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Transport Planning

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Research to Support the London Borough of Richmond-upon-Thames' Review of their Local Parking Standards

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Final Report

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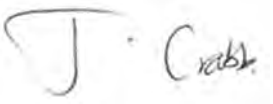

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1 Executive Summary

AECOM has been commissioned by the London Borough of Richmond-upon-Thames (LB Richmond-upon-Thames) to provide transport planning support in order to develop a robust and up-to-date evidence base to assist with the Borough's review of their parking standards and Local Plan. The Council has taken the opportunity to review the parking standards with a particular focus on the residential standards which are set out within the Development Management Plan. The car parking standards set the parameters for the maximum levels of car parking which should typically be provided in support of new developments with the aim of minimising the impact of car based travel. There is however also a need for the standards to be flexible where appropriate and contribute towards a safe road network without exacerbating existing on-street parking pressures.

LB Richmond-upon-Thames is an Outer London borough which experiences high levels of on-street parking stress in certain areas (as demonstrated by recent surveys) and has above average car ownership levels for Outer London. The study examines the existing standards in relation to various local characteristics across the borough including on-street parking sterss, car ownership, Public Transport Accessibility Levels (PTALs), housing types and projected housing delivery, parking restrictions and car clubs. A series of recommendations are provided to inform the review of the residential car parking standards and the study can also assist with the preparation of further evidence and justification to support the Local Plan review. The report has been developed in close partnership with LB Richmond-upon-Thames planning policy and transport officers.

This study has been informed by Borough-wide and locally specific research for other Outer London boroughs whilst also having regards to national guidance and the London Plan parking standards and supporting policies. Consideration has been made for the need to have a well-balanced set of local parking standards which cater for all user types and are able to be flexible to reflect local characteristics so that on-street parking pressures are not further exacerbated. The standards also need to consider the promotion of sustainable transport by not over-providing off-street provision at new housing developments. Although the existing parking standards are currently more generous than the London Plan standards, they are in general conformity and reflect national policy by allowing for flexibility in the way in which the standards are applied. Demand management measures should also be considered alongside the standards to help manage car parking across the borough.

A review of existing conditions has identified that there are on-street parking pressures across certain parts of the borough as a result of various factors including limited on-street and off-street parking availability, high car ownership levels, increased parking demand over recent years (due to population increase and a greater uptake of sustainable travel modes) and commuter parking. The borough typically has a poor level of accessibility to public transport services and car ownership levels tend to be higher in these areas. Areas with high PTAL such as the town centre locations of Richmond and Twickenham accommodate higher development densities. Community Parking Zones (CPZs) restrict on-street parking availability at various times throughout the day in these areas with a view to reduce car ownership levels. Car club membership has been on the increase in recent years which has also helped to reduce car ownership levels. Each car club vehicle replaces approximately 22 private vehicles within the borough on average based on the information provided by Zipcar and Enterprise car clubs.

A series of manual classified counts have been undertaken at six recently completed housing developments across the borough to identify vehicular trip rates and compare parking levels with parking provision to understand whether sufficient off-street parking has been provided. The results show that the number of car parking spaces provided at each site tends to be comparable with estimated car ownership levels. Whilst four sites have provided car parking towards or at the upper end of the maximum parking standards, one site has provided parking above the maximum standards, and another far below the standards to reflect local characteristics. It is considered that insufficient parking may have been provided at one of the sites which may have resulted in overspill parking. The disabled parking provision is in line with both the London Plan and the LB Richmond-upon-Thames car parking standards across all sites. The cycle parking provision is also in accordance with or above the minimum LB Richmond-upon-Thames cycle parking standards based on the transport documents submitted in support of each application.

The two-way vehicular trip rates obtained from the surveys at the six sites were highest at those which were situated outside of CPZs and comprised a higher proportion of larger dwellings, and lowest at those situated in areas with higher PTALs comprising smaller units with lower estimated car ownership levels. No apparent relationship could be drawn between the estimated proportion of households with access to a car and the vehicular trip rates. This is likely to be due to the range of other influencing factors which also affect car use including car ownership, availability of sustainable transport modes and the proximity of households to local facilities and amenities.

Parking beat surveys have been undertaken at eight different sites across the borough including overnight surveys for all areas and daytime surveys for the two sites situated near high street areas. The results show that overnight on-street parking stress levels tended to be higher in areas with moderate PTAL (2-3) and situated outside of CPZs where there are no parking restrictions in place during certain parts of the day. The areas with the lowest PTALs experienced lower levels of overnight on-street parking stress primarily due to a wider availability of on-street and off-street parking. There was also a higher prevalence of inappropriate parking at sites situated outside of CPZs with higher levels of overnight on-street parking stress. This can in turn contribute to other issues such as congestion and safety implications. The majority of on-street disabled parking bays were in use during the overnight surveys which reinforces the importance of reviewing the disabled parking standards as part of this study. The daytime surveys revealed that other factors such as the uptake of sustainable travel modes can also influence on-street parking stress levels as this affects the number of vehicles that are left at home and therefore potentially parked on-street.

Following the collation of the evidence base, the study explores the potential impacts of three different residential parking standard options on future parking conditions and other related transport characteristics across the borough. The three options have been assessed using an integrated and objectives-led approach with the overall objective of minimising the impact of parking and car basved travel on the operation of the road network as well as on the local environment. The likely impacts on sustainable travel, car ownership levels, car journeys, emissions, air quality, congestion, inappropriate parking and safety have also been considered.

The following three options have been explored:

1. LB Richmond-upon-Thames's current parking standards, as set out in Appendix 4 of the Development Management Plan;
2. The adopted London Plan standards (set out in the MALP) which allows a more flexible approach in areas of PTAL 1a-1b, with limited parts in PTAL 2; and
3. A new set of standards, which provide a more flexible approach in areas of PTAL 1a-2, with limited parts in PTAL 3.

The assessment has been used as a comparative tool to identify a preferred option based upon the extent to which they are each considered to achieve the following objectives:

1. To encourage travel by sustainable travel modes i.e. walking, cycling and public transport, to maximise the health and well-being of the population;
2. To reduce car dependency and the associated environmental implications; and
3. To improve conditions on the local highway network.

A number of supplementary objectives have also been identified including the need to cater for all user types including residents of wheelchair accessible units through providing sufficient disabled parking, encouraging cycling as a main mode of travel by providing sufficient cycle parking and reducing the level of land take required by off-street parking within new developments. These have been used to inform the recommendations of which further details have been provided overleaf.

The assessment has been informed by the Borough's planning and housing context and provides a qualitative comparative assessment to allow the preferred option to be more easily identified. The assessment has also been informed by the scoring system used to inform the Mayor's Integrated Impact Assessment on the London Plan parking standards. The projected future baseline conditions of the borough have been considered to reflect the delivery of housing in different areas as well as potential changes in PTAL, travel patterns, car club membership levels and car ownership levels.

The assessment reveals that each option is anticipated to have a mixture of positive and negative effects based on the three key objectives. The new set of standards are expected to result in the greatest net benefits compared to the other two options as although this will increase car dependency and environmental implications, this will significantly favour the local highway network by reducing on-street parking pressures and improving highway safety. **Option 3 (a new set of standards) therefore forms the preferred option of this study**. It is considered that the environmental impacts resulting from this option will be limited and will be able to be mitigated these through several identified methods such as demand management measures and applying the flexibility on a case-by-case basis. The preferred option is also considered to be in general conformance with the London Plan standards by providing maximum standards, only allowing flexibility in certain areas, and continuing the requirement for developers to demonstrate that their proposals would not have any adverse highway impacts.

Further to the residential parking standards, the study also provides a high-level assessment of the destination parking standards for commercial developments and educational establishments within the borough in relation to the key objectives. The London Plan allows Outer London Boroughs some flexibility in setting their destination parking standards where there is firstly a demonstrable need and where this would secondly not have unacceptable adverse impacts on the wider transport network and on air quality. A comparison has therefore been undertaken between the London Plan and LB Richmond-upon-Thames destination parking standards for a selection of commercial uses to identify differences in their requirements and the possible implications of these. The findings have then been used to inform the recommendations.

The recommendations of this study are as follows:

- To amend the existing residential car parking standards so that more flexibility is encouraged in PTALs 1a-2, with limited parts of 3 'the preferred option'. This flexibility should be applied on a case-by-case basis;
- To continue to encourage parking provision towards the upper end of the maximum car parking standards;
- To retain the less generous Borough-wide destination car parking standards;
- To maintain the distinction in the residential and destination standards between areas situated within and outside of CPZs;
- To retain the current disabled parking standards for residential and non-residential developments;
- To adopt the London Plan minimum cycle standards for residential development, as well as retail and employment uses;
- To retain the existing cycle parking standards for education uses;
- To encourage car-free housing developments in the appropriate locations e.g. within town centres;
- To review the provision of CPZs across the borough as a key demand management measure for addressing on-street parking pressures;
- To support the provision of car clubs and encourage the increased membership levels;
- To reduce car journeys and vehicular emissions through encouraging car sharing and requiring the provision of Electric Vehicle Charging Points within new developments;
- To reduce off-street parking land take such as through requiring efficient parking layouts in new housing developments; and
- To adopt the LB Lambeth parking beat survey methodology which provides an accurate representation of actual on-street parking capacity and average parking stress of a study area.

The effects of the above recommendations including the adoption of the preferred option should be monitored in relation to the objectives of the study including the target to improve conditions on the local highway network. A framework for implementing, monitoring and reviewing the recommendations in relation to the objectives has been provided as part of this study which includes details of timescales. This includes monitoring the additional parking spaces provided in support of new developments, undertaking additional on-street parking beat surveys to monitor the worst affected locations, considering additional demand management measures in support of the standards and monitoring conditions of the local highway network as future housing is delivered.

2 Introduction

2.1 Background

AECOM has been commissioned by LB Richmond-upon-Thames to develop an up-to-date evidence base to inform the Council's review of their current parking policies within the Local Plan including the adopted parking standards which are currently held within Appendix 4 of the Development Management Plan. The research will be used to inform the setting of Borough-wide local parking standards in relation to the current standards as well as those set out in the London Plan (including the Minor Alterations to the Parking Standards).

The study has been informed by Borough-wide and locally specific research, as well as the London Plan parking standards and the rationale that supports them. Three different residential parking standard options have been examined to provide a justification in support of either introducing new local standards, continuing with the existing local parking standards or adopting the London Plan standards. This has been informed by the Borough's planning and housing context including the current minimum annual housing target, as well as existing conditions where there are high levels of car ownership in parts of the borough and on-street parking availability is currently constrained in certain locations.

The report has been produced in close consultation with LB Richmond-upon-Thames Officers and a series of meetings have been held to guide the development of the study.

2.2 Approach

New development should be supported by a suitable level of parking provision/infrastructure as this forms an integral part to vehicular travel by accommodating vehicles once destinations have been reached. Policies and measures can influence parking patterns including by changing levels of provision or the location of parking facilities. Parking standards should allow sufficient off-street parking to be provided without unduly contributing to on-street parking pressures but also without deterring the use of sustainable travel modes. They should also be designed to sensitively support the management of parking across the borough in relation to varying accessibility levels and local conditions.

Paragraph 39 of the National Planning Policy Framework (NPPF) places the impetus upon local authorities to set their own parking standards with consideration to the accessibility and type of each new development, the availability of public transport, local car ownership levels and the need to reduce the use of high emission vehicles. However, the Ministerial Statement published on 25 March 2015 states that:

"Local Planning authorities should only impose local parking standards for residential and non-residential development where this is clear and compelling justification that it is necessary to manage their local road network".

The study therefore explores a variety of factors which influence parking levels across the borough to determine whether the setting of local parking standards (as opposed to the regional London Plan standards) can be considered to be more appropriate.

LB Richmond-upon-Thames is situated in Outer London where car ownership and dependency levels are higher than elsewhere in London and on-street parking is well-utilised particularly in dense residential areas and locations near railway stations for example where commuter parking is prevalent. Although the existing LB Richmond-upon-Thames parking standards provide maximum thresholds in line with the London Plan, sufficient levels of parking should be provided to meet parking needs without resulting in overspill parking and adversely affecting local highway conditions. This is supported by the recent Minor Alterations to the London Plan (MALP) which seeks to provide a greater level of flexibility than earlier versions by offering higher levels of parking provision in the less accessible areas of Outer London boroughs to reduce pressures for on-street parking.

The Core Strategy of the LB Richmond-upon-Thames Local Plan states the following under Paragraph 4.1.27 in relation to the existing parking situation:

"There is considerable pressure on parking – many older properties do not have off street parking and there is not much capacity for further on street parking in most areas. This is worsened where there is a demand for commuter parking. Approximately 30% of the Boroughs residents are within Controlled Parking Zones."

This study seeks to ascertain the extent of these existing pressures so that a suitable set of parking standards can be determined without further contributing to these pressures. To this end, the standards should encourage sustainable modes of travel and reduce the need to travel by private car to reduce congestion and pollution. Furthermore, on-street parking demand will need to be managed through encouraging car-free developments in highly accessible areas (i.e. PTALs 5 or 6) where appropriate, supporting the provision and use of car clubs across the borough and by advocating higher levels of off-street parking to meet user needs in less accessible areas. Consideration to PTALs, car ownership levels and CPZs will also need to be made.

The study focuses on the residential parking standards as guided by LB Richmond-upon-Thames as housing tends to contribute most to on-street parking pressures within the borough. Disabled road users, electric vehicle requirements and the cycle parking standards have also been considered.

In summary, the key purposes and objectives of this study are to:

- Examine the parking standards for LB Richmond-upon-Thames and other Outer London boroughs;
- Undertake parking stress surveys for a range of areas across the borough;
- Undertake traffic counts at recently completed residential developments in the borough to derive trip rates, identify parking levels and changes in the parking accumulation;
- Consider the availability of sustainable modes of transport including PTAL;
- Analyse the trend in car club provision in the borough and the potential to reduce car ownership levels;
- Test and undertake modelling of impacts for three residential parking standard options at a Borough-wide level;
- Advise on destination parking standards by undertaking a high level assessment of the current LB Richmond-upon-Thames and London Plan parking standards e.g. for commercial developments;
- Advise on Borough-wide cycle parking standards;
- Advise on disabled car parking standards;
- Advise on destination parking standards; and
- Present recommendations for the review of the Local Plan residential parking policy and parking standards.

2.3 Report Format

Following on from this introduction, this study is structured as follows:

- Section three provides a summary of the national, regional and local transport and parking policies, guidance and standards that relate to the review of the existing parking standards;
- Section four provides an overview of the existing conditions across the borough such as accessibility and parking stress levels as well as recent trends for housing completions, parking provision, on-street parking availability and car club provision;
- Section five examines three residential car parking standard options at borough-wide level and selects a preferred option based on the ability to meet several objectives including consideration of the likely impacts on future parking conditions within the borough as well as other related transport characteristics;
- Section six provides an overview of destination car parking standards and compares the existing borough-wide standards with the London Plan standards; and
- Section seven sets out the recommendations of this study to inform the review of the parking standards.

3 Policy Review

3.1 Background

This section explores the existing transport and parking policies, guidance and standards at national, regional and local levels to set out their current positions and provide a robust technical framework for this study. A summary of the supporting evidence used to guide and inform parking policies and standards has been provided and comparisons have been drawn where necessary. The review has been designed to provide a platform for this study in terms of the key indicators and parameters which should be investigated with regards to variations in parking provision and availability across the borough.

The national standards have been examined with reference to the National Planning Policy Framework (NPPF) and other Government guidance to illustrate how the approach to setting parking standards has changed in recent years and the associated implications this has had on parking provision. This has been juxtaposed against current London Plan policy in the context of the Further Alterations to the London Plan (FALP) where greater flexibility has been provided for the residential parking standards including to reflect PTALs, as well as the Minor Alternations to the London Plan (MALP) where more flexible standards can be considered for housing in Outer London boroughs in areas with low PTALs.

The current adopted parking standards for LB Richmond-upon-Thames have been examined and compared to those applied within other Outer London boroughs to understand any similarities and differences. Reference has again been made to the London Plan standards to establish where the local standards vary as well as to understand the supporting rationales. Further to the above, local consultation material provided by LB Richmond-upon-Thames has been reviewed to understand the views of the public on the current parking situation within the borough and therefore help to focus the study so that these issues can be duly considered.

3.2 National Guidance and Policy

The National Planning Policy Framework (NPPF) was published on 27th March 2012 (following the implementation of the Localism Act 2011) and replaced all Planning Policy Statement (PPS) and Planning Policy Guidance (PPG) documents which previously detailed the Government's planning policies for England. The NPPF provides a framework within which local people and councils can produce their own distinctive local and neighbourhood plans. The document aims to strengthen local decision making and reinforce the importance of keeping plans up to date.

Section 4 of the NPPF outlines the policies which promote sustainable transport. Those policies which are considered to be of relevance to this study are outlined below.

Paragraph 29: *'Transport policies have an important role to play in facilitating sustainable development but also in contributing to wider sustainability and health objectives. Smarter use of technologies can reduce the need to travel. The transport system needs to be balanced in favour of sustainable transport modes, giving people a real choice about how they travel. However, the Government recognises that different policies and measures will be required in different communities and opportunities to maximise sustainable transport solutions will vary from urban to rural areas.'*

Paragraph 30: '*Encouragement should be given to solutions which support reductions in greenhouse gas emissions and reduce congestion. In preparing Local Plans, local planning authorities should therefore support a pattern of development which, where reasonable to do so, facilitates the use of sustainable modes of transport.'*

Paragraph 35: *'Plans should protect and exploit opportunities for the use of sustainable transport modes for the movement of goods or people. Therefore, developments should be located and designed where practical to*:

- *accommodate the efficient delivery of goods and supplies*
- *give priority to pedestrian and cycle movements, and have access to high quality public transport facilities*
- *create safe and secure layouts which minimise conflicts between traffic and cyclists or pedestrians, avoiding street clutter and where appropriate establishing home zones*
- *incorporate facilities for charging plug-in and other ultra-low emission vehicles*
- *consider the needs of people with disabilities by all modes of transport.'*

Paragraph 39: *'If setting local parking standards for residential and non-residential development, local planning authorities should take into account:*

- *the accessibility of the development*
- *the type, mix and use of development*
- *the availability of and opportunities for public transport*
- *local car ownership levels*
- *an overall need to reduce the use of high-emission vehicles.'*

Paragraph 40: *'Local authorities should seek to improve the quality of parking in town centres so that it is convenient, safe and secure, including appropriate provision for motorcycles. They should set appropriate parking charges that do not undermine the vitality of town centres. Parking enforcement should be proportionate.'*

NPPF Summary

In terms of this review of the borough-wide local parking standards, it will be important to consider the following in line with the NPPF:

- **A well-balanced set of standards which permit suitable levels of parking in support of future housing without overproviding in order to be in favour of sustainable transport modes e.g. to discourage car use and limit congestion;**
- **The requirement to provide Electric Vehicle Charging Points (EVCPs) in support of parking at new developments e.g. to reduce greenhouse gas emissions;**
- **The need to reflect the criteria set out within Paragraph 39 of the NPPF so that the maximum permitted parking levels reflect local characteristics; and**
- **The importance to avoid contributing towards any existing on-street parking pressures, particularly within town centres such as Richmond and Twickenham e.g. to reduce inappropriate parking and improve highway safety.**

The National Planning Practice Guidance (NPPG) is a web-based resource which was launched on 6 March 2014 by the Department for Communities and Local Government (DCLG) which undergoes a regular review process to ensure it remains relevant, usable and up-to-date. The NPPG includes two guidance documents which are considered to be of particular relevance to this study. These have been explored immediately below.

'Transport evidence bases in plan making and decision taking' provides guidance to help local planning authorities assess strategic transport needs to reflect and, where appropriate, mitigate these in their Local Plan. It is important for local planning authorities to undertake an assessment of the transport implications in developing or reviewing their Local Plan. This should be supported by a robust transport evidence base which identifies the opportunities to encourage a shift to more sustainable transport modes where possible.

'Travel plans, transport assessments and statements in decision-taking' provides advice on when transport assessments and transport statements are required and the information which they should contain. These documents should positively contribute to encouraging sustainable travel, reducing environmental impacts, reducing the land take of off-street parking (and therefore attractiveness of sites) and improving the quality of town centre parking. The guidance identifies that capping parking provision through the use of maximum parking standards can result in poor quality development and congested streets. The level of parking provided in support of future housing should not be overly restrictive or reduced below a level that would not then meet user needs.

The above is reaffirmed by the Ministerial Policy Statement 'Parking: Helping Local Shops and Preventing Congestion' which was issued on the 25th March 2015 and states:

"The imposition of maximum parking standards under the last administration lead to blocked and congested streets and pavement parking. Arbitrarily restricting new off-street parking spaces does not reduce car use, it just leads to parking misery. It is for this reason that the government abolished national maximum parking standards in 2011. The market is best placed to decide if additional parking spaces should be provided."

This therefore also takes the view that adequate parking provision should be provided in support of new housing to avoid exacerbating existing on-street parking pressures.

NPPG Summary

This study will help to develop the transport evidence base in support of the Local Plan review by:

- **Identifying the existing parking situation across the borough including utilisation levels and instances of inappropriate parking;**
- **Examining the current conditions in relation to various transport characteristics such as accessibility, car ownership and parking stress;**
- **Identifying the short, medium and long-term housing targets and the likely changes in the parking situation based on three different residential parking standard options;**
- **Identifying the potential cumulative impacts of existing and proposed housing on the parking situation across the borough;**
- **Recommending standards which promote levels of parking provision in new residential development which meet the needs of users without contributing to overspill parking and on-street parking pressures; and**
- **Recommending a set of standards which will improve the sustainability of transport provision, promote choice amongst different modes of transport and improve health and well-being.**

In terms of destination parking standards, the Department for Transport's (DfT) 'Research into the Use and Effectiveness of Maximum Parking Standards' (2008) provided a review of existing research relating to applying maximum non-residential car parking standards. The following key messages are considered to be of particular relevance to the application of maximum destination parking standards within the borough.

Pros:

- Parking can be an effective demand management tool;
- There is a clear link between parking availability and car use;
- Restricting parking numbers (through maximum standards) can influence mode choice and reduce parking demand; and
- Without implementing maximum standards, there is a risk that there will be significant negative effects on other areas of transport policy.

Cons:

- Maximum standards can contribute to increased on-street parking pressures; and
- Rural areas with higher levels of car dependency and reduced availability of public transport require a greater level of flexibility to meet their local needs.

3.3 Regional Policy and Residential Parking Standards

London Plan and Recent Alterations

The Mayor of London is responsible for the production of the Spatial Development Strategy for London which takes the form of the London Plan (adopted July 2011). The London Plan sets out an integrated economic, environmental, transport and social framework for the development of London over the next 20-25 years. The London Plan is also related to the Mayor's Transport Strategy (MTS) where the policies and proposals are monitored in a co-ordinated way and are designed to achieve six main goals and themes.

Chapter 6 of the London Plan sets out the policies which are primarily intended to support the delivery of the sixth objective, that London should be a city where it is easy, safe and convenient for everyone to access jobs, opportunities and facilities with an efficient and effective transport system which encourages sustainable travel. The chapter also aims to support the integration of transport and development and sets out the car and cycle parking standards and associated parking policy to influence transport choice and address congestion.

The London Plan sets out maximum car parking standards which provide the policy context for Borough-wide standards and are designed to offer a degree of restraint to the level of car parking which can be provided in support of new

developments. The London Plan has however been consolidated with alterations since its adoption to provide added flexibility in the ways which the standards can be applied to reflect recent changes in national policy; namely the NPPF. A summary of these alterations has been provided below.

The Further Alterations to the London Plan (FALP) was published in March 2015 and recognised the opportunity to adopt a more flexible approach when applying car parking standards for developments in London. The FALP emphasised the importance of considering site PTALs to distinguish between different parts of London based on the level of connectivity from a location to the public transport network. Furthermore, the maximum residential car parking standards were increased so that higher levels of car parking could be considered in support of new housing, where appropriate. The minimum cycle parking standards were also updated to require significantly more cycle parking in support of new residential developments i.e. all dwellings with two bedrooms or more would need to provide at least two spaces (rather than just dwellings above 45sqm).

The Minor Alterations to the London Plan (MALP) was published on 14 March 2016 and sought to allow further flexibility in setting car parking standards to reflect national policy. The MALP focused on car parking policy specifically in less accessible parts of Outer London and promoted consideration of more generous standards for housing in areas with low public transport accessibility to reflect a greater dependence on car travel and the need to avoid exacerbating on-street parking pressures. The MALP was informed by the Outer London Commission's (OLC) Fourth Report and the Mayor's Integrated Impact Assessment (IIA) of which further details have been provided further below.

Evidence Base - OLC Fourth Report

The OLC Fourth Report (May 2015) outlined the latest evidence on various social, economic and environmental drivers used to inform parking standards and reviewed parking policy in parts of Outer London to address concerns that maximum standards could lead to a 'vicious cycle of clogged up streets' leaving 'motorists to run a gauntlet of congestion, unfair fines and restrictions'. The report was informed by the views of Outer London boroughs and several measures for taking local circumstances for new residential housing developments into consideration were put forward. Although it was recommended that the maximum parking standards should be retained (to avoid the potential over-provision of parking spaces), it was considered that PTALs should be used to provide added flexibility in their application. This was therefore in line with the recent changes made as part of the FALP.

The OLC Fourth Report also identified several additional characteristics which should be considered in order to provide a comprehensive approach when applying the maximum parking standards to new housing in Outer London boroughs. For example, potential parking overspill from a new development should be considered particularly in areas where parking stress levels are already high as this could result in safety implications such as by blocking the carriageway for emergency vehicles. A flexible approach also needs to be adopted to reflect car dependency and ownership levels in Outer London which are affected by a range of factors including household structure, type and other demographic variables.

The OLC Fourth Report concluded that the maximum parking standards set out in the London Plan need to allow for flexibility within each borough whilst also promoting the use of sustainable transport modes. Demand management measures such as the provision of CPZs and car clubs should also be used to address concerns surrounding car ownership levels and surrounding overspill where appropriate.

Evidence Base - Mayor's Integrated Impact Assessment on the London Plan Parking Standards

The Mayor's Integrated Impact Assessment (IIA) supported the MALP and was published by the Greater London Authority (GLA) in April 2015. The IIA is London-wide and not borough specific and was largely based on the information used to inform the FALP and recognised the opportunity to adopt a more flexible approach in parts of Outer London to reflect national policy. The IIA therefore considered the positive and negative environmental, social and economic implications of proposed changes to the maximum London Plan parking standards against a series of sustainability objectives. This therefore provided an objectives-lead approach and allowed the potential impacts to be assessed collectively. The following three strategic options were examined:

- No change (continue with the FALP);
- Allow/encourage more flexibility in PTALs 0-1 in Outer London; and
- Allow/encourage more flexibility in PTAL areas such as 0-2/3 in Outer London.

The IIA examined the various options over the short-term (first five years), medium-term (5-15 years post adoption) and long-term (15+ years) against 16 sustainability objectives. Of these, Strategic Objective 12 'Accessibility and Mobility' set out to *'Maximise the accessibility for all in and around London and increase the proportion of journeys made by sustainable transport modes (particularly public transport, walking and cycling'*. Reducing the reliance on private car use and increasing travel by sustainable modes of transport therefore formed two key performance indicators.

The IIA concluded that the second option (more flexibility in PTALs 0-1 in Outer London) formed the preferred approach and would result in generally positive social and economic outcomes. Although there would be negative environmental implications resulting from potential additional car journeys, the extent of the proposed changes to the standards would only be limited to new housing within less accessible areas of Outer London. A summary of the main advantages and disadvantages of amending the parking standards to provide more flexibility was identified as follows:

Pros:

- Improved viability for housing developers in low PTAL areas;
- Increased sense of vehicle safety i.e. when parked off-street; and
- More supportive of those with disabilities, with children or with a need to use a vehicle for work.

Cons:

- Additional car journeys with associated negative economic and environmental impacts; and
- Fewer people choosing to walk or cycle.

London Plan Car Parking Standards

The current maximum car parking standards are set out within Table 6.2 of the London Plan and these have been replicated in **Table 3-1** below for residential developments. It should be noted that the London Plan encourages developments in areas of good public transport accessibility to aim for significantly less than one space per unit and furthermore, promotes car free development in areas of high accessibility.

Table 3-1: London Plan Maximum Residential Car Parking Standards

Number of Beds	Parking Spaces
1-2	Less than 1 per unit
3	Up to 1.5 per unit
4+	Up to 2 per unit

The London Plan also includes a supplementary table which indicates the flexibility which can be applied based on variations in housing size, density and location. This effectively illustrates that more generous standards (up to two spaces per unit) can be applied for sites situated in less accessible areas (PTAL 1a to 1b) for new housing comprising larger units at low densities. **Table 3-2** replicates this information and the standards which are more likely to be applicable for an Outer London borough such as LB Richmond-upon-Thames are set out towards the top left i.e. highlighted in green and yellow.

Table 3-2: London Plan Parking for Residential Development

Location	PTAL 0 to 1		PTAL 2 to 4		PTAL 5 to 6	
Suburban	**150-220 hr/ha**	**Parking Provision**	**150-250 hr/ha**	**Parking Provision**	**200-350 hr/ha**	**Parking Provision**
3.8-4.6 hr/unit	35-55 u/ha		35-65 u/ha		45-90 u/ha	
3.1-3.7 hr/unit	40-65 u/ha	Up to 2 spaces/unit	40-80 u/ha	Up to 1.5 spaces/unit	55-115 u/ha	Up to one space/unit
2.7-3.0 hr/unit	50-75 u/ha		50-95 u/ha		70-130 u/ha	
Urban	**150-250 hr/ha**	**Parking Provision**	**200-450 hr/ha**	**Parking Provision**	**200-700 hr/ha**	**Parking Provision**
3.8-4.6 hr/unit	35-65 u/ha		45-120 u/ha	Up to 1.5 spaces/unit	45-185 u/ha	Up to one space/unit
3.1-3.7 hr/unit	40-80 u/ha	Up to 1.5 spaces/unit	55-145 u/ha		55-225 u/ha	
2.7-3.0 hr/unit	50-95 u/ha		70-170 u/ha	Up to one space/unit	70-260 u/ha	
Central	**150-300 hr/ha**	**Parking Provision**	**300-650 hr/ha**	**Parking Provision**	**650-1100 hr/ha**	**Parking Provision**
3.8-4.6 hr/unit	35-80 u/ha	Up to 1.5 spaces/unit	65-170 u/ha		140-290 u/ha	Up to one space/unit
3.1-3.7 hr/unit	40-100 u/ha		80-210 u/ha	Up to one space/unit	175-355 u/ha	
2.7-3.0 hr/unit	50-110 u/ha	Up to one space/unit	100-240 u/ha		215-405 u/ha	

Policy 6.13 sets out the parking policy in support of the standards which can be summarised as follows:

- An appropriate balance should be struck between promoting new development and preventing excessive car parking provision that could undermine cycling, walking and public transport use;
- Car-free developments should be promoted in areas of high public transport accessibility (whilst still providing for disabled people).
- All developments must ensure that 1 in 5 spaces (20%) provide an active electrical charging point to encourage the uptake of electric vehicles, with a further 1 in 5 spaces (20%) having passive provision;
- Adequate parking spaces must be provided for disabled people, preferably on-site;

The London Plan states that the maximum car parking standards should be used as the basis for those set out by London Boroughs within their DPDs. However, as previously mentioned, Outer London boroughs should consider more generous standards for housing in areas with low public transport accessibility (generally PTALs 0-1 as set out in the MALP) to avoid unacceptable pressure being generated for on-street parking i.e. where there is an increased dependency on car travel (particularly for larger dwellings). A more flexible approach may also be appropriate for limited parts of areas with PTAL 2 where the orientation or levels of public transport increase residents' dependence on car travel. The standards should also consider current and projected pressures for on-street parking, the criteria set out in paragraph 39 of the NPPF and the implications that car parking levels could have on air quality, overspill parking, congestion, safety and amenity.

With regards to areas with good public transport accessibility, TfL state (as part of their guidance on parking design) that residential developments should contain significantly less than one space per dwelling with only car-free developments being permitted in the most accessible locations. Residents should also be encouraged to make use of car club bays to reduce car ownership levels. Consideration should be made to making residents ineligible for applying for parking permits in CPZs to avoid adverse impacts resulting from on-street parking. This approach would therefore apply to both Richmond and Twickenham town centres which are both situated within CPZs and have PTALs of 6 and 5 respectively. Again, site PTALs should be considered and parking provision should aim to support the London Plan objectives of promoting sustainable travel, reducing congestion and improving air quality in less accessible areas.

A suitable level of blue badge parking should be provided in support of new housing. The provision should ideally be provided on-site and appropriately located and designed to maximise the accessibility of each bay and minimise walking distances to building entrances. The London Plan requires 10% of new housing to be wheelchair accessible or easily adaptable to become wheelchair accessible if needed. The Housing SPG (November 2012) requires each wheelchair accessible unit to have an associated blue badge parking bay. This therefore equates to a minimum of 10% of residential units provided at a new development, even for car-free schemes. Further details of the blue badge parking requirements which have been set at local level by a number of Outer London boroughs have been provided further on within this chapter.

London Plan Cycle Parking Standards

The minimum cycle parking standards are set out within Table 6.3 of the London Plan (FALP) and have been re-provided in **Table 3-3** below for residential developments:

Table 3-3: London Plan Minimum Residential Cycle Parking Standards

Number of Beds	Long-Stay	Short-Stay
1	1 space per unit	1 space per 40 units
2+	2 spaces per unit	

All developments in all parts of London must meet these minimum cycle parking standards.

Regional Policy Summary

The following regional policies should be considered when determining the borough-wide standards:

- **The London Plan sets out maximum parking standards which provide the policy context for Borough-wide standards;**
- **The London Plan has been consolidated with alterations to reflect national policy by providing added flexibility in the ways which the standards can be applied;**
- **These alterations were informed by the OLC Fourth Report and the Mayor's IIA where adopting more flexible standards for housing in less accessible areas (PTAL 1a-1b) of Outer London formed the preferred approach;**
- **Consideration should also be given to existing parking stress levels, car dependency and car ownership levels when applying maximum parking standards; and**
- **Demand management measures including car clubs and CPZs should also be considered alongside the parking standards to encourage mode shift and reduce car ownership levels.**

3.4 London Borough of Richmond-upon-Thames - Policy and Residential Parking Standards

Draft Local Plan

LB Richmond-upon-Thames is currently reviewing their existing adopted policies set out in the Core Strategy and Development Management Plan to develop the draft Local Plan. The Local Plan sets out a 15 year strategic vision for the borough, as well as the objectives, spatial strategy, planning policies and site allocations that will guide future development. The draft transport policies include:

Facilitating Sustainable Travel Choices – the Council will work in partnership to promote safe, sustainable and accessible transport solutions, which minimise the impacts of the development including in relation to congestion and air pollution, and maximise opportunities including for health benefits and providing access to services, facilities and employment.

Parking Standards and Servicing - The Council will require new development to make proper provision for the accommodation of vehicles in order to minimise the impact of car based travel including on the operation of the road network and local environment and ensuring making the best use of land. It will achieve this by:

1. Requiring new development to provide for car, cycle, 2 wheel and, where applicable, lorry parking and electric vehicle charging points in accordance with the standards set out in Appendix 3. Opportunities to minimise car parking through its shared use will be encouraged.

2. Resisting the provision of front garden car parking unless it can be demonstrated that:
    a. There would be no material impact on road or pedestrian safety;
    b. There would be no harmful impact on the character of the area, including the streetscape or setting of the property, in line with the policies on Local Character and Design; and
    c. The existing on street demand is less than available capacity.
3. Car free housing developments may be appropriate in areas with PTAL of 5 or 6, subject to:
    a. The provision of disabled parking;
    b. Appropriate servicing arrangements;
    c. Demonstrating that proper controls can be put in place to ensure that the proposal will not contribute to on-street parking stress in the locality; and
    d. Being supported by a Travel Plan.
4. Managing the level of publicly available car parking to support the vitality and viability of town and local centres within the borough whilst limiting its impacts on the road network.

Existing Local Plan - Core Strategy

The Core Strategy forms part of the existing Local Plan and sets out the strategic planning framework for the borough for 15 years from the document's adoption in April 2009. The Core Strategy supersedes the strategic policies set out within the Unitary Development Plan (UDP) (2005).

The LDF vision includes three inter-related themes of 'A Sustainable Future', 'Protecting Local Character' and 'Meeting People's Needs'.

Core Policy CP5 Sustainable Travel states that in promoting safe, sustainable and accessible transport modes such as walking, cycling and public transport, in association with its partners the Council will seek to:

- Require new car-free housing in Richmond and Twickenham town centres and in other areas where there is good public transport provision;
- Require less accessible areas to have regard to the maximum parking standards;
- Require car share facilities and car clubs in new developments (where appropriate) and encourage the use of low emission motor vehicles in order to reduce congestion and pollution;
- Discourage commuter parking particularly by giving priority to residents' needs (through CPZs and resident permits);
- Limit any further expansion of parking in town and local centres and manage parking controls (CPZs) to help maintain the vitality and viability of the centres, including the evening economy.

Existing Local Plan - Development Management Plan

The Development Management Plan was adopted in November 2011 and also forms part of the Local Plan. The document includes the detailed policies which are used to guide planning decisions in the borough. The Development Management Plan takes forward the strategic objectives of the Core Strategy including the three key themes.

Policy DM TP 8 Off-Street Parking – Retention and New Provision states that new developments, redevelopments, conversions and extensions will have to demonstrate that an appropriate level of off-street car parking will be provided to avoid any unacceptable impact on on-street parking or local traffic conditions.

LB Richmond-upon-Thames Car Parking Standards

The maximum car parking standards and minimum cycle parking standards are set out in Appendix 4 of the Development Management Plan. Adequate off-street parking provision is required in all developments and there is a policy requirement for the maximum standards to be met unless it can otherwise be demonstrated that there would be no adverse impacts on the area in terms of street scene or on-street parking situation. Lower levels of parking provision or car-free developments may be permissible in higher PTAL areas (5-6) such as within Richmond and Twickenham town centres, where this would not compromise road safety or emergency access or otherwise result in unacceptable overspill onto surrounding streets. Car share facilities and car clubs will be encouraged.

The maximum car parking standards for residential development are set out in **Table 3-4** below. Charging facilities for electric vehicles need to be provided in line with the London Plan standards.

Table 3-4: London Borough Richmond-upon-Thames Maximum Residential Car Parking Standards

Number of Beds	Parking Spaces (Borough-Wide & Within CPZs)
1-2	1 space
3	1 unit: 2 spaces 2+ units: 1.5 spaces, including 1 allocated space + sufficient unallocated provision
4+	2 spaces (negotiable where outside CPZ)

LB Richmond-upon-Thames applies separate car parking standards for developments situated within CPZs compared to the remainder of the borough. The CPZ standards favour lower levels of parking provision in support of non-residential developments to encourage the use of sustainable travel modes. The local parking standards provide more flexibility than the London Plan standards by providing slightly higher maximum standards for 1-2 bedroom properties and allowing negotiation for 4+ bedroom properties outside of CPZs. Occupiers of new residential developments in CPZs may not be eligible for on-street parking permits with the exception of Blue Badge holders.

The blue badge parking requirements are in line with the Mayor of London's Housing SPG (March 2016) which forms part of the London Plan. Standard 18 requires each designated wheelchair accessible dwelling to have access to a blue badge parking bay. LB Richmond-upon-Thames requires 10% of all new housing to be built to wheelchair standards. On this basis, it is therefore considered that the level of blue badge parking provided in support of new housing should be equivalent to at least 10% of overall dwellings, or provided at a 1:1 ratio with wheelchair accessible units.

LB Richmond-upon-Thames Cycle Parking Standards

The minimum cycle parking standards for residential development are set out in **Table 3-5**.

Table 3-5: London Borough of Richmond-upon-Thames Minimum Residential Cycle Parking Standards

Number of Beds	Parking Spaces
1-2	1 space
3	1 space
4	2 spaces

The minimum cycle parking standards are below those set out within the London Plan which requires a minimum of two spaces for every 2+ bedroom property.

Examination in Public

LB Richmond-upon-Thames successfully defended their parking standards at an Examination in Public (EiP) which was undertaken on the Development Management Plan (2011) as well as matters relating to off street parking and policy DMTP 8. The following responses were made to the Inspector to support the parking standards which were subsequently accepted by the GLA as being in conformity with the London Plan.

- The cycle parking standards are minimums and are considered to be similar to those in the London Plan. They have been accepted by the GLA as meeting their objectives;
- The car parking standards are all maximums and are considered to be broadly similar to those in the London Plan and other adjoining boroughs;
- The change in emphasis set out in the DMP is slight and reflects the worsening on-street parking situation within the borough;
- The policy and standards are considered to support the London Plan and Core Strategy;
- The ability to set Borough-wide standards is recognised by the London Plan and is considered to be appropriate;
- The standards should generally be met and developers should demonstrate that there would not be any adverse highway impacts as a result of a development; and
- Car-free developments are not precluded provided that the developer can show no adverse impact.

Although developers are permitted to provide lower levels of parking provision than set out by the maximum standards, this is only considered to be acceptable for proposals which would not result in adverse impacts on amenity, road safety, emergency access or on-street parking within the vicinity of the site. This therefore again reflects local circumstances as set out within the MALP and the supporting evidence base.

3.5 Outer London Parking Policy and Standards

As part of the review of the parking standards for LB Richmond-upon-Thames, it was agreed that consideration would also be given to the standards currently being applied in a sample of other Outer London boroughs including both those located in geographic proximity to Richmond, as well as others from further afield. The existing residential car parking standards have therefore been explored for a selection of Outer London boroughs as agreed with LB Richmond-upon-Thames and set out below:

- RB Kingston-upon-Thames;
- LB Hounslow;
- LB Hillingdon;
- LB Barnet;
- LB Redbridge;
- LB Waltham Forest; and,
- LB Bromley.

Kingston-upon-Thames

The Royal Borough of Kingston-upon-Thames is situated adjacent to LB Richmond-upon-Thames to the southeast and has slightly higher car ownership levels based on the 2011 Census. Although the Borough follows the London Plan car parking standards as set out within the Sustainable Transport SPD (May 2013), the document also states that:

'Although applicants should seek to satisfy adopted regional and local parking standards, each development proposal is considered on a case-by-case basis to ensure the standards are suited to the local circumstances. Due to the borough's outer London location with large areas of low public transport accessibility, poor orbital public transport links, and poor access to parts of Surrey via public transport, the adopted regional or local parking standards may not always be appropriate. In some cases, where adverse impacts on the local area, such as on-street parking issues, or constraints to economic growth, can be clearly demonstrated, increased parking provision that exceed the standards may be considered by the Council.'

This therefore again provides a more flexible approach where an increased level of parking provision in support of new housing may be suitable in locations where:

- A reduced level of parking in line with the adopted regional and local standards would result in increased on-street parking pressures that would significantly and adversely affect other factors including road safety, emergency access, traffic flows, bus movement, the amenity of local residents or street scene in the surrounding area; and
- Available public transport services and reasonably accessible walking and cycle links do not readily serve likely employment and services destinations, or relevant catchment areas.

With regards to the above, a reduced level of provision (below adopted regional or local standards) will not normally be acceptable on sites with PTALs of 1 to 3 unless it can be demonstrated this would not adversely affect the existing on-street parking situation. For more accessible sites (PTAL 4-6), a reduced level of parking provision may be more appropriate and car-free developments may be sought within CPZs where residents will not be able to apply for on-street parking permits.

Disabled parking should be provided in accordance with the London Plan. Developments with reduced levels of on-site parking (including car-free developments) should make adequate provision for disabled people with details for how this will be monitored to prevent misuse.

Hounslow

The London Borough of Hounslow is situated adjacent to LB Richmond-upon-Thames to the north and has lower car ownership levels based on the 2011 Census. The Borough follows the London Plan car parking standards and Policy EC2 of the Hounslow Local Plan Part 1 (2015-2030) states that the Council will secure a more sustainable local travel network by:

- Promoting 'car-free' and 'low car' developments in locations of high public transport accessibility and locations where there are CPZs;
- Promoting the active management of car parking and travel demand, through the implementation of CPZs and restricting access to these zones to existing dwellings; and

- Using the maximum standards outlined in the London Plan for car parking and cycle parking, plus standards for motorcycles, coaches, parking for persons with disabilities and electric vehicle charging.

