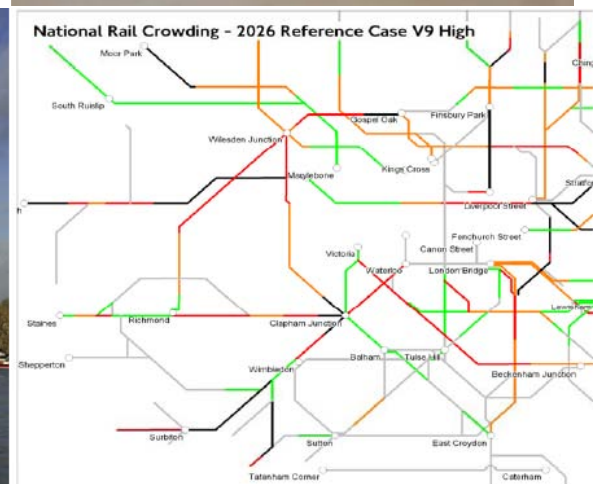


Central London Infrastructure Study Final Report



Prepared for:
Westminster City
Council and Central
London Forward

Prepared by:
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July 2009


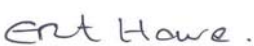
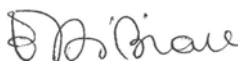


**Central London
Infrastructure Study**

July 2009
Final Report

Issue No 4
44935320

Project Title: Central London Infrastructure Study
Report Title: Central London Infrastructure Study
Project No: 44935320
Report Ref:
Status: Final Report
Client Contact Name: Eric Sorensen
Client Company Name: Westminster City Council and Central London Forward
Issued By: Esther Howe

Document Production / Approval Record

Issue No:	Name	Signature	Date	Position
1				
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Document Revision Record

Issue No	Date	Details of Revisions
1	09/01/09	Draft Report
2	06/03/09	Draft Report
3	15/06/09	Final Draft Report
4	24/07/09	Final Report

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ABBREVIATIONS

ADP	Approved Document Part
AL	Adult Learning
AMP	Asset Management Plan
AMS	Asset Management Strategy
BHPC	Barkantine Heat and Power Company
BS	British Standard
BSF	Building Schools for the Future
BT	British Telecommunications
CAZ	Central Activities Zone
CCAP	Centre for Clean Air Policy
CCHP	Combined Cooling Heat and Power
CCS	Congestion Charging Scheme
CIF	Capital Investment Fund
CIL	Community Infrastructure Levy
CLF	Central London Forward
CHP	Combined Heat and Power
CoL	City of London
CP	Control Period
CRT	Cross River Tram
DBERR	Department for Business, Enterprise and Regulatory Reform
DCLG	Department for Communities and Local Government
DCLG	Department for Communities and Local Government
DCSF	Department for Children, Schools and Families
DED	Decentralised Energy Delivery Unit
DEFRA	Department of Environment Food and Rural Affairs

DDA	Disabled Discrimination Act
DfT	Department for Transport
DIUS	Department of Innovation, Universities and Students
DLR	Docklands Light Railway
DMAG	Data Management and Analysis Group
DPCR	Distribution Price Control Review
EA	Environment Agency
EfW	Energy from Waste
ESCo	Energy Services Company
FE	Further Education
FTE	Full Time Equivalents
FT	Foundation Trust
GARDIT	General Aquifer Research Development and Investigation Team
GP	General Practice
GLA	Greater London Authority
HE	Higher Education
HEFCE	Higher Education Funding Council for England
HEPI	Higher Education Policy Institute
HESA	Higher Education Statistics Agency
HLDU	High Level Output Statement
HUDU	Healthy Urban Development Unit
IP	In Patient
ISU	Integrated Services Utilities
LATS	Landfill Allowance Trading Scheme
LB	London Borough
LBC	London Borough of Camden
LBI	London Borough of Islington

LBI	London Business Initiative
LCCA	London Climate Change Agency
LDA	London Development Agency
LIFT	Local Improvement Foundation Trust- 25 year partnership between the NHS and a private company or consortium to develop facilities
LDF	Local Development Framework
LPA	Local Planning Authority
LSBU	London South Bank University
LSC	Learning and Skills Council
LUL	London Underground Ltd
m	million
MBT	Mechanical Biological Treatment
MI/d	million litres per day
MPA	Metropolitan Police Authority
MPS	Metropolitan Police Service
MRF	Materials Recycling Facility
MSW	Municipal Solid Waste
MUSCo	Multiple Utilities Services Company
NFCDD	National Flood and Coastal Defence Database
NHM	Natural History Museum
NHS	National Health Service
NLWA	North London Waste Authority
NR	National Rail
ODPM	Office of Deputy Prime Minister
ONS	Office for National Statistics
PCT	Primary Care Trust
PFI	Private Finance Initiative

PPPs	Public Private Partnerships
PPS	Planning Policy Statement
PCSO	Police Community Support Officer
PV	Photovoltaic
ROCs	Renewables Obligations Certificates system
RUS	Route Utilisation Strategies
SELCHP	South East London Combined Heat and Power
SFRA	Strategic Flood Risk assessment
SHA	Strategic Health Authority
SOAS	School of Oriental and African Studies
SPG	Supplementary Planning Guidance
SRIF	Science Research Investment Funds
SSDP	Strategic Service Delivery Plan
SSSS	Sub-Regional Strategy Support Studies
SUDS	Sustainable Urban Drainage Systems
TER	Target Emissions Rate
TE2100	Thames Estuary 2100
TfL	Transport for London
UCL	University College London
UKCMRI	UK Centre for Medical Research and Innovation
URS	URS Corporation Ltd
VAM	Victoria & Albert Museum
WCML	West Coast Main Line

REPORT SUMMARY

INTRODUCTION

In September 2008 Westminster City Council and its partner authorities in Central London Forward (CLF) commissioned URS Corporation Ltd (URS) to carry out an assessment of their strategic infrastructure needs.

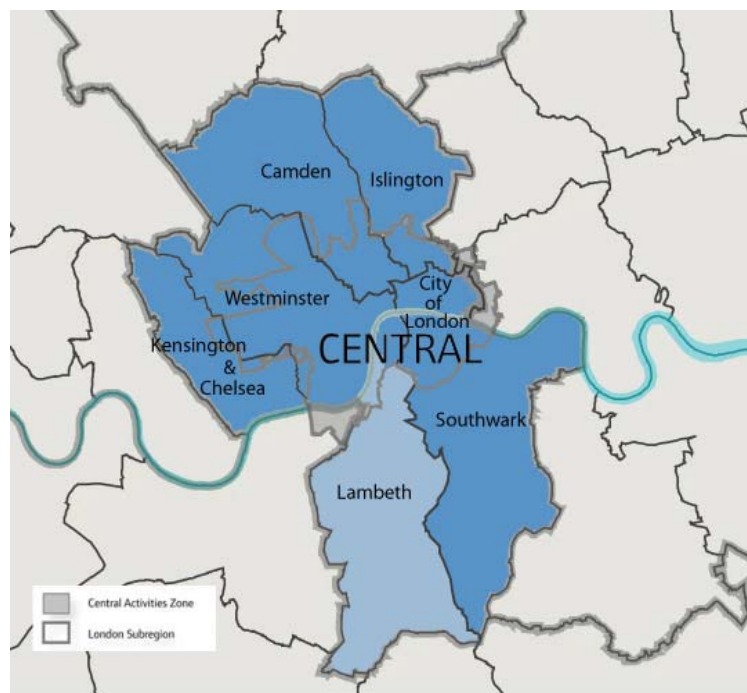
The overall study aims to provide a strategic (i.e. sub-regional) understanding of the implications of growth for the whole of Central London, with an indication of how growth, and therefore demand for infrastructure, is distributed across the study area.

The Central London Forward local authorities are:

- City of London
- City of Westminster
- London Borough of Camden
- London Borough of Islington
- London Borough of Southwark
- Royal Borough of Kensington and Chelsea.

The London Borough of Lambeth joined CLF in 2009, but as this was after the study was commissioned information on Lambeth is not included in the analysis.

Figure 1: Central London Forward Local Authorities



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Source: Central London Forward and URS Corporation

STRATEGIC INFRASTRUCTURE PLANNING REQUIREMENTS

The project brief identifies the study key tasks as being:

To assess the infrastructure needs of Central London for the next 15-20 years, to coincide with the time horizon of the LDF Core Strategy in a manner that enables boroughs to reflect these needs in their individual LDFs (which will cover the timeframe up to 2026).

This report covers:

- Basic utilities infrastructure including: water and sewerage; flood defences; power and telecommunications; waste management facilities
- Transport infrastructure - in particular proposals for mainline rail termini and major road congestion hotspots
- Social infrastructure including that which is provided on a London wide or sub regional level such: as adult learning and further education colleges; higher education; primary and secondary health care facilities; and emergency services.

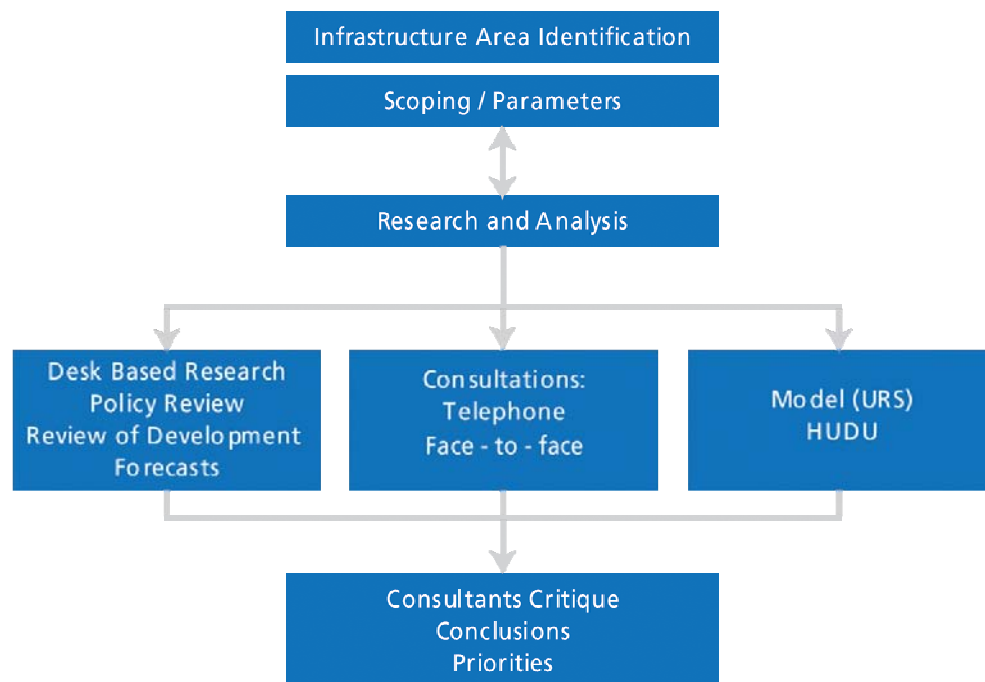
Planning Policy Statement (PPS) 12: 'Local Spatial Planning' requires planning authorities to place infrastructure planning at the heart of the planning process. It states that the Core Strategy should be supported by evidence of physical and social infrastructure requirements and advocates a strategic, collaborative and comprehensive approach to the forward planning of infrastructure.

In order to understand the future requirements for infrastructure provision it is essential to assess the extent of forecasted development growth in the context of current deficiencies. Our approach covers impact of both residential and commercial uses on the forecasted demand for relevant infrastructure items. Demand has taken account of both London Plan projections and individual authority forecasts. The focus of our work has been on assessing requirements of future development as planning guidance including Circular 5/05 and emerging guidance on CIL emphasises that new development should not be required to meet needs that already exist but rather needs that are arising as a consequence of development.

APPROACH

We have followed a common framework for the research so as to ensure consistent reporting between the infrastructure areas¹. A summary of the approach to this study is set out in Figure 2.

Figure 2: Central London Infrastructure Study, Methodology



Source: URS Corporation

DEMAND FRAMEWORK

We have looked at overall expected growth and relationship of the infrastructure assessment exercise to various factors affecting overall scale and distribution of demand for services.

The anticipated changes in population, commercial floorspace and dwellings are summarised in Table 1. These figures are the inputs driving the forecasts of demand for infrastructure items. The table also shows an indicative baseline for comparative purposes².

¹ See table at end of the executive summary for a list of all the components of this infrastructure.

² It should be noted that the baseline figures have no impact on the assessment of future infrastructure requirements and are presented only to offer an understanding of the likely scale of growth.

Details on how the growth trajectory was developed, including sources and approach, are presented in the Central London Infrastructure Study.

Table 1: Baseline and Projected Residential and Commercial Growth³

<i>Category</i>	<i>Authority</i>	<i>Existing</i>	<i>Growth to 2026</i>	<i>Growth as % of Existing</i>
Population (people)				
	City of London	8,000	4,227	53%
	Camden	231,900	35,175	15%
	Islington	178,600	40,943	23%
	Royal Borough of Kensington and Chelsea	187,800	16,438	9%
	Southwark	274,400	76,555	28%
	Westminster City Council	234,100	25,840	11%
<i>Sub-total</i>		<i>1,114,800</i>	<i>199,178</i>	<i>18%</i>
Dwellings (units)				
	City of London	5,720	1,800	31%
	Camden	96,641	14,979	15%
	Islington	88,537	24,581	28%
	Royal Borough of Kensington & Chelsea	85,458	7,000	8%
	Southwark	118,468	32,600	28%
	Westminster City Council	117,442	13,600	12%
<i>Sub-total</i>		<i>512,266</i>	<i>94,560</i>	<i>18%</i>
Business/Office Floorspace (Sqm)				
	City of London	4,895,000	1,018,223	13%
	Camden	2,179,000	614,820	28%
	Islington	1,323,000	390,796	30%
	Royal Borough of Kensington & Chelsea	601,000	118,103	20%
	Southwark	1,239,000	590,015	48%
	Westminster City Council	5,592,000	1,137,363	20%

³ Source: Population: Resident Population Estimates, ONS, 2006; Dwellings: Dwelling Stock by Tenure and Condition, ONS 2006; Business / Office Floorspace: Valuation Office Agency data, 2005, Net Internal Area, ONS, 2007; Retail Floorspace: Valuation Office Agency data, 2005, Net Internal Area, ONS, 2007. Baseline information for leisure floorspace is not available.

It should be noted that the growth trajectories are currently being further developed by the individual authorities as part of their LDF process. As such they are subject to change.

<i>Sub-total</i>		<i>15,829,000</i>	<i>3,869,320</i>	<i>24%</i>
<hr/>				
Retail Floorspace (Sqm)				
City of London		241,000	66,795	28%
Camden		641,000	27,009	4%
Islington		404,000	55,650	14%
Royal Borough of Kensington & Chelsea		609,000	115,065	19%
Southwark		438,000	84,400	19%
Westminster City Council		2,094,000	441,933	21%
<i>Sub-total</i>		<i>4,427,000</i>	<i>790,852</i>	<i>18%</i>
<hr/>				
Leisure Floorspace (Sqm)				
City of London			5,859	
Camden			91,229	
Islington			80,139	
Royal Borough of Kensington & Chelsea	Information not available		81,395	N/a
Southwark			94,577	
Westminster City Council			105,458	
<i>Sub-total</i>			<i>458,656</i>	

Source: URS Corporation

Growth is likely to be concentrated in certain parts of Central London. The London Plan (2008) refers to Opportunity Areas and Areas for Intensification where jobs, population and associated infrastructure demand are likely to be greatest. In Central London these include:

- Opportunity Areas: City Fringe (City of London and LB Hackney), Euston (LB Camden), King's Cross (LB Camden), Paddington (City of Westminster), Tottenham Court Road (City of Westminster and London Borough of Camden), Victoria (City of Westminster), Elephant and Castle and London Bridge (London Borough of Southwark)
- Areas for Intensification: Arsenal/Holloway (LB Islington), Farringdon/Smithfield (LB Islington and LB Camden), Holborn (LB Camden), West Hampstead Interchange (LB Camden).

Given the strategic nature of the study, the majority of infrastructure requirements identified are likely to relate to the entire sub-region or its authorities in their entirety.

The demand figures have been used as an input in to our analysis of infrastructure needs. There are a number of caveats to modelling demand for infrastructure according to projected growth in homes and jobs. Relevant points include:

- There is likely to be significant background growth in demand which is not captured in our analysis. For example within inner city administrative areas such as the Central London Forward authorities there is evidence of increasing intensity of occupation and use of existing development: household sizes appear to be increasing for the first time in years; vacant space is being brought back into use; and other space is being used more intensively than previously.
- There is a changing nature of demand and provision. London is becoming a 24 hour city and uses are intensifying in response to changing technology and lack of space. This requires new thinking about the relationship between development and the spatial and financial outcomes of the resulting demand for infrastructure.
- There is particular uncertainty over the modelling of future demand for energy and water. Forecasts need to take account of government policy which promotes more sustainable living and therefore a potential reduction in per capita usage. However, historically usage has increased year on year, and there is as yet no clear evidence that government policy will counter this.

Overall our work on modelling demand for infrastructure by reference to projected growth in homes and jobs has faced serious challenges both on gathering forward planning data from physical and social infrastructure providers, and with respect to the ways in which buildings and energy are used. This means that careful attention will need to be given to the quality of infrastructure requirement evidence to justify and support the Community Infrastructure Levy.

EXISTING INFORMATION, STRATEGY AND PLANNED DEVELOPMENT

Through our research and stakeholder consultation we sought to establish the degree to which providers themselves had forecast demand associated with new growth, and planned for it. This exercise proved difficult because of gaps in provider strategy and information. Reasons for issues include:

- Strategic planning requirements and priorities for service providers do not match with DPD frameworks, at either the individual the LDF Core Strategy level or London Plan level. DPDs consider growth and infrastructure requirements typically over a 15-20 year planning period up to 2026. For many infrastructure providers long term strategic planning timeframes are not necessary for a variety of reasons, particularly because funding cycles (a main driver) operate on short term time horizons.
- There is little incentive for some service providers to engage in the DPD plan making process. For example electricity, gas and water utilities providers tend to plan local or sub regional infrastructure on a reactive basis that subsequently can be charged to third parties. These organisations do carry out more strategic planning work⁴.

⁴ Extensive models for the areas that each provider is responsible for are likely to have been developed and to be continuously updated by providers as part of the regulatory process presided over by OFGEM, OFWAT and OFCOM. This information however is not transferred into the providers' strategic five years or 25 years plans at such a level of detail (regional, sub-regional and local level) to allow a clear understanding of the local challenges and opportunities.

- The regulatory environment encouraging competition may discourage/prevent co-ordinated strategic planning.
- Some providers are still developing their strategic plans and proposed investment. For example the London Strategic Health Authority is engaged in a major exercise to reconfigure health services between primary and secondary care. This will have a significant impact on the form of further investment.

Social infrastructure plans are developed by the public sector, for example the Primary Care Trust or Local Education Authority and these plans are published and available for review. Local Education Authorities (LEAs) are set to take over responsibility for education planning for 16 to 19 year olds from the Learning and Skills Council (LSC) starting from the 1st April 2010⁵. There has been little evidence that the LSC has in place a strategic plan or investment framework for future provision of education up to 2026. We assume that the LEAs will adopt a similar approach to FE planning to the work they do for early years, primary and secondary education. This should improve the situation⁶. Further details on the adequacy of strategic plans are given in Table 6 at the end of this summary section.

URS ASSESSMENT OF DEMAND AND REQUIREMENT

Following a review of existing information on current and planned provision of the different types of infrastructure for the Central London authorities⁷, we modelled the requirements for various infrastructures up to 2026 to provide an independent assessment of the likely demand associated with planned growth in the Central London Forward authorities. The scope of the exercise was necessarily broad brush and strategic and the outcomes provide an estimate of the scale of likely future requirements and were tested with providers where they were willing to engage. In this section we summarise our results.

However it was not meaningful or feasible to quantify demand for all infrastructures (including flood risk, waste management, transport, higher education and emergency services) and for those we offer a brief summary of the results of our research and consultations.

Utilities

Table 2 shows the estimates consumption of energy, water and sewage flows derived from the URS infrastructure model. In our model we have taken a pragmatic, worst case scenario which utilises strategic / design standards used currently by utilities companies. This analysis includes use of an in-house study to determine the possible energy consumption reductions due to the implementation of energy efficiency measures for both electricity and gas.

The forecast energy demand for residential and commercial uses in the Central London Forward authorities are provided in kVA (electrical peak demand) and m3/hour (gas demand). Based on our estimate of current electricity (531,267 kVA) and gas (83,951 m3/hour) peak

⁵ The 14-19 Reform, see <http://www.dcsf.gov.uk/14-19/>.

⁶ LEAs are currently responsible for early years, primary and secondary education planning, albeit the timeline of the exercise does not necessarily match the LDF 20 years time horizon.

⁷ Please see the Central London Infrastructure Study for full details.

demand⁸, and water (59 MLitres/ day) and sewage (89 MLitres/ day) requirements in Central London, the projected population growth can be expected to result in a growth in demand by approximately 20%⁹.

In order to interpret the impact of energy efficiency on the estimated additional energy demands arising from growth, in Table 2 we convert the figures to MWh to determine annual energy consumption¹⁰. We calculate the annual energy consumption based on a worst-case scenario, where no energy efficiency measure is implemented (Annual Energy Consumption Worst Case Scenario column), and a best case scenario, where a number of energy efficiency measures are implemented (Annual Energy Consumption Best Case Scenario column).

Table 2: Projected Demand for Electricity, Gas, Water and Sewerage Treatment from New Development to 2026¹¹

	<i>Electricity projection</i>		<i>Gas projection</i>		<i>Water</i>	<i>Sewage</i>
	<i>Annual Energy Consumption (MWh)</i>		<i>Annual Energy Consumption (MWh)</i>		<i>Demand</i>	<i>Demand</i>
	<i>Worst Case Scenario (MWh)</i>	<i>Best Case Scenario (MWh)</i>	<i>Worst Case Scenario (MWh)</i>	<i>Best Case Scenario (MWh)</i>	<i>(MLitres/ day)</i>	<i>(MLitres/ day)</i>
City of London	337,448	269,958	98,639	78,911	6.8	11.2
Camden	307,830	246,264	491,131	392,905	9.4	14
Islington	300,141	240,113	730,083	584,067	9.7	14.1
Royal Borough of Kensington & Chelsea	153,357	122,686	254,147	203,318	4.2	6.3
Southwark	418,560	334,848	1,014,387	811,510	15.8	22.6
Westminster City Council	632,546	506,037	496,957	397,566	13.2	21.2
Central London Total	2,149,882	1,719,905	3,085,345	2,468,276	59	89.4

Source: URS Corporation calculations

⁸ The strategic design figures consider the load that could hit the system at any one time as a peak.

⁹ Baseline figures for leisure uses are not available. The baseline utilities rates are an underestimate, resulting in an over-estimate of the percentage growth additional to the baseline.

¹⁰ It is assumed that commercial uses operate 12hrs/day and 9hrs/day during Bank Holidays, i.e. 4,350hrs/year so as to provide a conservative estimate. It is assumed that the residential uses operate 9hrs/day for the entire year, i.e. 3,285hrs/year.

¹¹ Baseline figures for leisure uses are not available. As such the baseline utilities rates are an underestimate, resulting in an over-estimate of the percentage growth additional to the baseline.

In order to provide an indication of the scale of estimated additional demand, we have estimated the quantum of utilities infrastructure that could be required as a result of the projected population growth. This does not incorporate detailed considerations of existing spare capacity as no detail on existing infrastructure has been so far made available by utility providers¹².

- For electricity, the estimated demand is equivalent to approximately 20 primary substations, four to five grid sites (converting electricity from 132kV to 33kV), 531 one-MVA substations (i.e. secondary substation catering for residential demand) and between 350 and 400 two or three-MVA substations (i.e. secondary substations catering for commercial demand particularly where this is highly concentrated)¹³.
- For gas, the strategic gas network is assumed to be functional and without need of uprating for the most part, with the exception of local reinforcement works that may be applicable. If no capacity were available in the existing network, the requirement would be for between eight and 10 pressure reducing stations (transforming the gas from medium pressure to low pressure).
- For water, new water mains and pumping stations (or at least upgraded pumping stations) will be required to meet the additional expected demand, which is equivalent to two local underground reservoirs each the size of a football pitch. Thames Water are however already planning for an additional reservoir and de-salination plant, so it assumed that additional resources will be adequate to support the projected growth.
- For sewage the additional estimated flows are equivalent to 34 new or renovated sewage treatment works (SWT) as well as new and renovated sewers.

With regards to costs, physical requirements are only indicative of the scale of the infrastructure needed to support the projected growth in demand. As such, we only provide indicative costing (2009 prices) associated with such requirements to suggest the scale of investment that may be required:

- For electricity a total of £40 million for the 20 primary substations, between £30 million and £37.5 million for the four to five grid sites, £48 million for 531 one-MVA substations and between £21 million and £24 million for the 350 and 400 two or three-MVA substations.
- For gas, in the region of £200K and £250K each for between eight and 10 pressure reducing stations.
- For water, in the region of £40 million in total for two local underground reservoirs.
- For sewage, £711 million for the 34 SWT and £888 million for new and renovated sewers.

¹² These figures effectively present a greenfield scenario which however takes into account the Central London location of the authorities and any information on planned works that was made available by utility companies.

¹³ While primary sub-stations are of considerable size, secondary substations within Greater London would generally be approximately five by five metres. As such new secondary sub-stations would generally be accommodated within basements of developments.

There may be other significant costs for example associated with upgrading existing infrastructure and providing new capacity / pipes¹⁴.

Other Hard Infrastructure

With regards to flood risk, our research demonstrates that Thames Water and the EA are making long term plans to mitigate flood risk through the Thames Tunnel and TE2100 schemes¹⁵. However there is insufficient data available on these planned investments to enable a detailed assessment of these strategies to manage increased flood risk, or to identify costs specifically associated with Central London. While maintaining hard flood defences is vital, it will be important for the local authorities to work together with the Environment Agency to implement a unified set of flood management standards, as well as with Thames Water and other agencies involved in the planning and funding of these schemes.

In respect of waste management in the Central London local authorities, waste is primarily transferred, treated and disposed of outside the local authority in which it is generated. Increases in population growth and consumption will lead to an increase in the volume of waste generated, so the challenge is to manage the disposal of an increasing volume of waste being generated, whilst having to divert waste from landfill and reuse/recycle a high proportion of the waste streams using the limited number of waste facilities in the Greater London area. While the available information does not allow a thorough assessment of future likely needs, it is evident that the rising cost of landfill has potentially significant implications for the Central London authorities, highlighting the urgent need to comprehensively plan for sustainable waste management.

Social Infrastructure

Table 3 lays out the estimates of quantum of demand for social infrastructures derived from the URS modelling exercise. The HUDU model was used for primary and secondary healthcare. While the HUDU model is a useful tool, it does not take the baseline position (i.e. existing capacity) into account. In addition, the model does not reflect evolving models of healthcare provision, for example the drive to better integrate health and care services and to shift care wherever possible out into the community, and the associated move towards polyclinics¹⁶. Our estimates of infrastructure demand were compared with those of the

¹⁴ URS has been commissioned by the City of London to look at the potential to develop a tunnel network for utilities and CHP.

¹⁵ Thames Estuary 2100 (TE2100) is an Environment Agency project to develop a tidal flood risk management plan for the Thames estuary through to the end of the century. The plan will evaluate the region flood risk including the effects of climate change, rising sea levels and the aging of existing flood defences. The EA's website states that TE 2100 is due to be submitted to the Government in March 2010.

The Thames Tideway project comprises two new tunnels to substantially reduce the amount of untreated sewage discharged to the River Thames and its tributary the River Lee after heavy rainfall via 57 Combined Sewage Outfalls (CSOs). The Thames Tunnel is a larger project which will comprise a 32 km long tunnel under the Thames from the west of the city to Beckton treatment works although the precise route is yet to be determined. Construction is provisionally scheduled to start in 2012 and finish in 2020. At this stage Thames Water expect to submit a planning application in late 2011.

¹⁶ London's Health Services: A Framework for Action, Professor Darzi, 2007

infrastructure providers where available. For acute healthcare, in the past the growth in demand has been met by efficiency improvements and it is possible this will continue in the future and consequently the infrastructure presented in Table 2 may not all be required.

Table 3: Projected Additional Requirements for Strategic Social Infrastructure¹⁷

Authority	FE & AL (Learners)	Primary Care (No. of GPs)	Acute and Mental Care (Beds)	Intermediate Care (Beds and Spaces)
City of London	376	3	18	1
Camden	3,131	18	90	18
Islington	3,488	25	134	25
Kensington & Chelsea	1,463	10	45	7
Southwark	6,825	33	154	28
Westminster	2,243	15	72	15
Central London Total	17,517	104	513	94
% Growth Additional to Existing	21%	N/a	N/a	N/a

Source: URS Corporation calculations and HUDU

Table 4 shows the projected approximate capital cost of strategic social infrastructure required to support new development in Central London authorities up to 2026.

Table 4: Total Capital Cost for Strategic Social Infrastructure (2009 prices)

Authority	FE & AL (£millions)	GP and Primary Care (£millions)	Acute and Mental Care (Beds) (£millions)	Intermediate Care (Beds and Spaces) (£millions)
City of London	9.4	1.2	2.7	0.3
Camden	78.3	15.8	26.7	12.8
Islington	87.2	22.6	41.6	17.9
Kensington & Chelsea	36.6	6.3	9.4	3.5
Southwark	170.4	34.5	55.0	22.3
Westminster	56.1	13.9	22.8	10.6
Central London Total	437.9	94.3	158.2	67.4

Source: URS Corporation calculations and HUDU

¹⁷ It should be noted that the growth trajectories are currently being further developed by the individual planning authorities as part of their LDF process. As such figures presented in this and the following tables are subject to change.

Transport

Our analysis shows that committed schemes in central London, and on rail routes into the centre, should at least hold conditions on the rail network stable and, at the same time, providing much needed modernisation. The funding of this programme is subject to several factors, including central Government grants, private sector contributions and primary legislation on supplementary business rates, and its delivery is contingent upon target levels of funding being achieved. Furthermore, several threats remain and the ability of underground, rail and road systems to handle passenger increases facilitated by line upgrades will depend upon matching increases in capacity and congestion improvement schemes.

