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WALKABILITY ALONG THE BUSSVEI

Perspectives from the stretch in Mariero, Stavanger

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Abstract

The urge to reduce the environmental impacts from transportation has induced several authorities worldwide to implement cleaner and efficient modes to travel around the cities. In the urban agglomeration of North Jæren, counting with 263,750 inhabitants as of 2021 (Hass-Klau, 2015; SSB, 2021) and headed by the city of Stavanger, dependency on individual cars is more than the Oslo, Bergen, and Trondheim, the three main urban areas in Norway (Grue et al., 2021, p. 43). Individual cars are still the primary mode of transport of 52% of commuters in North Jæren, 39% in Oslo, 49% in Bergen and 44% in Trondheim urban areas (Grue et al., 2021, p. 43). In the other hand, the public transportation in North Jæren shows low usage, counting only for 9% of commuters, face to 23% in Oslo, 15% in Bergen and 11% in Trondheim.

Often neglected, walking as a transport mode represents an opportunity to improve environmental performance in urban areas. Walking is cheap, clean, flexible and contributes to improving health conditions. The mobility by foot in North Jæren represents 20% of the overall transport mode share, lower than Oslo, Bergen and Trodheim urban areas, which are 24%, 21% and 25% respectively (Grue et al., 2021).

The *Bymiljøpakke* (Urban environment) is a package of incentives installed to face the challenge of turning urban mobility greener in North Jæren. The most notorious project thereby funded is the Bussvei, a bus rapid transit solution seeking to encourage more people to travel on public transport through faster and more frequent bus rides. However, some questions arise over this project in connection to the environmental quality it provides to pedestrians.

Well-established authors in Urban Studies, such as Jane Jacobs and Jan Gehl, have previously regarded the negative impact for urban walkability brought by major road improvements, like

these proposed by the Bussvei's design. Also, recent studies regarded the *sine qua non* biding between walking and access to public transit. In the light of these questions, this thesis aims to understand how pedestrians use and experience the pedestrians' structures within the structures of Bussvei.

Mariero, a commercial centrality in Stavanger, was chosen as a study case, where it lies a stretch of the Bussvei. First, environmental indicators and urbanistic features to which pedestrians are exposed were explored through spatial analysis along the Bussvei stretch in Mariero. Next, the usage pedestrians do of Bussvei structures was studied through direct observation, followed by behavioural mapping over three bus stops in the area (Eikeberg, Mariero and Lyngnesveien). Afterwards, the questionnaire permitted to identify how pedestrians experience the Bussvei.

Some weaknesses in the urban landscape in Marrero were found that eventually hold back the effort to encourage people to walk more. There is room to improve crossing possibilities, bus stops and attractiveness of façades and green elements.

Key words: Bus Rapid Transit, Mobility, Urban Planning, Universal Design, Walkability.

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To my husband, Stig-Tore, thanks for everything. Thanks for going to the field with me to gather data. Thanks for acting as a refuge whenever I felt insecure.

“Vulnerability is not winning or losing; it's having the courage to show up and be seen when we have no control over the outcome. Vulnerability is not weakness; it's our greatest measure of courage.”

Brené Brown

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Introduction

Among the efforts to mitigate the threats of climate changes, urban mobility projects perform the role of allowing the transit inside the cities in an efficient way and imply the minimal environmental impact as possible. The efficiency means, in general terms, the reduction of time spent in commuting, accessibility and coverage of the public transit system, and other incentives to bring the commuters to use the collective transport instead of individual automobiles. Regarding the environmental impact, the efforts have focused on offering transportation mods with low or zero emission of carbon and other GHG[1]. These efforts consequently include the reduction of other indicators, such as land use and noise pollution.

The European Commission is currently in the vanguard of mobilization towards the climate changes action plans. The member countries to this regional agreement compromised to reduce up to 40% of GHG emissions until 2030, referenced from 1990 (European Commission, 2021). The countries on the agreement also ought to produce at least 32% of their energy renewably and improve at least 32.5% of their rates of energy efficiency (European Commission, 2021). Norway participates in the effort with its neighbour countries, even not being a member state of the European Union.

In that sense, Norway has a big challenge to reach the goal of 40% less GHG emissions compared to 1990. In 2019, the country produced 51.09 million tonnes of GHG, only slightly lower than the year 1990, when Norway produced 51.43 million tonnes of GHG (Miljøstatus, 2021). In addition, the year 2020 also represented a smooth fall in GHG emissions, calculated at 49.3 million tonnes (Miljøstatus, 2021). However, this decrease was most likely a consequence of the COVID-19 pandemics. The transport sector, in special the road transport

[1] Greenhouse gases

sector, contribute heavily to the Norwegian GHG emission. In 2020, the road transport sector corresponded to 17.04% of emissions total (Miljøstatus, 2021). Therefore, a strategy to decrease GHG emissions must turn the road transport of people and goods more renewable.

However, one cannot affirm that Norway has not made any progress in that sense. Research broadcasted by the World Economic Forum says that 74.8% of cars sold in Norway in 2020 are plug-in electric (Richter, 2021), which are emission-free. But, while driving emission-free vehicles can help reduce direct GHG emissions, it holds back ancient urban traffic problems.

Therefore, an ideal green mobility strategy would not regard the GHG emissions solely by private cars but ultimately improve urban mobility with the lowest possible impact. For example, a city that incentivizes its inhabitants to walk for their mobility needs goes towards the overcoming of several environmental, health and urbanistic issues. As the World takes over a fight against climate change, it lies over local authorities' workloads the development of strategies and structures that allow and encourage people to adopt more sustainable ways of transportation. And no mode of transportation is more sustainable than using our human capacities to travel by walking.

North Jæren, the 3rd most populous urban area in Norway, is currently working on strategies to convert its mobility more efficient and greener. The region consists of the municipalities of Randaberg, Sandnes, Sola and Stavanger, all located in the county of Rogaland. The effort of concerned authorities on these municipalities and the county to improve the environmental performance in North Jæren resulted in the creation of the *Bymiljøpakken*, a package of strategies and measures to impulse green mobility. In fact, North Jæren urban area performs under the standards of the other main urban areas in Norway. Table 1 shows the mode of transport share among these regions.

Table 1: The national travel habits survey for Norway, 2018. Retrieved from Grue et. al. (2021)

	By walk	Cycling	Individual car	Car passanger	Public transport	Motorbikes and other	Total
Oslo area	24	5	39	8	23	1	100
Bergen area	21	3	49	10	15	1	100
Trondheim are	25	8	44	10	11	1	100
North Jæren	20	7	52	10	9	1	100

The share of people who walk or take public transport in North Jæren is the lowest among Norway's four most populated urban areas. Only 9% of residents of North Jæren use public transport for their daily travels. The Bussvei, figuring among the principal projects within the package, and can help to overcome this trend. *Bussvei* means the busway in Norwegian, and as it may suggest, it consists of a bus rapid transit system in the cities of North Jæren. This system consists of exclusive bus lanes and boarding platforms to facilitate fare collection and access to the buses (Cervero, 2013).

However, it is crucial to mind that every travel by public transport starts by walking. In other words, a public transport ride includes pre- and post-ride elements, which is usually completed by walking but not only. Moreover, when it concerns urban bus lines, it is more common for people to reach the bus stops by walking, which corroborates the argument that walking structures must be regarded while planning a public transport service (Hillnhütter, 2016).

In addition, the upgrade of roads, even if it is to fit in exclusive lanes for buses, is regarded with criticism (Jacobs, 1965; Gehl, 2010). Straightening and widening roads are processes that not rarely result in the demolition of houses and loss of spaces in gardens and sidewalks. The suppression of these elements might decrease pedestrians' attractiveness to walk through an area.

Implied by the criticism over the Bussvei and the potential to deteriorate the urban landscape where it crosses, this thesis copes with the attempt to study how people use and experiences the urban structures that make up the Bussvei. These structures (e.g., sidewalks, crossings, bus stops, underpasses) serve those who are going to access or leave the public transport and people who cross the area by walk. Picture 1 shows the urbanscape of the Bussvei in Mariero. That stretch of the Bussvei consists of central lanes exclusive to bus traffic. Trees, light poles, and bus stops lie in intermediate areas between bus and common traffic lanes. Cycling lanes were delimited between common traffic lanes and sidewalks. Through this picture, one can reflect if the features of this urbanscape looks attractive for pedestrians.

Picture 1: Urbanscape observed by Mariero, in Stavanger. Photo by Vieira (2021c).

Theoretical and specialists have been discussing which elements[2] affects the usage and experience of streets and walking paths by pedestrians. It includes in the scope of the present study to compile which elements of urbanscape are relevant to the study of Bussvei. Commonly, one might think over the aesthetical aspect, safety, accessibility, and other features that matter on personal perspectives as a pedestrian. Works developed by Hass-Klau (2015) and Hillnhütter (2016), however, studied the walkability over multiple cities to identify in depth which features of urbanscape affect the pedestrians' experience.

The features identified through the theoretical review base the spatial analysis. The spatial on the scope of this thesis consists of the study of geospatial data that affect the quality of the environment in which pedestrians travel along the Bussvei. Some of them could be retrieved

[2] Consider "feature" and "element" as synonyms.

through geospatial data portals of Norway, others mapped manually and vectorized through a GIS-tool afterwards.

To understand the pedestrians' usage and experience of the Bussvei, survey methods as behavioural mapping and questionnaire were respectively employed. Behavioral mapping allows to analyse in detail, for example, which structures are preferred by pedestrians and which are somehow avoided. On the other hand, the questionnaire enables a qualitative analysis of how pedestrians rate their experience in features such as bus stops, crosswalks, etc.

The choice of the region of Mariero was made as it represents an important commercial center for Stavanger and North Jaren. There, the Bussvei section was completed a few years ago, which allows for a consolidated perspective of its visitors. Therefore, three bus stops were selected to conduct the surveys to understand the walkability in this region: Eikeberg, Mariero and Lyngnesveien. Furthermore, indirect observations and questionnaires applied near the selected bus stops identified possible elements of discontentment on pedestrians walking through the Bussvei.

The discussion presents the information obtained in the study area through the research, as opposed to what is expected from an adequate and attractive structure for pedestrians. Thus, It is hoped to inspire improvements in the current structures of Bussvei, those that are under construction, and those still being sketched.

A walkable city

The abundance of automobiles in urban areas as the favoured way to travel requires extensive use of resources and space, leaving behind the efforts to provide structures for other modes of transportation. The preference and priority given to automobiles are due to the increased speed and commodity of transportation of people and goods. Since then, engineers have projected wider roads to improve the speed and travel time, besides the volume of traffic.

Jane Jacobs regarded this process as the "erosion of cities" (1965). As erosion, the author refers to the increasing of urban space dedicated to vehicular traffic in detriment of sidewalks, parks, squares, among other structures where people perform their activities in a city. According to (Jacobs, 1965, chapter 18, § 53)[3],

> "(…) Because of vehicular congestion, a street is widened here, another is straightened there, a wide avenue is converted to one-way flow, staggered-signal systems are installed for faster movement, a bridge is double-decked as its capacity is reached, an expressway is cut through yonder, and finally a whole web of expressways. More and more land goes into parking, to accommodate the ever-increasing numbers of vehicles while they are idle."

In addition, the erosion of cities is a cumulative process, according to Jacobs (1965). For example, as a road enlarges in width, more drivers will use their automobile, resulting in more reservation of land to the enlargement of roads.

The reduced space for pedestrians resulted from the space taken from sidewalks, and the segregation of blocks and even neighbourhoods by the large roads will create, therefore

[3] The symbol § refers to the paragraph number, counted from the beginning from the chapter. Being the retrieved material an e-book, the page numbers change according to the font size used. Being not proper to use for references.

depressing urban districts. The emblematic cases from the North American cities of Los Angeles, Detroit and New York, during the decades of 1940-1950, were brought as examples by Jacobs (1965, chapter 18, § 60-63). Certain districts in these cities were becoming "less lively, less convenient, less compact, less safe, (…)" (Jacobs, 1965, chapter 18, § 65) as crossing streets became more dangerous and long, sidewalks became thinner, and buildings that before hosted residences and commercial units had to give place to parking lots.

The reality of these large North American cities may seem rather different from the Bussvei built between the boroughs of Hillevåg and Hinna. The context is indeed different. During the years 1940 and 1950, the automobile industry was an important absorber of workers and has received subsidies for its expansion. As more cars were being produced and sold, more roads were provided, and then a stage of cities eroding was being set. Not less important, the issue of carbon and other GHG[4] emissions sharply increasing would also be added to the list of problems the city planners of nowadays need to deal with.

In that sense, the Bussvei arose as a solution for improving the public transport systems of the North Jæren urban area. It tries to convince more commuters to ride on buses through its premises of shorter travel-time and higher frequency. More people riding on collectives generally means fewer people using private cars. However, the Bussvei required an enlargement of roads to fit in two extra lanes of exclusive bus traffic in the middle of the road. Figure 1 shows the stretch of the Bussvei by Eikeberg stop, looked from above before its construction and after.

[4] Greenhouse gases.

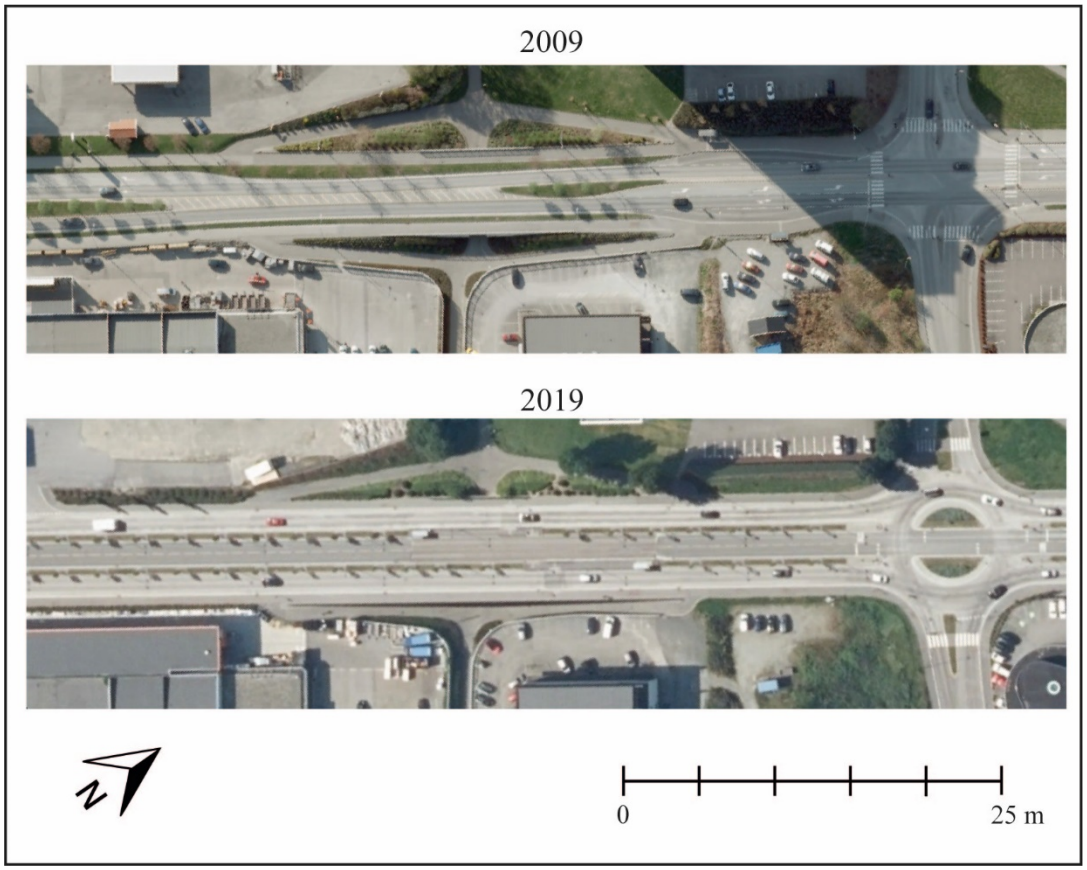


Figure 1: Comparison of Eikeberg bus stop between 2009 and 2019, before and after the Bussvei construction, respectively. Orthophotos retrieved from Norgedigitalt (2021b). North arrow retrieved from OpenClipart (2017).

Here one can notice that the common traffic lanes have been straightened, occupying the former bus pockets and green barriers between sidewalks and the road. These were, therefore, wholly suppressed. There was a reduction in the sidewalks' width. The building of exclusive bus lanes was over traffic islands, and the placement of passengers' platforms was between common and exclusive bus lanes. Previously, the placement of bus stops was directly on the sidewalks, adjacent to their respective bus pocket.

The transformations here described fit, therefore, in the description of a city erosion process. Bus and common traffic lanes have consumed some spaces for pedestrian traffic and transformed the shape of green elements along this stretch of road. According to Gehl (2010,

part 4.2, § 11), “an important prerequisite for a comfortable and pleasurable walk is room to walk relatively freely and unhampered, without having to weave in and out and without being pushed and shoved by others”.

While Jane Jacobs bring the aspects of how damaging can road enlargements cause on cities (1965), Jan Gehl introduces some relevant aspects to be regarded in a good city for walking (2010). In short, the author defends that pedestrians are prone to walk freely, straight, uninterrupted, at the same level and over smooth surfaces. That would mean that crowded, curvy, obstacles-filled and rugged-pavement paths are not interesting for pedestrians (Gehl, 2010) .

Gehl highlights that people will be prone to walk if, among other reasons, attractive façades enrich their view. (2010, part 4.2, § 34-36). In addition, by walking at the same level, the author presents regards as stairs functioning as psychological barriers and defending the “use of pedestrians bridges and underpasses as last resorts” , being ramps the recommended resource, for providing easier access to different levels for people with reduced mobility. Also, having pedestrians’ paths available all year round is an essential condition for a good city to walk (Gehl, 2010, part 4.2, § 47-48). This availability concerns, for example, de-icing and snow removal for pedestrians’ paths and sidewalks, as they are more vulnerable to accidents due to slippery conditions, in addition to illumination good enough so the users of a walking path can perceive any source of risk when it is dark (Gehl, 2010, part 4.2, § 47-48). In this last case, it is missing features for people with visual impairment that require special devices to perceive the environment by touching surfaces and hearing signals.

These two perspectives enable one to start reflecting on how walkable the structures for pedestrians’ use are designed and built along the Bussvei, in addition to other adjacent elements that composes the ambience of the Bussvei in Eikeberg, Mariero and Lyngnesveien areas.

However, it is not yet fully clarified the concept of walkability. Besides Gehl perspectives, other authors have focused on what cities, neighbourhoods, blocks, or streets good to walk are like (Ewing & Handy, 2009; Frank et al., 2010; Hass-Klau, 2015; Hillnhütter, 2016; Knapskog et al., 2019; Lo, 2009).

What is walkability?

"Walkable (adjective):

1. (of an area or route) suitable or safe for walking.

    'a walkable neighbourhood'

    1.1. (of a destination) close enough to be reached by walking.

    'this hotel is walkable from the bus station'"

(Oxford, 2021)

This Oxford dictionary's entry tells that the noun walkability derive from the adjective walkable (Oxford, 2021). Therefore, walkable is a value attributable to an object used to walk. Defining the suitability, safety and accepted distance for walking, however, has not yet reached a consensus in the academia (Ewing & Handy, 2009; Frank et al., 2010; Hass-Klau, 2015; Hillnhütter, 2016; Knapskog et al., 2019; Lo, 2009).

The walkability study of an area or route can assume different perspectives. Hillnhütter (2016), for instance, studied the views of walking to public transport. According to the author, as a mobility choice, the public transit modal should be understood with the walking component to reach the boarding structures and leave them towards the destination. Travelling on public transit includes a walking part in most cases or cycling and riding on a scooter at a more minor degree if the trains, buses or ferries are adequate to go onboard with them. Even if there is a third modal in the discussion, for example, driving to a certain point and taking the bus, train, or ferry closer to the destination (Hillnhütter, 2016).

Other studies will focus on the health aspects of walking, testing in-depth psychological and physiological reactions from pedestrians while walking and receiving immediate stimuli from their surroundings (Frank et al., 2006; Morency et al., 2011; Owen et al., 2007). For example, the study of (Frank et al., 2006) assumes metrics as BMI[5] and heart-beating rates resulting in how active residents of a given neighbourhood are regarding its walkability. These health aspects of walkability are indeed important but go beyond the scope of this thesis.

From urban planning and urban design perspectives, the literature's prospection of urban elements that establishes suitable and safe standards is more relevant. For example, some of the features cast by Gehl (2010) would highlight the presence of obstacles and detours, the road geometry, how access to different floor levels is possible, the smoothness of pavement, winter maintenance and illumination as the main items to reach the standard of a good city to walk. These elements were somehow incorporated into the methodology of this thesis, as it meets similar standards.

The walkability context of Stavanger, for instance, has been already object of some studies (Hass-Klau, 2015; Hillnhütter, 2016; Hjortol, 2016; Müller-Eie & Alvarez, 2019; Rynning et al., 2020). The studies of Hass-Klau (2015) and Hillnhütter (2016), for instance, contain summaries of how to evaluate the quality of structures for walking, which included Stavanger as one of the compared elements to identify their essential elements to reach the list of features to observe in field-work.

[5] Body Mass Index

How walkable is a city?

Hass-Klau (2015) has studied the conditions given to pedestrians in cities all over North America and Europe, including Stavanger and other cities of the Nordic countries. For example, in her analysis of Stavanger, she presented a somewhat positive perspective over the promenade along the coast in the city centre and the car-restraint historical core. The author, however, was displeased by the underground passages present all over the city, providing crossing possibilities under busy roads (Hass-Klau, 2015). According to her:

> "The underpasses are too steep and uncomfortable to use as they were applied at very busy roads (Kannik gata), which cuts a residential area in half, they act even more as barrier than traffic light junctions would." (Hass-Klau, 2015, chapter 11, § 75).

As she criticizes the option of providing underground crosses in Stavanger, Hass-Klau (2015) reunited other characteristics that imply the promotion of walking in the cities. Figure 2 summarizes these characteristics, which the author concluded after studying walking conditions over 26 cities across Europe and North America.

The author considers three of these characteristics non-essential but playing indirect roles in pedestrians' experiences of streets. The population density implies shorter distances to reach commerce and services and more concurred or absent possibilities to park a car (Hass-Klau, 2015). Concerning the climate, one may first think that cities more vulnerable to bad weather do not score high in quality of walking. Still, cities experiencing heavy rainfall, strong winds, scorching heat, or freezing temperatures may attenuate these conditions with architectural and urbanistic solutions (Hass-Klau, 2015). And then the road geometry. The author argues that straight paths measuring over 1km can cause some boredom on pedestrians if no other elements

such as façades, street furniture, monuments or trees are present along the way. The author, however, reinforces that curvy roads are not attractive by themselves, by "(…) not necessarily encoura(ing) more walking but may account(ing) for a more appealing stroll"(Hass-Klau, 2015, chapter 15, part II, § 38).

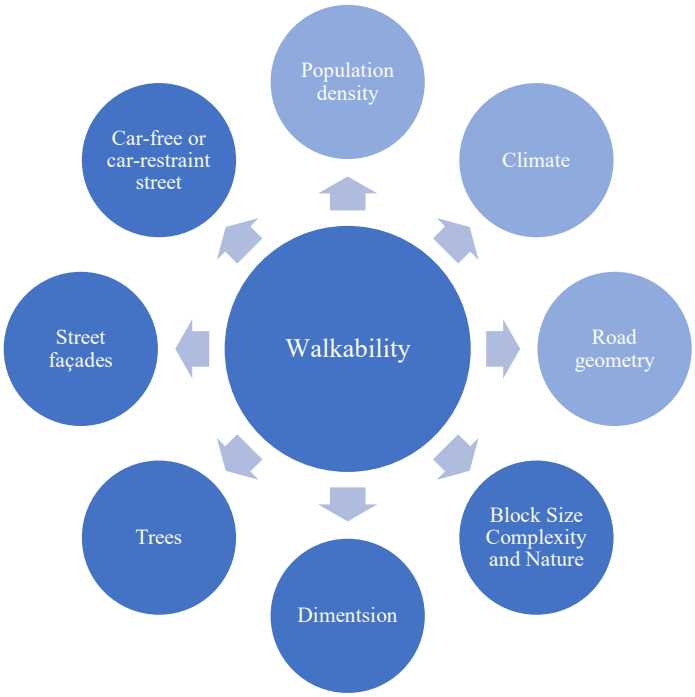


Figure 2: Factors corroborating to good walkability standards, according to Hass-Klau (2015, chapter 15, part II). Adapted from Hass-Klau (2015). Those in light color are considered not essential by the author.

Among the essential factors, the first one concerns the block complexity and nature, which in combination with the road geometry, correspond to the general physical aspects of the street the pedestrian is walking in (Hass-Klau, 2015). The pedestrian, according to Hass-Klau, is generally stimulated by the variety of elements on the reach of their sight (2015). Furthermore, water bodies and rocky outcrops can, for example, count as other natural features that enriches the pedestrian sensory experience. More about the built environment, the author mentions the

abundance of street intersections as more attractive for the human eyes than endless streets (Hass-Klau, 2015).

The second aspect is the dimension, basically the relation between vertical and horizontal dimensions (Hass-Klau, 2015). For example, one might feel like walking in a deep trench while walking on a narrow road surrounded by tall buildings, often blocking the sunlight most of the day and trapping down polluted air. On the other hand, feelings of desolation and vulnerability may be experienced by those walking on a wide road, relatively away from shelters provided by trees, street furniture, or buildings. shelters provided by trees, street furniture, or buildings.

The third elements are the trees. So far, the trees have had recognition for their importance in the quality of walking structures in different regards. However, according to Hass-Klau (2015), it is crucial to consider that trees are living beings and have their physiological demands. Therefore, when done indiscriminately, the plantation of trees can result in several problems. For example, roots can grow over the surface and crack the pavements around them, or branches or the entire trees can fall over during storms, causing damage to properties and representing threats to pedestrians (Hass-Klau, 2015). Whence, planting trees along streets requires a careful selection of species, so they can thrive in the environmental conditions at the same time by offering the expected benefits (Hass-Klau, 2015).

The fourth factor concerns the street façades. Hass-Klau (2015) argues that pedestrians often feel while walking by streets with enriched façades. The historical cores of many European cities are, for example, an object of interest for tourism. The streets of Paris, Amsterdam and Lisbon attract many tourists somewhat interested in experiencing their unique façades filled with small balconies and adornments around doors and windows. Elsewhere, tourists may gather positive experiences by food vendors by façades and showcases of shops. On the other

hand, monotonous façades bore pedestrians and may repel them from walking through paths without interesting features to amuse their view.

The fifth and last element is the restriction of car traffic in certain streets. The author identified the safety as one of the most important regards a pedestrians have while choosing their choices of way to go somewhere (Hass-Klau, 2015). Heavy car traffic poses risk to pedestrians and are responsible for other sources of discomfort, such as noise and air pollution. The restriction of circulation of vehicles are specially interesting for streets devoted to entertainment, restauration, and public assemblies, but arguably utopic for the entirety of cities. There are some strategies to turn streets with considerable vehicular traffic on more pedestrian friendly ones, like placing traffic calming and widening sidewalks.

Hass-Klau (2015) has also listed some factors that may prevent people from walk. Figure 3 synthesizes these elements that are source of unsafety and discomfort for pedestrians.

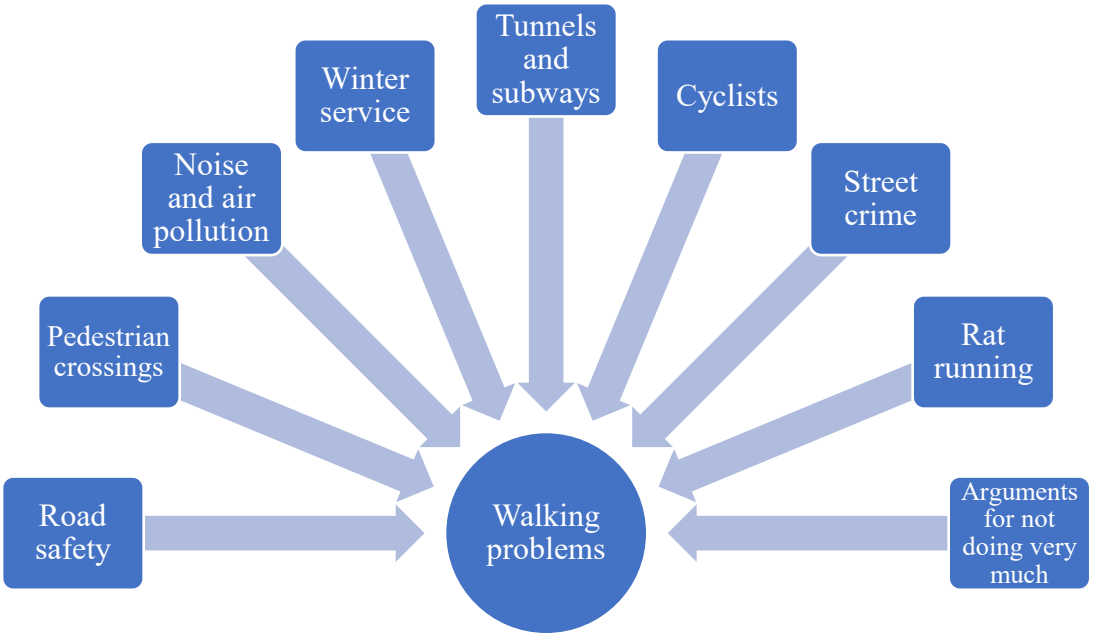


Figure 3: Sources of problems that affect standards of walkability, according to Hass-Klau (2015, chapter 15, part II). Adapted from Hass-Klau (2015)

The most important one is road safety. According to the author, that is not as serious in European cities as in North America, as the traffic's mortality rate is lower in Europe (Hass-Klau, 2015). However, pedestrians' vulnerability to bikes and cars is not neglectable. The main structures where pedestrians and the other road users encounter are on pedestrians' crossings, which is why the author emphasized these structures.

Pedestrians' crossings on the surface, conceived later as zebra crossings, are the most common structure while people cross streets in most western cities. The author argues about various debates about the limitations of street crossings considering traffic volume (Hass-Klau, 2015). However, where zebra crossings are present, they must provide good signalizing and visibility for all road users, besides mechanisms to reduce car speed and illumination during the night (Hass-Klau, 2015). Furthermore, pedestrians should not encounter barriers to access and leave zebra crossings, such as steps (Hass-Klau, 2015).

Noise and air pollution represent immediate discomfort for pedestrians and pose threats to human health over time (Hass-Klau, 2015).

Winter services mean removing snow and ice from the sidewalks and paths, so the risk of injuries reduces (Hass-Klau, 2015). Therefore, cities with frequent snowfall in the winter are more likely to provide these services with more quality. In contrast, in cities where the snowfall is occasional, the removal of ice and snow might occur more slowly and imply a higher risk for pedestrians, especially children and elders.

Underground passages and tunnels for pedestrians must be built and kept with particular regard (Hass-Klau, 2015). This is because pedestrians are likely to experience the environment more closely than other road users. For example, a cyclist must spend a few seconds going through an underground passage, while people walking at a slower pace takes more time, and therefore will pay more attention to details and feel affected whenever these details are a source of concern or discomfort. Besides, where these underground passages and tunnels requires steep ramps or stairs to be reached, these represents extra barriers.

Cyclists also pose threats to pedestrians as they move faster and might not be able to stop the bikes in advance to avoid an accident. It is, therefore, essential to reserve separate spaces for cyclists and pedestrians on the roads and encourage cyclists to mind pedestrians where they need to share roads (Hass-Klau, 2015).

Street crime, for instance, can also be considered a significant source of concern for pedestrians, even though at a lower level in European cities (Hass-Klau, 2015). However,

even in cities considered safe, women, children, and elders are vulnerable to harassment and theft. They are more likely to occur at night and in places with weak surveillance.

