Appendix 7

Movement & Access Strategy

A development framework for the

elephant & castle

Elephant & Castle

Movement and Access Strategy

Contents

Tables and Figures

1 Introduction

1.1 This report details movement and circulation principles for the Elephant & Castle development for inclusion in the Comprehensive Framework Document. It reacts to the progress and further detailing of the masterplan draft.

1.2 The regeneration of Elephant & Castle offers a unique opportunity to illustrate how good urban design and an excellent transport infrastructure can work together to achieve the benefits of sustainable development.

1.3 The transport strategy aims to reduce the transport impact of the development and to define, in an integrated approach with the urban design, how transport demand for the development can be limited and properly managed.

1.4 Chapter 2 defines the objectives and principles for the development. The following chapters detail a range of measures that can meet and help in managing travel demand generated by the development. It is important that these measures are built into the design guidance for the public realm.

1.5 It is not only car traffic and public transport that requires space within the urban design. Infrastructure for cycling, taxis and other Transport Demand Management (TDM) measures, such as car clubs, need to be integrated into the urban design. Solutions that enable a modal shift from car to other modes can only be achieved if these modes are properly integrated at an early stage of the project.

1.6 Every concept will create competing space requirements. Advantages, potential and opportunities to reduce traffic volumes need to be considered when the measures for pedestrians, cycles or other measures on traffic volumes are considered.

1.7 The last section of this report evaluates the outcomes of the measures described. As a result of the development substantially more trips will be made than are made today. However, modal split for the proposed development does not have to mirror the existing situation. TDM will have an impact on the trips generated by the new developments. A minimum and a maximum scenario are developed to estimate how many trips will be likely to be made with the different modes as a result of the movement and access strategy.

2 Objectives & Guiding Principles

General

2.1 It is vital that the transport strategy determines opportunities to manage all future trips in a sustainable way. The transport strategy should incorporate Transport Demand Management (TDM) measures and detail how the various components of the strategy will actually work together. The strategy should blend the initiatives and measures that will encourage preferred travel behaviour, with the engineering solutions designed to support them.

2.2 Transport Demand Management (TDM) is a term used to describe the broad array of measures and initiatives that can be used to manage demand for travel. There is a substantial literature now available on TDM (see www.vtpi.org for a useful overview). Some of the key aspects are summarised in table 2, below.

Table 2.1: Key TDM Components

Positive Incentives	Mixed	Negative Incentives
Alternative work schedules	Access management	Fuel tax increases
Bike/Transit integration	Car-free planning	Parking charges
Car clubs	Comprehensive market reforms	Road pricing
Car sharing	HOV preference	Vehicle use restrictions
Commuter financial incentives	Parking management	
Cycling improvements	Traffic calming	
Guaranteed ride home		
Park & Ride		
Pedestrian improvements		
Public transport improvements		
School run management		
Telewok		
Transit oriented development		

(based on: http://www.vtpi.org/tdm/tdm51.htm)

2.3 The transport strategy will need to incorporate a variety of measures suitable for the area. Best results are gained from a set of measures selected from a number of different categories, including:

- Practices that reduce the need for travel (public transport oriented development, location efficient development, mixed use and dense developments etc.);
- Measures to facilitate and promote walking;
- Measures to facilitate and promote cycling;
- Measures to facilitate and promote public transport use;
- Mobility services to reduce car use (car sharing, guaranteed ride home, car clubs, etc.);
- Travel information provision; and
- Marketing and communications strategy.

2.4 An effective strategy will need to include a well-balanced blend of incentives and disincentives that cover each of the main categories listed above. Cherry-picking specific measures or shying away from the disincentives will not enable the transport management potential to be realised and may render the

strategy ineffective. The effectiveness of a strategy is a result of its integrated nature, with each measure positively reinforcing another. If the strategy is deconstructed, say for unwarranted political or business concerns, it will not achieve the desired effect.

2.5 Changing travel behaviour is difficult. Transport behaviour quickly becomes habitual. Generally, people tend to adopt certain travel behaviour and do not change often for regular journeys, unless coerced into doing so.

2.6 However, travel behaviour is dynamic. It is constantly changing. Opportunities to change travel behaviour are most likely to correspond with life changes. In particular:

- Starting a new job;
- Moving home;
- Change in family circumstances (such as the birth or children and their educational arrangements); and
- Health considerations (such as the need to get fit, or deterioration of eye-sight).

2.7 These are the key life events where people rethink their mobility requirements. Such events are a unique opportunity for people to think about and evaluate travel options. It is at these stages that people are most likely to trial alternatives to the car, or start to use a car. It is vital that these opportunities are properly utilised.

2.8 The transport strategy has an important role to play helping to support the use of more sustainable methods of travel and to encourage mode-shift away from the car. New developments are an opportunity for change. Whether it is to work, live or just visit; they are new destinations that need to be accessed. This underlines the importance of an active transport strategy for the E&C development. It is important that the transport strategy is used to its full potential to detail the objectives and targets and to obtain buy-in with all relevant parties from the start.

Guiding Principles

2.9 The following section summarises the principles of the transport strategy for E&C. These principles for future development will need to be agreed and enforced. The guiding transport principles for an E&C masterplan that reflect sustainable objectives for future developments can be summarised under the following headings:

a) Sustainability

2.10 There is a responsibility to ensure that the actions of today do not reduce the quality of living and the opportunities of tomorrow. London Borough of Southwark needs to ensure commitment to long-term solutions. By making the best use of available resources, both social and economic growth can be achieved.

- Reduce the need to travel and reliance on the private motor car.
- Restrict and manage parking.
- Encourage alternative transport modes.
- Offer integrated mobility packages.
- Minimise pollution.
- Enable sustainable lifestyles and work practices through sensitive design.

b) Community

2.11 A strong sense of community should be celebrated and promoted.

- Create a safe and secure environment through natural surveillance.
- Ensure inclusion for all sections of the community through choice, mobility and access.
- Promote individual responsibility for the area.
- Raise the sense of pride in the area.

c) Accessibility

2.12 The area needs to be accessible by all different modes.

- Offer choice of route and movement type.
- Improve safety of roads and junctions.
- Integrate cycle lanes and safe walkways into the design of the streets.
- Establish travel information for the area.
- Integrate car clubs into the residential developments.
- Establish safe routes to schools.
- Offer quality cycle parking.

d) Inclusive design / access for all

2.13 Design streets and buildings for all users.

- Use ramps for all level changes; where ramps are not possible they can be replaced by publicly accessible lifts.
- Ensure barrier-free access to stations and stops.
- Integrate ramps in stairs to create barrier-free entrances to all buildings.

e) Vitality and Variety

2.14 Encourage diversification and give life to the streetscape.

- Connect destinations for pedestrian and cycle use
- Promote richness and aesthetic enjoyment through quality of design and materials
- Encourage use of the natural/park environment. The design of the area should allow variety of activities to co-exist without inhibiting each other.
- Encourage a mix of retail, business, industry and residential uses to promote vibrancy.

f) Sense of Place

2.15 Create an area with a distinct character and identity. Celebrating the sense of place through design and connectivity is fundamental to the effective operation of the transport strategy.

- Create visual character.
- Retain valued elements of existing character.
- Ensure legibility (recognition of location and natural sense of direction instilled by visible clues and landmarks).

g) Robustness

2.16 A robust design that allows uses to change over time with minimum need for demolition and re-build.

- Create streetscape and buildings in good quality materials.
- Establish buildings and transport network that can accommodate change in future years with minimal disruption.

h) Integration of Land Use and Transport Planning

2.17 Success of the other principles depends very much on an integrated approach of the land use and transport planning.

- Develop transport facilities according the different phases of the urban masterplan.
- Ensure that all modes of transport in place prior to residents moving in.

2.18 To meet these principles suitable measures need to be included in the Comprehensive Design Framework to ensure that effective transport of persons and goods within and through the development can be achieved. In order to make full choice of transport modes available, measures to facilitate and encourage their use needs to be considered. To achieve a safe and efficient way of servicing / deliveries that support the sustainable strategy an innovative city logistics concept is needed, including Green Fleets and Human Powered Freight.

3 Facilitate Walking

3.1 Walking is the main interchange mode. Users of all modes are also pedestrians. Therefore, an attractive walking environment needs to be established to create a viable and lively public realm.

Walking Network

3.2 The walking network needs to meet the needs and desire lines of all possible road users. In particular, the needs of more vulnerable user groups like children, elderly and mobility impaired must be addressed to achieve a quality pedestrian environment that meets the needs of all. Therefore the following principles should be considered:

- Routes that provide direct access to entrances of the buildings – avoid circuitous and indirect routes;
- Continuity of routes – avoid the fragmentation of the network by junctions or other physical barriers on the walkways;
- Permeability towards neighbouring areas;
- Facilitate crossing within the desire lines of pedestrians;
- Crossings should ensure pedestrian safety, also for children and elderly - no signalised junctions without pedestrian facilities;
- Wide and comfortable walkways that allow people to move unimpeded;
- Apply an inclusive design – ramps for all level changes, public accessible lifts where ramps are not possible; integration of ramps in stairs to ensure barrier-free entrances to all buildings;
- Kerb lowering to assist mobility impaired;
- Comprehensive signing of routes and destinations; and
- Ensure sufficient and attractive lighting of routes at night; distinguish between a day network including parks, route choices etc. and a well lit main night network.

3.3 These principles must be implemented for the pedestrian network within and through the development area.

Safe Routes to School

3.4 The pedestrian network should focus on routes to school through the promotion of Safe Routes to School projects within the area.

Safe Routes to Schools projects encourage and enable children to walk and cycle to school through a combined package of practical and educational measures. Safe Routes to Schools is a community approach to

- encourage more people to walk and cycle to school safely;
- improve road safety and reduce child casualties;
- improve children's health and development; and,
- reduce traffic congestion and pollution.

The infrastructure of the area needs to facilitate safe routes to schools. Schools in the neighbouring areas and their access routes need to be identified. In order to make these routes safe, traffic calming measures and safe crossings along these routes should be considered.

