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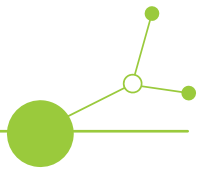
D.1.3.1 Local plan for the city of Paks



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 is a plan for the development of public transport in the city of Paks, following the principles that led to the creation of the OPTI-UP project.

The Paks Local Plan is based on:

- A comprehensive strategy for a sustainable and efficient public transport (PT) network in Central Europe, which includes a list of goals, measures, KPIs, stakeholders, etc. (D.1.3.2), and an analysis of PT needs in Paks through the collection of PT demand, operations, and policy data, as presented in the *Comprehensive Data Report on Existing Public Transport Networks and Best Practices* (D.1.1.1);
- Urban plans already defined by the Municipality of Paks and at the regional level;
- A Unified database of collected public transport data (D.1.1.2);
- The Paks transport model, developed from existing base models (D.1.2.1).

This document facilitates the implementation, but also evaluation, of public transport planning as well as future pilot projects, including the OPTI-UP pilot project in Paks.

Through collaboration with associated partners (AP) and knowledge sharing with other stakeholders, this Local Plan aims to promote Paks's urban development objectives and serve as a model for other European cities.

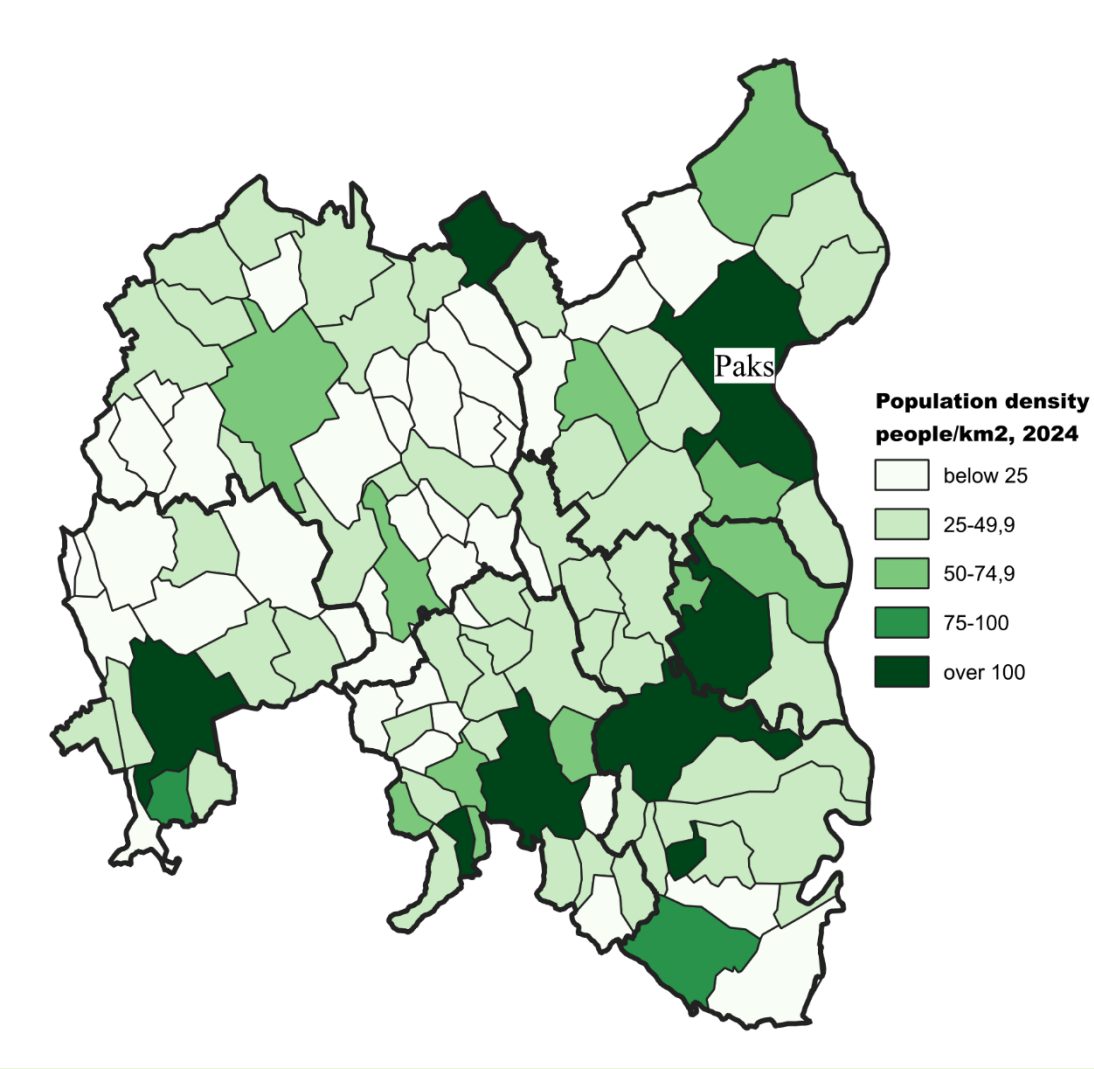
2. Background and Context

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.

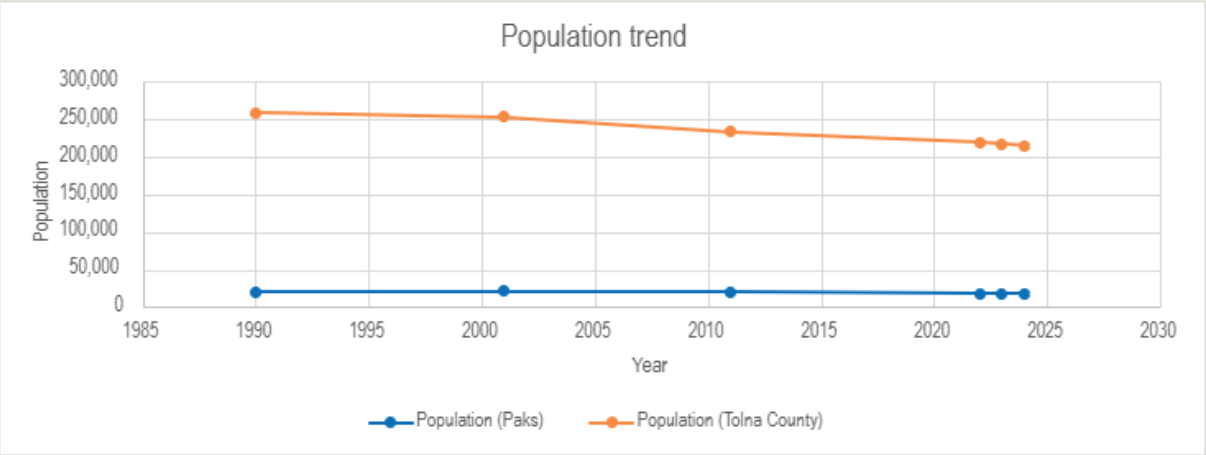
2.1. Context overview

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.

Paks is the second most populous city in Tolna county, accounting for 8.5% of the population of Tolna county. In terms of population density, however, it is one of the less populated district centers, but the reason for this is its large area, not its low population. The demographic trend of the country, i.e. the decrease in the number of the population as a whole, both for Paks and the characteristics of the region.



The city's population has decreased slightly in recent decades but remains below the county average.



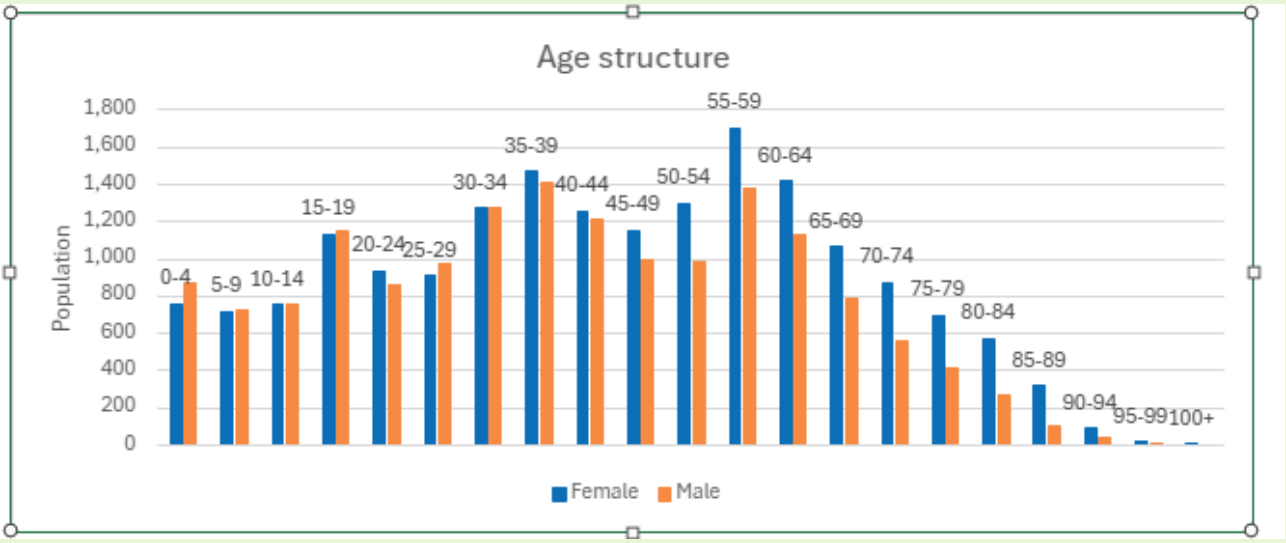
However, it is important to point out that in the near future the population may increase by one and a half times as a result of the new nuclear power plant investment and other economic, commercial and infrastructure development.

The population of Tolna County has a minimal but continuous decreasing trend of 0.5-0.6% per year. Natural decline, including much higher than average mortality, has reduced the population of the county recently.

Based on the final data of the latest census, Hungary's population was 9,603,634 inhabitants on October 1, 2022, a decrease of 334,000 since the previous census in 2011. Currently, the population of Hungary is 9,584,627 people, which shows a decreasing trend since 1981 due to the low number of births and the high number of deaths and is aging in terms of its structure.

Paks is the second most populous city in Tolna County. However, in terms of population density (126.43 inhabitants/km2), it belongs to the less populated district centres. This is due to its large size (154.08 km2) rather than its low population.

Looking at the age composition of the population, it can generally be established that it is national and county like trends. The population of the city of Paks and its region was also characterized by aging. Between 2001 and 2022, the proportion of the population aged 0-14 decreased by 4.07 percentage points and the proportion of the population over 60 increased by 10.36 percentage points. As a result, in 2022, 14.35% of the permanent population was made up of young people under 14 years of age and 21.96% of people over 60 years of age. Both changes significantly exceed national, county, and district averages.



Public transport in the region includes rail and water transport, but road transport, i.e. bus transport, is strongly dominant.

The Paks railway station, which is operated by MÁV (Hungarian State Railways), was built in 1896, and railway traffic has been operating in the city since then.

During the construction of the Paks Nuclear Power Plant, it became necessary to rebuild the Mezőfalva - Paks section, as well as to continue the route from the former terminus along the Danube to the power plant. The line extension was completed in 1976, in 1978 the city of Paks got a new terminus with a new admission building, as well as a stop (Paks-Dunapart) in the northern part of the city, next to the Old Town.

