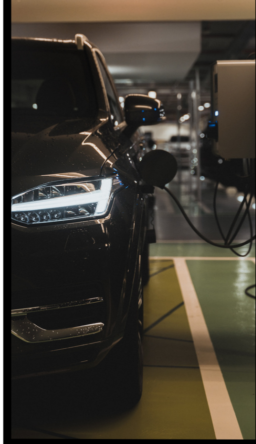





Electric Vehicle Charging Infrastructure Strategy

Working Paper 3 - Establish Baseline

Transport for the South East ARCADIS

Transport for the South East (TfSE) Electric Vehicle Charging Infrastructure Strategy

Working Paper 3 – Establish Baseline

MARCH 2023

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Version Control

Issue	Revision No.	Date Issued	Page No.	Description	Reviewed By	Authorised
1.0	1	21/10/22		Draft	Kimberley Chambers	Robert Tams
1.0	2	21/12/22		Draft	Kimberley Chambers	Daniel Parr
1.0	3	08/03/23		Final Draft	Tim Strong	Daniel Parr
1.0	4	30/03/23		Final	Daniel Parr	Tim Strong

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Glossary

Acronym	Description	Acronym	Description
BEIS	Department for Business, Energy, and Industrial Strategy	**PEMD**	Power electronics, Machines and Drives
BEV	Battery Electric Vehicle	**PHEV**	Plug-in Hybrid Electric Vehicle
BSI	British Standards Institute	**PIV**	Plug-in Vehicle
CaaS	Charging as a Service	**RCF**	Rapid Charging Fund
CCS	Combined Charging System	**RCV**	Refuse Collection Vehicle
CPO	Charge Point Operator	**SOC**	State of Charge
DfT	Department for Transport	**SRN**	Strategic Road Network
DNO	Distribution Network Operator	**TCO**	Total Cost of Ownership
DSO	Distribution Systems Operator	**UKRI**	UK Research & Innovation
EV	Electric Vehicle	**ULEV**	Ultra Low Emission Vehicle
EVCI	Electric Vehicle Charging Infrastructure	**WCS**	Workplace Charging Scheme
EVCP	Electric Vehicle Charging Point	**ZEV**	Zero Emission Vehicle
EVHS	Electric Vehicle Homecharging Scheme		
ICE	Internal Combustion Engine		
IEA	International Energy Association		
LA	Local Authority		
LTA	Local Transport Authority		
MVA	Mega Volt Amp		
LEVI	Local EV Infrastructure		
ORCS	On-street Residential Chargepoint Scheme		

Executive Summary

Introduction

This working paper has been commissioned by Transport for the South East (TfSE) to establish the baseline context for the current levels of Electric Vehicle (EV) uptake, EV chargepoint (EVCP) provision and grid capacity across the TfSE study area.

Current EV Uptake

Findings from the Department for Transport's (DfT's) vehicle registration data shows by 2022 Q1, there were 30,879 privately owned Battery Electric Vehicles (BEVs) in the TfSE area, equivalent to an increase of 9,000% since 2011. Compared to total vehicle registration figures, BEVs made up 0.74% at the start of 2022, higher than any other region in the UK and England, Wales, Scotland, and Northern Ireland.

Since 2020 BEV uptake has increased by 76% across the TfSE study area. Despite this, BEV uptake is still low considering targets and forecasts projections for 2030 (50% of total vehicles registered are to be BEVs by 2030 on a medium scenario[1]).

Within the TfSE area, Wokingham has the highest proportion of BEVs per total number of vehicles registered (0.96%). This is followed by Windsor and Maidenhead (0.91%) and Surrey (0.88%). Southampton, Portsmouth, Slough and Medway currently have the lowest number of BEVs per total vehicles. However, Southampton and Portsmouth have had the highest percentage increase in BEVs since 2017 compared to other local transport authorities within the TfSE study area.

Current and Planned EVCP Network

A review of the existing and planned EVCP network across the TfSE area using National Charging Network (NCR) data, Zap-Map, and data provided by the local transport authorities (LTAs), has identified a total of 2,308 public EVCPs. This comprises 893 slow, 1,114 fast and 301 rapid/ultra-rapid EVCPs. As of October 2022, the ratio of public EVCPs to registered BEVs equates to 16.5:1 in the TfSE, area, this is greater than the International Energy Agency (IEA)[1] recommendation of 10:1 and highlights the need for further investment in the region's EVCI network.

Using data based on privately owned BEVs registered by 2022 Q1 and the total number of public EVCPs as of October 2022, Portsmouth had the lowest ratio, at 2:1 BEVs:EVCPs. Surrey had the highest ratio at 34:1, closely followed by Windsor and Maidenhead with 33:1.

Substation Capacity

Having assessed and rated the available energy capacity for all primary substations across the TfSE study area, the majority (78%) of the substations have been rated as 'green' showing capacity above 3 MVA. There are 8% of primary substations rated as either 'red' or 'grey' indicating capacity between '0 and 1 Mega Volt Amp (MVA)' and 'negative headroom capacity', respectively.

Conclusions

This working paper provides the evidence base to inform TfSE's EVCI Strategy by establishing the current EV trends, the existing and planned public EVCP infrastructure and the available headroom capacity across the grid. This highlights the rapidly increasing number of EVs within the TfSE area and the relatively high ratio of EVs to EVCPs at a local scale. By understanding the baseline context, guidance can be provided for LTAs to plan EVCI provision to meet future EV uptake.

[1] What Is The "Minimum Acceptable" Ratio Of EVs to Charging Stations? | EVAdoption

1 Introduction

1.1.1 This working paper has been commissioned by Transport for the South East (TfSE) to establish the baseline context for the current levels of Electric Vehicle (EV) uptake, EVCP provision and grid capacity across the TfSE study area. This working paper provides analysis of the Battery Electric Vehicle (BEV) and Plug-in Hybrid Electric Vehicle (PHEV) uptake at a local, regional and national level. The analysis is accompanied by a desktop review of the existing EVCP network incorporating National Chargepoint Registry, Zap-Map, and local authority (LA) datasets (where available). In addition, a grid capacity assessment establishes available headroom capacity across the region.

1.1.2 The paper comprises of four sections:

- Current EV Uptake
- Current and Planned EVCP Networks
- Substation Capacity
- Conclusions

1.1.3 Where applicable, the working paper references the relevant Appendices to supplement the evidence base.

2 Current EV Uptake

2.1 Overview

2.1.1 This section presents the findings of the current trends across the Plug-in Vehicle (PIV) market (including BEVs and PHEVs). Both BEVs and PHEVs account for a large proportion of Ultra Low Emission Vehicles (ULEVs) at present, alternative fuels such as hydrogen and biofuels are currently at the very early stages in terms of mass rollout and therefore have not been analysed as part of this Working Paper.

2.1.2 BEVs have no Internal Combustion Engine (ICE). Electricity is stored in a battery or battery packs and the power is used to run the electric motor. BEVs are charged with electricity from an external source usually at home, work or via a public charge point. BEVs are zero emission at the point of use.

2.1.3 Hybrid vehicles are powered by electricity and an ICE. The electricity is usually generated by 'regenerative braking' or in newer 'self-charging' models, the ICE generates electricity whilst in use. The electric motor is typically used at lower speeds to minimise fuel consumption and enhance efficiency. Given that the sole power input for these vehicles is from traditional fuels, they are not considered full EVs as they are unable to receive power from green sources and are primarily used to improve fuel efficiency.

2.1.4 PHEVs usually have fairly small batteries that can be charged via 'regenerative braking' or can be plugged in to an external source. PHEV's can travel 20-40 miles on a single charge, making them well suited for shorter trips in 'EV mode', with the ICE available for longer journeys or when a charge point is not available.

2.1.5 The data presented in this section shows separate totals for ULEV, PHEV and BEV registrations where available. The data for this assessment excludes alternative fuels and any values which have been noted as either insignificant or omitted by the DfT.

2.1.6 ULEV registrations across all sixteen local transport authorities (LTAs) have been analysed to establish a regional baseline position. Detailed breakdowns of local BEV trends for each of the sixteen LTAs can be found in Appendix A: Registered Privately Owned BEV Trends – 16 LTAs.

2.2 Current Trends – BEV and PHEV Uptake

2.2.1 The DfT's Vehicle Licensing dataset has been used to inform the baseline context for the number of ULEVs registered within the study area. Table VEH01[2] of the DfT dataset has been included as part of this assessment which contains the following subsets of data: VEH0132, VEH0105 and VEH0134. Table 1 describes the data, which is presented cumulatively. Only data for privately owned vehicles from the DfT dataset have been presented for the purpose of this working paper.

Table 1 Subsets of DfT data

Data Set	Description
VEH0132	Licensed ULEVs at the end of the quarter by fuel type, keepership (private and company) and upper and lower tier local authority: UK.
VEH0105	Licensed vehicles at the end of the quarter by body type, fuel type, keepership (private and company) and upper and lower tier local authority: Great Britain and UK.
VEH0134	ULEVs licensed at the end of the quarter by postcode district: Great Britain and UK.

[2] HM Government, 'Vehicle licensing statistics data tables' (2022). https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01

2.2.2 The TfSE study area is comprised of 16 LTAs and is shown in Figure 1, below.

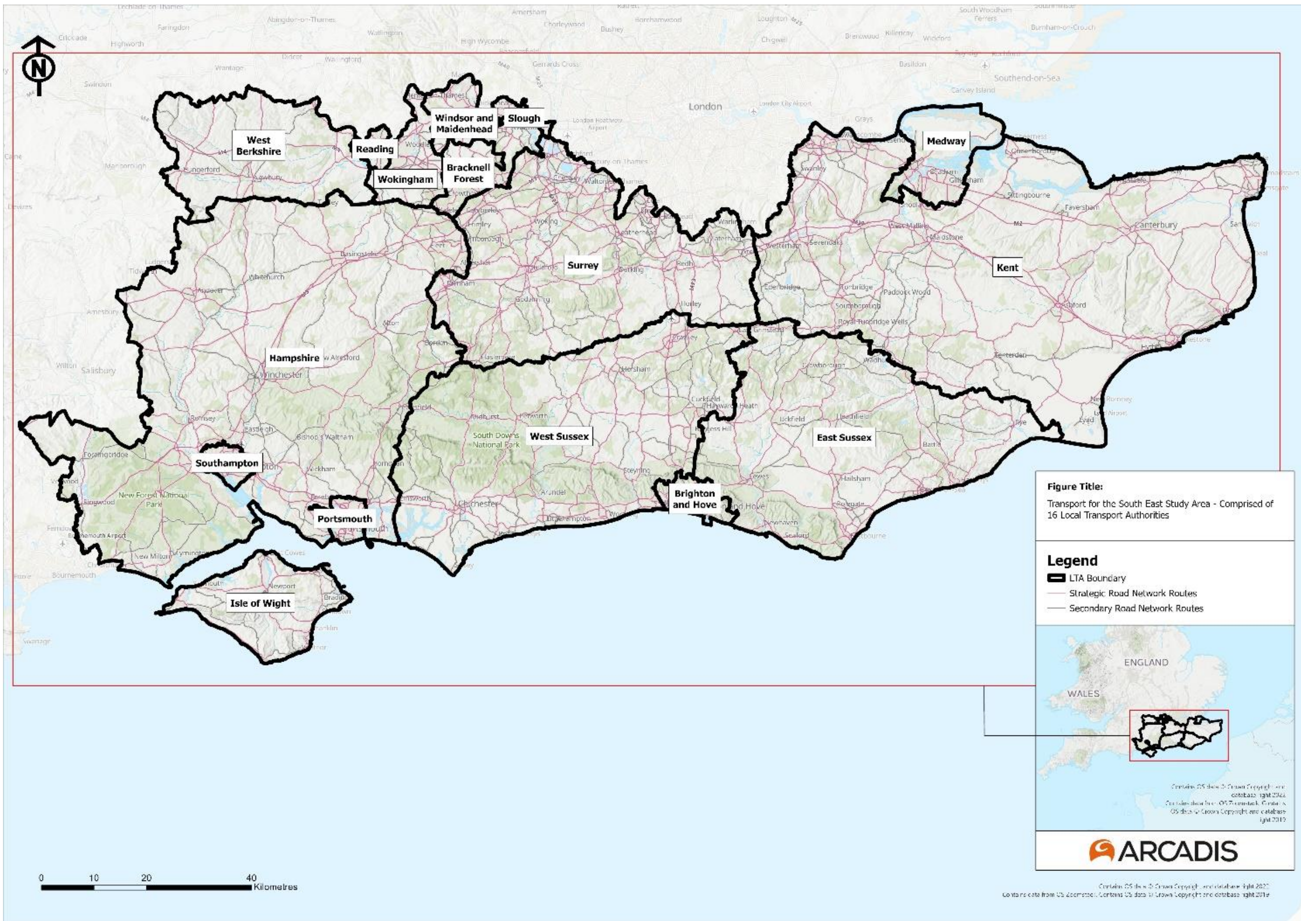

Figure 1 TfSE area

2.2.3 Details of ULEV registrations for each LTA were taken from the DfT dataset VEH0132. This dataset provides the total number of ULEV registrations, BEV registrations and PHEV registrations at the end of each quarter (Q) from 2011 Q4 to 2022 Q1 for each local authority. The analysis has been presented up until 2022 Q1 which is the most up to date data as of September 2022.

2.2.4 Details of total car registrations for the TfSE area were derived from DfT dataset VEH0105. This dataset documents licensed vehicles at the end of the year by body type and upper and lower tier local authority. VEH0105 presents car registrations per annum, hence this value has been divided by four to create quarterly values. This data has been used to calculate the quarterly percentage of new ULEV vehicle registrations across the TfSE area, and at a national level.

2.2.5 When inputting this data, a number of values (particularly in the early years of data collection) were marked with the letter 'c' meaning that the value is suppressed. This is to avoid the DfT disclosing personal data, due to the low sample sizes. In this analysis these values have been assumed to be zero. Company registered vehicles have also been excluded from the dataset.

2.2.6 Figure 2 illustrates PIV uptake, split by BEVs and PHEVs, for the TfSE study area from 2011 Q4 to 2022 Q1. The data displays a progressive increase in the number of BEVs registered in the region. 349 BEVs were registered by 2011 Q4, rising to 30,879 BEV registrations by 2022 Q1, approximately a 9,000% increase. As a percentage of total cars, BEVs accounted for 0.74 % by 2022 Q1, highlighting that the proportion of BEVs to total vehicles (private cars and LGVs) is very low, although the rate of uptake dramatically increased from 2019 Q2 onwards.

2.2.7 Throughout the assessed time period, the analysis indicates that the number of registered BEVs are consistently higher than the PHEVs on the road, with the gap increasing between the two types for each quarter from 2019 Q2 onwards.

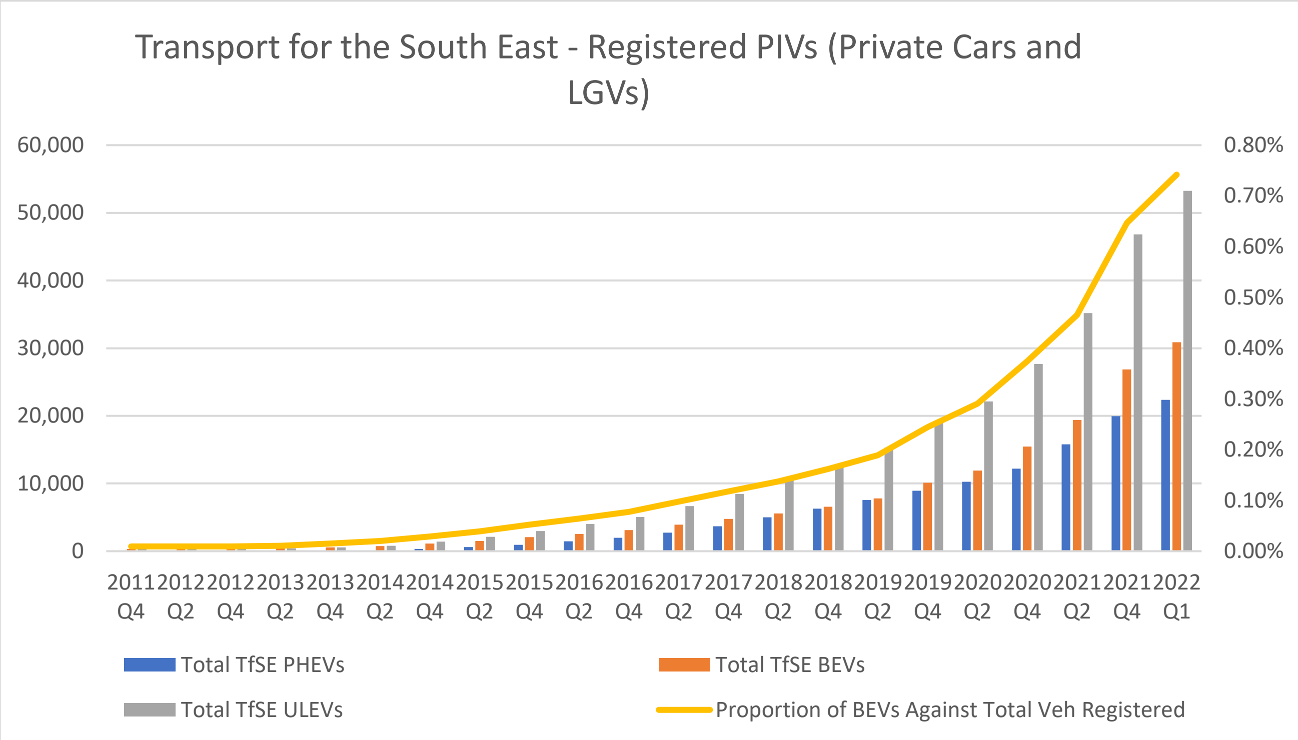

Figure 2 Registered PIVs for private cars and LGVs and the proportion of BEVs against total vehicles registered

National and Regional Uptake

2.2.8 The number of BEVs registered at a regional level is shown in **Error! Reference source not found.**. This shows that for the last 5 full years of data (2017 – 2021), the South East region has more BEVs registered than any of the other 7 regions. By 2021 Q4, the South East region had 34,133 BEVs registered. It should be noted that the South East does not include vehicles registered in London and differs from the TfSE area as it also includes Oxfordshire and Buckinghamshire.

2.2.9 Since 2017, the South East has experienced a 463% increase in BEV registrations, the highest rate of increase across the 8 regions.

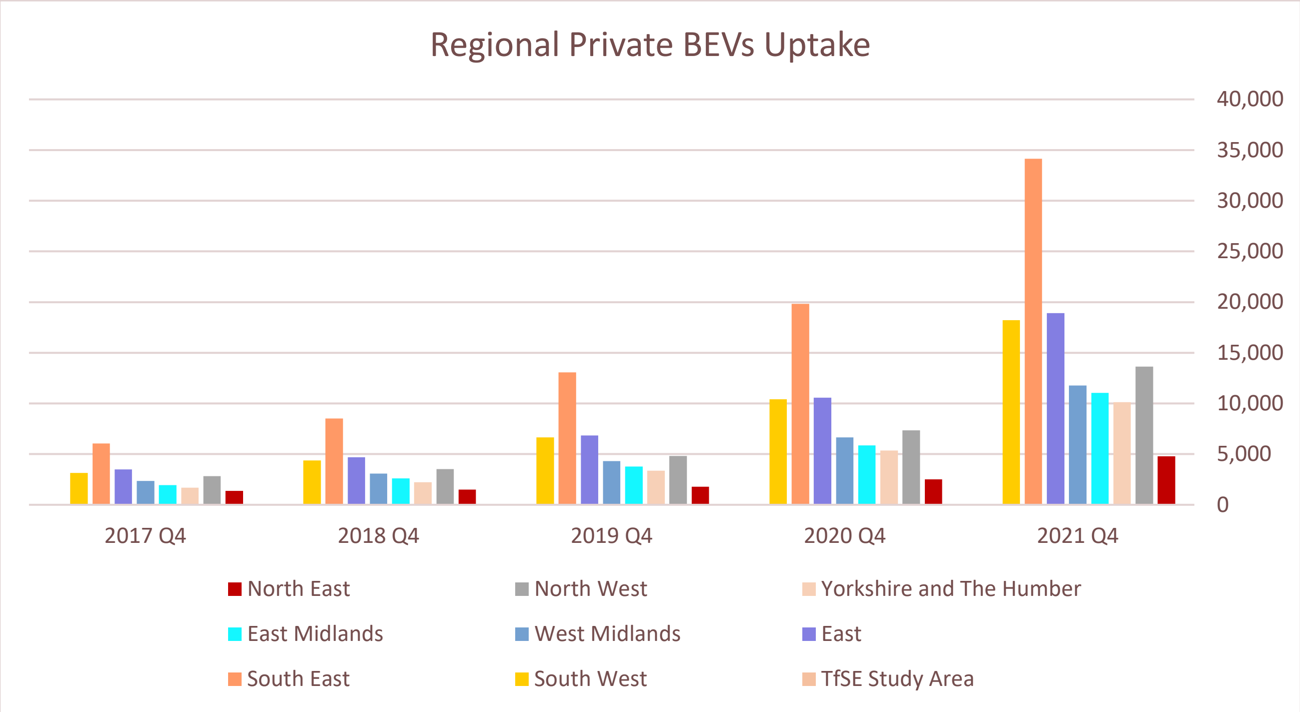

Figure 3 Registered BEVs for private cars and LGVs by region in the last 5 full years

2.2.10 **Error! Reference source not found.** shows the proportion of BEVs against the total vehicles registered (cars and LGVs) to show the market share of BEVs on the road. This has been presented for the TfSE area and national levels for the last 8 full years of data (2014 – 2021).

2.2.11 By 2021, BEVs accounted for 0.65% of total vehicles registered within the TfSE area, a 76% increase from 2020. The TfSE study area is shown to have a higher proportion of BEVs in relation to total vehicles than the UK, England, Wales, Scotland, and Northern Ireland. This is still low when considering targets and forecasts projections for 2030. For example, under a medium uptake scenario, DfT's Road to Zero projection shows 50% of total vehicles registered are BEVs by 2030.

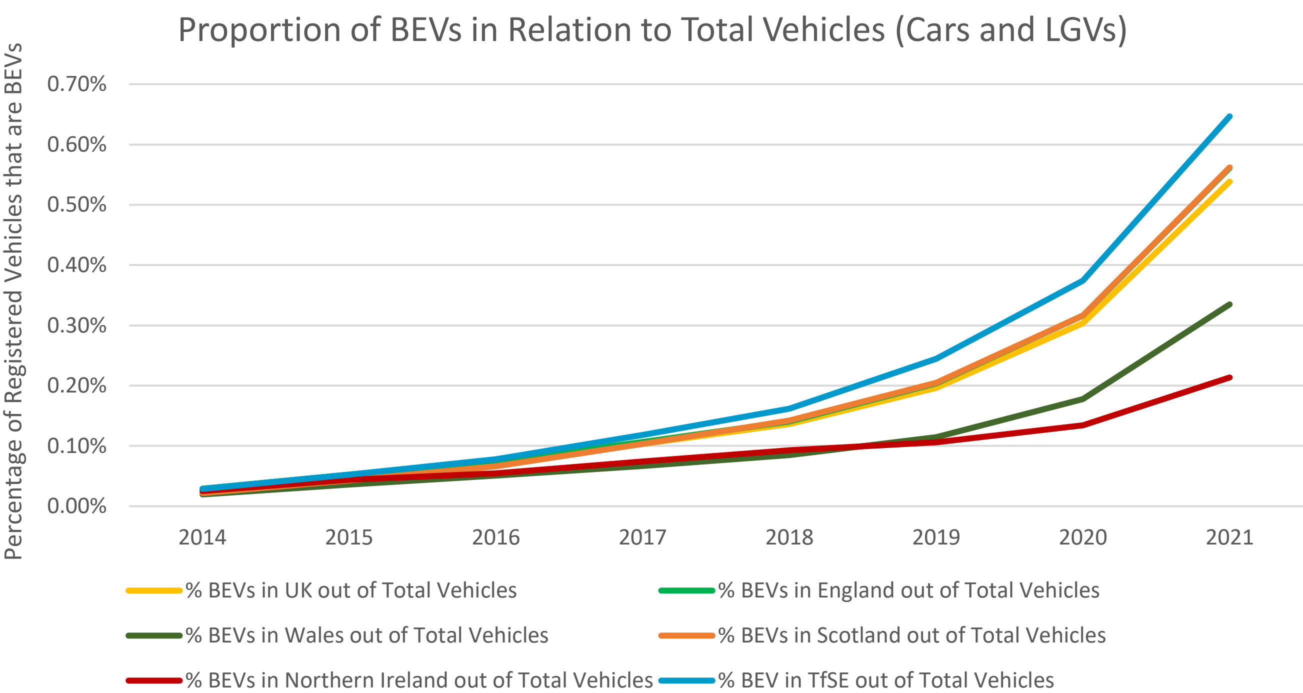

Figure 4 Registered BEVs for private cars and LGVs by nation and TfSE area in the last 8 full years

2.2.12 BEV adoption has been increasing year-on-year since 2014 across all countries in the UK, with Scotland and England leading the way. Since 2018, this increase has been accelerating and appears to be exhibiting exponential growth. BEV adoption across the TfSE study area has been higher than the home nations since 2017, and the gap appears to be growing.

Local Transport Authority BEV Uptake

2.2.13 Year-end BEV and vehicle registration data from each LTA over the last full 5 years of data (2017 Q4 – 2021 Q4) is presented in Table 2, below. Surrey has the highest number of BEVs registered by 2021 Q4 with 6,044 BEVs. Slough has been identified with the least number of registered BEVs by 2021 Q4 with 246 registered. The median number of BEVs registered in terms of the TfSE study area consists of approximately 712 BEVs. It is evident that Surrey, Hampshire, Kent, West Sussex and East Sussex have a higher number of registered BEVs, however, it should be noted that this is probably due to the size and population of the LTAs.

2.2.14 The percentage of BEVs registered per total number of vehicles is highest within Wokingham (0.96%), followed by Windsor and Maidenhead (0.91%) and Surrey (0.88%). Southampton, Portsmouth, Slough and Medway have the lowest number of BEVs registered per total vehicles. However, Southampton and Portsmouth have had the highest percentage increase in BEVs since 2017.

2.2.15 Figure 5 displays TfSE BEV registrations against the regions' population between 2011 and 2021. Population growth has been taken from 2011 and 2021 census data. The figure highlights that the rate of BEV uptake greatly exceeds that of the population, proving that BEVs are becoming more widely adopted.

2.2.16 Table 3 shows the total population and the number of BEVs for each local authority between 2017 and 2021. It also includes the percentage of BEVs to total population in 2017 and 2021 and the percentage increase in BEVs to total population. This shows that Wokingham and Windsor and Maidenhead, have the highest number of BEVs per total population.

