



Benefits of Parking Management in London

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List of Acronyms and Abbreviations

A.M.	Ante meridiem (before midday)
ANPR	Automatic Number Plate Recognition
APS	Association for Psychological Science
AQAP	Air Quality Action Plan
ATC	Australian Transport Council
ATCM	Association of Town & City Management
BBC	British Broadcasting Corporation
BCR	Benefit-cost ratio
BHF	British Heart Foundation
BID	Business Improvement District
BPA	British Parking Association
CAV	Connected and Autonomous Vehicle
CCTV	Closed-circuit television
CCZ	Congestion Charging Zone
CEO	Civil Enforcement Officer
CO	Carbon monoxide
CO ₂	Carbon dioxide
CPE	Civil Parking Enforcement
CPZ	Controlled Parking Zone
DCLG	Department for Communities & Local Government
DEFRA	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
DVLA	Driver and Vehicle Licensing Agency
EV	Electric Vehicle
FORS	Fleet Operator Recognition Scheme
FPN	Fixed Penalty Notice
FTA	Freight Transport Association

GDP	Gross Domestic Product
GLA	Greater London Authority
GPS	Global Positioning System
GULCS	Go Ultra Low City Scheme
GVA	Gross Value Added
HGV	Heavy Goods Vehicle
IoT	Internet of Things
IPPR	Institute for Public Policy Research
ITP	Integrated Transport Planning Ltd.
KSI	Killed or Seriously Injured
LGV	Light Goods Vehicle
LIP	Local Implementation Plan
LTS	London Transportation Studies model
MaaS	Mobility as a Service
MCA	Multi-Criteria Assessment
MTS	Mayor's Transport Strategy
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NoF	Neighbourhood of the Future
NOx	Nitrous oxide
OLEV	Office for Low Emission Vehicles
ONS	Office for National Statistics
P&R	Park and Ride
PCN	Penalty Charge Notice
PEP	Parking Enforcement Plan
PHV	Private Hire Vehicle
PM	Particulate matter (general use)
PM _{2.5}	Particulate matter (variant of less than 2.5µm in diameter)

PM ₁₀	Particulate matter (variant of between 2.5µm and 10µm in diameter)
PPA	Positive Parking Agenda or Permit Parking Area
PSPO	Public Space Protection Order
RAC	Royal Automobile Club
RPZ	Restricted Parking Zone
RTI	Real-Time Information
SEN	Special Educational Needs
SFMTA	San Francisco Municipal Transportation Agency
SUDS	Sustainable Urban Drainage Systems
TDM	Travel Demand Management
TfL	Transport for London
TMO	Traffic Management Order
UAV	Unmanned Aerial Vehicle
UK	United Kingdom of Great Britain & Northern Ireland
ULEV	Ultra-Low Emission Vehicle
ULEZ	Ultra Low Emission Zone
US	United States (of America)
VED	Vehicle Excise Duty
WEI	Wider Economic Impact
WHO	World Health Organization

EXECUTIVE SUMMARY

London Councils has become increasingly aware that parking management is misunderstood by the majority of Londoners. As part of the national Positive Parking Agenda¹, it was felt that there was a compelling case for challenging the narrative and demonstrating why parking is an essential public service. In order to improve understanding of the contribution parking management makes to London and Londoners, London Councils commissioned ITP to explore and evaluate this issue.

Around 9.6 million trips are made in London by car, taxi or private hire vehicle each day. At the beginning and end of these 9.6 million journeys, motorists must use some form of parking provision. The management of parking is therefore a critical resource allocation issue involving the application of various tools and techniques to reconcile supply and demand for parking spaces in the city.

The aim of parking management is twofold. Firstly, it has a travel demand management function, acting to dissuade marginal car trips at peak times, shifting them to more space-efficient and potentially healthier forms of travel such as public transport, walking or cycling². Secondly, it ensures an even distribution of parked or stationary vehicles.

To achieve these aims, parking management must deliver a range of desirable parking outcomes from the application of parking controls, pricing and other tools and techniques (discussed collectively as mechanisms or levers), including those related to parking scheme design and parking strategy.

The total benefit that parking management delivers to London has been estimated to stand at **£3.58billion**. This figure assumes that **£2.41billion** of benefit is achieved from delivering the core function of parking management with a further **£1.17billion** of benefit derived from reinvestment of local authority parking surplus. The core benefit has been calculated at a benefit-cost ratio of 10:1 with the surplus benefit calculated at an average benefit-cost ratio of 3.2:1.

This full benefit figure is based on the best available information but is acknowledged to be a reasonably pessimistic estimate in the case of London, given the city's scale and complexity and the particularly acute need to manage traffic. It is reasonable to assert that the importance of parking management in any urban environment will increase in proportion to its size and density. In London, its importance can therefore be expected to increase further still in line with forecasted increases in the city's population in future years.

The benefit-cost ratios demonstrate that parking management is a high-impact public service that delivers substantial benefit at comparatively little cost. Moreover, as parking revenues are predominantly sourced from motorists themselves (through charges and penalties) rather than the taxpayer, it can be deemed an equitable public service to finance.

¹The Positive Parking Agenda (PPA) is an initiative started by a group of local authorities, including Bristol, Essex, Gloucestershire, Liverpool, Oxfordshire, York, and London Councils, supported and assisted by the British Parking Association. The aim of the PPA is to build public confidence in the parking sector. For more information, visit www.britishparking.co.uk/Positive-Parking-Agenda.

²By way of extension, it can also shift other road-based trips such as freight trips to more desirable times of day.

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In addition to quantifying the full benefit, the study also defines eight individual benefits of parking management and, where possible, develops ways to quantify them. The benefits are presented below:

- Reducing congestion;
- Improving road safety;
- Improving air quality;
- Ensuring good access and accessibility;
- Promoting the local economy;
- Maximising the productive use of the land resource,
- Promoting health and wellbeing through travel choice, and;
- Providing funding for parking and wider transport scheme improvements

The study endeavoured to quantify the benefits below:

- **£1.9billion** – the annual cost of cruising for parking in London.
- **£58million** – the annual cost of road traffic collisions in London attributable to poor inter-visibility between road users, for which parked/stationary vehicles will be a factor.
- **£1.85billion** – the annual cost in terms of air quality of road-based transport in London, with **£1.5billion** representing the relative contribution of diesel-powered vehicles to this figure.
- **£23,907** – the annual benefit accrued in damage cost savings from a 1-minute reduction in engine idling for all vehicles in Central London attributable to particulate matter (PM) alone.
- **£241million** – the cost of delivering parking services in London in 2016/17.
- **£362million** – the value of parking surplus (predominantly from charges and penalties) raised in London in 2016/17. This surplus is hypothecated for reinvestment in the transport sector providing a vital source of revenue for delivering local transport improvements.

The report also considers public and industry perceptions of parking management. While road users generally accept and understand the need for parking management, public perceptions often tend towards the negative, driven by a media focus on the enforcement action that only happens when things go wrong. Consequently, parking management can be perceived to be unfair, inconsistent and lacking in transparency, especially with respect to the revenues generated.

By advancing public understanding and acceptance of parking controls, London Councils hopes to help improve the image of parking services in London, resulting in the ultimate goal of better compliance and greater benefit for all.

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The challenge of accurately appraising parking management in London is also considered, which relates mainly to the complex nature of the interrelationships between the identified benefits and a lack of available data from previous studies. Indeed, in the absence of modelling techniques it is argued that an effective appraisal would require a situation where parking enforcement is removed and the differential impact on each externality observed. Case studies from Aberystwyth and St Albans highlight the reasons why this would not be a desirable scenario.

Finally, the report assesses the impact of future technological developments on parking management and considers the requirements for evaluating and appraising parking schemes in order to fill existing gaps in the evidence base.

It concludes with a set of recommendations for action by London Councils, the London boroughs and other stakeholders that could be adopted to enhance a future view of parking management as an essential public service for London. These recommendations are set out below:

1. To develop and deliver public-facing campaigns to promote schemes that parking surpluses are being used to finance, such as the Freedom Pass, as part of the Positive Parking Agenda.
2. To develop a common framework for the appraisal and evaluation of parking schemes across London which should be incorporated into parking scheme design.
3. To develop a standard protocol for revenue reporting in local authority annual reports to ensure maximum transparency on parking surplus expenditure.
4. To engage proactively with the freight sector to better understand their concerns and to review and update existing guidance setting out a basis for exercising greater flexibility on freight servicing operations.
5. To publish a table of parking regulations in each borough (perhaps on a dedicated page on the London Councils website) to be promoted as a single-source point of information for reference and for wider dissemination to the freight and servicing industry.
6. To develop a mechanism to engage with relevant stakeholders to improve compliance at so-called 'PCN hotspots'.
7. Further research to be conducted informing a review of loading and unloading regulations in order to explore a range of alternative options including the adoption of a pay-per-minute system and other pricing-based approaches.
8. Further research to be conducted into the potential of technology and dynamic pricing to improve efficiencies in parking management and for these benefits to be quantified.
9. Further research to be conducted into the practice of railheading, with the aim of understanding how the practice can be best accommodated in a manner which does not detract from the local economies in which the vehicles are parked.

"None of us sets out with the objective of parking. We set out to go to work, to go to the shops, cinema and we want parking to be about as exciting as traveling in a lift. Press a button, lift comes, lift takes you to the floor, get out and you don't remember a thing."

Steve Gooding, RAC Foundation

1. Introduction

Integrated Transport Planning (ITP) Ltd. was commissioned by London Councils in December 2017 to undertake research into the subject of parking management. The aim of the research was to clearly articulate the positive contribution that parking management makes to the London economy – inclusive of societal and environmental contributions – and the importance of the role played by the 32 London boroughs and the City of London Corporation as parking ‘service providers’.

Specific objectives of the research were to:

- Enhance public understanding and acceptance of parking controls, resulting in improved compliance with parking regimes.
- Provide a basis for redressing some of the negative press given to parking management and local authorities by the media and support the discourse presented through the Positive Parking Agenda (PPA) campaign;
- Provide an evidence base for cost benefit analyses and business case development in relation to future parking management initiatives;
- Serve as a pioneer for further parking management research both in London and nationally.

The geographic scope of the research was focussed specifically on London; although the transferability of findings is considered in the discussion and case studies from other locations are presented where they represent innovative or best practice.

Meanwhile, the research focussed solely on public parking, both on and off-street, including waiting, loading and stopping as well as parking functions and did not consider private parking.

This report represents the key deliverable from the research. The content provided herein – inclusive of discussion, conclusions and recommendations – reflects the findings of a comprehensive literature review encompassing international parking management best practice as well as an extensive programme of focus groups, interviews and informal discussions with a wide range of stakeholders relevant to parking management in London.

The remainder of this report is structured as follows:

- Chapter 2 – introduces the concept of parking management and sets out the role played by London’s local authorities as parking service providers, providing what must be considered an essential public service.
- Chapter 3 – explores the issue of perceptions in the context of the differing wants and needs of parking stakeholders.
- Chapter 4 – identifies and presents a list of ‘benefits’ – also known as ‘gains’ or ‘positive externalities’ – that effective parking management can deliver in economic, societal and environmental terms. Examples are supported with evidence and the report attempts to quantify the full benefit of parking management.
- Chapter 5 – considers the requirements for appraising parking schemes and identifies a framework for scheme appraisal.

- Chapter 6 – assesses how parking and parking management may be influenced by emerging and future trends in transport and mobility, particularly through the impact of technology.
- Chapter 7 – provides reflection and identifies a series of recommendations, both in terms of parking management policy and research that could be adopted to positively influence the role of parking management in line with the aims and objectives of the study.

2. The Role of Parking Management

2.1. What is Parking Management?

Parking 'management' refers to the process through which local authorities accommodate the need for parked vehicles without compromising their economic, social and environmental responsibilities and policy objectives.

The need is to reconcile the supply of parking spaces with the demand for parking and the application of various tools and techniques (parking controls) to ensure that this process remains optimal.

The supply of parking and its management is therefore a resource allocation issue: a case of how to make best use of a scarce resource – a classic economic problem. Importantly, the resource is the land rather than the parking spaces themselves. Therefore, allocating land to parking comes with the opportunity cost of not being able to use it for other uses, including primary productive uses, and so there is an intrinsic motive for society not to overprovide.

With this in mind, the main functions/aims of parking management – in a holistic sense – are:

1. As a Travel Demand Management (TDM) tool to dissuade marginal car trips at peak times shifting them to more space efficient and potentially healthier forms of travel; namely to public transport, walking or cycling³ and/or;
2. To achieve a more equitable spatial distribution of parked vehicles.

2.2. Optimising Supply

A particular challenge of parking is that the demand profile of car use is highly dynamic, sensitive to time of day, type of land use/trip generator being served and the propensity for the land use 'mix' to change through time, owing to evolving patterns of development. This means that parking supply has to be designed to cater for the peak demand scenario. Consequently, the allocation of land to parking is sub-optimal at off-peak times.

However, in accord with its TDM function, parking management can be used to influence the peak demand scenario by reducing the total number of spaces required to serve a given trip attractor at peak time, through pricing. This in turn reduces the number of empty spaces at off-peak times leading to a more efficient use of land i.e. less land is required to be given over to parking. Similarly, parking management can be used to add and remove spaces in response to demand by restricting access for certain types of vehicles and/or at certain times of day which can help to give priority to different parking needs.

In this way, parking management enables the static supply (physical parking spaces) to be given an element of dynamism which responds to the demand profile in a more effective way. Moreover, parking management possesses unique flexibility as a TDM tool because it can exert its dynamism by acting on both price and quantity. This compares favourably, for instance, to road-user charging which acts only on price.

2.3. Types of Parking Controls

In managing parking, there are various different controls (or measures) that can be used. It is best to consider these as a toolkit for where different controls and combinations of controls

³By way of extension, it can also shift other road-based trips such as freight trips to more desirable times of day.

are more appropriate for certain circumstances and for achieving certain objectives. Parking controls are normally enacted through traffic management orders (TMO) and communicated to road users through a combination of lines and signs and can be applied to various spatial contexts.

According to the BPA (2016), the following parking controls can be used on UK roads (i.e. on-street).

Table 2-1: Types of parking controls

Control	Variation
Parking bays	<ul style="list-style-type: none"> • With or without a pricing regime – may be free for a certain period and priced thereafter • Time-restricted - by day of the week, for a certain duration within the day, or with day exemptions • Vehicle-restricted • Permit-based
Red lines	<ul style="list-style-type: none"> • Double red line – no stopping for any purpose except in an emergency or to set down a disabled person⁴ • Single red line – as above, but time limited
Yellow lines	<ul style="list-style-type: none"> • Double yellow line – no waiting, but stopping is permitted to pick up and set down passengers where this can be done safely as too is loading and unloading. • Single yellow line – as above, but time limited. • Yellow lines with kerb 'blips' – as above, but loading and unloading is also prohibited.
Parking zones	<ul style="list-style-type: none"> • Controlled Parking Zones (CPZ)s – waiting and loading is restricted for some or all of the time. • Restricted Parking Zones (RPZ)s – waiting (and sometimes loading) is restricted for some or all of the time. • Permit Parking Area (PPA) – parking is permitted only where appropriate permit can be displayed. • Pedestrian Zones – vehicle access is prohibited during operational hours, while waiting and loading are usually also prohibited outside of operational hours.
Other controls	<ul style="list-style-type: none"> • Clearways – no stopping, applies ubiquitously. • Footway parking – allowed only in designated areas where appropriate signs are displayed detailing whether the footway can be mounted partially or entirely. • School 'keep clear' markings – no stopping during days and hours of operation.

Source: based on BPA (2016)

Each control has its own characteristics capable of influencing the demand for kerbside road space for different vehicles/purposes and at different times of day.

Further controls exist in relation to cycle, bus and tram lane enforcement, where parking may be permitted at certain times of day, typically outside of hours of lane operation.

2.4. Parking Policy and Enforcement

London boroughs have been responsible for the civil enforcement of non-endorsable parking contraventions since 1993/94, as per the relevant powers set out in the Road Traffic Act 1991. This gives the boroughs responsibility to issue PCNs and to set the level of any parking charges⁵.

⁴ Taxis and private hire vehicles (PHVs) may set down and pick up on red routes.

⁵ However, boroughs are not able to set the level of the PCN.

For on-street parking, the level of the charge should not ordinarily exceed the level required to cover the cost of parking management and operation. However, in London, the scarcity of parking and the need to discourage non-essential car trips necessitates that higher charges are often required to ensure that the demand generated for parking equilibrates to the level of parking supply. For off-street parking, boroughs are free to set charges in proportion with the need to manage demand.

Where surpluses are generated from on-street parking charges and on and off-street parking enforcement, the excess revenue must be invested back into the parking function or used to support other transport/mobility objectives as set out in section 55 (as amended) of the Road Traffic Regulation Act 1984; boroughs have more flexibility over how they can invest surplus income from off-street parking charges. This hypothecation ensures that local authorities cannot 'profit' from parking management or its associated activities. Importantly, revenue raising cannot be the objective of a parking regime and surplus can only be justified where the need exists to manage demand.



Two PCNs applied to the windscreen of a car in London

Source: ITP

The enforcement and issue of PCNs is carried out by Civil Enforcement Officers (CEOs) on-street or in certain circumstances by post using CCTV monitoring. Enforcement staff may be employed directly by the Borough or by a third party contracted to deliver the service on behalf of the Borough.

While public perceptions of civil parking enforcement (CPE) are often negative (perceptions are discussed in detail in Chapter 3), the real value of parking management is demonstrated through cases where enforcement is lax or absent. Such cases demonstrate the important role parking management plays in maintaining order on our streets and that parking management really is an essential public service.

When Parking Management goes wrong - St Albans and Aberystwyth

CASE STUDY

In April 2004, the Hertfordshire city of St Albans was thrown into traffic 'anarchy' when the police withdrew parking wardens from their force in a bid to save Hertfordshire Constabulary around £1million. Despite providing St Albans District Council with 15 months' notice to set up a replacement service, this time did not prove sufficient and the city was left without any parking enforcement for a period of between 5 and 6 months.

Similarly, in the small seaside town of Aberystwyth, local residents were without a parking enforcement service for a period of 12 months from June 2011 when traffic wardens at Dyfed Powys police force were laid off due to budget cuts. On this occasion, residents were reported to celebrate their withdrawal, but perceptions quickly began to change as it became clear that the enforcement-less system was not going to work.

"Most people will welcome the fact that order is restored. You don't realise the value of things until they're gone. It wasn't supposed to be a trial, but some people didn't park sensibly and it became clear that it wasn't working. It has been chaotic, especially for people with disabilities, or delivery drivers. On balance, shoppers and the public generally will welcome the re-introduction of wardens."

Chris Mackenzie-Grieve, Joint Chairman of Aberystwyth Chamber of Commerce (in Telegraph, 2012)

The impact in both locations was one of widespread chaos with one particular journalist in St Albans comparing the scene on the city's main thoroughfare

to a war zone. Meanwhile, Aberystwyth was named the worst place to park in Britain with a study finding that 30% of the town's traffic was circulating looking for a space. Issues reported across both places included: vehicles parked on both sides of the street, on double yellow lines and at all angles with many cars reported to look more 'abandoned' than 'parked'. Indeed, motorists were reported to be occupying bus bays, loading bays, taxi ranks, parking on the footway and parking in spaces reserved for disabled people causing congestion and impacting local trade.

Following these periods of enforcement withdrawal, the people of both Aberystwyth and St Albans ultimately welcomed their enforcement services back with open arms and public understanding of the role of parking management in both locations was greatly enhanced thereafter.



St Albans city centre with parking management restored

Source: © Richard Gillin

Sources: Daily Mail (2012), and Telegraph (2004; 2012)

3. Perceptions of Parking Management

It is widely acknowledged that public perceptions towards parking management are generally negative. However, the factors that drive these perceptions are complex.

Ultimately, motorists want the act of parking to be as seamless as possible. They want to be able to find a space at an appropriate distance from the place they are trying to get to at a price they are willing to pay. RAC Foundation Director, Steve Gooding, compares this to being in a lift:

“None of us sets out with the objective of parking. We set out to go to work, to go to the shops, cinema and we want parking to be about as exciting as traveling in a lift. Press a button, lift comes, lift takes you to the floor, get out and you don’t remember a thing.”

Steve Gooding, RAC Foundation

In many cases, the public understand the need for parking management as the high demand for limited kerbside and off-street parking space is visible to them; particularly in urban environments such as London. While not everyone will appreciate the full range of benefits that parking management delivers to society, they will appreciate how the service impacts on their own personal activity and that without it, their personal utility would be compromised.

That said, the benefits and the need to introduce certain parking controls are generally more readily perceived by local authorities than they are by the public given the holistic oversight that local authorities have and the data they have access to. In their new Kerbside Strategy, Southwark Council (2017) state: “Over the last 2 years we have introduced CPZs into two new areas. In both cases there were previous consultations that led to no parking controls being implemented even though parking pressure at that time was high and demand was likely to increase further”.

Furthermore, there is evidence which suggests perceptions of parking schemes often become more favourable post-implementation, once the public are able to see the impact and the benefit derived (Southwark Council, 2017; Viennecouver, 2015). For instance, in Vienna, a city with a long history in parking management, the expansion of parking controls from 1st District to Districts 1 to 9 witnessed an increase in favourable opinion for the policy once it had been put in place – rising from 46% before implementation to 67% post implementation (Viennecouver, 2015).

The notion of improved acceptance post implementation is also supported by much of the literature around road pricing schemes, which are widely accepted as a more contentious form of TDM measure vis-à-vis parking schemes. Generally, the public has a tendency for caution and to be suspicious of the unknown. This inertia becomes more pronounced where there is a perceived lack of transparency on the motives for such schemes and/or where the benefits are not fully communicated or perceived – issues which commonly arise in relation to parking management.

3.1. Factors Driving Negative Perceptions

While road users accept and understand the need for and role of parking management in the general sense, evidence suggests that they harbour certain grievances with the system. These grievances are discussed in turn and many are interlinked.

3.1.1. The collection and use of revenue

The collection and subsequent use of revenue is a particularly emotive subject in the case of parking. While a limited number of people wrongly perceive that local authorities 'profit' from parking services, there is nonetheless a more widespread perception that revenue generation is the priority for local authorities when delivering parking services. This perception relates not only to the way in which the system is enforced but also the way it is set up. Revenue must be handled in the manner aforementioned in section 2.4 (page 4).

The best way to quell suspicion on the motives of revenue generation is for local authorities to be open and transparent with the public as to how surplus revenues are spent. Many London boroughs concede that a lot more could be done in this regard recognising that the breadth and transparency of information provided in their annual reports varies significantly between authorities.

While greater transparency and comprehensiveness in revenue reporting would represent good progress, local authorities should go further if they want to meaningfully engage with a wide public audience and redress negative perceptions relating to revenue. Doing so would require a targeted, public-facing campaign to promote the positive uses of parking revenue through a medium that the public can readily access.

The perception that parking management is a revenue/profit-focussed activity is unlikely to be helped where private sector contractors are brought in to deliver CPE services on behalf of local authorities. The public may be suspicious of the motives had by contractors for issuing PCNs and whether they are working to quotas or targets for enforcement as part of their contracts with local authorities, while others may not be aware that CPE is a public-sector responsibility at all.

