A Framework for Mobility Hub Networks in the UK.

How can a holistic approach to planning and design shape mobility hub networks in the UK?

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URBD7020 DISSERTATION

Word Count: 16,442

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19016542

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Abstract

Globally, urban environments are experiencing increasing pressures with growing emissions, inequality, poor health, and car dependency. Mobility hubs have developed in response to this, seeking to support a transition to sustainable movement patterns and create new and revived environments for local communities.

Existing research builds an understanding of what constitutes a mobility hub and studies its constituent components, such as micro-mobility user behaviour. Research to date has been supported by a range of guidance from Collaborative Mobility (CoMoUK), the national charity for shared transport, as well as industry, to share knowledge and promote principles for the implementation of mobility hubs. However, whilst Europe drives ahead in the creation of mobility hub networks, UK proposals face a series of barriers.

This research aims to develop a framework for the creation of a mobility hub network in the UK, to support delivery, through the exploration of case studies and undertaking interviews to understand the challenges and identify mechanisms to overcome them, as well as exploring how mobility hubs can be designed to support their communities beyond the transport purposes. The outcome of this research proposes a high-level framework to guide delivery and provide a platform upon which further research can take place.

Acknowledgements

With thanks to:

THE ACADEMY OF URBANISM

DAVID LOCK ASSOCIATES

OXFORDSHIRE COUNTY COUNCIL

Transport for **West Midlands**

itp
a company of **Royal HaskoningDHV**

OXFORD BROOKES UNIVERSITY

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Glossary

Mobility Hub: 'A place where different transport modes are integrated seamlessly, promoting efficient and sustainable urban mobility. Emphasis is given on shared mobility options', and their interchanges with public transport (Roukouni, et al., 2023, p. 6). 'The integration between mobility suppliers is important to provide a seamless, flexible connection at these transfer points. Ensuring an enjoyable experience for travellers is a crucial part of the hub concept as well, and therefore the hub should be considered not just as a transfer node' with mobility components, but as a community space with place and freight components (Roukouni, et al., 2023, p. 6).

Mobility Hub Network: A collection of mobility hubs, dispersed across an area, with a variety of mobility hub typologies.

Mobility Hub Typology: Different types of hubs that vary in scale, from large city centre interchanges to small-scale neighbourhood hubs. The different typologies feature variations in the provision of components and amenities, as well as the size of the hub.

Component: A facility or amenity provided at the mobility hub. A component can be a mobility or non-mobility element, such as a bus stop, e-scooter hire, parcel locker or community planter.

Local Plan: A public-facing document thatoutlines the opportunities for development in an area, identifying where development is permitted, and guiding future proposals. This helps to address local needs across a plan period.

Local Travel Plan: Forward-looking plans that outline the current transport context and outlines future objectives and the approach to achieving this.

Hoppin Point: Mobility hubs within Flanders, Belgium. The brand is used at mobility hubs to create recognisability and identifiability across the region.

Local Travel Point: Mobility hubs within the West Midlands. The brand integrates with the Transport for West Midlands branding.

Interreg North-West Europe: Programme looking to support transnational cooperation to increase living standards and the resilience of communities, through a series of innovative projects. This includes setting up the eHUBS project.

eHUBS: Mobility hubs that co-locate electric mobility options, such as electric vehicles and electrified micro-mobility.

Contents

01 Introduction

1. Introduction

1.1 Background

Climate change impacts are becoming ever more prevalent, with 78% of emissions from cities accounted to transport (Allam, et al., 2022, p. 2), and disparities exist across morphological scales. New solutions are needed to enable responsiveness, adaptability and equitability. Mobility hubs are a concept that have evolved from this goal (Arnold, et al., 2022, p. 858), initially conceptualised as a way of reducing congestion, through Park & Rides, providing cost-competitive parking and buses (Rongen, et al., 2022, p. 3). This concept has continued to evolve in response to innovations, climate change and the inequity vehicles subject to their environments, transitioning to a society which supports healthy and sustainable travel (Bell, 2019, p. 6).

Mobility hubs are now conceived as a network of multi-modal interchanges – a **'recognisable place with an offer of different and connected transport modes supplemented with enhanced facilities and information features to both attract and benefit the traveller'** (CoMoUK, 2020, p. 4). However, this definition can be further developed, by amalgamating definitions outlined in Roukouni (et al., 2023, p. 3 - 4) this research can define mobility hubs as 'a place where different transport modes are integrated seamlessly, promoting efficient and sustainable urban mobility. Emphasis is given on shared mobility options', and their interchanges with public transport (Roukouni, et al., 2023, p. 6). 'The integration between mobility suppliers is important to provide a seamless, flexible connection at these transfer points. Ensuring an enjoyable experience for travellers is a crucial part of the hub concept as well, and therefore the hub should be considered not just as a transfer node' with mobility components, but as a community space with place and freight components (Roukouni, et al., 2023, p. 6).

Recent policy trends have seen requirements for mobility hubs introduced in Local Development Plans and Local Travel Plans (LTPs), but there is a current lack of understanding of what mobility hubs are aiming to achieve, and how they are delivered (Austin, 2021). For example, should an environment deliver mobility hubs to reduce private vehicle usage, i.e. prioritising car clubs, or should they seek to encourage active travel, i.e. prioritising bicycle hire? This policy requirement is causing piecemeal mobility hubs to come through the planning system, many of which place great emphasis on transport, and lack the community element. Crucially these hubs are not designed as a part of a wider network.

1.2 Research Gap

The recognition of the benefits of mobility hubs as a tool for improving air quality, supporting active and sustainable travel and regenerating places, has led to a growth in research and the delivery of physical networks. The Interreg North-West Europe eHUBS project is an example of this which supported six pilot cities to deliver multi-modal mobility hub networks (Interreg, 2023). The existing research ranges from deliverability and maintenance, interplaying factors for design success, and the scales of hubs within networks. However, there is a gap in research looking at the relationship of mobility hub design to the existing morphology.

With many mobility hubs planned to be brought forward in the coming years, there is also a question about whether the UK should adopt a strategic approach to planning mobility hubs as a component of our travel infrastructure, with benefits for better connectivity, interchange, and recognition of transport modes. This approach can be seen in mainland Europe, particularly in Berlin's 'Jelbi' network and Belgium's 'Hoppin' Network.

Therefore, this research project seeks to develop a framework for **Mobility Hub Networks in the UK.** It is focused on the research question: **'How can a holistic approach to planning and design shape mobility hub networks in the UK?'**

ABOVE Figure 01: East Shortstown mobility hub concept.

1. Introduction

1.3 Aim

To develop a framework for the creation of a strategic mobility hub network in the UK, with recommendations for planning, design, and delivery.

1.4 Objectives

	Objective	Methodology	Expected Outcome
1	To build a foundational understanding of mobility hubs.	Analyse existing literature and guidance to gain an understanding of the background, characteristics and benefits.	To form an understanding of what mobility hubs are and the current research and guidance background. This will highlight what defines a high-quality mobility hub, to provide a foundation for the research.
2	To develop planning and design frameworks to guide the research.	Use the findings from the research and guidance review to form guiding analytical frameworks.	The analytical frameworks will structure and inform the research undertaken to ensure it achieves the research aim.
3	Use the Theme A analytical framework to investigate and establish the challenges and mechanisms of planning and delivering a strategic network.	A mix of desktop research, interviews and case studies are used to understand the challenges of mobility hubs and sustainable transport infrastructure delivery. The case study of Hoppin Point Leuven network will uncover how rapid implementation was achieved, and a look at the Local Travel Point network will illustrate how network delivery is feasible in the UK.	The research methods will identify key strategies for the planning and delivery of mobility hub networks.
4	Use the Theme B analytical framework to understand what makes a Mobility Hub successful.	A design evaluation of the Hoppin Point and Local Travel Point networks, complemented by interviews and desktop research, will evaluate the relationship between mobility hubs and morphology to understand how mobility hubs can be designed to integrate mobility and place.	To identify key design principles and qualities of mobility hub design.
5	To propose and test a Mobility Hub Networks Framework for the UK.	Evolve the research frameworks into a unified Mobility Hub Networks Framework that illustrates the process, considerations and principles for planning, design and delivery, to be tested with industry professionals.	Feedback gathered will generate amendments to the final framework.
6	To produce a Framework for Mobility Hub Networks in the UK.	Use the research to create a framework for the planning, design, and delivery of mobility hub networks in the UK.	The framework should be accessible and usable by policymakers, planning and urban design practitioners, and help guide future research.

ABOVE Table 01: Methodology table.

1.5 Scope of Research

This research explores the potential of mobility hub networks in the UK, reviewing current literature and guidance, engaging with industry, and examining case studies to explore feasibility.

The outcome of this research is a framework for the creation of mobility hub networks in the UK, acting as a stepping stone for further research. This research is not intended to be the final answer to how to implement mobility hubs but introduces new findings to create a conversation about a holistic approach to planning and designing our transport infrastructure.

The scope of this research is focused on mobility hubs in urban and suburban areas, retrofitting and plugging gaps in existing transport networks, and creating mobility hubs in new developments. Mobility hubs in rural areas introduce additional challenges due to movement patterns and viability, which the timescales of this research project are not equipped to answer. This research defines strategic networks as a collection of mobility hubs across a settlement, authority or region.

1.6 Structure of the Report

Chapter Two outlines the research methodology, followed by a literature and guidance review in Chapter Three provides an understanding to develop two analytical frameworks. These frameworks guide the research, particularly the two themes in Chapter Four and beyond. Chapter Five explores the Hoppin Point Case study which is guided by the analytical frameworks and evolves the findings to direct a study of the Local Travel Points network in Chapter Six. Chapter Seven evolves the findings and analytical frameworks into a unified Mobility Hubs Framework that has evolved and tested.

01 Introduction, Aims, Objectives and Methodology

02 Literature and Guidance Review

03 Research Themes

04 Case Study: De Hoppinpunten The Hoppin Points

05 Case Study: TfWM Local Travel Points

06 Framework and Testing

07 Conclusion

Frameworks inform studies

Analytical Frameworks
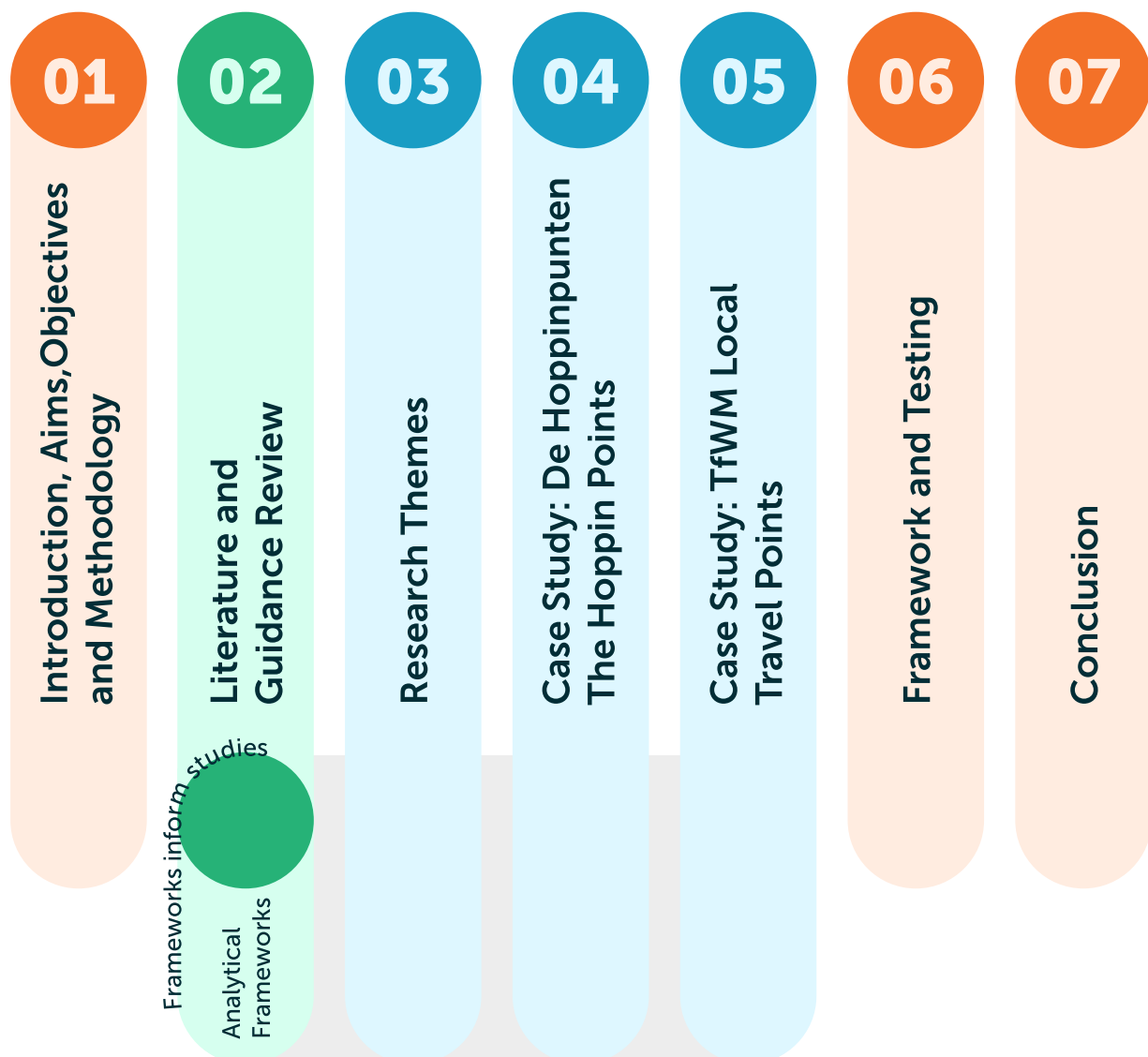
ABOVE Figure 02: Report structure.

1. Introduction

1.7 Methodological Approach

1.7.1 Research Approach.

Planning and design are interrelated but require different research approaches, which are represented through two analytical frameworks to guide two research themes. The outcome of this research evolves these frameworks into a unified framework which holistically illustrates the process of planning and designing mobility hub networks.

This research has been structured into two research themes:

- Theme A – Mechanisms and Challenges of a Strategic Approach
- Theme B – What makes a Mobility Hub Successful?

The following illustrates the research methods undertaken in this study.

1.7.2 Theme A: Mechanisms and Challenges of a Strategic Approach.

Theme A researches the challenges of mobility hub planning and delivery and the mechanisms that could enable a strategic approach to be brought forward. Theme A is undertaken through two research methods.

1.7.2.1 Interviews

Discussions with professionals provide insight into the factors considered when planning, designing and delivering a mobility hub network. Interviews explore how stakeholders are responding to challenges in a UK context, with insights from:

- Oxfordshire County Council;
- Integrated Transport Planning; and
- Transport for West Midlands.

1.7.2.2 Case Study Oxfordshire County Council Mobility Hubs Strategy

This case study builds on the interviews, exploring the strategy set out, including its aims, and explores the forward-thinking public engagement process.

1.7.3 Theme B: What makes a Mobility Hub successful?

Theme B explores the design stage of a mobility hubs delivery, looking to understand the design considerations for successfully integrating a mobility hub into its context. This theme is expanded on in further case studies.

1.7.3.1 UK Design Guidance

A short study is carried out to understand existing UK design guidance and the principles being promoted.

1.7.3.2 Public Consultation

This method explores what the public views to be the critical factors for increasing sustainable travel and identifies the perceived barriers currently preventing its uptake.

1.7.4 Case Study: De Hoppinpunten The Hoppin Points.

This study combines Themes A & B to explore the mobility hub network in Leuven – a vibrant student city, and one of the first places in mainland Europe to implement a mobility hub network. The Hoppin Point Network is a collection of 1000 mobility hubs across the Flanders region of Belgium, that builds on existing infrastructure to deliver new community amenities and increased transport options. A mix of desktop research and study visits identifies the mechanisms used to plan and deliver the network and highlights the design approach, integration with morphological context and any transferable strategies for the UK.

1.7.5 Case Study: Transport for West Midlands Local Travel Points.

This case study analyses the planning, design, and operational challenges of Halesowen's pilot project, undertaken using both research frameworks and an assessment evolved using findings from the Hoppin Point study.

1.8 Ethics

Ethical approval has been attained for this research. Surveys and interviews do not cover controversial or upsetting topics and results are anonymous. All participants are voluntary, and the research conforms to the Oxford Brookes Code of Practice and evidence of approval is in the Appendix.
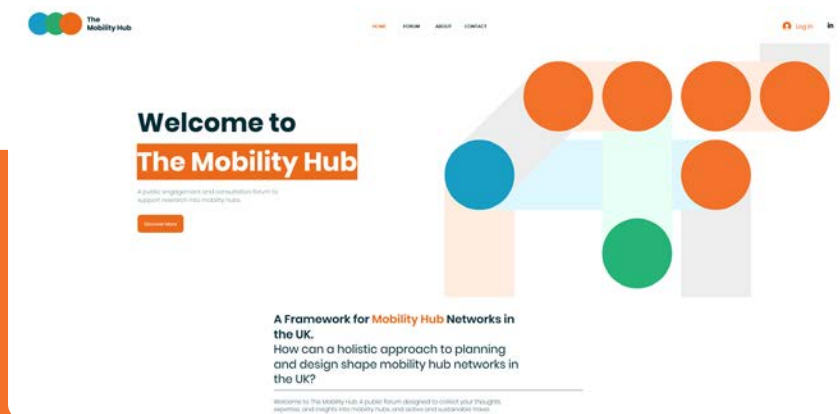
ABOVE Figure 03: Consultation homepage.
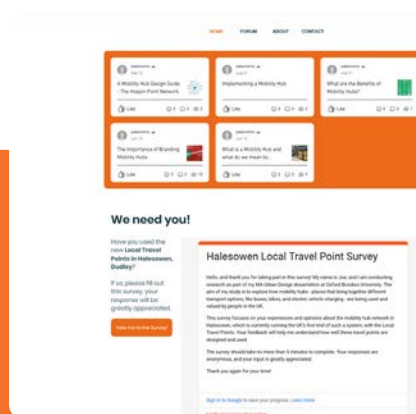
ABOVE Figure 04: Consultation survey.

Methodological Approach

Literature and Guidance Review

Analytical Framework

Theme A

Mechanisms and Challenges of a Strategic Approach

Interviews with
Oxfordshire County Council
Transport for West Midlands, and Graham Smith.

Theme B

What makes a Mobility Hub Successful?

Public Consultation

UK Design Guidance

Case Studies:
De Hoppinpunten The Hoppin Points
Transport for West Midlands Local Travel Points

This research approach provides an understanding of the challenges of planning mobility hub networks, and identifies approaches for their design and delivery, to inform a final framework.

Evolve and Test a Unified Framework

Framework for Mobility Hub Networks in the UK

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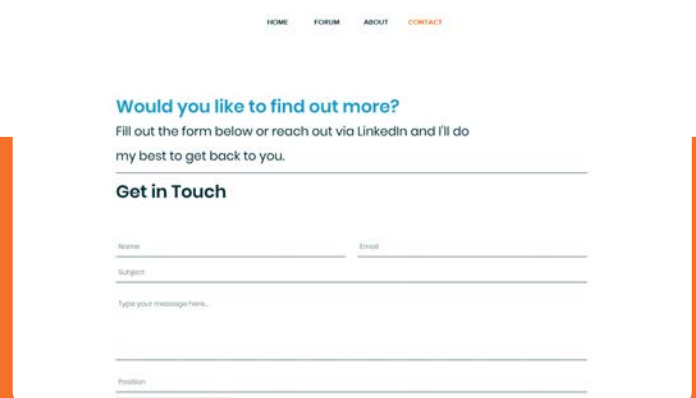
ABOVE Figure 06: Consultation contact page.
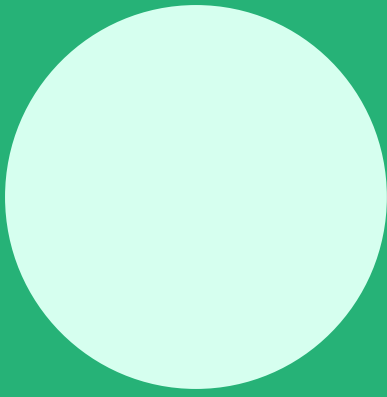
02 Literature and Guidance Review

Research into Mobility Hubs has been rapidly expanding in academia and industry, in recognition of the negative impacts of our transport systems, and the need to transition to sustainable behaviours. This literature and guidance review delves into a broad range of aspects regarding mobility hubs to develop an understanding of their evolution, their objectives and typologies, and the users and non-users of hubs. This depth of research forms a solid foundation for the following research.

2.1 Evolution of the Mobility Hub

2.1.1 The Needs

It is well-recognised that private vehicles are a significant detriment to our personal and environmental health (Arnold, et al., 2022, p. 858). Private car ownership dominates urban mobility, with consequences for pollution, congestion, land-use efficiencies, and social equality (Coenegrachts, et al., 2021, p. 1).

Anthropogenic emissions have driven climate change, which threatens the balance of life on earth, with wide-reaching impacts on the environment, economy and society (Sharifi & Khavarian-Garmsir, 2020, p. 12). Cities are a significant contributor of emissions, and with 27% of Europe's Greenhouse Gas Emissions deriving from transport, there is a pressing need to shift to sustainable mobility (Coenegrachts, et al., 2021, p. 1) (Arnold, et al., 2022, p. 858).

Mobility hubs are viewed as a way of achieving this shift, 'reducing the dominance of the private car and problems that are associated with them' in favour of 'multi-modal trips' and the use of active, public and/or shared modalities, with a **network of hubs as an enabler** (CoMoUK, 2021).

2.1.2 Current Trends

The Government Office for Science (2019, p. 38) reports that in the period between 1951 and 2017, the UK experienced a radical shift in mobility, with the number of households without a car declining from 86% to 24%. More recently, however, a decreasing use of private vehicles is evident (Government Office for Science, 2019, p. 39). Between 2002 and 2017, **'time spent in cars' decreased by 8%**, and the 'number of trips' and 'distance travelled per person' declined by 12% (Department for Transport, 2018, cited in, Government Office for Science, 2019, p. 39). In addition, there has been a decline in distance travelled, among all ages, genders, modes, and journey types due to changes in 'access to opportunities

ABOVE Figure 08: Average number of journeys per person per year in England (Government Office for Science, 2019).

ABOVE Figure 09: Modal share of passenger trips by journey distance and cost in England, 2017 (Government Office for Science, 2019).

and patterns of land use'. There is also a shift in social norms, with **younger people less pressured by status** associated with vehicle ownership, choosing 'usership over ownership' (Government Office for Science, 2019, p. 59). This is reinforced by the reduction in driving license applications among younger people and the **increase in shared mobility hires**, and lifestyle influences, which convey a **growing trend for localised journeys** if our environment affords it (Government Office for Science, 2019, p. 59).

2.1.3 Emergence of Mobility Hubs

Mobility hubs were originally conceptualised as a 'means of addressing a shortage of parking space by promoting shared mobility' (Arnold, et al., 2022, p. 858). The first hubs were delivered in Bremen, in 2003, fabricated as hubs that allowed interchange between bicycles, car sharing, and more recently public transport (Arnold, et al., 2022). In the UK, the concept was shaped as a 'Park-and-Ride' to link parking and public transport, to reduce inner-city congestion, and associated issues, and incentivise public transport (Rongen, et al., 2022, p. 3). These are examples of 'node-based' hubs that sought to shift the 'paradigm towards a desire to foster collective transport' (Rongen, et al., 2022, p. 3).

Since, the concept of a mobility hub has evolved into a 'place-focused concept' (Rongen, et al., 2022, p. 4). This is where hubs are viewed as key locations, not solely related to transit nodes, but also land use and distributed across an area with a hierarchy of typologies (Rongen, et al., 2022).

2.2 Mobility Hub Objectives

SEStran (2020, p. 26) highlight that mobility hubs aim to 'make multi-modal journeys easy and convenient and encourage the use of sustainable and shared transport modes'. ARUP (2021, p. 5) supports this, identifying that the key aim for hubs is to 'facilitate improvements to how we access and use existing and new modes' with an opportunity to improve the surrounding public realm, community cohesion and local economies. Whilst the key aim of mobility hubs is generally consistent among the literature and guidance, the objectives of mobility hubs vary according to context.

ARUP (2021, p. 5 - 6) highlights inclusive mobility, healthy streets, and vibrant neighbourhoods as the key goals for mobility hubs, achievable through **accessible and adaptable functions**, a common identity, **branding** and design, and flexibility in the hub design. Research by Arnold (et al., 2022) raises a different perspective on the mobility objectives, identifying two overarching objectives. Environmental objectives that seek to reduce emissions and generate improvements to the local environment. Under these objectives, mobility hubs should seek to provide 'seamless connectivity' and **improve 'user experience** to facilitate modal shift to sustainable forms of transport', in turn generating environmental benefits. Arnold (et al., 2022, p. 860) elaborates highlighting that this can be achieved through 'improving aesthetic design, **transport choice**, or **efficiency** for passengers within the hubs'. The second overarching objective is to
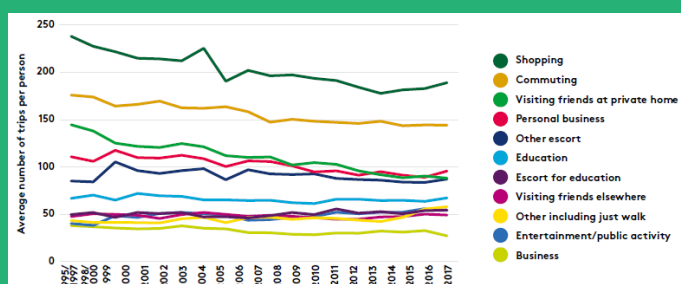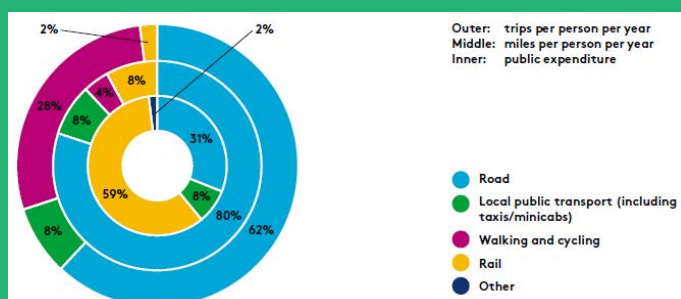
generate **'socioeconomic improvements'** that create 'equal access to jobs, education, healthcare, and other community resources' (Arnold, et al., 2022, p. 860). CoMoUK (2021, p. 4) contributes an additional dimension, which is the relationship between mobility hubs and public authority policy objectives. CoMoUK (2021, p. 4) highlights that where mobility hubs offer 'sustainable and active modes in easily accessible locations', they also contribute to health, transport and environmental policies, such as active travel and net-zero targets. When looking in the context of Scotland's policy environment, CoMoUK (2021, p. 4) identifies mobility hubs as a key tool for supporting the policies illustrated below:

- 'creating 20-minute neighbourhoods';
- 'reducing car dependency';
- 'responding to climate emergency and zero emission targets';
- 'decarbonising the transport sector';
- 'encouraging active travel';
- 'improving health and well-being';
- 'improving public transport';
- 'improving connectivity and developing an integrated transport network';
- 'decongesting and revitalising town centres and neighbourhoods';
- 'improving public realm';
- 'improving accessibility for health services, employment, education, leisure';
- 'responding to increasing cyclist numbers'; and
- 'responding to the desire for more local spaces for leisure'.

Variations in the urban fabric, and social and economic characteristics of places mean that mobility hubs need to be tailored individually to their context, not just for urban design considerations, but also for financial viability (CoMoUK, 2021). When establishing hubs, stakeholders need to identify the key aims and objectives, the challenges and opportunities presented, and the additional business case and deliverability factors (England's Economic Heartland, 2023).

2.3 Characteristics and Typologies

2.3.1 Characteristics

CoMoUK (2021) identifies the key characteristics of mobility hubs as the:

1 'Co-location of public transport and shared mobility modes which can include shared bikes, car clubs, cargo bikes and e-scooters';

2 'Provision of facilities other than transport appropriate to the area';

3 'Design of the space to reduce private car space and improve the surrounding public realm';

4 'Cycle and walking routes link into the hub and encourage active travel';

5 'Street design enables easy access for all through appropriate paving, drop kerbs and crossings';

6 'Pillar or sign which identifies the space as a mobility hub which is part of a wider network and ideally provides digital travel information'.

ABOVE Table 02: Characteristics of mobility hubs.

FEATURE: VIENNA

The City of Vienna set out with the aim of promoting sustainable transport (CoMoUK, 2021). The city sought to achieve a 'modal split of 80% sustainable modes and 20% car' through a series of policies for 'high-quality shared transport, public transport links and an excellent network of pedestrian and cycle routes' (CoMoUK, 2021, p. 5). Mobility hubs were used as a tool for achieving this, encouraging seamless transition between modes at a hub (CoMoUK, 2021, p. 5). In addition, the provision of excellent public transport and mobility hubs was a justification for increasing development density, by saving space from vehicle parking, which in turn supports the viability of public transport and shared modes (CoMoUK, 2021, p. 5). The introduction of mobility hubs forms part of the wider Step 2025 Urban Development Plan which seeks to transform Vienna through a series of projects that improve mobility, public realm, governance, and greenspace among others (Stadt Wien, 2024). One such programme is 'Cool Streets' which transforms city streets into traffic-calmed, climate-resilient places (Stadt Wien, 2024).

ABOVE Figure 10: Vienna's WeinMobil Mobility Hub (Schnabl, 2018).

Whilst CoMoUK (2021) presents these as universal characteristics of a mobility hub, mobility hubs must be tailored to their context – a principle supported by Arnold (et al., 2022, p. 860).

2.3.2 Transport Offer

Modes can include public transport, including buses, trams, and trains, and shared modes, including bicycles, e-bicycles, e-scooters, e-cargo bikes, and car clubs (Arnold, et al., 2022, p. 861). Arnold (202, p. 860) notes that the **modes delivered** at a hub are **influenced by 'the requirements of the local population'**, the **deliverability** of the options, and what will best a**chieve local policies** and objectives. Shared transport modes have the potential to increase the flexibility and desirability of public transport offerings, by expanding their catchment and providing more comfortable environments and efficient interchanges (Rongen, et al., 2022, p. 8).

2.3.3 Hub Location

The location of the mobility hub is a significant factor that alters the design and offering of the hub. Gustav Bösehans (et al., 2021) states that 'eHUBS' (a term used by the SHARE-North project as a mobility hub offering shared electric modalities) can be **'placed wherever sufficient demand is foreseen'**, such as along transit corridors, 'employment centres or tourist attractions'.

To achieve viability, mobility hubs need to be situated in areas with a **'sufficient density of residents, businesses** or' **passenger flows** and surrounding land uses that act as 'trip generators' (CoMoUK, 2020, p. 20). Proximity to cycle routes and areas with gaps in public transport provision are also identified as factors determining hub choice due to the mobility hubs' ability to encourage active travel (CoMoUK, 2021, p. 4). Location choice should consider the **wider morphology**, analysing gradients concerning cycling, proximity to destinations, green spaces, accessibility and sense of safety, as well as the capacity of infrastructure and utilities (CoMoUK, 2021, p. 4).

This variation and flexibility in location choice and transport offer mean that mobility hubs **cannot have a standardised delivery process**, but guidance sets out template typologies that can be delivered across a network (Austin, 2021).

2.3.4 Typologies

Weustenenk & Mingardo (2023, p. 2) note that the typologies of mobility hubs are defined by their scale, ranging from International Hubs to National, Interregional, Regional, Metropolitan, and Local. However, due to the **variability between urban environments**, there is **no 'common approach'** (Roukouni, et al., 2023, p. 6).

CoMoUK has undertaken this analysis to distinguish the typologies and their associated components for the UK context, as shown in Figure 15. Each typology has defining characteristics, associated with public transport scales, a series of required and desired mobility components, and additional complementary components that contribute to the integration of the hub within the community (CoMoUK, 2020).

Individual mobility hubs are typically the output of private developers and interests, such as BP (Intertraffic, 2021). However, the **most successful hubs are situated in a dense network** across the urban fabric to allow greater flexibility, convenience and efficiency in journeys (Rongen, et al., 2022, p. 10). Each hub in the network acts as a **'focal point' along a journey** offering a range of modalities, but also additional components that serve local needs (Roukouni, et al., 2023) (CoMoUK, 2021). In most cases, the **delivery** of mobility hubs is **'incremental'** and **influenced by arising opportunities**, such as grants and developer contributions, regeneration, utility works, and public engagement (CoMoUK, 2020, p. 15).

2.3.5 Branding and Additional Components

Beyond the physical form, mobility hubs incorporate a digital layer which supports the efficiency and attractiveness of transport services (Dilks, 2021). Mobility-as-a-Service (MaaS) is a mobile technology which combines transport services into a unified application for user convenience. It can facilitate journey planning, ticketing and real-time information in one app (Rongen, et al., 2022). The use of MaaS is a way of **reducing the perceived 'transfer penalty'** of taking multi-modal journeys instead of a private car, by reducing barriers through seamless access to public and shared mobility, in turn 'lowering the associated mental burden' (Rongen, et al., 2022, p. 8). In the physical mobility hub, a branded pillar or sign, with **integrated trip information** and planning can provide access to hub services without a smartphone, **increasing accessibility to a broader audience** (SEStran, 2020).

For a mobility hub to be effective, it needs to be **easily identifiable** as a **place of interchange** and travel. A **cohesive brand** across hubs can 'raise the profile of mobility hubs' by aiding the recognisability of transport infrastructure (CoMoUK, 2021, p. 10). Evidence of this can be seen in Amsterdam where hubs which featured a clear sign and user information attracted '28% more users

ABOVE Figure 11: Common, identifiable, Tim brand established in Linz, Austria (Jelinek, 2018).

ABOVE Figure 12: Manchester's public transport Bee Network (Peat, 2021).

ABOVE Figure 13: Jelbi brand unifying mobility operators in Berlin (Jelbi, 2024).

ABOVE Figure 14: National mobility hub branding in The Netherlands (Dutch Cycling Embassy, 2023).

Context & considerations	A1 - Mobility components: Public transport	A2 - Mobility components: Non public transport	B - Mobility related components	C - Non-mobility & Urban realm improvement
Large interchanges / City hubs (Larger multi-purpose or a network of smaller mobility hubs). High passenger numbers for starting / ending journeys / transferring between modes. Potential to convert private car and taxi trips to sustainable modes by raising the profile and improving links. Space may be limited meaning there may be a need to focus on priority sustainable, efficient modes and links to last mile modes	• National & regional rail • Tram • Local bus • Taxi	• Car club bay - electric & conventional • Bike share - electric & conventional	• Large scale cycle parking • Digital pillar, (transport info, ticketing, way finding, walk distances, local services). • EV charging bays	• Covered waiting area • Improved public realm, safer crossing, road or pavement repairs • Parklet or community art • Kiosk for refreshments
Transport corridor, smaller interchanges / Linking hubs. Focus on services which link residents in surrounding areas to core network services. An opportunity to offer greater choice to people for first and last trips	• Regional rail or tram • Local bus • DRT feeder service • Taxi	• Back to base car club bay with choice of van / estate car • Bike share - electric & conventional • E-cargo bike share / trailers	• Secure cycle parking for connecting travellers • Digital pillar, (transport info, ticketing, way finding, walk distances, local services). • Freight logistics hub • EV charging bays	• Covered waiting area • Safer crossing & street repairs • Package delivery lockers • Wi-Fi /phone charging • Play equipment • Kiosk for refreshments
Business park / new housing development hubs High density of users. A need to offer commuting links and back to base solutions.	• Regional rail or tram • Local bus • DRT feeder service	• Back to base car club bay with choice of van / estate car • One-way, shuttle or back to base bike share • E-cargo bike share / trailers	• Secure cycle parking • Digital pillar, (transport info, ticketing, way finding, walk distances, local services).	• Covered waiting area • Improved public realm • Art / planting / play equipment • Package delivery lockers
Suburbs / Mini hubs Lower density of people with higher private car ownership, mobility hubs can be designed to address local issues e.g. car club spaces to take away issues of over-crowded streets, bike share or secure cycle parking for flats without space for bike storage or DRT to supplement restricted bus services.	• Local bus • DRT feeder service	• Back to base car club bay with smaller vehicles	• Secure cycle parking • Bike repair stand / pump • EV charging bays	• Traffic calming & street repairs • Parklet • Community exercise equipment
Small market town, village hubs The extra space in these types of areas can be used to provide a wider range of services as long as there is critical mass to ensure there is viability. Assess local needs such as the limited public transport with pools of shared e-bikes or 2+ ride share stops.	• Regional rail or tram • Local bus • DRT feeder service • Taxi	• Back to base car club bay with choice of van / estate car • Back to base bike share • E-cargo bike share / trailers	• Bike repair stand / pump • EV charging bays	• Covered waiting area • Package delivery lockers
Tourism hubs Focus on services with easy registration for visitors which can then provide a seasonal boost to the viability of service for rural residents. Ideally well integrated with journey planning and wider ticketing services (e.g. combined travel with destination entry). While tourism areas are often in rural areas, they can also be areas of high demand where having a tangible, focal point for sustainable modes especially for visitors unfamiliar with the area. Could also apply to tourist destinations in more urban areas.	• Regional rail or tram • Local bus • DRT feeder service	• Back to base car club bay with choice of van / estate car • One-way, shuttle or back to base bike share • E-cargo bike share / trailers	• Secure cycle parking • Digital pillar, (transport info, ticketing, way finding, walk distances, local services).	• Covered waiting area • Improved public realm • Art / planting / play equipment • Package delivery lockers

ABOVE Figure 15: Typologies defined by CoMoUK (CoMoUK, 2020, pp.10 - 11).

than … [hubs] with no branding or information' (CoMoUK, 2022, p. 2). However, a unified brand across hubs can become **complicated** and costly to implement **across service providers** (CoMoUK, 2021, p. 19).

As an emerging concept, technological advances are influencing the elements and components of a mobility hub (Austin, 2021). Freight hubs are an innovation seeking to streamline last-mile deliveries, which account for 30-50% of supply chain costs and generate the most CO_2 per tonne in a parcel journey (Government Office for Science, 2019, p. 45). **Pressure** is growing on the freight industry, with rapid increases in home deliveries and increasing **congestion** (Government Office for Science, 2019, p. 45). Mobility hubs can act as the ideal location for parcel lockers to **reduce door-to-door deliveries**, as they will be accessible locations for communities (Intertraffic, 2021). However, introducing a **fragile business model** into mobility hubs which are already **financially and operationally sensitive** could add complications (Intertraffic, 2021).

2.4 Benefits
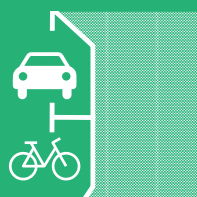
Smart transport planning by reclaiming vehicular space for shared and sustainable modes.

Improved accessibility and connectivity by enabling seamless interchanges and improved access to transit.
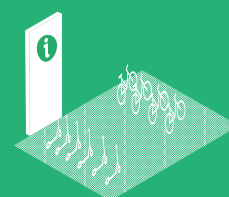
Encouraging multimodal behaviour by offering a variety of transport modes, such as cargo bikes.

Reducing gaps in the existing transport network.

Improved experiences and comfort.

Inclusivity to enable the use of **sustainable transport for everyone** in the community.

Increase awareness of sustainable transport and key locations in a neighbourhood, such as local shops.

Improvements to the public realm.

Increased dwell time with community features such as boards and food projects.

Encourages densification by reducing parking needs.

Management and monitoring of evolving services, such as e-scooters.
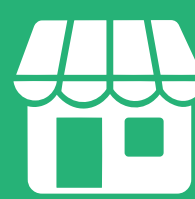
Increase in local amenities, such as parcel lockers in rural areas.

ABOVE Figure 16: Benefits of mobility hubs identified by CoMoUK (2021, pp. 5 – 8).

2.5 Acceptance

2.5.1 Users and Non-Users

Understanding potential user behaviours and characteristics is vital for the viability of mobility hub networks, as it informs decision-making for hub location choices. Research by Bösehans (et al., 2021, p. 200) looked at an 'attitudinal market segmentation approach' using results from a survey. The output was an analysis of the intention to use shared mobility across four social groups (Bösehans, et al., 2021, p. 205). Social group one was car-reliant and had families (Bösehans, et al., 2021, p. 209). Their high car use offers the 'greatest emissions reduction potential' and they are open to suitable transport alternatives (Bösehans, et al., 2021, p. 209). Group two currently use multi-modal journeys and active travel (Bösehans, et al., 2021, p. 210). These groups are most likely to use shared mobility, due to their environmental and technological competency, but they offer less potential for emission reductions as they already travel sustainably (Bösehans, et al., 2021, p. 210). Social group three were elderly individuals with a lower income and education levels, typically isolated and so would benefit from increased mobility options, but this group would need support and interventions to enable the use of mobility hubs (Bösehans, et al., 2021, p. 210).

Trends of users from emerging mobility hubs have also begun to develop. A study of bicycle sharing across five cities in North and Central America found users were typically **'wealthier, higher educated**, younger and more often **male'** (Horjus, et al., 2022, p. 3). A similar study of users in the Netherlands and Zurich found a comparable result (Horjus, et al., 2022, p. 3) (Reck and Axhausen cited in Bösehans, et al., 2023, p. 180). However, this result wasn't universal. Concerning shared electric modalities in general, users had no dominant gender, except for shared e-bikes, where females expressed greater interest (Bösehans, et al., 2023, p. 189). Instead, age, environmental opinion, car ownership, and perceived barriers were noted to be more influential (Bösehans, et al., 2023, p. 189).

2.5.2 Barriers to Use

It is recognised that sustainable mobility currently has perceived barriers to adoption (Roberts, et al., 2023). A study by Bösehans (et al., 2021, p. 209) identified a key perceived barrier to be **satisfaction with their existing transport mode**, with 68% of survey respondents noting this. There was also a notion that the use of public transport over shared mobilities has greater social acceptance among senior groups (Bösehans, et al., 2021, p. 209), but broader studies conducted by CoMoUK have highlighted users of shared modes are replacing journeys non-car journeys due to speed and convenience (Roberts, et al., 2023).

The use of shared transport and mobility hubs introduces an element of **insecurity** regarding **availability and cost** (Bösehans, et al., 2021, p. 209). A key barrier illustrated was concern about the availability of shared vehicles and proximity to the next hub if vehicles weren't available (Bösehans, et al., 2021, p. 210). With most
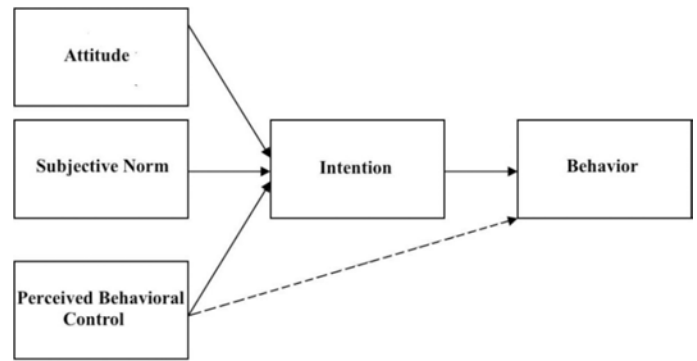
ABOVE Figure 17: Framework for the Theory of Planned Behaviour (Ajzen, 1991, cited in Bösehans, et al., 2023).

shared modes operated by private industry, there are also concerns about costs, particularly when compared to the lower daily operating cost of private cars (Bösehans, et al., 2021, p. 210).

Bösehans (et al., 2021, p. 211) illustrates that many of these perceived barriers can be tackled through:
- 'Affordable, clean, well maintained, and safe' hubs;
- Ensure data privacy;
- Make registration simple;
- 'Have a sufficiently large number of vehicles available';
- 'Have a large number of locations where vehicles can be accessed/left'; and
- 'Provide … easy to understand information' on operation.

Moreover, many of these barriers are tackled through high-quality design.

2.6 Implementation

Local authorities face significant challenges when planning mobility hubs, particularly regarding location identification, service selection and viability, and setting out management plans (Beard, 2022). This is a **resource-intensive process**, estimated to take between 1-2 years when resources are available (CoMoUK, 2020, p. 19). The Mobil.Punkt network in Bremen is estimated to consume 20% of planner's time, and local authorities in the UK are already stretched (CoMoUK, 2020, p. 19).

Currently, public transport in the UK is heavily subsidised by public funding (Rongen, et al., 2023, p. 7). However, with the partnerships and contracts in the **multi-interest mobility hub**, n**ew approaches to funding and procurement** are needed to ensure market competitiveness for the consumer and suitable management of the hub. **Optimising the hubs for the consumer** can ensure the financial sustainability of a sensitive business model long-term, by embedding the hubs into the community, ensuring efficient layouts for seamless interchanges, stakeholder engagement to understand in-demand components, and monitoring to adapt the services (CoMoUK, 2021, p. 7).

1. Large city centre / interchange hub

Components	Who specifies /controls	Who operates / manages	Who funds capital costs	Who funds revenue costs
The hub and its infrastructure, (buildings, road changes, information)	Direct control: The hub itself is operated by the lead body, "The Hub Partnership."	Partnership: The Hub Partnership is a new body created by Network Rail and the regional rail and local bus providers.	Capital costs are mainly covered by a government development grant in conjunction with contributions from The Hub Partnership.	• Rail & bus station operator charges • Revenue from the Café / co-working space, and cycle hub • Permit / rent contributions from the shop and other operators • Physical and digital advertising revenue
MaaS	Procured operator: The Hub Partnership in partnership with the local authority.	Third parties: MaaS platform provider.	The Hub Partnership in conjunction with the local authority and the MaaS provider.	A percentage of service revenue and digital advertising revenue.
Rail and bus	Procured operator: National and local government contracts.	Partnership: Rail and bus operators as part of the partnership.	Rail and bus operators.	Service revenue.
Car club, bike share and e-scooter	Procured operator: The local authority has partially specified and contracted these services as part of a wider network on a concession or permit basis. The Hub Partnership grant permission to operate in the hub.	Third parties: Commercially run. The bike and e-scooter services are run by the same company.	The local authority provided capital funding for electric charging points and bikes through a national government scheme. Remaining costs supported by service revenue.	Service revenue from all services. Sponsorship of the bike and scooters share scheme. (Services benefit from additional patronage from a points-based reward system run through a MaaS app).
Café, co-working space, cycle hub and Wi-Fi	Service contracts: Fully specified and contracted by The Hub Partnership.	Third parties: Independent contracted service providers.	Capital costs are managed by The Hub Partnership.	Generated revenue is collected by The Hub Partnership as part of the collective business model. (Services benefit from additional patronage from a points-based reward system run through a MaaS app).
Shop	Permission to operate: The Hub Partnership has grant permission to operate in the hub.	Third parties: Commercially run by a national chain.	National chain.	Revenue from sales.
Free library box & artwork	Permission to operate: A local community group.	Third parties: A local community group.	Community grant.	Volunteer time.
Parklet, fountain and benches	Direct control: The Hub Partnership authority in conjunction with the community.	Consortium: The Hub Partnership authority with volunteer support from the community group.	The Hub Partnership.	The Hub Partnership.

ABOVE Figure 18: City centre typology delivery model (CoMoUK, 2021).

2. Network of suburban mini hubs

Components	Who specifies /controls	Who operates / manages	Who funds capital costs	Who funds revenue costs
The hub and its infrastructure, (buildings, road changes, signage, information)	Direct control: The local authority.	Partnership: The local authority integrates infrastructure maintenance into wider service contracts. Transport operators manage their elements.	The local authority through national government development funding.	Permit contributions from operators, advertising revenue.
EV charging network	Procured operator: The local authority procures service.	Third party: EV charge provider.	The local authority in partnership with the EV charge provider.	Charging revenue.
Bus	Procured operator: The local authority.	Third party: The bus operator.	The local authority in conjunction with the bus operator.	Service revenue with local authority subsidy.
Car club, bike share	Procured operator: The local authority has specified and contracted the service for the network of hubs through a tender process.	Consortium: Commercially run by two separate operators who contract out combined tasks of bike and car vehicle checks to a local enterprise.	The local authority provides capital funding to the bike share operator through a national government scheme. Remaining costs supported by service revenue.	Service revenue and sponsorship of the bike share scheme.
Package locker	Direct control: The local authority.	Third party: Delivery company.	Delivery company.	Delivery company.
Parklets, bench and outdoor gym equipment	Direct control: The local authority in conjunction with community groups.	Consortium: The local authority in conjunction with community groups.	The local authority through national government development funding.	Permit contributions from operators, advertising revenue.
Community notice board	Permission to operate: A community group.	Third party: A community group.	The local authority.	Volunteer time.

ABOVE Figure 19: Suburban typology delivery model (CoMoUK, 2021).

3. A new residential development hub

Components	Who specifies /controls	Who operates / manages	Who funds capital costs	Who funds revenue costs
The hub and its infrastructure, (buildings, road changes, signage, information)	Direct control: The developer under guidance from the local authority Supplementary Planning Guidance.	Lead body: Management company controlled by the developer.	The developer.	Monthly resident service charges plus rent from creche.
DDRT	Procured operator: The local authority.	Third party: The DDRT operator.	The bus operator provides the vehicle and software.	Service revenue with local authority subsidy and contribution from the developer.
Car club, bike and e-scooter share	Service contracts: Fully specified and contracted service by management company.	Third party: Run by two separate operators (car club and micromobility) to specification set by the management company.	The service providers fund the capital in exchange for guaranteed monthly service fee.	Monthly resident fees pay for package of minutes of use with options to buy additional hires.
Lockable cycle shelter with tools, information board Wi-Fi and lighting	Direct control: The management company.	Lead body: Management company.	The developer.	Monthly resident fees plus rent from crèche.
Co-working space	Direct control: The management company.	Lead body: Management company.	The developer.	Revenue from services.
Crèche	Permission to operate: A service provider.	Third party: Delivery company.	The developer.	Revenue from services.
Shared garden and benches	Direct control: The management company.	Lead body: Management company.	The developer.	Monthly resident fees.

