Electric Vehicle Scenario Guide

UK Power Networks
Delivering your electricity

Introduction

This is a very exciting time for UK Power Networks, with an ever changing market and a huge increase in the uptake of EVs, it is important that we ensure that you, our customers, have all of the information you need before installing an EV charge point. Whether you are installing a charge point at home, on the highway or at a commercial premises, we want to make sure your transition to electric vehicles is as easy as possible.

In some cases installation may be straight forward and you will just need to notify us of your EV charge point. However, some larger installations may need a bit of work from our side, before you can make your connection.

In this guide, we have a number of different scenarios that will give you an idea of what work may need to be completed. As with any work by UK Power Networks, the usual quote application process and timeline will apply.

If you need any further help before you install or apply, we offer an ‘Ask the Expert’ service, which gives you the chance to have a one-to-one discussion with our team before submitting your application. Click here for more information.

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Connecting EV Charge points – getting started

This document will help you to understand the infrastructure that your local Distribution Network Operator will have to provide to enable you to install your EV charging points.Before you review the scenarios that we have put together, it is important that you are certain about what type of infrastructure you need to meet your customer needs and where you intend for those customers to charge.

The **type** of chargers you choose and the **location** of those chargers is very important as it can significantly affect the cost of connection.

Understanding your customer charging needs

How many vehicles do you want to charge at any one time?

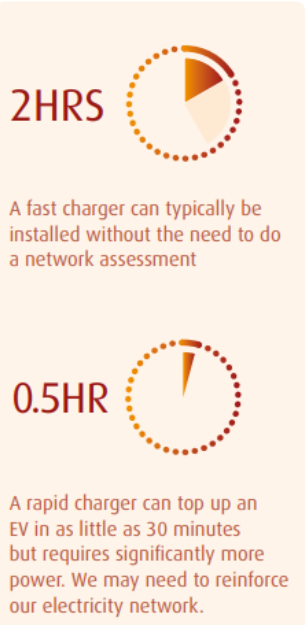
When do you expect the peak demand for charging to be?

How quickly do you need those vehicles to charge?

Meeting your customer charging needs

Decide how many chargers you need and the size of those chargers

Decide where you want to position your chargers – for example, in a car park, on the street or at a place of work



Why the type of charger is important

Some chargers draw a lot of power from the network. The smallest EV rapid charger will draw 50kW of power. These chargers are expensive to install but convenient for drivers so we expect them to be used up to 80% of the time. This is very different from the pattern of usage we see in a typical house or commercial building.

We need to take into account this different usage pattern when we plan the network. You can see what this means in the examples below.

You can find out more about how we plan for the power requirement of EV charge points in our EV Design Standard here

A small gas heated development of 25 Flats flats will have a maximum demand of 50KVA

1 x 50kW rapid charger could have the same impact on the network as 25 flats

Why the location of the charger is important

Where you place your charger can make a significant difference to the cost of connection depending upon the size and location of our cables. If the charger is positioned on the opposite side of the road to our cable this can also add significantly to the cost and time to connect.

While most customers are not able to identify the size and location of our cables by themselves we have an ‘Ask the expert’ service that can assist. Find out more here https://www.ukpowernetworks.co.uk/internet/en/help-and-advice/ask-the-expert/ask-the-expert-form/

Position 1

There are no UK Power Networks cables in the area and a new electricity cable will need to be installed. **Cost ~£50k**

Position 2

Existing UK Power Networks cable is too small and we could need to overlay part of the cable. **Cost up to £50k**

Position 3

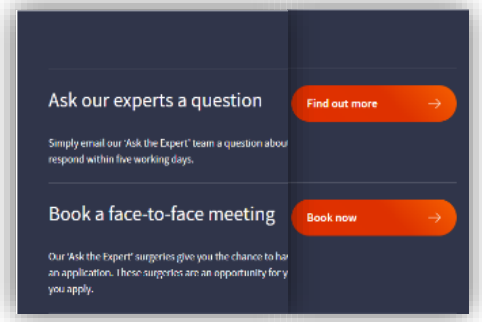
The best position allowing connection straight to the nearby cables. **Cost ~£10K**

Getting connected

Our website has a number of resources you can use to help you develop your EV infrastructure. You can use our EV Policy to help specify your infrastructure, our EV ‘heatmap’ to identify substations with spare capacity and our ‘Ask the expert’ service to get written or face to face advice.