Rat running does not mean unpleasant encounters with rats on the streets as it might suggest, but rather traffic from main avenues being deviated to minor residential streets (Hass-Klau, 2015). Children and pets normally walk around and play on these minor roads and are vulnerable to accidents whenever more cars passing by at higher speeds, seeking alternative routes from congested avenues. Therefore, the road grid must be conceived to do not allow these shortcuts on residential area.

The ultimate element that prevents people from walking is rather behavioural. According to the author, the "arguments for not doing very much" (Hass-Klau, 2015, chapter 15, part II, § 39). In this case, people would establish a repertory of excuses not to walk. Nevertheless, it does not regard pedestrians solely. Urban planners and managers may use alibies, such as typical treacherous weather or hilly terrain, to not implement policies to improve walkability.

As Hass-Klau (2015) summarized the features for observations of the structures for pedestrians, Hillnhütter (2021) created a matrix that permits their evaluation. Table 2 permits the understanding of this matrix.

Table 2: Matrix for the classification, description, and evaluation of characteristics of the pedestrian environment. Made by Hillnhütter (2021). Retrieved from Hillnhütter (2021, p. 6).

Feature	Unattractive pedestrians' environment	Condition 1	Condition 2	Condition 3	Condition 4	Attractive pedestrians' environment
Car restrictions		Car-dominated, fast and many cars	Traffic calmed, compromised pedestrian priority	Very few or no cars, pedestrian priority	As condition 3 but more intense and dominant.	
Shops and services		Shops, shop windows and services < 3 doors per 100m	Shops, shop windows and services 3 – 7 doors per 100m	Shops, shop windows and services > 7 doors per 100m	As condition 3 but more intense and dominant	
Social activity		Walking, no stationary activities	More walking, necessary activities	Much walking, stationary and optional activities	As condition 3 but more intense and dominant	
Enclosure		Street width/building height 3:1 and >3:1	Street width/building height 2:1	Street width/building height 1:1 and <1:1	As condition 3 but more intense and dominant	
Edges, façades		Closed, passive, boring, horizontally structured	Somewhat closed, some variation	Transparent ground floor, varied, vertically structured	As condition 3 but more intense and dominant	
Streetscape appearance		Technical, compromised maintenance, no identity	Clean, fairly well maintained, somewhat boring	Designed, high quality materials, varied, strong identity	As condition 3 but more intense and dominant	
Green		No green	Three-dimensional green, trees	Well-designed greening with trees, scenic view, park	As condition 3 but more intense and dominant	
Quantified value		1	2	3	4	

On his environmental matrix, four out of seven features regarded by Hillnhütter (2021) match the other four of the five essential features described by Hass-Klau (2015). The features related to block complexity and nature designated by Hass-Klau may approach the one intended by Hillnhütter as streetscape appearance. Both features must regard the variety of building material and structure, but different somehow as Hillnhütter (2021) put regard on the maintenance and sense of identity.

Hillnhütter (2021) also listed two more features that Hass-Klau (2015) had not regarded: shops and services and social activity. According to Hillnhütter (2021), the presence of seven shops and showcases or more per stretch of 100m of street assign higher attractiveness for pedestrians. Also, streets that offer activities other than walking and necessary activities (e.g., reach the public transit) and enriched with social activities (e.g., sports practice, social gatherings) score high in attractiveness.

The matrix of Hillnhütter (2021) present a nearly complete framework to study the attractiveness potential of walking structures by pedestrians. However, it did not bring at his work published in 2021 regards to pedestrians' crossings, noise and air pollution, the problematic underground passages, eventual conflicts with cyclists, street crime and arguments. These sources of problems for pedestrians brought by Hass-Klau (2015) are proven to be pertinent, based on her studies of these issues over 30 different cities. For that reason and for the purpose of this thesis, these features must also be included in the analysis of walkability near the bus stops of Eikeberg, Mariero and Lyngnesveien.

Fortunately, the Norwegian Public Roads Administration (Statens Vegvesen) has established parameters for some of these features on their handbooks (Vegdirektoratet, 2014a, 2014b, 2014c, 2019). However, the grading system of Hillnhütter (2021) may be inadequate for defined parameters. According to the parameters for pedestrians' crossings, for instance, they…

> "(…) should have warning fields at start/end to clearly warn of danger when crossing a carriageway. An area of attention should lead to the pedestrian area by walking across the entire sidewalk"[6].
>
> (Vegdirektoratet, 2014c, p. 43)

[6] Open translation

Also, “a distance between pedestrian crossings outside intersections of at least 50 meters in densely populated areas and 150 meters outside densely populated areas is recommended.”[7] (Vegdirektoratet, 2014a, p. 29). Thus, the pedestrians’ crossings are built according to the standards or not. In other words, they can be adequate or not.

The Norwegian Public Roads Authority published a whole handbook setting standards to build pedestrians’ crossings (Vegdirektoratet, 2014a), besides other mentions on other similar documents (Vegdirektoratet, 2014a, 2014c, 2019). Therefore, verifying them on detail for the three bus stops’ surroundings can result in exhaustive analysis that extrapolates the scope of this research. Hence, whether they are present, wide enough, well signalized (e.g., marked on the pavement) and have no barriers for pedestrians (e.g., fences and steps) are what matters for the analysis of these elements.

There are limits that the human body can tolerate related to noise. For example, noises over 70dB limit what is considered comfortable for human ears, and over 110dB, permanent hearing damage may be caused (Holtebekk et al., 2020).

The underground passages are exceptionally problematic in the context of Stavanger. According to Hass-Klau (2015):

> “Stavanger has an adaptation of the Radburn layout, probably built during the 1970s (…). The Stavanger example is interesting because it is easy to observe what can go wrong with such a design. As the reader may remember, the Radburn design allowed pedestrians to cross busy traffic roads with the help of underpasses (…). The underpasses (in Stavanger) are too step and uncomfortable to use and as they are applied at a very busy road (Kannik gata),

[7] Open translation

> which cuts a residential area in half, they act even more as a barrier than traffic light junctions would."
>
> (2015, chapter 15, part II, § 31-32)

The handbook of "Road and Street Design" from Statens Vegvesen applied limits of how steep the ramps giving access to underpasses can be. Table 2 shows these limits of inclination, calculated according to the length and location of the underpass (Vegdirektoratet, 2019).

Table 3: Maximum climbing for pedestrians and cyclists. Retrieved from Vegdirektoratet (2019, p. 66)[8]

Climbing length (m)	Central areas	Outside central areas
< 3 m	8%	8%
3-35 m	5%	8%
35-100 m	5%	7%
>100 m	5%	5%

The conflict with cyclists mentioned before is a type of information that is more easily retrieved by asking pedestrians about their eventual experiences of being bothered by bikes while walking on sidewalks or paths. The same way information about street crime can be retrieved.

The analysis of the "arguments for not doing very much" features, in the other hand, require a research of institutional efforts and pedestrians' motivations to walk.

The landscape study includes analyzing environmental indicators and urbanistic features mapping to determine whether the natural and built landscape factors would encourage people to walk to their destinations instead of using other modes of transport. The ensemble of factors on this perspective is summarized on the environmental matrix of Hillnhütter (2021) with some

[8] Open Translation

other features identified by Hass-Klau (2015). Among these characteristics, data related to access, sense of security, enclosure, and greenery could be retrieved from public portals online to print them on maps (Directorate for Cultural Heritage, 2021; Norgedigitalt, 2021a; Stavanger Kommune, 2019; The Norwegian Mapping Authority, 2021). In addition, building density, pedestrian infrastructure, ramp inclination and green coverture maps may lead to an approach of the environmental quality experienced by pedestrians.

For the rest of the elements, such as facilities, social activity, edges and façades and street scape conditions, the direct observation could allow their recognition in the landscape and consequently their mapping. Some cases are visible by pictures, such as the characteristics of façades along the Bussvei stretch in Mariero, as well as the maintenance of pedestrians' structures. The results of this direct observation are impressed in the behavioural maps over the three bus stops' immediate surroundings. The behavioural mapping and the inputs from the questionnaire also aim to supplement in more detail all these characteristics.

More detailed methodologies employed in this study are further explained in the following chapter.

Methodology

This thesis, having the aim to understand how pedestrians use and experience the Bussvei structures, combines research methods to understand important concepts, establishing hypothesis and outline which elements should be observed and studied during the field work.

The first step is a literature review. At this step, a variety of written documents have been consulted to understand in relevant concepts for studying the urbanscape for pedestrians within the Bussvei project.

The features identified through this theoretical review base the spatial analysis. Some geospatial data are available on data portals of Norway, such as floor area ratio or noise pollution; others were mapped manually and vectorized through a GIS tool afterwards, like the presence of fences and placement of trees.

Also, fieldwork surveys were necessary to get specific data over the study area. Two different methods are employed: observations, resulting in a behavioural mapping; and a questionnaire, in which pedestrians were asked a list of questions inspired by relevant studies (Hillnhütter, 2016; International Transport International Transport Forum, 2012; Rynning et al., 2020).

The structure of this thesis was meant to understand the cohesion between facts, deliberative documents, academic discussions, statistics and public data and then empirical data. The main academics discussion, bringing in relevant concepts related to walkability, could be found in the previous chapter, the theory.

Due to the extension of bus corridors along several neighborhoods, it is not feasible to perform data collection on field in the scope of a master thesis. The direct observations would result in a huge pile of sheets, to be afterwards vectorized through GIS-tools, and the questionnaires would have to be asked by several people, in all the neighborhoods where Bussvei crosses.

This effort was, therefore, shortened to the surrounding areas of the Bussvei stops of Eikeberg, Mariero and Lyngnesveien, in which a single-student and an eventual help could cover alone.

The study case

The Bussvei, as a transport and mobility structure, manifests in the space as a linear feature. In other words, it establishes an axis that canalizes the bus-based public transport in semi-segregated lanes in order to provide a frequent and rapid offer of bus routes (Cervero, 2013).

The Bussvei structures lie on stretches of a vital transport axis in several neighbourhoods of Stavanger and Sandnes (Figure 4). Therefore, it is necessary to comprehend some dynamics occurring in the places where Bussveien crosses. By dynamics, one may assume the socioeconomic, environmental, and institutional aspects of these neighbourhoods. At this point, several questions emerged and guided the research. Questions like “what are the social profile of people living in the boroughs along with the Bussvei-along boroughs?”; “which deliberations and plans the development applies to these neighbourhoods?” may provide some overall perspectives to allow the understanding of possible public reactions towards the Bussvei project.

The context of the study resumed to the surrounding areas of Eikeberg, Mariero and Lyngnesveien infers that the spatial analysis, containing sociocultural, environmental, and urbanistic data, seems convenient to be circumscribed within 300 meters (Figure 5).

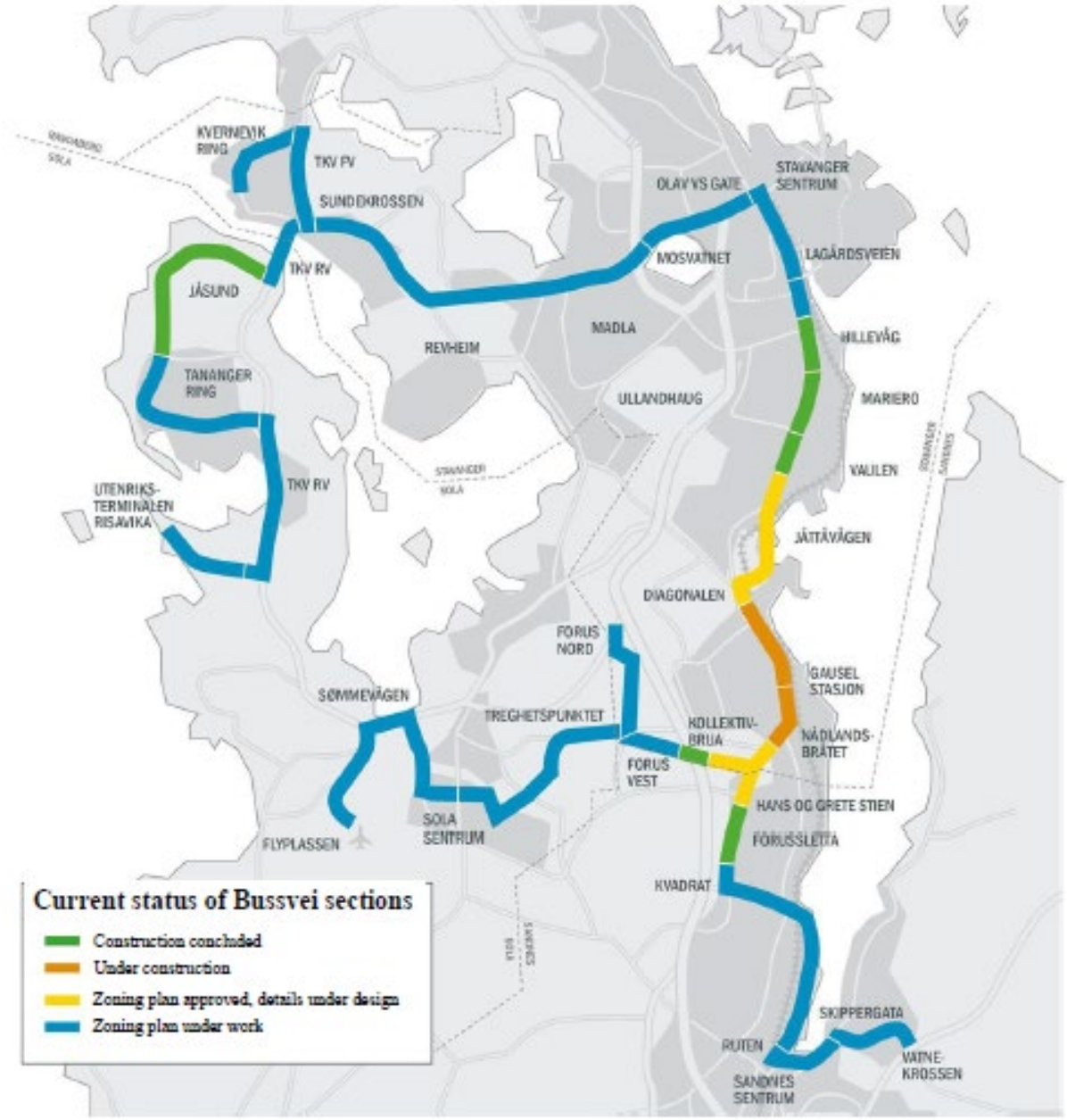


Figure 4: Bussvei stretches, as of November 2021. Map made by Rogaland Fylkeskommune (2021). Retrieved from Rogaland Fylkeskommune (2021)

This measurement derived from the guideline established on Walk Strategy for North Jæren (Jensen et al., 2017). It is important to highlight that the same document establishes a tolerable walking distance of 300m radius from and to ordinary bus stops and 500m for the Bussvei stops (2017, p. 13). For instance, the area within this distance that people are willing to walk to have access to the public transport can be conceived as catchment area. Based on the dense area

where the bus stops of Eikeberg, Mariero and Lyngnesveien are located, it is convenient for this study to define the catchment area in this study by 300 m radius.

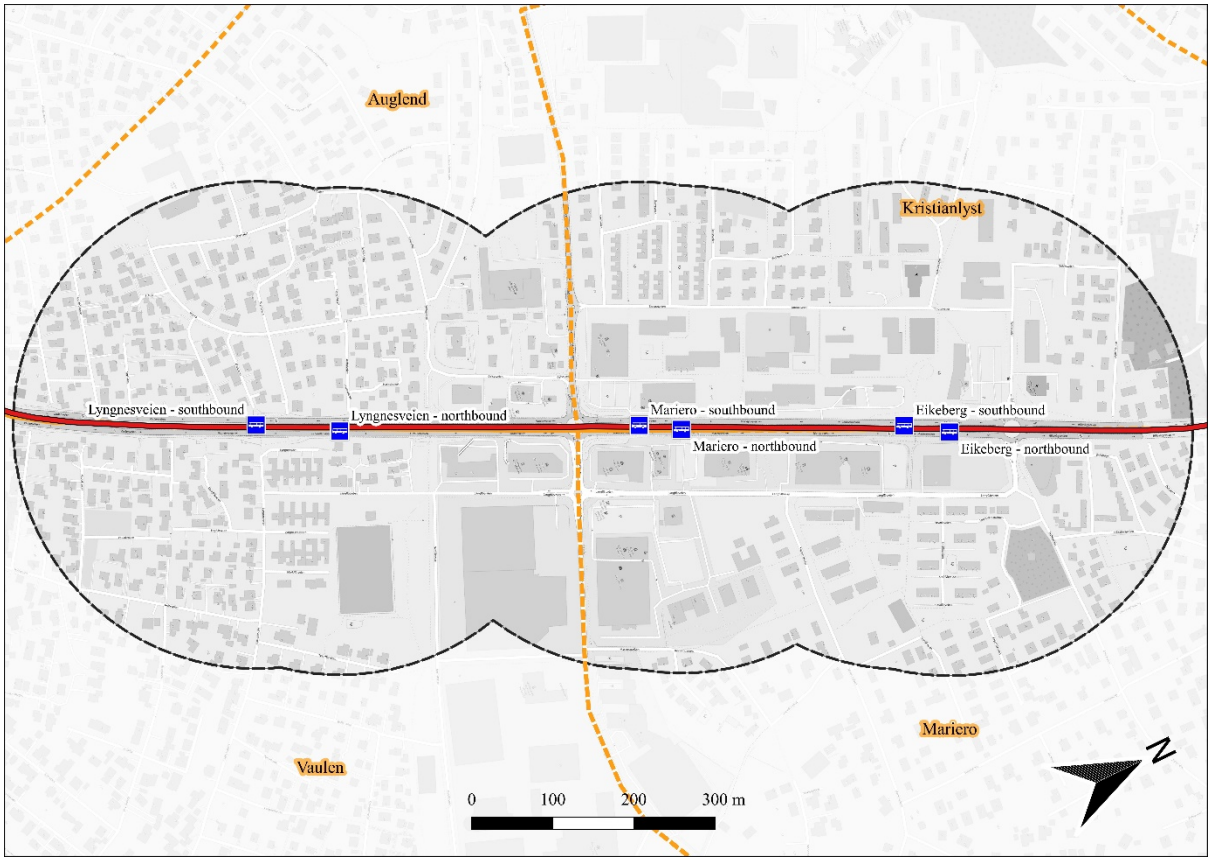


Figure 5: The catchment areas of the chosen bus stops. Map made by Lilienthal and Vieira (2021). Retrieved from Norgedigitalt (2021b).

The spatial analysis performed for the study area derived data retrieved from public portals that bring in analysis of environmental and socioeconomic indicators, as well as some urbanistic features.

Relevant data	Walkability features (Hass-Klau, 2015; Hillnhütter, 2016)
Building density (FAR).	Dimension, enclosure
Pedestrian infrastructure.	Block complexity and nature
Ramp inclination.	Underground structures
Green coverture.	Trees, green
Noise pollution	Noise
Street picture	Street façades, edges and façades.
Shops and services	Shops and services

Observations and behavioural mapping

In the scope of this research, the direct observations are a survey method chosen to map the behaviour of pedestrians in the immediate surroundings of Eikeberg, Mariero and Lyngnesveien bus stops. By immediate surroundings, one must understand as the bus stops shelters for passengers, underground passages, zebra crossings and sidewalks that are attached to the bus stops. These structures are those pedestrians use actively to fill their need to move by foot, and consequently correspond to the elements the professionals involved on the Bussvei project must have regard of. Also, from a practical perspective of the survey conduction, these structures on the immediate surrounding of the chosen bus stops tell which elements are to be observed from a single spot.

The scheme of direct observations is supported from similar studies performed by Ali and Fevang (2021) and Madsen (2015). All these works explore the direct observation as a survey method to investigate how people behave in a given place, putting into account the landscape elements within the view field of the observer, and *a posteriori* vectorization of their findings through a GIS-tool. Figure 3 shows how Ali and Fevang (2021) illustrated the pedestrians' activities as point features, with an arrow indicating where they are heading.

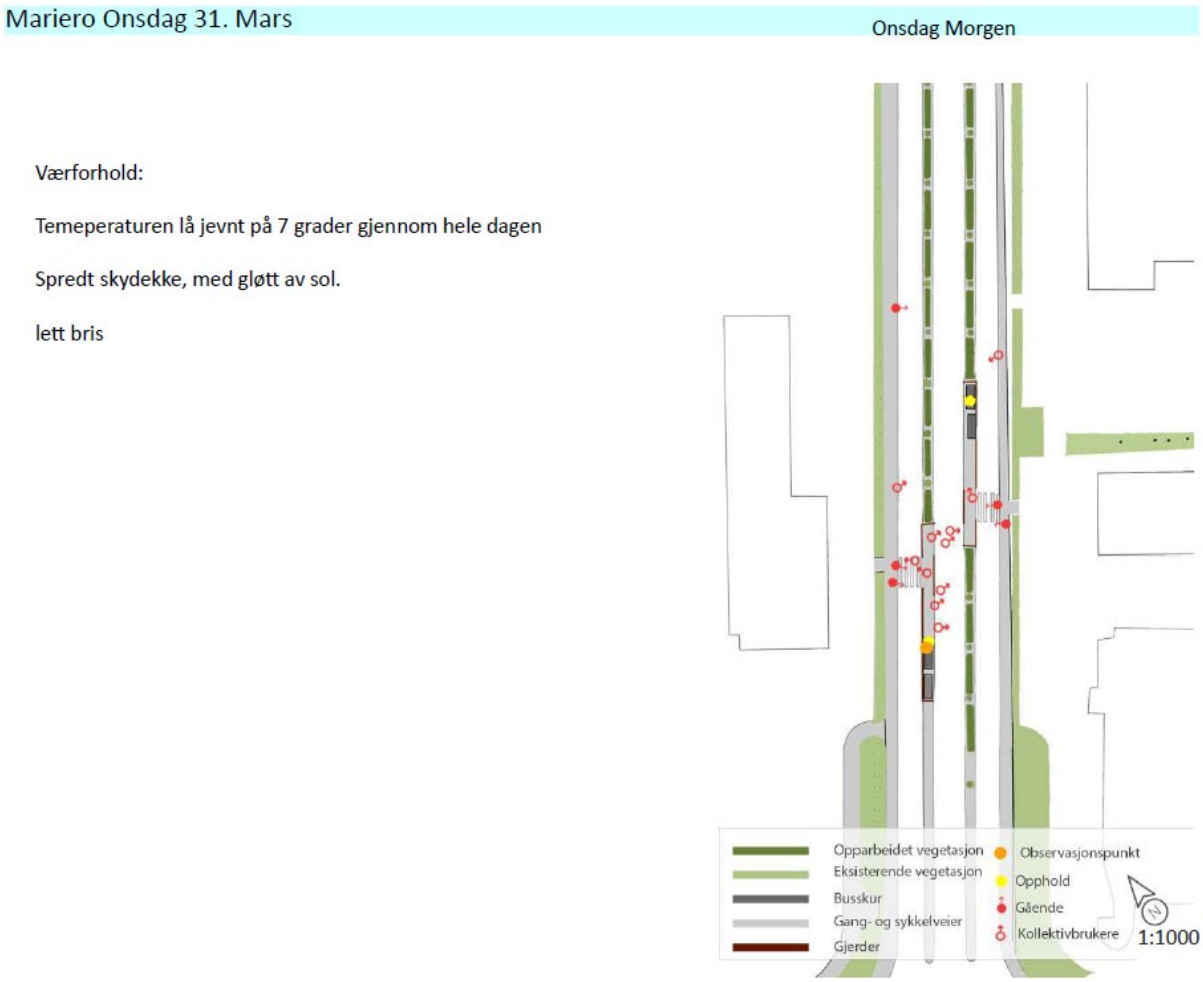


Figure 6: Behaviour map of Mariero on Wednesday, 31st Mars 2021, by morning. Retrieved from Ali and Fevang (2021, p. 90)

Even though the objective of mapping the pedestrians' behaviour is to understand how they use and interact with the landscape elements around them, going a bit deeper in detail can reveal to a certain level, some possible ways of how they experience the built and natural landscape. In other words, some people that use some structures along the Bussvei to practice sport, go walk their infants or pets, or even gather with friends, might have some sort of positive regard for the structures along Bussvei.

Than being said, the thesis of Madsen (2015) brings some more detailed categories of pedestrians, as one of her scopes was to identify the "qualities and activities one can perform

in Downtown Svortland" (2015, p. 9). The author's argument to employ the behavioural mapping for understanding the issue is

> "(…) to be able to compare the center with shopping malls in this thesis, this method is a good empirical analysis tool. Here we look at how people use the different environments they are in, to gain knowledge about which activities are repeated"
>
> (Madsen, 2015, p. 17)

Figure 4 shows how Madsen (2015) categorized the activities she observed. She divided the categories into "necessary, voluntary and social activities" and observed a broader sort of activities other than pedestrians do.

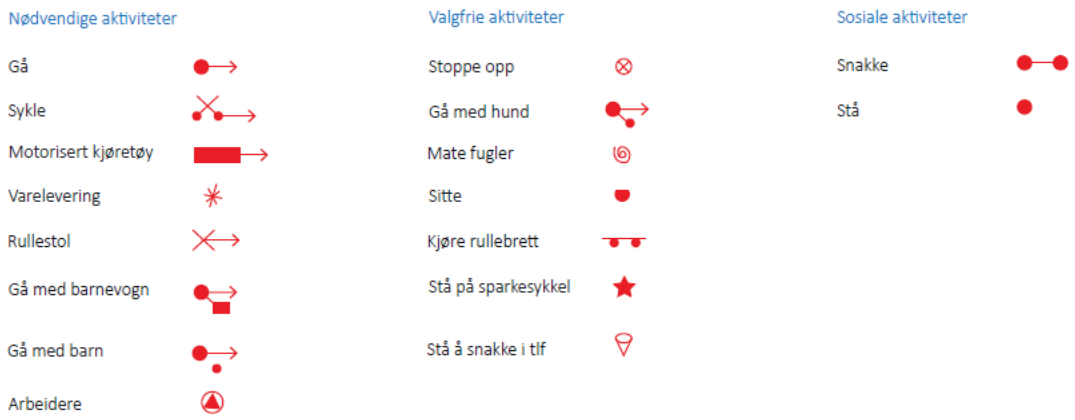


Figure 7: Categories of activities observed in Madsen's behavioural maps. Retrieved from Madsen (2015, p. 18)

Based on these studies, it is possible to design the observation maps that would attend the specific demands of this research. Besides the three categories established by Ali and Fevang (2021): people standing, walking by or the collective users, few others inspired on the categories of Madsen (2015, p. 18) were incorporated, like "people walking with support (wheelchair)", "pushing a baby trolley", "walking with children", "working", "walking a dog",

"feeding bird", "sitting", "riding a skateboard", and "standing and talking to the telephone", "standing and talking".

A blank map in gray scale was retrieved from Norkart (2021) to serve as register for the behaviour map. The observation and data registering for this research took place on set spot near each bus stop. Two observation spots were set for each bus stop, to allow a complete overview on the area. Figure 9 and Figure 10 show how these observations were registered over the view perspective of the two observers. Moreover, the maps in the appendix show the observation field division. For the maps of Eikeberg and Mariero, the west side correspond to observer A while the east sides were covered by observer B. For Lyngnesveien, Observer A covered the whole Bussvei urbanscape, while observer B stood by the underground passage.

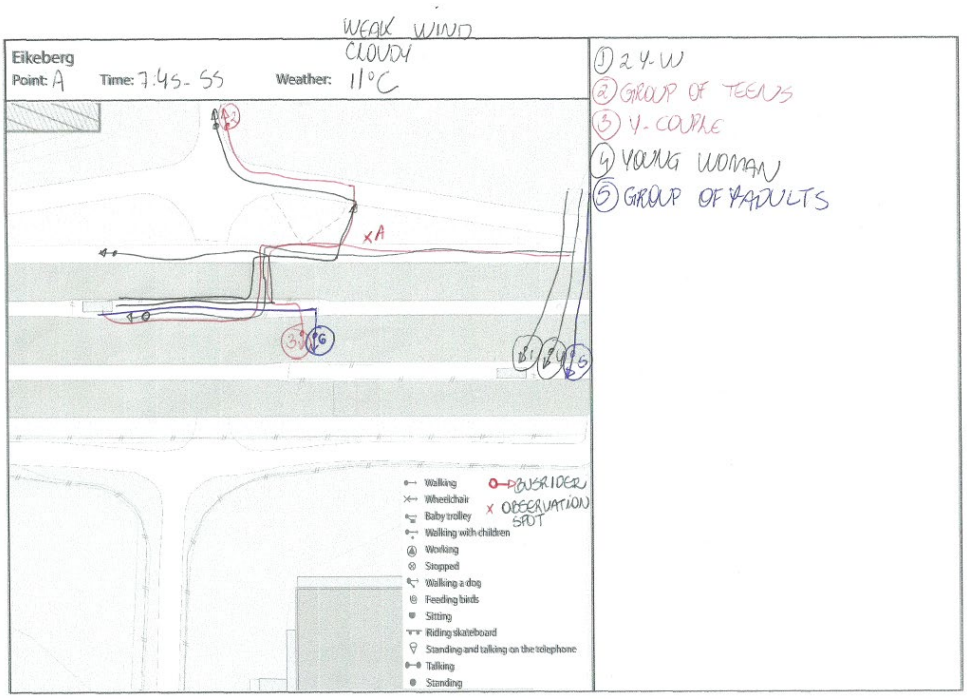


Figure 8: Handmade behaviour map from observer A perspective. Background map retrieved from Norkart (2021). Legend adapted from Madsen (2015).

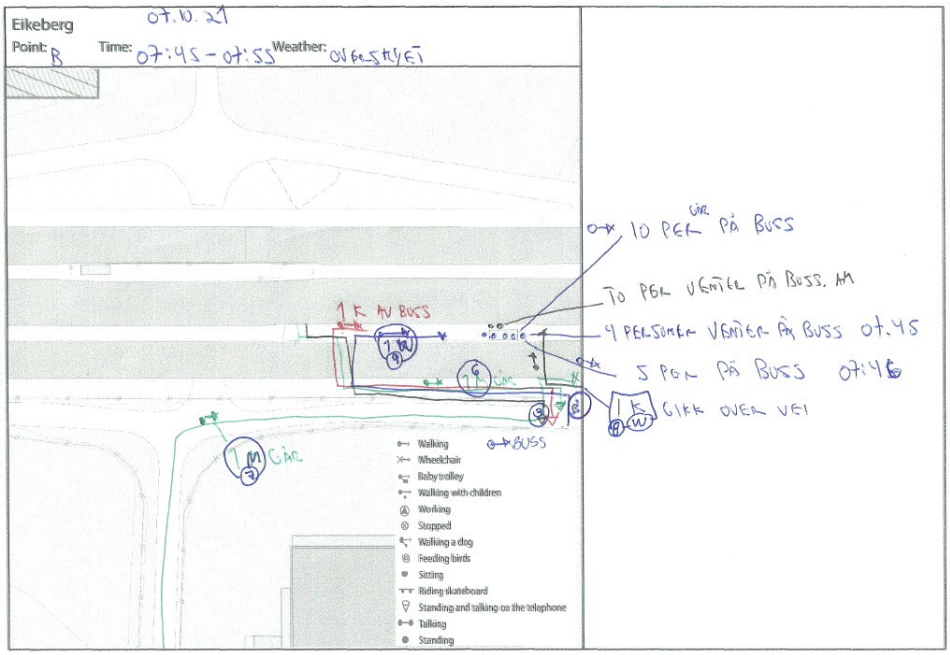


Figure 9: Handmade behaviour map from observer B perspective. Background map retrieved from Norkart (2021). Legend adapted from Madsen (2015).

These printed maps were filled two turnus of 10 minutes, gathering pedestrians' paths during 20 minutes in total for each shift. Table 4 shows how the observation shifts were organized. Table 5 shows the summary of the collected material.