ABOVE Figure 20: New residential development typology delivery model (CoMoUK, 2021).

4. A village / community hub

Components	Who specifies /controls	Who operates / manages	Who funds capital costs	Who funds revenue costs
The hub & its infrastructure, (buildings, signage, information)	Direct control: Led by the Community Interest Company (CIC) under guidance from the Parish Council.	Lead body: The CIC.	Existing building used with adaptations funded by the parish council, community share subscriptions.	Revenue from the community café, bike hire and pop-up event space.
DDRT	Procured operator: The local authority.	Third party: The DDRT operator.	The bus operator provides the vehicle and software.	Service revenue with local authority subsidy.
Community car sharing	Permission to operate: CIC supported a community car share scheme to place 2 cars at the hub as part of local village network.	Third party: Car sharing scheme which is operated by a local community group.	Vehicles funded by a community start up grant. Keys managed through a key safe.	Revenue from hires.
Bike library	Direct control: The CIC.	Lead body: The CIC offers free loans to locals and paid for hires to tourists.	Parish council, share subscriptions from the local community.	Volunteer time plus tourist hires.
Café	Direct control: The CIC.	Lead body: The CIC.	Existing business of the CIC.	Revenue from sales.
Pop up event space	Permission to operate: CIC rents the space to third parties.	Third party: Various small businesses and charities rent the space managed by the CIC.	Parish council, share subscriptions from the local community.	Revenue from services.
Play area and sitting area	Direct control: The CIC.	Lead body: The CIC.	Parish council, share subscriptions from the local community.	Revenue from the community café, bike hire and pop-up event space.

ABOVE Figure 21: Village/community typology delivery model (CoMoUK, 2021).

2.7 Conclusions

Several key takeaways can be taken from this literature and guidance review to inform the analytical framework.

Mobility Hub Objectives

Characteristics and Typologies

Behaviour

Implementation

Mobility Hub Objectives

The driving objectives of a mobility hub network are shaped by the policy objectives and local need.

Whilst the objectives may change, the overall aim of mobility hubs remain the same – to 'facilitate improvements to how we access and use existing and new modes' (ARUP, 2021).

The driving objectives themselves shape the characteristics and typologies of the mobility hubs, such as what transport offer is delivered and the scales that are needed.

Behaviour

Micro-mobility offerings tend to attract younger, affluent males, whereas EV bicycles tend to attract females.

Understanding of policy and mobility hub objectives will help identify the target market.

Reliability, availability, and convenience are identified as key barriers to uptake of public and shared modalities.

Ultimately age, environmental opinion, car ownership, and perceived barriers are most influential in usership.

Characteristics and Typologies

The transport modes delivered are selected to best achieve local policies and objectives.

A network of hubs can support the viability of existing transport services.

Mobility hubs should be 'placed wherever sufficient demand is foreseen', in current and future scenarios.

Mobility hubs work best within a network, and private interests should look to integrate their hubs into a network.

Public engagement is key to the success of a network, particularly around setting typologies, locating hubs, branding, and integrating with the context.

Mobility hub typologies change by place, depending on objectives.

Typologies are typically informed by public transport and place-based context, and include scales of hubs, with varying mobility and non-mobility offerings.

Branding is essential to the success of mobility hubs, important for recognisability, information conveyance and attracting and aiding users.

Implementation

Delivering mobility hub networks is resource intensive for planning departments.

Funding, delivery, and operational factors are yet to be tested in the long-term.

ABOVE Figure 22: Conclusions.

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2.8 Research Frameworks

Research Question: A framework for Mobility Hub Networks in the UK. How can a holistic approach to planning and design shape mobility hub networks in the UK?

Answering the research question will be achieved through two research themes, both interconnected, but requiring criteria for research analysis. These will evolve through the research to become a unified framework. The analytical frameworks created for each theme have been formed from the lessons identified in the literature and guidance review, providing a guide for the studies to take place.

2.8.1 Theme A Analytical Framework

Theme A takes an analytical approach, setting out three categories under which, criteria for investigation provide a guide for the study. These investigations should look to identify mechanisms and approaches under their theme, or challenges and solutions.

Objectives

- What are the objectives of the network?
- Are the objectives informed by policy and need?
- What is the approach for objectives selection?

Characteristics & Typologies

- How are hub locations selected?
- What is the extent of the network and plans for the future?
- What typologies have been adopted?
- How do the components, mobility and non-mobility, achieve the objectives?
- How is branding created and integrated?

Implementation

- What delivery model was adopted?
- What challenges arose during implementation?
- Has viability been tested?

Identify Mechanisms and Approaches

Identify Challenges and Solutions

Identify Transferable Strategies and Solutions

ABOVE Figure 23: Research Stream A Framework.

2.8.1 Theme B Analytical Framework

Theme B explores the relationship between mobility hub design and morphological context, identifying design approaches and principles for creating mobility hubs which are embedded in their community. Theme B will evaluate the quality of mobility hubs and understand how the functions are used.
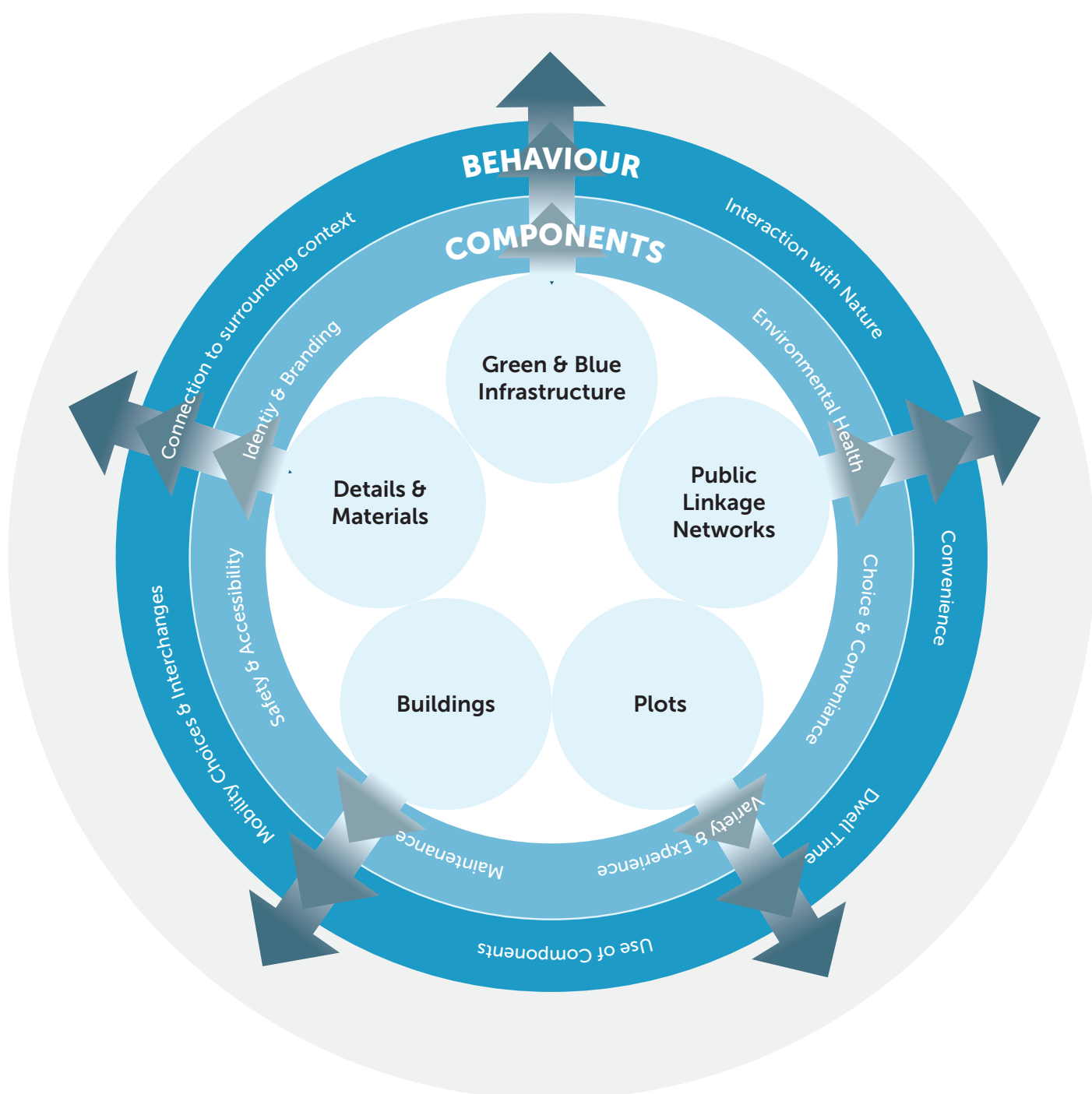
ABOVE Figure 24: Research Stream B Framework.

03 Research Themes

Theme A outlines the challenges of mobility hub networks and identifies mechanisms and strategies for the planning and delivery of strategic networks. This is achieved through a series of interviews with key professionals involved in the mobility hub and sustainable transport planning, design and delivery processes.

Theme B explores existing UK design guidance and analyses a survey to explore travel habits and understand the public's perception of how barriers to sustainable travel can be overcome.

Theme A Mechanisms and Challenges of a Strategic Network.

3.1 Interviews

Interviews have been conducted with professionals to identify the challenges of planning and delivering mobility hub networks, and the mechanisms available to aid their delivery. The Theme A research framework has guided these interviews, and this chapter illustrates the findings through this framework.

Interviews were conducted with a mix of public and private interests, who each experience different challenges and pressures. Despite this, there are patterns and shared experiences that can be identified. Interviews took place with four individuals from:

- Transport Policy, Oxfordshire County Council [Interviewee 1];
- Integrated Transport Planning [Interviewee 2];
- Future Mobility, Transport for West Midlands [Interviewee 3]; and
- Graham Smith, Urban Design consultant.

The interviewees were contacted directly and have signed a Participant Consent Form.
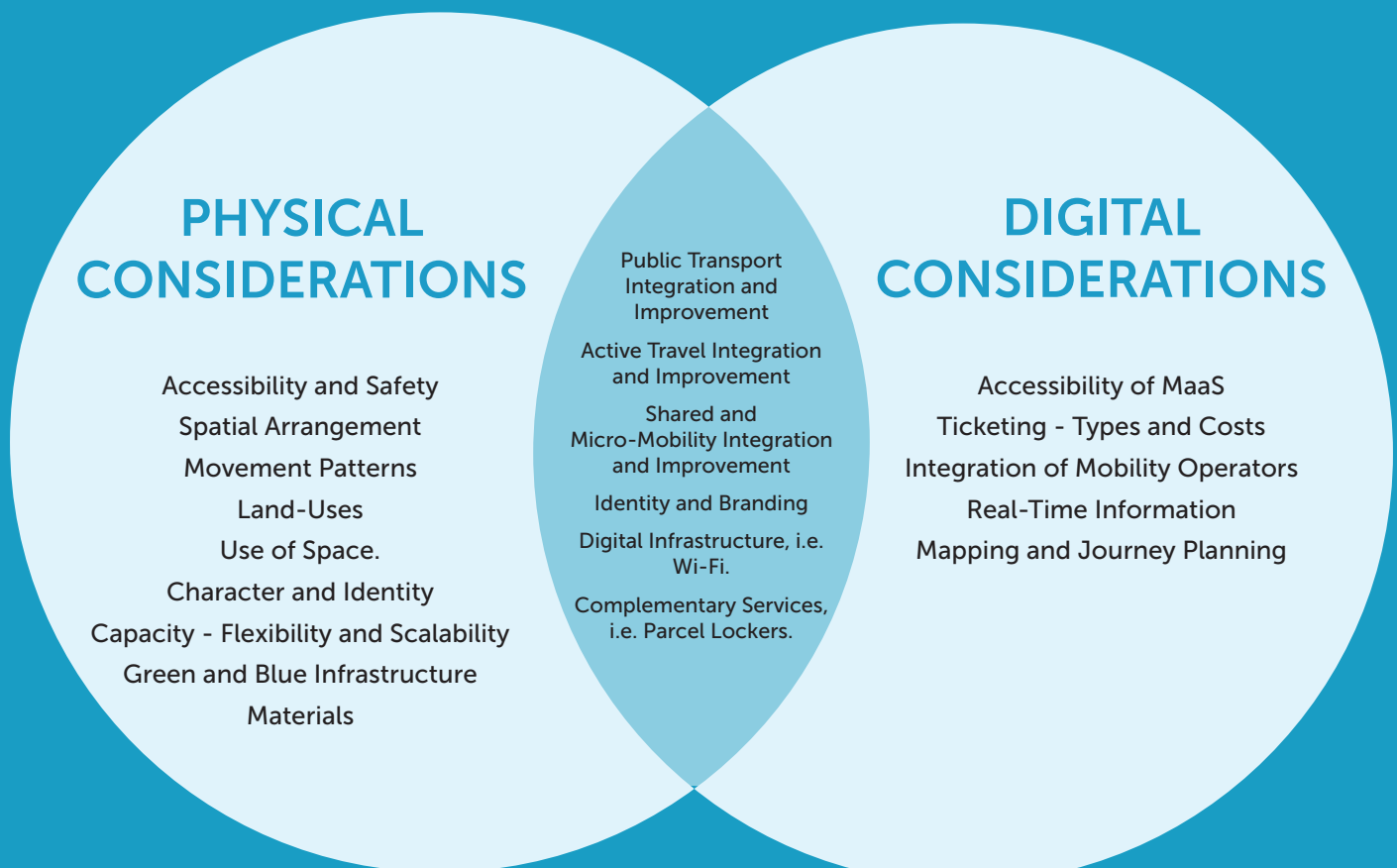
3.1.1 Catalysts and Objectives

Research indicates that mobility hubs are a mechanism to reduce private vehicle use, by providing 'shared mobility as an alternative to the private car' (SEStran, 2020, p. 5). The literature review expanded on this view, illustrating that the objectives of a proposed mobility hub network vary by context. There are a variety of factors at play that alter the need for mobility hubs, including the policy context, as well as socio-demographic influences and environmental considerations. As such the interviews demonstrated different forces are driving mobility hubs.

The primary aim of mobility hubs was noted to be **a tool to reduce vehicle trips**. For Oxfordshire County Council's (OCC) case, this is incorporated into the Local Transport and Connectivity Plan, with a set timeframe to achieve this by 2030, and complemented by a series of policies to aid the transition, including 'Safe Streets' and the expansion of 20-minute neighbourhoods across Oxfordshire (Oxfordshire County Council, 2022, p. 8). A similar case is made by Transport for West Midlands (TfWM), where there is an **overreliance on driving** for short trips, noting that '7 in 10 trips between 1 and 2 miles are taken by car' (Interviewee 3, 2024).

There is an acknowledgement, however, that vehicle trips cannot be reduced if additional options are not delivered, so **new and retrofitted infrastructure is needed** (Interviewee 1, 2024). Improving and investing in new active and public transport infrastructure through mobility hubs 'opens up possibilities for people' by generating awareness and new potential journeys (Smith, 2024). Convenience is a significant factor as to why individuals choose private vehicles over public transport, and the interviews indicate that the **lack of a seamless interchange** is the 'missing link' in transport systems (Interviewee 1, 2024) (Interviewee 3, 2024). This seamless interchange extends to more than **physical location**, **timetabling** of services, **digital infrastructure**, **quality of the environment**, **proximity** to services, and **affordability**. These can be separated as both physical

PHYSICAL CONSIDERATIONS

Accessibility and Safety
Spatial Arrangement
Movement Patterns
Land-Uses
Use of Space.
Character and Identity
Capacity - Flexibility and Scalability
Green and Blue Infrastructure
Materials

Public Transport Integration and Improvement

Active Travel Integration and Improvement

Shared and Micro-Mobility Integration and Improvement

Identity and Branding

Digital Infrastructure, i.e. Wi-Fi.

Complementary Services, i.e. Parcel Lockers.

DIGITAL CONSIDERATIONS

Accessibility of MaaS
Ticketing - Types and Costs
Integration of Mobility Operators
Real-Time Information
Mapping and Journey Planning

ABOVE Figure 25: List of physical and digital considerations.

and digital considerations. Mobility hubs were identified as a means to help address these barriers and challenges.

Funding constraints can be a limiting factor but also help to **'focus improvements'** and the aim of a mobility hub network (Interviewee 2, 2024). This approach can be seen in Derbyshire, where developing proposals are looking to introduce scaled-back typologies of mobility hubs that deliver focused improvements to the bus infrastructure, to **increase patronage**, in addition to **improved pedestrian environments** and perceived safety. Central to improving bus patronage is improving the ease of interchange.

In addition to this public sector momentum, there is a **drive from private developers** seeking to deliver mobility hubs, often part of a **'package of mitigating measures'** of development, in addition to encouraging sustainable transport in new places (Interviewee 2, 2024). For developers delivering residential and employment schemes, mobility hubs can prove a **useful tool to reduce private vehicle reliance**. Both the public and private sectors face differing challenges concerning mobility hubs, but there are commonalities between these challenges, and the aim of mobility hubs remains the same – to improve accessibility to and quality of our sustainable movement networks.

3.1.2 Characteristics and Typologies

The literature and guidance review highlighted that typologies and their characteristics vary according to the local context. However, when planning a network of mobility hubs, three categories of hubs can be universally identified: Retrofit, Plugging Gaps and New Development.

ABOVE Figure 26: Categories of hubs.

3.1.2.1 Retrofit

Movement patterns already exist within places, but mobility hubs can adapt and formalise existing infrastructure to provide better interchange between modes, provide more and better facilities and amenities, and improve comfort.

3.1.2.2 Plugging Gaps

Where accessibility to existing public transport services is low, mobility hubs can help increase mobility choice and freedom, helping to reduce reliance on private vehicles and increase public transport catchments.

3.1.2.3 New Development

Where new residential and employment schemes are delivered, introducing mobility hubs at an early phase can help to embed sustainable travel behaviours among new residents and employees, and will connect to a wider mobility hub network.

CoMoUK provides guidance on mobility hub typologies, informed by European case studies, which themselves feature varied scales. Interviews acknowledged the benefits of this guidance to steer the strategic planning of mobility hubs, but the identified six hub scales were deemed to be 'too complicated' (Interviewee 1, 2024). Adapting this guidance into **simplified scales** with **'clear distinctions'** between both their purpose and infrastructure not only aids the efficiency of planning, design and delivery but provides **clarity** for stakeholders and the public (Interviewee 1, 2024). CoMoUK (2020, p.10), acknowledges that the identified scales illustrate 'possible combinations of components' and that these need to be **adapted for each location**.

3.1.3 Public Engagement

Beyond the infrastructure and transport components of a mobility hub are its community and placemaking aspects. Mobility hubs can have the potential to become **destinations** for a community, with space to gather and socialise, and interact with nature, such as through community gardens. The interviews demonstrated that there are limiting factors to public engagement. Funding for mobility hubs can often be attained as windfalls, which attached **time limitations**. These funding windows can facilitate network implementation but **constrains public engagement** potential and creates a top-down process. Consequently, innovative approaches to public engagement are needed to gather views and feedback on the strategy and design.

The scales and limits of engagement were also raised as unknown factors. Interview 3 (2024) noted that mobility hubs can be delivered through 'permitted development' which has **'no formal planning or consultation'** requirements (Interviewee 3, 2024). It is noted this allows for greater flexibility in the consultation approach, but the lack of structure could limit meaningful engagement (Interviewee 3, 2024).

3.1.4 Delivery

The process of going from strategy to implemented network is acknowledged as a significant challenge for those involved in delivery.

3.1.4.1 Funding for Local Authority-Led Mobility Hubs

Funding was identified as the primary constraint for the delivery of mobility hubs. A lack of funding threatens aspirations being watered down, with Councils particularly, questioning 'what can [feasibly] be accommodated', delivered and maintained (Interviewee 2, 2024). Cost-benefit analyses are undertaken to justify the schemes, but they often face the initial barrier of gaining funding.

In the case of Oxfordshire, funding has shaped the delivery strategy into a **'reactive process'** that relies on windfall funding and developer contributions (Interviewee 1, 2024). A range of guidance exists which provides recommendations on funding sources. These include, but are not limited to:
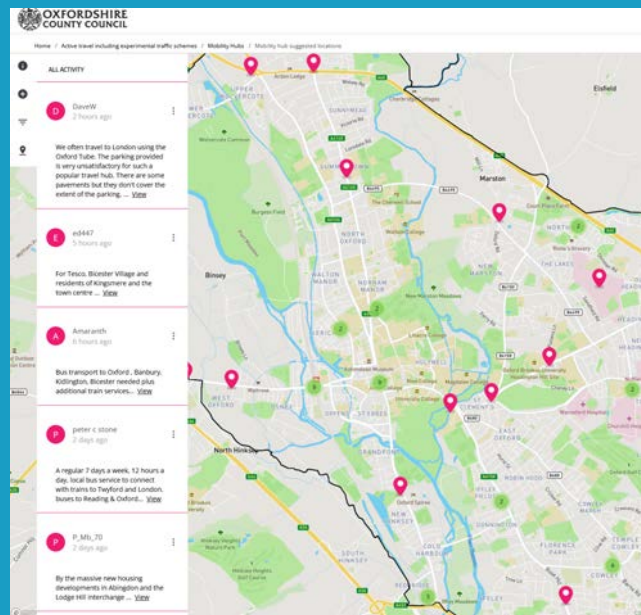- Subsidies from central government.
- Transport operators funding their own infrastructure and operating costs.

ABOVE Figure 27: Mobility Hubs, Let's Talk Oxfordshire, consultation page.

- Grants from projects such as the EU Interreg North Sea Region SHARE-North Project.
- Developer contributions
- Energy Saving Trust – EV Infrastructure
- MaaS Investment Fund.
- Active travel funding schemes such as the National Lottery and Paths for All.
  (CoMoUK, 2021)

However, these sources **do not provide a stable infrastructure investment revenue stream** and are fragmented and **intermittent**. Smith (2024) highlights that 'long-term investment strategies' are needed to provide stability for project delivery. To generate stability, there needs to be clarity and drive from central government, and a step change is occurring. Upcoming changes to the NPPF are shifting transport planning to a **'vision-led approach to promoting sustainable transport modes'** (Ministry of Housing, Communities & Local Government, 2024, p. 35). Furthermore, the transport secretary Louise Haigh (2024, cited in Laker, 2024) has committed to 'unprecedented levels of funding' for active travel, with a strategy that could provide 'long-term funding settlements' (Laker, 2024). This would be a powerful lever in eliminating the funding barrier. Evidence of this can be seen in the case of TfWM, where allocated funding is driving forward a regional mobility hub network (Interviewee 3, 2024).

3.1.4.2 Experience

Mobility hubs are a relatively new concept, with a lack of unified guidance. The interviewees acknowledge that European case studies can provide inspiration and ideas, but the differences in context, culture, and government structures limit their transferability to the UK. The UK has increasing numbers of proposals for mobility hub networks, but there is a **lack of experience** in design, implementation and operation, which induces a 'lack of knowledge sharing' between Councils and organisations (Interviewee 1, 2024). A **UK network case study could provide a model**, offering a degree of assurance and guidance to aid others in delivery.

The lack of experience extends beyond planning and delivery, but also a lack of urban design and placemaking expertise within the public sector, which risks a strong focus on transport and weakened importance on community and integration with context.

3.1.4.3 Planning, Operational and Monitoring Barriers

Mobility hubs require a range of stakeholders to agree to a shared vision and strategy. Land ownership was noted to be a key barrier to implementing mobility hubs. It was highlighted that **'competing operators and ownership'** and varied aims between stakeholders can alter and impact the strategy and deliverability of mobility hub networks (Interviewee 1, 2024). As a consequence, many mobility hubs being brought forward in the UK to date are on public sector land or new development sites. New developments do not face the same land ownership barriers and can deliver the infrastructure. However, questions remain about who manages the hub, once the infrastructure is delivered.
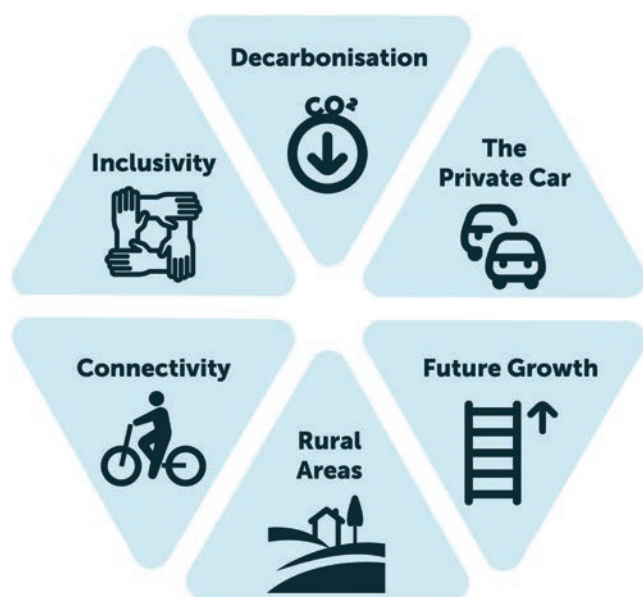
Guidance exists from a range of charities and bodies with suggestions for operational models for varied scales (CoMoUK, 2020, pp. 11 - 13) (SEStran, 2020, p. 22). Some of these models suggest a landlord/tenant approach, where space is rented to service operators. Interviewee 3 (2024) highlighted the experience of the Jelbi network in Berlin, where encouraging service operators to use the mobility hubs was a significant challenge and **introducing rent would further complicate negotiations**. Successful operation requires all stakeholders to be fully engaged in planning and design (Interviewee 3, 2024).

3.2 Case Study: Oxfordshire County Council Mobility Hub Strategy

3.2.1 Context

The mobility hub strategy for Oxfordshire has developed as a result of the adopted Local Transport and Connectivity Plan (LTCP), which sets out the vision for transport and mobility across the county. It was formed against the backdrop of 'rising car use' which is creating 'environments that are less welcoming places for people' (Oxfordshire County Council, 2023, p. 9). The LTCP sets out a 'clear vision for delivering a net-zero Oxfordshire', through three key actions - Avoiding the need to travel, shifting to lower-emission vehicles, and improving vehicles and fuel efficiency (Oxfordshire County Council, 2022, pp. 5, 34). This approach is heavily focused on enforcing early behavioural change, which could have detrimental impacts on Oxfordshire's economy, and the accessibility within and between communities (Smith, 2024). The behavioural change aspects are complemented by actions to invest, improve, and connect the transport systems, and utilise mobility hubs as a tool to improve interchange between modes, but highlights funding limitations that could hinder these proposals.

Policy 22 – We will:

a. Consider multi-modal travel as a central option for transport planning and planning for new developments to achieve greater integration of the transport system.

b. Seek to improve physical access and interchange facilities as well continuing to monitor and explore opportunities for MaaS with partners.

c. Undertake assessments of the facilities for people walking and cycling at stops and stations on our core public transport corridors, so that we can identify opportunities for improvements in more detail.

d. Work with stakeholders, including the rail and bus industry, to improve access to existing railway stations on foot, by cycle and bus.

e. Work with stakeholders to ensure new railway stations are delivered with appropriate walking, cycling and public transport access.

f. Work with stakeholders as part of our bus enhanced partnership to improve real-time information and multi-operator ticketing.

Policy 23 – We will:

a. Support the development of mobility hubs in a range of locations and sizes in order to improve interchange opportunities, connectivity and accessibility. Appendix 4 summarises the type of facilities and services that could be provided at different scales and locations within Oxfordshire.

b. Carefully consider the following matters when developing plans for any new mobility hubs:

- The identification and safeguarding of suitable land.
- The character and needs of the local area.
- The proximity of proposals to strategic rail, bus and active travel networks.
- The potential to achieve more walking and cycling, including the need for suitable cycle parking.
- The ability to develop and improve existing assets or facilities such as stations, bus stopping areas or Park and Rides.
- The potential to tie in with high quality digital and renewable energy networks.
- The opportunity to provide complementary facilities and services such as flexible workspaces, shops and refreshment options.

c. Encourage developers to design mobility hubs into development where appropriate.

ABOVE Figure 29: Policies 22 and 23 extracted from the LTCP (Oxfordshire County Council, 2022).

ABOVE Figure 30: Mobility hub delivery process, outlined in the Oxfordshire County Council Mobility Hub Strategy. (Oxfordshire County Council, 2023).

ABOVE Figure 28: Challenges the LTCP seeks to address.

5.2.2 Policy

Policies 22 and 23 outline the mobility hub policies to deliver a 'network of mobility hubs across the county', with the strategy being the guiding document to how this can be achieved (Oxfordshire County Council, 2022, pp. 81 - 83).

The policies are naturally intertwined with the wider LTCP policies, particularly the 20-minute neighbourhoods. Mobility hubs allow the potential for the co-location of transport modes and services, allowing for the reduction in journey 'frequency and length' and the 'integration … into new development' (Oxfordshire County Council, 2022, p. 82).
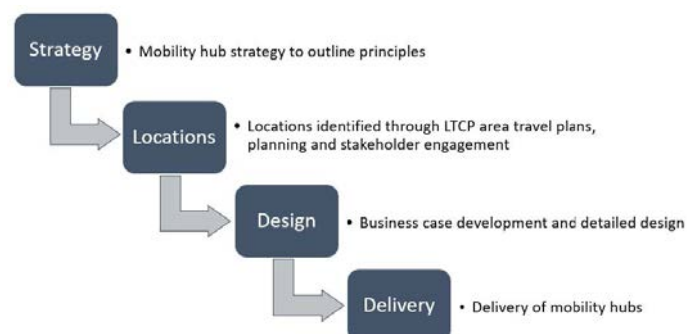
These policies ensure that mobility hubs are considered by transport planners as **opportunities for transport network integration**, and community amenities. The policies also outline the high-level considerations to allow mobility hubs to reflect their local context, fully connected to existing infrastructure and movement patterns, and are used as a mechanism to improve facilities, services and information. The LTCP policies provide a foundation upon which the Mobility Hub Strategy was formed.

3.2.3 Strategy

The strategy outlines the overarching principles, typologies, and proposed delivery process, illustrated in Figure 30.
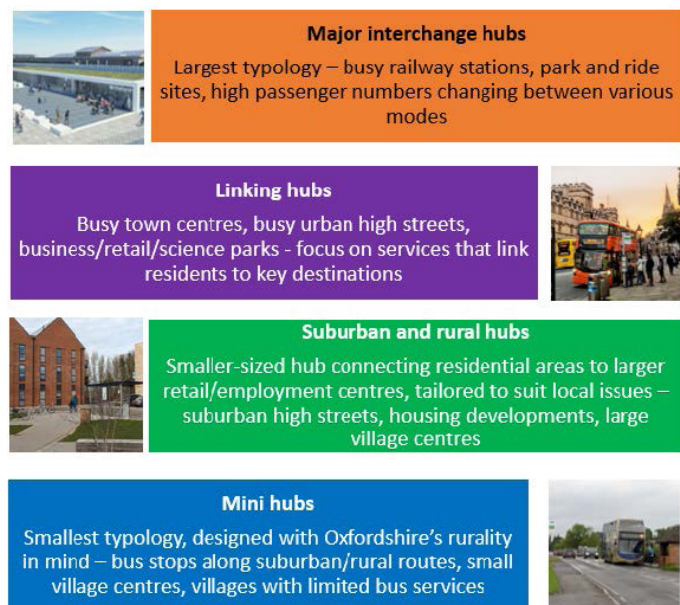
ABOVE Figure 31: Proposed typologies for the Oxfordshire mobility hub network, extracted from the strategy report (Oxfordshire County Council, 2023).

3.2.3.1 Typologies and Design

The typologies proposed for the mobility hub network build on CoMoUK's guidance, creating a simplified platform of four typologies which can be adapted to 'the needs of the local area' (Oxfordshire County Council, 2023, p. 18). The typologies defined cover all areas of Oxfordshire, looking beyond the city centre and residential areas, to include other trip generators, such as employment sites.

The defined typologies **clearly illustrate the aim of each scale**, such as access to day-to-day facilities, outline the typology vision, and provide existing local case studies to indicate the expected standard of design.

The strategy clearly outlines the components required and desired for each typology but falls short in defining detailed and measurable principles or guidance to guide how hubs will be designed with the local context.

3.2.3.2 Identifying Locations.

Identifying locations of mobility hubs cannot be done as an isolated exercise, but in line with the LTCP to understand how mobility hubs can contribute to the other aims and policy objectives. Oxfordshire's mobility hub strategy notes that identifying locations will be an exercise undertaken 'through the LTCP area travel plans', which support the LTCP in demonstrating how 'LTCP policies are applied in practice' (Oxfordshire County Council, 2023, p. 30).

Whilst it is beneficial that a formal process exists for the identification of mobility hubs, to be carried out within a coordinated area travel plan, the methods of selecting locations are not outlined. Alternatively, factors are set out to ensure **'a consistent approach'**, but these considerations are qualitative, lacking measurability which would ensure consistency between area travel plans and a guide for individual stakeholders bringing hubs forward

(Oxfordshire County Council, 2023, p. 30).

3.2.3.3 Business Case and Implementation

The development of business cases is conducted by OCC either for individual hubs or for a collection of them as a part of central government funding bids. Further work to understand costs and delivery timescales could provide a measure of the success of the 'reactive' implementation approach (Interviewee 1, 2024).

Furthermore, the strategy lacks a defined approach to implementation, operation, and management. **Flexibility** has been **embedded** into the strategy to enable the **gradual growth** of a mobility hub network through a variety of means, whether that be driven by OCC, private developers, or bus companies, for example. This leaves options for the Council to ensure that the network can be feasibly delivered but doesn't provide clarity on operation and management procedures to private interests delivering hubs, who can provide infrastructure, but not operate the services. Furthermore, CoMoUK (2022, p.16) highlight that it **'is important to understand the preferred delivery method'** to provide clarity for contracts and procurement.

3.2.4 Conclusions

The Oxfordshire Mobility Hub Strategy provides a useful guide to understanding the vision and high-level processes that will enable the growth of a mobility hub network. It clearly illustrates a series of **understandable typologies** of hubs which can be implemented by stakeholders, sets out the process by which locations can begin to be identified, and **outlines the funding opportunities** available. The strategy also successfully details additional considerations which can expand the usability and offering of hubs, such as providing greater detail on MaaS, branding, and freight consolidation.

However, there are lessons to take away from the strategy:

- A series of detailed design principles can support private stakeholders, such as consultants and developers, to develop mobility hubs that are consistent with the wider network, both in terms of brand identi-ty and integrating with context and identity.
- Measurable considerations would provide a greater understanding of how to identify appropriate loca-tions for mobility hubs and how to spatially arrange them.
- Defining a universal operation model could prove easier to manage in contrast to individual models for each hub. This could be beneficial in terms of cost-efficiency but also provide certainty to the private sector in understanding how to hand over the mobility hub infrastructure to operators.
- Meaningful public engagement helps to understand where mobility hubs can be successful and begins to create public awareness around the concept.

Theme B What makes a Mobility Hub successful?

3.3 UK Design Guidance

The UK has a detailed range of design guidance related to cycle infrastructure design and designing for inclusivity but currently lacks mobility hub design guidance which not only refers to these documents but sets principles for integrating hubs with their context (CoMoUK, 2022, p. 18).

CoMoUK (2022) has provided the most in-depth guidance to date, with hypothetical, yet grounded, concepts for five of their typologies. This guidance provides an example of a mobility hub that integrates the new and existing transport infrastructure, complemented by key factors for the success in that typology, and a breakdown of costs.

Research from ARUP (2021) adds to this, setting out three high-level design principles – Adaptability and Function, Identity and Integration, and Sustainable Growth, which is further supported by bespoke principles for each typology.

There **lacks a cohesiveness between existing guidance**, and more so, a strong focus on transport with reduced emphasis on using mobility hubs as a placemaking tool that sensitively sits within existing and new contexts, rather than being the dominating feature.

ABOVE Figure 32: Visualisation of an Large Urban Rail Interchange by CoMoUK (2024).
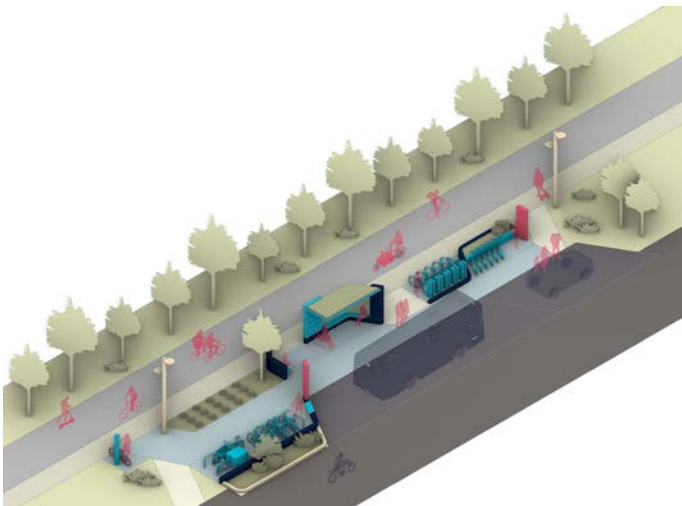

ABOVE Figure 33: Visualisation of the flexible 'Future Mobility Hub' designed by Arup and Go Ahead Group (Arup, 2021).

3.4 Public Consultation

To understand perceived barriers to sustainable travel and identify measures to improve the success of mobility hubs, a consultation website was launched to host forums and surveys. Engagement was achieved through The Academy of Urbanism, allowing industry professionals to provide their expertise.
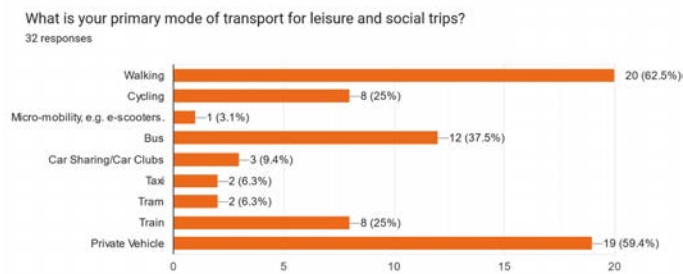
Out of the surveyed respondents, 53% were male and 47% were female, across a variety of age categories, and 84% of the respondents were aware of what a Mobility Hub is (Sustainable Transport Survey, 2024).
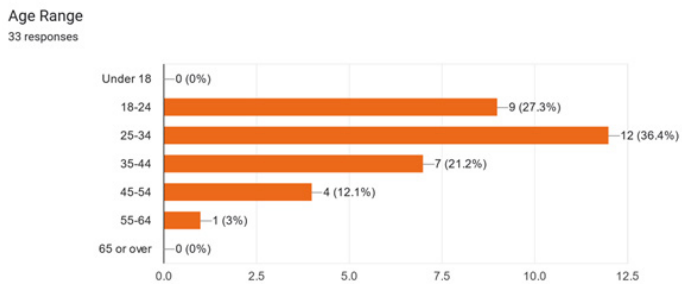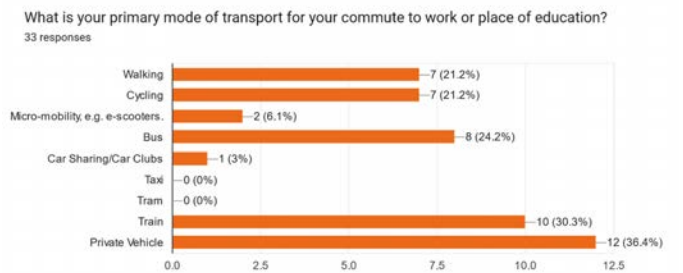

ABOVE Figure 34A: Age of survey respondents.
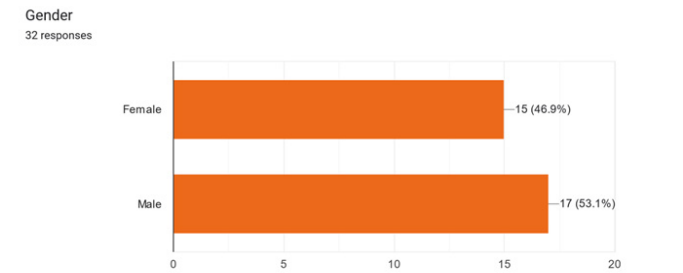
ABOVE Figure 34B : Gender of survey respondents.

ABOVE Figure 35: Q2. What is your primary mode of transport for leisure and social trips? (Sustainable Transport Survey, 2024)


ABOVE Figure 36: Q3. What is your primary mode of transport for your commute to work or place of education? (Sustainable Transport Survey, 2024)

There was a broad **acknowledgement of the benefits of mobility hubs**, particularly the potential to improve convenience and journey experience, and deliver a broad choice of modes for a user's journey (Sustainable Transport Survey, 2024). The potential for a 'healthier lifestyle' was noted as an additional benefit with mobility hubs noted as helping to not only facilitate active travel but also improve the convenience of journeys for those already travelling sustainably (Sustainable Transport Survey, 2024).

Uptake of sustainable travel is an important component of ensuring mobility hubs attract users, and the key barriers to this are illustrated in Figure 37B. Barriers can be categorised into two parts – Perceived and Actual Barriers. Perceived barriers saw the greatest response and need to be tackled to encourage uptake, through improving perceptions by reducing actual barriers (Sustainable Transport Survey, 2024). Actual barriers which were noted, such as **poor integration** between services and authorities, **car-dominant policy** and design, lack of central government investment and support, and poor accessibility and choice for the mobility impaired, should be addressed in mobility hubs to increase chances of success (Sustainable Transport Survey, 2024)

The survey highlights that a holistic approach is needed to eliminate barriers to sustainable travel (Sustainable Transport Survey, 2024). Respondents were asked to select the most important factor for encouraging sustainable travel. The responses emphasised the **importance of a comprehensive design** that considers all aspects, including transport functions, place functions, digital functions, and social considerations (Sustainable Transport Survey, 2024). An interesting comparison, however, can be made, where cost and affordability are
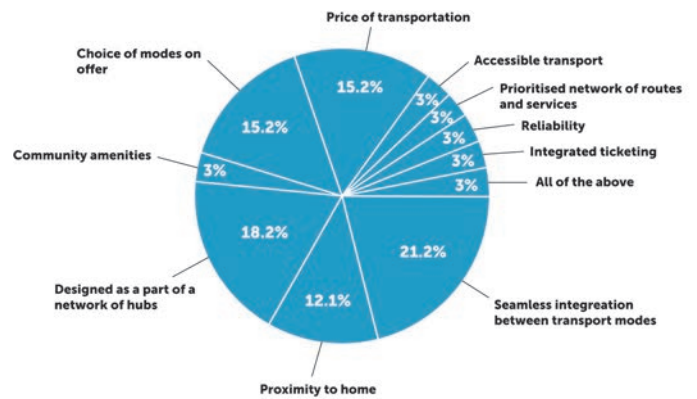
ABOVE Figure 37A: Results of Q8. What would you consider to be the most important factor in mobility hub design that would encourage you to take sustainable modes? (Sustainable Transport Survey, 2024).

perceived to be a key barrier to the uptake of sustainable travel, and seamless integration between transport modes has been identified as the most important factor that would encourage uptake. **Seamless integration** goes beyond the **co-location of components** but can include **timetabling, ticketing and MaaS integration**. The results demonstrate that tackling 'actual' barriers could reduce 'perceived' barriers.

ABOVE Figure 37B: Results of Q5. What do you feel are the key barriers to sustainable travel? (Sustainable Transport Survey, 2024)

04 Case Study:
De Hoppinpunten
The Hoppin Points

4.1 Introduction

With over 50 mobility hubs across its authority area, and more in planning and trial stages, this critical analysis of the Hoppin Point network is being undertaken using both the Theme A and B research frameworks, for a comprehensive evaluation of the planning, design and implementation.

7.2 Understanding Leuven

Leuven, or Louvain, is a thriving city east of Brussels, within the Flanders region. A university city since 1425, Leuven has a rich mix of historic and contemporary quarters, a prospering economy of innovation and science, and a diverse 100,000-strong population, of which half are students at KU Leuven University (Gentili & Hoekstra, 2022) (KU Leuven, 2024) (European Commission, 2023).

Leuven experiences mild weather, with its proximity to the North Sea creating a balanced distribution of rainfall throughout the year (Weather Atlas, 2024). The daily average temperature can be as low as 3°C in January to 18°C in July and August (Weather Spark, 2024).

Leuven has a rich history, with many spaces protected under a range of international, national, and local protections. The green infrastructure plan indicates that the historic cores are particularly dense when compared to the outer suburban development. Characterised by a dense network of streets, alleys, courtyards and squares, Leuven's pockets of history are distributed across the city, particularly along the River Dyle and within the city core, such as Leuven Station and the UNESCO-protected Great Beguinage. Leuven's character and identity are embedded in this heritage, which was built on a foundation of religion, education and innovation.

Leuven experienced economic growth due to its connection to the Leuven-Dijle Canal, yet, the city grew with its backs to the water, and many of the waterways are inaccessible (Vlaanderen, 2024). Leuven has a distinctive spatial structure, first defined by its waterways weaving north-south through the city but now the city ring road creates a characteristic edge to the city, with a near-circular form connecting the city to its suburbs, as well as drawing vehicular movement away from the city core. The city has a series of formalised greenspaces with space for play and discovery, such as the Kruidtuin Botanic Garden. The railway creates east-west severance, forming a significant corridor that has attracted agglomeration of industrial uses towards the northwest of Leuven.

Leuven's green and blue network lies on what is a relatively flat plain, which peaks beyond the ring road towards the northwest of the city and is at its lowest point within the heart of the city. This topography, alongside the climate, policy, and built form, is a factor in which the city has a thriving cycling culture. The city is situated within the agricultural countryside and provides a vast array of high-quality green spaces which are highly accessible to residents. The built nature of the city core has created little green coverage, but the make-up of the city allows
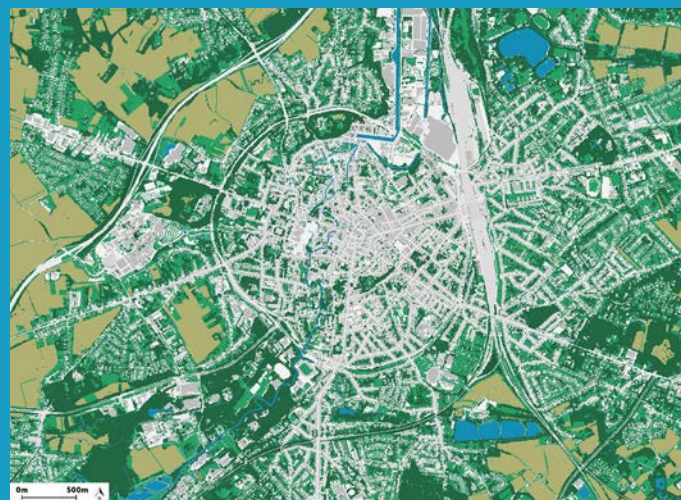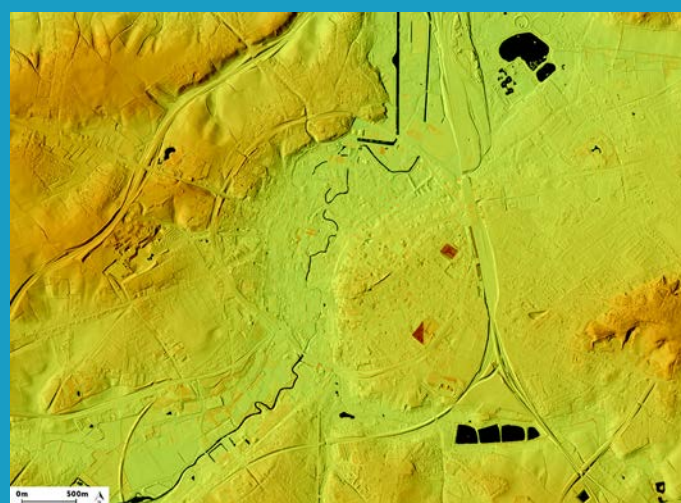

ABOVE Figure 38: Green and blue network, graded by quality.

KEY:
- High-quality greenspace
- Low-quality greenspace
- Agricultural land
- Water
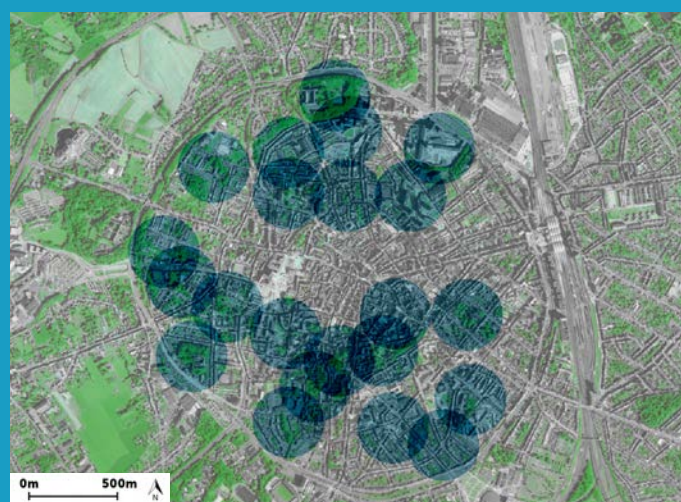
ABOVE Figure 39: 400m isochrones from accessible greenspaces within the ring road.

