

UK SAFETY BOARD INTERIM REPORT

TIER

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Foreword

TIER's mission is for shared, electric micro-mobility to deliver on its potential to make our towns and cities less polluted and congested. We will not pursue that mission at the cost of making UK cities less inclusive or less safe.

Members of the TIER UK Safety Board represent experts in transport and Covid safety, as well as people who can experience the greatest barriers in our society. With this expert knowledge of disability and transport safety, the Safety Board scrutinises our actions and holds TIER to the highest standards of safety. These standards are reflected through our operations in the UK, where the team can be proud of a safety record of zero injuries to riders or pedestrians across the entire period of this interim report: the first six months of TIER in the UK, encompassing tens of thousands of trips and hundreds of thousands of miles ridden.

Throughout our operations under the Government e-scooter trials to date, TIER has worked closely with leading individuals who understand the lived experiences of disabled people and their concerns. As a result, we have been able to better identify the measures we must take to mitigate the negative impacts micro-mobility can bring to our community.

These measures include completing our own Equality Impact Assessment before bringing e-scooters to UK streets, so identifying actions to lessen impacts on equality, as well as innovating to solve two of the main areas of concern emerging with e-scooter operators to date: the risks posed by silent vehicles to those with sight loss and the need for controlled and orderly parking.

At TIER, our pioneering safety culture saw the business become the first in the industry to commit to adding sound to our vehicles last year. In the past six months we ran a nationwide survey with blind and visually impaired people, and undertook extensive research with disabled people and national sight loss groups to develop a sound alert which will better enable people to identify when e-scooters are nearby. This report includes those initial findings. We have also deployed new protocols and technology to address the limitations of traditional approaches to parking, so minimising clutter and making street parking as accurate and orderly as possible.

By co-developing these solutions with disabled people, and delivering measures that seek to uphold safety and independence for diverse groups, we can deliver benefits for everyone in our society through the running of responsible micro-mobility. This is why we are delighted to share the recommendations from the TIER UK Safety Board and advocate for the legislation and regulation required to mandate these across the micro-mobility industry. We also share our safety data and outcomes, offering complete transparency into our operational performance.



Fred Jones
Regional General Manager, Northern Europe, TIER,
and Chair, TIER UK Safety Board

A stylized, handwritten signature in black ink, appearing to read 'Fred Jones'.

Executive Summary

The UK's e-scooter trials are core to Government plans for greener, cleaner and more sustainable towns and cities. The programme is an opportunity to assess e-scooters as a new mode of transport, and for operators to learn, share data and engage with key stakeholders to ensure the highest of safety standards for users and pedestrians made vulnerable by their operations. TIER's UK Safety Board, comprising independent experts in road safety, sight loss and other disabilities, has led interviews, focus groups and national surveys with disabled individuals and national sight loss groups to understand their key concerns about e-scooters. The report highlights actions required for responsible e-scooter use and parking, concluding with key safety recommendations to be adopted by all micro-mobility operators in the UK, whether to be enacted voluntarily, via city regulations, or potential Government legislation.

Research in this report shows blind and partially sighted people are universally concerned about poor parking and the silent nature of e-scooters

Heightened stress and anxiety from poorly parked e-scooters blocking pavements, and concerns on the quietness of e-scooters, were recurring themes in interviews, focus groups and surveys. Blind and partially sighted people noted they do not know when an e-scooter is approaching until the moment it passes them, based solely on the sound of wheels on the pavement and the electric noise of the battery. Moreover, guide dogs do not recognise them for these same reasons. As to parking, disabled people were concerned e-scooters would be left in designated disabled parking areas, whilst those abandoned on pavements would cause trip hazards.

The type of sound added to e-scooters is important to those with sight loss

Based on this research, TIER developed concept sounds with national charity Thomas Pocklington Trust that were played to participants. The primary outcome was that this should be constant, pleasant, loud enough and distinguishable from other city sounds, rather than mimic traffic or cars and tested in a safe controlled environment. It is vital that any sound delivered protects varying needs of diverse members of communities and reflects requirements of different environments.

Identifying suitable parking locations with communities, disabled people and Local Authorities is essential activity

The parking criteria for each city is unique and so parking solutions must be assessed on a city-by-city basis. Proposed solutions must have input from key stakeholders such as the Police, representatives of disabled people and pedestrians. Further to this, riders should be well-educated on proper road use and considerate parking behaviour, which is a duty of the operator.