INFRASTRUCTURE PRIORITIES¹⁸

Due to the lack of detailed data available, the comments on infrastructure priorities made here constitute general principles rather than a quantitative analysis. Nonetheless some key conclusions can be drawn relating to the magnitude of demand, the scale of investment required and the implications for the activities of Central London authorities and other agencies.

Transport

Transport is fundamental not only to the sustainable delivery of new homes and jobs in Central London, but to improve accessibility of residents to existing and emerging employment opportunities, including residents in deprived communities. The assessment highlighted that Central London has an infrastructure investment programme to 2018, including Thameslink, the East London Line Extension and Crossrail, which adds significant additional public transport capacity. However several residual problems remain and post-2018 further capacity increases will be required and at present, no firm proposals exist to address these. Initiatives which encourage higher levels of walking and cycling in Central London, including public realm improvements, are cost effective and relatively simple measures which have the potential to divert pressure away from public transport while generating wider social benefits.

Energy and Other Utilities

There was a general lack of detailed information on utilities but the assessment identified potential future supply deficits relating to electricity and potable water. These infrastructures can perhaps more than any others be described as essential to developments and therefore to the delivery of growth in Central London, and their cost and scale can be substantial. Utilities companies largely operate in a reactive way when schemes come forward, and potential cost and efficiency benefits could be derived from a more strategic approach. This could include the approach to funding; at the moment developers negotiate directly with utilities providers and are generally expected to fund connection to the existing networks and

¹⁸ These are the priorities as recommended by the consultant team; they do not necessarily reflect the assessment of CLF and the individual Central London authorities.

potentially upgrades to the local network which may require substantial upfront costs¹⁹. Movement towards CIL and the introduction of forward-funding mechanisms such as the Regional Infrastructure Funds being introduced by a number of Regional Development Agencies could play a role here.

Sustainable Energy

Particular opportunities exist for developing the sustainable energy agenda within the DPD Processes. The Mayor is committed to cutting carbon emissions in London by 60% by 2025 and is delivering unprecedented levels of funding towards climate change programmes. This is a very ambitious target. Successful implementation of programmes such as the following will help achieve this ambition:

- Develop the electric vehicle market by delivering 25,000 charging points by 2015, and encouraging early adoption by GLA group and others
- Retrofit 60% of London's homes to the required energy efficiency standards, which could save one million tonnes of CO₂ per year by 2015, and the roll out of a similar programme for public buildings
- Deliver 25% of London's energy requirements through decentralised energy production by 2025
- Turn waste into a resource through recycling or energy generation for London.

A strategy for carbon reduction could benefit from more attention being given to the cost-effectiveness of solutions, for example making use of the carbon abatement curve and costs per tonne of carbon saved. This approach involves ranking solutions based upon their cost effectiveness, together with other factors such as practicality/deliverability.

These programmes are challenging but achievable provided certain conditions are fulfilled. An essential element to the delivery of the Mayor's aspirations is the availability of sufficient levels of funding on the part of the Government and through PFIs and PPPs. A key requirement to ensure that the CHP programme is delivered is also the creation of statutory frameworks that incentivise the uptake and delivery of these programmes including resolving issues around competition and the role of OFGEM. Existing technical issues around connecting district heating systems to the grid will also need solutions. In the case of the implementation of decentralised energy schemes, energy demand forecasting for Central London should be undertaken to establish optimum phasing for areas identified for

¹⁹ Networks upgrades or expansions are generally funded by a mixture of developers' and utilities monies. Developers' contributions to any utility work would depend on both the scale of the proposed development, and the resulting additional load to the network, and the capacity situation of the local network. Utility companies like EDF however generally try to recover as much of the costs as possible.

Taking the electricity network as an example, if the proposed development is expected to result in substantial additional demand, and the local network is working at full or near to full capacity, then EDF would negotiate with the developer to charge them some secondary network works. If more than one development would benefit from such works, then the costs would generally be apportioned. There are however limitations to the costs that developers would be charged; for a large residential development the developer would never be charged for works to the network at above the 11 kV level (the lowest voltage network), whereas for commercial developments even with significant load the developer would not be required to fund any work to the primary network.

intensification or considered to be opportunity areas. Specific timeframes for delivery should be presented and adhered to. A monitoring role could be through the LDA's Decentralised Energy Delivery (DED) Unit.

Other Physical Infrastructure

A short term requirement for upgrades to flood defences in three of the six Central London authorities was identified, as well investment in sewage treatment works and reduced sewer flooding. Other agencies are taking the longer term agenda for provision of adequate flood and drainage infrastructure forward; the scale and costs of these schemes is significant, reflecting the magnitude of potential impacts should adequate mitigation not take place.

The requirements around waste management emphasise the need for a strategic approach to infrastructure provision. To a greater degree than some other infrastructures it is the Central London authorities who will directly experience the disbenefits of failing to devise and implement a successful forward strategy, due to increasing landfill charges.

Social Infrastructure

While in general the scale of required investment is smaller for strategic social infrastructure than other infrastructure items, a potential deficit was identified in relation to FE and adult learning. FE and skills training is an important mechanism to ensure local people benefit from planned growth and for this reason should be considered a high priority.

There was a lack of data relating to the social infrastructure areas. However it is clear that for a number of infrastructures, including primary healthcare, HE and police, there are considerable backlog costs associated with getting the existing estates and services up to a suitable standard; costs for expansion and improvement of services are further to these existing investment requirements.

Table 5: Central London Authorities and Infrastructure Requirements

<i>Location</i>	<i>Infrastructure priorities: proposed schemes and recommended actions</i>
Central London	<p>Ensure delivery of Thames Tideway overflow scheme</p> <p>Implementation of SUDS</p> <p>Ensure delivery of sufficient alternative waste management arrangements to limit quantum of waste sent to landfill</p> <p>New and refurbished sewerage treatment works including odour reduction</p> <p>New and renovated sewers including investment required to reduce sewer flooding.</p> <p>New and refurbished pumping stations</p> <p>Network rail train service upgrades, including: Thameslink 2000, CTRL Domestic Services, Integrated Kent Franchise, Brighton and Sussex, South West, West Anglia, Thameside, Great Eastern and East Coast Main Line</p> <p>Major Station upgrade /redevelopments</p> <p>Transport for London service upgrades, including: Cross Rail, East London Line, road congestion schemes, LU stations congestion relief programme, increased capacity at LU lines, interchange improvements at several stations , public realm improvements at locations identified in Central London Pedestrian Study.</p>

<i>Location</i>	<i>Infrastructure priorities: proposed schemes and recommended actions</i>
	<p>Monitor and where possible help facilitate water leakage reduction techniques including replacement of Victorian mains</p> <p>Redevelopment/ reconfiguration/ renewal of estate/ Expansion of capacity at FE and AL facilities</p> <p>Expansion of secondary healthcare capacity</p> <p>Repair or replacement to provide additional primary healthcare capacity</p> <p>Redevelopment / reconfiguration / renewal of fire and police estate</p>
City of Westminster	<p>Shoring up flood defences</p> <p>Major station upgrade /redevelopments at Victoria Rail Station</p> <p>Station Congestion Scheme at Victoria, Bond Street and Paddington</p> <p>Opportunity to introduce CHP schemes at Paddington, Victoria, Tottenham Court Road, Queen's Park, Marylebone, Soho and Imperial College (further analysis required)</p> <p>City of Westminster College redevelopment, St Charles College FE College</p> <p>University of Westminster Redevelopment / reconfiguration / renewal of estate</p>
City of London	<p>Station Congestion Scheme at Bank</p> <p>Opportunity to introduce CHP scheme (further analysis in progress).</p> <p>City University Expansion</p>
Camden	<p>Major Station upgrade /redevelopments at King's Cross and Euston Rail Stations</p> <p>Station Congestion Scheme at Tottenham Court Road, King's Cross and Camden Town</p> <p>Opportunity to introduce CHP schemes at Euston, Bloomsbury and Gower Street (further analysis required)</p> <p>UCL Redevelopment / reconfiguration / renewal of estate and expansion of student accommodation capacity</p>
Islington	<p>Major Station upgrade /redevelopments at King's Cross²⁰</p> <p>East London Line extension to Highbury and Islington</p>
Kensington and Chelsea	<p>Shoring up flood defences that are regarded by the Environment Agency to be 'fair' through the SFRA.</p>
Southwark	<p>Ensure delivery of new Mechanical Biological Treatment (MBT) to help deal with management of waste.</p> <p>Major Station upgrade /redevelopment at Waterloo Rail Station²¹</p> <p>Major Station upgrade /redevelopment at London Bridge Rail Station</p> <p>New Thameslink station at Blackfriars²²</p>

²⁰ The station is in Camden but is included here for its proximity to Islington.

²¹ The station is in Lambeth but is included here for its proximity to Southwark.

<i>Location</i>	<i>Infrastructure priorities: proposed schemes and recommended actions</i>
	Transport for London service upgrades, including the East London Line
	Opportunity to introduce CHP schemes at Elephant and Castle (further analysis required)

Source: URS

NEXT STEPS AND RECOMMENDATIONS

Recommendations on Infrastructure Planning and Engagement

The findings of this study can be taken forward as part of the LDFs of the Central London authorities. In order to develop more detailed infrastructure strategies at a local authority level and potentially take these forward to help develop methodologies for the CLG, further work will be needed to bottom out the issues identified and quantify future requirements. This would include covering local infrastructures not included within the scope of this study.

A key finding is that there is a lack of information and strategies in a format that readily lends itself to translation into strategic infrastructure studies. This presents a risk to the delivery of sustainable growth and makes the formulation of robust LDFs which reflect future infrastructure requirements challenging. Our understanding of the position taken by Central Government is that reasonable efforts should be made to collect and interpret information and then pragmatic decisions made based on what is available. Given the significant resources that have gone in to this study we suggest that reasonable effort has already been put in to the work. The issues this raises are worth exploring further and we recommend presenting this report to CLG (and potentially other sponsor departments) and holding discussions with these organisations in order to raise awareness of the issues and clarify acceptable approaches.

We suggest it could be useful to carry out a separate study looking at setting up mechanisms to improve strategic infrastructure planning and assessment. Such mechanisms might include new national units to take on this task, or new requirements through the regulatory frameworks. The study would involve discussions with regulators, providers, CLG and other stakeholders so that the current planning processes and their complexities (relationship with competition rules, for examples) can be properly understood and addressed.

Relevant providers should be lobbied to enter in to the strategic planning process and engage with the local authorities. This point is especially applicable to the utilities providers, as these infrastructure items are of critical importance to the delivery of sustainable growth but their regulatory systems do not clear incentives to engagement and joined up planning.

Recommendations on Regional and Sub-regional Funding and Investment Framework

It may be helpful for the LDA to set up a Regional Infrastructure Fund (RIF) to help forward fund key strategic infrastructure. SWRDA is leading the way in this field with its £80 million

²² As suggested by London Borough of Southwark, personal communication, 19/06/2009.

RIF programme and other RDAs such as SEEDA. EEDA are also putting a programme in place.

The RIF is an innovative method of removing barriers to development and to ensure the timely provision of the infrastructure needed to support growth. It works by forward-funding developer contributions, using the planning obligations framework to recoup its investments. It improves the funding and delivery of strategic infrastructure by delivering regional growth aspirations, providing forward funding and coordinating funding streams to deliver regional priorities.

The RIF is of interest to this study as the co-ordination of the strategic infrastructure considered is more often than not beyond the remit of individual local delivery vehicles or the capability of local authority joint working. The RIF provides co-ordination and/or interim funding for strategic infrastructure investment that can be recouped from developer contributions, user charges and appropriate public funding streams as they become available. While SWRDA's RIF is focused on opening up new and brownfield development the framework is also relevant to the London context where RIF funding for example could be used to forward fund public transport improvements affecting a number of developments.

A London RIF could compliment local authority wide S106 and CIL levies and help fund strategic infrastructure where a known future deficit is anticipated. This might include, for example, helping increase the capacity in the energy network in advance of new development taking place, and forward funding flood defence measures and sewer improvements.

Another alternative funding mechanism currently receiving attention is Tax Incremental Financing (TIF). This is an approach in which bonds are issued to raise finance upfront against the guarantee of new local authority revenues associated with development. It is usually used in the United States and the implications for applying this in England are being reviewed²³.

²³ See 'Tax Incremental Financing: A New Tool for Funding Renewal in the UK', BPF, November 2008.

Table 6: Adequacy of Existing Strategic Planning for Infrastructure for LDF Purposes

<i>Infrastructure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Electricity	EDF	<ul style="list-style-type: none"> No strategic plan for electricity infrastructure is publicly available. No Central London specific plan exists or has been made publicly available. 	URS' model of forecast demand represents most robust available Central London evidence base for future requirements.
Gas	National Grid	<ul style="list-style-type: none"> No strategic plan for gas infrastructure is publicly available. No Central London specific plan exists or has been made publicly available. 	Discussions with National Grid suggest that upgrading of the network will support the projected growth in Central London.
Water	Thames Water	<ul style="list-style-type: none"> 'Draft Water Resources Management Plan, 2010-2035' (2008) Extends over 25 years. Covers the entire Thames Water region area. No Central London specific plan exists or has been made publicly available. 	<p>The plan extends beyond the London Plan and LDF planning periods.</p> <p>However the plan does not provide detailed information on baseline or future demand or supply at the CLF level.</p> <p>The information available and the proposed schemes to increase water supply in the Thames Water region area suggests there will be sufficient capacity to support the projected growth in Central London.</p>
Sewerage	Thames Water	<ul style="list-style-type: none"> 'Five Year Plan from 2010 to 2015' (2008) Extends over 5 years. Covers the entire Thames Water region area. 'Taking Care of Water: The next 25 Years, 2010/2035' (2008) Extends over 25 years. Covers the entire Thames Water region area. No Central London specific plan exists or has been made publicly available. 	<p>The plan extends beyond the London Plan or LDF planning periods.</p> <p>However the plan does not provide detailed information on baseline or future demand or supply at the CLF level.</p> <p>Therefore the document is not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p> <p>The information available from the document suggests that detailed local authority level studies may be necessary to understand the specific requirements of each authority.</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Flood risk	Thames Water	<ul style="list-style-type: none"> Strategic Flood Risk Assessments for each of the Central London authorities where available They cover the local authority area, with the exception of the North London Strategic Flood Risk assessment, covering Camden, Hackney and Islington. 'Five Year Plan from 2010 to 2015' (Thames Water, 2008) Extends over 5 years. Covers the entire Thames Water region area. 'Taking Care of Water: The next 25 Years, 2010/2035' (Thames Water, 2008) Extends over 25 years. Covers the entire Thames Water region area. 	<p>Thames Water plans extend over five and 25 years respectively. The Environmental Agency (EA) is also preparing a tidal flood risk management plan for the Thames estuary though to the end of the century.</p> <p>Whilst the EA plan is still being finalised, neither of Thames Water plans provides detailed baseline or future sewer flooding issues at the Central London level.</p> <p>The available documents are only partially adequate to assess the implication of projected growth up to 2026 on Central London's flood risk.</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Waste management	Waste Planning Authorities	<ul style="list-style-type: none"> • City of London Municipal Waste Strategy 2008-2020; • Central London Forward, Infrastructure in Central London, Strategic Scoping Report: Capacity and Future Planning; • Greater London Authority; Mayor's Municipal Waste Management Strategy; • London Borough of Southwark Waste Management Strategy 2003-2021; • City of Westminster Municipal Waste Management Strategy Implementation Programme 2004-2016; • Royal Borough of Kensington and Chelsea Municipal Waste Management Strategy and Action Plan 2004-2009; • North London Waste Plan Issues and Options Technical Report, North London Joint Waste Development Plan Document; • London Waste Apportionment Study – Update and further sensitivity testing PN21, dated April 2007, Jacobs UK Limited; • 'Westminster Municipal Waste Management Strategy Implementation Programme 2004-2012' (2004) 	<p>The programmes and plans do not extend over the LDF timeframes.</p> <p>They do not provide detailed information on the basis for the estimated reduction in MSW generated in waste planning authority areas, nor on the potential capacity and allocated funding of planned new facilities.</p> <p>The documents are only partially adequate to assess the implication of projected growth up to 2026 in Central London.</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Transport	Transport for London (TfL) LPAs	<ul style="list-style-type: none"> • 'TfL Business Plan 2009/10 – 2017/18' <p>Extends over 10 years.</p> <p>Covers the Greater London area.</p> <ul style="list-style-type: none"> • 'TfL Transport 2025: Transport Vision for a Growing World City' (2006) <p>Generally over 20 years.</p> <p>Covers the Greater London area.</p> <ul style="list-style-type: none"> • 'WCC Local Implementation Plan' <p>Extends over four years.</p> <p>Covers the Greater London area.</p>	The suite of strategic documents prepared both at the Greater London level is generally adequate to assess the implication of additional demand for transport infrastructure arising from projected growth up to 2026.
Further Education and Adult Learning	Learning and Skills Council	<ul style="list-style-type: none"> • 'LSC London Strategic Analysis' (2007) <p>LSC Capital Applications Approved 2007-2009 (2008)</p> <p>Both documents extend over one year.</p> <p>Covers the Greater London area.</p> <ul style="list-style-type: none"> • The London 'Government Investment Strategy 2009-2010' (2008) <ul style="list-style-type: none"> • 'LSC Statement of Priorities 2009-2010' <p>Both documents extend over one year.</p> <p>Cover the entire England area.</p>	<p>No detailed information is available at the individual central authorities level on current or planned demand and supply for FE and AL facilities.</p> <p>The available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p> <p>URS' model of forecast demand represents most robust available Central London evidence base for future requirements.</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Higher Education	Higher Education Funding Council for England (HEFCE)	<ul style="list-style-type: none"> • 'Higher Education Policy Institute Demand for Higher Education to 2029' (2008) Extends over twenty years. Covers the entire England area. • 'Higher Education Funding Council for England Strategic Plan 2006-2011' (2008) Extends over five years. Covers the entire England area. 	<p>No detailed information is available at the individual Central Authorities level on current or planned demand and supply for HE facilities. Also, the individual universities' estates strategies do not adequately quantify the extent of future needs and the likely financial requirements.</p> <p>The available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p> <p>URS' model of forecast demand represents most robust available Central London evidence base for future requirements</p>
Primary healthcare	PCTs	<ul style="list-style-type: none"> • City and Hackney Teaching PCT Commissioning Strategy 2005-2008 and Resource Strategy 2005-2008 (City and Hackney Teaching PCT, 2005) • Camden PCT Service and Estates Strategy (Camden PCT, 2007) • Islington PCT Commissioning Strategy Plan 2007/08-2011/12 (Islington PCT, 2007) • Kensington & Chelsea PCT 10 Year Primary Health Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007) • Southwark Primary Care Trust Asset Management Strategy 2005 (Southwark PCT, 2007) • 'Westminster PCT Strategic Service Development Plan 2008-2013' (2008) <p>All documents extend over five years.</p> <p>All documents cover the specific local authority area.</p>	<p>None of the plans go beyond 2013.</p> <p>All plans are focused on strategy and issues in current provision rather than planning for needs arising from new growth.</p> <p>The available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p> <p>URS' model of forecast demand represents most robust available Central London evidence base for future requirements</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Secondary healthcare	London Strategic Health Authority PCTs	<ul style="list-style-type: none"> • 'NHS London Strategic Plan' (2008) Extends over five years. Covers the Greater London area. • City and Hackney Teaching PCT Commissioning Strategy 2005-2008 and Resource Strategy 2005-2008 (City and Hackney Teaching PCT, 2005) • Camden PCT Service and Estates Strategy (Camden PCT, 2007) • Islington PCT Commissioning Strategy Plan 2007/08-2011/12 (Islington PCT, 2007) • Kensington & Chelsea PCT 10 Year Primary Health Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007) • Southwark Primary Care Trust Asset Management Strategy 2005 (Southwark PCT, 2007) • 'Westminster PCT Strategic Service Development Plan 2008-2013' (2008) <p>All documents extend over five years.</p> <p>All documents cover the specific local authority area.</p>	<p>None of the plans go beyond 2013.</p> <p>None of the plans provide detailed baseline of projected demand or supply information.</p> <p>None of the plans is focused on planning for needs arising from new growth.</p> <p>The available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p> <p>URS' model of forecast demand represents most robust available Central London evidence base for future requirements.</p>
Police	Metropolitan Police Metropolitan Police Authority	<ul style="list-style-type: none"> • 'Asset Management Plan' for individual authorities (2007) All documents extend over three years. All documents cover the specific local authority area. • 'Policing London 2008-2011 Business Plan' (2008) Extends over three years (capital funding is estimated up to 2015). Covers the Greater London area. 	<p>The Asset Management plans illustrate proposed works up to 2010, whilst the Policing London business plan provides capital funding allocations up to 2012, and then up to 2015.</p> <p>The documents do not provide detailed baseline information on adequacy of supply, nor projections of future demand and associated infrastructure needs.</p> <p>The available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p>

<i>Infra-structure Item</i>	<i>Infrastructure Provider/ Responsible Agency</i>	<i>Relevant Strategic Planning Process/Documents Timeframe Geographical Coverage</i>	<i>Adequacy of Strategic Planning Process and Plans</i>
Fire	London Fire and Emergency Planning Authority	<ul style="list-style-type: none"> • 'Borough Profile' for individual authorities (2007) All documents extend over three years. All documents cover the specific local authority area. • 'London Fire Brigade Fire Safety Plan' (2008) Extends over three years. Covers the Greater London area. • 'London Fire Brigade Draft Asset Management Property Plan' (2008) Extends over 15 years Covers the Greater London area. 	<p>The timeline for the documents is generally shorter than the LDF planning period.</p> <p>None of the available documents provides local authority specific detailed baseline information on adequacy of supply. Also the documents do not include projections of future demand and associated infrastructure needs at the local authority level.</p> <p>Therefore the available documents are not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p>
Ambulance	NHS London Ambulance Services	<ul style="list-style-type: none"> • 'London Ambulance Service NHS Trust Strategic Plan' (2007) Extends over five years. Covers the Greater London area. 	<p>The plan only covers the period up to 2013.</p> <p>The plan does not provide local authority specific detailed baseline information on adequacy of supply. Also the document does not include projections of future demand and associated infrastructure needs at the Westminster level.</p> <p>Therefore the available document is not in a format that readily lends itself to translation into this study and the requirements of PPS12.</p>

1. INTRODUCTION

1.1. Introduction

In September 2008 Westminster City Council and its partner authorities in Central London Forward (CLF)²⁴ commissioned URS Corporation Ltd (URS), in association with partnering sub contractors²⁵ to carry out an assessment of their strategic infrastructure needs.

The overall study aims to provide a strategic (i.e. sub-regional) understanding of the implications of growth for the whole of Central London, with an indication of how growth, and therefore demand for infrastructure, is distributed across the study area. This analysis allows Central London Forward to build a robust case for additional infrastructure investment for Central London to achieve sustainable growth up to 2026. In particular, as well as offering local authority level information and analysis, the report provides evidence of sub-regional issues and opportunities, encouraging joint solutions wherever appropriate. This study also identifies existing gaps and shortfalls in infrastructure provision.

The Central London Forward local authorities are:

- City of London
- City of Westminster
- London Borough of Camden
- London Borough of Islington
- London Borough of Southwark
- Royal Borough of Kensington and Chelsea.

The London Borough of Lambeth joined CLF in 2009, but as this was after the study was commissioned, it does not form a focus of this study. The predominant focus of the study area is the whole of the CLF boroughs. The study area is shown **Figure 1-1**. As noted, for the sake of geography, adjacent proximity to CLF boroughs and overlap of many hard infrastructure items, also covered are the LBs Hackney, Tower Hamlets and Wandsworth.

²⁴ Central London Forward is a cross-sectoral partnership led by City of London, LB Camden, LB Islington, the Royal Borough of Kensington and Chelsea, LB Southwark and Westminster City Council: CLF has close links with the GLA and with private sector organisations. For the purposes of this study parts of LB Wandsworth, LB Lambeth, LB Hackney and LB Tower Hamlets will also be included as these boroughs have areas within the Central Activities Zone as defined in the London Plan. CLF was set up to promote and make a case for Central London in the absence of a formal Central London sub-region, following the establishment of new sub-regions in the Further Alterations to the London Plan.

²⁵ The study team being headed by URS comprises Davis Langdon (costings), Integrated Services & Utilities Limited (utilities), Linklaters (planning law), Montagu Evans (property) and Steer Davis Gleave (transportation).

These authorities also fall within the GLA defined Central Activities Zone (CAZ) as set out in the London Plan.

Figure 1.1 below identifies CLF boroughs (including LB Lambeth), adjacent hard infrastructure overlap boroughs and the CAZ. The report refers to CLF boroughs as 'Central London'.

1.2. Objectives

The project brief identifies the key tasks as being:

To assess the infrastructure needs of Central London for the next 15-20 years, to coincide with the time horizon of the LDF Core Strategy in a manner that enables boroughs to reflect these needs in their individual LDFs (which will cover the timeframe up to 2026).

In summary, this report has covered:

- Basic utilities infrastructure including: water and sewerage; flood risk; power and telecommunications; waste management facilities
- Transport infrastructure - in particular proposals for mainline rail termini and major road congestion hotspots
- Social infrastructure including that which is provided on a London wide or sub regional level such as adult learning and further education colleges; higher education; primary and secondary healthcare facilities; emergency services.

Planning Policy Statement (PPS) 12: 'Local Spatial Planning' requires planning authorities to place infrastructure planning at the heart of the planning process. It states that the Core Strategy should be supported by evidence of physical and social infrastructure requirements and advocates a strategic, collaborative and comprehensive approach to the forward planning of infrastructure. The implementation of the Community Infrastructure Levy (CIL) also implies the need for quantitative and robust analysis of infrastructure requirements, costs and delivery mechanisms. The CIL legislation has yet to pass through parliament, but already proactive individual Central London authorities are commissioning research to determine a methodology for calculating an appropriate level of CIL once the legislation takes affect later this year²⁶.

A key driver for this work is the need to deliver the ambitious targets for population and employment growth in Central London in a sustainable manner. For the aforementioned infrastructure areas, this study explores current demand and provision. It then examines the forecasted demand for residential and commercial²⁷ development and plans providers

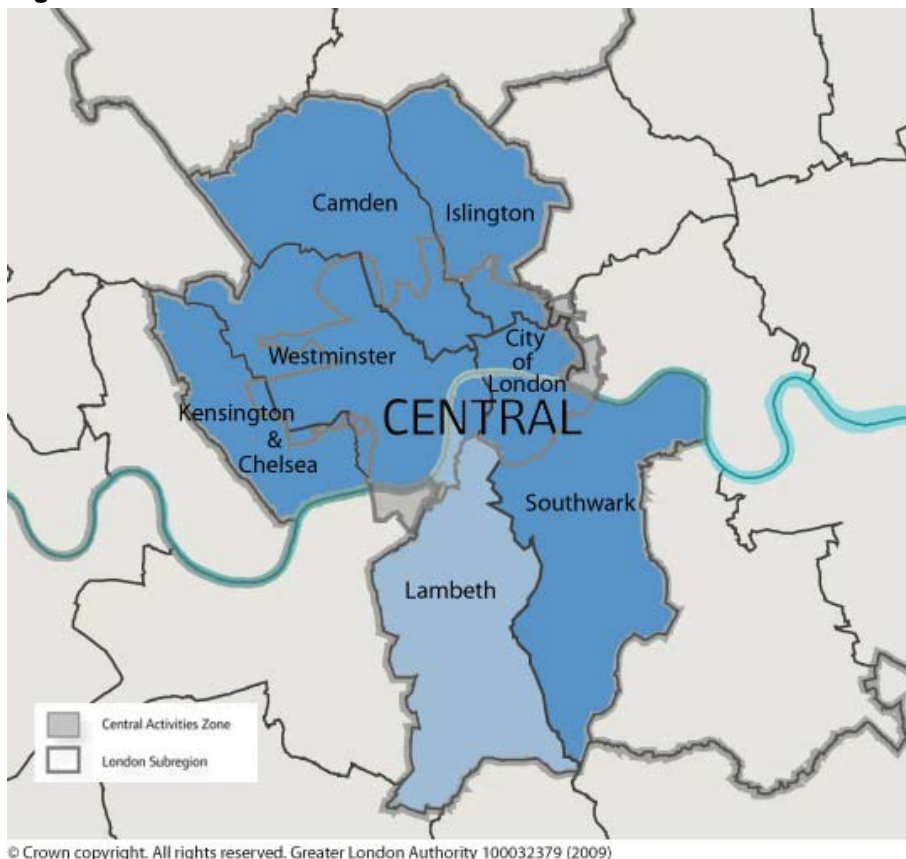
²⁶ Strategic Infrastructure Plans and associated CIL levy research is currently being carried out by URS for both the City of Westminster and LB Camden.

²⁷ Commercial covers retail, leisure and offices (businesses).

have in place in terms of meeting such demand in terms of the quantum of provision, costs and planned investment. In this way, existing or potential future gaps in provision are highlighted, as are risks to delivery. Where possible, we independently model demand and costs in order to allow an assessment of the adequacy of providers' forward strategies, and to provide an estimate of future demand and costs where none is yet available. This includes identifying the timing or location of need and provision where possible. In this way, implications for strategic planning at the Central London level are identified.

As of 2007 the six Central London Forward authorities were host to just above 1.1 million residents, together with approximately 4.4 million sqm of retail and 15.8 million sqm of office floorspace²⁸. Substantial growth is planned both in residential and commercial uses over the London Plan period up to 2026, which will result in increased demand for infrastructure including transport to move people around, basic utilities infrastructure such as electricity, gas and water to enable people to live, as well as social infrastructure.

Figure 1-1: Central London Forward Local Authorities



Source: Central London Forward

²⁸ Source: Resident Population Estimates, (ONS, June 2007); Commercial and Industrial Floorspace and Rateable Value Statistics, (ONS, April 2007).

In order to understand the future requirements for infrastructure provision it is essential to assess the extent of forecasted development growth. Our approach to this assessment is set out in **Section 2** and covers impact of both residential and commercial uses on the forecasted demand for infrastructure.