The parking standards therefore provide less flexibility than those used within both LB Richmond-upon-Thames and Kingston-upon-Thames.

Hillingdon

The London Borough of Hillingdon is situated in west London and has the highest car ownership levels of all London Boroughs (based on the 2011 Census). The Borough provides more generous car parking standards than those set out within the London Plan to reflect local circumstances for both employment and residential uses. The parking standards are set out in Appendix C of the Local Plan Part 2: Development Management Policies (October 2015) and are summarised in **Table 3-6** below.

Table 3-6: London Borough of Hillingdon Maximum Residential Car Parking Standards

Number of Beds	Flats	Dwellings with Curtilage
Studio	1 space per 2 units	2 spaces per dwelling
1-2	1.5-1 spaces per unit	
3+	2 spaces per unit	

All new development will also be required to provide conveniently located reserved spaces for disabled users in accordance with the Accessible Hillingdon Supplementary Planning Document (SPD).

As previously detailed, the Hillingdon parking standards are more generous than the London Plan by permitting higher levels of car parking provision in support of new housing where appropriate e.g. a maximum of 1.5 spaces per 1-2 bedroom unit, compared to less than one space per 1-2 bedroom unit. The standards are also more generous than the LB Richmond-upon-Thames parking standards.

Furthermore, the Council may agree to allow further flexibility to the above requirements when the variance would not negatively impact on-street parking provision, congestion or local amenity as demonstrated by a transport assessment or travel plan.

Barnet

The London Borough of Barnet is situated in northwest London and has similar car ownership levels to LB Richmond-upon-Thames based on the 2011 Census. The Borough provides more generous residential car parking standards than those set out within the London Plan. Non-residential development should however provide parking in line with the London Plan. The parking standards are set out in Policy DM17 of the Development Management Policies (September 2012) and are presented in **Table 3-7** below.

Table 3-7: London Borough of Barnet Maximum Residential Car Parking Standards

Number of Beds	Parking Spaces
1	1 to less than 1 space per unit (mostly flats)
2-3	1.5 to 1 space per unit (for terraced houses and flats)
4+	2 to 1.5 spaces per unit (for detached and semi-detached houses and flats)

An appropriate level of parking should be provided for disabled people, although no specific standards have been set.

As previously detailed, the Barnet parking standards are more generous than the London Plan e.g. a maximum of 1.5 spaces per two bedroom unit, compared to less than one space. The standards are also more generous than the LB Richmond-upon-Thames parking standards.

Despite the more generous standards, the Council specifies under Policy DM17 that limited levels of parking provision may be acceptable in support of new housing where there is sufficient on-street parking capacity outside of CPZs. However, applicants will need to enter into a legal agreement to restrict future occupiers from obtaining on-street parking permits where there is insufficient on-street parking capacity within CPZs.

In this regard, the LBB guidance seeks to move away from the London Plan guidance on the basis that characteristics within the borough can often be different than those experienced elsewhere in London, particularly in some more central locations. LBB identify for example, that high PTAL scores can in some instances artificially indicate a greater level of accessibility (i.e. to a limited number of frequent services) than may actually exist, when for example, a wider range of services are available.

LBB therefore identify that flexibility needs to be applied to consider the accessibility of individual locations, based on:

- The level of public transport accessibility (PTAL);
- Parking stress including the level of on-street parking control;
- The population density and parking ownership of surrounding areas;
- The location (i.e. is it in a town centre);
- Ease of access by cycling and walking; and
- Other relevant highway or planning considerations, such as to whether the proposal is a conversion of an existing use.

Redbridge

The London Borough of Redbridge is situated in northeast London and has similar car ownership levels to LB Richmond-upon-Thames based on the 2011 Census. The Borough broadly follows the London Plan car parking standards. The parking standards are set out in Schedule 3 of the Local Development Framework (LDF) Development Plan Document (May 2008) and are presented in **Table 3-8** below.

Table 3-8: London Borough of Redbridge Maximum Residential Car Parking Standards

Number of Beds	Parking Spaces
1-2	1 to less than 1 per unit
3	1.5 to 1 space per unit
4+	2 to 1.5 spaces per unit

Appropriate levels of disabled parking should be provided in line with the needs of the likely users at new residential development.

The standards are marginally more flexible than the London Plan standards by permitting one space per 1-2 bedroom unit (rather than up to one space) and also encourage parking levels towards the more generous maximum end of those set out within the London Plan. The Council specifies under Policy T5 that where a lesser standard of parking provision is proposed, that this will be considered based on the nature of development, the character of the area including PTAL, and adherence to green travel planning measures.

Waltham Forest

Located within the northeast of London, the London Borough of Waltham Forest has one of the lowest levels of average car ownership of all Outer London boroughs. The Borough provides less generous residential car parking standards compared to those set out within the London Plan and the upper threshold varies to reflect the location of housing based on PTALs and CPZs. Waltham Forest's car parking standards are set out in the Development Management Policies Local Plan Adoption Version (October 2013) as shown in **Table 3-9**.

Table 3-9: London Borough of Waltham Forest Maximum Residential Car Parking Standards

Number of Beds	PTAL 1-2		PTAL 3-4		PTAL 5-6	
	Outside CPZ	Within CPZ	Outside CPZ	Within CPZ	Outside CPZ	Within CPZ
1-2	1	0.75	0.6	0.4	0.3	0.25
3-4	1	1	1	0.75	0.75	0.5

In terms of disabled parking for residential developments, one space should be provided per wheelchair adapted unit which should be clearly allocated and located close to the respective dwelling. A minimum of one disabled space will be required for developments with 10 or more dwellings.

Table 3-9 shows that standards are generally in line with the London Plan standards for 1-2 bedroom dwellings, but are less generous for 3-4 bedroom dwellings with up to one space per dwelling compared to up to 1.5-2 spaces per dwelling. The standards are also less generous that the LB Richmond-upon-Thames car parking standards. Further details are set out in Policy DM16 of the Development Management Policies which states that the Council will seek to manage parking by:

- Requiring proposals to provide parking facilities in line with the Council's maximum parking standards, as a general guide, the Council will encourage lower car parking provision than stated in the maximum standards;
- Encouraging car-free and car-capped developments in locations which are highly accessible by public transport and have high levels of parking stress (and introducing CPZs where necessary); and
- Requiring developers to consider the provision of parking spaces in accordance with the following parking needs hierarchy:
    - Disabled parking needs
    - Car clubs
    - Resident parking (low emission vehicles)
    - Operational and servicing requirements
    - Local business parking
    - Short-term visitor parking
    - Long-term visitor parking.

This again emphasises the need for developments to always cater for blue badge parking and that the level of car parking proposed in support of new housing should be below the less generous local standards where possible by considering local conditions such as car ownership and the ability to make use of nearby car clubs.

Bromley

The London Borough of Bromley is located within the southeast of London and has one of the highest car ownership levels in London. Bromley's current residential car parking standards are held within the Unitary Development Plan (UDP) (2006) as shown in **Table 3-10** below.

Table 3-10: London Borough of Bromley Maximum Residential Car Parking Standards

Private		Affordable	
Housing Type	**Parking Spaces**	**No. Bedrooms**	**Parking Spaces**
Flats	1	1 bedroom	0.5
Terraced Housing/Flats	1.5	2 bedrooms	0.75
Detached Houses	2	3+ bedrooms	1

For private dwellings, parking standards are determined by housing type, whereas for affordable housing parking standards are determined by number of bedrooms, with less generous standards for affordable housing. The standards for affordable housing are also less generous compared to the London Plan standards. Developments must also provide designated blue badge parking as per the London Plan.

In August 2015, Bromley published a paper setting out the evidence supporting the Council's review of parking policy in the borough for residential development.

The 2015 Draft Allocations, Further Policies and Designations Document sets out the revised parking policy, which provides two sets of minimum residential parking standards. The first set remain as in the 2014 Draft Policies and Designations Document and are presented as being appropriate for the majority of the borough, as set out in **Table 3-11** below. Of note, the policies switch from maximum based standards (as contained within the current UDP) to minimum based standards.

Table 3-11: London Borough of Bromley Minimum Residential Car Parking Standards

Number of Beds	Parking Spaces
1-2	1 space
3	1.5 spaces
4+	2 spaces

The second set of standards have been developed specifically in the context of three areas of the borough where public transport provision and local characteristics are considered by the authority to allow a lower level of minimum residential parking to be acceptable, as summarised at **Table 3-12** below.

Table 3-12: London Borough of Bromley Minimum Residential Car Parking Standards for Three 'Parking Zones'

Number of Beds	Parking Spaces
1-2	0.7 space
3	1 space
4+	1.5 spaces

The three areas where lower standards were identified as being appropriate comprise 'Crystal Palace, Penge and Beckenham Town Centre', 'Bromley Town Centre' and 'Orpington Town Centre'. The three areas were chosen based on their accessibility to radial and orbital transport links, partly based on their PTAL levels as well as car ownership, CPZs and parking pressures.

Through the application of these minimum parking standards, the borough consider that a greater amount of flexibility can be provided in terms of residential car parking standards compared to the maximum standards set out in the London Plan. The Council specifies that the accessibility, type, mix and use of any new development along with availability and opportunity for public transport will be considered when determining appropriate levels of residential vehicle parking and acknowledges the need for a flexible approach to ensure that parking provision at new developments is sufficient.

The majority of the borough outside of the three zones is in PTALs 0-2 which the Council under the MALP would be permitted to provide higher levels of car parking. This tailored approach to parking to meet the needs of the borough therefore is in general compliance with the London Plan whilst remaining locally appropriate.

3.6 Summary of Outer London Parking Standards

A summary of the findings of the above review of parking standards applied in Outer London boroughs has been set out in **Table 3.13**. The boroughs have been listed in descending order from those which provide the most generous and flexible standards, to those which provide more restrictive maximum parking standards. Average car ownership levels have been taken from the 2011 Census database (Car or Van availability).

Table 3-13: Summary of Outer London Borough Residential Car Parking Standards

Borough	Location	Average Car Ownership (cars/dwell)	Comparison with London Plan (Generosity)	Comparison with LB Richmond-upon-Thames (Generosity)	Summary
Hillingdon	West	1.22			Permits higher levels of parking and further flexibility where necessary based on local characteristics
Bromley	Southeast	1.18			Proposed minimum standards permit higher level of flexibility
Barnet	Northwest	1.06			Permits higher level of parking, although lower levels in CPZs
Richmond-upon-Thames	**Southwest**	**1.06**		**-**	**Permits higher levels of parking in less accessible locations**
Redbridge	Northeast	1.07			Encourages parking towards the maximum levels
Kingston-upon-Thames	Southwest (adjacent)	1.11			Applies a flexible approach in less accessible areas or locations with higher parking stress
Hounslow	Southwest (adjacent)	0.99			Follows the London Plan
Waltham Forest	Northeast	0.75			Encourages lower levels of provision below the London Plan standards

The above indicates that the majority of the examined Outer London boroughs (including LB Richmond-upon-Thames) provide more generous and flexible residential parking standards than those set out within the London Plan. This allows for local circumstances to be considered particularly with regards to less accessible areas with higher average car ownership levels and PTAL. The table also demonstrates that the current LB Richmond-upon-Thames standards are representative of a typical Outer London borough and are again in general conformity with the London Plan.

Table 3-13 also demonstrates that there appears to be a trend between average car ownership levels and the generosity of the maximum residential parking standards which have been adopted by Outer London boroughs. This is likely to be a combination of the following two factors:

- Higher car ownership levels resulting in the need to derive and apply more generous standards; and
- More generous standards resulting in higher car ownership levels (in line with TfL's research).

Any recommendations on the existing residential car parking standards within LB Richmond-upon-Thames will therefore need to consider differences in car ownership levels and existing parking pressures (particularly on-street) across the borough with reference to the accessibility of these areas and other characteristics such as CPZs.

3.7 Local Consultation Responses

LB Richmond-upon-Thames conducted a scoping consultation on their Local Plan Review on 23rd February 2016. This section summarises a variety of consultation responses which have been received to understand stakeholder views including those of local residents on the existing parking situation across the borough.

Local Plan Consultation Responses

A total of 80 responses were received and a summary of those relating to car or cycle parking across the borough has been provided below to further understand the views of the public on current parking conditions, with a supporting commentary provided in *italics*.

- Three comments related to parking provision for the Twickenham RFU and the need to provide suitable parking provision for all (including disabled users and cyclists) on event days. *This therefore reflects the importance of considering and catering for all user types at key attractions, as well as major employment uses which attract trips*;
- Two comments supported off-street parking provision (including garages) and the need to avoid exacerbating existing on-street parking issues. *This relates directly to the parking standards such as the need for either car-free developments (with on-street permit ineligibility) or otherwise sufficient off-street parking provision in support of new developments in areas where existing on-street pressures exist including within CPZs;*
- Four comments sought a modal shift towards cycling and other sustainable modes across the borough and two of these suggested that the minimum cycle parking standards should be increased. *This highlights the view that more people can be encouraged to cycle through the provision of sufficient and secure cycle parking facilities which can be facilitated through the cycle parking standards;*
- Two comments were against the removal of verges and grassed areas for the purposes of widening the carriageway and providing additional on-street parking. *This again indicates that off-street parking provision is seen more favourably and that the on-street parking should not be provided to the detriment of attractiveness and amenity of the streetscape;*
- One comment was against the provision of off-street parking on new development forecourts as this was perceived to detract from the quality of the surrounding environment. *This comment therefore relates to the quality of the streetscape and to promoting a less car-dominated environment*;
- The Environment Agency (EA) stated that either physical measures or greater enforcement measures should be introduced to prevent vehicles parking illegally along the riverfront in flood risk areas. *This highlights the importance of enforcing any parking restrictions to deter drivers from parking their vehicles inappropriately and includes CPZs where these vehicles could then result in safety issues; and*
- One comment requested that major developments (including their associated parking areas and accesses) should be resisted in certain areas to sustain the character of these areas. *This supports the view that increased levels of parking provision and vehicular activity as a result of new developments can detract from the local environment.*

In summary, the responses are generally in favour of off-street parking provision and the need to reduce on-street parking pressures. The function that sustainable transport modes can have to reduce car ownership levels and the associated negative impacts that parked vehicles can have on the environment was also seen as important. Other key considerations include providing suitable levels of cycle parking in support of new housing and enforcing the restrictions within CPZs to increase parking availability by reducing the incentive to parking inappropriately or without a valid permit or pay & display ticket. The comments are available to view on LB Richmond-upon-Thames website which is as follows: http://www.richmond.gov.uk/home/services/planning/planning_policy/local_plan/local_plan_review/local_plan_scoping_consultation.htm.

Village Plan Consultation Responses

The following provides a summary of the consultation responses which have been received from various Village Plan events and relate to planning policy matters. Information has been provided for eight areas within LB Richmond-upon-Thames as follows:

- Whitton and Heathfield;
- St Margarets;
- Richmond and Richmond Hill Village;
- Mortlake Village;
- Kew Village;
- East Twickenham Village;

- East Sheen Village; and
- Barnes Village.

The views of local residents have been separated out by various topics and include those which are considered to be most pertinent to this study. Please note that respondents were allowed to raise any comments and weren't specifically asked about parking issues. These details are provided within **Table 3-14** below.

Table 3-14: Village Plan Consultation Responses

Category	# Comments	% Comments
Off-Street Parking – In Favour	24	41%
Off-Street Parking – Against	15	26%
Cycling Promotion	7	12%
Promotion of Sustainable Transport Modes through Parking Standards and Policies	5	9%
Narrow Road Widths	4	7%
Parking Restrictions e.g. CPZs	3	5%
Total	**58**	**100%**

The summary shows that the majority of comments (67%) received on parking across the borough related to off-street parking provision. A total of 24 of the 39 responses (61%) on this topic were in favour of off-street parking including on driveways or within garages to lessen the impact of on-street parking, reduce road safety hazards and to reduce congestion. The remaining 15 responses (39%) were against off-street parking as it can lead to cars parking on or overhanging footways as well as detracting from the attractiveness of the local environment, as well as potentially increasing car ownership levels.

A total of seven responses (12%) related to promoting cycling include through providing sheltered parking, encouraging cycling as a recreational activity (along off-street routes) and providing cycle parking in prominent locations within retail areas.

The responses show that local residents in general are in favour of the overarching aim of promoting sustainable travel and reducing car ownership levels through the application of appropriate parking standards and policies. For example, five responses (9%) indicated that sustainable travel should either be promoted by improving footways and cycle facilities or by reducing car parking levels to reduce car ownership within the borough.

A total of four responses (7%) related to issues associated with insufficient road widths. This included the benefits of removing on-street car parking along narrow streets as well as identifying congestion issues which arise due to narrow road widths.

Three responses (5%) related to issues associated with parking restrictions including CPZs and single yellow line restrictions. For example, CPZs were seen as reducing on-street availability for residents by causing overspill parking to other non-restricted areas. There was also a perception that single yellow line parking restrictions constrain on-street parking availability.

2006 New Homes Survey

The New Housing Survey was carried in April 2006 to gain an understanding of the housing market, review the policies on housing standards, and consider the implications of new development for travel and for school places. A total of 1,341 questionnaires were sent out to residents of new housing and a response rate of 30.5% was obtained.

The majority of parking comments within the New Homes Survey related to CPZs as well as the perceived lack of parking provision where 65.3% of respondents stated that they do not have access to on-street or off-street parking spaces. Parking pressures are already known to be high across the borough due to housing without off-street parking provision and other factors such as commuter parking which has reduced the availability of on-street parking for residents.

Local Consultation Summary

The following views have been expressed by stakeholders including local residents with regards to parking within LB Richmond-upon-Thames:

- **The importance of off-street parking for increasing parking availability and lessening the on-street parking impact particularly along narrow streets;**
- **The importance of promoting sustainable travel including the benefits of encouraging cycling and achieving modal shift through the provision of cycle parking;**
- **The potential to reduce car ownership levels through reduced car parking provision;**
- **The need to consider the quality of the streetscape and local environment;**
- **The need to enforce the restrictions within CPZs to reduce inappropriate or illegal parking, whilst considering the impacts of CPZs on adjoining areas; and**
- **The need to consider and cater for all user types.**

3.8 Local Housing Targets and Site Allocations

The London Plan sets LB Richmond-upon-Thames a target to deliver at least 315 homes per annum between 2015 and 2025. This equates to 3,150 dwellings over a ten year period. The latest version of the future Housing Land Supply for the borough is set out in the Housing AMR (2014/15) (www.richmond.gov.uk/authority_monitoring_report for further information) and identifies the provisional large residential sites (ten dwellings or above) and the approximate capacities for delivery between 2016 and 2026. A figure identifying these sites has been provided within **Appendix B**. A summary has been set out in **Table 3-15** based on the upper threshold of the number of units that could be delivered at each major site and the remainder envisaged to be delivered across minor sites where known.

Table 3-15: LB Richmond-upon-Thames Strategic Housing Land Supply (Major and Minor Developments)

Area (and wards)	Total Housing (2016 to 2026)		
	Minor (<10 dwellings)	Major (10 or more dwellings)	Total
Richmond	**272**	**932**	**1,204**
South Richmond	-4	123	119
North Richmond	137	401	538
Ham, Petersham and Richmond Riverside	61	218	279
Kew	78	190	268
Twickenham	**433**	**847**	**1,280**
Twickenham Riverside	216	139	355
St. Margarets & North Twickenham	39	567	606
South Twickenham	111	141	252
West Twickenham	68	0	68
Teddington and Hampton	**462**	**467**	**929**
Hampton North	61	0	61
Hampton	146	60	206
Fulwell and Hampton Hill	111	50	161
Teddington	126	286	412
Hampton Wick	17	71	88
East Sheen	**98**	**380**	**478**
East Sheen	35	10	45
Mortlake and Barnes Common	65	370	435
Barnes	-2	0	-2
Whitton	**94**	**44**	**138**
Whitton	17	20	37
Heathfield	76	24	100
Total	**1,359**	**2,670**	**4,029**

Table 3-15 indicates that approximately 2,670 dwellings are due to be delivered across the borough at major sites over the next ten years. An additional 1,359 dwellings are anticipated to be delivered across minor sites which will result in a total of 4,029 dwellings. It is therefore expected that the London Plan target of 3,150 dwellings will be exceeded by 879 dwellings over a period of ten years i.e. equivalent to approximately 88 dwellings per year.

3.9 Summary

An overall summary of the policy review surrounding the parking standards has been provided in **Table 3-16**.

Table 3-16: Summary of Policy Review

<table>
<tr><th>National</th><th>Regional</th></tr>
<tr><td rowspan="6">The standards require provision to be balanced, to:
Meet the needs of all users
Avoid contributing towards existing on-street parking pressures
Are in favour of sustainable transport by not overproviding
Reflect local characteristics</td><td>London Plan sets maximum standards which form the context for Borough-wide standards</td></tr>
<tr><td>Reflects national policy by providing flexibility in the way the standards can be applied</td></tr>
<tr><td>Need to consider local characteristics when applying the standards including parking stress, PTAL and car ownership</td></tr>
<tr><td>Demand management measures should also be considered alongside standards</td></tr>
<tr><td>Adequate provision required for disabled users (including at car-free developments)</td></tr>
<tr><td>Cycle parking to be provided in line with the minimum cycle parking standards</td></tr>
<tr><th colspan="2">Local</th></tr>
<tr><th>Outer London</th><th>LB Richmond-upon-Thames</th></tr>
<tr><td rowspan="2">The standards need to be in general conformity with the London Plan</td><td>Provides more generous standards than the London Plan</td></tr>
<tr><td>Standards are comparable to other Outer London boroughs</td></tr>
<tr><td rowspan="2">The standards vary from borough to borough to reflect local characteristics</td><td>Standards defended at EiP to demonstrate conformity with the London Plan</td></tr>
<tr><td>Application of standards in future to consider anticipated housing delivery across the borough</td></tr>
<tr><td>Boroughs with higher car ownership levels tend to provide more generous standards</td><td>Local stakeholders views include:
the need to reduce on-street parking pressures by providing adequate off-street
the need to consider the local environment and streetscape
the need to cater for all users
importance of enforcing CPZs and parking restrictions</td></tr>
</table>

Additional considerations include the minimum cycle parking standards and encouraging residents to cycle to increase travel by sustainable modes, reduce car use and improve health and wellbeing. The existing LB Richmond-upon-Thames cycle standards are currently less generous than the London Plan cycle standards. The disabled car parking standards are in line with the London Plan standards.

4 Existing Conditions and Recent Trends

4.1 Introduction

This section examines the existing conditions across the borough in relation to the various factors which can influence parking levels and the trends which can be drawn between these. For example, it is generally considered that car ownership levels tend to increase as the public transport accessibility level of an area decreases and this is therefore explored. A series of parking beat surveys have been undertaken to identify existing parking levels at different points within the borough and understand how these relate to the changes in PTALs and car ownership levels for example. The Pearson's Product-Moment Correlation Coefficient (PMCC) has been used as a statistical measure where appropriate to calculate the strength of any linear correlation between the different variables, and further details of this including the calculations are provided within **Appendix D**.

4.2 London Borough of LB Richmond-upon-Thames

Introduction

The London Borough of LB Richmond-upon-Thames is an Outer London borough situated in south west London. The borough is bounded by the London Borough of Hammersmith and Fulham to the northeast, the London Borough of Wandsworth to the east, the Royal Borough of Kingston-upon-Thames to the south, the Borough of Elmbridge to the southwest, the Borough of Spelthorne to the west and the London Borough of Hounslow to the northwest.

The borough covers an area of approximately 5,095 hectares and comprises a mixture of urban centres such as Richmond town centre and large open spaces including Richmond Park. The five main town centres include Richmond, Twickenham, Teddington, East Sheen and Whitton. The London Plan classifies Richmond as a Major Centre which is defined as an area which comprises over 50,000sqm of retail, leisure and service floorspace. The other four areas are defined as District Centres which are accessible by public transport, walking and cycling and typically contain 10,000-50,000sqm of retail, leisure and service floorspace.

There are a variety of shopping, employment and leisure facilities within Richmond including cinemas and theatres. It also attracts a large number of tourists due to its historic interests. Richmond provides one of the most sustainable options for housing in the borough due to its high level of accessibility and established range of services. Growth of Richmond centre to provide opportunities for leisure and tourism is encouraged, as is the expansion of retail and office provision.

Twickenham is the largest district centre within the borough and includes a wide range of shops, offices, educational and community facilities as well as leisure and entertainment facilities. The presence of Twickenham Rugby Football Union (RFU) attracts visitors to the town on match days. Revitalising Twickenham centre is a key theme as set out in the Twickenham Area Action Plan (2013). Twickenham centre is suitable for new major commercial development, and the evidence base suggests there is an indicative need for retail uses and convenience goods floorspace.

Teddington is a small scale historic town which is situated within close proximity to Bushy Park and the River Thames and has a range of smaller specialist non-food shops and restaurants. There are a variety of employment, leisure and community facilities as well as residential areas within this area.

East Sheen is a linear centre which includes a large supermarket and other shopping facilities, restaurants and services. Mortlake station is located in the vicinity of East Sheen.

Whitton is situated within the western part of the borough and provides small scale convenience and non-food shopping stores along the High Street, as well as community and educational facilities. Whitton station is also located on the main street. The strategy for Teddington, East Sheen and Whitton is to maintain and enhance, rather than significantly expand, their role of providing shops, services and employment opportunities for local communities.

The characteristics of the borough vary greatly and this study has focused on differences across the 18 wards (illustrated in **Figure 4-1**) to identify those areas where greater flexibility in parking standards may be required.

Figure 4-1: Ward Map of LB Richmond-upon-Thames
Source: https://www.richmond.gov.uk/ward_map_of_the_borough

A more detailed figure showing these ward boundaries has been provided within **Appendix C**.

Transport and Parking

There are several principal routes which run through the borough including the A316 (Great Chertsey Road) and the A205 (South Circular Road) which both form part of the Transport for London Road Network (TLRN).

Frequent bus services are available within the town centres and South West Trains Rail services can be accessed from numerous stations to provide access to other areas within LB Richmond-upon-Thames as well as further afield including central London to the northeast, and Reading to the west. Richmond station also provides access to London Underground services (District Line) and London Overground services which run to the north and east. There are however lower levels of access to public transport in areas further to the southwest as well as those within close proximity to parks or the River Thames which acts as a barrier to movement.

The borough has high levels of car ownership and utilisation with fairly densely developed residential areas and narrow streets in places. There are numerous parking pressures within the borough including in areas where residents do not have access to off-street parking (such as older housing) and where there is increased demand associated with commuter parking. Approximately 30% of residents live within CPZs and 76% households own a car.

Housing

LB Richmond-upon-Thames has the second highest average household income of the London Boroughs (£47,418, Paycheck 2007 CACI) and predominantly comprises private housing. Approximately 68% of the boroughs housing is in owner occupation whereas 15% is privately rented and 12% is rented from a housing association. Further details of housing size, type and tenure and possible relationships with car ownership levels within LB Richmond-upon-Thames are provided later within this chapter.

4.3 Car Ownership Levels

TfL's 'Residential Parking Provision in New Developments' (2012) identifies housing tenure and type, access to public transport and income as being the key factors which influence car ownership levels. Car ownership is higher on average in Outer London and there is a strong correlation with public transport accessibility i.e. the rate of car ownership in new housing tends to increase as the PTAL of the area decreases. The availability of car parking is also a key factor as residents are more likely to own a car where housing has greater access to off-street parking. TfL state that approximately 73% of the vehicles which are owned by residents in Outer London are parked off-street. Other factors which influence car ownership levels include nationality, working status, access to employment/services and car club membership, as identified by the Mayor's Integrated Impact Assessment on the London Plan parking standards.

Details of existing car ownership levels for residents living within LB Richmond-upon-Thames have been extracted from the 2011 Census database. An initial comparison has been undertaken between LB Richmond-upon-Thames compared to other Outer London boroughs, Inner London boroughs and London as a whole. A graph summarising the results is shown below in **Figure 4-2**.

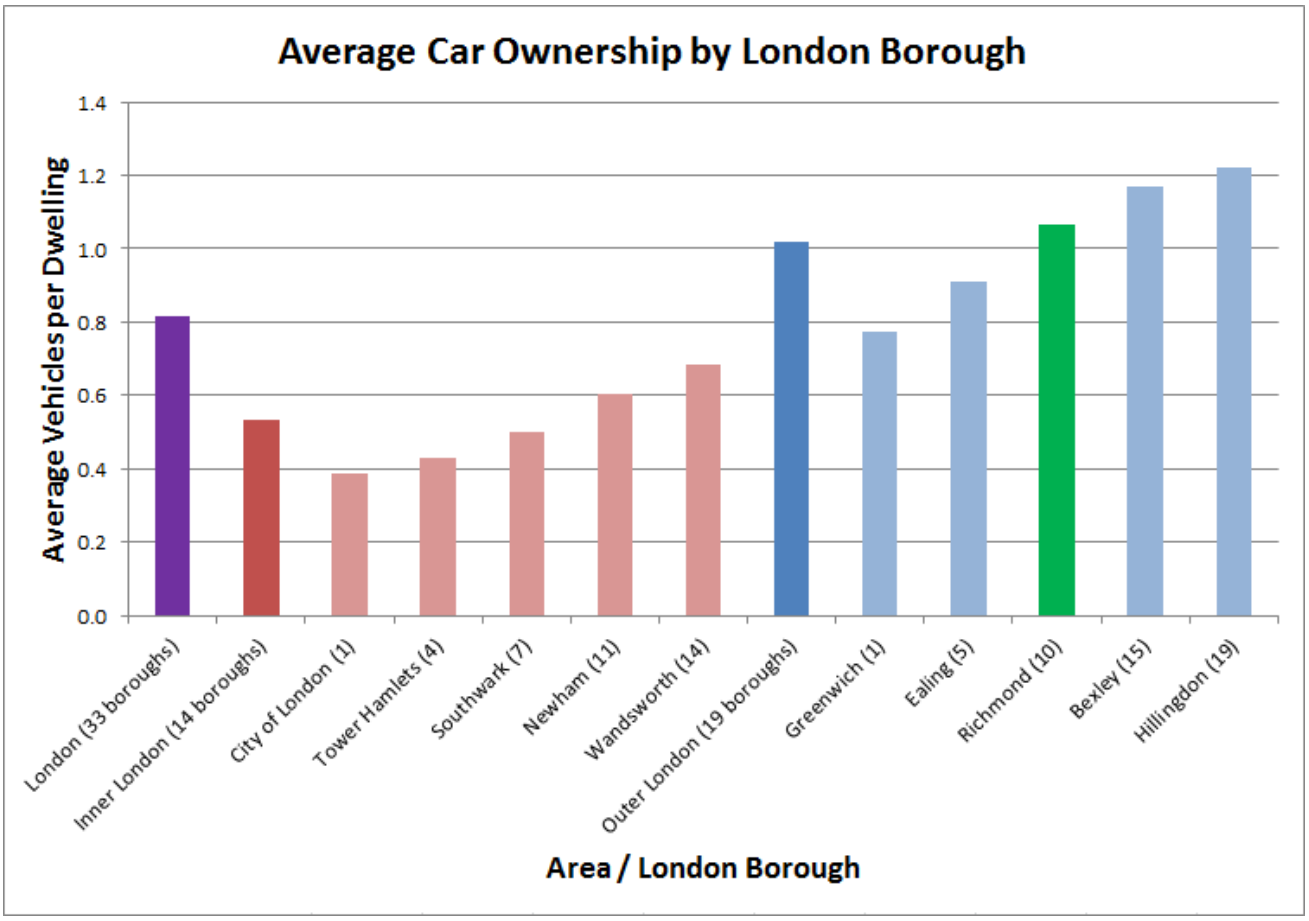


Figure 4-2: Average Car Ownership by London Borough

LB Richmond-upon-Thames has an average car ownership of 1.06 vehicles per dwelling which is above the Outer London average of 1.02 vehicles per dwelling. Greenwich (0.77) and Waltham Forest (0.79) have the lowest car ownership levels in Outer London, whereas Hillingdon (1.22) and Havering (1.21) have the highest car ownership levels. The most comparable boroughs to LB Richmond-upon-Thames are Redbridge (1.07) to the northeast and Barnet (1.06) to the northwest.

The information has been summarised in **Table 4-1** for each of the 18 wards within the LB Richmond-upon-Thames, as well as across the borough itself. The wards have been listed in descending order in terms of average car ownership levels recorded by the Census in 2011 and in comparison to levels recorded by the 2001 Census.

Table 4-1: Existing Car Ownership Levels (Total Accommodation)

Ward	Average Car Ownership (Vehicles/Dwelling)		
	2001	2011	Change
Hampton	1.22	1.25	+0.03
Heathfield	1.21	1.23	+0.02
Whitton	1.22	1.21	-0.01
Hampton North	1.17	1.17	0.00
West Twickenham	1.13	1.14	+0.01
South Twickenham	1.15	1.13	-0.02
East Sheen	1.17	1.13	-0.04
Fulwell and Hampton Hill	1.14	1.13	-0.01
St Margarets and North Twickenham	1.14	1.10	-0.04
Teddington	1.10	1.09	-0.01
Hampton Wick	1.08	1.05	-0.03
Barnes	1.09	1.02	-0.07
Ham, Petersham and Richmond Riverside	1.01	1.01	0.00
Kew	1.07	1.01	-0.06
North Richmond	0.95	0.92	-0.03
Twickenham Riverside	0.98	0.92	-0.06
Mortlake and Barnes Common	0.97	0.90	-0.07
South Richmond	0.92	0.88	-0.04
Borough Wide	**1.09**	**1.06**	**-0.03**

The results in **Table 4-1** show that average car ownership levels vary across LB Richmond-upon-Thames between 0.88-1.25 vehicles per dwelling and that 13 of the 18 wards have experienced a decrease between 2001 and 2011. The potential reasons for this decrease have been explored within the subsequent sections in comparison to other recent trends. The car ownership levels recorded in 2011 have also been colour coded to help visualise comparisons with other variables as these are explored, with green values 10% below the average for the borough, and red values 10% above the average. A figure showing the variations in car ownership levels across the borough is held within **Appendix E**.

4.4 Public Transport Accessibility Levels

Introduction

PTALs provide an indication of the connectivity of a location to the public transport network. The PTAL of a site or area is based on walking times to public transport facilities as well as the service range and reliability of services including the weekday morning peak period service frequency of all bus services accessible from stops within a 640m walk distance as well as rail services accessible from stations within a 960m walk distance. TfL has produced a consistent mapping facility to illustrate public transport access across London which is based on six main bands as illustrated below in **Table 4-2**.

Table 4-2: Summary of PTAL Bands

PTAL	Description
1a-1b	Very Poor
2	Poor
3	Moderate
4	Good
5	Very Good
6a-6b	Excellent

The PTALs can be used to help determine the appropriate level of parking provision which should be provided in support of new housing. The London Plan states that car use tends to decrease as accessibility to the public transport network increases (reflected by higher PTALs). Therefore it is considered that levels of car parking provided in support of new housing should decrease as public transport accessibility increases to avoid over-provision. However, TfL's guidance states that a greater proportion of vehicles are parked on-street within higher PTAL areas of Outer London boroughs. Therefore, a sufficient level of off-street parking still needs to be provided within more accessible areas. Higher levels of off-street parking provision should also be considered for sites with lower PTALs to avoid the possibility of parking over-spill onto the surrounding highway network which could exacerbate existing parking pressures.

As previously identified, the changes introduced as part of the FALP and more recently the MALP added greater flexibility to the application of the existing parking standards including with reference to PTALs. Therefore, a flexible approach should be considered when determining and applying maximum parking standards in Outer London boroughs to avoid potential issues. Again, it should be noted that many factors influence parking demand such as car ownership levels and these factors also need to be considered to ensure that the typology of each locality is better reflected. These comparisons are drawn out towards the end of this section.

LB Richmond-upon-Thames

The most recently available PTAL map of the borough (2012) is shown below in **Figure 4-3** as well as within **Appendix F** in more detail. The PTAL map reflects National Rail and London Overground information as well as London Bus and London Underground Limited (LUL) Service information from 2011.

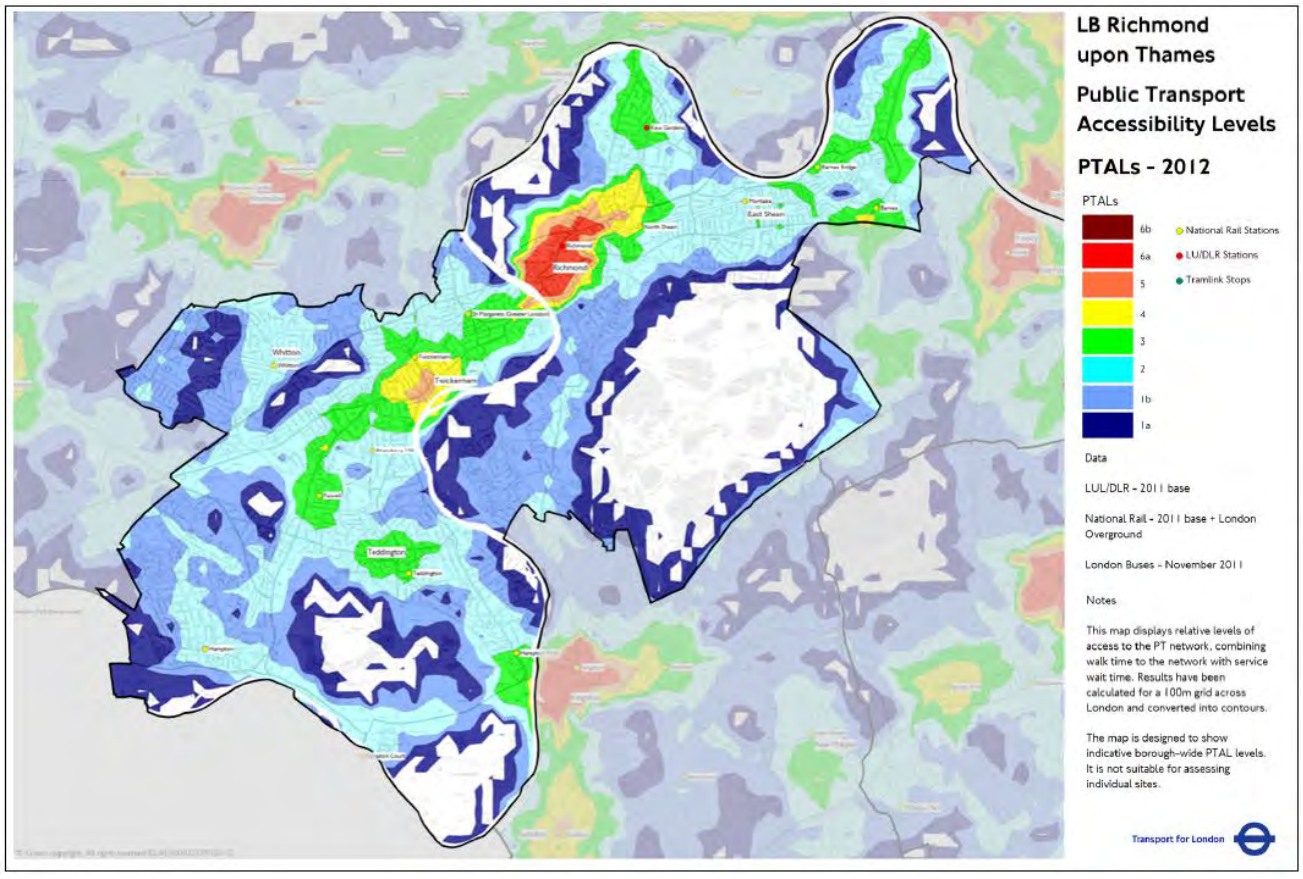


Figure 4-3: PTAL Map of LB Richmond-upon-Thames
Source: http://content.tfl.gov.uk/richmond-2012-ptals.pdf

The PTAL map indicates that PTALs vary considerably across the borough between 6a (Excellent) to 1a (Very Poor). Several residential areas within close proximity to parks or the River Thames have lower PTALs of 1a-1b (Very Poor) as a result of fewer bus services or rail services being accessible from within the specified 640m and 960m thresholds (respectively), whereas Richmond town centre and Twickenham town centre have PTALs ranging from 5 (Very Good) to 6a (Excellent). A more detailed figure showing the higher PTAL areas has been provided within **Appendix F**.

Table 4-3 provides a summary for the 18 wards across the borough in order of those which are most accessible, according to their PTAL classifications. The average PTALs have been based on the approximate coverage of each

band for the populated areas (further details further below) and the supporting calculations have been presented in **Appendix G**.

Table 4-3: Borough-Wide PTAL

Ward	Typical PTAL (Range)	Average PTAL (Populated Areas)
South Richmond	4 to 6	4.1
North Richmond	3 to 5	3.3
Twickenham Riverside	3 to 5	3.2
South Twickenham	2 to 3	2.4
Mortlake and Barnes Common	2 to 3	2.3
Kew	2 to 3	2.3
Teddington	2 to 3	2.2
Barnes	2 to 3	2.2
Fulwell and Hampton Hill	2	2.0
St Margarets and North Twickenham	2	2.0
West Twickenham	1 to 2	1.9
Hampton Wick	1 to 2	1.6
East Sheen	1 to 2	1.5
Whitton	1 to 2	1.4
Hampton	1 to 2	1.3
Hampton North	1	1.2
Heathfield	1	1.1
Ham, Petersham and Richmond Riverside	1	1.1
Borough-Wide	**-**	**2.1**

The results in **Table 4-3** indicate that the borough typically has a PTAL ranging from 1-3 (approximate 90% coverage), with an average PTAL of 2 (Poor). There are however four wards centred around Richmond and Twickenham town centres which have much higher than average PTALs due to an increased availability of bus and rail services.

The average PTAL excludes the non-populated areas including parks (Richmond Park, Bushy Park, Hampton Court Park, Barnes Common), areas of open space including playing fields and sports pitches (including adjacent to the River Thames), golf clubs (Fulwell Golf Club, Royal Mid Surrey Golf Course), as well as the Royal Botanic Gardens and the WWT London Wetland Centre.

Richmond and Twickenham (High PTAL)

Richmond town centre has the highest PTAL rating (6a) illustrating an excellent level of public transport accessibility. Richmond London Overground station offers services towards Stratford, London Waterloo, Upminster, Reading and Windsor and Eton Riverside. Richmond London Underground station provides access to District Line services which run towards Upminster via central London with stopping stations at Hammersmith Underground Station, Victoria and Embankment. Victoria and Hammersmith provide further access to the Circle and Piccadilly lines with access to the Hammersmith and City line also available from Hammersmith Underground Station. Embankment Underground Station provides connections to the Bakerloo, Circle and Northern lines. There are also a number of frequent bus services provided within Richmond which run towards Wimbledon, Chiswick and Hounslow for example.

Twickenham town centre has a good to very good level of public transport accessibility. This reflects national rail services at Twickenham station which run towards Windsor & Eton Riverside, Waterloo and Reading. There are also numerous frequent bus services in the town centre which provide services towards Kingston, Teddington, Hounslow and Heathrow as well as Richmond and Hammersmith.

Kew Gardens, Teddington and Barnes (Moderate PTAL)

Areas with moderate PTALs tend to have access to national rail services and bus routes but to a lesser extent than those available within the Richmond and Twickenham town centres. A few examples have been set out below.

Kew Gardens is served by frequent Overground and District line services at Kew Gardens station. The District line provides services between Richmond and Upminster and Overground services run between Richmond and Stratford. The area is also served by several frequent bus routes (65, 391 and R68) which run towards Kingston, Hampton and Ealing Broadway as well as towards Kensington and Fulham.

Teddington is served by frequent national rail services at Teddington station which run towards Wimbledon, Twickenham, Waterloo as well as Shepperton. The area is also served by several frequent bus routes which run towards Kingston, Twickenham and Barnes as well as towards Heathrow Airport.

Barnes Bridge is served by frequent national rail services at Barnes Bridge station which run towards Twickenham and Waterloo as well as Weybridge, Hounslow and Staines. There are also several bus routes in the area which run towards Mortlake, Richmond and Hammersmith as well as Putney.

Hampton, East Sheen, Whitton, Heathfield and Ham (Low PTAL)

Areas with low PTALs tend to have limited access to national rail services and bus routes, with those in the least accessible areas only having access to one or two bus routes.

