Rialtas na hÉireann
Government of Ireland

zevi

Zero Emission
Vehicles Ireland

Electric Vehicle Charging Infrastructure

Universal Design Guidelines

June 2023

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Accessibility Statement

This document has been created with accessibility in mind. Zero Emission Vehicles Ireland (ZEVI) have taken steps to ensure that it is easy to read and navigate, and that all users can access the content. If you have any feedback or encounter any issues, please reach out.

Email: zeviconsultations@transport.gov.ie

Acronyms

ABA	Architectural Barriers Act
ADA	Americans with Disabilities Act
AFIR	Alternative Fuel Infrastructure
BSI	British Standards Institution
CBC	California Building Code
CRC	Central Remedial Clinic
CRPD	Convention on the Rights of Persons with Disabilities
CPO	Charge Point Operators
DDAI	Disabled Drivers Association Ireland
DFI	Disability Federation of Ireland
DOJ	Department of Justice, U.S.
DPO	Disable Persons Organisation
DSA	Division of the State Architect
DWI	Disabled Women Ireland
EU	European Union
EV	Electric Vehicle
EVCI	Electric Vehicle Charging Infrastructure
IEVOA	Irish Electric Vehicle Owners Association
IPA	Irish Parking Association
IWA	Irish Wheelchair Association
LGA	Local Government Area
NCBI	National Council for the Blind of Ireland
NDA	National Disability Authority
NEVI	National Electric Vehicle Infrastructure, U.S.
NTA	National Transport Authority
OZEV	Office for Zero Emission Vehicles, UK
PAS	Publicly Available Specification
PTV	Pendulum Test Value
RFID	Radio-Frequency Identification
TEN-T	Trans-European Transport Network
VVI	Voice of Vision Impairment
ZEVI	Zero Emission Vehicles Ireland, Department of Transport

Definitions

Accessibility
Accessibility refers to the design and provision of products, services, and environments that are usable and accessible to people with disabilities, the elderly, and those with different needs, to ensure they have equal opportunities and can participate fully in society.

Charging Bay
A charging bay is a designated area or space where electric vehicles can be parked and connected to a charging station.

Charging Point
The electric energy is delivered through a charging point. A charging point may have one or several connectors to accommodate different connector types. Only one can be used at the same time.

Charging Pool
A charging pool consists of one or multiple charging stations and the accommodating charging bay(s).

Charging Station
A charging station is a device with one or more charging points that allows electric vehicles to charge. When there is only one charging point associated with a charging station, then these names can be used interchangeably. There are different types of charging stations with charging points ranging from slow to fast charging, varying power outputs, and different connector types.

Connector
A connector is the physical interface between the charging station and the electric vehicle through which the electric energy is delivered (e.g., plug on a cable).

Just Transition
The Just Transition is a vision-led set of principles, processes, and practices that seeks to ensure that the substantial benefits of a green economy transition are shared widely, while also supporting those who stand to lose economically – be they countries, regions, industries, communities, workers or consumers.

Kerb Drop
A kerb drop is a sloped area of the pavement at the edge of a sidewalk or pedestrian walkway that allows people with disabilities or mobility impairments to access the roadway safely and easily.

Definitions

Interoperability
Interoperability refers to the ability of different electric vehicles and charging infrastructure systems to communicate and function seamlessly together, enabling convenient and universal charging access for electric vehicle owners.

On/off-Street Charging
On-street charging refers to electric vehicle charging infrastructure that is installed on public roads or streets, usually in the form of a roadside charging station. Off-street charging, on the other hand, refers to charging infrastructure that is located in areas such as car parks or garages.

Parallel on-street parking
Parking bays where vehicles are parked back to front with their orientation parallel to the kerb.

Perpendicular parking bays
Parking bays where vehicles are parked side by side with their orientation perpendicular to the kerb.

Radio Frequency Identification (RFID) cards
The RFID card serves as a means of authentication and identification when using an electric vehicle charging station.

Road users
Road users refers to any individuals that use public roads or motorways, including pedestrians, cyclists, drivers, passengers, and any other means of transportation that uses the road network.

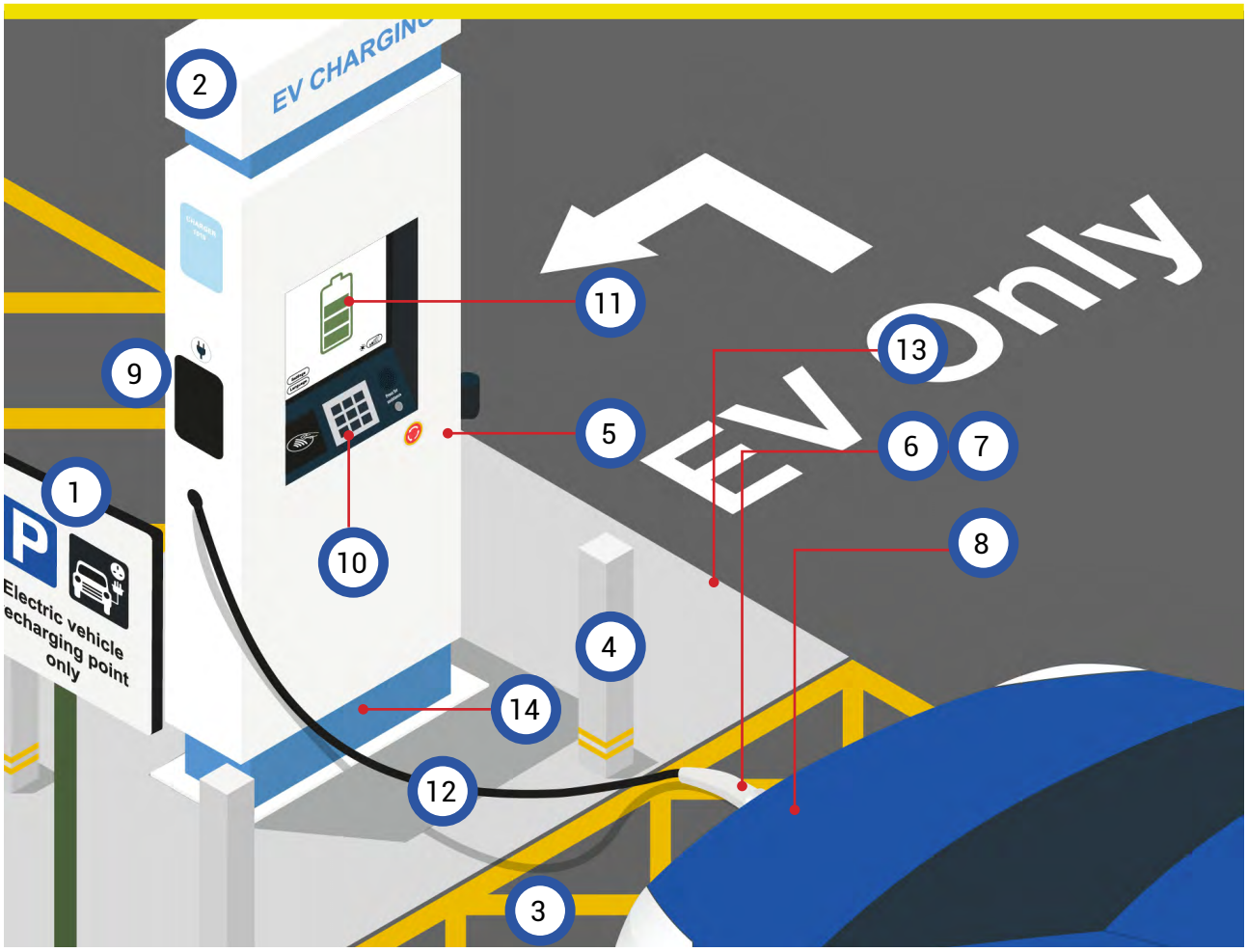
Tethered/Non-Tethered Cables
Tethered cables are built-in charging cables that are permanently attached to the charging unit, allowing users to connect them directly to their electric vehicles for charging. Non-tethered cables (user-owned) are charging cables that users bring with them and connect to the charging station's connector in order to charge their electric vehicles.

Universal Design
Universal Design is the design and composition of an environment, products, and services in a way that can be accessed, understood, and used by everyone, regardless of their age, size, or ability.

Universally Accessible Charging Station
An accessible charging station is one that has been designed to ensure it can be used easily, safely and comfortably by everyone without any physical, cognitive or technological barriers.

Definitions

Charging Station - Key Components



1. Signage
2. Charging Station
3. Road Markings
4. Bollard
5. Assistance Button
6. Plug
7. Plug Handle
8. Electric Vehicle Inlet
9. Socket Outlet
10. Payment System
11. Screen
12. Cable
13. Kerb Drop
14. Footwell

Foreword

I am pleased to share with you the Universal Design Guidelines for Electric Vehicle Charging Infrastructure.

The publication of the Electric Vehicle Charging Infrastructure Strategy 2022-2025 earlier this year, was an important step forward in our commitment to creating an inclusive and sustainable future as we embrace the global transition to clean, electric transportation.

As Ireland continues to decarbonise its transport sector, demand for electric vehicles (EVs) continues to grow, and it is vital that we ensure that the infrastructure is in place and accessible for all. These Guidelines propose a comprehensive framework that will facilitate the roll-out of accessible, user-friendly, and efficient charging infrastructure across the country.

This is especially important given the substantial level of funding that the Government will be committing in the coming years. While this consultation will be particularly important to both existing and future electric vehicle drivers, it is also important in the context of the charging industry and its users.

These Guidelines have been developed through extensive collaboration with various stakeholders, including industry experts, government agencies, disability associations and electric vehicle charging user groups. This collaborative approach has produced a comprehensive set of Guidelines that take into consideration the unique needs of different communities and environments. I would like to take this opportunity to extend my gratitude to all the individuals and organisations who have been part of this process.

These Guidelines include recommendations on the design, placement and information provision of EV charging infrastructure. Each of these elements plays an important part in ensuring that charging an electric vehicle is universally accessible and that no one is left behind in the transition to sustainable transport. These Guidelines also reflect lessons learned from international best practice.

In working together to implement these Guidelines, we are not only investing in our infrastructure but also in our people. A truly inclusive and accessible electric vehicle charging infrastructure network will empower individuals, communities, and businesses to embrace electric mobility, fostering economic growth and reducing our dependence on fossil fuels. This will allow us to accelerate our shift to cleaner alternatives and most importantly, support a just transition.

Eamon Ryan
Minister for Transport

1. Introduction

Why are the Universal Design Guidelines required?

The public network of electric vehicle chargers should be accessible to everyone. In Ireland, there are currently no specific guidelines that provide universal design recommendations for the design, installation and operation of electric vehicle charging infrastructure.

To address this issue, draft Universal Design Guidelines for Electric Vehicle Infrastructure (also referred in this document as 'the Guidelines' or 'the Universal Design Guidelines') have been developed. These Guidelines aim to make electric vehicle charging stations accessible to all users. These Guidelines summarise key considerations when designing, installing, and operating electric vehicle charging stations, including:

- the design of the charging station,
- accessibility of the site, and
- information and communications to inform users before, during, and after a charging session.

How were the Universal Design Guidelines developed?

To develop the Guidelines, Zero Emission Vehicles Ireland (ZEVI) reviewed international and industry best practices (see Appendix A for case studies and Appendix B for international best practice) and collaborated with a diverse group of stakeholders to identify universal design principles for electric vehicle charging infrastructure. User engagement was crucial in this process, and ZEVI worked with subject matter experts, electric vehicle user groups, disability associations (with a particular focus on Disabled Persons Organisations), and other stakeholder groups (see Appendix C for a full list) to develop this document.

ZEVI is publishing these Guidelines for consultation in July, August and September 2023. After which, the Guidelines will be further developed and published later this year.

How do the Universal Design Guidelines inform implementation?

