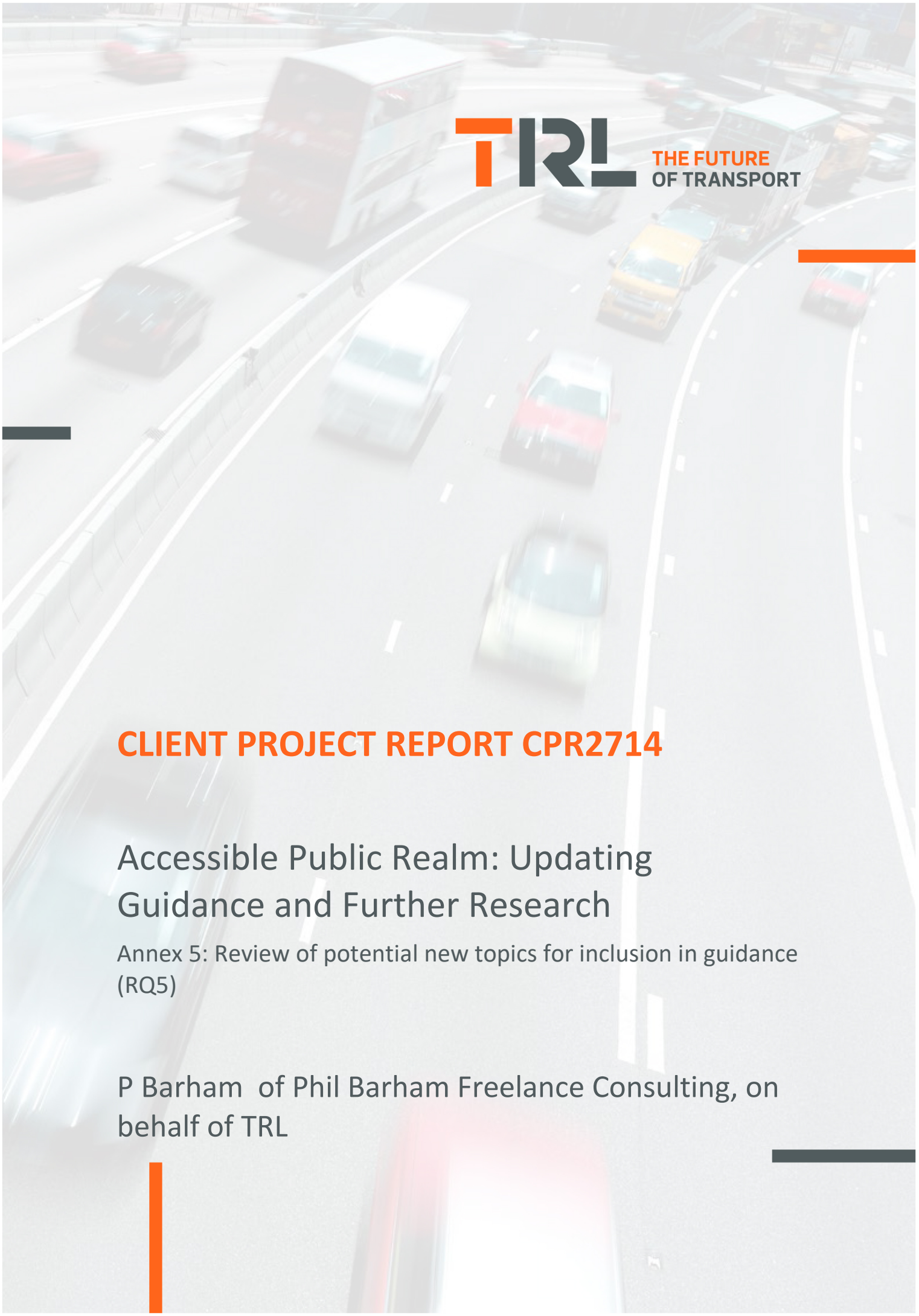

THE FUTURE OF TRANSPORT

CLIENT PROJECT REPORT CPR2714

Accessible Public Realm: Updating Guidance and Further Research

Annex 5: Review of potential new topics for inclusion in guidance (RQ5)

P Barham of Phil Barham Freelance Consulting, on behalf of TRL

Report details

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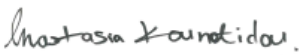
Anastasia Kounatidou (Project Manager)		Marcus Jones (Technical Reviewer)	

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Executive Summary

This document forms a Technical Annex to the report *Accessible Public Realm: Updating Guidance and Further Research* prepared by TRL for DfT. It sets out the detailed methodology, findings and recommendations from a workstream within the overall project that investigated whether and if so, which additional topics should be included in a future update of the Government's guidance on the accessible public realm.

Ten potential new items were selected and divided into two groups, one featuring innovations in transport infrastructure affecting cyclists and pedestrians, and the other concerning new technologies and the use of online public transport information. Each of these groups of items became the subject of discussion at a stakeholder workshop, as follows:

- **New infrastructure relating to cyclists and pedestrians** (bus stop bypasses, shared cycle / pedestrian pathways, cycles as a mobility aid, and pedestrian crossing control boxes)
- **New technologies and the use of online information** (touch screens, real-time information in stations and in vehicles, contactless ticketing, website accessibility, smartphone apps, wayfinding technologies used by blind and partially-sighted people)

Discussions with the stakeholders were informed by a literature search which also served to gather information to support any subsequent drafting of new material for *Inclusive Mobility*. There was general agreement that *Inclusive Mobility* contains out-dated content that can be omitted and several points of detail that need to be updated.

Additional guidance is recommended on:

- Bus stop bypasses, reflecting concerns about their impacts on people with impaired mobility, but acknowledging the benefits to cyclists
- Discouraging the mixing of cycle and pedestrian traffic on the same pathway
- Making cycling facilities accessible to disabled cyclists, so encouraging the use of cycles as a mobility aid

Design guidance in documents focused on cycling infrastructure may also need to be updated to ensure consistency between sources. There are several current initiatives by DfT, Transport Scotland and other government bodies that have a bearing on the design of the built environment: specifically cycling infrastructure, shared-space, side-road crossings and new personal mobility devices; these will all need to be considered in future updates.

Guidance on new ICT and internet-based technologies should be included, but it should set out general design principles and avoid duplicating existing technology-specific standards.

1 Introduction

1.1 This document

This document forms a Technical Annex to the report *Accessible Public Realm: Updating Guidance and Further Research* prepared by TRL for DfT. It sets out the detailed methodology, findings and recommendations from Research Question 5 (RQ5) of the project which considers the inclusion of additional content in the government's guidance on the accessible public realm.

1.2 Background to the research

This research considers whether additional topics such as new public transport technologies and innovative forms of transport infrastructure should be included in a future update of the Government's guidance on the accessible public realm; with a particular focus on Inclusive Mobility. A further objective was, for each new topic, to understand what fresh material should be included. The research also considered whether there was material that is no longer relevant and could be removed from the current version of Inclusive Mobility. The activities of the current research built upon the output of a predecessor Scoping Study, as set out in the report Updating Guidance on the Accessible Public Realm.

The text of Research Question 5 that was posed is as follows:

"New sections for Inclusive Mobility should be determined and produced to cover modern facilities and innovations such as touch screens."

It is recognised that there has been both a bedding-in of understanding around the issues dealt with in the Department for Transport's guidance document on accessible design, *Inclusive Mobility*. Since its publication, in 2002, there have also been a number of new developments, particularly relating to new technology, which will have an impact on the beneficiaries of *Inclusive Mobility*, notably older and disabled people. There is a need to understand what any new topics should cover, and what needs to be written about them in a revised version of *Inclusive Mobility*, so that public transport infrastructure and the related pedestrian environment can be better shaped to the needs of all potential users.

2 Methodology

The general approach has been to first decide upon the modern facilities and innovations that will be the subject of new sections in *Inclusive Mobility*, and to then progress discussions on what the new sections should contain. The task of deciding upon a 'short list' of innovations and new technologies to be the subject of a thorough literature review and of discussion at subsequent workshops was carried out through a review of the findings of the predecessor Scoping Study and in collaboration with the Project Steering Group. This is described in more detail in sub-sections 2.1 and 2.2. The overall methodology is summarised in the following flow chart.

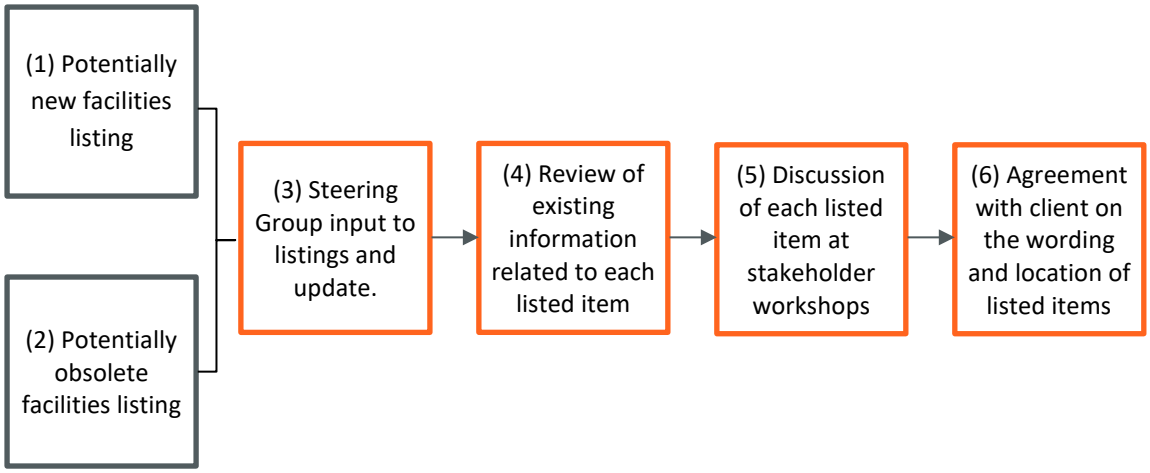

Figure 1: Project flow chart

2.1 Initial review of new sections that should be added

The task began with a review of the findings of the Scoping Study, with the research team reflecting on any updates or alterations that might be considered to the recommendations of this predecessor report. The current version of *Inclusive Mobility* was then reviewed in full, with three types of potential change identified:

- new innovations, features or facilities to be included in a revised draft;
- items which might be removed;
- updates required to the existing text.

The remainder of this report on activities responding to Research Question 5 will focus on the first two bullet points, above. A list of updates required to the existing text, including references to the Disability Discrimination Act of 1995, and to standards and regulations that have since been superseded, are reported separately.

2.2 Steering Group input

The Project Steering Group was invited to comment on the initial recommendations of the research team in terms of the three different types of potential change to the current *Inclusive Mobility* document described in sub-section 2.1. This review phase took place in May 2019, and helped to finalise which innovations and new technologies would be considered for further discussion during stakeholder workshops and be the subject of a literature review.

2.3 Literature review

A literature review was undertaken, with a focus on the subject areas selected by the project activities to date. The main objective of this review was to establish the extent to which good practice guides (in the UK, in the EU and beyond), guidelines and standards exist in relation to the accessible design of the innovations and new technologies under consideration to be included under new sections of *Inclusive Mobility*.

In the context of Information and Communication Technologies (ICT), the focus was placed on the many detailed standards that have been drafted, on many aspects of ICT, since 2002, including those of the International Organisation for Standardisation (ISO) and the European Committee for Standards (CEN), and on the output of authoritative EC-funded projects such as CARDIAC (Coordination Action in R&D in Accessible and Assistive ICT). For innovations in public transport infrastructure that did not concern ICT technologies, attention was more focused on official guidance published by the Government (such as Local Transport Notes and Traffic Advisory Leaflets) since 2002.

Whilst an emphasis was placed on searching for evidence of authoritative and well-established standards and guidance documents, which would provide robust material for *Inclusive Mobility*, a formal literature review was carried out to search for evidence of any research that might have been carried out into the design of the aspects of public transport infrastructure that were of interest to the current Research Question. The literature review

also included any reports or policy statements that might be available from organisations representing the interests of older and disabled people, relating to any concerns that these groups might have for the introduction of public transport infrastructure innovations being considered. Members of the project's stakeholder group were consulted as part of this process, to identify reports and other publications that might be of interest. Equal importance was given to searching for examples of work being undertaken into the accessible and inclusive design of such innovations, particularly where empirical research had been undertaken to establish the safety, or otherwise, of an innovation.

Part of the literature review involved formal searches of research databases using keywords, although much important information and copies of key documents were volunteered by stakeholders during the course of wider consultation activities for the project.

For the formal aspects of the literature review, the following databases and journals were searched:

- CORE
- PloS One
- ScienceDirect
- TRID
- Google Scholar
- Web of Science
- Journal of Disability Policy Studies
- Pub med
- Journal of Visual Impairment & Blindness

The review was implemented using the following search terms:

("Mobility impair*" OR "Visual impairment*" OR "visually impaired" OR Disabilit* OR Disabled OR Blind* OR "sight loss" OR "Hearing loss" OR "Partially*sighted") AND (Inclus* OR Accessib*) AND technolog* AND (Street* OR Urban OR Road* OR City OR Cities OR Transport*)

In addition, organisations and individuals were approached formally for the purpose of asking whether they had published relevant reports that could be made available to us. The full list of organisations contacted is as follows: The University of the West of England, London Travelwatch, the University of Westminster, City of Edinburgh Council, Leith Council, Euan's Associates, Sue Sharp, Edinburgh Access Panel, the RNIB, RNIB Scotland, Wheels for Wellbeing, Guide Dogs Scotland and Transport for London.

Some results of the literature review described above were used as a basis for the discussions that took place at the stakeholder workshops held during September 2019.

2.4 Stakeholder workshops

Three stakeholder workshops were planned, for the purpose of confirming the type of information that a revised version of *Inclusive Mobility* should contain, and the level of

detail that would be useful for practitioners. An important objective of the workshops was to elicit the views of organisations representing the interests of older and disabled people, to clarify the detailed aspects of innovative public transport-related structures that need to be accessible and therefore inclusive. The intention was to involve the designers of the types of infrastructure and facilities relevant to the new sections, so that they could engage in discussions with the organisations representing end users. It was also intended to involve practitioners, e.g. Local Authority Access Officers, architects, the designers of the pedestrian environment etc., as representatives of intended users of *Inclusive Mobility*. Furthermore, it was planned that representatives of other user groups, such as cyclists, non-disabled pedestrians and public transport operators should be invited to take part in the process, depending on the outcome of discussions to finalise the subject matter of the workshops.

The intention was that each of the workshops should focus on a specific subject area, which would be reflected in the list of stakeholders invited to attend, but that each workshop would provide participants with the opportunity to express their views on other innovations and subject areas included in this part of the project. An important principle was that this part of the research should be designed so that as many stakeholders as possible would be able to express their views, in addition to those who were able to attend the workshops. Of course, an accessible venue was chosen for each workshop, but also each discussion was broadcast online, using the Ring Central Meetings platform, and invitees unable to attend on the day were provided with instructions of how to follow proceedings live. In order that the smooth running of discussions should not be interrupted, this was a one-way means of communication, but those wishing to use the online feed were encouraged to email their views on any issue that was discussed following the workshop. Each workshop was staffed by two members of the project team; one to facilitate and one to take notes. One advantage of the online broadcast was that each discussion was recorded in its entirety, meaning that the details of what was said could be checked for the purpose of analysis.

2.5 Development of the list of potential new content for Inclusive Mobility

As described above, the first task for this Research Question was to create a list of new topics that should be part of a revised version of Inclusive Mobility, as well as identifying content that could be omitted. The process by which this list was derived, and of how the set of issues defined was used to design the content of subsequent workshops and the corresponding lists of invitees is described in this section of the report. The detailed findings relating to each defined subject area, from the literature review, workshop discussions and contributions from stakeholders by other means, are presented on a topic by topic basis in Section 3.

2.5.1 Initial suggestions for potential new sections for Inclusive Mobility (and omissions)

The project team's initial review of the current version of *Inclusive Mobility*, in the light of the findings of the predecessor Scoping Study, concluded that the following sections and text should be omitted when the guidance document is redrafted:

- In the section on Footways, Footpaths and Pedestrian Areas, reference to pelican crossings should be omitted, and it should be emphasised that pelican crossings are no longer prescribed, so that no new ones may be installed.
- In relation to tactile surfaces, it should be pointed out that if a surface is very rarely used, then its meaning is unlikely to be recognised, and so a case might be made for removing such a surface from the set of tactile surfaces used. (This is an issue that has been dealt with in detail under a separate Research Question).
- In the section on Bus Stops, there is currently a recommendation for 'panel' bus stops, on the grounds that they provide more space for information. This advice should, however, be reconsidered, given that such displays are unpopular with many disabled people. This is because wheelchair users and people of shorter stature are typically only able to read the information that is located at a certain height on these panels.
- In the section on "Transport Buildings: Facilities", detailed recommendations are provided on the design of public telephones. Consideration should be given to whether it is worthwhile including such details in a revised version of the guidance, due to the prevalence of the use of mobile 'phones, (subject to any requirement for a minimum number of public telephones being available in case of emergency). The recommendations regarding obstructions relating to public telephones might be retained, albeit in a different section and with reference to all obstructions.

The review of the current guidance by the project team resulted in a number of recommendations for additional text to be added, particularly for the purpose of describing the breadth and variety of needs that members of the travelling public have. These recommendations included, for example, the requirement for the Introduction to explain the importance of considering the needs of people with non-visible disabilities, an issue that is not dealt with in any depth in the current draft of *Inclusive Mobility*. All of these recommendations will be fully taken into account during any subsequent redrafting of the document. The following, however, is a list of additions that the project team felt might constitute a new section, sub-section or substantial amount of new text in *Inclusive Mobility*:

- There should be a section describing the needs of people living with mental health issues, or who are neuro-diverse.
- In the section on Bus Stops, some information on the provision and design of Variable Message Signs, and of other types of electronic display, should be provided.
- In the section on Bus Stops, some information on bus stop bypasses (or 'floating bus stops') should be considered for inclusion.
- In the section on "Transport Buildings: Facilities", there may be a need to add information regarding contactless payments or other payment mechanisms.
- In the section on "Transport Buildings: Facilities", information on Changing Places facilities needs to be added.
- In the section on Signage and Information, consideration needs to be given to the emergence of new technologies for navigation for blind and partially-sighted people.