New technology and partnerships can help mitigate issues with disorderly parking

TIER has implemented world-leading technology to set a new industry standard for e-scooter parking. TIER's partnerships with Lazarillo, the navigation app for people with sight loss, and Fantasma, developer of the world's most accurate parking technology, deliver robust solutions to the issues caused by abandoned e-scooters and mis-parking.

Legislation and regulation for improved safety across the micro-mobility industry

The research undertaken for this report has flagged clear recommendations for Government legislation, which would require all micro-mobility operators be bound to for delivery of safer services across the UK. Alongside delivery of an ethical sound alert solution and a parking approach that avoids reliance on inaccurate GPS signals, we also recommend lower speed limits of 12.5mph and a requirement for dynamic pricing which relieves pressure on riders to rush a journey while still keeping costs low. Using tools such as Equality Impact Assessments to identify actions which mitigate negative impacts on people with protected characteristics, and enhance the benefits of micro-mobility transport, should also be deemed essential for operators in the UK. This must therefore be accompanied by ongoing consultation with disabled people to co-design the solutions which protect safety in UK towns and cities.

TIER UK Safety Board

In advance of launching a UK service, TIER established an independent, member-led UK Safety Board to hold the business to the highest standards of safety and set a new bar for the e-scooter industry.

The Board meets quarterly to scrutinise TIER's approach to safety and responsible operations, stress-test the business' planned policies and features, explore best safety practice from other sectors, and advocate for new, industry-wide safety measures to mitigate the risks that e-scooters pose to cities.



David Davies,

Executive Director of the Parliamentary Advisory Council on Transport Safety (PACTS)



Dr Lena Ciric,

Associate Professor, UCL, and expert on COVID-19



Kirsty Hoyle,

CEO of leading accessibility body Transport For All



Mike Bell,

Senior Manager at Thomas Pocklington Trust (TPT)



Bhavini Makwana

Engagement Manager at London Vision, Ambassador for Retina UK & Co-Chair for sight loss BAME Committee

Protecting pedestrian safety

Statement from Mike Bell, Thomas Pocklington Trust and TIER UK Safety Board Member

Adopting micro-mobility transport solutions is part of the mix in addressing the climate emergency, but these cannot be at the expense of anyone in our society. At Thomas Pocklington Trust, for almost a year we have been collaborating with TIER on practical solutions that will not only help protect blind and partially sighted people and maintain their confidence and independence but ultimately set a standard for others to emulate.

The introduction of silent, heavy and fast e-scooters represents a real danger to all pedestrians, but especially blind and partially sighted people. Conducting a nationwide survey and running focus groups to better understand concerns, we provided the essential link for TIER to engage directly with the groups that could be impacted negatively by their services. Undoubtedly, the most widely held concerns are that e-scooters can be and too often are ridden on pavements and their silent operation makes it difficult for blind and partially sighted people to detect them. Improving the visibility of e-scooter licence plates by using black text on yellow backgrounds, investing in technology and training to curb pavement riding, and co-developing a sound alert with partially sighted people, are measures taken by TIER following this essential engagement with disability groups and organisations. To see some other operators now following their lead is testament to TIER's pioneering work in this area.

The recommendations presented here call for Government legislation - or new city regulations where appropriate - and the requirement of micro-mobility operators to adopt higher standards that will secure a safer experience for everyone in our society. -

Methodology and approach

“Scooters are still too silent to feel completely safe.”
Guide Dog user

Delivered by the member organisations of the Safety Board, a combination of interviews, focus groups and national surveys with disabled people were commissioned. These delivered better understanding of concerns surrounding the introduction of e-scooters to the UK and the actions required to address them.

