

Electric 'Plug-In' Vehicle Infrastructure Plan

2016 – 2018

Increasing electric vehicle take-up in the District of Daventry



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1. An Overview of Daventry District

Daventry District is situated in the county of Northamptonshire. The district is largely rural, made up of one market town (Daventry) and 74 parishes containing 78 villages. There are 77,843 residents living in the district according to the 2011 Census data. These residents form 31,647 households which is an increase of 10% since the last census in 2001.

Daventry District has excellent motorway and key road linkages and there are plans for the town and the number of houses it is expected to grow significantly over the next few years. The nearest train station to Daventry town is 4 miles away and although there are bus linkages, regular and direct services are limited to larger village and nearby towns and therefore the local population has a dependency upon the car for work and leisure purposes.

2. Aims and purpose

The Electric 'Plug-In' Vehicle Infrastructure Plan aims to support an increase in electric vehicle charging infrastructure. It aims to identify suitable sites for residents and visitors to the District to recharge at home, at work and when undertaking leisure activities. It aims to promote and build confidence in electric vehicle technology in the District and in doing so, increase the number of electric vehicles on the road. The main aims set for the Council are to.

- Enable local residents to take advantage of recharging locally.
- Be a leader in adopting ultra low emission technology and encourage local organisations to do the same.
- Effectively support the efficient operations of Daventry District Council with regards to electric vehicles.

3. Key Objectives

There are five key objectives of the Electric 'Plug-In' Vehicle Infrastructure Plan as follows.

1. Identify suitable sites for electric 'plug-in' vehicle infrastructure.
2. Explore funding opportunities both nationally such as Department for Transport / Office of Low Emission Vehicles and locally such as local partnerships and organisations.
3. Work with a range of partners to support the installation of infrastructure.
4. Build confidence in the technology by providing residents and local businesses with information on electric vehicles and recharging infrastructure. Promote home charging grants to residents.
5. Develop an Action Plan for delivery, review this regularly and report on progress internally and externally.

4. Progress by Daventry District Council so far

There has been some progress already in the District with regards to the installation of electric 'plug-in' vehicle infrastructure or 'chargepoints'.

- Dual 'fast' chargepoint installed in May 2013 at the Lodge Road, Daventry car park for public use and is free for the public to use. It has been 100% funded by Plugged in Midlands and Great Central Plastics, a local organisation. Electric costs have been fully funded by Great Central Plastics for the first three years.
- Dual 'fast' chargepoint installed at Welton Road car park, Daventry in November 2015 to support the recharging of Daventry District Council electric vehicles. This chargepoint is being converted in to a manual key pillar chargepoint due to signal connection failure.
- Watford Gap Services. Rapid chargepoints have been installed at the Roadchef Watford Gap Motorway Service Station, North and South stations.

At Daventry District Council, there has been progress with supporting electric 'plug-in' vehicles as follows.

- Electric van procured for the Environmental Health department to support environmental cleansing and dog control operations.
- Lease of a hybrid electric vehicle for the IT, Chairman supporting duties and casual business mileage.
- Lease of an electric vehicle for Daventry District Council staff for the sole purpose of undertaking casual business mileage.
- Eight lease car drivers have opted for hybrid and electric vehicles and this is set to rise.