Pre-application support

Our EV ‘heat map’



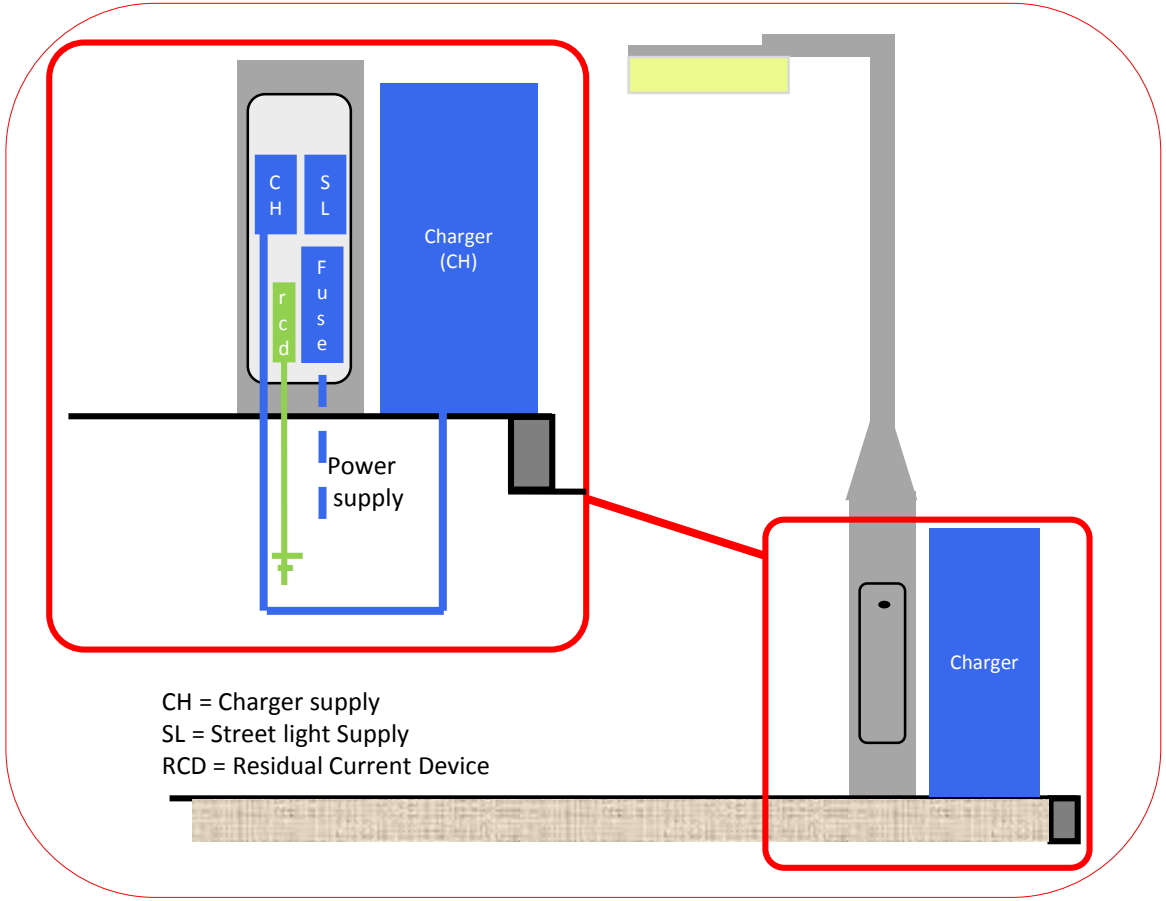
Book some time with an EV expert

ukpowernetworks.co.uk/electricity/electric-vehicle-charging-point

Please complete a form and we’ll call you back	Your project designer will assess and design	We'll send you a quote for you to accept and pay	We'll carry out the work you need	You'll need to install the electricity meter
	5 – 25 days for simple jobs		**4 – 16 weeks for single chargers**	
• We need ‘minimum information’ to progress the application • For rapid chargers we may need specific power quality data to help us develop our design	• We may want to conduct a site visit • We may ask you for additional information		• Delivery timescales are typically dictated by permits. • Opening notices vary between 10 days and 90 days.	• We will send you an MPAN so you can appoint a supplier • Even streetlight chargers need to be metered

Scenario 1 – Installing a charger to an existing street light

An EV charger can be retrofitted to an existing unmetered connection i.e. a street lighting column. The total maximum power available will range from 1.38kW to 5.75kW. If certain criteria are met a G39 approved electrical contractor may undertake the works without UK Power Networks intervention.