These Guidelines are not legally binding but are provided as technical assistance to help entities design, install and operate infrastructure that is accessible for everyone. It is not possible to foresee every circumstance, but these Guidelines should be applied where possible and adapted where required.

In the future, the site selection, procurement, and installation of electric vehicle charging stations with public funds will need to closely follow these Guidelines.

To support the development of accessible charging stations, minimum standards will be developed based on the Guidelines outlined in this document. These minimum standards will then become binding.

2. Topics Covered

These Guidelines provide clear direction to those involved in the manufacturing, procurement, installation, and operation of publicly accessible charging infrastructure. They present recommendations for the design of the charging station, the accessibility of the site, and the information and communications needed to inform users before, during, and after a charging session.

The Guidelines focus on publicly accessible electric vehicle charging infrastructure (fast and slow) for passenger vehicles and aim to ensure that charging stations are designed to be inclusive for all users. These Guidelines may also be useful to inform charging infrastructure for commercial light vehicles and privately owned chargers in some instances.

The Guidelines have been structured according to the following headings:

Charging Station Design

This includes the design and component specifications of accessible charging station infrastructure (e.g., cable length, plug handle, socket cover) and their immediate surroundings.

Site Design

This includes the physical aspects of the environment surrounding the charging station including its location, placement and spacing of the charging station.

Information and Communications

This includes the information and communications (physical and digital) a user has access to before, during, and after a charging process.

It is important to note that every charging site is unique and that it may not be possible to apply every recommendation in every location. Differences in vehicle types and user needs at a particular site will determine individual site requirements. Where additional guidelines are proposed for charging stations installed at designated accessible parking bays, this is explicitly stated.

In the future, additional considerations may need to be made to accommodate changing regulations and technological advancements in the charging space. Appendix D provides further information about potential innovations that may have implications for the Guidelines.

3. Roles and Responsibilities

There are several stakeholders involved in the manufacturing, procurement, installation, and operation of charging stations.

Those whose job it is to procure publicly accessible charging stations should ensure that charging stations are procured and installed with universal design principles in mind, and in accordance with the Guidelines.

Other stakeholders, including those involved in the manufacturing, installation, funding, energy and connection, and operation of charging stations, should also act upon the Guidelines where they are able to positively influence the accessibility of the charging infrastructure. Key stakeholders and their roles are set out below – it should be noted that not all of these roles are mutually exclusive – in some cases one organisation may take more than one of the stakeholder roles as set out below.

Key stakeholders

Funders
Those responsible for providing the necessary financial support for the development, installation, and maintenance of universally accessible charging stations.

Installers
Those responsible for the proper, safe, and compliant installation of charging infrastructure, ensuring that the equipment is accessible and functional for all users, while also providing necessary maintenance and support.

Operators
Those responsible for managing and maintaining the charging infrastructure, ensuring its reliability and accessibility, optimising user experience, and providing customer support.

Procurers
Those responsible for identifying high-quality charging equipment and services to ensure these meet all necessary standards and regulations.

Manufacturers
Those responsible for designing and producing reliable, efficient, and user-friendly charging equipment that meets regulatory standards.

Regulators
Those responsible for establishing and enforcing policies and standards that promote the development, installation, operation and accessibility of reliable and safe charging infrastructure.

Energy Providers
Those responsible for managing grid capacity and ensuring interoperability of equipment and data.

4. International Best Practices

As part of developing the Universal Design Guidelines, ZEVI reviewed relevant international best practice standards, technical guidance, and research regarding the universal design of electric vehicle charging infrastructure. These have informed the framing of the Guidelines proposed in this document. A full list of the documentation reviewed can be found in **Appendix B**.

The Alternative fuels Infrastructure Regulation (AFIR) (Article 5) proposes minimum accessibility requirements to ensure interoperability and ease of use of charging infrastructure across Europe. This will form the minimum basis for legislative universal design standards for electric vehicle charging infrastructure in Ireland and have been referenced throughout these Guidelines.

Some international best practices include:

PAS 1899: 2022 (United Kingdom)

Einfach laden ohne Hindernisse (Germany)

Accessible Charging Stations: Practical advice on designing inclusive charging stations (Sweden)

Design Guidance: Accessible EV Charging (United Kingdom)

The Americans with Disabilities Act (ADA) (United States)

Some elements suggested in these publications and others have been directly referenced in the Universal Design Guidelines below, in combination with national best practice guidelines.

Where relevant, detailed specifications extracted from these best practice standards, technical guidance and research are referenced to reinforce the Guidelines in this document. These suggestions may serve as a starting point for the development of more detailed minimum standards following the public consultation.

5. Understanding User Needs

Understanding the experiences and accessibility requirements of different users with regards to electric vehicle charging infrastructure has been a major component of the development of these Guidelines. In order to visualise real user needs and to help embed a user mindset in the decision-making process, five personas have been developed with their own journeys and interactions with electric vehicle charging infrastructure. These have been adapted from the personas presented in the Electric Vehicle Charging Infrastructure Strategy 2022 -2025 to highlight various user needs.

Personas are fictional profiles that represent specific characteristics of both current and potential future users of the electric vehicle charging network. These profiles have been developed from an understanding of some of the challenges that users face today and to help contextualise the Guidelines. Each persona's needs have been informed by existing research and by the feedback obtained during the stakeholder engagement process. A more detailed description of each persona's key user requirements is included in Appendix E.

In this document, the personas have been integrated as part of the Universal Design Guidelines chapter to help illustrate how the Guidelines address real user needs.

The Jacksons, Tourist Family

John and Janet Jackson are on holidays in Ireland with their two small kids. They have rented an electric vehicle for the first time to travel around the country, both to cities and to rural areas. They drive every day during their trip and are not familiar with the Irish electric vehicle charging system. They want to be able to:

- Easily identify locations and monitor availability where they will be able to charge their electric vehicle;
- Have access to user information such as price and charging speed at different stations; and to
- Easily park their vehicle with enough space to fully open the doors allowing them to safely help their kids in and out of a child seat.

Tara Traynor, Taxi Driver

Tara drives a taxi for a living. She drives her electric vehicle around her local town and occasionally has to travel longer trips to other towns during the day. During busy periods she also picks up a few night shifts. Tara wants to be able to:

- Check availability of charging stations on the go;
- Monitor the charging status from her phone while she is away from her car taking a break; and to
- Feel safe charging her car, particularly at night.

Ruairi Reynolds, Rural Commuter

Ruairi decided to purchase a second-hand electric vehicle which he uses to do the weekly grocery shopping, to go to work and to bring his daughter to extracurricular activities. He lives in Cavan and travels mostly at peak times in the morning and the evening. Ruari wants to be able to:

- Have certainty of the correct functioning of the charging process without needing to rely on audio cues that he might not be able to hear;
- Have access to responsive assistance in case an issue arises during the charging process; and to
- Not worry about the charging process requiring much physical strength, especially after his recent back injury.

Rachel Murphy, Retired Urban Dweller

Rachel lives in Clonmel and owns her own electric vehicle. She usually travels to visit her brother in Waterford, and to specialist medical appointments in Cork. She is a wheelchair user and needs to make sure that facilities are accessible to her before using them, including checking the availability of accessible parking bays and level access to buildings. She wants to be able to:

- Comfortably reach the charging station screen, handle and cable;
- Move around the parking space without encountering obstacles or kerbs; and to
- Avoid being exposed to the rain while exiting her car and reaching nearby facilities.

Caroline Connolly, Car Sharer

Caroline has recently signed up to a car-sharing app. To commute she usually relies on cycling and public transport, but she has decided to move apartments, so she needs a car to transport her belongings across the city. She also uses the shared car to do short trips around her area to shop for home furnishings. Caroline wants to be able to:

- Easily identify electric vehicle designated parking spaces to park the car;
- Feel safe charging the electric vehicle without worrying about tripping over the cable or slipping and to feel secure in her personal safety; and to
- See clear instructions to confidently charge the vehicle at different charging stations.

6. Universal Design Guidelines

The following section sets out the Universal Design Guidelines under the headings: Charging Station Design, Site Design, and Information and Communications. These Guidelines are general recommendations that should be taken into consideration during the procurement and design of electric vehicle charging infrastructure to provide accessible charging infrastructure to a wide range of users.

To ensure clarity for implementation, these Guidelines consider charging bays separately from public parking bays and suggest they should adhere to different standards.

ZEVI has defined a universally designed charging bay as for use by all electric vehicle users while charging their vehicle and which fully adheres to these Universal Design Guidelines.

ZEVI's ambition is for all charging infrastructure in Ireland to be universally accessible for all. Therefore, these Guidelines do not provide separate recommendations for charging bays designated for disabled person's parking card holders. Disabled persons should be able to access any charging station in the country. However, where this may not be feasible, due to real-world limitations, other provisions should be made to accommodate disabled person's parking card holders. This could include providing designated disabled parking charging bays using the same regulations as in place for regular parking bays. This consultation invites your view on how this might be approached.

These Guidelines encourage all charging bays to adopt universal design but recognises there may be real-world limitations in some instances.

6.1 Charging Station Design

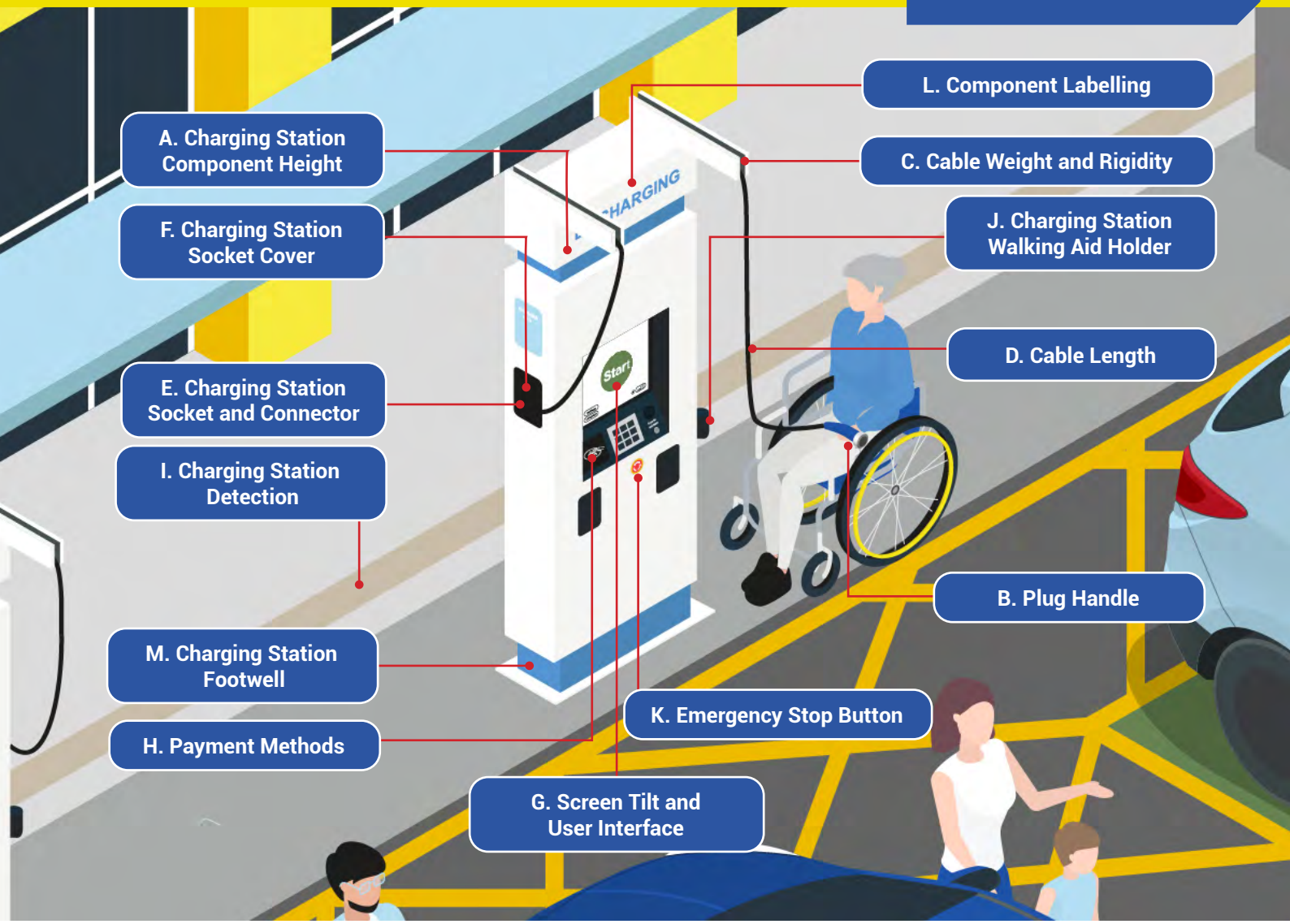
This section covers aspects related to the universal design of the charging station components. These Guidelines will ensure that a cohesive and consistent design approach is taken to charging stations across Ireland making them easy to use. This will also help manufacturers and procurers of charging infrastructure in identifying minimum user requirements for charging station hardware.