The report when published is not only a supporting evidence base for LDFs and potentially forthcoming Community Infrastructure Levies (CIL) for each of the Central London Forward authorities, but it may also be used as an engagement mechanism for lobbying infrastructure providers. As part of the report's research, attempts were made to engage all relevant service providers. The outcomes of both successful and unsuccessful attempts for service providers' engagement are recorded within the report.

If a decision is made by Central Government in 2010 to proceed with CIL then further work will be required to define the parameters of infrastructure will potentially be covered by this new levy and what will be covered under existing planning obligation arrangements.

Concurrent Strategic Infrastructure Plans (SIPs) are being conducted by URS for both Westminster City Council and the London Borough of Camden for the purpose of the LDF evidence bases. These studies are more detailed than the Central London Infrastructure Study and cover hard, social and transport infrastructure provided at the borough wide level. Where findings from the SIPs differ from those contained within this study, the SIP findings should be considered to supersede this work due to the more intensive local analysis undertaken.

1.3. Central London Forward Projections

Section 2 describes in greater detail the approach taken to generating URS' Central London Infrastructure Model. Some of the key components contributing towards the model are existing residential and commercial growth assessments. These are described in more below.

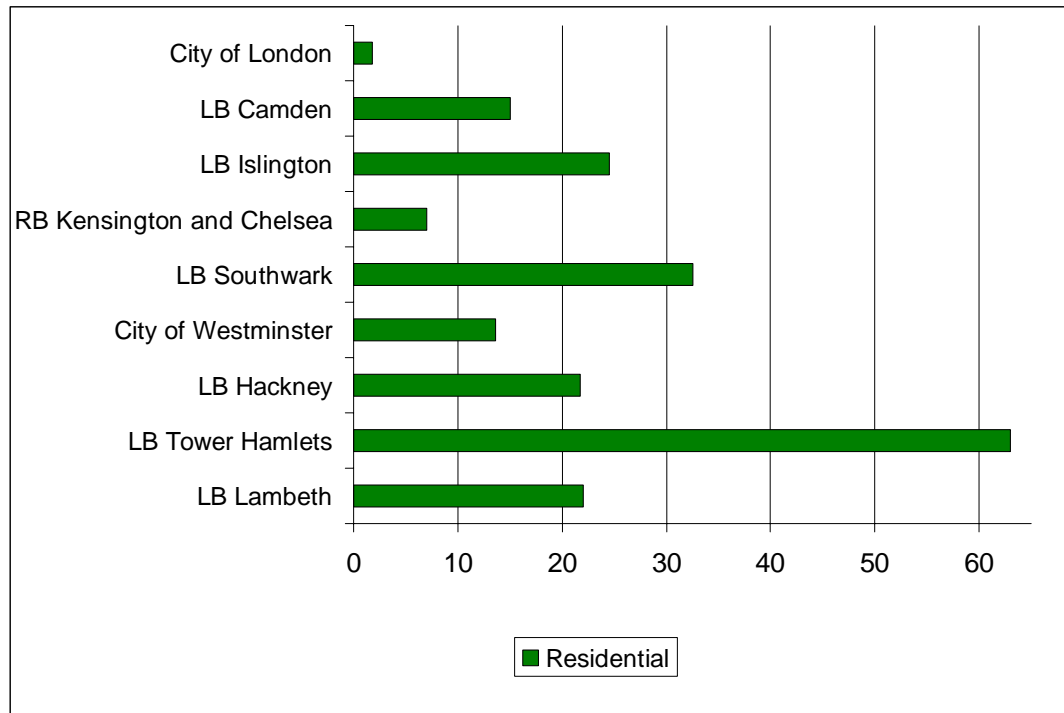
Residential Growth

The London Plan sets housing target for each of the London authorities up to 2016 together with indicative housing capacity ranges for additional homes from 2016 to 2026. Whilst a London wide assessment to identify housing capacity and for the full period up to 2026 is currently underway, there is currently a transition period where no formal target applies. To help address this issue, which potentially leaves local authorities' Core Strategies open to challenge, the Government Office for London and the GLA have issued a statement suggesting that London authorities should roll forward the London Plan annual target (e.g. 680 p.a. for City of Westminster) up to 2026 as an indicative figure²⁹.

²⁹ 'Addressing PPS3 requirements for a 15-year housing land supply (Interim Approach)' (Government Office for London, GLA, 2008).

Following consultation with the client group, it was also agreed that we should roll forward the current London Plan housing target up to 2026 to provide an indication of the extent of dwelling growth in Central London. For the LBs Islington and Camden we have instead requested that we use the revised housing trajectory that the Councils have prepared as part of their LDF process. **Figure 1-2** below presents the projected additional dwelling by Central London authority.

Figure 1-2: Dwelling Projections in Central London, '000s, 2006-2026



Source: URS Research and Analysis of London Plan 2008 (See sheet I2 in the URS model)

From the projected dwellings growth we have estimated the additional population based on standard assumptions on the tenure mix, size mix and occupancy rates. This approach was discussed and agreed with the client group at the initial stage of the commission. Whilst the approach can be considered to be somehow crude when compared with full demographic models such as the ones used for the GLA or ONS projections, a number of advantages come with it. We summarise the key elements in the next sub-section on our approach.

The assumptions we based our calculations on are listed below:

- The tenure split is 50% private housing, with the remainder 50% further split between social (70%) and intermediate (30%) as per London Plan 2008
- The housing size split is as per London Plan Annual Monitoring Report 4 (2008), using figures from 2006/2007 LDD

- Occupancy rates are from Wandsworth New Housing Survey (2007) for private housing, London and Sub-Regional Strategy Support Studies (SSSS) dataset (2004) for social housing, and a non weighted average between the two for intermediate housing; this methodology is recommended by the DMAG Update 'Child Occupancy of New Social Housing' (GLA, May 2006).

Exceptions are:

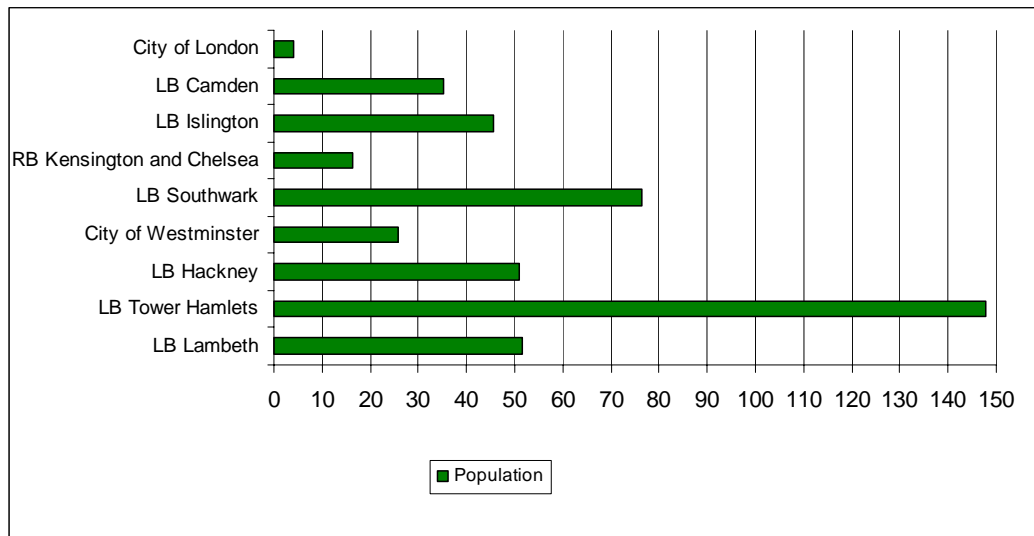
- The City of Westminster, for which a standard occupancy rate of 1.9 was applied across all tenures and size as per discussions with the Council³⁰
- The LB Islington, for which an occupancy rate of 1 was applied to the 4,511 non self-contained dwellings projected in the revised housing trajectory. To the remaining 20,070 projected new dwellings was applied an occupancy rate of 2.04³¹.

Based on these calculations we estimate Central London will see a growth in resident population by approximately 210,000 people. **Figure 1-3** presents the projected additional population. We look at growth in individual Central London authorities later in this section.

³⁰ Westminster City Council, email communication, 18/02/2009. WCC is also in the process of finalising its development trajectory as part of the LDF process. As such the figures used in this report may be revised at a later date. However no finalised figure was available at the time of submission of this report.

³¹ London Borough of Islington, email communication, 20/01/2009 and 05/03/2009

Figure 1-3: Population Projections in Central London, '000s, 2006-2026³²



Source: URS Analysis of London Plan 2008, Sheet I2 in the URS model

Commercial Growth

Significant growth is also forecast for commercial space between 2006 and 2026 - that is retail, leisure and business/offices³³. The information was sourced as follows:

- Office floorspace is from the GLA London Office Policy Review 2007
- Retail floorspace is comparison goods floorspace requirements from GLA 2008 Experian's Consumer Expenditure and Comparison Goods Floorspace Need in London – It should be noted that the estimated are based on expenditure and as such potentially overestimating the requirement; also site capacity and availability and the recent downturn are not reflected.
- Leisure floorspace is recreational and sporting services including cultural services, games of chance, restaurants, cafes, accommodation services, hairdressing salons and personal grooming establishments as per the GLA 2008 Experian's Consumer Expenditure and Comparison Goods Floorspace Need in London – it should be noted that the figures from which the requirements is calculated exclude domestic tourism, therefore the floorspace is potentially an under-estimate for Central London.

³² As noted above, this is based on housing trajectory rates as discussed as opposed to the GLA's population projections. See **Section 1.4** for further details.

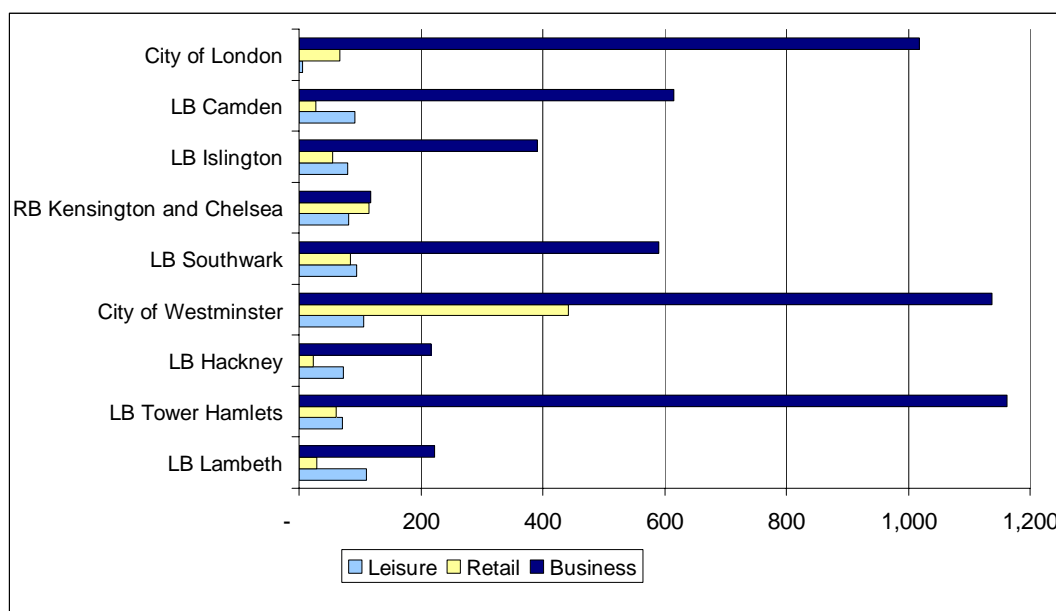
³³ The forecasts were developed by each of the responsible agency before the beginning of the current economic recession. At the moment the study does not consider the potential impact of the downturn nor whether this will have a long lasting impact on future commercial and residential growth. As such it is recommended that the projections, and the study as a result, are revised in future years as soon as the potential impact of the current recession becomes clearer.

Exceptions are:

- The LB Camden, for which office and retail figures are from the Camden Employment Study (2008) and Camden Retail Study (2008) respectively³⁴
- The LB Islington, for which office and retail figures are from the Islington Employment Study (2008) and Islington Retail Study (2008), respectively³⁵.

Figure 1-4 below sets out forecast development growth across the study area based on London Plan estimates and individual authority wide estimates (the 'Approach' section below elaborates upon our methodology for collating such information):

Figure 1-4: Commercial Floorspace Projections in Central London, '000s, 2006-2026³⁶



Source: URS Research, See sheet I2 in the URS model

Growth in Central London Local Authorities

City of London

The City of London was host in 2007 to just over 5,700 dwellings as well as over 4.8 million sqm of office space with a further 240,000 sqm of retail space³⁷.

³⁴ London Borough of Camden, telephone communication, 08/12/2008

³⁵ London Borough of Islington, telephone communication, 17/12/2008

³⁶ Additional Floorspace, Gross Internal.

³⁷ ONS, 2007

The CoL has already consulted on its Preferred Options, with the full plan to be completed by 2009 and adopted in 2010³⁸. The Preferred Options state the City's vision of a world class City, with good transport services, clean and attractive environment, healthy and skilled population, and a vibrant and dynamic cultural scene. This vision is to be achieved in the context of key challenges arising from growth.

Based on our analysis the City is set to provide an additional 1,800 dwellings by 2026, and to see a development of an additional 1.02 million sqm of business floorspace. Forecasts also suggest an increase in leisure and comparison good retail by approximately 6,000 and 67,000 sqm respectively. The leisure estimates are likely to be an underestimate of future growth, as it does not account for tourism related spending generated by world-wide attractions including St Paul's Cathedral and the Tower of London.

London Borough of Camden

As of 2007 the LB Camden had just over 96,000 dwellings, with 2.1m sqm of office space and a further 641,000 sqm of retail space³⁹.

The consultation and feedback from the Issues and Options stage in the development of Camden's Core Strategy, has been set out in Camden's Preferred Approach 2008⁴⁰. The document highlights key issues for Camden's future and how to respond to it, by managing growth and development in the six growth areas identified.

Based on our analysis the LB Camden forecasts suggest an additional 14,979 dwellings by 2026 and the development of 615,000 sqm of business floorspace. There is also an expected increase in both leisure and retail floorspace by 2026, with an additional 91,000 and 27,000 sqm floorspace.

London Borough of Islington

In 2007 the number of dwellings in the LB Islington was just under 89,000, with a 1.3m sqm of office space and a further 404,000 sqm of retail space⁴¹.

The Issues and Options 'Your Neighbourhood Your Islington' was completed in 2008 and consultation is completed and will result in a revised document in autumn 2009⁴². The document highlights the spatial vision for Islington in terms of anticipated change. In

³⁸ 'City of London Core Strategy Preferred Options' (CoL, 2007), 'City of London LDF Bulletin, January 2009' (CoL, 2009)

³⁹ ONS, 2007

⁴⁰ London Borough of Camden, Core Strategy Preferred Approach, (London Borough of Camden, 2008)

⁴¹ ONS, 2007

⁴² London Borough of Islington, Core Strategy Issue and Options 'Your Neighbourhood Your Islington' (London Borough of Islington 2008)

particular the key themes illustrated are growth in population, housing, employment and the issue of sustainability and climate change.

Based on our analysis the LB Islington there is an expected additional 24,581 dwellings by 2026 and the development of 390,796 sqm of business floorspace. There is also an expected increase in both leisure and retail floorspace by 2026, with an additional 80,139 and 55,650 sqm floorspace respectively.

Royal Borough of Kensington and Chelsea

As of 2007, The Royal Borough of Kensington and Chelsea was host to just over 85,000 dwellings but over 601,000 sqm of office space with a further 609,000 sqm of retail space⁴³.

The Royal Borough of Kensington and Chelsea are at its third stage in development of the Core Strategy and North Kensington Plan. After consultation of the Issues and Options stage there was an importance placed on the regeneration of the north of the borough. Consequently the North Kensington Plan will be integrated into Kensington and Chelsea's Core Strategy.⁴⁴ The 'Towards Preferred Options' document has been under consultation and will be reviewed. The Preferred Options states seven strategic objectives including: keeping life local, fostering vitality, better travel choices, caring for the public realm, renewing the legacy, diversity of housing and respecting environmental limits.⁴⁵ This vision to be achieved in spatial terms across the borough; areas have been identified for both North Kensington, and the Centre & South of the borough.

Based on our analysis the Royal Borough of Kensington and Chelsea forecasts suggest an additional 7,000 dwellings by 2026 and the development of 118,103 sqm of business floorspace. There is also an expected increase in both leisure and retail floorspace by 2026, with an additional 81,395 and 115,065 sqm floorspace.

London Borough of Southwark

The LB Southwark had over 118,000 dwellings as of 2007, and 438,000 sqm of office space with a further 1.2 million sqm of retail space⁴⁶.

Southwark is at the Issues and Options stage in its preparation for the Core Strategy. The consultation will be fed into the Preferred Options, which will be available in July 2009⁴⁷.

⁴³ ONS, 2007

⁴⁴ The Royal Borough of Kensington and Chelsea, Core Strategy and North Kensington Plan 'Towards Preferred Options' 2008, (London Borough of Kensington and Chelsea, 2008)

⁴⁵ The Royal Borough of Kensington and Chelsea, Core Strategy and North Kensington Plan 'Towards Preferred Options', (London Borough of Kensington and Chelsea, 2008)

⁴⁶ ONS, 2007

⁴⁷ The London Borough of Southwark, Core Strategy Issues and Options, (London Borough of Southwark, 2008)

The key issues identified are affordable housing and the protection of industrial land, with a number of options outlined offering ways to deal with these issues.

Based on our analysis the LB of Southwark forecasts suggest an additional 32,600 dwellings by 2026 and the development of 590,015 sqm of business floorspace. There is also an expected increase in both leisure and retail floorspace by 2026, with an additional 94,577 and 84,400 sqm floorspace respectively.

City of Westminster

As of 2007, the City of Westminster was host to just over 117,000 dwellings and over 5.6 million sqm of office space with a further 2 million sqm of retail space⁴⁸.

The City of Westminster has consulted on its Preferred Options and a submission draft will be completed by mid 2009 and adopted in 2010⁴⁹. The Preferred Options supports the vision to become both a place where people live and a successful capital city. This vision is to be achieved in the context of key challenges arising from growth. The main areas of focus are the management of change in Westminster, the cross-cutting themes which apply across Westminster and the land uses.

Based on our analysis the City of Westminster forecasts suggest an additional 13,600 dwellings by 2026 and the development of 1.4 million sqm of business/office floorspace. There is also an expected increase in both leisure and retail floorspace by 2026, with an additional 105,458 and 441,933 sqm of floorspace respectively⁵⁰.

1.4. Report Structure

The remainder of this report is structured as follows:

Section 2 covers the consultants' scope and framework approach to the study.

Sections 4, 5 and 5 set out the consultants research findings in relation to each of the infrastructure needs assessments. Section 2 covers energy (electricity and gas) and telecommunication; water and sewerage. Section 4 covers flood risk; waste management and transport. Section 5 finally covers adult learning and further education; higher education; primary and secondary healthcare, and emergency services. Conclusions and infrastructure priorities are identified where possible at the end of each section.

Section 6 summarises infrastructure priorities by authority where possible and identifies and investment schedule and phasing of required infrastructure in a table.

⁴⁸ ONS, 2007. WCC's own estimates own estimates are 7.5 million sqm for office and 1.7 million sqm for retail in the CAZ alone.

⁴⁹ City of Westminster, Core Strategy Preferred Approach, (City of Westminster, 2008)

⁵⁰ WCC is currently finalising its housing trajectory as part of the LDF process. However no finalised figure was available at the time of submission of this report.

Appendix 1 outlines how the assessment was repartitioned among the consultants' team.

Appendix 2 sets out the approach and parameters of the analysis for each of the infrastructure areas, the sources of information and details on the URS' Central London Infrastructure Model (URS Model) that has been used to assess the impact that projected growth in residential and non residential land uses are likely to have on social infrastructure and utilities.

Appendix 3 presents URS' Central London Infrastructure Model.

Appendix 4 sets out the main assumptions of the HUDU model, which has been used to assess the impact that projected growth in residential uses is likely to have on primary and secondary healthcare in the study area.

Appendix 4 sets out the main assumptions of the HUDU model, which has been used to assess the impact that projected growth in residential uses is likely to have on primary and secondary healthcare in the study area.

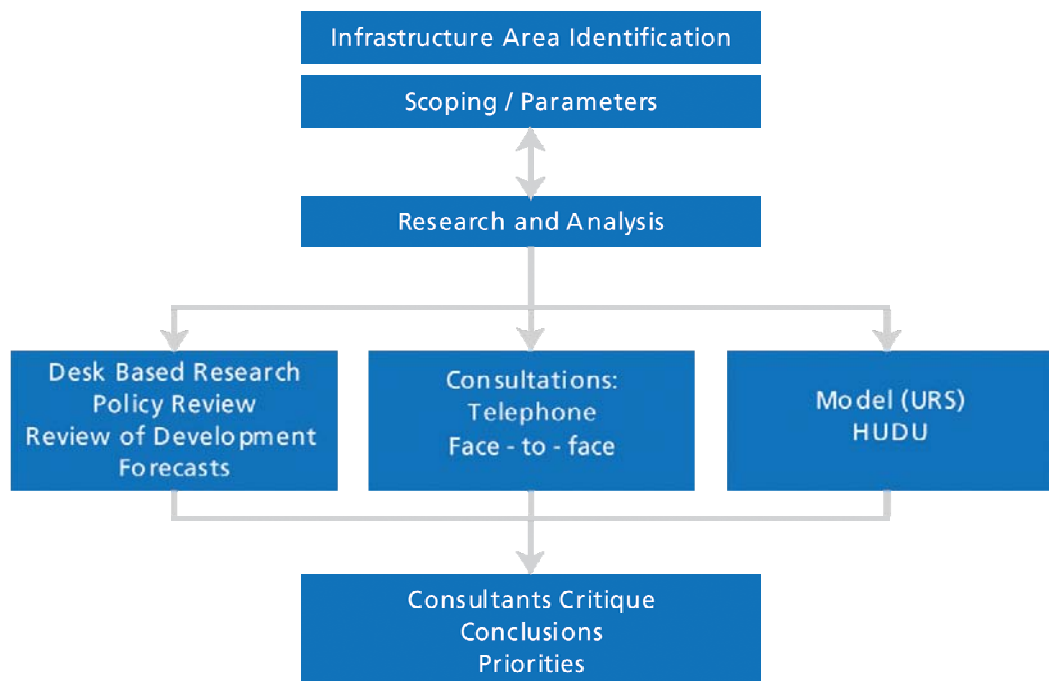
2. INFRASTRUCTURE STUDY SCOPE AND APPROACH

In terms of the approach to the analysis the consultants have followed a common framework for the research so as to ensure consistent reporting across the infrastructure areas. The research framework covered the including the following areas of analysis:

- Defining parameters of the work, based on professional experience, review of relevant available information and consultation with stakeholders
- Review of policy framework, business plans and previous studies undertaken
- Analysis of current supply and baseline situation
- Estimate of projected demand and issues (including a critique of how the demand for infrastructure has been projected)
- Identification of planned investment and costs, based on publicly available documents, consultation and URS' Infrastructure model
- Identification of gaps
- Summary, including commentary on priorities going forward.

Figure 2-1 below sets out the Central London Infrastructure methodology. The full detail on the scope of each area of analysis is set out in the individual infrastructure needs assessments.

Figure 2-1: Central London Infrastructure Study, Methodology



The key steps in the research and analysis, and any associated limitations of the approach, are described below.

Infrastructure Area Identification and Scoping / Parameters

Infrastructure areas required to be covered as part of the study were identified within the client brief and clarified at the inception meeting. Following that meeting the scope of analysis for each of the infrastructure areas was proposed by the consultants and agreed with the client team. For example, it was agreed that Higher education would cover expansion plans for the top six universities in terms of total enrolment numbers. Our subsequent 'research and analysis' covered a three-staged approach as outline below, including 'desk based research', 'consultations' and 'modelling'.

The full scoping and parameters text is included as Appendix 2. Each infrastructure section should be read alongside the supplementary scoping text in Appendix 2.

Desk-based research

Desk based research covered both policy review and generation of development forecasts as outline below.

In order to establish the parameters of the infrastructure study and to execute the assessment, we reviewed:

- London and Central London wide policy and evidence, and service provider business plans and forward strategies which were publicly available or sourced through consultation
- Local authority specific evidence base informing the emerging LDF documents.

Consultations

Alongside the desk-based research we contacted service providers, including Central London local authorities departments and external organisations, by telephone to source relevant data and information. Contacts were made both by phone and email – details of who was successfully or unsuccessfully contacted are presented in the assessment subsections for each of the infrastructure area. Furthermore, Steer Davies Gleeve met in person with organisations such as Transport for London and ISU met in person with utilities providers⁵¹.

Model

Where possible, we independently modelled demand for infrastructure and the associated requirements and costs up to 2026 based on development growth projections for different uses – this was carried out in relation to:

Hard infrastructure, covering:

⁵¹ EDF, Thames Water, Scotia, National Grid, BT.

- Water
- Sewerage
- Gas
- Electricity

This modelling served as a comparable to assess providers' growth strategies, where they existed.

Social infrastructure, covering:

- Adult Learning and Further Education
- Primary Healthcare
- Secondary Healthcare.

Estimating Population and Development Growth

The starting point for this model is the estimate of growth in residential and commercial floorspace up to 2026. The growth projections were refined and agreed with the client group to ensure their consistency with evidence submitted as part of the LDF process.

With regards to residential growth, being able to relate the projected population growth to the housing trajectory is essential for the purpose of this study. For example the main reason is that the driver of future demand is the number of dwellings for certain infrastructure areas (for instance electricity and gas) but the number of new residents for others (including water and sewerage and social infrastructure).

At the moment the available information on housing growth at the local authority and London level cannot be considered as finalised. The Mayor is drafting the new Housing Capacity and Strategic Housing Land Availability Assessment to be published in 2009, and the new London Housing Strategy is currently in Draft for Consultation with the London Assembly and functional bodies, November 2008. This means that local authority level dwelling targets may be revised within a year. Also, as the local authorities progress in their LDF process they may revised both their housing trajectory and the demographic assumptions, which would then in turn resulting in changes in the overall population growth figures. It should also be noted that discrepancies in population projections can be found even between the GLA and ONS estimates – adding to the complexity of establishing a one hundred percent reliable and meaningful information base on which to conduct the analysis.⁵²

Given the lack of established population projections reflecting the recent and imminent changes in the individual authorities housing trajectory and regional policies we consider

⁵² Detailed up-to-date demographic analysis relating to the London Borough of Southwark is contained with Southwark Analytical Hub 'Population: Now and the future' (January 2009).

it appropriate to use assumptions that, albeit less sophisticated, are transparent enough to allow a clear understanding of the relation between the number of dwellings that each authority is set to host and the resulting population.

It should be also noticed that the modelling exercise, as is further discussed below, was undertaken only for a limited number of infrastructure areas. Finally, as the population resulting from our model is consistently above the GLA estimates it should be considered as an indicative upper constraint to Central London's infrastructure needs.

As noted previously, a key driver for the demand for infrastructure is population and residential growth, however for Central London it has important to incorporate and take account of the increased demand for infrastructure resulting from the growth in commercial uses such as business, retail and leisure. Our infrastructure demand model has included agreed proportional infrastructure demand uplifts to take account of growth in such uses.

Estimating Demand for Infrastructure

Different approaches were adopted to assess the impact of residential and commercial growth on demand for services, namely:

- For utilities it was possible to model additional demand based on additional resident population and commercial floorspace – detailed assumptions are presented in Sheet A4 of URS Infrastructure Model attached in **Appendix 4**
- For further and adult education there is little if no evidence of the impact of commercial floorspace growth on demand. We therefore converted projected dwelling numbers to floorspace and considered the proportion of commercial to residential floorspace together using common sense and agreed judgement with the client group to suggest a 'non-residential factor' by which to increase the demand stemming from residential growth
- For Primary and Secondary Healthcare demand the HUDU model was used and no adjustment has been made to consider the impact of non-residential growth⁵³.

The outputs of the model feed into the assessment of each infrastructure where forecast demand and planned provision is examined and potential gaps identified. The model's results provide estimates of future demand and costs where none are yet available. Where service providers' forward strategies are available the model results provide a comparative assessment and enable a critique of service providers' plans.

However, forecast demand and costs could not be modelled and linked to requirements for all infrastructure items. For example, while satisfactory estimates of demand for power could be derived from the projection of new dwellings and non-residential floorspace, it is

⁵³ Unsuccessful attempts were made to retrieve information from Westminster City Council, both via email and by phone between the end of January and early February for potential 'non residential factors' to introduce uplift on the HUDU model outputs.

not considered meaningful to apply unitary costs to estimate required investment, as many other factors would need to be taken account of such as impact of emerging technologies etc. For infrastructure areas such as flood defences, higher education and emergency services, neither demand nor cost can be satisfactorily linked on a pro rata basis to dwellings, population or non-residential floorspace. The approach to modelling requirements for different infrastructure areas was formulated in collaboration with service providers.

A detailed explanation of the method utilised in both the URS and HUDU models is presented in Appendices 1 and 2. URS' model is structure as follows:

- Sheets A1 to A4 outline the assumptions utilised to estimate population growth, education, health and utilities demand respectively
- Sheets I1 and I2 outline the growth rate in residential and non residential uses and the analysis of such projected growth, identifying the sources and method
- Sheets R1 to R4 set out the results of the analysis.

Infrastructure Assessment Reporting

In terms of the approach to the analysis, the consultants have followed a common framework for the research so as to ensure consistent reporting across the infrastructure areas. The research framework covered the following areas of analysis: current demand and supply (baseline); forecast demand and supply; review of planned investment and costs; gap analysis; and conclusions and priorities.