- Consideration should be given to including a section on driverless vehicles.
- The increase in the number of 'shared space' schemes was noted in the Scoping Report, and so it was suggested that these schemes should be the subject of a section in *Inclusive Mobility*.
- The addition of a section on the accessibility of touchscreens was envisaged at the inception of the current project.

2.5.2 Outcomes of the Steering Group's input

Discussions with both the client and the Project Steering Group resulted in some additional suggestions being made for sub-sections or text that might be added to *Inclusive Mobility*. These included:

- In the section on Footways, Footpaths and Pedestrian Areas, the issue of conflict with cyclists on shared pathways with pedestrians requires greater consideration as to appropriate layouts and details.
- In the section on Footways, Footpaths and Pedestrian Areas, additional information was requested on the design of pedestrian crossing control units, particularly recommendations on the distance between the control unit and the tactile surface at a crossing, to ensure that any user of the control unit knows the correct place to stand.
- The section on Car Parking should include guidance on parking spaces for electric vehicle charging.
- A section should be included new forms of information provision, including websites and smartphone apps that provide service information.
- It was suggested, from the wider stakeholder group, that a section dealing with the use of cycles as a mobility aid, and the needs of disabled cyclists, should be added.

2.5.3 *Shortlisting the topics for discussion at the workshops*

After due deliberation, the decisions listed in Table 1 were made as to whether to take the topics suggested forward to discussion at the stakeholder workshops.

Table 1. Workshop decisions

Discussion topic	Taken forward?	Reason for not taking topic forward
Variable Message Signs	Yes	N/A
Bus stop bypasses / floating bus stops	Yes	N/A
Contactless payment technology	Yes	N/A
Wayfinding technology for blind and partially-sighted people	Yes	N/A
Touchscreens	Yes	N/A
Shared cyclist / pedestrian pathways	Yes	N/A
Pedestrian crossing control boxes	Yes	N/A
Accessible websites and smartphone apps	Yes	N/A
Cycles used as a mobility aid	Yes	N/A
People living with mental health issues, or who are neuro-diverse	No	This issue is being dealt with under a separate Research Question
Changing Places	No	Government consultations were in progress on Changing Places whilst the current project was taking place – in the UK from May to July 2019, and in Scotland from February to May 2019
Driverless vehicles	No	It was felt that the technologies connected with driverless vehicles were not sufficiently well developed to enable robust advice on accessibility issues to be included in the guidance
'Shared space' schemes	No	It was decided at an early stage of the project that 'shared space' issues were beyond the scope of the current project
Electric vehicle charging points	No	It was decided that accessibility issues relating to electric vehicle charging points were less of a priority for the current project than the topics that were selected for further discussion

2.5.4 Finalising the structure and content of the stakeholder workshops

The selected discussion topics described in the above table were then divided into three groups, with the intention that each should constitute the focus of a half-day stakeholder workshop, (and also form the subject matter of a literature review to inform subsequent discussions). The following groups of topics were suggested:

> **Workshop 1: New infrastructure relating to cyclists and pedestrians.** Bus stop bypasses, shared cycle / pedestrian pathways, cycles as a mobility aid / the needs of disabled cyclists, pedestrian crossing control boxes.
>
> **Workshop 2: New technologies.** Touch screens, real-time information in stations and in vehicles, contactless ticketing.
>
> **Workshop 3: The use of online information.** Website accessibility, smartphone apps, wayfinding technologies used by blind and partially-sighted people.

After further consideration and discussion with the client, it was decided that, because Workshops 2 and 3 dealt with similar subject areas, and because the list of invitees to these workshops was also similar, these should be combined into a single, full-day workshop. Therefore, two stakeholder engagement events were held for the purposes of Research Question 5. Workshop 1 (New infrastructure relating to cyclists and pedestrians) took place in Glasgow on 3rd September 2019, and Workshop 2/3 (New technologies and the use of online information) was held in London on 5th September 2019.

2.5.5 Stakeholder representation at the workshops

Two lists of invitees were drafted and agreed with both the client and the Project Steering Group, to reflect the different emphasis of each event. The organisations invited were as follows:

Workshop 1: Transport Scotland, The Mobility and Access Committee for Scotland (MACS), the Department for Transport (the DfT's street design and pedestrian crossings expert), Glasgow Access Panel, Guide Dogs Scotland, Royal National Institute for the Blind (RNIB Scotland), Wheels for Wellbeing, the Centre for Accessible Environments, Access Association, Age Scotland, About Dementia (a policy and practice forum), Strathclyde Partnership for Transport, David Bonnett Associates (an architectural consultancy specialising in inclusive design), the Design Council, the Transport Associates' Network, Living Streets, Urban Movement Ltd, Phil Jones Associates, Sustrans, the University of the West of England, British Cycling (Scottish Cycling).

Workshop 2/3: Sue Sharp, Age UK, Royal National Institute for the Blind (RNIB), Bryan Matthews (Institute for Transport Studies, University of Leeds), the Royal Society for Blind Children, Age UK, the Rail Delivery Group (formerly the Association of Train Operating Companies), First Bus, Stagecoach, Transport for London, David Bonnett Associates, AbilityNet, MessageMaker Displays Ltd, No Nonsense Design Ltd (a signage expert).

Attendance at the events was as follows:

Workshop 1: Transport Scotland (two people), Guide Dogs Scotland (two people), Sustrans, About Dementia (also representing Age Scotland), The Mobility and Access Committee for

Scotland (MACS). Representatives of Strathclyde Partnership for Transport and Urban Movement Ltd accepted an invitation to attend but sent apologies on the day.

Workshop 2/3: Sue Sharp, the Rail Delivery Group, AbilityNet, Royal National Institute for the Blind (two people), Transport for London (represented by a member of its Independent Disability Advisory Group (IDAG)).

In order to provide an opportunity for all invitees to submit their views on the issues discussed at the workshops, those unable to attend either workshop were invited to do so with an email containing details of the research questions related to the topics of discussion. A copy of the list of topics sent to potential respondents can be found in Appendix A. A response to this email was received from Bryan Matthews (Institute for Transport Studies, University of Leeds), the RNIB's Innovation and Technology Implementation Manager, Strathclyde Partnership for Transport, Living Streets, Wheels for Wellbeing (two respondents), the Professor of Transport Engineering of the University of the West of England, and David Bonnett Associates.

3 Findings

This section reports on the findings of the research on a topic by topic basis, providing details of both the documentary evidence that was found, and the views that were expressed through the stakeholder workshop discussions or through other means of communication (mostly email responses to the request for views described above). All the documents mentioned in this section are available to support the detailed drafting of any additions that are to be made to *Inclusive Mobility*.

3.1 New infrastructure relating to cyclists and pedestrians

3.1.1 Bus stop bypasses

Bus stop bypasses, which are sometimes referred to as 'floating bus stops', are a fairly recent phenomenon. Their primary purpose is that of the safety of on-road cyclists, with the aim of preventing cyclists from having to manoeuvre around a bus when the bus stops at a bus stop, and so potentially come into conflict with fast-moving motor vehicles. The objective is to instead route cyclists behind the bus stop. Bus bypasses are also installed when a cycle path that is separate from, but runs parallel to, a road encounters a bus stop, with bus passengers otherwise having to cross the cycle path in order to board / alight from the bus; this situation is illustrated in the drawing shown in Figure 2.

Figure 2. Experimental bus stop bypass, as used in off-street trials at TRL[1].

An alternative arrangement is what is referred to as a 'bus boarder', where the cycle path is not rerouted around the bus stop area, but continues on a course between where the bus stops and where people are waiting for the bus; however, the part of the cycle path where boarding and alighting are to take place is raised to kerb level, creating a brief space that is shared between cyclists and pedestrians (i.e. bus passengers), as illustrated in Figure 3 and Figure 4.

Figure 3. Illustration of a typical 'bus boarder'[2].

[1] *Off-street trials of a Bus Stop Bypass An assessment of user perceptions, safety, capacity and Accessibility* York I and Tong S TRL Report PPR730 2014.

[2] https://bikeportland.org/ Last accessed 260919.

Figure 4. Illustration of a bus boarder-type configuration at a tram stop, Toronto, Canada[3].

An issue that arises with each of these configurations is that, while the objective of separating cyclists and motorised vehicles is achieved, it creates potential conflict between two other groups of people, namely cyclists and pedestrians. *Inclusive Mobility* is particularly concerned with issues that might be experienced by more vulnerable pedestrians and bus users, and these might include people who are blind or partially-sighted people, people who are deaf or hard of hearing, older people, people with a learning disability or people who are neuro-diverse meaning that they fail to perceive danger in the same way as others.

Part of the research carried out for this part of the project has involved eliciting the views and policy positions of organisations representing the interests of disabled people in relation to bus stop bypasses, (as well as bus boarders, although the remit of the current work is to prioritise bypasses). Various safety concerns have been expressed by such organisations, but these are counter-balanced by the volume of work that is currently being undertaken to advance the accessible and inclusive design of bus stop bypasses.

The views of stakeholders

An example of an organisation that has articulated such concerns is the Royal National Institute for the Blind (RNIB), which issues a number of Policy Position Statements in relation to various aspects of the safety of public transport infrastructure for blind and partially-sighted people. The RNIB has published such a Policy Position Statement on the specific subject of bus stop bypasses and bus boarders, which was updated in August 2019. This Statement, which is reproduced in full as Annex 1 to this report, begins by reflecting feedback that the organisation has received from its members, which emphasises the reported problems that blind and partially-sighted people have in interacting with a rapidly expanding cycling infrastructure, which centre on detecting “silent” cycles. The Statement does, however, imply that the RNIB has no objection to the installation of bus stop bypasses if they can be designed in an inclusive way, and so be safe for all categories of user. The

[3] *Transit Street Design Guide*, (National Association of City Transportation Officials). NACTO is an organisation that covers all of North America, i.e. Canada, the USA and Mexico. The Transit Street Design Guide provides detailed design guidance on public transport infrastructure in a North American context.

organisation specifies that the safe areas of a bus stop bypass layout should be marked with a change in level of at least 60mm, on the grounds that this is the minimum requirement for enabling blind people to detect it, although it should be noted that a 'step' of this magnitude might cause problems for some wheelchair users and some people who have difficulty with walking.

During the stakeholder workshop held in Glasgow, where bus stop bypasses were discussed, the representative of Age Scotland (who was actually speaking on behalf of the About Dementia forum), explained that there was anecdotal evidence that cycle lanes can cause confusion for people with dementia, due to a lack of familiarity with the infrastructure, causing them to lose confidence that what they are doing is correct. The issue lies in there being clarity as to the demarcation between what constitutes a road or cycle path, and what constitutes a safe place for pedestrians.

At the same workshop, a representative of Guide Dogs Scotland explained that guide dogs are trained to follow a kerb, or alternative visual cue, so such a facility is necessary in order to make bus stop bypasses safe. Otherwise, blind and partially-sighted people will not know where it is safe to walk, causing anxiety and confusion, and discouraging them from using pedestrian facilities. She added that a problem with the zebra crossings installed on cycle paths on the Leith Walk Cycle Route, in Edinburgh, was that they were "ignored" by cyclists. This highlights the importance of cyclist behaviour in relation to the safety of bus stop bypasses and suggests that measures to promote awareness among cyclists might be important. The attendee from MACS pointed out that crossing a cycle lane using a designated crossing could also be a frightening experience for a wheelchair user, if it is perceived that an approaching cyclist is unlikely to stop. One of the Guide Dogs Scotland representatives added that a particular safety issue for blind and partially-sighted people is that they often use a navigation aid when negotiating the pedestrian environment, and that this can both make them less aware of the location and actions of other space users, and less likely to hear any warnings issued from approaching cyclists or from a device installed in the infrastructure. This is an important point to take into consideration when designing auditory warnings and signals in connection with bus stop bypasses.

A common view expressed by attendees of the workshop held in London was that it was important for all bus stop bypasses to be consistent in terms of their design. Generally, the view was that bus stop bypasses were currently too dangerous for older and disabled pedestrians to use them, and that work was required in order to make them safer and thus more inclusive. One of the RNIB representatives pointed out that such facilities were almost impossible for some people to cross during periods of peak flow, suggesting that some measures should be implemented to help them to do so. One idea put forward related to the availability of a button that could be pressed, to activate a red light that would alert cyclists on the cycle path to the fact that a pedestrian needs to cross at the crossing point. In such a situation, an education and publicity campaign would be required to ensure that all users of the bus stop bypass were aware of the meaning of the red light and understood the priority rules involved. A more extreme idea was that a gate system might be put in place, where a physical barrier is put across the cycle path in order to guarantee the safe passage of pedestrians to and from the bus stop island. The RNIB representative went further, suggesting that penalties should be introduced for cyclists who ignore a red light on a cycle path, or who cycle recklessly. Sue Sharp suggested that measures to slow cyclists down,

perhaps using something analogous to a 'speed hump', through bus stop bypass areas might be employed – but one of the RNIB representatives cautioned that such speed mitigation measures were likely to meet opposition from organisations representing the interests of cyclists.

A general point made by the RNIB was that blind and partially-sighted people tended to avoid bus stop bypasses if they considered them to be dangerous, meaning that there is a lack of data on the extent to which such infrastructure is safe for them. On the subject of statistics, the Transport for London representative questioned the safety-related motive behind bus stop bypasses, which was to improve the safety of cyclists; he suggested that they might merely transfer the risk from cyclists to pedestrians, adding that, in any case, cycling deaths and serious injuries were mostly caused by lorries turning left at a junction and nothing to do with buses.

All workshop invitees who were unable to attend a workshop on the day were invited to provide their views on the issues that were discussed through separate correspondence.

Living Streets provided the following statement in response to this invitation:

> "Living Streets supports innovation and the testing of new infrastructure designs. Bus stop bypasses can have a part to play, but need to be used sensitively, taking into account traffic speed and the needs of all pedestrians, particularly those with visual impairments. When poorly designed and being introduced into environments where many people cycle aggressively or at speed, they can disadvantage pedestrians, and seriously disadvantage people with a visual impairment. We are calling for more research to explore the provision of new designs which would allow those more seriously disadvantaged by the need to cross a cycle track to do so without fear or concern.
>
> We note that poor designs which bring pedestrians and people on cycles into conflict, are often the result of attempts to squeeze provision for cycling into an environment without a consequent decrease in the space utilised for private motor traffic. Acceptable designs for bus stop bypasses require adequate space. If adequate space is not available then the needs of those walking and cycling mean that the space for private motor traffic must be reduced.
>
> We note that minor changes in bus stop location can often solve problems, particularly by providing a fully signalised crossing to the bus stop as part of a signalised crossing of a wider junction.
>
> The use of traditional traffic signals for cycling should be avoided at locations where people will regularly be presented with a red signal demanding that they stop, but for no apparent purpose (because a crossing is clear). Situations should also be avoided where people on cycles are given a green signal while faced with people crossing. We note that there are no standards, and that there is very little discussion or debate, relating to the quality of standard crossings of a cycle track, yet the quality of a crossing can make a big difference to how well it is respected."

The view of Wheels for Wellbeing, a charity that promotes cycling for disabled people and champions the cause of disabled people who use a cycle as a mobility aid, is that it supports the creation of bus stop bypasses, provided that they are made safe for everyone to use.

Detailed design recommendations provided by Wheels for Wellbeing are included in sub-section 3.1.2 of the current report.

Strathclyde Partnership for Transport (SPT) provided a perspective from a public transport provider's point of view, emphasising the advantages of bus stop bypasses as being the facility for passengers to wait for a bus without being physically separated from the carriageway, and the fact that the configuration makes it easier for the bus driver to see passengers. SPT also acknowledged the accompanying implications for passenger safety relating to them having to cross a cycle path in order to access the bus stop 'island', stating that the extent of the risk of conflict between cyclists and passengers depends upon: 1. The level of the flow of passengers on and off buses, 2. The number of services using the stop; 3. The throughput of cyclists on the cycle path; and 4. Whether the flow of cycles on the cycle path is one-way or two-way. In terms of measures to increase the safety of bus stop bypasses, the priority, according to the SPT submission, is to alert cyclists to the fact that bus passengers have priority at the junction, and to the possibility that pedestrians might encroach onto the cycle path. Comments made about the design requirements of the bus stop 'island' referred to the need for this island to provide enough space to accommodate all necessary bus stop furniture (including shelter(s), bus stop flag, litter bins, etc.), as well as sufficient space for boarding passengers to pass passengers alighting from the bus, (which should enable two wheelchair users to pass each other.

The SPT response also expresses the opinion that a configuration that requires cyclists to pass between the passenger waiting area and the bus – this effectively describes a 'bus boarder' – would increase the risk of injury to passengers, particularly when they feel a sense of urgency in boarding or alighting from the bus, and so might be less likely to be aware of an approaching cyclist.

An interesting and important issue, which had not been raised at either of the workshops, was described by a respondent who was a regular walking stick user and occasional wheelchair or scooter user. Because of finding buses difficult to use, his main form of transport is taxis, which he often hails from the pavement, (mostly in London). He stated that the presence of a cycle path between the footway and the main carriageway, whether or not there were any change in level, constituted a considerable barrier to taxi use, sometimes for quite long distances. With the likelihood that the cycle network in many cities is likely to expand in the future, the impact of cycle paths on the public's use of taxis should be considered. One possibility is the introduction of a facility for boarding and alighting from taxis that is analogous to bus stop bypasses.