Table 2 Private BEV uptake by LTA

LTA	2017	2018	2019	2020	2021	% Increase 2017-21	% BEV/Total Veh Reg
Bracknell Forest	58	94	138	233	**456**	686%	0.64%
Brighton and Hove	112	139	246	389	**663**	492%	0.68%
East Sussex	362	461	657	1,027	**1,782**	392%	0.58%
Hampshire	914	1,335	2100	3,238	**5,599**	513%	0.67%
Isle of Wight	80	114	155	248	**442**	453%	0.55%
Kent	894	1,160	1,634	2,544	**4,508**	404%	0.54%
Medway	92	122	166	248	**477**	418%	0.34%
Portsmouth	34	55	96	155	**276**	712%	0.33%
Reading	67	98	155	230	**369**	451%	0.55%

Slough	48	59	85	135	**246**	413%	0.38%
Southampton	45	73	141	202	**369**	720%	0.36%
Surrey	1,078	1,534	2,430	3,638	**6,044**	461%	0.88%
West Berkshire	139	188	318	443	**762**	448%	0.79%
West Sussex	541	739	1,112	1,726	**3,089**	471%	0.62%
Windsor and Maidenhead	154	200	305	433	**782**	408%	0.91%
Wokingham	143	216	369	567	**996**	597%	0.96%
TfSE area	**4,761**	**6,587**	**10,107**	**15,456**	**26,860**	-	0.65%

Table 3 Private BEV uptake against total population

LTA	2017 population	2021 population	Number of BEVs in 2017	Number of BEVs in 2021	%BEVs/ Population 2017	%BEVs/ Population 2021	% Increase BEVs/Population 2017-21
Bracknell Forest	120,377	124,607	58	456	0.05%	0.37%	0.32%
Brighton	288,155	277,103	112	663	0.04%	0.24%	0.20%
East Sussex	552,259	545,848	362	1,782	0.07%	0.33%	0.26%
Hampshire	1,370,728	1,400,899	914	5,599	0.07%	0.40%	0.33%
Isle of Wight	140,984	140,459	80	442	0.06%	0.31%	0.26%
Kent	1,554,636	1,576,069	894	4,508	0.06%	0.29%	0.23%
Medway	277,616	279,773	92	477	0.03%	0.17%	0.14%
Portsmouth	214,718	208,003	34	276	0.02%	0.13%	0.12%
Reading	163,075	174,224	67	369	0.04%	0.21%	0.17%
Slough	148,768	158,500	48	246	0.03%	0.16%	0.12%
Southampton	252,359	248,922	45	369	0.02%	0.15%	0.13%

Surrey	1,185,321	1,203,108	1078	6,044	0.09%	0.50%	0.41%
West Berkshire	158,473	161,448	139	762	0.09%	0.47%	0.38%
West Sussex	852,353	882,674	541	3,089	0.06%	0.35%	0.29%
Windsor and Maidenhead	150,140	153,496	154	782	0.10%	0.51%	0.41%
Wokingham	164,980	177,503	143	996	0.09%	0.56%	0.47%

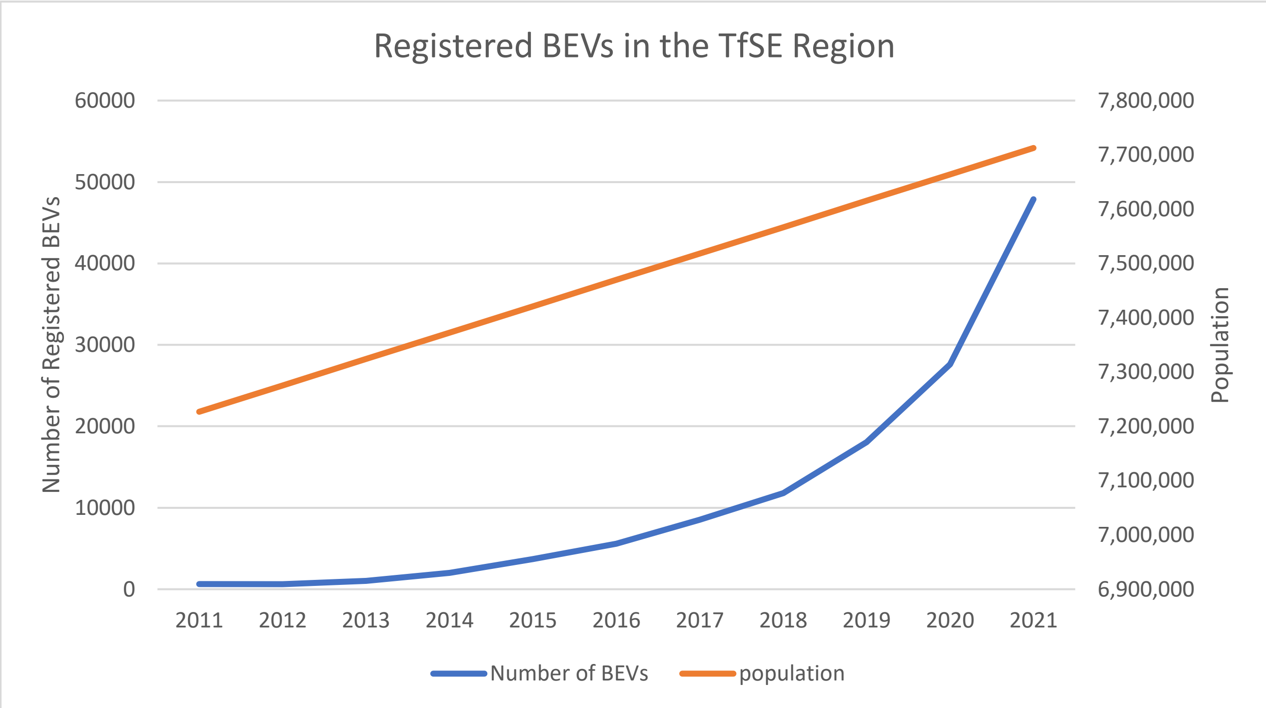

Figure 5 Registered number of private BEVs against population estimates within the TfSE area

3 Current and Planned EVCP Network

3.1 Existing and Planned EVCP Network

3.1.1 Zap-Map[3] provides the total number of publicly available EV charging devices in the UK. Zap-Map shows that in September 2022, there are 34,860 Electric Vehicle Charge Points (EVCPs) in the UK across 20,888 different locations. This is a 35% increase in the number of charging devices since September 2021. In September 2022, 1,126 new EV charging devices were added to the Zap-Map database.

The baseline EVCP data captures existing and planned public EVCP infrastructure within the TfSE area. Planned EVCPs refer to committed infrastructure which will be installed by the time the EVCI strategy is published. Table 4 lists planned EVCP data provided by LTAs, which has also been included in

3.1.2 Figure 6.

Table 4 Planned EVCP data provided by LTAs

LTA	Scheme	Funding Opportunity	No. EVCPs and Power Output
Bracknell Forest	-	-	16x 22kW chargepoints (Joju / MER)
Brighton & Hove	Next Phase Lamp Column	-	50x lamp column chargepoints
	Next Phase Fast	-	15x 22Kw 5x 7kW
Kent	Next Phase Fast	-	15x 22Kw 5x 7kW
	Parish Phase 2	-	18x dual socket 7kW chargepoints
Portsmouth	ORCS Phase 3	ORCS	300x 3.5-5.5kW
	Off-Street (For PHVs & Taxis only)	-	8x 50kW (Joju)
Wokingham	Proposed On-Street ORCS	ORCS	24x 7kW
	Proposed Car Park ORCS		14x 22kW

3 Zap-Map, 'EV Charging Statistics 2023' (2023). https://www.zap-map.com/statistics/#points

3.1.3 Locations such as hotels and dealerships, which have user restrictions in place, have been omitted from the baseline data, so it represents charging points that any members of the public can use.

3.1.4 DfT's National Chargepoint Registry (NCR), Zap-Map and data provided by LTAs has been used to visualise current and planned EVCPs. Incorporating all these data sources strengthens the validity of the baseline charging infrastructure.

Across the TfSE study area there are a total of 2,308 public EVCPs, constituting 893 slow chargers, 1,114 fast chargers, and 301 rapid/ultra-rapid chargers. A map of the EVCPs within the TfSE area is presented in

3.1.5 Figure 6.

3.1.6 The network is distributed along the southern coast, larger settlements and at visitor attractions, with a high density of EVCPs around the western border with Greater London, predominantly within Berkshire.

3.1.7 The TfSE area has one EVCP for every 16.5 EVs (based on existing EVCPs in October 2022 and BEVs registered in Q1 2022). According to the Society of Motor Manufacturers and Traders (SMMT), Britain's ratio of BEVs:EVCPs is one of the lowest among the top 10 global EV markets[4]. In 2020, Britain's ratio was 16:1, dropping from 11:1 in 2019. The International Energy Agency (IEA)[5] has set a recommended level of 10:1 BEVs:EVCPs which should be considered a best-in-class aspiration for the TfSE area to reach.

3.1.8 As BEVs are wholly dependent on EVCI (as opposed to PHEV having petrol / diesel backup) the number of BEVs have been presented initially. The ratio for the number of privately owned BEVs per EVCP for each of the sixteen LTAs has been presented in Table 5. This uses the latest available data for the number of BEVs registered by 2022 Q1 against the total number of public chargepoints, both existing and planned, as of October 2022. This has been captured as the ratio at a singular point in time and needs to be treated with caution given the rapid increase in the number of BEVs registered and EVCPs being installed. The planned EVCP data was sourced from LTAs via an information request early in the development of the strategy.

3.1.9 The existing EVCP data shows the ratios range from 34:1 in Surrey to 2:1 in Portsmouth. If including the 300 planned EVCPs, the data shows that Portsmouth will have a ratio of 1:1 BEVs to EVCPs. It is important to note that this data only includes privately registered BEVs. Therefore, when including company registered BEVs the ratios may increase significantly, but additional EVCI will be available from company fleet operators, so it is assumed to have a minimal net impact to the BEV:EVCP ratio.

3.1.10 Maps showing existing and planned EVCPs, including those on the SRN, for each LTA within the TfSE area is included in Appendix B: EVCP Network Maps – 16 LTAs.

[4] SMMT, 'Car charging point numbers fall behind as plug in vehicles surge' (2021). Car charging point numbers fall behind as plug-in vehicles surge - SMMT

5 EV Adoption, 'What is the 'minimum acceptable' ratio of EVs to charging stations?' (2019). https://evadoption.com/what-is-the-ideal-ratio-of-evs-to-charging-stations/

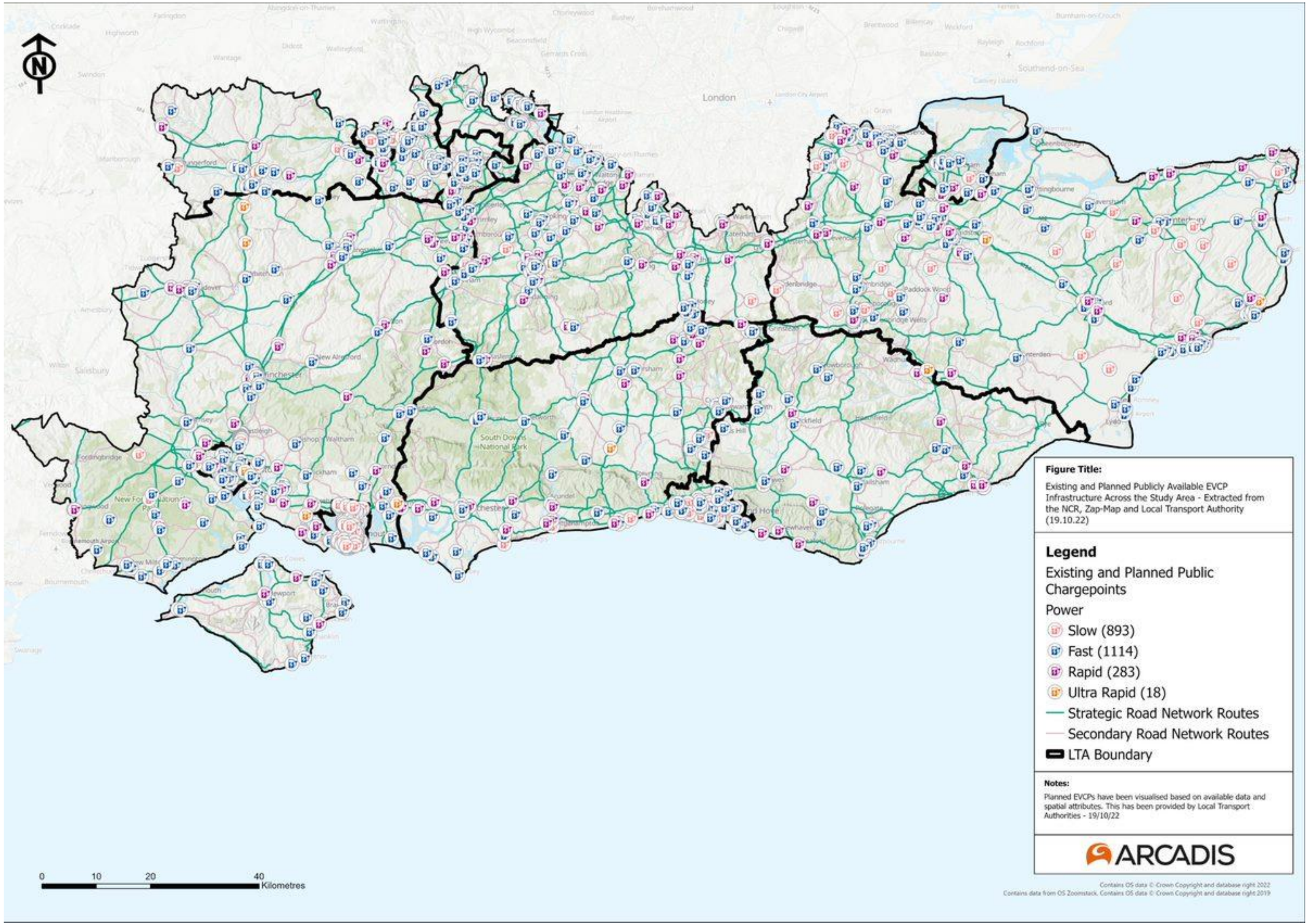

Figure 6 Existing and planned publicly available EVCPs across the TfSE area (October 2022)

Table 5 Privately Registered BEVs and public EVCPs in the LTAs (October 2022).

LTA	Privately registered BEVs	Existing EVCPs	Planned EVCPs	BEV:EVCP (Existing)	BEV:EVCP (Existing and Planned)
Bracknell Forest	524	48	-	11:1	11:1
Brighton and Hove	744	251	69	3:1	2:1
East Sussex	2,032	102	-	20:1	20:1
Hampshire	6,443	308	-	21:1	21:1
Isle of Wight	485	26	-	19:1	19:1
Kent	5,234	286	31	18:1	17:1
Medway	537	43	-	12:1	12:1
Portsmouth	316	175	300	2:1	1:1
Reading	415	33	-	13:1	13:1
Slough	278	13	-	21:1	21:1
Southampton	423	68	-	6:1	6:1
Surrey	6,968	204	-	34:1	34:1
West Berkshire	856	83	-	10:1	10:1
West Sussex	3,554	174	-	20:1	20:1
Windsor and Maidenhead	920	28	-	33:1	33:1
Wokingham	1,150	27	38	43:1	18:1
Total	**30,879**	**1,870**	**438**	**16.5:1**	**13:1**

**Ratios have been calculated including current and planned public EVCPs within the LTA*

4 Substation Capacity

4.1.1 Power availability at a desired/potential EV charging location is often the most limiting factor in the design of an EV charging network. Costs of new Distribution Network Operator (DNO) connections can be expensive depending upon the location, power requirements and condition of existing grid infrastructure. Therefore, careful network planning and consideration of grid capacity is required to ensure that new EVCI implementation is cost efficient.

4.1.2 UK Power Networks (UKPN) and Scottish & Southern Energy Networks (SSEN) are the DNOs for the TfSE study area.

4.1.3 Using the DNO's Headroom Data Tables[6][7], a grid analysis of Primary Substation (33kV/11kV) was conducted to develop a general baseline understanding regarding the headroom of the TfSE study area primary substation network.

4.1.4 A Red, Amber, Green (RAG) classification, based on a substation's current capacity, was used to identify and categorise which substations may need upgrading first to satisfy increasing demand for EV charging. Appendix D shows the MVA capacity data, from which the RAG ratings are calculated for each substation.

4.1.5 Demand Headroom (DH) for all primary substations in the TfSE study area was calculated using the equation below, where FC represents Firm Capacity and PD represents Peak Demand.

$$DH = FC - PD$$

4.1.6 It is important to note that the overall RAG classifications are a representation of each substation's demand headroom. Understanding the demand headroom of primary substations can help to reduce costs when installing an EVCP network as lower headroom locations can be avoided. By strategically avoiding those locations with lower headroom, it is less likely significant and costly upgrades will be required. There are however other parameters that may alter the complexity and cost of new EV infrastructure installations such as cable availability, site location and circuit ratings.

4.1.7 Visualisation of the primary substations and the associated RAG category for each of the primary substations within the study area is shown in Figure 8. The RAG ratings are also summarised in Table 6.

Table 6 RAG ratings of primary substations

Available capacity	RAG Rating	Number of Substations
< 1 MVA	Red/Grey	36
1 – 3 MVA	Amber	64
> 3 MVA	Green	355

[6] SSEN: https://network-maps.ssen.co.uk/opendataportal FGH SSEN: https://network-maps.ssen.co.uk/opendataportal
[7] UKPN: https://ukpowernetworks.opendatasoft.com/pages/ltds_ndp_landingpage/

4.1.8 It should be noted that the data used for this study was obtained directly from UKPN & SSEN data platforms and therefore any potential discrepancy in the data obtained would need to be confirmed directly with the appropriate DNO. A more rigorous assessment of EV charging based on power availability may be conducted through connection applications.

4.1.9 78% of the primary substations across the TfSE study area have a RAG rating of 'green' i.e. showing capacity above 3 Mega Volt Amp (MVA). At a high level, this shows a healthy amount of potential available capacity across the grid. However, 8% of the primary substations, which equates to 38 primary substations, are either RAG rated at a 'red' i.e., 0-1 MVA or a 'grey' resulting in a negative capacity. **Error! Reference source not found.** provides an illustration of how many EVCPs in simultaneous use, 1 MVA and 3 MVA can support.

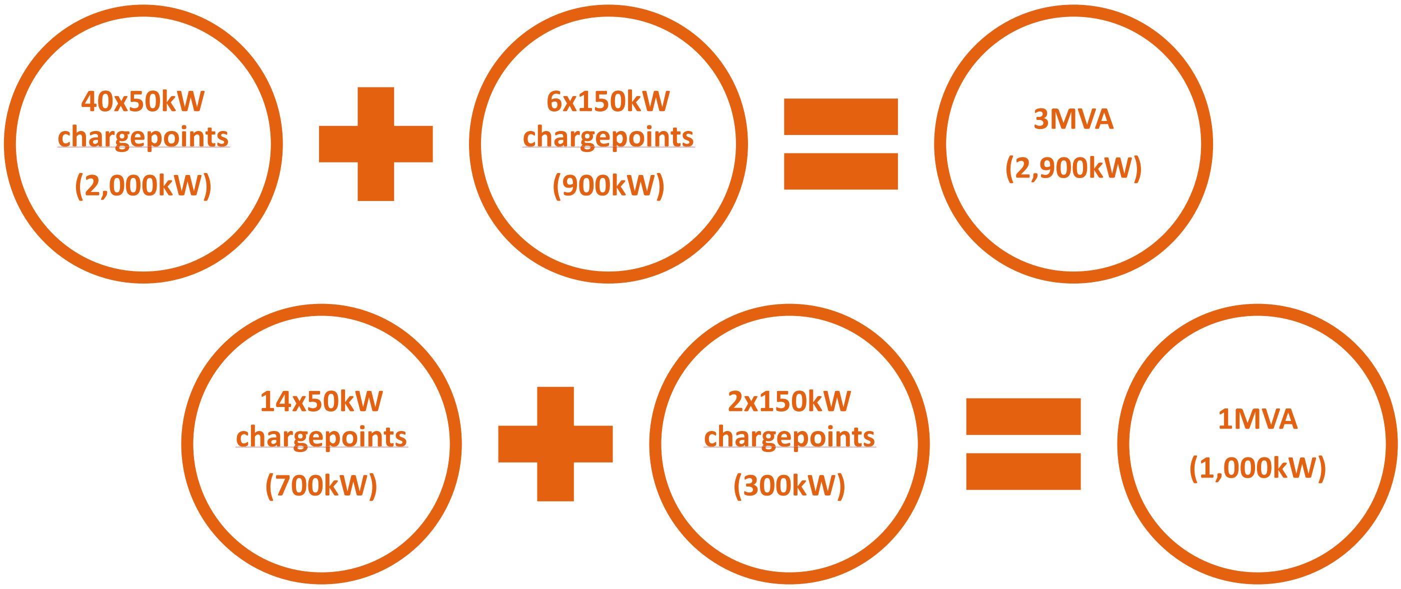

Figure 7 EVCP power equivalent of MVA

4.1.10 Individual grid capacity plans have been developed for each of the sixteen LTAs. These are shown in Appendix C: Grid Capacity Plans – 16 LTAs.Appendix C: Grid Capacity Plans – 16 LTAs

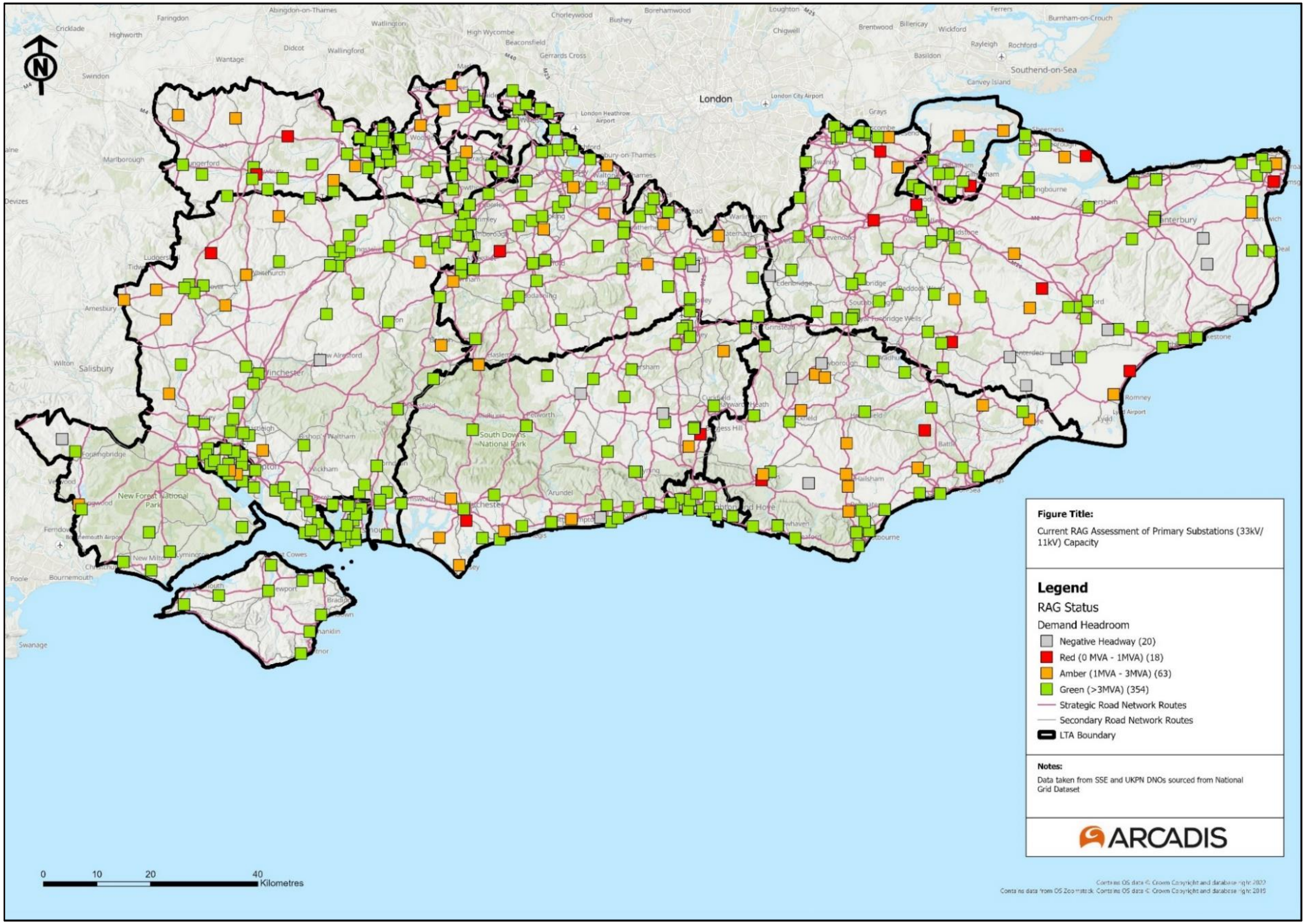

Figure 8 Current RAG assessment of primary substations within TfSE area

5 Conclusions

5.1.1 This working paper provides the evidence base to inform TfSE's EVCI Strategy by establishing the current EV trends, the existing and planned public EVCP infrastructure and the available headroom capacity across the grid.

5.1.2 The DfT's vehicle registration data shows that the TfSE area had 30,879 privately owned BEVs registered by 2022 Q1, which is approximately a 9,000% increase in the number of BEVs since 2011 Q4. BEVs make up 0.74% of all vehicles registered within the TfSE area, this is above the average values for UK, England, Wales, Scotland, and Northern Ireland. However, this is still low when considering targets and forecasts projections for 2030. For example, under a medium uptake scenario, DfT's Road to Zero projection shows 50% of total vehicles registered are BEVs by 2030.

5.1.3 Based on the review of the existing and planned EVCP network across the TfSE study area, by utilising NCR data, Zap-Map, and data provided by the LTAs, a total of 2,308 public EVCPs have been identified, of which there were:

- 893 slow EVCPs
- 1,114 fast EVCPs
- 301 rapid/ultra-rapid EVCPs

5.1.4 Using data based on BEVs registered by 2022 Q1 and the total number of existing public EVCPs as of October 2022, the total ratio of BEVs:EVCPs across the TfSE area was 16.5:1. It is important to note that this data only includes privately registered BEVs. Therefore, when including company registered BEVs the ratios may increase significantly, but additional EVCI will be available from company fleet operators, so it is assumed to have no net change to the BEV:EVCP ratio.

5.1.5 Given the accelerating growth in BEV uptake, this highlights the need for rapidly increased EVCP provision and long-term planning in order to ensure this ratio can be maintained, or preferably, reduced to meet the IEA recommended level of 10:1 BEVs:EVCPs which should be considered a best-in-class aspiration for the TfSE area to reach.

5.1.6 In terms of the primary substation capacity assessment, 78% of the substations have been RAG rated as 'green' showing capacity above 3 MVA, 14% between 3MVA and 1MVA (rated 'amber'), and 8% (38) of primary substations deemed to be rated as either 'red' or 'grey' indicating capacity between '0 and 1 MVA' and 'negative headroom capacity', respectively.

5.1.7 This working paper highlights the rapidly increasing number of EVs within the TfSE area and the relatively high ratio of EVs to EVCPs at a local scale. By understanding the baseline context, guidance can be provided for LTAs to plan EVCI provision to meet future EV uptake.

REFERENCES

EVAdoption, 'What is the 'Minimum Acceptable' Ratio of EVs to Charging Stations?' (2019). https://evadoption.com/what-is-the-ideal-ratio-of-evs-to-charging-stations/

Fleet News, 'Ratio of public charge points to electric vehicles falls' (2021). https://www.fleetnews.co.uk/news/latest-fleet-news/electric-fleet-news/2021/12/01/ratio-of-public-charge-points-to-electric-vehicles-falls

HM Government, 'Vehicle licensing statistics data tables' (2022). https://www.gov.uk/government/statistical-data-sets/all-vehicles-veh01

SMMT, 'Car charging point numbers fall behind as plug in vehicles surge' (2021). Car charging point numbers fall behind as plug-in vehicles surge - SMMT

Zap-Map, 'Electric vehicle market statistics 2023' (2023). https://www.zap-map.com/ev-market-statistics/

Zap-Map, 'EV Charging Statistics 2023' (2023). https://www.zap-map.com/statistics/

