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Peninsula Transport and Western Gateway

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PENINSULA TRANSPORT AND WESTERN GATEWAY

Electric Vehicle Charging Study

Western Gateway
Sub-national Transport Body

Peninsula Transport

Report contents

Document Control

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Prepared by	JW	MB	PK	GG
Checked by	GG	GG	KD	DQ
Authorised by	DQ	DQ	GG	DQ

WSP House
70 Chancery Lane
London
WC2A 1AF
wsp.com

Executive Summary

This study provides an evidence base to support future EV charging policy across Peninsula and Western Gateway

AIMS AND OBJECTIVES

WSP was appointed by Peninsula and Western Gateway Sub-National Transport Bodies (STBs) to undertake electric vehicle (EV) uptake and electric vehicle charge point (EVCP) requirements analysis across the region up to 2050 – but focussing on the time period to 2030.

The UK government has committed to an EV transition and the decarbonising of the transport sector. The following documents contain the key government targets:

Taking Charge: Electric Vehicle Infrastructure Strategy (March 2022):

- By 2030, the government expects there to be at least 300,000 public chargepoints across the UK.
- Provide high powered charge points on the strategic road network through the £950m Rapid Charging Fund to strengthen the commercial case for investment
- Support local-on street charging by putting an obligation (subject to consultation) on local authorities to develop and implement local charging strategies.

Net Zero Strategy: Build Back Greener (October 2021):

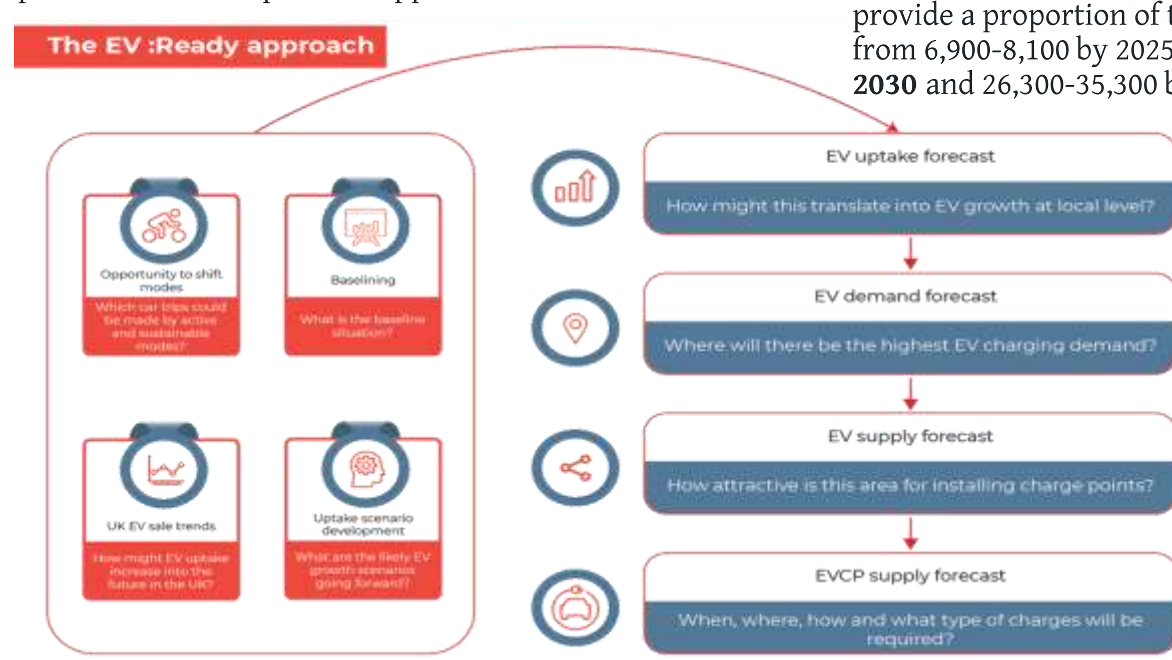
- Along with proposals to achieve net zero carbon emissions by 2050, they envision to achieve net zero through the discouraging the sale of new petrol and diesel cars and vans from 2030. All the new cars and vans must be zero emissions at the tailpipe.
- An additional £620m to be provided by government to support EV transition and the rollout of charging infrastructure, with a particular focus on local on-street residential charging and targeted plug-in vehicle grants.

METHODOLOGY

WSP's EV:Ready forecasting tool was used to determine the baseline situation within the study area, and to forecast future EV uptake, charging demand and EVCP requirements. The following process was followed.

- **Opportunity to shift modes:** Which car trips could be made by active and sustainable modes?
- **Baselining:** What is the baseline situation?
- **UK EV sales trends:** How might EV uptake increase into the future in the UK?
- **Uptake scenario development:** What are the likely EV growth scenarios in the UK going forward?
- **EV uptake forecast:** How might this translate into EV growth at a local level?
- **EV demand forecast:** Where will there be the highest EV charging demand?
- **EV supply forecast:** How attractive is the area for installing charge points?
- **EVCP requirements forecast:** When, where, how and what type of chargers will be required?

An additional methodology note setting out the process and assumptions is appended.



KEY FINDINGS AND MESSAGES

This study provides an evidence base to support future EV policy across Peninsula and Western Gateway. Key findings include:

- It is estimated that **24-43%** of current trips in the region could be **shifted to walking, cycling or public transport**. The remaining trips would still require a car.
- There are currently **99,134 electric vehicles** in the region, which account for **2.52%** of the total vehicles. Of this, 67% are fully battery electric and 33% are hybrids.
- There were **2,408 publicly accessible chargepoints** (76% standard and 24% rapid) based on DfT Electric Vehicle Charging Device Statistics data.
- EV uptake is forecast to increase in the future. By 2025 there will be 274-323k (7-8%) EVs, **by 2030 1.02-1.4m (25-35%)** and by 2035 there will be 2.3-3.2m (55-75%) EVs.
- Publicly accessible EVCPs will be required to meet this demand, ranging from 11,400 – 13,400 by 2025, **24,000 - 33,600 by 2030** and 54,800-74,400 by 2035.
- It is expected that the public sector will need to provide a proportion of the total EVCPs, ranging from 6,900-8,100 by 2025, **10,600-20,000 by 2030** and 26,300-35,300 by 2035.

Vehicle miles will decrease as drivers shift to active and sustainable travel

OPPORTUNITY TO SHIFT MODES

To meet transport decarbonisation goals there will need to be a shift to active and sustainable travel, as well as a transition to electric vehicles.

The hierarchy of travel diagram below communicates how sustainable travel should be prioritised over motor vehicles (where possible). Firstly, digital communication and work from home minimises the need for travel. The aspiration is then to shift as many journeys to sustainable modes as possible. Journeys which can only be carried out by motor vehicle should transition to EVs.

In the study area, currently 74% of journeys are made by car, which is higher than the UK average of 68%.

Analysis was carried out to understand which journeys could reasonably shift to sustainable modes. Two scenarios were tested:

- **High mode shift** – which sets ambitious thresholds for the length of journey which could made by sustainable modes. E.g. all trips under 2 miles could be walked and 5 miles could be cycled in urban areas. Under this scenario the aims of the Department for Transport's 'Gear Change' strategy would be achieved.
- **Lower mode shift** – which has a more conservative set of journey time limits for trips to be made by sustainable modes.

Hierarchy of travel

URBAN – RURAL SPLIT

The proportion of trips which can be shifted to sustainable modes in rural areas is much smaller than in urban areas.

In the high scenario, it was modelled that **93% of trips could be shifted in urban areas**, but this figure is **only 54% in rural areas.** While walking can facilitate over a quarter of urban trips, in rural areas only 3% of walking trips could be made in under 30 minutes.

In the low scenario, car dependency rises from 38% in urban areas to 76% in rural areas. Public transport is viable for only 1% of short rural trips and no short urban trips, indicating that services are not competitive with driving.

Many shorter trips, which may be possible by public transport, can also be made realistically by active modes, especially in urban areas.

In the high mode shift scenario, active travel accounted for 91% of trips with just 2% made by public transport. However, the low mode shift scenario assigns a lower 62% of trips to active transport and no trips to public transport.

PUBLIC TRANSPORT – DRIVE SPLIT

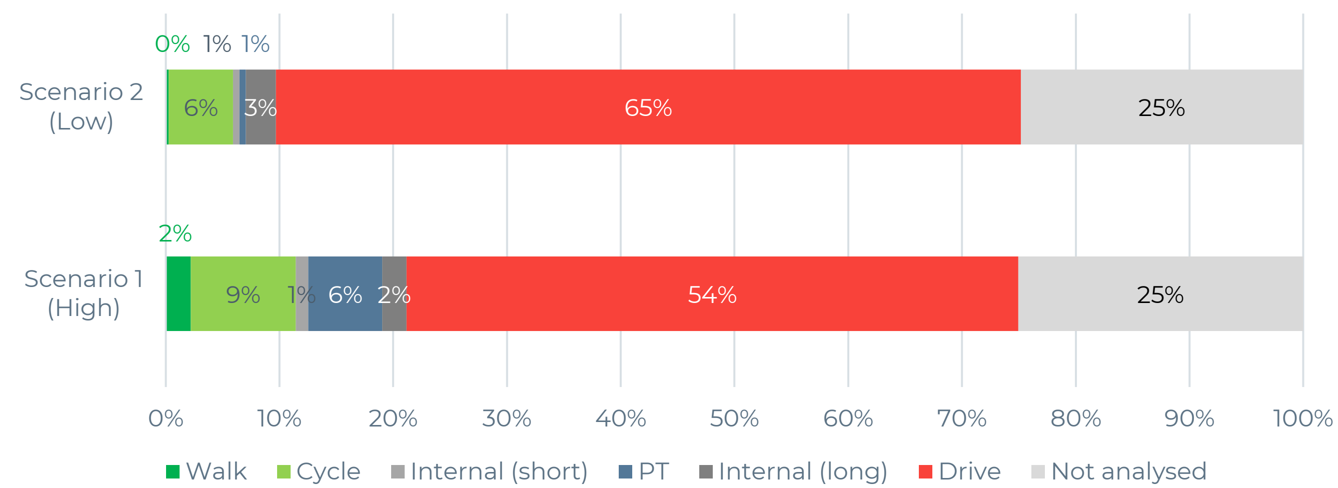
Under the high mode shift scenario the threshold for a trip being viable via public transport was if the journey was up to 2.4 times slower than driving, and without competition from active modes. However even with this generous assumption only 15% of trips could be shifted to public transport.

The lower mode shift scenario threshold was for trips to be up to 1.5 times slower than the equivalent journey by car. This resulted in just 1% of trips having the opportunity to shift from car to public transport.

DECARBONISATION

Under the higher mode shift scenario, 17% of baseline emissions could be reduced by mode shift towards walking, cycling and public transport. This equates to 2,962 tonnes of daily CO2e per day. The lower mode shift scenario can reduce 6% of emissions (1,299 tonnes).

Mode shift opportunity by kilometres travelled

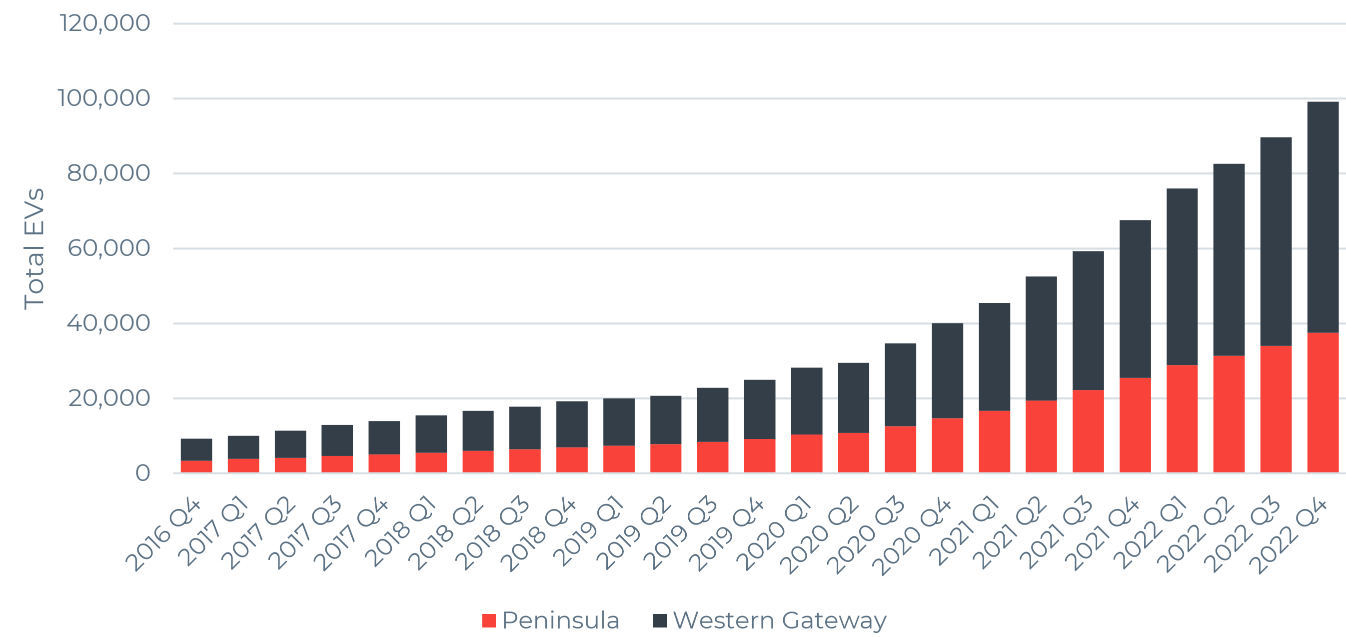


The number of EVs has been rising rapidly but from a low base. Currently the are 99,134 electric vehicles in the region and there are 2,408 public chargepoints serving them

CURRENT EVS

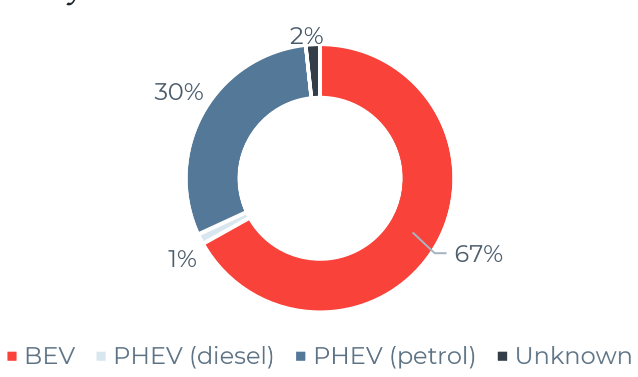
The number of EVs is increasing year on year although from a low base. Similar trends in growth have been seen throughout the UK and in the study area.

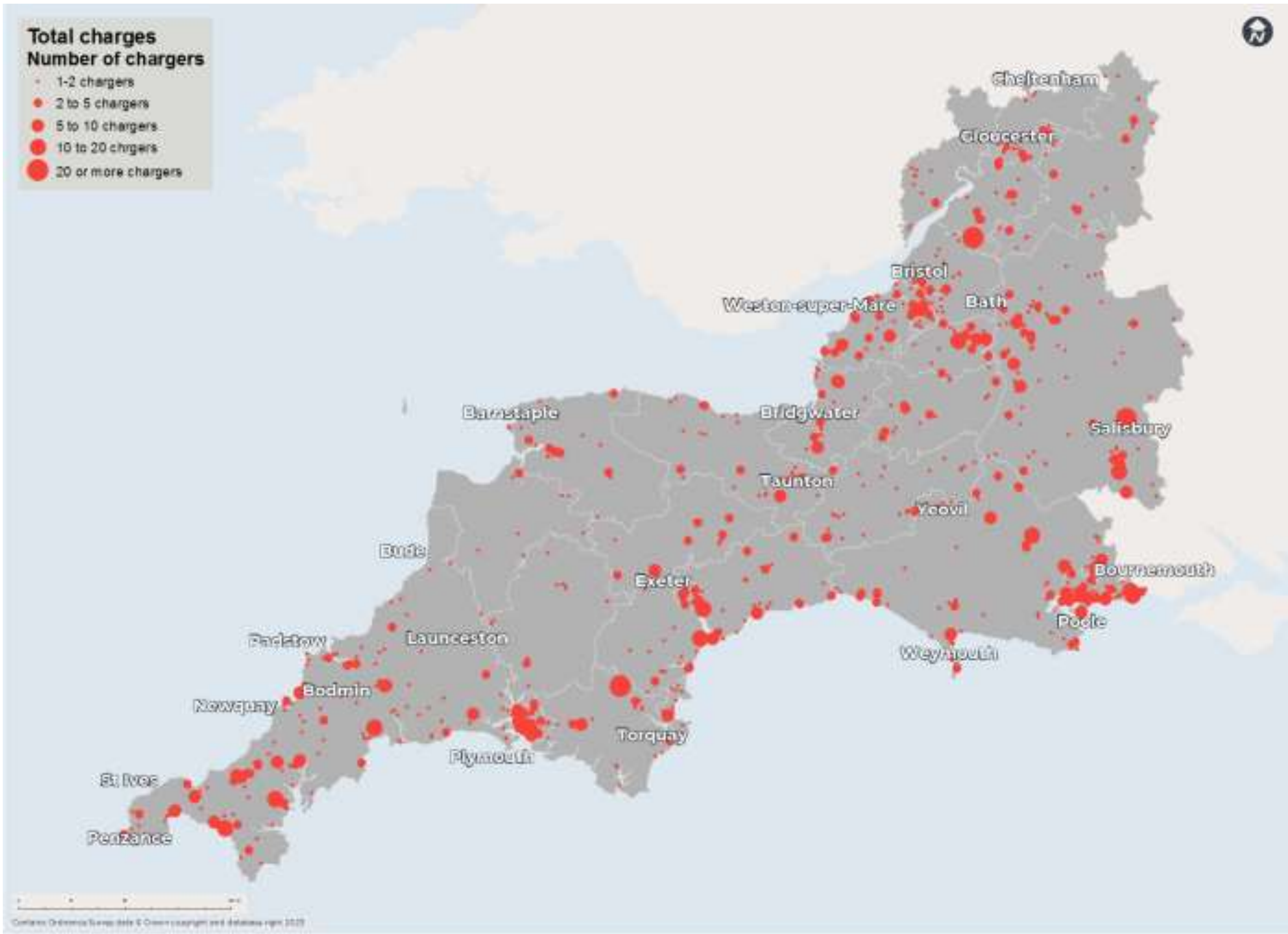
As of 2022 (Q4), there were 99,134 EVs registered in the region. This equates to 2.52% of all vehicles. EV uptake is slightly higher in Peninsula and Western Gateway than the UK as a whole where 2.44% of vehicles are EVs.



EV Fleet Share		
Year	2016	2022 (Q4)
Peninsula & Western Gateway	0.16%	2.52%
UK	0.22%	2.44%

The pie chart below shows the split between fully electric (BEV) and hybrid vehicles (PHEV). The majority are fully electric.





EXISTING EVCPS

As at January 2023, there was a total of 2,408 existing chargers already operating in the region. This is comprised of 582 DC rapid chargers (25-50kW), 24% of the total EV chargers in the study area and 1,826 AC standard chargers (22kW or less) representing 76% of chargers in the study area. They are distributed unevenly throughout the region with many areas having no nearby chargepoints.

EV uptake is forecast to accelerate rapidly up until 2050 when almost all vehicles will be electric

UPTAKE FORECASTS

The WSP EV:Ready model was used to calculate detailed forecasts of EV uptake in the future, up to 2050. The model combines granular neighbourhood level data on factors affecting EV uptake at a local level, with regional and national data sets.

A low and high forecast were calculated to represent the range of uncertainty. The two scenarios include different assumptions about the level of government intervention and consumer behaviour.

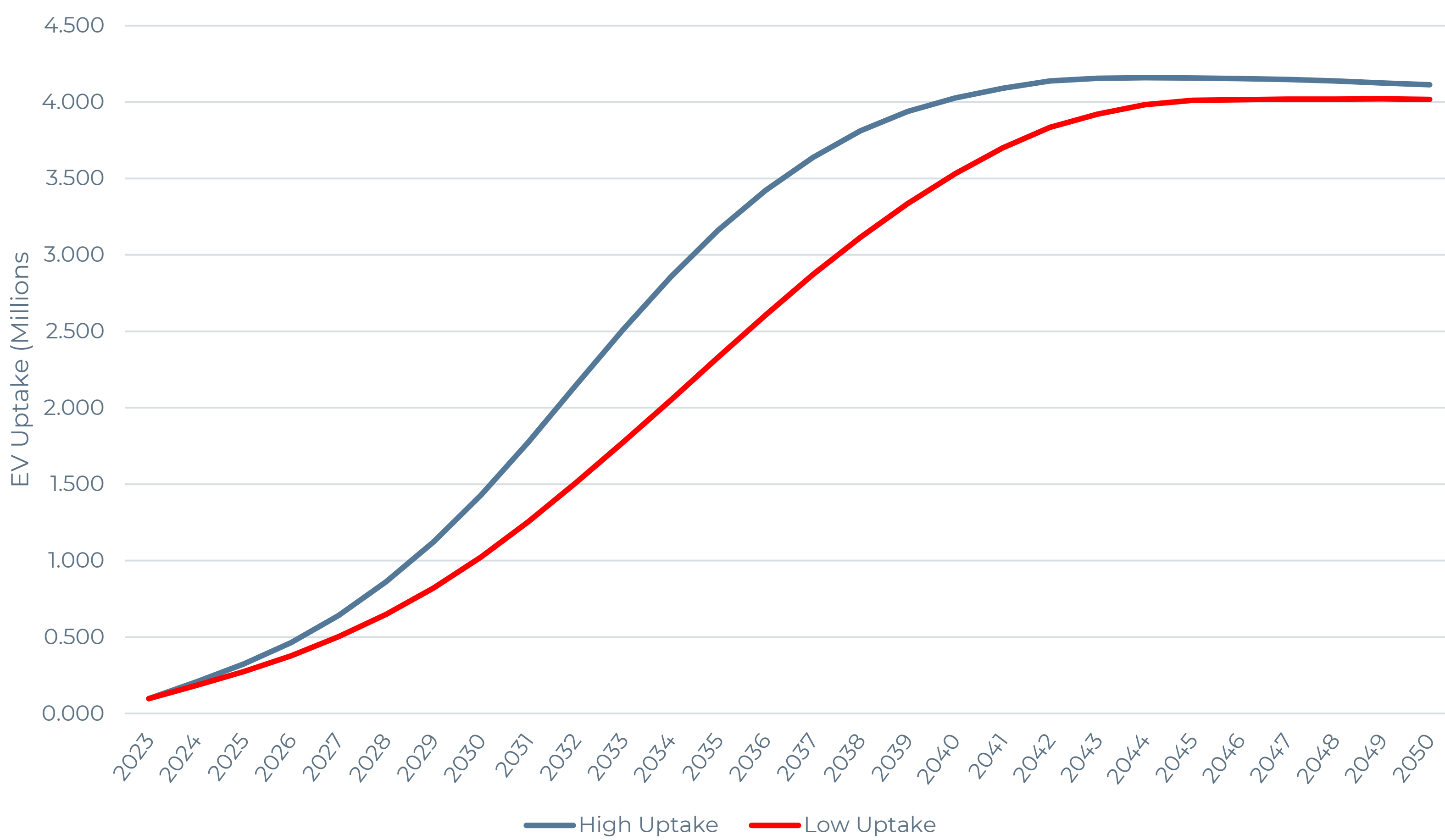
The line graph below shows the projected number of electric vehicles in the region up until 2050. The rate of EV uptake is expected to continue to increase in the coming years and be accelerated by the expected ban on sale of new ICE vehicles in 2030.

It is forecast that there will be between:

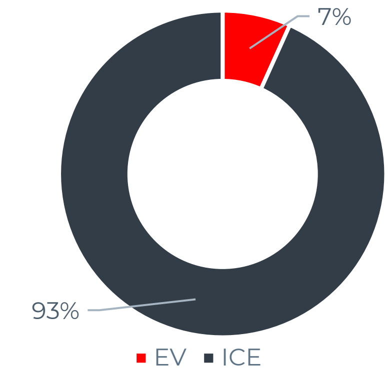
- 274,000 - 323,400 EVs by 2025,
- 1,022,800 – 1,426,800 by 2030 and,
- 2,329,000 - 3,160,100 by 2035.

The four donut charts show how the proportion of EVs and ICEs in the two regions will change every 5 years from 2025 to 2040 (in the high scenario).

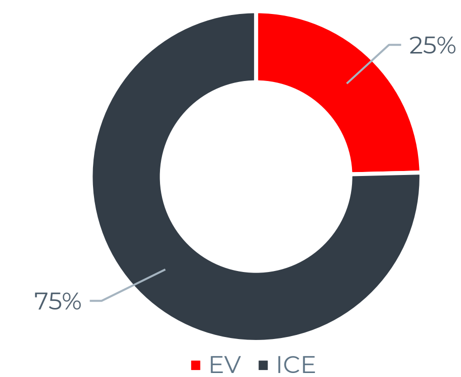
In 2030, it is predicted that 30% of vehicles will be EVs, and by 2035 that figure is predicted to rise to 65%. The rates of EV uptake will differ across the region depending on the demographics of the area.



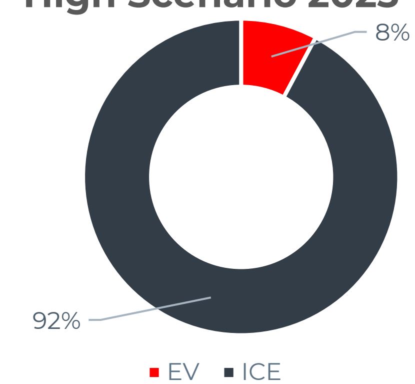
Low Scenario 2025



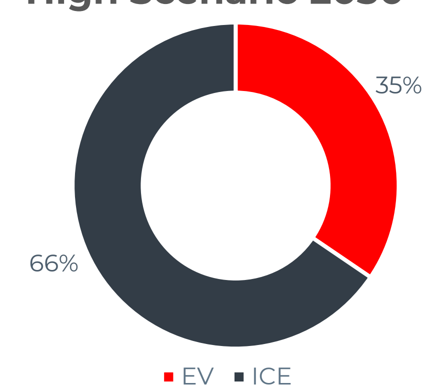
Low Scenario 2030



High Scenario 2025



High Scenario 2030



Demand for public residential charging is greatest in areas with high propensity to switch to EVs but a low availability of off-street parking

RELIANCE ON ON-STREET PARKING

About 93% of EVs are estimated to have access to home charging, despite between 20-40% of vehicles nationally having no such access to off-street parking. It is expected that the tendency for EV owners to rely on off-street parking will lessen over time as EV ranges increase, recharging times shorten and public infrastructure improves.

Reliance on on-street parking across the region, ranges from 18% to 38%. Usually more urban areas have a higher proportion of households reliant on on-street parking, such as Plymouth at 34%, and more rural areas tend to have a lower proportion of households reliant on on-street parking such as Dorset at 18%.

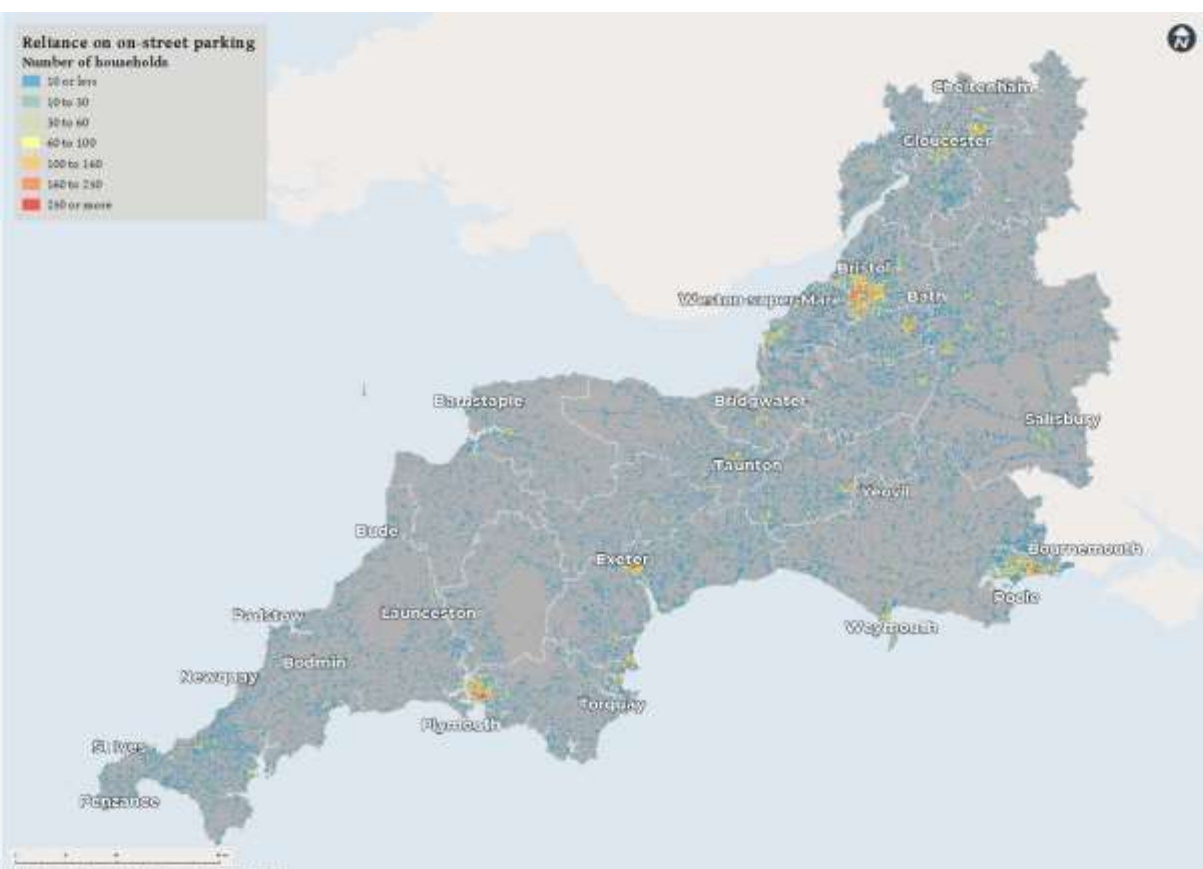
The bottom left map shows that reliance on on-street parking is generally low across the study area. In general, the reliance on on-street parking is much higher in urban areas and follows a similar trend to housing density.

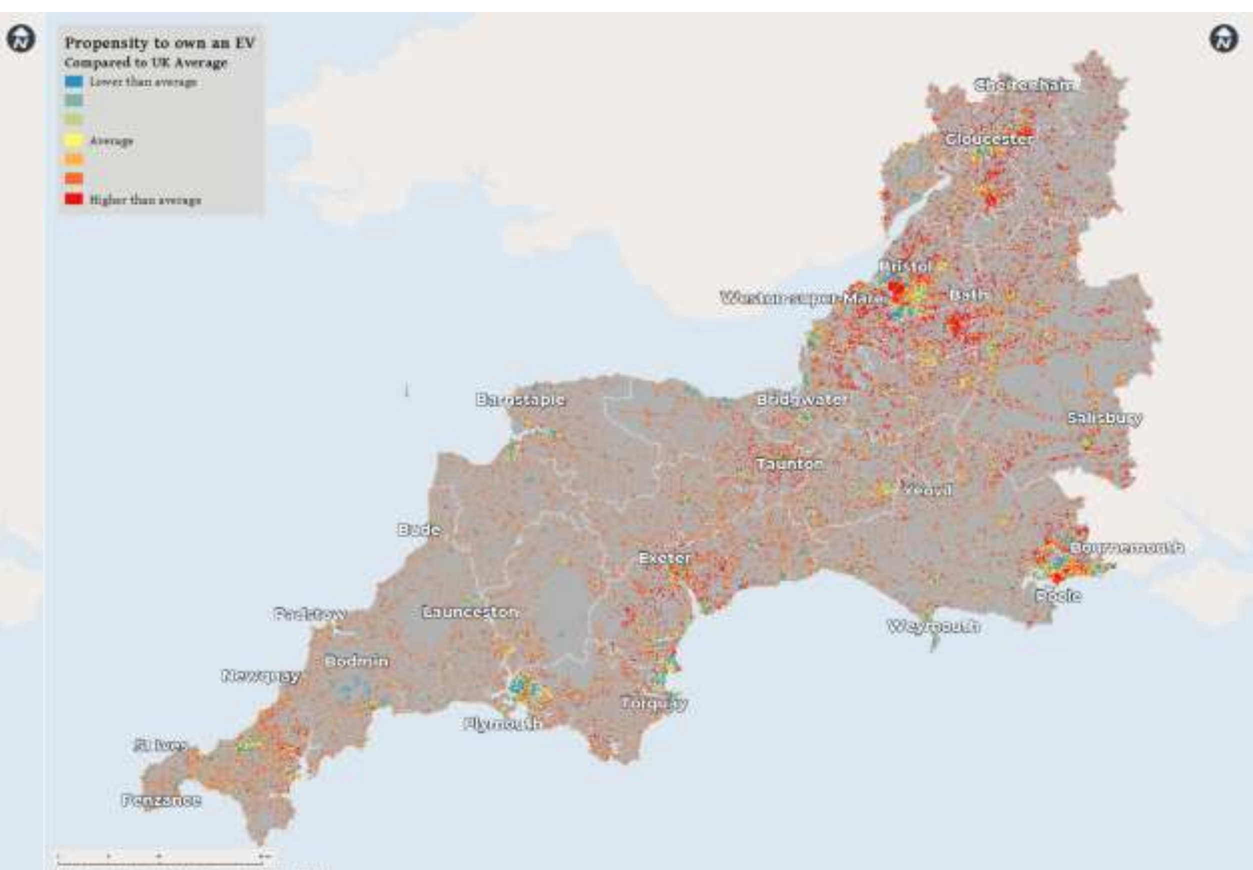
In particular the reliance is high around Bristol, Bournemouth, Plymouth and Gloucester, with the reliance exceeding 250 households in large areas. Other areas with notably high reliance are Bath, Cheltenham and Exeter, with large areas exceeding 100 households reliant on on-street parking per hex.

PROPENSITY TO OWN AN EV

Experian Mosaic profiles have been used to classify residents into user 'segments' of similar characteristics in order to determine their propensity to own an EV. The Experian Mosaic dataset is a cross-channel consumer classification system which segments the UK population into 15 groups.

The bottom right map presents the forecast propensity of residents to register an EV across the region, based on socio-demographic factors captured in Experian Mosaic. Some populations may have a high propensity to switch to an EV in theory, but if they are not already a vehicle owner then it is unlikely they will purchase an EV.





Chargepoints need to be installed where there is demand from drivers

To build an effective public EV charging network it is important that chargepoints are installed where there is demand from drivers. EV:Ready was used to forecast where this demand for charging will exist by 2030.

Two categories of chargepoints were considered which accommodate the different needs of drivers :

1. Standard AC charging demand – Focussed in residential areas to provide charging for drivers who do not have access to domestic off-street charging. As well as destination locations such as supermarkets where drivers would choose to 'top-up' whilst parked up.

2. Rapid DC charging demand – Predominantly located where en-route charging takes places, such as motorway service stations. Demand is driven by the volume of traffic flowing through the road network.

METHODOLOGY

To calculate the charging demand, EV:Ready was integrated with the 'South West Regional Transport Model' (SWRTM). This allows the flows of traffic throughout the region to be modelled.

Charging demand at three different stages of a journey was considered: origin, en-route and destination.

Origin demand: Identify the journeys which originate in an area using SWRTM. Based on EV:Ready EV uptake forecasting, assign the proportion of vehicles which would be EVs in 2030

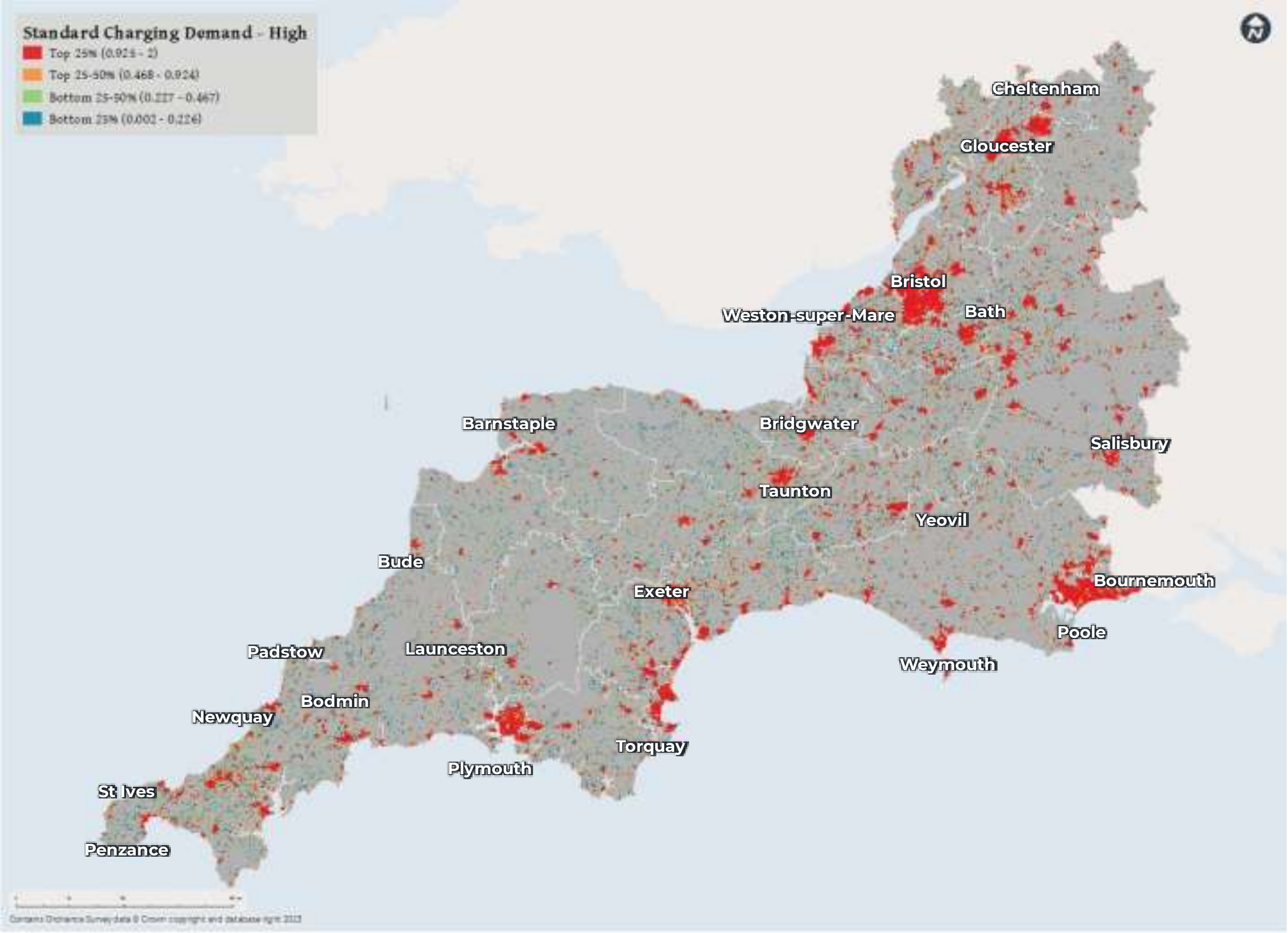
Destination demand: For each area, identify the number of journeys which would terminate there. Assign the proportion of EVs based on their origin. Aggregate the values for the larger model zones down to the smaller hex areas based on the number of destination land uses (e.g. supermarkets, retail, leisure etc).

En-route demand: Run SWRTM to calculate the number of EVs per day flowing through each road link based on the origin and destination of the journeys identified above.

STANDARD CHARGING DEMAND FORECAST

Standard charging demand is a summation of both the origin and destination demand modelled. Demand is generally concentrated in urban areas with high housing density.

Origin charging: Approximately 30% of households in the UK do not have access to off-street parking where they would be able to charge a vehicle. At present most EV owners (93%) have domestic off-street charging facilities but as EV uptake increases there will more EV drivers which depend on public residential charging and demand will rise.



In areas where there is a deficit of off-street parking there will be a higher demand for standard charging provision. Residential charging is provided on-street, or in public car parks.

Destination charging: Destination charging occurs when drivers take the opportunity to 'top-up' whilst parked at the destination of their journey e.g. shopping centres, railway stations and leisure sites.

The greater the density of 'destination' land uses in an area, the higher demand for standard charging provision.

En-route charging demand is greatest along the strategic route network

RAPID CHARGING DEMAND FORECAST

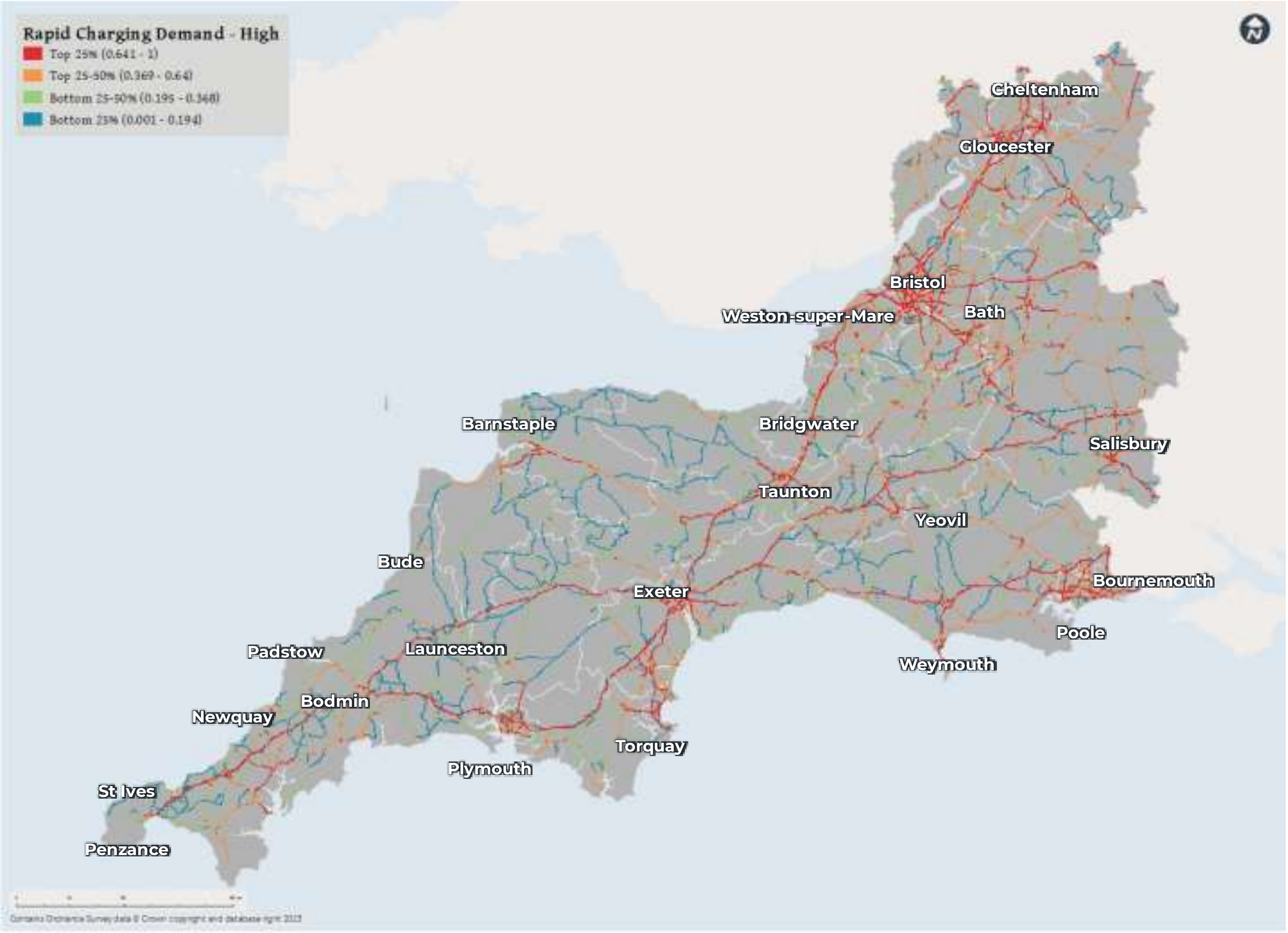
Vehicles travelling longer distances, may need to top up to extend their range and allow them to complete their journey. This is referred to as en-route or intermediate charging.

En-route charging is best suited to DC rapid chargepoints. A typical rapid charger can top up a car in the region of 45mins or faster, compared to a typical standard charger which would take 4-6 hours.

Using ‘rapids’ minimises the charging time and allows the driver to continue onto their destination as quickly as possible.

Rapid charging infrastructure would be most effectively applied as close to the high demand road links as possible, to minimise the length and time of detours. Ideal locations are motorway service stations or other land adjacent to major roads.

Whilst the priority is to install chargepoints in the areas of highest demand it is also important to create a network of chargers across the region to ensure there are no gaps where electric travel could be limited.



To meet demand, between 24,100-33,600 chargers will be required by 2030.

EVCP REQUIREMENTS FORECAST

The forecast uptake of EVs enables an assessment of associated charging infrastructure requirements. A wide range of variables are considered in this assessment, including: charging habits, vehicle mileage and efficiency, access to off-street parking, proportion of charging delivered via public chargers, trends in vehicle and charger technology, and average charge rates.

There are a range of approaches to forecasting charging infrastructure requirements. A low and high forecast is provided which reflects the two EV uptake scenarios present in the previous sections. These charge points would be provided by a combination of both the public and private sector.

Across the region, there are currently 2,408 chargepoints.

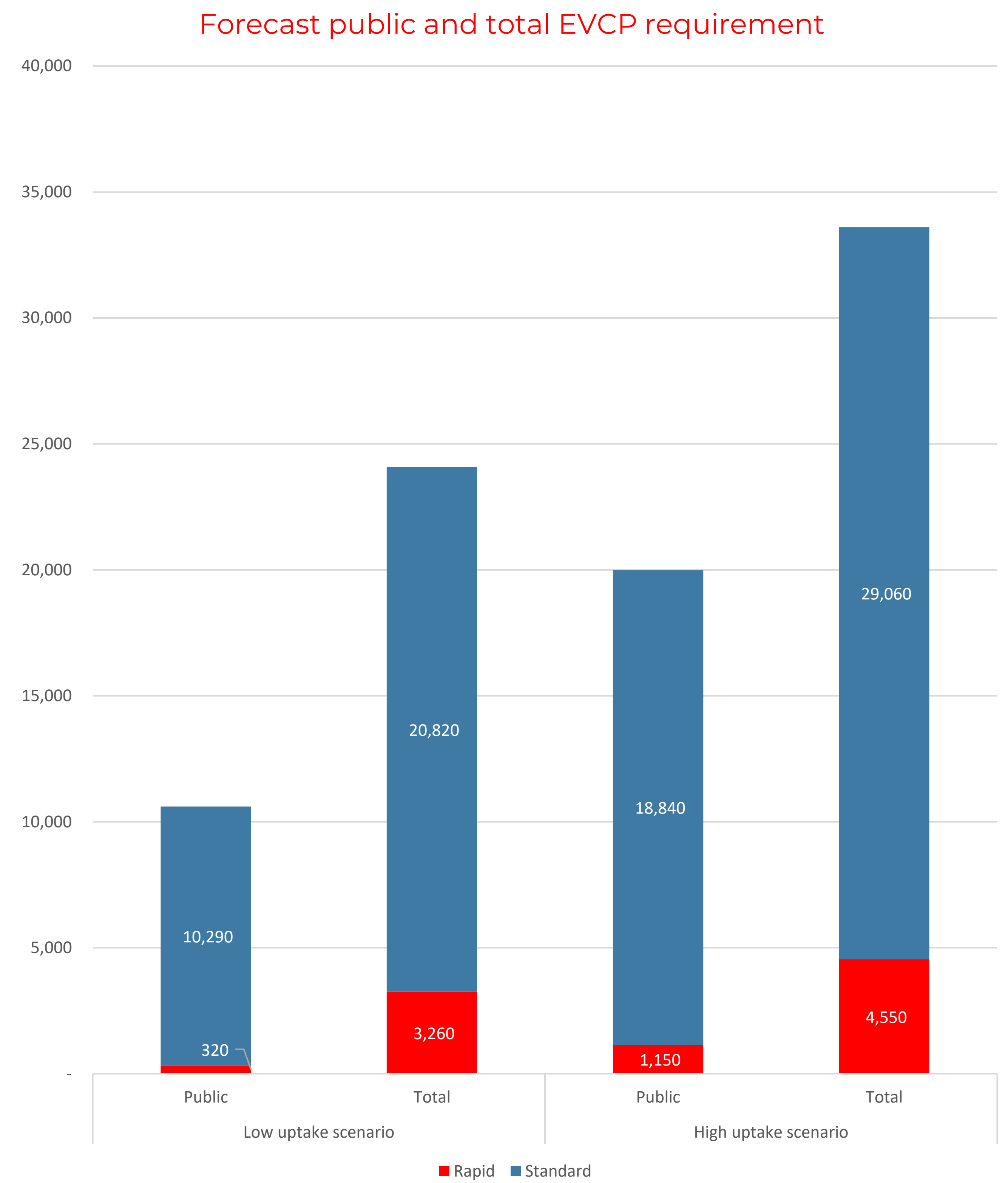
- By 2025, 11,400-13,400 charge points would be required.
- By 2030, 24,100-33,600 charge points would be required.
- By 2035, 54,900-74,400 charge points would be required.

These forecasts do not account for the additional charging demand generated by the building of new homes, as this is likely to be met through private home charge points, as required by planning policies and building regulations.

In the case an EVCP is assumed to have a single socket but in practice many chargepoints are dual socket and can serve to vehicles at once, minimising the number of units which will need to be installed.

Whilst the private sector will provide a proportion of the infrastructure required in the region, the public sector will need to intervene to fill gaps in the public charger network.

The majority of chargepoints will be standards with a small proportion being rapid chargepoints. It is expected that the private sector will continue to deliver most rapids chargepoints.



The public sector will need to provide chargers where there is a market failure

PRIVATE SECTOR INVESTMENT AND THE ROLE OF THE PUBLIC SECTOR

In order to create a successful EV charging network, that meets the needs of drivers, both the public and private sectors will both need to invest in EVCPs.

The ratio of change of public to private sector investment will change over time. Currently, we are in the early stages of the transition to electric vehicles and the number of EVs which require public chargers is relatively low. As a result there are many locations where EVCP installations are not commercially viable for the private sector. The contribution required by the public sector is therefore relatively high. As the number of EVs increases, the commercial viability will improve and the public sector contribution will decrease.

PROPORTION OF CHARGEPOINTS PROVIDED BY LOCAL AUTHORITIES

It is forecasted that the public sector will need to deliver **10,300 – 18,900 standard charge points and 300 – 1,200 rapid charge points by 2030.**

Roughly 5% of public charge points are forecasted to be rapid, with the rest standard in both high uptake and low uptake scenarios. This suggest public spendings on EVCPs should be mainly allocated to urban areas where there is a high demand for standard charging infrastructure.

GAP ANALYSIS

For local authorities, it is important to understand where the private sector is likely to invest. This is so limited resources can be appropriately focused on ‘plugging the gaps’ in the EVCP network and ensuring that equitable access to charging is achieved. This will drive EV uptake and ultimately contribute towards decarbonisation goals.

Analysis was carried out to identify areas of possible market failure where there will demand for charging but the private sector will not choose to install because it is not commercially attractive.

How local authorities can apply the findings of this report

The intention is that the local authorities within the Peninsula and Western Gateway areas use the outputs from the EV:Ready modelling to inform the planning of their EV charging networks and creation of EV Strategies.

This report contains the high-level outputs of the EV:Ready modelling and the methodology for how it was developed.

In future the data, should be made available via a an online dashboard which will allow council officers to interrogate the data in detail.

The outputs can be interpreted and applied in the following ways:

1. MAKE THE CASE FOR CHANGE

The baselining data shows the number and location of the existing EVs in the region. It also shows that there has been a rapid increase in the number of EVs, which is expected to continue in the future. There is existing infrastructure, but this will not be sufficient.

2. SET A TARGET NUMBER OF CHARGEPOINTS REQUIRED

A key part of an EV strategy is to define the number of chargepoints which will be required in the future. An action plan can then be developed for how this will be achieved.

3. IDENTIFY LOCATIONS WHERE CHARGEPOINTS SHOULD BE INSTALLED

Demand for charging is not equally distributed across the region. It is important to understand where chargepoints would be most beneficial and to focus investment in these areas. EV:Ready can be used to identify these locations.

The outputs are split into standard and rapid chargers and each should be considered separately Further review is required to identify specific locations within these 400mx400m hex areas that would be suitable for chargepoint installations. These could either be car parks, council land or on-street locations.

Councils should take a structured approach to this process and it is useful to define site selection criteria which can be consistently applied to any potential site.

The site selection criteria are specific to the objectives of each council but generally the following principles apply:

- Create a good distribution of chargers to ensure all who need it can have access to public EV charging within their area.
- Focus on areas where the private sector will not choose to invest.
- Exclude areas which are impractical or will have negative impact on the surrounding area e.g. footways not wide enough, parking stress too high.

Alternatively, officers may have existing locations in mind. These could be prioritised by assigning the EV:Ready score to each and ranking them.

4. LONG TERM MONITORING AND EVALUATION

Building charging networks will be an iterative process that will continue for many years to come.

It will be important to periodically review the progress made by the council against the target numbers of chargepoints for each year.

Additional metrics which could be monitored including number of chargepoints installed by the private sector and utilisation rates.

SECTION A

Introduction and methodology

Introduction

WSP was appointed by Peninsula and Western Gateway Sub-National Transport Bodies (STBs) to undertake electric vehicle (EV) uptake and electric vehicle charge point (EVCP) requirements analysis across the region up to 2050 – but foussing on the time period to 2030.

This project is part of a joint commission between the two STBs. This combined approach was undertaken due to the commonalities of the two regions, and their close relationship, not just in terms of transport approaches, but also geographically.

WSP's EV:Ready forecasting tool was used to determine the baseline situation within the study area, and to forecast future EV uptake, charging demand and EVCP requirements.

THE APPROACH

The following tasks were undertaken as part of this study to answer key questions:

- **Opportunity to shift modes:** Which car trips could be made by active and sustainable modes?
- **Baselining:** What is the baseline situation regarding EVs?
- **UK EV sales trends:** How might EV uptake increase into the future in the UK?
- **Uptake scenario development:** What are the likely EV growth scenarios in the UK going forward?
- **EV uptake forecast:** How might this translate into EV growth at a local level?
- **EV demand forecast:** Where will there be the highest EV charging demand?
- **EV supply forecast:** How attractive is the area for installing charge points?
- **EVCP requirements forecast:** When, where, how and what type of chargers will be required?

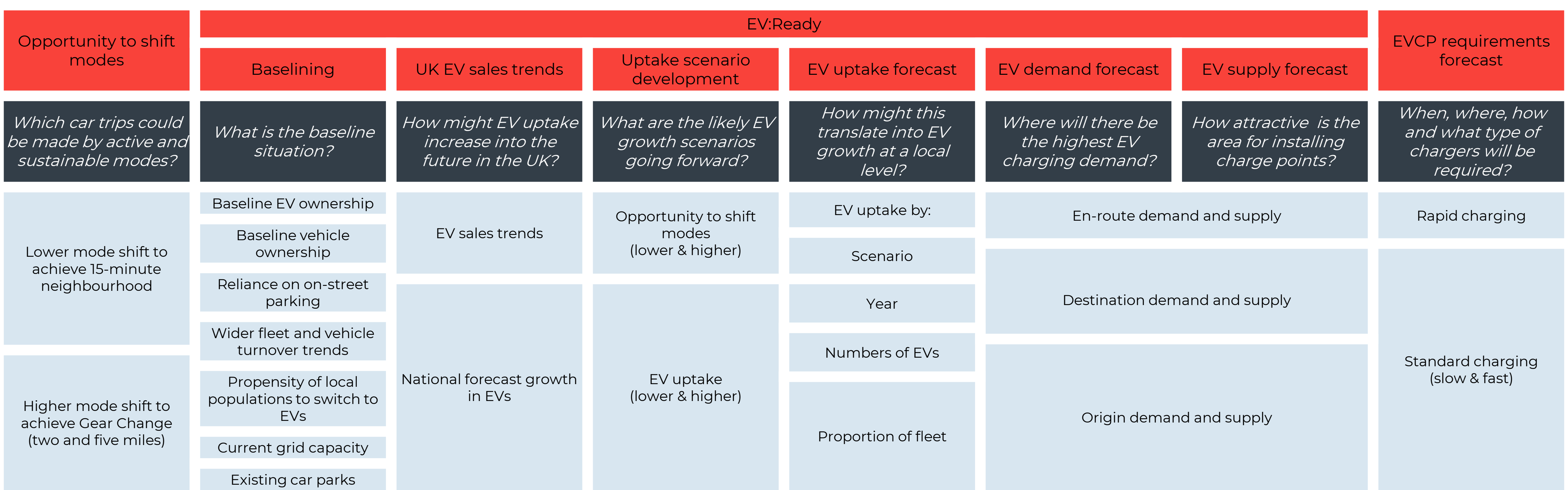
The diagram below illustrates the steps carried out.

Further analysis was carried out to understand the seasonal variation in charging demand.

KEY FINDINGS

This study provides an evidence base to support future EV policy across Peninsula and Western Gateway. Key findings include:

- It is estimated that **24-43%** of current trips in the region could be **shifted to walking, cycling or public transport**. The remaining trips would still require a car.
- There are currently **99,134 electric vehicles** in the region, which account for **2.52%** of the total vehicles. Of this, 67% are fully battery electric and 33% are hybrids.
- There were **2,408 publicly accessible chargepoints** (76% standard and 24% rapid) based on DfT Electric Vehicle Charging Device Statistics data.
- EV uptake is forecast to increase in the future. By 2025 there will be 274-323k (7-8%) EVs, **by 2030 1.02-1.4m (25-35%)** and by 2035 there will be 2.3-3.2m (55-75%) EVs.
- Publicly accessible EVCPs will be required to meet this demand, ranging from 11,400 – 13,400 by 2025, **24,000 - 33,600 by 2030** and 54,800-74,400 by 2035.
- It is expected that the public sector will need to provide a proportion of the total EVCPs, ranging from 6,900-8,100 by 2025, **10,600-20,000 by 2030** and 26,300-35,300 by 2035.



Methodology

OPPORTUNITY TO SHIFT MODE ANALYSIS

Outputs from the South West Regional Transport Model (SWRTM) were used to identify a representative sample of journey origins and destinations in the area.

The trip matrices were run through Google's Directions Application Programming Interface (API) to provide real-world transport route options for each journey, to produce network distance and journey time per mode (walking, cycling, public transport and driving).

From this, maps of areas recording a large demand for each mode, considering first mile and last mile sections for public transport, were produced.

Additional analysis was undertaken to identify areas where more sustainable modes are competitive with driving, and quantified these figures with Passenger Car Units (PCU) and Vehicle Kilometres Travelled (VKT) to understand the impact that this could have on net-zero goals.

The analysis and outputs of the opportunity to shift modes work is set out in Section B.

EV UPTAKE FORECAST

WSP's EV:Ready tool was used to estimate EV uptake forecasts for higher and lower uptake scenarios for years up to 2050 throughout the study area.

The model uses baseline Department for Transport EV registration data in addition to consumer segmentation analysis with Experian Mosaic (2022) and Census (2011) to calculate expected Electric Vehicle numbers.

The tool first assesses the baseline situation of the region, in terms of existing EV ownership, existing EVCPs and other demographics. **This is set out in Section C.**

This feeds into a forecast of EV uptake up to 2050, which looks at past sales trends, and industry forecasts – based on weighting National Grid's Future Energy Scenarios to determine a low and high UK EV uptake curve. **The EV uptake forecasting is set out in Section D.**

Then an upper and lower bound of likely EV growth scenarios are developed, which then leads to the EV uptake forecast specific to hexagonal shaped cells throughout the study area, with cells being 400m by 400m.

Hex cells have been used for all of the plots showing geographical representations of the inputs and outputs of the EV: Ready tool in this report to minimise the ambiguity caused by links travelling along cell edges or through corners joining multiple cells. This normalises the different data sets across the study area and allows for easier comparison.

EV CHARGING DEMAND AND SUPPLY

Firstly, an assessment of EV charging demand would occur based on forecasted mileages and efficiencies of the expected EV and PHEV fleet.

EV charging supply forecasts were also made by looking at expected en-route, origin and destination charging, which all have different requirements:

- En-route charging supply is assumed to be reliant on SWRTM vehicle demand on links along with the distribution of spare grid capacity. The latter assumption is particularly important when considering the feasibility of charging close to strategic links where electricity supply may be confined to specific points.
- Origin charging supply is assumed to be distributed according to EV-uptake, reliance on on-street parking, spare grid capacity and SWRTM trip demand by origin.
- Destination charging supply is assumed to be distributed according to modelled vehicle flow by link, spare grid capacity, relevant land use, and SWRTM trip demand by final destination.

The supply and demand analysis is set out in Section E.

PRIVATE SECTOR GAP ANALYSIS

The supply and demand results were analysed further to identify where the private sector is most likely to invest . Consequently, there may be areas with high demand, but due to limiting factors (such as grid connection) the private sector will be less-willing to supply EVCPs. Therefore, these gaps are locations where the public sector will need to intervene to 'fill the gaps'. This analysis is set out in **Sections E and F**

EVCP REQUIREMENTS FORECAST

Finally EV:Ready's Electric Vehicle Charge Point module was run, to generate forecasts for EVCP requirements to 2035, **and is set out in Section G.** This includes total numbers and an estimate of the proportion of chargepoints which the local authorities will need to provide.

Together the analysis provides detailed forecasting on when, where, how and what type of charges will be required in the future and where charge points should be prioritised for installation in the medium-term.

IMPACT OF TOURISM AND SEASONAL CHANGES IN DEMAND

A high-level assessment of the impact of tourism and season changes in demand has also been considered, **and is set out in Section H.**

SECTION B

Opportunity to shift modes

Opportunity to shift modes

ESTIMATING WHICH CAR TRIPS COULD BE MADE BY ACTIVE AND SUSTAINABLE MODES

The first task was to analyse which existing car journeys within the regions could be made by active and sustainable travel.

This opportunity represents the options reasonably available to the public but not their propensity to take them.

This analysis has wider applications, as it could support the development of Local Transport Plans (LTP) and active and sustainable transport investment programmes.

METHODOLOGY OVERVIEW

Origin-destination trip matrices from the South West Regional Traffic Model (SWRTM) were used to identify a representative sample of journey origins and destinations in the area.

The origin-destination trip matrices were run through Google's Directions Application Programming Interface (API) to provide real-world transport route options for each journey, to produce network distance and journey time per mode (walking, cycling, public transport and driving).

Additional analysis was undertaken to identify areas where more sustainable modes are competitive with driving, and quantified these figures with passenger car units (PCU) and vehicle kilometres travelled (VKT) measures of passenger flow.

As part of this analysis, the potential reduction in carbon emissions was estimated and compared to the baseline carbon emissions.

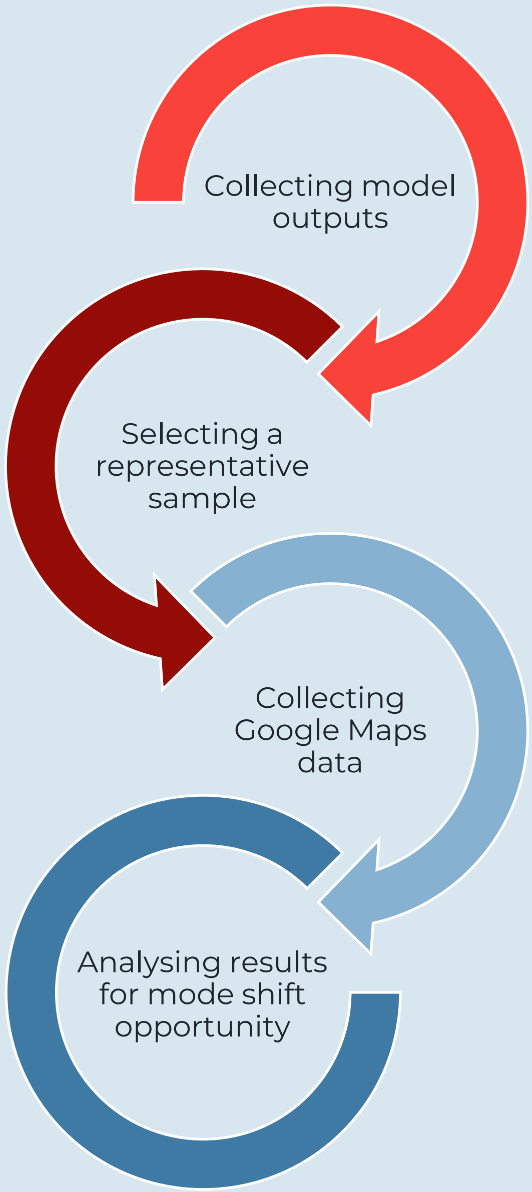


Figure B1: The opportunity to shift modes process

Opportunity to shift modes

WHICH CAR TRIPS COULD BE MADE BY ACTIVE AND SUSTAINABLE MODES?

To calculate this opportunity, data from a range of sources were used. These include:

- Modelling outputs, recording the origins, destinations and daily trip numbers of car journeys across the study area.
- Google Maps data, giving the distance, duration and route shape for a sample of these modelled trips.
- Government travel statistics and other research, which gives insight into how far people would be willing to travel by different modes.

SCENARIOS

Two scenarios have been developed to apply to this analysis, which are detailed in Table B1. They are:

- High mode shift – which has ambitious thresholds for trips to be made by sustainable modes as set out in the Department for Transport's Gear Change.
- Lower mode shift – which has a more conservative set of journey time limits for trips to be made by sustainable modes, achieving a 15-20 minute neighbourhood.

The National Travel Survey (NTS9903) indicates that people in rural **regions walk ~28% less** and **cycle ~19% less** often than people in urban regions across a year. To account for this, separate limits have been assumed for urban and rural areas.

The statistics for 2018/2019 were then used to adjust the Gear Change based thresholds used for the urban regions. This data was taken for 2018/2019 in order to avoid disruptions caused by Covid-19.

The high scenario public transport threshold and the upper limit for journey times were chosen based on statistics from the Labour Force Survey (TSGB0111). These statistics represented the average time people in the South West region took public transport and drove to work.

The threshold was set as slightly higher than the public transport / driving time ratio and the upper journey time limit was taken from the average rail journey time across 2018/2019. The low scenario threshold was selected as a reasonable lower alternative.

Table B1: Scenarios developed for mode shift opportunity

Mode shift opportunity	High mode shift	Lower mode shift
Car trips which could be walked	**Urban:** Under 2 miles / 3.2 km **40 mins**	**Urban:** Under 1 mile / 1.6 km **20 mins**
	Rural: Under 1.4 miles / 2.3 km **30 mins**	**Rural:** Under 0.7 miles / 1.2 km **15 mins**
Car trips which could be cycled	**Urban:** Under 5 miles / 8km **30 mins**	**Urban:** Under 3 miles / 4.8 km **18 mins**
	Rural: Under 4.1 miles / 6.5 km **25 mins**	**Rural:** Under 2.4 miles / 3.9 km **15 mins**
Car trips which could be made by public transport – limited to 75 minute PT journey (i.e. a car trip of 25 minutes would be shifted to PT if the corresponding trip was less than 60 minutes (high mode shift) or 37.5 minutes (low mode shift)	Less than **2.4x** slower	Less than **1.5x** slower

Our Process

QUANTIFYING POSSIBLE MODE SHIFT ACROSS THE STUDY AREA

The South West Regional Traffic Model (SWRTM) was used to obtain daily trip numbers by origin and destination (O-D) pairs in the modelled year 2031.

In total 99,095,136 trips were extracted from the model, however, many of these trips fell outside of the study area and were not relevant to this study.

SWRTM outputs were filtered to focus on the Peninsula and Western Gateway study area. The following criteria were used within the sift:

- Removing non-car trips (i.e. LGV/HGVs)
- Applying a 150km max travel distance buffer
- Filtering for trips that started and/or ended within the study area
- No internal zone trips (analysed separately)

Once this sift had been undertaken the sample included 7,731,917 trips and 82,103,678 vehicle kilometres.

The sift criteria is presented graphically overleaf in **Figure B3.**

The Google Maps Directions API was used to calculate possible journey routes and durations for these selected trips.

Results from Google Maps were then analysed and compared against the travel time thresholds for each mode and each of the two scenarios presented previously in **Table B1**.

This gives a figure for proportion of driving trips which could shift to sustainable modes.

Figure B2 shows the breakdown of the SWRTM model trips and the sample analysed in this study.

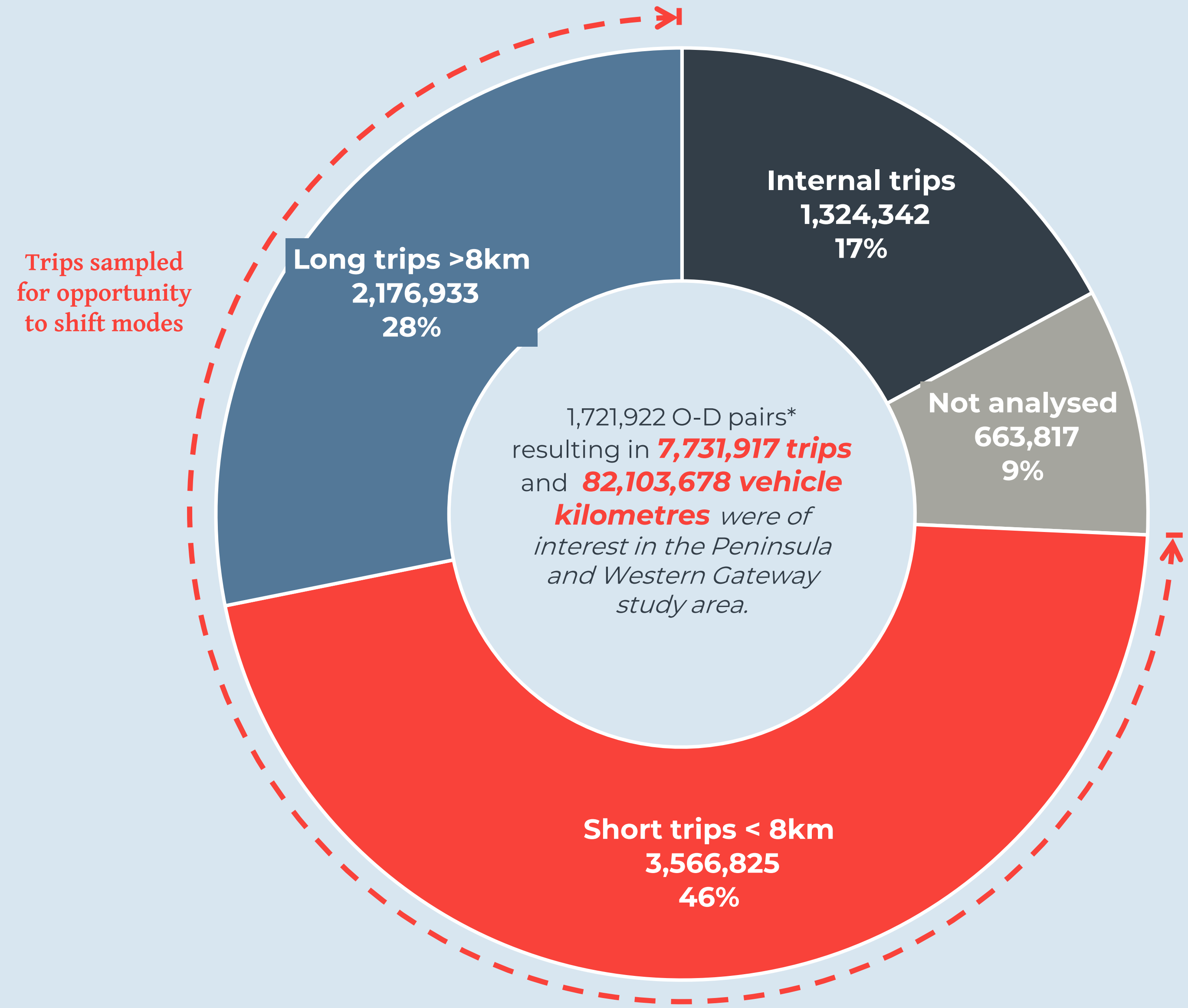


Figure B2: All trips modelled by SWRTM. The selected sample of trips is highlighted by the red dotted line.