Published research into bus stop bypasses

The RNIB's Policy Position Statement (see Appendix B)

Monitoring of on-street trials to investigate the safety of bus stop bypasses was carried out by TRL on behalf of Transport for London, in July 2018. The outcomes of this research are available in three separate Published Project Reports, describing accompanied visits of

samples of blind and partially-sighted volunteers to bus stop bypasses in London[4], the results of video analysis of the behaviour of pedestrians and cyclists at bus stop bypasses[5] and the results of questionnaire surveys eliciting the views of pedestrians and cyclists[6].

The accompanied visits constituted qualitative research, using a sample of 36 volunteers, which included blind and partially-sighted people, people who were deaf or hard of hearing, people who had a mobility impairment (which included some wheelchair users) and people with learning disabilities. The fieldwork used two bus stop bypass types in London: those with uncontrolled pedestrian crossings on the cycle path, and those with a zebra crossing[7] on the cycle path (two of these being equipped with Belisha beacons). The term 'zebra crossing' is used informally, in this context, to refer to any crossing point that is identified with alternating light and dark stripes. The use of the term does not imply that such a crossing has a particular legal status. According to traffic regulations in the UK, there is no requirement for a 'zebra crossing' on a cycle track to be accompanied by Belisha beacons[8].

Volunteers were observed in their use of the bus stop bypasses, and it was found that the most difficulty was experienced by those who were blind or partially-sighted. The most common problems encountered were in understanding the layout of the bus bypass and in being able to instruct their guide dog in how to negotiate the junction. This suggests that consistency in the design of bus stop bypasses is important in helping blind and partially-sighted people, and other more vulnerable pedestrians, to learn how to negotiate them safely. There was also helpful feedback from wheelchair users among the sample, who reported difficulties with manoeuvring in the limited space provided on the bus stop 'island' between the cycle track and the main carriageway. This suggests implications for the design and dimensions of such islands, and some examples of recommendations for suitable minimum dimensions will be provided later in this report. Bypasses with a zebra crossing were marginally preferred over those with an uncontrolled crossing in terms of feelings of safety and comfort, but the presence of Belisha beacons had no significant impact.

Findings from TRL Reports PPR854 and PPR855 found that the presence of a zebra crossing on a cycle path had a positive effect upon levels of interaction between cyclists and pedestrians using the crossing. The video analysis showed that the effect of having a zebra crossing was to increase the percentage of pedestrians using the crossing to cross the cycle path from 39% to 53%. Similarly, 40% of cyclists gave way to pedestrians at a zebra crossing,

[4] Greenshields, S., *Bus stop bypasses: Accompanied visits of people with disabilities to bus stop bypasses*, (TRL Published Project Report PPR853, Jul. 2018).

[5] Greenshields, S., Chowdhury, S. and Jones, P., *Bus stop bypasses: Analysis of pedestrian and cyclist behaviour via video*, (TRL Published Project Report PPR854, Mar. 2018).

[6] Greenshields, S. and Davidson, S., *Bus stop bypasses: Surveys of pedestrians and cyclists*, (TRL Published Project Report PPR855, Jul. 2018).

[7] The term 'zebra crossing' is used informally, in this section of the current report, to refer to any crossing point that is identified with alternating light and dark stripes. The use of the term does not imply that such a crossing has a particular legal status. According to

[8] *The Traffic Signs (Amendment) (England and Wales) Regulations and General Directions 2017*. (Her Majesty's Government, 2017).

which was significantly more than the 33% who gave way at an uncontrolled crossing. It was found that a key feature with such crossings was the accompanying tactile 'tail' installed across the footway which helped blind and partially-sighted pedestrians to locate the crossing.

The report on surveys conducted showed that, importantly, 82% of cyclists, and 73% of pedestrians, interviewed recognised that pedestrians had priority at a zebra crossing on the cycle path. The percentage figures in relation to the uncontrolled crossings used for the research were 30% and 35%, respectively.

In December 2015, Sustrans carried out a study of bus stop bypasses that had been installed in Cambridge, by Cambridgeshire County Council. The objective of the study was to monitor two bus stop bypasses in particular, to ascertain the level of any potentially unsafe interactions between cyclists and pedestrians, as well as between cyclists and cars and between cyclists and buses. It was found that all 'interactions' between different users of the bypasses happened at peak times during the week, and that all bar one of the interactions recorded were between a cyclist and a pedestrian. Interactions were defined as belonging to one of two categories: Category 1 involved "precautionary or anticipatory braking or slowing down when risk of collision was minimal", and Category 2 described "controlled braking, slowing down or stepping aside to avoid collision (but with ample time for manoeuvre)". Of the 42 interactions recorded, 39 (92.9%) were of Category 1, whilst the remaining 3 were of Category 2, indicating that no safety-critical interactions were observed.

City of Edinburgh Council's upgrading of the Roseburn to Leith Walk cycle route, in Edinburgh, provides a source of information of stakeholders' views, given that bus bypasses were included as part of this work. Atkins consultancy was commissioned to carry out the consultation work for this project[9]. Among the written correspondence received during this consultation were concerns that pedestrians would need to cross a two-way cycle path in order to get to and from some bus stops. The Edinburgh branch of Living Streets compiled a formal response to this consultation, expressing "big concerns about 'floating bus stops'", on the grounds that there would "inevitably be some deterioration in the convenience and safety of walking"[10].

Of the body of literature available on the inclusive design of cycling infra structure, some advice and guidance is contained within the comprehensive publication *Designing for cycle traffic: International principles and practice*, by John Parkin[11], who is Professor of Transport Engineering in the University of the West of England's Geography and Environmental Management Department. This document describes the safety advantages of bus stop bypasses in terms of removing the need for cyclists to manoeuvre around a bus that has stopped at a bus stop, but also provides general guidance on how any consequent conflict

[9] *Roseburn to Leith Walk cycle route and street improvements: Consultation Report*, (City of Edinburgh Council, Jul., 2016).

[10] http://www.livingstreetsedinburgh.org.uk/consultation-responses/roseburn-leith-walk-cycle-route-consultation-lse-response/ Last accessed 28/09/19.

[11] Parkin, J., *Designing for cycle traffic: International principles and practice*, (Institute of Civil Engineers Publishing, 2018).

between cyclists and pedestrians can be minimised. The general principle is that, if the cycle route bypassing a bus stop is identifiable as a specific path, then it should be treated as a carriageway, with clarity provided as to where pedestrians should cross the path. The document points out, however, that some local authorities regard the route to be taken, behind a bus stop, by cyclists as a 'shared space' area to be shared by cyclists and pedestrians, in which case some means must be introduced to substantially slow cyclists down as they enter this area (through the use of "SLOW" ground markings and/or the laying down of haptic strips, for example).

In a subsequent communication, the author has reiterated the view that the key to ensuring the safety of pedestrians is that the cycle path should be treated as a carriageway, with crossing points regarded in a similar way, adding that the detail of the design measures depends upon the relative volume of pedestrian and cycle traffic. Generally, a level crossing facility should be provided, by means of dropped kerbs, with appropriate tactile surfaces installed on either side of the cycle path – but there should never be tactile paving on the cycle path itself. Where the volume of cycle traffic might make it difficult for pedestrians to cross, meaning that there is a need to slow cyclists in some way, then the crossing point might need to be raised to 'pavement' level and/or zebra crossing-style markings might need to be added.

Designing for cycle traffic describes bus boarders as being a less complex alternative to bus stop bypasses, which have the advantage of being easier for blind and partially-sighted people to navigate, with pedestrians having clear priority over cyclists whilst boarding a bus. However, the RNIB's Policy Position Statement, reproduced in Appendix B, indicates that the organisation is not in favour of bus boarders. This is because the part of the cycle path that is used for boarding and alighting at a stop becomes what is effectively a 'shared space' when a bus pulls into a stop. This means that the bus user might be required to interact with an approaching cyclist, which a blind or partially-sighted person might not be able to see or hear.

More detailed guidelines have been disseminated by the Cycle Ambition Grant Cities, (Birmingham, Bristol, Cambridge, Leeds, Manchester and Norwich), so called because of being successful, in 2018, in applying for government funding to finance cycling safety projects. This guidance is contained within two case studies of bus stop bypasses being installed and piloted. Detailed and annotated plans of the bypasses used in each project are provided in this document.

The first of these studies features a mixed bus and cycling corridor along Manchester's very busy Oxford Road, in the context of 2,000 cycle movements and 3,000 buses per day, and so is a good example of how bus stop bypasses might be designed in a city centre context. The cycle infrastructure involved in this project consisted of two one-way cycle paths, segregated by a kerb on each side, on either side of the road. The width of the cycle path was 2 metres wherever feasible, and at least 1.5 metres. The bus stop bypasses included along this corridor were designed through a process of thorough consultation with stakeholders, consisting of nine design workshops involving groups representing cyclists, bus users, pedestrians and disabled people. An outcome of the pilot was that a width of 2.7m was found to be sufficient for the bus stop bypass island, and the optimum width of the cycle path was found to be 1.8m, as this was a width that was comfortable for a single

cyclist, but which discouraged overtaking and two-abreast riding. This width of cycle path also helped to moderate the speed of cyclists. A post-trial feedback workshop with stakeholders resulted in additional recommendations, including the addition of "SLOW" signs targeted at cyclists, extra signage to advertise priorities at pedestrian crossing points (including "Give Way" markings aimed at cyclists) and the introduction of an awareness-raising and behaviour change campaign (also aimed at cyclists).

The other case study in this publication featured a cycle path running parallel to a major arterial trunk road into the centre of Cambridge. A characteristic of the cycle path was that it was designed to give priority to cyclists, albeit with a view to narrowing the path to a width of 1.5m through, and on the approach to, bus stop bypasses in order to slow cyclists down. Again, alterations were made in response to feedback from stakeholders after a pilot period. These changes were as follows:

- the width of the bus boarding areas that formed part of the bypass configuration was increased from 1.5m to 2m, to enable a wheelchair user to comfortably make a 90° turn within the boarding area.
- the pedestrian path was extended to 2m on either side of the cycle path crossing point, also to allow space for a wheelchair user to make a 90° turn.
- the bus stop flag at each bus stop bypass was positioned so that buses could pull up alongside it; this was so that people who are blind or partially-sighted could use the bus stop flag as a means of orientation.
- cycle path crossing points were raised to the level of the footway, and also surfaced with the same material, of the same colour, as the footway, in order to reinforce the message of pedestrian priority.
- additional bollards were positioned on the pedestrian pathway on the approach to cycle path crossing points, to both create the impression of a 'gateway' for pedestrians and provide a reference point for blind and partially-sighted people.
- a tactile 'tail' was applied across the footway, to help blind and partially-sighted people to locate the position of each cycle path crossing point.

At the time of writing this report, it has come to the project team's notice that a trial is planned for the Oxford Road bus and cycle corridor, in Manchester, that features cameras and sensors that can detect cyclists approaching a bus stop bypass. When a cyclist is identified, that information is relayed, through a rotating cone, to any blind or partially-sighted person waiting to use a cycle path 'zebra crossing'.

A number of published guidelines exist for the design of cycling infrastructure. One of the most comprehensive is Transport for London's *London Cycling Design Standards*, which is well illustrated with photographs and technical diagrams of infrastructure features, which are annotated with dimensions. Chapter 4[12] of this publication contains a separate sub-section entitled "Bus stop bypasses".

[12] *London Cycling Design Standards. Chapter 4: Cycle lanes and tracks*, (Transport for London, Dec. 2014).

The text begins by stating that bus stop bypasses in London were designed following the example of similar infrastructure features successfully implemented in cities in mainland Europe and acknowledges their primary purpose of delivering "a higher level of service to cyclists. This is followed, however, by a separate section on accessibility. The guidance begins by highlighting the importance of engagement with a wide range of potential users of the bus stop bypass, and then describes the three main challenges for users as being: 1. Finding a safe place to cross the cycle path and then find the bus stop flag on the bypass's island, which might be particularly difficult for people who are blind or partially-sighted, 2. Crossing the cycle track with confidence, which is influenced by the behaviour of cyclists and their willingness to slow down for pedestrians, and 3. Learning the basic lay-out of a bus stop bypass, which is only possible if such features are installed with a consistency in their basic design.

The main design considerations recommended by the *London Cycling Design Standards* are as follows:

- There should be an appropriate delineation between the footway, the cycle path and the island where bus passengers wait for a bus.
- If this delineation is to be emphasised with a kerb, then the height of this kerb should be at least 50mm.
- The cycle path must have at least one crossing point for pedestrians, on the main identified pedestrian desire line, identified with blister tactile paving and with a means of creating a visual contrast between the crossing point and the rest of the cycle path. The crossing point should be raised so that there is no change of level for pedestrians using the bus stop. More than one crossing point should be considered if, for example, the island has more than one bus stop flag, or if the island is particularly long.
- The island should be of sufficient size to comfortably accommodate the number of bus users that are expected to use it. As an example, it states that a trial layout used by Transport for London, which was 2.5m wide and 18.2m in length (excluding tapers) was able to comfortably accommodate 68 waiting passengers.
- The creation of the bus stop bypass should maintain a 2m clear width of footway for passing pedestrians.

More general design recommendations include the maintenance of good sight-lines between cyclists and pedestrians, and details of a number of options for encouraging cyclists to slow down, including vertical calming measures, horizontal deflection of cyclists' line of travel, visual cues to inhibit speed and various enforcement and management techniques.

Wheels for Wellbeing's *A Guide to Inclusive Cycling* mentions the narrowing of the cycle path and the horizontal deflection of the path's route as being potential means of slowing cyclists on the approach to a bus stop bypass. However, this publication argues that kinks in the cycle path that are inserted with this purpose in mind should not be so severe as to make the route inaccessible for disabled people using cycles that are of non-standard design, and so may be wider and/or more difficult to manoeuvre than other cycles. It also states

that a vertical kerb on either side of the cycle path may be included as an additional means of encouraging cyclists to slow down, suggesting that installing a chamfered kerb instead would be more 'forgiving', and so make the bus stop bypass safer and easier to use for disabled cyclists.

An additional suggestion included in *A Guide to Inclusive Cycling*[13] is that an announcement should be made on-board the bus to alert passengers leaving the bus that they are about to alight onto a cycle path, (which will be particularly helpful for blind and partially-sighted passengers), and that some solution should be devised to alert cyclists to the fact that blind and partially-sighted people (who can't see them coming) might be crossing the cycle path.

The *London Cycling Design Standards* only mention the creation of a zebra crossing-type feature if the flows of pedestrians and cyclists appear to warrant it. Design guidance for all issues relating to crossings is contained in Chapter 5 of the Standards, which deals with "Junctions and Crossings"[14].

One interesting aspect of Chapter 4 of the *London Cycling Design Standards* is that, in a sub-section entitled "Integration with bus stops", it recommends the option of routing an on-street cycle path around a bus stop, but passing waiting buses on their off side, so that cyclists follow a marked path that is close to the centre of the carriageway. Such an arrangement would, of course, only be suitable in a location where there is a low volume of motorised traffic. A detailed diagram of an indicative layout is provided.

A similar Transport for London publication is entitled *Accessible bus stop design guidance*[15]. This publication repeats the advice on bus stop bypasses provided by the cycle design standards, but with a few additions, (which might simply reflect the later date of the bus stop design guidance):

- The guidance suggests specifically that cyclists might be slowed by means of narrowing the cycle path on the approach to a pedestrian crossing point.
- The creation of a new bus stop bypass should be publicised to bus users using targeted publicity and messaging, perhaps using iBus stop announcements.
- It is specified that the visual contrast between the footway and footway crossing point, and the cycle path, should be of a magnitude of at least 50% difference.
- It is stated that the reason for recommending that the bus stop island should be of a minimum width of 2.5m is partly to ensure that there is sufficient space to enable a wheelchair ramp to be deployed from a bus. There is also advice to consider the positioning of bins and other street furniture to ensure that such facilities do not cause an obstruction. This publication also adds that the width of the bus stop island should exceed 2.5m if it is to be used by coaches, on the grounds that extra space will be needed for dealing with passengers' luggage.

[13] *A guide to inclusive cycling*, (Wheels for Wellbeing, 2019).

[14] *London Cycling Design Standards. Chapter 5: Junctions and crossings*, (Transport for London, Dec. 2014).

[15] *Accessible bus stop design guidance,* (Transport for London, 2017).

- The cycle path should be of a sufficient width and geometry to enable comfortable passage of all types of cycle, including non-standard cycles; this recommendation encompasses cycles that are designed to be used by disabled people as a mobility aid, including three-wheeled cycles.
- An important addition is reference to a variant type of 'zebra crossing' for use on cycle tracks that appeared in The Traffic Signs Regulations and General Directions of 2016[16].

Statutory design guidance on highways-related issues is published by Highways England through Interim Advice Notes (IAN). One such document is IAN 195/16, which gives advice connected with cycle traffic and the strategic road network[17]. This IAN includes a sub-section entitled "Bus lanes and bus stops on cycle routes". One recommendation appearing in this sub-section is that bus passengers should not be required to alight onto a 'live' cycle path, which argues against the use of 'bus boarders', and is in agreement with the position of the RNIB on bus boarders (see Appendix B). No specific advice is given about the design of bus stop bypasses, although a photograph of a bus stop bypass is used to illustrate a clever means of encouraging bus users to cross the cycle path at an appropriate point.

The Department for Transport's Local Transport Note *Cycle infrastructure design*, LTN 2/08[18], which, at the time of writing, was in the process of being superseded by a replacement LTN, does not use the terms 'bus stop bypass' or 'floating bus stop'. There is, however, a mention, and photographic illustration, of a bus stop bypass which is mentioned as part of the discussion of 'cycle bypasses', which are primarily routes that cyclists can use to avoid traffic calming measures. There is an acknowledgement that a bus stop bypass might give rise to conflict between cyclists and pedestrians, but no design guidance is given.

