization of interventions. This methodology incorporates, specifically, the classic four-step transport model (e.g. VISUM) and land use–transport interaction (LUTI) models. These tools allowed the city of Osijek to move beyond static, prescriptive planning toward a dynamic, scenario-based approach aligned with European best practices and Sustainable Urban Mobility Plan (SUMP) guidelines.

By simulating future mobility and land use conditions under varying assumptions, models enable local decision makers to assess the likely impacts of different policies or actions, such as new transit lines, fare adjustments, or urban development strategies, on accessibility, modal shift, environmental outcomes, and social equity.

The following table summarize the main scenario that have been tested within the OPTI-UP project.

Table 5: List of actions and models scenario results

Action	Description of model results
Introduction of new city bus line in underserved areas (Opus Arena – Portanova - Đakovština – new bus line) without any changes in spatial development (Scenario 1)	General increase of public transport demand by **250 passengers per day**, representing a **1 % rise** compared to the current situation. The total number of daily passengers reached **26,290**, while the average number of passengers per line decreased by **8.2 %**. The number of departures rose by **3.3 %**, and the total network length expanded by **6.2 %**, improving connectivity between residential and employment areas in the western part of Osijek.
Introduction of new optimized bus public transport network without any changes in spatial development (Scenario 2)	The implementation of the optimized bus network led to a general increase of public transport demand by **4,902 passengers per day**, or **18.8 %** compared to the current situation.

	The total number of daily passengers reached **30,942**, while the number of stops increased from **360 to 388**, improving accessibility in suburban areas such as Čepin, Tenja, and Briješće. The number of departures rose by **4.4 %**, and the total network length expanded by **3.1 %**, reaching **351.87 km**.
Introduction of new optimized bus public transport network without any changes in spatial development (Scenario 3)	The further optimization of the public transport network resulted in a general increase of public transport demand by **2,532 passengers per day**, representing an **8.2 % growth** compared to Scenario 2 and a **28.6 % rise** compared to the current situation. The total number of daily passengers reached **33,474**, while the number of stops increased to **399**, enhancing spatial accessibility and network coverage. The number of departures grew slightly by **0.2 %**, and the total network length expanded by **2.1 %**, reaching **359.24 km**.

6.1. Overview of scenarios in VISUM (and LUTI)

The development of scenarios for the City of Osijek was developed first within the PTV Visum transport model, based on comprehensive analysis of spatial and demographic statistics, economic indicators, urban structure and land use, as well as the existing transport infrastructure relevant to public transport. The analysis also considered current services provided by GPP Osijek, the level of spatial accessibility, and the prevailing mobility patterns of the city's population. This integrated analytical process provided a solid foundation for defining realistic and applicable transport scenarios.

The main objective of the scenario analysis was to elevate the impacts of different organizational and infrastructural options for public transport on the overall efficiency of the system and the level of accessibility within the urban area, including municipalities Antunovac, Tenja, Čepin and Bilje.

Based on the analyses conducted, a total of three scenarios were defined for detailed modeling:

1. Current network with **one bus line expansion** – in addition to two tram lines and eight bus lines, a new bus line 9 Opus arena – Đakovština was introduced, providing a more direct connection between the residential area of Retfala and the S cesta business zone as well as the Industrijska četvrt district.
2. **Reorganization of the bus network** – the bus network was reorganized, comprising a total of 9 lines, with the aim of rationalizing routes, improving transfer opportunities and ensuring better coordination with the main tram corridors. The two existing tram lines remain unchanged in this scenario.
3. **Optimized bus network** – this scenario introduces an optimized configuration of the bus network, consisting of 9 lines, designed to improve accessibility to key urban and suburban areas and to enhance integration with both the tram and rail services. The two tram lines from the existing network are retained in this scenario as well.

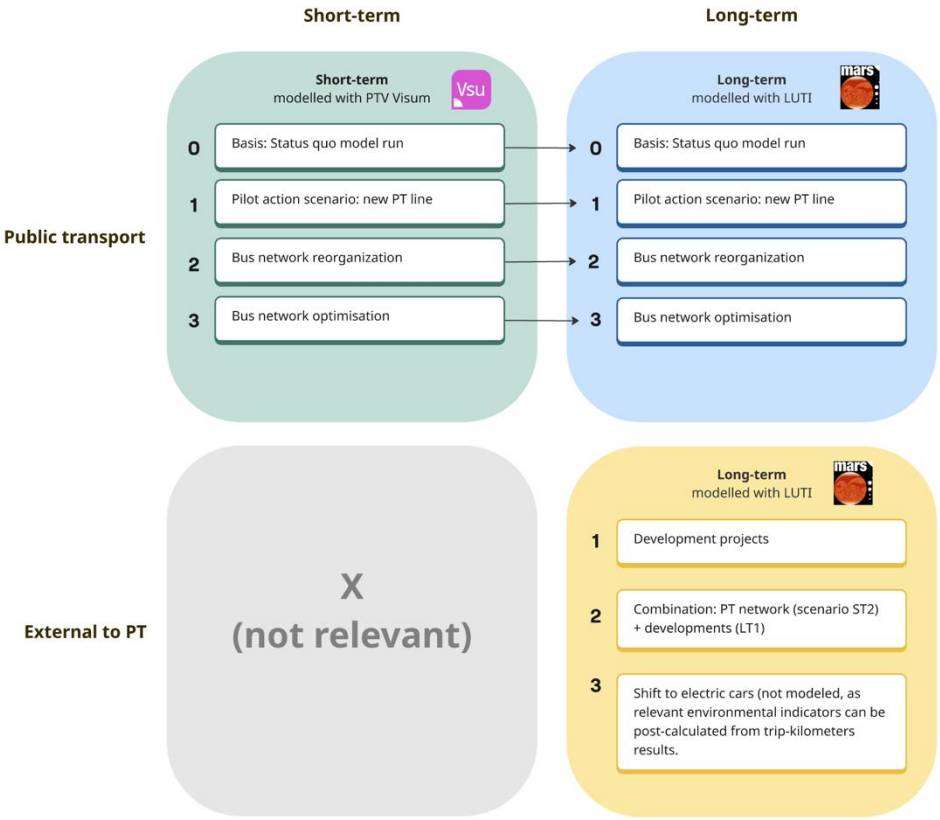


Figure 1: Scenario identification for the Osijek case study area

6.2. VISUM model of short-term scenarios

As stated in previous section, three different scenarios were developed and analysed using a transport model in PTV VISUM to evaluate potential improvements to public transport in Osijek and its surrounding municipalities. The scenarios explore different approaches to enhancing service efficiency, accessibility and operational organization, providing a basis for assessing network performance under varying configurations.

Table 6.1 provides an overview of the modelling results. Detailed information and results from the scenarios are presented in the following sections:

- Section 6.2.1 retains the current public transport network while adding a new 9 Opus arena – Đakovština bus line.
- Section 6.2.2 introduces a new configuration of 9 bus lines, with a reduced number of overlapping route variants, optimized connections to improve operational clarity, transfer opportunities, and overall attractiveness of the service; the two existing tram lines remain, but the existing bus lines are not retained.
- Section 6.2.3 presents an optimized configuration of 9 bus lines with further reduction of overlapping route variants and additional stops to improve coverage, creating more integrated, user-friendly network while the two tram lines remain.

Table 6: Scenarios overview

Indicator	Base scenario	Scenario 1	Scenario 2	Scenario 3
Traffic supply				
Lines	10 (2 tram + 8 bus)	11 (2 tram + 9 bus)	11 (2 tram + 9 bus)	11 (2 tram + 9 bus)
Line routes	93	95	22	22
Stops	360	365	388	399
Total length (km)	341.18	362.38	351.87	359.24
Vehicle journeys	813	840	849	851
Traffic demand				
Total number of passengers (daily)	26,040	26,290	30,942	33,474
Passengers per line (daily)	2,604	2,390	2,812	3,043
Passenger kilometres	92,872.43	93,104.75	111,897.29	119,192.45

6.2.1. Scenario S1 – Current network with one bus line expansion

In this scenario, the existing public transport network, consisting of 2 tram lines (4 line routes) and 8 bus lines (89 line routes), is complemented by a pilot bus line – 9 Opus Arena – Đakovština (2 line routes), resulting in a total of 2 tram lines and 91 bus line routes (Figure 2). In addition to these routes, 5 new stops were also introduced.

