



Why are cars getting bigger? A deep dive into how UK regulations are enabling car size growth

May 2023

Ruth Carlson
ruth.carlson@sustrans.org.uk

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1 Introduction

Cars are getting bigger. UK engineering regulations are changing to keep up with the growth, but should they?

The aim of this paper is to outline the current problems with bigger cars, the pitfalls of the current regulatory framework that have enabled this growth, and the changes to design guidance that could be adopted to limit car size growth.

A review of current design regulations and guidance specifying parking bay dimensions has been undertaken. A selection of local authority guidance has also been included.

This report does not comment on accessible parking spaces or parent and child parking spaces.

The terms 'big' and 'large' car have been used interchangeably throughout this report to refer to vehicles bigger than micro cars, super mini cars, or small family vehicles. SUV refers to Sports Utility Vehicle.

2 Impacts of Big Cars

2.1 Car size over time

In the UK, cars are getting bigger, and bigger cars like SUVs are becoming more popular. **Figure 1** compares the most common licensed car – the Ford Fiesta in the UK (1.29 million cars licensed in 2021) (RAC foundation, 2023) with the most popular new licensed car – the Nissan Qashqai (42,704 cars registered in 2022) (Holding, 2022). This shows cars in the UK are changing, from compact cars to SUVs.



Figure 1. Ford Fiesta (JA8) 5-door Hatchback 2008 compared with Nissan Qashqai (J12) SUV 2021 (carsized, 2023).

In Europe, the popularity of SUVs has been rapidly increasing over the past decade, making up almost half of new car sales (The International Council on Clean Transport, 2022) see Appendix A. 1. **Figure 2** shows an increase from 1.3 million new SUVs purchased in 2010 to 4.5 million in 2021. The rise in SUVs can account for the increase in average mass of new cars in the EU and the UK where the average mass of new cars has increased to 1,457kg, 3% higher than in 2019 and 15% above 2001 levels (The International Council on Clean Transport, 2022).

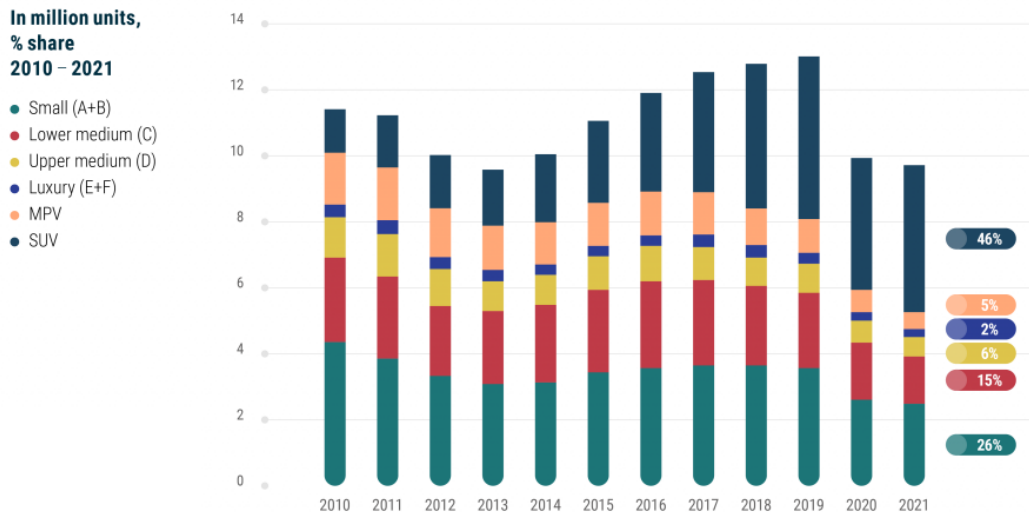


Figure 2. New passenger cars by type in million units, % share in the EU from 2010 to 2021 (ACEA, 2022).

2.2 Sustainability impacts of bigger cars

From 2001 – 2017 trends showed a decrease in the average CO₂ emissions of passenger vehicles in the EU and UK. However, since 2017 these emissions have begun to increase, largely driven by the uptake in SUV use (European Environment Agency, 2020).

Weight, engine power and frontal area size are all factors that increase fuel consumption. The bigger the vehicle, whether internal combustion or electric, the lower the fuel efficiency and higher emissions. The average emissions of new petrol SUVs are around 10% higher than the average emissions of new non-SUV petrol cars (European Environment Agency, 2020), but when comparing all SUVs to medium cars they consume about 20% more energy. Globally, SUVs are one of the top causes of energy related CO₂ emissions growth over the last 10 years (IEA, 2021).

Whilst electric vehicles contribute significantly lower CO₂ emissions over their lifetime when compared to internal combustion engine vehicles, the growth in electric vehicles is not rising quick enough to offset the increased emissions from all SUVs (IEA, 2023).

2.3 Health and safety impacts of bigger cars

Vehicles cause damage to multiple different groups: passengers, passengers of other vehicles, pedestrians, cyclists and other vulnerable road users. Although casualties are decreasing in Great Britain there were still 1,558 reported road deaths in 2021 - over 4 people a day (Department for Transport, 2022).

It is widely accepted that modern cars are safer than older cars. The fatality risk has reduced by 56% from the 1950s to 2012 for occupants of average vehicles in the US (United States Department of Transportation, 2023). However, this trend appears to be reversing as in 2022 traffic fatalities in the US reached a 16-year high (United States Department of Transportation, 2022).

As established, modern cars are also bigger which has caused many to believe bigger cars are safer. However, with the rise in fatalities coinciding with the increase in SUVs this is rightly being disputed.

A 2022 study of reported vehicle crashes on pedestrians and cyclists showed that “children are eight times more likely to die when struck by an SUV compared to those struck by a

passenger car”. SUVs are overrepresented in fatalities relative to the proportion of their involvement in crashes – they struck 14.7% of pedestrians and cyclists but were involved in 25.4% of fatalities. Meaning pedestrians and cyclists are more likely to die when being hit by an SUV (Edwards & Leonard, 2022).

A similar 2023 study of reported vehicle crashes on cyclists showed “SUVs inflicted significantly more severe injuries on struck bicyclists compared with cars”, “the typical head injury inflicted by SUVs was 63% more severe than that inflicted by cars” and “SUV crashes were more likely to involve bicyclists being run over and being injured by impacts with the ground” (Monfort & Mueller, 2023).

It is unsurprising that SUVs cause more severe injuries to vulnerable road users. The momentum of a travelling object is a product of its mass and velocity, meaning an SUV will have a higher momentum if travelling at the same speed, when compared to a lower weight car. To reduce their danger, SUVs would be required to have a lower speed limit to counteract their considerably higher mass.

2.4 Road space and damage impacts of bigger cars

In the UK, roads are typically designed for use by specialist vehicles such as emergency vehicles, busses, and HGVs. Currently, these vehicles do not make up a large percentage of licensed vehicles (Department for Transport, 2022). However, the higher the percentage of wider vehicles on the road, the less space there is on the road for vulnerable road users. This is shown in **Figure 3**.

