

URBAN PLANNING & TRANSPORTATION (UEEN0004)

Academic Year : 2024-2025

Sainte-Walburge: Towards a Vibrant Living Neighbourhood

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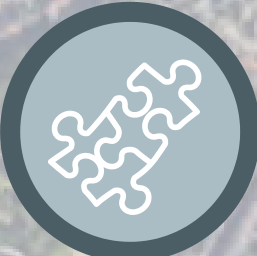
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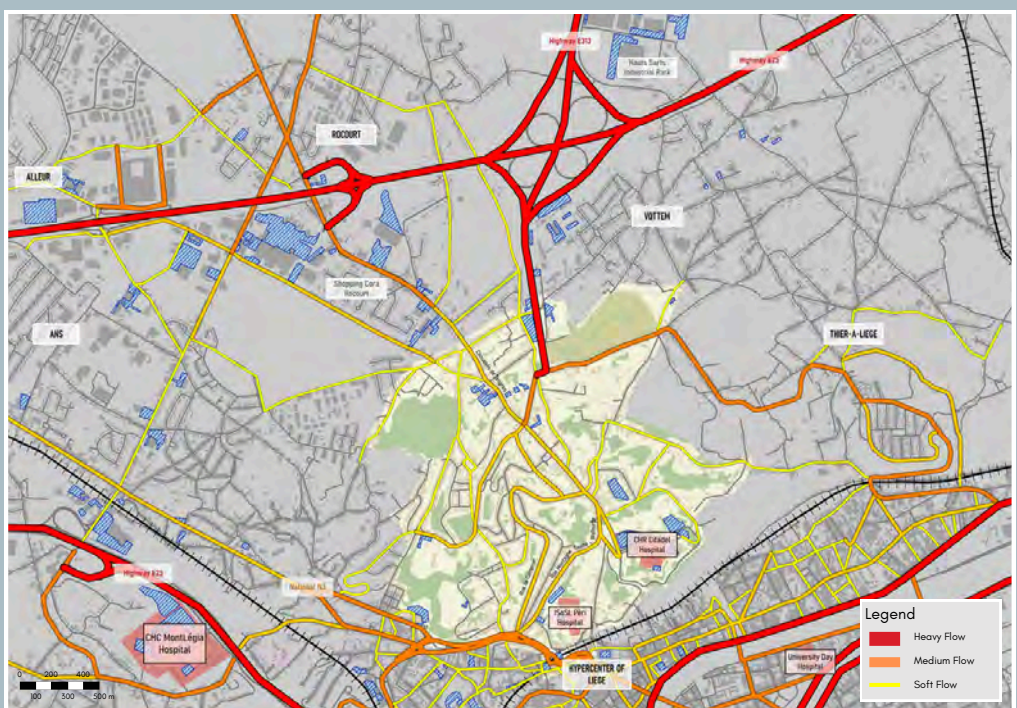


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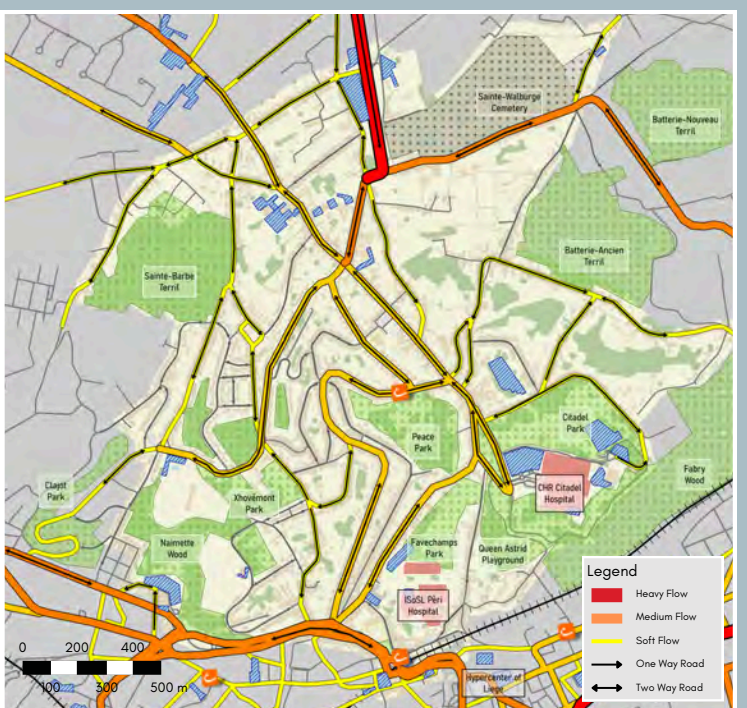
Task N°1 : Analysis of Existing Documents

By R. Cullens, M. Dahlems & Z. Saint-Remy

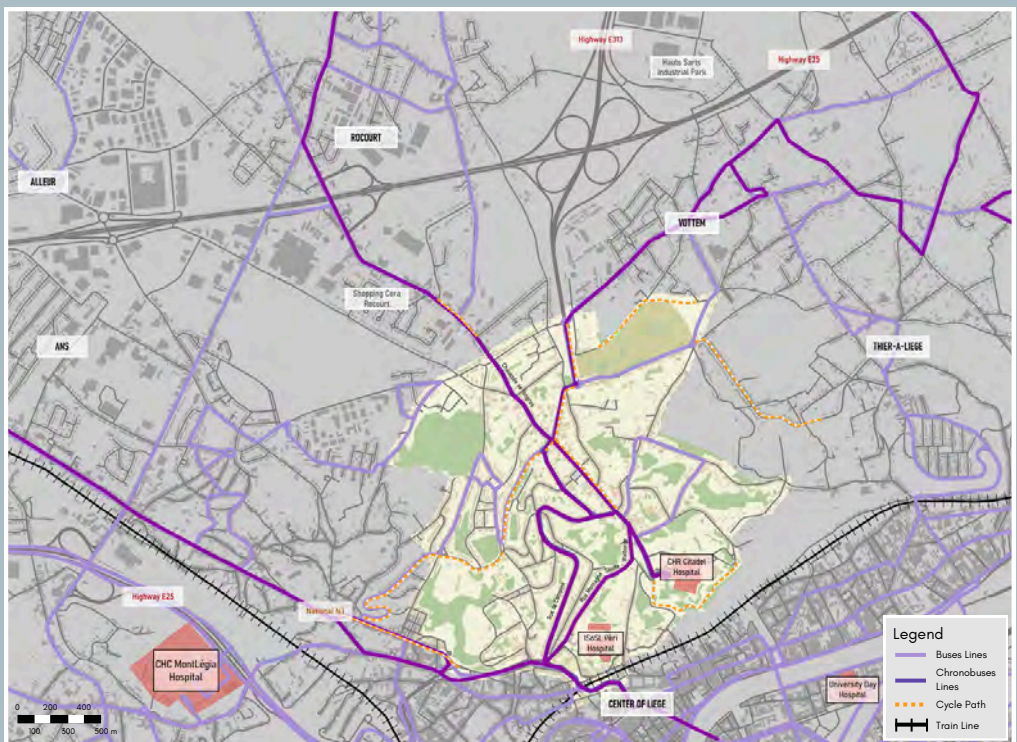
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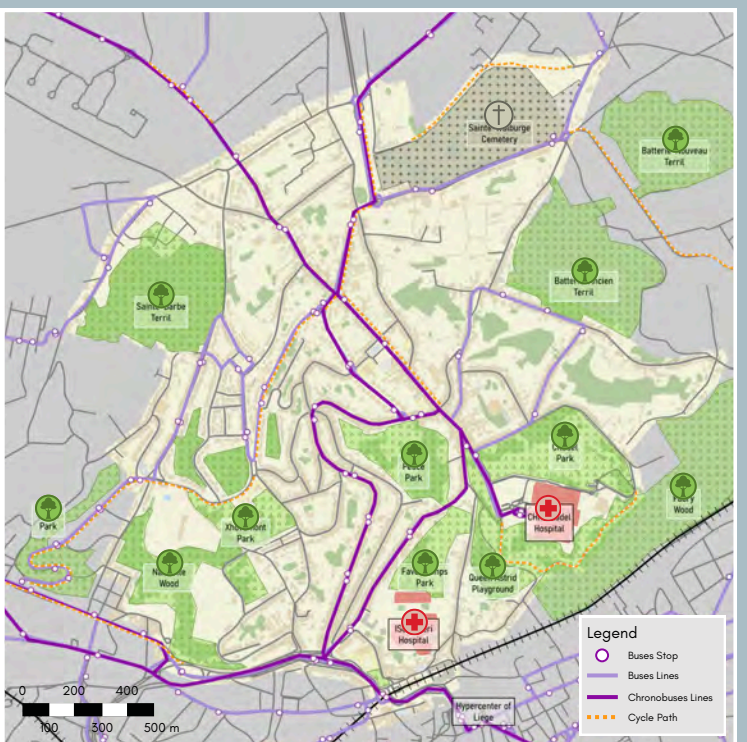
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Sainte Walburge Zoom - Car Analysis

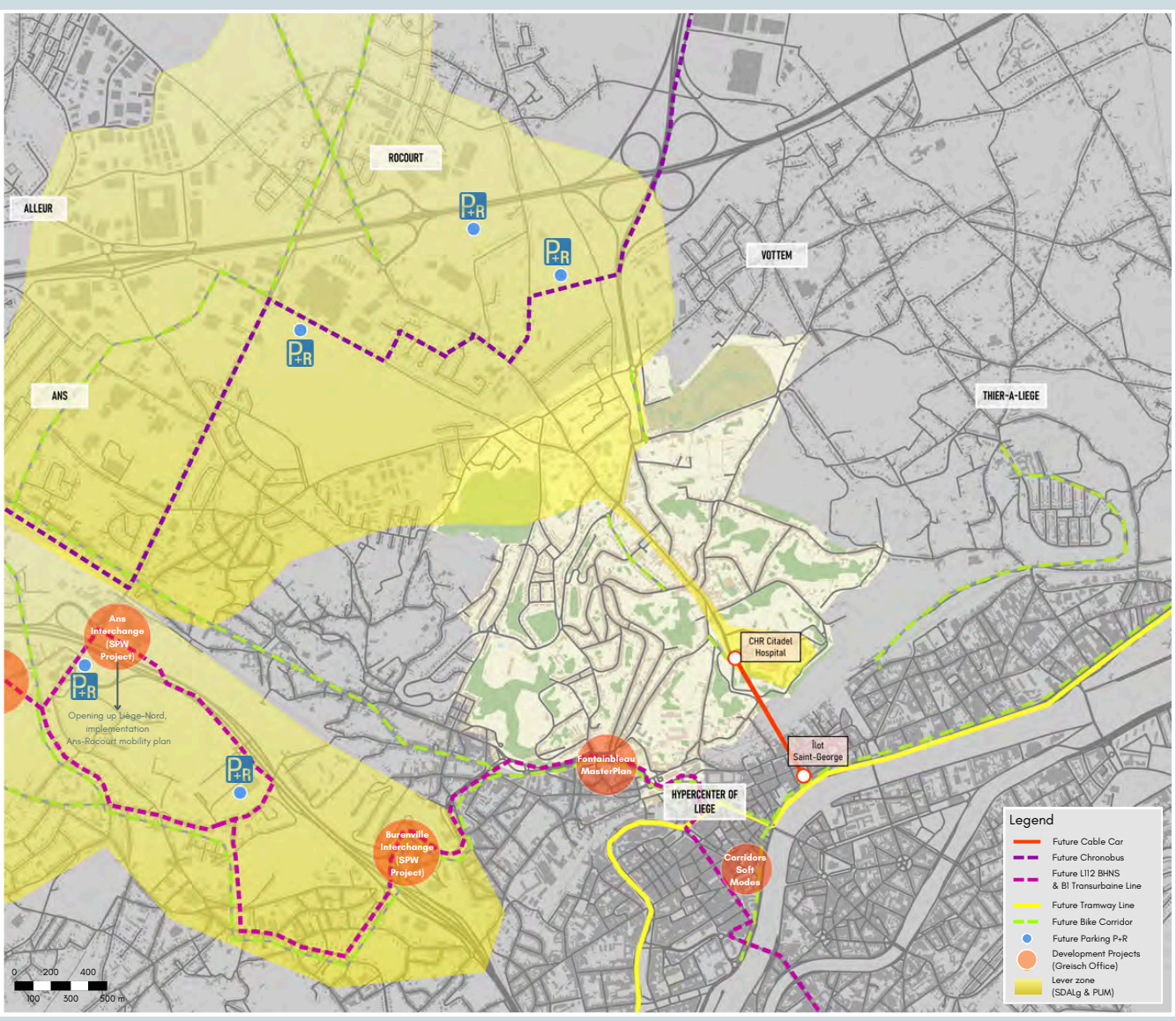


Global Map - Buses & Bicycle Analysis

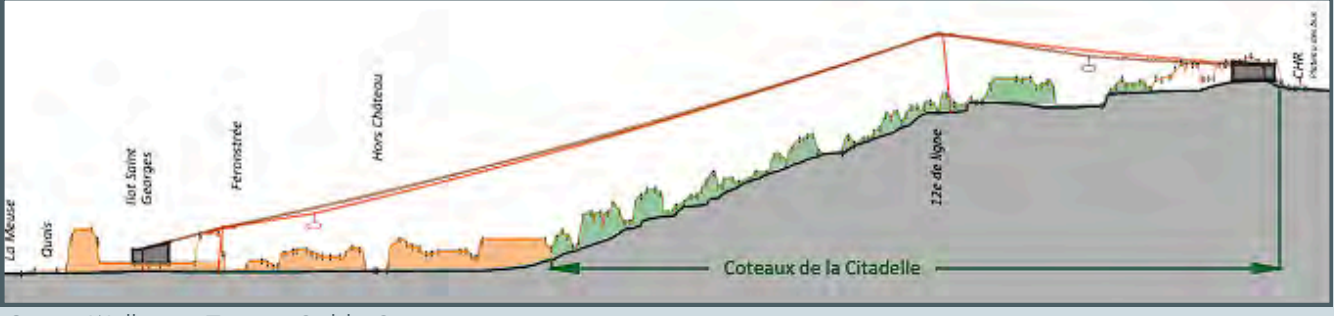


Sainte Walburge Zoom - Buses & Bicycle Analysis

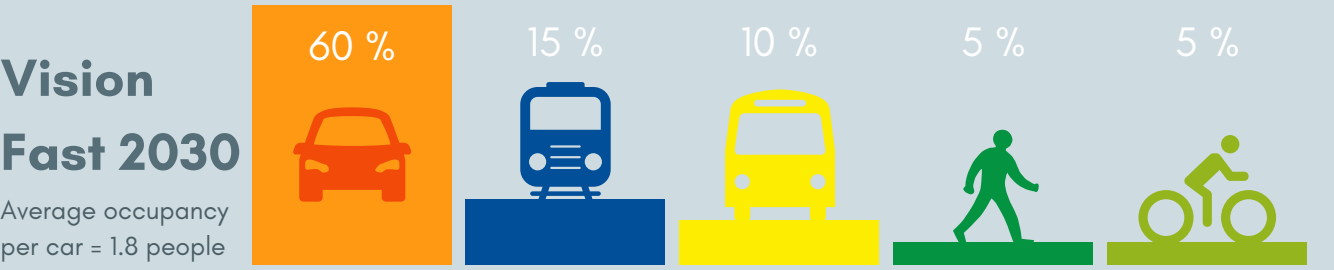
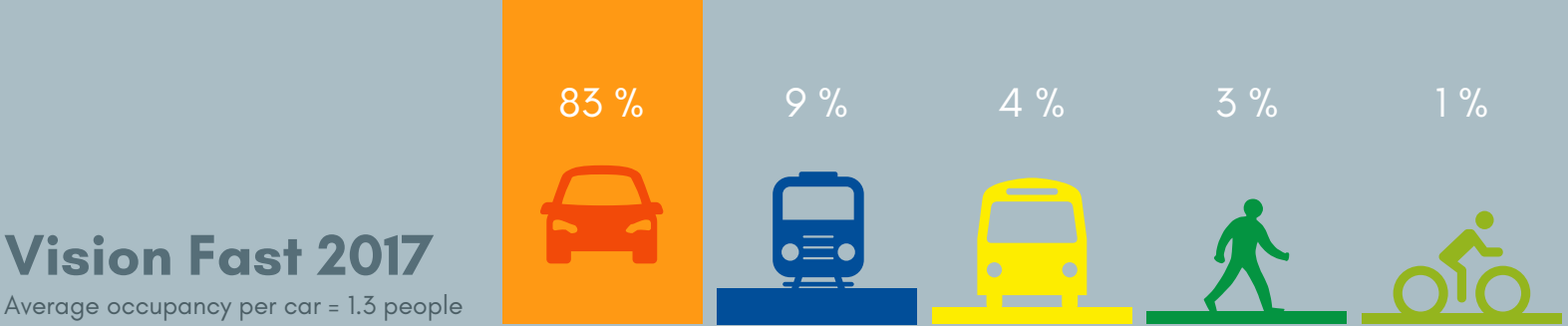
Expected Situation



Global Map Analysis of Expected Project Around Sainte-Walburge



Sainte Walburge Zoom - Cable Car



Task 1: Analysis of Existing Documents and Plans

As we embarked on our research of Sainte-Walburge, we were struck by the neighbourhood’s blend of historical charm and modern challenges. Situated on the slopes of Citadelle Hill, Sainte-Walburge holds both strategic importance and significant mobility issues. Its dense urban fabric, characterised by XIXth and early XXth-century housing, narrow streets and steep terrain, has shaped its transport systems in ways that are both interesting and constrained. Serving as a corridor connecting Liège’s city centre to its northern suburbs, Sainte-Walburge struggles with congestion, limited public transport options and a lack of infrastructure for walking and cycling. To address these challenges, we turned to foundational mobility plans and strategies for context, including Vision FAST 2030, the Plan Urbain de Mobilité (PUM), the Plan Communal de Mobilité (PCM) and thematic initiatives like the Plan Vélo and Plan Climat. These documents provide valuable insights into reducing car dependency, fostering multimodal systems and creating a more liveable neighbourhood. Our analysis focuses on how these frameworks can inform future interventions for Sainte-Walburge, aligning local needs with regional and national goals.

Public Transport

One of the most pressing challenges we observed in Sainte-Walburge is the inefficiency of its public transport system. Buses share lanes with private vehicles, leading to delays that frustrate commuters and undermine the reliability of public transport. Rue de Campine, the area’s primary artery, exemplifies these issues. With approximately 280 buses and 15,000 vehicles passing through daily, congestion is inevitable. The PUM offers a promising solution: a high-frequency Busway system designed to serve around 60,000 passengers per day with peak-hour frequencies of 5–10 minutes. We believe this system could transform mobility in Sainte-Walburge by providing a reliable and attractive alternative to car travel. As part of our RePIC journey we’ve been to other European cities and witnessed such systems and their potential to reduce congestion significantly while promoting sustainability. Additionally, the PCM’s innovative proposition for a cable car connecting Citadelle Hospital especially near to the nearly completed tram network could address the area’s topographical challenges, making public transport more accessible and efficient. As we analysed these proposals, we found ourselves optimistic about their potential. However, we also recognised the importance of integrating these new systems with existing infrastructure to ensure seamless, multimodal connectivity.

Road Transport

The road network in Sainte-Walburge faces significant strain, with congestion and bottlenecks particularly severe along Rue de Campine. These issues not only delay private vehicles but also exacerbate the challenges faced by public transport users. The PCM suggests converting certain streets into one-way systems to improve traffic flow, but we believe such measures need to be approached cautiously. Without complementary investments in alternative transport options, these changes could simply displace congestion to smaller residential streets. The broader vision articulated in Vision FAST 2030 targets a reduction in car dependency, aiming to lower the modal share of private vehicles from 83% to 63% by 2030. This ambitious goal aligns with environmental and safety objectives, including reduced emissions and improved road safety. However, as we reflected on these targets, we couldn’t ignore the complexity of achieving such a shift in a neighbourhood so reliant on cars. For us, this reinforces the need for a holistic approach that balances road transport reforms with investments in public transport and soft mobility.

Soft Mobility

Sainte-Walburge’s infrastructure for walking and cycling remains critically underdeveloped. Narrow sidewalks, the absence of cycling lanes and the dominance of high-traffic streets like Rue de Campine, Montagne Sainte Walburge and Rue de Saint Walburge discourage residents from adopting these sustainable modes of transport. As we navigated the neighbourhood during a site visit, we couldn’t help but feel how unwelcoming the streets are for pedestrians and cyclists. The Plan Vélo makes a strong case for the introduction of protected cycling lanes, particularly in high-traffic areas. This, combined with the PCM’s proposals to expand sidewalks and create pedestrian-priority zones, could transform Sainte-Walburge into a more liveable and sustainable space. Research consistently shows that such investments lead to significant modal shifts, reducing car dependency while improving urban quality of life (Heinen et al., 2010). For us, the lack of soft mobility options represents both a challenge and an opportunity. If the right investments are made, Sainte-Walburge could become a leader in promoting active and sustainable transport in Liege especially given its immense difficulty in its layout.

Vision FAST 2030

Vision FAST 2030 provides a comprehensive framework for achieving sustainable mobility across Wallonia. Its targets include reducing car usage to 63%, increasing public transport to 15%, and growing the share of walking and cycling to 22% by 2030. We were particularly struck by the vision’s emphasis on integrating local transport strategies with broader regional goals, ensuring accessibility and sustainability are prioritised. For Sainte-Walburge, this vision offers a roadmap for change. By aligning its mobility strategies with the principles outlined in Vision FAST 2030, the neighbourhood can address its specific challenges while contributing to the larger objective of creating a sustainable urban region.

Thematic Maps and Analysis

We created thematic maps to provide us with a clearer picture of Sainte-Walburge’s mobility dynamics and highlighted key areas for intervention:

- **Traffic Flow Map:** This map identifies heavy congestion zones, particularly along Rue de Campine, where red zones indicate critical pressure points. Medium and light flow areas provide additional context, underscoring the need for targeted traffic management solutions.
- **Cable Car and Tram Line Map:** The proposed cable car route and the nearly completed tram network are depicted together, illustrating their potential complementary potential in creating a multimodal transport system. The cable car, designed to overcome the area’s steep terrain, offers a novel solution to connect Citadelle Hospital with the rest of the city.
- **Overview Map:** This map situates Sainte-Walburge within the broader urban framework of Liège, highlighting its connections and areas for improvement in multimodal integration.