The city therefore has a railway connection, but since December 2009 passenger transport has been suspended.

From the middle of the last century, bus transport increasingly played a role instead of train transport.

Due to its location, the city has a lively long-distance bus service. Route 6 is one of the country's main north-south traffic lines. We can get to any part of the country, to several large cities directly, without having to transfer.

Local and intercity transport was handled by the nearly hundred-year-old state-owned bus company (VOLÁN), which was transformed into a joint-stock company in the 1990s and split into various subsidiaries, then merged again. This company was replaced by Paks Transportation LLC in the field of local transport in Paks from February 1, 2021.

Thanks to this, the streets of Paks are now exclusively powered by fully electric, carbon dioxide-free buses on all local routes.

Public transport within the city is only available by bus, on four different lines.

Water passenger traffic in the city was handled by the ferry between Paks and Géderlak (intercity mode), However, it will be discontinued from the second half of 2025, as the new bridge will make its existence unnecessary.

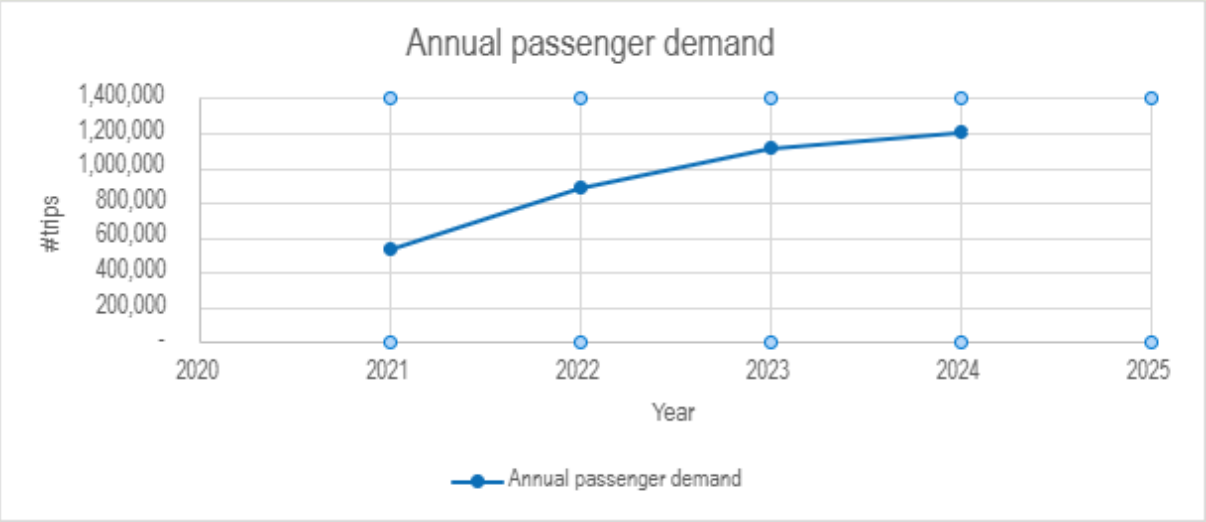
Other modes of transportation are not available (electric, e-bikes, etc.).

The bus system (operated by Paks Transportation llc) contains 10 autobuses, 4 pieces of MIDI buses and 6 pieces of SOLO buses. All buses are low floor, the MIDI buses are 2-door buses, the SOLO buses are 3-door

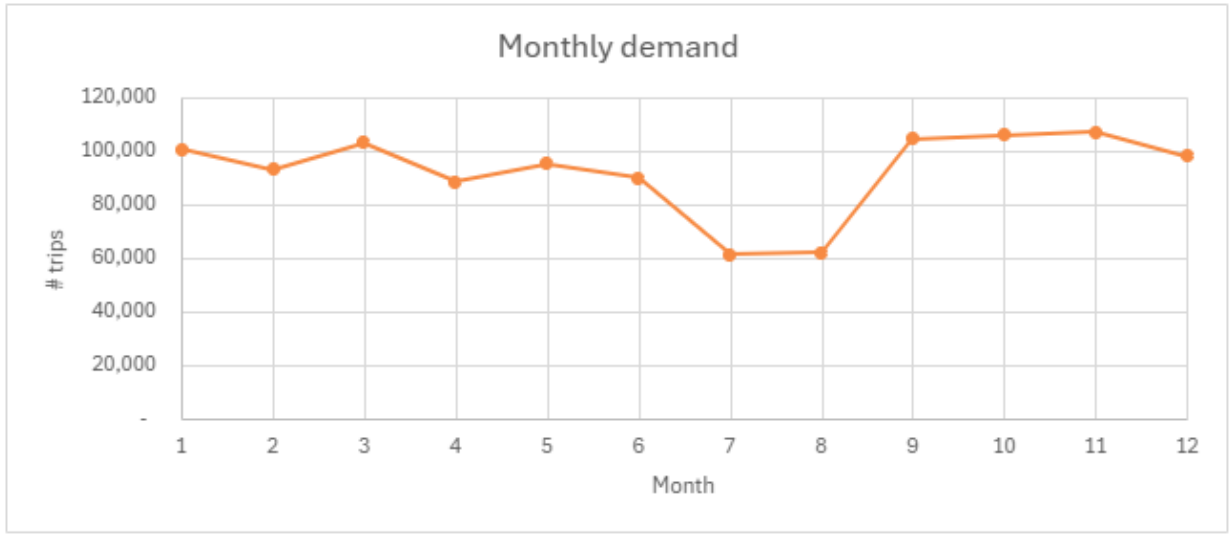
buses. All autobuses are electrically powered. All buses have disabled spaces and an audiovisual passenger information system that fully complies with equal opportunities.

	MIDI (4 buses)		SOLO (6 buses)	
		If disabled seat is in use		If disabled seat is in use
Seat	24	24	28	28
Standing place	20	16	35	31
Disabled place	0	1	0	1
TOTAL	**44**	**41**	**63**	**60**

After the restrictions imposed following the COVID-19 pandemic, passenger traffic returned to the level of 880K trips/year and has been growing significantly since then.



The highest monthly demand of passengers in Paks coincides with the school seasons (March-May, September-December). The demand is the lowest in the summer break (July and August).



Typically, there are two peak periods for public transport in Paks, which correspond to the start and end of school and work.

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.

- National Development- 2030 National Development and Regional Development Concept (2013)

The document defines a long-term vision and sets development policy goals based on the social, economic, sectoral and territorial development needs of Hungary. The concept deals with the issue of mobility in particular.

The document supports the prominent role of the sector, stating that "the transport sector directly employs approximately 300 thousand people, which represents approximately 8% of employees, but due to participation in individual and public passenger transport, in fact 80% of society is an active subject or part of this activity".

The development plan sets as its goal the creation of a transport structure that promotes social mobility through quick and easy accessibility to different territorial levels. At the local level, the two main areas of intervention are the development of transport within the city on the one hand, and the provision of mobility between the city and its catchment area on the other.

- Integrated Transport Development Operational Programme Plus 2021-2027 (2022)

The document establishes the basis for the use of EU funds for transport development in Hungary. The promotion of sustainable multimodal urban mobility as part of the transition to a net zero carbon economy is a specific objective.

- National Transport Infrastructure Development Strategy (2014)

From the perspective of the transport structure, the country is divided into two important industrial axes, which determine the industrial production hubs. One is the automotive axis in the western part of the country, and the other is in the eastern region, which includes heavy industry centers and the strengthening of the chemical industry.

Analyzing intercity transport habits, it can be stated that the number of daily intercity trips nationwide is approximately 2.5 million, of which the vast majority, approximately 95%, are trips from and to the place of residence. The proportion of trips departing from the municipalities of Budapest and Pest County is lower, which shows the dominance of local transport. Suburban and local transport needs to make up the largest part of the national transport statistics, and most trips are made by motorized means of transport, of which buses and railways dominate intercity passenger transport.

In international comparison, Hungary's transport situation is favorable, as the division of labor between individual and public transport modes is still more balanced than in Western European countries, where car use dominates. The domestic intercity passenger transport market is primarily dominated by buses and rail, where buses have a threefold advantage over rail. The advantage of rail lies in its performance measured in terms of passenger numbers, as it is in a more favorable position due to longer journeys.

Mobility-related objectives

The achievement of social goals must be considered at all levels, as they are closely related to each other and have an impact on the achievement of transport goals. The most important social goals include reducing negative impacts on the environment and enforcing climate protection considerations, which focus on the sustainable use of natural resources and prioritizing renewable energy sources. In parallel, the development of transport infrastructure should be carried out in a way that ensures the protection of the natural landscape and wildlife and strives to reduce the use of non-renewable energy sources.

Transport objectives fundamentally contribute to increasing the efficiency of the economy, as the improvement of the transport system has a positive impact on economic activities, work efficiency, and, through this, the expansion of employment. The development of transport networks provides an opportunity to improve the mobility of the workforce, especially in rural and peripheral areas, thereby reducing territorial inequalities and promoting the dynamism of the local economy. In addition, improving the well-being and mobility of the population is a priority objective, as the development of transport in a way that is accessible and sustainable for all contributes to increasing social well-being.

The transport objectives also include the optimization of the transport structure and transport modes, which brings more resource-efficient transport solutions to the fore. The prioritization of sustainable transport modes, such as walking and cycling, is a priority objective. Improving the quality and efficiency of transport services and developing transport infrastructure all contribute to the long-term sustainability of the transport system and ensuring efficient mobility, while also taking into account social and economic needs.

- Tolna County Regional Development Concept (2021)

The regional development of Tolna County is significantly influenced by the Tolnai-hegyha, which divides the county's territory into two and, as a result, often hinders the development of connections. There has been no close cooperation between the county's micro-regions, either socially or economically, and the development of individual districts has also been different. The county's development axis is the main road 6, which runs north south and connects to the more economically developed areas. The north-south transport connections are best developed on this line, while the east-west transport connections are less developed.

In terms of transport infrastructure, the county does not have significant east-west connections; although the main road 65 crosses the county diagonally, it does not significantly improve the connections between the eastern and western parts. Some significant developments have taken place in recent decades, such as the construction of the Szekszárd Danube Bridge and a section of the M9 expressway in 2002, and the completion of the Tolna county section of the M6 motorway in 2010, which provides a fast motorway connection between Budapest and Pécs. Although the new expressways have brought significant changes to the spatial structure of the county, they have not reduced the existing economic and social differences but have further strengthened them.

The transport situation in Tolna county is further complicated by the outdated and poor condition of the internal transport network, the condition of the roads and pavements, and the lack of the M9 transversal expressway that crosses the county. Transport connections within the county remain inadequate, and the necessary infrastructure developments have not been completed. One of the biggest risks is that the M9 expressway will not be built on time or bypass the county, which would further worsen the traffic situation in the county. Furthermore, the necessary renovations are not taking place in the face of the continuous deterioration of the transport infrastructure, and the construction of missing transport links is not being implemented at a sufficient pace.