3.5 The detailed principles also need to be applied to private land developments. It needs to be ensured that the pedestrian network does not contain any breaks. Space Syntax will present the desire lines for pedestrians, connections to the neighbouring areas, crossing points etc. that need special attention within the design proposal.

4 Facilitate Cycling

4.1 Cycling offers a great potential for sustainable transport. It is healthy and offers a larger catchment area than walking and can reduce demand on other modes of transport.

4.2 Cyclists differ in their journey purposes and their travel ability/behaviour, consequently cycle speeds and routes can differ. As proposed by the Design Manual of the London Cycle Network (LCN) the following groups need to be considered when designing a cycle network:

- Vulnerable – Children, inexperienced adults and elderly people. Speed is usually under 15mph. Predominantly short trips.
- Utility – Generally non-commuter trips i.e. social and shopping journeys. Speed and directness is often of less importance than safety and convenience.
- Commuter – Adults, reasonably confident in traffic. Value speed and directness. Speed is typically 15-20mph. Medium length trips.

4.3 Realisation of a good cycle environment can make a significant contribution in support of a reduced parking provision.

Cycle Network

4.4 In order to create a usable and safe environment for cycling, the following principles need to be considered for the E&C cycle network:

- Routes that provide direct access to home, work, shops and other facilities – avoid circuitous / indirect routes;
- Continuity of routes – avoid the fragmentation of the cycle network by junctions or other physical barriers; Link routes with the existing London Cycle Network (LCN);
- Routes leading through the heart of the developments, giving access to key land uses / major destinations (shopping, culture, leisure, workplaces, etc.) and public transport nodes;
- Meet the demand of different user groups: quick connections along arterial streets for commuter and utility purposes; routes along quieter, secondary streets for vulnerable users and utility purposes;
- Particular attention to be paid to junction design: ensure safe and direct crossing;
- Provision of dedicated cycle lanes, always segregated from pedestrians and where necessary also from vehicular traffic; segregate cycle lanes from frequently used bus lanes and bus stops;
- Gradients and surface of a sufficient quality and free of physical barriers (like lamp posts, traffic signals, litter bins, curbs, channels etc.) to allow high speeds and avoid accidents;
- Comprehensive signing of routes and destinations;
- Regular maintenance of routes and associated facilities;

4.5 For individual development sites the continuity of the public network without breaks, with priority for pedestrians and cyclists on-site and prioritised crossings where necessary needs to be ensured. Therefore, developers need to:

- Create safe routes through the development according defined design standards;
- Allocate space for cycling;
- Link routes through the area to other cycle routes; and
- Separate on-site cycle and walking space.

Design of cycle lanes

4.6 High quality routes meeting the design parameters detailed in the Design Manual of the London Cycle Network are required, The following width are suggested for E&C:

- separated cycle lanes = 2.00m;
- on-street cycle lanes = 1.80m; and
- a safety distance of 20cm towards traffic lanes, kerbs, walkways etc.

4.7 The use of bus lanes is in most cases a suitable and safe routing for cyclists. At bus lane sections with many and frequently used stops, buses and cyclists hinder each other and cycle safety is difficult to ensure. In addition, many pedestrians cross in these sections in order to reach a bus or a taxi.

This applies to the following sections within the development area:

- Elephant & Castle Road until Walworth Road
- New Kent Road

Therefore, cyclists should be separated from bus lanes on these sections. This segregation can be achieved by separated cycle lanes within the same street or via an alternative parallel route that attracts cyclists and ensures access points towards the bus stops of the parallel route.

4.8 Particular attention needs to be given to points where cyclists join, leave and cross main traffic routes.

4.9 The main part of the cycle network should lead directly through the core area, connecting the different land uses and giving access to the main destinations of the development. In order to achieve this, the streets around the new park should be designated as 'Cycle Streets'. Other vehicles are allowed but will be subordinated to cycle traffic. With this, access to residential parking within the core area, on-street loading by residents, some services/deliveries and emergency vehicles are able to use the streets. Also car club stations can be integrated within this area.

The proposed layout of the Cycle Streets consists of the following elements:

- minimum 4m to 5m walkways on each side;
- a mixed area for disabled car parking, public cycle parking, trees, car club parking and residential loading/servicing of 2.5m on alternating sides; and,
- a two way cycle lane of 5m to 6m.

A total minimum street space of 15 m is required for the Cycle Streets. The street design should separate the different street functions by different materials; level changes and kerbs should be avoided.

Public Cycle Parking

4.10 Provide public parking at public spaces, squares, public facilities, stations and stops. In most cases Sheffield Stands will be suitable. At strategically important and heavily used points protected parking will be necessary.

4.11 To facilitate an easy interchange of cycling with public transport, cycle parking needs to be provided at all public transport stations and the main bus and tram stops. The following locations are suggested to provide such Bike&Ride facilities:

- tube station entrances;
- tram stops;
- rail station entrances; and
- main bus stops.

Each location should consist of at least 5 Sheffield stands.

Cycle Station

4.12 With properly implemented TDM including the necessary limitations to parking, the increase in cycling will be high, therefore a high amount of cycle parking will be required.

4.13 The core element of the E&C cycle strategy should be a Cycle Station at the heart of the interchange. A Cycle Station offers supervised parking for a small daily charge. Several further cycle services can be integrated. Possible elements of the Cycle Station are:

- Supervised cycle parking;
- Lockers for storage of helmets etc.;
- Maintenance and repair service;
- Cycle shop;
- Cycle rent; and
- Cycle washing facility.

4.14 Charging rates for cycle parking needs to be low. Otherwise it would conflict with the promotion of cycling as the cheapest mean of transport. Charging of the cycle park will be on a daily basis, approximately 50p per day. Discounted monthly (£5) and annual (£50) tickets for regular users should be available.

4.15 Further mobility services, such as a TfL Information Centre / Journey Planning Centre, might be integrated within the same building.

4.16 On such a basis, German and Dutch examples have shown that a cost-efficient operation of a Cycle Station starts with 1,000 parking spaces.

4.17 The following assumptions on potential users of a bike station can be made:

- **public transport interchange users**, which use the bicycle as the feeder mode to bus, tram, tube and rail; considering the existing morning peak use of the E&C interchange approximately 200 to 300 users can be expected by cycle in the morning peak; they will be regular users with parking durations over the whole day;
- **High Street retail users**; with the proposed high amount of retail at the development over 1,000 cyclists per hour should be expected (see estimated trip generation in section 11); they will have low parking durations of 1 to 3 hours and mainly arrive after the morning peak;
- **High Street retail employees;** that have no parking facilities on-site (developers close to the cycle station can contribute to the cycle station instead of creating own cycle parking for employees); 100 to 200 users might be expected; and,
- **Visitors** of the office and residential uses in the area.

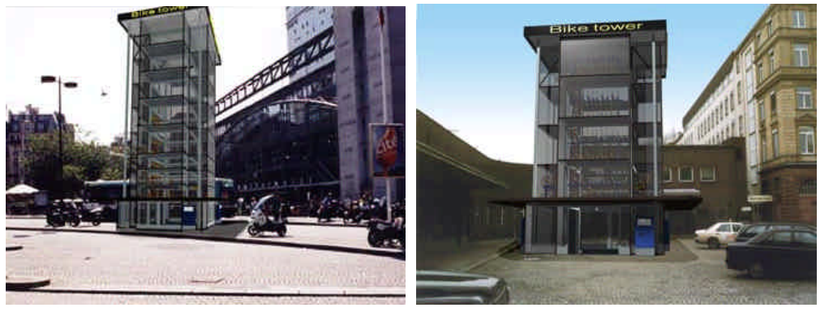
4.18 With these users the Cycle Station will have an approximate total demand of 1,000 to 1,500 parking spaces. If space-saving 'double-parkers' are used (such as those produced by 'Josta', as illustrated in Figure 4.1) a ground floor area of approximately 1,300 sqm to 1,800 sqm will be required.

4.19 An E&C Cycle Station might be located within a new building next to the railway station or could be integrated into the urban design of the roundabout. A separate landmark might be created to draw attention to the cycling issue.

4.20 Best practice for Cycle Stations can be seen in Munster. The landmark building in front of the main station, illustrated in Figure 4.1, offers parking for 3,300 bicycles on two levels (more pictures and details on http://www.klinke-macrae.org.uk/photos/2001/muenster/bike_station).

http://www.muenster.de/stadt/radstation

Figure 4.1: Cycle Station at the Main Station in Munster/Germany



http://www.josta.de

Figure 4.2: Automatic Cycle Parking: Josta Bike Towers

Area Specific Cycle Parking

4.21 Minimum cycle parking standards are detailed in the LCN Design Manual. In order to promote cycling as a preferred mode for the area and to support a car-free or at least car-reduced development, higher standards should be applied.

4.22 To offer a large quantity of good cycle parking, the following standards are suggested for E&C:

- 1 to 1.5 spaces per residential unit plus visitor parking at 1 space per 10 units;
- 1 space per 120 to 100 sqm retail use; and,
- 1 space per 80 to 60 sqm office use.

4.23 Table 4.1 shows the amount of required cycle parking according to these standards. A total of 4,000 to 5,500 residential and further 1,000 retail and office parking facilities need to be provided.

Table 4.1: Required Cycle Parking

Description	Use Class		Proposed Standard min	Proposed Standard max	Required Cycle Parking min	Required Cycle Parking max
		GFAm2	1 space per __ GFAm2			
High Street Retail	A1/A2/A3	103,315	120	100	861	1,033
Office	B1/A3	11,865	80	60	148	198
Residential		**Units**	spaces per unit			
	C3 Private	2,197	1	1.5	2,197	3,295
	C3 Affordable	1,790	1	1.5	1,790	2,685
	C3 visitors	3,987	0.01	0.01	40	40

4.24 The storage of the bicycle at home is recognised as one of the main constraints on cycling. Residential cycle parking therefore needs to be of excellent quality. Safe and weather protected parking facilities can be included within the buildings (special room near the entrance) and/or within protected shelters near the house.

For the residential sites within the core area cycle parking might be located within the court yards and sometimes combined with car and motorcycle parking.