3.1.2 Shared cyclist / pedestrian pathways

The views of stakeholders

There was a consensus among the stakeholders involved with the project that, generally, pedestrians and cyclists should not be mixed on a shared path. For example, in a private communication, Prof. John Parkin, author of Designing for Cycle Traffic: International Principles and Practice19, described the practice as a "no no", and a charity representing the interests of blind and partially-sighted people stated that cyclists and pedestrians should only share the same path "as a last resort". However, shared pathways for pedestrians and cyclists are not uncommon in the UK, and a representative of Transport Scotland pointed out that such shared pathways might be appropriate in a rural setting where space is limited and cycle and pedestrian flows are both light; he suggested that Inclusive Mobility might include a discussion of the circumstances in which pedestrians and cyclists should, and

[16] *The Traffic Signs Regulations and General Directions*, (Her Majesty's Government, 2016).

[17] *Interim Advice Note IAN 195/16: Cycle traffic and the strategic road network*, (Highways England, Oct. 2016).

[18] *Local Transport Note LTN 2/08: Cycle infrastructure design*, (Department for Transport, Oct. 2008).

[19] Parkin, J., *op. cit*., (2018).

should not, be mixed, adding that City of Edinburgh Council guidance documents dealt with this issue[20].

Parkin provides the following arguments, in his book on cycle traffic design, to support his condemnation of shared cyclist / pedestrian pathways:

- Traditionally, planners and infrastructure providers have perceived that cycling on the road is dangerous, so that policies have been introduced to separate cycles from cars; this has led to cyclists being encouraged to use routes originally intended for use by pedestrians, either as a shared space or as two lanes defined by a white line. This has led to a perception that cyclists and pedestrians have similar needs, meaning that cycling requirements are not met. Parkin argues that such an approach might actually deter people from cycling.
- Cyclists and pedestrians move at a different speed, and have different movement profiles. From the cyclist's point of view, the presence, or potential presence, of pedestrians on a route will not enable cycles to travel at the facility's design speed.
- Separation of cycles and pedestrians enables pedestrians to not have to worry about the presence of cyclists.
- The default assumption is that a pathway designed for cycle traffic will be a two-way pathway, with the two flows of cycle traffic separated with a white line in the centre, as prescribed by Highways England[21]. This implies a greater space requirement, and so less space available for pedestrians. (Interestingly, research into potential conflicts between pedestrians and cyclists on shared pathways, in 2012, concluded that the addition of a central dividing line in the centre of the pathway had no material impact on the potential for such conflicts[22]).

Parkin goes as far as to suggest that the Department for Transport's Local Transport Note *LTN 1/12 Shared Use Routes for Pedestrians and Cyclists* should be withdrawn[23].

The view provided by Living Streets is that a shared cyclist / pedestrian pathway running parallel to the main carriageway in a built-up, urban area is inappropriate, but that such an arrangement might be acceptable in circumstances where cycling and walking levels are so low that any conflicts between users of the pathway can be "avoided naturally". Living Streets added that it would support a shared pathway in such an environment, provided that it is understood that higher levels of use by cyclists and/or pedestrians will lead to the requirement for a wider pathway; furthermore, providers of such infrastructure should adopt the principle that people using a cycle will generally have the aspiration to travel faster than they would as a pedestrian, particularly on a commuting route, and so there should not be an expectation that they will be prepared to cycle at walking pace.

[20] *Edinburgh Street Design Guidance. Part C – Detailed Design Manual*, (City of Edinburgh Council, 2017).

[21] *Interim Advice Note IAN 195/16: Cycle traffic and the Strategic Road Network*, (Highways England, 2017).

[22] *Shared Use Operational Review*, (Atkins, 2012).

[23] *Local Transport Note LTN 1/12: Shared use routes for pedestrians and cyclists*, (Department for Transport, Sep.2012).

The response to the consultation of Wheels for Wellbeing was that the organisation was generally opposed to such shared pathways, but the organisation added that, if such facilities are to be provided, then the pathway should be of sufficient width to enable use by disabled people using cycles of non-standard design, as well as by people using wheelchairs and mobility scooters.

Responses were also received from individuals who had both experience of either research or professional practice in accessible design, and personal experience of living with a disability. One of these, a cane user and occasional wheelchair user, stated that designers of shared pathways should fully consider the needs of mobility scooter users. The other, who is blind, emphasised that such shared facilities, with their inherent risk of potential conflict between cyclists and pedestrians, were liable to adversely affect the confidence of disabled people, who were least able to avoid being involved in an incident or a near miss. The result of a reduction in confidence as a consequence of a traumatic experience when travelling is likely to be the avoidance of a particular route or a general reduction in mobility levels. He added that cyclists, too, are likely to prefer a dedicated cycling path to a facility they have to share with pedestrians.

During the discussion of shared cyclist / pedestrian pathways at the Glasgow stakeholder workshop, the representative of Sustrans stated that the organisation would not design or support a shared use pathway in a busy urban area, on the grounds of safety. He added that there were circumstances in which the issue of priority between pedestrians and cyclists needed to be considered, such as at the junction of a cycle path and pedestrian footway, and that Sustrans was currently working on this issue.

Documentary evidence

Reference has already been made to the Department for Transport's guidance document entitled *LTN 1/12 Shared Use Routes for Pedestrians and Cyclists*[24]. This Note begins by acknowledging that the design of shared use routes requires careful consideration, and that there had been some examples, in the UK, of the inappropriate conversion of footways to shared use routes. Making reference to another Local Transport Note, *LTN 2/08*[25], which is currently in the process of being superseded by updated guidance, *LTN 1/12* lists five core design principles, namely Convenience, Accessibility, Safety, Comfort and Attractiveness. It goes on to describe a hierarchy of provision, based on a definition of different types of cycle user and different objectives of provision. The Note describes a number of general design considerations, a few of which relate to the needs of older and disabled people, including the advice that, although actual conflict between pedestrians and cyclists is rare, more vulnerable space users might experience a perception of reduced safety. Much of the Note discusses the decision of whether or not pathways intended for cyclists and pedestrians should be segregated or unsegregated. The minimum width of pathway recommended by this document, where there is no segregation between cyclists and pedestrians is 3m, and 2m on each side of a central white line, if one is present, to enable two wheelchair users to

[24] *LTN 1/12*, *op. cit*., (Sep., 2012).

[25] *Local Transport Note LTN 2/08: Cycle infrastructure design*, (Department for Transport, Oct. 2008).

pass each other. This exceeds the current recommendation of *Inclusive Mobility*, which is a minimum of 2m.

Chapter 4 of the *London Cycling Design Standards*, which have been quoted in the current report in connection with bus stop bypasses, also provides detailed guidance on segregated and shared cycle pathways, with shared use facilities being discussed in the context of different types of public space.

- Sustrans produced a Technical Information Note (TIN) on when cyclists and pedestrians should be segregated on a shared use route[26]. The key messages from this TIN are as follows:
- Sustrans would normally regard unsegregated paths as the default approach, but each situation needs to be considered on a case by case basis.
- Segregation may be appropriate in certain situations such as where there is a high level of use and adequate space can be provided for each user group.
- Factors that might suggest that segregation would be preferred include: High pedestrian and / or cycle flow; High proportion of utility cyclists; and Locations where significant use by vulnerable pedestrians such as older and disabled people is expected, such as near residential homes.
- Developing the design of a shared use path, including decisions on segregation, should include early consultation with relevant interested parties such as those representing people with disabilities, walkers and cyclists.
- Constraints may make it undesirable / impracticable to segregate and unsegregated paths tend to encourage improved behaviour by all user groups.

The Royal Society for the Prevention of Accidents (RoSPA) published a Policy Paper on pedestrian safety, in 2018[27]. In a sub-section of this Paper entitled “Shared space”, it is stated that,

> “RoSPA supports ‘Shared Space’ schemes, but it is important that they are carefully designed and the needs of all users are accommodated…..”

Although it should be pointed out that ‘shared space’ is not directly analogous to shared cyclist / pedestrian pathways in terms of the safety and usability issues that are involved. RoSPA plays down the general issue of the danger posed to pedestrians by cyclists, and quotes accident statistics to support its stance:

> “the vast majority of pedestrians who are killed or injured in reported collisions are hit by a motor vehicle rather than a cycle. In Great Britain, from 2007 to 2016 cycles were involved in on average three pedestrian fatalities a year and 82 serious injuries, representing around 0.6% of pedestrian fatalities and 1.5% of serious injuries,

[26] *Technical Information Note TIN 19: Segregation of shared use routes*, (Sustrans, 2011).

[27] *RoSPA Pedestrian Safety Policy Paper*, (Royal Society for the Prevention of Accidents (RoSPA), Aug. 2018).

> whereas motor vehicles are involved in 67.5% of pedestrian fatalities and 81% of serious injuries[28]."

The Policy Paper adds:

> "In 2016, 43 pedestrians died in collisions involving a vehicle on the footway or verge; however, none of these involved a cyclist[29]."

The Road Safety Observatory, which is run by an independent Programme Board comprising a number of organisations, including the Department for Transport, RoSPA, Highways England and the Chartered Institute of Highways and Transportation, produced a thorough literature review of various types of cycling facilities, including "cycle paths" and "shared use paths" facilities[30]. This document did not identify relevant research in addition to the research studies and guidance documents described in the current report.

From the user perspective, the RNIB has a issued a Policy Position Statement that relates to the issue of shared cyclist / pedestrian pathways[31]. This Statement makes it clear that,

> "There is a growing body of evidence that shared use areas do not work for disabled people."

The Statement continues:

> ".....significant investments have been made to increase cycling infrastructure and rework public spaces across the country. This has resulted in the introduction of new cycle routes that often incorporate 'shared use' designs. 'Shared use' designs are based on the idea that through forcing different road and pavement users (such as cycles and pedestrians) to share pathways, that all groups will become more conscious of one another, and this will increase safety. However, this necessarily means that road and pavement users must communicate with each other to negotiate the shared use area or pathway through mainly visual cues. Around one in 190 people in the UK are currently registered blind or partially sighted (Registration data, 2017; ONS, 2015). Just over one in thirty people in the UK are living with sight loss that has a significant impact on their daily life, equivalent to over two million people, and this figure is predicted to significantly increase to over four million by 2050 (Pezzullo *et. al.*, 2018; ONS, 2015). At any given point in any given public space, there will be people with sight impairments making journeys that have the same importance as anyone else. RNIB is seriously concerned about the negative impact of existing shared use areas and pathways on blind and partially sighted people because of the on-going complaints we continue to receive about them. We are also extremely concerned that new public space and cycle schemes in planning persist

[28] *Cycling and pedestrians*, (Cycling UK, Nov. 2017). https://www.cyclinguk.org/campaigning/views-and-briefings/pedestrians Last accessed 290919.

[29] Cycling UK, Nov. 2017, *op. cit.*

[30] *Synthesis title: Cycling infrastructure. Observatory main category: Roads*, (Road Safety Observatory, Jul. 2016).

[31] *Policy Position Statement: Shared use areas and pathways (cycles and pedestrians)*, (RNIB, Aug. 2019).

> with shared use designs and that the concept of making a walking journey remains described and understood by the planners as a visually-dependent process."

Fundamental to the RNIB's position is that a lack of sight means that a blind or partially-sighted person has little or no ability to 'negotiate' in the way described, and that his or her consequent unpredictable behaviour might confuse an approaching cyclist in deciding the correct course of action in order to avoid a collision. The Statement emphasises that a cycle is a relatively quiet form of transport, so that a blind or partially-sighted person is very likely not to be able to hear it approaching. The Statement adds:

> "73 per cent of respondents to a survey carried out by RNIB to inform our response to the Department for Transport Accessibility Action Plan stated that they were not confident sharing paths and spaces with cycles (RNIB, 2017)."

Similarly, Wheels for Wellbeing has informed the current project that the organisation is opposed to shared pathways, just as it is not in favour of 'shared space' schemes in general.

3.1.3 Cycles as a mobility aid and the needs of disabled cyclists

The reason for including this topic as a potential new section of *Inclusive Mobility* is a growing acceptance that many disabled people use a cycle, whether this be a two- or three-wheeled vehicle, as a mobility aid, in much the same way as others might use a wheelchair or a mobility scooter. This has strengthened the view that *Inclusive Mobility* should consider the needs of disabled cyclists, and so go beyond its current focus on the requirements of older and disabled pedestrians and wheelchair and scooter users.

The views of stakeholders

Increasing awareness of the prevalence of cycles being used by disabled people as a mobility aid has been largely the result of the activities of the charity Wheels for Wellbeing. The organisation's publication A Guide to Inclusive Cycling[32] quotes a Transport for London survey's finding that 12% of disabled people cycle, which compares with the equivalent figure of 17% for non-disabled people. It also states that, according to a survey carried out by Wheels for Wellbeing in 2018, which involved a sample of 200 disabled cyclists, the majority cycle at least as often as once a week, most own a two-wheeled cycle and approximately 75% use their cycle as a mobility aid. The latter statistic is probably related to the finding that the same proportion of respondents said that they find cycling easier than walking.

Wheels for Wellbeing's campaign "My cycle My mobility aid"[33], which is backed by Cycling UK, responds to the issue that cycles are not defined in the Highways Regulations[34] as a type of mobility aid, or an 'invalid carriage', and so are not permitted on footways or in pedestrianised areas, unlike wheelchairs and mobility scooters. This is considered to be discriminatory against people who use a cycle as a mobility aid, both restricting their

[32] *A guide to inclusive cycling*, (Wheels for Wellbeing, 2019).

[33] *My cycle, my mobility aid*, (Wheels for Wellbeing, 2019).

[34] The Use of Invalid Carriages on Highways Regulations, (Her Majesty's Government, 1988).

mobility and denying them the opportunity to lead a more active lifestyle, with all the benefits for mental and physical health that that might entail.

The Wheels to Wellbeing publication *A Guide to Inclusive Cycling* provides examples from Japan, Australia and New Zealand of restrictions on cycling being relaxed for disabled cyclists. For instance, the State of Victoria, in Australia, cycling is permitted on the footway for children aged under 12, adults supervising a child under 12 and disabled people who find it difficult to cycle on the road.

An alternative suggestion of the organisation for how this situation might be resolved is through the piloting and introduction of a scheme that has analogies with the 'Blue Badge' parking scheme. This would provide disabled cyclists with a valuable form of identification, which could be used to permit disabled cyclists to cycle considerately in what are currently non-cycling areas (such as 'cyclists dismount' zones), and enable them to reserve cycle parking spaces that have been designed and allocated for use by non-standard cycles such as the type commonly used by disabled cyclists. Such a scheme could be developed in collaboration with local police forces, and with community and disability groups.

Work to change the legal status of cycles when they are being used as a mobility aid continues.

A Transport Scotland representative at the stakeholder workshop held in Glasgow suggested that the starting point for considering the requirements for disabled cyclists in relation to cycling infrastructure was to gather information on the type of non-standard devices that they used, and the dimensions of these devices.

There were no views received from the wider group of stakeholders consulted that challenged the principle of cycles used as mobility aids being regarded in the same light as wheelchairs or mobility scooters. Strathclyde Partnership for Transport did, however, offer the caveat that the 'blurring' of the boundary between pedestrians and cyclists might have implications for disabled cyclists' expectations relating to the carriage of bikes and trikes as mobility aids on public transport. (This is a potential issue that was also raised by a Transport Scotland representative at the Glasgow stakeholder workshop). The SPT correspondent pointed out that any change in legal status might have implications in terms of uncertainty over entitlement to use other spaces, and cited the example of shared pedestrian / cycle pathways, questioning whether there might be ambiguity as to which side of the pathway a disabled cyclist should use. What is being referred to, here, is the possibility that a disabled person using a cranked device (i.e. a 'cycle') as a mobility aid might argue that this device is a substitute for his or her legs, so that he/she should be entitled to be regarded as a pedestrian in the same circumstances as a wheelchair or scooter user is regarded as a pedestrian. This could result in tensions in certain environments, requiring individuals to justify their actions. SPT concludes with the view that further study should be undertaken to examine these potential impacts in detail before any decision is taken on equivalence, adding that the legal status of 'e-bikes' – as well as 'e-scooters', which are currently not permitted to be used either on roads or pavements in the UK – might also need to be considered.

An architectural access consultant specialising in inclusive design, who is also a mobility scooter user, did not disagree with the principle of a cycle being used as a mobility; he did,

however, express concern that some cycles of non-conventional design used by disabled people are more difficult to manoeuvre, and slower, than conventional cycles, meaning that they might be unwelcome on shared pathways. He suggested that such devices, like some mobility scooters, might be unsuited to use on cycle pathways.

The view from Living Streets was:

> "We understand that bicycles and tricycles, and a range of other wheeled vehicles, are used as mobility aids. We support their usage at appropriate speeds for all carriageway users. Care should be taken to ensure our streets and paths are wide enough to allow safe use of mobility aids alongside pedestrians."

Documentary evidence

Wheels for Wellbeing provides much information as to the ways in which environments can be made more inclusive for disabled cyclists, so enhancing their mobility, in the organisation's publication *A Guide to Inclusive Cycling*. It states that, at the most basic level, an inclusive cycle infrastructure should be step-free, offer a continuous and uninterrupted journey, and provide clear and accessible wayfinding information (i.e. signage). It should also make disabled cyclists feel safe and comfortable, and be sensitive to the ways in which some disabled cyclists might differ from others. For example, the organisation states that its own research has found that nearly half of a sample of disabled cyclists who use their cycle as a mobility aid had been asked to dismount and walk/wheel their cycle, even when it might be physically impossible for them to do so[35].

Among the common barriers to disabled cyclists listed by Wheels for Wellbeing are:

- Narrow cycle lanes
- Speed reduction measures
- Physical barriers and potholes on cycle lanes – any improvised avoidance of an obstacle is likely to be more difficult for a disabled cyclist, especially when that person's cycle might be wider, longer and/or heavier than a standard bike.
- Measures to exclude motorised vehicles in areas intended for cycling, such as the erection of bollards, can sometimes exclude tricycles and other types of cycle used by disabled people; access control measures that exclude motorcycles and mopeds are also likely to be inaccessible to many disabled cyclists.
- The lack of accessible cycle parking facilities – this might deter a disabled cyclist from starting a journey, in much the same way as a disabled user of public transport services might avoid travelling because of a lack of confidence that an accessible toilet will be available.
- Cycles of non-standard design, or which have been adapted, tend to be more expensive than standard models.

