

# URBAN PLANNING AND TRANSPORTATION

## ACADEMIC YEAR 2024/25

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### INTRODUCTION

This project focuses on the urban and transport planning of the Sainte-Walburge neighborhood in Liège and would turn it into a dynamic, sustainable, and accessible living environment. Sainte-Walburge with a rich historical background and peculiar topography, embodies several challenges and opportunities linked to urban renewal. The following proposal aims to try and solve some of the critical problems, including traffic congestion, ineffective public transportation, the lack of cycling infrastructure, and a shortage of pedestrian-friendly areas.

It will develop an integrated neighborhood mobility plan by combining fieldwork data with the assessment of mobility and integrating this with urban design that focuses on giving priority to transport modes in the public sphere, introducing reorganized flows of traffic, enhancing green and public space regarding improvement in the living standards of both residents and visitors.

It uses a multidisciplinary approach, hence joining theoretical considerations with practical action, in cooperation with local stakeholders and members of the community. This will serve to make Sainte-Walburge a model for urban restructuring and sustainable development through detailed analyses and strategic planning.



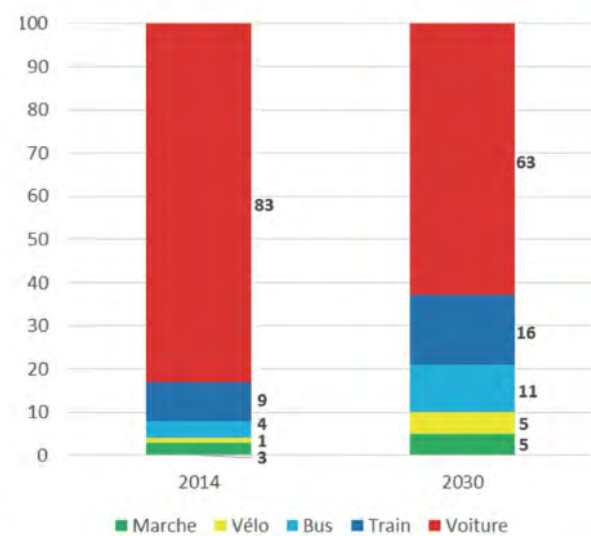
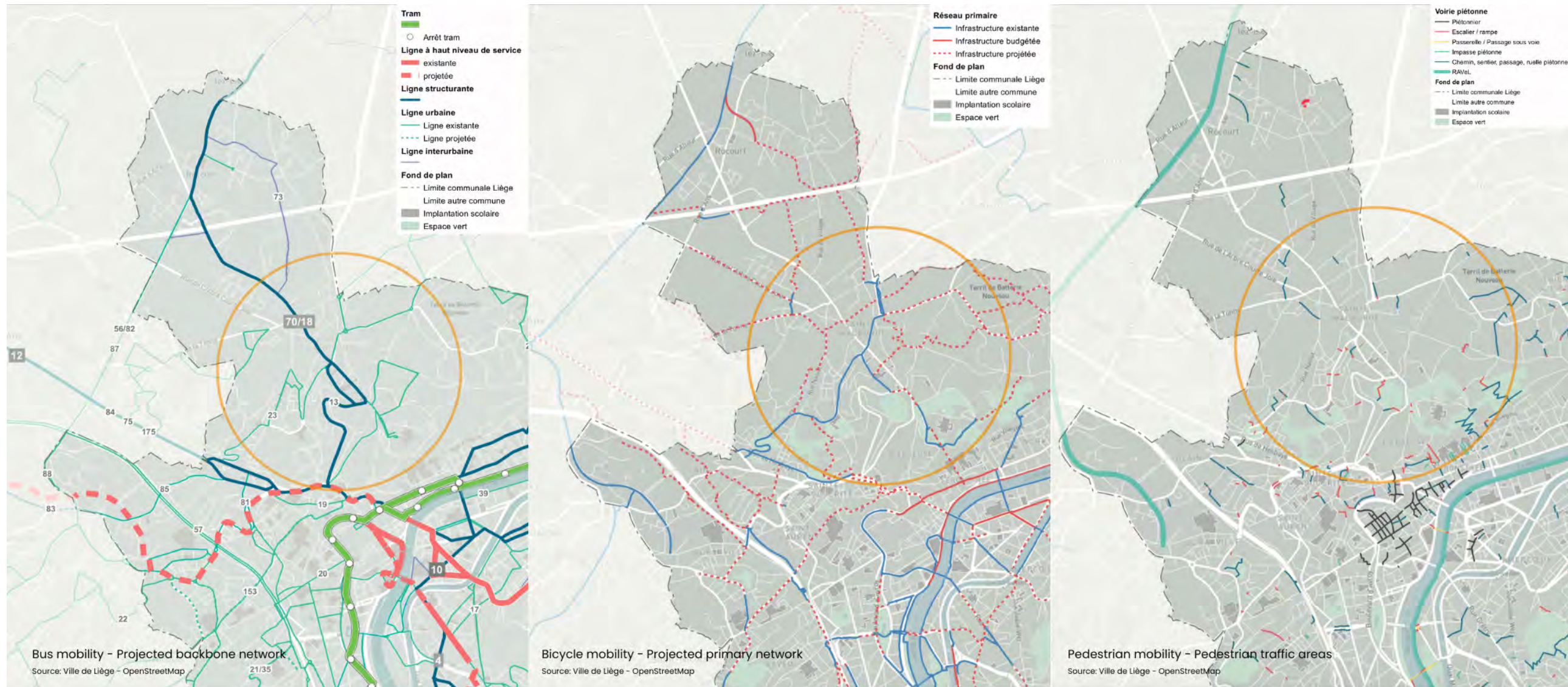
Image 1 - Sainte-Walburge neighbourhood (Facebook - enquête Sainte-Walburge 2030, 2018)

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- B) Asadi-Shekari, Z., Moeinaddini, M., & Shah, M. Z. (2013). Non-motorised Level of Service: Addressing Challenges in Pedestrian and Bicycle Level of Service. *Transport Reviews*.
- C) François Mirabel. 2014. Vers une réduction de la place de l'automobile en ville.
- D) Tori an AI. 2022. Developing disruptive mobility scenarios for rural areas. Participatory mobility scenario building in a Belgian village for the year 2050.
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Sources:  
 • Plan Urbain de Mobilité (PUM)  
 • SDALg (Schéma de Développement de l'Arrondissement de Liège)

**Summary of Mobility Issues and Priorities**

- Reducing Reliance on Cars
- Strengthening Public Transport
- Developing Cycling Infrastructure
- Improving Pedestrian Infrastructure
- Promoting Intermodal Transportation

**Weaknesses and Potential Problems**

- Congestion
- Underinvestment in Public Transport
- Fragmented Cycling Infrastructure
- Uneven Pedestrian Infrastructure
- Lack of Intermodal Integration

**Detailed of Modal Share Objectives**

- Reducing Car Dependency
  - Develop a dense network of safe and convenient cycling infrastructure
  - Improve pedestrian infrastructure
  - Promote the benefits of active modes of transport
- Making Public Transport a Preferred Mode
  - Invest in high-quality public transport infrastructure and services
  - Increase frequency and reliability
  - Integrate ticketing and payment systems
- Fostering Intermodal Transportation
  - Develop multimodal exchange hubs (PEMs)
  - Expand park-and-ride (P+R) facilities

The Saint-Walburge neighbourhood in Liège is a key area for urban transformation through targeted mobility and planning policies aligned with city-wide regulatory frameworks. The main goal is to reduce car dependency, improve public transportation, and foster sustainable, multimodal travel options. These objectives are consistent with overarching policies such as the "Plan Urbain de Mobilité" (PUM) and the "Schéma de Développement Territorial de l'Arrondissement de Liège" (SDALg).

### PRIORITIES AND OBJECTIVES

1. **Reducing Reliance on Cars:** The framework emphasizes the need to decrease the use of car as the main way of transport in the city. These are some of the main proposals made along the documentation:
  - Developing a comprehensive and safe cycling network that connects key areas within and beyond the neighbourhood.
  - Enhancing pedestrian-friendly infrastructure to ensure safe, and pleasant walking experiences.
  - Promoting the adoption of active modes of transportation such as walking and cycling through awareness campaigns and incentives.
2. **Strengthening Public Transport:** This is a very strong way to make public transport a viable alternative to cars. The main actions included over the different plans are the following:
  - Investments in high-quality infrastructure for buses, particularly through the development of a backbone network that ensures frequent and reliable service.
  - Prioritization of public transport lanes by designing exclusive lanes for buses and other public transport modes to improve their speed and reliability, particularly during peak hours. This can significantly reduce delays caused by shared lanes with cars.
  - Integration of ticketing and payment systems to simplify transit for users across different modes of transport.
  - Improvements in service frequency and connectivity, particularly to intermodal hubs and major attractors such as schools, hospitals, and retail centres.
3. **Developing Intermodal Transportation:** The strategy aims to make transitions between various modes of transport efficient and accessible by:
  - Establishing multimodal exchange hubs (PEMs) to facilitate connections between buses, trains, bicycles, and pedestrians.
  - Expanding park-and-ride (P+R) facilities at strategic locations to encourage commuters to park outside the city centre and use public transport.
4. **Addressing Infrastructure Weaknesses:** The analysis identifies critical issues all along the neighbourhood of Saint-Walburge, such as:
  - Fragmented cycling infrastructure that limits connectivity and safety.
  - Uneven pedestrian pathways that fail to support active mobility adequately.
  - Congestion caused by underinvestment in public transportation and excessive reliance on private cars.
  - Lack of integration between different transportation modes, which hinders seamless mobility across the area.

### PROPOSED MODAL SHARE TARGETS

Based on projections and policies in the PUM and SDALg, the plan seeks to significantly alter the modal share by 2030. The target includes:

- Boost the share of cycling by developing a safe, well-connected primary cycling network and installing secure bike parking at key locations. This makes cycling a viable and appealing mode of transport within and beyond the neighbourhood.
- The goal is to significantly raise the percentage of trips made using public transport by improving service frequency, reliability, and connectivity. Measures include integrating ticketing systems, reducing travel times, and enhancing links to major attractors like schools and hospitals.
- A substantial decrease in private car use is targeted through measures like traffic calming zones, one-way streets, and restricted parking. These efforts will be paired with incentives for alternative modes of transport, such as public transit and cycling.

The policy also integrates urban design considerations, focusing on:

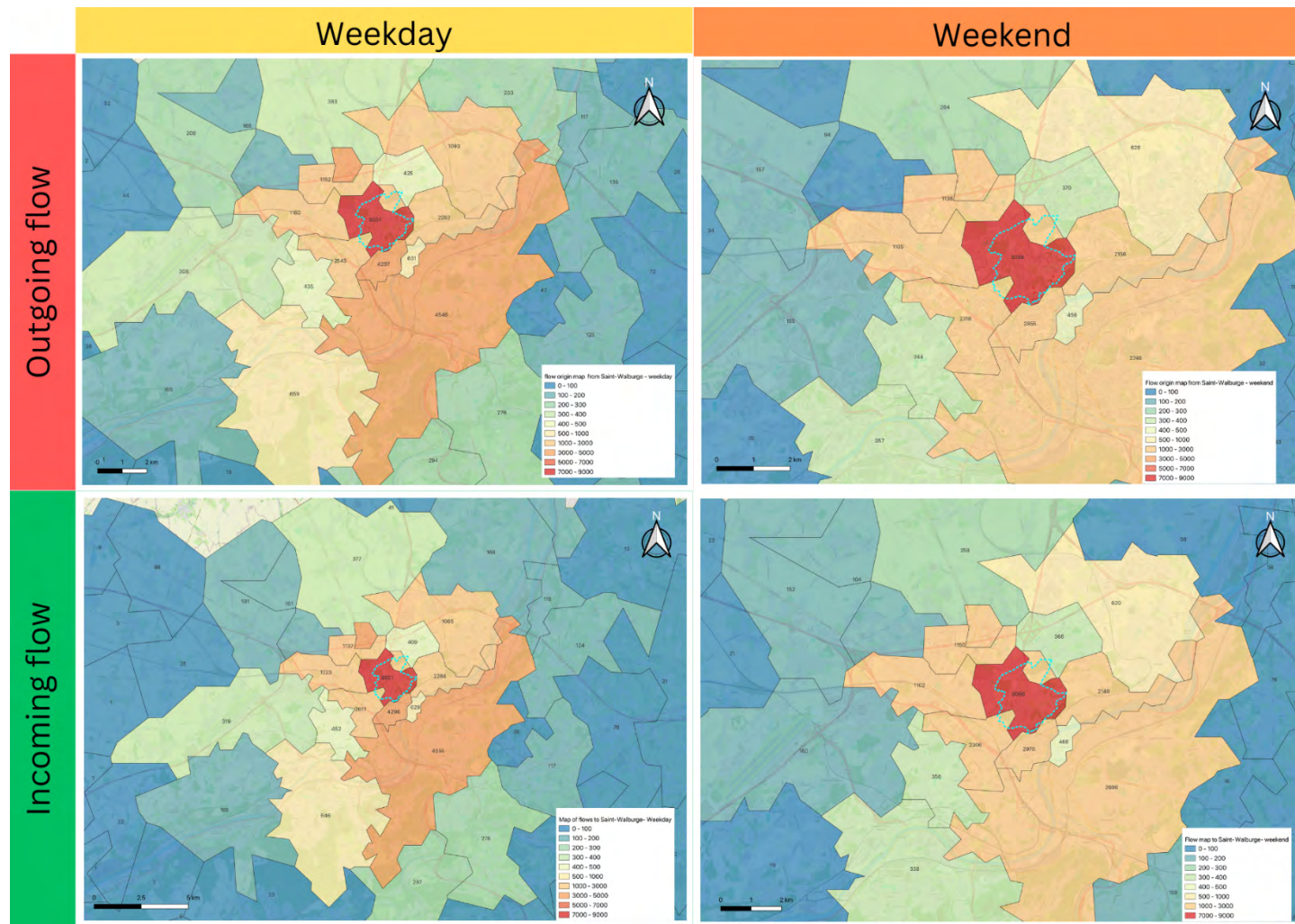
- Expanding green spaces to improve the connectivity and gain environmental quality.
- Reorganizing traffic flows within the neighbourhood to prioritize public transport and active modes.
- Revitalizing public spaces to support community activities and sustainable urban living.