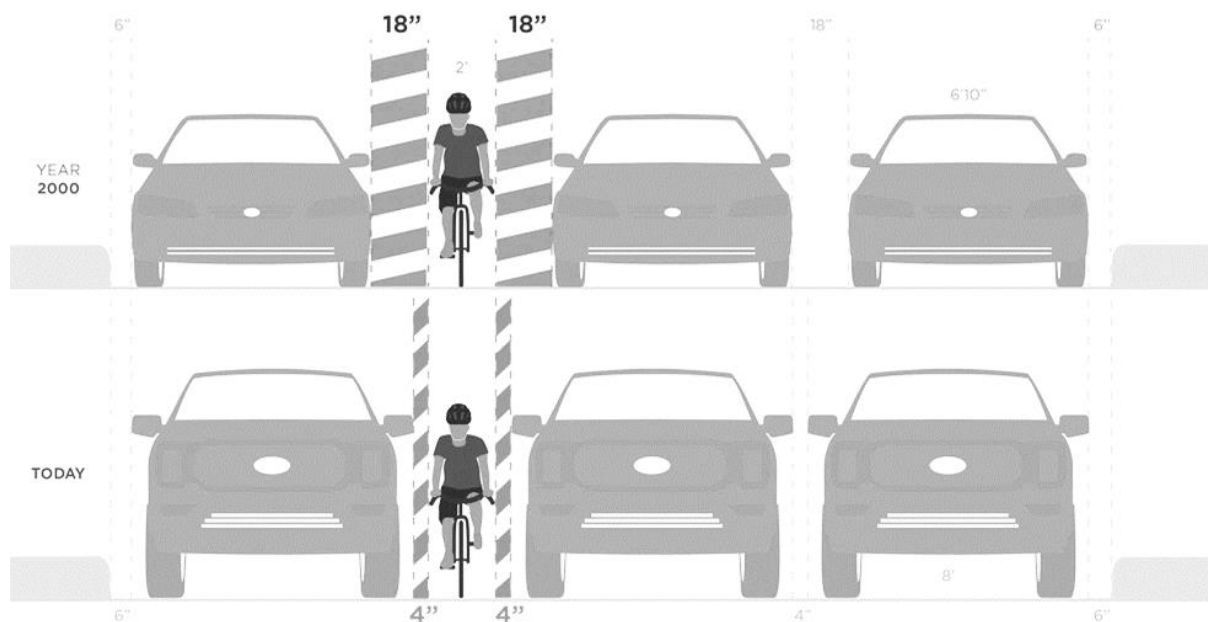


Figure 3. Space available for cyclist comparing standard car to SUV (Hurford, 2022).

It is widely accepted that the damage caused by a vehicle to the road is related to the axle weight to the power four (Yiu, 2020). This means that an SUV that is twice the weight of a car will do roughly 16 times more damage to the carriageway.

3 What Influences Car Size

Car size is influenced by many factors, some of these are outlined in **Figure 4**. This section gives a background to the current vehicle regulatory environment and discusses the key mechanisms currently shaping vehicle size in the UK.

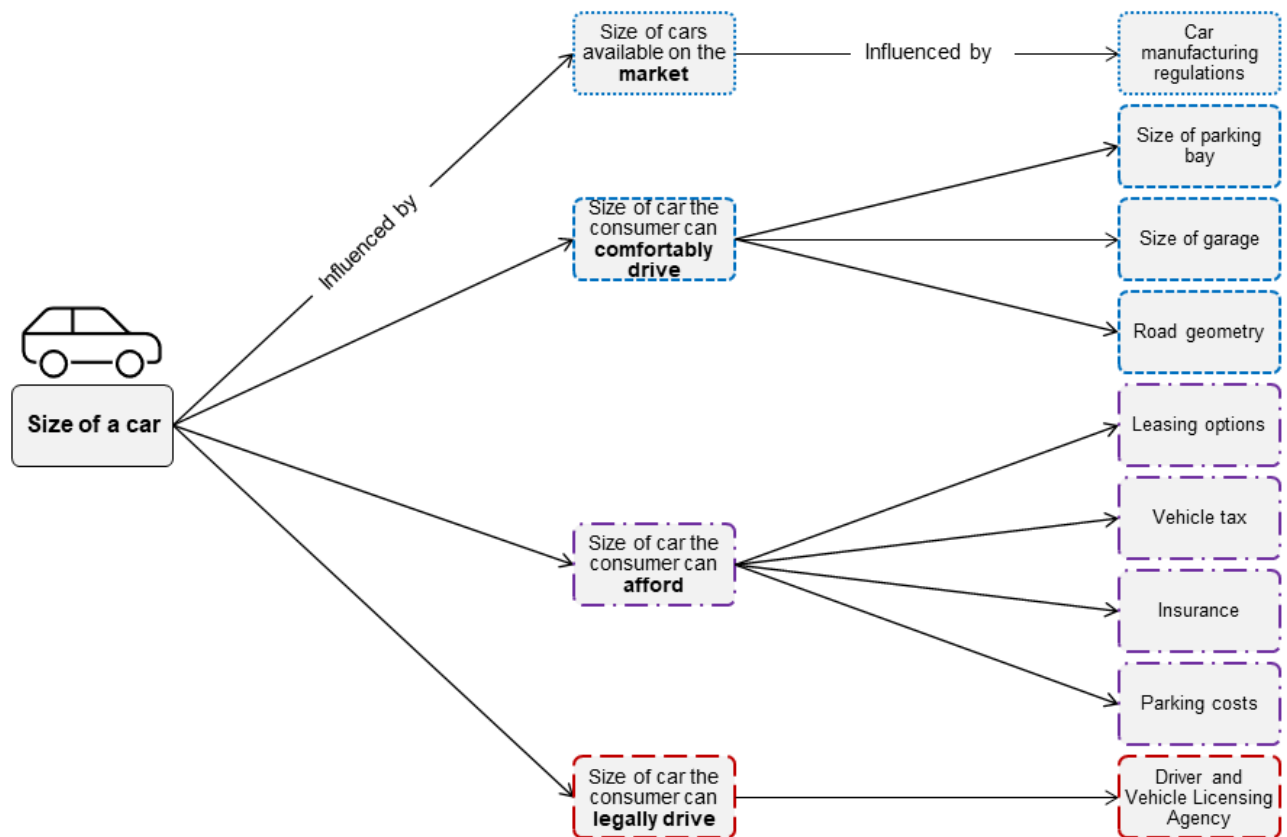


Figure 4. Factors impacting car size in the UK.

3.1 What are regulations?

The National Audit Office states, 'Regulation is used to protect and benefit people, businesses and the environment and to support economic growth' and it uses 'primary or secondary powers to achieve the behaviour change needed to achieve policy objectives' (National Audit Office, 2017).

Regulation has seen a shift since the turn of the century, from regulation in the public interest to regulation in the interest of public choice (Key, 2023). The UK has relatively low levels of regulation compared with other OECD states (National Audit Office, 2017). When governments reduce regulatory burden, the aim is to allow greater freedom for manufacturers and companies.

However, deregulation and privatisation can lead to tombstone legislation whereby changes in public interest only take place after a major loss of life (Carrington, 2019).

3.2 Current manufacturing regulations

There are two main manufacturing regulations that define the maximum dimensions of cars in the UK.