Mobility-related objective

Among the mobility objectives, the spread of environmentally friendly transport modes, such as public transport, cycling, and the use of electric vehicles, is a prominent role. To this end, it is important to increase the number and availability of charging stations supporting the use of electric vehicles. Tolna County aims to have a charging station available in every settlement that is suitable for charging passenger cars and buses, thus ensuring smooth transport and sustainable mobility.

The objectives for the development of the transport infrastructure include the fixing of the section of the M9 expressway between Dombóvár and Szekszárd, and the construction of missing transport links within the county. These developments provide opportunities to improve the efficiency of the transport system, continuously improve the condition of roads and pavements, and expand the existing transport network. New transport connections and infrastructure contribute to achieving economic development goals and supporting the development of local transport services.

Transport objectives necessary to achieve social goals include reducing negative impacts on the environment and implementing climate protection considerations. The aim of the development of the transport system is to promote sustainable and energy-saving solutions, including the spread of alternative modes of transport, such as electric buses and charging stations. In addition, the development of transport infrastructure also helps to increase economic efficiency, reduce the number of accidents, and improve employment.

- Tolna County Regional Development Program (2021)

Among the regions of Tolna County, the more developed areas are the districts of Paks, Tolnai and Szekszárd, located along the Danube, several of which are part of the Central Danube Priority Area. Tamási district, although it belongs to the priority area, is considered a peripheral area and cannot fully participate in the economic growth induced by the Paks developments, primarily due to the shortcomings of the transport infrastructure. Other parts of the county, such as Dombóvár district, the small villages of Bonyhád district and some settlements of Szekszárd district, are also considered peripheral areas.

In order to mitigate the effects of climate change, it is necessary to spread nature-friendly solutions and environmentally conscious and energy-efficient modes of transport (such as public transport, cycling, and electric vehicles). The county supports the increase in carbon-neutral energy use and considers it essential to educate the population about environmental awareness, as well as to promote sustainable production practices among businesses.

The county's transport situation is struggling with numerous problems in terms of accessibility and internal transport connections. The technical condition of the roads, especially the secondary roads, has deteriorated, which significantly limits mobility opportunities within the county. Infrastructure in such a state not only reduces transport safety but also restrains economic competitiveness. The need to develop the sections that bypass cities, the TEN-T network, remains a priority task. The developments will not only promote economic development but also make the transport system safer and more efficient.

One of the most important aspects of the development of transport connections is to provide faster transport options between the eastern and western areas of the county. The connection between Dombóvár and Szekszárd is currently extremely weak, and it is only possible to get between the two cities with significant detours. The construction of the entire section of the M9 expressway would fundamentally contribute to relieving the burden on the national transport network and reducing travel times between transport hubs, especially in the settlements of the outer city ring.

Mobility-related objective

The aim of the cooperation with the southern Transdanubian counties is to develop the transport network, which includes a number of important infrastructure investments. In order to expand the railway network, the Sárbogárd-Dombóvár railway line would be renovated, and the Sárbogárd-Szekszárd-Bátaszék-Baja line would be electrified. In addition, the development of public transport and the extension of the M6 and M60 motorways to the south and west are also among the objectives. The development of the main roads 66 and 67 and the expansion of the M9 expressway would also contribute to the development of the

transport system, while the improvement of the bicycle transport network would promote the spread of sustainable transport solutions.

In order to promote the economic development of rural areas, the development of transport infrastructure, especially connecting roads, suburban roads, and cycle paths, is crucial. In order to improve the transport connections of economically backward districts further from the motorway – such as Tamási, Dombóvár and Bonyhád districts – and to facilitate their catching up, new, effective regional development tools are needed.

In order to spread sustainable transport solutions, special attention should be paid to electric vehicles and buses. In order to promote electric transport, it is important to expand the infrastructure of charging stations, which also enables the charging of buses and cars. The aim of the Tolna County Electric Mobility Project is to build the necessary charging stations for electric vehicles in the county, thereby promoting the spread of environmentally friendly transport.

- 4.3.2. Tolna County Integrated Territorial Programme (2023)

The Central Danube Priority Area includes three counties (Tolna, Bács-Kiskun and Fejér) and a total of 99 settlements. The priority development objective of this area is the implementation of two new units of the Paks Nuclear Power Plant, which will have significant social, economic, infrastructure, and environmental impacts. Special attention is also paid to the development of the transport infrastructure, for example through the modernization of the M9 expressway, the Pörböly settlement bypass, the main road 66 and the Budapest-Pécs railway line, which will improve the accessibility of the area.

Szekszárd, the smallest county seat of Tolna County, and the district centers are all of average size in the country, so there is no single outstanding center in the area. However, Paks, the small town hosting the largest industrial investment, plays a key role in the development of the region. The city has good transport accessibility, as it is well connected to other important cities such as Dunaföldvár, Szekszárd and Dunaújváros via the M6 motorway.

In the eastern part of the county, there is an opportunity to strengthen territorial cohesion along the M6 motorway, which runs from Budapest to Mohács. The Paks II project is expected to expand the catchment area of Paks, especially through the construction of the future Danube Bridge, which will enable a closer connection between Paks and Kalocsa. In addition to the development of the transport infrastructure of the area, boosting tourism is also a priority, especially in the areas of eco- and health tourism. The Siófok-Tamás-Dombóvár-Pécs cycle route and the Catching Up Settlements programme can contribute to the economic and social catch-up of the region.

Mobility-related objectives

Mobility-related objectives focus on the development of railway and road infrastructure, with particular attention to improving regional connections. Within the framework of IKOP Plusz, the track renovation of the Sárbogárd-Dombóvár railway line and the electrification of the Sárbogárd-Szekszárd-Bátaszék-Baja railway line are priority projects, and the development of bus transfer options at the stations of the Bátaszék-Dombóvár railway line is also planned. In order to expand the motorway network, the extension of the M6 and M60 motorways to the national border, as well as the development and extension of the main road 67, are also priorities.

In addition to road and rail transport, the aim of transport development is to expand the cycling infrastructure, which affects several counties. The planned Siófok-Tamási-Dombóvár-Pécs cycle path and the development of the bicycle transport network can help sustainable transport and boost regional tourism. After the construction of the Paks-Kalocsa bridge, new cooperation will be possible between

Tolna and Bács-Kiskun counties, which will further strengthen the relations between the regions. Transport developments comprehensively support economic growth and promote the spread of sustainable mobility.

Paks Sustainable Urban Mobility Plan (SUMP)

The Municipality of Paks began the review of its Sustainable Urban Mobility Plan (SUMP) in summer 2024. The plan places residents at the center of mobility planning and sets long-term directions for safe, accessible, clean, efficient, and sustainable transport in the city and its wider functional urban area.

Unlike traditional transport planning, which focuses mainly on infrastructure and traffic flow, the SUMP applies an integrated approach, considering environmental, social, and economic aspects. Its development involved continuous participation of stakeholders, including decision-makers, professionals, and citizens, especially during the problem-identification phase.

Key Identified Challenges

Dominance of car use: Despite relatively high-quality public transport, cars remain the primary mode of travel, expected to increase further.

Congestion and safety risks: Growing motorization leads to traffic jams, longer travel times, and more accidents.

Pressure on urban space: Expanding Road and parking demand reduces green areas and community spaces, harming urban liveability.

Climate change impacts: Extreme weather events further strain infrastructure, raising maintenance costs.

Changing mobility habits: Remote work reduces commuting needs, while e-commerce increases logistics demands.

Opportunities for Paks

Given Paks' above-average education and income levels, the city can serve as a national pilot for sustainable mobility. Residents are open to testing new technologies and adopting forward-looking transport habits.

Strategic Goals

The strategy is built on the threefold principles of environmental protection, quality of life, and cost-efficiency. It sets measurable targets and prioritizes actions with the greatest social and environmental benefits.

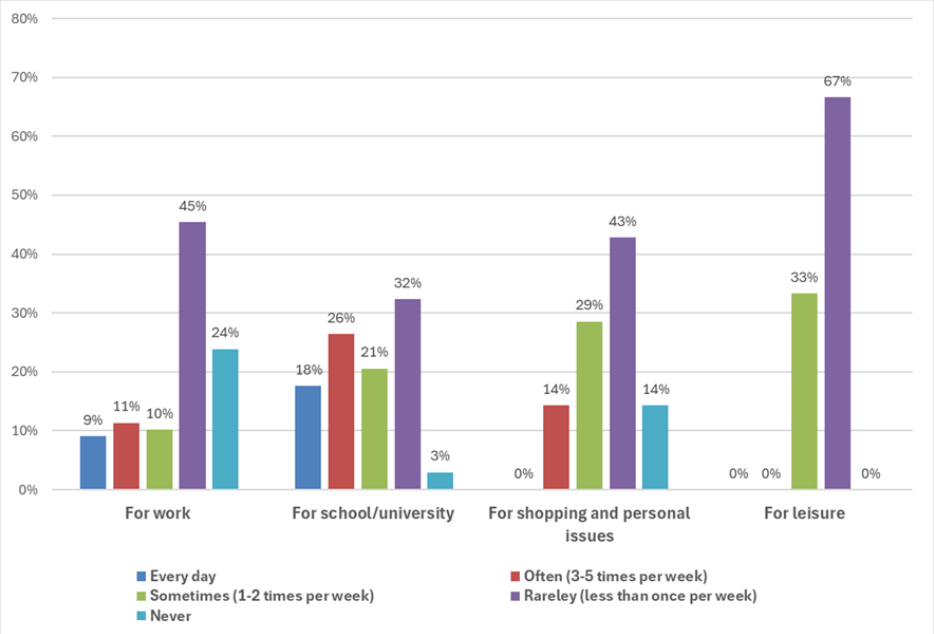
Interventions and Measures

The plan emphasizes not only infrastructure investment but also improved services, regulatory frameworks, and awareness-raising. Projects are ranked to focus resources on those with the highest added value.

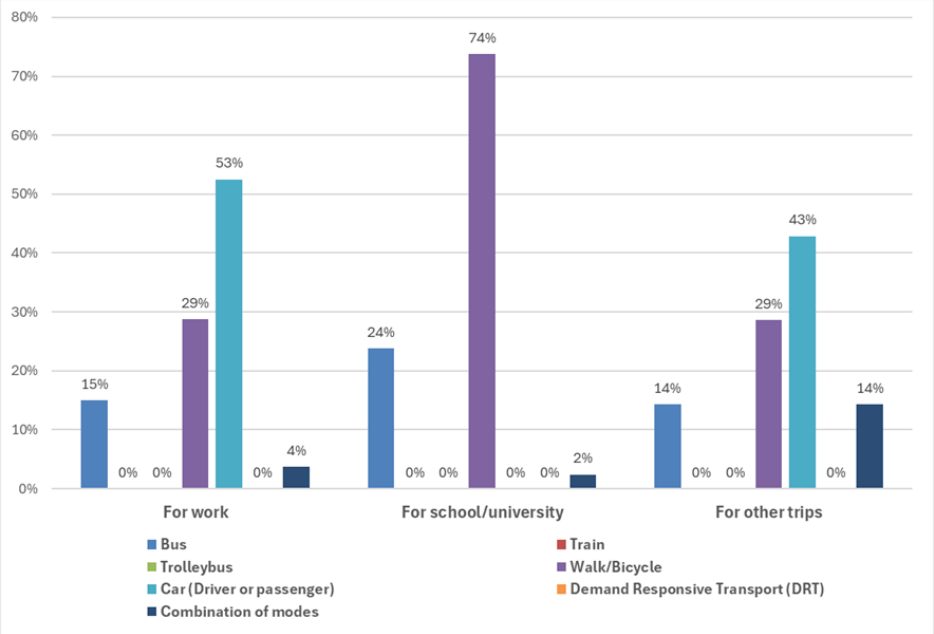
2.3. Results of survey

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 Public Transport?