This comprehensive strategy, supported by city regulations and plans, represents a critical step toward sustainable urban transformation in Saint-Walburge, aligning the neighbourhood with Liège's vision for a greener, more accessible, and less car-dependent future.

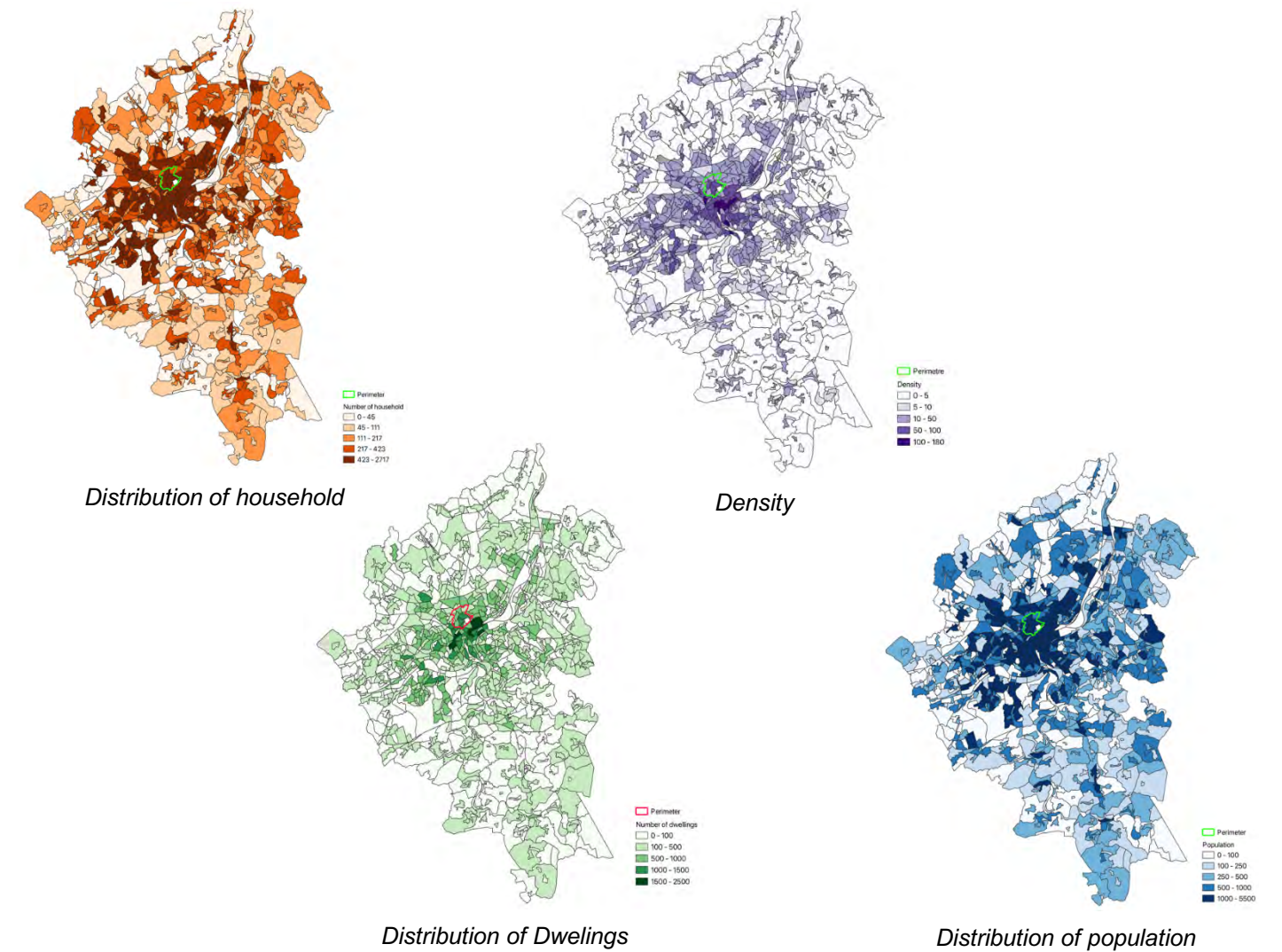
### ENVIROMENTAL CONSIDERATIONS

Urban planning in Liège can improve by using traffic and mobility data to create better strategies. Cars dominate key areas, while pedestrians and bicycles also play an important role. Expanding pedestrian-only zones in areas with many shops or schools would make walking safer, support local businesses, and reduce traffic. Building connected and safe bike lanes in residential and recreational areas would encourage cycling for daily travel and leisure. Reducing the use of cars in busy urban areas can help cut pollution and make the city more pleasant to live in. This can be done by promoting other transport options like bicycles and public transit. Combining these actions with green plans, such as planting more trees, would help tackle climate problems like the Urban Heat Island effect. At the same time, it would make the city greener, more attractive, and a better place for everyone to live and move around. (*Beaumont et al., 2022*)

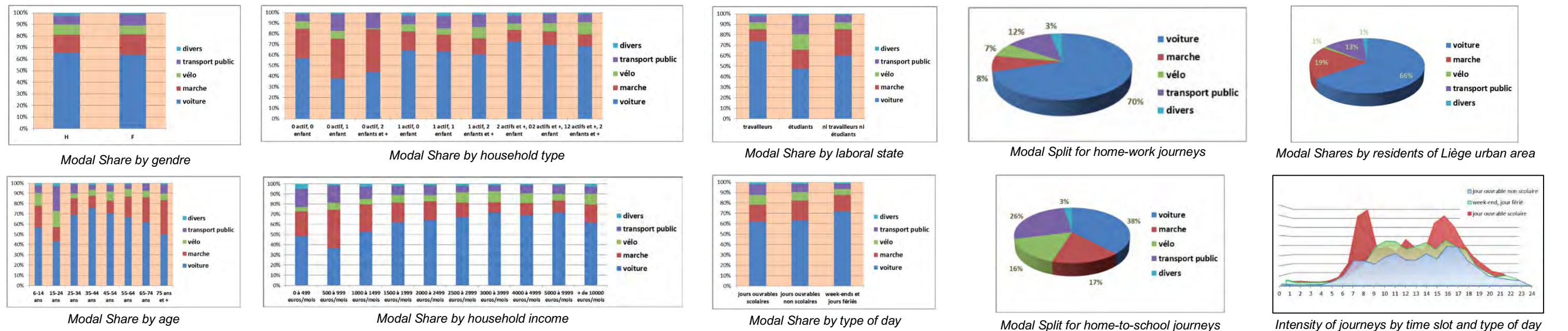
MAIN MOBILITY FLOWS WITH ORIGIN OR DESTINATION SAINTE-WALBURGE

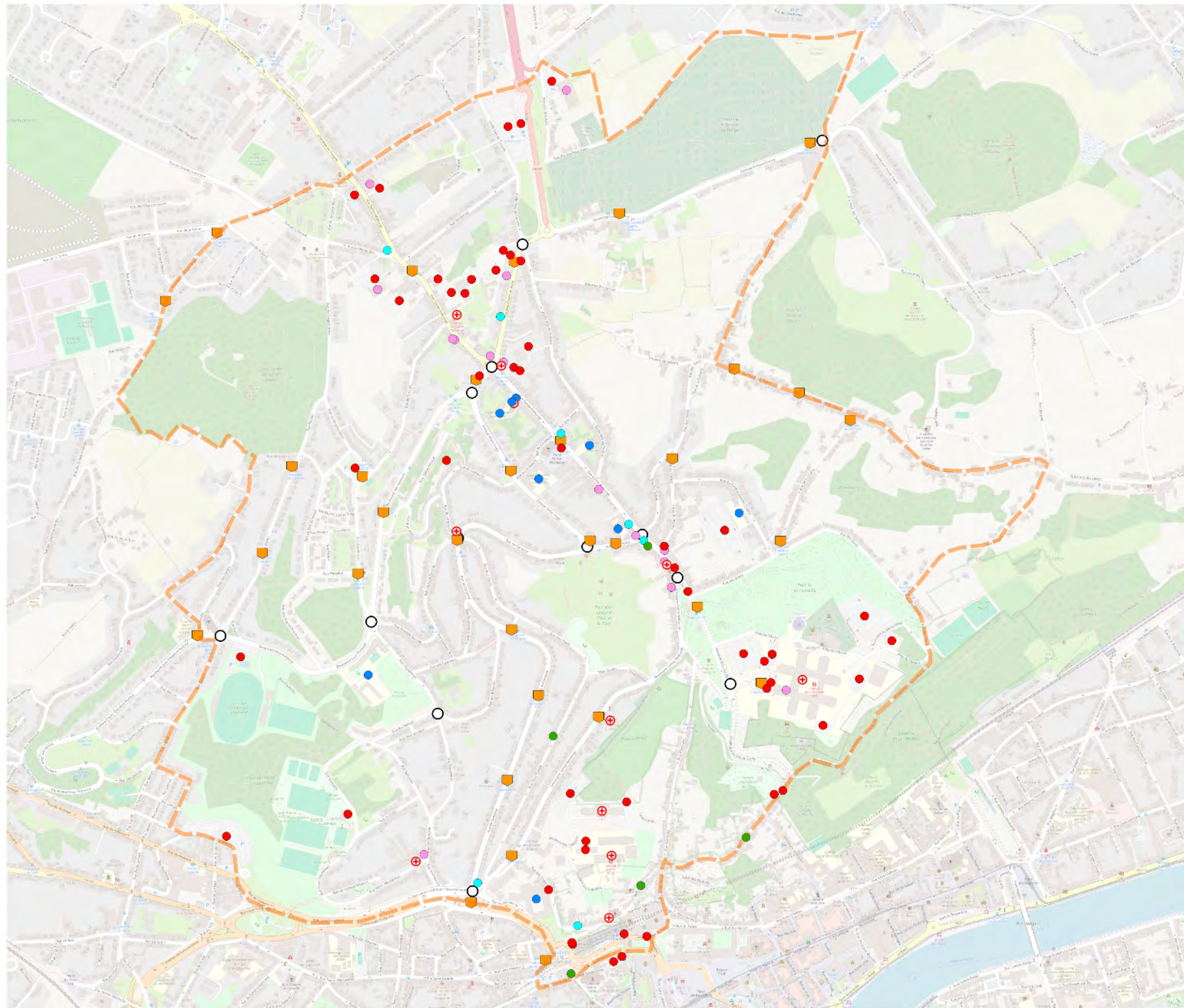


DISTRIBUTION CHARACTERISTICS IN LIÈGE AND AROUND THE NEIGHBORHOOD



MODAL SHARE PARAMETERS AND DISTRIBUTION (BELDAM REPORT)





- Attractivity
- Education
  - Entertainment-arts-culture
  - ⊕ Healthcare
  - Shop
  - Sustenance
  - Transportation
  - Perimeter
  - Bus Stop
  - Nodes

The BELDAM (Belgian Daily Mobility) survey is a national mobility study conducted in Belgium in 2010. Its primary aim was to provide up-to-date and detailed insights into the daily travel behaviour of Belgian residents, filling the gap left by the outdated 1999 MOBEL survey.

BELDAM collected data through extensive surveys of households and individuals across Belgium, analyzing key aspects such as modal share, frequency of trips, and reasons for travel. By capturing mobility patterns at federal, regional, and local levels, BELDAM has become an essential tool for understanding mobility trends, addressing congestion, and informing sustainable transportation policies.

The main factors to be considered in the analysis of mobility demand are the following ones:

### 1. Population Characteristics

The population of Liège presents a high urban density and a diverse socioeconomic structure, influencing its mobility patterns. According to BELDAM, this is the main modal share distribution:

- **Car:** Dominates as the primary mode of transport, aligning with the Wallonia regional average.
- **Public Transport:** Usage is lower compared to Flanders but concentrated on trips to key urban centres such as train stations, hospitals, and commercial zones.
- **Active Mobility (Walking/Cycling):** Walking rates are high for short-distance trips within the urban core, but cycling remains limited due to inadequate infrastructure.

The average number of daily trips in Liège is 3.2 trips per person, similar to the Wallonia regional average.

### 2. Main Attractors of Mobility

The following centres are identified as major generators of mobility demand in Liège:

- **Employment Centres:** Peripheral industrial zones and business parks such as the Parc Scientifique Sart Tilman. The city centre concentrates a large share of administrative services, shops, and small businesses.
- **Educational Centres:** The University of Liège (ULiège) in the Sart-Tilman campus and the urban centre is a key attractor, generating significant daily flows of students and staff.
- **Hospitals and Medical Centres:** The CHU de Liège (University Hospital) and the CHR de Liège (Hospital de la Citadelle) are both major attractors, particularly for workers and patients.
- **Commercial Zones:** Shopping centres like Médiacité and the commercial districts in the historic city centre attract significant demand for both private and public transportation.
- **Intermodal Transport Hubs:** The Liège-Guillemins Train Station acts as a key hub, connecting the city to other regions through high-speed trains (TGV) and local rail networks.

### 3. Identified Issues

These are some of the main issues the city is facing nowadays in terms of modal share and mobility:

- **Traffic Congestion:** High car dependency, particularly during peak hours in access routes to the centre and industrial areas.
- **Fragmented Infrastructure:** The cycling and pedestrian networks lack continuity and safety in many parts of the city.
- **Underdeveloped Public Transport:** TEC buses have insufficient frequency and intermodal connections to compete effectively with car usage.
- **Spatial Inequality:** Peripheral areas have limited access to key urban services compared to the central districts.