The Road Vehicles (Construction and Use) Regulation 1986 is a UK statutory regulation governing the construction, equipment, and maintenance of vehicles. Sections 7 to 10 set the

maximum limits for motor vehicle dimensions to be 12m in length, 2.5m in width and 3.66m in travelling height for a motor vehicle.

The individual Vehicle Approval (IVA) Inspection Manual determines the road worthiness of a vehicle. It is used for making or importing single or a small number of vehicles. Section 44 sets the maximum limits for passenger vehicle dimensions to be 12m in length, 2.5m in width and a weight that does not exceed the design axel weight (i.e., no maximum).

The maximum allowable dimensions of a passenger vehicle in the UK are therefore 12m in length, 2.5m in width and 3.66m in height. This is about the dimensions of a typical single decker bus in the UK (Lectura, 2023).

3.3 Current taxes

Vehicles are taxed variably in the UK. For cars first registered on or after 1 April 2017 the first year of tax is defined by the vehicle’s CO₂ emissions. The higher the emissions, the higher the tax for the first 12 months. This relationship is shown in **Figure 5**. Subsequent annual tax payments are a flat rate depending on the fuel type - £180 for petrol or diesel and £170 for alternative fuel vehicles (hybrids, bioethanol, and liquid petroleum gas). For vehicles with a price list over £40,000 a higher tax of £570 is paid for 5 years before reducing to £180 per annum (£560 and £170 for alternative fuel vehicles) (Vehicle tax rates, 2023).

A higher flat rate of tax for vehicles over £40,000 does more to disincentivise vehicles closest to £40,000 in price rather than higher emitting vehicles. A mid-range vehicle (in terms of emissions) will pay the same vehicle tax in the second year compared to the highest emitting vehicle, this comparison is shown in **Figure 6** and **Figure 7**.

Electric vehicles currently do not pay any vehicle tax in the UK.

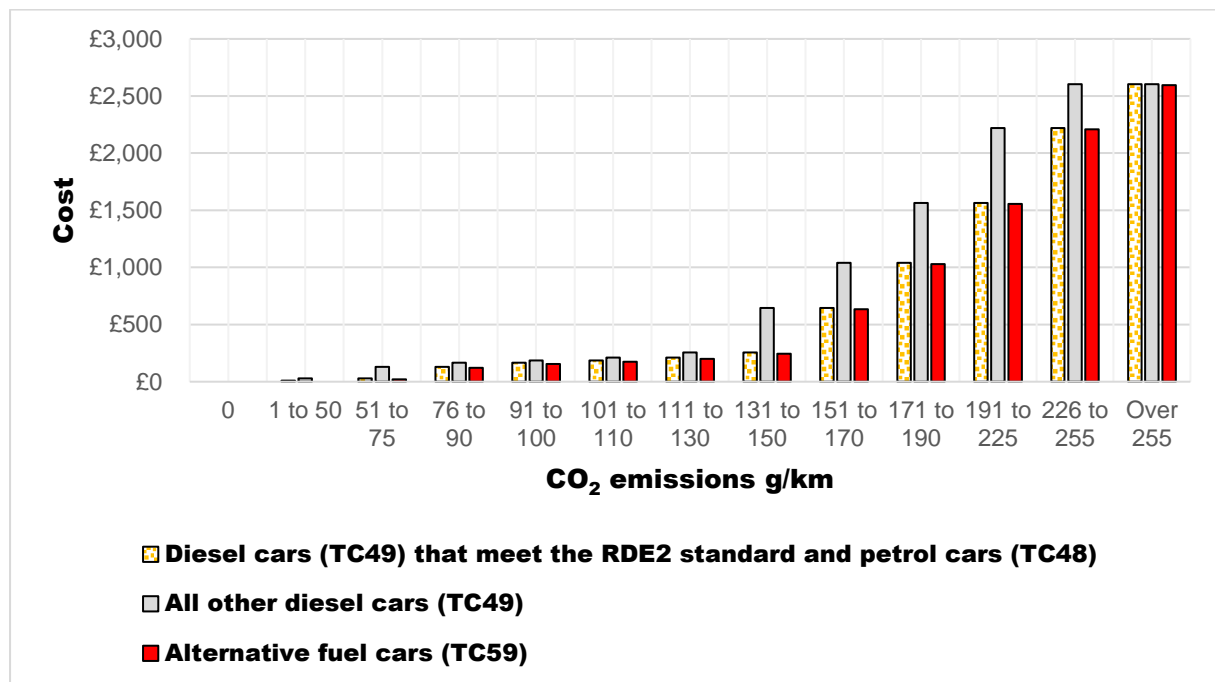


Figure 5. First vehicle tax rates for cars registered on or after 1 April 2017.

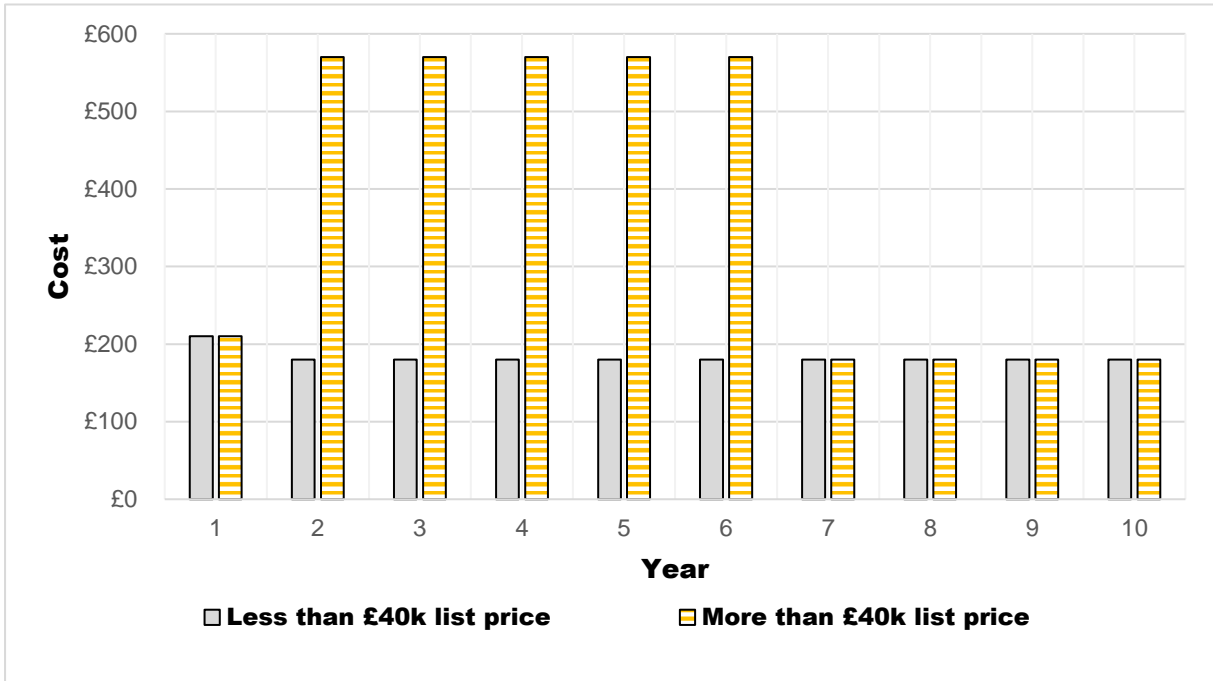


Figure 6. 10-year annual vehicle tax rates for Diesel cars (TC49) that meet the RDE2 standard and petrol cars (TC48) with 111 to 130 g/km emissions, registered on or after 1 April 2017.