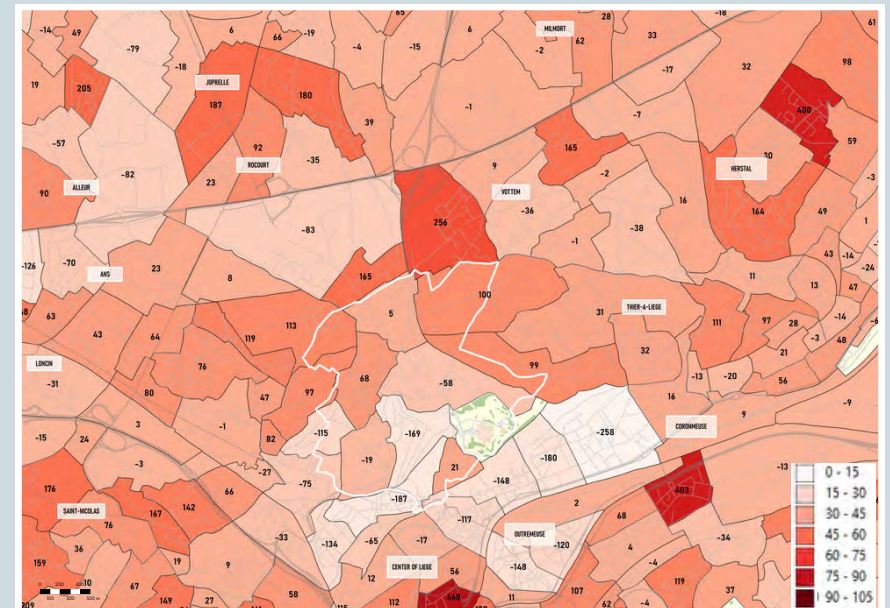
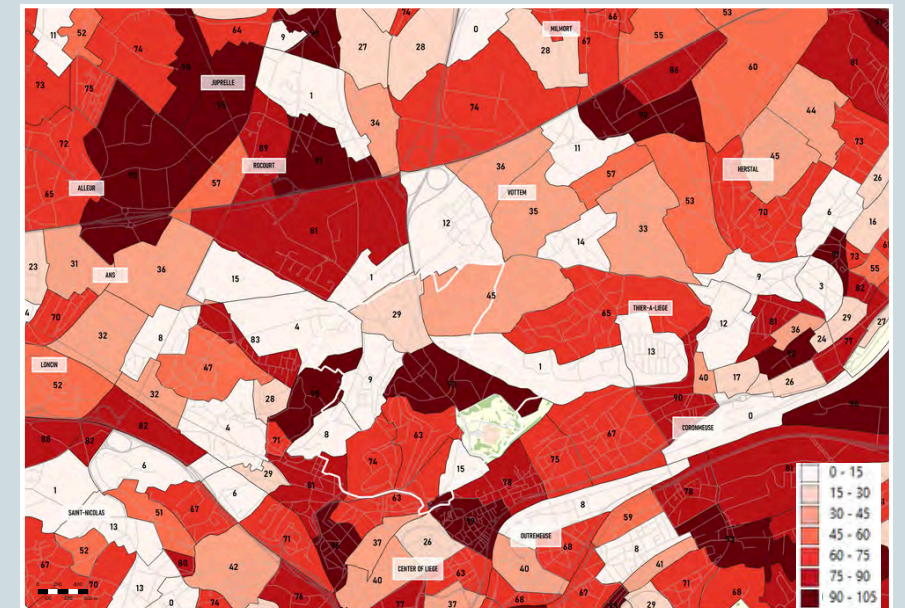
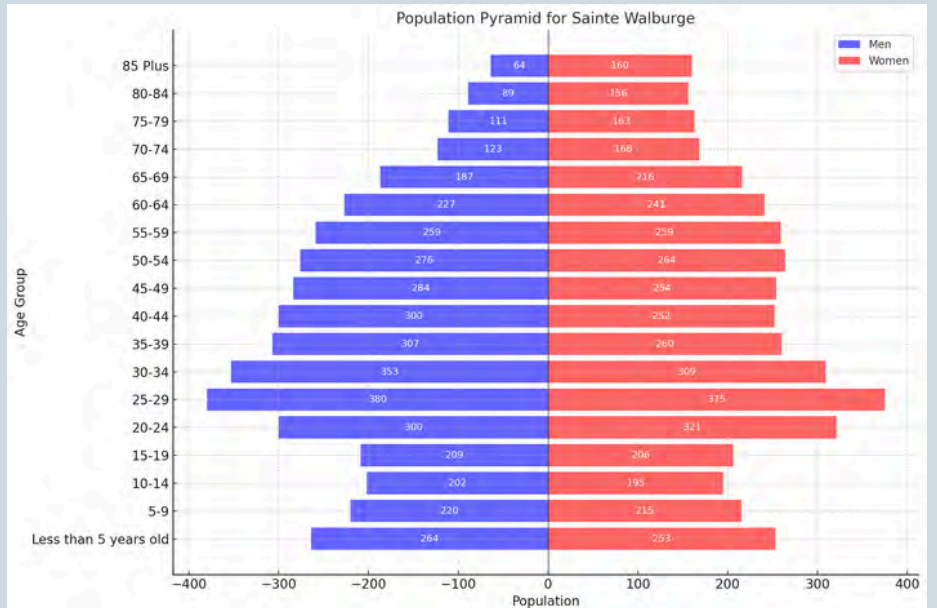
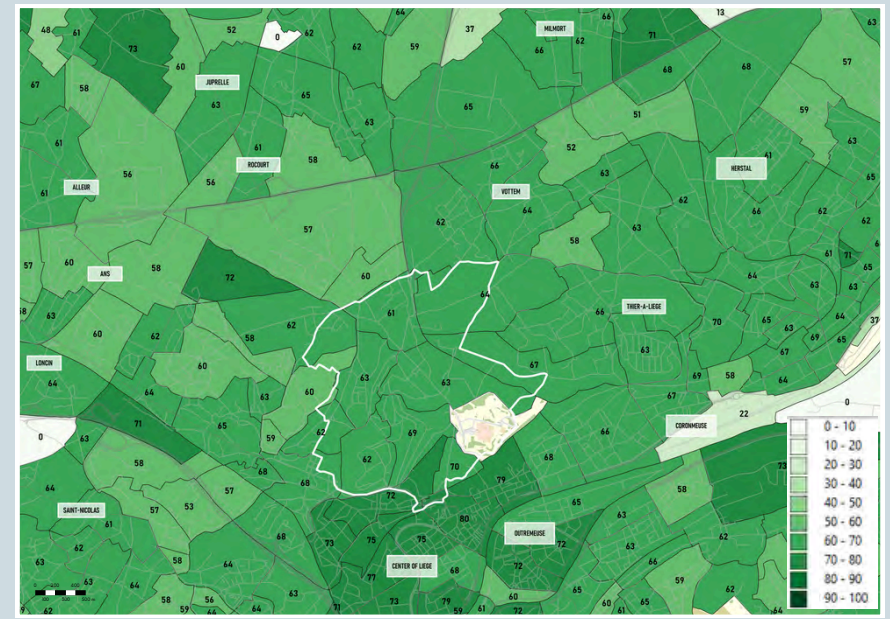
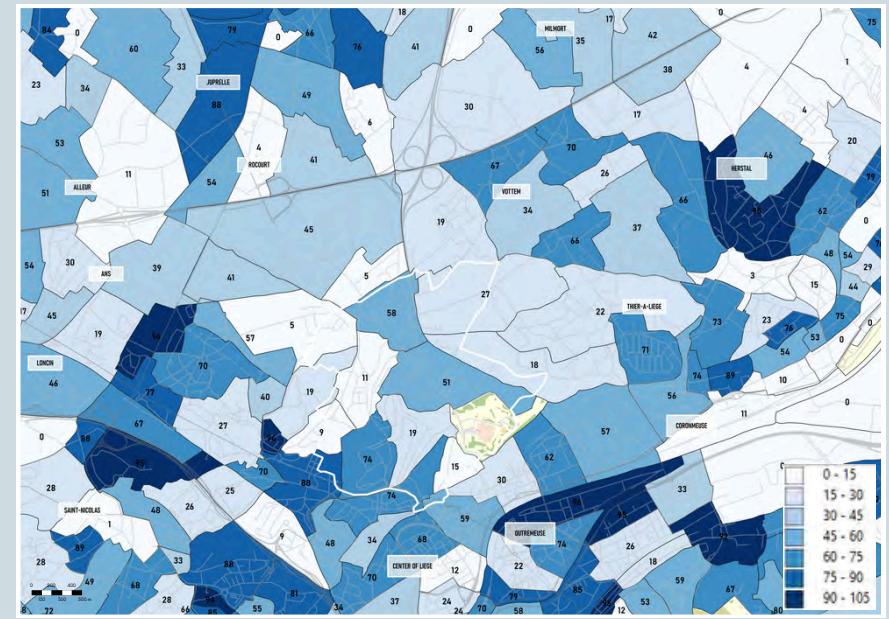
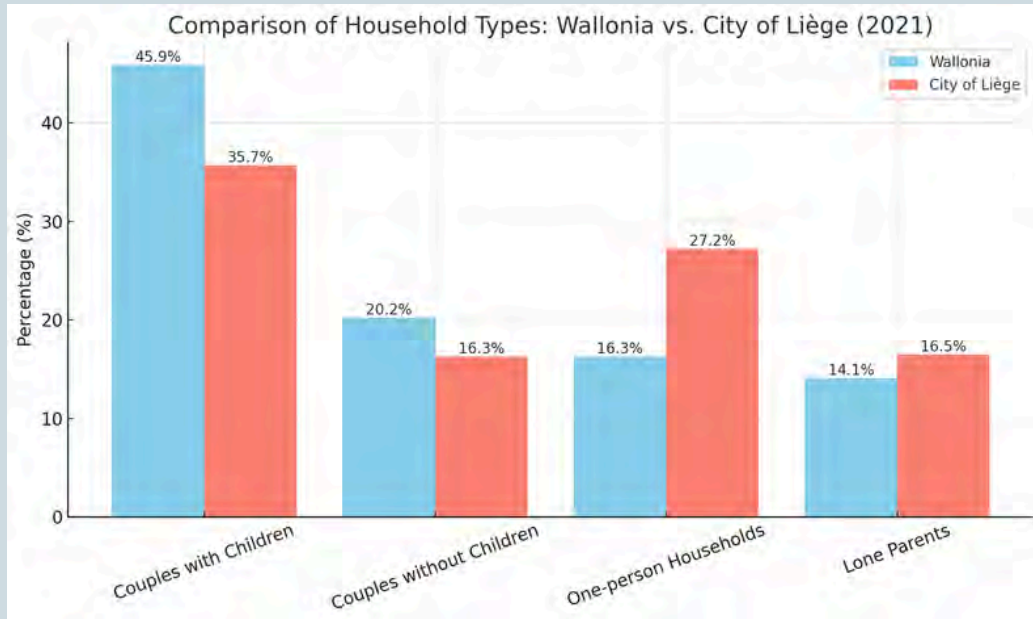
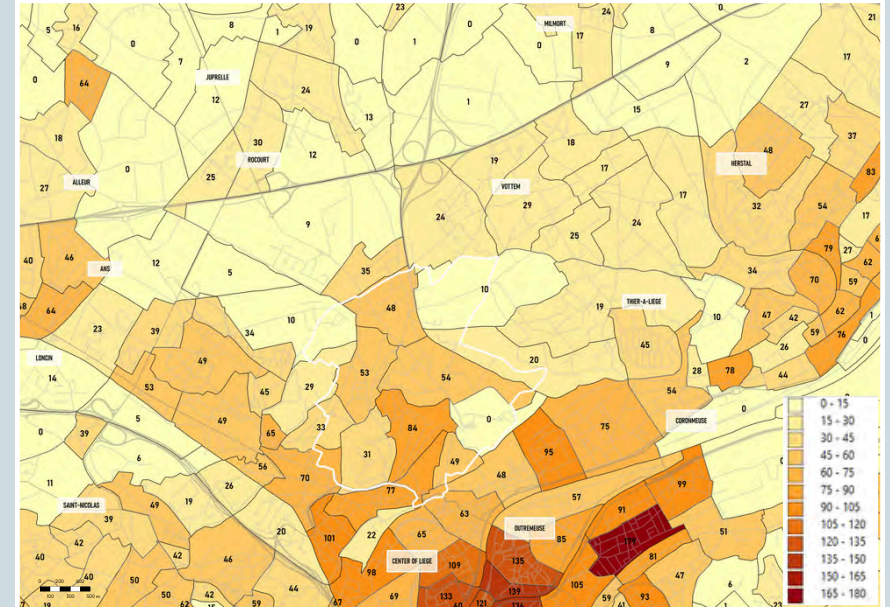
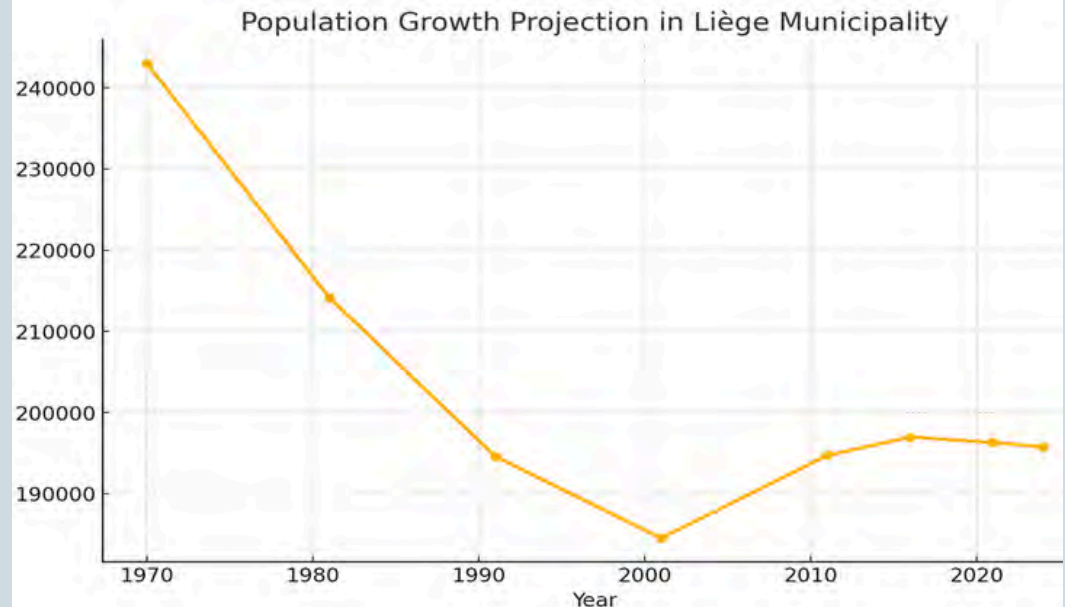
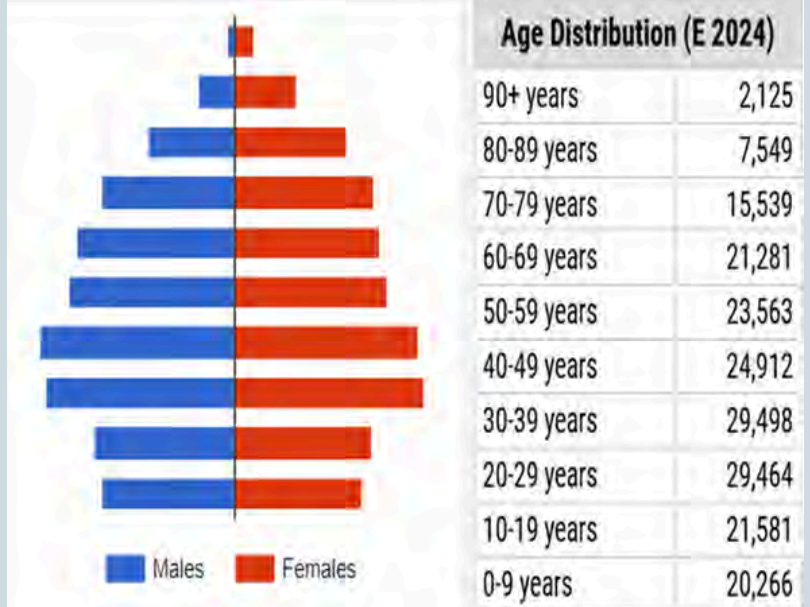
These maps helped us connect visual data to the broader goals of Vision FAST 2030, the PUM, and the PCM. For example, the traffic flow map reinforced the urgency of perhaps introducing dedicated bus lanes, while the cable car map highlighted the importance of innovative solutions tailored to local challenges such as the topography.

Reflection

Our analysis of existing documents and plans for Sainte-Walburge revealed a neighbourhood at a crossroads. The challenges of congestion, limited public transport and underdeveloped soft mobility infrastructure are significant but not insurmountable. We believe that the proposed Busway, tram network, and cable car represent essential steps toward reducing car dependency and improving accessibility. By aligning these local strategies with the principles of Vision FAST 2030 and the SDALg, Sainte-Walburge can transition into a more sustainable and liveable urban environment. The thematic maps and supporting analyses provide a strong foundation for future interventions, ensuring mobility solutions are both effective and contextually relevant.

Task N°2 : Demand and Attractors

By R. Cullens, M. Dahlems & Z. Saint-Remy



Task 2: Analysis of Existing and Future Mobility Demand

Sainte-Walburge, nestled on the steep slopes of Citadelle Hill, is a neighbourhood that brings together a fascinating mix of challenges and opportunities. It is both a residential area and a critical transit corridor, with its steep terrain and historical urban fabric influencing the way people live and move. Examining population density, household types, age distribution, and growth trends has allowed us to explore how socio-demographics shape mobility in Sainte-Walburge. These insights reveal not only the neighbourhood's immediate needs but also its long-term potential for more sustainable transport solutions. Through this work, we kept coming back to the same questions: how can we address the growing mobility demand in a neighbourhood constrained by geography and infrastructure? What do the people of Sainte-Walburge need to move freely and equitably? These reflections guided us as we delved into the graphics and considered the local context provided by key planning frameworks, including the Plan Urbain de Mobilité (PUM), the Plan Communal de Mobilité (PCM), the Schéma de Développement de l'Arrondissement de Liège (SDALg), and the BELdam report.

Population Density Map (2022)

The population density map draws attention to the dense clusters along Rue de Campine and Montagne Sainte-Walburge, as well as the streets near the Citadelle. These areas form the core of activity and demand in Sainte-Walburge, underscoring their importance as hubs of residential and transit use. With a population of 8,419 spread across 2.963 km², the neighbourhood has an average density that far surpasses its surrounding areas, and the red zones highlight the most significant pockets of pressure. As we examined this map, we found ourselves reflecting on how these dense clusters amplify mobility challenges. Steep streets like Rue de Campine not only concentrate traffic but also limit the feasibility of walking and cycling, leaving residents heavily reliant on private cars. This reliance exacerbates congestion, which is particularly problematic given the limited public transport options in these areas. We see this reflected in policy recommendations from the PUM and SDALg, which both advocate for increasing public transport capacity in high-density corridors. Proposals such as a high-frequency Busway system have the potential to alleviate some of this strain, offering residents a viable alternative to driving. At the same time, we also noticed an opportunity here. The density along these corridors creates the ideal conditions for public transport systems to thrive. Investments in multimodal solutions, such as combining Busways with pedestrian improvements, could transform Rue de Campine into a transit spine that serves not just Sainte-Walburge but the broader urban region.

Comparison of Household Types (2021)

The comparison of household types between Wallonia and Liège highlights a demographic characteristic that felt especially significant to us: the prevalence of single-person households in Sainte-Walburge. In Liège, 27.2% of households are single-person, compared to just 16.3% in Wallonia. This mirrors the situation in Sainte-Walburge, where smaller households dominate the demographic landscape. Single-person households generate more frequent and individualized trips, often by car due to limited public transport options. This pattern is visible in areas like Rue de Campine, where traffic congestion remains a persistent issue. The PCM recognizes this challenge and calls for enhanced public transport connectivity and the development of micro-mobility solutions. From our perspective, initiatives like shared e-scooters and protected cycling infrastructure could make a tangible difference for these residents. Single-person households are often more adaptable to alternative transport modes, provided these options are safe, reliable, and accessible. We found ourselves imagining how improved transport systems might impact these residents' daily lives. A more accessible bus system or a well-connected cycling path could not only ease their commutes but also reduce the financial burden of car ownership. For us, this graphic served as a reminder of the human side of transport planning, it's not just about moving people; it's about improving their quality of life.

Age Distribution (2024 Projections)

The age distribution pyramid for Sainte-Walburge shows a balanced demographic profile, with strong representation in the 20–39 and 50–59 age groups. These patterns align with the broader trends in Liège, where the average age is 38.7 years. What stood out to us is how this demographic diversity shapes mobility needs. Younger residents often rely on public transport or active mobility options, while older populations need safe pedestrian pathways and accessible transit services. As we considered this graphic, we thought about the different journeys these age groups might take each day. Young adults commuting to work or school would benefit from efficient and affordable public transport, while older residents navigating the steep terrain of Montagne Sainte-Walburge require well-maintained sidewalks and pedestrian-friendly crossings. The BELdam report emphasizes these needs, highlighting the importance of inclusive mobility solutions that cater to all age groups. The PCM's pedestrian-priority zones seem like a step in the right direction, but more must be done to ensure these initiatives are fully realized in Sainte-Walburge.

Population Growth Projections (1970–2022)

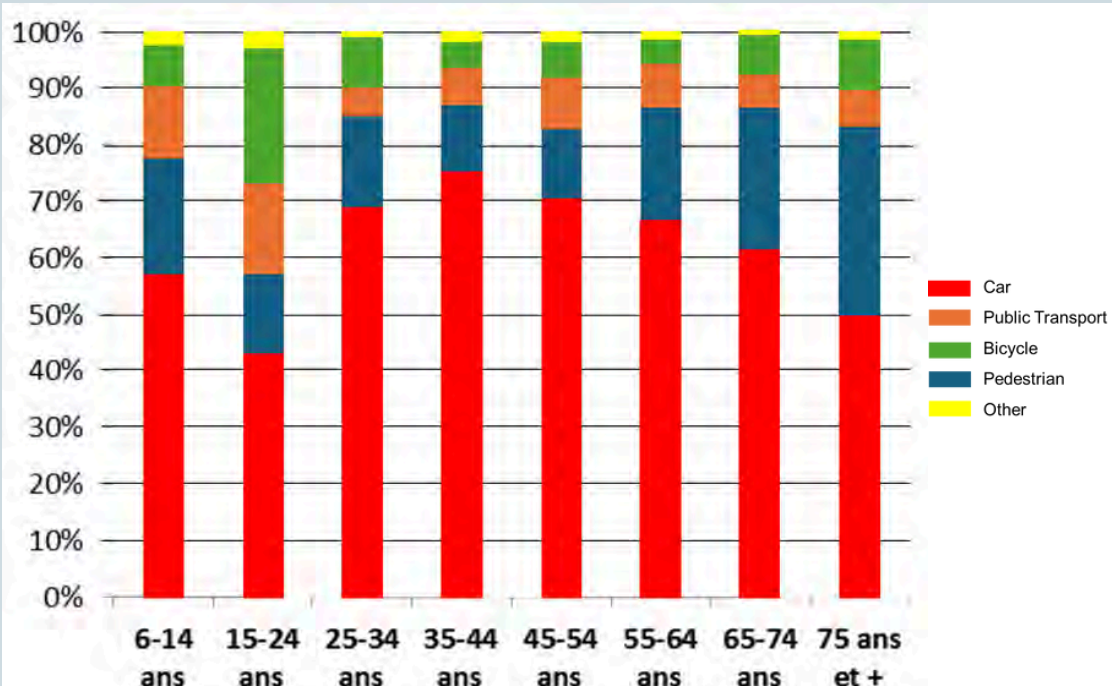
The population growth projection shows a decline in Liège's population from 1970 to 2000, followed by stabilization in recent years. Sainte-Walburge, however, has experienced modest growth, with a 7.1% increase between 1975 and 2015 and a similar 7.2% increase between 2000 and 2015 (City-Facts). This stabilization presents an opportunity for proactive transport planning, particularly in high-traffic corridors like Rue de Campine. We saw this as a call to action. The current stability provides a window to implement sustainable mobility solutions before further growth exacerbates existing challenges. Dedicated bus lanes, congestion management strategies, and demand-responsive transport systems could all play a role in addressing mobility demand while reducing car dependency. Vision FAST 2030 offers a roadmap for achieving these goals, with its focus on multimodal integration and sustainability.

Reflection

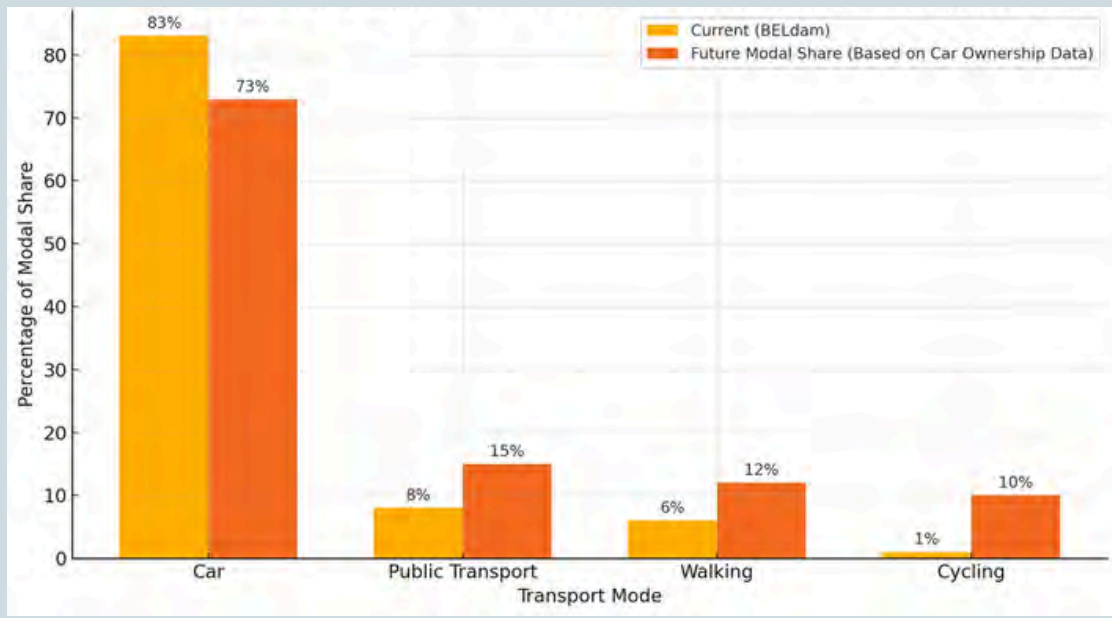
Looking at these graphics, we couldn't help but feel a sense of urgency. Sainte-Walburge's challenges are clear: steep terrain, car dependency, and limited public transport options. But so are its opportunities. The high population density along key corridors creates ideal conditions for public transport investments, while the prevalence of single-person households opens the door for innovative micro-mobility solutions. The age distribution reminds us that mobility systems must be inclusive, and the neighbourhood's modest growth gives us time to act. For us, this analysis isn't just about solving problems, it's about reimagining Sainte-Walburge as a place where mobility is equitable, sustainable, and empowering. By aligning local initiatives with frameworks like Vision FAST 2030, the PUM, and the PCM, we can help transform this neighbourhood into a model for sustainable urban mobility.

Task N°2 : Demand and Attractors

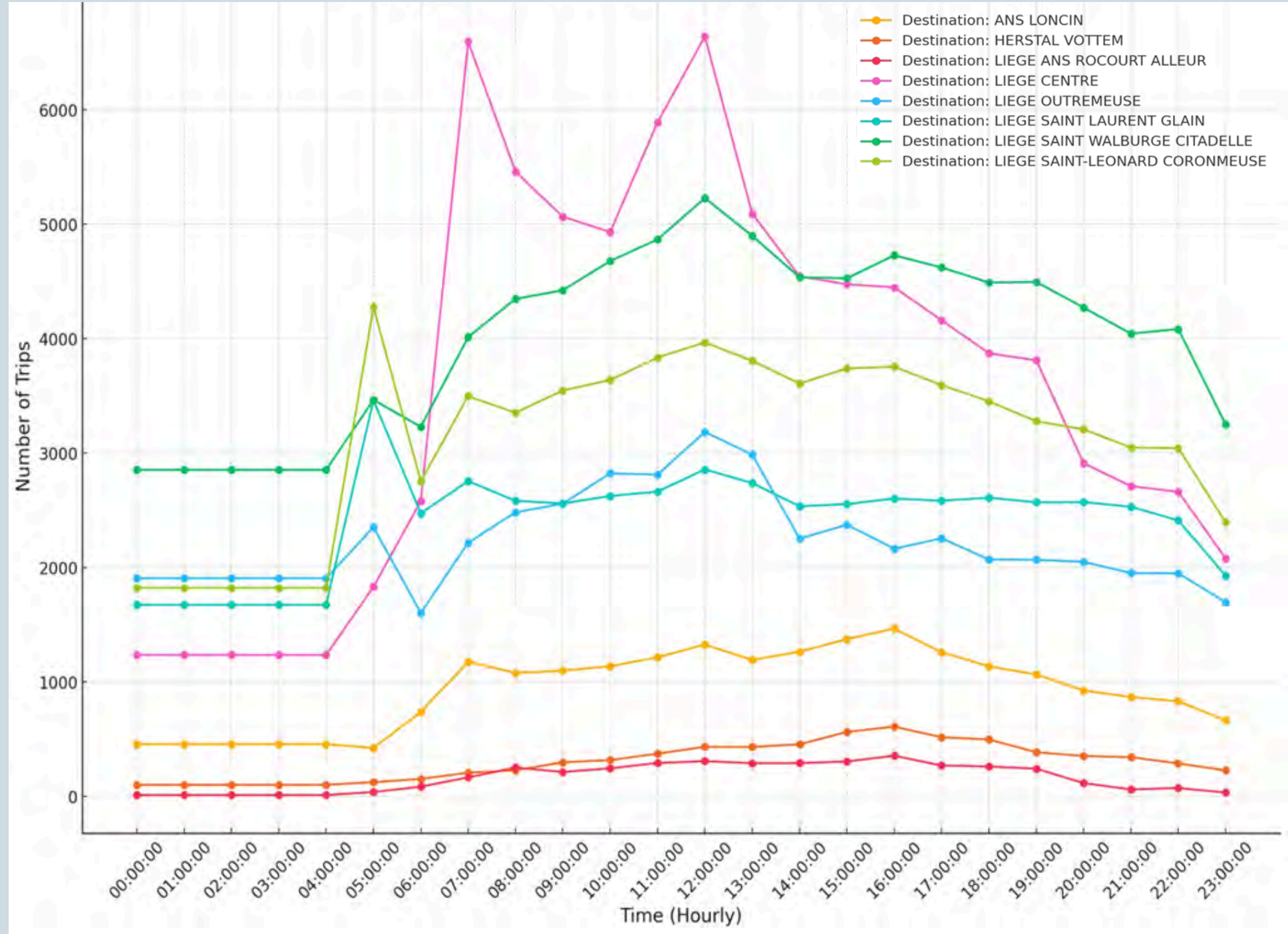
By R. Cullens, M. Dahlems & Z. Saint-Remy



Modal Share by Demographics



Current vs Future Modal Share for Liège (Based on Car Ownership Data)



Hourly Trip Distribution Across Destinations in Liège (Saint-Walburge)

Task 2: Analysis of Existing and Future Mobility Demand

Understanding mobility demand requires examining not only current patterns but also the factors influencing them. In Sainte-Walburge, steep terrain, fragmented infrastructure, and economic inequalities make mobility a complex issue. To better understand these dynamics, we analyzed data visualizations that explore modal share across demographics, hourly trip patterns, and comparisons of current and projected transport modes in Liège. These graphics, drawn from Statistical Sector data and cross-referenced with Stadel, provide a window into how mobility functions today and what shifts are possible in the future. This analysis not only highlights the systemic challenges but also offers insights into how sustainable and equitable mobility solutions could be achieved in a neighborhood as diverse and topographically complex as Sainte-Walburge.

Modal Share by Demographics

The first visualization highlights how different age groups in Liège engage with transport modes such as cars, public transport, bicycles, and walking. The data reveals stark trends: car use is consistently dominant, particularly among middle-aged individuals (45–64 years old), who often balance professional and family obligations. In contrast, younger people (6–24 years) rely more on public transport, reflecting limited access to private vehicles and the cost-effectiveness of public options. Meanwhile, older residents (65+) show a small but noticeable increase in pedestrian activity, likely tied to shorter travel distances and local errands. These patterns are particularly significant for Sainte-Walburge, where steep terrain and inadequate pedestrian infrastructure limit walking and cycling as viable options. The dominance of car use in middle-aged groups also exacerbates congestion on critical roads like Rue de Campine. For us, this visualization highlights the need to design age-targeted solutions. For younger residents, improved and affordable public transport could alleviate reliance on cars, while for older residents, safer pedestrian pathways are essential. Addressing these age-specific needs could create a more balanced and sustainable mobility system in Sainte-Walburge.

Hourly Trip Distribution Across Destinations

The second visualization focuses on the temporal distribution of trips to key destinations in Liège, including Sainte-Walburge. Predictably, the data shows distinct peaks during commuting hours, with trips spiking between 7:00–9:00 in the morning and 16:00–18:00 in the evening. Destinations like Saint-Léonard Coronmeuse and Liège Centre dominate trip volumes, underscoring their significance as economic and commercial hubs. Sainte-Walburge Citadelle, though less prominent, demonstrates steady activity throughout the day, tied to its role as a healthcare hub. This graphic highlights the mismatch between predictable demand patterns and the infrastructure meant to serve them. Roads leading to Sainte-Walburge experience severe congestion during peak hours, and public transport systems struggle to meet the rising demand. Midday dips, on the other hand, present an opportunity to optimize services for quieter periods, such as maintenance or demand-responsive transport options. For us, this data paints a vivid picture of the daily struggles faced by commuters in Sainte-Walburge. Addressing these issues requires not just more buses but smarter transport planning that aligns service availability with observed demand. Enhanced peak-hour services, dynamic scheduling, and improved traffic flow could significantly improve mobility for both residents and commuters passing through the area.

Current vs. Projected Modal Share

The third visualization compares current mobility patterns, dominated by private vehicles (83%), with future projections for 2030. These projections, based on strategic plans like Vision FAST 2030 and adjusted using Statistical Sector data, show modest improvements: car use is expected to decrease to 73%, while public transport usage rises to 15%, and walking and cycling see increases to 12% and 10%, respectively. While these projections indicate progress, they also highlight the enormity of the challenge. Cars remain the dominant mode, reflecting the deeply ingrained car culture in Liège. For Sainte-Walburge, achieving these projections will require both physical and cultural transformations. The steep terrain makes walking and cycling less appealing, while fragmented bus networks discourage public transport use. Infrastructure improvements, such as protected cycling lanes and reliable public transport, are essential, but equally important are initiatives to change public perceptions and habits around mobility. This visualization reminds us of the systemic barriers that must be addressed to reduce car dependency. For planners, the question is not just about providing alternatives but making them more attractive, accessible, and feasible than private vehicles.

Data and Methodology

The creation of these visualizations involved integrating data from the Statistical Sector dataset with findings from Stadel and the BELdam report. Modal share by demographics combines local and regional datasets to capture age-specific transport preferences. The hourly trip distribution data reflects traffic volumes across key destinations, while current versus projected modal share integrates BELdam data with Vision FAST 2030 targets, adjusted using car ownership statistics from the Statistical Sector database. By cross-verifying these sources, the graphs ensure reliability and relevance to the specific challenges of Sainte-Walburge. This methodology reflects our commitment to balancing data accuracy with actionable insights. These graphics are not abstract representations but tools for understanding and addressing real-world mobility challenges.

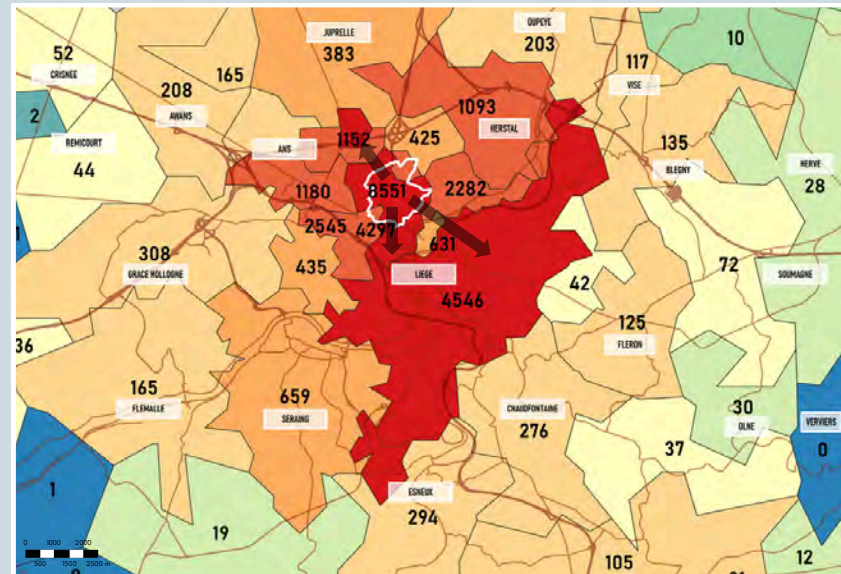
Reflection

As we examined these visualizations, we were struck by the interplay between systemic car dependency, socio-economic disparities, and the unique geography of Sainte-Walburge. The data underscores the need for targeted, equitable solutions that address the neighborhood's specific challenges. For middle-aged car users, alternatives like high-frequency buses or demand-responsive transport could reduce reliance on private vehicles. For older residents, safer and more accessible pedestrian infrastructure could foster greater mobility independence. Meanwhile, the temporal data points to the need for more dynamic and responsive public transport systems that align with commuting patterns. These findings are not just academic for us; they reflect the lived realities of Sainte-Walburge's residents. Mobility is not just about moving people but enabling them to access opportunities, services, and communities. For Sainte-Walburge, this means creating a system where mobility is equitable, sustainable, and inclusive. Addressing these challenges is no small task, but with a clear understanding of the data and the willingness to act, we believe meaningful progress is achievable.