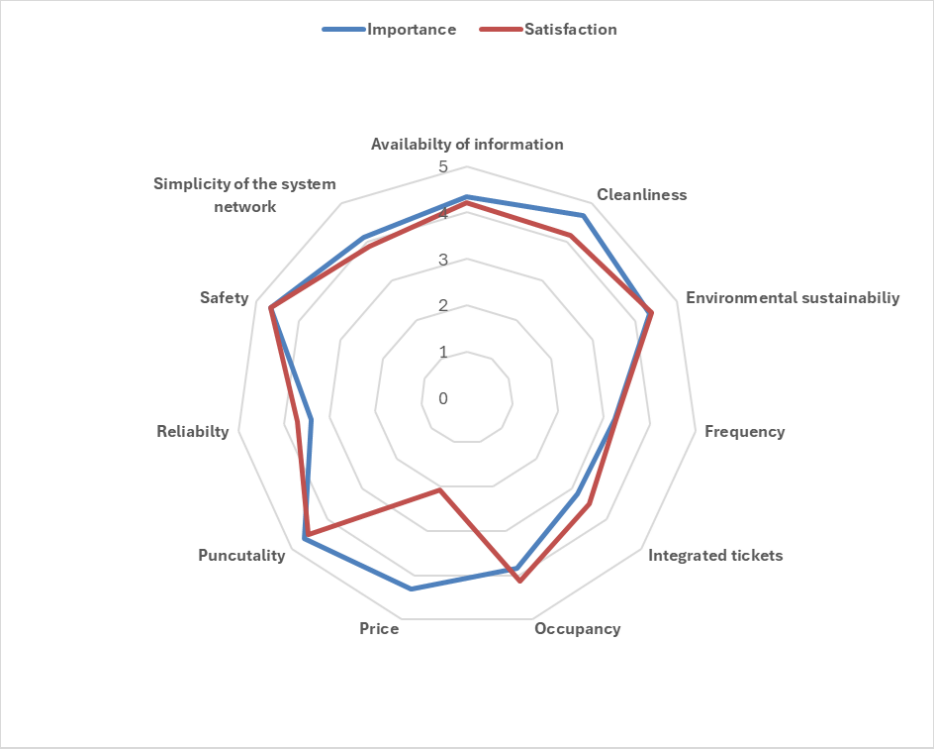


Which mode of transport do you use most often?

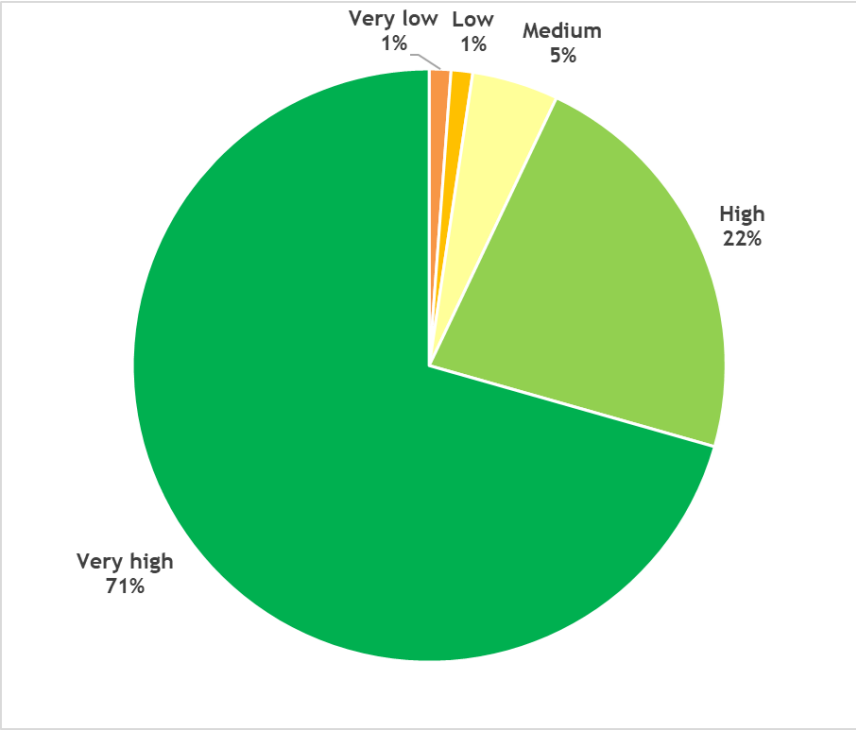


Grade the satisfaction and the importance of the following characteristics about the public transport.

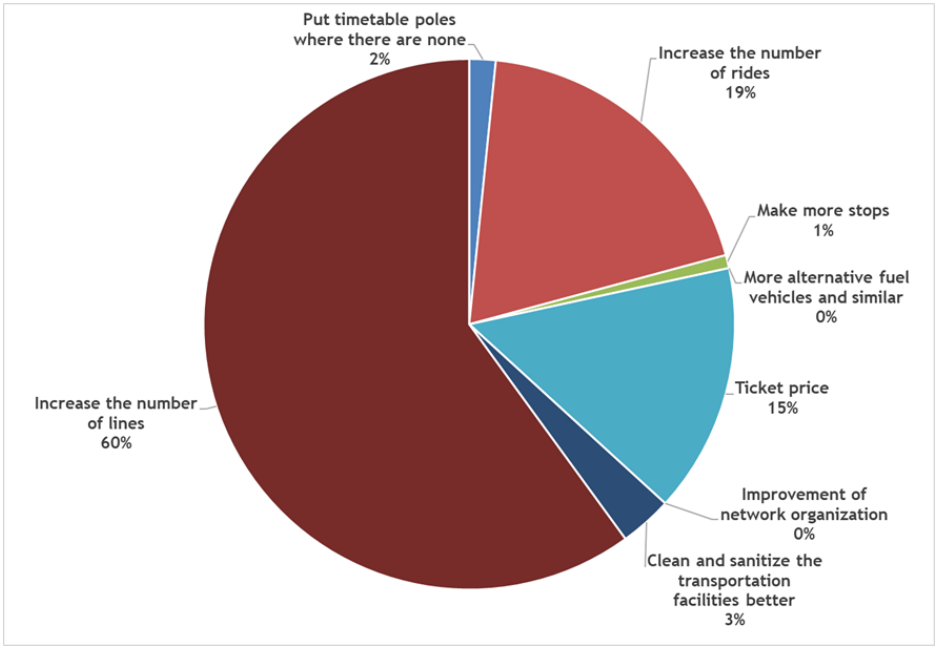
[Grades from 1= very low to 5= very high]



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



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



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

In the case of Paks, respondents raised an open question about what would motivate them to switch from cars to buses.

Overall results of the Survey

According to the online questionnaire survey prepared for the Paks Sustainable Urban Development Strategy in March 2022, among the travel-related services, the respondents were most satisfied with the quality of local public transport.

According to the online questionnaire survey conducted in August and September 2024, among the various modes of transport, the survey participants were also most satisfied with the conditions of bus transport.

The lowest satisfaction of users is related to the price of LPT.

The most important development need in bus transport was to improve transfer options, and several people mentioned that there is congestion on the routes in the morning on school and market days, but outside of peak periods, they are often unused, and traffic is lower at those times, and it could be handled with vehicles that are easier to navigate in the city.

According to the 2024 online survey, respondents were the least satisfied with the conditions of public transport among the various modes of transport and had a similarly unfavourable opinion about parking in the city.

Regarding public transport, the survey participants saw congestion and slow speeds as the main problems, and regarding parking, most of them assessed that there were not enough parking spaces available in the city centre and at major

institutions. In the 2022 online survey, respondents also considered parking options and local car traffic in general to be the main areas for improvement in the city.

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.

3.1. 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 Paks 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)
Favourable north and southbound transport connections
Satisfactory service level of intercity bus transport
Developed cycle path between the city and the nuclear power plant
Outstanding loading performance of the port in national terms
New Bridge – Paks – Kalocsa (West-East)
Weaknesses (W)
The role of the Danube as a transport divider
Missing settlement and regional elements of the cycle path network
Low-use local bus transport, uncoordinated local and intercity timetables, tariff system
Outdated railway infrastructure, suspended rail passenger transport
Significant freight traffic passing through the city centre, lack of a relief road
Waterway unused for passenger transport
Narrow road cross-sections in the city centre
The separating effect of the railway and main road no. 6 between the Danube bank and the city centre
Opportunities (O)
Construction of a bicycle path to Dunakömlőd and Dunaszentgyörgy
Establishment of an e-bike rental system
Reorganization of the downtown transportation network
Rethinking the role of main road no. 6 in order to make the Danube bank more accessible
Reorganization of local public transportation
Achieving a change of attitude by prioritizing sustainable forms of transportation
Diverting freight traffic outside the city by limiting weight and building a relief road

Threats (T)
Railway infrastructure will remain unused in the future
Local public transport will remain underutilized
Missing elements of the bicycle network will not be built
Increasing road freight and passenger traffic during the expansion of the nuclear power plant
The role of water transport will remain marginal
Recycling of the Danube bank for recreational purposes will not be implemented

3.2. 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
Citizen-oriented planning of public transport system in Rezekne city	Rezekne (Latvia)	Like Paks, the Rezekne city transport company defines itself as a "Green Company". PKK is interested in the methods its Latvian colleagues use to present this to the city's residents.
Pula Public transport new lines	PULA (Croatia)	The aim of the process in Pula was to ensure connectivity between the city's suburban areas and the city center which is the same aim in Paks. It is interesting for the PKK to see what aspects were taken into account in the Croatian city when designing the new lines.
Development of public transport by purchasing electric buses in Győr and its economic zone	GYŐR (Hungary)	In the project, similar to Paks, City of Győr wanted to improve public transport in a city dominated by a significant industrial infrastructure. The case study focuses on preparation and planning which helps to PKK in planning future development phase.

4. Vision and Goals

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

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

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.

4.1. Vision

By 2030, Paks will become the center of an urban region guaranteeing an adequate quality of life for its population, its traffic situation will improve as a result of the routine use of new forms of transport, and it will be able to sustainably manage the increasing mobility needs due to the nuclear power plant investment.

4.2. 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

No.	Goal	Description
G1	**Increase access to outlying areas (Mobility/Social)**	The city is very large, and several sparsely populated outlying areas are not accessible by local transport. Due to the significant increase in the price of urban real estate and the continuous increase in the number of city residents, these outlying areas are also becoming more populated, and the transport company will have to provide service to them in the future.
G2	**More effective collaboration with passengers (Mobility/Social)**	The continuous population growth in the city cannot keep up with the development of transport infrastructure, so residents should be encouraged to use local bus services more often. To achieve this, closer cooperation with passengers is essential.
G3	**Increase efficency of the transport system (Mobility/Environmental)**	Although the company provides local transport entirely with electric buses and this is the most environmentally friendly mode of transport, significant energy savings

		could be achieved by increasing efficiency, so this should also be taken into account.
G4	**Increase the offer to out of the city passengers to reach the city center/service center (Mobility)**	Many people travel to the city center, where office buildings and retail units are located, by car, especially from more remote areas. If we can connect these areas to the city center, it will significantly reduce peak traffic periods.