Appendix A: Registered Privately Owned BEV Trends – 16 LTAs

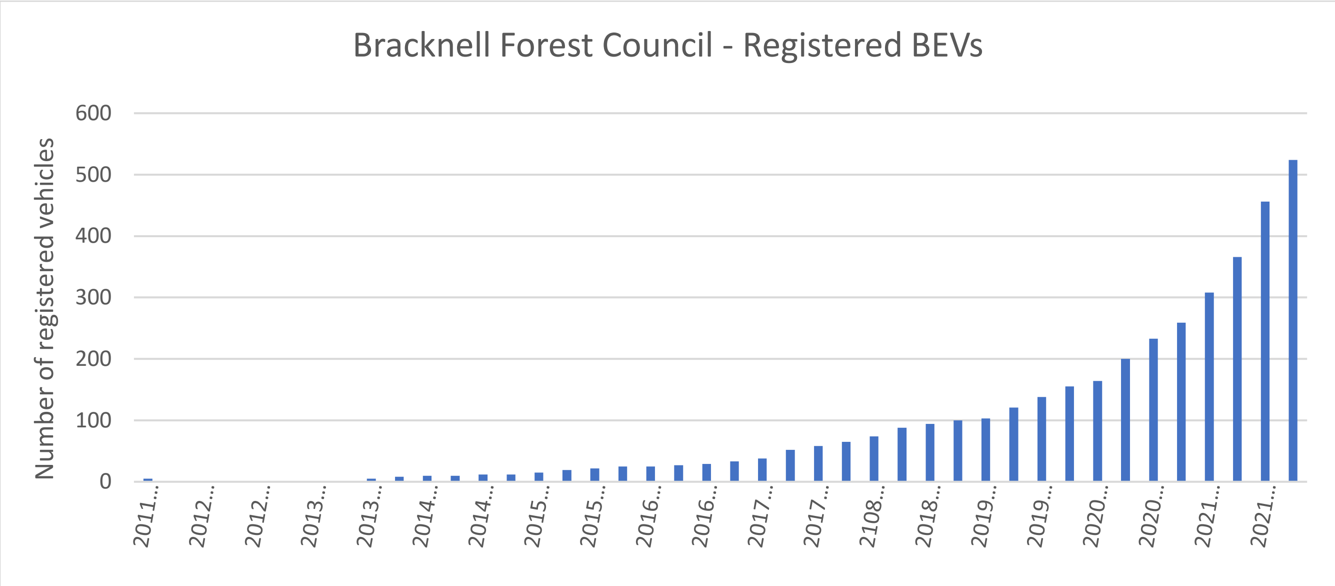

Figure 9 Bracknell Forest registered BEVs 2011-2021

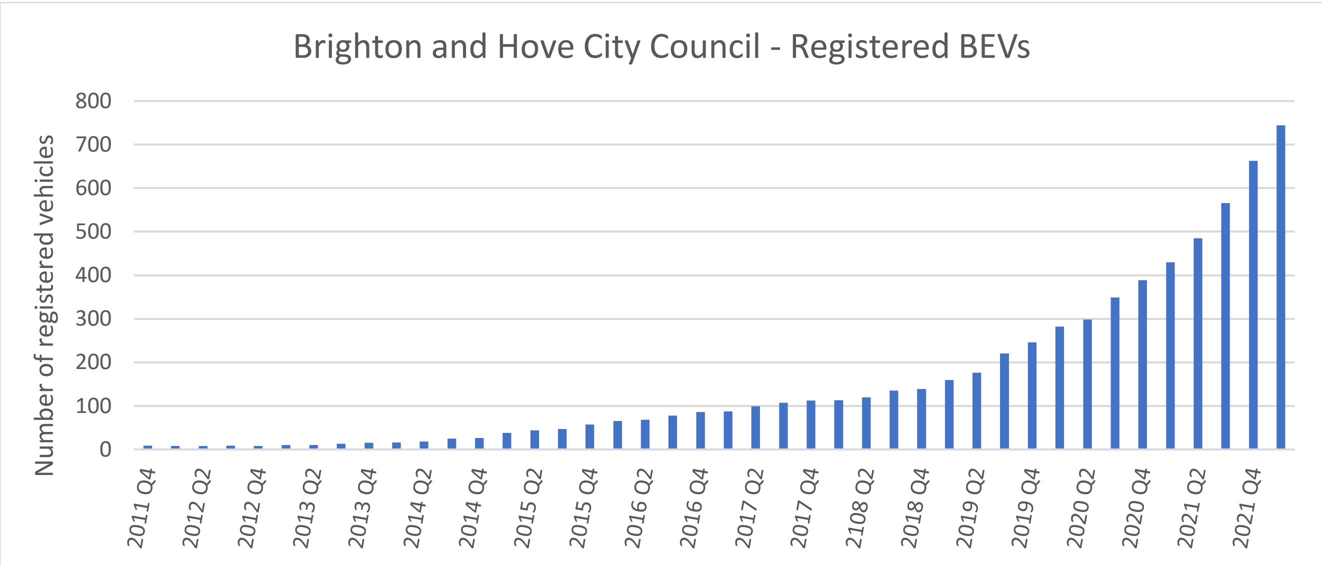

Figure 10 Brighton and Hove registered BEVs 2011 – 2021

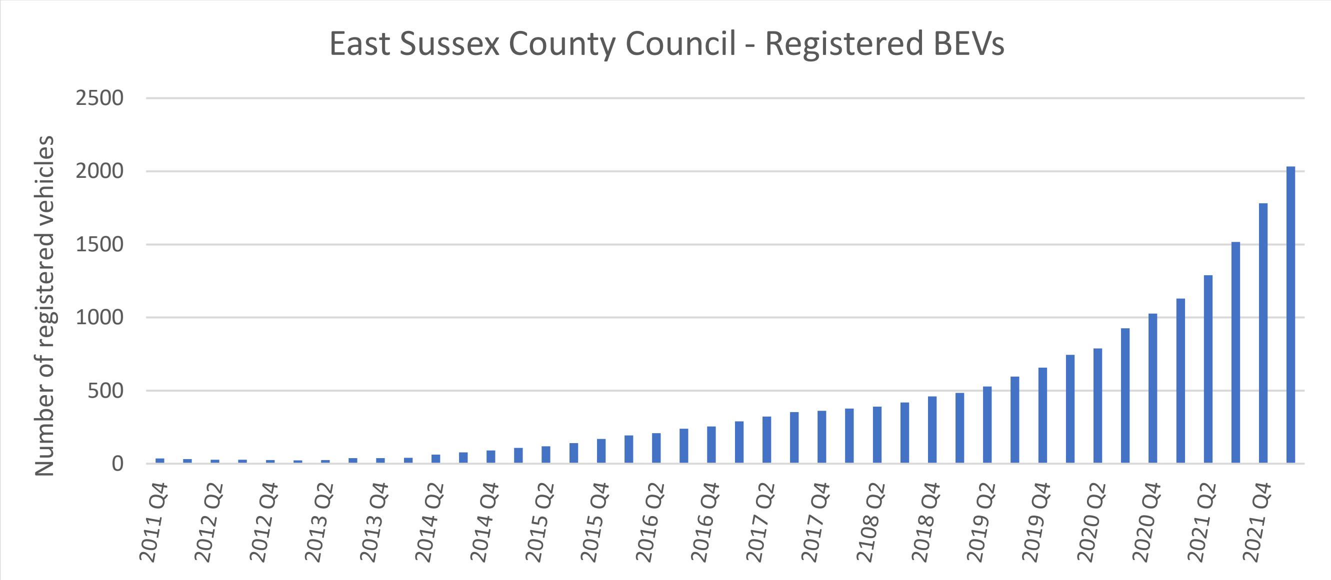

Figure 11 East Sussex registered BEVs 2011 – 2021

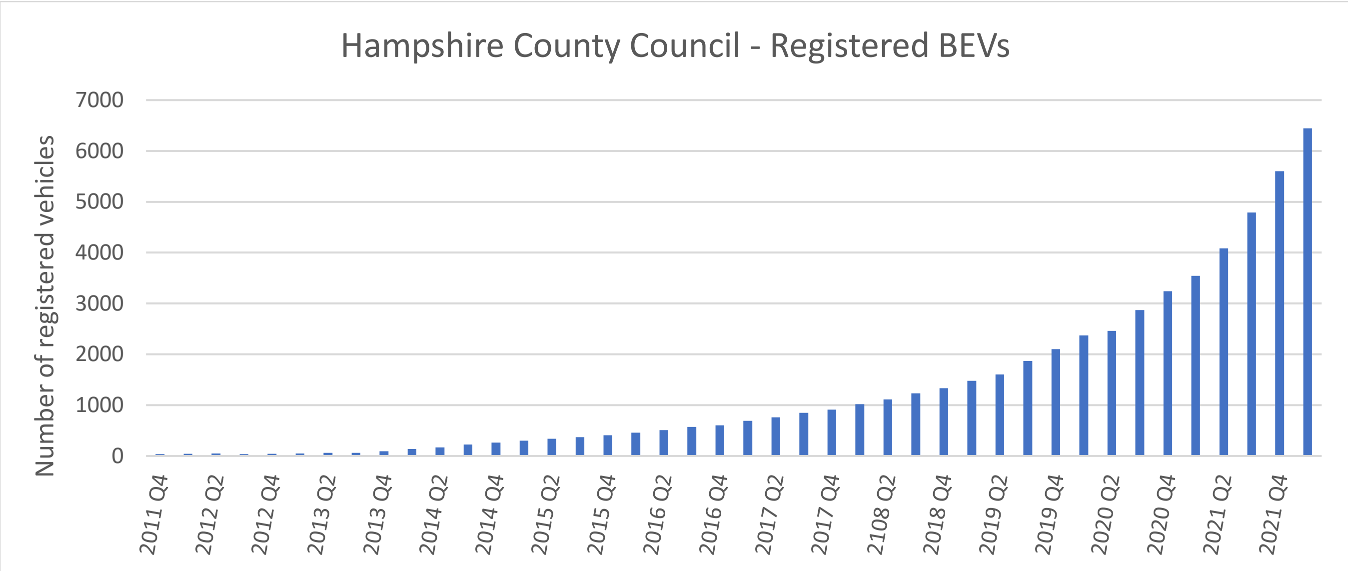

Figure 12 Hampshire registered BEVs 2011 – 2021

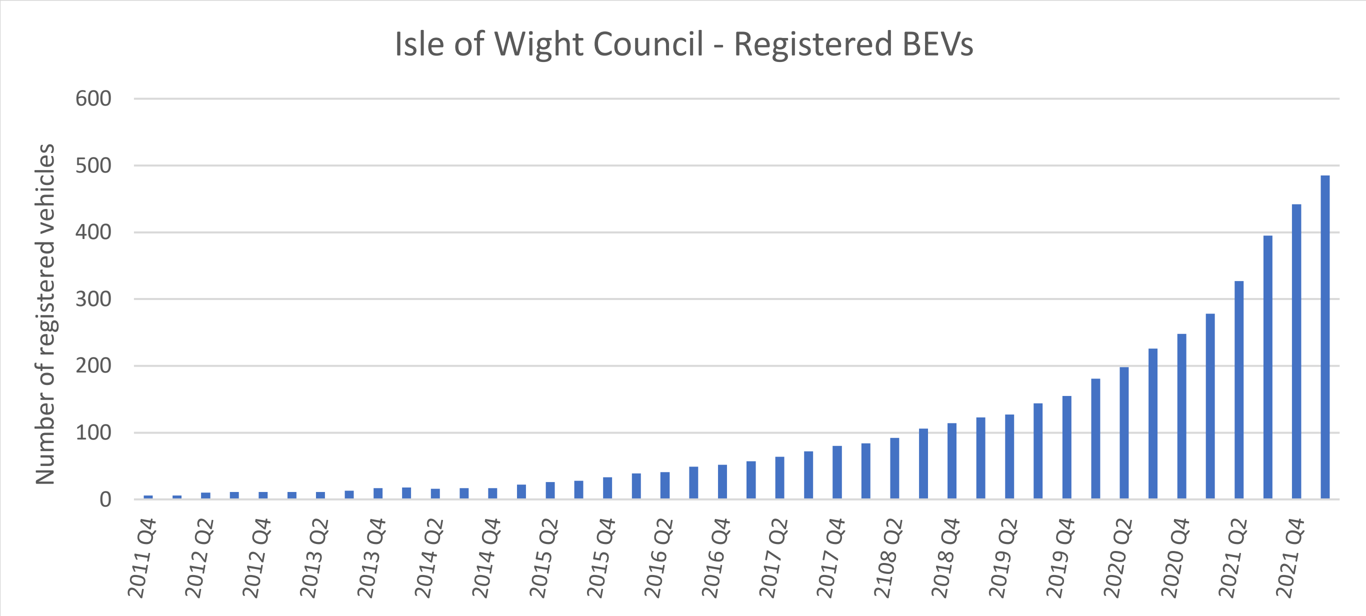

Figure 13 Isle of Wight registered BEVs 2011 – 2021

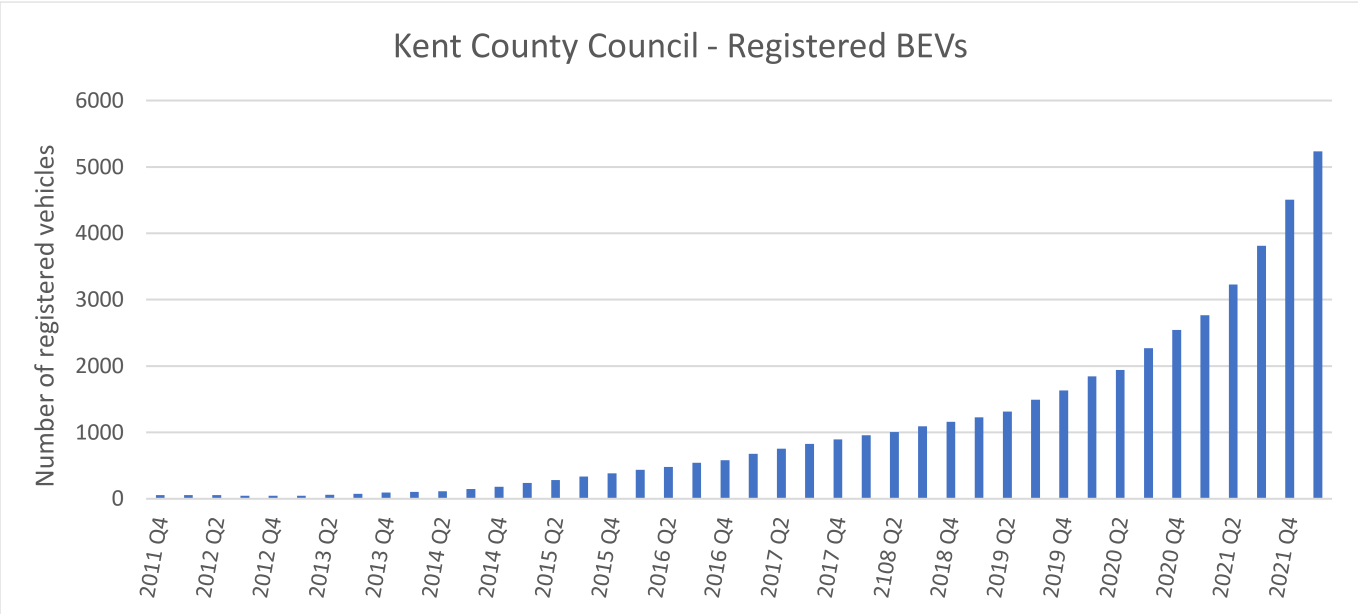

Figure 14 Kent registered BEVs 2011 – 2021

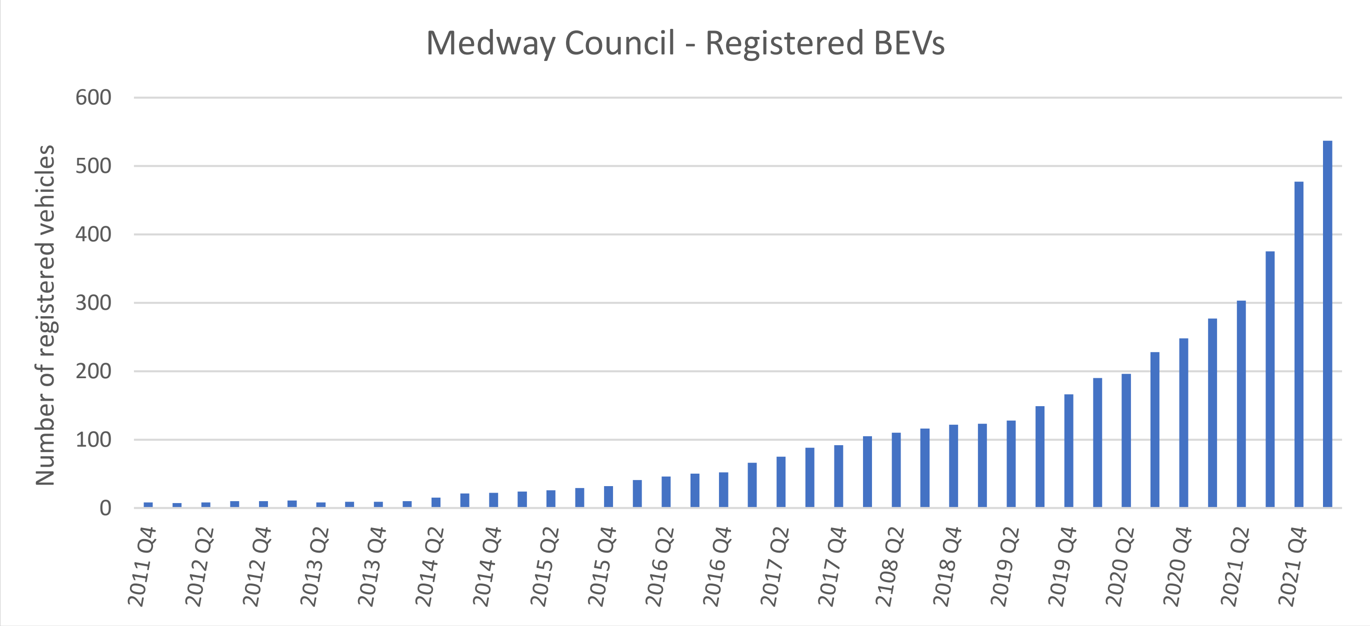

Figure 15 Medway registered BEVs 2011 – 2021

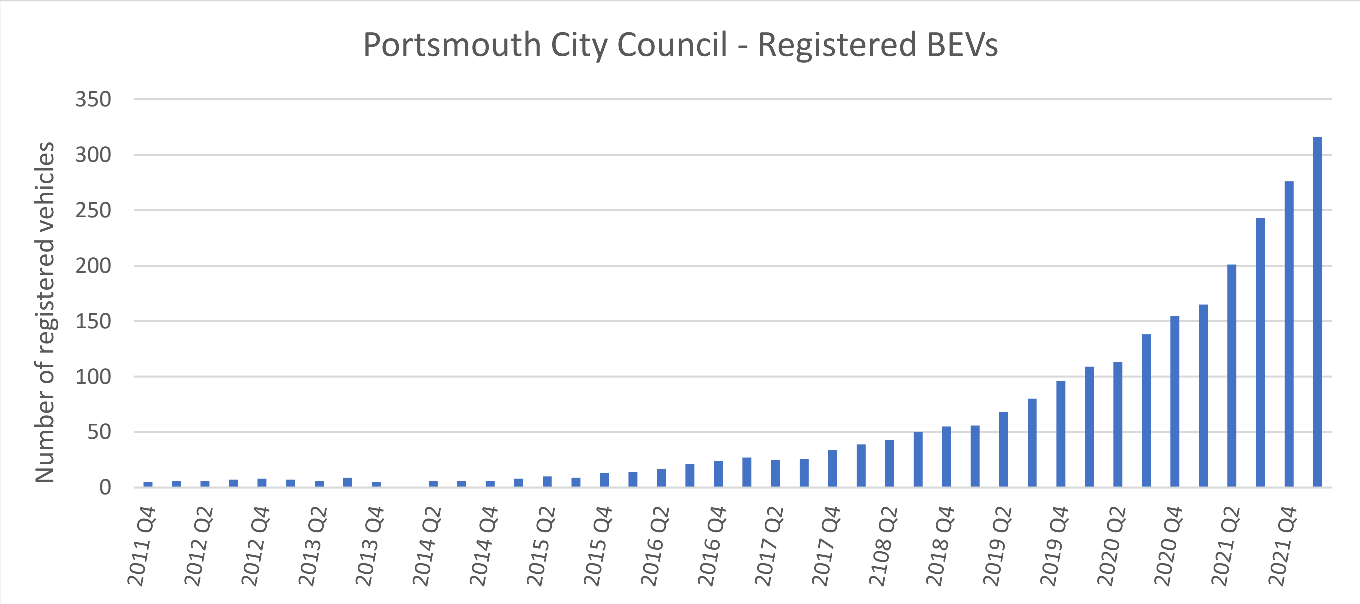

Figure 16 Portsmouth registered BEVs 2011 – 2021

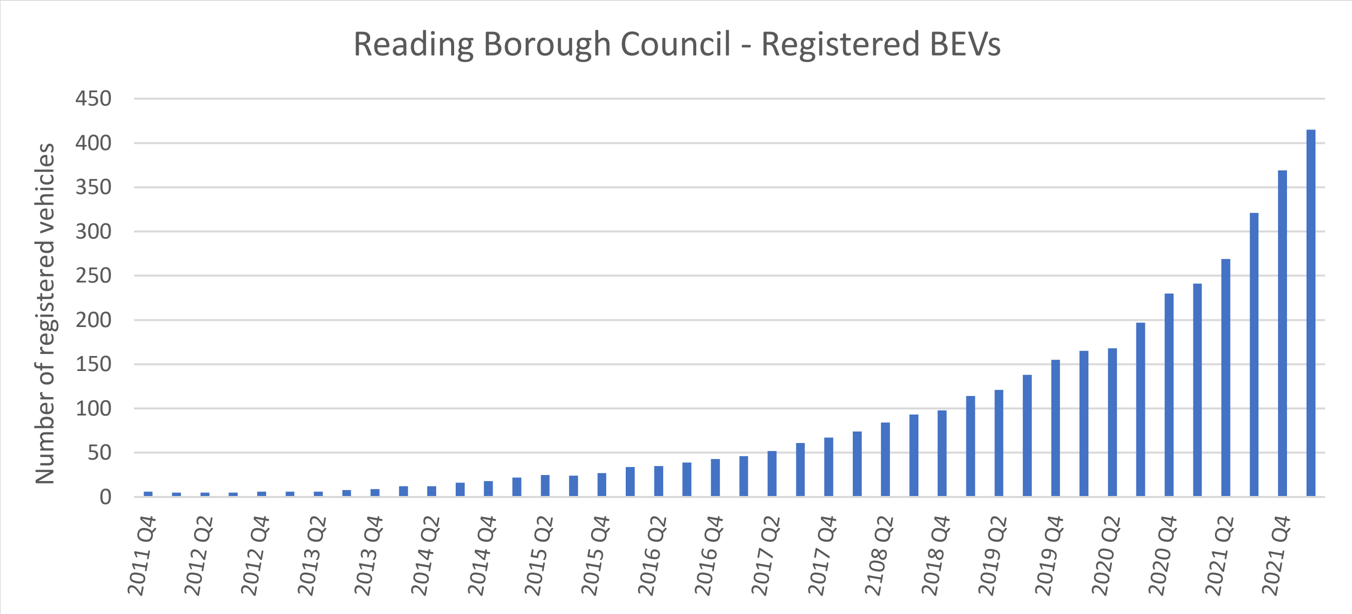

Figure 17 Reading registered BEVs 2011 – 2021

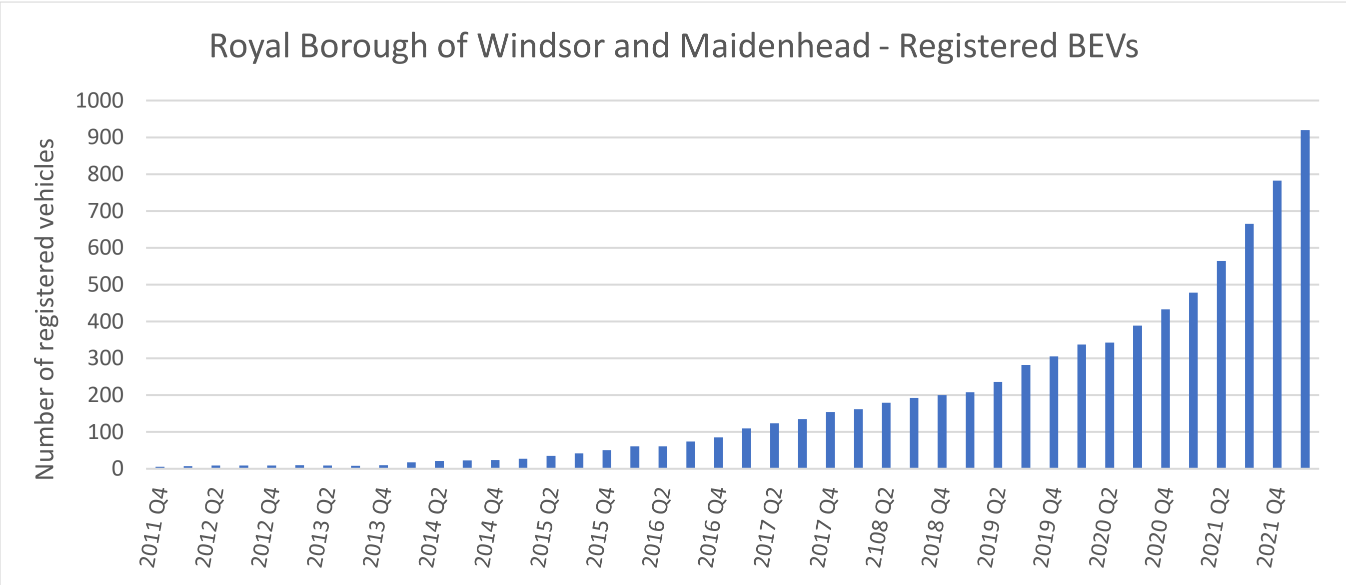

Figure 18 Windsor and Maidenhead registered BEVs 2011-2021

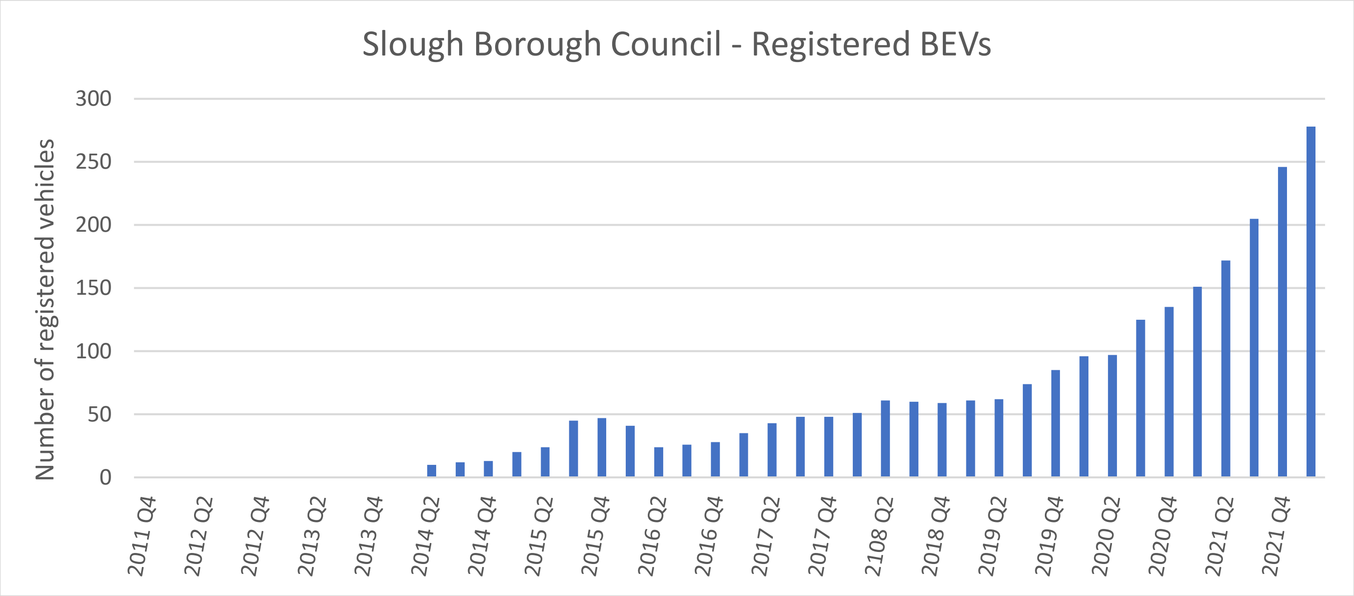

Figure 19 Slough registered BEVs 2011 – 2021

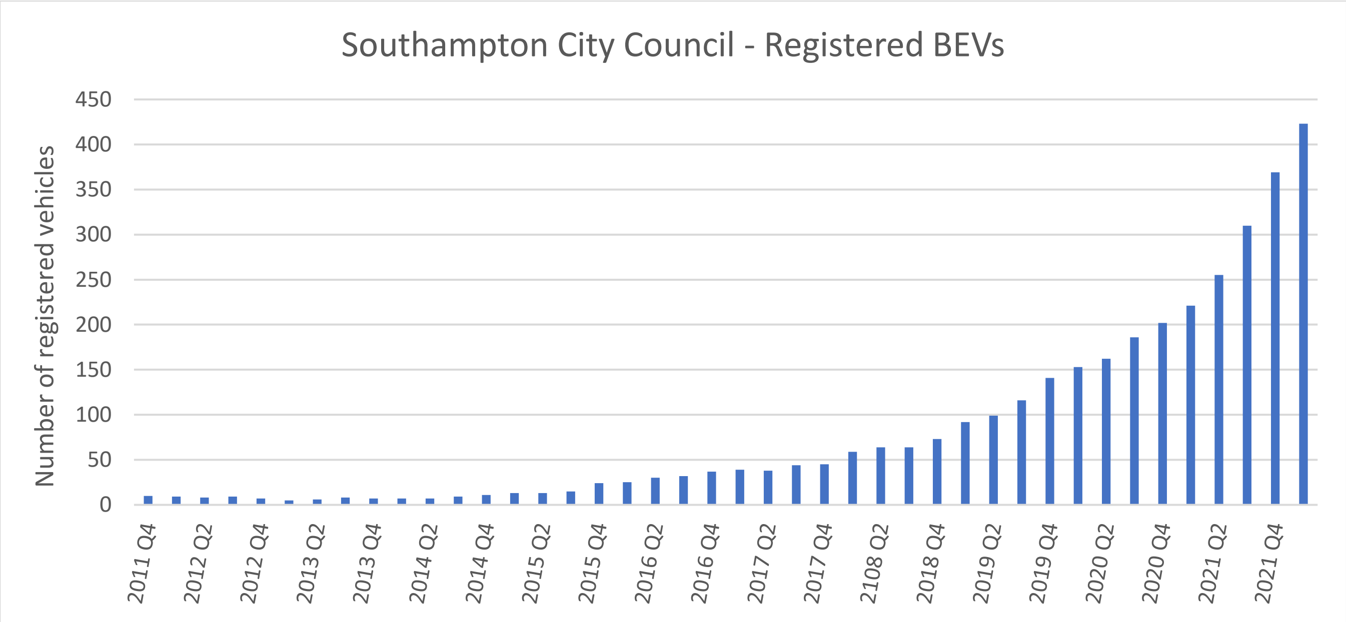

Figure 20 Southampton registered BEVs 2011 – 2021

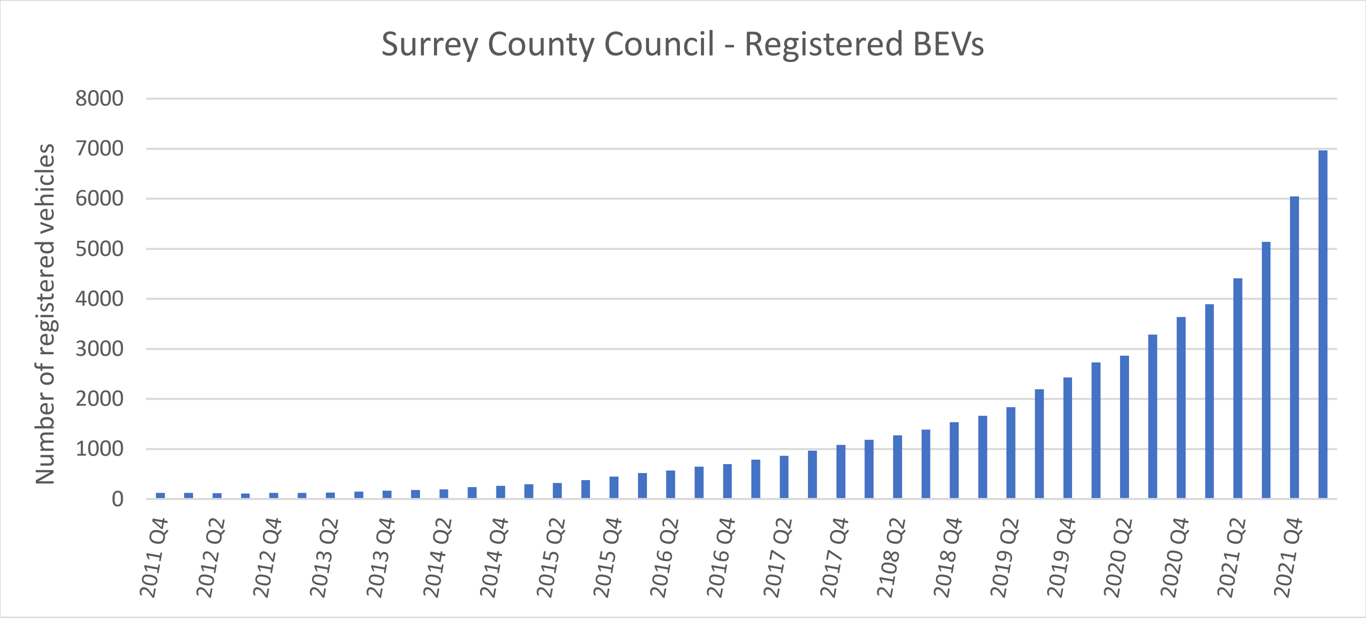

Figure 21 Surrey registered BEVs 2011 – 2021

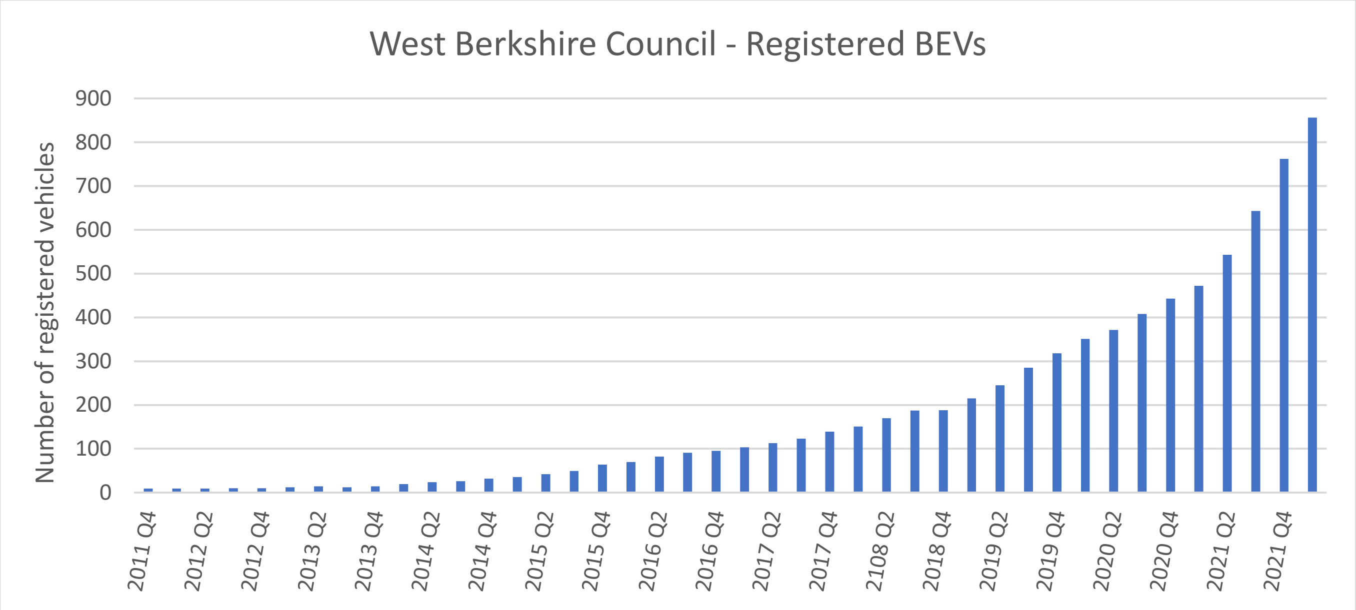

Figure 22 West Berkshire registered BEVs 2011 – 2021

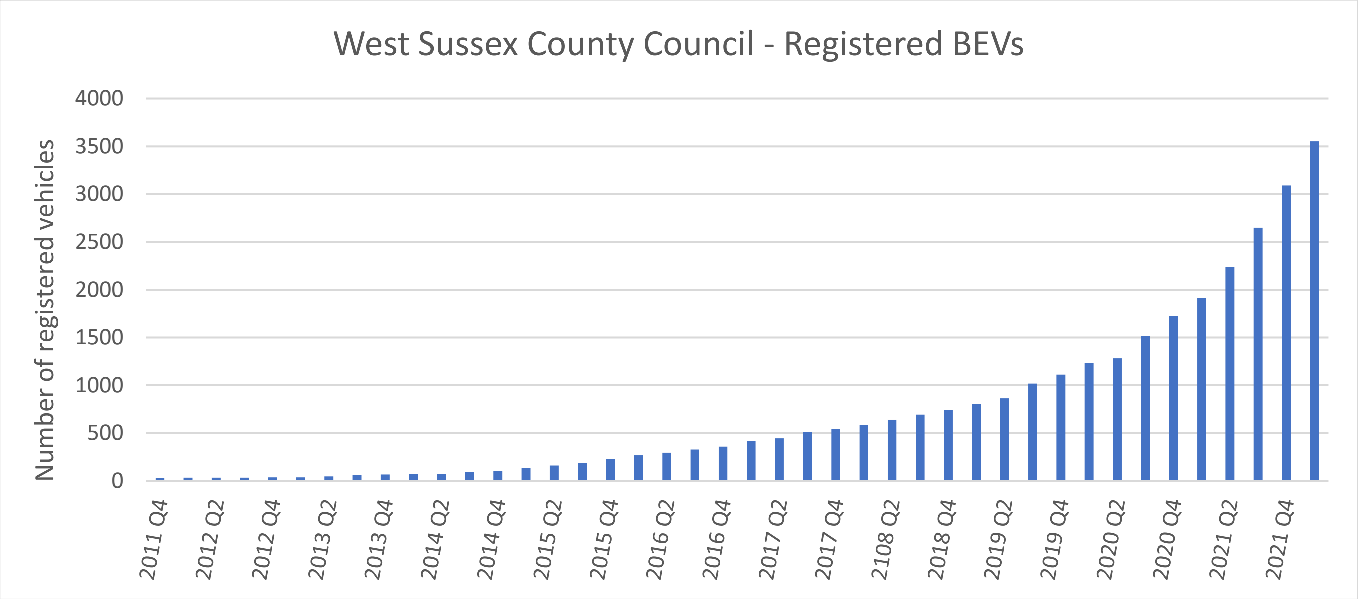

Figure 23 West Sussex registered BEVs 2011 – 2021

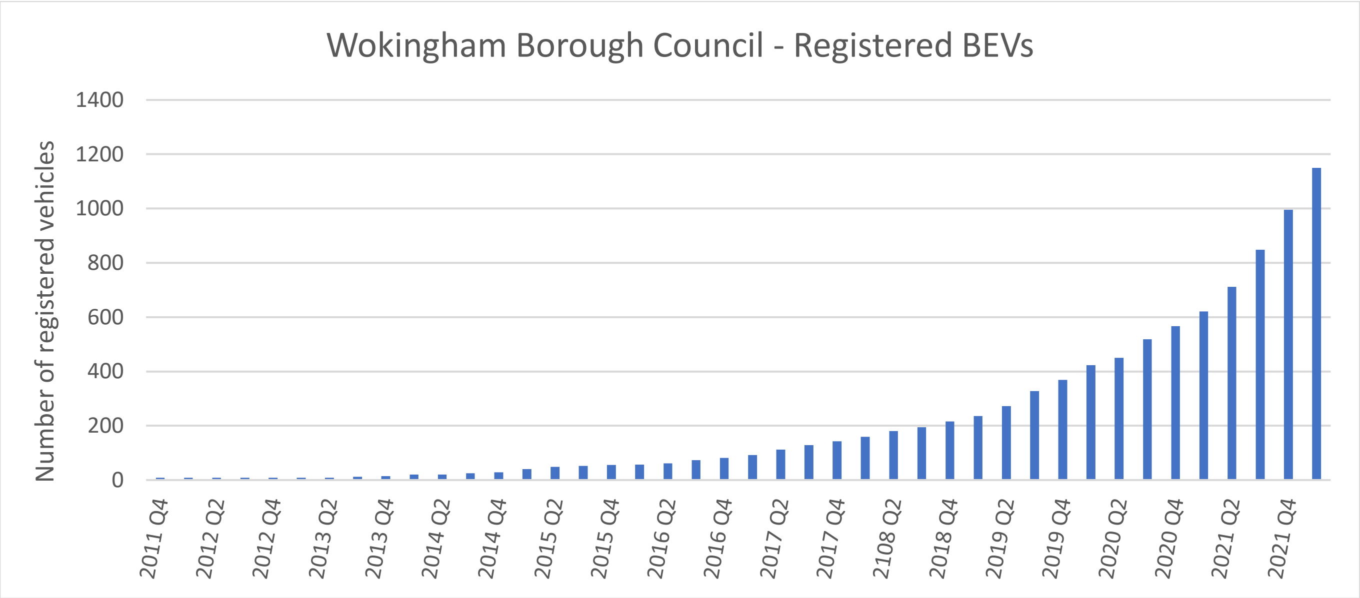

Figure 24 Wokingham registered BEVs 2011 – 2021

Appendix B: EVCP Network Maps – 16 LTAs

These maps represent existing and planned EVCP.

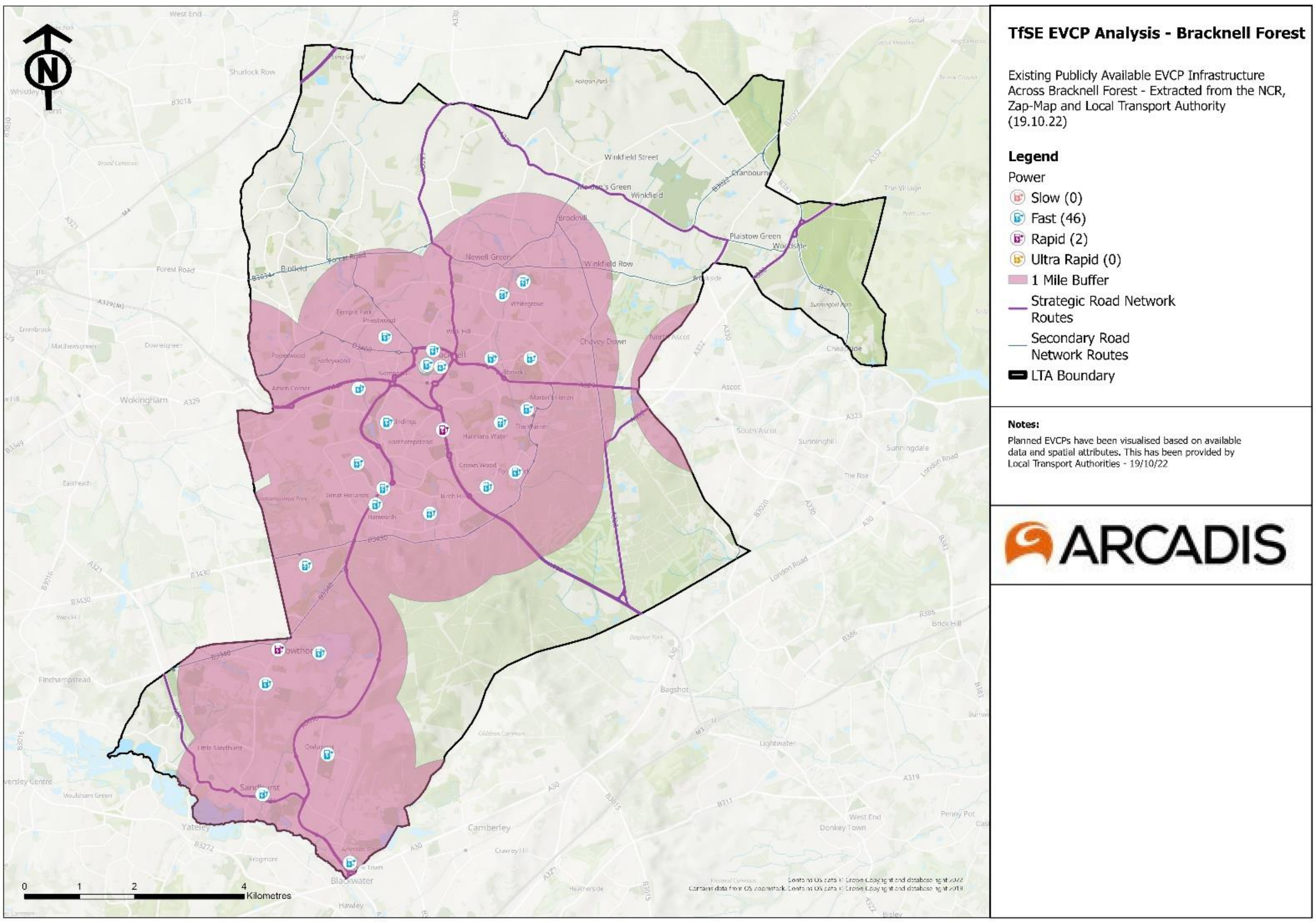

Figure 25 Bracknell Forest EVCP network