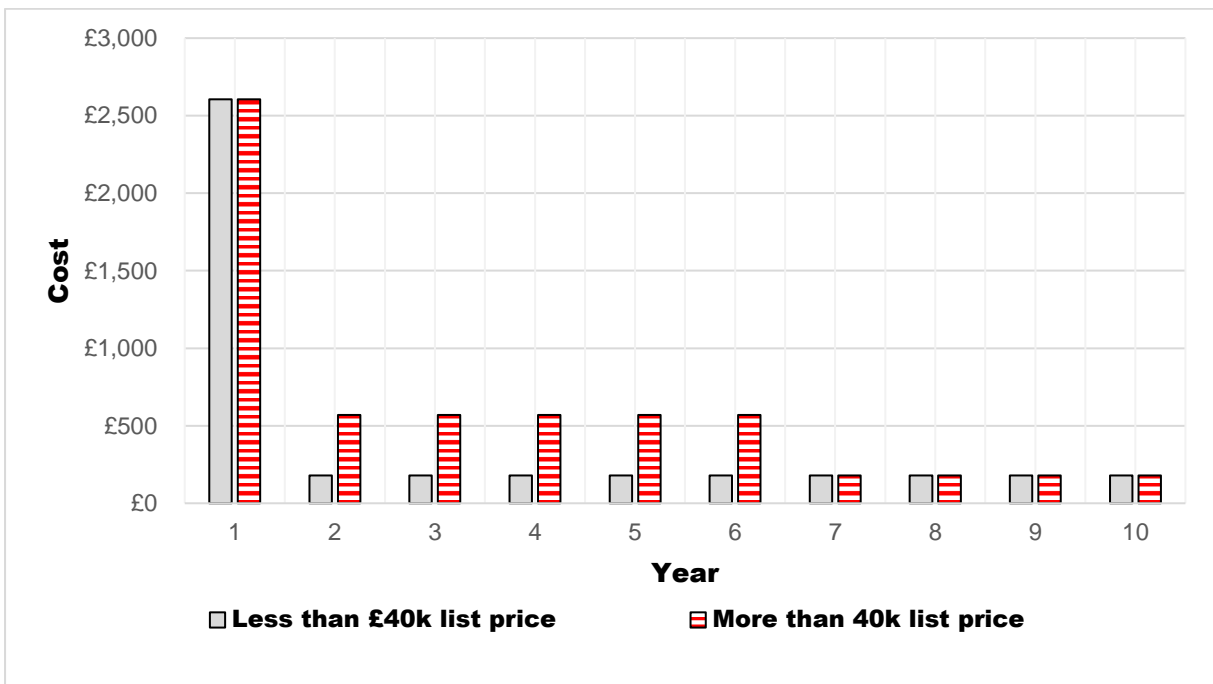


Figure 7. 10-year annual vehicle tax rates for Diesel cars (TC49) that meet the RDE2 standard and petrol cars (TC48) with over 255 g/km emissions, registered on or after 1 April 2017.

3.4 Current licensing

Under a standard drivers' licence (category B) in England, Wales, and Scotland, you can drive vehicles up to 3,500kg maximum authorised mass with up to 8 passenger seats (Driving licence categories, 2023).

If the licence was obtained before 1997 the maximum authorised mass increases to 8250kg. Meaning a significant number of the population hold a driver licence that allows them to drive a considerably heavier vehicle with no extra test required. The number of licence holders this equates to is unknown but could be up to 10 million people (Office for National Statistics, 2023) (National Travel Survey, 2023).

An additional category C1 licence is required to enable category B licence holders to drive vehicles between 3,500 to 7,500kg maximum authorised mass if they obtained their category B licence after 1997.

3.5 Current design regulations and guidance

Regulations, standards, and guidance are common mechanisms to maintain consistency and safety across the built environment. It is important to understand the difference between them and how these differences influence compliance.

Design regulations can be defined as “a document used by a local or national government body to control building practice through a set of statements of acceptable minimum requirements” (Key, 2023).

Design standards can be defined as “an agreed, repeatable way of doing something. It is a published document that contains a technical specification or other precise criteria designed to be used consistently” (The British Standards Institution, 2012). Design regulations often refer to design standards and serve as benchmarks for compliance.

Design guidance “sets out the general design principles and standards that...proposals should follow” (Department for Levelling Up, Housing and Communities, 2019).

It is a legal requirement to follow regulations. Following British Standards is voluntary, but as standards usually set the allowable benchmarks to achieve the regulations, they are heavily linked. There is no legal obligation to follow design guidance.

Section 4 gives an in-depth analysis of design regulations, standards and guidance relating to parking bay size.

3.6 Car size affordability

Although this report does not discuss consumer behaviour, it is important to address that the mechanisms for purchasing and owning a vehicle have changed.

Larger vehicles are in general, more expensive. In recent years it has become increasingly popular to lease a vehicle rather than buy it. This has shifted the threshold of affordability for many as the barrier of high capital expenditure is significantly reduced. Leading many vehicle owners to be up-sold a larger vehicle than they could have originally afforded if leasing was not available.

3.7 Summary

The recent growth in car size suggests that the current measures that can control growth are ineffective. This contradicts the governments aims to reduce road traffic collisions and to reduce transport emissions.

Due to the current manufacturing regulations setting car size limits so high, and current taxes and licensing doing little to limit the size – there is a disproportionate onus left on design guidance. It is rare for markets that cause so many daily fatalities to sit within such a weak regulatory environment.

4 In-depth Analysis of Design Regulations and Guidance

This section presents an in-depth analysis of the current design regulations and guidance related to parking bay size. **Figure 8** outlines the different regulations and guidance associated with parking bay size and where this sits in relation to the vehicle manufacturing regulations.