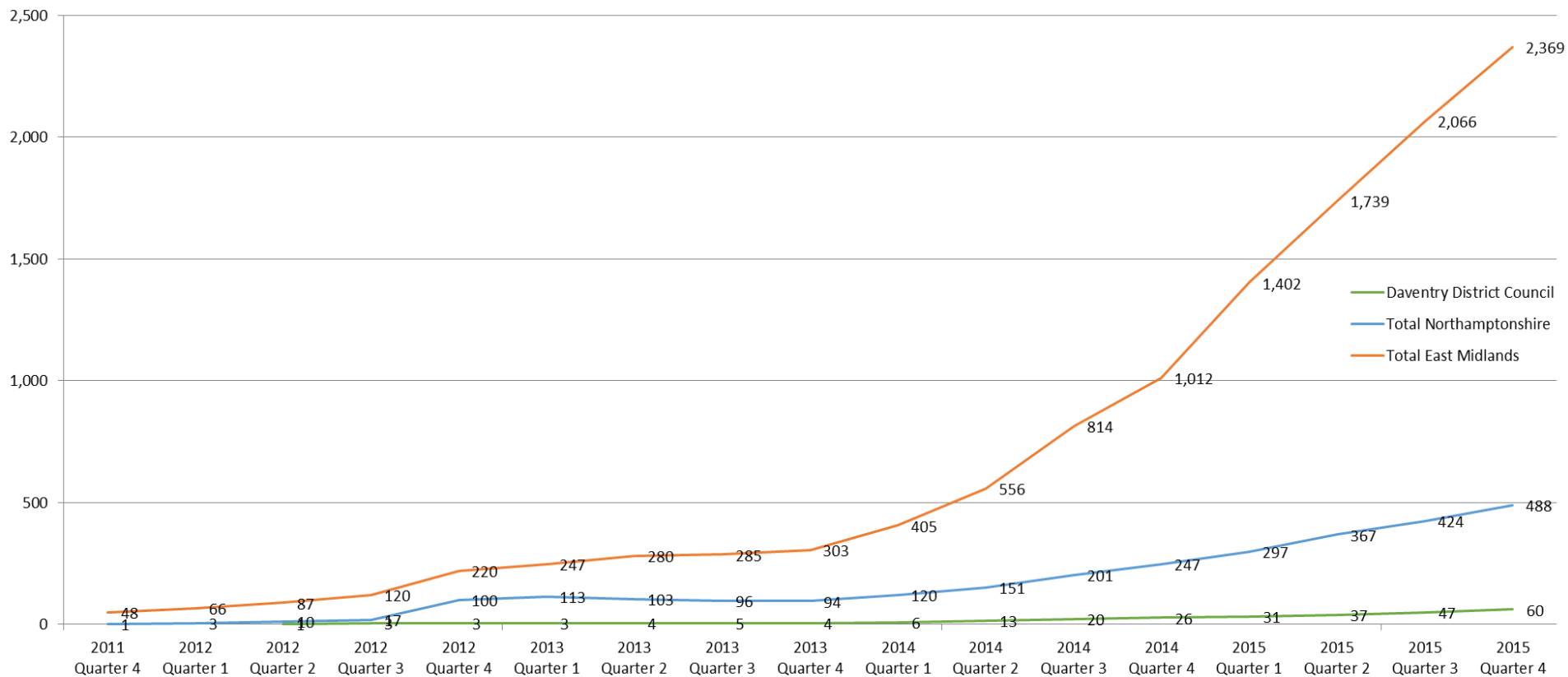
5. 'Plug-In' vehicles on the road – the national, regional and local picture

Plug-in vehicles on the road are rising and very rapidly and this is no surprise following the range of government subsidies available to incentivise plug-in vehicles as outlined in *Section 6* below. In addition, all major vehicle manufacturers now have electric vehicle models available and in some cases, several different types. The latter is a result of EU legislation requiring that new cars registered do not emit more than an average of 130 grams of CO₂ per km by 2015. By 2021, the fleet average to be achieved by all new cars is 95 grams of CO₂ per km.

According to the latest available data from the Department for Transport, there have been 246,000 plug-in vehicles registered on the road in the UK. The increase has seen a sharp rise; in the last quarter of 2011 just 1,205 electric vehicles were registered compared to the last quarter of 2015 with 47,288 electric vehicles registered. Data from the Society of Motor Manufacturers and Traders identifies there were 7,144 electric vehicles registered in March 2016 which is a 14% increase on the 6,114 vehicles registered in March 2015. *Figure 1* below shows the number of new electric vehicle registrations in Daventry District, the county of Northamptonshire and the East Midlands. During the period January to March 2015, 2.8% of all new car registrations were electric vehicles.

In the UK the Government is committed to reducing the UK's greenhouse gas emissions from 1990 levels by at least 80% by 2050. The Government has the aim of almost every car and van in the UK fleet to be a 'Go Ultra Low' or zero emission vehicle by 2050.