3.1.2. Fairness

There is a perception that aspects of the system are set up to catch people out as a motive for generating revenue. For example, the freight industry queries the appropriateness of using time restrictions to govern loading and unloading activity. It is argued that the industry has the built-in efficiency to ensure that vehicles are not parked for longer than is necessary to carry out operations and that the issuance of a PCN is not effective in driving operational efficiency as designed, but rather adds to the cost of doing business in London

A further issue for freight operations is that often elements of loading/unloading activity take place away from the vehicle and at such times the vehicle in question will be locked and appear to be parked. It may not be practical to attend to the vehicle at all times and delivery personnel are often faced with having to make a decision as to whether to contravene one regulation or another e.g. parking or health and safety regulations.

There is a further feeling that in some areas, particularly at so-called PCN 'hotspots' (where compliance is poor and PCNs are frequently issued), that the controls in place may not be fit for purpose. In order to address this perception, local authorities should be proactive in engaging with relevant stakeholders to get to the root cause of parking management issues in order to improve overall compliance, rather than simply being reactive in addressing disputes through London Tribunals.

“Generally, if you have a PCN hotspot, it is not that in that specific location motorists don’t care ... there’s obviously genuinely an issue, maybe the signs aren’t clear or the controls aren’t appropriate.”

Natalie Chapman, FTA

3.1.3. Consistency

Another point of contention relates to consistency of policies, rules and regulations and enforcement. While London Councils strives to work with the boroughs to achieve a consistent approach to parking management and has made significant progress in that regard, consistency remains a challenge, particularly at the micro level.

Indeed, many boroughs concede that there is a lack of consistency in the way policies are implemented between authorities. One stated example being variations in observation periods prior to freight loading and unloading before a PCN is issued. Another being resource availability and the way that different regulations are prioritised for enforcement by different authorities.

“People think there is a general lack of enforcement around schools. At those two points in the day, your workforce is utterly stretched because the demand outside schools is more than you can possibly cope with.”

Gavin Moore, Brent Council

It is important for local authorities to recognise that while public parking services are delivered by 33 different bodies and TfL, the ‘ordinary person on the street’ sees no reason for practices to differ between them; not least because such administrative boundaries are artificial to the public who may not know which borough they are in at any given time.

An additional challenge to public perceptions is that many local authorities require CEOs to implement parking regulations without flexibility and to advise offenders to appeal their penalty if they believe the PCN has been incorrectly issued or they have a mitigating circumstance. This approach is designed to ensure a consistency of enforcement on the street with all disputes handled in the back office to help to preserve the integrity of the parking enforcement service. However, this can present a rather cold image of CEOs, fostering negative perceptions of the service, particularly around heavy-handed enforcement and a lack of flexibility to account for potentially mitigating circumstances when engaging directly with the public on the street. In the worst cases, it can lead to CEOs being subjected to abuse.

Conversely, some boroughs do encourage CEOs to exercise flexibility on certain issues such as loading and unloading where there is no clear adverse effect on other road users and where it is clear that activities are continuous.

3.1.4. Location-specific issues

A further area of contention relates to the appropriateness of parking provisions and/or charges in certain locations. For instance, the level of residential parking provided in and around dense commercial centres, particularly in Central London, is a matter for debate. Concerns relate to both the perceived high level of provision afforded to residents who have otherwise excellent access to public transport and the feeling that the cost of residential permits was not thought to be proportionate to the value of land in such locations. It was therefore felt that the land asset could be better utilised if the parking resource was apportioned in a different way.

Similarly, the public have long questioned the appropriateness and level of parking charges at hospitals. While it is important to recognise that hospital parking is a matter for NHS Trusts and *not* local authorities, it does contribute to negative perceptions of parking services overall, particularly where individuals are unable to distinguish between different parking service administrators as is often the case.

3.1.5. The inherent nature of the system

A significant part of the challenge in redressing negative perceptions of parking services lies in the inherent nature of the system itself and the way the user interacts with it. As one would expect, the motorist will incur a private cost when they fail to comply with parking rules and regulations (i.e. through being issued with a PCN); however, they may also incur a private cost where they choose to be compliant (i.e. through having to pay a parking charge, obtaining a permit, etc.).

Whilst the private cost for non-compliance is clearly significantly greater than the cost of compliance, the motorist nonetheless incurs costs under both scenarios and is not being directly rewarded for complying with the system. Hence, the absence of any direct reward to them personally results in no reason for the motorist to form an especially positive perception of parking services. As the benefits of parking management are predominantly societal (external benefits), it is difficult for the individual to perceive these at the point of use⁶. Conversely, if the motorist is issued with a PCN, there is a high likelihood that their perception will be shaped negatively, especially if they feel the PCN is unjustified. Similarly, negative perceptions will form if they feel that parking charges, cost of permits, etc. are too high.

“You have to consider the knock-on effect of fines and the effect they have in terms of putting people off ever going back to that town centre.”

Joanna Hammond, Association of Town and City Management

Importantly, this does not inherently mean that the motorist will have a negative perception of parking management per se, because the motorist does not expect the system to reward them – it is not typical practice for motorists to be rewarded through, for instance, cheaper or preferential parking as a result of long-term compliance, nor should it be. However, it does mean that the motorist’s minimum expectation of the service aligns directly to the maximum level of service that parking management providers are able to offer. Hereby, where the system works for the motorist, their perception is more likely to be neutral or indifferent as opposed to positive because it has not exceeded their expectation.

That said, positive perceptions can be developed where the system becomes more reliable in terms of meeting the user’s expected level of service with improved regularity or where new features are introduced to add levels of ‘user experience’. For instance, where a new app is introduced enabling the motorist to find an available parking space more easily, or where they are able to obtain better information on charges or certain regulations with greater ease prior to making their trip, private benefits are delivered to the user which can positively influence their perception⁷. However, in this context, positive perceptions are generally only formed in the short term as the user will begin to expect such provisions as standard which will in turn increase their minimum service expectations.

⁶ Benefits are discussed in detail in chapter 4.

⁷ Existing external benefits are also strengthened; although these are difficult to perceive for the individual motorist.

"It's been a few years since CPZs were introduced in most areas [in Brent] and people have forgotten just how bad it was before they were put in. People have forgotten just how difficult it was trying to park near their homes when their streets were saturated with commuters."

Gavin Moore, Brent Council

3.2. Changing Perceptions

Importantly, redressing negative perceptions does not necessarily mean that they will be turned positive. As is outlined above, the very nature in which parking management works as a public service – particularly the way it delivers external benefits rather than private benefits – ensures that migrating the fulcrum of popular perception from negative to positive is a significant challenge; although not impossible.

"Getting to a positive perception of parking management is an incredibly hard task...by its very nature."

Steve Gooding, RAC Foundation

However, in any case, there absolutely is value in making perceptions 'less negative' not least for the benefit of CEOs on the front line who despite their narrow enforcement role, are the public face of the service.

What is clear from the evidence gathered on perceptions is that there are effectively two separate lines of action:

1. Ensuring service delivery is fair, consistent and transparent and that regulations and the need for controls are properly understood.
2. Better communicating the range of societal benefits of parking management to users/ the wider public.

3.2.1. The Positive Parking Agenda and the role of the media

The ethos of the need to change perceptions on parking management is encapsulated within the BPA's Positive Parking Agenda (PPA) – as supported by London Councils – which seeks to achieve the following objectives:

- To improve the public's understanding and image of parking management by helping local authorities to work together to: set and raise standards; improve communication; encourage innovation; and promote transparency in the delivery of parking management.
- To deliver fair, efficient and effective parking management for everyone in society, according to a set of defined key principles.
- To achieve a step change in public attitudes about parking, shifting the focus of public interest and media coverage to the positive benefits of effective parking management.

The final objective makes reference to media coverage and the desire to shift it towards the benefits of parking management and away from some of the negative stories which can discredit parking services.

Many London borough officers regard aspects of media coverage around parking to present a challenge to their profession; however, it is important to recognise the vital role played by the media in sounding out and exposing bad practice in parking management.

This is, of course, very different to headlines and stories that may be used opportunistically to the detriment of those working hard to deliver parking services which seek to play to popular perception to court readership.

Importantly, the future relationship between parking service providers and the media needs to be one of collaboration and the PPA is the perfect basis for engagement to try and effect the kind of change desired.

Firstly, the media – regulators and editors – need to be made aware of the motives for the PPA and its objectives. There then needs to be an established mechanism through which cases of bad journalism can be reported by the parking industry to ensure that offending journalists can be called out in the same way that they are expected to call out bad practice in parking management. Such a reporting mechanism must in no way be designed to be punitive, but focussed squarely on improving standards within the media.

Concurrently, the parking industry needs to maintain a dialogue with the media – local media in particular because parking is a local issue – to actively promote parking schemes, particularly new and emerging schemes, in a positive light. This can be done by jointly working to co-ordinate on press releases where local authorities have direct influence over the content of publications’

Where practical, it would also be beneficial for local authorities to be consulted prior to potentially detrimental stories on parking management being run to ensure that the content being reported is being presented from an unbiased position and is accurate. However, where negative stories are justified and are run, local authorities should regard this as the perfect opportunity to improve parking service delivery rather than as a slant on their endeavours.

Issue

Until recently, Brent Council experienced significant issues with vehicles parked on the footway preventing pedestrians from using the footpath at the Lower Place Industrial Estate. Parking bays were 97% occupied and there were frequently vehicles parked outside of marked bays. The car park regularly exceeded its safe capacity, reaching 108% occupancy at its peak.

Solution

In order to combat these issues, Brent Council undertook a public consultation, working with local residents and businesses to find a solution. Following a survey, the majority of respondents were in favour of the introduction of a CPZ.

Impact

The introduction of the CPZ has attracted considerable praise from local businesses and residents. One testimonial, from a local business, declares that: 'Every step of the way they have listened carefully to those of us operating on the estate. They have made themselves available to listen to our thoughts and concerns and have effectively communicated throughout the process.'

Another wrote: 'I would just like to thank you for all your hard work in implementing the parking scheme around the Lower Place Estate. It seems to be working very well & has got rid of the non-genuine business users around the area. It has created ample parking for all the local businesses as well as keeping the flow of traffic moving. It has also made it easier for people to deliver around the estate without causing disruption. Once again thank you and we hope it continues.'

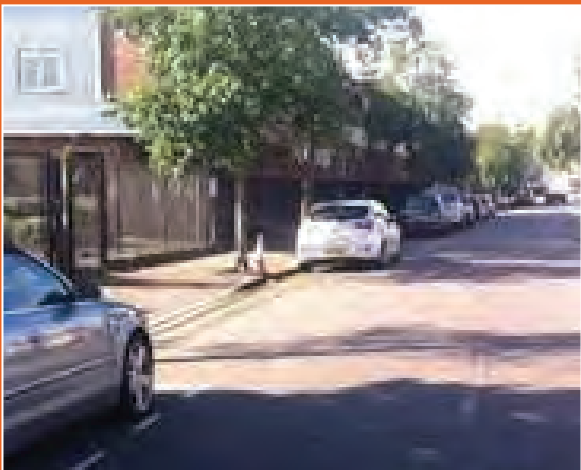
Brent Council claims that 'the overall success of the scheme stems from the council listening to the concerns and needs of local businesses, then developing and implementing a suitable solution.'

This demonstrates that parking management is not always contested by the public and that if the reasons for parking management are evident or communicated clearly, parking management measures are more likely to be accepted and acclaimed.



Lower Place Industrial Estate before the introduction of the CPZ

Source: © Brent Council



Lower Place Industrial Estate after the introduction of the CPZ

Source: © Brent Council

4. Benefits of Parking Management

As with any public service, the benefits of parking management are felt both by the users of the service and by society. Benefits are considered 'private benefits' where they deliver direct benefit to individual users or 'external benefits' where they deliver wider benefits to society. The sum-product of private and external benefits equates to the total 'social benefit' or the 'full benefit' of parking management. Economists sometimes refer to benefits as 'gains' or 'positive externalities'. The social benefit delivered through the function of parking management must outweigh the social cost for it to be a worthwhile public service.

Generally, private benefits are easily perceived because they impact directly on users (usually delivering financial gain), whereas external benefits are not readily perceived as their effects are distributed diffusely across society.

In the context of parking management, most benefits are external but with private elements. For instance, the external benefit of reducing congestion is increased flow on the highway network which ultimately leads to increased economic output to the benefit of everybody whether they benefitted directly from the reduction in congestion or not. Conversely, the private benefit is the journey time saving for each individual affected plus any savings accrued e.g. from reduced fuel expenditure. These savings ultimately result in more disposable time and income for beneficiaries to engage and invest in activities that bring them direct utility.

In the main, the benefits of parking management reciprocate the negative externalities (costs) of motoring. This is because parking management is a TDM function which seeks to 'manage' motoring activity to ensure it is conducted sustainably. Hence, parking management seeks to contain these externalities in a way that ensures the social benefit of motoring exceeds its social cost.

While one could conceivably draw up an extensive list of benefits accrued from parking management, their external nature ensures that they are diffuse in impact and difficult to quantify, hence this report considers only the main ones which parking schemes actively seek to deliver which have been identified through the research⁸ as:

1. Reduced congestion
2. Improved road safety
3. Improved air quality
4. Ensurance of good access and accessibility
5. Promotion of the local economy
6. Maximisation of the productive use of land resource
7. Promotion of health and wellbeing through travel choice
8. Providing funding for parking and wider transport scheme improvements

This chapter considers how parking schemes deliver these benefits through the delivery of desired parking scheme outcomes and how these are in turn derived from 'levers' or 'mechanisms' which comprise the building blocks of any parking scheme. It then considers each benefit individually in turn with accompanying case studies, before attempting to estimate the full benefit of parking management in London.

⁸ Research activity comprised a literature review, focus groups and depth interviews.

4.1. Deriving Benefits

In order to appreciate how the benefits of parking management are delivered, it is first necessary to understand what parking management seeks to achieve. While section 2.1 (page 16) sets out the 'functions' or 'aims' of parking management, there are a series of desirable 'outcomes' required to ensure that these aims become realised. These outcomes relate to the objectives of any parking scheme and can be summarised as follows:

1. Restricting overall demand for parking – related to the need to limit the overall demand for car use and achieve a mode shift toward more sustainable forms of mobility.
2. Reconciling, and where necessary, prioritising different road user needs to ensure inclusivity and to better appropriate supply with demand.
3. Mitigating instances of illegal and obstructive parking.
4. Limiting the prevalence of 'cruising for parking'.
5. Enabling a transition to more sustainable fuel sources.
6. Sustaining a revenue stream to invest in parking and wider transport schemes in the future (a secondary outcome).

In order to realise these outcomes, Parking Managers rely on various levers and mechanisms to ensure that motorists comply with the overall regime and that parking management therefore best serves the needs of society. These levers/mechanisms are described in Table 4-1 below and comprise different types, namely: physical, operational, behavioural and technological:

Table 4-1: Levers/mechanisms of parking management

Type of Lever / Mechanism	Lever / Mechanism
Physical	Physical design – relates to the physical configuration of parking spaces/car parks and their relationship to the highway and wider public and private realm.
	Level of supply – the number of parking spaces in absolute terms and in relation to the level of demand, all else being equal.
Operational	Pricing – the level of the charge and charging structures.
	Parking controls – principally lining, signing and zoning, as described in Table 2-1.
	Allocation – apportionment of parking stock by user, vehicle type, time of day, etc. – interrelated with parking controls.
	Deterrent – private cost of in compliance to the motorist.
	Enforcement – degree to which the deterrent is enforced which, together with the level of the deterrent, can influence the regularity at which the motorist chooses to comply with the regime ⁹ .
Behavioural	Promoting higher occupancy 'forms of car' – the promotion of car sharing and/or car clubs as alternatives to single-occupancy car use (in the case of car sharing) and vehicle ownership (in the case of car clubs).
	Appropriating cost and convenience with alternative modes – ensuring that alternative, more sustainable modes are competitive against the car for the majority of trips ¹⁰ .
Technological	Internet of Things (IOT)/Big data – relates to the capability for technology to drive new efficiency in the system.

⁹ Parking regimes should aim to achieve 100% compliance, although local authorities must recognise that some contraventions are more severe than others.

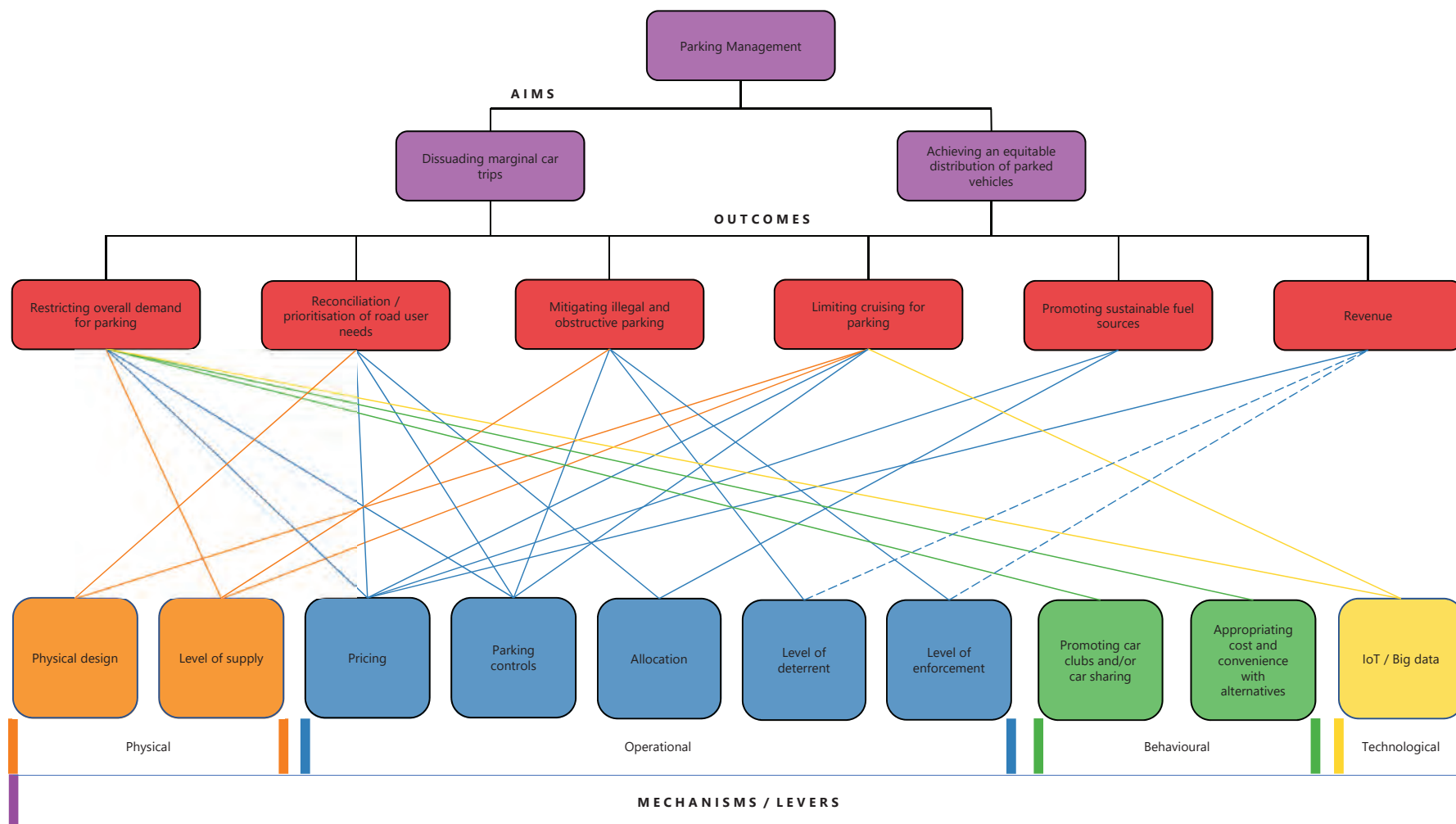
¹⁰ More difficult outside of London as this is reliant on high-quality alternative modes being available. It may not be a realistic mechanism in some rural market towns.

The relationship between levers/mechanisms and outcomes is displayed in Figure 4-1 overleaf. The figure shows that while some levers influence many desirable outcomes, others influence only one or two. Importantly, the figure does not indicate the magnitude of these relationships, it only seeks to highlight where they exist.

The array of connections between levers and outcomes also reflects the complexity of parking management, while showing how certain levers can be combined to greater effect to deliver specific scheme outcomes¹¹. For instance, a scheme which seeks to mitigate instances of illegal/obstructive parking would be best served by incorporating the use of parking controls with a strong and well enforced deterrent to ensure compliance with these controls. It would also be necessary for the scheme to ensure a basic level of supply such that it is possible to manage the level of demand, either through pricing or other means.

¹¹ The connecting lines indicate which levers influence which outcomes, colour-coded by lever type.

Figure 4-1: Conceptualisation of parking management¹²



¹² While the level of deterrent and the level of enforcement do influence the amount of revenue generated, this is not a linear relationship as it is dependent on the parking regime's capability to adequately combat instances of illegal and obstructive parking which is the outcome that these mechanisms are primarily targeted to address.

Developing on the relationship between levers and outcomes, Figure 4-2 shows how outcomes relate to benefits. It shows that some outcomes deliver a variety of benefits, while others deliver only one. As with levers, these relationships are complex, but the figure shows that some benefits are delivered from a common set of outcomes¹³, while further benefits have only small variation on this. Where outcomes are common, the levers that enable benefit realisation will be common also. Again, the figure does not highlight the strength of relationships so the number of connections cannot be considered a proxy for the magnitude of benefit delivered.