For the retail sites, parking facilities for employees and visitors need to be distinguished. Employees bringing their cycles regularly for the whole day have a higher need for protected storage than short-term visitors/shoppers. Visitors will be more concerned with easy access to cycle racks and short walk distances towards shop entrances. Furthermore, offices and other employers of the area should offer changing facilities, showers and storage facilities. Such requirements need to be embedded in Travel Plans.

City Bikes

4.25 City Bikes are publicly available bicycles in the public realm. Sometimes they are freely available for all, newer systems register the user and charge them a small fee. The bicycles are modern, with a unique design and often carrying sponsors advertisements.

4.26 Target groups for these short-term bike rental system are the residents of the area and the neighbouring areas that cycle occasionally, visitors and tourists to the area and commuters that want to use a cycle as their last transport mode to get to work.

4.27 Best practice for City Bikes can be found in Vienna, Berlin, Frankfurt and Munich. The German system 'Call a Bike' is operated by the Deutsche Bahn AG in Berlin, Frankfurt and Munich (http://www.callabike.de). CallBikes can be hired and returned at all major junctions by making a telephone call. Each CallBike is protected by an electronic lock that can be opened with a numerical code. This code is dispatched over the phone, when the bike is hired. To return the bike, it must be taken to the nearest major crossing and locked. A receipt code on the display is required for the return call. Charges are 5 Euro for 30 minutes and 6 Cent for any further minute.

http://www.callabike.de

Figure 4.3: 'Call a bike' in Munich, Berlin and Frankfurt

http://www.citybikewien.at

Figure 4.4: Vienna Citybike

5 Accommodating Public Transport

5.1 Improvements to the public transport system serving Elephant & Castle are already planned. Thameslink 2000 will improve the existing rail services. More and more frequent buses will serve the area and plans are being formulated for the introduction of two tram services through Elephant & Castle. For the proposed development, interchange between the all modes will be quicker, easier and accessible for all.

5.2 Issues on travel information, ticketing etc. are summarised within the proposed Mobility Center (see Section 9).

Rail Service Improvemnets

5.3 With the Thameslink 2000 project, rail services at E&C will be improved and line capacity increased.

5.4 The development proposes two new access points at the both ends of the platforms which will increase the movement capacity of the station. Interchange with tube, bus and taxi will be improved by this measure.

5.5 Accompanying measures will be undertaken to improve the realm of the station and the platforms. It will be important to provide convenient waiting facilities and a wide range of information (not only for trains but for interchange and the area).

Tube Access Improvements

5.6 Pedestrian access to the tube lines need to be improved. More capacity and escalators will provide convenient and fast access. This will also improve / simplify the interchange with tram, rail, bus, taxi and bicycle.

5.7 The Cycle Station needs to be located in convenient walking distance, some further short-term cycle parking facilities need to be offered close to the entrance.

5.8 SDG will develop / provide the concept for the tube access improvements.

New Tram as an integrated part of the urban design

5.9 The new tram services (Cross river Transit – CRT & City Tram) need to be marketed as a special feature of the area. This will attract as many users as possible. The system needs to be an integrated part of the urban design. Advantages and disadvantages of different route options need to consider to achieve a number of key objectives:

- Make CRT as accessible for the core development area and its residents and visitors as possible;
- Integrate CRT into the tube/bus interchange;
- Chose straight route alignments for highest transport comfort.

5.10 Urban design should ensure a harmonic integration of the tram into the urban spaces. The trams will not only be a means of transport but might also get an integrated part of the public realm. The example of Strasbourg shows dramatically how urban design and landscape architecture can be improved with the integration of a tram.

5.11 Several factors influence the visual impression of a tram system. The main aspects of tram infrastructure, important in the context of urban design are:

- Grade and Tracks
  Ballasted tracks are not only a visual nuisance but also a physical obstacle for the movement of people. Tram grades are part of streets and squares. To distinguish grades from driveways and secure attention by motorists and pedestrians, grades could be designed as a 'ribbon' or 'throughway'. Contrasting bright, low and broad stone curbs distinguish the route and allow easy crossing by pedestrians.

- Overhead Systems
  The Tram-vehicle not only passes through the area it will also be visible through its built elements: electrical pick-up or catenary system – posts, supports, wires and substations etc. The overhead system is an additional element in urban spaces, it is visible at all times. With this presence they become part of the built environment and careful consideration needs to be given to design, making these elements not only functional, but object of aesthetic ambition.
- Tram Stops
  The stops should be integrated into the public realm. They need to offer comfortable waiting times (with seating) and information (on the tram but also on interchange facilities). Identity and use grows by linking people and surrounding environment through information and integration.

Bus Service Extensions and Improvements

5.12 With the development a further increase in bus use can be expected. Together with the tram, alignment changes might be required concerning the frequency and capacity of routes. Bus services are constantly evolving to meet demand and it may be difficult to predict the likely bus services operating at the regenerated E&C. A number of good practice principles can, however be adopted.

5.13 Bus stops around the main rail interchange should be allocated to facilitate an easy exchange between the different modes.

5.14 Bus stops should be improved and/or relocated in order to improve linkages between different routes and modes and to facilitate easy interchange with short distances in between routes.

5.15 **Bus waiting stands** in the south part of the area should be provided in suitable on-street locations.

5.16 As London Buses are interested in improving their bus fleets, the demand for a refuelling station for any **alternative fuels** needs to be investigated. London Buses has embarked on an impressive programme of improvements to its fleet of buses, successfully reducing 'black smoke' and other harmful pollutants from their vehicles. An on-going programme will see the whole fleet fitted with Euro II engines or better and diesel particulate filters (DPFs) by 2005.

The improvements include the development of a London bus test cycle, introduction of diesel particulate filters, re-engineering of Routemasters plus 100% use of Ultra Low Sulphur Diesel (ULSD) with current research looking into water-diesel emulsion (PuriNOX ™). Exhaust Gas Recirculation (EGR) is also being trialled with 10 vehicles, and fuel cell buses will be demonstrated from late 2003 on a London bus route (http://www.transportenergy.org.uk).

Access for Coaches

5.17 The redevelopment is likely to attract tourists to the area , although it is not envisaged that Elephant & Castle will become a major coach interchange.. Access for coaches therefore needs to be considered. It is assumed that 2 to 3 boarding bays reserved for setting down / picking up only (allowing 15 minutes free time or short term parking of up to 3 hours) might be sufficient. A possible location might be within London Road, close to underground and local bus service stops.

6 Taxis at the Interchange

6.1 Taxis are an important part of integrated transport and are established as a significant mode of travel in south London. As a main feeder and mode for the last mile of a journey, taxis need to be considered as integrated part of the interchange. Within a car-reduced residential and a car free retail development the demand on taxis will increase. In order to give direct access to the residential homes taxis might also be permitted on the Cycle Streets within the core area of the development.

6.2 To facilitate pick-up and drop-off of taxi users without disturbing traffic and bus flow, taxi ranks at various strategic places will be required.

Cabs

6.3 Location close to the stations and bus and tram stops in order to facilitate an easy to use interchange. Well-located and comfortable taxi stands will avoid boarding within bus lanes and directly at bus stops.

6.4 Taxi stands should be located close to each underground station and the railway station. For each stand a minimum of 15m should be considered. One location should be established as the central taxi rank where waiting spaces for approximately 15 cabs are offered.

Rickshaws / Pedicabs

6.5 Rickshaws / Pedicabs have also an important taxi role in London. Several companies (BugBugs, Chariot Bikes, London Pedicabs, Zero, Nicolas, Hwan, Simon) operate rickshaw fleets to offer a noiseless and pollution free method of transportation.

6.6 A central rickshaw stand should be established within the core area as an integrated part of the main interchange. A possible location might be between the rail station entrance and the new market square.

6.7 Early contact with operators may be helpful to detail the potential and the size of a rickshaw stand.

7 Motorcycle parking

7.1 With the Congestion Charge (CC) and the planned restrictions of car parking at the E&C, motorcycles will be an important mode of transport. However, as motorcycles do not have the same limitations concerning their catchment area as cycles and do not need to pay CC, they have almost no importance as a feeder of the main public transport modes at E&C.

7.2 Attention needs to be paid to motorcycle parking needs tfor residential, office and retail uses. Similar to cyclists, motorcyclists expect secure parking provision close to their destinations. Motorcycle parking should be located at several points close to the High Street in order to limit noisy and polluting motorcycle traffic within the core area.

7.3 For the calculation of motorcycle parking facilities the following standards were applied:

- 1 space per 500 to 300 sqm retail and office use;
- 1 spaces per 50 to 35 residential units of private housing;
- no parking provision for residential units of affordable housing.

7.4 Table 7.1 shows the demand on motorcycle parking for the different uses.

A total of 44 to 66 residential parking facilities will be required. These facilities should be weather protected and located close to residential areas. To avoid noisy motorcycle traffic within the core area the parking facilities should also be located close to and accessed by the Ring Road.

For retail and office uses a demand of 274 to 354 parking facilities can be expected. Commuter parking has similar requirements as residential parking. Secure parking facilities for visitors can also be located on-street.

Table 7.1: Required Motorcycle Parking

Description	Use Class	Total GFAm2	Proposed Standard		Required M/Cycle Parking	
			min	max	min	max
		GFAm2	1 space per __ GFAm2			
High Street Retail	A1/A2/A3	103,315	500	400	207	258
Office	B1/A3	11,865	500	400	24	30
Residential		units	spaces per unit			
	C3 Private	2,197	0.02	0.03	44	66
	C3 Affordable	1,790	0	0	0	0
Total					**274**	**354**

7.5 The space requirements need to be considered within the masterplan.

8 Car Use

8.1 The Inner Ring Road is a strategic part of the London road network. Elephant & Castle is a major nodal point for inter borough movements, carrying large volumes of traffic. The capacity of the street network and in particular the Ring Road is already constrained. Current levels of car traffic are reduced as a consequence of the Congestion Charge, however to accommodate the aspirations of the development this reduction needs to be consolidated generation of car traffic by the development limited.

8.2 Car ownership and the use of private cars need to be limited as far as possible in order to achieve a sustainable development. Essential car traffic has to be managed efficiently. Car clubs offer a progressive solution, as well as professional organised car sharing. In order to reduce the negative environmental impacts of car traffic, the use of alternative fuels and more energy-efficient vehicles should be supported.

