ELECTRIC VEHICLE RAPID CHARGING HUBS

Guidance for Local Authorities and Landowners

October 2021





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Department for Environment Food & Rural Affairs

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This report has been created by Cross River Partnership (CRP), a non-profit impartial partnership organisation, on behalf of the Central London Sub-Regional Transport Partnership, a collective of senior transport officers and directors from ten London boroughs who provide strategic advice for, and on behalf of, Transport for London (TfL). The partnership, which has been active since 2009, acts as a trusted impartial forum for the boroughs to share experiences and enable collaboration on key sub-regional transport priorities, delivering projects, innovative pilots and trials, forward-thinking research and strategies.



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01 Introduction

With air quality, carbon and congestion improvement polices such as the London <u>Ultra Low Emission Zone</u> [1], <u>Low Emission</u> <u>Zone</u> [2], and the UK-wide <u>ban on the sale</u> <u>of new petrol and diesel cars</u> [3] coming into effect from 2030, the race is on to develop the permanent infrastructure necessary to support an accelerated switch to electric vehicle (EV) modes. Domestic transport is the biggest emission generator, accounting for 27% of the UK's total emissions in 2019 [4].

<u>Research</u> [5] shows that vehicle emissions contribute to the death of over 4000 Londoners per year; it is an urgent public health problem we need to tackle with measures such as electric vehicles. Facilitating London's switch to EVs starts with charging provision. However, public charging infrastructure that is reliable, easy to use and easily understood will be essential for a successful transition.

UK businesses are planning to spend £15.8bn on EVs between April 2021 and March 2022, a 50% increase in spending from the previous year [6]. Over the next 2 years, £300 million is being invested to triple the UK's ultra-rapid charging network, [7] which hopes to reduce potential range anxiety when using EVs. There are almost 6,000 EV charging points <u>across London</u> alone, and 35,000 charging points across the UK [8]. The Mayor's Electric Vehicle Infrastructure Delivery Taskforce proposes to build upon the existing network with a focus on the development of rapid charging

"Research shows that vehicle emissions contribute to the death of over 4000 Londoners per year, it is an urgent public health problem we need to tackle with measures such as electric vehicles" [5]





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hubs, as they can provide multiple charging points in one place increasing confidence in the reliability and ease of charging an EV [9].

The UK is the first major global economy to pass a <u>law</u> [10] that decrees net zero emissions by 2050, with London setting out its <u>ambition</u> to be a zero carbon city by 2030 [11]. 1 in 10 new cars bought were EVs in 2020, up from 1 in 30 the year prior [12]. This clear increase in demand for EVs must be reflected in the provision of efficient charging infrastructure. London's green economy recovery from COVID-19 will be aided by an increase in EV uptake, whilst global EV <u>trends</u> show a similar scope of ambition with other leading world economies investing in EVs [13]. The UK's green recovery from the pandemic relies on public health considerations, as a healthy city starts with the built environment. Significant progress has been made with EV charging infrastructure in London, however, use of this infrastructure should be as easy as purchasing petrol or diesel. Local authorities should strive to provide a service which is streamlined, simple to use and good value for the consumer. This can be achieved by steering the sector and establishing strong public and private relationships. According to a July 2021 report by the central government, market forces alone will not deliver all that is required to meet both London and national targets, thus careful planning and close working with the private sector is required. Commercial competition can maximise consumer benefits, but it must be managed effectively [14].





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Introduction

More detailed information [15] on how to successfully fund, implement and maintain rapid charging hubs has been requested by multiple sectors. Rapid chargers, in comparison to slow/standard and fast chargers, allow high mileage users such as taxi drivers, freight and fleet operators to quickly charge their electric vehicle in 20 to 30 minutes. This is in comparison to slow chargers, which can take five to eight hours and which are better suited to overnight charging. They can be strategically positioned throughout an urban area to ensure EVs can be charged in the right place at the right time, increasing the efficiency of movements along key transport routes.