[35] Andrews, N., My Cycle, *My Mobility Aid: Recognising cycles as a mobility aid*, (Article for Cycling UK, 240919). https://www.cyclinguk.org/article/my-cycle-my-mobility-aid-recognising-cycles-mobility-aid Last accessed 300919.

- Using public transport can be difficult for disabled cyclists using a cycle of non-standard design; research conducted by Wheel for Wellbeing found that only one in 25 Train Operating Companies (TOCs) had a policy to admit non-standard cycles onto their vehicles.
- When a cycle path is closed temporarily, this can disproportionately inconvenience disabled cyclists

Wheels for Wellbeing suggests the following measures for helping to make cycling more inclusive, and more accessible to, disabled people:

- A change in the culture of cycling, which can convey the impression that it is an activity that tend to be performed on two wheels by fit and athletic individuals. The attitude of 'e-assist' mechanisms being regarded as 'cheating' should also be discouraged.
- Cycling could be made more accessible to disabled people if subsidies were available to reduce the cost of cycles that are intended to be used as mobility aids.
- A recognition scheme for disabled cyclists, based on the principles of the Blue Badge parking scheme, would help to overcome difficulties with the lack of accessible cycle parking facilities. Such a scheme would also avoid the issue of disabled cyclists being asked to dismount on footways and in parks, shopping centres and railway stations. This is an idea that is echoed by Parkin in his overview of cycling-related design issues[36].
- All cycle parking facilities should provide spaces for cycles other than those with only two wheels. This is actually a British Standard requirement, since BS 8300:2018 Part 1 states that: "where a number of cycles stands are provided, some of the cycle stands should be positioned to allow the parking of adapted cycles, which can be considerably larger than other cycles"[37]. Wheels to Wellbeing recommends that 5% of all cycle bays should be accessible for users of cycles of non-standard design. All bays should be at least 1m wide, with bays intended to be accessible having a width of at least 1.5m, to allow space for dismounting. There should, of course, be step-free access to cycle parking facilities designed for disabled people, so these should ideally be at ground level. The location of accessible cycle parking bays should be highlighted by some means using blue and white paint. *A Guide to Inclusive Cycling* also provides detailed recommendations for minimum lighting levels at cycle parking locations.
- Cycling facilities need to be more spacious, to enable as many types of cycle as possible to use them.

[36] Parkin, J., *Designing for cycle traffic: International principles and practice*, (Institute of Civil Engineers Publishing, 2018).

[37] *BS 8300-1:2018 Design of an accessible and inclusive built environment. External environment - code of practice*, (British Standards Institution, 2018).

- Cycle hire schemes would be made more inclusive if they offered a wider variety of types of cycle; the provision of e-cycles for hire would increase the availability of cycling for disabled people.
- Public transport operators with a policy on the carriage of wheelchairs and mobility scooters on their vehicles should extend that policy to cover cycles that are used as a mobility aid, including those of non-standard construction
- Bollards and other measures designed to physically restrict areas intended for cycling should not be configured so that they also exclude larger types of cycle that are used by disabled people, the minimum clearance between bollards and similar structures should be 1.5m, as prescribed in the relevant Interim Advice Note (IAN)[38].
- Cycle lanes should be wide enough to comfortably accommodate a tricycle, including on bends and junctions. Ideal widths for key features of cycle paths should be as follows: Access control points 2m, cycle lane 2m, a one-way cycle path 3m, a two-way cycle path 4m.
- Disabled cyclists might find gradients more of a challenge than other cycle path users. It is recommended that the maximum gradient should be 1:20, provided that this is maintained for only a short distance. For longer stretches of cycle path, the gradient should be less than this.
- Similarly, a camber on a cycle path will affect a three-wheeled cycle far more than a bicycle; for that reason, the cross fall of a cycle path should not exceed a gradient of 1:40.
- Cycle lanes with a kerb to separate them from the footway should be 'permeable', in the sense that there should be dropped kerbs or raised crossings that enable a disabled cyclist to access the footway from the cycle lane without having to dismount.
- When a cycle path is closed temporarily, an alternative accessible cycle route should be provided and clearly signposted.
- All signage for cyclists should be accessible for all potential users; this means that all of the 'rules' of accessible signage, such as using an accessible font, using good colour contrast and using icons where appropriate, should be followed, but the position of signs should be such that they are clearly visible to cyclists who are lower down, such as users of recumbents and some hand-driven cycles.

In 2018, Sustrans carried out a review of the UK's National Cycle Network (NCN), for which the charity is responsible. As part of its 'Paths for Everyone' policy, ensuring that it is accessible for everyone travelling by foot, cycle, wheelchair or mobility scooter, it pledged to remove or redesign all 16,000 barriers on the NCN, making it accessible to everyone and ensuring that no dismounting is required[39].

[38] *Interim Advice Note IAN 195/16: Cycle traffic and the strategic road network*, (Highways England, Oct. 2016).

[39] https://www.sustrans.org.uk/about-us/paths-for-everyone/ Last accessed 300919.

3.1.4 Pedestrian crossing control boxes

It is likely that the addition of a section on pedestrian crossing control boxes to *Inclusive Mobility* can be achieved with reference to statutory instruments that have been put in place since the publication of the current document in 2002. For this reason, this issue provoked very little discussion among stakeholders, although there were some who offered some design advice.

The views of stakeholders

There were no objections from stakeholders to the suggestion that a section on pedestrian crossing control boxes should be added to *Inclusive Mobility*.

Among those providing advice on this issue was Bryan Matthews, of the Institute for Transport Studies at the University of Leeds, who is himself blind and a white cane user. He suggested that, in addition to guidance on the location of control boxes and means of making sure that they can be found, there should be some text on the importance of regular maintenance. This is to address any issues of broken or missing buttons, or of rotating cones that fail to rotate. He suggests that a mechanism of self-reporting of faults would solve such problems.

Strathclyde Partnership for Transport, the public transport operator provided some views on the accessibility of pedestrian crossings, suggesting that:

- Consistency is important in ensuring that disabled users of pedestrian crossings recognise audible and tactile information. For example, a lack of consistency regarding the positioning of the “green man” signal (whether it is across the road) can lead to some confusion, and some audible signals lack consistency so that, in some instances, users have to rely on local knowledge.
- Ensuring adequate crossing time is important, and this entails taking account of the number of pedestrians at a location and the range of abilities that needs to be catered for. Opportunities should be taken to consider smart measures where there are significant variations in pedestrian demand at a crossing. A technological solution might be appropriate in some instances.

Representatives of both Age Scotland and Guide Dogs Scotland attending the Glasgow stakeholder workshop pointed out that they were aware of considerable inconsistency in the layout and design of pedestrian crossings, and raised the question of why this lack of consistency occurs if the advice contained in statutory documents is clear. It was felt that this might be because, when alterations are made to a crossing, the personnel involved are unaware of the context of the original design, and do not understand the impact there will be on disabled crossing users of making changes. It was felt that there is a need for better education for designers, architects and contractors in the provision of inclusive infrastructure. A representative of Guide Dogs Scotland pointed out that there was also no consistency in the use of tactile surfaces at pedestrian crossings.

The representative of the Mobility and Access Committee for Scotland (MACS) agreed that tactile surfaces were not always effective in indicating a safe place to cross for blind and partially-sighted people, partly because the correct colour and type of surface was not always used. He added that problems were sometimes caused by the control box at the

crossing being too far from the tactile paving; according to Standards for the Built Environment[40], this distance should not exceed 300mm. This attendee also suggested that having a tapping rail to guide cane users through a pedestrian crossing might be useful, but reiterated the principle that consistency of provision was vital.

A Transport Scotland representative advised that much pedestrian crossing design guidance, including the issue of rotating cones, was being included within the Traffic Signs Manual[41], a new version of which was in the process of being drafted. A novel feature of the forthcoming new version is that it recommends that tactile paving should be provided at pedestrian crossings as a default.

Documentary evidence

Technical details on pedestrian crossing control boxes added to *Inclusive Mobility* should closely follow the content of the Department for Transport's current advice, which is contained within Traffic Advisory Leaflet *TAL5/05 Pedestrian Facilities at Signal-controlled Junctions*[42]. This advice superseded that which was contained within Traffic Advisory Leaflet TAL5/91 Audible and Tactile Signals at Signal-controlled Junctions[43]. TAL5/05 consists of four parts, of which Part 2 contains detailed diagrams which convey instructions for positioning of the control box within different lay outs of pedestrian crossings.

The Traffic Signs Manual is an additional source that might be used[44].

3.2 New technologies and the use of online information

What the 'new' technologies described in this section have in common is that, unlike the new types of infrastructure discussed in Section 3.1, they are all the subject of a considerable body of standards and guidelines; this includes detailed standards for making products accessible for older and disabled people. Although the technologies featured were not in widespread use at the time that *Inclusive Mobility* was last published, they are mostly mature technologies. A major issue to consider, in the context of the copious amount of detailed design guidance that is available, has been the level of detail of the information that should be included in the revised draft of the document. This was the first issue to be discussed during the stakeholder engagement exercise.

There was a broad consensus among the consultees that the role of *Inclusive Mobility* should be to emphasise the main design principles that should be followed with such technologies in order to meet the needs of all potential users, rather than to provide precise

[40] *Building standards technical handbook 2019: non-domestic*, (Scottish Government, 2019).

[41] *Traffic signs manual*, (Her Majesty's Government, Mar. 2019). https://www.gov.uk/government/publications/traffic-signs-manual Last accessed 300919.

[42] *Traffic Advisory Leaflet TAL5/05 Pedestrian Facilities at Signal-controlled Junctions*, (Department for Transport, Mar. 2005).

[43] *Traffic Advisory Leaflet TAL5/91 Audible and Tactile Signals at Signal-controlled Junctions*, (Department for Transport, 1991).

[44] *Traffic signs manual*, (Her Majesty's Government, Mar. 2019).

technical details. Representatives of the RNIB's Technology Evaluation team suggested that the guidance document should focus on publishing sound advice as to how disabled people, (including, but not exclusively, blind and partially-sighted people), can be helped to perform certain tasks, with links to detailed standards and guidelines should precise details be required. In short, the recommended strategy was to focus on **why** the new technologies featured in this section should be made accessible to all users, and the consequent benefits that can be derived, whilst signposting sources of detailed information on **how** this can be achieved, through the provision of links. Much of the discussions with stakeholders therefore focused on the general principles of accessible design, and the reasoning behind them.

Another reason for seeking to avoid drafting a great deal of technical detail in new sections of *Inclusive Mobility* was for the purpose of 'future proofing' the document. Because the technologies dealt with in this section are developing so rapidly, it is likely that specific technical guidelines might not remain current for very long, whereas good accessible design practice and users' objectives will to continue to be relevant over time.

A further view expressed, during the stakeholder workshop held in London, was that the guidance should focus on minimum requirements for good practice, rather than 'best practice', on the grounds that this might discourage or confuse designers and facility providers, who might then simply ignore the guidance. There was also a suggestion, at this workshop, that the *Inclusive Mobility* document might be presented as a 'live' document, in the sense of being an online resource that can be updated as and when new developments come to light. There was, however, no consensus as to which organisation(s) might take responsibility for ensuring that such a document is kept up to date.

In the remainder of this section, for each topic area that was discussed, the views of participating stakeholders will be summarised, followed by a list of the key sources of detailed design guidance. The stakeholders contributing to this part of the research were those who attended the stakeholder workshop held in London, the RNIB's Innovation and Technology Implementation Manager and his colleagues in the RNIB's technology evaluation department, and Bryan Matthews, a lecturer and researcher at the University of Leeds, who provided the current project with a number of insights relating to the use of technology.

3.2.1 Touchscreens

The accessible design of touchscreens is an important subject area, given the growing use of this technology in a number of public transport-related applications, from smartphones to ticket machines and information terminals.

The views of stakeholders

As with all of the technologies featured in this consultation, participating stakeholders were unanimous in agreeing that *Inclusive Mobility* should include a section on the issue of touchscreens. RNIB representatives described such a section as being "crucial", given the potential for touchscreens to be linked with speech output technology. They went on to point out, however, that touchscreen devices pose additional issues, in that their keypad is not accessible, given that a blind person does not know where the numbers are, or what

they are touching. This can lead to accidental button presses and incorrect PIN entry; (the numbers on a PIN key pad are not allowed to be read out, for security reasons). It was suggested that difficulties with such interfaces should be highlighted, as well as issues experienced by people with limited manual dexterity, and that appropriate alternatives should be recommended.

An attendee of the London stakeholder workshop pointed out that touchscreens were expensive to retro-fit, meaning that it is particularly important for new touchscreens to be accessible at the time that they are introduced.

Key sources of technical detail

One of the most comprehensive sources of information on how to make ICT systems and devices accessible is provided by the CARDIAC consortium[45]. This is an initiative that was funded by the European Commission under the Seventh Framework Programme, with the 'tag line': "Advancing research and development in the area of accessible and assistive ICT". The range of information that CARDIAC covers includes transport, household appliances, telecommunications, finance and eGovernment. For each domain, the project's website includes lists of standards and published guidelines on accessible design. The listings include standards issued by the International Organisation for Standardisation (ISO), and European Standards of the Comité Européen de Normalisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC) and the European Telecommunications Standards Institute (ETSI). Among the technologies included in CARDIAC's remit are computers, biometrics, Braille, audio input/output, visual displays, internet (www), user interfaces, telecommunications and wheelchairs.

Under the sub-section entitled "Visual displays" is a page on touchscreens[46]. Included on this page is a technical explanation of the way in which touchscreens work, details of different levels of touchscreen resolution and a discussion of use issues that people with different levels of ability might have with touchscreens. The page of information concludes with recommendations for accessible design and positioning, a list of relevant standards and a bibliography of further information. The CARDIAC recommendations for the accessible design and provision of touchscreen is reproduced in Appendix C.

3.2.2 Real-Time Information in public transport buildings and within vehicles

The views of stakeholders

The representative of the Rail Delivery Group explained that there were currently no regulations relating to real-time information systems in the bus, taxi and air transport industries, whereas rail operators have to adhere to certain standards. These standards entail ensuring that RTI equipment meets certain minimum requirements, that regular maintenance of signs is carried out, and that tests are carried out to verify that all information shown is displayed correctly (and not diminished by lighting etc.). He added that, because the rail industry is regulated, operators provide both online and offline

[45] http://www.cardiac-eu.org/index.htm Last accessed 011019.

[46] http://212.50.96.228:5000/cardiaceuorg/guidelines/touch.htm Last accessed 011019.

versions of timetables; bus companies, for example, have no regulatory obligation to provide timetables, and so the publication of timetable information depends upon the choice of the operator.

The representative of Transport for London (TfL) stated that LCD information displays are good and accessible, assuming that the colours used are correct (i.e. that backgrounds and text with poor colour contrast are not used). He added that any icons and symbols should be easily identifiable, and that text and colours should be altered depending on the environment's ambient lighting, for optimal viewing. He emphasised that, when there is no signage, there must be audio to replace it, and vice versa, but that both should be provided whenever possible.

The Rail Delivery Group representative pointed out that dot matrix displays were being replaced by LCD screens, meaning that icons and symbols can be, and are being, used – but more testing needs to be done in order to perfect current RTI displays. Generally, changing the colour of displays is very easy for Network Rail to do.

An RNIB representative at the workshop pointed out that some systems already have a feature that turns off the screen when nobody is on board the vehicle to view it. He also told the group that interactive signs might be developed with the capacity to tailor their display to be of relevance to the person viewing them, which would result in the passenger doing less work and finding the relevant information faster. There is the potential to link what is on signs to an individual's personal device, using similar technology to that which makes it possible to connect the monitor on a pupil's school desk to the smartboard at the front of the class.

A general point made was that good design principles relating to conventional signage, (in terms of size, font style and colour contrast), should be able to be carried over to the context of RTI displays. However, advice from the RNIB on presenting information on how text can be made legible is that it is important to not be too specific, as this might limit design and implementation options – the emphasis should be on the end goal of making sure that a given task can be carried out by somebody who is blind or partially sighted.

Some advice was provided on the siting of such signs, recommending that they should be positioned in places where they can be seen most easily, avoiding glare or locations where there is poor lighting. The speed at which the information scrolls and refreshes should be appropriate, giving adequate time for it to be read. Importantly, advertising messages and displays should not appear on the same screen as important travel information.

Key sources of technical detail

The relevant statutory advice in the UK is contained within the Department for Transport's Traffic Advisory Leaflet TAL 01/15 Variable Message Signs[47] and the Department's Traffic Advisory Leaflet ITS 7/03[48]. TAL 01/15 refers mostly to Variable Message Signs that are displayed at the roadside, but contains detailed information on letter heights and legibility that may be of relevance to the design of information displays in public transport

[47] *Traffic Advisory Leaflet TAL01/15 Variable Message Signs*, (Department for Transport, Jan. 2015).

[48] *Traffic Advisory Leaflet TAL7/03 Public transport information*, (Department for Transport, Dec. 2003).

environments. ITS 7/03 is one of a series of documents published by the DfT's ITS Assist Project, whose remit was to encourage and promote the use of Intelligent Transport Systems (ITS) in the UK. The Leaflet provides details of the main components of a Real-Time Information system, discusses system design, describes mechanisms for delivery of such a system and gives advice on the technologies that are available.

The Real Time Information Group (RTIG), whose members include local authorities, bus operators and equipment suppliers, has published a number of documents that are publicly available on its website[49]. One of these is entitled *Inclusive Passenger Information*[50], which is a guide to good practice in providing accessible information to passengers in the context of the bus industry. This document provides comprehensive information on the font and format of lettering, sign positioning and lighting, information terminals and ticket machines, audible information systems, and information provided via websites and mobile services.