KEY:
- 400m Isochrone


ABOVE Figure 40: Leuven topography.

KEY:
- Land height

for short journeys to green spaces through active and sustainable modes.

Across the municipality, Leuven has a low population density of 19 people per hectare, owing to the sprawling suburban development beyond the city ring road (City Population, 2024). The built form of the city within the ring road suggests a greater population density, which seasonally fluctuates with the academic calendar. The main university, KU Leuven, attracts approximately 50,000 students to the city annually, and this influx not only contributes to the city's economy but creates a bustling and vibrant city (KU Leuven, 2024).

Leuven is served by a significant railway station with national connections, complemented by an adjacent bus station, operated by De Lijn, whose headquarters forms part of Leuven's Station Square. This is a regional bus operator that delivers a rapid, accessible, and affordable public transit network across the city, its neighbourhoods and beyond, feeding out from the central station. This bus network is complemented by extensive coverage of high-quality cycling infrastructure. Cycling culture is embedded into the way of life within Leuven. It influences people's daily travel choices and alters the make-up of the built environment. Segregated cycle lanes, whilst present along the ring road and primary streets, are largely absent and the use of painted cycle lanes which indicate cycling priority are prevalent.
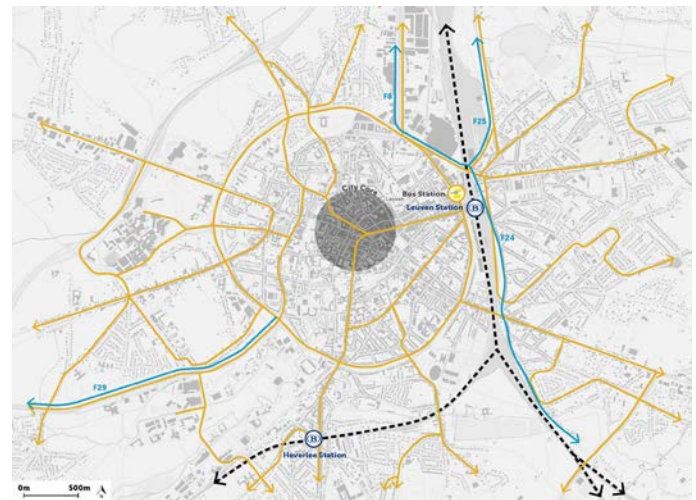
ABOVE Figure 41: Rail, bus and cycle highway movement networks in Leuven.

KEY:
- Railway
- Cycle Highway
- Bus Station
- Bus Route
- Railway Station

4.2.1 Socio-Economic Context

Leuven is a highly educated city, with the area hosting the 'highest number of highly educated people per square kilometre' in Belgium (Gentili & Hoekstra, 2022).

The economy in Leuven is dominated by tertiary and quaternary industries, particularly knowledge-based

ABOVE Figure 42: Combined morphological assessment.

jobs (Gentili & Hoekstra, 2022). Inequalities persist however, with higher levels of unemployment than the regional average, even more so for women who are 'at greater risk of in-work poverty than men', and high youth unemployment (Gentili & Hoekstra, 2022).

Health inequalities also follow a similar trend, with significant disparities defined by socioeconomic status (Gentili & Hoekstra, 2022). In Leuven, those with a higher education degree experienced much better health, 81%, than those with lower levels of education, 58%, and this is worsened for children whose behaviours are defined by their parents' socio-economic class (Gentili & Hoekstra, 2022).
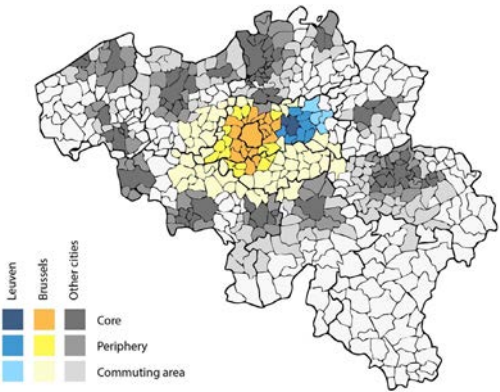
ABOVE Figure 44: Movement relationships with settlements.

ABOVE Figure 43: Historic city core.

ABOVE Figure 45: Contemporary city centre developments.

ABOVE Figure 46: Leuven identity.

4.2.1.1 Takeaways
1. The relatively flat and dense nature of Leuven, as well as its moderate climate, are influencers in its cycling culture, in addition to political drive.
2. Access to greenspace within the city core is particularly sparse, and street trees and pockets of green help bring that into the dense core.
3. Leuven is well-connected, locally and nationally. Its integrated bus network affords sustainable travel choices, with a frequent, accessible service, whilst its cycling network is an attractive and accessible enabler of active travel.
4. The city has built on its assets, such as the university, the waterways and railways, which brought industry, and now retains a highly educated, healthy and resilient population, but significant inequalities persist between socio-economic classes.

4.3 Planning and Design

4.3.1 Vision

The Hoppin Point network is a wider set of initiatives to achieve the Flander's Mobility Vision. The Flemish Government are driving a step change to **'maximise [spatial] connectivity and accessibility'** by 2040, which enables **'sustainable mobility solution[s]** within reach for everyone' and freight transport that is 'competitive and sustainable' (Vlassmse Overheid, 2022).

4.3.2 Top-Down Approach

The Hoppin Point network is being driven by the Flemish Government. Alongside its extensive collection of
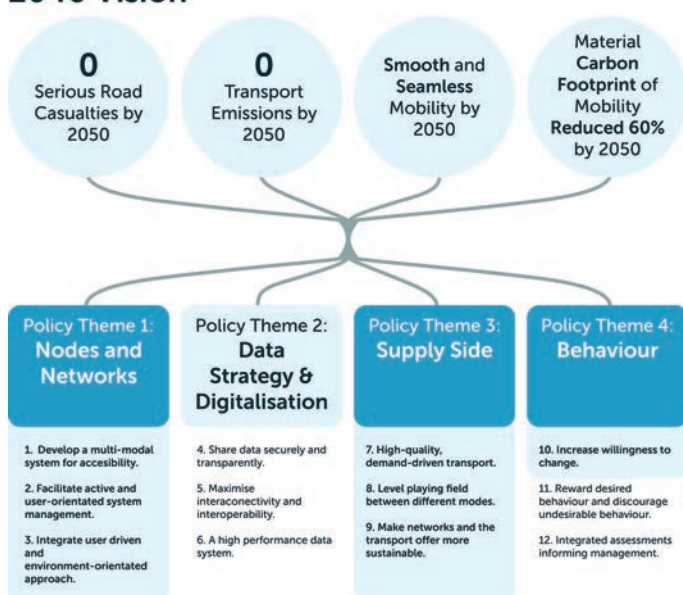
ABOVE Figure 47: Vision through the policy implementation. The Hoppin Points deliver on three policy themes.

ABOVE Figure 48: Potential home to destination first/last mile connectivity.

related guidance, such as accessibility guidelines, a suite of technical and delivery guidance has been produced to **streamline the implementation** of the network. This provides a **level of certainty** and clarity to guide delivery. It also provides a sounding board for local municipalities and creates consistency in delivery across the region.

Figure 49 illustrates the government's overarching delivery model, which provides a structured and logical method for implementation, supported by funding (Vlaanderen, 2022). Both the Flemish Government and local municipalities are involved in the implementation process. The Flemish Government is responsible for the Interregional and Regional Hoppin Points, whereas the local municipality determines Local and Neighbourhood hub locations on a **'network logic'** to integrate them into the regional mobility plan (Vlaanderen, 2024). Neighbourhood hubs, which are exclusive from public transport, instead plugging gaps in networks, can be determined on **'proximity logic'** (Vlaanderen, 2024). No distance between hubs is specified, but the hub locations are selected on a case-by-case basis (Vlaanderen, 2024).

Collectively, a clear approach to implementation, supported by the central government, working with local municipalities, and backed by subsidies, provides a streamlined framework, upon which the accelerated expansion of the network is being achieved. This approach could reduce barriers to implementation facing local authorities in the UK.
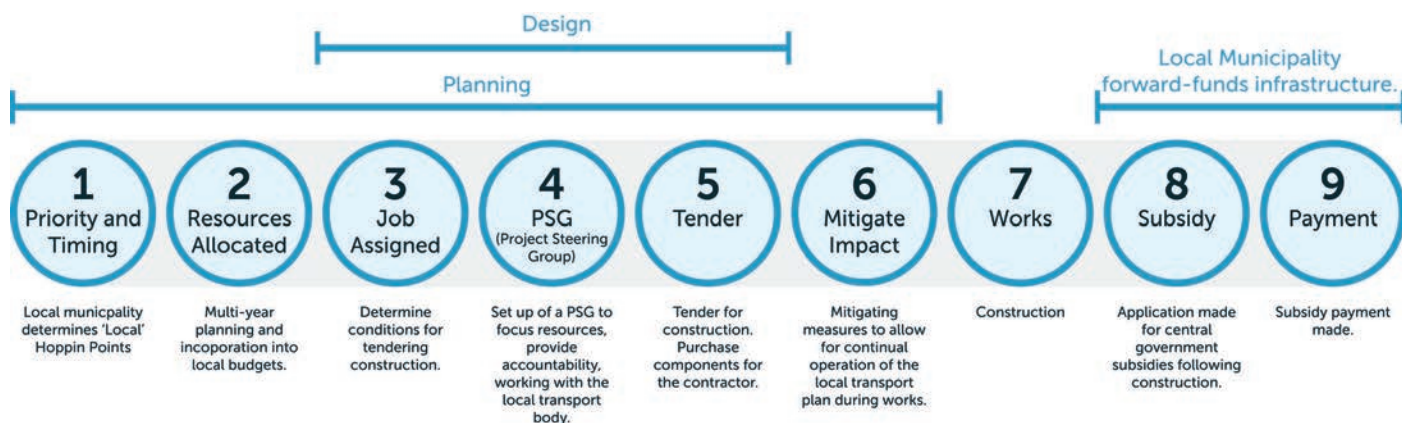
4.3.3 Design Guide

The Hoppin Point Design Guide is a comprehensive strategy for the design of mobility hubs. The document defines a Hoppin Point as **'a place where two or more modes of transport can be combined**, the conditions of the BVR Mobipoints are respected and the **Hoppin brand architecture is applied**' (Vlaanderen, 2022). This definition leaves flexibility in the design approach but is strongly focused on the transport function.

4.3.3.1 General Design Principles

The design principles create a **high-level foundation** upon which typologies can define the hub details. Key is the relationship to spatial context, with the typology defined by the built form, in addition to mobility patterns. Ensuring flexibility, but **minimising land-take** is a defining principle, which contrasts with the UK approach, ensuring a balance between transport and the public realm.

Furthermore, ensuring access to public space is a key driver for the principle of **'universal accessibility'** to allow for **'barrier-free transitions'** between modes and spaces. In this way, the Hoppin Points program is being used to improve the wider accessibility of a place, ensuring the hubs go beyond the transport function.

ABOVE Figure 49: Hoppin Point delivery process.

4.3.3.2 Typologies

The design guide identified two categories which determine a proposed hub typology – the **scale** and the **spatial context**. The scales are divided into Interregional, Regional, Local, and Neighbourhood (Vlaanderen, 2022). These scales are associated with transport, providing clear guidelines on the mobility context and potential offering. Spatial classification allows for a contextual design approach, dividing these four scales across urban contexts defined by central government mapping – Urbanised, Suburban, Rural, Business Park, and Visitor Hub (Vlaanderen, 2022). This matrix of categories, whilst adding a degree of complexity, provides guidance for different transport contexts, in relation to the spatial

ABOVE Figure 51: Transport and spatial context mobility hub typology matrix.

context, though one could argue with indistinguishable change between typologies.

Each typology has a defined **palette of principles**, essential and recommended **components** and services, and **guidance for signage**. This sits within the wider principles which apply across all typologies and delves into further detail, referring to broader technical guidance.

4.3.3.3 Technical Guidance

The technical guidance expands on the guidance outlined across 10 themes summarised in Figure 52.

Where this design guidance lacks clarity is engagement. The literature and guidance review highlighted community involvement as a component of a mobility hub's success, and understanding how to engage with the public to define hub design and provision would prove beneficial for creating locally distinctive hubs.

ABOVE Figure 50: Overarching design principles.

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4. Case Study: De Hoppinpunten The Hoppin Points
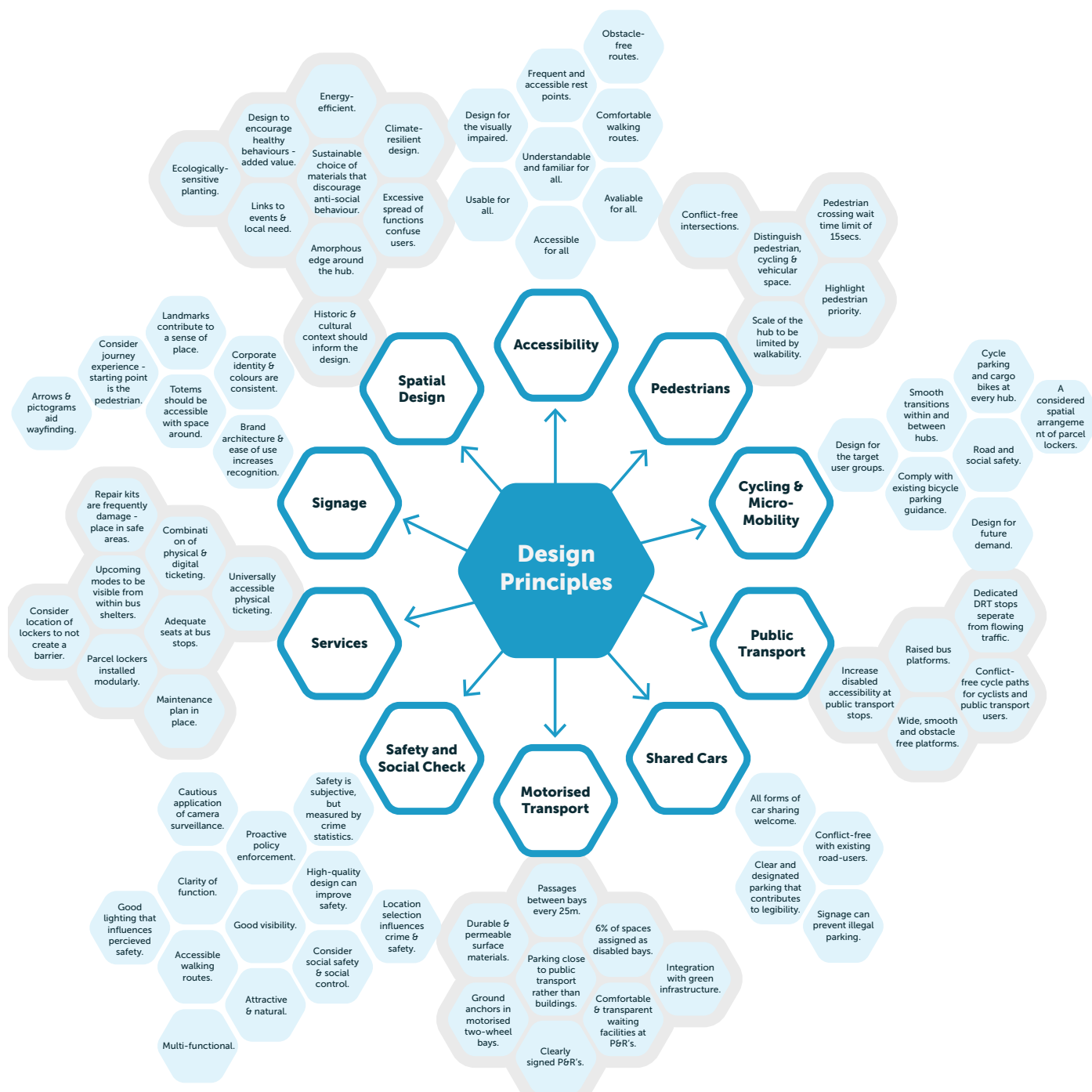
ABOVE Figure 52: Design Guide principles and recommendations.

4.3.4 Conclusions

1. A clear vision and strategy for mobility, that considers spatial context, can be a significant driver for the implementation of mobility hubs.
2. Clear and structured guidance can aid local authorities in delivery. Uncertainties can be reduced with central government engagement and funding opportunities.
3. Setting out an implementation and operation approach from the start can be a contributing factor for accelerated delivery.
4. A design guide can prove a useful tool for ensuring consistency in mobility hub delivery across a region. Setting out design principles provides guidance on how to not only provide an improved transport offer and experience, but an improved public realm.
5. Clearly defined mobility hub typologies, which consider transport and spatial context can aid the creation of mobility hubs that balance place and transport demands.

4.4 Study Methodology

Using the Theme B research framework, this study evaluates the design, arrangement and location of mobility hubs and how they have been integrated with the urban morphology. A quality assessment ranks perceived quality from a site visit, identifying successful design choices that contribute to success.

With such a large range of mobility hubs, this study identifies a random sample of mobility hubs to assess. The study analyses the four typologies: Interregional and Regional, of which there is one of each within the study area, and Local and Neighbourhood, of which 50% of each were randomly selected for this study. The study area was identified by a perception of the city boundary defined by walking accessibility. Figure 53 displays the study area and the locations of mobility hubs being assessed.

The methods chosen for this study are selected to understand the context, design and quality of the Hoppin Point network in Leuven. The study is observation-based, guided by the research frameworks and structured methodology, as well as a strong understanding of urban design and morphology.

Research Methods	Approach
Context and Morphology	An analysis of the urban morphology to understand the mobility hubs context, informed by on-site observations, and the design approach. The study is guided by the Theme B research framework to analyse the green and blue infrastructure, movement networks, blocks, plots and buildings, and details and materials.
Quality Assessment	An analysis of the quality of the mobility hubs, guided by the qualities identified in the Theme B research framework. Assessments were informed by individual perception and observation of the hubs as a first-time user.

**ABOVE** Table 03: Research methods for the Hoppin Point study.

KEY:
- Ⓗ Interregional hub
- Ⓗ Regional hub
- Ⓗ Local hub
- Ⓗ Neighbourhood hub
- Ⓗ Hub not in study
- Study area
- Walking radius

0m   500m
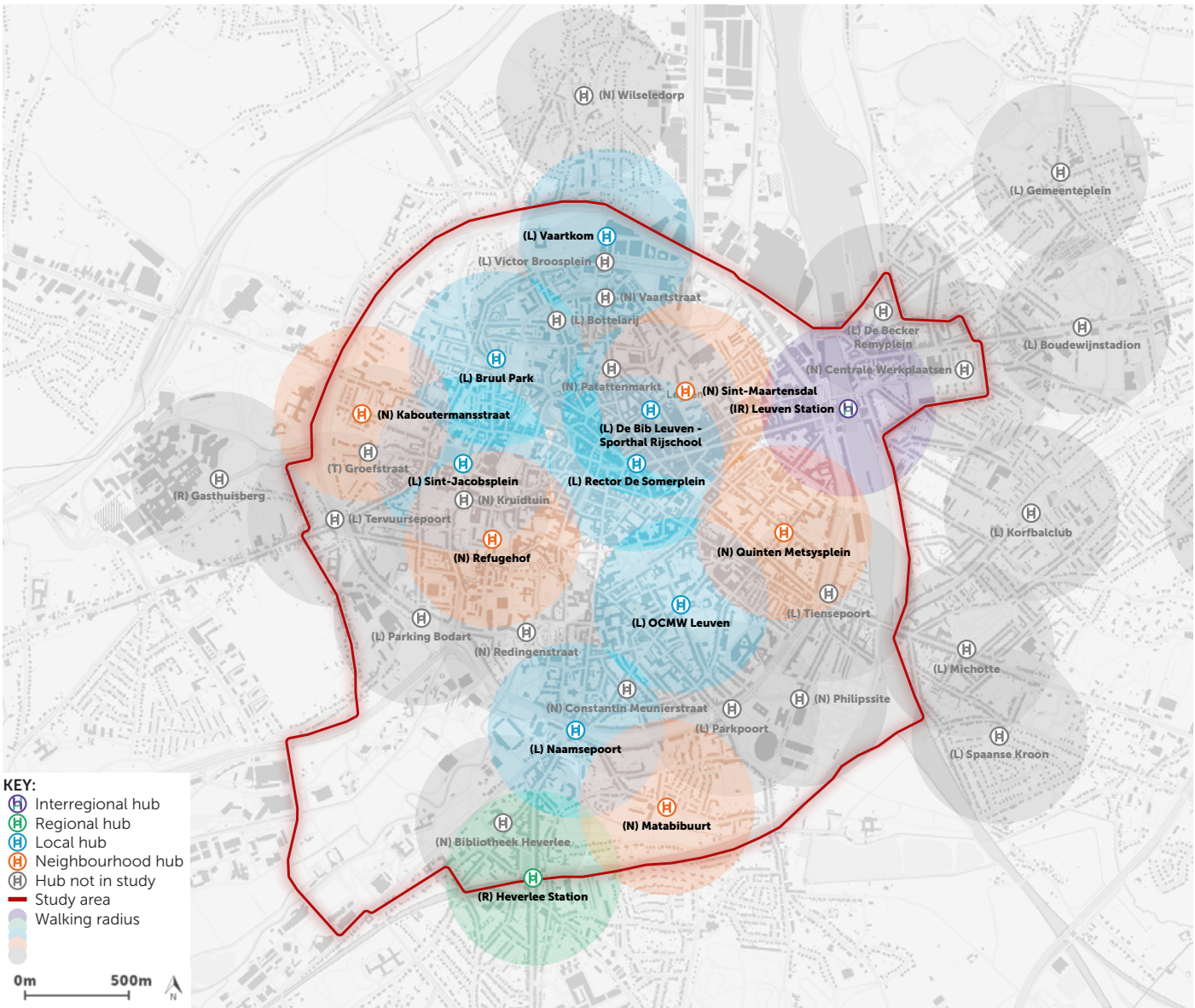
BELOW Figure 53: Hoppin Points within the Leuven study area.

4.5 Interregional Leuven Station

Type: City Centre Interchange.

The gateway into Leuven, the station area piloted a new approach to multi-disciplinary regeneration in Belgium in the early 2000s to become an iconic multi-modal transport interchange embedded in high-quality public realm.
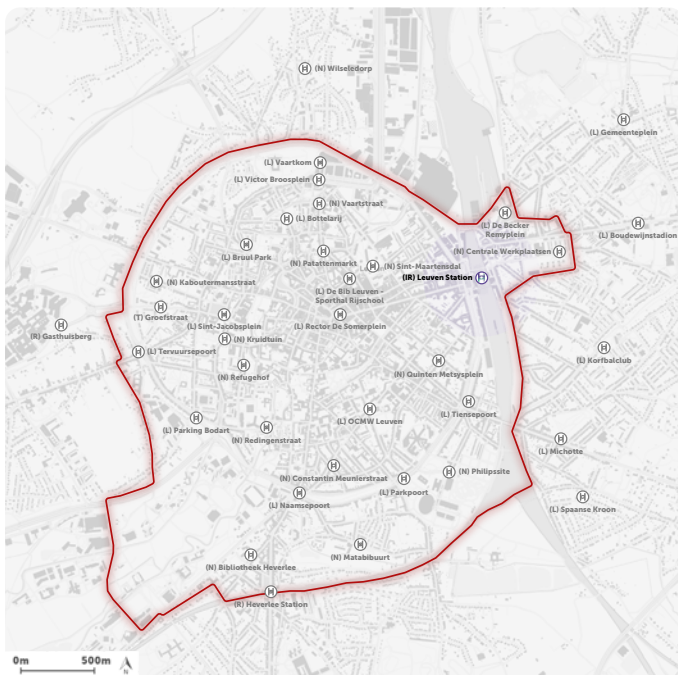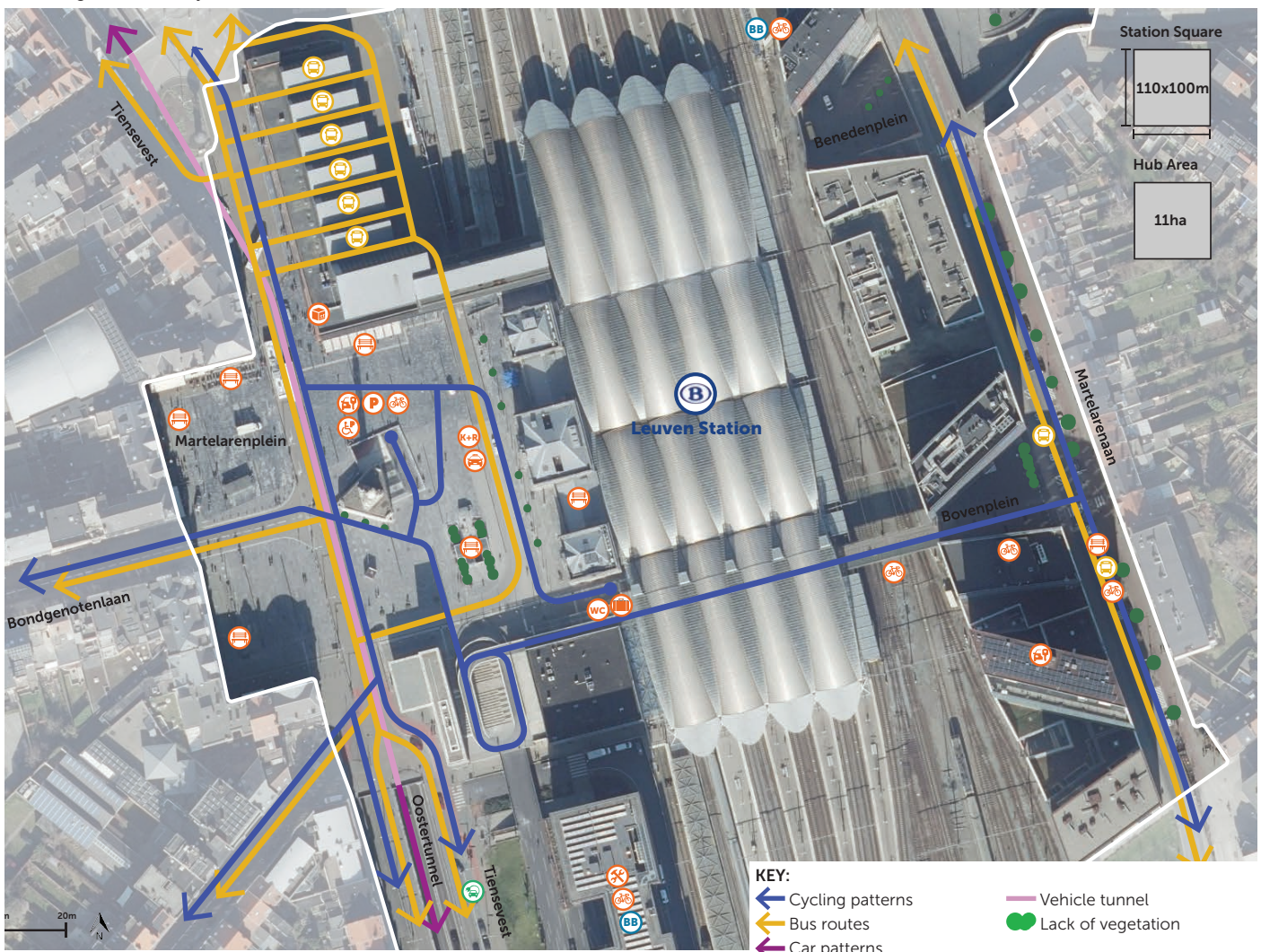

ABOVE Figure 54: Mobility hub location.

Mobility Components

(B) Railway Station		Car Club	
Bus Stop		K+R Kiss + Ride	
BB Bicycle Hire		Bicycle Parking	
Cargo Bicycle Hire		P Public Car Parking	
EV Charging		Disabled Car Parking	

Complementary Components

Luggage Lockers		WC Toilets	
Parcel Lockers		Seating	
Bicycle Repair Column			

Station Square
110x100m

Hub Area
11ha

Leuven Station

KEY:
- Cycling patterns
- Bus routes
- Car patterns
- Vehicle tunnel
- Lack of vegetation

ABOVE Figure 55: Leuven Station Hoppin Point plan.

4.5.1 Mobility Hub Analysis – Context and Morphology
4.5.1.1 Green and Blue Infrastructure

Leuven Station sits within a wider, fragmented, green loop, following the ring road around the city with attracting cycling and walking routes. The mobility hub is focused around a large public square, but this is a **harsh environment**, exposed to the sun with very little greenspace. Recent improvements have introduced a small collection of trees with seating. As one of the few **shaded spaces**, this small area has become a popular **place to dwell**.

4.5.1.2 Public Linkage Networks

This hub is a gateway to Leuven and the region. The railway is complemented by an extensive bus network, national and local cycle routes and a range of complementary transport modes and amenities.

The space is bustling, with constant flows of people, cyclists, buses and taxis, across the **multi-level space**. Cars and cyclists exist below ground in the parking areas. At ground level **all modes co-exist**, working their way across the shared space, and the flow of people continues north within the bus station, and within the railway station itself. At an upper level, a cycling bridge allows for a **seamless passage through the station**. Together, this multi-level movement pattern creates a **busy, yet organised, environment**. The presence of people in all areas of the hub creates a sense of safety, and the arrangement of buildings front onto streets and spaces creates natural overlook.

4.5.1.3 Blocks, Plots and Buildings

The hub is focused around a large public square, framed by traditional ornate terraced buildings which feature **vibrant** restaurants and cafes at ground level. Contemporary buildings and infrastructure flank either side of the square, creating a blend between building and transport infrastructure.
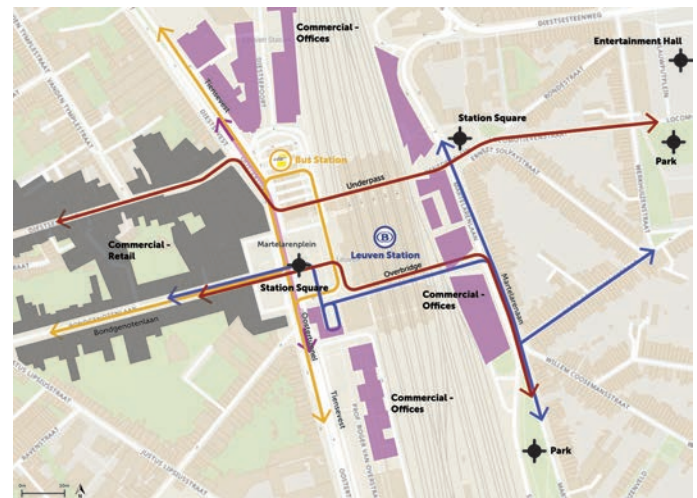
Connections across the railway increase permeability for local journeys into the city. The permeability of the city greatly increases further west, but adjacent to the hub, block sizes are large, with 140-330m spacing
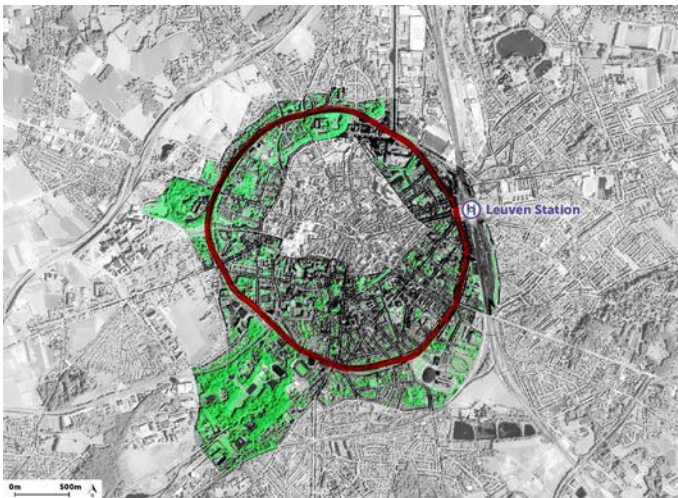
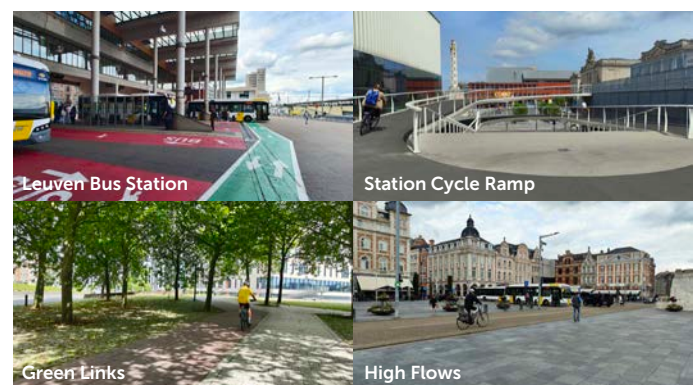**ABOVE** Figure 56: Fragmented green band around Leuven.

KEY:
- Vegetation

ABOVE Figure 57: Green infrastructure around Leuven Station.

KEY:

← Bus Movements	← Car Movements	Ⓑ Train Station
← Cycle Movements	Land-Uses	Ⓗ Bus Station
← Pedestrian Movements	✦ Landmarks	

ABOVE Figure 58: Movement flows.

Leuven Bus Station | Station Cycle Ramp
Green Links | High Flows

ABOVE Figure 59: Transport around Leuven Station.
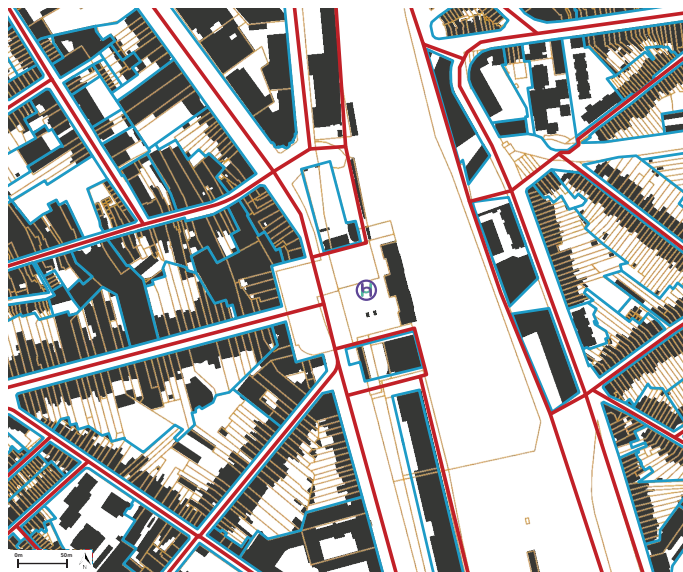
between junctions. Despite this, the user experience is positive, with a **comfortable scale**, with building heights around 4 stories, and a mix of land uses that draw users away from the interchange and into the city. The historic plots are narrow and deep, supporting a greater **mix of uses and businesses**, whereas the more recent additions to the square offer far less interest in terms of use, activity and architectural detailing.

4.5.1.4 Details and Materials

The balance between traditional and contemporary architecture in this space is reflected in the detailing and materials. To the west, the use of stone and red brick is complemented by ornate window frames and gables with a mixture of Dutch and classical French influences. Recent additions use a blend of red-brick, and glass and metal, with bold roof forms and bulky shapes, with repetitive façade patterns. Despite restricted visual interest in these new developments, the space works well owing to not only the footfall but its mixed-uses and natural surveillance.

The materiality of this square is distinctive from the rest of the city, with heavy use of textured granite paving and Mediterranean planting.

ABOVE Figure 62: Collage of materials and architectural details west of the station.

KEY:
- 🟥 Block
- 🟦 Plot Series
- 🟧 Plot
- ⬛ Building
- Ⓗ Hoppin Point

ABOVE Figure 60: Green infrastructure around Leuven Station.
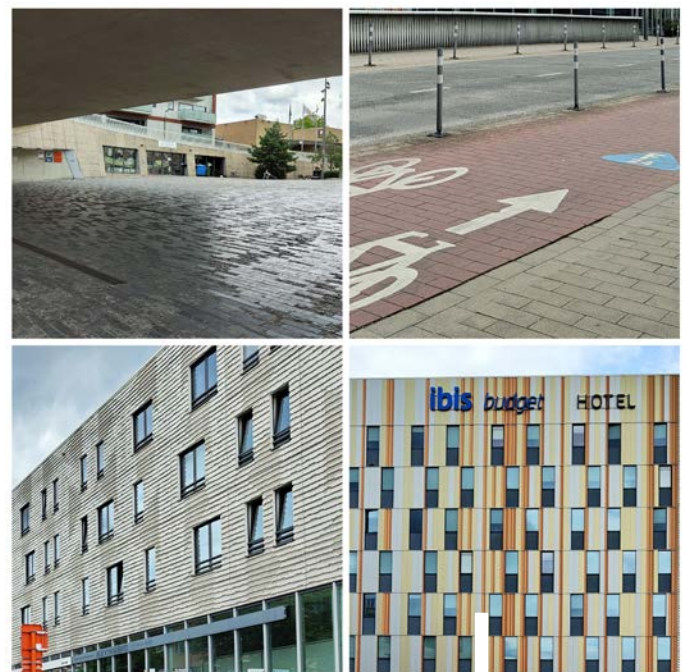
ABOVE Figure 63: Collage of materials and architectural details east of the station.

ABOVE Figure 61: Cycling ramp through to station.

ABOVE Figure 64: Contrast between old and new.

45

4.5.2 Quality Assessment

- Innovative public realm scheme.
- Clean.
- Recent shaded spaces and trees introduced with space to rest.
- Distinct lack of vegetation.

Environmental Health

Identity and Branding
- Adopts recognisable national railway branding, NMBS.
- Cluttered and contradictory signage could impede conveience of onward interchange.

Choice and Convenience
- National and regional rail connections
- Core of the bus network.
- Range of mobility options and complementary facilities.
- Scattered arrangement of components.
- Lack of a map or wayfinding totem reduces legibility.

Safety and Accessibility
- Well-lit.
- Flat, level surface.
- Dark and narrow underpass, with graffitti.

Legibility, Variety and Experience
- Good visibility in station square and clear sighlines through the station aid wayfinding.
- Square framed with traditional narrow plots and large buildings, creating a mixed character.
- Rail and bus interchange bring high pedestrian flows.
- A mix of pedestrian and cycling flows, narrow plots and mixed land-uses creates a vibrant and active atmosphere.

Maintenance and Cost
- Well-maintained.
- Staff presence.
- Dark and narrow underpass, with graffitti.
- €500,000 funding was avaliable to upgrade and integrate Leuven Station into the Hoppin Point network from the Flemish Government.

ABOVE Figure 65: Quality assessment.

7.5.3 Conclusions:
1. A totem or wayfinding map in a central location will aid visitors.
2. Multi-layered movement patterns contribute to the liveliness of the place. Buildings and infrastructure can be designed to create natural surveillance and help frame public spaces.
3. Land-uses and transport components influence the movement flows through a public space. These flows can contribute to the character of a place.
4. Creating car-free environments need not always inconvenience vehicle journeys. Creating a pedestrian-first environment will foster a culture of sustainable travel, and car-journeys can be re-routed though new infrastructure that does not detract from the public space.
5. Introducing pockets of greenspace can increase dwell time and create a comfortable environment. Linking these spaces to the wider green and blue infrastructure network can create attractive routes to the hub, as well as creating stronger natural networks.
6. Railway branding can often recognisable and sometimes for part of identity. Working this into a hub can make the post of this recognition to support the usership of a hub.

4. Case Study: De Hoppinpunten The Hoppin Points

4.6 Regional
Heverlee Station
Type: Suburban Interchange.

Heverlee is a key interchange for southern Leuven, along a rail line to Ottignies, and along a bus corridor into Leuven. The station is complemented by a parking square, with shops and restaurants.
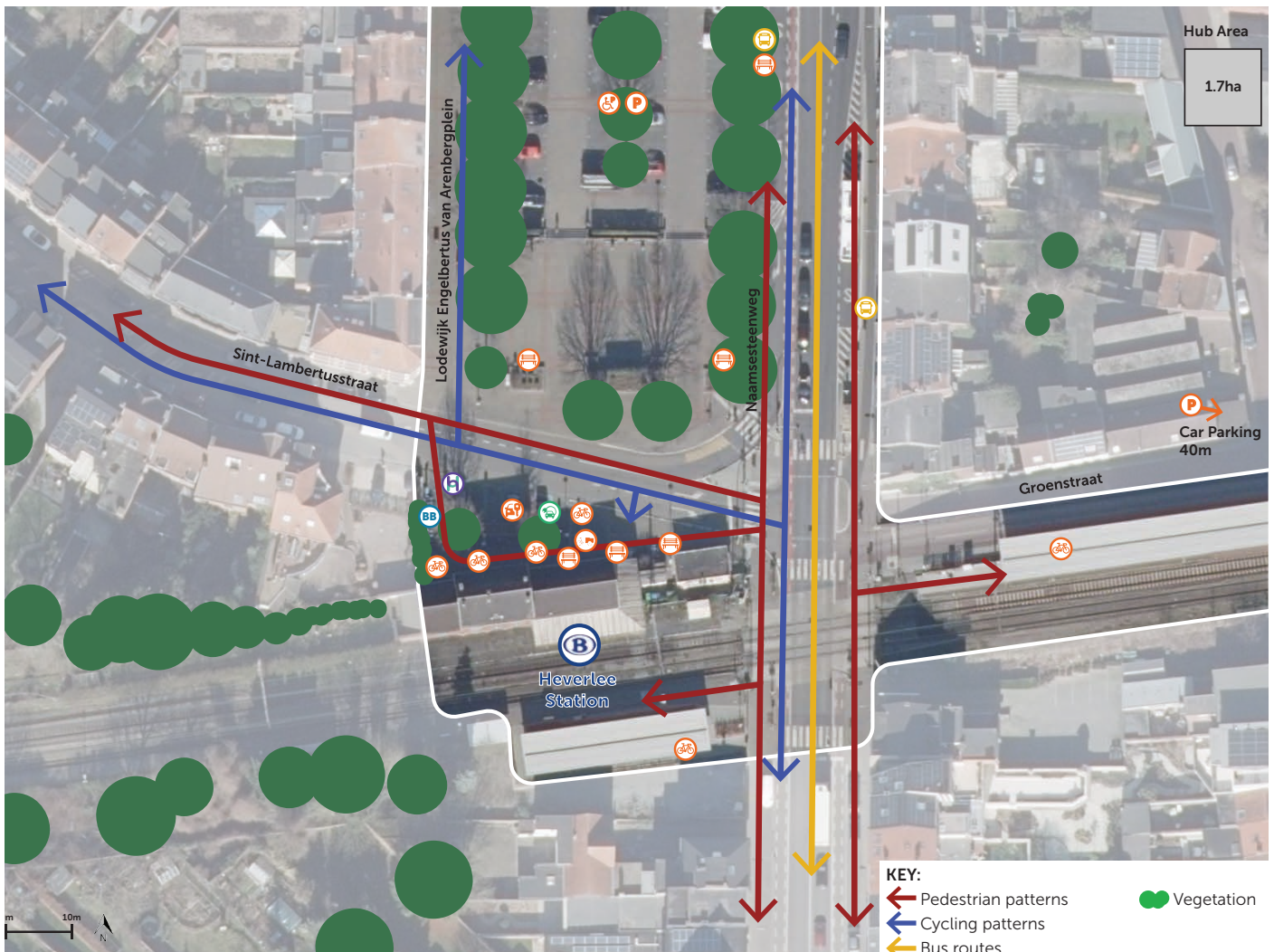

Mobility Components

Hoppin Totem		EV Charging	
Railway Station		Car Club	
Bus Stop		Bicycle Parking	
Bicycle Hire		Public Car Parking	
Cargo Bicycle Hire		Disabled Car Parking	

Complementary Components

Seating
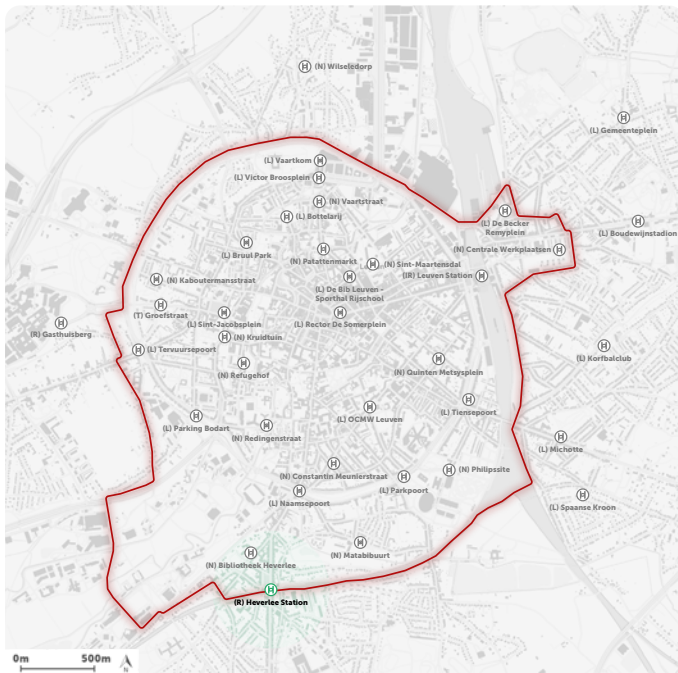
ABOVE Figure 66: Mobility hub location.

Hub Area

1.7ha

Car Parking 40m

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation

ABOVE Figure 67: Heverlee Station Hoppin Point plan.

4.6.1 Mobility Hub Analysis – Context and Morphology

4.6.1.1 Green and Blue Infrastructure

Heverlee is a suburban neighbourhood with excellent links to large woodlands and greenspaces, particularly the KU Leuven Campus, which is just a 10-minute walk from the mobility hub. The hub forms part of the station forecourt and a large parking public square. The area creates a comfortable and cool environment thanks to its **mature trees and planters**. The public square provides **ample resting space** and is designed around this existing green infrastructure helping to embed it into the place and adding a sense of maturation.

4.6.1.2 Public Linkage Networks

Heverlee acts as an interchange for regional and local commuters and travellers. It's situated along a busy north-south corridor into Leuven. The space struggles to balance its movement and place functions. A variety of shops and commercial units line the ground floor of Naamsesteenweg Road into Leuven but the nature of the thoroughfare **encourages you to move through**.

The public square, whilst temporarily closed for a weekly market, is **dominated by vehicle parking**, which does not create an inviting place to stay.

Naamsesteenweg is the primary route into Leuven, with segregated cycle lanes and frequent bus services. The hub is situated on the approach to the railway station from the west, catching pedestrian and cyclist flows, and integrating with these modes through branding.

4.6.1.3 Blocks, Plots and Buildings

Blocks in Heverlee are of a similar scale to comparable suburban neighbourhoods in Leuven. The area is **walkable and permeable**, with the distance between junctions between 90-160m.

The public parking square is framed by 3-4 storey buildings on narrow plots, which creates an interesting townscape, but the space lacks enclosure. Furthermore, the **public square lacks a visual anchor**. Views north along Naamsesteenweg are deflected, but the view south is unremitting, lacking an anchor, with the station building visually screened and situated off-centre.

ABOVE Figure 68: Wider green network.

ABOVE Figure 70: Movement flows.

ABOVE Figure 69: Green infrastructure around Heverlee Station.

ABOVE Figure 71: Blocks, plots and buildings arrangement.

4.6 Regional
Heverlee Station
Type: Suburban Interchange.

4.6.1.4 Details and Materials
Architectural details vary from ornate window surrounds to simple modernism, but a consistency exists using red-brick and white render which is characteristic of the region. Buildings lack a **continual rhythm**, with the diverse mix of facades and details creating an interesting experience that aids legibility.
Wayfinding is supported by a digital totem which provides mapping of the space and Leuven, supporting travellers.

4.6.2 Digital Layer
The Heverlee hub brings the digital component into the built form with an interactive totem that allows users to use maps, search bus and train times, identify other mobility hubs, explore components and learn how to use the different operators. This is beneficial for wayfinding, helping to **understand** both the **geography of the space** and of Leuven for visitors and onward travellers. The mobility hub is complemented by the Hoppin Point mobile app which is **intuitive** and makes planning journeys **seamless and hassle-free** across the Flanders region.