Each of the elements listed below has been identified as playing an important role in making sure that an electric vehicle charging station is easy to use. For each of the elements, e.g. plug handle, ZEVI has proposed a guideline based on international and national best practice standards, technical guidance and research. Accompanying each guideline, ZEVI has included a reference to one or more best practice standards, technical guidance and research. Where an Irish standard exists, this has been used in developing the Guidelines.

Consultation Question

With regard to the following section, ZEVI would like to know your opinion on whether these are the correct guidelines to apply in the Irish context?

Elements for Charging Station Design



A. Charging Station Component Height

The height of all charging components, including the socket, payment method, and screen, should accommodate users with varying height requirements and mobility aids. Components should be placed within reach (between 0.9 metres and 1.2 metres).

International Best Practices

The Irish Wheelchair Association's Best Practice Access Guidelines recommends a common reach zone between 0.9 metres and 1.2 metres.

B. Plug Handle

The plug handle of the charging station should be ergonomic and easy to grip without slipping. This may include considerations around surface finish and handle design. For both tethered and non-tethered cables there should be an option to grip the plug handle with one or two hands without relying on strength or dexterity. The plug receptacle should be ergonomically designed to ensure ease of use.

International Best Practices

Designability's Design Guidance for Accessible Electric Vehicle Charging recommends a handle that can be held in different ways (e.g., one-handed/both hands).

C. Cable Weight and Rigidity

The weight and rigidity of the cable must be manageable for people of all physical abilities and statures. The weight of the charging cable may increase significantly if the charging station has a high-power output (especially for fast charging). In such cases, it is important to include a cable management system if applicable.

International Best Practices

The PAS 1899:2022 recommends that the force required to lift a cable suspended in the air, with a length of 4 metres, should not exceed 60 Newtons (measure of force).

Designability's Scoping and Discovery Report for Accessible Electric Vehicle Charging suggests a cable weight of approximately 3 kilograms.

D. Cable Length

The tethered cable length should be long enough to reach any type of vehicle with varying socket positions. The cable should also be adaptable to all parking positions applicable to the parking bay. Where applicable, a cable management system (e.g., overhead cable support) should be used to avoid the cable forming an obstacle on footpaths or roadways and to avoid it being dragged across the ground. Fast chargers in particular should provide cable support to alleviate the weight of the cable. Where non-tethered cables (portable and owned by the user) are required the charging station should provide a system to support and manage the cable.

International Best Practices

The Einfach laden ohne Hindernisse recommends that a charging station with a tethered cable should have a cable management system in place to avoid the cable forming an obstacle on the ground and reducing the force required to handle cable.

The PAS 1899:2022 recommends that the length of the charging cable should not exceed 7.5 metres.

E. Charging Station Socket and Connector

The charging station socket should be easy to see and stand out visually for the user. It should also clearly indicate the plug type and orientation. Tilting the socket upwards at a slight angle can help taller users see the socket without compromising use for seated users. The connection force for inserting and removing the charging cable, both from the charging station and from the electric vehicle, should be accommodating to all users.

International Best Practices

The PAS 1899:2022 recommends that the connection force, where possible, should be limited to a maximum of 15 Newtons (measure of force).

The proposed AFIR legislation recommend that charging points for light-duty vehicles should be equipped (at least) with Type 2 connectors for AC connections and Combo 2 connectors for DC connections.

F. Charging Station Socket Cover

Socket covers, including a hinge in socket cover door, a push down socket cover, or a slide up socket cover, should be designed with user needs in mind. Where a socket cover is present, users should be able to easily open the socket cover and insert the connector using one hand.

International Best Practices

Designability's Design Guidance for Accessible Electric Vehicle Charging recommends that if a socket cover is needed, the user must be able to open it easily and insert a connector using one hand.

G. Screen Tilt and User Interface

The angle of the screen at the charging station should ideally be adjustable to improve readability from a seated or fully upright position and to mitigate sun glare. Additionally, the charging station screen should be touch-sensitive for ease of use, and be sufficiently sized, with a surface with adequate contrast, sufficient brightness and anti-glare properties. Buttons and controls on the charging station should be tactilely and visually distinguishable, including night-time functionality.

International Best Practices

The Einfach laden ohne Hindernisse recommends that the buttons and controls on a charging station are tactilely distinguishable and visually differentiated from the background and underlay. Additionally, the screen interface should provide sufficient visual contrast and brightness in different light condition, and charging station should be illuminated in a way that all controls can be recognised and operated even in the dark.

The PAS 1899:2022 recommends that the screen interface should be tilted at an angle between 0 degrees and 20 degrees upwards from the vertical plane towards the user of the charging station.

H. Payment Methods

Versatile and user-friendly (e.g. tap-and-go) payment methods should be provided to accommodate a range of user needs and make the process as simple and clear as possible. To ensure a seamless customer experience, plug and charge functionalities should be considered. The use of card readers that require the physical insertion of a card should be avoided in favour of contactless card readers. Where this is unavoidable, a tactile number pad should be included.

International Best Practices

The PAS 1899:2022 suggests that consumers can rely on a familiar payment method across charging station networks including Radio Frequency Identification (RFID) cards, a contactless payment card and/or a smartphone application.

The proposed AFIR legislation recommends that electric vehicle charging infrastructure should consider ease of payment, including contactless card payment.

I. Charging Station Detection

The charging station should be easily detectable to road-users by ensuring adequate indicators are in place, such as light, tactile elements, and different surfaces around the charging station. Using consistent and contrasting colours for the charging station, its components and surrounding environment can enhance user friendliness. Components that may stick out should be clearly demarcated. Charging stations can serve as important way finders on large open parking spaces for people with visual impairments. Ideally, charging station locations should be integrated in digital navigation aids.

International Best Practices

The Irish Wheelchair Association's Best Practice Access Guidelines recommends any street furniture provided should not intrude into the circulation route and should be clearly detectable by design and contrast against the background. Street furniture which can assist with route identification should be located in a line along or set back into the pavement or approach route.

J. Charging Station Walking Aid Holder

Incorporating a walking aid holder to the charging station provides a convenient space for users to rest walking sticks or crutches. This facilitates the charging process as it allows users to use their hand(s) to grab the plug handle. The holder can also be used to hang excess cable, which can help the user manage a non-tethered cable easier.

International Best Practices

The Designability's Design Guidance for Accessible Electric Vehicle Charging recommends and developed a prototype with a walking aid holder.

K. Emergency Stop Button

Fast-charging stations should provide a covered stop button that, in case of an emergency, could be pressed to halt the charging process. An auto-reset system should be applied to re-activate the charging station if no fault is detected.

International Best Practices

The PAS 1899:2022 recommends an emergency stop button on the charging station.

L. Component Labelling

Clear labelling of key features on the charging station, including the connection type and payment system, should be included.

International Best Practices

The PAS 1899:2022 recommends a clear label to indicate the type of connector.

M. Charging Station Footwell

A footwell or recession, to allow clearance for wheelchair footplate, at the base of the charging station should be considered.

International Best Practices

The Irish Wheelchair Association's Best Practice Access Guidelines recommends a footwell giving 300mm height clearance for wheelchair footplates to the base of the charging point is recommended to allow a person using a wheelchair to have a front-on close approach to the charging point.

6.2 Site Design

This section covers aspects related to the universal design of the environment around the charging station. These Guidelines will assist planners and installers of electric vehicle charging infrastructure in developing more universally designed spaces. This will enhance the user experiences of both electric vehicle drivers and passengers as well as other road users.

Each of the elements listed below has been identified as playing an important role in making sure that an electric vehicle charging station is easy to use. For each of the elements, e.g. parking bay dimensions, ZEVI has proposed a guideline based on international and national best practice standards, technical guidance and research. Accompanying each guideline, ZEVI has included a reference to one or more best practice standards, technical guidance and research. Where an Irish standard exists, this has been used in developing the Guidelines.

Consultation Question

With regard to the following section, Zero Emission Vehicles Ireland (ZEVI) would like to know your opinion on whether these are the correct guidelines to apply in the Irish context?