** Includes internal zone trips which were then analysed separately*

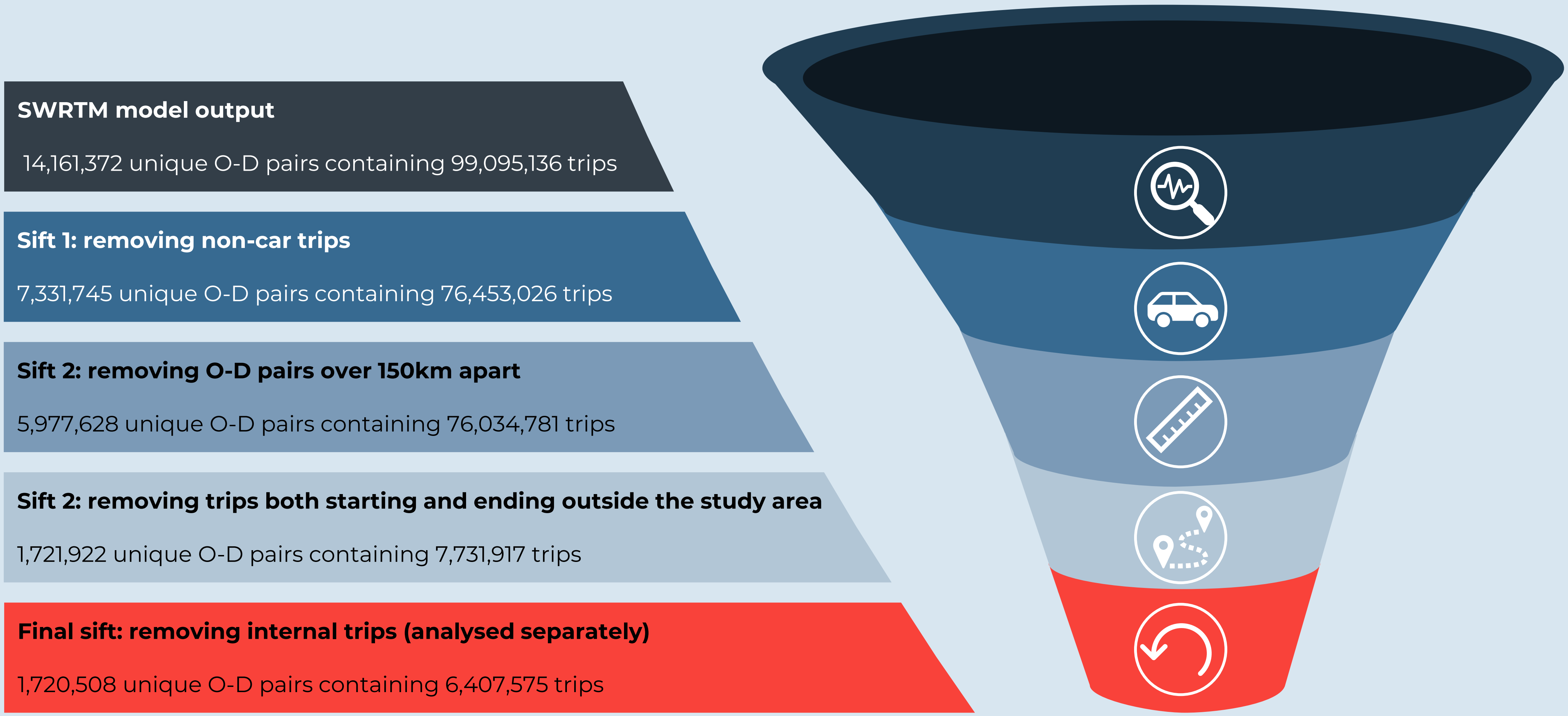


Figure B3: SWRTM output sifting approach

Analysing Internal Trips

GETTING AN INDICATION OF HOW INTERNAL TRIPS MAY SHIFT TO ACTIVE MODES

Due to limitations with SWRTM, it is not possible to extract the distance travelled, origins or destinations of trips that occur entirely within one zone. As this information is not available an alternative method of analysis has to be developed to find the opportunity to shift modes within model zones.

The opportunity to shift to active travel modes is decided both by travel time and distance. While the travel time is not calculable without the origin and destination of the trips, a maximum trip distance can be estimated to assess the opportunity in the 'worst case scenario'.

To find this estimate, the longest straight line that could fit within the boundaries of the zone was found and its length was used as the longest potential internal trip length. This longest trip length can then be compared to the high and low scenario thresholds to determine if the internal trips would shift to active modes.

The longest distance was chosen so that the internal trips can be shifted to active modes with a high confidence that using smaller distances within the zone would not afford. The opportunity for internal trips to shift to public transport was not calculable as it relies entirely on journey times which this method does not analyse.

Figure B4: Longest lines highlighted within zones where internal trips were considered to be taken by active travel. Dark green lines represent distances below the walking threshold, and light green lines represent distances between the walking and cycling threshold. (Top left) the Western Gateway study area, (top right) an urban region and (bottom) the Peninsula study area.

Mode shift opportunity

WHAT IS THE MODE SHIFT OPPORTUNITY ACROSS THE STUDY AREA?

Figure A5 shows high and low mode shift opportunity for trips and vehicle kilometres travelled (VKT) within the study area.

17% of trips are identified as internal within the same zone. Based on the size of the zone analysed, between 7% (lower mode shift scenario) and 11% (higher mode shift scenario) of trips are identified as short internal trips which are likely to be undertaken by active travel modes. The remaining 10% (lower scenario) and 6% (higher scenario) long internal trips and therefore more likely to be undertaken by other modes (i.e. public transport or driving).

Based on the sample of data analysed using the API, in the higher mode shift scenario as many as 43% of trips could be shifted from car to active or public transport. This includes almost a quarter of trips which are cyclable, demonstrating the large opportunity that bicycle travel uptake presents to support the decarbonisation of transport in the study area.

The lower mode shift scenario presents a more modest 24% shift from cars to sustainable modes. This includes 21% of trips which could be cycled even given the shorter time threshold of 18 minutes (or 15 minutes in rural areas).

When assessing mode shift opportunity by kilometres travelled, there is a larger proportion of kilometres which must be made by car than when measuring by trip numbers. Non-analysed car trips take up 25% of total trips within the study area.

Of analysed trips, 17% of vehicle kilometres could be shifted to sustainable modes in the high scenario, with 7% for the lower scenario. This demonstrates how a small number of longer trips can outweigh the large number of shorter trips when measuring vehicle kilometres. As VKT is proportional to carbon emissions, it is key to reduce car kilometres as well as car trips.

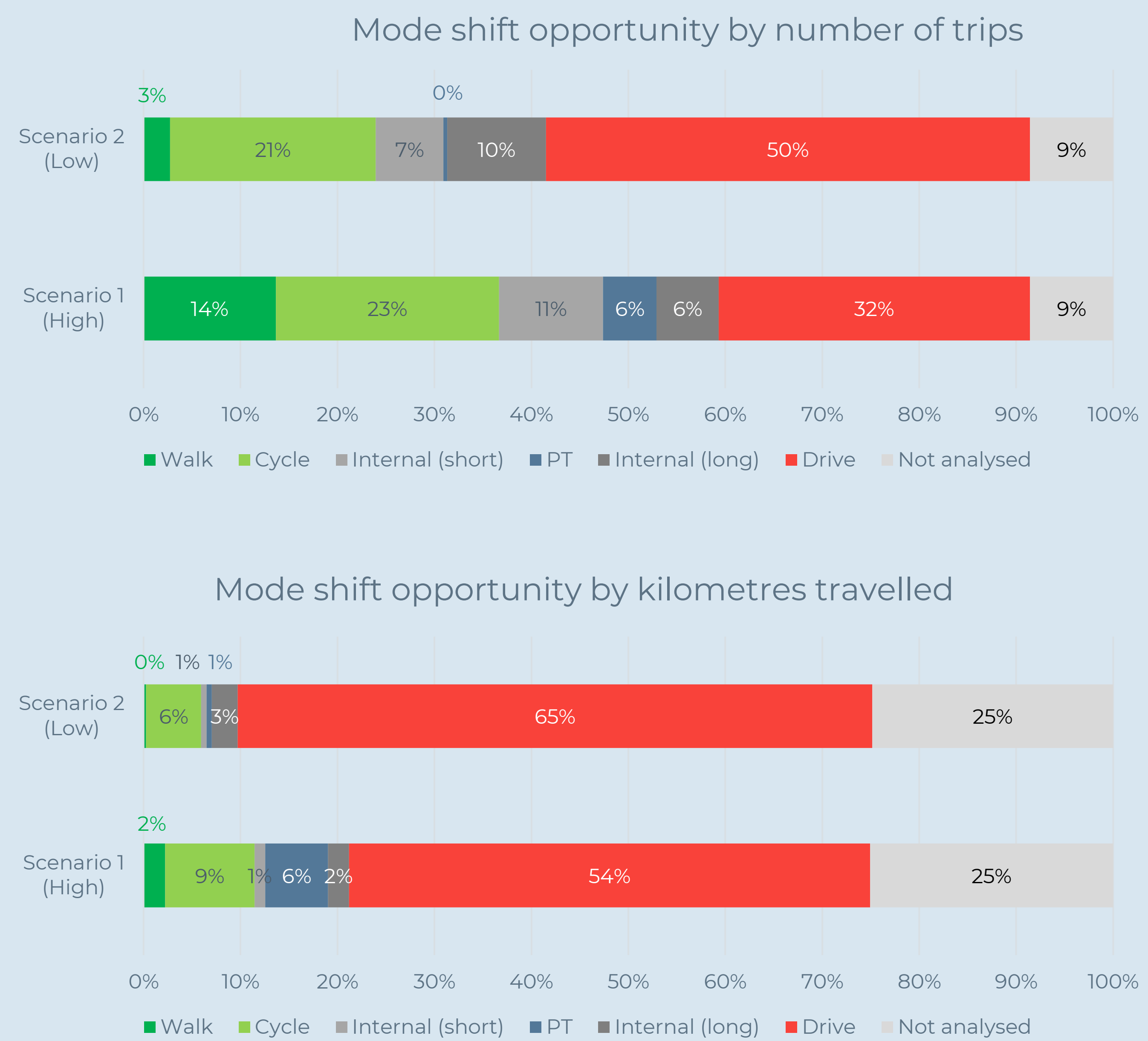


Figure B5: Mode shift opportunity (by number of trips and vehicle kilometres travelled)

Mode shift opportunity

WHAT IS THE URBAN RURAL SPLIT?

Mode shift opportunity in trip numbers for urban and rural areas is shown opposite in **Figure A6**. This assesses only shorter trips (<8km) between zones, which are trips that could possibly be walked or cycled.

There is a large divide between urban and rural areas regarding proportion of trips which can be shifted to sustainable modes. In the high scenario, **93% of trips could be shifted in urban areas**, but this figure is **only 54% in rural areas**. While walking can facilitate over a quarter of urban trips, the large distances in rural areas mean that a half hour trip can only carry 3% of trips.

In the low scenario, car dependency rises from 38% in urban areas to 76% in rural areas. Public transport holds only 1% of short rural trips and no short urban trips, indicating that services are not competitive with driving.

Many shorter trips which may be possible by public transport are potentially cannibalised by active modes, especially in urban areas. In the high mode shift scenario, active travel accounts for 91% of trips with just 2% for public transport. However, the low mode shift scenario assigns a lower 62% of trips to active transport and no trips to public transport.

Also to note, as the opportunity calculated is based on drive time and distance comparisons with the Google API it does not predict human behaviour. This is important to consider for rural areas where a lack of infrastructure, people's ability etc. may affect their likelihood to switch modes.

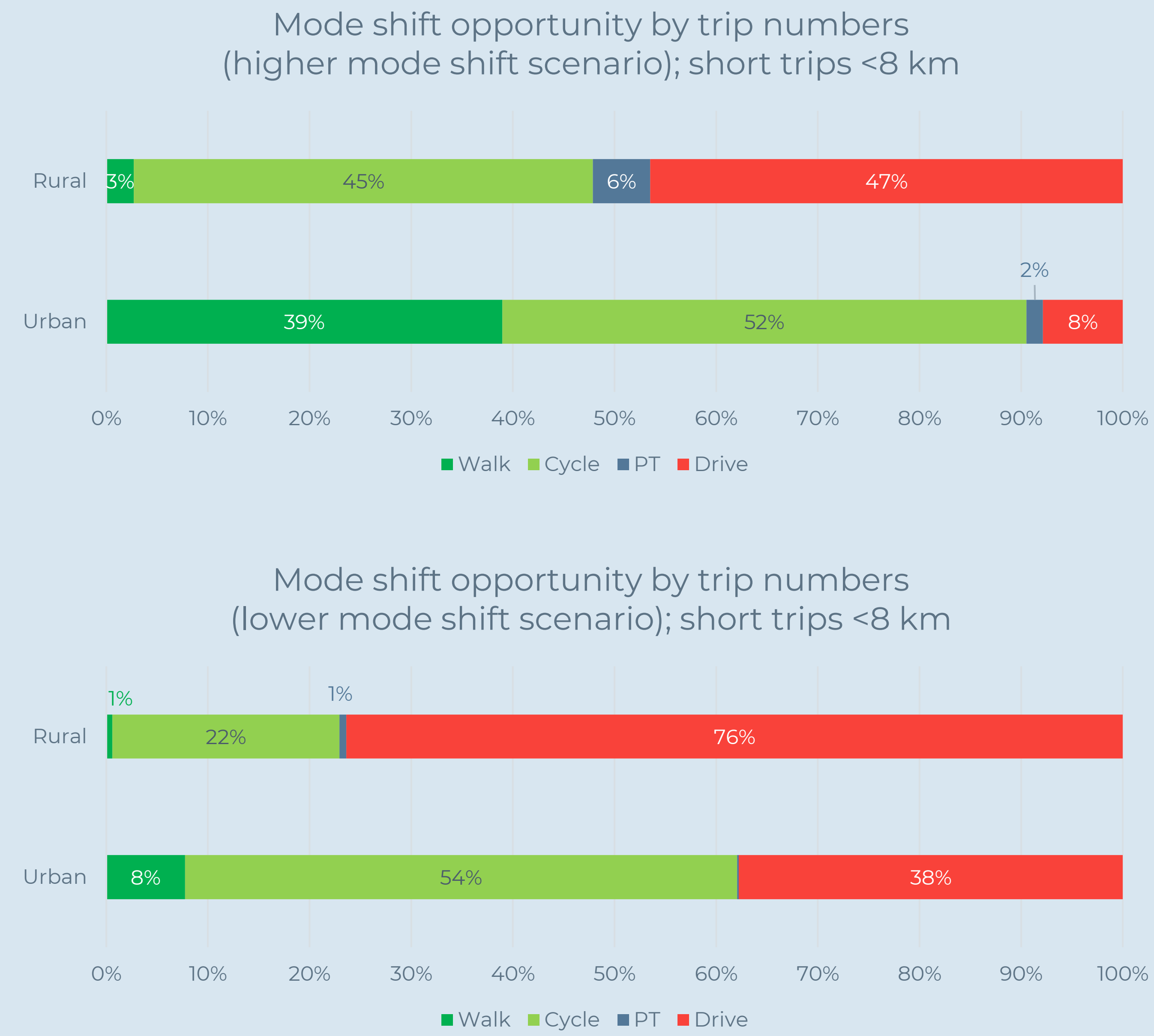


Figure B6: Mode shift opportunity among short trips (by number of trips) by urban and rural areas.

** Percentages may not add up to 100% completely due to rounding*

Mode shift opportunity

WHAT IS THE PT DRIVE SPLIT?

Mode shift opportunity in trip numbers and VKT is shown opposite in **Figure A7**. This assesses only longer trips (>8km) as these are trips that are very likely to be made by public transport or car.

This analysis shows that even with the high mode shift scenario's threshold of public transport journey times being as much as 2.4 times slower than driving, and without competition from active modes, only 15% of trips could be shifted to public transport. The lower mode shift scenario, of 1.5 times slower than the equivalent journey by car, sees just 1% of trips having the opportunity to shift from car to public transport.

Similarly, this analysis found that 11% of VKT could be shifted from car in the high scenario and 1% in the low scenario. This suggests that those trips that were shifted in the high scenario were dominated by shorter long trips. A comparison of public transport and car journey times are presented later.

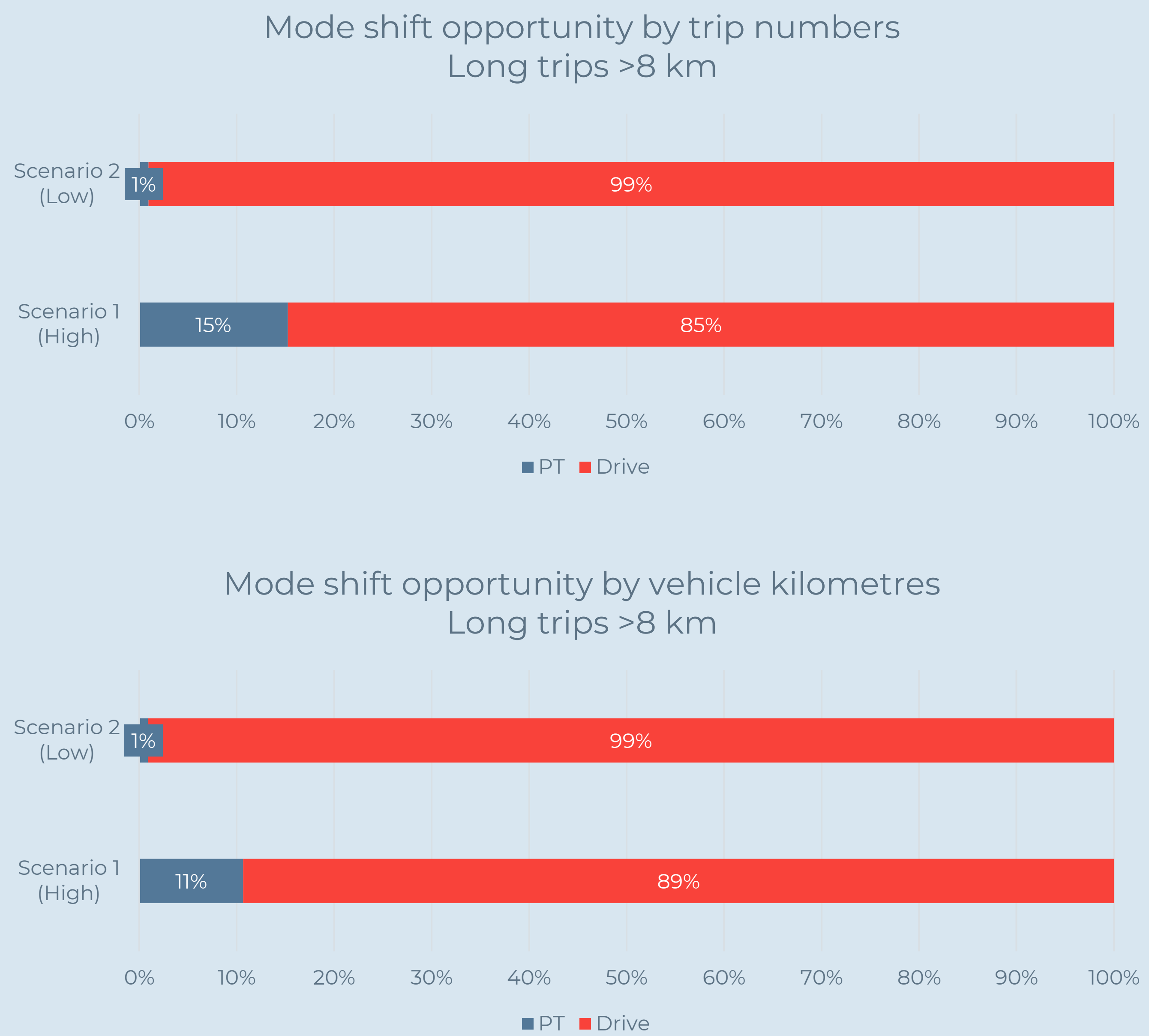


Figure B7: Mode shift opportunity among long trips (by number of trips and vehicle kilometres travelled).

Mode shift opportunity

DECARBONISATION

Carbon emissions were calculated for each mode using government carbon factors*. The factors used were 0.17 kgCO2e/km for car trips and 0.13 kgCO2e/km for public transport trips. The carbon emissions for the two scenarios is shown opposite in **Figure A8** for the study area.

Across the region's 5,743,758 analysed daily car trips, there were 13,268 tonnes of daily CO2e emissions in the baseline scenario. The results of this analysis show that under the higher mode shift scenario, 17% of baseline emissions could be removed by mode shift towards walking, cycling and public transport. This equates to 2,962 tonnes of daily CO2e per day. The lower mode shift scenario can reduce 6% of emissions (1,299 tonnes).

Table A2 overleaf presents all figures for trip numbers and people kilometres, as well as CO2e emissions and savings which were calculated for this analysis.

PUBLIC TRANSPORT TIME COMPARISON

Figure A9 overleaf shows routes for which trip demand is over 500, and public transport options available take over 2.4 times as long as driving. This can be seen as an indication to where current public transport provisions can be improved upon to promote mode shift.

The single trips with the highest demand are is seen between Gloucestershire and areas further north such as Birmingham and Worcester. Some areas on the other time contain a larger number origin / destination pairs which generally have a lower trip demand.

Examples of these areas include western Cornwall, the surrounding areas of many of the towns on the southern coast of the region, many journeys connecting the towns surrounding bath, some of the shorter journeys around the M5 in the middle of the study area and surrounding the town of Bideford in Devon.

*https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2022

Figure B8: Carbon emissions and saving opportunity by scenario (measured in CO2e).

Table B2: Results summary by scenario

Scenario	Internal Trips	Walk	Cycle	PT	Drive	Not Analysed
Baseline		**None**			**All**	
Trips	1,324,300 (17%)	0	0	0	5,743,800 (74%)	663,800 (9%)
People km	3,438,200 (estimated) (3%)	0	0	0	77,750,500 (72%)	26,535,300 (estimated) (25%)
Tonnes CO_2e	N/A	0	0	0	13,270	4,530 (estimated)
1: High mode shift		**40 mins or less**	**30 mins or less**	**PT if less than 2.4x slower than drive**		
Trips	1,324,300 (17%)	1,054,900 (14%)	1,779,600 (23%)	426,600 (6%)	2,482,600 (32%)	663,800 (9%)
People km	3,438,200 (estimated) (3%)	2,346,000 (2%)	9,770,300 (9%)	6,869,200 (6%)	56,912,400 (54%)	26,535,300 (estimated) (25%)
Tonnes CO_2e emissions; (% of total emissions)	N/A	0	0	590 (3%)	9,710 (55%)	4,530 (estimated) (25%)
Tonnes CO_2e savings; (% of total emissions)	N/A	-490 (3%)	-1,840 (10%)	-630 (4%)	0	N/A
2: Lower mode shift		**20 mins or less**	**15 mins or less**	**PT if less than 1.5x slower than drive**		
Trips	1,324,300 (17%)	210,000 (3%)	1,642,500 (21%)	31,300 (0%)	3,859,900 (50%)	663,800 (9%)
People km	3,438,200 (estimated) (3%)	280,600 (0%)	6,061,700 (6%)	579,000 (1%)	69,949,200 (65%)	26,535,300 (estimated) (25%)
Tonnes CO_2e emissions; (% of total emissions)	N/A	0	0	30 (0%)	11,940 (67%)	4,530 (estimated) (25%)
Tonnes CO_2e savings; (% of total emissions)	N/A	-60 (0%)	-1,150 (6%)	-90 (0%)	0	N/A

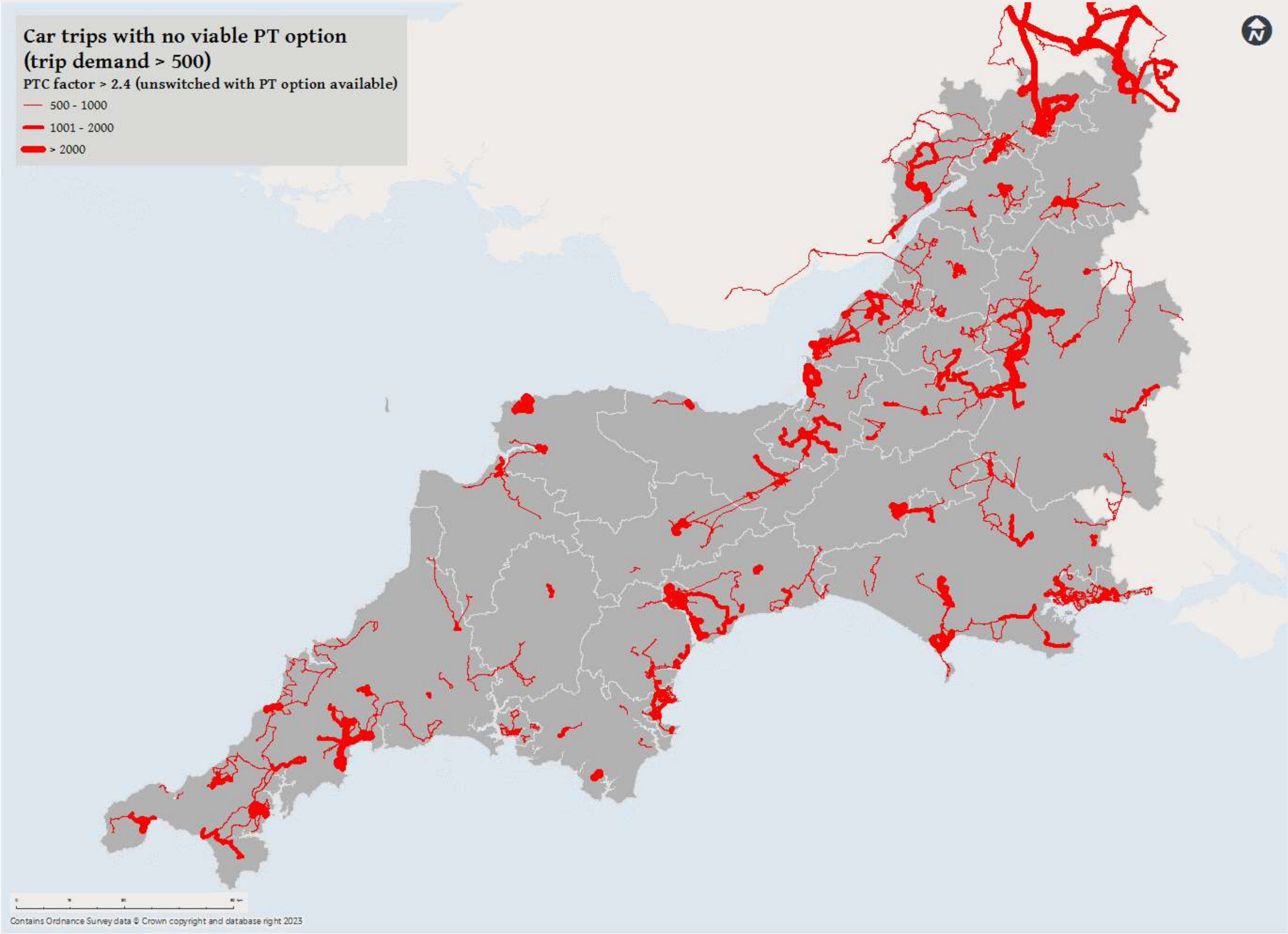


Figure B9: Public Transport Time Comparison

SECTION C

Baselining and EV:Ready inputs

Current level of EV ownership

GROWTH IN THE NUMBER OF EVs

In order to estimate the future EV uptake, it is first necessary to assess current level of EV ownership.

Data is provided by the DfT on all registered vehicles in the UK, broken down by local authority each quarter[1].

An adjustment was made to account for distortions introduced by company registered EVs, which are often registered away from where they are operated. To account for this source of error, company vehicles were redistributed across local authorities in the UK using the same distribution as that followed by private EVs.

Figure C1 shows that EV ownership has grown steadily since 2016. A comparison is made between the study area and the UK as a whole, as well as Transport East, which is included as a comparable sub-national transport body.

A similar trend was observed in all three areas. The UK EV fleet share increased from 0.22% of vehicles in 2016, to 2.44% of vehicles in 2022 (Q4). **In the study area EVs increased from 0.25% in 2016, to 2.52% in 2022 (Q4)**, and in Transport East, EV fleet share increased from 0.20% in 2016 Q4 to 2.43% in 2022 (Q4).

The growth in EV ownership has been driven by a range of factors, including government subsidies, technological improvements (increasing range and faster charging speeds), a growing choice of EV models available and a growing network of publicly accessible charge points.

Figure C2 shows the total number of EVs in the study area, has increased from under 10,000 in 2016 to approximately 100,000 vehicles in 2022 Q4.

The graph also shows the percentage growth in EV ownership each quarter. On average there has been growth of 10% each quarter since 2016 Q4.

Table C1 overleaf summarises the number and proportion of EVs in the vehicle fleet, in each council area. It also shows the proportion of the regions total EVs which are located in each area.

[1] See DfT Vehicle Licensing Statistics. Available online: https://www.gov.uk/government/collections/vehicles-statistics

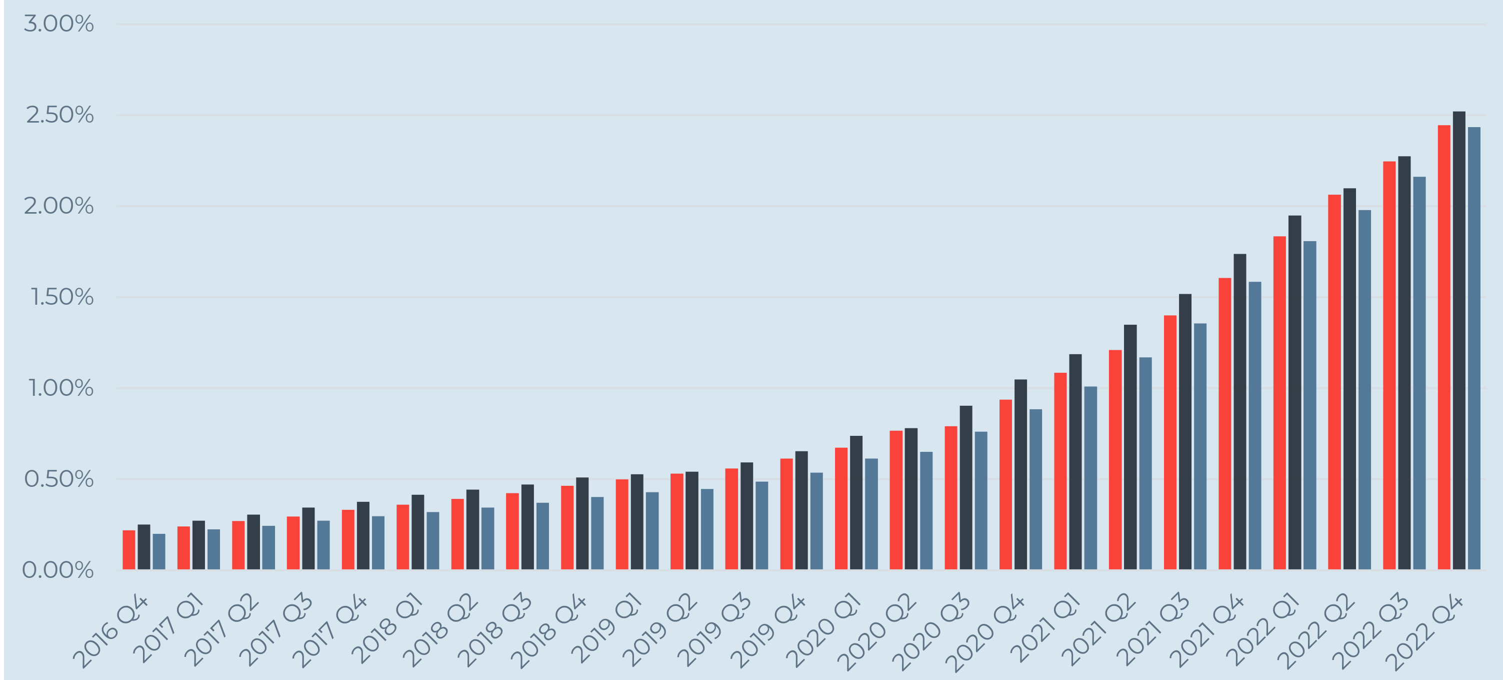


Figure C1: Comparison of EV uptake - UK and Study Area (2016– 2022)

Source: DfT Vehicle Licensing Statistics (Table VEH0132)

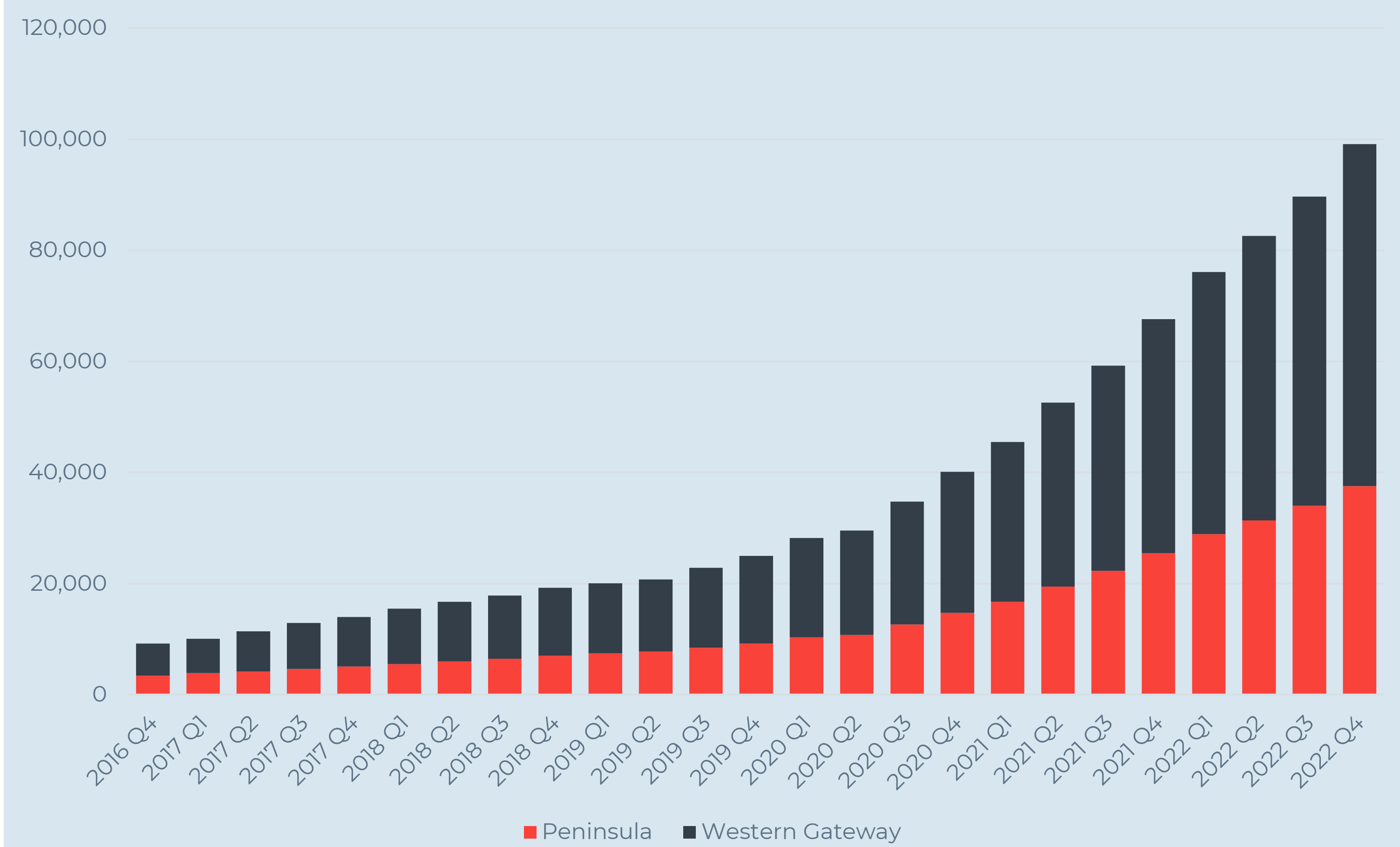


Figure C2: EV ownership in the Peninsula and Western Gateway study area (2016 – 2022)

Source: DfT Vehicle Licensing Statistics (Table VEH0132)

Table C1: Current level of EV ownership per Local Authority (as of 2022 Q4)

Authority	Total EVs	Total vehicles	EVs as a % of total vehicles	Proportion of total EVs in the Pen/WG region
Peninsula	**34,009**	**1,699,740**	**2.1%**	**43%**
Cornwall	7,744	424,596	1.9%	11%
Devon	13,576	616,084	2.4%	16%
Torbay	1,531	84,082	1.8%	2%
Plymouth	1,782	141,488	1.3%	4%
Somerset	9,376	433,490	2.2%	11%
Western Gateway	**55,676**	**2,244,332**	**2.8%**	**57%**
Bath and North East Somerset	4,632	113,170	2.4%	3%
North Somerset	4,840	153,456	2.5%	4%
Bournemouth, Christchurch and Poole	5,552	245,802	2.9%	6%
Dorset	6,963	296,528	2.9%	8%
Gloucestershire	12,640	456,414	4.2%	12%
Wiltshire	10,256	444,799	2.6%	11%
City of Bristol	5,559	229,284	3.3%	6%
South Gloucestershire	5,234	304,879	2.8%	8%
Total	**99,134**	**3,944,071**	**2.5%**	**100%**

Split between fully electric and hybrids

Electric vehicles can be classified as either fully electric (BEVs), or as hybrids (PHEVs) which use a combination of battery power and a traditional ICE engine. BEVs use exclusively electric power and therefore are more reliant on the public charging network.

Throughout the study area the majority of vehicles are BEVs (67%) and the remainder are PHEVs (33%). With most PHEVs being petrol hybrids and comparatively few diesel hybrids.

This analysis excludes 'mild hybrids' which use regenerative braking to generate electricity and run the vehicle in electric mode for short distances as they cannot be plugged in to charge.

Table C2 shows the split in drivetrain types in each local authority area. The pattern is broadly consistent between areas with a slightly higher proportion of BEVs in Western Gateway than Peninsula STB.

Figure C3: Split between fully electric and hybrid vehicles

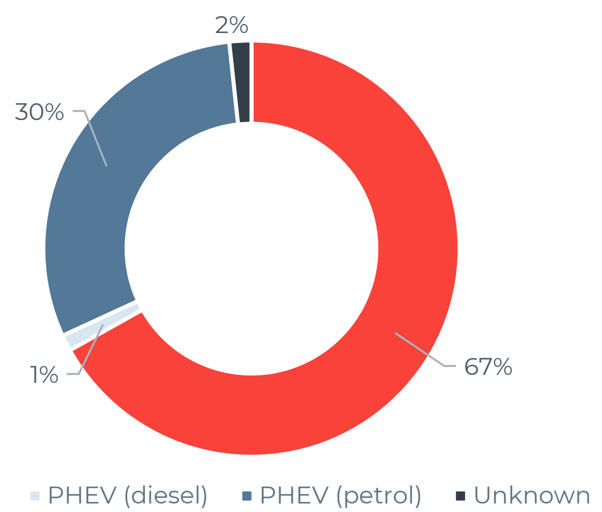


Table C2: Split between battery and hybrid vehicles (as of 2022 Q3)

Highway authority	BEV	PHEV (diesel)	PHEV (petrol)	Unknown
Peninsula	63%	1%	34%	3%
Cornwall	70%	1%	28%	2%
Devon	59%	1%	38%	2%
Torbay	60%	1%	36%	3%
Plymouth	67%	1%	29%	3%
Somerset	63%	1%	33%	3%
Western Gateway	68%	1%	29%	1%
Bath and North East Somerset	62%	1%	33%	3%
North Somerset	63%	1%	34%	2%
Bournemouth, Christchurch and Poole	64%	1%	32%	3%
Dorset	63%	1%	33%	3%
Gloucestershire	63%	1%	34%	3%
Wiltshire	67%	2%	30%	1%
City of Bristol	62%	1%	34%	4%
South Gloucestershire	73%	1%	25%	1%
Total	67%	1%	30%	2%

Existing public electric vehicle charge points

CHARGE POINT TYPES

The range of charging solutions for EVs is evolving rapidly and reflects the ongoing technological developments and increasing investment in this market, as well as the range of different users and use cases for charging.

The suitability of a particular charging technology is dependent on a wide range of factors, including the use case of the individual, their vehicle type, the type of location and the available power supply.

For instance, standard chargers are more appropriate for overnight domestic charging, whereas rapid charging points may be more beneficial on long distance routes, and rural regions between centres.

Table C3 summarises the different charge point types and provides information on the rates of charge, socket/plug type and charging duration.

They can be split into two main groups:

- Standard chargers (up to 22kW) – including domestic sockets, slow, standard and fast, and
- Rapid chargers (above 25kW) – including rapid, Tesla super charger and ultra-rapid.

MIX OF AC AND DC CHARGERS

Figure C4 shows the proportion of standard charge points versus rapid charge points across the study area. Of the charging points currently in the study area, 24% are rapid and 76% are standard.

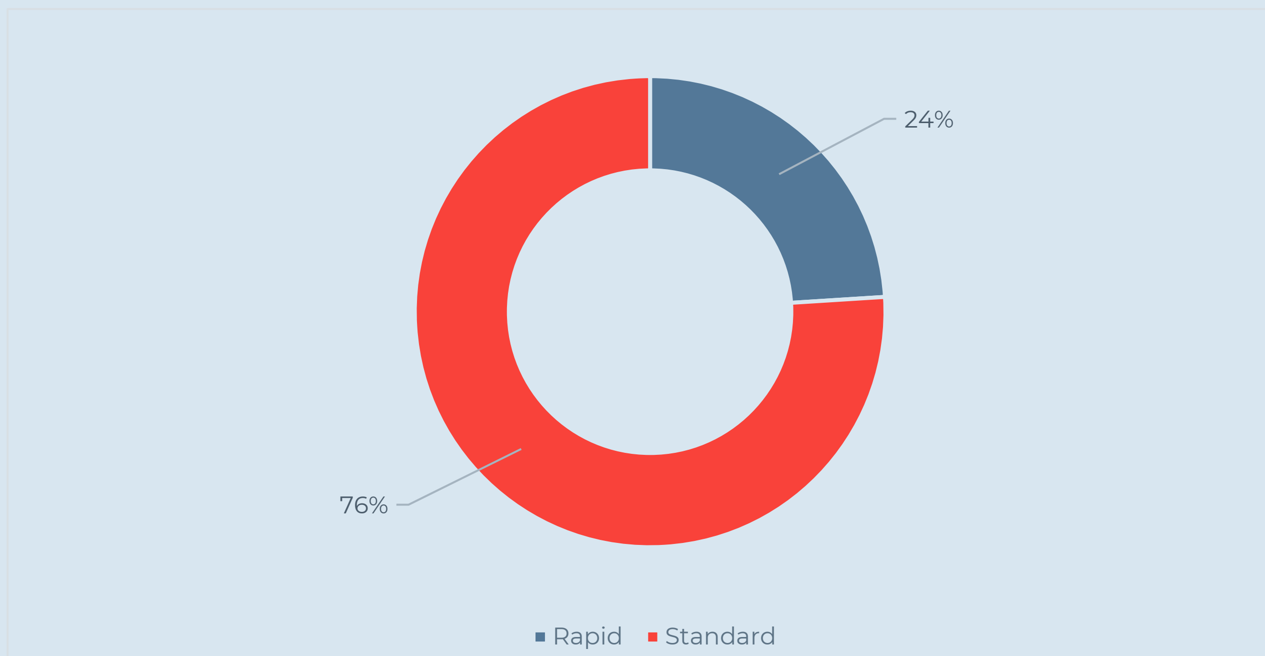
Figures C5-7 shows mapping of the existing EVCP infrastructure in the study area.

[1] See DfT Vehicle Licensing Statistics. Available online: https://www.gov.uk/government/statistics/electric-vehicle-charging-device-statistics-january-2023

Table C3: Summary of the different charge point types

Charge point type	Maximum Power Output	Current/ Supply Type	Input Voltage	Maximum Current	Charging Mode	Socket / Plugs	Charging duration (40kW battery)
Domestic Socket	2.3-3kW	AC – Single Phase	230V	10-13A	1/2	Type 1/2	Approx. 17 hours
Slow	3.7kW	AC – Single Phase	230V	16A	2/3	Type 1/2	Approx. 11 hours
Standard	7.4kW		230V	32A	2/3	Type 1/2	Approx. 6 hours
Fast	11-22kW	AC – Three Phase	400V	16-32A per phase	3	Type 2	Approx. 2-4 hours
Rapid	43kW	AC – Three Phase	400V	60A per phase	3	Type 2	Approx. 55 mins
	20-50kW	DC	400V	100A	4	CHAdeMO / CCS	Approx. 40 mins
Tesla Super Charger	75-250kW	DC	Up to 400V	Up to 800A	4	Tesla adapted Type 2	Approx. 10-20 mins
Ultra-Rapid	Up to 350kW	DC	Up to 920V	Up to 500A	4	CCS / Tesla adapted Type 2	Approx. 7-16 mins

Figure C4: Proportion of EVCP by type



Existing electric vehicle charge points as at January 2023

DISTRIBUTION ACROSS THE REGION

Table C4 shows the public EVCP as at January 2023 when the latest data at a local authority level was provided.

EVCP infrastructure in the regions was with 582 rapid chargers and 1,826 standard chargers (a total of 2,408 across the regions) as at January 2023.

This excludes private domestic chargepoints and also semi-private chargepoints such as those available at hotels exclusively for customers.

In general, there tend to be more standard chargers than rapid chargers, as they are far cheaper to install, and have comparatively more use cases compared to rapid chargers.

Figures C5, C6 and C7 show the distribution of rapid, standard, and combined chargers across the regions.

Figure C5 shows that the distribution of rapid chargers across the region is not uniform. Several of the local authorities having large areas with limited rapid charging infrastructure including Cornwall, Devon and Wiltshire. Urban areas tend to have more rapid chargers, such as Bristol and Bournemouth.

Figure C6 shows that there is coverage of standard EVCPs across most of the study area.

When looking at rapid and standard chargers combined, there is still a lack of coverage in more rural areas. It highlights the need to plug the gaps throughout the regions, to ensure a fully joined up network.

Table C4: Existing EVCP infrastructure as of January 2023

	DC (Rapid)	AC (Standard)	Total
Peninsula	224 (19%)	963 (81%)	1187
Cornwall	56 (17%)	275 (83%)	331
Devon	103 (23%)	339 (77%)	442
Torbay	7 (24%)	22 (76%)	29
Plymouth	8 (07%)	115 (93%)	123
Somerset	50 (19%)	212 (81%)	262
Western Gateway	358 (29%)	863 (71%)	1221
Bath and North-East Somerset	8 (8%)	87 (92%)	95
North Somerset	33 (34%)	64 (66%)	97
Bournemouth, Christchurch and Poole	48 (42%)	67 (58%)	115
Dorset	34 (24%)	110 (76%)	144
Gloucestershire	58 (23%)	194 (77%)	252
Wiltshire	65 (32%)	136 (68%)	201
City of Bristol	37 (25%)	111 (75%)	148
South Gloucestershire	75 (44%)	94 (56%)	169
Total	**582 (24%)**	**1,826 (76%)**	**2,408**

Existing electric vehicle charge points

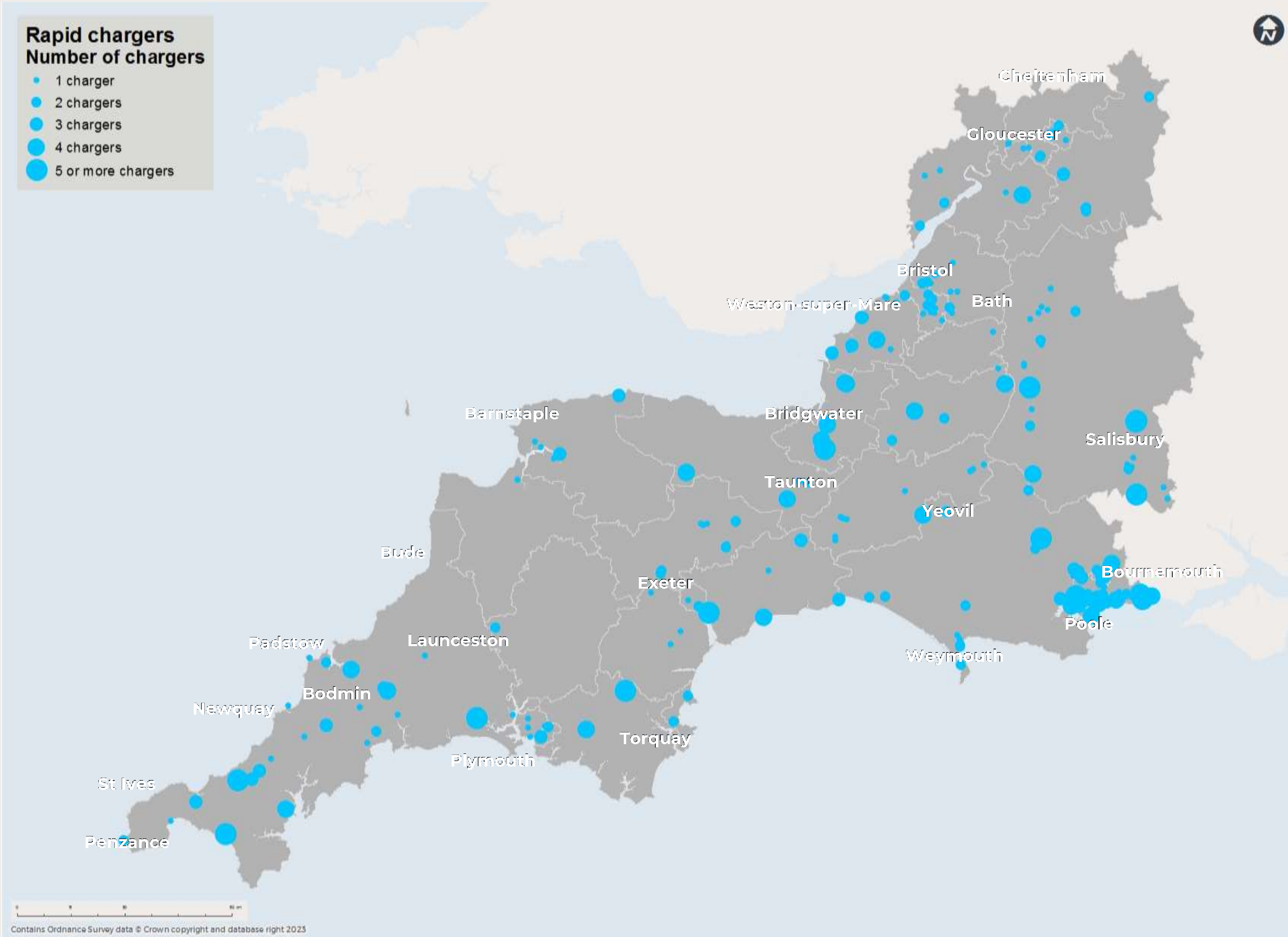


Figure C5: Existing publicly accessible rapid chargers

Source: WSP EV:Ready

Existing electric vehicle charge points

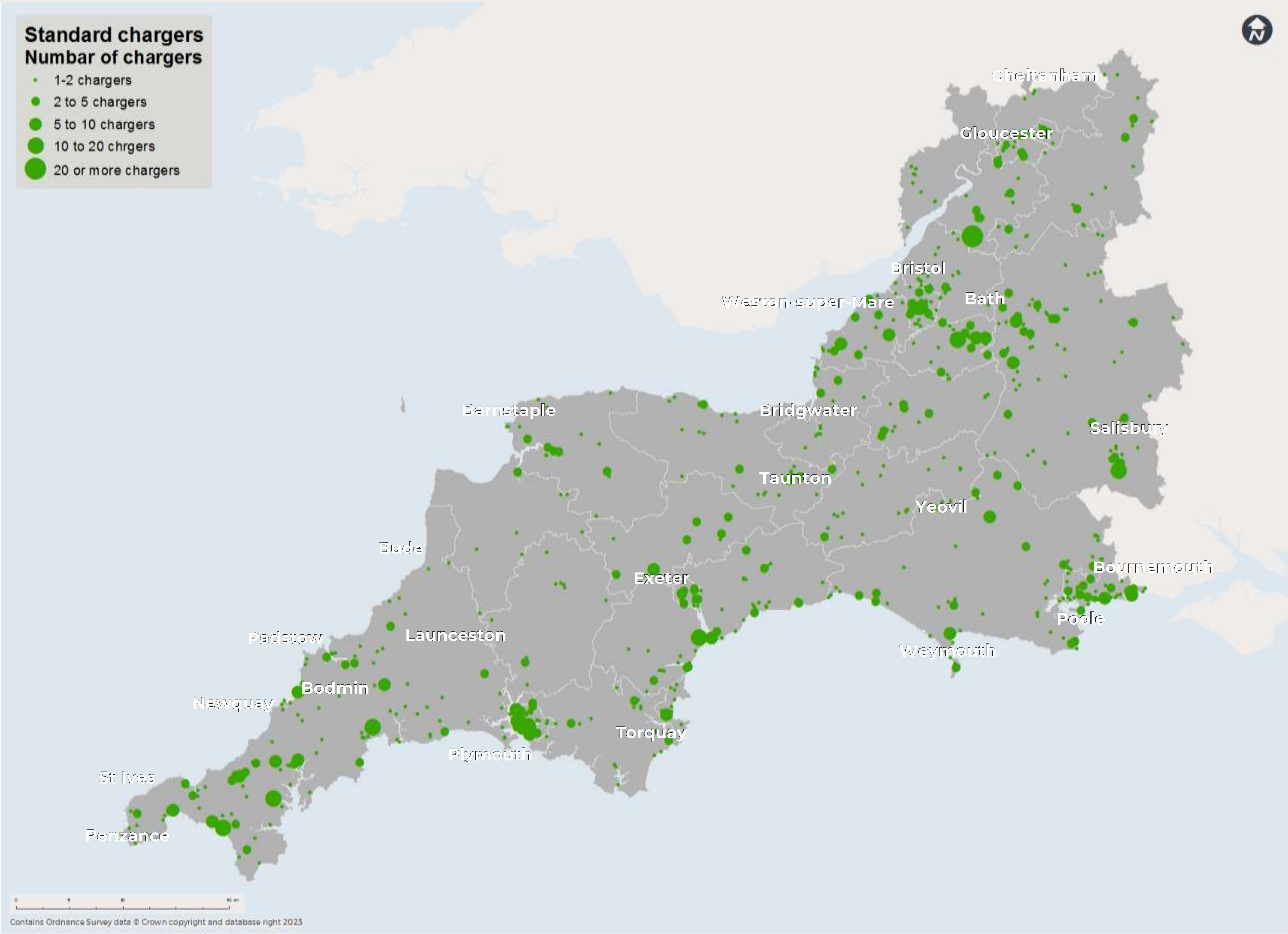


Figure C6: Existing publicly accessible standard chargers

Source: WSP EV:Ready

Existing electric vehicle charge points

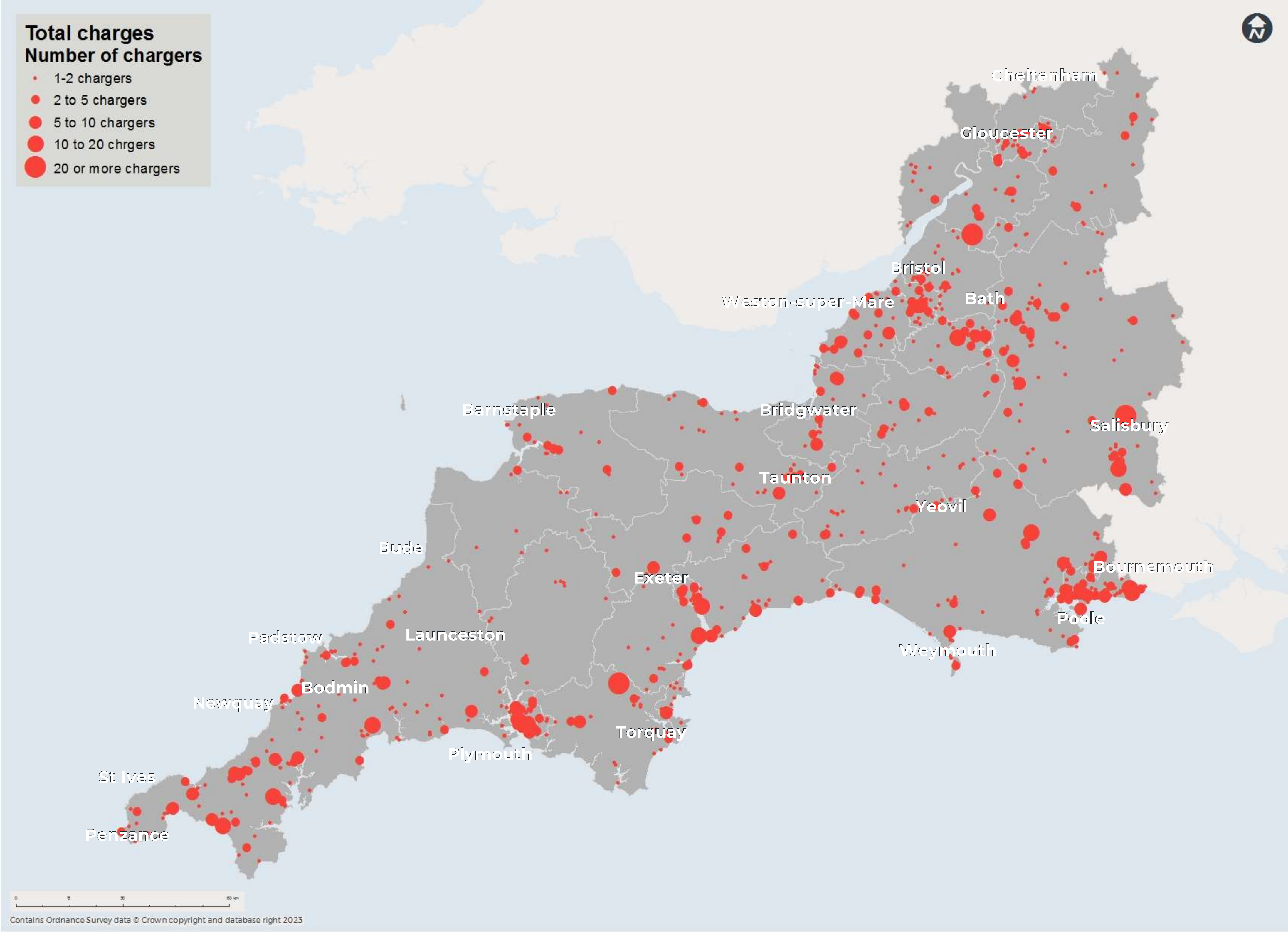


Figure C7: Total publicly accessible chargers (standard and rapid)

Source: WSP EV:Ready

Household demographics

SUMMARY

Table D5 (across) summarises key household statistics for the Peninsula and Western Gateway regions, that informs several of the figures overleaf.

The table shows population, the number of households, total vehicles, the average number of vehicles per household and the proportion of households reliant on on-street parking.

This data is directly fed into the EV:Ready tool to inform both EV uptake and EVCP requirements.

Household density is a valuable indicator to consider alongside EV uptake forecasting because it provides an indication of areas that are more likely to require publicly accessible charging.

Areas with a lower housing density are more likely to have access to private EV charging options on private driveways, whereas areas with a greater housing density are less likely to have access to private EV charging, are more reliant on on-street parking and therefore may require publicly accessible EVCPs.

In addition, understanding household density provides local authorities with an indication of where EVCP installation will have the greatest impact, in terms of the number of households served by an EVCP, and therefore the best value for money.

Figure D10 (overleaf) indicates that housing density across much of the study area is very sparse.

Authorities governing regions with more areas of high housing density are likely to be more reliant on public charging infrastructure and so will likely have a higher public spending allocation to increase the uptake of EVs, whilst those with lower housing density across the regions will be more likely to be more reliant on privately owned chargers.

Table C5: Household statistics

Local authority	Population	Households	Total vehicles	Average number of vehicles per household	Proportion of households reliant on on-street parking
Peninsula	2,357,500	1,030,700	1,699,740	1.65	25%
Cornwall	570,300	250,500	424,596	1.69	23%
Devon	811,600	352,500	616,084	1.75	23%
Torbay	139,300	63,000	84,082	1.33	28%
Plymouth	264,700	114,600	141,488	1.23	34%
Somerset	571,600	250,100	433,490	1.73	24%
Western Gateway	3,108,300	1,321,100	2,244,332	1.70	26%
Bath and North East Somerset	193,400	79,200	113,170	1.43	29%
North Somerset	216,700	94,600	153,456	1.62	21%
Bournemouth, Christchurch and Poole	400,300	173,800	245,802	1.41	27%
Dorset	379,600	169,300	296,528	1.75	18%
Gloucestershire	645,100	279,400	456,414	1.63	25%
Wiltshire	510,400	215,100	444,799	2.07	22%
City of Bristol	472,400	191,600	229,284	1.20	38%
South Gloucestershire	290,400	118,100	304,879	2.58	25%
Total	**5,465,800**	**2,351,800**	**3,944,071**	**1.68**	**25%**

Household demographics

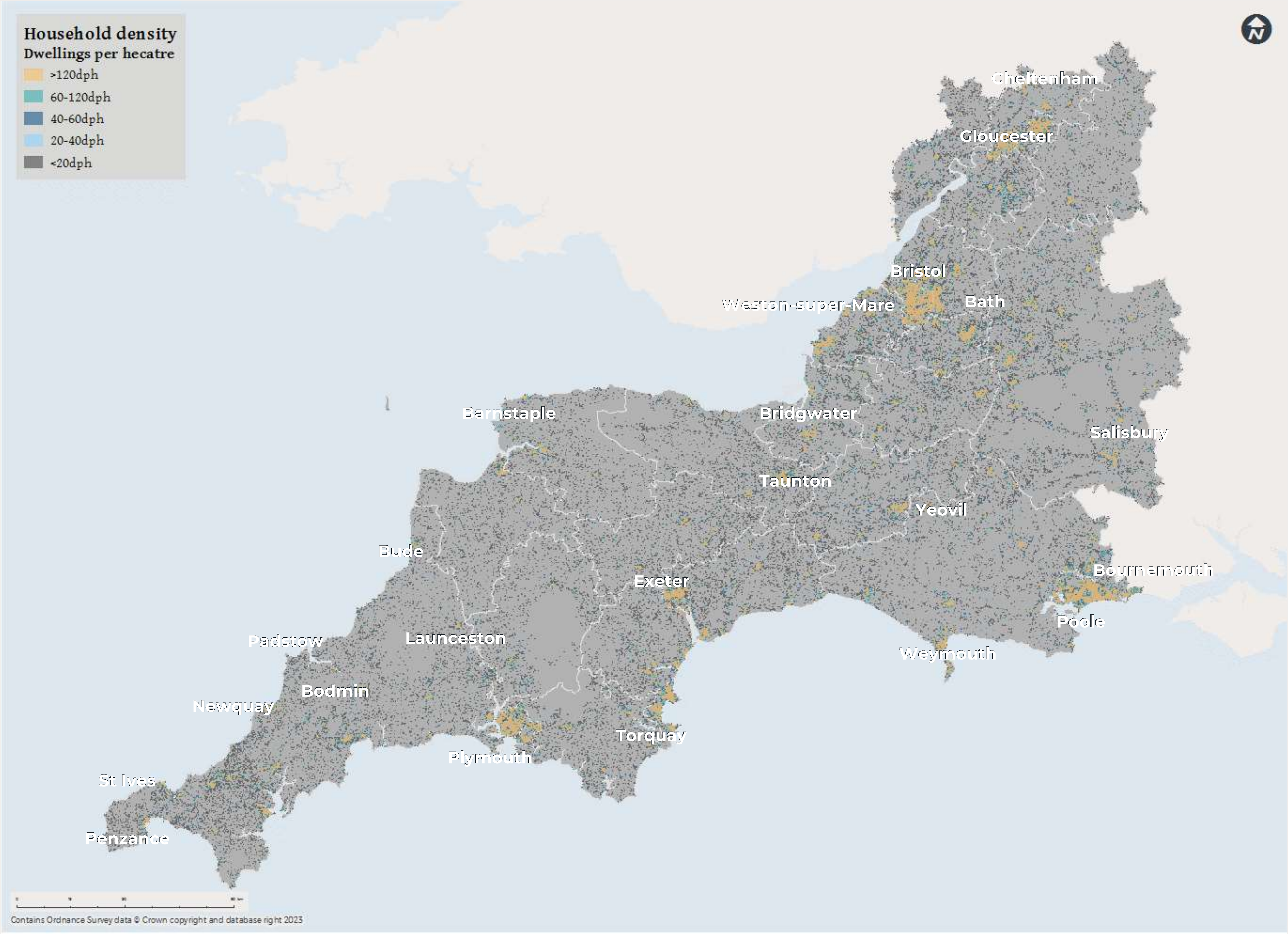


Figure C8: Household density

Source: WSP EV:Ready

Current Vehicle ownership

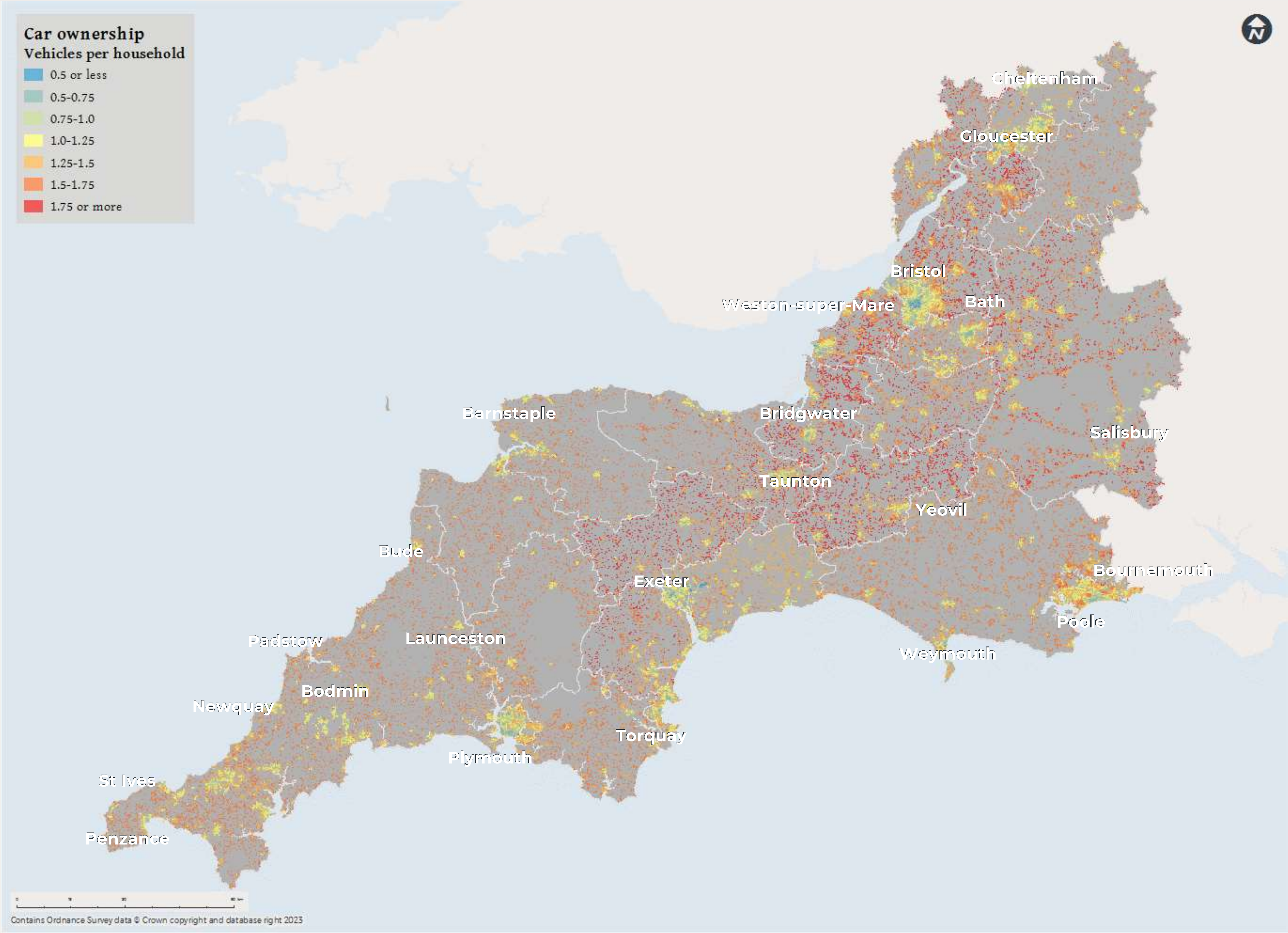


Figure C9: Car ownership (vehicles per household)

Source: WSP EV:Ready

Household demographics

RELIANCE ON ON-STREET PARKING

An important factor to EV uptake and EVCP demand is the extent to which areas are reliant on on-street parking. To date, those with access to off-street parking, where they can conveniently and reliably charge their vehicle overnight, have been over three times more likely to switch to an EV.

About 93% of current EV owners are estimated to have access to home charging, despite between 20-40% of vehicles nationally having no such access to off-street parking. This shows the tendency for current EV ownership to be indicative of off-street parking access. It is expected that the tendency for EV owners to rely on off-street parking will lessen over time as EV ranges increase, recharging times shorten and public infrastructure improves.

As shown in **Table C5** previously, reliance on on-street parking is fairly uniform across the region, ranging from 18% to 36%. Usually more urban areas have a higher proportion of households reliant on on-street parking, such as Plymouth at 36%, and more rural areas tend to have a lower proportion of households reliant on on-street parking such as Dorset at 18%.

In the areas where there is a lower reliance on on-street parking, often homeowners can install EV chargers on their driveways. In areas of a higher reliance on on-street parking, there needs to be access to publicly accessible EV charging provided by either the public or private sector.

The proportion of households reliant on on-street parking across the study area is 25%, which is lower than the average for the UK (30%).

Reference:

'Plugging the Gap' (2018) ICCC.
https://www.theccc.org.uk/2018/01/19/plugging-gap-next-britains-ev-public-charging-network/

Figure C10 (overleaf) shows that reliance on on-street parking is generally low across the study area. In general, the reliance on on-street parking is much higher in urban areas and follows a similar trend to housing density.

In particular, reliance is high around Bristol, Bournemouth, Plymouth and Gloucester, with the reliance exceeding 250 households in large areas. Other areas with notably high reliance are Bath, Cheltenham and Exeter, with large areas exceeding 100 households reliant on on-street parking.

Figure C11 (overleaf) shows that proportion of households reliant on on-street parking follows a similar trend as **Figure D10**, with large percentages of households relying on on-street parking in urban areas, and a lower percentage in rural areas.

One difference between **Figures D10 and D11** is that the proportion of households reliant on on-street parking in urban centres is more heavily contrasted with that in rural regions, as areas on the edge of towns and cities tend to have similar rates of reliance to those in the centre of the urban centres.

This is not the case when examining raw numbers of households reliant on on-street parking, which is likely a result of housing becoming less dense towards the edge of urban centres.

The likelihood of an area having access to off-street parking is determined based on the typical property types of the predominant Mosaic group at a postcode level and assumes that terraced dwellings and converted flats would be reliant on on-street parking.

All other housing types, such as detached dwellings, semi-detached dwellings and purpose-built flats, are assumed to have dedicated off-street parking and therefore not reliant on on-street parking. It should be noted however, that car ownership is much lower amongst households without off-street parking.

An on-street parking deflator is applied to reflect the impact on EV sales if a household does not have access to a driveway. This forecast is then applied to the EV sales profile by comparing the estimated proportion of households with a driveway and factoring this by the average number of houses with a driveway, relative to the national mean. The degree to which being reliant on on-street parking negatively effects EV uptake is forecast to reduce over time, as access to public charging infrastructure, battery range and consumer awareness improve.