Figure 4-2: Relationship between outcomes and benefits

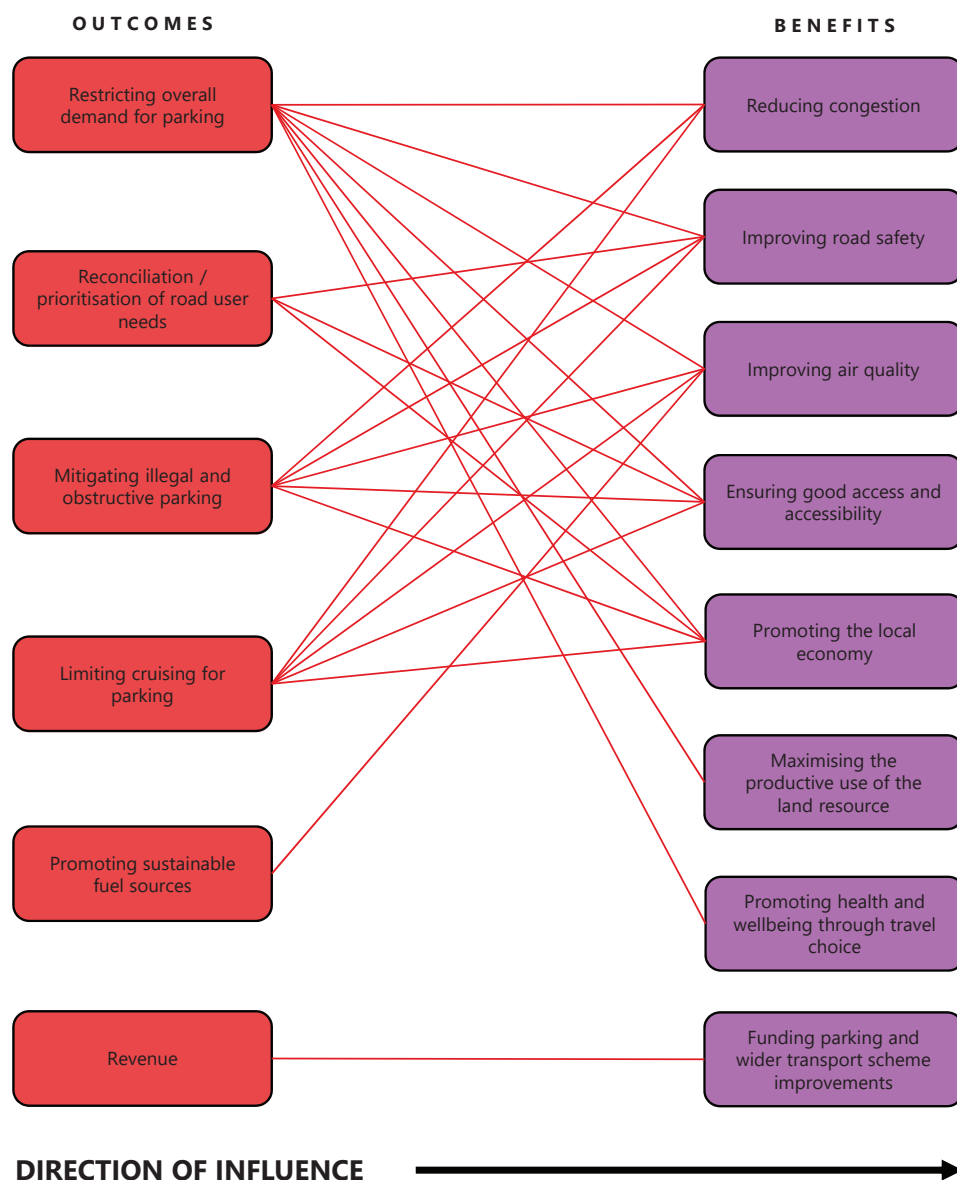
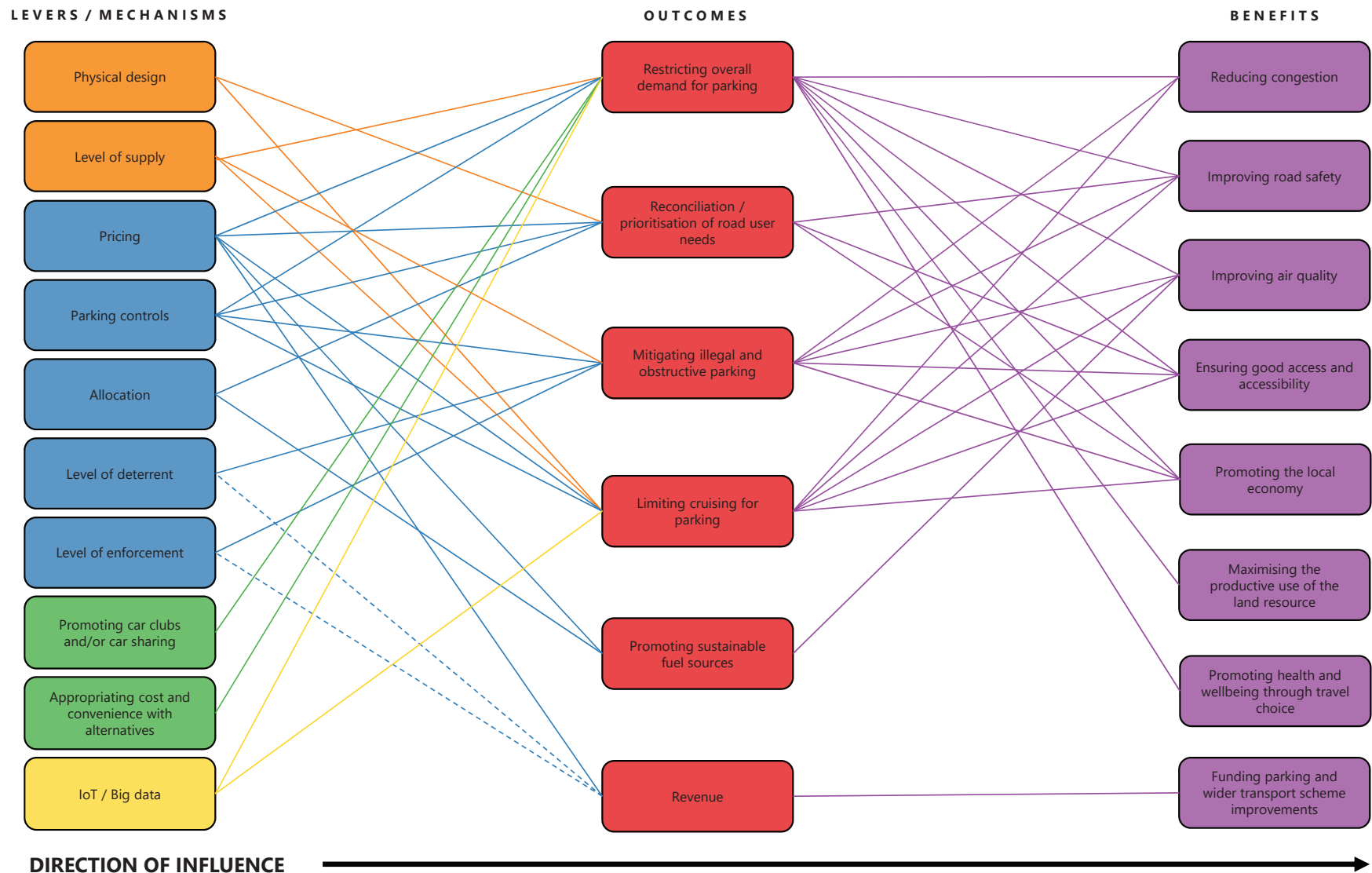


Figure 4-3 then presents the full pathway, demonstrating the relationship between levers, outcomes and benefits.

¹³ Namely 'improving road safety', 'ensuring good access and accessibility' and 'promoting the local economy'.

Figure 4-3: Relationship between levers, outcomes and benefits



4.2. Explaining Benefits

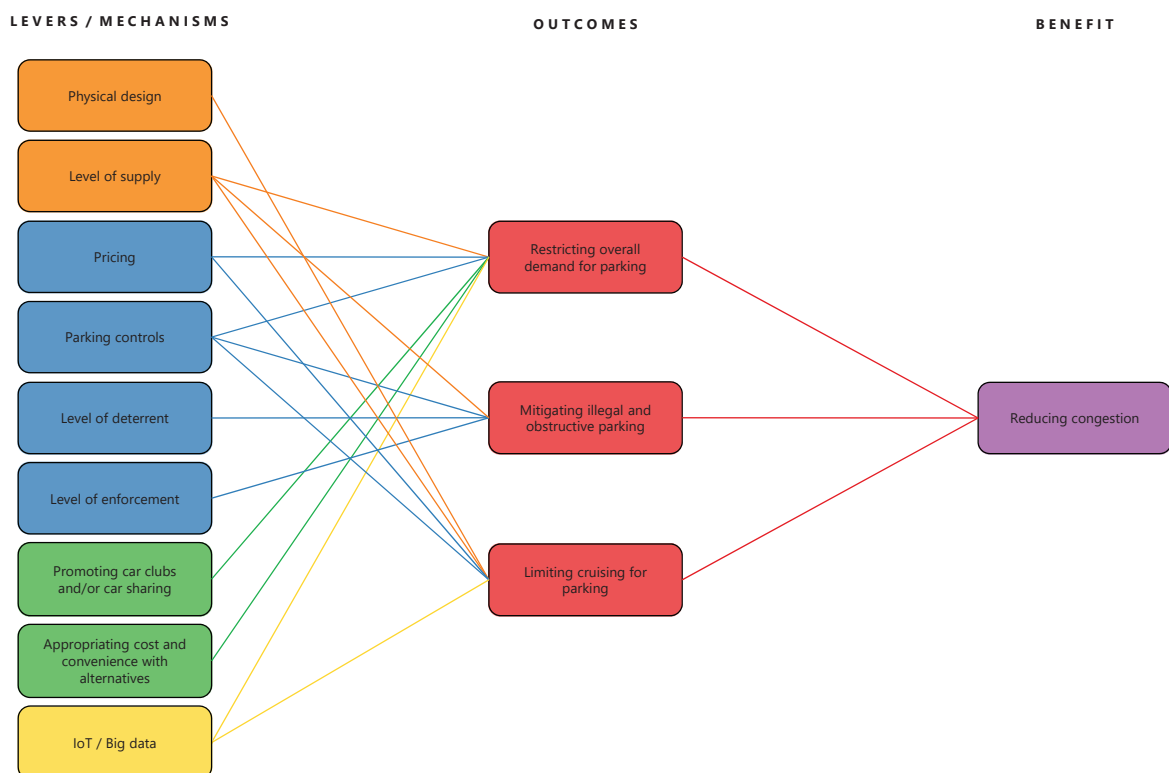
4.2.1. Reducing congestion

The cost of congestion to the London economy is estimated at £6.2billion per year (INRIX, 2016; ITP, 2017). Parking management helps to reduce congestion in three principal ways:

- Restricting the overall demand for parking.
- Mitigating instances of illegal and obstructive parking.
- Limiting the prevalence of 'cruising for parking'.

Figure 4-4 below provides a graphic illustration of this relationship, inclusive of levers/mechanisms:

Figure 4-4: Pathway for reducing congestion through parking management



Outcomes

Restricting overall demand for parking contributes to a reduction in congestion by reducing the overall number of vehicles on the highway network. The relationship between this outcome and benefit is a fundamental one and one that is principally achieved by targeting the marginal car user either to push trips onto other modes or by transferring trips to a more favourable time of day (pricing being a central mechanism), and in doing so, freeing up road capacity for those most in need.

Efforts to restrict the overall demand for parking should not result in trip suppression as this would constitute a system failure, but fewer trips may be achieved as an output of trip efficiencies e.g. through trip chaining¹⁴ which would further contribute to reduced congestion. While trip suppression would result in reduced congestion, this is not a desirable outcome of parking management or TDM schemes more widely.

¹⁴ Trip chaining is the practice of combining otherwise independent trips into a sequence of trips resulting in a single return journey as opposed to multiple return journeys. It is most commonly associated by linking trips into the commute (the most common type of trip) e.g. going to the shops, to the gym, combining with the school run etc. Where effective, trip chaining results in a reduction in total vehicle kilometres, total motoring expenditure and in certain circumstances a reduced demand for parking.

One challenge to this outcome is that the public often perceive the provision of additional parking capacity as a solution for congestion pressures and parking stress; however, evidence suggests the contrary (Push & Pull, 2015; van Ommeren et al., 2012). In the short run, additional parking capacity can free up availability leading to reductions in the time vehicles spend cruising for parking; however, in the medium to long-run it only serves to reinforce car use and its negative externalities by inducing new demand. Where such a policy is introduced, congestion usually becomes more of a problem after implementation than it was before as traffic gets abstracted from other modes due to the increased convenience of the car.

Mitigating illegal and obstructive parking

contributes to a reduction in congestion by ensuring that vehicles are not parked in places or in such a way that they inhibit the flow of traffic. In using parking management as a tool for congestion management, it is important to recognise the distinction between 'illegal' and 'obstructive' parking. Illegal parking is any vehicle that is in contravention of parking regulations, whereas a vehicle that is parked obstructively may not necessarily be in breach of the rules; although most illegally parked vehicles will also be obstructively parked vehicles by definition. Resultantly, strategic scheme design plays a vital role in mitigating instances of obstructive parking through the identification of areas both on and off-street that can safely accommodate parked vehicles whilst optimising traffic flow. By contrast, the mitigation of illegal parking is entirely reactionary in ensuring that motorists comply with the parking scheme once implemented.



A parked vehicle obstructing a cyclist

Source: © Harry Brown

Limiting the prevalence of cruising for parking contributes to a reduction in congestion by ensuring that vehicles are not circulating for a parking space for longer than is necessary. Time spent cruising for parking manifests as increased journey time without any corresponding increase in the distance travelled. It is therefore 'dead time' and should be minimised. In London, it is estimated that the average vehicle spends 8 minutes cruising for parking, while the average motorist spends nearly 4 days of every year looking for a parking space (BPA, 2017). Similarly, Shoup (2005) estimates that cruising for parking is the root of 30% of all congestion.

Based on INRIX's £6.2billion estimation of the annual cost of congestion in London and Shoup's estimation that cruising for parking accounts for 30% of all congestion, the act of cruising for parking can be estimated to cost the London economy around £1.9billion per year.

Effective parking management regimes help to reduce instances of cruising for parking by ensuring that around 20% of parking spaces are available at any given time. Higher availability is generally considered an inefficient use of parking stock, while lower availability would make it increasingly difficult to find a parking space, thus increasing the time spent cruising for parking and in turn increasing localised congestion.

Where availability falls below 15%, the local highway network can be considered to be at a point of 'parking stress' and at this point the act of finding a parking space is deemed to be contributing to congestion in itself. Ensuring occupancy remains at between 80%-85% is therefore seen as the ideal state at which the utilisation of the parking resource and the propensity for the act of parking itself to generate externality are reconciled. Mitigating cruising for parking is therefore somewhat of a trade-off with other externalities of parking.



A vehicle cruising for parking in an off-street car park.

Source: ITP

Discussion

Parking schemes help to achieve a reduction in congestion by increasing vehicle flow leading to a reduction in average journey time and improved journey time reliability for road users. This in turn reduces the generalised cost of travel leading to more disposable time and income¹⁵ for road users which represents the private benefit of reducing congestion.

While it is clearly important to optimise the flow of general traffic, congestion reduction takes on particular importance in preserving the operation of London's bus network which relies on the provision and preservation of high levels of bus priority to ensure that buses are a competitive form of transport against private vehicles on intra-London trips. Without an efficient and comprehensive bus network, many trips would be reassigned to private vehicles which would lead to significant increases in congestion. ITP (2017) observe a relationship between falling bus patronage and a decline in average bus speeds in Inner and Outer London of 0.5mph between 2013 and 2017. The same principle also applies to cycling and the need to preserve and promote the cycling mode share; although cycling is a less effective mode compared to the bus at reducing overall congestion because buses enable people to be transported at greater densities.

A further key audience for congestion reduction is the emergency services whose operations rely on uncongested and unobstructed roads. DCLG (2010) observe an inverse relationship between the response time of the fire brigade and loss of life and fire damage costs in all contexts studied. As traffic flow/highway condition is a key determinant of response times, this enables a relationship to be drawn between the level of congestion and loss of life. The same relationship will be true for the ambulance service.

¹⁵ Principally achieved through fuel savings, but possibly also through reduced maintenance costs.



Parking controls help to preserve the operation of London's bus network and create safer environments for cyclists.

Source: ITP

Looking to the future, new technology and the proliferation of the so-called Internet of Things (IoT) has the potential to positively influence how parking management can work to minimise congestion in future years. By connecting parking spaces up with sensors and other similar tools that relay real-time information (RTI) to people through apps, there is the potential to reduce cruising for parking by actively identifying the location of available parking spaces and guiding drivers to them. Thus, the activity of parking search shifts from a mission of trial and error to a data-led approach similar to the way that satellite navigation technologies have enabled people to circumvent traffic jams by providing RTI on optimum journey paths.

Additionally, such technology would enable local authorities to run parking facilities at a higher occupancy rate ensuring the parking stock is run more efficiently and increasing the revenue obtainable from it.

Furthermore, is the potential role of dynamic pricing where real-time congestion data can be used to vary parking charges in response to congestion levels as is being done in some US cities.

A detailed discussion on the opportunities for technology to positively influence parking management and to develop some of its benefits is presented in Chapter 6 along with case studies on Westminster and San Francisco.

Issue

Like many historically-grown cities, Vienna was not built for the car. With increasing traffic and scarce space for parking it was clear that intervention was necessary to protect Vienna's vitality and the high quality of life enjoyed by its residents.

Solution

Parking space management ('Parkraumbewirtschaftung') is Vienna's primary TDM tool to mitigate the negative externalities of motoring. The scheme has seen entire districts transformed into short-term parking zones beginning with 1st district in 1993 and expanding into many of the outer districts of the city in two phases, limiting parking during the day (Monday to Friday) to 2 or 3 hours, depending on the area. Vienna also implemented park-and-ride to help car users shift modes and reduce the numbers of cars entering the city centre. All revenues from the scheme are hypothecated for investment in Vienna's transport system including funds for public transport and road safety improvements.

Impact

The first expansion of the short-term parking zones from districts 1 to 9 brought a reduction in parking space occupancy rates from 109% to 71% in the morning and from 108% to 89% in the evening, a reduction in unauthorised parking (86% in the morning and 76% in the evening) and a 26% reduction in traffic volumes on secondary streets directly linked to a reduction in the volume of traffic cruising for parking – from 10 million to 3.3 million passenger kilometres annually. Furthermore, the number of people travelling into Vienna by car from outside the city reduced by two thirds, while there was a higher than expected shift to public transport (25% versus the forecasted 15%).

The second expansion – which encompassed districts 12, 14, 15, 16 and 17 – brought similar results. It reduced parking space occupancy rates from 83% to 60% in the morning and from 88% to 79% in the evening, reduced unauthorised parking by 72% in the morning and 13% in the evening, reduced the number of parked cars that did not originate in Vienna (from 20% to 3%) and reduced the prevalence of cruising for parking.

Although there is evidence of traffic displacement effects in some areas due to some districts choosing not participate in the scheme and therefore it is not city-wide, the policy is credited with decreasing occupancy rates, parking violations and traffic, improving parking space availability, reducing air and noise pollution and improvements in trade and retail footfall in the city as a whole.

Source: Viennacouver (2015)

4.2.2. Improving road safety

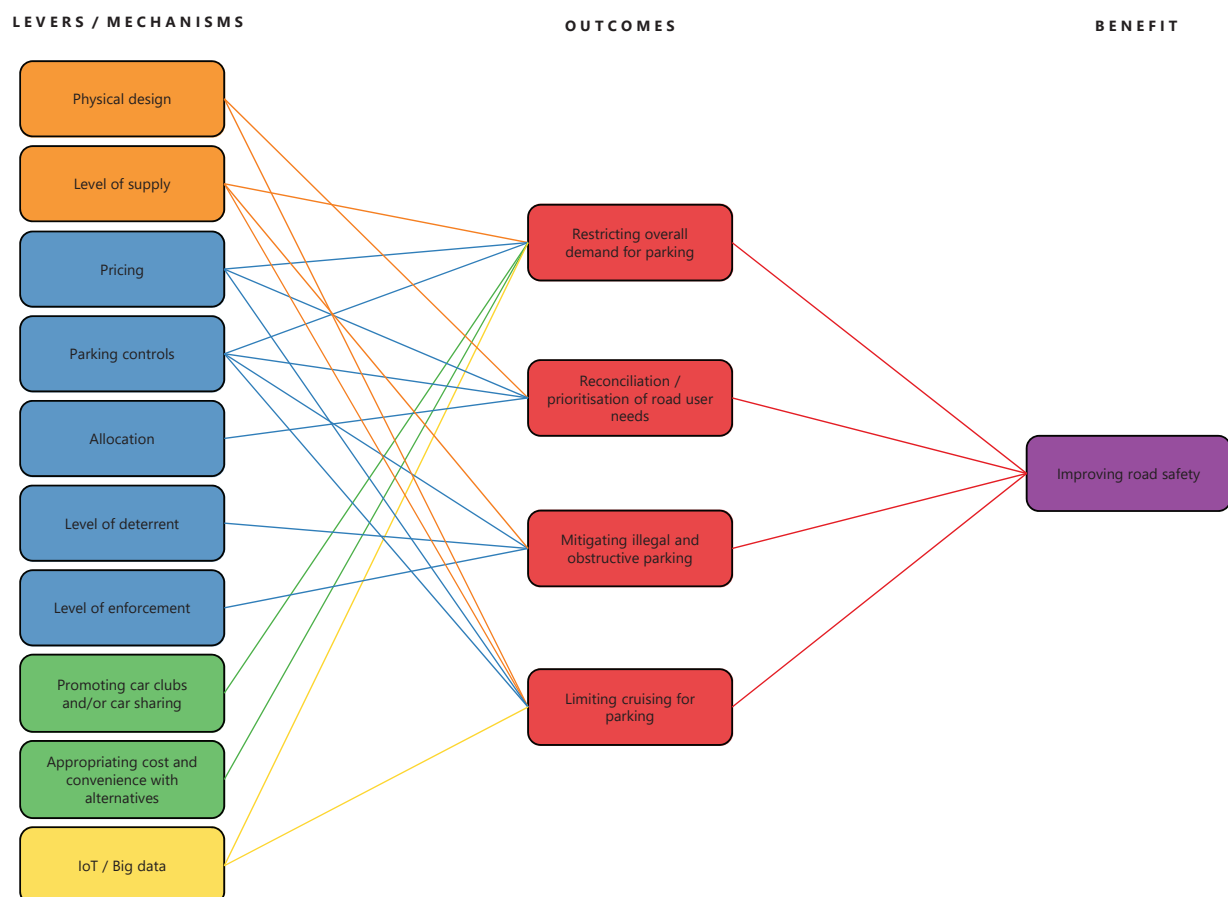
Road traffic collisions accounted for 30,270 casualties on London's highway network in 2016 (TfL, 2017b). 2,385 of these were serious injuries and 116 lives were lost. This means that on average a person is killed as a result of a road traffic collision in London every 3 days.

However, vehicles are not only a potential safety hazard when in motion. They can also present as a hazard to the public when parked – especially so when parked illegally or obstructively – and herein lies the integral role of parking management in ensuring the orderly and safe organisation of stationary vehicles.

Parking management helps to improve road safety in four principal ways:

- Restricting the overall demand for parking.
- Reconciling/prioritising road user needs.
- Mitigating instances of illegal and obstructive parking.
- Limiting the prevalence of 'cruising for parking'.

Figure 4-5: Pathway for improving road safety through parking management



Outcomes

Restricting the overall demand for parking helps to improve road safety by reducing society's overall exposure to road traffic collisions – again where a reduction in the demand for parking is linked to a reduction in trips made by private vehicle. However, increasing traffic can also have a positive impact on road safety, in theory, where traffic speeds are reduced to a level that reduces the likelihood of being killed or seriously injured (KSI) in a road traffic collision. Thus, the relationship drawn between demand for parking and road safety is somewhat determined by whether road safety is being measured in terms of overall exposure to road traffic collisions or exposure to road traffic collisions which result in KSIs, related to the level of congestion on the network.