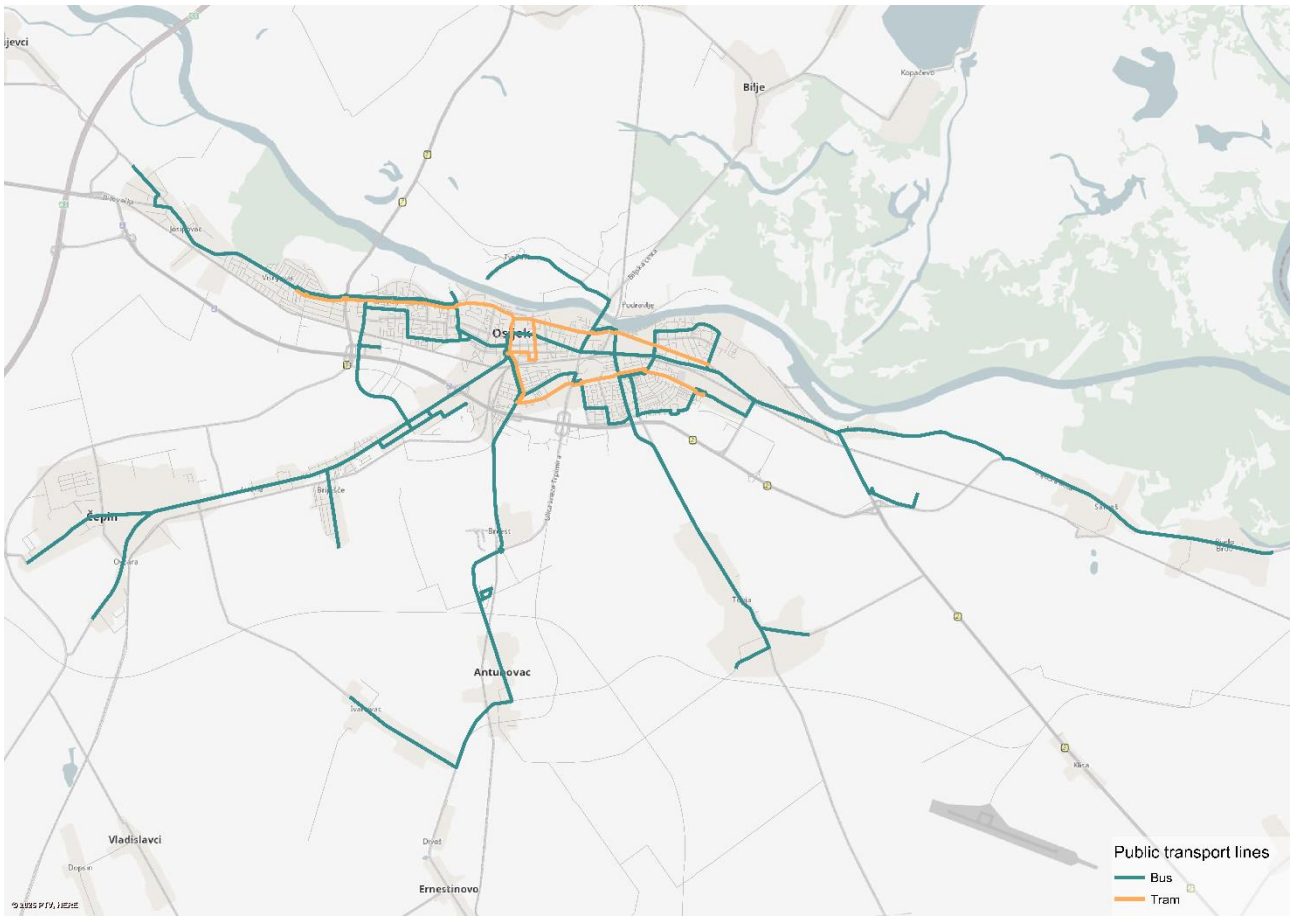


Figure 2: Public transport network Scenario 1

The pilot bus line was planned based on previous analyses and the identified needs of the population, in coordination with representatives of the City of Osijek. This line provides residents of the Retfala neighbourhood, located in the western part of the city, with a more direct connection to the newly developed S Cesta Business Zone and the Industrijska četvrt, which attracts a significant number of commuters. The route extends for a total length of 21.2 km (round trip) and serves 20 stops/turning points along its course (Figure 3).

With the introduction of the pilot line, the total length of the public transport network increased to 362.38 km, which is 6.2 % more compared to the base scenario. The new line is planned to operate 27 departures per day, raising the total number of public transport departures by 3.3 %.

In terms of demand, the number of daily passengers slightly increased by 1 %, while the average number of passengers per line decreased by 8.2 %. The total passenger-kilometres increased to 120,105 km, representing a 29 % rise compared to the base scenario.

The public transport lines in PTV VISUM for this scenario are shown in Figure 4.