Figure 25 shows the EVCP network within Bracknell Forest. There is a distributed network of EVCPs around Bracknell with a small number of EVCPs in Crowthorne, Owlsmoor and Sandhurst. The area consists almost solely of fast chargers (46).

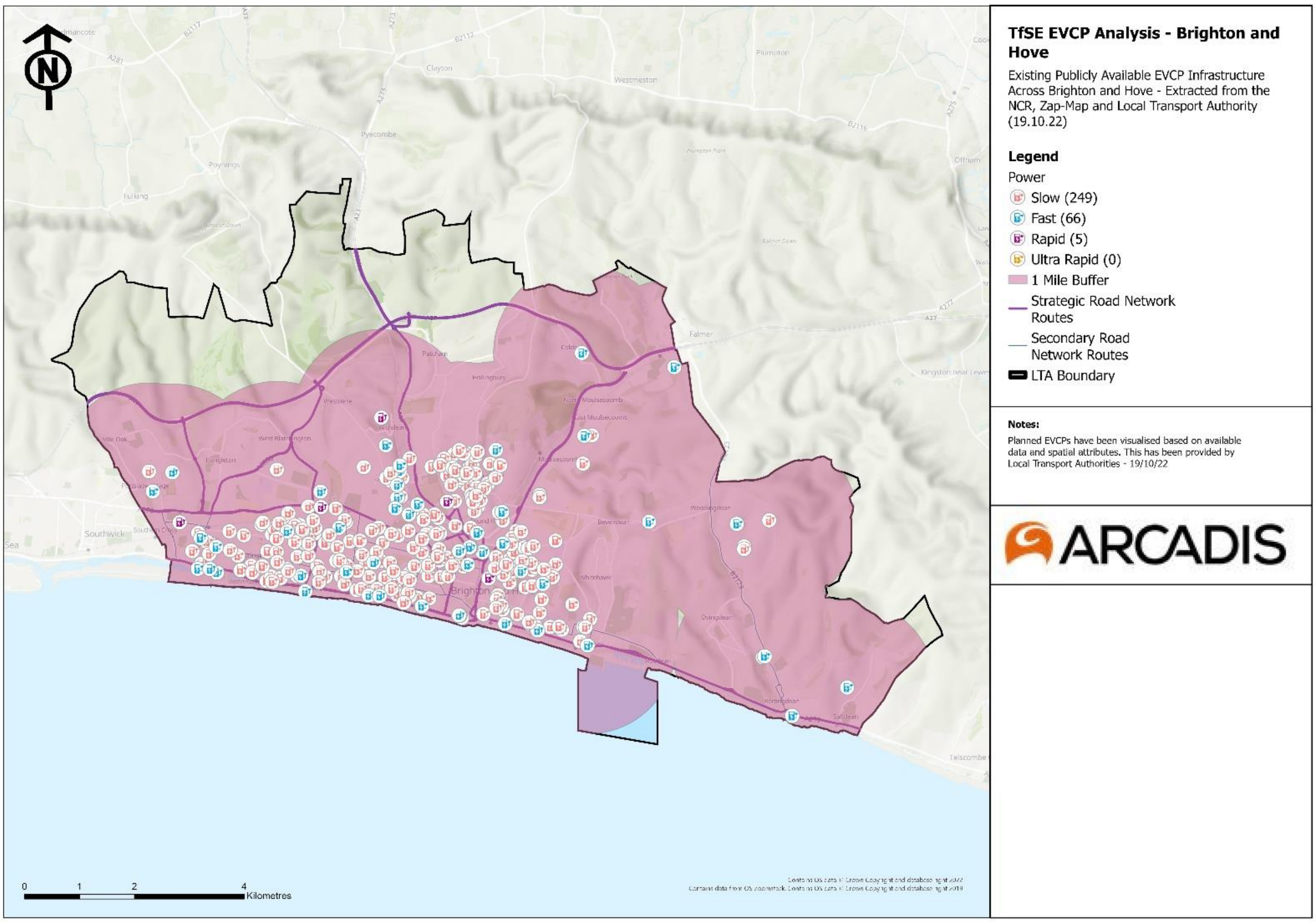

Figure 26 Brighton and Hove EVCP network

Figure 26 shows the Brighton and Hove EVCP network, this shows a dense network of chargers within Brighton and Hove. The area consists predominantly of slow chargers (249), however, there are some fast chargers (66). There are a small number of rapid chargers (5) and no ultra-rapid chargers.

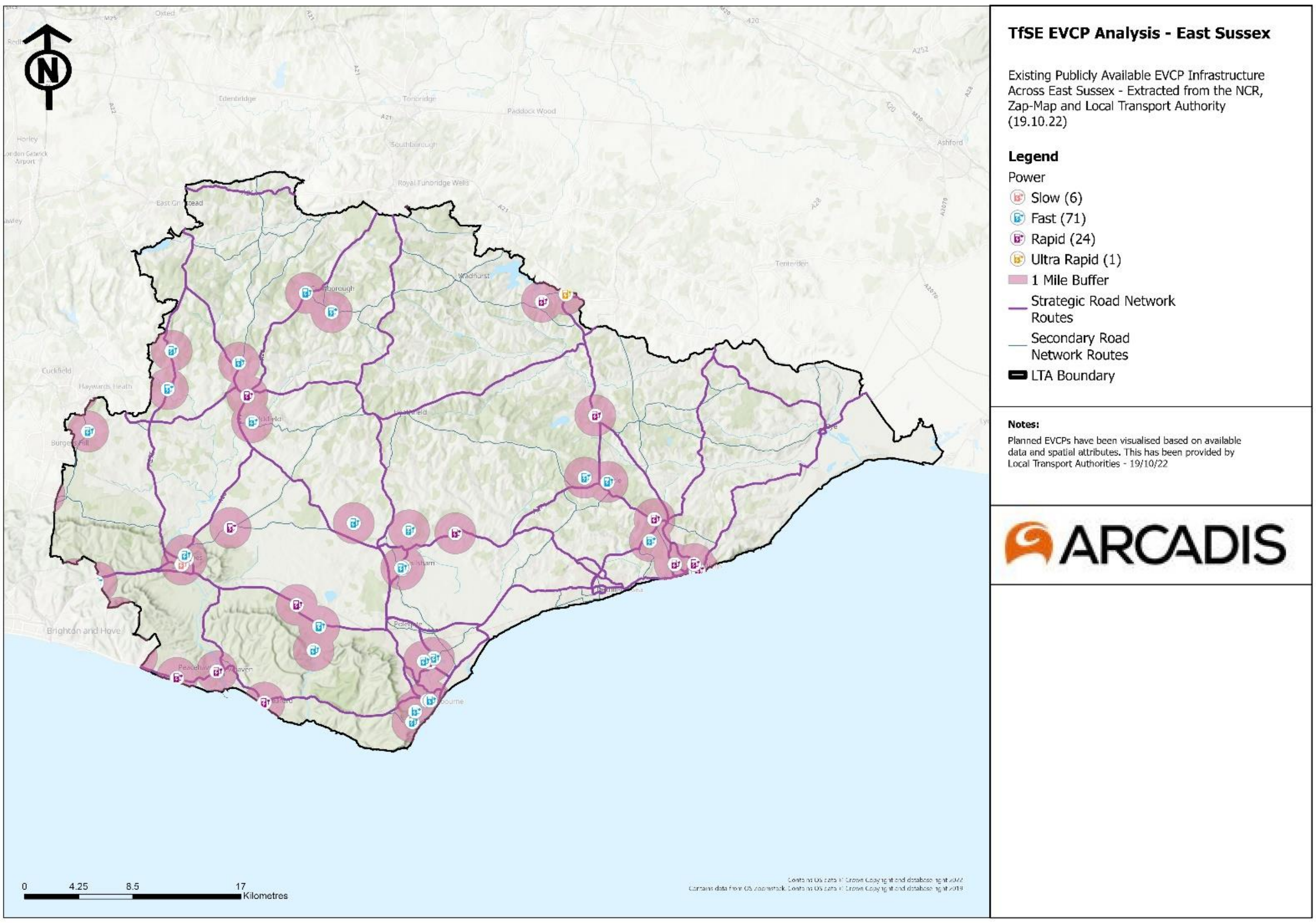

Figure 27 East Sussex EVCP network

Figure 27 shows the EVCP network in East Sussex. The predominant types of chargers within East Sussex are fast chargers (71). These are mainly located within the built-up areas on the south coast or along the strategic road network. East Sussex is one of the more rural geographies and therefore, has a more dispersed network of chargers.

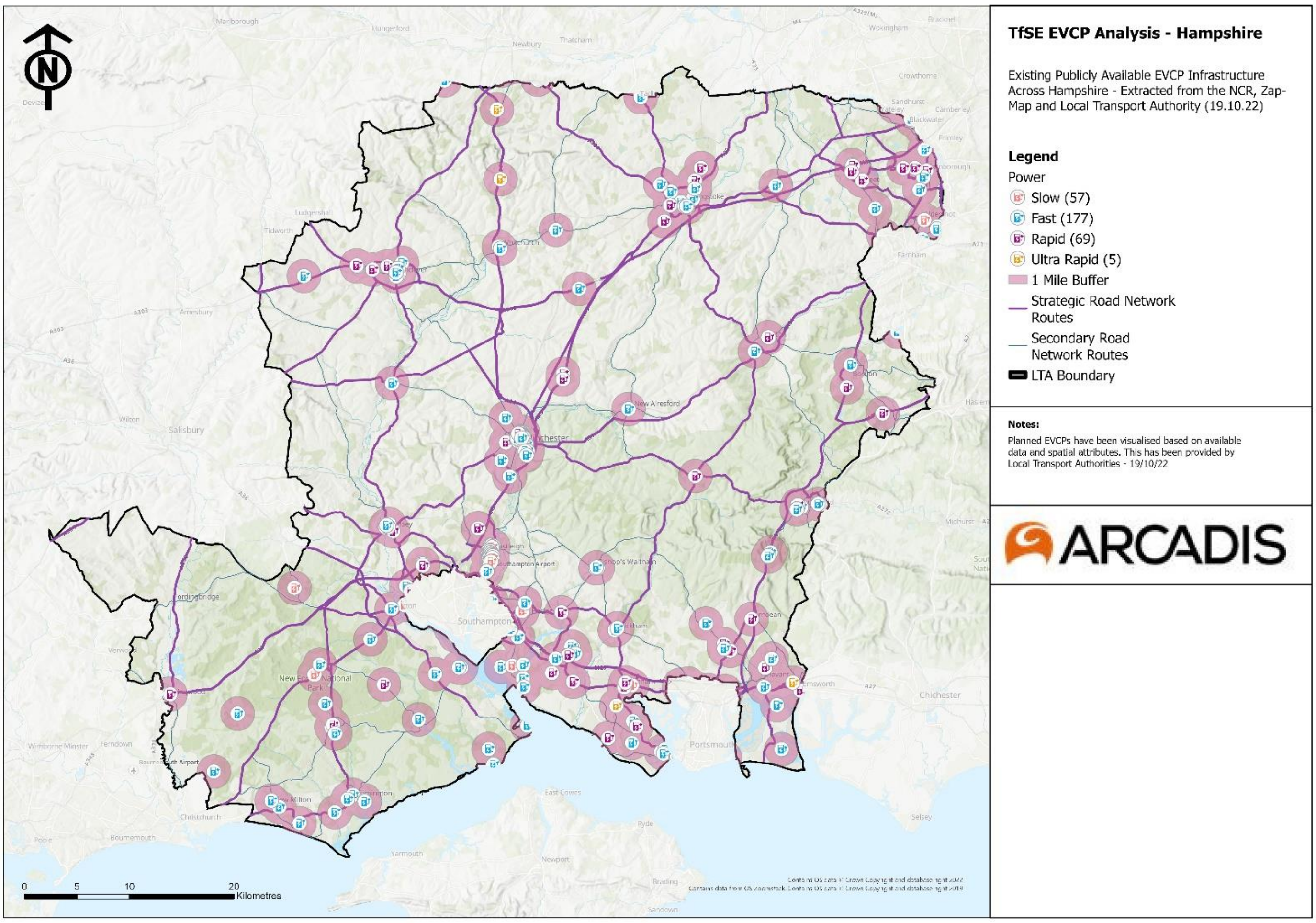

Figure 28 Hampshire EVCP network

Figure 28 shows the number of EVCPs within Hampshire. There is a high concentration of chargers around the outskirts of Southampton and Portsmouth, with clusters in the larger built-up areas of Winchester, Basingstoke and Farnborough. The vast number of EVCPs are fast chargers (177), accompanied by 69 rapid chargers and 57 slow chargers. 5 ultra rapids have been identified across Hampshire.

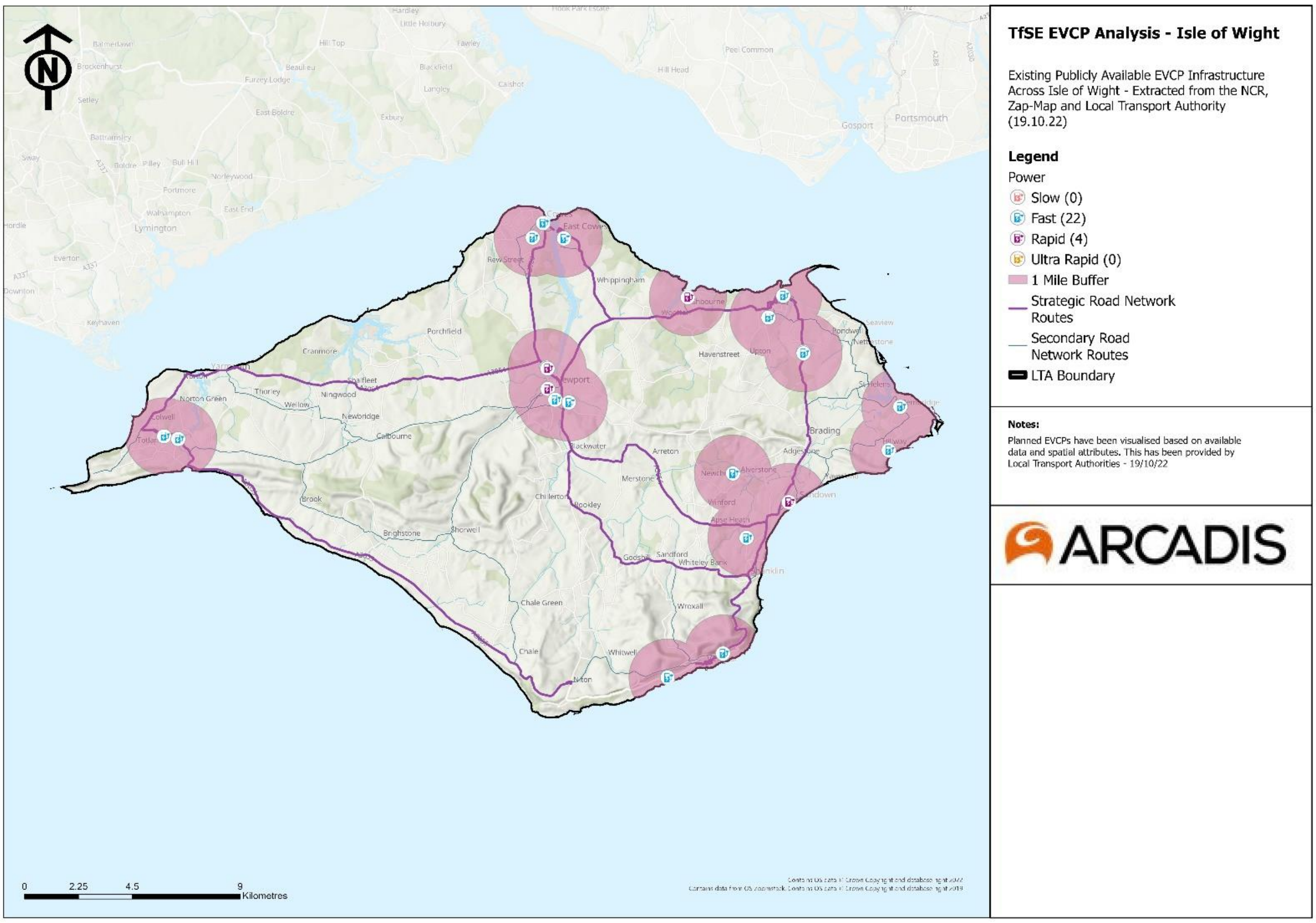

Figure 29 Isle of Wight EVCP network

Figure 29 shows the EVCPs on the Isle of Wight, there are 26 chargers in total. These predominantly consist of fast chargers. The chargers are mainly distributed among the northern and eastern side of the island.