Reliance on on-street parking

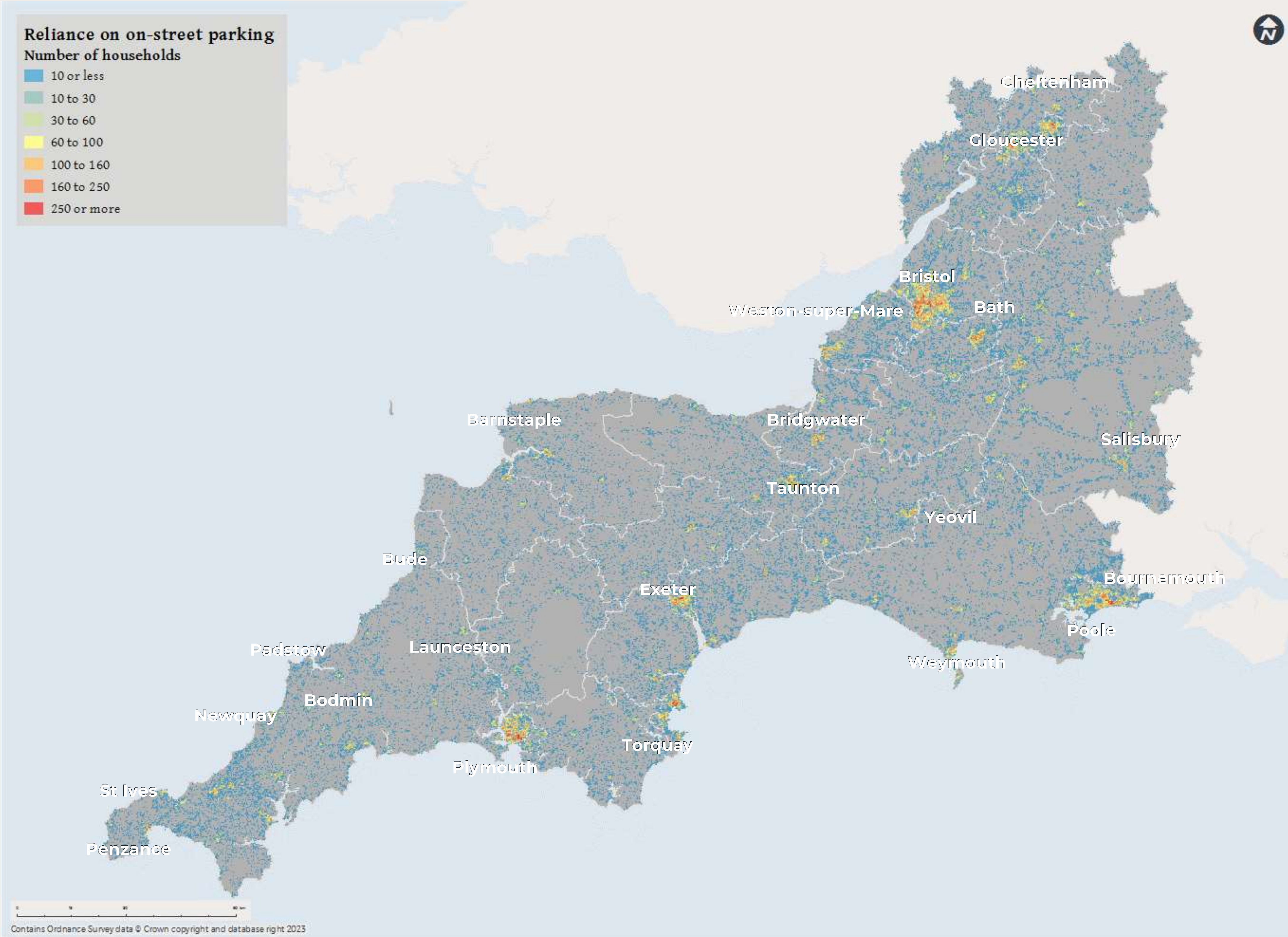


Figure C10: Reliance on on-street parking (number of households)

Source: WSP EV:Ready

Reliance on on-street parking

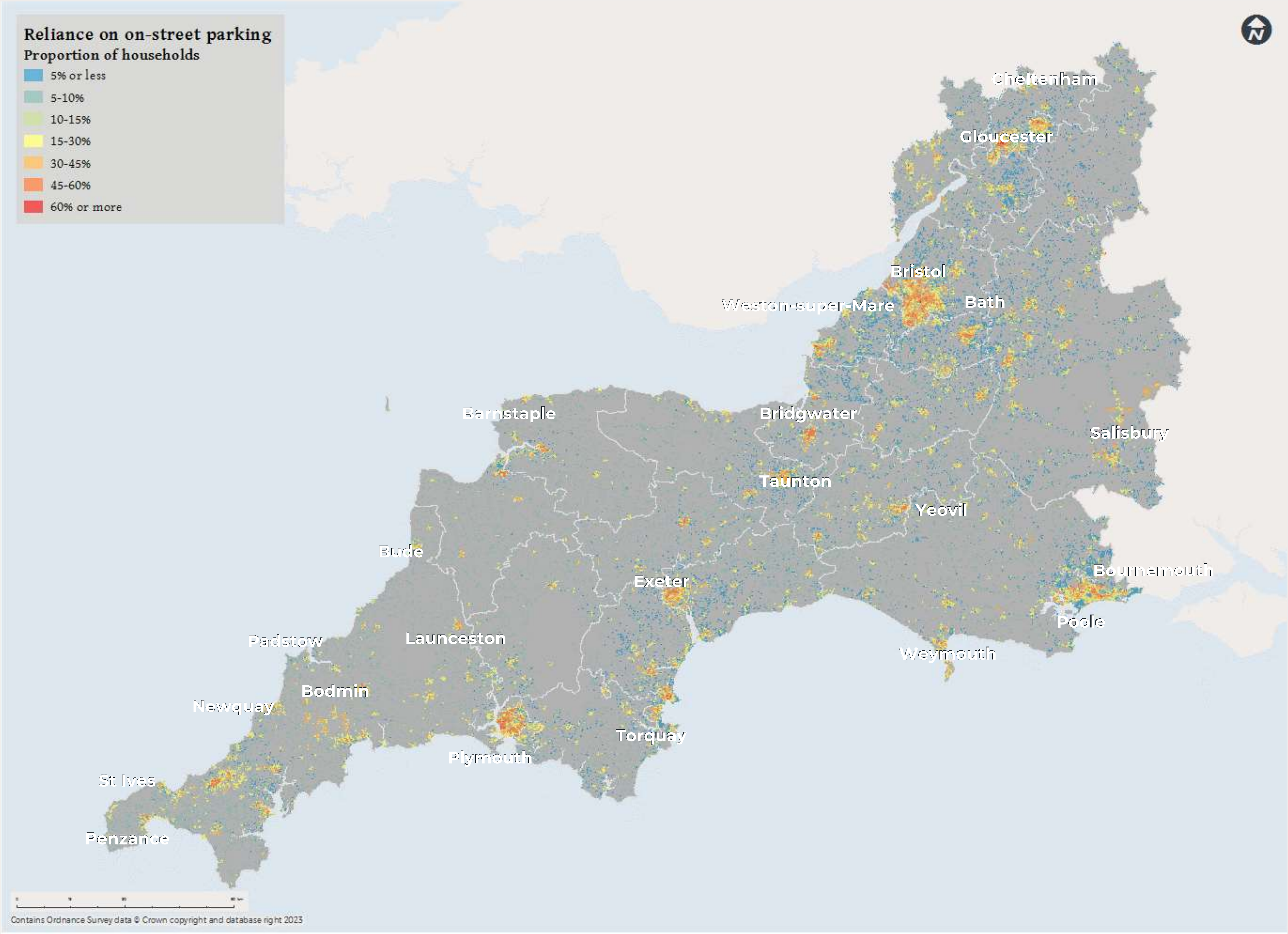


Figure C11: Reliance on on-street parking (proportion of households)

Source: WSP EV:Ready

Propensity to own an EV

Experian Mosaic profiles have been used to classify residents into user 'segments' of similar characteristics in order to determine their propensity to own an EV. The Experian Mosaic dataset is a cross-channel consumer classification system which segments the UK population into 15 groups. These segments are determined based on a wide array of data relating to demographics, employment, education and technology. The segments are summarised in **Table C6**.

Table C7 shows the propensity of each Experian Mosaic segments to own an EV relative to the UK average. The City Prosperity, Prestige Positions and Domestic Success have the highest propensity.

Figure C12 presents the forecast propensity of residents to register an EV across the region, based on socio-demographic factors captured in Experian Mosaic. Some populations may have a high propensity to switch to an EV in theory, but if they are not already a vehicle owner then it is unlikely they will become one for the sole purpose of purchasing an EV.

Table C7: Experian Mosaic segments

Mosaic segment	Propensity to own an EV (relative to UK average)
City Prosperity	+119%
Prestige Positions	+68%
Country Living	+23%
Rural Reality	-19%
Senior Security	-40%
Suburban Stability	-12%
Domestic Success	+40%
Aspiring Homemakers	+4%
Family Basics	-38%
Transient Renters	-12%
Municipal Tenants	-46%
Vintage Value	-70%
Modest Traditions	-31%
Urban Cohesion	-1%
Rental Hubs	+21%

Table C6: Experian Mosaic segments

Mosaic segment	Description
City Prosperity	High status city dwellers living in central locations and pursuing careers with high rewards
Prestige Positions	Established families in large detached homes living upmarket lifestyles
Country Living	Well-off owners in rural locations enjoying the benefits of country life
Rural Reality	Householders living in inexpensive homes in village communities
Senior Security	Elderly people with assets who are enjoying a comfortable retirement
Suburban Stability	Mature suburban owners living settled lives in mid-range housing
Domestic Success	Thriving families who are busy bringing up children and following careers
Aspiring Homemakers	Younger households settling down in housing priced within their means
Family Basics	Families with limited resources who have to budget to make ends meet
Transient Renters	Single people privately renting low cost homes for the short term
Municipal Tenants	Urban renters of social housing facing an array of challenges
Vintage Value	Elderly people reliant on support to meet financial or practical needs
Modest Traditions	Mature homeowners of value homes enjoying stable lifestyles
Urban Cohesion	Residents of settled urban communities with a strong sense of identity
Rental Hubs	Educated young people privately renting in urban neighbourhoods

Propensity to own an EV

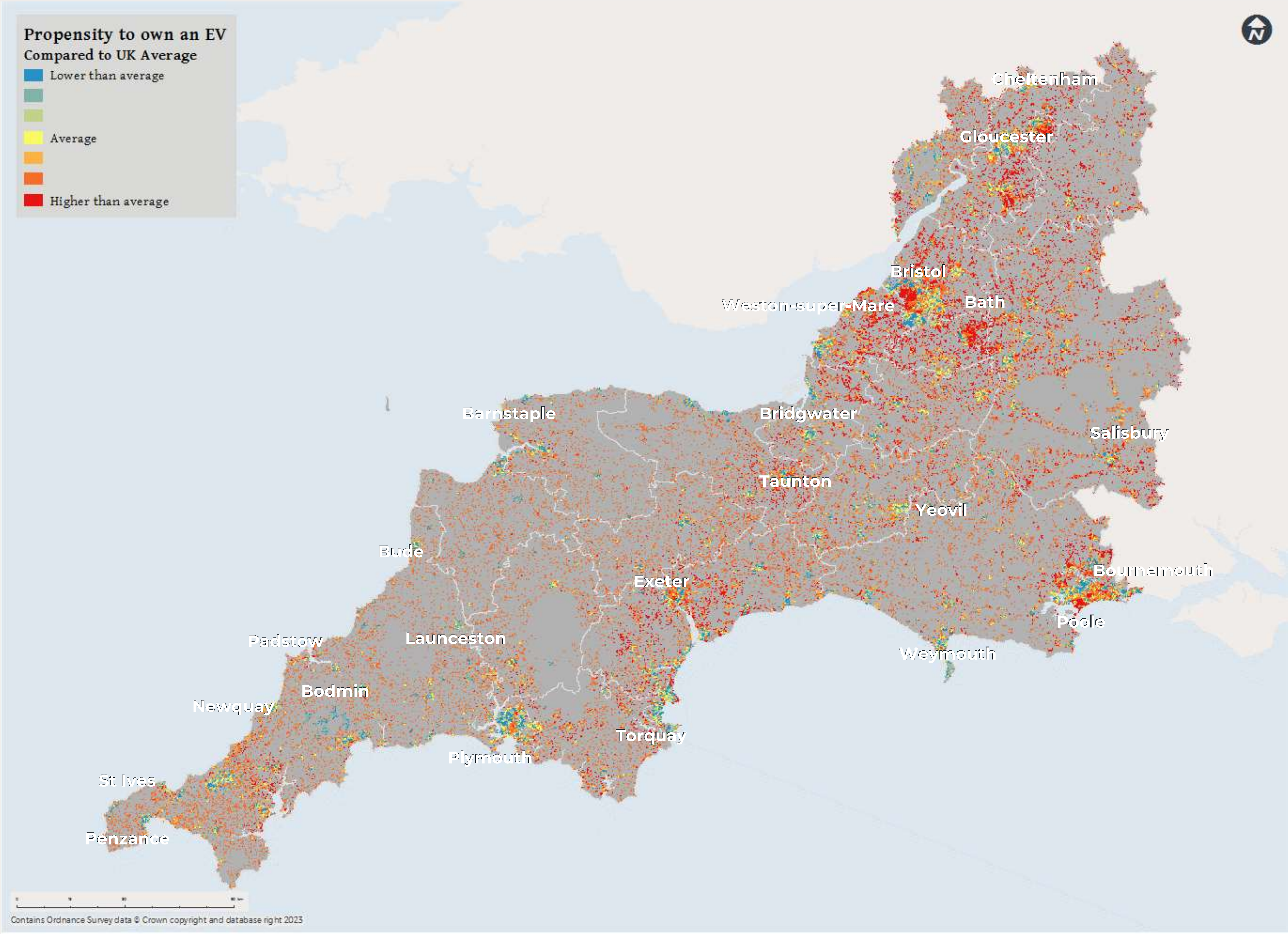


Figure C12: Propensity to own an EV

Source: WSP EV:Ready

Other inputs

EXISTING CAR PARKS

An understanding of the location and capacity of existing car parks is useful for when considering EVCP infrastructure, as these car parks are potential locations for installation.

For the purposes of this study, the EV:Ready model utilises the Valuation Office Agency Non-Domestic Property Rates, which has data on the number of car parking spaces. This includes public or privately operated car parks, as well as car parking spaces attached to non-residential land uses.

As there are typically fewer space constraints and stakeholder considerations, EVCP installation in car parks can be operationally preferable than at other sites such as on-street, particularly from the local authority perspective.

In the short term, Peninsula/Western Gateway and the constituent authorities may choose to encourage electric vehicle uptake across the region by installing affordable, publicly accessible EVCP infrastructure in their Council-owned car parks.

In the medium term, Peninsula/Western Gateway and the constituent authorities could engage with charge point operators (CPOs) to incentivise EVCP installation by the private sector.

Figure C14 (overleaf) shows the existing car parks across the region. As expected, in more urban areas there are more car parks, with higher capacities.

CURRENT GRID CAPACITY

By analysing data published by DNOs, the estimated available grid capacity (MVA) can be approximated at each primary substation. This gives a high-level indication of whether it will be possible to install EV chargepoints with or without upgrades to the grid infrastructure.

This is shown in **Figure C15** (overleaf). The majority of sub-stations in the region are shown to have >20% capacity available.

However, both EV chargers and heat pumps draw significant amounts of electricity. As the prevalence of both increases the demands on the electricity grid will grow. The unknowns around their rate of uptake introduces uncertainty into the data.

RELEVANT LAND USE

Figure D16 (overleaf) shows the total area of land use within each cell that drives vehicle demand. This includes a wide array of uses such as shopping centres, retail parks, offices, healthcare facilities, and tourist attractions etc. Many of these sites will coincide with the existing car parks shown in **Figure D14**.

Darker (red) cells have a greater area of land use for such activities, whereas lighter (blue) cells have a smaller area of land use for these activities. As such, darker areas will have a higher demand for electric vehicle charging.

As with existing car parks, there is more relevant land use in urban areas. This map intends to show likely destinations for users of electric vehicles, and aids in mapping where EVCP demand will be highest.

WIDER FLEET AND VEHICLE TURNOVER TRENDS

Across the UK, reduced car ownership and increasing use of car sharing and ride hailing schemes continues to be a growing trend amongst younger demographics. This shift may be slower in areas with low population density, longer trip distances and limited public transport access which may increase driving demands. However, car ownership is expected to grow until early 2040, when 'peak car' is reached.

In order to forecast the number of EVs it is necessary to assess current and future vehicle fleet size, vehicle replacement rates, average vehicle age when scrapped and the range of ages at which vehicles are scrapped.

The baseline vehicle fleet for the region (3,944,071) was projected forward based on an average of the National Grid Future Energy Scenarios (FES), which include a range of assumptions around the share of travel by public transport, the growth in ride sharing and autonomous vehicles. This equates to a steady growth in vehicle numbers up to 2035, after which point growth rates slow, peaking in 2042 and then slowly declining.

The average age a vehicle is scrapped in the UK is approximately 13 years (SMMT).

TRAFFIC FLOW

The South-West Regional Transport Model (SWERTM) was used to identify the flows of vehicular traffic throughout the strategic route network. This data was an input to EV:Ready for the forecasting of en-route charging demand.

Figures C16 and C17 (overleaf) show the vehicle kilometres per hour observed on each link of the road network across the region. This represents journeys made for all purposes including commuting, utility, leisure, and delivery/servicing movements.

Car Parks

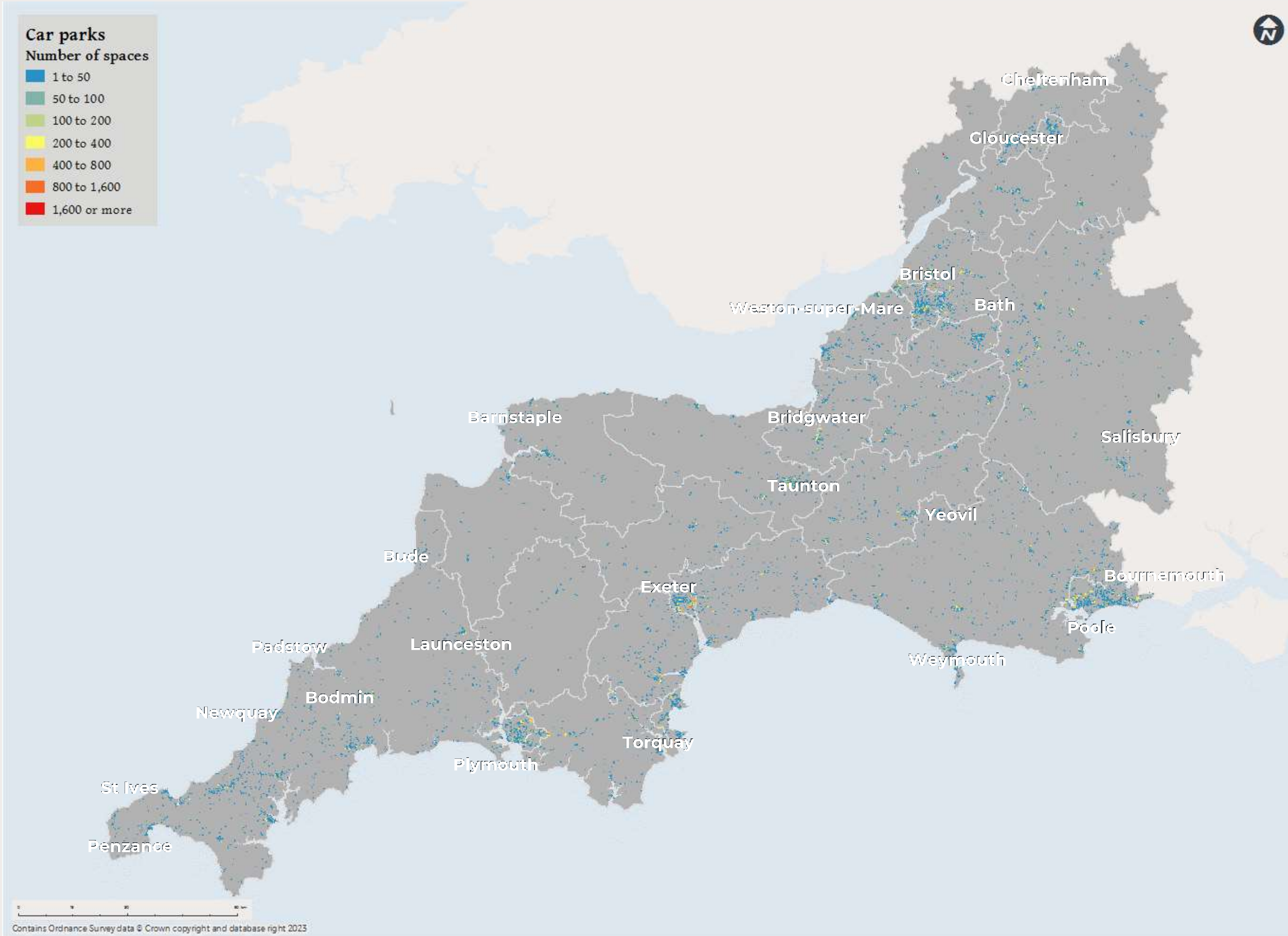


Figure C13: Car parks

Source: WSP EV:Ready

Grid Capacity

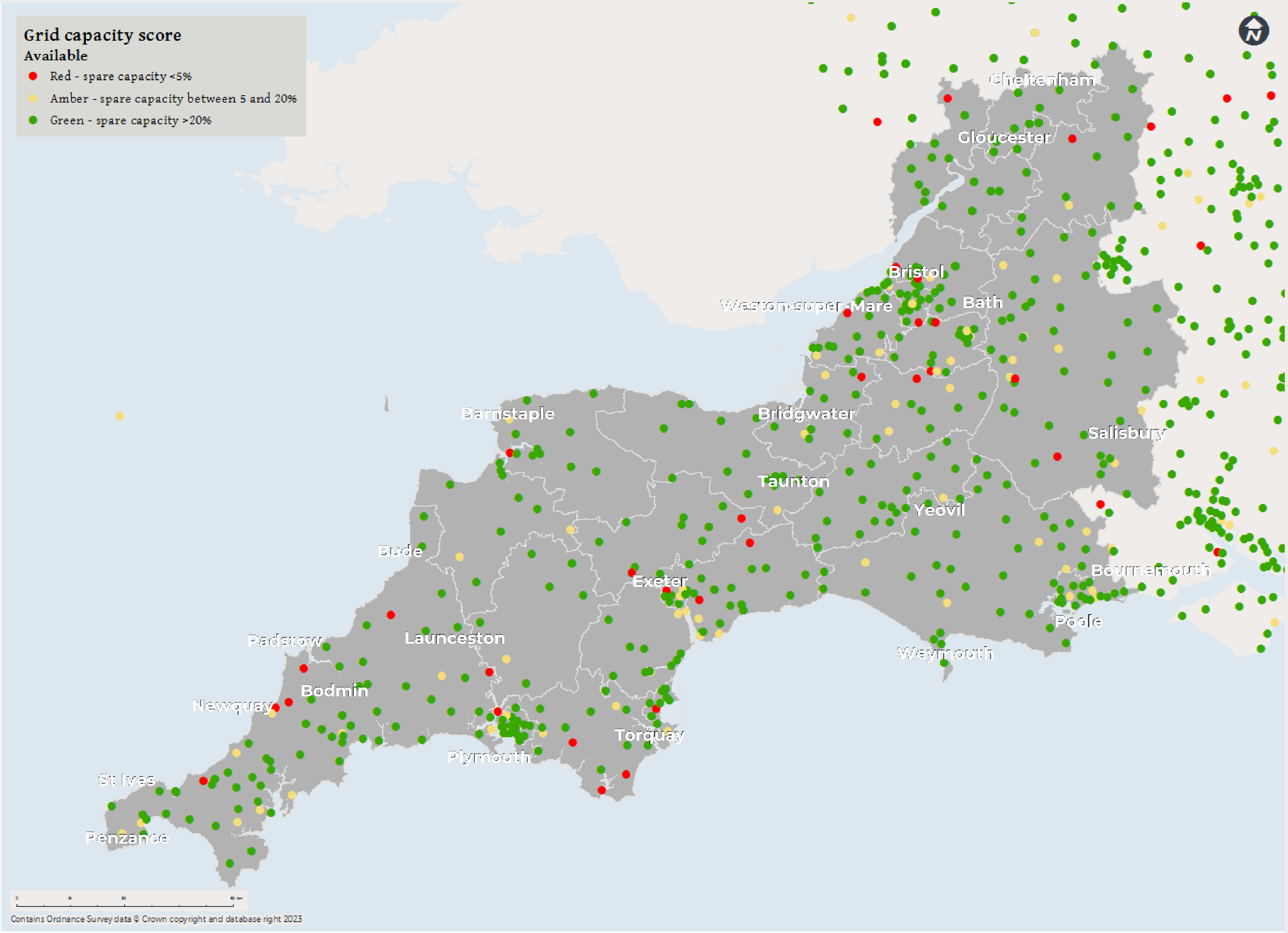


Figure C14: Spare grid capacity

Source: WSP EV:Ready

Land use

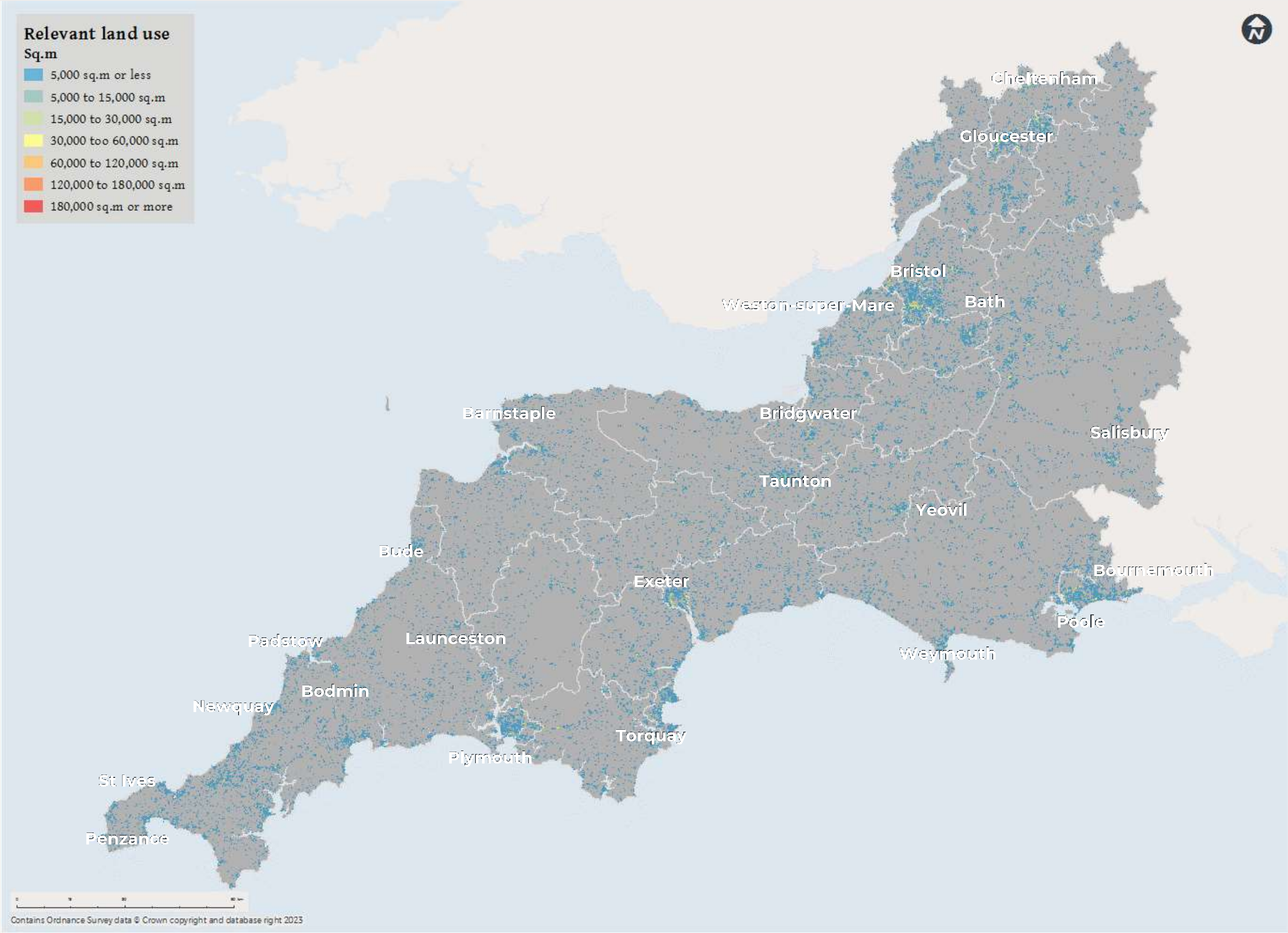


Figure C15: Relevant land uses which would generate demand for destination charging (Sq.m)

Source: WSP EV:Ready

EV traffic flows – Low EV uptake scenario

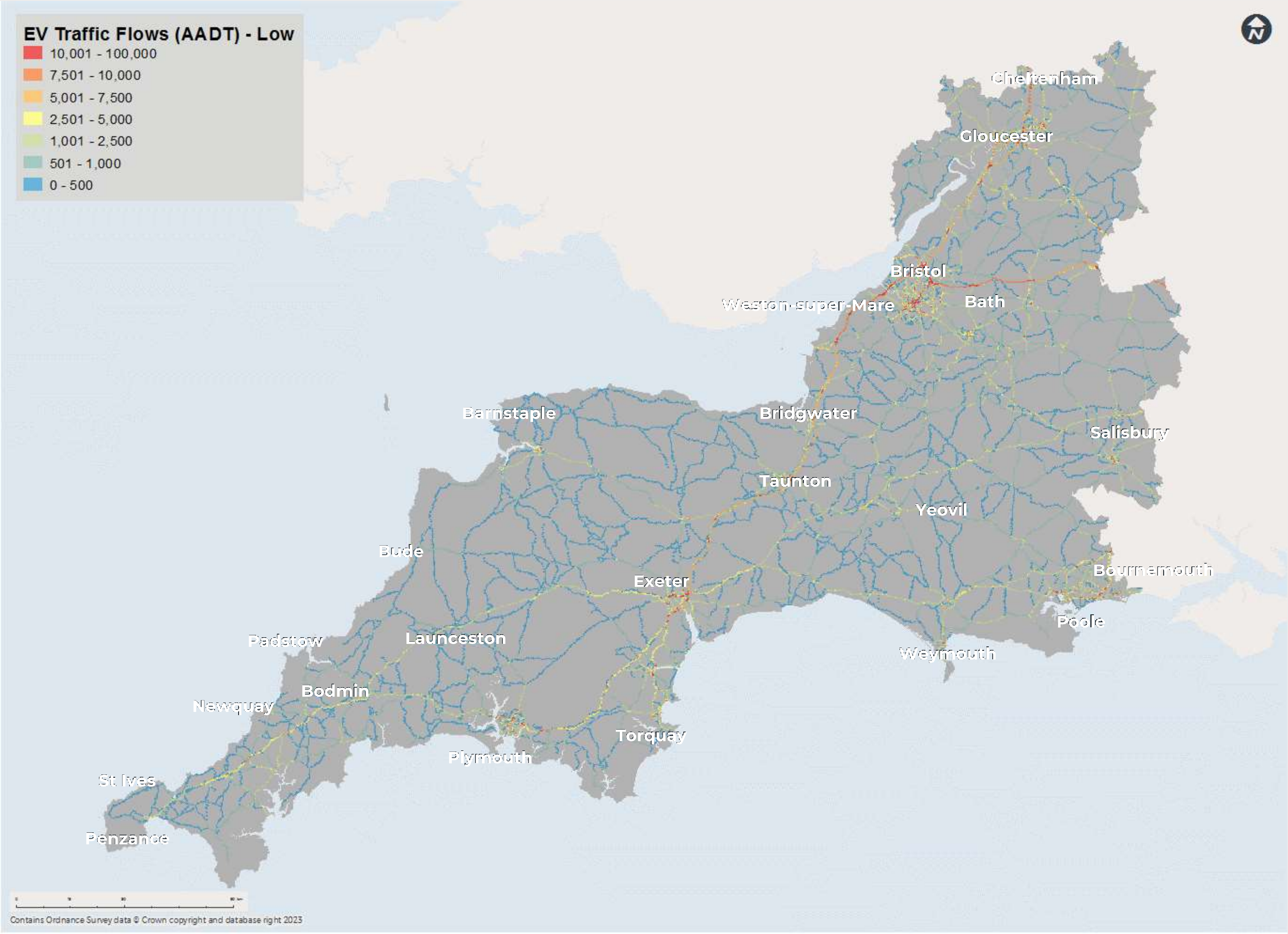


Figure C16: EV Traffic Flows - low - 2030 (AADT)

WSP EV:Ready

EV traffic flows – High EV uptake scenario

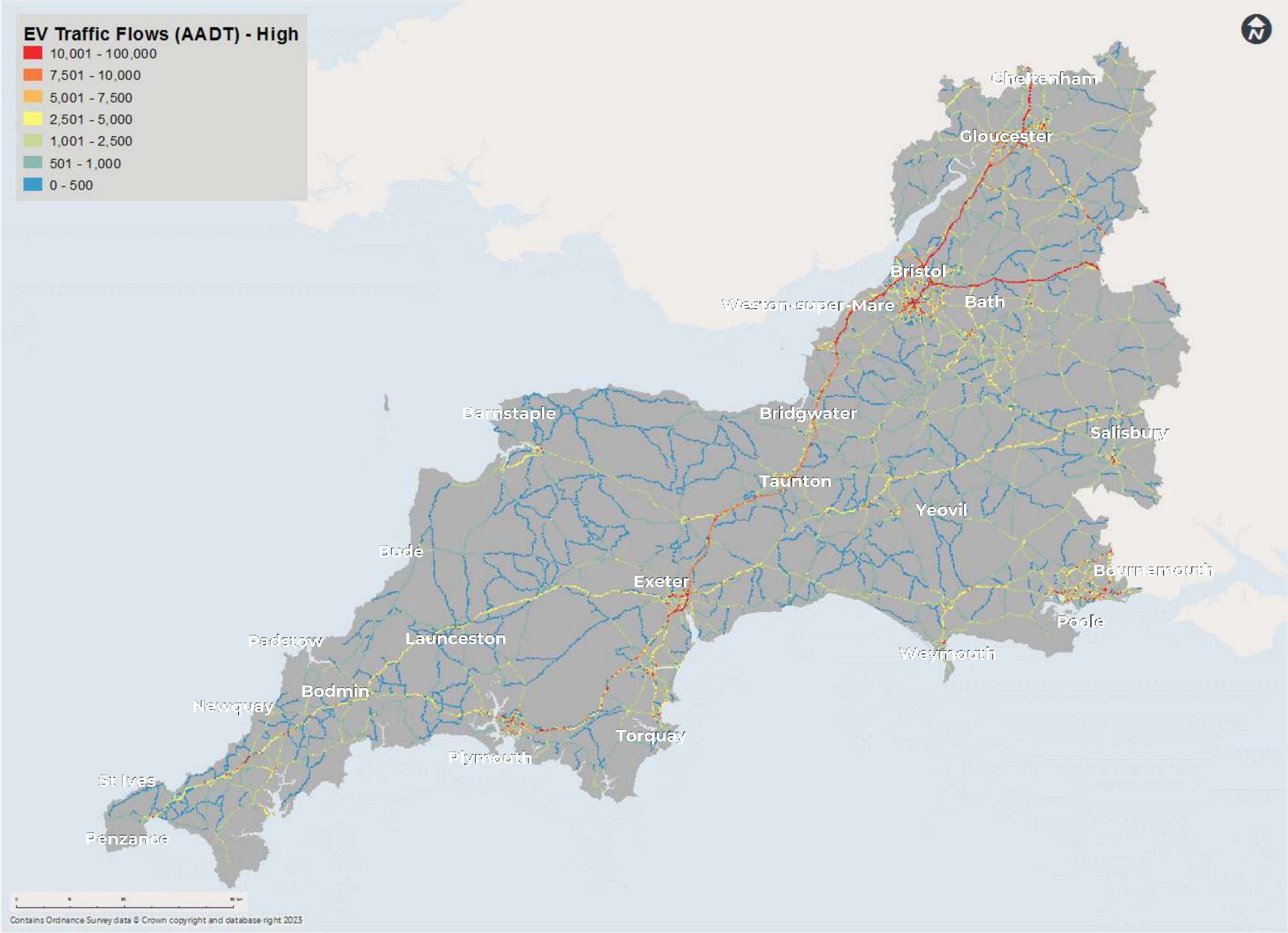


Figure C17: EV Traffic Flows - high – 2030 (AADT)

SECTION D

EV uptake

By 2030 – an estimated 25 to 35 percent of vehicles in the region will be EVs

EV uptake forecast

The EV:Ready model combines granular neighborhood level data on factors affecting EV uptake at a local level, with regional and national data sets, to calculate detailed forecasts of EV uptake.

FORECAST NUMBER OF EVS

Figure D1 shows the projected growth in the number of electric vehicles up till 2050. A low and high forecast is presented to represent the range of uncertainty. The two scenarios include different assumptions about the level of government intervention and consumer behaviour.

The rate of EV uptake is expected to continue to increase in the coming years and be accelerated by the ban on ICE vehicles in 2030. By 2050 it is expected that almost all vehicles will be electric.

The low uptake scenario reaches its highest rates of EV uptake shortly after 2030, whereas the high uptake scenario reaches peak growth a few years prior to 2030. This reflects the increased level of early-stage intervention and consumer adoption assumed in the high uptake scenario.

Table D1 shows the forecast number of electric vehicles in the region for each local authority. The range represents the difference between the low and high scenarios. Please see the separate methodology note which provides detail on the basis for these assumptions.

PROPORTION OF EVS IN THE VEHICLE FLEET

Figure D2 shows how the proportion of EVs and ICEs in the two regions will change between 2025 to 2030 (both low and high scenario). In 2030, it is predicted that 35% of vehicles will be EV’s in the high scenario, or 25% in the low scenario.

Note that in the final draft of this report, the EV uptake forecasts were updated to account for the governments announcement that the expected ban on sales of new ICE vehicles would be delayed until 2035.

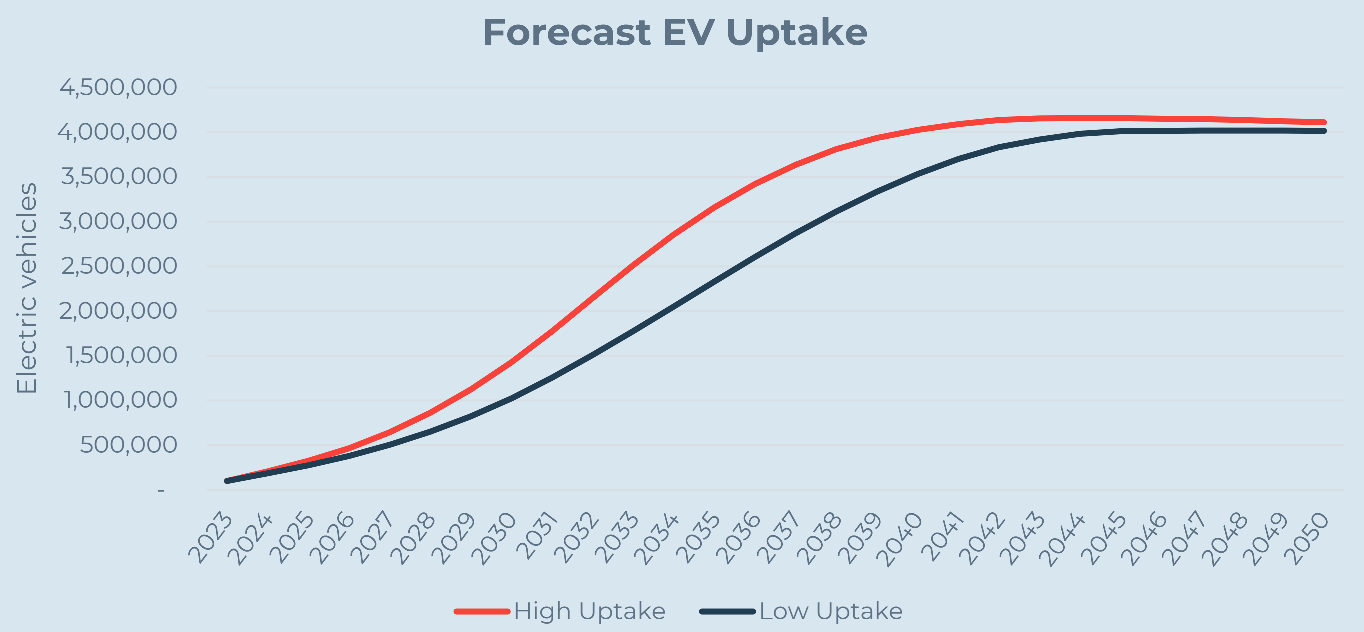


Figure D1: Forecast EV uptake across the study area

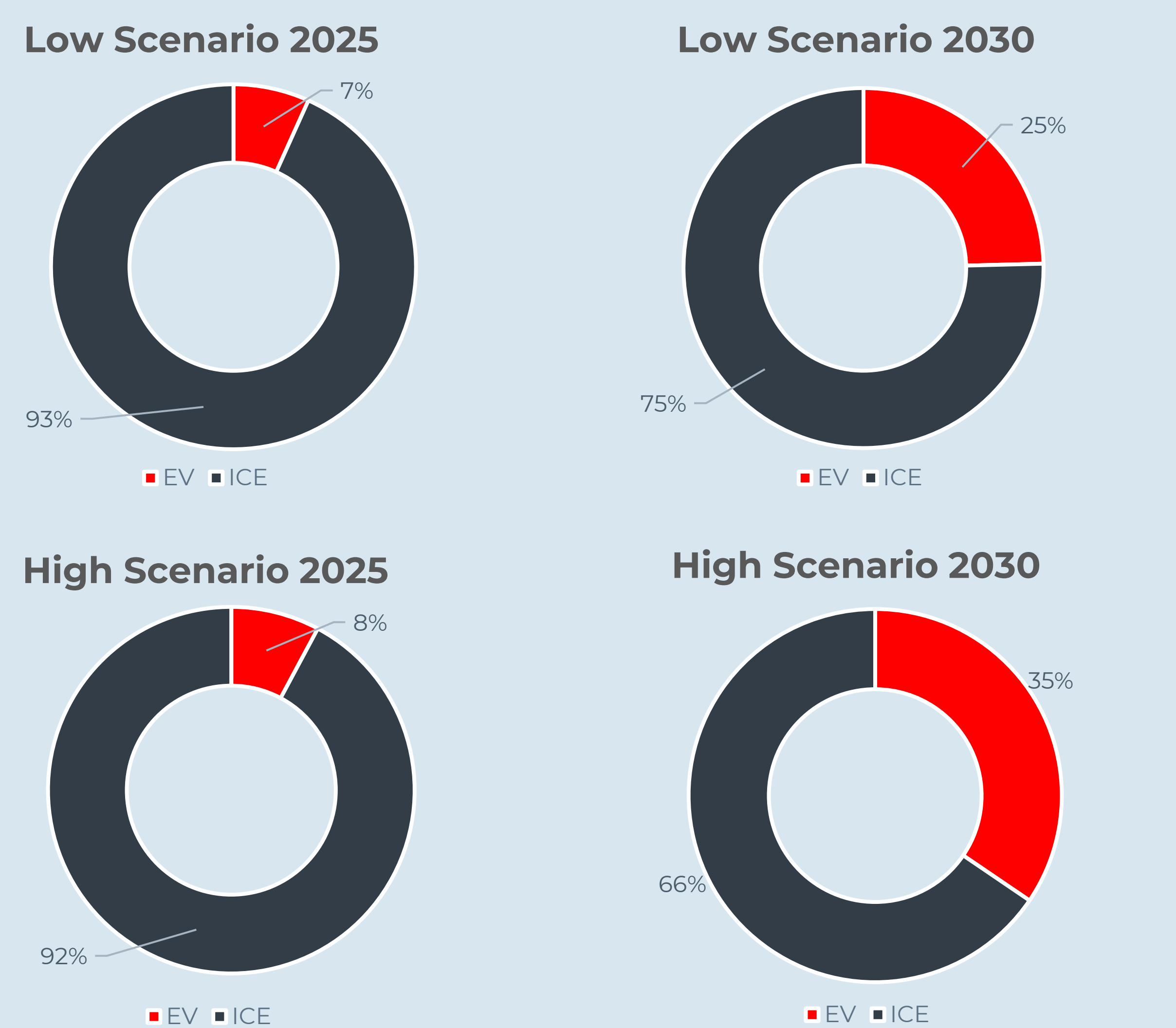


Figure D2: Proportion of EVs and ICEs – low and high scenarios

Source: WSP EV:Ready

EV uptake forecast

DISTRIBUTION OF UPTAKE ACROSS THE REGION

The rates of EV uptake will differ across the region.

Tables D1 – D2 show the absolute number of vehicles and proportion of vehicles respectively, forecast in each of the council areas for both the low and high scenarios.

Figures D3 – D6 show the patterns of uptake, mapped as absolute number of vehicles and proportion of vehicles, for both the low and high scenarios respectively.

Table D1: Forecast uptake to 2035 – number of vehicles

Highway authority	2022 (Actual DfT values)	2025	2030	2035
Peninsula	**34,009**	**112,500 – 131,800**	**435,000 – 605,300**	**1,023,000 – 1,407,000**
Cornwall	7,744	26,600 – 33,500	105,000 – 154,900	253,700 – 360,200
Devon	13,576	45,300 – 47,000	169,900 – 214,400	382,700 – 498,000
Torbay	1,531	5,100 – 6,500	20,300 – 29,900	49,100 – 69,700
Plymouth	1,782	8,500 – 10,800	34,200 – 50,400	82,800 – 117,500
Somerset	9,376	27,000 – 34,000	105,500 – 155,700	254,700 – 361,600
Western Gateway	**55,676**	**161,500 – 191,500**	**587,800 – 821,400**	**1,306,000 – 1,753,100**
Bath and Northeast Somerset	4,632	11,300 – 14,600	37,700 – 56,200	77,600 – 103,300
North Somerset	4,840	12,300 – 15,600	43,700 – 65,000	97,500 – 134,200
Bournemouth, Christchurch and Poole	5,552	18,600 – 19,000	69,400 – 86,100	155,100 – 199,600
Dorset	6,963	22,400 – 23,000	83,500 – 104,500	187,400 – 242,700
Gloucestershire	12,640	35,700 – 46,00	129,700 – 192,900	289,700 – 399,200
Wiltshire	10,256	28,800 – 36,800	104,800 – 155,800	234,000 – 322,500
City of Bristol	5,559	17,000 – 17,200	62,600 – 77,300	139,200 – 178,800
South Gloucestershire	5,234	15,400 – 19,700	56,256 – 83,600	125,500 – 172,800
Total	**89,684**	**274,000 – 323,400**	**1,022,800 – 1,426,800**	**2,329,000 – 3,160,100**

Source: WSP EV:Ready

Table D2: Forecast uptake to 2035 – percentage of vehicles

Highway authority	2022 (Actual DfT values)	2025	2030	2035
Peninsula	**2.0%**	**6% - 7%**	**23% - 32%**	**53% - 73%**
Cornwall	1.8%	6%-7%	22%-32%	52%-73%
Devon	2.2%	7%-7%	25%-32%	56%-73%
Torbay	1.8%	6%-7%	25%-32%	51%-73%
Plymouth	1.3%	5%-7%	22%-32%	52%-73%
Somerset	2.2%	6%-7%	22%-32%	52%-73%
Western Gateway	**2.5%**	**7%-9%**	**26%-37%**	**57%-77%**
Bath and Northeast Somerset	4.1%	9%-12%	31%-46%	62%-83%
North Somerset	3.2%	7%-9%	26%-39%	57%-79%
Bournemouth, Christchurch and Poole	2.3%	7%-7%	26%-32%	57%-73%
Dorset	2.3%	7%-7%	26%-32%	57%-73%
Gloucestershire	2.8%	7%-9%	26%-38%	57%-78%
Wiltshire	2.3%	7%-9%	26%-38%	57%-78%
City of Bristol	2.4%	7%-7%	26%-32%	57%-74%
South Gloucestershire	1.7%	7%-9%	26%-39%	57%-79%
Total	**2.3%**	**7%-8%**	**25%-35%**	**55%-75%**

EV uptake forecast

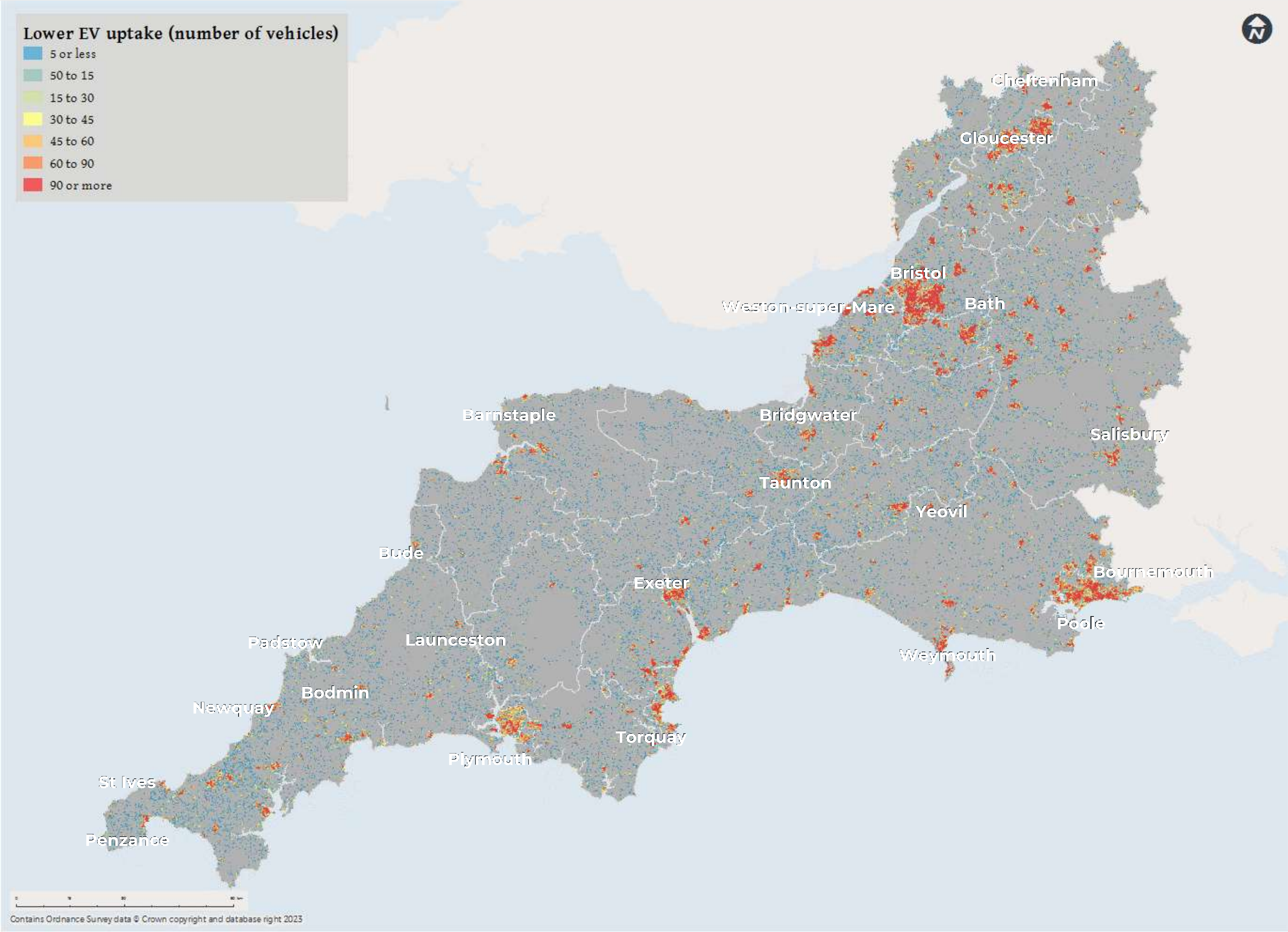


Figure D3: EV uptake low scenario (number of vehicles) - 2030

Source: WSP EV:Ready

EV uptake forecast

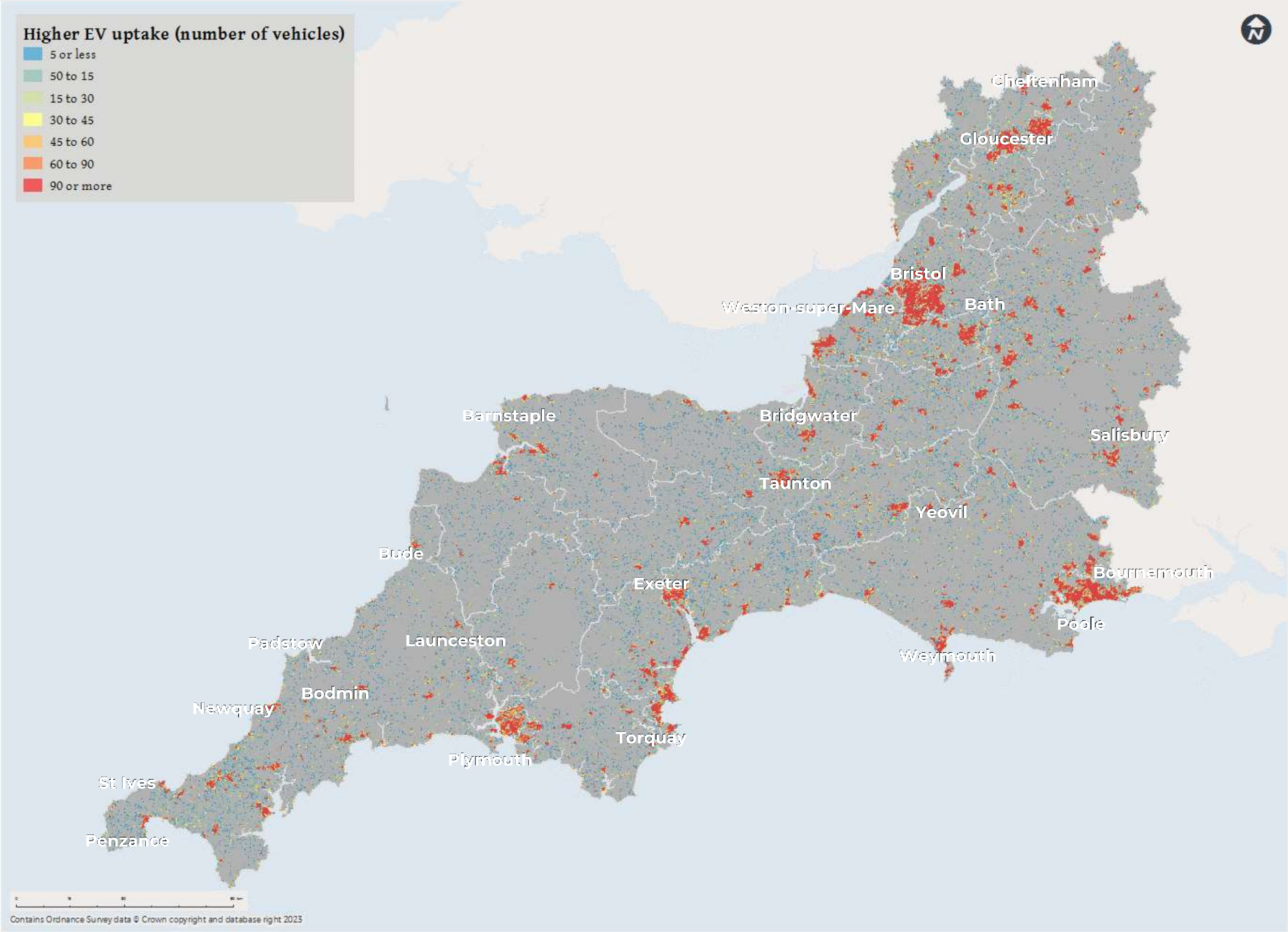


Figure D4: EV uptake high (number of vehicles) - 2030

Source: WSP EV:Ready

EV uptake forecast

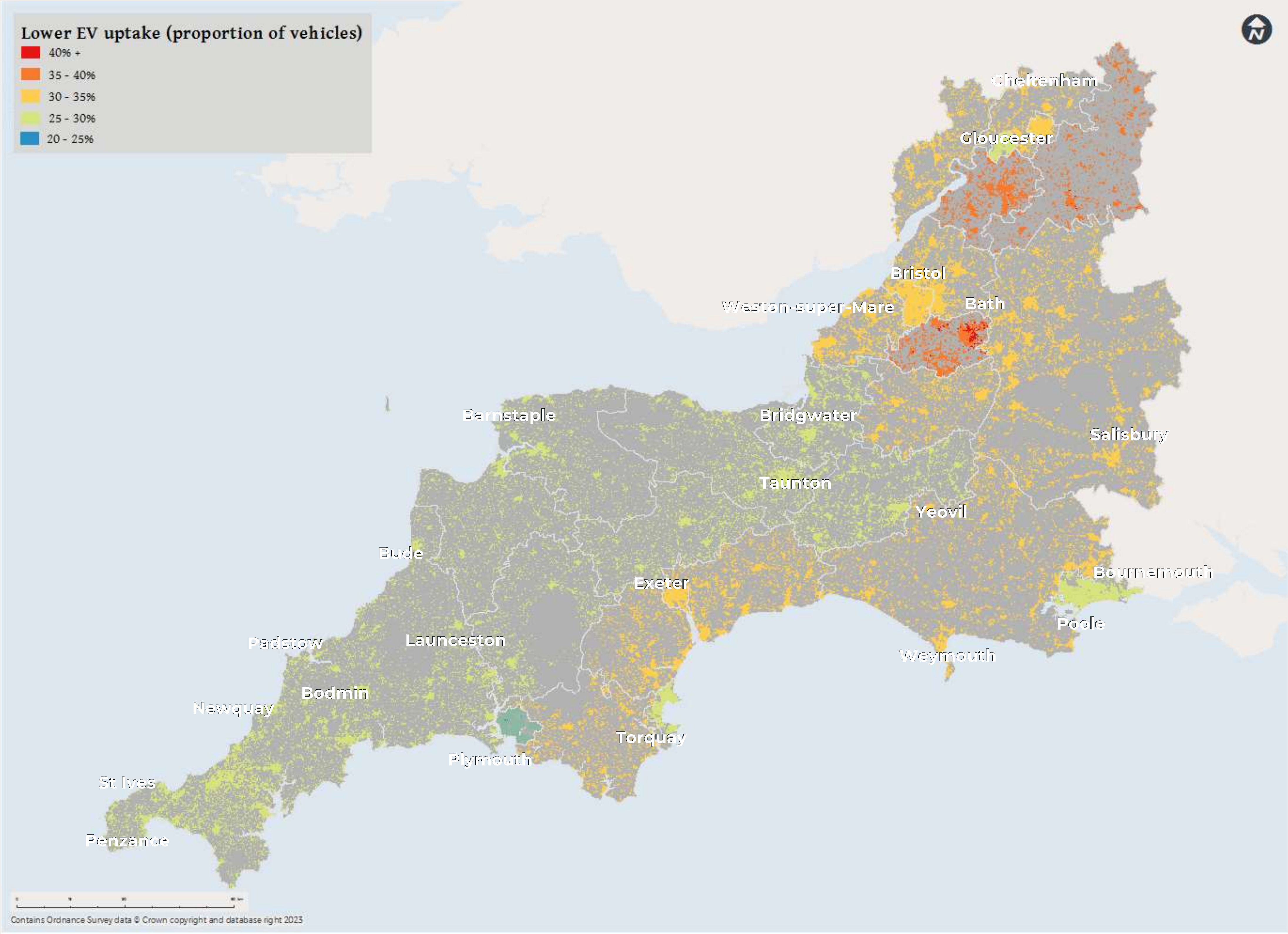


Figure D5: EV uptake low scenario (proportion of vehicles) - 2030

Source: WSP EV:Ready

EV uptake forecast

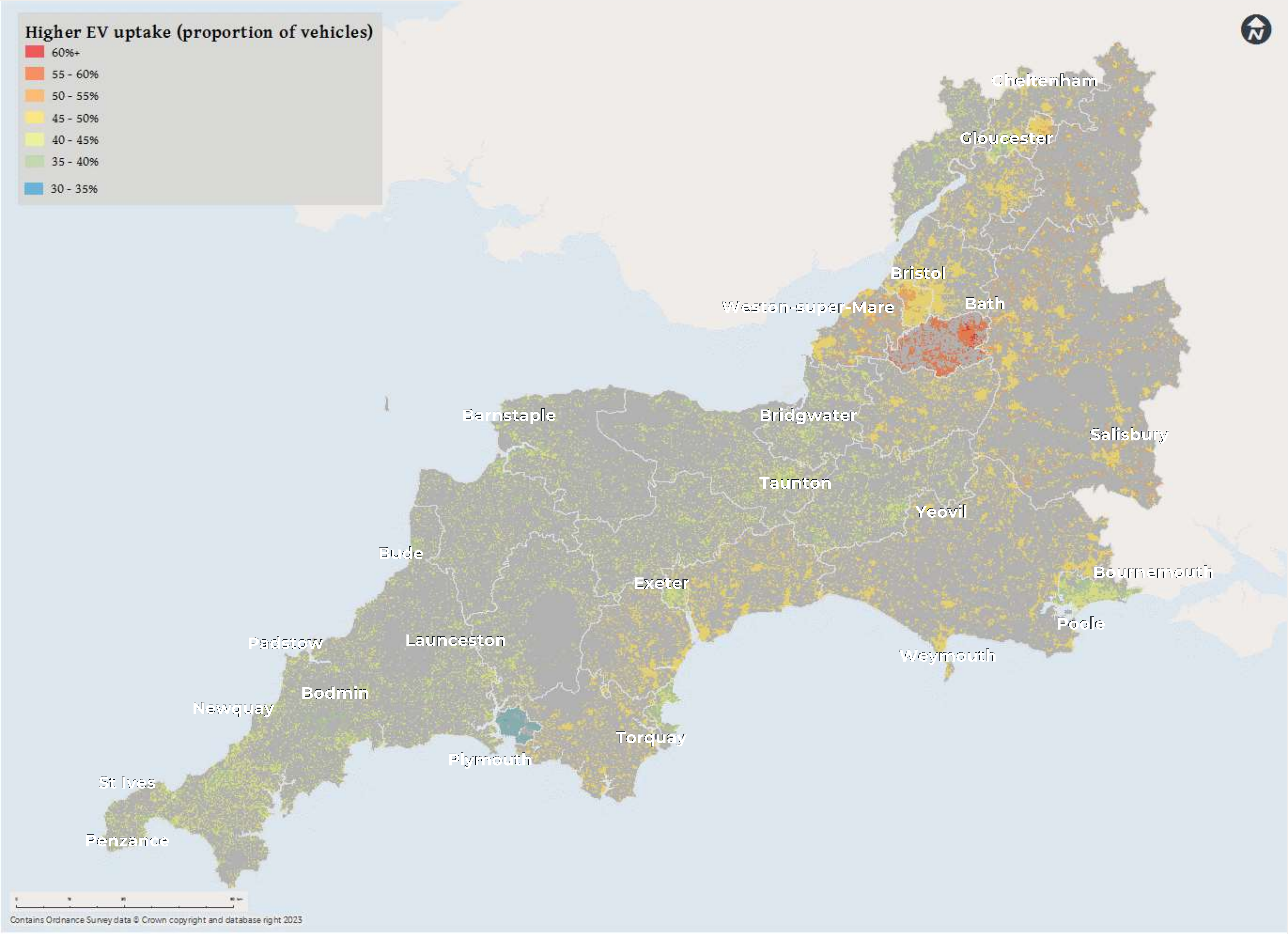


Figure D6: EV uptake high scenario (proportion of vehicles) - 2030

Source: WSP EV:Ready

SECTION E

Demand for charging

Demand for charging

To build an effective public EV charging network it is important that chargepoints are installed where there is demand from drivers. EV:Ready was used to forecast where this demand for charging will exist by 2030.

The network is comprised of two categories of chargepoints which accommodate the different needs of drivers: standard AC and rapid DC.

The type of chargepoint is dependent on the 'dwell time' at the location. It is important to match the speed of the chargepoint to the length of stay. For example, overnight charging on a residential street suits slower AC charging, whereas a quick mid-journey top up at a motorway service station requires faster DC rapid charging.

Each type of charging has a unique demand profile:

– **Standard AC charging demand** – Focussed in residential area where drivers do not have access to domestic off-street charging. As well as destination locations where drivers would choose to 'top-up' whilst parked up.
– **Rapid DC charging demand** – Predominantly located where en-route charging takes places, such as motorway service stations. Demand is driven by the volume of traffic flowing through the road network.

The results of the modelling are shown in Figures E1-6 overleaf. They provide an initial indication of where to deploy charging infrastructure. Further analysis is required to identify suitable sites within the areas highlighted.

MODELLING METHODOLOGY

To calculate the charging demand, EV:Ready was integrated with the 'South West Regional Transport Model' (SWRTM). This allows the flows of traffic throughout the region to be modelled.

Three different stages of a journey were considered: origin, en-route and destination. The following methodology was applied:

Origin demand: Identify the journeys which originate in an area using SWRTM. Based on EV:Ready EV uptake forecasting, assign the proportion of vehicles which would be EVs in 2030.

Two scenarios were calculated based on the low and high EV:Ready forecasts.

Destination demand: For each area identify the number of journeys which would terminate there. Assign the proportion of EVs based on their origin. Aggregate the values for the larger model zones down to the smaller hex areas based on the number of destination land uses (e.g. supermarkets, retail, leisure etc).

En-route demand: Run SWRTM to calculate the number of EVs per day flowing through each road link based on the origin and destination of the journeys identified above.

For each hex cell a normalised 0-1 demand score was assigned for the three stages of a journey: origin, en-route and destination.

Demand for charging

STANDARD CHARGING DEMAND FORECAST

Figures E1-2 (overleaf) shows the standard charging demand score for 2030 across the study area, for the low and high EV uptake scenarios.

Standard charging demand is a summation of both the origin and destination demand modelled.

Both figures show very similar levels of standard charging demand, with demand generally concentrated in urban areas with high housing density.

Origin charging: Approximately 30% of households in the UK do not have access to off-street parking (26% within the study area) where they would be able to charge a vehicle. At present most EV owners (93%) have domestic off-street charging facilities but as EV uptake increases there will more EV drivers which depend on public residential charging and demand will rise.

In areas where there is a deficit of off-street parking there will be a higher demand for standard charging provision. Residential charging is provided on-street, or in public car parks.

Destination charging: Destination charging occurs when drivers take the opportunity to 'top-up' whilst parked at the destination of their journey e.g. shopping centres, railway stations and leisure sites.

The greater the density of 'destination' land uses in an area, the higher demand for standard charging provision.

RAPID CHARGING DEMAND FORECAST

Vehicles travelling long distances, may need to top up to extend their range and allow them to complete their journey. This is referred to as en-route or intermediate charging.

En-route charging is best suited to DC rapid chargepoints. This minimises the charging time and allows the driver to continue onto their destination as quickly as possible.

Figures E5 and E6 (overleaf) show where the highest volumes of EVs would occur on the road network in 2030 and therefore where en-route charging demand would be greatest. Two scenarios are presented for the low and high EV uptake forecasts in 2030.

Rapid charging infrastructure would be most effectively applied as close to the high demand links as possible, to minimise the length and time of detours.

Whilst the priority is to install chargepoints in the areas of highest demand it is also important to create a network of chargers across the region to ensure there are no gaps where electric travel would be limited.

Demand for charging – AC standard chargepoints

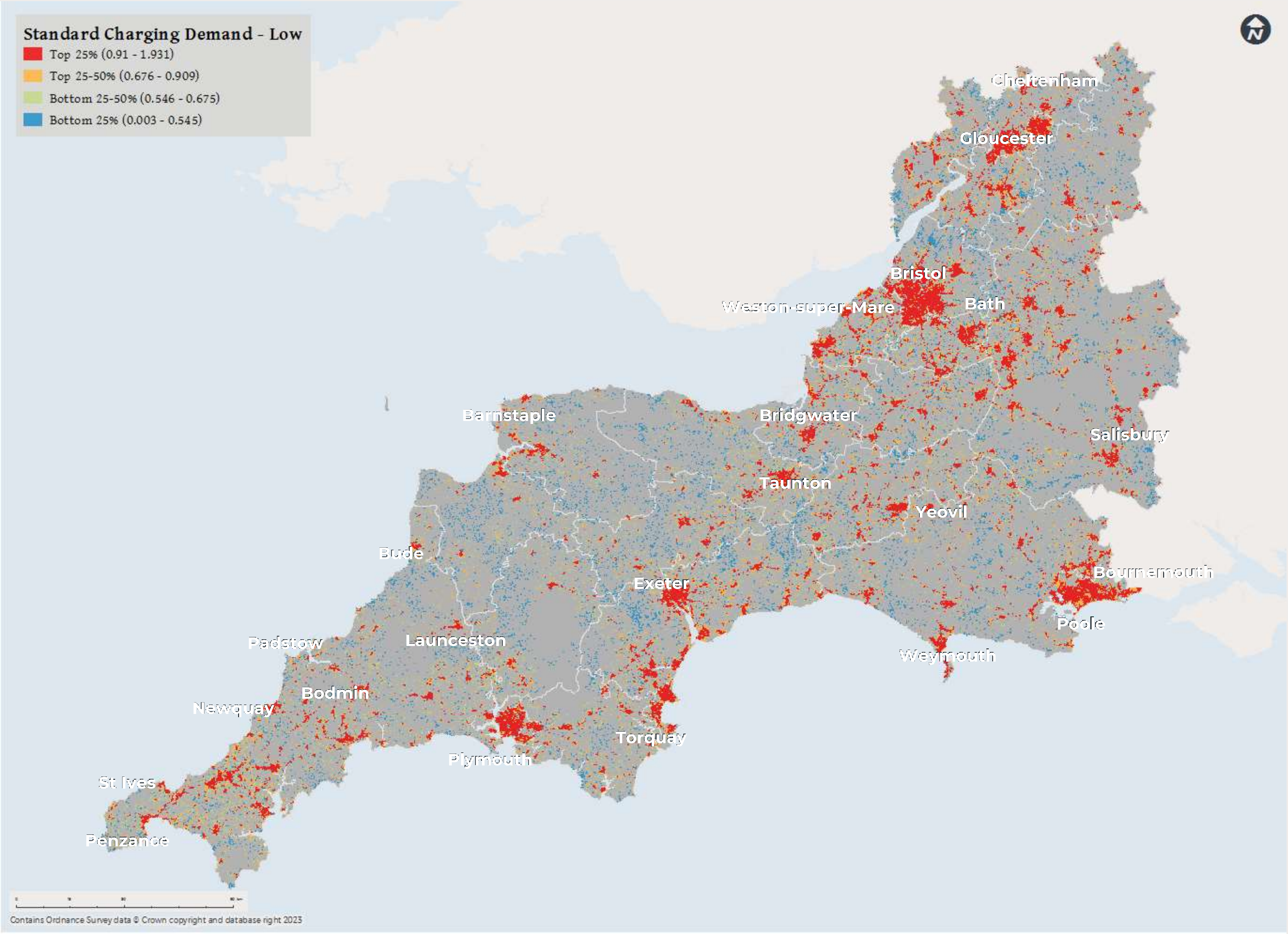


Figure E1: Standard charging demand low - 2030

Source: WSP EV:Ready

Demand for charging – AC standard chargepoints

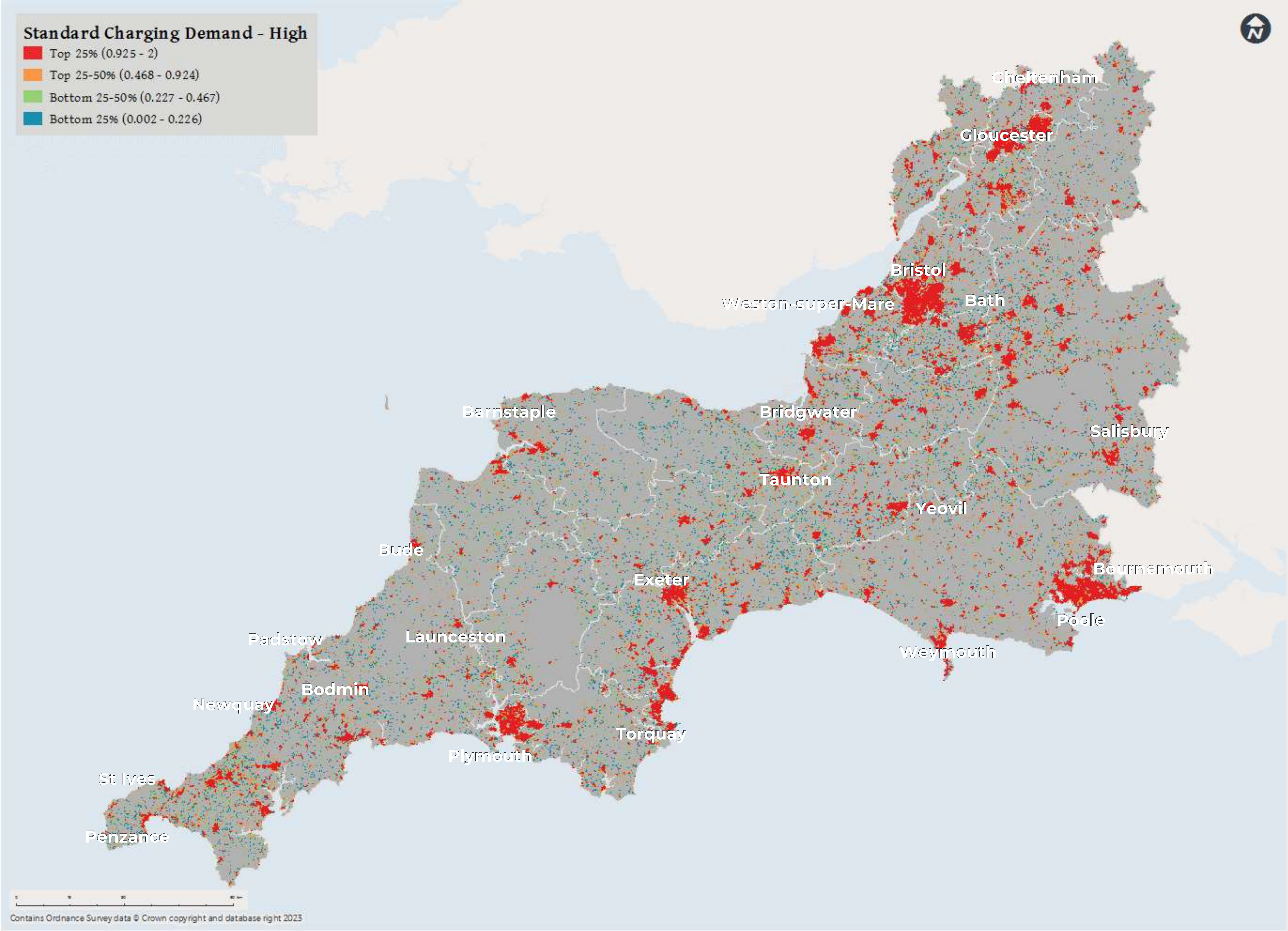


Figure E2: Standard charging demand high - 2030

Source: WSP EV:Ready

Demand for charging – DC rapid chargepoints

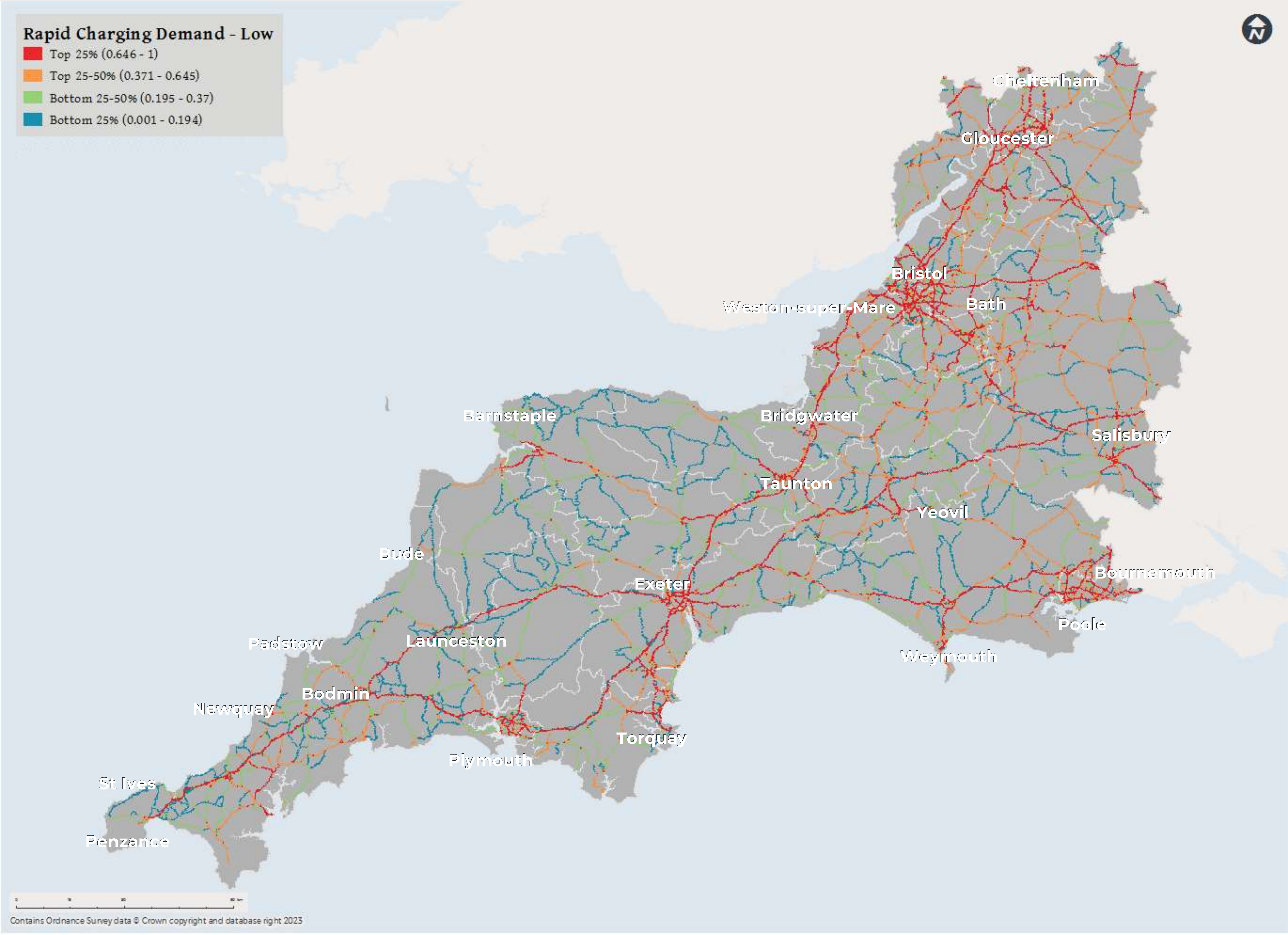


Figure E5: Rapid charging demand low - 2030

Source: WSP EV:Ready

Demand for charging – DC rapid chargepoints

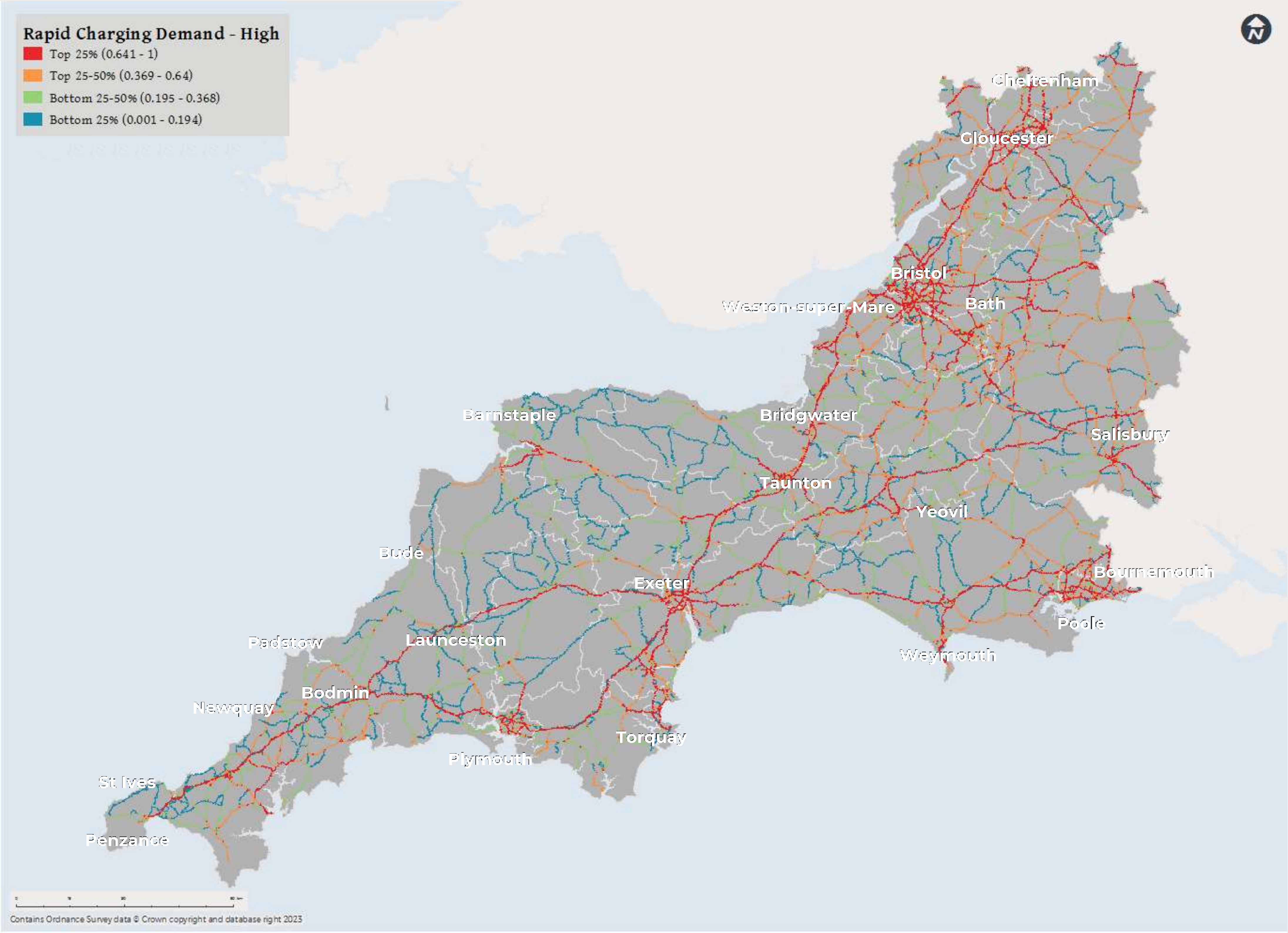


Figure E6: Rapid charging demand high - 2030

Source: WSP EV:Ready

SECTION F

Private sector charging provision gap analysis

Private sector charging provision gap analysis

SUPPLY SCORING

Both the public and private sector are actively engaged in the installation of EV charging infrastructure. For local authorities, it is important to understand where the private sector is likely to invest. This is so limited resources can be appropriately focused on 'plugging the gaps' in the EVCP network and ensuring that equitable access to charging is achieved. This will drive EV uptake and ultimately contribute towards decarbonisation goals.