Table 4: Scheme of observations

Days	**Tuesday, 5th October 2021**	**Wednesday, 6th October 2021**	**Thursday, 7th October 2021**	**Friday, 8th October 2021**	**Saturday, 9th October 2021**
Morning	x		Only Eikeberg and Mariero	Only Lyngnesveien	
Afternoon	x			x	x (Midday)
Evening		x		x	

Table 5: Summary of the direct observations and collected data

• **Eikeberg** • **Mariero** • **Lyngnesveien**	• **2 *turnus* of 10 minutes**	• **2 observers**	• **7 shifts**	• **84 handmade behavioural maps**

The handmade behavioural maps were afterwards transcribed into a GIS database, which permits handling the data in different ways and conducting specific analysis. By these means, it is possible to display the totality of the pedestrians' paths on one screen or by specific categories. An example of analysis that was of special interest for this research is the preferred features of the Bussvei urbanscape and the pedestrians' pattern of tracks. This GIS database was built through the software QGIS (QGIS Development Team, 2020, 3.16 Hannover version).

The pedestrians were divided into categories to allow different analyses. These categories are:

- Walking by: pedestrians walking over sidewalks or crossing the street
- Bus rider: pedestrians that just left the bus or are walking towards the bus stop.
- Gender: men, women or other. Other, in this case, can mean unidentified due to bad visibility.
- Age: pedestrians divided by their perceived age group. They can be children, teenagers, young adults, adults, elders, or unidentified.
- Usage: pedestrians using structures designed for them (on path), pedestrians using structures not designed to trespass, for example, jumping fences or crossings outside the zebra-crossings (outpath)

However, performing analyzes using the QGIS software may run into some limitations (QGIS Development Team, 2020, version 3.16 Hannover). For instance, it could not be found on the

catalogue of data operations offered by the software, some function that would symbolize the lines that represent paths, performed by multiple pedestrians, in larger width. Because of this limitation, it was not possible to show comparable data of preferred structures on maps, alternatively possible by percentages retrieved in the attribute table.

Questionnaire

The questionnaire was designed from features identified through Hass-Klau (2015) and Hillnhütter (2021). The structures built for pedestrians on the Bussvei include sidewalks, zebra-crossings, underground passages, and bus stops. Besides evaluating these features, pedestrians were also asked which mode of transport they used to reach Mariero, their reasons to be there, their evaluation of the public transportation offered by the Bussvei, their perception of safety, and their motivations to walk. Moreover, three other questions related to the respondent's background were asked, allowing to identify them by the language of preference, gender, and age regarding their anonymity of respondents' preservation. Appendix 8 shows the structure of the questionnaire.

The questions related to the structures of Bussvei inquired the respondents how they evaluate illumination, maintenance, accessibility, safety, greenery, comfort and aesthetics. The respondents could grade these aspects as "very bad", "bad", "neutral", "good" or "very good".

The question related to the public transportation quality has the same grading possibilities, but concerns the frequency of departures, offer of service lines and destinations and facility of boarding and leaving the buses. Afterwards, the "safety" question inquired how the respondent evaluated personal and traffic safety, besides other unpleasant events. The grading options were the same as the questions related to Bussvei's structures for these two questions.

Similarly, the “motivation to walk” question asked which grade the respondents agreed to the given statements. The options were “totally disagree”, “disagree”, “neutral”, “agree”, “totally agree”. In both cases, an extra option, “I do not know” was also available in case of misunderstanding.

The question inquiring respondents if they experienced walking barriers on Bussvei structures could be answered as “yes” or “no”. If they chose “yes”, the respondent was invited to justify their choice through an open answer space. Open answers were included in most of the other questions if the respondent desired to express themselves beyond the multiple option answers.

The application of the questionnaire were performed through the Survey Xact solution (Ramboll, 2021). This tool allowed the spread of questionnaire through QR-codes and the management of retrieved data. Figure 10 shows the poster through which the respondents were invited to participate in the questionnaire.

Figure 10: Poster containing invitation to answer the questionnaire remotely, through QR-code. Generated by Ramboll (2021).

This interpersonal aspect of the questionnaire spreading had two reasons. First, in October of 2021, the COVID-19 pandemics still required some cautions regarding social distancing. Through the QR-Code, the researcher avoids having closer contact to pedestrians willing to participate in the questionnaire. Second, people waiting for the bus or walking through the area would not be willing to participate in traditional methods of questionnaire application due to longer duration time. This virtual strategy allowed more flexibility in the application. For example, most respondents accessed the questionnaire on the bus stop and answered after boarding the busses.

However, the QR-Code strategy for the questionnaire failed in some aspects. First, it is illegal to post such invitation posters in the Bussvei structures, such as light poles and bus stops. It was necessary to personally invite the pedestrians to participate, even with regards of protective measures of COVID-19. Second, many people was not able to access the questionnaire for not

being used with digital technologies or having cellphones incompatible with the QR-code technology. Third, the flexibility to answer the questionnaire resulted in a considerable number of respondents quitting before conclusion.

For these reasons, the number of respondents that completed the questionnaire do not grant this survey with statistical relevance. Therefore, the data collected at this step are descriptive of how these participants experience the Bussvei.

The study case

Comprehending the factors that affect the walkability along Bussvei require a study of its immediate surrounding. The summed catchment areas of Eikeberg, Mariero and Lyngnesveien encompass a relevant urban centrality for the municipality of Stavanger, concentrating a broad offer of specialized and general retail and services.

Shops specialized in boat, car and car-repair, construction, decoration, electronic goods can be found in the area, more likely attracting clients from further neighbourhoods in Stavanger and North Jæren. Three franchises of supermarkets have units in the area: Obs, Helgø Meny and Rema1000, having the two firsts having bakeries, drugstores, flower shops and hairdressers attached to them. Also, the area counts with restaurants' franchises such as McDonalds, The Shack, Sabi Sushi and Foodcourt, besides Lucky Bowl, which is also a leisure place.

The most notorious establishment that figures as service offer in the area is the Hetland Videregående Skole, located near Mariero bus stop. Near Eikeberg bus stop lies two churches of different Christian denominations, the Fjelltun school, offering confessional education, and one public clinic focusing on children and youth health.

The Lyngnesveien bus stop is somehow an exception for lying in a predominantly residential area. Figure 11 shows the centrality aspect of the area.

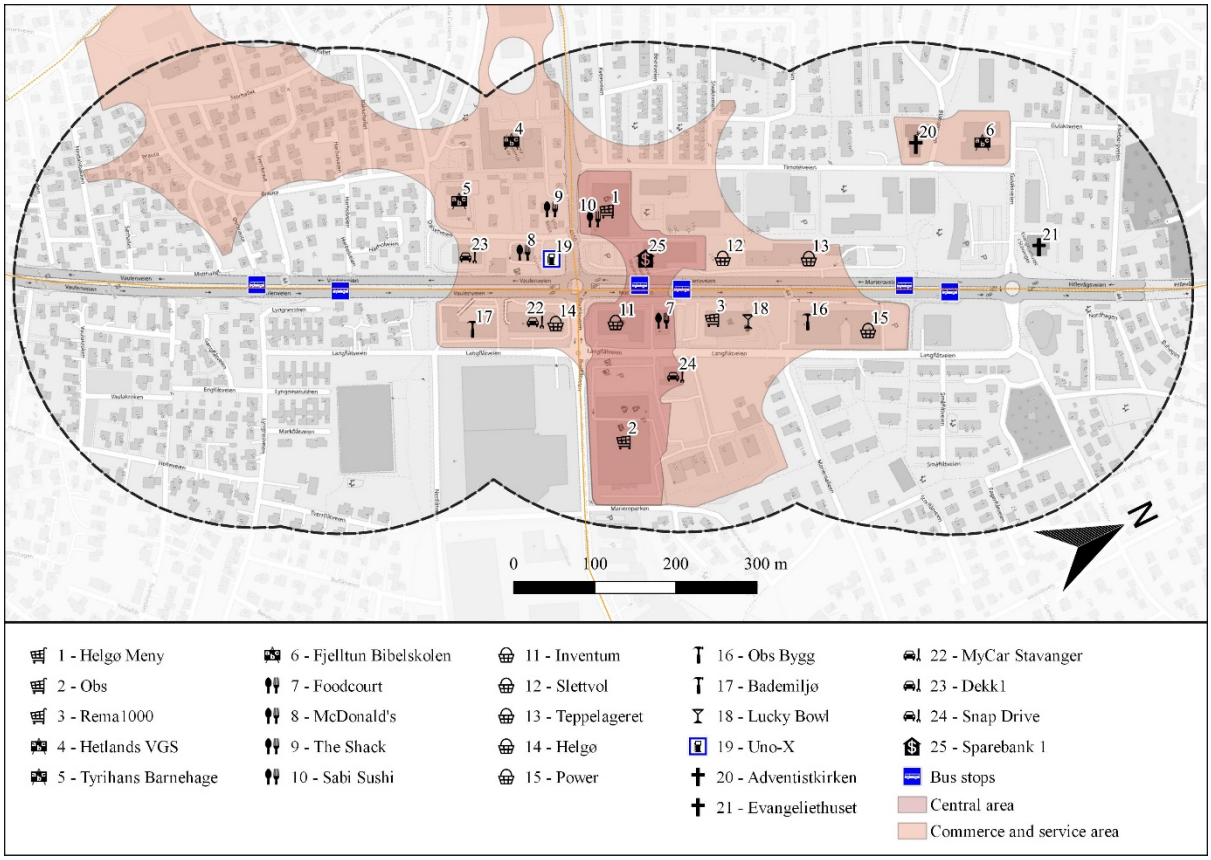


Figure 11: Urban centrality of Mariero. Adapted from SSB (2020).

It is deductible that establishing a BRT line through Mariero would encourage people to reach the area by bus and walk to complete their journeys. However, it is known that many other features that are crucial to evaluate the area's walkability. The conclusions of spatial analysis conducted in the area add crucial elements to evaluate the quality of the urbanscape regarding pedestrians. Geolocated data retrieved from public portals allow the identification of the pedestrian infrastructure, green areas, ramp inclination, noise pollution and location of parking lots.

Pedestrian infrastructure

According to the National Walking Strategy, the pedestrians network must be "(…) coherent and fine-meshed walkway with emphasis on accessibility, safety, attractiveness and universal

design" (Berge et al., 2012, p. 7). The walking structure network in Mariero, however, does not show much regard of this premise. It is fragmented, with crossing possibilities through Bussvei undesirably distant from which other.

The surface crossings between the Bus stops of Mariero and Eikeberg are over 300m, while Statens Vegvesen standards recommend a maximum distance of 150m between crossing possibilities (Vegdirektoratet, 2014a). Figure 12 shows the pedestrian network in Mariero. Moreover, there are no monuments that would improve the walking attractiveness in Mariero. Some elements with cultural relevance exist within walking distance from the Bussvei but do not relate to its attractiveness to pedestrians. To be relevant, these features of cultural and artistic value must be seen from the structure the pedestrian is walking, which is not the case.

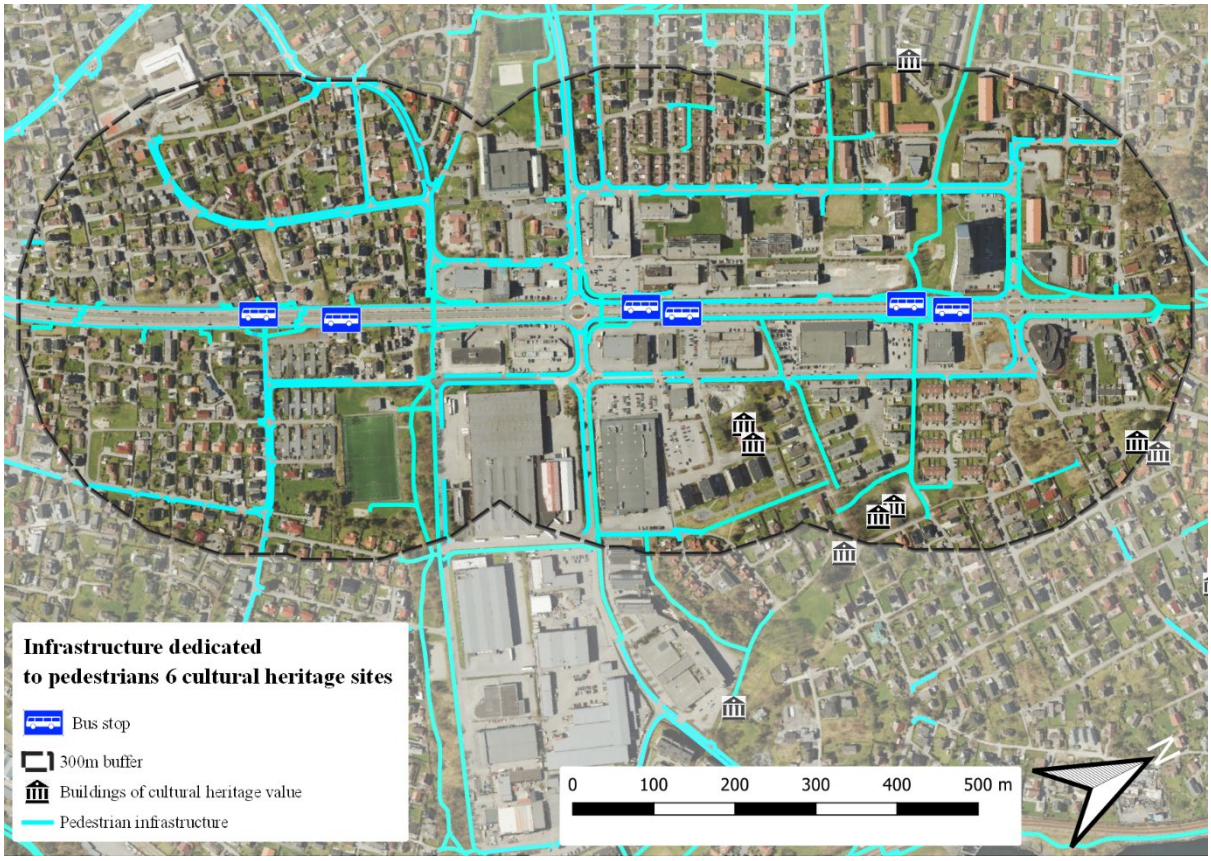


Figure 12: Pedestrian network in Mariero. Made by Lilienthal and Vieira (2021). Retrieved from Norgedigitalt (2021a) and Directorate for Cultural Heritage (2021).

Besides the zebra-crossings on surface to cross the road and the bus lanes, the pedestrian has option to use the underpasses. As Hass-Klau (2015) argued, these underpasses can be too steep and represent more barriers for pedestrians wishing to cross. The underpass located under the Eikeberg bus stop have ramp inclinations slightly over the recommended by Statens Vegvesen (Table 3; 2019) and is decorated with textured walls (Picture 2). Figure 13 shows the inclination of ramps attached to the underpass of Eikeberg.

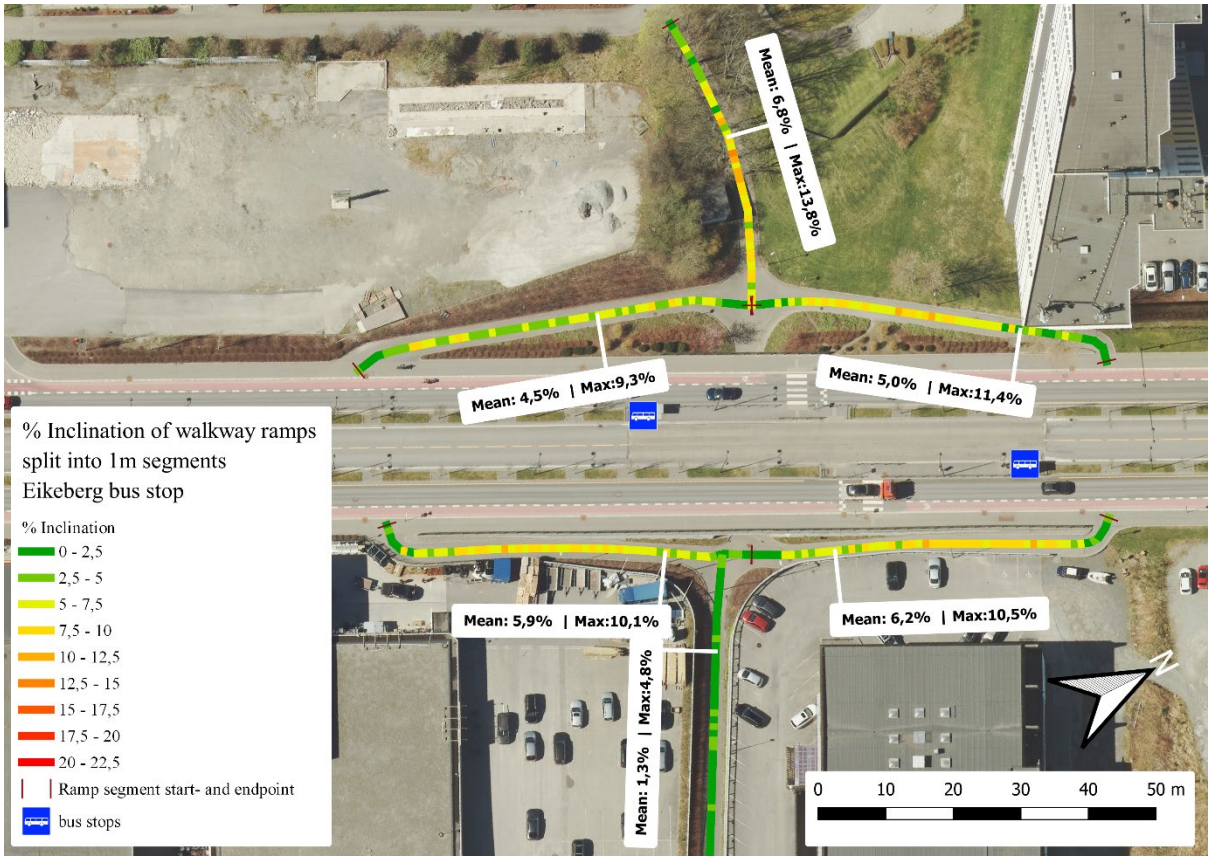


Figure 13: Inclination of ramps accessing Eikeberg underpass. Made by Lilienthal and Vieira (2021). Retrieved from Stavanger Kommune (2019).

Picture 2: Interior of Eikeberg underpass. Photo by Vieira (2021c).

However, the underpass near the bus stop of Mariero seemed to be rather problematic. The ramps inclination exceeds considerably the maximum established by Statens Vegvesen of 5% (Figure 14). Likewise, accessing the ramps from the sidewalks can add few more meters of walking depending on the direction one is coming from. The aesthetical is not attractive either inside the underpass. Its internal walls are coated solely with concrete, featuring a gray color with some black spray marks. Picture 3 shows the interior aspect of the underpass near Mariero bus stop.

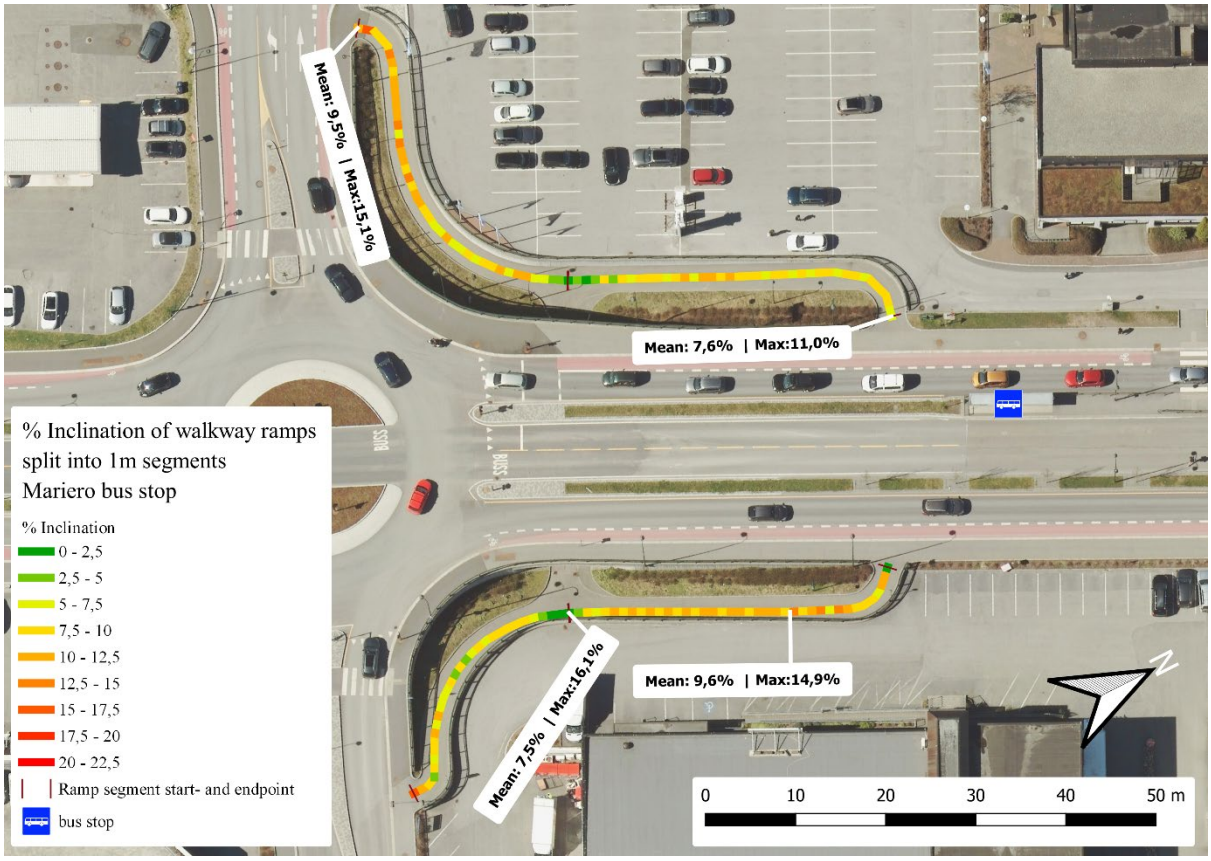


Figure 14: Inclination of ramps giving access to Mariero underpass. Made by Lilienthal and Vieira (2021). Retrieved from Stavanger Kommune (2019).

Picture 3: View of the interior of the underpass near the Mariero bus stop. Photo by Vieira (2021c).

The underground passage beneath Lyngnesveien bus stop is the only with ramps inclinations below the standard of 5%. However, one of the access to the underpass is done by staircases, which according to Hass-Klau (2015), represent a considerable barrier for pedestrians with reduced mobility. The internal aspect of this underpass has some attractive features. Part of the floor is paved with colorful tiles and the walls' coat are textured.

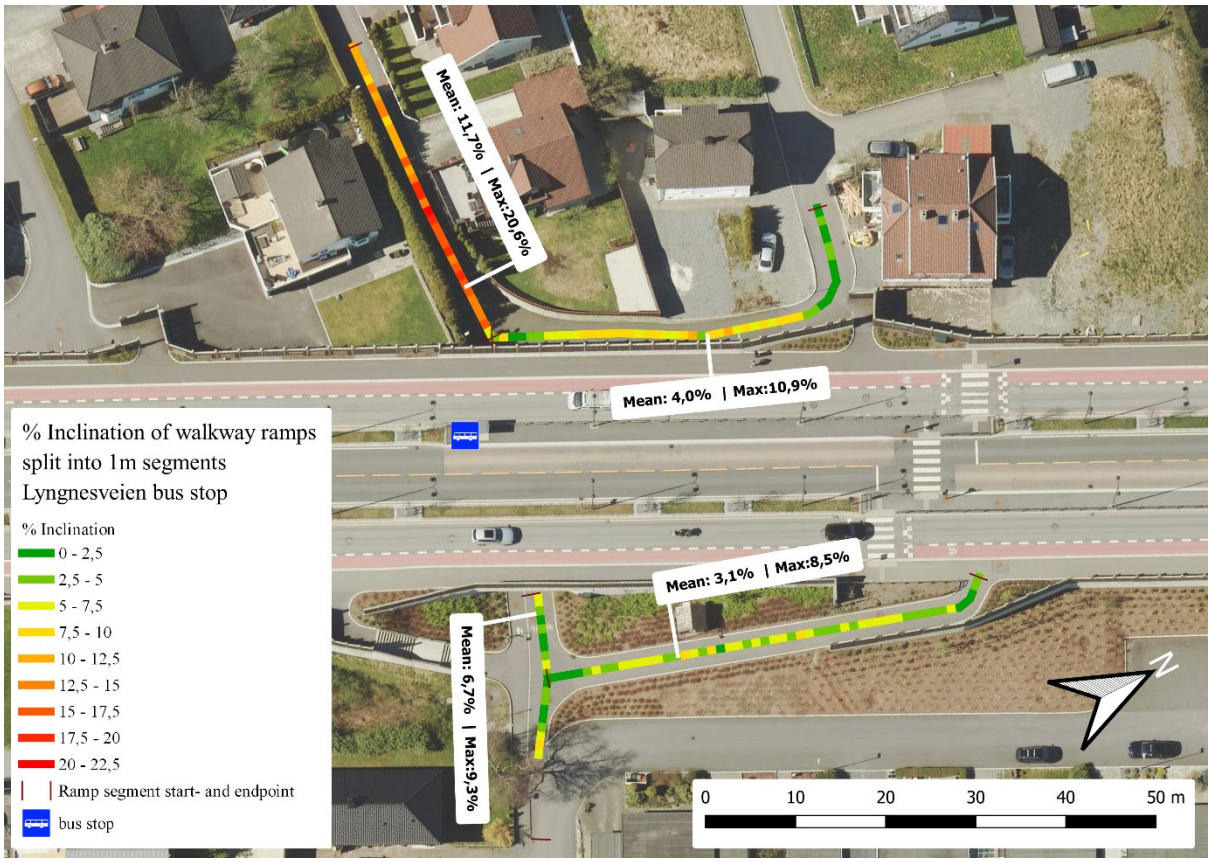


Figure 15: Ramp inclination of underpass beneath Lyngnesveien bus stop. Made by Lilienthal and Vieira (2021). Retrieved from Stavanger Kommune (2019).

Some features of pedestrians' structures in Mariero are quite problematic. Crossing possibilities are scarce all over the area, exceeding 150m between them. The accesses to the underpass near Mariero bus stop are steep well above the acceptable, besides the unattractive interior aspect of this underpass. The following feature to be studied is the pedestrians' exposure to noise pollution.

Picture 4: Internal aspect of Lyngnesveien underpass. Photo by Vieira (2021c).

Noise pollution

The noise pollution represents not only sources of discomfort but also threats to human health. The continuous exposure to high levels of noise can cause headache and result in loss of hearing. In urban centres, the car traffic is a considerable source of noise pollution, and in Marieroveien is not different. Figure 16 show the average level of noise pollution captured in the arterial roads of Mariero. The noise levels can reach up 74dB during the daytime, which is enough to cause discomfort. To avoid hearing uncomfortable noises from traffic, it is usual for pedestrians in the area to hear music through earplugs and headsets. Thus, the continuous use of these gadgets can lead to hearing problems. In such event, the noise pollution plays an indirect role of damage.

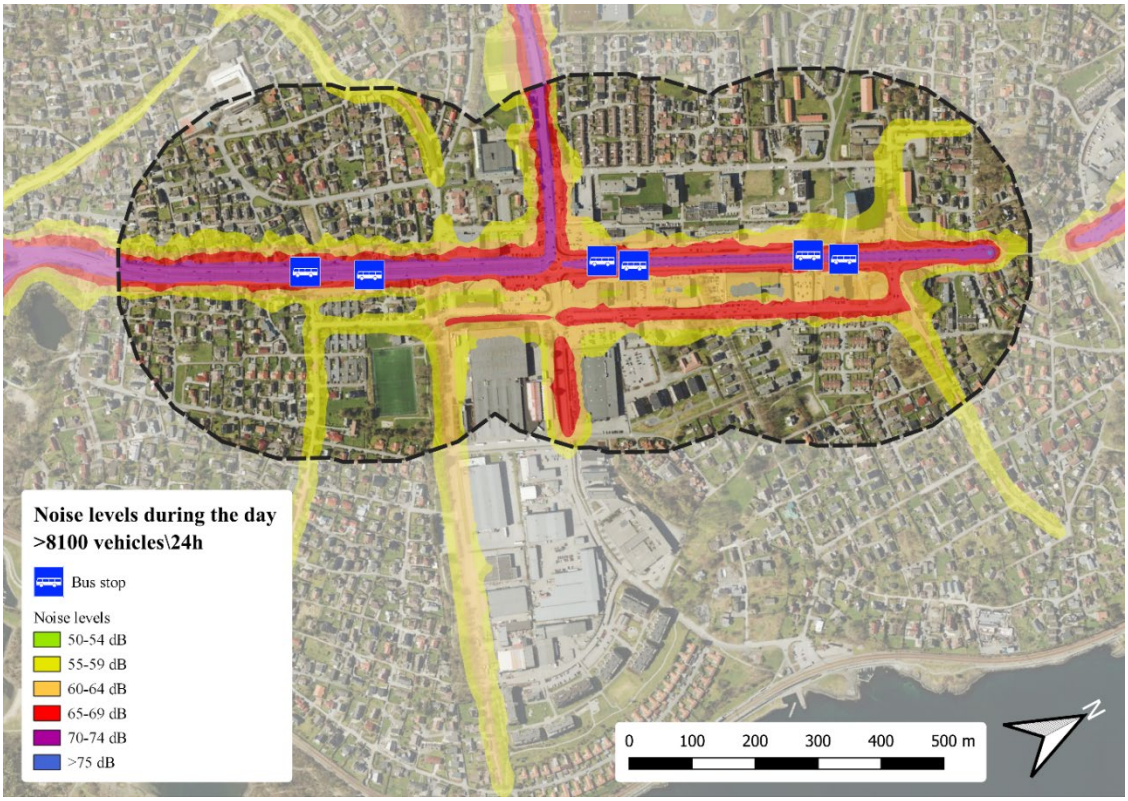


Figure 16: Noise levels during daytime in Mariero

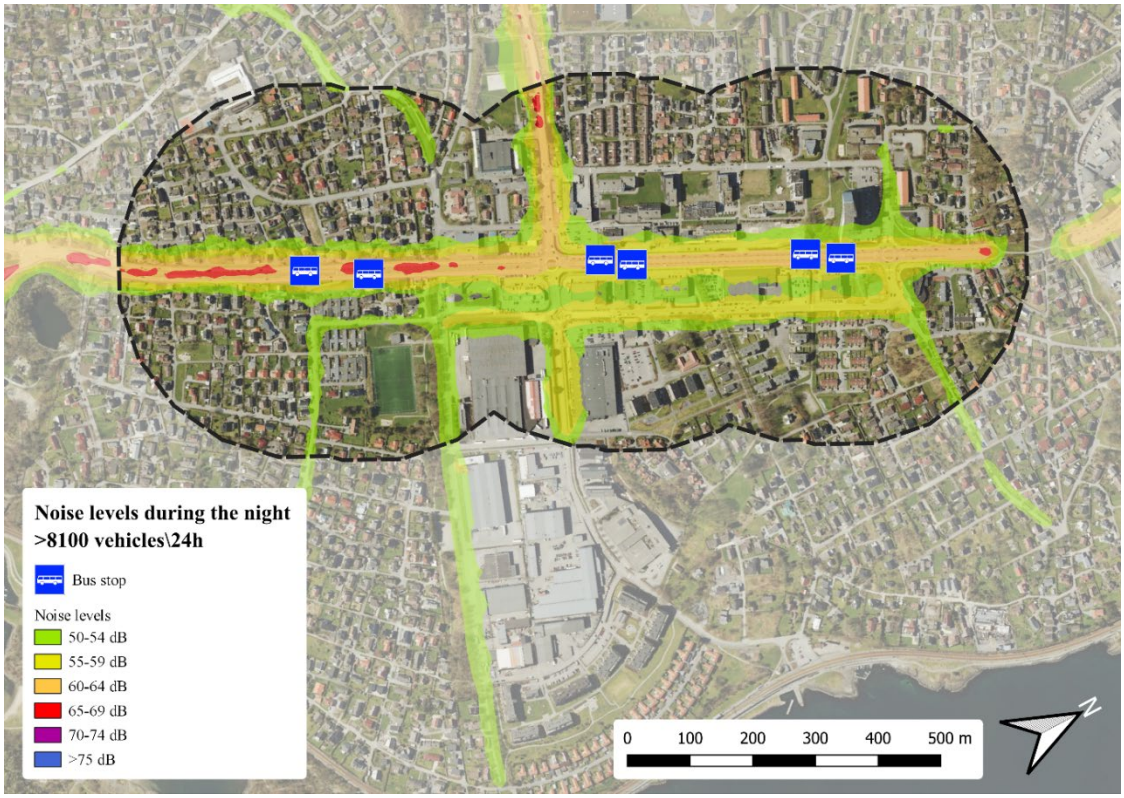


Figure 17: Noise levels during nightime in Mariero.