4.3. 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

No.	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
G1	**Increase access to outlying areas (Mobility/Social)**	Priority 1	□	□	■ ■	■
G2	**More effective collaboration with passengers (Mobility/Social)**	Priority 1	□	□	■	■
G3	**Increase efficency of the transport system (Mobility/Environmental)**	Priority 1	■ ■	■	■ ■	■ ■
G4	**Increase the offer to out of the city passengers to reach the city center/service center**	Priority 1	□	□	■ ■	□

5. Actions

This chapter introduces the first structured outline of possible actions that the city of Paks 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.

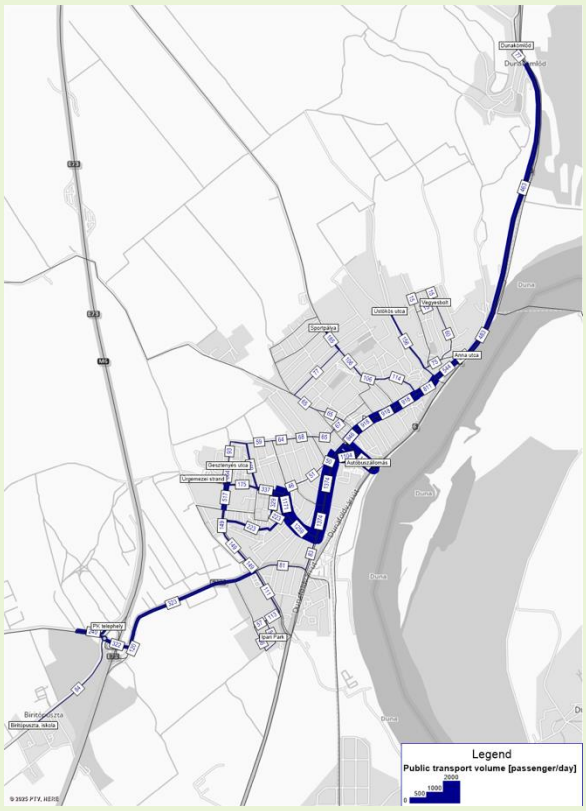
However, these proposed actions are not final. They will undergo a validation process through scenario-based assessments and modelling tools. This process will help refine the actions, add technical and financial detail, and establish a hierarchy of priorities based on impact, feasibility, and consistency 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

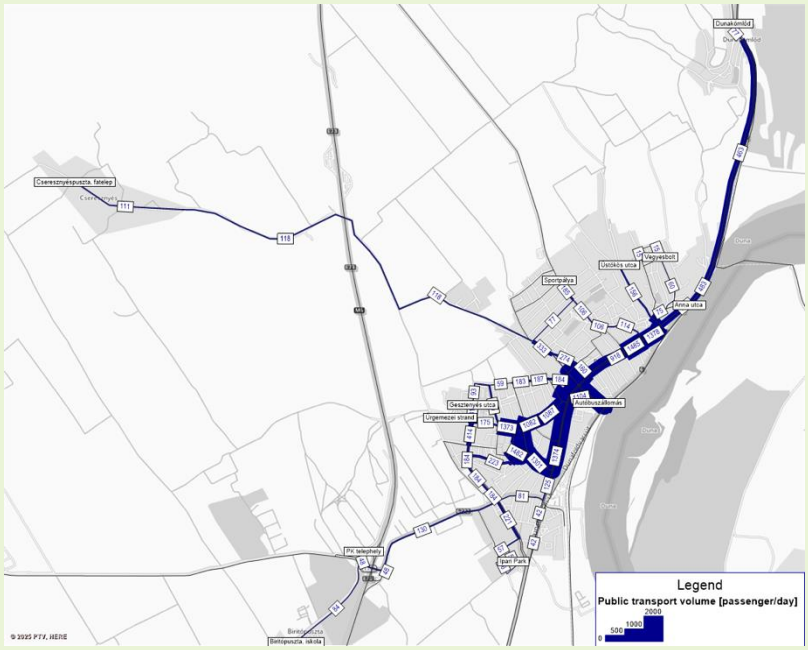
Actions	Action name	Brief description	Goals
A1	**Revising/replanning the lines**	This activity focuses on optimizing bus lines and schedules to reduce travel times, eliminate overlaps, and ensure reliable connections between key residential areas, workplaces, services, and transport hubs. The revision supports sustainable urban mobility by encouraging higher public transport usage, reducing congestion, and contributing to a cleaner and safer urban environment.	Efficiency improvement (G1, G3, G4)
A2	**Revising/replanning communication plan**	Reviewing existing communication practices and strategies, evaluating their effectiveness and planning/implementing new media campaigns	More direct contact with passengers, increasing the proportion of transport service users (G2)
A3	**Improving the efficiency both financial both operational level**	Review of current operational and financial operations, adoption of best practices, coordination with the owner of the company (City of Paks).	More efficient use of financial and other resources (G3)
A4	**Investigating the possibility of creating a new bus stop/junction**	This activity involves analysing passenger flows, travel demands, and urban development trends to identify suitable locations for a new stop or junction. By doing so, the public transport system can offer shorter walking distances, smoother transfers, and better access to key destinations, ultimately encouraging more people to choose sustainable mobility options.	The goal is to strengthen the overall public transport network and improve connections between different parts of the city. (G1, G3, G4)

6. Actions and Traffic Models Scenarios

Table 5: List of actions and models scenario results

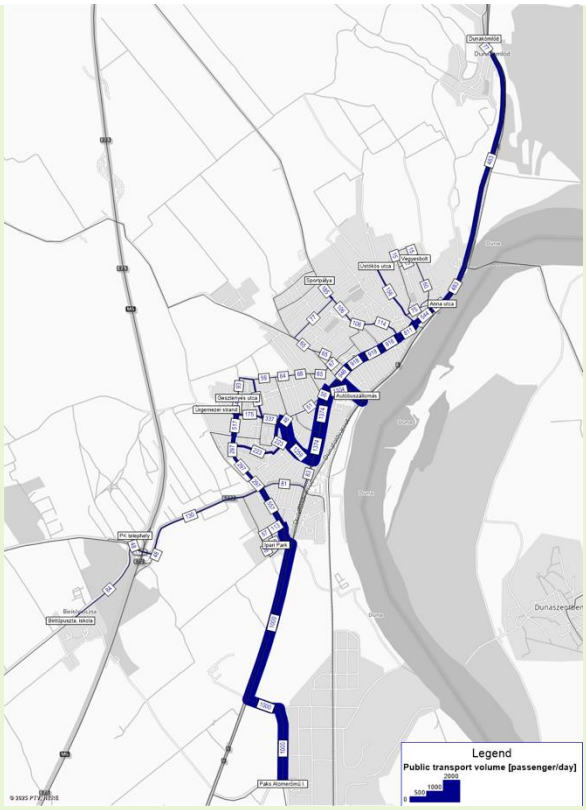
Action	Description of model results
Scenario ST1 – Improving Accessibility of Southeastern Areas	Scenario ST1 focuses on improving access to the southeastern suburban area of Paks through the introduction of a new bus line (Line 5), connecting the Gesztenyés utca and “PK telephely” stops. This intervention provides a direct public transport link to an expanding residential and business district, significantly improving connectivity and operational efficiency without requiring new vehicles. The VISUM modeling results show a moderate increase in total network departures (from 209 to 237 per day) and passenger capacity (by 14%), with only a slight rise in vehicle performance, demonstrating better resource utilization. Accessibility indicators also improved, with the average number of departures within 300 meters of residents increasing from 98.9 to 102.5 per day. Overall, ST1 achieves better spatial coverage, shorter travel times, and enhanced integration between suburban and urban routes, representing a practical pilot action for sustainable urban mobility enhancement. 
Scenario ST2 – Improving Accessibility of Outer Areas (Cseresznyéspuszta)	Scenario ST2 aims to integrate the outer settlement of Cseresznyéspuszta—previously unserved by local public transport—into the Paks bus network via a new Line 6 connection to the city center. The scenario addresses the high car dependency of this area by promoting modal shift and improving social inclusion through

enhanced accessibility. The VISUM model indicates an increase in total network length (from 25.2 km to 32.1 km) and passenger capacity (+700 passengers/day), alongside a 10% rise in total departures. Although average passenger numbers per day decreased slightly due to the dispersed demand, the network's overall service coverage expanded by nearly 700 inhabitants. This demonstrates that the ST2 scenario prioritizes accessibility and inclusivity over short-term load efficiency, aligning with Paks' long-term objective of reducing private car use and promoting sustainable suburban connectivity.



Scenario ST3 – Network Expansion and Integration of the Nuclear Power Plant

Scenario ST3 represents a comprehensive restructuring and expansion of the city's public transport system, with a strong focus on integrating the Paks Nuclear Power Plant into the local mobility network. This scenario introduces new high-frequency lines, notably Line 13, to serve the plant directly and strengthen connections with major employment zones, industrial parks, and educational institutions. According to the VISUM results, this scenario produces the most substantial improvement in network performance: the number of daily departures increases by 56% (to 327), passenger capacity grows by over 7,700 passengers per day, and passenger performance rises by nearly 50%. The accessibility index also improves significantly, with the average number of accessible transit lines per inhabitant increasing from 3.1 to 4.7. ST3 directly supports sustainable growth, workforce mobility, and the integration of outlying settlements such as Dunakömlőd and Cseresznyéspuszta, laying the foundation for a zero-emission, energy-efficient transport system based on electric and future hydrogen-powered buses.


Legend
Public transport volume [passenger/day]
2000
1000
500
0

6.1. Overview of scenarios in VISUM

The main challenge in operating the public transport (PT) system in the case study area of Paks lies in its limited connectivity to newly developed or peripheral settlement areas, particularly in light of the city's dynamic expansion. Figure 1 illustrates potential directions for expanding the network to address these challenges. In developing the modelling scenarios, the original objectives defined during the project planning phase served as key reference points:

- Improving the efficiency of the existing local transport system;
- Enhancing coordination between transport services within Paks and those of surrounding settlements in the city's agglomeration;
- Improving accessibility to parts of the city that are currently underserved by public transport.

In total, one base scenario and three alternative scenarios were examined (Figure 2). The short-term (ST) Scenarios 1 and 2 involve modifications to the operation of two simpler suburban access routes: one in the southeastern and one in the northeastern part of the city. In contrast, the more complex alternative, Scenario ST3, integrates the region's largest employer, the Paks Nuclear Power Plant, into the city's public transport network.

