Sevenoaks
DISTRICT COUNCIL

Future Demand for EV Infrastructure

Contents

1. Introduction

1.1. Sevenoaks District Council recognises that a significant barrier to the adoption of Battery Electric Vehicles (BEV) is the lack of availability of public Electric Vehicle (EV) infrastructure. However, and at the same time, the installation of public EV infrastructure is not currently commercially viable within all areas as EV adoption by the public (although growing) remains relatively low compared to Internal Combustion Engine (ICE) Vehicles.

1.2. Most current public EV infrastructure is only suitable for supplementary charging (at a destination) and therefore it is almost a necessity for an EV driver to install their own private EV charger at home. In turn this effectively requires that EV owners have privately accessible driveways.

1.3. Increased Public EV Infrastructure that is suitable to support households without off-street parking is therefore critical to ensure that all households have the opportunity to transition to an EV.

1.4. Whilst the District Council is unable to implement and install all of the required public EV infrastructure itself, we do consider that we have a leadership role in ensuring that partners install charging where it is most needed.

1.5. This study seeks to identify the future demand (2030) for EV vehicles within Sevenoaks district. It then utilises bespoke modelling from Field Dynamics to predict the future need for public infrastructure geographically and numerically.

1.6. Air Quality Context

1.6.1. Sevenoaks District Council currently has 4 Air Quality Management Areas where Nitrogen Dioxide (NO_2) is predicted/ modelled to exceed national objective levels ($40ugm^3$ as an annual average). These are

- AQMA 8- London Road/ High Street, Swanley
- AQMA 10 Sevenoaks Town Centre
- AQMA 13 A25- entire length from boundary with Tandridge to Tonbridge and Malling
- AQMA 14- Junction of Birchwood Road and London Road Swanley

1.6.2. In each of these areas, poor air quality is primarily as a result of tail pipe emissions from Internal Combustion Engine (ICE) vehicles. Studies commissioned by the District Council have shown that the sources of pollution are as follows:

- Diesel private cars- 32.9%
- Diesel light goods vehicles (LGVs) –19.6%
- Diesel heavy goods vehicles (HGVs)- 9.9%
- Petrol cars- 5.1%
- Bus/Coach –2.0%
- Motorcycle –0.1%

1.6.3. Measure 15 of the Sevenoaks District Council's Air Quality Action Plan 2022-2027 commits the District Council to improving and developing the EV infrastructure within the District.

1.7. Climate Action Context

1.7.1. In 2021 Sevenoaks District Council published its "Low Emission and Electric Vehicle Strategy". As outlined in this document, in 2019, transport was the largest carbon emitting sector in the UK, responsible for 27% of total carbon emissions. In Sevenoaks District, transport accounts for 63% of the District's total emissions.

1.7.2. The Council's Movement Strategy, adopted in 2022, sets out the District Council's opportunities and challenges and key priorities for sustainable movement and transport within the District. This identifies the high level of car ownership in the District and the lack of electric vehicle charging infrastructure. A key priority of the strategy is to improve electric vehicle use and infrastructure within the District to facilitate the use of electric vehicles.

1.7.3. Whilst the best way to reduce carbon emissions from transport is to reduce the need to travel, it is unrealistic to expect residents and businesses to forsake personal motorised transport entirely. Where such journeys continue to be necessary then it is significantly better for the environment if they are made within low or zero emission vehicles.

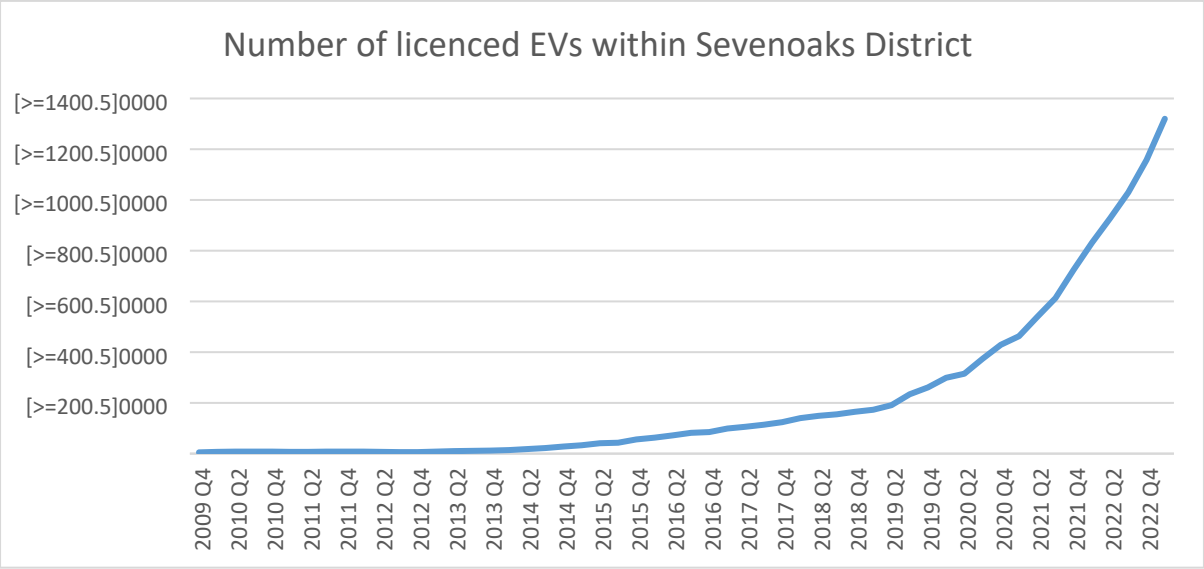
1.7.4. In March 2021 the Government confirmed 2030 as the phase out date for new petrol and diesel cars and vans, with all vehicles being required to have a "significant zero emissions capability" from 2030 and be 100% zero emissions from 2035.

1.8. Current Electric Vehicles within Sevenoaks District

1.8.1. The number of electric vehicles sold in the UK continues to grow. In 2015 electric vehicles accounted for just 1.1% of all new cars registered in the UK compared to 14% in Q3 of 2022 (House of Commons Library, 2023). It is a growing sector and electric vehicles, as well as the accompanying charging infrastructure, are crucial to reducing carbon emissions and improving air quality.

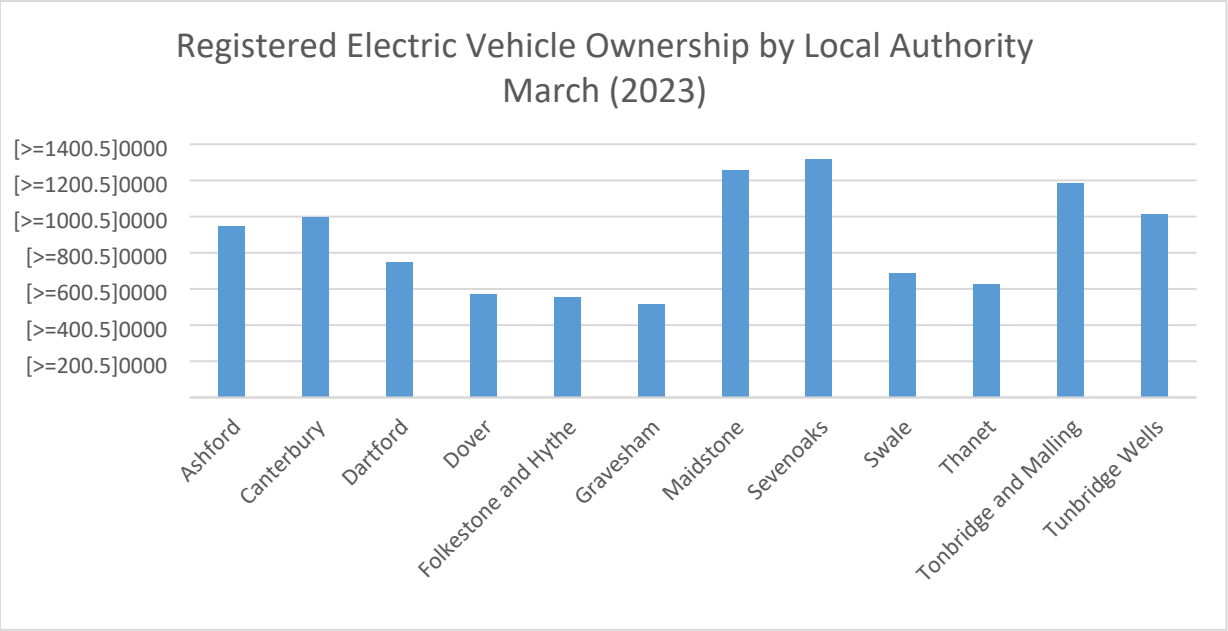
1.8.2. Within Sevenoaks District the number of registered EVs continues to increase rapidly (over 1300 in Q1 of 2023) as shown in Figure 1 (Gov.uk, 2023).

Figure 1- EV vehicles registered within Sevenoaks District- August 2023



1.8.3. Sevenoaks District continues to have the highest level of electric vehicle ownership in Kent (Figure 2) (Gov.uk, 2023).

Figure 2: Registered Electric Vehicle Ownership by Local Authority- March 2023



1.9. The need for Public EV infrastructure

1.9.1. It is important to understand that EV ownership requires a different mind-set to that required for traditional ICE vehicle ownership. The average range of a new EV vehicle is estimated to be 211 miles and the majority of EV owners charge their vehicles at home via a slow (3kw) or fast (7kw) chargers. At these charging speeds most vehicles can be fully charged within about 8 hours (often overnight when some electricity tariffs offer favourable rates for EV owners).

1.9.2. Most journeys within the UK are relatively short. 61% of car journeys are under 5 miles and the average UK car journey is believed to be around 8.4 miles (Department for Transport, 2022). Therefore in normal circumstances most EV drivers need to charge their vehicles less than once per week.

1.9.3. On longer journeys (which exceed the vehicles battery range) or where a resident does not have access to off street parking (where an EV charger can be installed) public charging infrastructure becomes critical to the use of an EV.

1.9.4. Currently within the UK, EV chargers are classified as:

- Slow- usually rated up to 3kW and can include 3-pin plugs (2.3kW). These are often found at domestic premises where the vehicle will be parked for an extended length of time (6-12hrs)
- Fast- these are typically rated at 7kW (although 22kW charges also fall within this category). Fast chargers tend to be found at destinations where the user is likely to be parked for an hour or more such as car parks, supermarkets, commercial premises or leisure centres. Most home charges installed at domestic properties also fall within this category.
- Rapid chargers- these operate at 50kW+ and have traditionally been installed at motorway service stations, town centres or close to main transport routes. This type of charger is most commonly used by those needing to charge in order to complete a journey.
- Ultra Rapid Chargers provide power at 100kW or more and therefore charging times are significantly reduced. This type of charger is becoming increasingly common as it results in an experience closer to that of an ICE vehicle (i.e. significant charge within 20 minutes).

1.9.5. Unlike an ICE vehicle where the driver can fill the tank with fuel within a few minutes, EV batteries take time to charge depending on the charger used (see 1.9.4). As a result, EV technology works best when the battery is charged whilst the vehicles driver carries out a secondary activity (i.e. charges whilst undertaking the weekly food shop, is asleep at night, goes to the cinema etc.).

1.9.6. It is often believed that it is important to install the fastest possible charger at all locations in order to try and closely replicate the ICE experience of refuelling. In practice however, this is not possible (owing to electricity grid capacity) or necessary.

1.9.7. Generally, rapid or ultra-rapid charges have higher unit prices per kW of energy supplied (cost more to use) and most have idle fees which apply after a vehicle remains connected to the charger. Therefore, they are not appropriate for scenarios

whereby a driver wishes to charge overnight. They also require significant infrastructure to operate and sufficient electricity grid capacity.