The noise levels during the night are lower, but near Lyngnesveien can reach up to 69 dB. This can explain why the urbanscape there is dominated by the noise abatement walls (Picture 7). The noise barriers filter the traffic noise that reach the houses in the neighbourhoods of Vaulen and Auglend. Hass-Klau (2015) and Hillnhütter (2021) would regards these walls as a source of unattractiveness for the urbanscape, as they represent monotonous features within the pedestrians view from the near Bussvei stretch. The enclosure, regarded by Hillnhütter (2021), is also affected by these noise barriers, as the opening to access the neighbourhoods from the sidewalks of Bussvei are hard to visualize from a certain distance.

Urbanscape

The urbanscape consists of the urban landscape the pedestrians are walking by. According to Hillnhütter (2021), aspects such as green elements, active façades and the enclosure between road and buildings affect the pedestrian experience.

Figure 18 shows the Floor Area Ratio of Mariero. Where it is possible to see that enclosure is not much of a problem in Mariero. The sole building that reaches 70 m is the residential Gullaksveien 2 (Picture 5). However, it results in a low floor area ratio as most of the property is covered by a lawn. The other buildings have few floors and therefore do not feel tight enclosures.

Picture 5: Gullaksveien 2 building near Eikeberg bus stop, the highest structure within the study area. Photo by Vieira (2021c)

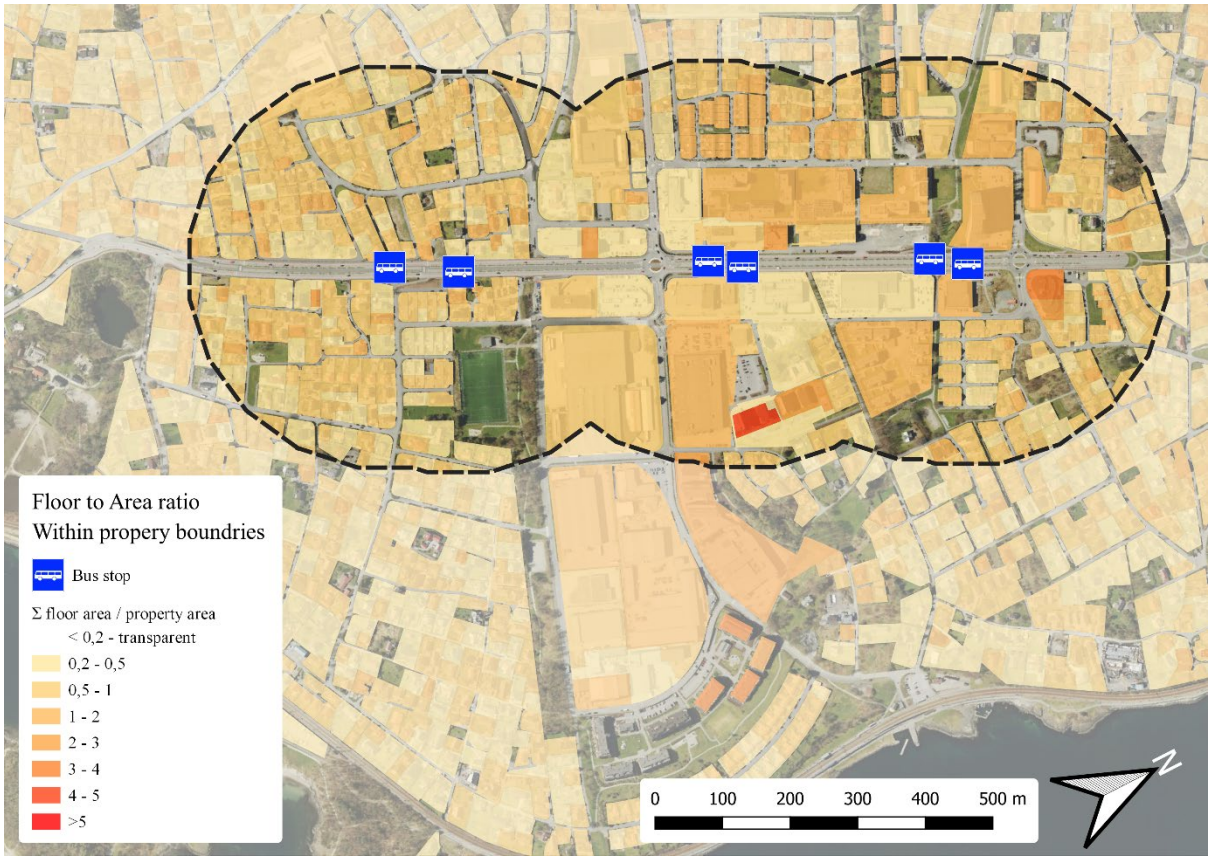


Figure 18: Map of Floor Area Ratio of properties in Mariero. Made by Lilienthal and Vieira (2021). Retrieved from Norgedigitalt (2021a) and The Norwegian Mapping Authority (2021).

Analysis

Pedestrians use of the Bussvei: behavioral mapping

The behavioural mapping here allows studying how pedestrians use the Bussvei urbanscape in Mariero. The range of pedestrians' activities can be varied (Madsen, 2015). However, the variety of activities within the study area was quite reduced. Most people seem to use the pedestrian structures of Bussvei as a part of their travel by public transport. Few exceptions can be made near Mariero bus stop on Friday night, where few gatherings of teenagers can be seen, especially near the McDonalds, or young adult men gathering around parked cars in front of Foodcourt.

However, the pedestrians in the study area developed different patterns of tracks, while some were tempted to cross outside the determinate zones (e.g., the zebra-crossings). The most emblematic cases were observed in Eikeberg, where many people tended to cross the road outside. Figure 19 shows the identified crossing preferences at the Eikeberg bus stop. People were crossing to reach the bus stops or leaving the bus stops towards the sidewalks, through the closest horizontal distances. Similar patterns were also identified in the other two areas, inducing the reflection of adding more crossings near the bus stops (Figure 21 and Figure 24).

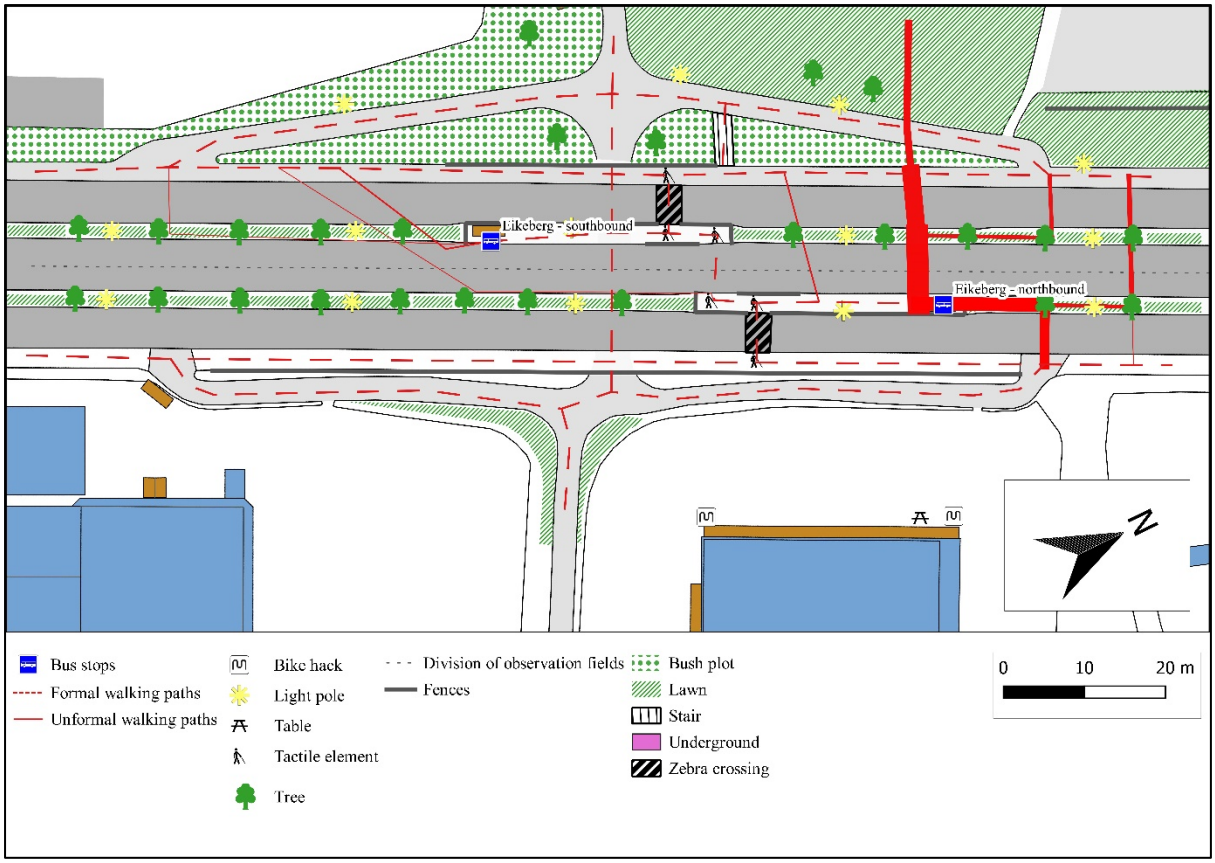


Figure 19: Map highlightning the most frequent registers of crossing Marieroveien outside the determined areas, in Eikeberg. Made by Vieira (2021a). Retrieved from Norgedigitalt (2021b).

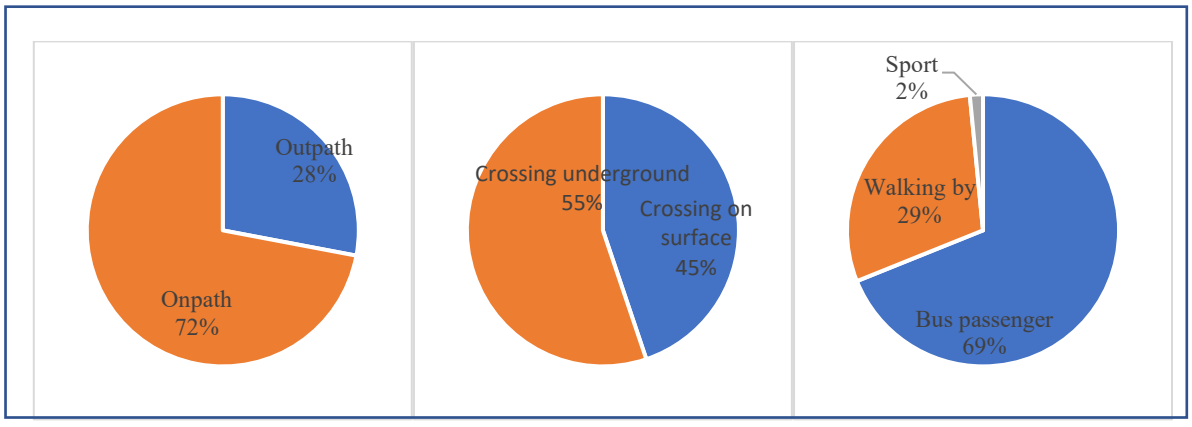


Figure 20: Profile of pedestrian usage of Bussvei pedestrian structures near Eikeberg

Figure 19 shows the profile established by analyzing other data gathered during the mapping in Eikeberg. More than in the other two bus stops, in Eikeberg, it is more frequent to see pedestrians crossing outside the design zones while on the surface. Moreover, most pedestrians crossing from one side to another of Marieroveien used the underground crossings. Among the reason pedestrians use the area, the majority is there to access public transport.

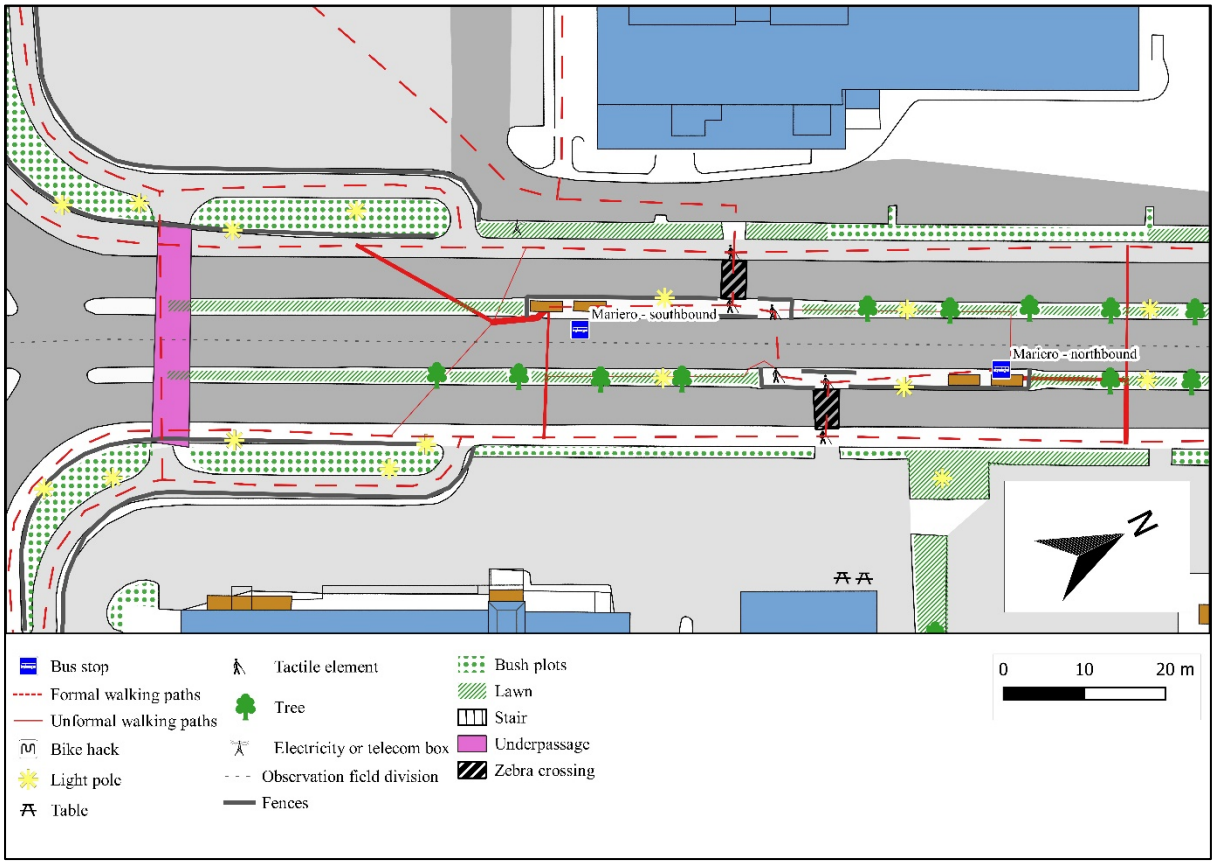


Figure 21: Map highlighting the most frequent registers of crossing Marieroveien outside the determined areas, in Mariero. Made by Vieira (2021a). Retrieved from Vieira (2021b) and Norgedigitalt (2021b).

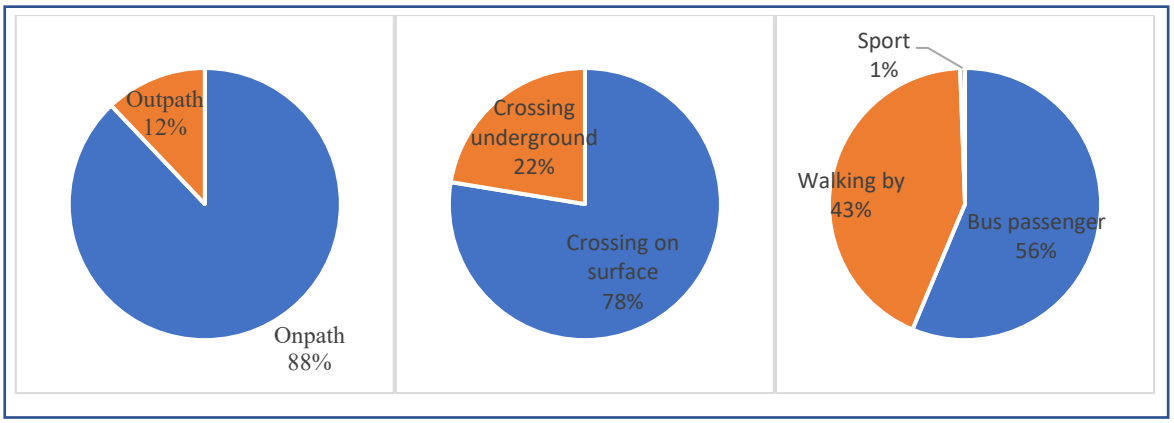


Figure 22: Profile of pedestrian usage of Bussvei pedestrian structures near Mariero. Retrieved from Vieira (2021b)

Figure 22 shows the profile established by analyzing other data gathered during the mapping at the Mariero bus stop. 88% of pedestrians near the Mariero bus stop used the structures developed to them, and 12% crossed outside zebra crossings. Among those crossing the Marieroveien, 78% crossed on the surface and 22% using the underpass, the lowest percentage of all the three bus stops. This result, in particular, is not surprising given the unattractive aspects of the underpass near the Mariero bus stop. 56% of the pedestrians observed near the Mariero bus stop were in the area as a part of their public transportation travel. Moreover, 43% of pedestrians observed in this area were walking by, perhaps due to the concentration of shops and services near the Mariero bus stop. Only 1% were observed jogging.

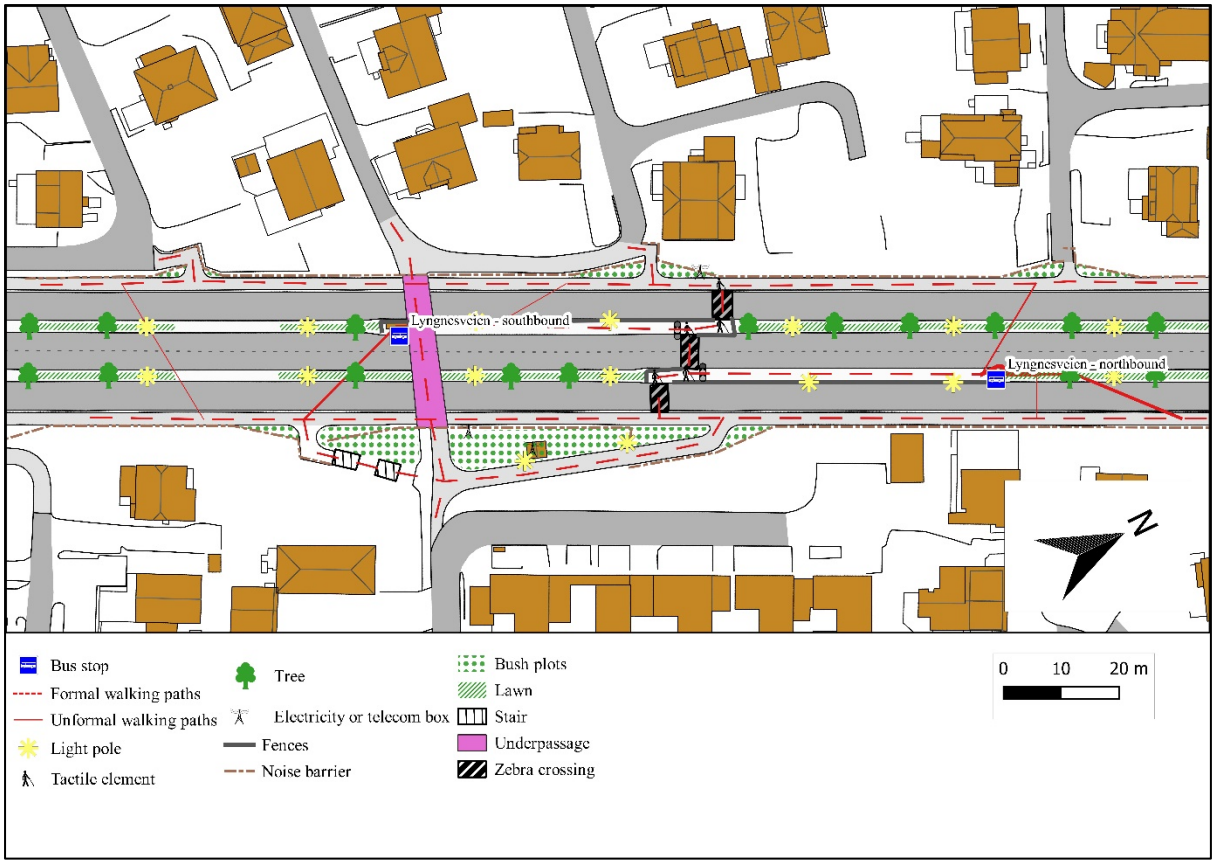


Figure 23: Map highlightning the most frequent registers of crossing Marieroveien outside the determined areas, in Lyngnesveien. Made by Vieira (2021a). Retrieved from Vieira (2021b) and Norgedigitalt (2021b).

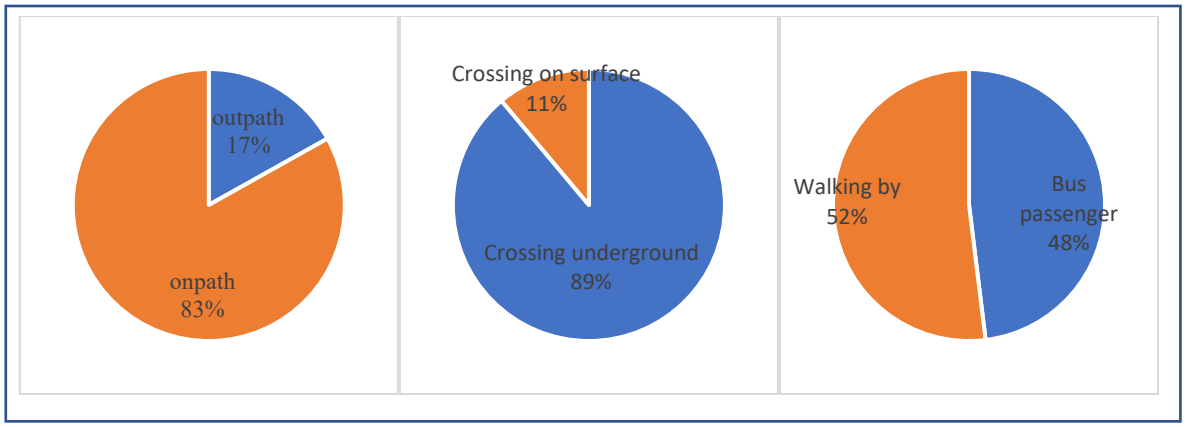


Figure 24: Profile of pedestrian usage of Bussvei pedestrian structures near Lyngnesveien. Retrieved from Vieira (2021b).

Figure 24 shows the profile established by analyzing other data gathered during the mapping near the Lyngnesveien bus stop. 83% of pedestrians near Lyngnesveien crossed the road or walked to the bus stops using designed walking structures, while 17% were moving outside zebra-crossings. 89% of pedestrians crossed underground counter 11% crossing on the surface. However, this indicator is particular in Lyngnesveien as the terrain level of Marieroveien is higher than Lyngnesveien (Lyngnes road). Therefore, the underpass is just natural. Also different from the other bus stops areas, near Lyngnesveien people, mostly walking by.

Pedestrians experience of the Bussvei: questionnaire assessment

Which mode of travel did you use to get to the study area today?

Transport modal	% of respondents
Car	12,20%
Bus	70,70%
Walking	17,10%
Bike	4,90%
e-Bike	7,30%
e-Scooter	7,30%
Train	4,90%
Other	7,30%

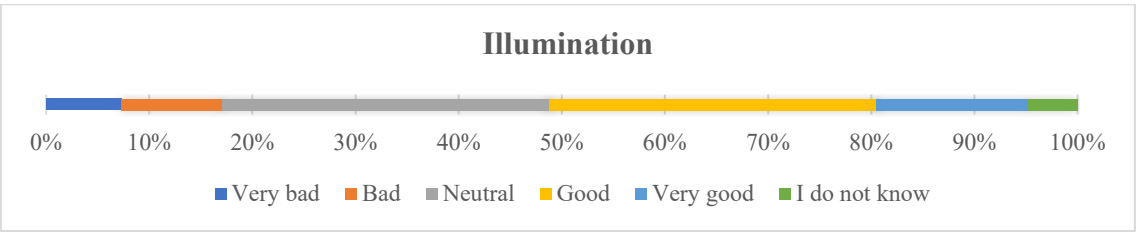
According to this chart, the pedestrians accessing Mariero would instead do it by bus. However, it must be regarded that most parts of the questionnaires were applied on the bus stops, and therefore it just becomes unbalanced that the bus is the most popular transport modal. Perhaps if the questionnaire were used inside the shops or in the parking lots, the categories share on this table would be somewhat different.

Why are you in the study area?

Activities or main reasons to be in the study area	% of respondents
Live in the surroundings	19,50%
Visiting someone	12,20%
Shopping	26,80%
Work	41,50%
Study	7,30%
Cultural or religious activities	4,90%
Entertainement (restaurant, cafe, ...)	2,40%
Sports or leisure activities	7,30%
Thorough-fare	14,60%
Other	2,40%

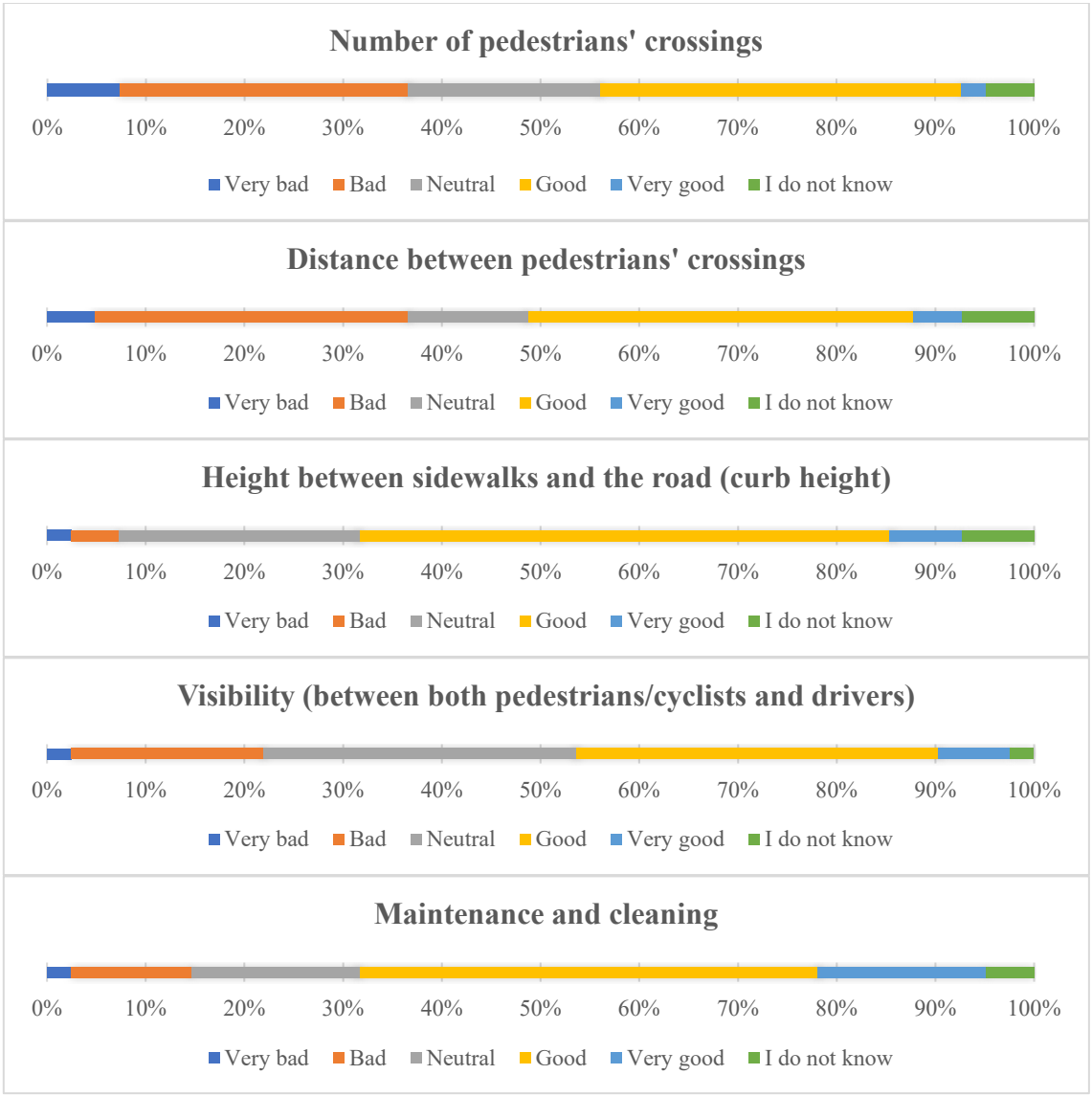
41,5% of the respondents said that Mariero is where they work, while 26,8% travel to Mariero to go shopping. The central aspect of the area can explain the figure of these two activities at the top.

How do you experience the <u>sidewalks</u> at the bus stops in Mariero, Eikeberg and Lyngnesveien?



The sidewalks in Mariero are generally well evaluated for the width, smoothness of the pavement and access to stores and services. However, the traffic noise and the green elements are a source of discontentment among most of the respondents.

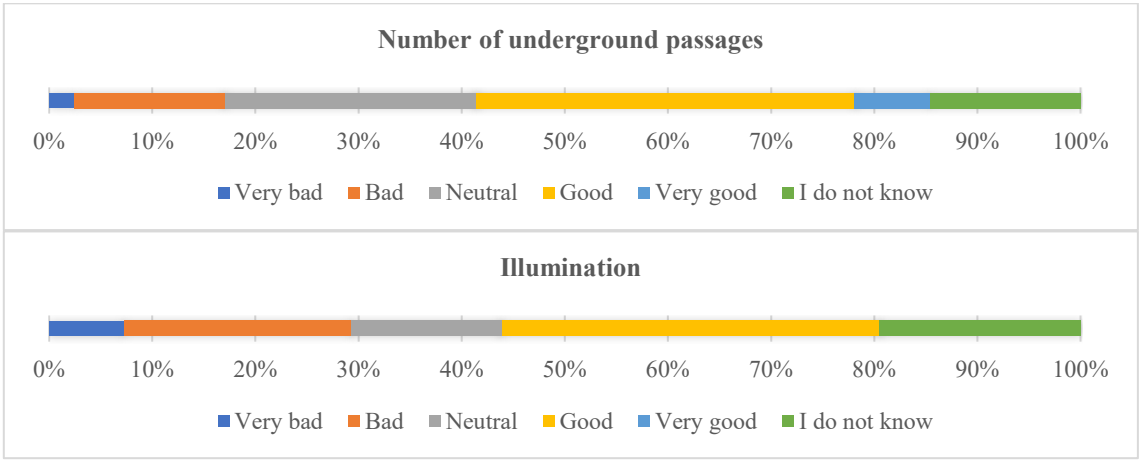
How do you experience <u>pedestrian crossings</u> at the bus stops in Mariero and Eikeberg?