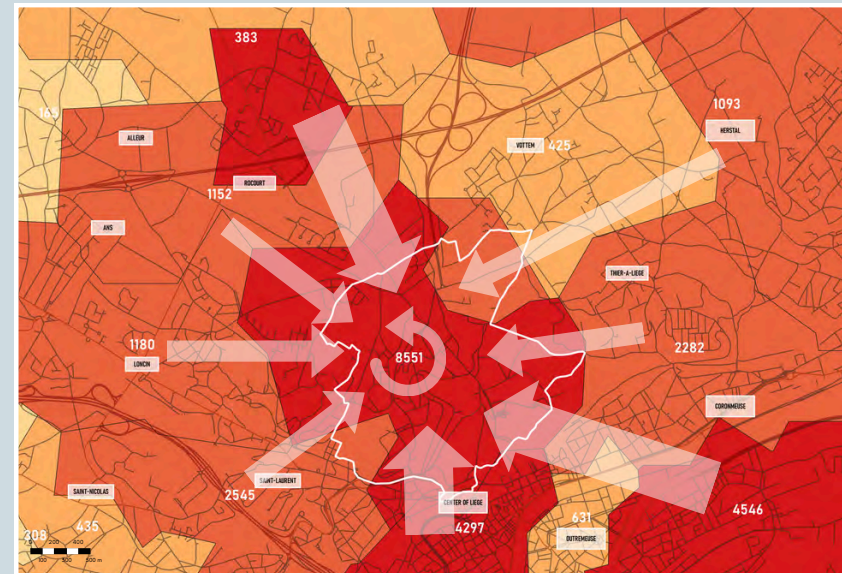
Task N°2 : Demand and Attractors

By R. Cullens, M. Dahlems & Z. Saint-Remy

MAIN ATTRACTORS



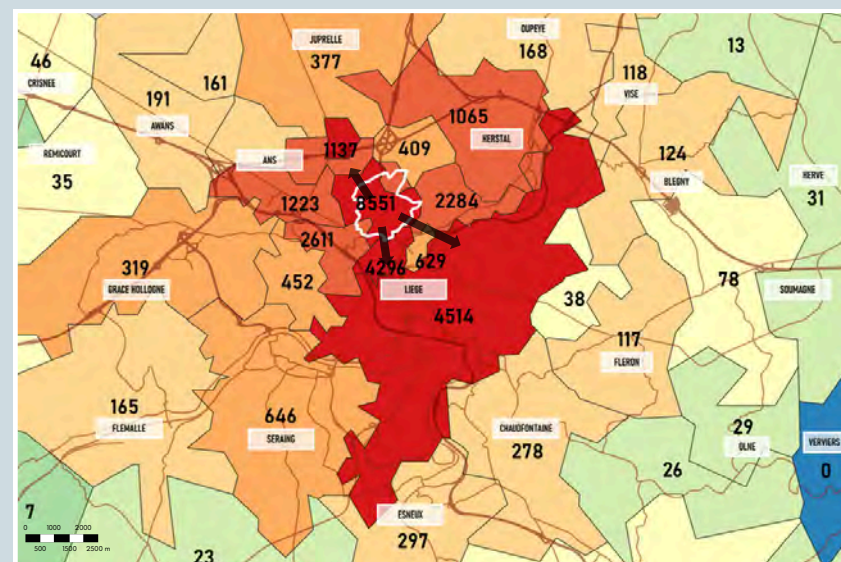
Global Map - Flow IN Saint-Walburge - Weekdays



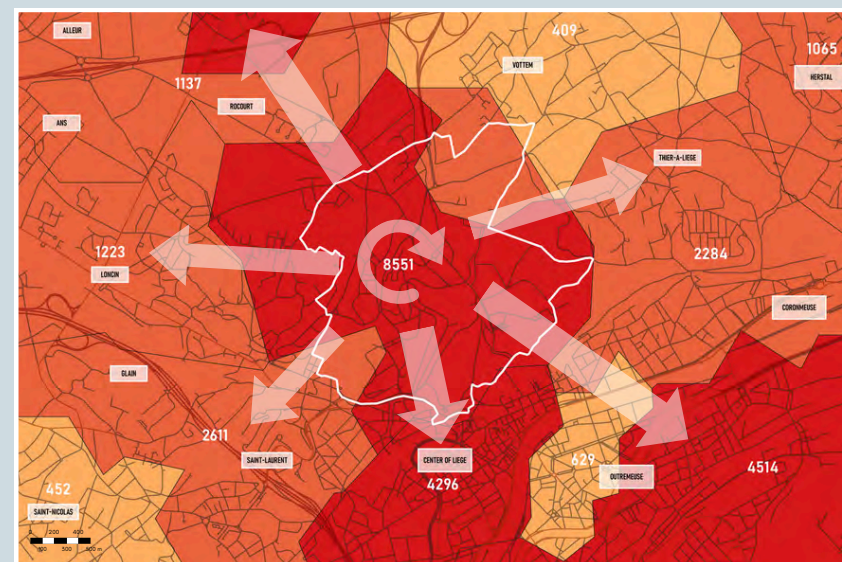
Focus Map - Flow IN Saint-Walburge - Weekdays



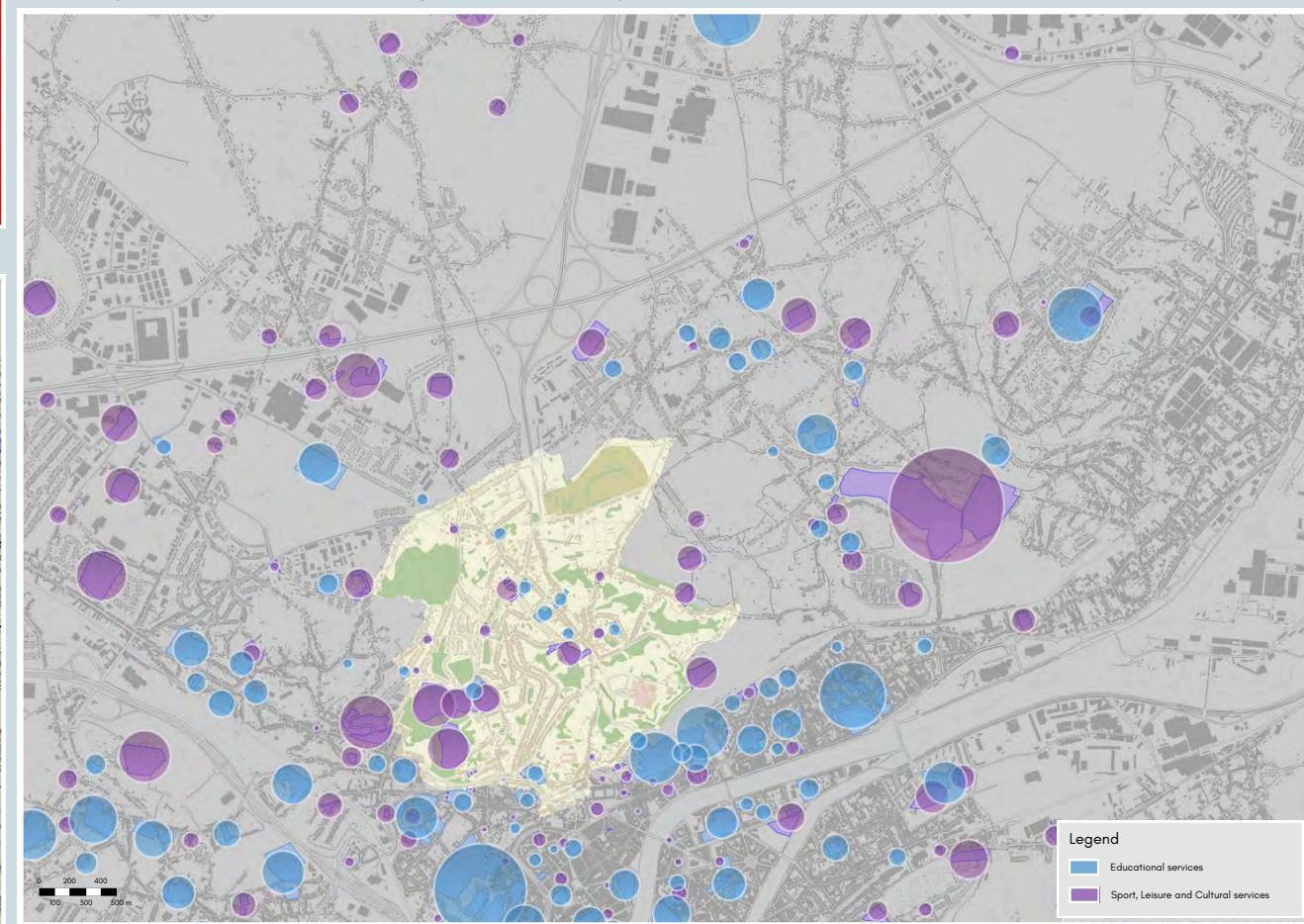
Global Map - Main Attractors Zone - Industry/Health & Care/Shops Services



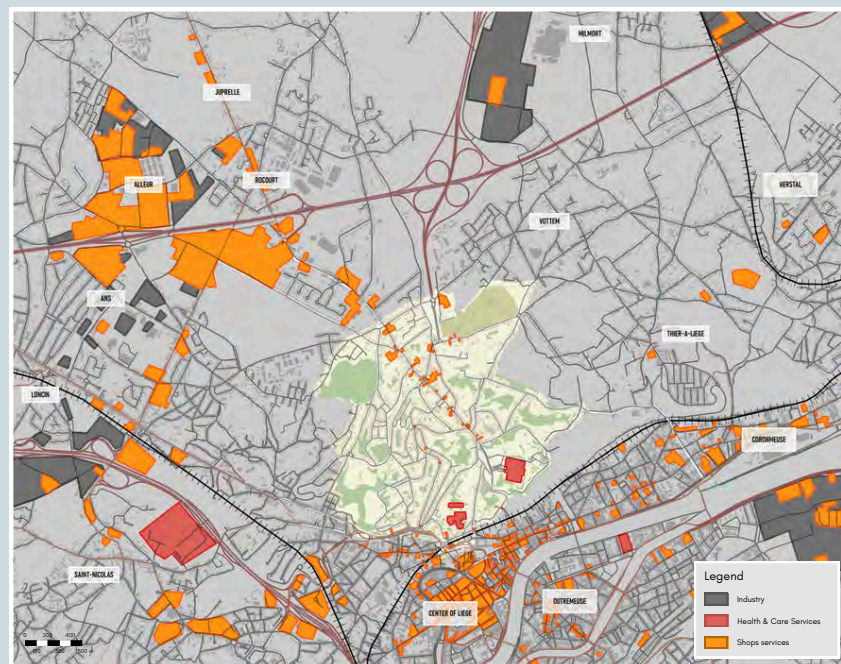
Global Map - Flow OUT Saint-Walburge - Weekdays



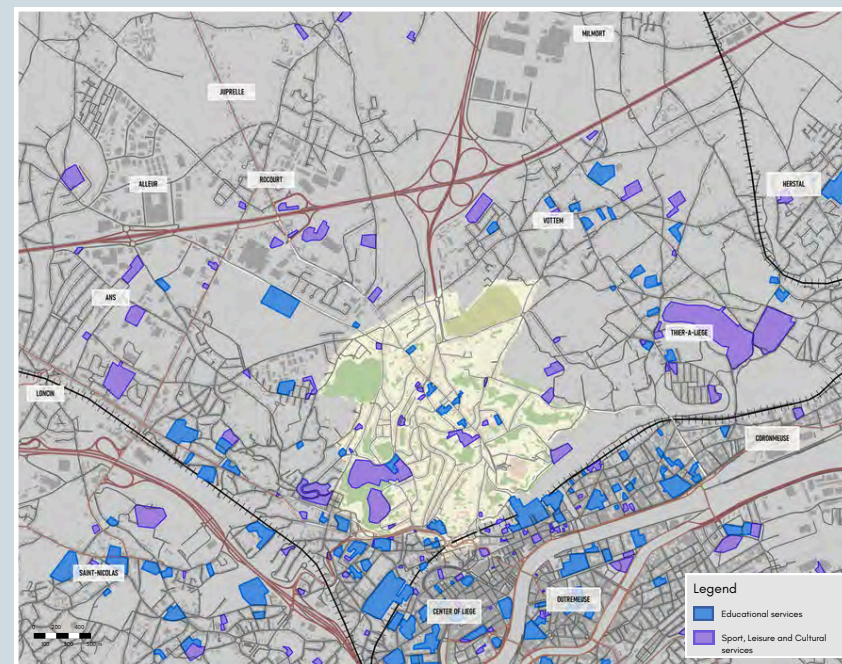
Focus Map - Flow OUT Saint-Walburge - Weekdays



Global Map - Main Attractors Zone - Educational/Sport/Leisure/Cultural Services



Global Map - Main Attractors Building - Industry/Health & Care/Shops Services



Global Map - Main Attractors Building - Educational/Sport/Leisure/Cultural Services

Task 2: Main Attractors

Sainte-Walburge occupies a pivotal position within Liège’s urban framework, acting as both a residential neighbourhood and a critical transit corridor. Its steep terrain, historical layout, and strategic location make it a unique challenge for mobility planning. While Sainte-Walburge hosts localized attractors such as schools, health facilities, and cultural hubs, a significant proportion of traffic through the area is driven by regional destinations, supported by major roadways like the E25 and E313. These dynamics shape both the daily lives of residents and the overall flow of people and goods in the region, presenting opportunities and challenges for sustainable transport solutions.

Local Attractors in Sainte-Walburge

Within Sainte-Walburge, several attractors contribute to local traffic patterns and mobility demand. Schools scattered throughout the neighbourhood generate predictable peaks during morning and afternoon hours. These educational institutions cater primarily to residents, with students and staff typically traveling short distances. However, the reliance on narrow streets such as Rue de Campine creates localized congestion, particularly during school hours. The Citadelle Hospital, located on Montagne Sainte-Walburge, is the most significant localized attractor. Serving as a regional healthcare hub, the hospital draws patients, staff, and visitors from across Liège and beyond. Its elevated position exacerbates accessibility challenges, particularly for those relying on walking or public transport. As one of the largest employers in the area, the hospital also contributes to commuter flows during peak hours, further burdening the already-congested Rue de Campine. Cultural and community spaces, though smaller in scale, add to Sainte-Walburge’s vibrancy. Local art events and community gatherings attract residents and visitors, contributing to short, localized trips. While these attractors play an essential role in defining the character of the neighbourhood, their impact on overall mobility is modest compared to larger destinations.

Regional Attractors and Transit Flows

Sainte-Walburge’s significance extends far beyond its immediate boundaries, as a substantial portion of traffic passing through the neighbourhood originates from regional attractors. Chief among these is the city centre of Liège, a hub for employment, retail, and leisure activities. Commuters traveling to central Liège often use Sainte-Walburge’s main roads, such as Rue de Campine, as transit routes, contributing to congestion during peak times. The University of Liège, including its Sart Tilman campus to the south, is another major regional attractor. Serving thousands of students, faculty, and staff, the university generates considerable daily traffic. While the campus itself is not located in Sainte-Walburge, many of its commuters likely pass through the neighbourhood, relying on its roadways as critical connectors. This dynamic highlights Sainte-Walburge’s role not only as a residential area but also as a gateway for regional mobility. To the northeast of Sainte-Walburge lies the Parc Industriel des Hauts Sarts, a major employment hub that draws workers from across the Liège region. Although this industrial zone is outside Sainte-Walburge’s borders, its influence on the neighbourhood’s traffic patterns is significant. Workers commuting to Hauts Sarts often pass through Sainte-Walburge, adding to the volume of vehicles on already congested roads like Montagne Sainte-Walburge.

The Role of the E25 and E313 Roads

The E25 and E313 motorways further emphasize Sainte-Walburge’s importance as a transit corridor. These major roadways form part of the European road network, connecting Liège to other cities and regions within Belgium and beyond. Their proximity to Sainte-Walburge means that a significant amount of regional and long-distance traffic flows through the neighbourhood, particularly via feeder roads like Rue de Campine. The E25, running north-south, connects Liège to Maastricht and Luxembourg, facilitating both commuter and freight traffic. Similarly, the E313 provides an east-west axis linking Liège with Antwerp and Germany. Together, these motorways support the movement of goods and people across regional and international scales. However, their influence also adds to the pressure on Sainte-Walburge’s local infrastructure, as drivers often use its streets to access these larger road networks. This through-traffic exacerbates congestion and underscores the need for strategic planning to balance local and regional mobility demands.

Implications for Mobility Planning

Sainte-Walburge’s attractors and its role as a transit corridor present both opportunities and challenges for mobility planning. Localized attractors like schools and the Citadelle Hospital generate predictable patterns of demand, which could be addressed through targeted interventions such as improved pedestrian pathways and localized traffic calming measures. However, the significant through-traffic driven by regional attractors like the city centre, Sart Tilman, and Hauts Sarts demands more comprehensive solutions. To reduce congestion and improve accessibility, investment in public transport infrastructure is critical. High-frequency bus services and dedicated lanes could provide viable alternatives to private vehicles, particularly for commuters traveling to regional destinations. The proposed cable car system linking the Citadelle Hospital with the city’s tram network offers an innovative solution to overcome the challenges posed by Sainte-Walburge’s steep terrain. By connecting major attractors with sustainable transport options, this project could alleviate pressure on local roads while improving access for residents and visitors alike. Enhancing cycling infrastructure is another key strategy for reducing car dependency. Protected bike lanes along flatter routes and improved connections to regional cycling networks could encourage more sustainable travel. For shorter trips within Sainte-Walburge, shared mobility options such as e-scooters or bike-sharing programs could provide flexible alternatives to car use, particularly for younger populations.

Reflections on Sainte-Walburge’s Mobility Landscape

As we analyzed the attractors and transit flows in Sainte-Walburge, it became clear that the neighbourhood’s challenges are deeply tied to its dual identity. The local attractors, such as the Citadelle Hospital and schools, highlight the importance of addressing accessibility for residents. At the same time, the significant regional traffic passing through Sainte-Walburge underscores the need for integrated solutions that consider its role within Liège’s broader transport network. The influence of major roadways like the E25 and E313 adds another layer of complexity, as their connectivity brings both benefits and burdens to Sainte-Walburge. While these roads facilitate regional mobility and economic activity, they also channel a high volume of traffic through the neighbourhood, impacting its liveability and environmental quality. For us, this analysis underscores the importance of balancing local and regional needs in mobility planning. Sainte-Walburge’s steep terrain, historical layout, and strategic location require innovative solutions that go beyond traditional transport approaches. By prioritizing sustainable and multimodal systems, Sainte-Walburge can transition from a congested corridor to a model for equitable and efficient urban mobility.

Reflection

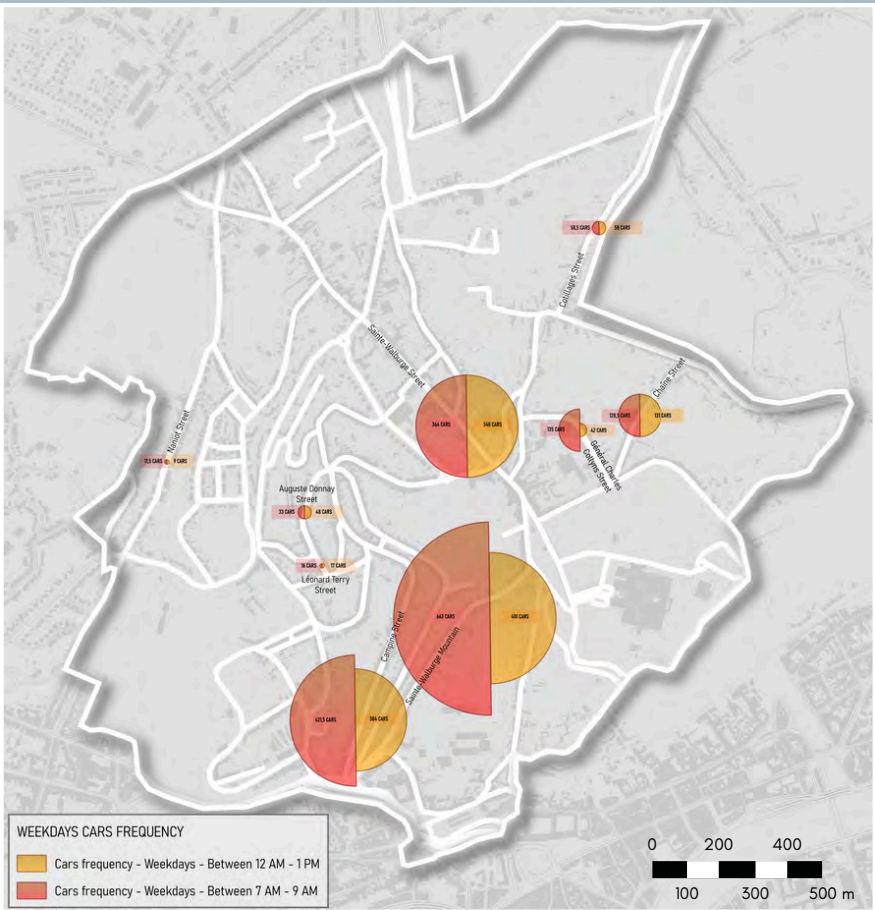
Sainte-Walburge’s attractors and transit dynamics make it a critical node in Liège’s urban fabric. The combination of local and regional influences highlights the need for a comprehensive mobility strategy that addresses both localized challenges and broader connectivity requirements. By aligning interventions with regional frameworks and investing in sustainable transport options, Sainte-Walburge can become a neighbourhood where mobility is not only functional but also transformative for its residents and visitors alike.

Task N°3 : Telraam Data Analysis

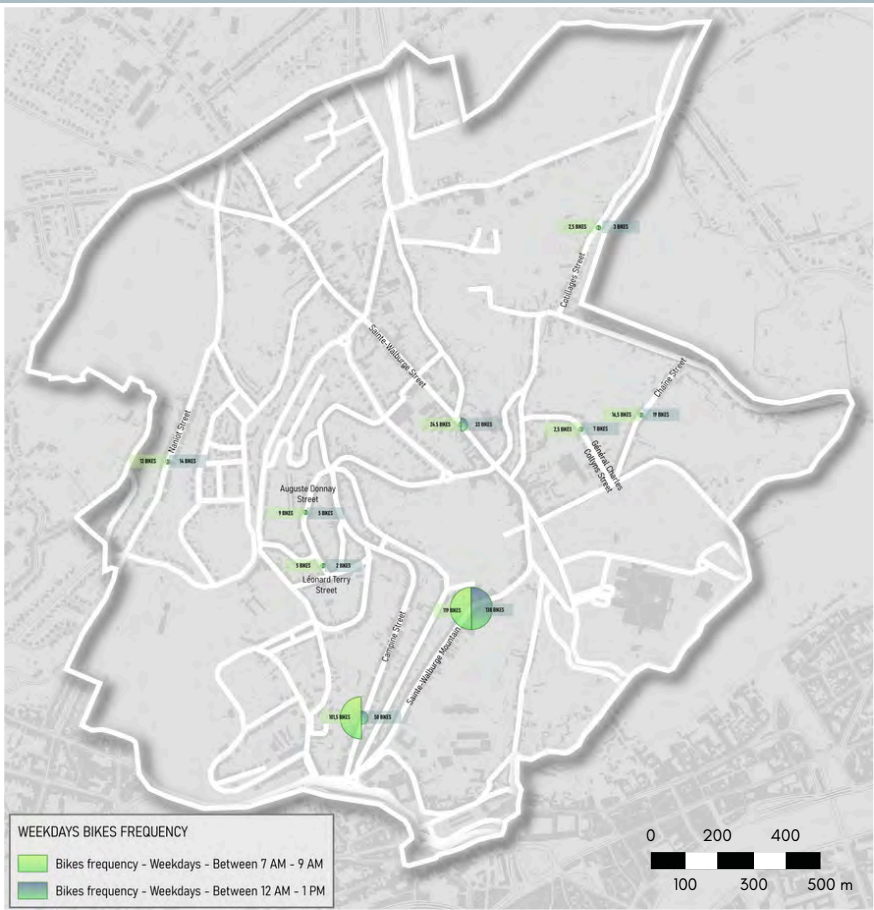
By R. Cullens, M. Dahlems & Z. Saint-Remy