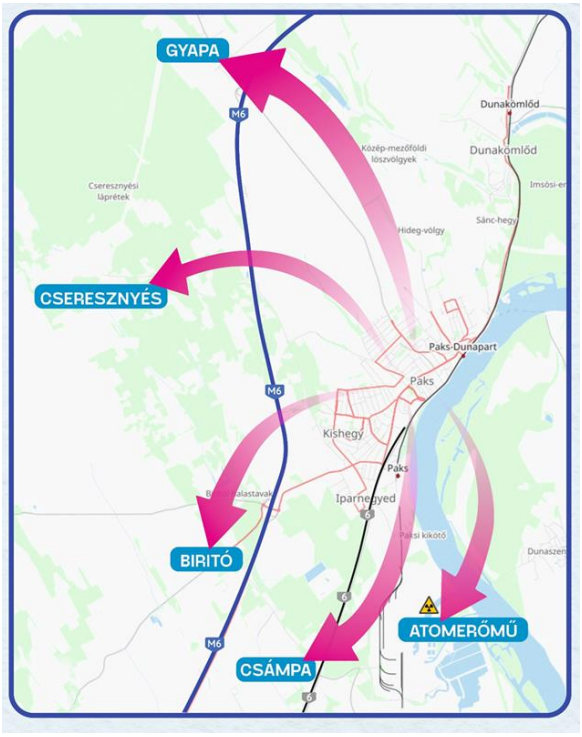


Figure 1: Scenario development for Paks model. Possible network expansion directions in the City of Paks

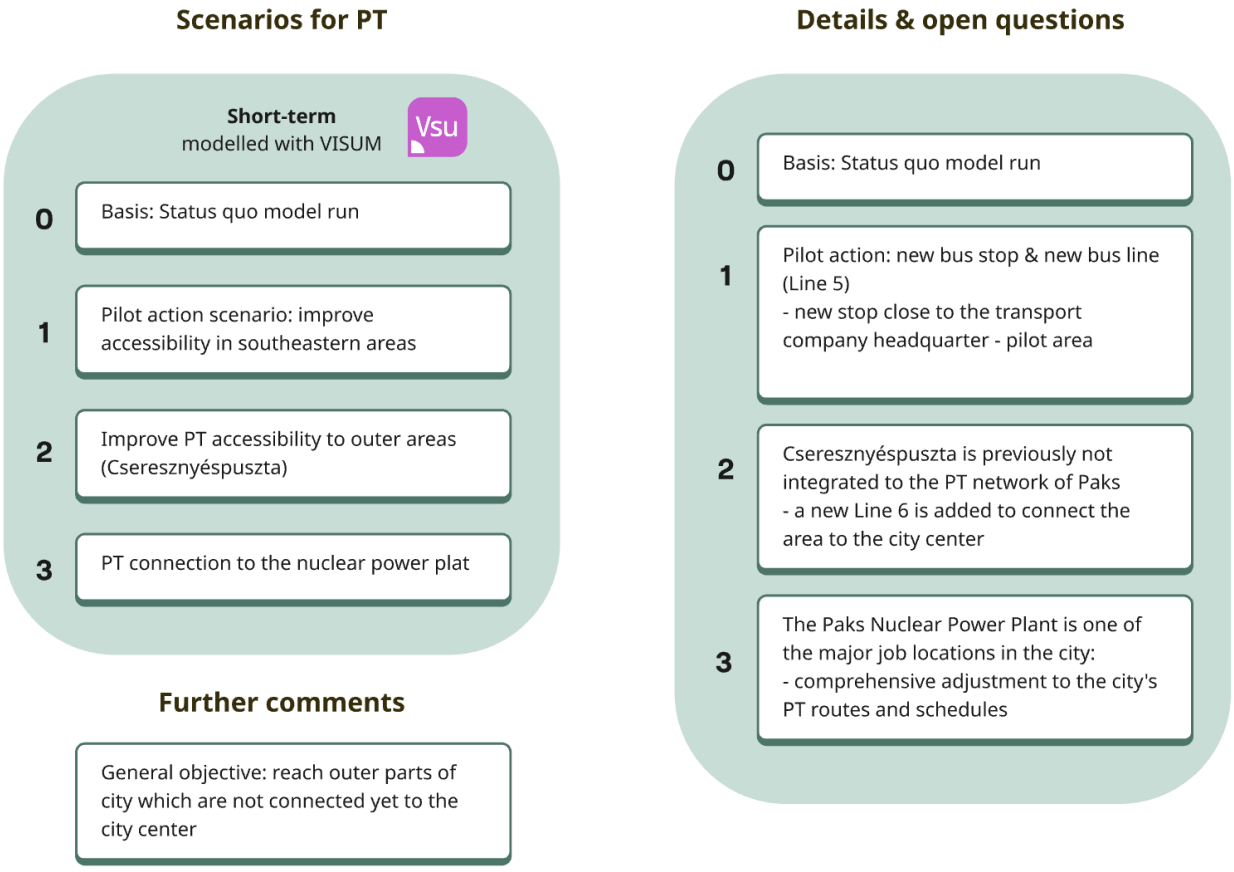


Figure 2. Model scenarios in Paks

6.2. VISUM model of short-term scenarios

6.2.1. Scenario ST1 - Improving Accessibility of Southeastern areas (pilot action scenario)

The planned scenario provides access to the suburban area located in the southeastern part of the city and offers a transfer option to the local bus service for those arriving by car from the southeast. This ensures access to the city's business center in approximately 6 minutes.

A new line will be analysed, which will be designated as line 5. The schematic map is presented in Figure 3(a) and the position in the overall network in VISUM is highlighted with the blue circle in Figure 3(b) Services on this line will transport passengers between the Gesztenyés utca stop and the newly included "PK telephely" stop in the Paks Transportation llc transport network. Between the two terminals, we will serve the stops named Jedlik Ányos utca, Költségvetési üzem and Szőlőhegy in both directions.

The first stop on the new line provides access to an outer residential area that was previously inaccessible by public transport, and passengers coming from Nagydorog (a city to the west) can transfer here if they are heading to the city's business center. The terminus will serve a newly built residential complex and office building, where there will be significant additional demand for public transport services in the future.

In addition to all this, operational efficiency will improve (the number of kilometres traveled will decrease proportionally), and there was no need to purchase additional buses, as the existing buses will be able to serve passengers on the new route.

The traffic modeling for Paks was developed as a comprehensive, macro-level analytical tool to evaluate the potential effects of network modifications and land-use changes on traffic flows and mobility patterns. The modeling process was based on the widely recognized and validated PTV VISUM software, which allows for robust simulation and forecasting of transport demand and traffic distribution. The objective was to reproduce existing traffic conditions with high accuracy, verify the model's reliability through calibration and test runs, and then use the validated model to forecast the impacts of planned developments and demographic changes. The current traffic demand was first analyzed using available survey data, including 2024 traffic counts from seven key intersections conducted by Közlekedés Kft. The modeling team constructed both the territorial and network models, incorporating spatial zones, network links, and travel behavior characteristics.

The model followed the classical four-step transportation modeling framework, which includes trip generation, trip distribution, modal split, and traffic assignment. Trip generation estimated the number of trips produced and attracted by each traffic zone. Trip distribution connected these origins and destinations based on travel impedance and accessibility factors. The modal split defined the share of trips between different transport modes, such as private cars, public transport, and active mobility. Finally, the assignment phase allocated these trips to the transport network, determining route choice and resulting traffic volumes on each link. The Least Squares calibration method was applied to minimize differences between observed and modeled volumes, ensuring the model accurately reflected real-world conditions. Separate matrices were used for private cars, light commercial vehicles, and heavy trucks, the latter represented by an equivalent unit factor of 2.5 Ejm/jmdb to account for higher road occupancy and impact. Both private and public transport matrices were calibrated independently to ensure consistency across transport modes.

The spatial coverage of the model extended across Paks and its wider catchment area, which was subdivided into traffic analysis zones to capture detailed travel demand. The road network model included all relevant categories of roads—national routes, local collector and residential streets, as well as access links to major traffic-generating sites such as the Paks Nuclear Power Plant, educational institutions, healthcare facilities, and commercial areas. The modeling team developed the base network using the 2022 National Road Traffic Database (OKKF) as a foundation, expanding it with additional detail for the Paks area and the vicinity of the power plant. In addition to road infrastructure, the network also integrated public transport lines and stops, transfer points, and terminal stations, covering both local and regional routes. The model also incorporated cycling infrastructure and parking demand, providing a multimodal representation of the city's transport system.

Following calibration, the validated base model served as the foundation for forecast simulations covering several time horizons (2025, 2030, 2035, 2045, and 2055). Future scenarios included assumptions about population growth—considering residents, power plant construction workers, and plant employees—and potential modal shift effects, where 10%, 20%, or 30% of private car users were projected to switch to public transport. These predictive simulations produced quantitative outputs of expected traffic volumes (ANF) and passenger flows under different scenarios. The resulting models provide a reliable, data-driven basis for strategic planning and decision-making in urban transport development, enabling the evaluation of infrastructure investments, network expansions, and sustainable mobility measures with a high degree of analytical confidence.

Figure 3: Network optimization in ST scenario 1: (a) Number of departures 5; (b) Public transport volume (VISUM).

Scenario ST1 focuses on improving access to the southeastern suburban area of Paks through the introduction of a new bus line (Line 5), connecting the Gesztenyés utca and “PK telephely” stops. This intervention provides a direct public transport link to an expanding residential and business district, significantly improving connectivity and operational efficiency without requiring new vehicles. The VISUM modeling results show a moderate increase in total network departures (from 209 to 237 per day) and passenger capacity (by 14%), with only a slight rise in vehicle performance, demonstrating better resource utilization. Accessibility indicators also improved, with the average number of departures within 300 meters of residents increasing from 98.9 to 102.5 per day. Overall, ST1 achieves better spatial coverage, shorter travel times, and enhanced integration between suburban and urban routes, representing a practical pilot action for sustainable urban mobility enhancement.

Table 6: VISUM simulation results of ST1 in comparison with the base scenario

Scenario	Base	ST1	
	Total	Line 5	Total
Indicators			
length of network [km]	25,2	0,7	25,9
number of departures on the network [departures/day]	209,0	28,0	237,0

place capacity [passenger-capacity/day]	13 730,0	1 960,0	15 690,0
vehicle performance [vehicle-kilometres/day]	1 634,2	117,4	1 751,6
passenger-performance [passenger-kilometres/day]	10 407,6	792,5	11 200,1
average number of departures on the network [departures/day]	64,8	2,7	67,6
average number of passengers on the network [passengers/day]	412,8	19,2	432,0
average number of passengers per departure [passengers/departures/day]	6,4	0,0	6,4
average number of passengers per 1 kilometres of line length [passengers/day/kilometres]	16,4	0,3	16,7
average number of passengers per vehicle-kilometres [passengers/day/vehicle-kilometres]	0,3	0,0	0,2
Service coverage and accessibility indicators			
number of inhabitants located within the coverage of a line (max 300 m from stops)	18 029,9	73,0	18 102,9
coverage ratio within total population	0,8	0,0	0,8
average number of accessible transit lines (max 300 m from inhabitant)	3,1	0,1	3,2
average number of accessible transit departures (max 300 m from inhabitant) [departures/day]	98,9	3,6	102,5

6.2.2. Scenario ST2 – Improving Accessibility of Outer Areas (2)

Cseresznyéspuszta is an outlying area administratively belonging to the city of Paks, which is currently not connected to the local public transport network. The main reasons for this were that the access road did not meet the technical requirements for scheduled bus services, and residents of the area primarily preferred individual transport by private cars.