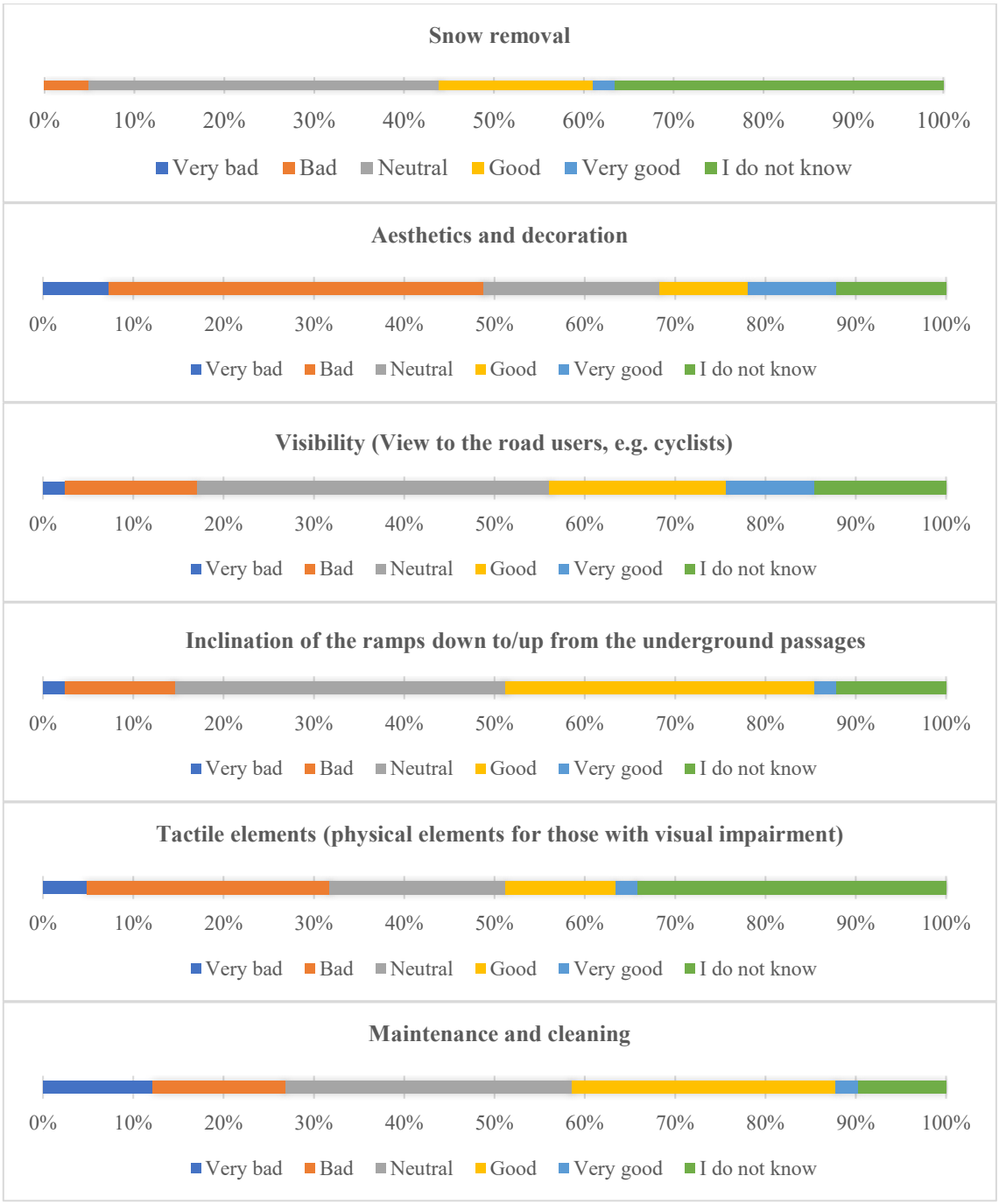


The number and distance between zebra crossings are some discontentment for pedestrians, which might be why a considerable number of them cross outside. On the other hand, the height level difference between the sidewalk and the road is relatively high. It offers good protection for pedestrians, the reason why most people evaluate it positively.

Picture 6: Zebra-crossing near the Lyngnesveien bus stop. Photo by Vieira (2021).

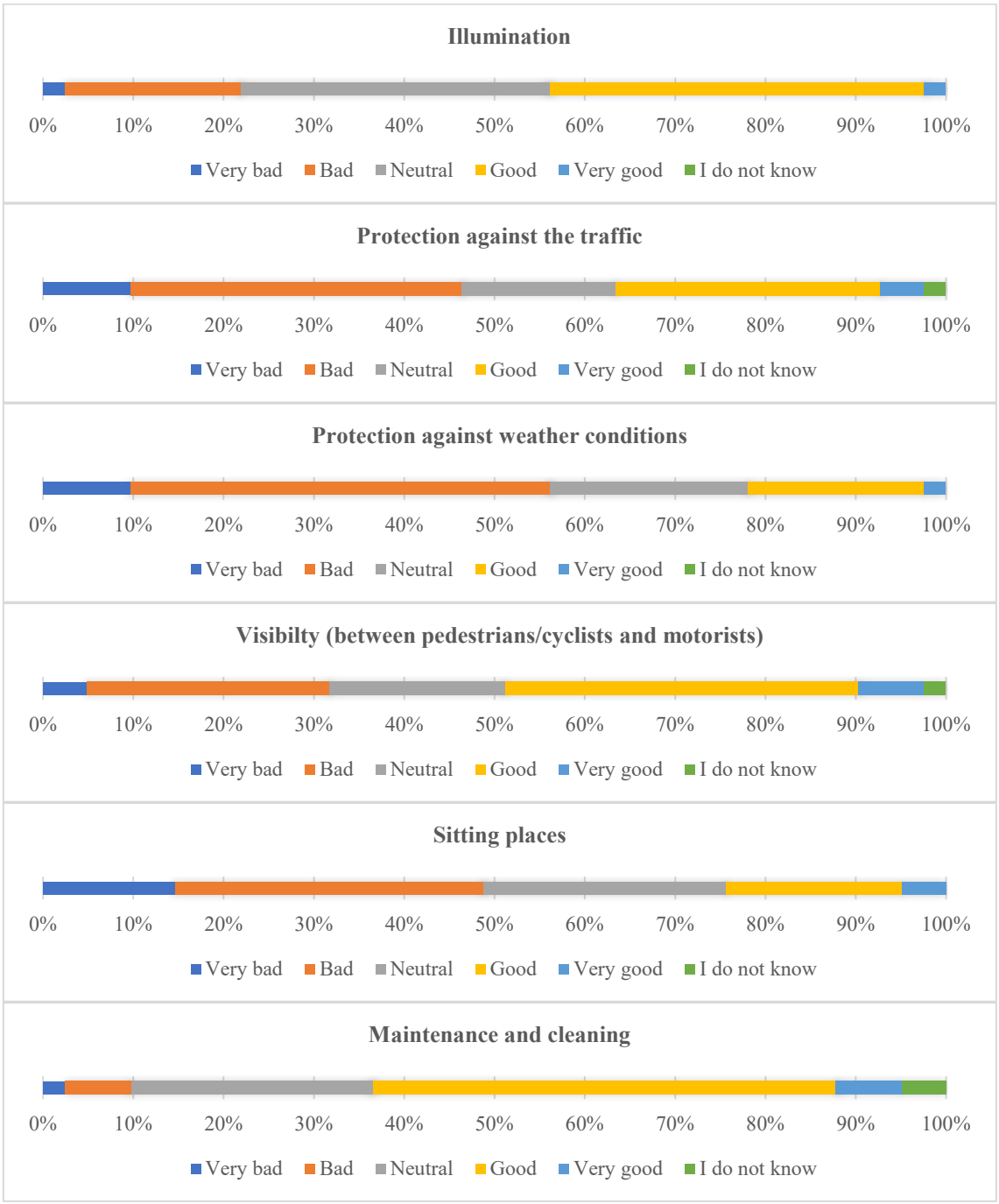
How do you experience the physical quality of the underground passages at the bus stops in Mariero, Eikeberg and Lyngnesveien?





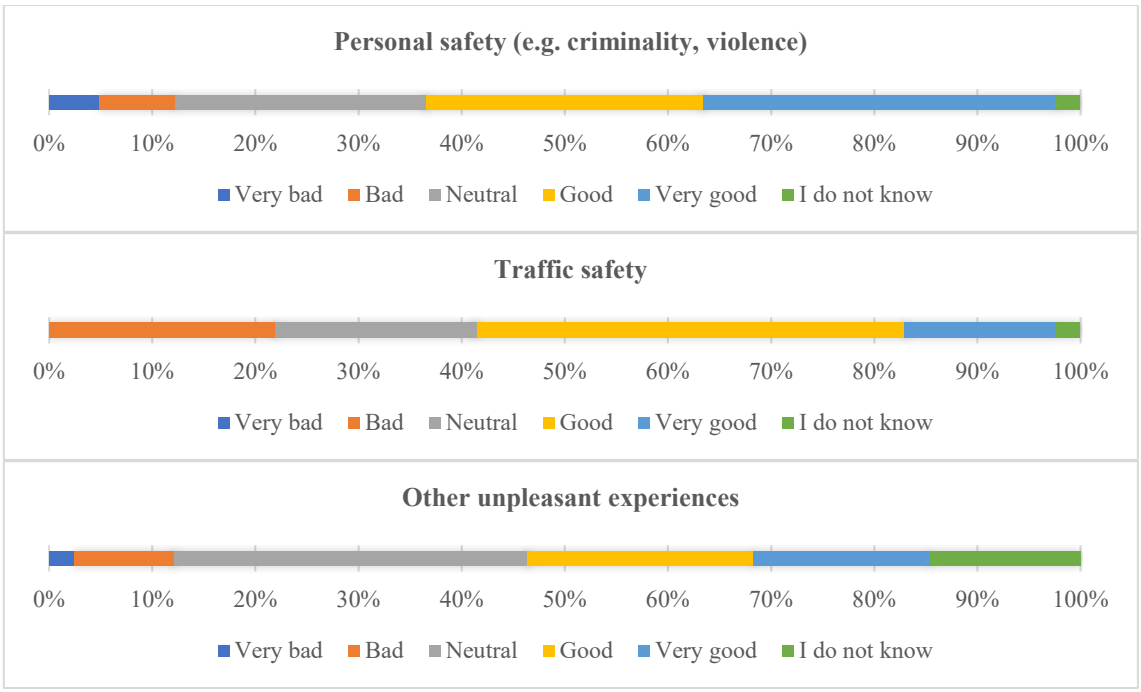
Underpasses are aesthetically bad and lack proper illumination according to the points of view retrieved from the questionnaire. Surprisingly, few people feel bothered by the steep ramps that give access to some of them. Tactile elements to provide accessibility for people with visual impairment are absent in all three underpasses observed, but a high share of respondents seem unfamiliar with the concept of special floor adapted for those with visual deficiency.

How do you experience the physical quality of the bus stops in Mariero, Eikeberg and Lyngnesveien?



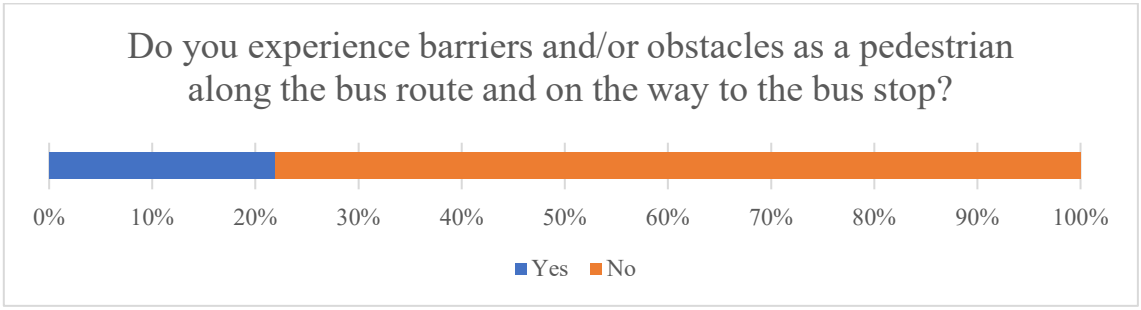
The respondents of the questionnaire expressed discontentment about protection against traffic and weather offered by the bus stops. There is also a high part of participants that evaluated bad or very bad the offer of seats for those waiting for the buses. In the other hand, aspects as illumination and maintenance were well evaluated by the respondents.6

How <u>safe</u> do you feel when traveling along the Bussvei in relation to different aspects?



Safety issues does not seem to be a source of concern for pedestrians. The speed limit for cars and buses along Marieroveien is 40 km/h, which is rather adequate for the safety of pedestrians and other road users.

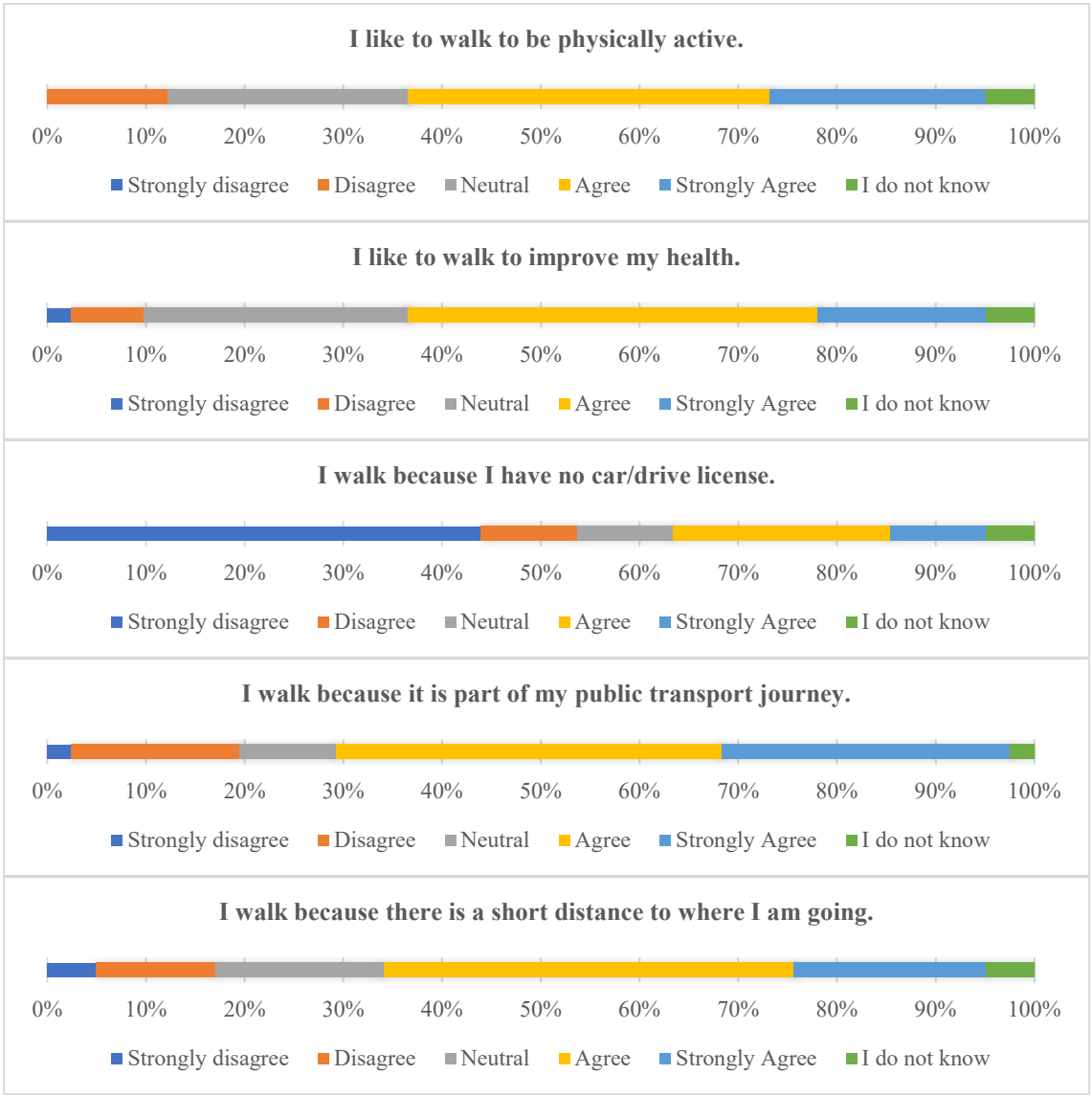
Do you experience <u>barriers and/or obstacles</u> as a pedestrian along the bus route and on the way to the bus stop?



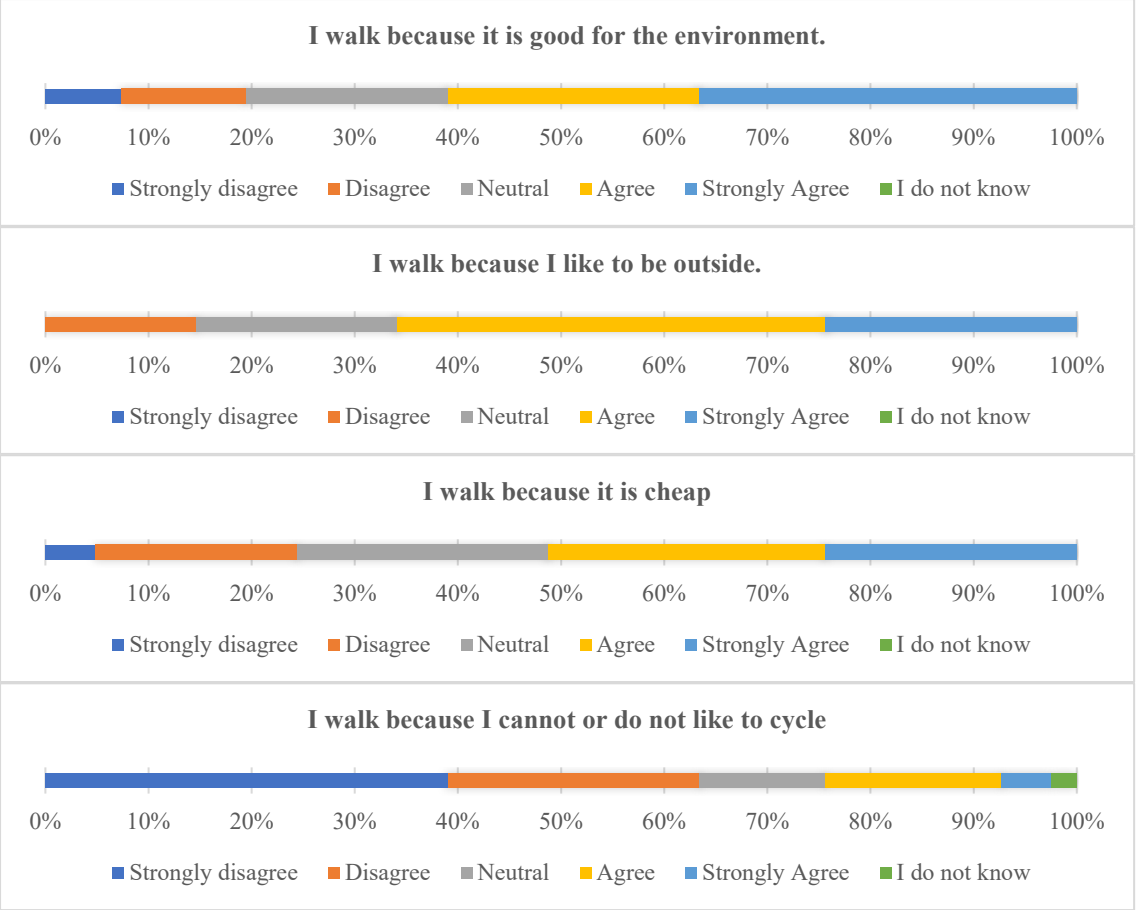
Slightly over 20% of respondents answered yes for the experience of barriers along Bussvei, or in their way to the bus stops. However, one respondent added an open answer claiming about the volume of traffic as a barrier, besides the traffic noise and the noise abatement walls near

Lyngnesveien. According to this respondent:" I feel unsafe when the traffic is too heavy, much noise, and high noise barriers that makes it stressful to more around here"[9]. Another respondent claimed of the noise and the air pollution. The given input was: "noise and air pollution makes me choose alternative routes when possible"[10].

How much do you agree with the following statements about your <u>motivation to walk</u>?



[9] Open translation
[10] Open translation.



Most respondents seem motivated to walk to be physically active and improve their health, besides of willing to walk if there a short distance to where they are heading, for environmental reasons and for being a cheap alternative. This aspect brings an optimistic perspective, which people are willing to walk for its benefits for personal health and environmental reasons. To the lack of access to cars and bikes as motivations to walk, most respondents disagreed.

Discussion

The underpasses, as predicted through the work of Hass-Klau (2015), are indeed problematic in the study area. The one built near the bus stop of Mariero is steep over the recommended by the guidelines of Statens Vegvesen (2019). Also, the green corners of this specific underpass are often filled with garbage (Picture 3), which confers very low quality to the urbanscape.

Picture 7: Disposable straws lying in a green corner of Mariero underpass. Photo by Vieira (2021c).

Moreover, the establishment of underpasses poses philosophical reflections over the priority given to pedestrians. If pedestrians rely on their physical stamina to move around, why would

they have to walk down and up again just to cross a road? Why not digging tunnels for vehicles and live the surface more available to pedestrians? What could be retrieved by the behavioural mapping and the questionnaire is that underpasses are underused by pedestrians.

Furthermore, Mariero seem a place that invite the use of cars, despites the lower preference given to them in the Marieroveien. The sidewalks between the bus stops of Eikeberg and Mariero are surrounded by parking lots. Finding a place to park whenever you go shopping in Mariero does not seem a challenge. However, the pedestrians must walk through these parking lots to try to reach the shops or walking towards the bus stops. Therefore, it represents a place where cars and pedestrians need to share a space, and pedestrians will be always more vulnerable in this relation.

In addition to the large offer of parking places, the façades lying behind them are not attractive either. They do not expose products that pedestrians would like to browse and look. They can be made by glass, but often covered with sticks. Picture 4 show an example of a building with inactive façade with parking lots in front of them.

Other element that is present in very low abundance on Picture 4 is trees and bushes near the sidewalk. Only a narrow strip of lawn exists, separating public (sidewalk) and private spaces (parking lot). Perhaps this frontal parking lots could give place to more trees to improve the aesthetic aspect of Mariero, besides serving as abatement for traffic noise and contribute to the carbon balance. Figure 15 shows that more parking lots exist behind these buildings, which can compensate the loss of the parking possibilities by Marieroveien.

Picture 8: Parking lots and inactive façades near Mariero bus stop. Photo by Vieira (2021c).

If parking lots and inactive façades give poor attractiveness for pedestrians near Eikeberg and Mariero bus stops, the problem near Lyngnesveien bus stop are the sound barriers. They are elements of brutalist urbanism and are not attractive for pedestrians at all. The tall wooden walls give sensation of enclosure and monotonous views. They block the view to and from the Bussvei urbanscape to the neighborhoods. However, it would be worst without them, unless the dwellings have each improvement to avoid annoyances from the traffic noise. Picture 5 shows the urbanscape of the Bussvei enclosed by noise abatement walls near Lyngnesveien bus stop.

Picture 9: Noise abatements near Lyngnesveien bus stop. Vieira (2021c)

One remaining element composing the urbanscape in Mariero is the people. The behavioural mapping revealed that the largest share of pedestrians observed near the bus stops and its adjacent walking structures were there as a part to their travels by public transport. The second highest share were of pedestrians crossing the Marieroveien and very few cases were of people jogging or participating in some social activity. Among the respondents of the questionnaire,

over 40% answered that working is the main reason for them to be in Mariero, followed by shopping.

However, the behavioural mapping revealed a considerable frequency of students arriving by morning in Mariero bus stop and leaving by afternoon. Picture 6 shows Mariero bus stop overcrowded with students from Hetlands Videregående Skole after classes.

Picture 10: Overcrowding of Mariero bus stop in the afternoon. Photo by Vieira (2021c).

It is crucial to any proposal of urban design to place the pedestrian in first place in the priority. In the case of the Bussvei, the objective of encouraging more people to use the public transportations risks to do not be reached if the quality of the pedestrian infrastructure and urbanscape attractiveness are not improved.

Conclusion

The walkability study involves understanding the urbanscape in which the pedestrian is inserted and identifying the structures that encourage walking there. First, however, it is essential to know why pedestrians choose specific shortcuts and avoid other structures. Many pedestrians will be willing to take the shortest route, even if it involves a slight risk of accidents. Others will avoid structures they find impractical or unpleasant.

In the case of the bus stops near Mariero, the highest share of observed pedestrians performs their crossings through the zebra-crossings, and a smaller share will cross towards the bus stops from the part of the sidewalk immediately in front of these bus stops, deviating from the fences and walking on the bus lane if necessary.

The underpass of Mariero resulted in being especially problematic. It is unattractive, steep, often dirty, dark, and requires a detour to reach its ramps from the sidewalks, posing more barriers than connections. The same does not happen to the other two underpasses, which are flatter and allow the crossings in straight lines from the opposite sides of Marieroveien.

Most people using the whole urbanscape of Mariero are walking there as part of their public transportation travel. This means that the area lacks attractiveness for pedestrians in several aspects. Greenery is insufficient. Most façades are inactive and lie behind parking lots. Significantly few urban furniture would permit more social activities, although some people were observed jogging in the area.

The common pedestrian experience, identified through the questionnaire, summarizes that most respondents do not feel threatened for insecurity but are somehow annoyed by the aesthetical and comfort aspects of the bus stops and underpasses. The current design of the bus stops of the Bussvei is not different from the ones elsewhere in North Jæren. They do not ease

boarding and leaving the buses from these bus stops. If they remain at regular bus stops, people will likely not feel attracted to use public transport more.

There is room for improvements in all features of the Bussvei. Inquiring about the perspectives and identifying the usage pedestrians made of the current structures is essential to plan and design layouts. By doing so on this thesis, it can be concluded that the design premisses of the Bussvei in Mariero do not prioritize the pedestrian, through the unattractive urbanscape and scarce possibilities to cross the road.

Through the effort to describe how pedestrians use and experience the Bussvei in Mariero, it is expected that the pedestrians must be a priority if the objective is to develop cities more walkable and functional.

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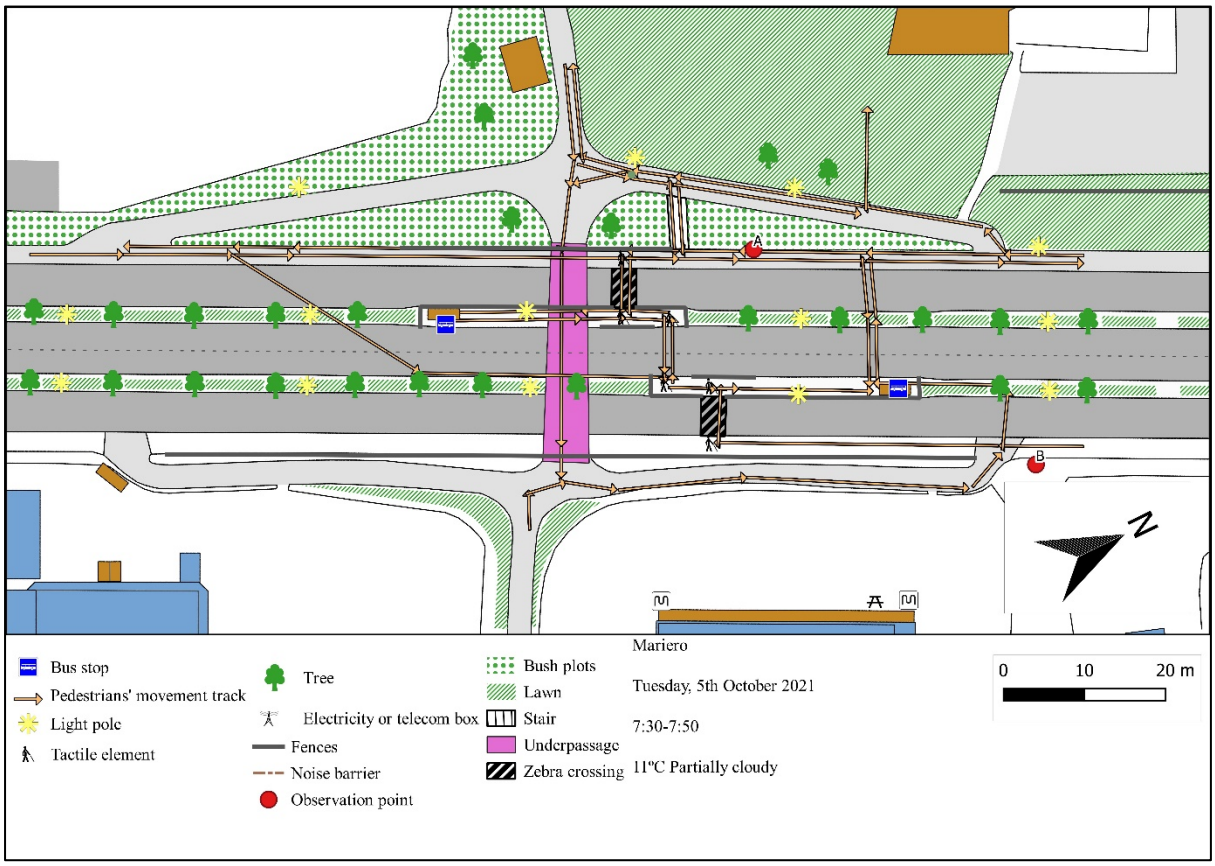
Appendix