East Sheen and Mortlake are served by national rail services at Mortlake station which run towards Shepperton, Waterloo, Kingston, Wimbledon and Hounslow, but have a more limited provision of bus routes.

Hampton is served by national rail services at Hampton and Hampton Wick stations which run towards Waterloo and Shepperton. There are only three bus routes which provide services towards Teddington, Kingston and Staines as well as Hounslow.

Comparison with Car Ownership

Figure 4-4 provides a comparison between car ownership levels and access to public transport (PTAL) for LB Richmond-upon-Thames compared with average levels for both Outer London and Inner London boroughs based on the information contained within the OLC Fourth Report.

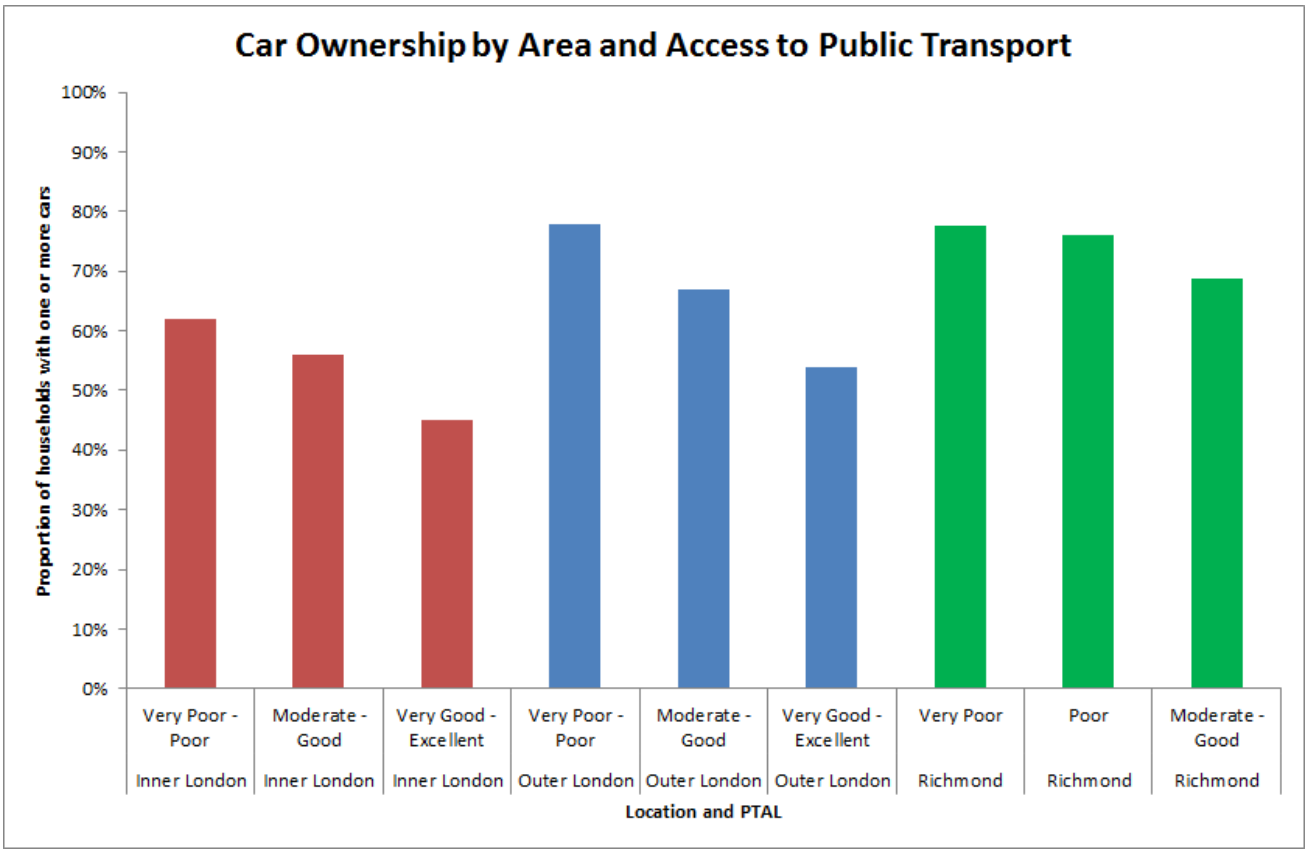


Figure 4-4: Car Ownership Levels by Area compared to PTAL

Figure 4-4 shows that LB Richmond-upon-Thames experiences similar trends to those experienced across Outer London boroughs as a whole where car ownership levels decrease on average as PTAL increases. Again, car ownership levels are higher on average within LB Richmond-upon-Thames compared to the average Outer London borough. To explore

this relationship in more detail, the average PTAL for each of the 18 wards set out within **Table 4-3** has been plotted against the 2011 car ownership levels set out within **Table 4-1**. The results are shown in **Figure 4-5** below.

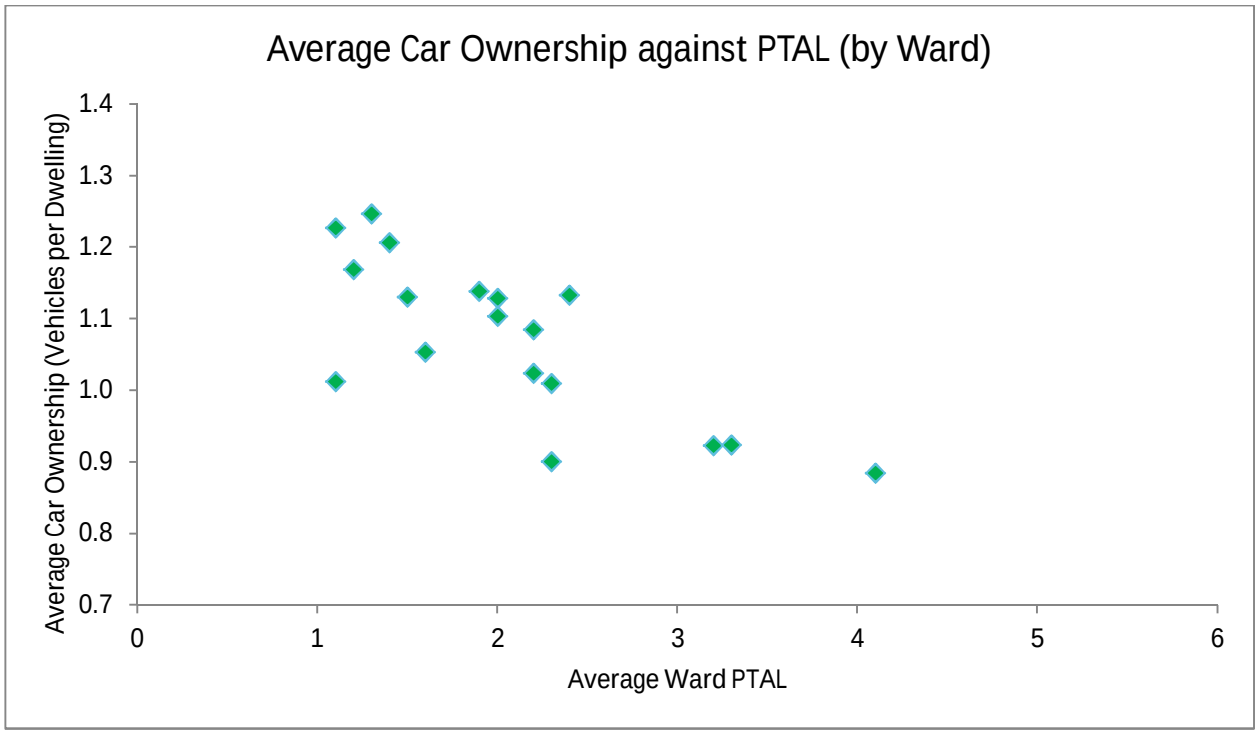


Figure 4-5: Average Car Ownership against PTAL (by Ward)

Figure 4-5 indicates that as the average PTAL of a ward increases, average car ownership tends to decreases. This is supported by the Pearson's PMCC between the 18 wards' which indicates a strong negative correlation (r = **-0.77**, N = 18, p < 0.001) between these two variables. Car ownership levels therefore tend to be higher in areas with lower PTALs within LB Richmond-upon-Thames. These findings are also reflected in **Table 4-4** below.

Table 4-4: Car Ownership against PTAL

Average PTAL	# Wards	Average Car Ownership – vehs/dwelling (2011)	% Households with One or More Cars
Moderate (3) to Good (4)	3	0.91	69%
Poor (2)	7	1.05	76%
Very Poor (1)	8	1.15	78%
Borough-wide	**18**	**1.06**	**75%**

4.5 Availability of Sustainable Transport Modes

As part of the review of sustainable transport access within the borough, consideration has been given to a number of actual case study examples, in addition to focusing on existing measures such as PTAL.

In this regard, it is recognised that PTALs have some limitations which may not give the full picture when distinguishing different accessibility levels and in the context of this study, parking requirements. This is particularly the case if they are used mechanically as the only or main factor in applying parking policy as they may not reflect the reality on the ground or allow for the differentiation between typologies of places. PTAL does not consider quality of service or the range of the service available; for example, it cannot differentiate between a single frequent service and several infrequent services. The 'real' level of accessibility may be different therefore; as having one very frequent bus service could give an artificially high PTAL, whereas having a number of low frequency routes could give an artificially low PTAL when in fact the opposite might be true.

TfL acknowledge this and has noted that PTALs may be refined in the future. PTALs take a point and assess whether or not there is a bus service (within 640m) or rail service (within 960m) within specific distances, and the frequency of those services, which may not fully reflect variations in public transport connectivity.

Examples of areas that have been analysed for having either a potential artificially higher or lower PTAL within the borough have been set out in **Appendix A**.

4.6 Existing Mode Share and Travel Patterns

The Mayor's Integrated Impact Assessment includes a summary of regional car driver travel patterns based on the average mode share derived from 2011 Census Journey to Work data which has been represented as follows:

- Inner London – 14% Car Driver;
- Outer London – 38% Car Driver; and
- South East – 62% Car Driver.

The Census Journey to Work mode share of residents within LB Richmond-upon-Thames has been illustrated within **Table 4-5**. This includes data for both 2001 and 2011 to identify how travel patterns have changed. A figure showing the variations in the proportion of residents travelling as a car driver across the borough based on the 2011 Census Journey to Work data is held in **Appendix H**.

Table 4-5: LB Richmond-upon-Thames Census Journey to Work Mode Shares

LB Richmond-upon-Thames	Census Journey to Work Mode Share			
	2001	2011	Mode Share Change	Relative Change*
Underground	9.4%	11.7%	+2.4%	+25.4%
Train	21.1%	24.1%	+3.0%	+14.2%
Bus	7.9%	8.3%	+0.4%	+5.0%
Taxi	0.3%	0.3%	0.0%	-8.9%
Motorcycle	1.9%	1.8%	-0.1%	-5.2%
Car Driver	43.5%	35.7%	-7.8%	-18.0%
Car Passenger	2.2%	1.5%	-0.7%	-32.4%
Bicycle	4.4%	6.7%	+2.3%	+52.8%
Walk	8.6%	9.0%	+0.4%	+4.2%
Other	0.6%	0.8%	+0.2%	-
Total	100.0%	100.0%	-	-

*represents the relative increase or decrease in 2011 compared to 2001

Table 4-5 shows that between 2001 and 2011 there has been an 18% reduction in the proportion of residents commuting to/from work as a car driver, despite average car ownership levels only falling by around 0.03 vehicles per dwelling (approximately 3%) over this period. This is most likely attributable to the increased demand for and usage of public transport within Richmond (as well as London) over the past 15 years, particularly by London Underground and by bus.

Whilst the above could suggest that the proportion of residents commuting as a car driver could continue to fall into the future, the extent of future mode shift cannot be predicted with any certainty due to the vast number of influencing factors which affect chosen travel mode. It is clear from the data however, that car use has decreased to a greater extent than car ownership between the two census surveys. Over the longer term, this may lead to reduced car ownership levels particularly with the use of car clubs and similar schemes. In the shorter term however, this indicates that residents are choosing to continue to own cars but use them less.

A figure providing a comparison between the proportion of residents commuting as a car driver and average car ownership levels for each of the 18 wards has been provided within **Appendix I**, along with a summary of the PMCC calculations. This shows that residents are more likely to travel by car (at least for commuting purposes) if they own a vehicle. Although this would appear to be contrary to the Mayor's IIA on the London Plan parking standards which does not identify a clear relationship between ownership levels and car use, this has been considered as part of the residential parking standard options assessment within **Chapter 5.0**.

A comparison has also been undertaken between the proportion of residents commuting by public transport (which has increased between 2001 and 2011, particularly by London Underground) and the PTAL of each of the 18 wards. These details are again provided within **Appendix I** and show that modes of public transport are more likely to be utilised where there is a greater availability of these services. It is considered that PTALs provide a useful indication of public transport accessibility within the borough and despite the limitations with the methodology where certain areas may be assigned a

lower level of public transport accessibility when compared to reality (see **Section 4.5**), should be used to help inform the residential parking standards.

Table 4-5 also indicates that whilst the change in the cyclist mode share appears to be fairly modest (just a 2.3% increase relative to all other modes), this actually represents a 53% increase in the proportion of residents commuting to/from work by bicycle. This is considered to be a significant increase which can be partially explained by the demographics of the borough and has been considered in relation to the cycle parking standards later on within this report.

4.7 Household Size, Type and Tenure

In addition to the characteristics already examined, car ownership levels are also affected by household size, type and tenure; where there tend to be higher levels of car ownership in areas with owned houses and larger dwellings, and lower levels in areas with rented flats and smaller dwellings. These relationships are confirmed by **Table 4-6** which provides details for LB Richmond-upon-Thames based on the 2011 Census (T0103 – Accommodation type by tenure by number of rooms by car or van availability).

Table 4-6: Comparison of Household Size, Type and Tenure with Car Ownership Levels in LB Richmond-upon-Thames (2011 Census)

Households in Richmond	Average Car Ownership (Vehicles/Dwelling)
Size	
1 to 4 rooms	0.71
5 to 6 rooms	1.12
7+ rooms	1.55
Type	
Flat, Maisonette or Apartment	0.71
House or Bungalow	1.28
Tenure	
Rented	0.72
Owned	1.24

A summary of the wards based on a combination of the three criteria presented above (based on the 2011 Census) has been provided in **Table 4-7** in descending order.

Table 4-7: Household Size, Type and Tenure by Ward (2011 Census)

Ward	# Dwellings (2011)	Owned Houses with 5+ Rooms (%)	Average Car Ownership – vehs/dwelling (2011)
Whitton	3,814	43.2%	1.21
West Twickenham	4,280	35.9%	1.14
East Sheen	4,151	32.9%	1.13
Heathfield	3,918	32.0%	1.23
Hampton	4,108	31.8%	1.25
Fulwell and Hampton Hill	4,250	29.7%	1.13
South Twickenham	4,015	28.7%	1.13
Hampton North	4,077	25.6%	1.17
St Margarets and North Twickenham	4,576	24.8%	1.10
Ham, Petersham and Richmond Riverside	4,450	20.5%	1.01
Barnes	4,296	20.3%	1.02
Teddington	4,615	19.9%	1.08
North Richmond	4,771	17.9%	0.92
Kew	4,960	17.4%	1.01
Mortlake and Barnes Common	4,940	15.0%	0.90
Hampton Wick	4,434	14.8%	1.05
Twickenham Riverside	4,825	10.3%	0.92
South Richmond	5,168	9.6%	0.88
Borough Wide (2011)	79,648	22.2%	1.06
Borough Wide (2001)	76,146	25.5%	1.09

The above shows that the wards which comprise higher proportions of owned houses and larger dwellings tend to have above average car ownership levels across the borough (and vice-versa). Individual graphs comparing each of the three variables against car ownership levels for the 18 wards are presented within **Appendix J**. The PMCC calculations held in **Appendix D** indicate that there are strong positive linear correlations between car ownership and household type, tenure and size (in descending order). This therefore demonstrates that the residential parking standards will need to allow flexibility for considering different housing characteristics within new residential developments.

A comparison has been undertaken between the 2001 and 2011 Census data to understand whether the reduction in car ownership levels over this period could be attributed to changes in housing characteristics across the borough. **Table 4-8** summarises the results.

Table 4-8: Recent Trends in Household Size, Type and Tenure

Borough-Wide	# Dwellings	% Houses	% 5+ Rooms	% Owned	Average Car Ownership (Vehicles/Dwelling)
2001	76,146	61.9%	59.5%	69.3%	1.09
2011	79,648	60.1%	58.0%	63.6%	1.06
Difference	**+3,502**	**-1.8%**	**-1.5%**	**-5.7%**	**-0.03**

Table 4-8 indicates that there was a reduction in the proportion of residential dwellings comprising houses, larger dwellings and owned households between 2001 and 2011. Based on the 2011 trends, the average car ownership reduction of 0.03 vehicles per dwelling is in line with what would be expected based on the changes in these housing characteristics.

This is therefore considered to be the primary factor relating to reduced car ownership in LB Richmond-upon-Thames over this ten year period. As previously demonstrated, there has been a 20% reduction in the proportion of residents

commuting to/from work as a car driver over the same period. This therefore suggests that there has been an increasing trend in the proportion (and therefore number) of vehicles remaining parked at residential properties as residents commute by other means whilst continuing to own a vehicle.

This could partially explain the increases in on-street parking pressures which have been experienced in the most sensitive residential areas across the borough, particularly within CPZs where these parking pressures are experienced across the day.

4.8 Community Parking Zones

There are 38 CPZs situated across the borough where on-street parking is restricted during certain periods. These are designed to assist in the management of vehicular access, highway safety and parking conditions for the community by reducing parking levels and associated issues. TfL's Residential Parking Provision in New Developments: Travel in London Research Report (2012) indicates that parking availability is considered to be more important to those living within Outer London boroughs although residents sometimes hold the view that these restrictions are not always necessary. A plan showing the existing CPZs within LB Richmond-upon-Thames has been provided within **Appendix K**. These have been summarised in **Table 4-9**.

Table 4-9: CPZs within LB Richmond-upon-Thames

Area	Main CPZ Zones	CPZ Restrictions	Nearby Centres	Nearby Stations/ Attractions
Barnes	B/CB	Permit, Pay & Display, Short Stay	Barnes (Local Centre), Hammersmith (Major Town Centre – adjacent borough)	Barnes Bridge Station & Barnes Wetland Centre
East Sheen & Mortlake	ES/M	Permit, Pay & Display, Short Stay	East Sheen (District Centre)	Barnes Bridge Station & Mortlake Station
Kew	K	Permit, Pay & Display, Short Stay	Kew (Local Centre)	Kew Gardens Station, Kew Bridge Station & Kew Gardens
Richmond	A/N/G/J	Permit, Pay & Display	Richmond (Major Town Centre)	Richmond Station & North Sheen Station
East Twickenham & St Margarets South	F/S	Pay & Display	St Margarets (Local Centre), East Twickenham (Local Centre)	St Margarets Station, Marble Hill & Orleans Gallery
Twickenham Central, South & North Twickenham	D/E/C/HM	Permit, Pay & Display, Short Stay	Twickenham (District Centre)	Strawberry Hill Station & Strawberry Hill
Twickenham Event Zone	R	Permit	Twickenham (District Centre), Whitton (District Centre)	Whitton Station, St Margarets Station & Twickenham Rugby Football Union
Teddington	T	Permit, Pay & Display, Short Stay	Teddington (District Centre)	Teddington Station
Hampton Wick	X	Permit, Pay & Display	Hampton Wick (Neighbourhood Centre) & Kingston (Major Town Centre – adjacent borough)	Hampton Wick Station

A total of 14 out of 38 CPZs (37%) operate across the day for the ten hour period between 08.30-18.30, with most of these operating Monday to Saturday. These include Richmond Town (A1), Central Barnes (CB), Central Twickenham (D), Hampton Court (H) and Hampton Wick (X). Four CPZs (11%) operate for eight hours between 09:00-17:00 within the Barnes and Mortlake Common area. Eight CPZs (21%) operate for a shorter period across the day between 10.00-16.30, including East Twickenham (F), North Kew (KC), North East Richmond (N) and St Margarets South (S). The four CPZs (11%) of Barnes (B1), East Sheen (ES), Kew (KA) and South Kew (KB) are only in operation for a couple of hours

between 10.00-12.00. Further details regarding the operating hours of CPZs within LB Richmond-upon-Thames are provided in **Appendix K**.

The operating hours of the CPZs in the neighbouring RB Kingston-upon-Thames and LB Hounslow have been examined for comparative purposes. The majority of CPZs in the central areas of RB Kingston-upon-Thames operate for a ten hour period between the hours of 08.30-18.30 Monday to Saturday which is the same as those applied within 14 CPZs within LB Richmond-upon-Thames. The CPZs within LB Hounslow operate across different hours such as between 09.30-18.00 (Mon-Fri) and 09.30-12.30 (Sat) within Hounslow town centre, between 09.30-12.30 (Mon-Sat) and 16.30-18.30 (Mon-Fri) within Central Chiswick, 09.00-18.00 (Mon-Fri) in West Chiswick and 09.00-19.00 (Mon-Sat) in East Chiswick. This provides a similar approach to LB Richmond-upon-Thames where the restrictions vary and tend to be more extensive in the town centre locations.

The CPZs tend to be located to control parking in areas where the demand would otherwise be escalated as a result of commuter parking e.g. at stations, consumer and staff parking e.g. retail and recreational parking e.g. attractions. It will therefore be important to continue to consider the need to control and manage parking within CPZs as part of parking policy and standards. A summary of the coverage of CPZs within each of the 18 wards within the borough has been set out within **Table 4-10**. These have been compared with car ownership levels and average PTALs in descending order of CPZ coverage. A figure comparing the CPZ boundaries with PTALs across the borough has been provided within **Appendix L**.

Table 4-10: CPZ Coverage by Ward

CPZ Coverage	% CPZ	Ward	Average Car Ownership Vehs/Dwelling (2011)	Average PTAL (Populated Areas)
High	100%	Twickenham Riverside	0.92	3.2
	90%	South Richmond	0.88	4.1
	80%	Barnes	1.02	2.2
	70%	Mortlake & Barnes Common	0.90	2.3
	70%	St Margarets & North Twickenham	1.10	2.0
	70%	Whitton	1.21	1.4
Moderate	50%	Kew	1.01	2.3
	40%	North Richmond	0.92	3.3
	40%	Hampton Wick	1.05	1.6
	40%	South Twickenham	1.13	2.4
Low	20%	Teddington	1.08	2.2
	20%	East Sheen	1.13	1.5
	10%	Ham, Petersham & Richmond Riverside	1.01	1.1
None	0%	Fulwell & Hampton Hill	1.13	2.0
	0%	West Twickenham	1.14	1.9
	0%	Hampton North	1.17	1.2
	0%	Heathfield	1.23	1.1
	0%	Hampton	1.25	1.3

The results set out in **Table 4-10** above indicate that average car ownership levels tend to be lower in CPZs where on-street parking availability would be expected to be lower than areas without these restrictions in place. The CPZs have also been implemented within the more accessible parts of the borough where there are greater opportunities to travel to and from these areas by public transport.

4.9 Car Club Provision

There are currently more than 2,200 car club vehicles in London (including plug-in hybrids and electric vehicles) which are used by 185,000 people (equating to over 80 members per vehicle). LB Richmond-upon-Thames has two car club operators (Zipcar and Enterprise) which together provide a total of 77 car club vehicles across the borough. During the first quarter of 2016, there were a total of 5,867 car club members within LB Richmond-upon-Thames which equates to around 76 members per vehicle. There has been an increasing trend of both car club membership and vehicle utilisation levels within the borough over recent years. Figures showing the locations of existing car club bays and members across the borough have been provided within **Appendix M**.

A summary of the locations of the 77 car club vehicles has been set out in **Table 4-11** and includes a comparison with the CPZ coverage (defined in **Table 4-10**) and car ownership levels (defined in **Table 4-1**) of each area. The average utilisation levels of the car club vehicles has also been provided based on the information provided by Zipcar and Enterprise car clubs.

Table 4-11: Summary of Car Clubs within LB Richmond-upon-Thames

Ward(s)	CPZ Coverage	Car Ownership	Total # vehicles	Average Utilisation (%)	Average Weekly # Vehicle Uses*
North / South Richmond	High	Low	21	22%	32
Twickenham Riverside / St Margarets and North Twickenham	High	Moderate	15	24%	25
Mortlake and Barnes Common	High	Low	13	23%	21
Teddington	Low	Moderate	6	30%	13
Kew	Moderate	Moderate	8	18%	10
Barnes	High	Moderate	5	21%	7
East Sheen	Low	Moderate	2	30%	4
South Twickenham	Moderate	Moderate	2	27%	4
Hampton Wick	Moderate	Moderate	3	13%	3
Fulwell & Hampton Hill / Hampton	None	High	2	15%	2
Total	**-**	**-**	**77**	**23%**	**121**

*calculated on the basis that a car club vehicle is used for a duration of one day

Table 4-11 above identifies that 54/77 (70%) of car club vehicles are situated in areas with high CPZ coverage where the highest vehicle usage levels are also experienced i.e. within the town centres of Richmond and Twickenham. This suggests that demand levels tend to be higher in locations where there are greater restrictions on car ownership. In turn, it is considered that the greater levels of car club membership subsequently reduce car ownership in these areas. It is estimated that approximately 1,730 car club members have sold at least one vehicle since joining a car club within LB Richmond-upon Thames. This is equivalent to each car club vehicle replacing approximately 22 vehicles on average since the 77 car club vehicles were provided across the borough.

To calculate the potential for car club vehicles to reduce car ownership levels, the number of vehicles anticipated to have been sold by car club members within each area has been estimated (based on usage levels) and then compared to the number of dwellings. It should be noted that although the calculations have been informed by a number of assumptions, the results are considered to be robust as each member has only been assumed to have sold up to one vehicle. The results have been presented in **Table 4-12** below.

Table 4-12: Summary of Privates Vehicles Sold and Car Ownership Reductions by Area

Ward(s)	# Dwellings (2011)	Estimated Number of Private Vehicles Sold	Estimated Car Ownership Reduction (Average Vehs/Unit)
North / South Richmond	9,939	455	-0.05
Twickenham Riverside / St Margarets and North Twickenham	9,401	373	-0.04
Mortlake and Barnes Common	4,940	305	-0.06
Kew	4,960	142	-0.03
Teddington	4,615	180	-0.04
Barnes	4,296	103	-0.02
East Sheen	4,151	63	-0.01
South Twickenham	4,015	51	-0.01
Fulwell & Hampton Hill / Hampton	8,358	29	0.00
Hampton Wick	4,434	30	-0.01
Remaining Five Wards	20,539	0	0.00
Total	**79,648**	**1,730**	**-0.02**

Table 4-12 excludes those vehicles which have not been purchased by residents after subsequently joining a car club. Based on the information provided by Zipcar and Enterprise car clubs, it is estimated that approximately 1,628 members either deferred or cancelled purchasing a car in LB Richmond-upon-Thames since joining. On the assumption that 50% of these members did not purchase a vehicle as a result of joining a car club, it is estimated that 814 fewer vehicles are owned by residents in LB Richmond-upon-Thames as a result of the two car club operators. This equates to a further average car ownership reduction of 0.01 vehicles per dwelling, and therefore a total average reduction of **0.03 vehicles** per dwelling.

The above demonstrates that car clubs can be effective at reducing car ownership and associated parking demand, particularly in town centre locations and areas with CPZs. Therefore, as car club membership levels continue to grow, it is anticipated that car ownership levels will continue to fall in the future. This is in line with the Mayor's aspiration for supporting the provision and expansion of car clubs and encouraging the use of low emission vehicles.

4.10 Recently Completed Housing Developments

Background

To understand the parking situation at recently completed housing developments across the borough, a total of six different sites have been identified (following liaison with LB Richmond-upon-Thames) and examined. Specifically this work has established the level of car and cycle parking present at each site (including blue badge car parking bays, where this information is available), investigated parking accumulations throughout the day and potential for consequential overspill parking and has derived vehicular trip rates for each of the developments. Details of the six recently completed housing developments including each accommodation schedule are presented in **Table 4-13** and the locations of these are illustrated on the figures contained within **Appendix N**.

Table 4-13: Summary of Recently Completed Housing Developments and Accommodation Schedule

Site Ref	Development Location	Ward	Private			Affordable			Total # Units
			Flats	Houses	Total	Flats	Houses	Total	
A	St Margarets Road	St Margarets and North Twickenham	17	0	17	10	0	10	27
B	Wadham Mews (Williams Lane)	Mortlake & Barnes Common	44	17	61	15	0	15	76
C	Parison Close (Lower Richmond Road)	North Richmond	0	0	0	52	0	52	52
D*	Saville Road	South Twickenham	14	0	14	8	0	8	22
E	Elmtree Road / Somerset Road	Fulwell & Hampton Hill	13	19	32	21	5	26	58
F	Blagrove Road (Sandy Lane)	Hampton Wick	56	0	56	38	0	38	94

*Site D is situated within a CPZ

Surveys were undertaken at each of the recently completed developments on Thursday 26th May 2016 to record two-way vehicular movements across a 12 hour period (between 07:00 and 19:00). A parking accumulation has been derived for sites B (Wadham Mews) and C (Parison Close) based on the number of vehicles parked at the start of the period and then vehicles leaving and entering the sites across the day. Access to the car parks of the remaining sites was restricted and the parking accumulation has therefore been calculated solely on the arrival and departure movements.

Car Parking Provision and Anticipated Car Ownership

Table 4-14 provides further details of the level of car parking and number of bedrooms for each of the dwellings at the above sites so that this can be compared with the current LB Richmond-upon-Thames car parking standards as set out within **Chapter 3**.

Table 4-14: Car Parking Provision at the Recently Completed Housing Developments

Site Reference	Total # Residential Units	Number of Bedrooms			Maximum Car Parking (Current Borough Standards)	Car Parking Provided
		1-2	3	4+		
A	27	25	2	0	28	20
B	76	56	18	2	87	68
C	52	30	22	0	63	31
D	22	22	0	0	22*	18
E	58	30	18	10	77	85
F	94	94	0	0	94	94

*Although Site D is situated within a CPZ where more flexible standards can be applied to larger dwellings (4+ bedrooms), this does not apply in this instance given that Site D comprises solely 1-2 bedroom dwellings

The anticipated average level of car ownership of each of the above sites has been calculated based on the ward upon which each site is situated and the accommodation schedule including tenure and dwelling size. The following assumptions have been used to inform this methodology:

- Data has been extracted from the 2011 Census Data: CT0103 – Accommodation type by tenure by number of rooms by car or van availability;
- Flats were separated between private and affordable, with smaller dwellings assumed to comprise 1-4 rooms and larger dwellings 5-7 rooms; and

- Houses were separated between private and affordable, with smaller dwellings assumed to comprise 5-7 rooms and larger dwellings 8+ rooms.

The car ownership calculations are provided within **Appendix Q**. Further details of each of the sites including PTALs and the calculated car ownership levels (as above) are set out within **Table 4-15** below.

Table 4-15: Additional Characteristics of the Recently Completed Developments

Site Reference	Total # Residential Units	Car Parking Provided	Average Spaces per Unit	Car Ownership (Average Vehs/Unit)		PTAL	CPZ
				LSOA	Calculated		
A	27	20	0.74	1.17	0.78	1b	No (although within close proximity)
B	76	68	0.89	0.75	0.82	1a	No (although within close proximity)
C	52	31	0.60	0.87	0.65	4	No (although within close proximity)
D	22	18	0.82	1.02	0.81	5	Yes
E	58	85	1.47	1.08	1.08	2	No
F	94	94	1.00	0.87	0.74	2	No (although within close proximity)
Overall Average			**0.92**	**0.96**	**0.81**	**-**	**-**

Table 4-15 indicates that the average spaces/unit at each of the above sites is comparable with the average vehicles/unit for sites A-D. There is a greater level of parking provision at sites E (Elmtree Road) and F (Blagrove Road) compared to the anticipated car ownership levels of these sites. However, these sites are situated within a poor PTAL (2) and the level of parking provided is therefore considered to be flexible as the estimated car ownership level may be unrepresentative of actual levels. Whilst the average spaces/unit is lower at Site C (Parison Close), this site has a good PTAL (4) and the estimated car ownership level may be higher than in reality. Although it could be considered that an insufficient level of parking was provided at Site A (St Margarets Road), this site has smaller dwellings and has very low vehicular trip rates as set out later within this section.

Based on the details provided within **Tables 4-14** and **4-15**, sites A, B and D have all provided car parking at approximately 70-80% of the maximum parking standards. These sites have therefore providing parking towards the upper end of the standards and it is considered that this could be a reflection of the very poor PTAL (1a-1b) of sites A and B. Whilst the parking provision at Site D could be considered to be excessive particularly given that this site has a very good PTAL (5) and is situated within a CPZ, there average spaces/unit is comparable with the anticipated car ownership at this site.

Site F has provided parking in accordance with the maximum levels permitted under the car parking standards which reflects the poor PTAL (2) of the surrounding area. Car parking provision at Site C falls far below the maximum levels permitted under the standards (approximately 50%); however this site has a good PTAL (4) and the lowest anticipated car ownership levels (0.60) when compared to the other five sites.

Although the level of car parking provided at Site E (Elmtree Road / Somerset Road) exceeds the current maximum LB Richmond-upon-Thames car parking standards, the level of provision has been designed to address concerns raised during the public exhibition with regards to managing overspill parking on the surrounding residential streets. Furthermore, this site has a poor PTAL (2) and has the highest anticipated levels of car ownership (1.08) of all six sites. The level of car parking is therefore considered to be appropriate by reflecting the need to account for local characteristics and to apply flexibility for less accessible areas.

Disabled Car Parking Provision

Table 4-16 below provides details of the disabled parking provision at each of the six recently completed housing developments in comparison with the number of wheelchair accessible units.

Table 4-16: Disabled Car Parking Provision at Recently Completed Housing Developments

Site Ref	Total Residential Units	Total Car Parking Provided	Wheelchair Accessible Units	Disabled Car Parking Provided	Disabled Parking as Proportion of Total	Disabled Car Parking Spaces per Wheelchair Accessible Unit
A	27	20	3	3	15.0%	1.0
B	76	68	7	7	10.3%	1.0
C	52	31	6	6	19.4%	1.0
D	22	18	*Unknown*	1	5.6%	*Unknown*
E	58	85	10	10	11.8%	1.0
F	94	94	9	9	9.6%	1.0
Total			35*	35	11.9%	1.0*

*excludes Site D, due to unknown details

As a proportion of total car parking at each of the six developments, disabled parking ranges from 5.6% at Site D (Saville Road) to 19.4% at Site C (Parison Close). The majority of other sites provide disabled car parking space at around 10-15% of overall provision. More importantly, each site provides at least one disabled car parking bay per wheelchair accessible unit which is in line with both the London Plan and the LB Richmond-upon-Thames car parking standards.

Parking Accumulation

It has been possible to derive a parking accumulation for sites B (Wadham Mews) and C (Parison Close) based on the number of vehicles parked prior to the surveys and the number of vehicles entering and exiting each of the sites during the 12 hour surveyed period. These profiles have been compared with the overall number of spaces available (excluding disabled parking bays) to ascertain whether any overspill parking has been likely to have occurred e.g. if utilisation levels approach or exceed 100%. The disabled parking bays have been excluded from this analysis on the assumption that these may be empty and to therefore provide a more robust evaluation of parking utilisation.

Site B (Wadham Mews, Mortlake & Barnes Common)

The parking accumulation profile for Site B (Wadham Mews) has been presented in **Figure 4-6** as a proportion of the overall car parking capacity of standard parking bays (61 spaces) available to residents on-site.

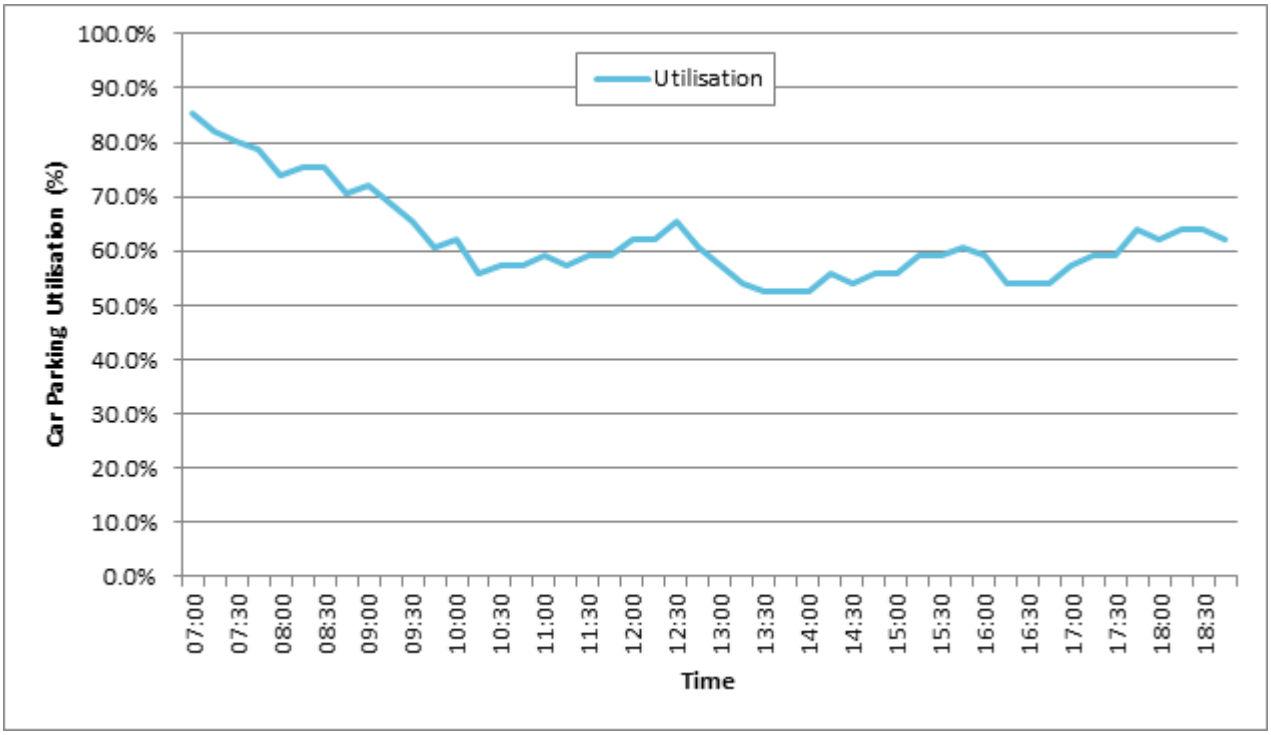


Figure 4-6: Car Parking Accumulation Profile – Site B (Wadham Mews)

A total of 52 parking bays were occupied prior to commencing the surveys at 07:00 which represents 85% of the overall standard car parking bay capacity at the site i.e. excluding disabled bays. During the course of the day the utilisation of the spaces reduced to around 55% between 10:00 and 15:00. A small increase in car park utilisation was recorded during the lunchtime hours, with around 65% of spaces used. Towards the end of the survey, parking utilisation levels started to increase which could reflect residents returning back home from their place of employment. Based on the data recorded on site, and although some residents may leave prior to 07:00, the parking capacity on site appears to be comparable with the parking demand generated by this development. It is therefore unlikely that this development currently results in parking overspill onto the surrounding streets.

A maximum car parking demand of 52 vehicles was recorded by the surveys which equates to 85% of standard car parking provision, or 77% of all parking provision including disabled bays. Based on the car ownership details presented earlier (average of 0.82 vehicles/dwelling), a total of 63 vehicles would be anticipated to be owned at the site with an overall car parking capacity of 68 bays (including disabled bays). As such, it is considered that the level of parking provided is appropriate for the site and takes into consideration local characteristics including the poor PTAL (1a) and the need to therefore provide a sufficient level of parking.

Site C (Parison Close, North Richmond)

The parking accumulation profile for Site C (Parison Close) has been presented in **Figure 4-7**, as a proportion of the overall car parking capacity of standard parking bays (25 spaces) available to residents on-site.

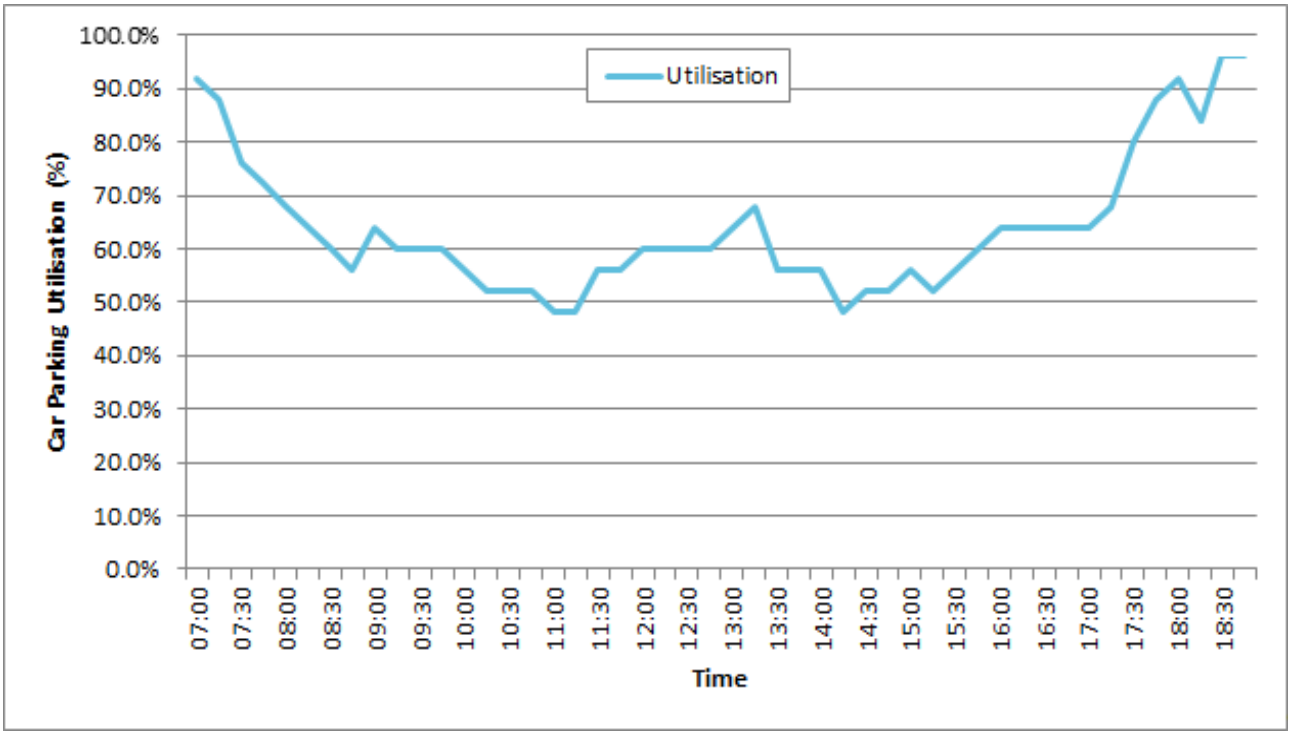


Figure 4-7: Car Parking Accumulation Profile – Site C (Parison Close)

A total of 23 parking bays were occupied prior to commencing the surveys at 07:00 which represents 92% of the standard car parking capacity at the site i.e. excluding disabled bays. During the course of the day the utilisation of the spaces reduced to around 50% between 10:00 and 15:00. A small increase in car park utilisation was recorded during the lunchtime hours where levels approached 70%. Towards the end of the survey, parking utilisation levels exceeded levels at the start of the day which could again reflect residents returning back home from their place of employment including those which may have departed before 07:00. Based on the data recorded on site, the parking capacity on-site appears to be comparable with the parking demand generated by the development, although there may be potential for some overspill parking onto the surrounding streets.

A maximum car parking demand of 24 vehicles was recorded by the surveys which equates to 96% of standard car parking provision, or 77% of all parking provision including disabled bays. Based on the car ownership details presented earlier (average of 0.65 vehicles/dwelling), a total of 34 vehicles would be anticipated to be owned at the site with an overall car parking capacity of 31 bays (including disabled bays). As such, whilst it is considered that the constrained level of on-site car parking may have helped to reduce car ownership levels at this development which comprises 1-3 bedroom dwellings in an area with good PTAL (4), the development may have resulted in overspill parking due to the high parking utilisation levels experienced.