However, one of the key objectives of the City of Paks is to promote sustainable mobility by strengthening public transport and reducing the proportion of individual car use. To support this goal, the necessary road connection has been constructed, and the local transport company has conducted an assessment of potential service demand.

According to the survey results, Cseresznyéspuszta shows a relatively high rate of car ownership and above-average household income levels; nevertheless, there is a growing demand for the establishment of a public transport connection, particularly towards the city centre.

The proposed new bus line (nr. 6) will therefore terminate at the Paks Bus Station, as Cseresznyéspuszta primarily generates passenger traffic in the direction of the city centre.

Scenario ST2 aims to integrate the outer settlement of Cseresznyéspuszta—previously unserved by local public transport—into the Paks bus network via a new Line 6 connection to the city center. The scenario addresses the high car dependency of this area by promoting modal shift and improving social inclusion through enhanced accessibility. The VISUM model indicates an increase in total network length (from 25.2 km to 32.1 km) and passenger capacity (+700 passengers/day), alongside a 10% rise in total departures. Although average passenger numbers per day decreased slightly due to the dispersed demand, the network's overall service coverage expanded by nearly 700 inhabitants. This demonstrates that the ST2 scenario prioritizes accessibility and inclusivity over short-term load efficiency, aligning with Paks' long-term objective of reducing private car use and promoting sustainable suburban connectivity.

Figure 4: Network optimization in ST scenario 2: (a) Number of departures 5; (b) Public transport volume (VISUM).

Table 7: VISUM simulation results of ST2 in comparison with the base scenario

Scenario	Base	ST2	
	Total	Line 6	Total
Indicators			
length of network [km]	25,2	6,9	32,1
number of departures on the network [departures/day]	209,0	10,0	219,0
place capacity [passenger-capacity/day]	13 730,0	700,0	14 430,0
vehicle performance [vehicle-kilometres/day]	1 634,2	81,0	1 715,3
passenger-performance [passenger-kilometres/day]	10 407,6	1 019,7	11 427,3
average number of departures on the network [departures/day]	64,8	-11,4	53,4
average number of passengers on the network [passengers/day]	412,8	-57,0	355,8
average number of passengers per departure [passengers/departures/day]	6,4	0,3	6,7
average number of passengers per 1 kilometres of line length [passengers/day/kilometres]	16,4	-5,3	11,1
average number of passengers per vehicle-kilometres [passengers/day/vehicle-kilometres]	0,3	0,0	0,2
Service coverage and accessibility indicators			
number of inhabitants located within the coverage of a line (max 300 m from stops)	18 029,9	687,1	18 717,1
coverage ratio within total population	0,8	0,0	0,8
average number of accessible transit lines (max 300 m from inhabitant)	3,1	0,1	3,2
average number of accessible transit departures (max 300 m from inhabitant) [departures/day]	98,9	1,2	100,1

6.2.3. Scenario ST3 – Network Expansion – Integration of the Nuclear Power Plant into the Local Public Transport System

The planned scenario for Paks has been designed as a forward-looking transformation of the city's public transport system, with special emphasis on sustainability, service quality, and the capacity to respond to major demographic and industrial developments, particularly the expansion of the Paks Nuclear Power Plant. The design process builds on the results of the traffic model, surveys, and performance evaluations, while seeking to align with regional mobility goals and EU-funded program requirements. The aim is to create a bus system that provides efficient coverage of both the city and its outer districts, integrates new development areas, and offers reliable connections to workplaces, schools, and regional transport hubs.

One of the main challenges addressed in the new network is the expected growth in daily commuter flows, especially toward the Nuclear Power Plant, which will generate a significant increase in workforce mobility. The proposed system therefore establishes direct and frequent services from the main residential areas and the city center to the plant's entrances, ensuring fast and predictable travel during peak hours. This reflects the strategic role of the plant in shaping local transport demand. In addition to direct plant services, the network is structured to better serve other employment zones, industrial parks, and educational institutions, thus supporting a balanced distribution of travel opportunities.

A key element of the design is the identification of new bus stops to enhance accessibility. These stops are introduced in residential expansion zones, planned housing areas, and locations where surveys revealed unmet demand. The locations of these stops also consider pedestrian access, safety, and potential for future intermodal connections. The extension of the network to outlying settlements, such as Dunakömlőd and Cseresznyés, is another strategic improvement, aiming to integrate peripheral communities into the city's mobility framework and reduce car dependency.

The planned interventions in the network include the rationalization of existing routes, the elimination of redundancies, and the restructuring of line alignments to provide more direct connections. Journey times are optimized to avoid unnecessary detours and to make better use of the fleet. These adjustments also support regular headways and simplified timetables, which are essential for passenger comprehension and confidence. The introduction of new lines and modifications of existing ones are complemented by infrastructure measures, such as adjustments to turning loops, the establishment of layover points, and technical provisions for charging electric buses, ensuring that operational needs are fully integrated into the planning.

Special attention is given to Line 13, which is conceived as a key service connecting the northern industrial and residential zones with the Nuclear Power Plant. This line is designed to function with high capacity and frequency, directly targeting the work-related demand peaks. By providing an alternative to private car travel, Line 13 is expected to absorb a considerable share of the commuter market. Its operational plan includes priority at critical junctions, adequate layover facilities, and synchronization with other lines to maintain network coherence.

The overall structure of the planned network is visualized through new network diagrams, which illustrate both the full system and specific sub-networks dedicated to strategic destinations, such as the Nuclear Power Plant. The diagrams show a clear hierarchy of routes, ranging from primary high-demand lines to secondary feeders, which together create a coherent and legible system. The design philosophy emphasizes simplicity, coverage, and reliability, balancing the need for comprehensive service with operational efficiency.

From a broader perspective, the planned network contributes to the city's transition toward sustainable mobility. By improving the attractiveness of bus transport through more direct routes, reduced travel times,

and expanded coverage, it encourages modal shift away from private cars. This aligns with the city's zero-emission strategy, which is already advanced by its exclusive use of electric buses. The integration of planned hydrogen-powered buses and advanced passenger information systems further reinforces the innovative character of the system. Additionally, the introduction of new parking policies and digital ticketing solutions will complement the network by managing car use and simplifying access to public transport.

Overall, the planned network represents a significant leap forward for Paks in terms of urban mobility. It responds to immediate challenges such as the nuclear plant expansion and population growth, while laying the foundation for a resilient, environmentally friendly, and user-centered transport system. The emphasis on direct connections, new stops, targeted interventions, and modern operational practices ensures that the city can meet future demands effectively. Through these measures, Paks not only enhances its local public transport but also sets an example of how medium-sized cities can innovate in mobility planning to support economic development, environmental goals, and quality of life for residents.

Scenario ST3 represents a comprehensive restructuring and expansion of the city's public transport system, with a strong focus on integrating the Paks Nuclear Power Plant into the local mobility network. This scenario introduces new high-frequency lines, notably Line 13, to serve the plant directly and strengthen connections with major employment zones, industrial parks, and educational institutions. According to the VISUM results, this scenario produces the most substantial improvement in network performance: the number of daily departures increases by 56% (to 327), passenger capacity grows by over 7,700 passengers per day, and passenger performance rises by nearly 50%. The accessibility index also improves significantly, with the average number of accessible transit lines per inhabitant increasing from 3.1 to 4.7. ST3 directly supports sustainable growth, workforce mobility, and the integration of outlying settlements such as Dunakömlőd and Cseresznyéspuszta, laying the foundation for a zero-emission, energy-efficient transport system based on electric and future hydrogen-powered buses.

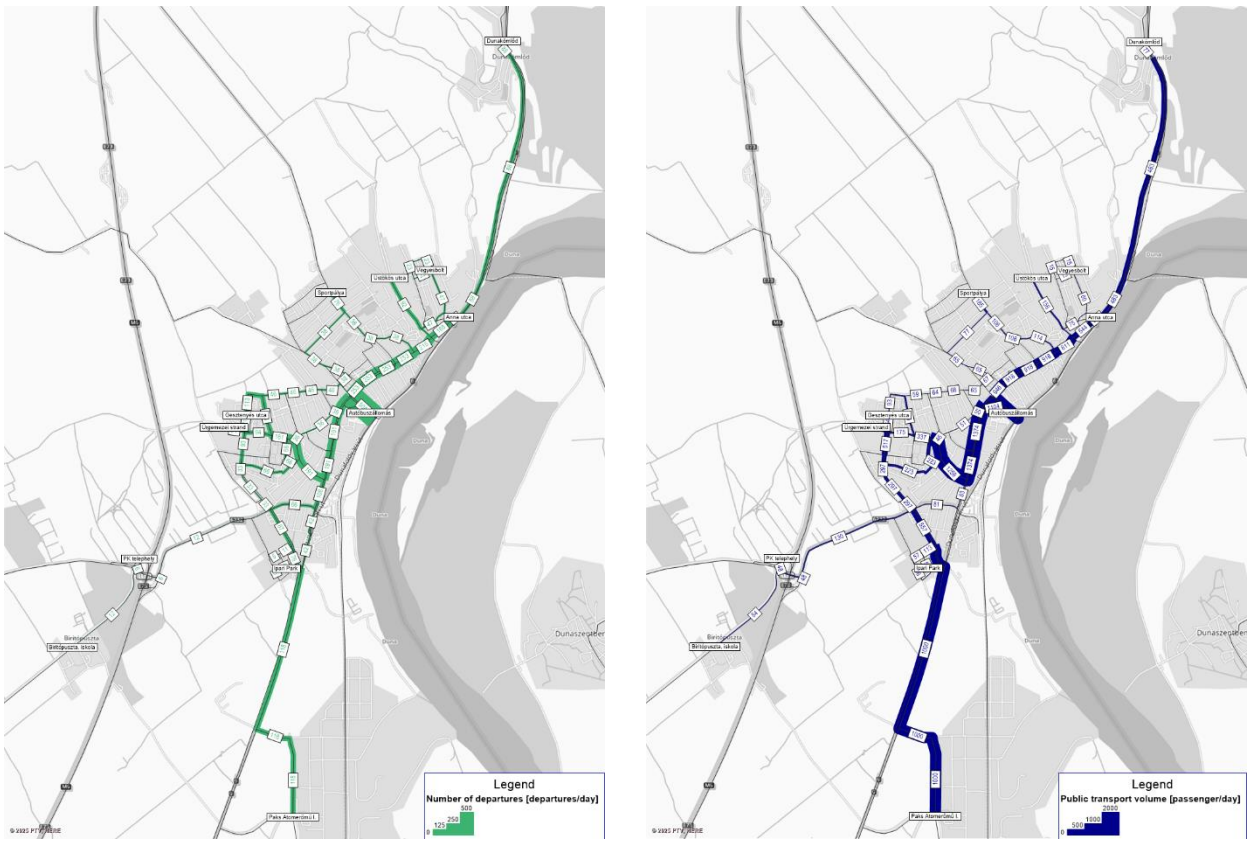


Figure 5: Network optimization in ST scenario 3: (a) Number of departures 5; (b) Public transport volume (VISUM).