Parking management can also deliver road safety improvements by **prioritising the needs of certain road users** in certain locations. The best examples relate to the protection of children at schools, but it is also applicable to other environments with concentrations of vulnerable street users. Schools are particularly sensitive due to the high concentration of children and the high levels of car use that is generated by 'the school run'.



Keep clear markings prohibit parking immediately outside school gates preserving visibility and helping to keep children safe.

Source: ITP

Children are more likely to be shaded by parked vehicles due to their smaller stature ensuring that they are most vulnerable to issues of inter-visibility i.e. they are less likely to see and be seen by drivers, while they are also more likely to contravene the principles set out in the Green Cross Code and 'run out into the road' (APS, 2011). In economic terms, a child's life is deemed more valuable than an adult's due to the increased time foregone in the event of fatal or life-changing injury. Therefore, ensuring the safety of children on our roads has particular value to the economy.

The **mitigation of illegal and obstructive parking** delivers road safety improvements owing to reduced conflict between stationary vehicles and moving traffic and improved inter-visibility between moving vehicles and pedestrians crossing the road. Conflict can result in moving vehicles colliding with parked vehicles but is also generated where road users are required to 'navigate' parked vehicles which can cause avoidable conflict with other moving traffic. This is particularly problematic where parking takes place at junctions and other similar locations where minimum visibility splays are required for the safe operation of the highway. While this implicates all road users, emergency service vehicles and cyclists are particularly vulnerable owing to reasons of speed and exposure respectively, while pedestrians are implicated when crossing the road.

Road safety can also be improved by **limiting the prevalence of cruising for parking**. Again, this is linked to exposure with more vehicles on the road network searching for parking increasing the likelihood of collision. Furthermore, the act of parking is shown to be the most stressful part of driving and at such times motorists are dealing with a greater array of stimuli which can result in a reduced awareness of other road users around them.

Discussion

Central to the relationship between parking management and road safety is the danger posed where parked vehicles obstruct inter-visibility between road users – a particular challenge is at crossings and junctions. Most abundantly, this is between motorists and pedestrians, but cyclists are just as susceptible to collision and injury. Indeed, there have been instances of motorists opening their doors into passing cyclists whilst trying to get out of their vehicles once parked (see Evening Standard, 2017).

Hackney Council (2016) purport that poor inter-visibility between road users is a factor in 3% of all road traffic collisions nationally. Assuming this figure is reflective of London, this equates to an estimated 3.5 fatalities, 72 serious injuries and 833 slight injuries occurring in London as a result of poor inter-visibility in London each year, totalling an annual cost of almost £58million based on Department for Transport (DfT) appraisal guidance.

Table 4-2: Estimated annual cost of road traffic incidents in London where poor inter-visibility due to parked cars was a contributing factor

Casualty Type	Cost Per Casualty (£)	Total Casualty Cost (£)	Cost per Incident ¹⁶ (£)	Total Incident Cost (£)	Full Cost (£)
Fatal	1,841,315	6,407,776	212,499	739,497	7,147,273
Serious	206,912	14,804,554	30,615	2,190,503	16,995,057
Slight	15,951	13,288,300	24,535	20,439,372	33,727,672
Combined	2,064,178	34,500,629	267,649	23,369,372	57,870,002

Source: from calculations based on DfT (2016), Hackney Council (2016) and TfL (2017b).

However, given that a disproportionately high amount of the benefit of parking management in road safety terms can be attributed to protecting children, the £58million cost figure shown in Table 4-2 may be conservative by virtue that it is not weighted to account for the increased economic loss attributed to KSI incidents involving children nor does it account for their increased exposure to road traffic collisions.

Further to the above, on-street parking scheme design can deliver a traffic calming function. Typically, this can be achieved where the relationship of parking spaces to the highway results in a reduction in carriageway width and/or where passing places are created to establish informal priority.



In this example, on-street parking provision on both sides of the carriageway helps to calm vehicle speeds.

Source: ITP

¹⁶ An incident can be described as any road traffic collision that brings about injury, slight, serious or fatal, to one or more road users.

Issue

For many years, parents' preference for dropping their children off directly outside the school gates had presented a road safety hazard at several schools in Havering. Following a series of unsuccessful campaigns and polite requests for parents to change their parking behaviour, the council decided that a more robust intervention was required with the safety of children paramount.

Solution

The London Borough of Havering was the first to launch a scheme to make it a fineable offence for parents to park in a CPZ set around four schools in the borough. The scheme, implemented in November 2016, is administered through a PSPO using powers granted under the Anti-social Behaviour Crime and Policing Act 2014. The Order prohibits parking in the zone during peak school hours and the scheme is enforced using Fixed Penalty Notices (FPNs), CCTV and Automatic Number Plate Recognition (ANPR). A standard fine is

£100, but multiple offenders (three offences or more) could receive a £1000 fine and a criminal record.

Impact

Once implemented, results were immediately positive with instances of parking inside the prohibited zone reduced to almost zero. Havering Council attribute part of the scheme's success to the effective communication and engagement with all major stakeholders delivered in the run-up to its introduction as well as the positive contribution of the media in helping to raise the profile of the scheme, including national broadcasters such as BBC and ITV. Havering Council does stress, however, that a PSPO should only be used as a last-resort measure only once more conventional approaches have been tried and exhausted. It is important to recognise the prohibition was imposed on preventing anti-social behaviour, not for stopping parking, nor penalising residents.



Outside The James Oglethorpe School
8:37am 8th February 2016



Outside The James Oglethorpe School
8:37am 1st February 2017

Sources: Havering Council (2018), Independent (2016)

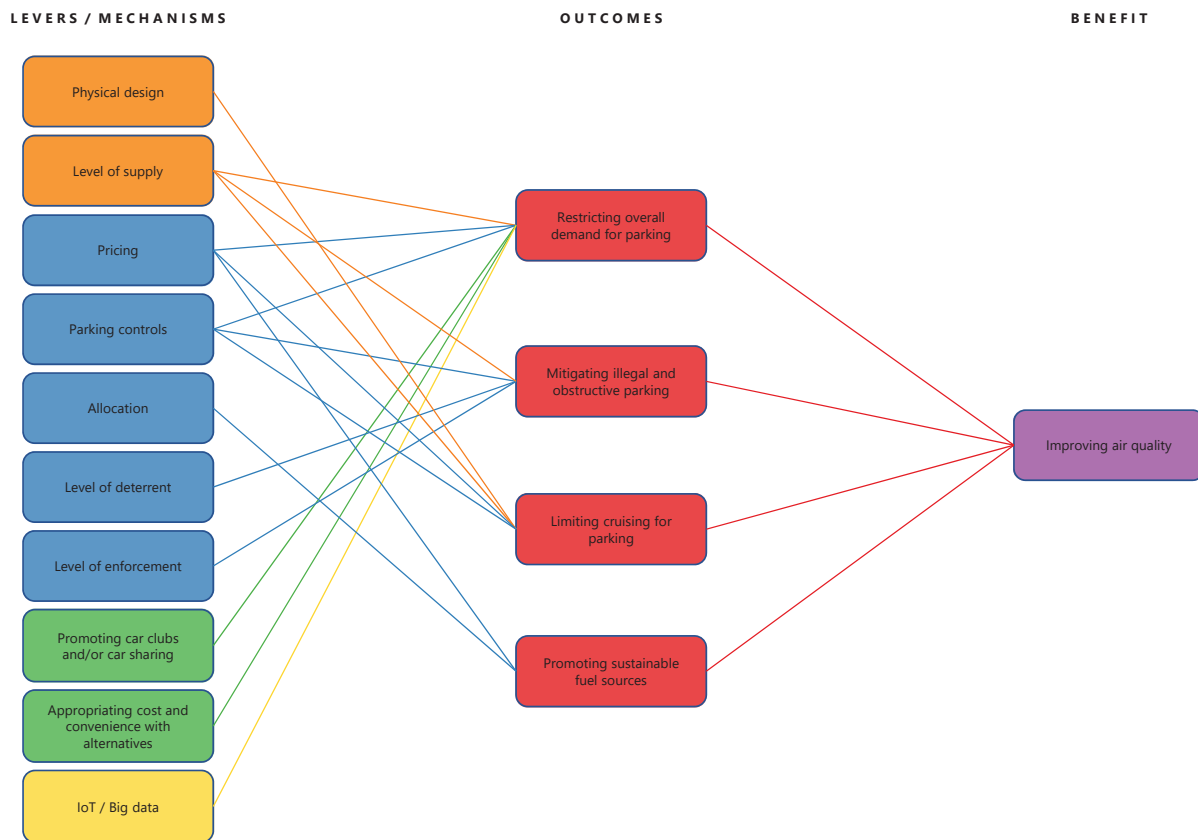
4.2.3. Improving air quality

Air pollution has long been an issue in the city. Despite this, it has played only a secondary role to congestion in transport policy terms for many decades; although this has now changed.

Parking management helps to improve air quality in four principal ways:

- Restricting the overall demand for parking.
- Mitigating instances of illegal and obstructive parking.
- Limiting the prevalence of 'cruising for parking'.
- Promoting sustainable fuel sources.

Figure 4-6: Pathway for improving air quality through parking management



Outcomes

A large part of the air quality benefit derived from parking management can be attributed to its ability to improve traffic flow, reduce journey times and to dissuade excess vehicles from accessing areas prone to poor air quality. In this way, the realisation of air quality benefits is strongly correlated to the realisation of congestion reduction benefits. Quite simply, the less time a vehicle spends on the network, the less time it spends polluting and the lower the overall level of emissions produced. These benefits are accrued primarily by **restricting parking demand**, limiting time spent cruising for parking, and to a lesser extent, **mitigating illegal and obstructive parking** where such vehicles contribute to congestion in an area.

Importantly, the relationship between parking demand and air quality is not always linear. The externality of air pollution will begin to increase exponentially – rather than linearly – at a point of congestion or parking stress as the stop-start nature of congested traffic leads to increases in journey times in absolute terms as well as increases in the rate of vehicle emissions. Therefore, parking regimes which help to shift marginal car trips to more sustainable modes, as per the TDM function of parking management, are intrinsically beneficial to air quality.

The other way in which parking management can deliver air quality improvements is through the promotion of **more sustainable fuel sources**. This is achieved either through pricing where the cost of parking charges or permits is differentiated by vehicle fuel type or through allocation where dedicated parking provision is provided to less polluting vehicle types e.g. electric vehicles (EV), or both. The use of parking management to promote less polluting fuel sources is a common feature of Air Quality Action Plans (AQAPs).

Discussion

Cases such as Brixton Road in Lambeth, where in 2017 the annual legal limit for nitrous oxide (NO_x) – a toxic gaseous substance – was breached in just 5 days and Putney High Street in Wandsworth, where the hourly limit for NO_x was exceeded on 1,200 separate occasions the year before, serve to highlight the magnitude of the issue (Guardian, 2017). In addition to NO_x, London also exceeds the World Health Organization's (WHO) stated safe limit for particulate matter (PM). TfL (2018) estimate that road-based transport contributes to 14% of London's ambient NO_x and 56% of its PM_{2.5} – the most hazardous form of PM to human health.

Research conducted by King's College London estimates that air pollution shortened lives by 140,743 years in London in 2010 – equivalent to 9,400 deaths – at a cost of £3.7billion (IPPR, 2016). Furthermore, IPPR (2016) attribute the cause of 50% of air pollution in London to road transport, 40% of which is to diesel-powered vehicles. This suggests that the economic contribution of road-based transport to London's air quality crisis stands at around £1.85billion with diesel-powered vehicles alone accounting for just shy of £1.5billion.

While the effect of air pollution is ubiquitously felt, poor air quality has a disproportionately high cost for vulnerable user groups, particularly children and disabled people as well as those with underlying health conditions of a respiratory or cardiovascular nature. To this end, the National Institute for Health and Care Excellence (NICE) recommend that clean air zones and fuel-efficient driving initiatives be introduced at locations such as schools, hospitals and care homes where vulnerable users congregate in order to prioritise the needs of these groups (NICE, 2017)

There are a range of approaches being used by local authorities in London to address air pollution through parking management schemes. In August 2017, London Councils, TfL and the Greater London Authority (GLA) jointly announced a £4.5million fund courtesy of the DfT's Office for Low Emission Vehicles' (OLEV) Go Ultra Low City Scheme (GULCS) to install EV charging infrastructure on London's streets which will result in 25 boroughs each receiving up to £300,000 to install 1,500 standard-speed on-street charging points in residential areas (TfL, 2017c). These provisions are additional to the network of rapid charging points that TfL plan to install before the end of 2020 which will enable a reallocation of on-street parking

supply from general use to EV-only. In addition to reallocation, EV parking provisions are incentivised by several boroughs through free or discounted parking.

Furthermore, many boroughs are beginning to use emissions-differentiated parking pricing to promote the use of less polluting vehicles, particularly in Central and Inner London. This is to exercise the so-called 'polluter pays principle' which is more commonly associated with vehicle excise duty (VED) payment brackets, but it is becoming an increasingly popular technique in the context of parking charges.

Camden has been allocating residential parking permits based on vehicle emissions since 2007. Meanwhile, Islington, which also grades residential parking permits based on emissions, has recently introduced a 50% surcharge on diesel vehicles parked in the borough, as has Westminster through a pilot scheme contained to Zone F in Marylebone. Such levies sit on top of the Mayor's new £10 'toxicity charge' (T-Charge) – introduced in October 2017 affecting pre-Euro 4 petrol and diesel vehicles entering London's congestion charging zone (CCZ) – and together are designed to influence consumer purchasing behaviour in favour of less polluting fuel sources. The Ultra Low Emission Zone (ULEV), which comes into effect across the existing CCZ area in 2019, will supersede the T-Charge and be even more selective in the type of vehicles it promotes.

A further issue to have gained prominence in London is that of engine idling – the act of leaving a vehicle's engine running whilst stationary – which relates to stopped or waiting vehicles as opposed to those that are parked. Moreover, there is plenty of anecdotal evidence to suggest that driver motives for engine idling are often based on misconceptions around saving fuel by not having to turn vehicle engines off and back on again.

Fleet Operator Recognition Scheme (FORS, 2018a) estimates that 90kg of PM₁₀ could be saved per year if all drivers in Central London reduced instances of idling by 1 minute per day. Similarly, FORS (2018b) outlines that idling can use up to 2 litres of fuel per hour, emitting around 5.3kg of carbon dioxide (CO₂).

Relating the FORS (2018a) estimate to official figures on damage costs from PM from the Department for the Environment and Rural Affairs (DEFRA, 2015), the economic benefit accrued from a 1-minute reduction in engine idling in Central London would equate to £23,907. Where accounting for sensitivity on DEFRA's damage cost estimates, this could be as high as £27,167. Of course, where accounting for other pollutants, this value will be higher.

Importantly however, realising a blanket reduction in engine idling throughout any part of London cannot realistically be achieved through parking management/enforcement (although campaigns and the deployment of air quality marshals can help to reduce idling instances). Appreciating the full benefit would most likely require legislative intervention on the vehicle manufacturers' part, perhaps by applying a software setting that would automatically turn a vehicle's engine off if it is stationary for a given length of time.

Issue

Despite the majority of trips in London taking place by public transport, walking and cycling, there are many trips that are only possible by car. With this in mind, London is aiming to position itself as the Ultra-Low Emission Vehicle (ULEV) capital of Europe and in doing so working to address the challenge that private vehicles pose on air quality in the city at a strategic level. However, one of the largest barriers to the uptake of ULEVs is the relative absence of dedicated EV charging infrastructure.

Solution

GULCS is a partnership between TfL, London Councils and GLA, initiated in 2017 that will see 25 of London's boroughs, each receiving up to £300,000, to install up to 1,500 standard-speed on-street charging points in residential areas across London throughout 2018 and 2019. These electric charge points will be either specially-constructed 'freestanding' ones or fixed to existing lamp columns. Using lamp columns for charge points is cheaper, quicker and easier to install with less impact on the streetscape.

In addition to the rollout of ULEV charging infrastructure on residential streets will be an increase in charging infrastructure in car clubs bays and support for rapid EV chargers. Meanwhile, the final stream of GULCS funding will be used to promote so-called Neighbourhoods of the Future (NoFs) which support local, innovative projects that prioritise and encourage the uptake of ULEVs.

Impact

An independent economic assessment by Ecorys – cited in the bid for the GULCS scheme – showed that high uptake of ULEVs in London would result in total net Gross Value Added (GVA) for the UK of around £230 million a year by 2050, with over 3,000 net jobs created or safeguarded across the country. Ecorys has also calculated the social and environmental benefits of securing wider uptake of ULEVs in London. This showed nearly £30 million benefit by 2025, including health benefits due to reduced pollutant emissions worth around £10 million by 2025.

Although the scheme is still ongoing, further funding is earmarked for interested boroughs once TfL, London Councils and the GLA are happy with the progress made on the current allocation.



Dedicated EV parking bays with complementary charging infrastructure can help to increase the uptake of EVs in London.

Source: London Councils

Emissions-based pricing in Islington

CASE STUDY

Issue

Islington Council estimates that between 25-30% of the 1.59million short-stay parking sessions within the borough are undertaken by diesel vehicles correlating with the borough's high mortality rates of cancer and respiratory diseases. The Council acknowledge that diesel emissions have been linked to cancer, heart and lung damage and a range of other health issues and that the WHO has classified diesel emissions as carcinogenic to humans.

Solution

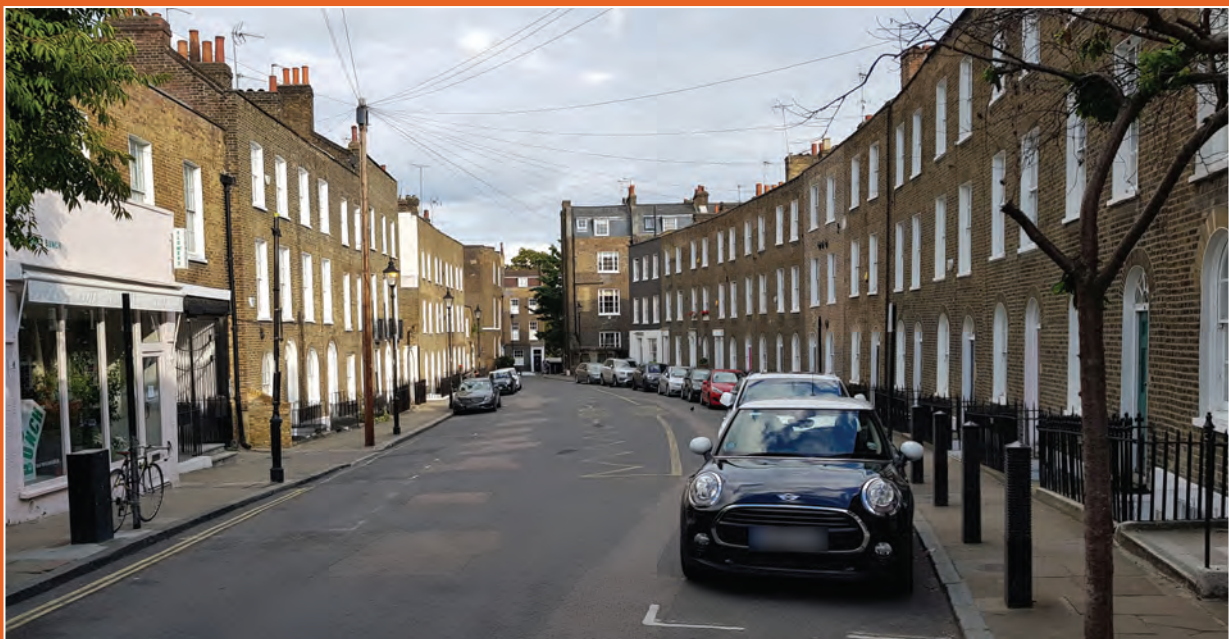
In a bid to tackle growing air quality concerns, Islington Council are utilising parking management to deter individuals from making private vehicle trips and promote the use of less-polluting vehicles through establishing dedicated/priority parking and reduced-price parking in favour of low-emission vehicles.

Since 2015, the Council grades residents' parking permits according to their engine size and CO₂ emission levels and charges diesel vehicle owners an additional £99.65 annual surcharge on top of the permit rates. As a result of this surcharge, owners of a diesel car pay up to six times more than those who drive a petrol car with the same emissions.

The Council has also recently introduced a short stay parking surcharge of £2 for all diesel cars, on top of existing hourly rates.

Impact

These two emission-based pricing schemes together aim to influence both residents' and visitors' travel behaviour, to encourage cleaner, more environmentally-friendly modes of transport to improve the borough's air quality and in turn, resident's health.



Source: ITP

Sources: Islington Council (2015, 2018), This is Money (2017)

Issue

Westminster suffers from one of the highest rates of mortality attributable to poor air quality anywhere in the UK, second only to the City of London and air quality is the recognised number one concern of the borough's residents. One of the key recognised issues in Westminster relates to engine idling – where a vehicle's engine is left running whilst it is stationary, loading or waiting at the roadside.

Solution

Westminster's 'Don't Be Idle' (#DontBeIdle) campaign represents the borough's attempt to eliminate instances of engine idling. Through the campaign, Westminster deploys dedicated anti-idling enforcement officers (or air-quality marshals) at known pollution hotspots to approach idling motorists and politely ask that they turn their engine off. Where motorists refuse, officers have the power to issue an £80 PCN which acts as the deterrent; although in the overwhelming majority of cases, a polite word works just fine.

The campaign has also gathered momentum as a social movement where individuals are encouraged to get involved and become 'air quality champions', participate in anti-idling events held within the borough and report any cases of motorists failing to turn their engines off through an online interactive web-page. The campaign has also benefitted from a series of celebrity pledges.

Impact

The campaign has been running for just under 2 years and has gathered significant momentum over this time having amassed over 6000 people signed-up to pledge against idling. While the precise impact is unknown, anecdotal evidence is positive and Westminster report that nine out of ten motorists will turn their engines off without any fuss when asked to do so first time. In addition to improving air quality for local stakeholders, the campaign also seeks to address the misconception that engine idling saves fuel.