1.9.8. As outlined in 1.9.4, different charging speeds have different purposes depending on the type of charging necessary, and often it is the availability and maintenance of chargers which is more critical to EV drivers rather than the speed. Whilst a rapid or ultra-rapid charger is best whilst a driver gets a coffee and uses the facilities at a motorway service station (20-30 minute charge), a slow or fast charger is best for an overnight charge (6-8hrs).

1.10. Current Public EV Infrastructure within Sevenoaks District

1.10.1. Currently there are believed to be 33 publicly available charging devices/ stations within the Sevenoaks District. Of these 14 are rapid chargers or faster (50KW+). This represents 27.3 chargers per 100,000 people and 11.6 rapid chargers per 100,000 people or alternatively 2 chargers for every 100 privately registered plug-in vehicles in this area. (House of Commons Library, 2023)

1.10.2. The District Council have committed to installing electric vehicle charging points in Sevenoaks District Council owned car parks. This is included as an action for the Net Zero 2030 work. Currently the Council has installed 10 charging points within Sevenoaks District Council owned car parks. This is detailed in Table 3.

Table 3- Details of Public EV chargers within SDC car parks

Car Park	Location	Capacity	Disabled dual use bays	Single use disabled bays	Other bays	EVCP
Sevenoaks Town car park	Sevenoaks	449	19	4	0	8 (BP Pulse)
Bradbourne car park	Sevenoaks	420 + 20	8	2	0	2 (Charge Master)

1.10.3. In addition, we have installed 8 publicly accessible charges at Argyle Road (Carbon 3).

2. Methodology

2.1. Sevenoaks District Council engaged Field Dynamics (a leading net zero data analytics consultancy) to help identify future demand for public EV infrastructure within Sevenoaks District via their 'JumpStart project'.

2.2. JumpStart is a data driven, structured and proven approach that builds an evidence foundation specific to the needs of their client. Officers from Environmental Health,

Planning Policy and GIS teams participated in a number of workshops where key national data sets were adapted around the needs of Sevenoaks District Council. The outputs from this data was combined with local factors and provided back to us for future analysis and decision making.

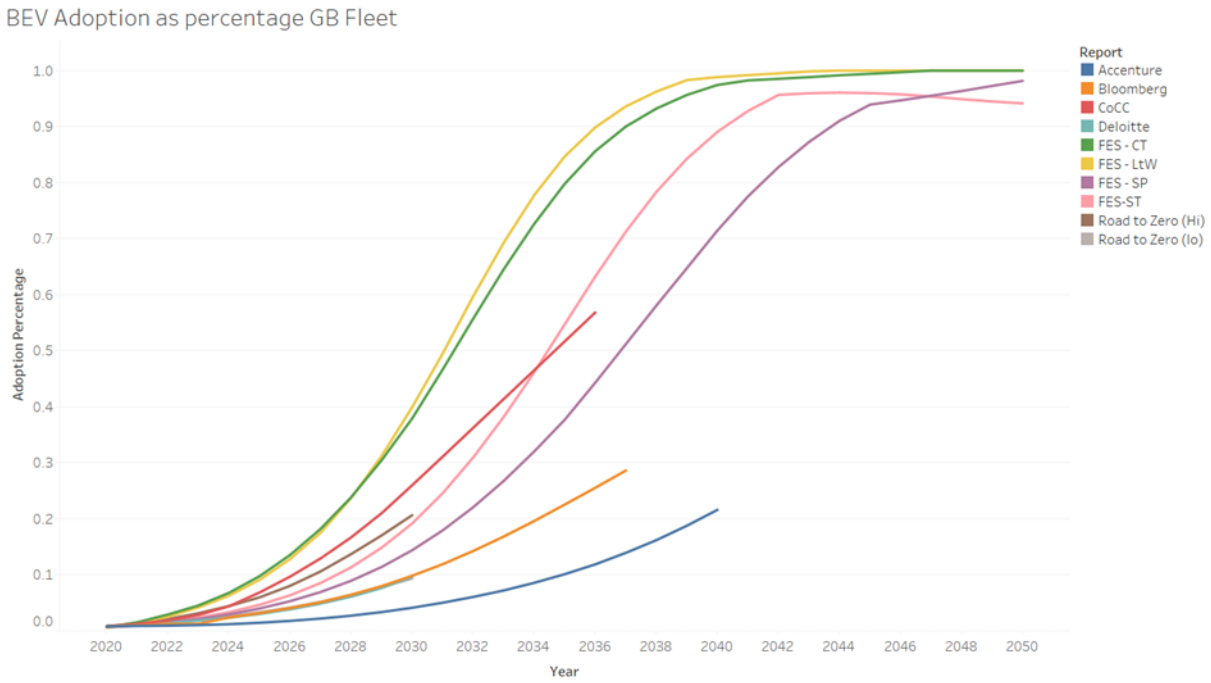
2.3. The stages of JumpStart are:

- Step 1- Planning Horizon- Identify what initial level of adoption to plan for.
- Step 2- Scale of Challenge- Calculate what scale of service would be required for the initial scenario
- Step 3- Demand Zoning- Define how services will be allocated to zones with different demand profiles
- Step 4- Initial Site Location- Selection of ideal Public EV locations within the demand zones

3. Future Demand (2030)

3.1. There are a number of publicly available 'potential EV adoption' models which can be used to predict future EV (and therefore EV charger) demand (see figure 4 below).

Figure 4 – Battery Electric Vehicle adoption curbs

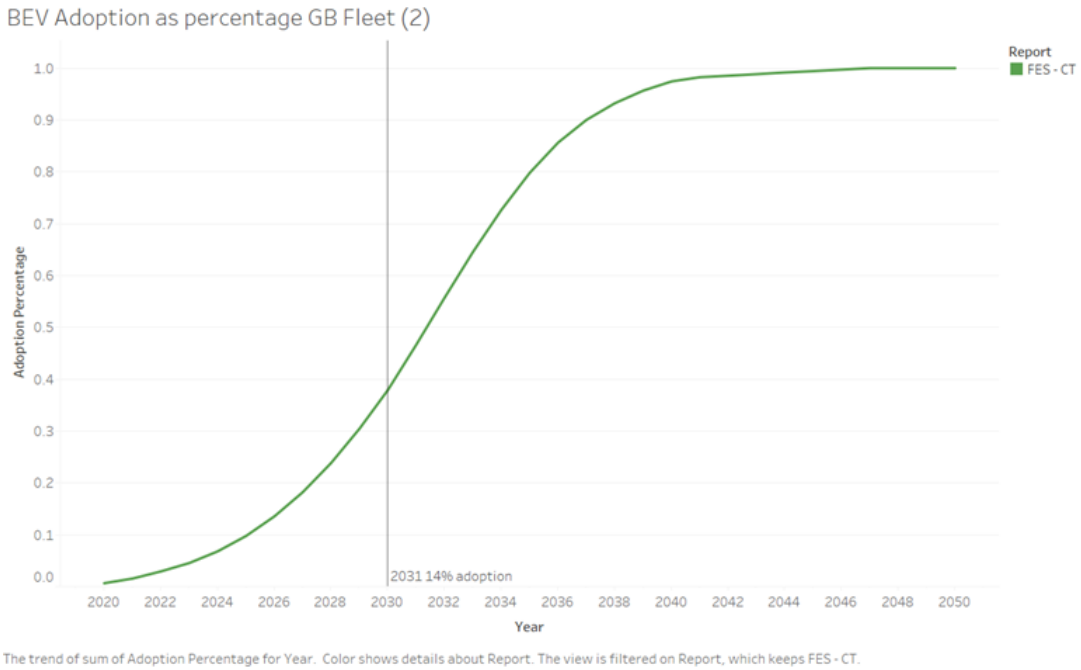


The trend of sum of Adoption Percentage for Year. Color shows details about Report. The view is filtered on Report, which keeps 10 of 10 members.

3.2. Each of these scenarios has built in assumptions which affect the model output. Their accuracy can be significantly affected by future changes to government policy, cost/ availability of infrastructure and vehicles, changes to socioeconomic factors or public perception.

3.3. Field Dynamics have considered the relative merits of each of these adoption curves to act as a 'Planning Horizon' for Sevenoaks. With consideration of a number of criteria (including current levels of adoption and local population), it has been determined that the adoption curve published within 'National Grid: Future Energy Scenarios- Consumer Transformation' (available at https://www.nationalgrideso.com/future-energy/future-energy-scenarios) is most appropriate for Sevenoaks District (see Figure 5).

Figure 5- Selected adoption curve for Sevenoaks



3.4. Using this adoption curve, Field Dynamics have forecast future EV numbers within Sevenoaks District (Table 6 below)

Table 6- Forecast of EV numbers within Sevenoaks District in 2030

	% of fleet	EV Number	Total Fleet
Current Assumed Adoption	2.20%	1670	63009
Predicted demand in 2030	36%	22683	

4. Scale of Challenge

4.1. The next step of JumpStart is to understand the size of the public charging infrastructure required to support the predicted EV fleet. Field Dynamics have modelled EV use based on the personas of 8 different driver profiles as follows:

Table 7 –Modelled EV driver profiles within Sevenoaks District

Profile	Description	Predicted EV adoption	EV Count	Use of Public EV infrastructure (%)
On Street- Business Miles -1	A sales person (or similar) who travels a lot outside of the area but returns home each evening	30%	961	4%
On Street- Business Miles -2	A local trades person with a van/ car who primarily travels within the area	30%		
On Street Personal Miles -1	A driver who primarily makes use of a charger near to their home	34%	6634	26%
On Street Personal Miles -2	A driver who primarily charges at a secondary destination (in town or destination charger)	34%		
Off Street Business Miles- 1	A sales person (or similar) who travels a lot outside of the area but returns home each evening	38%	2362	70%
Off Street Business Miles- 2	A local trades person with a van/ car who primarily travels within the area	38%		
Off Street Personal Miles- 1	An office worker who commutes out of the area, with no work based charging	40%	15149	0%
Off Street Personal Miles- 2	A retiree who goes to different locations or a parent who goes to multiple events	40%		

4.2. Each of the profiles outlined above is modelled as using a different mix of private and public charging infrastructure. It is anticipated that where personal and business drivers have off street parking they will install and utilise private charging infrastructure whenever possible and are therefore not reliant on public EV infrastructure except to undertake top-up charges. Those without access to off street parking are more reliant on public EV charging infrastructure. The amount and type of charging required will vary depending on the number of miles travelled and the type of journeys undertaken (i.e. high mileage vehicles undertaking journeys within a vehicles range may only require charging overnight on fast chargers, whereas vehicles travelling significant miles within the District may require destination or top-up charging at rapid chargers).

4.3. These modelled profiles were used by Field Dynamics to predict the numbers of EV chargers required by purpose based on the following categorisations:

- Local- A public EV connector that is within walking distance of the household. These are generally 'fast' (up to 22kW) but may be slower when powered from street furniture (sometimes 3kW). These chargers generally

require a vehicle to be plugged in for several hours and so lend themselves to overnight charging.

- High Convenience- A public EV connector that is visited for the primary purpose of charging such as those at designated charging hubs or at motorway service stations. Normally these chargers are rapid or ultra-rapid (50kW+). These chargers can fully charge an EV within 20-40 minutes (depending on battery and charger type).
- Destination- A public EV charger that is visited for some other primary purpose (such as shopping in a town centre, or leisure activity) and where charging is the secondary purpose. These charges are usually fast (7-22kW) or rapid (normally up to 50kW) and can charge a vehicle within approximately 1-3 hours. Ideally the speed of charger is matched to the time spent at the primary activity.

4.4. Field Dynamics have utilised the 'Modelled EV Driver Profiles' to estimate the quantity of public EV chargers required within the district by type in order to fully support predicted adoption levels in 2030 (Table 8 below)

Table 8- Number of Public EV Chargers required to support predicted 2030 adoption.