Figure 1 – Number of ‘plug-in’ vehicle registrations 2011 - 2015



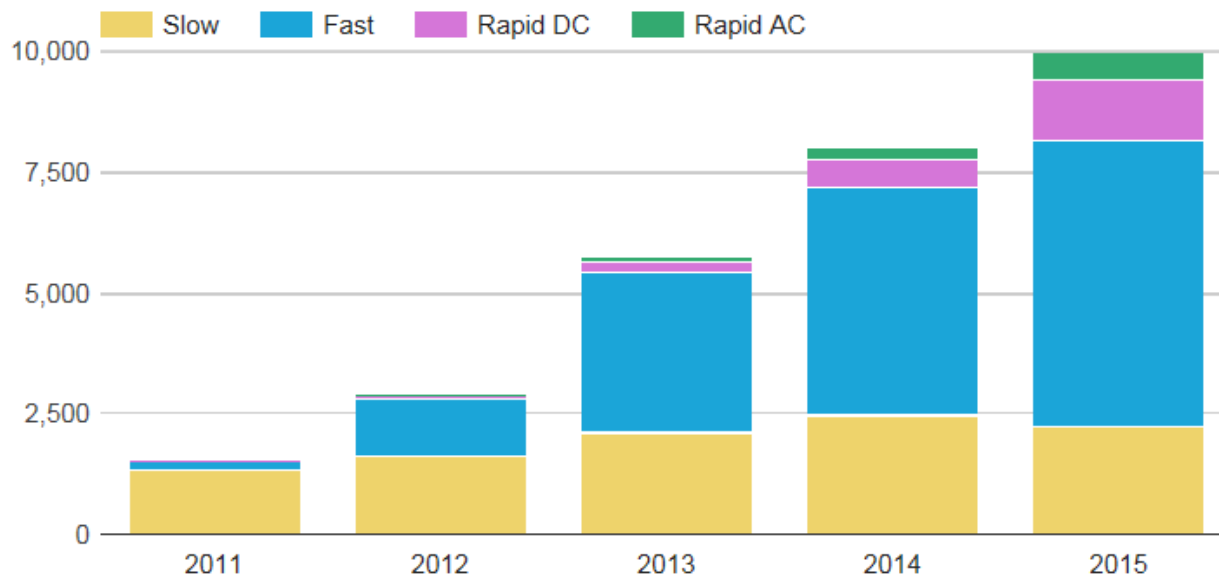
Source: Department for Transport statistical release, 14 April 2016

6. Electric chargepoint installs over time

In the UK there are 3,954 locations with public chargepoints installed; of these locations, there are 5,916 devices or chargepoints and the number of connectors is 10,870 as some of the devices are dual and have more than one connector (Source: Zap-map, May 2016). In the District of Daventry, there are currently three public devices located at the Lodge Road car park, M1 Watford Gap Services and Long Buckby train station and of these, there are a total of six connectors.

Figure 2 below demonstrates the number of UK public charging installations from 2011 to 2015 and shows a breakdown of connectors by type whether this be Slow, Fast, Rapid DC and Rapid AC for the last four years. The different types of charger relate to the speed with which vehicles are able to be recharged. There is a move towards implementing rapid chargepoints which allow a much quicker charge than the current predominantly installed 'fast' chargepoints. Further explanation of chargepoint types and speeds is outlined in Section 9.3 below.

Figure 2 – UK public EV chargepoint installations by type 2011 - 2015



Source: 2011-2015 Zap-Map statistics, www.zap-map.com/statistics

7. The pull factors of electric 'plug-in' vehicles

7.1 Government incentives

Government support is available in the form of the Plug-in Vehicle Grant to reduce the initial cost of purchasing an electric vehicle. This provides a subsidy of 35% of the cost of a car, depending on the category type as outlined below the model belongs to. There is also a 20% grant towards the cost of a van, up to a maximum of £8,000.

The three grant categories for cars are based on the carbon dioxide emissions and zero emission range.