3. HARD INFRASTRUCTURE ASSESSMENT

3.1. Electricity

3.1.1. Baseline

The 'host' provider for the London area is EDF Energy and this is under a licence issued by OFGEM for a footprint known as London Power Networks; in essence, the old London Electricity Board zone. The consultant team met with EDF strategic planning officers in order to obtain evidence regarding the current capacity of the network, current demand, forecast demand and provision, forecast cost and planned investment. This included presenting the URS model of future demand in the Central London authorities, details of which are provided in **Appendix 3**. The information obtained is included here; however this information remains relatively limited at present, because the requested further feedback has not yet been received and the planned follow up meeting has not yet taken place.⁵⁴

EDF are obliged to manage their network against many criteria but with quality and consistency being the main 'public' facing measurements. Typically, this is to provide electricity at 230V, with a tolerance of +10% -6%, to each residential unit assuming a single phase intake. Of course, taking this as a given, the expectation is that electricity is available at all times of the day and year.

Technically, EDF generally take in at 132kV (132,000 volts) and transform this down to 33kV or 11kV via major substations located in positions throughout each local authority area. From these strategic points, local networks are established to afford connection and interconnection, maintaining supplies and quality as previously identified. A map of the EDF London Network Development Plan covering Central London is presented in below.

⁵⁴ EDF is likely to confirm their own demand projections and give feedback on the URS forecasts by the end of March.

Source: EDF



The electricity demand for the whole of the LPN zone (i.e. greater than the six LA areas), identified by EDF during September 2008, was 5,100MW supplying 2.25M customers via some 35,000km of underground cabling. The impact of the growth over and above that already planned is significant and therefore the delivery timescales need to ensure that EDF engage early in the planning process although more defined development areas may well be required in order to establish appropriate design.

The design of the EDF network is unique in the UK as it recognises the importance of the need to maintain uninterruptible supplies, probably to a higher degree than that of more provincial areas, by employing a configuration that mitigates against faults that result in 'customer minutes lost' (one of the KPI measurements utilised by OFGEM). In essence, faults do occur but they do not necessarily mean that electricity is disconnected.

3.1.2. Forecast Demand and Planned Provision

The network is ageing⁵⁵ and at the same time must respond to requirements associated with new development.

Per capita consumption of electricity may increase in future years, implying that even if there were no new developments at all, the demand for energy would still increase - for example, due to the increasing aspirations of individuals and more materialistic outcomes (televisions in more than one room being a good example). Of course, government aims to increase energy efficiency and encourage lower per capita energy usage, and this may be achieved through the Code for Sustainable Homes and other regulatory initiatives. However there is as yet no quantifiable evidence of success and so a pragmatic, cautionary approach appears sensible (this is reflected in the URS model of demand).

It is also not yet clear how much energy might in future be supplied by renewable sources. Though there are significant policy drivers, the electricity network in the UK has not generally been built to accommodate generation at this level and there are technical issues with connecting or, indeed, feeding energy back into the grid.

Combined heat and power (CHP) systems can generate electricity with relative efficiency; however, where they have been successfully established they generally run on 'private wire' type grids, though large CHPs have a grid synchronised systems. The regulatory system and competition rules are also complex.

Micro-generation is subject to feed-in tariff incentives whilst CHP operates on a Renewables Obligations Certificates system (ROCs) that is designed to encourage investment.

EDF have planned for a degree of growth according to known development requirements extracted from the planning process. At the same time however, planning, securing land for substations, negotiating cable routes in highway and cashflow are all factors that

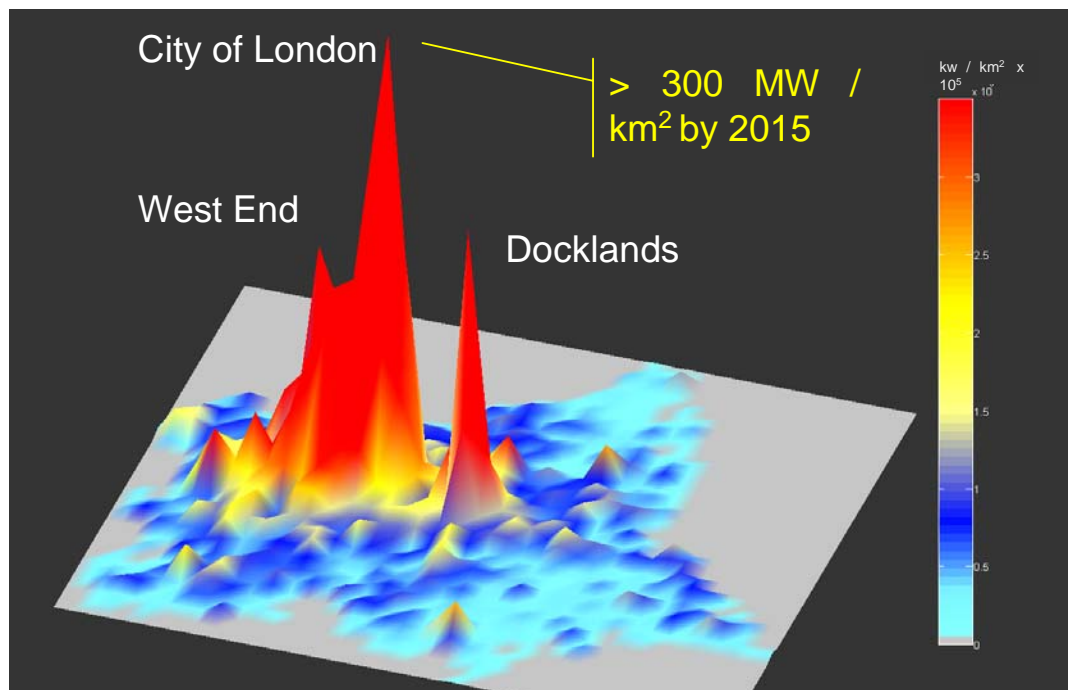
⁵⁵ The Electricity, Safety, Quality and Continuity Regulations 2002 specify safety standards to protect the general public and consumer from danger. In addition, the regulations specify power quality and supply continuity requirements to ensure efficient and economic electricity supply service to consumers.

influence their decision making process. OFGEM also demands delivery in line with pre-agreed charging structures to recover capital expenditure.⁵⁶

The EDF Distribution Price Control Review (DPCR)⁵⁷ lays out plans to provide for growth currently anticipated for London's central area. It notes that the West End is predominantly driven by tourism and leisure with other areas being lead by re-development of residential areas. The impact of the Olympics is also a major influence even though the location of the main facilities is not directly within the study zone.

Currently, the EDF Distribution Review considers that Kensington and Chelsea is likely to experience the lightest energy growth and the City of London and the Docklands the greatest. This is represented in Figure 3-2.

Figure 3-2: Projected Energy Demand for Central London, 2015



Source: EDF Energy

Delivery wise however, this should not be assumed to reflect the most work given that capacity may already be present and / or provided via schemes in hand, or indeed

⁵⁶ EDF secure forward capital expenditure via agreement with OFGEM whom effectively check to ensure that monies spent deliver customer benefit. This occurs every 5 years and lasts for 5 years so the upgrading of infrastructure becomes ever more important. EDF recover the cost of upgrades via charges it makes to suppliers, who then pass the charge on to customers.

⁵⁷ Distribution Price Control Review (DPCR). As DNOs are natural monopolies, OFGEM protects customers' interests by regulating the companies through five-year price control periods, which include curbs on expenditure as well as incentives to be efficient and innovative. The review process, on which we are consulting with you here (DPCR5), will determine the amount of money which can be invested in our networks between 2010 and 2015, and also looks ahead to long term requirements.

already underway. Schemes already underway include a deep tunnel under the river to afford better interconnection between north and south London with upgrading works to existing strategic intake points being completed. A new EDF station has been built behind the Tate Modern and is being connected to Lewisham. Other imminent schemes include two new major substations (132kV transformation points) at Paddington and Fulham as well as a deep tunnel from the City to East London (see **Figure 3-3**).

Figure 3-3: Brunswick Wharf to Osborn Street Tunnel



Source: EDF

Significant planning is required to deliver development schemes over and above those already in the planning process. In addition, practicalities will also influence matters – for example, the Olympics will potentially dominate planned works so other reinforcement schemes may well be delayed.

The existing planning and funding mechanisms do not tend to promote detailed forward planning and funding of electricity provision. The normal investment vehicle follows two routes. The first is more strategic investment that is made by EDF and recovered via agreed processes that include household energy bills (i.e. a part of each bill that a residential unit pays). The second is direct investment made by developers and computed against actual scheme design; for example, if a cable is laid to solely service a new development, the cost is likely to be wholly borne by the developer although there are instances where EDF would contribute. The latter process is reactive as it uses design criteria based upon client specifications and these do vary considerably. For the development plans that lie within Central London, it is likely that the investment required would be facilitated via the latter process.

In an ideal situation, EDF would deliver capacity in advance of development. However this would need reasonable load assessments to be made, development sites to be identified and early monies invested. The last element is where this ideal scenario usually fails. Developers need to have known revenue returns or have an end user in mind before committing monies, particularly early – though there are strategic land developers,

such as Canary Wharf, whom have invested early into the utility system so that the availability of load is present.

Such a strategy may result in slightly higher costs than if the more reactive route had been followed; however, attracting major clients to Canary Wharf for example, with certainty over electricity availability would have proven attractive to incoming end users. There is, therefore, something of a vicious circle associated with the current funding arrangements.

URS modelled demand for electricity associated with residential and non-residential forecast growth in each of the Central London authorities. The forecasting approach, which is described in more detail in **Appendix 2**, has looked at a strategic process and not individual development schemes and the workings rely on a number of assumptions. The forecasts were presented to EDF as a means to initiate discussion on the approach and outputs. As feedback was not forthcoming in time for incorporation in this report, the figures presented below do not reflect EDF's comments on the methodology and comparison with EDFs own workings was not possible⁵⁸.

Table 3-1, and the full workings presented in sheet R4 in the model (see **Appendix 3**), indicate that energy demand to 2026 could be 531,267 kVA for the whole Central London area. The figures reflect the proportion of different land uses, i.e. residential, office, leisure and retail, driving the projected growth across the Central London authorities (as shown in **Figure 1-2** and **Figure 1-4**). The table shows that electricity demand in some authorities, such as the City of London and Westminster and to a lesser extent Camden and Kensington and Chelsea, is driven mostly by the projected commercial growth; in the City of London office development is by far the largest component. In other authorities there is a more even balance between residential and commercial led demand, as is the case for instance in Islington, Southwark and Lambeth.

These figures are almost certainly too high and should be treated with caution. It is likely that for a strategic perspective a greater diversity should be used than that employed for this assessment. However it was not possible to verify the approach with EDF and so these figures represent a starting point for further analysis.

In terms of physical requirements this would equate for in the region of 20 primary substations, four to five grid sites (converting electricity from 132kV to 33kV), 531 one-MVA substations (i.e. secondary substation catering for residential demand) and between 350 and 400 two or three-MVA substations (i.e. secondary substations catering for commercial demand particularly where this is highly concentrated). It should however be noted that this does not incorporate detailed considerations of existing spare capacity, and is therefore only indicative of the absolute scale of growth likely to be required.

⁵⁸ Following an initial contact with EDF, the provider is currently still investigating their current growth projections. Whilst a response was expected by the end of March this has not yet materialised.

Table 3-1: URS Assessment of Additional Demand for Electricity from New Development, kVA, 2006-2026

<i>Local Authority</i>	<i>Residential Demand</i>	<i>Non Residential Demand</i>	<i>Total Demand</i>
City of London	2,880	75,399	78,279
Camden	23,966	52,667	76,633
Islington	39,330	39,297	78,627
Kensington & Chelsea	11,200	26,797	37,997
Southwark	52,160	56,831	108,991
Westminster	21,760	128,980	150,740
<i>Central London Sub-total</i>	<i>151,296</i>	<i>379,971</i>	<i>531,267</i>
Hackney	34,720	23,800	58,520
Tower Hamlets	100,800	90,914	191,714
Lambeth	35,200	28,327	63,527

Source: URS Calculations see A4 and R4 Sheets

In our model we have taken a pragmatic, worst case scenario which utilities strategic / design standards used currently by utilities companies.

This analysis however includes use of an in-house study to determine the possible energy consumption reductions due to the implementation of energy efficiency measures for both electricity and gas. For electricity the forecast energy demand for residential and commercial uses in the Central London Forward authorities are provided in kVA (electrical demand) and m3/hour (gas demand). In order to interpret the impact of energy efficiency on these energy demands, these figures are converted to MWh to determine annual energy consumption⁵⁹. We calculate the annual energy consumption based on a worst case scenario, where no energy efficiency measure is implemented (Annual Energy Consumption Worst Case Scenario column), and a best case scenario, where a number of energy efficiency measures are implemented (Annual Energy Consumption Best Case Scenario column).

⁵⁹ It is assumed that commercial uses operate 12hrs/day and 9hrs/day during Bank Holidays, i.e. 4,350hrs/year so as to provide a conservative estimate. It is assumed that the residential uses operate 9hrs/day for the entire year, i.e. 3,285hrs/year.

Table 3-2: Annual Energy Consumption Projected Demand for Electricity from New Development, MWh, 2006 - 2026⁶⁰

Authority	Electricity projection	
	Annual Energy Consumption (MWh)	
	Worst Case Scenario (MWh)	Best Case Scenario (MWh)
City of London	337,448	269,958
Camden	307,830	246,264
Islington	300,141	240,113
Kensington & Chelsea	153,357	122,686
Southwark	418,560	334,848
Westminster	632,546	506,037
Central London Total	2,149,882	1,719,905

Source: URS calculations

In general however it is anticipated that the requirement to meet energy efficiency targets is likely to have a greater impact on the gas network than on the electricity network as the most cost effective energy efficiency measures are introduced within construction standards, i.e. the thermal performance of the building fabric, ventilation and air leakage. As these standards improve the requirement for space heating will be significantly reduced, resulting in an anticipated general reduction in gas consumption.

3.1.3. Forecast Costs and Planned Investment

The schemes described in the EDF plan and laid out above equate to a reported committed expenditure of £250m for Central London. The URS model does not forecast costs associated with utilities infrastructure.

Given the reactive nature of the current process for planning and funding electricity, it would make sense to move towards a process of more forward planning and funding. Developers can instigate infrastructure as this is permitted via the OFGEM rules. The example of Canary Wharf, where this route has been followed, illustrates that advanced works can be completed and the security of supply provided early on, with the result that development has secured capacity that facilitates the selling of floor space (though Canary Wharf has most likely paid for infrastructure which under normal situations they would have not have been obliged to pay for; also Canary Wharf is a single landowner and estate and this approach is less practical in more typical Central London situations).

⁶⁰ Baseline figures for leisure uses are not available. As such the baseline utilities rates are an underestimate, resulting in an over-estimate of the percentage growth additional to the baseline.

3.1.4. Conclusions

Utilities provision is fundamental to the delivery of planned growth. Data is lacking to evidence EDF's own plans for growth, and to quantify existing and planned capacity in the existing network. Planned provision investment is unlikely to cover forecast demand.

EDF are required to review network requirements every five years by the regulator and have a plan to 2020. However the planning process remains mostly reactive, with investment related to specific schemes when plans are worked up. The current EDF Plan identifies a number of schemes which are planned or underway, with related expenditure of £250m.

EDF need to be engaged early in the planning process and future requirements need to be co-ordinated in a strategic manner with adjacent growth areas for the major works. Significant 'local' works may also be required. Central London authorities should lobby for better engagement and a more strategic approach whereby providers better respond to the long term growth agenda.

An immediate step could be to carry out research into options for changing the forward planning process and regulatory requirements. This could be presented to central government and stakeholders.

Table 3-1, and the full workings presented in sheet R4 in the model (see **Appendix 3**), show that energy demand to 2026 could be 845,029 kVA for the whole Central London area. These figures are almost certainly too high and should be treated with caution. As discussed in **Section 3.1.2** the outcomes of the policies on sustainable energy at different government levels are unclear at this stage. In terms of physical requirements, the estimated electricity load would equate to a requirement for in the region of 20 primary substations, four to five grid sites (converting electricity from 132kV to 33kV), 531 one-MVA substations (i.e. secondary substation catering for residential demand) and between 350 and 400 two or three-MVA substations (i.e. secondary substations catering for commercial demand particularly where this is highly concentrated). It should however be noted that this does not incorporate detailed considerations of existing spare capacity, and is therefore only indicative of the absolute scale of growth likely to be required.

3.2. Gas

3.2.1. Baseline

The 'host' providers for the study area are National Grid and Scotia Gas Networks via operating licences issued by OFGEM. Historically, each zone was part of British Gas that subsequently became Transco and then National Grid. More recently, National Grid sold one of their local distribution zones to Scotia Gas Networks whom operate the network via a subsidiary called Southern Gas Networks.

The consultant team contacted National Grid and Scotia Gas Networks to obtain evidence regarding the current capacity of the network, current demand, forecast demand and provision, forecast cost and planned investment. This included presenting the URS model of future demand in the Central London local authorities, details of which are provided in **Appendix 3**.

A meeting with National Grid was held and, after a period, relevant information was supplied to the consultant team. Numerous attempts were made to set up a meeting with Scotia Gas but these were not successful.⁶¹ Information on Southwark is therefore largely missing from this analysis.

The providers are obliged to manage their network against many criteria but with quality, i.e. pre-set pressures, and consistency being the main 'public' facing measurements.

Each provider has incoming pressure reducing stations that transform the pressure from high or intermediate to medium, and this is subsequently then reduced from medium to low although it is somewhat dependant upon end user requirements. A factory may, for example, require gas at medium pressure whilst a residential unit would normally utilise low pressure as an end user pressure.

No figures were provided on current gas usage in the Central London area.

3.2.2. Forecast Demand and Planned Provision

The network is ageing and at the same time must respond to requirements associated with new development. As for electricity, there is little quantitative evidence of how per capita consumption of gas may change in the future, and of the degree to which renewable sources could meet future demand for gas.

CHP systems, when employed to provide district heating schemes as well as electricity generation, achieve greater efficiencies than individual means. The per capita impact on the gas network is not yet fully determined.

Both National Grid and Scotia Gas Networks make strategic investment that is recovered via agreed processes that include household energy bills. They are also obliged to plan

⁶¹ Initial contact made via letter to Southern Gas Connections, Dec 08; follow-up thereafter by email and telephone, December 08 - March 08

for growth that is identified via the normal planning process. Network configuration, securing land for pressure reducing stations, negotiating pipe routes in highway and cashflow are all factors that influence the investment decision making process within each company. OFGEM also demand delivery in line with pre-agreed timeframes as part of the capital expenditure recovery structure.

In general, therefore, the current system is not conducive to long term planning but more geared up for responding to requirements associated with specific schemes.

URS modelled demand for gas associated with residential and non-residential forecast growth in each of the Central London authorities. The forecasting approach, which is described in more detail in **Appendix 3**, has looked at a strategic process and not individual development schemes and the workings rely on a number of assumptions. The forecasts were presented to National Grid and Scotia Gas as a means to initiate discussion on the approach and outputs.

National Grid was consulted early during the production of this report. As such they commented on the figures presented in **Table 3-3**. These figures have been however now superseded by those in **Table 3-4**, which reflect the latest changes made to the growth trajectory for some authorities.

The figures secured from National Grid in terms of gas loads (**Table 3-3**) reflected anticipated energy usage against future development aspirations as of December 2008⁶² (Scenario 1 in the model in **Appendix 3**). The recent revision to these aspirations⁶³ is likely to increase the energy demand from the gas system (**Table 3-4**) but the effect, in terms of system capability, is not known. To achieve complete understanding of the increase, a new assessment of the gas system would need to be made and the limited timeframe does not enable this to happen.

Based on the figures presented in **Table 3-3** National Grid indicated that there was sufficient capacity with regard to gas on the medium and higher pressure systems within the existing network to cater for projected demand to 2026, in all the five Central London authorities which they cover. The assessment cannot be presented for Southwark and Scotia Gas did not engage with the consultant team.

⁶² In December the model was still assuming office growth as per London Office Policy Review 2006, and population growth based on a 45% affordable housing in the tenure split.

⁶³ In the version of the model that can be found in **Appendix 3** the office floorspace figures have been updated in line with the London Office Policy Review 2007, and population estimates have been updated to reflect the London Plan targets on affordable housing.

Table 3-3: URS Assessment of Additional Demand for Gas from New Development, m³/hour, 2006-2026 - Scenario 1

<i>Local Authority</i>	<i>Residential Demand</i>	<i>Non Residential Demand</i>	<i>Total Demand</i>
City of London	977	824	1,800
Camden	12,239	1,340	13,580
Islington	19,920	1,539	21,460
Kensington & Chelsea	5,073	2,227	7,300
Southwark	26,482	2,029	28,511
Westminster	7,245	6,205	13,450
<i>Central London Sub-total</i>	<i>71,936</i>	<i>14,164</i>	<i>86,101</i>
Hackney	19,590	1,095	20,685
Tower Hamlets	49,804	1,516	51,320
Lambeth	21,358	1,582	22,940

Source: URS calculations A4 and R4 Sheets

Table 3-4, and the full workings presented in sheet R4 in the model (see **Appendix 3**), indicate that gas demand to 2026 could be 83,951 m³/hour for the whole Central London area.

Table 3-4: URS Assessment of Additional Demand for Gas from New Development, m3/hour, 2006-2026 - Scenario 2

<i>Local Authority</i>	<i>Residential Demand</i>	<i>Non Residential Demand</i>	<i>Total Demand</i>
City of London	977	1,391	2,368
Camden	12,141	1,430	13,571
Islington	19,023	1,390	20,413
Kensington & Chelsea	5,073	1,653	6,727
Southwark	26,482	1,892	28,374
Westminster	7,245	5,253	12,498
<i>Central London Sub-total</i>	<i>70,941</i>	<i>13,009</i>	<i>83,951</i>
Hackney	19,590	940	20,530
Tower Hamlets	49,804	1,991	51,795
Lambeth	21,358	1,285	22,643

Source: URS calculations A4 and R4 Sheets

The strategic gas network is therefore assumed to be functional and without need of upgrading for the most part, with the exception of local reinforcement works that may be applicable. Assuming no capacity is available in the existing network, the scale of growth would equate to a requirement for between eight and 10 pressure reducing stations (transforming the gas from medium pressure to low pressure). It should however be noted that this does not incorporate detailed considerations of existing spare capacity, and is therefore only indicative of the absolute scale of growth likely to be required.

As for the modelling of demand for electricity, for gas we have taken a pragmatic, worst case scenario which utilises strategic / design standards used currently by utilities companies.

We have also for gas demand undertaken an in-house study to determine the possible energy consumption reductions due to the implementation of energy efficiency measures. For gas the forecast energy demand for residential and commercial uses in the Central London Forward authorities are provided m3/hour (gas demand). In order to interpret the impact of energy efficiency on these energy demands, these figures are converted to MWh to determine annual energy consumption⁶⁴. We calculate the annual energy

⁶⁴ It is assumed that commercial uses operate 12hrs/day and 9hrs/day during Bank Holidays, i.e. 4,350hrs/year so as to provide a conservative estimate. It is assumed that the residential uses operate 9hrs/day for the entire year, i.e. 3,285hrs/year.

consumption based on a worst case scenario, where no energy efficiency measure is implemented (Annual Energy Consumption Worst Case Scenario column), and a best case scenario, where a number of energy efficiency measures are implemented (Annual Energy Consumption Best Case Scenario column).

Table 3-5: Projected Annual Energy Consumption for Gas from New Development MWh, 2006 - 2026

Authority	Gas projection	
	Annual Energy Consumption (MWh)	
	Worst Case Scenario (MWh)	Best Case Scenario (MWh)
City of London	98,639	78,911
Camden	491,131	392,905
Islington	730,083	584,067
Kensington & Chelsea	254,147	203,318
Southwark	1,014,387	811,510
Westminster	496,957	397,566
Central London Total	3,085,345	2,468,276

Source: URS calculations

3.2.3. Forecast Costs and Planned Investment

No information was available from providers.

3.2.4. Conclusions

Consultation with National Grid indicated that for the five Central London authorities which it covers, there is likely to be sufficient capacity within regard to medium and the higher pressure gas networks to cater for demand up to 2026.

Based on early discussions with National Grid the strategic gas network is therefore assumed to be functional and without need of uprating for the most part, with the exception of local reinforcement works that may be applicable. If no capacity were available in the existing network, the scale of growth would equate to a requirement for between eight and 10 pressure reducing stations (transforming the gas from medium pressure to low pressure). It should however be noted that this does not incorporate detailed considerations of existing spare capacity, and is therefore only indicative of the absolute scale of growth likely to be required.

The gas providers do not publish strategic plans and engagement is difficult. This highlights the need for the London authorities to lobby for an improved framework for strategic partnership working, and to engage early where at all possible.

Table 3-4, and the full workings presented in sheet R4 in the model (see **Appendix 3**) show our independent assessment of potential gas demand to 2026 : 83,951 m³/hour for the whole Central London area.

The outcomes of the policies on sustainable energy at different government levels are unclear at this stage. It is anticipated that the requirement to meet energy efficiency targets is likely to have a greater impact on the gas network than on the electricity network as the most cost effective energy efficiency measures are introduced within construction standards, i.e. the thermal performance of the building fabric, ventilation and air leakage. As these standards improve the requirement for space heating will be significantly reduced, resulting in an anticipated general reduction in gas consumption.

In our model we have taken a cautious approach, based on which we estimate that the annual energy consumption up to 2026 in Central London would reach a total of 3,085,345 MWh. In a best case scenario where the energy efficient targets are met however, the annual energy consumption would go down to 2,468,276 MWh.

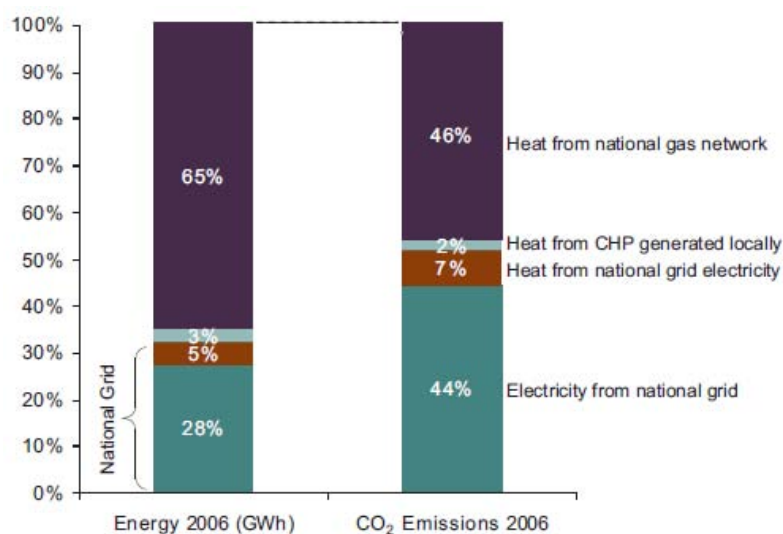
3.3. Sustainable Energy: Heating, Cooling and Power

3.3.1. Policy Context

'The Mayor's Climate Change Action Plan', February 2007⁶⁵ (hereafter referred to as the CCAP) has a core message that Londoners do not have to reduce their standard of living for London to play its part in tackling climate change, but rather we all have to change the way we live. The Mayor's top priority for reducing London's carbon emissions is to move as much as possible away from reliance on the national grid and on to local, low carbon energy supply, including combined cooling heat and power (CCHP), energy from waste (EfW), and on site renewable energy technologies. This approach is often termed 'decentralised energy'.

65% of the energy consumed in London today is in the form of heat supplied by the gas utility infrastructure and 32% of energy is electricity from the national grid. Currently only 3% of London's heating demand is met through local CHP generation (2006 – see **Figure 3-4** below) and plays a relatively minor role. The carbon intensity of grid supplied electricity is higher than that of gas, thus electricity accounts for over half of the CO₂ emissions from energy consumption even though it only meets 28% of London's energy demand.

Figure 3-4: London's energy supply and CO₂ emissions



100% = 125,000 GWh; 34.7 mt CO₂

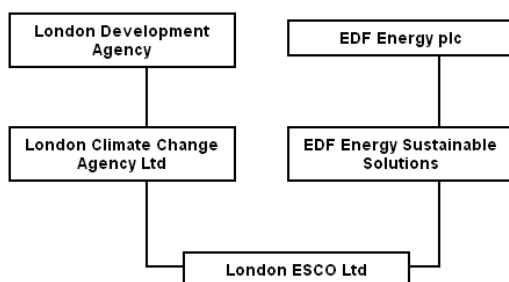
Source – 'The Mayor's Climate Change Action Plan', February 2007

London's push for a decentralised, sustainable energy supply will include dramatically increasing the rollout of combined cooling, heat and power energy supply. Through the

⁶⁵ 'The Mayor's Climate Change Action Plan' (GLA, 2007)

direct investment of the London Development Agency and the requirements of 'The London Plan, Spatial Development Strategy For Greater London, Consolidated with Alterations since 2004', February 2008⁶⁶ (hereafter referred to as The London Plan), supplying energy through CCHP will become the norm in major new London schemes. However, the bulk of CCHP's potential will need to be realised through supplying London's existing building stock. Two potential major vehicles for this will be London Energy Services Company (ESCO) (now entirely owned by EDF) (see **Figure 3-5** below), and the London Development Agency's Decentralised Energy Delivery Unit (DED).

Figure 3-5: London ESCo partnership arrangement



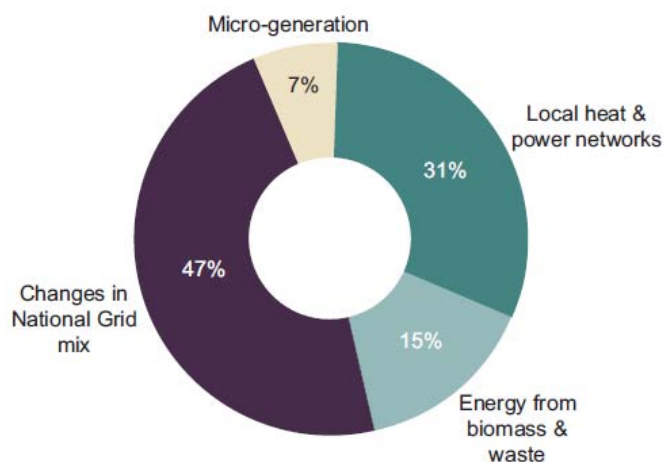
Source – <http://www.edfenergy.com/lesco/aboutus.html>

The Mayor's goal is to enable a quarter of London's energy supply to be moved off the grid and on to local, decentralised systems by 2025, with the majority of London's energy being supplied in this way by 2050. London could achieve CO₂ emissions savings of 7.2 million tonnes by 2025 through improved energy supply.