Surveyed Vehicular Trip Rates

The vehicular trip rates have been calculated for each of the six sites based on the survey results and number of dwellings. These have been set out below in **Table 4-17** for each of the hours surveyed across the day.

Table 4-17: Surveyed Vehicular Trip Rates per dwelling, by Recently Completed Development

Time Period	Site A		Site B		Site C		Site D		Site E		Site F		Average*		
	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Arr	Dep	Tot
07:00-08:00	0.000	0.037	0.026	0.105	0.019	0.096	0.000	0.091	0.000	0.069	0.021	0.138	0.017	0.102	0.119
08:00-09:00	0.000	0.000	0.066	0.118	0.019	0.096	0.000	0.000	0.052	0.069	0.032	0.053	0.042	0.084	0.126
09:00-10:00	0.000	0.037	0.132	0.184	0.038	0.019	0.000	0.045	0.052	0.190	0.053	0.064	0.069	0.114	0.183
10:00-11:00	0.000	0.000	0.092	0.118	0.058	0.096	0.000	0.000	0.017	0.086	0.053	0.064	0.055	0.091	0.146
11:00-12:00	0.037	0.000	0.079	0.079	0.058	0.038	0.045	0.000	0.103	0.121	0.064	0.096	0.076	0.084	0.160
12:00-13:00	0.000	0.000	0.066	0.053	0.058	0.038	0.091	0.045	0.052	0.052	0.085	0.096	0.065	0.060	0.125
13:00-14:00	0.000	0.037	0.026	0.092	0.058	0.077	0.045	0.045	0.052	0.052	0.053	0.032	0.047	0.063	0.111
14:00-15:00	0.000	0.000	0.066	0.039	0.058	0.077	0.000	0.000	0.086	0.069	0.064	0.053	0.069	0.060	0.128
15:00-16:00	0.000	0.000	0.079	0.039	0.115	0.096	0.000	0.045	0.069	0.052	0.064	0.043	0.082	0.058	0.139
16:00-17:00	0.000	0.000	0.092	0.132	0.019	0.019	0.000	0.000	0.017	0.017	0.074	0.043	0.051	0.053	0.103
17:00-18:00	0.000	0.037	0.118	0.053	0.154	0.038	0.045	0.000	0.155	0.052	0.085	0.043	0.128	0.047	0.175
18:00-19:00	0.037	0.037	0.079	0.092	0.212	0.192	0.045	0.045	0.052	0.052	0.106	0.064	0.112	0.100	0.212
Total	**0.074**	**0.185**	**0.921**	**1.105**	**0.865**	**0.885**	**0.273**	**0.318**	**0.707**	**0.879**	**0.755**	**0.787**	0.812	0.914	1.726

*excludes sites A & D which have lower and less comparable trip rates

The two-way vehicular trip rates for each site have been presented below in **Figure 4-8** for the identified average weekday AM peak period (09:00-10:00), PM peak (18:00-19:00) and the overall 12 hour period as identified within **Table 4-17** above.

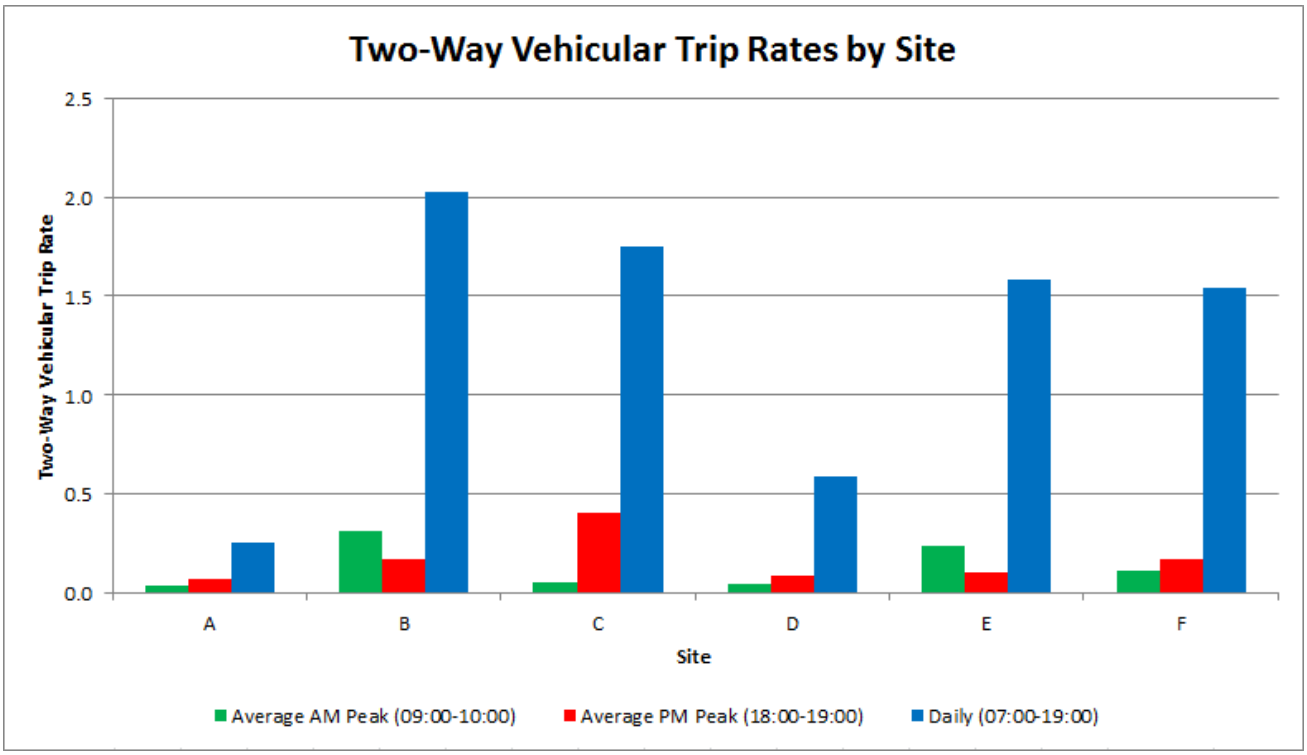


Figure 4-8: Two-Way Vehicular Trip Rates by Site

The results show that Sites A (St Margarets Road) and D (Saville Road) have the lowest vehicular trip rates of all six sites. **Tables 4-14** and **4-15** demonstrate that these sites primarily comprise 1-2 bedrooms dwellings, with Site A having in excess of 90% of these smaller units and Site D having 100% of these smaller units. Furthermore, Site A is anticipated to have lower car ownership levels (average of 0.78 vehicles per household) and has a level of car parking equivalent to

approximately 70% of the maximum standards. Site D also has a level of car parking equivalent to circa. 80% of the maximum standards, and is situated in an area of very good PTAL (5).

Sites B (Wadham Mews) and C (Parison Close) have the highest average trip rates per dwelling of the six sites throughout the course of the day. This is likely to be in part due to the higher proportion of dwellings with three or more bedroom (26% at Site B and 42% at Site C). Both of the sites are located outside of CPZs and parking is therefore not restricted during the day which could encourage higher car ownership levels. Site B is located in an area with very poor PTAL (1a) which could also contribute towards higher vehicular trip rates. As previously stated, Site C has a good PTAL (4) and the level of parking provided (circa. 50% of the maximum standards) may be considered to be insufficient which is also supported by the parking accumulation where potential overspill parking may occur.

Table 4-18 provides a comparison of the daily two-way vehicular trip rates presented in **Table 4-17** with those set out within the respective Transport Assessment/Statement produced in support of the planning application for each site.

Table 4-18: Comparison of Daily Two-Way Vehicular Trip Rates, Calculated versus TA/TS

Site Reference	Daily Two-Way Vehicular Trip Rate		Difference	
	TA / TS	Surveyed	#	%
A	*N/A*	0.259	*N/A*	*N/A*
B	3.637	2.026	-1.611	-44%
C	4.229	1.750	-2.479	-59%
D	1.535	0.591	-0.944	-61%
E	2.851	1.586	-1.265	-44%
F	2.686	1.543	-1.143	-43%

Table 4-18 shows that the surveyed vehicular trip rates are lower than those presented within the supporting Transport Assessments/Statements for each of the five sites where this information is available. This may be the result of worst case vehicular trip rates being adopted within the supporting transport reports, or as a result of higher generating sites within the TRICS or TRAVL databases being selected. There are particularly high differences for Site C & D which are the two sites with the highest PTALs. It is therefore also considered that a higher proportion of residents may be making use of sustainable travel modes in the area than was anticipated within the supporting transport documents.

Car Ownership and Car Use

The OLC Fourth Report identifies a strong positive linear relationship between the proportion of households with access to a car and the two-way daily vehicular trip rate based average values for each of the 32 London boroughs. The report does however also state that there is a complex relationship between these two characteristics. The proportion of households with access to a car at each of the above six sites has been estimated based on the anticipated car ownership levels (and therefore number of vehicles based at each site) and on the assumption that 50% of larger households (three and four bedroom dwellings) would own two vehicles. This has then been compared with the daily two-way vehicular trip rates set out earlier in **Figure 4-9**.

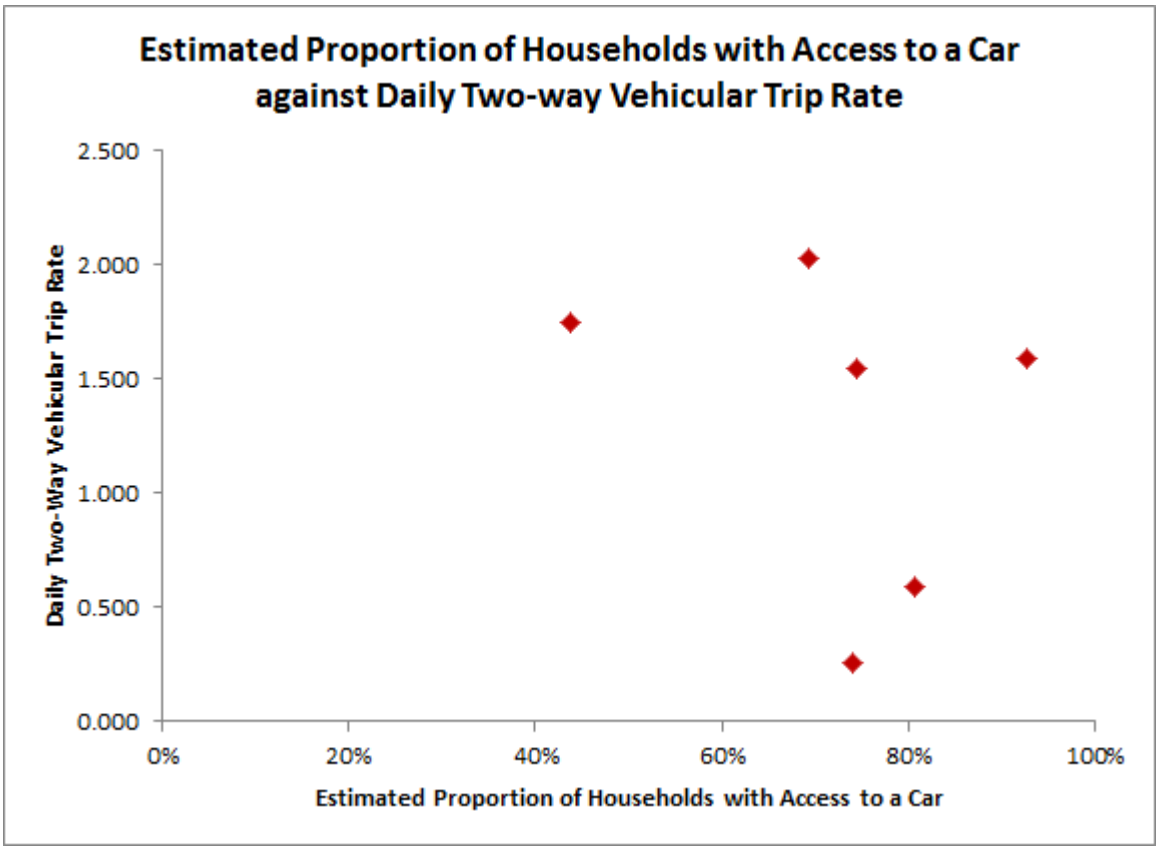


Figure 4-9: Comparison of Car Access and Daily Two-Way Vehicular Trip Rates

The above shows that there is no apparent relationship between these two characteristics based on the surveys undertaken at the six recently completed housing developments and the subsequent analysis. This therefore confirms that a range of other factors such as car ownership and opportunities to make use of sustainable travel modes also influence the two-way vehicular trip rate which makes any direct comparisons with just one of these variables less clear.

Cycle Parking

The current LB Richmond-upon-Thames residential cycle parking standards state that dwellings with 1-3 bedrooms each require a minimum of one cycle parking space, whilst dwellings with 4 or more bedrooms each require a minimum of two cycle parking spaces. **Table 4-19** provides details of the level of cycle parking provided at each site (based on the level proposed as set out within the supporting planning application documents) compared with the minimum levels required by the cycle parking standards.

Table 4-19: Cycle Parking Provision at Recently Completed Developments

Site Reference	Total Residential Units	1-3 Bedroom Dwellings	4+ Bedroom Dwellings	Minimum Cycle Parking Required (Current LB Richmond-upon-Thames Standards)	Cycle Parking Provided*
A	27	27	0	27	27
B	76	76	0	76	76
C	52	52	0	52	52
D	22	22	0	22	36
E	58	48	10	68	88
F	94	94	0	94	94

*based on supporting planning application documents

Sites A (St Margarets Road), B (Wadham Mews), C (Parison Close) and F (Blagrove Road) only comprise dwellings with three or fewer bedrooms and, as such, only require a minimum of one cycle parking space per dwelling based on the current LB Richmond-upon-Thames cycle parking standards. All four of these recently completed developments comply with this standard.

Site D has provided more than the required level of cycle parking for a residential development, with 36 covered and secure cycle parking spaces. This is equivalent to 1.64 cycle parking spaces per residential unit, and exceeds the required level of 1.00 cycle parking spaces per unit. There are also an additional 10 cycle parking spaces for 'visitors', which have been excluded from **Table 4-19** given that these may be intended to support other land uses in the vicinity of the site.

Site E has also provided more cycle parking than required, with 40 cycle parking spaces provided for the apartment element of the development (34 dwellings). The remaining 24 dwellings are houses and it was suggested within the supporting transport reports that two cycle parking spaces would be able to be accommodated within the back gardens i.e. within garden sheds.

SUMMARY

- **Six recently completed housing developments have been examined in terms of car parking provision, comparison with the standards, parking accumulation and vehicular trip rates;**
- **The average number of car parking spaces provided at each of the sites tends to be comparable with the anticipated car ownership levels based on housing size, type and tenure;**
- **Four sites have provided parking towards or at the upper end of the maximum parking standards which reflects PTAL and anticipated car ownership levels at these sites;**
- **One site provided parking far below the maximum standards but has a good PTAL (4) and the lowest anticipated car ownership levels of all sites;**
- **One site provided parking above the maximum standards to reflect local characteristics;**
- **The disabled parking provision at each of the sites is in line with both the London Plan and the LB Richmond-upon-Thames car parking standards;**
- **Based on car ownership levels and the parking accumulation at two of the sites, it is considered that a sufficient level of car parking has been provided at Site B, whilst insufficient parking may have been provided at Site C which could have resulted in overspill parking;**
- **The lowest two-way vehicular trip rates were observed at two of the sites which comprised smaller units with either lower anticipated car ownership levels or being situated in an area of very good PTAL (5);**
- **The two-way vehicular trip rates were more comparable across the remaining four sites, where the highest rates were at recorded at those sites with larger dwellings and situated outside of CPZs;**
- **The surveyed trip rates were lower than those presented within the transport reports in support of the planning applications for each site in all cases;**
- **There was no apparent relationship between the estimated proportion of households having access to a car and the vehicular trip rates which confirms the complexity of this relationship and the range of other influencing factors such as car ownership and PTAL; and**
- **All six sites provided cycle parking either in accordance with or above the minimum LB Richmond-upon-Thames cycle parking standards based on the supporting documents.**

4.11 Parking Beat Surveys

Introduction

There are a number of known on-street parking issues across the borough particularly in town centre locations including Richmond, Twickenham, Teddington and East Sheen. Although CPZs are present in these areas, previous parking beat surveys have indicated that on-street parking continues to be close to capacity. The following factors are considered to contribute towards the high levels of parking demand experienced:

- Limited off-street parking provision for housing located within close proximity to shopping centres;
- Limited on-street parking availability compared to the number of issued resident permits;
- High car ownership levels, influenced by limited public transport services at weekends;
- Population increase with more cars being owned across the borough; and
- Commuter parking near stations and areas of employment and higher education where there are car parking capacity issues.

Further to the above, parking pressures are also experienced in other areas of LB Richmond-upon-Thames where there are dense residential areas with narrow streets and limited off-street parking for example. This includes areas such as Teddington, Hampton Hill and St Margarets, as well as Mortlake and Barnes.

TfL's 'Residential Parking Provision in New Developments' states that in Outer London, 20% of vehicles are parked on-street in low PTAL areas which increases to 25% and 33% in medium and high PTAL areas respectively.

Methodology

A series of parking beat surveys have been undertaken to develop an understanding of existing parking stress levels within eight residential areas ('sites') across the borough. A summary of these sites which were discussed and agreed with LB Richmond-upon-Thames have been outlined in **Table 4-20** below and the locations of these have also been presented within **Appendix O**.

Table 4-20: Parking Beat Survey Locations

Site Ref	Site Area	CPZ		Roads Surveyed
		Zone	Operation	
1	Barnes	Yes (B1)	Mon-Fri (10:00-12:00)	Berkley Road, Charlotte Road, Cumberland Road, Ellerton Road, Gerard Road, Grange Road, Kitson Road, Lowther Road, Melville Road, Nassau Road, Parke Road and Westmoreland Road
2	Twickenham	Yes (D)	Mon-Sat (08:30-18:30)	Clifden Road, Copthall Gardens, Grosvenor Road, Queen's Road, Sherland Road, Station Road and Tudor Gardens
3	St Margarets	Yes (F & S)	Mon-Fri (10:00-16:30)	Arlington Road, Baronsfield Road, Claremont Road, Ellesmere Road, King's Road, Norman Avenue, Ravensbourne Road, Riverdale Road, Rosslyn Road, Sandy Coombe Road, St Margarets Road and St Stephen's Gardens
4	Hampton Hill	No	N/A	Alpha Road, Anlaby Road, Connaught Road, Kent Drive, Kings Road, Mays Road, Oxford Road, Prince's Road, Royal Road and Windsor Road
5	East Sheen	No	N/A	Beechcroft Road, Bexhill Road, Carlton Road, Connaught Avenue, Earl Road, Eastbourne Gardens, Elm Road, Holmesdale Avenue, Leinster Avenue, Ormonde Road and St Leonards Road
6	Hampton	No	N/A	Broad Lane, Cambridge Road, Cleveland Avenue, Coombe Crescent, Coombe Road, Courtlands Avenue, Falcon Road, Hatherop Road, Holly Bush Lane, Oak Avenue, Orchard Road, South Road and Westbrook Avenue
7	Richmond	Yes (A1)	Mon-Sat (08:30-18:30)	Church Terrace, Grosvenor Avenue, Grosvenor Road, Halford Road, Mount Arat Road, Ormond Road, Paradise Road, Sheen Road, The Hermitage and The Vineyard
8	Ham	No	N/A	Ashburnham Road, Broughton Ave, Cave Road, Croft Way, Dukes Avenue, Fellbrook, Hardwicke Road, Kingfisher Drive, Langham Gardens, Lawrence Road, Lock Road, Mariner Gardens, Riverside Dr, Rushmead, Sheridan Road, Simpson Road, Watermill Close

Table 4-20 shows that four sites are located within CPZs including Sites 1 (Barnes) and 3 (St Margarets) which are subject to restrictions during the late morning and early afternoon of each weekday, and Sites 2 (Twickenham) and 7 (Richmond) which are subject to more extensive restrictions across each weekday and on Saturday. Sites 4, 5, 6 and 8 are situated outside of CPZs and are therefore not subject to any of these restrictions. Further details of the CPZs within LB Richmond-upon-Thames are provided within **Appendix K**.

The streets at each survey site were examined to establish the type of parking restrictions (where present) by length in metres. Once this information had been gathered, the levels of parking were recorded.

The surveys took place at all eight sites during the following 'overnight' dates and times:

- Sunday 22nd May 2016, 01:00 - 05:30;
- Tuesday 24th May 2016, 01:00 - 05:30; and
- Wednesday 25th May 2016, 01:00 - 05:30.

In addition, Sites 2 (Twickenham) and 5 (East Sheen) were surveyed during the daytime due to the presence of nearby retail and commercial land uses so that the parking demand associated with these uses such as visitors could be incorporated. These daytime surveys were undertaken during the following dates and times:

- Tuesday 24th May 2016, 06:00 – 20:00; and
- Wednesday 25th May 2016, 06:00 – 20:00.

The average levels of parking stress at each site have been calculated based on the proportion of available car parking spaces which were utilised. The available car parking capacity of each area includes areas of kerbline where vehicles are able to legally park e.g. resident permit bays, pay & display parking bays and areas of unrestricted kerbline. The overall capacity has then been calculated using both the LB Richmond-upon-Thames methodology which assumes that an average vehicle occupies 5.5m of kerbline length and the LB Lambeth methodology which uses 5.0m. These two methodologies have been compared using the survey data within **Appendix P** to provide a view on which method is considered to provide a more appropriate representation of parking capacity, average parking utilisation and therefore parking stress levels across a given study area. The LB Richmond-upon-Thames methodology takes 90% parking stress as the level at which capacity is considered to be close to being reached, whilst the LB Lambeth methodology uses an 85% parking stress threshold.

The parking beat survey results have been compared against a variety of different factors which have been categorised in **Table 4-21** to aid the comparisons:

Table 4-21: Summary of Characteristics

Characteristic	Green	Amber	Red
PTAL	5-6	3-4	1-2
Car Ownership (vehs/dwelling)	<0.95	0.95-1.15	>1.15
CPZ	Daytime restrictions (Mon-Sat)	Morning and afternoon restrictions (Mon-Fri)	None
% Car Drivers (Daytime)	<30%	30-40%	>40%
Parking Stress*	<70%	70-90%	>90%

*average parking stress has been calculated using both LB Richmond-upon-Thames and LB Lambeth methodologies

The above has been informed by the following Borough-wide averages:

- PTAL 2-3
- Car ownership: 1.06
- CPZ: circa. 40% coverage, with a range of operating hours
- % Car Drivers (2011 Census Journey to Work Mode Share): 35.7%

LB Richmond-upon-Thames currently considers a parking stress level of 90% to represent the threshold upon which applicants proposing new developments have to demonstrate that their proposals will have a nil-detriment effect i.e. by providing sufficient levels of parking on-site.

Survey Data Results

Overnight On-Street Parking

The overnight on-street parking stress levels for each area have been presented below in **Table 4-22** using both methodologies. A number of area characteristics including the PTAL range of the area surveyed, any presence of CPZs and the average car ownership level of existing residents living within the appropriate LSOA(s) where the surveys were undertaken have also been shown for comparative purposes. Parking stress has been presented for each site based on the maximum level experienced at any given time (on any given day) and as an overall average of all three surveys between 01:00-05:30. For the purposes of this study, low parking stress is considered to be below 70%, whereas high parking stress is considered to be above 90% (see **Table 4-21**) irrespective of the methodology applied.

Table 4-22: Overnight On-Street Parking Stress (01:00 – 05:30), by Site

Site	Area Characteristics			Parking Stress LB Richmond-upon-Thames Method (5.5m per bay)		Parking Stress Lambeth Method (5.0m per bay)	
	PTAL	CPZ	Car Ownership (vehs/dwelling)	Average	Maximum	Average	Maximum
1	1a - 3	B1	1.14	66%	71%	60%	65%
2	4 - 5	D	0.78	92%	96%	84%	88%
3	3 - 4	F & S	0.93	103%	106%	88%	91%
4	2 - 3	None	1.14	85%	88%	76%	78%
5	2 - 3	None	0.98	94%	96%	85%	87%
6	1b - 2	None	1.40	68%	70%	60%	62%
7	5 - 6a	A1	0.82	82%	84%	75%	78%
8	1a - 1b	None	1.08	57%	57%	52%	52%

The results in **Table 4-22** reveal that the LB Richmond-upon-Thames methodology results in a relative parking stress increase of circa. 10% when compared to the LB Lambeth methodology. A detailed comparison of these methodologies has been provided within **Appendix P**. A figure presenting the above results for each of the eight sites is contained within **Appendix O** and can be summarised as follows:

- Sites 2, 3 and 5 experience high levels of on-street parking stress, with Site 3 (St Margarets) being considered to be over-capacity;
- Sites 4 and 5 experience moderate to high levels of on-street parking stress and are both subject to moderate PTALs (2-3) without any CPZ restrictions throughout the day;
- Sites 2, 3 and 7 experience higher overnight on-street parking stress levels than would be expected based on their lower car ownership levels which suggests that other factors have a greater influence; and
- Sites 1, 6 and 8 experience lower overnight on-street parking stress levels than would be expected based on both their lower PTALs and higher car ownership levels, which again suggests that other factors such as parking availability have a greater influence on parking stress levels at these locations.

There is a clear trend between PTAL and overnight on-street parking stress based on the eight surveyed sites, where the three sites (Sites 1, 6 and 8) with the lowest PTALs also experience the lowest levels of overnight on-street parking stress. The two sites (Sites 3 and 5) which experience the highest levels of parking stress are both situated in areas with moderate PTAL (2-3). The other three sites which have a moderate or high PTALs, also experience higher levels of parking stress than the least accessible areas; at least 82% on average based on the LB Richmond-upon-Thames methodology. The least accessible areas (PTAL 1a-2) tend to have lower average and maximum parking stress levels due to lower housing densities, increased on-street parking availability (with fewer single yellow line restrictions) and a wider availability of off-street parking.

There is no clear trend between average car ownership levels and overnight on-street parking stress based on the eight surveyed sites. This suggests that whilst car ownership affects parking demand, the type and availability of provision has a greater influence on on-street parking utilisation levels. For example, there is a wider availability of on-street and off-street parking within the less accessible areas which offsets the higher car ownership levels at these locations. Whilst car ownership levels are lower within higher PTAL areas, there is less availability of on-street and off-street parking which conversely increases on-street parking stress.

Overnight on-street parking stress tends to be higher in areas where CPZ restrictions are more extensive and in place over the course of the day (Mon-Sat). This would be expected, given that CPZs tend to be implemented in areas where parking pressures are highest e.g. within town centre locations. However, the two areas with the highest CPZ coverage (Sites 2 and 7) experience less parking stress than Sites 3 and 5 which have less (or no) CPZ coverage. It is therefore considered that CPZs can be a useful tool for reducing on-street parking stress in areas where parking availability is much more limited. Furthermore, car ownership levels tend to be lower in CPZ locations which therefore also help to reduce the overall demand for parking in the surrounding area.

As previously set out, there are several additional factors which need to be considered when comparing overnight on-street parking stress with the other area characteristics set out in **Table 4-22**:

- Off-street parking provision: areas with a greater availability of off-street parking provision e.g. the less accessible areas, tend to experience lower on-street parking stress levels;
- Housing density levels: areas with lower housing density e.g. the less accessible areas, would be expected to experience lower on-street parking stress levels; and
- On-street parking capacity: areas with constrained on-street parking capacity resulting from narrow carriageway widths, broken up areas of parking, dropped kerbs, extensive single yellow line restrictions etc. would be expected to experience higher on-street parking stress levels e.g. within the more accessible areas.

It is considered that based on the above, greater levels of off-street parking should be provided in areas subject to moderate PTALs (2-3) to reduce the high levels of on-street parking stress experienced at these locations. The least accessible areas (PTAL 1a-2) tend to experience lower levels of on-street parking stress due to a wider availability of on-street and off-street parking, whereas the most accessible areas (PTAL 4-6) tend to be subject to CPZ restrictions across the day which is a key measure that can be used to manage on-street parking pressures. As previously demonstrated, areas within CPZs also tend to have lower car ownership levels which helps to reduce on-street parking stress where there is limited off-street parking availability. It is therefore considered that appropriate levels of off-street parking should continue to be provided within areas subject to CPZ restrictions during the day, whilst allowing for the consideration of car-free developments in the most accessible locations.

A number of different parking bay types have been excluded from the parking stress level calculations so that these provide a more accurate representation of the level of general parking utilised by residents and therefore the remaining level available. For example, car club bays, areas of dropped kerb, disabled bays, loading bays and motorcycle bays were all excluded for this purpose. Areas of kerbline subject to single yellow line restrictions were also excluded e.g. in areas where the carriageway is too narrow to park on both sides. Nonetheless, it is important to consider the existing utilisation levels of disabled parking bays to understand whether there is sufficient parking availability for disabled users. Instances of inappropriate parking such as on single or double yellow/red line restrictions, across dropped kerbs or on school keep clear or zig-zag markings should also be considered.

These characteristics have been examined in **Table 4-23** below in relation to average parking stress using both methodologies. For instances of inappropriate parking, low utilisation levels are considered to be below 10% and high utilisation levels are considered to be above 20%.

Table 4-23: Overnight Utilisation (01:00 – 05:30) of Disabled Bays and Inappropriate Parking

Site	CPZ	Average Parking Stress		Maximum use of Disabled Bays		Maximum Level of Inappropriate Parking	
		LB Richmond-upon-Thames (5.5m / bay)	Lambeth (5.0m / bay)	LB Richmond-upon-Thames (5.5m / bay)	Lambeth (5.0m / bay)	LB Richmond-upon-Thames (5.5m / bay)	Lambeth (5.0m /r bay)
1	B1	66%	60%	83%	83%	14%	11%
2	D	92%	84%	100%	100%	8%	7%
3	F & S	103%	88%	50%	50%	6%	5%
4	None	85%	76%	100%	100%	11%	9%
5	None	94%	85%	100%	100%	47%	39%
6	None	68%	60%	100%	100%	15%	12%
7	A1	82%	75%	67%	50%	3%	3%
8	None	57%	52%	133%	80%	5%	4%

The following findings have been determined from the results shown in **Table 4-23**:

- The majority of disabled parking bays are in use and equivalent to a maximum of 100% of all disabled bays at four of the eight sites;
- There is a low level of correlation between general average parking stress and the maximum utilisation levels of disabled parking bays;
- A low level of inappropriate parking was recorded at four of the sites, of which three are situated within CPZs and the other experienced the lowest on-street parking stress levels of all eight sites;
- Moderate and high levels of inappropriate parking were recorded at four of the sites, of which three are not subject to CPZ restrictions throughout the day and two experienced moderate or high levels of on-street parking stress; and
- Site 5 (East Sheen) experienced the second highest levels of average parking stress and the highest level of inappropriate parking.

The above suggests that there could be insufficient levels of disabled parking bay provision in certain areas across the borough and that the standards should therefore seek to maximise the level of blue badge parking provided in support of new housing developments particularly where on-street availability is limited. LB Richmond-upon-Thames currently issue 170-200 blue badge permits each month which highlights the existing levels of demand and the need to therefore provide a suitable level of provision.

The above also demonstrates that on-street parking stress can contribute to inappropriate parking (such as at Site 5) and therefore potentially increase localised congestion levels and safety implications e.g. vehicles parking on footways. Notwithstanding this, CPZs have been found to reduce inappropriate parking even at sites which experience high levels of on-street parking stress (such as at Site 3), which indicates that the (potential) enforcement of these restrictions acts as an effective deterrent even outside of the relevant periods. It is therefore considered that the standards can help to reduce instances of inappropriate parking in areas outside of CPZs by ensuring sufficient off-street provision is made available.

Daytime Parking

The daytime on-street parking stress levels for Sites 2 (Twickenham) and 5 (East Sheen) have been calculated using the approach described previously and have been presented below in **Table 4-24**. These have again been compared to a number of different area characteristics including the proportion of residents travelling as a car driver (2011 Census Journey to Work mode share) given that residents are more likely to travel during the day and indicates the extent to which vehicles could be parked elsewhere e.g. at a place of employment.

Table 4-24: Daytime On-Street Parking Stress (06:00 – 20:00), by Area

Site	Area Characteristics				Parking Stress LB Richmond-upon-Thames Method (5.5m per bay)		Parking Stress Lambeth Method (5.0m per bay)	
	PTAL	CPZ	Car Ownership (vehs/dwelling)	% Car Drivers	Average	Maximum	Average	Maximum
2	4 - 5	D	0.78	26%	80%	96%	73%	88%
5	2 - 3	None	0.98	27%	88%	92%	80%	83%

Table 4-24 shows that high levels of daytime on-street parking stress are experienced at both sites. Average parking stress levels are slightly higher across the day at Site 5 (East Sheen) which has a lower PTAL, higher car ownership levels and is not subject to CPZ restrictions throughout the day compared to Site 2 (Twickenham). The proportion of residents that commute as a car driver is however similar between the two sites which suggests that a higher proportion of vehicles tend to remain parked outside of residents' houses at Site 5 (East Sheen) given the higher car ownership levels. A higher than average proportion of East Sheen residents also make use of public transport and cycling when compared to the remainder of the borough. These findings support those made on the overnight car parking beat surveys where it is considered that greater levels of off-street parking should be provided in areas which are situated outside of CPZs and are subject to moderate PTALs (2-3) due to the greater opportunities for utilising sustainable travel modes than compared to very poor PTAL areas (1a-1b).

SUMMARY

A figure providing a summary of the eight surveyed locations has been provided within Appendix O which provides a comparison between the following characteristics:

- **PTAL**
- **Car Ownership**
- **CPZ**
- **% Car Drivers (2011 Census Journey to Work Mode Share)**
- **Average overnight on-street parking stress.**

This indicates that (overnight) on-street parking stress levels tend to be lower in the least accessible areas despite higher car ownership levels, and that parking stress levels tend to be higher in the moderate PTAL areas (2-3) where there are either no or only limited CPZ restrictions during the daytime. Whilst parking stress is also moderate to high at the two most accessible sites (PTAL 5-6a), the CPZ restrictions have helped to reduce car ownership levels and control parking stress to some degree i.e. when compared to Sites 3 (St Margarets) and 5 (East Sheen).

Again, there are a range of other factors which influence on-street parking stress levels including housing density levels and the wider availability of both on-street and off-street parking. For example, it is considered that the high daytime on-street parking stress levels experienced at Site 5 (East Sheen) are partially attributed to the above average uptake of sustainable travel modes in this ward which results in a greater number of vehicles being left at home and therefore potentially being parked on-street.

4.12 Car Journeys

The following two documents have been reviewed to understand existing travel trends within London and how this relates to car journeys, emissions and environmental impacts including upon air quality:

- The 'Travel in London Key Trends and Developments' report (2009), TfL; and
- The 'London Travel Demand Survey' (LTDS) published in 2015.

Travel in London Key Trends and Developments (2009) states that travel distances and travel times are influenced by key variables such as personal preferences, the operation and performance of the transport networks and other travel characteristics such as travel mode and journey efficiency. The report states that in 2010/11, London residents travelled an average of 14.9km per day (based on an average seven day week), of which 5.0km was undertaken by car. The report further states that the average car trip is approximately 24-25 minutes in duration.

The LTDS calculates the distance between the origin and destination of a trip in a straight-line i.e. 'as the crow flies'. Although this tends to underestimate the actual distance travelled by each mode (by approximately 30%), this nonetheless provides an indication of approximate distances which can be used for comparative purposes. The LTDS states that journey lengths have remained relatively stable within Outer London within recent years and that the average journey distance of those travelling by car was 6.0km per day in 2013/14.

As demonstrated earlier within **Table 4-17**, the average daily two-way vehicular trip rate of the four most comparable sites is 1.726 per dwelling. Within LB Richmond-upon-Thames, the 2011 Census data indicates that there are a total of 184,098 residents living within 79,835 households which equates to an average of 2.31 residents per household. The average daily two-way vehicular trip rate for these four sites is therefore 0.748 per resident, or 0.374 for departures and 0.374 for arrivals. This is comparable to the 2011 Census 'Journey to Work' car driver mode share (35.7%) of residents within LB Richmond-upon-Thames. It can therefore be surmised that 60-65% of residents do not make any vehicular trips across the day with the remaining 35-40% of residents travelling an average of 6.0km by car each day i.e. 3.0km in each direction which could be the results of one or several vehicular trips.

On the above basis, it is considered that car journeys will tend to be lower at sites with higher PTALs and lower car ownership levels as these factors generally result in lower vehicular trip rates. As such, the level of car parking provided at new housing based on the residential parking standards should seek to restrain car ownership levels by not overproviding as this could otherwise increase car journeys.

4.13 Environmental (Air Quality)

This section explores the potential impacts of car journeys on the environment including air quality. All combustion processes, including those by motor engines, produce Oxides of Nitrogen (NOx) which convert to Nitrogen Dioxide (NO_2) when in the atmosphere. This can cause detrimental health effects including aggravating respiratory conditions such as asthma and causing inflammation of the airways. It is therefore important to consider the effects of road traffic on these pollutants which also include particulate matters (PM_{10} and $PM_{2.5}$) also referred to as fine particles.

In Greater London in 2008, 52,145 tonnes of NOx emissions were emitted including 32,466 tonnes (62%) as a result of ground-based transportation. Of these emissions, 24,340 tonnes of NOx emissions (47%) resulted from road transportation as illustrated below in **Figure 4-10**.

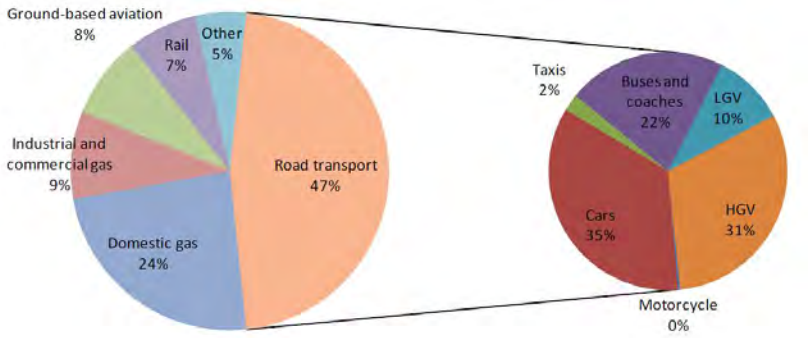


Figure 4-10: Basic source apportionment of NOx emissions in Greater London, contribution to 2008 annual total (Source: Greater London Authority, London Energy and Greenhouse Gas Inventory 2004/05 (Dec 2008)

Figure 4-10 suggests that 35% of road transport emissions are related to car transportation and as such, 17% of NOx emissions are caused as a result of car activity. This indicates that the residential parking standards should be considered in relation to car use and car journeys given the health and environmental implications highlighted.

Further to the above, carbon dioxide (CO_2) is also released from combustion processes and is considered to be a primary cause of climate change. Ground-based transport accounted for around 22% of Greater London's CO_2 emissions in 2006. TfL aims to reduce the impact of the transport networks on climate change by encouraging a modal shift away from vehicular travel modes, by using lower carbon fuels and technology and by managing business activities.

According to the GLA's 'London Energy and Greenhouse Gas Inventory (LEGGI) 2004/05' (December 2008), a total of 212 kilotonnes of CO_2 was emitted in LB Richmond-upon-Thames equating to 18% of total road transport emissions and 6.48 tonnes per capita for the resident population. The remaining 82% of road transport emissions therefore comprise other gases and particulate matters including NOx. Again, this suggests that increased car use and car journeys can contribute towards climate change which should also be considered.

4.14 Additional Considerations

The following explores several additional factors which need to be considered by the residential parking standards which has been informed by the OLC Fourth Report (May 2015) for Outer London where appropriate.

Congestion

Congestion levels in Outer London are forecast to increase by 15% by 2031 with an additional 300,000 vehicles forecast to be on London's roads based on current population increase projections. TfL's 'Residential Parking Provision in New Developments' (2012) identifies that an increase in parking provision is likely to lead to more people owning a car and therefore increase the likelihood of car usage and subsequently congestion. However, the OLC Fourth Report and the Mayor's IIA on the London Plan parking standards does not identify a clear link between car ownership and car usage, implying that even if increased parking provision leads to increased car ownership, this may not adversely impact congestion. These factors should be used to inform the residential parking standards.

Inappropriate Parking and Safety

An under-provision of parking can lead to overspill parking pressures and an adverse impact on the surrounding community. This problem has been recognised by a number of Outer London boroughs as identified within the OLC Fourth Report. Some boroughs have reported that development proposals with low levels of proposed parking provision can sometimes receive local opposition due to potential overspill issues. This was the case for Site E (Elmtree Road / Somerset Road) where the level of parking provision exceeded the maximum car parking standards in order to address

concerns raised during the public exhibition with regards to managing overspill parking on the surrounding residential streets. CPZs have also been identified as a useful tool for managing these issues and should therefore be considered alongside the residential parking standards.

Overspill parking onto the surrounding road network can have severe consequences for safety including for emergency vehicle access where this can be restricted particularly on already narrow streets. Inappropriately parked vehicles can restrict access to footways and result in pedestrians and wheelchair users (for example) having to enter the highway when negotiating these vehicles therefore putting themselves at risk. This can also create issues for children, those with visual impairments or health issues as well as for those crossing the road from between inappropriately parked vehicles where visibility between pedestrians and road users becomes reduced.

In relation to the above, the parking beat surveys revealed that areas which are situated outside of CPZs and experience higher levels of on-street parking stress are more likely to experience instances of inappropriate parking such as vehicles parking across dropped kerbs. Existing on-street parking stress levels should therefore be considered when examining new housing proposals in moderately accessible areas (PTAL 2-3) outside of CPZs so that more generous levels of off-street parking are provided in areas where these pressures are highest. This will therefore reduce potential parking overspill and the associated safety implications.

Enforcement

Details of Penalty Charge Notices (PCNs) have been provided by LB Richmond-upon-Thames as far as possible and at a borough-wide level as presented below in **Table 4-25**.

Table 4-25: Penalty Charge Notices Issued in LB Richmond-upon-Thames (January to April 2016)

Period	Number Issued
January 2016	6,065
February 2016	6,063
March 2016	6,129
April 2016	5,383
Total	23,940

Whilst this data is relatively limited, it does demonstrate that enforcement is being continually undertaken against inappropriate and illegal parking across the borough with just under an average of 200 PCNs being issued every day. This equates to approximately 10-11 PCNs being issued within each ward per day, although it would be expected that the majority of these are issued within those wards with CPZs particularly within Richmond and Twickenham town centres.

Table 4-22 also demonstrates that inappropriate and illegal parking is an ongoing issue and that high levels of parking stress within parts of the borough could be contributing towards this trend where vehicles are more likely to park inappropriately e.g. Site 5. Again, the use of CPZs and the enforcement of these restrictions is a key mechanism which should be considered alongside the residential parking standards for addressing issues relating to on-street parking stress and inappropriate parking. This is supported by the parking beat surveys where less inappropriate overnight parking was found within areas subject to CPZ restrictions which illustrates the effectiveness of enforcement even outside of the restricted periods.