Category 1: carbon dioxide emissions of less than 50g/km and a zero emission range of at least 70 miles.

Category 2: carbon dioxide emissions of less than 50g/km and a zero emission range between 10 and 69 miles.

Category 3: carbon dioxide emissions of 50-75g/km and a zero emission range of at least 20 miles.

Vans: carbon dioxide emissions of less than 75g/km and a zero emission range of at least 10 miles.

Since 1 March 2016, two grant rates are available: 'Category 1' vehicles benefit from a grant of £4,500. 'Category 2 and 3' vehicles with a shorter zero emission range — such as plug-in hybrid vehicles with a petrol or diesel engine — receive £2,500.

In addition, there is a grant available of £500 towards the cost of installing a home chargepoint.

7.2 Running costs

The low running fuel costs are by far the biggest pull factor to owning an electric vehicle, whereby a full charge will cost around £2-3 and will give a typical range of 100 miles. In comparison, driving 100 miles in a petrol or diesel car, will cost £9 to £13 in fuel. This means there are savings of around £100 for every 1,000 miles driven in an electric vehicle. Home recharging could cost even less for owners with access to an overnight low rate electricity tariff. Additional benefits of plug-in vehicles are as follows.

1. Vehicle Excise Duty (road tax) exemption.
2. 100% discount from the London Congestion Charge, worth up to £2,900 a year.
3. Free parking is often available to electric vehicles.
4. There are fewer mechanical components than conventional vehicles, so servicing costs are likely to be lower and maintenance costs may be lower too (Energy Saving Trust).
5. Low company car tax or associated employer national insurance contributions.

8. Electric 'plug-in' vehicles – health and the environment

A zero emission 100% electric vehicle produces no CO₂ emissions at the tailpipe, which is referred to as a 'tank-to-wheel' CO₂ rate and is the basis of 'road tax' bandings. However, this does not account for the emissions created through the drilling, refining and shipping process needed to get the fuel into your tank.

A 'well-to-wheel' calculation however considers the energy required and emissions produced in generating the fuel needed to propel a car. According to the Department of Energy and Climate Change, the production and delivery of petrol and diesel means adding 20g CO₂/km. There are also emissions from power generation to consider with regards to electric vehicles.

According to the Office for Low Emission Vehicles, an average 1.6 litre hatchback is likely to list its emissions as 99gCO₂/km. In a 'well-to-wheel' measurement, an extra 20g needs to be added, rising to 119g CO₂/km. A fully electric car, based on the emissions from power generation needed to provide the electricity would give an equivalent 'well-to-wheel' figure of 87g CO₂/km.

Considerable progress is being made in reducing emissions from energy generation through the increase of renewable energy and as a result of this emissions from power generation will continue to decline. Therefore, an electric vehicle has lower carbon emissions now and will have even less in the future as power generation decarbonises and there is a move to utilising renewable technologies.

Additional emissions from tailpipes to CO₂, include particulates, nitrogen oxides and sulphur oxides, which directly impact on local air quality and health particularly amongst children. The Department of Health estimates that poor air quality costs our economy up to £17 billion each year through increased health problems and reduced life expectancy.

Electric vehicles also have the added benefit of little or no engine noise, which can help reduce noise disturbances and improve the local environment and mental health of people living near to busy roads.

9. Types of electric 'plug-in' vehicles and chargepoints

9.1 Types of electric 'plug-in' vehicles

Pure EV - A pure EV also known as a BEV (battery operated electric vehicle) is a vehicle powered solely by a battery charged from mains electricity. Currently typical pure-electric cars have a range of around 100 miles. Current mainstream models include the Nissan Leaf, BMW i3, Renault Zoe and Kia Soul. As with conventional motoring, driving style, speed, use of air conditioning and heating use can reduce the range available. There top-end vehicle manufacturers including Chevrolet and Tesla that have ranges of over 200-260 miles.