Saving 7.2 million tones of CO₂ emissions could be achieved through four key levers (see **Figure 3-6** below).

⁶⁶ 'The London Plan, Spatial Development Strategy For Greater London, Consolidated with Alterations since 2004' (GLA, 2008)

Figure 3-6: Sources of CO2 emissions savings from energy supply by 2025



100% = 7 million tones

Source – ‘London Energy and CO2 Emissions Inventory 2003; Powering London into the 21st Century’, PB Power study for Mayor of London & Greenpeace, March 2006

London First, an influential business membership organisation whose mission it is to make London the best city in the world in which to do business, recognises the imperative to address climate change and support the need to generate more of London’s energy from decentralised sources. The organisation has undertaken additional work in the development of a consultation report, ‘Cutting the Capital’s Carbon Footprint – Delivering Decentralised Energy’, October 2008⁶⁷. Their stance is that the 25% decentralised energy target for 2025, set out in the CCAP, whilst challenging, can be achieved through collaboration between the Mayor, local authority and business.

The London First consultation report sets out key recommendations which are laid out in **Appendix 2**. The aim of the Central London Infrastructure Study is to identify opportunities where these recommendations can be effectively implemented, and discusses the drivers for uptake of decentralised energy.

3.3.2. Existing CHP Schemes in Central London

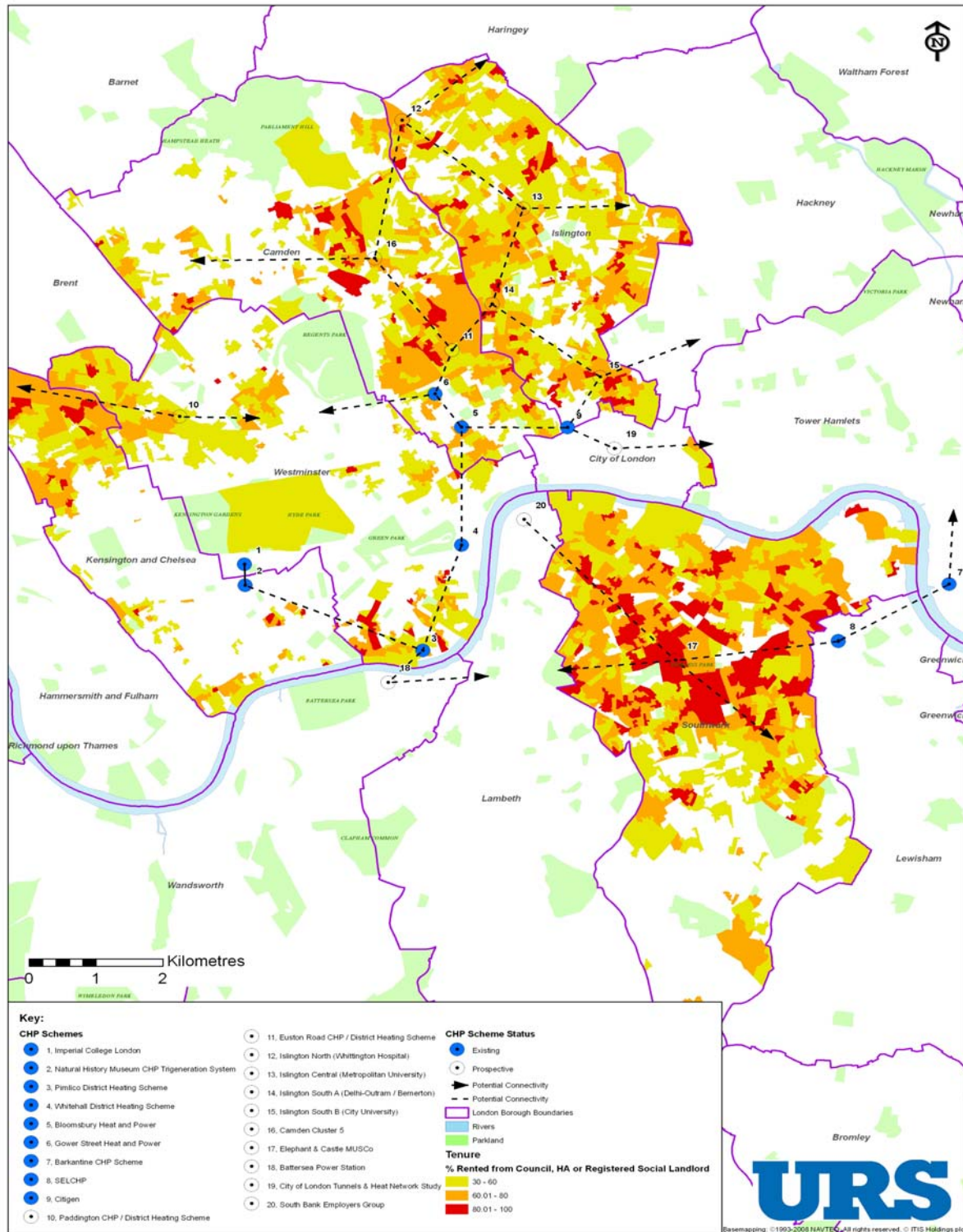
Figure 3-7 sets out the energy centre locations of existing and potential combined heat and power (CHP) schemes.

The mapping of these existing and potential CHP schemes is led by the feasibility work being conducted by each Central London local authority (where undertaken), and goes beyond this in order to illustrate a possible Central London sustainable energy infrastructure.

⁶⁷ ‘Cutting the Capital’s Carbon Footprint – Delivering Decentralised Energy’ (London First, 2008)

This section of the report provides details of the existing CHP schemes, whilst the following section provides details of the potential CHP schemes. Section 2.3.4 analyses the contextual background to the mapping exercise, explains the methodology of its development and takes forward the analysis of the map and wider issues relating to future potential CHP provision.

Figure 3-7: Central London Sustainable Energy Infrastructure Map – Identifying the Existing and Proposed CHP Schemes



Source – URS

Below the existing combined heat and power schemes in Central London are described.

1. Imperial College London

A new combined heat and power scheme at Imperial College London replaced the existing 30-year-old boilers and provides electrical power to the College buildings, lecture theatres, and halls of residence for 9,000 students.

A subsidiary of London Power Company, London Heat & Power Company will operate the plant for a 15 year period. The plant will provide all the heating, hot water and electricity for the College and campus, with any additional electricity being exported to the grid.

This scheme is a Private Finance Initiative (PFI).

2. Natural History Museum CHP Trigeneration System

Until 2000 the Natural History Museum (NHM) was part of a 42 MW district heating scheme that also included the adjacent Science Museum, Victoria & Albert Museum (VAM) and Imperial College London. When Imperial College London and the Science Museum withdrew from the heating scheme in 2000, the running costs of the two remaining partners increased substantially. To bring the cost back to its original price, £3.7m funds were raised from The Co-operative Bank to upgrade the existing system.

In 2006 a partnership between NHM, VAM, The Co-operative Bank and Vital Energi Ltd was established, with Vital Energi Ltd in charge of operation and maintenance of the Energy Centre for 15 years from its start up.

The partnership employed two Danish consulting engineering firms, JPH for the design of the refurbishment of the Energy Centre and COWI for the analysis of the existing district heating network and design of the new cooling network.

The project demonstrates how an existing heating system of an iconic London landmark can be retrofitted to enhance low-carbon decentralised energy systems without incurring large-scale modifications.

The CHP system was completed and commissioned in December 2006 and has run for 6,323 hours producing 9,331 MWh of electricity and 10,517 MWh of heat, of which 8,560 MWh supplied the district heating network, 1,604 MWh supplied the heat fired absorption chillers and 1,353 MWh of heat was rejected via a heat rejection system on the roof. The large amount of thermal energy rejected into the atmosphere was due to the two heat fired absorption chillers only being commissioned in July 2007, seven months after the CHP system was completed.

The new energy system includes a CHP unit generating 1.8 MW_e of electricity and 1.7 MW_{th} of thermal energy at full load, a waste-heat recovery boiler to recover the thermal energy in the flue gases and engine jacket, and two heat fired absorption chillers each providing 705 kW_{coolth} of cooling. Two boilers were retained as back-up boilers and fitted

with new low-NOx gas fired burners and the existing electrical chillers were de-commissioned.

This scheme is a Private Finance Initiative (PFI).

3. *Pimlico District Heating Scheme*

Situated in the middle of the Pimlico Estate on the north side of the River Thames, the scheme supplies heating and hot water to approximately 4,200 dwellings within the Pimlico Estate. Three boilers installed by Dalkia Utilities Services generate heat in the form of hot water. These dual fuel (natural gas and gas oil) boilers supply 10.3MWh of heat per year. Additionally, within the last three years Dalkia Utilities Services have installed two gas fired CHP engines on site, representing 3.5 MW_e generation capacity. The district heating plant further consists of thermal storage, a pumping station and more than three miles of distribution pipework.

This scheme demonstrates a Public Private Partnership between Dalkia Utilities Services and Westminster City Council (PPP).

4. *Whitehall District Heating Scheme*

The Whitehall District Heating Scheme provides heat to 23 Government office buildings in Whitehall, amounting to 270,000m² of floor space.

Electricity is generated by a gas turbine unit producing 4.7 MW_e of electrical power and 9MW_{th} of heat. The normal fuel source is natural gas but the CHP unit has the ability to run on oil during supply interruptions. The electricity generated is exported to the grid.

5. *Bloomsbury Heat and Power* & 6. *Gower Street Heat and Power*

The heat and power schemes serve 450,000m² of educational and research facilities. Clients include the University College London (UCL) main campus, School of Oriental and African Studies (SOAS), Institute of Education, Birkbeck College and various other colleges of University of London.

Approximately 58,000 MWh of heat and 33,000 MWh of electrical power are currently generated by the heat and power schemes. The primary CHP plant capacity is 4.5MW_e.

The heat and electrical power supplies from the two schemes are supplied under long term Public Private Partnership (PPP) contracts.

7. *Barkantine Combined Heat and Power Plant*

London Climate Change Agency (LCCA), 'Barkantine Combined Heat and Power Plant, Case Study 9, April 2008'⁶⁸, establishes that the CHP plant at Barkantine is owned and managed by the Barkantine Heat and Power Company (BHPC), which is part of EDF

⁶⁸ Barkantine Combined Heat and Power Plant, Case Study 9 (LCCA, 2008)

Energy's generation portfolio. The energy centre is located right in the heart of the Barkantine Estate in Tower Hamlets.

BHPC was originally jointly conceived by EDF Energy and the London Borough of Tower Hamlets' Energy Efficiency Unit and funded by the Department of Environment Food and Rural Affairs (DEFRA) as a National Pathfinder scheme. It demonstrates how a PFI can be used to deliver innovation and environmental protection through supporting heat and power projects.

The Barkantine Energy Centre consists of a 1.3 MW_e/1.6 MW_{th} CHP gas engine, four 1.4 MW_{th} gas boilers and 2 105 m³ of thermal storage. The gas boilers are only used to meet peak demand on cold winter days and to meet the heat demand when the CHP engine is unavailable. The thermal storage can store 4.5 MWh of heat, which is sufficient to cover up to 8 hours of heat demand across the district heating network.

BHPC supplies 8,000 MWh of heat and exports 5,500 MWh of power per year. The overall efficiency of the scheme is 82%. In comparison to standard heat and power generation (local boiler plant and large scale electricity generation plant), the scheme saves more than 1,700 tonnes of CO₂ emissions each year as the typical efficiency for large scale electricity generation plant is only 35% due to the non-utilisation of the waste heat by-product and distribution losses associated with the National Grid.

8. South East London Combined Heat and Power (SELCHP)

In the mid-1980s the London Boroughs of Lewisham and Greenwich realised an alternative solution would need to be found to the dwindling landfill resources taking London's waste. The result was SELCHP, an Energy from Waste (EfW) facility built through a partnership between the public and private sectors (PPP), which opened in 1994.

SELCHP is a commercial partnership between the public and private sectors (PPP), operated through a consortium of local authorities and specialist companies. These include the following private sector companies: Onyx Environmental Group plc, CNIM, London Energy, Switch 2 Energy Solutions, and John Laing plc; and include the following public sector local authorities: London Borough of Lewisham, and London Borough of Greenwich.

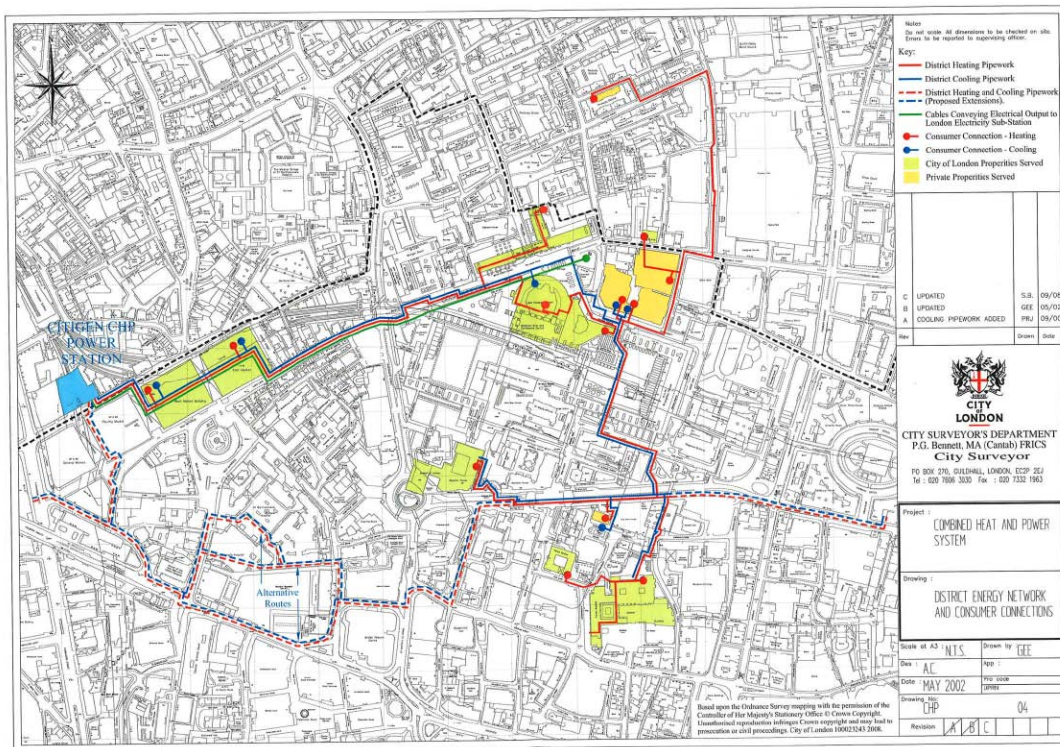
The CHP plant consists of a single 35 MW_e steam turbine generator. The electricity generated is exported to the grid.

Whilst SELCHP is not a live decentralised scheme (waste incineration plant generating electricity only), there is the potential to utilise the waste heat by-product from the electricity generation to serve the surrounding area and facilitate a sustainable infrastructure connection to the existing Barkantine Combined Heat and Power Plant, and the prospective Elephant & Castle MUSCo (Multiple Utilities Services Company) (see Figure 2-4). There is at least 40 MW of heat available with a low carbon content. The heat load that can be supplied is located to the north, west and east of the plant. As a result it

is possible to phase the development to enable the concept to be established before requiring further capital financing.

9. Citigen

Figure 3-8: The Citigen District energy Network and Consumer Connections



Source – City Surveyor's Department, City of London

Citigen is a wholly owned subsidiary of E-on UK (ESCo). Due to the contractual relationship between Citigen and the City of London, this scheme represents a PPP.

The CCHP plant consists of two 15.8 MW_e/12.5 MW_{th} diesel/natural gas fired CHP engines and provides district heating and cooling (via absorption chillers), with the electrical power being exported to the grid and traded through the parent E-on group. The heat and electrical power generation efficiency is 70%. The system produces approximately 60,000 MWh of heat (including output from auxiliary boilers), 32,000 MWh of electricity, and 30,000 MWh of chilled water per year.

PB Power has been commissioned to undertake a study for an expansion of the Citigen combined heat and power system. The results of this study are expected in May 2009 and it is anticipated that the study will indicate the feasibility of an expansion of the district energy network into the London Borough of Islington and Westminster city Council. PB Power has been commissioned to undertake a study for an expansion of the Citigen combined cooling, heat and power system. The results of this study are expected in late 2009 and it is anticipated that the study will indicate the feasibility of an expansion of the district energy network into other parts of the City of London and adjacent boroughs.

3.3.3. Potential CHP Schemes

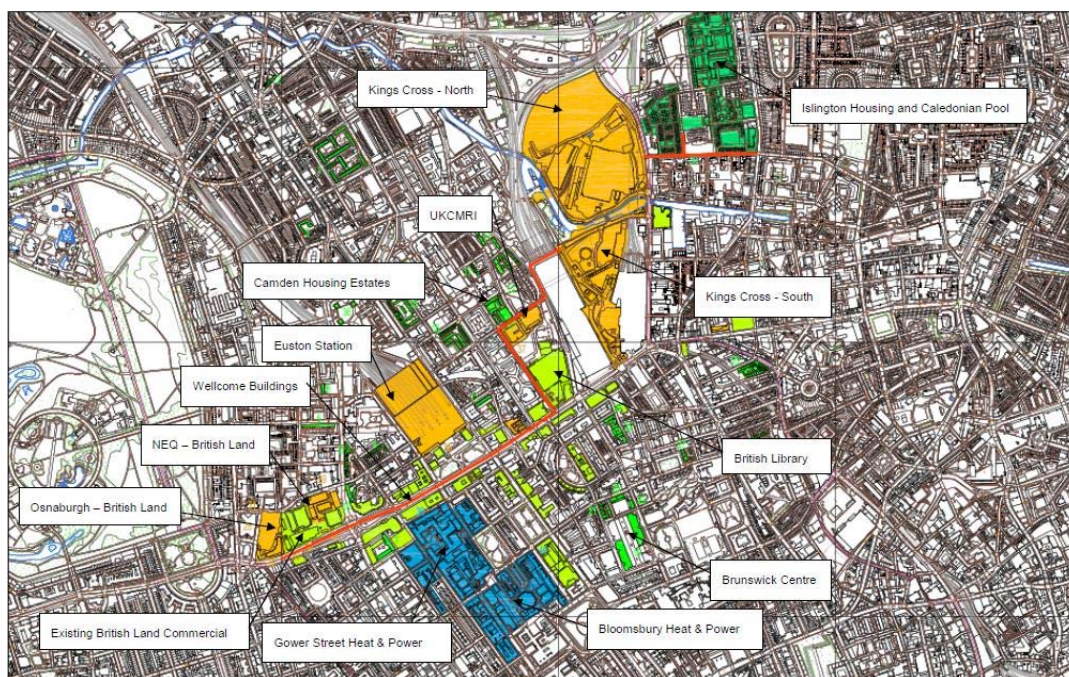
Prospective heat and power schemes identified in **Figure 3-7** are described below. The schemes in this section represent potential opportunities for further developing sustainable energy infrastructure in the Central London area⁶⁹.

10. Paddington CHP/District Heating Scheme

Assessing **Figure 3-7**, the heat mapping clearly indicates a gap where decentralised energy can be efficiently implemented. This implies that the density of social housing in the Paddington area is sufficient to ensure the financial viability of implementing a combined heat and power scheme through a PPP. This is considered further in the Westminster Infrastructure Study, which is being undertaken by URS alongside the Central London Infrastructure Study.

11. Euston Road District Heating Scheme

Figure 3-9: The Euston Road District Heating Scheme and its Potential Customers



Source – 'Euston Road District Heating Scheme, Executive Summary – November 2008', LDA

The London Development Agency (LDA) has recently completed the first part of a two-stage study, according to the 'Euston Road District Heating Scheme, Executive Summary – November 2008'⁷⁰. The benefits and feasibility of developing an area-wide CHP/district

⁶⁹ The schemes are at various stages of progress and in some cases represent our own ideas; they have not necessarily been agreed upon by the relevant LPAs and partners.

⁷⁰ 'Euston Road District Heating Scheme, Executive Summary (LDA, 2008)

heating network are assessed for the Euston Road area, extending from Regent's Park in the west to Caledonian Road in the east. The LDA has no specific land interests in this area but is taking a strategic view, to identify and appraise this pan-local authority scheme, which could have commercial and environmental benefits for all concerned.

Figure 3-9 above demonstrates a number of existing buildings in this area which could potentially be connected to such a scheme, including local authority housing, the British Library, Camden Civic Offices and Town Hall, the Wellcome Buildings and Regents Place. There are also a number of major new developments planned and under construction, including the areas around Euston and King's Cross Stations (British Land and Argent respectively), the UKCMRI (a new medical research facility) and a new HQ for Unison on Euston Road itself.

Existing CHP/district heating schemes already supply two University College London campuses in the area, Bloomsbury Heat and Power and Gower Street Heat and Power (see baseline schemes 5 & 6), and there are a large number of communal heating schemes serving local authority housing estates, particularly in Camden on the northern side of Euston Road.

12. Islington's Potential CHP Hubs (12 – 16)

The London Borough of Islington (LBI) commissioned SEA/RENUE to develop the 'Islington CHP Scoping Study to 2014 – Stage 2', Draft Report, January 2008, to provide a more detailed assessment of what could be achieved in terms of the roll out of district heating and CHP by the year 2014. It builds on previous work assessing the economics and potential in three clusters, but breaking this down into four potential schemes. These four schemes are:

- North Cluster: Elthorne Estate, Miranda Estate, Whittington Hospital and Archway Redevelopment
- Central Cluster: Sobell Leisure Centre, Arsenal/Queensland Rd new build; Harvest Estate (elec) and London Metropolitan University
- South Cluster A: Caledonian Road Pool, Bemerton Estate and Delhi Outram Estate;
- South Cluster B: Old St scheme inc. Ironmonger Rd Baths, Finsbury Leisure Centre and Stafford Cripps Estate plus City University (Northampton Square), Kings Square Estate, Brunswick Estate and Finsbury Estate.

The potential CHP capacities and CO₂ emissions savings of the four schemes are set out below.

Table 3-6: Summary of the CHP Capacity and Possible CO₂ Emissions Savings for the Four Schemes Identified

<i>Cluster</i>	<i>CHP Capacity (kW_e)</i>	<i>CO₂ Emissions Savings (tpa)</i>
North	6,800	5,784
Central	3,047	1,770
South A	1,416	1,408
South B	6,800	7,672
Total	18,063	16,634

Source - 'Islington CHP Scoping Study to 2014 – Stage 2', Draft Report, January 2008

Figure 3-10 shows heat loads mapped thematically for large single point public sector partners and sites of the LBI's own gas contracts. The larger the square the larger the gas demand at the site. The four clusters selected for analysis in the report are shown circled in yellow. Also demonstrated is the interconnectivity of the four schemes, which would involve approximately 5km of pipework.

The map displays a dense network of nodes and edges, representing a complex system. The nodes are color-coded: red squares are the most numerous, followed by green and blue squares. The edges are represented by thin lines connecting the nodes. Several locations are labeled with text, including:

- NHS Match to 1
- London Metropolitan University
- City University
- Royal Mail
- Guinness Trust
- London Metropolitan University (multiple instances)
- City University (multiple instances)
- Royal Mail (multiple instances)
- Guinness Trust (multiple instances)
- London Metropolitan University (multiple instances)
- City University (multiple instances)
- Royal Mail (multiple instances)
- Guinness Trust (multiple instances)

A yellow circle highlights a specific area in the top left, and a yellow oval highlights a specific area in the bottom right.

Islington North – Whittington Hospital

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Islington Central – Metropolitan University

Availability of space at Metropolitan University, Holloway Road, is not currently known but CHP has been considered in the past and the institution is known to be interested in new proposals.

Islington South A – Delhi Outram/Bemerton

South A cluster offers two potential sites. There is no space in any of the existing plant rooms on the scheme but spaces adjacent to the plant rooms offer space for extensions or containerised/package plant. At Delhi Outram there is a large open space at the rear. At Bemerton, space exists in a large open plan garage. A side wall of the garage adjoins one of the Bemerton boiler rooms.

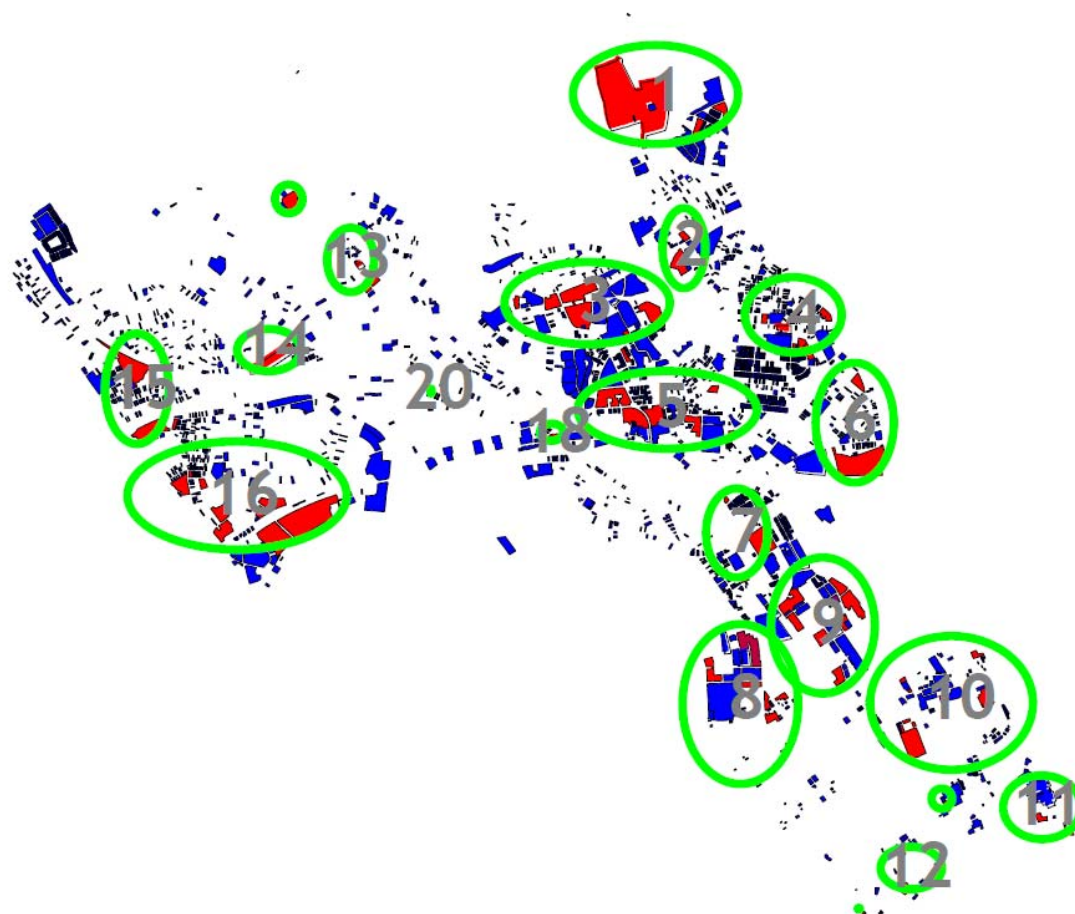
Islington South B – City University

The main City University boiler room at Northampton Square has a large plant with the potential to extend through to an adjacent store room. City University appear keen to participate in a joint scheme.

16. Camden's Potential CHP Hub and Interconnection with Islington (16)

The London Borough of Camden (LBC) commissioned SEA/RENUE to assist with the identification of a pilot site for a large scale CHP installation. This follows on from a scenario modelling exercise entitled 'Delivering a Low Carbon Camden', which recommended a local authority wide district heating network supplied by CHP in order to meet CO₂ reduction targets of at least 60% by 2050.

Figure 3-11: Map by Site and Cluster with Community Heating, Corporate Stock and Other Potential Customers such as Hospitals and Housing Associations Identified

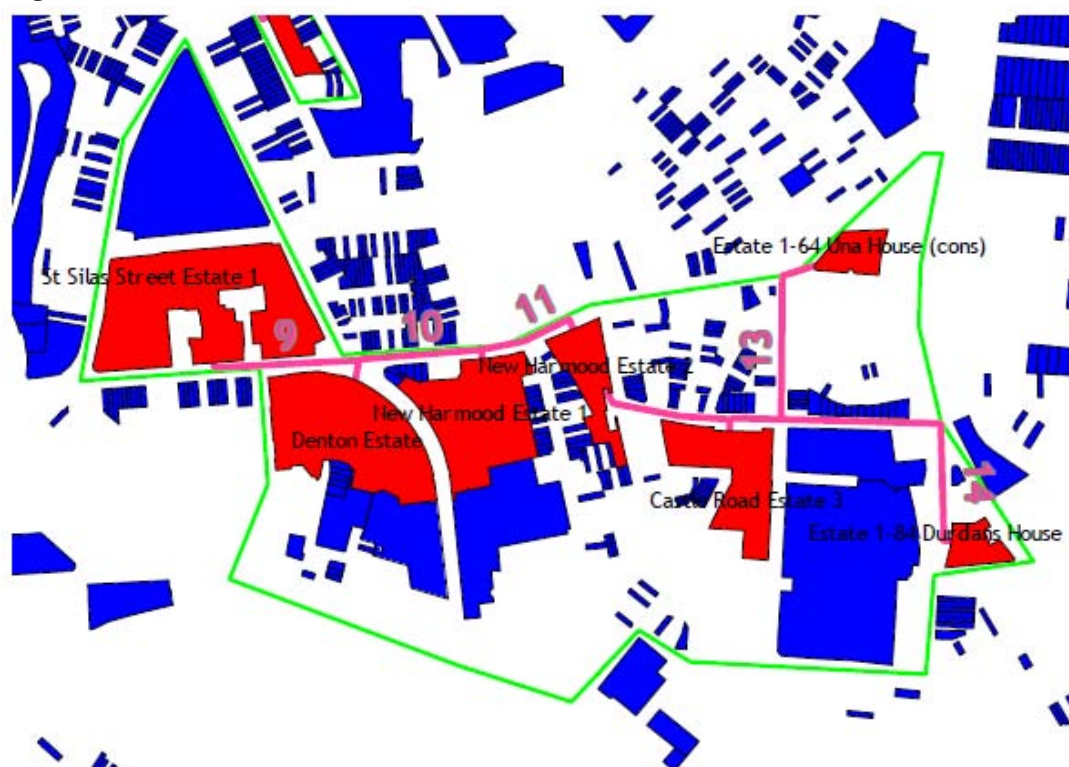


Source - 'Camden Large Scale CHP Pilot Site Identification', Final Report, September 2007

17. Camden Cluster 5

Cluster 5 gives the highest CO₂ emissions savings at the lowest capital cost and with the best net present value. Potential CHP Capacity is identified as 6,800 kWe and potential CO₂ Emissions Savings as 6,291 tonnes per annum. Its geographical location also makes it ideal for future expansion work as it has the advantage of being more central in the borough so could extend to cover the areas around clusters 3 and 9 later. Within the 'Camden Large Scale CHP Pilot Site Identification', Final Report, September 2007, it is recommended that Cluster 5 be taken ahead for more detailed examination.