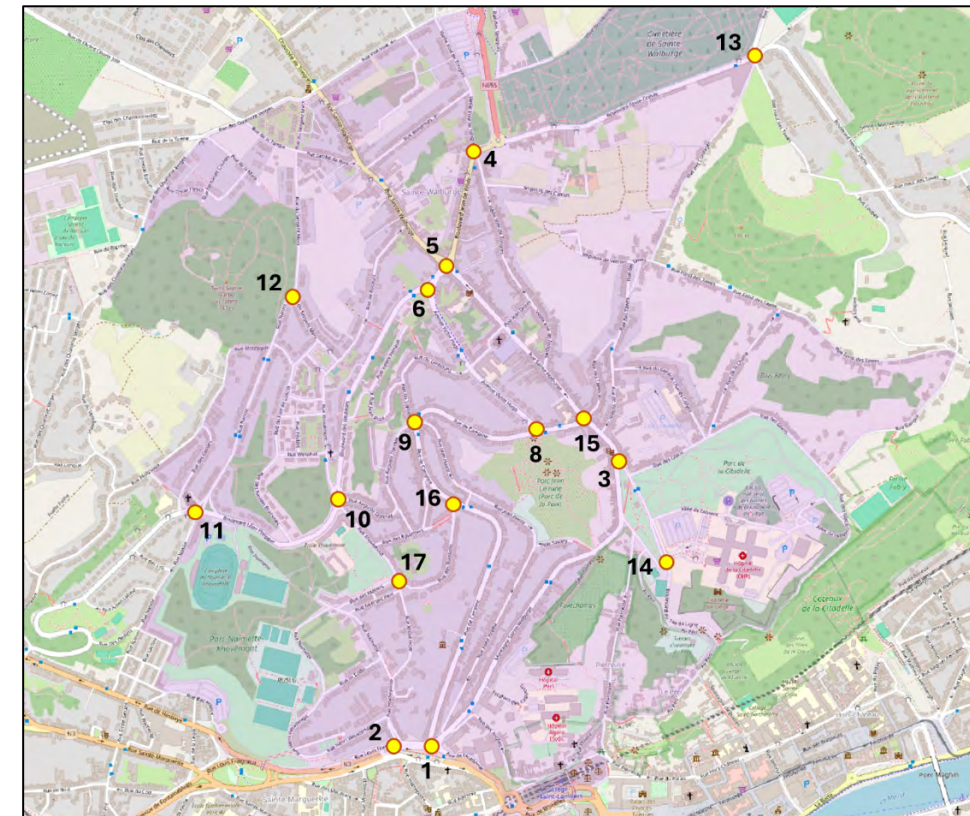
### 4. Mobility Demand Analysis

The mobility demand in Liège is structured around two main patterns:

- **Daily Work and Education Trips:** Represent the majority of travel during peak hours. Work and education trips account for 45% of travel reasons.
- **Leisure and Shopping Trips:** These trips occur mostly during weekends or off-peak hours, directed toward shopping centres and recreational areas.

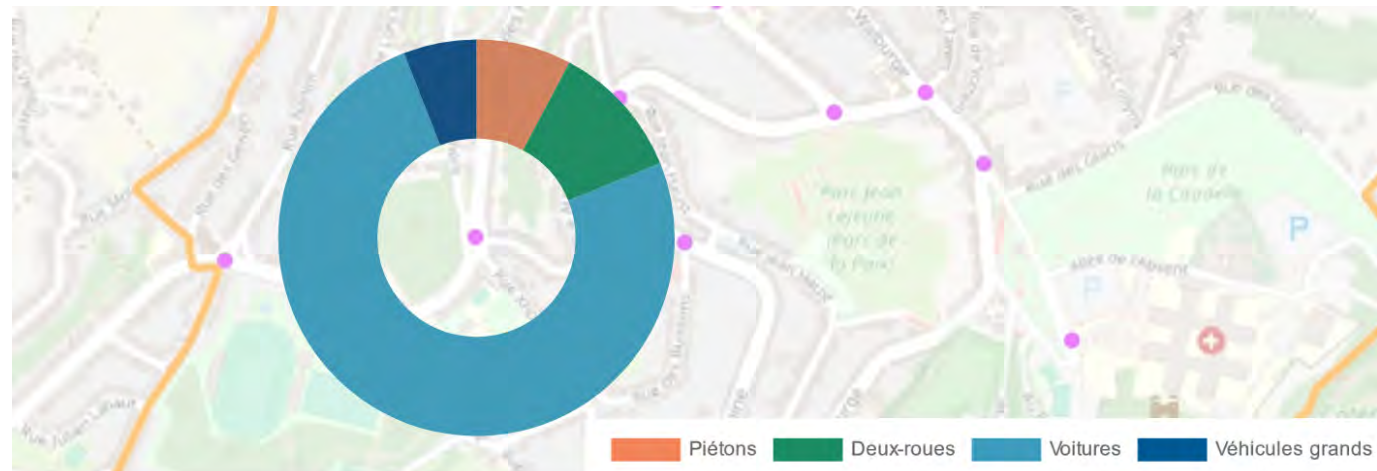
The railway infrastructure at Liège-Guillemins Station facilitates interregional mobility, but integration with other modes like bicycles remains limited.

In the following tasks, we'll make reference to some specific points and intersections around the neighbourhood. To have a better view of these points, we are going to assign a different number to each one. This is the distribution of the numbers around the neighbourhood:

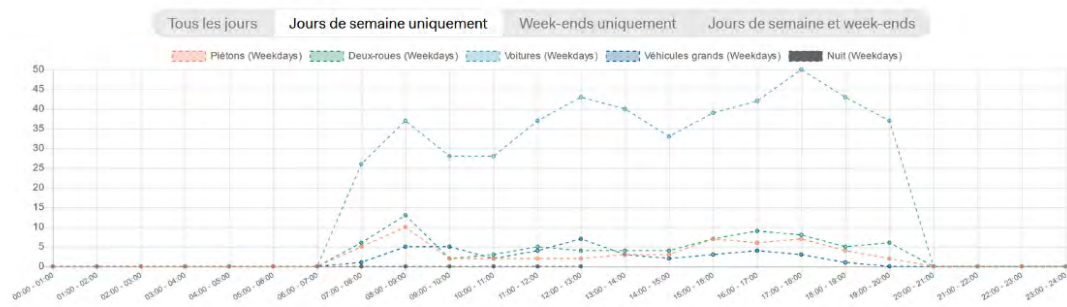


Node	Location
1	Campine x Académie x Montagne Ste-Walburge
2	Hocheporte
3	Montagne Ste-Walburge x Glacis
4	Jean de Wilde x Vieille Voie de Tongres
5	Jean de Wilde x Ste-Walburge x Hauteur
6	Hauteurs x Victor Hugo
7	Victor Hugo x Limbourg
8	Victor Hugo x Campine
9	Campine x Limbourg x Auguste Donnay x Jean Haus

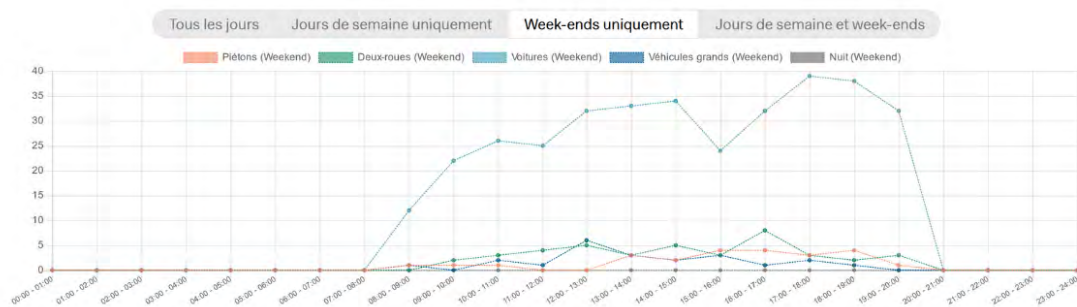
Node	Location
10	Léon Philippet x Xhovémont x Auguste Donnay x Hauteurs
11	Léon Philippet x Naniot
12	Naniot x Sergent Merx
13	Fosse-Crahay x Cotillages x Plope
14	12e de Ligne x CHR
15	Campine x Ste-Walburge x Tawes
16	Buissons x Campine
17	Xhovémont x Buissons



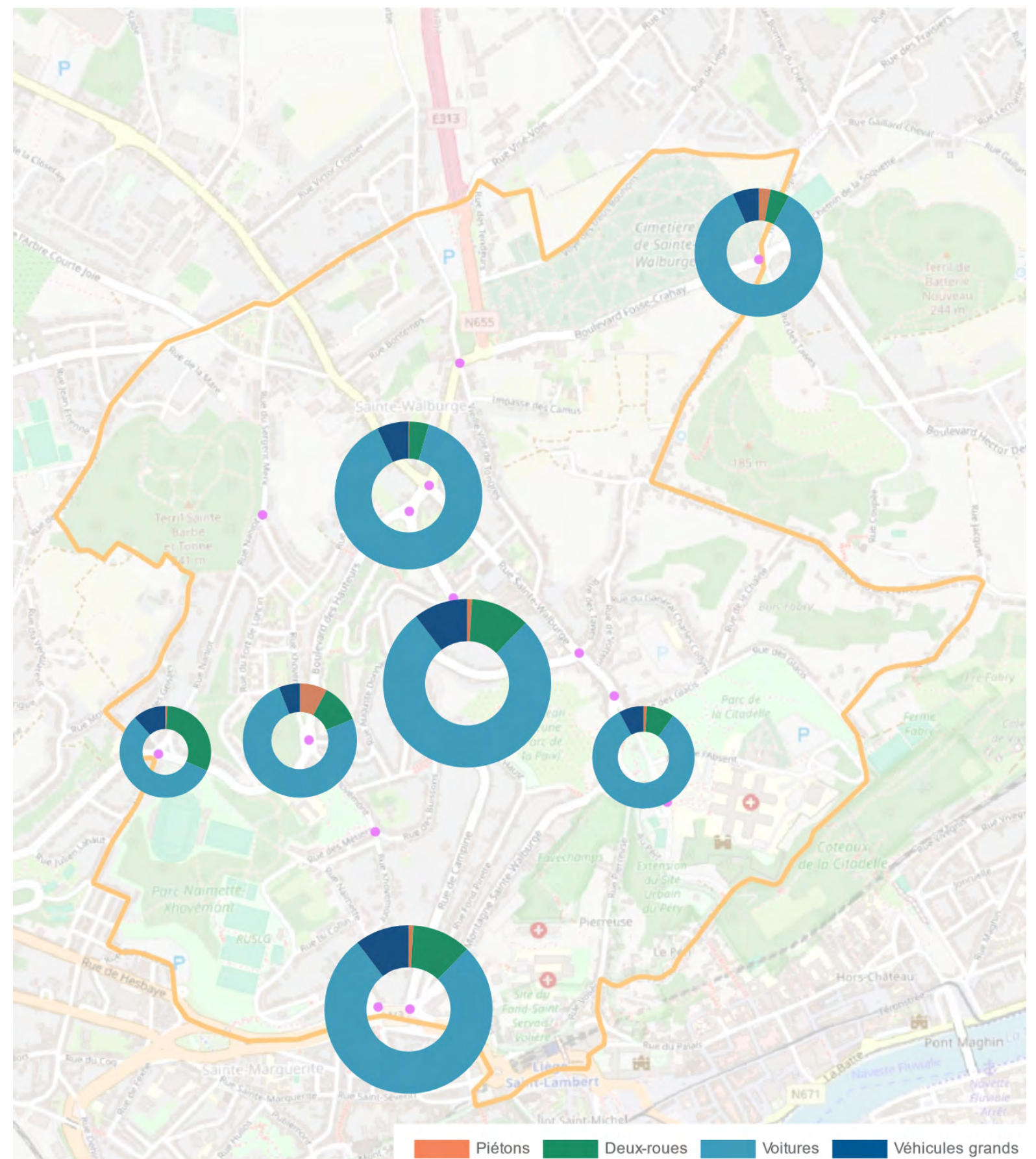
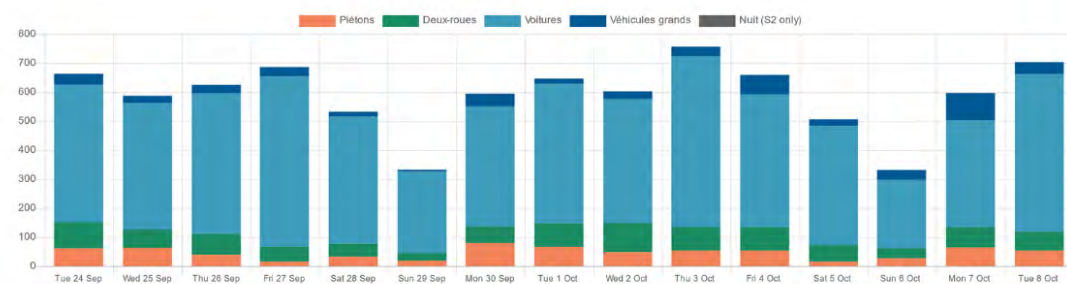
Moyenne par 24h



Moyenne par 24h



Aperçu par jour



The data highlights that cars dominate traffic in Saint Walburge, particularly on weekdays, with the highest concentrations occurring at nodes 1, 2, 8, and 13. These nodes appear to serve as critical connectors or primary traffic arteries, experiencing significant congestion during peak hours (8 AM and 4 PM). In contrast, nodes like 17 consistently experience lower car volumes, indicating less activity or importance within the traffic network in those areas.

Similarly, the soft mobility flow data reveals a steady level of activity throughout Saint Walburge, with central nodes such as 1, 2, 9, and 11 showing notable peaks. These locations likely correspond to public transport hubs, commercial areas, or zones with high urban density. Peripheral nodes exhibit relatively lower pedestrian activity, suggesting limited connectivity or fewer attractions in those regions. The observed patterns indicate that the soft mobility movement is strongly influenced by the presence of amenities, public transport access, and recreational spaces.

