



## Advanced Environmental Monitoring within the Intelligent Transportation System in Tychy

### Project Background

The city of Tychy, located in the Silesian Voivodeship, launched an ambitious Intelligent Transportation System (ITS) initiative to improve traffic management and monitor environmental conditions. A key component of the project was the implementation of an advanced environmental monitoring system, designed to provide continuous air quality and noise level data – directly contributing to a better quality of life for residents.

### Challenge

Before the ITS rollout, Tychy struggled with air pollution, excessive noise, and high traffic density. The city lacked effective tools to monitor and respond to rapidly changing environmental conditions, which negatively impacted both public health and road infrastructure.



## Solution

As part of the ITS project, a **comprehensive environmental monitoring network** was deployed. The main contractor was **Yunex Traffic Poland** (formerly **Siemens Mobility**), with **Far Data** supplying the measurement stations.

The system included:

- **Weather monitoring stations** placed at key locations across the city to detect changing conditions and quickly respond to threats such as fog or black ice.
- **Air quality and noise monitoring stations:** 7 units were installed to measure carbon monoxide, nitrogen oxides, sulfur dioxide, and particulate matter. The data supports decisions on traffic restrictions to help reduce pollution.
- **Bluetooth detection network:** 39 additional Bluetooth sensors (each environmental station is equipped with a standard Bluetooth detector) were installed on selected road sections to analyze vehicle travel times and assess traffic flow efficiency in real time.

All stations were mounted on existing traction and lighting poles within the road corridor.

## Environmental Impact Assessment

A major goal of the monitoring system was to evaluate the ITS's impact on reducing emissions – including **greenhouse gases (CO<sub>2</sub> equivalent), gaseous pollutants, and particulates** – in comparison to baseline levels. Since the stations were installed as the first component of the ITS, they provided a reference point for measuring future improvements.

Measurement results, collected in line with an approved methodology, will be combined with mathematical modeling to quantify environmental benefits.

The deployment of **radar-based vehicle classification** and **Bluetooth travel time analysis** also supports emission modeling. Since **traffic fluidity** is a key factor affecting transport-related emissions (besides volume and vehicle type), ITS improvements – especially at intersections – are expected to be reflected in the pollution measurements.



## Results

Comparison of Far Data station results with those from a GIOŚ (Polish Chief Inspectorate of Environmental Protection) reference station confirmed the **high accuracy** of the environmental monitoring solutions implemented as part of the ITS system.

The system, completed in October 2022, delivered several measurable benefits for the city of Tychy:

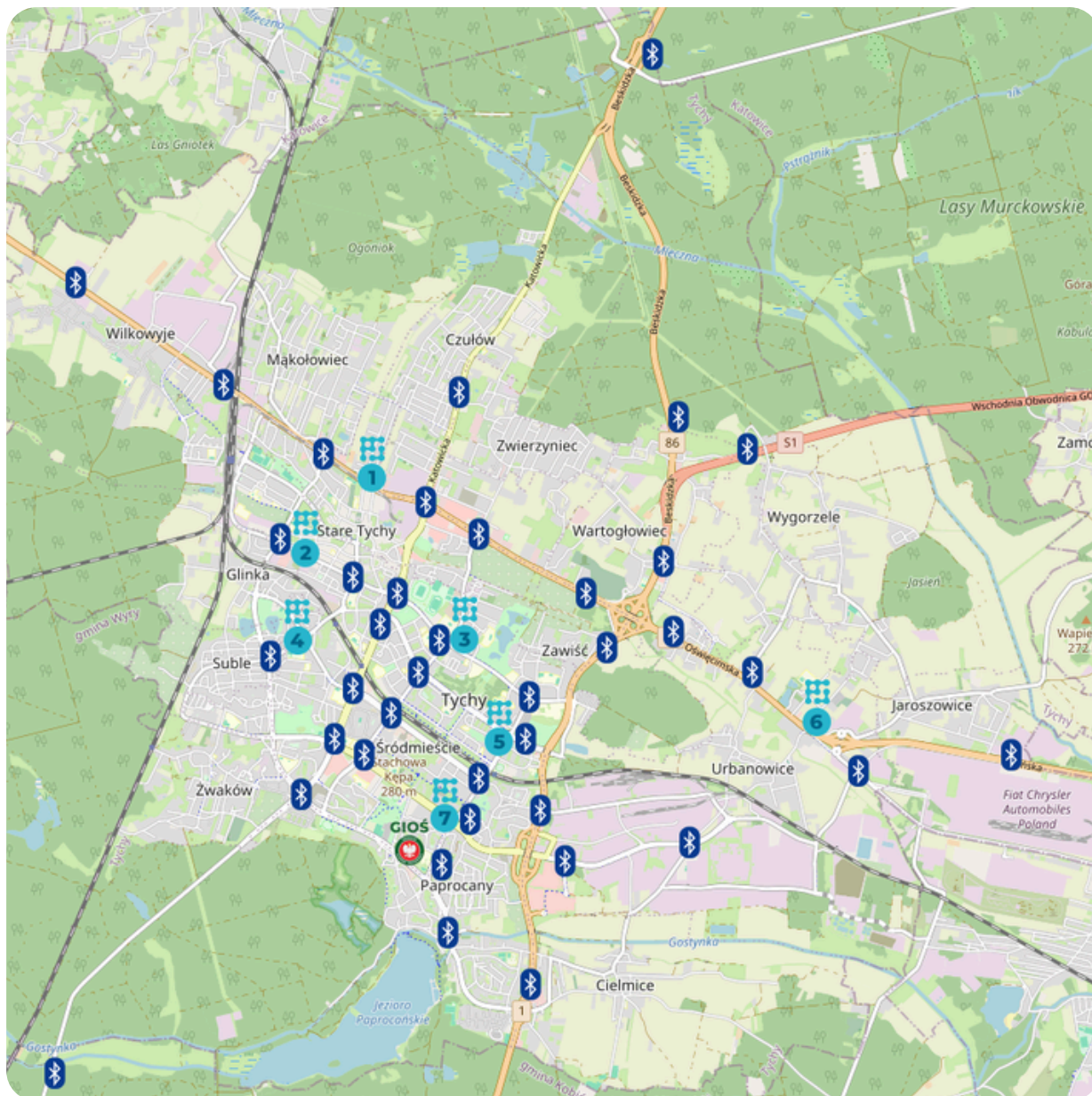
- **Improved air quality:** The monitoring system enabled swift implementation of measures to reduce emissions, contributing to improved health and living conditions for residents.
- **Noise reduction:** Noise level analysis allowed the identification of the most problematic areas and the implementation of mitigation strategies, resulting in a quieter urban environment.
- **Increased road safety:** Enhanced control of weather conditions and traffic monitoring contributed to a reduction in road accidents.
- **Traffic flow optimization:** The Bluetooth detection system improved traffic flow management, reducing travel times on major urban arteries.

## Conclusion & Outlook

The implementation of the environmental monitoring system within the ITS framework in Tychy exemplifies the successful integration of modern technologies into urban management. This project not only improved residents' quality of life but also supported sustainable urban development by protecting the environment and enhancing traffic management efficiency.

Further expansion of the system is planned, including the addition of more monitoring stations and integration with systems in other cities. This will enable more efficient environmental and traffic management across the region. This case study demonstrates how **modern technological solutions can effectively address environmental and mobility challenges** in growing cities.





 Far Data Sp. z o.o. 

 Chief Inspectorate for  
Environmental Protection







 **FARDATA**