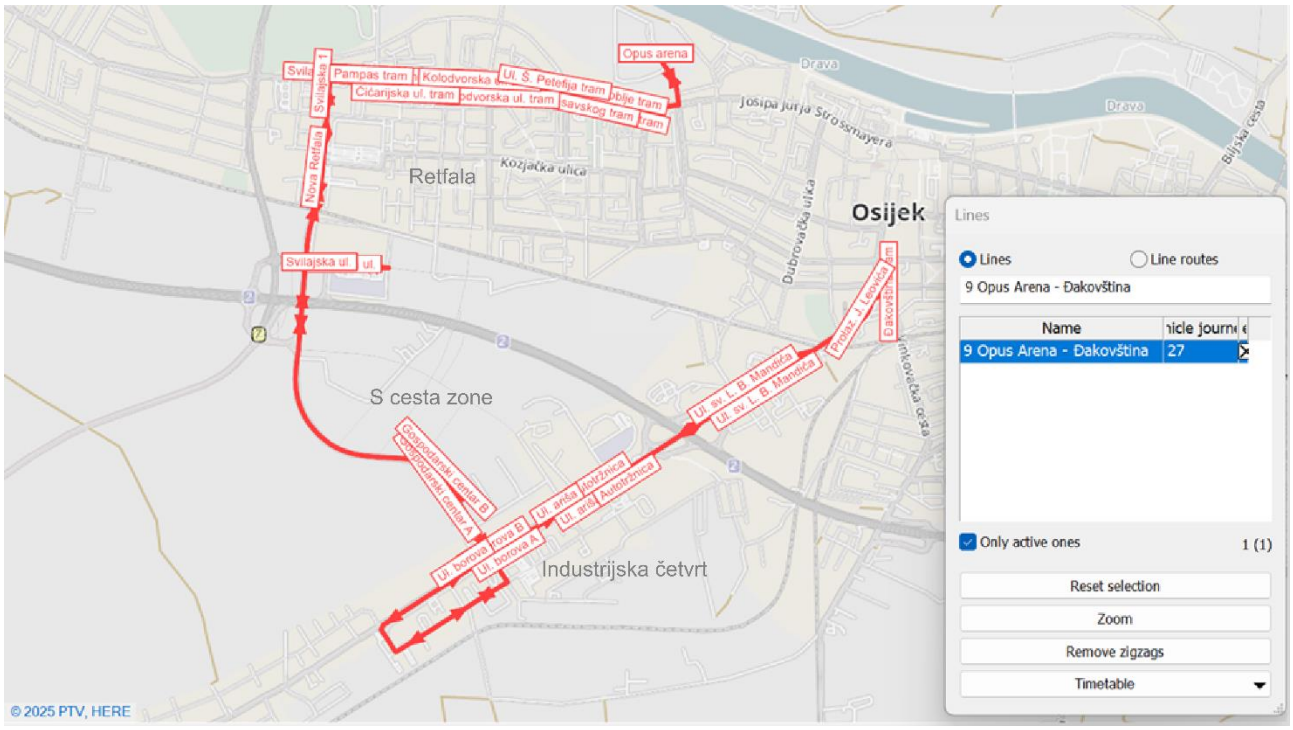


Figure 3: New pilot bus line 9 Opus arena - Đakovština

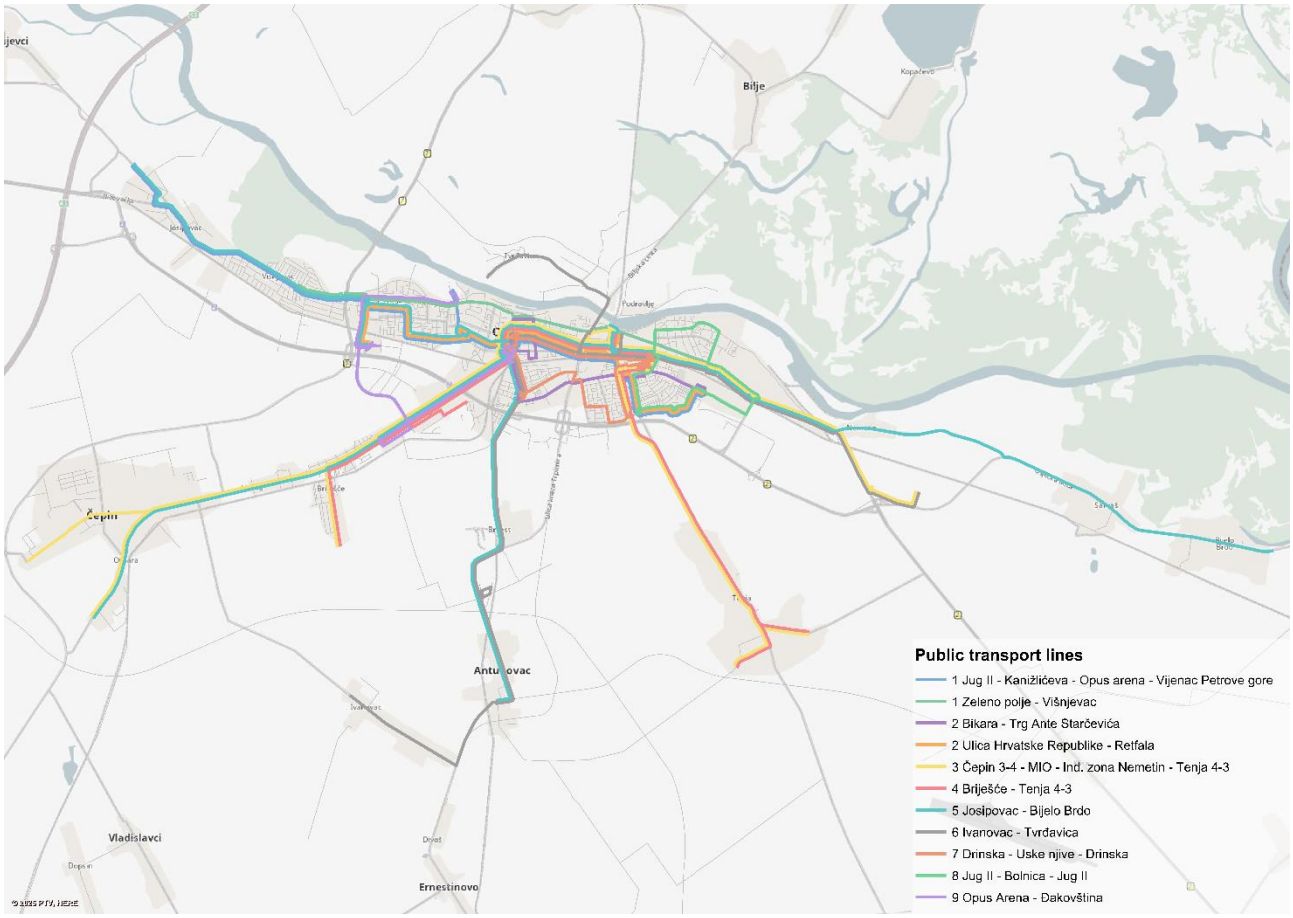


Figure 4: Public transport lines Scenario 1

6.2.2. Scenario S2 – Reorganization of the bus network

A new configuration of 9 bus lines with 18 line routes replaces the existing bus lines, is designed to reduce overlapping routes and simplify service patterns. Additional stops improve accessibility, while operational adjustments enhance efficiency, transfer opportunities, and overall service quality. The two tram lines (1 Zeleno polje – Višnjevac and 2 Bikara – Trg Ante Starčevića) are retained to preserve core connections across the urban area.

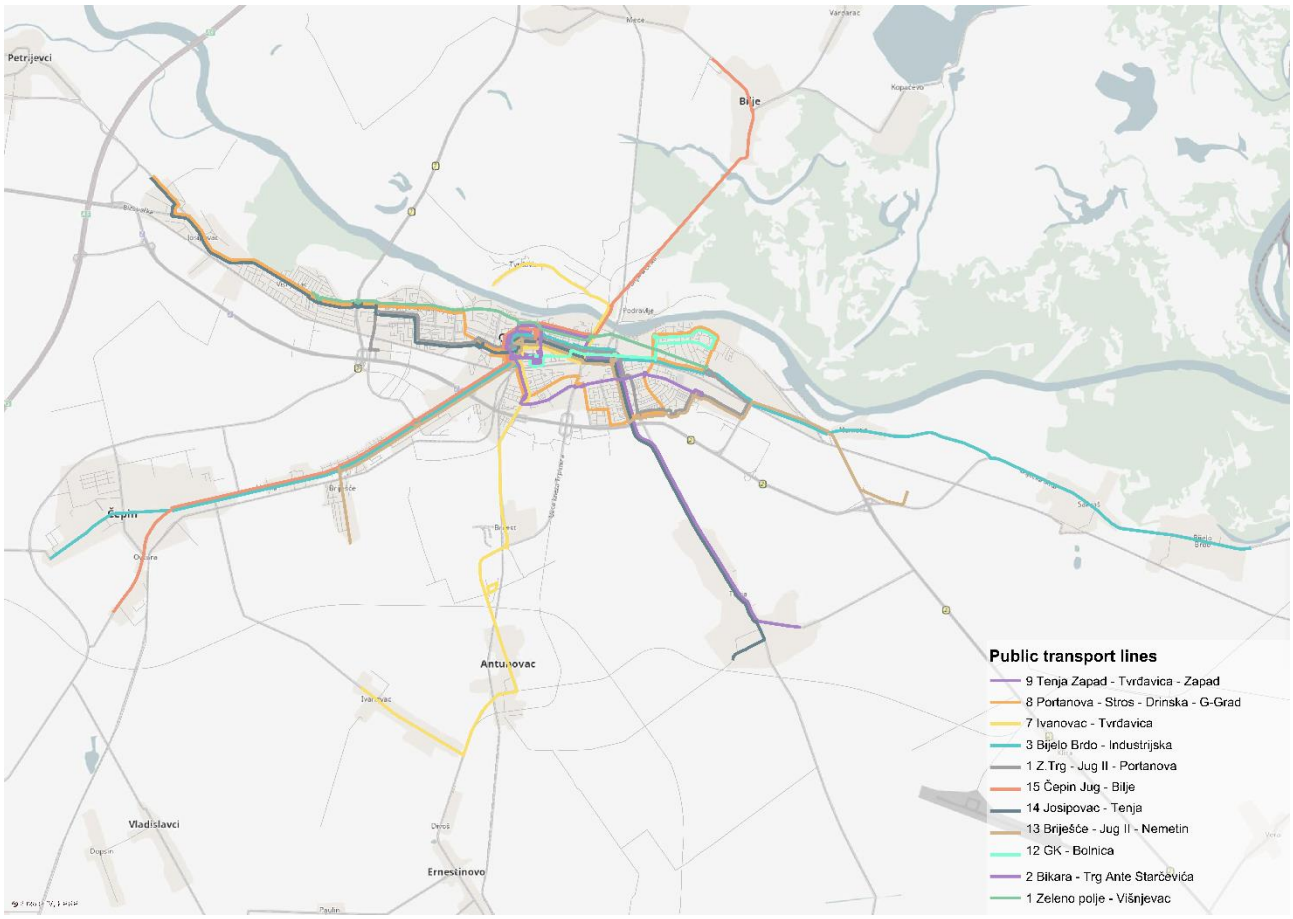


Figure 5: Public transport lines Scenario 2

With the implementation of Scenario 2, the total number of public transport lines increased from 10 (2 tram and 8 bus lines) to 11 (2 tram and 9 bus lines). At the same time, the number of routes was reduced from 93 to 22 to simplify the network for passengers and avoid overlapping routes.

The overall network length expanded from 341.18 km to 351.87 km, representing an increase of 3.1 % compared to the base scenario. The total number of vehicle journeys also rose, from 813 to 849 (4.4 % %).

In terms of demand, the number of daily passengers increased from 26,040 to 30,942 (18.8 %), while the average number of passengers per line rose from 2,604 to 2,812, marking an increase of 8 %.

Furthermore, the total passenger-kilometres increased from 92,872 km to 111,897.29 km, representing a 20.5 % rise compared to the base scenario.

Overall indicators for public transport lines for this scenario are shown in the Table 7.