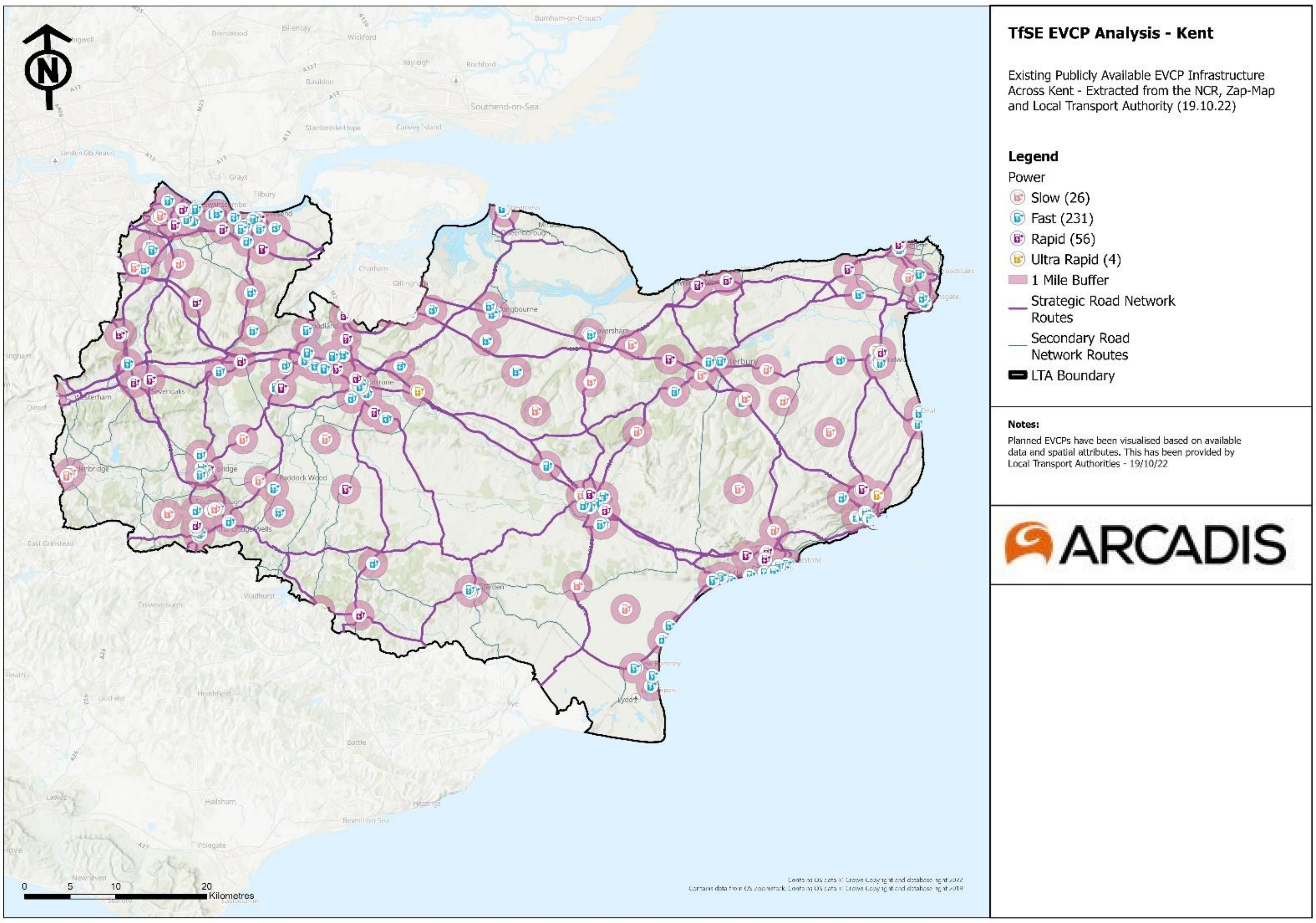

Figure 30 Kent EVCP network

Figure 30 shows the EVCP network within Kent. Kent consists predominantly of fast charger types (231). There are a small number of ultra-rapid chargers (4). There are high concentrations of EVCPs around Maidstone and Dartford with some smaller clusters around the built-up areas of Canterbury and Royal Tunbridge Wells. The rural chargers are based close to the strategic road network within Kent.

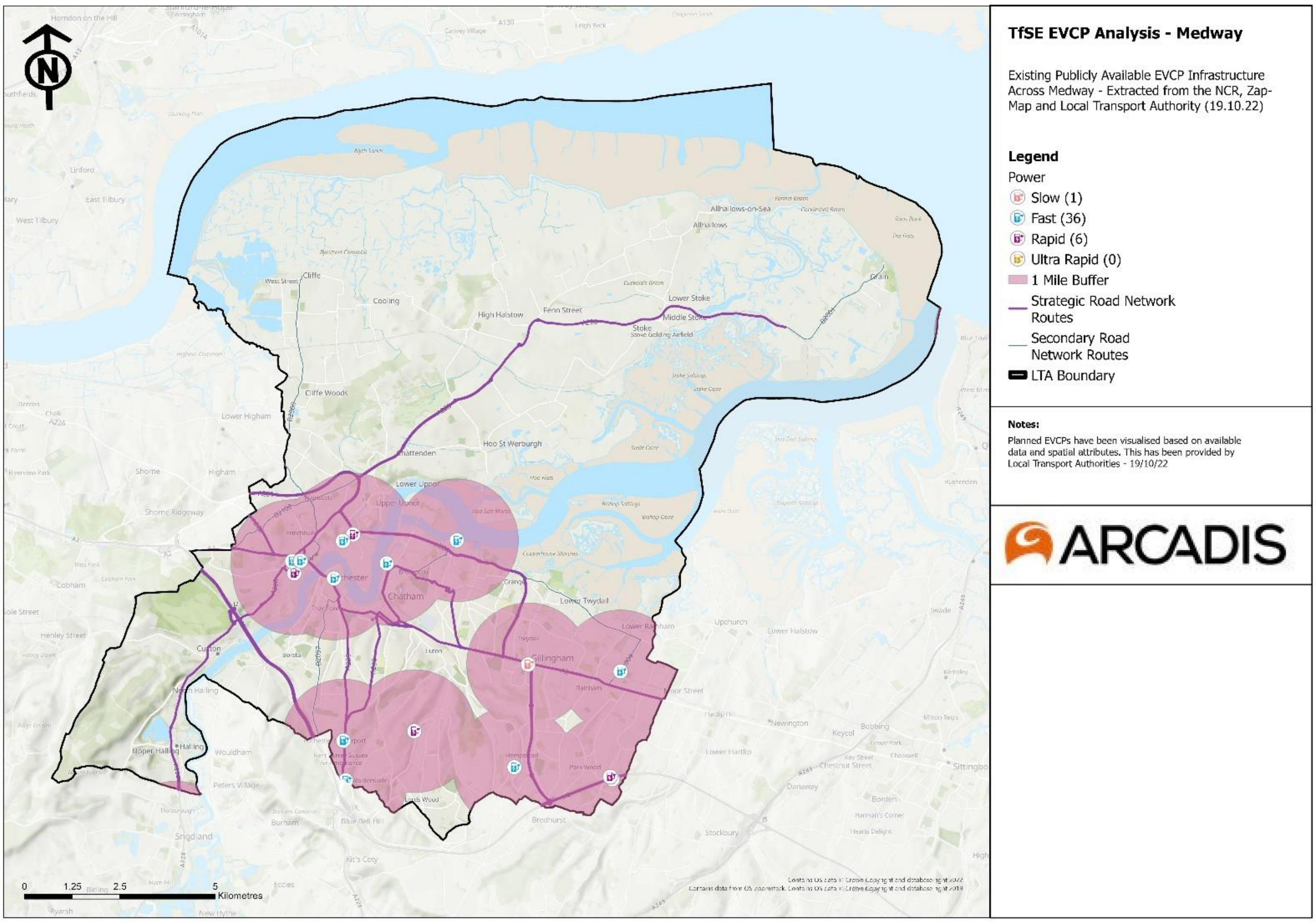

Figure 31 Medway EVCP network

Figure 31 shows the EVCP network within Medway, this network predominantly consists of fast chargers (36). The chargers are mainly concentrated around Rochester, with also a small number of chargers within Rainham. Most EVCPs are along the strategic road network within Medway.

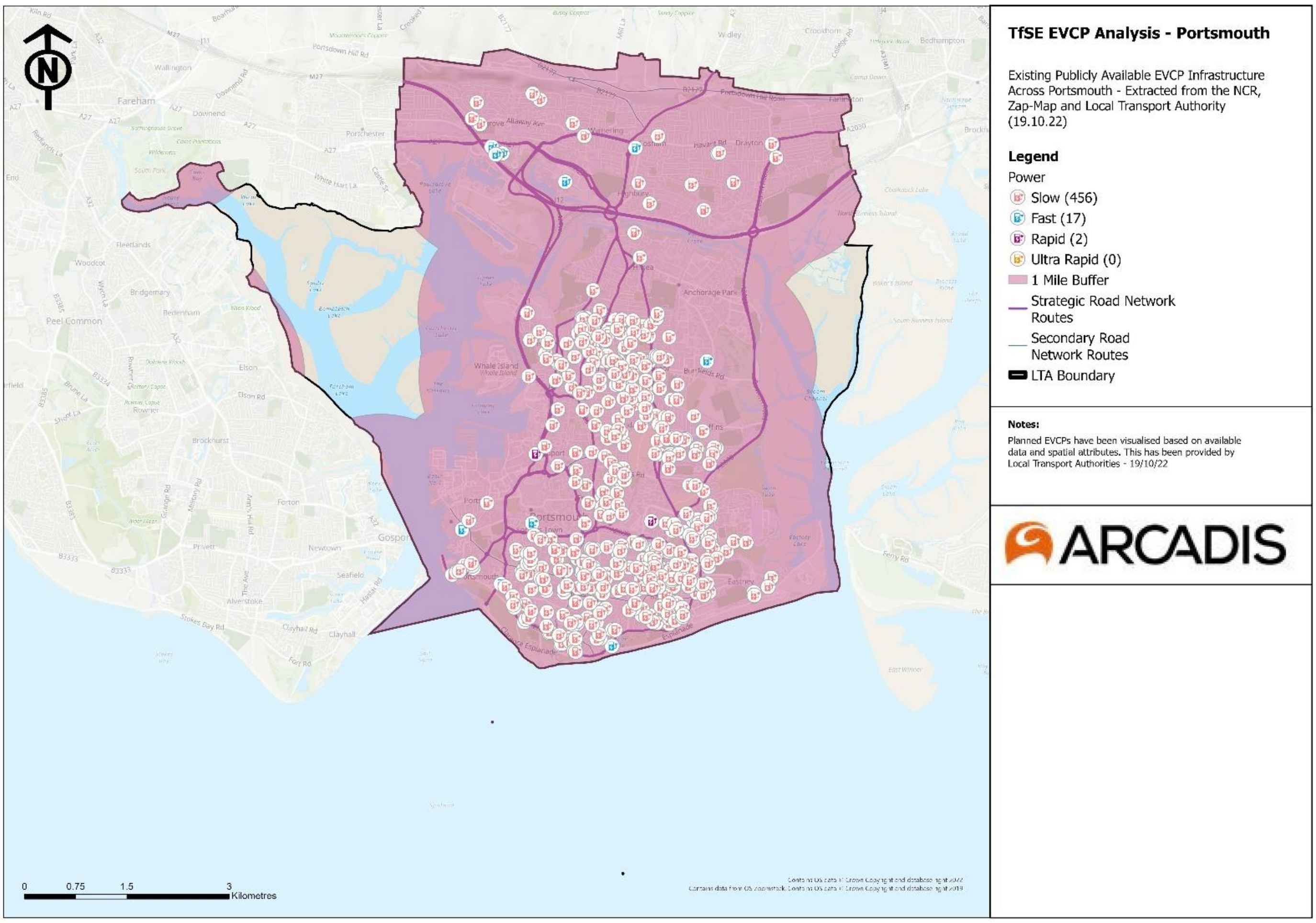

Figure 32 Portsmouth EVCP network

Figure 32 shows the EVCP network within Portsmouth. This is a densely populated network of chargers within the city, especially at the southern end. The predominant chargers are slow (456), with only 17 fast and 2 rapid chargers.

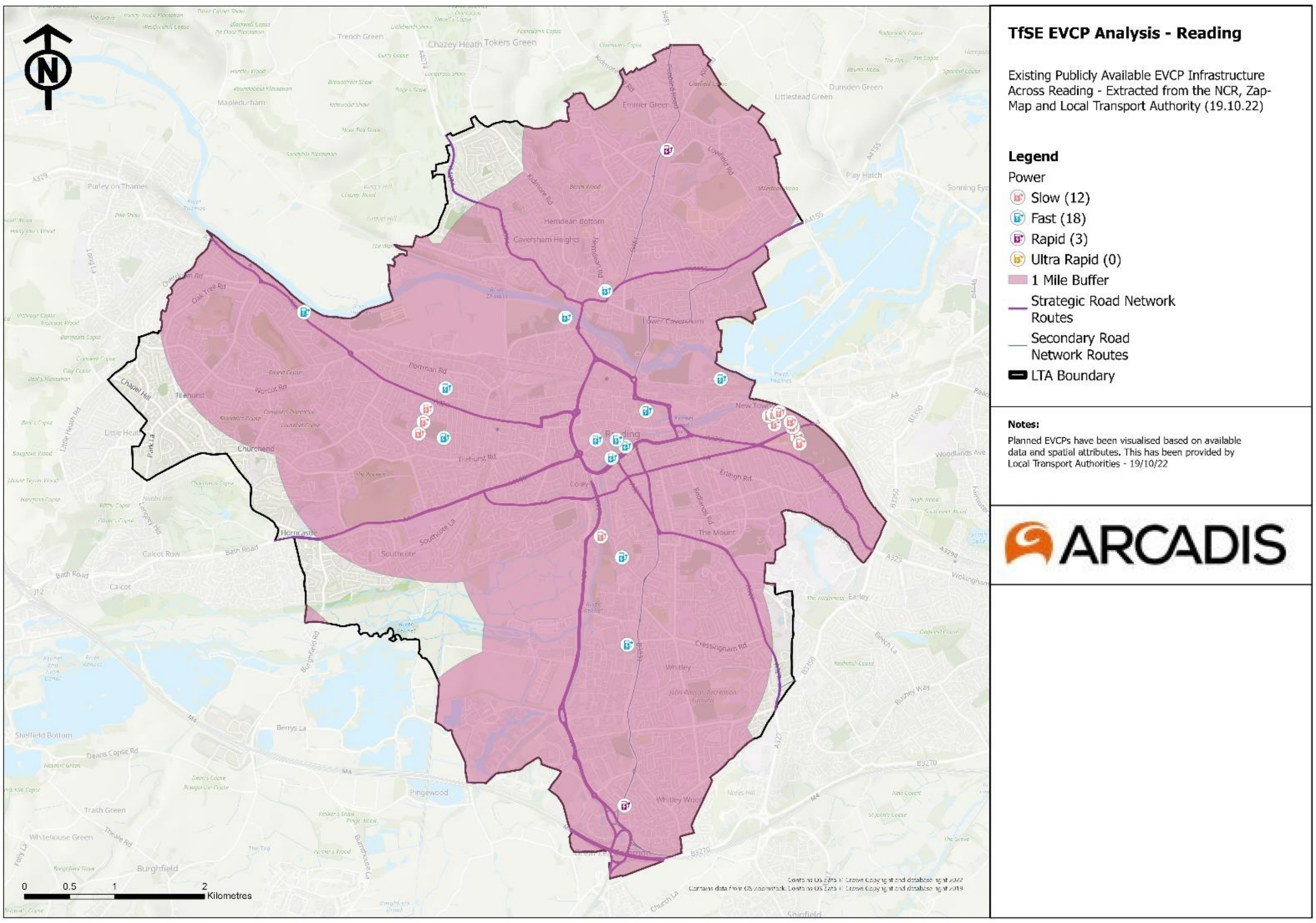

Figure 33 Reading EVCP network

Figure 33 shows the Reading EVCP network. There are 33 chargers within Reading itself predominantly made up of fast (18) and slow (12) chargers.

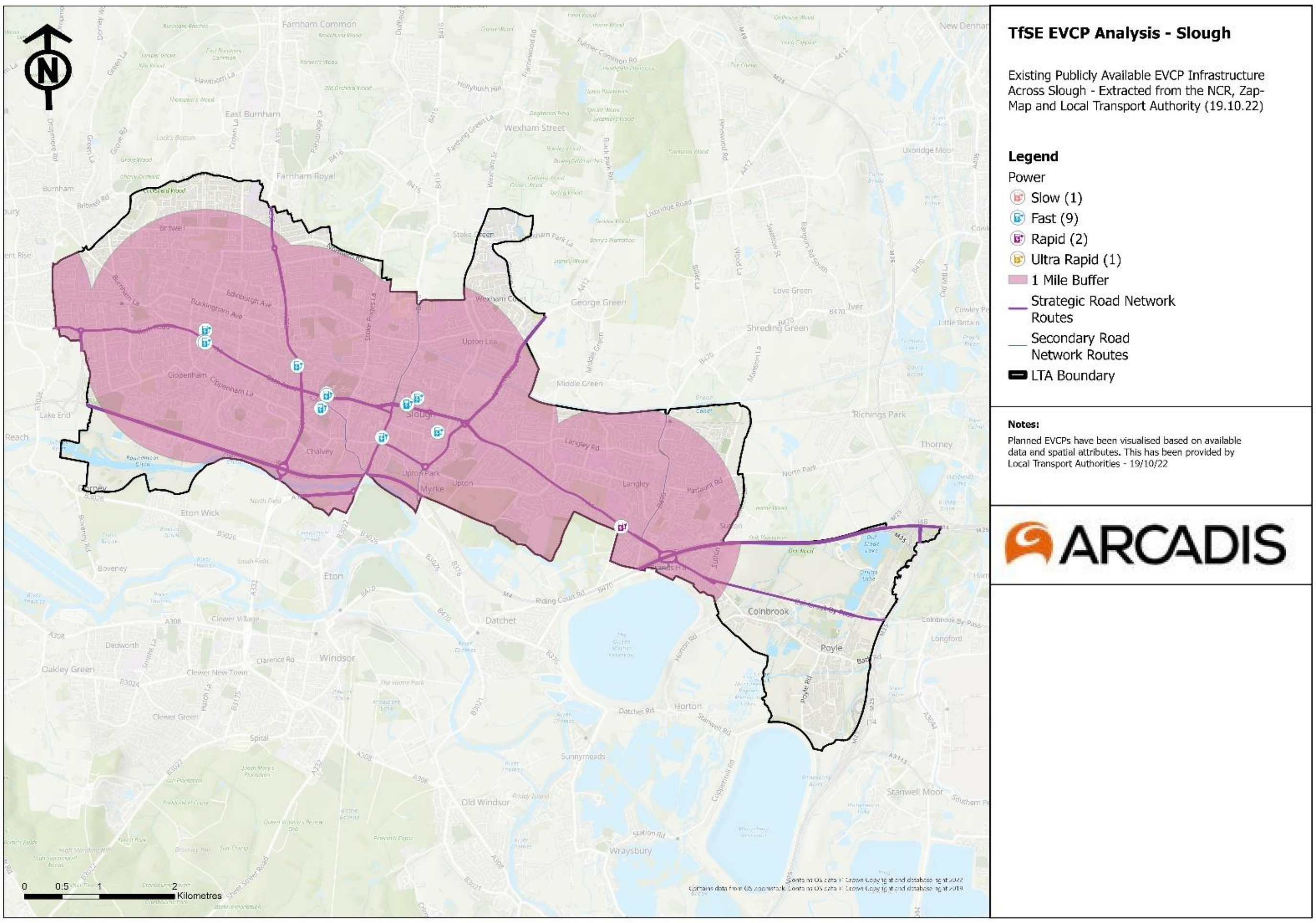

Figure 34 Slough EVCP network

Figure 34 shows the Slough EVCP network. There are a total of 13 chargers within the town mainly consisting of fast chargers (9). The chargers are located in close proximity to Bath Road which is the main strategic road through the town.

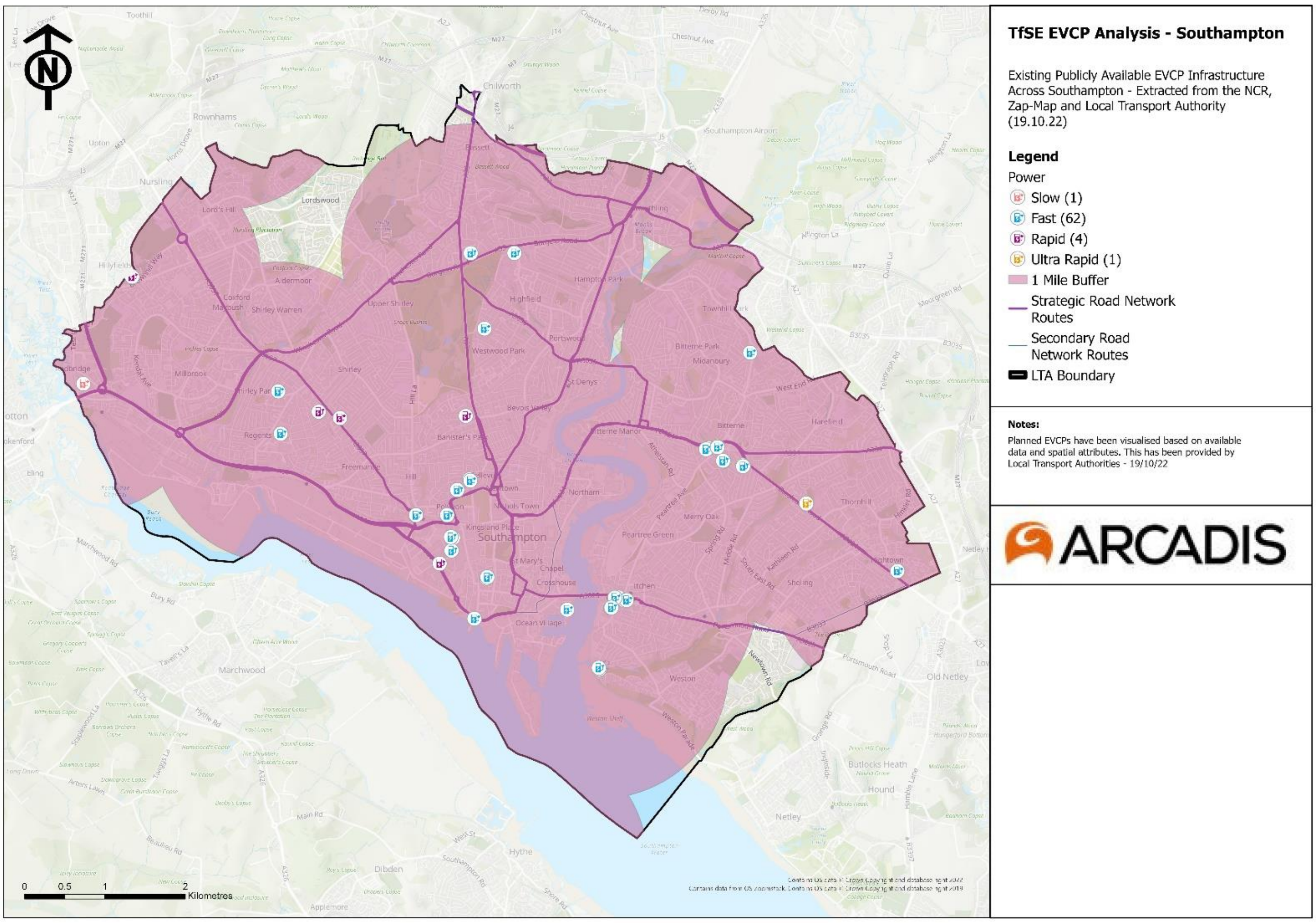

Figure 35 Southampton EVCP network

Figure 35 shows the EVCP network in Southampton. This shows a higher density of chargers around the centre of the city. The majority of chargers are fast chargers with 62 of them compared to 4 rapid, 1 slow and 1 ultra-rapid charger.

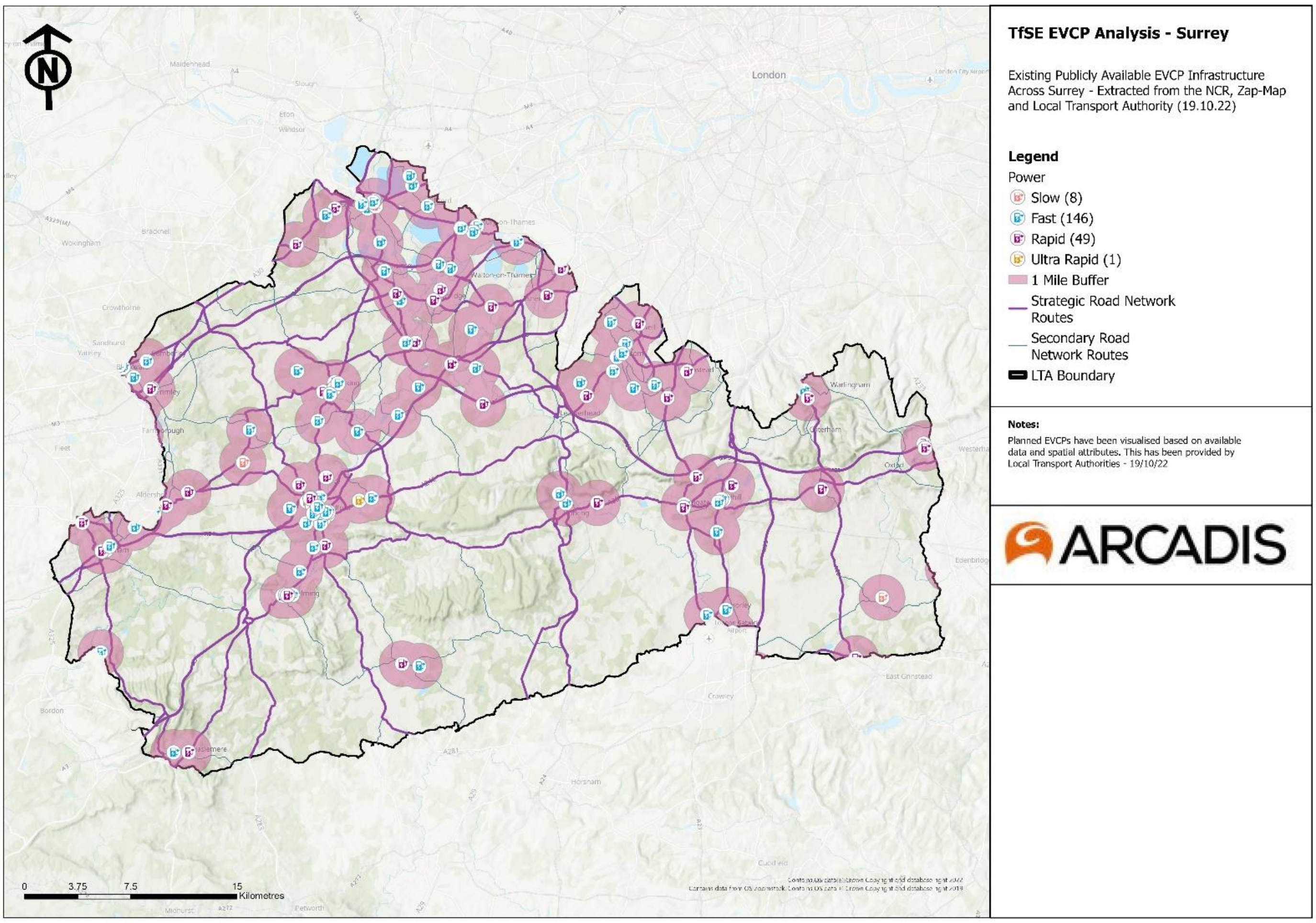

Figure 36 Surrey EVCP network

Figure 36 shows the existing charging network within Surrey, this shows a network of predominantly fast (146) and rapid (49) chargers. The concentration of chargers is based around the town of Guildford. There is also a dense network of chargers in the northern part of Surrey that borders London.