However, there can be geographical, historical, political, and socio-economic

barriers to introducing rapid charging hubs. There is also the challenge to futureproof the installed infrastructure to ensure it doesn't become redundant as technology develops and preferences in transport methods adapt over the next five to ten years.

The aim of this guidance report will be to offer tailored advice for local authorities and landowners in relation to rapid charging hubs, the steps necessary to successfully implement them, who needs to be involved, the key considerations to act on, and how to ensure that legacy is intrinsically developed throughout a rapid charging hub project.





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02 Locations of Current Rapid Charging Hubs and Projected Demand Across London

TfL <u>data</u> shows that the highest overall demand for EV rapid charging points is in central London, with potentially additional demand in south-east London. Charging points are being used most between the



times of 9am – 9pm, with low usage between 1am – 7am and lower usage on weekends. However, a study by The Mayor's Electric Vehicle Infrastructure Taskforce with different parameters found the most popular time was 5pm – 8pm, with weekends being slightly more popular [16]. Thus, it is important to identify specific needs across various boroughs, urban typologies and demographics, as one size does not fit all. The International Council on Clean Transportation released a working paper in November 2020 – <u>'Fulfilling electric vehicle</u> <u>charging infrastructure needs in Greater</u> <u>London and its boroughs</u>' [17] which demonstrated that every borough will need at least twice as much public charging capacity by 2030, and most boroughs will need 4 - 20 times as much. The analysis also found that constructing additional rapid charging may be a priority in inner London boroughs, whereas public residential charging need is greater in outer London boroughs.

Further data on demand will be included in TfL's EV Infrastructure Strategy, which is due to be released by the end of 2021. Locations of all TfL and non-TfL supported EV charging sites in London can be found <u>here</u> [18]. UK-wide sites can be found <u>here</u> [19].

TfL Timeline:

- May 2018 EV infrastructure taskforce established.
- June 2019- <u>London EV Infrastructure</u> <u>Delivery Plan</u> [20].
- July 2020- London Councils set up the EV coordination body.
- Dec 2020- Hit target of 300 rapid chargers.



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03 Planning and Legislative Context

The planning and legislative context of EV charging infrastructure is rapidly evolving. When planning any new infrastructure considerations for new and proposed regulations, polices must be researched, as guidance documents and reports can go quickly out of date.

The <u>latest</u> National Planning Policy Framework from July 2021 states that policies for both residential and nonresidential developments should ensure adequate provision of spaces for charging when setting local parking standards [21].

Building Regulation amendments enacted through the Electric Vehicle Charging Points (New Buildings) <u>Bill</u> [22] have passed through the first reading in the House of Commons and are scheduled for a second reading in October 2021. If this bill is passed. provision for electric vehicle charging points will be required in both residential and commercial new buildings.

The government has also consulted on <u>'Smart Charging'</u>, [23] highlighting the opportunity for flexible electricity systems. 'Smart Charging' is:

• Cheaper charging during 'off-peak' times.

- Charging is shifted to periods where there is plentiful renewable electricity generation and support system operation by providing electricity grid services.
- Connection to a cloud-based solution, allowing the charging point owner to monitor and manage use.

One of the key points from the government's Electric Vehicle Smart Charging Consultation was that 'The Automated and Electric Vehicles (AEV) Act 2018 gives Government powers through secondary legislation to mandate that all EV charge points sold and installed in the UK have smart functionality and meet minimum device-level requirements.' Any new EV charging infrastructure should take this possibility into account. London's biggest Distribution Network Operator (DNO), UK Power Networks (UKPN), have developed a 'heat map' [24] showing where the cheapest and guickest locations are likely to be to connect EV chargers on low voltage networks.

It is important to revisit the ever-evolving planning and legislative context at the beginning and throughout the lifetime of an EV charging project. As EV use increases the demand on the electricity system increases, considerations such as smart charging and the provision of EV infrastructure through new buildings will shape the landscape of EV charging.