	Local	High Convenience	Destination
On Street business driver	415	4	19
On-street non-business driver	216	18	155
Off-street business driver	0	3	5
Off street non-business driver	0	8	12
TOTAL	631	33	191

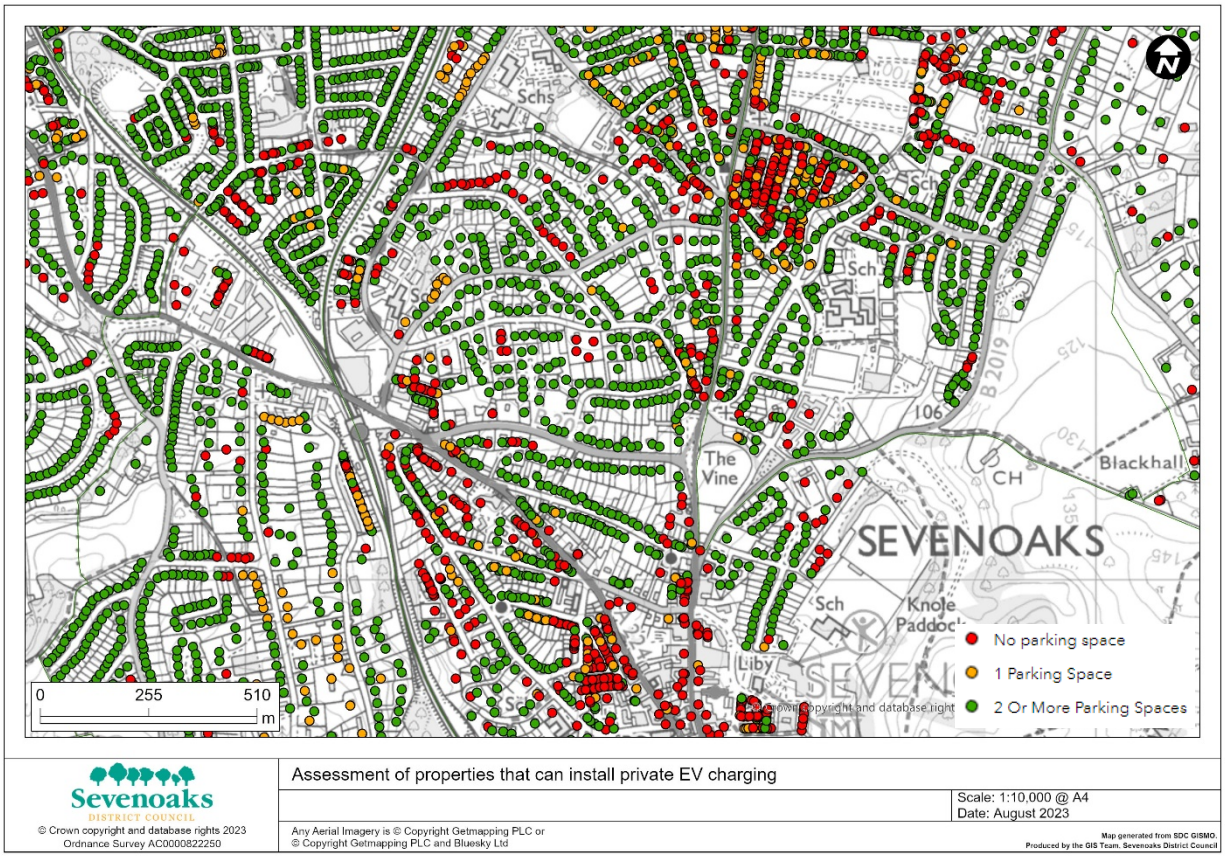
5. Demand Zoning

5.1. Following the assessment of number of public chargers potentially required by 2030 it is necessary to assess geographically the areas of greatest need in order to help the District Council prioritise where to focus its limited resources. This type of evidence based zoning enables the District Council to prioritise investment based on clear, robust data and evidence decisions made clearly to stakeholders.

5.2. Field Dynamics used their proprietary model to assess which properties in Sevenoaks District are likely to be able to install their own charging infrastructure. As outlined in 1.9, it can be assumed that the vast majority of residents with off-street parking will install a home charger. They are therefore likely to be far less reliant on public EV infrastructure than those without off road parking and a lack of public EV infrastructure is unlikely to be a substantial barrier to EV adoption.

5.3. Using the Field Dynamics model there are believed to be approximately 16,620 properties within Sevenoaks District that will be reliant on public EV infrastructure (do not have access to off street parking).

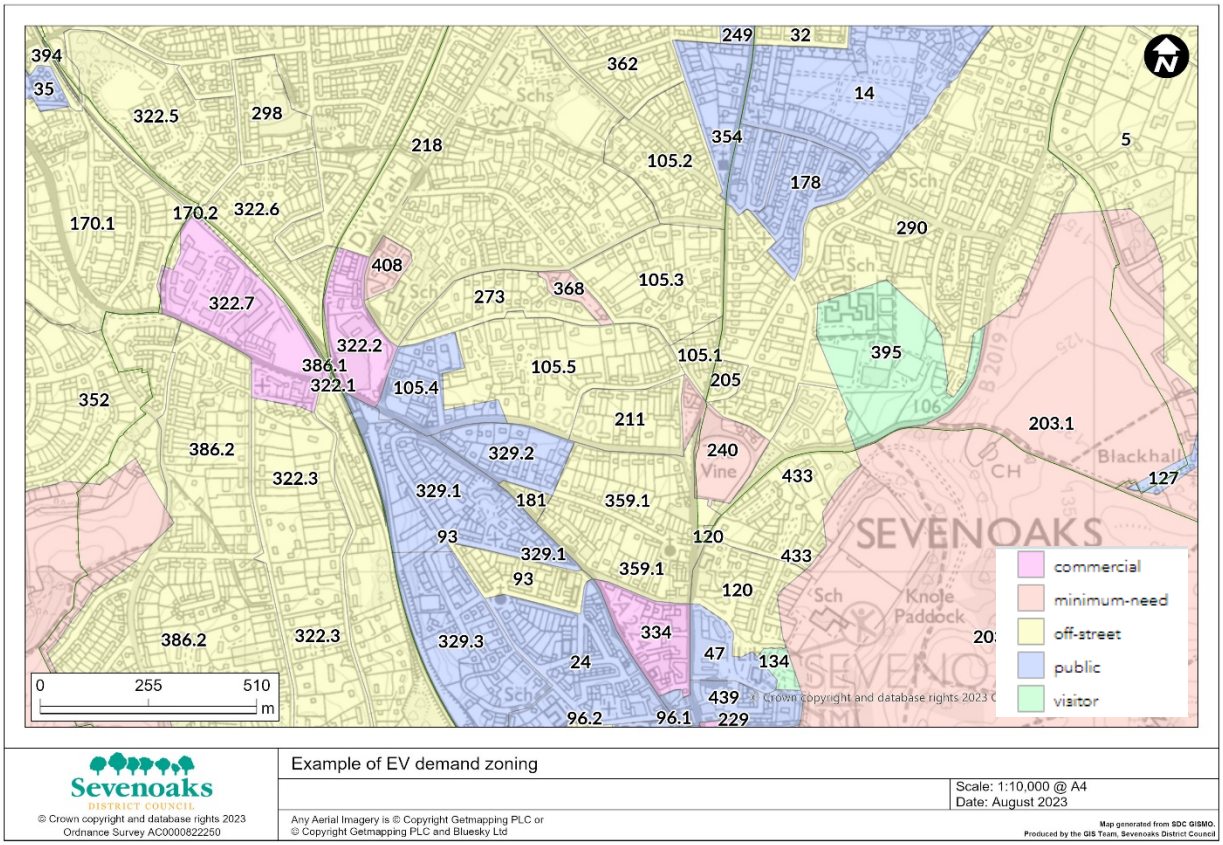
Figure 9- Example of output from Field Dynamics model showing which properties can install private EV charging.



5.4. Using the output from the initial assessment, Field Dynamics have utilised their modelling software to split the Sevenoaks District into 5 types of zones based on their unique household dataset. These zones are:

- Public Need – These zones have a high level of residents who will be reliant on public charging
- Off-Street – These zones have a high level of residents who will be able to charge at home
- Commercial – Zones where residents will be able to rely on commercially provided chargers
- Visitor – Zones where non-residents will make a up a high level of charging
- Low Density – Zones where there is a minimum need for public charging

Figure 10- Example of zoning output from Field Dynamics.



5.5. Using this zoning process, Field Dynamic's model split the district into 280 zones. This split is outlined in Table 11 below.

Table 11- Split of zoning output from Field Dynamics

Zone Type	Number of zones	On-Street Households
Public Need	91	8657
Off Street	112	4113
Commercial	19	700
Visitor	4	27
Low Density/ minimum need	54	3123
Total	280	16,620

6. Public EV Charging Site Selection

6.1. The demand zoning helps the District Council to prioritise where there is greatest need for public EV chargers. Generally these are the areas with the highest number of on-street households which are not served by existing or planned EV infrastructure.

6.2. Analysis of demand zoning for Sevenoaks has been used to identify the top 25 areas of demand for the installation of public charging infrastructure (Table 12 below).

Table 12- Top 25 Demand Zones identified by Field Dynamics

Zone ID	Area description	Total Households	Total On-Street Households	Percentage On- Street Households
200	New Ash Green (Farm Holt, Olivers Mill, Ayelands)	997	662	66.4%
121	Dunton Green (Former West Kent Coldstore)	646	425	65.8%
62	South Darenth- (Former Paper Mill Site)	467	330	70.7%
136	Swanley- (High Firs Estate)	695	313	45.0%
294	New Ash Green (Capelands, Spring Cross, Lambardes, Redhill Wood, Bowes Wood, Manor Forstal, Westfield)	615	311	50.5
76	Edenbridge (Spitals Cross Estate)	432	306	70.8%
329.1	Sevenoaks (Granville Road)	349	275	78.8%
73	Westerham (Croydon Road, Rysted Lane, The Paddock, Grange Close, New Street, Westbury Terrace, Squerryes Mead, Black Eagle Close, Atterbury Close)	663	254	38.3%
126	Hartley (Billings Estate)	235	219	93.2%
80	Swanley (Sycamore Drive)	292	213	72.9%
251.2	Swanley (Oakleigh Close)	333	202	60.7%
58	Swanley (Bonney Way)	275	201	73.1%
193	New Ash Green (Punch Croft)	365	199	54.5%
96.1	Sevenoaks (Oak Tree Close)	218	176	80.1%
348	Seal (Childsbridge Lane)	462	175	37.9%
46	West Kingsdown (Kaysland Park)	190	167	87.9%
88	South Darenth (Gorringe Avenue)	203	165	81.3%
24	Sevenoaks (Lime Tree Walk)	233	157	67.4%
354	Sevenoaks (St Johns Road)	222	141	63.5%
14	Sevenoaks (Hillingdon Rise)	392	137	34.9%
144	Edenbridge (Residential area bordered by Lingfield Road, Mont St Aignan Way and High Street, Edenbridge)	302	133	44.0%
438	New Ash Green (Ayelands Lane)	237	133	56.1%
401	Dunton Green- (London Road, Lennard Road, Barretts Road, Donnington Road)	343	129	37.6%

Zone ID	Area description	Total Households	Total On-Street Households	Percentage On- Street Households
413.2	Edenbridge (Residential area north of the Edenbridge Railway Station bounded by Hilders lane and Main Road.)	247	129	52.2%
70.2	Hextable (St Davids Road)	242	125	51.7%

6.3. This information indicates the following areas of priority for the installation of public EV infrastructure:

Table 13- Priority Locations for EV infrastructure

Priority	Location	Number of on-street households
1	New Ash Green	1305
2	Swanley	946
3	Sevenoaks	886
4	South Darenth	495
5	Edenbridge	439
6	Dunton Green	425
7	Westerham	254
8	Hartley	219
9	Seal	175
10	West Kingsdown	167

7. Catchment Modeller

7.1. Demand zoning information was transferred to 'Field Dynamics' Catchment Modeller Service'.

7.2. Catchment Modeller allows the District Council to model the impact (potential on-street household's serviced) of a particular charger type in a particular location. For the purposes of this model chargers are categorised as follows:

- Nearby (<22kW)- users will walk up to 3 minutes to this charger type
- Primary (normally 50kW+)- users will drive up to 10 minutes to use this charger type
- Secondary (normally >22kW to 50kW)- users will normally drive up to 5 minutes to use this charger type.