Figure 3-12: Cluster 5



Source - 'Camden Large Scale CHP Pilot Site Identification', Final Report, September 2007

Table 3-7: Summary of the CHP Capacity and Possible CO₂ Emissions Savings for the Four Schemes Identified

Cluster	CHP Capacity (kW _e)	CO ₂ Emissions Savings (tpa)
5	6,800	6,291

Source - 'Camden Large Scale CHP Pilot Site Identification', Final Report, September 2007

The LBI has already explored the possible interconnection with the LBC. This future interconnection is fully illustrated in **Figure 3-7**.

18. Elephant & Castle MUSCo

The Elephant and Castle regeneration scheme is to consist of 5,131 new homes, 60,988m² retail, 34,121m² mixed commercial, 46,118m² culture/leisure/public, and 12,926m² entertainment of which 1,242 (24%) new homes and 28,503m² mixed use has already received planning consent and is scheduled for completion around January 2010. Ultimately the Elephant and Castle MUSCo will encompass the Aylesbury development, delivering services to over 10,000 homes.

100% of the commercial risk for the MUSCo scheme is to be taken by a consortium of Dalkia (heating, cooling and power), Veolia (non-potable water making up 30% of the overall water supply demand), and Independent Fibre Networks (data services), whilst

Southwark Council are creating the opportunity and providing land for energy centres. The Council will seek to recover value once the scheme becomes profitable.

Figure 3-13 below demonstrates the energy centre locations. The EC2 Heygate energy centre is to be replaced to allow for the provision of district heating to the existing Heygate and Salisbury Estates, as well as to serve the regeneration scheme.

Figure 3-13: Proposed Elephant and Castle regeneration identifying the energy centre locations



Source – Elephant and Castle, Sustainable Community Infrastructure, Southwark Council, Brian Dunlop Associates

19. Battersea Power Station

The proposed development of the Battersea Power Station site will create a new urban district of London. Providing the energy required for this scale of development in a sustainable manner is one of the project's key objectives. The current scheme is being developed around a large central energy centre or a decentralised plant strategy (to take account of the phasing of the development), which is to serve the total development with plant and systems chosen to meet a site zero carbon energy in use solution.

20. *City of London Tunnels and Heat Network Study*

Forecast growth in the City of London creates a unique opportunity for further CHP development. The City is currently looking into the feasibility of establishing a district wide tri-generation network across the entire Square Mile to deliver low carbon heating, cooling and electricity. However, the growth of the last decades has put much pressure on the space below the highway and it is not possible to plan for new network infrastructure below the ground. Developing such a network will therefore have to explore ways of using the existing service tunnels ("pipe subways") managed and owned by the City or to expand them. One of the options could also be to use disused tunnels (legacy infrastructure) to supply energy.

21. *South Bank Employers Group*

The LDA has funded the South Bank Employers Group (SBEG), in conjunction with South Bank University, to look at the potential for an extensive CHP scheme across London's South Bank. The scheme would connect major energy users to a district heating network.

Existing public and private buildings such as St Thomas' Hospital, the South Bank Arts complex and Shell buildings are all possible heat customers, as well as a number of planned high density mixed use developments. The SBEG have now suggested a number of feasible schemes and the SBEG and the DED unit are in discussions on how to progress the CHP scheme.

3.3.4. **Potential to Integrate and Extend Central London CHP Schemes - An Analysis**

A map of Central London has been prepared (see Figure 2-11) to demonstrate the density of social housing in the Central London local authority. In this context, social housing is defined as that which is rented from the local authority (LA), Housing Authority (HA) and registered social landlords (RSL's). This in turn reflects the density of heat loads in Central London attributed to the social housing space heating and domestic hot water heating demands. A 'heat map' is effectively created as a result. This exercise is undertaken to illustrate the heat demand profile for the Central London local authority and identify the locations where decentralised energy can be most effectively delivered (see London First recommendation 2, **Appendix 2**).

Energy centre locations representing existing and potential combined heat and power schemes are identified in **Figure 3-7**. The mapping exercise identifies that these energy centre locations are well suited to deliver decentralised energy. A possible interconnectivity is also highlighted in order to establish a Central London wide sustainable infrastructure that fully supports the CCAP aspirations and delivers an effective energy masterplan for Central London (see London First recommendation 4).

There have recently been a number of measures and initiatives which promote sustainable energy generation and use, going some way to meeting the recommendations of the London First report described above. However, further policy / financial changes are required to establish the drivers for investment in an uptake of

decentralised energy schemes. The relevant initiatives and issues are described in more detail below.

Economic Incentives

In terms of economic incentives that recognise the carbon savings from decentralised energy, the 'Energy Act 2008'⁷¹ provides for the introduction of feed-in tariffs for renewable electricity and incentives for renewable heat. This will improve the economic viability of establishing new energy centres and increasing the capacity of existing energy centres. Of more significance to district heating schemes, however, is OFGEM's reconsideration of the Class C supply licence exemption for schemes of up to 1 MW_e and whether this is increased or a junior licensing regime for embedded generation is put into place.

These financial incentives and the work being carried out by OFGEM and BERR will improve the business case for sustainable energy and encourage private sector energy companies to expand their current decentralised energy provision to meet this demand for investment. However, the availability and likelihood of obtaining funding remains a key priority going forward. It is anticipated that where the Central London authorities will need to contribute is in creating the opportunity and providing land for energy centres.

The current process of decentralised energy is influenced by limitations set by OFGEM; however, notwithstanding these implications, the electricity distribution system in London, as elsewhere in the UK, has not historically been designed to accommodate connection for generation.

This situation is likely to deteriorate as the increasing demand on the electricity network has lead EDF to consider their distribution protocols and this, in turn, is likely to exacerbate the matter further. In essence, fault levels computed on the EDF network are likely to be significantly increased and this will potentially impact upon connection options.

EDF currently consider that decentralised energy will only be delivered if the networks effectively stand alone without any interconnection with the wider public network. To achieve this, OFGEM may therefore need to consider rule changes.

Opportunities for Decentralised Energy through Inter- and Cross-Authority Partnerships

In some localities in Central London, decentralised energy is already being provided at a district scale where it can most efficiently be delivered. **Figure 3-7** demonstrates that the majority of the existing heat and power schemes fall within the high density areas for council housing in the Central London area. A number of authorities have already initiated studies in relation to establishing decentralised energy strategies. These include the Central London local authority of Camden, Islington, Westminster and neighbouring Tower Hamlets.

⁷¹ 'Energy Act 2008'

This report goes some way to identifying a possible sustainable Central London infrastructure. **Figure 3-7** identifies not only existing energy centre schemes but also key prospective energy centre schemes that can contribute to an overall sustainable Central London heating, cooling and power infrastructure. The gaps in energy centre scheme provision become clear with a lack of existing and prospective schemes in the Paddington (Westminster) area, an area with a high density of council housing.

Figure 3-7 clearly identifies the importance of inter- and cross-authority partnerships in delivery decentralised energy. For example, the viability of the prospective Euston Road District Heating scheme is dependent on upgrading the Bloomsbury and Gower Street combined heat and power schemes to allow a number of existing and proposed buildings to be connected. They offer an opportunity for an expansion on the existing PPP. Another example of possible interconnection is constituted by the sites identified in Islington and Camden, which is fully discussed in Section 3.3.3.

Decentralised energy is only effective in saving CO₂ emissions when it is located where heating, cooling and power can be supplied most efficiently, i.e. where there are supporting 'anchor tenant' heat loads and where there are suitable customers, both existing and prospective (i.e. large scale regeneration schemes such as Elephant and Castle, Euston Road, etc.). It is essential that the public sector continue to connect 'anchor tenant' heat loads to kick start build out of decentralised energy schemes to ensure the economic viability of a decentralised energy scheme, as has been the case for the Barkantine CHP scheme, Pimlico district heating scheme, etc.

Partnerships for Funding and Delivery

Bodies such as the London ESCo or DED Unit are in a position to take advantage of possible Government funding, and to establish inter- and cross-borough PPPs to deliver decentralised energy. They are responsible for actively seeking to invest in projects and create commercially viable ESCos serving local communities. Their involvement is critical to implement a successful Central London heat and power infrastructure.

PFI and PPPs are typically the funding vehicle required to achieve financial viability of projects, and a number have already been established by energy service companies (ESCOs). All of the existing and prospective combined heat and power schemes described in **Sections 3.3.2** and **3.3.3** form part of a PFI or PPP. With the enactment of the Energy Act 2008 economic incentives have been established for renewable electricity and heat with the introduction of feed-in tariffs. Additionally, the work being carried out by OFGEM and BERR in this area in relation to the distributed/decentralised generation review, the renewable energy strategy and the heat strategy will strengthen the viability of PFI and PPPs. Banks and energy companies will need to further work together on innovative ways of securing funding for low carbon decentralised energy projects.

Industry Standards and Regulation

There is a requirement not only for to establish London wide standards and technical specifications for heat networks, but also national heat network standards (a British Standard (BS)). This latter requirement relates to the activities of Central Government.

Whilst we are only considering the Central London infrastructure opportunities, decentralised energy strategies should be applied on a national scale where feasible, i.e. for large urban centres.

To ensure the long term viability of district heating schemes in terms of establishing a competitive heat supply market and from a heat supply customer perspective, an industry wide Code of Practice for heat networks which includes consumer protection agreements and guarantees of minimum service levels is required. In addition, OFGEM should oversee the appointment of a heat supply ombudsman as part of the Energy Ombudsman Longer term/policy/regulatory change.

The definition of zero carbon to recognise near site provision is becoming an extremely prevalent topic and the Department for Communities and Local Government (DCLG) is currently undertaking a public consultation – ‘Definition of Zero Carbon Homes and Non-Domestic Buildings, Consultation, December 2008’⁷² – relating to the definition of zero carbon homes that will apply for new homes built from 2016 and it also seeks views on Government’s ambition that new non-domestic buildings should be zero carbon from 2019. This consultation document recognises the range of off-site solutions to tackling the CO₂ emissions remaining after high levels of energy efficiency and passive design measures are applied and on-site renewable energy supply is provided.

Role of Planning Authorities

Local and regional planning policy and decisions should recognise near-site renewable energy provision with flexibility to connect post completion, establishing an expectation for all new private sector developments to connect to local decentralised energy schemes. The national framework is already in place with the recent supplement to PPS1. This needs to be filtered down to the local level so new developments are able to demonstrate compliance with local and regional energy policies without providing on site systems.

Local policy expectations for major construction and refurbishment developments⁷³ could be outlined in the form of an energy hierarchy, defined in the following order:

- First stage – Lean Scheme: Achieve a minimum improvement over the requirements of the *Approved Document Part L (ADL)* of the Building Regulations target carbon dioxide emissions rate (TER), which is the Baseline Scheme, by implementing energy efficiency and passive design measures
- Second stage – Lean and Clean Scheme: Determine the feasibility of connection to a near-site Combined Heat and Power (CHP)/Combined Cooling, Heat Power (CCHP) scheme for heating, cooling and power; If not feasible, then determining the feasibility

⁷² ‘Definition of Zero Carbon Homes and Non-Domestic Buildings, Consultation (CLG, 2008)

⁷³ Major developments as defined by *The London Plan* – 10 dwellings or having a floor space greater than 1,000m².

of installation of on site CHP/CCHP (building/site) and micro-CHP (individual dwellings)

- Final stage – Lean, Clean and Green Scheme: Achieve a minimum savings in carbon dioxide emissions rate over the Lean and Clean Scheme by implementing on-site renewable energy technology; Note: other renewable energy technologies should be considered against CHP/CCHP technology in terms of overall potential carbon dioxide emissions savings and where the feasible renewable energy technology is not compatible with CHP/CCHP technology (i.e. biomass boilers and solar thermal hot water heating) a Section 106 contribution can to be made that allows the omission of on-site renewable energy technology.

The following notes / caveats would need to be borne in mind in relation to the above points:

- All strategies to achieve savings in CO₂ emissions are to be tested for cost effectiveness by calculating their £/kgCO₂/year per m² of treated floor area (TFA). This will enable a “reality check” to be carried out using the figures given in the GLA’s Renewables Toolkit;
- The energy hierarchy stages should reflect industry standard best practice key performance indicators (KPI’s) as we progress to the 2025 CCAP aspirations.

Through the planning system the Central London authorities could also:

- Provide guidance on suitable energy efficiency and passive design measures for all types of developments (e.g. solar control glazing for developments providing cooling, lighting controls and energy efficient fittings, etc.)
- Provide guidance on suitable sizing and selection of CHP/CCHP for all types of development where it is not feasible to connect to a near-site CHP/CCHP scheme
- Provide guidance on suitable renewable energy technologies for all types of developments (e.g. air and ground source heat pumps, and solar collectors for residential developments).

3.3.5. Conclusions

Particular opportunities exist for developing the sustainable energy agenda within the DPD Processes. The Mayor is committed to cutting carbon emissions in London by 60% by 2025 and is delivering unprecedented levels of funding towards climate change programmes. Successful implementation of programmes such as the following will help achieve this ambition:

- Develop the electric vehicle market by delivering 25,000 charging points by 2015, and encouraging early adoption by GLA group and others

- Retrofit 60% of London's homes to the required energy efficiency standards, which could save one million tonnes of CO₂ per year by 2015, and the roll out of a similar programme for public buildings
- Deliver 25% of London's energy requirements through decentralised energy production by 2025
- Turn waste into a resource through recycling or energy generation for London.

The compilation of data on the existing and potential combined heat and power schemes for Central London as part of a mapping exercise comprehensively illustrates that the creation of a Central London wide sustainable energy infrastructure through a decentralised energy strategy is feasible.

It clearly highlights the partnerships and opportunities for local authority buy-in, the creation of appropriate partnerships and development.

The Mayor's programmes listed above are challenging but achievable provided certain conditions are fulfilled. Economic incentivisation is identified as essential to driving the uptake of a decentralised energy strategy. These policy drivers are emerging and will only improve the opportunities for partnership (PFIs and PPPs) and delivery but will need to be coupled with adequate levels of funding.

A key requirement to ensure that the CHP programme is delivered is also the creation of statutory frameworks that incentivise the uptake and delivery of these programmes including resolving issues around competition and the role of OFGEM. Existing technical issues around connecting district heating systems to the grid will also need solutions. In the case of the implementation of decentralised energy schemes, energy demand forecasting for Central London should be undertaken to establish optimum phasing for areas identified for intensification or considered to be opportunity areas. Specific timeframes for delivery should be presented and adhered to. A monitoring role could be through the LDA's Decentralised Energy Delivery (DED) Unit.

The role of the Central London authorities is critical in developing local planning policy to create expectations for new and existing developments to connect to distributed energy networks, further incentivising uptake. There is an expectation on local authorities to implement the aims and objectives of national planning policy

3.4. Telecommunications

3.4.1. Baseline

BT, given their history as the GPO, has been considered to be the significant provider for the study zone. However there are an increasing number of 'host' providers offering connection to telecommunication networks in the study area, such as Virgin Media, Cable and Wireless, Kingston Communications and Global Crossing to name but a few possible alternatives. Wider issues relating to these providers have been considered also.

The consultant team applied to BT in order to obtain information on the baseline position, forecast demand for and planned provision of telecommunication services, and forecast costs and investment⁷⁴. A comprehensive response was not forth-coming, though some data on highway works was supplied. There are no published BT documents on long term planning for demand in the Central London area or which quantify current usage.

BT utilise a mixture of fibre optic cables as well as copper cables. Historically, the copper network would have afforded connectivity but as demand for higher quality telephone and / or data transmission, fibre optic cabling will become increasingly utilised for all aspects of the service. This is especially relevant for businesses, though the recently announced government aspiration for all homes to have broadband by 2012 highlights the implications of changing lifestyles at home as well⁷⁵.

3.4.2. Forecast Demand and Planned Provision

With regard to new development opportunities, alternative providers are increasingly offering connection to telecommunication networks, often via the application of high quality lines secured via fibre optic. The result is that there are other providers vying for the same highway space, which is known to be limited, or sharing duct tracks with providers whom already have infrastructure in place (effectively renting duct space).

Discussions with BT have identified that the works in the highway to complete renewals and / or new duct tracks are likely to increase on average by 15%, or so, by 2026. Southwark and Islington will see an increase in planned works of circa 33% and 24% respectively. Conversely, Westminster, whilst experiencing the highest volume of planned works will only see an increase of circa 9%.

This information provides limited insight given that works can be so diverse. For example, there is no delineation of whether the proposed project covers the replacement of 250m of cable or 4km, and not all works are necessarily intrusive.

BT do not have plans for establishing new exchanges at this stage but they are looking at high fault areas, or ageing networks, so that priority replacement works can be targeted.

⁷⁴ Initial contact with EDF made via letter to Chairman's office, Dec 08; email correspondence followed (Dec 08 - Jan 08).

⁷⁵ Digital Britain report, Department of Culture, Media and Sport, 2009

The outcomes of the consultation with BT demonstrate that the provider is geared up to react to forth-coming schemes rather than to forward plan in a strategic way. Certainly, technology does change very quickly and therefore strategic planning is somewhat limited, given that end user demands change in line with opportunities. However, residential requirements and applications are likely to be more static.

Whilst the cabling and associated technology changes at some pace, there is every opportunity for BT, and other providers if appropriate, to install new infrastructure duct work early on in the development process so that demand for new connections can be delivered relatively easily and without repetitive disruption to stakeholders in the area.

3.4.3. Forecast Costs and Planned Investment

No information was available on forecast costs and planned investment for telecommunications infrastructure.

Funding frameworks have changed in recent years. For local schemes, BT now charge beyond a certain ceiling for connections (previously connections were free); strategic works can be funded out of BT's overhead structure. Contact made with British Telecom to identify any investment committed to expanding or upgrading strategic infrastructure has been so far unsuccessful.

3.4.4. Conclusions

The consultation process indicates that BT is set up to respond reactively to development rather than to plan provision in a strategic way. In general capacity constraints are less of an issue for telecommunications than for some other areas of infrastructure.

Early and ongoing communication by Central London authorities is suggested so that a co-ordinated delivery can be established and to minimise risks to the delivery of growth. Again, it may be useful to review options for the strategic planning regulatory framework.

3.5. Water

3.5.1. Baseline

Clean water to the London authorities included within the Infrastructure Study is supplied by Thames Water. The Thames Water supply area is divided into six independent water resource zones. The largest of these is London which covers the Greater London Area.

Attempts to engage with Thames Water were made up to Chief Executive level. No one was available to meet with the consultant team until April 2009. The estimates of forecast demand were forwarded as well but again no response was offered. This section therefore reflects information obtained from published documentation only, namely the Thames Water Water Resources Management Plan (draft for consultation).

The clean water resources for London zone are largely based on abstraction from rivers which is stored in reservoirs. The clean water resources for the areas subject to the Infrastructure Study are drawn from the Rivers Thames and Lee.

In the whole of their supply area for the year 2006/07, Thames Water estimated that household consumption accounted for 47% of demand, non-household consumption 21%, and unbilled and operational use 2%. Leakage accounted for 30% of demand, split into 22% distribution losses (mains in road) and 8% customer supply pipe (individual service pipes to properties) leakage.

No data is available on current levels of water consumption.

3.5.2. Forecast Demand and Planned Provision

Thames Water assesses that up until 2034/35 within the London zone the population will rise by 1m people with a consideration via an additional allowance for clandestine ('uncounted') population and / or short term migrant population. Over the whole of its supply area, Thames Water estimate that each person uses on average 160 litres of water per day although conventional planning approaches normally apply a slightly lower range of 150l/day.

Water use per person is affected by several factors; typically, these are household occupancy, water use via appliances, fixture and fittings within the property, householders' water use behaviour, garden use and whether the property is metered or not. It is certainly possible that per capita usage of water will decrease in future years due to the economic climate, policy drivers such as the Code for Sustainable Homes and supply-side measures such as use of harvested rainwater. Thames Water identify that although there is increasing pressure to use more water efficient appliances and an improvement in the education of the wider population to use water more wisely, this will not be enough to off-set other factors. They forecast that overall demand for water will rise due to an increasing population, an increase rise in single occupancy houses still using all the appliances of a larger unit, smaller family groups and climate change.

Thames Water has calculated non-household volumes by subtracting measured household volumes from total billed measured volumes and, from this reasonably basic assessment, they have produced forecasts for both service and non-service sectors in each WRZ. The outcomes of their calculations are not published.

The London zone is predominantly made up of service sector industries and Thames Water indicate that there has been a marked decline in non-service demand (mainly in the food, drink and tobacco sector), though this reduction has been more than off-set by a rise in the service sector demand.

Based on current forecasts Thames Water predict as a whole that the London zone will have a supply demand deficit increasing from 2% in 2009/10 to 20% by 2034/35 without expanded provision. The deficit is essentially being driven by demand but leakage management may off set an element of the shortfall.

Current thinking is that there is a proposal to follow a 'twin track approach' in balancing the supply and demand which involves the use of enhanced demand management activities combined with the development of new resource schemes.

Initially, Thames Water is proposing a significant programme of demand management to close the supply demand deficit which primarily include leakage reduction techniques (the replacement of Victorian mains) and active leakage control; in addition, a progressive programme to employ compulsory metering (the plan being to increase the proportion of domestic properties with meters from 25% to approximately 54% over the next 5 years) and establish an enhanced water efficiency programme.

Management of demand alone however is unlikely to close the deficit and therefore a desalination water treatment plant is being constructed in Beckton and works are already underway. Further afield, there are also plans for construction of a large reservoir in Oxfordshire which it is hoped will be operational by 2021.

URS model have estimated likely additional demand for potable water to 2026. The methodology and assumptions are described in **Appendices 3** and **4**. As no response to the workings was obtained from Thames Water, it is not possible to comment on how the outcomes of the modelling exercise compare to the providers' calculations of future demand.

Table 3-8 indicates that additional demand for potable water could total 81.2m litres per day across the six Central London authorities up to 2026.

Table 3-8: URS Assessment of Additional Demand for Water from New Development, L/day, 2006 - 2026

<i>Local Authority</i>	<i>Residential Demand</i>	<i>Non Residential Demand</i>	<i>Total Demand</i>
City of London	634,041	6,148,264	6,782,306
Camden	5,276,281	4,098,465	9,374,746
Islington	6,818,070	2,919,840	9,737,910
Kensington & Chelsea	2,465,717	1,689,194	4,154,911
Southwark	11,483,195	4,273,164	15,756,359
Westminster	3,876,000	9,287,847	13,163,847
<i>Central London Sub-total</i>	<i>151,296</i>	<i>379,971</i>	<i>531,267</i>
Hackney	7,643,722	1,726,556	9,370,278
Tower Hamlets	22,191,450	7,279,283	29,470,732
Lambeth	7,749,395	1,983,583	9,732,978

Source: URS calculations A4 and R4 Sheets

3.5.3. Forecast Costs and Planned Investment

No costs are available for the schemes described above.

As for the previous infrastructure areas, funding for strategic long term projects will be sourced from Thames Waters' revenue, while developers may make contributions to more local infrastructure associated with specific schemes.

3.5.4. Conclusions

Thames Water have identified a likely future deficit in supply of water in the London water resource zone to 2034, and strategic plans to address this are being formulated. However detailed information on the methodology used to establish estimated demand and of the investment programmes was not available. Therefore a meaningful comparison with the URS model estimates of demand, and a critique of the needs assessment, was not possible.

Like the other utility providers, Thames Water is in the main set up to respond to detailed development schemes as they come forward and their capacity to engage in meaningful dialogue with partners on strategic planning is somewhat limited. This is a flaw in the existing system and a risk to growth. Central London authorities should make efforts to engage in meaningful dialogue with Thames Water at the earliest possible stage in the authorities' strategic planning process.

3.6. Sewers and Sewerage Infrastructure

3.6.1. Baseline

The sewers in Central London are owned and operated by Thames Water. London's sewers were originally designed in the 19th century as a combined surface and foul water system based on a much smaller population. Thames Water own and operate 68,000 km of sewer, 800,000 manholes, 2,530 pumping stations and 349 sewage treatment works receiving 4.3 million cubic meters of sewage per day. The three main treatment plants for the Central London area are Beckton and Crossness in East London and Mogden in West London.

In times of high rainfall the system overflows into the Thames via combined sewerage outfalls. The system has expanded in line with economic and population growth and increasing rainfall intensities. Sewer flooding is disproportionately high in Central London due to the number of basement dwellings and the fact that rainwater is mixed with foul sewage in a combined system. For example in Camden, sewer flooding occurred in August 2002, caused by excessive rainfall causing sewers to surcharge in the Hampstead area, forcing water back up the system into the streets and into residential dwellings at basement and ground floor level⁷⁶. Around 90 Camden properties were affected by sewer flooding in the past 10 years according to Thames Water records. In Westminster, sewer flooding of residential properties occurred in a total of 8 properties within the SW1 V1 and SW1 V2 postcode areas between 1997 and 2007⁷⁷. According to Westminster City Council, sewer flooding is confined to a few isolated areas including the area between the northern end of Whitehall and Trafalgar Square, the area around Chippenham Road and along Westbourne Grove, the latter area having been severely affected during the July 2007 floods. In response, Thames Water are currently constructing a sewer relief scheme on Westbourne Grove involving laying a new 1.5m diameter sewer and underground storage sewer within the Hatfield Estate.

An assessment was undertaken of the volume of sewage treated by Thames Water per day under the baseline scenario as shown in **Table 3-9**, and is compared with the 2026 scenario in the next sub-section. The foul flow rates generated by the baseline residential population and commercial areas⁷⁸ were calculated using the standard industry procedure used to design adoptable sewers, 'Sewers for Adoption'⁷⁹. These flow rates were compared with flow rates received at Thames Water treatment works calculated

⁷⁶ North London Strategic Flood Risk Assessment, Mouchel, August 2008.

⁷⁷ Draft Westminster Strategic Flood Risk Assessment, Halcrow, August 2008.

⁷⁸ Commercial floorspace is assumed to comprise office and retail space only as baseline figures for leisure are not available.

⁷⁹ Sewers for Adoption 6th Edition, Water Research Council, clause 2.12.2. Residential flow rates are based on 200 L/day and commercial rates are based on 1.1 L/s/hectare.

from data provided by Thames Water⁸⁰ (see **Appendix 2** for an outline of the assumptions and **Appendix 3** for the model calculations).

Table 3-9: URS Assessment of Sewer Flow Rates Compared to Thames Water Data, L/day, 2006

<i>Development</i>		<i>Foul Flow Rates Calculated Using 'Sewers for Adoption'</i>	<i>Combined Sewage Treated by Thames Water</i>
Residential population	1,813,000	362.6m	-
Commercial area	2,495 hectare	237.1m	-
Total		600.0m	577.5m

As shown the foul flow generated by residential, office and retail development is approximately equal to the volume treated by Thames Water for Central London. No account is taken of surface water flow rates, or of foul flow rates generated by other forms of development. The sewage leaving the system via outfalls into rivers is also neglected. The data made available for the study was limited and therefore it is emphasised that the assessment is approximate.

3.6.2. Forecast Demand and Planned Provision

Sewer flooding has been worsened in the past due to urbanisation, most significantly where gardens have been paved over preventing rainwater from soaking into the soil naturally. The implementation of Sustainable Urban Drainage Systems (SUDS) in new developments will also be an important measure mitigating increased run-off from developed areas⁸¹.

Planning Policy Statement 25, Development and Flood Risk indicates that the anticipated increase in rainfall intensity due to climate change is estimated to be 5% in the period up to 2025. Extreme rainfall events are predicted to increase in frequency over the years requiring greater capacity in sewers. Hotter, drier summers will increase the demand for water and therefore increase pressure on sewers.

Average household occupancy is anticipated to decrease, which will increase per capita water use. Metering of household water is being introduced in an attempt to counteract increasing water demand. Water meters will be installed in 28% of households by 2010 and 84% by 2025.

⁸⁰ Thames Water treats 4.3m cubic metres of sewage per day for 13.5m customers in their region, or 319 L/day per customer <http://www.thameswater.co.uk/cps/rde/xchg/corp/hs.xsl/4625.htm> Thames Water, About Us, Our Business, Facts and Figures. Accessed on 13 February 2009.

⁸¹ SUDS are designed to mimic the rainwater attenuation properties of a natural landscape and prevent large volumes of surface water runoff into the sewer system following intense rainstorms. SUDS can significantly reduce surface water or sewer flooding.

Investment in treatment works will be required to meet increasingly stringent water quality targets. Thames Water has legal obligations set at EU and national UK level to meet effluent quality targets. The Environment Agency (EA) and the Department for Environment, Food and Rural Affairs (DEFRA) are responsible for making sure Thames Water meets environmental standards for treated sewage effluent. Each treatment works has a permit to discharge and if effluent quality targets are not met Thames Water can be prosecuted by the Environment Agency. Population growth in recent years has increased pressure on treatment works, which increases the risk of breach in effluent quality targets.