4.15 Summary of Key Findings

LB RICHMOND-UPON-THAMES

- **LB Richmond-upon Thames is an Outer London borough and certain characteristics such as PTAL and car ownership levels vary considerably across different areas;**
- **There are a number of on-street parking issues across the borough which relate to limited on-street and off-street parking provision and availability, high car ownership levels, population increase and commuter parking;**
- **Car ownership levels are above the Outer London average where 76% households own at least one vehicle;**
- **The borough typically has a PTAL ranging 1-3 (approximate 90% coverage) with an average PTAL of 2 (Poor). Richmond and Twickenham town centres have the highest PTALs 4-6;**
- **Approximately 68% dwellings are in owner occupation and approximately 22% dwellings are owned houses within 5 or more rooms;**
- **There has been a reduction in the proportion of dwellings comprising houses, larger dwellings and owned households;**
- **The 2011 Census 'Journey to Work' mode share for LB Richmond-upon-Thames indicates that the car driver mode share has reduced in recent years with a higher proportion of residents making use of public transport;**
- **There has been a significant increase in the proportion of residents commuting by bicycle;**
- **Car usage levels have decreased in recent years and at a greater rate than the reduction in car ownership levels which indicates that residents may be using their vehicles less; and**
- **The greater uptake of sustainable travel modes can result in higher levels of daytime on-street parking stress at certain locations e.g. at East Sheen as identified by the surveys.**

GENERAL TRENDS

- **Residents are more likely to commute by car if they own a vehicle;**
- **The proportion of households with one or more vehicles tends to decrease as PTAL increases, which is a clear trend for Inner London, Outer London and LB Richmond-upon-Thames;**
- **Average car ownership (vehicles/dwelling) also tends to decrease as PTAL increases; and**
- **Car ownership levels tend to be lower in CPZs where on-street parking availability is restricted at various times during the day.**

CPZS AND CAR CLUBS

- **Approximately 30% residents live within CPZs which tend to be situated in town centre locations and in areas with higher PTALs;**
- **Car ownership levels tend to be lower in CPZs;**
- **There are a total of 77 car club vehicles across the borough and there has been an increasing level of car club membership and vehicle utilisation levels over recent years;**
- **The majority of car club vehicles are situated in areas with high CPZ coverage which suggests that demand levels are higher where there are greater restrictions on car ownership; and**
- **Each car club vehicle replaces approximately 22 vehicles within the borough on average, and have reduced average car ownership levels by 0.03 vehicles/dwelling.**

RECENTLY COMPLETED HOUSING DEVELOPMENTS

- **The average number of car parking spaces provided at each of the sites tends to be comparable with the anticipated car ownership levels based on housing size, type and tenure;**
- **Four sites have provided parking towards or at the upper end of the maximum parking standards which reflects PTAL and anticipated car ownership levels at these sites;**
- **Two sites have provided parking either in excess, or far below the maximum standards to reflect local characteristics. Insufficient parking may have been provided at the latter which could have resulted in overspill parking;**
- **The two-way vehicular trip rates were highest at sites with larger dwellings situated outside of CPZs and lowest at sites which comprised smaller units with either lower anticipated car ownership levels or a higher PTAL;**
- **No apparent relationship has been identified between the estimated proportion of households having access to a car and the vehicular trip rates which is likely to be due to the range of other influencing factors such as car ownership and PTAL;**
- **The disabled parking provision at each of the sites is in line with both the London Plan and the LB Richmond-upon-Thames car parking standards; and**
- **All six sites provided cycle parking either in accordance with or above the minimum LB Richmond-upon-Thames cycle parking standards based on the supporting documents.**

PARKING BEAT SURVEYS

- **High levels of overnight on-street parking stress were recorded at three of the sites, with Site 3 being classified as over-capacity. High levels of daytime on-street parking stress were also recorded at the two surveyed sites;**
- **Overnight on-street parking stress tends to be higher in areas with moderate PTAL (2-3) based on the eight surveyed sites;**
- **Overnight on-street parking stress tends to lower in the least accessible areas (PTAL 1a-2) where there is a wider availability of both on-street and off-street parking (despite higher car ownership levels);**
- **CPZ restrictions can be effective at reducing on-street parking stress levels in the most accessible areas (PTAL 5-6a) where parking availability is reduced;**
- **There is no clear direct trend between car ownership levels and overnight on-street parking stress at the eight sites surveyed which suggests that parking stress is mainly affected by the type and availability of parking provision in the surrounding area;**
- **Slightly higher average daytime on-street parking stress levels were found where PTALs were lower, car ownership levels were higher and in areas outside of CPZs. This is also affected by the uptake of sustainable travel modes where cars are left at home and therefore potentially parked on-street;**
- **High levels of on-street parking stress in areas outside of CPZs can contribute to increased levels of inappropriate parking and therefore other issues such as congestion and safety implications; and**
- **The majority of disabled parking bays are in use based on the eight sites surveyed.**

CONCLUSION

- **Car ownership levels are related to a variety of different factors including PTAL, household size, type and tenure, as well as CPZs and car club membership levels;**
- **Higher levels of off-street parking should be provided in areas which have moderate PTALs (2-3) and are not subject to CPZ restrictions during the day;**
- **Appropriate levels of off-street parking should continue to be provided within areas subject to daytime CPZ restrictions, which could comprise car-free developments in the most accessible locations;**
- **The residential parking standards should consider the potential to reduce car journeys, associated car mileage and environmental impacts; and**
- **Additional factors relating to car journeys, air quality, congestion, inappropriate parking, safety and enforcement also need to be considered.**

5 Residential Parking Standards Options Analysis

5.1 Introduction

This section examines the potential impacts of three different residential parking standard options on future parking conditions across the borough and other transport characteristics based on the evidence base collated as part of this study. The three options have been assessed using an integrated and objectives-led approach to consider these potential impacts collectively with the overall objective of minimising the impact of parking and car based travel on the operation of the road network and on the local environment.

The assessment has been used as a comparative tool to identify a preferred option which is considered to offer a balanced outcome. The assessment has been informed by the Borough's planning and housing context including the current minimum annual housing target of 315 homes per annum (set out in the London Plan) and the need to make the best use of land. The analysis reflects the constrained nature of on-street parking and high car ownership levels in parts of the borough.

5.2 Options and Scope of Analysis

The three options have been designed to examine residential car parking within LB Richmond-upon-Thames with a particular focus on areas subject to lower PTALs and therefore lower levels of accessibility. The following three options have been explored:

1. LB Richmond-upon-Thames's current parking standards, as set out in Appendix 4 of the Development Management Plan;
2. The adopted London Plan standards (set out in the MALP) which allows a more flexible approach in areas of PTAL 1a-1b, with limited parts in PTAL 2; and
3. A new set of standards, which provide a more flexible approach in areas of PTAL 1a-2, with limited parts in PTAL 3.

In all cases, car-free housing developments may be considered to be appropriate in the most accessible areas of the borough with a PTAL 5-6a subject to providing adequate disabled parking (in line with the standards), appropriate servicing arrangements and without contributing towards existing on-street parking stress in the locality.

The effects of the recommendations and potential policy alterations may change over time and the temporal effects have been considered for the short-term (within the first five years of implementation considered to be 2021), the medium-term (between five to 15 years) and the long-term (beyond 15 years) where relevant. It should be noted that there is less certainty associated with the longer term projections.

5.3 Objectives

A series of objectives have been established to assess the overall potential effects of the three options. These have been developed in consultation with LB Richmond-upon-Thames and provide a range of topic areas to inform the recommendations on the standards. The objectives also provide a framework for assessing the three options in a consistent manner. The following objectives have been identified:

1. To encourage travel by **sustainable travel modes** i.e. walking, cycling and public transport, to maximise the **health and well-being** of the population. To achieve this objective, the option will be required to **increase** trips made by these modes relative to the other two options;
2. To reduce **car dependency** and the associated **environmental implications**. To achieve this objective, the option will be required to result in the following relative to the other two options:
    a. **Reduce** car ownership levels and therefore the associated parking demand, which could partially be achieved by increasing car club membership levels;
    b. **Reduce** car journeys and therefore the total mileage of residents within the borough; and
    c. **Improve** air quality by reducing vehicular emissions;
3. To improve conditions on the **local highway network**. To achieve this objective, the option will be required to result in the following relative to the other two options:
    a. **Reduce** overspill parking and therefore on-street parking stress levels , particularly in areas where these pressures are highest;

b. **Reduce** inappropriate parking e.g. across dropped kerbs, or illegal parking e.g. within CPZs; and

c. **Improve** highway safety for all users including pedestrians and wheelchair users.

As identified above, each option will be assessed in terms of the extent to which they would be considered to achieve each objective relative to the other two options. This comparative and objectives-led approach has been designed to provide a qualitative assessment so that a preferred option can be more easily identified, rather than deriving quantitative values against each objective.

A few supplementary objectives have also been identified which will need to be achieved through a combination of the residential parking standards and the master-planning of residential developments. These are as follows:

- To cater for **all user types**, including residents of wheelchair accessible units by providing sufficient disabled parking;
- To encourage **cycling** as a main mode of travel by providing sufficient levels of cycle parking; and
- To reduce the level of **land take** required by parking within new developments (and therefore within the borough) with the aim to improve the public realm.

The supplementary objectives have been examined in relation to the preferred option as these do not directly affect the analysis of the three options which focus on the level of standard car parking bay provision, as opposed to disabled parking, cycle parking or the internal site layout of new developments.

5.4 Policy Options

The analysis will determine whether there is a justification to support the retention of the existing parking standards, the adoption of the London Plan standards, or the introduction of a new set of local standards based on the collective assessment of a series of objectives which have been set out previously. The potential recommendations are therefore as follows:

- To retain the existing LB Richmond-upon-Thames residential car parking standards;
- To include a policy alteration to:
    - Encourage more flexibility in PTALs 1a-1b, with limited parts of PTAL 2; or
    - Encourage more flexibility in PTALs 1a-2, with limited parts of PTAL 3.

The assessment has been informed by the scoring system set out in **Table 5-1**. This has been based on the system which was used to inform the Mayor's IIA of the London Plan parking standards for consistency (see **Chapter 3.0** for further details).

Table 5-1: Assessment Scoring System

Score	Symbol	Summary
Major positive effect	+ +	The option would contribute significantly towards the achievement of the objective compared to the other two options
Minor positive effect	+	The option would contribute towards the achievement of the objective, but not significantly when compared to the other two options
No effects	0	The option would have a limited effect on the achievement of the objective when compared to the other two options
Minor negative effect	-	The option would detract from the achievement of the objective, but not significantly when compared to the other two options
Major negative effect	- -	The option would detract significantly from the achievement of the objective compared to the other two options
Uncertain effect	?	The option would have an uncertain effect on the achievement of the objective compared to the other two options e.g. if insufficient information is available

5.5 Future Baseline Conditions

To further inform the analysis of the three options, the projected changes in the future baseline conditions of the borough has been examined to determine how certain characteristics are likely to vary in the short, medium and long-term. The main implications of these changes will relate to the less accessible parts of LB Richmond-upon-Thames (particularly those in areas of PTAL 1a-2) given that this is where the differences in the three options are focused. The projections have been informed by the recent trends set out within **Chapter 4.0** where appropriate.

PTAL

The anticipated future PTALs across LB Richmond-upon-Thames have been derived using the TfL Web-based Connectivity Assessment Toolkit (WebCAT) which provides an indication of the connectivity of different parts of the borough to the public transport network. This information is currently forecasted to 2021 and 2031, although there are currently no projected PTAL differences between these scenarios. As such, the anticipated changes in PTAL have been examined for the short-term up to 2021 as set out in **Table 5-2**. The supporting calculations are again held in **Appendix G**.

Table 5-2: Forecast PTAL Increase within LB Richmond-upon-Thames (2011 to 2021)

Ward	Description	Average PTAL (Populated Areas)	
		Base (2011)	Forecast (2021)
South Richmond	+ High PTAL Areas	4.1	4.5 (**+0.4**)
North Richmond	+ Med/High PTAL Areas	3.3	3.7 (**+0.4**)
Twickenham Riverside	+ Med/High PTAL Areas	3.2	3.4 (**+0.2**)
South Twickenham	-	2.4	2.4
Mortlake and Barnes Common	+ Med PTAL Areas	2.3	2.6 (**+0.3**)
Kew	+ Med PTAL Areas	2.3	3.0 (**+0.7**)
Teddington	-	2.2	2.2
Barnes	+ Med PTAL Areas	2.2	2.3 (**+0.1**)
Fulwell and Hampton Hill	-	2.0	2.0
St Margarets and North Twickenham	-	2.0	2.0
West Twickenham	-	1.9	1.9
Hampton Wick	-	1.6	1.6
East Sheen	+ Med PTAL Areas	1.5	1.6 (**+0.1**)
Whitton	-	1.4	1.4
Hampton	-	1.3	1.3
Hampton North	-	1.2	1.2
Heathfield	-	1.1	1.1
Ham, Petersham and Richmond Riverside	-	1.1	1.1
Borough-Wide	**-**	**2.1**	**2.2 (+0.1)**

The projected short-term PTAL increases are related to the following:

- Increase in the number and/or frequency of rail services which serve stations across the borough including at Richmond, Twickenham, Kew Gardens and Barnes stations; and
- Increase in the number and/or frequency of bus services across the borough including within the town centre locations and along the South Circular Road.

The results in **Table 5-2** indicate that the most accessible parts of the borough are anticipated to become more accessible by public transport, whilst there will be limited change within the least accessible parts. Kew has been identified to experience the greatest estimated PTAL improvement with a typical PTAL increase from 2-3 to 3-4. As such, it is considered that there will be more areas subject to a moderate PTAL of 3 and fewer areas subject to a poor PTAL of 2 in the short-term, which is likely to carry through into the medium and long-term. The new set of standards explored under Option 3 will therefore apply to a larger proportion of the borough going forward, whilst Option 2 will apply to a smaller proportion of the borough, albeit still covering the majority.

Mode Share

The recent changes in the Census Journey to Work mode share and therefore travel patterns of residents within LB Richmond-upon-Thames have been set out within **Section 4.7**. Based on these findings, the following continued trends have been projected for the future short, medium and long-term:

- Continued increase in the proportion and therefore number of residents making use of public transport (which will be supported by the projected increase in the PTAL of certain areas);
- Continued increase in the proportion and number of residents walking and cycling (which has been considered with regards to the cycle parking standards);
- Reduction in the proportion and number of residents travelling by car (both as a car driver and passenger); and
- A greater reduction in car use compared to car ownership resulting in a higher demand for vehicles to remain parked within residential areas across the day.

These trends relate mainly to the first two objectives (see **Section 5.3**) where sustainable travel patterns are projected to increase across the borough and dependence on car travel is projected to decrease regardless of which of the three options are implemented. This furthermore indicates that whilst the options are likely to have a greater influence over car ownership levels, they are less likely to affect car use and therefore car journeys.

Housing

The future Housing Land Supply for the borough has been used to identify the approximate capacities for the delivery of dwellings between 2016 and 2026. This has been separated to between 2016 to 2021 (short-term) and 2016 to 2026 (medium-term) as set out in **Table 5-3** below.

Table 5-3: Estimated LB Richmond-upon-Thames Future Housing Land Supply by Five Year Periods

Area (and wards)	Total Housing (Major and Minor Developments)		
	2016 to 2021	2021 to 2026	Total
Richmond	**672**	**532**	**1,204**
South Richmond	101	18	119
North Richmond	209	329	538
Ham, Petersham and Richmond Riverside	156	123	279
Kew	206	62	268
Twickenham	**741**	**539**	**1,280**
Twickenham Riverside	168	187	355
St. Margarets & North Twickenham	470	136	606
South Twickenham	72	180	252
West Twickenham	31	37	68
Teddington and Hampton	**569**	**360**	**929**
Hampton North	28	33	61
Hampton	97	109	206
Fulwell and Hampton Hill	51	110	161
Teddington	314	98	412
Hampton Wick	79	9	88
East Sheen	**105**	**373**	**478**
East Sheen	16	29	45
Mortlake and Barnes Common	90	345	435
Barnes	-1	-1	-2
Whitton	**67**	**71**	**138**
Whitton	8	29	37
Heathfield	59	41	100
Total	**2,154**	**1,875**	**4,029**

The housing trajectory in the AMR assumes fairly constant delivery, although the proportion of large sites within individual years can fluctuate. Again, the projections will result in the London Plan target of 3,150 dwellings being exceeded by 879 dwellings over the ten year period. The housing trajectory presented in **Table 5-3** has been separated by PTAL based on the ranges presented earlier within **Table 4-3** for each ward. The results are shown in **Table 5-4**.

Table 5-4: Housing Trajectory by PTAL

PTAL Range	Total Housing (2016-2026)	Proportion (%)
4 to 6	119	3%
3 to 5	893	22%
2 to 3	1,366	34%
2	767	19%
1 to 2	444	11%
1	440	11%
Total	**4,029**	**100%**

Table 5-4 shows that approximately 75% of dwellings are anticipated to be delivered in less accessible areas (up to PTAL 3), whilst 25% will be delivered in areas with moderate to excellent PTAL.

Based on the analysis of Census data from 2001 and 2011, in relation to the size, type and tenure of households across the borough as set out within **Section 4.7**, it could be assumed that there will be a continued overall reduction in the proportion of dwellings comprising houses, larger dwellings and owned households. However, since the adoption of the Development Management Plan in 2011, policies generally encourage family housing except in more sustainable locations such as town centres and higher PTAL areas where a higher proportion of smaller units would be expected. New additions to the housing stock are relatively small in proportion and it is therefore unclear how this trend will continue.

Car Clubs

As set out in **Section 4.10**, there are a total of 77 car club vehicles within the borough with an increasing level of both car club membership and vehicle utilisation levels in recent years. The majority of car club vehicles are situated within CPZs where there are greater restrictions on car ownership. Each car club vehicle has currently replaced an average of 22 private vehicles within LB Richmond-upon-Thames based on those subsequently sold by members. It is anticipated that car club membership levels will continue to increase in the future and the option which will result in lower car ownership levels (compared to the other two options) will further contribute to this trend. Nonetheless, the scope for each of the three options to influence car club membership levels will be limited given that the differences focus on the lower PTAL areas where there is less opportunity to make use of car club vehicles i.e. compared to the CPZs where the majority of car club vehicles are situated and car ownership levels are already lower.

Car Ownership

Average car ownership levels across the borough have decreased in recent years and this trend is expected to continue within LB Richmond-upon-Thames as a result of (and not limited to) the following:

- A projected increase in future PTALs (particularly in the most accessible parts of the borough), increasing opportunities to travel by public transport;
- A projected reduction in the number and proportion of residents travelling by car; and
- A projected increase in car club provision and membership levels.

Based on the patterns set out within **Section 4.4**, the following trends have been projected for the future short, medium and long-term:

- A minimal change in car ownership levels for areas with PTALs 1a-1b;
- A minor decrease in car ownership levels for areas with PTALs 2-3; and
- A minor decrease in car ownership levels for areas with PTALs 4-6.

As such, it is considered that the ability to reduce car ownership levels within PTALs 1a-1b through the standards will have a greater benefit than elsewhere within the borough given the decreasing trend. Nonetheless, other issues such as on-street parking stress need to be considered when determining where best to reduce car ownership levels.

5.6 Assessment of Options

The assessment of the three options against each of the objectives set out in **Section 5.3** has been set out in **Table 5-5** overleaf. This has been designed to provide both a qualitative assessment and a consistent approach with the Mayor's IIA of the London Plan parking standards.

Table 5-5: Residential Parking Standard Options Assessment

Objective	Option 1 LB Richmond-upon-Thames's current parking standards	Option 2 The adopted London Plan standards – added flexibility in areas of PTAL 1a-1b, with limited parts in PTAL 2	Option 3 A new set of standards – added flexibility in areas of PTAL 1a-2, with limited parts in PTAL 3
	The parking standards will influence travel by sustainable travel modes by affecting the levels of off-street car parking provision provided at new housing developments. Car free housing developments may be appropriate in areas with a PTAL of 5 or 6 subject to the provision of disabled parking, appropriate servicing arrangements and demonstrating that controls will be in place to ensure that the development will not contribute to on-street parking stress. The parking standards are also maximum standards in line with the NPPF and the London Plan. It is therefore considered that each of the three options will be **inherently in favour of sustainable travel** which is seen as an important issue by local residents. The uptake of sustainable travel modes will be affected by a range of other factors such as the availability of public transport (informed by PTAL), the minimum cycle parking standards (and therefore cycle parking availability) as well as pedestrian and cycle facilities. A high proportion of residents across the borough already make use of sustainable travel modes which is projected to increase in the short-term (based on recent trends and the projected increase in moderate PTAL 3). The parking standards will therefore **support these trends**, rather than being the leading factor for influencing sustainable travel. The standards are projected to have a similar influence on sustainable transport in the medium and long-term given the relatively stable housing projections between 2016 and 2026. There are however fewer known details surrounding any further borough-wide PTAL improvements beyond 2021.		
1. To encourage travel by **sustainable travel modes** i.e. walking, cycling and public transport, to maximise the **health and well-being** of the population. To achieve this objective, the option will be required to **increase** trips made by these modes relative to the other two options.	This option is likely to favour sustainable transport by not over-providing off-street provision at new housing developments. This will therefore encourage modal shift and promote sustainable travel. This will have less of a benefit in the least accessible areas where residents are more dependent on car travel due to the limited opportunities to make use of public transport. **Minor positive effect**	This option is likely to favour sustainable transport by not over-providing off-street provision at new housing developments in the majority of locations. Although additional off-street provision will be made within the least accessible parts of the borough, the potential to make use of sustainable travel modes is more limited at these locations and will be less likely to be influenced by the parking standards. Nonetheless, it is considered that some parts of the borough are in reality more accessible than indicated by the PTAL and that sustainable travel may be discouraged where more generous standards are applied in areas with PTAL 2. This will however be offset by PTAL improvements across the borough and the application of more flexible standards will also be determined by other local characteristics such as on-street parking stress, rather than just applying a blanket-approach. **Minor positive effect**	This option is likely to have a minimal overall influence on travel by sustainable transport. The option will be in favour of sustainable travel by not over-providing off-street provision in the most accessible locations, but could discourage the use of sustainable transport modes within the moderately accessible areas (PTAL 3) or within certain pockets of PTAL 2 where accessibility is higher in reality. However, this will be offset by PTAL improvements across the borough and again, other local characteristics will also need to be considered before applying the more flexible standards, as opposed to just applying the more flexible standards across all areas. Furthermore, residents may be more comfortable leaving their car at home and utilising other travel modes given that these will be more likely to be parked on-site. **Neutral effect**

Objective	Option 1 LB Richmond-upon-Thames's current parking standards	Option 2 The adopted London Plan standards – added flexibility in areas of PTAL 1a-1b, with limited parts in PTAL 2	Option 3 A new set of standards – added flexibility in areas of PTAL 1a-2, with limited parts in PTAL 3
2. To **reduce car dependency** and the associated **environmental implications**. To achieve this objective, the option will be required to result in the following relative to the other two options: a. **Reduce** car ownership levels and therefore the associated parking demand, which could partially be achieved by increasing car club membership levels; b. **Reduce** car journeys and therefore the total mileage of residents within the borough; and c. **Improve** air quality by reducing vehicular emissions;	Car ownership levels are above the Outer London average in LB Richmond-upon-Thames. The parking standards will influence car ownership levels by affecting the levels of off-street car parking provision provided at new housing developments. Again, the parking standards are maximum standards. Car-free developments may be appropriate in areas with a PTAL of 5 or 6, such as in town centre locations, and where controls are in place to ensure the development does not contribute to on-street parking e.g. within a CPZ. It is therefore considered that all three options will be **inherently in favour of restricting car ownership levels (at least in the most accessible locations)** and encouraging the use of car clubs at these locations. Car ownership levels have slightly reduced in recent years, with a much higher reduction in the proportion of residents commuting as a car driver. This suggests that whilst car parking availability has an influence on car ownership levels, there is less of a clear trend between parking availability and car use. Furthermore, vehicles are more frequently being left outside of residential properties during the day, as residents commute by alternative modes of travel (whilst still owning a car). This highlights the importance of other measures which can be implemented to manage parking and influence car ownership levels in residential and high street such as parking restrictions including CPZs and encouraging membership to car clubs. Future dependence on private car travel is projected to further decrease in the short-term due to the projected PTAL improvements and increase in car club membership levels which will further reduce (and also result from) reduced car ownership. It is therefore considered that the type of parking provision (on-street v off-street) is just as important as the overall availability of provision given the increasing parking demand in residential areas. Whilst the parking standards will influence car ownership levels, there is **less opportunity** for these to affect car journeys and therefore the associated implications of vehicular emissions and impacts on air quality.		
	This option is likely to reduce car ownership levels by limiting off-street car parking provision at new housing developments. This will therefore reduce overall parking demand but is likely to result in additional vehicles being parked on-street i.e. as there will be less potential for these vehicles to be accommodated on-site. Car journeys and associated emissions are also anticipated to be lower for this option but to a lesser degree than car ownership. The associated medium and long-term benefits to air quality may be partially offset by increased on-street parking stress and inappropriate parking which could increase localised congestion levels and journey times. The extent to which this option can reduce car dependency and associated environmental implications will therefore be limited. **Neutral effect**	This option is likely to reduce car ownership levels across the majority of locations by limiting off-street car parking provision at new housing developments. Additional off-street provision will however be made available within certain less accessible parts (PTAL 1a-1b) of the borough which could increase car ownership levels. It is anticipated that the potential subsequent increase in car journeys (and emissions) will be limited given the existing reliance on vehicular travel modes within these areas. This option will also potentially address on-street parking pressures and localised congestion levels in the most constrained areas by providing additional off-street parking. Nonetheless, car dependency and the associated environmental implications will be likely to increase albeit to a limited degree. **Minor negative effect**	This option is likely to have a minimal overall influence on car ownership levels as whilst off-street car parking provision will be limited in the most accessible locations, higher car ownership may be encouraged in the less accessible areas (PTAL 1a-2) where greater levels of off-street provision are provided. This option has the most potential to reduce localised congestion resulting from on-street parking stress and inappropriate parking which will partially offset the air quality implications of additional car journeys and emissions. These issues will however still be worsened on the whole given that the more generous parking standards would apply to the majority of the borough. This will again be limited nonetheless, given that the standards will have less potential to influence car use compared to car ownership. Furthermore, this option will seek to re-balance parking availability in favour of off-street provision at the most pressured locations, rather than encouraging increased car ownership through over-providing. **Minor negative effect**

Objective	Option 1 LB Richmond-upon-Thames's current parking standards	Option 2 The adopted London Plan standards – added flexibility in areas of PTAL 1a-1b, with limited parts in PTAL 2	Option 3 A new set of standards – added flexibility in areas of PTAL 1a-2, with limited parts in PTAL 3
3. To improve conditions on the **local highway network**. To achieve this objective, the option will be required to result in the following relative to the other two options: a. **Reduce** overspill parking and therefore on-street parking stress levels , particularly in areas where these pressures are highest; b. **Reduce** inappropriate parking e.g. across dropped kerbs, or illegal parking e.g. within CPZs; and c. **Improve** highway safety for all users including pedestrians and wheelchair users.	LB Richmond-upon-Thames experiences high levels of on-street parking stress within certain areas. The parking beat surveys demonstrate that pressures tend to be highest within moderately accessible areas (PTAL 2-3) that are situated outside of CPZs which suggests that there is **insufficient off-street parking availability at these locations which can be directly related to the existing parking standards**. Parking pressures tend to be lower in the most accessible areas of the borough e.g. town centres, due to the operation of CPZs, better opportunities to utilise public transport, higher uptake or car clubs and opportunities for car-free developments where appropriate, which have all helped to reduce car ownership levels. Parking pressures tend to be lowest in the least accessible parts of the borough (PTAL 1a-1b) where there is a greater availability of on-street and off-street parking. The surveys undertaken at the recently completed housing developments revealed that car parking tends to be provided towards the upper end of the maximum standards. Nonetheless, it is suspected that insufficient parking was provided at one of the sites which may have resulted in overspill parking. There is a particular need for the parking standards to avoid contributing towards existing parking pressures and overspill parking due to the associated implications such as inappropriate parking and reduced highway safety. Whilst borough-wide car ownership levels have been falling and are continued to be expected to do so, the overall number of owned vehicles will increase. Furthermore, car use (for commuting purposes) has been shown to be falling at a greater rate than car ownership which suggests that parking levels have conversely been increasing in residential areas (particularly PTAL 2-3) as residents utilise alternative modes to travel to work whilst continuing to own a vehicle. The projected increase in car club membership levels has the potential to reduce car ownership in the most accessible parts of the borough, but to a much more limited extent within the poorest areas (PTAL 1a-1b).		
	This option will continue to exacerbate on-street parking pressures across the borough particularly in the moderately accessible areas (PTAL 2-3) outside of CPZs where existing pressures have been found to be highest. Whilst some flexibility is permitted for larger households outside of CPZs, this will have limited scope to ease pressures in the areas where higher density developments are proposed with smaller units. Furthermore, whilst car ownership levels may be reduced by limiting off-street provision, this option is the most likely to contribute towards additional overspill parking, inappropriate parking and associated safety concerns. This option will therefore be expected to cause significant harm to conditions on the local highway network. **Major negative effect**	This option will allow more flexibility in the limited areas of PTAL 2 where on-street parking pressures have been found to exist. This will therefore help to re-balance parking in favour of off-street parking provision so that overspill and inappropriate parking can be prevented to thereby ease any existing safety concerns. Whilst car ownership levels could increase at these locations, any additional vehicles would be expected to be accommodated on-site so as not to increase local on-street parking pressures. There is also currently wider parking availability in the less accessible areas (PTAL 1a-1b) where on-street parking stress levels are lowest. The scope of this option is however limited as this will not prevent a deterioration in local highway conditions within all of the moderately accessible areas (PTAL 2-3) where the highest on-street parking pressures have been observed. This option will therefore have benefits in certain areas, whilst continuing to cause pressures in others. **Neutral effect**	This option will benefit local highway conditions by allowing greater flexibility in off-street car parking provision for new housing situated in areas where the greatest on-street parking pressures currently exist (PTAL 2-3, outside of CPZs). Therefore, whilst car ownership levels may increase, these additional vehicles would be expected to be accommodated on-site. Increased car ownership levels may also be partially offset in these areas through anticipated improvements to public transport accessibility and increased car club membership. The wider parking availability in the less accessible areas (PTAL 1a-1b) will also be retained so that new pressures are not introduced. As such, this option will be expected to significantly reduce instances of inappropriate parking and the associated safety concerns compared to the other two options. The maximum standards will continue to restrict parking availability within the most accessible parts of the borough to deter car ownership. **Major positive effect**

5.7 Preferred Option

Table 5-6 below presents a summary of the effects of the three options against each of the objectives. This has been informed by the qualitative comparative scoring system set out earlier within **Section 5.4**.

Table 5-6: Assessment Summary

Option		Objective			Overall Score
		Sustainable Travel	Car Dependency & the Environment	Local Highway Network	
1	LB Richmond-upon-Thames's current parking standards	+	0	- -	-
2	The adopted London Plan standards – added flexibility in areas of PTAL 1a-1b, with limited parts in PTAL 2	+	-	0	0
3	**A new set of standards – added flexibility in areas of PTAL 1a-2, with limited parts in PTAL 3**	**0**	-	+ +	+

Table 5-6 shows that each option is anticipated to have a mixture of positive and negative effects based on the three key objectives examined as part of the study. The existing parking standards are anticipated to have the least overall benefits as although this will favour sustainable transport, it is expected to significantly harm conditions on the local highway network compared to the other two options. The adopted London Plan standards are anticipated to have a balanced outcome by again favouring sustainable transport but increasing car dependency and environmental implications. The new set of standards are expected to result in the greatest net benefits compared to the other two options as although this will increase car dependency and environmental implications, this will significantly favour the local highway network by reducing on-street parking pressures and improving highway safety. **Option 3 (a new set of standards) therefore forms the preferred option of this study**.

In light of the above, the preferred option and therefore the proposed policy alteration to encourage more flexibility in PTALs 1a-2, with limited parts of PTAL 3 within LB Richmond-upon-Thames where the majority of housing will be delivered (see **Table 5.4**). The preferred option has been assessed to be generally positive for the local highway network but slightly negative for environmental outcomes. The environmental impacts will be limited and can be mitigated through (and not limited to) the following means:

- The added flexibility should be applied on a case-by-case basis (considering other factors such as on-street parking stress for example) rather than as a blanket-wide approach for all new developments within PTAL 1a-2, with limited parts of 3;
- The parking standards will continue to be maximum standards and car-free developments may be appropriate in areas of PTAL 5 or 6, for example in town centre locations including within CPZs. This will restrict car ownership and the associated car journeys and vehicular emissions in these locations;
- The added flexibility will re-balance parking in favour of off-street parking and may not necessarily increase car emissions and environmental impacts given that these vehicles may have otherwise been parked on-street;
- Whilst car parking availability has an influence on car ownership levels, this will not necessarily result in an increase in car journeys and vehicular emissions as residents may still choose to travel by alternative means, but it would provide local residents with the flexibility and potential of owning a car;
- Furthermore, future dependence on private car travel is projected to decrease due to projected PTAL improvements and increases in car club membership levels which will help to offset any additional car journeys made as a result of the more flexible standards;
- Additional measures such as CPZs and encouraging car club membership can continue to be used to manage parking and reduce car ownership levels particularly in areas with PTAL 3+; and
- Additional trips by sustainable travel modes can be encouraged through the cycle parking standards which are explored in the next section. This will further help to reduce car dependency and the associated environmental impacts.

5.8 Supplementary Objectives

The following sets out details of the supplementary objectives which have been considered alongside the analysis of the three options. These have been examined separately given that they are applicable to all three options and will therefore support the recommendations.

Blue Badge Parking

The first supplementary objective seeks for the standards to cater for all user types, including residents of wheelchair accessible units by providing sufficient disabled parking. The London Plan requires 10% of new housing to be wheelchair accessible or easily adaptable to become wheelchair accessible if needed and refers to the Mayor of London's Housing SPG (March 2016) which requires each wheelchair accessible unit to have an associated blue badge parking bay. This therefore equates to a minimum of 10% blue badge parking bays provided at a new development based on the number of dwellings, even for car-free schemes. The LB Richmond-upon-Thames blue badge parking requirements are in line with the London Plan requirements, where blue badge parking provided in support of new housing should be equivalent to at least 10% of overall dwellings, or provided at a 1:1 ratio with wheelchair accessible units.

New housing should always be supported by a suitable level of blue badge parking and as previously demonstrated; the six surveyed sites all provided disabled parking in line with the London Plan requirements and therefore the LB Richmond-upon-Thames car parking standards. The summary has been re-presented in **Table 5-7** below.

Table 5-7: Disabled Parking Provision and Recently Completed Housing Developments

Site Reference	Wheelchair Accessible Units	Total Car Parking Provided	Disabled Car Parking Provided	Disabled Parking as Proportion of Total	Disabled Car Parking Spaces per Wheelchair Accessible Unit
A	3	20	3	15.0%	1.0
B	7	68	7	10.3%	1.0
C	6	31	6	19.4%	1.0
D	*Unknown*	18	1	5.6%	*Unknown*
E	10	85	10	11.8%	1.0
F	9	94	9	9.6%	1.0

It is recognised that some authorities do not request that disabled parking is provided on a 1:1 basis for wheelchair accessible homes, as this can lead to considerable overprovisions of these facilities. The London Borough of Tower Hamlets for example require in their Core Strategy and Development Control Plan (2007) that disabled parking is provided, as a minimum, as either two spaces or 10% of the total parking provision whichever is greater. This is instead of providing one space per dwelling, where it is often assumed that 10% of the total housing provision will be wheelchair accessible. From experience, it can be possible to identify additional spaces above this provision level which can be provided to accessible standards but not marked as such, so that these can be easily converted to disabled spaces later on, should there be sufficient demand.

On the basis of the above, a reduced level of disabled provision would have been provided at Sites A, C and E if only 10% of the total parking provision had been provided, whilst a similar level of provision would have been made at Sites B and F (with unknown details for Site D). It is therefore considered that the current residential blue badge parking requirements are appropriate particularly given that the overnight parking beat surveys demonstrated that the majority of on-street disabled parking bays were in use across the eight surveyed areas and that there is therefore a need for new housing to provide a sufficient level of disabled parking to meet the needs of all users.

Cycle Parking

The second supplementary objective seeks to encourage cycling as a main mode of travel by providing sufficient levels of cycle parking through the standards. The LB Richmond-upon-Thames and London Plan minimum cycle parking standards are presented in **Tables 5-8** and **5-9** respectively.

Table 5-8: LB Richmond-upon-Thames Minimum Residential Cycle Parking Standards

Number of Bedrooms	Number of Spaces
1-2	1
3	1
4+	2

Table 5-9: London Plan Minimum Residential Cycle Parking Standards

Number of Bedrooms	Number of Spaces
1	1
2+	2

Table 5-9 demonstrates that the London Plan standards are more generous than the current LB Richmond-upon-Thames guidelines. The proportion (and therefore number) of residents cycling within the borough has significantly increased over recent years. Therefore, in order to continue to support this trend and maximise the potential for cycling, it is considered that LB Richmond-upon-Thames should seek to adopt the higher London Plan maximum standards, including the requirements for visitor provision (one space per 40 units). This will also help to reduce dependency on car travel with a view to improving air quality and the environment by reducing vehicular emissions.

Land Take/Public Realm

The third supplementary objective seeks to reduce the level of land take required by parking within new developments (and therefore within the borough) with the aim to improve the public realm. Whilst the three different options will affect the level of off-street parking provided in support of a proportion of new housing, this will also have an effect on on-street parking demand and the space taken up by vehicles on the local highway network. The more flexible standards under the preferred option will increase the level of off-street parking land take in new developments where the added flexibility is applied but will subsequently reduce on-street parking uptake.

The approximate land take of off-street parking provision ultimately depends on the type of parking provided. For example, surface level parking will generally take up more land than underground parking provided in support of larger schemes or podium parking provided in support of smaller developments. The level of land take will also be affected by the quality of residential scheme design and constraints such as site size and layout e.g. a regular shaped car park with efficiently organised bay parking will typically require less land than an irregularly shaped car park with bays positioned at angles. The OLC Fourth Report estimates average off-street parking land take at a range of 19-24sqm per bay. This equates to a typical bay size of 2.4m x 4.8m (11.5sqm) with an associated aisle width of 2.4m x 3.0m per bay (7.2sqm) and the additional space for providing access/egress to the car park. This range also reflects the efficiency of a parking layout, which tends to be higher for larger car parks.

A comparison has been undertaken between the flexibility permitted under the existing London Plan standards (added flexibility in areas of PTAL 1a-1b, with limited parts in PTAL 2) and the new standards proposed under the preferred option (added flexibility in areas of PTAL 1a-2, with limited parts in PTAL 3). This has been informed by the projected delivery of housing across the borough using the supply figures for 2016 to 2026 to represent an average ten year period. This has also been informed by the details set out in **Table 5-4** which separates the housing trajectory by PTAL. The results of this exercise have been set out in **Table 5-10** below.

It should be noted that the identified housing land supply over the next five years benefits largely from existing permissions, which have already been consented in line with existing adopted parking standards (i.e. Development Management Plan 2011). As the broad pattern of development is expected to continue, those figures in the future housing land supply have been used to model the potential change in future years.

Table 5-10: Application of Parking Standards Flexibility to Projected Ten Year Housing Delivery (based on supply figures for 2016-2026)

PTAL	Estimated Total Housing Delivery (Ten Years)	London Plan		New Standards		Increased Applicability of Flexibility due to New Standards	
		Extent of Flexibility	# Units	Extent of Flexibility	# Units	# Units	% Units
1	440	50%	220	50%	220	0	0%
1 to 2	444	50%	222	50%	222	0	0%
2	767	25%	192	50%	383	+191	+25%
2 to 3	1,366	0%	0	25%	342	+342	+25%
3 to 6	1,012	0%	0	0%	0	0	0%
Total	**4,029**	**-**	**634**	**-**	**1,167**	**+533**	**+13%**

Table 5-10 shows that when compared to the existing London Plan standards, the more flexible element of the new standards could be applicable to an additional 533 dwellings as these are delivered across LB Richmond-upon-Thames over an average ten year period. This is equivalent to an additional 53 dwellings per year, or an additional 13% of the total number of dwellings which are projected to be delivered within the borough. On this basis, it is considered that the new standards could potentially result in 27-53 additional off-street parking bays per year (compared to the London Plan standards) depending on the degree of flexibility applied e.g. an additional 0.5-1.0 spaces per dwelling.

It is considered that the additional off-street parking provision required by the more flexible standards could be incorporated into the initial design/viability process. This could enable solutions to be identified so that the parking requirements of residents can be met without having to reduce housing density levels. The additional off-street parking land take could also potentially be mitigated through:

- Higher density developments;
- Underground parking (larger schemes);
- Podium parking (smaller developments);
- More efficient parking layouts;
- Shared parking between developments; and
- Limiting the provision of garages (which may not be used to park vehicles).

In light of the above, it is considered that the additional flexibility in the parking standards under the preferred option will not necessarily increase the level of off-street parking land take by 19-24sqm per bay. The additional off-street parking land take resulting from the preferred option is therefore not anticipated to significantly affect housing density or the ability to deliver housing in line with the London Plan targets, particularly given that these are already due to be exceeded by 879 dwellings over a ten year period. The added flexibility of the preferred option is in keeping with the objectives of this study and will improve the surrounding streetscape by restricting excess on-street car parking demand. This will also re-balance the surrounding environment in favour of pedestrians and cyclists by reducing the dominance of vehicles.

6 Review of Destination Parking Standards

6.1 Introduction

The study has so far predominantly focused on the residential parking standards and this section is therefore designed to provide an appreciation of the destination parking standards for commercial developments within the borough. National planning guidance (NPPF and NPPG) states that parking provision should be enhanced to encourage the vitality of town centres and that a shortage of parking for commercial uses can constrain economic growth. However, whilst the Mayor supports further office development in Outer London, this should be achieved without contributing towards unacceptable levels of congestion and pollution which could occur as a result of an over-provision of parking. The destination standards have been examined in relation to the key objectives of this study.

In a similar fashion to the residential standards, the London Plan allows Outer London Boroughs some flexibility in setting their destination parking standards where there is firstly a demonstrable need and where this would secondly not have unacceptable adverse impacts on the wider transport network and on air quality. A comparison has therefore been undertaken between the London Plan and LB Richmond-upon-Thames destination parking standards for a selection of commercial uses to identify differences in their requirements and the possible implications of these. The parking standards for education uses have also been briefly examined. Again, the standards should be considered alongside other town centre parking management strategies to help reduce the impact of parking on the surrounding highway network.

6.2 Retail and Employment Uses

The projected delivery of retail floorspace within LB Richmond-upon-Thames (up to 2024) has been identified below in **Table 6-1** to provide a focus for the comparison exercise i.e. based on the likely locations of new developments.

Table 6-1: Anticipated Delivery of Retail Floorspace in LB Richmond-upon-Thames up to 2024

Location	CPZ	PTAL	Approximate Floorspace (sqm)
Richmond (Major Town Centre)	Mon-Sat (08:30-18:30)	5 to 6	7,000
Twickenham (District Centre)	Mon-Sat (08:30-18:30)	4 to 5	2,300
Teddington (District Centre)	Mon-Fri (08:30-10:30)	3	1,300
East Sheen (District Centre)	Mon-Fri (10:00-12:00)	2	1,000
Whitton (District Centre)	Variable (Twickenham Event Zone)	2	900
Local Centres*	Variable (mainly Mon-Fri 10:00-16:30 or 10:00-12:00)	2 to 3	3,200
Total	-	-	15,700

*Barnes, East Twickenham, Hampton Hill, Hampton Village, Ham Common, Kew Gardens Station & St Margarets

The majority of the employment uses are also anticipated to take place within the town and district centres with an estimated 18,000 jobs to be delivered between 2011 and 2031.

Based on the above, the London Plan standards have been examined for developments situated in Outer London locations subject to a PTAL of 2-4 (more generous) and 5-6 (less generous) and compared with the LB Richmond-upon-Thames standards for those situated in CPZs (less generous).

The London Plan and LB Richmond-upon-Thames destination car parking standards have been compared for the following retail uses:

- A1 Shops
- A2 Financial and Professional Services
- A3-A5 Food and Drink

The car parking standards have also been compared for the following employment uses:

- B1 Office
- B2 General Industrial

The disabled parking standards and cycle parking standards have been examined separately later within this section.

6.3 Car Parking Standards

Retail

The maximum car parking standards for retail land uses are set out in **Table 6-2** below and are based on the Gross Internal Area (GIA) of the proposed development, where up to one space can be provided per area shown. For example, for a development comprising 500sqm of A1 shops in a PTAL 5-6, the London Plan would require a maximum of one space per 40-60sqm which equates to a maximum of eight car parking spaces.