Important considerations

- These charging points must be metered using a measured central management system approved by Elexon
- These assets must be included on an unmetered supply inventory
- All charge points connected in the public highway must be connected to a TT earthing system.
- The maximum power available will be determined by the DNO fuse size. This can be upgraded dependent on the maximum earth fault loop impendence
- The G39 contractor should consult and comply with the UK Power Networks EV standard EDS 08-5050 before upgrading a fuse or retrofitting an EV charger.
- **If the contractor cannot comply with the UK Power Networks EV standard then we will need to fit a new service to that column.**

To find out more consult our guide for connecting charge points on the public highway here

DNO price

N/A

If asset suitable for conversion

Time to deliver

Quick

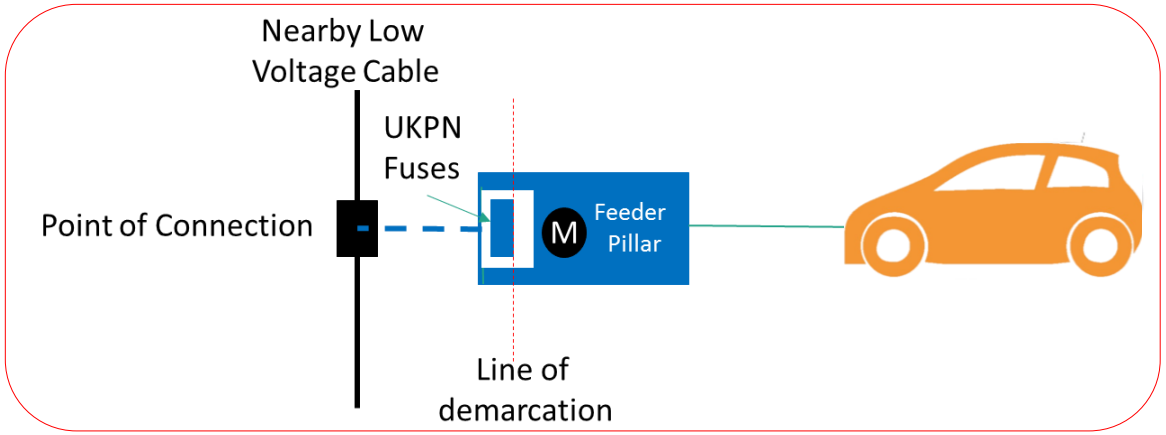
Space requirements

Minimal

An example of a retro fit to an existing street light

Scenario 2 – Installing an on street charger

An EV charger can be installed by the roadside, typically these can range from 7kW – 22kW and can normally be connected to the nearby low voltage network. A new connection will likely require us to excavate in the public highway and install a new cable and you to provide a new feeder pillar.



Important considerations

- Feeder pillar placement must be no more than 43m from the existing LV cable.
- Placement of additional street furniture can lead to a 'busy' street scene.
- The cut-out and whole current meter shall be accommodated within a customer owned, provided and maintained pillar. It must be weatherproof and watertight and secured with the appropriate tool
- The meter shall not be positioned lower than 500mm or higher than 1800mm
- Reference should be made to EDS 08-2100 for 3-phase supplies and EDS 08-2101 for single phase supplies.