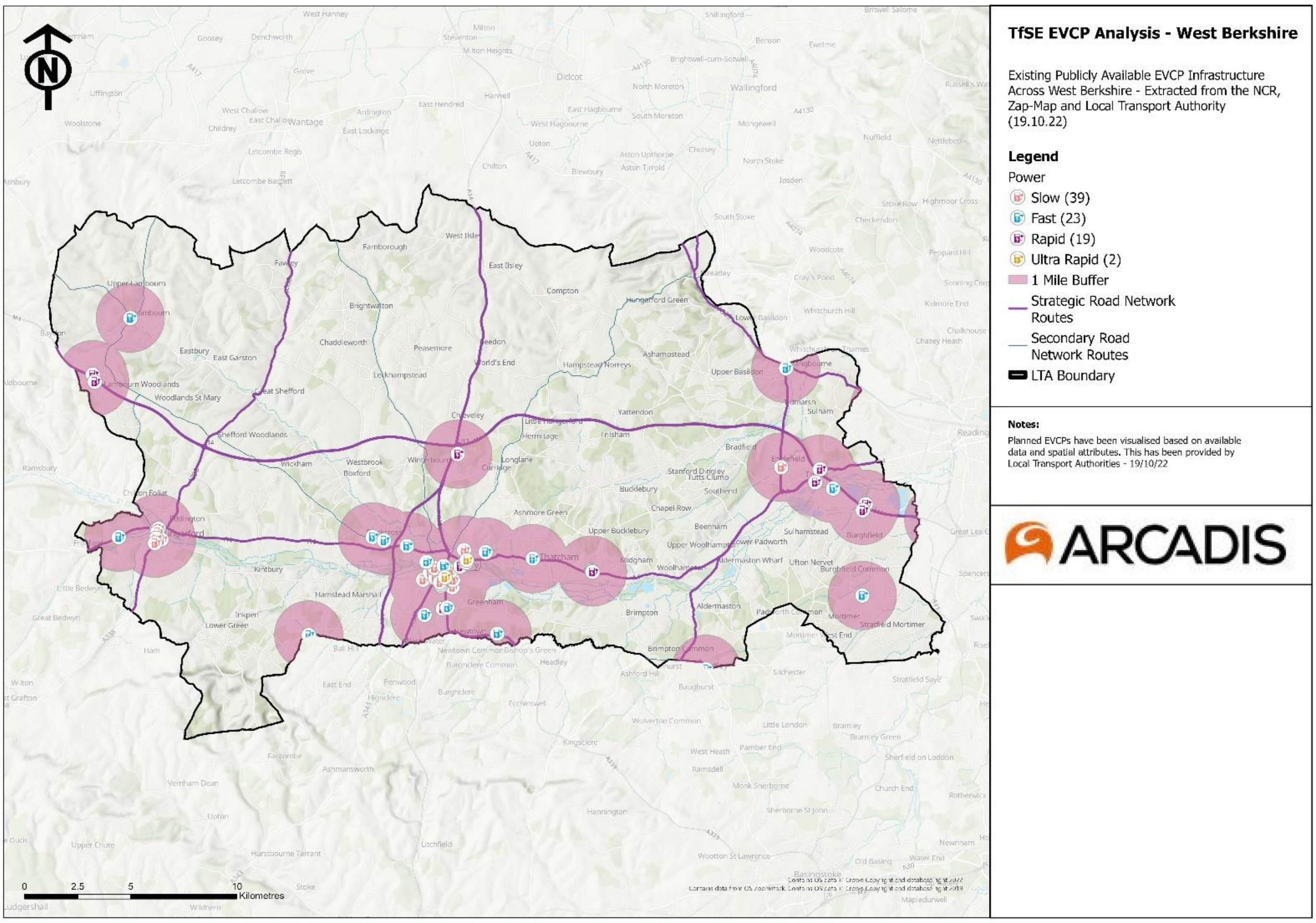

Figure 37 West Berkshire EVCP network

Figure 37 shows the existing charging network within West Berkshire, this consists mainly of slow chargers (39) and a smaller number of fast (23) and rapid (19) chargers. West Berkshire is rural, and the dense charging network is located in Newbury.

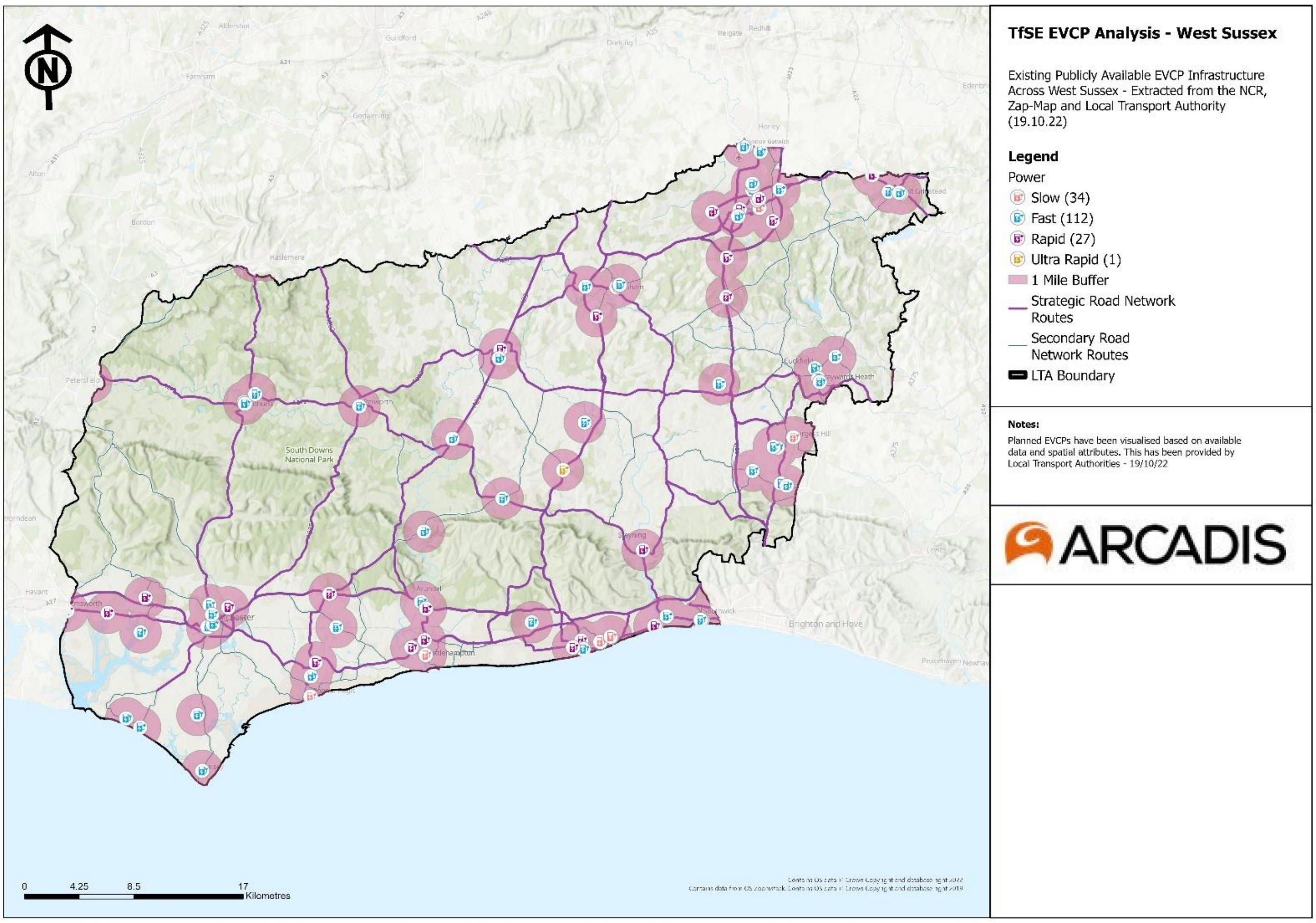

Figure 38 West Sussex EVCP network

Figure 38 shows the charging network within West Sussex. This shows a distribution of chargers along the strategic road network. The charging network mainly consists of fast (112) chargers with a smaller number of rapid (34) and slow (27) chargers.

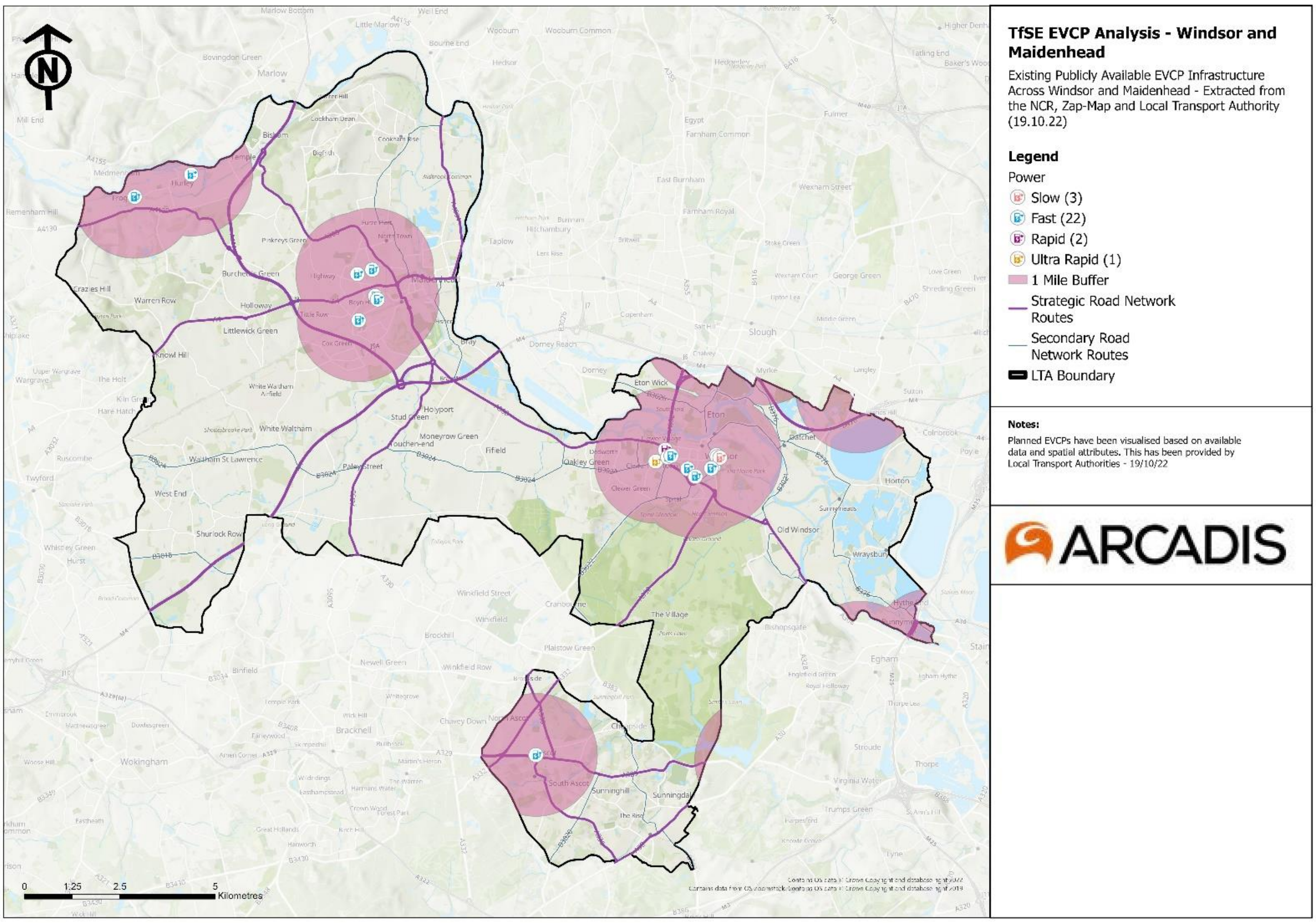

Figure 39 Windsor and Maidenhead EVCP network

Figure 39 shows the EVCP network within Windsor and Maidenhead. This shows a higher density of chargers located within the centre of Windsor and the centre of Maidenhead. There are not many chargers located in the more rural areas. The main types of chargers are fast chargers (22).

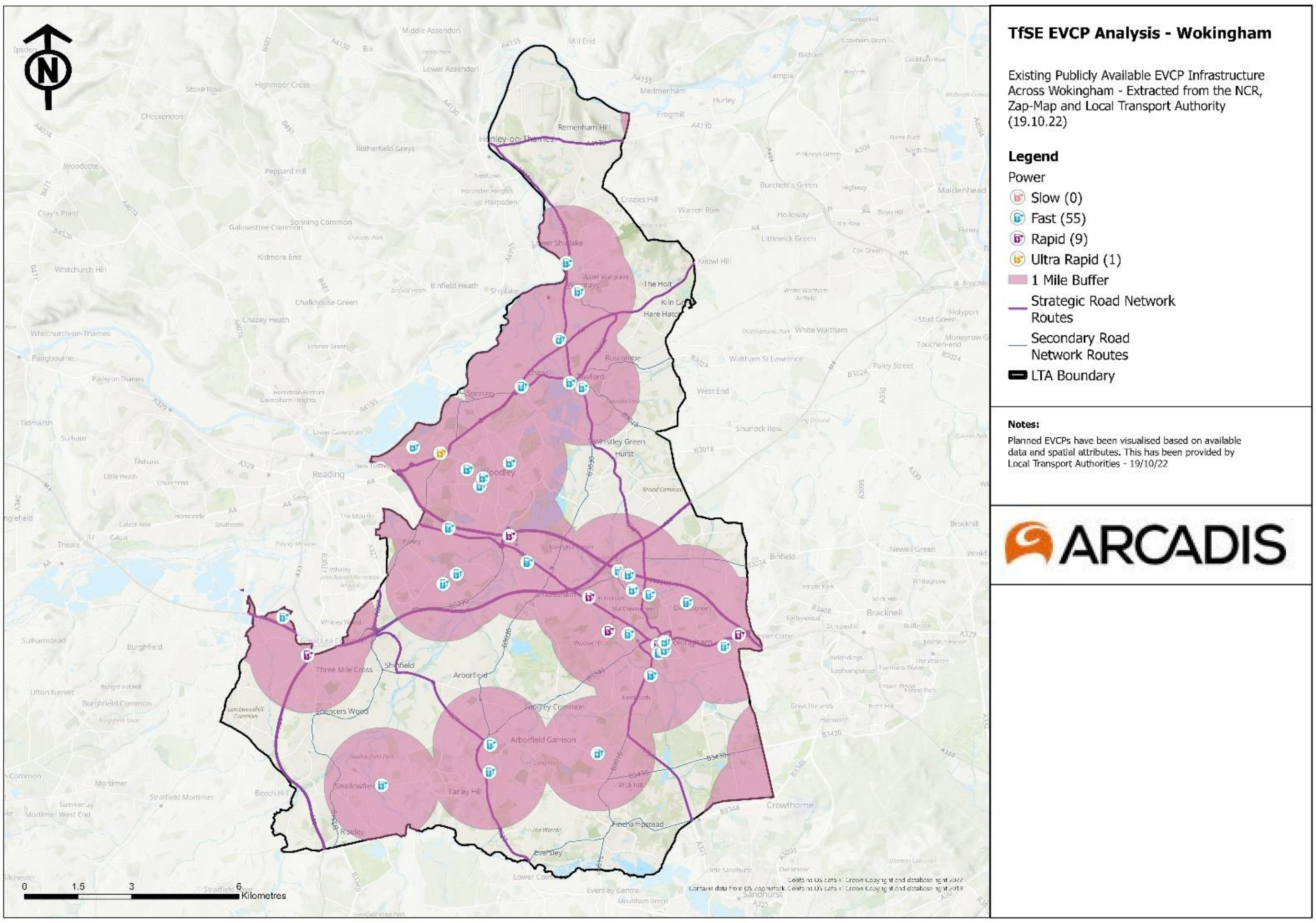

Figure 40 Wokingham EVCP network

Figure 40 shows the charging network within Wokingham. The charging network is more densely populated on the outskirts of Wokingham. There are also chargers on the more rural network, particularly on the border with Reading. The charger types are predominantly fast (55) and rapid (9).

Appendix C: Grid Capacity Plans – 16 LTAs

This section displays the grid capacity analysis for each 16 local transport authorities, mapping the primary substations in each location.

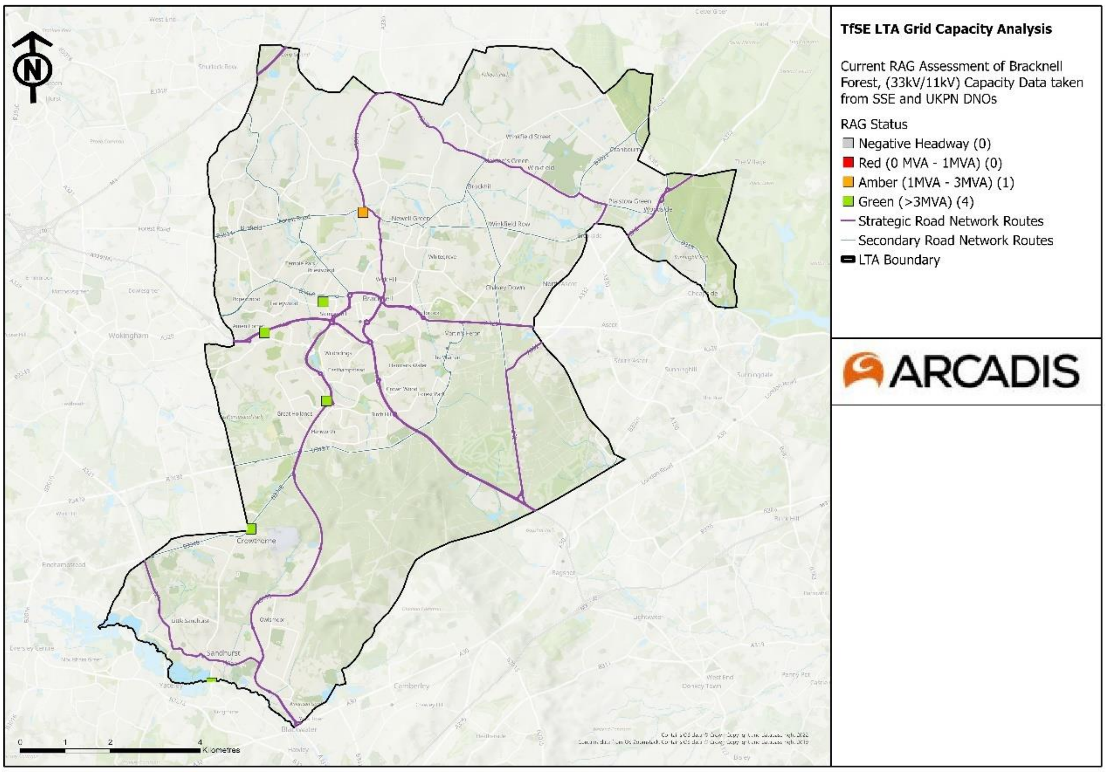

Figure 41 Bracknell Forest grid capacity plan

Figure 41 shows the grid capacity analysis for Bracknell Forest. Of the 5 substations present, 4 were given a green rating (>3MVA), 1 was given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

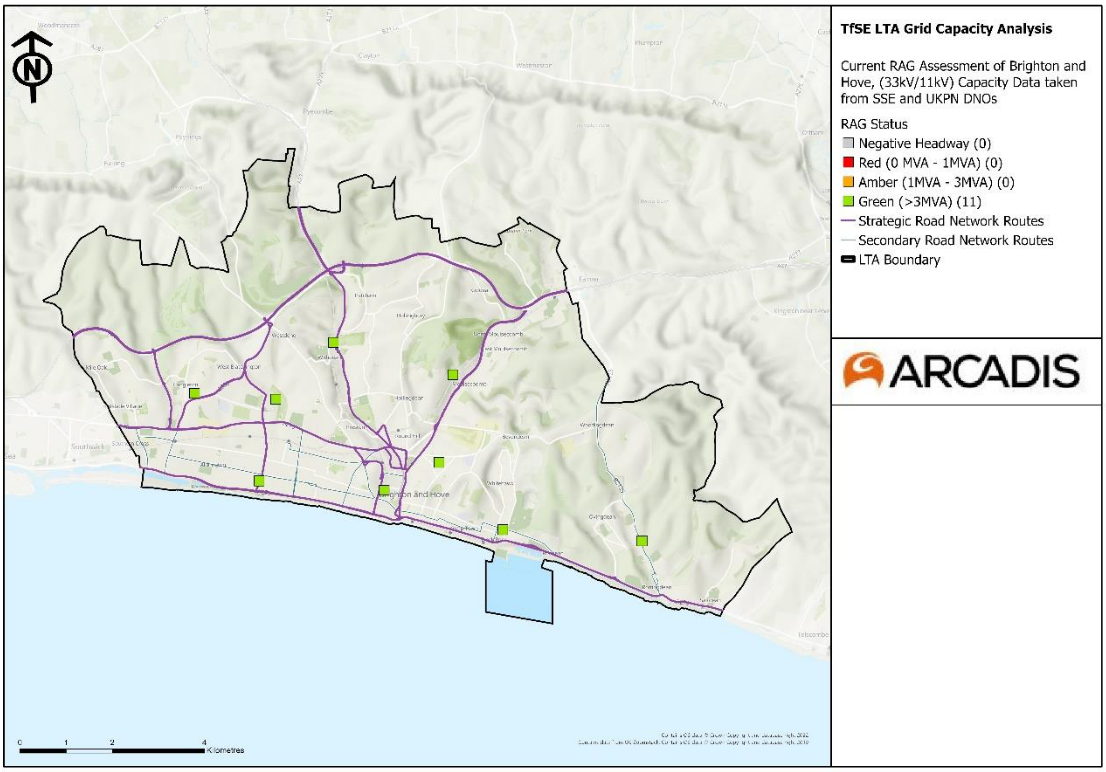

Figure 42 Brighton and Hove grid capacity plan

Figure 42 Figure 42 Brighton and Hove grid capacity planshows the grid capacity analysis for Brighton and Hove. Of the 11 substations present, 11 were given a green rating (>3MVA), 0 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

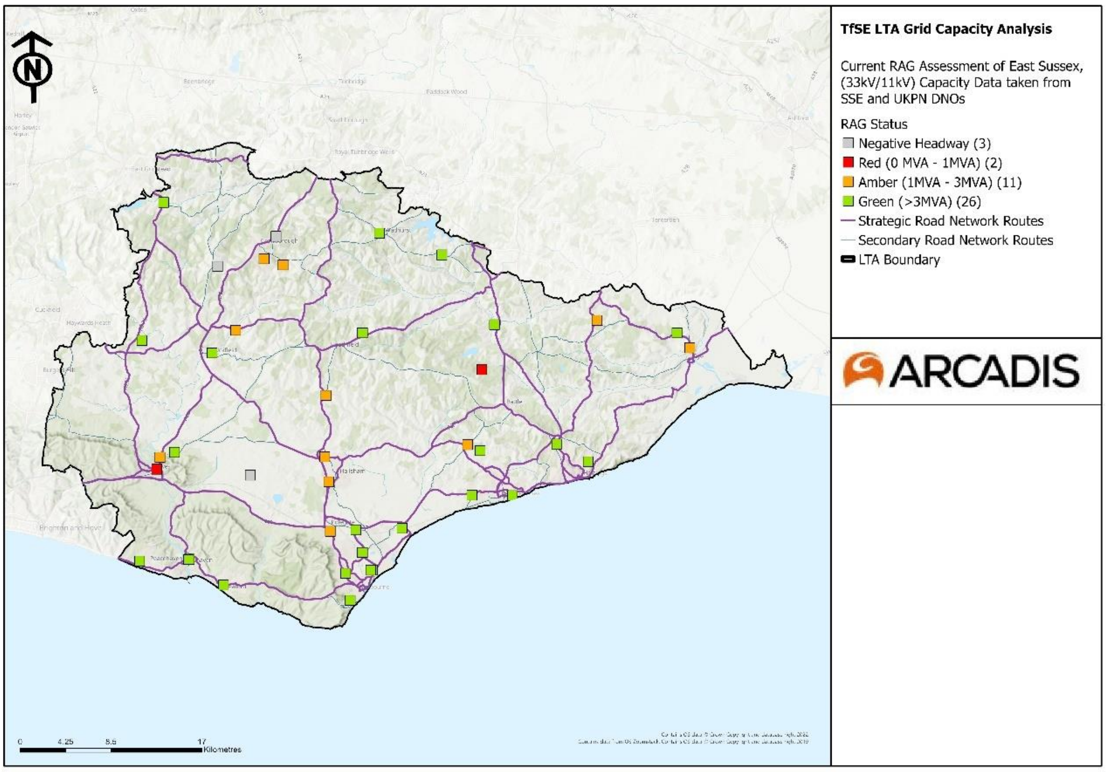

Figure 43 East Sussex grid capacity plan

Figure 43 shows the grid capacity analysis for East Sussex. Of the 42 substations present, 26 were given a green rating (>3MVA), 11 were given an amber rating (1MVA-3MVA), 2 were given a red rating (<1MVA) and 3 were rated grey (<0MVA).

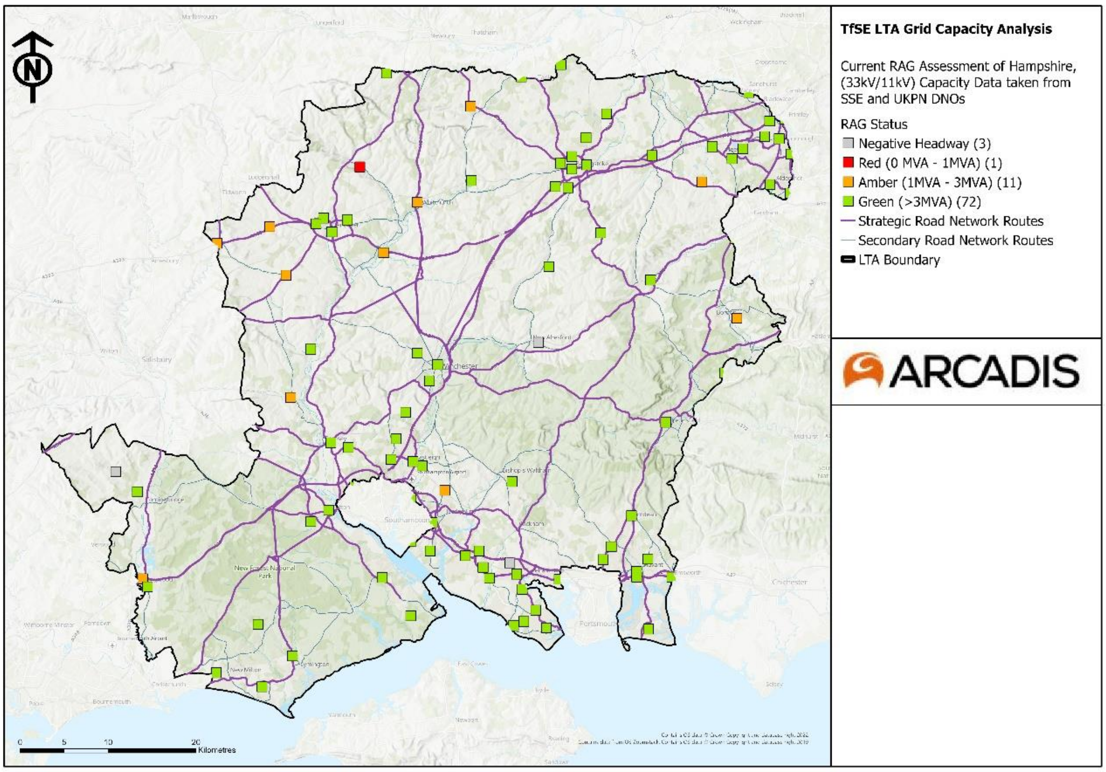

Figure 44 Hampshire grid capacity plan

Figure 44 shows the grid capacity analysis for Hampshire. Of the 88 substations present, 73 were given a green rating (>3MVA), 11 were given an amber rating (1MVA-3MVA), 1 was given a red rating (<1MVA) and 3 were rated grey (<0MVA).