Table 6-2: Maximum Non-Operational Car Parking Standards for Retail Uses

Land Use	London Plan (GIA)		LB-Richmond-upon-Thames (GIA)	
	Outer London		CPZs	*Remainder of Borough*
	PTAL 5-6	PTAL 2-4		
A1 Non-Food Retail	60-40sqm	50-30sqm	Richmond & Twickenham town centres: Operational parking only Elsewhere: 50-100sqm	*As CPZ*
A1 Food Retail	75-50sqm	50-35sqm	20sqm	*As CPZ*
A1 Garden centre / DIY Store	65-45sqm	45-30sqm	30sqm (although considered on site's merits)	*As CPZ*
A2 Financial and Professional Services	100-600sqm		600sqm	*300-450sqm (depending on proximity to rail stations)*
A3-A5 Food: up to 500sqm	75sqm	50-35sqm	A3-A4: 16sqm of net **dining** floor area A5: Off-street provision only for delivery vehicles, motorcycles and scooters	*A3-A4: 8sqm of net dining floor area* *A5: As CPZ*
A3-A5 Food: up to 2500sqm	45-30sqm	30-20sqm		
A3-A5 Food: over 2500sqm	38-25sqm	25-18sqm		

Table 6-2 shows that the London Plan standards tend to be less generous in the more accessible areas (PTAL 5-6) where fewer space are permitted. This is also the case for the LB Richmond-upon-Thames standards on the basis that:

- Only operational parking is permitted in support of A1 Non-Food Retail within Richmond and Twickenham town centres which have higher PTALs than all other areas within the borough; and
- The standards are less generous for developments situated within CPZs (which tend to have higher PTALs) in the case of the A2, A3 and A4 land uses.

Table 6-2 also indicates that the London Plan standards are more generous than the LB Richmond-upon-Thames CPZ standards for A1 Non-Food Retail, A2 Financial and Professional Services and A5 Hot Food Takeaways. The standards are comparable for the other uses except for A1 Food Retail where the LB Richmond-upon-Thames standards are more generous. Whilst the LB Richmond-upon-Thames CPZ standards appear to be more generous for A3 Restaurants and Cafes and A4 Drinking Establishments, these are based on net **dining** floor area, as opposed to overall GIA and are therefore considered to be more comparable e.g. if net dining area represents 80% of overall GIA, then the standards would result in a maximum of one space per 20sqm.

In terms of Electric Vehicle Charging Points (EVCPs) for retail uses, the London Plan requires 10% of all spaces to be active spaces with an additional 10% passive provision to accommodate for future demand.

Employment

The maximum car parking standards for employment land uses are set out in **Table 6-3** below and are again based on the GIA of the proposed use, where up to one space can be provided per area shown. For example, a maximum of one space would be permitted per 500sqm of B2 use based on the London Plan. The London Plan does not separate the employment standards out by PTAL as for the retail uses.

Table 6-3: Maximum Non-Operational Car Parking Standards for Employment Uses

Land Use	London Plan (GIA)	LB-Richmond-upon-Thames (GIA)	
	Outer London	CPZs	*Remainder of Borough*
B1 Office	100-600sqm	300sqm	*100-200sqm (depending on proximity to rail stations)*
B1 Office (in locations identified through a DPD where more generous standards should apply)	50-100sqm		
B2 General Industry	500sqm	600sqm	*200-450sqm (depending on proximity to rail stations)*

It is considered that the less generous London Plan standards would be applicable to new developments situated within higher PTAL areas. The LB Richmond-upon-Thames standards again have more generous standards for those employment uses situated outside of CPZs.

Table 6-3 demonstrates that the London Plan standards tend to be more generous than the LB Richmond-upon-Thames CPZ standards for B1 Office and B2 General Industry. The London Plan standards are only less generous when the B1 Office standards are applied towards the upper threshold of up to one space per 600sqm which would be applied in the most accessible locations.

In terms of EVCPs for employment uses, the London Plan requires 20% of all spaces to be active spaces and with an additional 10% passive provision to accommodate for future demand.

Education

The maximum car parking standards for education land uses are set out in **Table 6-4** below. The LB Richmond-upon-Thames standards are based on staff numbers whilst no standards are explicitly set out for education land uses within the London Plan. It is therefore considered that the provision should consistent with the objectives of the London Plan i.e. to reduce traffic levels and congestion and to encourage travel by sustainable travel modes.

Table 6-4: Maximum Car Parking Standards for Education Uses

Land Use	London Plan	LB-Richmond-upon-Thames	
	Outer London	CPZs	Remainder of Borough
D1 Schools	No specific standards for education – *it is therefore considered that the provision should consistent with the objectives of the London Plan*	1 space per 2 staff. Arrangements must also be made for appropriate setting down areas and visitor parking spaces. Adequate facilities for the setting down of coaches shall also be considered.	1 space per 2 staff

The adjacent Outer London boroughs of RB Kingston-upon-Thames and LB Hounslow also do not set out any specific car parking standards for education uses which are either based on the London Plan or require the level of provision to be assessed on a case-by-case basis. The LB Richmond-upon-Thames standards are therefore the only standards which provide specific standards and are designed to restrict parking levels for staff and visitors (including parents) by only permitting one space per two staff members.

Summary

In summary, the London Plan standards tend to apply more generous destination standards in Outer London boroughs when compared to those applied within the CPZs of LB Richmond-upon-Thames where the majority of new retail and employment uses are projected to be delivered. It is therefore considered that the existing destination car parking standards should be retained in order to be aligned with the following objectives of this study:

- To encourage travel by **sustainable travel modes** i.e. walking, cycling and public transport, to maximise the **health and well-being** of the population;

- To reduce **car dependency** and the associated **environmental implications**; and
- To reduce the level of **land take** required by parking within new developments (and therefore within the borough) with the aim to improve the public realm.

The above also applies to the education uses where the LB Richmond-upon-Thames standards are designed to restrict parking to all users including staff and visitors. The retention of the existing less generous maximum standards is also considered to be in line with the DfT's *Research into the Use and Effectiveness of Maximum Parking Standards'* (2008) which states that:

- Parking can be an effective demand management tool;
- There is a clear link between parking availability and car use;
- Restricting parking numbers can influence mode choice and reduce parking demand; and
- Without implementing maximum standards, there is a risk that there will be significant negative effects on other areas of transport policy.

Furthermore, the application of less generous standards is considered to be appropriate in the town centre locations given that:

- The Richmond and Twickenham town centre locations are accessible by public transport (PTALs 4-6);
- There is a high availability of car clubs within the town centre locations and membership levels are increasing;
- The proportion of residents commuting by public transport and cycling has increased significantly within recent years (see comparison between 2001 and 2011 Census data); and
- There is a need to promote alternatives to private car travel including for commuting purposes.

Lastly, whilst less generous maximum standards can contribute towards a higher level of on-street parking demand, the majority of retail and employment uses are projected to be delivered within CPZs. The application of less generous standards is therefore considered to be appropriate given that the existing controls on the surrounding roads will help to reduce overspill parking, on-street parking stress levels, inappropriate parking and associated safety implications. It is therefore not considered that the less generous standards would cause harm to the local highway network if this is managed appropriately.

6.4 Disabled Parking Standards

The LB Richmond-upon-Thames disabled parking requirements for non-residential uses are currently in line with the London Plan standards which require all non-residential developments (including those that are car-free) to provide at least one accessible on or off-street car parking bay designated for blue badge holders. Furthermore, any non-residential development providing off-street parking should ensure at least two bays designated for blue badge holders are provided. The London Plan non-residential blue badge bay requirements have been set out in **Table 6-5** below and are based on those recommended in BS 8300:2009.

Table 6-5: Non-Residential Blue Badge Parking Bays Recommended in London Plan

Building Type	Provision from the Outset		Future Provision
	Number of spaces for each employee who is a disabled motorist	Number of spaces for visiting disabled motorists	Number of enlarged standard spaces
Workplaces	One space	5% of the total capacity	A further 5% of the total capacity
Shopping, recreation and leisure facilities	One space	6% of the total capacity	A further 4% of the total capacity
Railway buildings	One space	5% of the total capacity	A further 5% of the total capacity
Religious buildings and crematoria	Two spaces or 6% whichever is the greater		A further 4% of the total capacity
Sports facilities	Determined according to the usage of the sports facility		

The standards are partially based on a percentage of the total car parking provision and will therefore need to be carefully assessed to ensure that adequate provision is made for disabled people. This will also vary depending on the size, nature and location of each new development, as well as the characteristics explored as part of the residential parking standards such as PTAL. It is however considered that the LB Richmond-upon-Thames blue badge parking standards should

continue to reflect the London Plan standards given that these require provision based on the number of employees that are disabled motorists and are therefore designed to cater for all user types. This also provides a consistent approach with the residential standards which are also in line with the London Plan standards.

6.5 Cycle Parking Standards

The London Plan and LB Richmond-upon-Thames minimum cycle parking standards for the retail, employment and education uses are set out in **Table 6-6** below. The London Plan standards separate the standards between long-stay provision for staff and short-stay provision for customers and visitors. The LB Richmond-upon-Thames standards represent the total provision required. Unlike the car parking standards, the requirements are the same regardless of PTAL or whether the development is situated within a CPZ.

Table 6-6: Minimum Cycle Parking Standards – Retail and Employment

<table>
<tr><th colspan="2" rowspan="3">Land Use</th><th colspan="2">London Plan (GIA)</th><th>LB Richmond-upon-Thames (GIA)</th></tr>
<tr><th colspan="2">Outer London</th><th>All Areas</th></tr>
<tr><th>Long-Stay</th><th>Short-Stay</th><th>Total Provision</th></tr>
<tr><td rowspan="2">A1</td><td>Food retail</td><td>From a threshold of 100sqm: 1 space per 175sqm</td><td>From a threshold of 100sqm: first 750sqm: 1 space per 40sqm, thereafter: 1 space per 300sqm</td><td>1 space per 200sqm</td></tr>
<tr><td>Non-food retail</td><td>From a threshold of 100sqm: first 1,000sqm: 1 space per 250sqm, thereafter: 1 space per 1,000sqm</td><td>From a threshold of 100sqm: first 1,000sqm: 1 space per 125sqm, thereafter: 1 space per 1,000sqm</td><td>1 space per 100sqm (Richmond and Twickenham town centres)

1 space per 200sqm (elsewhere)</td></tr>
<tr><td>A2</td><td>Financial / professional services</td><td rowspan="4">From a threshold of 100sqm: 1 space per 175sqm</td><td rowspan="4">From a threshold of 100sqm: 1 space per 40sqm</td><td>1 space per 125sqm</td></tr>
<tr><td>A3</td><td>Cafes and restaurants</td><td>1 space per 20 staff + 1 per 20 customers</td></tr>
<tr><td>A4</td><td>Drinking establishments</td><td>1 space per 100sqm</td></tr>
<tr><td>A5</td><td>Hot food takeaways</td><td>1 space per 50sqm</td></tr>
<tr><td rowspan="2">B1</td><td>Business offices</td><td>1 space per 150sqm</td><td>First 5,000sqm: 1 space per 500sqm, thereafter: 1 space per 5,000sqm</td><td>1 space per 200sqm</td></tr>
<tr><td>Light industry and research and development</td><td>1 space per 250sqm</td><td>1 space per 1,000sqm</td><td>1 space per 200sqm</td></tr>
<tr><td>B2-B8</td><td>General industrial, storage or distribution</td><td>1 space per 500sqm</td><td>1 space per 1,000sqm</td><td>1 space per 200sqm</td></tr>
<tr><td>D1</td><td>Nurseries/Schools (Primary and Secondary)</td><td>1 space per 8 staff + 1 space per 8 students</td><td>1 space per 100 students</td><td>5 spaces per classroom depending on the nature of the school</td></tr>
</table>

The above standards (excluding education) have each been applied to a proposed development comprising 1,000sqm for each land use so that a more direct comparison can be made between the standards. The education standards have been applied to a two-form entry primary school with 420 pupils, 30 staff and 14 classrooms i.e. seven year groups with two forms each. The results have been summarised in **Table 6-7**.

Table 6-7: Comparison of Minimum Cycle Parking Requirements – Retail and Employment (1,000sqm) and Education (420 pupils, 30 staff and 14 classrooms)

Land Use		Minimum Cycle Parking Requirement (Spaces)		Most Generous Standard
		London Plan	LB Richmond-upon-Thames	
A1	Food retail	**26** (6 long-stay + 20 short-stay)	**5**	London Plan
	Non-food retail	**12** (4 long-stay + 8 short-stay)	**10** (Richmond/Twickenham town centres) 5 (elsewhere)	London Plan
A2	Financial / professional services	**31** (6 long-stay + 25 short-stay)	**8**	London Plan
A3	Cafes and restaurants		Unknown	-
A4	Drinking establishments		**10**	London Plan
A5	Hot food takeaways		**20**	London Plan
B1	Business offices	**9** (7 long-stay + 2 short-stay)	**5**	London Plan
	Light industry and research and development	**5** (4 long-stay + 1 short-stay)	**5**	Comparable
B2-B8	General industrial, storage or distribution	**3** (2 long-stay + 1 short-stay)	**5**	LB Richmond-upon-Thames
D1	Nurseries/Schools (Primary and Secondary)	**62** (57 long-stay + 5 short-stay)	**70**	LB Richmond-upon-Thames

Table 6-7 indicates that the London Plan cycle parking standards tend to be more generous than the LB Richmond-upon-Thames standards for retail and employment uses. It is therefore considered that the London Plan cycle parking standards should be adopted for retail and employment uses so that suitable levels of cycle parking are provided for staff, customers and visitors i.e. a suitable mixture between long and short-stay cycle parking provision. This will encourage cycling as a main mode of travel and will also be in line with the recommendations on the residential cycle parking standards which are also proposed to be in line with the London Plan given the high uptake of this travel mode within the borough. It is nonetheless considered that the existing LB Richmond-upon-Thames cycle parking standards should be retained for education uses given that these are more comparable to the London Plan (and slightly more generous based on the example set out).

6.6 Summary of Key Findings

The London Plan destination car parking standards tend to be more generous for retail and employment uses within Outer London than those currently adopted by LB Richmond-upon-Thames standards where the majority of these uses are projected to be delivered i.e. within CPZs. It is considered that the existing less generous standards should be retained to encourage travel by sustainable travel modes, reduce car dependency and reduce the level of land take required by parking within new commercial developments. This can furthermore be used as a demand management tool alongside the use of CPZs which will help to reduce on-street parking stress levels and inappropriate parking. It is considered that there are very good opportunities to access the town centre locations by other means to the private motor vehicle including by public transport and by bicycle. There is also a high availability of car clubs at these locations.

The existing disabled parking standards for non-residential uses are in line with the London Plan standards which base the levels of provision on the number of employees that are disabled motorists as well as of a certain proportion of the overall car parking provided in support of the development. Although this level of provision is considered to be appropriate for meeting the needs of all user types, it is considered that the disabled provision should be carefully assessed on a case-by-case basis to reflect the size, nature and location of each new development.

The London Plan cycle parking standards tend to be more generous for retail and employment uses than the LB Richmond-upon-Thames standards. Therefore, in order to further encourage cycling as a main mode of travel, it is considered that the London Plan standards should be adopted for these uses to provide suitable levels of long-stay and short-stay cycle parking for staff, customers and visitors. This will support the high uptake and increasing trend of cycling within the borough. The existing cycle parking standards for education uses are however more comparable to the London Plan and should therefore be retained.

7 Recommendations on Parking Standards

7.1 Introduction

This section presents the recommendations to inform LB Richmond-upon-Thames' review of their Local Plan residential parking policy and parking standards. These have been based on the main findings of the study and reflect the preferred option for the residential car parking standards which is expected to result in the greatest net benefits when examined against the three key objectives. There is also a requirement for the parking standards to be in line with the appropriate national and regional policies whilst also reflecting local characteristics where necessary to address the challenges and needs of different areas.

7.2 Objectives

The main objective of the recommendations on the residential car parking standards is to minimise the impact of parking and car based travel on the operation of the highway network and on the local environment. This has been more clearly defined within the three sub-objectives which have been used to assess parking standard options within Chapter 5 and can be summarised as follows:

1. To encourage travel by **sustainable travel modes** i.e. walking, cycling and public transport, to maximise the **health and well-being** of the population.
2. To reduce **car dependency** and the associated **environmental implications**.
3. To improve conditions on the **local highway network**.

The following supplementary objectives have also been set as part of this study:

- To cater for **all user types**, including residents of wheelchair accessible units by providing sufficient disabled parking;
- To encourage **cycling** as a main mode of travel by providing sufficient levels of cycle parking; and
- To reduce the level of **land take** required by parking within new developments (and therefore within the borough) with the aim to improve the public realm.

7.3 Preferred Option

The preferred option has been assessed to result in the greatest net benefits based on the above when compared to the other two options explored as part of the study. This option is therefore recommended within **Table 7-1** and is also considered to be in general conformity with the London Plan for the following reasons:

- The car parking standards will continue to be maximum standards and will allow for additional flexibility in certain areas much like that introduced by the MALP for PTALs 0-1, with limited parts of 2;
- The added flexibility is comparable to other Outer London boroughs such as LB Barnet and LB Hillingdon where more generous residential standards are permitted when compared to the London Plan as well as LB Richmond-upon-Thames' existing standards;
- The requirement for additional flexibility in the standards is limited compared to the London Plan and reflects the high levels of on-street parking stress experienced within certain parts of the borough which would otherwise be projected to worsen;
- The ability to set borough-wide standards is recognised by the London Plan and is considered to be appropriate;
- The standards should generally be met and there will be a continued requirement for developers to demonstrate that any proposals for new housing would not have any adverse highway impacts; and
- Car-free developments will continue to be permitted and even encouraged in the most accessible locations such as within CPZs, provided that the developer can demonstrate that there would be no adverse highway impacts.

Further to the above, the minimum residential cycle parking standards and blue badge parking requirements are also recommended to be in line with the London Plan. A suitable level of blue badge parking will be required across all developments including those which are proposed to be car-free.

7.4 Recommendations

The recommendations on the residential car parking standards as well as the destination standards and other factors considered by this study including blue badge parking and cycle parking are set out overleaf in **Table 7-1**.

Table 7-1: Recommendations on the Residential Car Parking Standards

Ref	Recommendation	Description	Objective(s)
Residential Car Parking Standards			
1a	Amend the existing residential car parking standards so that more flexibility is encouraged in PTALs 1a-2, with limited parts of 3	LB Richmond-upon-Thames experiences high levels of on-street parking stress across a number of locations, as well as above average levels of car ownership compared to other Outer London boroughs. This will therefore benefit local highway conditions by allowing greater flexibility in off-street car parking provision for new housing situated in areas where the greatest on-street parking pressures currently exist (PTALs 2-3, outside of CPZs). Additionally, the associated implications of inappropriate parking and safety concerns will also be expected to be improved by not further exacerbating on-street parking pressures. The maximum standards will continue to restrict parking availability within the most accessible parts of the borough to deter car ownership.	To improve conditions on the **local highway network**.
1b	To apply the additional flexibility on a case-by-case basis	The added flexibility in the parking standards should be applied on a case-by-case basis (considering other factors such as on-street parking stress for example) rather than as a blanket-wide approach for all new developments within PTAL 1a-2, with limited parts of 3. The following PTAL 3 areas should be considered to be applicable due to existing on-street parking stress: • St Margarets; • East Sheen; and • Hampton Hill. The following PTAL 3 areas should also be considered to be applicable due to projected PTAL improvements in the future which could increase parking demand: • Kew; • Mortlake and Barnes Common; and • Twickenham Riverside. Additional factors such as housing mix and local car ownership levels should also be considered in line with paragraph 39 of the NPPF, as well as the London Plan. The added flexibility will re-balance parking in favour of off-street parking and may not necessarily increase car emissions and environmental impacts given that these vehicles may have otherwise been parked on-street.	

Ref	Recommendation	Description	Objective(s)
2	To continue to encourage provision towards the upper end of the maximum car parking standards	Applicants of new developments should continue to provide parking towards the upper end of the maximum parking standards to reduce the likelihood of potential car parking overspill onto the surrounding highway network. Lower levels of provision will however be supported in areas where this can be justified e.g. where there are lower levels of overnight on-street parking stress (below 85% based on recommended LB Lambeth methodology threshold – see **Appendix P**), for sites situated in high PTAL areas (5-6) and in line with local car ownership levels for comparable housing size, type and tenure.	To improve conditions on the **local highway network**.
3	To encourage car-free housing developments in the appropriate locations	Car-free housing developments should continue to be encouraged within the most accessible locations (PTAL 5-6) within CPZs including within Richmond and Twickenham town centres where there are very good opportunities to utilise alternative travel modes including public transport. Residents should also be encouraged to become members of car clubs at these locations.	To encourage travel by **sustainable travel modes** and maximise the **health and well-being** of the population. To reduce **car dependency** and the associated **environmental implications**.
Destination Car Parking Standards			
4	To retain the less generous Borough-wide destination car parking standards	To retain the borough's less generous maximum standards for retail, employment and education uses (as opposed to the London Plan), so that this can be used as an effective demand management tool by reducing car use, car ownership and influencing sustainable travel in line with the DfT's *'Research into the Use and Effectiveness of Maximum Parking Standards'* (2008).	To encourage travel by **sustainable travel modes** and maximise the **health and well-being** of the population. To reduce **car dependency** and the associated **environmental implications**.
Less Flexible Standards in CPZs			
5	To maintain the distinction between areas situated within and outside of CPZs	The less flexible standards should continue to be applied to new housing and commercial developments situated within CPZs to avoid the over-provision of off-street parking at these locations. This will help to reduce car ownership levels and the dependence on car travel in areas where there are greater opportunities to make use of public transport and car club vehicles.	To encourage travel by **sustainable travel modes** and maximise the **health and well-being** of the population. To reduce **car dependency** and the associated **environmental implications**.

Ref	Recommendation	Description	Objective(s)
Demand Management Measures			
6	To review Community Parking Zones (CPZs) and continue with their enforcement	CPZs are a key tool which can be used to reduce on-street parking pressures in areas which experience high levels of parking demand such as within town centre locations. Car ownership will be discouraged by restricting parking availability in the local area and drivers will be deterred from parking inappropriately or illegally through the enforcement of these restrictions. This will in turn encourage the use of alternative more sustainable modes of travel as well as improving highway safety. The hours of operation of the CPZs should be reviewed in the most pressured areas to determine whether they are currently being abused or can be made more effective. Consideration should also be made to extending existing CPZs or providing new CPZs in areas where on-street parking pressures cannot solely be reduced through the more flexible parking standards.	To improve conditions on the **local highway network**. To encourage travel by **sustainable travel modes** and maximise the **health and well-being** of the population. To reduce **car dependency** and the associated **environmental implications**.
7	To support the provision of car clubs and encourage car club membership	Car clubs should be considered alongside the parking standards to encourage modal shift and reduce car ownership levels in line with the London Plan. These could for example be required in new larger developments where there would be a greater level of uptake and the promotion of existing and / or provision of additional car clubs should be encouraged through development travel plans in all cases.	To reduce **car dependency** and the associated **environmental implications**.
Additional Mitigation			
8	To reduce off-street parking land take in new developments	To reduce the land take required by off-street parking, the parking layouts of new housing developments should be designed to accommodate parking as efficiently as possible. Furthermore, consideration to providing parking on a separate level such as underground parking for larger developments, or podium parking for smaller developments should be made to maximise the availability of land for dwellings and the supporting public realm. The appropriate provision of additional off-street parking will improve the surrounding streetscape in areas which experience on-street parking pressures by re-balancing this in favour of pedestrians and cyclists by reducing the dominance that vehicles have on the surrounding environment.	To reduce the level of **land take** required by parking within new developments (and therefore within the borough) with the aim to improve the public realm.
9	To reduce car journeys and vehicular emissions	To reduce single occupancy car journeys and vehicular emissions, car sharing should continue to be promoted with new residential and commercial developments alongside the standards e.g. through the implementation of travel plans. EVCPs should also be provided in line with the London Plan requirements to support the uptake of lower emission electric vehicles. These measures will both reduce vehicular emissions and the associated environmental implications including upon air quality.	To reduce **car dependency** and the associated **environmental implications**.

Ref	Recommendation	Description	Objective(s)
Blue Badge Parking			
10	To retain the current disabled parking standards for residential developments	To retain the current residential blue badge parking requirements for residential developments, as opposed to adopting lower standards such as 10% of overall car parking provision. The overnight parking beat surveys demonstrated that the majority of on-street disabled parking bays are currently in use and that there is therefore a need for new housing to provide a sufficient level of disabled parking to meet the needs of all user types in line with NPPG and the London Plan. This also takes into account the need for future proofing developments for accessibility impaired residents and an ageing population.	To cater for **all user types**, including residents of wheelchair accessible units by providing sufficient disabled parking.
11	To retain the current disabled parking standards for non-residential developments	To retain the existing disabled parking standards for non-residential uses which are in line with the London Plan and are designed to meet user needs. The provision should also be assessed on a case-by-case basis to reflect the size, nature and location of each new development.	
Cycle Parking			
12	To adopt the London Plan minimum cycle standards for residential development	The proportion of residents cycling within the borough has significantly increased over recent years. Therefore, in order to continue to support this trend and maximise the potential for cycling, it is considered that LB Richmond-upon-Thames should revise the cycle parking standards so that these are in line with the more generous London Plan standards. This will help to improve the sustainability of transport provision, promote cycling and improve health and well-being, in line with NPPG. This will further help to reduce car dependency and the associated environmental impacts.	To encourage **cycling** as a main mode of travel by providing sufficient levels of cycle parking. To reduce **car dependency** and the associated **environmental implications**.
13	To adopt the London Plan minimum cycle standards for retail and employment uses	The London Plan cycle parking standards tend to be more generous for retail and employment uses than the LB Richmond-upon-Thames standards. Therefore, in order to further encourage cycling as a main mode of travel, it is considered that the London Plan standards should be adopted for these uses to provide suitable levels of long-stay and short-stay cycle parking for staff, customers and visitors. This will support the high uptake and increasing trend of cycling within the borough.	
14	To retain the existing cycle parking standards for education uses	The existing LB Richmond-upon-Thames cycle parking standards are comparable to the London Plan and it is therefore considered that these should be retained given that these will result in similar (and potentially more) levels of cycle parking being provided at educational establishments.	

Ref	Recommendation	Description	Objective(s)
Parking Beat Survey Methodology			
15	To adopt the LB Lambeth parking beat survey methodology and 85% parking stress threshold	To adopt the LB Lambeth parking beat survey methodology (5.0m average vehicle spacing) which provides a more accurate representation of the actual on-street parking capacity and average parking stress of a study area than compared to the existing LB Richmond-upon-Thames methodology (5.5m average vehicle spacing). The on-street parking stress threshold which is currently used to determine whether capacity is considered to be close to being reached should accordingly be reduced from 90% to 85% to identify areas where new developments should make allowance for their parking demand to avoid exacerbating existing on-street parking pressures. This will support the parking standards by ensuring that new housing developments provide sufficient amounts of off-street parking in areas subject to high levels of on-street parking stress. Further details of the supporting evidence base for this recommendation are provided within **Appendix P**.	To improve conditions on the **local highway network**.

7.5 Framework for Implementation

The effects of the recommendations including the adoption of the preferred option should be monitored in relation to the objectives of the study (see **Section 7.2**) including the target to improve conditions on the local highway network. The assessment of the preferred option reveals that it will be generally positive for the local highway network but slightly negative for environmental outcomes. The environmental impacts should therefore also be monitored and mitigated through the measures previously set out in **Section 5.7**.

A framework for implementing, monitoring and reviewing the recommendations in relation to the objectives has been set out below:

- The new standards should be monitored based on the number of additional parking spaces provided in support of new housing developments over the next 5-10 years. This can then be converted to approximate additional off-street **land take** required by parking to ascertain the potential impact on housing delivery within the borough in relation to the London Plan targets.
- Monitor **on-street parking stress levels** in the most pressured areas such as surveyed sites 3 and 5, or those with a moderate PTAL of 2-3 to determine whether these stabilise following the introduction of the more flexible standards, or continue to increase. This should be undertaken on an annual basis with repeat surveys in areas where the highest levels of new housing is anticipated to be delivered over the next 5-10 years e.g. St Margarets and North Twickenham.
- Continue to monitor car club membership levels and the number of vehicles available across the borough on a quarterly basis. Obtain additional details from car club operators (Zipcar and Enterprise) annually to understand changes in vehicle utilisation levels and numbers of private vehicles sold and therefore **potential reduction in car dependency and car ownership levels** as a result of car clubs.
- Continue to enforce the CPZ restrictions and monitor the number of PCNs issued on a monthly basis to determine whether **inappropriate/illegal parking** reduces following the introduction of the more flexible standards.
- Consider whether additional **demand management measures** are required in the worst affected areas including increasing the hours of operation of existing CPZs, introducing new CPZs, increasing enforcement of inappropriate or illegal parking and introducing additional car club bays. This should be reviewed twice per year.
- Monitor conditions of the **local highway network** following the implementation of any additional measures including on-street parking stress (through surveys), inappropriate parking (through enforcement) and highway safety (such as through a review of accident data) on an annual basis.
- Annually monitor the uptake of **on-street disabled bays** across the borough to determine whether there could potentially be a shortfall and whether additional off-street disabled provision may be required in the future.
- Monitor the travel patterns of residents at new housing developments against the 2011 Census travel to work mode share through the travel planning process to identify the uptake of **sustainable travel modes** and determine whether increased the levels of cycle parking provision (through the London Plan standards) further encourage cycling as a main mode of travel.
- Implement the **LB Lambeth parking beat survey methodology** going forward when assessing existing levels of on-street parking stress across the borough.

Appendix A: Examination of Site PTALs

Kings Road (Richmond)

Kings Road is situated in the vicinity of Winter Box Walk and has a PTAL of 2, as shown in **Figure A-1** below. To the north, the northern section of Kings Road and the A305 Sheen Road fall within a PTAL of 4 (good) and to the west is the centre of Richmond which generally has an excellent PTAL of 6a. The area shown in **Figure A-1** therefore sits on the edge of a higher PTAL area. Kings Road is located approximately 710m from Richmond station (which is within the walking distance threshold of 960m), from which there is access to National Rail and Overground services, as well as a connection to the District Line on the London Underground Network. There is good accessibility to bus stops located on the A305 Sheen Road, with the closest stops (Stop SF westbound and SH eastbound) within 120m and 230m walking distance respectively, providing access to four bus services (33, 337, 493 and 969). These services provide connections to Hammersmith, Barnes station, Fulwell station, Putney, Clapham Junction, Richmond station, Wimbledon, Twickenham and Tooting Broadway with a service every 6-13 minutes.

A wide range of local amenities and facilities, including shops, supermarkets and leisure facilities are available in central Richmond on George Street and The Quadrant, an approximate 750m walking distance from Kings Road. Due to the wide range of local amenities within walking distance and the high frequency of bus services that are accessible from Kings Road, as well as that it is located on the edge of an area of higher PTAL, it can be concluded that in reality, this area of Kings Road may actually have a higher accessibility than that derived from WebCAT.

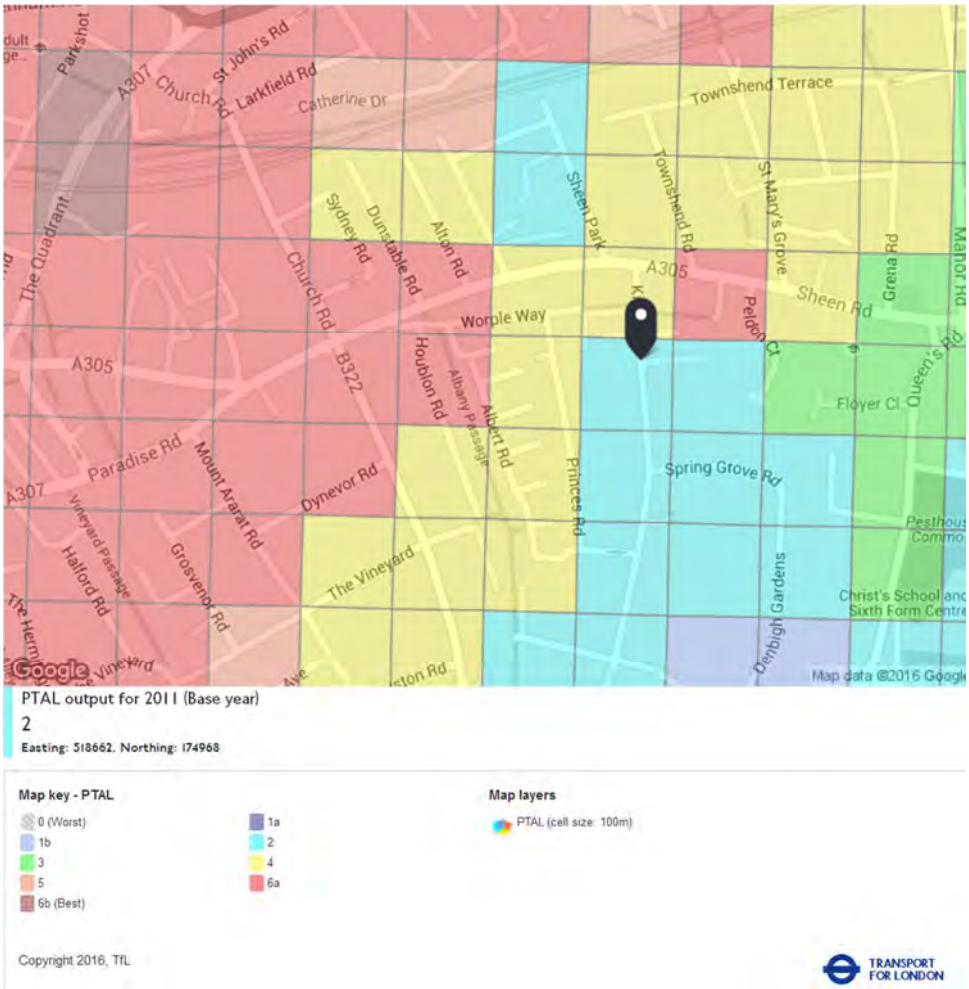


Figure A-1: WebCAT PTAL Map – Kings Road

Priests Bridge (Mortlake and Barnes Common)

Another example of an area with a potential artificially lower PTAL score is Priests Bridge in Mortlake and Barnes Common ward, as shown in **Figure A-2**. The area shown has a PTAL score of 2 (Poor), which suggests that it has limited accessibility to public transport. However Priests Bridge lies on the edge of an area of PTAL 3-4 to the east, which encompasses the centre of Barnes and therefore may, in reality, have higher accessibility to public transport in addition to local amenities and facilities than that derived by the PTAL methodology.

Bus services operate along the South Circular Road, with the closest eastbound bus stop approximately 42m from Priests Bridge and the closest westbound bus stop approximately 130m walking distance. These bus stops provide access to three bus services (33, 337 and 493) which provide connections to Hammersmith, Clapham Junction, Tooting and Putney amongst others with a service calling at the stops every 6-13 minutes. Barnes station is approximately 690m from Priests Bridge (which is within the walking distance threshold of 960m), from which there is access to National Rail services to destinations such as London Waterloo, Weybridge, Hounslow, Twickenham, Richmond, Clapham Junction and Vauxhall. A Sainsbury's supermarket is located an approximate 660m walking distance from Priests Bridge on White Hart Lane and a range of shops and services are located along the South Circular Road to the west of Priests Bridge. Barnes Hospital is also in close proximity to Priests Bridge off South Worple Way.

This area is in close proximity to high frequency bus services, rail services can be accessed at Barnes station providing services to Central London and there are a range of amenities accessible on foot in the local area. It can therefore be concluded that the area of Priests Bridge shown on **Figure A-2** may in reality benefit from a higher level of accessibility than that derived using the PTAL methodology.

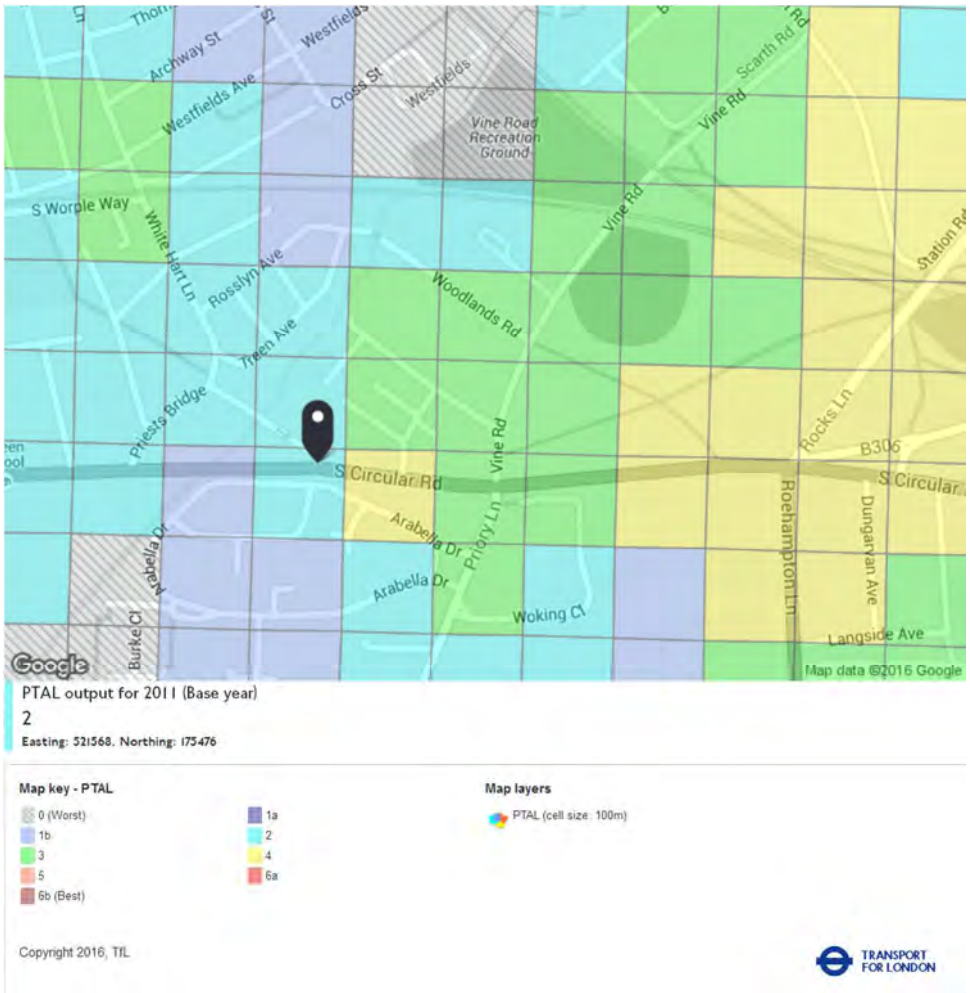


Figure A-2: WebCAT PTAL Map – Priests Bridge

Temple Road (Kew)

Temple Road has a PTAL of 4 (good) at the junction with Gordon Road, as shown in **Figure A-3** below. The northern section of Temple Road falls within a PTAL of 3 and is situated on the edge of a large area which stretches from Windsor Road to Kew Gardens and comprises a PTAL of 2. The area shown in **Figure A-3** therefore sits on the edge of a lower PTAL area.

The Temple Road/Gordon Road junction is located approximately 900m to the south of Kew Gardens station, 700m to the north of North Sheen station and 1.4km to the northeast of Richmond station. Bus stops are located on the B353 Sandycombe Road, with the closest bus stops (L northbound and K southbound) both situated within a 200m walking distance. Despite the close proximity of these bus stops, they only serve one bus route (391), with the service starting at George Street/Richmond Station and running towards Kew Gardens, Kew Bridge, Hammersmith, Kensington Olympia and Imperial Wharf to the northeast with an approximate frequency of every 10-13 minutes. The amenities and facilities of Richmond town centre are located in excess of 1km to the southwest.

Based on the above, it is considered that the identified area of Temple Road may have a lower accessibility level than that derived from WebCAT in reality. There is only one high frequency bus service available within close proximity which serves a limited area and both Richmond station and town centre are situated in excess of 1km which therefore limits the accessibility of the available services and amenities from Temple Road.

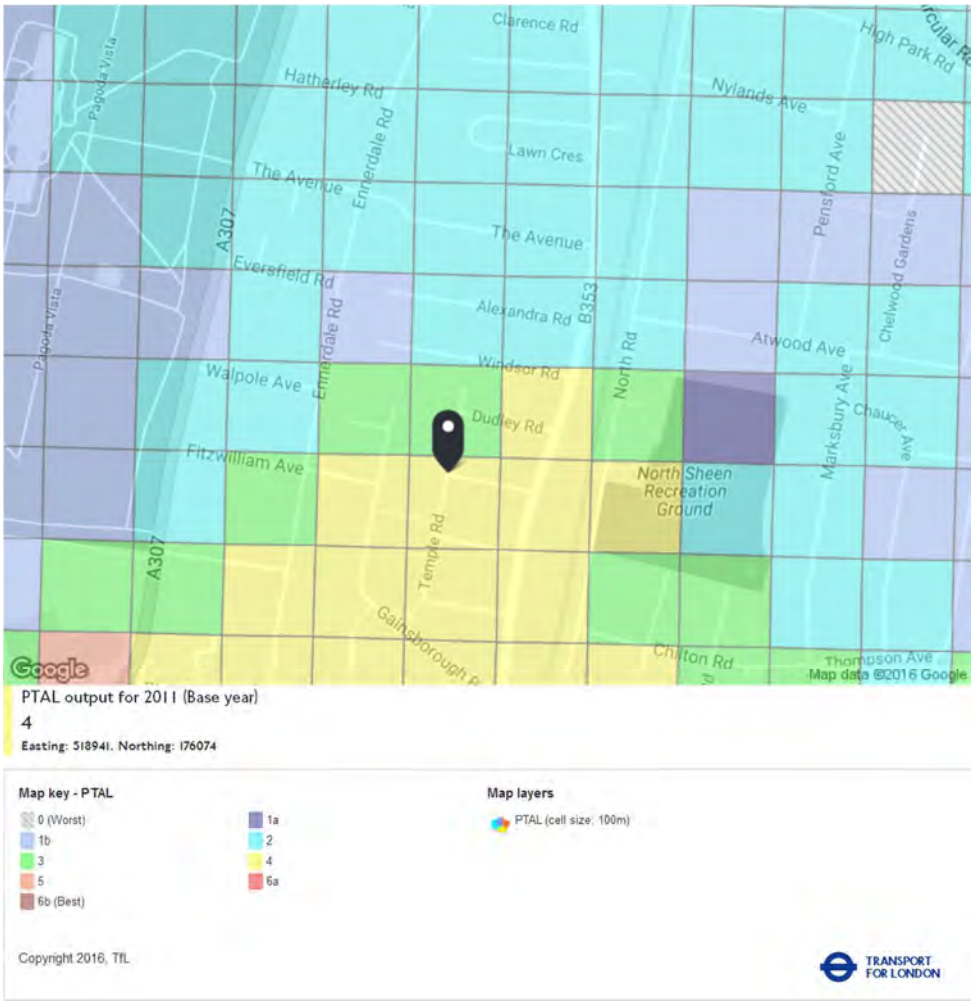


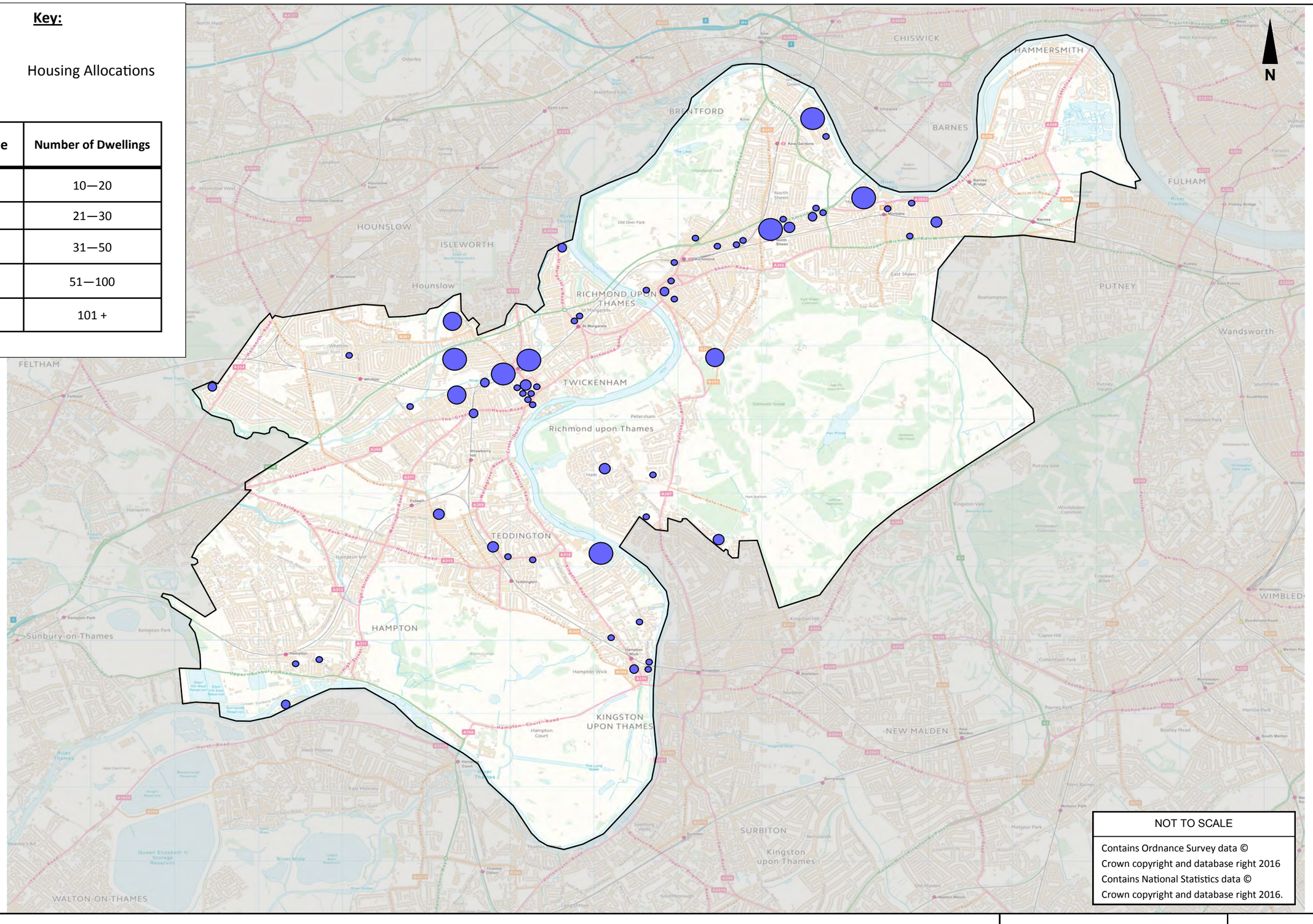
Figure A-3: WebCAT PTAL Map – Temple Road

Appendix B: LB Richmond-upon-Thames Strategic Housing Land Supply (2016-2026)

Key:

Housing Allocations

Shape Size	Number of Dwellings
●	10—20
●	21—30
●	31—50
●	51—100
●	101 +



NOT TO SCALE

London Borough of Richmond-upon-Thames Strategic Housing Land Supply of Major Sites (2016-2026)

Appendix B

AECOM

Appendix C: LB Richmond-upon-Thames Ward Boundaries

Key:

Ward Boundaries

BARNES

KEW

MORTLAKE AND BARNES COMMON

NORTH RICHMOND

SOUTH RICHMOND

EAST SHEEN

WHITTON

ST MARGARETS AND NORTH TWICKENHAM

TWICKENHAM RIVERSIDE

HEATHFIELD

WEST TWICKENHAM

SOUTH TWICKENHAM

HAM, PETERSHAM AND RICHMOND RIVERSIDE

HAMPTON NORTH

FULWELL AND HAMPTON HILL

HAMPTON WICK

TEDDINGTON

HAMPTON

NOT TO SCALE

London Borough of Richmond-upon-Thames Ward Boundaries

Appendix C

AECOM

Appendix D: PMCC Summary and Calculations

Pearson's Product-Moment Correlation Coefficient

The Pearson's Product-Moment Correlation Coefficient (PMCC) is a statistical measure which can be used to signify the strength of a **linear relationship** between two different variables. The PMCC provides a value between -1 and +1, where positive values denote positive linear correlations and vice-versa. A value of 0 denotes no linear correlation; although this does not necessarily imply that there is no relationship between the variables e.g. there may be a non-linear correlation. The detailed calculations used to inform the PMCC are set out further below for each of the characteristics which have been tested as part of this study. **Table D-1** below illustrates how the PMCC can be interpreted.