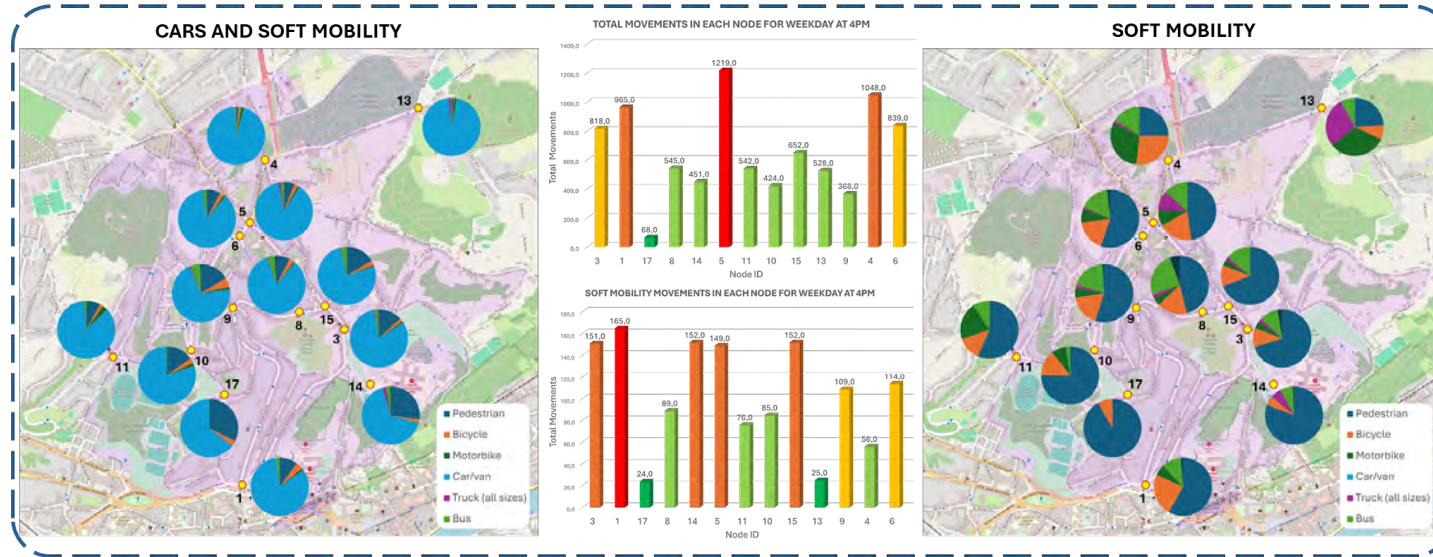
The data reveals that Node 10 experiences moderate levels of traffic activity, with cars forming a significant portion of the flow, particularly during weekday peak hours. However, it does not exhibit the same level of intensity as critical connectors such as nodes 1, 2, or 13. Node 10 seems to act as a secondary connector within the network, showing periodic spikes during rush hours (likely 8 AM and 4 PM) but not as much congestion compared to the main traffic arteries.

Pedestrian activity at Node 10 appears to be steady but not as prominent as central nodes like 1, 2, or 9. This pattern suggests that while Node 10 is somewhat accessible, it may not serve as a major hub for public transport or urban amenities. Its lower pedestrian activity, particularly during off-peak hours, indicates limited nearby attractions or reduced connectivity to central areas.

In summary, Node 10 plays a supporting role in the traffic and pedestrian flow of Saint Walburge, with moderate vehicle and pedestrian activity that aligns with its peripheral position in the network.

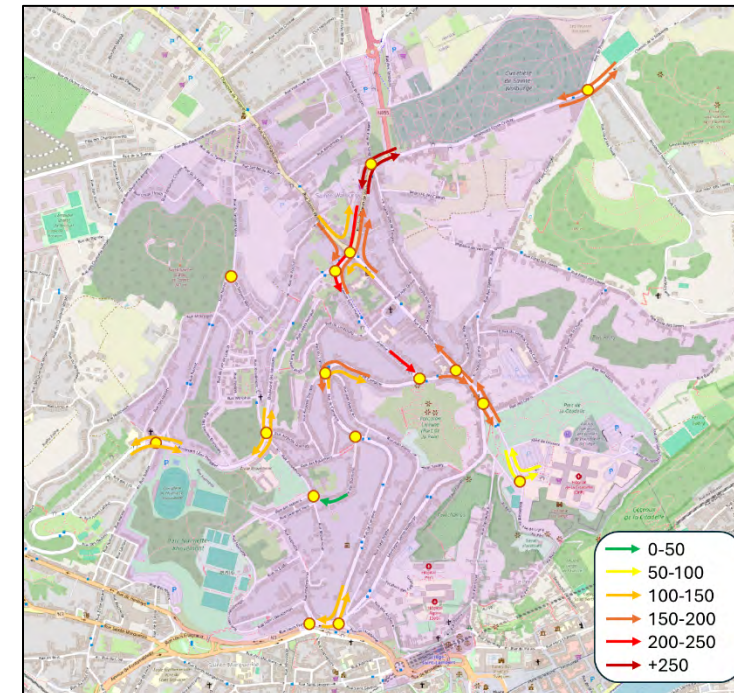


Modal Share distribution around the neighborhood on a **weekday at 4PM**



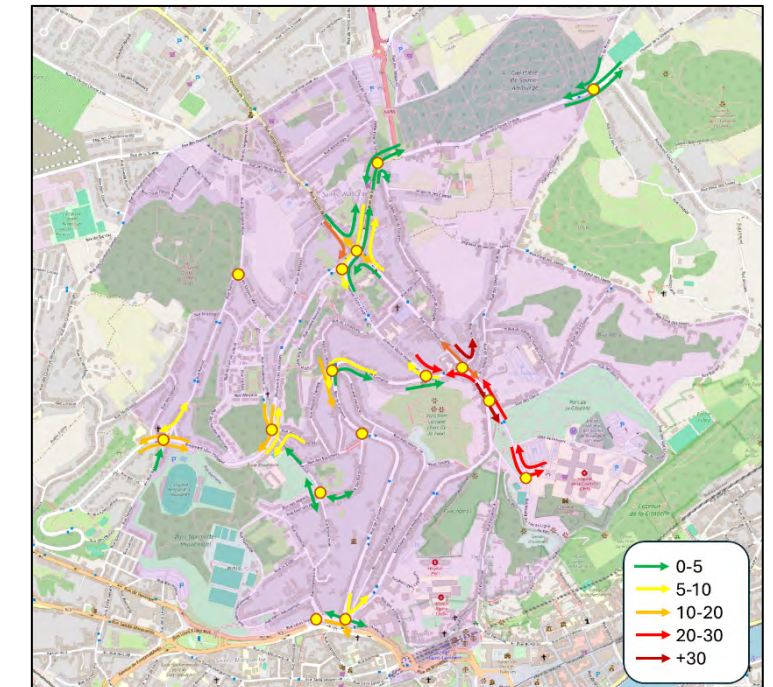
MAIN FLOWS AROUND THE NEIGHBORHOOD FOR THE DIFFERENT MODAL SHARES

MAIN FLOWS FOR CARS



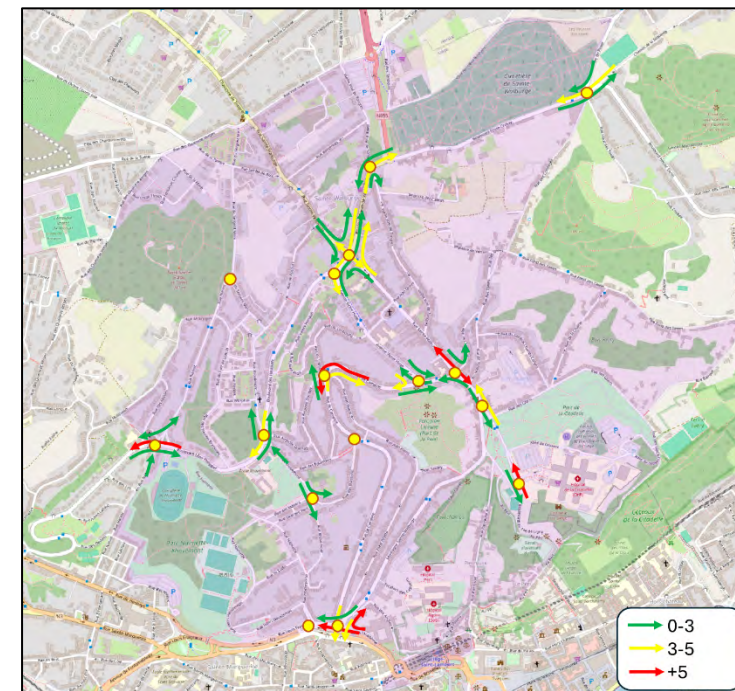
Main flows for cars around the neighborhood