8. Impact of current public charging infrastructure

8.1. Catchment Modeller was used to model the number of off-street households served by Sevenoaks District Council owned public charging infrastructure installed across the District Council Area (Table 13 below).

Table 14- Modelled impact of current SDC installed public chargers

Location	Town	Field Dynamics classification	Charger Type and number	On-street properties served
Bradbourne Road Car Park	Sevenoaks	Nearby	2x 22kW	56
Sevenoaks Town Car Park	Sevenoaks	Nearby	8x 7kW	95
Council Offices- Argyle Road	Sevenoaks	Nearby	8 x 22kW	193
		TOTAL	18	344

8.2. The public EV chargers within Bradbourne and Sevenoaks Town car parks have been modelled as 'Nearby' owing to their speed (fast chargers). However, the primary use of these chargers is by EV drivers who are visiting Sevenoaks Town Centre and consequently they are technically classified as secondary use as per 4.3. Users of these EV chargers are required to adhere to relevant terms and conditions of the relevant car-park including the payment of fees and stay conditions.

8.3. The public EV chargers at the Council Offices are classified as 'Nearby'. These are sited to allow a vehicle to be charged for several hours (i.e. overnight) and have been made available for local residents to use.

8.4. Including the District Council's public EV chargers (Table 13 above), the number of on-street properties currently served by public charging infrastructure is modelled to be 583 (3.51% coverage of on-street households within Sevenoaks District).

8.5. In addition to the currently installed EV infrastructure provided by SDC, there is further agreement to install additional public EV chargers in a number of District Council maintained car-parks. The modelled impact of these is shown in Table 14.

Table 15- Modelled impact of current SDC installed public chargers

Location	Town	Field Dynamics classification	Charger Type and number	On-street properties served
Blighs car park	Sevenoaks	Secondary	Rapid 50 kW - X4	4018
South Park car park	Sevenoaks	Secondary	Rapid 50 kW - x2	
Park Road car park	Swanley	Secondary	Rapid 50 kW - x2	2865

Location	Town	Field Dynamics classification	Charger Type and number	On-street properties served
Station Road car park	Swanley	Secondary	Rapid 50 kW - x2	
Quebec Avenue car park (Outside Village Hall)	Westerham	Secondary	Rapid 50 kW x2	698
		TOTAL	**Rapid 50kW x12**	**7581**

8.6. Owing to the type of charger that it is proposed is installed the scheme outlined in 8.5 (above) will increase modelled coverage of on-street households to approximately 46% (7581 on street households).

9. On-Street Charging

9.1. The District Council recognises that on-street charging (where charging infrastructure is installed along the roadside) has the potential to significantly contribute to/ meet future public EV charging demand. In most cases, this type of charging will be the most convenient for on-street householders as it requires them to make minimal changes to their existing lifestyle choices (simply plugging in when they park).

9.2. Whilst this type of charging is critical to facilitate the transition to EV vehicles, this report focusses on the delivery of charging on private/ public land where power constraints may be more easily overcome and where the District Council can help influence partners.

9.3. Nevertheless, Sevenoaks District Council is committed to working with Kent County Council (the highways authority) to facilitate the installation of roadside public EV charging points whenever possible.

10. Future Priorities for Public EV Infrastructure in Sevenoaks District

10.1. The District Council is keen to support the continued expansion and availability of public EV charging facilities across the district.

10.2. We recognise that installation of EV charging (particularly Rapid and Ultra Rapid charging) needs to be commercially viable and consequently major suppliers are likely to seek sites with significant vehicle turnover and where returns can be made on infrastructure investment. The District Council considers that this process will occur organically (led by consumer demand) without the need for intervention.

10.3. Unfortunately, it is unlikely that public EV charging will be commercially viable in all areas (particularly rural communities and villages). In these areas the District Council will

need to be creative in identifying solutions and funding to meet the EV charging needs of residents who do not have access to off-street parking

10.4. With consideration to existing and proposed public EV chargers, the following areas have been identified as having the greatest need for focus by the District Council

10.5. New Ash Green

10.5.1. New Ash Green is a wholly-designed village with an original innovative core of houses and a commercial centre, built in the early 1960's. A large amount of the housing is arranged in clusters around green spaces accessed by public footpaths. Cars are kept separate from pedestrians and householders park their cars either within designated shared car parks or along the edges of roads and then walk to their properties.

10.5.2. The Field Dynamics model estimates that there are 1372 on street households in this area (8.3% of on street households within Sevenoaks District) and 4 of the top 25 district wide public EV charging demand zones:

Figure 16- Map showing demand zoning in New Ash Green

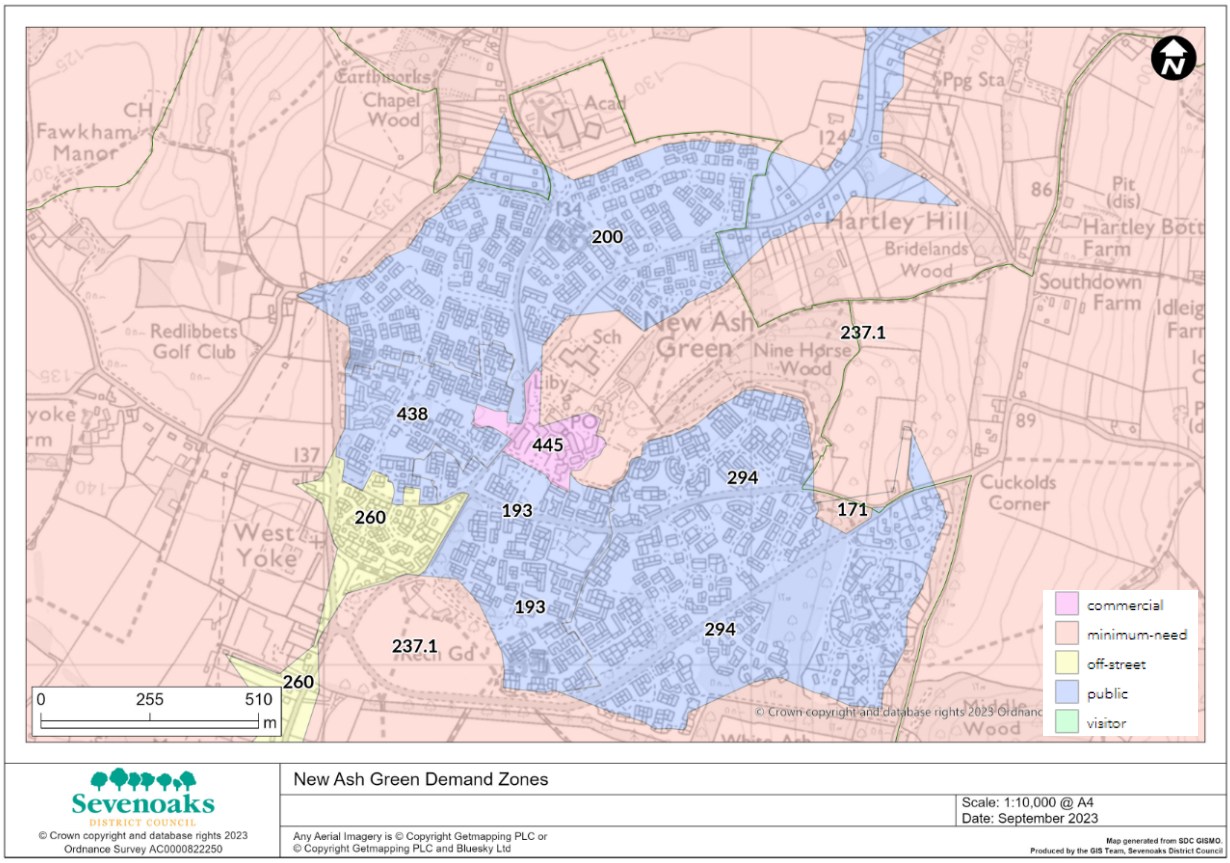


Table 17- Demand Zoning in New Ash Green.

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
193	Public	365	199	54.5
200	Public	997	662	66.4
260	Off-street	155	34	21.9
294	Public	615	311	50.6
438	Public	237	133	56.1
445	Commercial	33	33	100
TOTAL		2262	1372	60.7

10.5.3. Many of the residential properties within New Ash Green are served by communal parking areas that are some distance from their associated properties. Consequently, residents are unable to install private EV charging infrastructure.

10.5.4. The communal parking areas are understood to be within the ownership of the New Ash Green Village Association and most areas appear to have limited street lighting from which slow charging (3kW) may be possible. It is however unlikely that it would be possible to install 'fast' or 'rapid' charging infrastructure in these areas.

10.5.5. The New Ash Green Shopping Centre (zone classification: commercial) has free public car parking and is potentially a suitable location of 'destination' EV charging. However, owing to the geographical size of New Ash Green unless this charger is 'rapid or ultra-rapid' it would only provide potential infrastructure for up to 150 on-street households.

10.5.6. The installation of Fast/Rapid or Ultra Rapid Charging within New Ash Green would (according to Field Dynamics model) serve the entire village but may not be commercially viable and would require significant alterations to power infrastructure.

10.5.7. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 56.96% electricity demand headroom in this location. This suggests that grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.6. South Darenth

10.6.1. South Darenth is a village in the parish of Horton Kirby and South Darenth. It is located 4.2 miles east of Swanley & 4.4 miles south of Dartford. The village originally developed around the Horton Kirby Mill (originally built in 1820) which some years later was converted into a paper mill. Accommodation was needed for the workers, so small terraced houses were built close by. The mill ceased operating in February 2003 and has since been redeveloped extensively for housing. A Co-op Food supermarket is located in one of the listed mill buildings.

10.6.2. The Field Dynamics model estimates that there are 495 on street households in this area (3.0% of on street households within Sevenoaks District) and 2 of the top 25 district wide public EV charging demand zones.