8.3 Space allocated to car parking is one major concern within urban areas, especially from an economic point of view. More land can be marketed if less car parking is provided.

Strategic Road Network

8.4 The Inner Ring Road is part of the development. Its negative impacts, like noise, air pollution, severance, safety and visual impacts need to be limited and managed. As traffic volumes will be high in the future, street design and compensatory measures need to ensure compatibility of the streets with its surroundings.

8.5 In order to support the sustainable development of E&C, traffic needs to be managed efficiently. Pedestrian and cycle movements need to be prioritised wherever possible. Severance needs to be avoided and streetscape improved by integrating crossing facilities and trees, applying the boulevard approach.

8.6 However, high traffic volumes on the strategic roads will have a significant impact on the public realm of the development. Measures need to be considered to limit this impact, useful techniques include;

- limit speeds to the speed level;
- reduce the effect of severance;
- offer good accessibility for pedestrians and cyclists along and across the streets;
- reduce the visual dominance of the street; and,
- maintain capacity for current volumes of car traffic.

8.7 Many of these principles can be met by the “greening” of the streets and a 3:4:3 proportion between traffic lanes and other road users space. This proportion ensures that the street design is not dominated by car traffic and pedestrians will enjoy the feeling of space, even though it is a arterial road.

For streets with two traffic lanes (7.3m) and two bus lanes (7.0m) this would mean that on each street side 10.7m should be available for other uses, such as walkways, trees, bus waiting facilities, cycle lanes, seating areas of cafes etc. For this, a total space of 36m in between the buildings will be necessary.

Another important technique to reduce the impacts of noise and pollution is the provision of street trees.

8.8 Famous examples of boulevards in Paris, Berlin and other European Cities demonstrate that high car volumes do not automatically create an unpleasant street realm. However, boulevards require space. Safe street lay outs ideally separate cycling from all other users, also from bus lanes if there are many stops and high numbers of buses.

8.9 Table 8.1 presents the minimum space recommendations for the different user.

Table 8.1: Space Requirements of the Different Streets

	peds	trees	bus lanes	cycle lanes	car lanes	traffic lanes	side space	total	currently available
New Kent Road	10.0	3.0	6.0	4.0	7.3	13.3 44%	17.0 56%	**30.3**	**28.4**
Elephant&Caste Road	11.0	3.0	7.0	4.6	7.3	14.3 43%	18.6 57%	**32.9**	**33.4**
Heygate Street	13.0	6.0	7.0	4.6	7.3	14.3 38%	23.6 62%	**37.9**	**37.4**
Rodney Place	8.0	6.0	7.0	4.6	7.3	14.3 43%	18.6 57%	**32.9**	
Cycle Streets	10.0	2.5		6.0		0.0 0%	18.5 100%	**18.5**	

Core Area Street Design

8.10 Walworth Road, it's extension through to the northern roundabout and the new market space will be designated as pedestrian areas. These will be important links for pedestrian accessibility to the main retail area, rail and tube stations.

8.11 In order to achieve the mix of pedestrian, cars and cycling envisaged for the core area, streets around the new park should be designed as 'cycle streets'. Other vehicles will be allowed access, but have to concede priority to cycle traffic. Some services/deliveries and essential car access will be permitted also car club stations can be integrated within this area. Taxis should be restricted to the front entrances.

One possible layout for the cycle streets consists of minimum 4m walkways on each side, a mixed area for disabled car parking, public cycle parking, trees, car club parking, etc. of 2.5 m on alternating sides and a two way cycle street lane of 4.5 m. A total minimum street space of 15 m will be needed for the Cycle Streets. Level changes, should be avoided, no kerbs, separation by contrasting materials.

Car Parking Provision

8.12 The amount of car parking that will be provided for residents, businesses and employees is critically related to the amount of car traffic that will be generated by the development. To retain capacity of the Ring Road development generated car traffic needs to be restricted as far as possible.

8.13 Car free living within inner London is not the invention of a new lifestyle. Many people already live without a car. Transport options are well developed and even people that own a car use it mainly in the evenings or at the weekend. These are exactly the purposes that are addressed by car clubs. People are offered a car close to their homes for the special purposes and only for the time the vehicle is actually needed.

8.14 Any retail use at the development need to be car-free. The amount of retail planned is so huge that any public car parking would generate traffic that the Ring Road is not capable of handling. The case for not providing dedicated visitor car parking for new retail development is a strong one for the Elephant & Castle, given its excellent public transport accessibility index.

8.15 For the office uses of the development, only some visitor parking will be provided. No parking spaces will be provided for employees.

8.16 The residential parking provision is reduced to 0.1 parking spaces per private housing unit. With this low car/ car free areas can be developed and marketed. However, every 10th household will have the opportunity to rent a car parking space. Affordable housing will be car-free housing. For the luxury housing within the Tower Blocks 0.25 parking spaces per unit will be provided.

Residential visitors will be included within the parking management, as indicated below.

8.17 With this the following car parking standards would be applied:

- 1 spaces per 10 residential units of private housing;
- 1 space per 4 residential units of the two tower blocks;
- no parking provision for residential units of affordable housing;
- no parking provision for retail and office use.

8.18 Table 8.2 shows the amount of parking spaces that will be required under these conditions. A total of 319 residential and 12 office parking spaces will be required.

Table 8.2: Required Car Parking

Description	Use Class	Total GFAm2	Proposed Standard	Required Car Parking
		GFAm2	1 space per __ GFAm2	
High Street Retail	A1/A2/A3	103,315	0	0
Office	B1/A3	11,865	1,000	12
Residential		units	spaces per unit	
	C3 Private	1,537	0.1	154
	C3 Tower Blocks	660	0.25	165
	C3 Affordable	1,790	0	0
Total				331

Separated Markets for Car Parking

8.19 An important factor for the marketing of the area is the separation of the parking spaces from the markets of flats. Costs of private parking should not be included in the costs of the apartments (for selling or rent). Residents should pay separately for the 'real' cost of parking spaces. Parking should therefore be offered through a separate market. Residents who do want to have a car can then rent a car parking space.

Automatic Parking Systems

8.20 The most space efficient way of parking is delivered by Automatic Parking Systems: Parking takes place automatically, without the driver on board. The patron simply drives the car into a parking lane that serves as the loading pick-up point, turns the car off and leaves. An elevator automatically transfers the car to a safe dock then conveys the car to the parking slot. The driver receives a magnetic card to retrieve the vehicle and to pay for its storage. Total cycle time for retrieval takes between fifteen seconds and one minute, based on vehicle location within the garage.

8.21 The advantages of Automatic Parking Systems are:

- Reduces land usage - conveying the vehicle by a vertical elevator rather than using sloped ramps and driving lanes.
- Permits optimum storage capacity - using 20 m^2 per parked car compared to 37 m^2 per parked car in conventional garages.
- Preserves the urban realm - no ramps or open cuts to degrade the visual environment.
- Minimizes environmental impact of underground parking because 80% of the surface circumference can be landscaped. Can be built in tight areas, near / beneath existing buildings or within new constructions.
- Prevents scratches, dents and vandalism.
- Guarantees security and uninterrupted operation - featuring a 24-hour central control station.
- Accommodates all sizes of cars, light trucks and sport utility vehicles - a special system can be designed to accommodate trucks and coaches if required.

8.22 Initial costs for Automatic Parking Systems are relatively higher than traditional parking systems, but the cost can be offset by lower operating costs, e.g. since the vehicle is not running when being stored, it uses only one third of energy required to ventilate a conventional garage.

8.23 Manufactures of Automatic Parking Systems are for example Sterlingparking (http://www.sterlingparking.com), Woehr (http://www.woehr.de) and Trevi Icos Corporation (http://www.treviicos.com).

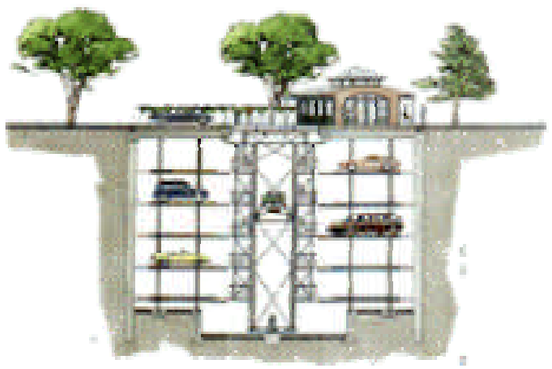


Figure 8.1: Automatic Parking System TreviPark

For example TreviPark fits into a 72'-diameter circle and holds 12 cars per floor, accommodating between 72 and 108 cars, with a surface impact of only two parking spaces and one kiosk. A surface kiosk, which provide a sheltered and secure waiting area during retrieval, is designed to enhance surrounding architecture and open space. Retail or other public services can be incorporated into the design of the kiosk.

Figure 8.2: Buildings with integrated Automatic Parking Systems

First photo shows a revitalised office building, where in the centre a Wöhr Multiparker 720 provides parking space for 90 cars distributed on 5 or 10 parking levels respectively. The offices are situated on the front side where a lot of light enters.

Second photo shows a office building in Berlin equipped with Wöhr parking systems, among others the Levelparker 570 and 590.

Location and Access of Car Parking

8.24 Car parking should be offered at limited locations within the core area, with good walking accessibility. A mixture of public and private car parking should be offered.

8.25 Good locations for car parks might be under/near a public space or integrated into some of the developments sites.

8.26 An exception should be made for the two tower blocks were car parking should be included on-site, preferably with sub-surface access. Access to the core area will be via the Cycle Streets. Resident's loading will be permitted on-street through limited stay restrictions.

Disabled Car parking

8.27 In accordance with the draft London Plan and the related TA 5/95, developments should provide the following parking provision for disabled car users:

- provide at least one accessible car parking bay designated for use by disabled people, even if no general parking is provided;
- all developments with associated car parking should have at least two parking bays for use by disabled people; and,
- stated in the TA 5/95:
  - 6 bays plus 2% of total capacity for business premises
  - 4 bays plus 4% of total capacity for shopping, recreation & leisure.