ABOVE Figure 72: Collage of materials and architectural details.
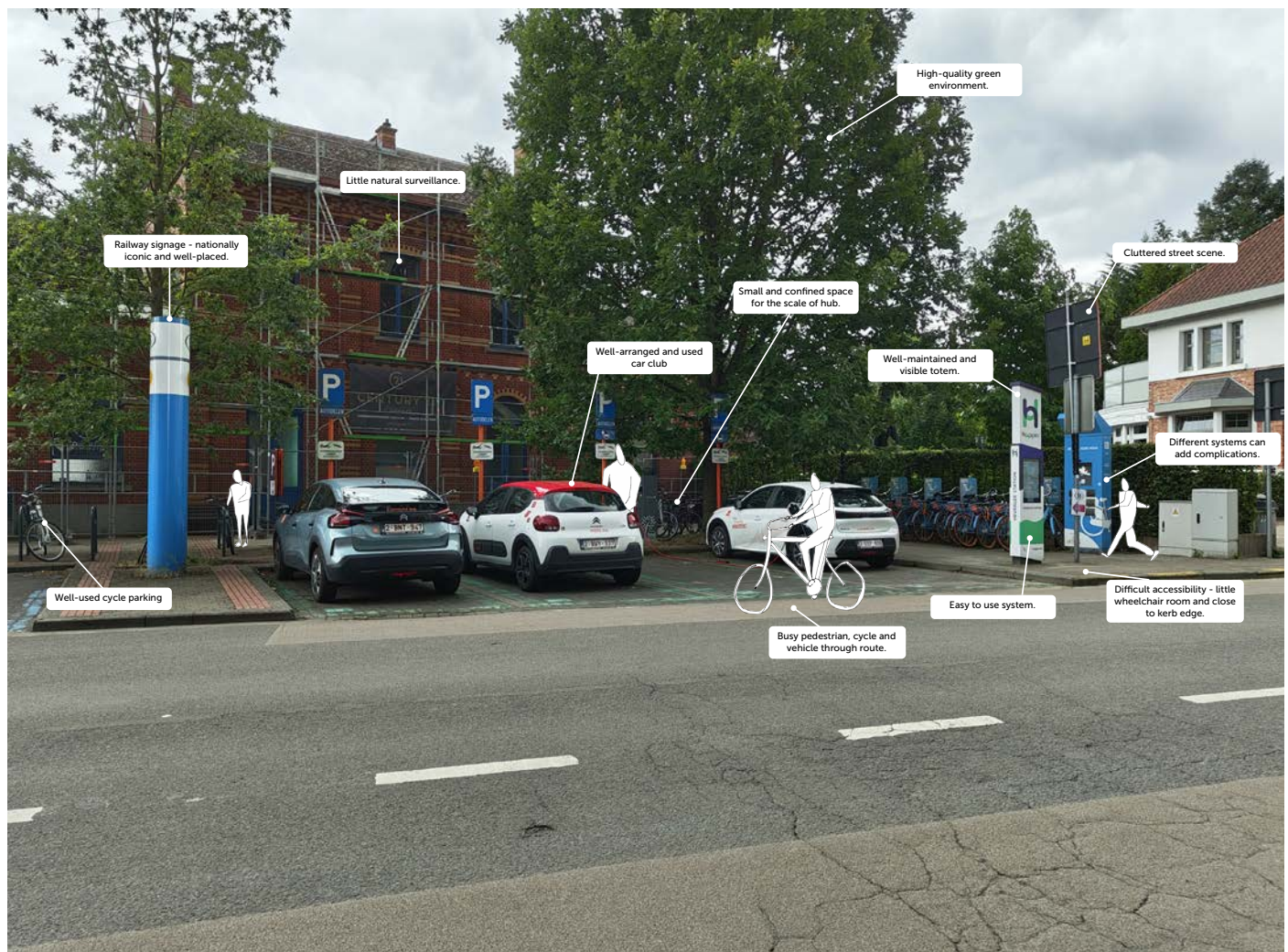
ABOVE Figure 73: Photographic assessment.

4.6.4 Conclusions:
1. All components should be accessible to all.
2. Co-locate mobility options, such as bicycle parking and car clubs.
3. Digital information through a mobility application is a useful aid for planning journeys, particularly if that information is available at bus stops and/or through interactive totems.
4. Consider how a mobility hub can be designed to anchor a space.
5. Consider the arrangement of trees and vegetation to not screen natural surveillance.

ABOVE Figure 74: Functionality of the Hoppin Travel Planner app.

4.6.3 Quality Assessment

High-quality green environment.

Comfortable with shade from trees and space to rest.

Mild pollution from vehicle movements. The hub offers alternatvie means of transport to alleviate this.

Environmental Health

Identity and Branding

Adopts recognisable national railway branding, NMBS.

Cluttered signage harms the appearence of the street scene.

Mixed branding with NMBS, Hoppin, Blue-Bike and Cambio in one place.

Choice and Convenience

Wide range of choice.

Location catches pedestrian and cyclist flows to and from the station.

Components are arranged to allow for quick interchanges.

The easy-to-use interactive totem makes onward travel convenient and informed.

Safety and Accessibility

Buildings overlook the space well, and movements create a sense of safety.

Formal crossings and wide pavements make this an accessible area for most.

A lack of dropped kerbs for car club and disabled parking.

A lack of wheelchair room around the disabled bay hinders universal accessibility.

Maintenance and Cost

Generally well-maintained.

Vegetation is mature and well-cared for.

Signs of wear and damage are present in the hub material choices, particularly car club painted bay markings.

As a regional railway station, €250,000 funding is avaliable to integrate it into the Hoppin Point network from the Flemish Government.

Legibility, Variety and Experience

The arrangement of components is legible and organised.

All components, including the totem, are visible and identifiable, allowing for seamless interchange.

The plots, buildings and land-uses create a dynamic townscape experience.

ABOVE Figure 75: Quality assessment.

4.7 Local
Bruul Park
Type: Car Park.

Located in north-west Leuven, Bruul Park is situated along a busy bus corridor linking the ring-road to the city centre. This hub converts existing car parking spaces to introduce a wider range of mobility choices for the community.
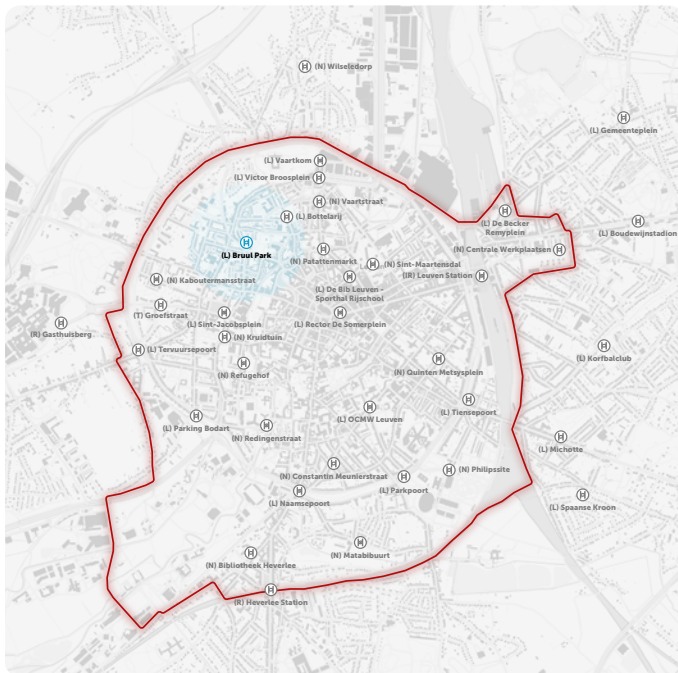
ABOVE Figure 76: Mobility hub location.

Mobility Components

(H) Hoppin Totem	EV Charging
Bus Stop	(P) Public Car Parking
Cargo Bicycle Hire	Disabled Car Parking
Car Club	Bicycle Parking

Complementary Components

Seating	Water Refill Point
Parcel Locker	

ABOVE Figure 77: Bruul Park Hoppin Point plan.

KEY:
- Pedestrian patterns
- Quiet pedestrian footfall
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

0m   10m

Hub Area
0.98ha

Fonteinstraat
25m

Petermannenstraat

Bus Stop
95m

55m

Parcel Locker
150m

Water Refill Point
80m

De Bruul Park

Bus Stop
70m

Tessenstraat

Brouwersstraat

4.7.1 Mobility Hub Analysis – Context and Morphology
4.7.1.1 Green and Blue Infrastructure

Bruul Park is a large park just 50m from the mobility hub. The parkland features a series of play spaces, including basketball and skateboarding, and is highly accessible to the surrounding area. It provides a space for **recreation and a connection to nature**, with mature tree planting.

The mobility hub is characterised by its formal planting, with well-maintained hedgerows and street trees, bringing the park into the street. A cool environment is created through shade from tall apartment buildings and mature trees but risks creating a cold and windy environment during the winter.

4.7.1.2 Public Linkage Networks

Aiming to **reduce private vehicle use** by providing suitable alternative travel options, the conversion of parking spaces at the Bruul Park hub creates a l**egible layout**, with high **visibility and identifiability of components** within the space to aid interchange.

Situated along a primary bus corridor, the

wayfinding totem is well-located at a key junction, which sees a high number of pedestrian and cyclist flows (segregated cycle lane) past the totem.

The movement network brings you into the green network, with **tree-covered cycle lanes** and footpaths and bus stops adjacent to the park. The design of the hub reflects the aim to reduce private car ownership, placing car clubs, cargo bicycle hire and cycle parking closest to building entrances. The dense network of footpaths and streets makes this a highly permeable area, with many routes between neighbourhoods, adding interest to the user experience through a choice of routes that are well-overlooked and contribute to a sense of safety.

4.7.1.3 Blocks, Plots and Buildings

Evolving following the bombing of this area in 1940, this mobility hub is surrounded by a mix of narrow and wide terraced plots with 3-storey homes, as well as taller apartment buildings surrounded by **unclaimed greenspaces** and **orientated to disengage with the primary street** (Vlaanderen, 2024). Despite this, the space remains **well overlooked**, and the greenspaces create a

ABOVE Figure 78: Wider green network.

ABOVE Figure 80: Movement flows.

ABOVE Figure 79: Green infrastructure around Bruul Park.

ABOVE Figure 81: Blocks, plots and buildings arrangement.

4.7 Local
Bruul Park
Type: Car Park.

calm and **pleasant environment** with a comfortable street width and building height ratio.

4.7.1.4 Details and Materials

Given the site's history during WW2 and its later developments, this mobility hub sits in a unique context that blends traditional Leuven materiality with brutalist and contemporary styles. For the most part, traditional plot layouts remain, with contemporary red-brick buildings. This contrasts with large apartment buildings with grey-brick or concrete facades. Street surfaces are more characteristic of Leuven with cobble setts for the street and narrow herringbone paving for footpaths.

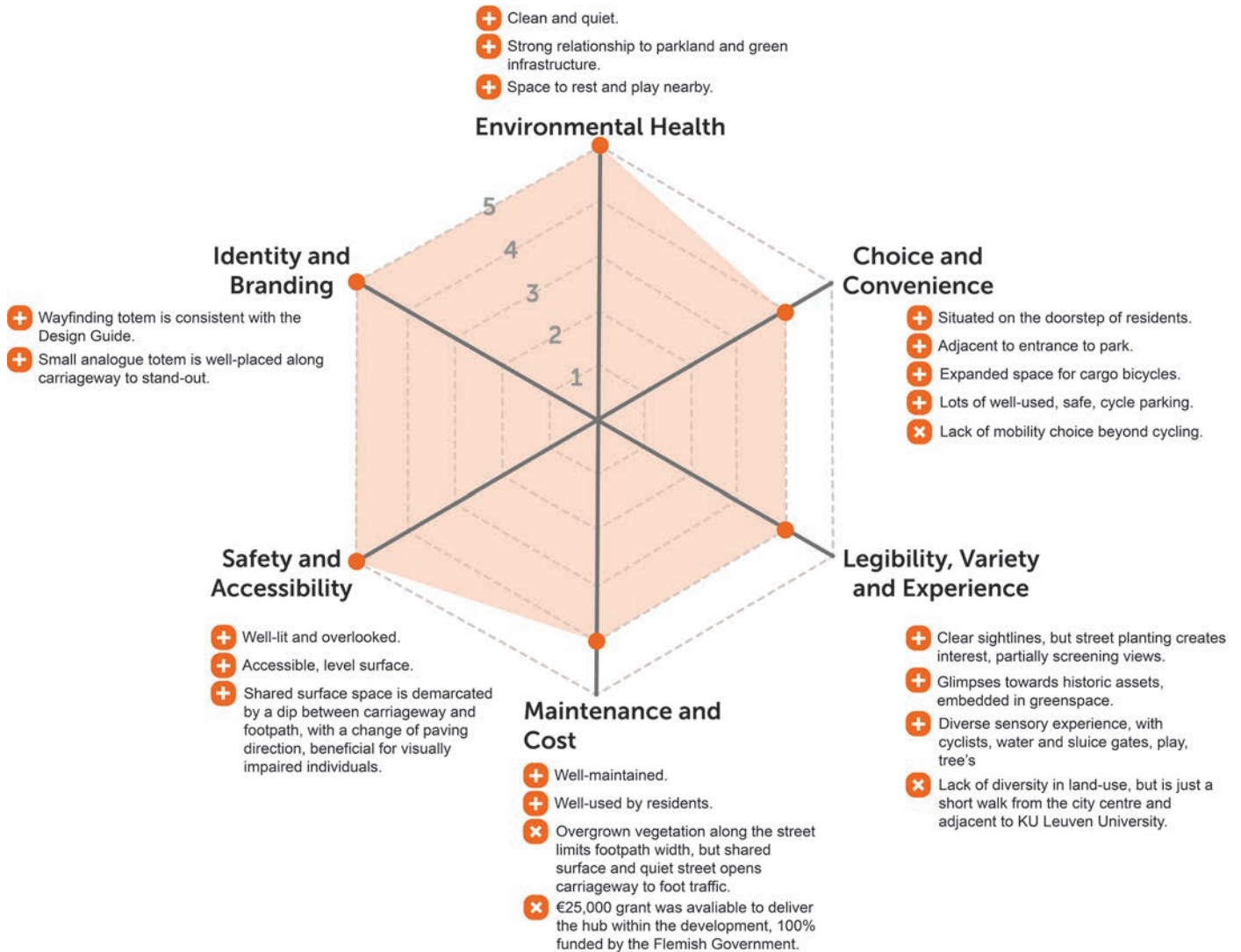**ABOVE** Figure 82: Retrofitting existing cycle parking with branding.

ABOVE Figure 83: Collage of materials and architectural details.

ABOVE Figure 84: Photographic assessment.

4.7.2 Quality Assessment
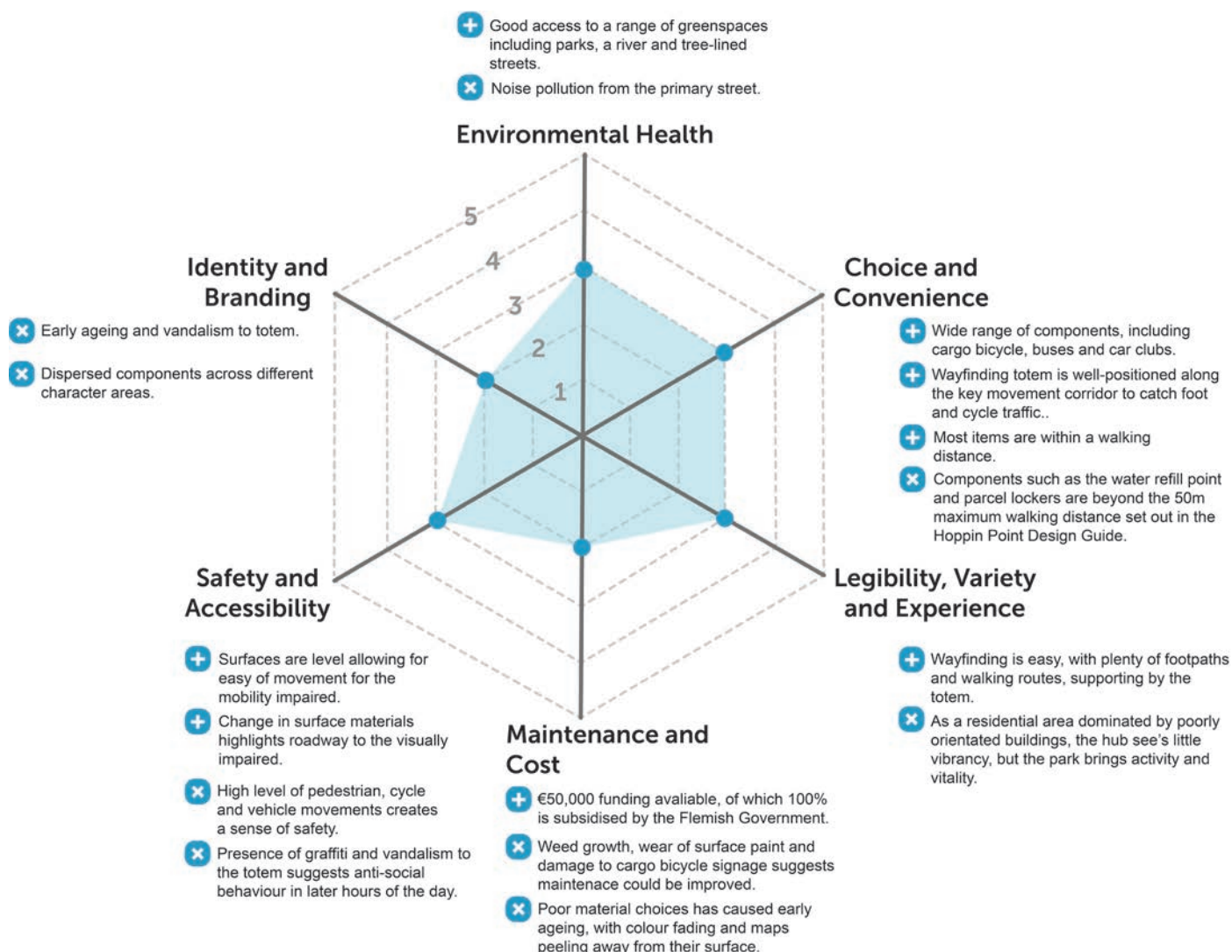
ABOVE Figure 85: Quality assessment.

4.7.3 Conclusions:

1. Conversion of car parks are a successful way to create mobility hubs. This restricts space for private vehicles but provides viable alternatives for medium-long journeys.
2. Signage location is important for protection against anti-social behaviour, ensuring spaces are well-overlooked, and supporting safety and surveillance.
3. Materials should be durable and long-lasting to prevent the early ageing of infrastructure, which could incur additional maintenance and costs, and achieve universal design.
4. Street furniture and materials could be used to create cohesiveness between distant components as a part of a sprawled mobility hub.
5. Car clubs outside residential complexes can be an attractive travel choice and when placed at building entrances, more convenient than private vehicles. The same can be said for cycle parking, which should be placed closer to building entrances than cars.

4.8 Neighbourhood
Refugehof
Type: New Development.

Refugehof is a new neighbourhood southwest of Leuven's city centre. Former employment land has been regenerated into a green residential neighbourhood, opening access to the River Dyle with new greenspace.
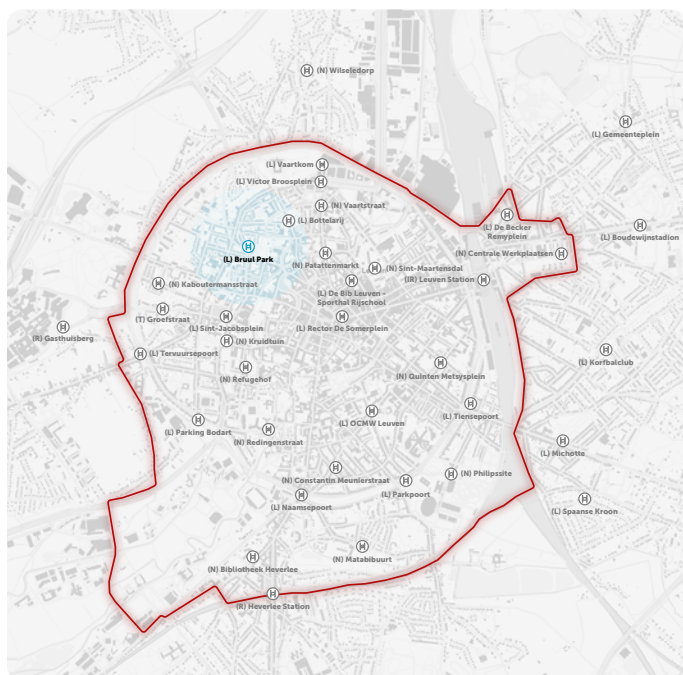
ABOVE Figure 86: Mobility hub location.

Mobility Components

- Hoppin Totem
- Bus Stop
- Cargo Bicycle Hire
- Bicycle Parking

Complementary Components

- Seating

KEY:
- Pedestrian patterns
- Quiet pedestrian footfall
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

Bus Stop 130m
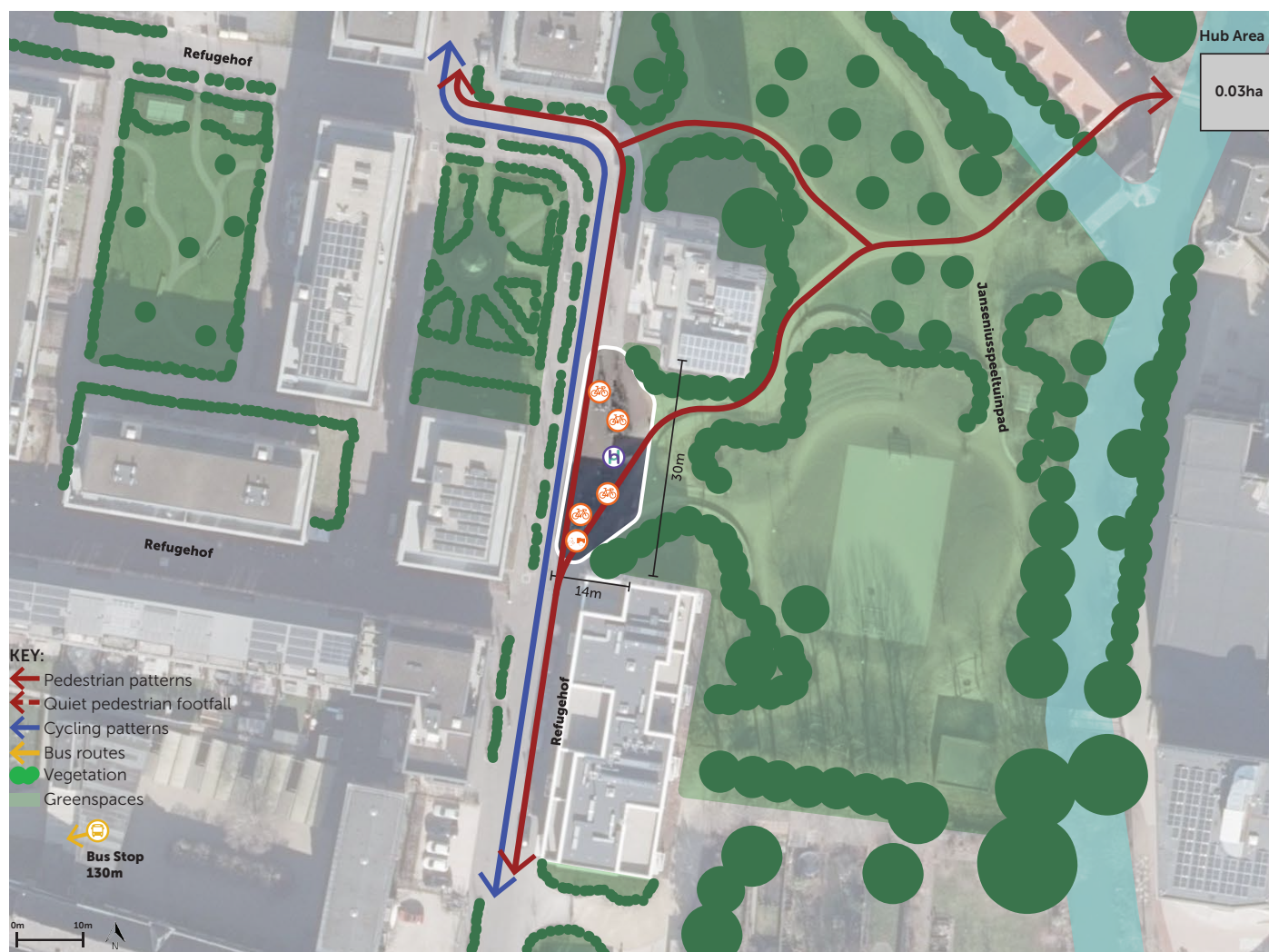
ABOVE Figure 87: Refugehof Hoppin Point plan.

4.8.1 Mobility Hub Analysis – Context and Morphology

4.8.1.1 Green and Blue Infrastructure

As a new development, Refugehof successfully integrates green infrastructure into the built form with a series of **mixed-use spaces** that balance **biodiversity, flood alleviation and activity and use.** Extensive tree planting, and hedgerows define the street spaces, with residential apartments floating around the green infrastructure.

The mobility hub itself lacks green infrastructure within its boundary, but it sits at the **gateway to Jansenius Park**, creating a strong relationship with the green space and is ideally placed to **facilitate first/last-mile trips** to the park.

4.8.1.2 Public Linkage Networks

The mobility hub sits in a quiet residential area. Its location and typology are suited to first/last mile commutes and social trips and are unlikely to attract tourists and business trips. The redevelopment of this area has created an additional attractive, quiet, cycling route into the city centre, and the hub location along here, and at the gateway to the park brings footfall. This typology of mobility hub is not linked to a bus stop and is designed to plug a gap in the transport network, helping to facilitate local trips and connections towards bus services.

4.8.1.3 Blocks, Plots and Buildings

The residential scheme was constructed on a patch of land adjacent to KU Leuven's Holland Collage, separated by the River Dyle. The building scale and orientation were designed to **frame views** towards Justus Lipsiustoren and Janseniustoren – a set of turrets that formed part of Leuven's city wall in the Middle Ages, at a watergate into the city (VisitLeuven, 2024). Openings between buildings create **glimpses towards the historic landmarks**, and the green infrastructure creates a semi-natural setting, reflecting the rural countryside that existed beyond the city walls.

Leuven is a city where the plot structure is typically characterised by narrow and deep plots. Refugehof contrasts with this but is in line with modern developments across the city. Larger plots create a blur between the
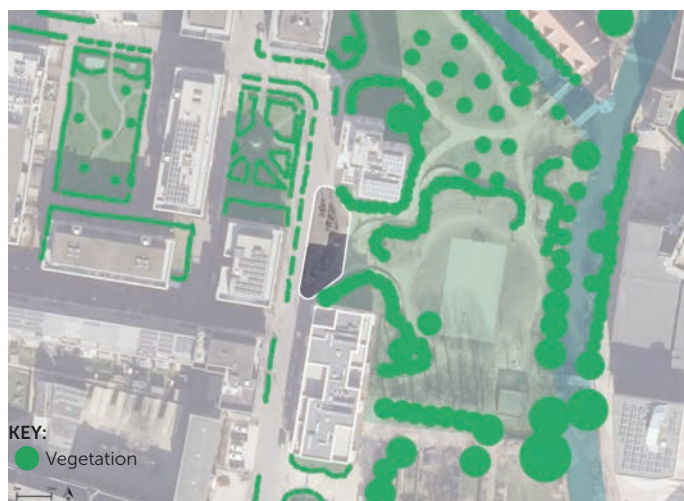
ABOVE Figure 88: Green infrastructure around Refugehof.
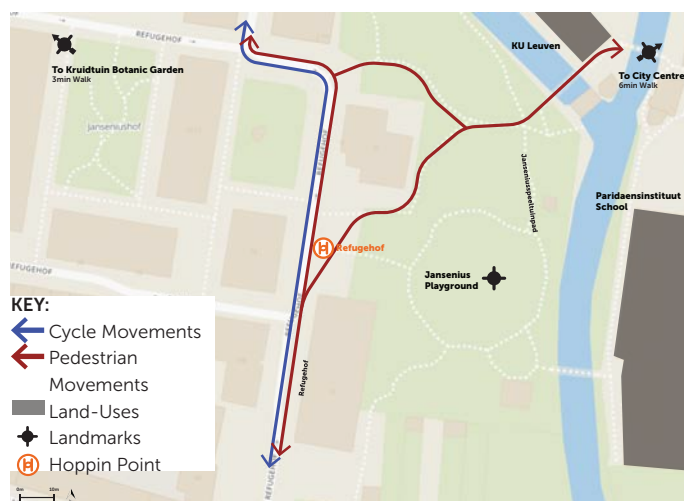
ABOVE Figure 90: Movement flows.

ABOVE Figure 89: Movement flows.

ABOVE Figure 91: Blocks, plots and buildings arrangement.

4.8 Neighbourhood
Refugehof
Type: New Development.

ABOVE Figure 92: Blocks, plots and buildings arrangement.

public and private realms. Despite this, the mobility hub is well overlooked by residential apartments, aided by the increase in height and comfortable scale.

4.8.1.4 Details and Materials

The redevelopment of Refugehof has integrated materials which are characteristic of this region, with narrow herringbone paving, and black metal street furniture, **seamlessly blending the public realm** into the existing city fabric. The mobility hub **materials and colour palettes are consistent with the wider brand** and Design Guide. Buildings adopt brick similar to the local palette, but introduce timber as a secondary material, which is not locally characteristic.
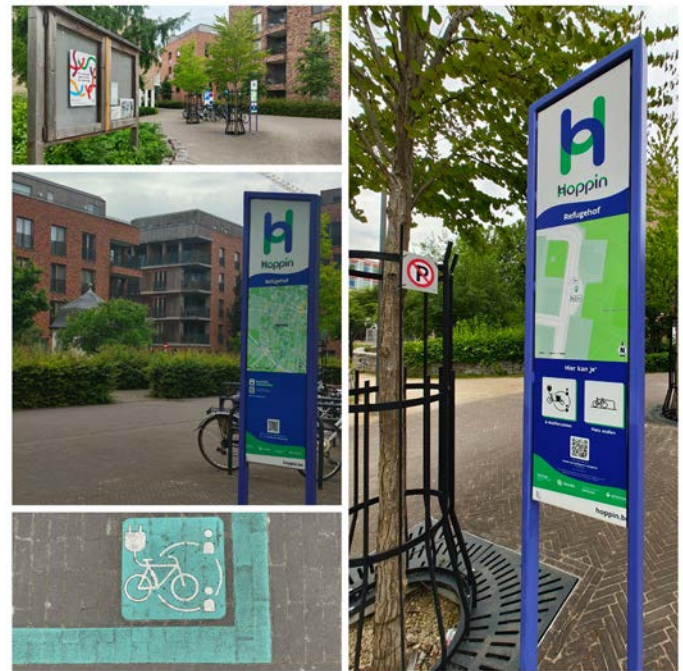
ABOVE Figure 93: Collage of materials and architectural details.

ABOVE Figure 94: Photographic assessment.

4.8.2 Quality Assessment

Clean and quiet.
Strong relationship to parkland and green infrastructure.
Space to rest and play nearby.

Environmental Health

Identity and Branding
Wayfinding totem is consistent with the Design Guide.
Small analogue totem is well-placed along carriageway to stand-out.

Choice and Convenience
Situated on the doorstep of residents.
Adjacent to entrance to park.
Expanded space for cargo bicycles.
Lots of well-used, safe, cycle parking.
Lack of mobility choice beyond cycling.

Safety and Accessibility
Well-lit and overlooked.
Accessible, level surface.
Shared surface space is demarcated by a dip between carriageway and footpath, with a change of paving direction, beneficial for visually impaired individuals.

Legibility, Variety and Experience
Clear sightlines, but street planting creates interest, partially screening views.
Glimpses towards historic assets, embedded in greenspace.
Diverse sensory experience, with cyclists, water and sluice gates, play, tree's
Lack of diversity in land-use, but is just a short walk from the city centre and adjacent to KU Leuven University.

Maintenance and Cost
Well-maintained.
Well-used by residents.
Overgrown vegetation along the street limits footpath width, but shared surface and quiet street opens carriageway to foot traffic.
€25,000 grant was avaliable to deliver the hub within the development, 100% funded by the Flemish Government.

ABOVE Figure 95: Quality assessment.

4.8.3 Conclusions:

1. Mobility hubs are placed at the gateway to greenspaces, ensure accessibility for residents, facilitate sustainable travel to the greenspace, and create awareness of the hub along the street.
2. Considering mobility hubs in the early design of new developments allows for a suitable level of space to be dedicated, allowing for flexibility and expansion in the future.
3. Mobility hubs can form part of the public realm in new development, leaving space for gathering, activity and rest, and designing mobility infrastructure around this.
4. New communities can become engaged in the hub through community notice boards.
5. Success isn't tied to integration with public transport. Residential hubs can provide sustainable first/last mile travel choices, plugging gaps in the existing public transport network.

4.9 Summary

In total 14 mobility hubs were analysed as a part of this study. The case studies illustrated reflect hubs most characteristic of that scale. This spread provides a summary of the key takeaways from the study. Further details regarding the findings from the other 8 mobility hubs can be found in Appendix E.

The quality assessments highlight key trends across mobility hub typologies. The results illustrate that across Local Hoppin Points, there is greater emphasis placed on environmental quality, choice and convenience, and safety and accessibility. Across Neighbourhood Points
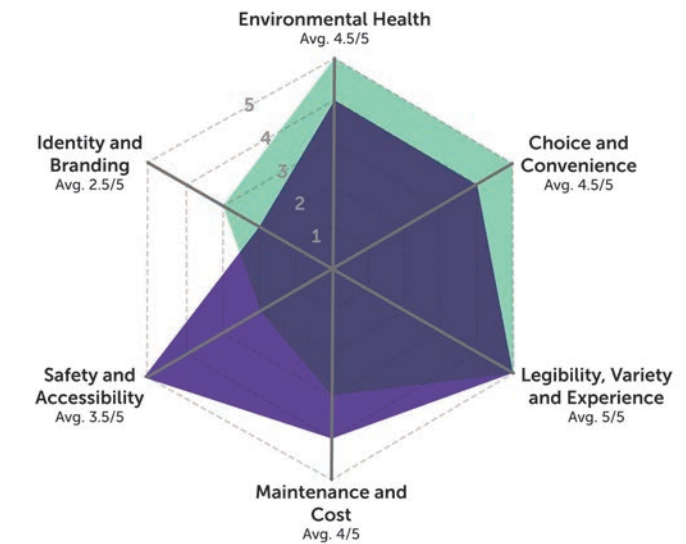
ABOVE Figure 96: Interregional and regional points quality assessment.
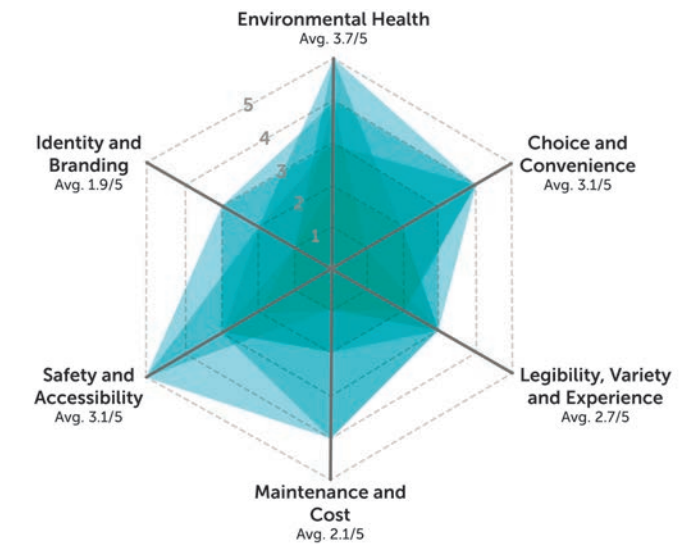
ABOVE Figure 97: Local points quality assessments.

Theme A Conclusions

Vision
- An overarching vision can create impetus for change.
- Identifying a clear implementation strategy supports local municipalities in delivery.

Context
- Considering climate and morphology can inform the choice of modes on offer.
- Mobility hubs can support accessibility towards greenspaces when correctly located.
- Understanding the land-use distribution can inform mobility hub location and design to support trip generators.

Support
- Guidance and support from central government can provide clarity and reduce uncertainties.
- A collaboprative approach to network planning with stakeholders can streamline delivery.
- Financial support from central government can accelerate delivery.

Theme B Conclusions

Design Principles
- A mobility hub definition can illustrate the aim and approach.
- High-level design principles allow for consistency in design quality acorss a region, and set the expected standard.
- Defining typologies that consider spatial context, ensure integration, and balance between transport and place demands.

Green & Blue Infrastructure
- Mobility hubs can facilitate access to greenspace.
- Design that responds to the local micro-climate can ensure comfort.
- Incorporating shaded space through tree's or infrastructure can provide respite from heat and increase dwell time.
- Planting can subtely define a space, but should be arranged to not screen natural surveillance.
- Mobility hubs can introduce pockets of greenspace to increase dwell time , comfort, and biodiversity.

ABOVE Figure 100: Hoppin Point study conclusions.

there is a less defined priority, but greater emphasis on identity and branding.

This distinctive difference reflects the purpose of each hub. Integration with public transport at Local Points looks to improve the attractiveness of sustainable transport, in contrast to neighbourhood hubs which lack a public transport connection, and the priority is on increasing awareness of new transport options.

When forming conclusions and transferable approaches it is important to acknowledge the Flemish context, where public transport infrastructure is standardised but extensive, and communities benefit from access to public realm and community facilities, when compared to equivalent UK communities.
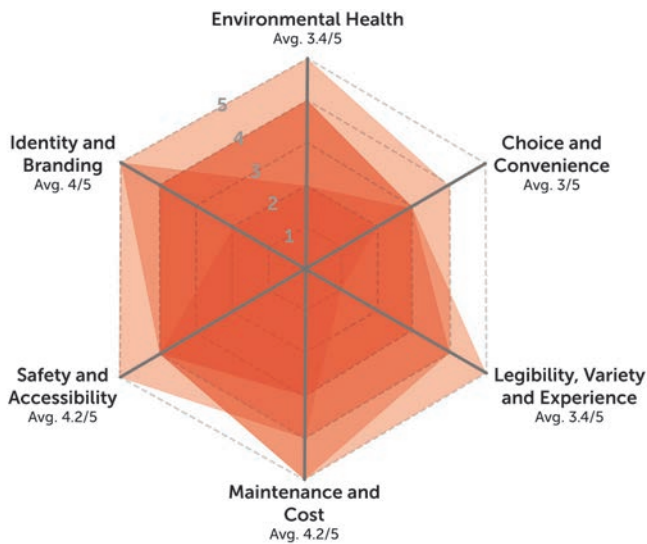
ABOVE Figure 98: Neighbourhood points quality assessment.
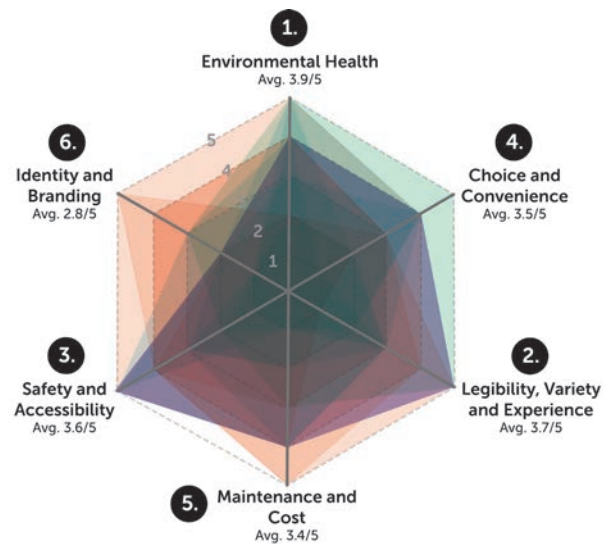
ABOVE Figure 99: All points quality assessment.

Public Linkage Networks	Blocks, Plots & Buildings	Details and Materials	Integration and Digitisation	
Multi-layered movement patterns add vibrancy to a place.	Mobility hubs should respond to the built form, not forming a barrier and placed in visible areas.	Adopting local materials ensures hubs integrate into place identity.	Integrating existing transport branding creates recognisability and associations with transport.	Small scale hubs can be successful without a direct public transport connection to provide first/last mile transport.
Land-uses influence movement flows and should be considered in the placement of components.	Components should be arranged to prevent anti-social behaviour, considering the built form.	Cohesive street furniture should be consistent with the local palette.	Hubs should be accessible between components and modes, across a public realm, and across digital platforms.	New developments should offer a range of route choice and types to integrate with context.
A pedestrian-first environment can foster sustainable travel if alternatives to the car are provided.	Mobility hubs can anchor a public space, when designed to consider views, landmarks, materiality, and scale.	Materials and components should be durable and flexible for future adaptability.	MaaS is an intuitive tool that can simplify journey planning and ticketing, and influences use of public space.	Mobility hubs should form part of a public space, but should not be a sprawling feature.
Car clubs should be located near residential building entrances to attract users.	Components are best located in well-overlooked, well-lit, and accessible areas.		Choice of components should be informed by project aims and local need to ensure success.	Use of community elements can bring engagement and sense of ownership to hubs.
A well-located totem along a movement corridor aids wayfinding and hub awareness.				

05 Case Study:
Transport for West
Midlands
Local Travel Points

5.1 Context

The West Midland's Combined Authority (WMCA) consists of seven metropolitan boroughs, with the role of coordinating transport services, under the TfWM brand. Part of its duty is the production of the Local Transport Plan, which the local authorities must deliver.

The Local Transport Plan Core Strategy (2021) outlines the vision and aims for the region and the approach to achieving this. Mobility hubs form a part of this vision to tackle transport-related issues the region faces, such as a dependence on private vehicles and a gap in first/last mile transport provisions (Interviewee 3, 2024).

ABOVE Figure 101: The need for change, outlined in the TfWM Local Transport Plan Core Strategy (TfWM, 2024).

The region has been the beneficiary of a significant amount of investment into transport infrastructure, such as the Wolverhampton to Edgbaston Village tram link and the TfWM Cycle Hire. However, many of these services are delivered independently, and there is an identified **need for integration between mobility services** (Interviewee 3, 2024).

This aim, of driving forward **behavioural change** through infrastructure investment, has seen TfWM develop a mobility hub trial, which further sparked a trial network of three mobility hubs in Halesowen, a suburb of the Dudley authority, 30mins from Birmingham city centre by bus (Interviewee 3, 2024). This network, branded as Local Travel Points, has been implemented in Halesowen, a demographically diverse place, which is beneficial in post-monitoring the population's response to them, informing further expansion of the network (Interviewee 3, 2024).

5.2 A Structured Approach

TfWM has taken a structured approach to deliver a mobility hub network that ensures what is being delivered achieves the aims of the LTP. Trials will be evaluated by the TfWM Influencing Transport Lab, to **'evaluate the impacts of interventions on local people'** (Interviewee 3, 2024). The lessons from this will inform a business case to draw down funding from the City Regions Sustainable Transport Settlement, unlocking funding for a whole network of hubs (Interviewee 3, 2024). Collectively, **funding availability** and a clear plan for the entire network provide direction and reduce barriers to delivery.

ABOVE Figure 102: Local Travel Points project process.

ABOVE Figure 103: Pop-up mobility hub trial at the University of Warwick (West Midlands Combined Authority, 2021).

5.3 Design Approach

An initial concept looked to deliver a flexible, pop-up, network that can be adjusted and relocated where needed (Interviewee 3, 2024). Lessons from this sought to deliver **permanent facilities**, which are of an **equal specification to bus infrastructure**, yet **distinct**, being **bold** and attractive (Interviewee 3, 2024). This will aid awareness of purpose and service availability, integrating into the TfWM branding, with wayfinding totems and distinctive furniture.

Interviewee 3 (2024) noted that it is 'unknown what mobility services will be available in the region in 5 years', so **modularity, flexibility, and expandability** need to be embedded in the design, both spatially and technically (Interviewee 3, 2024).

5. Case Study: Transport for West Midlands Local Travel Points

ABOVE Figure 104: Local Travel Points design principles.

ABOVE Figure 105: Residents percieved quality of Huntingtree Park Local Travel Point, overlayed with individual assessment.

Beyond transport, mobility hubs offer an opportunity to improve the public realm to support communities, creating space to gather and socialise (Interviewee 3, 2024). Interviewee 3 (2024) noted that case studies in mainland Europe, tend to be focused on transport, as the **community infrastructure already exists,** whereas this is lacking in areas such as Halesowen. Mobility hubs can't deliver all the community needs but can provide some of the infrastructure.

Location choice is key for ensuring the community has access to these facilities. At present, n**o formal process for location selection has been developed**, due to the **contextual approach** needed. Planners are pragmatic, considering factors such as socio-demographics, gaps in investment and infrastructure, relationship to existing modes, and land availability/ownership. Location selection could be a **'long and drawn-out process'** due to challenges associated with land ownership (Interviewee 3, 2024).

On average these mobility hubs can cost between **£100,000-£150,000**, delivering a high specification, and whilst this is greater than the Hoppin Points, it should be noted that much of the infrastructure in the Hoppin Point Network was pre-existing and instead aimed to integrate and complement those modes with new options, wayfinding and amenities (Interviewee 3, 2024).

5.4 Challenges

The **'patchwork of landownership'** was noted as a significant challenge, where lease agreements need to be negotiated (Interviewee 3, 2024). This is particularly challenging around railway stations, which could benefit from improved facilities and first/last-mile transport options, due to **safety**, **land-use restrictions** and **lease agreements** (Interviewee 3, 2024). This could be perceived as a legal issue rather than a planning concern, but effective stakeholder project involvement can help prevent delays (Interviewee 3, 2024).

The Local Travel Points are being implemented through **permitted development rights**, which allows flexibility, but risks weakened arguments as no formal engagement structure exists (Interviewee 3, 2024). TfWM has been working to facilitate a digital engagement platform. Local Travel Point proposals received a **balanced response**, with a mix of positive and neutral responses, albeit with **concerns about anti-social behaviour** and
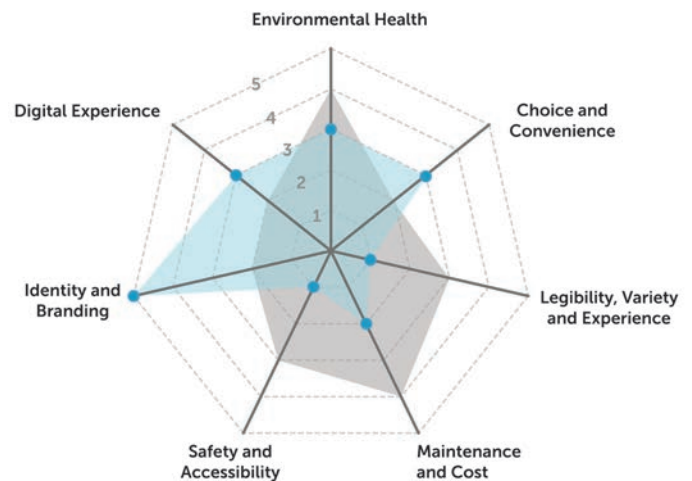
location choice (TfWM, 2024). The Halesowen Local Travel Point Survey (2024), conducted by this research saw one response and reflected an equal sentiment. Many of the concerns raised can be combated through design and spatial arrangement.

5.5 Study Methodology

Using a similar approach to the Hoppin Point case study, the Local Travel Point study conducts a morphological analysis to understand the mobility hub context. This is undertaken using the Theme B research framework, refined from prior findings. A quality assessment, represented through a radar chart, has been undertaken for the mobility hubs, informed by an urban design understanding and individual perceptions as a

ABOVE Figure 106: Pilot area (TfWM, 2024).

ABOVE Figure 107: Pilot area (TfWM, 2024).

visitor and user of the infrastructure.

5.6.1 Morphological Context

Andrew Road Car Park is perfectly placed to facilitate first/last-mile transportation. Located a short walk from Highfield Park and allotments, this mobility hub can enable sustainable local trips to the recreation facilities on offer, as well as supporting accessibility of this suburb for the younger population. A clear divide in greenspace provision is evident, with Queensway and Andrew Road forming a dividing line against the hard landscaping and built form of the town centre.

In contrast to Leuven, Halesowen's movement patterns are **heavily car-dominated**, with restricted pedestrian flows, and **little to no cycling infrastructure** beyond cycle parking. Pedestrian flows are guided towards landmarks such as the shopping centre and High

Mobility Components

	Wayfinding Totem		EV Charging
	Bus Stop		Public Car Parking
	Bicycle Hire		Disabled Car Parking
	Secure Cycle Storage		

Complementary Components

	Seating		Bicycle Repair Stand
	Shelter		Planting

ABOVE Figure 108: Cycle hire.
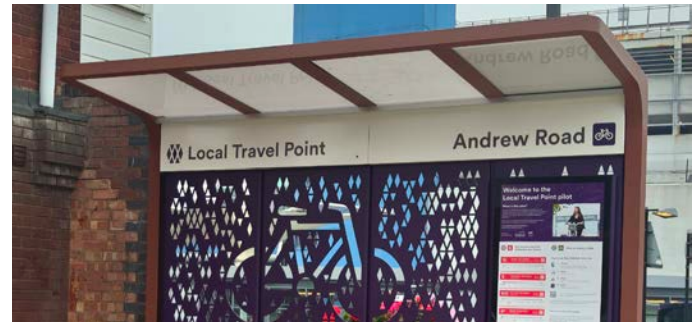
ABOVE Figure 109: Andrew Road high-quality street furniture.

ABOVE Figure 110: Analysis of the Andrew Road Car Park mobility hub.

5.6 Andrew Road Car Park
Type: Car Park

Street. Most visitors enter the area via the bus station and head east into town. The design of the bus station creates a **high-quality passenger experience** but forms a **barrier** towards the West, where many choose to park. Despite this barrier, a **formal crossing** exists and notable pedestrian movement between the car park and shopping centre, albeit a trip facilitated by cars.

The area is not characterised by its heritage but **locally distinctive landmarks** and designs, which aid legibility and wayfinding, such as the elevated apartment blocks and blue accents on buildings.

The location of the mobility hub creates awareness by catching pedestrian flows between the car park and shopping centre, located to provide quick interchange with the bus station and within short walking distance to local destinations.