MAIN FLOWS FOR PEDESTRIANS



Main flows for pedestrians around the neighborhood

MAIN FLOWS FOR BIKES



Main flows for bikes around the neighborhood

Modal Share distribution around the neighborhood on a **weekday at 8AM**

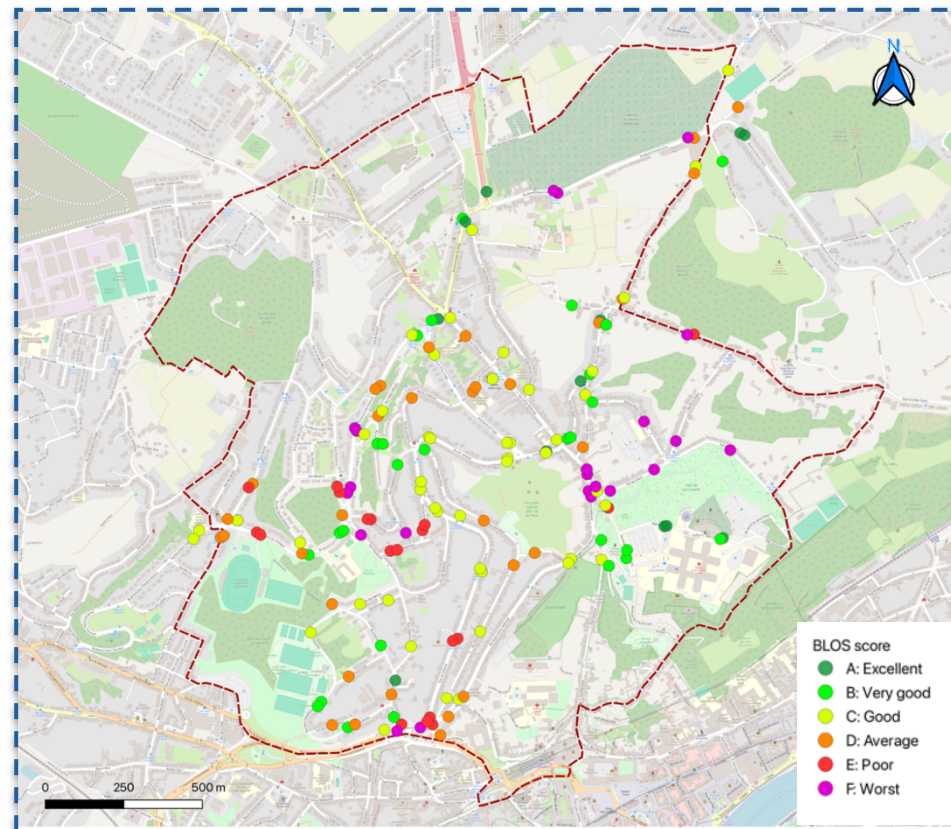


Modal Share distribution around the neighborhood on a **weekend**

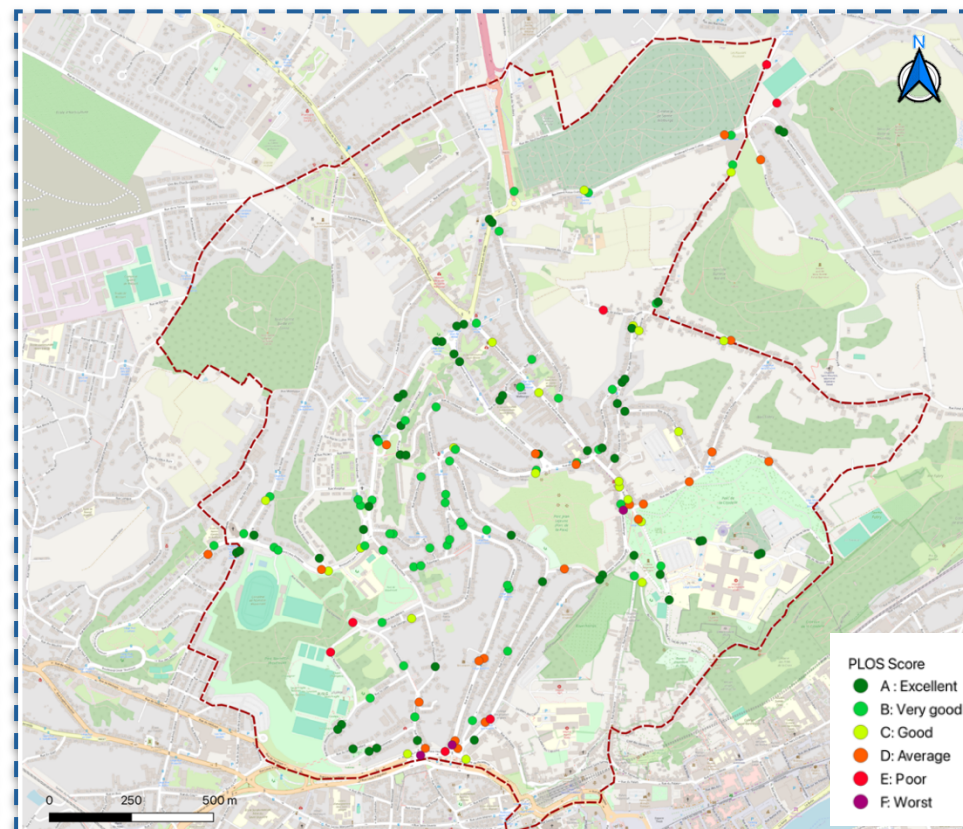


PEDESTRIAN AND BIKE LEVEL OF SERVICE ANALYSIS AT NEIGHBORHOOD AND NODE SCALE

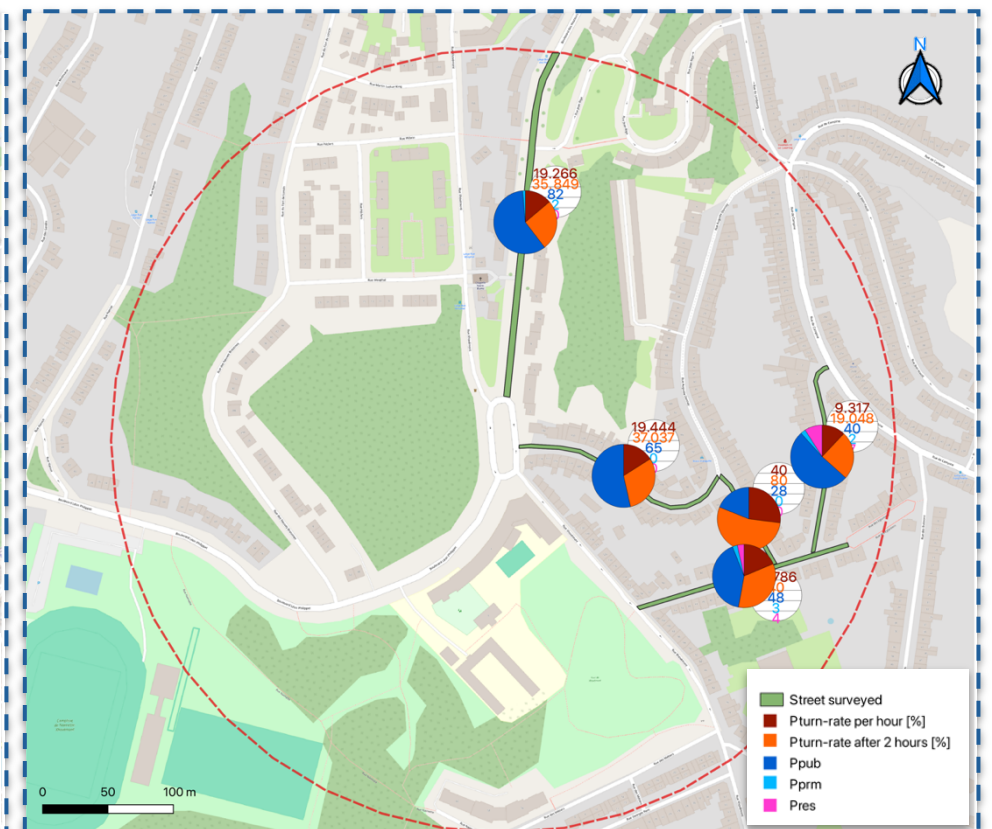
PARKING AND MAIN BARRIERS ANALYSIS AROUND THE NODE



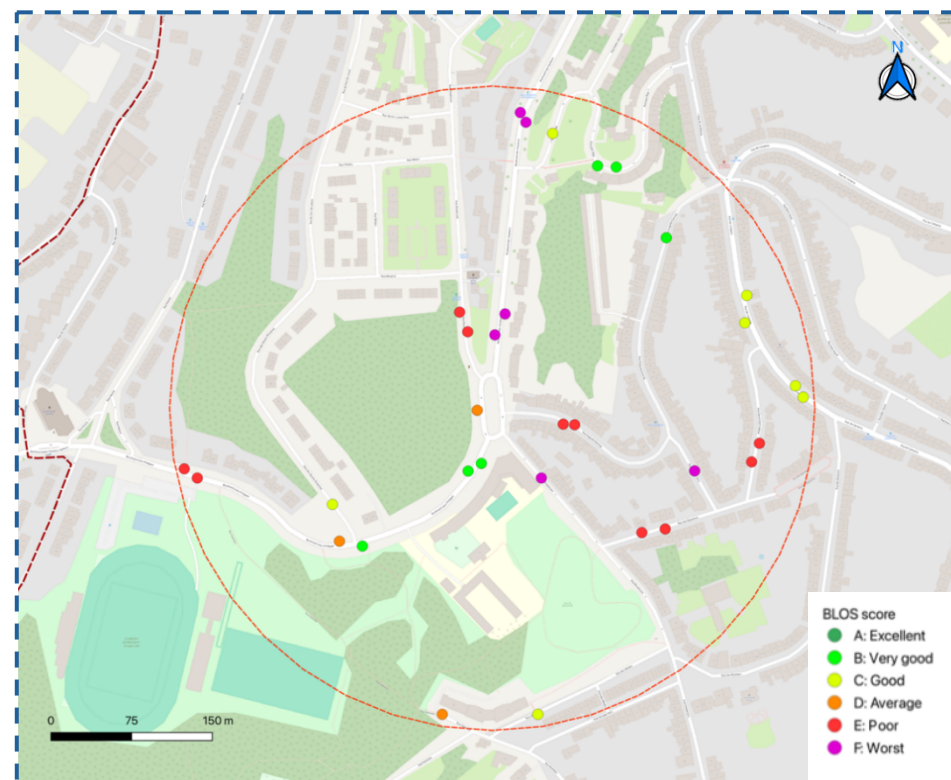
Bike Level of Service (BLOS) at neighborhood scale



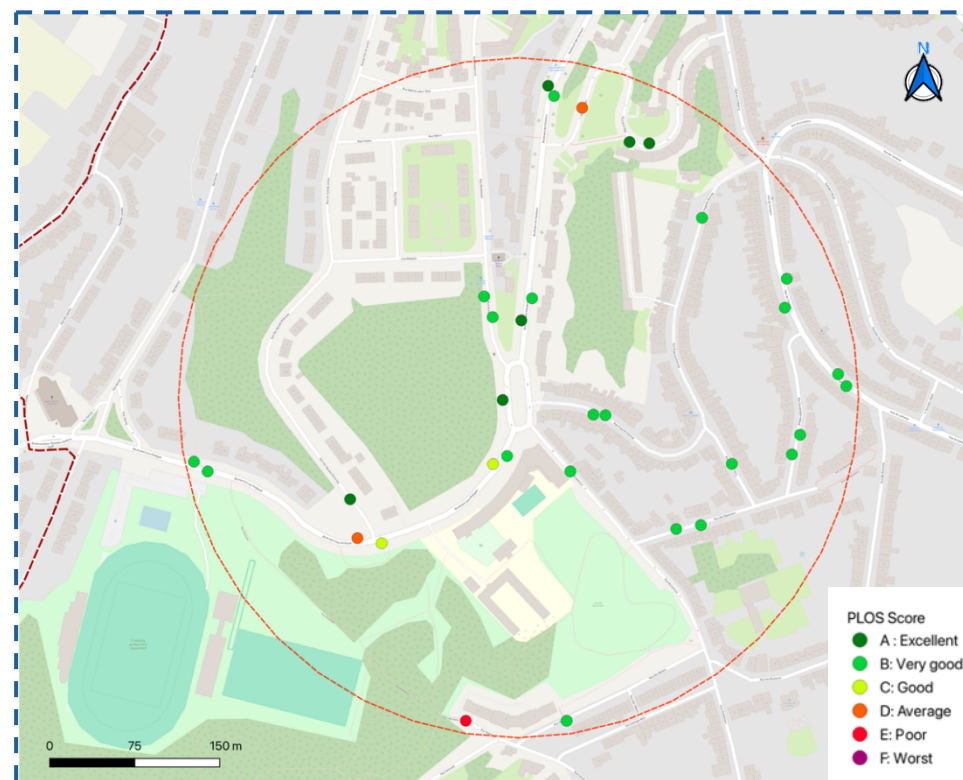
Pedestrian Level of Service (PLOS) at neighborhood scale



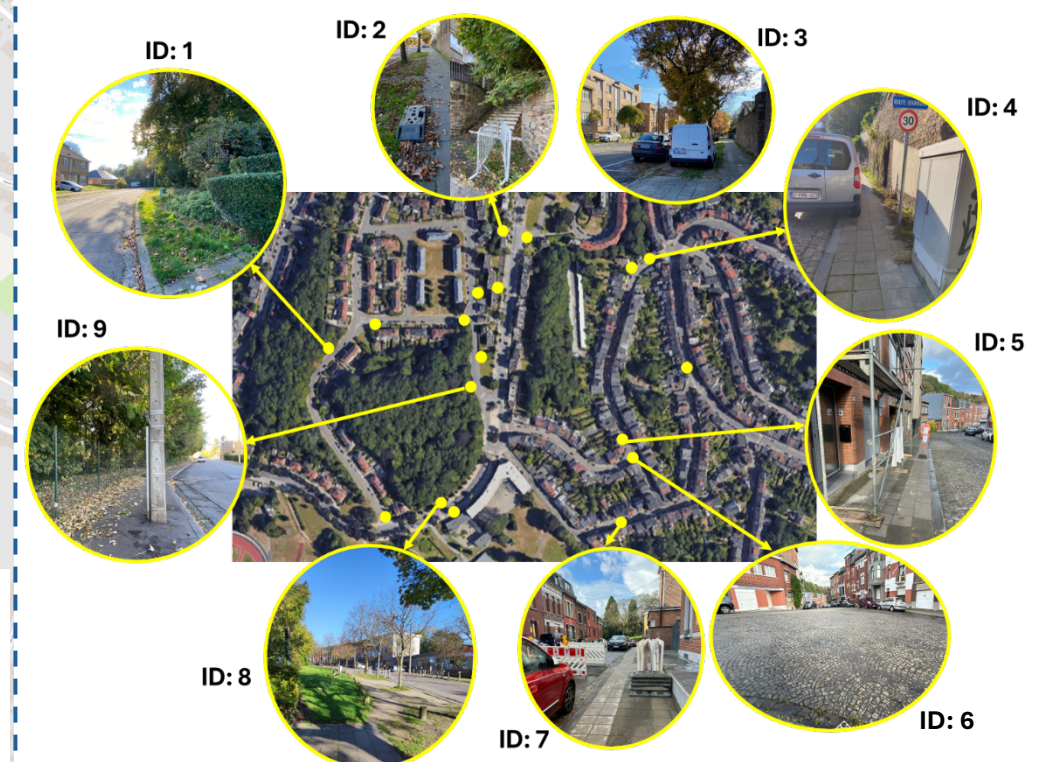
Parking quality analysis around the node



Bike Level of Service (BLOS) around Node 10 scale



Pedestrian Level of Service (PLOS) around Node 10 scale



Main barriers detected around the node

### MODAL SHARE AND MAIN FLOWS IN THE NEIGHBORHOOD

The data shows that **cars** dominate traffic in Saint Walburge, particularly during weekdays, with the highest concentration observed at nodes 14, 8, and 15. These nodes appear to be critical connectors or main traffic arteries, experiencing significant congestion during the main hours (entry to school and work-to-home travels). On weekends, car usage decreases overall, but there is a slight rise in traffic in some areas, such as nodes 5 and 13, likely reflecting leisure activities. There are other nodes, such as 17, that see consistently lower car flows, suggesting less activity or importance in the traffic network in those areas.

The data indicates a steady flow of **pedestrian** activity across Saint Walburge, with notable peaks in central nodes such as 9 and 11 during weekdays. These areas likely correspond to public transport hubs, commercial zones, or areas of dense urban activity. During weekends, pedestrian movement increases overall, particularly in recreational and mixed-use nodes like 13 and 9, reflecting leisure and social activities. Peripheral nodes see relatively lower pedestrian activity, suggesting less connectivity or fewer destinations of interest in those areas. The patterns suggest that pedestrian flows are highly influenced by access to amenities, public transport, and recreational spaces.

The data reveals that **bike** usage in Saint Walburge is relatively low on weekdays, with limited activity focused on nodes such as 5 and 13. This suggests that cycling is not yet a primary mode of daily transportation, possibly due to limited infrastructure or cultural preferences. However, on weekends, there is a significant increase in bike activity, indicating a preference for cycling for leisure rather than commuting. The flow of bikes remains dispersed, with fewer concentrated routes, highlighting the need for stronger cycling networks to support consistent usage.

To face all the detected issues, it's important to propose some **improvements** around the neighbourhood:

- **Cars:** Alternative routes should be developed to reduce congestion in key nodes like 14, 8, and 15. Implementing smart traffic signals and improving signage can optimize flows in high-demand areas. Additionally, promoting public transportation as an alternative, particularly during peak hours, can help decrease car dependency and alleviate bottlenecks across the neighbourhood.
- **Pedestrians:** Infrastructure improvements such as wider sidewalks, safer crossings, and dedicated pedestrian zones should be prioritized in high-traffic nodes. Additionally, pedestrian-only areas should be promoted in locations with high commercial activity or near schools, ensuring safe and convenient walking environments while reducing reliance on motorized transport in these key areas.
- **Bicycles:** Developing a network of protected and connected bike lanes should be prioritized, especially in key nodes like 1 and 9. Additionally, bicycle-only zones should be promoted in areas with high recreational activity or near schools, encouraging safe and convenient cycling while reducing reliance on motorized transport in these key locations.

Finally, to improve traffic in Saint Walburge, it is important to focus on sustainable transport and reduce car use, especially in busy areas like nodes 8 and 15. Public transportation should be improved to give people a better option for daily travel, especially during peak hours. For pedestrians, better infrastructure is needed, such as wider sidewalks, safer crossings, and areas just for walking. This will encourage more walking and make it safer and easier.

For bicycles, building safe and connected bike lanes is key to encouraging their use for daily travel, not just for recreation. Connecting nodes like 5 and 13 with bike lanes will create a better network for cyclists. Adding bike rental stations and running campaigns can also help people choose bikes instead of cars. These changes, combined, will reduce traffic problems and make traveling around the neighbourhood easier and more sustainable.

### PEDESTRIAN AND BIKE LEVELS OF SERVICE

The analysis of Pedestrian Level of Service (PLOS) and Bicycle Level of Service (BLOS) for Saint Walburge highlights the quality and challenges of non-motorized transport in this neighbourhood. PLOS evaluates pedestrian environments based on factors like safety, accessibility, and comfort. In the maps provided, areas with excellent or very good PLOS scores are typically found near schools, parks, and public spaces, where sidewalks are wide and crossings are safe. However, areas marked as poor or worst show limited pedestrian infrastructure, such as narrow sidewalks, lack of crossings, or high vehicular interference, making them unsafe and uncomfortable for walking.