Combined sewerage outfalls discharge to the River Thames and River Lee. Currently, combined sewage overflows into the tidal reaches of the River Thames which is an infringement of the EU Urban Wastewater Treatment Directive. To address requirements for quality improvements, the proposed Thames Tideway project⁸², the Lee and Thames Tideway Tunnels, will capture and transport raw sewage that would otherwise discharge into the watercourses. These discharges create foul conditions in the river, resulting in an elevated health risk to river users and damage to the ecology of the river. The project will also help to alleviate some of the flood risk due to sewers and surface water, and is illustrated in **Figure 3-14**.

Future development in Central London will therefore necessitate investment in new sewerage infrastructure to increase capacity. In addition, existing assets will continue to require maintenance and improvements. Possible measures to meet future expansion in levels of service provision include the following:

- New infrastructure to accommodate population and employment growth and sewer flooding alleviation
- Upgrades to treatment works including treated effluent quality, sludge capacity and odour reduction
- Tideway Tunnel and associated improvements to Beckton treatment works.

Thames Water estimates that the number of properties at risk will be 2,000 in 2010 rising to 4,000 by 2015. Thames Water has committed to virtually eliminate high risk sewer flooding by 2035, by installing oversized pipes or tanks to increase sewer capacity. It is

⁸² The Thames Tideway project comprises two new tunnels to substantially reduce the amount of untreated sewage discharged to the River Thames and its tributary the River Lee after heavy rainfall via 57 Combined Sewage Outfalls (CSOs). The Lee tunnel will run for 7 km from Stratford to Beckton sewage treatment works and will isolate the CSO discharging from Abbey Mills Pumping Station. The tunnel will isolate half the total volume of discharges that currently enter the River Thames. A planning application submitted in May 2008 is currently still pending. Construction is scheduled to start in 2009 and finish in 2014. The Thames Tunnel is a larger project which will comprise a 32 km long tunnel under the Thames from the west of the city to Beckton treatment works although the precise route is yet to be determined. Construction is provisionally scheduled to start in 2012 and finish in 2020. At this stage Thames Water expect to submit a planning application in late 2011. The overflow of untreated sewage into the Thames is a legacy of the original design for London's sewers and currently occurs around once per week. On average 32 million cubic metres is discharged every year. The proposed Thames Tideway has still not yet received planning permission and therefore may not be implemented in its planned form.

not yet possible to determine areas that will be at risk of sewer flooding by 2026 because network models are still being developed to assess where capacity improvements are required.

The volume of sewage treated per day in 2026 was estimated based on predicted growth figures, to evaluate Thames Water's plans and thereby check for gaps in provision of sewerage infrastructure. The same method was used as in the baseline section, subject to the same limitations, using the predicted residential population and commercial floorspace⁸³ and 'Sewers for Adoption'⁸⁴. These flow rates were compared with flow rates received at Thames Water treatment works calculated from data provided by Thames Water⁸⁵.

Table 3-10: URS Assessment of Additional Sewer Flow Rates from New Development Compared to Thames Water Data, L/day, 2006 - 2026

<i>Development</i>		<i>Foul Flow Rates Calculated Using 'Sewers for Adoption'</i>	<i>Combined Sewage Treated by Thames Water</i>
Residential population	2,275,054	455.0m	-
Commercial area	3,204 hectares	304.5m	-
Total		759.5m	716.3m

Similar to the baseline scenario, the calculated foul flow for the 2026 scenario is approximately equal to the volume treated by Thames Water for Central London. The assessment indicates that in general, Thames Water has adequately predicted the sewerage infrastructure required by the future planned development⁸⁶.

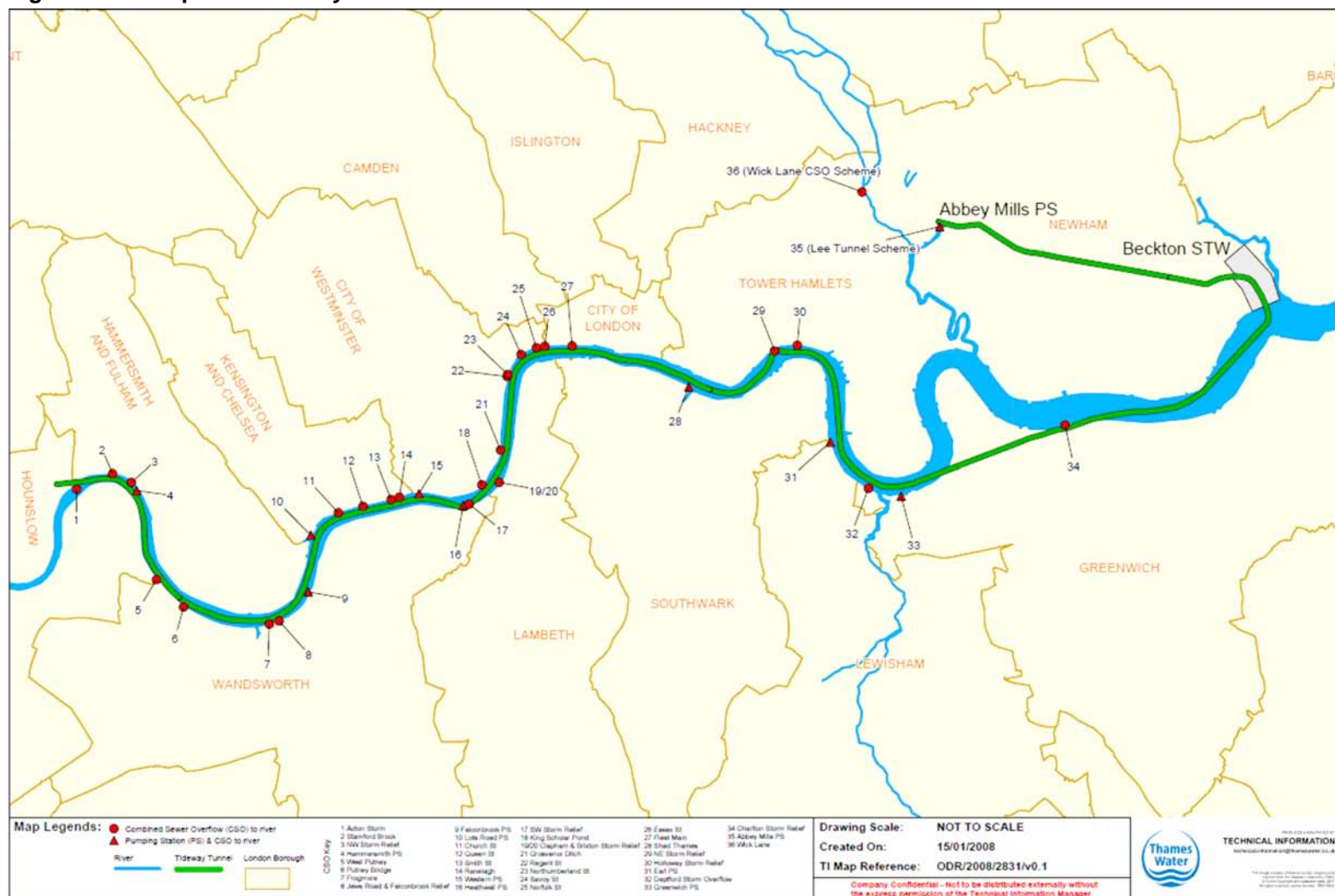
⁸³ Commercial area is assumed to comprise office and retail space only.

⁸⁴ Sewers for Adoption 6th Edition, Water Research Council, clause 2.12.2. Residential flow rates are based on 200 L/day and commercial rates are based on 1.1 L/s/hectare.

⁸⁵ Thames Water treats an estimated 319 L/day per customer and will serve an estimated 14.4M customers by 2026 as detailed in the Appendix.

⁸⁶ Given the scale of the estimated additional demand existing shortfalls could be addressed contextually to an expansion in capacity.

Figure 3-14: Proposed Tideway Tunnel Route and Connected Combined Sewer Overflow



Source: Thames Water

3.6.3. Forecast Costs and Planned Investment

Existing assets require routine maintenance costing on average £1bn per year⁸⁷ for both water supply and sewerage across the Thames Water region, equivalent to £133m per year for the Central London study area⁸⁸.

Table 3-11 below shows capital investment in sewerage infrastructure within Central London. Detailed investment information is available for the period from 2010 to 2015 and more approximate costs are available for 2015-2020. Projects will be funded by revenue from Thames Water customers averaged over the whole Thames Water region.

It was not possible to extract precise details of plans relating to the Central London area because Thames Water's investment plans relate not only Central London but also most of the Thames catchment area, from Warwickshire to Sussex and from Gloucestershire to Essex. The entire Thames Water region constitutes a total area of 37,700 km² of which Central London is only 167 km², or 0.4% by area. In terms of population Central London is more significant; around 1.8m people live in Central London compared to a total population of 13.5m in the Thames Region or 13% by population.

In response to a request for information regarding proposed investment in sewerage infrastructure specific to Central London, Thames Water stated that:

*"(The) best (approach) is to go with the figures set out in our published draft business plan for the next 5 years (as on the website). The figures are for the total catchment **but are very difficult to break down to a London base level**. It should also be noted that AMP5 investment won't be agreed until next year, and AMP6 and AMP7 funding will be agreed 5 and 10 years respectively after that."*

Therefore investment figures for Central London were estimated based on equivalent population.

⁸⁷ 'Taking Care of Water – The Next 25 Years (2010-2035)' (Thames Water)

⁸⁸ Based on equivalent population of 1.8m in Central London compared to 13.5m in the Thames Water region.

Table 3-11: Capital Investment in Sewerage Infrastructure in Central London, 2007 – 2025

Key Activity Projections	Estimated Central London (Thames Water Region cost in brackets)⁸⁹			
	2007-2010	2010-2015	2015-2020	2020-2025
New and renovated sewers		£306m (£2,297m)	£277m (£2,079m)	
New and refurbished treatment works		£234m (£1,755m)	£224m (£1,682m)	
New and refurbished pumping stations		£17m (£125m)	£16m (£118m)	
Management and general costs		£25m (£191m)	£27m (£199m)	
Thames Tideway Project		£176m (£1,321.3m)		
Total Central London	£160m	£583m	£544m	£537m⁹⁰
Total Thames Water Region	£1,200m	£4,369m	£4,080m	£4,025m

Source: "Taking Care of Water – The Next 25 Years (2010-2035)", Thames Water p. 67; "Five-Year Plan from 2010 to 2015", Draft Report, Thames Water p. 88-89

3.6.4. Conclusions

The assessment of foul flow rates for the baseline and 2026 scenarios shown above indicates that Thames Water have adequately predicted the sewerage infrastructure required for Central London up to 2026. Currently sewer flooding is known to be widespread and is predicted to deteriorate by 2015. Thames Water is undertaking a sewer alleviation programme but this will not be completed until 2035, 9 years after the end of the study period.

There are potential gaps in provision as a result of the current planning system arrangements. Under the current planning regime, developers have an automatic right to connect new developments to the public sewer system once planning permission has been granted⁹¹. Using Westminster City Council as an example⁹², in consultations with Thames Water discussing whether planning permission would be conditional on demonstration that sufficient sewerage capacity either exists already or would be funded by the developer, Thames Water commented that:

⁸⁹ Estimated Central London cost is based on population equivalent: Central London population is 1.8m; Thames Water Region population is 13.5m.

⁹⁰ Based on predicted total capital investment of £5,750m in 2020-2025 assuming 70% covers sewerage (the rest covers water supply), based on long term cost assessments ("Taking Care of Water – The Next 25 Years (2010-2035)", Thames Water, p. 67)

⁹¹ Pitt Report Executive Summary, paragraph ES.28

⁹² City of Westminster, Local Development Framework, Core Strategy Preferred Options, July 2008, p43

“Water and sewerage undertakers have limited powers under the Water Industry Act to prevent connection ahead of infrastructure upgrades... where there is a (sewer) capacity problem and no improvements are programmed ... the developer needs to contact the undertaker to agree what improvements are required and how they will be funded.”

As identified by Westminster City Council, there is a potential risk that an individual developer is not able to fund the necessary sewer upgrade, which may present a barrier to future development.

“To require individual developments to provide infrastructure would unreasonably constrain development, and would fail to accord with the London Plan... that looks to fund infrastructure partly through pooled contributions.”⁹³

Thames Water has based their investment projections on existing asset maintenance costs and projections of required improvements and additional infrastructure required to meet forecasted demand. Several factors may have an impact on the predicted investment plans as summarised in **Table 3-12**, including public expectations, the state of physical assets and the external environment.

Table 3-12: Potential Factors Affecting Future Required Investment in Sewers in Central London

Population	Assets	External Environment
Demographic changes: Increasingly mobile and/or transient population makes it difficult to predict demand for sewerage services	Innovations in treatment technology such as fuel cells	Extent of climate change may differ from predictions
Evolving public expectations regarding level of service, e.g. sewer flooding and river water quality	Efficiency improvements such as automated monitoring	Downturn in the economy will constrain investment; market forces will affect demand and price for sewage services
Adaptation to and tolerance of climate change impacts, e.g. increased water use in the summer months; if Greywater recycling becomes common place (i.e. rainwater harvesting for garden use and wc flushing) demand may be reduced	Development of smaller scale, localised solutions Resilience of assets to climate change impacts - degradation may be accelerated or capacity exceeded Pressure to cut carbon emissions	Changing land use plans could alter existing / forecast drainage patterns Restructuring of the water industry to stimulate competition will affect investment plans Tightening legislative and regulatory environment

Source: “Taking Care of Water – The Next 25 Years (2010-2035)”, Thames Water p. 13

⁹³ City of Westminster, Local Development Framework, Core Strategy Preferred Options, (July 2008)

3.7. Flood Risk

3.7.1. Baseline

Sources of Flood Risk

The potential sources of flood risk assessed for each of the ten local authorities include groundwater, sewer, surface water, fluvial, and tidal. In addition, the flood risks caused by canals and reservoirs that have been identified in the SFRA have been noted. Each source of flooding has been given a degree of risk as high, medium or low corresponding with the results determined in the SFRA. See **Table 3-13** for a summary of these findings.

Table 3-13: Sources of Flooding and Degree of Risk (in Accordance with the Findings of the Local Authorities' SFRA)⁹⁴

<i>Local Authority</i>	<i>Sources of Flooding</i>					<i>Reservoirs, Canals and Docks</i>
	<i>Groundwater</i>	<i>Sewer</i>	<i>Surface water</i>	<i>Fluvial</i>	<i>Tidal</i>	
Westminster	Low	High	High	High	Low – High Residual	Low
Camden	Low	Medium	Medium	None	None	Medium
City of London	Low	Low	Low	Low	Low – High Residual	None
Hackney	Low	Low	Low	Medium	Medium	High
Islington	Low	Low	Low	None	None	Medium
Kensington and Chelsea	Low – no records	High	High	None	Low – High Residual	None
Lambeth	♦	♦	♦	♦	♦	♦
Southwark	Low	High	High	Low	Low – High Residual	Low
Tower Hamlets	Medium	Medium	Medium	Medium	Low - defended	Low
Wandsworth	♦	♦	♦	♦	♦	♦

♦ To date the SFRA for Lambeth has not been published. The SFRA for Wandsworth is now available though it was published too late for inclusion in this report's analysis.

It appears that all local authorities with SFRA are reporting low to medium groundwater flooding concerns. To this end, each local authority should continue to work with General Aquifer Research Development and Investigation Team (GARDIT) formed by Thames Water Utilities, London Underground Limited and the Environment Agency (EA) in 1992

⁹⁴ The degree of risk is defined by the authors of the SFRA for each borough.

to mitigate the problem. GARDIT has been able to increase the groundwater abstraction in London by up to 50 million litres per day (Ml/d), which has reduced the rate of groundwater rise considerably. While the groundwater is not directly potable; it can be used for industrial processing, spray irrigation, topping up wildlife ponds, dust suppression, and other various non-potable uses. It could also be used as a water source for water treatment plants.

In all local authorities there is a sewerage and surface water flood risk of some degree. This condition is caused by the majority of the sewers in the area being combined foul and surface water sewers that are at capacity during 1 in 1 year and 1 in 2 year storm events. Therefore, small storm events can cause extensive sewer flooding where surface water overwhelms the sewerage network. Surface water flooding then occurs when the excess surface water ponds or flows downhill as overland flow. Climate change is likely to worsen this condition because rainfall is forecast to become more intense. Schemes such as the Thames Tideway Tunnel scheme will provide increased capacity in the sewerage network and provide sewerage overflow attenuation.

The fluvial and tidal risks in the local authorities are due to the River Thames and its tributaries. The Thames Barrier along with 32km of flood defences protects the local authorities of London for storms up to and including the 1 in 1000 year or 0.1% annual probability storm event. However, in 2030 the barrier is expected to reach its design life due to the unanticipated increasing rate in sea level rise. In addition, the flood defence walls will no longer be high enough to contain the river during extreme storm events. Thames Estuary 2100 (TE2100) is an Environment Agency project to develop a tidal flood risk management plan for the Thames estuary through to the end of the century. The plan will evaluate the region flood risk including the effects of climate change, rising sea levels and the aging of existing flood defences. The EA's website states that TE 2100 is due to be submitted to the Government in March 2010.

In six local authorities reservoirs, canals and docks pose a potential flood risk. If the dams retaining these water bodies fail then the areas surrounding them would be inundated with water. Chapter 19 - *Effective Management of Dams and Reservoirs* of The Pitt Review⁹⁵ states that reservoir undertakers may be legislated to prepare a flood plan setting out how they would control or mitigate the effects of flooding likely to result from the escape of water from both large and small reservoirs. The Government has indicated that a Draft Bill legislating this requirement may be available in the spring of 2009. It is unknown at this time what the final wording of the legislation will be and whose responsibility it will be to prepare inundation maps for large and small reservoirs.

Flood Defences

Within in each SFRA, the presence of flood defences has been identified. In many cases, the EA's National Flood and Coastal Defence Database (NFCDD) grades for the River Thames flood defences have also been identified. **Table 3-14** contains the flood defence grade findings for each of the local authorities.

Table 3-14: Flood Defence Grades (in Accordance with the Findings of the Local Authorities' SFRA)

Local Authority	Flood Defence NFCDD* grades	SFRA reference
Westminster	Flood defence wall is in good (grade 2) condition, though there is anecdotal evidence of one section (Milbank) being subject to seepage	Appendix 1: Westminster Breach Analysis and Surface Water Flooding Assessment, Section 2.2.2 and 2.2.3
Camden	No flood defences	Map 15: Camden & Islington Flood Defence Asset Condition Map
City of London	49 flood defences – 43 grade 1 or 2, 4 grade 3, 1 grade 4 Two of the grade 3 and 4 flood defences are scheduled for replacement during the forthcoming year (2008).	Map 9: Flood Defence Gratings
Hackney	Canal flood defences graded 2, 3	Map 16: Hackney Flood Defence Asset Condition
Islington	No flood defences	Map 15: Camden & Islington Flood Defence Asset Condition Map
Kensington and Chelsea	Majority of flood defences are a grade 2 with a few areas graded 3	Map 12: Breach Locations & Flood Defence Conditions
Lambeth	♦	
Southwark	Majority of flood defences are a grade 2 with some areas graded 1 and 3	Fig 2A: Flood Defences
Tower Hamlets	NFCDD data was obtained for the SFRA; but the grades of the flood defences were not identified in the report	n/a
Wandsworth	♦	

* Data provided by the Environment Agency to the authors of the SFRA from the National Flood and Coastal Defence Database (NFCDD). Grades - Very Good (1), Good (2), Fair (3), Poor (4), Very Poor (5)

♦ To date the SFRA for Lambeth has not been published. The SFRA for Wandsworth is now available though it was published too late for inclusion in this report's analysis.

For those local authorities along the River Thames, the majority of the flood defences are graded by NFCDD as in good condition (grade 2). URS recommends that the local authorities should work to maintain this condition level by shoring up any areas with defences identified as fair (grade 3), poor (grade 4) or very poor (grade 5) by the Environment Agency. In any case where a flood defence in need of maintenance is near the boundary of a local authority, the local authorities should work together to make sure that the location of the flood defence does not hinder its repair.

⁹⁵ The Pitt Review (June 2008), Learning Lessons from the 2007 Floods, London

3.7.2. Forecast Demand and Planned Provision

The effects of climate change on both rainfall intensities and sea level rise pose serious flood risk concerns from a variety of sources.

In 2030 the Thames barrier is expected to reach its design life due to the unanticipated increasing rate in sea level rise. In addition, the flood defence walls will no longer be high enough to contain the river during extreme storm events. Thames Estuary 2100 (TE2100) is an Environment Agency (EA) project to develop a tidal flood risk management plan for the Thames estuary through to the end of the century. The plan will evaluate the region's flood risk including the effects of climate change, rising sea levels and the aging of existing flood defences. The EA's website states that TE 2100 is due to be submitted to the Government in March 2010. The results of TE 2100 should outline other areas of investment that can be pursued by London authorities.

Landowners of sites (riparian owners) have legal responsibility to maintain and repair defences of sites adjacent to the Thames. As well as planning flood for fluvial and tidal flood risk on a long term basis, the EA inspects flood defences twice a year and enforces the obligation for action if necessary. The EA has a contributions policy which can help landowners with costs where necessary.

In terms of sewerage and surface flooding, Thames Water has a five year Asset Management Plan and also a 25 year investment plan which covers measures to maintain sewers and reduce flooding; see **Section 3.6** for full details. The Thames Tideway scheme will help to alleviate some of the risk. Construction on this scheme is expected to start in 2009 and to complete in 2020.

3.7.3. Forecast Costs and Planned Investment

There is insufficient data to enable costs associated with flood defences in the Central London local authorities to be separated from higher level cost information available from Thames Water and the EA.

Thames Water plan to invest approximately £2bn in the Thames Tideway storm overflow scheme, which will help to alleviate some of the flood risk due to sewers and surface water. See **Section 3.6** for further details. Although construction of this scheme is set to start in 2009, detailed information and costs are not available⁹⁶.

The results of TE 2100 should outline other areas of investment that can be pursued by the local authorities to protect their areas.

⁹⁶ The Thames Tideway scheme is at an early stage, with no final design nor planning application submitted yet. As such the only information publicly available is the one to be found on Thames Water website. Contact was made with Thames Water by email on 6 and 26 November and 1 December 2008 and by telephone over the same period.

3.7.4. Conclusions

Thames Water and the EA are making long term plans to mitigate flood risk through the Thames Tunnel and TE2100 schemes. However there is insufficient data available on these planned investments to enable a detailed assessment of these strategies to manage increased flood risk, or to identify costs specifically associated with Central London.

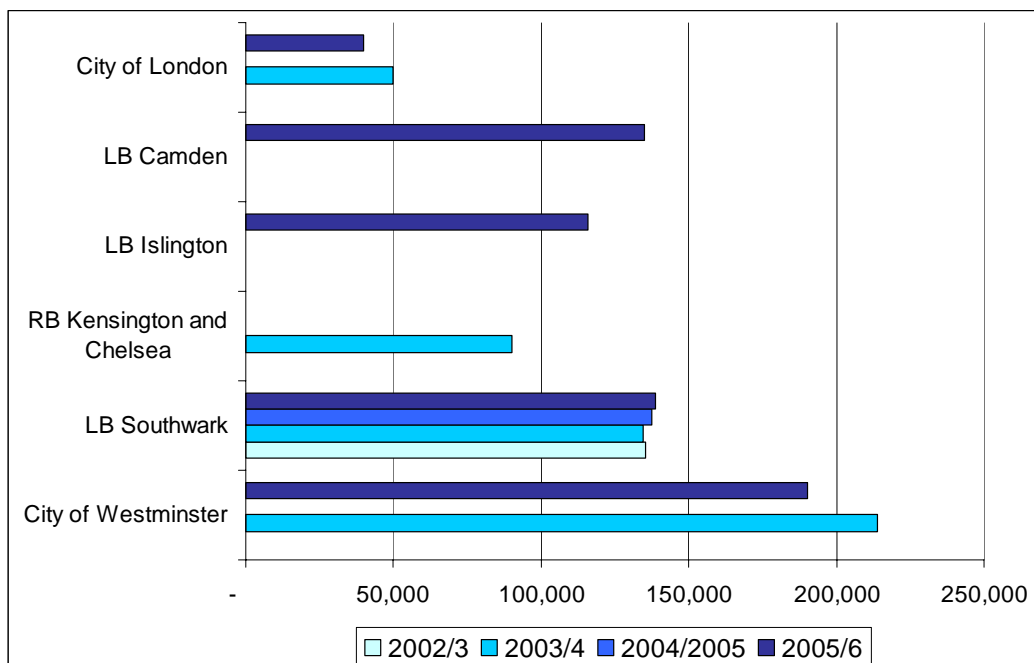
While maintaining hard flood defences is vital, it will be important for the local authorities to work together with the Environment Agency to implement a unified set of flood management standards, as well as with Thames Water and other agencies involved in the planning and funding of these schemes. Currently there are a variety of standards that provide guidance on flood risk and defence including: Planning Policy Statement 25 (PPS25): *Development and Flood Risk*, the London Plan, each local authority's Strategic Flood Risk Assessment (once published) and local planning guidance (either Unitary Development Plan or Local Plan). These standards should help reduce the amount of surface water generated by proposed developments by requiring the implementation of sustainable drainage systems (SUDS) and encourage the implementation of flood resilient architecture.

3.8. Waste Management

3.8.1. Baseline

Some baseline data for each of the local authorities is available, although as shown in the figure below a number of data sets are not reported. The amount of Municipal Solid Waste (MSW) generated by local authority is shown below:

Figure 3-15: Municipal Solid Waste Generated, 2003 – 2006



Source: URS Research, see **Appendix 1** for a thorough list of the sources.

The capacity for treating and disposing of municipal waste in London is restricted and primarily centres on incineration, using two Energy from Waste incinerator plants, one in Edmonton (London Borough of Enfield) and one in Lewisham (London Borough of Lewisham). According to the GLA, in 2001/2002 approximately 19% of London's municipal waste was incinerated at these two plants (530,000 tonnes/annum at Edmonton and 419,000 tonnes at Lewisham). London's incineration capacity is estimated by the GLA to be 1.5 million tonnes/annum.

According to the GLA, a large amount (73% in 2001/2002) of municipal waste generated in London is disposed of to landfill outside Greater London. In 2001/2002, only 38% of London's municipal waste was dealt with within London's boundaries; 865,266 tonnes was incinerated, 484,944 tonnes landfilled, and 350,518 tonnes was recycled.

According to the GLA, a total of 50,574 tonnes of organic waste was collected for composting in London in 2001/2002. There are a total of 60 composting facilities in London, with a current capacity of 51,000 tonnes/annum.

There is a reported capacity of 4.901 million tonnes of recyclables processing in London (including glass, mixed recyclables, oil, paper, plastics, wood, textiles, metals and cans). London also has 39 civic amenity sites accepting bulky wastes. The GLA reports that the majority of the London authorities have one or two civic amenity sites. There are none within the City of London, LB Hammersmith and Fulham, LB Hackney and City of Westminster boundaries. LB Croydon, LB Hillingdon and LB Ealing each have three sites.

According to the GLA, only two landfills (Rainham in Havering and Beddington Farm in Croydon) are able to accept municipal waste.

The City of London's residual municipal waste⁹⁷ is currently disposed of in Mucking Landfill in Essex. This landfill was due to close in 2007 but operations have been extended to 2010. An alternative landfill in Colchester has been identified for use after 2010.

Nearly half of the waste generated in North London Waste Authority, which includes the LB Camden and LB Islington, is still sent to landfill, mostly outside of London⁹⁸. Predicted MSW, construction, demolition and excavation waste arisings by the North London Waste Authority, which includes the LB Islington, LB Barnet, LB Enfield, LB Hackney, LB Haringey, LB Camden and LB Waltham Forest in 2020 are approximately 3,500,000 tonnes and the current capacity at existing facilities is approximately 1,750,000 tonnes. The City of Westminster transfers most (94% in 2003/2004) of its MSW out of its boundaries.

For Greater London or individual authorities to dispose of all the municipal waste they generate, more waste management facilities are required, including reprocessing facilities to meet the growing collections of recyclables. Given that the capacity for composting organic wastes in London only just exceeds the current throughput (based on 2001/2002 figures), there is likely to be a significant capacity shortage for organic waste collected for composting.

As outlined above there is considerable evidence of under-provision for dealing with MSW. Waste is primarily transferred, treated and disposed of outside the local authority in which it is generated.

3.8.2. Forecast Demand and Planned Provision

EU Directives and Regulations, National Regulations and Guidance, Regional Guidance and Local Policy are seen as future drivers of demand and supply.

The New Performance Framework for Local Authorities and Local Authorities Partnerships came into force in April 2008, defining requirements that must be met by

⁹⁷ It should be noted that in the City of London's municipal waste is a relatively small component of the overall amount of waste generated. The majority of the City's waste is predominantly dealt with by private contractors.

⁹⁸ The North London Waste Plan Draft North London Joint Waste Strategy, (2008) sets out the proposed waste strategy for the North London Waste Authority partners.

local authorities in order to meet national priorities. This includes targets/measures relating to residual household waste per head, household waste recycled and municipal waste landfilled, amongst others.