ABOVE Figure 111: The mobility hub catches pedestrian flows from the car park to town centre.

Environmental Health
- ➕ High-quality shelter to provide shade and wind protection.
- ➕ Good accessibility to nearby greenspaces.
- ❌ Greenspaces are poor quality undefined public or private.
- ❌ Lack of a street bins has encouraged litter.

Digital Experience
- ➕ Easy to use app for information.
- ➕ Swift and seamless docking on mobile and the station.
- ❌ Main TfWM app is slow and clunky.
- ❌ Took time to set-up with issues identifying the service zone.

Identity and Branding
- ➕ High-quality components.
- ➕ Cohesive branding across components.
- ➕ Adopts existing Transport for West Midlands branding to integrate into the wider transport network.
- ❌ Hub not visible from the bus station. No information avaliable at the bus station about the Local Travel Point.

Safety and Accessibility
- ➕ Smooth, level surface is accessible.
- ❌ Lack of tactile or audible information for those with mobility impairments.
- ❌ Accent lighting on the shelter, but a lack of lighting for the wider space.
- ❌ Combination of a car park, inactive facade, and main road creates a poor sense of safety.

Choice and Convenience
- ➕ Frequent and accessible bus services to the wider region.
- ➕ Modular cycle hire provision, including e-bike hire.
- ➕ Good facilities for secure cycle storage and maintenance.
- ❌ Lack of short-term cycling facilities.

Legibility, Variety and Experience
- ➕ Space is logically arranged to allow for cycle manouverability.
- ➕ Legible direction from car park to bus station and town centre, supported by wayfinding totem.
- ❌ Busy road seperates hub from bus station.

Maintenance and Cost
- ➕ £100,000-150,000 for components and installation.
- ➕ Street furniture designed to be durable and long-lasting.
- ❌ Poor colour choice in surface material highlights dirt.

ABOVE Figure 112: Andrew Road Car Park quality assessment.

ABOVE Figure 113: Local advertising.

ABOVE Figure 114: Options for secure cycle storage.

ABOVE Figure 115: Cycle maintenance pointin a visible location.
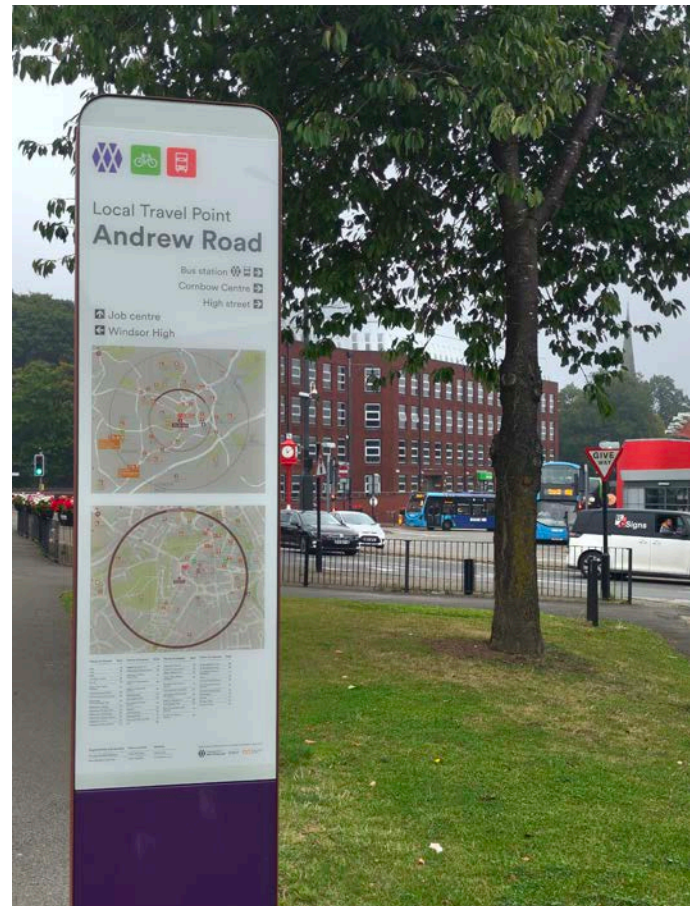
ABOVE Figure 116: Wayfinding totem in distinctive branding.
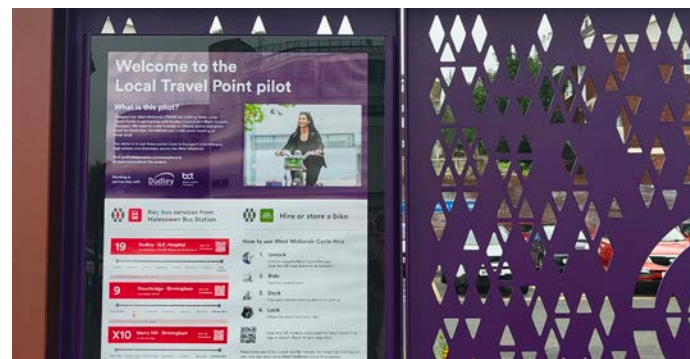
ABOVE Figure 117: Clear onward travel information.

ABOVE Figure 118: Halesowen Bus Station forms a barrier, enclosing the space.

5.7 Huntingtree Park
Type: Community Centre

5.7.1 Morphological Context

The Huntingtree Park Local Travel Point is nestled within a sizeable park, with spaces for nature and play. Opposite the Huntingtree Primary School, adjacent to a Health Hub, as well as a range of sports facilities, this **mobility hub provides sustainable travel options** towards these destinations. The park is popular with all ages and users, such as runners and dog walkers. The mobility hub itself features planters which help to soften the pre-existing hard landscaping.

Much like Andrew Road, movement is dominated by **private vehicles**, although a **frequent bus service** runs along Huntingtree Road. In comparison to frequent vehicle movements, f**ew people are present** along the residential streets. The cycle hire provision turns a 20-minute walk to Halesowen Bus Station into a 5-minute downhill cycle ride, though inexperienced cyclists may feel uncomfortable due to the **lack of cycle lanes and infrastructure**. Considering local demographics, as highlighted by Interviewee 3 (2024), **mobility provision could be better tailored to the older demographic**. Options such as e-cargo bicycles could be attractive to those less confident on two wheels. This reflects the **importance of a flexible design approach** which can be seen in Huntingtree Park, and a need to coordinate mobility hubs with active travel improvements.

KEY:
- ← Pedestrian patterns
- ← Car Movement
- ← Bus routes
- Vegetation
- ✦ Landmark
- Greenspace
- Buildings

Mobility Components
- Wayfinding Totem
- Bus Stop -126m
- Bicycle Hire
- Secure Cycle Storage
- Bicycle Parking
- Public Car Parking
- Disabled Car Parking

Complementary Components
- Seating
- Planting
- Shelter

ABOVE Figure 119: Wayfinding at Huntingtree Park.

ABOVE Figure 120: Analysis of the Andrew Road Car Park mobility hub.

5.7.2 Quality Assessment

Environmental Health

- ➕ Nestled at the gateway to a significant park.
- ✖ Introduced new planters.
- ✖ Litter free.
- ✖ Sheltered seating

Digital Experience

- ➕ Easy to use app for information.
- ➕ QR Code's on the shelter made it easy to find bus times.
- ✖ Bicycle docking physically difficult and digitally slow.

Choice and Convenience

- ➕ Good instructions.
- ➕ Good cycle hire provision, and secure and short-term cycle parking.
- ✖ Local Travel Point not indicated from the bus stop, which is a 3min walk away.
- ✖ Only cycling options is on offer.

Identity and Branding

- ➕ Consistent branding in-line with the TfWM brand.
- ✖ Wayfinding totem and signage situated within the hub, not visible from the main road.

Legibility, Variety and Experience

- ➕ Lots of sports and recreation facilities opposite a school.
- ➕ Easy to navigate.
- ➕ Adjacent to community centre entrance to encourage sustainable travel and add vitality to the space.
- ✖ Components are arranged in a way which clutters and consumes the public realm.

Safety and Accessibility

- ➕ Smooth, level surface is accessible.
- ✖ Lack of tactile or audible information for those with mobility impairements.
- ✖ Accent lighting on the shelter, but a lack of lighting for the wider space.
- ✖ Hub sits at a lower level. This and the combination of a car park, poor overlook, and inactive facades along the community centre create a poor sense of safety.

Maintenance and Cost

- ➕ £100,000-150,000 for components and installation.
- ➕ Well-maintained environment.
- ✖ Existing street furniture showing signs of age and could be upgraded as part of hub scheme.

ABOVE Figure 121: Andrew Road Car Park quality assessment.

ABOVE Figure 122: Shelter creates a space of gathering in the public realm.

ABOVE Figure 123: Local Travel Point sits at a lower level, surrounded by inactive edges.

5.8 Conclusions:

1. A singular body managing mobility hubs smooths planning and implementation. This should be, or work with the local transport body. Mobility hubs should be viewed as a tool to unite and integrate existing transport services rather than implemented as an independent project.
2. A clear delivery strategy, with allocated funding, provides certainty and direction.
3. Pop-ups are beneficial for public engagement and product development, but permanent installations are required to compete with private vehicles.
4. Flexibility is more than an operational consideration but provides space for the community to use the mobility hub through events and pop-ups.
5. Fully engaging stakeholders, such as landowners, in the project from the outset could speed delivery, particularly at land negotiation stages.
6. Visibility of mobility hubs is more than signage, but views, vistas, branding and connections.
7. Mobility choices need to be better tailored to the local demographics.

06 Framework

6. Framework

6.1 Evolution

The following framework has been developed through a culmination of the research undertaken, setting out a workable, holistic, approach, to developing a network of mobility hubs that adopts planning and design best practice.

The framework has evolved from the analytical frameworks into a unified framework presented at the Viva presentation. Feedback from the panel evolved this to versions two and three. Framework V3 was reviewed with CoMoUK and OCC.

6.1.1 Viva Framework and Feedback
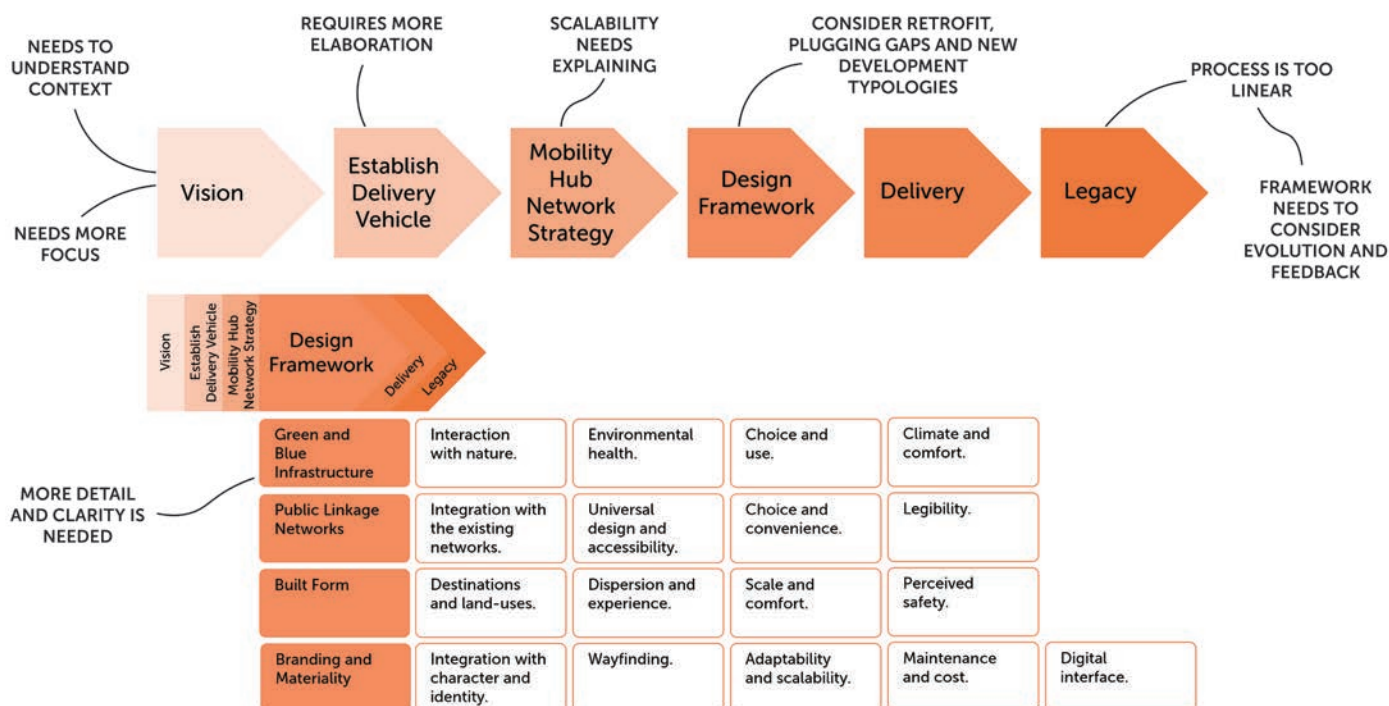
ABOVE Figure 124: Viva presentation feedback.

6.1.2 V2 Framework Feedback
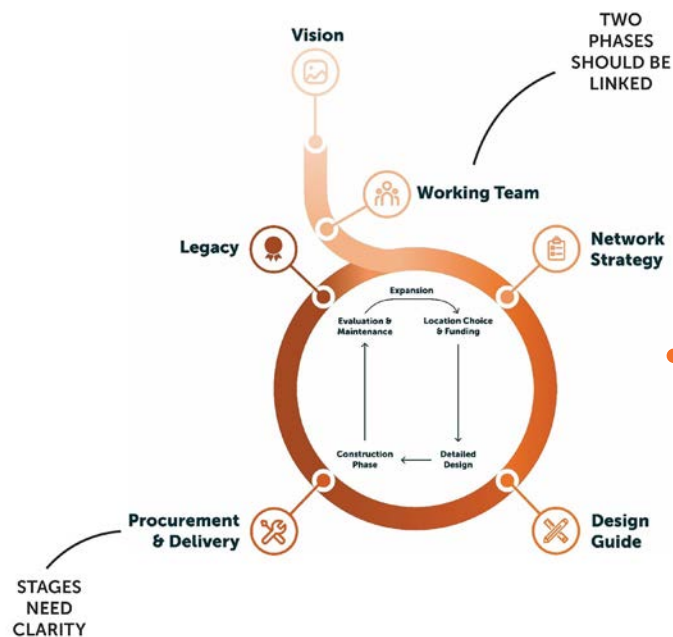
ABOVE Figure 125: First draft following the viva feedback with personal review to continue the evolution.

6.1.3 V3 Framework Feedback
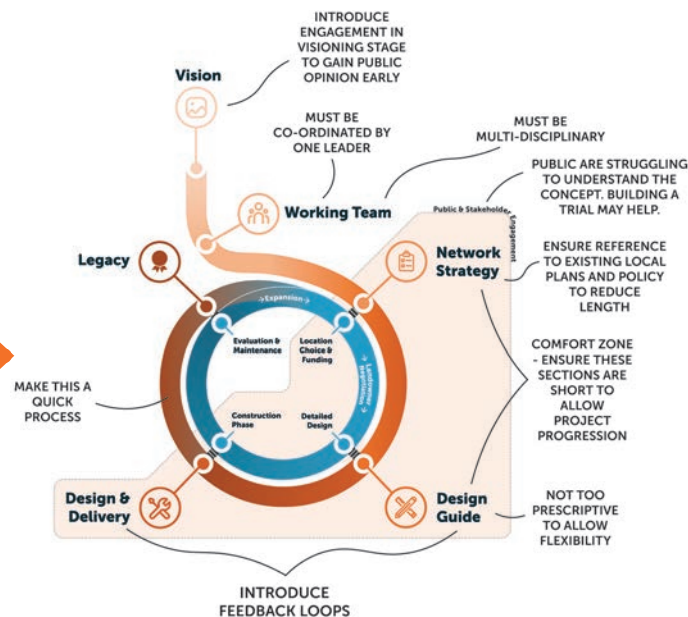
ABOVE Figure 126: Feedback from CoMoUK and OCC on the evolving framework.

6.2 Final Framework

The 6-stage process is circular, designed as two rings' reflecting the two-phase nature of network implementation - Phase 1 being the initial implementation of a network, and Phase 2 being the management and expansion, informed by evaluation.

The following pages outline each stage in greater detail.
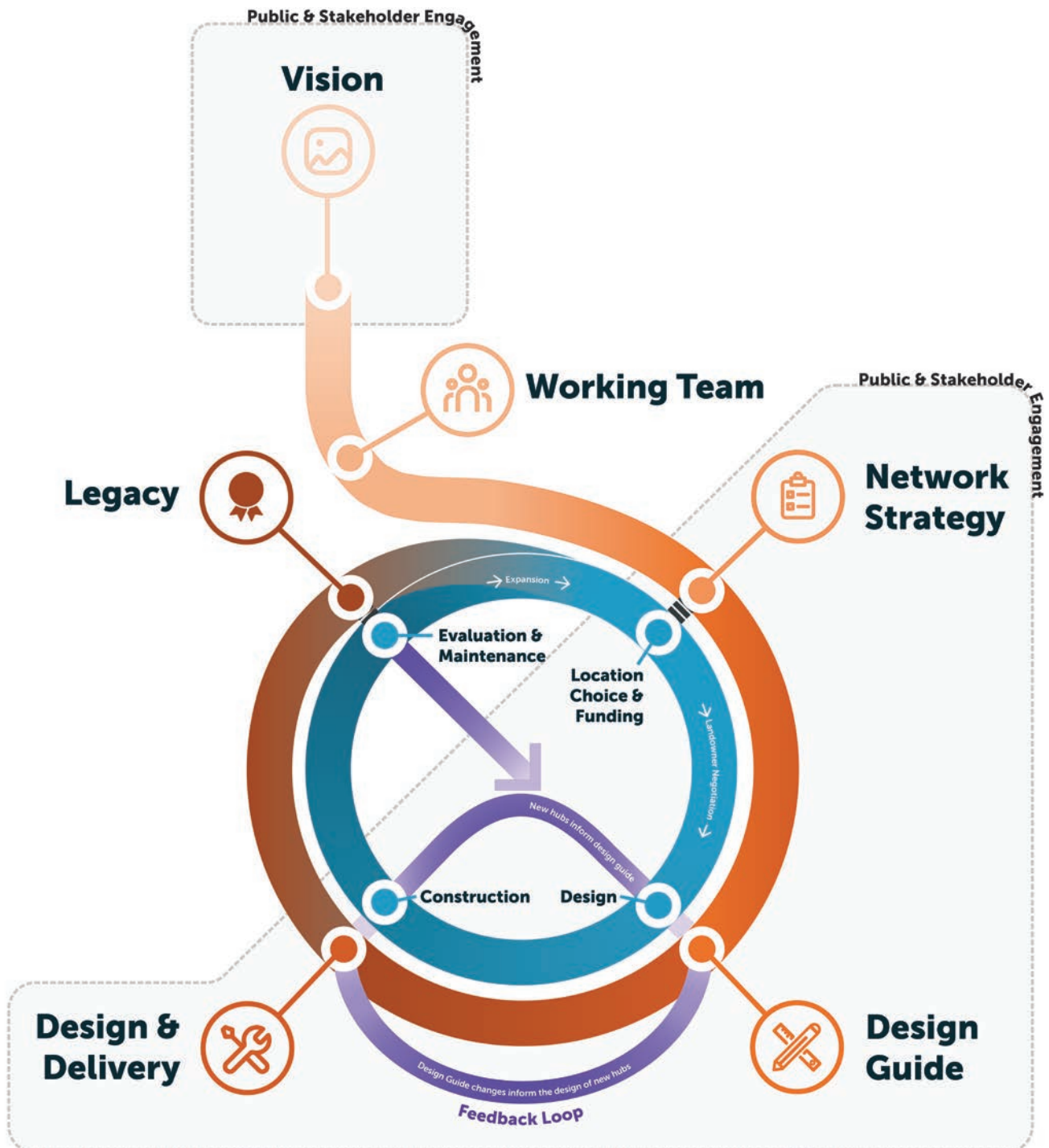
ABOVE Figure 127: Final framework incoporating feedback from the Viva panel, OCC and CoMoUK.

6.3 Vision

Vision

A 'vision-led approach' can communicate the overall concept to stakeholders and the public. It is the starting point of the project, under which the aims for mobility hubs can be outlined.

When developing the vision it is important to engage with stakeholders from the outset to understand local needs and to ensure they are proponents of the mobility hub programme. The vision can be outlined in the Local Development Plan or Local Transport Plan.

ABOVE Figure 128: Developing the vision and aims.

6.4 Working Team

Working Team

A dedicated mobility hubs team ensures the planning, design and delivery processes are focused and coordinated. This team should be cross-boundary and cross-organisation but should be co-ordinated from one local authority, combined authority or transport body, with a team leader. The working team needs to include and engage with stakeholders.

Lessons from UK case studies highlighted the impact of siloed infrastructure delivery, so the working team must combine a range of departments and skills, including members from the policy and delivery teams; planning, urban design and conservation teams; and transport teams.

The working team will be the managing responsibility of the mobility hubs network, evolving it from vision to expansion.

ABOVE Figure 129: Collaborative working team.

6.5 Network Strategy

Location Choice and Funding

Network Strategy

The Mobility Hub Network Strategy outlines the guiding approach for the delivery of mobility hubs. This approach, either proactive or reactive, will define the delivery programme. Whether an approach is proactive or reactive relies upon funding availability. The working group should seek to receive allocated funding from the council's public and active transport budgets and should seek additional grants and bid opportunities to secure certainty.

The Network Strategy combines a series of resource-intensive tasks, such as identifying locations and setting out the evaluation approach. However, this process must be undertaken swiftly to prevent project stagnation.
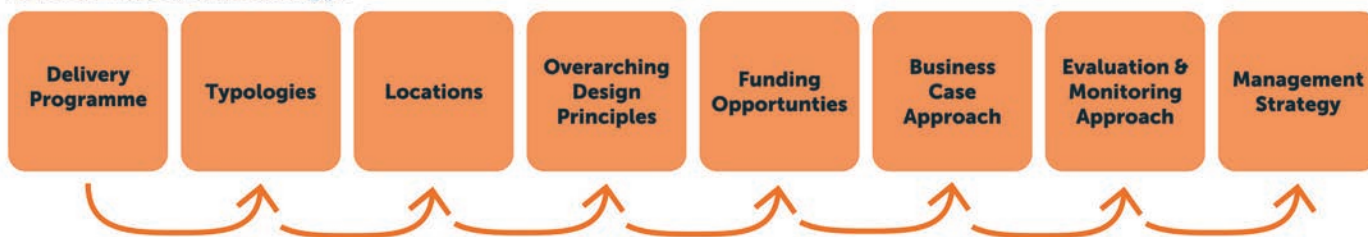
ABOVE Figure 130: Themes within the network strategy.

Proactive	An allocated funding pot enables quicker delivery of a mobility hub network.
Reactive	Funding uncertainty delays network implementation as it is developed when opportunities arise.

Typologies	Typology categorisation should be informed by spatial and transport context to ensure both transport and placemaking and community objectives are being achieved, using CoMoUK (2020, p. 10-11) typologies as a good starting point.
Locations	The Network Strategy should identify high-level locations for mobility hubs, categorised by typologies, helping to focus areas of investment. Incorporating this work into the Network Strategy allows the working team to begin conversations with landowners.
Funding Opportunities	The Network Strategy should outline funding opportunities that are available and will be sought, as well as indicate approximate costings of mobility hub typologies.
Evaluation & Monitoring Approach	The strategy should provide a clear indication of how success will be evaluated, and account for quantitative and qualitative measures. Thinking about this early allows more time to understand how to approach hard-to-measure factors, such as social value.
Management Strategy	Outlining the management approach provides clarity for developers implementing mobility hub infrastructure. A unified approach will allow for smooth maintenance operations and upgrades compared to separate management teams.

6.6 Design Guide

Design Guide
informed
by post-
monitoring.

Design
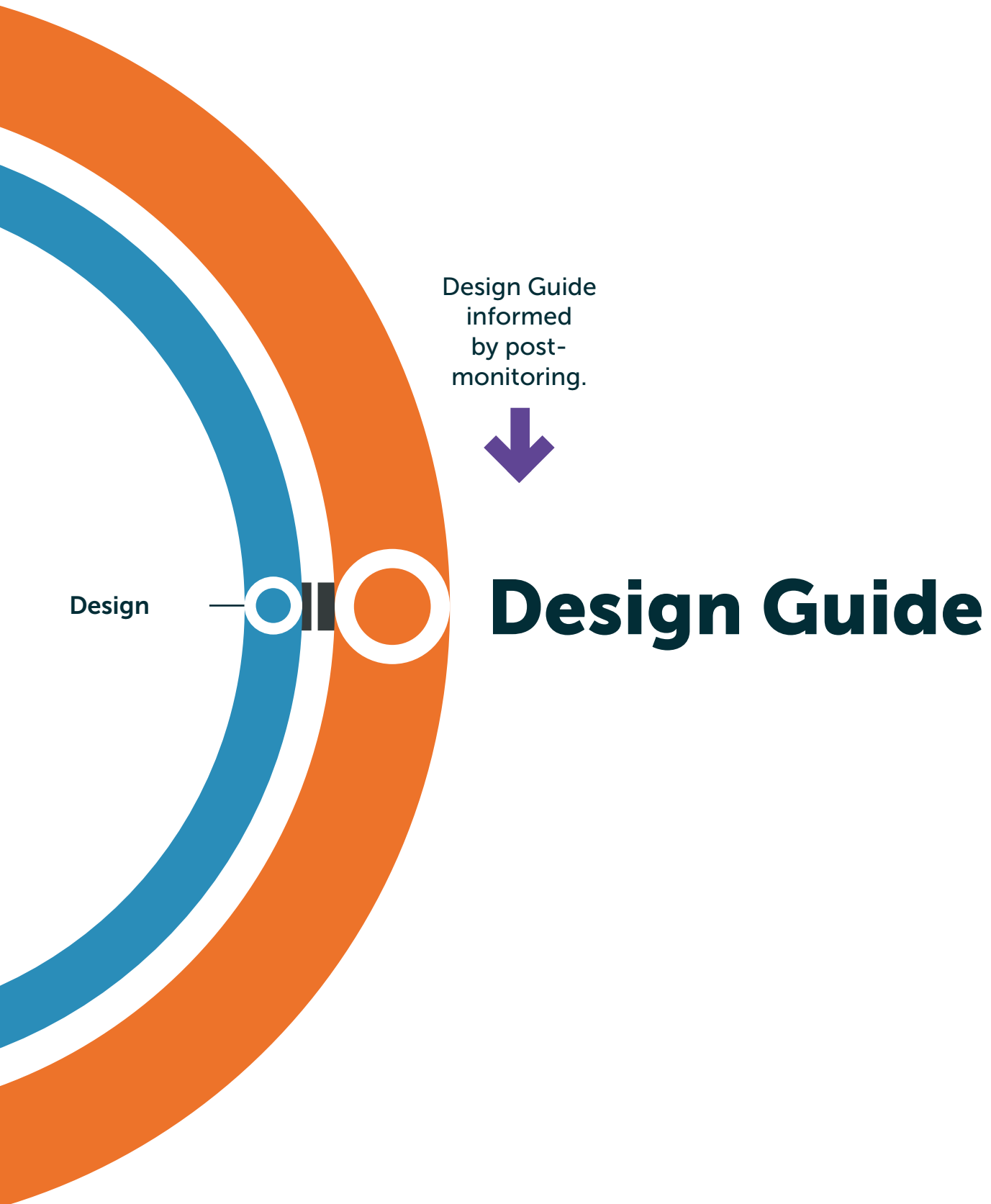
Design Guide

The design guide should outline recommendations, linked to national and local policy, for designing hubs that balance transport and placemaking.

The design approach will alter between Retrofit, New Development, and Plugging Gap Mobility Hubs, as outlined in Figure 131.

6.6.1 Design Recommendations

This research can provide a starting point for designing mobility hubs which facilitate transport aims and integrate with context and community through the following recommendations informed by findings.

Retrofit

Design focus is on upgrading and improving existing transport points. The hub is distributed across an accessible area, integrating existing and new community amenities to attract users.

All design principles are followed.

Plugging Gaps

Designed for first/last-mile transport, components should be tailored to local need. Co-design with the community is best practice.

A link to nearby public transport is ideal but not necessary. Urban extensions should seek to implement public transport to complement first/last-mile modes.

New Development

Mobility hubs should become a focal point, integrating new uses and provide space for the community, such as notice boards.

ABOVE Figure 131: Varied design approach.

6.6.2 Accessibility

Accessible for all.
All components and modes are reachable without detour, barrier or assistance.

Usable for everyone.
Mobility options and services are universally usable, including for those with mobility and visual impairments.

Available for all.
Modes and services are available and operational when needed.

Understandable for all.
The information is clear and legible.

Safe and obstacle-free routes and crossings.

Rest stops along movement routes.

Well-maintained, level and slip-free surfacing.

Clear demarcation between footpath and carriageway in shared surface environments.

ABOVE Figure 132: Accessibility design recommendations.
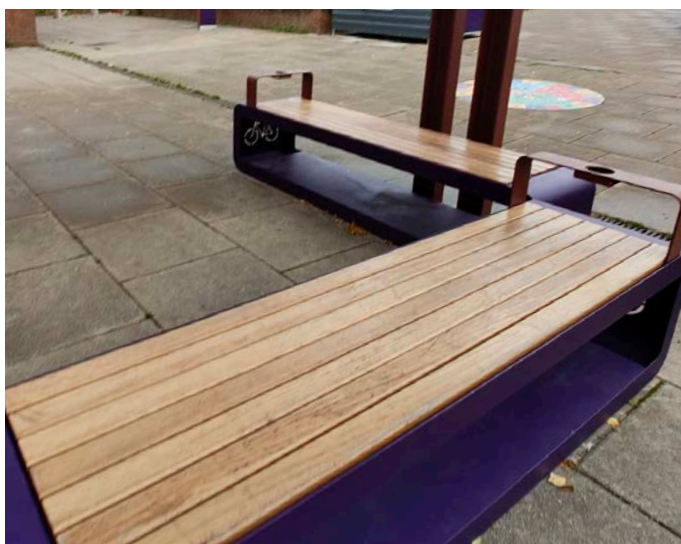
ABOVE Figure 133: High-quality rest stops in Halesowen.

ABOVE Figure 134: Level space with clear demarcation of space in Halesowen.

6.6.3 Safety
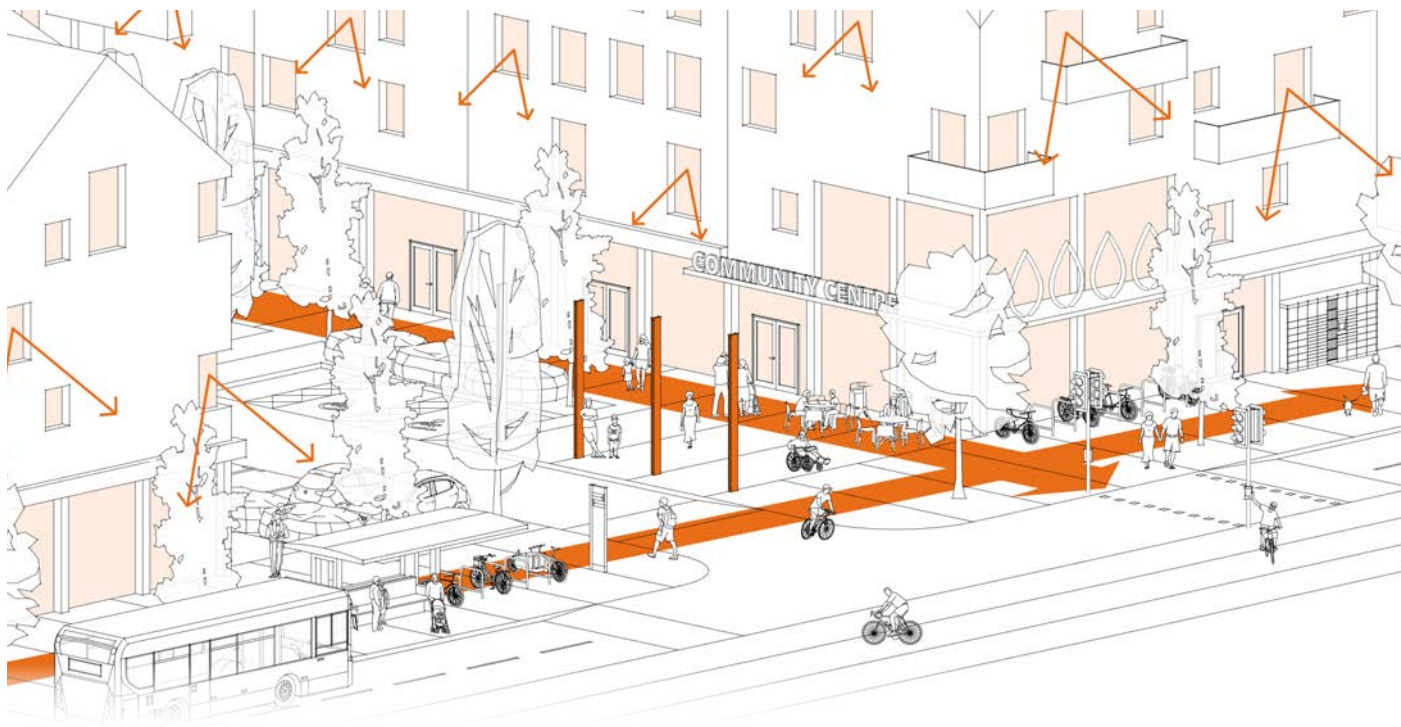
Improved safety through the design approach.

Optimal location for passive surveillance.

Good visibility within and to the hub.

High-quality, attractive, design.

Mixed-use space to attract footfall.

Clear and recognisable function.

Well-lit space that highlights hub contours and components.

Pro-active social control through community involvement, such as through edible gardens.

ABOVE Figure 135: Safety design recommendations.

ABOVE Figure 136: Well-overlooked components in Leuven.

ABOVE Figure 137: Mixed-use mobility hub in Leuven.

6.6.4 Choice & Convenience

Components for local need,
e.g. tricycle hire and DRT.

Co-located components
within an extent limited by walkability.

Conflict-free design
between all users at junctions, with pedestrian priority.

Accessibility
to a choice of routes.

Onward travel information
that is accessible and up to date.

Future demand
accounted in service and cycle parking provision.

Flexible spatial design.

Multiple ticketing options,
including physical and digital choices.

Additional services
that attract users and complement local amenities.

Integrate existing amenities
into the mobility hub, such as toilets.

Barrier-free arrangement
of services to not sever space.

Digital integration.

ABOVE Figure 138: Choice & convenience design recommendations.

ABOVE Figure 139: Co-location of amenities in Leuven.

ABOVE Figure 140: Physical digital integration in Leuven.

6.6.5 Place & Community

Historic and cultural context
should be respected and inform the design through views, materials and signage.

Optimal location choice
that provides accessibility to land-use attractors, such as parks and events.

Seamless integration
with the public realm through design. An interchange point can still be identified.

Integration of greenspace
that creates comfortable, shaded, spaces.

Use of community components,
such as food planters and community notice boards.

Use of buildings and infrastructure as a part of the hub, such as urban rooms, cafés and co-working space.

Respond to building orientations.

Link to local health facilities
and programmes, such as medical centres and active travel routes.

A balance between place and transport.

Unimpeded views
through design and arrangement of components.

Sensory experience
should be considered.

Clear and legible wayfinding
directs towards both transport and place elements, such as land uses.

ABOVE Figure 141: Place & community design recommendations.
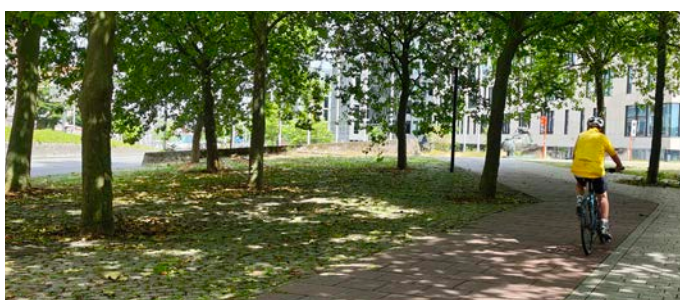
ABOVE Figure 142: Integration of green infrastructure in Leuven.

ABOVE Figure 143: Community-led interventions in Stratford.

6.6.6 Identity & Branding

Consistent branding within the mobility hub.

Locally distinctive and recognisable branding.

Adopts local transport branding where possible.

Visible totems from key movement routes.

Accessible totems and signage with manoeuvrable space.

Incorporate landmarks and artwork that add (to) a sense of place.

Street markings such as pictograms can aid wayfinding but should be designed sensitively to not clutter the environment.

Local art to create a distinctive point.

ABOVE Figure 144: Identity & branding design recommendations.

ABOVE Figure 145: Unified branding and materials in Halesowen.
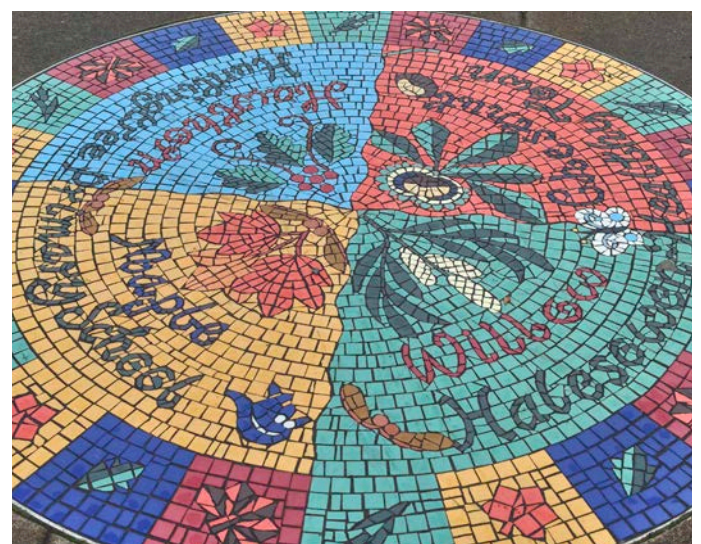
ABOVE Figure 146: Local artwork in Halesowen.

6.6.7 Maintenance

Surface materials that balance maintenance requirements and link to the local material palette.

Durable, permeable, and long-lasting materials.

Waste and recycling bins along movement paths to reduce street litter.

Integration of compost bins in small mobility hubs can provide a sustainable waste solution for homes.

Maintenance-friendly planting.

ABOVE Figure 147: Maintenance design recommendations.

6.6.8 Digital Integration

Single application for journey planning and ticketing for all modes and services.

Real-time information within the hub and on mobile.

Digital infrastructure such as Wi-Fi and mobile charging to aid journey planning.

Digital community features, such as an online notice board and local business information.
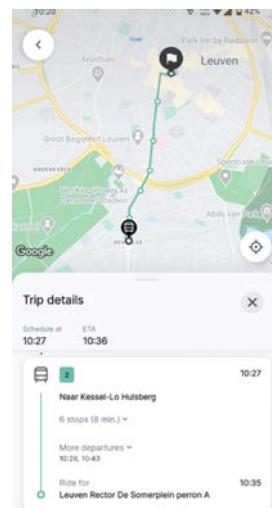
ABOVE Figure 148: Accessible Hoppin MaaS application.

ABOVE Figure 149: Real-time information in Leuven.

6.7 Procurement & Delivery

Construction

Design & Delivery

Design Lessons inform Design Guide
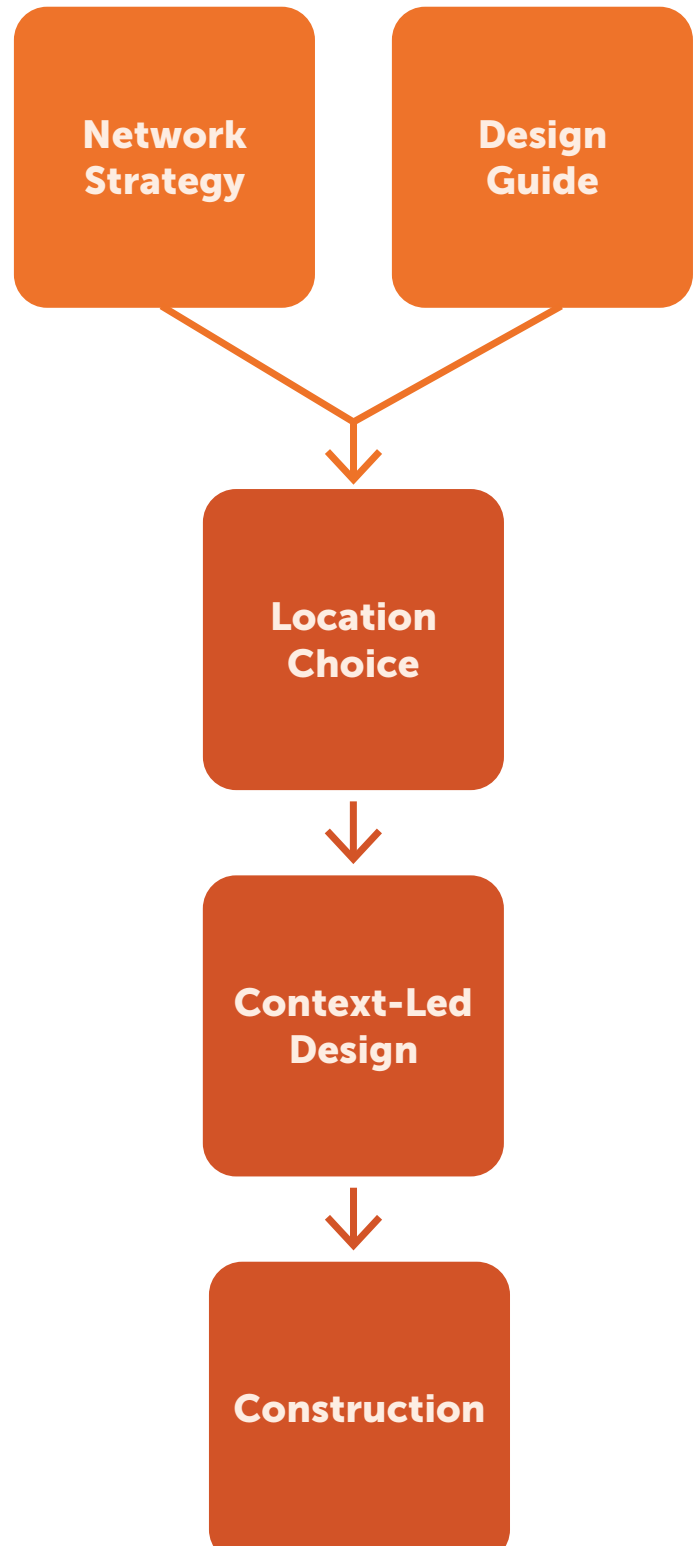
With the Network Strategy and Design Guide, the working team has a strong foundation to begin implementation. Detailed designs can be produced for each site. A 'Kit of Parts' would streamline the design process, but a contextual design approach should be taken when designing each location (ARUP, 2021, p. 7). This should be available to developers looking to implement mobility hub infrastructure.

```
Network          Design
Strategy         Guide
        ↓     ↓
    Location
    Choice
        ↓
  Context-Led
    Design
        ↓
  Construction
```

ABOVE Figure 150: Stage 5 process.

6.8 Legacy

Evaluation &
Maintenance

Legacy

Post-
monitoring
informs
Design Guide

Following the construction of the initial network, an evaluation of success needs to be undertaken. This will provide insight into public perception and use, the impact on travel behaviours, and social benefits. Findings will inform any changes and improvements and inform reviews of the Network Strategy and Design Guide to ensure the successful expansion of the network going forward. The maintenance plan should be implemented to ensure the mobility hub network is maintained in line with public transport infrastructure.

From this stage, the framework enters phase two, where the network will continue to evolve and expand.
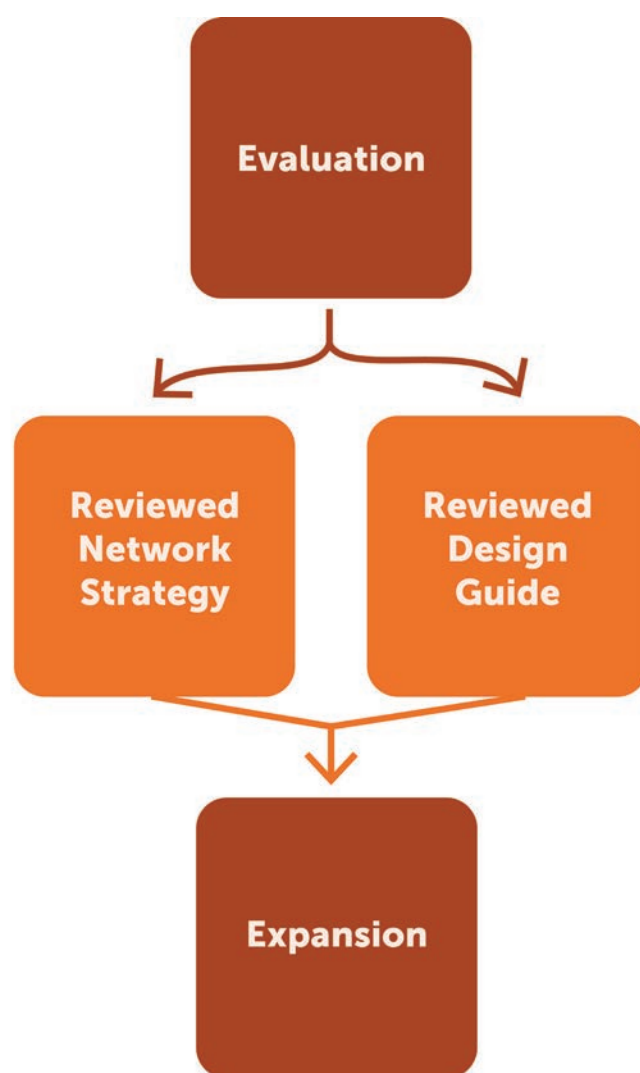
ABOVE Figure 151: Moving from Phase 1 to Phase 2.

07 Conclusion

7. Conclusion

Research Question: A framework for Mobility Hub Networks in the UK. How can a holistic approach to planning and design shape mobility hub networks in the UK?

The aim and objectives provided a guiding line through the research, starting with a literature and guidance review to establish a foundational understanding, and analysing planning and design concepts as two themes, that evolve into a unified framework. Key to informing this framework was the Hoppin Point Network, which identified planning and design strategies for success.

OBJ1: To build a foundational understanding of mobility hubs.

The literature and guidance review formed an understanding of the UK's dependency on private vehicles, upon which mobility hubs have emerged to support a transition to sustainable transport. It highlighted the influence of objectives on mobility hub typologies and began to explore implementation challenges.

OBJ2: To develop planning and design frameworks to guide the research.

The two research frameworks provided a guide for interviews, a public consultation and case studies. It evolved through the research, integrating new findings to inform the Strategic Mobility Hubs Framework.

OBJ3: Use the Theme A analytical framework to investigate and establish the challenges and mechanisms of planning and delivering a strategic network.

Research Theme A explored the mechanisms and challenges of planning and delivering mobility hub networks, using a series of interviews and a case study, identifying key challenges related to funding availability, land ownership and lack of knowledge sharing.

OBJ4: Use the Theme B analytical framework to understand what makes a Mobility Hub successful.

Theme B identified successful design approaches through a public consultation, and evaluation of UK design guidance. A series of case studies further enriched this theme, identifying transferable design approaches from the Hoppin Point Network and Local Travel Points.

OBJ5: To propose and test a Mobility Hub Networks Framework for the UK.

The findings of the research evolved the two analytical frameworks into a unified framework, which was tested with industry.

OBJ6: To produce a Framework for Mobility Hub Networks in the UK.

The final framework is a starting point in understanding the challenges of planning, design and delivery and promoting ideas to reduce barriers to implementation.

LEFT Table 04: Achieving objectives.

7.1 Research Contribution

This research sits alongside an extensive range of research exploring mobility hubs, which is an evolving concept. This research undertook interviews to identify the challenges of mobility hub planning and delivery and explored case studies to identify how mobility hubs can be better designed to integrate with their context. Combined this formed a clear and structured framework that holisticly considers planning and design, through a two-phase approach, that guides a project from initiation and network implementation through to evolution.

The framework itself is not only a guide, as planning, design and delivery may be non-linear and disrupted by challenges, but with this research looks to provide thought and inspiration for how mobility hub networks can be implemented and evolved. The Academy of Urbanism is supporting this, providing a platform for presenting the findings.

7.2 Limitations

Undertaking this project was a large challenge, not only due to the complexities of planning systems, but the multiple, interrelating, factors that influence planning and design decisions, as well as viability and delivery.

Time constraints placed limits on the Hoppin Point study where time in Leuven was limited to 3-days. Whilst the study did provide a detailed understanding of the network and Leuven, a combination of the study length, visiting during university holidays, and technological barriers prevented further work from being undertaken, such as surveys, trialling components and accessing data.

Time also placed a constraint on the availability of interviewees, as this study was undertaken during the school holidays. Despite this, a vast breadth of experience has informed this research.

Beyond time, the survey response rate was poor for the Transport for West Midlands study, with just one response received out of 100 leaflets distributed.

7.3 Further Research

The research provides a starting point for further exploration, and this research field will continue to grow as new mobility hubs come online. This research is an initial step towards understanding how transport interchanges can form part of the community fabric.