Activity	Emerging Themes
Nationwide survey of all Sight Loss Council Members	<ul style="list-style-type: none">● 95.5% of respondents held concerns that e-scooters are silent and you cannot hear them coming● 72% of respondents fear obstructions from poorly parked e-scooters leading to trips and falls
Transport for All focus groups with Deaf and disabled people with a range of impairments to inform TIER Equality Impact Assessment	<ul style="list-style-type: none">● Concerns of collisions between pedestrians and other street users and e-scooters● Issues caused by poorly parked e-scooters● Possible benefits from ability to combine a mobility device with walking● Provision of personal transport can provide greater flexibility and freedom for movement

London Vision engagement with local blind and partially sighted people	<ul style="list-style-type: none"> Stress and anxiety heightened from existence of poorly parked e-scooters obstructing the pavement and a fear of collisions, trips and falls or obstructed journeys Concerns that e-scooters are inaudible when being ridden Fear of e-scooters being ridden on pavements and potential collisions that could result
In-depth interviews conducted by Thomas Pocklington Trust with blind and partially sighted people	<ul style="list-style-type: none"> Scooters are too silent to feel safe on streets Poorly parked vehicles are accidents waiting to happen, they are difficult to avoid and can cause tripping hazards

Outputs from each of these measures highlighted two recurring themes to be addressed: poor parking and the silent nature of e-scooters.

The widespread concern of these risks to public safety have been borne out in the media, with headlines routinely pointing to ‘abandoned and badly parked e-scooters’ resulting in fear and unease. Further detail therefore is provided on the characteristics needed for an acoustic vehicle alert on e-scooters and the approach required from operators to achieve orderly parking.

Addressing concerns through the addition of sound

“The first time I heard an e-scooter passing by, I thought it was a drone.” Symbol cane user

There are two primary scenarios where concerns held by visually impaired people could be alleviated through the addition of an alerting sound to an e-scooters presence: riding on pavements and riding through red lights.

These are major concerns because:

- Blind and partially sighted people do not know when an e-scooter is approaching until the moment the scooter passes by them. They identify it by the sound of the wheels on the pavement, its electric noise due to the battery, and when it rattles.
- Blind and partially sighted people cannot anticipate avoiding e-scooters because they don’t hear them, and guide dogs do not recognise them for the same reasons.
- E-scooter riders might not be able to tell if someone is visually impaired, leading to anxiety amongst blind and partially sighted people that riders could hit them if they assume they themselves are visible to all pedestrians. Some blind and partially sighted people will avoid crowded streets for this reason.

Expectations and insights for the scooter’s sound

“When I hear a new sound coming towards me, I would ask somebody to make sure it is not dangerous.” Symbol cane user

Sound helps to anticipate the approach of e-scooters:

- A sound would help understand where the scooter is coming from and its speed, especially in busy areas
- It would also help guide dogs to identify the vehicle
- Acoustic vehicle alerts must be tested in a controlled, safe setting to determine suitability before being tested in city environments so as not to alarm pedestrians
- Having a sound when a scooter is laying on the ground was also mentioned by one participant

Based on research, TIER created five concept sounds that were played to participants who were asked what they thought of the samples and how they imagined these sounds for e-scooters. This helped the business to understand the criteria required for sound design.

Essential criteria:

- Loud enough - more than currently and than when the samples were first heard
- Distinct, distinguishable and not blendable into the city sounds
- Relatable to an electric vehicle
- Able to indicate something is 'gearing up'
- Constant, not fading out and in
- Not attached to a specific e-scooter brand

Preferred criteria:

- Soft, not irritating
- Pleasant sound, comforting
- Not frightening (e.g no metallic or industrial sound)

Sound is one of the most important senses to rely on when navigating. It helps to anticipate moving objects or persons and decide on when to move and in what direction. Adding sound on moving e-scooters is not the only solution but it is the most pressing in order to ease navigation for visually impaired people and protect the safety of all pedestrians. This however must be developed taking into account a multitude of diverse needs, with an ethical and safe testing process in a controlled environment before trialling on city streets.

Key learnings

- An e-scooter alert must be co-designed accounting for not only the groups it delivers most benefit to but also the needs of people with hearing loss and neurodiversity
- Comprehensive testing of suitable sounds should be delivered in controlled, safe conditions that replicate real-life city experience before being tested on city roads
- Operators should develop a suite of measures that complement technology and set standards for safe rider behaviour, using training and engaging with local communities to set this expectation in rental scheme operations
- Operators must engage with a diverse group of people to develop solutions that protect their accessibility needs and deliver safety for everyone

"E-scooters can have potentially negative impacts on disabled and older pedestrians. At Transport for All, we urge local authorities and micro-mobility providers to recognise these and commit to taking action to mitigate them. We are delighted to see TIER committing to working with the organisations and groups that urgently need the addition of sound to e-scooters and with their honest and inclusive approach to developing a safe service." **Kirsty Hoyle, CEO Transport for All, TIER Safety Board Member**

Inclusive parking

Abandoned e-scooters in the middle of pavements, parking locations that are overfilled and in disarray and risks of additional street clutter in limited space are concerns widely held by the general public when it comes to the operation of rental e-scooter schemes. However, these are most acutely felt by disabled and older people, so addressing the issues that result from poor parking remains a key focus for TIER's UK Safety Board.