DNO price

£5k - £10k

Time to deliver

8 - 12 weeks

Space requirements

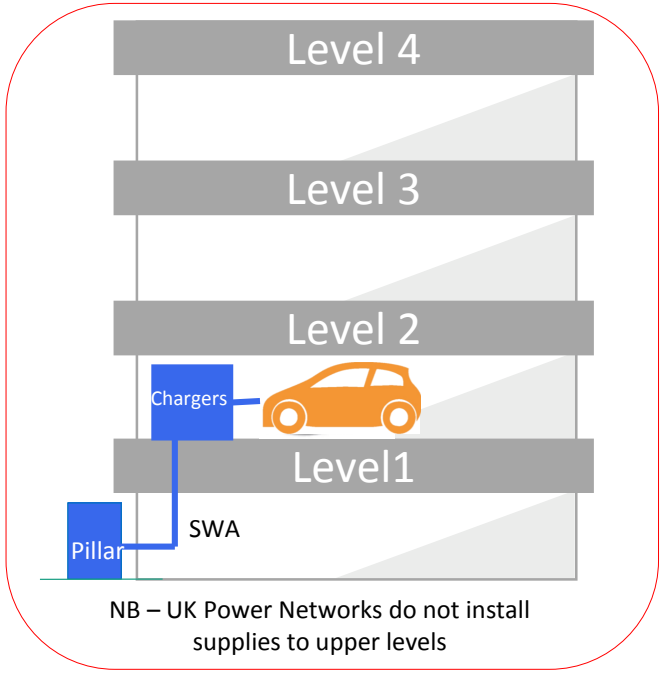
Small

An example of an on street charger

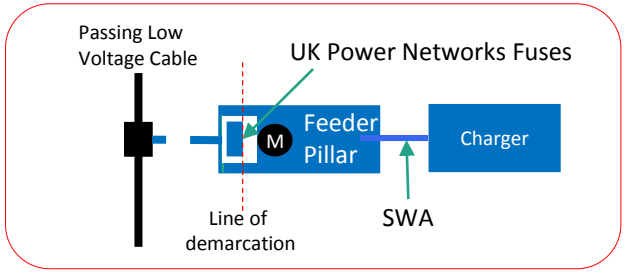
M = **Meter** **Line of demarcation** = Point where responsibility changes

Scenario 3 – Installing a charger at a car park

For multiple 7kW or 22kW fast chargers up to a total of 69kVA, the connection can sometimes be made to the low voltage network. In some locations there may be too great an impact on the local network, but our designers will discuss the options available, should this be the case.



NB – UK Power Networks do not install supplies to upper levels



Important considerations

- The new connection can sometimes be provided via the existing supply – but only in some circumstances.
- If a new supply is needed, the feeder pillar placement must be no more than 43m from the existing LV cable.
- Any new supply is to be installed at ground floor level. Any new wires beyond the pillar will be installed and operated by you.
- An assessment of the compatibility with any existing building's supply arrangement will need to be completed.
- On occasion further work may be required to ensure any new connection is compatible with the existing building.

DNO price

£10k+

Time to deliver

8 - 12 weeks

Space requirements

Medium

(2m x 1m)

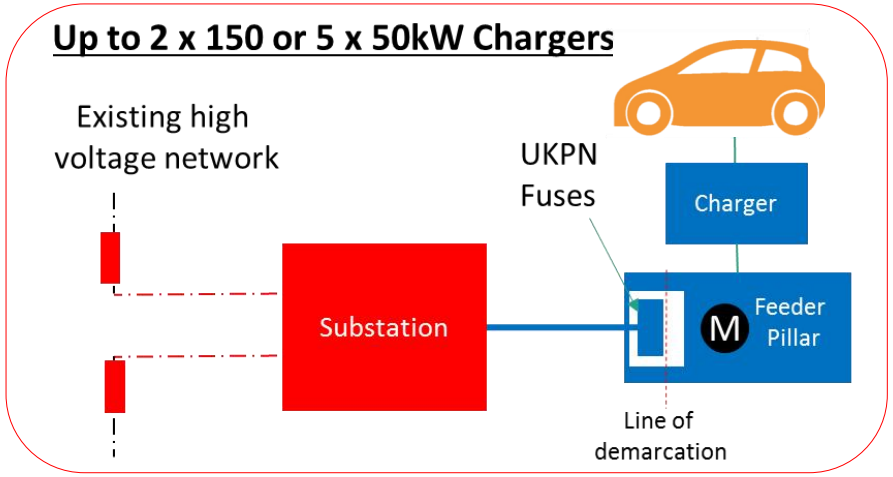
An example of EV chargers installed in a car park