Table D-1: PMCC Values

PMCC	Strength of Linear Correlation
0.00 – 0.20	Very Weak
0.20 – 0.40	Weak
0.40 – 0.60	Moderate
0.60 – 0.80	Strong
0.80 – 1.00	Very Strong

The PMCC has been used for indicative purposes only and to inform the interpretation of the results when comparing each pair of characteristics. It should be noted that the existence of a correlation also does not necessarily imply that there is a causal link between the variables, as there could be other characteristics which influence these patterns.

The formula for calculating the PMCC value is as follows, where **x** and **y** each represent one of the tested characteristics, and **n** represents the number of data pairs i.e. equivalent to the number of wards:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

The results have been presented for the following characteristics which have been compared across the 18 wards within the London Borough of Richmond-upon-Thames:

- PTAL and car ownership;
- Car ownership and % car drivers (2011 Census Journey to Work);
- PTAL and % users of public transport (2011 Census Journey to Work);
- Car ownership and % dwellings with 5+ rooms;
- Car ownership and % houses; and
- Car ownership and % owned households.

The calculations and results have been presented over the next few pages.

PTAL and Car Ownership

n	Car Ownership	PTAL	xy	x^2	y^2
1	1.25	1.3	1.62	1.55	1.69
2	1.23	1.1	1.35	1.50	1.21
3	1.21	1.4	1.69	1.45	1.96
4	1.17	1.2	1.40	1.37	1.44
5	1.14	1.9	2.16	1.30	3.61
6	1.13	2.4	2.72	1.28	5.76
7	1.13	1.5	1.70	1.28	2.25
8	1.13	2.0	2.26	1.27	4.00
9	1.10	2.0	2.21	1.22	4.00
10	1.08	2.2	2.39	1.18	4.84
11	1.05	1.6	1.68	1.11	2.56
12	1.02	2.2	2.25	1.05	4.84
13	1.01	1.1	1.11	1.02	1.21
14	1.01	2.3	2.32	1.02	5.29
15	0.92	3.2	2.95	0.85	10.24
16	0.92	3.3	3.05	0.85	10.89
17	0.90	2.3	2.07	0.81	5.29
18	0.88	4.1	3.62	0.78	16.81
Sum (∑)	19.29	37.1	38.56	20.90	87.89

r = -0.77

Car Ownership and % Car Drivers (2011 Census Journey to Work)

n	Car Ownership	% Car Drivers	xy	x^2	y^2
1	1.25	0.48	0.59	1.55	0.23
2	1.23	0.53	0.66	1.50	0.29
3	1.21	0.47	0.57	1.45	0.22
4	1.17	0.56	0.66	1.37	0.32
5	1.14	0.44	0.50	1.30	0.19
6	1.13	0.36	0.41	1.28	0.13
7	1.13	0.28	0.31	1.28	0.08
8	1.13	0.42	0.47	1.27	0.17
9	1.10	0.33	0.36	1.22	0.11
10	1.08	0.37	0.40	1.18	0.13
11	1.05	0.37	0.39	1.11	0.14
12	1.02	0.23	0.24	1.05	0.05
13	1.01	0.36	0.36	1.02	0.13
14	1.01	0.28	0.29	1.02	0.08
15	0.92	0.29	0.27	0.85	0.08
16	0.92	0.27	0.25	0.85	0.07
17	0.90	0.23	0.21	0.81	0.05
18	0.88	0.24	0.21	0.78	0.06
Sum (∑)	19.29	6.50	7.13	20.90	2.53

r = +0.83

PTAL and % Users of Public Transport (2011 Census Journey to Work)

n	PTAL	% Public Transport	xy	x^2	y^2
1	4.1	0.34	1.38	16.81	0.11
2	3.3	0.32	1.05	10.89	0.10
3	3.2	0.34	1.07	10.24	0.11
4	2.4	0.27	0.64	5.76	0.07
5	2.3	0.37	0.84	5.29	0.13
6	2.3	0.44	1.01	5.29	0.19
7	2.2	0.49	1.07	4.84	0.24
8	2.2	0.36	0.79	4.84	0.13
9	2	0.48	0.97	4.00	0.23
10	2	0.43	0.85	4.00	0.18
11	1.9	0.41	0.77	3.61	0.16
12	1.6	0.53	0.85	2.56	0.28
13	1.5	0.41	0.61	2.25	0.17
14	1.4	0.52	0.73	1.96	0.28
15	1.3	0.51	0.67	1.69	0.26
16	1.2	0.53	0.63	1.44	0.28
17	1.1	0.56	0.61	1.21	0.31
18	1.1	0.59	0.65	1.21	0.35
Sum (∑)	37.1	7.87	15.20	87.89	3.59

r = -0.79

Car ownership and % Dwellings with 5+ Rooms

n	Car Ownership	% 5+ Rooms	xy	x^2	y^2
1	1.21	0.75	0.90	1.45	0.56
2	1.14	0.67	0.76	1.30	0.44
3	1.13	0.67	0.75	1.28	0.44
4	1.23	0.66	0.80	1.50	0.43
5	1.25	0.65	0.81	1.55	0.42
6	1.13	0.62	0.70	1.27	0.39
7	1.13	0.60	0.68	1.28	0.37
8	1.17	0.56	0.66	1.37	0.32
9	1.10	0.61	0.67	1.22	0.37
10	1.01	0.61	0.61	1.02	0.37
11	1.02	0.61	0.63	1.05	0.38
12	1.08	0.55	0.59	1.18	0.30
13	0.92	0.54	0.50	0.85	0.29
14	1.01	0.54	0.54	1.02	0.29
15	0.90	0.51	0.46	0.81	0.26
16	1.05	0.49	0.52	1.11	0.24
17	0.92	0.45	0.41	0.85	0.20
18	0.88	0.45	0.40	0.78	0.20
Sum (∑)	19.29	10.54	11.42	20.90	6.28

r = +0.79

Car Ownership and % Houses

n	Car Ownership	% Houses	xy	x^2	y^2
1	1.21	0.78	0.95	1.45	0.61
2	1.14	0.75	0.86	1.30	0.57
3	1.13	0.70	0.79	1.28	0.49
4	1.23	0.75	0.91	1.50	0.56
5	1.25	0.73	0.90	1.55	0.53
6	1.13	0.67	0.75	1.27	0.44
7	1.13	0.67	0.76	1.28	0.45
8	1.17	0.73	0.86	1.37	0.54
9	1.10	0.59	0.65	1.22	0.35
10	1.01	0.57	0.57	1.02	0.32
11	1.02	0.58	0.59	1.05	0.33
12	1.08	0.55	0.59	1.18	0.30
13	0.92	0.58	0.54	0.85	0.34
14	1.01	0.54	0.54	1.02	0.29
15	0.90	0.50	0.45	0.81	0.25
16	1.05	0.48	0.51	1.11	0.23
17	0.92	0.40	0.37	0.85	0.16
18	0.88	0.41	0.36	0.78	0.17
Sum (∑)	19.29	10.98	11.97	20.90	6.93

r = +0.88

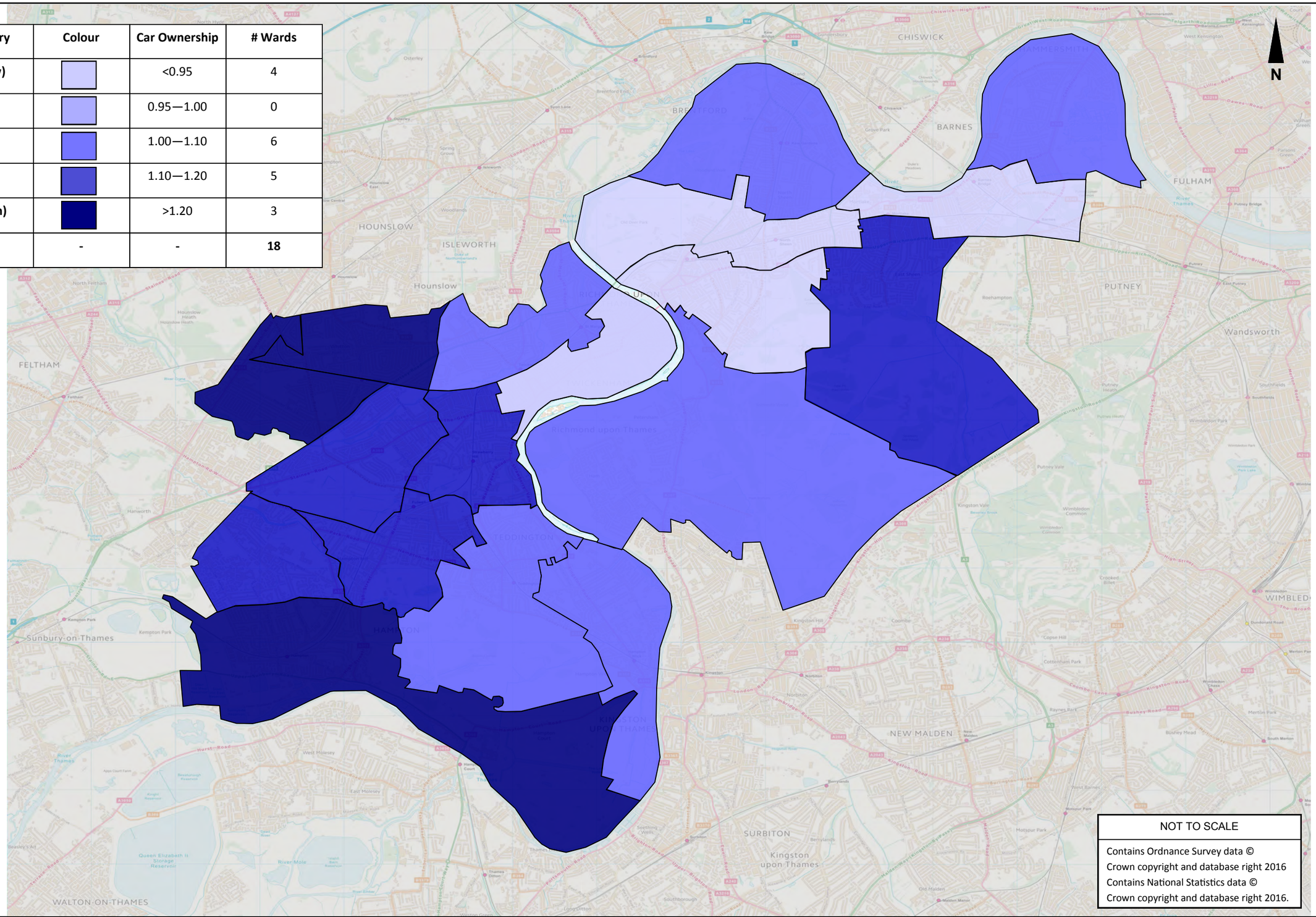
Car Ownership and % Owned Households

n	Car Ownership	% Owned	xy	x^2	y^2
1	1.21	0.74	0.89	1.45	0.54
2	1.14	0.72	0.82	1.30	0.51
3	1.13	0.70	0.79	1.28	0.49
4	1.23	0.65	0.80	1.50	0.43
5	1.25	0.68	0.85	1.55	0.46
6	1.13	0.72	0.81	1.27	0.51
7	1.13	0.71	0.80	1.28	0.50
8	1.17	0.62	0.73	1.37	0.39
9	1.10	0.68	0.75	1.22	0.47
10	1.01	0.60	0.60	1.02	0.36
11	1.02	0.57	0.59	1.05	0.33
12	1.08	0.66	0.72	1.18	0.44
13	0.92	0.57	0.52	0.85	0.32
14	1.01	0.60	0.61	1.02	0.36
15	0.90	0.58	0.52	0.81	0.34
16	1.05	0.62	0.66	1.11	0.39
17	0.92	0.58	0.53	0.85	0.33
18	0.88	0.51	0.46	0.78	0.27
Sum (∑)	19.29	11.51	12.44	20.90	7.43

r = +0.82

Appendix E: Car Ownership Levels

Category	Colour	Car Ownership	# Wards
1 (Low)		<0.95	4
2		0.95—1.00	0
3		1.00—1.10	6
4		1.10—1.20	5
5 (High)		>1.20	3
Total	-	-	18



London Borough of Richmond-upon-Thames

2011 Census - Car Ownership by Ward (Average Vehicles/Dwelling)

Appendix E

AECOM

Appendix F: PTAL Maps

Key:

PTALs

- 6a (Excellent)
- 5 (Very Good)
- 4 (Good)
- 3 (Moderate)

N

NOT TO SCALE

London Borough of Richmond-upon-Thames

Public Transport Accessibility Levels 3– 6

Appendix F

AECOM

Appendix G: Average PTAL Calculations

Baseline Average Ward PTAL (2011)

The average baseline PTAL of each ward for 2011 has been set out in **Table G-1**. This has been informed by an assessment of the average PTAL coverage (by band) for populated areas.

Table G-1: Calculations of Baseline Average Ward PTAL (2011)

Ward	# Dwellings (2011)	Typical PTAL Range	PTAL						Average PTAL
			1	2	3	4	5	6	
South Richmond	5,168	4 to 6	10%	20%	10%	10%	10%	40%	4.1
North Richmond	4,771	3 to 5		40%	20%	20%	10%	10%	3.3
Twickenham Riverside	4,825	3 to 5		20%	50%	20%	10%		3.2
South Twickenham	4,015	2 to 3	10%	50%	30%	10%			2.4
Mortlake and Barnes Common	4,940	2 to 3	10%	50%	40%				2.3
Kew	4,960	2 to 3	20%	40%	30%	10%			2.3
Teddington	4,615	2 to 3	20%	40%	40%				2.2
Barnes	4,296	2 to 3	20%	40%	40%				2.2
Fulwell and Hampton Hill	4,250	2	20%	60%	20%				2
St Margarets and North Twickenham	4,576	2	20%	60%	20%				2
West Twickenham	4,280	1 to 2	30%	50%	20%				1.9
Hampton Wick	4,434	1 to 2	50%	40%	10%				1.6
East Sheen	4,151	1 to 2	50%	50%					1.5
Whitton	3,814	1 to 2	60%	40%					1.4
Hampton	4,108	1 to 2	70%	30%					1.3
Hampton North	4,077	1	80%	20%					1.2
Heathfield	3,918	1	90%	10%					1.1
Ham, Petersham and Richmond Riverside	4,450	1	90%	10%					1.1
Borough-Wide	79,648	**-**	**35%**	**37%**	**19%**	**4%**	**2%**	**3%**	**2.1**

Projected Average Ward PTAL (2021)

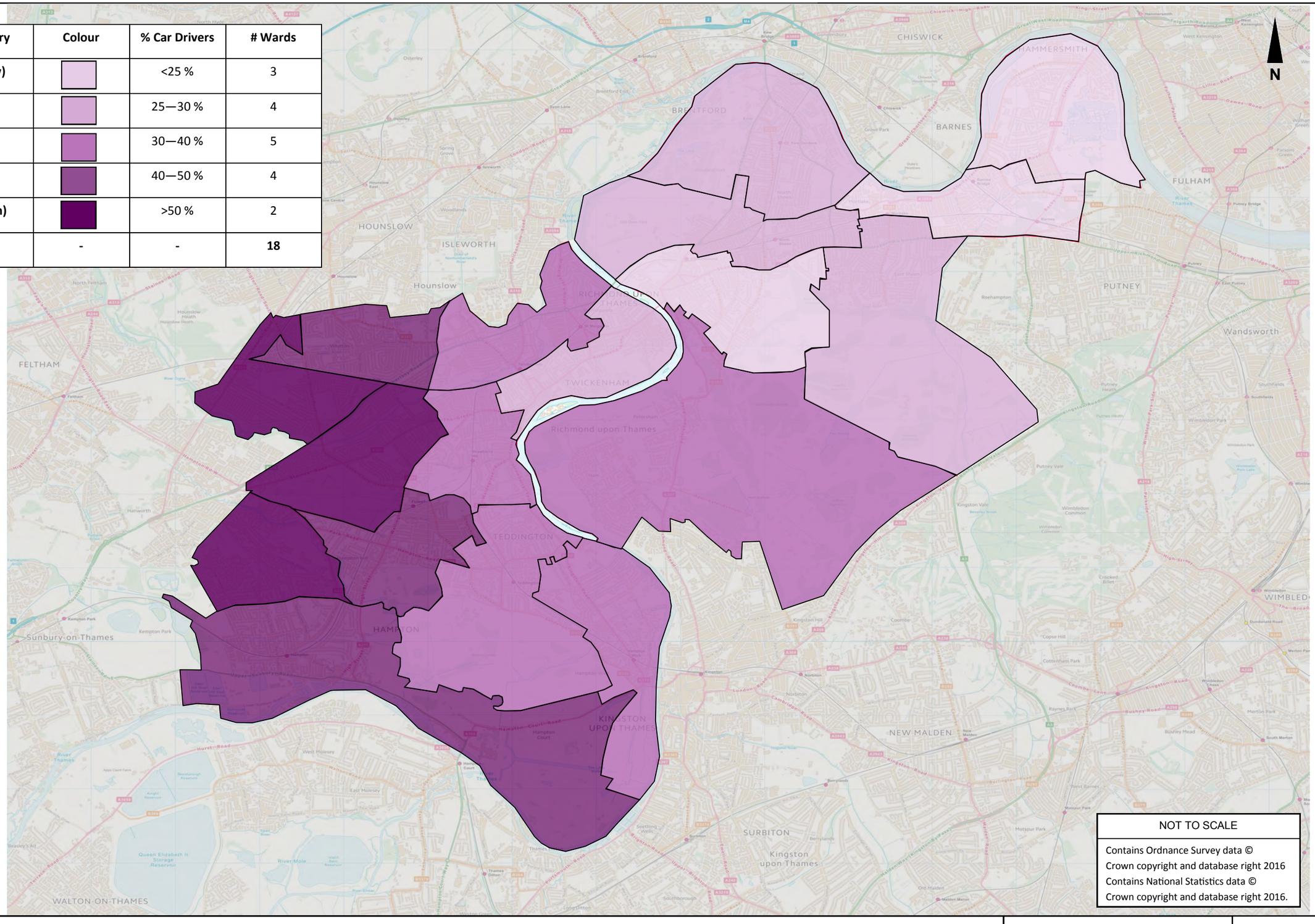
The average projected PTAL of each ward for 2021 has been set out in **Table G-2** utilising the same methodology as before.

Table G-2: Calculations of Projected Average Ward PTAL (2021)

Ward	Typical PTAL Range	PTAL						Average PTAL
		1	2	3	4	5	6	
South Richmond	4 to 6	10%	10%	10%	10%	10%	50%	4.5 (**+0.4**)
North Richmond	3 to 5		25%	25%	20%	15%	15%	3.7 (**+0.4**)
Twickenham Riverside	3 to 5		20%	40%	25%	10%	5%	3.4 (**+0.2**)
South Twickenham	2 to 3	10%	50%	30%	10%			2.4
Mortlake and Barnes Common	2 to 3	10%	30%	50%	10%			2.6 (**+0.3**)
Kew	2 to 3	5%	10%	65%	20%			3.0 (**+0.7**)
Teddington	2 to 3	20%	40%	40%				2.2
Barnes	2 to 3	20%	30%	50%				2.3 (**+0.1**)
Fulwell and Hampton Hill	2	20%	60%	20%				2
St Margarets and North Twickenham	2	20%	60%	20%				2
West Twickenham	1 to 2	30%	50%	20%				1.9
Hampton Wick	1 to 2	50%	40%	10%				1.6
East Sheen	1 to 2	50%	40%	10%				1.6 (**+0.1**)
Whitton	1 to 2	60%	40%					1.4
Hampton	1 to 2	70%	30%					1.3
Hampton North	1	80%	20%					1.2
Heathfield	1	90%	10%					1.1
Ham, Petersham and Richmond Riverside	1	90%	10%					1.1
Borough-Wide	**-**	**33%**	**32%**	**23%**	**6%**	**2%**	**4%**	**2.2 (+0.1)**

Appendix H: 2011 Census Journey to Work – Mode Share - % Car Drivers

Category	Colour	% Car Drivers	# Wards
1 (Low)		<25 %	3
2		25—30 %	4
3		30—40 %	5
4		40—50 %	4
5 (High)		>50 %	2
Total	-	-	18



NOT TO SCALE

London Borough of Richmond-upon-Thames

2011 Census Journey to Work – Mode Share - % Car Drivers

Appendix H

AECOM

Appendix I: Comparisons with Census Journey to Work Travel Patterns

Comparison of Average Car Ownership and Car Drivers

Figure I-1 below compares the average levels of car ownership against the proportion of residents commuting as a car driver (relative to all modes) from each of the 18 wards within LB Richmond-upon-Thames based on the 2011 Census.

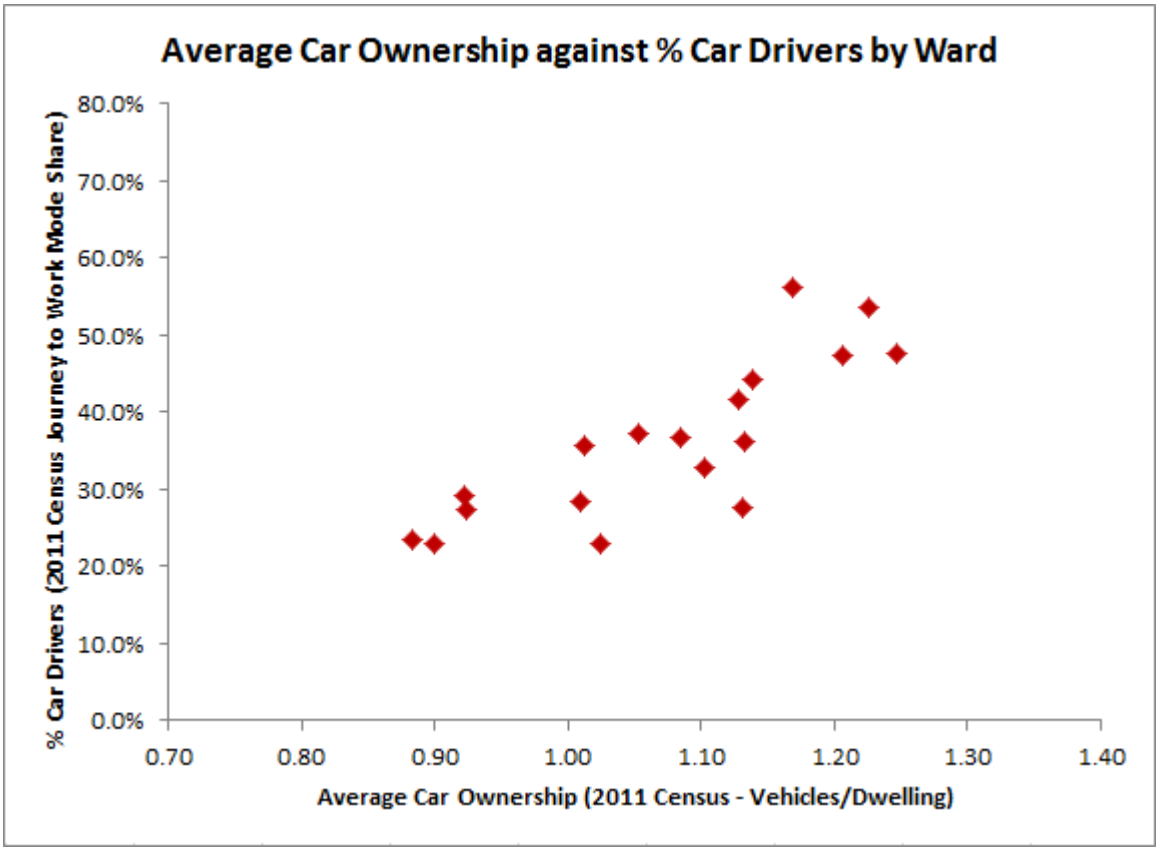


Figure I-1: Average Car Ownership against % Car Drivers (by Ward)

The Pearson's PMCC (see **Appendix D**) indicates a very strong positive correlation ($r = +\mathbf{0.83}$, $N = 18$, $p < 0.001$) between these variables indicating that the proportion of residents commuting as a car driver tends to be higher in areas where car ownership levels are higher.

Comparison of Average PTAL and Use of Public Transport

Figure I-2 below compares the average PTAL against the proportion of residents commuting by public transport from each of the 18 wards within LB Richmond-upon-Thames based on the 2011 Census.

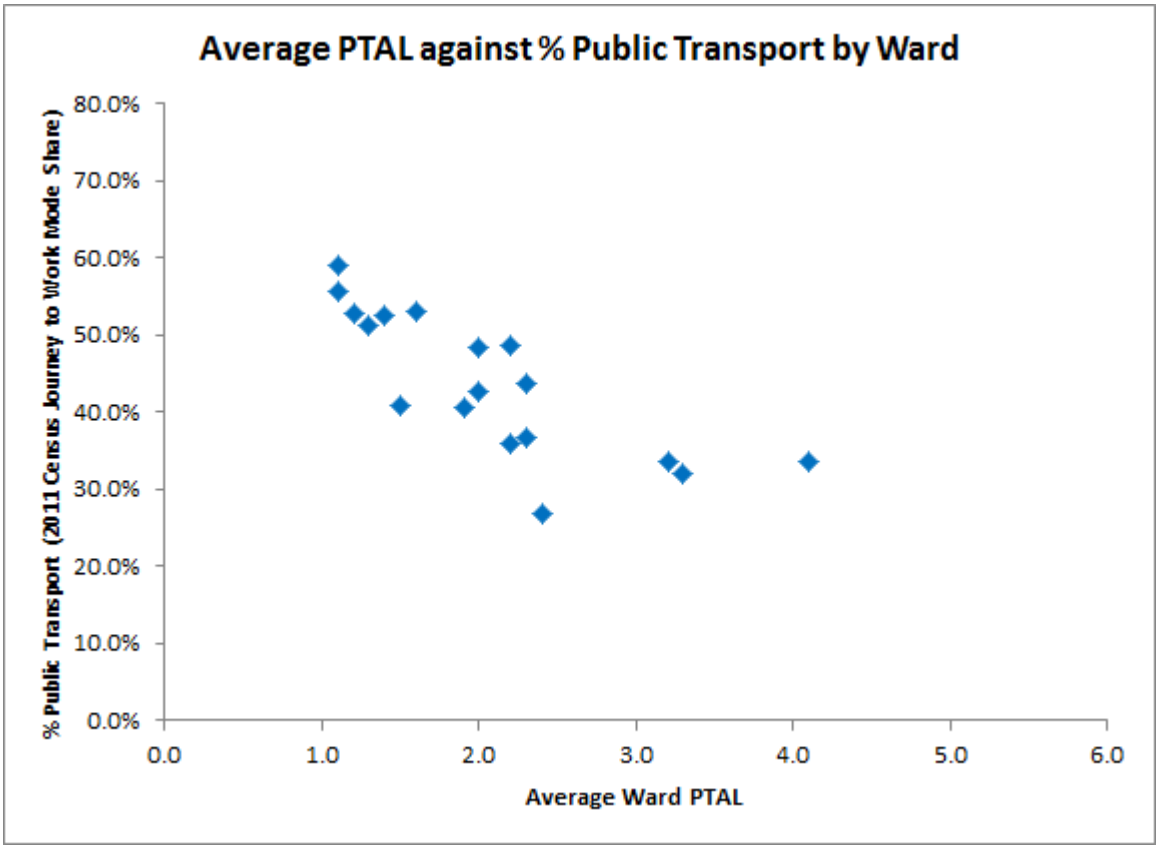


Figure I-2: Average PTAL against % Public Transport (by Ward)

The Pearson's PMCC (see **Appendix D**) indicates a strong negative correlation (r = -**0.79**, N = 18, p < 0.001) between these variables indicating that the proportion of residents commuting by public transport tends to be higher in areas with higher PTALs.

Appendix J: Car Ownership against Housing Size, Type and Tenure

Comparison of Car Ownership and Housing Size

Figure J-1 below compares the average levels of car ownership against average housing size based on the proportion of dwellings within each ward comprising five or more rooms as informed by the 2011 Census.

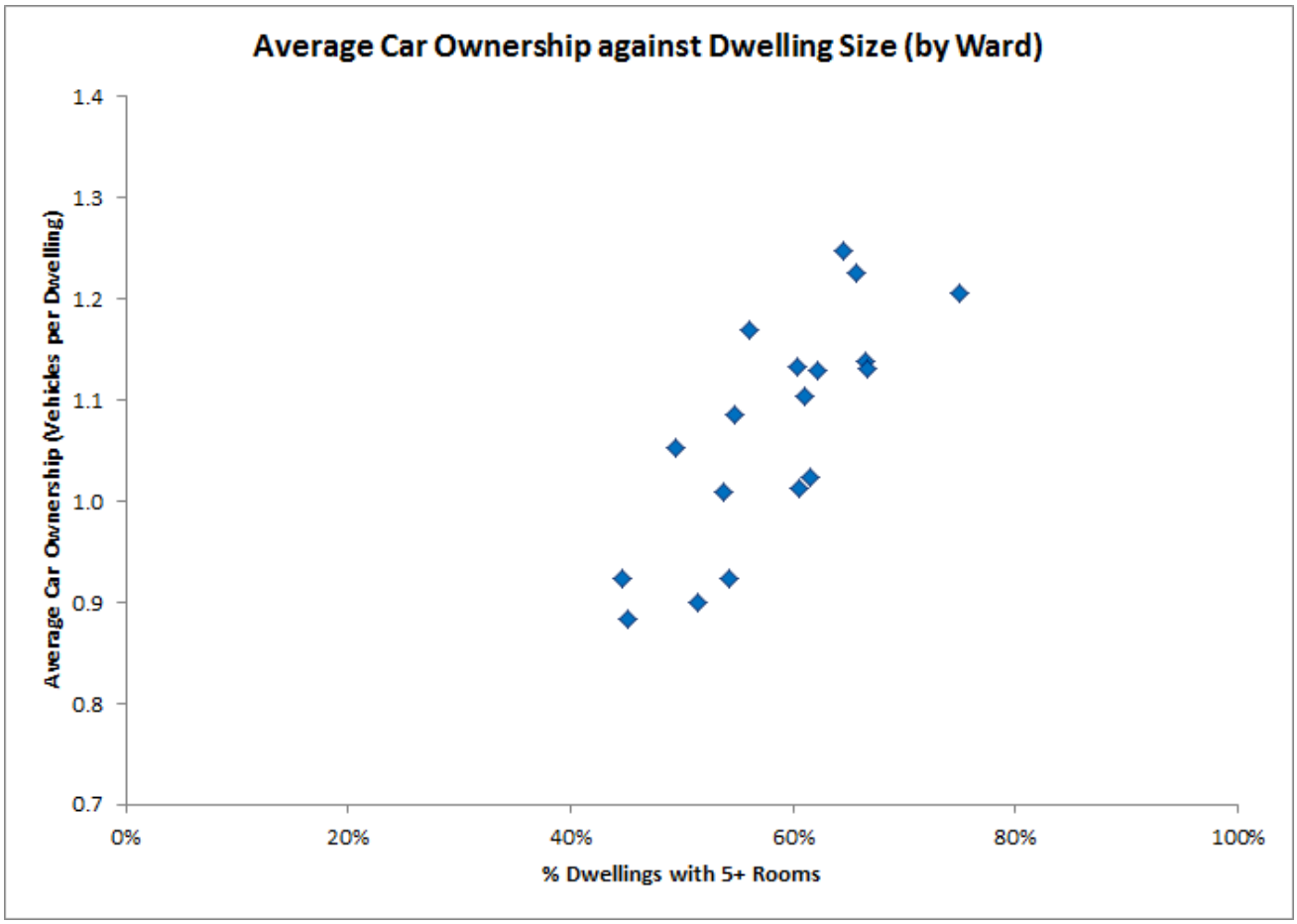


Figure J-1: Average Car Ownership against Dwelling Size (by Ward)

The Pearson's PMCC (see **Appendix D**) indicates a strong positive correlation ($r = +\mathbf{0.79}$, $N = 18$, $p < 0.001$) between these variables indicating that car ownership tends to be higher in areas which have a higher proportion of larger households.

Comparison of Car Ownership and Housing Type

Figure J-2 below compares the average levels of car ownership against average housing size based on the proportion of dwellings within each ward comprising five or more rooms as informed by the 2011 Census.

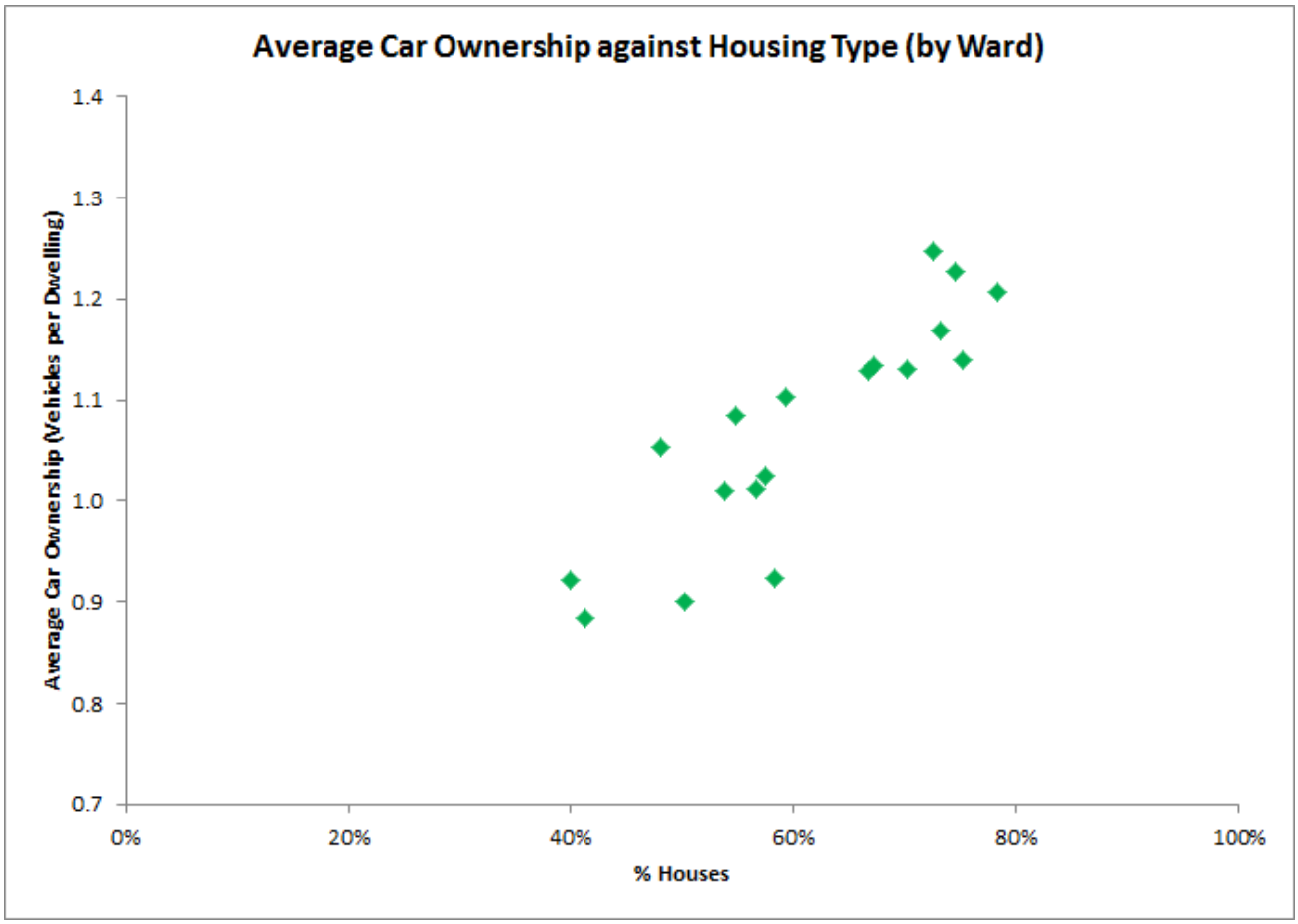


Figure J-2: Average Car Ownership against Housing Type (by Ward)

The Pearson's PMCC (see **Appendix D**) indicates a very strong positive correlation ($r = +\mathbf{0.88}$, $N = 18$, $p < 0.001$) between these variables indicating that car ownership tends to be higher in areas which have a higher proportion of houses.

Comparison of Car Ownership and Housing Tenure

Figure J-3 below compares the average levels of car ownership against average housing size based on the proportion of dwellings within each ward comprising five or more rooms as informed by the 2011 Census.

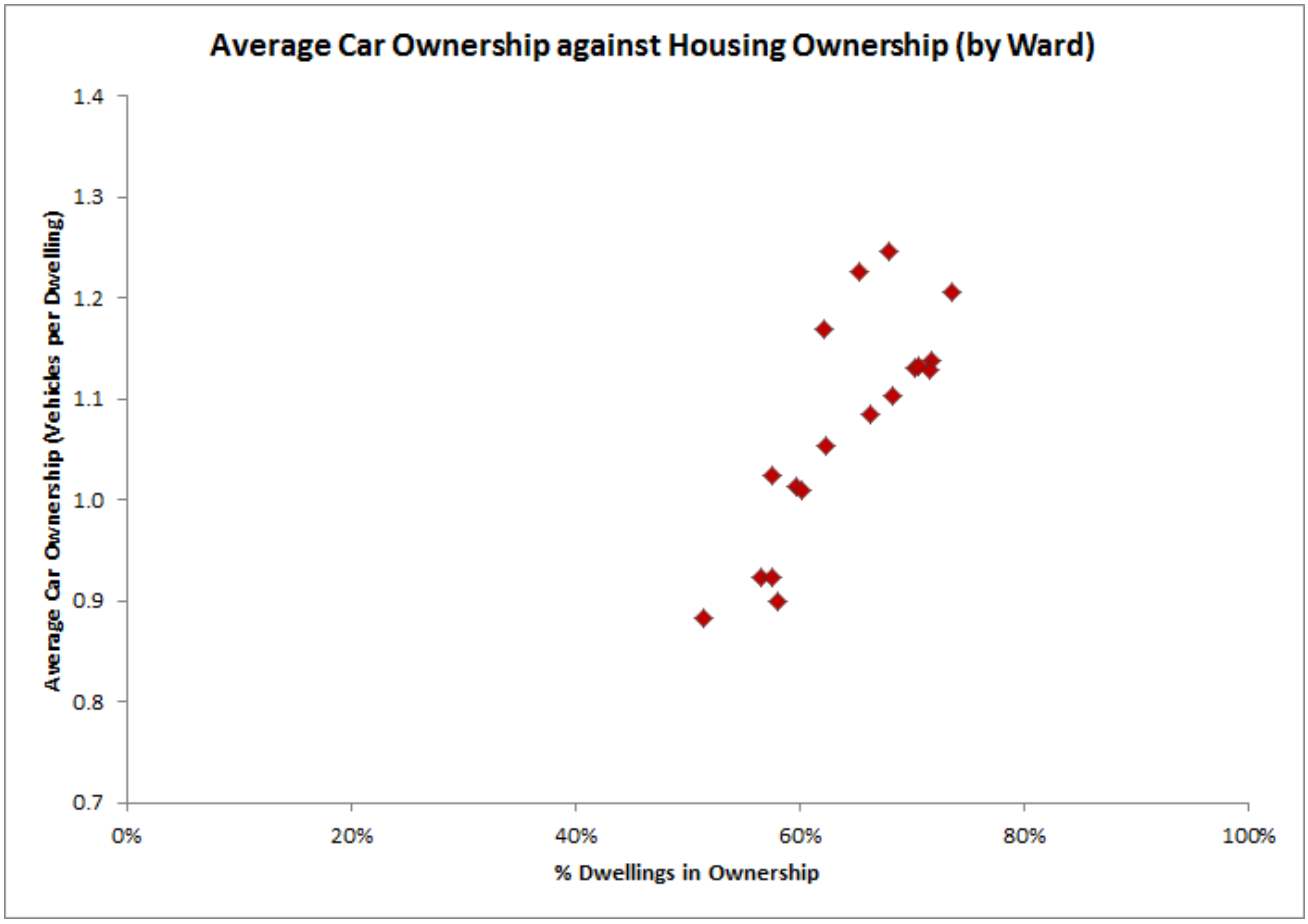


Figure J-3: Average Car Ownership against Housing Type (by Ward

The Pearson's PMCC (see **Appendix D**) indicates a very strong positive correlation (r = +**0.82**, N = 18, p < 0.001) between these variables indicating that car ownership tends to be higher in areas which have a higher proportion of owned households.