Further research is needed to clearly define success, and part of this answer may arise during post-monitoring and network effect studies, which will come forward as mobility hubs become embedded in their communities.

This research highlighted challenges of delivery which require further exploration, particularly understanding the quantifiable economic, social and environmental impacts of networks. Understanding this will support business cases and will be enriched as public and private sectors gain experience in design and delivery.

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Appendix

A.1 E1 Form

TDE Form E1

OXFORD BROOKES UNIVERSITY

Faculty of Technology, Design and Environment - Ethics Review Form E1
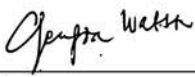
- This form should be completed jointly by the **Supervisor and Student** who is undertaking a research/major project which involves human participants.

- It is the **Supervisor** who is responsible for exercising appropriate professional judgement in this review.

- Before completing this form, please refer to the University **Code of Practice for the Ethical Standards for Research involving Human Participants**, available at https://www.brookes.ac.uk/sites/research-support/research-ethics-and-integrity/policies-procedures-and-useful-documents/obu-urec-code-of-practise-policies and to any guidelines provided by relevant academic or professional associations.

- Note that the ethics review process needs to fully completed and signed **before fieldwork commences**.

(i) **Project Title:** A Case for Strategic Mobility Hub Planning in the UK. Are Mobility Hubs an effective tool for increasing sustainable journeys.

(ii) **Name of Supervisor and School in which located:** Georgia Butina Watson – School of the Built Environment

(iii) **Name of Student and Student Number:** Joe Bonomo - 19016542

(iv) **Brief description of project outlining where human participants will be involved (30-50 words):**

- Digital consultation, where users can anonymously comment, like, and share insights into the subject area, as well as complete surveys and polls to feed into the research project.
- Interviews with industry professionals to learn from their experience around mobility hubs and active/sustainable travel more widely.

		Yes	No
1.	Does the study involve participants who are unable to give informed consent (e.g. children, people with learning disabilities)?	☐	☒
2.	If the study will involve participants who are unable to give informed consent (e.g. children under the age of 18, people with learning disabilities), will you be unable to obtain permission from their parents or guardians (as appropriate)? Not applicable	☐	☐
3.	Will the study require the cooperation of a gatekeeper for initial access to groups or individuals to be recruited (e.g. students, members of a self-help group, employees of a company)?	☐	☒

TDE Ethics Review E1 v23-10-17

Page 1 of 2

4.	Are there any problems with the participants' right to remain anonymous, or to have the information they give not identifiable as theirs?	☐	☒
5.	Will it be necessary for the participants to take part in the study without their knowledge/consent at the time? (e.g. covert observation of people in non-public places?)	☐	☒
6.	Will the study involve discussion of or responses to questions the participants might find sensitive? (e.g. own traumatic experiences)	☐	☒
7.	Are drugs, placebos or other substances (e.g. food substances, vitamins) to be administered to the study participants?	☐	☒
8.	Will blood or tissue samples be obtained from participants?	☐	☒
9.	Is pain or more than mild discomfort likely to result from the study?	☐	☒
10.	Could the study induce psychological stress or anxiety?	☐	☒
11.	Will the study involve prolonged or repetitive testing of participants?	☐	☒
12.	Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants?	☐	☒
13.	Will deception of participants be necessary during the study?	☐	☒
14.	Will the study involve NHS patients, staff, carers or premises?	☐	☒

Signed:	*Grayson Walsh*	Supervisor
Signed:	*Bononi*	Student
Date:	18.06.24	

What to do now:

1. If you have answered **'no'** to all the above questions:

   (a) The student must **send** the completed and fully signed E1 form to their **Dissertation Module Leader.**
   (b) The student must keep a copy of the E1 form which must be bound into their dissertation as an appendix.
   (c) The supervisor must keep a copy of the E1 form as they are responsible for monitoring compliance during the fieldwork.

2. If you have answered **'yes'** to **any** of the above questions:

   (a) The supervisor and student must complete the TDE E2 form available at https://www.brookes.ac.uk/sites/research-support/research-ethics-and-integrity/research-ethics/ethics-application-process-forms/forms-and-templates-for-masters-and-undergraduate
   (b) Note that the information in the E2 must be in **sufficient detail** for the ethical implications to be clearly identified.
   (c) The signed E2 and signed E1 Form must be emailed to Tim Jones (tjones@brookes.ac.uk) who is the Faculty Research Ethics Officer (FREO) for review. Please allow **at least two weeks** for this review process.
   (d) If/when approved the FREO will issue an E3 Ethics Approval Notice.
   (e) The student must send the E1, E2 and E3 Notice **to the Dissertation Module Leader**.
   (f) The student must also keep copies which must be bound into their dissertation as an appendix.

(g) The supervisor must keep a copy of documentation to monitor compliance during field work.

3. If you answered 'yes' to any of questions 1-13 and 'yes' to question 14, an application must be submitted to the appropriate NHS research ethics committee. This is an onerous and time consuming process so the supervisor should liaise early with the FREO if the student is considering this.

A.2 Participant Information Sheet

OXFORD BROOKES UNIVERSITY

Participant Information Sheet

Study title:

A framework for Mobility Hub Networks in the UK. How can a holistic approach to planning and design shape mobility hub networks in the UK?

Invitation:

I'm a part-time MA Urban Design student, conducting a research study as a part of the summer semester. You have been invited to take part in an informal interview/discussion to help me gain a stronger insight into mobility hubs, sustainable travel, and integrated transport in the UK and abroad. Before you decide whether to take part, it is important to understand the purpose of the research and what it will involve.

Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

This study is running until the end of August to mid-September. The rollout of mobility hubs in the UK has been slow, for a variety of reasons such as viability and planning delays. Mobility hubs have been planned at a small scale, compared to our mainland European cousins. This research looks to begin a conversation to plug that gap, aiming to develop a framework for the creation of a strategic mobility hub network in the UK, with recommendations for planning, design, and delivery.

Why have I been invited to participate?

This research looks to involve industry and academic expertise to enrich the findings and ensure the outcomes are grounded.

Do I have to take part?

It is up to you to decide whether or not to take part in this research study. If you do decide to take part, along with this information sheet, you will be asked to give consent. If you do decide to take part you are still free to withdraw at any time and without giving a reason. Any data collected from you can be withdrawn and/or anonymised, up to the point of publication.

Any data collected will not be stored on third-party servers. You may request a digital copy of this Participant Information Sheet and of the signed Consent Form.

What will happen to me if I take part?

By taking part in the research, you will be voluntarily giving up a short amount of your time, but the information you provide will be extremely valuable to inform this study and its outcomes.

Will what I say in this study be kept confidential?

The interview may be recorded with the participants permission, and the participant will be made aware if it is. You may request the interview not be recorded if you prefer.

All information collected will remain confidential, and the results will be presented anonymously. The information will be secured on a password protected device for the greatest security. The data will not be shared with third parties. In line with Oxford Brookes University guidance, the data will be kept until I graduate, which is the 27th September 2024.

What should I do if I want to take part?

If you would like to take part in the research, then please opt-in by filling out the consent form and contacting Joe Bonomo with this email address 19016542@brookes.ac.uk. The deadline for consenting to participate is the 08/04/2022.

You can also take part by engaging with 'The Mobility Hub' consultation webpage where there will be frequent updates in regards to the research and opportunities comment opinions and insights, and to take part in surveys. This page can be found here: https://joebonomo.wixsite.com/consultation

What will happen to the results of the research study?

The research report and its findings will be published as a part of the Academy of Urbanism's Small Grants Scheme. Findings will be used for presentations and events, and a digital copy will be made available online. You will be able to access findings on 'The Mobility Hub' webpage. A copy of the final report and its outcomes can be emailed to you upon publication, if you request.

Who is organising and funding the research?

This research is being conducted as a student of Oxford Brookes University, on the MA Urban Design course as a part of the School of the Built Environment. My attendance on this course is being funded by David Lock Associates Limited, and the research is being funded by the Academy of Urbanisms Small Grants Scheme. It should be noted that this will not influence the research findings.

Who has reviewed the study?

This research has been approved by the University Research Ethics Committee at Oxford Brookes University.

Contact for Further Information:

If you would like to get in touch with me for further information then please contact me, Joe Bonomo, using this email address 19016542@brookes.ac.uk. If you have any concerns regarding the study and the way it is being conducted, then please reach out and I can pass on my supervisor contact details. Alternatively you may contact the Chair of the University Research Ethics Committee on ethics@brookes.ac.uk."

Thank you for taking the time to read this information sheet, and I hope you will be able to take part in the study.

A.3 Template Consent Form

OXFORD
BROOKES
UNIVERSITY

CONSENT FORM

A framework for Mobility Hub Networks in the UK. How can a holistic approach to planning and design shape mobility hub networks in the UK?

Joe Bonomo – Student/Assistant Urban Designer – 19016542@brookes.ac.uk

		Please initial box
1.	I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions	
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason	
3.	I understand that if I withdraw from the study my data can be withdrawn up to the point of publication.	
4.	I agree to the interview being audio recorded	
5.	I agree to the use of anonymised quotes in publications	
6.	I agree to take part in the above study	

Name of Participant:	Date:	Signature:
Name of Researcher:	Date:	Signature:
Joe Bonomo		

B.1 Interviewee 1 - Oxfordshire County Council

What was the need?
- Local transport plan sets out targets to reduce vehicle trips by 2040.
- The current public transport network is missing a link. The interchange.
- Need to view the transport system as one network, rather than a variety of networks.
- Need to integrate public transport and active travel.
- Improve accessibility and inclusivity.
- Mobility hubs can help to address these barriers.
- Infrastructure
- Looking to incorporate existing infrastructure as well as introducing new infrastructure.
- New P&R at Eynsham.
- Some infrastructure will need adapting and formalising, such as the Lewknor bus interchange.
- It's a case of adapting what we have, formalising existing, plugging gaps in the existing network and creating new hubs.

CoMoUK Typologies
- The strategy is informed by the work from CoMo which provides useful guidance, adapted to the UK context using a variety of European case studies.
- Scales were too complicated and there needed to be a clear distinction between the different scales.
- Distinction helps to improve efficiency and clarity, both helping with the planning and design of hubs, but also for improved public awareness.

Public Consultation
- Consultations ran internally with a range of stakeholders and councillors.
- The next step is quantifying the locations.
- Current planning has taken a high-level assessment using a range of data related to patronage, densities and distances. These need further in-depth assessment and prioritising.
- Public consultation will be continuously live, allowing the public to contribute ideas.
- Funding
- New mobility hubs planned for Bampton and Carterton, with a £ 1.5 million budget, planned as a part of the council's annual budget. To be delivered by 2025-26 aim.
- Funding and planning future hubs are likely to be reactive, utilising S278 and S106.
- Once location and funding are allocated business case can be produced. As each hub is bespoke they get fed into a capital pipeline of schemes.
- Funding can be attained from new schemes like the workplace parking levy in Oxford, but this funding can only contribute to the mobility hubs within Oxford.

Delivery
- How do we measure and monitor success? This is still being worked out. Assessment is likely to be based on quantitative measures such as passenger numbers.
- The transport element is something the council can deliver but lacks the placemaking and urban design specialism/skills to add the community and place element to mobility hubs.

Case Studies
- Great European case studies, but the local government structure is different abroad.
- Mobility hubs are a new concept, with a lack of guidance. This creates uncertainty.
- Delivery is a massive challenge. How do we go from strategy to delivery?
- Funding is one challenge.
- Lack of knowledge sharing between councils and organisations doesn't aid processes. If there was a successful UK case study this could provide a degree of confidence and a platform for others to begin delivery.
- Challenges around competing operators and ownership of land and infrastructure. Different parties and stakeholders.
- Planning and logistical barriers.

B.2 Interviewee 2 - Integrated Transport Planning

- Derbyshire is working on Bus Improvement Plans.
- Derbyshire identified that the vision for mobility hubs is not feasible, funding-wise, and so is focusing the budget on bus improvements.
- Key improvements in Alfreton and Swadlincote.

Drive
- A lot of drive coming from developers proposing mobility hubs in their schemes as part of a package of mitigating measures.
- Hubs prove a useful tool to reduce reliance on cars.
- For councils, there is the issue of ongoing maintenance, and so it is easy to stick with existing known transport infrastructure. Councils tender for funding which has a fixed period.

Aims
- For Derbyshire, there is a focus on increasing patronage on buses.
- Want to make it easier to interchange.
- Provide better information, with new displays and shelters.
- Provide better walking areas and improve perceived safety.

Community Involvement
- Can't comment on details.
- Funding windows limit public engagement.
- Access and land constraints make mobility hub design difficult.
- Is a top-heavy process.

Transport or Urban Design
- Depends on how the client judges the funding being used and the timescales for delivery.

Feasibility
- Councils question what can be accommodated, what ongoing revenue there will be and the cost/operation of maintenance and management regimes.
- There is a cost-benefit as the user benefits.
- Easier to deliver on public sector land-owners, but 3rd party stakeholders may shift the priorities – depending on the circumstance of the hubs project and the site.

Challenges and Delivery
- Funding and land ownership are key challenges.
- Aspirations end up being watered down.
- Concern mobility hubs are a buzzphrase -> and confusion exists as to what it is.
- It aims to be a community asset.
- Rural challenges exist with practicality.
- There is a lack of experience and confidence.
- Upfront work needs to be done to understand what the aim and purpose of the project is.

Future Research
- Would be useful to have before and after information on case studies - what was the uptake of these different modes? Raw data would be useful.
- Would also be useful to have greater context on case studies.

B.3 Interviewee 3 - Transport for West Midlands

Aim/Context
- The main business case built on the west midlands region being far too dependent on driving for trips that could be viably undertaken by micro-mobility.
- 7 in 10 trips between 1 and 2 miles taken by car
- The opportunity cost for physical activity, congestion on roads, spending money on the car than doing something cheaper.
- Lots of big infrastructure projects being undertaken in the West Midlands are above 1 to 2 miles first/last mile local trips. Investment is longer distance trips. A gap in strategy in short distance trips.
- Installed e-scooter pilot and introduced West Midlands cycle hire. Introduced in separate places and not natural interchange with those modes and existing public transport.
- Not easily visible or close to bus stops or train stations.
- Just being introduced, but makes it difficult to justify the relevance of these services for people.
- Interested in using e-scooters and cycle hire for first/last mile modes, but lack of interchange makes this difficult. Provision is not in the right places or not visible enough.
- Realised we need infrastructure to allow these shared mobility services to make sense for people. Need a place for them to be.
- E-scooters and bicycles had to be delivered quickly. Funding. Nature of buzz after COVID-19. Also delivered by different teams.
- Also concerned about competition if located in the same place. E-scooters vs cycle hire, if placed together

would people prefer e-scooters over cycle hire?
- Lack of land - difficult to find space.
- Train stations patchwork of land ownership. Space owned by the council, space by network rail, space operated by TfWM but leasehold with network rail freehold. Looks like free space, but there are complications getting them set up.
- Network rail has complications associated with what you're allowed to use in the leasehold. The lease agreement need changing to allow mobility hubs. Also issues with public safety, some things are not allowed.
- Trial Locations are located on Dudley council land, controlled by TfWM - car park. The second site is the transport department, but controlled by the health department, the third location is built on land which is controlled by the Dudley Housing Association, slow to set up because of issues with land ownership and lease agreements. Access to land issues is big.
- Negotiating a lease agreement takes time. Needs someone from, that body to be involved in the project to get stakeholder sign-off.
- Lots done under permitted development. No formal planning or consultation.
- No formal process for engagement, so specific way to engage and sign off. No set structure and limit to engagement which makes things easier but also harder.

Location
- Pragmatism. What locations make logical sense?
- Desire to direct some investment in that direction to the Black Country.
- Evaluated locations in the black country which might make sense for people.
- What places could be linked up to make sense? Distances between locations.
- Looked at the population. Will this work for these people?
- Halesowen - a few factors which suggest hubs won't work, with high car ownership and elderly population. But wanted to trial hubs in an area where to weren't guaranteed to work. Wanted to try somewhere which is a harder nut to crack.
- Need to get 50% cycling for urban trips, and need to learn how to sort out other places, beyond the city core.
- Data analysis - segments of west midlands transport users, spending patterns, transport use. Segmented - each household in the region is given 1 of 8 different personas.
- Whilst the population looks elderly, there is a broad range of segments living in the area - which could give a broad range of input on how those segments react to hubs.
- In future, keen to align with broader development frameworks.
- Standalone in Halesowen as needed to deliver quickly.

Future Strategy
- Public facing document will be produced by ITL - Influencing Transport Lab. Produce an external

document evaluating the impact of the intervention on local people and lessons learnt.
- Internally, data from the pilot will feed into the business planning process to obtain capital funding for additional mobility hubs for Halesowen and the mobility hub network.
- City region sustainable transport settlement. City regions have capital transport funding in large lumps.
- TfWM given £2billion. Everyone in West Midlands needs to put together a business case to withdraw money. MHs have £ 9 million allocated. Next 8 months need to put together a business case to collect money.

Design
- Created prototype in 2021.
- Gave initial ideas of how hubs could look and feel.
- Initially pop-up concept, due to the trend of pop-ups. Something you could put up and then take down and relocate.
- Want to be long-lasting additions to the public transport network. Built to the same quality as bus infrastructure. Hard-wearing and long-lasting.
- Modular and flexible. Didn't want to be completely fixed to transport services available when it was constructed. Unknown what mobility services will be available in the region in 5 years' time.
- Bold and stand-out. Not look like a bus stop.
- Wanted them to be more than about transport. Not reached it yet.
- The general idea is that lots of places in the West Midlands lack a public realm.
- Halesowen Parklets installed in a pandemic.
- Need places to meet, stay outside, find information, businesses can pop-up. Space for the community.
- Europe doesn't have this issue. They have a public realm.
- The UK has a need for that community infrastructure.
- Frustrating - feels like people expect mobility hubs will address things nothing to do with transport.
- Putting too much into the concept of mobility hubs.
- Argument if you put in space in the community, people won't need to travel.

Components
- Simple stuff about location - make sure there is additional space to include new components if it goes well.
- General stuff like making sure you have space for cabling and electricity supply.
- No real-time passenger information at the locations, but canopies are designed to feed cabling through.
- Making sure electricity supply is available.

Business Case
- The business planning process is normally set up for approving things like bridges and motorways.
- A very clear case for change.
- Mobility hubs feel like asking for seed investment for a new product. Don't know who is going to use them, or what the outcome will be. Need to be careful in how the cost-benefit analysis is done.

- The need to use traditional tools in transport planning to do something is quite tricky.
- Access to land - to draw down money, need to know where 40 locations will be. Precise bits of street to be costed.
- Location selection could be a long and drawn-out process.
- Separating the economic benefits of mobility hubs from the benefits of separate services like e-scooters.
- Hubs introduce totems, shelters, benches... Business cases already approved for West Midlands cycle hire and e-scooters. Risk of double counting, do benefits go to hubs or to micro-mobility?
- Plymouth introducing micro-mobility services through mobility hubs, so it's one unified project.
- TfWM retrofitting to get services into mobility hubs.
- Cycle hire isn't fixed. Lifted into place. Can move cycle hire.

Operation
- The space is managed by the team at the council. Car parks team or public health.
- The Hubs department looks after their assets, cleaning totem and canopy.
- Operators of mobility services. Only 1-West Midlands cycle hire. Don't rent space.
- Medium term not looking to charge mobility service providers to access space, but rather mandate that they use the space. Restrict parking elsewhere.
- Additional services, like parcel lockers, and advertising, this is where revenue could be gained.
- Hard enough to get service providers to use the space, without a charge. Jelbi - lots of work to get service providers to participate in the scheme.

Cost
- £100,000 - £150,000 for infrastructure components. £350,000 across three sites. Additional costs for marketing and engagement and introducing cycle hire.
- May be less for smaller locations. Can be done cheaper, but how long will they last? Considering to make them out of wooden structures. What will it look like in 4 years time?

Evaluation
- Difficult to scale up data. Only 3 locations. Can't evaluate a network effect.
- How do people react to having them on the street?
- Do visitors use them? Could they imagine it on their own street?
- Demonstrator? Qualitative feedback.

B.3 Interview - Graham Smith

- Need to integrate design into mobility hubs.
- Location choice is influenced by destinations, land uses and passing traffic. Important to locate mobility hubs close to destinations and flows to attract users.
- Introducing mobility hubs needs to consider the culture of car dependency and consider the public's reaction to losing parking spaces that are frequently used.

Introducing mobility hubs in parking spaces that aren't used will risk the mobility hub also not being used.

- Mobility hubs can receive a short-term negative response, especially when in car parks.
- Mobility hubs can be good for introducing new amenities but they have a limit on the services that can be provided.

B.4 Interviewee 4 - CoMoUK Framework Interview

- The idea of a working team is interesting.
- Would need to be multi-disciplinary, including specialisms.
- The question over who would fund the working team.
- Framework represents an ideal world and not the ways councils may work through this.
- Many proposals are stuck at the network strategy stage. This is often a comfortable stage that is too long. Hooks already exist in policies.
- Local plans and policies should make reference to the Network Strategy to engage developers and encourage change, such as permitting increased densities and/or reduced parking when mobility hubs are introduced.
- The network strategy stage needs to be quick and short in order to move on with the project. It needs to be linked with policy and consider future demand and population growth.
- The design of mobility hubs needs to have a common identity, but the guide shouldn't be too prescriptive. Must be simple to allow for context-informed design.
- A feedback loop would be beneficial to represent how mobility hub design can then inform the design guide.
- Evaluation is a challenge as mobility hubs are funded by different funds, which each have different monitoring requirements. There is no consistency for comparisons.
- Public engagement should be introduced early on in the vision.

B.5 Interviewee 1 - Oxfordshire County Council Framework Interview

- A working team would need a range of skillsets to input.
- Working team requires a coordinating job position to be created within the local authority. The role is the lead the mobility hubs project, pulling the people and stakeholders together.
- As mobility hubs are a new concept, it makes it difficult to narrow down what goes into a network strategy, but it needs to be designed to allow the project to move on.
- Public engagement needs to be clear and effective, but there may be challenges in understanding what mobility hubs are. Building them may aid public understanding.
- It is difficult to pin down where the best locations

for mobility hubs are until they've been built and data exists to highlight the most successful location selection parameters.

- Building out the mobility hubs will help to inform future changes.
- The design guide should not be too prescriptive.

C.1 Website

Appendix C. Website and Surveys

Hi, I'm Joe.

I'm currently undertaking my MA Urban Design Dissertation, exploring the potential for a strategic approach to mobility hub planning and design. This page is set up to gain your thoughts and insights and share the progress and lessons learned along the way.

Feel free to comment in the forum, check in for updates, and get in touch if you're interested in finding out more.

Would you like to find out more?

Fill out the form below or reach out via LinkedIn and I'll do my best to get back to you.

Get in Touch

Name   Email

Subject

Type your message here...

Position

☐ I'm not a robot   reCAPTCHA

Send Message

C.2 Sustainable Transport Survey

Sustainable Transport Survey

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Your Travel Habits

What is your primary mode of transport for leisure and social trips?

- [ ] Walking
- [ ] Cycling
- [ ] Micro-mobility, e.g. e-scooters.
- [ ] Bus
- [ ] Car Sharing/Car Clubs
- [ ] Taxi
- [ ] Tram
- [ ] Train
- [ ] Private Vehicle

What is your primary mode of transport for your commute to work or place of education?

- [ ] Walking
- [ ] Cycling
- [ ] Micro-mobility, e.g. e-scooters.
- [ ] Bus
- [ ] Car Sharing/Car Clubs
- [ ] Taxi
- [ ] Tram
- [ ] Train
- [ ] Private Vehicle

If you don't do so already, what would encourage you to take these journeys using sustainable modes? e.g. bus, walking, car clubs...

Your answer

What do you feel are the key barriers to sustainable travel?

Your answer

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Sustainable Transport Survey

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Potential of Mobility Hubs

How do you picture you could benefit from living in close proximity to a mobility hub?

Your answer

How would living in close proximity to a mobility hub change your travel habits?

Your answer

What would you consider to be the most important factor in mobility hub design that would encourage you to take sustainable modes?

- ( ) Seamless integration between transport modes
- ( ) Proximity to home
- ( ) Designed as a part of a network of hubs
- ( ) Easy to understand wayfinding information, such as local maps.
- ( ) Easy to use ticketing, such as a mobile application.
- ( ) Community amenities, such as pocket gardens, community notice board and co-working spaces.
- ( ) The choice of transport modes on offer.
- ( ) Price of transport modes, e.g. a bus ticket.
- ( ) Availability of transport modes on offer, e.g. the number of e-scooters or car club cars parked at a hub.
- ( ) Sense of safety.
- ( ) Other:

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C.2.1 Survey Results

Do you know what a 'Mobility Hub' is?
33 responses

- Yes — 28 (84.8%)
- Not Sure — 5 (15.2%)
- No — 1 (3%)
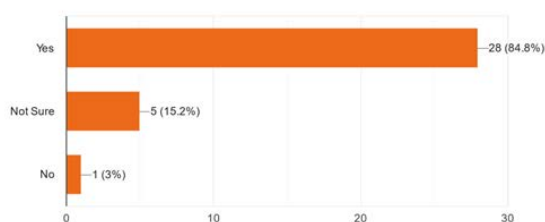
What is your primary mode of transport for leisure and social trips?
32 responses

- Walking — 20 (62.5%)
- Cycling — 8 (25%)
- Micro-mobility, e.g. e-scooters. — 1 (3.1%)
- Bus — 12 (37.5%)
- Car Sharing/Car Clubs — 3 (9.4%)
- Taxi — 2 (6.3%)
- Tram — 2 (6.3%)
- Train — 8 (25%)
- Private Vehicle — 19 (59.4%)
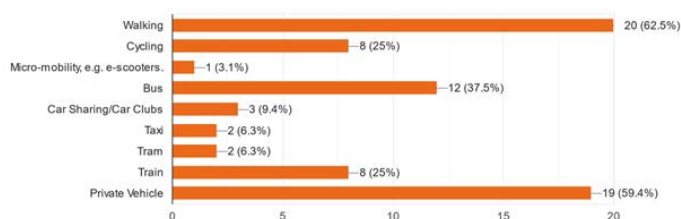
What is your primary mode of transport for your commute to work or place of education?
33 responses
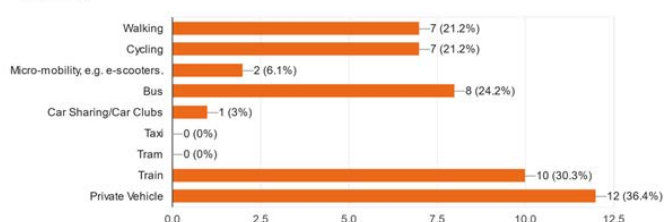
- Walking — 7 (21.2%)
- Cycling — 7 (21.2%)
- Micro-mobility, e.g. e-scooters. — 2 (6.1%)
- Bus — 8 (24.2%)
- Car Sharing/Car Clubs — 1 (3%)
- Taxi — 0 (0%)
- Tram — 0 (0%)
- Train — 10 (30.3%)
- Private Vehicle — 12 (36.4%)

If you don't do so already, what would encourage you to take these journeys using sustainable modes? e.g. bus, walking, car clubs...
27 Responses

- Cheaper public transport / better intermodal sustainable transport infrastructure
- Walking
- Subsidised services which are more frequent and consistent.
- Safer cycle lanes with improved infrastructure for cycle storage in cities.
- NA
- proximity/frequency of services, price, sense of safety on the walking route
- More reliable PT
- More frequent buses and cheaper rail tickets
- congestion increasing journey times and the availability of a viable alternative to make a more sustainable choice.
- Accessible toilets on route for walking, inconsistent buses, I don't feel like car clubs are very prominent so people don't think to use them.
- Having a train service from near home to the place of work
- Them being faster. I generally opt for private vehicles because it's the fastest approach. If buses were faster (direct route to central location or something to reduce convoluted routes) it would make them more attractive as an option. I wouldn't be opposed to a car club, depending on how easily available the service was.
- Better, more frequent and integrated transport links ie Hubs
- Ease of movement, cost, proximity to the final destination
- Would take buses more if they had their own lane, continuously (in a city), otherwise they are as slow as other traffic

- Cheaper public transport
- Direct quick routes
- More frequent bus services, better road quality for cycling.
- Yes
- a cargo bike so I can fit both kids on
- proximity and ease of use
- A public transport system that included rural areas that was reliable and cheaper than driving.
- An efficient infrastructure would be essential
- Cheaper bus fares
- Better rural connections
- Buses would need to be reliable, a pleasant experience to use, cost and environmentally efficient and take me where and when I want.
- Greater reliability and cheaper train travel fares

What do you feel are the key barriers to sustainable travel?
33 Responses
- More expensive, there's not enough eco-friendly infrastructure.
- Affordability + lack of infrastructure.
- Choice and Budget.
- Re: Active Travel only - Connectivity, Perceived safety (vs. actual safety), Directness, Lack of Route Type Variation (Cycle superhighway not safe for kids, etc.).
- Car-dominated environments / too many car parking spaces.
- I am a wheelchair user. Inaccessible stations and services make sustainable travel a challenge. For example, the nearest train station where I live does not have step-free access, so I travel by car to the second nearest. Adapted cycles are very expensive (about £5,000 min), I would love to cycle but currently cannot afford to, so travel by car more. The majority of EV charging stations, including new charging infrastructure are also not accessible. In terms of travelling by wheelchair, I am reliant on good quality paths with dropped kerbs, which often do not exist.
- Lack of financial support from central government and infrastructure. Needs to be looked at from a strategic/ cross-boundary perspective / along key travel routes to ensure positive take up and effectiveness.
- Lack of investment, Lack of change among people (reliability of private cars), frequency of public transport.
- poor public transport service (constant delay, unpredictable travel time), lack of user-friendly wayfinding information that allows people to understand ALL transport modes in the area through just one system.
- Distribution of destinations - if it were a short journey (effectively "on your doorstep"), then I am more likely to consider alternatives to the car. As it stands if I wanted to take long journeys (or ones where I need to carry things) then my options are infrequent/unreliable bus services or an overpriced Uber. Tram services are great but not available everywhere and I do not often need to travel outside my city (and when I do, I can take the train/coach).
- Poor reliability/quality services/infrastructure.

- Price, frequency, and reliability.
- Ease and emphasis on private cars in most towns/ places; PT is seen as second-class transport, not sustainable transport for all.
- Lack of bike lanes in rural counties.
- Poor quality service and infrastructure provision.
- Day-to-day demands of each individual.
- Lack of integration, cost, frequency, and access.
- Lack of integrated networks.
- Cost, reach (eg to areas just outside city centres), social 'status' (difficult for homeless/ low income).
- Affordability, quality of infrastructure, convenience, "directness" of routes.
- Cost, frequency of services, ease of access, connectivity between modes.
- The ease of access when using private vehicles.
- Not being adequately equipped to deal with the weather. Financial barriers to owning or renting a bicycle/scooter (Although arguably a car is much more expensive in the long run). The location of workplaces/ schools being unreachable by active travel/public transport.
- The frequency of services and accessibility to public transport, weather and hills make it difficult to cycle.
- Distance to bus stop.
- Often places are designed for cars (which can put less confident cyclists off) and therefore driving seems like the obvious choice; unreliability or perception of unreliability when it comes to public transport; location of docking stations for bikes/ scooters and whether there will be space at the next convenient docking station; needing a new app for each new electric vehicle mode (aside from that being annoying for a lot of people, it's exclusive).
- Cost, availability, proximity.
- Unreliability and cost.
- High costs.
- Pro-car transport policies.
- Better dedicated infrastructure, culture, and rural bus provision.
- Integrated timetables, reliability, single easy payments, less expensive the more you use them, safe and environmentally excellent - eg, Oslo tram system for less than 5m people is a delight to use.
- Reasonable fares (fare caps) and reliable service.

How do you picture you could benefit from living in close proximity to a mobility hub?
30 Responses
- Living close to a mobility hub would make it easier and more convenient to access various transportation options, reducing travel time and costs while enhancing overall mobility.
- An easier, quicker and more enjoyable trip into the city centre.
- Healthy Lifestyle and Choice.
- Availability of choice, dedicated place to park bicycle/ scooter.
- I already do :) (next to the bus stop/ train station/ car hire).
- Range of transport methods available, an opportunity

to work during a commute (on the bus or train), and a healthier lifestyle (cycling).

- Cycle storage.
- Constant using the mobility hub as the starting point or destination.
- If the services provided by the mobility hub made my travel time/experience more attractive.
- Journey planning without a car would be much easier.
- If provided access to quality and prioritised sustainable travel then it would enable me to make a more sustainable choice.
- Less money spent on transport.
- It would encourage me to lose my car less, particularly for more local journeys.
- Greatly - it would reduce traffic flows in the area.
- Park / Cycle and ride - ease of movement and less time in traffic.
- Fast/ more convenient transit to parts of the city. More convenient car hire.
- Everything's within reach/walkable distance. Community facilities nearby.
- I would have more transport options open to me which might make me consider a more sustainable option than the private car.
- A healthier lifestyle.
- On days when I don't want to lock up my bike at my final destination, or if I know I will be changing locations throughout the day and not wanting to walk my bike around with me, then having access to a rental bike would be useful.
- I would be able to minimise the time spent in a car and improve my physical health by having the choice of driving and cycling when I travel.
- Better and easy travel.
- If there was a mobility hub in my town, it would mean that all my key journeys could be sustainable. I mostly walk or cycle but when I have to collect both of my children from 2 opposite ends of town, within 15 minutes of each other I drive which feels rubbish.
- Cheaper, more sustainable transport.
- Alternative options.
- Having options would be appealing.
- It would provide a greater range of transport options.
- Choice of travel modes.
- Greater choice of movement but who wants to live over a noisy bus interchange with anti-social behaviour late at night?
- Wouldn't need to own a car, would save a lot of money.

How would living in close proximity to a mobility hub change your travel habits?
28 Responses
- It would significantly change my travel habits.
- Reduce the use of private transport.
- N/A
- Reduce use of the private car.
- More sustainable commuting.
- Visiting it to take or understand public transport frequently.
- As above.
- It depends on whether the services from the mobility

hub made my life easier.
- I try to use sustainable modes as much as possible but do drive when the distance is too far to walk/cycle and there is no public transport provision.
- enable me to travel more sustainably.
- I think that if cycle lanes were adequate around the mobility hub it would be useful, and if bus stops were reliable.
- Unfortunately, I do not think it would have a significant impact aside from the odd journey.
- Not at all - depends on the type of transport - airports/ railway stations should be Hubs.
- I mostly use sustainable transport methods, but it would encourage me to travel further sustainably.
- Might be better for weekend travel - I do not own a car due to living in a city.
- Potentially.
- I would use more sustainable travel methods to commute.
- It would not change my day-to-day habits since I already walk and cycle but would make it more convenient to choose active travel when faced with the situation I described above.
- I would be less reliant on a car.
- I can travel more frequently on my own.
- As above, it would support post-work childcare pick-up.
- Depends on its effectiveness/ease of use/cost.
- Would use it as an alternative to car travel occasionally.
- I would use more public transportation.
- It might limit trips by car.
- Probably use a scooter more.
- I would have a shorter commute but would live in a poorer quality environment with far more noise, air pollution and anti-social behaviour.
- Would enjoy walking more.

What would you consider to be the most important factor in mobility hub design that would encourage you to take sustainable modes?
33 responses
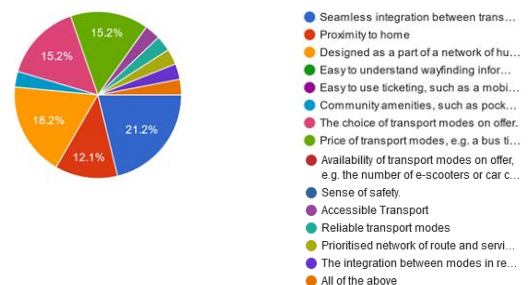
Gender
32 responses
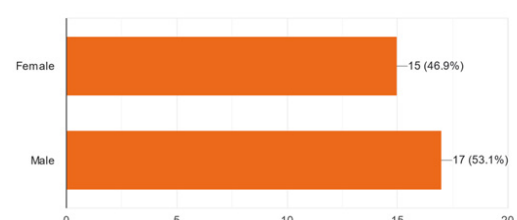
Age Range
33 responses
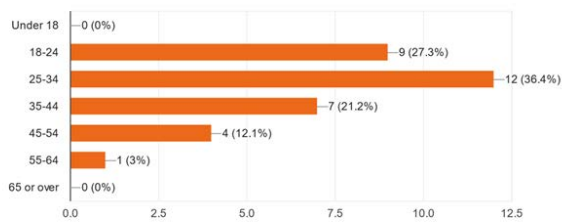
Ethnicity
33 responses
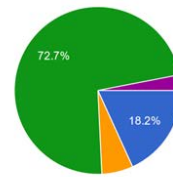
- ● Asian or Asian British
- ● Black, Black British, Caribbean or African
- ● Mixed or multiple ethnic groups
- ● White
- ● Other ethnic group

C.3 Halesowen Local Travel Point Survey

Appendix C. Website and Surveys

Halesowen Local Travel Point Survey

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3. Quality of the Local Travel Points

This section looks to understand your opinion of the design and quality of the Local Travel Points and the space around them.

On a scale of 1 to 5, please rank the following features of the Local Travel Points:

3a) The quality of the environment.
This can include the use of planting, proximity to parks, air quality and noise pollution, and the comfort of the environment, e.g. well-shaded and not exposed to wind.

	1	2	3	4	5	
Poor Quality	○	○	○	○	○	High Quality

3b) Transport choice and convenience
Is there a wide choice of transport modes on offer and are these modes convenient to use?

	1	2	3	4	5	
Low Choice and Low Convenience	○	○	○	○	○	High Choice and High Convenience

3c) Experience in the Space
How would you rank the quality of your experience in the space? E.g. Was there lots of activity and people around, is the local area easy to understand and navigate?

	1	2	3	4	5	
Poor Experience	○	○	○	○	○	Excellent Experience

3d) How well-maintained is the space?

	1	2	3	4	5	
Poorly Maintained	○	○	○	○	○	Well-Maintained

3e) How safe and accessible do you feel the space is?

	1	2	3	4	5	
Feels Unsafe and Inaccessible	○	○	○	○	○	Feels Safe and Accessible to All.

3f) Is the branding of the Local Travel Points recognisable and understandable?

	1	2	3	4	5	
Poorly	○	○	○	○	○	Highly

3g) Is the Transport for West Midlands mobile app easy to use?

	1	2	3	4	5	
Difficult to Use	○	○	○	○	○	Easy to Use

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Halesowen Local Travel Point Survey

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Understanding the Impact of the Local Travel Points

4) Has the introduction of the Local Travel Points encouraged you to travel differently?
This could be for any means, such as work, school-runs, and leisure trips.

○ Yes
○ No

4a) If yes, how have they changed your travel patterns?

Your answer

Back   Next   ▬▬▬▬▬ Page 3 of 5   Clear form

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Google Forms

Halesowen Local Travel Point Survey

19016543@brookes.ac.uk Switch accounts

Not shared

Final Thoughts

5) What changes would you make to improve the local travel points?

Your answer

6) Any other thoughts and comments?

Your answer

Back   Next   ▬▬▬▬▬▬▬   Page 4 of 5   Clear form

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Google Forms

Halesowen Local Travel Point Survey

19016543@brookes.ac.uk Switch accounts

Not shared

* Indicates required question

About You

All information gathered is anonymous.

Gender *

○ Male

○ Female

○ Other:

Age Range *

○ Under 18

○ 18-24

○ 25-34

○ 35-44

○ 45-54

○ 55-64

○ 65 or over

○ Other:

Ethnicity *

○ Asian or Asian British

○ Black, Black British, Caribbean or African

○ Mixed or Multiple Ethnic Groups

○ White

○ Other Ethnic Group

Back   Submit   ▬▬▬▬▬▬▬   Page 5 of 5   Clear form

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Appendix C. Website and Surveys

HELP SHAPE LOCAL TRANSPORT

As part of my **Urban Design Dissertation** at Oxford Brookes University, I'm researching the **Local Travel Points** on trial in **Halesowen**.

Complete a **5-minute survey** to share your thoughts!

Dear Resident,

I'm exploring the future of transport, and your opinion matters!

As part of a research study for my MA Urban Design dissertation at Oxford Brookes University, I'm inviting you to take part in a short survey about the two new Local Travel Points at Huntingtree Park and Andrew Road.

Whether you've noticed changes, used the hubs, or just have thoughts on the local transport, your feedback will be invaluable to informing the findings of my dissertation.

Scan the QR code or visit the link below to complete the survey! It should take no more than 5 minutes.

Thank you for your time and input!

Many thanks,
Joe Bonomo

joebonomo.wixsite.com/consultation
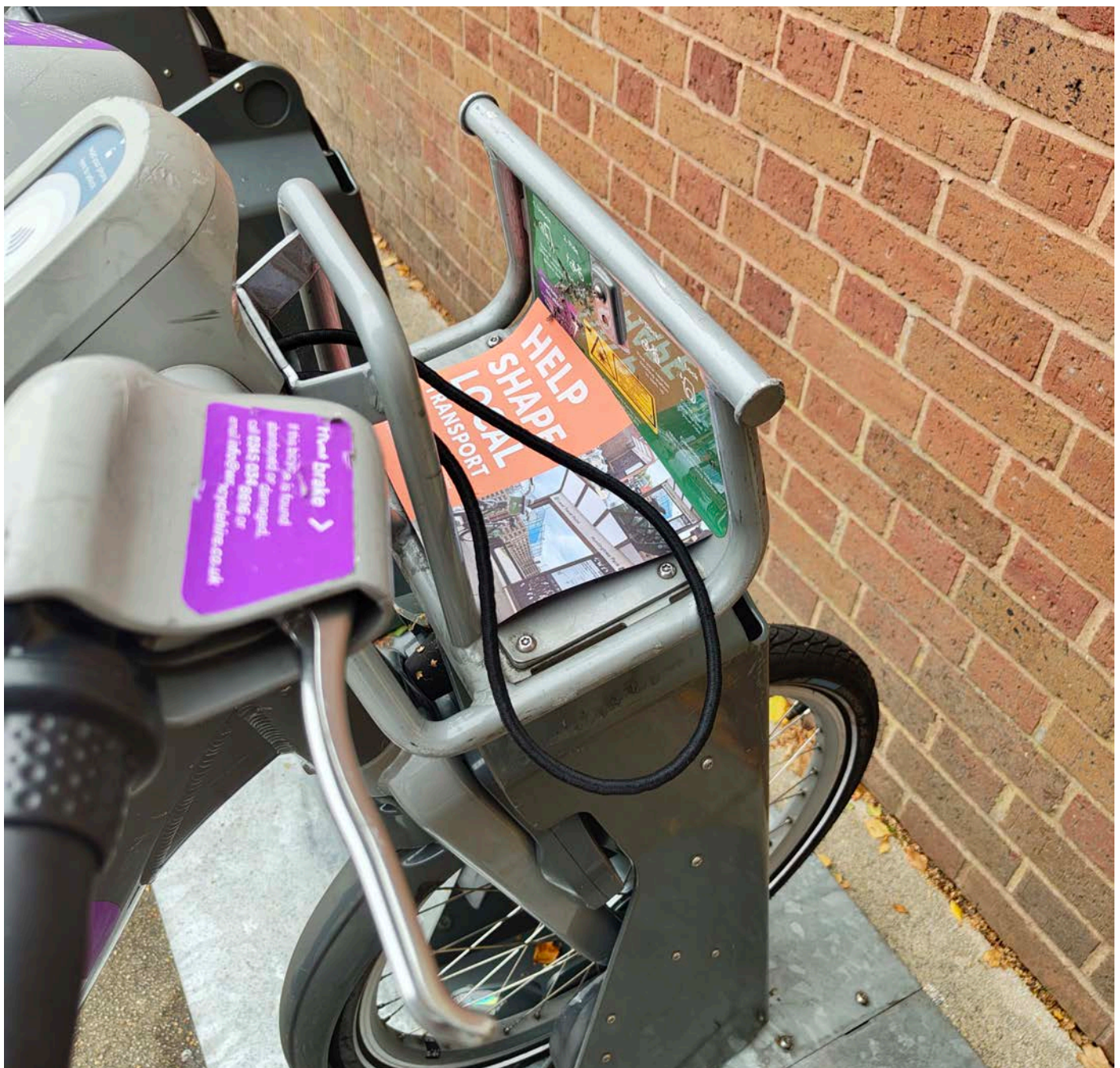
1) Have you heard about or seen the new Local Travel Points being trialled in Halesowen?
1 response

- Yes
- No

100%

3d) How well-maintained is the space?
1 response
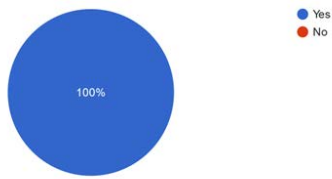
2) Have you used one of the Local Travel Points?
1 response

- Yes
- No

100%
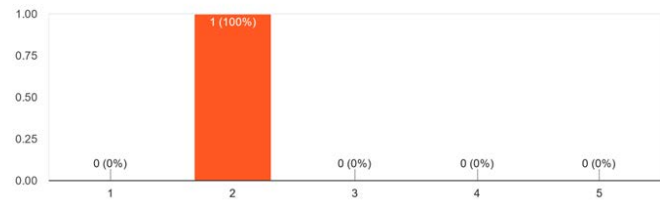
3e) How safe and accessible do you feel the space is?
1 response
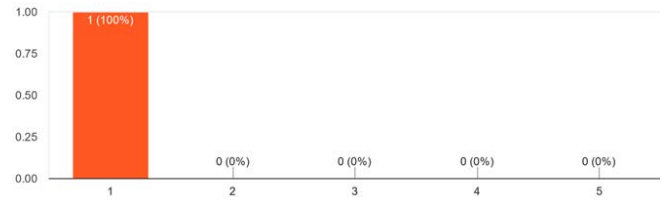
3a) The quality of the environment.
1 response
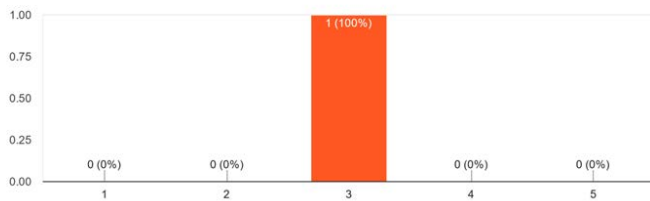
3f) Is the branding of the Local Travel Points recognisable and understandable?
1 response
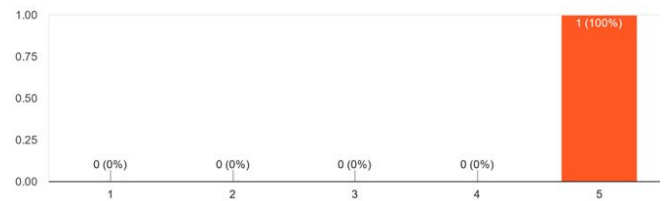
3b) Transport choice and convenience
1 response
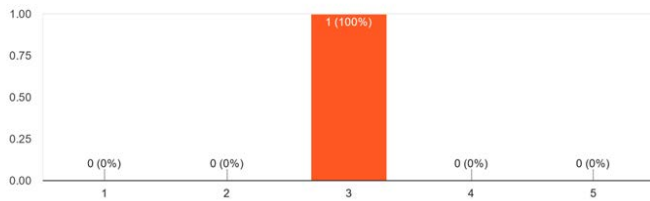
3g) Is the Transport for West Midlands mobile app easy to use?
1 response
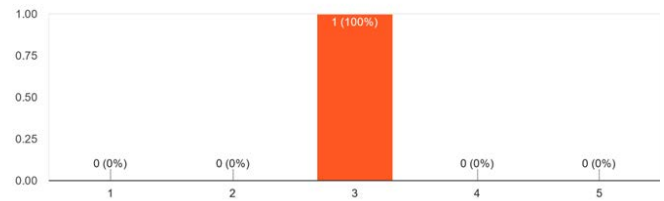
3c) Experience in the Space
1 response
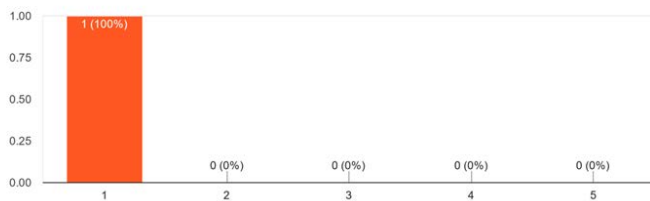
4) Has the introduction of the Local Travel Points encouraged you to travel differently?
1 response

- Yes
- No

100%
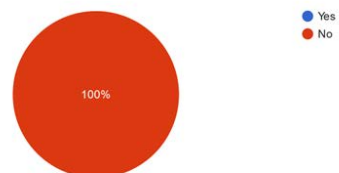
6) Any other thoughts and comments?
1 response
- Unfortunately the bikes are being rode around parks at speed and surrounding rounds so they have become a tool in anti social behaviour.

Gender
1 response

- Male
- Female

100%

Age Range
1 response

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or over

100%

Ethnicity
1 response

- Asian or Asian British
- Black, Black British, Caribbean or African
- Mixed or Multiple Ethnic Groups
- White
- Other Ethnic Group

100%

No response to questions:
- 2a
- 2b
- 2c
- 4a
- 5

D.1 Presentation Slides

Literature and Guidance

Mechanisms and Challenges of a Strategic Approach

Literature and Guidance Review

Literature and Guidance review divided into five key components.