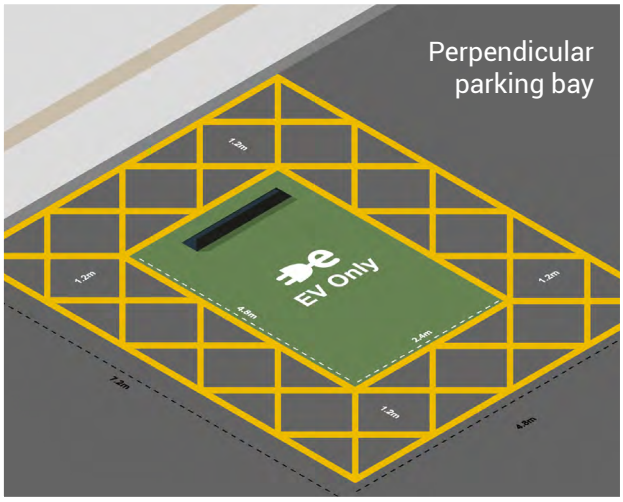
Elements for Site Design

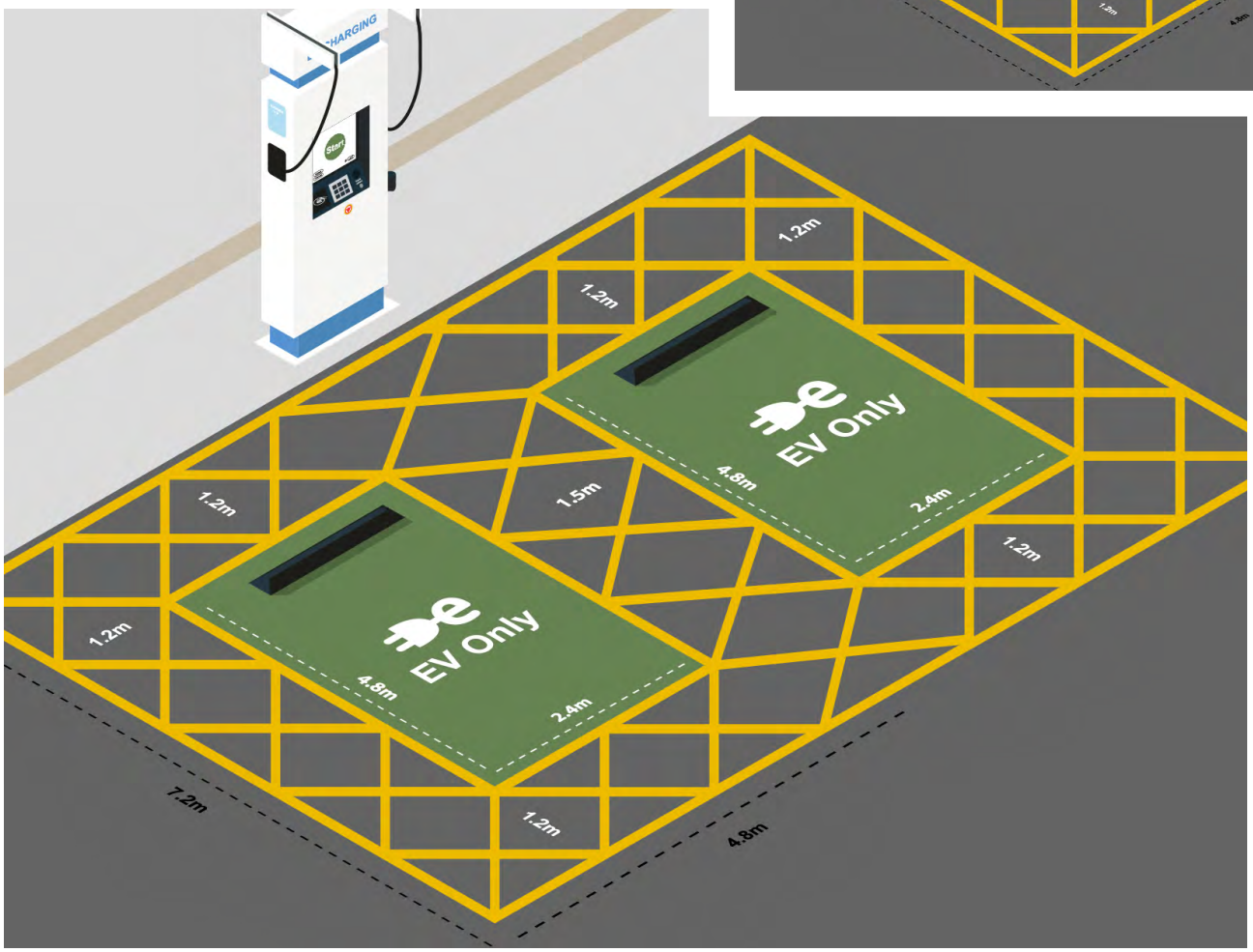
A. Parking Bay Dimensions

Parking bays should be designed to accommodate all users to get in and out of their vehicles, move around the vehicle safely, access the charging station, and park comfortably. These Guidelines address the most common types of parking: perpendicular and parallel parking. These two examples can help inform the design of other parking types.

(A1) Perpendicular parking bays

To ensure universal access, perpendicular charging bays should be 4.8 metres by 7.2 metres, which includes a 1.2 metres access zone on both sides, in front and behind each bay. Where possible the 1.2 metres access zone should be increased to a 1.5 metres access zone between the parking bay and the charging station. For side-by-side parking bays an appropriate access zone (1.5 to 1.8 metres) between parking bays should be provided.

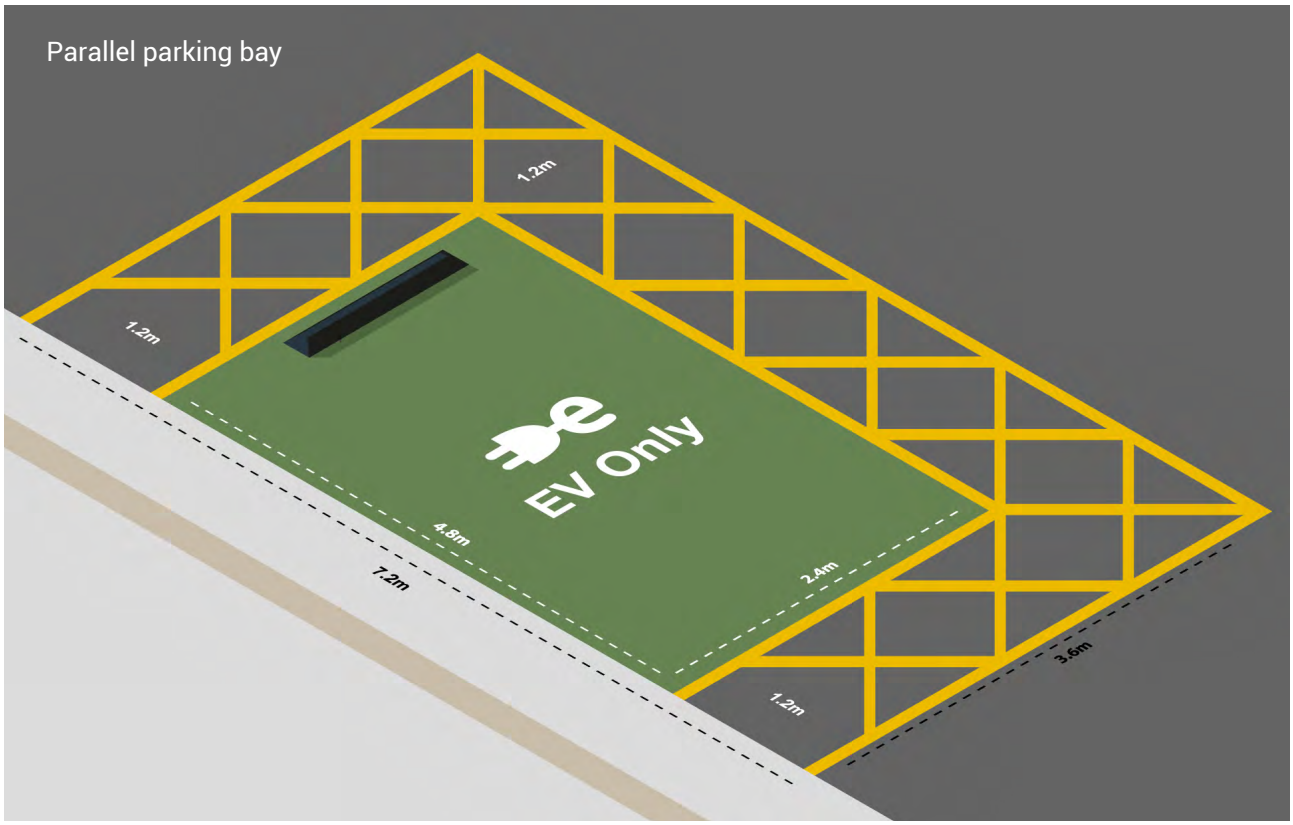




(A2) Parallel parking bays
To ensure universal access, parallel on-street charging bays should be 3.6 metres by 7.2 metres, which includes a 1.2 metres access zone in the front, back, and along the roadside of the parking bay. Where a minimum width of 3.6 metres cannot be guaranteed, level access along the full length of the pavement should be provided.

Where the space permits, the access zone of 1.2 metres around the parking bay should be increased to 1.5 metres.

Furthermore, the dimensions of the charging bay must meet the existing planning regulations, and where possible, fully adopt the proposed dimensions to ensure universal access. Where it may not be possible to apply the full dimensions, a 1.2 metres access zone between the vehicle and the charger should be retained as a minimum. In this case, other provisions should be made to accommodate disabled person's parking card holders, such as providing a designated disabled parking charging bay. This consultation invites your view on how this might be approached.



International Best Practices

The Irish Wheelchair Association suggests all charging stations for electric vehicles should include a standard designated accessible parking bay with level access to the use of the charging equipment and including a 1.2 metres, but preferably a 1.5 metres, access zone between the vehicle and the charging station, to allow sufficient space for a person who is a wheelchair user to manoeuvre and gain access to the charging equipment and to the vehicle connection point.

The PAS 1899:2022 recommends a minimum barrier of 1.2 metres between the vehicle and the charging station. A minimum space of 1.8 metres would enable a wheelchair to turn through a 180° angle.

B. Parking Bay Access

The parking bay should be in an area where there is enough space for manoeuvring while parking. This will make it easier for users to park their vehicles and access the charging station. Where applicable, adequate head room should be considered to accommodate taller vehicles (e.g., multi-purpose vehicles, commercial vehicles).

International Best Practices

Motability's Scoping and Discovery Report: Accessible EV Charging recommends the site design should consider varying vehicle socket location, therefore providing ample space for different parking orientations to safely manoeuvre and charge the vehicle.

C. Ground Surface Type

The public charging station must be installed on a flat, stable, and non-sloping surface with adequate grip. Different surfaces should be applied in the immediate vicinity of the charging station to inform orientation and presence of an obstacle. An appropriate slop (surface gradient) should be provided underneath the charging station, and water drainage facilities should be in place to prevent puddles from forming around the charging station.

International Best Practices

The National Disability Authority's (NDA's) Building for Everyone: A Universal Design Approach recommends a dry friction coefficient (surface friction) between 35 and 45 (PTV).

The Einfach laden ohne Hindernisse recommends that the access areas around the charging station are firm, even, can be rolled over with low vibration, and are slip-resistant for barrier-free use.

The PAS 1899:2022 recommends that the gradient should not be steeper than 1:50.

D. Ground Surface Height Differences

Where possible, the charging stations should be positioned on the same level as the roadway to allow for easy access. However, where height differences are unavoidable, disabled access such as kerb drops and ramps built following existing regulations should be provided. Drainage infrastructure should not be placed in a way that it inhibits access to the charging station.

International Best Practices

The Irish Wheelchair Association's Best Practice Access Guidelines recommends installing a kerb with a slip resistant surface with a minimum width of 1.2 metres and a gradient no steeper than 1:12.

The Einfach laden ohne Hindernisse recommends a maximum longitudinal slope of 3 % and transverse slope of 2 %.

The Swedish Accessible Charging Station manual suggests it is important to remove as many obstacles as possible, such as different surface levels.

The PAS 1899:2022 recommends a dropped kerb within a maximum of 20 metres distance of the charging station.

E. Removing Obstacles

Obstacles around the charging station should be removed where possible. Any obstacles such as wheel stops, bollards, safety barriers, drainage infrastructure, or kerbs should be placed appropriately to allow adequate access to the charging station and avoid being an obstacle for other road users. Unmanaged cables (tethered or untethered) are a trip hazard and should not form an obstruction for other road users, including on footpaths and cycling lanes.

International Best Practices

The Irish Wheelchair Association's Best Practice Access Guidelines recommends that street and pavement clutter should be avoided.

The PAS 1899:2022 suggests that there should be no obstacles in front of the charging station, so that the reach distance is 0 metres.

F. Access to Amenities

Charging stations should be installed as close as possible to any available amenities in the immediate vicinity, such as shops, toilets, cafes, or other services. Universally designed public seating in the vicinity of the charging station may be provided where this does not cause obstruction to individuals.

International Best Practices

The PAS 1899:2022 recommends building the charging station as near as possible to the amenities.

G. Weather Protection

Where possible, adequate overhead weather protection should be placed around charging stations and along access routes from the charging stations to nearby amenities or facilities to minimise the impact of adverse weather conditions on users.

International Best Practices

The ADA Accessibility Standards recommends installing weather protection, security and adequate lighting at parking spaces.

H. Safety Considerations

Ensuring a safe and secure charging environment is essential for all users. Clearly visible security cameras with a direct view of the charging stations can help deter crime. Sightlines to other users and nearby amenities should also be considered and charging infrastructure should be placed near facilities. Charging should be in the most highly trafficked sections of a carpark to facilitate passive surveillance and a feeling of safety for users.

International Best Practices

The PAS 1899:2022 recommends security cameras should be provided in the vicinity of public charging stations and particularly in the vicinity of public charging station located at designated accessible parking bays. Security cameras should be visible such that it is obvious that an area containing public charging station is protected by the security cameras and should be maintained in good working order for monitoring and maintenance.

The proposed AFIR legislation recommends that charging infrastructure on the TEN-T road network should be installed in a safe and secure parking area. At unattended charging stations, the legislation suggests the installation of camera surveillance systems and an emergency call button for immediate contact with local emergency services.