Figure 18- Map showing demand zoning in South Darenth

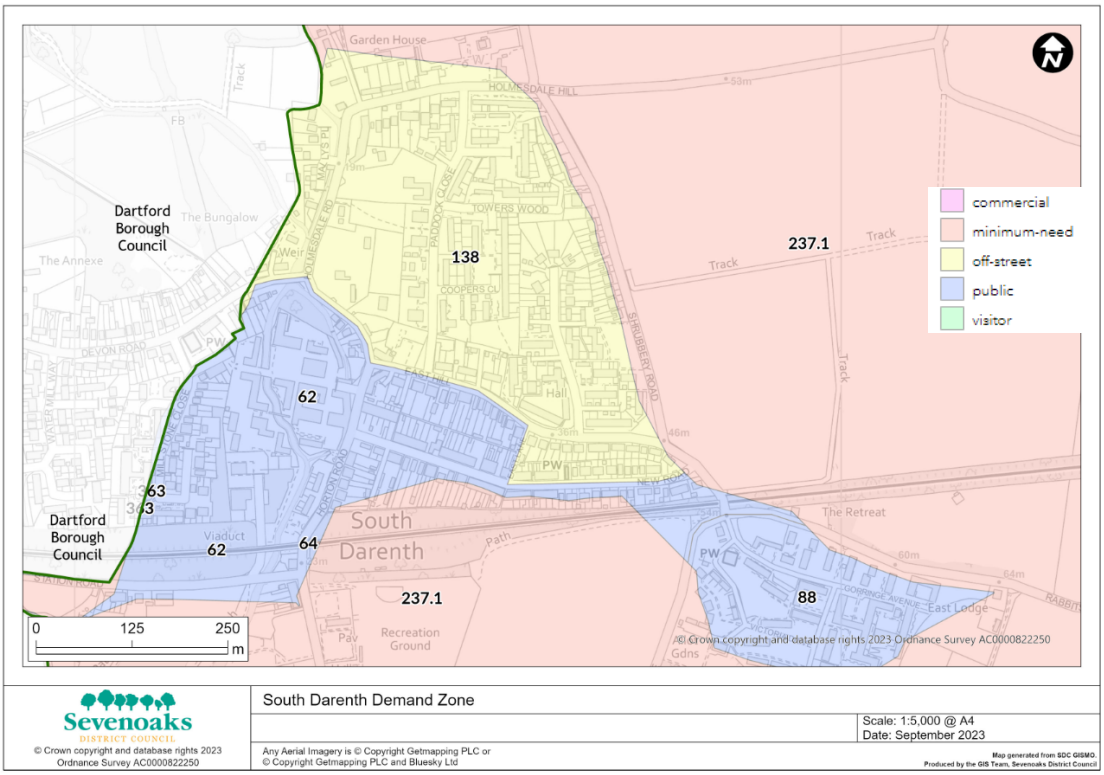


Table 19- Demand zoning in South Darenth

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
62	Public	467	330	70.1
88	Public	203	165	81.3
138	Off Street	417	94	22.5
TOTAL		670	495	73.9

10.6.3. There are a very small number of possible locations within South Darenth that would be viable for installing EV chargers. It is likely that the best solution would (subject to power constraints) would be to install a rapid or ultra-rapid charger near to the Co-op supermarket. Installing a rapid charger in this location would have the potential to serve 821 households within its catchment.

10.6.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 14.41% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.7. Edenbridge

10.7.1. Edenbridge lies in the west of the District, close to the Surrey border, and located at the bridging point of the River Eden which flows eastwards until it joins the River Medway at Penshurst. Historically the town grew along an older Roman road and it was the centre of the Wealden iron industry in the middle Ages. There are many medieval timber buildings which can still be seen around the town.

10.7.2. The Field Dynamics model estimates that there are 1606 on street households in this area (9.7% of on street households within Sevenoaks District) and 3 of the top 25 district wide public EV charging demand zones.

Figure 20- Map showing demand zoning in Edenbridge

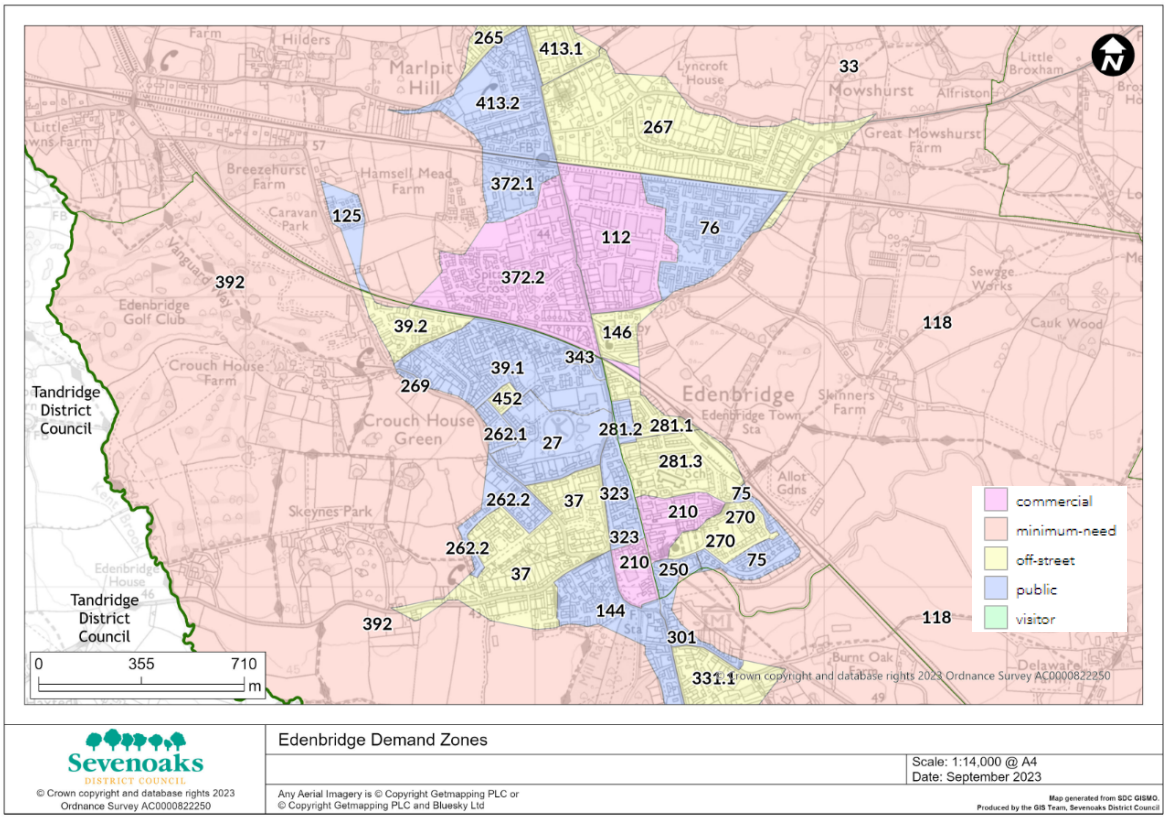


Figure 21- Demand zoning in Edenbridge

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
27	Public	108	60	55.6
37	Off Street	332	29	8.7
39.1	Public	344	124	36.0
39.2	Off Street	61	33	54.1
75	Public	117	38	32.5
76	Public	432	306	70.8
112	Commercial	86	50	58.1

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
125	Public	52	45	86.5
144	Public	302	133	44.0
146	Off Street	40	30	7.5
210	Commercial	158	90	57.0
250	Public	27	7	25.9
262.1	Public	55	25	45.5
262.2	Public	74	21	28.4
265	Off Street	79	8	10.1
267	Off Street	237	46	19.4
269	Public	6	5	83.3
270	Off Street	74	3	4.1
281.1	Off Street	47	11	23.4
281.2	Public	56	56	100
281.3	Off Street	157	83	52.8
301	Public	40	12	30.0
331.1	Off Street	128	57	44.5
343	Public	14	5	35.7
372.1	Public	81	57	70.4
372.2	Commercial	345	102	29.6
413.1	Off-Street	159	37	23.3
413.2	Public	247	129	52.2
452	Off Street	31	4	12.9
TOTAL		3889	1606	41.3

10.7.3. It is understood that Edenbridge Town Council are intending to install 4 public EV chargers within the Market Car Park for use by visitors to the town. It is assumed that these chargers would provide charging capability for 66 on-street households.

10.7.4. Further public EV development opportunities within Edenbridge could be realised by working with existing retailers in the area such as Waitrose, Aldi, or Home Bargains. Destination chargers in these zones could increase the number of on-street households provided for by approximately 244.

10.7.5. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is -13.64% electricity demand headroom in this location and the existing network is more than 5% overloaded. This suggests that current grid capacity may be a limiting factor to the installation of public EV charging.

10.8. Dunton Green

10.8.1. Dunton Green is situated in the valley of the river Darent and is a designated part of the Kent Downs (an area of outstanding natural beauty). Historically Dunton Green was a centre for making bricks and tiles. Dunton Green railway station provides good connections into London, running every 30 minutes and is situated within the commuter belt. There are also many bus connections from Dunton Green which connect to the wider Sevenoaks area, such as Knockholt, Halsted and Sevenoaks Weald.

10.8.2. The Field Dynamics model estimates that there are 813 on street households in this area (4.9% of on street households within Sevenoaks District) and 2 of the top 25 district wide public EV charging demand zones:

Figure 22- Map showing demand zoning in Dunton Green

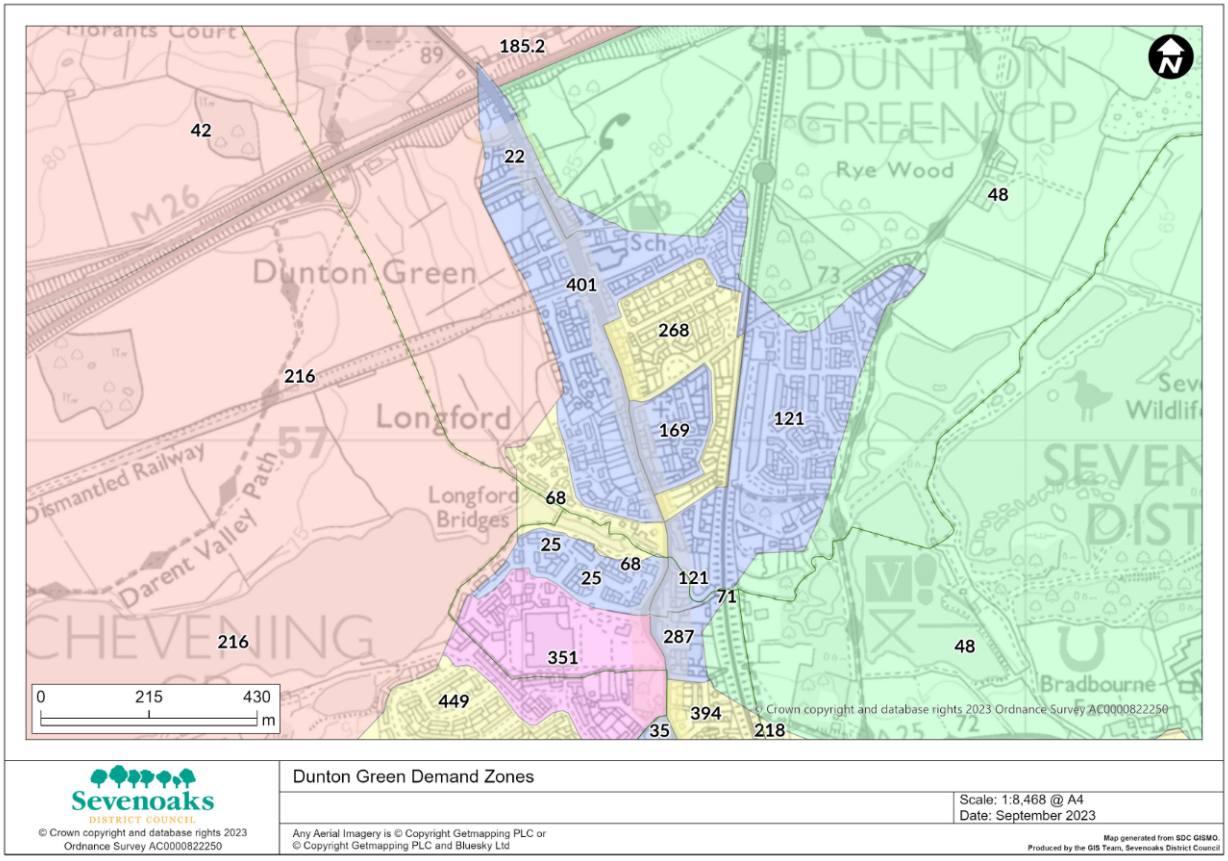


Table 23- Demand zoning in Dunton Green

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
22	Public	83	35	42.2
25	Public	123	33	26.8
68	Off Street	39	9	23.1
121	Public	646	425	65.8
169	Public	117	70	59.8

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
268	Off street	186	29	15.6
287	Public	24	16	66.7
351	Commercial	182	67	36.8
401	Public	343	129	37.6
TOTAL		1743	813	46.6

10.8.3. Currently no specific locations have been identified for potential EV charger installations within Dunton Green, however the most likely proposal would be to expand the existing locations available within Tesco or seek expansion of the Tesla station at Donnington Manor Hotel to other makes of EV.