WEEKDAYS

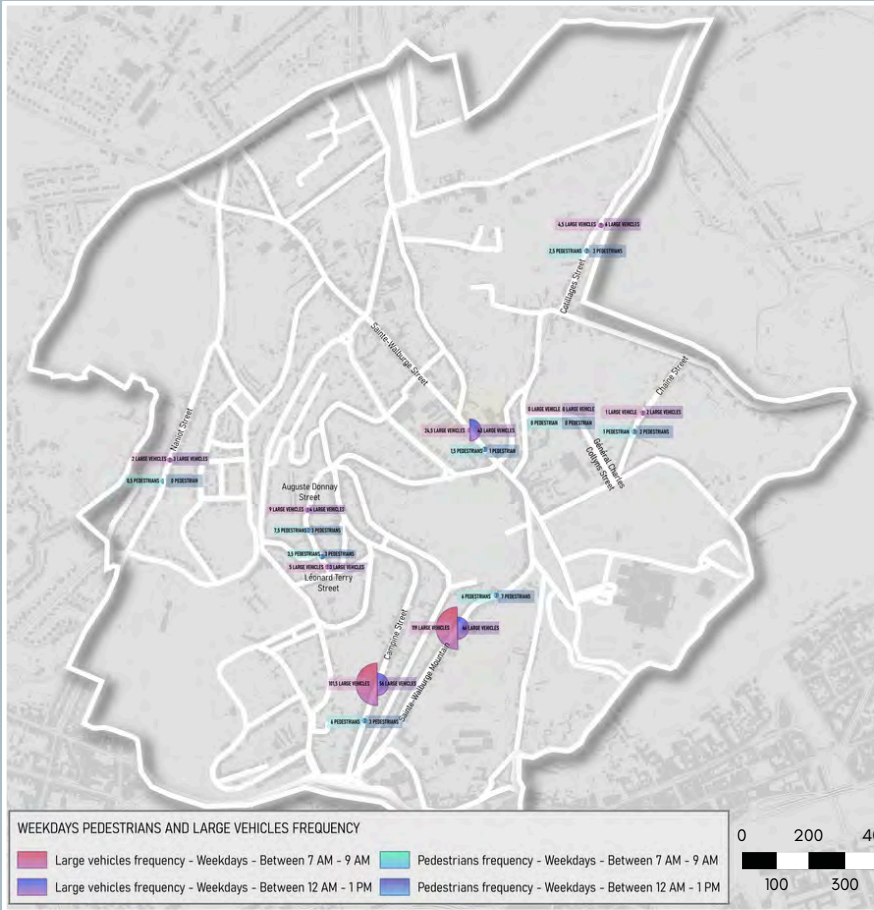
CARS



BIKES

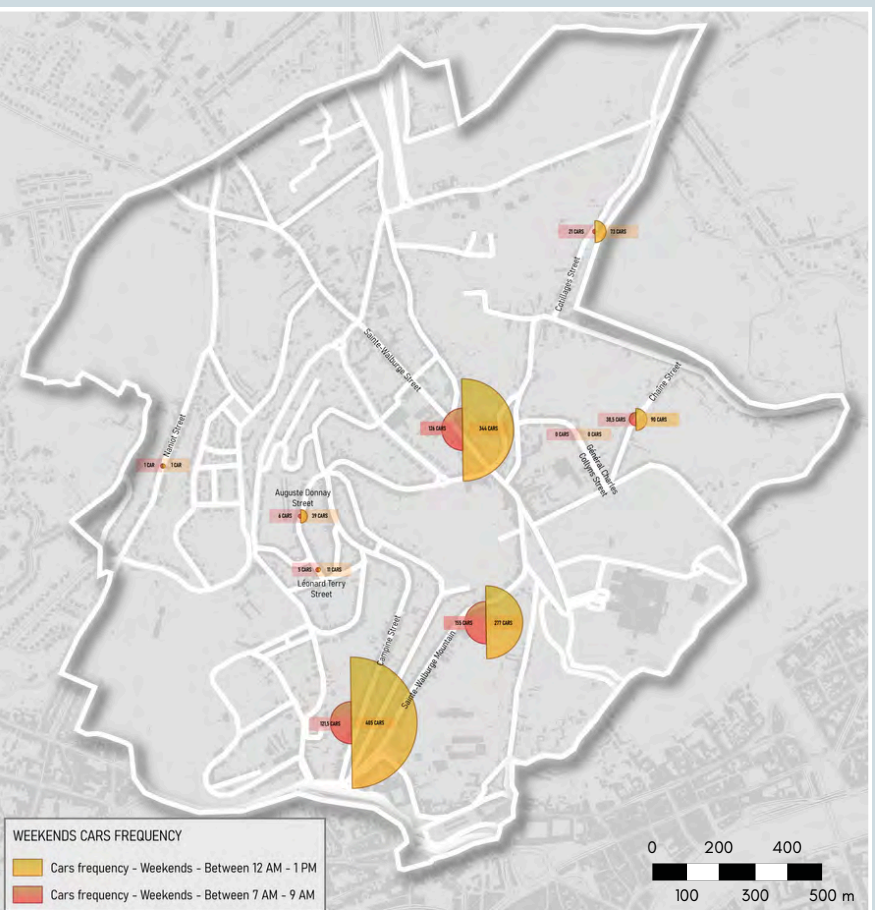


PEDESTRIANS & LARGE VEHICLES

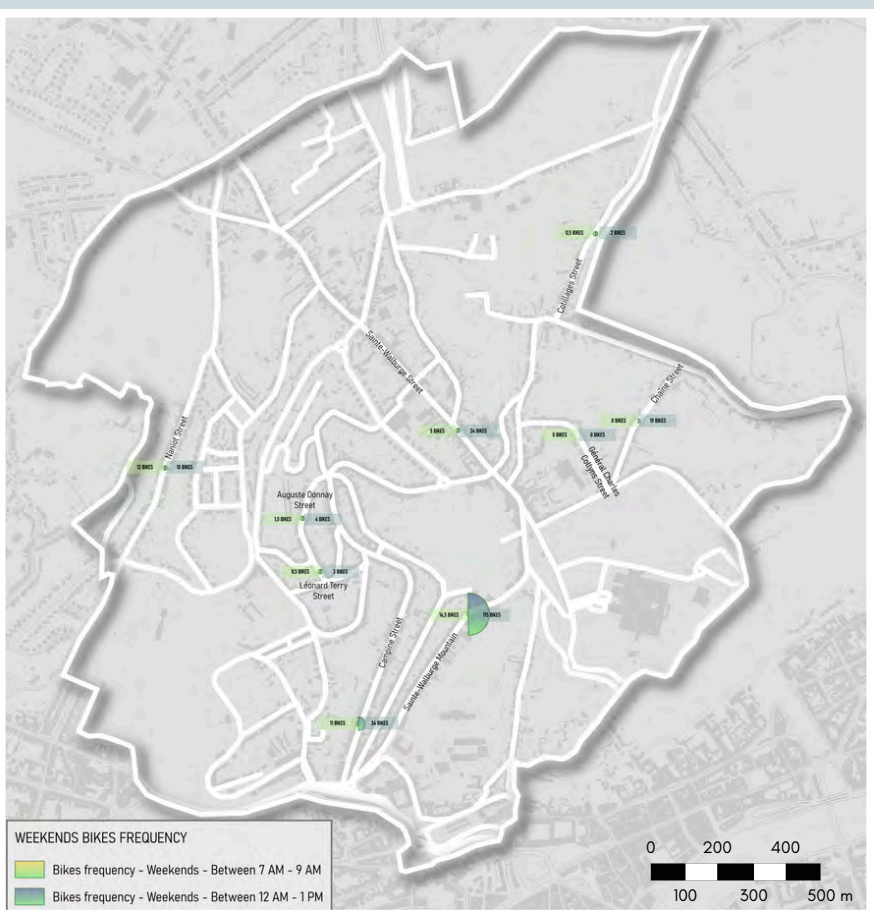


WEEKENDS

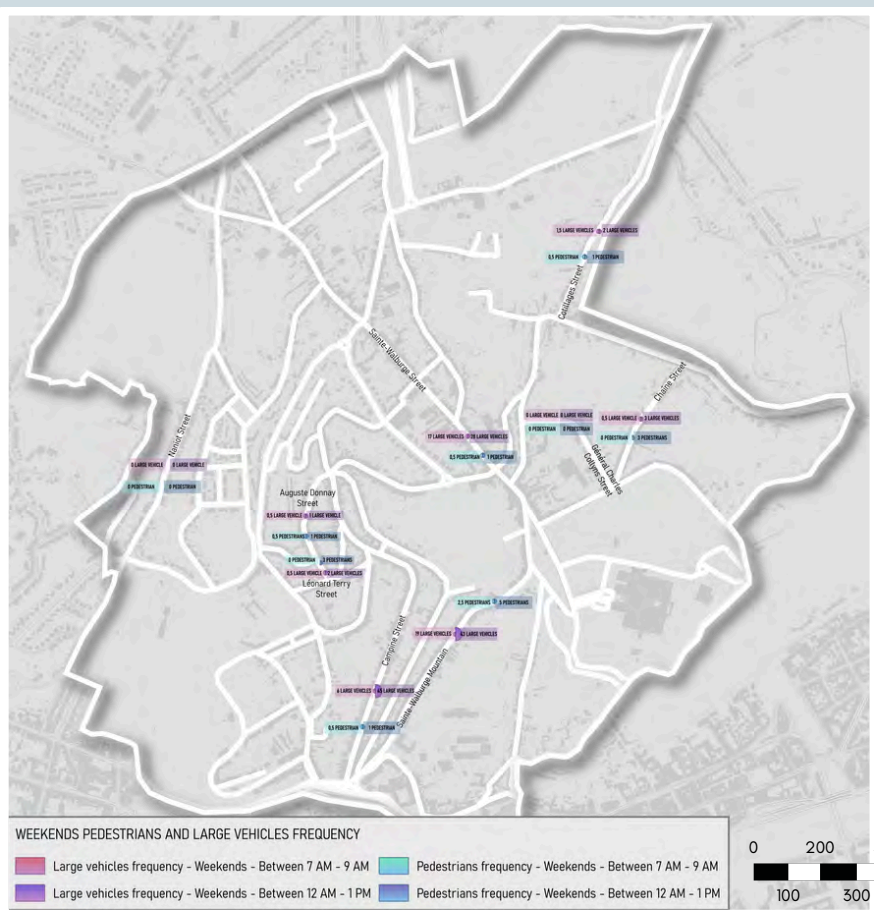
CARS



BIKES



PEDESTRIANS & LARGE VEHICLES



Task 3: Telraam

The Telraam dataset provided a vital foundation for analyzing the mobility dynamics of Sainte-Walburge over a three-month period. This low-cost, community-based traffic monitoring tool offers the advantage of providing aggregated averages hourly, daily, and monthly that help smooth out anomalies caused by temporal factors such as weather or specific events. However, our analysis revealed several challenges that stemmed from both technical limitations of the system and the unique geographical and infrastructural characteristics of Sainte-Walburge. These challenges shaped our reliance on manual observations in Task 4, allowing us to supplement and refine the insights gained from Telraam. Sainte-Walburge, with its steep terrain and reliance on key corridors like Rue de Campine and Montagne Sainte-Walburge, functions both as a residential area and a transit corridor. The traffic patterns observed through Telraam underscored the car-centric nature of its mobility system, while highlighting the underrepresentation of active mobility modes and large vehicles. This data has not only informed our understanding of mobility patterns but also sparked deeper questions about the inclusivity and accuracy of emerging monitoring technologies.

Telraam Data and Observed Patterns

The Telraam dataset revealed a consistent dominance of car traffic in Sainte-Walburge, particularly along main arteries such as Rue de Campine. This trend aligns with the neighborhood's role as a connector between the Liège city center and external destinations, such as the E25 and E313 highways and the University of Liège in Sart-Tilman. The data revealed predictable peak-hour congestion during weekdays, reflecting commuter flows, while weekends showed moderate activity attributed to leisure and retail trips. These trends are consistent with findings in urban mobility literature, which highlight the car's dominance in environments with limited alternatives (Banister, 2008). One notable strength of Telraam is its use of aggregated averages, which provided us with a clearer view of long-term mobility trends. However, while this normalization of data smoothed out short-term anomalies, it also obscured localized peaks and troughs in traffic, such as the intense congestion observed during weekday mornings on Rue de Campine. This limitation reinforced the need for complementary methodologies, including manual counts, to fully capture the dynamics of traffic in high-pressure zones.

Technical and Contextual Limitations

Despite its accessibility and affordability, the Telraam system exhibited significant limitations. One of the primary issues was the undercounting of pedestrians and cyclists, particularly in areas with steep terrain like Montagne Sainte-Walburge. The sensors, positioned slightly above pedestrian height, failed to detect individuals navigating inclines, significantly skewing the recorded modal share in favor of motorized transport. This challenge is particularly acute in areas like Sainte-Walburge, where steep slopes already discourage walking and cycling. Telraam also struggled with the classification of larger vehicles, such as buses and delivery trucks. These inaccuracies arose from the sensor's limited ability to distinguish between vehicle types, especially when multiple vehicles passed simultaneously. On roads like Rue de Campine, where mixed-use traffic is common, this limitation meant that heavy vehicles were often misrepresented or entirely omitted. Additionally, critiques of Telraam in academic literature have highlighted its operational gaps. Kraus et al. (2022) note that while Telraam devices are cost-effective and accessible, they often fall short in accuracy when compared to traditional systems such as inductive loop counters (ILCs). Similarly, Telraam's own documentation acknowledges that its earlier sensors (V1) faced challenges with nighttime monitoring, capturing traffic only 70–75% of the time during daylight hours and relying on corrections for the remaining periods. While newer iterations, such as the Telraam S2, have addressed some of these issues, the system's precision at night and in complex traffic scenarios remains suboptimal.

The Role of Sainte-Walburge's Geography

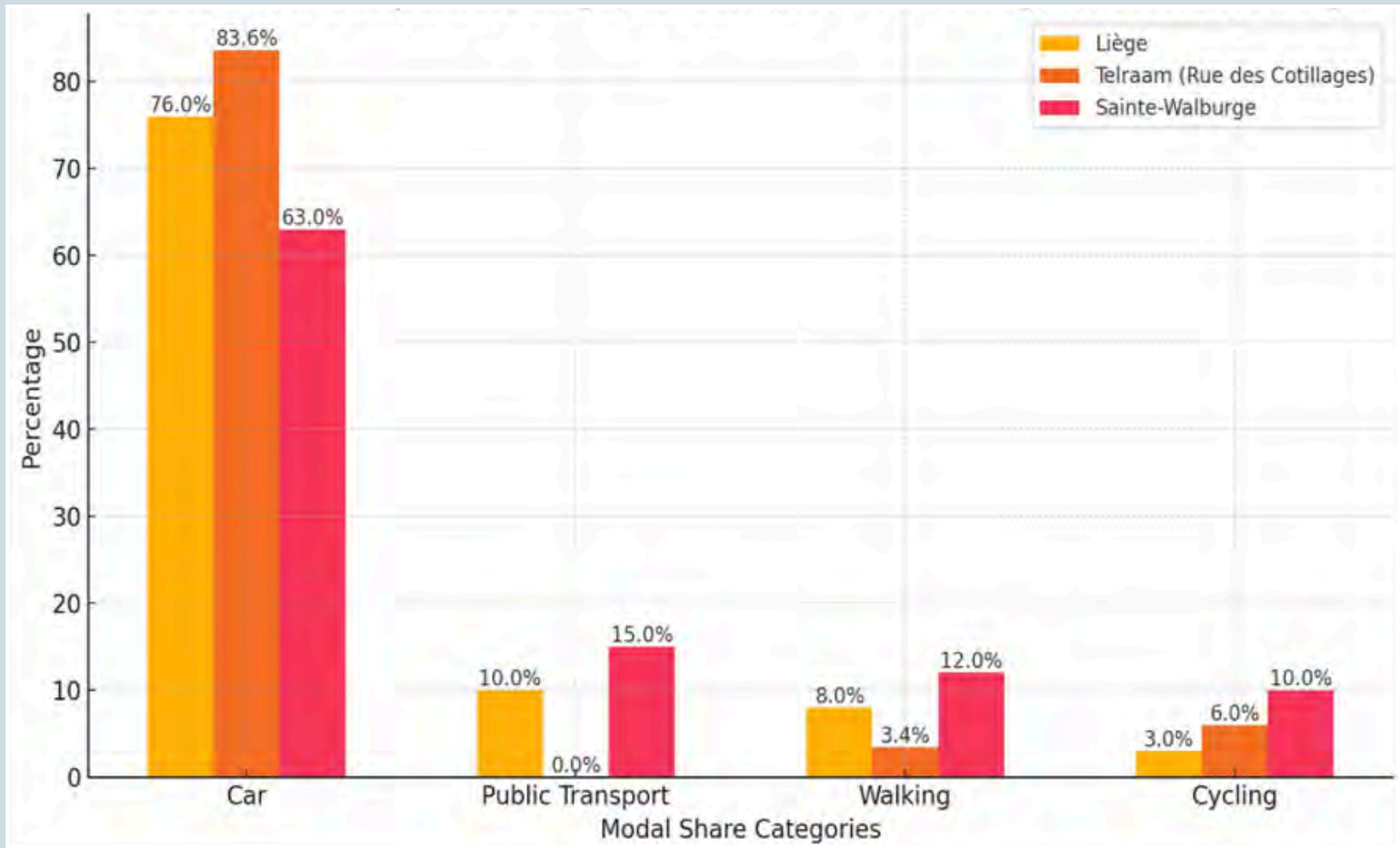
The steep terrain of Sainte-Walburge presented an additional layer of complexity. Slopes not only shape mobility choices, encouraging car dependency while discouraging walking and cycling, but also exacerbate the limitations of Telraam's sensors. Pedestrians and cyclists passing below the detection range on inclines often went unrecorded, resulting in an underrepresentation of active mobility. This issue is consistent with findings in other studies of mobility in hilly urban environments, which report similar biases in automated systems (Zhang et al., 2017). These geographical challenges highlight the importance of adaptive solutions. For Sainte-Walburge, this means positioning sensors at varying heights to capture a broader range of users or supplementing automated systems with on-the-ground observations. As we progressed to Task 4, this awareness informed our decision to focus manual counts on areas and modes that Telraam underrepresented, particularly along steep routes like Montagne Sainte-Walburge.

Reflection

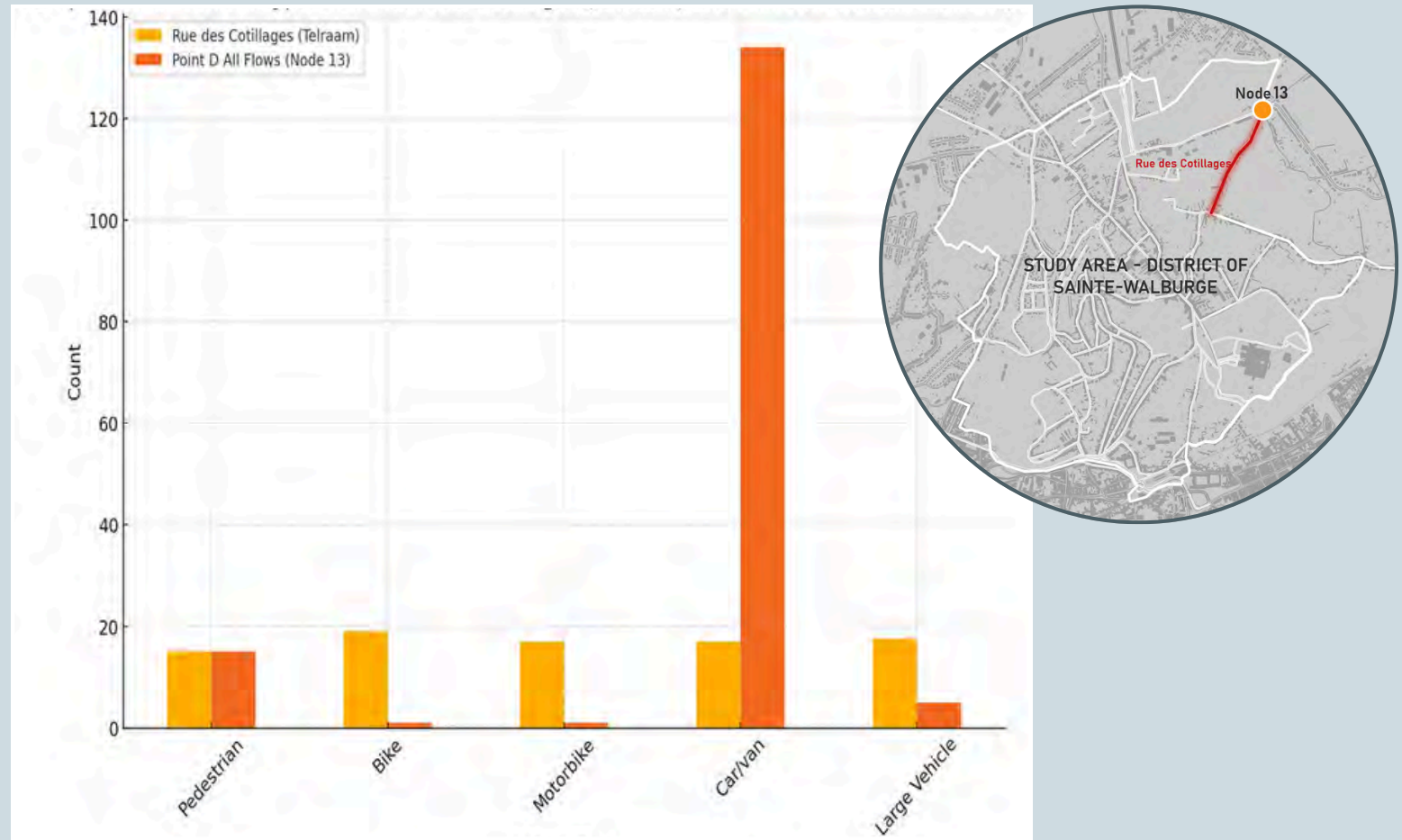
Working with Telraam's data has been both enlightening and challenging. As planners, we appreciated the system's ability to reveal long-term trends and identify high-pressure zones. However, its limitations in detecting certain modes and its reliance on averages reminded us of the need for a holistic approach to data collection. For us, Telraam was not just a tool but a starting point a foundation upon which we could build a more comprehensive understanding of mobility in Sainte-Walburge. The integration of manual counts in Task 4 allowed us to fill the gaps in Telraam's data and address its biases. This iterative process of combining technology with human observation has reinforced the importance of flexibility and adaptability in mobility planning. By embracing these lessons, we can better address the unique challenges of neighborhoods like Sainte-Walburge, ensuring that transport systems are equitable, sustainable, and reflective of the realities on the ground.

Task 3 : Telraam Data Analysis

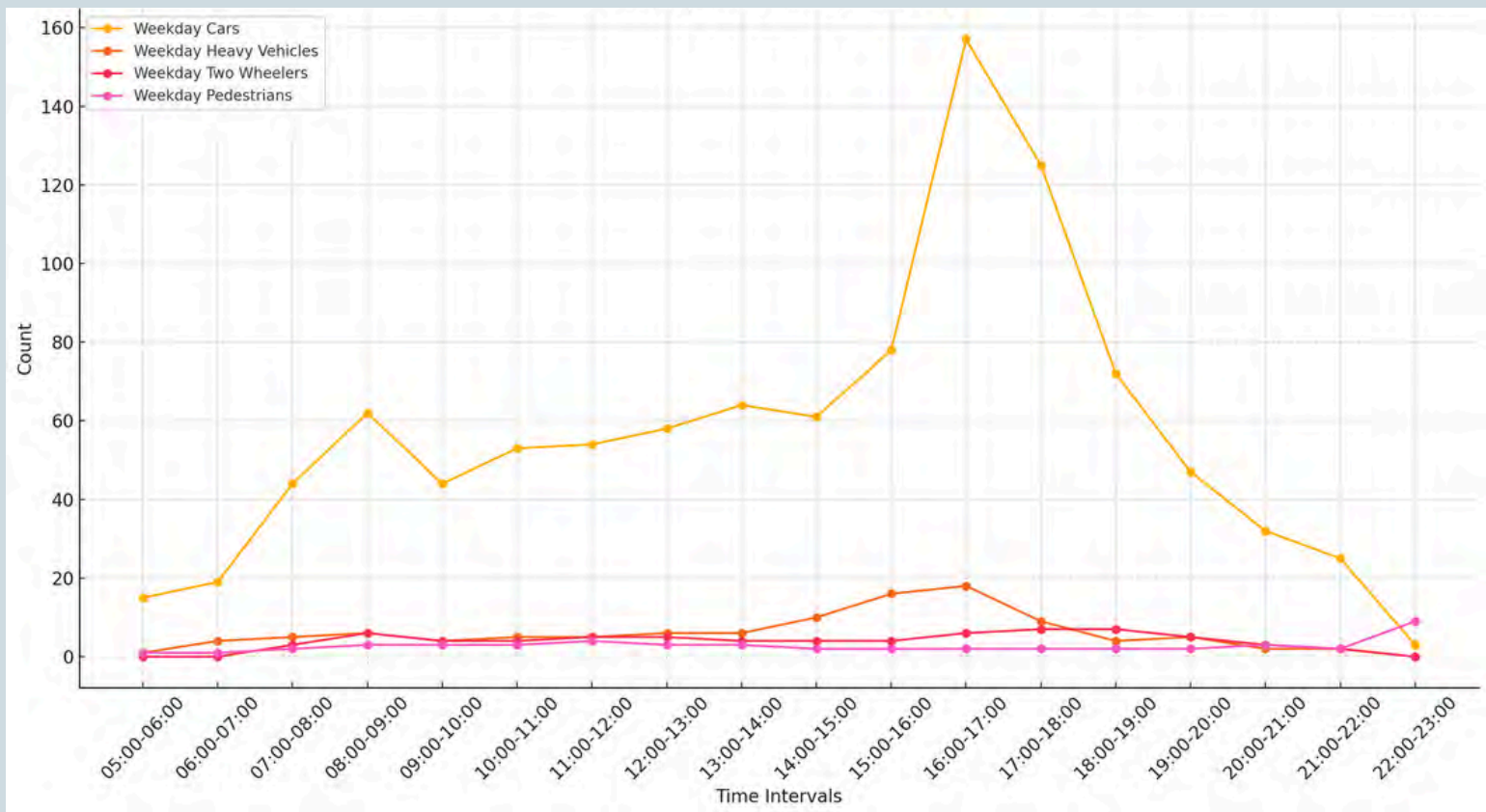
By R. Cullens, M. Dahlems & Z. Saint-Remy



Modal Share Comparison : Liège/Telraam "Rue des Cotillages"/Sainte-Walburge



Comparison of Vehicules Types From "Rue des Cotillages" (Telraam) and All Flows to Node 13



Weekday Traffic Data by Category



Weekend Traffic Data by Category

Task 3: Telraam

To develop a nuanced understanding of traffic patterns in Sainte-Walburge, we analysed Telraam data for Rue des Cotillages, a key street within our study area and the closest sensor to our Node. This street serves as a connector to the roundabout at Node 13 from Rue Fond de Tawes and is seemingly mainly used by residents and experiences significant daily traffic flows. The Telraam platform provided preliminary data on modal shares and traffic volumes, which we later complemented with manual counts to gain a fuller perspective. The graphics we generated from the Telraam dataset played a central role in visualizing traffic trends, highlighting patterns that could inform future mobility interventions.

Observations and Insights from the Graphics

The graphics derived from the Telraam dataset provide significant insights into Rue des Cotillages' mobility dynamics. While the weekday traffic data by category, displayed in line graphs, emphasizes the dominance of car traffic, this is primarily due to the street's steep incline, which poses challenges for walking and cycling. Notable peaks during the morning and evening rush hours align with commuter patterns, although the midday dip, often associated with work and school routines, reinforces the residential nature of the road rather than its role as a major artery that Telraam would have you believe. The modal share comparison chart highlights a striking imbalance between motorized and active mobility modes. Car usage accounts for over 80% of trips, while cycling and walking collectively constitute less than 10%. This imbalance is partly explained by the steep slope of Rue des Cotillages, which deters active mobility. A potential intervention to encourage walking could include installing a guard rail on one side of the street to provide additional safety and support for pedestrians navigating the incline. Additionally, the lower numbers for pedestrians and cyclists may be skewed due to limitations of the Telraam sensor. The laser's inability to consistently trigger when individuals pass, especially given the angle of the slope, may result in undercounting. The map graphic situates Rue des Cotillages within the context of the study area, providing a spatial understanding of its role. While the street connects to the roundabout at Node 13, it functions primarily as a public residential road rather than a main artery. However, its connection to local neighborhoods and external destinations like the Liège city center makes it a noteworthy contributor to mobility flows in Sainte-Walburge.

The Strengths and Limitations of Telraam

The point of Telraam's supposed strength lies in its ability to generate long-term aggregated data, offering a clear picture of general trends. Theoretically, the hourly data averages smooth out anomalies, such as fluctuations caused by weather or special events, providing a reliable baseline for analysis. For instance, the weekday traffic graphic would be consistent with the peak times shown and its patterns across multiple days obviously for commuter travel to work or school, somewhat highlighting the robustness of Telraam's aggregated approach. However, our experience revealed several limitations. The system clearly struggles to accurately count pedestrians and cyclists, particularly on slopes like Rue des Cotillages and most likely other streets with a similar slope profile. The sensor height and the steep incline would definitely place pedestrians out of the detection range, leading to underreported activity for these modes. This limitation was particularly evident when comparing the Telraam data with our manual observations, which recorded higher pedestrian counts during off-peak times. While the Telraam data for Rue des Cotillages provides a useful baseline, we find the recorded numbers over a three-month period grossly overestimate how busy this street realistically should be. For instance, weekday car counts often surpass 100 trips during peak hours (e.g., 125 trips from 17:00-18:00), which seems inconsistent given the profile of the street. We looked on Google Maps before making a site visit in Task 4 to Rue des Cotillages and its surrounding residential area, the traffic felt significantly lighter than the data suggests, particularly during non-commuting hours. This discrepancy raises questions about whether Telraam's aggregated approach might misrepresent localized realities, especially for streets like this one, where short bursts of activity might skew averages. Vehicle classification posed another challenge on this street more clearly than it did for the neighbourhood scale of Telraam analysis. On Rue des Cotillages, Telraam is definitely misclassifying cars as large vehicles. Again, this is one of Telraam's major flaws and only became more apparent in its classification of vehicles on Rue des Cotillages. The data suggests the presence of heavy vehicles, with counts reaching up to 10 per hour during certain periods, such as 14:00-15:00 on weekdays. However, there is no plausible reason for large vehicles, such as delivery trucks or buses, to regularly use this steep and narrow residential street that is quite out of the way. This inconsistency strongly suggests a misclassification issue, where Telraam may have categorized larger passenger cars or SUVs as heavy vehicles. Such errors distort the overall traffic profile and emphasize the need for manual validation to refine these classifications.

Using Telraam Data to Inform Manual Counts

The insights gained from Telraam's graphics informed our approach to manual counting in Task 4. By identifying gaps in the automated data, we were able to focus our fieldwork on areas and modes that were underrepresented. For example, we prioritized pedestrian counts on slopes like Rue des Cotillages, where we knew that Telraam had failed to capture accurate figures. The weekday traffic graphic also guided our scheduling of manual counts. Knowing the peak congestion times allowed us to target specific periods, ensuring that our observations captured the most critical traffic flows. This alignment between automated and manual methods enhanced the reliability and depth of our analysis, revealing discrepancies that enriched our understanding of Rue des Cotillages' mobility dynamics and the wider patterns of Sainte Walburge.

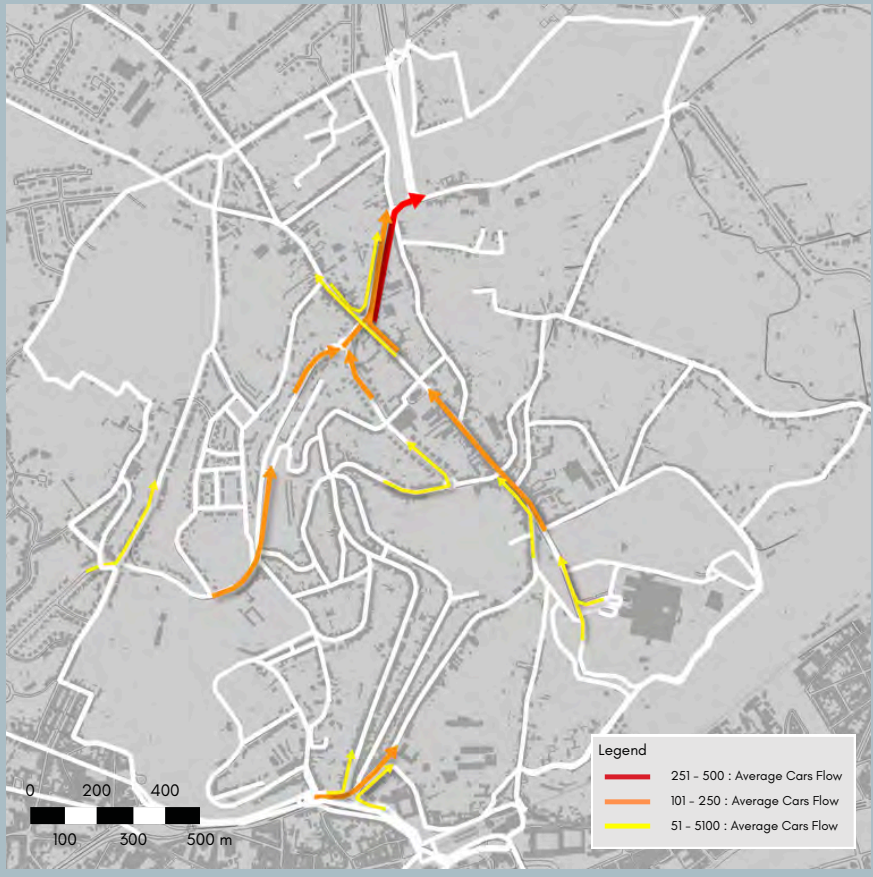
Reflection

There is no denying that working with Telraam data can be a valuable exercise in balancing the strengths and limitations of automated systems. The graphics we were able to create provided a strong foundation for us to understand the traffic trends, but they also highlighted the importance of manual validation. As planners, we recognized the need for a hybrid approach to data collection, combining technology with on-the-ground observations to capture the full spectrum of mobility patterns. The insights gained from this task extended beyond Rue des Cotillages. They underscored the wider challenges of creating sustainable transport systems in car-dependent neighbourhoods like Sainte-Walburge. While the data might be skewed in terms of modal share numbers, the graphics we created did serve as a visual reminder of the dominance of motorized modes and the marginalization of active mobility as would be expected for a steep incline, inspiring us to think critically about interventions that could address these imbalances. By integrating these insights into our planning process, we gained a deeper understanding of the street's role within the neighbourhood's mobility network. This task reaffirmed the importance of adaptability and innovation in urban planning, reminding us that effective solutions require both technological tools and human expertise.