This approach is supported by the DfT's national EV charging strategy.

SUPPLY SCORE

The supply score is essentially a measure of how attractive a site is to the private sector.

The key factors which they consider are: the level of demand, the cost of grid upgrades and other works and any competition from other nearby chargepoints.

- Demand is driven by different factors depending on the type of chargepoint: en-route, destination or origin.
- Electrical grid capacity is a key determinant of supply. Where headroom in the local electricity network is low, installation of EVCPs could require costly upgrade works which can extend to millions of pounds in extreme cases.
- The presence of existing EVCPs in an area, which are already meeting the demand, will be a deterrent to further supply being installed.

Table F1 below shows how the supply score for en-route, origin and destination charging is calculated, by combining a number of factors from the modelling.

RAPID EVCP SUPPLY SCORE

Rapid supply is scored via modelled flow, grid supply, and presence of existing rapid EVCPs. For example, if there is already a rapid EVCP in a hex cell, the en-route supply would be 0.

STANDARD EVCP SUPPLY SCORE

The standard charging supply score is the combination of the destination and origin charging supply scores of an area.

- Origin supply is scored according to EV uptake, reliance on on-street parking, grid supply, origin demand and the presence of existing EVCPs. This means that an area with high EV uptake, high reliance on on-street parking, good connections to the grid, high origin demand and no existing EVCPs present will have a high origin supply score.
- Destination supply is scored according to modelled flow, grid supply, relevant land use, destination demand and presence of existing EVCPs. This means that an area with high modelled EV flow, good grid connections, relevant land uses (leisure/office etc), high destination demand score and no existing EVCPs will have a high destination supply score.

Table F1: Supply score assumptions (weighted)

Assumptions and weightings	EV uptake normalised to 1	Reliance on on-street parking – higher %, higher score	Modelled Flow normalised to 1	Grid supply normalised to 1	Land use normalised to 1	Origin demand normalised to 1	Destination demand normalised to 1	Weighting
Rapid Supply Score (out of 1)			50%	50%				Rapid EVCPs - 0 Standard EVCPs - 0.5
Standard Supply Score (out of 2)	Sum of the origin and destination supply calculations							
Origin Supply (out of 1)	25%	25%		25%		25%		Any EVCP - 0.5
Destination Supply (out of 1)			25%	25%	25%		25%	Any EVCP - 0.5

Private sector charging provision gap analysis

PRIVATE SECTOR INVESTMENT AND THE ROLE OF THE PUBLIC SECTOR

In order to create a successful EV charging network, that meets the needs of drivers, both the public and private sectors will need to invest in EVCPs.

There is a keen appetite to invest in EV charging infrastructure from the private sector, with a number of large operators having established themselves, as well as new entrants and acquisitions by major investors.

However, the private sector will only invest where there they are confident of financial returns. Commercial charge point deployments are typically focused on destinations and intermediate sites (i.e. service stations, roadside cafes), where demand is high, with high traffic volumes or reasonable dwell times. Rapid chargers are more likely to be commercially deliverable by the private sector than standard / fast chargers.

The ratio of change of public to private sector investment will change over time. Currently we are in the early stages of the transition to electric vehicles and the number of EVs which require public chargers is relatively low.

As a result, there are many locations where EVCP installations are not commercially viable for the private sector at present. The contribution required by the public sector is therefore relatively high. As the number of EVs increases, the commercial viability will improve and the public sector contribution will decrease.

GAP ANALYSIS

A gap analysis has been undertaken to identify locations where the private sector will likely leave gaps in the network of public chargepoints and where the public sector will need to intervene.

This was calculated by comparing the supply score (likelihood of the private sector investing) and demand score (demand for charging irrespective of whether the area was commercially attractive).

Figure F1 and F2 (overleaf) shows the results of the analysis. Blue represents locations where local authorities will need to provide chargepoints, red areas where the private sector will likely invest and yellow could be considered by either party.

Rapid DC charging:

Figure F1 shows the results of the rapid charging gap analysis for 2030 (high scenario).

The majority of rapid charging point locations would be of interest to the private sector, but that does not preclude public sector investment. Rapid charging is generally more profitable than standard charging.

It is expected that the private sector would prefer to install rapid chargers along high traffic routes such as motorways and A roads, and therefore the public sector would focus on town or village centres. In these locations, rapids would be beneficial to groups such as taxi drivers and delivery vehicles, as well as long distance travellers.

Standard AC charging:

Figures F2 shows the results of the standard charging gap analysis by 2030 (high scenario).

Compared to rapid charging, a greater proportion of the standard charging would need to be provided by the local authorities.

Generally, the more isolated rural areas are less attractive to the private CPOs and the urban areas more attractive.

When comparing the low and high forecasts it is observed that there would be less gaps in provision left by the private sector in the high scenario than the low. This is because a higher EV uptake would result in higher utilisation of chargepoints and improve the financial performance of each site. Which would allow the CPOs to invest in more locations.

Priority locations

In the Appendix D (p.138 onwards) mapping of the gap analysis is provided. For each local authority the highest priority locations are shown, which should be considered first for installation of chargepoints by the local authorities.

These high priority locations are chosen by extracting only the highest scoring hexes from the gap analysis.

Indicative locations for installation of rapid chargepoints

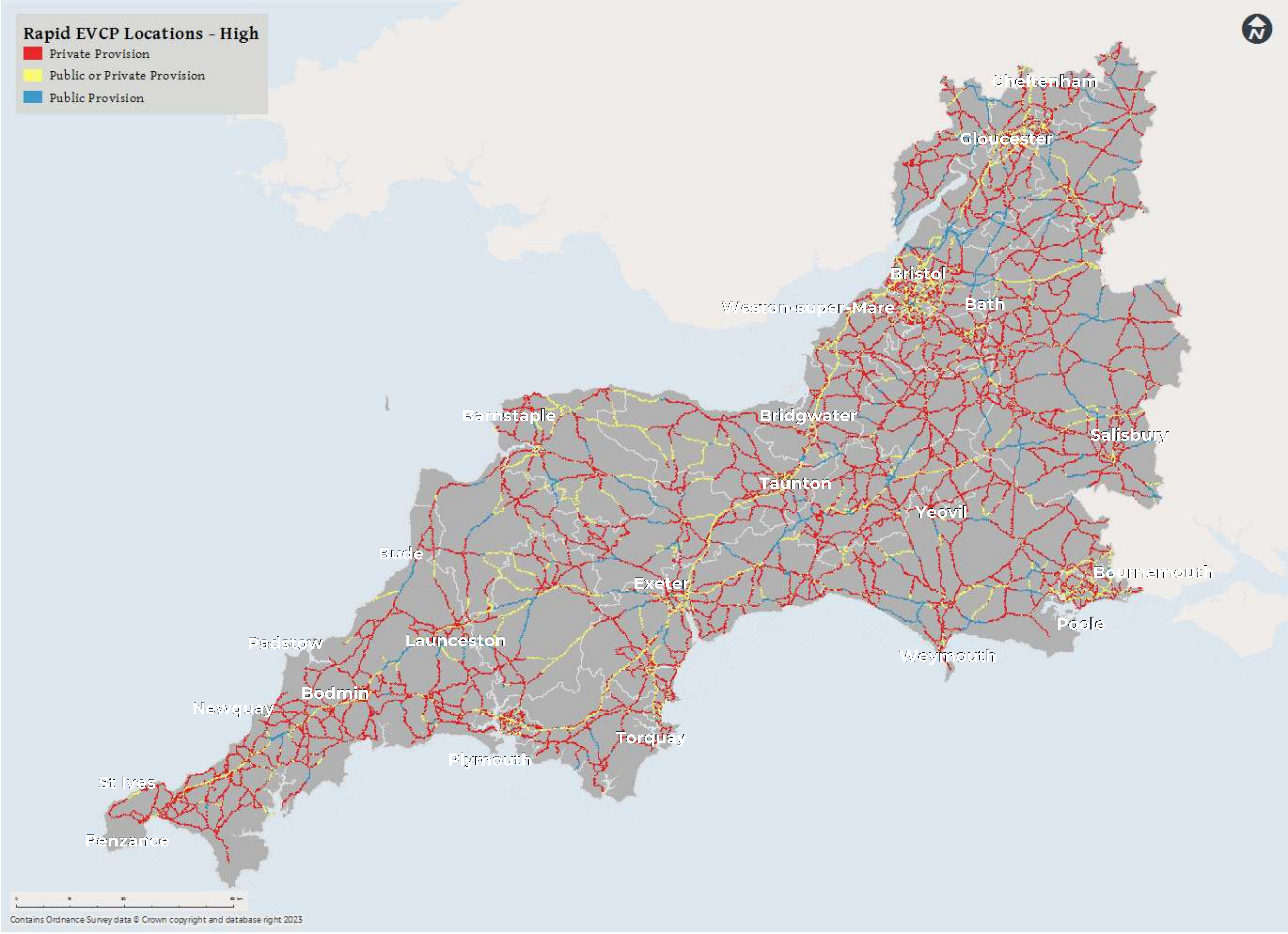


Figure F1: Illustrative rapid charge point locations high - 2030

Source: WSP EV:Ready

Indicative locations for installation of standard chargepoints

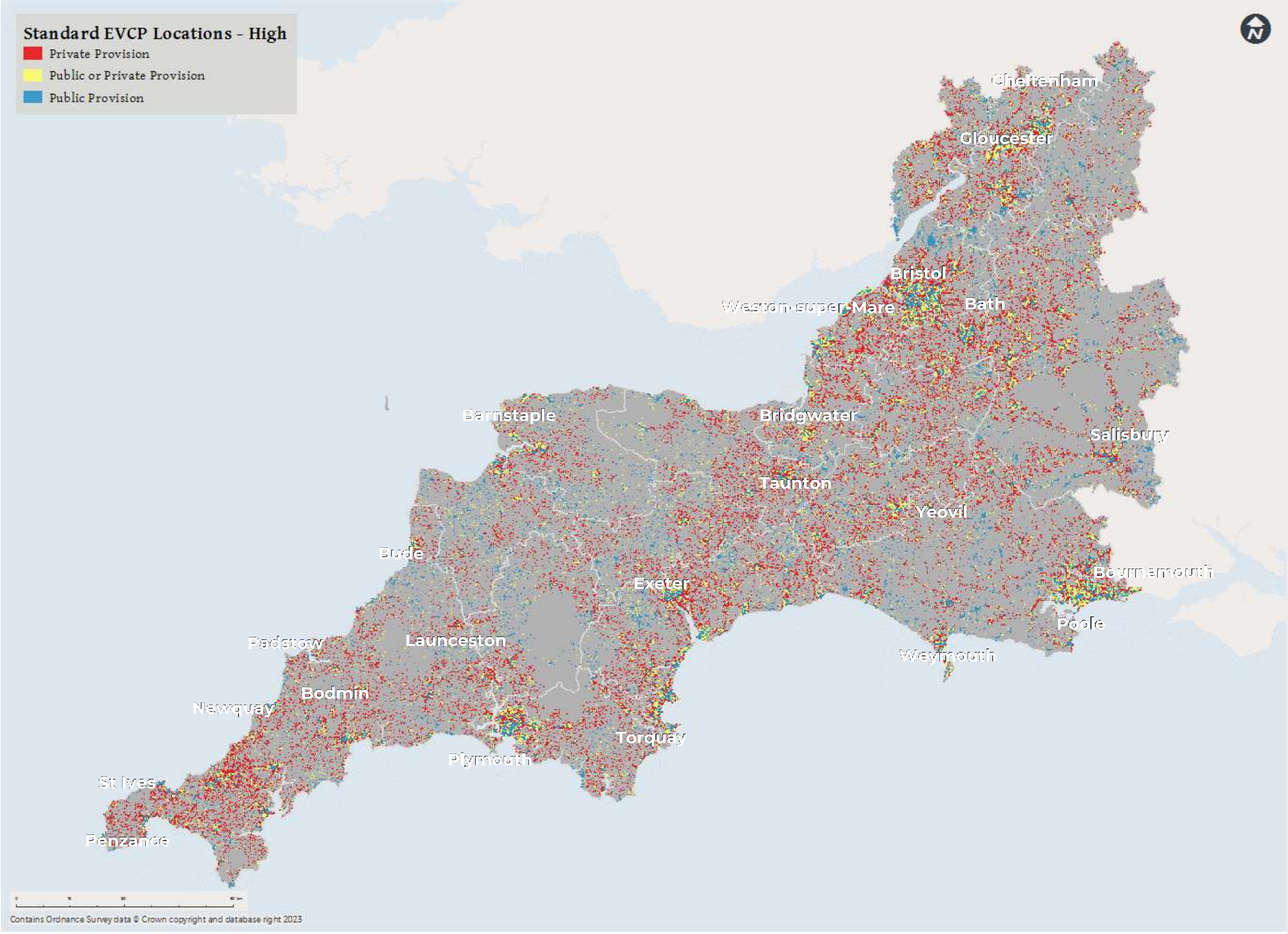


Figure F2: Illustrative standard charge point locations high - 2030

Source: WSP EV:Ready

SECTION G

Chargepoint requirements

Chargepoint requirements

TOTAL EVCPS REQUIRED

The forecast uptake of EVs enables an assessment of associated charging infrastructure requirements. A wide range of variables are considered in this assessment, including: charging habits, vehicle mileage and efficiency, access to off-street parking, proportion of charging delivered via public chargers, trends in vehicle and charger technology, and average charge rates.

There are a range of approaches to forecasting charging infrastructure requirements. WSP has used the best available assumptions and input data to produce predictions which are robust and in line with other published predictions. However, there remains uncertainty especially beyond 2030. See methodology note for detailed assumptions and the process carried out.

Table G1 shows the total number of publicly accessible EV sockets which will be required across the region in the years 2025, 2030 and 2035. A low and high forecast is provided which reflects the two EV uptake scenarios present in the previous sections. These charge points would be provided by a combination of both the public and private sector.

Across the region there are currently 2,408 chargepoints.

- By 2025, 11,350 – 13,380 charge points would be required.
- By 2030, 24,080 - 33,610 charge points would be required.
- By 2035, 54,840-74,400 charge points would be required.

These forecasts do not account for the additional charging demand generated by the building of new homes, as this is likely to be met through private home charge points, as required by planning policies and building regulations.

Table G1: Total EVCP sockets requirements forecast

Highway authority	Existing (Apr' 23)	Low forecast number of EVCPs			High forecast number of EVCPs		
		2025	2030	2035	2025	2030	2035
Peninsula	**1,187**	**4,700**	**10,240**	**24,080**	**5,500**	**14,260**	**3,3110**
Cornwall	331	1,110	2,460	5970	1,400	3,640	8,480
Devon	442	1,890	4,000	9,000	1,960	5,050	11,720
Torbay	29	210	480	1,160	270	710	1,640
Plymouth	123	360	810	1,950	450	1,190	2,760
Somerset	262	1,130	2,490	6,000	1,420	3,670	8,510
Western Gateway	**1,221**	**6,650**	**13,840**	**30,760**	**7,880**	**19,350**	**41,290**
Bath and North East Somerset	95	470	890	1,830	610	1,330	2,430
North Somerset	97	510	1,030	2,290	650	1,530	3,160
Bournemouth, Christchurch and Poole	115	780	1,630	3,650	790	2,020	4,710
Dorset	144	930	1,970	4,420	960	2,460	5,710
Gloucestershire	252	1,490	3,050	6,820	1,900	4,540	9,400
Wiltshire	201	1,200	2,460	5,520	1,540	3,670	7,600
City of Bristol	148	710	1,480	3,270	720	1,830	4,210
South Gloucestershire	169	560	1,330	2,960	710	1,970	4,070
Total	**2,408**	**11,350**	**24,080**	**54,840**	**13,380**	**33,610**	**74,400**

Chargepoint requirements

PROPORTION OF EVCPS WHICH WILL BE DELIVERED BY LOCAL AUTHORITIES

Whilst the private sector will provide a proportion of the infrastructure required in the region, the public sector will need to intervene to fill gaps in the public charger network.

Figure G1 and Table G2 show a forecast of charge points which the public sector will be required to deliver, either directly or via partnerships with CPOs. This is compared to the greater total number of charge points required. Numbers shown are indicative only and are intended to provide a broad suggestion of the volume of charge points required.

The proportion of EVCPs which will be supplied by the public sector is derived from engagement with CPOs, industry and literature review.

To plug the gap left by the private sector, it is forecasted that the public sector will need to deliver 10,290 – 18,840 standard charge points and 320 – 1,150 rapid charge points by 2030.

Standard charge points refers to all AC charge points up to 22 kW, and rapid includes all 50 kW and above DC charge points.

The majority of chargepoints will be standards with a small proportion being rapid chargepoints. It is expected that the private sector will continue to deliver most rapids chargepoints.

Installing the required volume of chargepoints, ahead of demand, will be challenging. The expectation of the Department for Transport is that councils will leverage private sector investment and skills in order to install chargepoints at the scale and pace required.

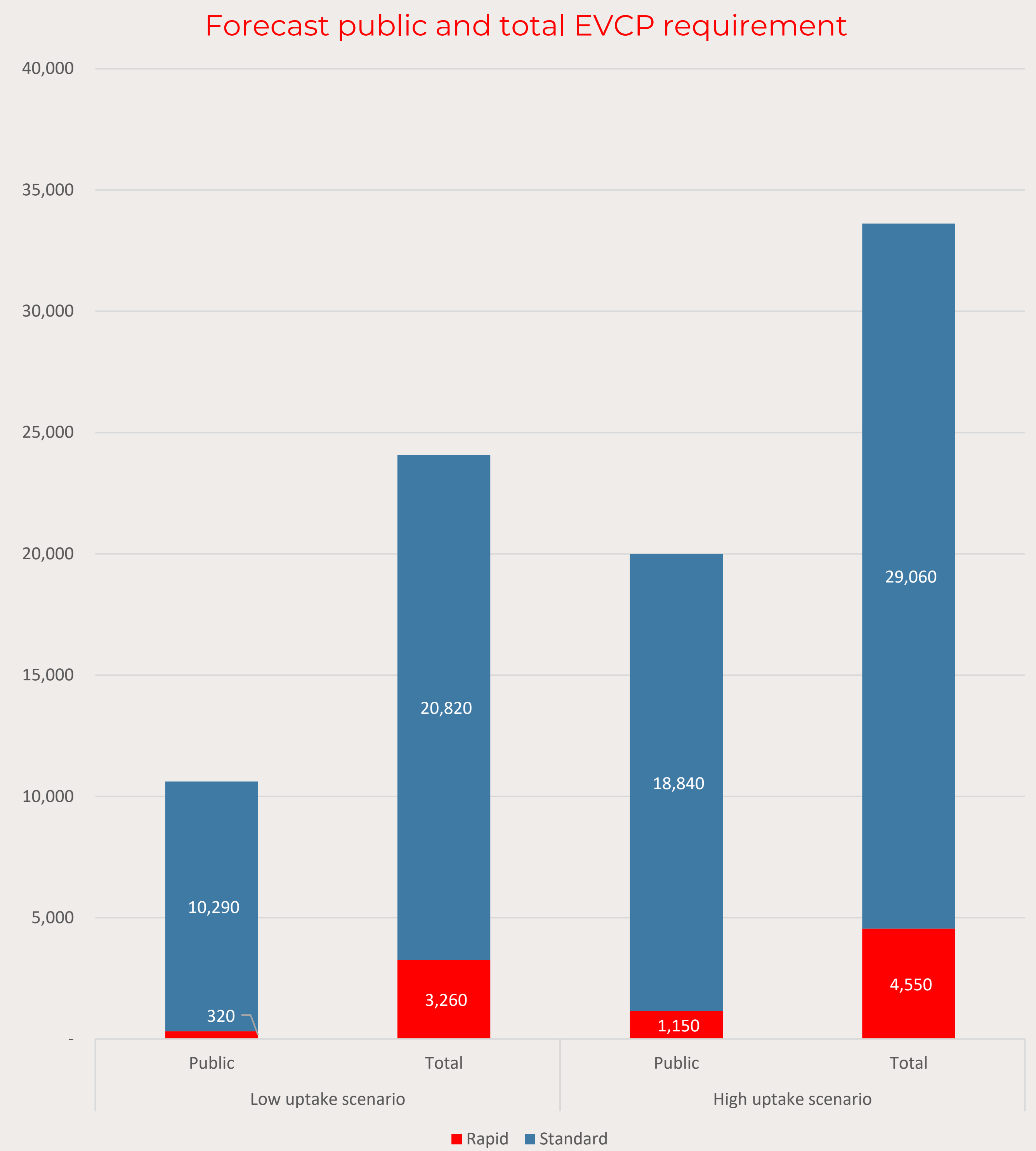


Figure G1: Total and Public EVCP Sockets Requirement - 2030

Source: WSP EV:Ready

Highway authority	Low forecast number of EVCPs				High forecast number of EVCPs			
	Public Sector		Total		Public Sector		Total	
	Rapid	Standard	Rapid	Standard	Rapid	Standard	Rapid	Standard
Peninsula	**140**	**4,180**	**1,390**	**8,850**	**490**	**7,830**	**1,930**	**12,330**
Cornwall	40	990	330	2,130	120	1,850	490	3,150
Devon	30	1,660	540	3,460	190	3,100	680	4,370
Torbay	10	220	70	410	40	580	100	610
Plymouth	20	280	110	700	120	1,920	160	1,030
Somerset	40	1,030	340	2,150	20	380	500	3,170
Western Gateway	**180**	**6,110**	**1,870**	**11,970**	**660**	**11,010**	**2,620**	**16,730**
Bath and North East Somerset	20	370	120	770	50	690	180	1,150
North Somerset	10	460	140	890	50	820	210	1,320
Bournemouth, Christchurch and Poole	20	740	220	1,410	70	1,320	270	1,750
Dorset	30	870	270	1,700	100	1,570	330	2,130
Gloucestershire	50	1,350	410	2,640	160	2,430	610	3,930
Wiltshire	30	1,120	330	2,130	120	1,980	500	3,170
City of Bristol	20	640	200	1,280	70	1,160	250	1,580
South Gloucestershire	10	560	180	1,150	40	1,040	270	1,700
Total	**330**	**10,290**	**3,260**	**20,820**	**1,150**	**18,840**	**4,550**	**29,060**

Table G2: Total and Public EVCP Sockets Requirement - 2030

Source: WSP EV:Ready

Impact of installing dual socket chargepoints

The modelling shown in Tables G1 and G2 assumes that an EVCP would have a single socket and could charge a single vehicle at once. However, in practice many chargepoints are dual socket and can serve two vehicles at once, minimising the number of units which will need to be installed.

Table G3 shows an estimate of the total of charger installations required, if dual socket chargepoints are taken into consideration. Based on these assumptions the number of EVCPs to be installed would be in the region of 40% less than the number of sockets forecast in Table G2.

This was calculated using the assumption that 80% of standard chargers will be dual socket and 20% will be single socket and all rapid chargers will be single sockets.

However, the actual ratio of single and dual socket chargers which are installed will in reality depend on the equipment choices made by the individual councils and will likely be driven by the options provided by suppliers and concessionaires which these councils choose to partner with in the future.

Highway authority	Low forecast number of EVCPs				High forecast number of EVCPs			
	Public Sector		Total		Public Sector		Total	
	Rapid	Standard	Rapid	Standard	Rapid	Standard	Rapid	Standard
Peninsula	**140**	**2,510**	**1,390**	**5,310**	**490**	**4,700**	**1,930**	**7,400**
Cornwall	40	590	330	1,280	120	1,110	490	1,890
Devon	30	1,000	540	2,080	190	1,860	680	2,620
Torbay	10	130	70	250	40	350	100	370
Plymouth	20	170	110	420	120	1,150	160	620
Somerset	40	620	340	1,290	20	230	500	1,900
Western Gateway	**190**	**3,670**	**1,870**	**7,180**	**660**	**6,610**	**2,620**	**10,040**
Bath and North East Somerset	20	220	120	460	50	410	180	690
North Somerset	10	280	140	530	50	490	210	790
Bournemouth, Christchurch and Poole	20	440	220	850	70	790	270	1,050
Dorset	30	520	270	1,020	100	940	330	1,280
Gloucestershire	50	810	410	1,580	160	1,460	610	2,360
Wiltshire	30	670	330	1,280	120	1,190	500	1,900
City of Bristol	20	380	200	770	70	700	250	950
South Gloucestershire	10	340	180	690	40	620	270	1,020
Total	**330**	**6,170**	**3,260**	**12,490**	**1,150**	**11,300**	**4,550**	**17,440**

Table G3: Total and Public EVCP Requirement – 2030 (Dual Charging)

How local authorities can apply the findings of this report

The intention is that the local authorities within the Peninsula and Western Gateway areas use the outputs from the EV:Ready modelling to inform the planning of their EV charging networks and creation of EV Strategies.

This report contains the high-level outputs of the EV:Ready modelling and the methodology for how it was developed.

In future the data, should be made available via a an online dashboard which will allow council officers to interrogate the data in detail.

The outputs can be interpreted and applied in the following ways:

1. MAKE THE CASE FOR CHANGE

The baselining data shows the number and location of the existing EVs in the region. It also shows that there has been a rapid increase in the number of EVs, which is expected to continue in the future. There is existing infrastructure, but this will not be sufficient.

2. SET A TARGET NUMBER OF CHARGEPOINTS REQUIRED

A key part of an EV strategy is to define the number of chargepoints which will be required in the future. An action plan can then be developed for how this will be achieved.

3. IDENTIFY LOCATIONS WHERE CHARGEPOINTS SHOULD BE INSTALLED

Demand for charging is not equally distributed across the region. It is important to understand where chargepoints would be most beneficial and to focus investment in these areas. EV:Ready can be used to identify these locations.

The outputs are split into standard and rapid chargers and each should be considered separately Further review is required to identify specific locations within these 400mx400m hex areas that would be suitable for chargepoint installations. These could either be car parks, council land or on-street locations.

Councils should take a structured approach to this process and it is useful to define site selection criteria which can be consistently applied to any potential site.

The site selection criteria are specific to the objectives of each council but generally the following principles apply:

- Create a good distribution of chargers to ensure all who need it can have access to public EV charging within their area.
- Focus on areas where the private sector will not choose to invest.
- Exclude areas which are impractical or will have negative impact on the surrounding area e.g. footways not wide enough, parking stress too high.

Alternatively, officers may have existing locations in mind. These could be prioritised by assigning the EV:Ready score to each and ranking them.

4. LONG TERM MONITORING AND EVALUATION

Building charging networks will be an iterative process that will continue for many years to come.

It will be important to periodically review the progress made by the council against the target numbers of chargepoints for each year.

Additional metrics which could be monitored including number of chargepoints installed by the private sector and utilisation rates.

SECTION H

Seasonality and impact of tourism

Seasonality and impact of tourism

The previous sections considered charging demand and chargepoint requirement from residents and visitors during an average week. However throughout much of the region there are significant seasonal fluctuations in population, caused by tourism.

Further analysis has been carried out to understand the impact of tourism on the charging network.

TYPES OF SEASONAL CHARGING

Charging demand from tourist vehicles will be accommodated at three types of locations. The charging behaviour of tourists and visitors differs to local vehicles.

- **Strategic route network**: It is expected that a large proportion of charging will be provided at hubs along the strategic route network both at service stations and purpose built sites. Private CPOs are already investing in this infrastructure but coverage remains sparce at present.
- **Destinations**: There will need to be charging facilities at tourist attractions to allow drivers to top up whilst they are visiting. Council car parks which serve these locations will be key locations for charging.
- **Accommodation**: Accommodation such as B&Bs, hotels and holiday lets are expected to provide charging facilities where possible, similar to how residential properties with off-street parking install chargers. There is already a move by the industry to provide this service for customers. Locations such as holiday parks and campsites, which attract large numbers of vehicles, will find it more difficult to install equipment due to the cost and constraints of establishing power connections.

METHODOLOGY

The seasonal peaks in charging demand were forecast using the following methodology.

Calculate the increase in mileage by all vehicles

- Historic AADT data from the Strategic Route network was collated and used as a proxy for seasonal increases in mileage for all vehicles (EV and ICE).
- Peak traffic flows were identified as occurring in August and the average flows were represented by the March data.
- The difference between the months of March and August was used to estimate the uplift in mileage during peak season.
- To calculate the peak season uplift for each council area, multiple AADT measurements were weighted and averaged by the length of the road that is located within each LA.
- Torbay did not have enough available AADT measurements and so its uplift was estimated as the average of the surrounding LAs.

Calculate the proportion of this mileage which will be driven by EVs.

- Using the EV:Ready low and high EV uptake forecasts, the proportion of the total peak season vehicle miles which would be driven by EVs was modelled for future years.
- The UK level uptake forecasts are applied to these vehicles rather than the local Peninsula and Western Gateway forecasts.

Calculate the chargepoints required to power the additional vehicles.

- EV:Ready was used to calculate number of chargepoints required to power the additional EVs, for the mileage calculated.

SEASONAL IMPACT ON CHARGING DEMAND

Table H1 shows the results of the analysis. Across the region there is estimated to be an uplift in vehicle miles of 24% in peak month (August) relative to the average (March). Peninsula experiences greater seasonality than Western Gateway. The uplift varies between local authorities.

By 2030, this level of vehicle mileage would be equivalent to between 550-800MWh of power required by EVs. Additional chargepoints would be required to service this higher demand for charging during peak season. This is estimated to be between 5,900 and 8,600 sockets across the region, equivalent to 21% sockets than would be needed in an average month.

The proportion of additional chargers is lower than the uplift in AADT for two reasons. In these peak periods high demand will result in high utilisation. So, each charger will serve more vehicles per day. Secondly, the mix of chargepoints would include a higher proportion of 22kW fast and rapid chargers which can again serve more vehicles per day.

It is predicted that the private sector will provide the majority of this infrastructure. The key areas when the local authorities will need to intervene will be in council car parks which serve tourist destinations. Further analysis will need to be carried out to identify these locations.

DIFFICULTIES OF PROVIDING CHARGEPOINTS FOR SEASONAL DEMAND

There will be commercial challenges in providing chargepoints for peaks in tourist demand. The financial viability of chargepoints depends on achieving a sufficient level of utilisation to generate the revenue needed to pay back the upfront investment. If the equipment is underutilised outside of the tourist season, then sufficient revenue is unlikely to be generated to attract private sector investment.

Local authority	AADT uplift (%)	Standards		Rapids		Total chargepoints	
		Low EV uptake scenario	High EV uptake scenario	Low EV uptake scenario	High EV uptake scenario	Low EV uptake scenario	High EV uptake scenario
Peninsula	**29**	**2,600**	**3,600**	**400**	**600**	**3,000**	**4,100**
Cornwall	34	700	1,100	100	200	800	1,200
Devon	50	1,700	2,200	300	300	2,000	2,500
Torbay	25	100	200	20	30	100	200
Plymouth	3	20	30	0	0	20	40
Somerset	32	700	1,000	100	200	800	1,200
Western Gateway	**18**	**2,200**	**3,000**	**300**	**500**	**2,500**	**3,500**
Bath and North East Somerset	9	70	100	10	20	80	100
North Somerset	35	300	500	50	70	400	500
Bournemouth, Christchurch and Poole	8	100	100	20	20	100	200
Dorset	25	400	500	70	80	500	600
Gloucestershire	22	600	900	90	100	700	1,000
Wiltshire	23	500	700	80	100	600	800
City of Bristol	7	90	100	10	20	100	100
South Gloucestershire	18	200	300	30	50	200	400
Total	**24**	**4,800**	**6,600**	**700**	**1,100**	**5,500**	**7,600**

Table G2: Additional chargepoints required to meet seasonal peaks in demand – 2030.