PHEV (Plug-in Hybrid EV) - A vehicle with a plug-in battery and an internal combustion engine powered by petrol or diesel. Typical PHEVs will have a pure-electric range of up to 30 miles. After the pure-electric range is utilised, the vehicle reverts to the benefits of full hybrid capability using both battery power and the engine. The benefit of these vehicles is that once the electric battery is depleted, journeys can still continue in hybrid mode. Current models include the Mitsubishi Outlander PHEV, Audi e-tron and VW Golf GTE.

E-REV (Extended Range EV) - These are a version of plug-in hybrids, with the vehicle powered by a battery with a petrol or diesel powered generator on board. With an E-REV the propulsion technology is always electric and range can be between 150 to 300 miles. Examples include the Vauxhall Ampera and BMW i3 with range-extender.

9.2 Types of electric chargepoints

There are three main types of chargepoints which are defined by the power in Kilowatts they can produce and this relates to the speed they are capable of charging an electric vehicle.

Slow 'Trickle' Chargers (up to 3kW). These are the most common method of charging electric vehicles and are use best suited for 6-8 hours overnight. It largely involves a standard single-phase 13 Amp three-pin plug used to draw up to 3kW of power – with a full charge typically taking 6 to 8 hours. Home or workplace overnight charging is the most common type of charging for this type. Although a standard single-phase 13 amp three-pin domestic socket is adequate for home charging, a dedicated EV unit should be installed.

Fast Chargers (7kW). These chargers can fully recharge some models in 3-4 hours compared to the 'slow charger' charge times to around half that of by doubling the available current to 32 amps (7kW). This means a full charge can typically be achieved in 3 to 4 hours. Most commercial and many public on-street chargers already use this technology.

Rapid AC Chargers (up to 43kW). Rapid AC chargepoints provide a high power alternating current (AC) supply with a power rating of up to 43kW. At this level of power, an electric vehicle can typically be charged to 80% in less than half an hour. The Rapid AC option is a new development and only available on one or two electric models in the UK.

Rapid DC chargers (up to 50kW). Rapid DC chargepoints provide a high power direct current (DC) supply with power ratings of up to 50kW. At these charging rates, charging an electric vehicle to 80% typically takes half an hour.

10. National and local attitudes

10.1 National attitudes

The Department for Transport produces annual statistics with regards to public attitudes towards electric vehicles and the most recent study was published in June 2015 and this Section provides an outline of the top level results.

For driving licence holders, the percentage of drivers who hadn't thought about buying an electric vehicle was 69% with 17% having considered this.

Factors considered most important to encouraging people to buy an electric vehicle were cost (33%), battery / distance travelled on charge (19%), convenience of recharging (17%) and the vehicle being environmentally friendly (11%). The study revealed that those that hold a degree are more likely to report that they had thought about buying an electric vehicle.