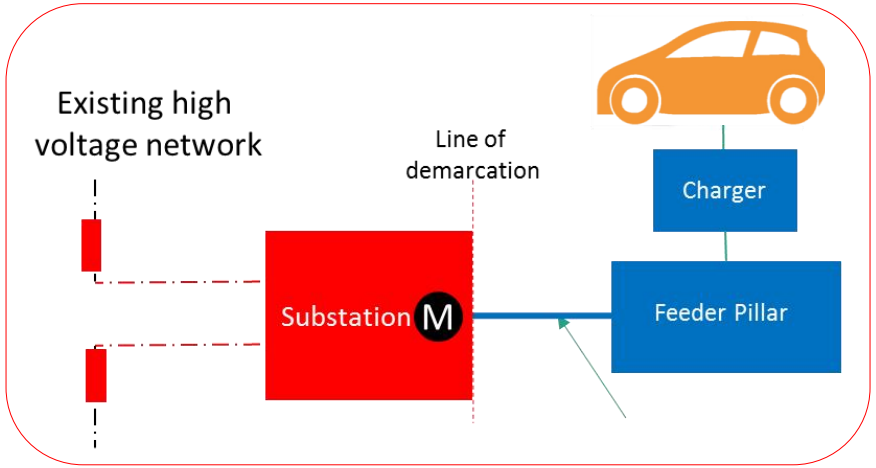
Ⓜ = **Meter**

Line of demarcation = Point where responsibility changes

Scenario 4 – Installing multiple 150KW rapid chargers

Installing multiple chargers of this size is unlikely to be connected to the local LV network and will normally require a new substation to be established.





Important considerations

- High voltage cables may not be close to the site, so site selection can be important.
- Establishing a new substation will present a step up in costs
- An on-site substation will require a building to house it, either a GRP enclosure or a brick building.
- The substation is likely to require legal consent from any relevant land owners.
- The time it may take to obtain any legal consent can be hard to predict, this needs to be reflected in your work programme
- There are options for this supply arrangement, it is important to discuss your requirements with your appointed designer.

DNO price

£100k +

Time to deliver

12 - 16 weeks

Space requirements

Large

(minimum 5m x4m)

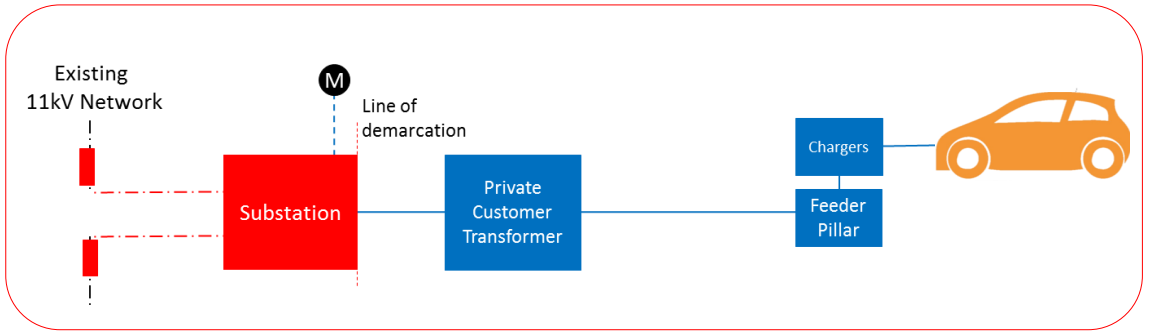
Ⓜ = **Meter**

Line of demarcation = Point where responsibility changes

An example of multiple EV rapid chargers

Scenario 5 – Installing 10 x 150kW rapid charger (1.5 – 2MVA)

The maximum size transformer that is used in UK Power Networks' area is 1,500kVA, therefore any supply larger than this will mean that the connection is provided at 11kV and that you will need to install and operate your own transformer.



Typical GRP Substation

Typical Feeder Pillar

Important considerations

- Having the supply at 11kV and operating your own transformer can add complexity to your design and on-going maintenance.
- Reinforcement to our network is generally not required but a load of this size can mean that the point of connection could be some distance away.
- An on-site UK Power Networks substation will always be required. In addition, you will also need to house your equipment meaning a much larger space is required.
- The time it may take to obtain legal consent or be granted permission for the cable routes will need to be considered at the earliest opportunity.

DNO price

£150k

Time to deliver

16 weeks +

Space requirements

Large (x2)

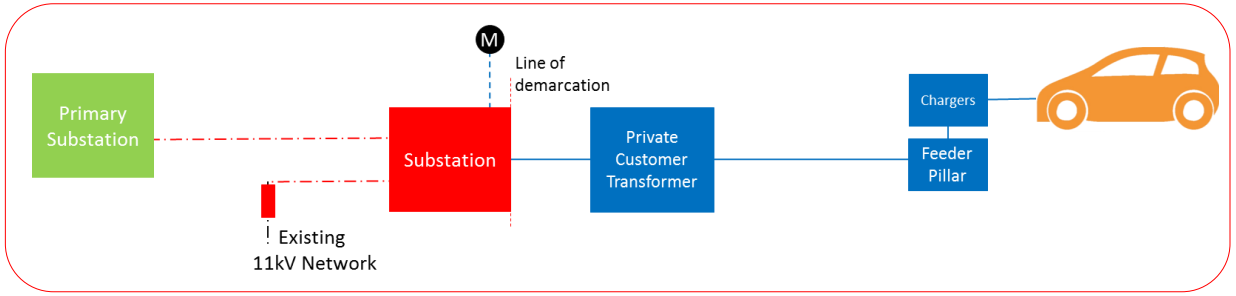
(minimum (x2) 5m x 4m)