04 Case Study: Glass Yard Woolwich

In September 2021, TfL opened a Rapid Charging Hub at Glass Yard in Woolwich. It follows a 'petrol station' model and has 8 rapid charging points that provide charging times of 20 - 30 minutes. The Woolwich Rapid Charging Hub is TfL's second of five planned hubs, after Stratford's Rapid Charging Hub and has received praise from the Mayor of London. The project encountered some challenges with ground and utility considerations, however as it was the first of its kind in London it is a useful case study to learn from as rapid charging hubs become more common. While TfL led on the sites, they were tendered to chargepoint operators on a Rapids Framework.



Glass Yard Rapid Charging Hub, Woolwich Image: TfL



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The step-by-step process to implementing a rapid charging hub

The operator (ESB) was responsible for financing, installing, operating and maintaining, benefitting from TfL's branding and marketing. Solar panelling was installed to support some of the electrical loading on site such as the lighting. The project was initiated in 2017 and is located on London River Services Land, adjacent to Woolwich Ferry.

It is a standalone site on brownfield land. What was learned from this was that ground conditions were a major challenge and the history of the site should be considered as early as possible. The land was contaminated by heavy metals and two chambers of gas were discovered, delaying completion. Equipment had to be restricted as to not affect the sewer system, as there was a concern that the vibrations would impact the sewers.

There were more significant civil works required than was anticipated, which increased delivery time. The site also had an unexplored ordinance risk and required retaining walls due to the steep incline of the site and the vehicle space required. Many of these issues are specific to the development of an ex-industrial site, however Glass Yard demonstrates the significance of a thorough awareness of the history of the site in selecting development opportunities. Connection to the grid was relatively easy.

Technical Specifications:

- 8 Rapid charging Points
- 20 30 minute charging time
- High Voltage Substation and Low Voltage Switch-Room
- Solar panels to offset electricity demands for elements such as lighting
- 2 Million Pounds investment with operator ESB Energy and Siemens Mobility Limited as installation partner
- Operator: ESB Energy responsible for finance, installation, operation and maintenance
- Brownfield site: extensive civils work required
- Timber structure





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05 The Step-by-Step Process to Implementing a Rapid Charging Hub

1 Historical and archaeological considerations of the site

When deciding on locations for a rapid charging hub, regardless of size or capacity, it is first recommended that a thorough evaluation of the land use is undertaken dating back as far as possible. This is to reveal any underlying contamination risks (e.g. heavy metal contamination from brownfield sites), historical structures of importance, and unexplored ordinance risks which could impact on the delivery time of the project and incur extra costs to investigate and remediate the land to a usable state. It is important to consider these elements of the project as early as possible.

2 Geological considerations

All aspects of the potential site's geology should be carefully measured and evaluated to build a complete site profile in the early stages of the project. Cross referencing the initial design of how cars are going to manoeuvre in, out and around the site with the current composition of the underlying ground and vegetation above, is essential and can save time and money in the long term. It is important to consider that the spatial considerations of a charging site are not just the charger(s) themselves, but the entire space that will be used by the vehicle and the person operating the vehicle. multiple interventions to accommodate the capacity required, it may be more costeffective to explore other areas that already have favourable foundations or would require minimal work to apply the infrastructure required.

3 Utilities

A Ground Penetrating Radar (GPR) survey should be done as standard when assessing a potential site to identify the structures that exist beneath the surface. However, this action alone is not 100% accurate at identifying all possible utilities cables in the ground. Contacting utilities organisations (water, sewer, electric, gas, communications etc.) during the initial stages and before any design stages to identify structures that might collide with elements of the proposed site, directly or indirectly (e.g. through building vibrations), should be done. An awareness of any prior studies that have been conducted should be a priority, liaising with relevant planning departments and stakeholders which hold relevant information on the site is key in the strategic stages. Because of the complex nature of EV infrastructure, coordination between relevant organisations, departments and individuals is important to a successful outcome.

During the design and construction stages, it is good practice to continuously check the impact on utilities to reduce the risk of encountering a problem further along in the development.