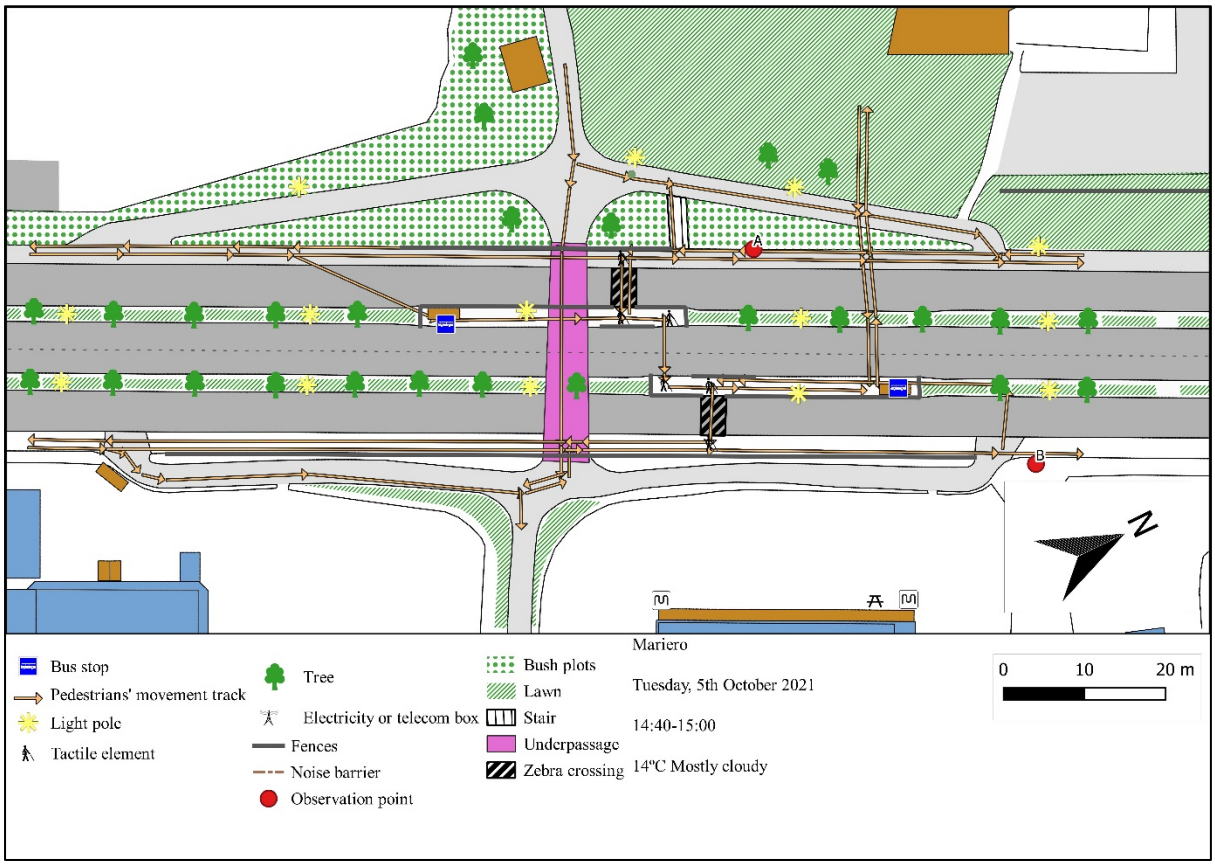
Appendix 1: Eikeberg, Tuesday morning



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	adult	onpath	walking	crossing_underground	a	b
2	man	adult	onpath	walking	crossing_underground	a	b
3	man	adult_man	onpath	walking	crossing_underground	a	b
4	woman	adult	onpath	busrider		a	b
5	woman	unidentified	onpath	busrider		a	a
6	woman	adult	onpath	sport		a	a
7	woman	young_adult	outpath	busrider		b	a
8	woman	young_adult	outpath	busrider		a	b
9	woman	young_adult	outpath	busrider		a	b
10	woman	young_adult	outpath	busrider		a	b
11	woman	young_adult	outpath	busrider		a	b
12	man	young_adult	outpath	busrider		a	b
13	man	young_adult	outpath	busrider		a	b
14	man	adult	onpath	busrider		b	b
15	man	adult	onpath	busrider		b	b
16	man	adult	onpath	busrider		b	b
17	man	teen	outpath	busrider		a	b
18	man	unidentified	onpath	busrider		a	b
19	woman	unidentified	onpath	busrider		a	b
20	woman	unidentified	onpath	busrider		a	b
21	man	unidentified	onpath	busrider		a	b
22	man	teen	onpath	busrider		a	a
23	woman	unidentified	onpath	busrider		a	a
24	man	unidentified	onpath	busrider		a	a
25	man	teen	onpath	busrider		a	a
26	woman	teen	onpath	busrider		b	a

27	man	young_adult	outpath	busrider	a	b
28	man	young_adult	outpath	busrider	a	b
29	woman	young_adult	outpath	busrider	a	b
30	woman	young_adult	outpath	busrider	a	b
31	woman	young_adult	outpath	busrider	a	b
32	woman	young_adult	outpath	busrider	a	b

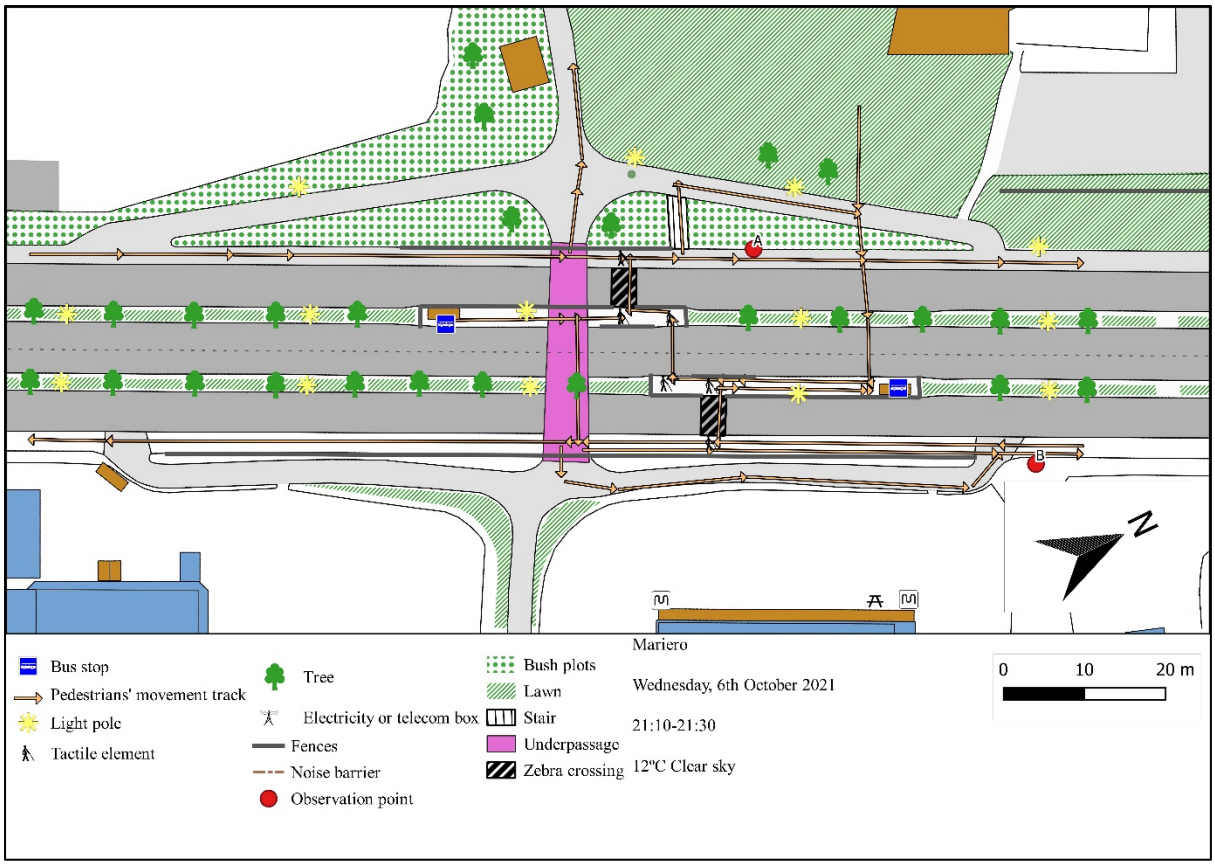
Appendix 2: Eikeberg, Tuesday afternoon



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	teen	onpath	busrider		a	b
2	woman	unidentified	outpath	busrider		a	b
3	man	teen	outpath	busrider		a	a
4	man	teen	outpath	busrider		a	a
5	woman	young_adult	onpath	busrider		a	b
6	woman	young_adult	onpath	busrider		a	b
7	woman	yound_adult	onpath	walking	crossing_surface	a	b
8	woman	young_adult	onpath	busrider		a	b
9	woman	young_adult	onpath	busrider		a	b
10	woman	young_adult	outpath	busrider		a	b
11	woman	young_adult	outpath	busrider		a	b
12	man	young_adult	outpath	busrider		a	b
13	woman	teen	outpath	busrider		a	b
14	woman	teen	outpath	busrider		a	b
15	woman	unidentified	onpath	walking	crossing_surface	a	b
16	woman	unidentified	onpath	busrider		a	b
17	man	young_adult	onpath	walking		a	a
18	woman	unidentified	onpath	walking		a	a
19	woman	unidentified	onpath	busrider		a	b
20	man	child	onpath	walking		b	b
21	woman	child	onpath	walking		b	b

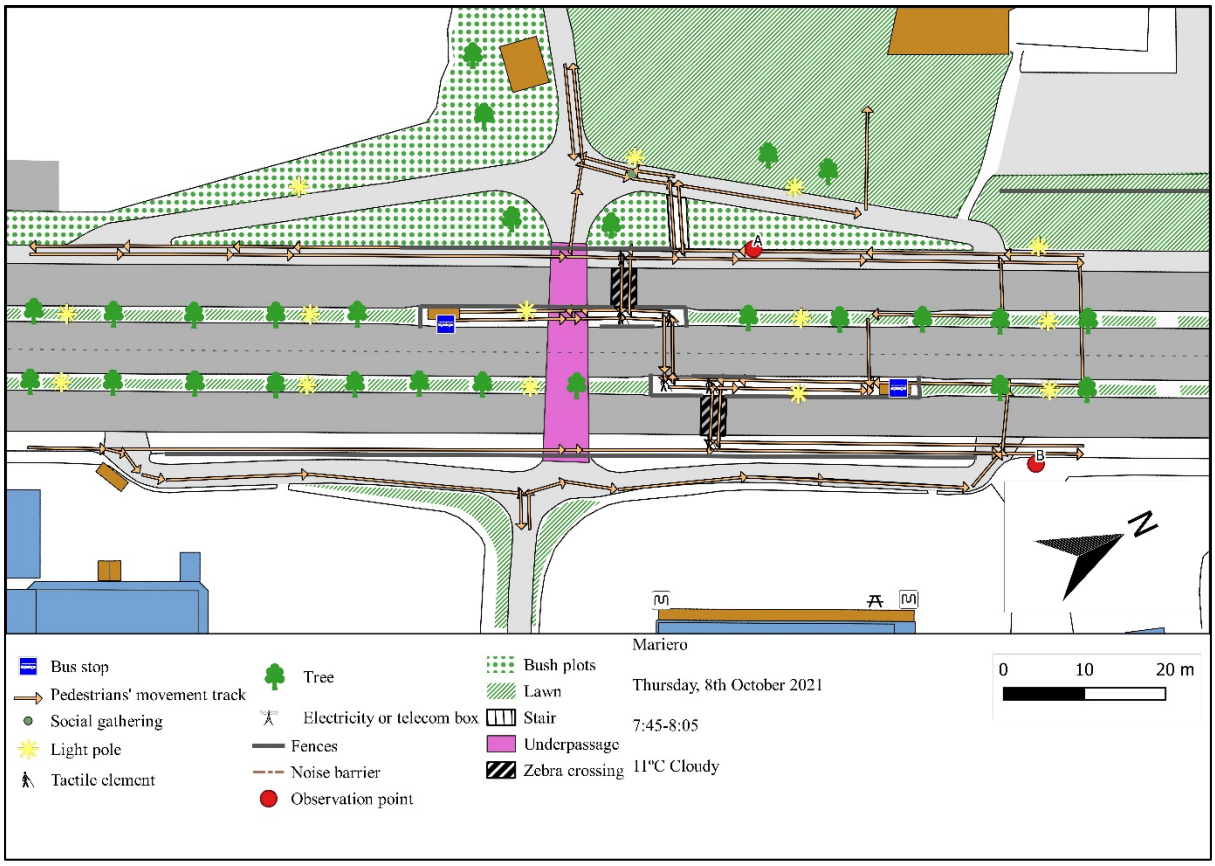
22	man	young_adult	onpath	walking		b	b
23	man	young_adult	onpath	walking		b	b
24	man	young_adult	onpath	walking		b	b
25	man	adult	onpath	walking	crossing_underground	b	a
26	man	adult	onpath	walking	crossing_underground	b	a
27	woman	young_adult	outpath	busrider		b	b
28	woman	adult	onpath	walking_dog	crossing_underground	a	b
29	woman	unidentified	onpath	walking	crossing_surface	a	b
30	woman	adult	onpath	walking_child		a	a
31	man	young_adult	outpath	busrider		b	a
32	woman	young_adult	onpath	busrider		a	a
33	woman	young_adult	onpath	busrider		a	a
34	woman	young_adult	onpath	busrider		a	a
35	woman	teen	onpath	busrider		a	a
36	man	adult	onpath	walking		a	a
37	woman	teen	onpath	busrider		b	b
38	woman	teen	onpath	walking		b	b
39	man	adult	onpath	walking	crossing_undergrounf	a	b
40	woman	teen	onpath	busrider		b	b
41	man	teen	onpath	busrider		a	b

Appendix 3: Eikeberg, Wednesday evening



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	busrider		a	a
2	man	adult	onpath	walking		a	a
3	man	young_adult	outpath	busrider		a	b
4	man	young_adult	outpath	busrider		a	b
5	man	adult	onpath	walking	crossing_underground	a	b
6	man	unidentified	onpath	busrider		b	b
7	man	unidentified	onpath	walking		b	b
8	woman	adult	onpath	walking		b	b
9	woman	young_adult	onpath	busrider		b	a
10	woman	yound_adult	onpath	busrider		a	a
11	man	adult	onpath	busrider		a	a
12	man	teen	outpath	busrider		a	b
13	man	young_adult	onpath	walking		a	a
14	man	young_adult	onpath	walking_dog	crossing_underground	b	a
15	woman	young_adult	onpath	walking_dog	crossing_underground	b	a
16	woman	adult	onpath	busrider		a	a

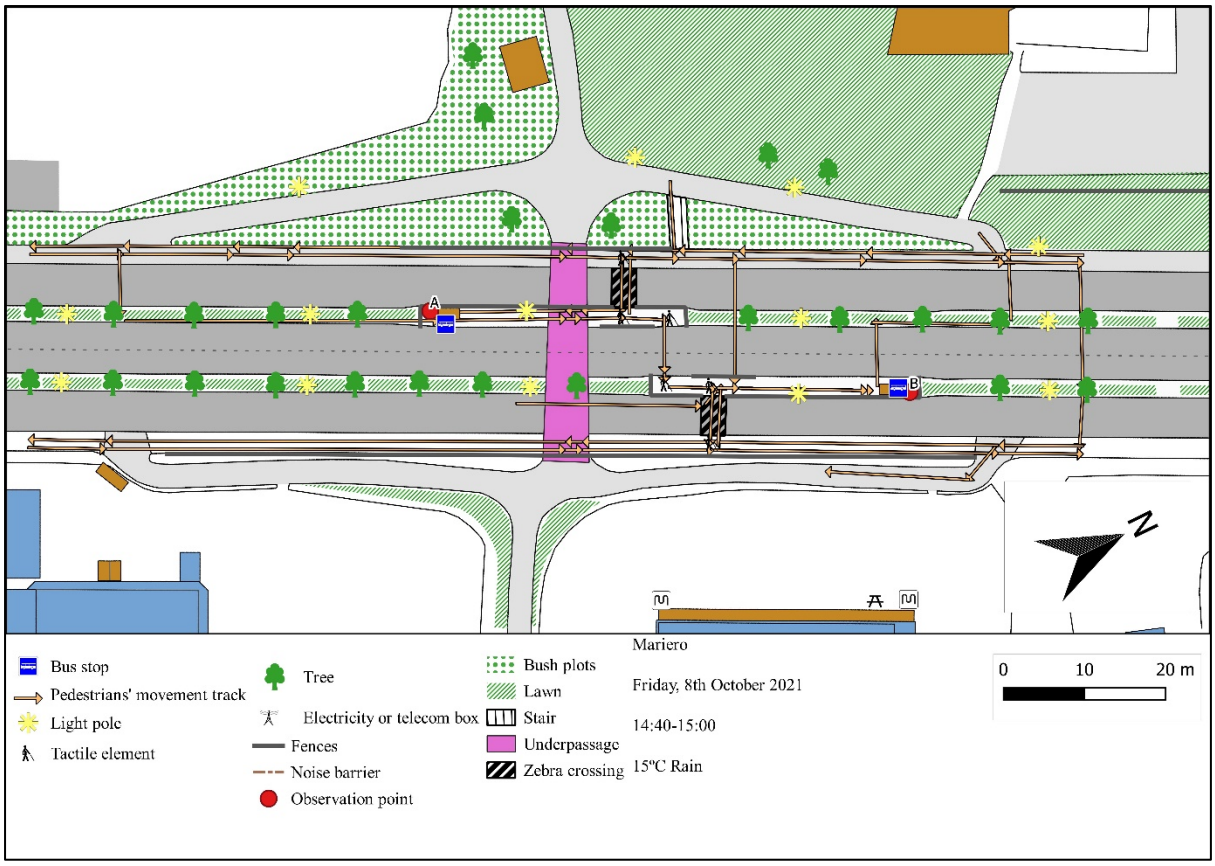
Appendix 4: Eikeberg, Thursday morning



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	young_adult	outpath	busrider		a	b
2	woman	young_adult	outpath	busrider		a	b
3	man	young_adult	onpath	walking	crossing_surface	a	b
4	woman	young_adult	onpath	walking	crossing_surface	a	b
5	woman	young_adult	outpath	busrider		a	b
6	man	adult	onpath	busrider		a	b
7	woman	unidentified	onpath	busrider		a	a
8	woman	unidentified	onpath	busrider		a	a
9	woman	unidentified	onpath	busrider		a	a
10	woman	adult	outpath	busrider		b	b
11	woman	unidentified	onpath	busrider		b	b
12	woman	adult	onpath	busrider		b	b
13	man	adult	onpath	walking		b	b
14	man	young_adult	outpath	busrider		a	b
15	man	young_adult	outpath	busrider		a	b
16	woman	teen	onpath	busrider	school	a	a
17	woman	teen	onpath	busrider	school	a	a
18	woman	teen	onpath	busrider	school	a	a
19	man	old	onpath	walking		a	a
20	man	young_adult	onpath	busrider		b	a
21	woman	young_adult	onpath	busrider		b	a
22	woman	young_adult	outpath	busrider		a	b
23	woman	young_adult	outpath	busrider		a	b
24	man	adult	onpath	busrider		a	a
25	woman	adult	onpath	sport		a	a

26	woman	teen	onpath	busrider	school	a	a
27	woman	teen	onpath	busrider	school	a	a
28	woman	child	onpath	busrider		a	a
29	woman	teen	onpath	busrider		a	a
30	woman	teen	onpath	busrider		a	a
31	man	child	onpath	walking	crossing_surface	b	a
32	man	child	onpath	walking	crossing_surface	b	a
33	man	adult	onpath	walking	crossing_underground	b	a
34	woman	adult	onpath	busrider		a	b
35	woman	unidentified	onpath	walking	crossing_surface	b	a
36	woman	adult	onpath	busrider		b	b
37	woman	adult	outpath	busrider		b	b
38	woman	adult	outpath	busrider		b	b
39	woman	young_adult	outpath	busrider		b	b
40	woman	young_adult	outpath	busrider		b	b
41	woman	young_adult	outpath	busrider		b	b
42	man	young_adult	outpath	busrider		b	b
43	man	young_adult	outpath	busrider		b	b
44	man	young_adult	outpath	busrider		b	b
45	man	adult	onpath	busrider		b	b
46	woman	adult	onpath	walking		b	b
47	woman	young_adult	outpath	busrider		a	b

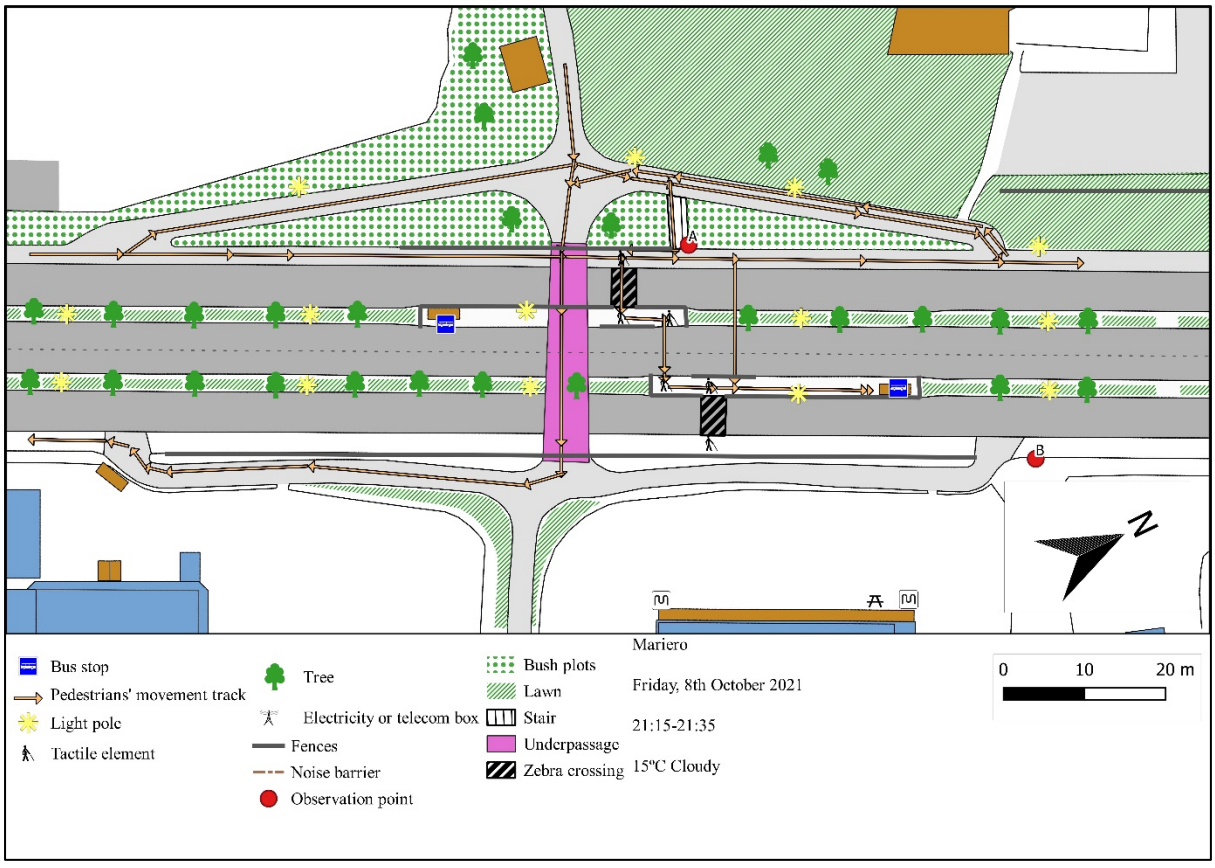
Appendix 5: Eikeberg, Friday afternoon



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	young_adult	onpath	walking	crossing_surface	a	b
2	woman	young_adult	onpath	busrider		a	b
3	woman	young_adult	onpath	busrider		a	b
4	man	unidentified	outpath	busrider		b	a
5	man	unidentified	onpath	busrider	baby_trolley	a	b
6	man	adult	onpath	busrider		a	b
7	man	unidentified	onpath	walking	crossing_surface	a	b
8	woman	teen	onpath	walking		a	b
9	man	teen	onpath	busrider		a	a
10	woman	child	onpath	busrider		a	a
11	woman	adult	onpath	busrider		a	b
12	man	unidentified	outpath	busrider		b	b
13	woman	unidentified	onpath	walking		b	b
14	man	unidentified	onpath	walking		b	b
15	woman	unidentified	onpath	walking	baby_trolley	a	a
16	woman	young_adult	onpath	walking	crossing_surface	a	b
17	woman	teen	outpath	busrider		a	b
18	woman	adult	onpath	busrider		a	b
19	woman	adult	onpath	busrider		a	b
20	woman	adult	onpath	walking	crossing_surface	a	b
21	man	unidentified	onpath	busrider		a	b
22	woman	unidentified	onpath	busrider		a	b
23	woman	unidentified	onpath	busrider		a	b
24	man	unidentified	outpath	walking	crossing_surface	a	b
25	man	unidentified	onpath	busrider		b	b
26	unidentified	child	onpath	busrider		b	b
27	man	unidentified	onpath	busrider		a	a

28	man	unidentified	onpath	busrider		a	a
29	man	unidentified	onpath	walking		a	a
30	man	unidentified	outpath	busrider		a	a
31	man	young_adult	onpath	walking	crossing_surface	a	b
32	woman	young_adult	onpath	busrider		a	b
33	woman	young_adult	onpath	busrider		a	b
34	man	unidentified	outpath	busrider		b	a
35	man	unidentified	onpath	busrider	baby_trolley	a	b
36	man	adult	onpath	busrider		a	b
37	man	unidentified	onpath	walking	crossing_surface	a	b
38	woman	teen	onpath	walking		a	b
39	man	teen	onpath	busrider		a	a
40	woman	child	onpath	busrider		a	a
41	woman	adult	onpath	busrider		a	b

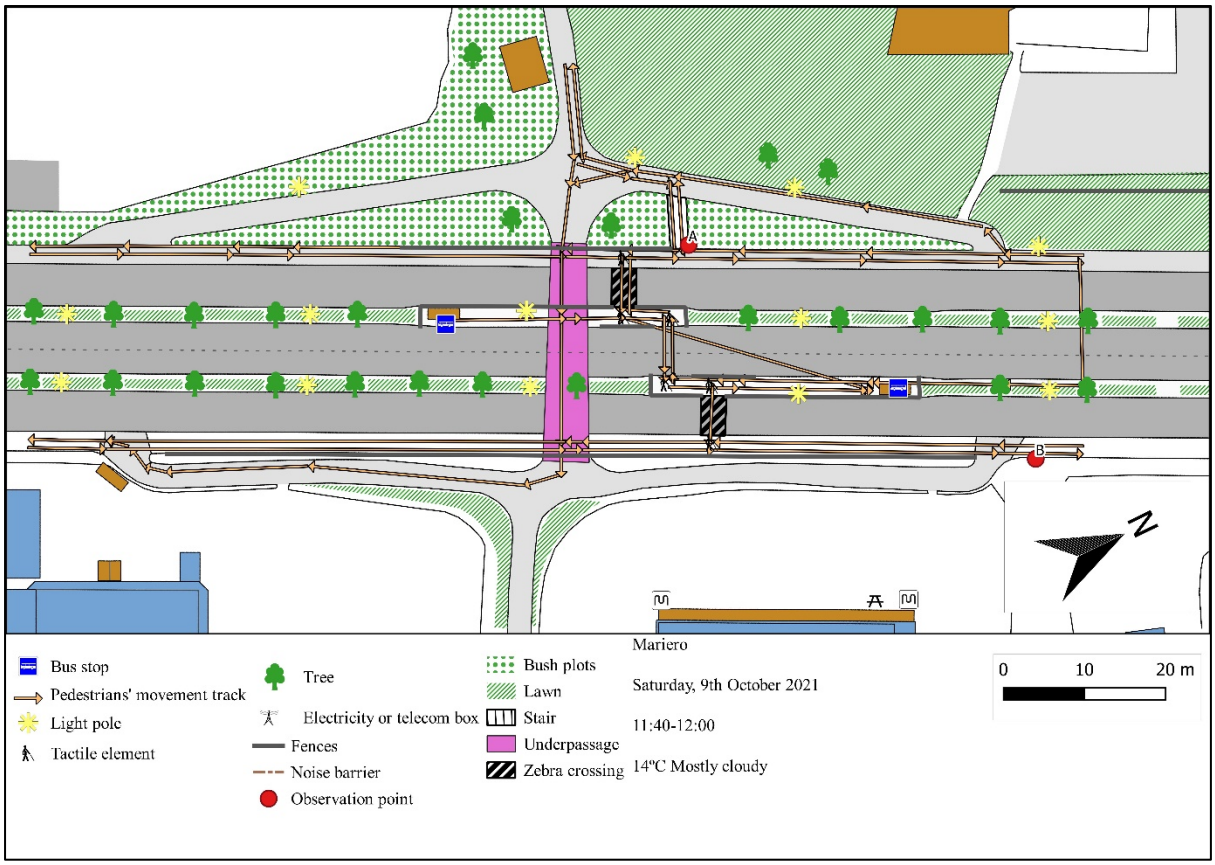
Appendix 6: Eikeberg, Friday evening



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	walking			
2	man	young_adult	outpath	busrider		a	b
3	man	young_adult	onpath	busrider		a	b
4	man	young_adult	onpath	busrider		a	b
5	woman	young_adult	onpath	busrider		a	b
6	woman	child	onpath	busrider		a	b
7	man	adult	onpath	walking	crossing_underground	a	b
8	man	young_adult	onpath	walking	shopping	a	a
9	woman	young_adult	onpath	walking_dog	crossing_underground	a	b

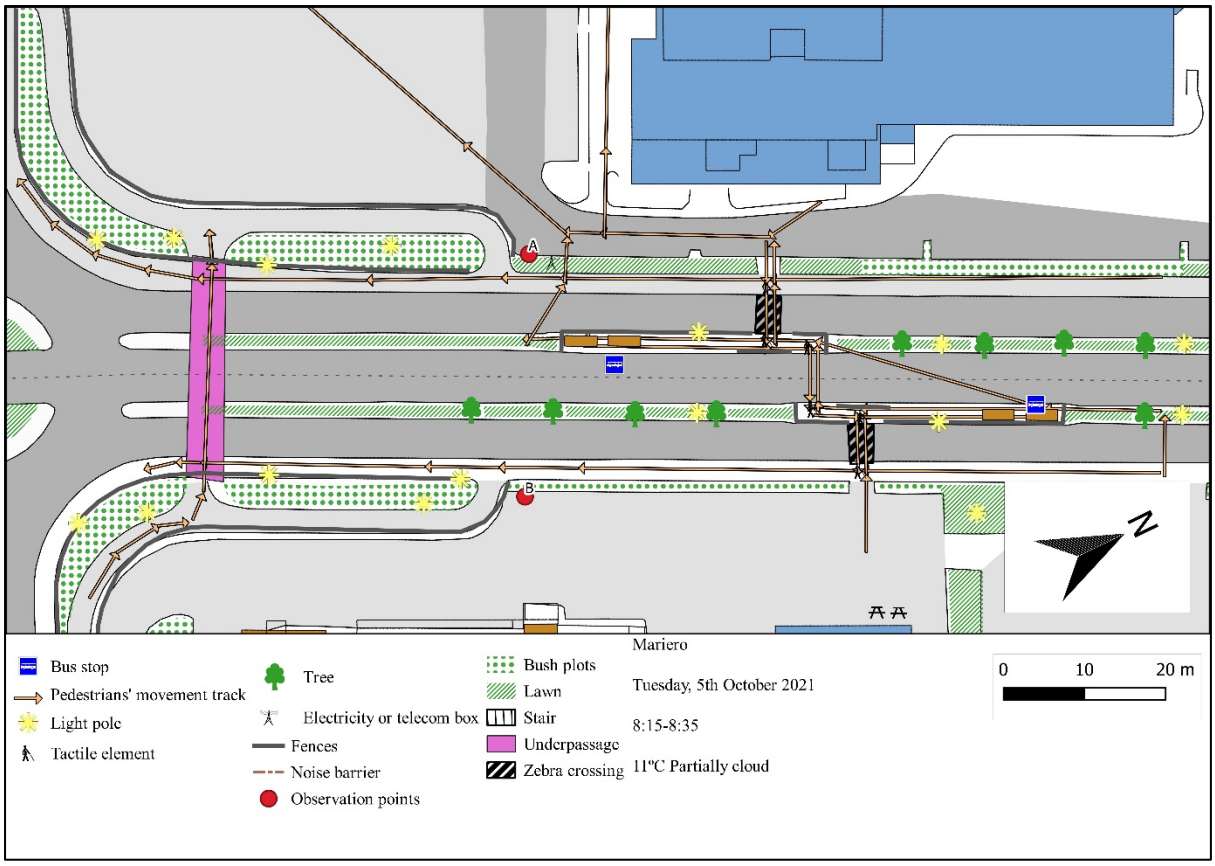
10	man	young_adult	onpath	walking_dog	crossing_underground	a	b

Appendix 7: Eikeberg, Saturday midday



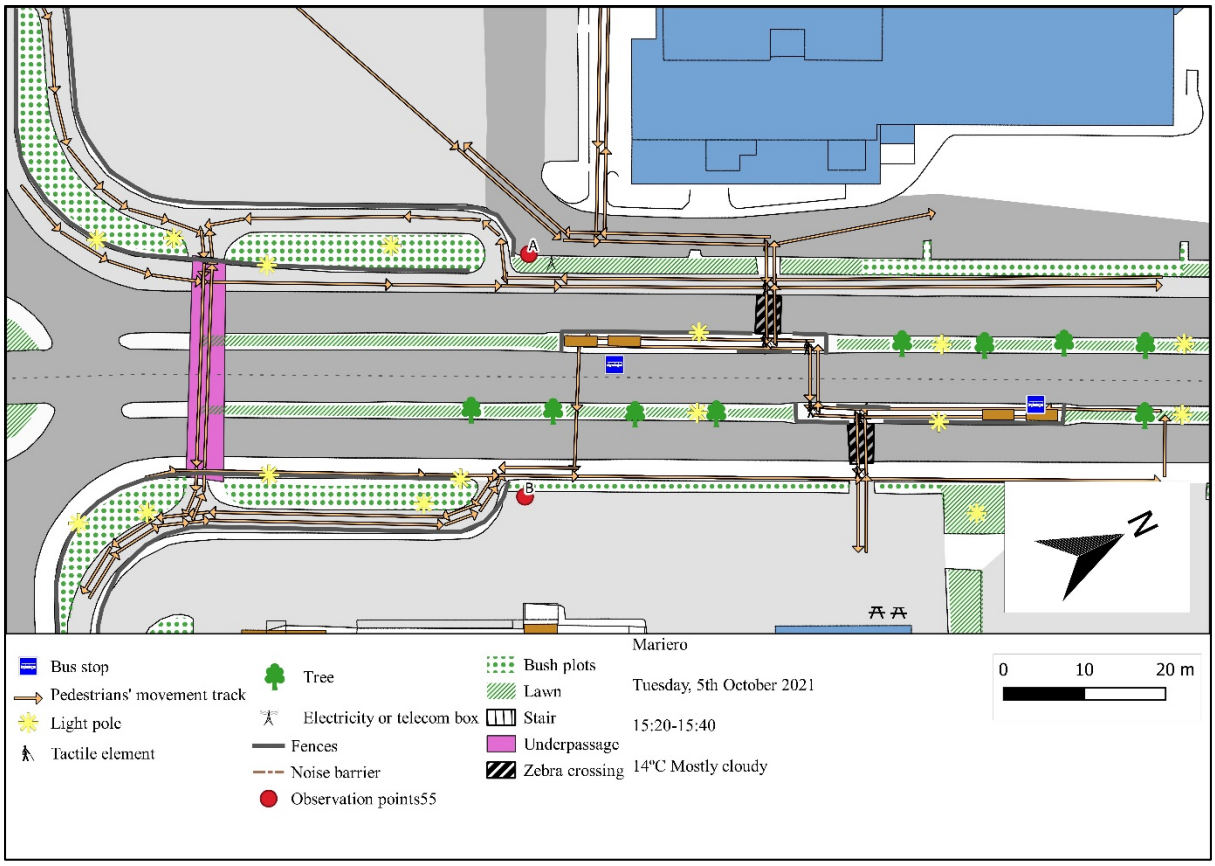
Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination	Entry
1	Man	young_adult	onpath	busrider			a	a
2	Man	young_adult	onpath	busrider			a	a
3	woman	old	outpath	busrider			a	b
4	woman	adult	onpath	walk			a	a
5	woman	old	onpath	walk	talk	walking_support	a	a
6	woman	old	onpath	walk	talk	crossing_underground	a	b
7	woman	yound_adult	outpath	busrider			a	b
8	man	adult	onpath	sport	crossing_underground		a	b
9	woman	young_adult	onpath	busrider			a	b
10	woman	young_adult	onpath	busrider			b	a
11	woman	young_adult	onpath	busrider			b	4
12	man	yound_adult	onpath	busrider			b	a
13	man	young_adult	onpath	walk			a	a
14	man	old	onpath	walking	walk_support		b	b
15	man	young_adult	onpath	busrider			a	a
16	woman	adult	onpath	busrider			a	b
17	woman	adult	outpath	busrider			a	b
18	woman	adult	onpath	walking			b	b

Appendix 8: Mariero, Tuesday morning.