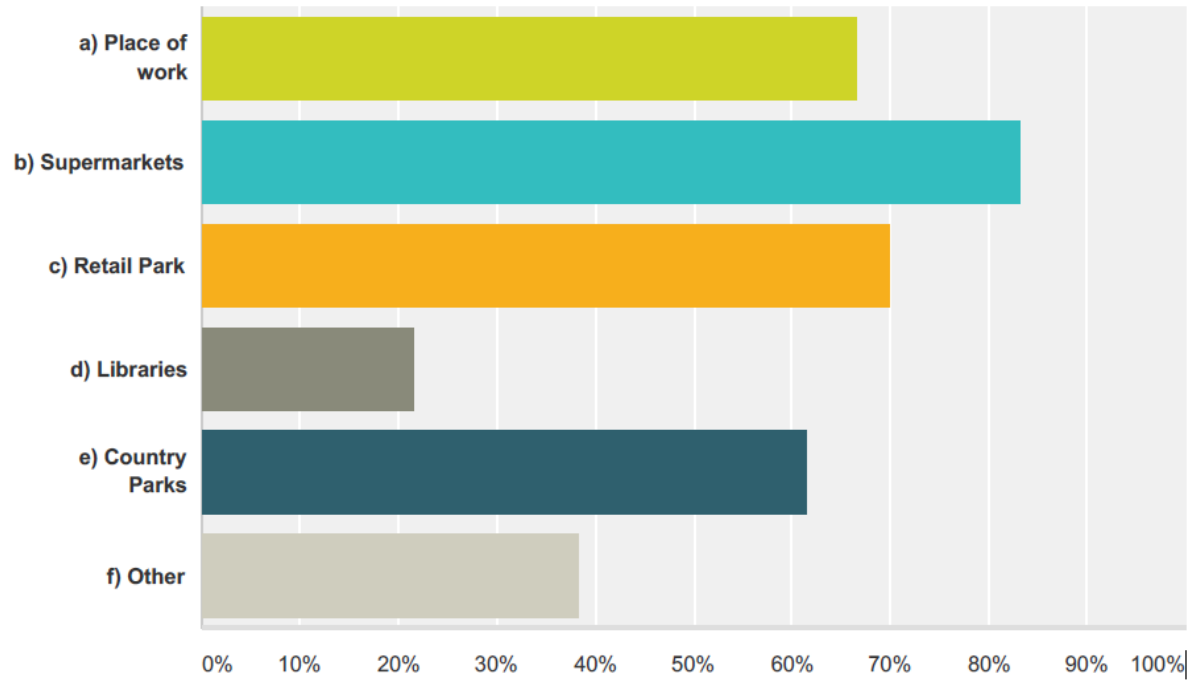
10.2 Local attitudes

A residents' survey was undertaken by Daventry District Council asking about local attitudes towards electric vehicles, recharging and suitable locations for chargepoints. Just under 70 people responded to this survey and 10% of respondents stated that they already drove an electric vehicle. The Department for Transport national survey identified that just 0.1% of the population drive an electric vehicle so electric vehicle drivers were overrepresented in our residents' survey. Of the responses, 62% advised they were considering buying an electric vehicle in the next 2-3 years for personal use.

Of those that are not currently considering purchasing an electric vehicle, the reasons for this are that the mileage range isn't large enough (41%), the technology isn't considered good enough (18%) and they are considered to be too expensive (64%). Other reasons provided included a lack of information and knowledge on electric vehicles, concerns over batteries deteriorating over a short time and insufficient recharging points.

Figure 3 below shows the survey response to locations that would be appropriate for public chargepoints which was a multiple answer question. Of the 'other' responses, the large majority included car parks, followed by service stations and village centres.

Figure 3 – Preferred locations for public chargepoints



Source: Daventry District Council Electric Vehicle Infrastructure Survey, May 2016.

11. Site selection criteria

The following criteria have been identified to help establish locations to install chargepoints.

Meeting the demands of residents

- Resident, parish council or other requirements / demands including known locations of electric vehicle owners.

Site considerations

- Proximity to key destinations e.g. town or large village centres, leisure centres, markets, village halls, supermarkets and retail parks.
- Proximity to the strategic road network.
- Even distribution of chargepoints across the District.
- Areas where there is little or no parking stress in the local area.
- Proximity to incoming electricity supply.
- Remote Communication and Signal strength
- Lower levels of vandalism.

Costs and legal considerations

- Council owned land preferable to avoid costly and complex legal arrangements.
- Funding opportunities from Government and/or local businesses.

Other

- DDC own operational requirements for increased recharging infrastructure.

12. Site selection matrix

The following site selection matrix in *Figure 4* identifies a number of potential sites for chargepoint installations. The matrix identified suitable sites taking account of the DDC local attitude survey, discussions with Parish Councils and other local knowledge. It is by no means exhaustive, for example, future planning permission particularly in relation to new developments should take advantage of electric vehicle infrastructure installation opportunities. Funding opportunities are outlined in *Section 14* below.

The proximity to incoming electricity distribution is important to determining site suitability and will impact on cost and needs to be assessed from a site visit by a potential network provider. The potential for vandalism will also be considered with in relation to local issues and locations that may be more exposed at specific times of the day. The signal strength is key for operational use of the chargepoint, without stable connectivity the chargepoints are not operational.

Planning permission for chargepoints is permitted upon meeting the requirements of the Part 2 Class E of the Town and Country Planning (General Permitted Development) (England) Order, 2015. Each site will consider all necessary planning requirements.