If, for example, a particular site will need



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4 Other Challenges identified in site development

Checking that the site has a DNO connection, understanding the local substation located near the site and whether this has access to this substation is critical; previous sites have had a challenge of access to the substation which then required a new stairwell to be installed, costs of this can cause an increase in budget.

If a car park site is identified, there are extra considerations needed, such as:

- Whether ventilation will be needed: a previous site needed to upgrade the ventilation system to comply with fire regulation which caused significant delays on installation.
- Charging points ideally to be located on ground floor for ease of access. This could impact the availability of bays for blue badges.

- Civil works that would need to be done for cabling: in central London this may require road closures for works. In some instances, excavation works cannot happen so alternative ways of placing cables will need to be explored.
- Coordinating power network shutdown to the car park: coordination with UKPN is important for any installation.
- Access to the car park e.g. HGV access potentially with height restrictions and operational costs of using the bay and using charging point. Longer term operational decisions on ANPR with car parks.
- Proximity to a railway station: The site may be under the Railways Act and Tri party agreement- meaning that landlords could remove the infrastructure at any time. It is worth charge point operators spending sufficient time with the right legal bodies when a site has been chosen.



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5 Design and spatial considerations

Particularly in cases where new design of chargers or new configurations are used, multiple elements should be considered to ensure safe and efficient charging.

- Trailing cables: attention should be paid to all possible use positions, often users will position their vehicle for speed of access, not necessarily how it was intended for use.
- Futureproofing: integration of smart charging capacity and awareness of plug systems.
- Kerbside strategy if applicable.
- Parking space protection: enforcement plan.
- Accessibility: all forms of accessibility to be considered, from mobility considerations such as wheelchair access, to sensory considerations such as visual impairments.
- Constraints, eg. Exclusion zones: the zones are up to 15m for some installers, trees and drain covers can also cause issues.
- Notification and consultation.
- Signage and wayfinding.
- Secure by Design: both physical and digital security, issues such as lighting, cyber security, surveillance, tamperproof equipment. These measures can encourage use as they address not only crime but fear of crime.
- Responsibility for the management of elements such as sub-stations.
- Stakeholder coordination and consultation at the start of the project.

6 Community Considerations

Considerations for the existing site should not just take into account geological, historical, utilities and archaeological, they should also consider communities and human impact. Care should be given to ensure that the following are assessed:

- Engaging at the earliest opportunity with local residents
- Manging expectations: available staff resources on the application process
- Noise pollution
- Light pollution
- Air quality
- Congestion and impacts on adjacent roads
- Spatial quality and aesthetics of the proposed site
- Obstructed visibility





The step-by-step process to implementing a rapid charging hub

7 Individual vs. rapid charging hub sites

Single chargers		Rapid charging hubs	
Pros	Cons	Pros	Cons
 Less expensive than hubs 	• Usually only one or a few in close proximity	• Usually only one or a few in close proximity	• Usually only one or a few in close proximity
• Good for residential areas	• Often no alternative nearby if the charger fails	• Greater commercial potential and public sector returns	 Additional infra. may be required such as a new sub- station or grid reinforcement. This could impact on cost for a public sector body if no partnership with an operator
 Less space, and potentially no need for grid updates 	 Potentially slower charging e.g. slow or fast charging instead of rapid 	 Reduced need for individual pavement chargers that could have negative impacts e.g. clutter 	• Longer time required for all stages of design and build
		• Easier to develop a business case for these sites, e.g. like a petrol station	• Land availability can take time to source

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8 Who is the charging hub going to be used by?

- Businesses or fleets with larger vehicles: the key considerations are to ensure there is no height restriction for access to the charging points. Main roads, brownfield sites, or fuel stations are ideal locations. Business/freight vehicles will need to charge in short amount of time to keep efficient delivery times in central London.
- Taxis: may be using slow or fast chargers across the network but in need of a rapid charge. TfL have installed Taxi rapid charging points in red routes for this use.
- Residents: Consider places where there are other amenities close by to be used whilst vehicle is charging, or use lampposts charging columns that are quite common in most London boroughs. Residents most likely wouldn't need a rapid charger close to home and will use rapid chargers on route in fuel stations/ service stations.