#DontBeIdle

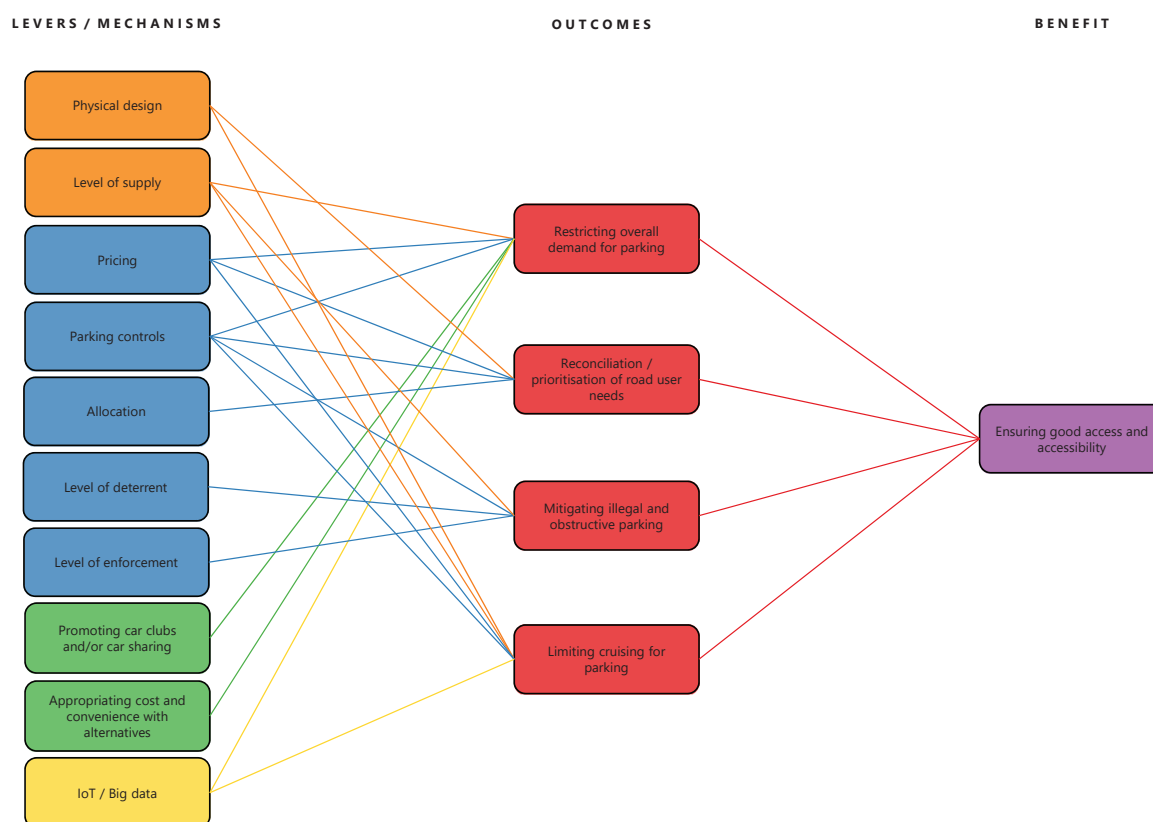
Sources: City of Westminster (2018), Kieran Fitsall

4.2.4. Ensuring good access and accessibility

While good access and accessibility benefits everybody, the limited kerbside space in London ensures that parking needs often have to be prioritised. Parking management helps to promote access and accessibility in the following ways:

- Restricting the overall demand for parking.
- Reconciling/prioritising road user needs.
- Mitigating instances of illegal and obstructive parking.
- Limiting the prevalence of 'cruising for parking'.

Figure 4-7: Pathway for ensuring good access and accessibility through parking management



Outcomes

The **prioritisation and reconciliation of road user needs** is the most important consideration when promoting access and accessibility through parking schemes. Given limitations of parking supply and availability, there is often the need to ensure that certain user groups have access to parking at certain times of day. For instance, residential parking permit schemes help to ensure that residents have availability to park close to their homes, while Blue Badges give suitable priority to people with reduced mobility through access to designated disabled parking bays at a wide range of trip attractors. Prioritisation can also be used (through allocation) to ensure that freight vehicles are able to load and unload as close as possible to the facilities they are servicing, maximising the productivity of their work at reduced cost to businesses/premises¹⁷.

¹⁷More detail on commercial needs and the freight sector is given in section 4.2.5 'promoting the local economy'.

A further, fundamental role of parking management in respect of access is the need to **prevent vehicles from parking, stopping and waiting in undesirable locations**. Where vehicles park illegally or obstructively on footways, in cycleways or in bus lanes, the benefit of such segregated facilities is compromised and if such activity was prolific, London would descend into chaos. Even isolated instances of illegal parking behaviour can be highly detrimental to the access needs of other road users e.g. where a vehicle is parked on a footway it can prevent a wheelchair user from passing along the footway, forcing them into the road. Similarly, parking management plays a vital role in protecting access points and spaces for emergency service vehicles enabling them to respond to emergencies in the quickest possible time.



Permitting is a common tool to give parking priority to residents in residential areas.

Source: ITP



This vehicle is parked on double yellow lines and on the footway.

Source: ITP

Further to this, where parking management schemes aim to limit the overall number of vehicles they create more amenable, navigable and less intimidating environments for people – children, older and disabled people, in particular – to be in and to get around. This can reduce severance where high levels of parking could otherwise act as a barrier to crossing the road. This can be achieved through schemes which seek to **restrict parking demand** and **limit cruising for parking**.

Discussion on Blue Badge parking

Perhaps the most challenging prioritisation issue relates to Blue Badge parking. In addition to dedicated parking bays, Blue Badge holders are also allowed to park on yellow lines and in residential bays in some boroughs which increases capacity – but policies do vary. For instance, Kensington and Chelsea (Purple Badge), the City of London (Red Badge), Camden (Green Badge) and Westminster (White Badge) do not afford concessions to Blue Badge holders, instead operating their own bespoke schemes.

Parking schemes need to balance the access needs of a variety of different users, but ensuring that people with reduced mobility have good access to facilities and services beyond their residencies can be the difference between them making a trip or not and ensuring that they have access to dedicated and convenient parking – and that they have a high level of certainty in this knowledge – is a significant part of that puzzle.

Where people with reduced mobility do not have such confidence, they may be deterred from making a trip which in the long run can be detrimental to their physical and mental wellbeing as well as the broader economy. Moreover, they also need confidence that regulations will be enforced. According to The RAC Foundation (2005), 14% of non-disabled motorists admitted to parking in a disabled bay because of a lack of available regular spaces – an action which undermines the integrity of the system.



A taxi parked in a disabled parking bay

Source: ITP

"This [Blue Badge fraud] isn't the biggest crime wave the country faces, but abuse of the system creates huge levels of ill feeling and risks bringing into disrepute the whole scheme, which is invaluable for those who really need it."

Steve Gooding, RAC Foundation (in Telegraph, 2016)

It is widely felt within the parking industry that enhanced powers to use CCTV to enforce Blue Badge parking would lead to a reduction in instances of Blue Badge parking offences resulting in the improved availability of disabled parking bays for Blue Badge users.

Ensuring access for those who need it most – Bromley and Bexley: Blue Badge Misuse Campaign

CASE STUDY

Issue

Bromley and Bexley councils have suffered from a history of widespread abuse and fraud in relation to Blue Badge parking. The councils reported that on many occasions, user groups with disabilities were often unable to locate a parking space within an accessible distance to their destination, resulting in disabled motorists being forced to abandon their trips.

Solution

In 2016, the two boroughs jointly launched their Blue Badge Misuse Campaign to tackle this fraudulent activity and to help safeguard the rights of disabled motorists and passengers. Several new parking measures were implemented to deter improper use, including:

Warning signs displayed in key areas on-street and in car parks.

- Specific training for CEOs and Kiosk Attendants in car parks.
- Daily Blue Badge checks by CEOs to ensure badges on display are valid and concessions are being used for the benefit of badge holders only.
- Distribution of business cards encouraging badge holders to report misuse concerns.
- Regular 'call in' days when the validity of Blue Badges displayed within vehicles on-street and in car parks are checked through the national database.
- Distribution of feedback cards to encourage drivers to leave their comments after an inspection.

- An awareness campaign including a news bulletin and survey, regular updates and a guide to 'Blue Badge Rules' was provided through the councils' websites.

Impact

Bromley and Bexley councils report that the scheme has been successful at combatting Blue Badge fraud with more than 80 prosecutions to date since the campaign launch. Moreover, the survey results show that over 80% of those surveyed thought the bulletin was helpful, more than 60% had seen the warning signs displayed and over 45% agreed that the campaign's misuse prevention measures are effective. The councils have also received a number of positive testimonials from Blue Badge holders in regard to the success of the scheme.



Enforcement of blue badge parking

Source: London Boroughs of Bromley & Bexley (2018)

4.2.5. Promoting the local economy

The extent to which car access is required to support local economic growth is an often-debated issue. While historical practice in many UK towns and cities has been to provide for the car based on the level of unmet demand, there has been a body of evidence growing for some time which suggests that this is in fact counterproductive; particularly so in dense urban environments such as London.

“For too long cars have been given ‘free rein’ in town centres... The worst thing you can do is give free rein to the car. The idea of giving free rein to the car and excluding or marginalising pedestrians does not work economically, does not work environmentally and is a failed policy of the 1970s.”

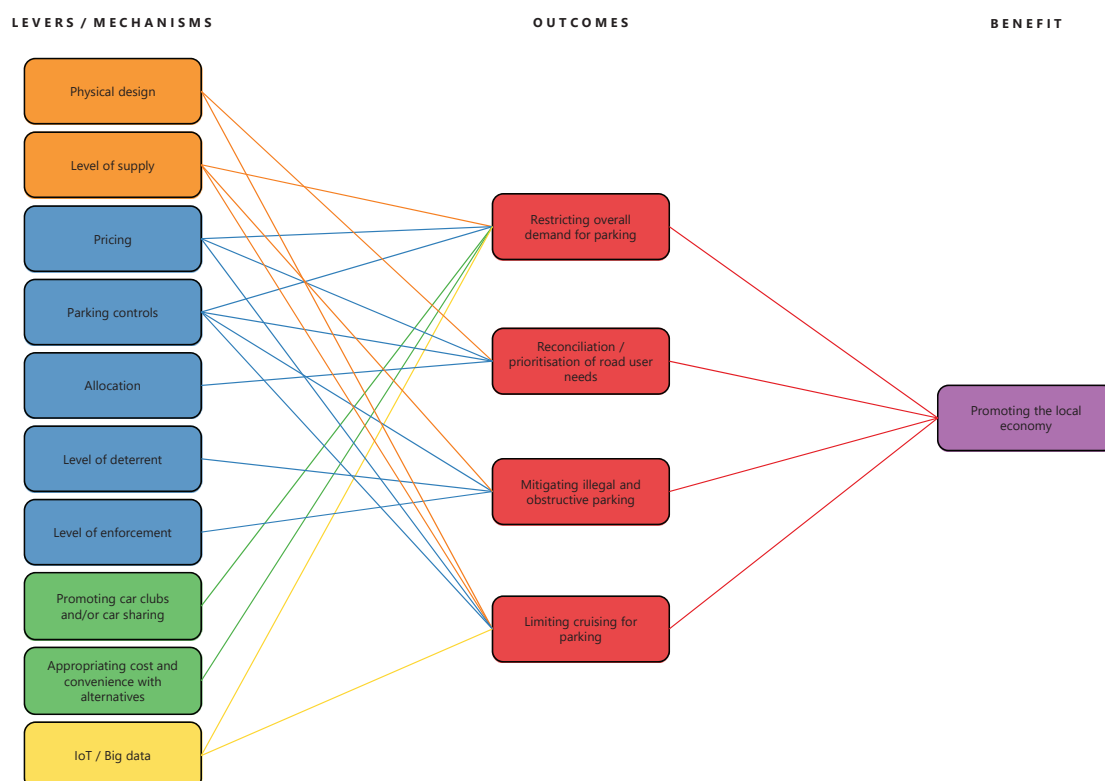
Norman Baker MP, former Transport Minister (in Telegraph 2013)

The use of parking management to promote the local economy (principally, urban centres) can be defined as that which helps to drive and maximise the economic output generated from these locations in terms of productivity and job creation and is therefore intrinsically linked to supporting business. Furthermore, local economies/urban centres – due to their density and diversity – represent the spatial context within which parking pressures are often most intense.

Parking management can be considered to contribute to the local economy in the following ways:

- Restricting the overall demand for parking.
- Reconciling/prioritising road user needs.
- Mitigating instances of illegal and obstructive parking.
- Limiting the prevalence of ‘cruising for parking’

Figure 4-8: Pathway for promoting the local economy through parking management



Outcomes

Restricting the overall demand for parking helps to boost the local economy by better appropriating the balance of modes (mode share) to the needs of the urban centre in question. Without this appropriation, the private car would invariably dominate, detracting from the operation of other modes, particularly the benefit obtained from buses as a highly space-efficient mode of transport capable of moving large volumes of people in and out of a highly space-constrained environment and for freight vehicles in the context of servicing and deliveries. In effect, parking management prevents the private car from dominating, providing sufficient space for bus users, pedestrians, cyclists and freight and servicing vehicles as need dictates. The balance of this need will differ subtly between urban centres, with the greatest difference experienced between Central and Outer London.

The need to reconcile/prioritise different road user needs is arguably more intense in urban centres than at any other location due to the many different user groups that require parking e.g. shoppers, commuters, visitors, freight/commercial vehicles, etc. Parking Forum (2006) argue that parking management can be used to prioritise certain types of car trips, discouraging those which present less benefit for the local economy. In the context of urban centres, tariff structures can be used to encourage turnover of spaces and discourage 'long-stay' commuter parking. Commuters usually occupy spaces for the whole day which reduces the effective capacity of the parking supply vis-à-vis parking for shoppers and other leisure uses where turnover is higher and thus Parking Forum (2006) suggest that commuters should be encouraged to park further away.

This notion is supported by ATCM & BPA (2013) who claim that parking management can be used to moderate demand by targeting different user groups at different times of day.

Meanwhile, **illegal and obstructive parking** can be detrimental to local economies where they prevent freight vehicles from servicing sites – adding time and cost to their operations which in the long run will be passed onto businesses – and in deterring customers who may object to the congestion and general chaos caused and take their custom elsewhere.

Similarly, **cruising for parking** is problematic because it contributes unnecessarily to the congestion in an urban centre, adding time to people's journeys. The effect of congestion is to make one urban centre less attractive vis-à-vis other neighbouring and competing urban centres, and in doing so losing custom and trade to these centres.

Discussion on retail

London Councils (2012) purport that in a retail context, shopkeepers consistently overestimate the share of their customers who travel by car, sometimes by as much as 400%. In London, as well as in other cities, the proportion of trips made to urban centres by foot or by public transport is greater than those made by car.

TfL conducted research between 1999 and 2011 exploring the ways people travel to urban centres within London for leisure purposes such as shopping, entertainment and dining out¹⁸. A study undertaken by TfL (2011) found that the train/tube was the most popular means of getting to Central London (52%) but accounted for only 4-5% of trips to Inner and Outer London, while the bus (36%) was the most popular mode overall followed by walking (28%). The car was found to be used by 2% of those accessing Central London, 8% accessing Inner London and 19% accessing urban centres within Outer London at an average of 14% mode share across all three. Furthermore, the research found that car drivers were 'satisfied'

¹⁸ The research also gathered information on duration of stay, frequency, reason for selecting the mode, as well as wider information relating to consumer experience.

with the number of spaces available in all areas of London with only marginal variance in satisfaction scores of 0.6 out of 10.

Table 4-3 displays consumer spend per visit and per week dependent on the mode of travel. TfL (2011) found that while car users spend more per visit, they spend less than those travelling by public transport or walking to urban centres over time as they make fewer trips.

Table 4-3: Average consumer spend in London by mode per visit and per week

Mode	Average spend per visit	Average spend per week
Car	£41	£56
Train / tube	£38	£59
Bus	£32	£70
Walk	£26	£93
Cycle	£21	£47

This evidence suggests that while more influential in Outer London, car use plays a largely supporting role to walking and public transport in promoting the vitality of urban centres from the perspective of access and mobility throughout London.

Despite this, the issue of car access and parking can become more influential where proximate and competing urban centres are otherwise equal and where parking charges and availability are therefore one of the few differentiating factors between them. Importantly in the context of London, this is not to assume that cheap and abundant parking will win out – because the car is rarely the dominant mode and oversupply will compromise the access for these modes – but that the parking management regime is effective at reconciling the needs of all users in a manner deemed acceptable and appropriate to the local context. Unfortunately, there can be no single recipe which sets out the ‘optimum’ parking management regime for a given ‘type’ of place because the immediate local context will always be the most important consideration.

The perception that the level of parking supply is directly proportional to economic vitality is further challenged by the examples of Barcelona and Canterbury. In Barcelona, on-street parking supply was reduced by 24% as part of a wider framework of urban regeneration which sought to give more precedence to the use of public space. Following the regeneration programme – which took place from 2003 until 2007 – tourist and leisure-related activity increased by 13% and there was a 27% increase in demand for accommodation (Push & Pull, 2015). Meanwhile, Canterbury reduced its city centre parking supply whilst increasing parking charges by 50% with no losses to city centre trade (London Councils, 2012).

Furthermore, London Councils (2012) identify the common practice of railheading – where people (typically commuters) park their cars at outlying rail stations before completing their trip by train – as being largely detrimental to the local economy. London Councils (2012) suggest that this practice is disliked by many boroughs because the parked cars take up valuable space, remaining there all day, whilst their owners spend very little money in the local area. Consequently, many boroughs place commuters at the bottom of their parking hierarchy.

The practice of railheading presents somewhat of a policy conundrum because it is often liked by strategic planners for its capability to intercept car trips, preventing cars from being driven into the city centre where space is even scarcer and land is more valuable. London Councils (2012) concede that railheading would be more acceptable if promoted through dedicated park & ride (P&R) facilities aimed to minimise the externalities of railheading on town centre parking supply.

Discussion on freight

Independent Transport Consultants (ITC, 2017) recognise that: 'Urban logistics and deliveries are essential to the functioning and flourishing of a city, keeping consumers, public services, and industry supplied with the goods they need while removing exports and waste produced in the city'.

The success of urban road freight is predicated on two essential components: uncongested roads and an available loading/unloading bay or space. Drivers of goods vehicles are often under the greatest pressure because they have to hit specific delivery windows, service the premises in the allocated time and then head off for the next location – commonly undertaking a multitude of trips to premises all over London each day.

When working to such tight time restrictions, the occurrence of any delay can be extremely costly to the freight sector, particularly where it results in lost trade. Given the economic importance of freight, freight traffic does therefore require some degree of prioritisation. While parking management delivers important benefit to the freight sector through its role in congestion management, the key benefit is the priority afforded in a parking context where freight traffic is able to stop on single yellow and double-yellow lines usually in close proximity to the premises served, therefore minimising the time required to conduct activities. However, where other vehicles park in these areas, this can obstruct access to premises forcing delivery and servicing vehicles to stop elsewhere. It is important to recognise that even small distances can add significant time to delivery/servicing activities, particularly where the goods being handled are heavy.

In most boroughs, delivery and servicing vehicles are afforded 40mins to load and unload and while special dispensation can be afforded for a lengthier time window, sometimes circumstances foreseen or otherwise determine that this is not enough and drivers may be issued with a PCN. One of the key challenges with the 40min time window relates to the fact that the policy direction for more urban consolidation is encouraging larger freight vehicles to be adopted, upscaling from Light Goods Vehicles (LGV) to Heavy Goods Vehicles (HGV) in some cases. However, larger vehicles take more time to be loaded and unloaded and therefore, despite politicians being keen to promote more consolidated activities, the regulations do not necessarily support it.

The parking industry is generally of the belief that enhanced powers to use CCTV to enforce parking regulations would be beneficial to the freight industry in enabling parking enforcement to be more responsive in addressing parking contraventions, protecting designated spaces for freight operators to the benefit of the local economy.

Issue

Freight traffic accounts for around one third of all traffic in Central London during the A.M. peak with LGV traffic having grown by 13% between 2012 and 2016 across the capital. With commercial space at a premium and with consumer pressure driving ever more responsive supply chains, it is little wonder that so much congestion in Central London is caused by freight-related activity.

Solution

Owing to their common servicing requirements, many businesses have started to come together to implement consolidated delivery and waste collection schemes in a bid to reduce the number of freight trips required to service their area, reducing congestion and releasing some of the growing pressure on kerbside space. Such schemes are now in place on Regent Street, Baker Street and Bond Street and are often initiated through Business Improvement District (BID) partnerships.

The recycling scheme on Baker Street – an area-wide waste and recycling scheme called ‘Smarter Recycling’ – was set up by BakerStreetQ – the local BID – in 2013. To date, 65 businesses are signed up to use a common provider with a further 30 businesses in the process of signing up. Alongside Smarter Recycling is a scheme called ‘Smarter Deliveries’ which consolidates servicing trips to multi-tenant buildings and hotels. The project aims for a 50% reduction in deliveries made to these buildings with a stretch target of a 75%

to 80% reduction in vehicle movements; although the scheme is still young.

Impact

Smarter Recycling has so far resulted in a 12% reduction in waste vehicle movements in the Baker Street area, while the rate of recycling has also increased with an estimated 2640 tonnes diverted from landfill resulting in a 1740 tonne carbon saving.

Meanwhile, the Regent Street scheme, which has 21 participating retailers, has seen a remarkable 80% reduction in the number of retail-associated HGV movements, while the Bond Street Commercial Vehicle Reduction Scheme – which has 81% of all retailers and 66% of all businesses on Bond Street on-board – has cut the number of waste collection service providers from 47 to just 5 under phase one of the scheme. Phase two, which will focus on rationalising the 55 separate delivery companies will begin soon.



Freight activity is vital for the success of the economy but the use of large vehicles in space-constrained environments such as here in the City of London can present a challenge.

Sources: Arup (2018), Baker Street Two Way (2018), New West End Company (2016)

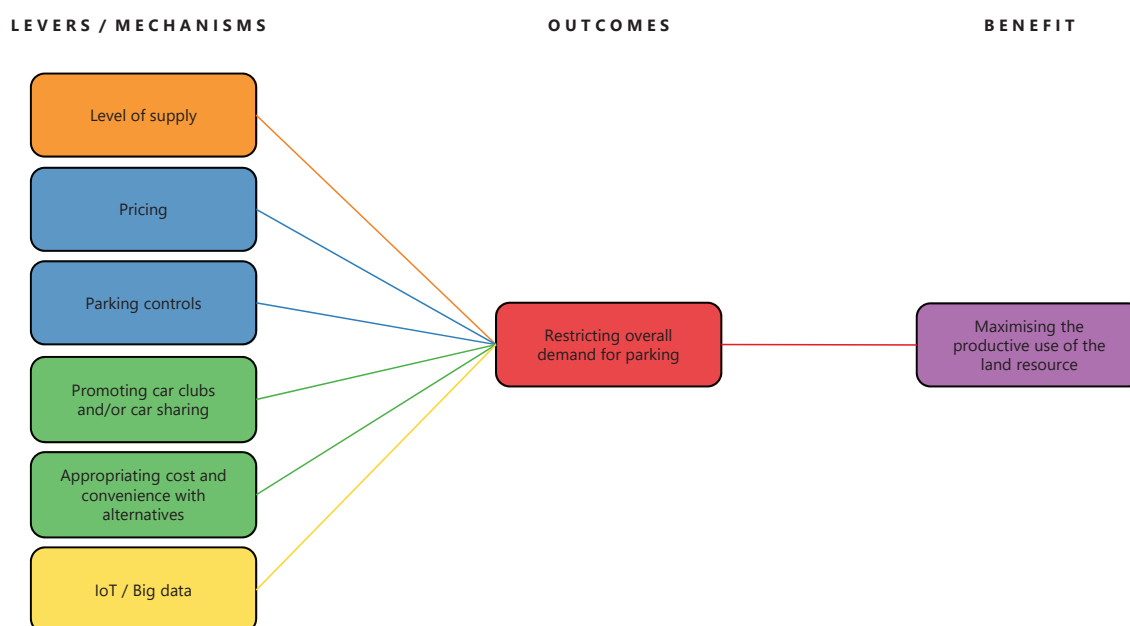
Source: ITP

4.2.6. Maximising the productive use of the land resource

Fundamentally, parking requires land. According to Willson (2015), an off-street parking space – inclusive of drive-in and drive-out envelope – occupies around 300ft² (28m²) of land which he claims is roughly the same as the average size of a studio apartment in New York. However, land that is allocated to parking cannot be used for other purposes and it hereby comes with an opportunity cost. Where parking is not being utilised, it is effectively 'dead land', while excess parking could be more productive if released for other uses.