10.8.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 49.89% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.9. Hartley

10.9.1. Hartley is a small village located in the North of Sevenoaks District and borders both Dartford and Gravesham Borough Council areas. Historically, the village of Hartley was referred to within the Domesday Book of 1086 and some believe it dates to early Anglo-Saxon times. In 1872 following the development of the Longfield railway station, the village began to evolve from an agricultural hub to a commuter belt community.

10.9.2. The Field Dynamics model estimates that there are 1241 on street households in this area (7.5% of on street households within Sevenoaks District) and 2 of the top 25 district wide public EV charging demand zones:

Figure 24- Map showing demand zoning in Hartley

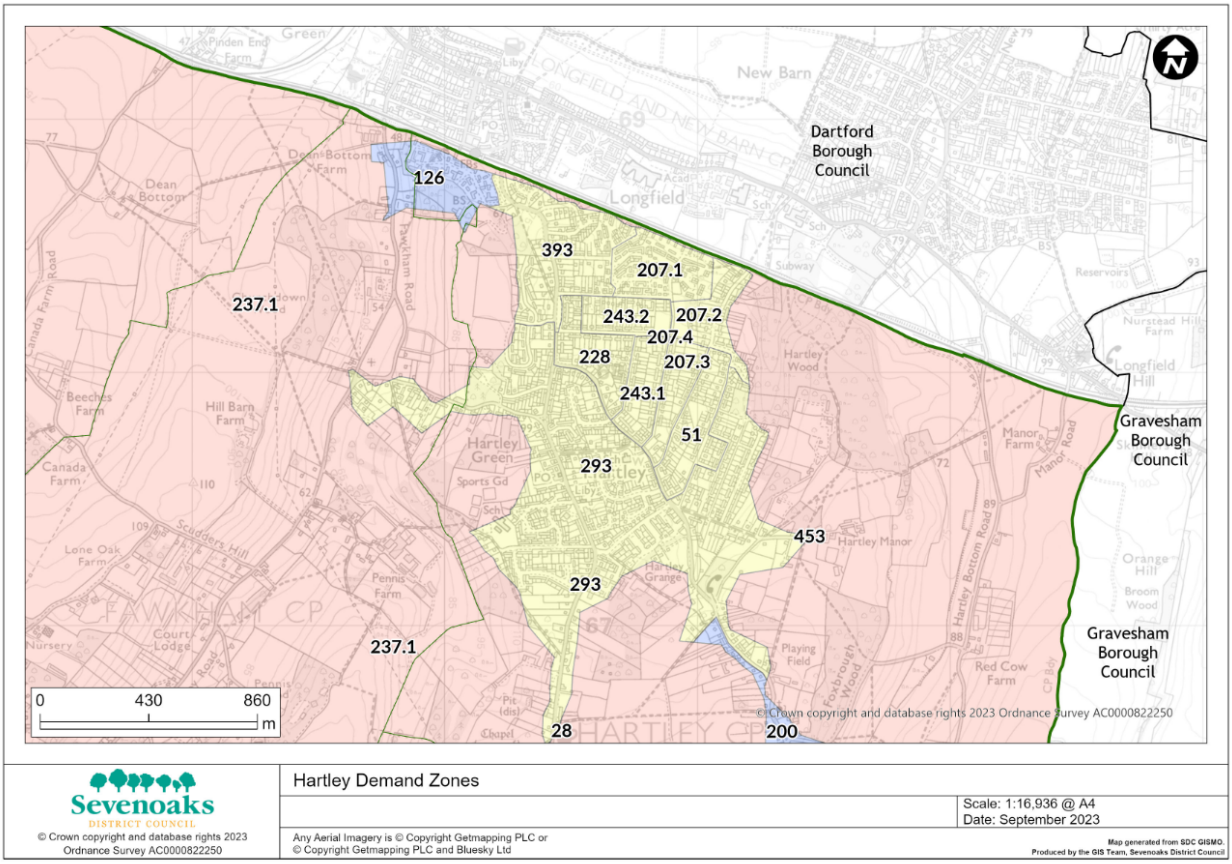


Table 25- Demand zoning in Hartley

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
51	off-street	93	2	2.2
126	public	235	219	93.2
200	public	997	662	66.4
207.1	off-street	323	145	44.9
207.2	off-street	65	6	9.29
207.3	off-street	73	8	10.99

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
207.4	public	0	0	0
228	off-street	104	11	10.6
243.1	off-street	64	1	1.6
243.2	off-street	65	29	44.6
293	off-street	952	103	10.8
393	off-street	261	55	21.1
TOTAL		3232	1241	38.4

10.9.3. Development opportunities within Hartley would require cross borough cooperation, as many of the larger amenities within the village lie outside of the Hartley boundary and within Dartford Borough Council's area.

10.9.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 56.96% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.10. Seal

10.10.1. Seal is situated along the A25 to the Northeast of Sevenoaks Town.. Historically it is believed Seal dates to Anglo Saxon times and was recorded in the Domesday Book in 1096. The main High street of Seal is located along the A25 and has a small number of amenities. Transport links in Seal are limited to bus links, which connect to other parts of Sevenoaks District and surrounding areas.

10.10.2. The Field Dynamics model estimates that there are 224 on street households in this area (1.3% of on street households within Sevenoaks District) and 1 of the top 25 district wide public EV charging demand zones:

Figure 26- Map of demand zones in Seal

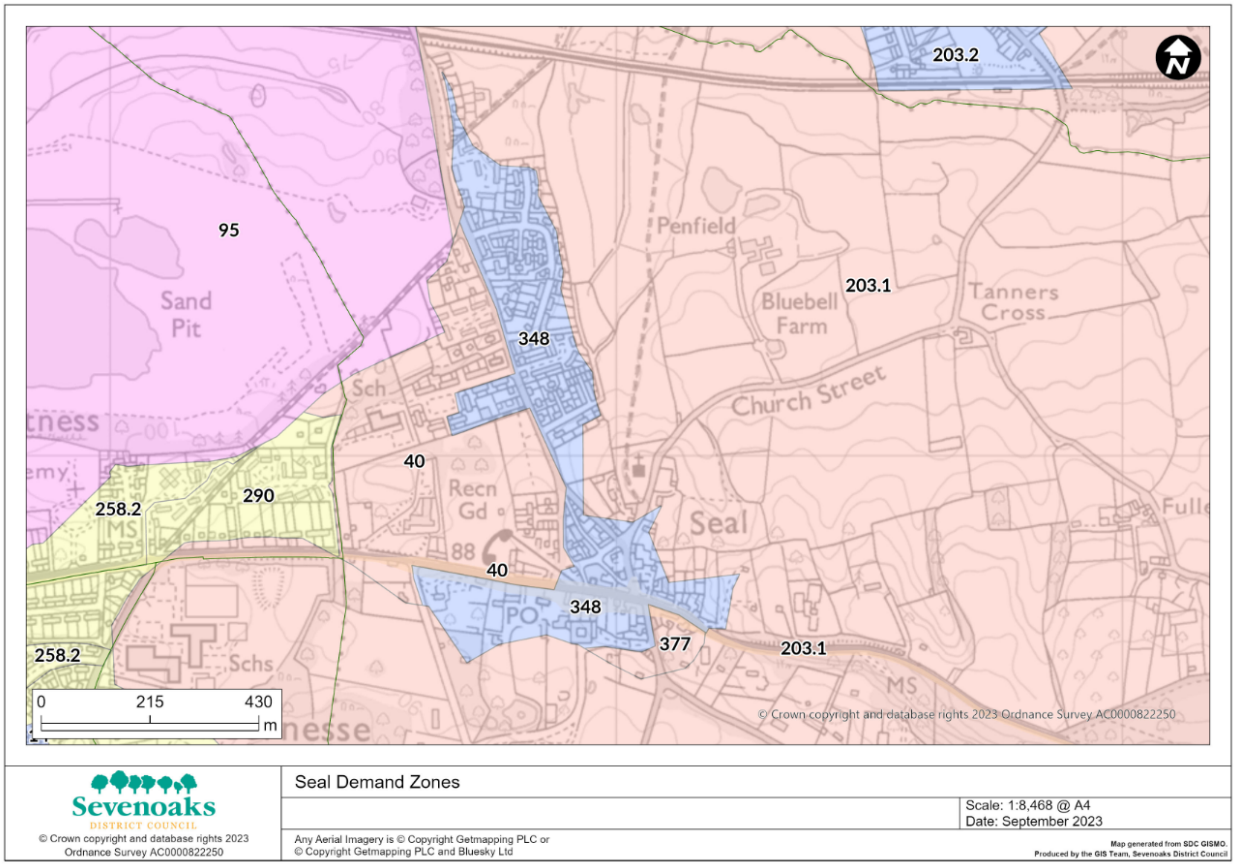


Table 27- Demand zones in Seal

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
348	Public	462	175	37.9
40	Minimum need	130	49	37.7
TOTAL		592	224	37.8

10.10.3. Due to its small size, EV development opportunities within Seal are limited. The most appropriate location to look at installing chargers is within the Seal Recreation Ground Car Park, which is located west of the Library and Parish Council.

10.10.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 49.89% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.11. West Kingsdown

10.11.1. West Kingsdown is located along the A20 and grew significantly in size following the First World War. It is most known for being home to Brands Hatch Racing Circuit, which held its first race in 1926 for cyclists and cross-country runners. In 1947, the BBC televised the first motorcycle event on British TV from Brands Hatch and in 2012 hosted the UK Paralympic Games Road cycling. Historically, West Kingsdown was known as Kingsown, and can be traced back to Anglo Saxon settlements. In the 1950s the Post Office requested the name be changed to avoid confusion with other villages in Kent, where it now became known as West Kingsdown.

10.11.2. The Field Dynamics model estimates that there are 482 on street households in this area (2.9% of on street households within Sevenoaks District) and 1 of the top 25 district wide public EV charging demand zones.