9 Key stakeholders

It is important to consider the operational use of the rapid charging hub site at the very early stages of the design process. Consultation with stakeholders who will be involved with aspects such as on-site security, sub-station maintenance, exterior and interior buildings, cleaning, overall ownership etc.





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06 Project Process

Key Stakeholder	Why they need to be involved?	
 Local Authorities: Planning teams: Commercial, transport, highways, including any department responsible for electric vehicles. Climate change team Business team 	 Planning applications Awareness of potential restrictions Key stakeholder To align strategic targets (e.g. number of charging points. 	
2 Charging point company/ operator	 Owner of infrastructure Funder of the infrastructure development Operational stage development and implementation Key stakeholder 	
3 Landowners/ managing agents	 Planning, operation and installation stage involvement. Agreement of contracts and use of space. 	
4 Carpark management (if relevant)	Managing agents of the spaceCost and access of space	
5 DNO, UKPN, potentially any utility company that may be affected by civil works	 Planning and installation Access to network and capacity of infrastructure 	
6 Security such as the CCTV operators	 Accessibility, security and safety 	
7 Sub-station operator	Grid capacity and upgrade consulting	
8 Retail occupiers	Cost of space use	
9 Users of space:CommunityBusinesses	 How will the space be used? Does it align with demand and impact? Accessibility 	



The step-by-step process to implementing a rapid charging hub

10 List of questions to ask a charging point operator looking for space

- How many charge points will be there?
- Who is the main audience for the infrastructure?
- Will you be leasing or owning the space?
- Who is responsible for maintenance of the site/ infrastructure upgrades?
- Are there any benefits to the local community aside from the physical charging point?
- What are the charging point specifications?

11 Timeframes

- It is important to allow for site considerations, installation time, and coordination of stakeholders and utilities.
- To make sure the landowner is onboard with any changes made more time might be needed. This can be quite site specific.
- Work with the DNO is key to make sure the connection for the charging points is secure.
- Once all is agreed the infrastructure could take around 2 weeks to install excluding a substation upgrade.





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07 Conclusions and Recommendations

EV use continues to expand and in the coming decades it could become the main mode of vehicular transport. Thus, it is important to provide the charging infrastructure to aid this process. Rapid charging hubs will provide the necessary efficiency of speed for this shift to take place, while continuing to establish London as a world-leader in electric vehicle infrastructure. The report outlines the following recommendations:

- Establish the charging need by examining hours of use, length of use, most popular days of use, commercial/residential use and cost of use.
- 'Smart Charging' will possibly become a requirement. Ensure the capacity exists.
- Before the design stages, a thorough awareness of historical, archaeological, geological and utilities conditions. Unexpected ground issues can cause significant delays and costs.
- Liaise with all relevant stakeholders who hold information on the site.
- Consider not just the chargers but the spatial requirements of the site and how it functions as a whole, examining concerns such as access, secure by design, signage, lighting etc.
- Continuously monitor the impact on utilities during each design iteration.

- Liaise with all stakeholders at the beginning of the project, carry out suitable consultations and coordination planning. If the site for the chargers is a carpark, the building will need to be considered in its whole, e.g. ventilation, civil works and fire regulations.
- Consider futureproofing.
- Consider the potential negative impacts of the scheme such as noise pollution, light pollution, congestion on roads etc.
- Consider the potential positive or negative impacts on the community.
- Consider the planning and legislative context, it is an area which is moving fast.
- Establish future planning for maintenance, upgrades and management between the public and private sectors not just for the chargers, but also for the infrastructure.



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Acronyms

CRP: Cross River Partnership TfL: Transport for London DNC: Delcared Net Capacity UKPN: United Kingdom Power Network EV: Electric Vehicle GLA: Greater London Authority DfT: Department for Transport DNO: Distribution Network Operator





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