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	sport		a	a
2	woman	teen	outpath	busrider		a	a
3	woman	unidentified	onpath	busrider		b	a
4	man	unidentified	onpath	busrider		a	a
5	man	unidentified	onpath	busrider		a	b
6	woman	unidentified	onpath	busrider	walking_support	a	a
7	woman	teen	onpath	busrider		a	b
8	man	teen	onpath	busrider		a	b
9	man	young_adult	onpath	walking	crossing_surface	a	b
10	man	adult	onpath	walking		b	b
11	woman	adult	onpath	walking	crossing_underground	a	b
12	woman	young_adult	outpath	busrider		a	b
13	woman	unidentified	onpath	walking	crossing_surface	b	a
14	woman	young_adult	onpath	busrider		b	a
15	unidentified	teen	onpath	busrider		a	b
16	man	teen	onpath	busrider		a	b
17	man	adult	onpath	busrider		b	b
18	woman	teen	outpath	busrider		b	b
19	man	adult	onpath	walking	crossing_underground	a	b
20	woman	adult	onpath	sport		a	a

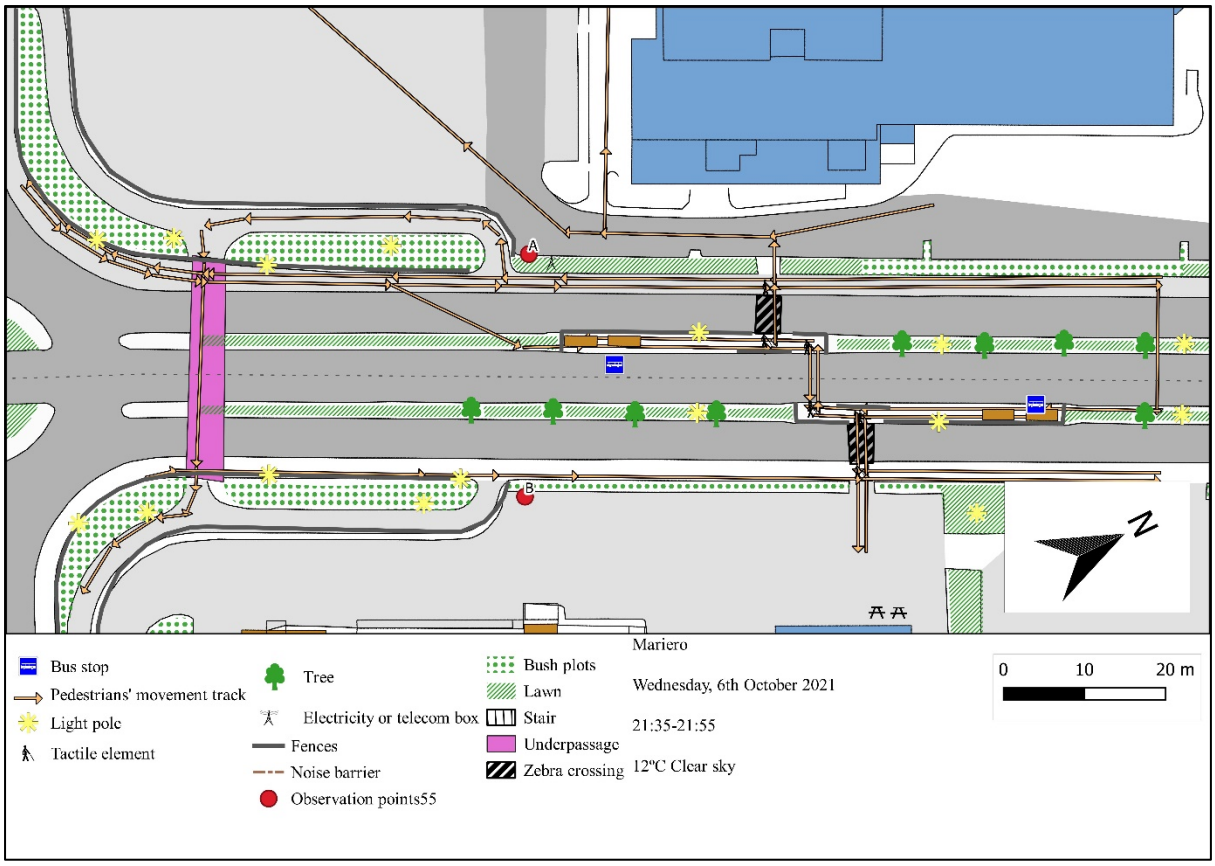
Appendix 9: Mariero, Tuesday afternoon



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	young_adult	onpath	busrider		a	b
2	man	young_adult	onpath	busrider		a	b
3	man	young_adult	onpath	busrider		a	b
4	man	young_adult	onpath	busrider		b	a
5	woman	unidentified	onpath	walking		b	a
6	man	unidentified	onpath	busrider		b	a
7	man	unidentified	onpath	busrider		a	a
8	woman	young_adult	onpath	walking		a	b
9	woman	young_adult	onpath	walking		a	b
10	woman	adult	onpath	walking		a	b
11	man	young_adult	onpath	busrider		a	a
12	woman	unidentified	onpath	busrider		b	a
13	woman	adult	onpath	walking		b	a
14	woman	teen	onpath	walking		b	a
15	man	teen	outpath	busrider		b	a
16	man	teen	outpath	busrider		b	a
17	unidentified	unidentified	onpath	busrider		b	b
18	unidentified	unidentified	onpath	busrider		b	b
19	unidentified	unidentified	onpath	busrider		b	b
20	man	adult	onpath	busrider		b	b
21	woman	old	onpath	busrider		b	b
22	man	adult	outpath	busrider		b	b
23	woman	old	onpath	walking		b	a
24	woman	unidentified	onpath	walking_child		a	b
25	man	adult	onpath	walking		b	a
26	woman	teen	onpath	busrider		b	a
27	woman	teen	onpath	busrider		b	a

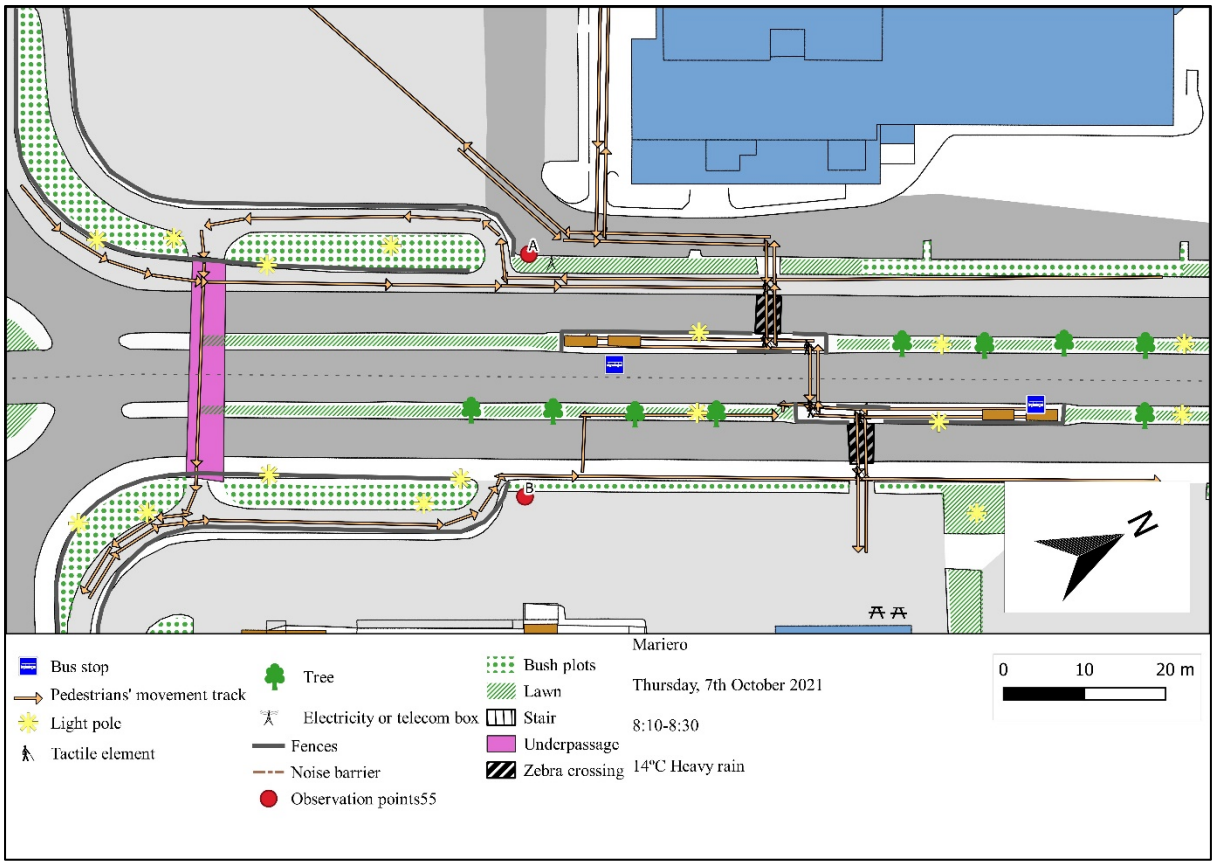
28	woman	old	onpath	walking_support	b	a
29	woman	unidentified	onpath	walking	a	b
30	man	unidentified	onpath	busrider	b	a
31	man	unidentified	onpath	walking	a	b
32	man	child	onpath	walking	a	b
33	woman	old	onpath	walking	a	b
34	man	teen	onpath	walking	a	b
35	woman	teen	onpath	busrider	b	b
36	woman	unidentified	onpath	busrider	b	b
37	man	adult	yes	busrider	b	b
38	man	adult	onpath	walking	b	b
39	man	unidentified	onpath	busrider	b	b
40	woman	old	onpath	busrider	b	b

Appendix 10: Mariero, Wednesday evening



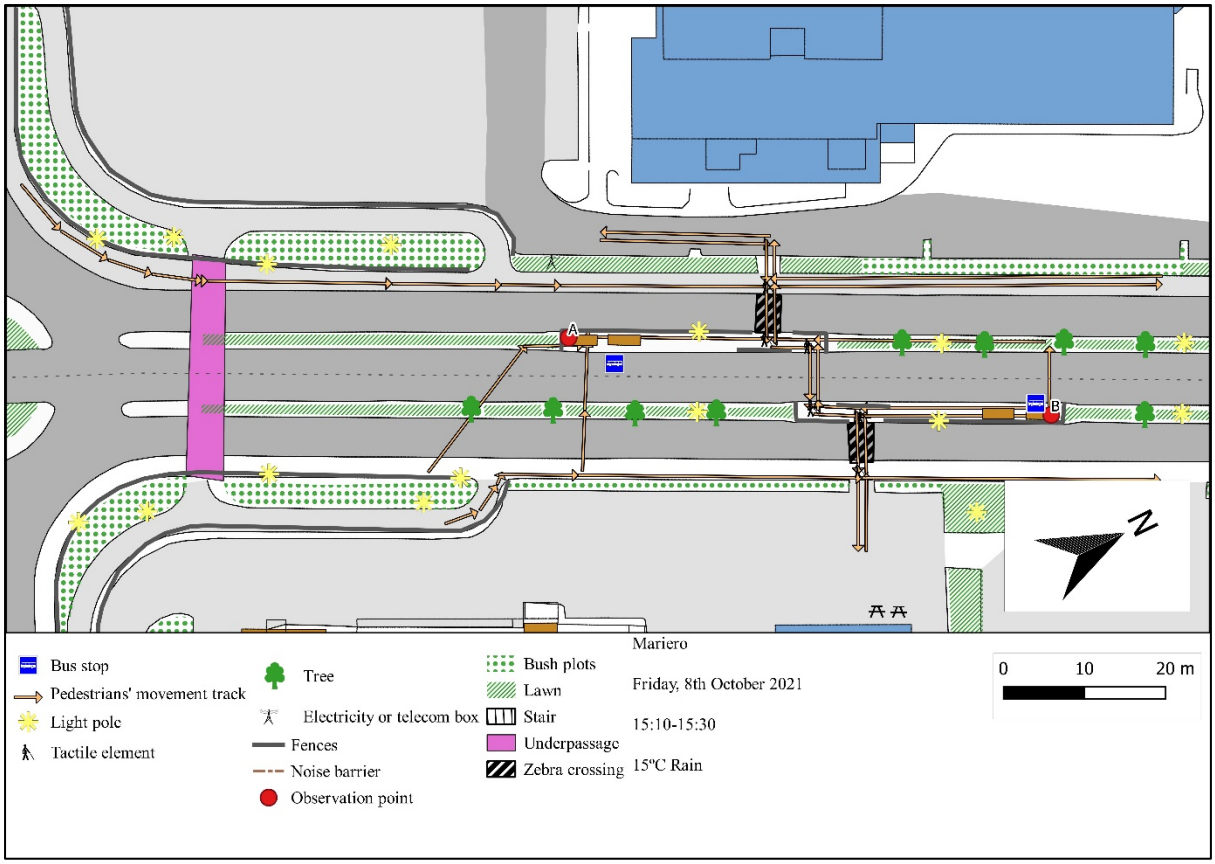
Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	adult	onpath	walking	crossing_surface	a	b
2	man	young_adult	onpath	busrider		a	b
3	man	old	onpath	busrider		b	a
4	woman	old	onpath	busrider		b	a
5	man	teen	onpath	walking	crossing_surface	a	b
6	woman	teen	onpath	walking	crossing_surface	a	b
7	woman	adult	outpath	walking		a	a
8	woman	young_adult	onpath	busrider		b	a
9	woman	young_adult	onpath	busrider		b	a
10	woman	young_adult	onpath	busrider		b	a
11	woman	young_adult	outpath	busrider		b	a
12	man	adult	onpath	walking		a	a
13	man	adult	onpath	busrider		b	b
14	man	unidentified	onpath	busrider		b	b
15	woman	adult	onpath	walking	crossing_underground	b	a
16	woman	young_adult	onpath	walking		a	a
17	woman	young_adult	outpath	busrider		a	a
18	woman	young_adult	outpath	busrider		a	a
19	man	adult	onpath	walking		a	b
20	woman	unidentified	outpath	walking	crossing_surface	b	a
21	woman	young_adult	onpath	busrider	shopping	a	b
22	woman	young_adult	onpath	busrider		a	a
23	woman	young_adult	onpath	busrider		a	a
24	woman	young_adult	onpath	busrider		a	a
25	woman	young_adult	onpath	busrider		a	a
26	man	adult	onpath	busrider		b	b
27	man	adult	onpath	busrider		b	b

Appendix 11: Mariero, Thursday morning



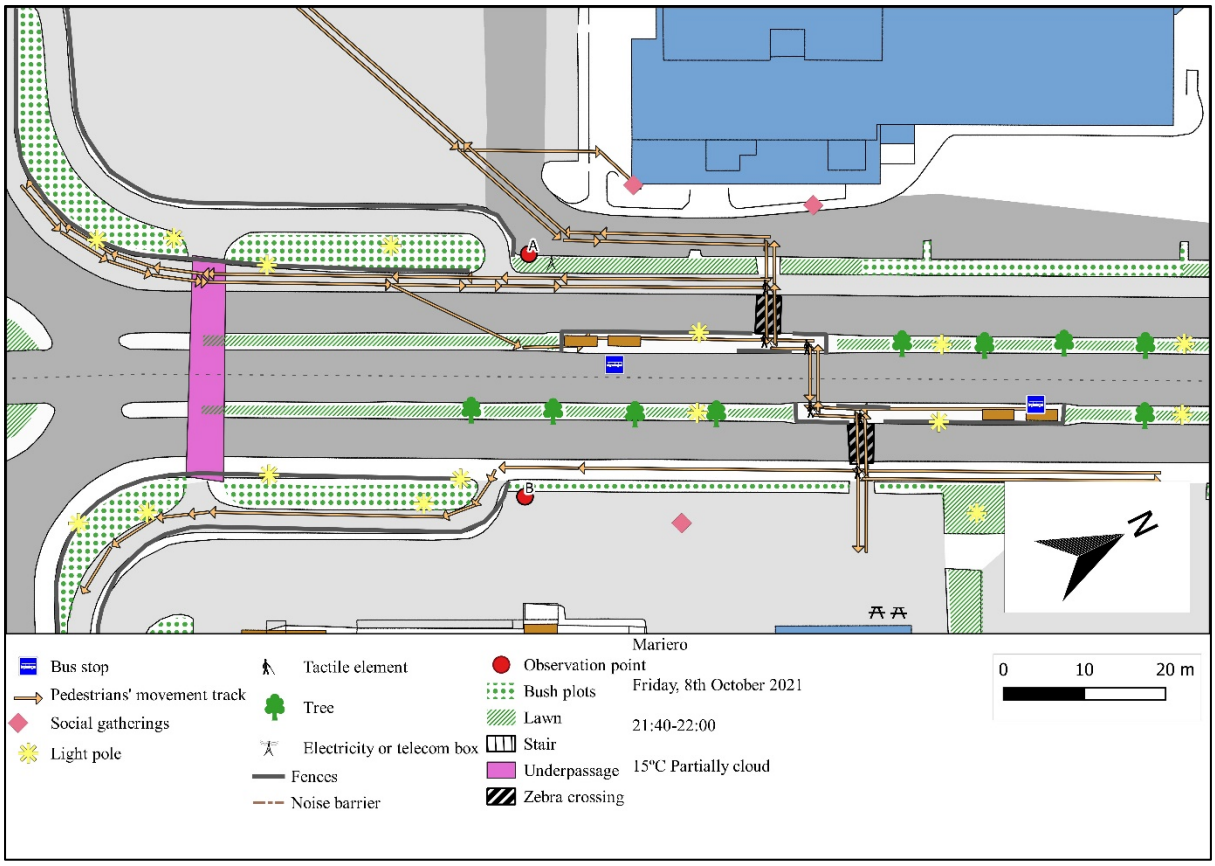
Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	busrider		a	a
2	woman	adult	onpath	walking	crossing_surface	b	a
3	man	adult	onpath	busrider		b	a
4	woman	teen	onpath	busrider	school	a	b
5	woman	teen	onpath	busrider	school	a	b
6	woman	teen	onpath	busrider	school	a	b
7	man	adult	onpath	busrider	crossing_underground	b	a
8	woman	young_adult	onpath	busrider		a	b
9	man	young_adult	onpath	walking		a	b
10	woman	young_adult	onpath	walking		a	b
11	man	adult	onpath	busrider		a	b
12	woman	adult	onpath	busrider		b	a
13	woman	adult	onpath	walking	crossing_underground	b	a
14	man	adult	outpath	busrider		b	b
15	man	adult	onpath	busrider		a	a
16	man	adult	onpath	walking		a	a
17	man	adult	onpath	walking	crossing_surface	b	a
18	woman	adult	onpath	busrider		a	a
19	woman	adult	onpath	busrider		a	a
20	woman	adult	onpath	busrider		a	a
21	man	adult	onpath	busrider		b	a
22	woman	adult	onpath	walking	crossing_underground	b	a
23	man	unidentified	onpath	walking		b	b
24	man	adult	onpath	busrider		b	b
25	woman	adult	onpath	busrider		b	a
26	woman	adult	onpath	busrider		a	a
27	woman	adult	onpath	walking	crossing_surface	b	a

Appendix 12: Mariero, Friday afternoon



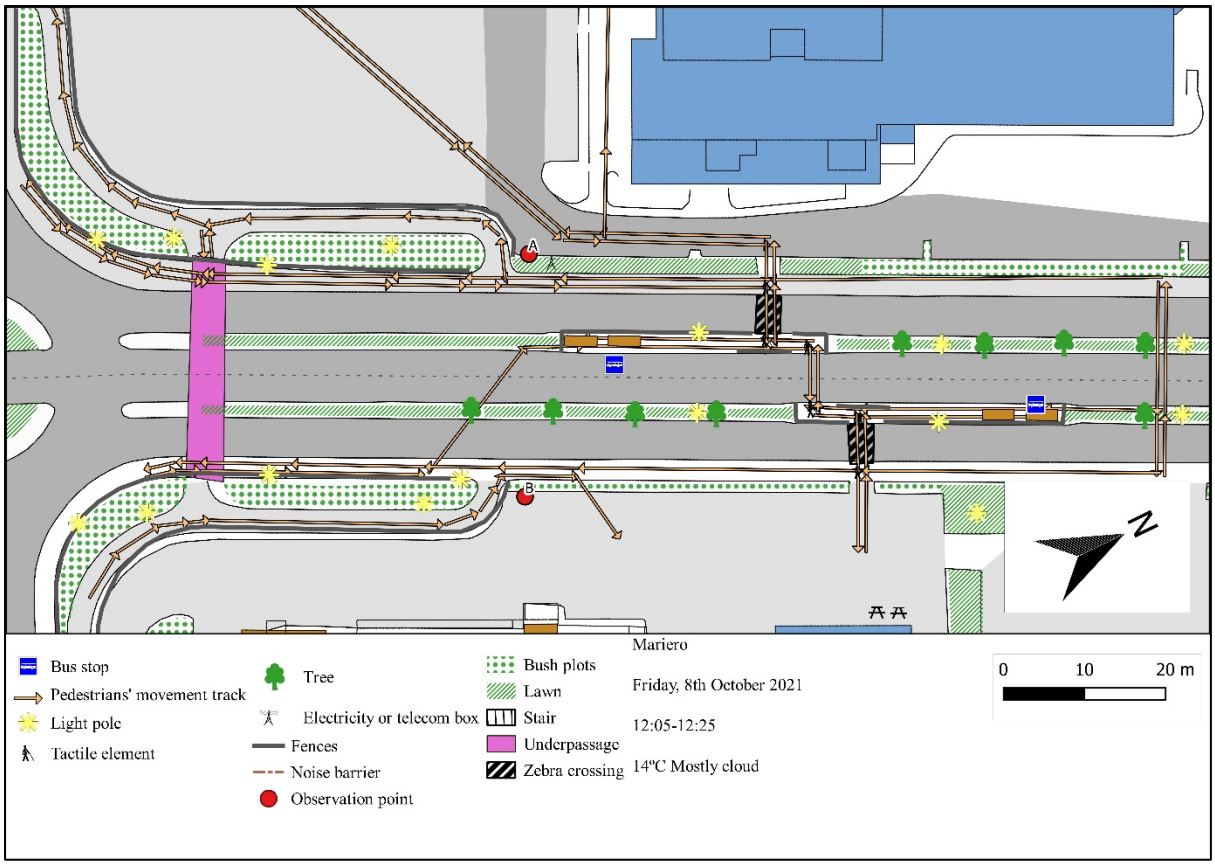
Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	walking	crossing_surface	a	b
2	woman	young_adult	onpath	busrider		b	a
3	man	teen	onpath	busrider		a	a
4	man	young_adult	onpath	busrider		a	a
5	man	young_adult	onpath	busrider		a	b
6	man	adult	onpath	busrider		a	b
7	man	adult	outpath	busrider		a	b
8	woman	young_adult	onpath	busrider		a	b
9	woman	young_adult	onpath	busrider		a	b
10	woman	unidentified	onpath	walking	crossing_surface	b	a
11	woman	young_adult	outpath	busrider		a	b
12	man	adult	onpath	busrider		a	b
13	woman	old	onpath	walking_support	crossing_surface	b	a
14	woman	unidentified	outpath	busrider		a	b
15	man	unidentified	onpath	busrider		b	b
16	man	unidentified	onpath	walking		b	b
17	woman	adult	onpath	walking	crossing_surface	a	b

Appendix 13: Mariero, Friday evening



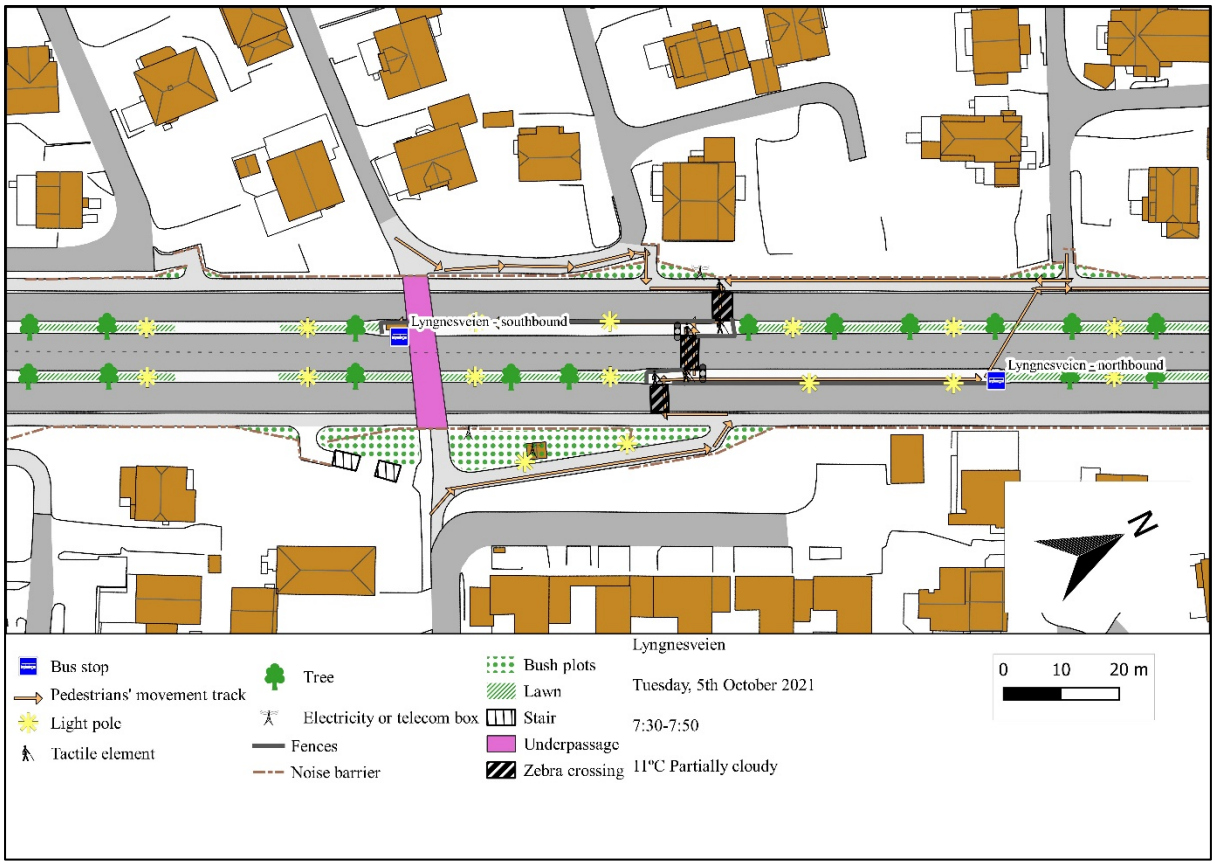
Entry	Gender	Age group	Path	Activity	Compl.		Origin	Destination
1	woman	teen	onpath	walking			b	a
2	woman	teen	onpath	walking			b	a
3	woman	teen	onpath	walking			b	a
4	man	teen	onpath	walking	crossing_surface		a	b
5	woman	teen	onpath	walking	crossing_surface		a	b
6	man	teen	onpath	busrider			a	a
7	woman	teen	onpath	busrider			a	a
8	man	teen	onpath	busrider			a	a
9	woman	teen	onpath	busrider			a	a
10	unidentified	unidentified	outpath	walking	crossing_surface		a	b
11	man	teen	onpath	walking	crossing_surface		b	a
12	man	teen	onpath	walking	crossing_surface		b	a
13	woman	adult	onpath	walking_dog			b	b
14	man	adult	onpath	walking_dog			b	b
15	woman	young_adult	onpath	walking	crossing_surface		b	a
16	man	adult	onpath	busrider			a	b
17	woman	teen	onpath	walking	crossing_surface		b	a
18	woman	teen	onpath	walking	crossing_surface		b	a
19	man	man	teen	walking	talking		a	a
20	man	man	teen	walking	talking		a	a
21	man	man	teen	walking	talking		a	a
22	man	man	teen	walking	talking		a	a
23	man	man	teen	walking	talking		a	a
24	woman	teen	outpath	busrider			a	a
25	woman	teen	outpath	busrider			a	a
26	woman	teen	outpath	busrider			a	a
27	woman	teen	onpath	walking	crossing_surface		a	b
28	woman	teen	onpath	walking	crossing_surface		a	b
29	man	teen	onpath	walking	shopping	crossing_surface	a	b
30	man	teen	onpath	walking	shopping	crossing_surface	a	b
31	woman	teen	onpath	walking			b	a