Through engagement with disabled people we were able to understand in greater detail the concerns with different parking approaches taken by operators across the country.

- **Free-floating:** when e-scooters can be parked anywhere on streets this can add to street clutter and opportunities for riders to leave e-scooters strewn across pavements, presenting trip hazards and unforeseeable obstructions
- **Unmarked parking bays:** when bays are not clearly marked e-scooters can end up scattered in a disorderly manner leading to areas that are impossible to navigate
- **Mis-managed parking areas:** when inaccuracies in GPS make it possible to leave e-scooters at already full bays and operators are slow to rectify, this can lead to space in surrounding areas becoming disordered and used as an extended parking bay with e-scooters occupying essential space needed for other road users
- **Lack of capacity limits on parking bays:** without capacity limits for identified parking bays areas can become overcrowded with vehicles leading to unsafe use of public spaces

Mandatory parking zones, managed well by operators and respected by riders, are therefore essential to protecting the accessibility of UK streets hosting e-scooter trials. Bays identified must be accessible to riders while not adding to street clutter. Co-designing requirements and identifying suitable locations for parking with local disabled people and groups are necessary actions for operators.

Methodology for inclusive parking

Working with TIER, members of the Safety Board developed a series of essential actions for operators to adopt when implementing rental micro-mobility schemes in the UK.

1. Develop key criteria unique to each city and assess parking spaces against these
2. Work with local communities and representatives for disabled people to understand suitable locations for parking that protects accessibility for all
3. Submit these for consultation to the Local Authority and continue to review with local community representatives first consulted to confirm suitability
4. Implement parking spaces and integrate with support through targeted pavement and parking patrols for the initial period to ensure new spots are deployed smoothly
5. Provide rider education and include detail on the impact to different road users from inconsiderate parking behaviour in order to prevent its occurrence
6. Prohibit parking in unsuitable locations through the use of no-parking zones
7. Deploy camera vision technology and capacity limits for parking bays in dense urban settings so as not to rely on inaccurate GPS

This methodology should be accompanied by clear reporting processes communicated well to the public, so people feel empowered to take action when affected by poor parking. As technology develops and innovation leads to better, more accurate solutions for parking, operators must continue to review their approach to parking, and seek out the partnerships that will improve their offer.

Visual impairment navigation

Working with services designed for specific needs for different groups of people can further improve safety when implementing parking solutions.

Sharing parking data with partner applications that support navigation for blind and partially sighted people can offer greater protection and improve safety standards for those that are more negatively impacted by poor parking practices. Through sharing data on the routes most used by the visually impaired community, operators are able to make better, well-informed decisions when distributing e-scooters, selecting locations for parking bays and setting up no-go and go-slow zones.

Meanwhile, operators sharing parking bay locations and the routes riders are allowed to take with navigation apps used by different groups of people can help raise awareness of the busy e-scooter areas when navigating cities.

We encourage TIER and all operators to integrate into wayfinding apps, improving access and convenience for both users and non-users of rental micro-mobility schemes when navigating towns and cities.

Camera positioning technology

When it comes to ensuring users actually park in the zones identified, GPS positioning does not provide enough accuracy in dense urban areas. This is why TIER has acquired next-generation mapping technology to improve positioning accuracy and create the world's most accurate e-scooter parking system.¹ GPS signals can have margins of error of many metres. The CPS (Camera Positioning System) partnership dramatically improves accuracy to within 20cm or less by utilising the smartphone camera of users and matching the visual camera content with an accurate 3D model of the city.