Figure 4-9 below details the pathway for maximising the productive use of land resource:

Figure 4-9: Pathway for maximising the productive use of the land resource through parking management



Restricting demand for parking enables more precious land resource to be allocated to other uses which deliver greater economic output (e.g. employment land, retail) or bring direct utility to individuals (e.g. homes, leisure purposes). Ultimately, the number of parking spaces needed to support an area will be governed by peak-time demand and influenced by pricing.

While parking is generally considered to be an inefficient use of land and the consequence of oversupply therefore manifests as a loss in output, equally, if too little land is allocated to parking, the externalities generated from congestion, in particular, will constrain output; thus, the need is to find the equilibrium point. Parking should be considered as a contributing factor to the economic output of the 'primary' land uses it serves, but it delivers very little economic benefit directly.

Furthermore, restricting the overall level of parking supply enables land uses to be densified which in turn promotes the improved function of mass transit modes by bringing more people within easier walking distances of services. This increases the catchment for these services, which increases the demand, which enables more services to be laid on and at higher frequencies. This achieves economies which, all else being equal, should also reduce their cost leading to lower fares for public transport users.

Importantly, there are also ways of making private vehicle use more efficient from a parking/land take perspective. This can be achieved by encouraging turnover of spaces, providing dedicated car share spaces to promote higher vehicle occupancy rates, or by promoting car club schemes which seek to increase vehicle utilisation times and in doing so reducing the time spent parked e.g. by encouraging non-ownership models. The use of taxis and private hire vehicles (PHVs) could theoretically also help to facilitate the latter, but only where such trips are abstracted from one's own private vehicle as opposed to public transport and active modes. The same is potentially true of Connected and Autonomous Vehicles (CAVs) if they become realised in the future under a non-ownership model.



Car clubs provide an alternative to car ownership typically leading to a reduction in the time vehicles spend parked.

Source: ITP

According to TfL (2017d), cars take up 19% of street space in Central London but account for just 11% of journey kilometres, compared to buses which occupy 11% of the street space and account for 57% of journey kilometres.

Finally, the provision of lining does in itself have substantial benefits in terms of land efficiency as it encourages motorists to park within designated areas. The absence of parking bays, in particular, encourages motorists to leave greater space between their vehicle and adjacent vehicles reducing the overall capacity of a parking area.

Making best use of a scarce resource – Southwark's Kerbside Strategy

CASE STUDY

Issue

Southwark Council, like many local authorities within London, struggle with congestion and parking stress. Despite 60% of Southwark households not owning a private vehicle, and walking being the dominant mode, parking for private vehicles dominates the borough's kerbside. Providing an abundance of car parking options can encourage increased levels of driving, accentuating the issues of cruising and congestion.

Solution

Through the Kerbside Strategy, Southwark Council plans to implement a number of different measures with the aim of de-cluttering the kerbside to create safe, attractive and multi-functional streets through shifting the priority towards more walking and cycling.

At present, approximately 40% of the borough's streets are CPZs, enforced by CEOs. They plan to expand this network to

cover areas of severe parking stress to deter vehicle use. A further key approach set to be implemented is a performance-based model for car park pricing. This will entail a flexible approach where car park rates alter in accordance to the context's demand, with higher prices charged when demand is greater. This is set to increase parking turnover, whilst also encouraging alternative sustainable travel.

Impact

Southwark Council report that a previous scheme over the 2015/2016 period where two CPZs were introduced proved highly successful from a parking management perspective. The enforcement of zones P and PR led to a reduction of parked cars by 50% and 40% respectively. Although the strategy is yet to be finalised, the new approach to the role and value of kerbside space will aim to reduce car use, improve air quality, ease congestion, and create healthy streets and thriving neighbourhoods throughout Southwark.



A residential street in Southwark

Source: Southwark Council (2017)

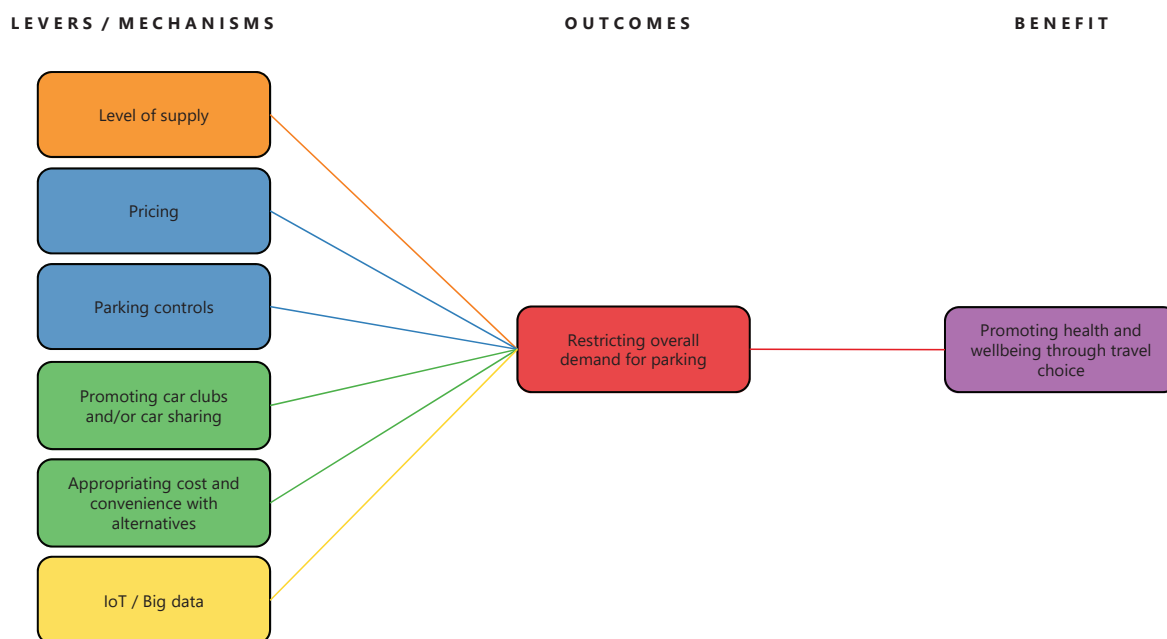
4.2.7. Promoting health and wellbeing through travel choice

The private car is widely accepted to be the least sustainable mode of travel. This is principally because it is more polluting and takes up more space per user than every other mainstream mode of surface transport. Simply put, the externalities that car use generates are more pronounced and more wide-ranging.

However, limiting car use and therefore **restricting the demand for parking** is not only good for the economy and the environment, there is increasing evidence that alternative forms of travel make us happier and healthier too. The latest MTS for London (TfL, 2018) is predicated on an agenda known as the 'Healthy Streets Approach' and includes the ambitious targets of: ensuring that all Londoners get the 20 minutes of exercise needed each day to be considered 'healthy' from their transport choice alone¹⁹ and; that 80% of trips are undertaken by walking, cycling or public transport; both by 2041²⁰. Achieving these goals will require fundamental changes to the mobility fabric of the city.

Figure 4-10 below demonstrates how health and wellbeing through travel choice can be promoted by restricting overall demand for parking.

Figure 4-10: Pathway for promoting health and wellbeing through travel choice



The Healthy Streets Approach argues that this basic level of exercise should be achieved purely through society's travel choices; specifically walking and cycling, including walking and cycling to access public transport services. If one travels to work by public transport with a 5-minute walk to and from the station or stop at each end, they will achieve the 20-minute target each working day assuming they make a return trip without needing to undertake any further physical activity.



On-carriageway cycle parking along Borough High Street used as an alternative to car parking

Source: ITP

¹⁹ Widely accepted and documented figure within the public health industry for the amount of daily exercise needed to protect against chronic diseases such as diabetes, depression, dementia, heart disease and cancer.

²⁰ Compared to 63% of trips undertaken by walking, cycling or public transport combined in 2015 (TfL, 2018).

Meanwhile, BHF (2017) estimate physical inactivity to cost the UK healthcare system around £1.2billion per year, rising to £1.5million when accounting for wider economic costs. Furthermore, BHF (2017) purport that 40% of Londoners are physically inactive compared to the national average of 39%²¹, equating to a London-specific cost of more than £200million per year based on the £1.5billion annual UK-wide figure.

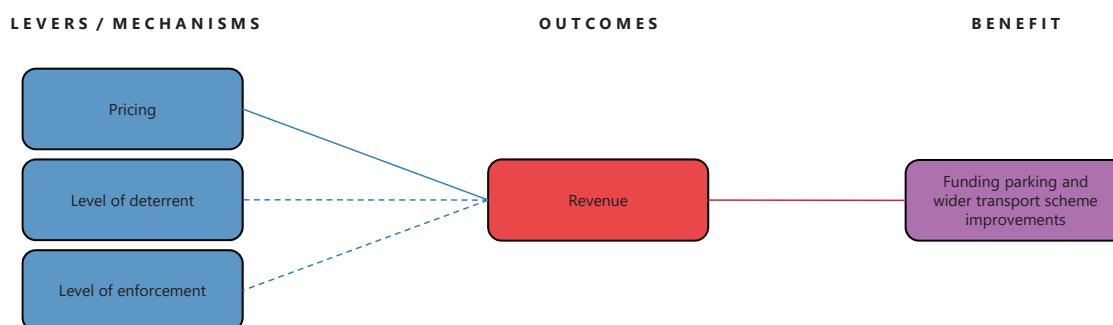
While it is not possible nor practical to try and quantify the potential contribution that parking management could make to reducing physical inactivity directly, what is clear is that parking management will play an increasingly important role in London over the next two decades if the Mayor's aspirational targets for mode shift are to be met, particularly in Outer London. The Mayor's pledge to get more people walking and cycling is principally at the expense of car use and herein parking management practices would be expected to get tighter, either in terms of the controls themselves, pricing, or in all likelihood, both. It is and will continue to be, a fundamental part of London's transport policy discourse.

4.2.8. Importance of revenue

Unlike most public services, funds for delivering parking services are generated by charging the users of parking services themselves, as opposed to being generated through taxation. Principally, this comes from pricing (e.g. parking charges, permit acquisitions, etc.), but also from PCNs and FPNs (penalties) where rules and regulations have been contravened.

The pathway for generating revenue through parking management is presented below.

Figure 4-11: Pathway for generating revenue through parking management²²



For on-street parking, local authorities are legally obliged to set the level of any parking charge at the level required to cover the cost of providing the service²³. This includes the cost of maintaining the space, the cost of enforcement and the cost of running the back-office function and appeals service. However, they may set the charge at a higher level if there is a need to restrict demand at a level appropriate to the extent of the need to do so.

Due to the limited supply of kerbside space in London, all boroughs generate a surplus from their on-street parking and enforcement operations of some kind. However, the value of this surplus varies significantly between boroughs as does the cost of operation which is dependent on a variety of different factors not least the level and sophistication of parking provision.

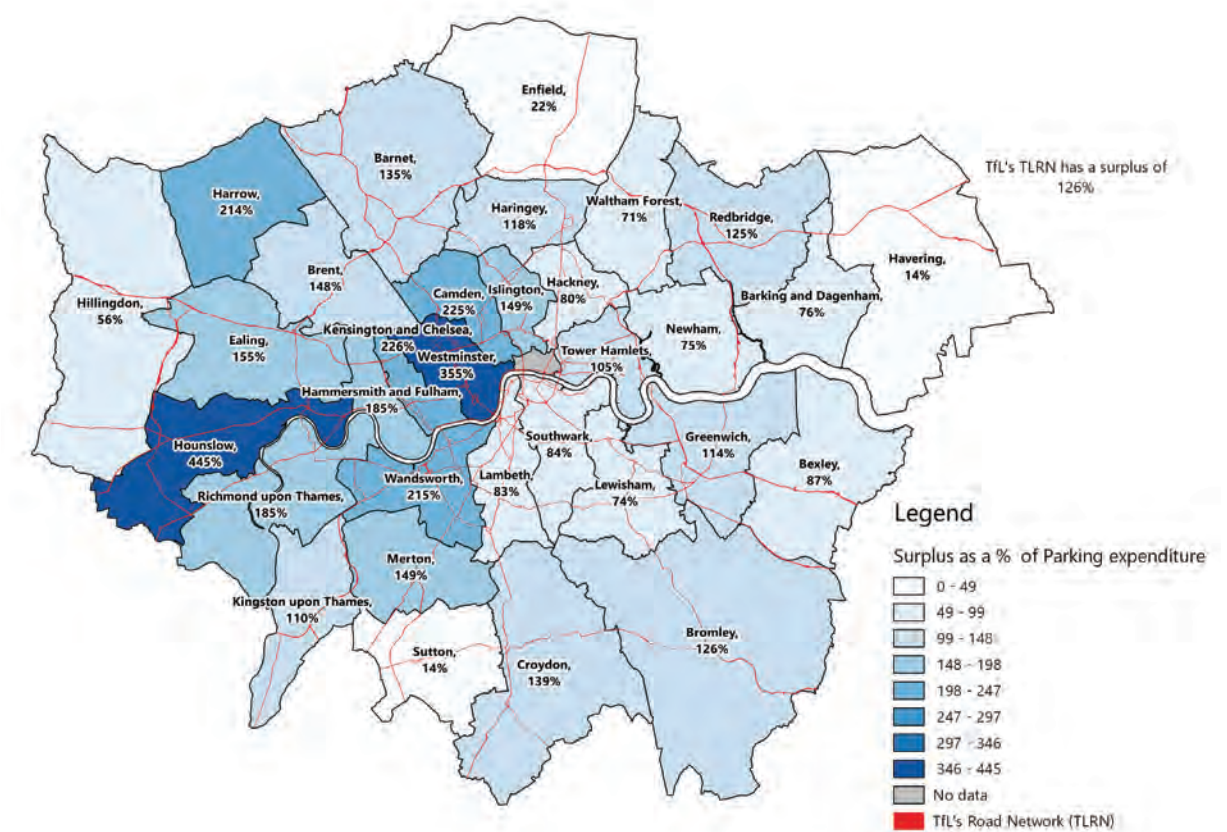
Figure 4-12 and Figure 4-13 demonstrate the parking surplus generated by each borough in relation to parking expenditure and population respectively.

²¹ It is not clear how BHF (2017) classify people as being 'physically inactive'

²² While the level of deterrent and the level of enforcement do influence the amount of revenue generated, this is not a linear relationship as it is dependent on the parking regime's capability to adequately combat instances of illegal and obstructive parking which is the outcome that these mechanisms are primarily targeted to address. In theory, if the level of deterrent and enforcement were to mitigate illegal and obstructive parking entirely, no revenue would be obtainable from penalties.

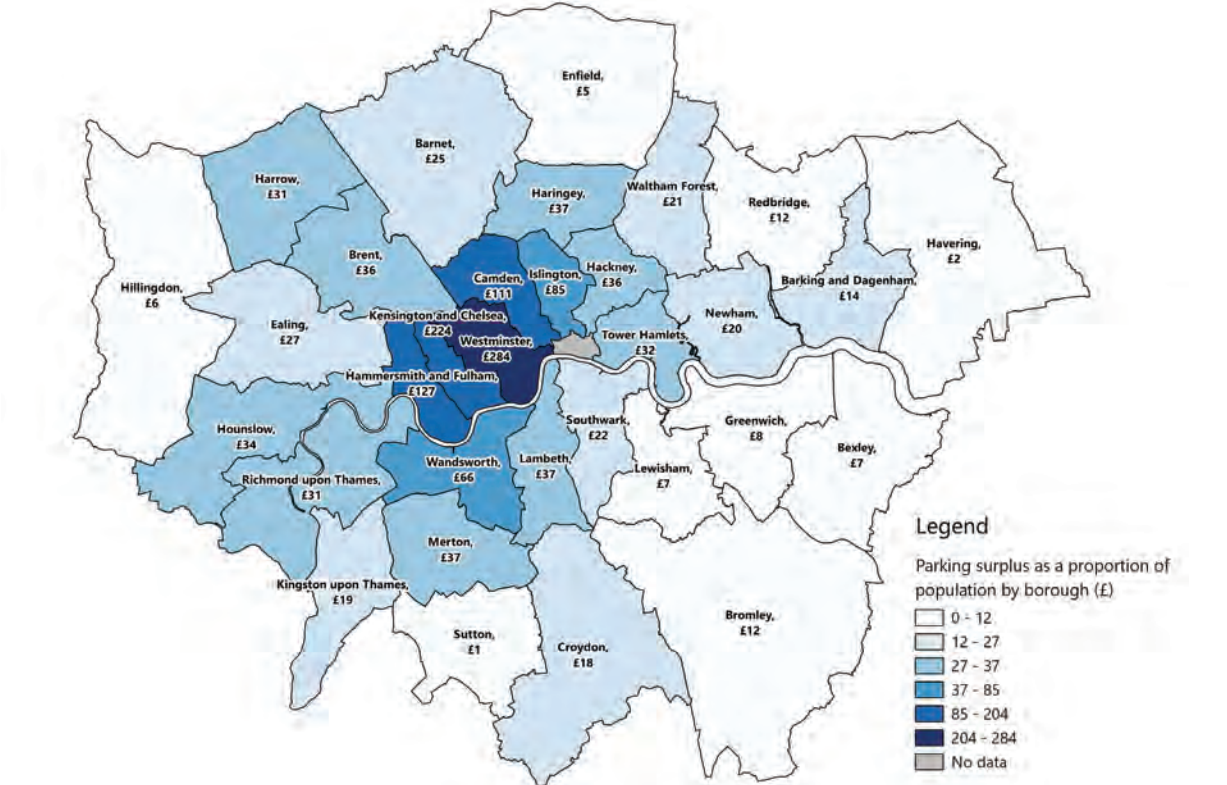
²³ They have more flexibility for off-street parking.

Figure 4-12: Parking surplus as a percentage of parking expenditure for London boroughs and TfL



Source: Local authority parking accounts 2016/17

Figure 4-13: Parking surplus raised per capita, by borough



Source: Local authority parking accounts 2016/17 and ONS 2015 population data.

Where surplus is generated, reinvestment of this surplus must be hypothecated to parking or wider transport spend as set out in section 55 (as amended) of the Road Traffic Regulation Act 1984. While economists generally dislike hypothecation because it ties capital resource to specific pre-defined functions, this is largely irrelevant in the case of parking revenue as surpluses rarely come close to matching local authority transport expenditure (Parliament, 2013).

However, what is significant is that because local authorities are not reliant on budget allocations from higher government, they can plan parking services with a strategic focus, whilst also having a consistent allocation for further transport expenditure where they can accurately forecast their surplus for future years. This means that parking services, as well as aspects of wider transport spend, are effectively immune to the impacts of austerity and the broader 'climate' of central government until such a point that the relevant legislation and provisions are amended. In this way, local authorities exert an element of fiscal autonomy in the way they administer their parking services operations.

In London, many local authorities use parking surpluses to help fund the Freedom Pass which is a concessionary travel scheme providing free travel on London's public transport services to eligible older and disabled residents in Greater London. A breakdown of parking surplus expenditure is presented in Table 4-4 below. Surplus expenditure has been grouped into the categories defined.

Table 4-4: Parking surplus expenditure in London in 2016/17

Category	Total Surplus Expenditure ²⁴ (£)	% Surplus Expenditure
Concessionary fares e.g. the Freedom Pass	£154,841,571	43%
Highways infrastructure, operation and maintenance e.g. road resurfacing and repairing potholes	£82,342,946	23%
Reserves ²⁵	£24,816,000	7%
Other welfare transport e.g. community transport, Special Educational Needs (SEN) transport, taxicard	£11,792,170	3%
Green infrastructure e.g. Sustainable Urban Drainage Systems (SUDS) and street trees	£11,692,212	3%
On-street parking e.g. the provision of more spaces	£1,366,436	0.4%
Public transport (non-concessionary)	£1,303,687	0.4%
Walking and cycling e.g. new cycling and walking routes and signs	£1,303,687	0.4%
Off-street parking e.g. better and safer car park facilities	£1,262,471	0.3%
Other ²⁶	£70,835,427	20%
Total	£361,556,607	100%

Source: Local authority parking accounts 2016/17²⁷.

²⁴ Some local authority parking accounts are known to include a wider remit of activities than just parking. This may include activities relating to bus lane enforcement, moving traffic contraventions, etc. Notably, greater transparency and consistency in how parking income/expenditure is reported is a recommendation of this study and the data presented in Table 4-4 is based on the best available data.

²⁵ Also hypothecated for transport spend.

²⁶ This category mainly reflects expenditure that was too broad to classify or where the allocation breakdown was not presented in the parking accounts. Ultimately, this surplus will also be spent on transport-related investments. Notably, improving the transparency and consistency of revenue reporting across all London local authorities forms an important recommendation of this study.

²⁷ Data includes TfL.

Funding the Freedom Pass through parking revenue

CASE STUDY

The Freedom Pass is London's concessionary travel scheme which allows free travel for older and disabled people across London's entire public transport network and on local bus services across England during off-peak hours.

Anyone aged 66 or older is currently eligible; although eligibility tracks the women's state pension age and so the age may change over time. Anyone aged between 60 and 66 can apply to TfL for a 60+ Oyster photocard which allows free travel on TfL-run services across Greater London, but is not valid outside of London.

The Freedom Pass currently takes the form of a contactless smartcard compatible with Oyster card readers and the scheme is funded by the London boroughs and the City of London and co-ordinated by London Councils.

In 2016/17, the Freedom Pass cost London boroughs £355million. However, much of this cost is raised from parking revenue – both charges and penalties. This means that motorists are effectively subsidising the provisions that allow older and disabled people to get about London.

As is shown in Table 4-4 above, £155million of parking surplus was used to fund the Freedom Pass in 2016/17 which amounts to 44% of the total required funding for the service.

This funding was provided by 20 different boroughs with the boroughs of Brent, Greenwich, Hackney, Harrow, Hounslow, Merton and Tower Hamlets allocating their entire 2016/17 parking surplus to the scheme. Theoretically, if all parking surplus was hypothecated to funding the Freedom Pass, it would do so entirely, and there would still be around £6.6million left over for other uses.

The benefit of the Freedom Pass is that it enables older and disabled people right across London to lead more active, happier and healthier lives, facilitating social inclusion and ensuring their continued participation in society. Parking management therefore plays a fundamentally-important role in enabling this service to exist.