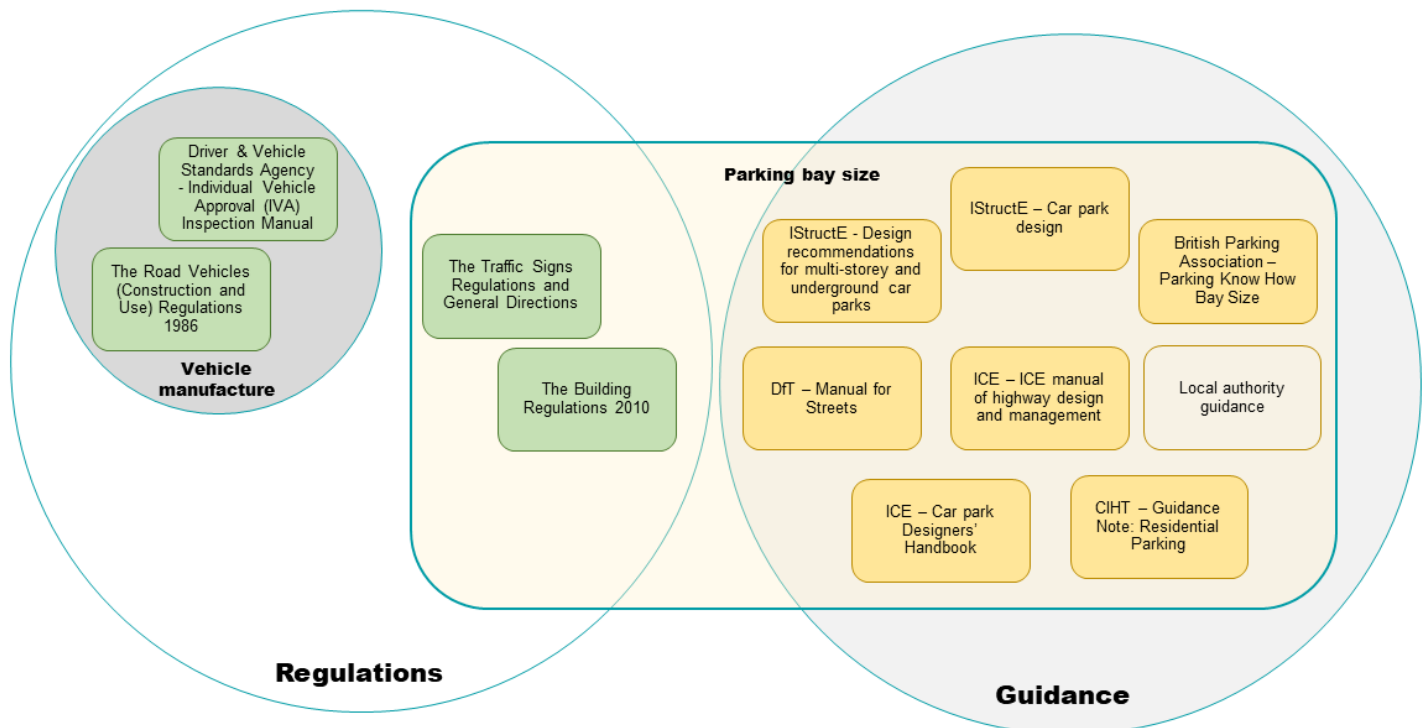


Figure 8. Parking bay size regulations and guidance Venn diagram.

4.1 Design regulations

There are two regulations associated with the size of a parking bay:

1. The Traffic Signs Regulations and General Directions 2016 (Traffic Signs Regulations, 2016).
2. The Building Regulations 2010 (HM Government, 2023).

The Traffic Signs Regulations and General Directions (TSRGD) is the law that sets out the design conditions for traffic signs, signals, crossings, and road markings in Great Britain. This is an important regulation that defines the size of a parking bay.

Schedule 7, Part 4 defines the minimum width of a parking bay to be 1.8m. There is no maximum dimension defined and no minimum length defined.

The previous edition of TSRGD defined a clear maximum and minimum size of a parking bay. Maximum values of 2.7m in width and 6.6m in length and minimum values of 1.8m in width and 4.5m in length. As TSRGD is a regulation defined in law, it means before the latest edition update, a parallel parking space could not legally be bigger than 2.7m x 6.6m (Traffic Signs Regulations, 2002). This change was a deliberate intervention by the Department for Transport to “allow traffic authorities flexibility in determining the bay or parking space size”. In addition to this the DfT states that “In cases where larger vehicles... cannot fit fully within the marking, it is recommended that traffic authorities use discretion over enforcement”. The language used by the DfT regarding the change to TSRGD focusses on the change to traffic signs that will “reduce congestion [and] improve road safety...[and] promote cycling take up

and safety” (Department for Transport, 2016). This ignores the impact of bigger vehicles on the road facilitated by the change to parking bay size regulations and less stringent enforcement.

The Building Regulations are an enforceable regulation for the design of buildings in England. In Appendix A, The Building Regulations 2010 set the size of a standard parking bay to be 2.4m wide by 4.8m long. This should be taken to be a minimum value.

4.2 Design guidance

As parking bay design interacts with multiple different sectors of the built environment, there are multiple design guidance documents that reference the size of a parking bay. The following section covers the main guidance documents used within the built environment sector.

Table 1 summarises the variety of parking bay dimensions provided in the regulations, guidance and regional guidance discussed. See **Appendix B** for guidance excerpts.

Table 1. Design regulations, guidance, and regional guidance dimensions summary.

Type	Title	Parallel Parking		Perpendicular Parking	
		Width	Length	Width	Length
Regulation	The Traffic Signs Regulations and General Directions	1.8m min	-	-	-
	The Building Regulations 2010	-	-	2.4m min	4.8m min
Guidance	The Institution of Structural Engineers – Design recommendations for multi-storey and underground car parks (Fourth edition)	-	-	2.4m min	4.8m min
	British Parking Association – Parking Know How Bay Size	-	-	-	-
	DfT – Manual for Streets	2.0m min	6.0m min	2.4m min	4.8m min
	Institution of Civil Engineers - Car Park Designers' Handbook	-	-	2.5m min	4.8m min
	Institution of Civil Engineers - ICE manual of highway design and management	1.8m min 2.7m max	4.5m min 8.8m max	-	-
Regional guidance	The Essex Design Guide – Design Details Parking Design V.1	2.9m min	6.0m min	2.9m min	5.5m min
	Transport for London – Streetscape Guidance Fourth Edition 2022 Revision 2	1.8m min	-	-	-
	Buckinghamshire Council – Parking guidance for new developments	3.0m min	6.0m min	2.8m min	5.0m min
	Kent Design Guide – Parking Standards	2.5m min	6.0m min	2.5m min	5.0m min

At time of writing, the new IStructE guidance document for the design of car parks had not been published. The IStructE state this new guidance will “reflect the significant changes to vehicular size, weight and manoeuvrability in recent years, to offer modern guidance on parking bay sizes and deck loadings.” (IStructE, 2023).

The British Parking Association is a British based trade association. They encourage the use of larger parking bays and state “good access and wider bays aids efficient use of the parking area.” (British Parking Association, 2016).

The Department for Transport’s Manual for Streets explains how to design, construct, adopt and maintain new and existing residential streets in England and Wales. A new edition of the Manual for Streets is expected (Department for Transport, 2007).

The ICE manual of highway design and management, like other sources, references that “flexibility is allowed in determining the size of bays”. It is, however, the only current guidance document to specify a maximum value for the dimensions of a parking bay. The maximum values specified are 2.7m in width and 8.8m in length. Although these maximum values are likely too large to discourage bigger cars, it is a welcome change to have a maximum limit (Walsh, et al., 2011).

The Chartered Institution of Highways and Transportation do not publish design guidance with specific dimensions, but they do publish a guidance note on residential parking. This document reaffirms (with no challenge), the sentiments in section 51 of Planning Policy Statement 3 (PPS3): that local authorities should set parking standards “without trying to control car ownership” (The Chartered Institution of Highways & Transportation, 2011).

4.3 Regional design guidance

Although there is some national regulation and guidance, it is the local authorities who are required to set parking standards for their area.