Figure 4 - Site Selection Matrix

Potential Site Locations	Meeting the demands of residents	Site considerations				Costs and Legal Considerations	Other	Suitability Score	Proposed chargepoint installations
	1. Resident, parish council or other demands including known locations of electric vehicle owners.	2. Proximity to key destinations e.g. town or large village centres, leisure centres, markets and supermarkets including shopping centres.	3. Proximity to the strategic road network.	4. Even distribution of chargepoints across the District.	5. Areas where there is little or no parking stress in the local area.	6. Council owned land preferable to avoid costly and complex legal arrangements.	7. DDC own requirements for increased recharging infrastructure.	Sites that are suitable have been scored out of 7. Each 'x' accounts for one point. It is considered that 4 or more points could be a feasible install.	
<i>Daventry Tesco car park</i>	x	x	x		x			4	1 x Rapid DC chargepoint
<i>Daventry Waitrose car park</i>	x	x	x					4	1 x dual fast chargepoint
<i>Daventry Aldi car park</i>	x	x	x			x		4	1 x dual fast chargepoint
<i>Daventry Abbey Retail Park</i>	x	x	x		x			4	1 x Rapid DC chargepoint
<i>New Moulton Library (build deadline Feb 2017)</i>	x	x		x	x			4	1 x dual fast chargepoint
<i>Woodford Halse Co-operative car park</i>	x	x		x				3	Site not considered suitable at present
<i>Lodge Road car park, Daventry</i>	x	x	x		x	x	x	6	1 x dual fast chargepoint

Potential Site Locations	Meeting the demands of residents	Site considerations				Costs and Legal Considerations	Other	Suitability Score	Proposed chargepoint installations
	1. Resident, parish council or other demands including known locations of electric vehicle owners.	2. Proximity to key destinations e.g. town or large village centres, leisure centres, markets and supermarkets including shopping centres.	3. Proximity to the strategic road network.	4. Even distribution of chargepoints across the District.	5. Areas where there is little or no parking stress in the local area.	6. Council owned land preferable to avoid costly and complex legal arrangements.	7. DDC own requirements for increased recharging infrastructure.	Sites that are suitable have been scored out of 7. Each 'x' accounts for one point. It is considered that 4 or more points could be a feasible install.	
<i>Daventry Country Park</i>	x				x	x		3	Site not considered suitable at present
<i>Brixworth Country Park</i>	x			x	x			3	Site not considered suitable at present
<i>Brixworth High Street / Information Centre</i>	x	x		x				3	Site not considered suitable at present
<i>Long Buckby Library</i>		x		x				2	Site not considered suitable at present
<i>Long Buckby, The Co-operative Food car park</i>		x	x	x	x			4	1 x dual fast chargepoint
<i>Weedon. Tesco Metro, BP or other site in the village centre</i>	x	x	x	x				4	1 x dual fast chargepoint
<i>Long Buckby Train Station</i>	x	x	x	x	x			5	Developer funded. Chargepoint

Potential Site Locations	Meeting the demands of residents	Site considerations				Costs and Legal Considerations	Other	Suitability Score	Proposed chargepoint installations
	1. Resident, parish council or other demands including known locations of electric vehicle owners.	2. Proximity to key destinations e.g. town or large village centres, leisure centres, markets and supermarkets including shopping centres.	3. Proximity to the strategic road network.	4. Even distribution of chargepoints across the District.	5. Areas where there is little or no parking stress in the local area.	6. Council owned land preferable to avoid costly and complex legal arrangements.	7. DDC own requirements for increased recharging infrastructure.	Sites that are suitable have been scored out of 7. Each 'x' accounts for one point. It is considered that 4 or more points could be a feasible install.	
									installations outlined in the approved car park planning application although these were not a specific condition. Number of chargepoints to be confirmed.
Total									8 chargepoints 16 connectors

13. Costs and funding opportunities for chargepoint installations

13.1 Infrastructure costs

The costs of installing chargepoints will to some extent depend on site specific details and in particular, proximity to incoming electricity supply. However, to take average costs, based on previous chargepoints installed and information from the network installer Chargemaster, an installed 'fast' dual chargepoint will cost approximately £3,000 and an installed dual rapid chargepoint will cost approximately £20,000.