"Operators must work with a diverse group of people to ensure they deliver parking solutions that work not only for the users of their services, but for the people not taking part. Adopting a parking approach that invests in new technology, involves local people, and continues to challenge the minimum standard is a commitment we invite all operators to take, before further advocating for the legislation needed that will make inclusive parking solutions a necessity." **Bhavini Makwana, Engagement Manager London Vision and Board member**

Co-designing parking solutions

Alongside mandatory parking zones, any parking stand solutions for e-scooters must be designed inclusively, taking into account different access requirements of disabled people that improve confidence rental schemes are managed well and protect streets from additional clutter. In 2020 TIER collaborated with Sight Loss Councils to review the design of current e-scooter stands, and identify criteria when selecting locations for their installation in cities. Tactile indicators, the use of yellow banding and sensitive locations were identified as key actions to protecting access and preventing obstructions to pedestrians when using e-scooter stands.

Reporting poor parking and obstructions

Operators must provide multiple methods for the general public to report poor parking or obstructions caused by abandoned e-scooters. This should include traditional means as well as the technological solutions that bring convenience and ease. Partnerships with solutions, such as TIER's with Captur², speed up generic reporting lines, linking reports

¹ <https://www.tier.app/tier-partners-with-fantasmio/>

² <https://www.capturphotos.com/#product>

directly to maintenance and on-street teams and assist operators with understanding how their customers are using their services. These reporting methods must be clearly communicated through a variety of channels to reach the broadest possible audience, and ensure the public feels empowered to take action when being impacted negatively by poor behaviour or mis-managed schemes.

Industry recommendations from TIER UK Safety Board

1. Adopt an ethically tested sound that safely alerts pedestrians to e-scooters on streets without alarm or detriment

Electric vehicles, including cars, buses and now e-scooters, all require an alerting sound that everyone and particularly blind and partially sighted people can recognise in their environments to protect their safety and independence. Manufacturers, transport authorities and operators must work to identify sounds that work together, to complement our city soundscapes and ultimately protect everyone's safety. Sounds developed must therefore reflect the needs of a range of different groups to ensure that a solution delivers universal benefits to all pedestrians and reflects the needs of different cities.

2. Mandate a parking approach that includes consultation with local people and the use of technology that overcomes limitations of GPS and avoids unrestricted free-floating

Dense city environments with conflicting demands in limited spaces mean the identification of suitable parking locations can be challenging. Context and knowledge of local people are essential to the selection of suitable parking spaces for micro-mobility vehicles, and technology that demands accuracy for parking behaviour is vital. Operators must commit to an array of actions to protect inclusivity with on-street parking and avoid free-floating models in dense urban settings.

3. Legislate the restriction of speed limits to 12.5mph on all electric scooters and lower in appropriate circumstances

Speeds of e-scooters present the greatest risk to safety for riders and other road users. Mandating the requirement for caps to speeds on all e-scooters, private and rental, of 12.5mph and 10mph in go-slow areas will curb the risk riding too fast presents to road environments.

4. Offer dynamic pricing for riders that protects safety and encourages good behaviour

Typical approaches to pricing that are based on journey times can lead to poor rider behaviour. The pressures to arrive at a destination quickly to achieve the cheapest possible cost can lead to speeding, ignoring red lights and other unsafe behaviours. Operators must consider a non-typical approach that encourages riders to take their time without impacting on levels of affordability.

5. Test vehicles when procuring micro-mobility solutions

Testing that demands vehicles be placed in a myriad of situations, all of which could be possible in town and city environments, should be part of a procurement and selection process. Unsubstantiated claims made by operators of their vehicle standards and technology are not sufficient, and if not tested thoroughly could put public safety at risk. Mandating this as a requirement for procurement processes is essential for city authorities to be able to make the safest selection when adopting micro-mobility solutions for their communities.

6. Assess and mitigate negative impacts through an Equality Impact Assessment (EqIA)

Operators, local government and transport authorities all should undertake an EqIA to identify the mitigating actions they can take to reduce the negative impact of micro-mobility transport on people with protected characteristics, and develop the solutions that will heighten its benefits. EqIAs are not 'final' and should be continually reviewed and updated as rental schemes, learning and research develops and matures, involving experts from the outset.

7. Consult and engage with disabled people and those who may not be able to partake in mainstream micro-mobility solutions

Seeking out the viewpoints and concerns of disabled pedestrians, through a range of accessible communication methods should remain a top priority for micro-mobility operators and transport authorities. Co-designing solutions with people that have different needs is essential to maintaining inclusion and accessibility in UK towns and cities..