Source: WSP EV:Ready

APPENDIX A

Mapping - Standard Charging Demand – High

Plymouth - Standard Charging Demand - High

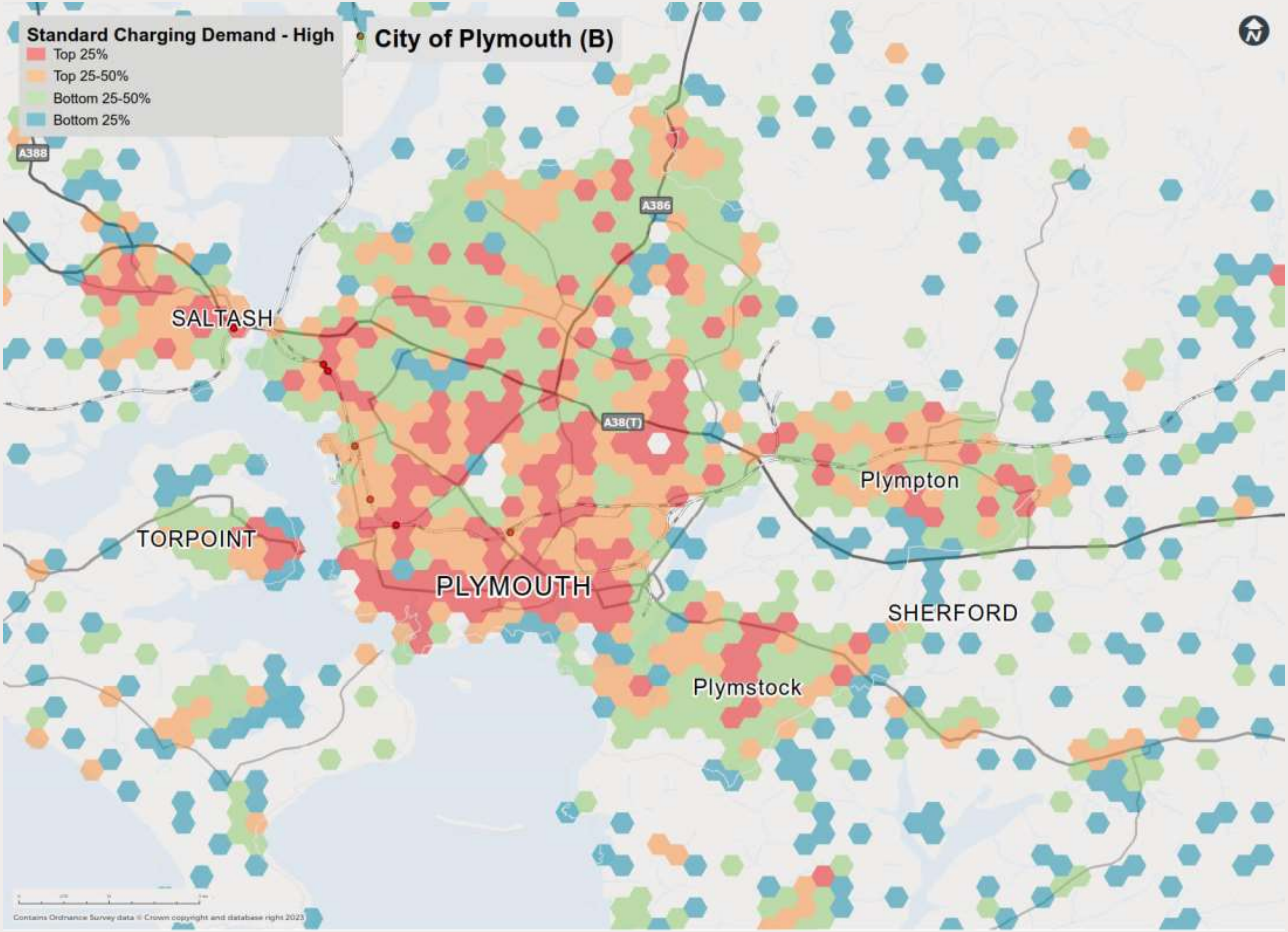


Figure Ap7: Standard Charging Demand - High

Source: WSP EV:Ready

North Somerset - Standard Charging Demand - High

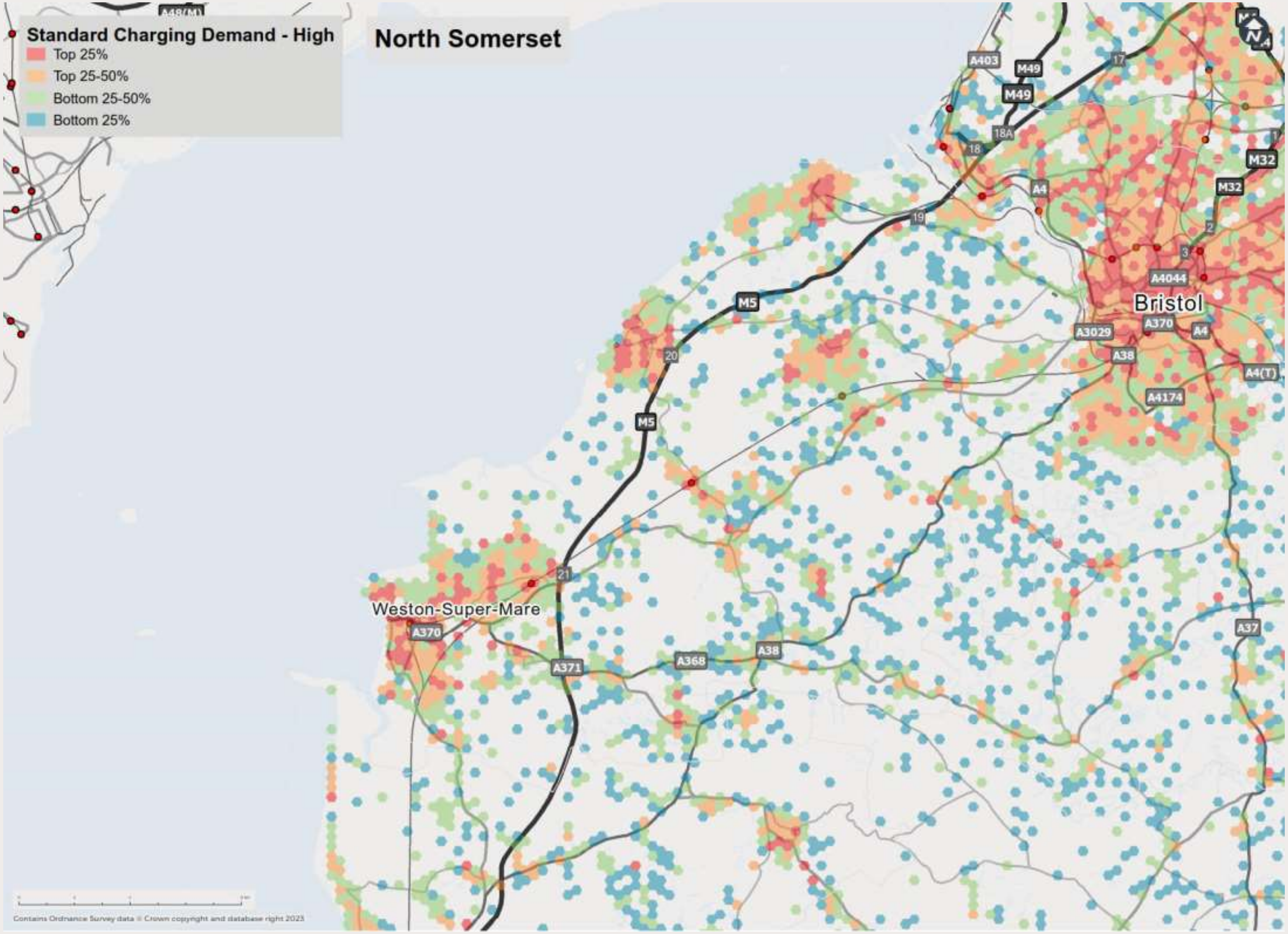


Figure Ap8: Standard Charging Demand - High

Source: WSP EV:Ready

Cornwall – Standard Charging Demand - High

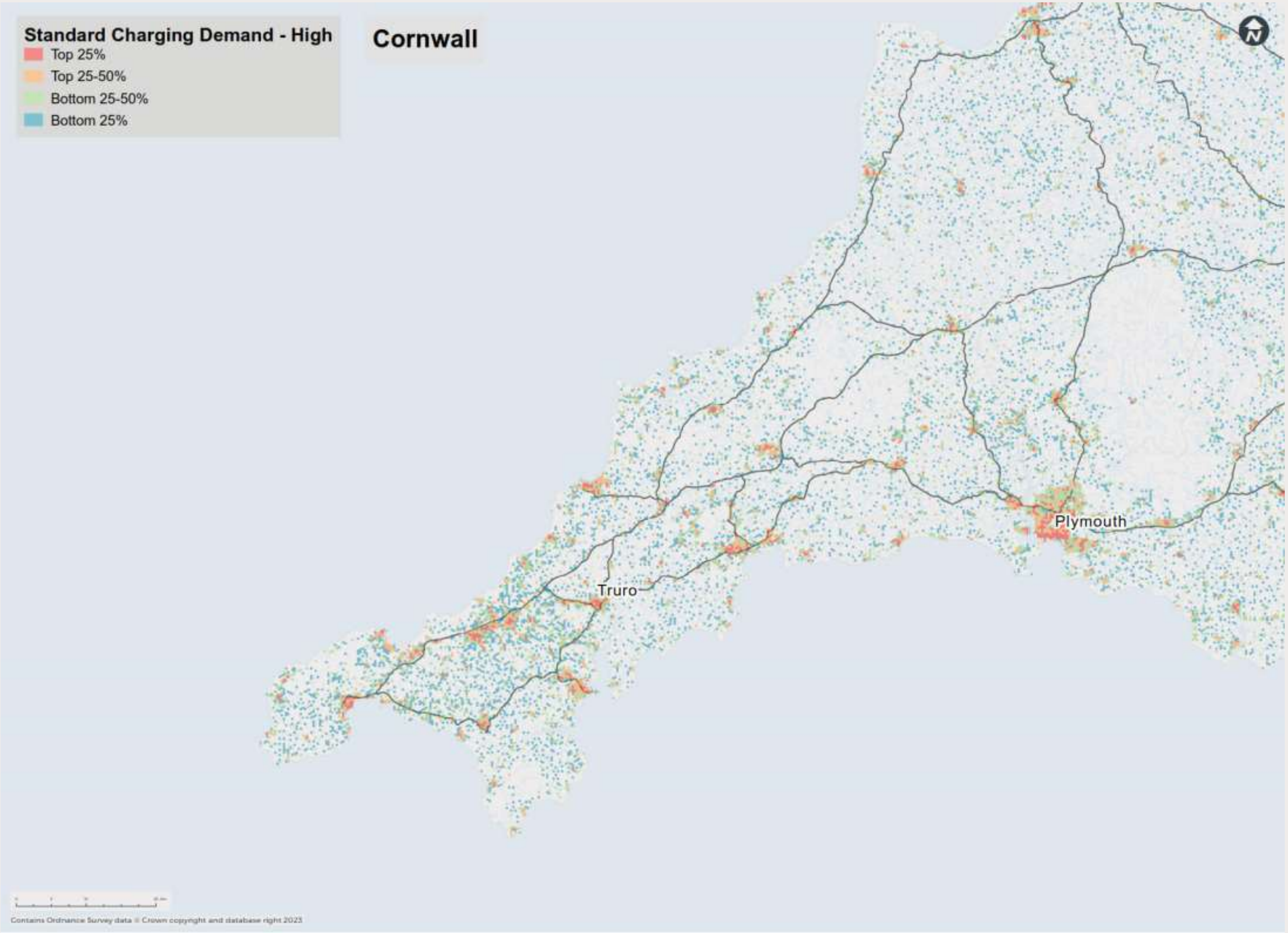


Figure Ap1: Standard Charging Demand - High

Source: WSP EV:Ready

East Devon - Standard Charging Demand - High

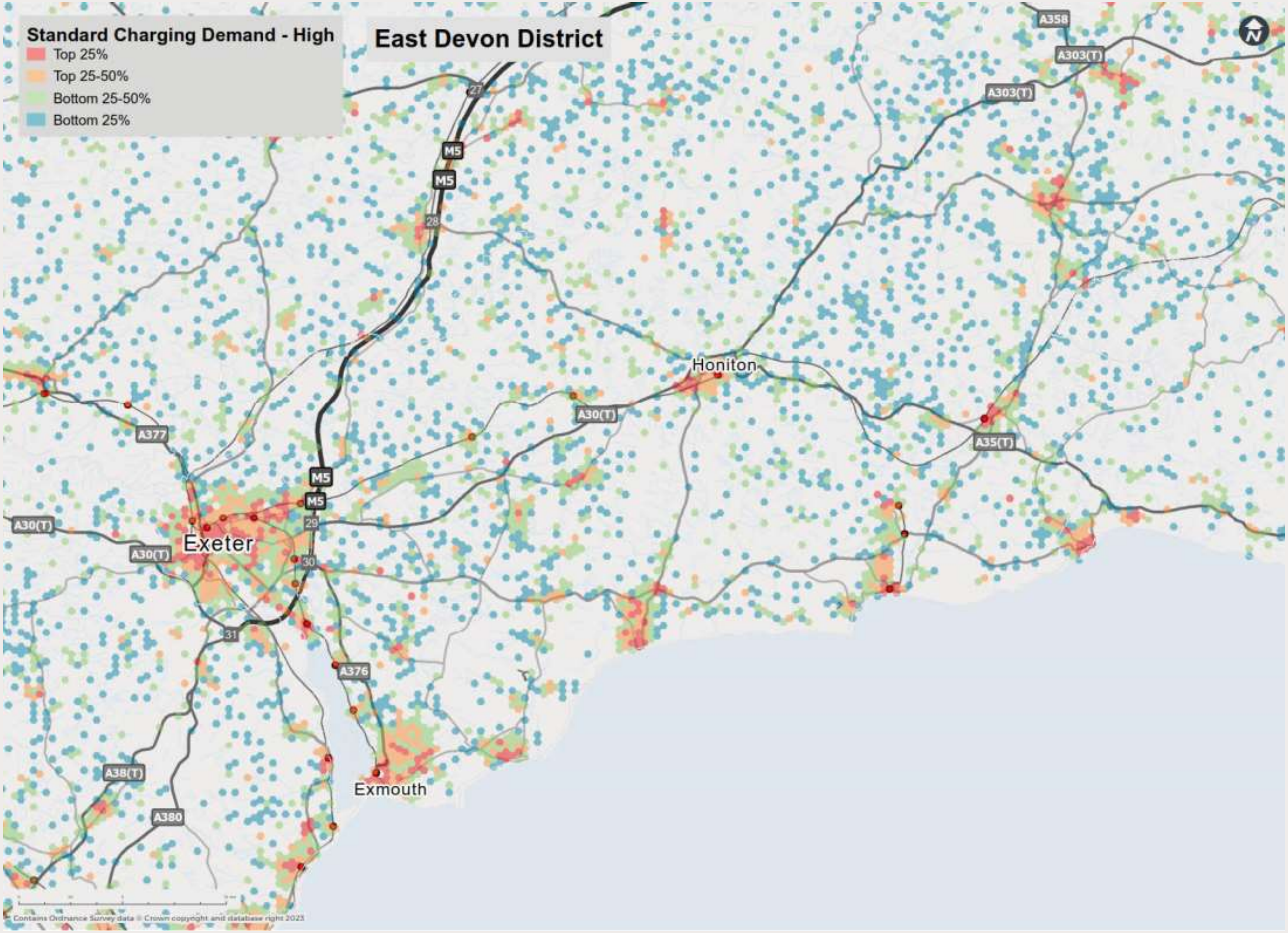


Figure Ap2: Standard Charging Demand - High

Source: WSP EV:Ready

Mid Devon - Standard Charging Demand - High

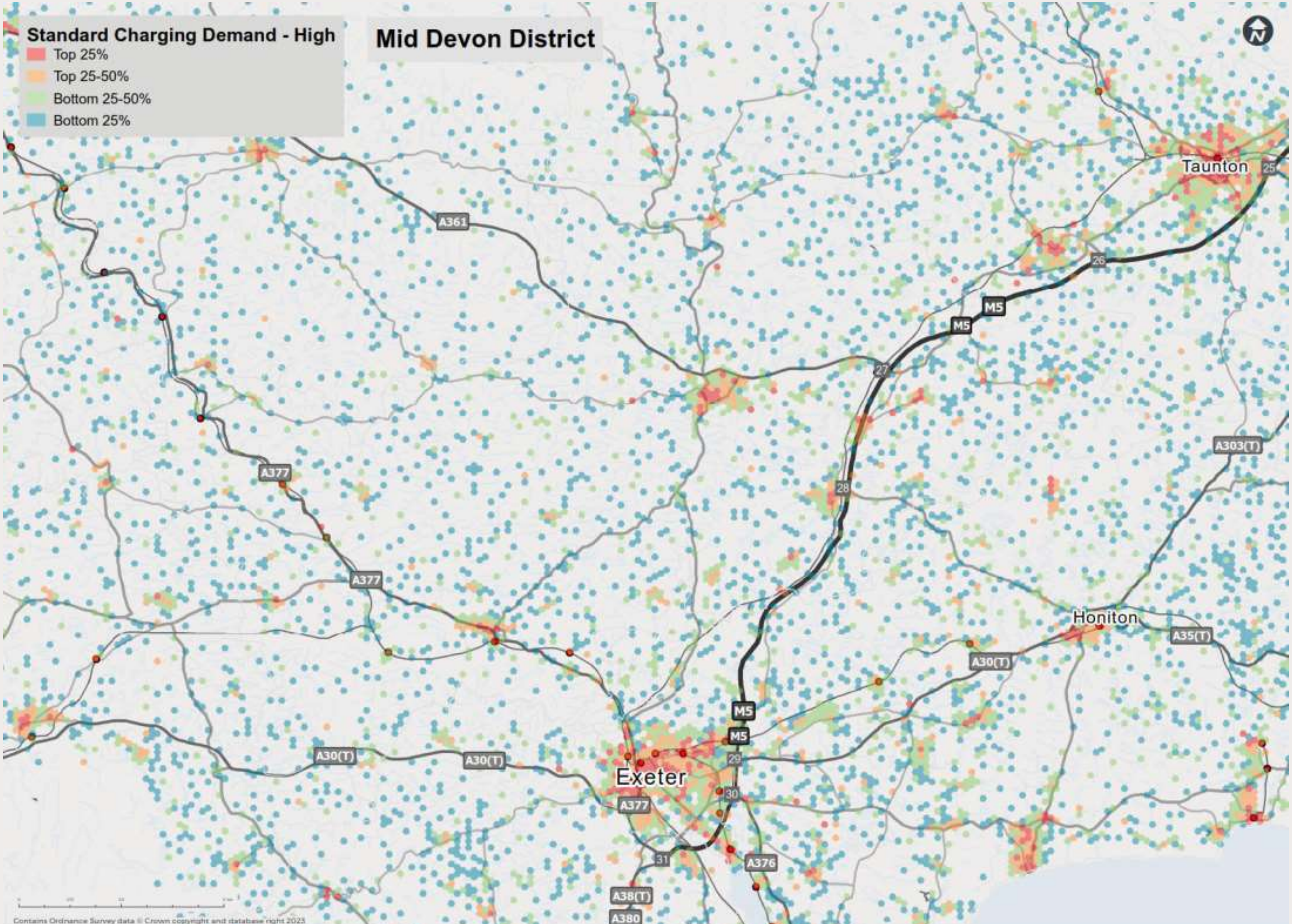


Figure Ap3: Standard Charging Demand - High

Source: WSP EV:Ready

North Devon - Standard Charging Demand - High

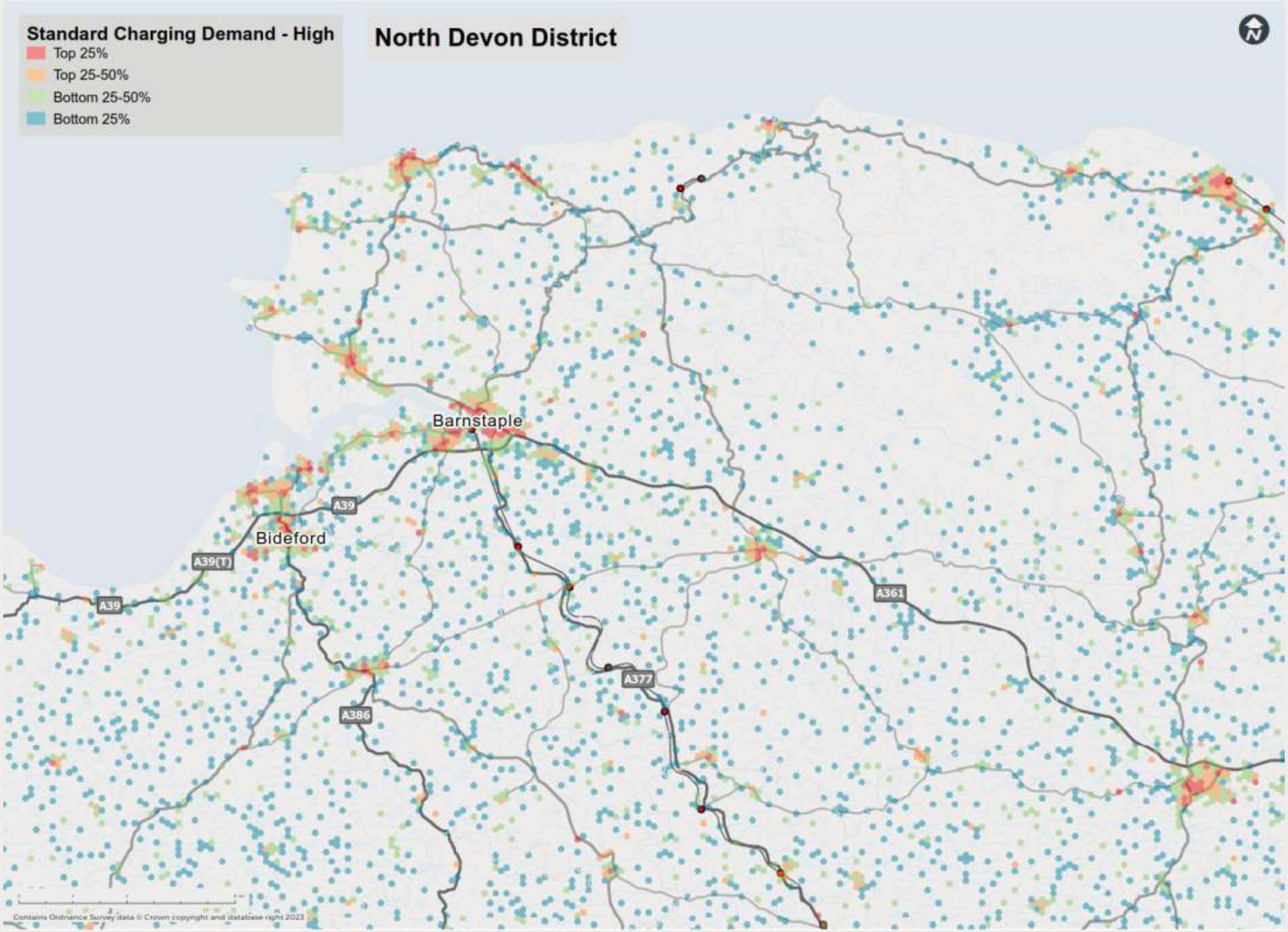


Figure Ap4: Standard Charging Demand - High

Source: WSP EV:Ready

West Devon - Standard Charging Demand - High

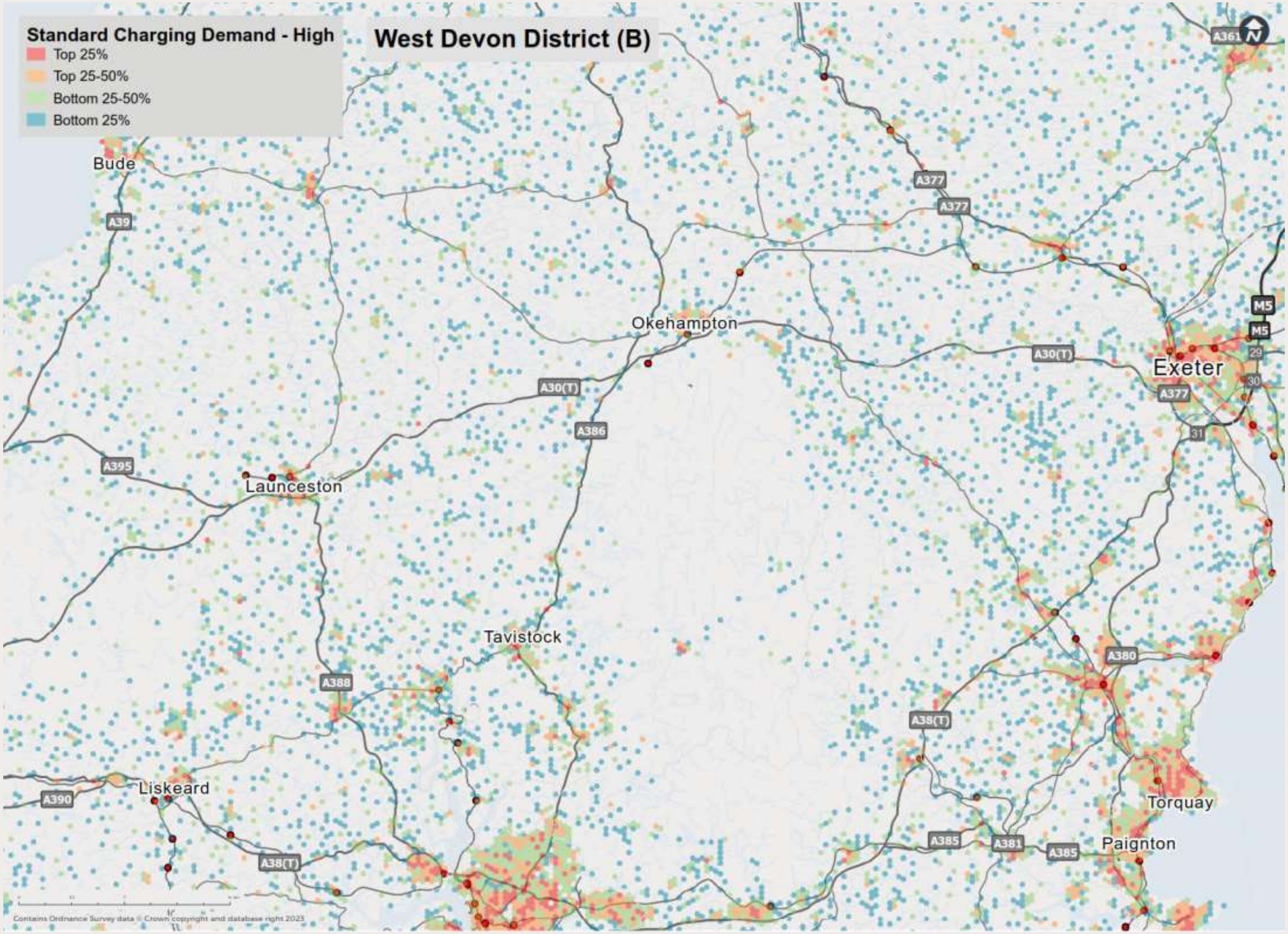


Figure Ap5: Standard Charging Demand - High

Source: WSP EV:Ready

Torbay - Standard Charging Demand - High

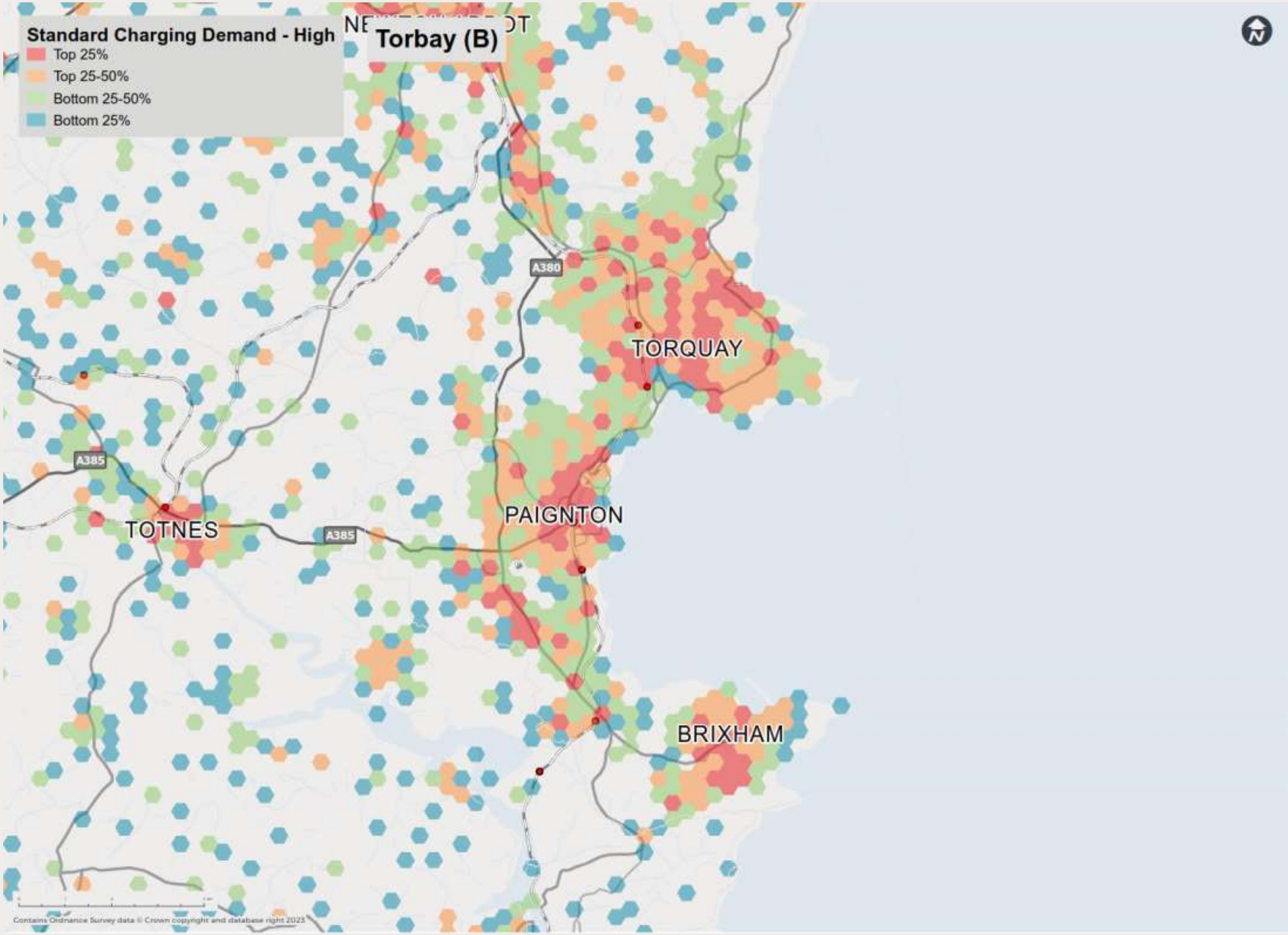


Figure Ap6: Standard Charging Demand - High

Source: WSP EV:Ready

Somerset West and Taunton - Standard Charging Demand - High

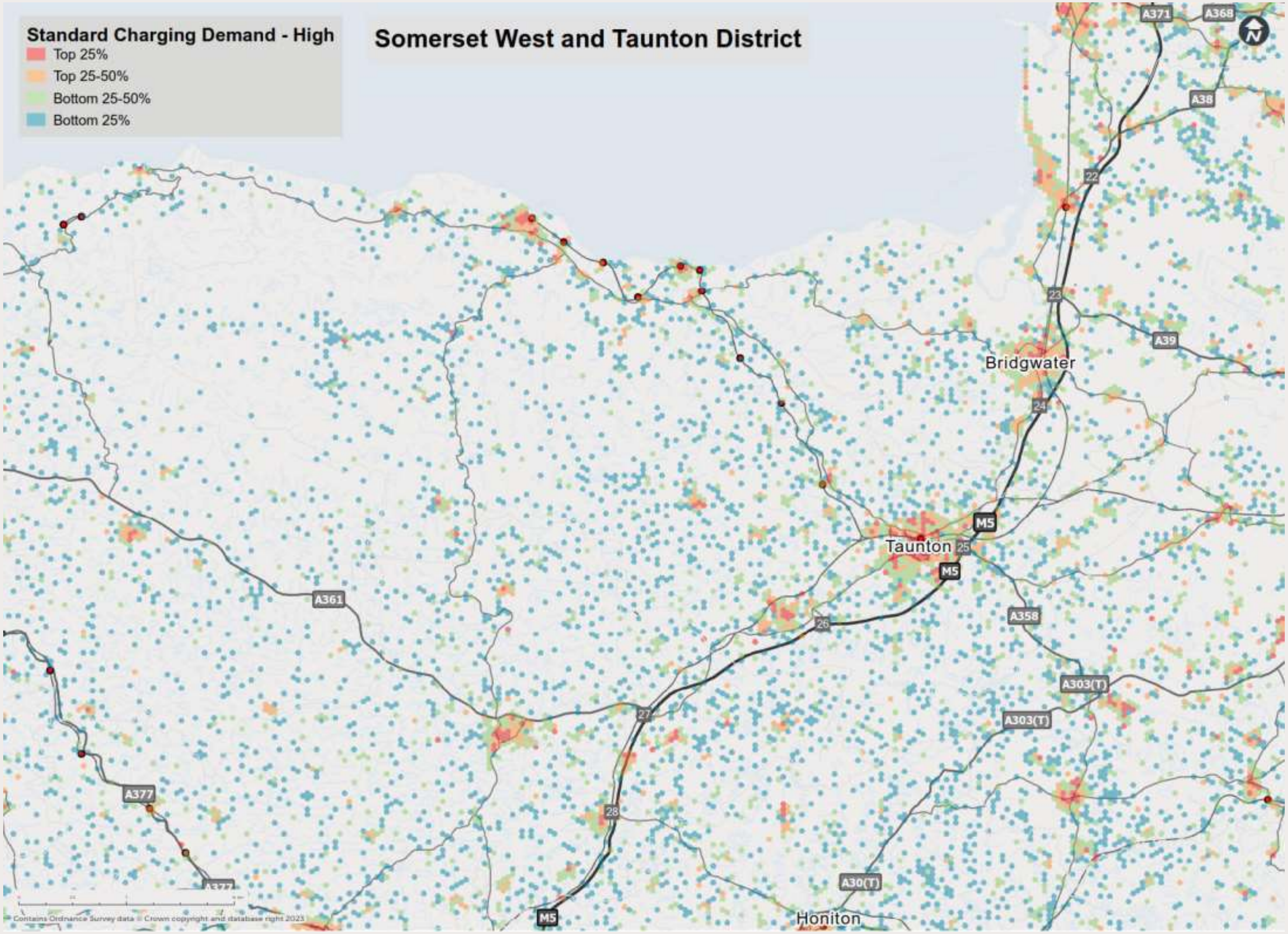


Figure Ap9: Standard Charging Demand - High

Source: WSP EV:Ready

Bath and North East Somerset - Standard Charging Demand - High

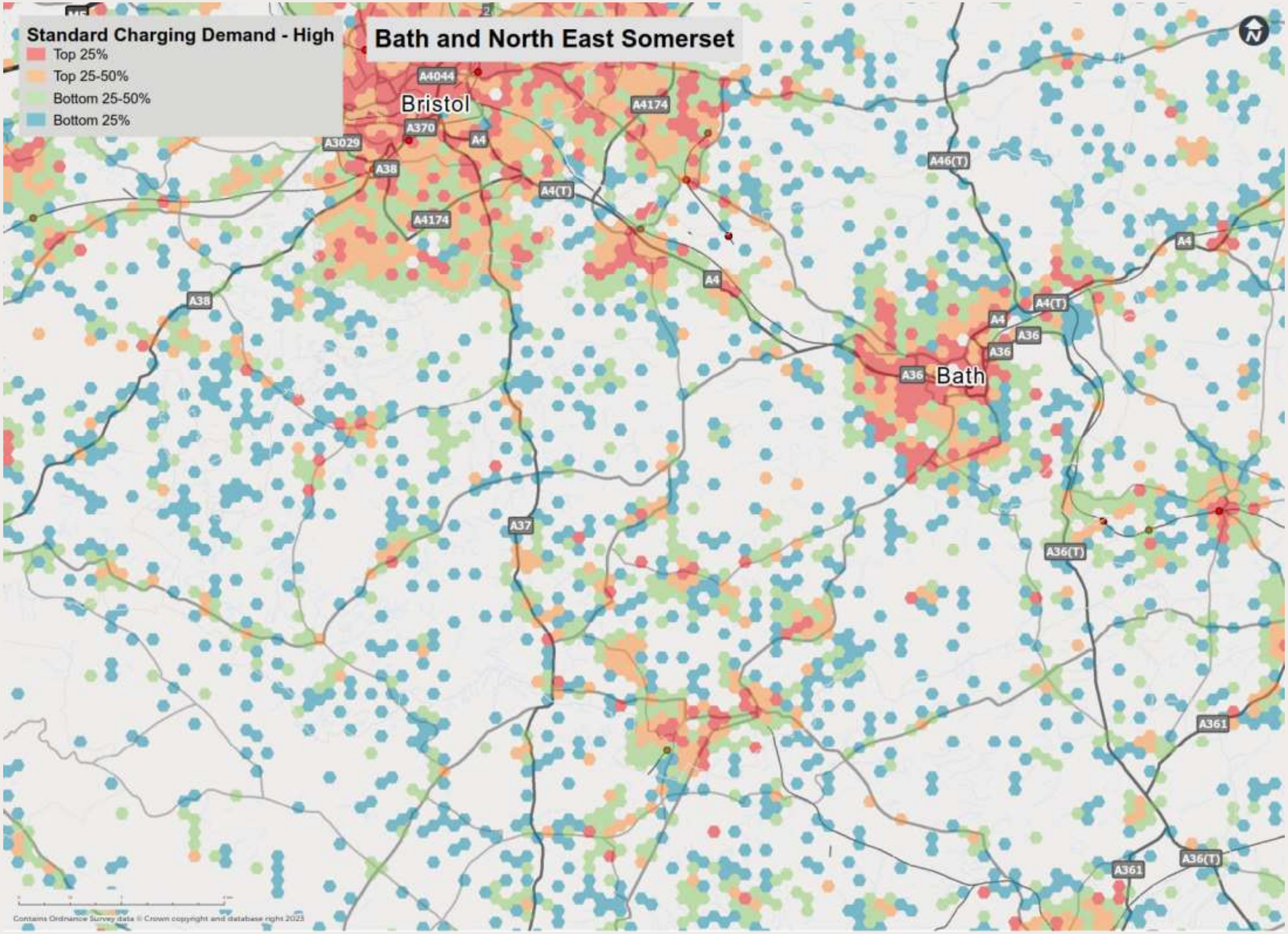


Figure Ap10: Standard Charging Demand - High

Source: WSP EV:Ready

North Somerset - Standard Charging Demand - High

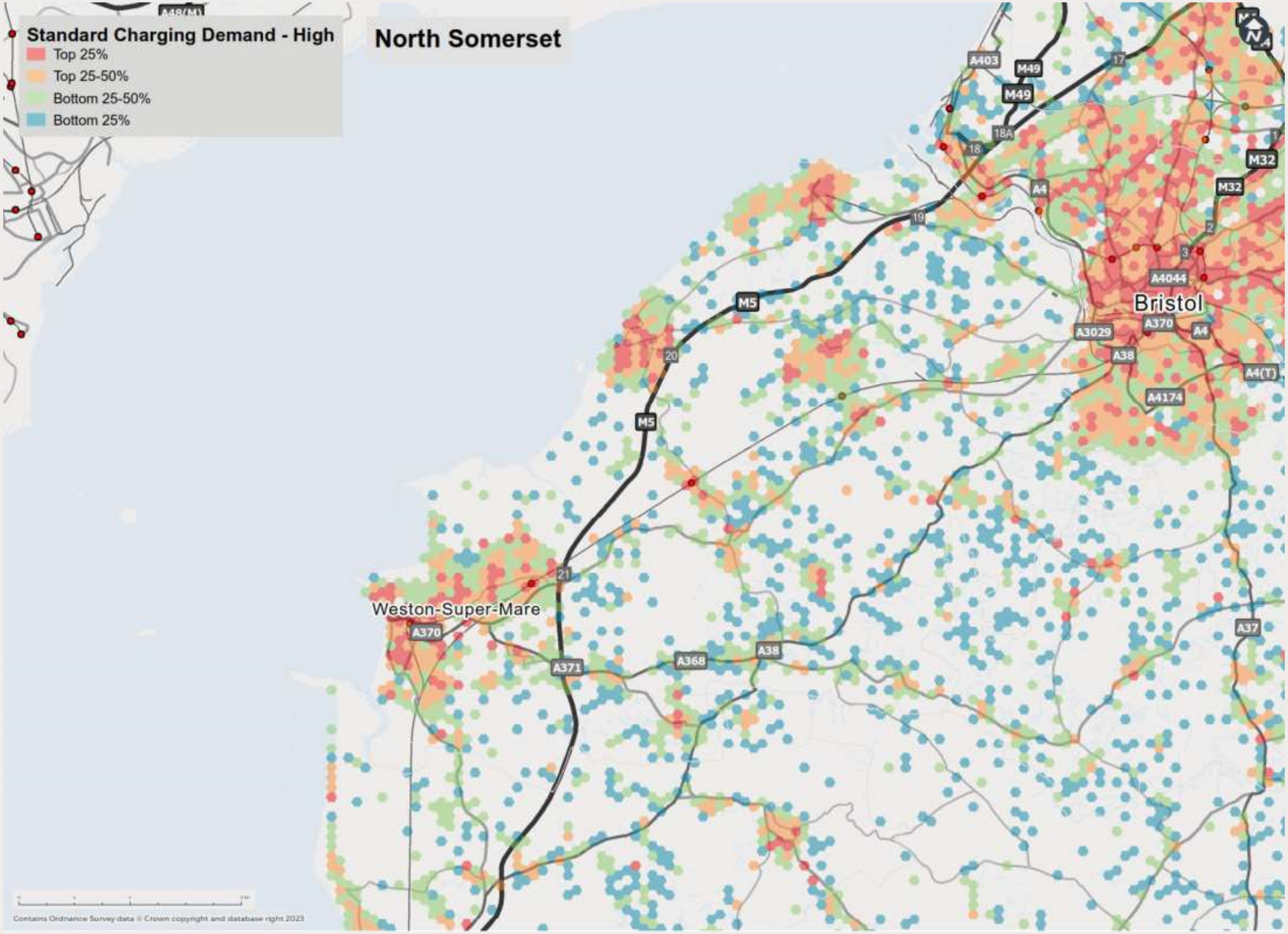


Figure Ap11: Standard Charging Demand - High

Source: WSP EV:Ready

South Somerset - Standard Charging Demand - High

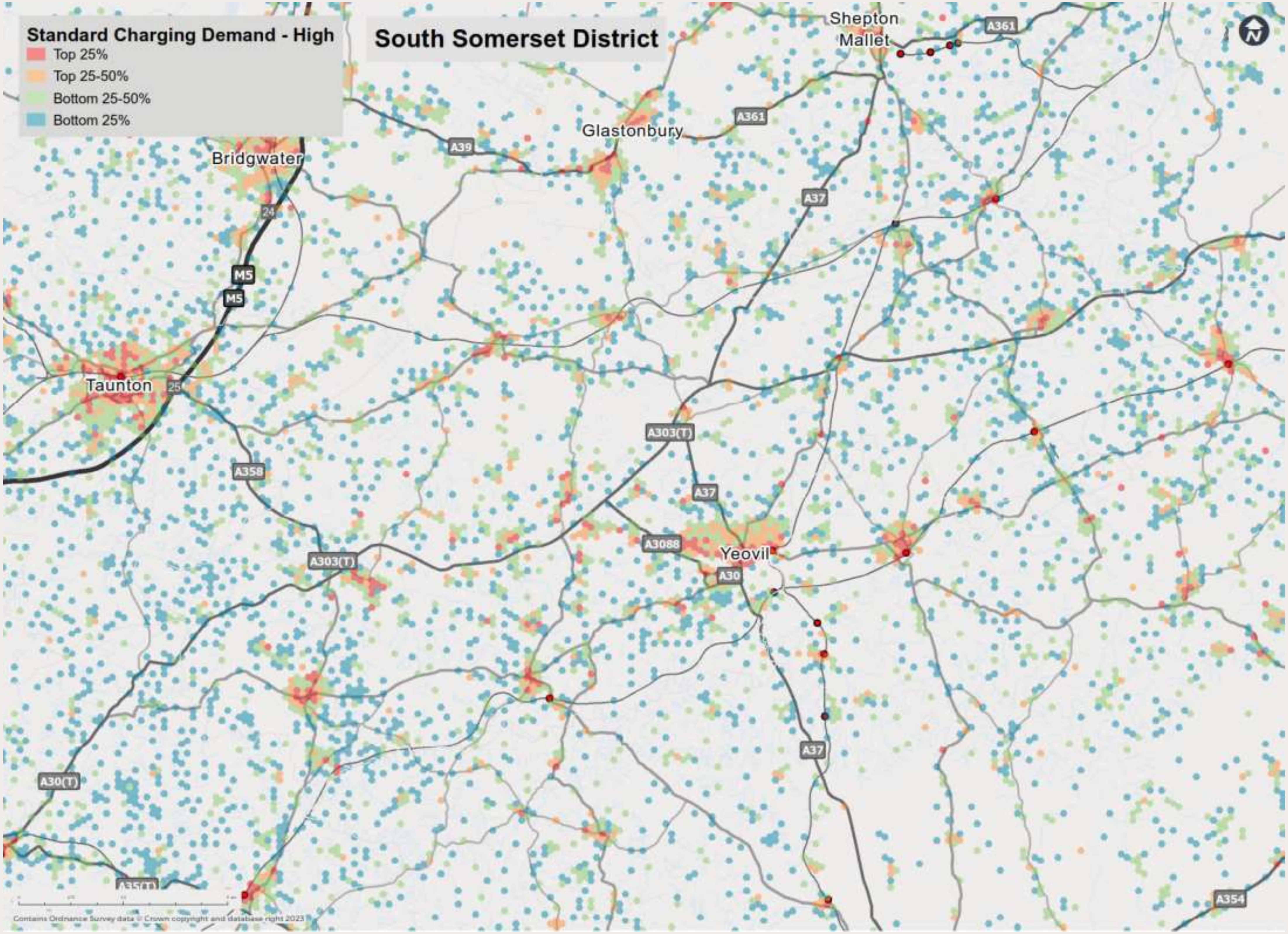


Figure Ap12: Standard Charging Demand - High

Source: WSP EV:Ready

Bournemouth, Christchurch and Poole - Standard Charging Demand - High

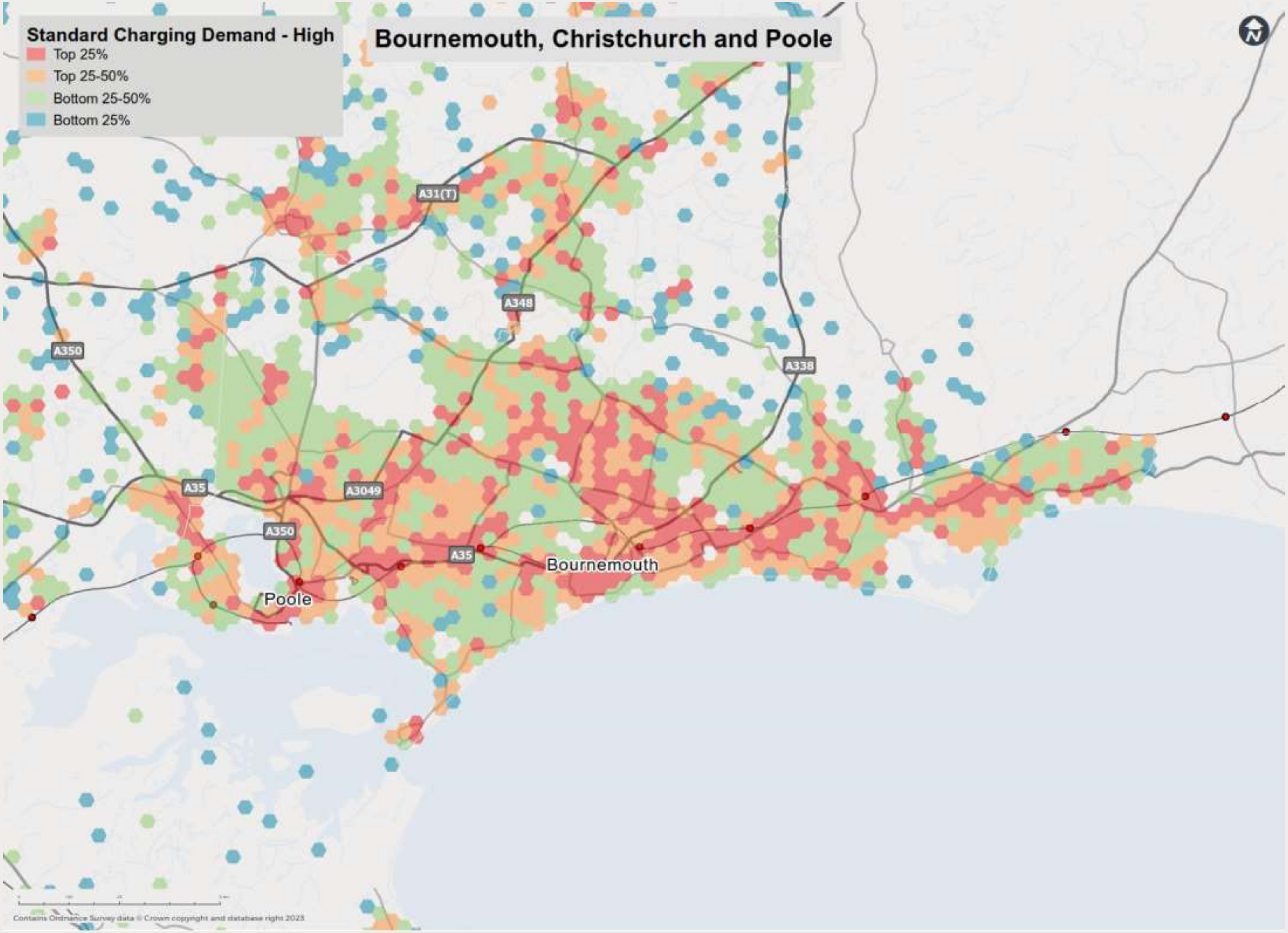


Figure Ap13: Standard Charging Demand - High

Source: WSP EV:Ready

Dorset - Standard Charging Demand - High

Figure Ap14: Standard Charging Demand - High

Source: WSP EV:Ready

Gloucestershire - Standard Charging Demand - High

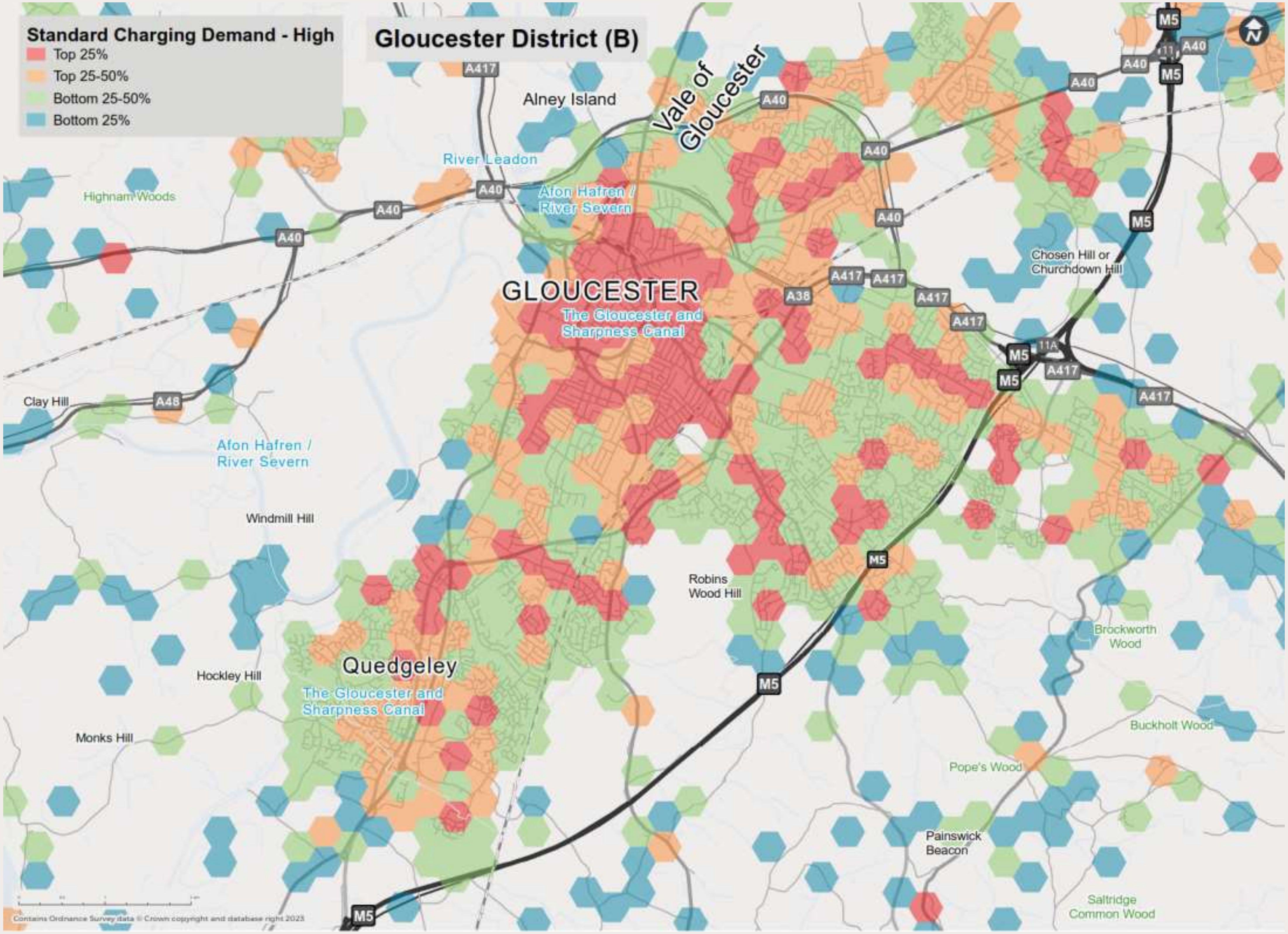


Figure Ap15: Standard Charging Demand - High

Source: WSP EV:Ready

Cheltenham District - Standard Charging Demand - High

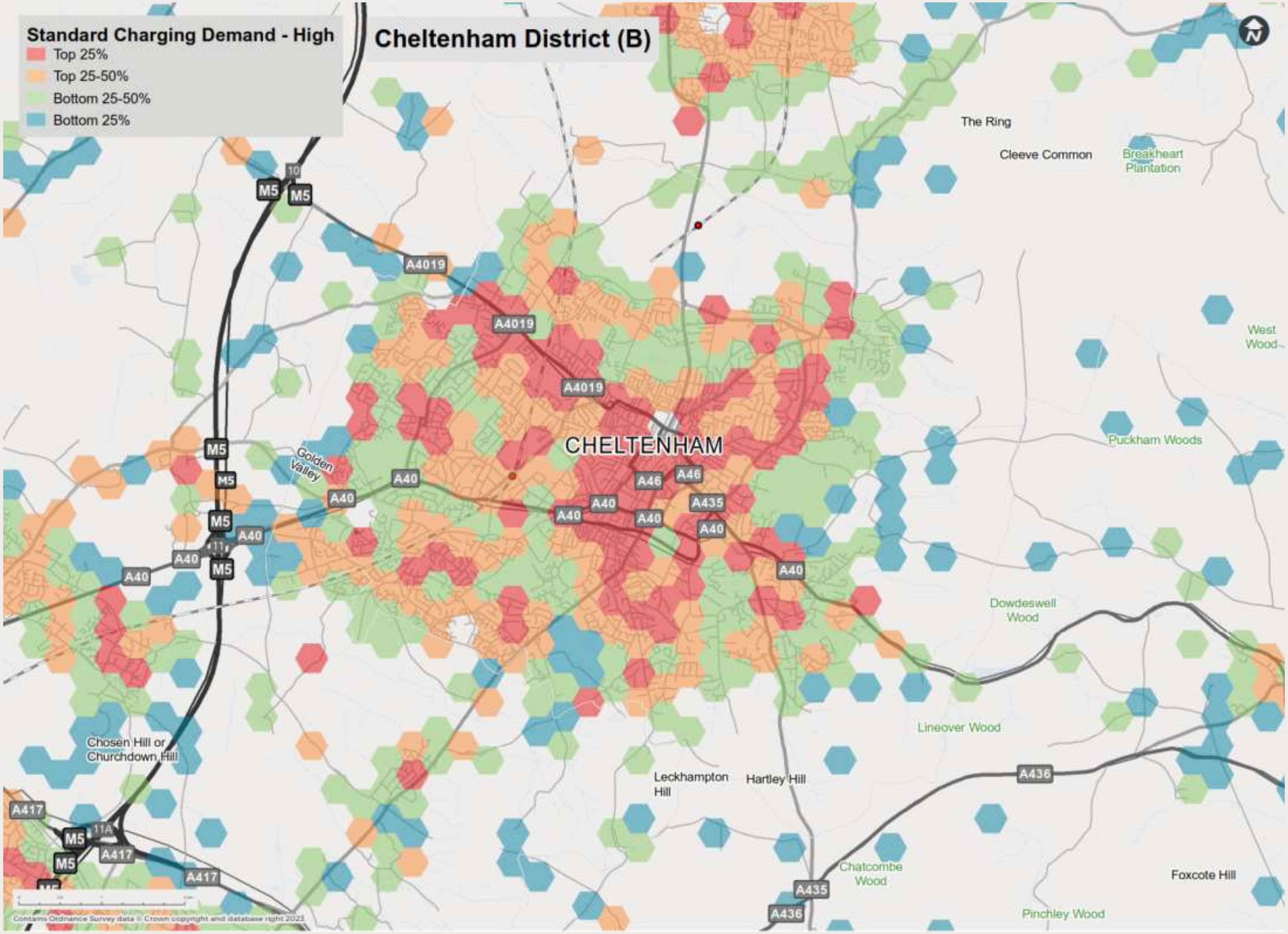


Figure Ap16: Standard Charging Demand - High

Source: WSP EV:Ready

Stroud - Standard Charging Demand - High

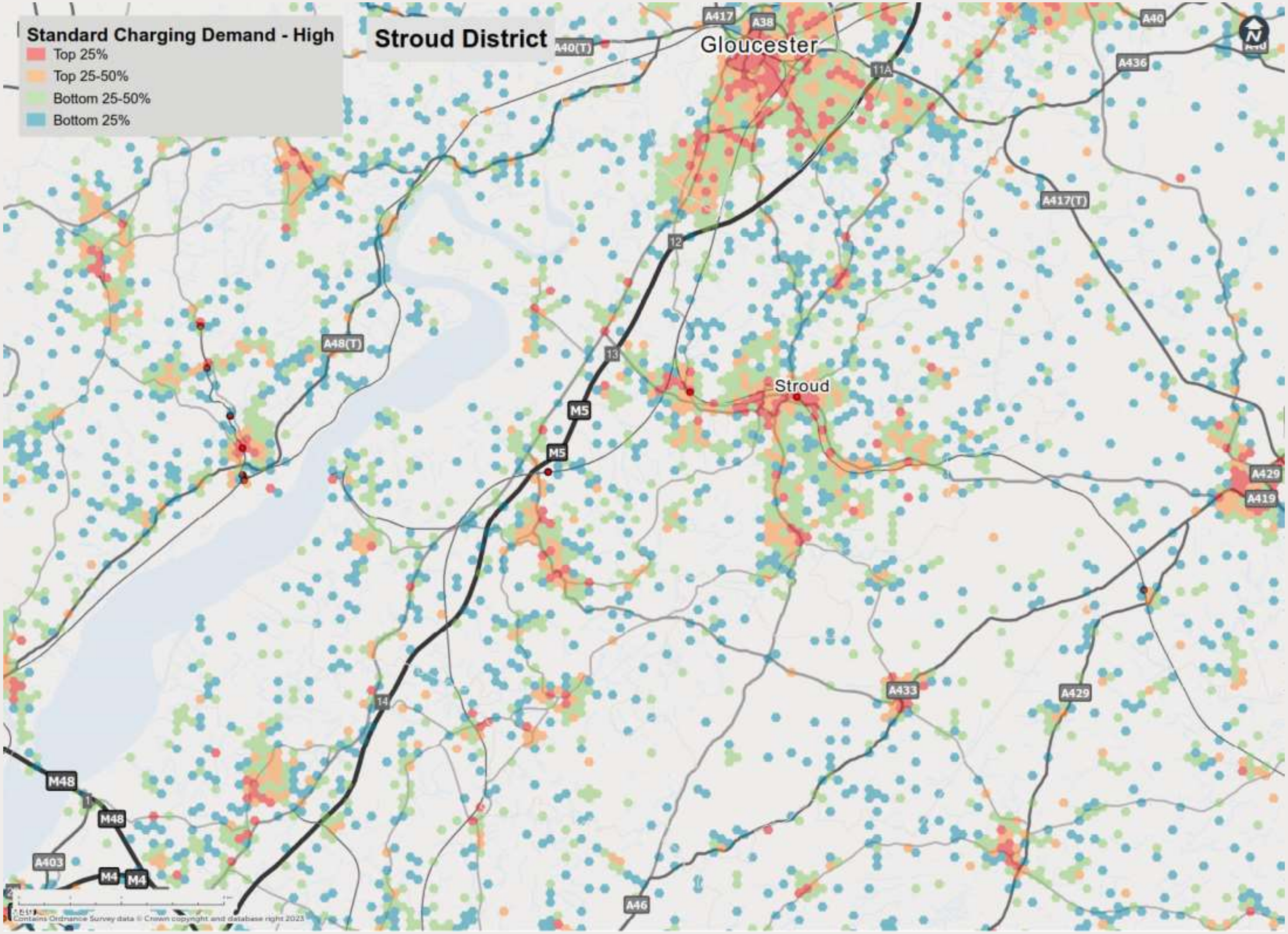


Figure Ap17: Standard Charging Demand - High

Source: WSP EV:Ready

Cotswold District - Standard Charging Demand - High

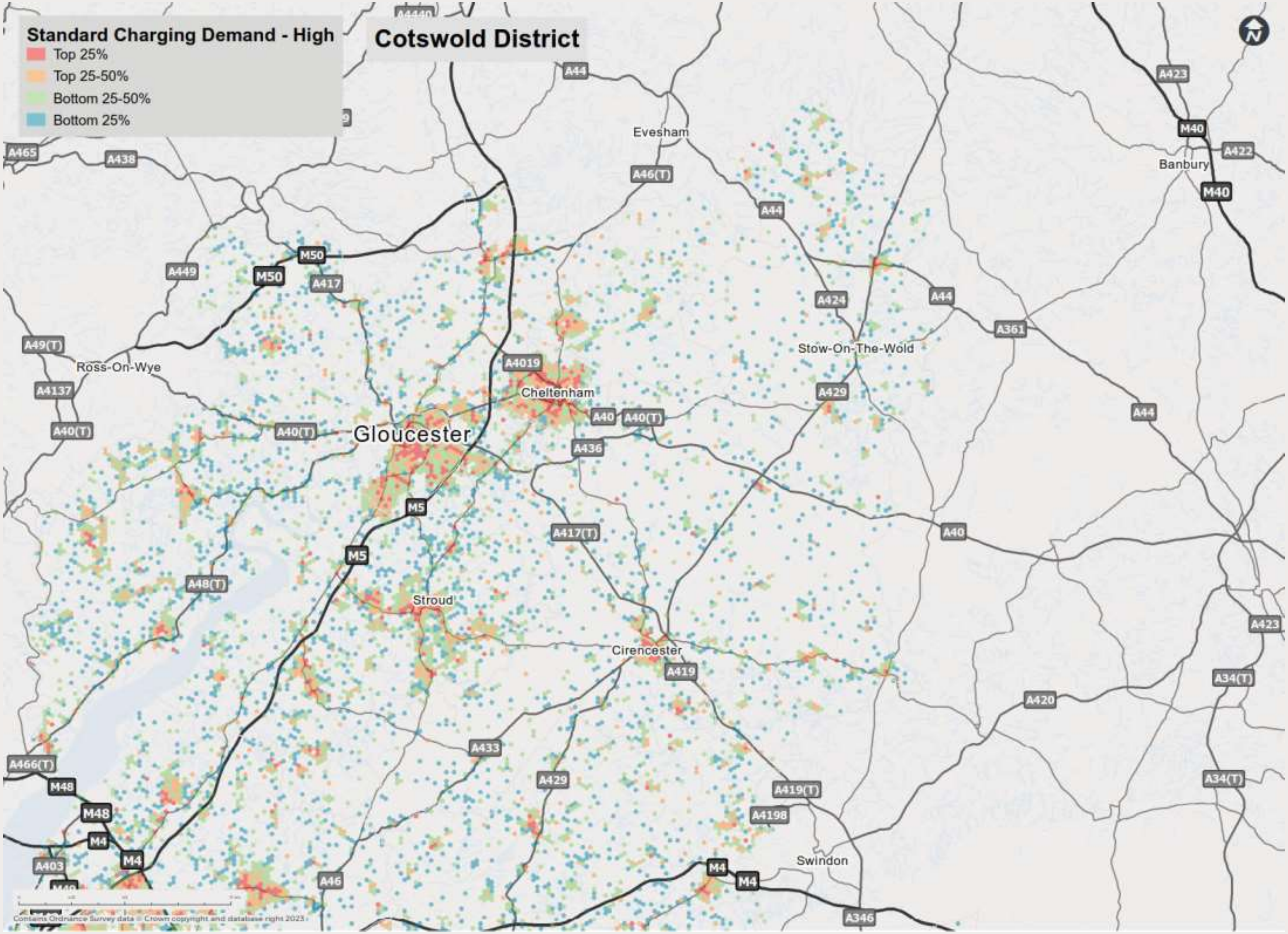


Figure Ap18: Standard Charging Demand - High

Source: WSP EV:Ready

Forest of Dean - Standard Charging Demand - High

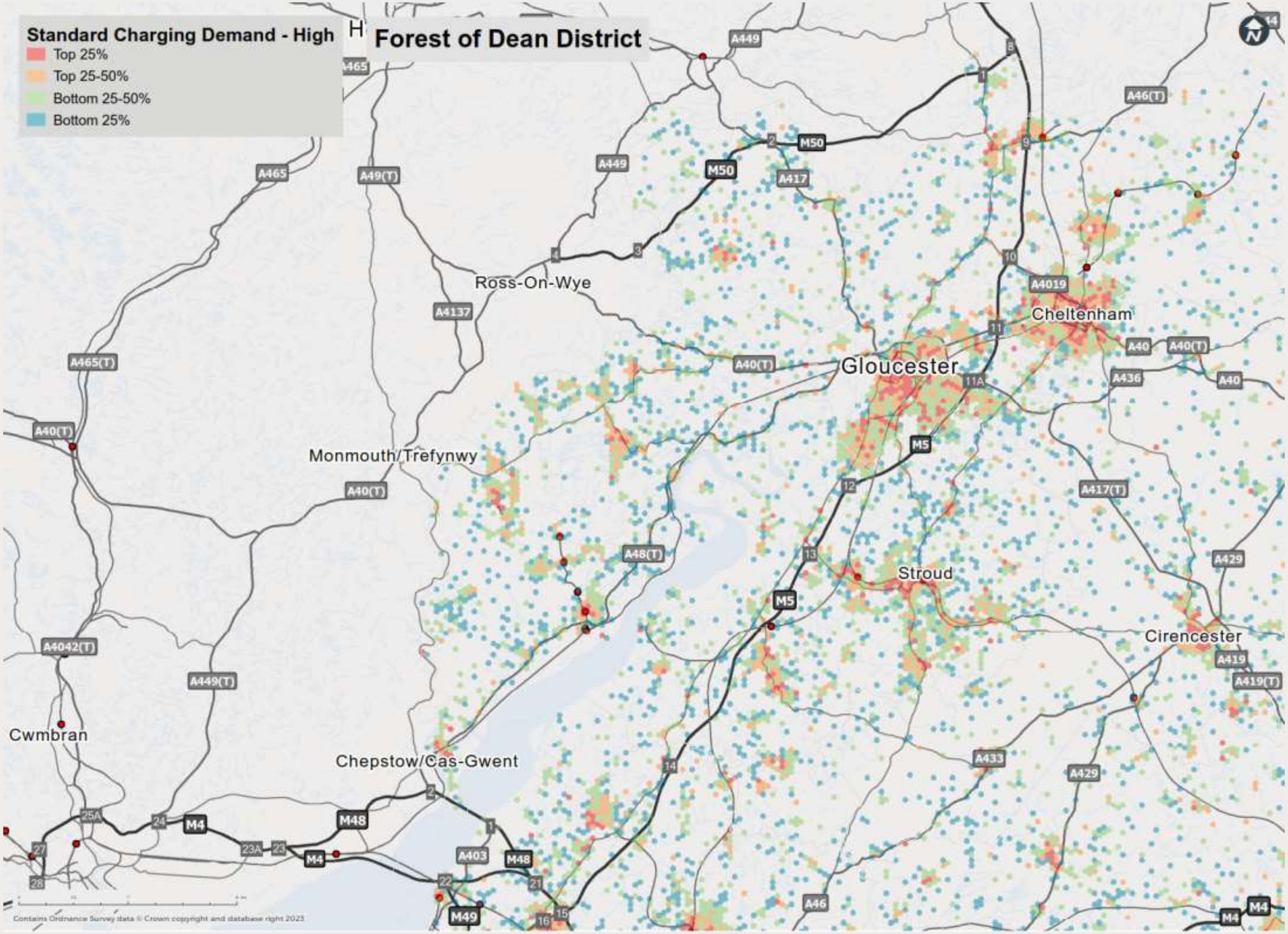


Figure Ap19: Standard Charging Demand - High

Source: WSP EV:Ready

Tewkesbury - Standard Charging Demand - High

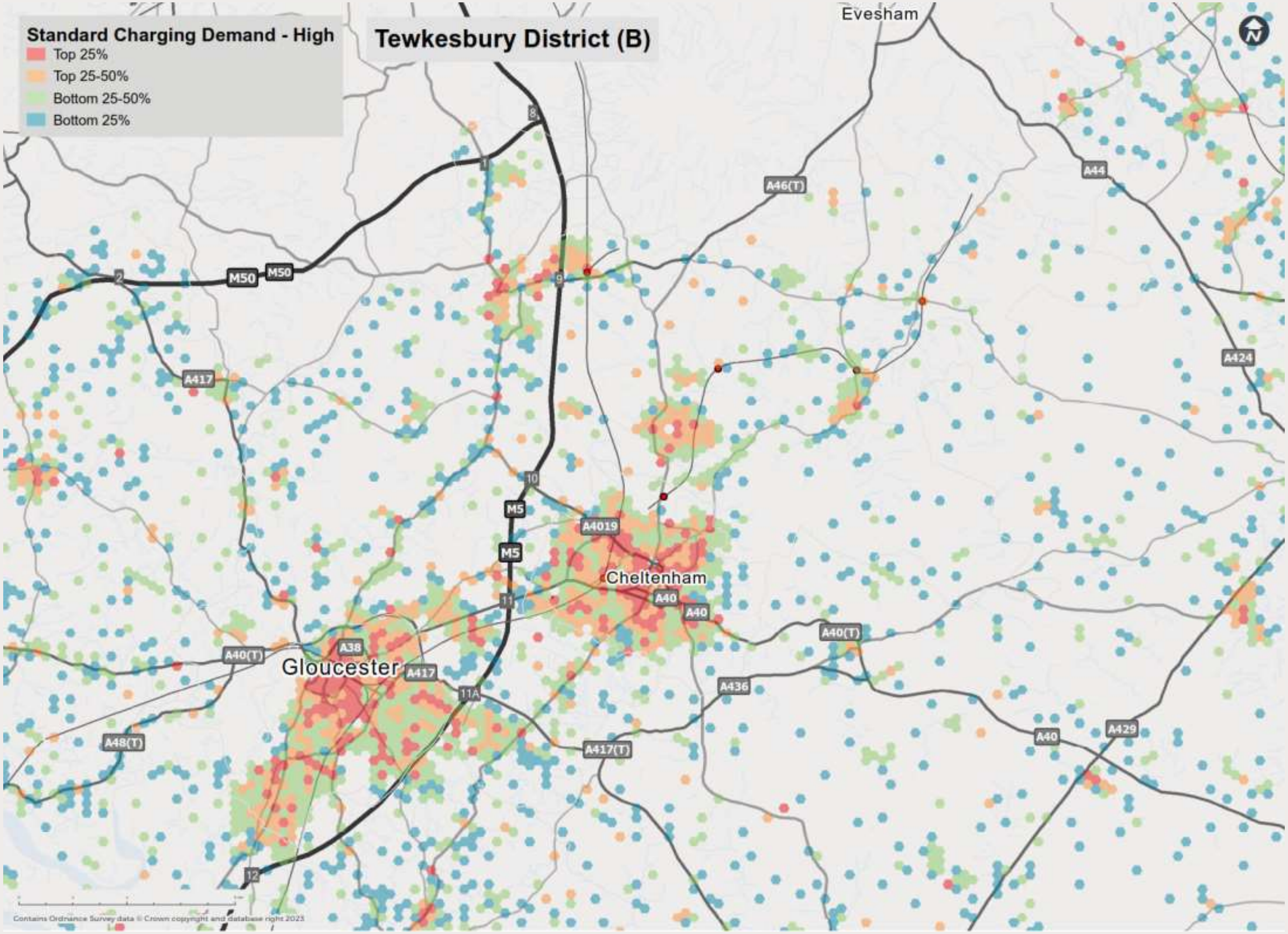


Figure Ap20: Standard Charging Demand - High

Source: WSP EV:Ready

Wiltshire - Standard Charging Demand - High

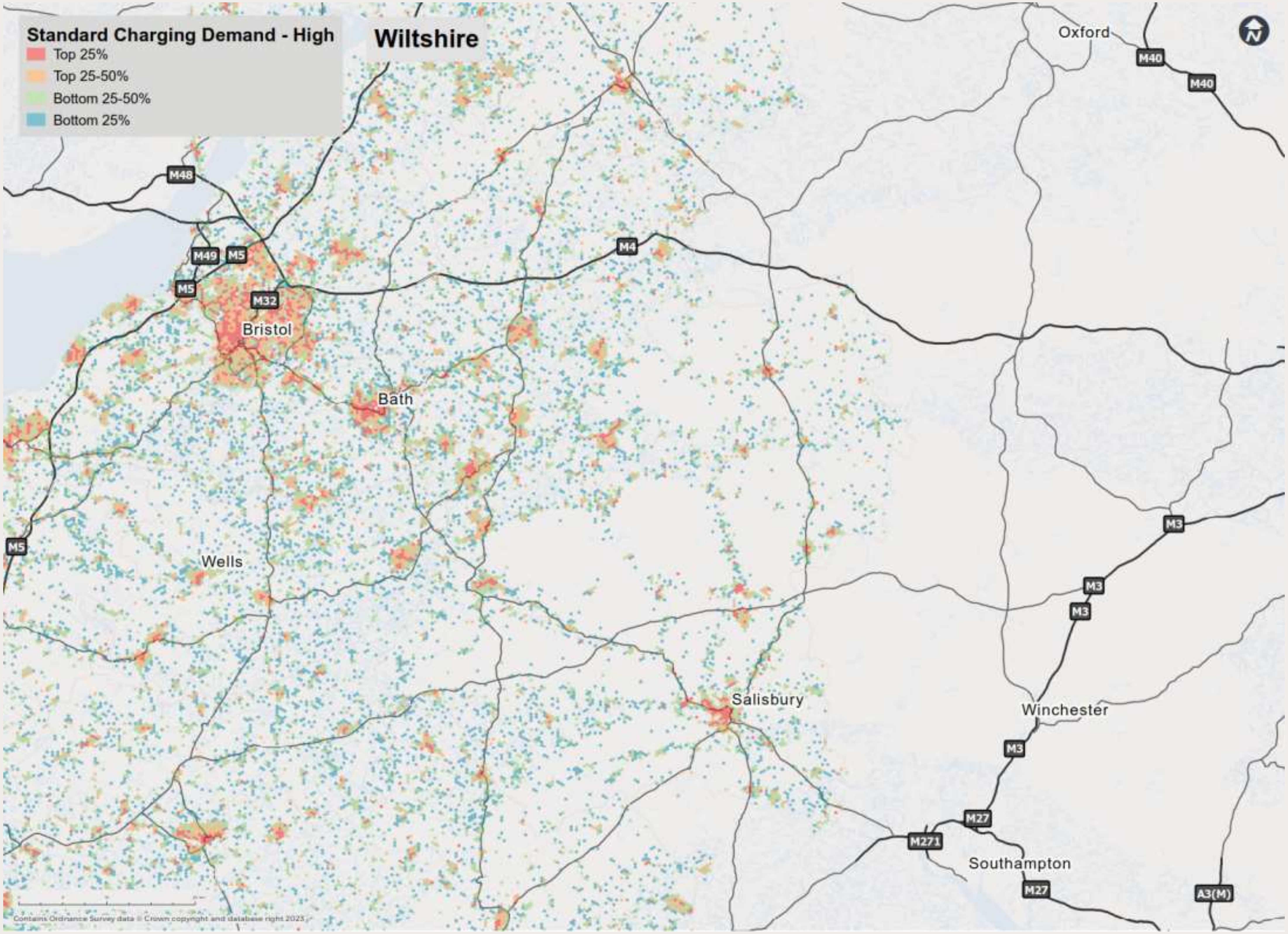


Figure 21 Standard Charging Demand - High

Source: WSP EV:Ready

City of Bristol - Standard Charging Demand - High

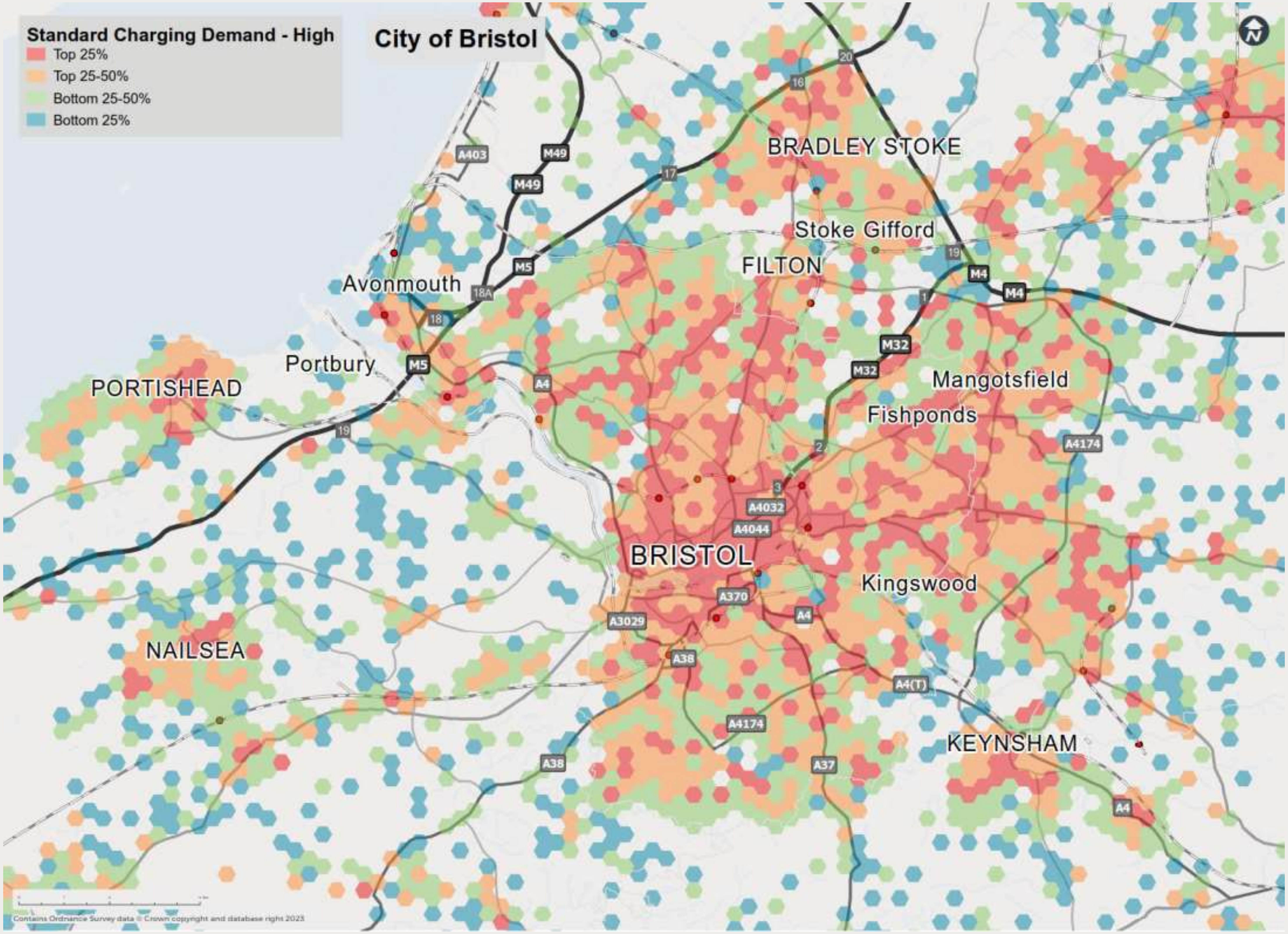


Figure Ap22: Standard Charging Demand - High

Source: WSP EV:Ready

South Gloucestershire - Standard Charging Demand - High

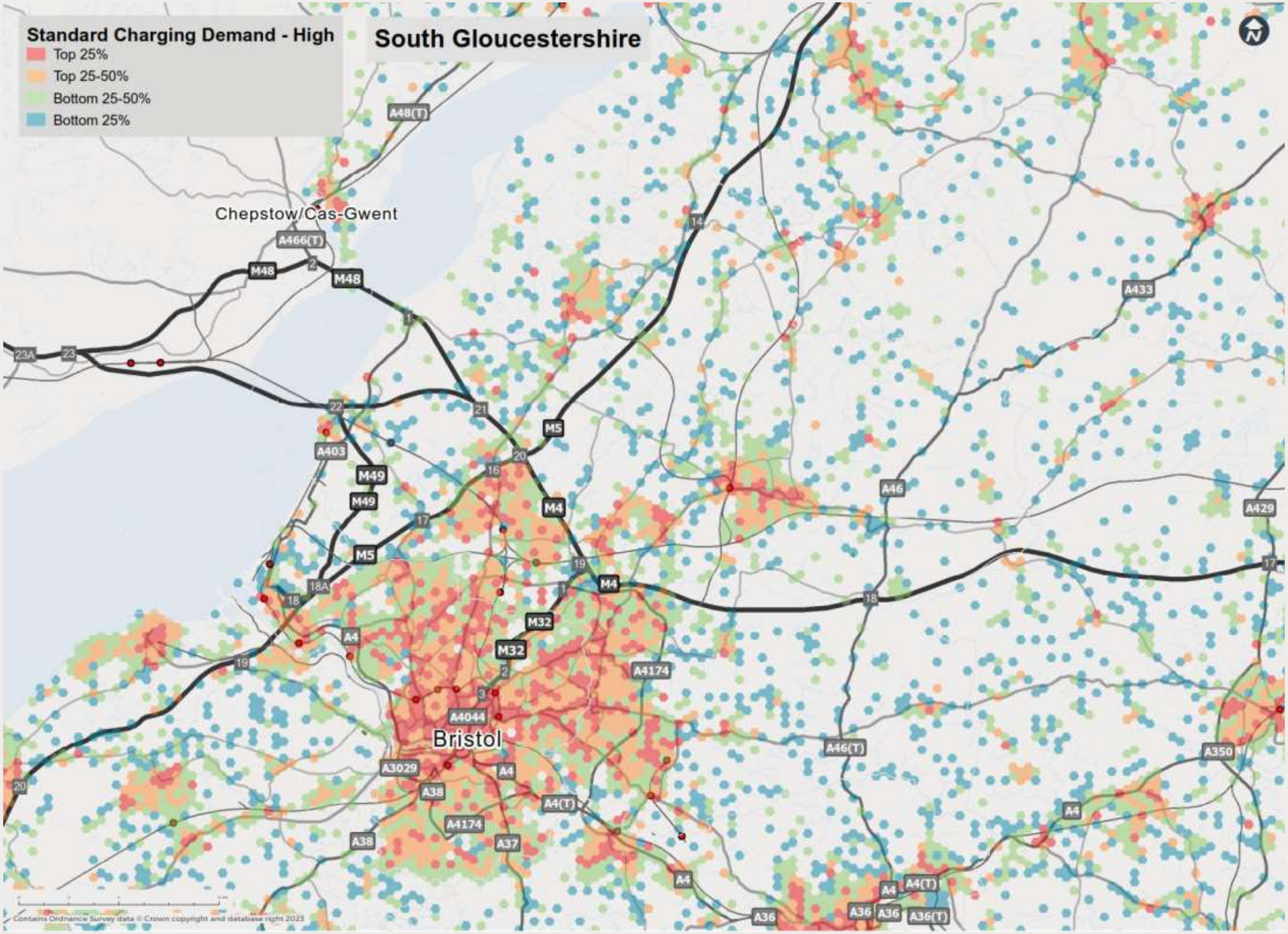


Figure Ap23: Standard Charging Demand - High

Source: WSP EV:Ready

APPENDIX B

Mapping – Rapid Charging Demand - High

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Plymouth - Rapid Charging Demand - High