Table 7: Public transport overview Scenario 2

Line	Length (km)	Passengers	Passengers per 1km of line length	Departures	Passengers per departure
1 Zeleno polje - Višnjevac	18,40	12.434	675	252	49
2 Bikara - Trg Ante Starčevića	13,65	2.637	193	144	18
12 GK - Bolnica	9,90	374	37	75	5
13 Briješće - Jug II - Nemetin	37,37	2.322	62	35	66
14 Josipovac - Tenja	42,07	1.474	35	40	36
15 Čepin Jug - Bilje	43,44	877	20	38	23
11 Z.Trg - Jug II - Portanova	26,92	3.476	129	111	31
3 Bijelo Brdo - Industrijska	59,20	1.768	29	39	45
7 Ivanovac - Tvrđavica	39,62	1.627	41	38	42
8 Portanova - Stros - Drinska - G-Grad	38,06	2.316	60	39	59
9 Tenja Zapad - Tvrđavica - Zapad	23,25	1.636	70	38	43,1

6.2.3. Scenario S3 – Optimized bus network

The bus network is further refined with 9 bus lines (18 line routes), minimizing the overlapping routes and adding additional stops to expand coverage and accessibility. Total number of new stops in this scenario is 39. Operational adjustments aim to create more integrated and user-friendly network, while the two existing tram lines are retained.

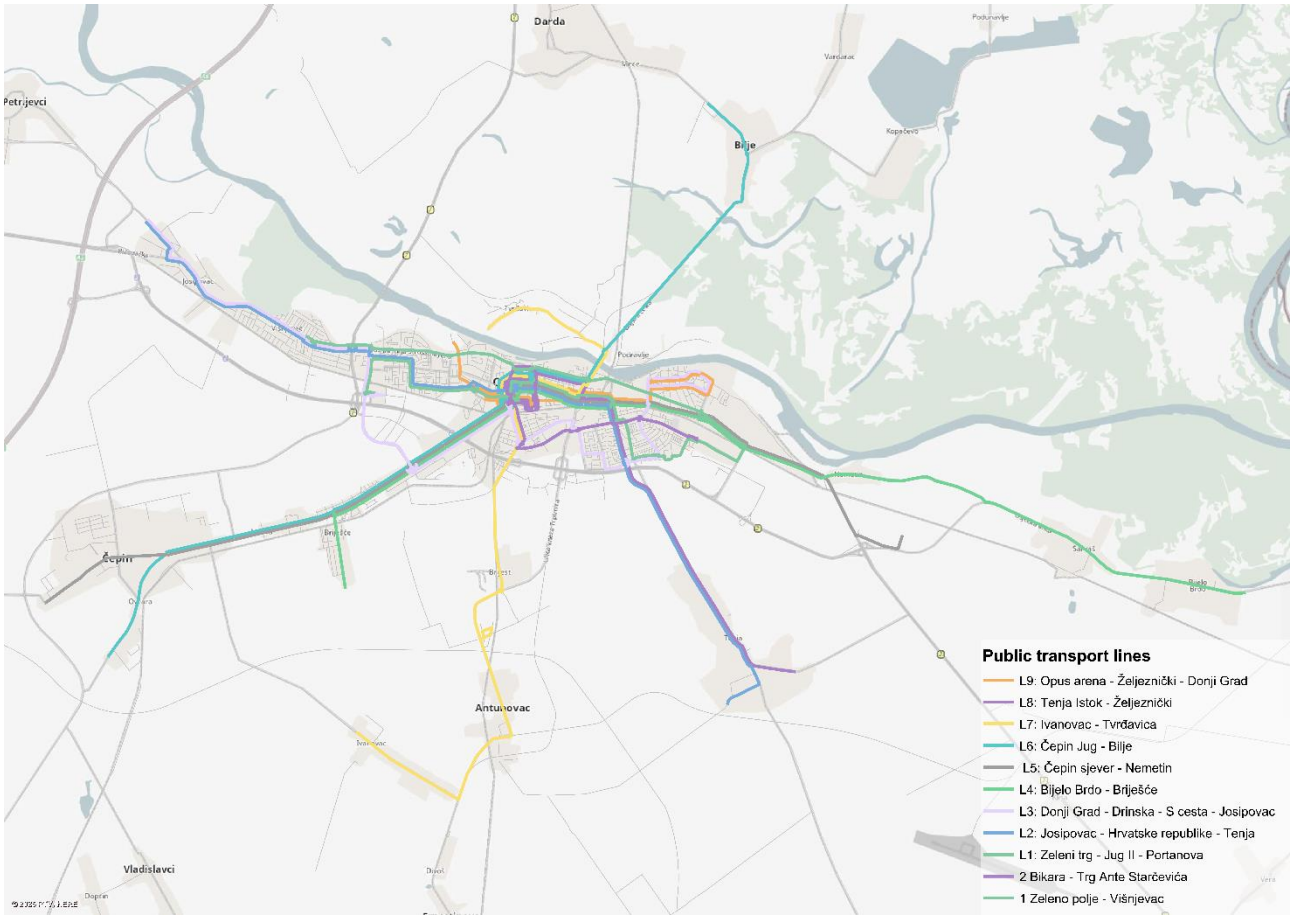


Figure 6: Public transport lines Scenario 3

Compared to Scenario 2, Scenario 3 features a more compact and streamlined public transport network. The total number of lines remained at 11 (2 tram and 11 bus lines), as well as the number of line routes (22), ensuring network simplicity and service clarity for passengers.

The total network length slightly increased from 351.87 km to 359.24 km (2.1 %), and the number of vehicle journeys rose marginally, from 849 to 851 (0.2 %).

Despite the relatively small change in network extent, demand indicators improved further. The total number of daily passengers increased from 30,942 to 33,474 (8.2 %), and the average number of passengers per line rose from 2,812 to 3,043, marking an increase of 8.2 %.

The total passenger-kilometres also grew, from 111,897 km to 119,192 km, marking a 6.5 % growth compared to Scenario 2.

Table 8: Public transport network overview Scenario 3

Line	Length	Passengers	Passengers per 1km of line length	Departures	Passengers per departure
1 Zeleno polje - Višnjevac	18,40	13.585	738	252	53
2 Bikara - Trg Ante Starčevića	13,65	2.877	210	144	20

L1: Zeleni trg - Jug II - Portanova	26,91	4.767	177	362	13
L2: Josipovac - Hrvatske republike - Tenja	42,07	1.481	35	116	12
L3: Donji Grad - Drinska - S cesta - Josipovac	43,07	1.267	29	214	5
L4: Bijelo Brdo - Briješće	48,51	2.204	45	187	11
L5: Čepin sjever - Nemetin	44,67	1.186	26	108	11
L6: Čepin Jug - Bilje	43,26	939	21	109	8
L7: Ivanovac - Tvrđavica	39,62	1.732	43	113	15
L8: Tenja Istok - Željeznički	23,49	1.632	69	114	14
L9: Opus arena - Željeznički - Donji Grad	15,59	1.805	115	188	9

6.3. LUTI model of long-term scenarios

6.3.1. LUTI Scenario ST1, ST2 and ST3 – PT improvements

The above bus and PT optimization scenarios are also modeled in LUTI model MARS to predict the changes over the long term. The resulting mode split and passenger-kilometres changes over time are plotted in Figure 7, and the numerical results at the end of the simulation is given in Table 9. As it can be seen in Figure 7, the resulting trends are very similar across the three scenarios, where the share of car-based trips is the highest, followed by walking, PT, and cycling trips. Table 9 further suggests that all three PT improvement scenarios can increase the passenger-kilometre activities of PT compared to the baseline scenario, but the final passenger-kilometres of car trips also increase compared to the baseline scenario.