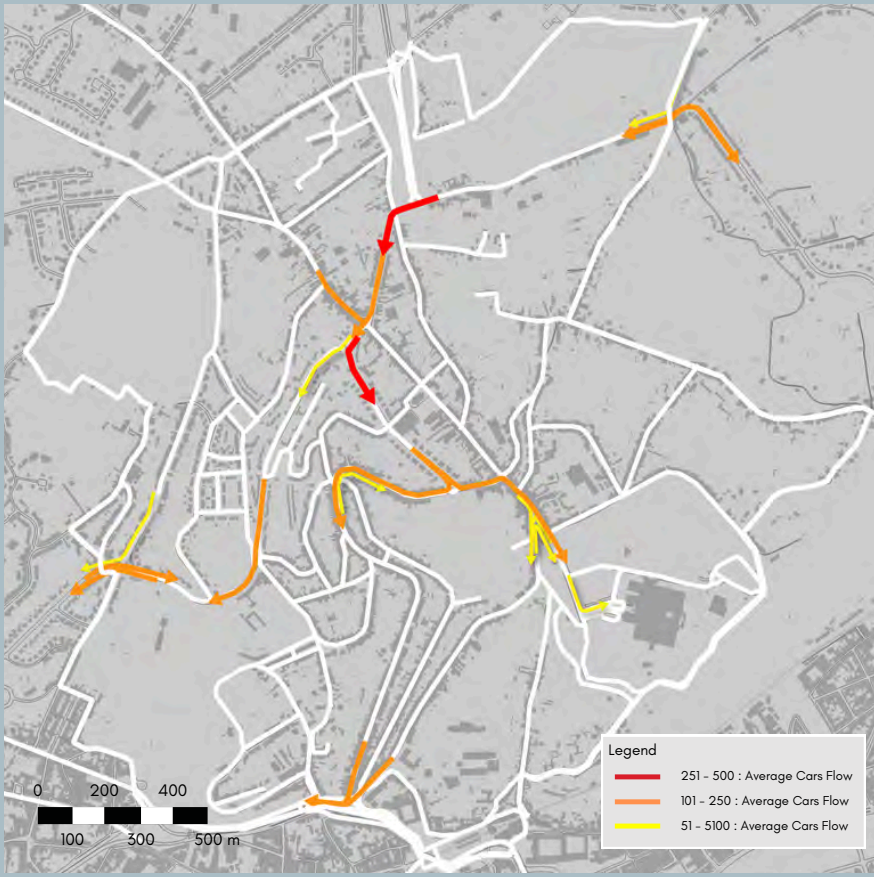
Task N°6 : Mobility Flows

By R. Cullens, M. Dahlems & Z. Saint-Remy

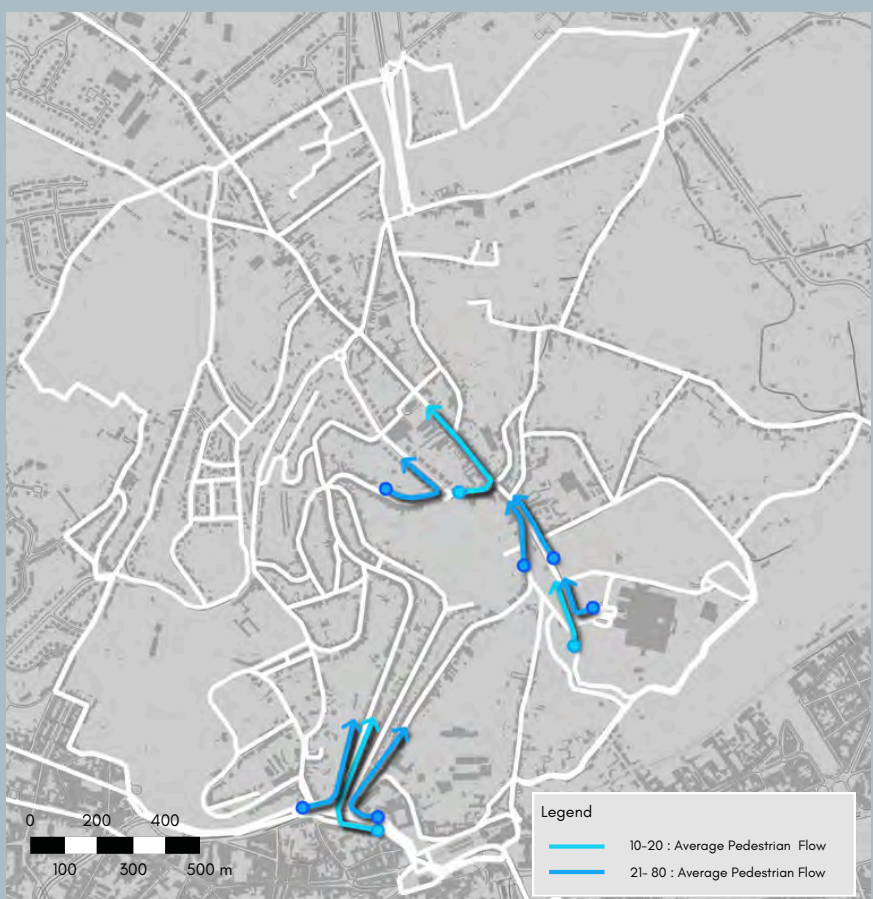
On District



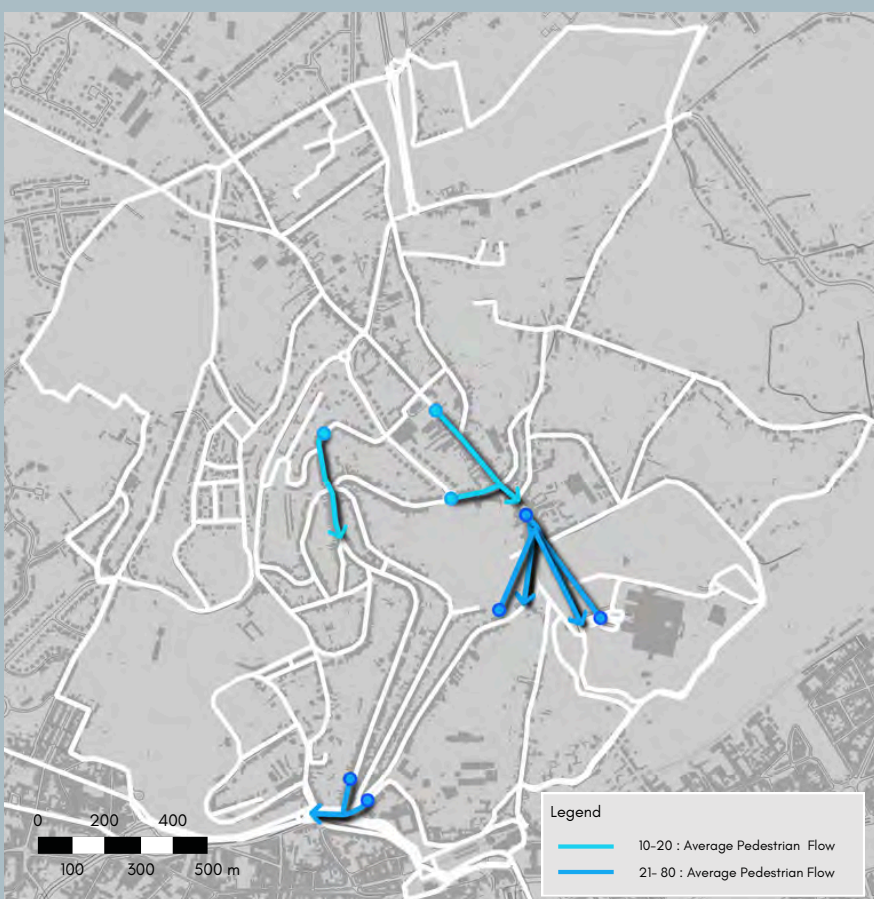
Average Quantities Car Flow - Direction : South to North



Average Quantities Car Flow - Direction : North to South

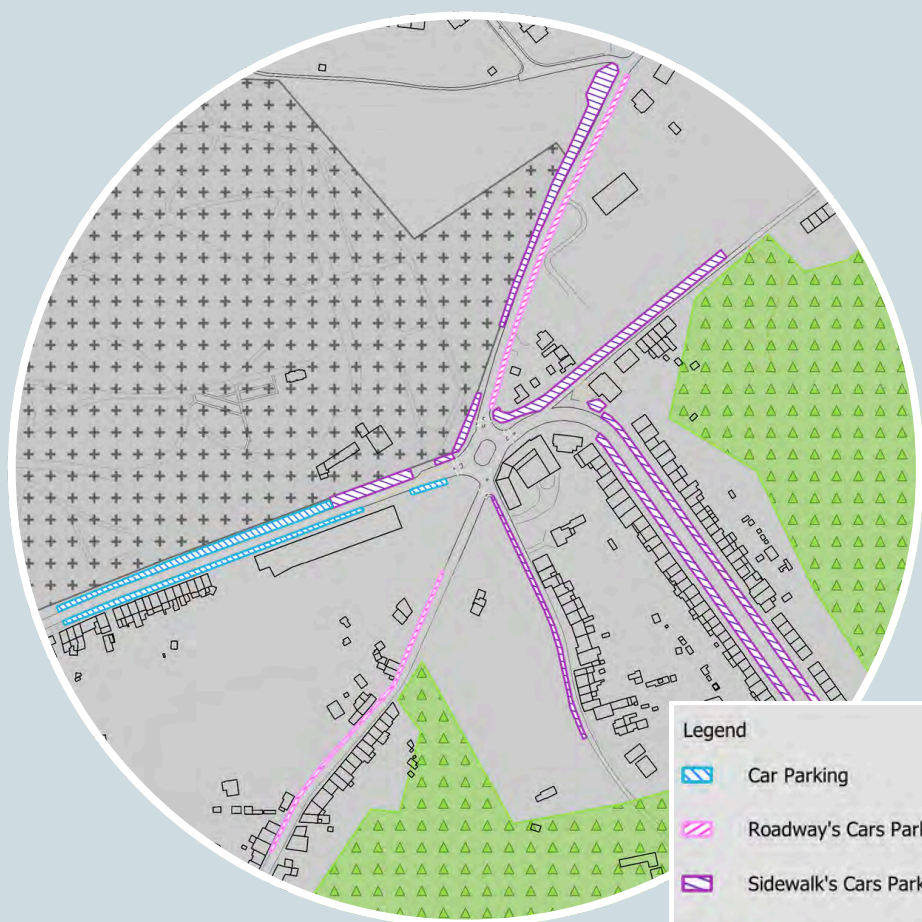
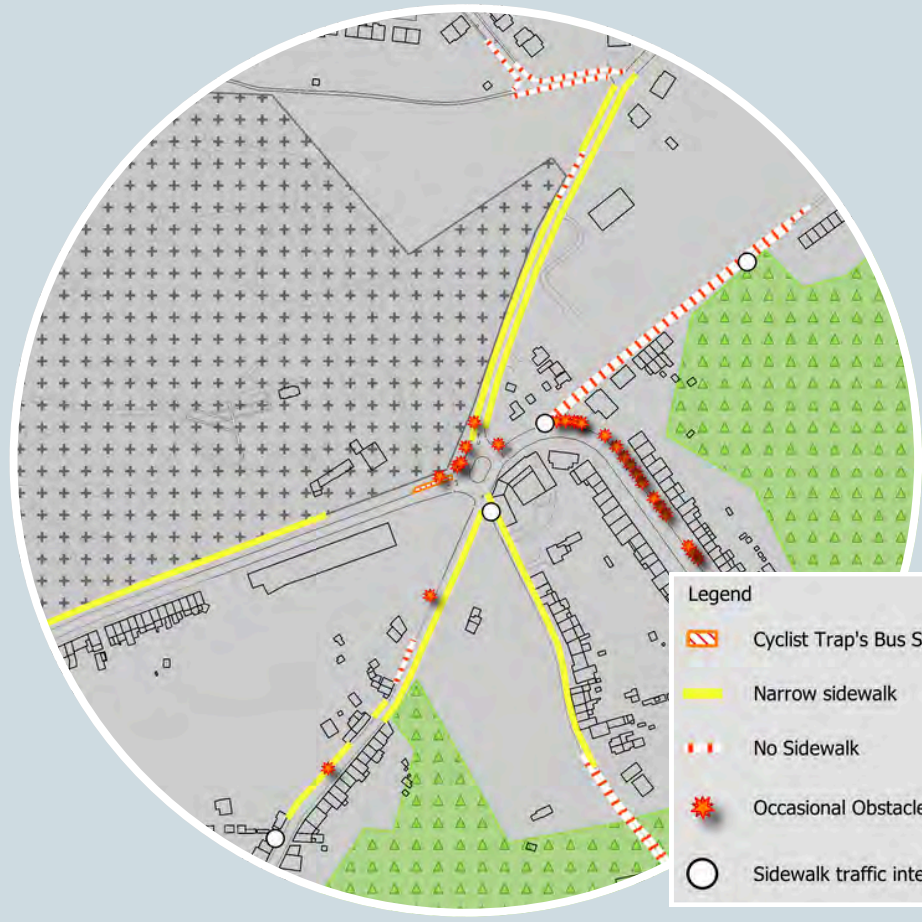


Average Quantities Pedestrian Flow- Direction : South to North



Average Quantities Pedestrian Flow- Direction : North to South

On Node 13



Task 6: Mobility Flows

For Task 6, we analysed the data we gathered from site visits for task 4 & 5 and created graphics to depict traffic flows, infrastructure conditions and parking dynamics within the neighbourhood scale surrounding Node 13. To achieve this, we conducted a multi-phased analysis comprising of manual traffic counts PLOS & BLOS analysis and examining cycle conditions. By combining these methods, we aimed to assess not only the volume and composition of traffic but also the challenges pedestrians and cyclists face, alongside parking inefficiencies that would contribute to congestion. This task also represents a critical step in identifying the strengths and limitations of both automated (Telraam) and manual traffic counting and the potential for overhauling traffic monitoring systems that could better inform future infrastructure planning in the neighbourhood and beyond.

Phase 1: Manual Traffic Counts

Manual traffic counts were conducted over three days in the week before schools broke up for midterm and each session lasted 30 minutes. We selected specific time slots, Tuesday morning (8:15–8:45), Wednesday afternoon (16:15–16:45), and Saturday afternoon (15:15–15:45) to capture variations in weekday commuting patterns and weekend activity. Traffic was recorded at Node 13, covering flows in four directions (A to D) and differentiating between pedestrians, cyclists, motorbikes, cars/vans, trucks, and buses. We divided the flow directions between us to ensure we didn't miss any traffic when flows got heavy. The higher-traffic routes were split between two of us, while the low-traffic routes were monitored by one individual. Rue Haut-des-Tawes, for instance, was one of the quieter routes included from our count. This manual process allowed us to collect nuanced observations that automated systems like Telraam completely overlook. For example, the complex flows at Node 13, combined with steep slopes and varying vehicle speeds, required active attention to accurately classify vehicle types. Manual counts also ensured that pedestrians and cyclists, often undercounted by automated systems like Telraam, were fully captured.

Phase 2: Telraam Data and Comparative Analysis

It felt necessary to show the comparison of a manual count compared to the Telraam system installed on Rue des Cotillages which provides automated traffic data averaged over time for pedestrians, bikes, cars and larger vehicles. These automated counts obviously offer a longer-term dataset than what a manual count could commit to in terms of capturing hourly, daily and weekly averages to smooth out short-term fluctuations. However, Telraam's reliability in Sainte-Walburge proved inconsistent, particularly on Rue des Cotillages, where the road's steep slope introduced significant limitations. Due to the elevation, pedestrians walking at lower levels of the slope would clearly go undetected, as Telraam sensors would not see them. Similarly, the system's classification mechanism would definitely misidentify larger cars as trucks especially for the large number of SUVs that drove past which have a similar height profile to larger vehicles, thus distorting the recorded "Large Vehicle" counts. These limitations reflect a key challenge in relying solely on laser automated systems for data collection in areas with complex topography and varying vehicle dimensions. To provide a clearer comparison, we aggregated manual count data for Point D at Node 13, including all flows (A-D, B-D, C-D, and return directions). A side-by-side analysis of Telraam and manual data revealed discrepancies, particularly for pedestrians and large vehicles. The manual counts generally reported higher pedestrian and cyclist volumes, as they accounted for all movements across Node 13, including flows that would have been missed by the Telraam sensors. Similarly, the detailed classifications enabled by manual observation ensured a more accurate differentiation between cars and trucks. These findings underscore the strengths and weaknesses of each method. While Telraam excels in providing continuous and averaged counts, it lacks the precision to capture contextual factors such as slope-related detection errors and nuanced vehicle classification. Manual counts, on the other hand, offer greater accuracy but are resource-intensive and limited to specific timeframes.

Phase 3: Infrastructure and Parking Assessment

To complement our traffic analysis, we evaluated the quality of pedestrian and cycling infrastructure using Level of Service (LOS) analysis as outlined by Dowling (2008). This methodology allowed us to assign comparative values for pedestrian (PLOS) and bicycle (BLOS) infrastructure based on measured path widths, road widths and traffic conditions.

Using tools such as measuring tapes and LiDAR sensors on our phones, we recorded dimensions for sidewalks, bike lanes and parking zones across key streets, such as Rue des Cotillages, Bd Fosse-Crahay, Bd Hector Denis and Rue de Plope. Photos and Google Street View data provided additional context for identifying barriers such as narrow pavements, obstructive parking and uneven surfaces.

Key observations included:

- Pedestrian Infrastructure: Pavements in high-traffic areas, like Rue de Cotillages, were often too narrow to accommodate safe pedestrian flow. While widening pavements is not feasible due to spatial constraints, upgrades like non-slip surfaces and improved lighting are essential to enhance pedestrian safety.
- Cycling Infrastructure: Dedicated cycling lanes were largely absent or poorly designed across major roads. For example, the existing cycle lane on Bd Hector Denis is only on one side of the road and lacks any physical separation from vehicular traffic especially given the amount of available space the street has which is a luxury for the neighbourhood.

Additionally, the parking assessment highlighted significant inefficiencies. Over a three-hour period, we recorded the number of official and unofficial parking spaces along Boulevard Fosse-Crahay and Rue des Cotillages. By observing vehicle turnover at hourly intervals, we identified trends such as unauthorized parking and underutilized spaces. Stabilised video recordings taking while sat in one of our cars at 30 km/h enabled us to map the parking situation comprehensively while minimising time distortions that would occur due to walking pace especially when checking on the hour.

Reflection

Our comparative analysis between manual counts and Telraam data revealed significant discrepancies, particularly for pedestrians and cyclists. Telraam's automated approach, while useful for providing averaged data, definitely struggles to account for contextual challenges like slopes, limited visibility and vehicle misclassification. In contrast, the manual counts captured a more complete and accurate picture of traffic flows and composition. This insight proved valuable for Task 7, where our proposals for infrastructure improvements relied heavily on the precision of these observations. The LOS analysis confirmed that pedestrian and cycling infrastructure in Sainte-Walburge is underdeveloped, creating barriers to active mobility. Narrow, uneven pavements and a lack of protected cycling paths discourage sustainable travel modes, particularly on busy roads like Bd Hector Denis and according to another group's analysis Bd des Hauteres. The parking assessment underscored the need for better management strategies. Issues such as unauthorized parking and low vehicle turnover exacerbate congestion and reduce the efficiency of available spaces. Dynamic pricing systems, as we later developed in task 7, could alleviate these problems by encouraging more efficient use of parking resources. For us, this task highlighted the importance of integrating multiple data collection methods. While Telraam originally gave us an insight in task 3 for mobility patterns and traffic flows, its ability to give consistent and scalable observations is questionable. While Telraam can accumulate vast amounts of data over time, manual counts are essential for capturing nuanced observations, particularly in areas with challenging topography. However, by combining these approaches with PLOS & BLOS assessments, we gained a holistic understanding of Sainte-Walburge's mobility challenges, one that balances quantitative data with on-the-ground realities.

Task N°7 : Objectives and Principles

By R. Cullens, M. Dahlems & Z. Saint-Remy

Objectives & Principles

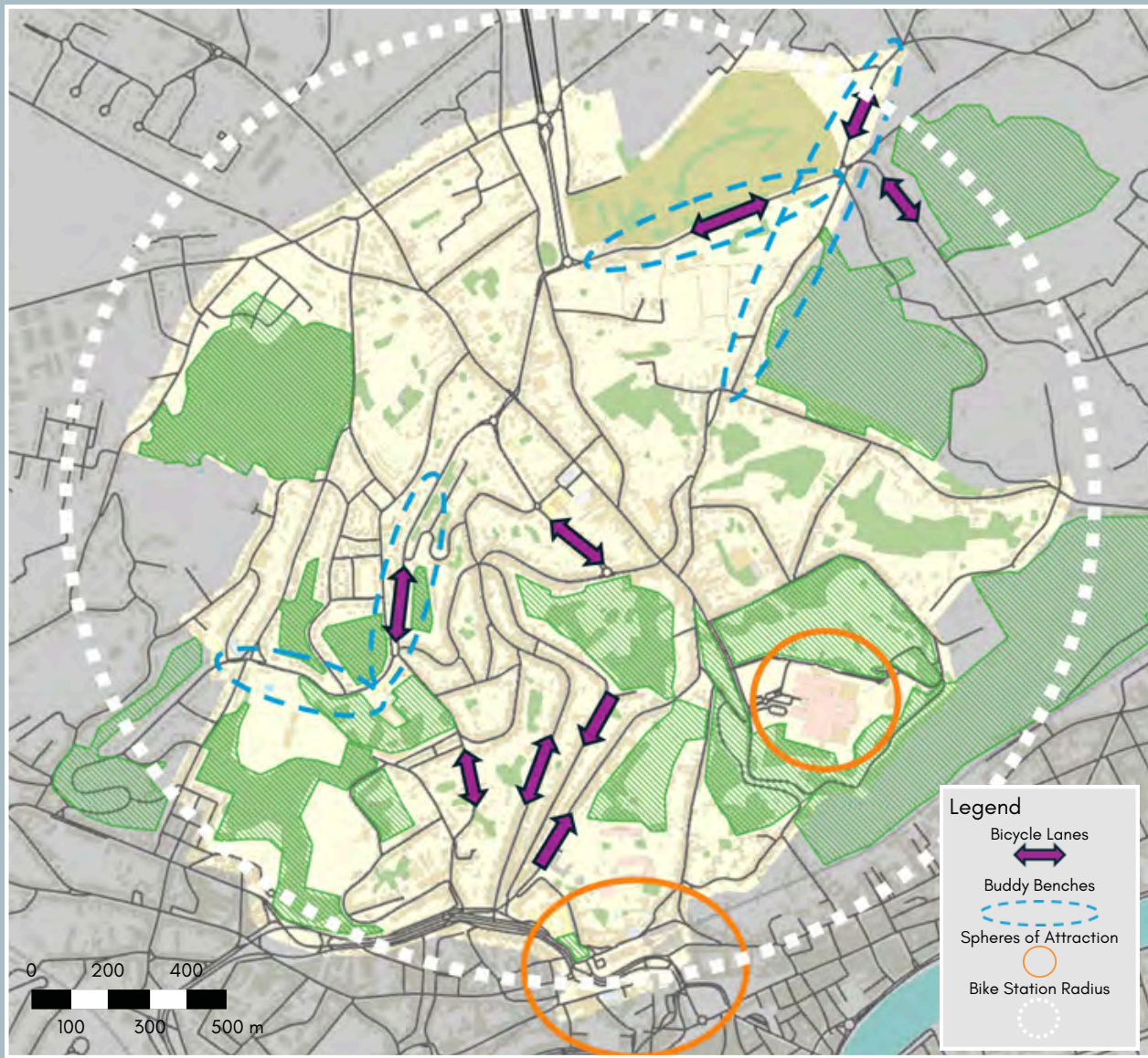
Pedestrian & Cycling Infrastructure

Dynamic Parking Management

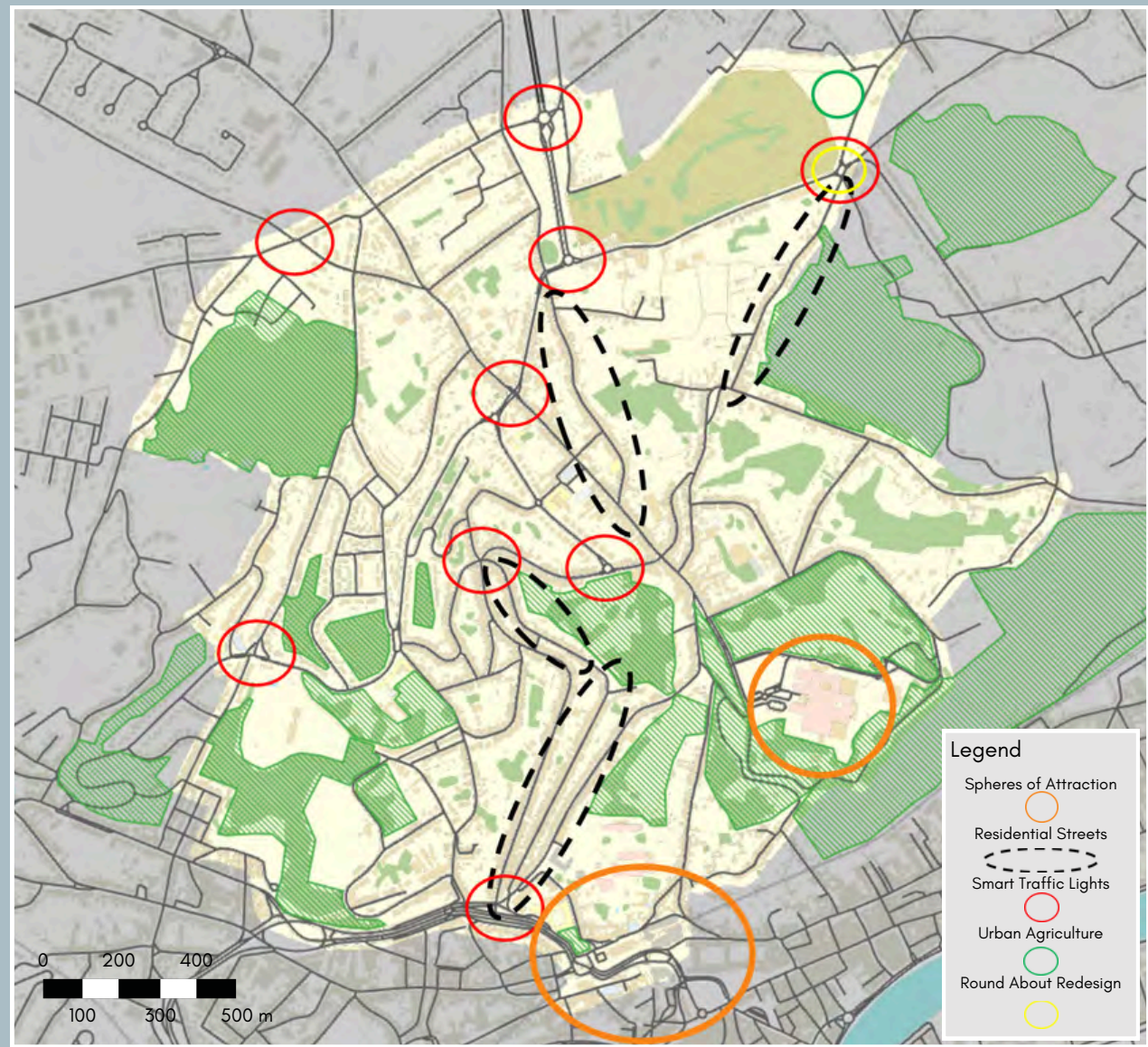
Public Spaces Activation

Urban Agriculture

Safety & Traffic Management



Objectives and Principles Map about Bikers and Pedestrian



Objectives and Principles Map about Cars



Illustrations of Objectives and Intentions

Task 7: Objectives and Principles

Task 7 was about developing objectives and principles informed by the culmination of all the data gathered from previous tasks. This task allowed us to explore solutions that respond to the challenges faced by Sainte-Walburge at a neighbourhood scale before we focused at node level. Drawing on insights from previous analyses, we aimed to create a balanced approach that prioritises safety, accessibility and sustainable mobility for pedestrians, cyclists and drivers. Streets like Rue de Campine, Montagne Sainte-Walburge, and Bd des Hauteres represent major traffic arteries, while our Node 13 highlights specific dangers associated with poorly designed intersections. Given the spatial constraints of Sainte-Walburge's streets, our proposals often focus on enhancing existing infrastructure rather than large-scale redesigns. For instance, where pavements cannot be widened, improvements like non-slip surfaces and better lighting are prioritised to enhance safety. Similarly, innovative measures such as dynamic parking management and pop-up pedestrian/residential only zones aim to maximise the neighbourhood's potential without significant spatial interventions.

Safety and Traffic Management

Addressing safety concerns in Sainte-Walburge required a focus on high-risk areas like Node 13. The current roundabout, which connects Rue de Cotillages, Bd Fosse-Crahay, and other streets, poses significant risks due to its steep approach and poor visibility. The one-way uphill design of Rue de Cotillages further exacerbates the issue, with vehicles upsending into the roundabout from a slope where visibility is poor and unsafe speeds from other streets merge. To mitigate these risks, we proposed replacing the roundabout with a controlled intersection. By introducing pedestrian crossings and traffic calming measures like rumble strips and smart traffic lights, the intersection would become safer for all users. This design also ensures that pedestrians and cyclists have clear, prioritised routes, reducing conflict with vehicles. On streets like Rue de Campine that are 12-14m, congestion and heavy traffic volumes create additional hazards. While widening pavements is not feasible to the spatial constraints of these streets, we recommended upgrading existing walkways with non-slip surfaces, tactile paving for accessibility and improved lighting. These enhancements would make the streets safer and more navigable, particularly for older adults and children. However, for Montagne Sainte-Walburge, the pavements are 0.5m and it is possible to increase the width to 1.0m which is not a huge improvement but given the limited space, it does make it more comfortable to walk.

Pedestrian and Cycling Infrastructure

Sainte-Walburge's steep terrain and fragmented pathways make walking and cycling particularly challenging. Streets such as Bd Fosse-Crahay and Bd des Hauteres lack dedicated cycling infrastructure, while pedestrian paths are often narrow and uneven like on Montagne Sainte Walburge. These conditions discourage active mobility, perpetuating reliance on private vehicles. Recognising these limitations, our proposals focused on targeted upgrades to existing infrastructure. For pedestrians, we suggested improving pavement surfaces to be non-slip and durable while also increasing the width only where feasible, ensuring they are safe to use in all weather conditions. On high-footfall streets like Rue de Plope and Bd Fosse-Crahay, we proposed installing buddy benches at regular intervals to provide rest points, particularly for older residents and those navigating steep routes. For cyclists, we recommended installing protected bike lanes on streets like Bd des Hauteres, where space permits. Physical barriers or bollards would separate cyclists from vehicular traffic, ensuring safer and more accessible routes. Additionally, we propose bike repair stations near key transit stops and community areas to support cycling as a primary mode of transport.