In 2011 the coalition government announced the intention to ‘end the war on cars’ which removed national limits on residential parking and sent a clear message to local authorities to stop ‘trying to control car ownership’. These sentiments can be seen in the local authority guidance for parking, with no maximum size limits found for the guidance reviewed.

The aim of this section is to understand if the changes national policy, regulation and guidance has filtered into local authority design guidance. Only sources published after the 2016 change to TSRGD were looked at.

Four local authority design guidance documents have been reviewed and summarised in **Table 1**. The Essex Design Guide, Buckinghamshire Council and The Kent Design Guide all specify parking bays of differing dimensions, all greater than the previous standard dimensions. Buckinghamshire Council specified the biggest bays – parallel bays 3.0m in width and 6.0m in length. This is over 1m wider and 1.5m longer than the typical 1.8 x 4.5m bays (Buckinghamshire Council, 2022).

The Streetscape Guidance is a best practice design guide for London. It is a reference document for most local authorities and designers working in London. Section 10 states limited design requirements for parking bays, only defining a minimum width of 1.8m.

This review of local authority guidance shows clear evidence that parking bays are being designed to be wider and longer to accommodate bigger cars.

4.4 Discussion

The data gathered and presented in **Table 1** has been presented in a series of scatter graphs.

These parking dimensions have been compared to the previous standard size. The previous standard size of a parallel parking bay was 1.8m in width and 4.5m in length as defined in TSRGD 2002. The comparison in **Figure 9** shows that recent guidance all have larger parking bay sizes. The spread of different widths and lengths also show the differences across the design guidance, showing an inconsistent approach to defining parallel parking bay size. When comparing against the maximum bay size (2.7m in width by 6.6m in length), some guidance still exceeded this large dimension.

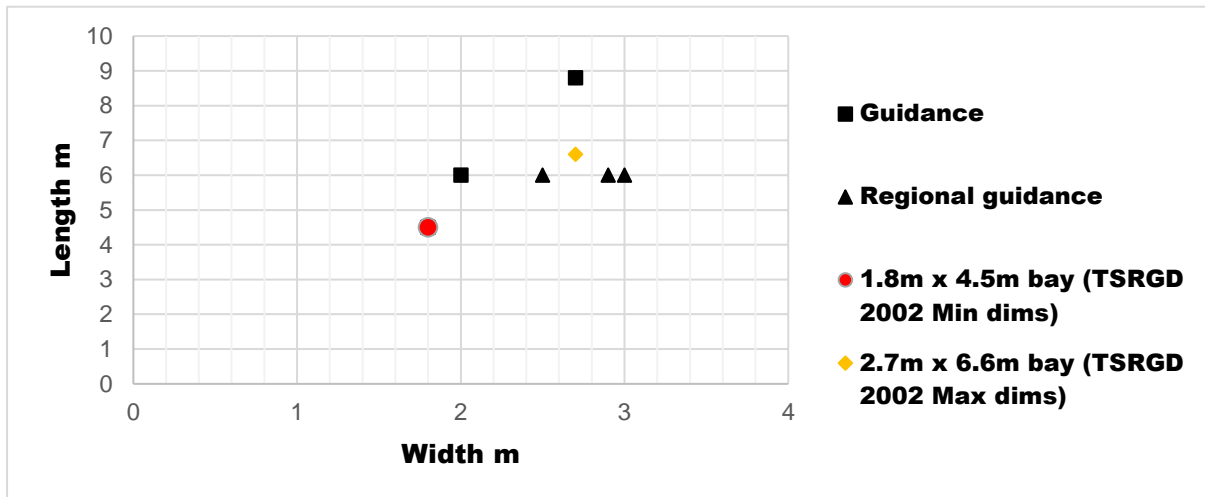


Figure 9. Parallel parking bay regulation and guidance dimensions in comparison to TSRGD 2002 dimensions – scatter.

Figure 10 visualises the difference in area of parking bay size, showing that most guidance is now bigger in area.

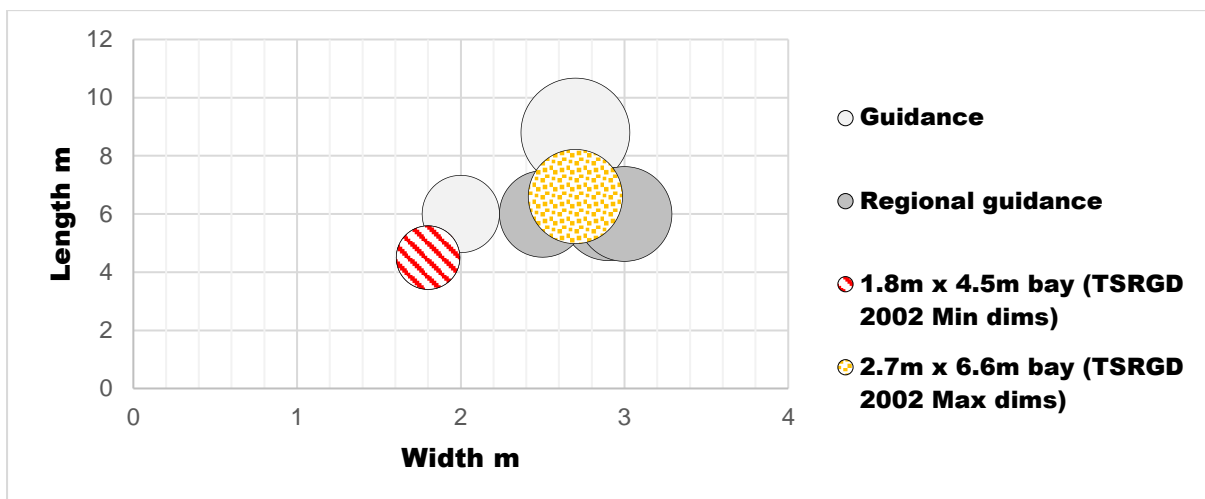


Figure 10. Parallel parking bay regulation and guidance dimensions in comparison to TSRGD 2002 dimensions – bubble scatter.

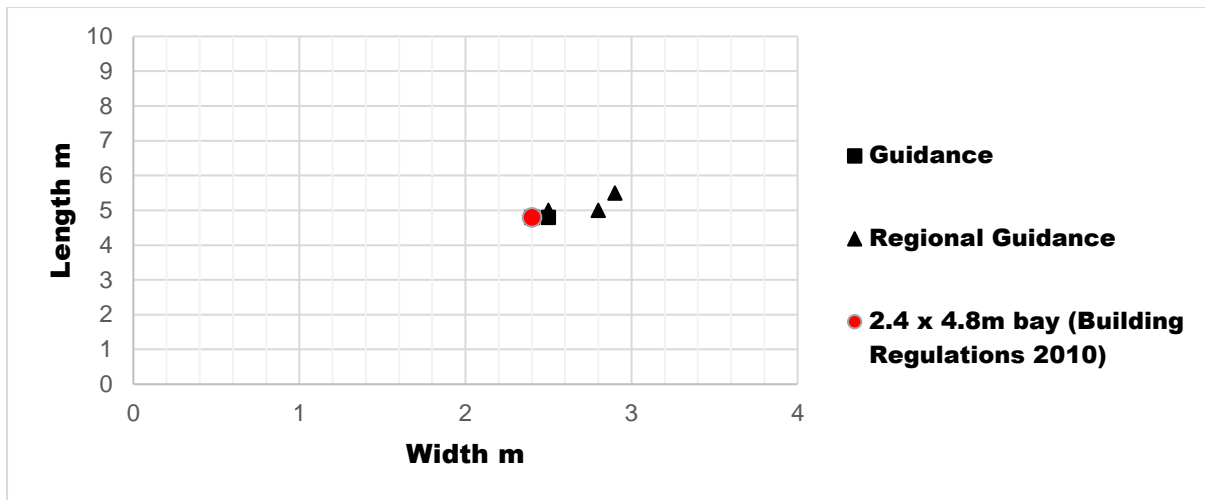


Figure 11. Perpendicular parking bay regulation and guidance dimensions in comparison to minimum Building Regulations 2010 dimensions – scatter.