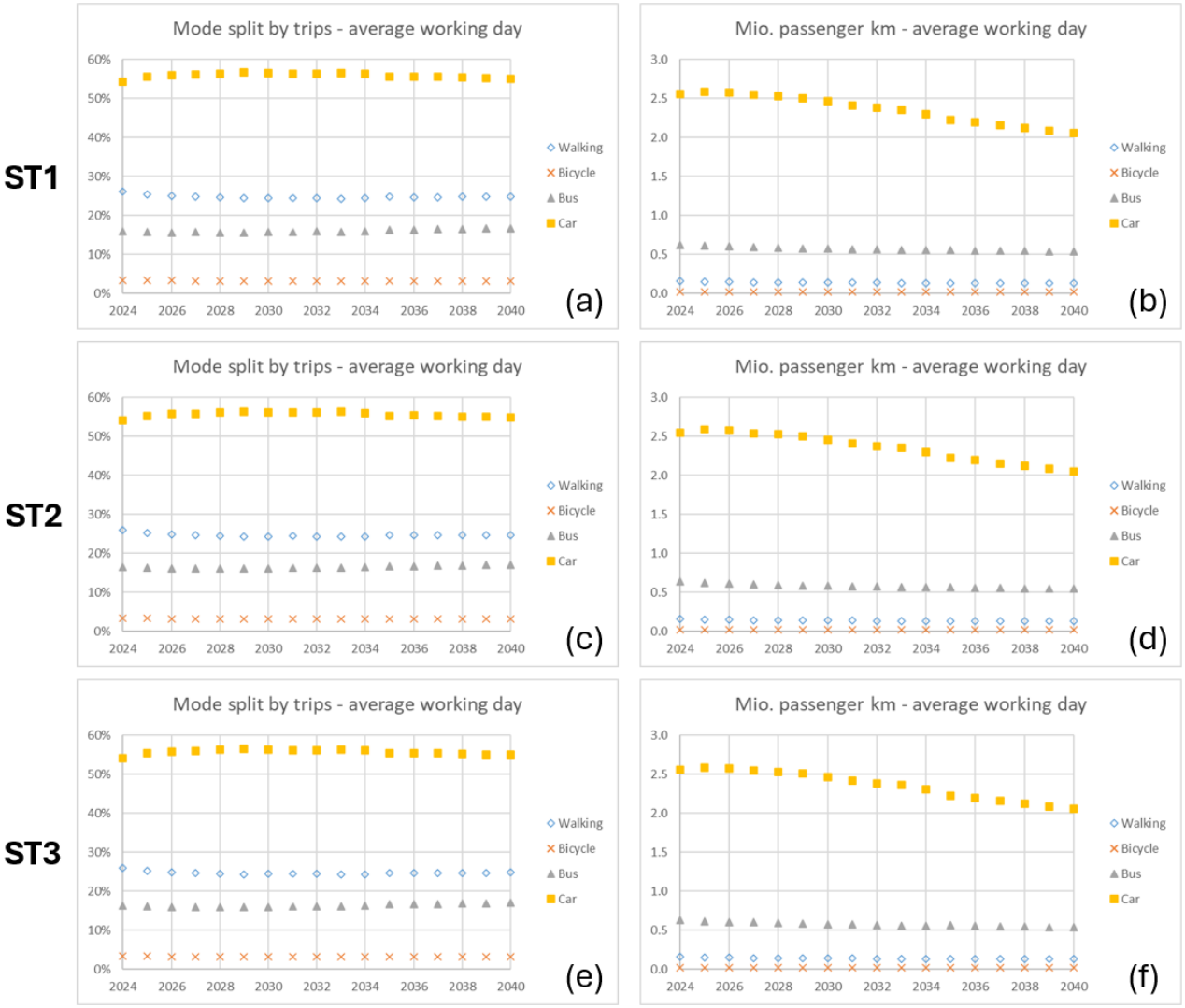


Figure 7: MARS results of ST1-T3: (a), (c), (e): mode split change over time; (b), (d), (f): passenger-kilometres change over time.

Table 9: MARS results of ST1-ST3

Indicator	Base scenario	ST 1	ST 2	ST 3
Mode split in 2040				
Walking	23.9%	24.8%	24.7%	24.8%
Cycling	3.2%	3.3%	3.3%	3.3%
Bus	19.7%	16.4%	16.8%	17.0%
Car	53.2%	55.5%	55.3%	54.9%
Passenger-kilometre in 2040 (in million)				

Walking	0.13	0.13	0.13	0.13
Cycling	0.02	0.02	0.02	0.02
Bus	0.42	0.54	0.55	0.54
Car	2.01	2.05	2.05	2.06
Daily passenger counts in 2040				
Walking	114,968	117,909	117,757	118,381
Cycling	15,247	15,637	15,623	15,702
Bus	94,913	79,351	81,541	81,086
Car	256,383	261,213	260,572	263,992

6.3.1. LUTI Scenario LT1 – Planned development projects

Scenario LT1 represents the change in inhabitants and workplaces resulting from planned urban development projects. While in the BAU scenario, spatial development is simulated according to the built-in land-use model in MARS, in Scenario LT1, this information was introduced as an external input to reflect expected demographic and spatial changes based on existing municipal spatial development plans and identified investment projects.

The assumptions are based on an analysis of past trends in filled and vacant jobs in the cities within the study area and the wider Osijek–Baranja County over the period 2011–2021, as well as population change between 2001 and 2024 across the same region. In parallel, we reviewed spatial planning documents to understand the location and quantity of land designated for economic expansion, analysed data on issued location and building permits, and incorporated other relevant inputs that indicate potential spatial and demographic changes.

An illustrative example of planned urban development is the Jug IV (South IV) area, corresponding to LUTI zone 34, which is planned for approximately 3,000 - 5,000 new inhabitants and includes several smaller mixed-use and social zones. This area represents a logical direction for urban expansion, supported by ongoing municipal investments, the preparation of a Detailed Urban Plan, and the planned realization of infrastructure and the first construction phase.

Based on these calculations and projections, the study area's population is expected to decline by approximately 7.9% by 2040, decreasing from around 125,000 to roughly 115,000 inhabitants. In the BAU scenario, it was assumed based on current trends that the population declines by 1.18% per year to about 103,000 inhabitants in 2040. In contrast, the number of jobs is projected to increase from 53,000 in 2024 to 80,000 in 2040 in scenario LT1, reflecting the implementation of key development projects such as the expansion of the Nemetin business zone, the third phase of construction of the Osijek economic zone, and the construction of the new hospital site in Osijek. Number of workplaces in the BAU scenario were assumed to grow by 0.81% every year to about 60,000 in 2040. The resulting dataset expresses the expected change per LUTI zone by 2040, assuming linear growth between the base year 2024 and 2040. Figure 8 and Figure 9 illustrate the change in inhabitants between 2024 and 2040 for both scenarios.