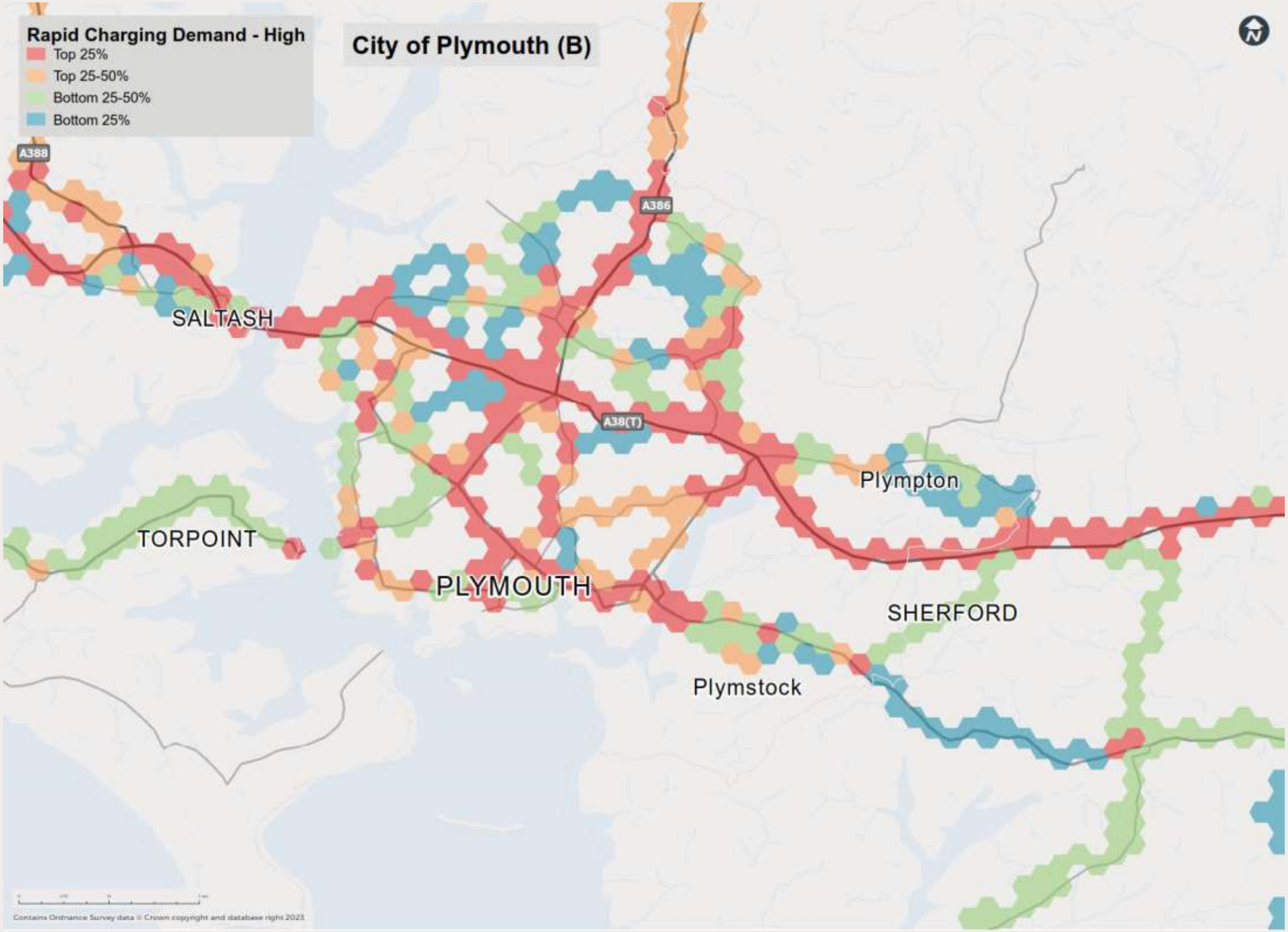

Figure Ap24: Rapid Charging Demand - High

Source: WSP EV:Ready

North Somerset - Rapid Charging Demand - High

Figure Ap25: Rapid Charging Demand - High

Source: WSP EV:Ready

108

Cornwall - Rapid Charging Demand - High

Figure Ap26: Rapid Charging Demand - High

Source: WSP EV:Ready

East Devon - Rapid Charging Demand - High

Figure Ap27: Rapid Charging Demand - High

Source: WSP EV:Ready

Mid Devon - Rapid Charging Demand - High

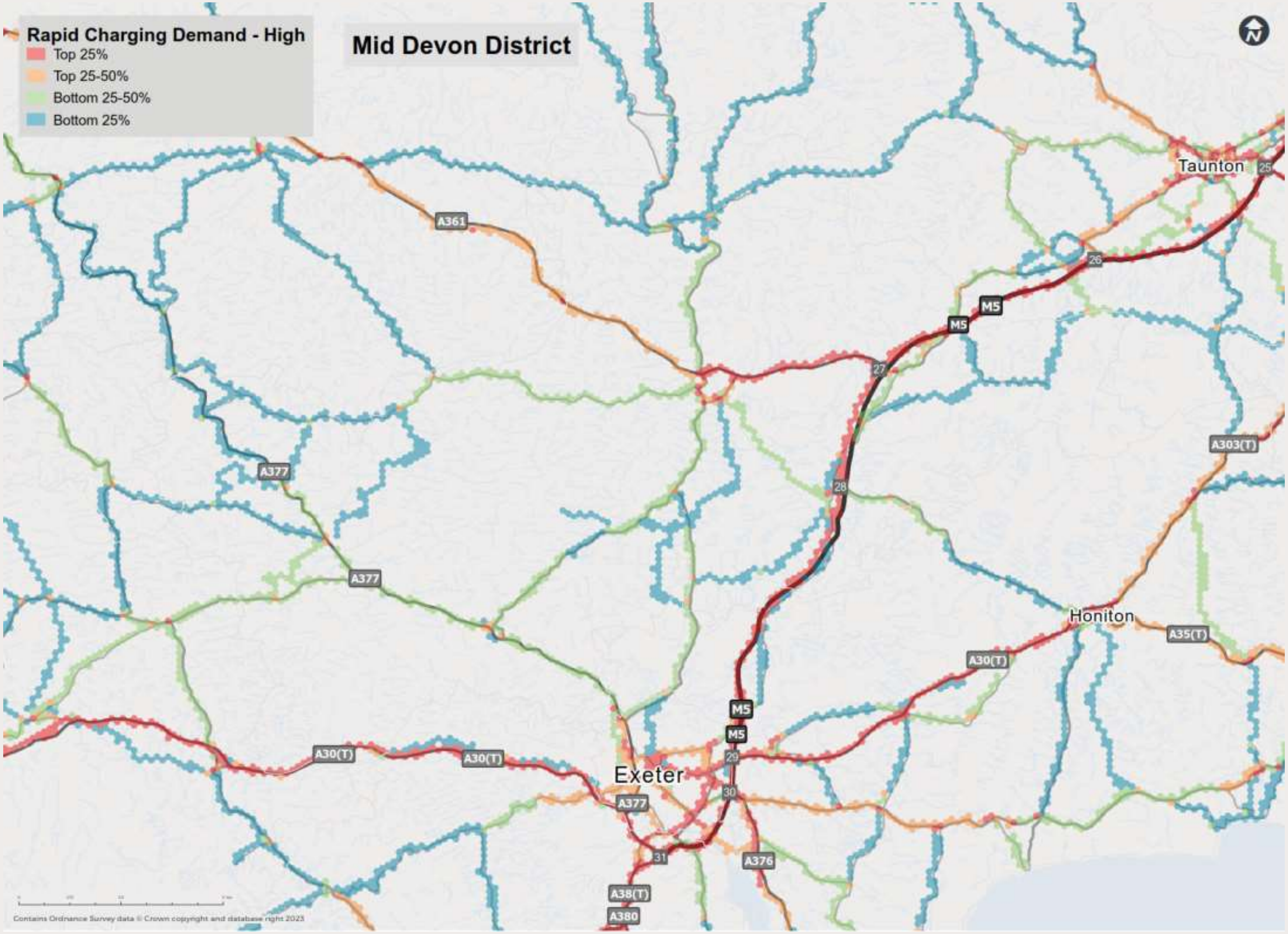

Figure Ap28: Rapid Charging Demand - High

Source: WSP EV:Ready

North Devon - Rapid Charging Demand - High

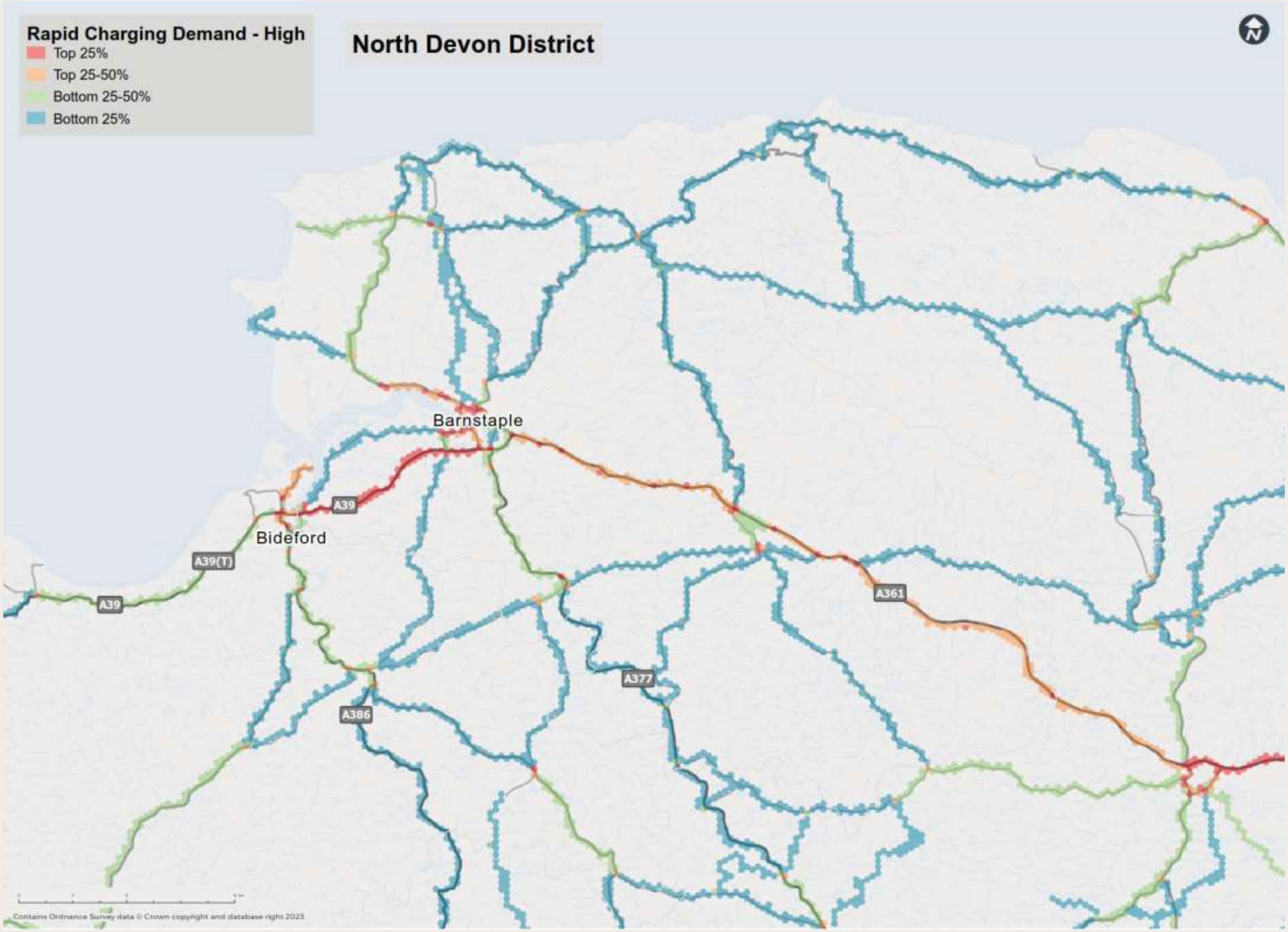

Figure Ap29: Rapid Charging Demand - High

Source: WSP EV:Ready

West Devon - Rapid Charging Demand - High

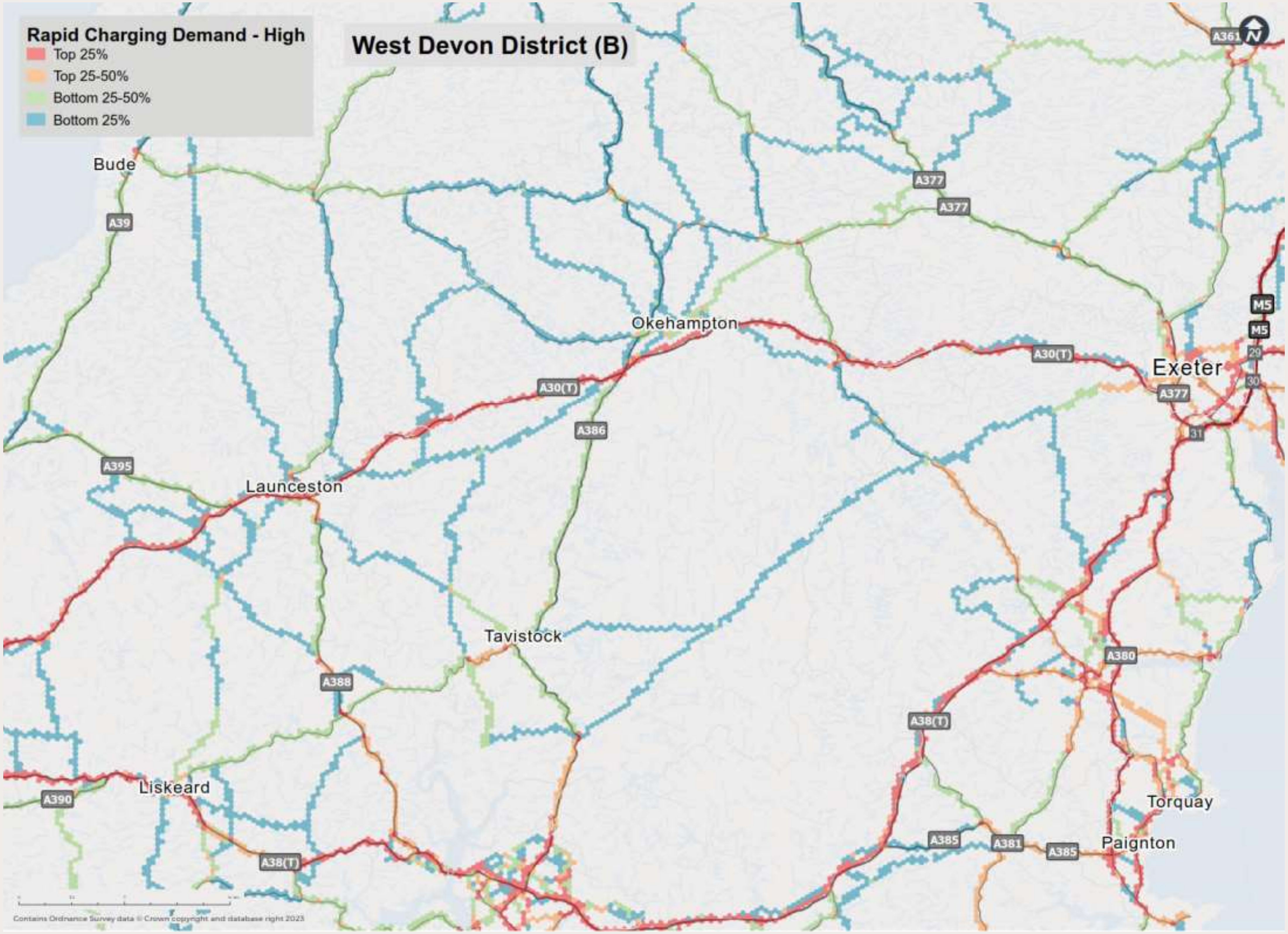

Figure Ap30: Rapid Charging Demand - High

Source: WSP EV:Ready

Torbay - Rapid Charging Demand - High

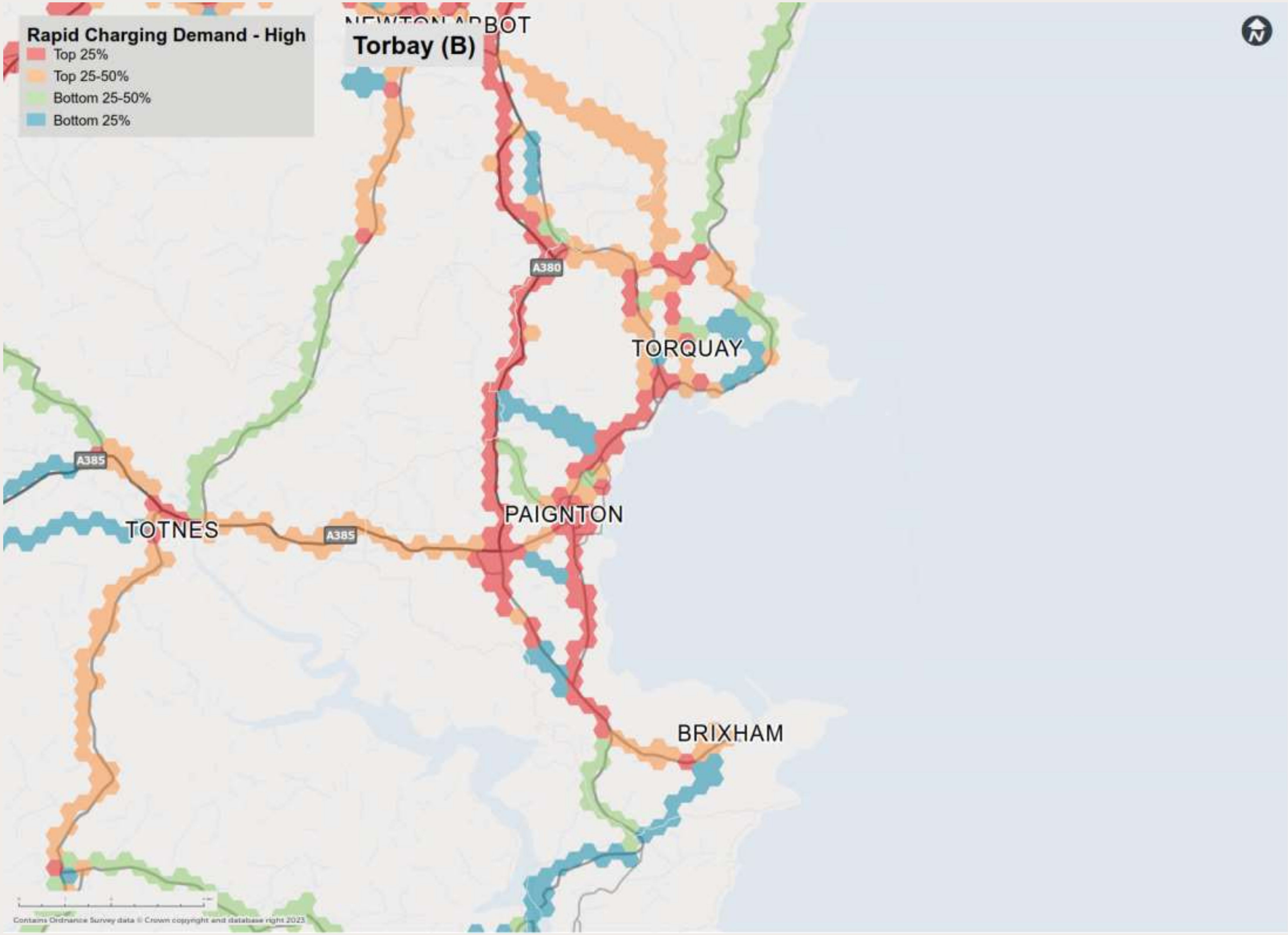

Figure Ap31: Rapid Charging Demand - High

Source: WSP EV:Ready

Somerset West and Taunton - Rapid Charging Demand - High

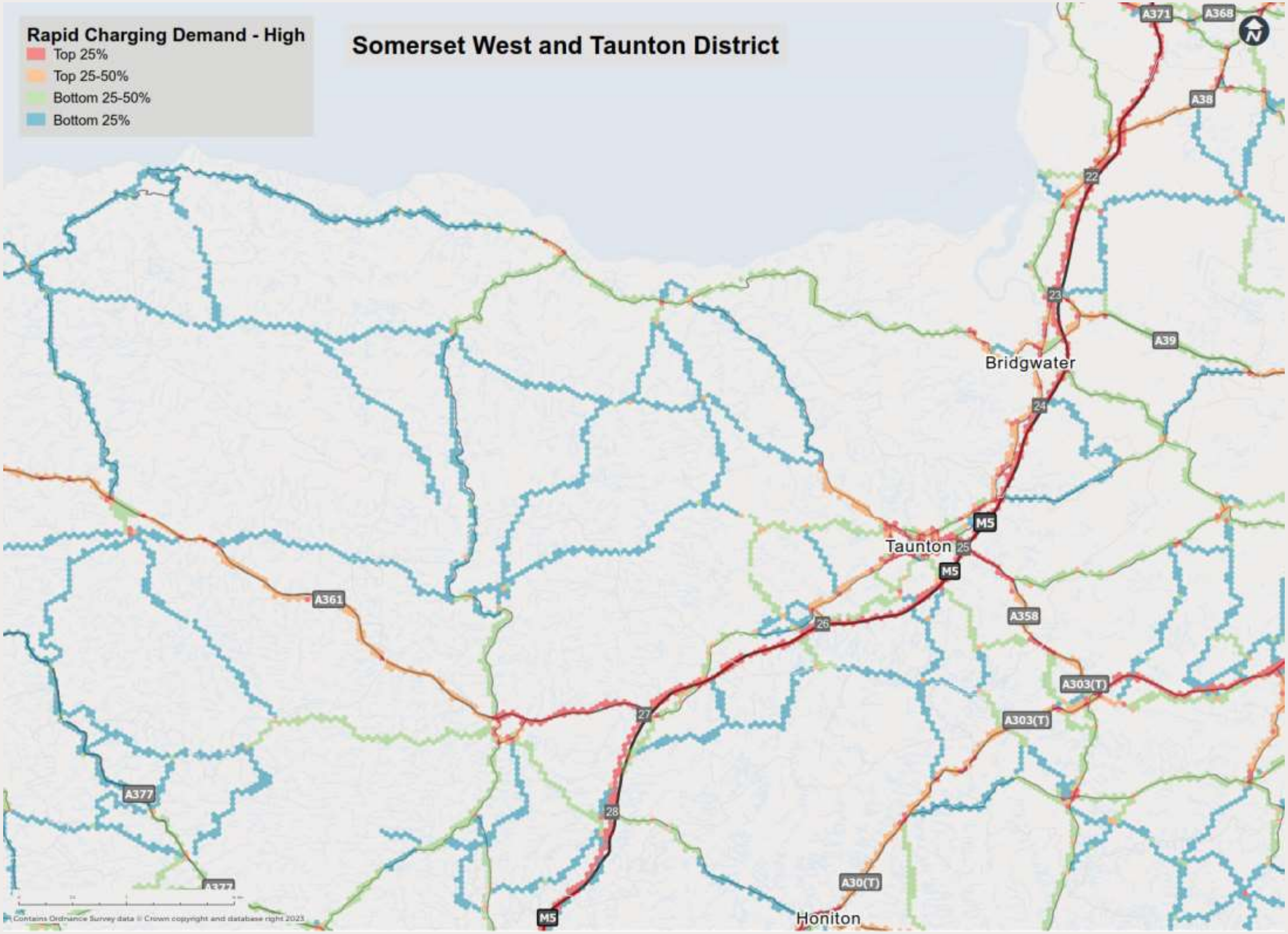

Figure Ap32: Rapid Charging Demand - High

Source: WSP EV:Ready

Bath and North East Somerset - Rapid Charging Demand - High

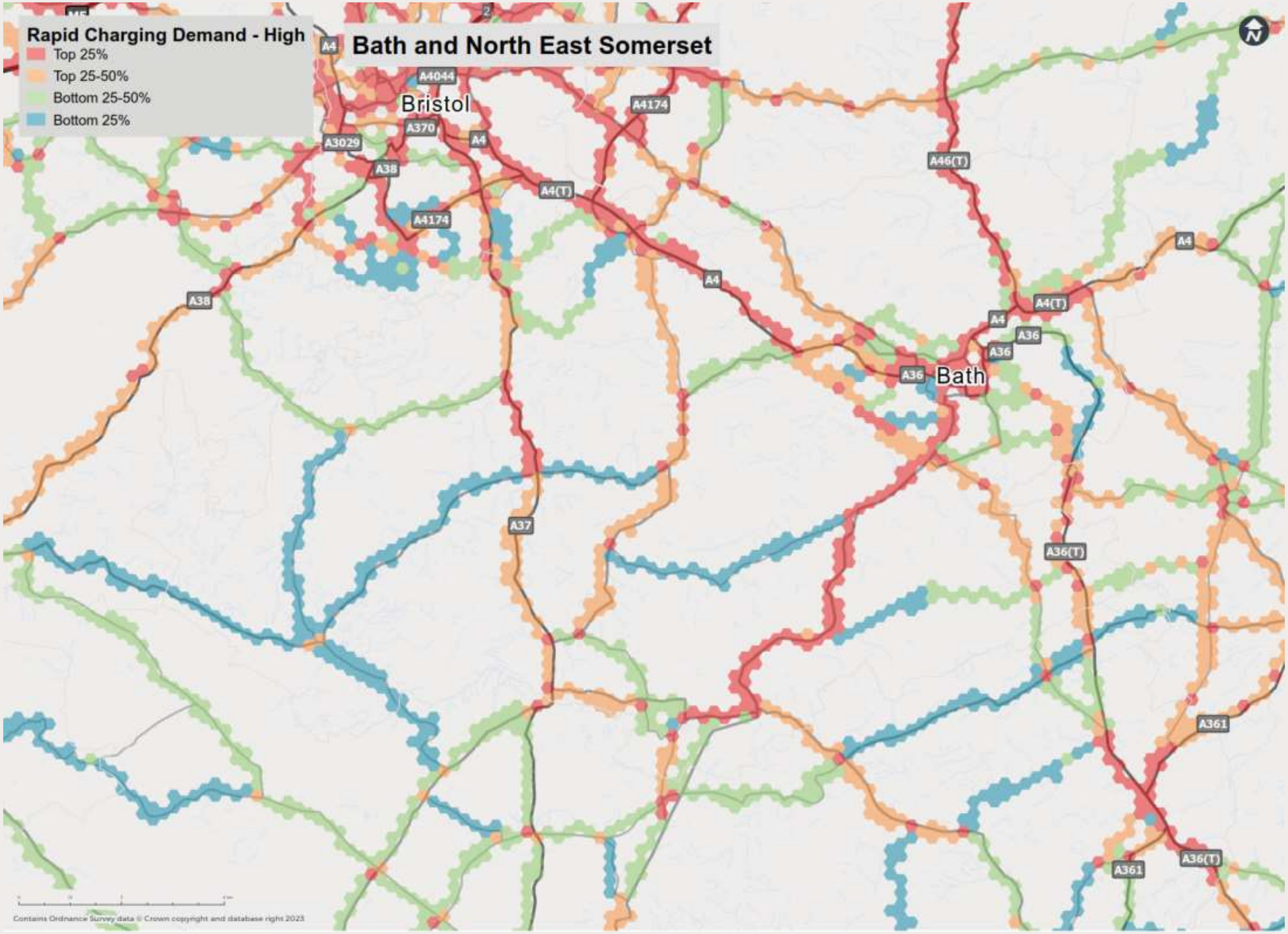

Figure Ap33: Rapid Charging Demand - High

Source: WSP EV:Ready

North Somerset - Rapid Charging Demand - High

Figure Ap29: Rapid Charging Demand - High

Source: WSP EV:Ready

South Somerset - Rapid Charging Demand - High

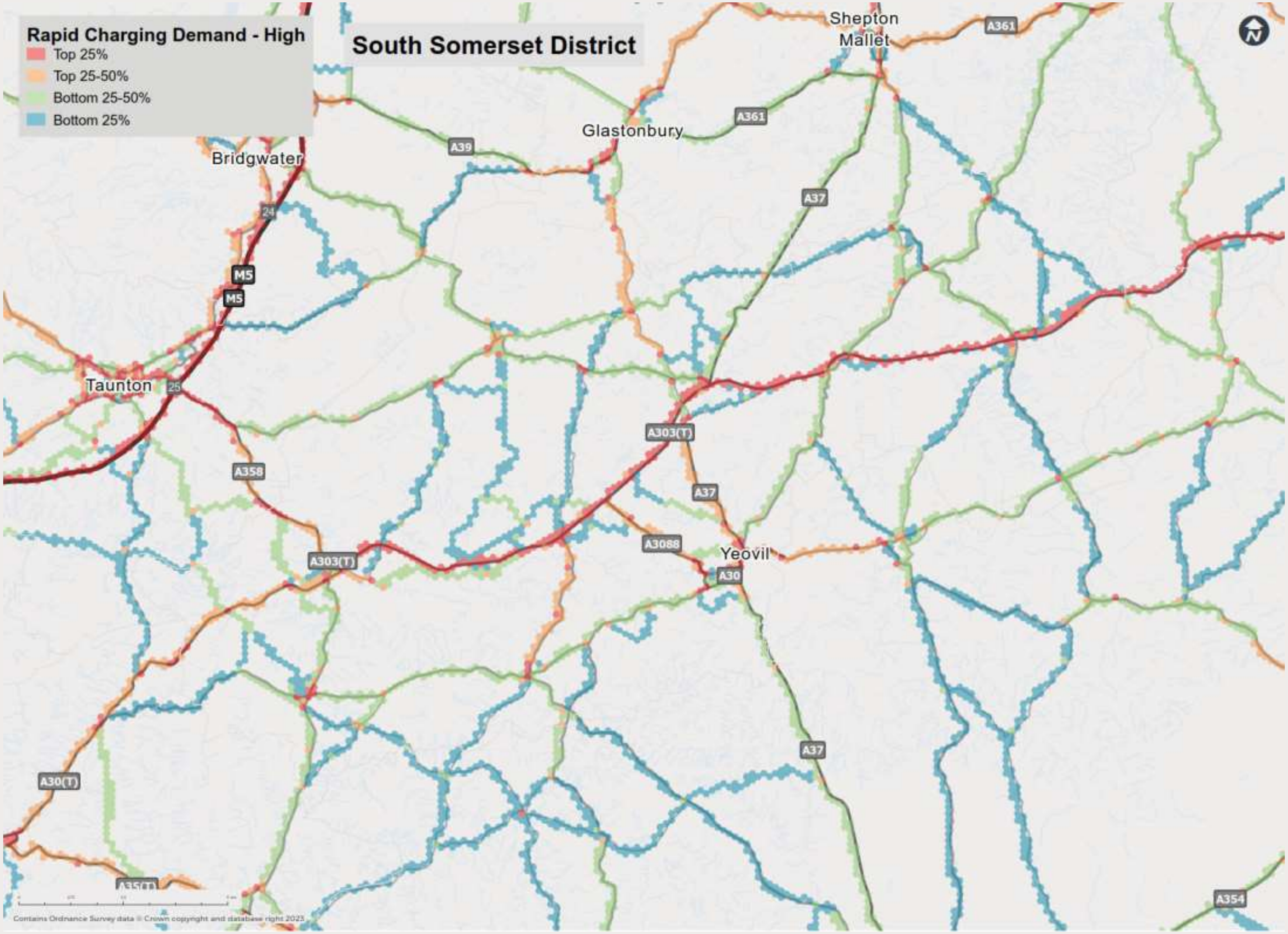

Figure Ap34: Rapid Charging Demand - High

Source: WSP EV:Ready

Bournemouth, Christchurch and Poole - Rapid Charging Demand - High

Figure Ap35: Rapid Charging Demand - High

Source: WSP EV:Ready

Dorset - Rapid Charging Demand - High

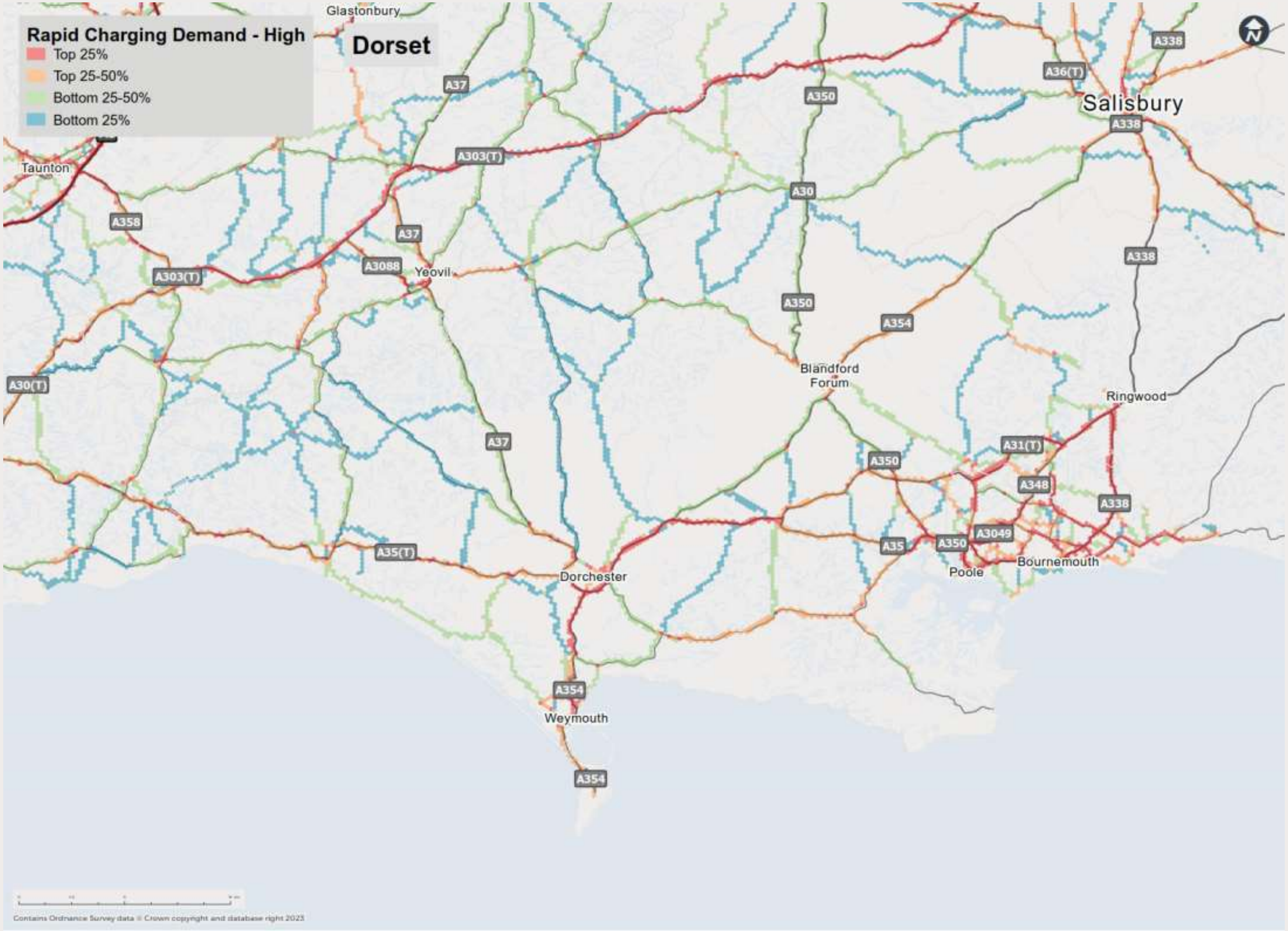

Figure Ap36: Rapid Charging Demand - High

Source: WSP EV:Ready

Gloucestershire - Rapid Charging Demand - High

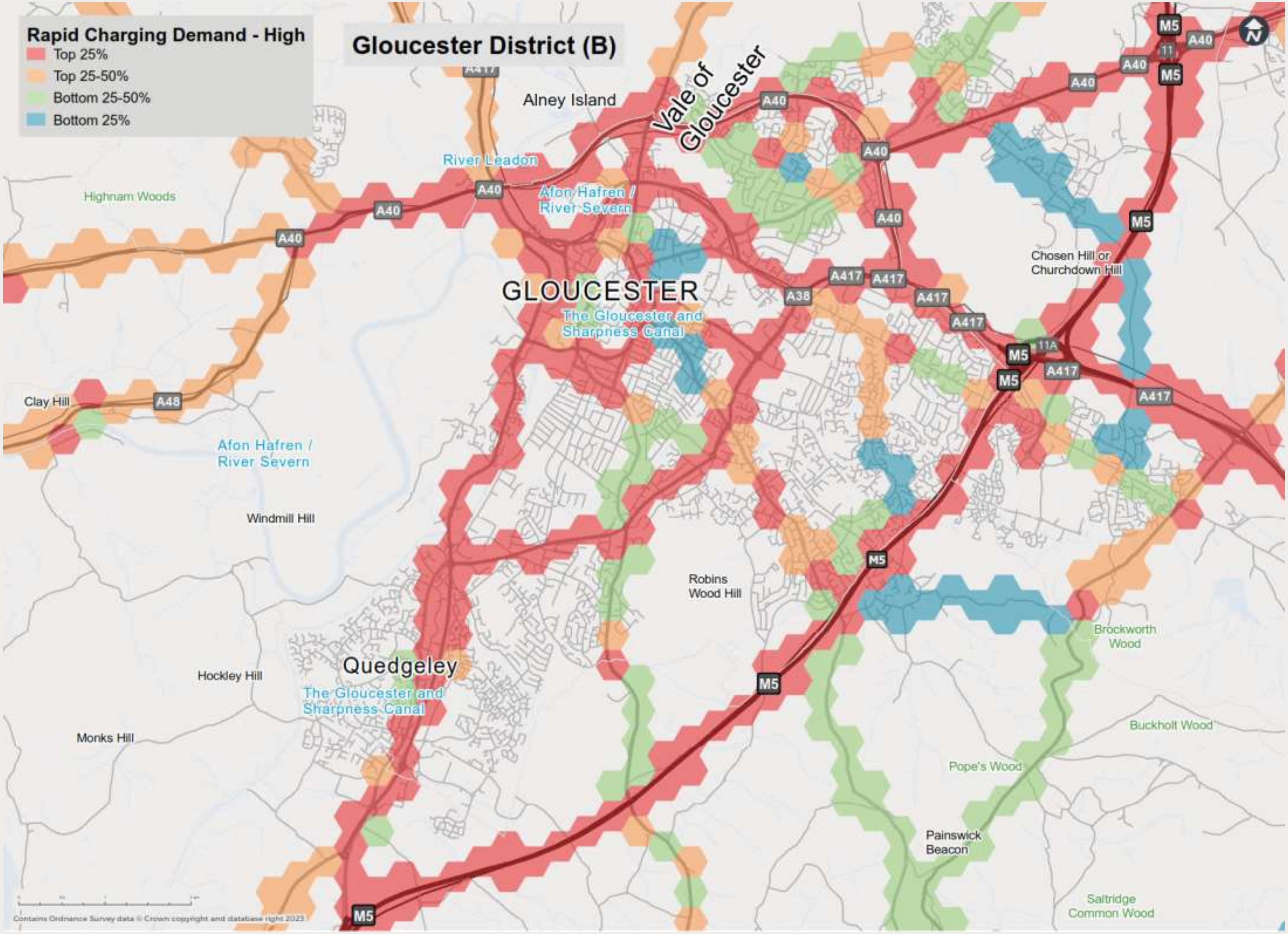

Figure Ap37: Rapid Charging Demand - High

Source: WSP EV:Ready

Cheltenham District – Rapid Charging Demand - High

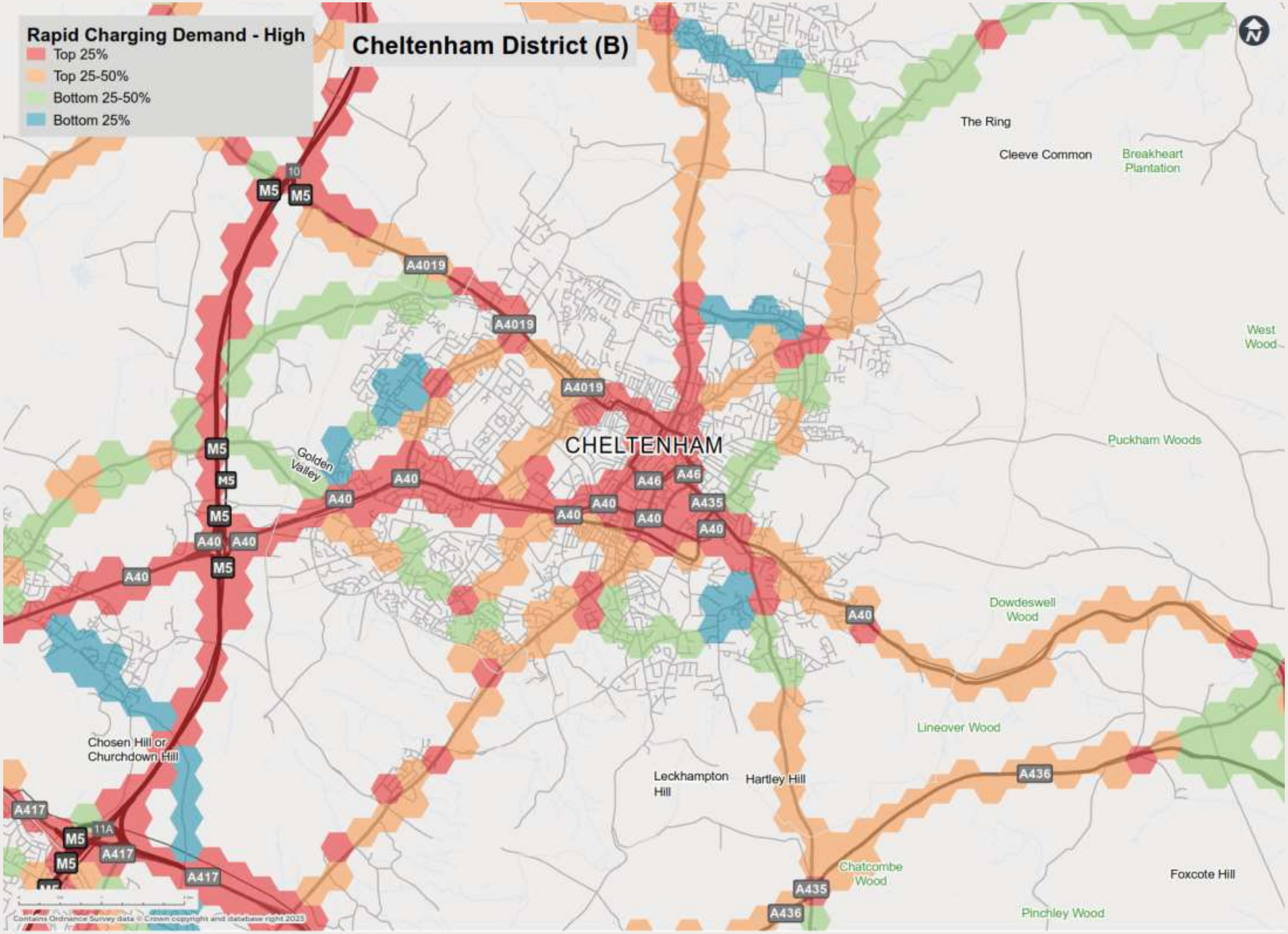

Figure Ap38: Rapid Charging Demand - High

Source: WSP EV:Ready

Stroud - Rapid Charging Demand - High

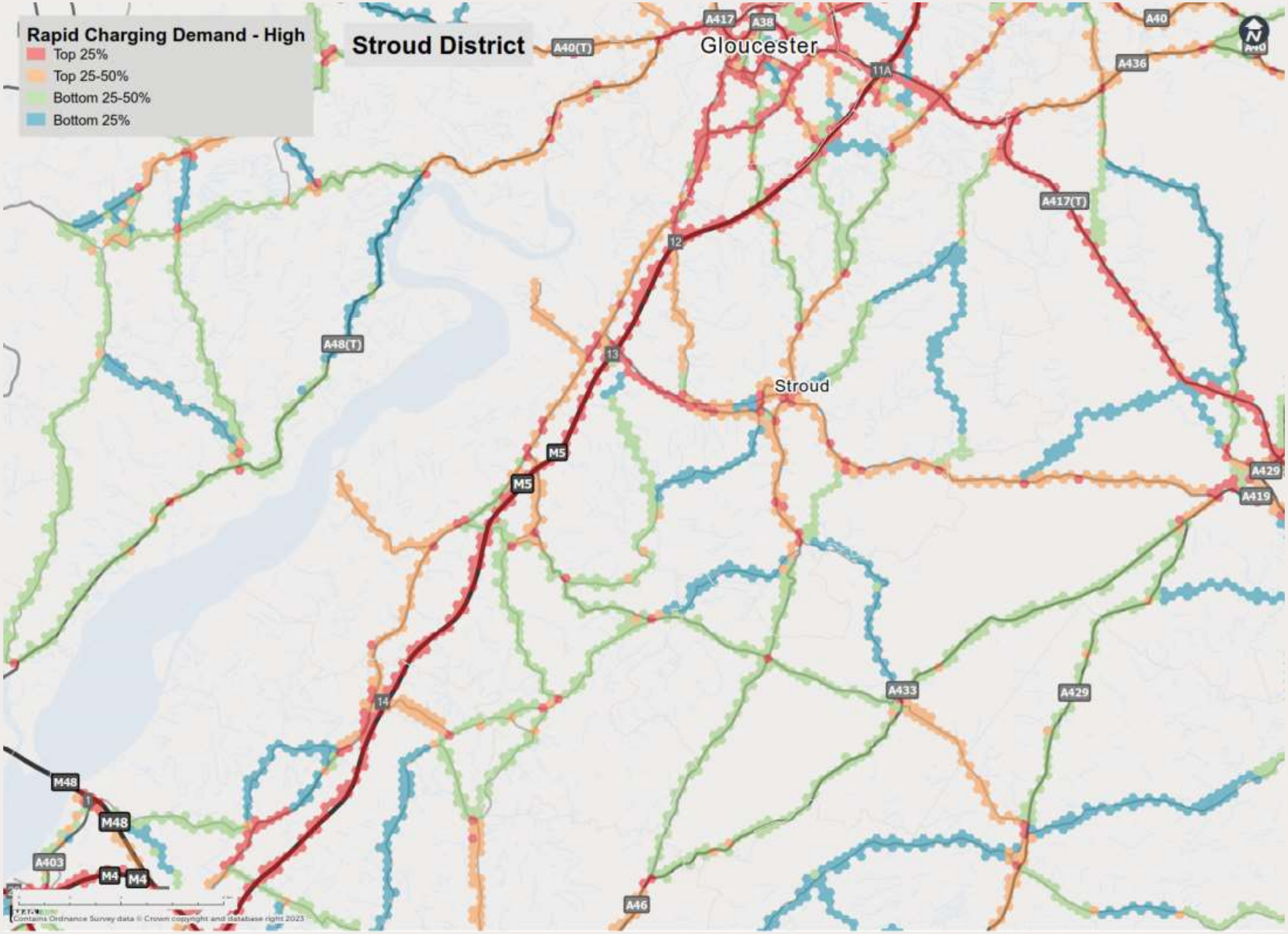

Figure Ap39: Rapid Charging Demand - High

Source: WSP EV:Ready

Cotswold District – Rapid Charging Demand - High

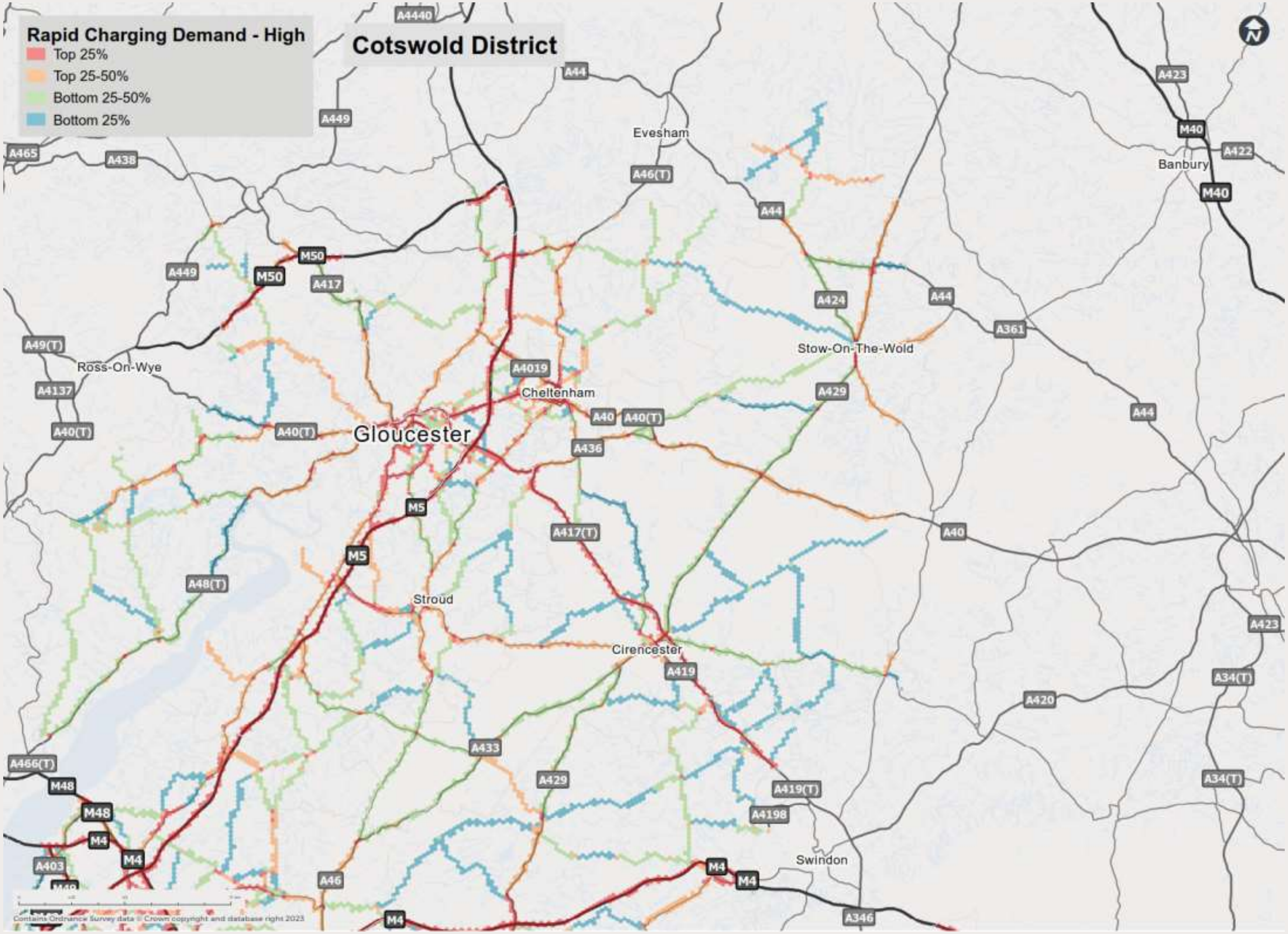

Figure Ap40: Rapid Charging Demand - High

Source: WSP EV:Ready

Forest of Dean – Rapid Charging Demand - High

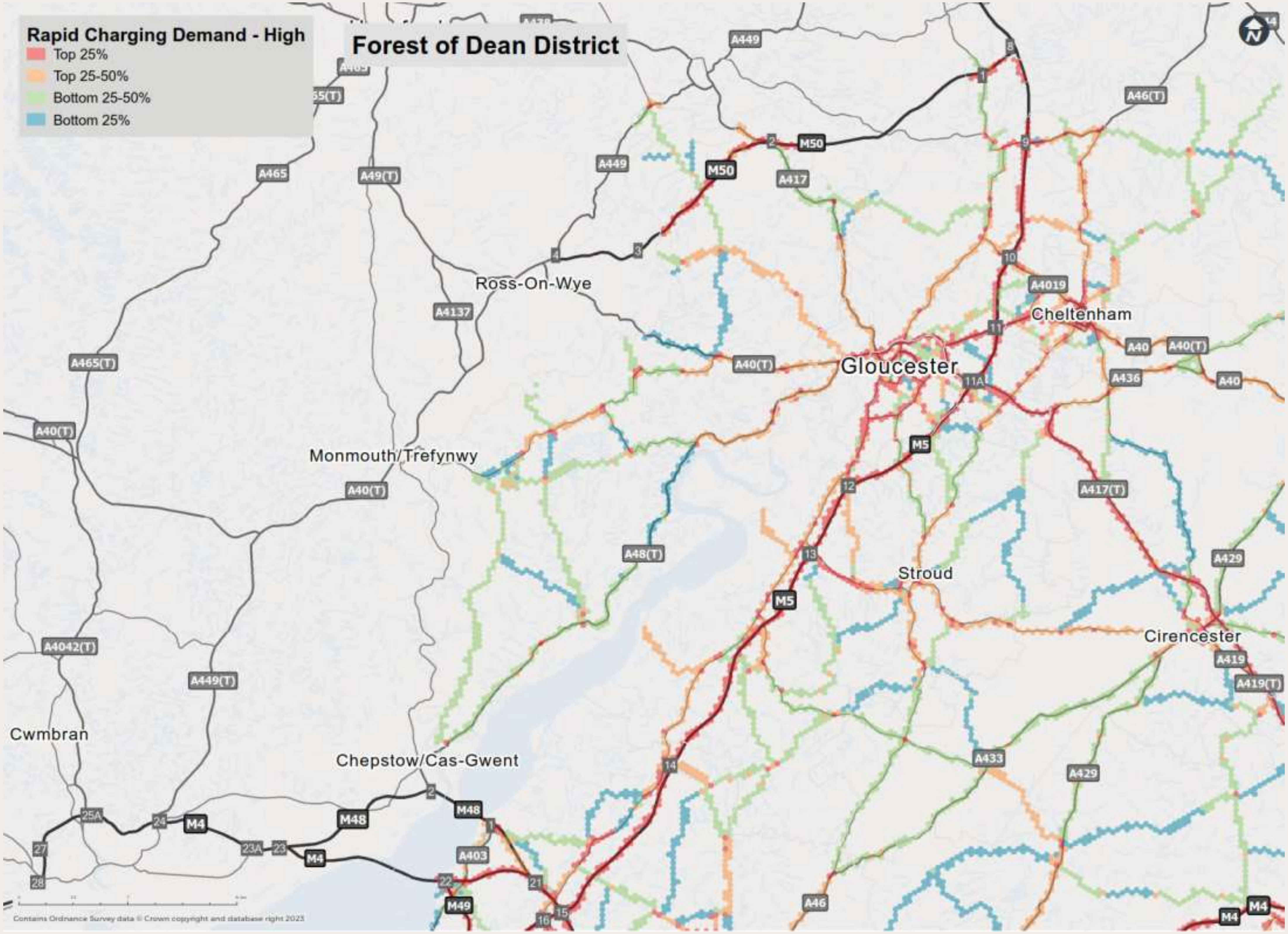

Figure Ap41: Rapid Charging Demand - High

Source: WSP EV:Ready

Tewkesbury - Rapid Charging Demand - High

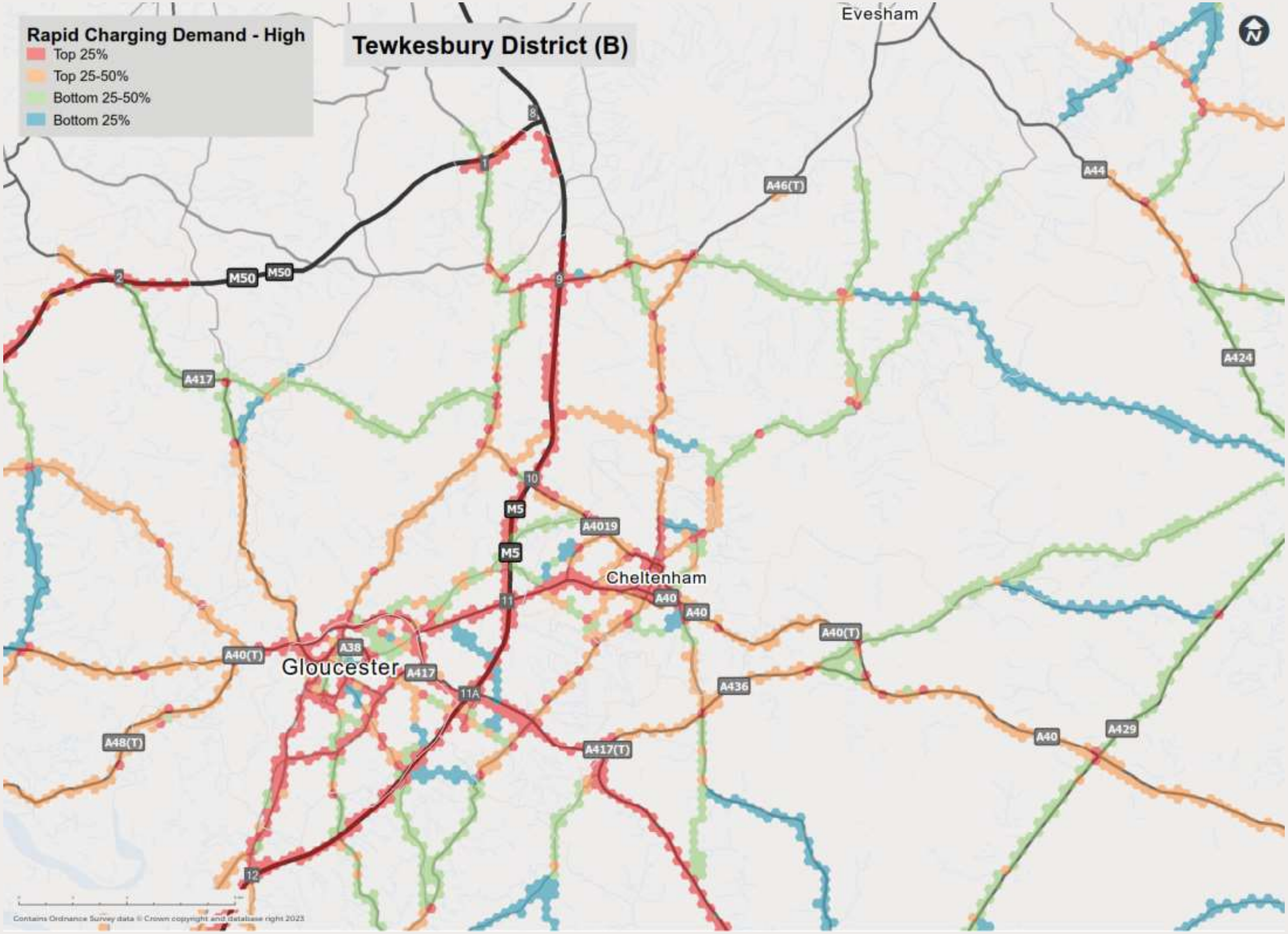

Figure Ap42: Rapid Charging Demand - High

Source: WSP EV:Ready

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Wiltshire - Rapid Charging Demand - High