An example of EV Rapid Chargers

M = **Meter** **Line of demarcation** = Point where responsibility changes

Scenario 6 – Installing 15+ 150kW rapid chargers (2 – 5 MVA)

Charging sites of this size will attract significant work in order to connect, as it is unlikely that an established cable will have this amount of spare capacity. Therefore it is likely that a new cable(s) will need to be installed back to one of our Primary substations.



Important considerations

- It is likely that new equipment will be required at the existing Primary Substation along with other reinforcement work, such as cable upgrade work.
- A UK Power Networks substation on site will always be required. In addition, you will also need to house your equipment meaning a much larger space is required.
- The time it may take to obtain legal consent or be granted permission for the cable runs will need to be considered at the earliest opportunity.
- The cable installation and/or reinforcement can mean significant work off site, this can represent a significant increase in the costs.

DNO price

£400k +

Time to deliver

20 weeks +

Space requirements

Large (x2)

(minimum (x2) 5m x 4m)

Typical GRP substation for UK Power Networks and customer

Typical Feeder Pillar

An example of rapid chargers

M = **Meter** **Line of demarcation** = Point where responsibility changes

Glossary of Terms

EHV – Extra high voltage, which is 33,000V and above

HV – High voltage, 11,000V and above

LV – Low voltage, 230V single phase, 400V three phase

kW – is a kilowatt, which is a 1000 watts

kVA - is a kilovolt-ampere, which is 1,000 volt-amperes.

MVA – MVA is a megavolt ampere, which is 1000,000 volt-amperes

Amp – measurement of current in and electrical circuit

Electric Vehicle - EV stands for electric vehicle, which refers to a vehicle with an electric powertrain.

EV Hub – A Charging Station replacing a traditional fossil fuel forecourt providing multiple on route charging

Fast charger - Fast chargers are typically rated at either 7kW or 22kW. Charging speeds will vary with the vehicle but as a rough rule of thumb, a 7kW charger will recharge from empty a compatible EV with a 40kWh battery in 4-6 hours, and a 22kW charger in 1-2 hours

Rapid charger - Rapid chargers are the fastest way to charge an EV, often found at motorway services or locations close to main routes. Rapid devices supply high power direct or alternating current – DC or AC – to recharge a car as fast as possible. Rapid DC chargers provide power at 50kW enabling you to charge an EV to 80% in 20 minutes to an hour. Rapid AC chargers provide power at 43kW to deliver an EV an 80% charge in 20-40 minutes.

Earthing conversion – when install an EV a TT earth may be required meaning the earth provision to the building required a TT conversion and the installation of a RCD

TT – terre-terre type of earth connection utilising a earth stake and RCD provided by the customer.

RCD – Residual Current Device which will trip and isolate supplies in time of an fault.

Fuse upgrade – On a supply the DNO fuses can sometimes be replaced for a larger fuse without further works

Feeder pillar – lockable waterproof kiosk used to house the UK Power Networks supply plus Meter and customer switchgear.

Line of demarcation – point at which the responsibility changes from UK Power Networks to the customer

SWA – Steel Wired Armoured refers to the private wire armoured cable from the UK Power Networks supply point to the customer equipment

Primary substation - the interconnection between high voltage (33kV) and medium voltage (11kV)

Substation – installed by UK Power Networks to transform 11,00 volts to 400 volts when demands above 240kVA is required. Also install when a 11,000 volt supply is required for higher demands above 1.5MVA

GRP – Glass Reinforced Plastic which is the material used to construct the substation housing. Comes fully built delivered via HIAB lorry

UK Power Networks - refers to UK Power Networks, the distribution network operator that owns and maintains electricity cables and lines across London, the South East and East of England

G39 – EREC (Engineering Recommendation)

Contact us

Call Us

Lines are open Monday to Friday 8:30-5:00pm

0800 029 4285

Email Us

Join us for an EV Ask the Expert Surgery

asktheexpert@ukpowernetworks.co.uk

Talking to us early can help us meet your programme