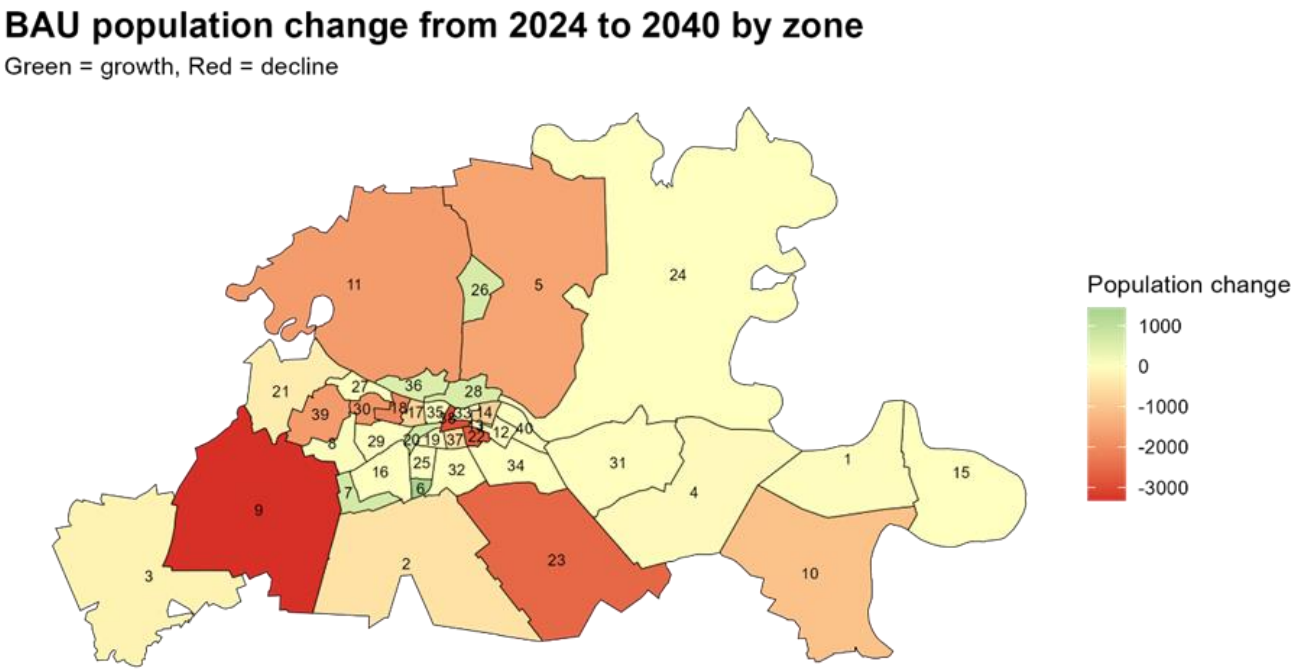


Figure 8: Population change in the BAU scenario

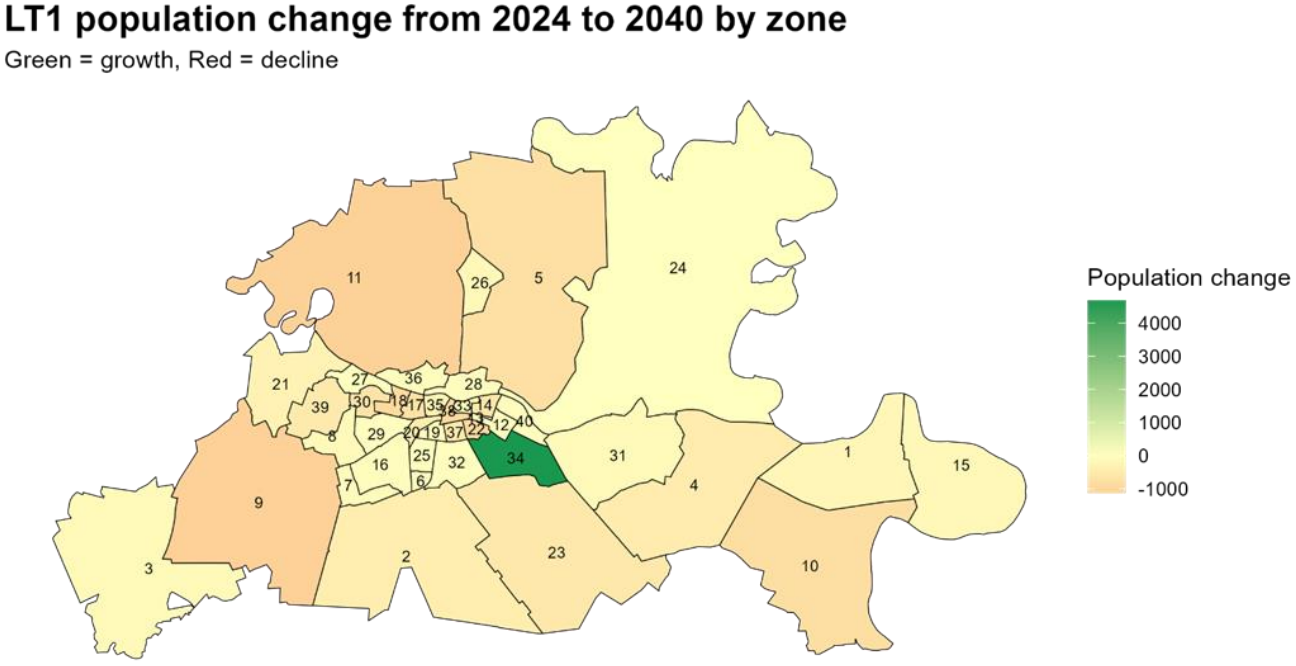


Figure 9: Population change in the LT1 scenario

While the population declines in both scenarios overall, there are large differences in the assumptions of which zones lose or gain inhabitants. In scenario LT1, population growth is dominated by zone 34 with a large development project while it stays the same in the BAU scenario. In the BAU, outer zones are more prone to have declining populations while some more central zones show an increasing population. This can be explained by better accessibility.

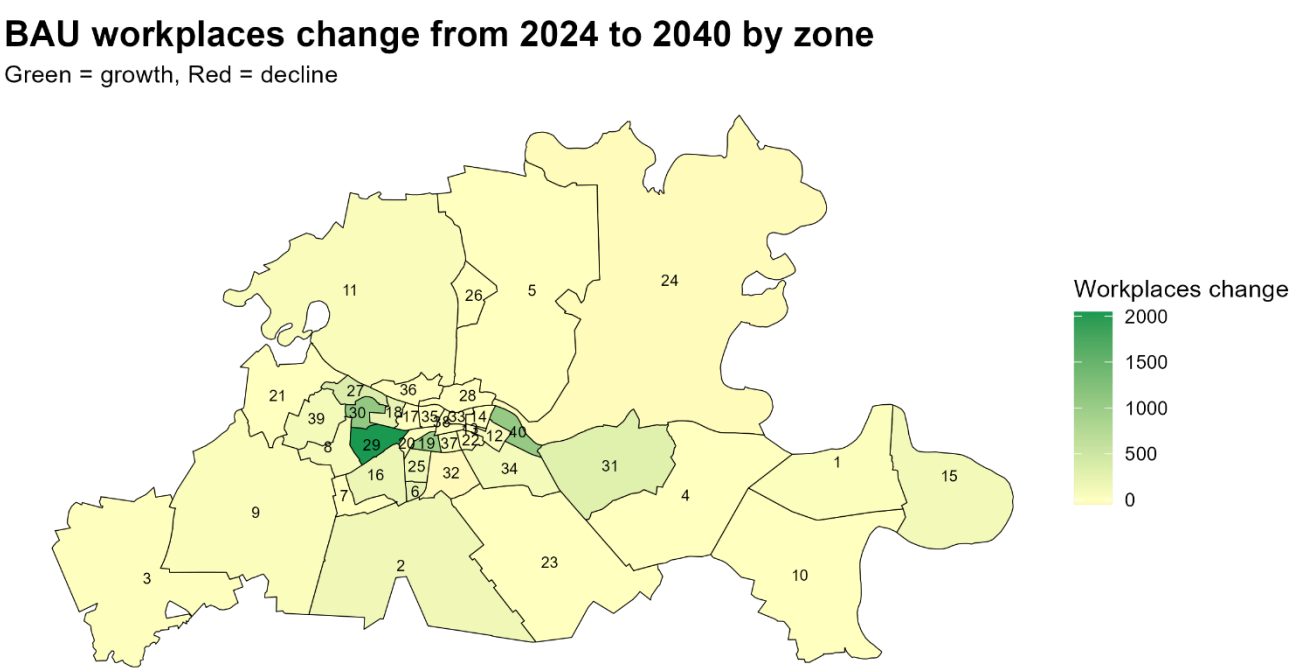


Figure 10: Change of workplaces in BAU scenario

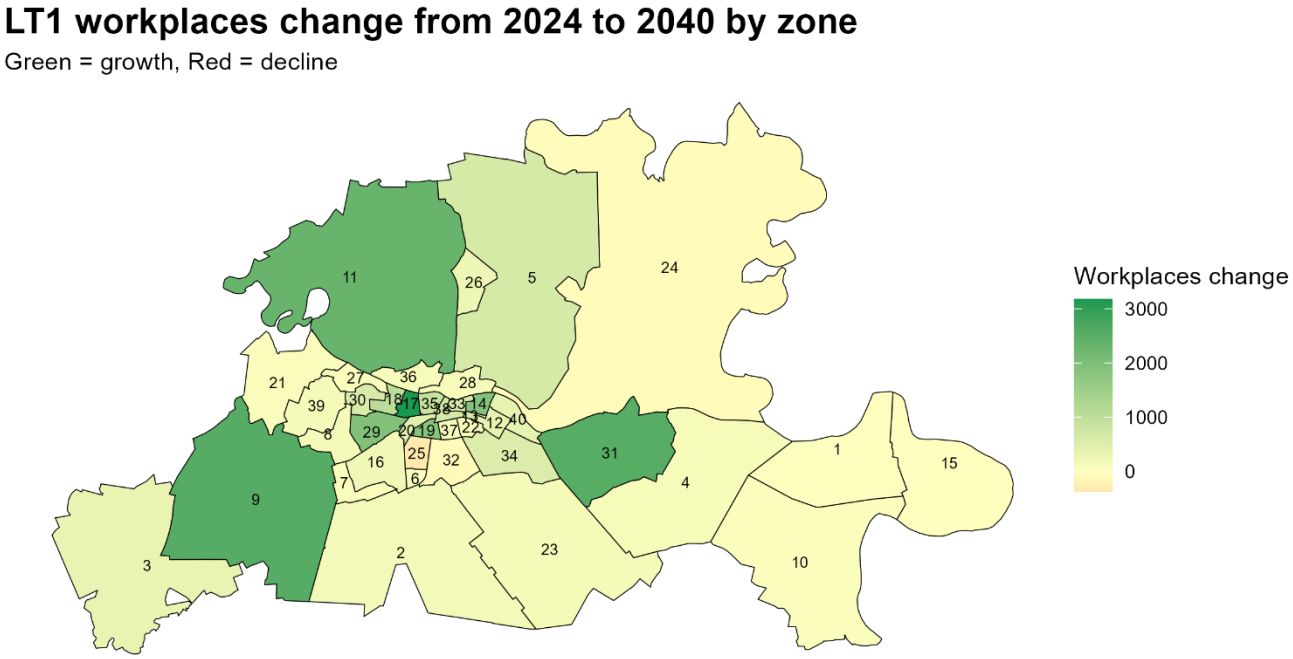


Figure 11: Change of workplaces in LT1 scenario

Figure 10 and Figure 11 show the changes in workplaces for scenario BAU and LT1, respectively. While there is more growth in inner zones in the BAU scenario, large developments projects in the outer zones 9, 11 and 31 are shown to increase workplaces in these zones in scenario LT1.