I. Lighting

Adequate and consistent lighting following relevant standards throughout different parts of the day is crucial. This will allow all users to safely navigate the environment surrounding the charger, use the equipment, and access the routes between the public charging stations and nearby amenities.

International Best Practices

The Irish Wheelchair Association suggests access routes to car and multi-purpose vehicle bays should be adequately illuminated with a recommended 150 lux level.

The PAS 1899:2022 recommends lighting should be provided in the environment surrounding public charging station, to enable safe use of the charging station, as well as routes from the public charging station to any nearby venues or amenities.

J. Charging Station Placement

The charging station should be placed in such a way that it does not obstruct sightlines for other road users and can be safely operated. It should also be placed in a way that it accommodates differences in vehicle types and limits obstruction in its surroundings for other road users. To provide users with more options to orientate their vehicle, charging stations should be placed in variable positions to allow for multiple parking orientations. For on-street locations, charging stations should be placed on kerb extensions to avoid cluttering footpaths. For en-route fast charging stations, a side-on layout similar to that of existing petrol stations may be considered to accommodate longer vehicles. If there is a charging station that serves multiple charging bays, it should be located in the middle between those bays.

International Best Practices

The Swedish Accessible Charging Station manual suggests positioning the charging station like a traditional petrol station makes it easy to exit after charging and makes it easier for longer vehicles and vehicles with trailers to charge.

The PAS 1899:2022 recommends that the placement of a public charging station, in combination with other existing furniture, should not further compromise the accessibility of the surrounding environment.

K. Site Access

Barriers or policies that would prevent access to the public charging station at any time of the day should be avoided (e.g., height restrictions) where possible. Measures should also be in place to ensure accessibility of ticketing machines within a closed/barrier-controlled parking area to prevent these becoming a barrier to using the charging station.

International Best Practices

The Federal Highway Administration's National Electric Vehicle Infrastructure Standards and Requirements recommends for the majority of stations to be accessible 24 hours per day, 7 days per week.

L. Impact Protection

To ensure the safety and protection of the charging station from potential vehicle impact damage, impact protection measures such as wheel stops should be installed in high-risk areas. However, it is crucial to ensure that these measures do not obstruct road users or create obstacles for users to access and use the charging station. Additionally, they must be in contrast with the surrounding environment to avoid reflecting the light.

International Best Practices

The PAS 1899:2022 recommends a distance between any impact protection barriers and a public charging station should not exceed 0.22 metres. The height of impact protections barriers should not exceed 0.6 metres.

The PAS 1899:2022 recommends bollards should have a diameter not exceeding 0.1 metres and they should be at least 1 metre from the ground level. The minimum distance between bollards centres should be of 1.4 metres. The bollards should be located no more than 0.3 metres away from the charging station (either forward or to the side).

The PAS 1899:2022 recommends where a wheel stop is installed within a designated accessible off-street parking bay, the installation of the wheel stop is provided with a minimum 0.9 metres clearance from the front of the parking space to the wheel stop (not including the access zone), and with a wheel stop of maximum width of 1.8 metres.

M. Site Maintenance

To ensure safe and accessible use of the charging stations, operators should ensure that electric vehicle charging infrastructure is kept in proper working condition throughout its commercial lifetime, and the quality and access of charging stations maintained.

International Best Practices

The proposed AFIR legislation recommends that charging station operators should ensure the proper condition and functionalities of electric vehicle charging infrastructure throughout its commercial lifetime.

6.3 Information and Communications

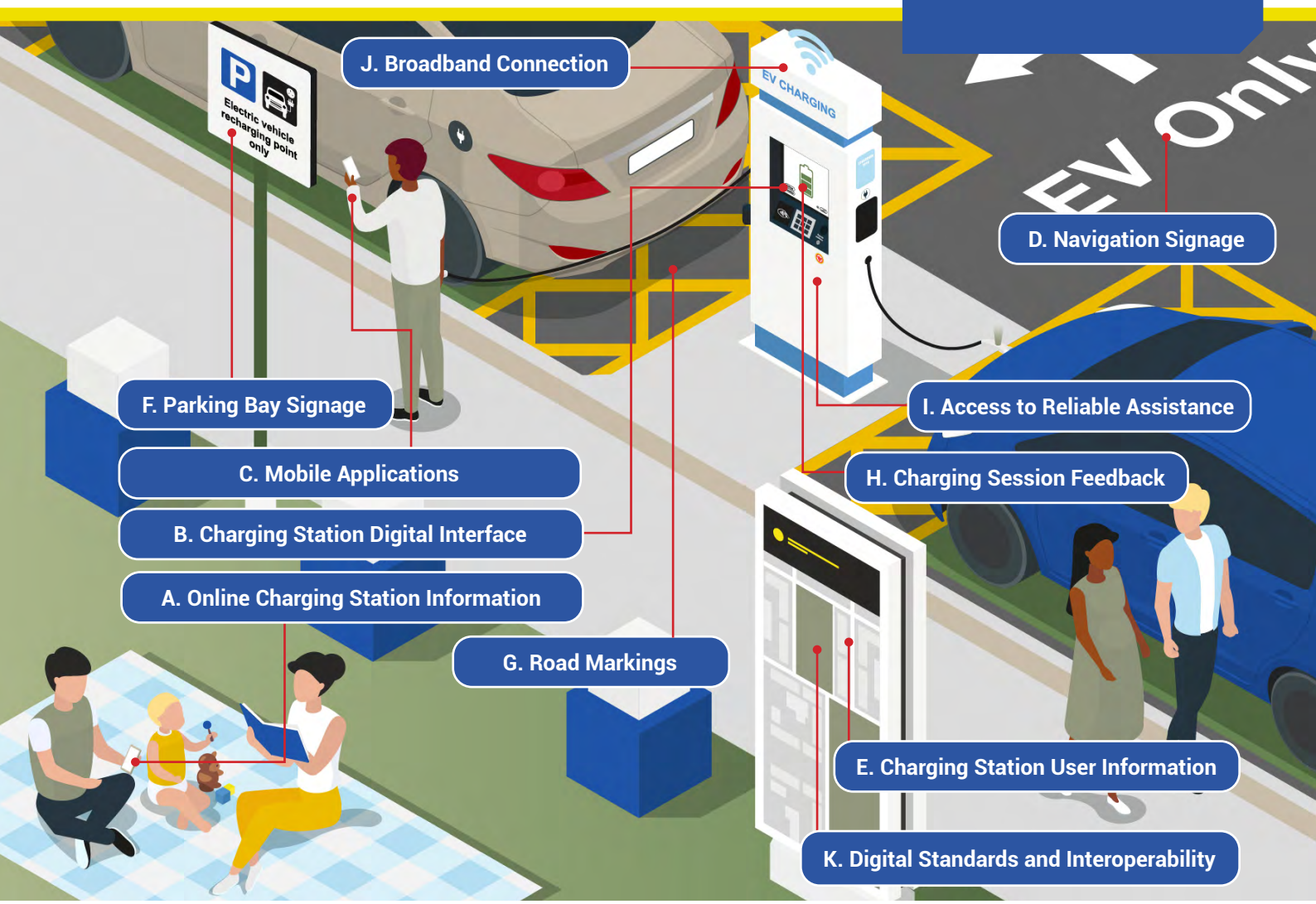
This section covers aspects related to the information and communication associated with the electric vehicle charging process. These Guidelines will contribute to improving user awareness and experience before, during and after recharging. Additionally, this will support charge point operators and government organisations in ensuring that clear, consistent and accessible information is available to the public.

Each of the elements listed below has been identified as playing an important role in making sure that an electric vehicle charging station is easy to use. For each of the elements, e.g. remote charging station information, ZEVI has proposed a guideline based on international and national best practice standards, technical guidance and research. Accompanying each guideline, ZEVI has included a reference to one or more best practice standards, technical guidance and research. Where an Irish standard exists, this has been used in developing the Guidelines.

Consultation Question

With regard to the following section, Zero Emission Vehicles Ireland (ZEVI) would like to know your opinion on whether these are the correct guidelines to apply in the Irish context?

Elements for Information and Communications



A. Online Charging Station Information

Providing information about charging stations remotely gives users greater confidence that they can access them before driving to the location. Some key considerations include the exact location of the charging station, booking options, power output, accessibility, charging costs, available payment types, charger availability, vehicle compatibility, language on the display, and nearby facilities.

International Best Practices

The PAS 1899:2022 suggests that the provision of data and information regarding the locations and characteristics of public charging stations can assist drivers to plan their journeys in advance.

The proposed AFIR legislation encourages operators to take necessary measures to offer standardised and fully interoperable information systems providing information about the availability of recharging stations. Such systems shall be precise, user-friendly and operable in the official language(s) of the Member State and in English. Additionally, the legislation proposes that operators shall ensure the availability of static and dynamic data relating to electric vehicles charging infrastructure and allow access to this data through the National Access Point, at no cost.

B. Charging Station Digital Interface

Where suitable, adopt next generation technology to provide a seamless user experience. Where a charging station digital display is required, this should provide clear and simple instructions at every step of the charging process. The text size and interactive buttons should be adjustable, and visuals should be displayed in a high-contrast format, including commonly recognised symbols and images where appropriate. Instructions should be in layperson's terms and language options should be available. Speech-based navigation and screen reader mode could be integrated to aid the user through the charging process.

International Best Practices

Designability's Design Guidance for Accessible Electric Vehicle Charging recommends that visual instructions, including in a smartphone app, should have clear layout, good contrast and large enough information to be read from the appropriate distance, following best practice in information design. When writing text instructions, consider that not everyone will have English as a first language, or be literate, so use symbols alongside text as an additional format. Be consistent and group information together to make it easier to take in.

C. Mobile Applications

Mobile applications are a common way to facilitate the charging process and to improve the user experience by providing access to information before, during and after a charging session. Remote feedback during the charging process can help users avoid the need to repeatedly exit or return to their vehicle to check on the charge status or to stop the charging process.

International Best Practices

The Federal Highway Administration's National Electric Vehicle Infrastructure Standards and Requirements recommends information on publicly available EV charging infrastructure locations, pricing, real-time availability, and accessibility should be available through mapping applications.

The Einfach laden ohne Hindernisse recommends that all functions of the charger (except charging cable) should be controllable via mobile application on a smartphone.

D. Navigation Signage

Clear, visible, and consistent signage should be displayed to help users locate charging stations, for instance, at the entrance of a car park.

International Best Practices

Designability's Design Guidance for Accessible Electric Vehicle Charging recommends providing clear, consistent navigation signage from a site entrance to charging stations.

The proposed AFIR legislation suggests appropriate signposting is deployed within parking and rest areas on the TEN-T road network where electric vehicle charging infrastructure is installed.

E. Charging Station User Information

Key information should be clearly displayed on or near the charging station, such as who can use it, how to use it, whether parking charges apply, charging prices, connector and socket type, charging speed, customer service contact, and potential time limits and penalties.

International Best Practices

The proposed AFIR legislation suggests pricing information should be clearly and easily made available including all its price components.

F. Parking Bay Signage

To ensure that users are well-informed, signage at the charging station should include clear and comprehensive information about the charger. This should include details such as the type of vehicle that is allowed to use the charger (e.g., electric or hybrid vehicles), as well as any other relevant information, such as the charging cost and payment methods. Signage should be installed at an appropriate height and supplement road markings.

International Best Practices

The Current Traffic Signs Manual's Regulatory Signs states that Electric Vehicle only parking bays may be denoted by the use of the Electric Vehicle Parking sign Rus 020a and shall be used with Supplementary Plate P 053.

The Swedish Accessible Charging Station manual suggests it is important that information about the charging is clear and easy for everyone to understand. Position the information so that it can be read by both seated and standing users of different heights.