1. Evolution of Mobility Hubs
2. Mobility Hub Objectives
3. Characteristics and Typologies
4. User Behaviour
5. Implementation

These provide an understanding of the research to-date, exploring the key aspects related to mobility hubs.

Strategic Research Framework
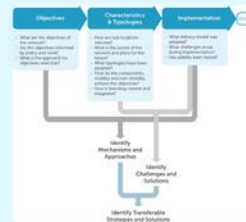
- Informed by the literature and guidance review to guide interviews.
- Provides context for the design framework.

Literature and Guidance Review

- Mobility Hub Objectives
- Behaviour
- Characteristics and Typologies
- Implementation
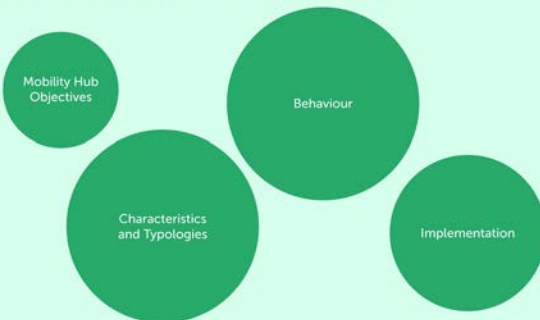
Objectives

- Reduce vehicle trips and reliance.
- Current sustainable transport networks are missing seamless interchanges – operator coordination, proximity of stops and services and additional facilities.
- Integrate public transport and active travel to improve patronage, and to create better and pedestrian areas.
- Improve information.
- Improve inclusivity of the transport network.

Findings → Informing the Research

Strategic Research Framework

Design Research Framework

Characteristics and Typologies

- Adapting existing guidance to create mobility hub typologies suitable to that area.
- Focus on formalising and adapting existing infrastructure and plugging gaps with new hubs.
- Windfall funding windows limit public engagement.
- Combination of lack of experience, uncertainty and funding limitations slows progress and limits visions.
- Tight budgets create more focused and targeted improvements to maximise benefits.

Implementation

- Interviews uncovered that delivery of hubs is one of the largest challenges.
- Constraints hinder delivery:
  - Funding and delivery windows
  - Planning and logistical barriers, such as land ownership.
  - Lack of shared experience is a limiting factor to moving hubs forward. Brings uncertainty as ideas are untested in the UK context.
- Interviews also highlighted questions that still remain:
  - Lack of government/or delivery mechanisms
  - Measuring and monitoring .

The Hoppin Point Network

Objectives
- Aims to make destinations as accessible as possible, for everyone, by sustainable means.
- Supports the Flemish Governments 2040 Mobility Vision

What makes a Mobility Hub Successful?

The Hoppin Point Network

Morphology Assessment
- Takes the research framework to guide an assessment of the morphological context of sampled hubs.
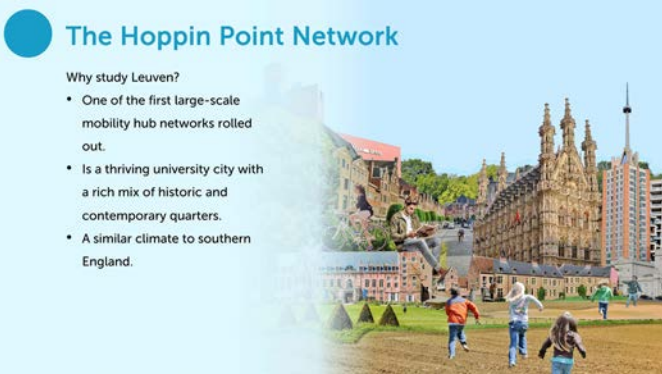
De Hoppinpunten Hoppin Points

What are the Hoppin points?
- A network of over 1000 mobility hubs across the Flanders region of Belgium.
- Coordinates and integrates existing and new transport infrastructure into a unified network through physical and digital means.

The Hoppin Point Network

The Hoppin Point network is divided into four scales:
- Interregional
- Regional
- Local
- Neighbourhood

50% of each were randomly selected for this study, within an accessible study area.

The Hoppin Point Network

Why study Leuven?
- One of the first large-scale mobility hub networks rolled out.
- Is a thriving university city with a rich mix of historic and contemporary quarters.
- A similar climate to southern England.

Heverlee Hoppin Point

Heverlee Station (Regional Hub)

Wider Green Network

Green Network

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Heverlee Hoppin Point

Heverlee Station (Regional Hub)

Public Linkage Networks and Land-Uses

Blocks, Plots and Buildings

Join at menti.com | use code 2540 7

What qualities are missi

focus bold
creativ

Heverlee Hoppin Point

Heverlee Station (Regional Hub)

Details and Materials
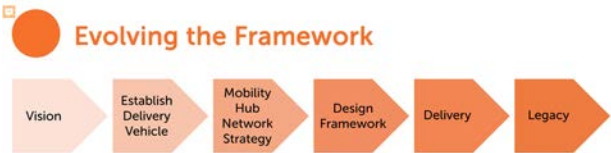

What can the Hoppin network teach us?

Importance of a vision

Importance of forward planning.

Impact of top-down delivery.

Influence of morphology on design response and quality of hubs.

Heverlee Hoppin Point

Heverlee Station (Regional Hub)
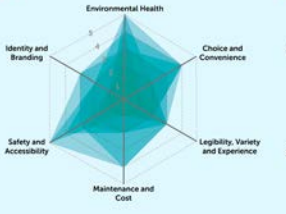
Quality Assessment

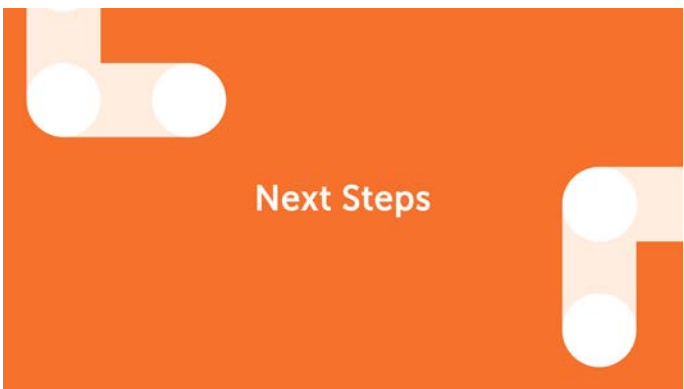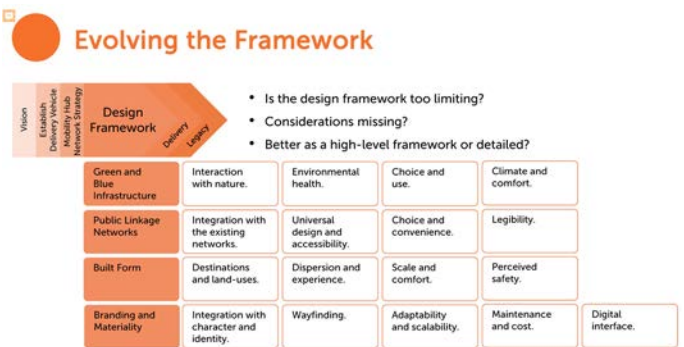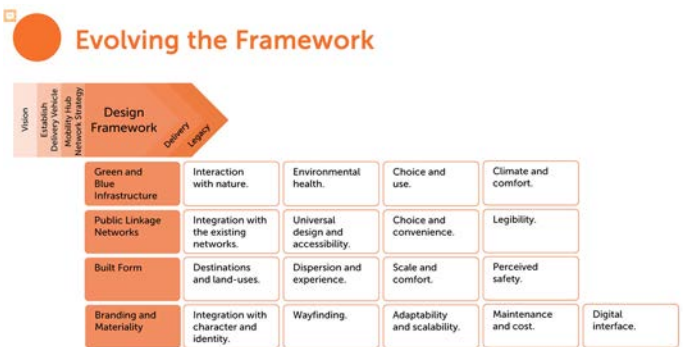

What can the Hoppin network teach us?

- Mix of land-uses and green infrastructure increases dwell times.
- Transport infrastructure can be integrated into built form – not standalone components.
- Apps can influence behaviours.
- Location planning should look beyond transport planning to morphology.
- Mobility hubs need to consider environmental, experiential, safety and accessibility and operational considerations.

What can the Hoppin network teach us?

Quality of Hubs

Local

Neighbourhood

Evolving the Framework

Evolving the Research Framework

Draft framework is a combination of findings from:

Literature and Guidance Review	Interviews	Leuven Study

Oxfordshire County Council

Integrated Transport Planning (Derbyshire MHs)

Framework to be reviewed with today's panel, and:

- Oxfordshire County Council;
- Integrated Transport Planning;
- Hadley Property Group;
- Transport for West Midlands; and
- David Lock Associates.

Next Steps

Further Research

Desktop Research Case Studies	Halesowen MH Study	Stratford MH Study

Today's Feedback

Findings Inform Evolving Framework

Review Evolving Framework
- Oxfordshire County Council
- Integrated Transport Planning
- Hadley Property Group
- Transport for West Midlands
- David Lock Associates

Strategic Mobility Hub Framework for the UK.

Presentation to AoU. 3rd October

Evolving the Framework

Vision → Establish Delivery Vehicle → Mobility Hub Network Strategy → Design Framework → Delivery → Legacy

Evolving the Framework

Vision → Establish Delivery Vehicle → Mobility Hub Network Strategy → Design Framework → Delivery → Legacy

- Does the structure work?
- Missing steps?
- Public engagement?
- Any missing factors/stages?
- How could this illustrate ways of resolving current challenges?

Evolving the Framework

Vision / Establish Delivery Vehicle / Mobility Hub Network Strategy — Design Framework — Delivery — Legacy

Green and Blue Infrastructure	Interaction with nature.	Environmental health.	Choice and use.	Climate and comfort.	
Public Linkage Networks	Integration with the existing networks.	Universal design and accessibility.	Choice and convenience.	Legibility.	
Built Form	Destinations and land-uses.	Dispersion and experience.	Scale and comfort.	Perceived safety.	
Branding and Materiality	Integration with character and identity.	Wayfinding.	Adaptability and scalability.	Maintenance and cost.	Digital interface.

Evolving the Framework

Vision / Establish Delivery Vehicle / Mobility Hub Network Strategy — Design Framework — Delivery — Legacy

- Is the design framework too limiting?
- Considerations missing?
- Better as a high-level framework or detailed?

Green and Blue Infrastructure	Interaction with nature.	Environmental health.	Choice and use.	Climate and comfort.	
Public Linkage Networks	Integration with the existing networks.	Universal design and accessibility.	Choice and convenience.	Legibility.	
Built Form	Destinations and land-uses.	Dispersion and experience.	Scale and comfort.	Perceived safety.	
Branding and Materiality	Integration with character and identity.	Wayfinding.	Adaptability and scalability.	Maintenance and cost.	Digital interface.

Next Steps

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E.1 Local
De Bib Leuven – Sporthal Rijschool

Situated along Rijschoolstraat, this hub is located along a route between Sint-Maartensdal and the city core. The hub has been integrated into an existing small square outside a sports hall and the city library.

ABOVE: Mobility hub location.

Mobility Components

- (H) Hoppin Totem
- Bus Stop
- Cargo Bicycle Hire
- Disabled Car Parking
- Bicycle Parking

Complementary Components

- Seating

E.1.1 Mobility Hub Analysis

This mobility hub has been successfully integrated into an established public realm. Buildings are orientated well onto the public square, with an architecture different to the surrounding area. The space feels like it was cut out of the buildings thanks to the continuous building frontages. The mature trees also aid the framing of the space, marking the 4 corners and creating a sense of enclosure and comfort.

The hub retains existing car parking spaces but introduces cargo bicycle parking and a wayfinding totem along a bus route which stops within this square.

Movements through the space are channelled east-west with little movement between the north and southern spaces. The space is quiet despite being a busy bus route. The cycle route is not segregated due to space constraints, but priority is highlighted with painted lanes which highlights cars to give way.

This square has good tree cover and hedgerows but beyond this, the mobility hub does little to offer additional travel choices. Bus stops and cycle parking are

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: De Bib Leuven Hoppin Point plan.

pre-existing infrastructure, supported by the introduction of a cargo bicycle space. The lack of car club restricts choice for groups. The Sint-Maartensdal hub is located not too distant from here and is visible. This hub features far more amenities and a larger totem and so the categorisation of these hubs is wrong. Sint-Maartensdal should be a local hub and De Bib Leuven a Neighbourhood hub.

The space is legible and convenient. The area with mobility components is poorly activated, with blank walls which create a poor atmosphere in the evening and at night. Evidence of anti-social behaviour exists with a damaged totem, graffiti on bins and litter throughout the space, which is evidence of poor maintenance regimes. The public realm offers multi-functional street furniture with stacked seating that can double as play equipment for young children.

E.1.2 Quality Assessment
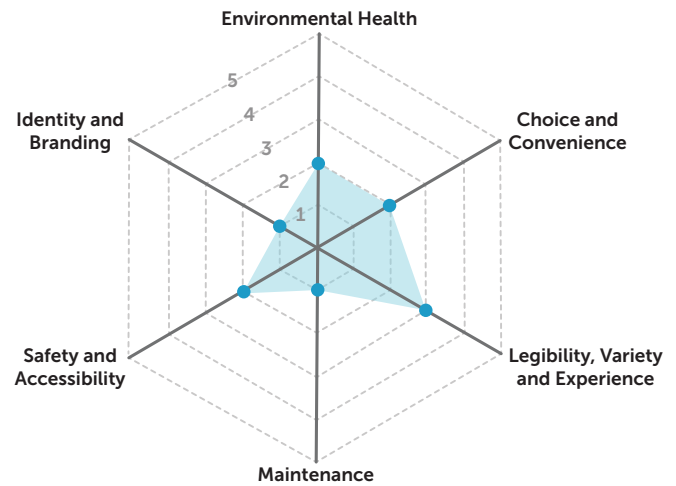
ABOVE: Quality radar chart.

ABOVE: Photographic analysis.

E.2 Local
Naamsepoort

Naamsepoort sits along the Leuven ring road, to the south of the city. This locally important interchange provides links to the city from Heverlee and provides connections to the Den Dreef Stadium and KU Leuven University.
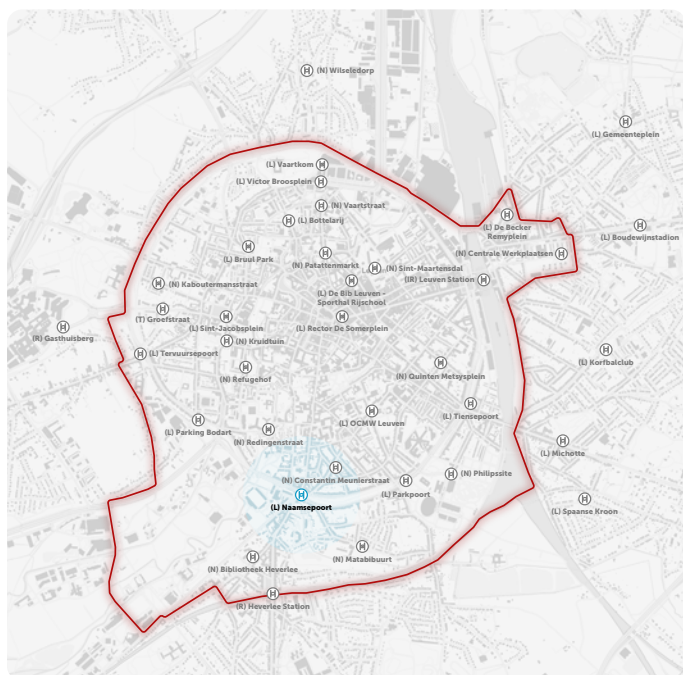
ABOVE: Mobility hub location.

Mobility Components

- Ⓗ Hoppin Totem
- 🚌 Bus Stop
- 🚗 Car Club
- 🚲 Bicycle Parking

- 🚗 EV Charging
- Ⓟ Public Car Parking
- ♿Ⓟ Disabled Car Parking

Complementary Components

- 📦 Parcel Locker

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: Naamsepoort Hoppin Point plan.

E.2.1 Mobility Hub Analysis

A car park typology, this mobility hub converts existing spaces outside a parade of shops and complements it with additional amenities. The components are co-located adjacent to each other with a unifying analogue totem. A total of 7 car club bays accompany well-used cycle parking, parcel lockers and bus stops.

As a busy interchange, cyclists' movements are restrained, but well-facilitated by segregated lanes in all directions and priority crossings. Similar can be said for pedestrian movement which is facilitated by formal crossings. The high traffic flows seem to deter pedestrian movement, with flows quiet. A variety of quiet routes are available nearby.

ABOVE: Naamsepoort.

E.2.2 Quality Assessment
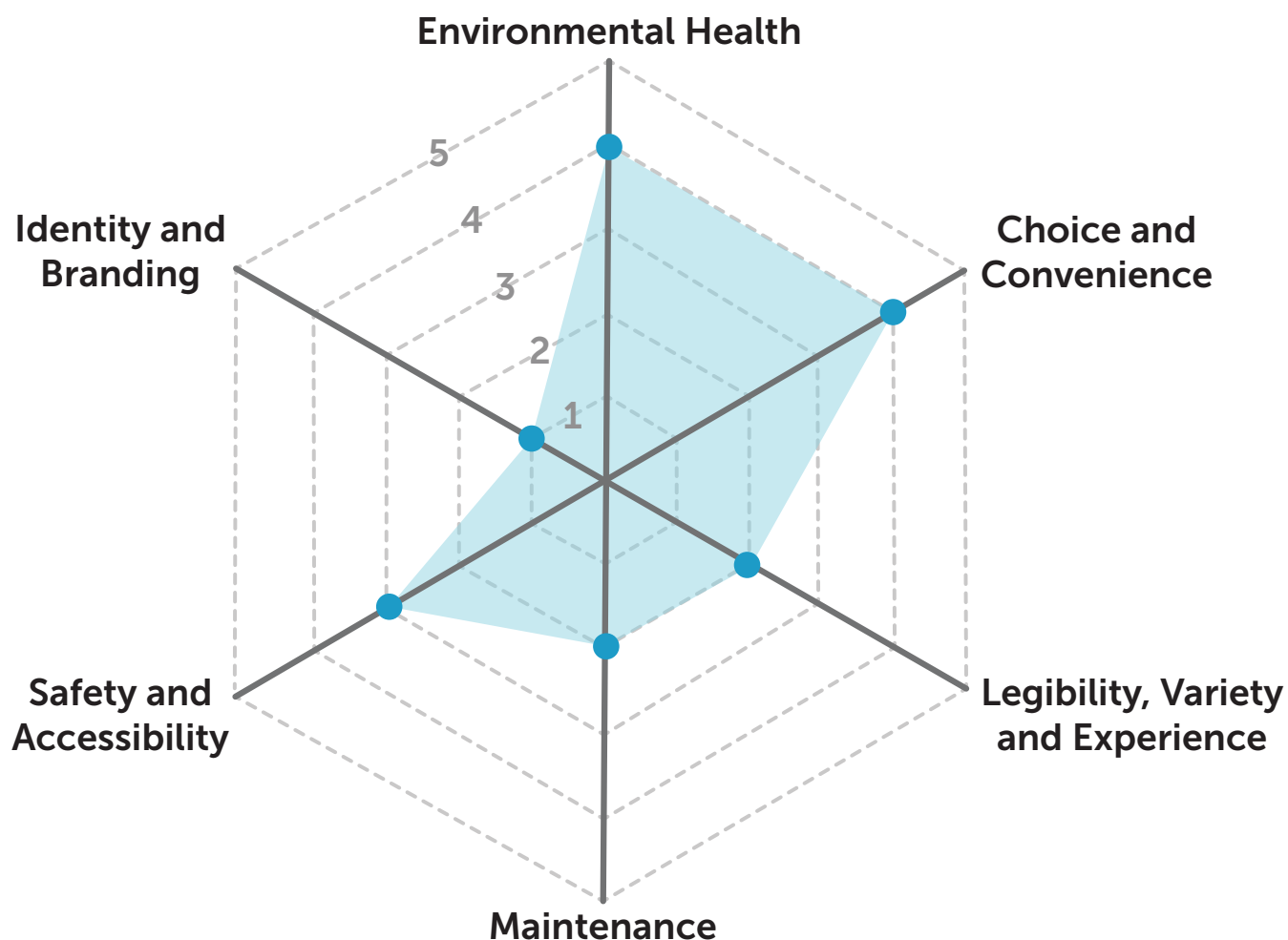
ABOVE: Quality radar chart.

E.3 Local
OCMW Leuven

OCMW is distributed across the Andreas Vesaliusstraat and Frederik Lintsstraat streets, between an Elderly Assisted Living and a Welfare office, providing new transport means to access these facilities.
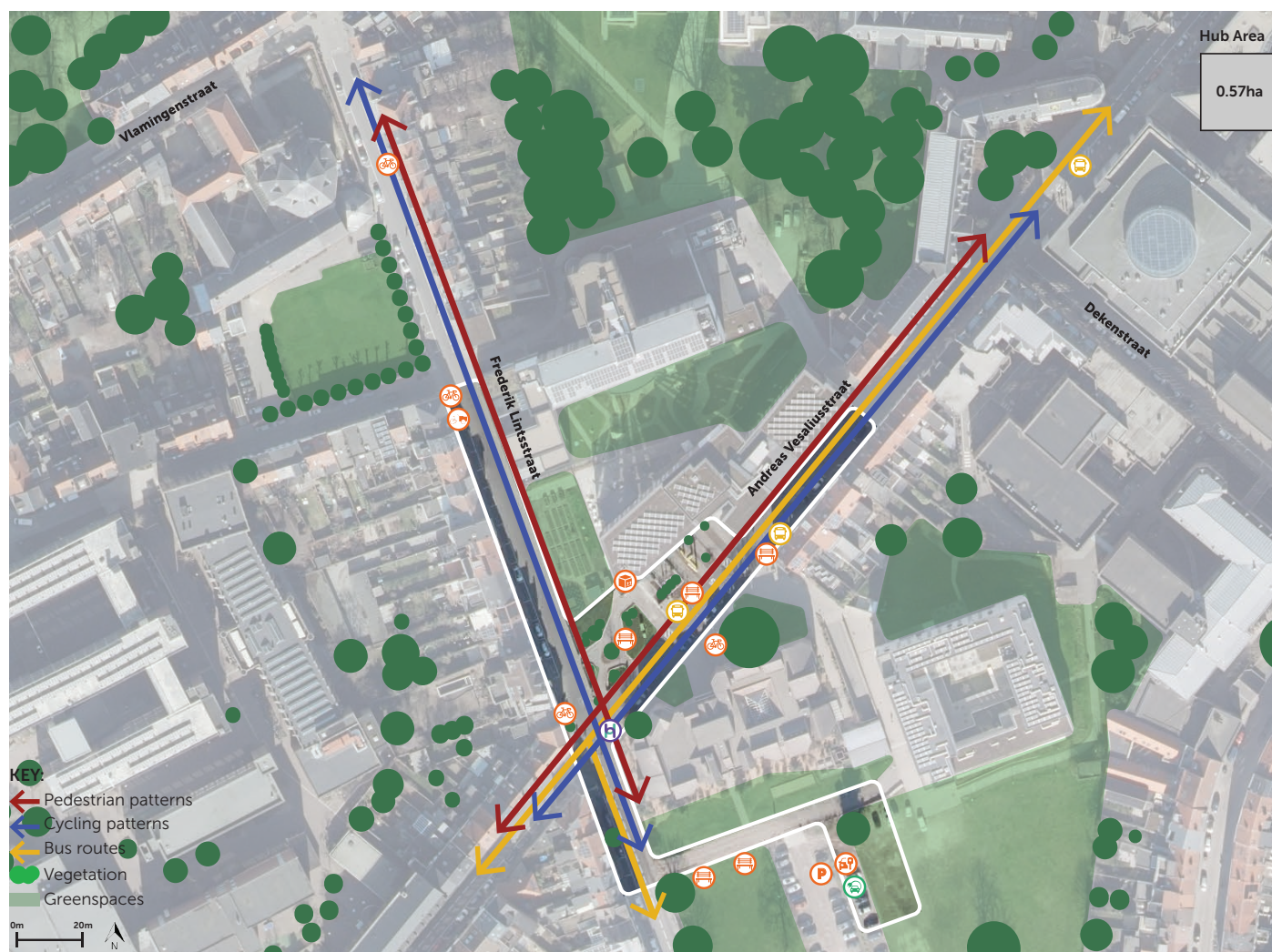

ABOVE: Mobility hub location.

Mobility Components

- (H) Hoppin Totem
- Bus Stop
- Car Club
- Bicycle Parking
- EV Charging
- (P) Public Car Parking
- Disabled Car Parking
- Cargo Bicycle Hire

Complementary Components

- Parcel Locker

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: OCMW Leuven Hoppin Point plan.

E.3.1 Mobility Hub Analysis

This mobility hub is highly accessible and creates a positive experience through its comfortable scale, public realm, street art, and natural surveillance. The hub is situated along a key bus corridor, as well as a popular cycling route. The totem makes the best use of this, situated on a street corner for visibility. The hub is embedded in green infrastructure, from street planters and trees to allotments and community gardens, which creates positive interaction with nature.

The spatial arrangement is sparse and confusing. Despite the wayfinding totem, some components are very distant and difficult to find, creating a sense of separation from the mobility hub. The car club particularly is tucked away behind a building, accessed via an uneven gravel road.
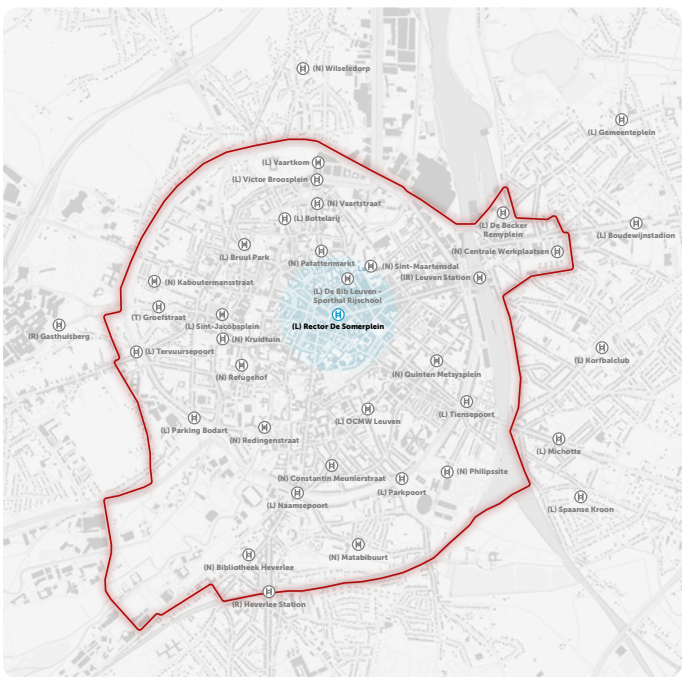

ABOVE: OCMW Leuven.

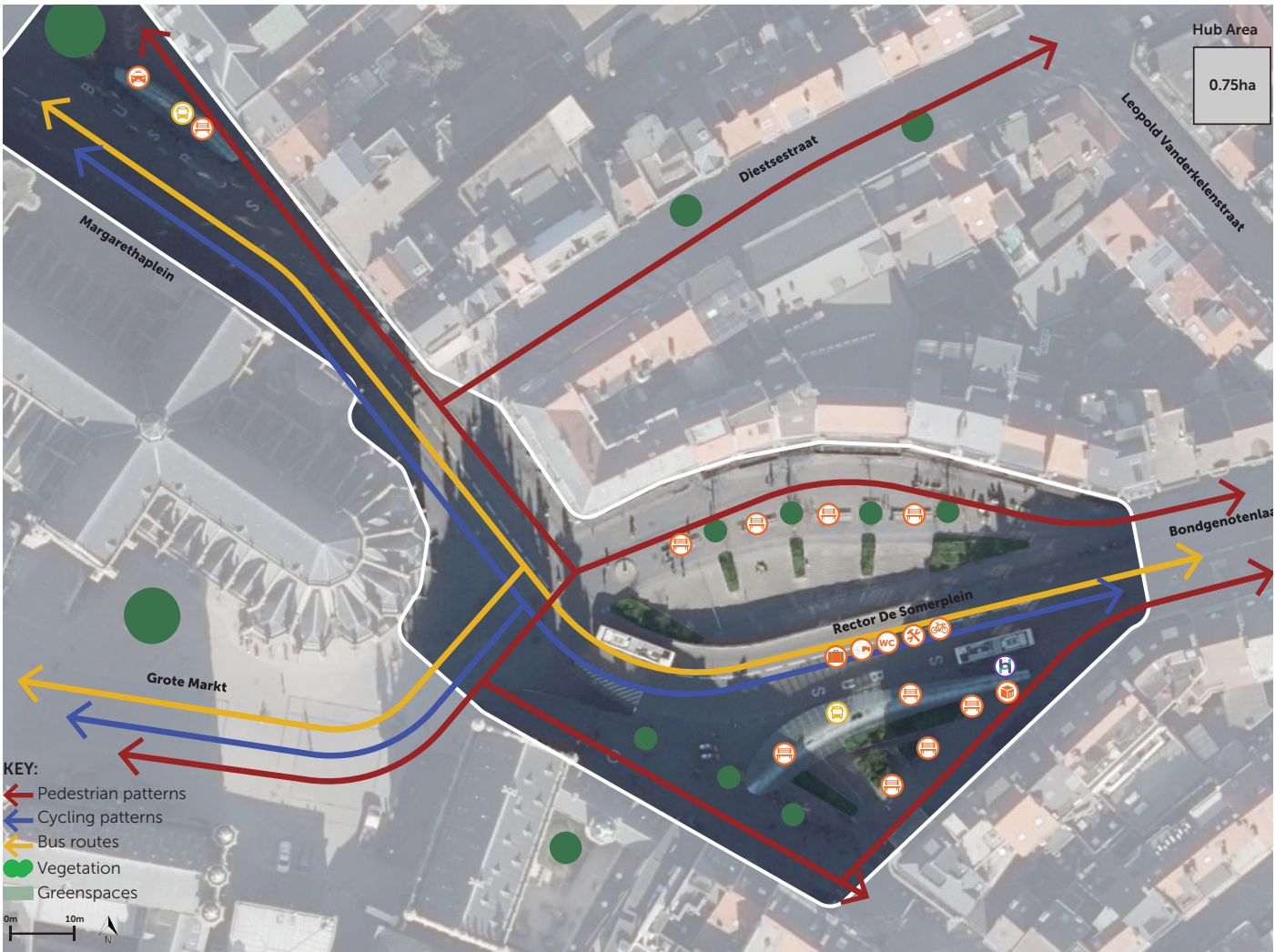### E.3.2 Quality Assessment
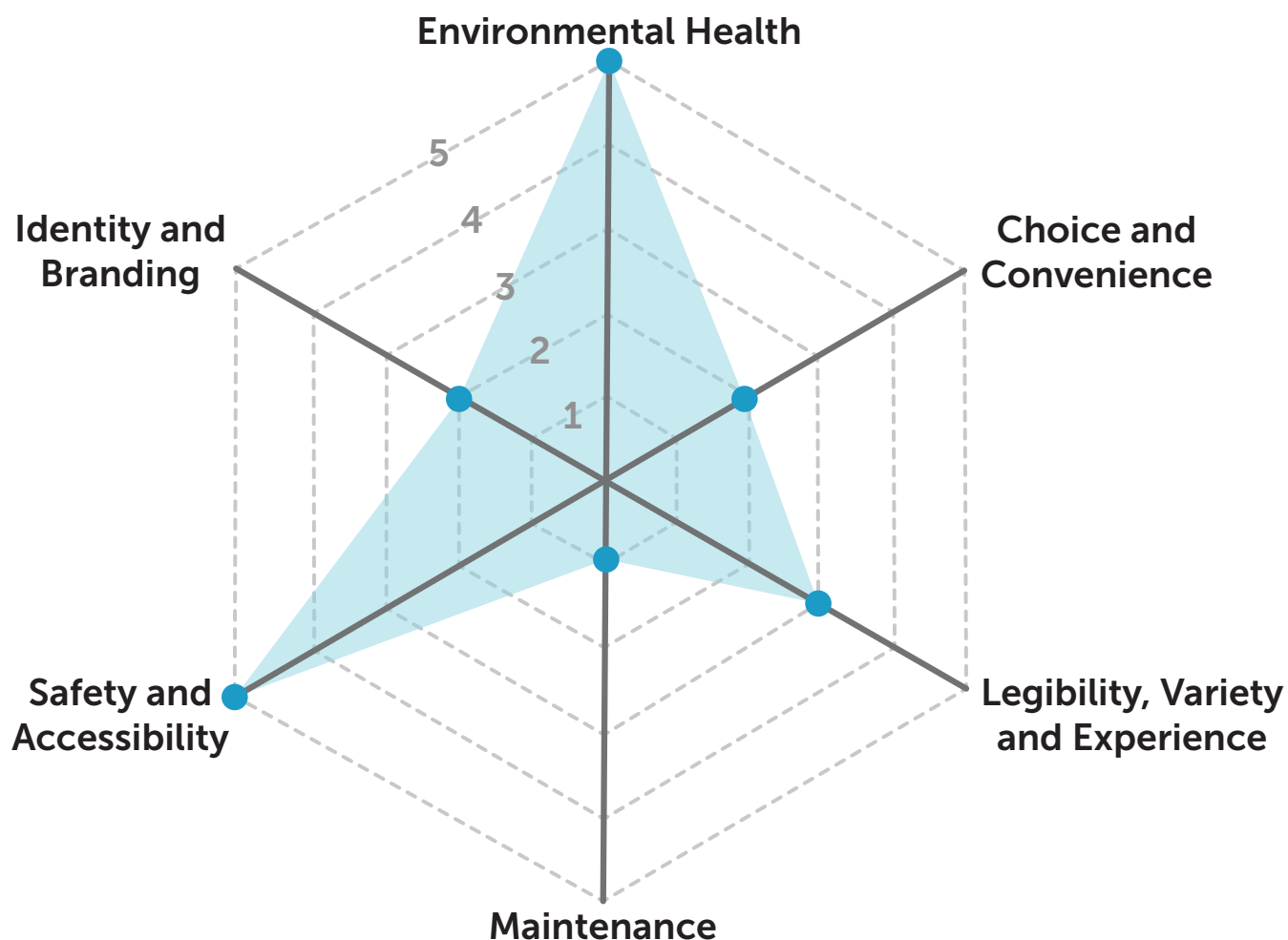
ABOVE: Quality radar chart.

E.4 Local
Rector De Somerplein

The gateway to Leuven's historic city core, Rector De Somerplein transformed a car-orientated space into a comfortable and green square.

ABOVE: Mobility hub location.

Mobility Components

(H) Hoppin Totem   🚲 Bicycle Parking

🚌 Bus Stop

🛵 Cargo Bicycle Hire

Complementary Components

🧳 Luggage Lockers   WC Toilets

📦 Parcel Lockers   🪑 Seating

🔧 Bicycle Repair Column

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

0m   10m

Hub Area

0.75ha

ABOVE: Rector De Somerplein Hoppin Point plan.

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E.4.1 Mobility Hub Analysis

Rector De Somerplein is a multi-level transport interchange that maximises the potential of this busy destination through sub-surface amenities. A range of facilities, including toilets and luggage lockers, are available at a lower level, accessible via stairs and a lift that allows for through connectivity across the public space. The design is contemporary, yet light, making the square a destination, yet not detracting from the infamous city hall and St Peter's Church. Planting was introduced to follow the steps, adding interest, however, this does block natural surveillance towards the lower levels.

Services and amenities are easy to find, but unfortunately, the wayfinding sticker is discreet. Despite this, the function of the space is clear.

The public square, whilst connected at a lower level is severed by the design of the interchange, which forms a barrier between the southern and northern halves, reducing accessibility for those less mobile.
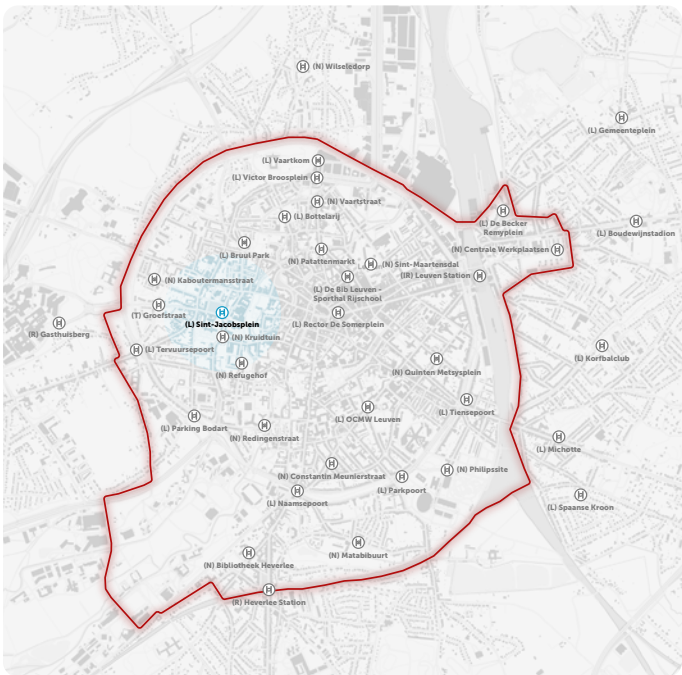

ABOVE: Rector De Somerplein.

E.4.2 Quality Assessment
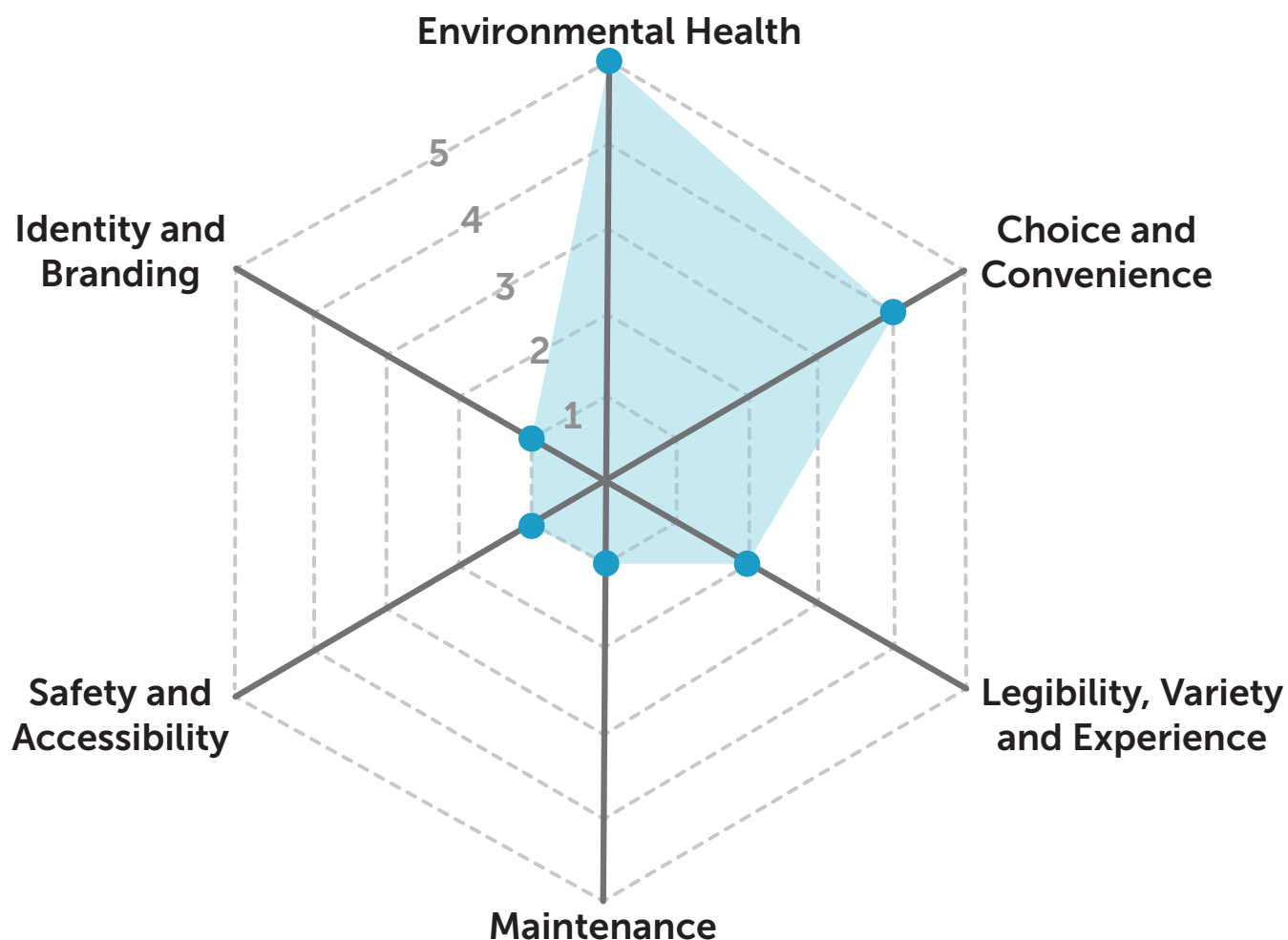
ABOVE: Quality radar chart.

E.5 Local
Sint-Jacobsplein

A large car park in a residential quarter, Sint-Jacobsplein has excellent bus and cycle connectivity and is located in proximity to a series of regeneration sites.
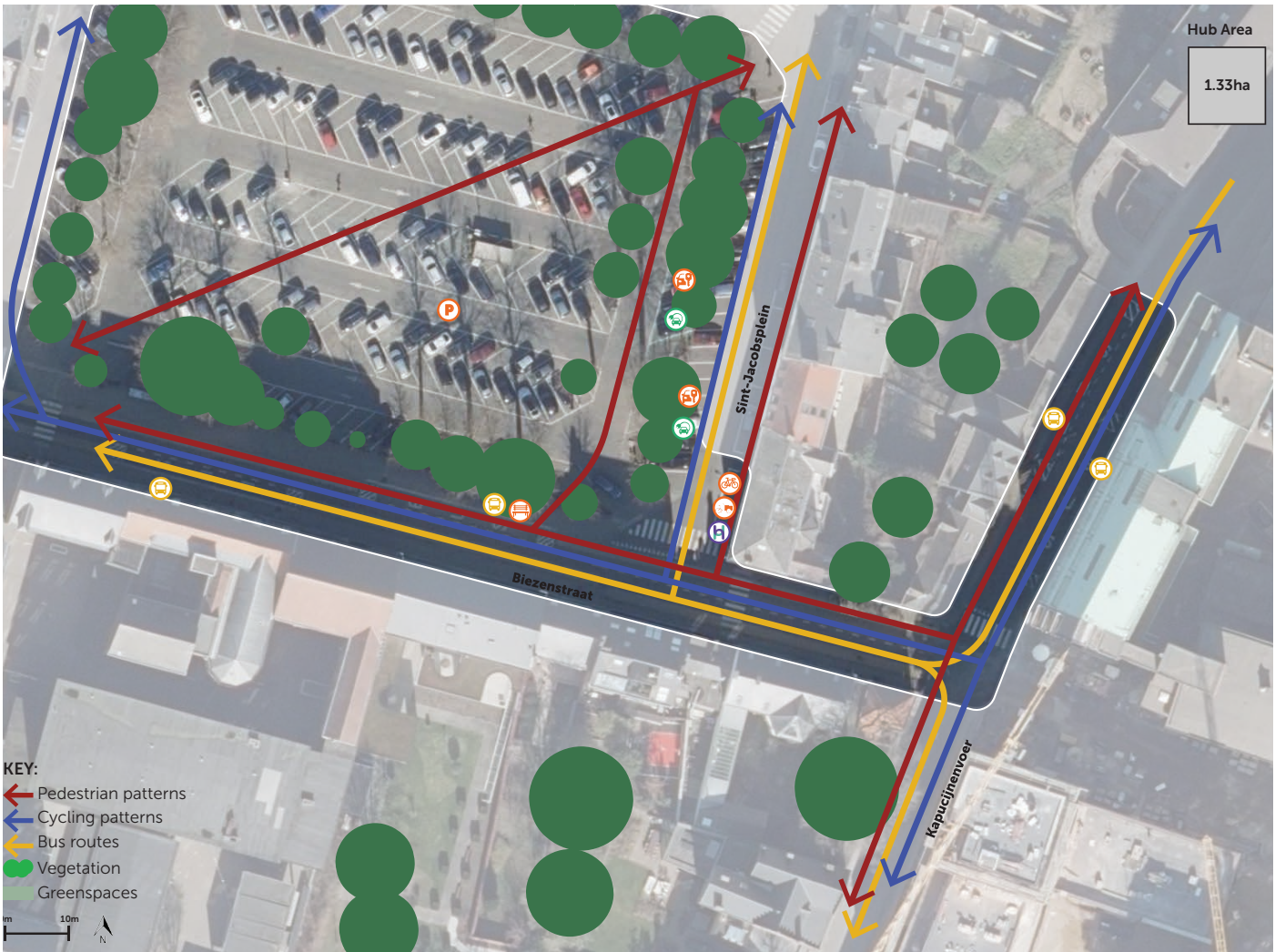

ABOVE: Mobility hub location.

Mobility Components

(H) Hoppin Totem

(car) EV Charging

(bus) Bus Stop

(P) Public Car Parking

(car) Car Club

(P) Disabled Car Parking

(bike) Bicycle Parking

(cargo) Cargo Bicycle Hire

Complementary Components

(seat) Seating

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: Sint-Jacobsplein Hoppin Point plan.

E.5.1 Mobility Hub Analysis

Sint-Jacobsplein is a space dominated by private vehicles, but the street design aims to shift the hierarchy to prioritise more vulnerable modes. The mobility hub is situated at the edge of the car park, closing parallel street parking for cycling parking, a cargo bike hire, and a wayfinding totem, situated at the corner of the street for visibility and accessibility. Car club bays and bus stops are just a short walk.

Despite the expansive car park, the street feels relatively well-enclosed due to the mature tree planting and is well-overlooked.

ABOVE: Sint-Jacobsplein.

E.5.2 Quality Assessment
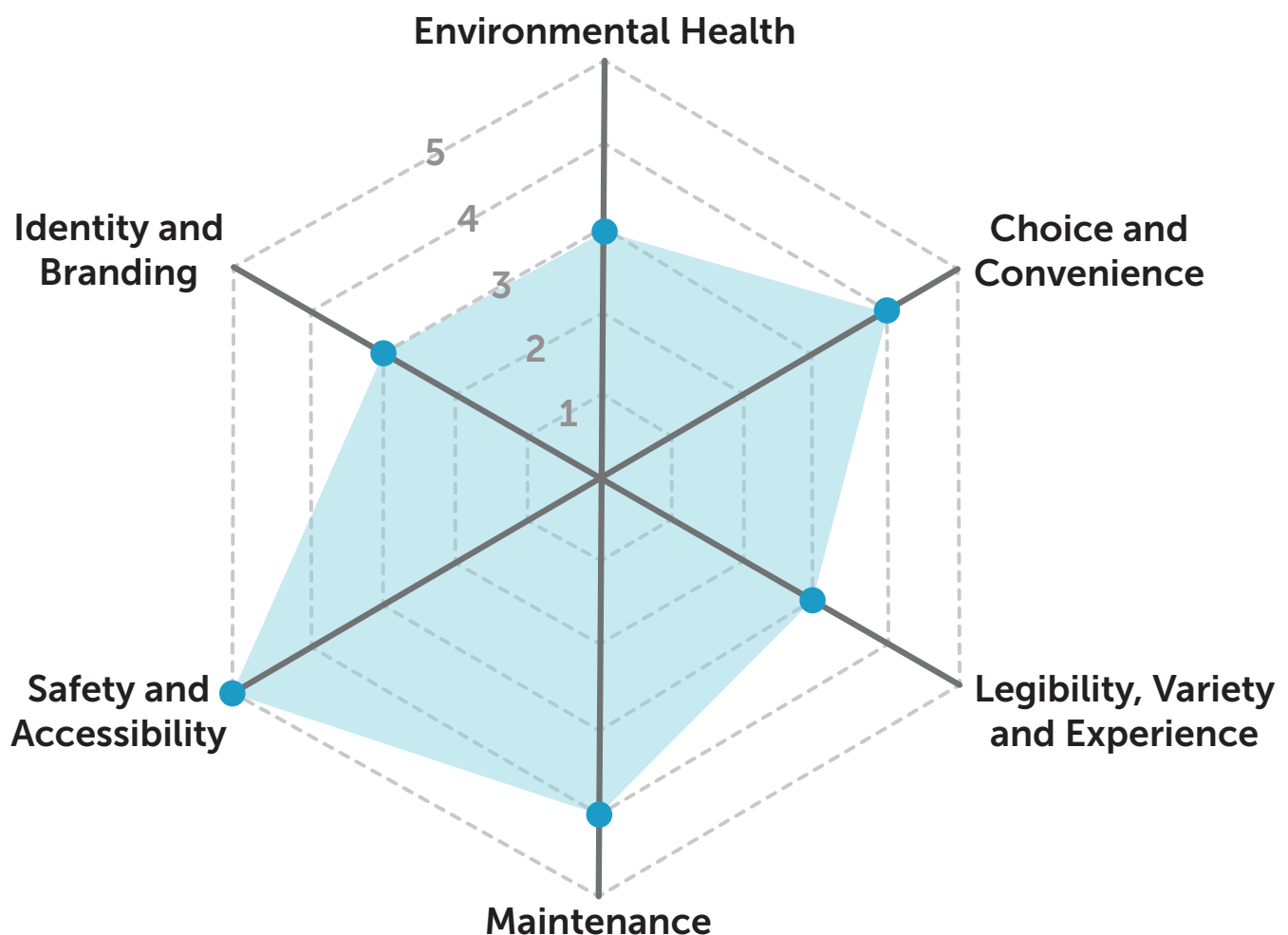
ABOVE: Quality radar chart.