Results

In Scenario LT1, passenger-kilometres by car show a slight increase over the long term compared to BAU, reflecting the moderate rise in population linked to planned development projects (see Figure 12). Similarly,

bus passenger-kilometres (pkm) also grow modestly, while walking and cycling trips remain largely unchanged.

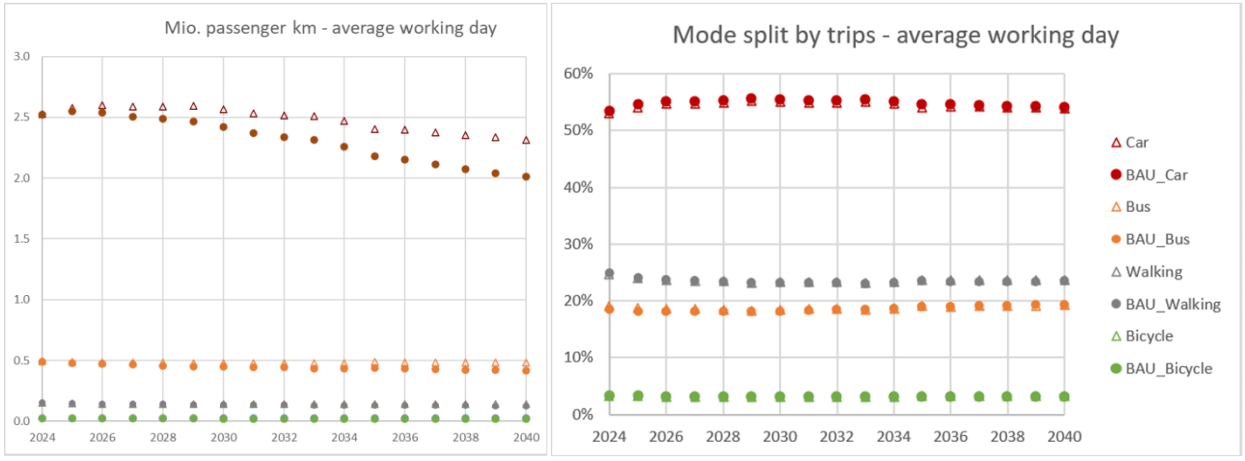


Figure 12: Passenger-kilometres per mode and Modal Split in the scenario BAU and LT1

Overall, the modal split remains relatively stable compared to the base year. The observed increase in total travel activity is therefore mainly a result of population growth, rather than substantial behavioural changes in mode choice. Car travel continues to dominate, followed by public transport, whereas active modes contribute only marginally to the overall mobility pattern. This suggests that, under the current development assumptions, new residents are likely to adopt mobility behaviours similar to the existing population. However, the introduction of additional public transport infrastructure, such as a new bus line or improved service frequency, could potentially shift some trips from private cars to public transport in these expanding areas.

6.3.2. LUTI Scenario LT2 –Optimized PT network in combination with planned development projects

In Scenario LT2, the spatial development from Scenario LT1 was combined with the optimized public transport network from short-term Scenario ST3. The results, shown in Figure 13, indicate an increase in passenger-kilometres by bus, while the bus mode share is lower than in both the BAU and LT1 scenarios. At the same time, the car mode share is higher, and car passenger-kilometres remain similar to those in LT1. This suggests that although fewer trips are made by bus, the average trip length has increased.

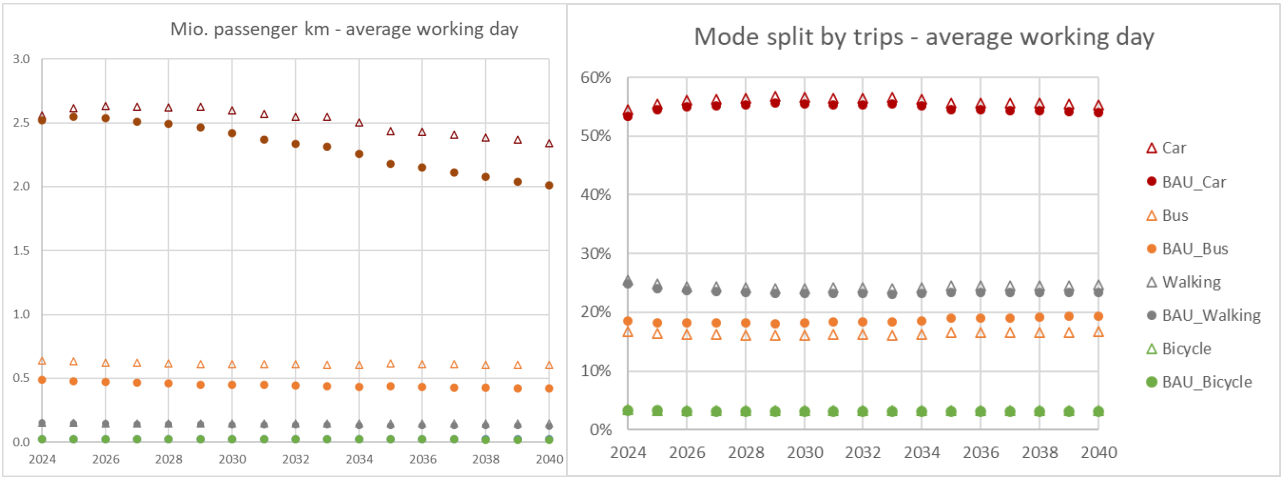


Figure 13: Passenger-kilometres per mode and Modal Split in the scenario BAU and LT2

6.4. Conclusion of scenario modelling

Summary of scenario modelling results

The modelling of the three public transport scenarios in PTV VISUM revealed distinct outcomes in terms of network performance and passenger demand. Scenario 1, which included the implementation of a pilot bus line, initially improved connectivity but proved unsustainable in operation, highlighting the need for more comprehensive network adjustments. Scenarios 2 and 3, based on reorganization and optimization of the bus network, demonstrated greater potential for long-term improvement in accessibility, efficiency, and overall service attractiveness. These results emphasize the importance of coordinated and systematic planning over isolated interventions.

For LUTI models, the long-term scenarios featuring planned development projects in the city are predicted to result in higher passenger-kilometres for PT trips as well as car trips. The changes in passenger-kilometres remain largely unchanged for cycling and walking. In addition, the scenario LT1 results in mode split that is largely similar to the BAU, indicating that travel behavior remains largely stable. In Scenario LT2, the integration of an optimized public transport network improves accessibility, though car dependency remains strong and only limited shifts toward bus travel are observed.

Connections with Local Goals and Visions set in Chapter 4

The scenario modelling results support Osijek's vision of a sustainable, efficient, and inclusive public transport system. While the pilot line in Scenario 1 faced operational challenges, Scenarios 2 and 3 show that network reorganization and optimization can significantly improve accessibility, service frequency, and operational efficiency. These scenarios contribute to key goals such as optimizing routes, increasing bus speeds and frequency, enhancing accessibility, and integrating with other mobility modes. By making public transport more attractive and reliable, the scenarios also support increased ridership, reduced car dependency, and lower emissions, advancing the city's environmental and social objectives. Overall, the modelling demonstrates how targeted network improvements align with Osijek's long-term vision for a modern, user-friendly, and sustainable mobility system.

Limitations in Scenario Definition, Modelling, and Results Analysis

The modelling is limited by assumptions on travel behaviour, static input data, and simplified operational conditions, which may not fully capture real-world constraints such as traffic variability, service reliability, or passenger responses. For the pilot line, actual ridership, punctuality, and accessibility performance may differ from modelled projections. These limitations could be addressed by integrating real-time data, conducting sensitivity analyses, or validating the model against observed travel patterns once the pilot is operational. Such steps would improve accuracy and strengthen confidence in scenario-based decision-making.