8.28 A low car/ car free development should not reduce access for disabled car users. Therefore, for the E&C normal standards have been applied to residential units and GFA of other land uses. As a result the following standards for disabled parking provision should be applied to the development:

- 1 space per 2,500 to 2,000 sqm High Street Retail;
- 1 space per 100 to 70 residential units, both private and affordable housing;
- 1 space per 2,000 to 1,500 sqm office use.

8.29 Table 8.3 presents the amount of disabled car parking requirements. A total of 87 to 119 spaces is required for the whole area. 40 to 60 spaces for residential uses and 47 to 60 spaces for the retail and office uses are required.

Table 8.3: Required Disabled Car Parking

Description	Use Class	Total GFAm2	Proposed Standard		Required Disabled Parking	
			min	max	min	max
		GFAm2	1 space per __ GFAm2			
High Street Retail	A1/A2/A3	103,315	2,500	2,000	41	52
Office	B1/A3	11,865	2,000	1,500	6	8
Residential		**units**	spaces per unit			
	C3 Private	2,197	0.01	0.015	22	33
	C3 Affordable	1,790	0.01	0.015	18	27
Total					**87**	**119**

8.30 Some of these spaces should be located on-street, close to the entrances of residential sites, e.g. within the cycle streets running through the core area.

8.31 Most of the spaces will be integrated within the other car parking facilities. Automatic car parks need to provide loading bays that can be used by wheelchair drivers and other mobility impaired people. Therefore, the loading bays need to reflect the dimensions of other disabled parking spaces.

Parking Control and Management

8.32 The limited amount of car parking needs to be managed area wide. For times where parking demand is high, a clear parking distribution policy should be considered.

8.33 Parking charges should be based on monthly rates for residents of the area. For residential and office visitors an hourly basis should be offered. Residents and offices have to book a parking space if visitors want to come by car. With this the demand can be properly managed, for example by staff of the Mobility Center (see section 9).

8.34 The development area as well as the neighbouring areas need to be covered by Controlled Parking Zones (CPZ). Only disabled car parking, cycle and motorcycle parking and parking for car club cars will be provided on-street. In order to control resident's loading on-street, regular enforcement will be necessary to avoid on-street parking.

Car Club Integration

8.35 It is essential that the transport strategy for the development is effective. The whole spectrum of mobility needs to be recognised and reflected in the transport strategy. It is not enough to think about how many (less) parking spaces are affordable for a qualitative life and the public realm. People like to travel by car, this has to be taken into account. Innovative approaches must be considered that offer people the whole range of mobility, including car use.

8.36 The concept of car clubs offers an effective solution. Car clubs are about using a shared pool of vehicles. Neighbourhood-based car stations provide short-term access to cars for periods as brief as one hour. The functioning of car clubs is described as follows (http://www.carshareclubs.org.uk):

- A car is booked through a central office using the telephone or internet.
- Cars can be hired 24 hours a day for as little as an hour at a time.
- Cars are located at designated parking bays less than 10 minutes walk from where you live or work.
- Keys are either kept at a nearby safe, or in the car, which is accessed using a smart card.
- Drivers pay a monthly fee and are billed for hours hired and miles driven.
- Servicing and maintenance are taken care of for you.

8.37 Members of a car club pay lower fixed costs than car owners. The joining fee and annual membership typically come to £125, which is less than a tax disc. There are often low user membership fees for those doing only one or two trips a month. After that you pay as you drive. Typical car club costs are detailed in Table 8.4 below.

Table 8.4: Typical Car Clubs Costs

Fixed costs	
A one-off joining fee	£25
Membership fee	£100 /year or £10 /month
Returnable deposit to cover any insurance excess incurred	£100
Cost per journey	
Hourly rate	£2 - £3
Mileage rate, including fuel	15p – 20p
Booking fee	£1- £2.50

Note: Rates may vary depending on the size of the car and the area where the club is running.

(Source: www.carshareclubs.org.uk)

8.38 Car clubs can be easily integrated into housing developments. They should be available from the very beginning and should be promoted to the residents as part of living in the area. This gives incentives to live without owning a car and establishes behaviour from an early stage. If these opportunities can be grasped, less provision of residential parking space will be required, while enabling the development to function efficiently.

8.39 Transport modes other than the car, can serve most mobility needs. Public transport can be used for short (bus) and longer (train) trips but do not offer enough flexibility for all purposes. The taxi and the bicycle offer large flexibility, but they are limited by distance due to costs or effort/time. Car rental therefore serves another need. It is mostly used for trips over a few days when flexibility is necessary. There is a gap in demand between these usual means of transport. For journeys with special purposes, such as, to visit a special place, to carry something, or to travel at an unusual time, these modes may not be suitable. Sometimes people would simply prefer to travel by car. Car clubs bridge this gap.

8.40 Car clubs accommodate the basic needs of mobility by car while contributing to sustainable urban development. They allow cars to be used appropriately. They avoid the mobility trap that means once costs are 'sunk' into purchasing a car, that marginal costs are lower than many alternatives. Car clubs allow people to choose to use the appropriate mode for the journey. They enable people to make comparisons of the marginal costs for all modes. As a result, fewer parking spaces are needed, use of alternative modes is strengthened, car trips are reduced and short distances of daily mobility are preserved.

8.41 Car club users focus their mobility habits on public transport, cycling and walking. The use of the car is restricted to certain occasions when necessary. This shows the importance of attractive public transport and cycling facilities for the members. Car clubs fill a gap between the other sustainable modes. Therefore, it has to be offered as part of an integrated package, which incorporates further mobility facilities and services alongside car clubs. These packages are described further in Section 9.

8.42 The integration of a car club service into the housing development would give inhabitants the option of occasional use of a car without owning one. The most desirable solution would be to integrate the membership within the costof the apartments for purchasing or renting. Residents of the development would automatically become car club members. If they want to make use of it, they simply then register and pay for their trips.

Another possibility would be to give new residents a special offer with reduced fixed costs for becoming car club members. However, It is envisaged that the first option would provide more incentive.

8.43 The car club operator would handle all organisational transaction, expenses and maintenance of the vehicles. Collaboration between the developers and the car club's operator would enable:

- Reserved parking places exclusively for use by the car club.
- Construction of parking spaces at selected locations, reserved exclusively for the car club cars.
- The car club operator handles all organisational transactions. The service would be delivered to a high standard, which offers an easy handling for the users.
- The residential management would assist with initial start-up financing of the car club. e.g. to finance up to two car club vehicles over the first 30 months. In this time the residents may use these vehicles with special incentives. This can be part of a first promotion action to ensure success of the service.
- Marketing and promotion could be done together by the car club operator and the residential management. However, the direct contact of the residential management with residents would be very important.

8.44 The estimate of participation and the required cars to support a car club is estimated as:

- One car club parking space per 100 residential units and one per 130 employees should be provided.
- Within the Key Development Area 20 to 30 parking spaces should be provided. The required space for an expansion up to 60 cars should be reserved.
- Within the Potential Development Areas 10 to 15 parking spaces should be provided. An expansion for up to 25 cars should be possible.

8.45 The estimates provided assume that the scheme achieves its full potential. A car club operator would carry out more detailed calculations. Early operator involvement would allow safeguarding of land for car club parking spaces and provide data to assist the design process.

8.46 Where possible the cars should be located near to the residential zones. A decentralised location policy with 3 to 4 cars per location would meet the requirements of the participants most effectively.

8.47 A main car club station should be integrated into the 'private car parking', where spaces close to the entrances should be reserved or integrated into an automatic parking scheme.

8.48 Special co-operation with retail and office companies of the area would allow the car club fleet to be used for business (and private) trips of employees.

Car Sharing

8.49 Car sharing is the organised taking or giving of lifts with private cars. A web-based service has grown in last years in the UK and especially rapidly in London. The biggest operator is Liftshare (http://www.liftshare.com) with several thousand users within London. Several sub-schemes were launched for sub-regions, boroughs or organisations/companies.

8.50 For a car-reduced development like the E&C a well organised car sharing service is of great importance. Car free households do not have opportunities for informal car sharing, like giving a lift for family members or neighbours. For a web based systems these are no limitations. Car drivers that pass along the E&C, wherever their trip has started, are potentially a car sharer; that is the way the database works.

http://www.selondontransport.org

Figure 8.3: South East London Car Share Scheme

8.51 For E&C it would not be necessary to offer a sub-system within South London. However, the information and promotion of the system is of great importance. Therefore, car sharing information should be included in a travel information brochure for the area, part of the mobility packages for residents, integrated within the personalised journey planning of the mobility centre.

8.52 An innovative approach would be the introduction of a designated car sharing pick-up and drop-off point at the edge of the core area. This would also be a chance to promote the service in the public realm.

Alternative Fuels

8.53 Whether for private use or company fleets the use of alternative fuels is a positivie initiative in support of a less polluted environment. There are cleaner alternatives to traditional petrol and diesel engine vehicles. These include vehicles running on Liquefied Petroleum Gas (LPG) / Autogas, natural gas, electricity, fuel cells and Biofuels, as well as hybrid vehicles.

Table 8.5: Availability of Refuelling Stations

	UK	London
Total LPG stations	1398	29
Total Natural Gas stations	12	1
Electricity recharching points	8	5
Total Biodiesel stations	82	1

(Source: http://www.cleaner-drive.co.uk/transportenergy; last update on 24 Oct 2003)

8.54 Within London refuelling stations are mainly available for LPG. In total 29 stations for LPG, 1 Natural Gas, 5 Electricity and 1 Biodiesel station are available.

8.55 The capacity of the existing alternative fuel refuelling stations in Southwark needs to be reviewed to ensure capacity can meet any additional demand raised by the E&C development.

9 Marketing and Awareness Raising

9.1 Awareness raising is crucial for a successful movement and access strategy and the marketing of alternative modes of transport. People need to be informed of the mode choice and travel options. Special attention needs to be drawn to cycling, car clubs and car sharing as they are not common and almost unused and or unknown at present.

9.2 The fundamental principle for information provision is: Information must be brought to the people instead of seeing it as their fault to ask for it.