8. Develop adaptable vehicles and solutions that bridge the gap for disabled people to enjoy micro-mobility benefits

The industry must invest and commit to improving accessibility in their offer to society. Operators must achieve long-term cultural change within their organisation to ensure disabled and older people's needs are an integral part of the design, development and delivery of their solutions. Operators must prioritise collaboration with disabled people and groups which represent them to gather insights and identify the right solutions to address barriers and issues.

9. Mandate the requirement for disability equality training for operator employees including visual impairment specific training

Ensuring staff have undergone effective awareness training that recognises the diverse needs of people in our community is key for designers, operations and leaders in the industry to make the decisions that are inclusive and improve accessibility for the broadest in our society.

10. Seek advice from the experts and representatives and hold operators accountable to continually improve standards for safety

Operators must consult with experts so as to better inform decision-making as trials of e-scooters continue, and work with national and local government to deliver the legislation required to enforce them.

"Local and national government, transport authorities and operators all have a vital role to play in setting standards that meet and alleviate concerns held by the public when it comes to safe transport in the UK. Local regulations and national legislation must ensure high standards of safety for operators to adhere to, if cities are to realise the full benefits of micro-mobility." - **David Davies, Executive Director of the Parliamentary Advisory Committee on Transport Safety (PaCTS) and Board member**

Appendices

Appendix 1 - Literature review wayfinding in the city for visually impaired people

Sight loss affects a person's ability to pick up information from the surroundings. For visually impaired people, important information can be found in two primary zones:

- The path ahead. Blind pedestrians need information about obstacles that may occur in the spatial area through which they will be moving.
- The adjoining space (immediately perceptible to both sides of the intended path and overhead). Blind pedestrians may need information about features of the space that adjoin the travel path, particularly so that such features may serve as landmarks.

Landmarks and obstacles act as wayfinding aids

- The obstacles along a path help blind people estimate their distance to an object, and to understand their location and direction.
- Ordinarily, route knowledge includes landmarks (e.g., distinctive characteristics of the surface underfoot or features in the spaces bound by path segments) which pedestrians use to confirm their route positions.

Cognitive representations of the environment

- Visually impaired people often find themselves in situations in which landmarks are scarce, and, when this is so, they must depend on more generalised or stereotyped cognitive representations.
- Some of this can be replaced with tactile or audible information but much cannot. Visually impaired people deal with this by relying on their mental maps of an area. This meant that predictability in the environment is essential for wayfinding.

Sound is the most important sensory input

- Sound is the most used environmental sensory input in urban areas. Visually impaired people assess the distance of a sound source, the estimation of the location of landmarks and reference points.
- Both blind and sighted pedestrians must use estimates of the rate and direction of motion of moving things in order to make decisions about when and when not to move and, if to move, in what direction and how fast. Blind pedestrians get the information they need for these decisions by hearing audible things in motion .

Appendix 2 - TIER UKI Safety Outcomes December 2020 - May 2021

Target Outcome	Key Metrics	KPI
TIER's service meets user demand and expectations	Rider satisfaction (% trips rated > 4 out of 5)	78%
TIER's service is reliable and can be used safely	Safety check / sanitisation performed correctly %	99.9%
	Scooters repaired %	4.0%
	Helmet availability rate (% of trips)	99.6%
	Trips where riders use the helmet % (peak)	29.8%
	Riders who wore a helmet (% of riders Jan - April 21)	14.7%
TIER e-scooters do not cause additional anxiety to vulnerable residents	Negative local media reports on TIER	0%
	Complaints about TIER from people with visual impairment (% of complaints)	0%
	Serious complaints about TIER (% of complaints)	0%
TIER's service does not create additional risk to travelling around the city	E-scooters parked correctly (out of harm's way)	98.1%
	Complaints regarding parking and street clutter (% of complaints)	0.03%
	Report rate of TIER pavement riding (% of reports)	0.04%
	E-scooters left outside the designated business area	0.01%
	E-scooters fallen over > 3 hours	0.08%
TIER's service safely integrates into transport mix	Accident rate	0%
	Near misses incident rate	0%
	Police report rate of unsafe behaviour	0.1%