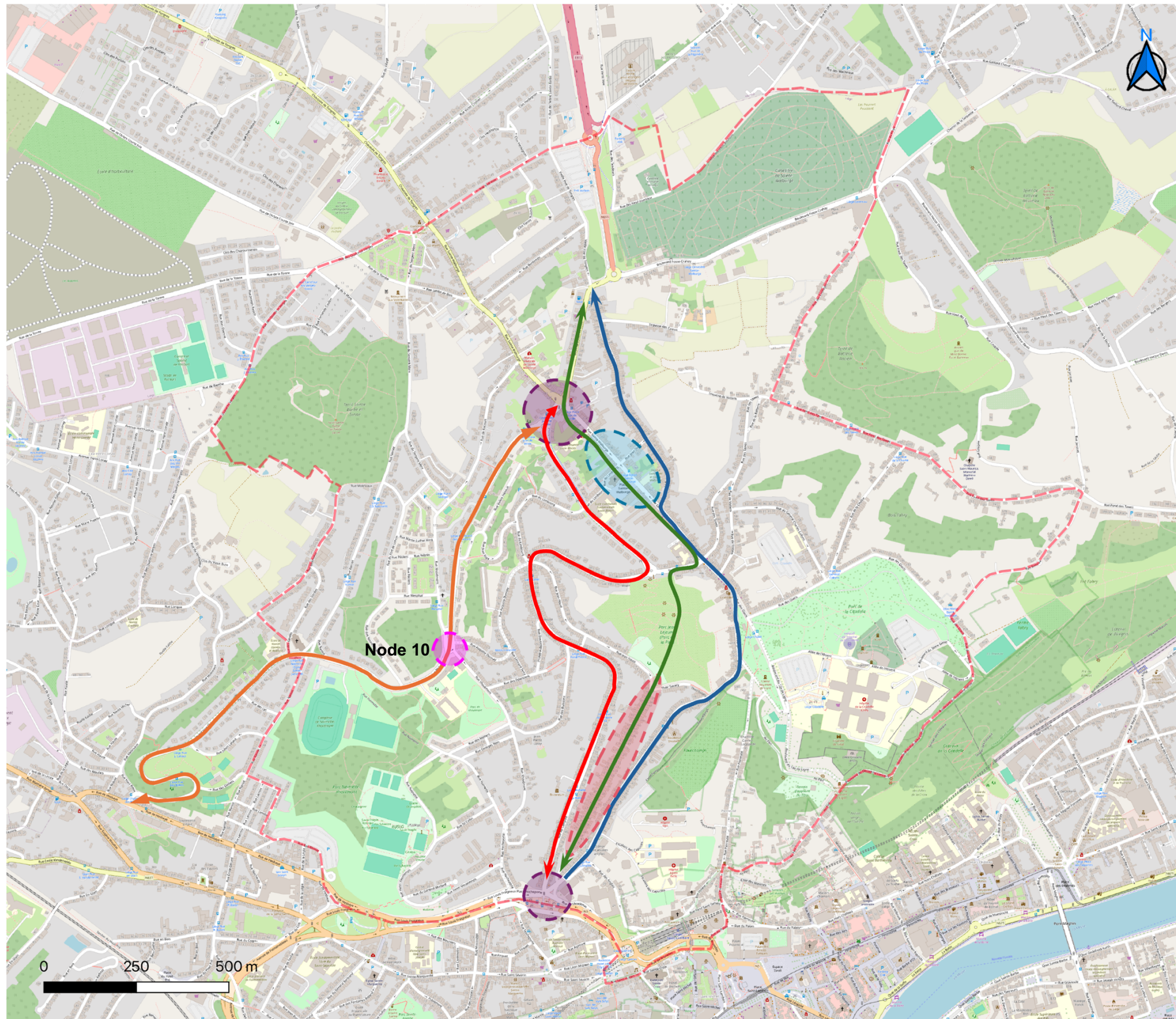
BLOS, which measures the quality of the cycling environment, shows a similar pattern. Excellent and very good BLOS scores appear along streets with bike lanes or low traffic volumes, ensuring safe and efficient cycling routes. On the other hand, poor or worst scores are found along busier roads or areas without dedicated cycling infrastructure. Factors like high traffic speeds, lack of bike lanes, and inadequate road connectivity reduce the overall BLOS, discouraging cycling as a viable transport mode.








Improving both PLOS and BLOS in Saint Walburge requires addressing these deficiencies systematically. For pedestrians, enhancing infrastructure such as adding wider sidewalks, safer crossings, and pedestrian-only zones can increase safety and comfort. For cyclists, creating dedicated bike lanes, reducing traffic speeds in key areas, and connecting important nodes can boost BLOS scores. The integration of these improvements aligns with the framework in the study by Zohreh Asadi-Shekari et al., emphasizing that prioritizing non-motorized modes can enhance overall urban mobility, reduce car dependency, and create safer, more inclusive environments. Focusing on these measures will improve both walking and cycling conditions, promoting sustainable and active transportation in Saint Walburge. (Asadi-Shekari et al., 2013)

### MAIN BARRIERS DETECTED

In this part, we can see the main barriers and obstacles found around the node 10 for pedestrians, bicycles and cars, followed by a brief description of the detected problem. We can also see the pictures of those obstacles in the last picture of the upper sheet. The description for each obstacle is summarized in the following table:

ID Barrier	Description
1	End of paved footpath and obstacles for pedestrians caused by unofficial parkings
2	Obstacles for pedestrians
3	Obstacle for pedestrians caused by an unofficial parking
4	Obstacle for pedestrians caused by a badly parked car
5	Obstacle for pedestrians
6	Dangerous crosswalk in wide street
7	Obstacle for pedestrians
8	End of paved footpath and obstacles for pedestrians
9	Obstacle for pedestrians



-  Development of public spaces to reduce vehicle speeds, manage traffic flow, enhance circulation, and improve user safety.
-  Creation of a zone dedicated to pedestrians, cyclists and public transport, promoting a calmer living environment.
-  Design of a 20 km/h zone reserved primarily for local residents, guaranteeing peace of mind and local accessibility.
-  Development of a shared-use lane limited to a speed of 30 km/h (Double Sense), specially designed to accommodate the four modes of mobility: car, bus, pedestrian and bicycle, ensuring harmonious and safe cohabitation.
-  Creation of a shared-use lane with a 30 km/h speed limit (uphill direction).
-  Creation of a green cordior allowing cyclists and pedestrians to cross the neighborhood in a pleasant atmosphere.
-  Development of a shared-use lane (Double Sense), specially designed to accommodate the four modes of mobility: car, bus, pedestrian and bicycle, ensuring harmonious and safe cohabitation.

Map of intentions

Following on from the various phases of analysis carried out in the previous tasks concerning the St. Walburge district, this section focuses on the development of a scheme of intentions and concrete objectives to improve mobility in this district.

**Soothing key points:**

The first objectives of the project concern two areas identified in purple on the map. The first is located to the south of the district, at the intersection of rue Campine, Montagne Saint-Walburge and rue Fond Pirette. The second is to the north, at the junction of rue Sainte-Walburge, boulevard des Hauteurs and boulevard Jean de Wilde. These two junctions mark the beginning and end, respectively, of the district's growth axis, and play a strategic role in linking Saint-Walburge to downtown Liège on the one hand, and to the Rocourt district on the other. These areas are heavily trafficked, both on weekdays and weekends.

Our proposals therefore focus on the development of public spaces in order to reduce vehicle speeds, better manage traffic flows, improve traffic flow and enhance safety for all users by prioritizing pedestrians, cyclists, and public transport through the allocation of road space which could make these modes more attractive and encourage a shift away from car use (François Mirabel, 2014).

**New urban hub:**

Secondly, attention is focused on the objectives for the center of the Saint-Walburge district, located near the church, an area identified in blue on the map. With a high average flow of around 150 movements per hour, this area stands out for its dynamism, surpassing other sectors. This highlights its importance and potential for the development of economic and leisure activities, with a view to becoming an attractive hub that would contribute to a new centrality within the city of Liège.

This transformation could also reduce the need for local residents to travel to the city center for certain activities. In terms of mobility, this would be made possible by the creation of spaces reserved for pedestrians, cyclists and public transport. The aim is to create a calmer environment, allowing comfortable and pleasant access to the various activities on offer in the area.

**Soft mobility priority zone and green corridor:**

The red oval shape and the green line crossing Rue Fond Pirette illustrate two key proposals for improving local quality of life. The red oval marks the location of a future traffic-calmed zone, limited to 20 km/h, designed primarily for local residents. The aim is to guarantee a calm environment and improved accessibility for local residents.

As for the green line, it symbolizes the potential for creating a genuine green corridor. This project would reinforce the soft mobility infrastructure by integrating bicycle paths linking the south and north of the district, while passing through the park located above this area. Such an initiative would encourage more sustainable travel while enhancing the value of the surrounding natural spaces. The safety and adequacy of infrastructure are also important features in encouraging sustainable transportation. In this respect, safe and well-maintained bike lanes, pedestrian crossings, well-lit walkways may significantly influence the adoption of soft mobility (Tori an Al., 2022).

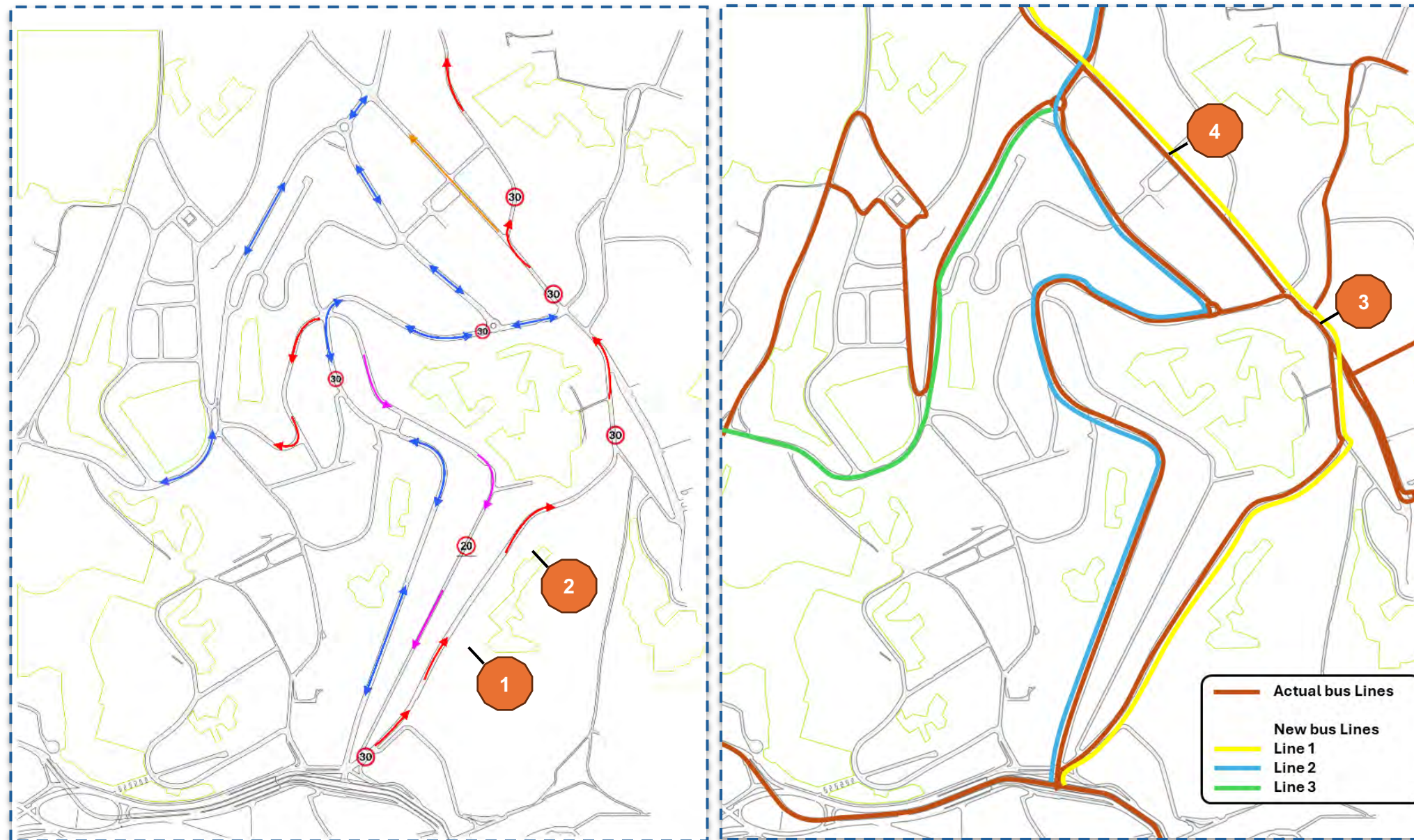
**Developing shared use:**

With regard to the red line (two-way only for bus) and the blue line (one-way only), our intention is to create a shared lane limited to 30 km/h. This layout would be designed to harmoniously integrate the different modes of mobility and improving transfers between modes. This configuration could regulate the flow of traffic and balance traffic flow on the two main axes (Rue Campine et Rue Montaigne Saint-Walburge) linking the south and north of the Saint-Walburge district. These two axes, currently more oriented towards car use, require improvements to better answer the needs of other modes of travel. The well-designed intermodal systems could make public

transportation more competitive with cars, enhance mobility options for individuals, and contribute to the overall goal of creating more sustainable and efficient transportation systems in cities (François Mirabel, 2014).