G. Road Markings

Road markings should indicate the boundaries of both on-street and off-street parking bays. The parking bay should be clearly identified, with the words 'Electric Vehicle Charging' or 'EV Charging' written on the roadway in letters at least 0.35 metres in height. To differentiate with regular parking bays, the standardised white 'EV' symbol on a green background should be prominently displayed. The surrounding access zone should be hatched in yellow.

International Best Practices

The Current Traffic Signs Manual's Road Marking states that an Electric Vehicle Recharging Bay is indicated by road marking RRM 034, marked in white and located on the outer edge of each bay and should be accompanied by the upright Electric Vehicle Parking Bay regulatory sign (Rus 020a). The bay may also have green surfacing applied within the limits of the bay, but this should not be extended into the adjacent carriageway or any buffer zones.

H. Charging Session Feedback

Feedback during the charging process can help communicate to users what stage in the charging process their vehicle is at, provide confirmation that various actions were successful (e.g., when the connector is plugged in successfully, when the connector is ready to unplug, etc.), and confirm that the payment process was successful. Additionally, the charging station should provide clear next steps in case that the charging process fails (e.g., the next available charging station). Where light cues are used, these should be consistent across charge point operators and clearly visible even in daylight. These Guidelines recommend using three different colours to represent the three main charging stages: "operational," "charging is complete," and "possible issue", and a flashing light during the "charger in use" stage. To ensure inclusivity, audio cues can be added to avoid confusion in case the user is colour-blind. Supplementary audio cues should be included to enhance inclusivity and vibration cues should be avoided.

International Best Practices

The PAS 1899:2022 points to research that recommends the following colours for the different operational stages: green indicates the device is operational; blue indicates the device is in use; red indicates the device is non-operational; and blue flashing indicates charging is finished.

I. Access to Reliable Assistance

24/7 responsive assistance should be available via phone, text, voice command or a help button when in-person service is not available. Open channels should be in place for misuse reporting. Customer support should be accessible to all users and a customer service number should be clearly displayed on or near the charging station.

International Best Practices

The PAS 1899:2022 suggests additional assistance at service areas should be provided.

The proposed AFIR legislation recommends that operators of publicly accessible charging stations shall ensure that the necessary contact information for local emergency services is clearly displayed at charging stations.

J. Broadband Connection

The charging location should preferably have adequate broadband or mobile phone coverage to accommodate the use of mobile applications during the charging process.

International Best Practices

Designability's User engagement report for Accessible EV charging specifies smartphone apps may be unreliable for payment if adequate mobile phone signal is not available. This could be mitigated by providing mobile phone hotspots at the charging station.

K. Digital Standards and Interoperability

Charging stations should be interoperable in line with national and EU regulations. A separate data strategy is being developed by ZEVI to address interoperability of national data requirements for electric vehicle changing infrastructure.

International Best Practices

The proposed AFIR legislation aims to achieve full interoperability of electric vehicle charging infrastructure throughout the EU.

ZEVI would welcome your feedback on these Guidelines in its public consultation. Please **click here** to be brought directly to the consultation portal.

7. Next Steps

The Universal Design Guidelines presented in this document provide an initial framework for expanding access to more inclusive charging infrastructure across Ireland.

To ensure accessible electric vehicle charging infrastructure, the following actions are now proposed:

Publish draft guidelines

Publish for public consultation the draft Universal Design Guidelines for Electric Vehicle Charging Infrastructure;

Review Feedback

Review feedback and update the Universal Design Guidelines for Accessible Charging Infrastructure; and

Further stakeholder Engagement

Engage with charge point operators and Public Sector buyers to support the use of these Guidelines.

Following the public consultation, the actions outlined above will be initiated in collaboration with relevant stakeholders.

Acknowledgements

ZEVI would like to give a special thank you to all the people who shared their knowledge and experience to inform the development of the Universal Design Guidelines. ZEVI is looking forward to continuing to engage with you in the next phase and would appreciate your feedback in the public consultation.

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Appendix A
Case Studies

Electric Vehicle
Charging Infrastructure
Universal Design Guidelines

Appendix A – Case Studies

As part of the process to identify international best practices, case studies from various countries were examined to gain insights into existing charging stations infrastructure. By including practical examples, this study aims to provide tangible evidence of potential ways to implement accessible charging stations. Please find a selection of case studies below.

GRIDSERVE Electric Forecourt Norwich, UK (2022)

Background

The GRIDSERVE Electric Forecourt in Norwich is a state-of-the-art charging facility for electric vehicles. It offers 36 charging bays, including fast and accessible charging stations, with a user-friendly screen interface and card reader. The facility also provides different payment methods, including contactless, and a management system to avoid cable obstructions on footpaths. The charging bays are conveniently located near amenities, and the environment is well-lit for user safety. The facility also provides 24/7 support with a dedicated hotline.

Key Learnings

- The facility provides covered parking, although it does not include sheltered access to amenities.
- The dimensions of the disabled parking bays are adequate, and the facility offers disabled access in and around the building.
- The environment is well-lit, enhancing the user experience and providing a sense of safety.

Designability Charging Unit Prototype, UK (2022)

Background

The Designability Charging Unit Prototype is an innovative design aimed at improving accessibility for electric vehicle charging for disabled users. The prototype includes a range of features such as easy-to-use interfaces, high visibility, and tactile elements to aid users with visual impairments. The unit's height and placement of the cable are adjustable to cater to different heights, and the charge socket is angled to make the connector easier to plug in. The unit's design also provides adequate space for disabled parking charging and ensures that there are no obstructions in the surrounding area. The prototype has undergone extensive testing and feedback to ensure it meets the needs of its users, making it a promising solution for accessible electric vehicle charging.

Key Learnings

- The design of the handles is ergonomic, allowing users to handle the charger plug with ease.
- The cable management system can carry the weight of the cable, reducing the likelihood of accidents and making it easier for users to handle the cable.
- The screen interface, although relatively small, is simple and easy to use, providing a user-friendly experience.

EvoEnergy HyperHubs, Monks Cross Park and Ride, York, UK (2022)

Background

The City of York, in collaboration with Evo Energy, has established a HyperHubs charging station near Monks Cross Park and Ride in York. The facility features 30 fast charging points, 4 rapid charging points, and 4 ultra-rapid charging points.

Key Learnings

- Obstacle-free parking bays with easy door access ensuring accessibility of the charging stations.
- A simple screen interface, card reader, and RFDI reader at an accessible height caters to the needs of both standing and sitting users.
- Charging cables are not heavy and are positioned in a way that does not create obstacles, which contributes to a more inclusive and user-friendly charging experience.

Appendix B
International Best Practice

Electric Vehicle
Charging Infrastructure
Universal Design Guidelines

Appendix B – International Best Practice

The table below provides an overview of some relevant international best practice standards, technical guidance, and research.

Publication	Document Type	Author	Country / Year	Description
Accessible Charging: A Guide for Accessible Charging Inputs from Sweden, Switzerland, USA and Germany	Technical Guidance	Swiss Paraplegic Association and European Spinal Cord Injury Federation	Switzerland 2022	This document provides a summary overview of multiple national accessibility requirements for electric vehicle charging infrastructure. This includes Switzerland, Sweden, USA and Germany.
Accessible Charging Stations: Practical advice on designing inclusive charging stations	Technical Guidance	Region Jämtland Härjedalen and BioFuel	Sweden 2022	This guide helps installers of charging stations in Sweden to design electric vehicle charging infrastructure in a more accessible way and to choose equipment that is easy to use.
Alternative Fuels Infrastructure Regulation (AFIR)	Proposal for Regulation	European Commission	European Union 2023	The Alternative fuels Infrastructure Regulation (AFIR) (Article 5) proposes minimum accessibility requirements to ensure interoperability and ease of use of charging infrastructure across Europe.
Americans with Disabilities Act (ADA)	Standards	U.S. Department of Justice (DOJ) and the Department of Transport	United States 2010	The Americans with Disabilities Act (ADA) sets accessibility standards for places of public accommodation, commercial facilities, and state and local government facilities in new construction, alterations, and additions. The standards are based on minimum guidelines set by the U.S. Access Board.
Design Recommendations for Accessible Electric Vehicle Charging Stations	Technical Guidance	U.S. Access Board	United States 2022	The ADA and ABA Accessibility Standards contain requirements applicable to electric vehicle charging stations, and regulated entities must ensure that they are accessible to and usable by individuals with disabilities. The document also addresses the accessibility of user interfaces and payment systems that may be considered in information and communication technology.
Design considerations for electric vehicle charge points	Technical Guidance	Office for Zero Emissions Vehicles (OZEV)	United Kingdom 2022	This document builds on the learnings from the charge point design concept project and outlines design considerations for organisations installing charge points. It aims to help organisations think through the role of design in creating a positive experience for both consumers and those using the wider environment, such as pedestrians.

Publication	Document Type	Author	Country / Year	Description
Design Guidance: Accessible EV Charging	Technical Guidance	Designability	United Kingdom 2022	This document compiles extensive evidence concerning the inaccessible elements of current public electric vehicle charging and proposes detailed descriptions of their developed prototypes to illustrate the impact of good and bad design on real people. The guidance is aimed at anyone involved in, or responsible for, planning, procuring, designing, manufacturing, or installing public electric vehicle charging points.
Einfach laden ohne Hindernisse (nationale-leitstelle.de)	Technical Guidance	Nationale Leitstelle Ladeinfrastruk tur	Germany 2023	The document provides guidelines on barrier-free charging infrastructure for tendering, commissioning, and regulating/ administrating institutions as well as for manufacturers and operators of charging infrastructure. The guidelines will serve as a basis for the development of accessibility requirements for public charging infrastructure in Germany.
Electric Vehicle Charging Stations	Technical Guidance	Division of the Sate Architect (DSA)	United States 2020	The report discusses accessibility regulations for electric vehicle charging stations in California. It outlines requirements for the location, accessibility, and operability of electric vehicle charging stations in accordance with the Americans with Disabilities Act (ADA) and California Building Code (CBC).
Electric Vehicle Charging Infrastructure for People Living with Disabilities	Research Report	Ricardo Energy & Environment (commissioned by Motability)	United Kingdom 2020	This report examines the accessibility challenges that disabled people are expected to face with existing electric vehicle charging infrastructure; the scale of these issues; and how they might be solved. The findings included key considerations on disabled users and charging point technology aimed at solving the identified issues with the charging points.
Enable Report	Research Report	UK Power Networks in collaboration with Ricardo and Motability	United Kingdom 2022	This report explores available data and evidence to identify the needs of disabled motorists with respect to on-street charging, the location of disabled bays and the impact of their electrification on the UK charging network. The key findings, recommended the action plan for UK Power Networks and potential for further trials were presented to local authorities, charge point operators and other interested stakeholders.
Guidelines for Electric Vehicle Charging Infrastructure on Council Land	Technical Guidance	City of Parramatta	Australia 2022	The guidelines outline the principles for planning EV charging infrastructure on public land and to support the selection of the correct type of infrastructure at the right location. This provides guidance for the provision, installation, management, maintenance, and removal of Electric Vehicle (EV) charging infrastructure on public land in the City of Parramatta Local Government Area (LGA).