Therefore, six installed dual fast chargepoints and two dual rapid chargepoints, will cost around £58,000. This does not include legal costs associated with installing chargepoints on land not owned by Daventry District Council or electricity cost arrangements. Daventry District Council is therefore required to explore external funding opportunities as outlined in *Section 14* below.

13.2 Electricity costs and parking arrangements

There needs to be a long term sustainable plan to cover electricity costs from recharging at newly installed chargepoints. Daventry District Council was fortunate to have the electricity costs of its first installed public chargepoint paid for by a local business and is able to meet operational costs internally for the charging of the electric van, pool cars and lease vehicles. It could get very complicated if different arrangements are in place to cover electricity costs for different chargepoints across the District, either by Daventry District Council, local businesses or Developers.

It is recommended for car parking charges to be avoided for recharging at the proposed chargepoint locations. However, it would be a sensible approach for the user of newly installed public chargepoints to incur the small electricity cost or recharging. One such arrangement with the network provider Chargemaster is through a POLAR scheme whereby the driver of the plug-in vehicle can purchase a charging 'RFID' card and pay a monthly fee with the benefit of charging their vehicle at all national Chargemaster chargepoints. The electricity bill payer / land owner then invoices Chargemaster for the electricity costs. This will set a platform for a sustainable long term solution to avoid overly complicated arrangements put on the Council.

14. Funding

14.1 Government funding

Investments are being made by Government in relation to plug-in vehicle infrastructure; £400 million has already been committed to encourage people to buy and drive ultra low emission vehicles, providing money for innovation, infrastructure and incentives. A further £500 million is committed between 2015 and 2020.

Specifically, funding has already been obtained by Daventry District Council from OLEV (Office of Low Emission Vehicles) as outlined previously. OLEV have advised that the government is committed to supporting the uptake of Ultra Low Emission Vehicles and will look to support (Daventry District Council) wherever possible and any further developments will be communicated. This implies there may be ad hoc funding available and therefore Daventry District Council should advise OLEV of their plans and establish if funding could be obtained.

14.2 Network provider funding

The local network provider Chargemaster have agreed to a 25% reduction of the cost of five installed chargepoints, although this offer is for a short-term and limited time. Other network providers may offer funding also. Given that the two chargepoints already installed are on the chargemaster network, it would be appropriate to continue with this network provider.

14.3 Additional funding

Second Homes funding of £5,000 has already been secured to install one or possibly two additional public chargepoints and it may be possible to secure further funding once external funding opportunities have been explored. Local businesses should be targeted to install chargepoints on their own sites and help fund chargepoints across the District. Section 106 funding should be explored and partners of 'Love Daventry' may have funding in support of Daventry specific initiatives.

15. Further Areas To Explore

1. Encourage local businesses to install chargepoints in their own workplaces which should include an emphasis at DIRFT in particular.
2. Develop promotional literature and explore the possibility of undertaking a promotional event with regards to 'plug-in' infrastructure, electric vehicles and government funding available to residents.
3. Explore the benefits of becoming an Energy Saving Trust Plug-In member.
4. Explore opportunities for solar photovoltaic system installs linked to sites to cover the costs of recharging.

16. Summary

In summary, the electric 'plug-in' vehicle infrastructure plan has been developed to outline the aims and objectives of Daventry District Council with regards to increasing 'plug in' infrastructure across the district of Daventry. It is clear from national and local data that electric vehicles on the road are increasing, but a number of constraining factors are limiting this including the convenience of recharging. A number of potential locations have been proposed to enable a further 8 chargepoints to be installed across the District; achieving a total of 16 additional connectors. This is a sensible number of additional chargepoints, taking account of local demand, appropriate locations based on specific site selection criteria and it reflects the rural nature of the District focussing on the town of Daventry and larger village locations. Funding opportunities are outlined and should be explored in partnership with other organisations.