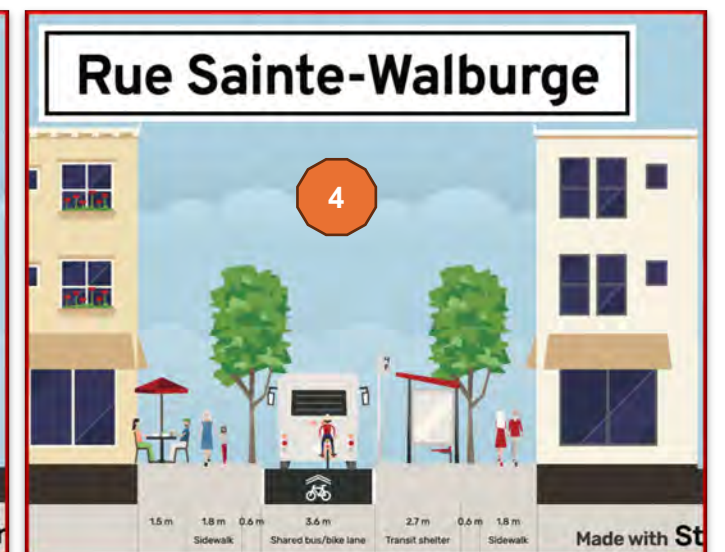
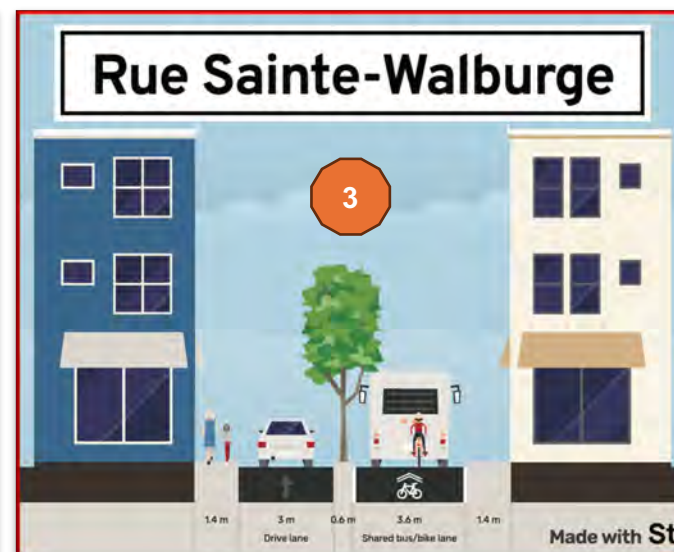
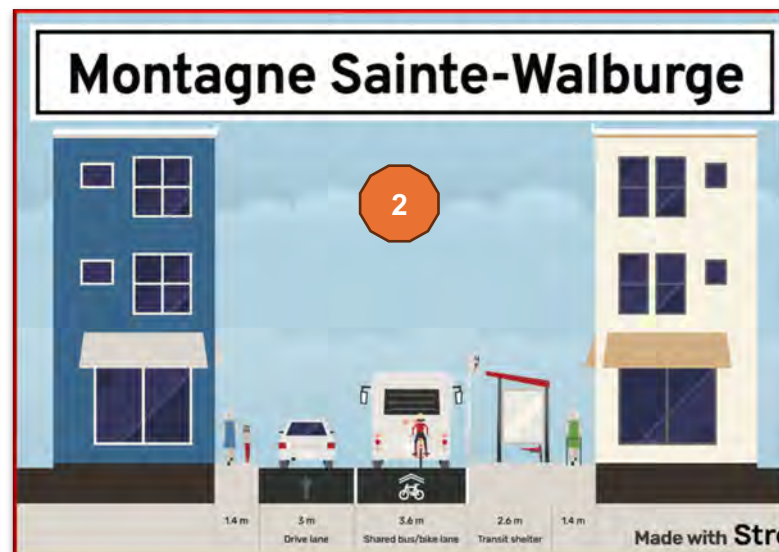
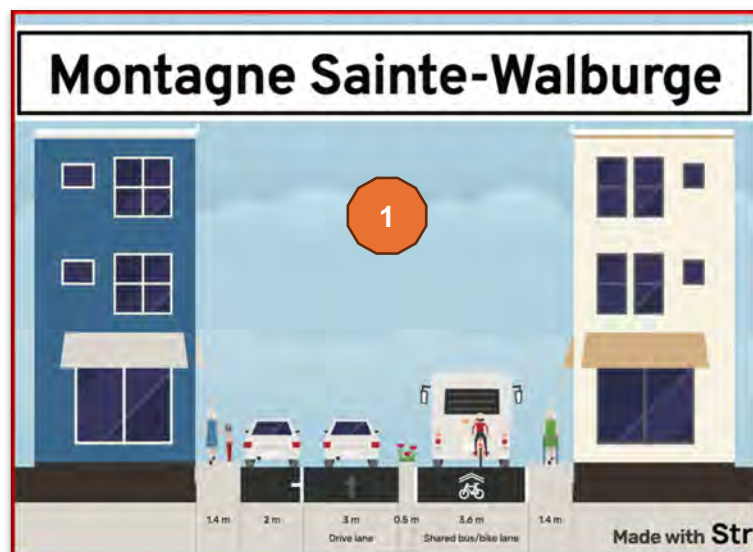
**Multiple transport corridor:**

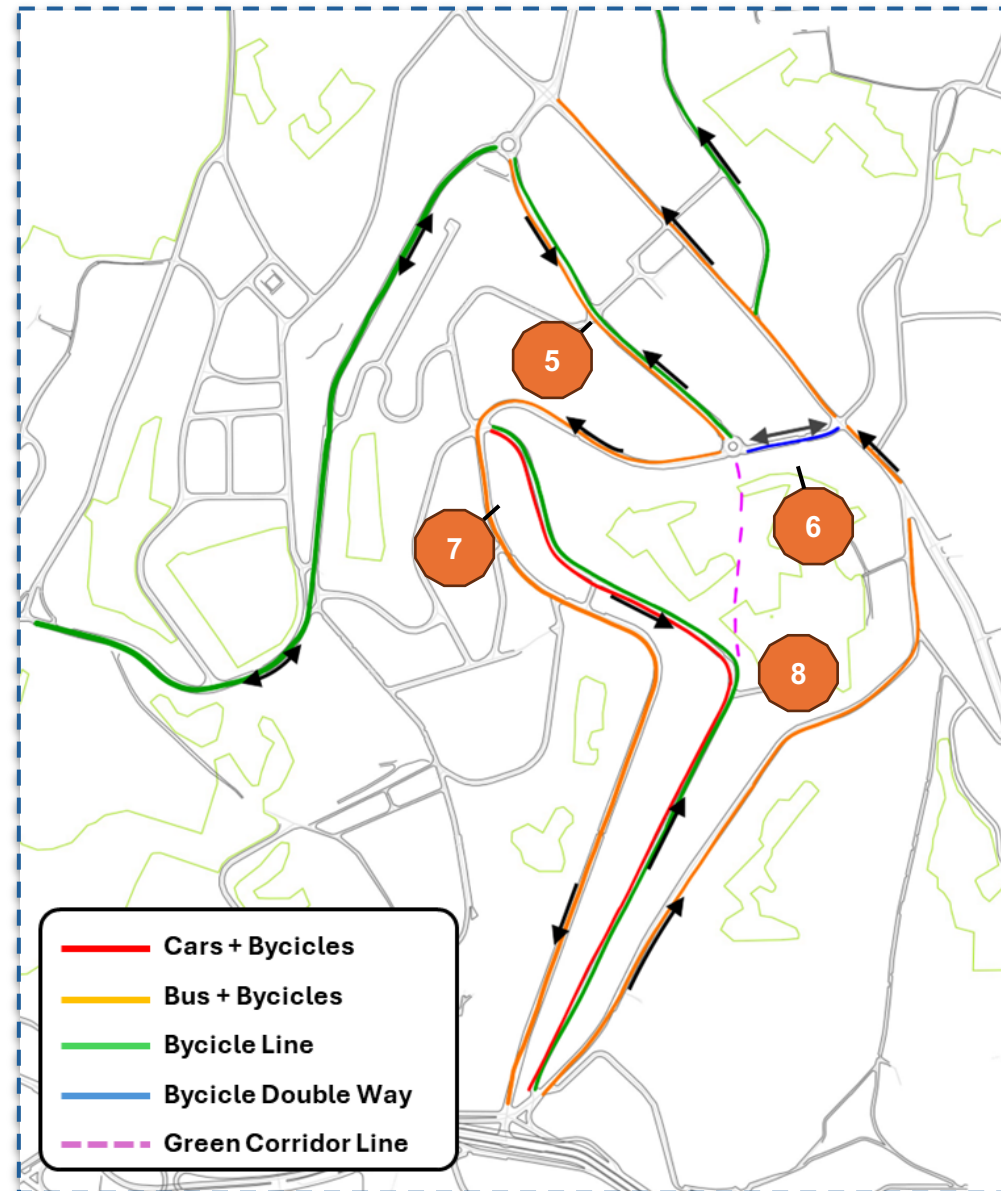
Finally, we'd like to pay particular attention to the boulevard des Hauteurs, shown in orange on the map. This boulevard also crosses the junction we've been studying and analyzing throughout this semester. It offers great potential for the development of shared-use lanes in both directions, enabling the four main modes of mobility to be accommodated: car, bus, pedestrian and bicycle. This project could facilitate the flow of traffic through the Saint-Walburge district and offer fluid access to other districts around Liège thanks to its multiple transport options.



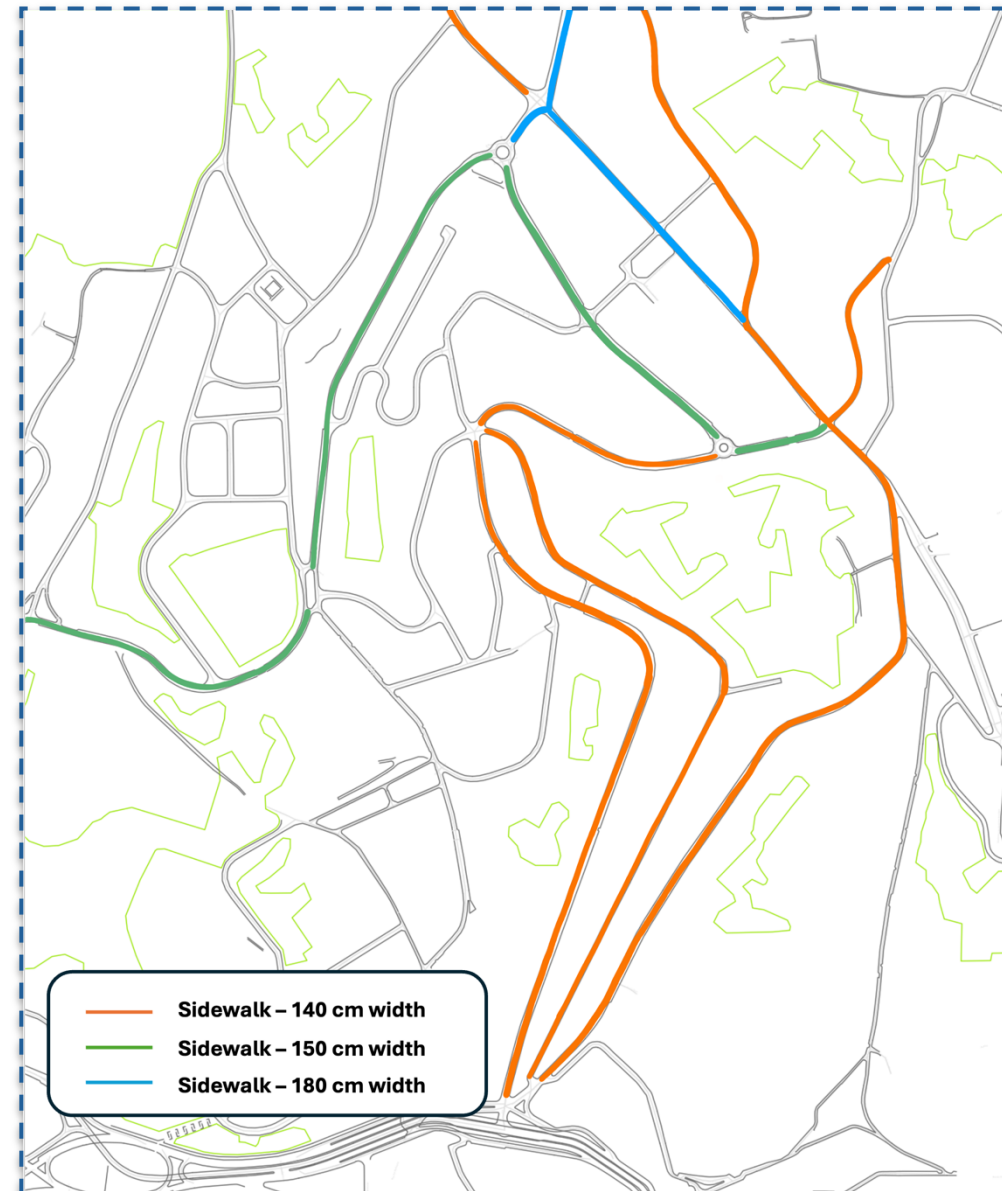
Map of street directions and speed limits

Map of existing and planned bus routes

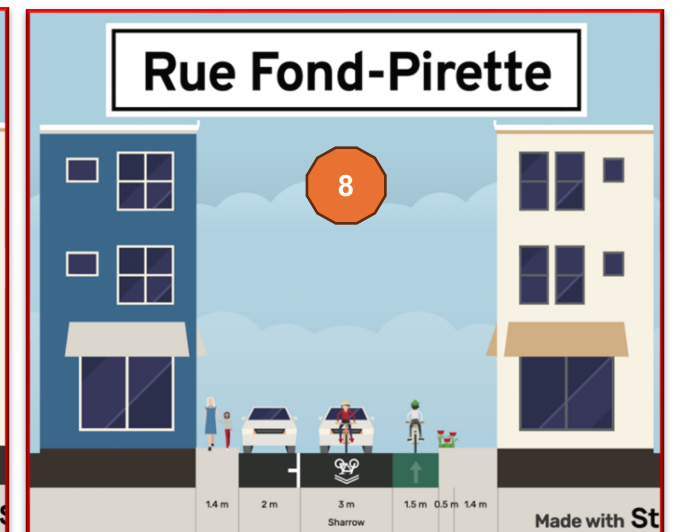
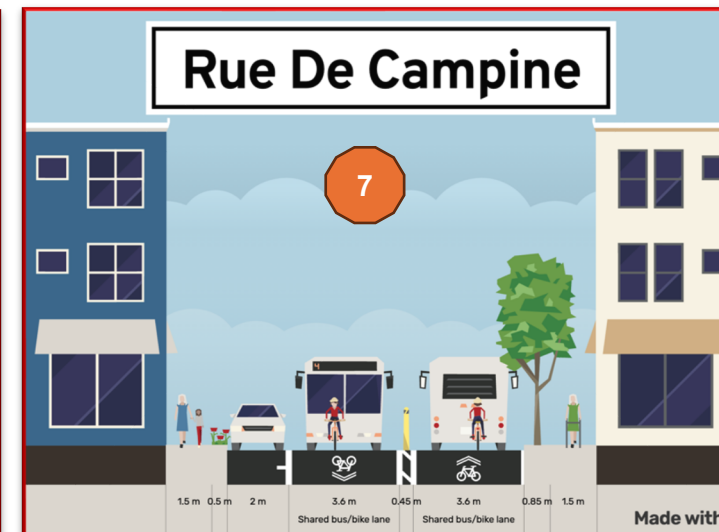
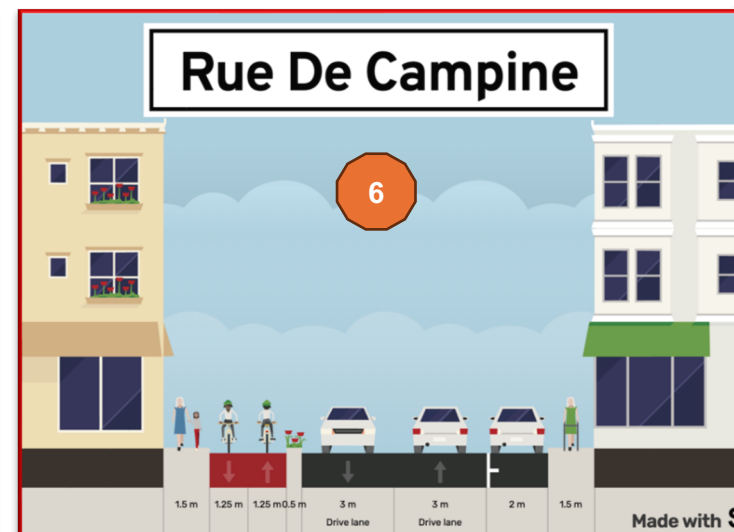




Map of cycle paths



Map of sidewalk



**1. Map of cycle paths**

This map shows the layout of routes for cyclists, which will favor this mode of transport on the main roads in the neighborhood.