Figure 28- Map of demand zones in West Kingsdown

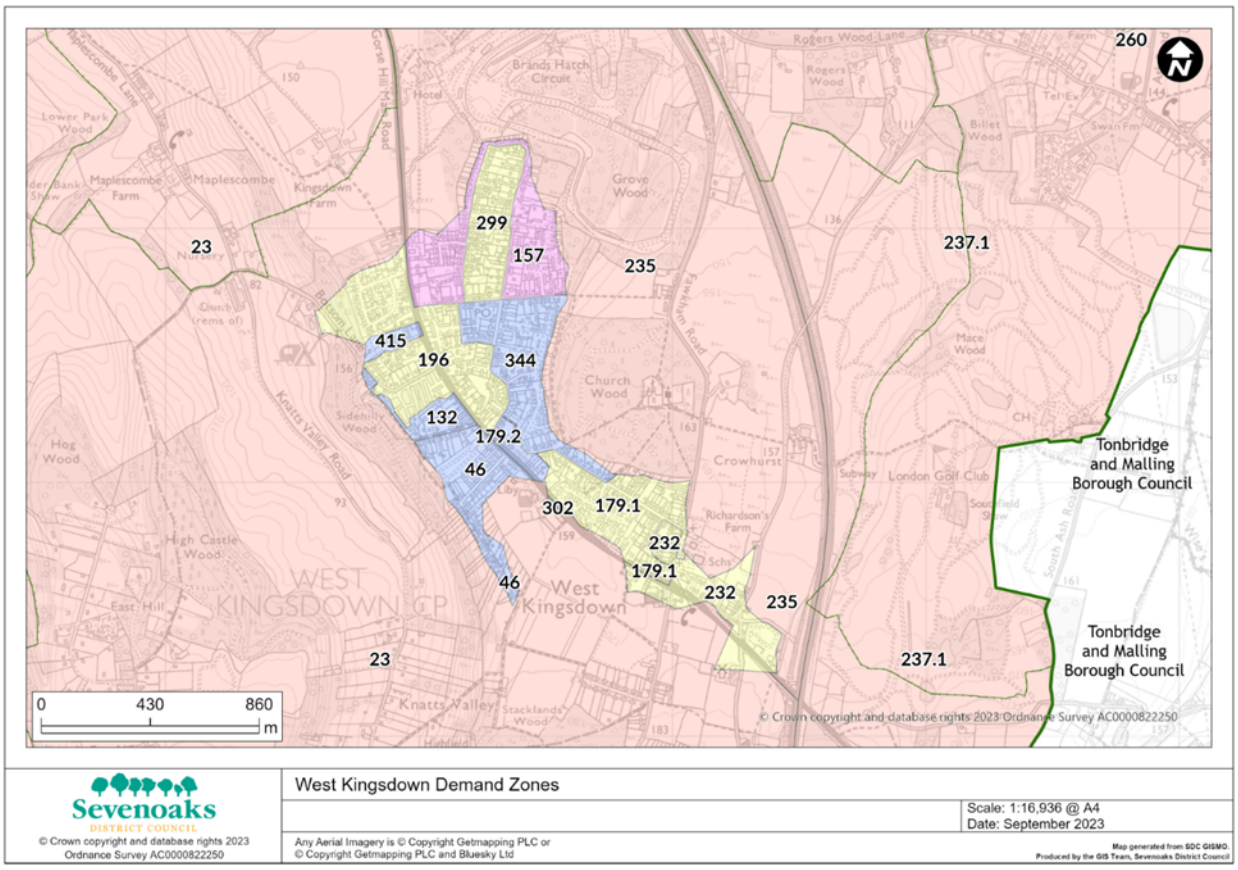


Table 29- Demand Zones in West Kingsdown

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
46	public	190	167	87.9
132	public	68	23	33.8
157	Commercial	294	48	16.3

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
179.1	Off Street	255	33	12.9
179.2	public	36	19	52.8
196	Off street	423	66	15.6
344	public	328	105	32.0
415	public	45	21	46.7
TOTAL		1639	482	29.4

10.11.3. The most appropriate locations to look at installing chargers is within the car park west of the Parish Council, the newly developed car park for the co-op off Hever Road/Hever Avenue. It may also be possible to work with a few larger sporting venues within the area such as Brands Hatch and London Golf Club to install rapid/ultra-rapid charging that would provide a facility for a significantly wider area.

10.11.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 14.41% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.12. Sevenoaks

10.12.1. Sevenoaks is a built-up area with an approximate population of more than 30,000. Sevenoaks consists of a main high street and a core retail centre at Blighs, which is pedestrianised off the main high street. The average ages of Sevenoaks residents fall between 35-64 years old, with a substantial proportion of its residents owning their own homes and being in full time employment. Sevenoaks has a large commuter population, due to its fast train connections into central London and is a desirable location.

10.12.2. The Field Dynamics model estimates that there are 3330 on street households in this area (20.0% of on street households within Sevenoaks District) and 5 of the top 25 district wide public EV charging demand zones.

Figure 30- Map of demand zones in Sevenoaks

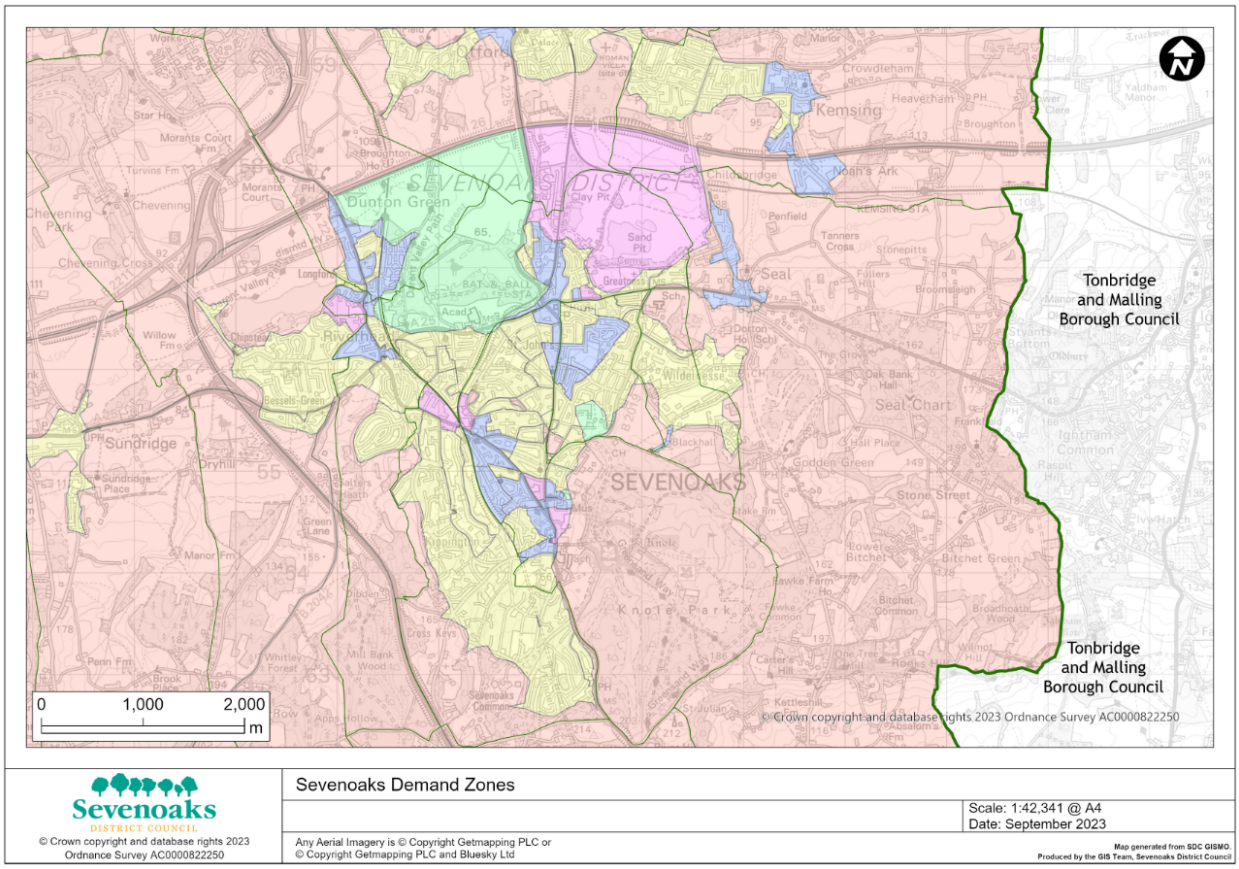


Table 31- Demand zones in Sevenoaks

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
5	Off-street	139	20	14.4
10	Commercial	49	15	30.6
12.1	Public	234	105	44.9
12.2	Public	217	69	31.8
14	Public	392	137	34.9
24	Public	233	157	67.4
25	Public	123	33	26.8
32	Off-street	199	9	4.5
35	Public	235	118	50.2
47	Public	14	12	85.7
48	Visitor	43	19	44.2
68	Off-street	39	9	23.1
93	Off-street	40	1	2.5
95	Commercial	31	17	54.8
96.1	Public	218	176	80.7
96.2	Off-Street	151	64	42.4
105.1	Off-street	55	29	52.7

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
105.2	Off-street	176	99	56.2
105.3	Off-street	75	14	18.7
105.4	Public	72	48	66.7
105.5	Off-street	108	30	27.8
120	Off-Street	38	6	15.8
134	Visitor	0	0	0
139	Off-street	59	12	20.3
149	Off-street	70	18	25.7
170.1	Off-street	165	36	21.8
170.2	Off-street	0	0	0
178	Public	199	84	42.2
181	Off-street	11	0	0
205	Off Street	21	7	33.3
211	Off-street	30	0	0
214	Off-steer	1	0	0
218	Off-street	673	66	9.8
229	Commercial	58	40	69.0
240	Minimum need	10	0	0
249	Public	73	36	49.3
258.1	Public	53	33	62.3
258.2	Off-street	262	112	42.7
273	Off-street	31	0	0
287	Public	24	16	66.7
290	Off Street	660	104	15.8
298	Off-street	30	9	30
322.1	Commercial	0	0	0
322.2	Commercial	48	27	56.3
322.3	Off-street	118	9	7.6
322.5	Off-street	126	7	5.6
322.6	Off-Street	114	23	20.2
322.7	Commercial	83	71	85.5
329.1	Public	349	275	78.8
329.2	Public	57	19	33.3
329.3	Public	128	92	71.9
334	Commercial	51	49	96.1
351	Commercial	182	67	36.8
352	Off-street	257	9	3.5
359.1	Off-street	143	66	46.2
362	Off-street	274	68	24.8
368	Minimum need	6	0	0
380	Public	61	8	13.1
386.2	Off Street	1545	386	25.0
394	Off-street	92	16	17.4

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
395	Visitor	0	0	0
396	Off-street	170	14	8.2
400	Off-street	87	12	13.8
408	Minimum need	5	3	60
425	Off-street	314	58	18.5
433	Off street	128	86	67.2
434	Off-street	84	14	16.7
439	Public	86	70	81.4
440	Off-street	14	0	0
434	Off-street	84	14	16.7
449	Off-street	796	107	13.4
TOTAL		10713	3330	31.1

10.12.3. As outlined above, the District Council has already installed multiple public EV chargers within Sevenoaks and more are proposed within Sevenoaks District Council owned carparks.

10.12.4. Currently no further locations have been identified for potential EV charger installations within Sevenoaks, however there are lots of potential opportunities available.

10.12.5. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 27.81% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.13. Swanley

10.13.1. Swanley is Sevenoaks District's second largest town, after Sevenoaks itself. Swanley borders both the London Borough of Bexley and the London Borough of Bromley. It is a commuter town for London and is situated within the M25. It is believed the name originates from the agricultural past of the town. Swanley has a pedestrianised high street, comprising of several shops and amenities. It also has a newly refurbished leisure centre White Oak and a 60-acre park formally known as New Barn Park. Swanley also has a general market which takes place every Wednesday and Sunday in the town centre.

10.13.2. The Field Dynamics model estimates that there are 2036 on street households in this area (12.3% of on street households within Sevenoaks District) and 4 of the top 25 district wide public EV charging demand zones.