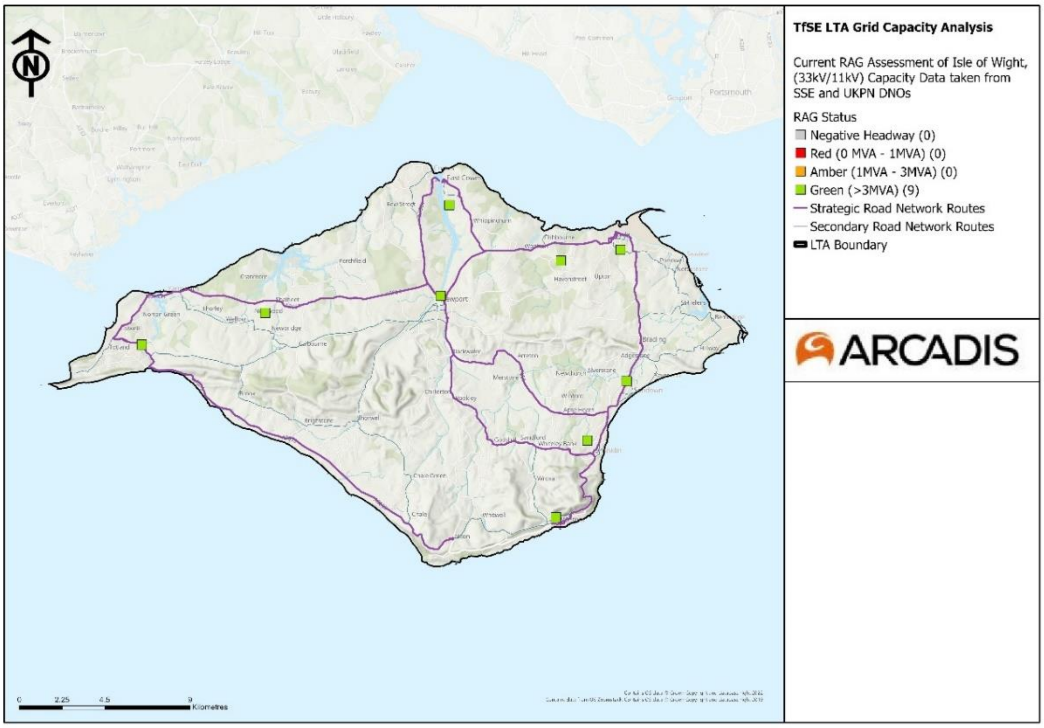

Figure 45 Isle of Wight grid capacity plan

Figure 45 Figure 45 Isle of Wight grid capacity planshows the grid capacity analysis for the Isle of Wight. Of the 9 substations present, 9 were given a green rating (>3MVA), 0 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

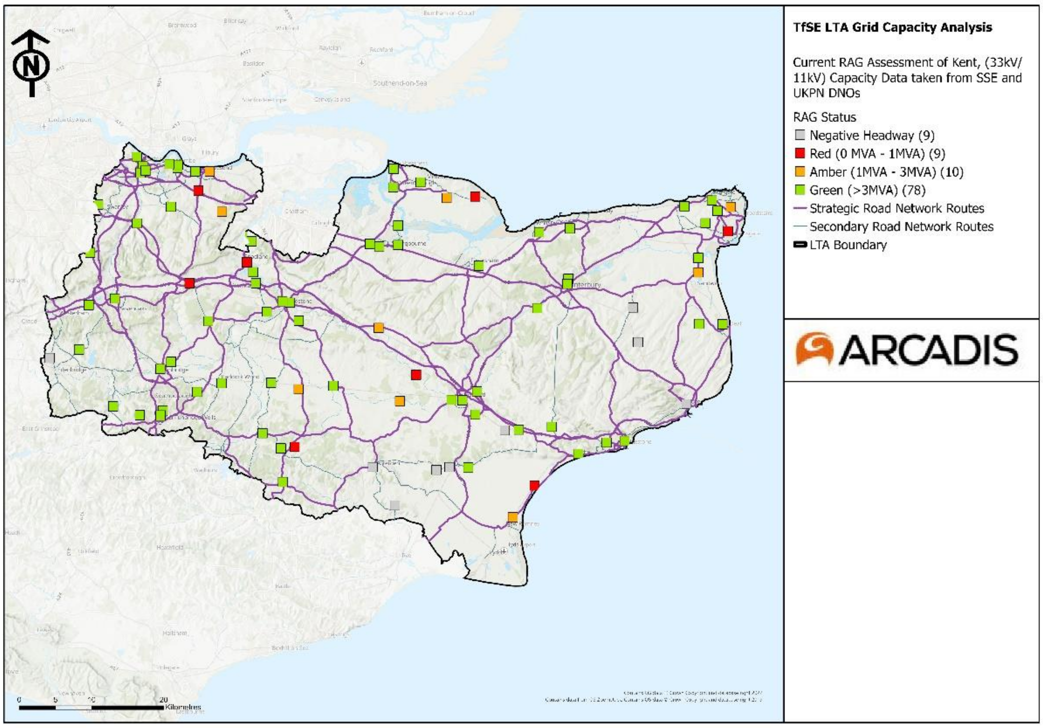

Figure 46 Kent grid capacity plan

Figure 46 Figure 46 Kent grid capacity planshows the grid capacity analysis for Kent. Of the 106 substations present, 78 were given a green rating (>3MVA), 10 were given an amber rating (1MVA-3MVA), 9 were given a red rating (<1MVA) and 9 were rated grey (<0MVA).

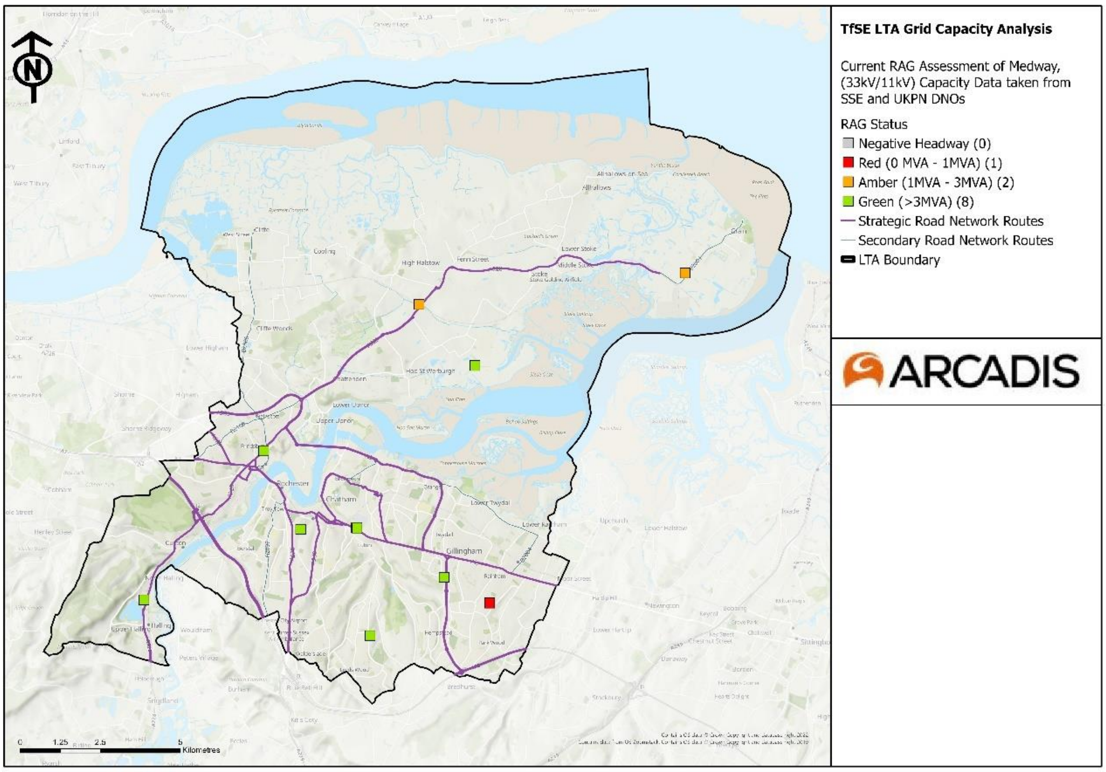

Figure 47 Medway grid capacity plan

Figure 47Figure 47 Medway grid capacity plan shows the grid capacity analysis for Medway. Of the 11 substations present, 8 were given a green rating (>3MVA), 2 were given an amber rating (1MVA-3MVA), 1 was given a red rating (<1MVA) and 0 were rated grey (<0MVA).

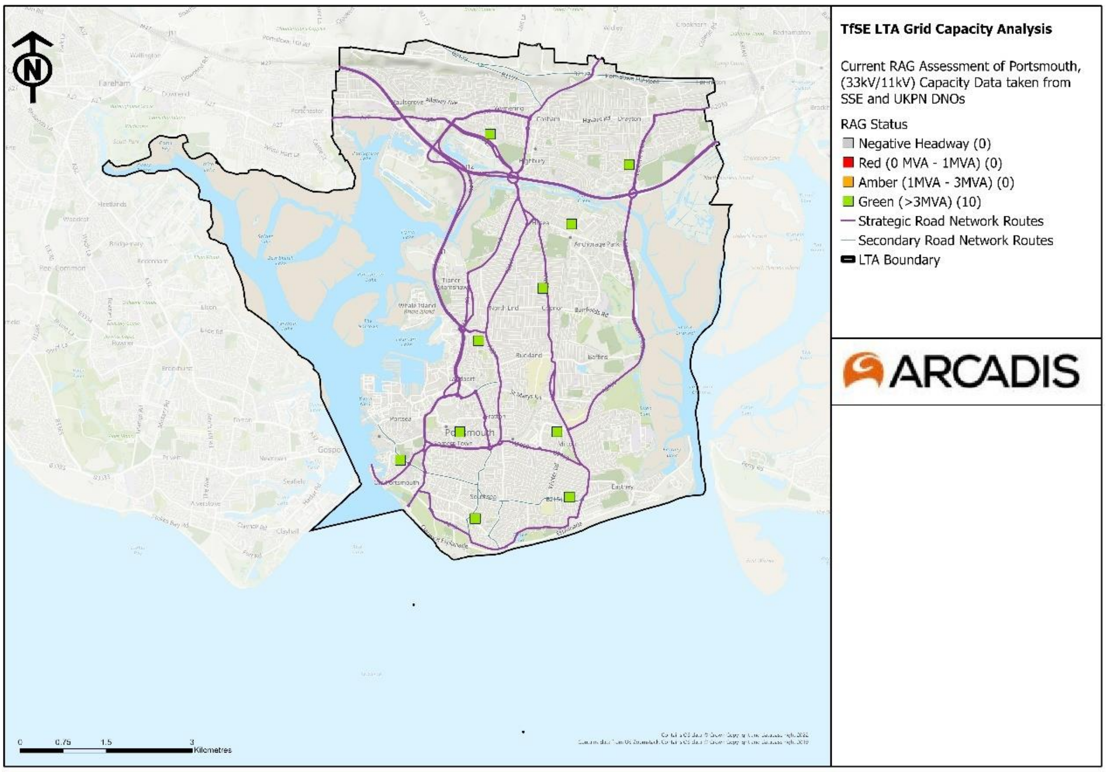

Figure 48 Portsmouth grid capacity plan

Figure 48 shows the grid capacity analysis for Portsmouth. Of the 10 substations present, 10 were given a green rating (>3MVA), 0 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

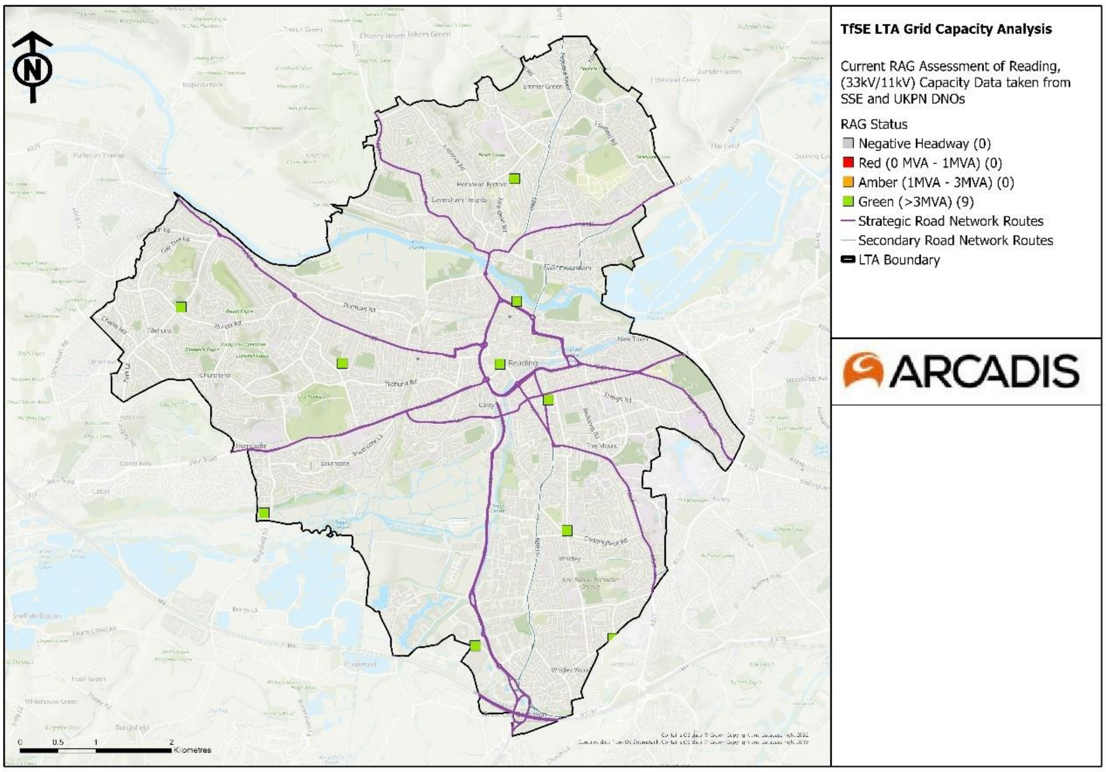

Figure 49 Reading grid capacity plan

Figure 49 Figure 49 Reading grid capacity planshows the grid capacity analysis for Reading. Of the 9 substations present, 9 were given a green rating (>3MVA), 0 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

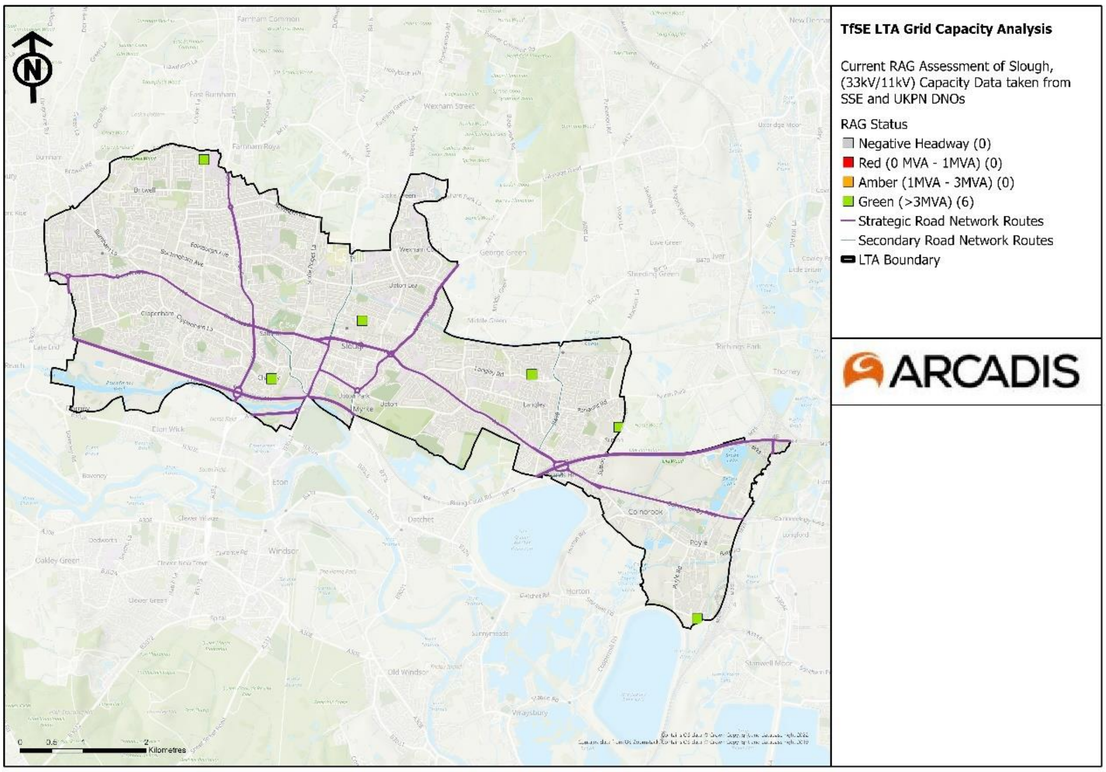

Figure 50 Slough grid capacity plan

Figure 50 shows the grid capacity analysis for Slough. Of the 6 substations present, 6 were given a green rating (>3MVA), 0 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

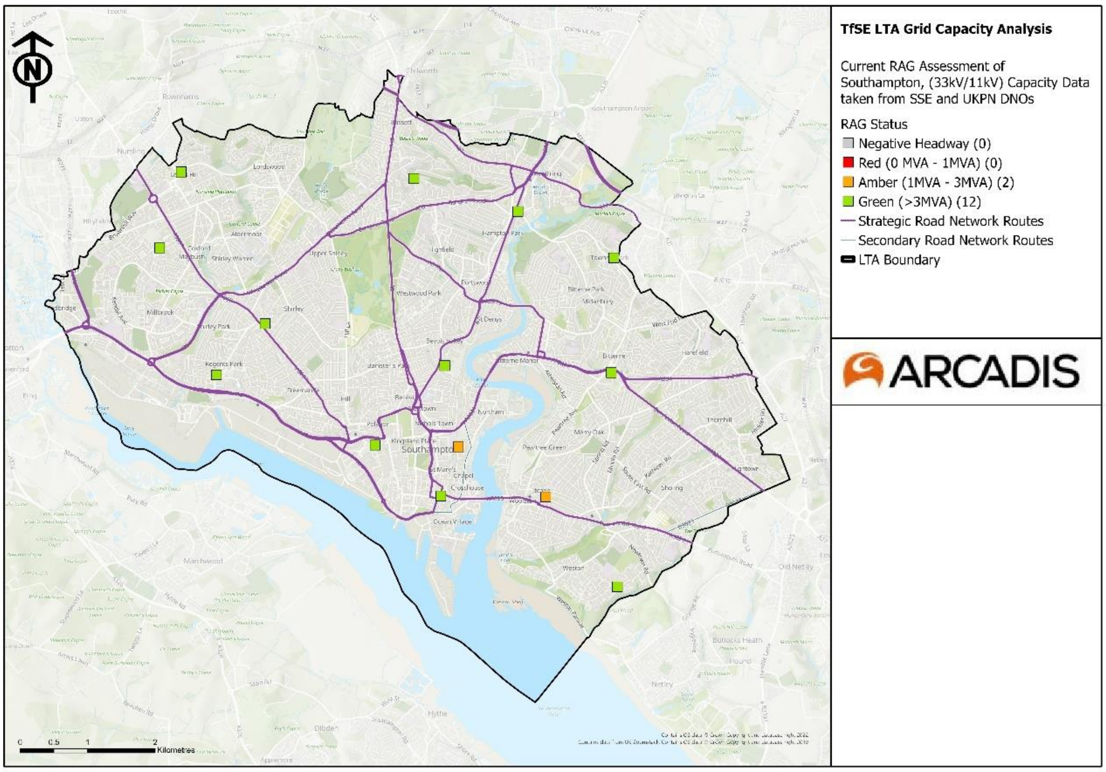

Figure 51 Southampton grid capacity plan

Figure 51 shows the grid capacity analysis for Southampton. Of the 14 substations present, 12 were given a green rating (>3MVA), 2 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

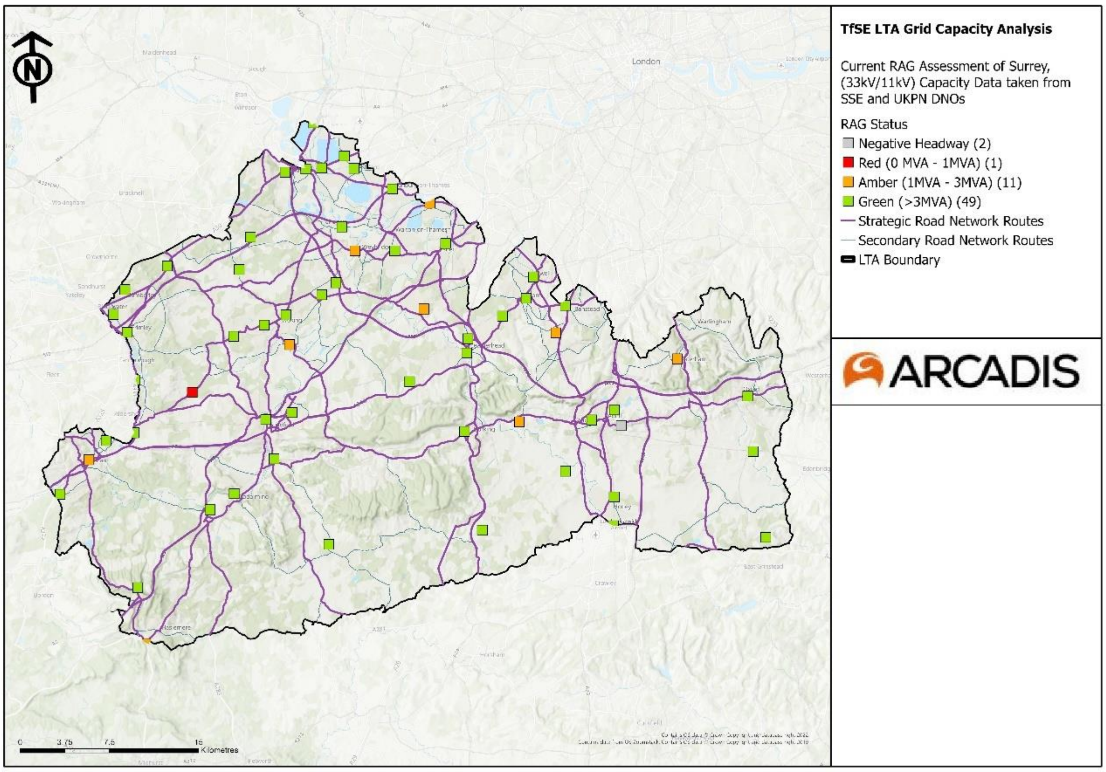

Figure 52 Surrey grid capacity plan

Figure 52 shows the grid capacity analysis for Surrey. Of the 63 substations present, 49 were given a green rating (>3MVA), 11 were given an amber rating (1MVA-3MVA), 1 was given a red rating (<1MVA) and 2 were rated grey (<0MVA).

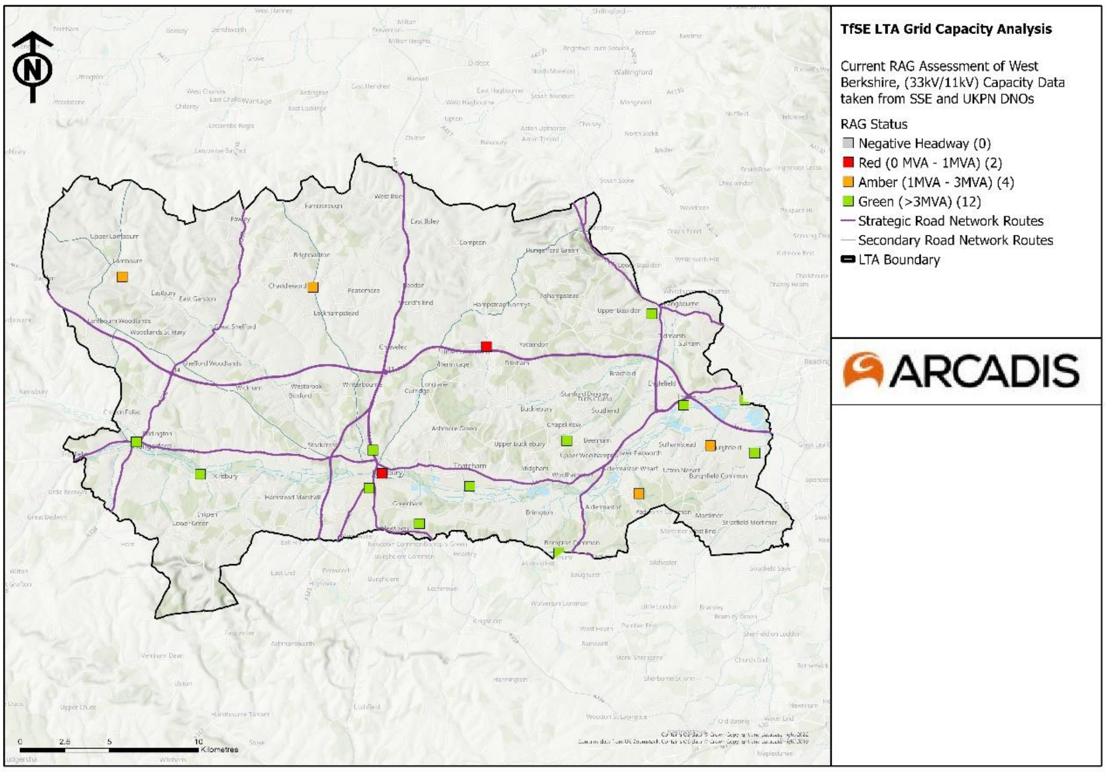

Figure 53 West Berkshire grid capacity plan

Figure 53 shows the grid capacity analysis for West Berkshire. Of the 18 substations present, 12 were given a green rating (>3MVA), 4 were given an amber rating (1MVA-3MVA), 2 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

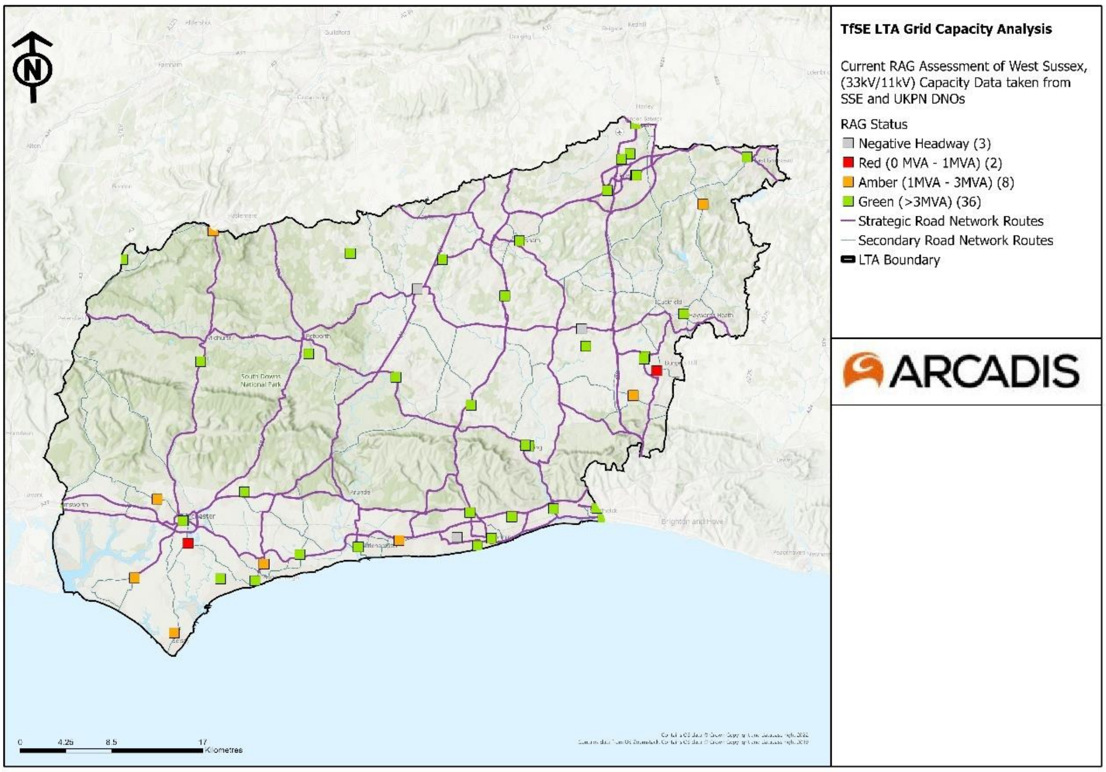

Figure 54 West Sussex grid capacity plan

Figure 54 shows the grid capacity analysis for West Sussex. Of the 49 substations present, 36 were given a green rating (>3MVA), 8 were given an amber rating (1MVA-3MVA), 2 were given a red rating (<1MVA) and 3 were rated grey (<0MVA).

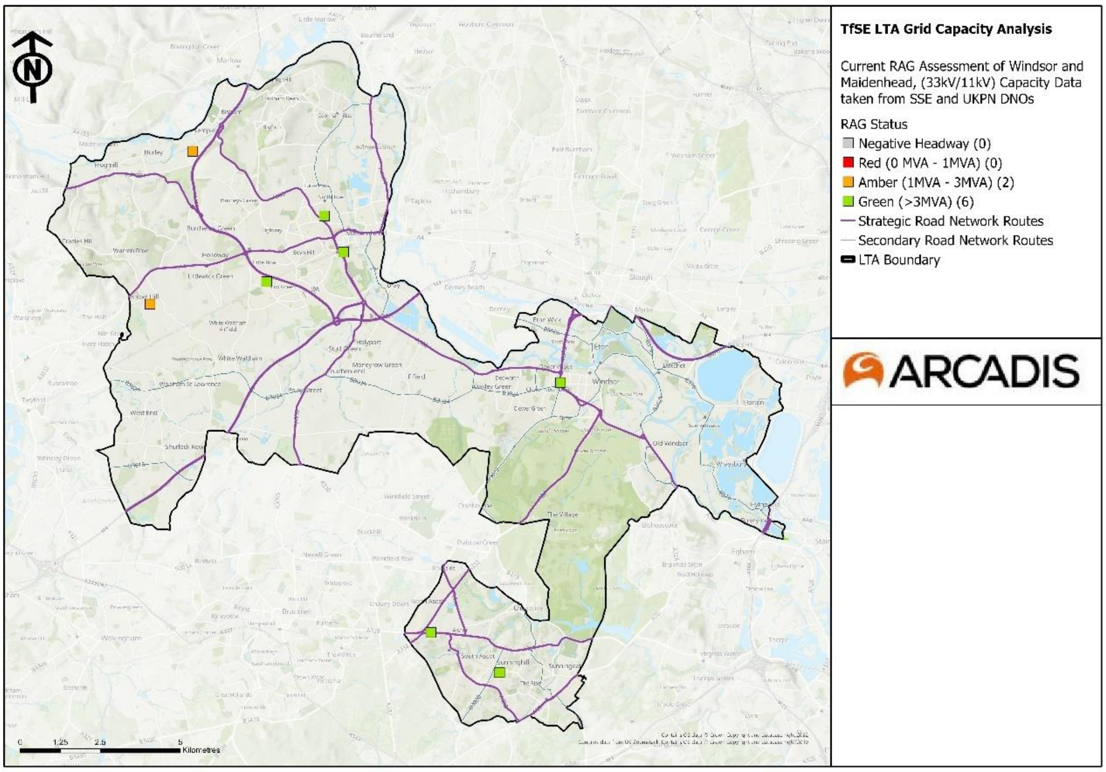

Figure 55 Windsor and Maidenhead grid capacity plan

Figure 55 shows the grid capacity analysis for Windsor and Maidenhead. Of the 8 substations present, 6 were given a green rating (>3MVA), 2 were given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

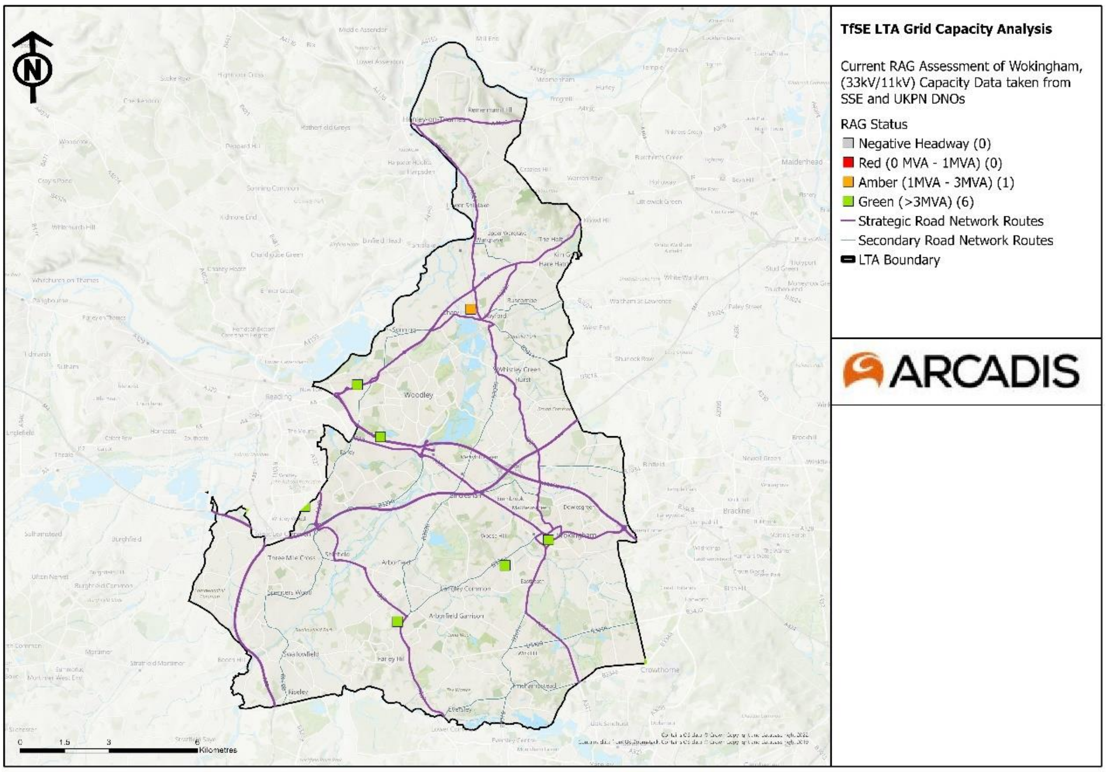

Figure 56 Wokingham grid capacity plan

Figure 56 shows the grid capacity analysis for Wokingham. Of the 7 substations present, 6 were given a green rating (>3MVA), 1 was given an amber rating (1MVA-3MVA), 0 were given a red rating (<1MVA) and 0 were rated grey (<0MVA).