The CARDIAC consortium again provides useful information on this subject. Its page on "Passenger information systems" describes various means of conveying Real-Time Information on public transport services, including large-scale public displays at transport interchanges, online sources and interactive television. For each context, the needs of blind and partially-sighted people are discussed. The page also includes a description of how speech output might be obtained from a visual display using a mobile 'phone and a short-range radio link, such as Bluetooth. CARDIAC provides the following fairly general recommendations on the provision of passenger transport information:

- Messages should be made accessible to as many users as possible
- Messages should be clear, concise and consistent
- Messages should remain distinct from one another
- Messages should not provide so much information that they overload the user
- Where possible, information should be provided in both visual and audible form

An authoritative source of information on general issues relating to the accessible design of signage is the *Sign Design Guide*, which is published by the Sign Design Society[51]. Much of its advice on how to maximise the legibility of signs, particularly for people with low vision, is relevant in the context of Real-Time Information systems.

3.2.3 Contactless payment and ticketing mechanisms

The views of stakeholders

An RNIB representative stated that there are trust issues with PIN numbers for some users. For example, some older people and people with learning disabilities prefer contactless mechanisms because they do not have to remember a PIN. He added that prepaid card

[49] http://www.rtig.org.uk/web/RTIGdocuments/tabid/56/Default.aspx Last accessed 011019.

[50] *Inclusive passenger information: A guide to good practice for bus passenger technology providers*, (RTIG, Apr. 2018).

[51] Barker, P. and Fraser, J., *Sign design guide: A guide to inclusive signage*, (Sign Design Society, 2004).

systems, such as Oyster, are excellent for older people and people with learning disabilities, although an Oyster card does not tell the user clearly how much credit is left. The representative of Transport for London countered this by stating that Oyster is easy to check online, as the web platform is very good. This would not be the case if the website were poorly designed.

The RNIB representative made the more general point that most cards do not bear a number that is accessible for blind and partially-sighted people, which can make it very difficult to perform certain activities online or on a ticket machine. A brail display or raised numbers on the card could solve this problem.

The important characteristics of a contactless payment system, to make it accessible for all users, were described as follows:

- All users must be able to detect where a device (such as a touch pad) is positioned - one solution to this is consistent layouts for such systems, so that it is as easy as possible to orient oneself and locate the card reader;
- All users must know how to use it;
- All users must know what they are paying for;
- All users must know how the payment is to be made;
- There must be an acknowledgement, that is clear to all users, that a payment has been made - the provision of audible and haptic clues, as well as visual feedback, can be used to confirm transactions.

A further suggestion was that there should always be a back-up, such as having staff available, in case of a passenger struggling to interact with the system, or in case the technology fails. One respondent went as far as to suggest that alternative payment and access mechanisms should be provided for those unable or unwilling to use contactless technology.

Key sources of technical detail

The main source of technical information in the UK is ITSO (formerly the Integrated Transport Smartcard Organisation)[52]. ITSO is the body responsible for ensuring standardisation and interoperability in terms of the smartcards that are used in the UK public transport industry. All smart ticketing systems can be made according to the ITSO specification. The English National Concessionary Travel Scheme relies on the ITSO specification for its nationwide operability, (although Transport for London's Oyster system is a non-ITSO system).

The CARDIAC consortium provides a great deal of technical information on the technical aspects of contactless systems, describing both near-field communication systems, and radio frequency identification system[53], but no information is provided on how contactless

[52] https://www.itso.org.uk/ Last accessed 011019.

[53] http://212.50.96.228:5000/cardiaceuorg/guidelines/guidelines_list.htm#applicationareas Last accessed 011019.

ticketing and payment systems might be made accessible for older and disabled people. In fact, no sources of information on the accessibility of contactless technology in the context of public transport were found.

3.2.4 Website accessibility and compatibility with assistive technology

The views of stakeholders

An important point made by the RNIB is that, even though a website might conform to WCAG, this does not necessarily mean that the website can be used by a blind or partially sighted person. 'Usability' is key and is often overlooked. Assessing the website for usability for people using access technology should be included, in addition to assessing for accessibility though WCAG checks. Any information that is visual needs to be designed in such a way that the information is easily readable by the majority of people, and is accessible in other formats for people who are unable to read printed information. This implies consideration of providing information in a different font size or contrast ratio, but also with audio and braille alternatives.

Basic advice on the presentation of information online included the need to keep displays simple and uncluttered, and using clearly contrasting colours, and text of an appropriate size and font. Where graphics or icons are used, provide text labels with these, and ensure that all graphic items or icons on a given page are clearly distinct from one another. It should be possible to zoom in on all items, and the speed at which information scrolls and refreshes should give adequate time for it to be read. Ideally, adverts should not appear on the same page as important travel information. It is good practice to include disabled people with a range of different access needs in the design process.

At the stakeholder workshop, the AbilityNet's Head of Digital Inclusion reiterated the importance of *Inclusive Mobility* recommending that end user tests were important as part of the design process. He also felt that website accessibility must include all user interfaces, including smartphone apps, smart speakers, etc., and recommended that all websites should be built "from square one", to ensure that they are easier for all users to use. This will be more beneficial in the long term, as less modification will be required.

It was widely agreed at the workshop that most of the tags and/or descriptions attached to photos and pictures on websites were not detailed enough. For example, a photo of a coffee cup would have a tag of "coffee cup", which is not enough detail, as it should say something like "white coffee cup with brown rim on a blue background".

The Transport for London representative suggested that it would be very beneficial to get all companies to use similar formats in their information displays. For example, the consistent use of bus timetables would be extremely useful. Another of his suggestions was that proof of end user testing should be shown before a website is permitted to be fully released to the public.

Key sources of technical detail

The internationally-recognised body for all standards relating to the internet is the World Wide Web Consortium, or w3c[54]. The w3c has a number of working groups dealing with various aspects of the internet, one of which is the Web Content Accessibility Guidelines Working Group, which has produced the Web Content Accessibility Guidelines, the most recent version of which, *WCAG 2.1*, was published in 2018[55].

The RNIB has a team of accessibility consultants that offers advice on issues relating to the accessibility of websites[56]. This includes an 'observed user testing service', using blind and partially-sighted testers.

3.2.5 The accessible design of smartphone apps

The views of stakeholders

The view of the RNIB was that it would be crucial to include some guidance on the design of smartphone apps. The fact that smartphones these days have built in accessibility features for people who are blind (e.g. speech) or partially sighted (e.g. magnification) does not mean that the app is accessible and usable. The app needs to be designed in such a way that those accessibility features work with the app. For example, if the buttons on the app are not labelled correctly (in the programming, rather than visually), then the phone will not be able to convey this information in speech to a blind user - and the app will be unusable. In addition, mobile apps are crucial in the area of wayfinding, and the nature of maps means that there will be challenges in conveying this information to somebody who is unable to see the screen. All these factors need to be taken into account when designing an app. Accessibility and usability testing is also crucial, as an accessible and usable app can make all the difference to a user, as they can use the app 'on the go', as opposed to just consulting a website prior to a journey. An app also needs to be accessible and usable to people using access technology (such as speech or magnification) on their smartphone.

It was also suggested that the guidance could usefully provide an overview of the contribution that smartphone apps can make to inclusive mobility, with some discussion of their merits and possible drawbacks. Those using the guidance should be encouraged to think about how smartphone apps might be used, in tandem with the appropriate design of the built environment.

It was pointed out, at the stakeholder workshop, that some current apps are not fit for purpose, an example being given of a taxi app specifically designed for accessible taxi services, which is not accessible for all potential users. It was emphasised that user testing should involve all types of potential user. There is little incentive to test for accessibility in this way, but if an app were designed for disabled users, it would be easier for everyone to use. Another important point made was that apps must be developed for use on all

[54] https://www.w3.org/standards/ Last accessed 011019.

[55] https://www.w3.org/TR/WCAG21/ Last accessed 011019.

[56] https://www.rnib.org.uk/rnib-business/website-and-apps Last accessed 011019.

smartphone models, because some users lack the means to update their phone as regularly as others, and they must not be left behind. One attendee stated that phones are unreliable. They run out of battery and 'crash', and so there must always be an alternative to obtaining information via a smartphone app.

Key sources of technical detail

The World Wide Web Consortium's WCAG 2.1[57] includes advice on how smartphone apps can be made accessible. There is not a separate publication on mobile accessibility, but the Web accessibility Initiative (WAI) does have a Mobile Accessibility Task Force devoted to such issues. Guidance on mobile accessibility is provided on the w3c website[58].

Similarly, the service offered by the RNIB to provide technical assistance on the accessibility of websites also extends to technical assistance with the design of smartphone apps[59].

The CARDIAC consortium provides a great deal of advice on the design of smartphones. Some of this relates to the physical design of handsets, (including recommendations such as having a non-slip back, etc.), but recommendations concerning the user interface, the visual display and other issues that might be relevant to the design of apps for smartphones are as follows:

- Keys, or "button" areas, should be well contrasted, visually, with their background, and should be as large as possible, whilst preserving a distance between keys of half a key's width. The target size of a touch sensitive area is quoted as being a minimum of 9.2mm in width for discrete tasks, and 9.6mm in width for serial tasks, (which should be sufficiently large for one-handed, thumb operation). Labelling of buttons should be clear, the text or icon should be as large as possible and well colour contrasted with the button itself.
- The display should follow all legibility guidelines relating to colour contrast, lighting, font size, etc., with the facility provided for the user to be able to adjust any parameter relating to the device's visual or audible output. The iPhone provides accessibility features such as the "white on black" and "zoom" options. In addition, text should not flash or scroll, and audible outputs should have a synchronised visual confirmation.
- All recognised conventions for the meaning of colours should be adhered to, (e.g. red for "stop", green for "go").
- Some audible and/or visual feedback in response to each input should be provided. Audible output should also be available for the identification of controls.
- It should be easy for the user to return to the previous, or default, screen, at any stage of operation, (i.e. the system should be as error tolerant as possible).

[57] https://www.w3.org/TR/WCAG21/ Last accessed 011019.

[58] Patch, K., Spellman, J. and Wahlbin, K., *Mobile accessibility: How WCAG 2.0 and other w3c/WAI guidelines apply to mobile*, (w3c, Feb. 2015).

[59] https://www.rnib.org.uk/rnib-business/website-and-apps Last accessed 011019.

3.2.6 Wayfinding technologies for blind and partially-sighted people

The views of stakeholders

The RNIB expressed the view that it is crucial for there to be suitable guidance on wayfinding solutions, as the majority of commercial offerings are not accessible. Another contributor expressed the opinion that the guidance should not set out a case in favour of one form of wayfinding technology over another, on the grounds that there is not enough evidence yet as to what works most effectively, in which circumstances and for which groups of people. Instead, the guidance could usefully provide an overview of the different types of technology, with some discussion of the relative merits of different technologies.

The RNIB's advice is that providing guidance on specific technologies would undoubtedly mean the document could quickly become out of date and irrelevant, and such guidance might, in any case, need a cavate such as "these technologies are not endorsed or tested, but merely described for information purposes". Therefore, a solution could be to provide context and overarching general design principles, and refer the reader to RNIB for information on current or suitable solutions that meet the needs of blind and partially sighted people. The technology landscape has changed in recent years, with the built environment (indoor/outdoor), the infrastructure (the operating system that we rely upon) and digital platforms (the operating systems digital relies upon) merging. Within the travel and transport industry, there has been considerable change recently with the advent of Intelligent Mobility, Mobility as a Service (MaaS) and the Internet of Things (IoT). The UK government's commitment to the testing and adoption of autonomous vehicles and 5G connectivity provides an opportunity to allow complex user needs to be catered for within this changing landscape. There have been huge leaps in terms of independence and access to information through the use of smart devices, and this trend is set to continue. The RNIB continues to research and test suitable technology solutions that, when coupled with the devices that people own and the adoption of inclusive design principles in the built environment, can radically improve independence, and mitigate issues around travel and transport, for blind and partially sighted individuals. The RNIB has identified several solutions that remove the indoor / outdoor divide, providing seamless benefit for blind and partially-sighted people and sighted people alike.

There is no single technology that caters for all users' needs within a complex environment. As such, solutions need to fuse and blend to provide sustainable benefits. Solutions that address issues in the context of wayfinding and travel and transport can be simplified to four main principles:

- Obtaining information and using it
- Orientation
- Navigation
- 'Entrance and Exit' (including hand-off / task completion)

Technology solutions that support these principles should be applied with the precursor of the adoption of inclusive design principles in the built environment. RNIB suggests that now is the time to start to evaluate some of these solutions to determine their effectiveness and

readiness within the remit of the government drive to determine fit-for-purpose solutions to realise these benefits for anyone and everyone that may utilise the environment.

The following are requirements that any digital wayfinding solution, in its broadest sense, irrespective of the underlining technology utilised, should provide:

- It should be fit-for-purpose for people living with sight loss and other disabilities, as validated by user testing
- There is the 'Wayfindr' open standard that defines best practice for the implementation of audio-based navigation systems (messaging), although there is no standard covering the usability of digital wayfinding solutions
- In today's current multi-cultural society, any solution should be able to deliver information in the native language of the recipient without the need to reconfigure or translate the information; by the same token, because society is made up of diverse intellectual understanding, the solution should also be able to deliver information in a form that is suitable for the user, and so be, for example, child friendly, easy read, in British Sign Language, or understandable for people with a mental health condition, etc.
- The solution should provide an intuitive interface with user defined preferences, allowing the individual to select/reselect the 'form' in which the information would be useful for them, (e.g. visual, audio, haptic)
- It should be sympathetic to the environment, with a low carbon footprint
- There should be ease of access to the solution, so it should ideally be free to the user
- No special equipment should be required, making it possible for the user's own smart device to be used, reducing cost for both user and stakeholder
- Commercial viability, providing benefits for all of society; this, in turn, ensures sustainability of the solution for blind and partially sighted people and other disability groups.
- The capability to be used with existing mobility aids and orientation workarounds used by people with sight loss and other disabilities (e.g. smart devices), and by those accompanying them
- Easy implementation and sustainable maintenance, so that the solution does not become out of date and can evolve with the business need
- The solution should be easily scalable to meet changing business needs
- It should be possible for the solution to be integrated into existing commercial offerings, enabling control by the stakeholder, thus providing ownership of customer service
- The capability to provide wayfinding 'GONE' principles (i.e. Getting information and using it, Orientation, Navigation and Entrance and exit identification)

- The ability to provide either static and dynamic information (e.g. with Real-Time Information on transport services), or static information (e.g. with signage: “Toilets”, “Consultation Room 1”, etc.)
- The solution should be able to deliver information about static and moving objects, and provide wayfinding and orientation information
- The solution must be capable of delivering relevant bi-directional information relevant to the location and direction of the individual
- The solution must blend with other solutions and workarounds, as there is no single technology that meets all the requirements of an individual whilst travelling through complex environments
- The solution must also be able to be utilised outside of the stakeholder’s ‘controlled environment’, such as a rail/bus station or shopping centre, i.e. within the surrounding area/community, so that the task or journey can be completed
- The solution should ideally provide benefit within more private environments, such as the home, providing benefit and familiarity as the need arises
- The solution should ideally capitalise on the predicted trajectory of technological advances, such as smart devices, Artificial Intelligence, Image Processing, Augmented Reality and the perceived form factor and adoption of ‘wearables’

The perspective of the Rail Delivery Group representative was that safety is the most important element concerning the use of wayfinding devices by blind and partially-sighted people. He also raised the issue of installation having many problems, one being that system beacons need power. This can be achieved via the ethernet, although there will be an increased security risk. Another issue is that much infrastructure is classified as ‘heritage’, and there are many problems with installing a wayfinding device on a listed building.

The stakeholder workshop discussion turned to various ‘low-tech’ solutions for wayfinding, one of which was consistency of design. In this context, the Rail Delivery Group representative stated that Network Rail was in the process of rolling out a system whereby there will be only three possible locations for a help desk or kiosk, depending on the category of the station. A beacon might also be placed on a kiosk, to help blind and partially-sighted passengers with navigation. A question was raised, however, as to what happens with passengers who are ‘technology naked’, when a method of navigation is required without the use of personal technology. The RNIB representative at the workshop expressed the opinion that audible announcements could be used to better effect, quoting the example of Manchester Piccadilly railway station, where it is possible for a blind person to tell which platform he or she is on, from audio information alone. Another idea put forward was that all lift button layouts should be the same across the rail network, and it was agreed that this was readily achievable, even across the entire transport network. The Transport for London representative raised the issue of lighting, initially stating that it can be poor in many rail, underground and bus stations, but adding that lighting is used very little as a spatial orientation tool. The use of tactile floor strips was suggested as a potential navigation device, with those used in Milan Airport quoted as an example. The Rail Delivery Group stated that Transport for London was interested in adopting such a strip system, but

warned that TfL has its own standard for such things, and so its system will differ from that of other transport hubs. Similarly, all airports have their own standards, making it very difficult to achieve agreement on colours and tactile configurations.

There was a brief discussion of wayfinding technologies for blind and partially-sighted people during the Glasgow stakeholder workshop, with one attendee mentioning the Neatbox system, which tells the user how close a crossing is, and can even communicate with crossings. Such a solution needs infrastructure to be fitted in order to work. Neatbox has similarities with the Soundscape system, which tells the user about his or her location, and about the shops that are nearby. Soundscape depends upon ownership of a smartphone, and on the user's ability to use the technology.

Key sources of technical detail

A comprehensive review of wayfinding technologies and systems intended to help blind and partially-sighted people to navigate the pedestrian environment, entitled Wayfinding Project, is provided by the RNIB's Innovation Unit[60].

A useful overview of the range of navigation systems designed for blind and partially-sighted people is provided by Wikipedia[61].

4 Conclusions and Recommendations

An initial review was made of the of the conclusions of the predecessor Scoping Study. On the issue of the content of the current version of *Inclusive Mobility* that should be omitted from a redraft, the Project Team found no reason to differ from the Scoping Study's conclusions.