A Freedom Pass being used for payment on a London bus

Source: London Councils

4.3. Quantifying Benefits

Observing the full benefit that parking management delivers to London can only be comprehensively achieved by removing parking enforcement and monitoring, over a period of time, the implications in terms of the aforementioned benefits described. Such a scenario in a large, dense urban environment like London would result in total chaos and a total breakdown of the transport system.

The difference between this chaos scenario and the current situation in terms of levels of congestion, air pollution, road traffic collisions, etc. would represent the benefit of parking management and would enable the relative contribution that parking management makes to each identified benefit to be individually quantified. This is possible because the removal of parking enforcement would create an environment in which all other factors could theoretically be controlled for. While the aforementioned cases of Aberystwyth and St Albans provide qualitative justification for the benefit that parking management delivers, these places do not compare with London for scale – scale is important as the benefits will increase in magnitude in proportion to the size and density of the location needing to be ‘managed’ i.e. rate of return on investment will be higher. For context, London has around 60 times the population of St Albans and around 600 times the population of Aberystwyth.

However, even a short-term withdrawal of parking enforcement would not be able to capture the wider economic impacts (WEIs) that removing parking management would have in the long term, such as the effect on the jobs market, population and land values. Estimating the full impact would require parking enforcement to be withdrawn for a significant period of time to enable the macroeconomic and related demographic implications to play out. Alternatively, and more realistically, the impact of withdrawing parking management could be modelled using a strategic urban transport model for London such as the London Transportation Studies (LTS) model, or for specific areas the impact could be modelled using micro-simulation tools, which provide finer detail on the interaction between vehicles on the network.

For the purpose of this study we are not able to undertake real-world trials (which would not be appropriate in any case), or carry out strategic / local modelling, hence the economic appraisal is based on best interpretation of available data sets and previous studies, and hence its interpretation should be treated with caution and with an appropriate understanding of the limitations of the approach adopted.

4.3.1. Calculating the cost of parking management in London

The total cost of delivering parking services in London for the 2016/17 financial year can be estimated at £240.9million. This figure has been calculated by summing parking expenditure in every local authority in London, plus TfL expenditure, with the exception of the City of London where the cost has been estimated (as the mean average of all borough parking expenditure). This figure equates to a per capita cost of £27.77 based on Office for National Statistics (ONS) population data for 2015.

A comparison of the 2016/17 parking accounts in London is presented in Table 4-5 below²⁸. This shows that unlike most transport schemes parking management generates a net surplus of revenues, with an annual 'revenue to cost' ratio of around 2.5:1. Assuming parking management schemes also achieve wider savings as set out in standard WebTag appraisal (travel time, distance travelled, air quality, noise, health, road safety etc...), the out-turn Benefit Cost Ratio (BCR) will be much higher than this, but without more detailed study this cannot be further articulated.

Table 4-5: Summary of London local authority parking accounts 2016/17²⁹

Local Authority	Income	Expenditure	Surplus
Barking	£6,305,000	£3,575,000	£2,730,000
Barnet	£16,400,000	£6,991,000	£9,409,000
Bexley	£3,525,000	£1,890,000	£1,635,000
Brent	£19,660,000	£7,937,000	£11,724,000
Bromley	£6,948,000	£3,078,000	£3,870,000
Camden	£38,861,000	£11,884,000	£26,797,000
City of London	No data	No data	£6,549,000
Croydon	£11,595,000	£4,852,000	£6,743,000
Ealing	£15,124,000	£5,920,000	£9,204,000
Enfield	£8,154,892	£6,657,854	£1,497,038
Greenwich	£4,211,517	£1,971,408	£2,240,109
Hackney	£21,455,760	£11,900,055	£9,555,705
Hammersmith and Fulham	£35,094,413	£12,299,037	£22,795,376
Haringey	£18,544,782	£8,505,563	£10,039,219
Harrow	£11,088,000	£3,530,000	£7,558,000
Havering	£4,737,411	£4,164,167	£573,244
Hillingdon	£4,778,369	£3,059,419	£1,718,951
Hounslow	£11,203,000	£2,056,000	£9,147,000
Islington	£32,513,000	£13,063,000	£19,450,000
Kensington and Chelsea	£44,315,000	£12,104,000	£32,211,000
Kingston upon Thames	£6,310,925	£2,999,555	£3,311,371
Lambeth	£26,654,000	£14,549,000	£12,105,000
Lewisham	£5,074,000	£2,912,000	£2,162,000
Merton	£12,633,151	£5,079,495	£7,553,656
Newham	£15,187,470	£8,685,882	£6,501,588
Redbridge	£8,301,000	£4,610,000	£3,691,000
Richmond upon Thames	£9,354,110	£3,281,275	£6,067,108
Southwark	£14,900,000	£8,104,000	£6,796,000
Sutton	£2,121,510	£1,857,261	£264,249
TfL	£23,388,456	£10,351,587	£13,036,870
Tower Hamlets	£18,543,000	£9,039,000	£9,504,000
Waltham Forest	£13,498,836	£7,878,324	£5,620,512
Wandsworth	£30,304,502	£9,633,891	£20,670,611
Westminster	£88,200,000	£19,374,000	£68,826,000
Total	£588,985,104	£233,792,773	£361,556,607

²⁸ No data could be obtained on income or expenditure for the City of London.

²⁹ Some local authority parking accounts are known to include a wider remit of activities than just parking. This may include activities relating to bus lane enforcement, moving traffic contraventions, etc. Notably, greater transparency and consistency in how parking income/expenditure is reported is a recommendation of this study and the data presented in Table 4-5 is based on the best available data.

4.3.2. Calculating the benefit of parking management in London

BCR values from literature and their relevance

Although it is not possible to calculate a BCR for parking management within this study, we have looked at comparator BCRs for other transport schemes to try and ascertain where the likely BCR might lie. Table 4.6 below presents a summary of BCR values discussed in the Eddington Transport Study (Eddington, 2006) which identifies BCRs from a range of transport schemes and interventions in a UK context. For context, DfT considers a BCR of 2:1 to represent 'high' value for money and a BCR of 4:1 or higher to represent 'very high' value for money.

Table 4-6: Summary of wider BCR values presented in the Eddington Transport Study

Intervention	Wider BCR Value	Page reference
Urban transport schemes	1.3 – 15	p.127
Fixed capacity schemes	0 – 25	p.128
Road schemes	5.6	p.130
Bus and interchange schemes	4.6	p.130
Junction improvement schemes	2 – 25	p.131
Two-way traffic management systems	6.3 – 7.6	p.150
Walking and cycling schemes	14.9 – 32.5	p.185
Tram schemes	2.7 – 5.1	p.189
Urban rail schemes aimed at alleviating 'extreme' capacity issues	2 – 3	p.191
London Underground station congestion relief schemes	4.5 – 8	p.191
Urban road capacity enhancement schemes	4 – 11	p.192

Source: Eddington (2006).

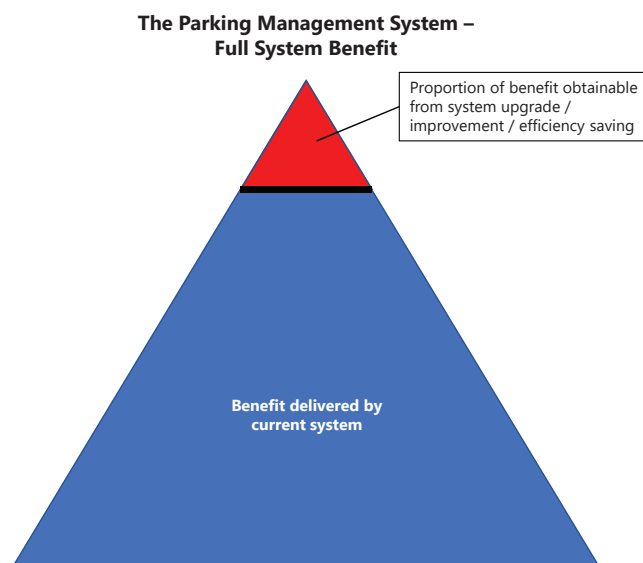
Unfortunately, Eddington (2006) provides no commentary on parking scheme performance which reflects the absence of parking scheme evaluations from the literature. However, Eddington (2006) does consider broader categories of intervention that relate to the strategic function of parking management e.g. urban transport schemes and general highways schemes such as junction improvement schemes, traffic management schemes and urban road capacity enhancement schemes. Eddington (2006) suggests that such schemes can deliver BCRs of up to 25:1.

Furthermore, Eddington (2006) observes that lower-cost schemes often deliver greatest benefit. The cases of junction improvements and walking and cycling schemes are discussed as schemes capable of delivering BCRs of up to 25:1 and 32.5:1 respectively. Considering parking management in this context, the evidence would suggest that it is generally very effective at maximising the operational capacity of the highway at a fraction of the cost of many capital schemes. This positions it as a low cost-high return TDM proposition, further strengthened in that parking management typically generates revenues that are higher than operating costs, resulting in a surplus which can be used to support other local authority and transport functions.

Figure 4-14 below attempts to illustrate this point in the context of parking management. The area of the full triangle represents the full potential benefit obtainable from parking management, while the area of the blue section indicates the proportion being delivered by the current system with the red area representing the proportion of benefit that further

schemes, improvements or efficiencies can help to obtain. The relative balance of current benefit to future benefit will be determined by the effectiveness of any existing system – the more effective it is, the greater the area of the blue section and vice versa.

Figure 4-14: Conceptualisation of the system benefit of parking management



While only a conceptualisation, Figure 4-14 aims to demonstrate that BCR calculations for new schemes can only deliver a small proportion of the total benefit delivered by the full system and that benefit-cost ratios for enhancements will therefore be lower than the one which ultimately describes the full system benefit. In essence, the benefit of parking management in London is derived from the application of a network of local, low-cost interventions which deliver far greater benefit as a network than they do individually. This interrelationship ensures that the full benefit of parking management will be greater than the sum of its parts.

Estimating the full benefit of parking management

If one takes a reasonably pessimistic BCR estimate of 10:1 (which falls within the average range of local traffic management schemes from Eddington) and applies it to the known parking expenditure figure, this would give a total of £2.41billion. While the absence of data on parking scheme performance and the external nature of benefits makes it impossible to give a more accurate figure, if a more robust methodology could be followed (e.g. through use of the LTS model or similar), it would not be surprising if the benefit figure presented would be significantly higher if the full range of costs and benefits were accounted for.

Ultimately, mobility is a vital input factor into the factors of production which drives economic growth and parking management is a key tool in enabling optimal mobility outcomes, even more so in dense urban environments like London. Therefore, inefficient mobility is a constraint on the economy. Given that London has developed around a highly effective parking management system, the implication of removing this system altogether would be extreme in economic, social and environmental terms.

In addition, and to broadly corroborate findings, INRIX's cost of congestion in London is estimated to be £6.2billion as quoted by ITP (2017). Assuming existing parking management brings crude estimated benefits of around £2.41billion, calculations would suggest that this total estimate of congestion in London would be around a third higher if parking management were not in place.

Estimating the benefit of the surplus

In addition to the core benefit of parking management, further benefit is generated through the reinvestment of the surplus. The magnitude of this benefit is much easier to estimate because the surplus income is invested in schemes for which BCRs can be readily sourced. However, the challenge is in the transparency of this spend with few local authorities providing a breakdown beyond broad, heterogeneous categorisations which differ between them. Resultantly, categories such as 'highways infrastructure, operation and maintenance' comprise a vast array of different schemes related to highways and while some schemes in this category can deliver BCRs of up to 25:1, a conservative BCR has been applied. The same approach has been taken for other similar categories

A full breakdown of parking surplus expenditure for 2016/17 was presented in Table 4-4. Table 4-7 below relates this expenditure to BCRs to calculate the benefit obtainable from the total surplus expenditure. It estimates the benefit derived from the reinvestment of parking surplus to surmount to £1.17billion at an average BCR of 3.2:1.

Table 4-7: Calculation of benefit obtained from parking surplus expenditure in London in 2016/17

Surplus Expenditure Category	Total Surplus Expenditure (£)	% Surplus Expenditure	Assumed BCR	Estimated Benefit (£)
Concessionary fares	£154,841,571	43%	2.87 ³⁰	£444,395,308
Highways infrastructure, operation and maintenance	£82,342,946	23%	5.6 ³¹	£461,120,497
Reserves	£24,816,000	7%	0 ³²	£0
Other welfare transport	£11,792,170	3%	2.87 ³³	£33,843,528
Green infrastructure	£11,692,212	3%	2 ³⁴	£23,384,424
On-street parking	£1,366,436	0.4%	5.6 ³⁵	£7,652,040
Public transport (non-concessionary)	£1,303,687	0.4%	4.3 ³⁶	£5,605,854
Walking and cycling	£1,303,687	0.4%	32.5 ³⁷	£42,369,828
Off-street parking	£1,262,471	0.3%	5.6 ³⁸	£7,069,839
Other	£70,835,427	20%	2 ³⁹	£141,670,856
Total	£361,556,607	100%	3.23	£1,167,112,172

³⁰ Based on VfM score in Greener Journeys (2014)

³¹ BCR for 'roads' schemes in Eddington (2006)

³² Assumes no benefit delivered.

³³ BCR value assumed same as for concessionary fares.

³⁴ No BCR value found; assumed to deliver 'high' value.

³⁵ No evidence available for parking schemes; BCR for 'roads' schemes used as in Eddington (2006)

³⁶ BCR from PTEG (2013)

³⁷ High-end BCR value given in Eddington (2006)

³⁸ No evidence available for parking schemes; BCR for 'roads' schemes used as in Eddington (2006)

³⁹ No BCR value found; assumed to deliver 'high' value.

Therefore, when combining both the intrinsic benefit of parking management in London with the benefit obtained from surplus expenditure, the full benefit will likely be in excess of £3.58billion.

5. Appraising and Evaluating Parking Schemes

5.1. The Importance of Appraisal and Evaluation

As has been highlighted in Chapter 4, one of the principal challenges facing the parking industry is a relative lack of data on scheme performance. Owing to the relatively localised nature of most parking schemes and the resource pressures at local authority level, schemes are rarely appraised or evaluated. While subjecting schemes to appraisal and evaluation processes may seem like a lot of effort, doing so consistently and systematically could be incredibly valuable to local authorities in helping to get schemes through. Clearly, however, any appraisal/evaluation methodology adopted must be proportionate to the scale of the scheme.

To date, parking schemes have largely been designed and implemented through a process whereby the local authority will identify an issue, propose a set of solutions (usually with a preferred option), before putting these through a process of public consultation. However, often the public will not perceive the issue in the same way that the local authority does and therefore the 'do-nothing' scenario ends up as the outcome of the consultation.

“Over the last 2 years we have introduced CPZs into two new areas. In both cases there were previous consultations that led to no parking controls being implemented even though parking pressure at that time was high and demand was likely to increase further”.

Southwark Kerbside Strategy

As the above quote demonstrates, relying on the court of public opinion is often not the most efficient way to address some of the parking pressures experienced on the street. However, if the local authority was able to put across a stronger case – based on evidence from an options appraisal as well as evaluations of comparable schemes – this could help convince the public of the merits of intervention. One could surmise that where the public has a genuine distrust of the parking management system, they will also be likely to distrust the merits of any proposed interventions tabled by the local authority, hereby defaulting to the status quo scenario.

With this in mind, it is vital that local authorities begin to appraise and evaluate parking schemes as a matter of priority in order to remove public perceptions of bias from the process. Doing so will be particularly important where local authorities seek to move to implement schemes such as dynamic pricing in the future, as such schemes may trigger public misconceptions on revenue to deepen.

5.2. Developing an Appraisal Framework

It is important to recognise that every parking scheme is different. The localised nature of parking issues ensures that a scheme in one part of London will not necessarily transfer to another part of London, even one with similar characteristics. Therefore, the creation of a deeply methodological appraisal process will not be beneficial to local authorities in achieving their principal aim of providing more robust evidence in support of options put before the public/stakeholders at consultation. It is essential that the appraisal framework retains the flexibility to be relevant to a range of schemes and environments.

5.2.1. Guiding questions for appraisal

While the discipline of parking management is capable of delivering a wide range of social benefits, it is more than likely that any given parking scheme will be focussed on delivering one or two of these as a particular focus.

For instance, a parking scheme targeted at a school may have the primary objective of improving road safety. With this objective in mind, it would seem logical that a reduction in the levels of congestion outside the school would also be beneficial as this may be identified as a causal factor, while a reduction in congestion may further lead to an improvement in air quality which would be regarded as a highly desirable outcome at a school. Conversely, benefits such as access and accessibility may be seen as irrelevant to the context of the scheme if current arrangements are deemed to be good. However, the local authority should, nonetheless, be capable of demonstrating that the scheme will have 'no detriment' on access arrangements and accessibility.

Table 5-1 below sets out a list of guiding questions for appraisal. While not all questions will be relevant to every scheme, local authorities should be able to demonstrate no detriment against each of the considerations. Considerations are built from the identified 'benefits' of parking management.

Table 5-1: Guiding questions for appraisal

Consideration	Questions
Congestion	<ul style="list-style-type: none">• Will the scheme lead to an overall reduction in the level of congestion experienced on the immediate road network?• Will the scheme result in displaced traffic elsewhere?• Will the scheme lead to a reduction in cruising for parking?
Road Safety	<ul style="list-style-type: none">• Will the scheme reduce the speeds of traffic on the immediate road network?• Will the scheme alter the composition of traffic on the immediate road network?• Will the scheme improve the inter-visibility between pedestrians and motorists?• Will the scheme compromise the function of other modes e.g. buses?
Air quality	<ul style="list-style-type: none">• Will the scheme lead to a reduction in the volume of CO₂, NO_x and/or PM?
Access & Accessibility	<ul style="list-style-type: none">• Will the scheme dissuade less desirable users from parking e.g. long-stay commuter parking, if relevant?• Will the scheme improve access for freight/commercial vehicles?• Will the scheme improve access for Blue Badge users?• Will the scheme preserve the integrity of the footway?• Will the scheme contribute positively to achieving a 'sense of place', reduce severance and/or lead to improvements to the public realm?
Local economy	<ul style="list-style-type: none">• Will the scheme benefit local businesses?• Will the scheme capture any missed trade currently experienced due to practices such as railheading?• Will the scheme contribute to the consolidation of freight and/or promote more off-peak deliveries?
Land take	<ul style="list-style-type: none">• Will the scheme result in a more desirable apportionment of supply and demand?• Will the scheme promote more efficient forms of 'car use' such as car sharing and/or car clubs?
Health & Wellbeing	<ul style="list-style-type: none">• Will the scheme encourage a mode shift towards walking, cycling and/or public transport?

5.2.2. Multi-criteria assessment appraisal matrix

To ensure appropriateness and proportionality, it is recommended that the appraisal of parking schemes should take the form of a multi-criteria assessment (MCA) which is a scaled back, streamlined version of a full scheme appraisal. However, local authorities should be free to conduct full appraisals in lieu of an MCA or as an additional step if deemed appropriate.

MCAs are commonly used when appraising different options across a common set of benefits, as is the case when considering the relevance of different options for parking schemes.

Appraisers should first review options against the guiding questions and then populate an appraisal matrix as shown in the example in Table 5-2. Each score should be qualified with qualitative and, where possible/appropriate, quantitative justification. Appraisers may also wish to weight considerations based on the objectives of the scheme. Note that the example shown in Table 5-2 is unweighted.

Furthermore, appraisers should seek to define the parameters used in the key. Any schemes that prove detrimental across any of the considerations (i.e. do not score a 3 or higher) should be ruled out. Therefore, in the example below, only options 2, 4 and the do-nothing scenario would be put forward to consultation⁴⁰.

⁴⁰ The do-nothing scenario will always score 3 and therefore should always be consulted on.

Table 5-2: Example multi-criteria assessment matrix

Option	Congestion	Road Safety	Air Quality	Access & Accessibility	Local Economy	Land Take	Health & Wellbeing	Average
1	4	3	4	2	4	3	4	3.43
2	4	5	4	3	4	3	4	3.86
3	3	2	3	2	5	3	3	3.00
4	5	4	5	4	3	3	3	3.86
Do-nothing	3	3	3	3	3	3	3	3.00

Key:

- 1 = much worse than current situation;
- 2 = slightly worse than current situation;
- 3 = no detriment or negligible difference;
- 4 = slightly better than current situation;
- 5 = much better than current situation.

5.3. Evaluation

In addition to appraising parking schemes, it is also vital that these schemes are evaluated. As per appraisal, the means of evaluation should be proportionate to the scheme.

Beyond the immediate benefit to the local authority, the primary purpose of establishing a common evaluation framework for parking schemes is to develop the evidence base for parking scheme performance across London, building up a readily-available dataset for use in the appraisal of future schemes and to provide a London-wide basis for redressing negative perceptions and press. In this way, the process of evaluation should go further than a simple before and after analysis of PCNs.

Once a new scheme has been identified, the local authority should decide upon which metrics it is to be evaluated against. The local authority may decide to evaluate performance across all of the identified benefits of parking management or it may decide to focus upon those most relevant to the objectives of the scheme and remove anything expected to be without detriment.

Evaluations should primarily be outcome based. Outputs and processes may be evaluated at the local authority's discretion but it is not necessary that they form part of a common evaluation framework.

Once scoped, evaluation should come in two parts: a 'before' study and an 'after' study. Depending on the scale and nature of the evaluation and the data available to the local authority, it may be possible for aspects of both studies to be desk-based, thus reducing the resource impact on the local authority. However, there will be some aspects that require in situ delivery.

The most important aspect of any evaluation is that the approach to before and after studies is consistent. With this in mind, the exact measures used to evaluate each consideration are not set in stone and should be based on the most appropriate information each local authority has access to. However, the same measures should be used in both studies. Table 5-3 outlines a suggested approach.

Table 5-3: Suggested approach to evaluation

Consideration		Measures
Congestion	General congestion	<ul style="list-style-type: none"> • Average A.M. peak speed data • Queue length data
	Congestion on surrounding highway	As above, but on surrounding links
	Cruising for parking	<ul style="list-style-type: none"> • Possible to evaluate using data of parking app companies
Road Safety		<ul style="list-style-type: none"> • Visibility splays • Road traffic collision data • Analysis of traffic composition (if relevant)
Air quality		<ul style="list-style-type: none"> • Air quality data
Access & Accessibility		<ul style="list-style-type: none"> • User surveys • User observation
Local economy	Impact of trade	<ul style="list-style-type: none"> • Business performance (proxy)
	Freight efficiency	<ul style="list-style-type: none"> • No. of unique deliveries (where freight consolidation is desired)
Land take		<ul style="list-style-type: none"> • Occupancy data • Duration of stay data (where evaluating turnover)
Health & Wellbeing	Mode shift	<ul style="list-style-type: none"> • User surveys (need to use same survey group for before and after surveys)

While there would likely be a heavy influence of qualitative judgment in the appraisal process initially, the development of an evidence base, built-up from scheme evaluations around London, would enable more quantitative evidence to be built into appraisals over time. Furthermore, the development of such an evidence base would result in greater understanding and quantification of the benefits of parking management over time.