Appendix D: MVA Capacity – 16 LTAs

A Red, Amber, Green (RAG) classification, based on a substation’s current capacity, was used to identify and categorise which substations may need upgrading first to satisfy increasing demand for EV charging. **Error! Reference source not found.** displays the demand headroom and RAG status of each primary substation within the TfSE area.

Table 7 Demand headroom and RAG status of primary substations in TfSE area

Local Authority	Primary Substation	DNO	Demand Headroom	RAG Status
Bracknell Forest	Bracknell	SSE	31.55	Green
Bracknell Forest	Warfield	SSE	1.5	Amber
Bracknell Forest	Easthampstead	SSE	10.48	Green
Bracknell Forest	Crowthorne	SSE	8.01	Green
Bracknell Forest	Peacock Farm	SSE	6.4	Green
Brighton and Hove	Brighton Local	UKPN	36	Green
Brighton and Hove	Brighton Town	UKPN	24.4	Green
Brighton and Hove	Hangleton	UKPN	6.2	Green
Brighton and Hove	Kemp Town	UKPN	7.9	Green
Brighton and Hove	Moulsecoomb	UKPN	6.4	Green
Brighton and Hove	Moulsecoomb Grid	UKPN	27.3	Green
Brighton and Hove	Queens Park	UKPN	5.9	Green
Brighton and Hove	Rottingdean	UKPN	9	Green
Brighton and Hove	South Hove	UKPN	3.2	Green
Brighton and Hove	The Droveway	UKPN	14.2	Green
Brighton and Hove	Withdean	UKPN	6.5	Green
East Sussex	Baldslow	UKPN	6.4	Green
East Sussex	Bexhill Town	UKPN	3.1	Green
East Sussex	Broad Oak	UKPN	3.1	Green
East Sussex	Buxted	UKPN	2.9	Amber
East Sussex	Crowborough Town	UKPN	1.8	Amber
East Sussex	D.W.S.	UKPN	-1.68	Red
East Sussex	Eastbourne	UKPN	10.7	Green
East Sussex	Eastbourne Grid	UKPN	17.8	Green

East Sussex	Forest Row	UKPN	4.7	Green
East Sussex	Hailsham	UKPN	3	Amber
East Sussex	Hampden Park	UKPN	3.8	Green
East Sussex	Hastings	UKPN	60.6	Green
East Sussex	Hastings Local	UKPN	12.1	Green
East Sussex	Horam	UKPN	2	Amber
East Sussex	Horsebridge	UKPN	2.2	Amber
East Sussex	Jarvis Brook	UKPN	2	Amber
East Sussex	Lewes Central	UKPN	0.086	Red
East Sussex	Lewes Grid	UKPN	34.7	Green
East Sussex	Lewes Town	UKPN	1.7	Amber
East Sussex	Little Common	UKPN	7.5	Green
East Sussex	Meads	UKPN	11.6	Green
East Sussex	Mountfield	UKPN	1	Amber
East Sussex	Newhaven Grid	UKPN	32.7	Green
East Sussex	Newhaven Town	UKPN	6.9	Green
East Sussex	Newick	UKPN	4.8	Green
East Sussex	Ninfield Grid	UKPN	57.1	Green
East Sussex	Ninfield Local	UKPN	1.5	Amber
East Sussex	Northiam	UKPN	1.994	Amber
East Sussex	Ocklynge	UKPN	10.3	Green
East Sussex	Peacehaven	UKPN	7.3	Green
East Sussex	Pevensey Bay	UKPN	5.8	Green
East Sussex	Polegate Grid	UKPN	17	Green
East Sussex	Polegate Town	UKPN	2.8	Amber
East Sussex	Ripe	UKPN	-1.74	Red

East Sussex	Robertsbridge	UKPN	8	Green
East Sussex	Rye	UKPN	1.8	Amber
East Sussex	Rye Grid	UKPN	6.44	Green
East Sussex	Seaford	UKPN	7.9	Green
East Sussex	Steel Cross	UKPN	-0.325	Red
East Sussex	Ticehurst	UKPN	8.5	Green
East Sussex	Uckfield	UKPN	8.2	Green
East Sussex	Wadhurst	UKPN	3.4	Green
Hampshire	Park Gate	SSE	8.18	Green
Hampshire	Whiteley	SSE	3.47	Green
Hampshire	Bishops Waltham	SSE	8.32	Green
Hampshire	Hamble	SSE	13.85	Green
Hampshire	Netley Common	SSE	3.85	Green
Hampshire	Park House	SSE	1.8	Amber
Hampshire	Ball Hill	SSE	7.11	Green
Hampshire	Kingsclere	SSE	2.88	Amber
Hampshire	Basingstoke	SSE	12.82	Green
Hampshire	Jays Close	SSE	9.72	Green
Hampshire	Bramley Green	SSE	10.84	Green
Hampshire	Chineham	SSE	13.45	Green
Hampshire	Down Grange	SSE	8.74	Green
Hampshire	Overton	SSE	4.25	Green
Hampshire	Brook Street	SSE	16.7	Green
Hampshire	Houndmills	SSE	22.55	Green
Hampshire	Oakridge	SSE	19.8	Green
Hampshire	Butts Ash	SSE	6.58	Green

Hampshire	Langley	SSE	5.62	Green
Hampshire	Laburnum Road	SSE	10.7	Green
Hampshire	Tongham	SSE	13.6	Green
Hampshire	Alresford	SSE	-1.63	Red
Hampshire	Alton Local	SSE	9.75	Green
Hampshire	Bordon	SSE	2.48	Amber
Hampshire	Herriard	SSE	5.8	Green
Hampshire	Petersfield	SSE	9.46	Green
Hampshire	Preston Candover	SSE	10.57	Green
Hampshire	Mortimer	SSE	7	Green
Hampshire	Sandhurst	SSE	9.07	Green
Hampshire	Cove	SSE	13.98	Green
Hampshire	Farnborough	SSE	14.26	Green
Hampshire	Queensmead	SSE	3.43	Green
Hampshire	Coxmoor Wood	SSE	2.3	Amber
Hampshire	Crookham	SSE	11.38	Green
Hampshire	Hawley	SSE	10.72	Green
Hampshire	Hitches Lane	SSE	16.54	Green
Hampshire	Hook	SSE	15.29	Green
Hampshire	Pyestock 33/11	SSE	17.49	Green
Hampshire	Brockhurst	SSE	6.81	Green
Hampshire	Hoeford	SSE	7.91	Green
Hampshire	North Fareham	SSE	-0.14	Red
Hampshire	Plessey Titchfield	SSE	17.14	Green
Hampshire	Titchfield	SSE	5.3	Green
Hampshire	West End	SSE	14.41	Green

Hampshire	Lee-On-Solent	SSE	11.7	Green
Hampshire	Rowner Park	SSE	21.19	Green
Hampshire	Zetland Road	SSE	9.45	Green
Hampshire	Brockhampton	SSE	14.59	Green
Hampshire	Emsworth	SSE	3.01	Green
Hampshire	Gable Head	SSE	18.06	Green
Hampshire	Horndean	SSE	8.92	Green
Hampshire	Leigh Park	SSE	11.8	Green
Hampshire	Meyrick Road	SSE	6.91	Green
Hampshire	Portchester	SSE	3.96	Green
Hampshire	Purbrook	SSE	4.6	Green
Hampshire	Waterlooville	SSE	23.63	Green
Hampshire	Hincheslea	SSE	8.3	Green
Hampshire	Lymington	SSE	12.1	Green
Hampshire	Milford-On-Sea	SSE	3.4	Green
Hampshire	New Milton	SSE	8	Green
Hampshire	Fordingbridge	SSE	7.9	Green
Hampshire	Mill Lane	SSE	2.7	Amber
Hampshire	New Street	SSE	3.2	Green
Hampshire	Rockbourne	SSE	0	Red
Hampshire	Andover	SSE	21.5	Green
Hampshire	Andover East	SSE	9.4	Green
Hampshire	Andover Town	SSE	4.8	Green
Hampshire	Barton Stacey	SSE	1.4	Amber
Hampshire	Hurstbourne Tarrant	SSE	0.96	Red
Hampshire	Middle Wallop	SSE	2.4	Amber

Hampshire	Portway	SSE	7.2	Green
Hampshire	Thruxton	SSE	1.2	Amber
Hampshire	Whitchurch	SSE	1.6	Amber
Hampshire	Fletchwood	SSE	12.59	Green
Hampshire	North Baddesley	SSE	4.72	Green
Hampshire	Romsey	SSE	4.8	Green
Hampshire	Silkstead	SSE	5.88	Green
Hampshire	Totton	SSE	8.91	Green
Hampshire	Bishopstoke	SSE	6.18	Green
Hampshire	Chandlers Ford	SSE	17.4	Green
Hampshire	Eastleigh North	SSE	9.86	Green
Hampshire	Hedge End	SSE	1.09	Amber
Hampshire	Velmore	SSE	4.64	Green
Hampshire	Dunbridge	SSE	1.54	Amber
Hampshire	Gordon Road	SSE	6.11	Green
Hampshire	Harestock	SSE	8.14	Green
Hampshire	Houghton	SSE	3.45	Green
Hampshire	St Cross	SSE	8.87	Green
Isle of Wight	Binstead	SSE	8.53	Green
Isle of Wight	Cowes Power Station	SSE	10.63	Green
Isle of Wight	Freshwater	SSE	8.6	Green
Isle of Wight	Newport	SSE	7.63	Green
Isle of Wight	Ryde	SSE	12.75	Green
Isle of Wight	Sandown	SSE	3.49	Green
Isle of Wight	Shalfleet	SSE	8.77	Green
Isle of Wight	Shanklin	SSE	18.19	Green

Isle of Wight	Ventnor	SSE	20.96	Green
Kent	Ashford Central	UKPN	3.3	Green
Kent	Ashford East	UKPN	5.7	Green
Kent	Ashford Grid	UKPN	34.8	Green
Kent	Aylesford	UKPN	5.9	Green
Kent	Barming	UKPN	5.1	Green
Kent	Betteshanger Grid	UKPN	23.2	Green
Kent	Betteshanger Local	UKPN	8.2	Green
Kent	Burham	UKPN	37.1	Green
Kent	Canterbury Local	UKPN	4.1	Green
Kent	Canterbury South	UKPN	58	Green
Kent	Canterbury Town	UKPN	8.2	Green
Kent	Chartham	UKPN	4.24	Green
Kent	Chelsfield Grid	UKPN	27.1	Green
Kent	Cobham Kent	UKPN	2.3	Amber
Kent	Cranbrook	UKPN	0.042	Red
Kent	Crossways	UKPN	11.5	Green
Kent	Deal	UKPN	10.4	Green
Kent	Dover	UKPN	-7.5	Red
Kent	Dymchurch	UKPN	0.564	Red
Kent	Eastchurch Prison	UKPN	1.3	Amber
Kent	Ebbsfleet	UKPN	18.7	Green
Kent	Edenbridge	UKPN	-0.98	Red
Kent	Farningham	UKPN	4.2	Green
Kent	Faversham	UKPN	20	Green
Kent	Folkestone East	UKPN	5.9	Green

Kent	Folkestone Grid	UKPN	27.4	Green
Kent	Four Elms	UKPN	4.5	Green
Kent	Goudhurst	UKPN	3.8	Green
Kent	Gravesend South	UKPN	1	Amber
Kent	Gravesend Town	UKPN	1.9	Amber
Kent	Gravesend West	UKPN	2.8	Amber
Kent	Grovehurst Local	UKPN	3.8	Green
Kent	Harrietsham	UKPN	2.7	Amber
Kent	Hartley Grid	UKPN	16.6	Green
Kent	Hawkhurst	UKPN	3.4	Green
Kent	Headcorn	UKPN	4.9	Green
Kent	Herne Bay	UKPN	18.9	Green
Kent	Herne Bay Grid	UKPN	46.3	Green
Kent	Hythe Main	UKPN	10.2	Green
Kent	Kenardington	UKPN	-0.14	Red
Kent	Leysdown	UKPN	0.2	Red
Kent	Lightweight Aggregates	UKPN	0	Red
Kent	Little Chart	UKPN	0.6	Red
Kent	Littlebrook Park	UKPN	50.6	Green
Kent	Longfield	UKPN	7	Green
Kent	Maidstone Grid	UKPN	29.6	Green
Kent	Maidstone Grid North	UKPN	14.5	Green
Kent	Maidstone Grid South	UKPN	14.7	Green
Kent	Manston	UKPN	19.1	Green
Kent	Marden	UKPN	3.2	Green
Kent	Margate	UKPN	15.8	Green

Kent	Medway	UKPN	4	Green
Kent	Medway Grid	UKPN	79.7	Green
Kent	Mereworth	UKPN	3.25	Green
Kent	Minster	UKPN	4.3	Green
Kent	Morehall 132/	UKPN	38.9	Green
Kent	North Sevenoaks	UKPN	19.6	Green
Kent	Northfleet East	UKPN	81.7	Green
Kent	Paddock Wood	UKPN	7.8	Green
Kent	Pembury Grid	UKPN	19.6	Green
Kent	Penshurst	UKPN	7.4	Green
Kent	Queenborough	UKPN	8.5	Green
Kent	Ramsgate	UKPN	0.5007	Red
Kent	Richborough	UKPN	1.5	Amber
Kent	Richborough Grid	UKPN	71.9	Green
Kent	Romney Warren	UKPN	2.6	Amber
Kent	Rosherville	UKPN	4.5	Green
Kent	Ruckinge Grid	UKPN	9.6	Green
Kent	Rusthall	UKPN	5.7	Green
Kent	Sellindge Local	UKPN	25.8	Green
Kent	Sevington	UKPN	3.9	Green
Kent	Sheerness	UKPN	5.1	Green
Kent	Sheerness Grid	UKPN	24	Green
Kent	Shepway	UKPN	11.65	Green
Kent	Singleton	UKPN	10.2	Green
Kent	Sittingbourne Grid	UKPN	11.7	Green
Kent	Sittingbourne Town	UKPN	8	Green

Kent	Sittingbourne West	UKPN	15.3	Green
Kent	Smeeth	UKPN	-0.3	Red
Kent	St Peters	UKPN	1.35	Amber
Kent	Stanford	UKPN	5.8	Green
Kent	Staplehurst	UKPN	1.2	Amber
Kent	Stelrad	UKPN	0.13	Red
Kent	Stone	UKPN	6.7	Green
Kent	Stonemarshes	UKPN	8.2	Green
Kent	Sundridge	UKPN	11.8	Green
Kent	Swanley	UKPN	5.4	Green
Kent	Swanscombe	UKPN	7.7	Green
Kent	Tenterden	UKPN	-0.1	Red
Kent	Thanet	UKPN	10	Green
Kent	Thanet Grid	UKPN	20.6	Green
Kent	Tonbridge East	UKPN	5.5	Green
Kent	Tonbridge Town	UKPN	7.3	Green
Kent	Townsend Hook	UKPN	0.6408	Red
Kent	Tunbridge Wells Grid	UKPN	7.4	Green
Kent	Tunbridge Wells Grid	UKPN	26.8	Green
Kent	Tunbridge Wells Town	UKPN	4.3	Green
Kent	Tunbridge Wells Town	UKPN	11.7	Green
Kent	Warehorne	UKPN	-0.275	Red
Kent	Waterside	UKPN	13.8	Green
Kent	West Ashford	UKPN	1.3	Amber
Kent	Westgate	UKPN	3.4	Green
Kent	Whitstable	UKPN	13.1	Green

Kent	Wingham	UKPN	-2.34832	Red
Kent	Wittersham	UKPN	-0.309	Red
Kent	Wrotham Heath	UKPN	0.2	Red
Medway	Chatham Grid	UKPN	44.9	Green
Medway	Chatham Hill	UKPN	8.7	Green
Medway	Chatham West	UKPN	10.399	Green
Medway	Grain	UKPN	2.1	Amber
Medway	Halling	UKPN	11.3	Green
Medway	Kingsnorth Grid	UKPN	23.8	Green
Medway	Lordswood	UKPN	9.1	Green
Medway	Rainham	UKPN	0.476	Red
Medway	Rainham Mark	UKPN	18.4	Green
Medway	Sharnal Street	UKPN	2	Amber
Medway	Strood	UKPN	19.2	Green
Portsmouth	Brandon Road	SSE	9.46	Green
Portsmouth	Eastney	SSE	12.11	Green
Portsmouth	Fratton Park	SSE	9.08	Green
Portsmouth	Greetham Street	SSE	15.54	Green
Portsmouth	Portsmouth	SSE	27.08	Green
Portsmouth	College Park	SSE	3.95	Green
Portsmouth	Farlington	SSE	15.27	Green
Portsmouth	Gamble Road	SSE	11.27	Green
Portsmouth	Hilsea	SSE	15.55	Green
Portsmouth	Wymering	SSE	17.68	Green
Reading	Kentwood Hill	SSE	3.07	Green
Reading	Whitley Wood	SSE	5.28	Green

Reading	Wilson Road	SSE	12.12	Green
Reading	Southcote	SSE	10.48	Green
Reading	Northumberland Avenue	SSE	6.53	Green
Reading	Silver Street	SSE	8.23	Green
Reading	Caversham	SSE	16.69	Green
Reading	Reading Town	SSE	19	Green
Reading	The Mall	SSE	7	Green
Slough	Chalvey	SSE	35.23	Green
Slough	Petersfield Avenue	SSE	4.1	Green
Slough	Poyle	SSE	4.94	Green
Slough	Farnham Royal	SSE	20.21	Green
Slough	Sutton Lane	SSE	12.3	Green
Slough	Upton	SSE	3.2	Green
Southampton	Bitterne	SSE	3.35	Green
Southampton	Townhill Park	SSE	9.67	Green
Southampton	Weston	SSE	14.34	Green
Southampton	Woolston	SSE	1.76	Amber
Southampton	Lordshill	SSE	15.52	Green
Southampton	Maybush	SSE	10.04	Green
Southampton	Bevois Valley	SSE	8.36	Green
Southampton	Central Bridge	SSE	18.42	Green
Southampton	Chapel	SSE	2.57	Amber
Southampton	Regents Park	SSE	14.27	Green
Southampton	Shirley	SSE	14.37	Green
Southampton	Western Esplanade	SSE	26.95	Green
Southampton	Woodmill Lane	SSE	15.42	Green

Southampton	Bassett	SSE	11.57	Green
Surrey	Aldershot	SSE	6.24	Green
Surrey	Farnham	SSE	1.59	Amber
Surrey	Godalming	SSE	9.36	Green
Surrey	Hindhead	SSE	8.71	Green
Surrey	Milford	SSE	12.89	Green
Surrey	Normandy	SSE	0.1	Red
Surrey	Bagshot	SSE	9.86	Green
Surrey	Chobham	SSE	3.79	Green
Surrey	Mvee	SSE	21.07	Green
Surrey	Camberley	SSE	53.6	Green
Surrey	Kings Ride	SSE	6.66	Green
Surrey	Frimley	SSE	5.46	Green
Surrey	Wrecclesham	SSE	17.08	Green
Surrey	Church Road	SSE	10.9	Green
Surrey	Causeway	SSE	48.4	Green
Surrey	Egham	SSE	33.8	Green
Surrey	Sidney Road	SSE	47.2	Green
Surrey	Stanwell	SSE	49.6	Green
Surrey	Sunbury Cross	SSE	46	Green
Surrey	Ashtead	UKPN	5.7	Green
Surrey	Banstead	UKPN	3	Amber
Surrey	Betchworth	UKPN	1.7	Amber
Surrey	Brookwood	UKPN	12	Green
Surrey	Byfleet	UKPN	12.3	Green
Surrey	Byfleet Grid	UKPN	28.9	Green

Surrey	C.E.R.L.	UKPN	1.35	Amber
Surrey	Capel	UKPN	9.355	Green
Surrey	Caterham	UKPN	2.6	Amber
Surrey	Chertsey	UKPN	12.3	Green
Surrey	Cobham Surrey	UKPN	1.7	Amber
Surrey	Cranleigh	UKPN	7.255	Green
Surrey	Crowhurst	UKPN	4.8	Green
Surrey	Dorking Town	UKPN	11.8	Green
Surrey	Dormansland Grid	UKPN	49.5	Green
Surrey	Effingham	UKPN	7.3	Green
Surrey	Epsom	UKPN	3.9	Green
Surrey	Esher	UKPN	10.6	Green
Surrey	Ewell	UKPN	10.3	Green
Surrey	Gatwick Airport AF	UKPN	23	Green
Surrey	Guildford	UKPN	4.7	Green
Surrey	Guildford 'A'	UKPN	-0.1	Red
Surrey	Guildford 'B'	UKPN	1.8	Amber
Surrey	Guildford Grid	UKPN	27	Green
Surrey	Horley 33/11	UKPN	18.1	Green
Surrey	Horsell	UKPN	4.9	Green
Surrey	Leatherhead Grid	UKPN	59	Green
Surrey	Leatherhead Town	UKPN	5.8	Green
Surrey	Leigh Grid	UKPN	41.3	Green
Surrey	Merrow	UKPN	4.5	Green
Surrey	Molesey	UKPN	1.2	Amber
Surrey	Nork	UKPN	11	Green

Surrey	Nutfield	UKPN	-2	Red
Surrey	Old Woking	UKPN	1.9	Amber
Surrey	Oxted	UKPN	5	Green
Surrey	Redhill Primary	UKPN	20.3	Green
Surrey	Reigate	UKPN	19	Green
Surrey	Shalford	UKPN	5.7	Green
Surrey	Smallfield Grid	UKPN	49.8	Green
Surrey	Walton	UKPN	12.5	Green
Surrey	West Weybridge	UKPN	1.8	Amber
Surrey	West Weybridge Grid	UKPN	9.5	Green
Surrey	Weybridge	UKPN	1.767	Amber
Surrey	Woking	UKPN	8.5	Green
West Berkshire	Beenham	SSE	5.84	Green
West Berkshire	Greenham Common	SSE	16.82	Green
West Berkshire	Hungerford	SSE	4.82	Green
West Berkshire	Kintbury	SSE	4.71	Green
West Berkshire	Lambourn	SSE	1.73	Amber
West Berkshire	Leckhampstead	SSE	1.19	Amber
West Berkshire	Love Lane	SSE	17.93	Green
West Berkshire	Riverside	SSE	0.57	Red
West Berkshire	St Johns	SSE	3.34	Green
West Berkshire	Tadley	SSE	6.59	Green
West Berkshire	Thatcham	SSE	6.81	Green
West Berkshire	Yattendon	SSE	0.56	Red
West Berkshire	Padworth	SSE	1.71	Amber
West Berkshire	Pangbourne	SSE	20.73	Green

West Berkshire	Theale	SSE	13.31	Green
West Berkshire	Trash Green	SSE	2.13	Amber
West Berkshire	Pingewood	SSE	6.23	Green
West Sussex	Five Oaks	SSE	4	Green
West Sussex	Haslemere	SSE	1.67	Amber
West Sussex	Haslingbourne	SSE	5.82	Green
West Sussex	Langley Court	SSE	13.93	Green
West Sussex	Midhurst	SSE	18.52	Green
West Sussex	Plaistow	SSE	10.39	Green
West Sussex	Argyle Road	SSE	12.53	Green
West Sussex	Ashling Road	SSE	1.9	Amber
West Sussex	Billingshurst	SSE	0	Red
West Sussex	Bilsham	SSE	11	Green
West Sussex	Birdham	SSE	1.4	Amber
West Sussex	Chichester	SSE	5.98	Green
West Sussex	Hunston	SSE	0.1	Red
West Sussex	Market	SSE	11.83	Green
West Sussex	Rose Green	SSE	12.59	Green
West Sussex	Selsey	SSE	2.61	Amber
West Sussex	South Bersted	SSE	1.9	Amber
West Sussex	Angmering	UKPN	1.6	Amber
West Sussex	Ashington	UKPN	6.4	Green
West Sussex	Bolney Grid	UKPN	7.1	Green
West Sussex	Burgess Hill	UKPN	0.1	Red
West Sussex	Cowfold	UKPN	-0.1	Red
West Sussex	Crawley Ind East	UKPN	9.3	Green

West Sussex	Crawley Industrial West	UKPN	6.4	Green
West Sussex	Crawley Town	UKPN	27.3	Green
West Sussex	East Grinstead	UKPN	9.3	Green
West Sussex	Goddards Green	UKPN	14.3	Green
West Sussex	Goddards Green Grid	UKPN	38.2	Green
West Sussex	Haywards Heath	UKPN	9.9	Green
West Sussex	Horsham Grid	UKPN	26.6	Green
West Sussex	Hurstpierpoint	UKPN	1.492	Amber
West Sussex	Littlehampton	UKPN	5.9	Green
West Sussex	North Shoreham	UKPN	5.5	Green
West Sussex	North Worthing	UKPN	4.8	Green
West Sussex	Portslade	UKPN	21.8	Green
West Sussex	Pulborough	UKPN	7.2	Green
West Sussex	Sompting	UKPN	5.6	Green
West Sussex	South Worthing	UKPN	8.7	Green
West Sussex	Southgate	UKPN	15.7	Green
West Sussex	Southwater	UKPN	11.7	Green
West Sussex	Southwick	UKPN	4.9	Green
West Sussex	Steyning	UKPN	7.2	Green
West Sussex	Steyning Grid	UKPN	30	Green
West Sussex	Three Bridges Local	UKPN	58.9	Green
West Sussex	West Hoathly	UKPN	1.2	Amber
West Sussex	West Worthing	UKPN	0	Red
West Sussex	Worthing Grid A	UKPN	35.259	Green
West Sussex	Worthing Grid B	UKPN	46.6	Green
West Sussex	Worthing Town	UKPN	26.3	Green

Windsor and Maidenhead	Ascot	SSE	14.5	Green
Windsor and Maidenhead	Sunninghill	SSE	12.01	Green
Windsor and Maidenhead	Braywick Road	SSE	4.31	Green
Windsor and Maidenhead	Cordwallis	SSE	9.16	Green
Windsor and Maidenhead	Knowl Hill	SSE	2.35	Amber
Windsor and Maidenhead	Maidenhead	SSE	9.7	Green
Windsor and Maidenhead	Temple Farm	SSE	1.03	Amber
Windsor and Maidenhead	Clarence Road	SSE	13.1	Green
Wokingham	Arborfield	SSE	18	Green
Wokingham	Courages	SSE	11.39	Green
Wokingham	Little Hungerford	SSE	14.39	Green
Wokingham	Reading	SSE	9.8	Green
Wokingham	Twyford	SSE	2.15	Amber
Wokingham	Elms Road	SSE	7.51	Green
Wokingham	Wokingham	SSE	20.05	Green

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