Recommendation 1: The following content should be omitted from the revised version of *Inclusive Mobility*:

- In the section "Footways, Footpaths and Pedestrian Areas", all references to pelican crossings, on the grounds that they are no longer prescribed;
- In the section "Tactile Surfaces", the "Information" surface should be removed from the list of recommended surfaces, due to a lack of usage;
- In the section "Bus Stops", the recommendation to install 'panel' information displays, on the grounds that they are not suitable for wheelchair users and people of short stature;
- In the section "Transport Buildings: Facilities", all recommendations on the design of public telephones, (subject to any requirement for a minimum number of public telephones being available in case of emergency), because of the prevalence of the use of mobile 'phones**.**

On the issue of potential additions to a redrafted version of *Inclusive Mobility*, after a review of the conclusions of the Scoping Study, followed by discussions with the client and the

[60] Worsfold, J. and Chandler, E., *Wayfinder Project*, (RNIB Innovation Unit, Jul. 2010).

[61] https://en.wikipedia.org/wiki/GPS_for_the_visually_impaired Last accessed 011019.

Project Steering Group, a list of topics was developed, and these were divided into the following two broad categories:

- New infrastructure relating to cyclists and pedestrians: Bus stop bypasses; Shared cycle / pedestrian pathways; Cycles as a mobility aid and the needs of disabled cyclists; Pedestrian crossing control boxes.
- New technologies and the use of online information: Touchscreens; Real-time information in stations and in vehicles; Contactless ticketing; Website accessibility; Smartphone apps; Wayfinding technologies for blind and partially-sighted people.

Discussions with stakeholders, facilitated by two stakeholder workshops and additional correspondence, and informed by a thorough literature review, have resulted in the following conclusions:

Bus stop bypasses

Reservations were expressed by organisations representing the interests of people who are blind or partially-sighted as to the safety of bus stop bypasses. However, these concerns are counter-balanced by a great deal of work that is being undertaken on the accessible and inclusive design of bus stop bypasses. In conclusion, because of the benefits in terms of cyclist safety, and the likelihood that bus stop bypasses can be designed so that they are safe for everyone to use, a section on their accessible design should be included in the revised guidance.

Recommendation 2: A section on bus stop bypasses should be included in the forthcoming redraft of *Inclusive Mobility*; design guidance in other documents focused on cycling infrastructure may also need to be updated to ensure consistency between sources.

Shared cycle / pedestrian pathways

Strong views were expressed by stakeholders to the effect that mixing pedestrians and cyclists on the same pathway is potentially dangerous, and therefore undesirable, and so should not be a policy choice.

Recommendation 3: Text should be included that discourages the mixing of cycle and pedestrian traffic on the same pathway. The text should state that shared cycle / pedestrian pathways should only be installed on routes where few cyclists and pedestrians are expected, and where the location enables a pathway of ample width to be created. This recommendation has implications for other design guidance on cycling and pedestrian infrastructure, such as LTN 1/12 Shared Use Routes for Pedestrians and Cyclists**.**

Cycles as a mobility aid and the needs of disabled cyclists

There was agreement among stakeholders with the principle that *Inclusive Mobility* should feature the needs of disabled cyclists as well as disabled pedestrians. There is also evidence of an increasing awareness of the extent to which disabled people use cycles as a mobility aid., although questions remain unanswered as to all of the consequences, should cycles used as a mobility aid be granted the same status as wheelchairs and mobility scooters at some time in the future.

Recommendation 4: A section on how to make cycling facilities accessible to disabled cyclists should be included in the forthcoming redraft of *Inclusive Mobility* (this may also

need to be reflected in cycling infrastructure guidance). Such measures might include the avoidance of narrow cycleways and cycle lanes, and of access control measures to exclude motorised vehicles, that might also exclude cycles that are of non-standard design (such as tricycles and other types of cycle that are favoured by disabled cyclists). Cycling infrastructure should also be step-free, and disabled cyclists should not be expected to dismount from their cycle. The revised guidance should also raise awareness of the extent to which disabled people might use a cycle as a mobility aid**.**

Concerning recommendations 2, 3 and 4 it is important to note that there is a significant amount of design guidance specifically on cycling infrastructure that highway engineers are likely to look to for advice on those topics in the first instance. Designers may not consult Inclusive Mobility unless prompted to do so by sources they are more familiar with. It is therefore recommended that the primary sources of guidance on cycling infrastructure design are also updated to be consistent with new advice in *Inclusive Mobility*.

Pedestrian crossing control boxes

All issues relating to the design of pedestrian crossing control boxes are fully covered in the relevant statutory documents.

Recommendation 5: A section on pedestrian crossing control boxes should be included in the forthcoming redraft of *Inclusive Mobility* and be based closely on the text of the relevant statutory documents.

New technologies and the use of online information

The new technologies identified considered in this research are all in a fairly advanced stage of development, and so are the subject of a large body of existing detailed standards and design guidelines specific to each technology. In the light of this, there was a strong consensus that the revised guidance should avoid technical specifications details, and instead focus on broad design principles. The text should explain why certain design features are important for disabled people, and then 'signpost' the reader to the specific standards and guidelines that will explain how accessibility can be achieved. This will help to 'future proof' the revised document, given that technical specifications are likely to soon be out of date, in a rapidly developing sector, whereas users' needs will remain relatively unchanged. There was also a strong consensus that all six of the areas of 'new technology' identified should be the subject of new sections in a revised version of the guidance.

Recommendation 6: All of the 'new technologies' featured in the research - namely Touchscreens, Real-time information in stations and in vehicles, Contactless ticketing, Website accessibility, Smartphone apps and Wayfinding technologies for blind and partially-sighted people – should be featured in new sections of *Inclusive Mobility*. The text should have a strong emphasis on explaining the basic design principles involved with making such technology accessible, as opposed to focusing on the inclusion of detailed technical data.

Miscellaneous recommended updates

As part of the process of consulting on the proposed additions to the guidance a number of points of detail were noted that require updating or otherwise amending to reflect more recent guidance, terminology or practice. This list of miscellaneous recommendations is provided as Appendix D.

Appendix A List of questions sent to individuals and organisations unable to attend a stakeholder workshop

New infrastructure relating to cyclists and pedestrians

Bus stop bypasses / floating bus stops

Some reference is made to bus stop bypasses / floating bus stops in the government's Local Transport Note *LTN2/08 Cycle Infrastructure Design*, which I understand is in the process of being superseded by a revised LTN on this subject.

What are your / your organisation's views on bus stop bypasses / floating bus stops from the points of view of their safety and accessibility?

Are you aware of any research that has been carried out into the safety of bus stop bypasses / floating bus stops?

In your / your organisation's view, what are the key issues that need to be solved in order for bus stop bypasses / floating bus stops to be made safe for everyone to use?

Are you aware of any research that has been carried out into how to make bus stop bypasses / floating bus stops safe for everyone to use?

Shared (cycle / pedestrian) pathways

There are several guidance documents that cover the issue of shared (cycle / pedestrian) pathways, including the current Local Transport Note LTN2/08, Local Transport Note *LTN1/12 Shared Use Routes for Pedestrians and Cyclists*, Transport for London's *London Cycling Design Standards*, Cycling UK's *Space for Cycling: A Guide for Local Decision-makers*, Sustrans' *Handbook for Cycle-friendly Design*, Transport Scotland's *Cycling by Design*, etc.

What is your / your organisation's general view of shared (cycle / pedestrian) pathways?

Do you consider any particular set of guidelines on the design of shared (cycle / pedestrian) pathways to be the most authoritative? (Either among those listed above, or from elsewhere)

Are you aware of any recent research that has been carried out into the safety / accessibility of shared (cycle / pedestrian) pathways?

In your / your organisation's view, what should *Inclusive Mobility* include on the accessibility of shared (cycle / pedestrian) pathways?

Bicycles / trikes used as a mobility aid

Do you agree with the principle that a bicycle / trike might be used as a mobility aid, and so be regarded as having the same status as a wheelchair or mobility scooter in some or all circumstances?

If not, why not? What restrictions, if any, should be placed on a bicycle / trike having the same status as a wheelchair or mobility scooter?

Consideration is being given to including guidance on how to make cycling infrastructure accessible to disabled cyclists, in which case, what do you consider to be the most important issues to be covered on this subject?

Are you aware of any guidance that provides details of how to make cycling infrastructure accessible to disabled cyclists?

Pedestrian crossing control boxes

Consideration is being given to including a section on the design of pedestrian crossing control boxes in *Inclusive Mobility*, in which case close reference will be made to Traffic Advisory Leaflet *TAL5/05 Pedestrian Facilities at Signal-controlled Crossings*. This will cover issues such as the positioning of the rotating cone to assist blind and partially-sighted people at such crossings.

Are you aware of any similar guidance that should be considered?

Are there any considerations for pedestrian safety that you think should definitely be included in any guidance relating to pedestrian crossing control boxes?

New technologies and the use of online information

General questions in relation to the accessibility of ICT systems

Many detailed, well-established standards and guidelines are available on the accessible design of ICT systems. These include those published by the International Standards Organisation (ISO), the European Committee for Standardisation (CEN), the American National Standards Institute (ANSI), the European Union-funded COST 219 initiative and the CARDIAC Project, and the Sign Design Guide.

Are you aware of any other sources of design guidance that should be taken into consideration?

What type of information do you think *Inclusive Mobility* should include on the accessibility of ICT systems – general design principles, detailed technical information or both?

What type of detailed technical information, if any, do you think should be published in *Inclusive Mobility*?

What are the important general design principles, if any, that should be published in *Inclusive Mobility*?

Wayfinding technologies for blind and partially-sighted people

Do you think that it will be useful for *Inclusive Mobility* to include a section on wayfinding technologies for blind and partially-sighted people?

If so, what aspects of wayfinding technologies should be included? (This might, for example, include guidelines on beacons, or other infrastructure to support wayfinding technology).

Website accessibility and compatibility with assistive technology

There are well-established and well-regarded guidelines on the accessible design of websites, such as the Web Content Accessibility Guidelines (WCAG) 2.1 of the World Wide Web Consortium (w3c), which now constitute an ISO/IEC Standard.

Do you think that it would be useful for *Inclusive Mobility* to include some guidance on website accessibility and compatibility with assistive technology?

If so, what are the most important issues to be covered?

Real-Time Information (RTI) in stations and in vehicles

Inclusive Mobility currently provides guidance on the legibility of 'conventional' signage, (in terms of type of font, achieving a good colour and tonal contrast, the size of lettering, etc.). There are also design guidelines available on general issues relating to Variable Message Signs (VMS), such as Traffic Advisory Leaflet *TAL 01/15 Variable Message Signs*, which relates mainly to road traffic signs.

Do you think that it would be useful for some guidance on the accessible design of VMS to be included in *Inclusive Mobility*?

If so, what are the most important issues that should be covered in *Inclusive Mobility* in this subject area?

Are there any specific details of design that should be included in *Inclusive Mobility* on this issue?

Are you aware of any standards or guidance that relates specifically to VMS in public transport terminals and/or public transport vehicles?

The accessible design of smartphone apps

Most smartphones already provide an 'accessibility' feature that enables the user to personalise the device so that it is suitable for his or her needs. At the same time, there are apps aimed at older people that include features such as 'error trapping' that predict, and deal with, errors that this type of user is likely to make.

With this in mind, do you think that it would be useful for *Inclusive Mobility* to include some guidance on the design of smartphone apps?

If so, what are the most important issues that should be covered in *Inclusive Mobility* in this subject area?

Are there any specific details of design that should be included in *Inclusive Mobility* on this issue?

Contactless ticketing and payment mechanisms

Contactless technologies are being used increasingly in the public transport industry, with a growth in the number of networks using a 'tap & go' system. Although contactless ticketing has the potential to improve rates of throughput in public transport environments, it might also give rise to issues of trust and security, particularly among older people or people who are blind or partially-sighted.

Do you think that it would be useful for *Inclusive Mobility* to include some accessibility-related guidance on the use of contactless ticketing and payment mechanisms?

If so, what are the most important issues that should be covered in *Inclusive Mobility* in this subject area?

Are there any specific details of design that should be included in *Inclusive Mobility* on this issue?

Touchscreens

Touchscreens are being used increasingly in many contexts, on cash machines, information terminals and ticket machines. Detailed standards and guidelines are available on the accessible design of touchscreens.

Do you think that it would be useful for *Inclusive Mobility* to include some accessibility-related guidance on touchscreens?

If so, what are the most important issues that should be covered in *Inclusive Mobility* in this subject area?

Are there any specific details of design relating to touchscreens that should be included in *Inclusive Mobility*?

Appendix B RNIB Policy Position Statement on bus stop bypasses and bus stop boarders

Access to Bus Stops (Bus Stop Bypasses and Bus Stop Boarders)

August 2019

What we think

Blind and partially sighted people rely on public transport (particularly buses) as a primary means of travel, as they are unable to drive and often face challenges walking around the built environment. Having to cross a cycle lane without an accessible crossing or shared use pedestrian/cycle area to get on and off buses makes getting around harder for blind and partially sighted people because of the difficulty identifying silent cycles. The more difficult it is to get around, the less freedom and opportunity people have to participate in society and access key services and employment.

Blind and partially sighted people tell us they find it impossible to access local bus services at locations where Bus Stop Bypasses and Bus Stop Boarders are installed, reporting feeling unsafe, anxious and vulnerable to collisions with cycles. When key aspects of the public space become inaccessible in this way, people with sight loss are no longer able to safely make independent journeys.

What are Bus Stop Bypasses and Bus Stop Boarders?

A Bus Stop Bypass gives cyclists an alternative way to overtake a bus that has pulled up at the stop, where the cyclist can choose to depart from the carriageway and follow a dedicated cycle track that loops around the back of the bus-stop and over the pavement. In some cases, a mini-zebra crossing is provided for pedestrians to cross over the cycle track to the bus stand, or vice-versa, but in many cases the cycle track has no provisions for pedestrians crossing.

With a Bus Stop Boarder there is again a cycle-track running between the pavement and the place where the bus stops, but the difference is that there is no dedicated bus stop island where pedestrians wait for the bus. People attempting to access the bus or alight from it must do so from the cycle lane which becomes a shared use area at this point. Therefore, when getting on or off the bus they are effectively stepping directly from, or onto, a live cycle-track.

These designs create a range of mobility and personal safety issues for blind and partially sighted people who are faced with having to locate the cycle track, which are often not detectable, and then find a safe way to cross by interacting with cyclists they cannot see or hear approaching the shared use area while also trying to get on or off a bus. RNIB object to shared use areas because they force blind and partially sighted pedestrians to interact with approaching bikes and other vehicles that they will often be unable to hear or see. Please also refer to RNIB's policy position on shared use areas.

What's happening now

Increase in cycleway infrastructure

Because of the recent push to encourage cycling and provide alternative tracks for cyclists to use, significant investments have been made to increase cycling infrastructure across the country. This has resulted in new cycleways, and cycle infrastructure such as cycle racks and bus stop boarders and bypasses.

In 2018, research on bus stop bypasses by Transport for London found that the average speed of cycles using bus stop bypasses was 14.4 mph (TfL, 2018, p.17). The addition of Zebra crossings in bus stop bypass locations made no difference to cycle speeds.

When pedestrians are having to negotiate shared use areas with cycles moving this fast to access a bus stop, this presents serious hazards to both cycles and to pedestrians trying to access a bus stop.

Although in this research, Transport for London recommended the use of Zebra crossings without Belisha beacons as effective 'in place of uncontrolled crossings', they also said:

"Owing to the little evidence of improved give way behaviour, it is recommended that complementary measures are also introduced. These could include audio announcements on buses on the approach to a BSB [bus stop bypass], and behaviour change activities to encourage cyclists to give way at Zebra crossings" (TfL, 2018, p.16).

We regularly receive reports of the confusion caused by pus stop bypasses for all user groups, over for example right of way. In many bus stop bypass locations signs telling cyclists to give way to bus passengers have not been installed, there is a general lack of clarity over the meaning of markings on cycleways, and audio announcements on buses often do not include warnings for passengers that they will be alighting onto a shared use area.

RNIB supports cycling and investment in cycle infrastructure which is designed inclusively. However, we are seriously concerned about the negative impacts caused by the bus stop bypasses and bus stop boarders that have already been built. We are also concerned that new schemes in planning continue to persist with non-inclusive designs and those that create shared use spaces and place people with sight loss at risk.

What must happen

We support the aim to promote walking and cycling, to increase levels of healthy activity and the move to zero emission transport. Our support is based on all developments and schemes being designed inclusively. government and local authorities must protect the rights of all road and pavement users, including blind and partially sighted people, to empower them to make safe and independent journeys.

We think Bus Stop Bypasses that do not provide a detectable cycle track or a fully inclusive pedestrian crossing are a hazard to blind and partially sighted people and will act to prevent people from accessing the bus services at that stop.

We think Bus Stop Boarders of all kinds create an unacceptable level of risk and due to the design cannot be made accessible. Bus Stop Boarders do not protect the right of blind and

partially sighted people to access the bus services from a space that accommodates their access needs.

We think there should be no further construction of Bus Stop Bypasses or Bus Stop Boarders until a comprehensive investigation has been conducted into the issues. Getting inclusive and accessible design right from the start is crucial. Spending public money building non-inclusive cycleways and then having to retrofit accessibility is inefficient and potentially endangers both pedestrians and cyclists.

For blind and partially sighted people who find it difficult or impossible to detect the presence of bicycles, all pedestrian crossing points over cycle tracks must provide an auxiliary aid, such as an audible and tactile beacon which indicates in an accessible format when it is safe to cross before the person has to step on to the crossing. Warning markings and signage must also be provided to instruct cyclists to stop when pedestrians are near or on the formal crossing. We think a notice to reduce speed should be marked on the bypass at regular intervals to remind cyclists that the area they are cycling through is predominantly a footway. Where new markings are introduced, there must be efforts to train all user groups as to the meanings and implications of these. We also think that there should be full kerbs between the cycle track and the pavement and the cycle track and the bus stop island, and full tactile paving at the crossing points.