Dynamic Parking Management

Parking remains a significant issue in Sainte-Walburge, particularly along busy streets like Rue de Campine, Montagne Sainte-Walburge and Rue de Sainte-Walburge. The high demand for parking spaces often leads to congestion and unauthorised parking, further straining the neighbourhood's infrastructure. To address this, we propose a dynamic parking fee system. This system would adjust parking prices based on demand, with higher fees during peak hours to discourage unnecessary car trips. Local residents would receive free or reduced-cost parking permits, ensuring equitable access, while non-residents and commuters would pay demand-based fees. This will help with Rue de Campine's road restructuring where we remove parallel parking on the right side of the street facing North. The 70 cars parked on that side can fit on the left and the dynamic policy can help to ensure that the reduced spaces would be prioritized to residents first. The revenue generated from this system could be reinvested into public transport improvements and active mobility infrastructure within the neighbourhood, creating a sustainable funding loop or circular economy. This approach not only alleviates congestion but also incentivises the use of alternative transport modes, aligning with the broader goals of plans like Vision FAST 2030.

Public Spaces and Community Engagement

Public spaces in Sainte-Walburge have the potential to become vibrant community hubs but are currently underutilised. Streets like Rue Fond Pirette and Rue de Cotillages could be activated through initiatives such as pedestrian/residential zones, which restrict vehicle access to residents only, thus creating spaces for children to play, cyclists and other recreational activities. These zones would encourage social interaction and strengthen community ties on the streets they are on while showcasing the benefits of reduced car dependency. Additionally, we proposed introducing urban agriculture projects, such as community tactile gardens near Node 13's intersection of Bd Fosse-Crahay, Rue de Plope, Bd Hector Denis and Rue de Cotillages which would promote sustainability and local food production in addition to strengthening community cohesion. These initiatives can also be located near parks or public squares, engaging residents in meaningful activities and enhancing the neighbourhood's environmental resilience.

Regional Connections and Sustainable Flow

Sainte-Walburge's role as a transit corridor means it must accommodate both local and regional traffic. Streets like Rue de Campine and Rue de Sainte-Walburge connect to major roads like the E25 and E313, facilitating movement between Liège city centre and surrounding areas. This dual role contributes to congestion and safety concerns, particularly during peak hours. To manage these flows, we recommended improving public transport services across the neighbourhood, ensuring reliable schedules and increased frequencies. Furthermore, our proposition for enhancing cycling and pedestrian pathways provides sustainable alternatives for short- and medium-distance trips, reducing reliance on private vehicles for residents which frees up the roadways for the transit traffic that passes through the area. By integrating local traffic management strategies with regional mobility plans, Sainte-Walburge can balance the demands of through-traffic with the needs of its residents.

Reflection

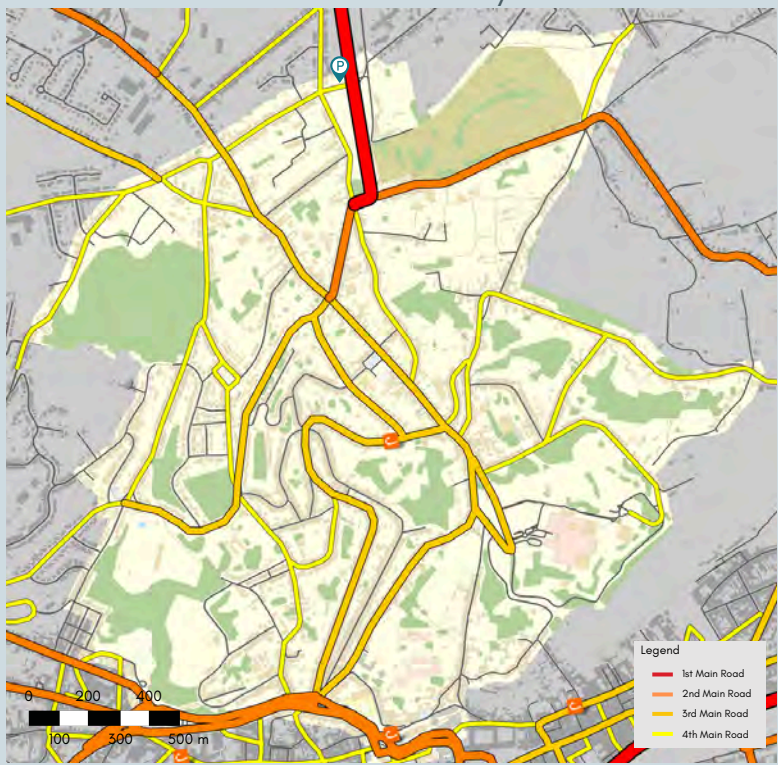
Developing these objectives and principles allowed us to take a holistic view of Sainte-Walburge's mobility challenges and opportunities. The spatial constraints of the neighbourhood require innovative solutions, such as upgrading pavements with non-slip surfaces rather than widening them. Similarly, proposals like the dynamic parking fee system and pop-up pedestrian zones reflect our commitment to balancing functionality with community engagement. The insights gained from earlier tasks were invaluable in shaping our approach. For example, the safety issues identified at Node 13 informed our broader recommendations for intersection redesigns and traffic calming measures. Meanwhile, the analysis of mobility demand underscored the importance of improving active mobility infrastructure to reduce car dependency. For us, this task allowed us to funnel our ideas into a potential reality for Sainte-Walburge to become a neighbourhood that prioritises safety, sustainability and inclusivity. By addressing immediate challenges while aligning with regional frameworks like Vision FAST 2030, we believe these proposals can set the foundation for a more liveable and connected community.

Task N°8 : Mobility Plan

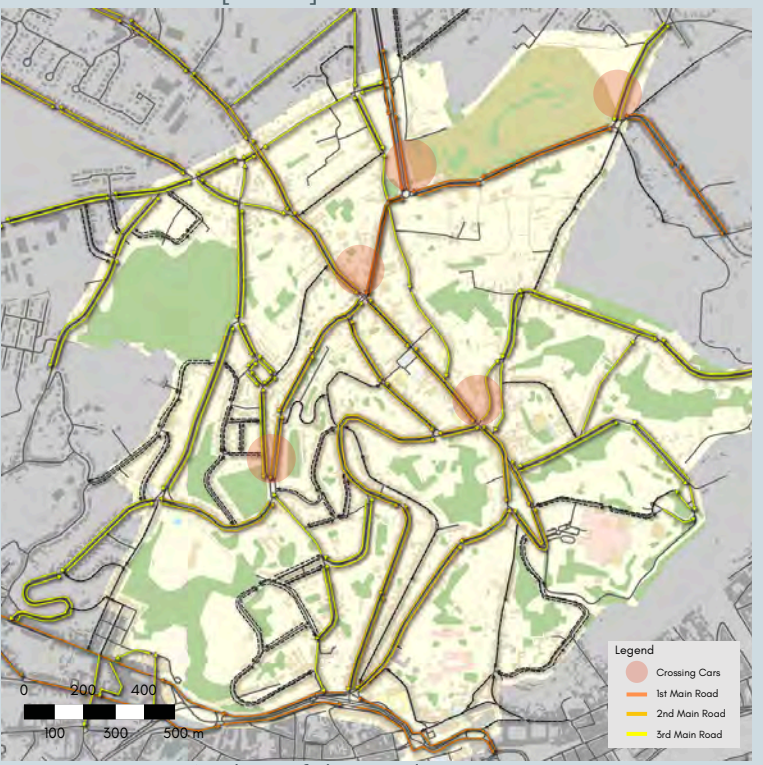
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Before

Analysis Based on the Policies Documents [Task 1]

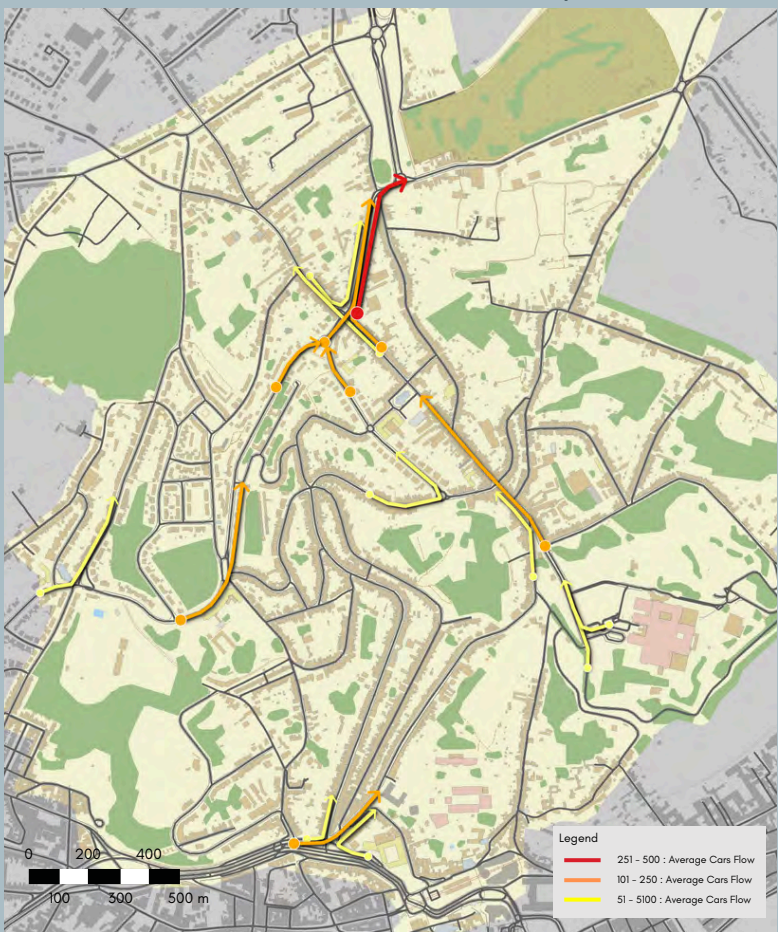


First Analysis of the Main Car Flow

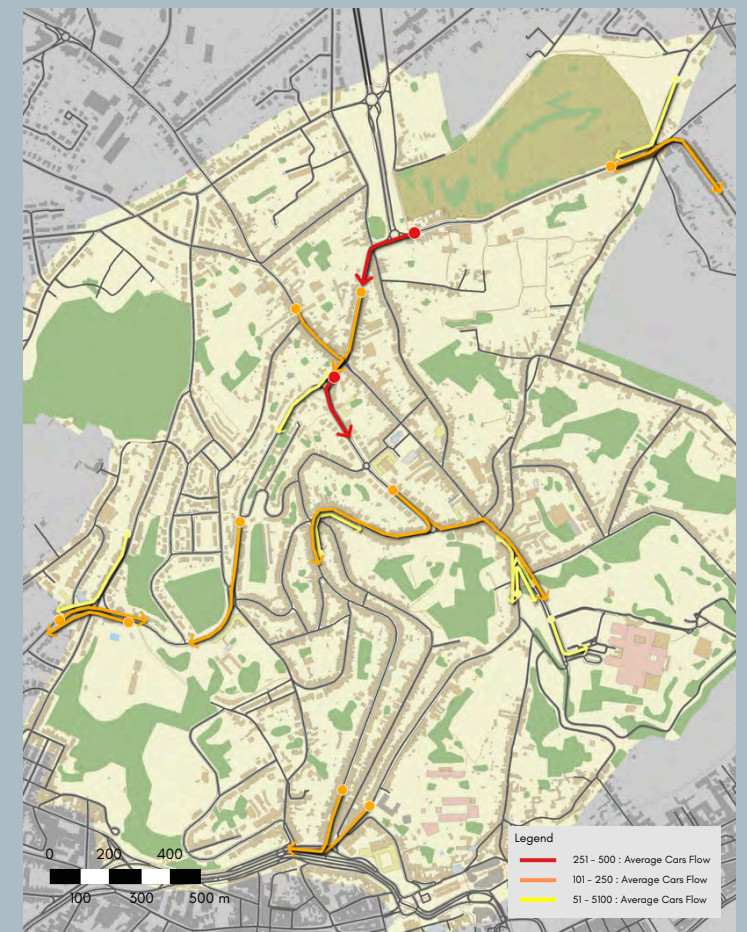


Analysis of the Road Car Direction

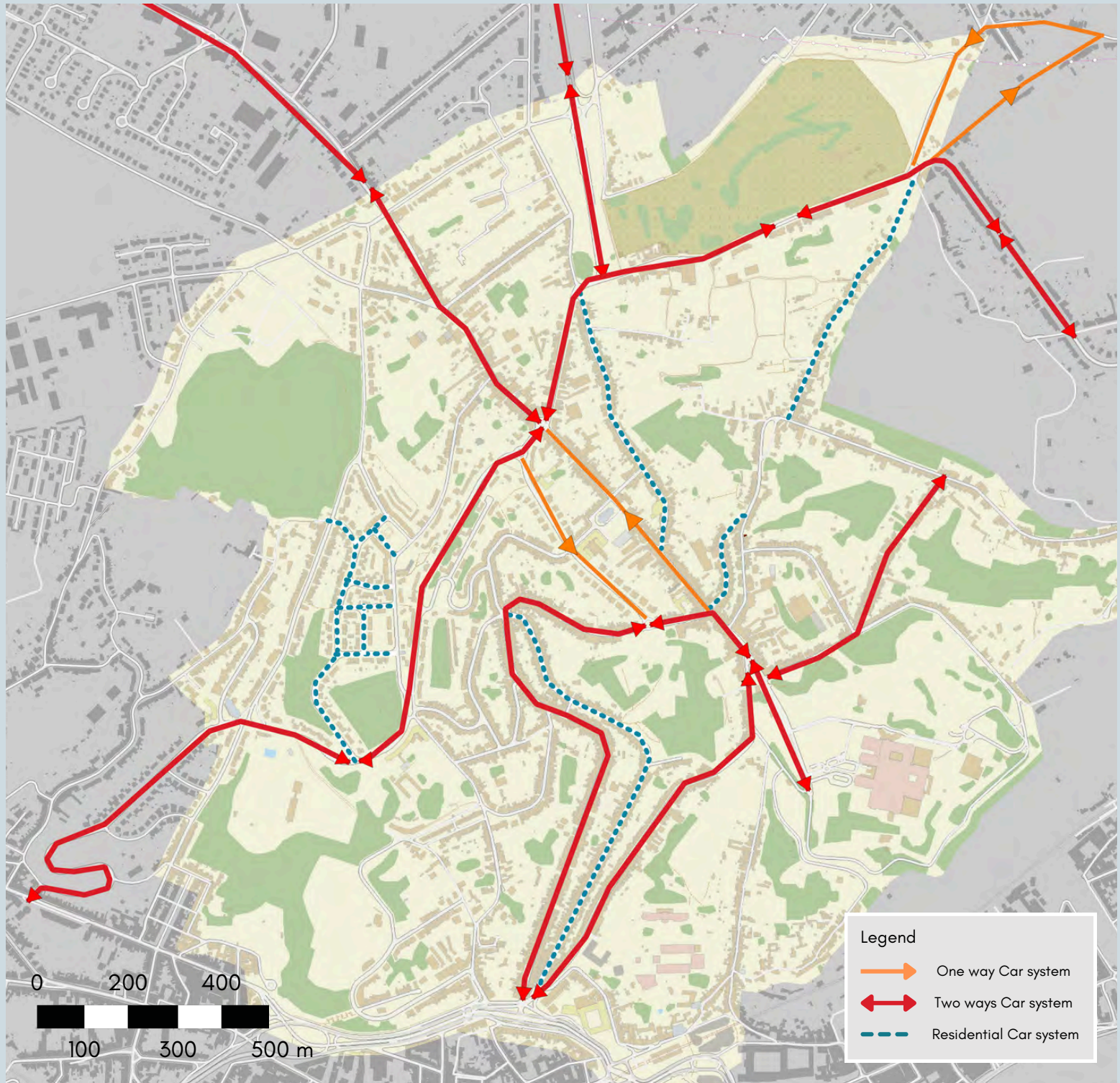
Analysis Based on the Data Site [Task 5]



Average Quantities Car Flow - Direction : South to North



Average Quantities Car Flow - Direction : North to South



Proposition of a New Car Flow Direction

Task 8: Mobility Plan

Our mobility plan for Sainte-Walburge emerged from a comprehensive analysis of the neighbourhood's existing traffic flows, infrastructure limitations and the wider regional dynamics. This task represents the culmination of our efforts to balance the needs of various road users while prioritizing safety, accessibility and sustainability. The revised modal flow system reflects not only the insights gleaned from previous tasks but also our vision for Sainte-Walburge as a neighbourhood that embraces multimodal transport solutions and enhances the quality of life for its residents.

Analysis of the Existing System

The current mobility system in Sainte-Walburge exhibits several challenges, many of which stem from its dual role as a residential neighbourhood and a key transit corridor. Streets such as Rue de Sainte-Walburge, Rue de Cotillages, and Montagne Sainte-Walburge experience significant congestion due to their function as main access routes connecting the Liège city centre to the E25 and E313 highways. These roads are heavily trafficked by commuters, commercial vehicles and local residents alike, creating bottlenecks and safety hazards, particularly at intersections with residential flows meeting the transit flows from Node 13 on the Bd Fosse Crahay. The before maps illustrate the inefficiencies in the existing system. Rue de Sainte-Walburge, for example, is overwhelmed during peak hours, while Montagne Sainte-Walburge suffers from steep inclines that discourage active mobility. Our observations during Task 6 revealed that many residential streets are clearly used as cut-through routes, exacerbating congestion and undermining the safety and liveability of these areas. These issues are consistent with findings in urban mobility literature, which highlights the impact of unregulated traffic on neighbourhood dynamics (Banister, 2008).

Child-Friendly Residential Zones

Our mobility plan incorporates the creation of residential zones designed to reduce through-traffic, ensuring safer streets for children to play outdoors. These zones prioritize local traffic only, limiting vehicles from cutting through and thereby significantly reducing traffic volumes and speeds. This approach is supported by studies demonstrating the positive impact of traffic reduction on children's safety and outdoor activity. For instance, research on child-friendly urban highlights that reducing vehicular traffic in residential areas encourages outdoor play and improves social cohesion among neighbours (Marzi & Reimers, 2018). Additionally, studies on "Play Streets" show that limiting car access enhances opportunities for children to engage in active play while also fostering a sense of community among residents (Smith et al., 2020). By creating these residential zones, we aim to reclaim streets as multifunctional spaces where children can play safely, and residents can socialize without the disruption of non-local traffic. Measures such as traffic-calming installations and smart bollards further enhance the utility and safety of these spaces, aligning with evidence-based strategies to improve urban liveability for all age groups.

Car Flow Reorganization

One of the key features of our proposal is the redesign of Rue de Cotillages. Currently, this street functions as a one-way route leading into a roundabout, a configuration that is particularly dangerous due to the steep slope and poor visibility. We propose converting this roundabout into an intersection with speed reduction measures such as raised pedestrian crossings and angled barriers. These changes aim to reduce vehicle speeds and improve safety for all road users. Montagne Sainte-Walburge and Rue de Campine, two critical corridors, retain their two-way flows but incorporate traffic-calming measures. Smart traffic lights at the key intersection will help manage congestion during peak hours, while overhauled pedestrian pavements with anti-slip and better lighting will enhance safety and accessibility. These interventions align with recommendations from the Schéma de Développement de l'Arrondissement de Liège (SDALg), which advocates for traffic management solutions that prioritize non-motorized users. In addition to these changes, we propose introducing one-way systems on select streets to streamline traffic flow and reduce congestion particularly around our Node on Rue de Plope as one example. The plan also includes designated residential zones with restricted access for through-traffic. These zones are designed to protect local streets from being overwhelmed by non-local vehicles, enhancing the safety and quality of life for residents while also limiting the amount of non-residential parked vehicles further backed by the dynamic parking principle.

Pedestrian and Cycling Infrastructure

A significant focus of our mobility plan is the promotion of active transport modes. Sainte-Walburge currently lacks adequate infrastructure for walking and cycling, a gap that discourages residents from choosing these sustainable modes. Our plan addresses this issue through several key interventions:

- Pedestrian Pavement Upgrades:** Given the limited space for widening pavements, we propose upgrading existing surfaces to be non-slip and accessible. These improvements will make walking safer and more appealing, particularly for older residents and those with mobility challenges.
- Dedicated Cycling Lanes:** Protected bike lanes are proposed along major corridors, including Rue de Campine, Montagne Sainte-Walburge, Bd Fosse Crahay in addition to upgrading existing cycle infrastructure like on Bd des Hauteurs. The lanes for Bd Hauters and Bd Fosse Crahay for example will be physically separated from car traffic, providing a safe and efficient route for cyclists whereas due to limited spacing on Rue de Campine and Montagne Sainte Walburge cyclists will have a lane beside the vehicles but the speed limits and vehicle width restrictions will keep these cyclists safe.
- Bike Repair Stations:** To support cycling as a primary mode of transport, we propose installing self-service repair stations at key locations such as important transit stops in the area and the reclaimed community spaces, we are able to create due to turning certain areas residential and also the large spaces created through redesigning Node 13. These stations will provide basic tools and secure bike racks, reducing barriers to cycling.

These interventions are informed by principles outlined in the Plan Communal de Mobilité (PCM), which emphasizes the importance of integrating active mobility into urban planning.

Public Transport Enhancements

Public transport plays a critical role in reducing car dependency and improving accessibility. While we felt that the addition of new bus routes was not necessary, our plan includes the introduction of demand-responsive bus services that can adapt to real-time passenger needs. These services will complement existing routes and provide a reliable alternative for residents who currently rely on private vehicles. In addition, we propose enhancing connectivity between Sainte-Walburge and regional destinations such as the University of Liège in Sart-Tilman. Improved public transport links will reduce commuter traffic on key corridors and support regional mobility goals outlined in Vision FAST 2030.

Reflection

Developing this mobility plan was an iterative process that required us to synthesize data, field observations and reexamine new and old policy frameworks. As a team, we reflected on the challenges and opportunities presented by Sainte-Walburge's unique characteristics. The steep terrain, while a barrier to active mobility, also provided insights into the limitations of existing monitoring tools like Telraam, which struggled to capture pedestrian and cyclist activity on inclines. The proposed interventions, such as the redesign of Rue de Cotillages and the introduction of residential zones, are ambitious yet grounded in the realities of the neighbourhood. These changes reflect our commitment to creating a mobility system that prioritizes people over cars but also understanding the convenience of the residents by not making major roads one-way systems. Our mobility plan for Sainte-Walburge represents a comprehensive approach to addressing the neighbourhood's mobility challenges. By reorganizing car flows, enhancing active transport infrastructure, and improving public transport, we aim to create a system that is safe, efficient and inclusive. This plan not only addresses immediate issues but also lays the groundwork for long-term sustainability, ensuring that Sainte-Walburge can thrive as a vibrant, connected community.

Task N°8 : Mobility Plan

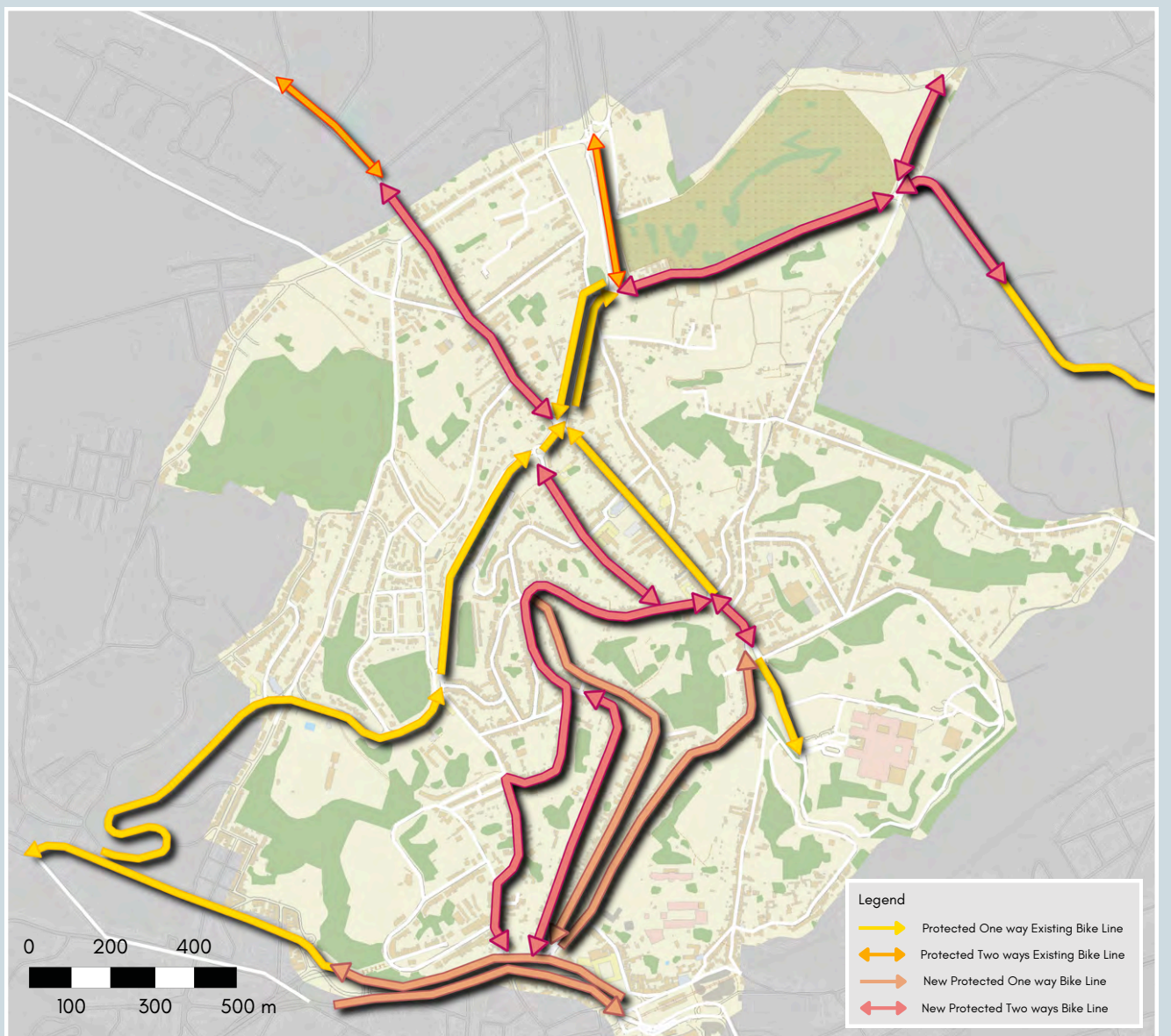
By R. Cullens, M. Dahlems & Z. Saint-Remy

Before



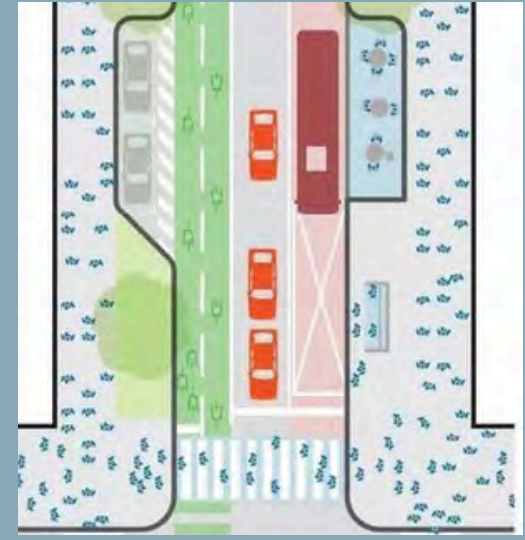
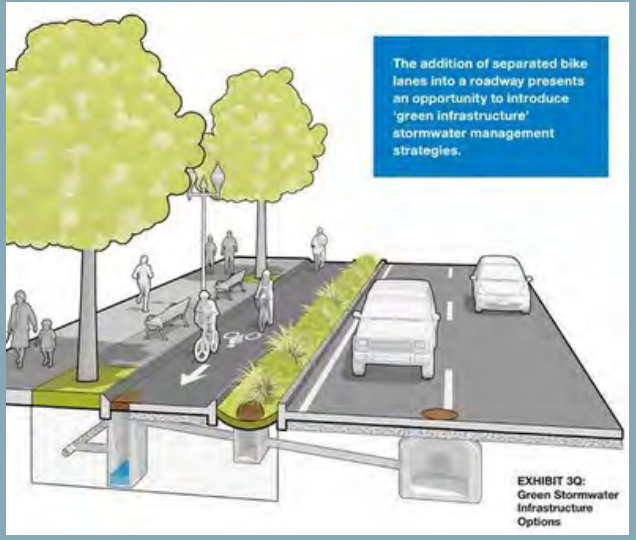
Existing Bike Line

After



New Proposition Bike Line

Proposition for Comfort and Security of Bikers



Task 8: Mobility Plan

The proposed redesign of bicycle infrastructure in Sainte-Walburge addresses a long-standing issue of disconnected and underutilized cycling networks. The "before" graphic demonstrates the fragmented nature of the existing infrastructure, where isolated bike lanes fail to form a cohesive system. This poor connectivity limits the usability of the lanes, leaving cyclists to navigate unsafe routes alongside motorized traffic. The "after" graphic illustrates a bold vision for an integrated network that not only connects existing lanes but also introduces new routes designed to fill critical gaps in the system. The accompanying design examples offer practical and actionable solutions for creating a safer, more inviting cycling environment.