Publication	Document Type	Author	Country / Year	Description
National Electric Vehicle Infrastructure Standards and Requirements	Standards	Federal Highway Administration	United States 2023	The National Electric Vehicle Infrastructure Standards and Requirements mandates minimum specifications for electric vehicle infrastructure projects, funded under the National Electric Vehicle Infrastructure (NEVI) Formula Program, and construction of publicly accessible electric vehicle chargers under certain statutory authorities. The regulations encompass the installation, operation, and maintenance of electric vehicle charging infrastructure, data submission format and schedule, network connectivity, as well as publicly available information regarding electric vehicle charging infrastructure locations, pricing, availability, and accessibility through mapping applications.
PAS1899:2022	Standards	Motability and OZEV	United Kingdom 2022	PAS 1899:2022 is an accessibility standard developed by the British Standards Institution (BSI). It provides essential specifications for designers, procurers, and installers to create accessible public charge points for electric vehicles.
Rollstuhlgerechte Ladeplaetze	Technical Guidance	Die Schweizer Fachstelle	Switzerland 2021	This guidance document supports planners and operators in choosing a suitable concept for planning and implementing accessibility.
Scoping and Discovery Report -Accessible EV Charging	Research Report	Motability and Designability	United Kingdom 2021	This report outlines the scoping and discovery work carried out by Designability in preparation for a future phase of user engagement, as part of their project with Motability to make electric vehicle charging accessible for disabled drivers, passengers, and pedestrians. The research focused on the usability of current electric vehicle charging infrastructure and hardware, identifying groups within the disabled population who should be prioritised in user testing, aspects of charging components and built environment to prioritise, and types of infrastructure to consider when proposing potential design solutions and guidance.
User Engagement Report - Accessible EV Charging	Research Report	Motability and Designability	United Kingdom 2021	Designability conducted user engagement research with 87 Motability Scheme customers to gather detailed insights into their experiences and views on the electric vehicle charging process, public charging provision, and related topics.

Appendix C
Stakeholder Engagement

Electric Vehicle
Charging Infrastructure
Universal Design Guidelines

Appendix C – Stakeholder Engagement

Stakeholder engagement has played a crucial role in the development of the Universal Design Guidelines for Electric Vehicle Charging Infrastructure. The purpose of this engagement has been to:

- Involve key stakeholders from the early stages in the development of the document;
- Gather additional information on electric vehicle charging infrastructure requirements based on user experiences and needs; and
- Obtain feedback and agreement on the content of the Guidelines.

The input has been collected through interviews with representatives of identified organisations and by distributing a survey among Disabled Persons Organisation (DPOs) and disability associations, and charge point operators. Through this consultation, Zero Emission Vehicles Ireland (ZEVI) will gather the broader public's feedback.

The following is the full list of stakeholders who were engaged, either through calls, surveys, or both:

National Stakeholders

Irish Electric Vehicle Owners Association (IEVOA)
NTA Transport Users Advisory Group
NTA Community Pillar
Dún Laoghaire-Rathdown County Council
Irish Parking Association (IPA)

International Accessibility Experts

Motability UK
Charge Safe

Disabled Persons Organisations (DPOs)

In accordance with the United Nations Convention on the Rights of Persons with Disabilities (CRPD).

Voice of Vision Impairment (VVI)
Disabled Women Ireland (DWI)
Irish Deaf Society
National Platform of Self-Advocates
Invisible Disability Ireland

Disability Associations

Disabled Drivers Association of Ireland (DDAI)
Irish Wheelchair Association (IWA)
Chime - National Charity for Deafness and Hearing Loss
Disability Federation of Ireland (DFI)
Central Remedial Clinic (CRC)
Vantastic
Galway Centre for Independent Living
Age Friendly Ireland
National Council for the Blind of Ireland (NCBI)

Charge Point Operators (CPOs)

POWERSUB
Evbnb.ie
IONITY
ChargePoint
Q-Park Limited
APCOA Parking Ireland Limited
TSG Ireland
Ecars
Maverick EV Services
Fastned
EasyGo (CarCharger EV Limited)
Randridge Darkin Charging Solutions
Local Power Ltd
Circle K
GlenEV Technologies
ePower
Applegreen Electric
Flowbird Smart City
Gocharge
Go Eve Ltd
SSE
Weev
Blink Charging
EC Charging
Other (anonymous in survey)

Stakeholder Engagement Process

The stakeholder engagement process has consisted of four phases:

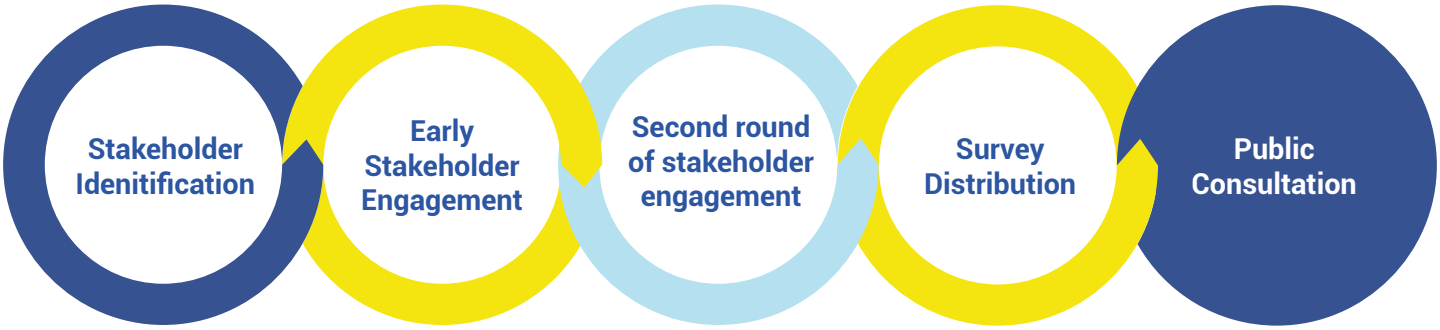
Stakeholder identification: a list of relevant stakeholders was identified. For this project, stakeholders are defined as any individual or group that:

- May have an interest and/or influence in relation to the project;
- May have information and/or resources needed for the project; and
- Could be affected by or benefit from the project's delivery or outputs, directly and/or indirectly.

Early stakeholder engagement: individual calls with an initial group of stakeholders were set up (including DPOs, Irish disability organisations, other national stakeholders, and international accessibility experts) to raise awareness for this work, gather information on similar projects carried out internationally and obtain initial input on the accessibility requirements of different user groups.

Second round of stakeholder engagement: individual calls with a second group of stakeholders were set up (DPOs, Irish disability organisations and other national stakeholders) to obtain direct feedback on the content of the Guidelines and finalise the document before going to public consultation. Some of the stakeholders contacted in this phase had previously engaged with ZEVI as part of the early stakeholder engagement stage.

Survey distribution: a survey to DPOs and Irish disability associations was developed and distributed to further inform the content of the Guidelines. The survey allowed priorities to be identify across Charge Point Design, Site Design and Information and Communications in electric vehicle charging infrastructure for user groups with different accessibility requirements. In addition, a survey was circulated among Charge Point Operators (CPOs) to identify their current awareness of universal design requirements for charging infrastructure.



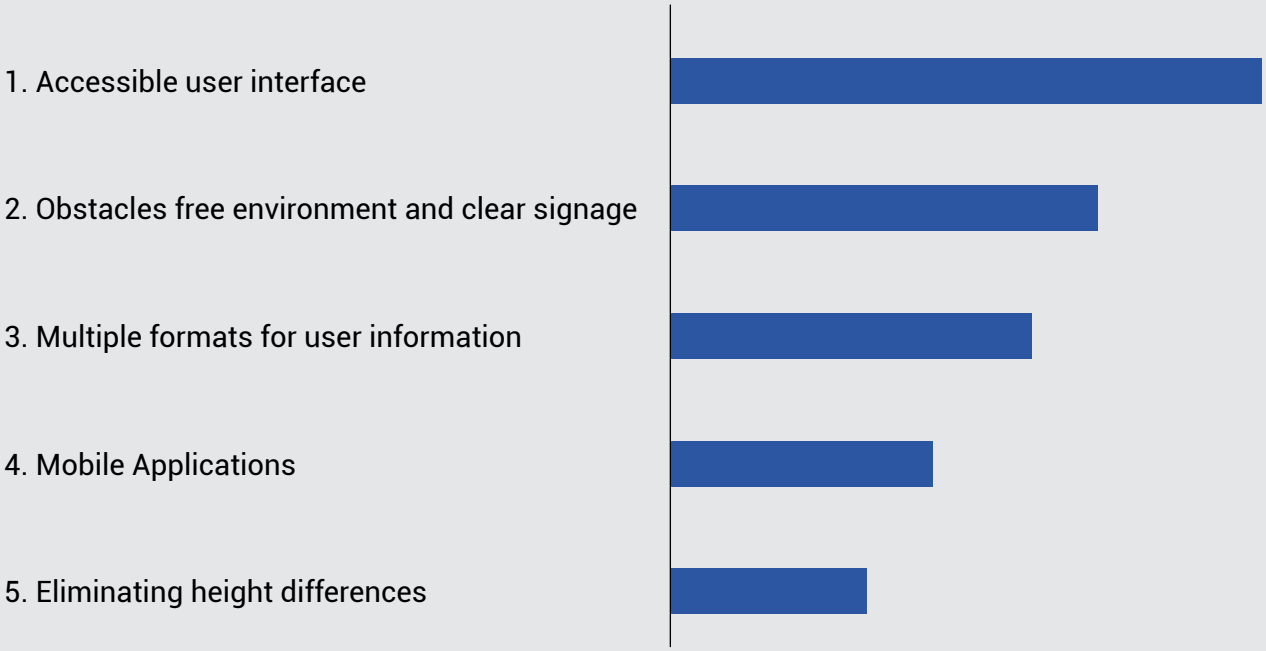
Survey Results

DPOs and Irish disability associations
Between the 22nd of March 2023 and the 7th of April 2023, a survey was distributed among DPOs and Irish disability associations to capture respondents' insights on their accessibility requirements regarding electric vehicle charging infrastructure and thus inform the development of these Guidelines.

In total, 43 responses were received from individuals with diverse accessibility needs. The respondents included both individuals who had previously charged and electric vehicle and individuals who had not.

Respondents were asked to rank (from 'Extremely important' to 'Extremely not important') how significant they considered different elements across Charging Station Design, Site Design and Information and Communications for them to be able to access and use an electric vehicle charge point.

Top 5 Accessibility Concerns according to the DPOs and Irish Disability Associations survey



It was found that the accessibility of the user interface (e.g., used for payment, monitoring charging process, etc.) is the most prevalent concern for accessing and using electric vehicle charging infrastructure. The second most prevalent accessibility concerns were signage to navigate to the charging station (e.g., wayfinding, signage in the car park, etc.) and reducing obstacles in the environment around the charging station (e.g., bollards, bump stops, street furniture). The third most important accessibility concern respondents raised was the benefit of multiple formats for user information (e.g., voice instructions, visual displays). This was followed by having access to mobile applications for public charge points (e.g., for locating available charge points, to monitor charging process, etc.) and lastly eliminating height differences at the charging site (e.g., kerbs).

Charge Point Operators (CPOs)
Between the of 29th of March 2023 and the 25th of April 2023, a survey was circulated among CPOs to identify which aspects of accessibility they find most challenging to implement, what measures they have in place to facilitate accessibility of their charging stations and any additional suggestions to inform the development of the Guidelines.

In total, 25 responses were received from different charge point operators.