How the Modelling Action Informs the Selection of Local Actions

While the final selection of local actions depends heavily on operational feasibility, the modelling provides insights into the relative performance of different options, such as route optimization or network reorganization. By estimating potential impacts on ridership, vehicle-kilometres, and accessibility, the model helps identify strategies with the greatest efficiency and energy-saving potential. These insights guide planning decisions, highlighting which interventions are likely to deliver meaningful improvements, even if some cannot be fully implemented due to practical constraints.

7. Stakeholders

In this chapter were identified key stakeholders from various sectors and regions.

Stakeholder engagement is emphasized through regular meetings, networking opportunities, experience sharing, and study tours, with reports compiled to document best practices and lessons learned.

Table 10: List of stakeholders

Stakeholder	Type	Role	Importance	Influence
City of Osijek	Local Government	Decision-making, financing, strategic planning	High	High
Osijek-Baranja County	Regional Government	Coordination of plans and resources with cities and municipalities	High	High
GPP Osijek	Transport Operator / Public Company	Operational management of public transport in Osijek	High	High
Hrvatske ceste d.o.o.	State Institution	Management of state roads affecting access to Osijek	High	High
County Roads Administration OBŽ	Regional Institution	Planning and maintenance of county and local roads	High	High
Ministry of the Sea, Transport and Infrastructure	National Government	Regulation, funding, legal framework	High	High
Taxi Operators (e.g., Osijek Taxi)	Private Sector / Service	Alternative to public transport, connecting with wider Osijek area	Medium	Medium
GPP Union	Labor Organization	Representing GPP employees, negotiating working conditions	Medium	Medium
Environmental Protection and Energy Efficiency Fund	State Institution	Co-financing eco-friendly projects in public transport	High	High

Hrvatska elektroprivreda d.d.	State Institution	Electricity provider for electric vehicles	High	High
Arriva d.o.o.	Private Sector / Transport Operator	Organizing intercity bus services, integrating with public transport	High	High
Slavonija bus	Private Sector / Transport Operator	Connecting Osijek with other cities, participating in intercity transport	High	High
Čazmatrans d.o.o.	Private Sector / Transport Operator	Major inter-county bus operator covering Osijek and surrounding areas	High	High

8. Action Plan

For each Action proposed in Chapter 5 and validated by the activities summarized in chapter 6, a table with the following information are defined: Resources, Timeline, Stakeholders, expected impacts, Risks and mitigation.

Table 11: Actions descriptions

Action	Resources	Timeline	Stakeholders	Expected Impact	Risks and Mitigation
Introduce new bus lines in underserved areas	Budget for fleet expansion, driver recruitment, operational subsidies	Start: Q1 2026End: Q4 2030	Local municipalities (Osijek, Bilje), transport agency, residents	Increased connectivity, social inclusion, public satisfaction	Low initial ridership → Mitigate with awareness campaigns and free trial periods
Bus route restructuring and optimization	Planning tools, transport consultants, data analytics tools	Start: Q1 2026End: Q4 2028	Public transport operator, urban planners, user groups	Improved efficiency, reduced travel time, cost savings	Resistance to route changes → Run public consultation and phased pilot
High-frequency bus corridors	Additional vehicles, driver shifts, scheduling software	Start: Q1 2026End: Q4 2028	Transport operator, municipal traffic department	Reduced wait times, better user experience, ridership growth	Fleet shortage or budget overrun → Prioritize high-demand routes and seek co-funding
Fleet electrification	Investment in electric buses, charging infrastructure,	Start: Q4 2025End: Q4 2026	National transport ministry, energy	Lower emissions, better air quality, long-	High upfront costs → Apply for EU funding or public-

	maintenance training		providers, manufacturers	term cost reduction	private partnerships
Real-time tracking system	Software platform, GPS devices, app development	Start: Q1 2026End: Q4 2030	IT vendors, transport agency, commuters	Increased reliability, better user information	Technical integration delays → Pilot system on one corridor before full rollout
Mobility hub development	Urban land, construction budget, multi-modal coordination	Start: Q1 2026End: Q4 2030	Municipal planning dept., bike/car-sharing firms, national rail	Seamless intermodal transfers, urban regeneration	Delays in land acquisition or permits → Pre-plan site selection and legal review
Marketing campaign to boost ridership	Communications team, design/media budget, outreach staff	Start: Q4 2025End: Q4 2030	Local media, schools, employers, civil society	Increased awareness, ridership, modal shift	Low engagement → Partner with influencers and community leaders
Regional rail integration	Coordination with rail operator, joint ticketing software	Start: Q1 2026End: Q4 2030	National rail operator, regional councils	Smoother regional commuting, improved access to jobs	Coordination delays → Create joint task force with agreed milestones
Infrastructure upgrade program	Capital investment, engineering teams, contractors	Start: Q4 2025End: Q4 2030	National transport fund, construction firms, city council	Increased capacity, long-term system resilience	Budget overruns or supply chain issues → Phased approach with cost monitoring

9. Monitoring and KPIs

A constant monitoring is important to ensure that local plans proceed as planned, with predefined reporting deadlines for each action (action proposed in Chapter 5.)

In this chapter a scheme of KPI's and their main features is proposed.

Table 12: Local Plan KPIs

KPI	Action	Brief Description	Unit	Target
KP_1	Introduce new bus lines in underserved areas	Number of new lines introduced in underserved areas	Number of routes	5 new routes by 2030
KP_2	Marketing campaign to boost ridership, High-frequency bus corridors, Real-time tracking system	Increase in the number of passengers using public transport	% increase (baseline: 2022)	+35% by 2030

KP_3	High-frequency bus corridors	Time interval between buses on main routes	Minutes	≤10 minutes during peak hours by 2028
KP_4	Fleet electrification	Share of zero-emission vehicles in total fleet	%	70% by 2030
KP_5	Bus route restructuring and optimization, Real-time tracking system	Share of vehicles arriving/departing within scheduled time	% of services	≥95% on-time by 2028
KP_6	Introduce new bus lines in underserved areas, Real-time tracking system, Bus route restructuring and optimization, Marketing campaign to boost ridership	Satisfaction rating collected via periodic surveys	Average score (1–5)	≥4.0 average rating annually
KP_7	Real-time tracking system	Percentage of routes covered by GPS-based tracking and passenger info	%	100% by end of 2030
KP_8	Mobility hub development	Number of integrated mobility hubs constructed	Number	At least 3 major hubs by 2030
KP_9	Marketing campaign to boost ridership	Number of people reached by marketing campaign	People	≥10,000+ annually
KP_10	Regional rail integration	Increase in regional public transport users post-integration	%	+50% by 2030
KP_11	Infrastructure upgrade program	Number of infrastructure upgrades completed	Number	20 projects by 2030

9.1. Description of data sources & tool for KPIs

Table 13: Identification of data sources & tools for KPIs data

KPI	Data List	Methodology	Data Source	Data Tool
KP_1	List of operational bus lines by year	Count newly added routes in a given year	Public transport operator	Excel, GIS
KP_2	Annual passenger counts, baseline year ridership	(Currentyearridership−Baselineridership)÷Baselineridership×100(Current year ridership − Baseline ridership) ÷ Baseline ridership × 100	Ticketing systems, operator records	Automatic fare collection (AFC), Excel
KP_3	Timetables, GPS logs, vehicle dispatch data	Average interval between buses during peak hours	Operator schedule, real-time logs	Scheduling software, AVL (Automatic Vehicle Location)
KP_4	Number of electric vehicles, total fleet size	(Electricfleet÷Totalfleet)×100	Fleet inventory, depot reports	Excel

KP_5	Scheduled vs. actual arrival/departure times	(Number of on-time trips ÷ Total trips) × 100	GPS data, dispatch logs	AVL system, real-time tracking platform
KP_6	Survey results, response counts	Average of survey ratings (scale 1–5)	Passenger surveys	Online surveys, field tablets
KP_7	Number of lines with GPS tracking	Trackedlines÷Total lines×100	IT department, transport agency	Real-time tracking backend
KP_8	Completed hub projects, construction status reports	Count completed projects	Infrastructure unit reports	Project management software (e.g., MS Project)
KP_9	Audience analytics, media impressions, engagement stats	Aggregated reach across channels	Communications team, media agencies	Social media analytics, campaign reports
KP_10	Rail passenger counts (pre/post-integration)	(Post−integrationpassengers−Pre−integrationpassengers)÷Pre×100	National rail operator, ticketing data	passenger counts
KP_11	Number of upgrades finalized	Count projects with completion status marked “done”	City planning, construction reports	PM tools (Asana, MS Project), dashboards