Evaluating the Existing Cycling Network

The current network is a reflection of piecemeal planning, where bike lanes exist in isolation rather than as part of a broader mobility framework. Sainte-Walburge's residents, already contending with narrow roads and heavy traffic, are left without reliable options for active mobility. The lack of connectivity discourages cycling as a viable mode of transport and perpetuates car dependency. The redesign aims to tackle this issue head-on, focusing on improving safety and accessibility while trying to foster a culture of sustainable mobility now and for the future. The before map illustrates the scattered bike lanes that fail to connect key areas such as Rue de Sainte-Walburge and Rue de Tendeurs bike lane beside E313 that could easily be connected to other cycle lanes in the vicinity. These gaps force cyclists to navigate high-risk routes shared with motorized vehicles, undermining their safety and comfort. Furthermore, the absence of links to key destinations such as the Liège city centre, nearby green spaces or even public transport hubs further diminishes the usability of the network especially given Sainte Walburg's topography. In recognition of this, our suggested new design integrates existing lanes into a comprehensive network, ensuring that cyclists can travel seamlessly between residential, commercial and recreational areas. In addition to connecting existing lanes, the redesign introduces new routes along high-traffic corridors such as Rue de Campine and Montagne Sainte-Walburge. These additions are strategically planned to address gaps and provide safe alternatives for cyclists navigating these busy areas. The proposed network also incorporates protected lanes that physically separate cyclists from cars, creating a safer and more comfortable riding experience. The inclusion of raised barriers and bollards, as shown in the design examples, ensures that cyclists are shielded from motorized traffic but this is only applicable on streets that have the space to permit it like Bd des Hauters. The question again arose amongst us as to why they did not do this in the first place. The proposed network is designed with all users in mind, accommodating experienced commuters, occasional riders and families. By linking residential neighbourhoods to schools, workplaces and green spaces the network fosters a culture of cycling that is inclusive and equitable. The bottom section of the graphic provides specific examples of proposed updates, such as protected bike lanes, dedicated intersections and green infrastructure along the routes. These examples demonstrate how the conceptual plan can be implemented in practice, ensuring functionality and aesthetic appeal.

Designing a Comprehensive and Inclusive Cycling Network

Our proposal in the after section aims to not only address connectivity but also prioritise safety where applicable. The redesign includes protected intersections with features such as bike boxes and adjusted signal timings to reduce conflicts between cyclists and vehicles. These improvements are particularly important in high-traffic zones like Rue de Sainte-Walburge, where cyclists often compete with cars for space. The addition of green infrastructure, such as tree-lined buffers, further enhances the cycling environment by providing shade and reducing air pollution. One of the primary challenges in Sainte-Walburge is its steep terrain, which discourages walking and cycling. The redesign addresses this by introducing electric-assist bike lanes on inclines such as Montagne Sainte-Walburge. These lanes enable cyclists to navigate slopes more easily without the pressure from cars travelling directly behind them. This innovation makes cycling accessible to a broader range of users, particularly those who might otherwise avoid it due to physical constraints. Traffic congestion is another significant challenge, particularly along corridors like Bd Fosse Crahay near our Node. The redesign along this street alleviates this issue by providing safe and efficient alternatives for cyclists, reducing the overall volume of cars on the road. By encouraging a modal shift from cars to bicycles, our plan aims to create a more balanced and sustainable transport system. We also believe that conducting educational campaigns and community events would be extremely beneficial to promote cycling as a viable and enjoyable mode of transport, helping to shift cultural attitudes and increase adoption rates.

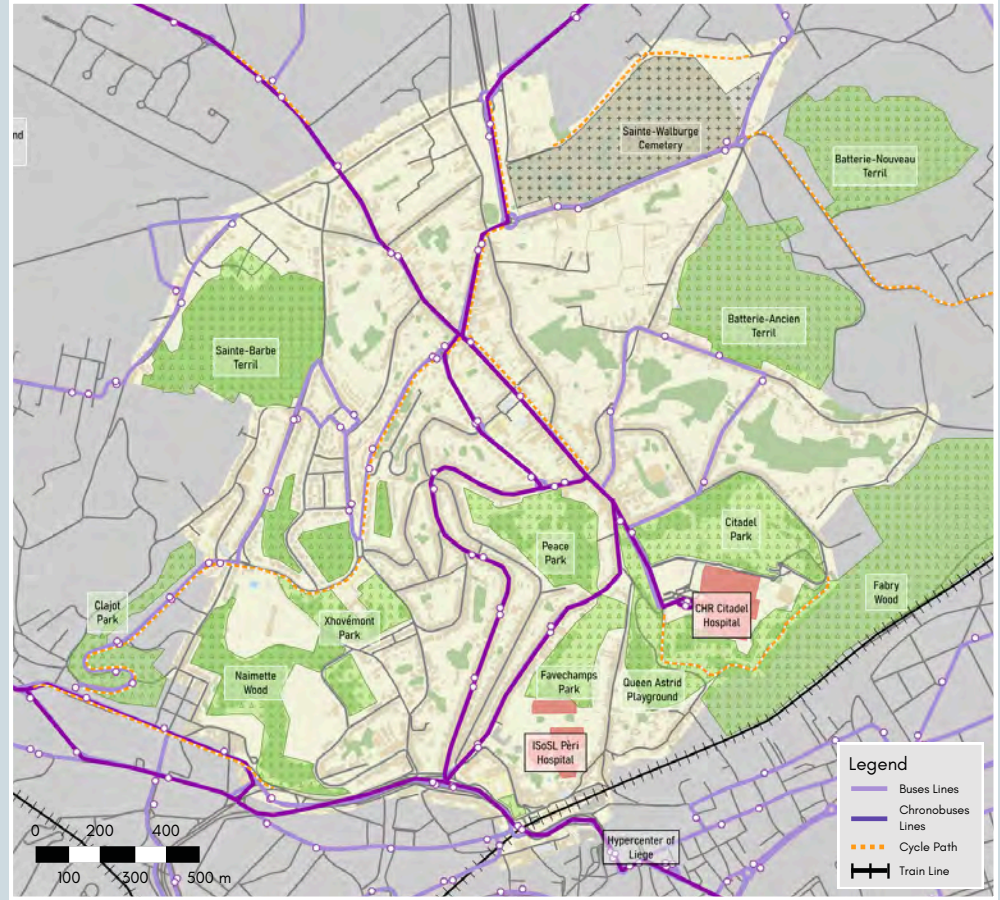
Reflection

As we developed this mobility plan, we were struck by the transformative potential of a well-designed bike network like we had seen in Maastricht firsthand and kept that image in our minds when developing plans for Sainte Walburge. The existing infrastructure, while flawed, provided a foundation for envisioning a system that prioritizes connectivity, safety and sustainability. Our work on this task reinforced the importance of adopting a user-centric approach, considering the diverse needs and perspectives of Sainte-Walburge's residents. By integrating bike lanes with public transport hubs and pedestrian pathways, our plan promotes a multimodal approach to transport that is efficient and environmentally friendly. The proposed redesign represents a bold vision for a more connected, safe and sustainable Sainte-Walburge. By addressing the shortcomings of the existing network and introducing innovative solutions, we aim to make cycling an integral part of the neighbourhood's mobility system. The new network not only prioritizes safety but also enhances the overall quality of life for residents. It provides a roadmap for creating a neighbourhood where cycling is not only possible but also practical, enjoyable and as safe as it can be. Through this plan, Sainte-Walburge can serve as a model for sustainable urban development, inspiring other communities to prioritize active mobility in their own contexts.

Task N°8 : Mobility Plan

By R. Cullens, M. Dahlems & Z. Saint-Remy

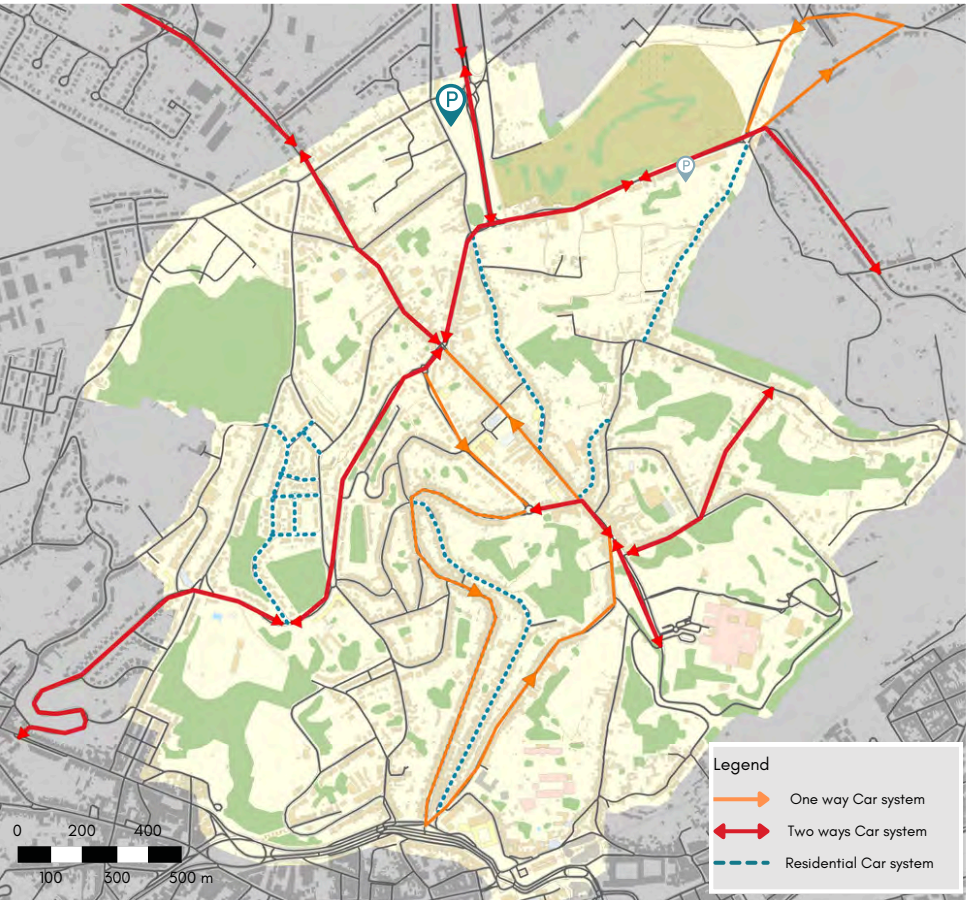
Summarize of Mobility Plan



TASK 1 : Sainte Walburge Zoom - Buses & Bicycle Analysis

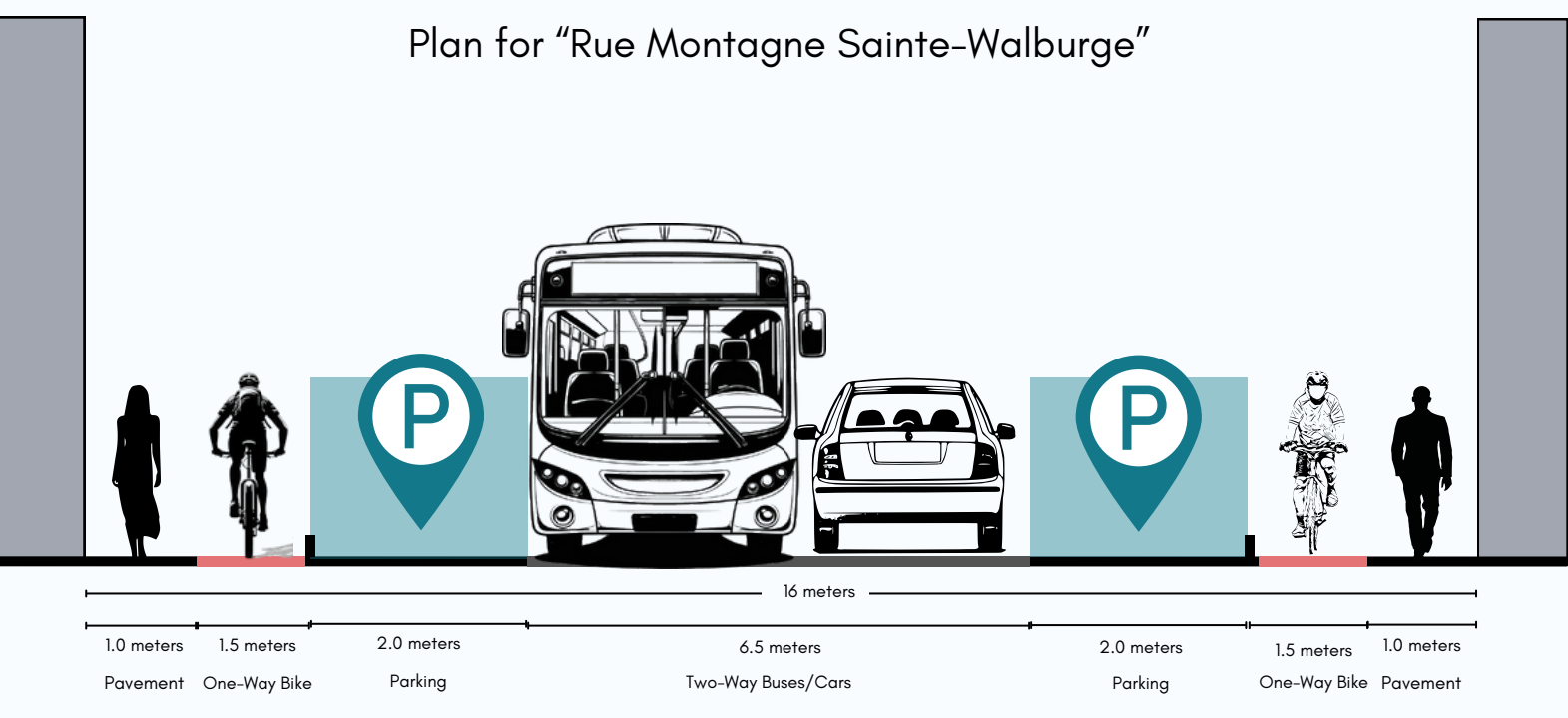


TASK 8 : New Proposition Bike Line

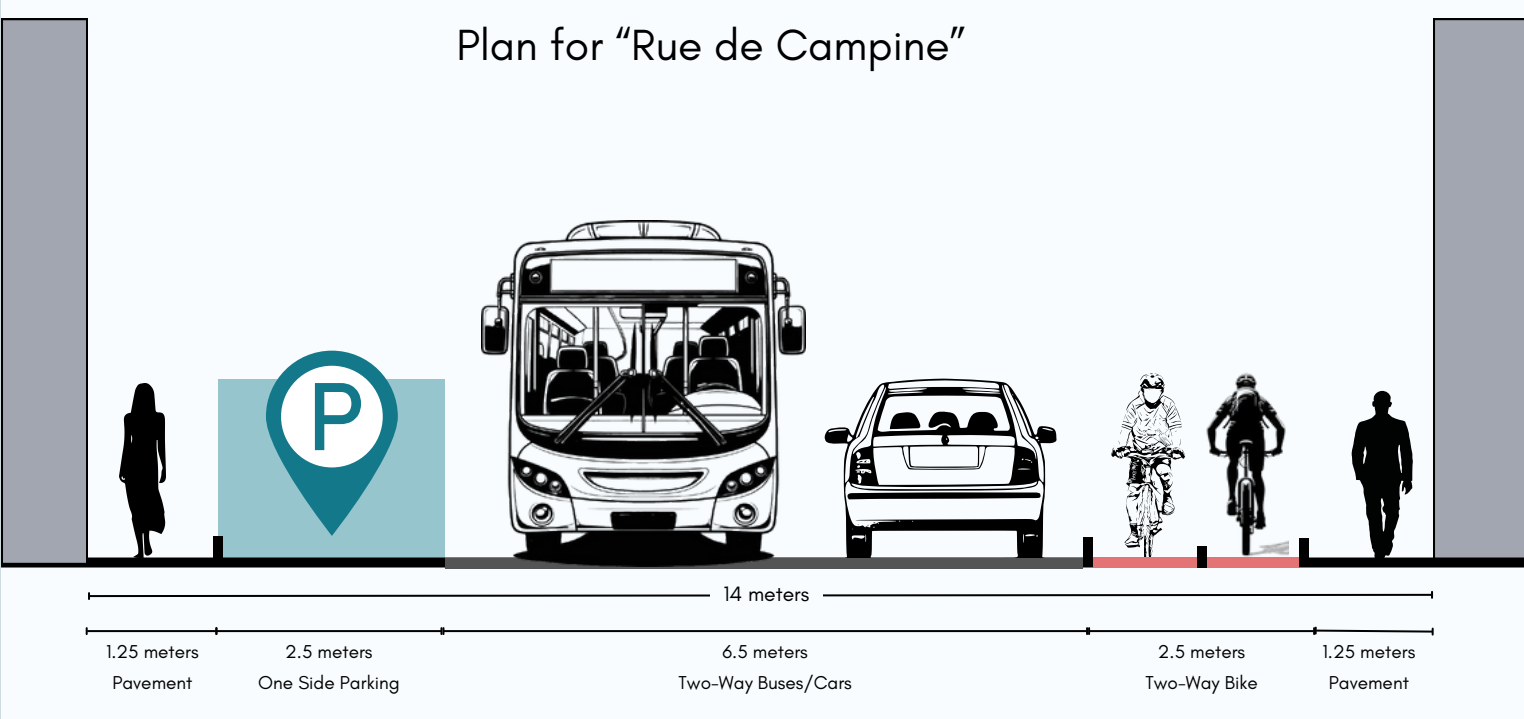


TASK 8 : Proposition of a New Car Flow Direction

Plan for "Rue Montagne Sainte-Walburge"



Plan for "Rue de Campine"



Task 8: Mobility Plan

The mobility redesign for Sainte-Walburge culminates in the synthesis of bus, bike and pedestrian infrastructure, aiming for a seamless, safe and sustainable transport system. This section builds on insights and designs explored earlier, particularly from the maps and visuals presented in Task 8, by diving deeper into the specific configurations proposed for key streets and their implications for the neighbourhood's mobility dynamics.

Existing and Proposed Bus Infrastructure

As highlighted earlier in Task 8, the existing bus lanes, shown as purple lines in the initial maps, are already well-aligned with major routes connecting Sainte-Walburge to critical destinations such as the Liège city center. These lanes were evaluated as sufficient in their current placement and function, providing reliable public transport access to residents. However, the need for increased service frequency has been identified as a pressing issue. Our fieldwork and evaluation of mobility demand have shown that inconsistent bus schedules discourage broader adoption of public transport, particularly during peak hours.

By increasing bus frequency, particularly along high-demand corridors such as Rue de Campine and Montagne Sainte-Walburge, we aim to make public transport a more appealing and reliable option for residents and commuters alike. This enhancement ties into earlier discussions on modal share goals, where reducing car dependency and promoting multimodal transport are key priorities for the neighbourhood's future.

Cycling Infrastructure: Connecting and Expanding the Network

The middle map from Task 8 showcased the existing cycling lanes, characterized by a lack of connectivity that forces cyclists onto high-traffic roads. In our proposed design, these gaps are addressed with new, strategically placed lanes, creating a comprehensive network that connects residential areas, schools, public transport hubs, and green spaces.

The proposed bike lanes are designed with both functionality and safety in mind. For example, protected lanes with bollards and raised barriers are included on wider streets such as Bd des Hauters. This ensures that cyclists have dedicated spaces free from vehicular interference. On narrower streets, such as Rue de Cotillages, marked lanes are prioritized to improve visibility while maintaining the flow of other traffic.

Additionally, the integration of cycling routes with existing infrastructure, such as connecting Rue de Sainte-Walburge to nearby cycle-friendly paths, creates a cohesive network. This vision reflects lessons learned from successful multimodal systems in cities like Maastricht, which served as a reference point for our design strategy.

Street Cross-Sections: Balancing Dimensions and Functionality

The cross-section design for key streets, such as Rue de Campine and Montagne Sainte-Walburge, is central to this redesign, with deliberate allocation of space for pedestrians, cyclists and vehicles. The proposed dimensions include:

- **Pedestrian Pathways:** At 1.0 meter wide, these paths remain functional due to their non-slip surfaces and tactile paving. When bikes are not passing, the adjacent bike lanes can act as an extension for pedestrians, providing a combined space of 2.5 meters.
- **Cycling Lanes:** Allocated 1.5 meters beside the pavement, these lanes prioritize safety with protective features on busier corridors, ensuring smooth integration with the pedestrian pathway.
- **Vehicle Lanes:** The 6.5-meter width (3.25 meters per lane) for two-way traffic provides sufficient space for smooth flow while discouraging excessive speeding. This design aligns with observed traffic volumes and the need for efficient vehicular movement alongside expanded cycling and pedestrian facilities.
- **Parking Adjustments:** Dynamic pricing and allocation of parking spaces have been incorporated to better manage car usage. Strategic adjustments ensure that parking supports the overall goal of reducing car dependency without compromising accessibility for residents. The redesign reduces parking on one side to 2.0 meters wide for Montagne Sainte-Walburge, ensuring sufficient parking capacity while accommodating the new mobility design.

The justification for all these dimensions lies in their practicality and adaptability. While adhering to ideal standards may be preferable, the realities of Sainte-Walburge's urban layout necessitate a balance between meeting mobility needs and maintaining spatial efficiency.

Integrating Multimodal Mobility: A Unified Vision

The proposal also emphasizes the importance of integrating cycling and pedestrian networks with public transport. By linking the new cycling routes to bus stops and key destinations, such as educational institutions and commercial centers, the design fosters a multimodal approach to mobility. This integration not only enhances accessibility but also encourages a modal shift away from car dependency, as residents have multiple viable options for their daily journeys.

The inclusion of green infrastructure along redesigned routes further elevates the user experience. Tree-lined buffers between cycling lanes and vehicle paths, for example, provide shade and improve air quality while serving as a visual barrier that enhances safety.

Reflections on the Redesign Process

Developing this integrated mobility plan has reinforced the importance of considering user needs and local context. The fragmented state of Sainte-Walburge's current infrastructure reflects decades of piecemeal planning, where cycling and pedestrian paths were treated as secondary to vehicular traffic. Our redesign seeks to correct this imbalance by prioritizing active mobility and public transport.

As a team, we grappled with the challenges of allocating limited space while ensuring functionality and safety for all users. The iterative process of analysing maps, conducting fieldwork, and designing cross-sections taught us the value of flexibility and innovation. For instance, the decision to include electric-assist lanes on steep inclines stemmed from observing firsthand how the topography discouraged cycling. Similarly, the emphasis on bus frequency emerged from our recognition of the critical role public transport plays in connecting Sainte-Walburge to the broader Liège region.

Reflection

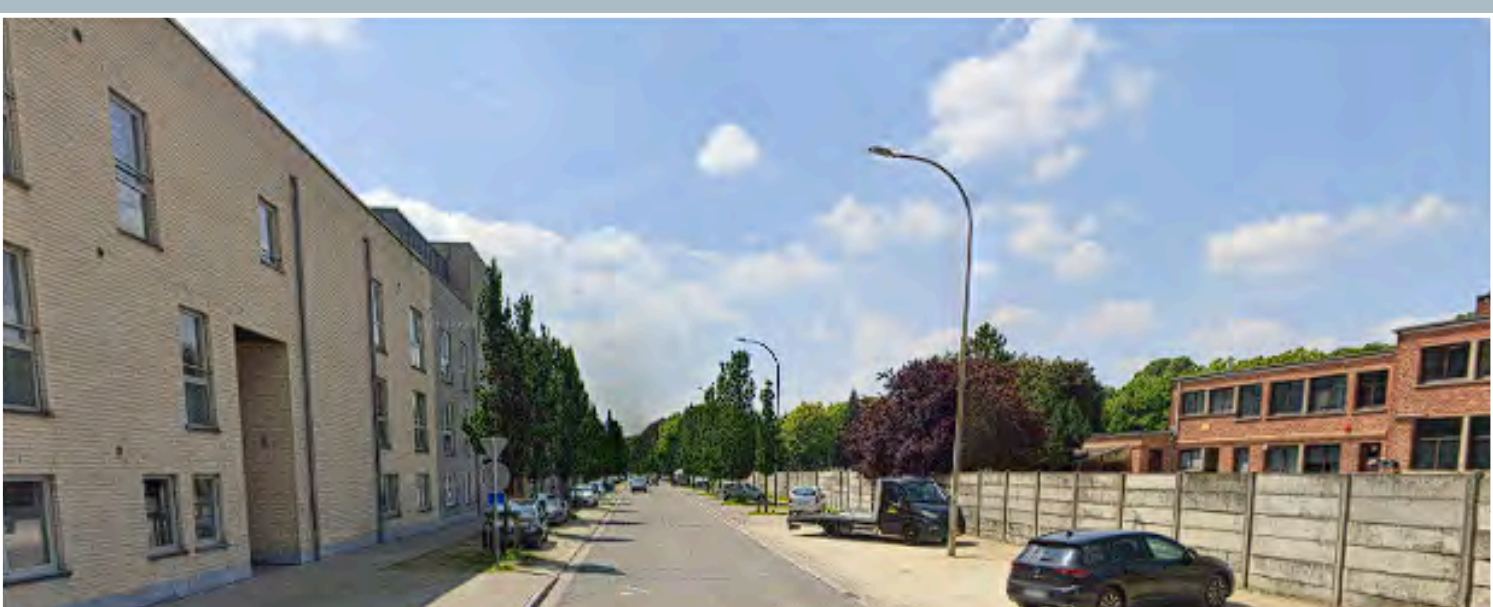
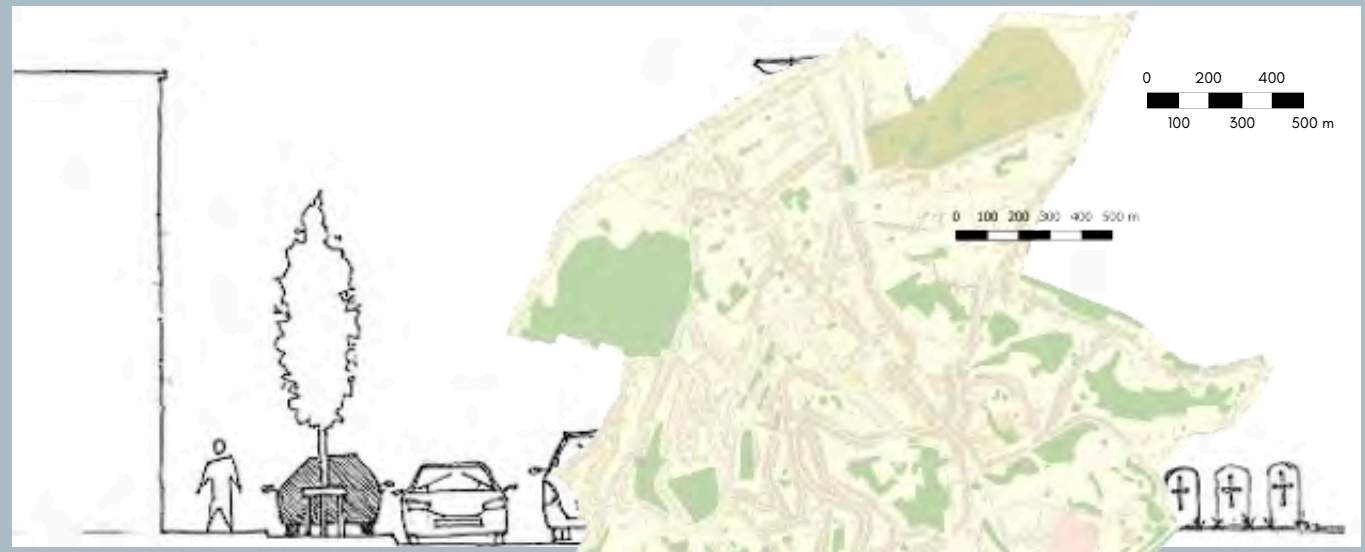
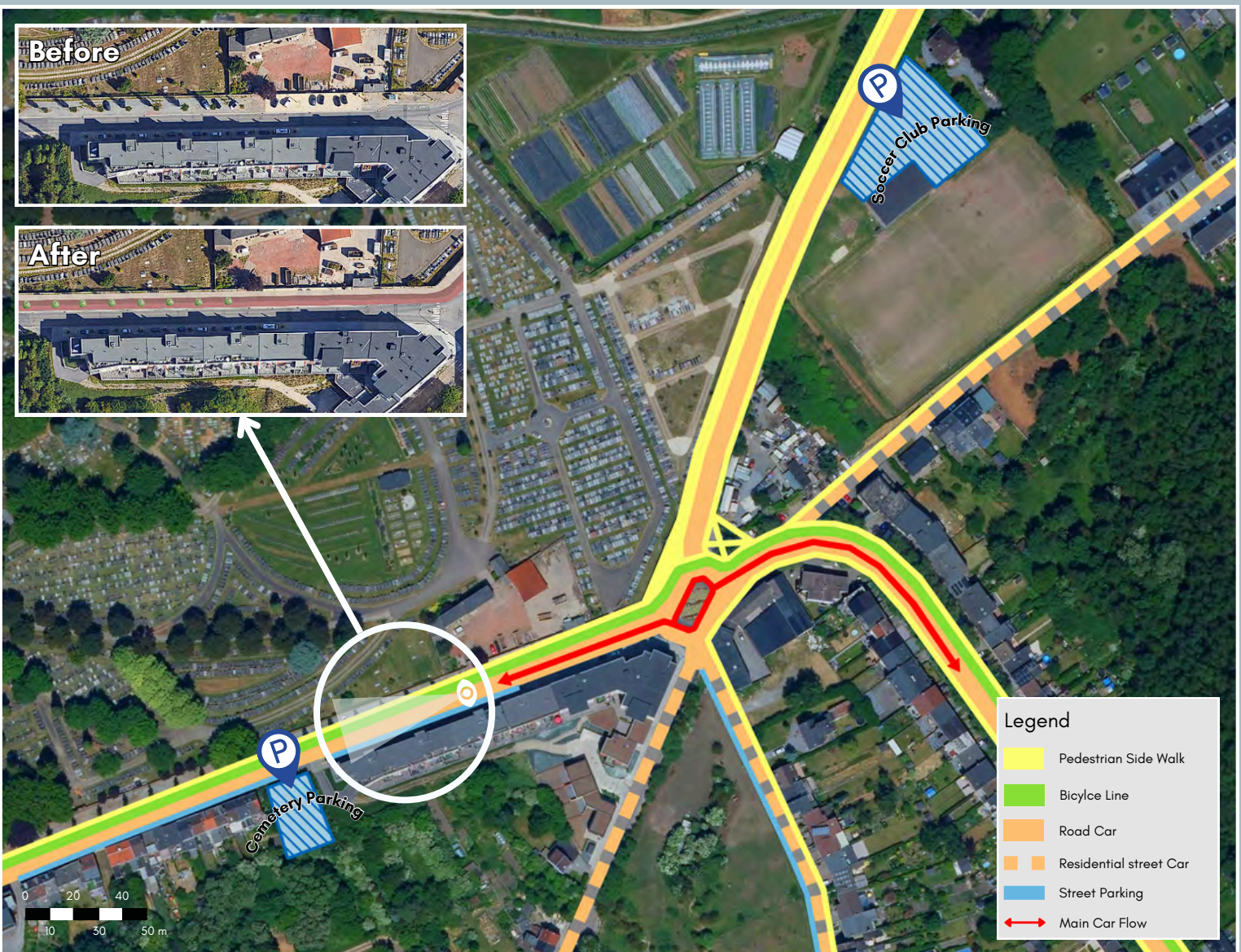
The proposed redesign for Sainte-Walburge's streets represents a bold step toward creating a neighbourhood that is safe, sustainable and accessible for all. Our aim of integrating bus, cycling and pedestrian infrastructure into a cohesive system tries to address the current deficiencies while anticipating future needs. Our design suggestions would not only improve mobility but also enhance the quality of life for residents, fostering a community where active and public transport are not just viable but preferred options. Through these changes, we believe that Sainte-Walburge has the potential to become a model for other urban areas in Liege, demonstrating how thoughtful planning and innovative design can transform mobility systems and contribute to broader sustainability goals.