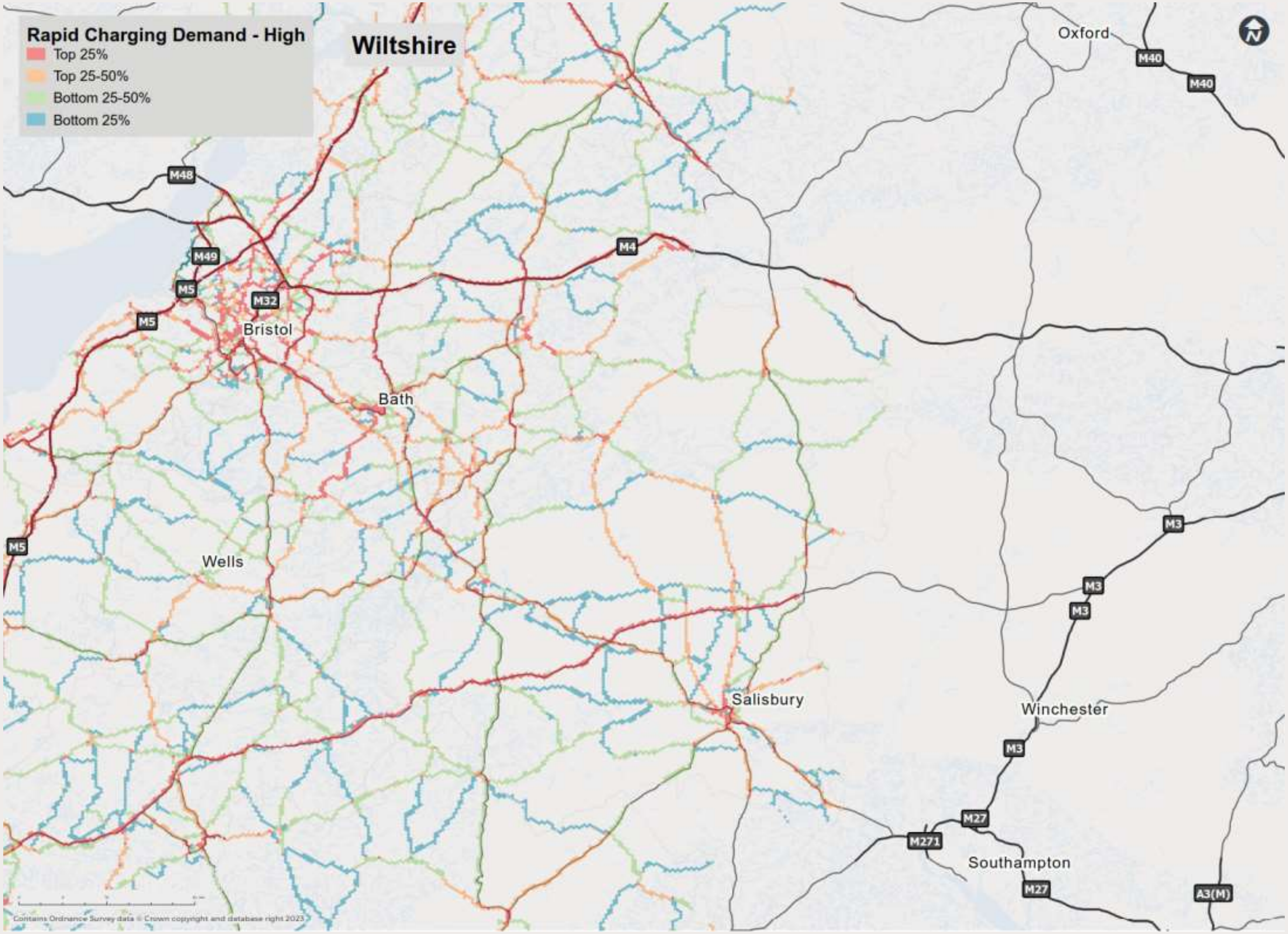

Figure Ap43: Rapid Charging Demand - High

Source: WSP EV:Ready

City of Bristol - Rapid Charging Demand - High

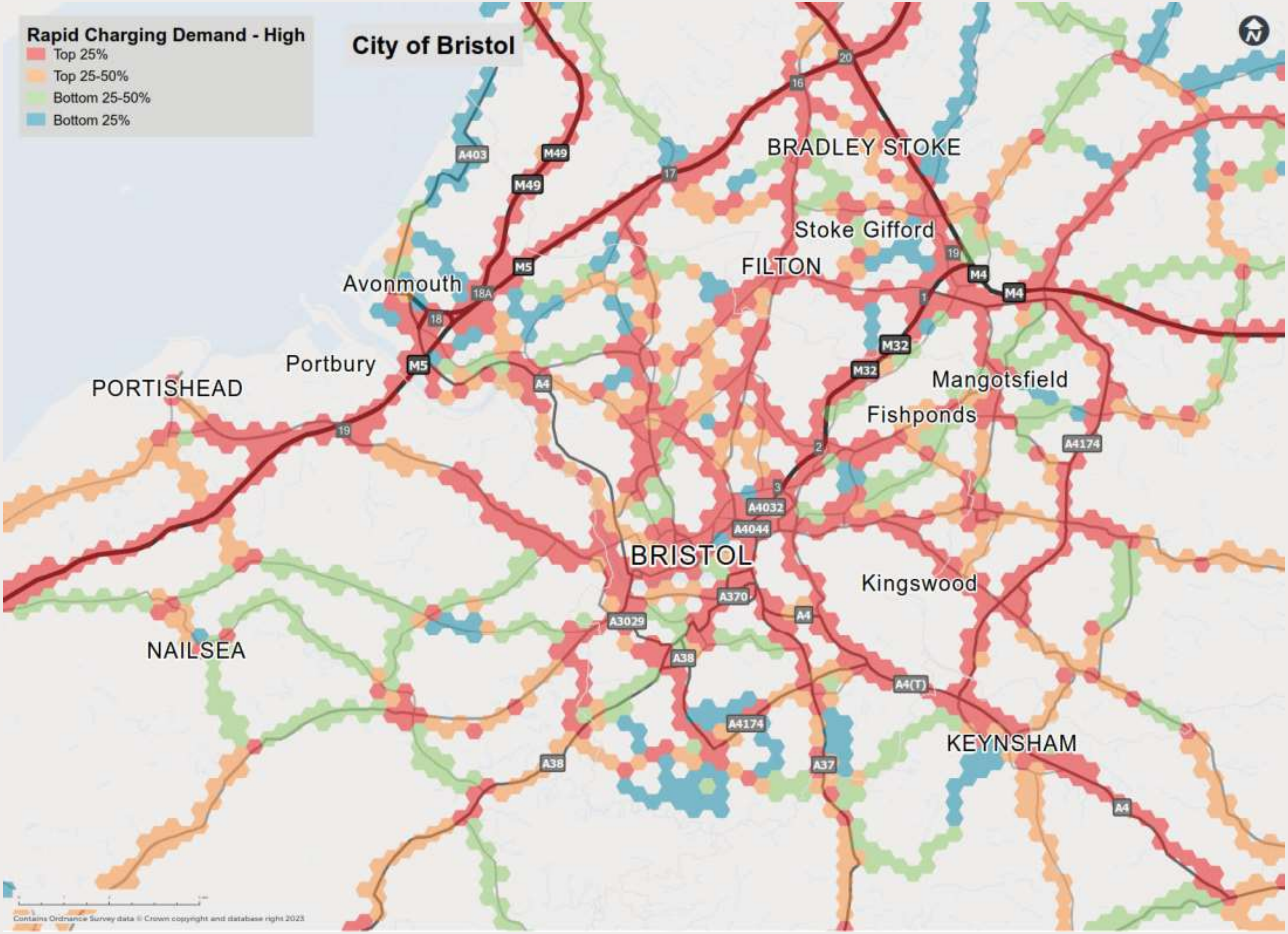

Figure Ap44: Rapid Charging Demand - High

Source: WSP EV:Ready

South Gloucestershire - Rapid Charging Demand - High

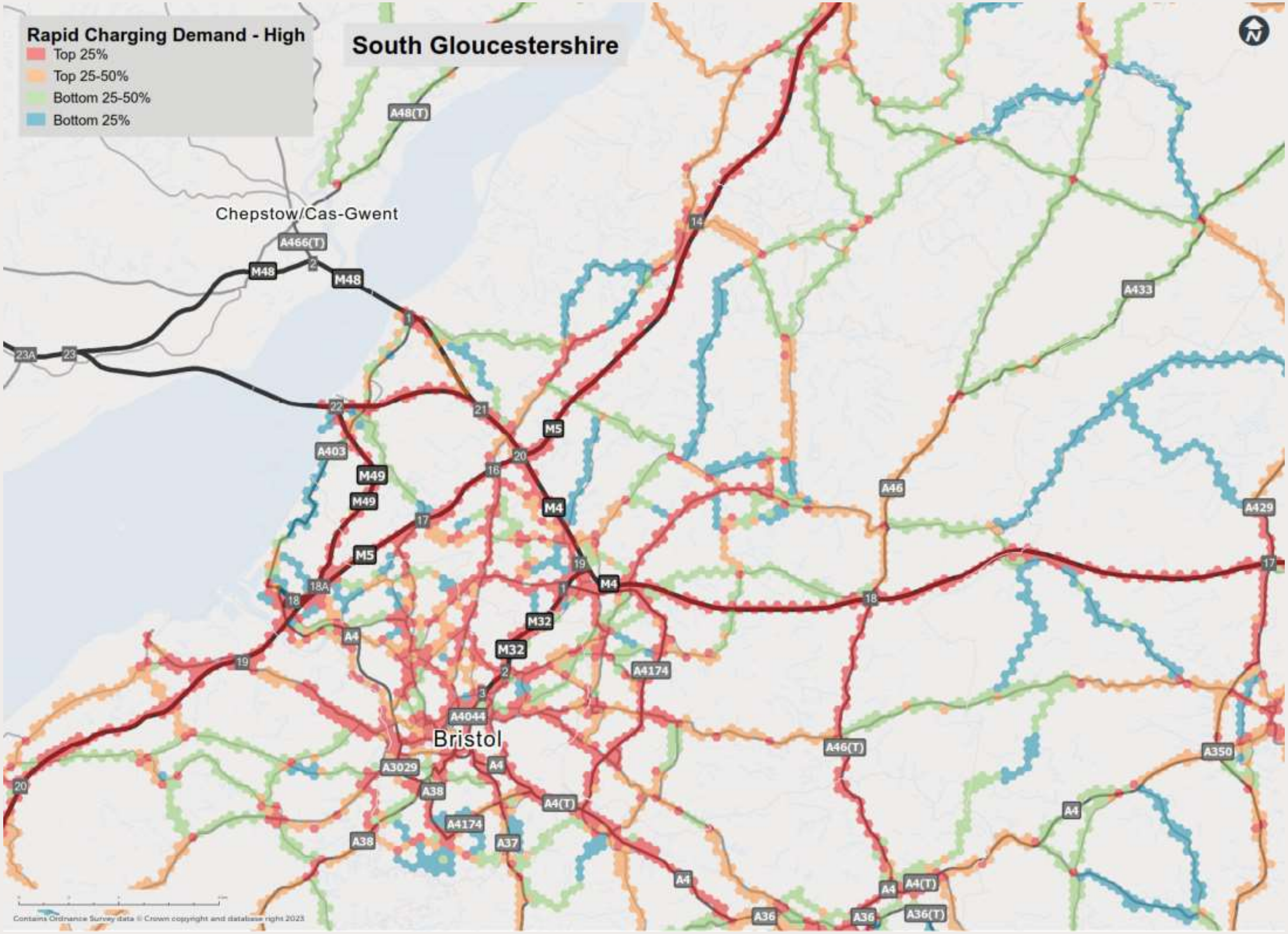

Figure Ap45: Rapid Charging Demand - High

Source: WSP EV:Ready

APPENDIX C

Mapping - Reliance on On-Street Parking

Plymouth - Reliance on On-Street Parking

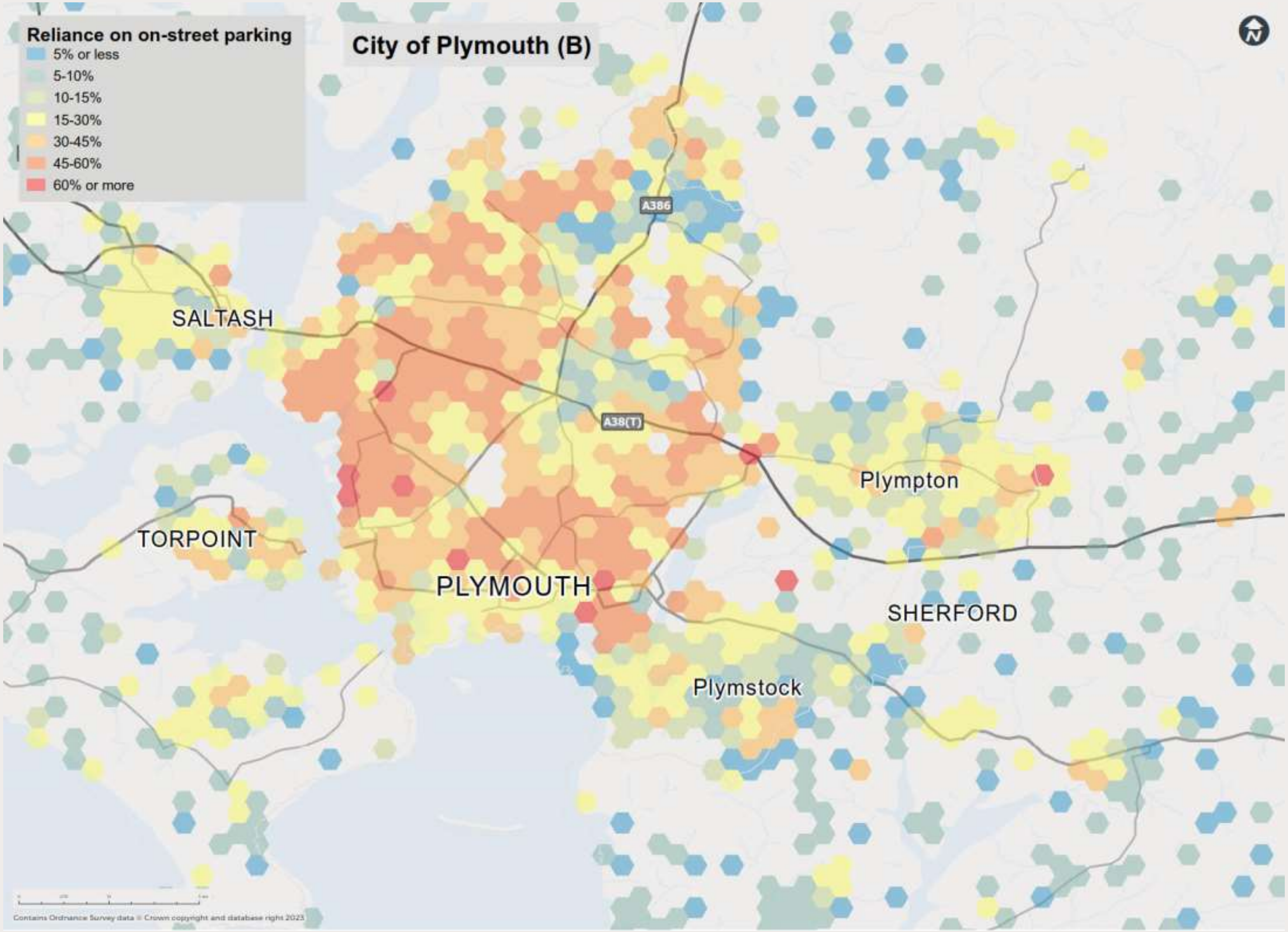

Figure Ap46: Reliance on On-Street Parking

Source: WSP EV:Ready

Somerset - Reliance on On-Street Parking

Figure Ap47: Reliance on On-Street Parking

Source: WSP EV:Ready

Cornwall – Reliance on On-Street Parking

Figure Ap48: Reliance on On-Street Parking

Source: WSP EV:Ready

East Devon - Reliance on On-Street Parking

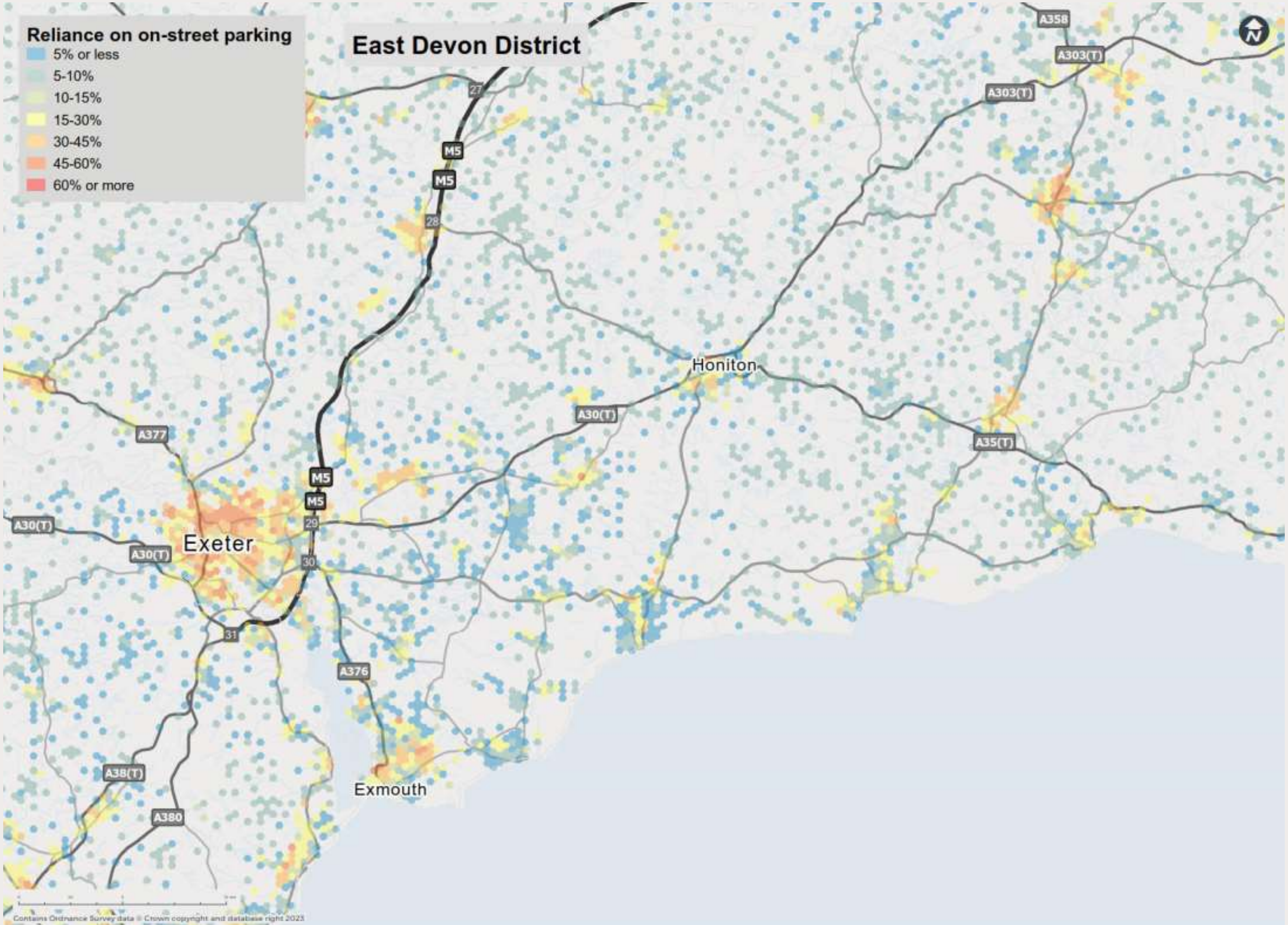

Figure Ap49: Reliance on On-Street Parking

Source: WSP EV:Ready

Mid Devon - Reliance on On-Street Parking

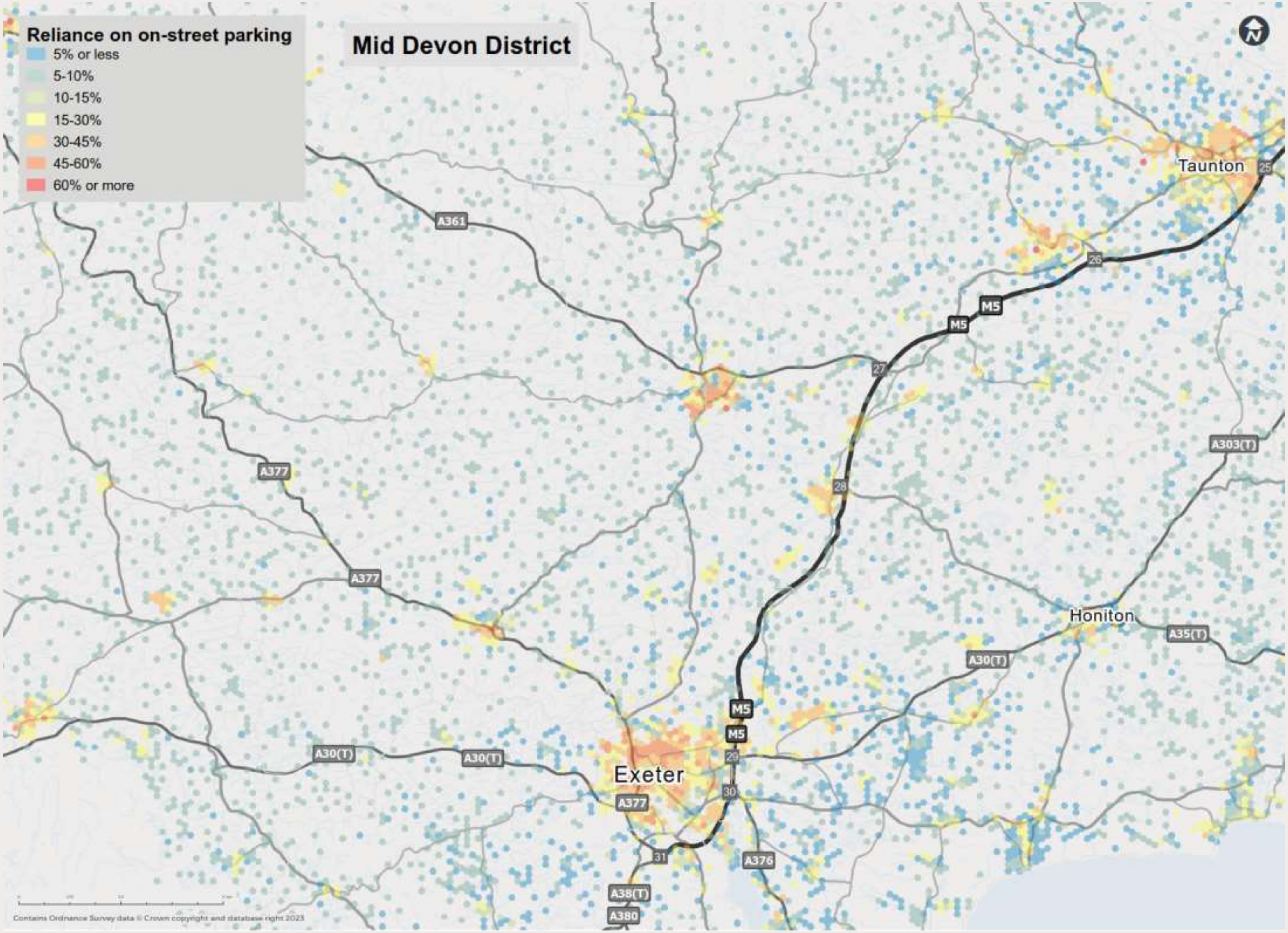

Figure Ap50: Reliance on On-Street Parking

Source: WSP EV:Ready

North Devon - Reliance on On-Street Parking

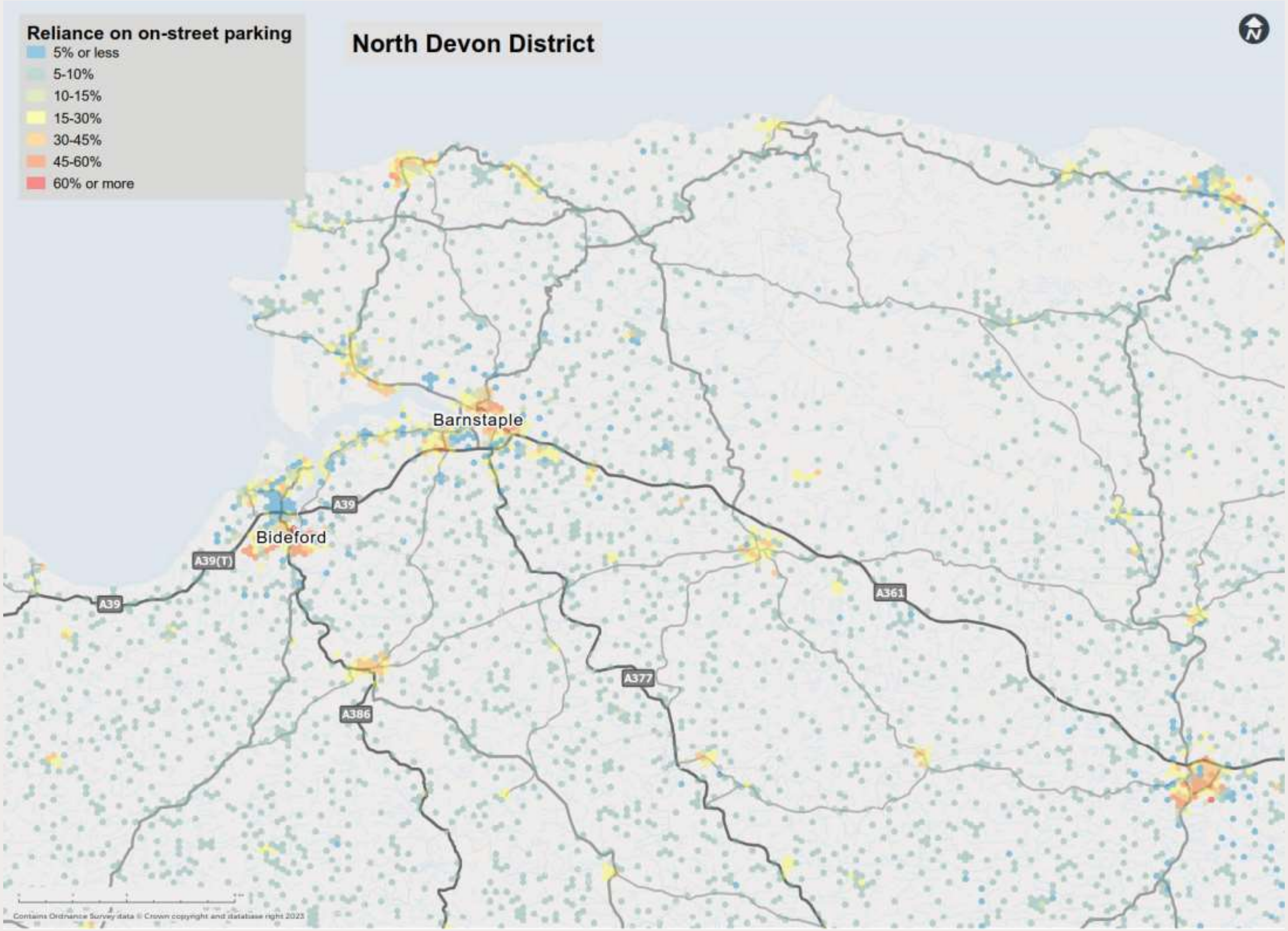

Figure Ap51: Reliance on On-Street Parking

Source: WSP EV:Ready

WestDevon - Reliance on On-Street Parking

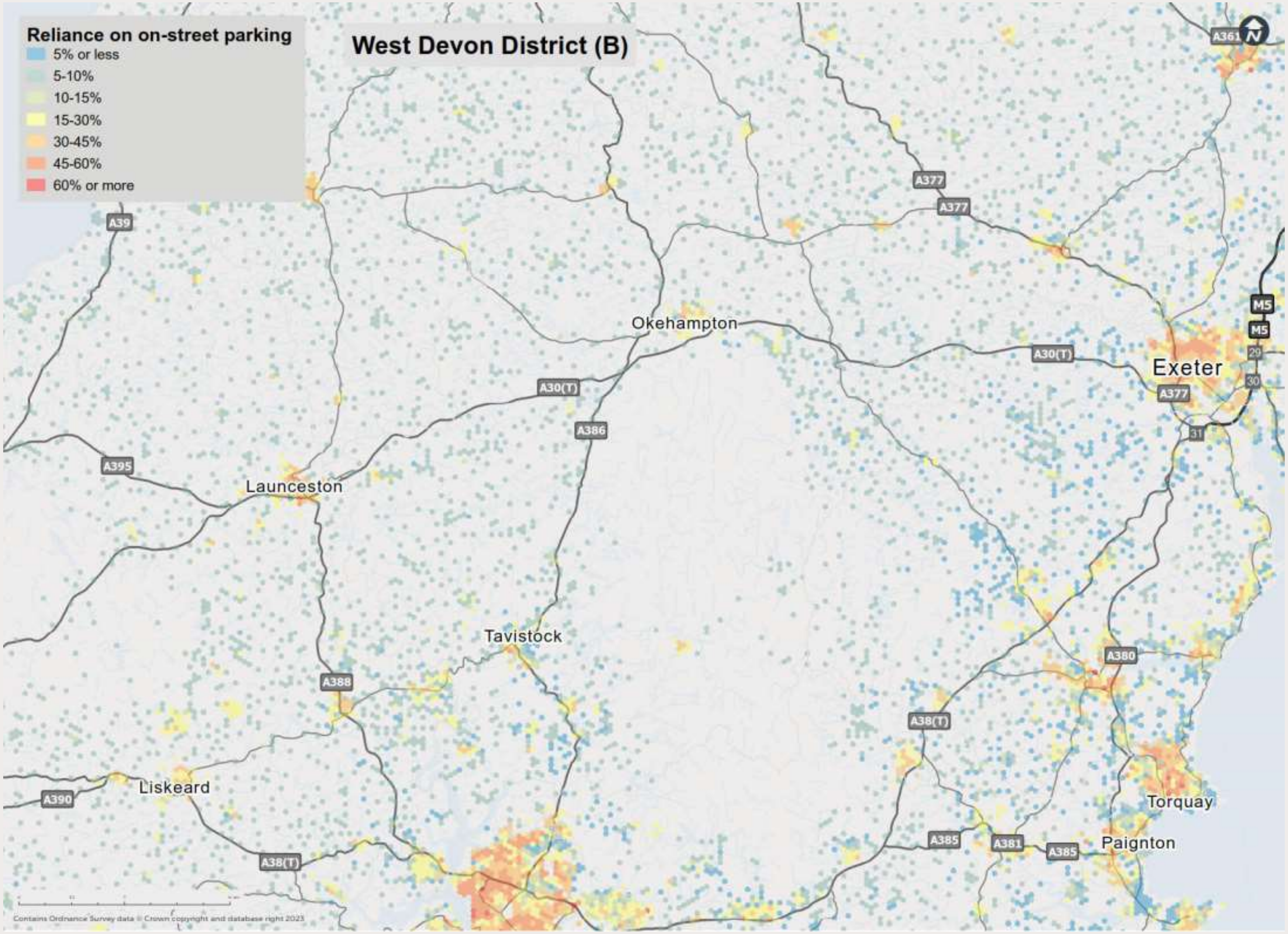

Figure Ap52: Reliance on On-Street Parking

Source: WSP EV:Ready

Torbay - Reliance on On-Street Parking

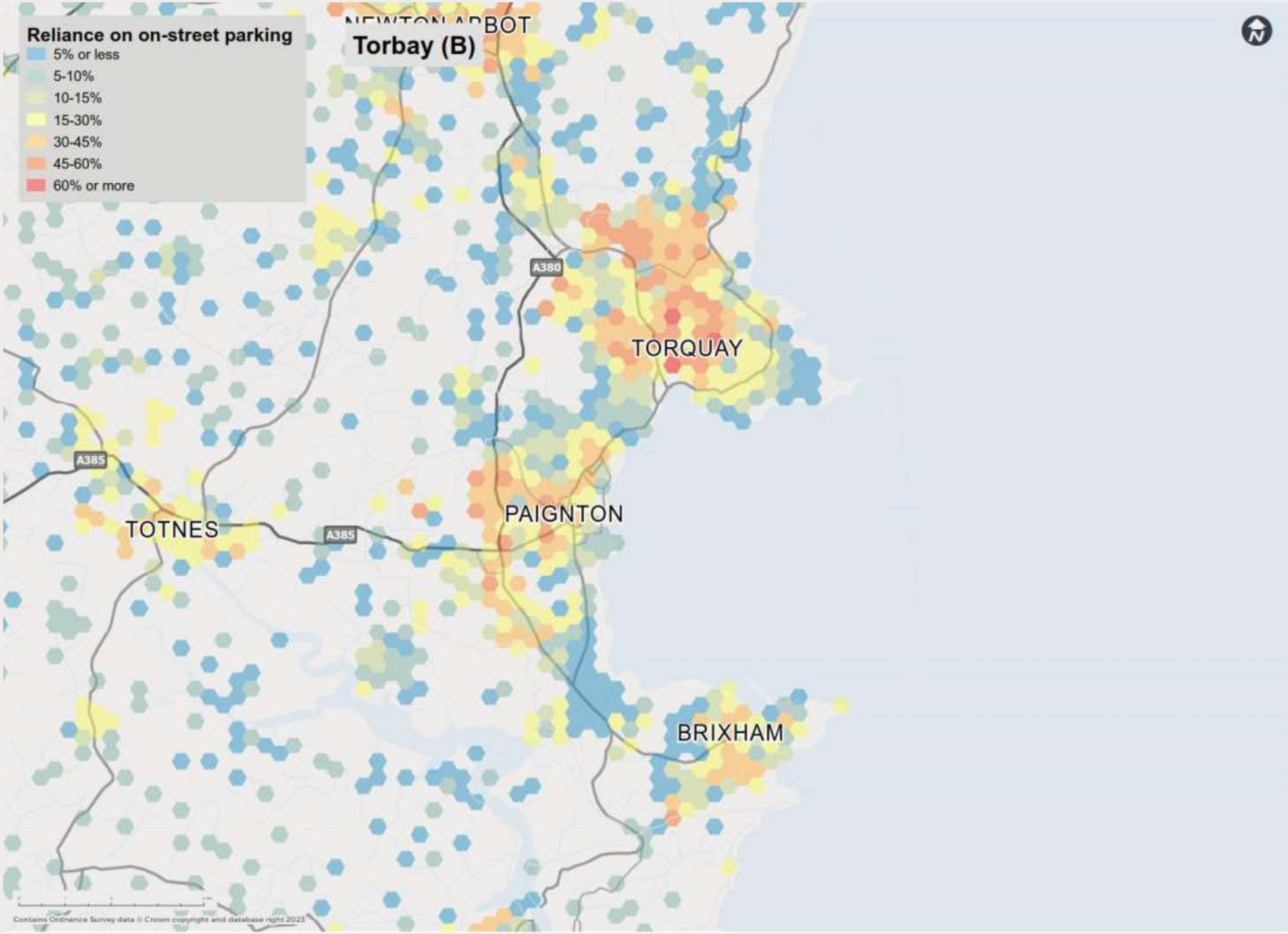

Figure Ap53: Reliance on On-Street Parking

Source: WSP EV:Ready

Somerset West and Taunton - Reliance on On-Street Parking

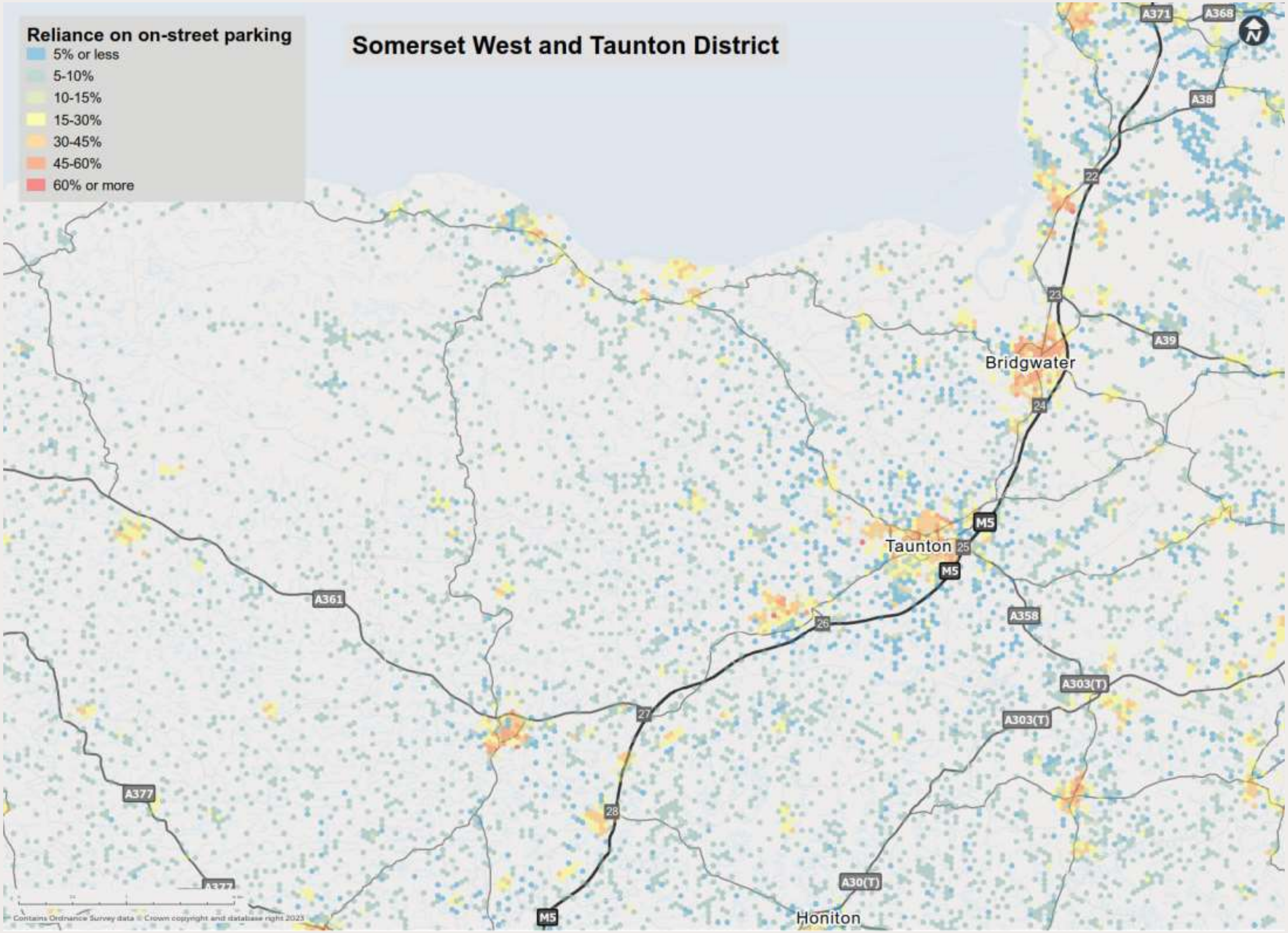

Figure Ap54: Reliance on On-Street Parking

Source: WSP EV:Ready

Bath and North East Somerset - Reliance on On-Street Parking

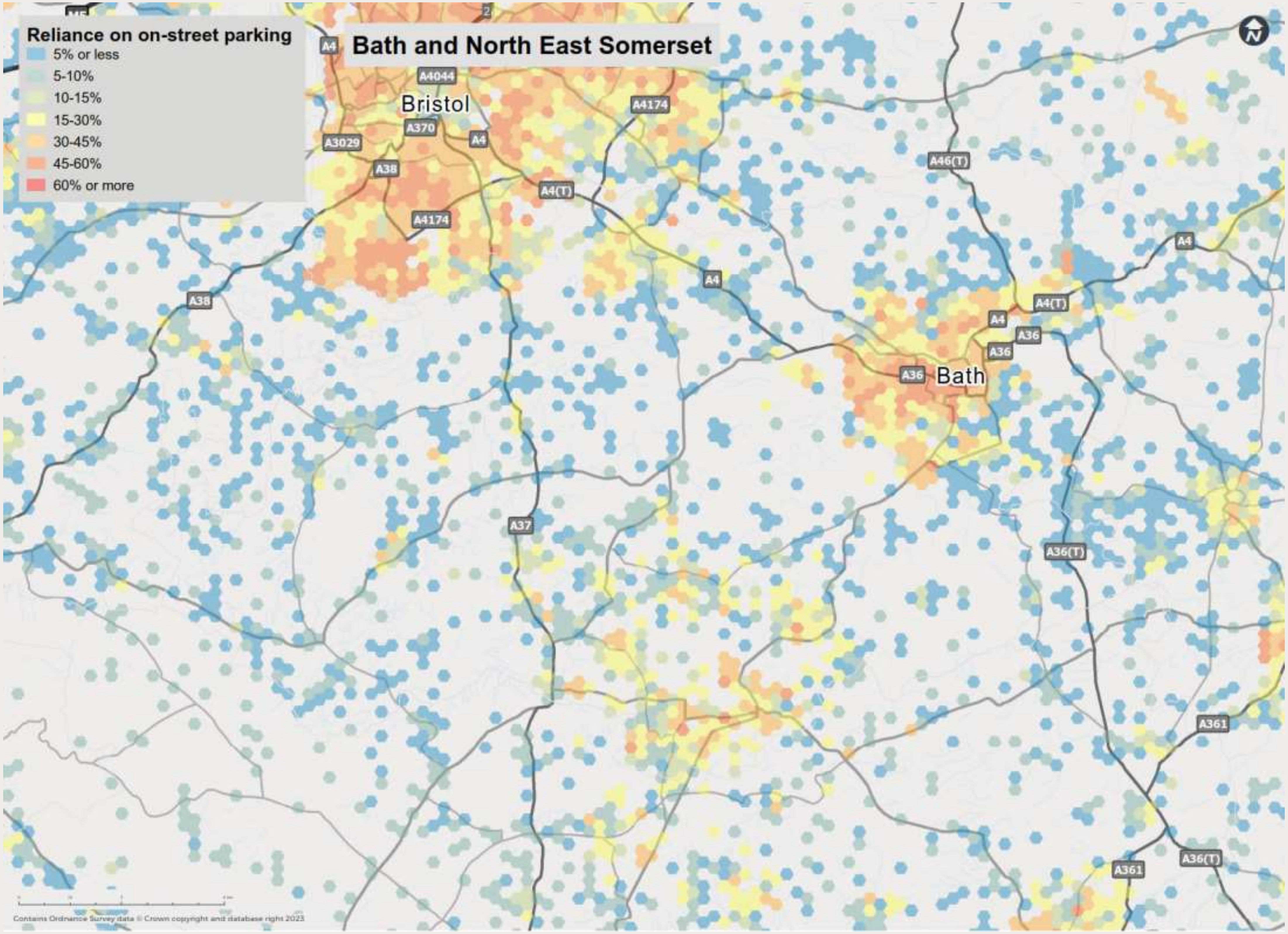

Figure Ap55: Reliance on On-Street Parking

Source: WSP EV:Ready

North Somerset - Reliance on On-Street Parking

Figure Ap56: Reliance on On-Street Parking

Source: WSP EV:Ready

South Somerset - Reliance on On-Street Parking

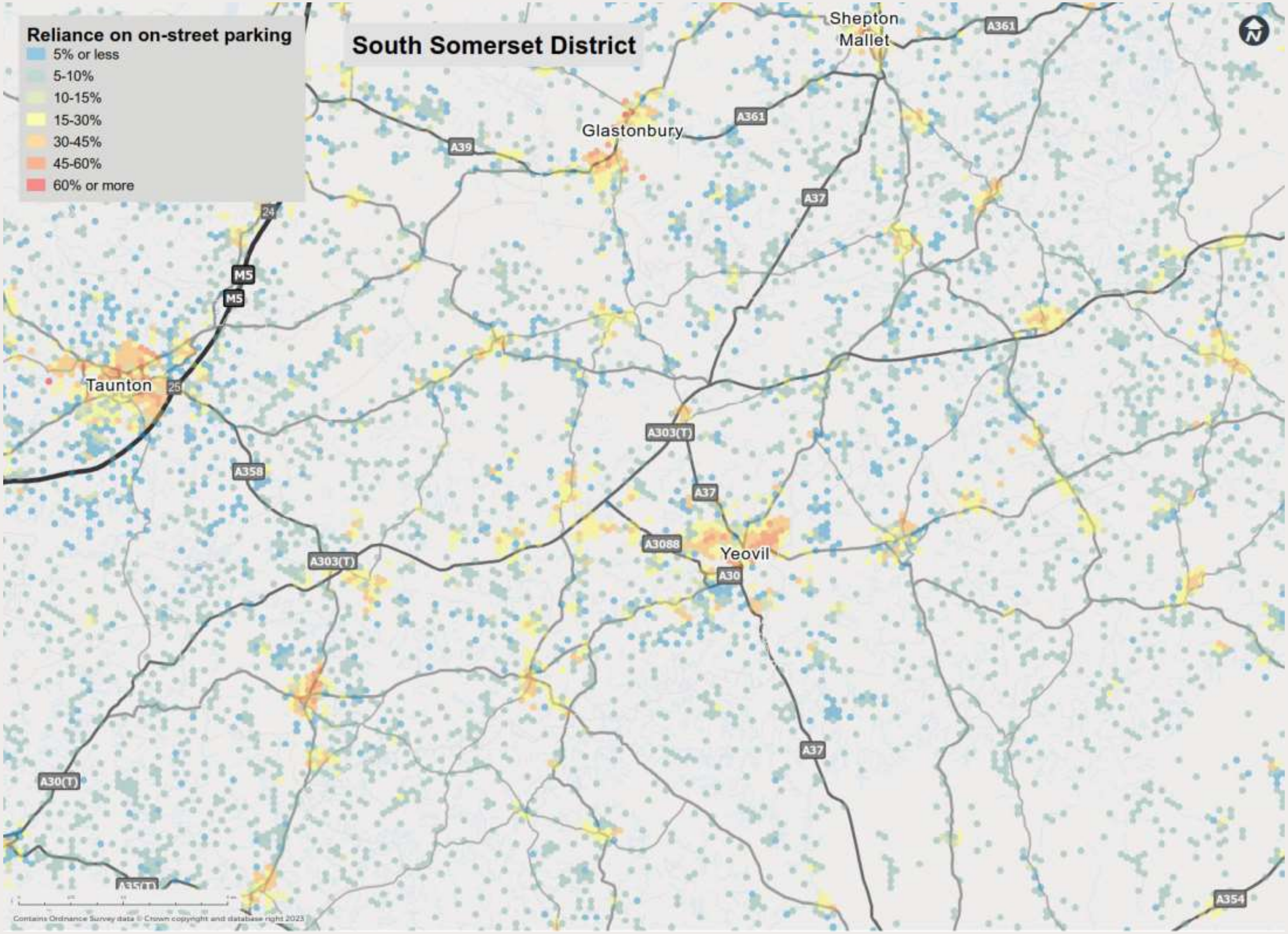

Figure Ap57: Reliance on On-Street Parking

Source: WSP EV:Ready

Bournemouth, Christchurch and Poole - Reliance on On-Street Parking

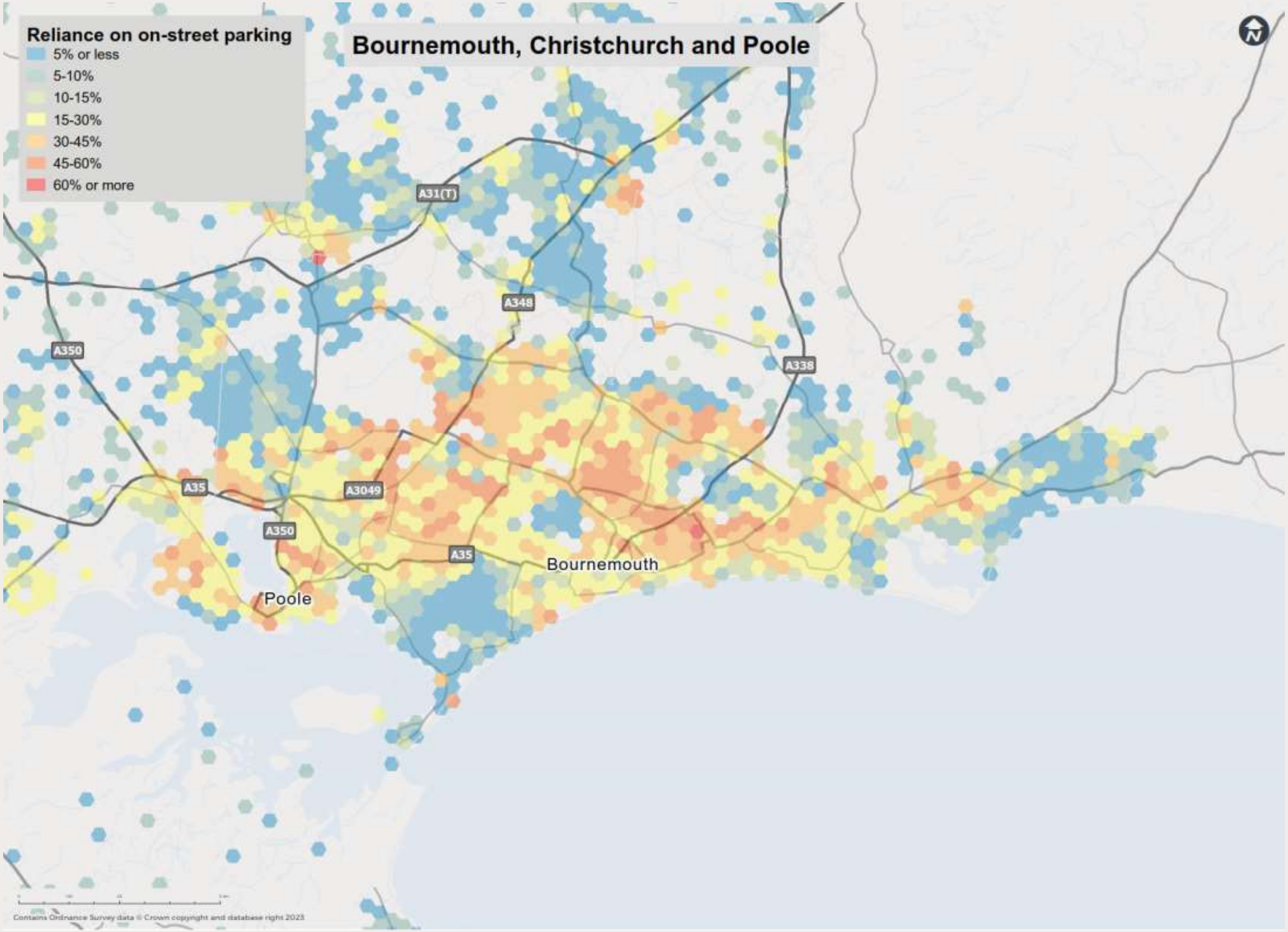

Figure Ap58: Reliance on On-Street Parking

Source: WSP EV:Ready

Dorset - Reliance on On-Street Parking

Figure Ap59: Reliance on On-Street Parking

Source: WSP EV:Ready

Gloucester - Reliance on On-Street Parking

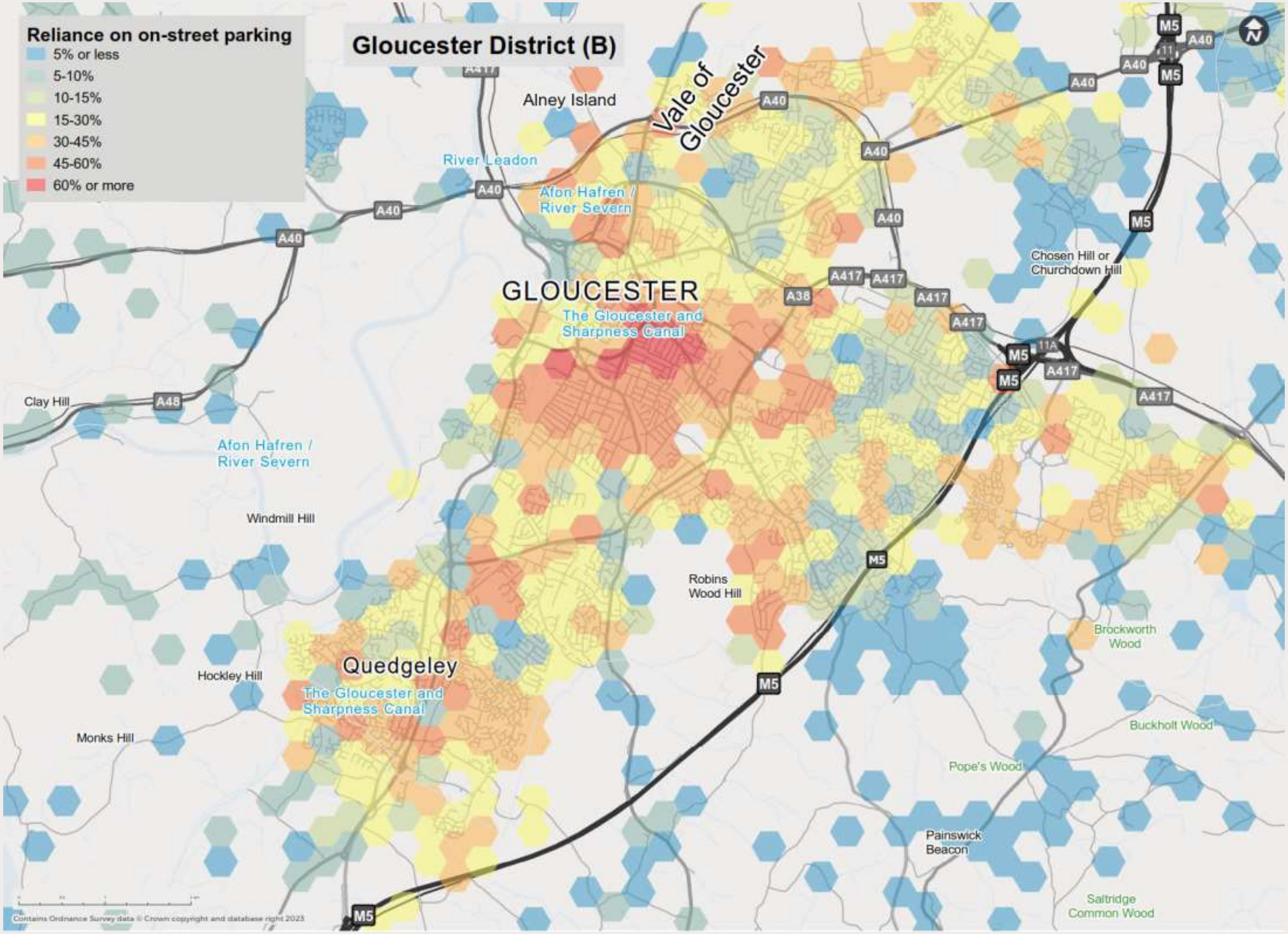

Figure Ap60: Reliance on On-Street Parking

Source: WSP EV:Ready

Cheltenham District - Reliance on On-Street Parking

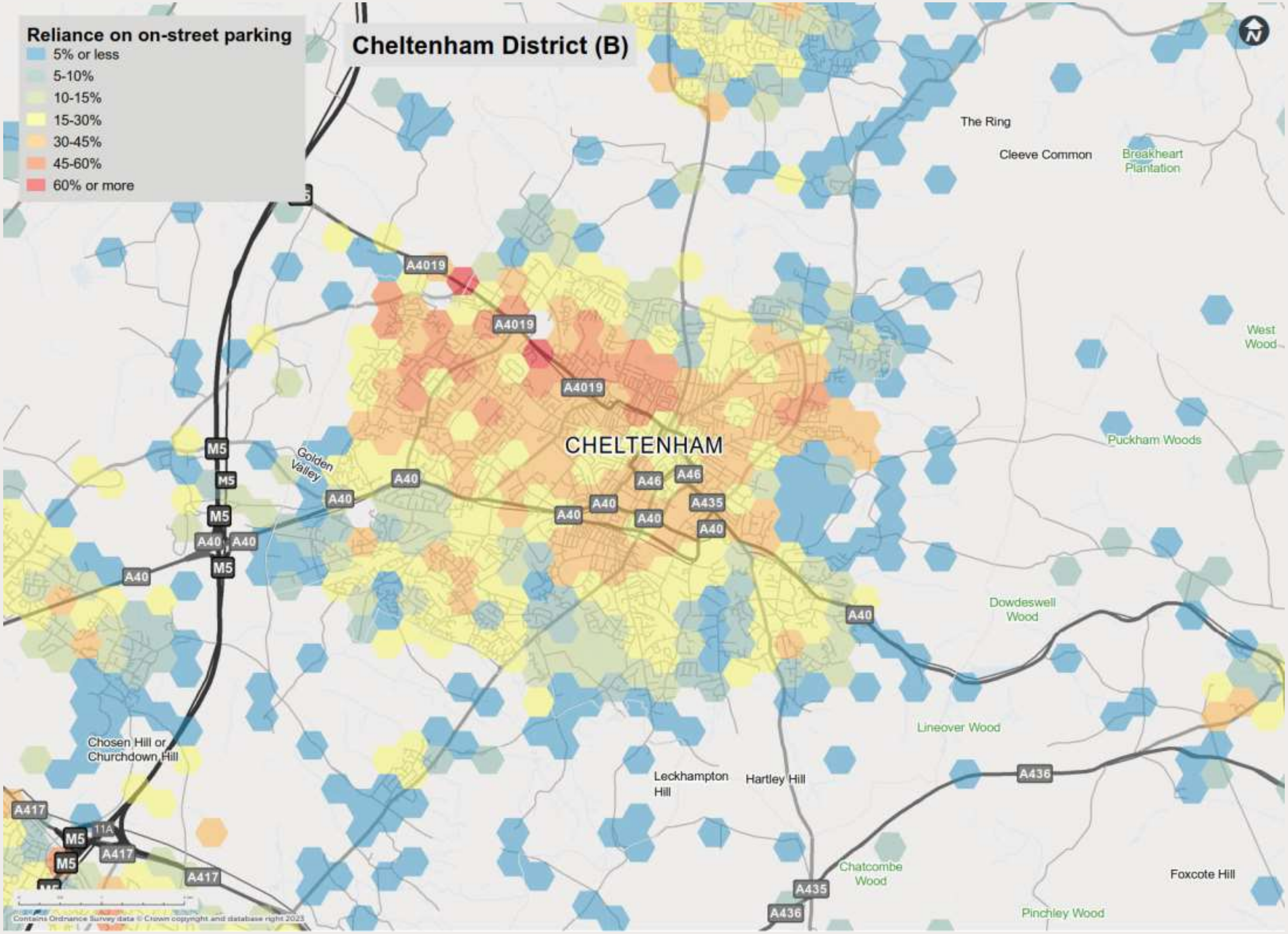

Figure Ap61: Reliance on On-Street Parking

Source: WSP EV:Ready

Stroud - Reliance on On-Street Parking

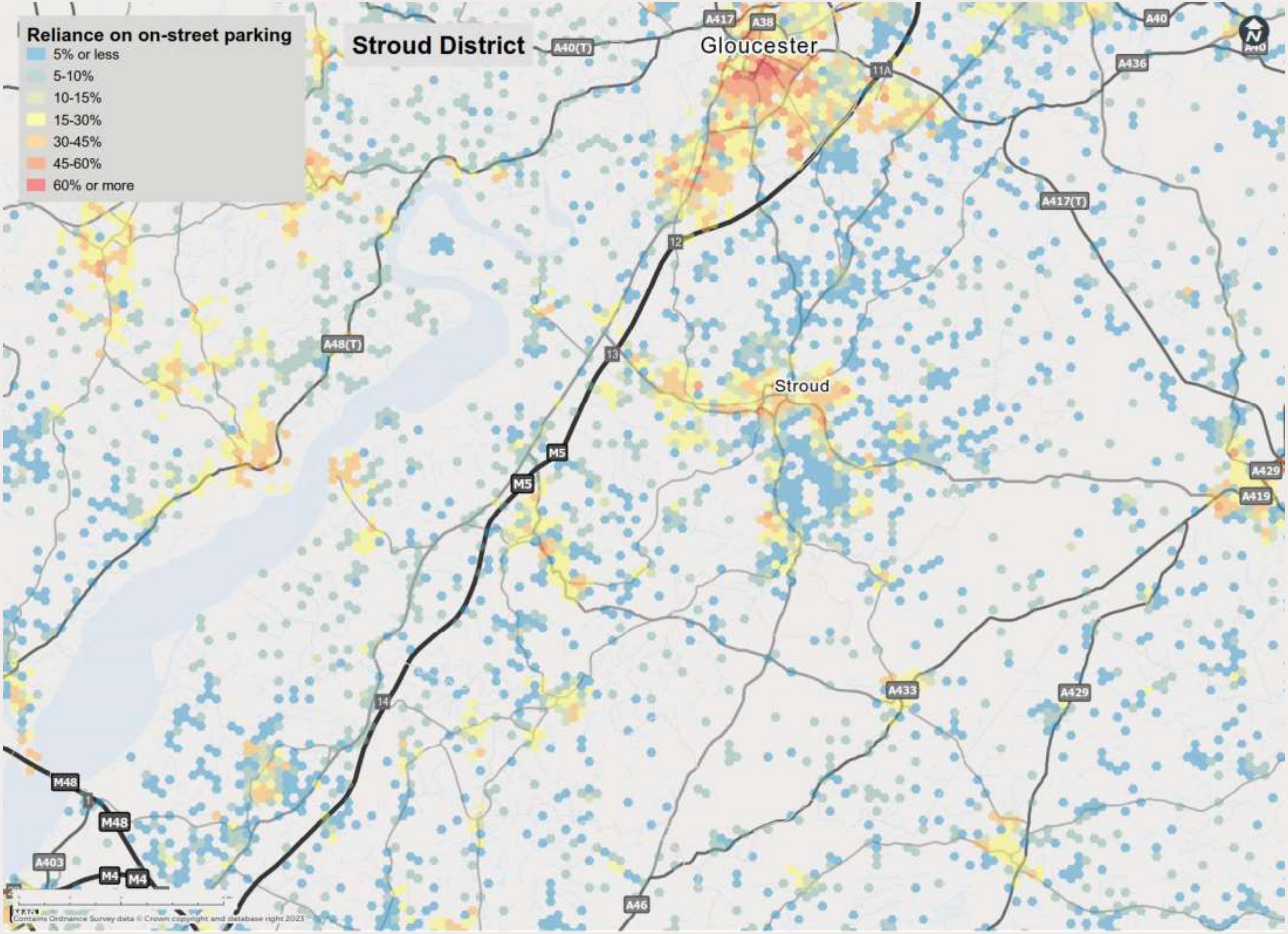

Figure Ap62: Reliance on On-Street Parking

Source: WSP EV:Ready

Cotswold District - Reliance on On-Street Parking

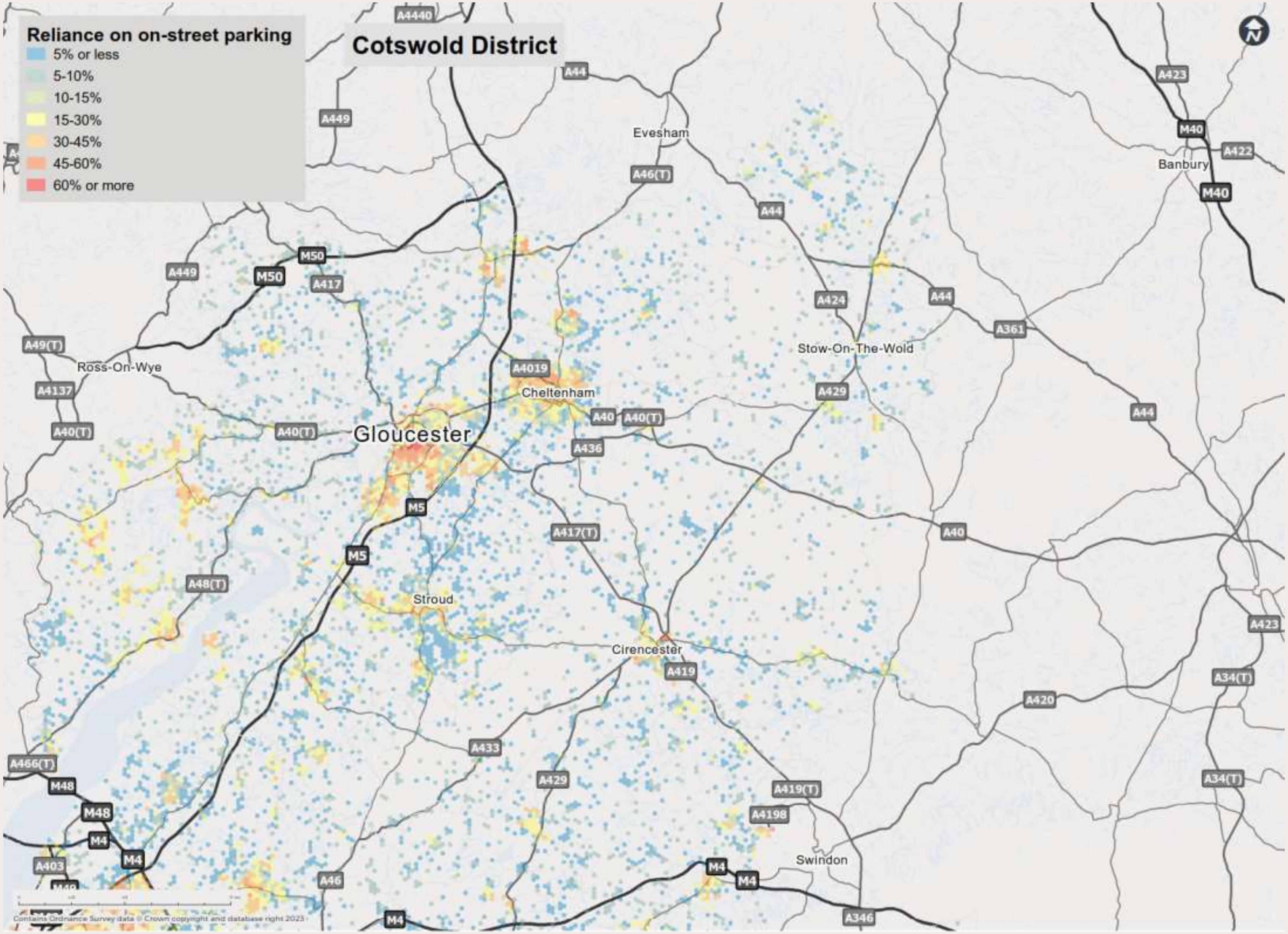

Figure Ap63: Reliance on On-Street Parking

Source: WSP EV:Ready

Forest of Dean - Reliance on On-Street Parking

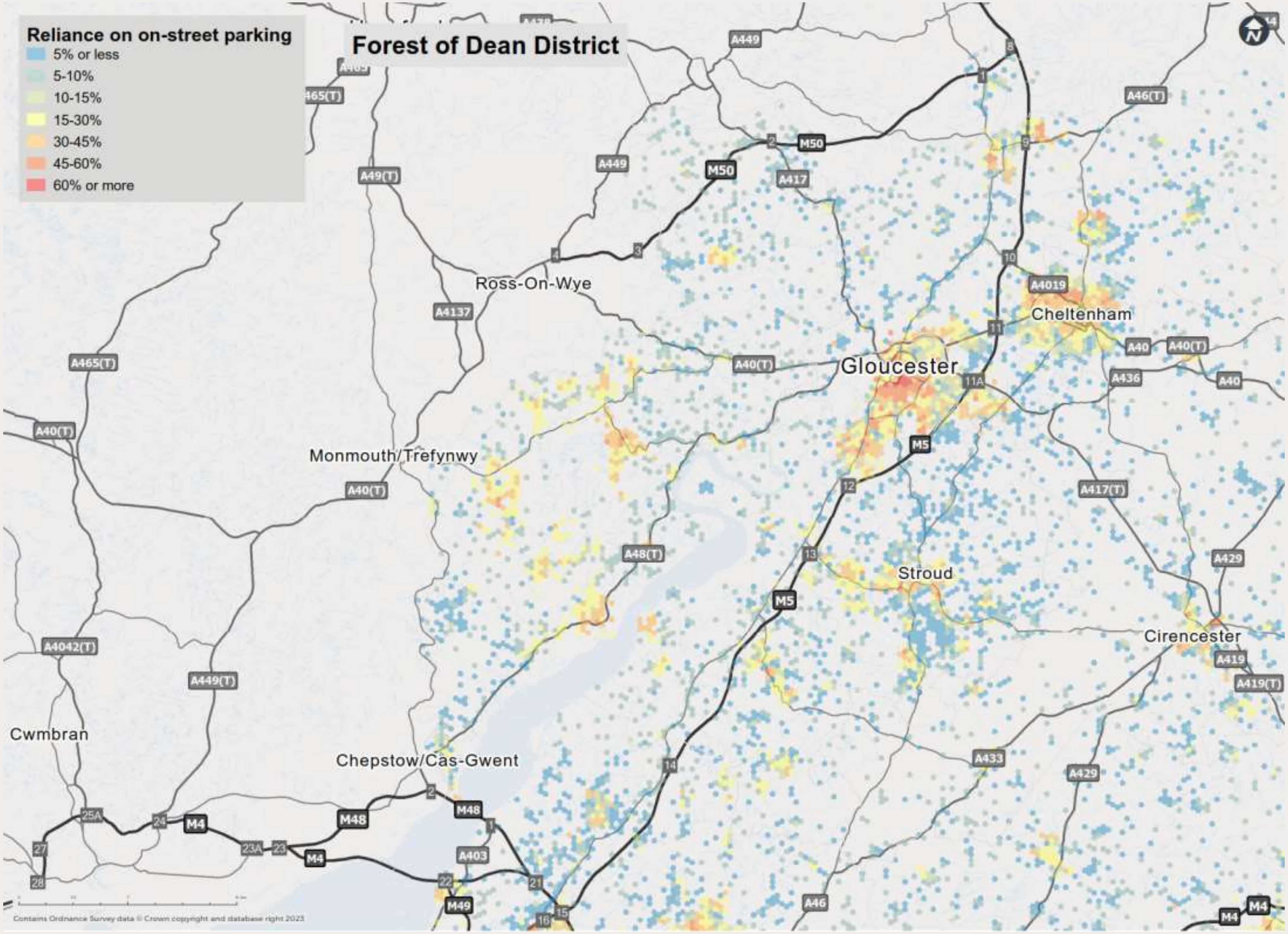

Figure Ap64: Reliance on On-Street Parking

Source: WSP EV:Ready

Tewkesbury - Reliance on On-Street Parking

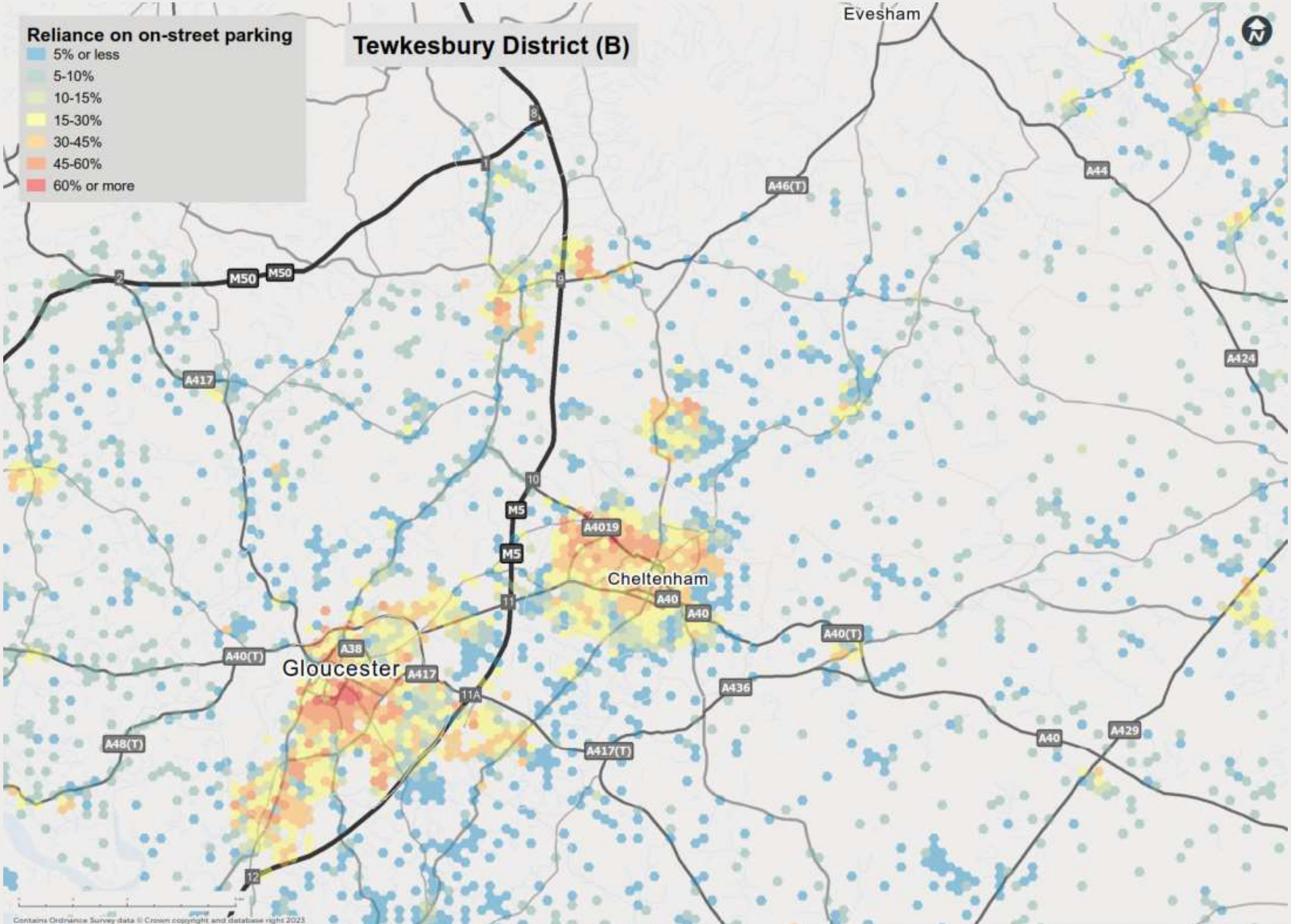

Figure Ap65: Reliance on On-Street Parking

Source: WSP EV:Ready

Wiltshire - Reliance on On-Street Parking

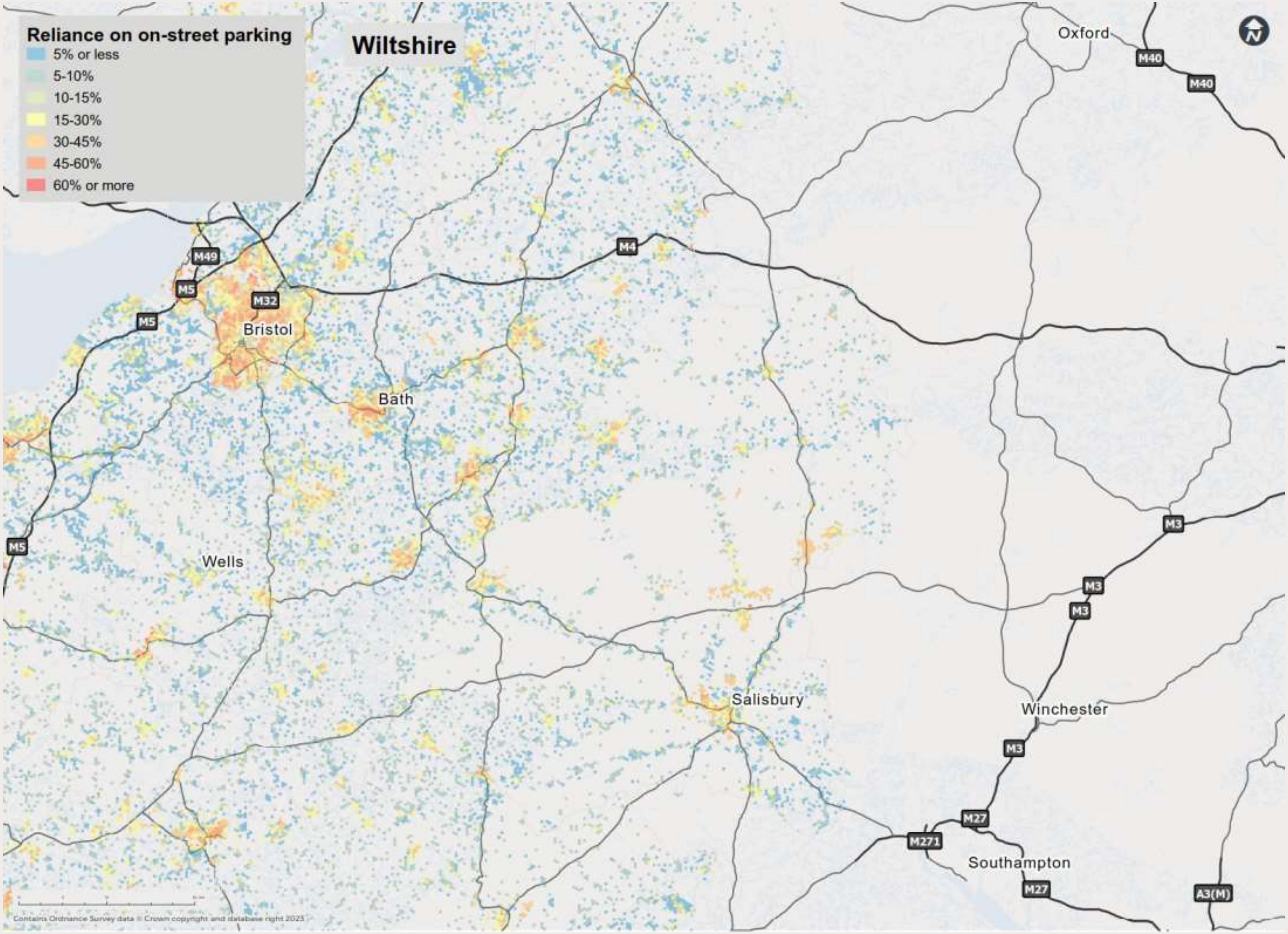

Figure Ap66: Reliance on On-Street Parking

Source: WSP EV:Ready

City of Bristol - Reliance on On-Street Parking

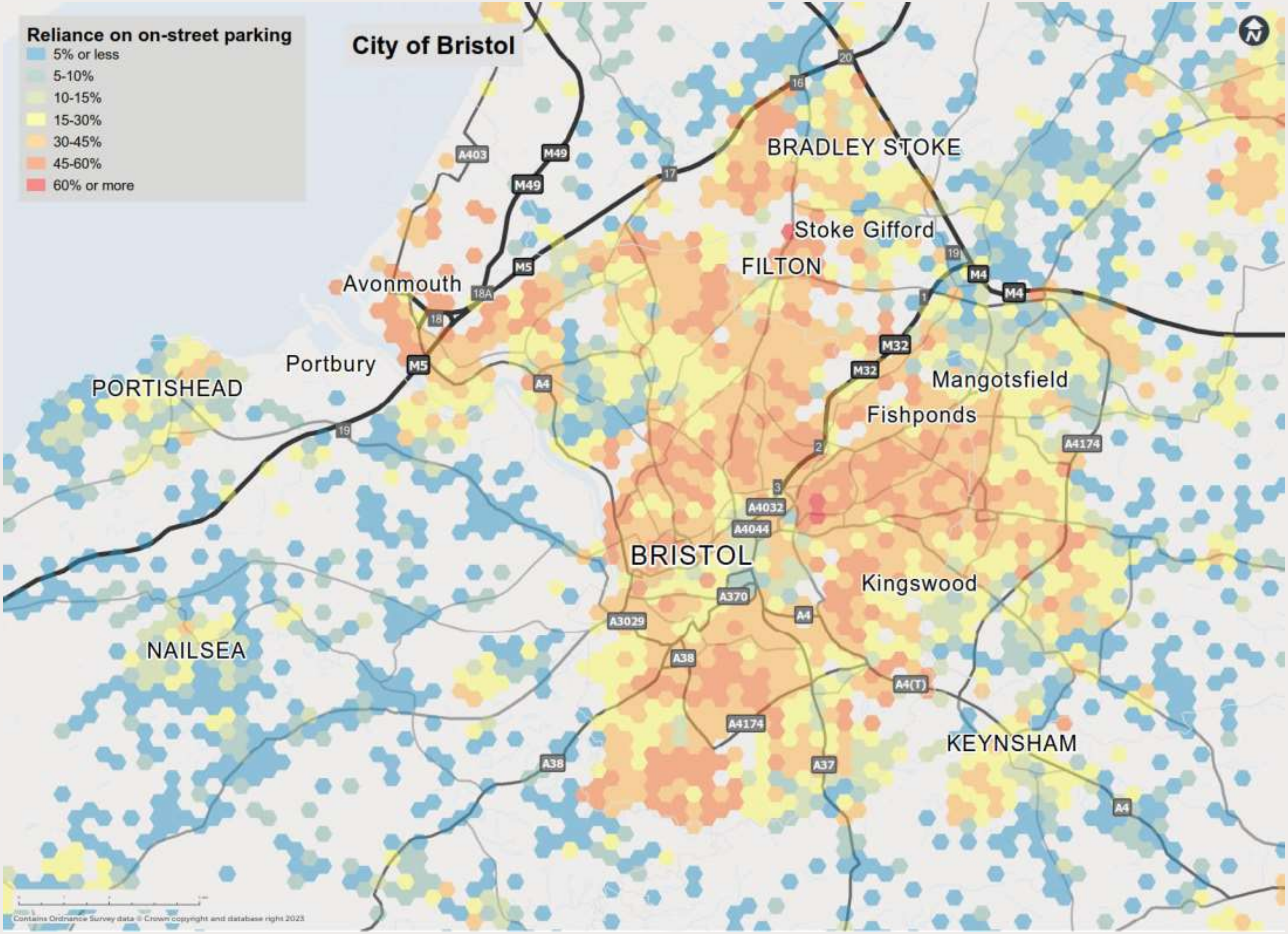

Figure Ap67: Reliance on On-Street Parking

Source: WSP EV:Ready

South Gloucestershire - Reliance on On-Street Parking

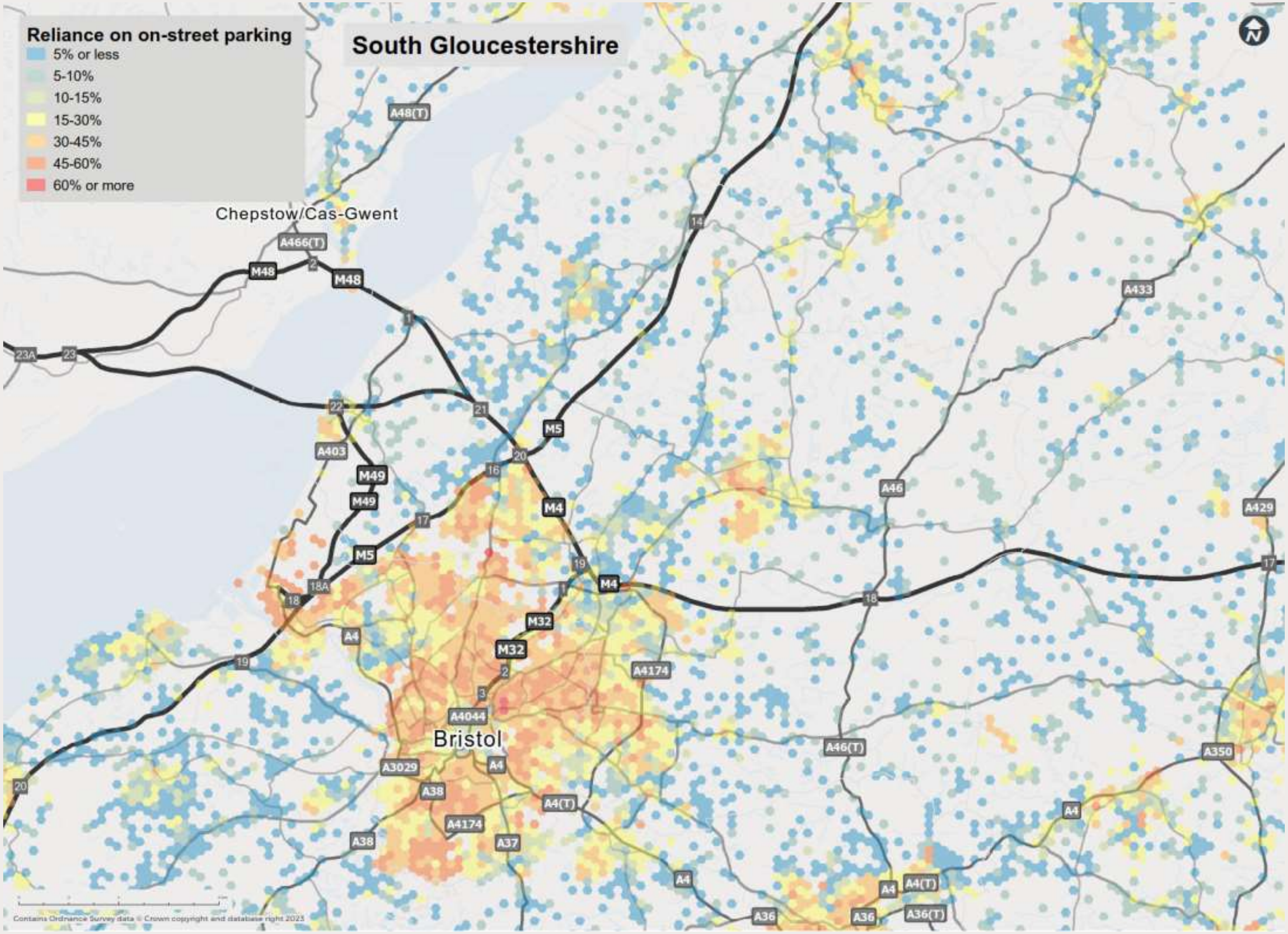

Figure Ap68: Reliance on On-Street Parking

Source: WSP EV:Ready

APPENDIX D

Mapping - Priority locations for installation by local authorities

Plymouth – High priority locations for the installation of EV chargepoints

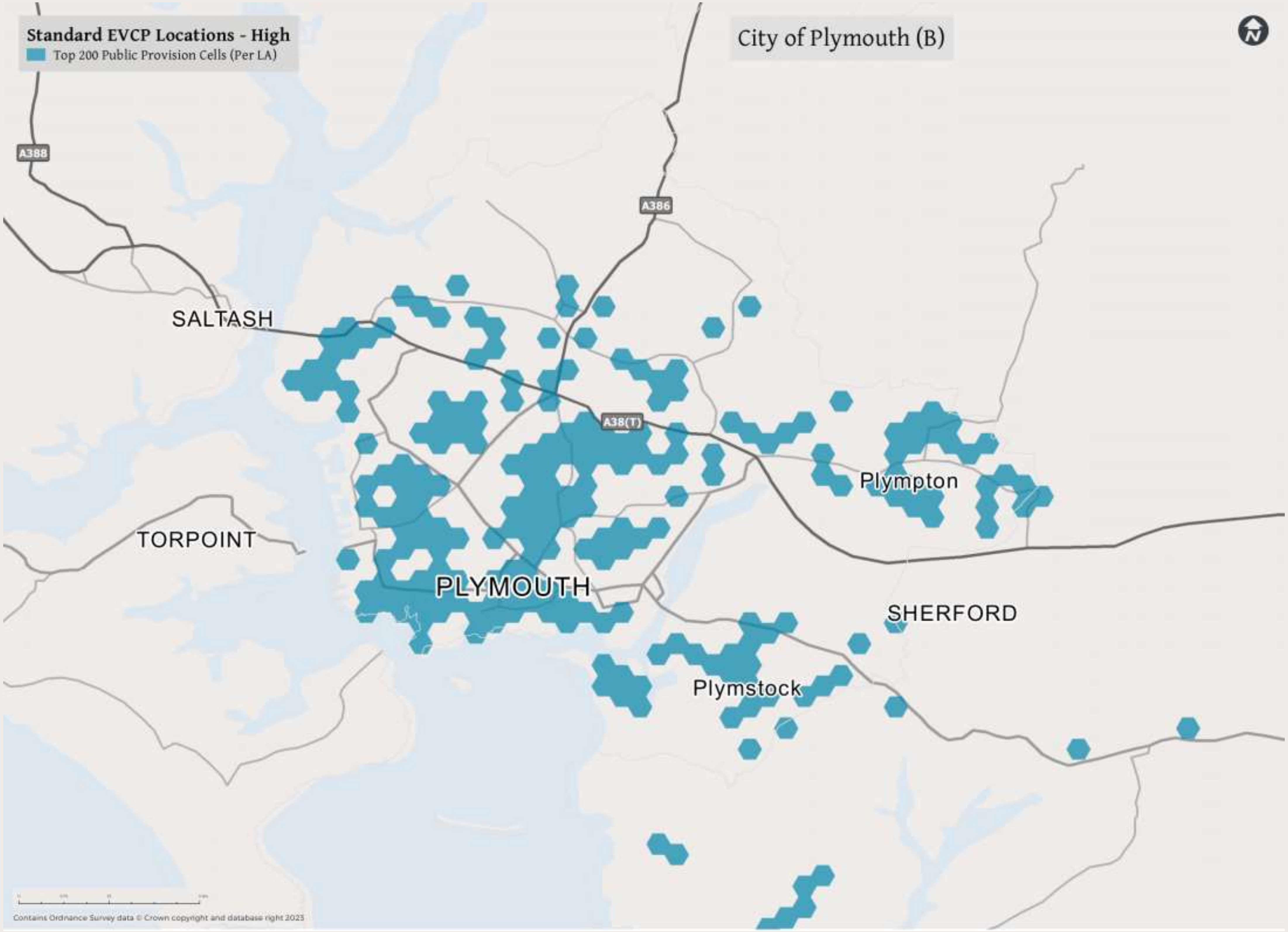

Figure Ap69: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Bournemouth, Christchurch and Poole - High priority locations for the installation of EV chargepoints

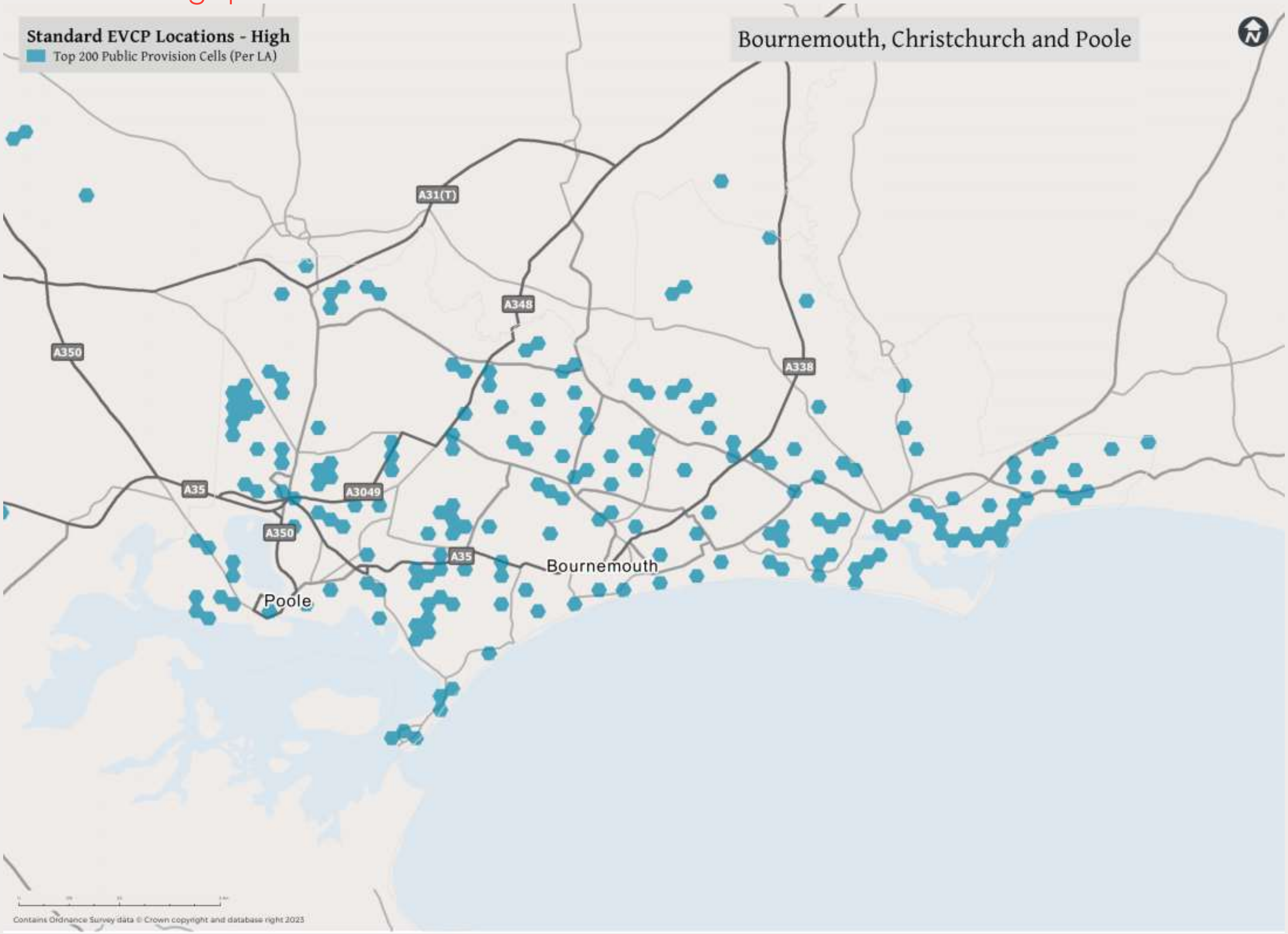

Figure Ap70: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Somerset - High priority locations for the installation of EV chargepoints

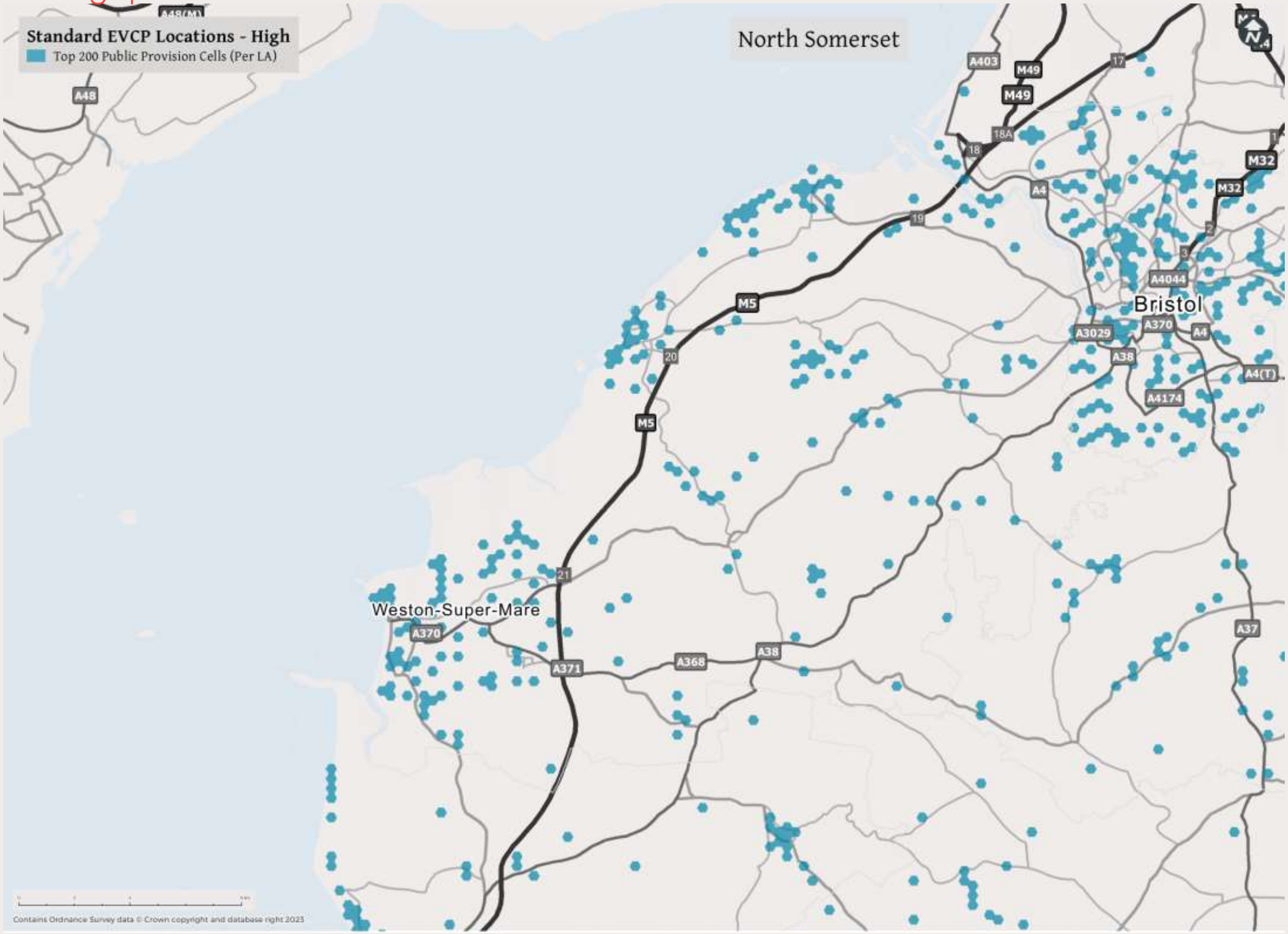

Figure Ap71: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Gloucester - High priority locations for the installation of EV chargepoints

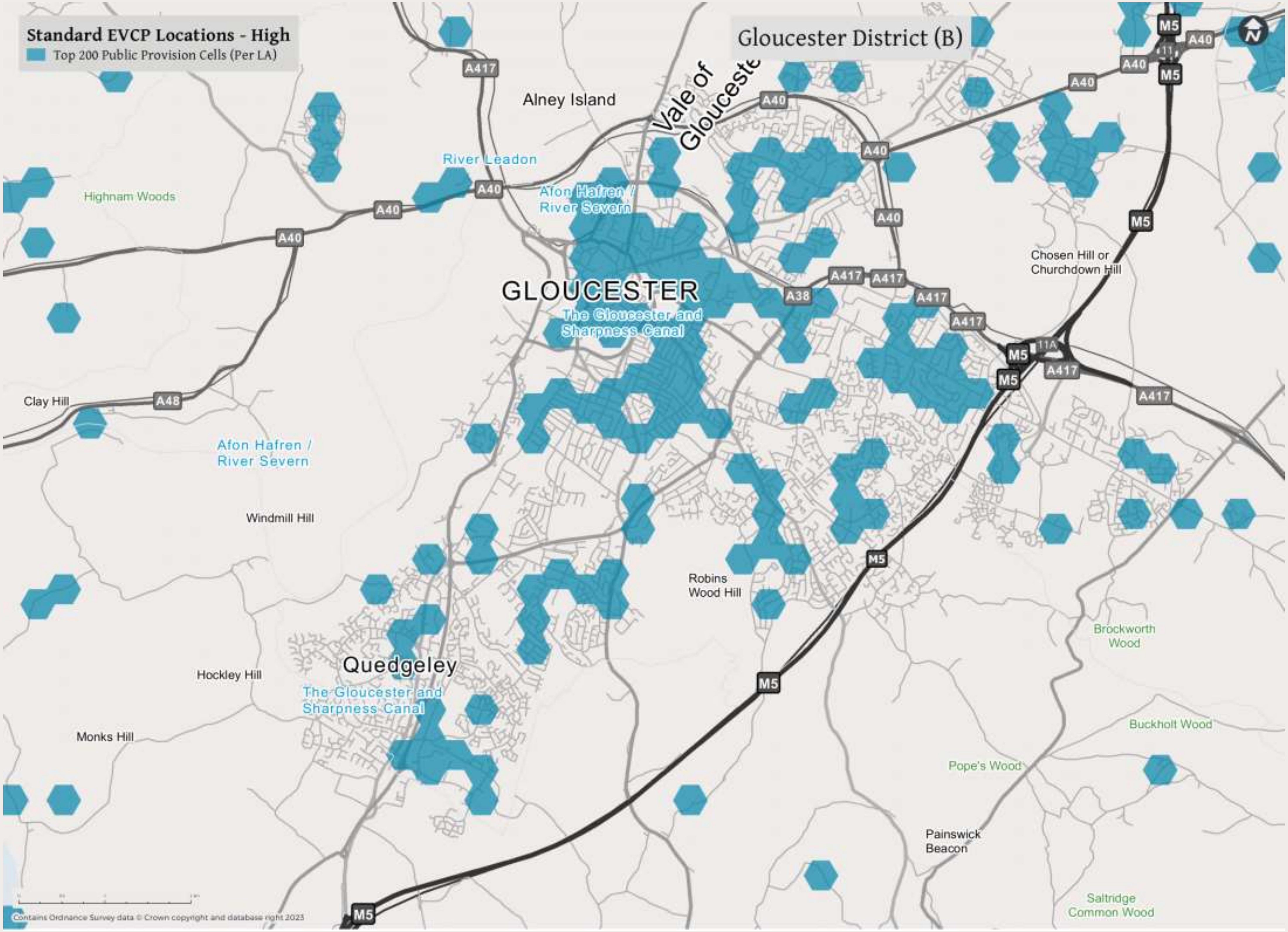

Figure Ap72: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

City of Bristol - High priority locations for the installation of EV chargepoints

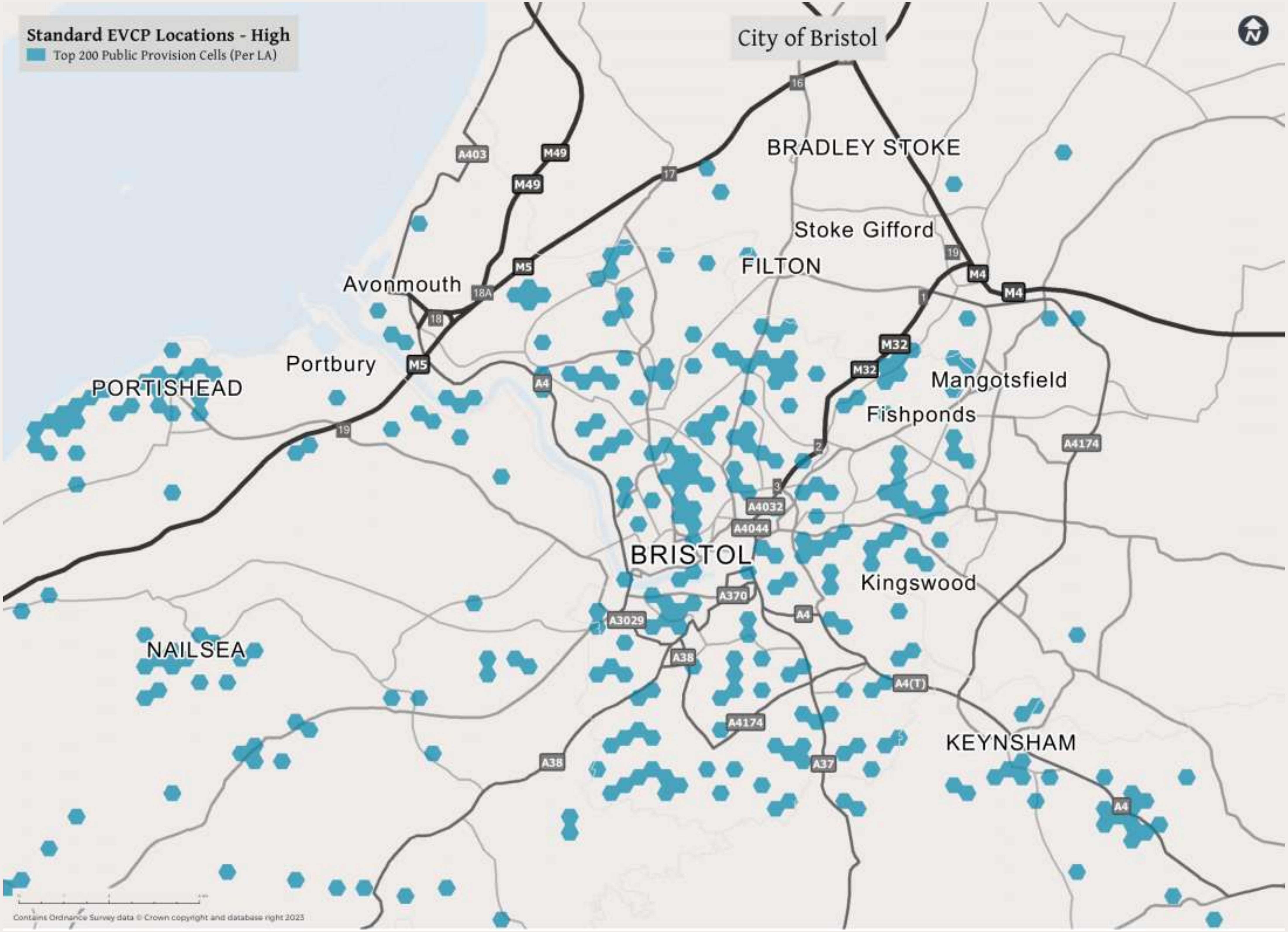

Figure Ap73: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

South Gloucestershire - High priority locations for the installation of EV chargepoints

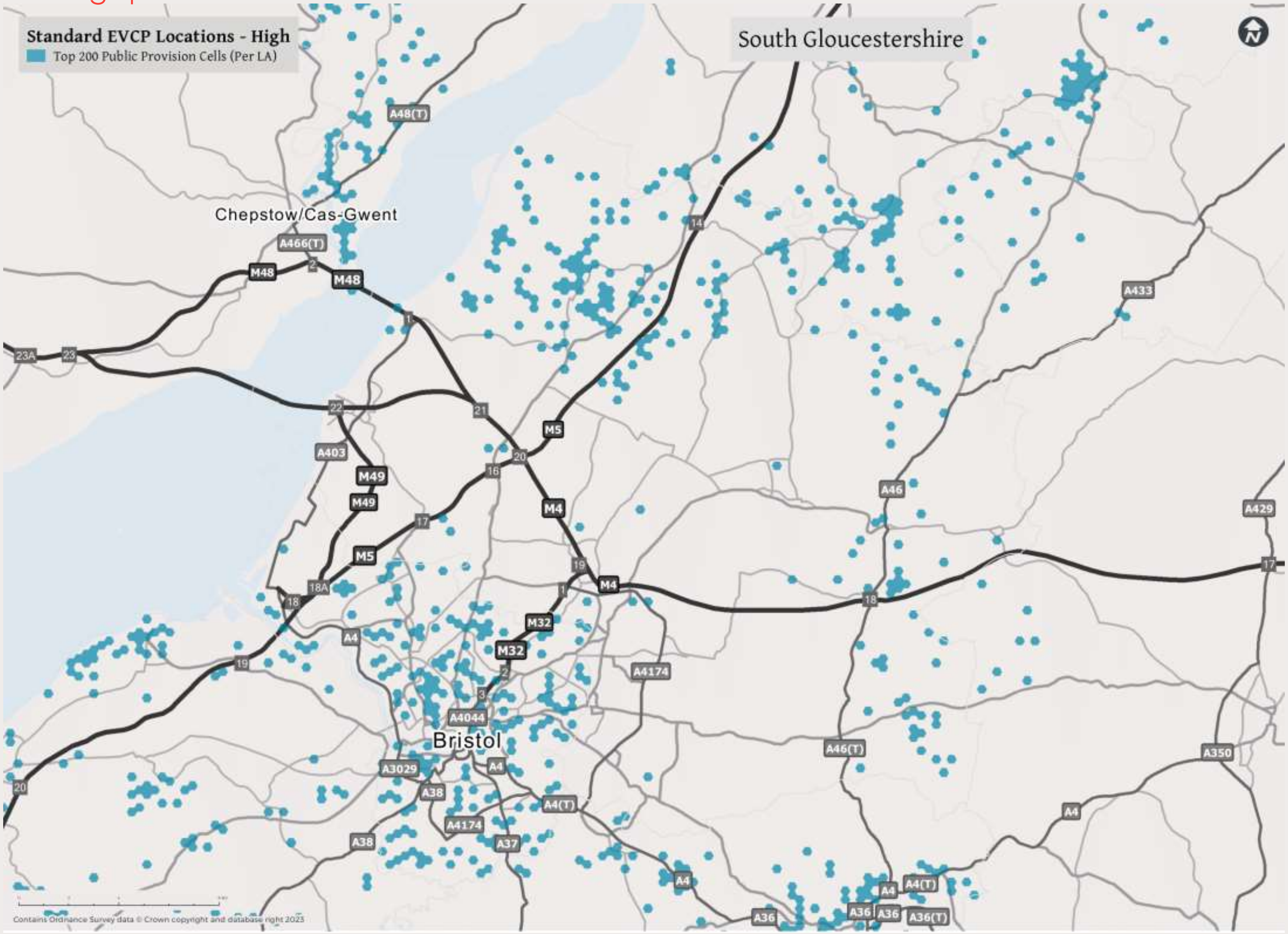

Figure Ap74: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Cornwall – High priority locations for the installation of EV chargepoints