Figure 32- Map of demand zones in Swanley

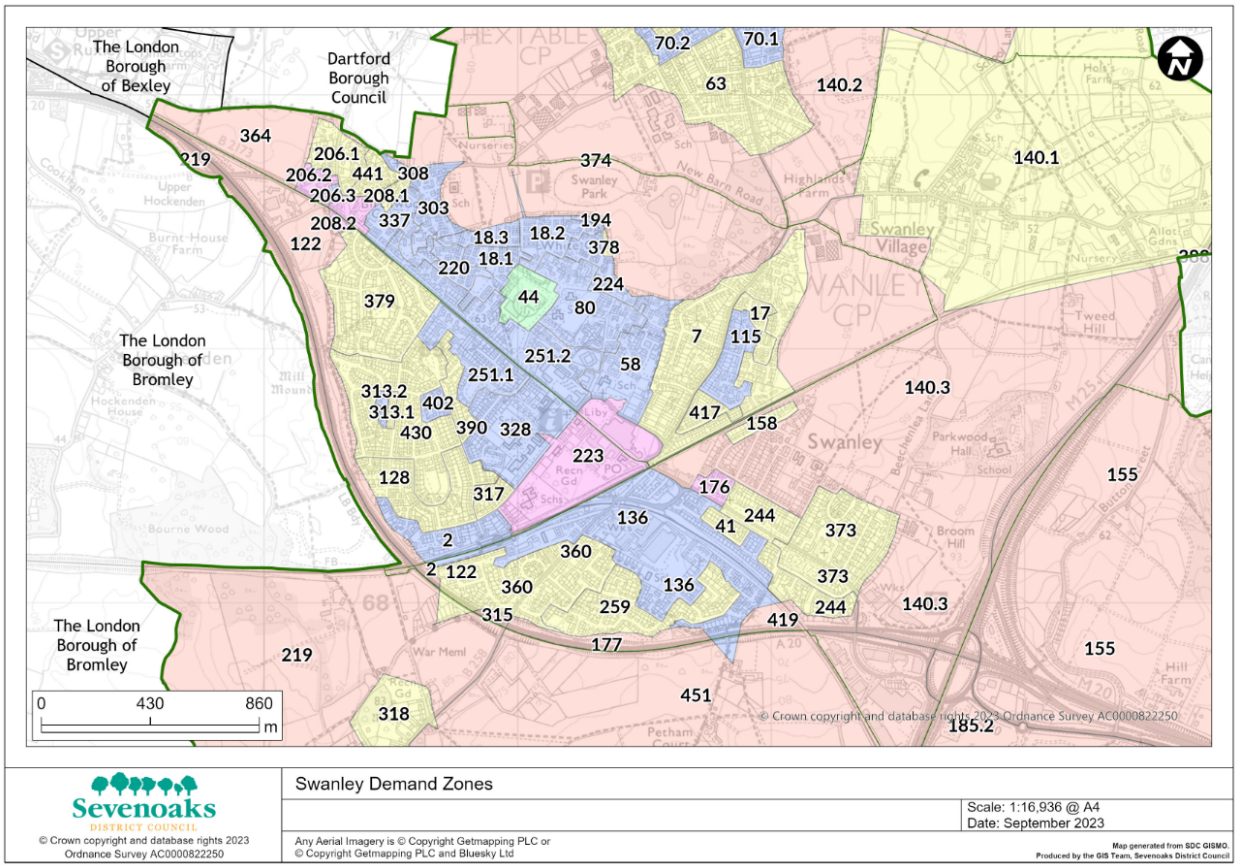


Table 33- Demand Zoning in Swanley

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
2	Public	163	49	30.1
7	Off-street	597	99	16.6
17	Off-street	59	3	5.1
18.1	Public	103	19	18.4
18.2	Public	168	28	16.7
18.3	Public	72	17	23.6
41	Off-street	46	9	19.6
44	Visitor	33	8	24.2
58	Public	275	201	73.1
80	Public	292	213	72.9
115	Public	179	106	59.2
128	Off-street	260	30	11.5
136	Public	695	313	45.0
158	Off-street	36	0	0
176	Commercial	30	0	0
194	Public	13	9	69.2
206.1	Off-street	62	23	37.1

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
206.2	Commercial	6	0	0
206.3	Public	19	19	100
208.1	Off-Street	24	0	0
208.2	Commercial	24	8	33.3
220	Public	96	42	43.8
223	Commercial	86	74	86.0
224	Public	170	104	61.2
244	Off-street	203	30	14.8
251.1	Public	190	57	30
251.2	Public	333	202	60.1
259	Off-street	323	15	4.6
303	public	156	68	43.6
313.1	Off-street	20	0	0
313.2	Public	20	11	55
317	Off-street	46	0	0
328	Public	169	62	36.7
337	Public	127	12	9.4
360	Off-street	450	30	6.7
373	Off-street	368	57	15.5
378	Off-street	9	0	0
379	Off-street	364	28	7.7
390	Off-street	81	5	6.2
402	Public	37	22	59.5
417	Off-street	67	4	6.0
430	Off-street	518	59	11.4
441	Off-street	32	0	0
TOTAL		7021	2036	29.0

10.13.3. There is a current ‘fast’ public EV Charger located at ASDA in Swanley. Further an as outlined above the District Council will be installing additional chargers within its carparks in the near future.

10.13.4. Analysis of Network Power UK’s ‘Demand Headroom’ data indicates that there is 26.9% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

10.14. Westerham

10.14.1. Westerham is situated in the West of Sevenoaks District and shares a boundary with Surrey and Greater London. Evidence suggests that the area around Westerham can date back to 2000BC, and it was also noted in the Domesday Book. Westerham was granted a market charter by King Henry III, which boosted the growth of the town as a major player in buying and selling cattle in Kent, this lasted until 1961 when the last cattle market was held. Westerham is also home to Chartwell, which was home to Winston Churchill and is now part of the National Trust. Westerham has a small high street with a good amenities and good transport links to the M25.

10.14.2. The Field Dynamics model estimates that there are 478 on street households in this area (2.9% of on street households within Sevenoaks District) and 1 of the top 25 district wide public EV charging demand zones.

Figure 34- Map of demand zoning in Westerham

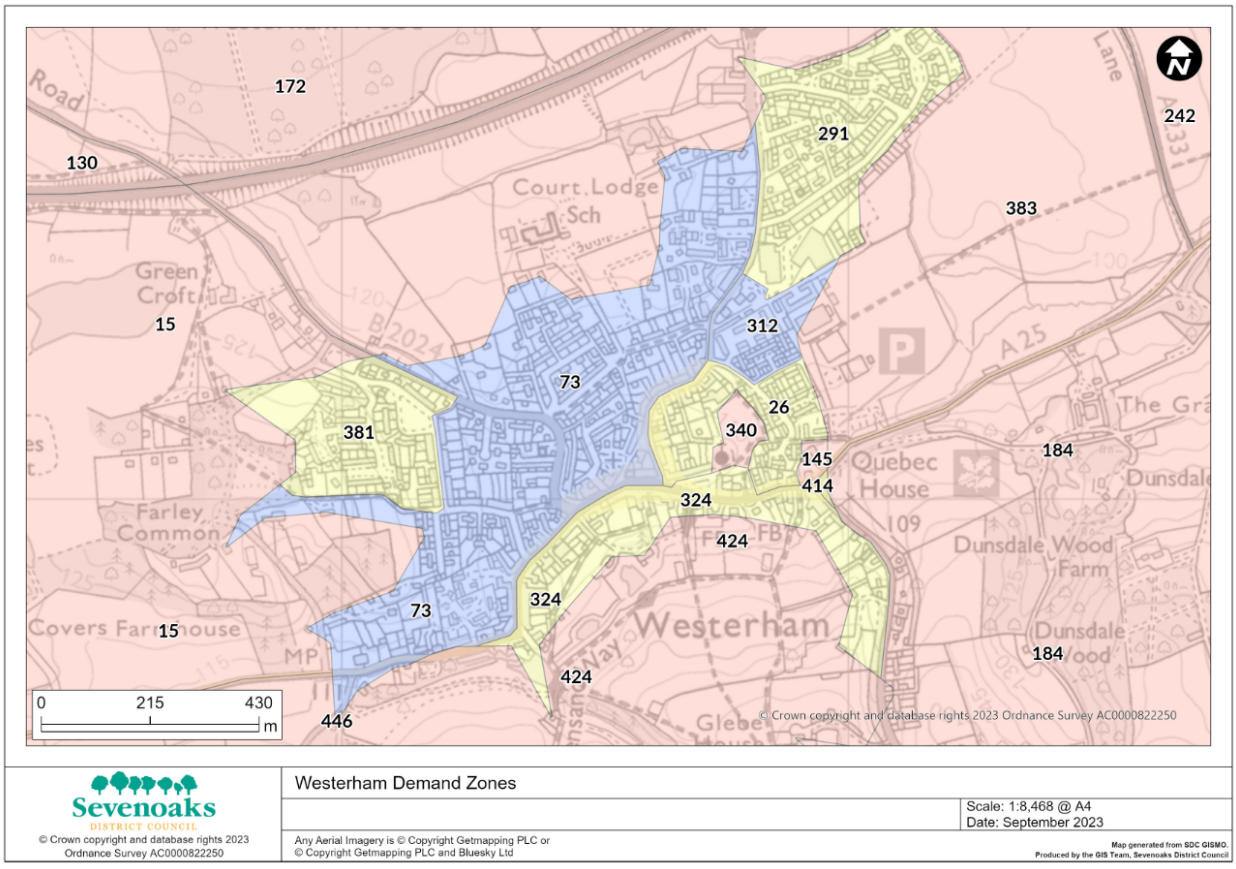


Table 35- Demand zoning in Westerham

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
26	Off-street	159	46	28.9
73	Public	663	254	38.3
291	Off-street	319	40	12.5
312	Public	113	74	65.5

Zone ID	Zone Classification	Number of households	Number of On-Street households	Percentage On-Street Households
324	Off-street	152	61	40.1
381	Off-street	102	3	2.9
414	Off-street	1	0	0
TOTAL		1509	478	31.7

10.14.3. As outlined in 8.5, the District Council has committed to installing public EV infrastructure within the Quebec Avenue Car-Park. This public charger is estimated to serve 698 on-street households.

10.14.4. Analysis of Network Power UK's 'Demand Headroom' data indicates that there is 27.81% electricity demand headroom in this location. This suggests grid capacity would not be a significant limiting factor to the installation of public EV charging.

11. Other Key Partners

11.1. As more and more drivers transition to EV vehicles, it will become increasingly commercially viable for large existing fuel suppliers to diversify and offer EV charging. This transition has already begun and a number of traditional fuel companies are branching out into providing public EV charging.

11.2. Petrol Filling Stations are often located strategically in areas where they can service the largest possible driver population. They may therefore be ideal locations for future EV infrastructure. The table below shows the predicted impact (number of on street households that would be served) from installing rapid/ ultra-rapid public EV infrastructure at the existing sites within Sevenoaks district.

Table 36- Potential impact of installing Rapid/ Ultra Rapid charging at petrol stations

Station Name	Location	Number of On-street households served
Champion Filling Station	Station Road, Edenbridge	1810
Farningham Filling Station	Dartford Road, Farningham	2586
Mill Hill Garage	Mill Hill, Edenbridge	1783
Oakstead Service Station	London Road, Swanley	2614
Oil Well Service Station,	London Road Swanley	2559
Sainsburys Petrol Filling Station	Otford	3627
Seal Road Filling Station	Seal Road, Sevenoaks	4638
Swanley Service Station	High Street, Swanley	2870
Tesco Petrol Filling Station	Riverhead	3944
Tubbs Hill Petrol Filling Station	London Road, Sevenoaks	4312
Twenty Mile Service Station	London Road, West Kingsdown	1032
Wolfe Garage	London Road, Westerham	740

11.3. There is a Tesla Supercharger site located at the Donnington Manor Hotel in Dunton Green. This site has 8 EV chargers available 24hrs a day which can operate up to 250kW. Currently, the majority of Tesla supercharger sites are restricted to Tesla vehicles but in 2022, Tesla began a pilot at selected sites whereby they were opened up for use by owners of other vehicle types. It is understood that the Donnington Manor Supercharger was not part of this pilot scheme but should Tesla open this up to other manufacturers it may provide infrastructure for up to 6234 on street households.

Table 37- Potential impact of Tesla supercharger being made available to other vehicle types

Station Name	Location	Number of On-street households served
Tesla Supercharger	Donnington Manor, Dunton Green	6234

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