Task N°9 : Urban Design

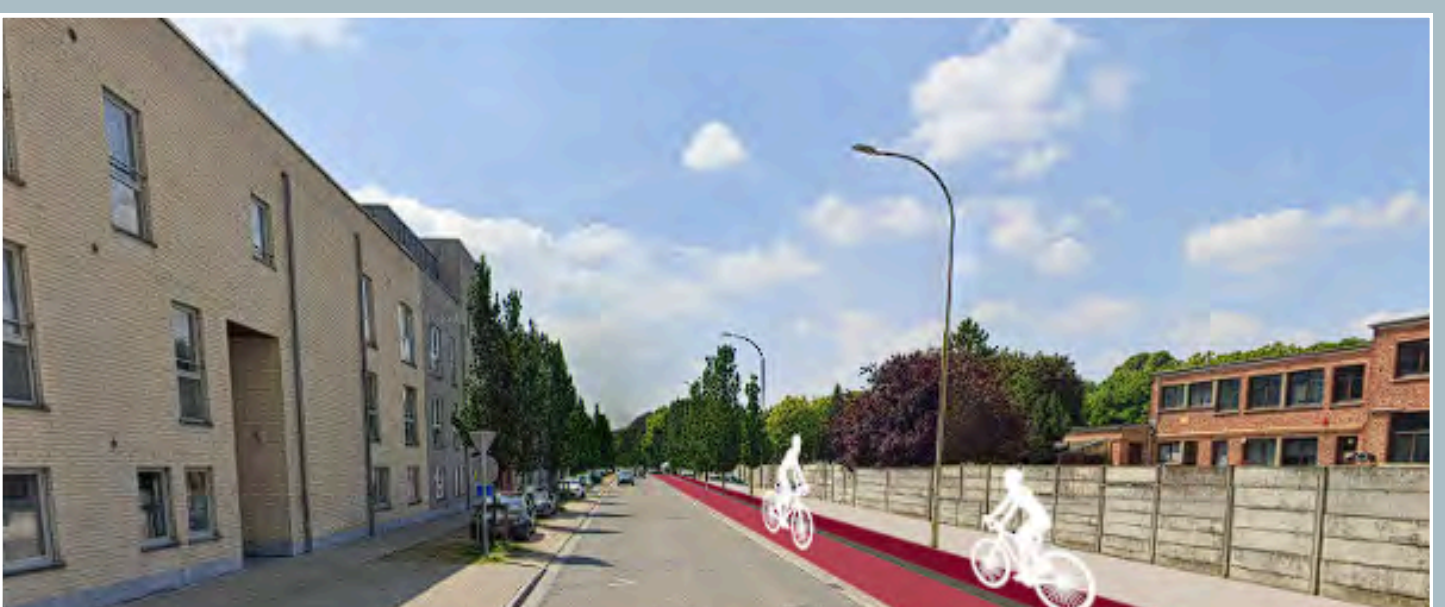
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Scheme of the First Propostion (Less costly)

FIRST PROPOSITION



Perspective View of Boulevard Fosse-Crahay Before



Perspective View of Boulevard Fosse-Crahay After

Task 9: Urban Design - First Proposition

Our primary goal is to provide a pragmatic, cost-efficient solution that enhances traffic flow and mobility while improving the overall quality of life in Sainte-Walburge. By retaining the existing roundabout, we avoid the significant disruptions and costs associated with converting it into an intersection. This decision ensures a shorter implementation timeline, reducing inconvenience for residents and commuters. Additionally, the plan prioritizes sustainable mobility by strengthening infrastructure for walking and cycling, reducing car dependency and fostering an environment aligned with urban sustainability goals. Key features of this proposal include preserving Rue Haut-des-Tawes' direct connection to the roundabout without requiring structural changes and converting Rue de Cotillages into a residential street. This measure reclaims road space for community use, providing new opportunities for recreation and social interaction while maintaining access for residents and essential services. Together, these initiatives balance practical traffic needs with meaningful neighbourhood upgrades.

Outcome

By maintaining the roundabout, its central traffic flow is preserved, facilitating seamless movement for vehicles while avoiding the complexities of major infrastructure overhauls. Intelligent traffic management systems will optimize efficiency, dynamically adjusting traffic flow based on real-time conditions. This integration ensures the roundabout remains adaptive and efficient for varying vehicle volumes. The central island will be revitalized to serve as a multifunctional space. Landscaping, including trees and graphic elements, will redefine the roundabout as a community asset. The addition of park benches and small green areas will create inviting recreational spaces, offering shade in summer and acting as noise barriers for nearby residential buildings. These enhancements ensure the roundabout serves not only as a traffic hub but also as a vibrant focal point for the neighbourhood. The conversion of Rue de Cotillages into a residential street is a transformative step. Using smart bollards, through traffic will be restricted, reclaiming the space for community activities. Despite the slope, the reclaimed street can host children's play areas, community gatherings, and seasonal events, fostering a vibrant, interactive environment. These changes contribute to a safer, more inclusive neighbourhood while aligning with broader goals of traffic reduction.

Traffic Space and Infrastructure

The redesign of the surrounding traffic space aims to promote alternative mobility and enhance safety. Existing unregulated parking spaces along road edges will be replaced with structured, modern infrastructure, allowing for the creation of wide sidewalks and protected bike lanes. For example, Bd Fosse Crahay and Rue de Plope will feature designated pedestrian and cyclist pathways, ensuring a safe, comfortable experience for non-motorized traffic participants and encouraging active travel. Parking adjustments are an essential component of the redesign. Strategic reductions in parking availability on one side of selected streets will accommodate new cycling and pedestrian infrastructure. Remaining parking spaces will maintain a width of 2.0 meters, ensuring safe and functional use without intruding on other road users. To address the reduced on-street parking, structured parking zones will be introduced. A key initiative involves transforming a currently for-sale property at Boulevard Fosse-Crahay 232 into a modern parking area. Additionally, the nearby sports facility's parking lot will be expanded to manage demand from events, cemetery visitors, and local recreational activities. For cyclists, the integration of the existing bike lane on Bd Hector Denis with a new two-way lane along Bd Fosse Crahay will create a cohesive network linking to the E313 route. This addition complements the neighbourhood-wide cycling infrastructure proposed in Task 8, encouraging active travel and providing safer, more connected routes. These measures reflect our commitment to fostering sustainable mobility while maintaining practical solutions for current traffic needs.

Neighborhood Enhancement

Beyond addressing mobility challenges, the proposal prioritizes enhancing the social and aesthetic fabric of Sainte-Walburge. Tactical urbanism strategies, including colourful markings and creative design elements, will transform the roundabout and its surroundings into a welcoming, engaging space. These improvements foster community pride and turn functional traffic infrastructure into areas of cultural and social value. Landscaping improvements, such as green spaces and tree-lined buffers, further support the neighbourhood's environmental goals. These features improve air quality, reduce urban heat, and create a more health-conscious environment. The broader mobility plan, incorporating safe pedestrian pathways and interconnected cycling lanes, complements these enhancements, creating a cohesive urban setting where sustainability and livability coexist.

Parking and Electric Mobility

The proposal also addresses parking dynamics to balance accessibility with sustainable mobility goals. Structured parking zones, like the planned area at Boulevard Fosse-Crahay 232, provide solutions for local parking needs, including overflow from cemetery visitors. Additionally, the gravel parking lot near the football club will be modernized and reorganized to maximize capacity during peak events, preventing chaotic, uncontrolled parking. To promote green mobility, public EV charging stations will be installed at 9-7 Boulevard Hector Denis. This initiative supports residents transitioning to electric vehicles, particularly those without access to private charging facilities. Together, these measures align with sustainability goals while ensuring practical solutions for residents and visitors.

Reflection

This proposal for the Sainte-Walburge roundabout reflects a balanced, cost-efficient approach to urban planning. Retaining the roundabout minimizes disruptions and costs while enhancing its functionality through modern traffic management systems. The redesign fosters sustainable mobility by prioritizing pedestrians, cyclists, and electric vehicles, with structured parking solutions and EV charging stations addressing practical needs. The revitalization of Rue de Cotillages into a residential street and the transformation of the central island into a vibrant community space exemplify the potential for urban spaces to be reimagined for people rather than just vehicles. By integrating cycling networks, improving pedestrian pathways, and enhancing aesthetic and social elements, this plan elevates the quality of life for Sainte-Walburge residents while setting a precedent for pragmatic urban sustainability.

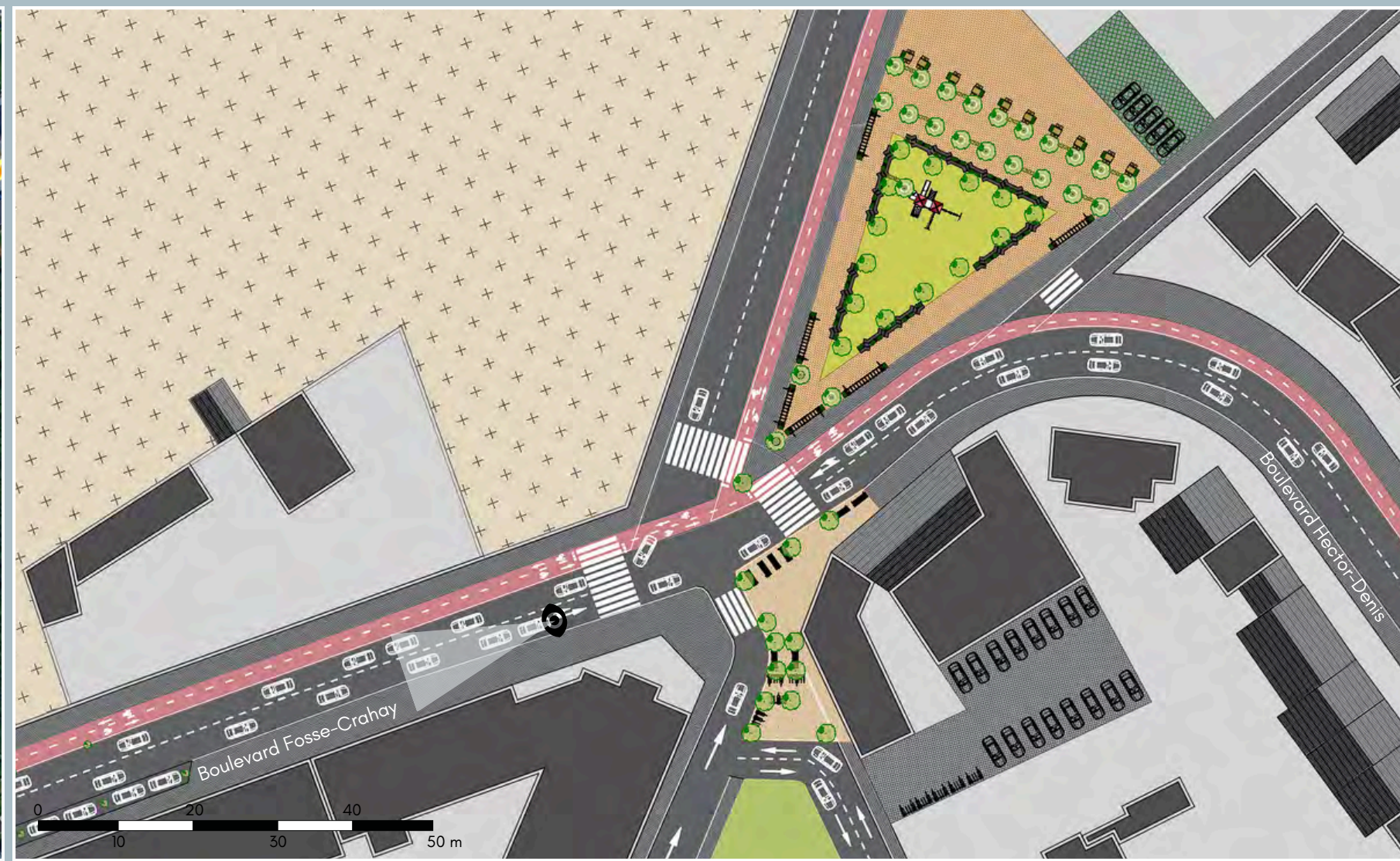
Task N°9 : Urban Design

By R. Cullens, M. Dahlems & Z. Saint-Remy

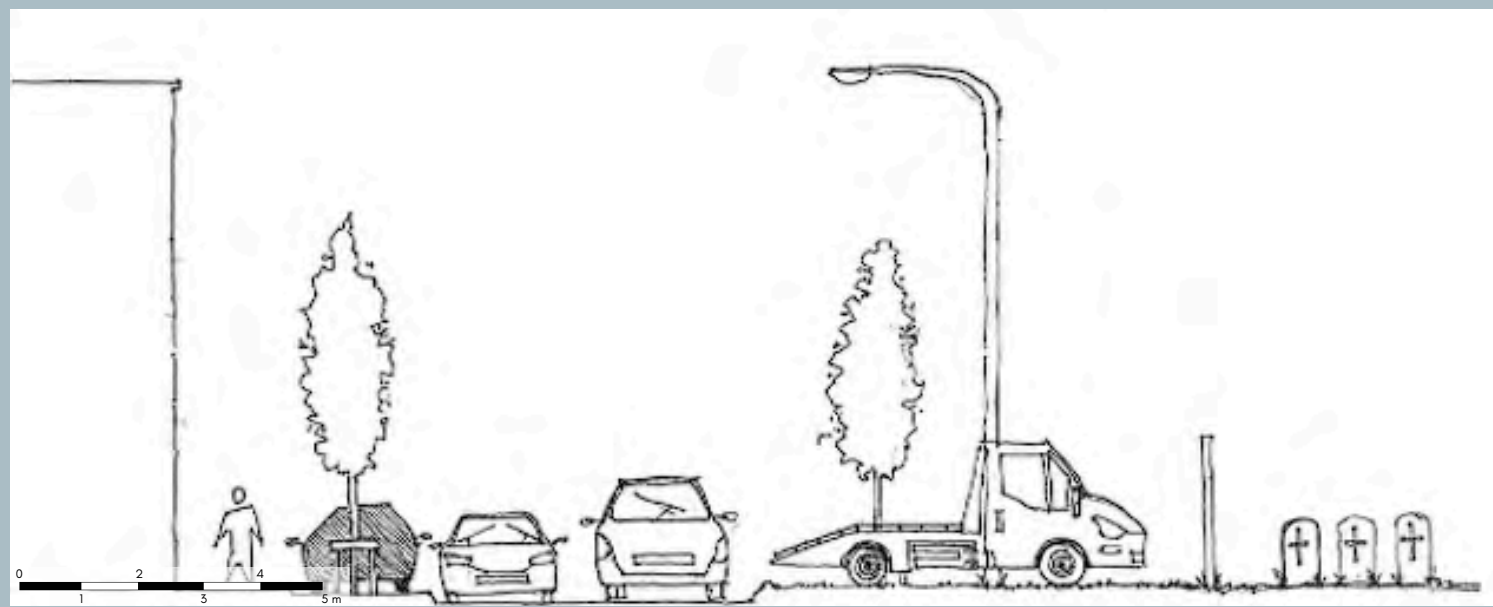
SECOND PROPOSITION



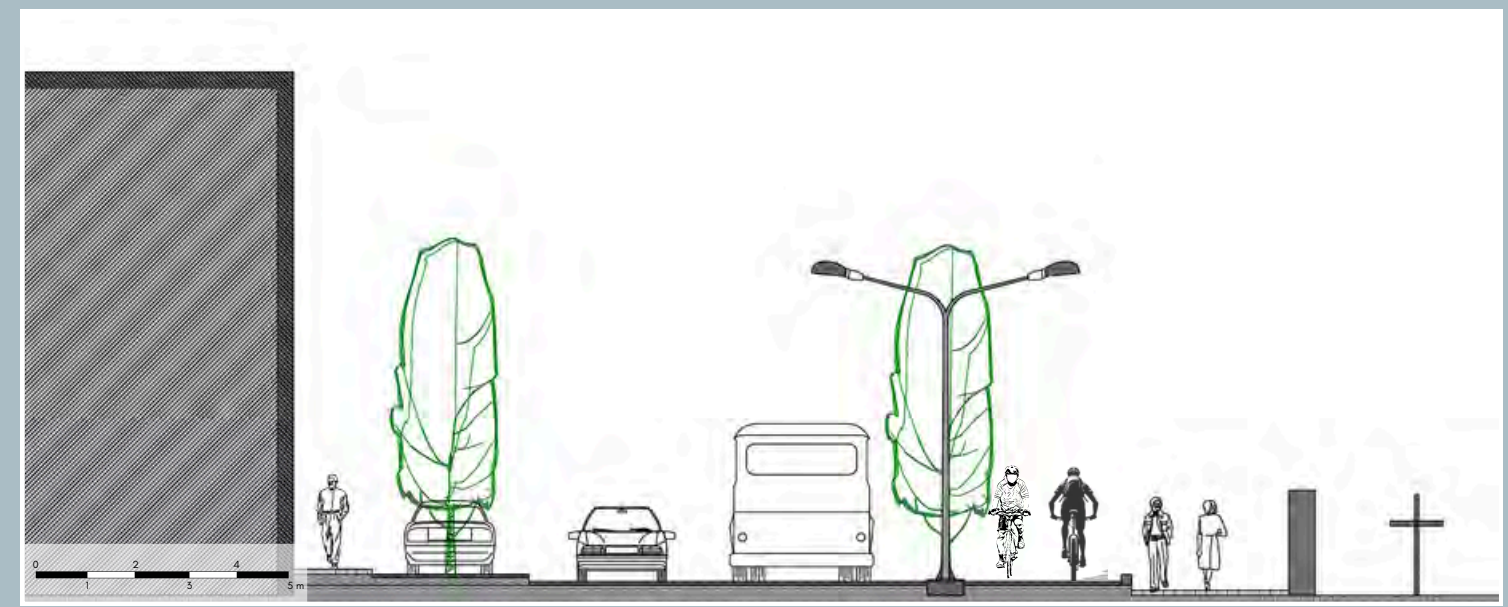
Scheme of the Second Proposition



Development Plan of the Second Proposition



Cross-Section of Boulevard Fosse-Crahay Before



Cross-Section of Boulevard Fosse-Crahay After

Task 9: Urban Design -Second Proposition

The second proposal aims to resolve the challenges posed by the existing roundabout at Sainte-Walburge by converting it into a controlled intersection, emphasizing unique enhancements that transform the area into a safer, more efficient and community orientated space. This approach prioritizes addressing the high traffic volumes on Boulevard Fosse-Crahay during peak times while reclaiming underutilized spaces for vibrant public use. By integrating sustainable mobility principles, we aim to enhance accessibility for all users, promote alternative transport modes and reduce car dependency without compromising functionality. In addition to improving traffic flow, our proposal focuses on introducing dynamic and creative urban features. By transforming the reclaimed spaces around the intersection, we aim to enhance the quality of life for residents, making the area a model of sustainable, inclusive and visually attractive urban design. Our plan also includes targeted updates to pedestrian and cycling infrastructure, innovative parking solutions and the integration of new community-focused amenities, ensuring a holistic transformation of the neighbourhood.

Key Results

The conversion of the roundabout into a controlled intersection simplifies traffic movement and reduces the confusion and hazards clearly visible with the current design that we observed during task 4. Intelligent traffic control systems will dynamically adjust signal timings based on real-time traffic volumes, ensuring smooth and efficient flows across all approaches. This system will alleviate peak-hour congestion from Bd Hector Denis onto Boulevard Fosse-Crahay and nearby routes, significantly enhancing commuter experiences. Furthermore, by reducing the footprint of the intersection, we reclaim valuable land along its periphery. These newly available spaces will be transformed into pedestrian-focused green zones with planter pots of herbs and vegetables for urban agriculture, walking paths and interactive elements. These enhancements create a welcoming environment for residents and visitors, turning the intersection into a vibrant hub rather than merely a transit node. The reclaimed spaces around the intersection will be reimaged as dynamic public zones. One of the standout features is the introduction of shaded play areas for children and small-scale community gathering spots. By incorporating tactical urbanism principles, such as colourful street art, urban agriculture and modular seating arrangements, these spaces will become focal points for social interaction and neighbourhood pride. Wide, accessible sidewalks will flank the redesigned intersection, with clearly marked pedestrian crossings and raised safety zones at key points. The integration of greenery and tactile paving enhances usability for individuals of all ages and abilities. These improvements ensure that pedestrians are not only accommodated but prioritized in the overall design. A unique addition is the seamless integration of existing cycling infrastructure into a comprehensive network. The single bike lane on Boulevard Hector Denis will be expanded into a two-way cycle path extending along Boulevard Fosse-Crahay and connecting to the E313 bike route. This cohesive network provides cyclists with direct and safe routes to major destinations, encouraging a modal shift from cars to bicycles. Protected lanes and green buffers ensure that cyclists feel secure and comfortable, fostering a culture of active mobility. To balance accessibility with the goals of reducing car dependency, parking solutions have been rethought with innovation. The for-sale lot at Boulevard Fosse-Crahay 232 will be developed into a structured parking facility to address overflow demand from events and cemetery visits. A limited number of designated parking spaces will also be included within the landscaped zones, ensuring that essential parking needs are met without detracting from the area's aesthetic and functional appeal. Rue des Cotillages will be transformed into a semi-pedestrianized residential street through the strategic placement of smart bollards. This allows for controlled access by residents and essential vehicles while reclaiming road space for community activities. Despite the incline, parts of the street will be adapted for versatile uses such as children's play areas, pop-up markets, or small-scale seasonal events. Public EV charging stations will be installed at Boulevard Hector Denis, catering to residents in apartment complexes without private chargers. By promoting electric vehicle use, this measure aligns with the broader objectives of sustainability while addressing the practical needs of the community.

Enhancements to the Neighbourhood

A standout feature of the redesign is the emphasis on green infrastructure. Native trees and shrubs will be planted along the edges of the intersection, creating a buffer zone that absorbs noise and improves air quality. These green spaces serve dual purposes: enhancing the visual appeal of the area and providing environmental benefits, such as reducing heat island effects. A new café near the intersection will serve as a social and cultural focal point for the neighbourhood. This amenity not only brings vibrancy to the area but also provides a meeting space for residents and visitors. Surrounding the café, modular seating and shade structures will encourage people to linger and interact, fostering a sense of community. To ensure the space remains lively and adaptable, tactical urbanism strategies will be employed. Temporary installations such as art displays, seasonal decorations and interactive features like pop-up play zones will keep the area engaging and responsive to the community's evolving needs. Protected cycle paths and wide, accessible sidewalks will be integrated into the traffic space, ensuring the safety and comfort of non-motorized users. Clearly marked lanes, dedicated bike signals and raised crossings reduce conflicts between cyclists, pedestrians and vehicles particularly in high-traffic areas. Rue Haut-des-Tawes will be removed from the main intersection and rerouted to connect with Rue des Cotillages. This simplification reduces the scale and complexity of the intersection, making it safer and more efficient for all users. Additionally, the space formerly occupied by the roundabout's central island will be repurposed, adding functionality and visual interest to the area.

Reflection

The second proposal for Sainte-Walburge demonstrates the potential of innovative urban planning to address mobility challenges while enhancing the quality of life for residents. By converting the roundabout into a controlled intersection, we believe we can achieve a safer and more efficient traffic flow. The integration of smart traffic systems, connected cycling infrastructure and more intense pedestrian-focused design creates an environment that prioritizes sustainability and inclusivity. The reclaimed spaces around the intersection are not just byproducts of the redesign, rather they are intentional and transformative elements that serve as community assets. From shaded play areas and green buffers to a vibrant café hub, these features redefine the area as a destination rather than a transit point. By implementing this holistic plan, we create a Sainte-Walburge that is safer, greener, and more connected, setting a benchmark for sustainable urban development that balances functionality with community well-being.

Concluding Remarks

Our journey through the mobility challenges and opportunities of Sainte-Walburge has been a transformative process. It pushed us to move beyond theoretical planning and immerse ourselves in the nuanced realities of urban life. This reflection synthesizes insights from all tasks, weaving together the technical, cultural, and human dimensions of our work into a cohesive narrative of learning and discovery. From the outset, Sainte-Walburge's character, a vibrant yet constrained neighbourhood challenged us to rethink what it means to design for people. The steep terrain and dense urban fabric shaped not just mobility patterns but the lived experiences of residents. Our work on Task 1 highlighted the systemic challenges faced by the area: narrow streets, inadequate public transport, and a reliance on private cars. This foundation provided the lens through which we analysed the neighbourhood's broader needs and potential. In particular, the public transport inefficiencies along Rue de Campine, observed during Task 1, emphasized the human toll of congestion. It wasn't just data points; it was parents rushing their children to school or older residents navigating unsafe sidewalks. These reflections anchored our commitment to making mobility equitable and accessible.

The analysis in Task 3, using Telraam data, revealed the dominance of car traffic in Sainte-Walburge. However, the technical limitations of the tool such as its inability to accurately capture pedestrian and cyclist activity on steep inclines, reminded us of the value of manual observation. This was evident during our field visits for Task 4, where we witnessed firsthand the gaps in automated data collection. Combining quantitative tools like Telraam with qualitative, on-the-ground insights became a recurring theme in our methodology. For instance, our manual counts on Rue des Cotillages highlighted significant discrepancies in recorded traffic flows. This nuanced understanding informed our subsequent recommendations, ensuring they were grounded in reality rather than abstract averages. Tasks 6 and 7 allowed us to propose interventions that responded to both immediate challenges and long-term aspirations. The proposed redesign of Node 13's roundabout into a controlled intersection reflected our focus on safety and efficiency. This solution wasn't just about traffic flows; it was about reclaiming the space for pedestrians and cyclists, ensuring they had equal priority in a traditionally car-dominated environment.

Similarly, our dynamic parking management proposal reflected the tension between bold ideas and practical constraints. While dynamic pricing offers a powerful tool for reducing congestion, it also raises ethical questions about accessibility for low-income residents. These dilemmas forced us to think critically, adapting our proposals to include reduced-cost permits for locals and reinvesting revenues into public transport infrastructure. Sainte-Walburge's topography posed significant barriers to walking and cycling, as explored in Task 2. Yet, this challenge became an opportunity to innovate. The introduction of protected bike lanes and electric-assist cycling routes particularly on steep streets like Montagne Sainte-Walburge, showcased our commitment to inclusive design. Similarly, the inclusion of buddy benches along key pedestrian routes wasn't just a technical solution; it was a nod to the social and intergenerational fabric of the neighbourhood.

In Task 8, our mobility plan expanded on these ideas, emphasizing the integration of cycling infrastructure with public transport hubs and residential zones. This multimodal approach aimed to reduce car dependency while fostering a culture of sustainability. One of Sainte-Walburge's defining features is its dual identity as a residential neighbourhood and a transit corridor. This duality became a central theme in our work, particularly during the analysis in Task 5. Understanding how regional flows intersect with local needs was critical. For example, the heavy through-traffic generated by the E25 and E313 motorways highlighted the importance of balancing connectivity with liveability. Throughout this project, collaboration was a driving force. Debating solutions, such as the feasibility of pedestrian-priority zones or the reorganization of car flows, often led to innovative outcomes. For example, transforming Rue de Cotillages into a safer, pedestrian-friendly street was the result of blending technical insights with creative thinking. The integration of urban agriculture projects at key intersections further illustrated how mobility planning can contribute to community building and environmental resilience.

Key Lessons and Broader Implications

Looking back, several key lessons emerge:

1. **Holistic Planning:** Effective urban mobility solutions require integrating data, policy, and lived experiences.
2. **Flexibility and Adaptation:** The iterative nature of planning, refining proposals based on constraints and feedback is essential for meaningful change.
3. **Equity as a Guiding Principle:** Prioritizing the needs of vulnerable groups, from low-income residents to older adults, ensures that planning benefits everyone.
4. **The Power of Visualization:** Thematic maps and diagrams were invaluable for communicating complex ideas.

A Vision for Sainte-Walburge

Ultimately, our work reaffirms the transformative potential of thoughtful urban planning. Sainte-Walburge is more than a set of mobility challenges; it is a community with immense potential. By addressing systemic issues like car dependency and underdeveloped soft mobility infrastructure, our proposals aim to create a neighbourhood that is vibrant, connected and will hopefully thrive as time goes on. This final reflection encapsulates not only the technical achievements of this project but also the human stories and aspirations that shaped it. As planners, we leave this experience with a deeper understanding of the complexities of urban life and a renewed commitment to designing cities that prioritize people, equity and sustainability. Sainte-Walburge has taught us that meaningful progress is possible when bold ideas meet grounded, empathetic planning. To conclude this journey, we felt that this fitting adage really encapsulates what we have learned, cities are not just made of streets and buildings; they are built on the dreams, struggles, and connections of their people. To plan for a city is to plan for its soul.

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