The comparison in **Figure 11** shows that recent guidance defines larger minimum bay sizes. The different dimensions for perpendicular parking bays are more consistent when compared to parallel bays. This is expected to change when the IStructE revise their car park design guidance. The standard size of a perpendicular parking bay was 2.4m in width and 4.8m in length as defined in The Building Regulations 2010.

The area of perpendicular bays is more consistent, as shown below in **Figure 12**.

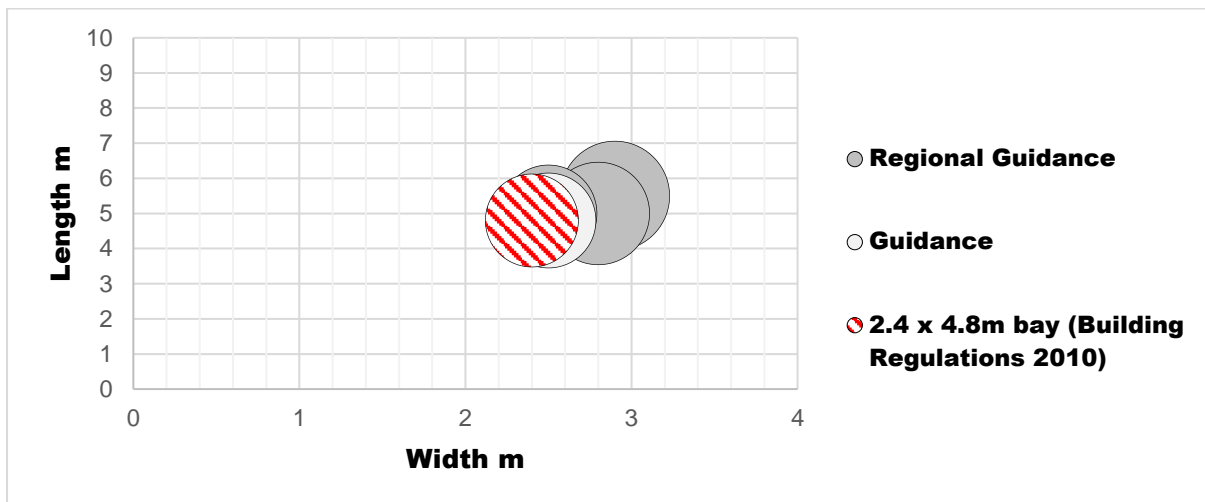


Figure 12. Perpendicular parking bay regulation and guidance dimensions in comparison to minimum Building Regulations 2010 dimensions - bubble scatter

If there was coherent and strict regulation of parking bay size there would not be the variation seen in **Figure 9 - Figure 12**. A consistent approach is important when designing for the built environment.

Many of the design guidance refer to promoting cycling and walking, at the same time as increasing the space for cars. This is contradictory. The previous sections of this report demonstrate that larger vehicles cause more fatalities and higher severity of injuries to pedestrians and people who cycle. Enabling larger vehicles is likely to result in more large vehicles on the roads leading to higher pedestrian and cycling fatalities. This does not promote cycling or walking.

None of the regulations, guidance, or regional guidance documents discuss the sustainability impacts of parking bay size to any significant detail. From an engineering perspective, it was surprising to see no consideration for measures to limit car ownership or the size of cars. There is limited space, especially in urban environments and no consideration for this goes against core engineering sustainability principles. These documents fail to understand the link between bigger cars and sustainability.

The change to the IStructE design guidance has significant weight and sets a clear tone for the future of car park design. Once this guidance is published, along with local authority design guidance, car spaces will get bigger, increasing the comfort of large car drivers, further encouraging their use.

The constraint of parking bay size is no longer what it used to be, and car manufacturers are pushing the limits of design, to the detriment of people walking and cycling, taxpayers, and the environment.

5 Recommendations

Based on the analysis of car size growth, the impacts of this and the regulations and frameworks that shape this, this report provides the following recommendations:

Design regulation and guidance recommendations:

1. Revise all design regulations, design guidance and local design guidance referring to parking bay size. Set the maximum size of a parking space to be the same in all design guidance and regulations (2.4m in width and 4.8m in length for perpendicular parking bay, 1.8m in width and 4.5m in length for a parallel parking bay).

Other recommendations:

2. Government data should publish data on the type of car. 'Car' is too broad a term and doesn't allow for the analysis of data required to monitor large car trends.
3. Fatality and collision data to define a vehicle type and weight.

Further research:

4. A full analysis of all local authority design guidance should be undertaken, to understand the full spread of parking bay dimensions across the UK.
5. An analysis of vehicle size regulations in different countries.

6 Conclusion

Currently in the UK, you can own and register a vehicle that is 2.5m wide and 12m long. You can drive it on a standard licence if its passenger capacity is fewer than 8 and less than and 3.5 tonnes. Having such a large extent is essentially having no regulation at all, meaning a disproportionate responsibility lies on other factors to reduce car size. Namely car space size.

As Paul Herriotts, professor in transport design at Coventry University states “I believe we are at peak size because our infrastructure won’t let cars get any bigger. Parking spaces don’t allow much room for you to open your door and get in and out and that’s already causing people problems” (Foxall, 2023). However, as this report has highlighted, design regulations and guidance are changing to accommodate larger cars – enabling increases in car size.

As this report has highlighted, bigger cars have adverse impacts on people and the planet. Therefore, this report has set out several key recommendations to increase the evidence base around car size growth and its impact and to limit the further growth of cars in the UK. The key recommendation of this report is to define a maximum size of a parking bay in all UK design guidance and regulations.