6. The Future of Parking Management

Arguably the most significant development to have impacted the parking industry to date was the decriminalisation of parking offences enabled through the Road Traffic Act 1991. While decriminalisation represented a major change to the way the system was administered and enforced, it did not necessarily change the parking experience for the user – aside from sparing them a criminal conviction where contravening regulation.

However, today, we stand on the brink of the first major revolution in parking that will fundamentally improve the user's experience. Like many industries, the parking industry has the potential to benefit greatly from the so-called data revolution. With levels of parking stress high and with a clear policy mandate, local authorities are keen to embrace new innovations that will enable their parking stock to be optimised with a view to maximising the obtainable benefit that parking services and parking management can deliver.

To this end, local authorities across London are beginning to actively engage in the data revolution with Westminster City Council widely acknowledged to be taking a lead with the initial evaluation of its 'Connected Parking Initiatives' project soon to be published. Meanwhile, the BPA has also been exploring opportunities for integrating parking and technology through its Parking 20:20 workstream.

This chapter briefly explores some of the possibilities for integrated and connected parking management in the context of benefit realisation. It sets out a short-term scenario (vision 2025) and a long-term scenario (vision 2050) and speculates on how different types of schemes might be brought forward within those timeframes.

6.1. Vision 2025

Much of the short-term gain obtainable to parking management relates to the use of IoT, big data and analytics and how such data can be harnessed and put to use. Such technology has the potential to benefit the motorist's parking experience, whilst delivering efficiencies for local authorities in how they administer and enforce parking services.

6.1.1. Leveraging big data and the Internet of Things to 'drive' a seamless parking experience

The notion of parking ever being a 'seamless experience' is a difficult one to comprehend for most London motorists. Evidence indicates that parking is the most stressful component of motoring and the activity is fraught with anxieties, particularly where parking in an unfamiliar area where neither the local highway network nor local parking restrictions are known to the motorist. However, this does not have to be the case. The emergence and subsequent take-up of smart phone technology within society dictates that more people have access to more data at their fingertips than ever before and often data is provided in real-time. Statistica (2018) estimate the UK's smartphone penetration rate to currently stand at 73%, while they forecast it to rise to 80% by 2022.

Admittedly, the notion of 'seamless experience' represents more of an aspiration or an ideal than a truism. Parking can never be truly seamless for as long as there is someone else to dive into a parking space just before you; however, it can be made seamless more often and hopefully, more often than not.

A particular opportunity is presented through the use of smartphone apps and parking and in-vehicle sensors. This section explores some of their potential uses with a view to making parking 'more seamless'.

Finding a parking space

By connecting parking spaces up with sensors that relay information on availability to users in real time through an app, the potential exists for motorists to be actively directed to available parking spaces based on RTI rather than the conventional method of trial and error. Connecting the motorist to the parking stock in such a way can deliver significant benefits in terms of congestion and air quality, principally through savings accrued from a reduction in cruising for parking which is estimated to cost London's economy £1.9 billion per annum. Moreover, where motorists are actively led to free parking spaces based on data, local authorities could potentially operate their parking stock at a higher rate of utilisation, ensuring that parking assets get used more efficiently.

Paying for parking

Furthermore, where the use of sensors and apps present the possibility to lead drivers to spaces, it also presents possibilities for seamless payment. The act of walking to a payment machine has become an activity that the motorist takes for granted as a necessary component of parking a vehicle in a paid-parking area. However, this is effectively time that a user is occupying a parking space without actually needing it (unless they are returning to top-up payment which constitutes a further inefficiency).

While conventional methods of paying for parking do not take long per user, when aggregated to a borough or a London-wide level the cumulative time savings become a lot more interesting. Ultimately, where a motorist does not have to expend additional time paying for use of the system, the parking space they occupy becomes freer sooner which will potentially save them money (particularly if parking charges become dynamic), whilst ensuring that spaces are turned over quicker, increasing the effective capacity of the parking stock for the local authority.

However, it is not necessarily a case of moving from an external payment system to one where the user pays through an app. The best systems will not require the user to click a button to pay at all, but instead will be predicated on in-vehicle sensors that detect the duration at which a vehicle is parked and 'call payment' once the vehicle moves off from the space. In other words, the user does not have to interact with the system at all. Such a system would be linked to an app – perhaps through Bluetooth technology – which would in turn be linked to the user's bank account enabling payment in real-time.

Importantly, Global Positioning System (GPS) technology is not deemed suitable to enable this type of system to work accurately because of the propensity for GPS signals to become distorted e.g. by large buildings or for it to 'wander'. To this end, it is necessary that such systems are based on in-vehicle sensors or some form of dongle for older vehicles – as has been trialled in Westminster – that communicate with parking sensors on the ground.

Information

While apps can play a central role in the processes of finding and paying for parking, they also have the potential to relay information on parking restrictions, charges, etc., directly to users. While apps could provide general information on parking regulations and restrictions,

the real value comes where information can be disaggregated to borough and, where relevant, street level, and where this can be relayed to motorists prior to making their trip or at least prior to parking.

Importantly, this type of system will be of no utility to the motorist if they are forced to use different apps for different processes or for different parts of London. Hence, the need exists for a single, integrated, free-to-use app which covers all London-wide parking services⁴¹.

6.1.2. Preventing taxi over-ranking

Taxi over-ranking is a term to describe the point at which the number of taxis parked at a taxi rank outstrips the capacity of the rank to accommodate them. This is a problem in particular parts of London where taxis often form long queues at ranks which provide prime sources of trade. Taxi over-ranking can cause obstructions to the highway network, impacting traffic flow, pedestrian and cyclist safety, etc. The problem often occurs despite other neighbouring ranks being empty or under capacity. If a taxi driver knew that a neighbouring rank was empty, they may take a different view on how worthwhile that location was to ply for trade.

Hereby, the use of an app which provides RTI to taxi drivers on rank availability/estimated waiting times could help taxi drivers to optimise their spatial distribution across London, preventing them from over-congregating at well-known sources of trade.

6.1.3. Dynamic pricing

One way of making the parking stock more responsive to the dynamic profile of demand is to vary the level of the charge based on the level of congestion on the network, or the availability of parking spaces in real time. This 'dynamic pricing' would charge motorists more for parking when demand was greater, effectively incentivising more trips to shift to the off-peak or encouraging motorists to park further from their destination in exchange for a cheaper rate, helping to promote the use of potentially underutilised parking stock. The level of the charge would be set so as to manage the level of parking stress, maintaining it at the desired level.

Importantly, maximum and minimum charge rates would need to be agreed at the outset so that the motorist could understand the range in which the charge may fluctuate. It may also be deemed more appropriate for the charge to be varied only at set time intervals (e.g. every hour) in order to give some certainty to the motorist as to the level of the charge that they are likely to incur upon parking.

6.2. Vision 2050

Where Vision 2025 focussed on the role of data and technology and how efficiencies can be delivered to the current system, Vision 2050 presents some of the emerging disruptive concepts of the future and considers how these might relate to the parking sector.

6.2.1. Mobility as a Service

Mobility as a Service (MaaS) is an emerging concept which relates to how people will consume transport in the future. It is based on a premise where the consumer purchases a package or bundle of transport options, based on a subscription, which allows them to then travel free-at-the-point-of-use in accordance with the terms of the package. More expensive packages will allow for greater mobility freedom. In this way, MaaS provides for a similar model to the way in which one purchases energy or telecommunications in the current market.

⁴¹ Or for a common set of data standards to be defined to ensure the interoperability of parking apps.

Importantly, MaaS seeks to go beyond the Oyster-style travel card which represents the most advanced form of mobility integration in the UK today. It would be inclusive of all modes short of one's own private or commercial vehicle (although this could be included over time), encompassing, for instance: cycle hire, car clubs and car share schemes within the overall package.

Where MaaS would be designed to make alternatives to the car more attractive to the consumer, this would ultimately result in a reduction in single-occupancy car use and therein a reduction in demand for parking.

6.2.2. Connected and Autonomous Vehicles

A lot has been said, written and speculated about the future role of CAVs. One of the main points of discussion relates to the ownership model and whether one will own one's own vehicle or whether CAVs will operate more like a driverless taxi service. Assuming the latter, which would seem most logical in an urban environment, it would result in the improved utilisation of vehicles – when compared with current private vehicles – probably at a level more akin to a taxi. Resultantly, where vehicles no longer spend 96% of their time parked, there would be a lot less demand for parking ensuring that a significant proportion of parking stock could be repurposed for more productive uses, benefitting the economy.

Meanwhile, where parking for CAVs was required, this could be designed in a far denser format, reducing the land take required. Essentially, only the vehicle parked at the head of the queue or at the head of the lot would need to move. There would be no need for manoeuvring vehicles past one another where they were not owned by specific individuals.

Perhaps the most logical parking arrangement for an urban network of CAVs would be a series of evenly dispersed depots from which vehicles could be called from at the start of a day and return to once they have no further business.

6.2.3. Unmanned Aerial Vehicles

In the context of mobility and urban planning, UAVs are drones primarily purposed to service the freight sector. UAVs represent an innovative means through which individual packages of small/light goods could be delivered to recipients. They would work best where serving particularly sparse or particularly dense areas where there either is not the commercial benefit of operating a manned delivery vehicle (i.e. limited economies of scale and therefore high cost) or where environments are highly congested and therefore challenging for LGVs to access, such as delivering to commercial premises in Central London.

Ultimately, UAVs would take some of the strain off the transport network, replacing LGVs where LGVs are not efficient or not helpful. However, because they would most likely be dealing with small volumes of goods, at least initially, they would only really be working at the margins and their principal role in congested areas would be to free road space up for other users.

While UAVs are being trialled by some large US corporations, their widespread rollout would likely require new legislation of a similar complexity to that required to enable CAVs, including considerations of airspace.

Parking sensors and real-time information – the future? The case of Westminster City Council and Appy Parking

CASE STUDY

Issue

With the average motorist spending 8 minutes cruising for parking per trip and parking search estimated to account for 30% of all congestion (BPA, 2017; Shoup, 2005), the potential economic benefit of eliminating this practice is huge. In London, this is estimated to stand at around £1.9billion per annum. Six deliveries in a day amounts to 48 minutes spent cruising for parking in total, then eradicating this time could enable another delivery.

While parking search frustrates everybody, there is a particular cost to the commercial sector where cruising can impact the number of deliveries that can be

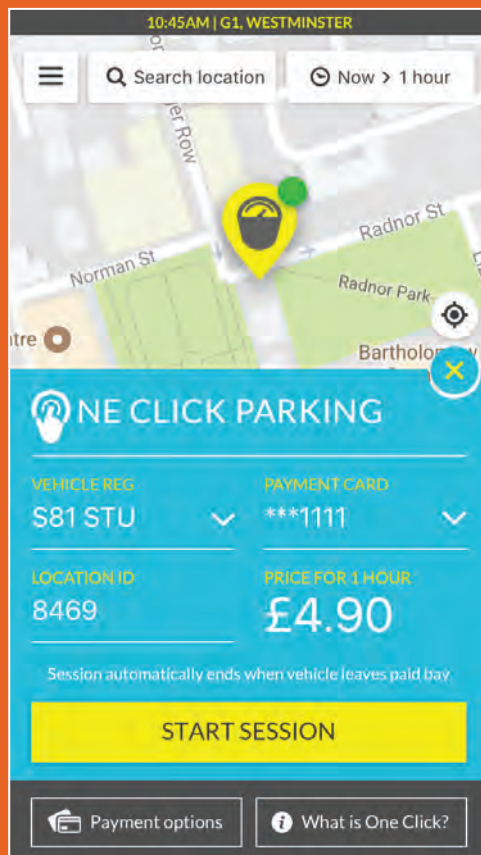
undertaken in a day or the congestion caused by cruising can lead a driver to miss their delivery window, possibly losing trade.

Fundamental to the issue is that the act of finding a parking space is down to trial and error and can feel like a matter of cat and mouse. One typically has no more insight into parking space availability than that had through their own local knowledge.

Solution

Westminster City Council teamed up with Appy Parking to deliver the 'One Click Parking' project. Using Westminster's network of 41,000 parking space sensors and a database of parking rates attributed to each, Appy Parking was able to develop an app capable of guiding drivers to available parking spaces based on real-time information relayed from the sensors. Once parked, the driver can click a button to initiate the parking session. Once having returned to the vehicle, the driver can simply drive off with the accompanying in-vehicle sensor (a dongle) capable of recognising that the vehicle has moved off at which point payment is called directly from the account holder's debit or credit card.

The result is that the parking experience is designed to become seamless with the issues and inconveniences of cruising and onerous payment practices seemingly eradicated.



The One Click Parking app interface

Source: Kieran Fitsall, Westminster CC

Impact

An initial trial of the app in 2015 with Pimlico Plumbers proved highly successful with the company estimating that they could save around £100,000 annually in PCN charges and avoiding the need to overcompensate when purchasing time.

Partners are now looking to move the project to its next phase.



Pimlico Plumbers employees posing with their new parking app

Source: Kieran Fitsall, Westminster CC

Issue

Where parking charges are set based on pre-determined rates, local authorities are restricted in their ability to account for the changing dynamics of parking demand which is sensitive to a complex array of factors. Ideally, local authorities would want to be able to vary parking charges in real-time to respond to changes in the profile of demand in order to alleviate parking stress and improve the utilisation of underused parking stock.

Solution

In December 2017, the San Francisco Municipal Transportation Agency (SFMTA) adopted the 'Demand-Responsive Pricing Program' which uses 'smart pricing' to vary the level of parking charges based on demand. This expanded a trial programme, SFpark, from 7,000 of the city's parking meters to the full 28,000.

Under the trial programme, blocks that continually exceeded 80% occupancy incurred a \$0.25 hourly price increase, prices at blocks with medium-high occupancy of between 60-80% stayed the same, while those under 60% occupancy decreased in cost by \$0.25 per hour. A minimum meter charge of \$0.50 per hour and maximum of \$8.00 represented the lower and upper charge limits of the system. Meters were 'connected' through wireless sensors and charges were varied by block.



A smart parking meter in San Francisco

Source: © Jun Seita

Impact

The impacts of the trial were impressive. Cruising declined by 40%, the number of blocks at parking stress fell by 16% and the utilisation of underutilised blocks increased by 31%. Moreover, the city generated an additional \$2million in net parking revenue per year despite average meter rates falling by 4% and city-owned garage rates falling by 12% based on pre-dynamic pricing levels.

7. Conclusion and Recommendations

This report demonstrates that parking management is an essential public service and one that delivers an extremely high return on investment to society. This benefit is proportional to the scale and the density of its urban environment and in the relationship with alternative transport options and the prevailing level of demand for motoring. In the context of London, this means that the benefit of parking management is particularly high.

However, quantifying the precise benefit that parking management delivers is a virtually impossible task. It can only be accurately achieved where parking enforcement is removed and the difference in terms of the impact on each externality generated (discussed in Chapter 4 in terms of the 'benefits' of parking management) under such a scenario is observed. Understanding of the full benefit will, to a large degree, depend on the extent to which the average motorist chooses to behave in a manner which benefits other road users in a situation where parking enforcement is removed versus the extent to which they pursue their own private gain.

The cases of St Albans and Aberystwyth indicate that without parking management cities would descend into chaos. The likely impacts of such a scenario in London would seem particularly severe given its scale and density and the vital role parking management plays in protecting the operations of other modes, particularly in ensuring the operation of the bus network which carries such strategic mobility influence in the city. While fully-segregated modes such as rail and the London Underground would not be directly implicated by a removal of parking enforcement in a way that would prevent them from operating, they would, however, suffer substantially from being totally overwhelmed with demand.

With this in mind, the £3.58billion figure that this report has estimated as the full benefit of parking management is a victim of great uncertainty. Owing to the complexities, the simplistic method for calculation and the heroism of some of the assumptions made, we have ensured that this figure is a conservative one.

If, hypothetically, the removal of parking enforcement would result in total gridlock, the value of the benefit delivered by parking management would undoubtedly be much higher. Under a gridlock scenario the implications of the congestion caused could conceivably have extreme impacts on London's economic competitiveness in terms of productivity, job creation, etc., and benefit could then be assessed quite clearly in terms of the constraint placed on the city's contribution to GDP. However, in all reality, such a situation will never unfold to present the opportunity for observation. It is always far easier to determine the cost of a system and therein the portion of benefit that society misses out on as this is part is observed, whereas the benefit is hidden.

In any case, parking management is the most effective TDM measure when one considers that it combines characteristics of public acceptance and impact. Road pricing is arguably a more effective tool at dissuading marginal car use, but it is politically difficult to implement; although this is changing in London, particularly as air quality continues to be a matter of public concern. That said, until such a point that the 'need to park' reduces e.g. a transition to a non-ownership model possibly predicated on CAVs becomes a reality, parking management will be no less important, all else equal, in future years to the importance that it carries today. Meanwhile, parking management is the only mechanism through which local authorities can ensure stationary vehicles are parked in an amenable and equitable manner,

thus solidifying its importance and the benefit it delivers. Moreover, as the population of London continues to grow and its urban form densifies, the benefit of parking management will only increase further.

Chapter 4 has highlighted the many benefits that parking management generates through the delivery of desirable parking outcomes and has identified the significant interrelationships between them. These benefits are:

- Reducing congestion;
- Improving road safety;
- Improving air quality;
- Ensuring good access and accessibility;
- Promoting the local economy;
- Maximising the productive use of the land resource;
- Promoting health and wellbeing through travel choice, and;
- Providing funding for parking and wider transport scheme improvements

Of particular significance is the fact that these benefits deliver benefit to everybody from motorists themselves to the person sat at home waiting for a delivery to turn up at the door, and all road users and non-road users in between. They are all external.

Also of importance is the strong relationship to other modes of transport. Parking management sits at the very heart of the strategic function of London's transport network and as such it keeps buses in the bus lanes, preserves the footway for pedestrians and frees up the cycle superhighway for cyclists and the tramways for tram services. As a central TDM instrument, parking management is one of the main strings of London's transport system and is essential in delivering desired mobility outcomes above and beyond the parking outcomes described in Chapter 4.

Despite of all this, parking services teams and CEOs remain largely unloved by the public. Motorists observe PCNs being slapped on windscreens and they pay their charges at the meter, while non-motorists probably have very little perception of the importance of parking management at all. Owing to the fact that the majority of benefits are external rather than private, it is very difficult for the public at large to obtain a particularly positive perception of the service – which is unfortunate. The system is merely there to help people go about their daily lives.

Parking management is ultimately designed to deliver a parking space for a motorist where they want, when they want and at a price they are willing to pay. If this is what the motorist gets then they will be satisfied, but not more. If they spend too long cruising or the price is a little higher than they were expecting or, worst case, they receive a penalty, they will be dissatisfied. If for every ten parking experiences, they have one unsatisfactory experience, this is likely to leave them with a negative perception overall. The notable exception to this in the UK – which is far less relevant in London – is when parking is free as the motorist would normally expect to have to pay and therefore they feel that they have benefitted from the system which provides a perceived sense of private gain.

Beyond perceptions formed around the motorist's day-to-day interaction with the system is their general distrust of it, in particular perceptions of where parking revenues are spent

– and addressing this issue is well within the capability of local authorities. While, the media are quick to identify that parking management generates a surplus in London and that this surplus often increases over time, they are less quick to inform of where this spend goes and the strict rules which govern it. Resultantly, local authorities would benefit greatly from being proactive with the media and driving the narrative on parking themselves in part to communicate and promote some of the excellent schemes that parking surplus is used to support, such as the Freedom Pass. This should be a focus for the PPA.

The public do not necessarily go looking for information on surplus expenditure but this is not to say that they are not interested to learn of it; however, it would involve local authorities reaching out to the public rather than vice versa. The estimated annual benefit accrued from parking surplus expenditure is £1.17billion at an average BCR of 3.2:1 which represents a 'high' return on investment in transport appraisal terms. This is worth shouting about.

Interestingly, there are some exciting activities on the horizon that can have a really positive influence on parking management in the future. Beyond the significant step of decriminalisation, parking management has been a discipline that has gone relatively unchanged over time – the principles have always been the same. However, today, there are genuinely exciting and potentially revolutionary changes afoot in relation to the integration of parking management and digital technology. The influence and role of IoT and big data has already been demonstrated in Westminster through the 'One Click' Parking project which has all but eliminated the need to cruise for parking by guiding drivers to parking spaces based on RTI at a potential annual saving to trialists Pimlico Plumbers of £100,000.

Cruising for parking is a phenomenon that parking management should theoretically be well placed to address, but has historically struggled with. This report has estimated the potential benefit of eliminating cruising for parking in London to be £1.9billion. IoT and RTI have the potential to substantially reduce the time spent cruising and make significant strides towards fulfilling this untapped benefit. Achieving a 50% reduction would save almost £1billion if delivered London-wide. Similar demand-side benefits are possible through dynamic pricing which also has the potential to deliver supply-side benefits for local authorities, most notably by promoting the use of underutilised parking stock.

Similarly, parking management can play a leading role in facilitating the transition towards greener urban mobility. Where the air quality implications of road-based transport stand at £1.85billion per annum and diesel vehicles account for £1.5billion of this cost, parking management can enable this transition by providing dedicated parking spaces and infrastructure. This is also something that should be widely promoted.

Finally, in the future, the role that parking management could play in managing a transition towards CAV-led mobility would be exciting; although it is difficult to predict what such an environment would look like for London given its complexity.

CONCLUSION AND RECOMMENDATIONS

7.1 Recommendations from the research

Below we set out our recommendations from the research focussing principally on communicating the benefits of parking management in a London context, improving the policies and practices of local authorities in operating parking management schemes and outlining opportunities for future parking management research.

1. To develop and deliver public facing campaigns to promote schemes that parking surpluses, such as the Freedom Pass, are being used to finance as part of the Positive Parking Agenda.
2. To develop a common framework for the appraisal and evaluation of parking schemes across London which should be incorporated into parking scheme design.
3. To develop a standard protocol for revenue reporting in local authority annual reports to ensure maximum transparency on parking surplus expenditure.
4. To engage proactively with the freight sector to better understand their concerns and to review and update existing guidance setting out a basis for exercising greater flexibility on freight servicing operations.
5. To publish of a table of parking regulations in each borough (perhaps on a dedicated page on the London Councils website to be promoted as a single-source point of information for reference and for wider dissemination to the freight and servicing industry.
6. To develop a mechanism to engage with relevant stakeholders to improve compliance at so-called 'PCN hotspots'.
7. Further research to be conducted informing a review of loading and unloading regulations in order to explore a range of alternative options including the adoption of a pay-per-minute system and other pricing-based approaches.
8. Further research to be conducted into the potential of technology and dynamic pricing to improve efficiencies in parking management and for these benefits to be quantified.
9. Further research to be conducted into the practice of railheading with the aim of understanding how the practice can be best accommodated in a manner which does not detract from the local economies in which the vehicles are parked⁴².

⁴² Railheading is the activity whereby motorists park at outlying rail stations before completing their journey by train. While railheading is generally promoted at the city level as a means of preventing vehicles from being driven into Central London leading to a reduction in city-centre congestion, it can create negative externalities in the areas for which the vehicles are parked given the significant land consumed and the limited contribution made by these motorists to the local economy.

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