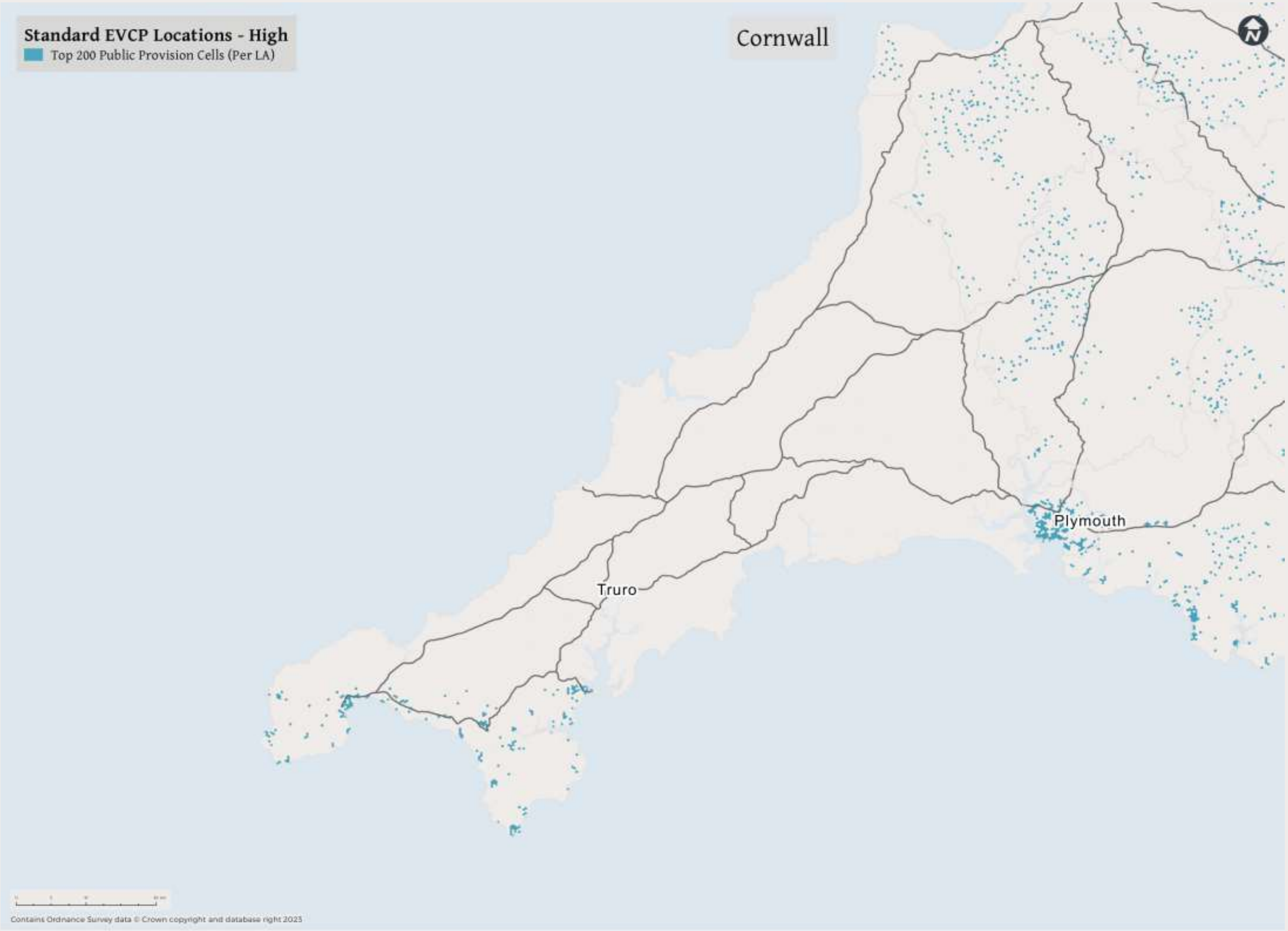

Figure Ap75: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

East Devon - High priority locations for the installation of EV chargepoints

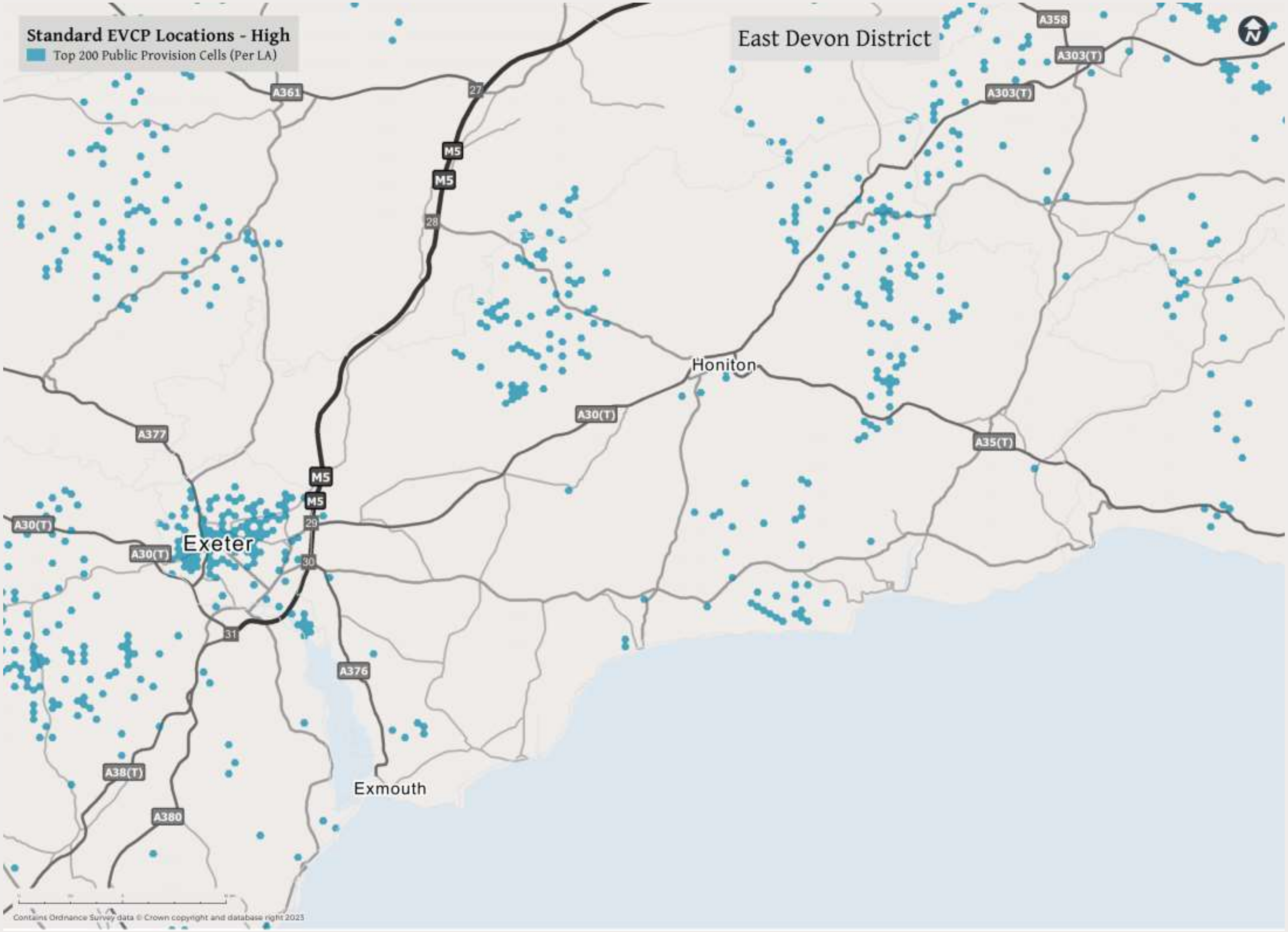

Figure Ap76: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Mid Devon - High priority locations for the installation of EV chargepoints

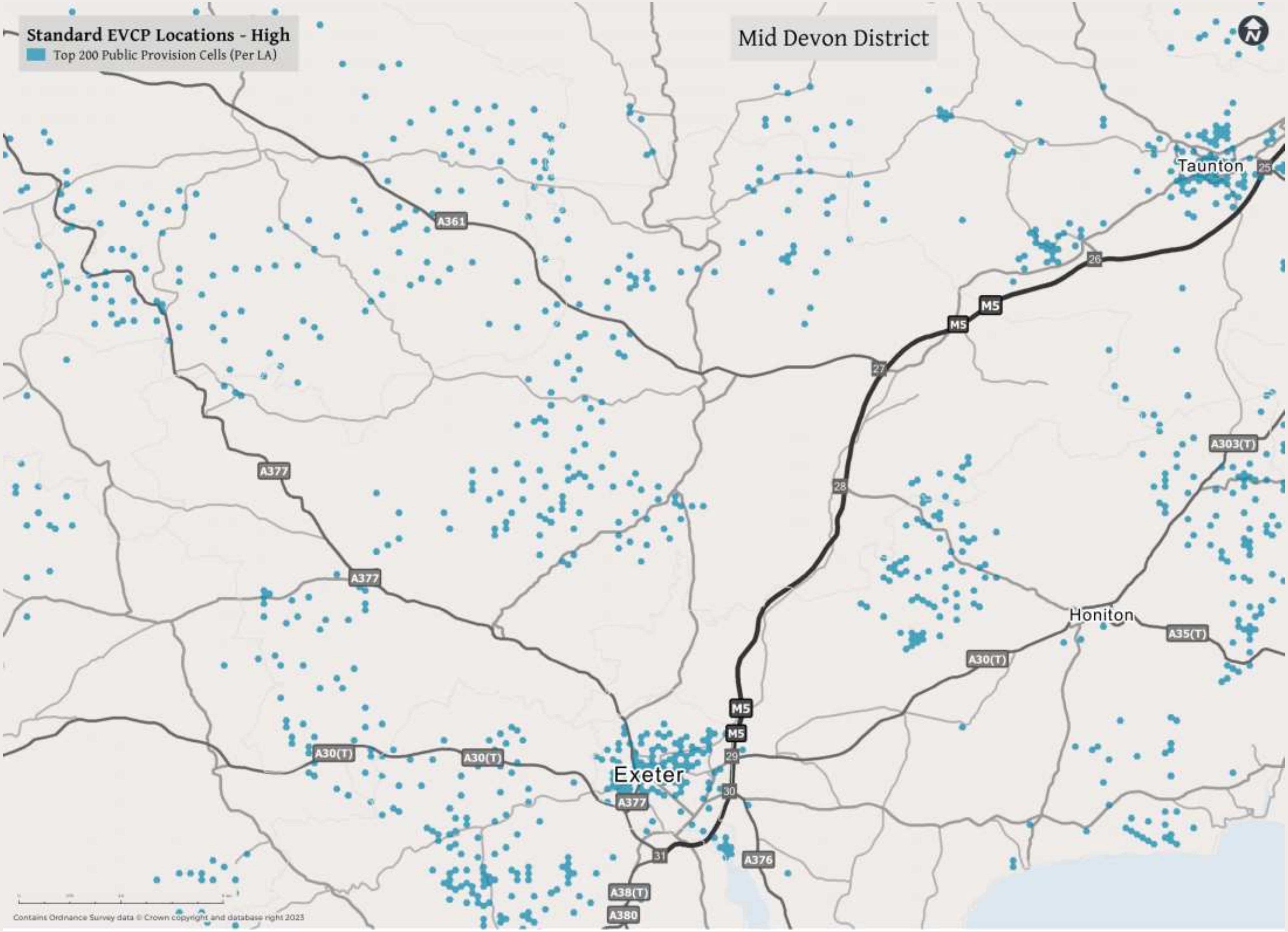

Figure Ap77: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Devon - High priority locations for the installation of EV chargepoints

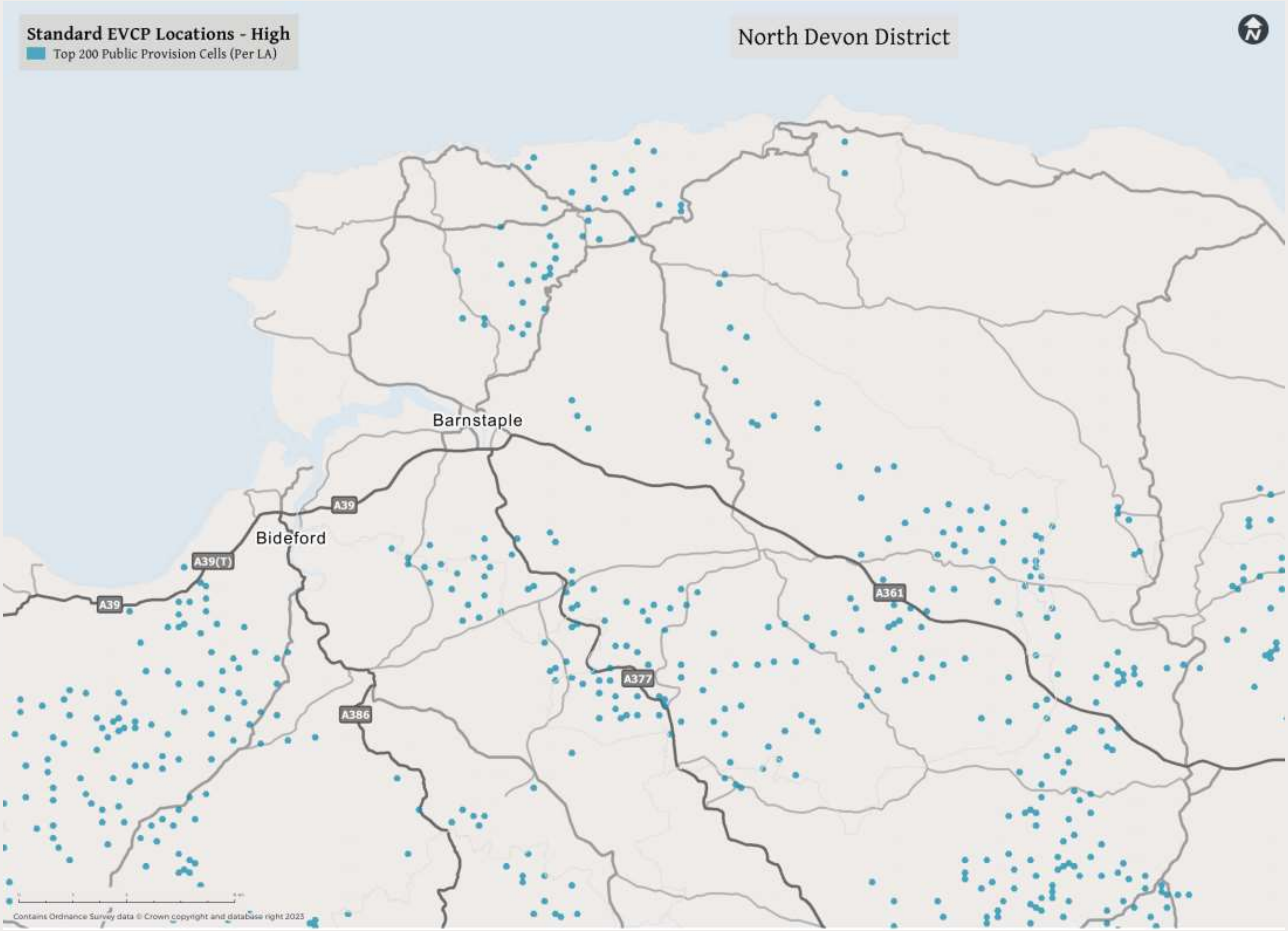

Figure Ap78: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Somerset West and Taunton- High priority locations for the installation of EV chargepoints

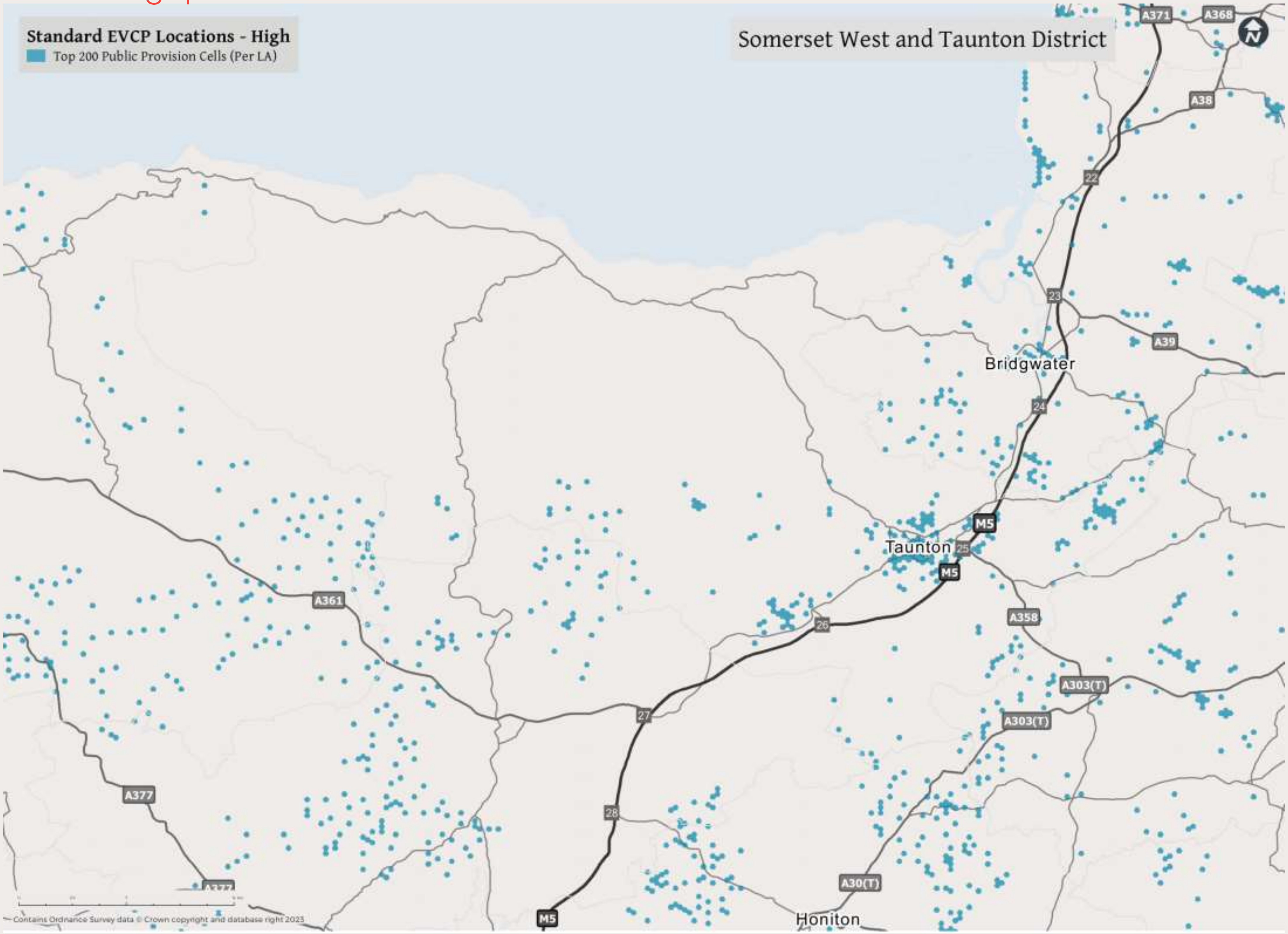

Figure Ap79: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Bath and North East Somerset - High priority locations for the installation of EV chargepoints

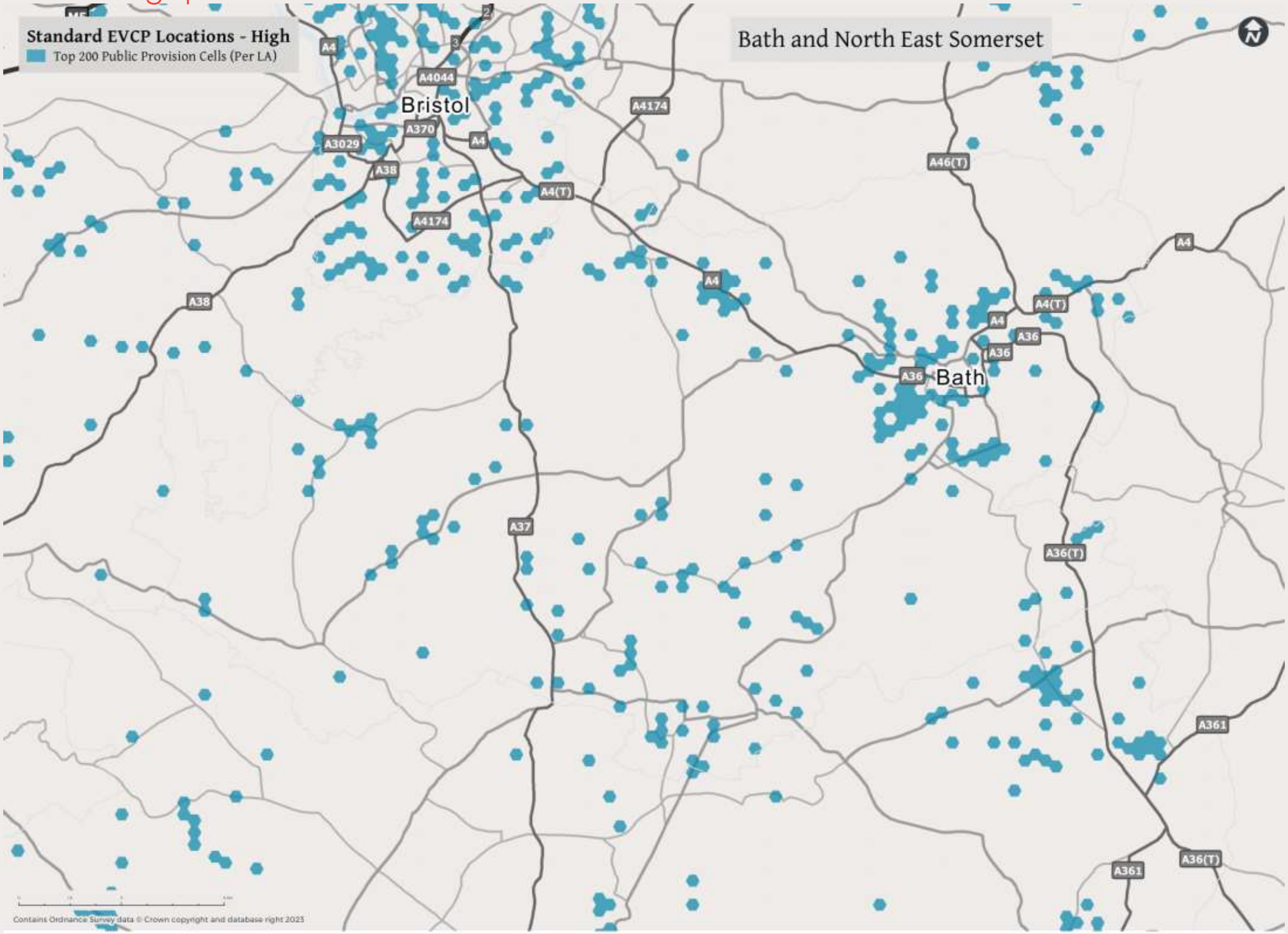

Figure Ap80: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Somerset - High priority locations for the installation of EV chargepoints

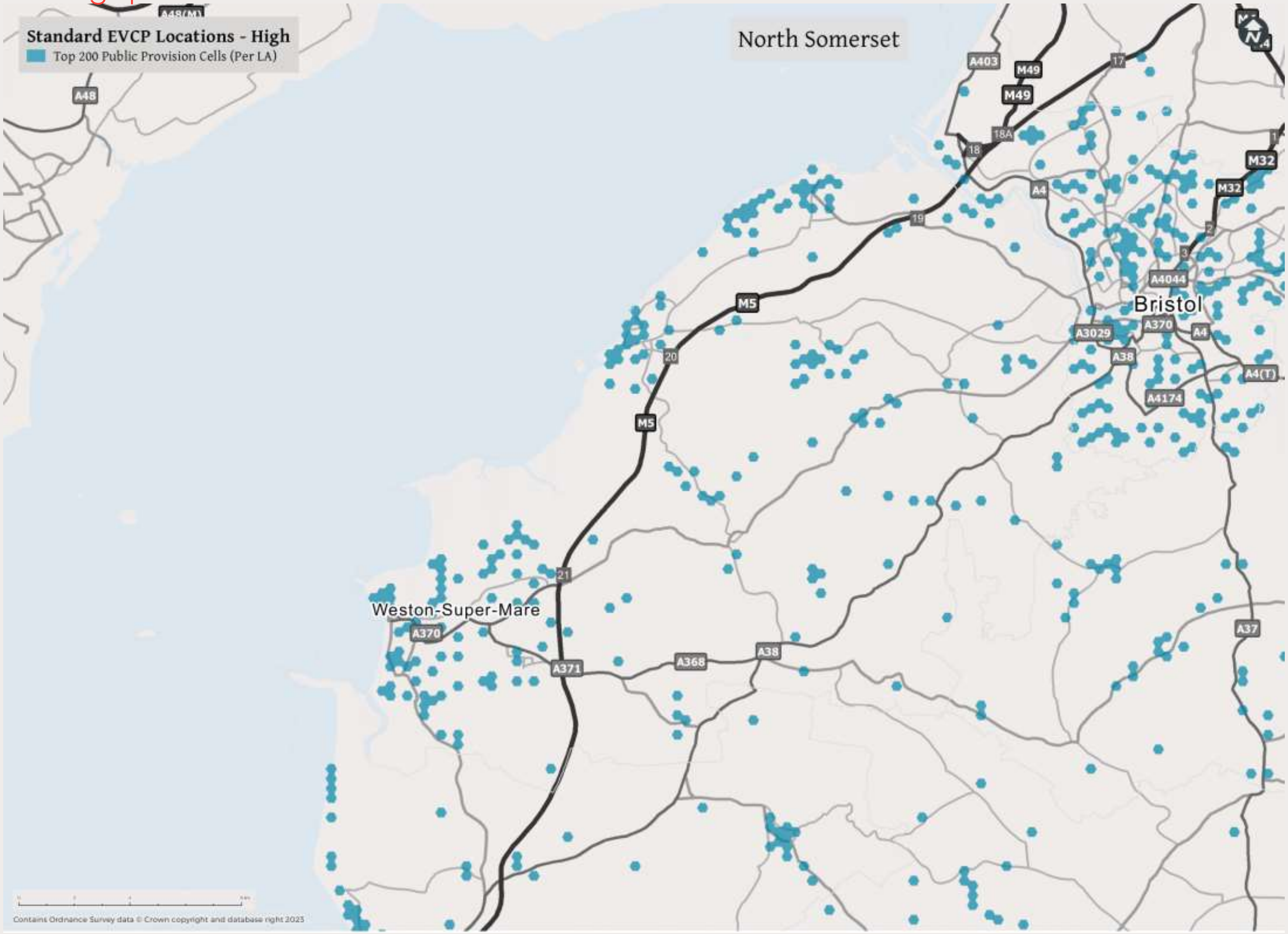

Figure Ap81: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Dorset - High priority locations for the installation of EV chargepoints

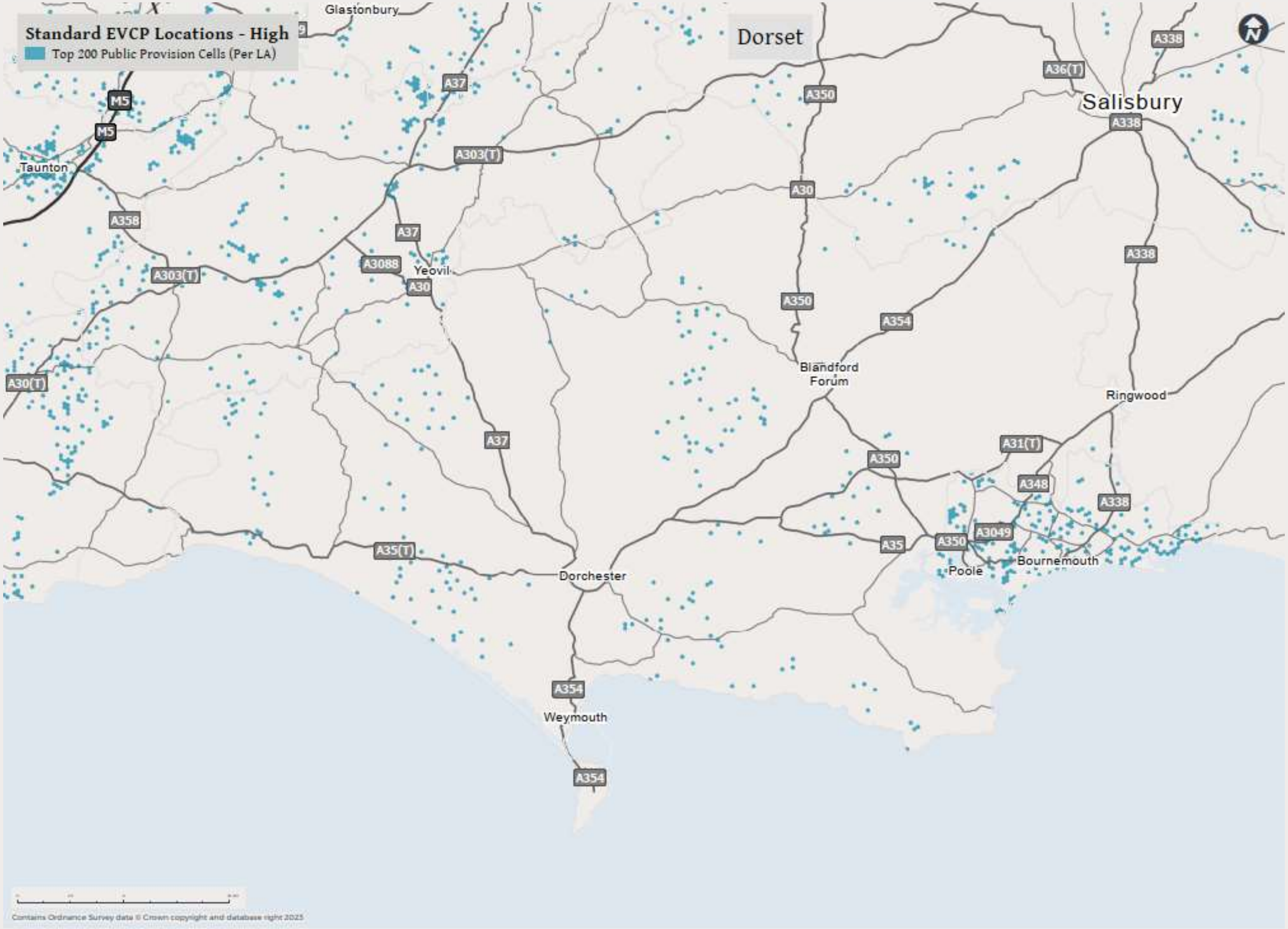

Figure Ap82: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Plymouth – High priority locations for the installation of EV chargepoints

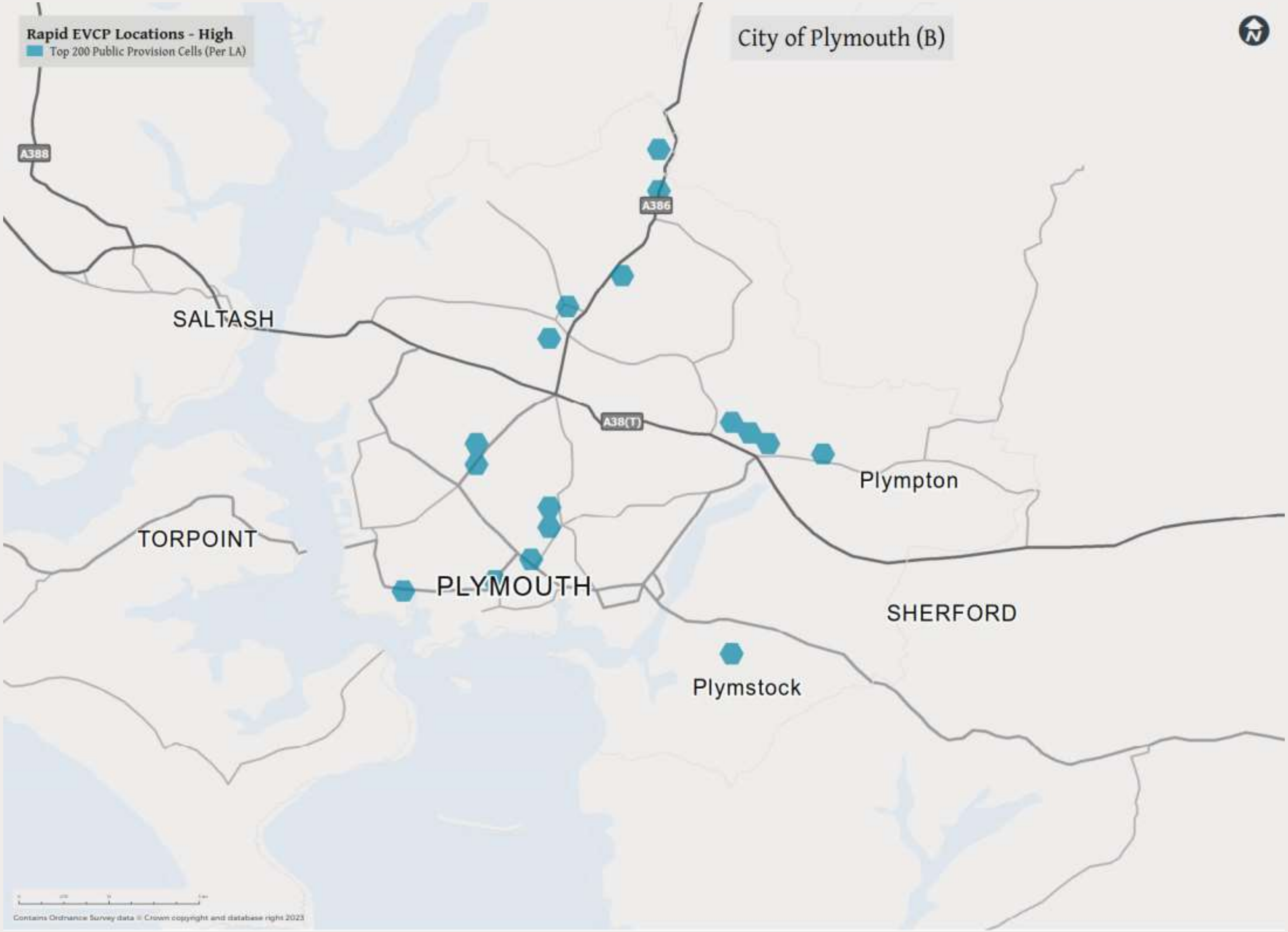

Figure Ap83: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Bournemouth, Christchurch and Poole - High priority locations for the installation of EV chargepoints

Figure Ap84: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Somerset - High priority locations for the installation of EV chargepoints

Figure Ap85: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Gloucestershire - High priority locations for the installation of EV chargepoints

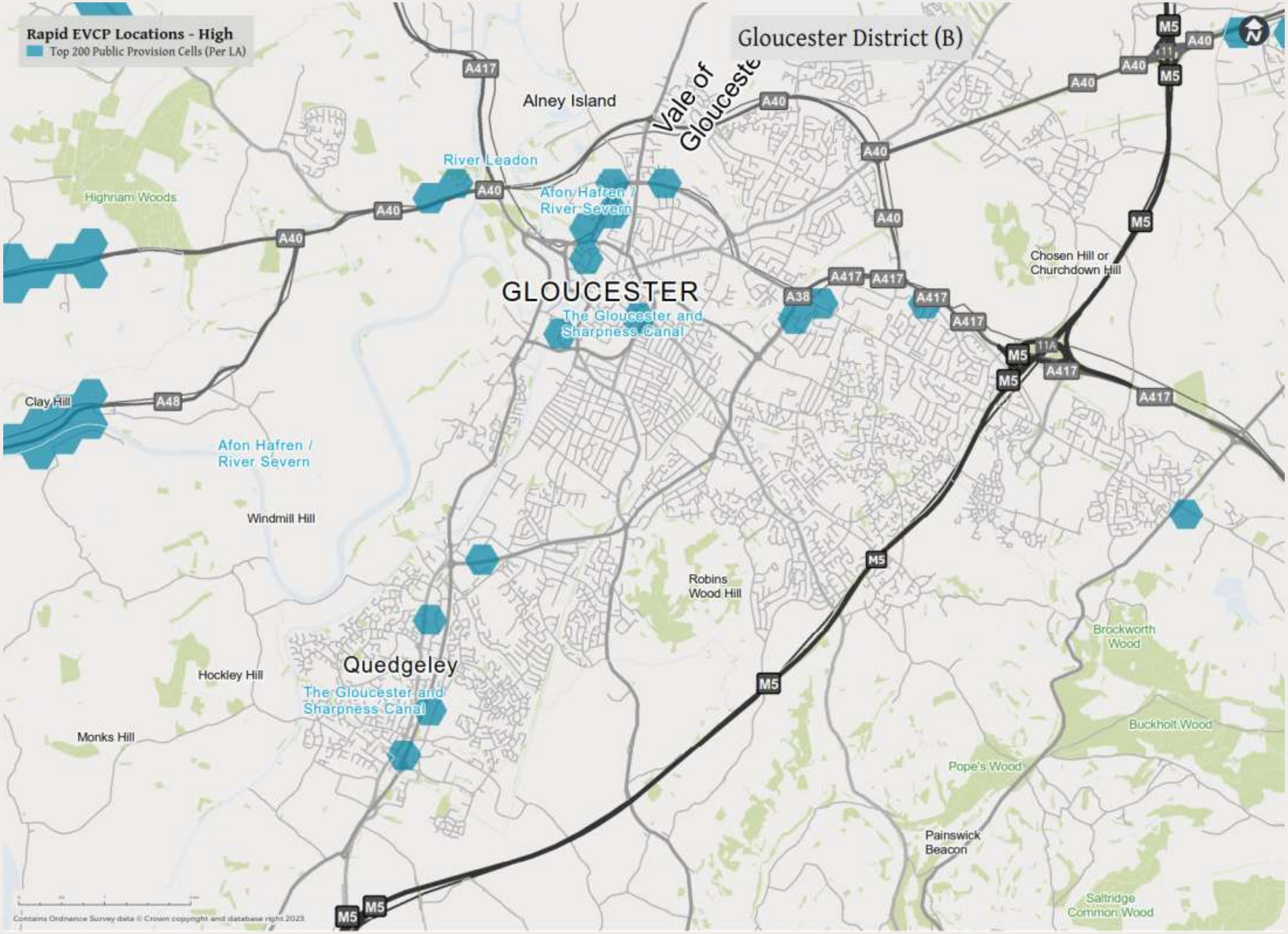

Figure Ap86: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Cheltenham District - High priority locations for the installation of EV chargepoints

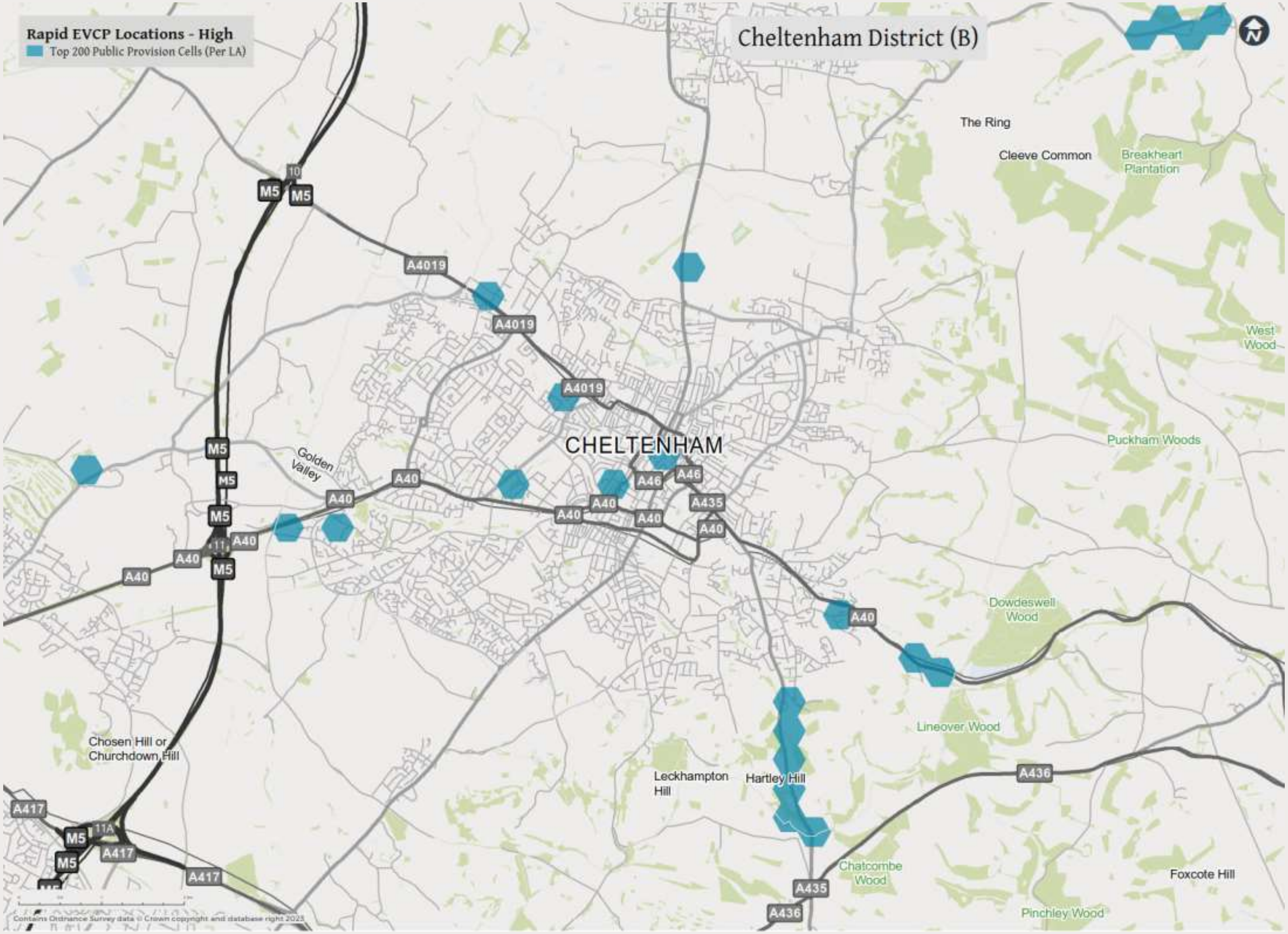

Figure Ap87: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Stroud - High priority locations for the installation of EV chargepoints

Figure Ap88: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Cotswold District - High priority locations for the installation of EV chargepoints

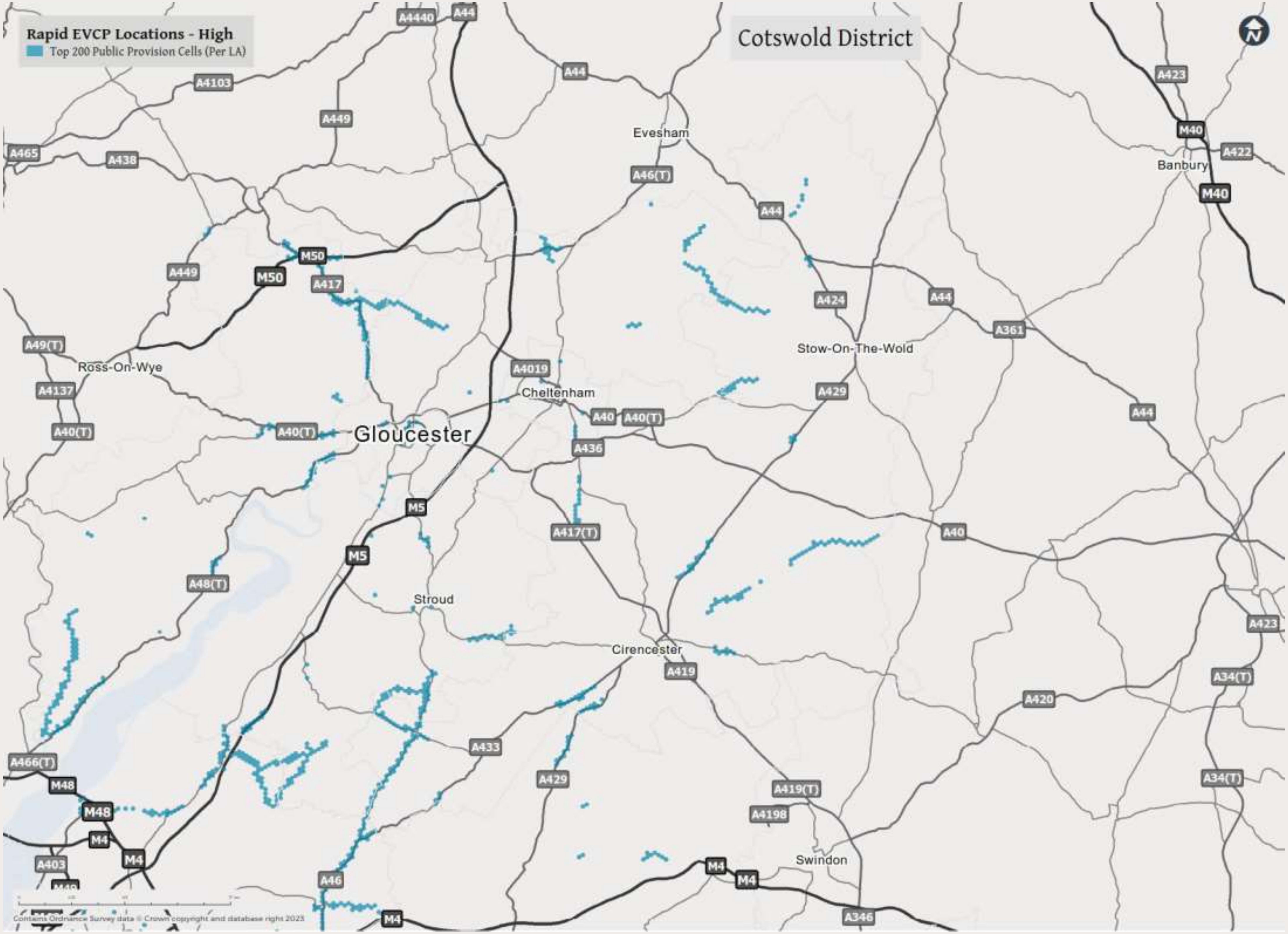

Figure Ap89: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Forest of Dean - High priority locations for the installation of EV chargepoints

Figure Ap90: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Tewkesbury - High priority locations for the installation of EV chargepoints

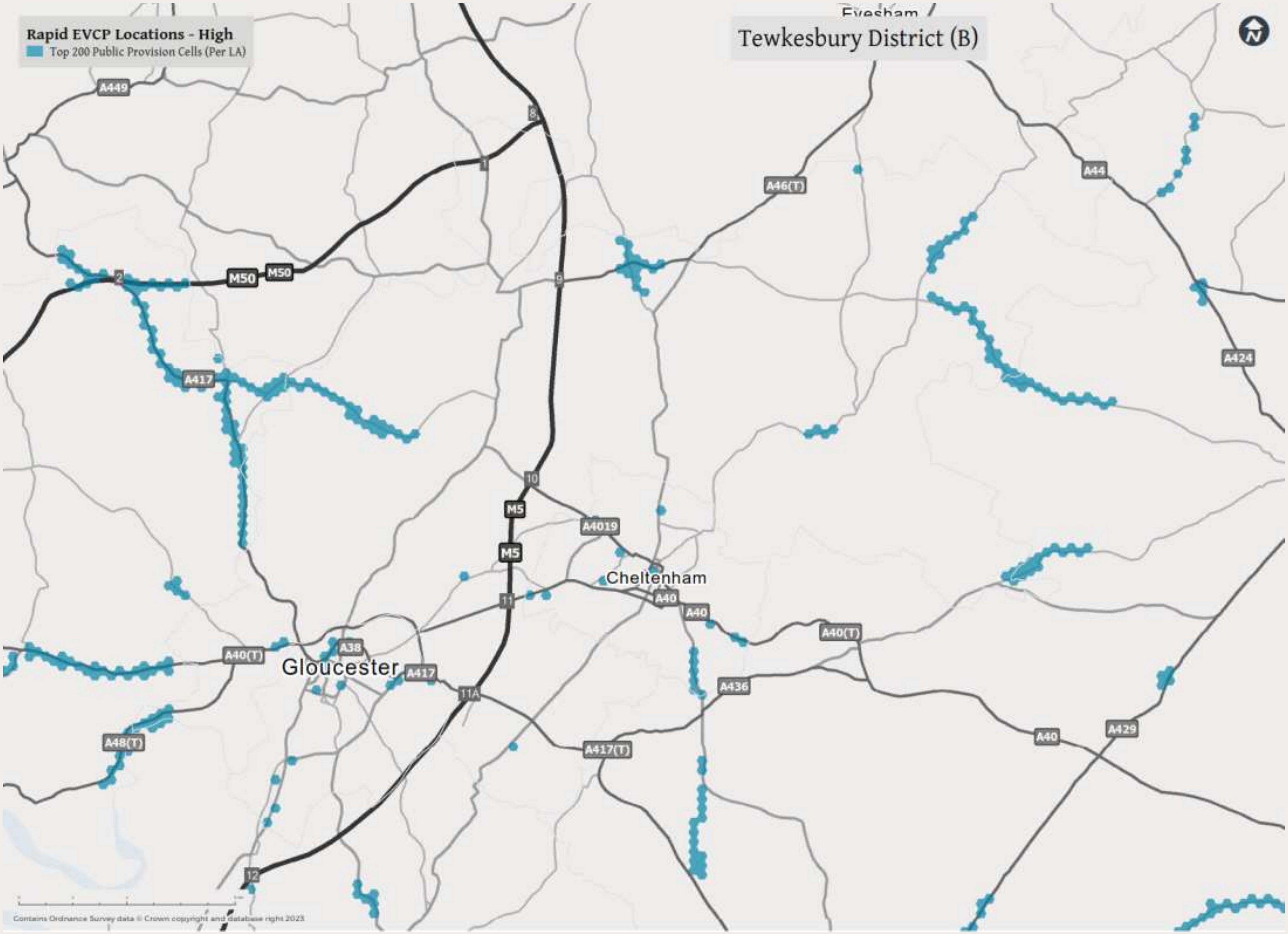

Figure Ap91: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

City of Bristol - High priority locations for the installation of EV chargepoints

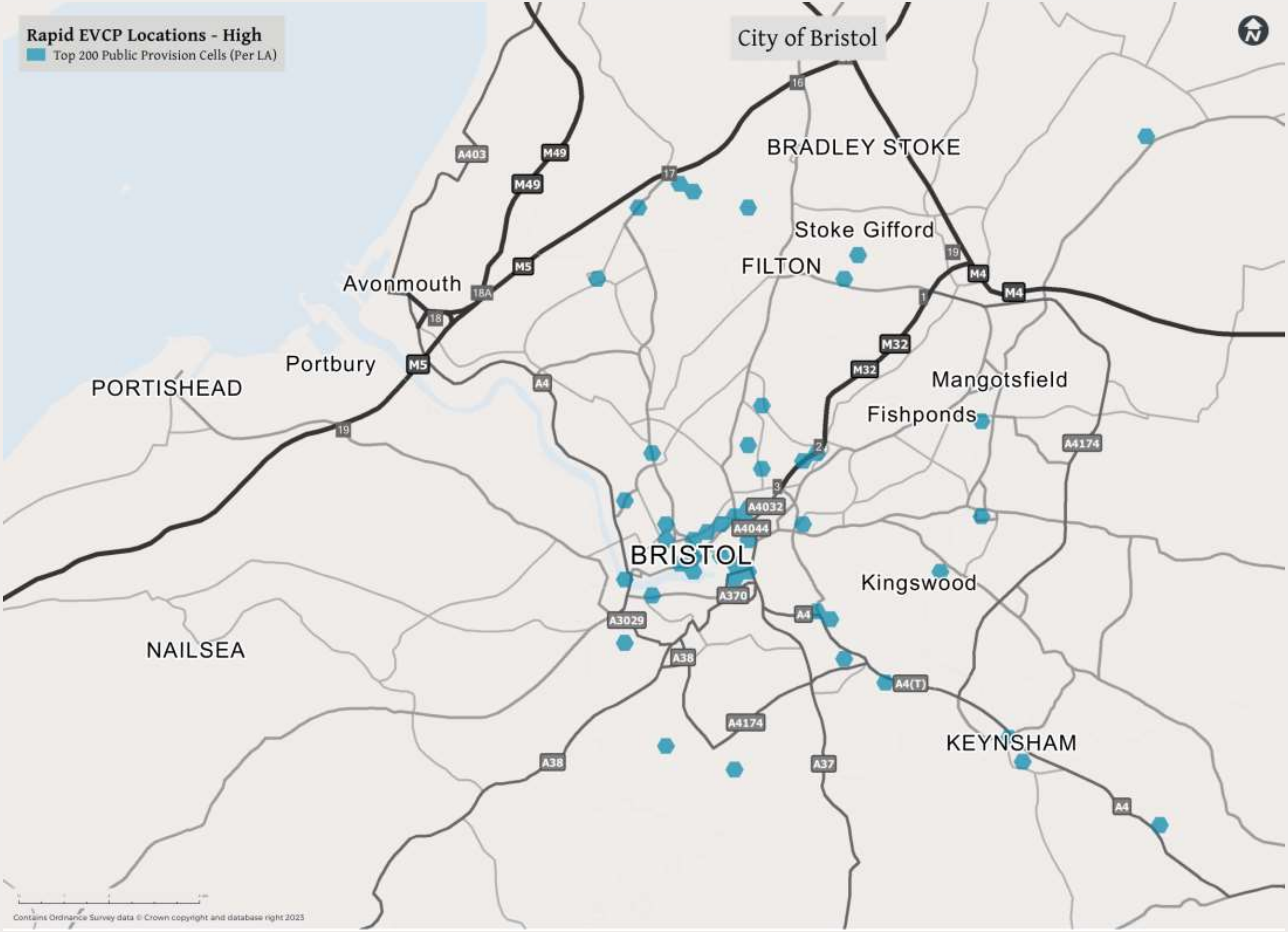

Figure Ap92: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

South Gloucestershire - High priority locations for the installation of EV chargepoints

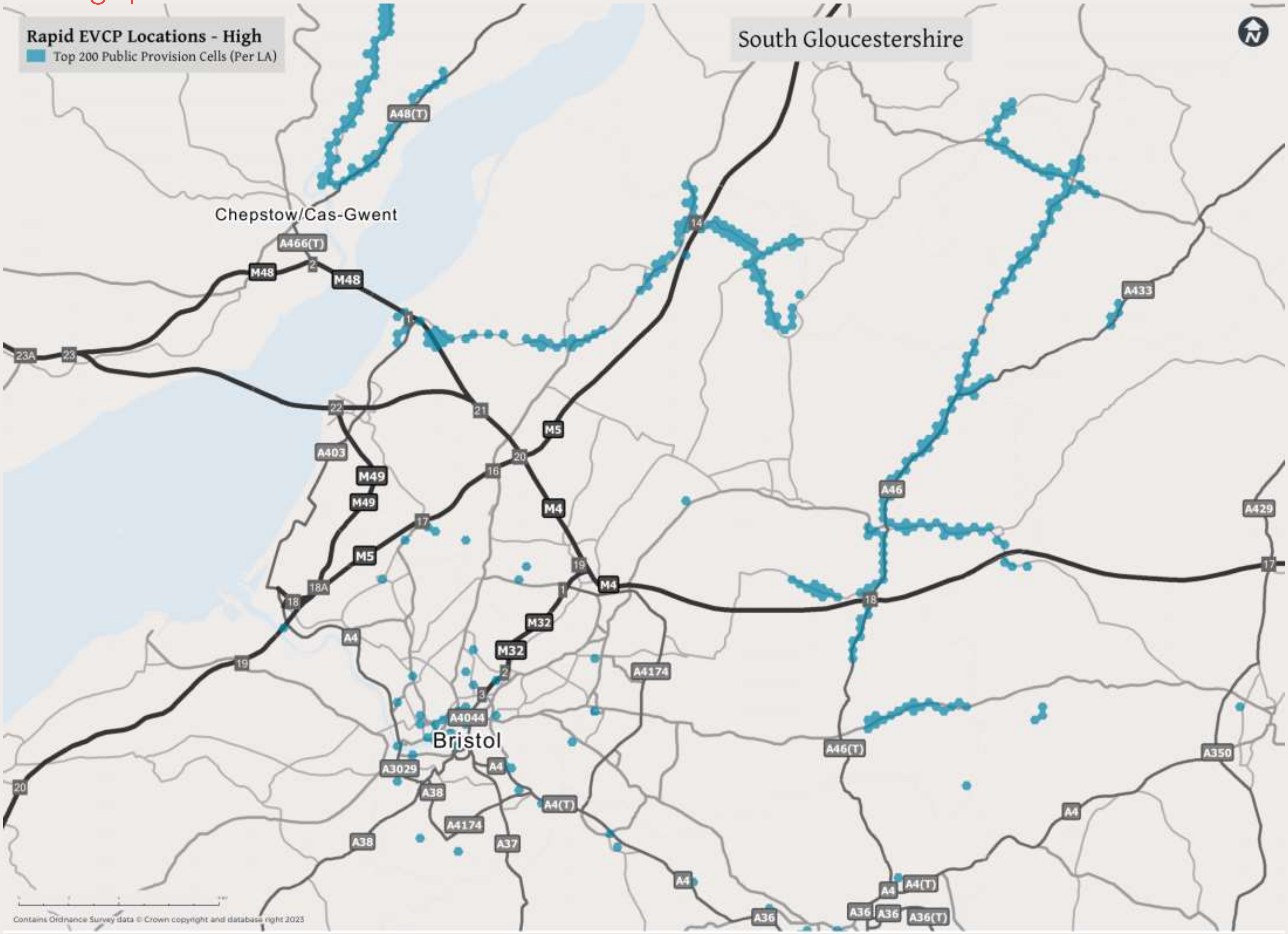

Figure Ap93: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Cornwall – High priority locations for the installation of EV chargepoints

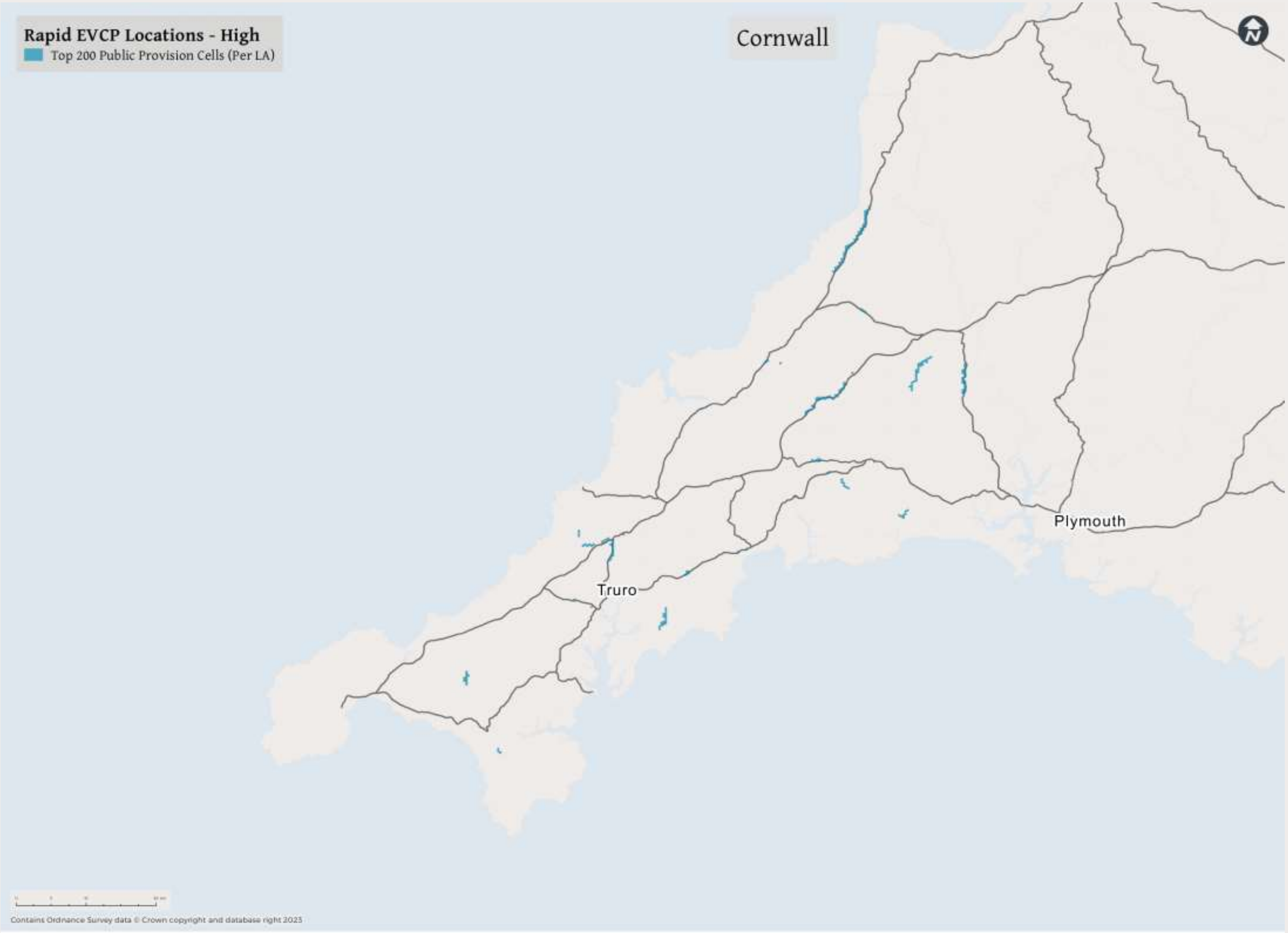

Figure Ap94: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

East Devon - High priority locations for the installation of EV chargepoints

Figure Ap95: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Mid Devon - High priority locations for the installation of EV chargepoints

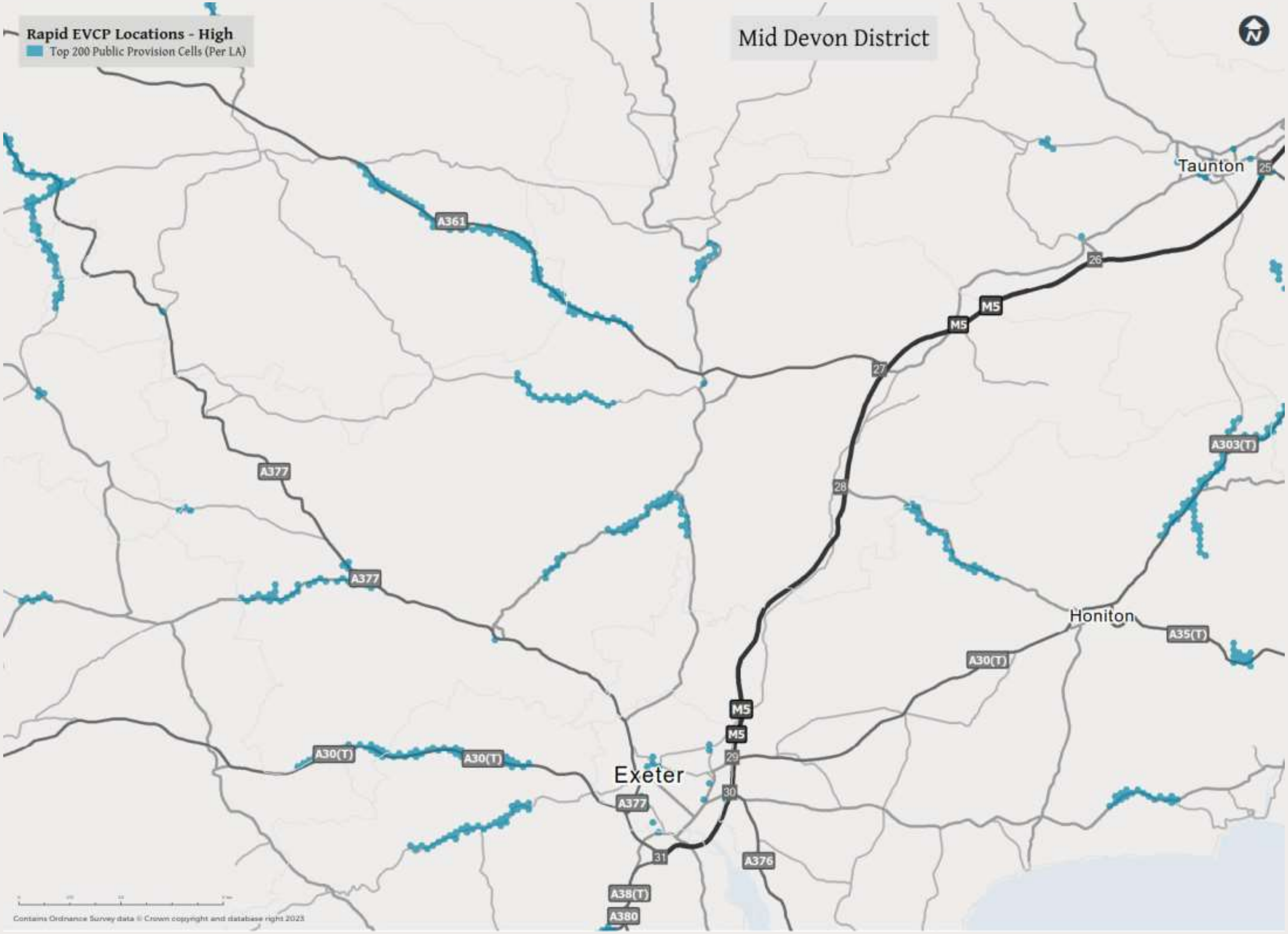

Figure Ap96: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Devon - High priority locations for the installation of EV chargepoints

Figure 97 High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Somerset West and Taunton - High priority locations for the installation of EV chargepoints

Figure Ap99: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Bath and North East Somerset - High priority locations for the installation of EV chargepoints

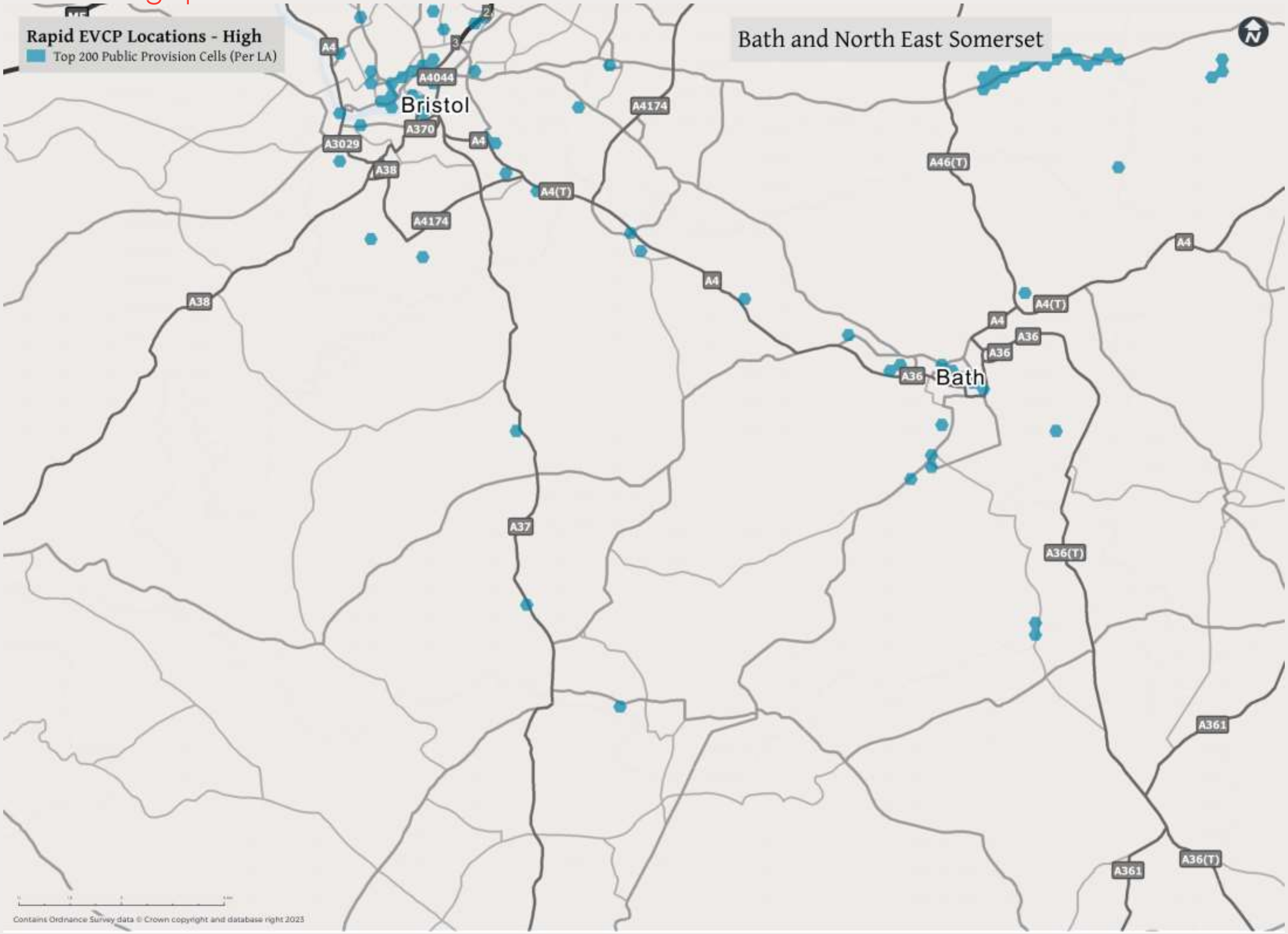

Figure Ap99: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

North Somerset - High priority locations for the installation of EV chargepoints

Figure Ap100: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

Dorset - High priority locations for the installation of EV chargepoints

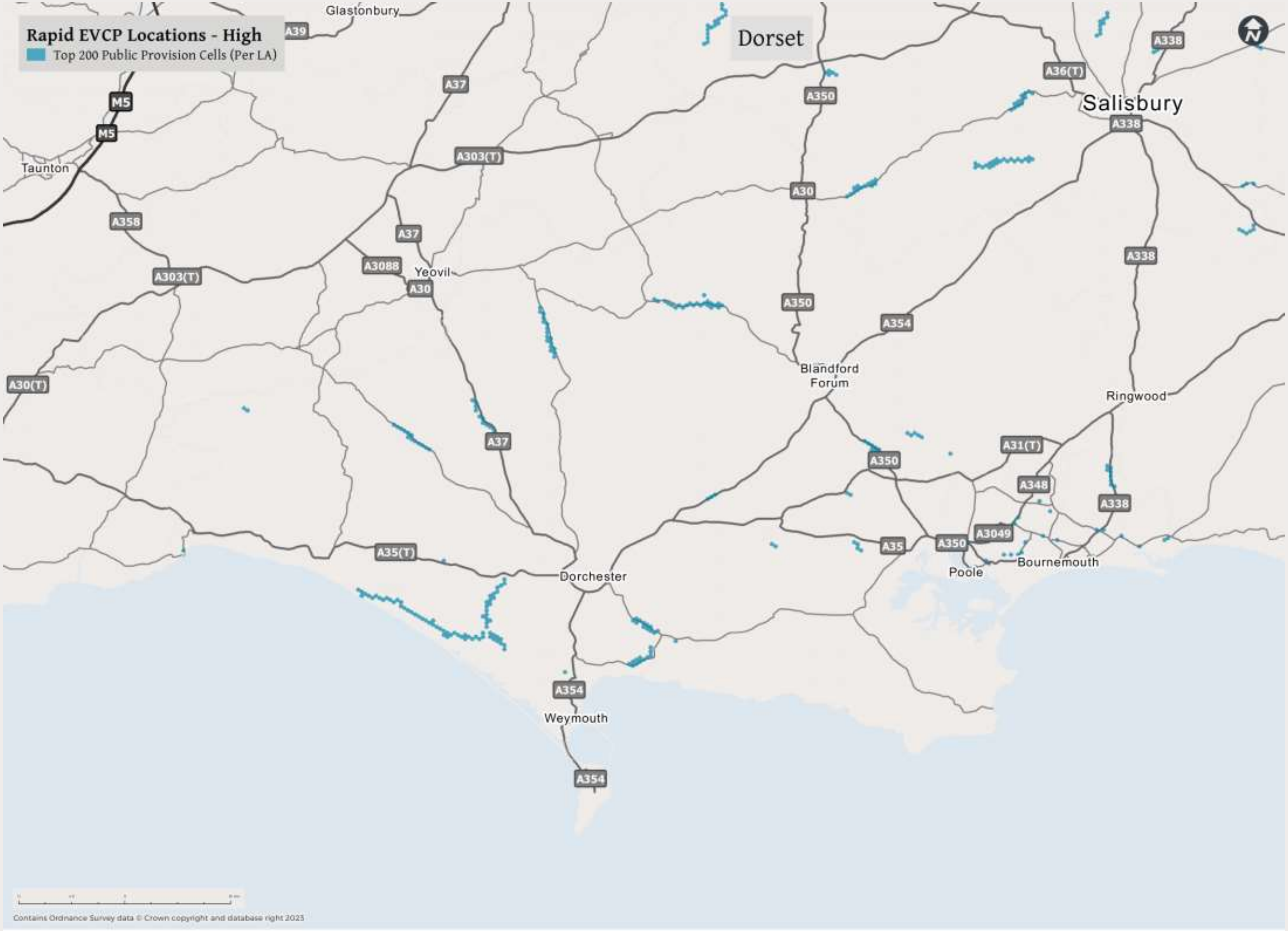

Figure Ap101: High priority locations for the installation of EV chargepoints

Source: WSP EV:Ready

WSP House
70 Chancery Lane
London
WC2A 1AF
wsp.com