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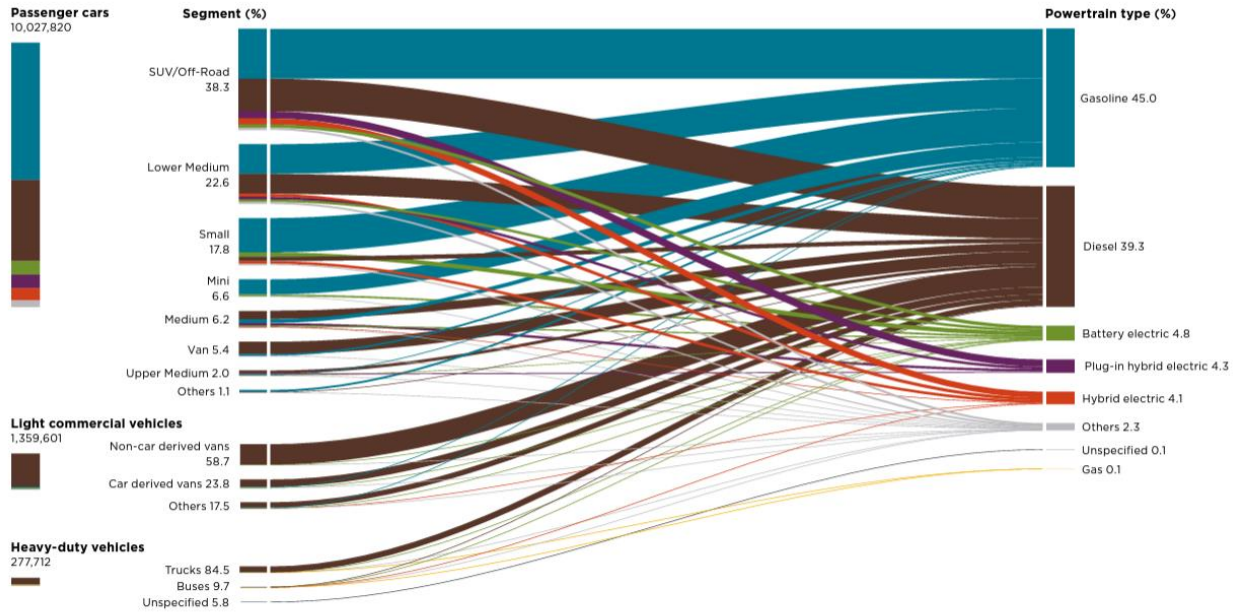
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Appendix A

2020 European new light-duty and heavy-duty vehicle registrations by segment and powertrain type (The International Council on Clean Transport, 2022).

2020 European new light-duty and heavy-duty vehicle registrations by segment and powertrain type



Data is for the 27 EU Member States.

A. 1. 2020 European new light-duty and heavy-duty vehicle registrations by segment and powertrain type (The International Council on Clean Transport, 2022).

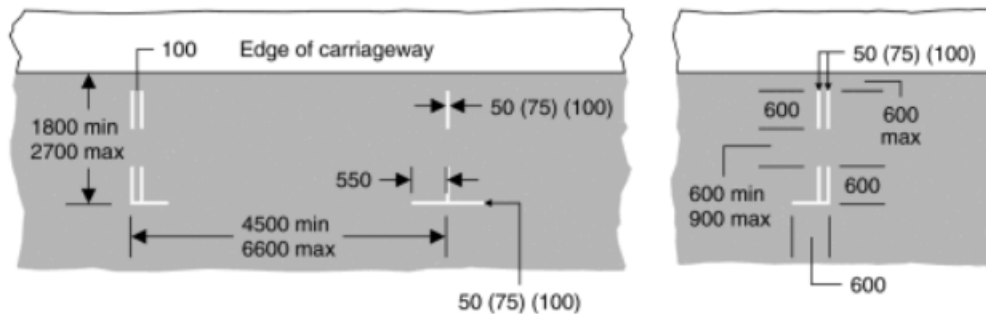
Appendix B

Parking bay dimensions

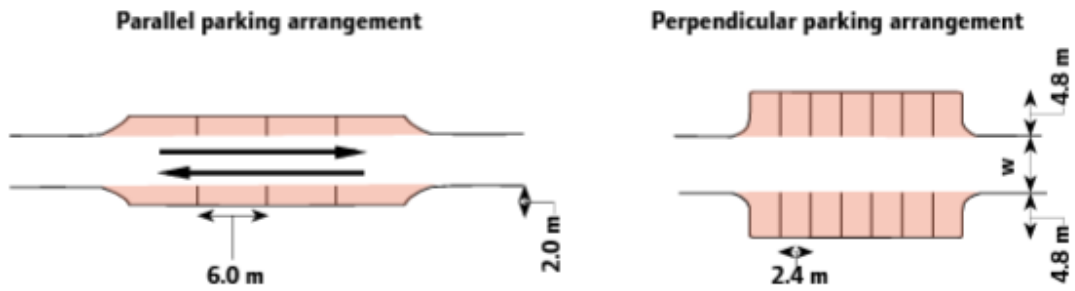
Sign table — Schedule 7, Part 4

(1) Item	(2) Description	(3) Diagram
6	Diagram 1028.4 Alternative types of parking bay— (a) at the edge of the carriageway and situated wholly on either the carriageway or footway; or (b) in the centre of the carriageway or partly on the carriageway and partly on the footway	

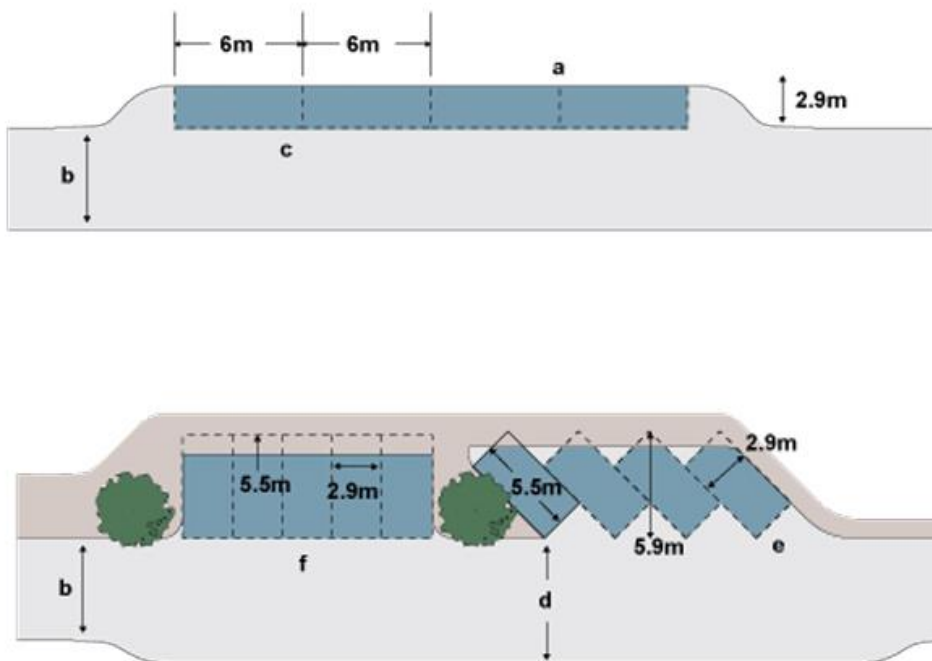
B. 1. TSRGD 2016 Schedule 7, Part 4 (Traffic Signs Regulations, 2016).



B. 2. TSRGD 2002 Parking Bay marked with individual parking spaces (Traffic Signs Regulations, 2002).



B. 3. Manual for Streets suggested parallel and perpendicular parking arrangements (Department for Transport, 2022)



B. 4. Essex design guide parking bay dimensions (Essex Planning Officers Association, 2018).