Table 8: VISUM simulation results of ST3 in comparison with the base scenario

Scenario	Base	ST3	
	Total	Line 10+	Total
Indicators			
length of network [km]	25,2	4,8	30,0
number of departures on the network [departures/day]	209,0	118,0	327,0
place capacity [passenger-capacity/day]	13 730,0	7 780,0	21 510,0
vehicle performance [vehicle-kilometres/day]	1 634,2	968,3	2 602,6
passenger-performance [passenger-kilometres/day]	10 407,6	4 852,7	15 260,3
average number of departures on the network [departures/day]	64,8	21,9	86,7
average number of passengers on the network [passengers/day]	412,8	95,4	508,2
average number of passengers per departure [passengers/departures/day]	6,4	-0,5	5,9
average number of passengers per 1 kilometres of line length [passengers/day/kilometres]	16,4	0,6	16,9

average number of passengers per vehicle-kilometres [passengers/day/vehicle-kilometres]	0,3	-0,1	0,2
Service coverage and accessibility indicators			
number of inhabitants located within the coverage of a line (max 300 m from stops)	18 029,9	1,8	18 031,7
coverage ratio within total population	0,8	0,0	0,8
average number of accessible transit lines (max 300 m from inhabitant)	3,1	1,6	4,7
average number of accessible transit departures (max 300 m from inhabitant) [departures/day]	98,9	39,1	137,9

6.3. Conclusion of scenario modelling

Summary of scenario modelling results

Three scenarios were modelled in PTV VISUM to assess improvements in Paks' public transport network. ST1 introduced a new line to the southeastern area, improving access and operational efficiency with minimal additional resources. ST2 extended services to Cseresznyéspuszta, integrating an outer settlement and enhancing social and spatial coverage. ST3 represented a major network expansion, connecting the Nuclear Power Plant and other employment zones, significantly increasing departures, capacity, and service accessibility. Overall, the simulations show progressive network improvement, greater population coverage, and enhanced sustainable mobility, confirming the effectiveness of integrated planning for future urban transport development in Paks.

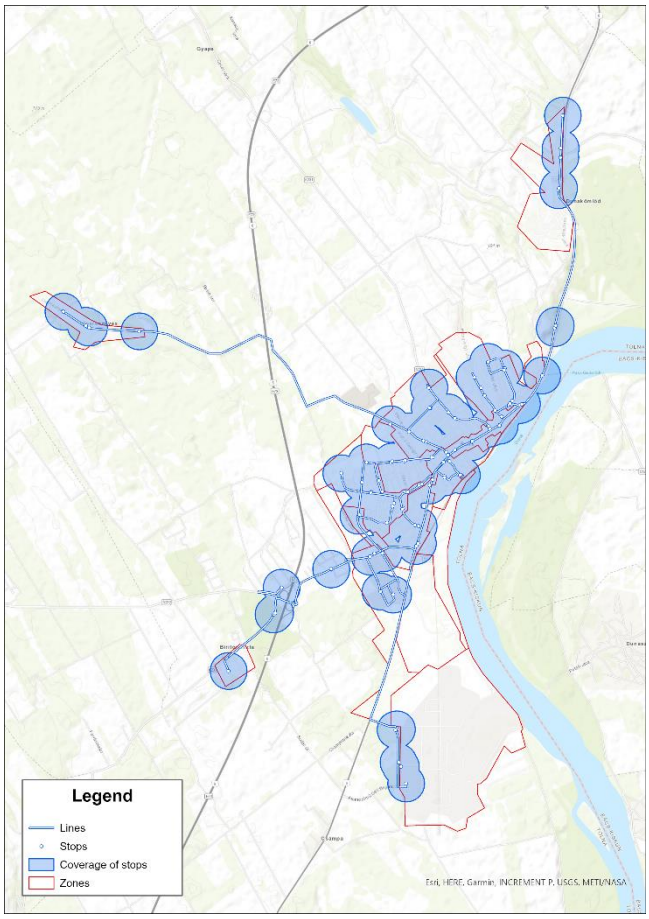


Figure 6: Public transport coverage (existing and analysed scenarios)

The map illustrates the public transport network coverage for Paks, showing existing and planned bus lines, stops, and service zones as represented in the VISUM model from the OPTI-UP Local Plan. The blue lines indicate bus routes connecting the central urban area with peripheral settlements such as Dunakömlőd, Cseresznyéspuszta, and Biritó, while the shaded blue circles mark the 300-meter coverage areas around each stop. The red outlines represent traffic analysis zones used for modeling accessibility and travel demand. The visualization confirms that the urban core of Paks benefits from dense service coverage, whereas the southern industrial zone (including the Nuclear Power Plant) and outer residential areas have been newly integrated into the network, reflecting the objectives of Scenarios ST1–ST3 to enhance accessibility, connectivity, and sustainable mobility across the wider municipal area.

Connections with Local Goals and Visions set in Chapter 4

The VISUM modelling scenarios for Paks are closely aligned with the city's strategic vision and local goals defined in Chapter 4 of the Local Plan. By 2030, Paks aims to become a well-connected and sustainable urban hub capable of efficiently managing increased mobility demands resulting from the Nuclear Power Plant expansion. Each scenario contributes to this vision through tangible improvements in accessibility, efficiency, and sustainability.

Scenario ST1, improving access to the southeastern area, directly supports the goal of increasing access to outlying areas and promotes more effective collaboration with passengers by providing new mobility options close to residential zones. Scenario ST2, connecting Cseresznyéspuszta, enhances social inclusion and spatial equity, fully reflecting the objective of ensuring public transport availability in currently underserved areas. Finally, Scenario ST3, integrating the Nuclear Power Plant and expanding the city-wide network,

corresponds to the goals of increasing the efficiency of the transport system and expanding the offer to passengers travelling from outer areas to the city centre.

Collectively, these modelling actions operationalize the city's vision of environmentally responsible, citizen-oriented, and energy-efficient mobility. They align with both local and regional objectives, including the Tolna County Development Concept and the Paks Sustainable Urban Mobility Plan (SUMP), which emphasize zero-emission transport, reduced car dependency, and improved accessibility for all residents.

Limitations in Scenario Definition, Modelling, and Results Analysis

A key limitation of the modeling was the lack of detailed demographic data, such as age-, gender-, or education-related travel demand. Traffic demand estimates were based on surveys covering 5% of the local population, and results were extrapolated to represent the whole municipality. Population forecasts were also used to estimate future residential distribution across districts.

Scenario-based passenger forecasts can be validated by monitoring the performance of implemented routes and collecting user feedback. Over time, the model can be refined using stakeholder input and updated demand data to improve accuracy and responsiveness to real-world changes.

How the Modelling Action Informs the Selection of Local Actions

The VISUM modelling process directly informed the selection of local actions by identifying which network modifications most effectively improve accessibility, coverage, and operational efficiency. Through the comparison of Scenarios ST1–ST3, modelling quantified the expected impacts of new routes, service frequency changes, and network extensions. Although operational conditions ultimately define feasibility, the simulations revealed the relative benefits of each intervention in terms of passenger demand, travel time reduction, and energy efficiency. These results guide decision-makers in prioritizing actions that best align with Paks's strategic goals of sustainable mobility, reduced emissions, and optimized public transport performance

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 9: List of stakeholders

Stakeholder	Type	Role	Importance	Influence
Local Government of Paks	Decision maker/owner/financing	Approval/financing of activities	High	High
Hungarian Railways	PT provider	Coordination of timetables, use of common stops	Medium	Low
Local social/educational organisations	Public service providers	Determining PT needs	Medium	High
Local media (social, online, print)	Media	Promoting PT, conveying positive messages	High	High
Local enterprises	Business sector	Determining PT needs	Medium	Medium

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 10: Actions descriptions

Actions	Resources	Timeline	Stakeholders	Expected impact	Risk
A1	Internal (Low)	2025.05.31	Local Government of Paks	Higher ratio public transport usage, reduced congestion, cleaner and safer urban environment.	Changing schedules may cause public discontent until passengers get used to the new system
A2	External media service providers (Medium)	2025.08.31	Local government, Local media, Schools, local influencers, Football Clubs, external communication service providers	Higher ratio public transport usage, increase in PT satisfaction	The risk lies in the fact that targeting does not work well.
A3	Internal (Low)	2025.08.31	Local Government of Paks	Better results on operational and financial operations	The service customer and the Paks City Government must approve the operational and financial changes, which will most likely be made if sufficiently substantiated.
A4	Internal (Low)	2026.08.31	Local government, citizens, local enterprises, public service providers, local social/educational organisations	More efficient operation, greater population reach	People living in the suburbs are few in number, so passengers from more densely populated areas may be against.

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 11: Local Plan KPIs

Actions	KPI	Brief description	Unit	Target
A4	**Number of the settlements reachable**	Number of settlements and parts of settlements which of the new bus stop make more accessible by public transport.	Piece	2
A1, A4	**Number of citizens in reachable new areas**	The population of the settlements and parts of the settlements which are newly involved in the public transport.	Persons	3.700
A4	**Number of new lines that reach the outer city areas**	The number of newly established lines that affect areas of settlements that have not been reached so far.	Piece	1
A1, A3	**Change of the frequency for runs that reach the outer city areas**	The frequency of daily departures numbers.	%	-1
A1, A3	**Total yearly cost per km (financial)**	The change in costs one kilometre away on an annual basis.	HUF/KM	-1%
A1, A3	**Total yearly cost per travel (transport)**	The change in costs per trip on an annual basis.	HUF/TRAVEL	-1%
A2, A3	**Number of feedback received (Number of satisfaction surveys per year)**	The number of comments received regarding the evaluation of public transport. (The number of complaints received via email and phone, the number of completed questionnaires.)	Piece	1
A4	**Number of suggestions from citizens that enter in the plan/project**	The number of solutions incorporated into the company's operations based on public feedback.	Piece	2-3
A2	**Number of yearly Social campaigns**	The number of social media campaigns carried out in a year.	Piece	1

9.1. Description of data sources & tool for KPIs

Table 12: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
Number of the settlements reachable	Number of settlements reached with new service	Incorporating the latest available official data	Hungarian Central Statistic Office	Excel
Number of citizens in reachable new areas	Number of people living in the settlement	Incorporating the latest available official data	Hungarian Central Statistic Office	Excel
Number of new lines that reach the outer city areas	Number of new lines	New lines created based on the schedule	PAKS Transportation llc	Map and schedule of the new line
Change of the frequency for runs that reach the outer city areas	Number of weekly bus routes on the given route	Analysing the schedule	PAKS Transportation llc	Schedules
Total yearly cost per km (financial)	Total operating cost; Mileage	Comparison of last year's annual report and this year's business plan	PAKS Transportation llc	Report for the Ministry and for the City
Total yearly cost per travel (transport)	Total operating cost; total number of travels	Comparison of last year's annual report and this year's business plan	PAKS Transportation llc	Report for the Ministry and for the City
Number of feedback received (Number of satisfaction surveys per year)	Number of satisfaction questionnaires/number of respondents	Analysing the results of the survey	PAKS Transportation llc	The complaint reporting system on the PT llc online platform
Number of suggestions from citizens that enter in the plan/project	Number of proposals received, and number of proposals used	Communication documentation, preparation of an action plan	PAKS Transportation llc	The complaint reporting system on the PT llc online platform
Number of yearly social campaigns	Number of social media campaigns conducted	Social Media analysis	PAKS Transportation llc	Internal report