**2. Sidewalk map**

This map shows the widths of the sidewalks. We have tried to respect the minimum width possible to promote pedestrian mobility, and where possible we have widened this width.

**3. Map of street directions and speed**

This map shows street directions and speed limits, with arrows indicating the direction of traffic.

**4. Map of existing and planned bus routes**

Illustrates existing bus routes and new routes proposed for the development and reorganization of the public transport network to better serve the area.

**Cross-sections:**

Each diagram represents a cross-section of the main streets (Montagne Sainte-Walburge and Rue Sainte-Walburge) for four specific points that represent the different shapes we're likely to find on these streets:

**Point 1:**

An urban street with one lane of car traffic, one lane of bus and bicycle traffic and a widened sidewalk.

**Point 2:**

A similar configuration to Point 1, but with the presence of a bus stop, resulting in the removal of the parking space and a slight deviation in the street.

**Point 3:**

A greener street, with special consideration for pedestrians as this part of the street is close to several shops.

**Point 4:**

A section integrating wide sidewalks, bike paths and abundant vegetation to transition to soft-mobility zones and semi-pedestrian spaces.

**Point 5:**

A 1.5 m sidewalk for pedestrians, a 1.5 m cycle path physically separated from motorized traffic and a single car lane for each direction to promote a safe environment for cyclists while maintaining traffic flow.

**Point 6:**

This is a densely-used urban street, and we included in its design two 1.5 m, two-way bicycle lanes with an emphasis on cyclist safety.

**Point 7: (Different section)**

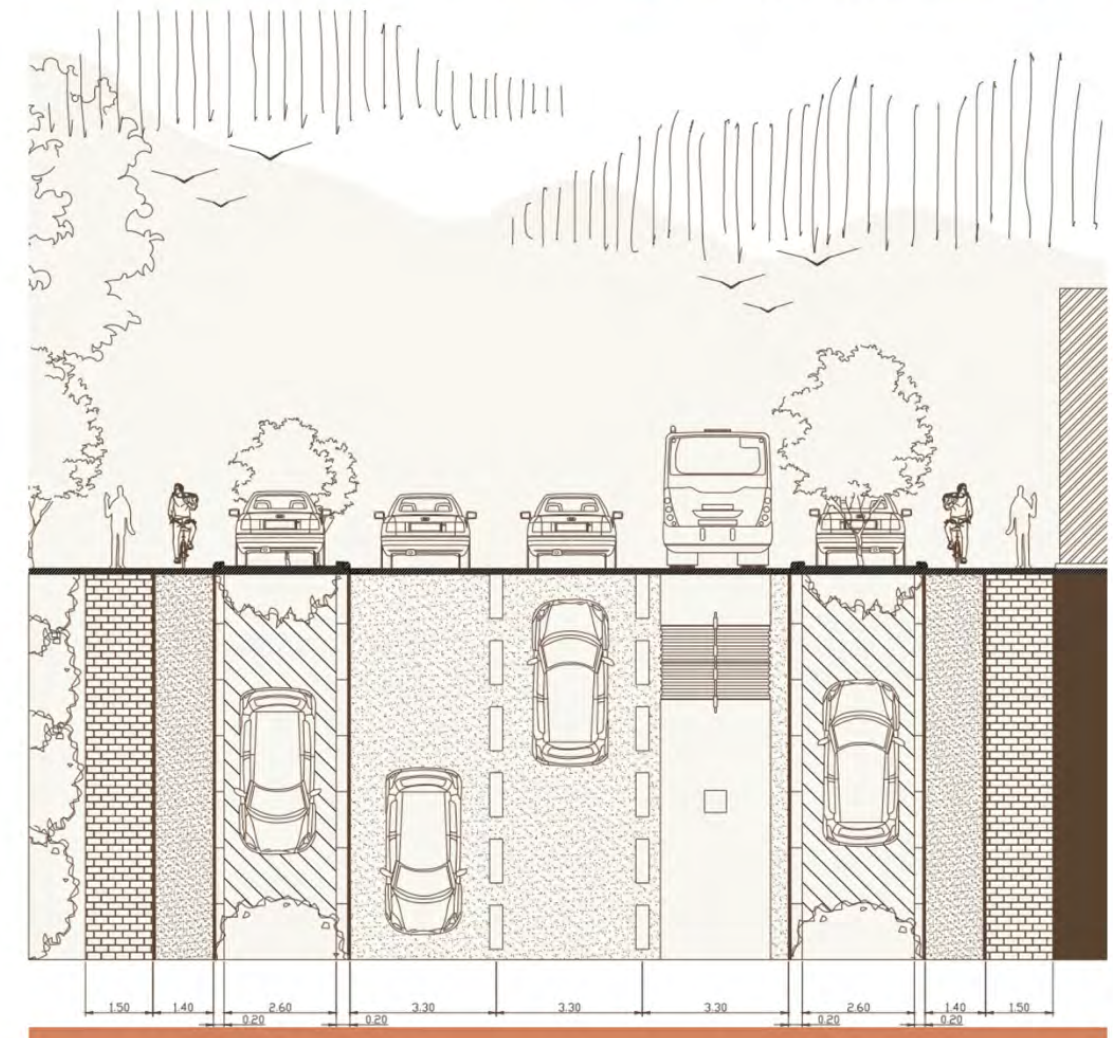
This section shows the lower part of rue Campine, where we've reinforced bus traffic by creating two lanes for buses, one that will only allow buses to get on and one that will be dedicated to buses and cars. In both of these lanes, bicycles are allowed and have priority.

**Point 8: (Green Corridor)**

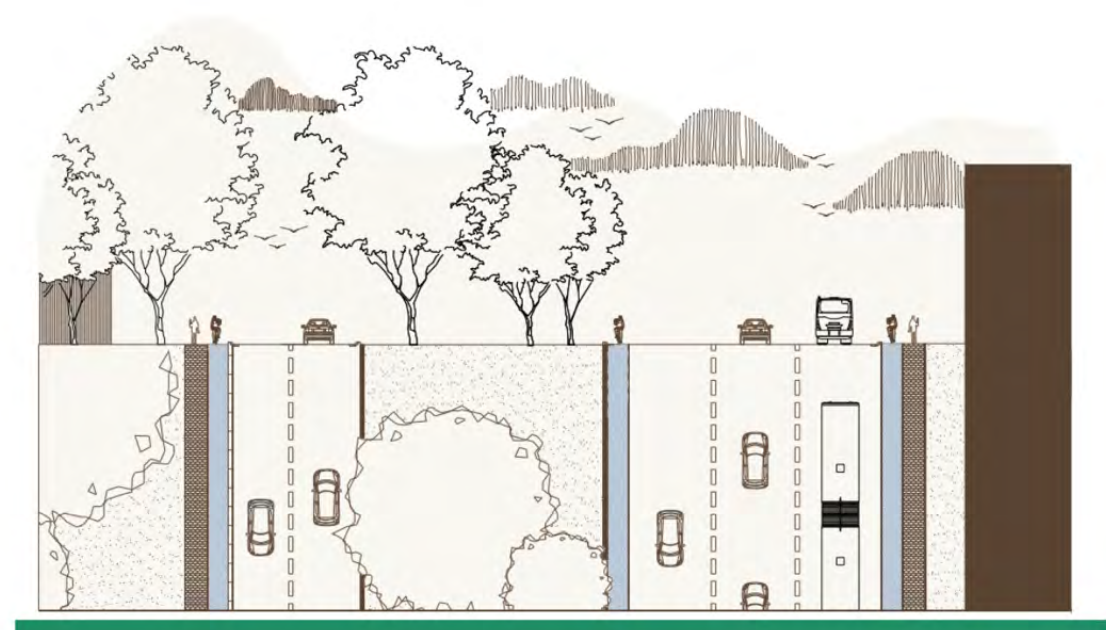
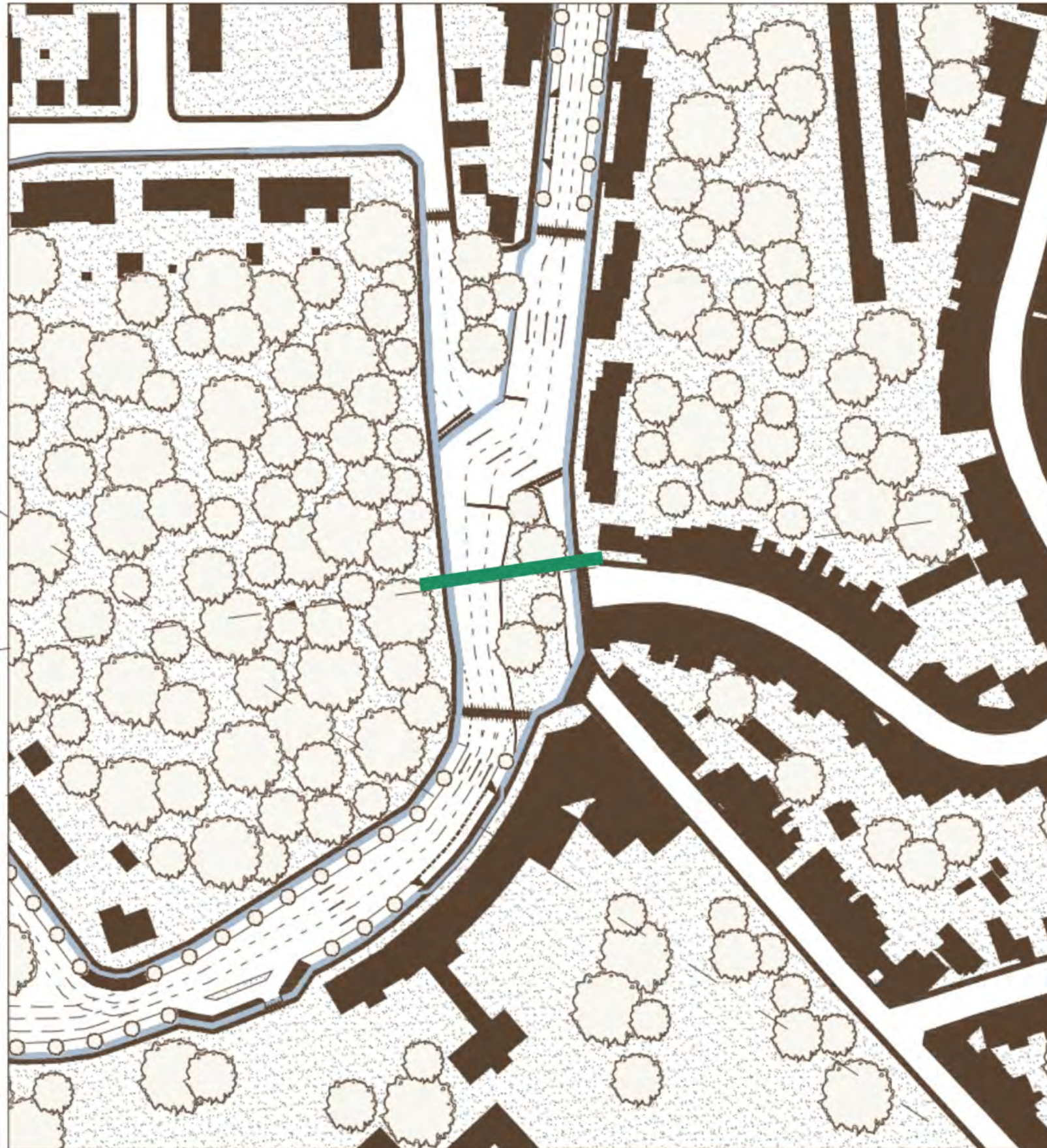
A street designed to give priority to soft mobility, with narrow sidewalks.



Proposition N°1



### Proposition N°2



In the first proposal, our aim is to enhance the functionality and safety of the area by extending the roundabout and creating new traffic lanes to improve traffic flow and accommodate all road users. Dedicated bike lanes will be added on both sides of the roadway to provide safe and continuous paths for cyclists. In addition, a designated bus lane will be introduced to ensure smoother and more efficient public transportation services, reducing delays and improving accessibility.

To optimize space and improve pedestrian and cyclist safety, we propose adjusting the current parking configuration. The existing perpendicular parking spaces will be reoriented to parallel parking, strategically positioned between the existing trees. This modification will free up space for the installation of a wide pedestrian walkway and a separate bike path, ensuring a clear and secure route for non-motorized traffic. For buses, a dedicated uphill lane will be established to maintain efficient traffic flow, while the downhill bus lane will be integrated into the general roadway to minimize disruption and maximize space utilization.

To further support public transportation, two bus stops will be installed near the school, offering convenient access for students and other commuters. Additionally, we will create a "kiss-and-ride" zone on the uphill side, specifically designed to allow parents to safely drop off their children. From this point, children can walk up the street to the school, reducing unnecessary congestion and improving traffic safety. The kiss-and-ride zone will be strategically located near the parking area reserved for the school to streamline its use and enhance its effectiveness.

In the second proposal, we propose replacing the roundabout with a signalized intersection featuring traffic lights. This change aims to provide more structured traffic management while maintaining safety and accessibility for all users. As in the first proposal, the inclusion of dedicated bus and bike lanes remains a priority, along with the bus stops and the "kiss-and-ride" zone, ensuring consistency in supporting sustainable and safe transportation options.

This proposal also reimagines the existing roundabout by extending it toward the school entrance to create a public space that fosters community interaction. The redesigned space will prioritize cyclists traveling on the eastern street, granting them the right of way to ensure their safety and ease of movement. As a result, vehicles coming from Rue Auguste Donnay and Rue Xhovémont will no longer have priority and will be required to yield to cyclists before merging onto the main roadway. This measure is designed to encourage more sustainable modes of transport by giving precedence to cyclists while simultaneously reducing vehicle dominance in the area.

By integrating these changes, both proposals aim to balance functionality, safety, and sustainability, creating a more inclusive and efficient urban environment for all road users.