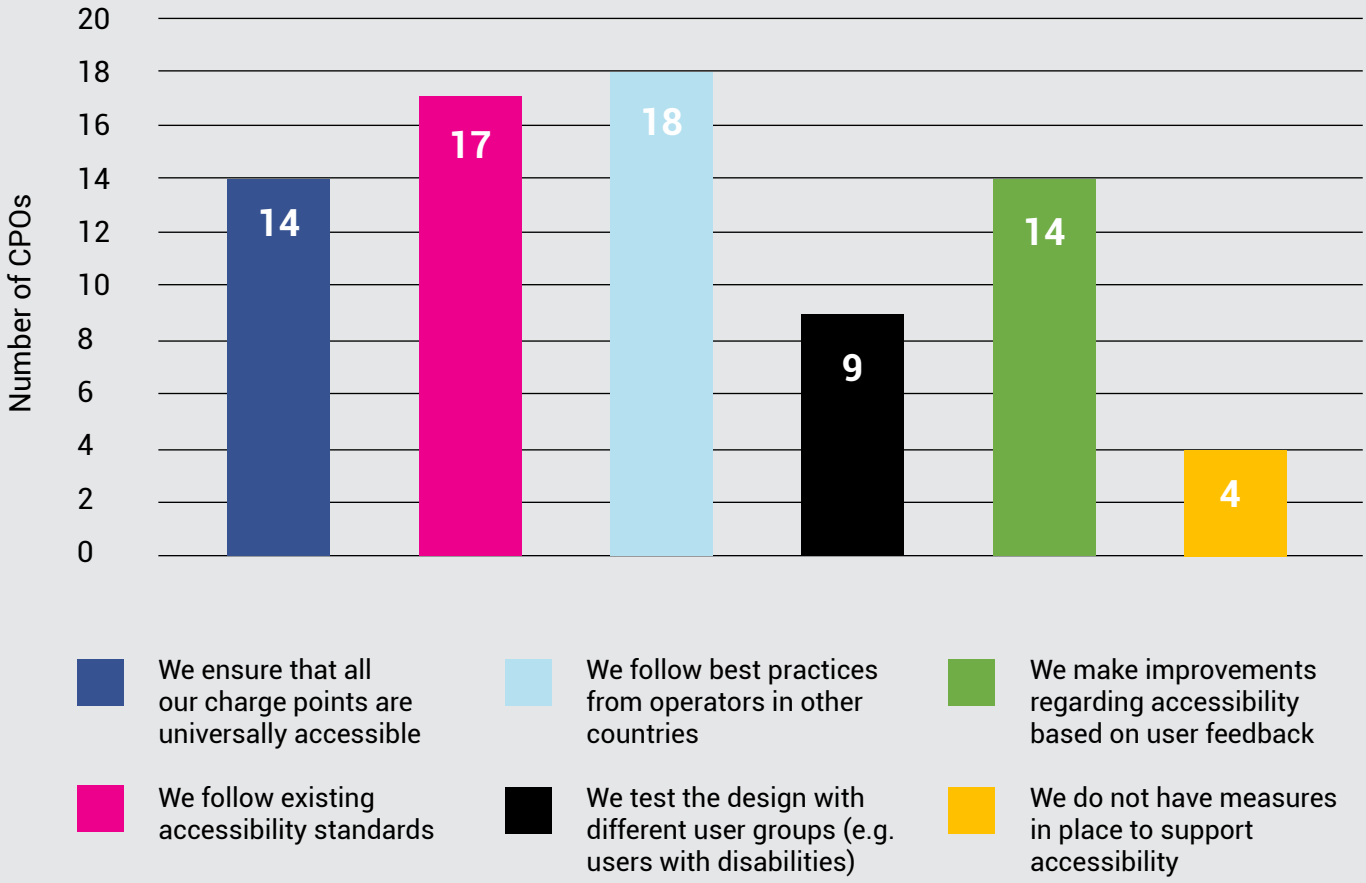
Generally, charge point operators perceived accessibility to be an important aspect of providing charging infrastructure. On a scale of one to five (one being low and five being high), on average charge point operators rated the importance of accessibility to be 4.44 out of 5.

When asked what the most challenging aspects to implement accessible charging infrastructure were, charge point operators responded that, on average, their primary concern was adequate car parking space available. This was followed by site accessibility requirements, charge point design constraints, and lastly, signage and information provision.

When asked which measures charge point operators had in place to support the accessibility of charging infrastructure in Ireland, the majority mentioned that they followed best practices from operators in other countries, while the minority stated that they do not have any measures in place to support accessibility.

Measures in place to support accessibility by CPOs according to CPO survey.

Which of the following measures do you have in place to support the accessibility of your Electric Vehicle Charging Infrastructure (EVCI) in Ireland?



Some further recommendations from charge point operators to enhance the accessibility of charging infrastructure included:

Avoid reverting to last generation access tools and incorporate new international standards such as 'Plug and Charge'

Where possible, harmonise with existing standards including the ADA in the U.S. and the PAS 1899:2022 in the UK

Provide grant aid to ensure accessible charging infrastructure

Facilitate diverse and interoperable payment methods

Provide public parking spaces that accommodate both heavy duty vehicles and accessible vehicles

Have a minimum of one accessible charging station available at every charging pool

Make universally designed and accessible charging spaces available to all drivers to avoid empty bays

Appendix D
Innovation in Charging

Electric Vehicle
Charging Infrastructure
Universal Design Guidelines

Appendix D – Innovation in Charging

In this section, some key innovations in charging are highlighted that may have significant implications for electric vehicle charging infrastructure users. As technology evolves, the Universal Design Guidelines for electric vehicle charging will need to accommodate changes in the charging experience.

Inductive Charging: This allows electric vehicles to be charged without the need for cables, by using a wireless charging pad that is placed on the ground. Inductive charging would provide a more seamless and convenient charging experience for electric vehicle drivers, as they can simply park their vehicles over a wireless charging pad and the charging process will begin automatically.

Robotics: Robotics refers to the use of machines and robots to automate the process of charging electric vehicles. This can lead to more efficient and faster charging times, as well as reduced costs for charging infrastructure. It can also potentially improve accessibility for those with physical disabilities who may have difficulty plugging in and unplugging the charging cable.

Battery Swap Technology: Battery swap technology can improve the accessibility of electric vehicle charging infrastructure by providing more options for charging. Battery swap services can allow electric vehicle drivers to quickly exchange their depleted battery for a fully charged one, reducing charging time and eliminating range anxiety.

Plug and Charge: Plug and charge is a technology that allows electric vehicle drivers to simply plug in their vehicle and start charging without the need for any additional steps such as authentication or payment. This can improve accessibility for those who may not be tech-savvy or may have difficulty using payment systems. It can also potentially reduce charging times and improve the overall charging experience.

Improved Battery Technology: Battery technology advancements can have significant implications for electric vehicle charging infrastructure accessibility. Improved battery technology can increase the range of electric vehicles, reducing the need for frequent charging.

Mobile Charging Units: Mobile charging units are portable charging stations that can be brought to electric vehicles that need a charge, making charging more accessible in remote or hard-to-reach areas. These units can be particularly useful in areas where fixed charging infrastructure is not available.

Dynamic Wireless Charging: Dynamic charging technology enables electric vehicles to charge wirelessly while driving on the road, making charging more accessible for long-distance travel. This technology has the potential to eliminate the need for traditional charging infrastructure along highways and other major roads, making electric vehicle adoption more feasible and accessible.

High-power Charging: High-power charging technology enables faster charging times for electric vehicles. With high-power charging stations, electric vehicles can be charged in a matter of minutes, making it more convenient for drivers on long journeys by reducing waiting times.

Appendix E
Personas

Electric Vehicle
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Universal Design Guidelines

Appendix E – Personas

The Jacksons, Tourist Family

Age: 42, 42, 8, 4
Location: Wild Atlantic Way

Descriptor: John and Janet Jackson and their two small kids are on holidays in Ireland. They have rented an electric vehicle for the first time to travel around the country, both to cities and to rural areas. They drive the car every day during their trip.

User needs:

- Remote charging station information: When travelling, John and Janet get a bit nervous about where they will be able to charge the vehicle. Being able to locate available charging stations in advance at their planned destinations is essential for them as they are not familiar with the electric vehicle charging system in Ireland.
- User information: When they get to the charging station, being able to see clear user information such as the price of charging and charging speed, makes the process seamless and convenient.
- Parking bay dimensions: For John and Janet, the parking space should be wide enough to safely open the doors fully on both sides of the vehicle to help their kids in and out the car while staying clear from surrounding traffic.

Tara Traynor, Taxi Driver

Age: 55
Location: Skibbereen, Cork

Descriptor: Tara drives a taxi for a living. She drives her electric vehicle around her local town and occasionally has to travel longer trips to other towns during the day. During busy periods she also picks up a few night shifts.

User needs:

- Check availability of charging stations: Tara wants to make sure that she always has a full charge to avoid turning down potential clients. Although she has access to home charging, being able to locate available charging stations multiple times during the day at different locations helps her reliably charge her vehicle on the go.
- Monitor charging status through a mobile application: Having remote feedback on her phone allows her keep track of her car's charging status while stretching her legs away from the vehicle. This allows her to use her time more efficiently so that she can get back to the car as soon as the charge is complete.
- Feeling safe: Since Tara sometimes works late at night, security at charging stations is extremely important. Tara finds charging stations with good lighting, security cameras and nearby amenities feel safer and more welcoming.

Ruairi Reynolds, Rural Commuter

Age: 33
Location: Virginia, Cavan

Descriptor: Ruairi decided to purchase a second-hand electric vehicle which he uses to do the weekly grocery shopping, to go to work and to bring his daughter to extracurricular activities. He lives in Cavan and travels mostly at peak times in the morning and the evening.

User needs:

- Visual feedback: Ruairi uses hearing aids so when charging the vehicle, he cannot rely on audio feedback. Visual cues on the well-lit screen and charging station such as the green light around the cable when the connector is plugged in successfully help him navigate the charging process.
- Access to reliable assistance: Since Ruairi does not have access to home charging, he relies on public charging stations. Because of his schedule, he tends to charge his electric vehicle outside of peak hours. Considering there are not many public charging stations in his area, a phone number clearly displayed on the charging station ensures that he can access assistance via text in case something goes wrong during the charging session. This makes him feel confident that he will not be left stranded.
- Weight of cable: Ruairi recently injured his back which makes light, manoeuvrable cables and smooth connectors easier for him to charge his car without needing excessive force. Having the option to hold the plug handle with both hands is particularly helpful.

Rachel Murphy, Retired Urban Dweller

Age: 67
Location: Clonmel

Descriptor: Rachel lives in Clonmel and owns her own electric vehicle. She usually travels to visit her brother in Waterford, and to specialist medical appointments in Cork. She is a wheelchair user, so she needs to make sure that facilities are accessible to her before using them, including checking the availability of accessible parking bays and level access to buildings.

User needs:

- Charging station height and screen tilt: For Rachel, being able to reach the plug handle, interact with the screen and make the payment while remaining seated in her wheelchair is essential. The possibility to adjust the angle of the screen is highly useful to her as sun glare sometimes obstruct the visibility of the screen.
- Ground height differences and absence of obstacles: Dropped kerbs allow Rachel to move around the space with her wheelchair and get access to the charging station. The presence of kerbs would make it impossible for her to charge her vehicle independently. Another main aspect is that the impact collision bollards are installed close to the charging station, in a way that still allows her to be at a suitable reach distance from it.
- Weather protection: While visiting her doctor in Cork, Rachel charges her car in the medical facility's large car park. Because of the distance between the parking bay and the entrance to the clinic, having an overhead canopy shelters her from the rain along the access route.

Caroline Connolly, Car Sharer

Age: 28
Location: Dublin

Descriptor: Caroline has recently signed up to a car-sharing app. To commute she usually relies on cycling and public transport, but she has decided to move apartments, so she needs a car to transport her belongings across the city. She also uses the car to do short trips around her area to shop for home furnishings.

User needs:

- Easily identify electric vehicle charging bay: When charging at larger electric vehicle charging stations in retail parks, Caroline finds upright signage and road markings such as the electric vehicle symbol particularly helpful, as she can easily see where she can park the car.
- Cable management and ground surface: Caroline is six months pregnant and fears tripping on untangled cables or other potential obstacles. Being able to easily manage the excess cable, for instance resting it on the walking aid holder incorporated on the side of the charging station, helps her charge her electric vehicle without any risks of falling. She also feels more secure when the ground surface is flat and slip resistant.
- Charging station digital interface: Being new to electric vehicles, Caroline finds clear and simple step-by-step instructions on the charging station display extremely helpful to ensure that she is charging the vehicle correctly. This allows her to feel confident wherever she decides to go.

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