Mobility Center

9.3 For a successful strategy all information needs to be offered at one point. This point should be accessible by several media:

- walk in, sit down center, meeting a personal adviser;
- 24 h telephone hotline; and
- web based travel information.

9.4 Within the mobility center a wide range of services should be brought together:

Personal Journey Planning

9.5 The main part of the center will be for personal journey planning. People will receive information on all public transport, cycling, walking, car sharing, car clubs etc. suitable for their special demand and trip purpose. Information on available transport modes and special maps for walking and cycling will be provided.

Public Transport Tickets

9.6 TfL and rail tickets for a special journey or season tickets will be sold.

Complaint Management

9.7 Complaints can be made and will be transferred to the responsible organisations and will be reported back to the complainant.

Car Club Operation

9.8 Personal introductions and explanations concerning the car club should be made to individuals and companies. Car club bookings can be made in the center (in addition to the possibility of online and telephone bookings).

Parking Management

9.9 The parking control and management as described in section 8 will be organised, implemented and maintained by the mobility center.

9.10 The mobility center should be located in the heart of the development. It can be assumed that at least 3 to 4 full time working places will be required. The organisation of the overnight service needs to be considered (for all enquiries and car club bookings); on-site or through co-operation with another call center (TfL, car club operator etc.).Further integration of local groups or a mobility café might be considered.

9.11 Figure 9.1 shows examples of mobility centers in Frankfurt and Leipzig. To draw attention both are small landmark buildings on prominent locations.

Figure 9.1: Mobility Centers in Frankfurt (left) and Leipzig

Publicity and Information Material

9.12 Information material on travel with different modes within and through the E&C needs to be developed at an early stage.

9.13 This would be distributed to the local residents and employees and would be available in the Mobility Center. Also signage can be used in an integrated approach and raise awareness of alternative transport modes.

9.14 Figure 9.2 shows the interchange signage that is used in Munster. It shows parking status, the different travel times towards the city center for different modes (cycling is the quickest), and the existence of a car club station at this interchange.

Figure 9.2: Interchange Signage in Munster

Events

9.15 The introduction of any new infrastructure can be celebrated and promoted as a public event. Press releases for the event ensure additional publicity. Such events may be suitable for

- E&C rail station re-opening
- New cycle parking facilities at the main interchanges
- Car club opening

Integrated Mobility Packages

9.16 Instead of just providing car parking the development will offer a whole range of different transport modes. In order to make use of the different modes as easy as possible, all residents and employees should be provided incentives for the use of alternative modes. Together with the stick of car reduced or car free developments, carrots need to be offered. The advantages and specials of the development need to be actively promoted.

9.17 Car clubs will have to compensate for the lack of cars / car parking in the area. As they only fill a gap between the other sustainable modes (see section 8 Car Club Integration), car clubs have to be offered as part of an integrated package, which incorporates further mobility facilities and services alongside the clubs.

9.18 Table 9.1 summarises the services that can be offered to residents. The mobility packages should be provided for new residents from their first day in their new home.

Table 9.1: Integrated Mobility Packages for New Residents

	Mobility Package
Public transport	Information package with a free (or discounted) travel cards for the first month.
Car clubs	All residents are automatically members without additional fixed costs. / Residents have access to the car club with reduced fix costs.
Taxi	Rickshaw voucher for the first mile.
Cycling	Information package and maps on walking and cycling.
Cycle rent	To offer city bikes. / Special rental conditions for residents.
Car share	Information package.
Personal journey planning	Information on and invitation to the Mobility Center.
	Information on Hotline and Web based travel information.
Home delivery	Information on the services of the High Street Retail.
Motorcycle	Information on parking provision.
Car parking	Information on provision of parking and charges.
	Daily parking for residential visitors possible (need to be booked in advance).

9.19 A similar package might be developed for employees of the retail and office use and integrated within their Travel Plans.

10 City Logistics: Servicing & Deliveries

10.1 It is envisaged that the largest freight deliveries will be organised via an underground access to the main High Street Retail facilities. As these services will impact upon the operation of the Ring Road, a time management for these deliveries needs to be introduced, concentrating servicing on evenings and nights.

Management of On-Site Deliveries

10.2 In order to control the volume of vehicles accessing the area, a freight distribution center should be established. This center could carry out the last mile phase of a consignments delivery, usually the most troublesome and costly part of a consignments progress to its final destination. It is also where high pollution levels and disturbance becomes a problem.

At this distribution center the consignments are unloaded and consolidated onto vans or smaller vehicles of a Green Fleet using alternative fuels. In many cases vans will not be effective and can be supplemented by load carrying bicycles. Such low cost and zero emissions vehicles are currently operated by Work Bike and IHPVA in London. These services can run over the whole day.

Considered might also be given to use of the tram as part of the logistical approach. (the example of Dresden is shown in Figure 10.1).

Figure 10.1: Cargo Tram in Dresden

Home Delivery Services

10.3 With the car-free development of the High Street Retail, services that help customers with their shopping are crucial. Home delivery services for customers would be an essential service for all sites. The distribution center can be used to bundle all of these services and to manage the home deliveries in an efficient way. If this service is offered for free, the benefit for customers might be better than any free car parking. For the company it will still be cheaper to pay for these home deliveries than building car parking spaces.

10.4 Retail sites outside the pedestrian zone in the core area of the development can also offer another service to their customers: the use of car club cars for taking home shopping. Afterwards, shoppers bring the car back and go home as they arrived (by walking, cycling, bus, tram etc.).

The shoppers do not need to be members of the car club, the retail company is the member / cooperation partner of the club. On-site parking facilities for the car club would be provided. These cars would be booked by the retail company over the day and provided to customers if they need one. The service will be offered together with the bill for the shopping and the customer have to leave a security deposit passport to be collected on return. Outside the opening times of the shop, the cars would be used for the regular car club members. A similar system is successfully operated by MIGRO Switzerland (http://www.mobility.ch).

10.5 The marketing of the area needs to emphasis these advantages of the car free development and encourage participation in the t innovative approach adopted.

11 Influence on Trip Generation and Modal Split

11.1 Limited capacities on road and rail infrastructure requires a shift towards walking and cycling. The mixture of retail, office and residential use the E&C developments creates an opportunity to realise this. The measures described demonstrate the opportunities that will help to create a sustainable transport development.

11.2 At the same time E&C will show best transport practice within London and the UK and provide a good example for future development. This will help to market the development.

11.3 Any development at the E&C needs to be car reduced / car free. The proposed amount of retail seems so high, that hardly only residents in the wider catchment area might be addressed. Most of the trips will need to be done by public transport and will affect the capacity of bus, tube and the new tram.

11.4 With the help of TDM measures additional trips can be reassigned to more sustainable modes. However, a critical review is needed on the potential for mode shift in respect of the existing situation. It has to be taken into account, how much of the existing transport will be effected by the strategy, what capacity can be made available and how the E&C will be affected by the estimated trip generation of the development. Understanding this will show the net balance that needs to be considered for the design of the infrastructure.

11.5 The capacity assessment of the different modes are interrelated. For example, cycle crossings will affect the capacity on the ring road and would therefore probably be seen as problematic. However, a successful cycle strategy will have the opportunity to reduce traffic volumes on the ring road and therefore improve capacity in general. Such interrelations need to be carefully considered when allocating the competing space requirements to different infrastructure elements.

Methodology

11.6 The assessment of trip generations was undertaken by JMP Consultants Ltd. For Scenario 1 Revision 1: findings were outlined in 'Trip Generations Working Note No. 2', October 2003. Table 11.1 shows the estimated trip generations and existing modal split. For the purpose of this report the assessment that follows, the estimated trip generation under the existing modal split is termed the 'baseline scenario for the development'.

Table 11.1: Baseline Scenario for the Development: Result of the Trip Generation Calculation Scenario 1 Revision 1

	modal split	no. of trips			
		residential	**retail**	**office**	***total***
walking	21%	2,350	80,055	600	**83,006**
cycling	1%	95	3,241	24	**3,361**
motorcycle	0%	24	810	6	**840**
bus	41%	4,681	159,463	1,196	**165,339**
tube	20%	2,283	77,787	583	**80,653**
rail	4%	457	15,557	117	**16,131**
taxi	0%	0	0	0	**0**
car driver	9%	1,013	34,518	259	**35,790**
car passenger	5%	514	17,502	131	**18,147**
total	**100%**	**11,416**	**388,933**	**2,916**	**403,266**

11.7 To estimate the impact of the movement and access strategy on the estimated trip generation, a Minimum and Maximum Scenario have been developed to show the range of mode shifts that are likely to be achieved.

11.8 The mode shift assumptions for the Movement & Access Strategy are based on comparisons with other areas/cities that have implemented similar measures to those proposed, actual research results, model calculations as well as conclusions by analogy about the transport mode choice in London.

11.9 The likelihood of a shift from one transport mode to another is not the same for all modes (e.g. car drivers can be better addressed by a new tram system than the existing buses) and is either the same for all trip purposes (e.g. some are more cost sensible than others).

11.10 Therefore, assumptions are made for the different land uses within the development (retail, residential and office use).

11.11 The mode shift rates for the single land uses are applied on the baseline scenario for the development for the total daily trip rates. As retail is the main trip generator, the morning peak is not that dominant as it would, if offices were the main trip generator.

11.12 The estimated trips for each land use are finally summarised to give a total mode split of the trips generated by the development.

Modal Shift assumptions

11.13 An efficient movement and access strategy provides residents and visitors of the area with a variety of choices from which they can choose the combination of quantity, quality and price that best suits their needs. With this in mind, mode choice will depend on the needed / wished flexibility (offered e.g. by car, motorcycle and cycle), costs (walking and cycling are free), weather independency (e.g. public transport) etc.