Appendix K: CPZs within LB Richmond-upon-Thames

Key:

Community Parking Zone (CPZ)

N

NOT TO SCALE

Community Parking Zones within the London Borough of Richmond-upon-Thames

Appendix K

AECOM

Appendix L: CPZ locations against PTAL

Key:

Community Parking Zone (CPZ)

PTALs

- **6a (Excellent)**
- **5 (Very Good)**
- **4 (Good)**
- **3 (Moderate)**

N

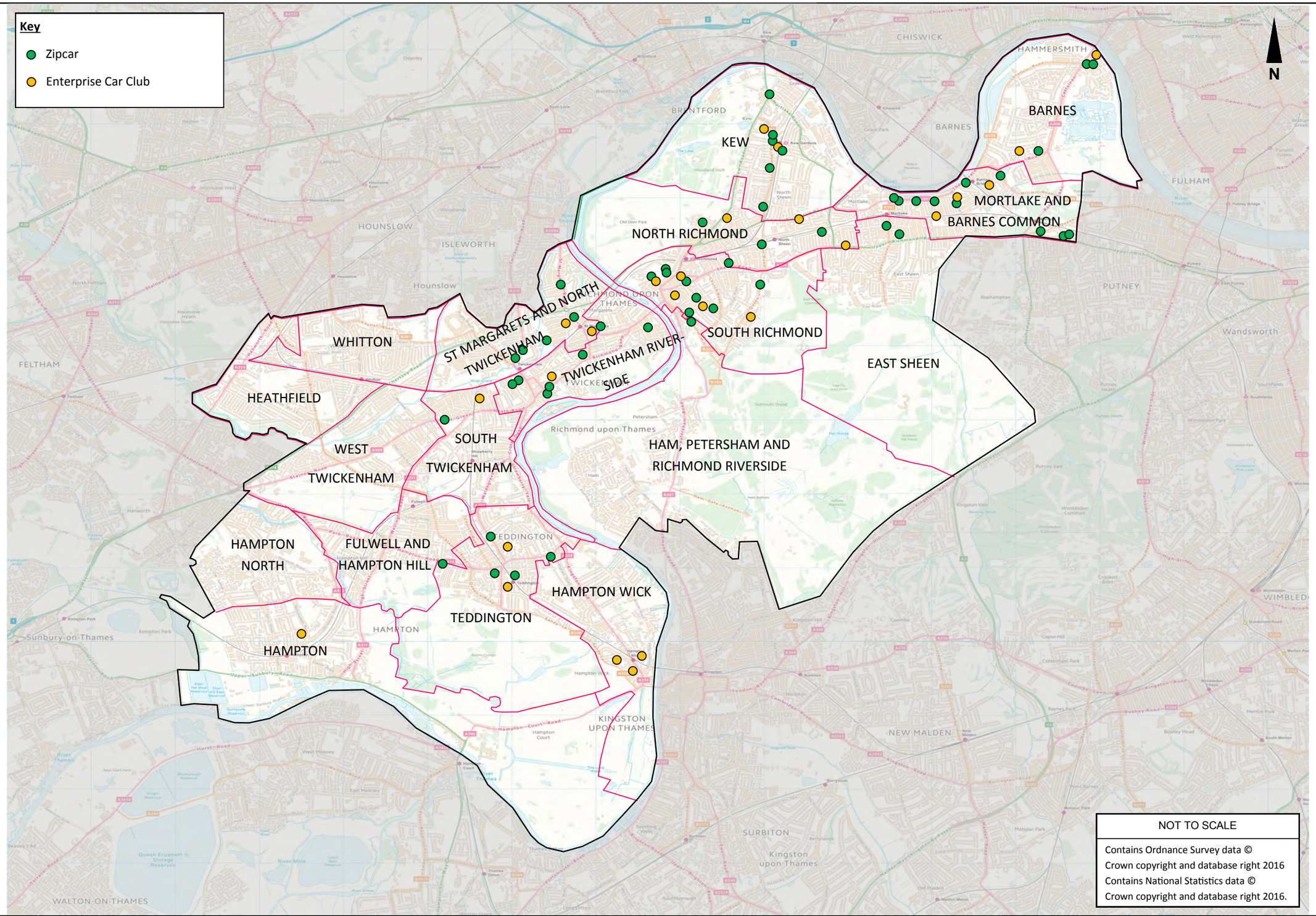
NOT TO SCALE

Comparison of CPZs and PTALs 3-6 within the London Borough of Richmond-upon-Thames

Appendix L

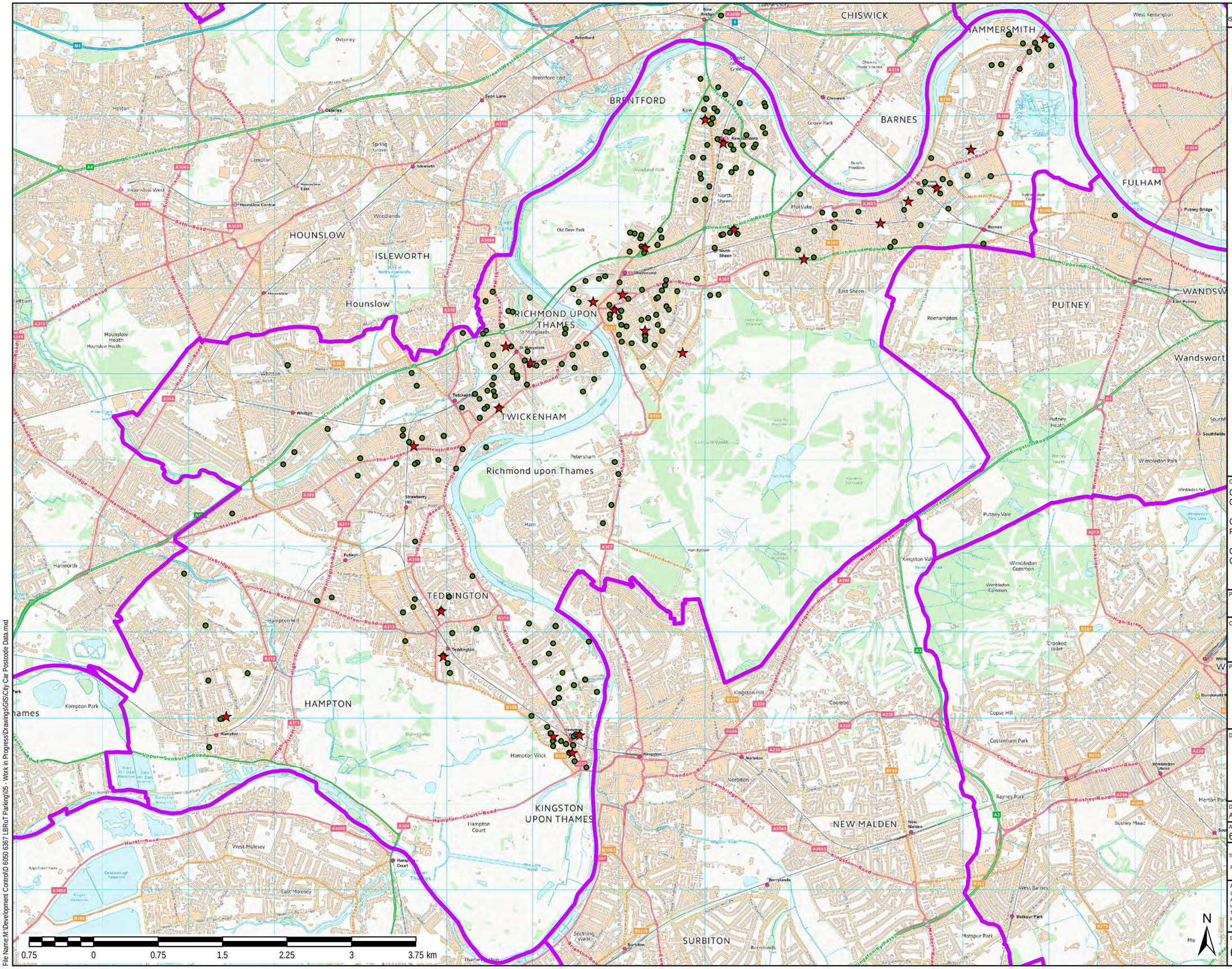
AECOM

Appendix M: Car Club Member and Bay Locations



London Borough of Richmond-upon-Thames Car Club Bay Locations

Appendix M



THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Vehicles
- Members
- Borough

Purpose of Issue
INFORMATION

Client
LONDON BOROUGH OF RICHMOND-UPON-THAMES

Project Title
LONDON BOROUGH OF RICHMOND-UPON-THAMES PARKING STANDARDS REVIEW

Drawing Title
ENTERPRISE CAR CLUB VEHICLE AND MEMBER LOCATIONS

Drawn	Checked	Approved	Date
AB	CR	CR	04/07/2016

AECOM Internal Project No.	Scale @ A3
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Alencon Link, Basingstoke
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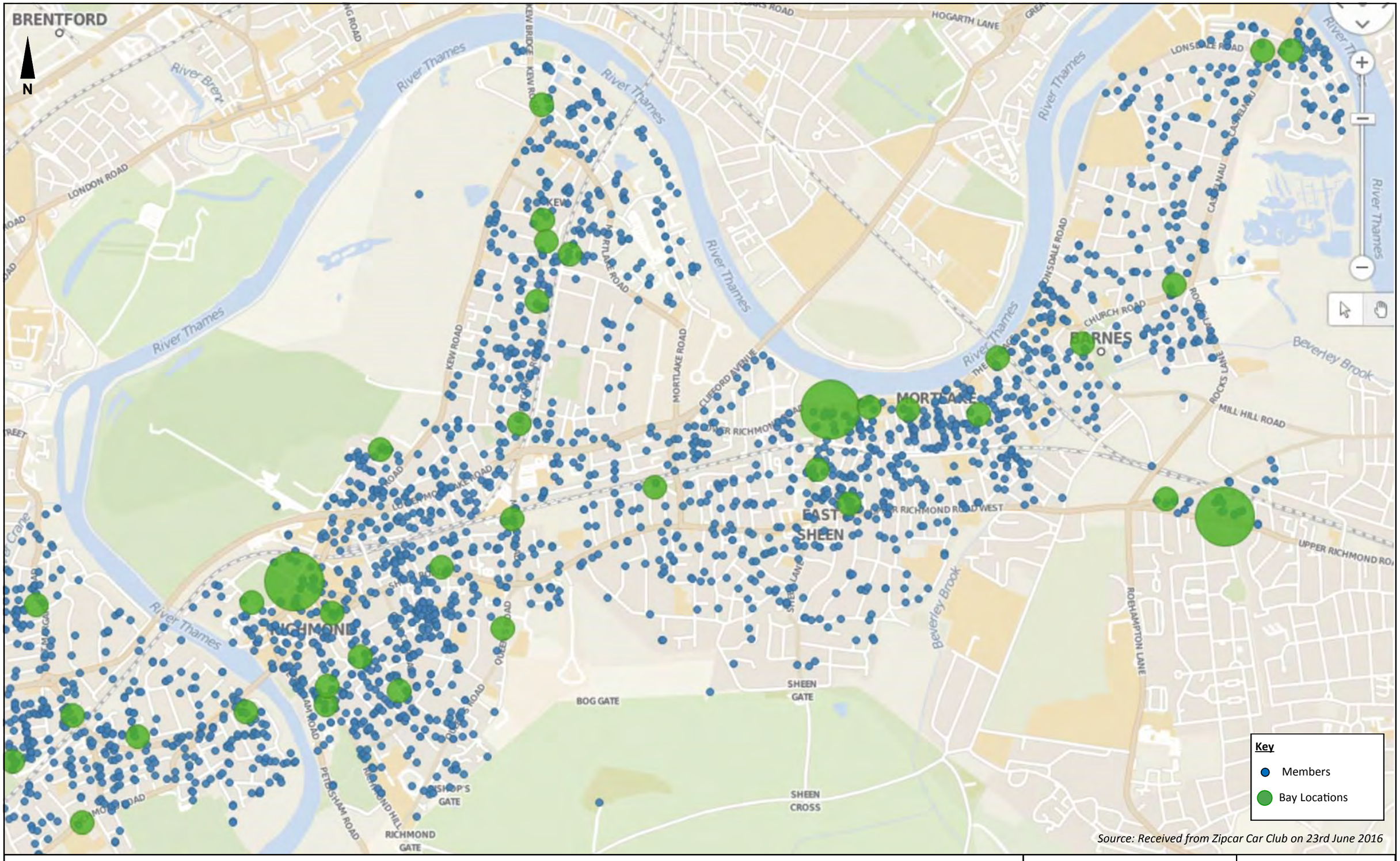
Drawing Number	Rev
60506367-001	A

File Name:M:\Development Control\D 6050 6367 LBRuT Parking\05 - Work in Progress\Drawings\GIS\City Car Postcode Data.mxd

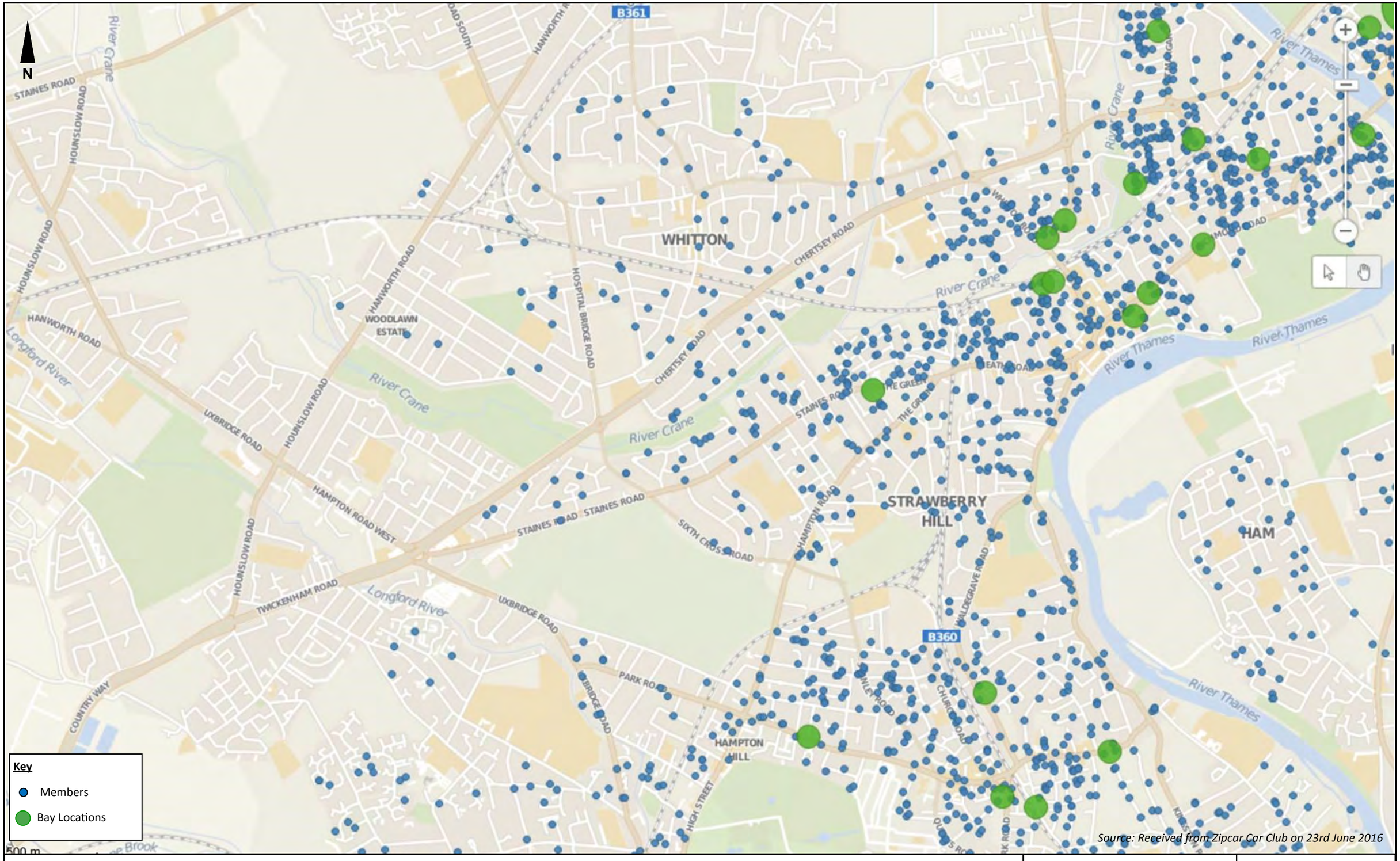


Source: Received from Zipcar Car Club on 23rd June 2016

London Borough of Richmond-upon-Thames
Zipcar Car Club Bay and Member Locations (Northeast)

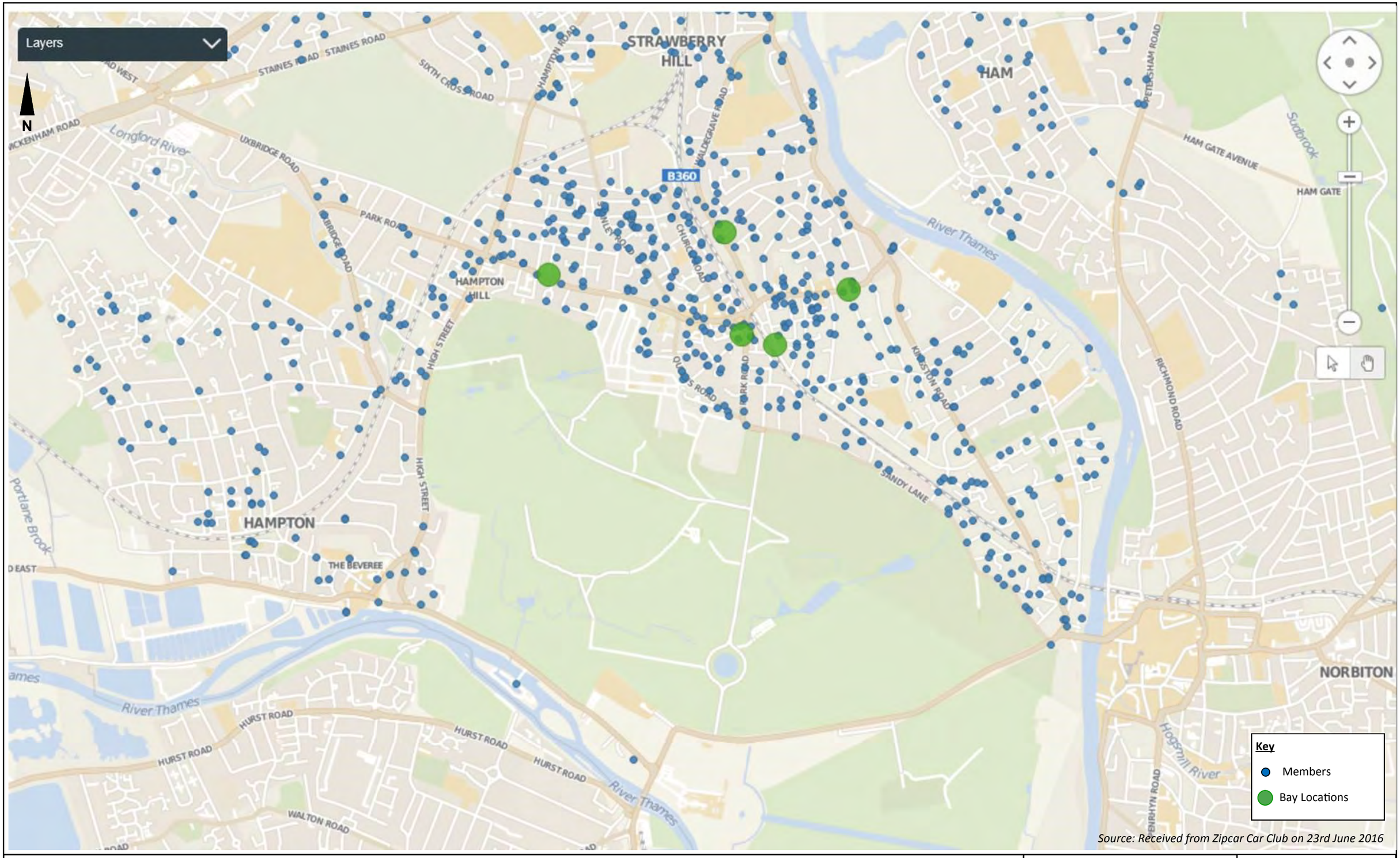
Appendix M

AECOM



London Borough of Richmond-upon-Thames
Zipcar Car Club Bay and Member Locations (West)

Appendix M



Source: Received from Zipcar Car Club on 23rd June 2016

London Borough of Richmond-upon-Thames
Zipcar Car Club Bay and Member Locations (South)

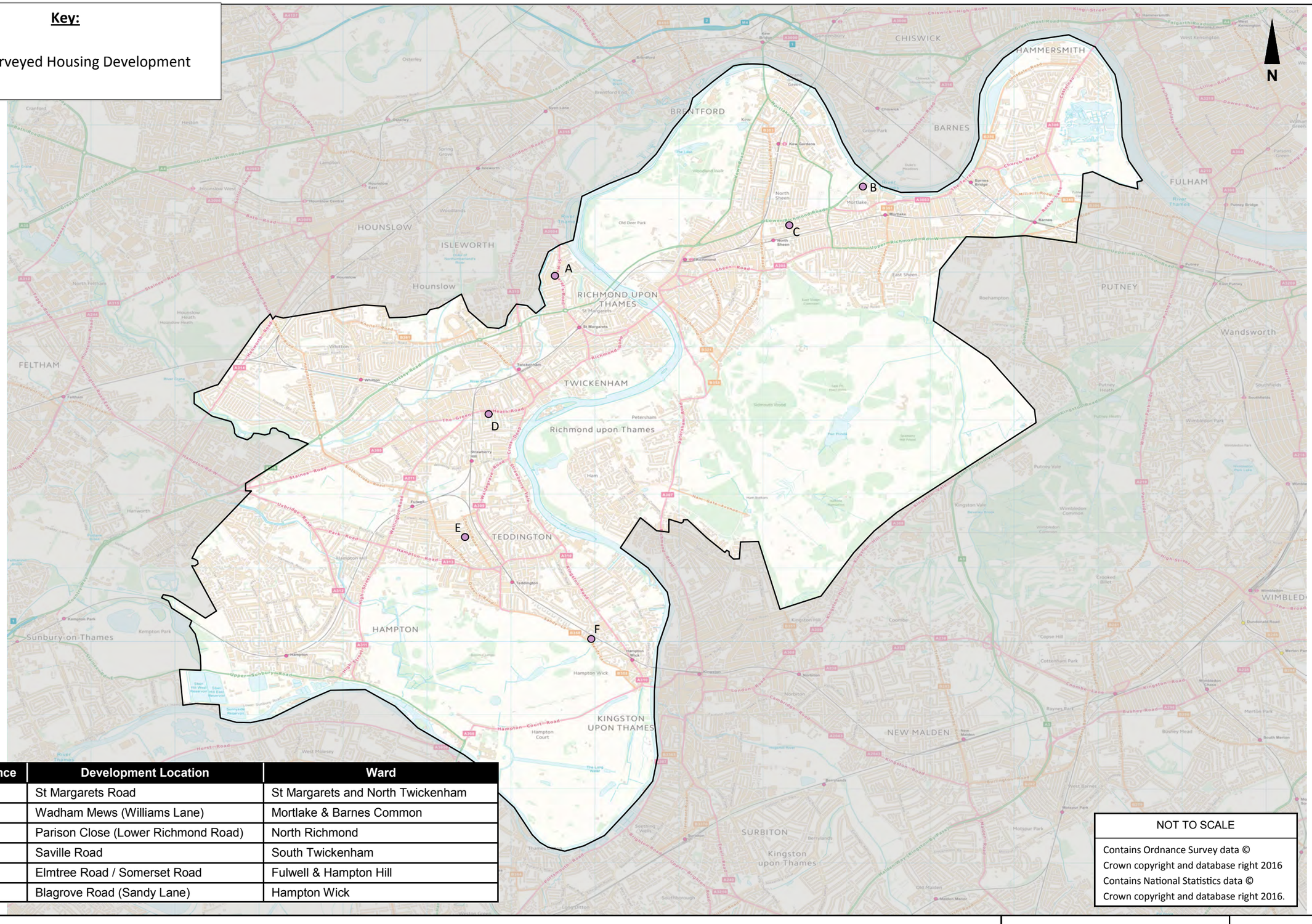
Appendix M

AECOM

Appendix N: Recently Completed Housing Development Survey Locations

Key:

Surveyed Housing Development



Site Reference	Development Location	Ward
A	St Margarets Road	St Margarets and North Twickenham
B	Wadham Mews (Williams Lane)	Mortlake & Barnes Common
C	Parison Close (Lower Richmond Road)	North Richmond
D	Saville Road	South Twickenham
E	Elmtree Road / Somerset Road	Fulwell & Hampton Hill
F	Blagrove Road (Sandy Lane)	Hampton Wick

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London Borough of Richmond-upon-Thames

Recently Completed Housing Development Survey Locations

Appendix N

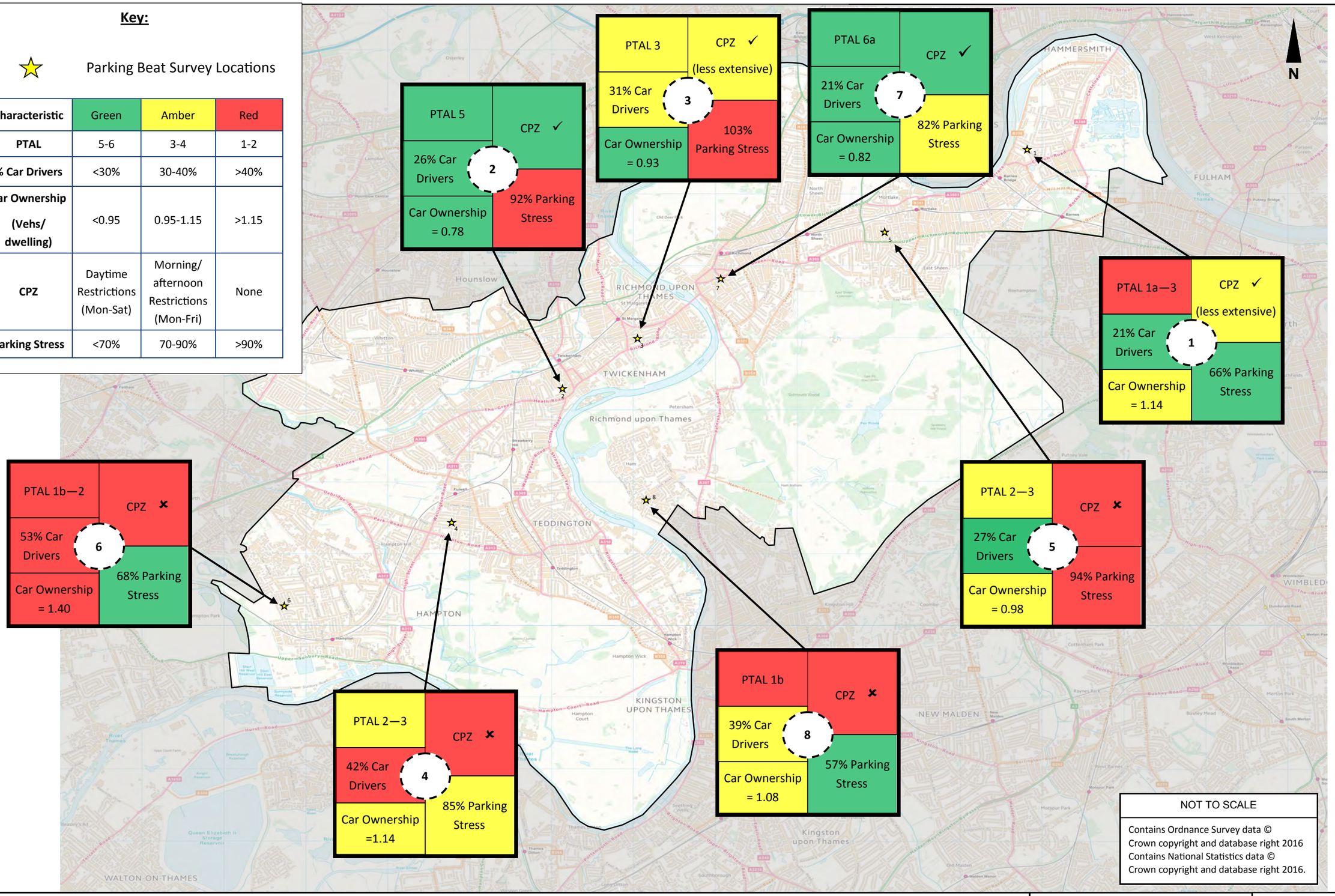
AECOM

Appendix O: Parking Beat Survey Locations

Key:

☆ Parking Beat Survey Locations

Characteristic	Green	Amber	Red
PTAL	5-6	3-4	1-2
% Car Drivers	<30%	30-40%	>40%
Car Ownership (Vehs/ dwelling)	<0.95	0.95-1.15	>1.15
CPZ	Daytime Restrictions (Mon-Sat)	Morning/ afternoon Restrictions (Mon-Fri)	None
Parking Stress	<70%	70-90%	>90%



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London Borough of Richmond-upon-Thames

Summary of Overnight Parking Beat Survey Results and Local Characteristics

Appendix O

AECOM

Appendix P: Parking Beat Survey Methodology Comparison

Introduction

A comparison has been undertaken between the LB Richmond-upon-Thames and LB Lambeth parking beat survey methodologies using the survey data collected as part of this study. To calculate the theoretical on-street car parking capacity of a study area, the LB Lambeth methodology adopts 5.0m as the average length of kerbline occupied by a vehicle (when parking parallel), whilst the LB Richmond-upon-Thames methodology uses 5.5m. As such, the theoretical on-street parking capacity of a study area would be expected to be approximately 10% lower using the LB Richmond-upon-Thames methodology. Conversely, the LB Lambeth methodology would be expected to result in approximately 10% lower average on-street parking stress levels. This has been examined further below in relation to the survey data and in terms of average vehicle spacing to determine which methodology can be considered to be more appropriate for estimating actual on-street parking capacity.

Further to the above, the LB Richmond-upon-Thames methodology adopts a 90% parking stress threshold as the level at which capacity is considered to be close to being reached and those locations where new developments should therefore make allowance for accommodating or restricting their parking demand so that on-street pressures are not further exacerbated. The LB Lambeth methodology adopts a lower 85% parking stress threshold which increases the scope for areas to fall within this category.

Parking Capacity and On-Street Parking Stress

A summary of the eight surveyed sites in terms of the available parking capacity of each site and average overnight on-street parking stress levels has been provided below in **Table P-1** based on both methodologies. Parking stress has been highlighted in red where it exceeds the thresholds identified above i.e. 90% for the LB Richmond-upon-Thames methodology and 85% for LB Lambeth.

Table P-1: Methodology Differences in Theoretical Capacity and On-Street Parking Stress

Site	Available Capacity (# of Vehicles)			Average Overnight On-Street Parking Stress (%)		
	Lambeth	Richmond	Difference	Lambeth	Richmond	Difference
1	695	636	-8.5%	59.9%	65.5%	+9.3%
2	336	305	-9.2%	83.5%	92.0%	+10.2%
3	515	439	-14.8%	87.7%	102.9%	+17.3%
4	848	759	-10.5%	76.2%	85.1%	+11.8%
5	541	490	-9.4%	85.8%	94.8%	+10.4%
6	701	621	-11.4%	60.5%	68.3%	+12.9%
7	188	173	-8.0%	75.4%	81.9%	+8.7%
8	847	769	-9.2%	51.8%	57.0%	+10.1%
Total	**4,671**	**4,192**	**-10.3%**	**72.6%**	**80.9%**	**+11.5%**

Table P-1 shows that the overall theoretical on-street car parking capacity of all eight sites is approximately 10% lower using the LB Richmond-upon-Thames methodology which is in line with expectations. This does however vary between 8.0% at Site 7 and 14.8% at Site 3 which is due to the differences in the capacity of each individual area and whether they tend to fall within a threshold which results additional capacity under the LB Lambeth methodology. For example, areas between 5.5-9.9m are considered to have a capacity of one vehicle under both methodologies, whilst sections between 10.0m-10.9m are considered to be able to accommodate one additional vehicle under the LB Lambeth methodology. This is more clearly illustrated within **Table P-2** for areas of unrestricted kerbline or discrete rows of parking bays up to 99.9m.

Table P-2: Methodology Differences in Theoretical Capacity based on Area Length

Area Length (m)	Capacity (# Vehicles)		Difference	
	Lambeth	Richmond	# Vehicles	%
0.1-4.9	0	0	0	0%
5.0-5.4	1	0	-1	-100%
5.5-9.9	1	1	0	0%
10.0-10.9	2	1	-1	-50%
11.0-14.9	2	2	0	0%
15.0-16.4	3	2	-1	-33%
16.5-19.9	3	3	0	0%
20.0-21.9	4	3	-1	-25%
22.0-24.9	4	4	0	0%
25.0-27.4	5	4	-1	-20%
27.5-29.9	5	5	0	0%
30.0-32.9	6	5	-1	-17%
33.0-34.9	6	6	0	0%
35.0-38.4	7	6	-1	-14%
38.5-39.9	7	7	0	0%
40.0-43.9	8	7	-1	-13%
44.0-44.9	8	8	0	0%
45.0-49.4	9	8	-1	-11%
49.5-49.9	9	9	0	0%
50.0-54.9	10	9	-1	-10%
55.0-59.9	11	10	-1	-9%
60.0-60.4	12	10	-2	-17%
60.5-64.9	12	11	-1	-8%
65.0-65.9	13	11	-2	-15%
66.0-69.9	13	12	-1	-8%
70.0-71.4	14	12	-2	-14%
71.5-74.9	14	13	-1	-7%
75.0-76.9	15	13	-2	-13%
77.0-79.9	15	14	-1	-7%
80.0-82.4	16	14	-2	-13%
82.5-84.9	16	15	-1	-6%
85.0-87.9	17	15	-2	-12%
88.0-89.9	17	16	-1	-6%
90.0-93.4	18	16	-2	-11%
93.5-94.9	18	17	-1	-6%
95.0-98.9	19	17	-2	-11%
99.0-99.9	19	18	-1	-5%

Table P-2 indicates that sites comprising a higher proportion of areas highlighted in grey will be more comparable in terms of capacity when applying the two methodologies e.g. Site 7, whereas those sites having a higher proportion of non-highlighted area lengths will have a much lower relative capacity under the LB Richmond-upon-Thames methodology e.g. Site 3. Based on the details set out in **Table P-2**, 27.4% of area lengths would result in no difference between the results, whilst 54.5% of areas would be considered to be able to accommodate one less vehicle under the LB Richmond-upon-Thames methodology, and two fewer vehicles for the remaining 18.1%.

The theoretical parking capacity of an area has an almost direct relationship with average on-street parking stress. Based on the results set out in **Table P-1** for all eight sites, the LB Richmond-upon Thames methodology results in an overall reduced capacity of 10.3%, which is equivalent to the LB Lambeth methodology resulting in an increased overall capacity of 11.4%. The LB Richmond-upon-Thames methodology results in a higher average parking stress of 11.5% across the eight sites which is therefore comparable. This relationship is also true for each of the eight individual sites e.g. for Site 3, the LB Lambeth methodology results in an increased on-street parking capacity of 17.3% which is equivalent to the increase in average parking stress under the LB Richmond-upon-Thames methodology (also 17.3%).

Lastly, the LB Richmond-upon-Thames methodology results in sites 2, 3 and 5 exceeding the parking stress threshold of 90% whilst the LB Lambeth methodology only results in sites 3 and 5 exceeding the threshold of 85%. It is therefore considered that the LB Richmond-upon-Thames methodology provides a more robust measure of parking stress which is echoed below.

Over-Capacity Areas

A comparison has been undertaken between the areas e.g. sections of kerbline or rows of bays, which were deemed to be over-capacity under each of the two methodologies. The results have been presented in **Table P-3** below.

Table P-3: Methodology Differences in Over-Capacity Areas

Site	Over-Capacity Sections		
	Lambeth	Richmond	Difference
1	23	31	+34.8%
2	12	26	+116.7%
3	30	58	+93.3%
4	19	38	+100.0%
5	16	26	+62.5%
6	29	54	+86.2%
7	20	28	+40.0%
8	17	24	+41.2%
Total	**166**	**285**	**+71.7%**

Table P-3 shows that the LB Richmond-upon-Thames methodology results in an additional 119 sections being classified as over-capacity across the eight sites which represents a 71.7% increase when compared to the LB Lambeth methodology. The majority of these areas were between 10-10.9m, 15-16.4m and 20-21.9m i.e. where the theoretical capacity is one vehicle less compared to the LB Lambeth methodology (see **Table P-2**). This demonstrates that calculations of on-street parking stress are particularly sensitive at the lower ends of the spectrum.

Average Vehicle Spacing

To determine the appropriateness of each methodology for estimating actual on-street parking capacity (and therefore parking stress), the average spacing of vehicles has been calculated across all eight sites for the most utilised areas. The following areas of kerbline have been included:

- At least 22m in length and therefore able to accommodate four or more vehicles under both methodologies; and
- At least 100% utilised to discount areas where gaps may exist and include those where vehicles would be parked more closely together.

A total of 30 areas have been included under the LB Lambeth methodology and 70 areas under the LB Richmond-upon-Thames methodology as a result of the above criteria. The results have been presented in **Table P-4**.

Table P-4: Average Vehicle Spacing based on Fully Utilised Areas by Methodology

Criteria	Lambeth	Richmond
# Areas ≥ 22m length	436	436
# Areas (≥ 22m) also ≥ 100% utilised	30	70
Applicable Areas (%)	6.9%	16.1%
Minimum Vehicle Spacing (Area Above Capacity)	4.0m	4.0m
Maximum Vehicle Spacing (Area 100% Utilised)	5.0m	5.5m
Average Vehicle Spacing	**4.7m**	**5.0m**
Vehicles Spaced 4.5-5.5m (%)	83.3%	92.9%

The results in **Table P-4** indicate that in those areas considered to be at or above full capacity, all vehicles parked at an average spacing of between 4.0m and 5.5m. The LB Richmond-upon-Thames provides the greatest dataset where the average vehicle spacing across the 70 sites was 5.0m. Furthermore, 92.9% of vehicles were parked at an average spacing of between 4.5-5.5m. Both methodologies result in similar parking utilisation results for individual bays (including disabled bays) which tend to be between 6.0-8.0m in length and therefore considered to be able to accommodate up to one vehicle in both cases.

On the basis of the above, it is considered that LB Lambeth's methodology (5.0m) provides a more accurate representation of vehicle spacing in highly utilised areas and therefore the actual on-street parking capacity and parking stress of a study area. Whilst the LB Richmond-upon-Thames methodology (5.5m) is considered to be robust, this is more likely to result in areas being classified as having reached capacity when in reality additional capacity exists for at least one additional vehicle e.g. a 10.5m length of kerbline could reasonably be expected to accommodate up to two vehicles, as opposed to just one. It is therefore recommended that the LB Lambeth methodology is adopted as follows:

- Calculate on-street parking capacity (and therefore parking stress) by adopting 5.0m as the average length of kerbline that would be expected to be occupied by a vehicle; and
- Identify areas which are considered to be close to reaching capacity by adopting a parking stress threshold of 85%.

It should be noted that retaining the 90% parking stress threshold would not be considered to provide a robust measure of parking stress given that on-street parking capacity would be expected to increase by around 10% when adopting the LB Lambeth methodology. This would for example result in none of the eight sites being identified as having high parking stress (see **Table P-1**) which would not provide a true reflection of reality i.e. for sites 3 and 5.

Summary

- The theoretical on-street parking capacity of a study area tends to be approximately 10% lower using the LB Richmond-upon-Thames methodology (5.5m average length occupied by a vehicle) compared to the LB Lambeth methodology (5.0m);
- This has an almost direct relationship with average on-street parking stress which tends to be approximately 10% lower using the LB Lambeth methodology;
- Parking stress levels are particularly sensitive to changes in theoretical parking capacity at the lower end of the spectrum i.e. for smaller kerbline lengths which have different capacities depending on the applied methodology;
- The average vehicle spacing across the 70 areas which were at least 22m in length and classified as at or over-capacity (based on the LB Richmond-upon-Thames methodology) was 5.0m;
- Both methodologies result in similar results for individual bays (such as disabled bays) which tend to be 6.0-8.0m in length and are therefore able to accommodate up to one vehicle.
- Whilst the LB Richmond-upon-Thames methodology provides a more robust measure of parking capacity (and therefore parking stress), it is considered that the LB Lambeth methodology provides a more accurate representation of vehicle spacing in highly utilised areas and therefore the actual on-street parking capacity of an area; and
- It is recommended that the LB methodology is adopted in place of the LB Richmond-upon-Thames methodology.

Appendix Q: Car Ownership Calculations (Six Sites)

Recently Completed Housing Developments – Car Ownership

Tables Q-1 to **Q-4** provide further details of the calculations used to derive average car ownership levels for each of the six recently completed housing developments. This has been informed by accommodation details provided in each of the supporting transport assessments as well as 2011 Census data (CT0103 - Accommodation type by tenure by number of rooms by car or van availability) to apply the average car ownership levels for the respective ward by housing type, size and tenure.

Table Q-1: Initial Accommodation Schedule of the Six Recently Completed Housing Developments

Site Ref	Ward	Number of Dwellings						
		Private			Affordable			Total # Units
		Flats	Houses	Total	Flats	Houses	Total	
A	St Margarets and North Twickenham	17	0	17	10	0	10	27
B	Mortlake & Barnes Common	44	17	61	15	0	15	76
C	North Richmond	0	0	0	52	0	52	52
D	South Twickenham	14	0	14	8	0	8	22
E	Fulwell & Hampton Hill	13	19	32	21	5	26	58
F	Hampton Wick	56	0	56	38	0	38	94

Table Q-2: Detailed Accommodation Schedule of the Six Recently Completed Housing Developments

Site Ref	Ward	Number of Dwellings							
		Flats				Houses			
		Private		Affordable		Private		Affordable	
		1-4 rooms	5-7 rooms	1-4 rooms	5-7 rooms	5-7 rooms	8+ rooms	5-7 rooms	8+ rooms
A	St Margarets and North Twickenham	15	2	10					
B	Mortlake & Barnes Common	43	1	15		15	2		
C	North Richmond			30	22				
D	South Twickenham	14		8					
E	Fulwell & Hampton Hill	9	4	21		9	10	5	
F	Hampton Wick	56		38					

Table Q-3: Average Car Ownership Levels by Dwelling Type, Size and Tenure

Site Ref	Ward	2011 Census - Average Car Ownership (Vehicles / Dwelling)							
		Flats				Houses			
		Private		Affordable		Private		Affordable	
		1-4 rooms	5-7 rooms	1-4 rooms	5-7 rooms	5-7 rooms	8+ rooms	5-7 rooms	8+ rooms
A	St Margarets and North Twickenham	0.77	1.23	0.69					
B	Mortlake & Barnes Common	0.78	1.11	0.50		1.14	1.71		
C	North Richmond			0.56	0.77				
D	South Twickenham	0.87		0.70					
E	Fulwell & Hampton Hill	0.83	1.57	0.68		1.28	1.72	1.21	
F	Hampton Wick	0.82		0.63					

Table Q-4: Average Car Ownership for the Six Recently Completed Housing Developments

Site Ref	Ward	Total # Units	Estimated # Owned Vehicles	Average Car Ownership (Vehicles / Dwelling)
A	St Margarets and North Twickenham	27	21	0.78
B	Mortlake & Barnes Common	76	63	0.82
C	North Richmond	52	34	0.65
D	South Twickenham	22	18	0.81
E	Fulwell & Hampton Hill	58	63	1.08
F	Hampton Wick	94	70	0.74

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