What RNIB is doing

We support blind and partially sighted people to campaign locally on accessible streets and transport, including to challenge the installation of Bus Stop Bypasses, Bus Stop Boarders, and shared use paths. We will endeavour to actively challenge authorities who have already installed, or who propose to install Bus Stop Boarders in their area, or Bus Stop Bypasses without fully accessible formal crossings and full kerbs.

We are keen to engage with planners, designers and engineers to identify solutions to the current problems and welcome the opportunity to discuss any issue covered in this RNIB policy position statement.

This position statement will be reviewed in November 2019 or as needed.

References

TfL (2018), 'New Cycle Infrastructure on London's Streets: Summary report of on-street trials.' Available at:

http://content.tfl.gov.uk/new-cycle-infrastructure-monitoring-report.pdf

see pg. 16 and 17 appendix 6.3 (Accessed 13 August 2019).

Related Policy Position Statements

- Cycling and Cycleways Policy Position Statement
- Pedestrian Crossings Policy Position Statement
- Kerbs: Detectable Footways, Cycleways and Roads Policy Position Statement
- Shared Use Areas and Pathways (Cycles and Pedestrians) Policy Position Statement
- Shared Space Policy Position Statement
- Continuous Footways Policy Position Statement

Document end.

Appendix C CARDIAC recommendation on the accessible design and use of touchscreens

Screens

- The touchscreen should be shielded from sunlight
- The screen should be angled towards the horizontal to provide arm/wrist support
- The screen should be perpendicular to the line of sight
- The text and background colour combination should have high contrast
- Avoid shades of blue, green and violet for conveying information since they are problematic for older users
- There should be no noticeable flicker on the screen
- Structure the visual display layout so that the user can predict where to find required information and how to use it

Controls

According to Namahn (2000), touch sensitive areas or keys for users with no impairments, should be of a:

- "minimal size: 22mm across"

However, Colle & Hiszem (2004) recommend that:

- a "key size no smaller than 20mm...should be used if sufficient space is available"

Key size should be varied according to the size and use of the screen and the impairment type. For example, for one-handed thumb use of mobile handheld devices equipped with a touch-sensitive screen Parhi, Karlson and Bederson (2006) state that:

- "target size of 9.2mm for discrete tasks and targets of 9.6mm for serial tasks should be sufficiently large...without degrading performance and preference"
- Graphical symbols (such as icons) should be accompanied by text
- There should be high contrast between touch areas, text and background colour
- Text or controls should not be placed over a background image or over a patterned background
- White or yellow type on black or a dark colour is more legible, provided that the typeface, weight and size are suitable
- Controls are labelled in a large high contrast font
- Audible output or tactile output is provided for identification of controls and for results of activating controls
- An inactive space of at least 1mm should be provided around each target (Colle & Hiszem, 2004)
- Labels should be easily distinguishable from controls

- Controls should be operable by a mouthstick, headstick or another similar device (stylus)
- Commands can be entered by voice
- For wheelchair users the height of the active areas on the screen should be between 800mm and 1200mm
- The system must be error tolerant by providing a clear unambiguous control that permits the user to go back a step
- Position controls on the screen in a way that is consistent with functions
- All labels and instructions should be in short and simple phrases or sentences. Avoid the use of abbreviations where possible
- Provide text versions of audio prompts that are synchronised with the audio so that the timing is the same
- Speech output of instructions, as an addition to (and not a replacement for), on-screen instructions, is recommended
- Adhere to existing colour conventions e.g. red for stop

Help facilities

- Guidance should be readily distinguishable from other displayed information
- Provide the user with specific information relative to the task context rather than a generic message
- Provide information on how to recover from errors
- Indicate permitted range of values or syntax for user response
- Ideally, multi-modal help should be provided
- Allow skilled users the option of switching off help prompts if they are not required
- Keep spoken messages short and simple
- Do not use abbreviations in audio messages
- Allow users to interrupt the help at any time and return to the task
- An intelligent help facility is not an adequate solution to a poor user interface

Standards

- ISO 13406-1 (1999) Ergonomic requirements for work with visual displays based on flat panels. Part 1 - Introduction.
- ISO 13406-2 (2001) Ergonomic requirements for work with visual displays based on flat panels. Part 2 - Ergonomic requirements for flat panel displays.
- ISO 80416-4 (2005) Basic principles for graphical symbols for use on equipment. Part 4 - Guidelines for the adaptation of graphical symbols for use on screens and displays.

- ISO 9355-1 (1999) Ergonomic requirements for the design of displays and control actuators. Part 1: Human interactions with displays and control actuators.
- ISO 9355-2 (1999) Ergonomic requirements for the design of displays and control actuators. Part 2: Displays.
- ISO / IEC 24755 (2007) Information technology - Screen icons and symbols for personal mobile communication devices.
- ITU-T E.902 (1995) Interactive services design guidelines.

Appendix D Miscellaneous recommended updates

D.1.1 Section – Introduction

This section has an emphasis on removing barriers. There is a requirement to emphasise the objective of creating a more inclusive society, based on the principles of Universal Design. This should mention the requirement for the needs of people living with non-physical, often 'invisible', challenges to be considered.

The scope extends to people who are "travelling with small children or are carrying luggage or heavy shopping", and people with "temporary mobility problems …. and many older people" but makes little further mention of them. Any amended version of Inclusive Mobility should place greater emphasis on the importance of the accessibility of public transport relating to all members of society, according to the principles of Universal Design. Mention of the issues of sensory impairment and the needs of people with a learning disability should be added in this Introduction, given that they are dealt with specifically later on in the document. Similarly, consideration might be given, in the current project, to making reference to the needs of people living with mental health issues, or who are neurodiverse – as is covered elsewhere in the project.

D.1.2 Section – Basic Human Factors Information

This section disaggregates "disability" in terms of Locomotion, Seeing, Hearing, Reaching / Stretching / Dexterity, and Learning Disability. There is a need to look for more recent evidence to verify, and potentially update, some of the statistics cited, for example:

- *"Approaching 70% of disabled people have locomotion difficulties: those with walking difficulties outnumber wheelchair users by about 10:1."*
- *"…there are almost two million people in Great Britain with a significant sight loss."*
- *"….there are over eight million deaf or hard of hearing people in the UK of whom approaching 700,000 are severely or profoundly deaf."*
- *There is a need to look for more recent human factors evidence relating to people.*
- *All references to wheelchair dimensions need to be updated, to reflect the full range of products on the market.*
- *Walking distance figures are derived from research carried out in the late 1980s.*
- *Reference is also made to data from the USA; again, any updates on these data need to be examined.*

Note that the ISO Standard for wheelchairs (ISO 7193) consists of several sections, and it will be necessary to consider all updates, as well as standards from elsewhere.

D.1.3 Section – Footways, Footpaths and Pedestrian Areas

Stakeholders suggested that additional guidance was needed on the following:

- Appropriate gradients.

- Colour contrast, including the use of stickers etc to warn against collision with glass doors and windows
- Pavement parking (legislation is planned in Scotland)
- Other obstructions, in particular the encroachment of "café tables" which is dealt with briefly; however, revised guidance might provide more detail on the use of pavements by cafés and restaurants, given that 'café culture' has been embraced, in the UK, to a larger extent than it had been when Inclusive Mobility was first published.

There is a section on Road Crossings, which needs to be updated according to the Local Transport Notes (LTN) and other circulars that have been issued by the Department for Transport since the publication of Inclusive Mobility; these should include details of the design of puffin crossings, toucan crossings and pedestrian count-downs. The revised guidance should emphasise that Pelican crossings are no longer prescribed and that no new ones may be installed.

D.1.4 Section – Car Parking

This section refers to the provision of designated parking spaces for Blue Badge holders wherever conventional parking spaces are provided, in both Local Authority provided car parks, and car parks provided for the public by private companies.

Guidance covers the site and location of designated parking spaces, the percentage of parking spaces that should be designated for older and disabled people, the detailed design of accessible parking bays, signage & marking and the design of parking control (i.e. payment) equipment.

There may be a need to review the suitable proportion of designated parking spaces in light of the current proportion of blue badge holders.

D.1.5 Section – Bus Stops

The guidance covers the spacing of bus stops, the design and dimensions of raised boarding areas (including kerb heights), the design and positioning of shelters, the design and positioning of bus stop flags, seating at bus stops and timetable information.

> "…research that shows that, for disabled people, bus use falls off sharply if the distance [between bus stops] is more than 200 metres…". There is a need to investigate whether more up to date research has been carried out on this issue.

Reference is made to the Public Service Vehicles Accessibility Regulations 2000 (PSVAR), where they relate to the maximum acceptable gradient of a bus boarding ramp.

> "…research by Greater Manchester Passenger Transport Executive…". There is a need to check the findings of more recent research that has been carried out into the same issue.
>
> "…new designs of 'panel' bus stops provide more space for information." This advice might be reconsidered, given that such displays are unpopular with many disabled

people, given that wheelchair users and people of shorter stature are typically only able to read the information that is located at a certain height on these panels.

There is no consideration of the provision or design of Variable Message Signs, or of any other type of electronic display.

It is recommended that TfL's 2017 Accessible Bus Stop Design Guidance is reviewed as a potential source of updated information, and a search may be made for other alternative sources which cater for areas different to London.

D.1.6 Section – Taxi Ranks

This is a very short section, which provides general guidance concerning the siting, design and signing of taxi ranks.

"At present, over 80 Licensing Authorities have introduced mandatory orders requiring some or all of the taxis within their area to be wheelchair accessible." This statement is clearly out of date and needs to be updated if it is to be retained.

D.1.7 Section – Access to and within Transport-related Buildings

This is a large and comprehensive section. Consideration should be given to the following revisions:

- *Consideration should be given to how much of the Building Regulations apply to such buildings in any case and whether there is unnecessary duplication.*
- Reference is made to an "American guideline" (Federal Register, Vol.56, No.173). *There is a need to check for updates on this guideline and related guidelines.*
- The document admits that recommended dimensions for features such as steps and stairs are based on research carried out in the 1970s and 1980s, and on the length of a size 9 shoe. *There is need to check more recent research to verify that these guidelines remain relevant for today's population*.
- There is also reference made to Australian standards. *There is need to check current Australian guidance, to review any changes in the dimensions quoted.*

D.1.8 Section – Transport Buildings: Facilities

Detailed recommendations are provided on the design of public telephones. Consideration should be given to whether such guidance is necessary, (subject to any requirement for a minimum number of public telephones being available in case of emergency), due to the growing prevalence of the use of mobile 'phones. The definitions regarding obstructions relating to public telephones might be extended to cover other obstructions, or be replaced altogether.

There may be a need to review guidance on the accessibility of ticket machines from the perspective of blind and partially-sighted users (especially touch screens) and people with learning disabilities. There may be a need to add detail regarding contactless payments or other payment mechanisms.

Reference is made to the type of seating provided by Merseyside PTE. This is very likely to be an out of date reference.

Regulations from the USA and guidelines from Australia are quoted concerning the number of spaces for wheelchair users that should be provided as a proportion of the total number of fixed seats. There is need to check documentation for updates if these references are to be retained.

As well as being based on superseded building regulation documents, the comprehensive section on toilet facilities does not cover current Changing Places requirements, (although there is a short paragraph on the recommended height of a "colostomy changing shelf"). A section on Changing Places needs to be added.

D.1.9 Section – Signage and Information

This section makes specific reference to the needs of people who are blind or partially-sighted, and people who are deaf or hard of hearing, but also emphasises the general advantage of "simplicity", which can help everyone, but particularly people with learning disabilities. The section also emphasises the importance of good signage in relation to emergencies and evacuation procedures. Further emphasis may need to be given to the importance of consistency and clarity of signage, for example for people with dementia.

Reference is made to guidelines from the USA on minimum letter heights – if such a reference is to be retained, then it will be necessary to establish the most up to date information from this source.

Detailed data are provided on the size requirements for symbols, citing Transport Canada as the source. There is a need to check whether more recent information is available.

There are new types of signage/legibility features (e.g. relating to Legible London and similar initiatives) and there may also need to be consideration of the emergence of new technologies for navigation.

D.1.10 Section – Lighting

This section explains the principles of reflection and glare etc. and describes how lighting can be used to give directional guidance. There were no particular issues raised with this section, except that *the "Code of Practice for Road Lighting", BS5489 document has since been updated*.

D.1.11 Section – Access in the Countryside

The BT's "Countryside for All" (1997) publication is acknowledged as being the source of most of the recommendations made in this section, which covers the dimensions of rural paths, gateways, bridges & boardwalks, steps, seating & resting places, viewing points and information displays. There were no particular issues raised with this section, except that *the BT "Countryside for All" (1997) guidelines have since been updated by the Fieldfare Trust.*

D.1.12 Section – Consultation, Training and Management

This section emphasises the importance of "consultation and participation", and of involving key stakeholder organisations. There is a sub-section on "disability awareness training" for staff, with recommendations as to the main content of such training.

The sub-section on "disability awareness training" will require some updating, to bring it in line with current thinking in this subject area'

D.1.13 Section – Glossary, Bibliography and Useful Addresses

Information is outdated and should be updated as appropriate.

D.1.14 Superseded References within the Document

The following superseded references were found within Inclusive Mobility:

- Disability Discrimination Act (1995).
- Legislation on reasonable adjustments (Oct. 1999).
- The "Strategic Rail Authority".
- The SRA's "Train and Station Services for Disabled Passengers".
- Part V of the DDA.
- British Standard BS8300 (a new version was published in late 2018).
- The DfT's Mobility and Inclusion Unit.
- Institution of Highways and Transport.
- The IHT's "Reducing Mobility Handicaps – Towards a Barrier Free Environment".
- "The DDA".
- The Royal National Institute for Deaf People (RNID).
- ISO Standard for Wheelchairs (ISO 7193).
- Local Transport Note (LTN) 2/86 "Shared Use by Cyclists and Pedestrians" which has been superseded by LTN 1/12 "Shared Use Routes for Pedestrians and Cyclists".
- Traffic Advisory Leaflet (TAL) 4/91 "Audible and Tactile Signals at Pelican Crossings" dates from Nov. 1991. There is a need to provide updates from subsequent TALs[62], (such as TAL 05/05 "Pedestrian Facilities at Signal-controlled Junctions").
- It is understood that this guidance will be superseded by the Traffic Signs Manual Chapter 6, which is currently being drafted.
- The Traffic Signs Regulations and General Directions has been updated, with the latest version being 2016, including 'H' marking which is still prescribed in TSRGD 2016 as Diagram 1026.1 (at Schedule 11 Part 4 Item 17).
- "…push button units used in Great Britain must first be approved by Traffic Control and Lighting, in Bristol." This has been superseded by the TOPAS product registration.

[62] The DfT has indicated that a list of TALs is available to facilitate this.

- Reference is made to BS 7997 “Products for Tactile Paving Surface Indicators”, which provides construction standards for paving materials. There is a 2003 version of this Standard, which should be referenced.
- The “Railway Inspectorate”.
- “‘Blue (formerly Orange) Badge’ holders” – Reference to the Blue Badge’s former colour should now be omitted.
- TAL 5/95 “Parking for Disabled People” dates from 1995.
- The SRA’s “Train and Station Services for Disabled Passengers” is referenced.
- Section 5.4 appears to show unlawful road markings for on-street bays.
- “Greater Manchester Passenger Transport Executive”.
- “The information provided on [the timetable] display should also include directions to and distance of the nearest public telephone…”. Consideration should be given to omitting this, and similar, guidance, given the increasing rarity of public telephones.
- “Code of Practice for Means of Escape for Disabled People”, BS5588, Part 8, (1988). This guidance has been revised several times.
- BS8300, which has recently been revised, is referred to when dealing with ramps and gradients.
- “European Lift Standard” (April 2000). This guidance has been revised several times, most recently in 2017.
- “Merseyside PTE”.
- The detailed section on the design and provision of toilets carries an acknowledgement of having drawn heavily from BS8300 “Design of Buildings and their Approaches to Meet the Needs of Disabled People”, Part M of the Building Regulations (1991) and Part T of the Technical Standards (Scotland) (1990). All of these source documents have been superseded several times.
- Reference to “Sign Design Guide” (2000), which has since been updated. This document does not cover traffic signs, which are separately covered by the “Traffic Signs Manual and the Traffic Signs Regulations and General Directions”.
- “Legibility of Timetables, Books and Leaflets”, (DPTAC, 1996). This document was updated by the Association of Transport Co-ordinating Officers in Sep 2002, with “minor updates and corrections” made in May 2003.
- “Code of Practice for Road Lighting”, BS5489. This document has since been updated.
- “British Telecom (BT)”.
- BT’s “Countryside for All” (1997). These standards & guidelines have since been updated by the Fieldfare Trust.
- “Guidance on Full Local Transport Plans”, Department for Transport, (Mar. 2000). The most recent update of this document appears to have been in July 2009.

- "Encouraging Walking", Department for Transport, (Mar. 2000) – This document has been superseded by a number of policy documents, some of which have included cycling within their remit.

D.1.15 Outdated terminology

Potentially outdated terminology has been highlighted. No attempt is made in this analysis to perform a comprehensive audit of the language used, on the grounds that when the documents featured in this project are redrafted appropriate terminology will be used. For example, it will be natural to refer to "engagement" instead of "consultation". Furthermore, not every example of outdated terms used throughout the documents, (such as references to "impairment"), are highlighted in this table, as these can be eliminated during any future drafting process.

- *"sensory and cognitive impairments".*
- *"people with mobility impairments".*
- *"physical, sensory or mental impairment".*
- *Reference to "elderly" people.*
- *The reference to "cash tills" is now rather obsolete and should be replaced with a more modern equivalent term. Similarly, references to "ticket barriers" and "automatic ticket vending machines" should be updated.*
- *"Ambulant disabled people".*
- *"Colostomy changing shelf".*
- *"Hard of hearing people".*
- *References to "consultation" might be replaced with references to "engagement".*

Accessible Public Realm: Updating Guidance and Further Research

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