11.14 The provided modal shift assumptions are based on the following general issues:

- Car drivers prefer more flexible transport modes like bicycles and motorcycles.
- Car drivers can be attracted by new transport systems like a tram, due to the image of new technology and comfort of such systems.
- Good cycle conditions will encourage people to shift from public transport journeys to cycling for journeys of up to 5 km; bus trips will be more affected than tube trips.
- Many bus and some tube users will shift towards the tram if their trips destinations are served by the tram.
- Rail service improvements (Thameslink 2000) will lead towards a small shift from tube to rail.
- Car Clubs enable residents and employees to travel by car if they need and want to. The purchase of cars will be avoided and some people might get rid of their car.
- Travel Blending depends on information and management; if this is provided people will use the advantages of real mode choice and use different modes for different purposes and times.

11.15 In addition to these general tendencies, the mode choice depends on different land uses and their users. Residents of the area will probably use other modes for their trips than employers or visitors of the area.

11.16 Based on these assumptions, the modal shift has been calculated for the three main user groups in the area.

Residential Use

11.17 Additional / special assumptions for trips generated by the residents of the area:

- The parking restrictions will establish a high degree of car-free households; car trips will be replaced by all different modes; car trips will be only occasionally made by car club cars.
- Car parking restrictions and motorcycle parking provision will increase the ownership rate of motorcycles; a shift from car trips to motorcycle trips can therefore be assumed.
- Car free households will spend more money on occasional taxi journeys.
- Good cycle storage facilities will lead to a high cycle ownership rate for households; together with public cycle parking in the area this will support and encourage cycling.
- Cycling will be able to replace bus trips, as the journeys are often quicker (up to 3 km distance) and offer higher flexibility.

- As the area offers more services (retail etc.) the residents will be able to make more shorter trips; resulting in shifts from car and public transport trips towards walking.
- Car sharing will encourage residents to look for and book lifts, especially for the trips to work.
- Unorganised car sharing (of members of the same household) will decrease as less households will own a car.

Table 11.2: Assumed Modal Shift for Trips generated by the residents

to / **% shift**	**walking**		**pedal-cycle**		**motor-cycle**		**bus**		**tram**		**tube**		**rail**		**taxi**		**car pas-senger**		**minimum**	**maximum**
	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	*total shift from each mode*	
from																				
walking			2%	5%															**2%**	**5%**
cycling																			**0%**	**0%**
motorcycle			1%	3%															**1%**	**3%**
bus	5%	10%	5%	8%					10%	15%			1%	3%					**21%**	**36%**
tram																			**0%**	**0%**
tube			5%	8%					5%	10%			1%	5%					**11%**	**23%**
rail			0%	1%					5%	10%									**5%**	**11%**
taxi																			**0%**	**0%**
car driver	5%	8%	10%	15%	5%	7%	7%	10%	10%	12%	5%	7%	2%	3%	1%	2%	1%	2%	**46%**	**66%**
car passenger	1%	2%	2%	4%	1%	2%	2%	4%	2%	4%					1%	2%			**9%**	**18%**

High Street Retail Uses

11.18 Additional assumptions for the High Street Retail uses:

- Customers / visitors will arrive by all other modes if no car parking is offered for these uses; main shift will be from car to tube, tram and bus.
- Due to the parking restrictions, the use of taxis will increase.
- Employees will be able to live in the area; this will create a shift towards walking and cycling.
- Home deliveries will create some car trips that can be described as a shift from more to less car trips.

Table 11.3: Assumed Modal Shift for Trips generated by the High Street Retail Users

% shift	*to* walking		pedal-cycle		motor-cycle		bus		tram		tube		rail		taxi		car pas-senger		*total shift from each mode*	
	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
from **walking**			1%	2%															**1%**	**2%**
cycling																			**0%**	**0%**
motorcycle			1%	2%															**1%**	**2%**
bus	3%	5%	4%	7%					15%	18%									**22%**	**30%**
tram																			**0%**	**0%**
tube			3%	5%					7%	10%			1%	3%					**11%**	**18%**
rail			1%	2%					5%	8%									**6%**	**10%**
taxi																			**0%**	**0%**
car driver	7%	10%	3%	5%	5%	7%	12%	15%	20%	23%	12%	15%	9%	12%	7%	10%	1%	2%	**76%**	**99%**
car passenger	7%	10%	2%	4%	2%	4%	12%	15%	17%	20%	12%	15%	7%	10%	7%	10%			**66%**	**88%**

Office Use

11.19 Additional assumptions for the office uses:

- Employees will arrive by all other modes if no car parking is offered for these uses; main shift will be from car to tube, tram and bus; accessibility by bike will be high but depends also on the home conditions of employees;
- Employees will be able to live in the area; this will create a shift towards walking and cycling.
- With the reduction of parking space car drivers are more likely to share a car or to switch to the existing public transport services.
- Limited parking provisions for business visitors will create a shift from car to tram, tube and taxi.

Table 11.4: Assumed Modal Shift for Trips generated by the Office Use

% shift	*to* walking		pedal-cycle		motor-cycle		bus		tram		tube		rail		taxi		car pas-senger		*total shift from each mode*	
	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum	minimum	maximum
from **walking**			1%	2%															**1%**	**2%**
cycling																			**0%**	**0%**
motorcycle			1%	2%															**1%**	**2%**
bus	3%	5%	4%	7%					15%	18%									**22%**	**30%**
tram																			**0%**	**0%**
tube			3%	5%					7%	10%			1%	3%					**11%**	**18%**
rail			1%	2%					5%	8%									**6%**	**10%**
taxi																			**0%**	**0%**
car driver	5%	7%	10%	12%	7%	10%	12%	15%	17%	20%	12%	15%	7%	10%	3%	6%	3%	5%	**76%**	**100%**
car passenger	5%	7%	8%	10%	3%	6%	12%	15%	17%	20%	12%	15%	7%	10%	3%	6%			**67%**	**89%**

Achievable Modal Split and Trip Generation

11.20 The results of the different mode shifts were aggregated towards a total modal split. Figure 11.5 shows how the estimated 403,266 trips generated by the development would be made if the minimum or maximum modal shifts are assumed.

11.21 Following the described shifts in relation to the baseline scenario for the development, Table 11.5 presents the % and net change for each mode as well as the predicted total daily trips per mode (see also Figure 11.1) and the modal split (see also Figure 11.2).

Table 11.5: Achievable Overall Modal Shift for Trips Generated by the Development

	total shift				**modal split**			
	minimum		maximum		minimum		maximum	
from	% shift	change of trips	% shift	change of trips	no. of trips	**modal split**	no. of trips	**modal split**
walking	2%	7,918	3%	12,093	90,923	**22.5%**	95,098	**23.6%**
cycling	3%	11,674	5%	20,426	15,035	**3.7%**	23,787	**5.9%**
motorcycle	1%	2,144	1%	3,213	2,985	**0.7%**	4,053	**1.0%**
bus	-7%	-29,957	-10%	-41,899	135,382	**33.6%**	123,440	**30.6%**
tram	10%	41,031	13%	50,646	41,031	**10.2%**	50,646	**12.6%**
tube	-1%	-2,532	-2%	-6,699	78,121	**19.4%**	73,954	**18.3%**
rail	1%	4,270	2%	6,950	20,401	**5.1%**	23,081	**5.7%**
taxi	1%	3,671	1%	5,258	3,671	**0.9%**	5,258	**1.3%**
car driver	-7%	-26,896	-9%	-35,100	8,894	**2.2%**	690	**0.2%**
car passenger	-3%	-11,323	-4%	-14,888	6,824	**1.7%**	3,259	**0.8%**
total					**403,266**	**100%**	**403,266**	**100%**

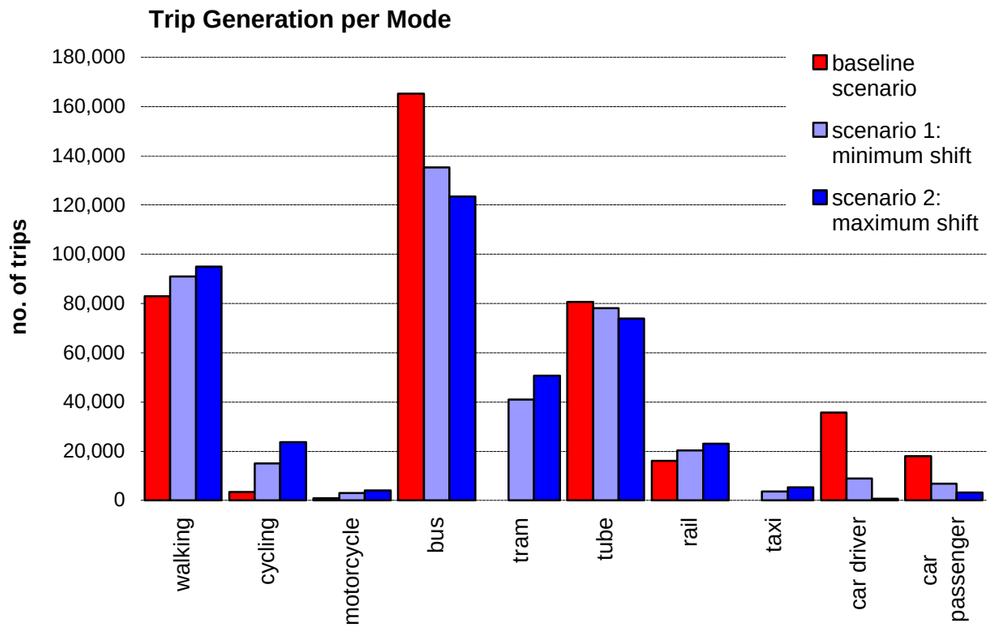


Figure 11.1: Number of trips per mode – Potential of the movement and access strategy