Appendix 14: Mariero, Saturday midday



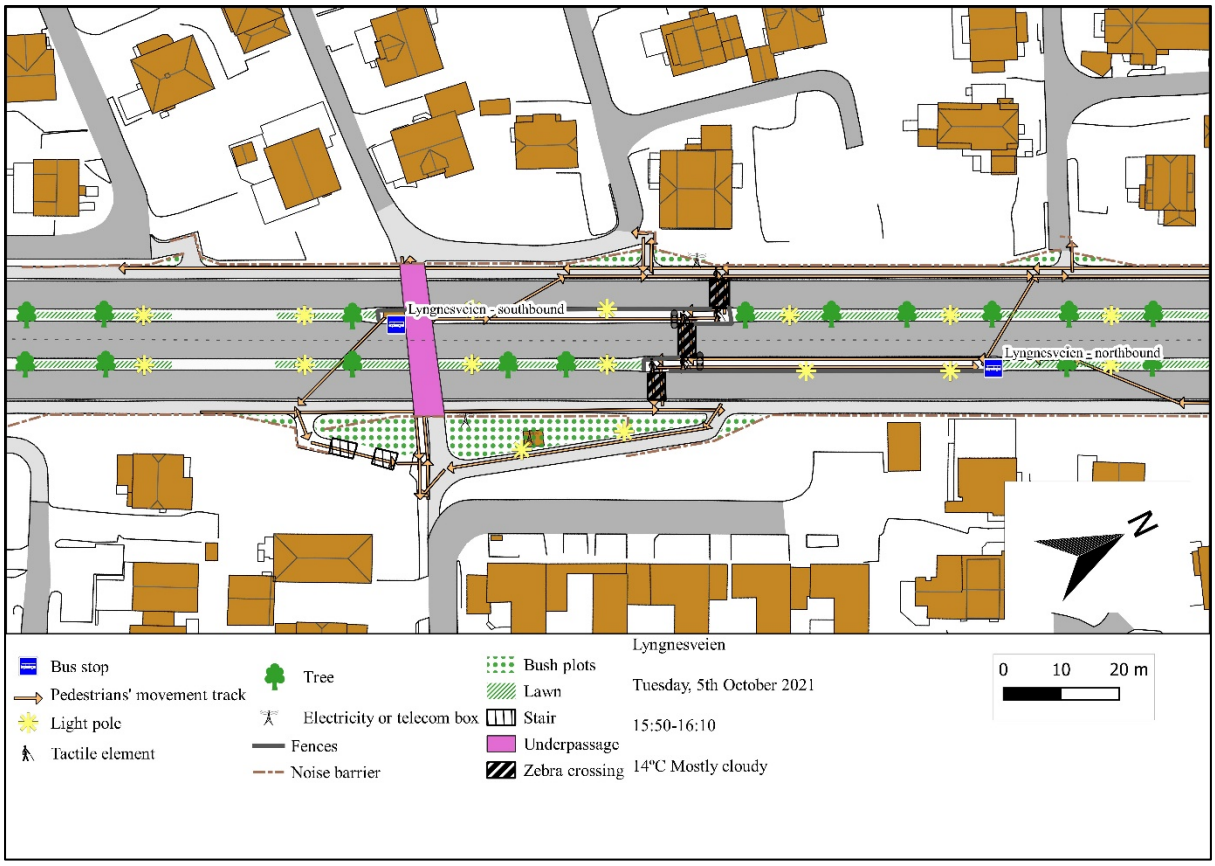
Entry	Gender	Age group	Path	Activity	Compl.		Origin	Destination
1	woman	teen	onpath	busrider			a	b
2	woman	old	onpath	busrider	shopping		a	a
3	man	undefined	outpath	walking	crossing_surface		a	b
4	man	young_adult	outpath	busrider			a	b
5	man	adult	onpath	walking	crossing_surface			
6	woman	adult	onpath	walking	crossing_surface		a	b
7	man	young_adult	onpath	busrider			b	a
8	woman	young_adult	onpath	walking	baby_trolley	crossing_underground	a	b
9	man	adult	onpath	walking			a	a
10	woman	child	onpath	walking			a	a
11	woman	child	onpath	walking			a	a
12	woman	teen	onpath	walking			b	a
13	woman	teen	outpah	busrider			b	b
14	man	adult	onpath	busrider	baby_trolley		b	b
15	woman	teen	outpah	busrider			b	b
16	man	old	onpath	busrider			a	b
17	woman	old	onpath	walking	shopping	crossing_surface	a	b
18	man	adult	onpath	walking	crossing_surface		b	a
19	man	teen	onpath	busrider			b	a
20	man	old	onpath	walking	crossing_underground		b	b
21	man	child	onpath	walking	crossing_surface		b	a
22	woman	old	onpath	walking	crossing_underground		b	b
23	man	adult	outpath	walking	walking_dog	crossing_surface	b	a
24	woman	adult	yes	walking	crossing_surface		b	a
25	man	young_adult	onpath	walking_dog	baby_trolley	crossing_underground	b	b
26	woman	teen	onpath	busrider			a	b
27	woman	adult	onpath	busrider			b	b
28	woman	adult	onpath	busrider			b	b
29	man	adult	onpath	walking	crossing_surface		a	b
30	man	adult	onpath	walking			b	b
31	man	child	onpath	walking			b	b
32	woman	teen	onpath	busrider			a	b

Appendix 15: Lyngnesveien, Tuesday morning



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	busrider		surface	surface
2	woman	adult	onpath	busrider	w/child	underground	underground
3	woman	teen	onpath	busrider		underground	surface
4	woman	teen	onpath	busrider		underground	surface
5	man	teen	onpath	busrider		underground	surface
6	woman	unidentified	onpath	busrider		surface	surface
7	man	adult	outpath	busrider		surface	surface

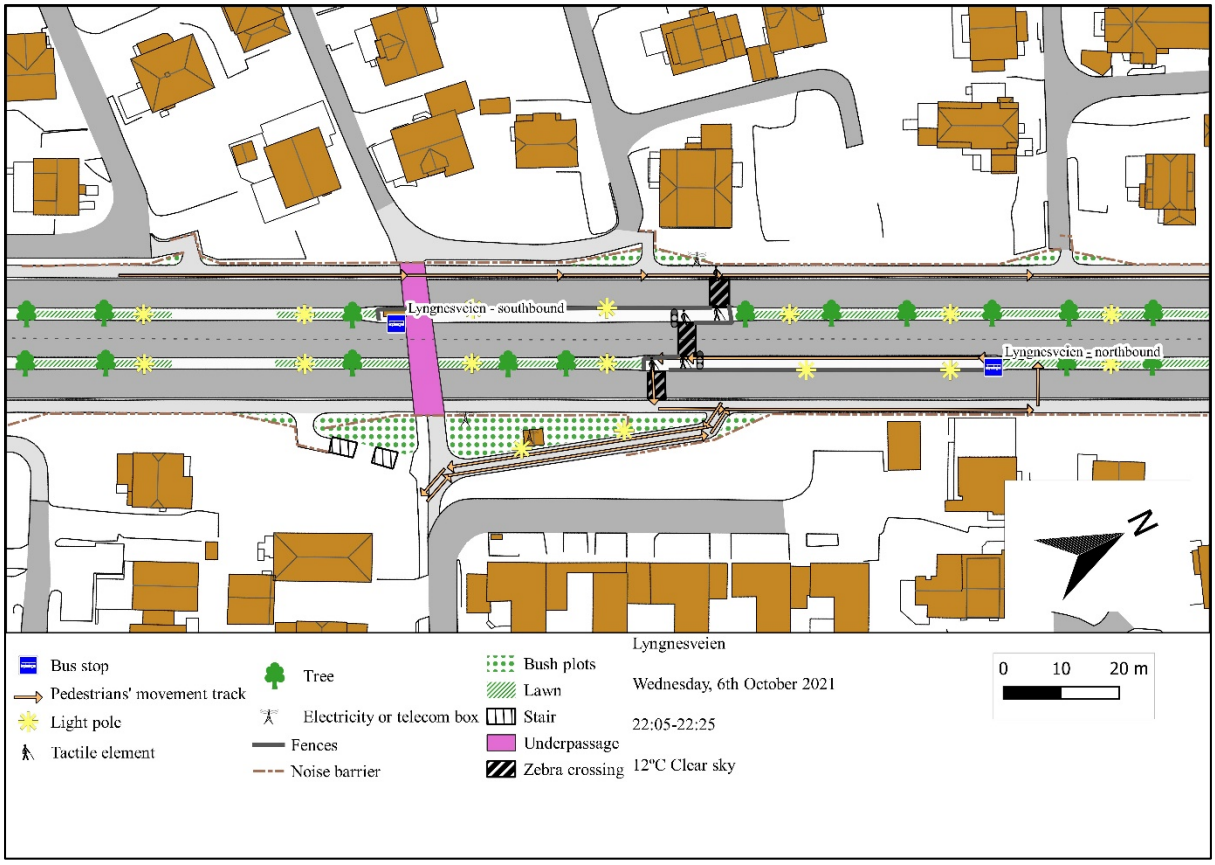
Appendix 16: Lyngnesveien, Tuesday afternoon



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	unidentified	outpath	busrider		surface	surface
2	man	child	onpath	walking	crossing_surface	surface	surface
3	woman	adult	onpath	busrider	walking_child	surface	surface
4	woman	adult	onpath	busrider	baby_trolley	surface	surface
5	woman	old	onpath	walking		surface	surface
6	man	old	onpath	walking_support		surface	surface
7	woman	adult	onpath	walking		surface	surface
8	woman	adult	onpath	walking		surface	surface
9	woman	adult	onpath	busrider		surface	surface
10	man	young_adult	outpath	busrider		surface	surface
11	man	child	onpath	walking		surface	surface
12	man	young_adult	outpath	busrider		surface	underground
13	woman	adult	onpath	walking_dog	crossing_underground	underground	underground
14	man	child	onpath	walking	crossing_underground	underground	underground
15	woman	child	onpath	walking	crossing_underground	underground	underground
16	man	child	onpath	walking	crossing_underground	underground	underground
17	woman	unidentified	onpath	busrider	baby_trolley	surface	surface
18	woman	unidentified	onpath	busrider		surface	surface
19	woman	teen	onpath	busrider		surface	surface
20	woman	teen	onpath	busrider		surface	surface
21	man	young_adult	outpath	busrider		surface	surface
22	man	adult	outpath	busrider		surface	surface

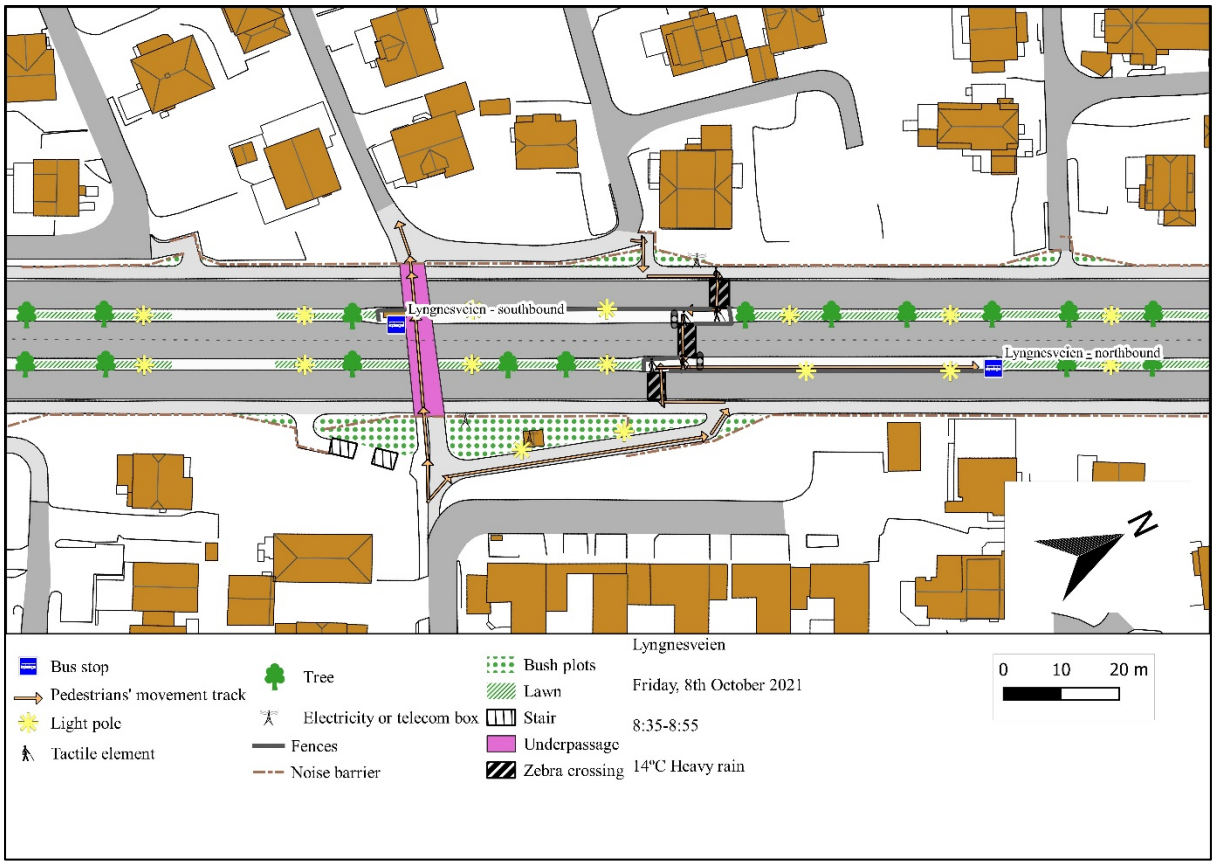
23	man	teen	onpath	busrider		surface	underground
24	woman	young_adult	onpath	busrider		surface	underground
25	man	adult	onpath	walking	crossing_underground	underground	underground
26	man	adult	onpath	walking	crossing_underground	underground	underground
27	woman	old	onpath	walking	crossing_underground	underground	underground
28	woman	old	onpath	walking_dog	crossing_underground	underground	underground

Appendix 17: Lyngnesveien, Wednesday evening



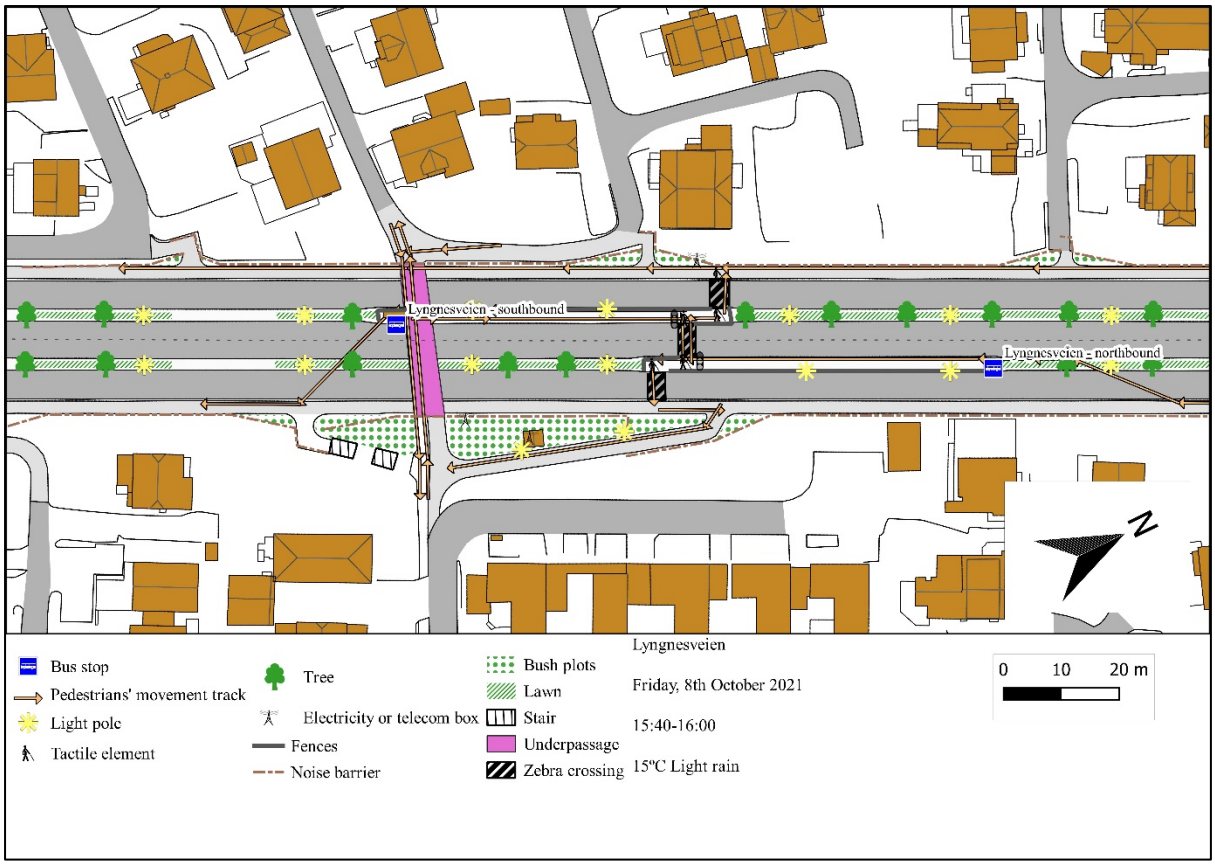
Entry	Gender	Age group	Path	Activity	Origin	Destination
1	woman	young_adult	outpath	busrider	underground	surface
2	woman	adult	onpath	busrider	surface	underground
3	woman	adult	onpath	busrider	surface	underground
4	man	adult	onpath	walking	surface	surface

Appendix 18: Lyngnesveien, Friday morning



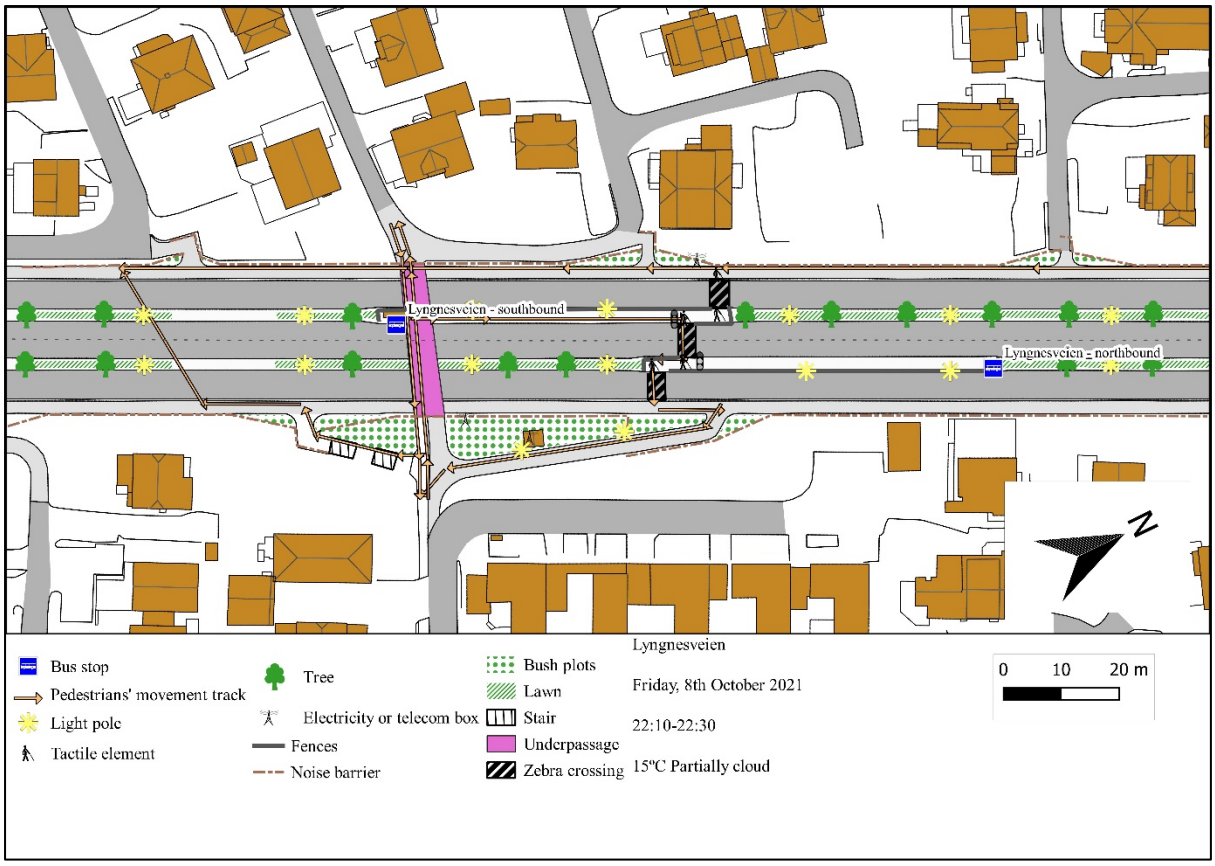
Entry	Gender	Age group	Path	Activity	Complement	Origin	Destination
1	woman	unidentified	onpath	walking_dog	crossing_underground	underground	underground
2	man	unidentified	onpath	busrider		underground	surface
3	woman	unidentified	onpath	busrider		surface	surface
4	man	unidentified	onpath	walking	crossing_underground	underground	underground

Appendix 19: Lyngnesveien, Friday afternoon



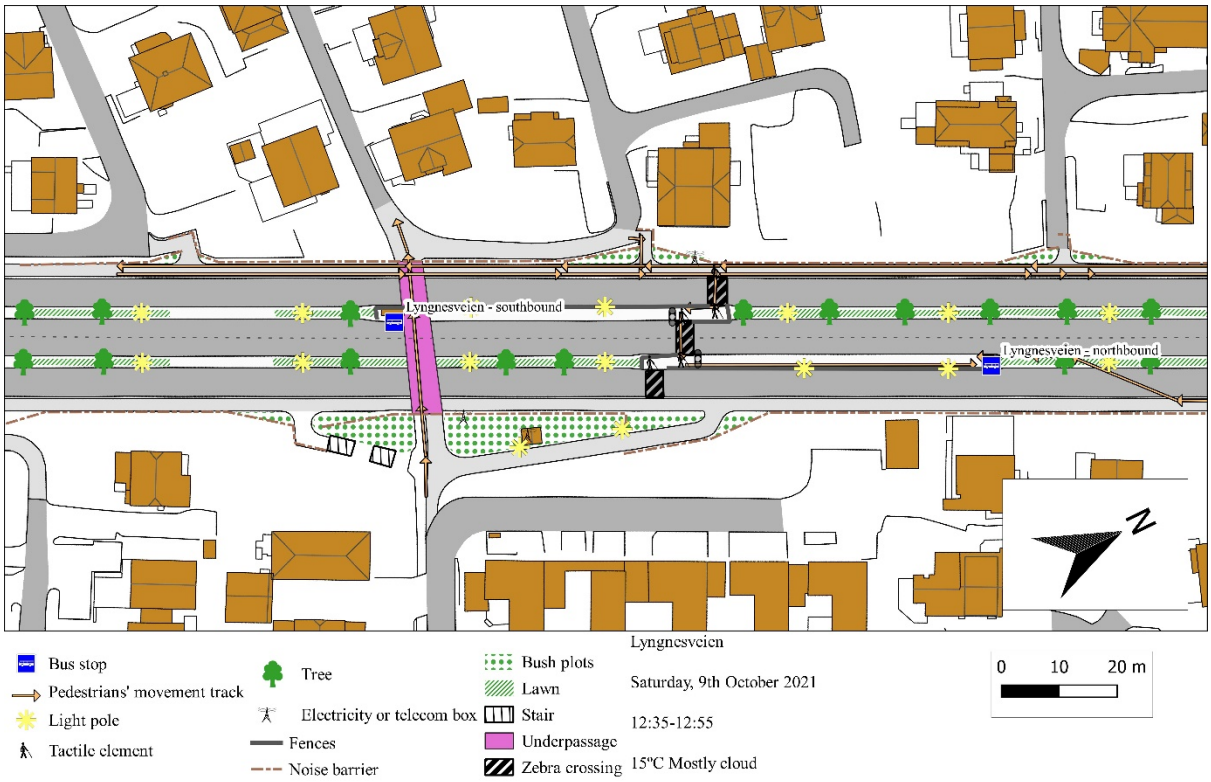
Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	adult	onpath	busrider		underground	surface
2	man	unidentified	outpath	busrider		surface	surface
3	woman	young_adult	onpath	walking	baby_trolley	surface	surface
4	woman	teen	onpath	busrider		surface	surface
5	woman	young_adult	onpath	busrider		surface	underground
6	woman	adult	onpath	busrider		surface	underground
7	man	adult	outpath	busrider		surface	surface
8	man	adult	outpath	busrider		surface	surface
9	woman	teen	onpath	walking	crossing_underground	underground	underground
10	woman	teen	onpath	walking	crossing_underground	underground	underground
11	woman	teen	onpath	walking	crossing_underground	underground	underground
12	woman	teen	onpath	walking	crossing_underground	underground	underground
13	man	teen	onpath	walking	crossing_underground	underground	underground
14	woman	teen	onpath	walking	crossing_underground	underground	underground
15	woman	adult	onpath	walking_dog	crossing_underground	underground	underground
16	woman	adult	onpath	walking	crossing_underground	unfderground	underground
17	woman	adult	onpath	walking_dog	crossing_underground	underground	underground
18	man	adult	onpath	walking	crossing_underground	underground	underground
19	woman	adult	onpath	walking	crossing_underground	underground	underground
20	woman	teen	onpath	walking	crossing_underground	underground	underground

Appendix 20: Lyngnesveien, Friday evening



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	woman	young_adult	onpath	busrider		surface	underground
2	man	unidentified	outpath	walking	crossing_surface	underground	surface
3	woman	unidentified	onpath	walking_dog	crossing_underground	underground	underground
4	woman	young_adult	onpath	walking		surface	surface
5	woman	young_adult	onpath	walking		surface	surface
6	woman	unidentified	onpath	walking	crossing_underground	underground	underground

Appendix 21: Lyngnesveien, Saturday midday



Entry	Gender	Age group	Path	Activity	Compl.	Origin	Destination
1	man	old	outpath	busrider		surface	surface
2	woman	adult	onpath	walking_dog		underground	underground
3	woman	adult	onpath	walking		underground	underground
4	man	old	onpath	busrider		surface	surface
5	man	old	onpath	walking_support		surface	surface
6	woman	young_adult	onpath	busrider		surface	surface
7	woman	adult	outpath	walking	crossing_surface	surface	surface
8	woman	young_adult	onpath	walking		surface	surface

Appendix 22: The questionnaire

Main questions	Subquestions	Possibility to answer
Language choice		• Norwegian • English
1. Do you live within 300m of the bus stops in Mariero, Eikeberg or Lyngnesveien?		Yes or No
2. Which mode of travel did you use to get to the study area today?	• Car • Bus • Walking • Bike • E-Bike • E-Scooter • Train • Other	• Multiple choice • Open answer for "other"
3. Why are you in the study area?	• Live in the area • Visiting someone • Shopping • Work • Study • Cultural or religious activity • Entertainment (restaurant, café…) • Sports or Leisure activity • Thorough fare	• Multiple choice • Open answer for "other"

4. How do you experience the sidewalks at the bus stops in Mariero, Eikeberg and Lyngnesveien?	• Illumination
	• Width
	• Snow removal
	• Smoothness of the pavement
	• Location and quantity of flowers, plants and trees
	• Noise
	• Tactile elements
		• Granding:
		  ○ Very bad
		  ○ Bad
		  ○ Neutral
		  ○ Good
		  ○ Very good
		  ○ Other
		• Open answer for "Do you have comments on the physical

	• Access to stores and services • Do you have comments on the physical quality of sidewalks in the area?	quality of bus stops in the area?"
5. How do you experience pedestrian crossings at the bus stops in Mariero and Eikeberg?	• Number of pedestrians' crossings • Distance between pedestrian crossings • Height between the sidewalks and the road • Visibility • Maintenance • Do you have comments on the physical quality of pedestrians' crossings in the area?	• Granding: o Very bad o Bad o Neutral o Good o Very good o Other • Open answer for "Do you have comments on the physical quality of the pedestrians' crossings?"
6. How do you experience the physical quality of the underground passages at the bus stops in Mariero, Eikeberg and Lyngnesveien?	• Number of underground passages • Illumination • Snow removal • Aesthetics and decoration • Visibility (view to the road users, e.g. cyclists) • Inclination of the ramps down to/up from the underground passages (steep / gentle) • Tactile elements (physical elements for those with visual impairment)	• Granding: o Very bad o Bad o Neutral o Good o Very good o Other • Open answer for "Do you have comments on the physical quality of the underground passages?"

	• Maintenance and cleaning • Do you have comments on the physical quality of the underground passages?	

7. How do you experience the physical quality of the bus stops in Mariero, Eikeberg and Lyngnesveien?	• Illumination
	• Protection against the traffic
	• Protection against weather conditions
	• Visibilty (between pedestrians/cyclists and motorists)
	• Sitting places
	• Maintenance and cleaning
	• Do you have comments on the physical quality of the bus stops?
		• Granding:
		  ○ Very bad
		  ○ Bad
		  ○ Neutral
		  ○ Good
		  ○ Very good
		  ○ Other
		• Open answer for “Do you have comments on the physical quality of the bus stops?”

8. How do you experience the public transport service at the bus stops in Mariero, Eikeberg and Lyngnesveien?	• Number of departures (frequency)
	• Number of destinations/numbers of service lines
	• Boarding the public transport vehicle (easy/difficult to get on the bus)
	• Do you have comments on the public transport service in the area?
		• Granding:
		  ○ Very bad
		  ○ Bad
		  ○ Neutral
		  ○ Good
		  ○ Very good
		  ○ Other
		• Open answer for “Do you have comments on the public transport service in the area?”

9. Do you experience barriers and/or obstacles as a pedestrian along the bus route and		• Yes or No • Open answer if the respondent choose yes “which”?

on the way to the bus stop?		

10. How safe do you feel when traveling along the Bussvei in relation to different aspects?	• Personal safety (e.g. criminality, violence)
	• Traffic safety
	• Other unpleasant experiences
	• Do you have comments on safety along the bus route?
		• Granding:
		  ○ Very bad
		  ○ Bad
		  ○ Neutral
		  ○ Good
		  ○ Very good
		  ○ Other
		• Open answer for "Do you have comments on safety along the bus route?"

11. How much do you agree with the following statements about your motivation to walk?	• I like to walk to be physically active.
	• I like to walk to improve my health.
	• I walk because I have no car/drive license.
	• I walk because it is part of my public transport journey.
	• I walk because there is a short distance to where I am going.
	• I walk because I like to be outside.
	• I walk because it is good for the environment.
	• I walk because it is cheap
	• I walk because I cannot or do not like to cycle
	• Do you have comments on your motivation for walking and/or taking the bus?
		• Granding:
		  ○ Strongly disagree
		  ○ Disagree
		  ○ Neutral
		  ○ Agree
		  ○ Strongly agree
		  ○ Other
		• Open answer for "Do you have comments on your motivation for walking and/or taking the bus?"

Your age	• 18 – 25 years • 26 – 40 years • 41 – 67 years • 68+ years
Gender	• Woman • Man • Other