E.6 Local
Vaartkom

Vaartkom is a significant regeneration project, converting former docks and breweries into a residential and economic quarter.
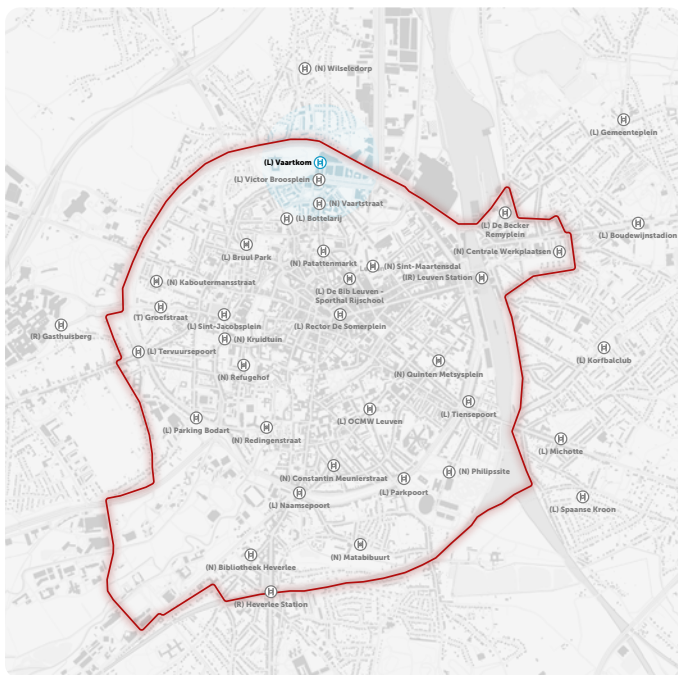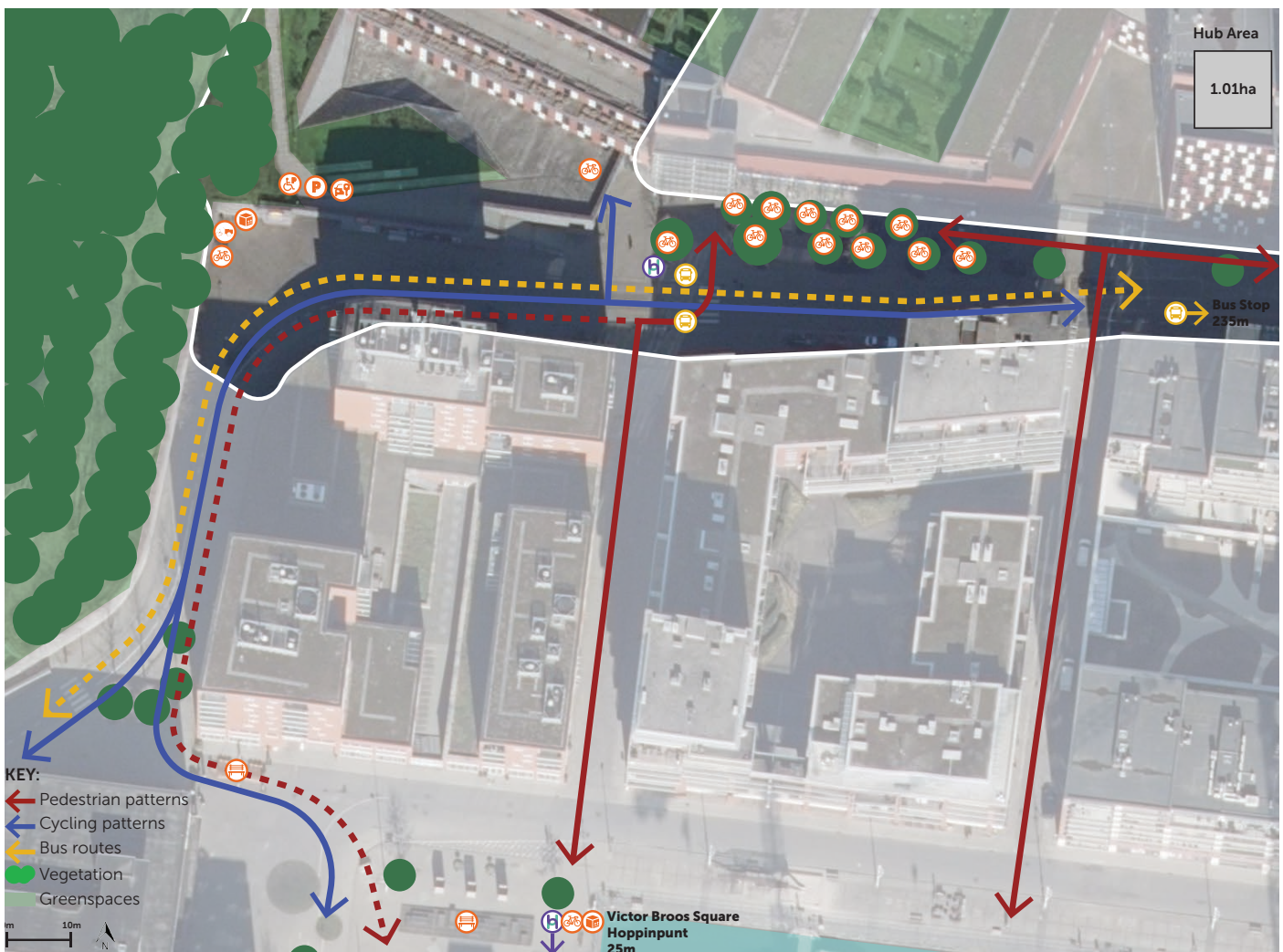

ABOVE: Mobility hub location.

Mobility Components

Ⓗ	Hoppin Totem	Ⓟ	Public Car Parking
🚍	Bus Stop	♿	Disabled Car Parking
🚗	Car Club	🚲	Cargo Bicycle Hire
🚲	Bicycle Parking		

Complementary Components

🪑	Seating	📦	Parcel Lockers

Hub Area

1.01ha

Bus Stop 235m

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

Victor Broos Square
Hoppinpunt
25m

ABOVE: Vaartkom Hoppin Point plan.

E.6.1 Mobility Hub Analysis

Vaartkom has two mobility hubs, which are interconnected due to their proximity. The Victor Broos Square mobility hub has fewer amenities in comparison to the Vaartkom mobility hub.

Vaartkom has its components distributed across multiple spatial scales. Covered cycle parking can be found underground, as well as on surface level, with parking bays designed around tree planting, creating a connection with the new green infrastructure. Parcel lockers and cargo bike parking take advantage of blank walls to add purpose, and retail outlets bring footfall to this space.

The mobility hub incorporates a Demand Response Transport option, called Hoppin Flex, where users can call a bus on the Hoppin mobile app. The wayfinding totem is situated at this stop.

The public space transitions from a comfortable, tree-lined environment, to one that is windy and exposed,

with high walls, and apartment blocks which lack visual interest. Despite this, Vaartkom offers a sensory experience through its restaurants and dock that make this an attractive destination that stands out from the Leuven character.
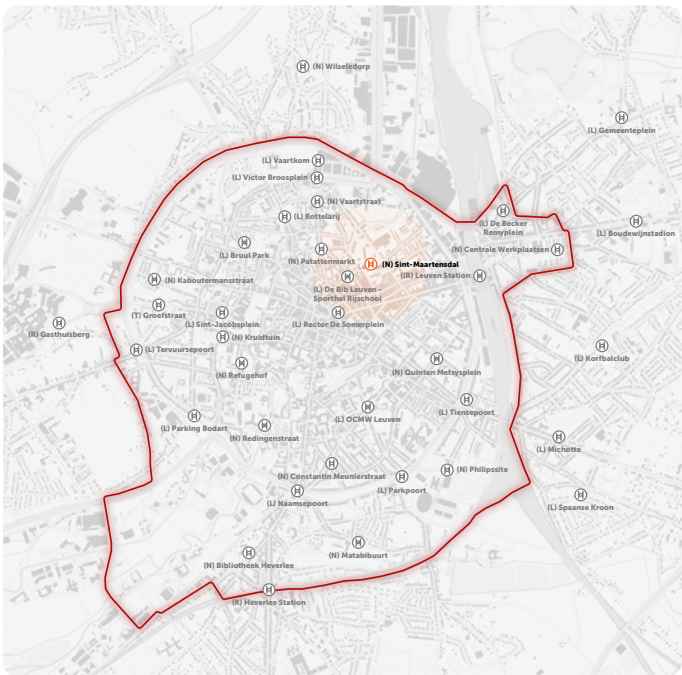

ABOVE: Vaartkom.

E.6.2 Quality Assessment
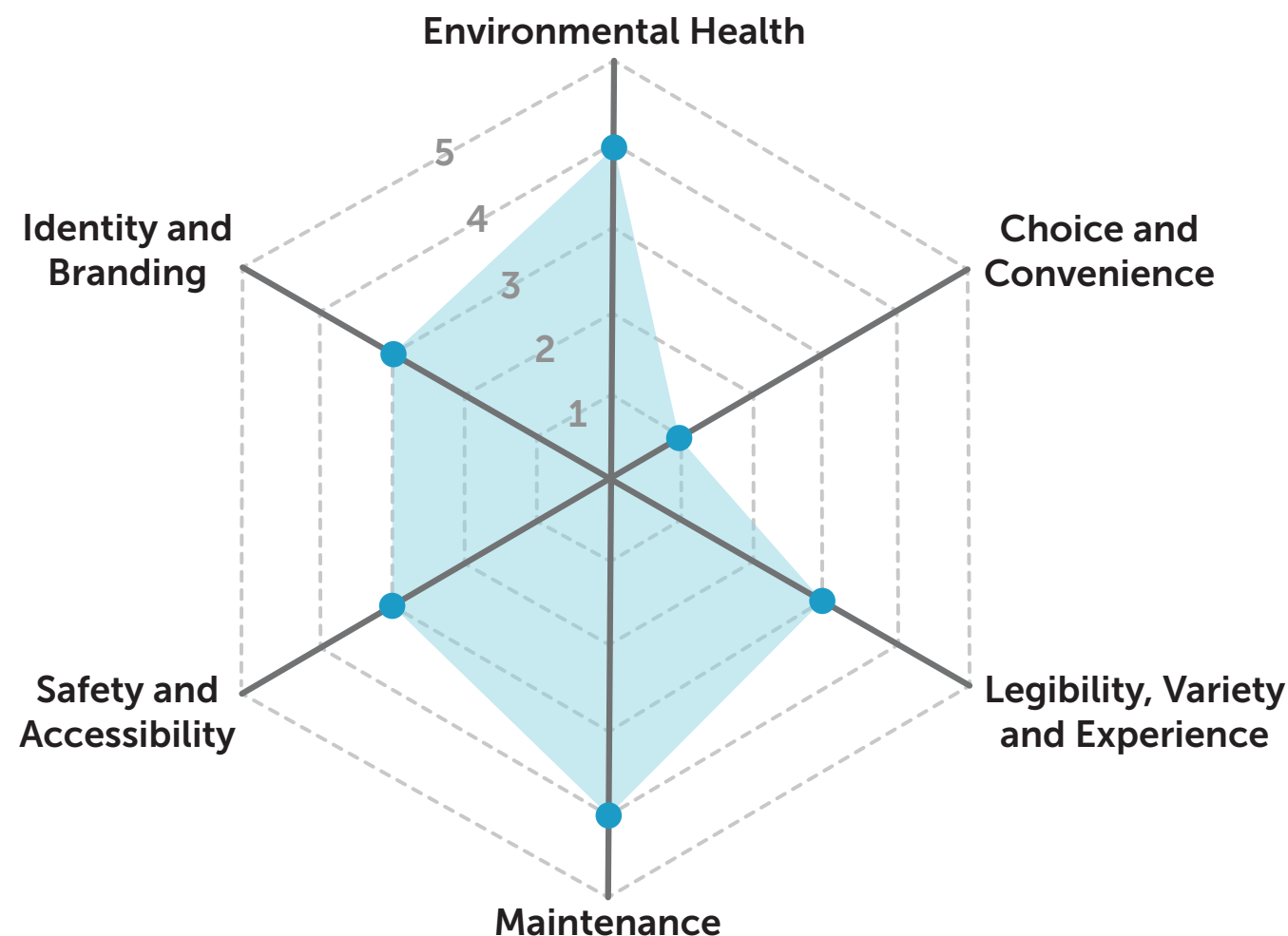
ABOVE: Quality radar chart.

E.7 Neighbourhood Sint-Maartensdal

A Neighbourhood point along Mathias Van den Gheynlaan, situated within an underused public realm in the 1960s Sint-Maartensdal residential complex.
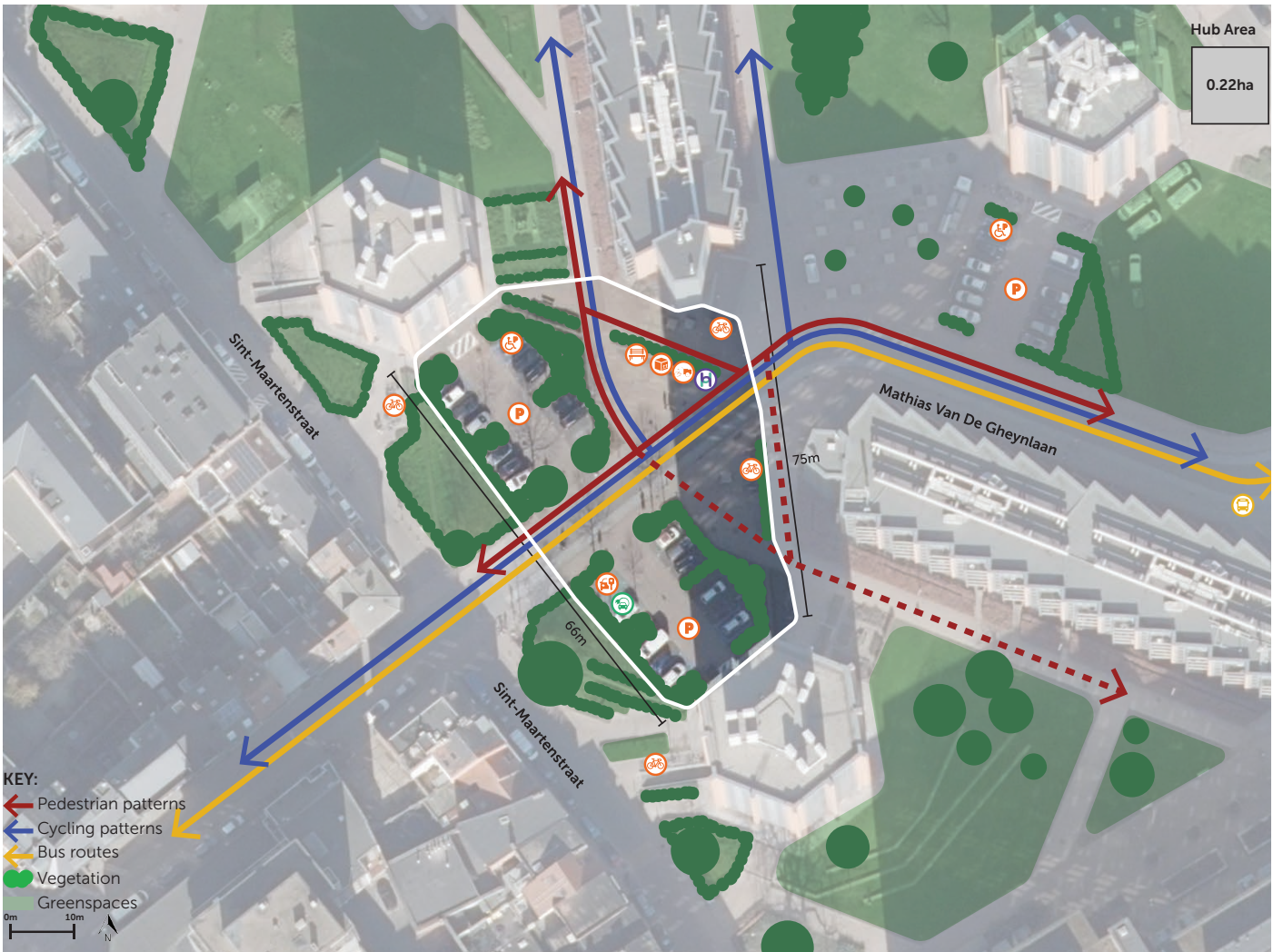

ABOVE: Mobility hub location.

Mobility Components

 Hoppin Totem

 Bus Stop

 Car Club

 Bicycle Parking

 Public Car Parking

 Disabled Car Parking

 Cargo Bicycle Hire

 EV Charging

Complementary Components

 Seating

 Parcel Lockers

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: Sint-Maartensdal Hoppin Point plan.

E.7.1 Mobility Hub Analysis

Sint-Maartensdal takes advantage of the plethora of public spaces provided in this masterplanned area. The wayfinding totem is well placed at the intersection point of key pedestrian movements, and stand's out amongst Leuven's signage-cluttered streets.

Cycling priority has been demarcated along the main road through paint rather than segregation, a reflection of Leuven's cycling culture. Many footpaths within this area experience cycling movements joining the main route. Multiple bus routes operate through the street connecting the city core to the railway station. A missed opportunity exists to connect the mobility hub to the adjacent bus stop, which lies just 87m away.

The mobility hub is well-integrated into existing hedgerows and tree planting and has a variety of publicly accessible greenspaces. However, natural surveillance could be improved, but the introduction of components in this space does give purpose to an otherwise empty public realm.
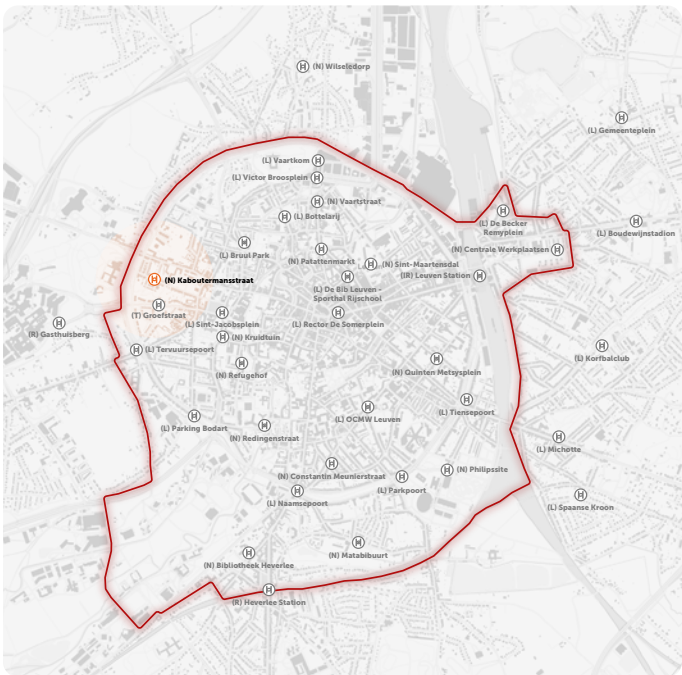
E.7.2 Quality Assessment
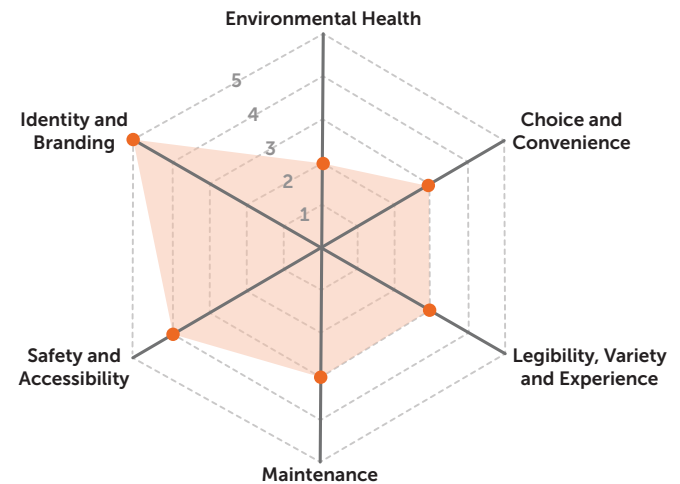
ABOVE: Quality radar chart.
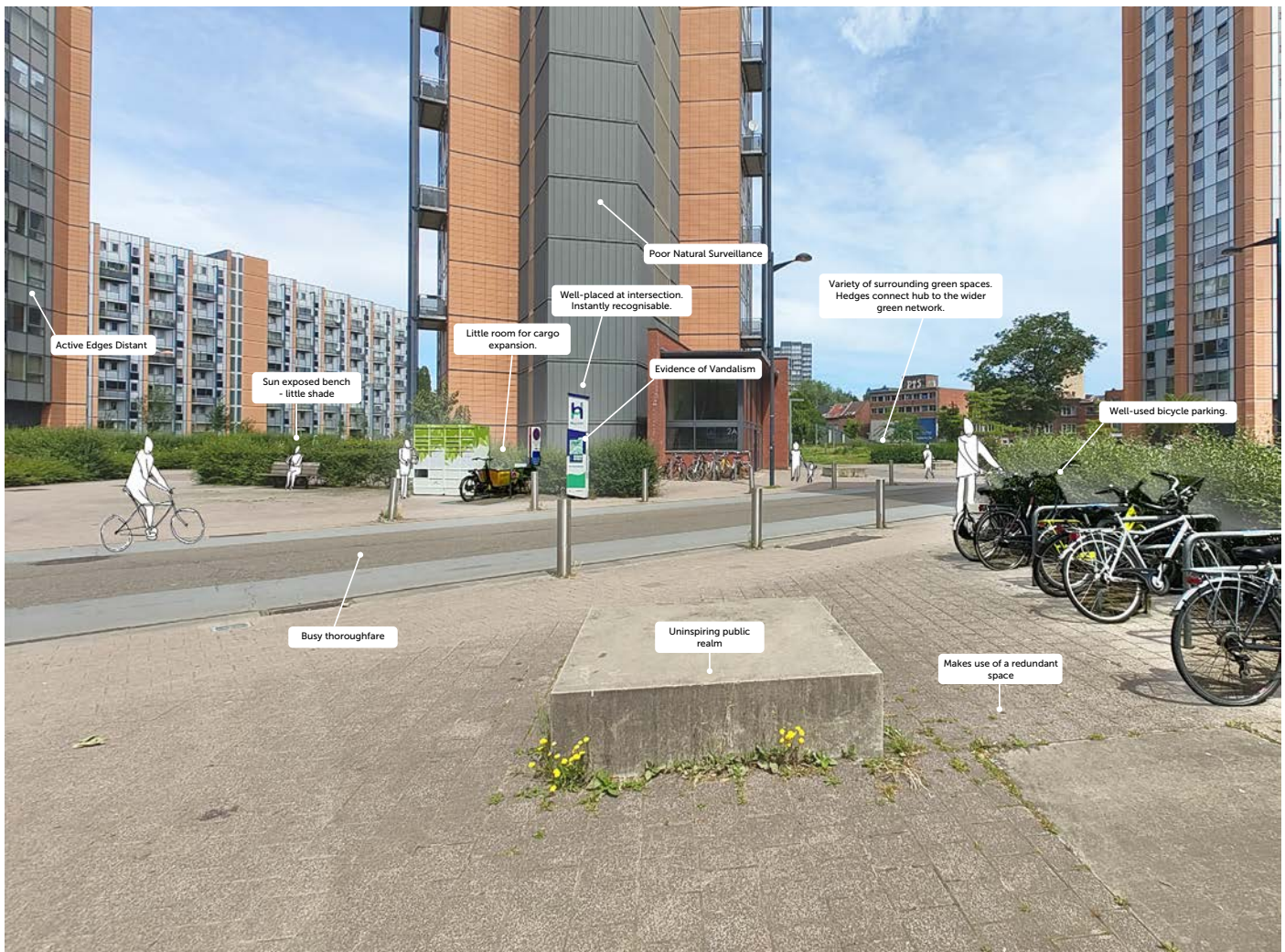
ABOVE: Photographic analysis.

E.8 Neighbourhood
Kaboutermansstraat

At the western edge of the city, adjacent to the ring road, Kaboutermansstraat achieves small-scale interventions to improve the accessibility and transport choices for a fairly car-dominated residential area.

ABOVE: Mobility hub location.

Mobility Components

- Hoppin Totem
- Bus Stop
- Car Club
- Cargo Bicycle Hire

Bus Stop
85m

Hub Area

0.1ha

Edouard Remyvest

Gijzelaarsstraat

Tolhuizenstraat

Muurkruidstraat

38m

15m

Kaboutermansstraat

Cardenberch

Car Club
75m

Cardenberch

KEY:
- Pedestrian patterns
- Cycling patterns
- Bus routes
- Vegetation
- Greenspaces

ABOVE: Kaboutermansstraat Hoppin Point plan.

E.8.1 Mobility Hub Analysis

Kaboutermansstraat is a quaint neighbourhood, with a mix of traditional terraces and cobbled streets, blended with larger apartment blocks, but achieves a consistent street frontage and comfortable scale that makes this a walkable and pleasant environment. The neighbourhood features direct access to Edouard Remyvest, a green walking and cycling corridor that follows the ring road along the western periphery of the city.

The mobility hub components are sparsely distributed, with components positioned in areas with distinctly varied characters. Not only does the character create a loss of cohesiveness, but as does walking distances and routes, with indirect linkages between components. Car club spaces have been provided at the bottom of the hill to the east, whereas e-cargo bicycle parking towards the top of the hill, which may make it an unattractive option.

E.8.2 Quality Assessment

The wayfinding totem is hidden amongst the network of streets, and complementary signage adjacent to nearby bus stops may help with legibility.
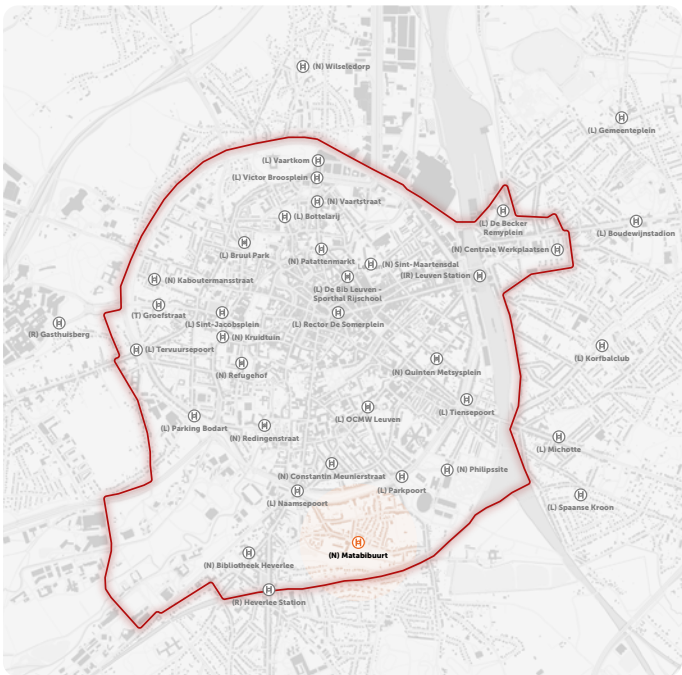

ABOVE: Kaboutermansstraat.
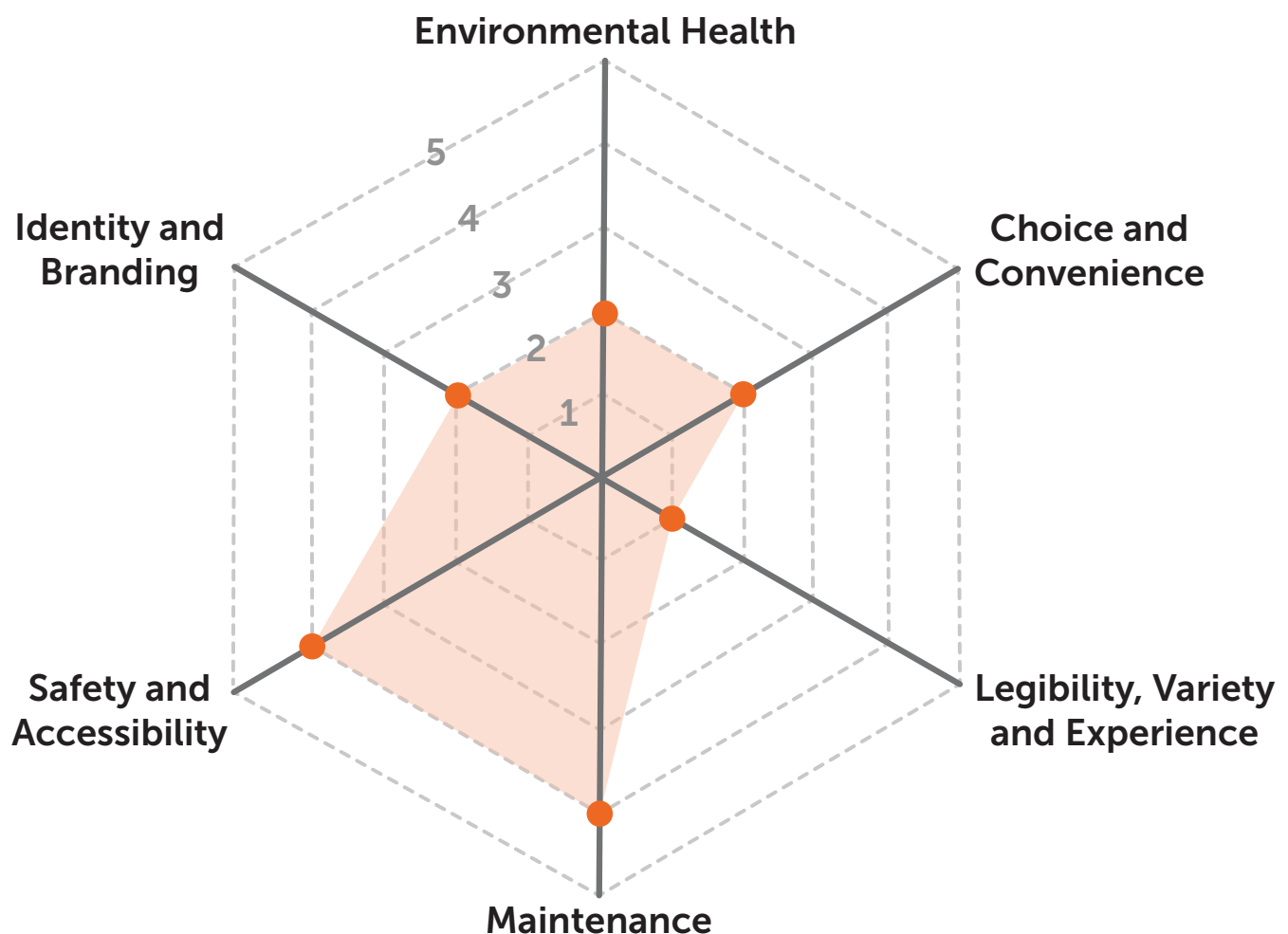
ABOVE: Quality radar chart.

E.9 Neighbourhood
Matadibuurt

Matadibuurt is a neighbourhood in southern Leuven, in short proximity to Heverlee Station, Leuven Sports Complex and a mix of parklands.

ABOVE: Mobility hub location.
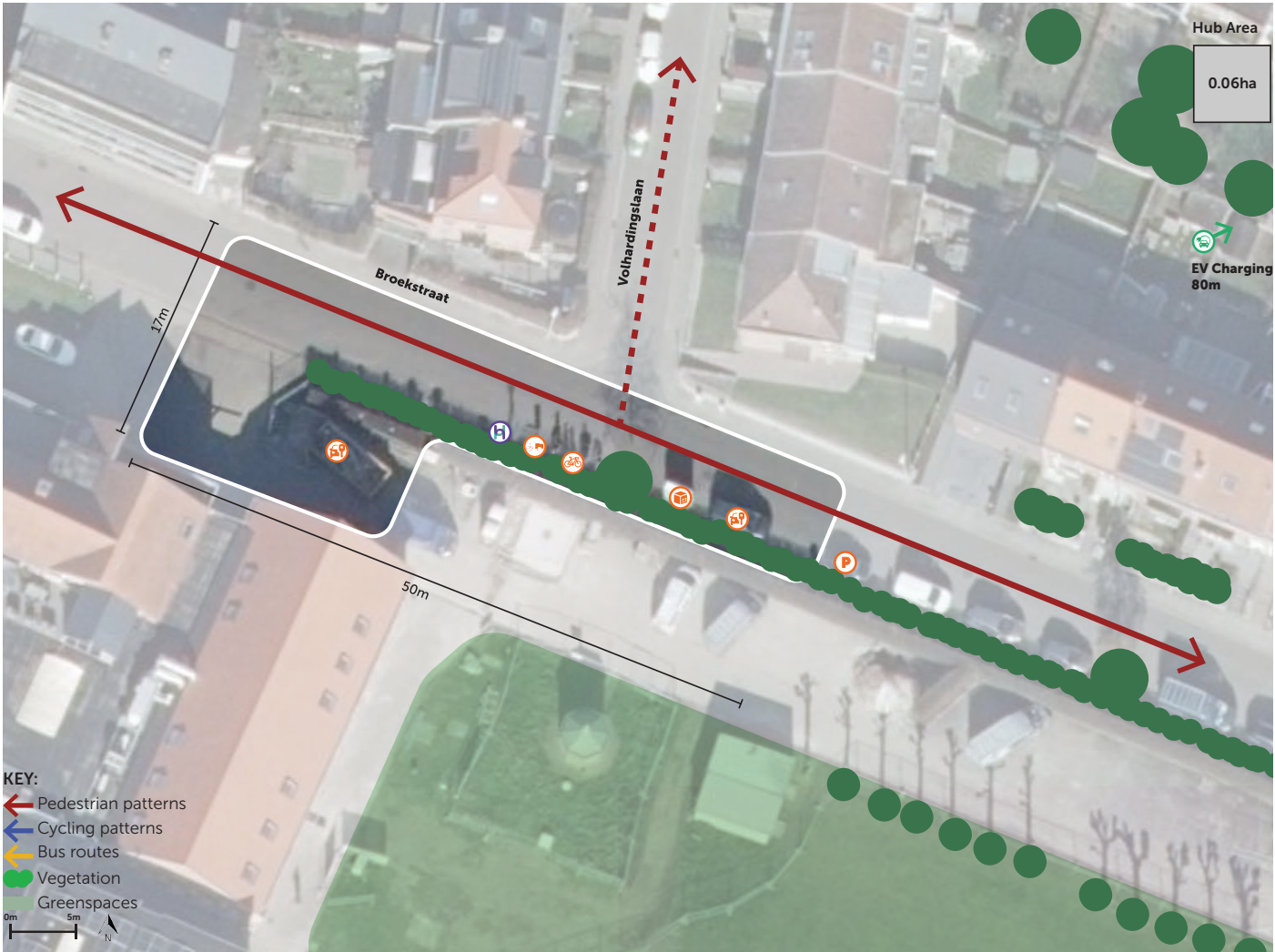
Mobility Components

🅗 Hoppin Totem   🅟 Public Car Parking

🚌 Bus Stop   🚲 Cargo Bicycle Hire

🚗 Car Club

🚲 Bicycle Parking

Complementary Components

📦 Parcel Lockers

KEY:
← Pedestrian patterns
← Cycling patterns
← Bus routes
● Vegetation
   Greenspaces

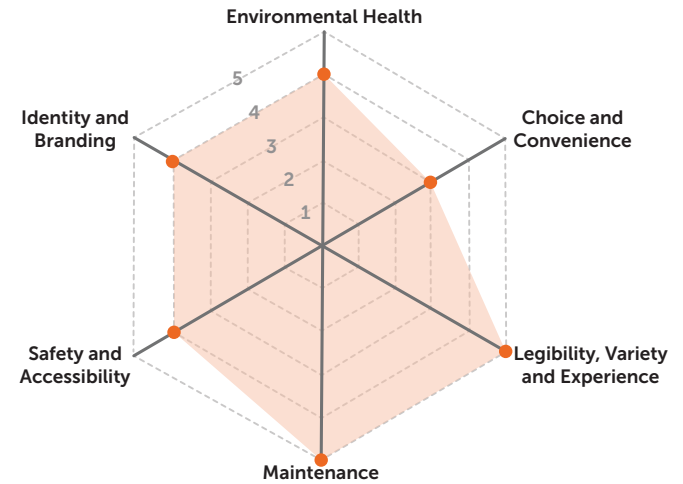**ABOVE**: Matadibuurt Hoppin Point plan.

E.9.1 Mobility Hub Analysis

Matadibuurt is a neighbourhood mobility hub designed to facilitate first/last mile journeys with new sustainable transport options. Converting existing car parking spaces, this mobility hub logically arranges its components at a movement junction.
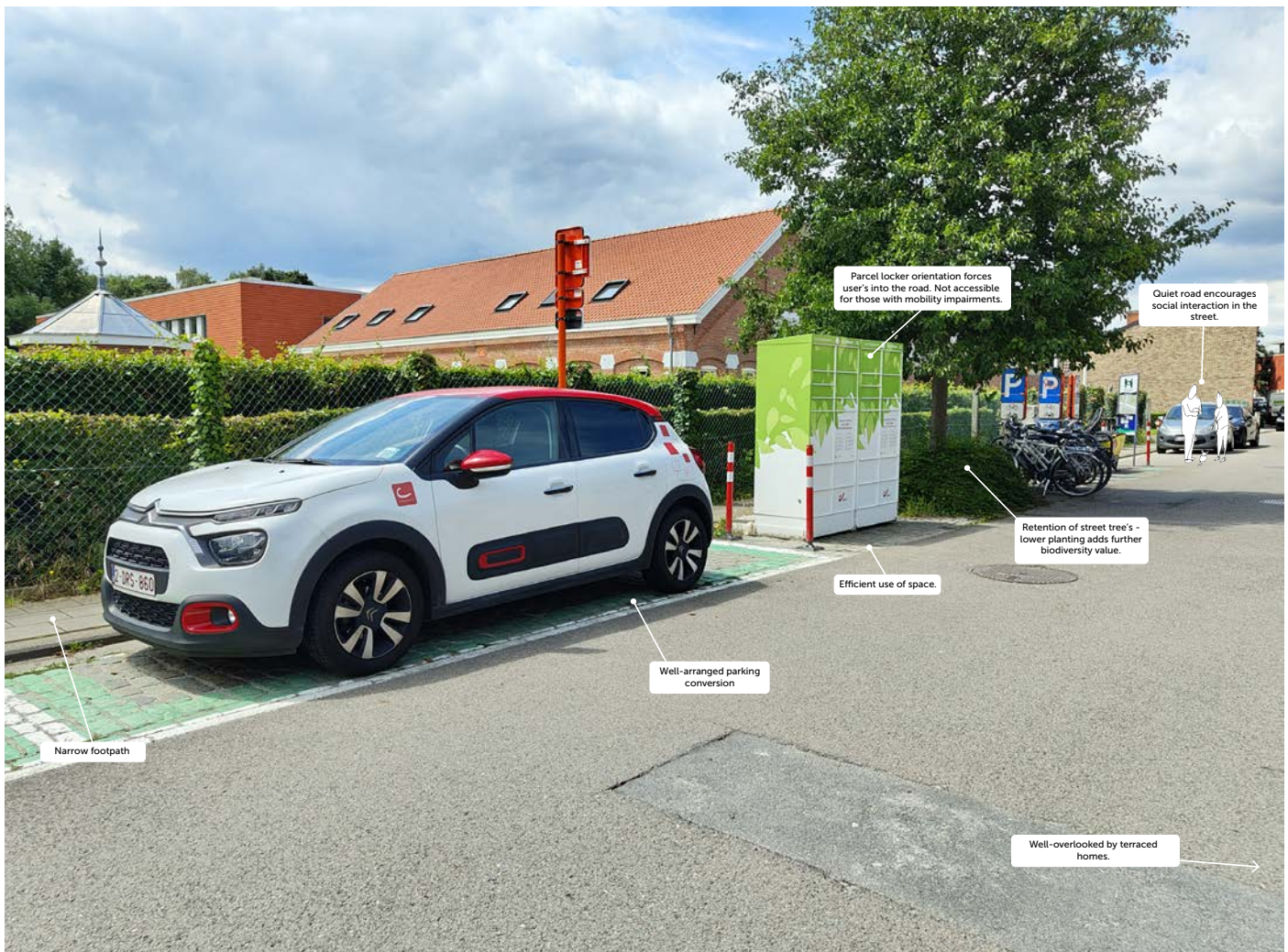
The quiet residential street is lined with well-planted front gardens and hedgerows, adding a green character to this neighbourhood. The wayfinding totem is placed at the western edge and is visible and identifiable along the length of the street.

Accessibility and safety could be improved, with parcel lockers forcing users into the carriageway to access the locker, and creating a barrier against the pavement.

E.9.2 Quality Assessment

ABOVE: Quality radar chart.

Parcel locker orientation forces user's into the road. Not accessible for those with mobility impairments.

Quiet road encourages social interaction in the street.

Retention of street tree's - lower planting adds further biodiversity value.

Efficient use of space.

Well-arranged parking conversion

Narrow footpath

Well-overlooked by terraced homes.

ABOVE: Photographic analysis.

E.10 Neighbourhood
Quinten Metsysplein

Situated a 15-minute walk from Leuven Station, Quinten Metsysplein is a comfortable public square, that opens up the urban form with high-quality planting, seating and community space.
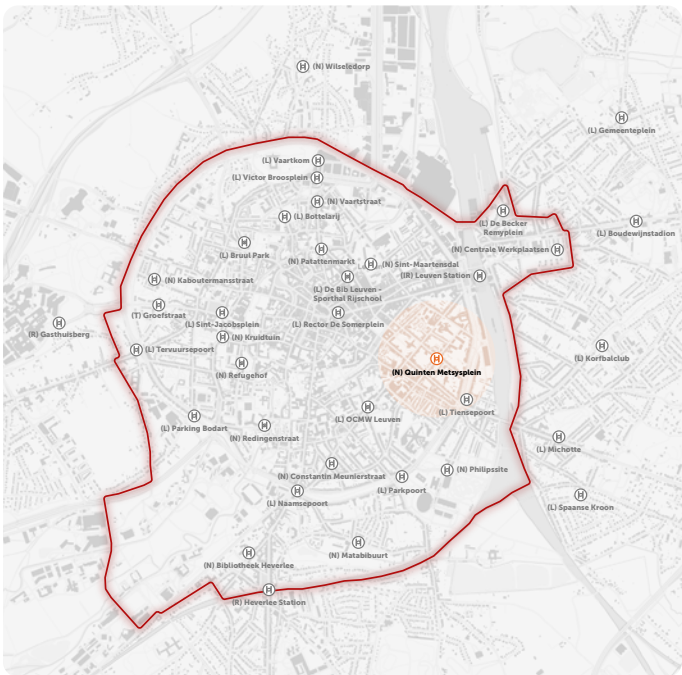
ABOVE: Mobility hub location.

Mobility Components

- (H) Hoppin Totem
- (car) Car Club
- (bike) Bicycle Parking
- (P) Public Car Parking
- (cargo) Cargo Bicycle Hire
- (EV) EV Charging

Complementary Components

- (seat) Seating

Hub Area

0.19ha

KEY:
- Car patterns
- Cycling patterns
- Vegetation
- Greenspaces

0m   10m

ABOVE: Quinten Metsysplein Hoppin Point plan.

E.10.1 Mobility Hub Analysis

This public square is well framed and over-looked, with building heights around 3-4 storeys, and emphasis on the street corners. The space adopts locally characteristic materials, with herringbone and paving setts, and architecture that adopts red-brick and white render, as seen elsewhere in Leuven.

The mobility hub converts street parking into car club bays, e-cargo bicycle parking, and a wayfinding totem, which are all highly visible and accessible. This is supported by an extensive choice of pre-existing cycle parking and seating.

On-route to the ring road, this space experiences frequent vehicular traffic, but the space acts as a traffic calming tool, and provides a comfortable environment for cyclists.

E.10.2 Quality Assessment
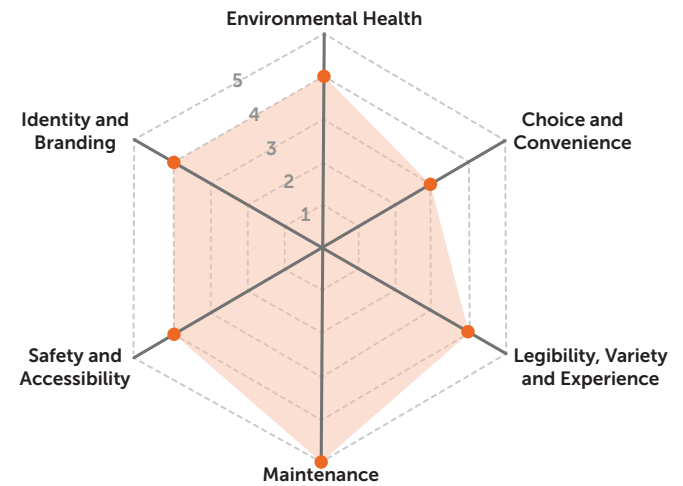
ABOVE: Quality radar chart.
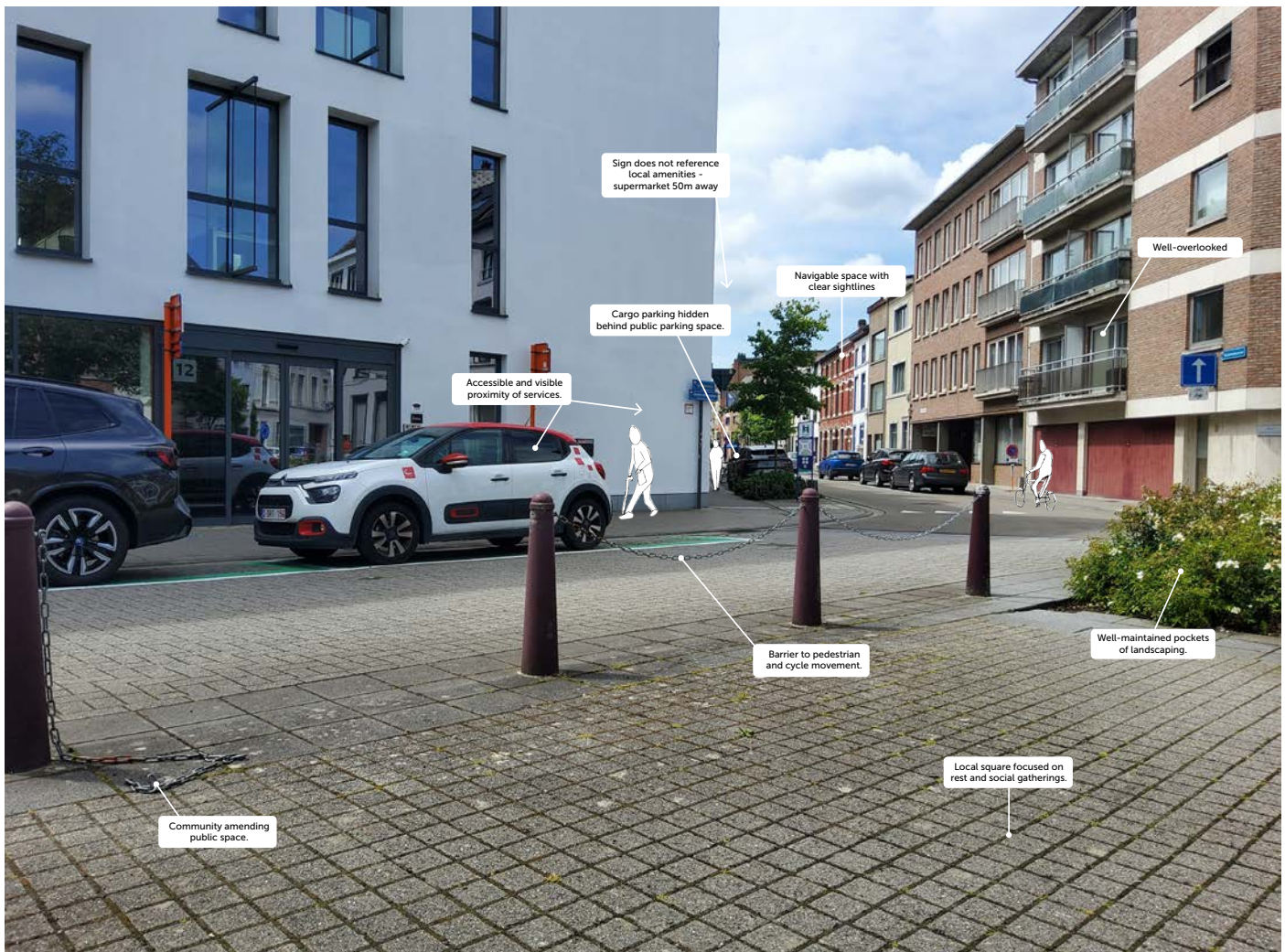
ABOVE: Photographic analysis.

Giuseppe Bonomo

A Framework for Mobility Hub Networks in the UK. How can a holistic approach to planning and design shape mobility hub networks in the UK?