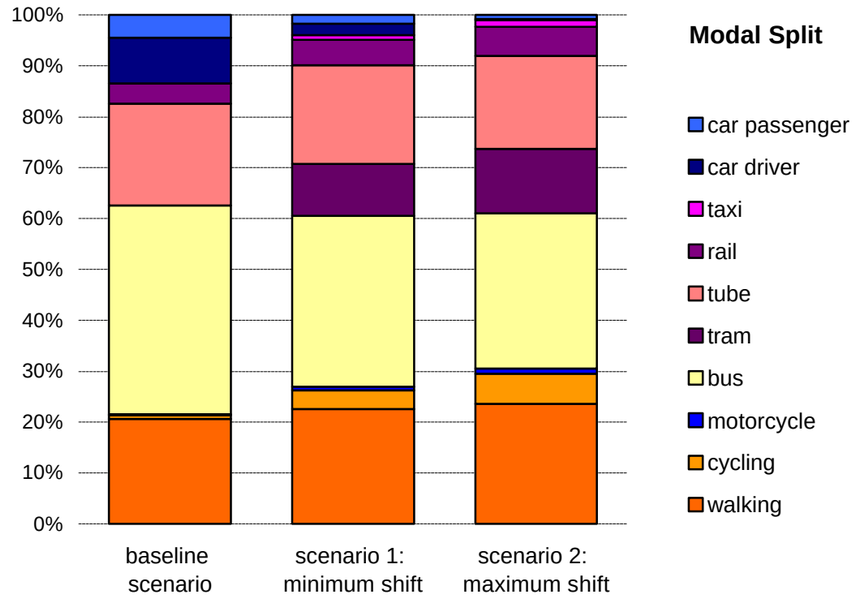


Figure 11.2: Modal Split – Potential of the movement and access strategy

12 Summary

12.1 The Movement & Access Strategy consists of a set of measures that offers choice for all movement generated by the E&C development area and supports / facilitates walking, cycling and the use of public transport. The following measures need to be seen as the heart of the strategy:

- Car-free retail developments (apart from servicing and disabled parking) and limited car parking for residents and office uses:
  - 1 space per 10 residential units of private housing;
  - 1 space per 4 residential units of the two tower blocks;
  - 1 space per 1,000 sqm office use;
  - no parking provision for residential units of affordable housing;
  - no parking provision for retail use.
- Separate markets for parking, i.e. no parking provision inclusive to residential units;

Table 12.1: Summary of the Required Car Parking Provision:

	On-street	On-site	Automatic car parking, separetely managed	total
Residential parking			154	154
Tower block parking		165		165
Office parking			12	12
Disabled car parking	10	8 (towers)	70	87
Car clubs parking	10		10	20
Total	**20**	**173**	**92**	**438**

- Mobility packages providing all new residents with Car Club access, discounted travel cards for the first month, and information on all transport modes;
- A Mobility Centre offering personal journey planning, ticket selling, complaints management etc.; also parking management and car club operation might be integrated;
- A Cycle Station offering 1,000 to 1,500 cycle parking spaces and related services like repair service, cycle rental, cycle washing facilities, lockers etc.; approximately 1,300 sqm to 1,800 sqm are required;
- A consistent, direct and safe cycle network and on-street cycle parking;
- Simple and seamless interchange between tube, train, tram, bus, cycling and taxi;
- Excellent access to rail, tube, tram, bus and the destinations of the area by walking; including safe and convenient crossings; and,
- Home delivery services for the car-free retail developments.

12.2 Additionally, a city logistic concept that distributes goods with a 'Green Fleet' should be developed. 'City Bikes' for the area should also be considered.

12.3 The implementation of the strategy depends on the following issues that need to be integrated within the Design Guidance for the Public Realm and the Site Specific Design Guidance.

Design Guidance for the Public Realm

- Design a safe and convenient pedestrian environment;
- Offer safe routes to school within the development context;
- Create signage strategies for walking and cycling, especially facilitating convenient interchange;

- Provide cycle parking through out the development, especially at bus stops;
- Design the access streets within the core area as 'Cycle Streets';
- Provide 2 to 3 coach bays for tourists of the area;
- Create new access points to the rail line service at both ends of the platforms; improvement of the platform facilities / services;
- Improve tube access and the interchange with tram, rail, bus, taxi and bicycle;
- Create convenient bus and tram stops that provide information on interchange;
- Provide bus stands in the southern end of the development;
- Create a pick-up point (1 parking space) for the South East London Car Share Scheme with information on the scheme;
- Provide a Rickshaw waiting stand within the core area (as part of / close to the interchange, e.g. in front of the east entrance of the rail station);
- Provide taxi ranks close to the tube and rail stations;
- Provide disabled on-street parking;
- Provide on-street motorcycle parking;
- Provide on-street car club parking spaces;
- Review existnig Controlled Parking Zones to incorporate development changes; and
- Introduce an overall parking management strategy for the development and a central point/office of contact (e.g. integrated in the Mobility Centre).

Area Specific Design Guidance

- Full access for mobility impaired;
- High quality cycle parking for the required standard of
  - 1 to 1.5 spaces per residential unit;
  - 1 space per 120 to 100 sqm retail use; and,
  - 1 space per 80 to 60 sqm office use.
- Provide mobility packages for all new residents;
- High standard of disabled parking provision;
- Limited parking for residential units;
- No parking for retail and office uses;
- Safe and weather protected motorcycle parking close to High Streets;
- Separate markets for parking, i.e. no parking provision inclusive to residential units;
- Favour automatic parking systems (and ensure accessibility for disabled car parking); and
- Support car club operation, reserve at least 2 parking spaces at each site.

Achievable Modal Split and Trip Generation

12.4 With the implementation of the measures described in the public realm as well as developer's briefs (i.e. that require the stated measures from the developers of the single sites), people will have a greater choice of modes and more restrictions to car use. The likely modal shifts were estimated with a minimum and a maximum scenario to show the range likely to be achieved.

12.5 The modal shift assumptions are based on comparisons with other areas/cities that have implemented similar measures as proposed, actual research results, model calculations as well as conclusions by analogy about the transport mode choice in London.

12.6 Table 12.1 and 12.2 summarise the range of trips generated by the development and the modal split that can be achieved.

Table 12.2: Achievable Modal Split and Trip Generation – Minimum Scenario

	modal split			daily total			am peak			off peak			pm peak		
per land use	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**
total	**100%**	**100%**	**100%**	**11,416**	**389,334**	**2,515**	**2,213**	**6,685**	**261**	**949**	**36,857**	**369**	**1,238**	**38,876**	**223**
walking	22.7%	22.5%	22.3%	2,593	87,771	560	503	1,507	58	216	8,309	82	281	8,764	50
cycling	5.3%	3.7%	4.6%	602	14,318	115	117	246	12	50	1,355	17	65	1,430	10
motorcycle	0.7%	0.7%	1.0%	79	2,881	24	15	49	3	7	273	4	9	288	2
bus	33.1%	33.6%	33.6%	3,779	130,758	845	732	2,245	88	314	12,378	124	410	13,056	75
tram	6.3%	10.3%	10.0%	717	40,063	252	139	688	26	60	3,793	37	78	4,000	22
tube	18.2%	19.4%	19.4%	2,083	75,550	488	404	1,297	51	173	7,152	72	226	7,544	43
rail	4.6%	5.1%	4.9%	524	19,754	123	102	339	13	44	1,870	18	57	1,972	11
taxi	0.1%	0.9%	0.4%	15	3,645	10	3	63	1	1	345	1	2	364	1
car driver	4.8%	2.1%	2.1%	547	8,293	54	106	142	6	45	785	8	59	828	5
car passenger	4.2%	1.6%	1.8%	478	6,302	44	93	108	5	40	597	6	52	629	4

all land uses	**modal split**	**daily total**	**am peak**	**off peak**	**pm peak**
total	**100%**	**403,265**	**9,159**	**38,175**	**40,337**
walking	**22.5%**	90,923	2,068	8,607	9,095
cycling	**3.7%**	15,035	374	1,422	1,505
motorcycle	**0.7%**	2,985	67	283	298
bus	**33.6%**	135,381	3,065	12,816	13,541
tram	**10.2%**	41,031	853	3,889	4,100
tube	**19.4%**	78,121	1,752	7,397	7,813
rail	**5.1%**	20,401	453	1,932	2,040
taxi	**0.9%**	3,671	67	348	367
car driver	**2.2%**	8,894	254	838	892
car passenger	**1.7%**	6,824	205	643	685

Table 12.3: Achievable Modal Split and Trip Generation – Maximum Scenario

	modal split			daily total			am peak			off peak			pm peak		
per land use	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**	**Resi-dential**	**High Street Retail**	**Office**
total	**100%**	**100%**	**100%**	**11,416**	**389,334**	**2,515**	**2,213**	**6,685**	**261**	**949**	**36,857**	**369**	**1,238**	**38,876**	**223**
walking	24.5%	23.6%	23.2%	2,792	91,724	582	541	1,575	60	232	8,683	85	303	9,159	52
cycling	8.3%	5.8%	6.7%	948	22,671	169	184	389	18	79	2,146	25	103	2,264	15
motorcycle	0.9%	1.0%	1.4%	104	3,914	34	20	67	4	9	371	5	11	391	3
bus	27.3%	30.7%	30.7%	3,117	119,550	772	604	2,053	80	259	11,317	113	338	11,937	68
tram	9.8%	12.6%	12.4%	1,118	49,217	311	217	845	32	93	4,659	46	121	4,914	28
tube	16.0%	18.4%	18.4%	1,829	71,662	463	355	1,231	48	152	6,784	68	198	7,156	41
rail	6.1%	5.7%	5.5%	691	22,250	139	134	382	14	57	2,106	20	75	2,222	12
taxi	0.3%	1.3%	0.8%	31	5,207	20	6	89	2	3	493	3	3	520	2
car driver	3.0%	0.1%	0.0%	344	346	0	67	6	0	29	33	0	37	35	0
car passenger	3.9%	0.7%	0.9%	442	2,793	24	86	48	2	37	264	3	48	279	2

all land uses	**modal split**	**daily total**	**am peak**	**off peak**	**pm peak**
total	**100%**	**403,265**	**9,159**	**38,175**	**40,337**
walking	**23.6%**	95,098	2,177	9,001	9,513
cycling	**5.9%**	23,787	590	2,250	2,381
motorcycle	**1.0%**	4,053	91	384	405
bus	**30.6%**	123,440	2,737	11,690	12,344
tram	**12.6%**	50,646	1,094	4,798	5,063
tube	**18.3%**	73,954	1,633	7,004	7,395
rail	**5.7%**	23,081	531	2,184	2,309
taxi	**1.3%**	5,258	97	498	525
car driver	**0.2%**	690	73	61	72
car passenger	**0.8%**	3,259	136	305	329