The Planning Policy Statement 10 (PPS10) published in 2005 requires that waste management requirements should be apportioned to waste planning authority areas by tonnage, and also specifies that the apportionments should be based upon relevant regional spatial planning, waste management issues and key waste planning objectives. In addition, the London Plan sets a target for all London authorities to be 85% self sufficient in managing their own waste by 2020. A waste apportionment study undertaken by Jacobs UK Limited discusses these requirements and concludes that, overall such a target could be met for London as a whole, provided appropriate investment in infrastructure is made, but that individual local authorities may not be able to meet the 85% target independently. As such the study apportions waste management in tonnes between the local authorities. According to the study, the local authorities included in the apportionment assessment would need to be able to manage the following tonnages of waste:

Table 3-15: Waste* Requiring Management, Tonnes, 2009-2020, from GLA Apportionment Study 2006

<i>Local Authority</i>	<i>2009/10</i>	<i>2015</i>	<i>2019/20</i>	<i>2020</i>
<i>Central London Forward Local Authorities</i>				
City of London	100,000	100,000	100,000	100,000
Camden	249,921	289,402	318,161	325,603
Islington	282,371	326,979	359,472	367,880
Kensington and Chelsea	251,830	291,614	320,592	328,091
Southwark	275,727	319,286	351,014	359,225
Westminster	163,788	189,663	208,511	213,388
Hackney	167,852	194,369	213,684	218,682
Lambeth	248,714	288,005	316,625	324,031
Tower Hamlets	345,960	400,613	440,423	450,725
Barking and Dagenham	496,360	574,774	631,890	646,670
Barnet	196,068	227,042	249,604	255,442
Bexley	540,600	626,003	688,210	704,308
Brent	444,793	515,060	566,242	579,487
Bromley	215,001	248,966	273,706	280,108
Croydon	290,743	336,674	370,130	378,788
Ealing	480,618	556,544	611,849	626,160
Enfield	419,241	485,471	533,714	546,198
Greenwich	413,370	478,673	526,239	538,548
Hammersmith and Fulham	270,796	313,575	344,736	352,800
Haringey	128,749	149,088	163,903	167,737

Local Authority	2009/10	2015	2019/20	2020
Harrow	235,645	272,872	299,988	307,004
Havering	397,240	459,995	505,706	517,534
Hillingdon	314,215	363,854	400,011	409,368
Hounslow	293,122	339,428	373,158	381,886
Kingston upon Thames	177,718	205,793	226,243	231,535
Lewisham	237,313	274,804	302,111	309,178
Merton	245,621	284,424	312,688	320,001
Newham	844,223	977,591	1,074,736	1,099,874
Redbridge	144,242	167,029	183,627	187,922
Richmond upon Thames	222,854	258,059	283,703	290,339
Sutton	279,366	323,499	355,646	363,964
Waltham Forest	226,478	262,256	288,317	295,061
Wandsworth	339,522	393,159	432,228	442,338

Source: GLA London Waste Apportionment Study (Jacobs Babbie, 2006)

**Municipal, industrial and commercial waste is included within these figures.*

In order to divert waste from landfill, the volume of waste which can be landfilled by local authorities will be restricted year on year due to the effects of EU Landfill Directive. The Waste Emissions Trading Act 2003 spreads the responsibility for meeting the EU Landfill Directive targets amongst all local authorities in the UK. Individual targets for each local authority have been set up to 2020. The Act also enables the Government to fine local authorities if they exceed these targets. In England, the fine equates to £150/tonne landfilled above the set target. For example, the City of London had an effective MSW to landfill target of 45,250 tonnes in 2005/2006, which will be reduced to 18,500 tonnes in 2020.

Local authorities are required to pay landfill tax on all wastes disposed of to landfill. For the current year 2008/2009 the tax levied is £32/tonne. This is set to increase by £8 per year until at least 2010/2011 and is therefore a significant financial driver for local authorities to divert wastes away from landfill; especially since the GLA report "Rethinking Rubbish in London The Mayors Municipal Waste Management Strategy", September 2003 indicates that local authorities have contributed around 60% of the gross landfill tax yield. However, some of the funds generated by the Landfill Tax scheme can be recouped for sustainable waste projects through the Landfill Tax Credits Scheme. According to the GLA Mayor's Municipal Waste Management Strategy, approximately £3.6 million of funding was allocated to London authorities through this scheme, managed by DEFRA, for 2003/2004.

The London Borough of Southwark has estimated that, should their current approach to waste management practices continue, the financial implications of landfill tax alone will increase from around £3-4million in 2008/2009 to £5 million in 2021/22.

The City of Westminster anticipates the future drivers of demand and supply to be:

- EU Directives, Waste Strategies, Regulations and Guidance

- The Landfill Allowance Trading Scheme (LATS), which introduces significant and innovative changes in waste policy and practice for the diversion of biodegradable municipal waste from landfill. The Scheme is intended to provide a cost effective way of enabling England to meet its targets for reducing the landfilling of biodegradable municipal waste under Article 5(2) of the EC Landfill Directive.

The Royal Borough of Kensington & Chelsea sees as future drivers of demand and supply:

- Legislation; e.g. the EU Landfill Directive requires a reduction in the amount of biodegradable municipal waste disposed of to landfill in 2010, to 75% of the amount sent in 1995
- Recycling target for household waste set by the Government; e.g. one third to be recycled or composted by 2005/06 based on 1998/99 data.

Increases in population growth and consumption will naturally lead to an increase in the overall volume of waste generated by the London authorities. Some limited information on population growth is discussed in the available waste reports.

A growth in the resident population of Westminster is predicted to give rise to waste arisings in 2015/16 as follows: household 66,015 tonnes, street cleansing 29,645 tonnes, commercial 117,377 tonnes, parks 1,029 tonnes, thus predicting an overall total of 214,066 tonnes; where commercial activities are the primary source of the waste generated. The total 2015/16 predicted MSW arising is the same amount as that generated in 2003/04 and is approximately a 13% increase to that generated in 2005/06 (190,000 tonnes). Predicted waste management options for MSW in 2015/16 are: 15% of the waste to be recycled/composted, 77% to be disposed of in energy from waste (EfW) facilities and 8% to go to landfill.

The LB Southwark has set a target to recycle/compost 50% of the household waste generated and to recover 75% of the MSW. The amount of MSW generated in the borough in 2020/2021 is predicted to vary from around 160,000 tonnes to 275,000 tonnes; the London Borough of Southwark states it will be 216,400 tonnes.

The North London Waste Authority, which includes the LB Islington, LB Barnet, LB Enfield, LB Hackney, LB Haringey, LB Camden and LB Waltham Forest has estimated that these authorities will be producing 1.4M tonnes of MSW by 2020 (NLWA figures, 1.376M tonnes estimated by LGA).

The Royal Borough of Kensington & Chelsea has targets to reduce the amount of household waste generated in 2008/09 by 5% (4,500 tonnes) of the 2003/04 levels (90,000 tonnes).

Walbrook Wharf (a waste transfer station) in the City of London has a total design capacity of 110,000 tonnes per annum. The facility is currently accepting 85,000 tonnes per annum. This capacity was set through a planning condition with the specific aim of

limiting lorry traffic to and from the site. The City of London reports that any expansion beyond this tonnage would be unacceptable in terms of local transport⁹⁹. The waste is currently transferred to Mucking though in the future it will be transferred to the Riverside (Belvedere) Energy from Waste Facility.

Further alterations to the North London Waste Plan (December 2006) provide self-sufficiency targets for the amount of MSW to be managed in each authority (Islington, Barnet, Enfield, Hackney, Haringey, Camden and Waltham Forest) up to 2020; e.g. 111,000 tonnes by the LB Islington by 2020 and 103,000 tonnes by the London Borough of Camden in 2020.

The LB Southwark set a target to limit MSW growth to below 3% by 2005/06, no data is currently available to ascertain if this target was met; and to 2% by 2010 (134,060 tonnes was reported to have been generated in 2002/03). Other targets have been set to divert waste away from landfill and to increase recycling and recovery.

Very little information is available regarding the preferred options that providers have identified for meeting future demand.

The City of London has suggested that the stringent landfilling targets could be met in future by reducing the amount of commercial waste collected (this forms a large proportion of the MSW collected by the Authority) and by buying the required allowance for LATs. However, the need for additional waste facilities is also discussed. The City considers that there are three options: continue to landfill waste outside the London area, send the waste to the Riverside (Belvedere) Energy from Waste Facility (EfW) which is due to come online in 2010 or send it to a Mechanical Biological Treatment Plant in Southwark which has yet to receive planning permission but may be operational in 2012.

The City of London has identified that residual waste management costs are cheaper for an EfW facility over the period 2007 to 2035 (£194m) compared with those for mechanical biological treatment (MBT) (£210m) and landfill (£224m). EfW is also their preferred option as this option has planning permission, it is an established treatment methodology, and both the cost and transport options are favourable.

As complete forecast data sets for the Central London authorities' comprising this study are not available it is not possible to map the predicted amount of MSW against the type, design and actual available capacity of the waste management facilities required to handle the amount of waste.

Increases in population growth and consumption will inevitably lead to an increase in the volume of waste generated by each of the London authorities, so the challenge is to manage the disposal of an increasing volume of waste being generated, whilst having to divert waste from landfill and reuse/recycle a high proportion of the waste streams, more than at present using the limited number of waste facilities in the Greater London area.

⁹⁹ City of London, e-mail to URS dated 03 February 2009.

3.8.3. Forecast Costs and Planned Investment

It is reported that a new Materials Recycling Facility (MRF) is to be built at Smugglers Way (LB Wandsworth). Construction work is scheduled to begin at the end of 2008. The design capacity of the facility is 84,000 tonnes/year and it will sort recyclables collected by Western Riverside Waste Authority and it is due to be operational in summer 2010. The residual waste will go by barge to the new Riverside Energy from Waste plant at Belvedere, which should be operational from 2010 (LB Bexley).

It is also reported that a Mechanical Biological Treatment (MBT) plant is planned for Southwark. Available information suggests that this has not yet received planning approval, but could be operational from 2012.

The City of London is considering options for the disposal of residual wastes, which could total 53,000 tonnes per year by 2019/2020. Given that the LATS allowance is 18,500 tonnes/year for this period, there is the possibility that this volume could lead to a large fine, in accordance with the Waste Emissions Trading Act 2003. A number of options are being considered for the residual wastes, these include: continue to landfill, send the waste to the Riverside Energy from Waste facility, which is expected to be able to take all the residual waste from the City of London from 2011 or to the proposed MBT plant in Southwark (planning application to be submitted in 2008). It is understood that this has been given a provisional green light by the LB Southwark. It should be noted that this proposed MBT plant is not mentioned in any LB Southwark documentation.

It is understood the Royal Borough of Kensington & Chelsea is seeking external funding for an in-vessel composter for food waste from households, located in the north west of the borough.

The GLA indicates that there is support from the Mayor's office to promote the use of anaerobic digestion for treating biodegradable waste. It is understood that two plants previously used to treat sewage sludge (prior to disposal of sea), located in East London, have been mothballed since 1998. The GLA is of the opinion that these plants could be converted and could potentially process a total of 220,000 tonnes of biodegradable waste per annum. There is also potential capacity for this to take place at Mogden (estimated capacity of 90,000 tonnes/annum) and Beddington, giving a total potential capacity of more than 600,000 tonnes/annum.

For Greater London in general funding is available from the London Recycling Fund, which has already funded: a green waste composting facility, improvements to civic amenity sites, recycling on estates, the proposed new Riverside Energy from Waste facility at Belvedere, and a planning application for an MBT plant located at Southwark. The Belvedere plant will be able to accept 585,000 tonnes of waste per annum.

No information is available regarding the cost of any required future works. It is therefore not possible to ascertain if the required investments are 'planned and funded' or 'planned but not fully funded'. Very little information is available concerning the relative priority of projects. It should also be noted that planning conditions, contractual obligations and Private Finance Initiatives (PFI) are not necessarily flexible enough to allow changes to

the arrangements at a waste management facility. For example, according to the Greater London Authority (GLA), the owner of a waste wharf in Battersea wishes to treat waste generated on site in an on-site Energy from Waste plant; but this is not possible as the waste has been contracted to be treated at a facility in Belvedere.

3.8.4. Conclusions

In the Central London local authorities, waste is primarily transferred, treated and disposed of outside the local authority in which it is generated. Increases in population growth and consumption will lead to an increase in the volume of waste generated, so the challenge is to manage the disposal of an increasing volume of waste being generated, whilst having to divert waste from landfill and reuse/recycle a high proportion of the waste streams using the limited number of waste facilities in the Greater London area.

While a series of interventions at various stages of planning are underway, complete data sets and information are not available to compare future requirements versus future capacity to manage waste. Assumptions have not been consistently reported in the documents reviewed with regard to forecast demand, supply and required investment, making it difficult to judge the robustness of the various assessments of need. It is however evident that the rising cost of landfill has potentially significant implications for the Central London authorities, highlighting the urgent need to comprehensively plan for sustainable waste management. Planning conditions, contractual obligations and Private Finance Initiatives (PFI) are not necessarily flexible enough to allow changes to the arrangements at a waste management facility.

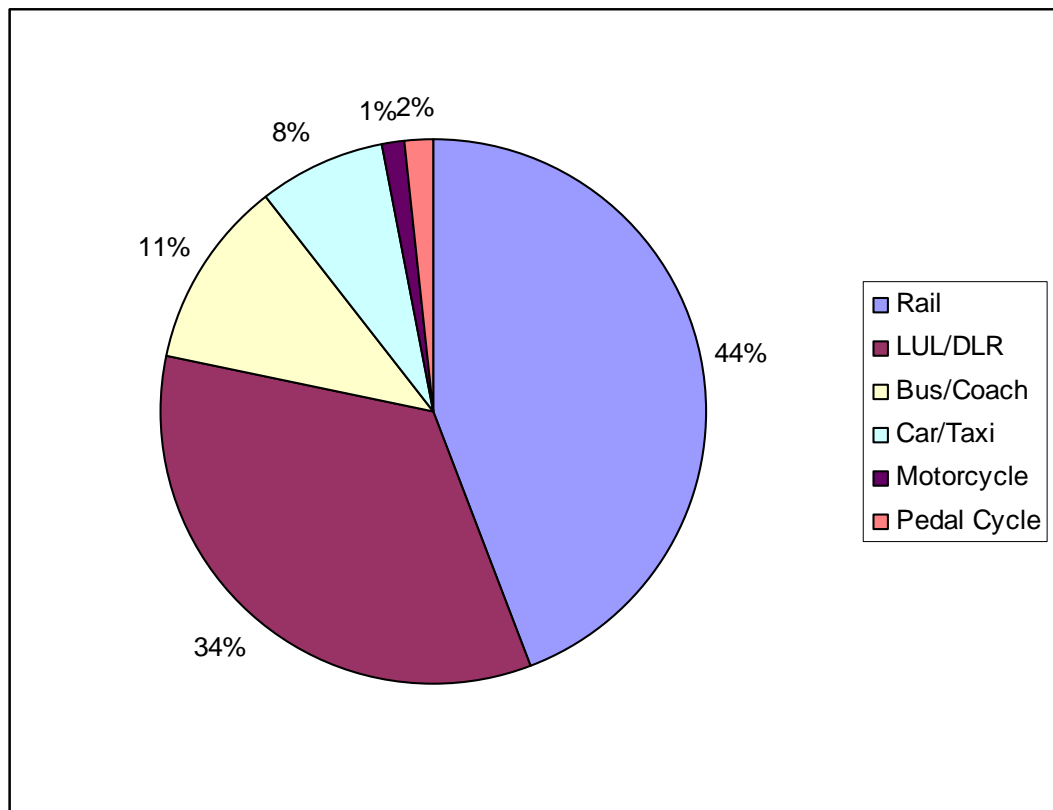
4. TRANSPORT INFRASTRUCTURE ASSESSMENT

4.1. Baseline

Travel into central London¹⁰⁰ is monitored annually by Transport for London and is reported in the London Travel Report 2007 (Transport for London, 2007). In the period 1991-2006, the total number of people entering central London in the morning peak period (07.00 to 10.00) varied between 1.0 and 1.1 million (central London is defined as the area within the main National Rail terminus stations, including King's Cross/St Pancras, Liverpool Street, London Bridge, Waterloo, Victoria, Paddington and Euston).

Figure 4-1 shows the distribution of trips into central London in the AM peak period by mode. Trips by public transport account for 89% of all movements.

Figure 4-1: Trips into Central London by Mode, 2006 (07.00 – 10.00)



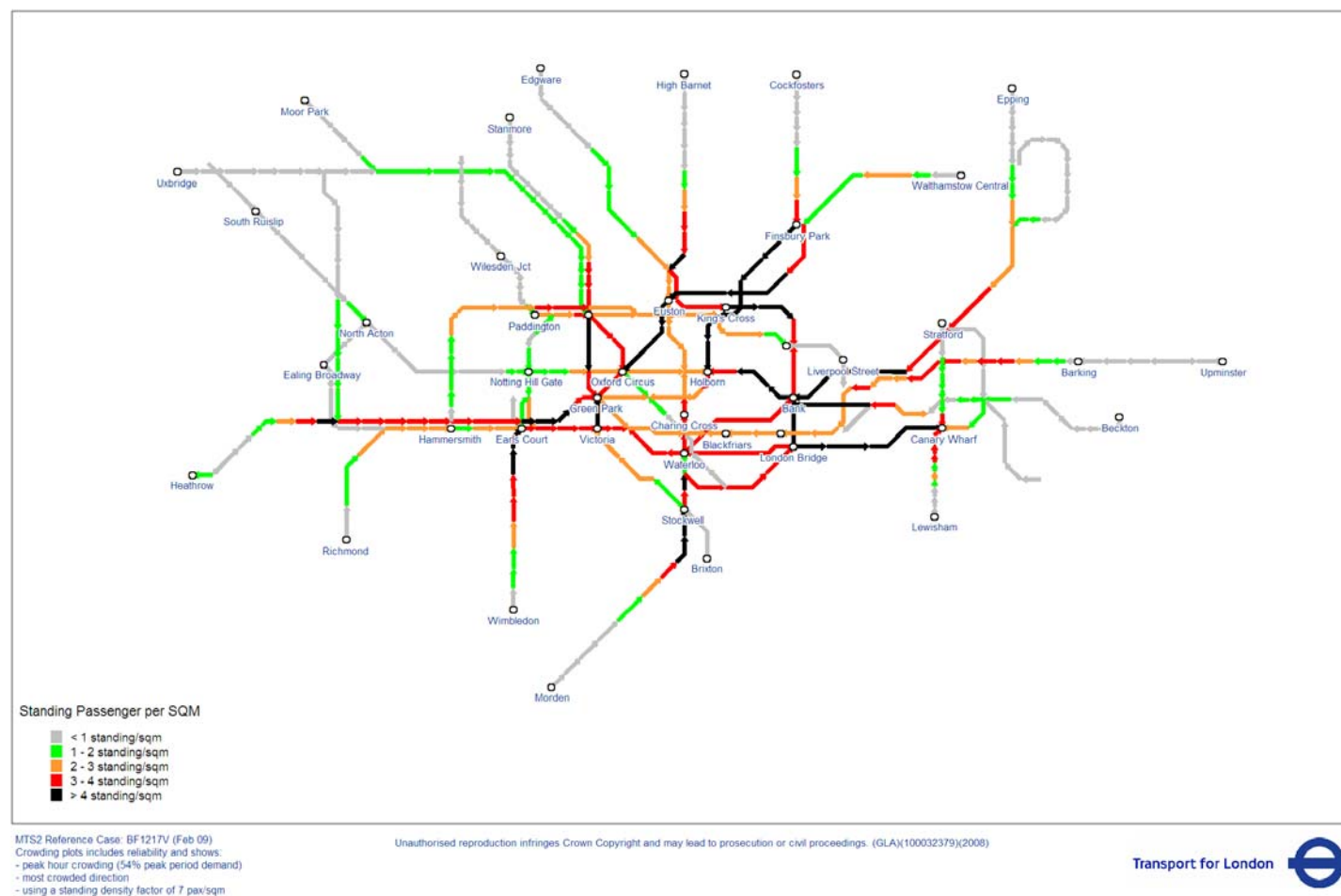
Source: T2025

¹⁰⁰ Given the strategic nature of the study the approach taken is that transport infrastructure has only been considered outside with the CAZ where the piece of infrastructure in question comes into / has implications for Central London as defined by the CAZ.

The high degree of dependency of trips into Central London on public transport modes reflects the dispersed pattern of commuting. Commuters spend an average of 55 minutes travelling to work in central London compared with 27 minutes for employees working in outer London.

Travel conditions on public transport in Central London are represented by levels of crowding. **Figure 4-2** shows existing levels of crowding on the tube network in central London (black bands represent very crowded conditions and red bands crowded conditions). Sections of the Victoria Line, Central Line, Jubilee Line, Northern line, Piccadilly line, the DLR and Bakerloo Line are already very crowded during peak periods.

Figure 4-2: London Underground Crowding, 2005 (AM Peak)



Source: T2025

There are also significant levels of crowding at several LUL stations in central London. In the most extreme cases, this can lead to partial or full station closures during peak periods. LUL has a forward programme of congestion relief works but the main priorities are Victoria, Tottenham Court Road, Bond Street and Bank. Many stations within Central London do not have step free access.

The National Rail network within Central London comprises largely radial lines into the main rail termini. Only First Capital Connect (formerly Thameslink) services (King's Cross to London Bridge) cross the central area. Many National Rail stations do not have step free access. **Figure 4-3** shows crowding levels on National Rail services. Peak period services on lines into London Bridge and Moorgate are very crowded, as are First Capital Connect services. There is also crowding on lines into Waterloo, Marylebone and Paddington (Note: NR figures are averages of services on a line and do disguise significant variations between services).

Figure 4-3: National Rail Crowding, 2006 (AM Peak)



Source: T2025

There are also crowding problems at several mainline stations but these are mostly the result of high levels of interchange demand (Euston and Victoria) rather than space restrictions within stations. There is no consistent measure of crowding at stations and any problems tend to be isolated to specific areas or facilities, such as gatelines or escalators.

The GLA's Transport Committee produced 'The Big Squeeze – Rail overcrowding in London' (February 2009). This document reports that London's rail network is

overcrowded and that trains are more crowded than reported in official figures. In addition two-thirds of London commuters are dissatisfied with crowding on peak rail services with some services so packed that there are health and safety risks. In fact London performs worse than in other areas of the UK.

Buses account for only 11% of peak trips into central London and are a more important mode of travel in inner and outer London than in the central area. However, there is a significant density of bus movement in the central area, with over 80 services operating in Westminster alone. The density of routes enables most major corridors to provide high levels of frequency (in Westminster, for example, the average wait for a bus is less than 5 minutes).

However, buses are susceptible to congestion, especially in the central area, and much has been achieved through the London Bus Initiative (LBI) to improve reliability with bus lanes and other priority measures.

Highway conditions are more difficult to define given the diffuse character of the road network. Historically, average traffic speeds in central London have changed little in the last 100 years at around 10 miles per hour. The introduction of the Congestion Charging Scheme (CCS) in February 2003 had a very marked initial effect on traffic volumes entering the charge area. In the first year, all motor vehicles declined by 14% but, since the first year, and despite subsequent increases in charges, the reduction in 2007 is only 16% compared with 2002.

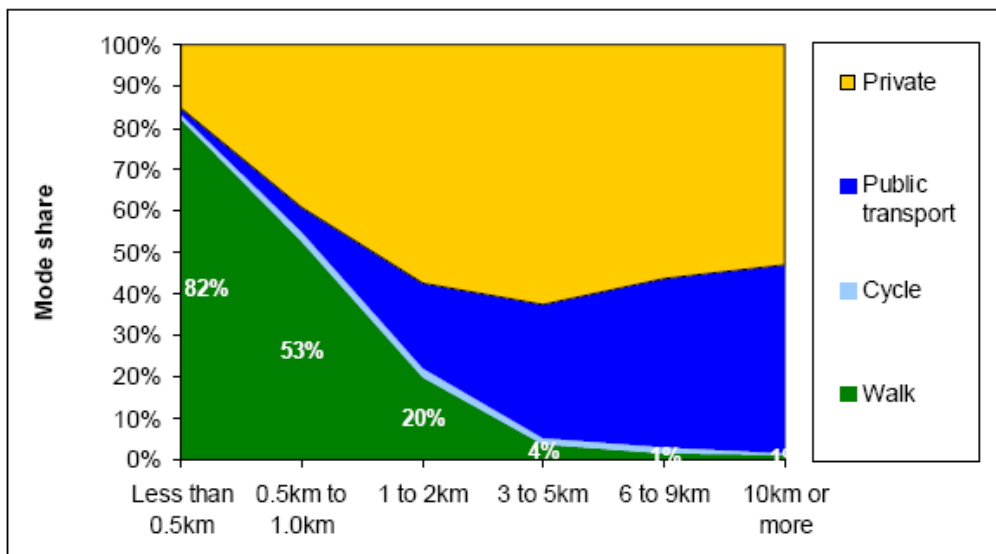
Transport for London also monitors congestion within the charging zone as reported in the Sixth Annual Report (Transport for London, July 2008). In 2002, the average excess vehicle time per kilometre in central London was 2.3 minutes (equivalent to a reduction in speed from 30 mph to 14 mph). Initially, congestion fell following the introduction of charging but by 2007 excess travel time per kilometre was back to 2.3 minutes. There are several contributory factors to this higher level of congestion, including roadworks, but taking these factors into account there is still an unexplained increase.

International transport corridors are important to City businesses. London already has good access to five international airports (Heathrow, Gatwick, Stansted, Luton and City). Heathrow caters for more international trips than any other airport in the world. These airports link into central London by existing rail and underground lines.

Walking is an increasingly important mode in London and the Legible London project by TfL aims to encourage more people to make short journeys on foot rather than by mechanised modes. However, pedestrians are highly susceptible to a range of problems that reduce the amenity of the walking environment, including traffic, poorly located crossings, narrow footways and street clutter.

The importance of walk trips over short distances is illustrated by **Figure 4-4** – 53% of journeys in London below 1 kilometre are carried out on foot.

Figure 4-4: Mode Split by Distance for Journeys in London



Source: T2025

The Central London Pedestrian Study, Intelligence Space Partnership (December 2007) examined pedestrian conditions at 102 key locations and systematically audited these sites against fixed criteria. It is noted that this study only focuses on locations on the TLRN and that it did not include locations such as King's Cross for example. This was commissioned by Transport for London as part of the organisations commitment to improving the pedestrian environment throughout London. The definition of Central London used by the study extends well beyond the CAZ but several of the sites identified as having the highest priority for improvement are within the central area. The highest priority sites include Euston Station and Euston Road Underpass, Bishopsgate, Monument, Westminster Bridge, London Bridge Station and Borough Market, Baker Street, Marble Arch, Knightsbridge and Victoria Station. Many of the problems identified at these locations arise from high pedestrian volumes in areas with inadequate footways and/or formal crossings.

Central London is served by river services and has a number of piers, including Embankment Pier, Millennium Pier, London Bridge City Pier and Blackfriars Millennium Pier. These are served by commuter services to from the east (Canary Wharf and Greenwich) and to the west (Putney and Chelsea Harbour). Leisure services also operate.

4.2. Forecast

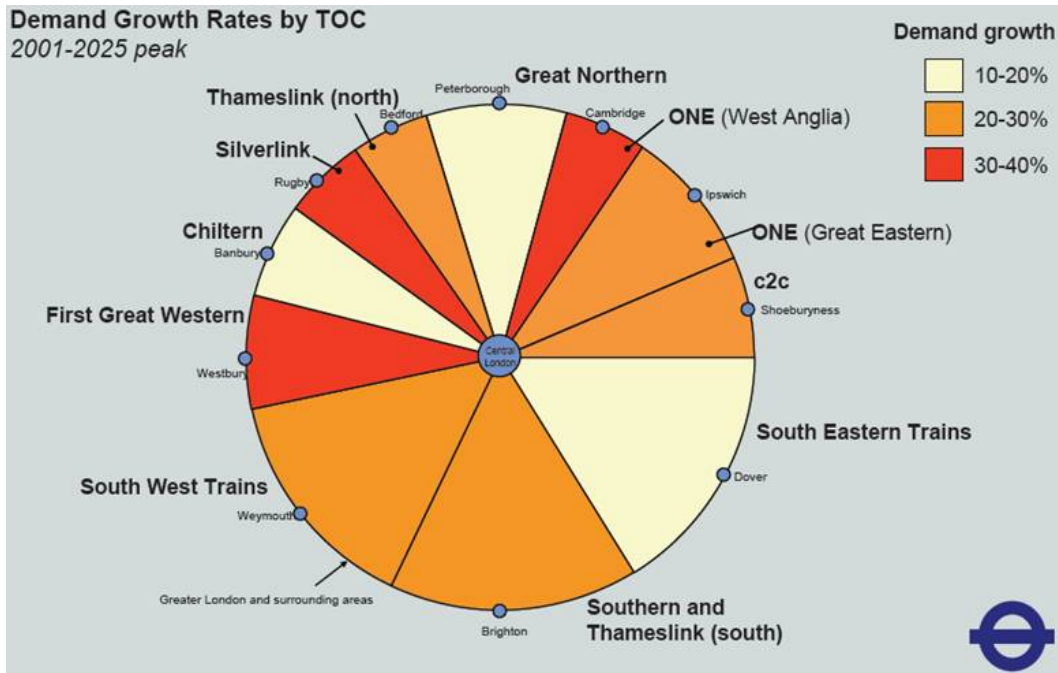
Travel demand into central London in the AM peak period remained constant between 1991 and 2006 but is projected to increase significantly thereafter as employment levels and the number of residents increase.

Transport 2025 (T2025: Transport Challenges for a Growing City, Transport for London, May 2006) provides a general indication of changes in modal patterns in London but

gives no specific data for central London. In general, however, car trips are expected to fall and public transport and cycle trips to increase. T2025 does provide an indication of rail growth by corridor and this is shown in **Figure 4-5**. Rail trips into central London are forecast to increase by between 10% and 40% with the highest levels of growth into Liverpool Street, Euston and Paddington.

Figure 4-5: Growth in Rail Trips into Central London to 2025

Demand Growth Rates by TOC
2001-2025 peak



Source: T2025

Figure 4-5 above provided a breakdown of trips into the central area by mode. **Table 4-1** provides an analysis of changes in trips entering the central area based on the projected increase in jobs and expected changes in mode split.

Table 4-1: Trips Entering Central Area by Mode, '000s, 2026

	<i>Trips</i>	<i>Mode</i>	<i>Trips</i>	<i>Mode</i>	<i>Increase</i>
<i>Mode</i>	<i>2006</i>	<i>(%)</i>	<i>2026</i>	<i>(%)</i>	<i>(%)</i>
Rail Only	280	25.1	358	26.5	27.9
Rail + Tube	211	19.0	230	17.0	9.0
Tube Only	380	34.1	426	31.5	12.1
Bus/Coach	124	11.2	169	12.5	36.3
Car/Taxi	85	7.7	88	6.5	3.5
Motorcycle	15	1.3	20	1.5	33.3
Pedal Cycle	18	1.6	61	4.5	238.9
Total	1,113	100.0	1,352	100.0	21.5

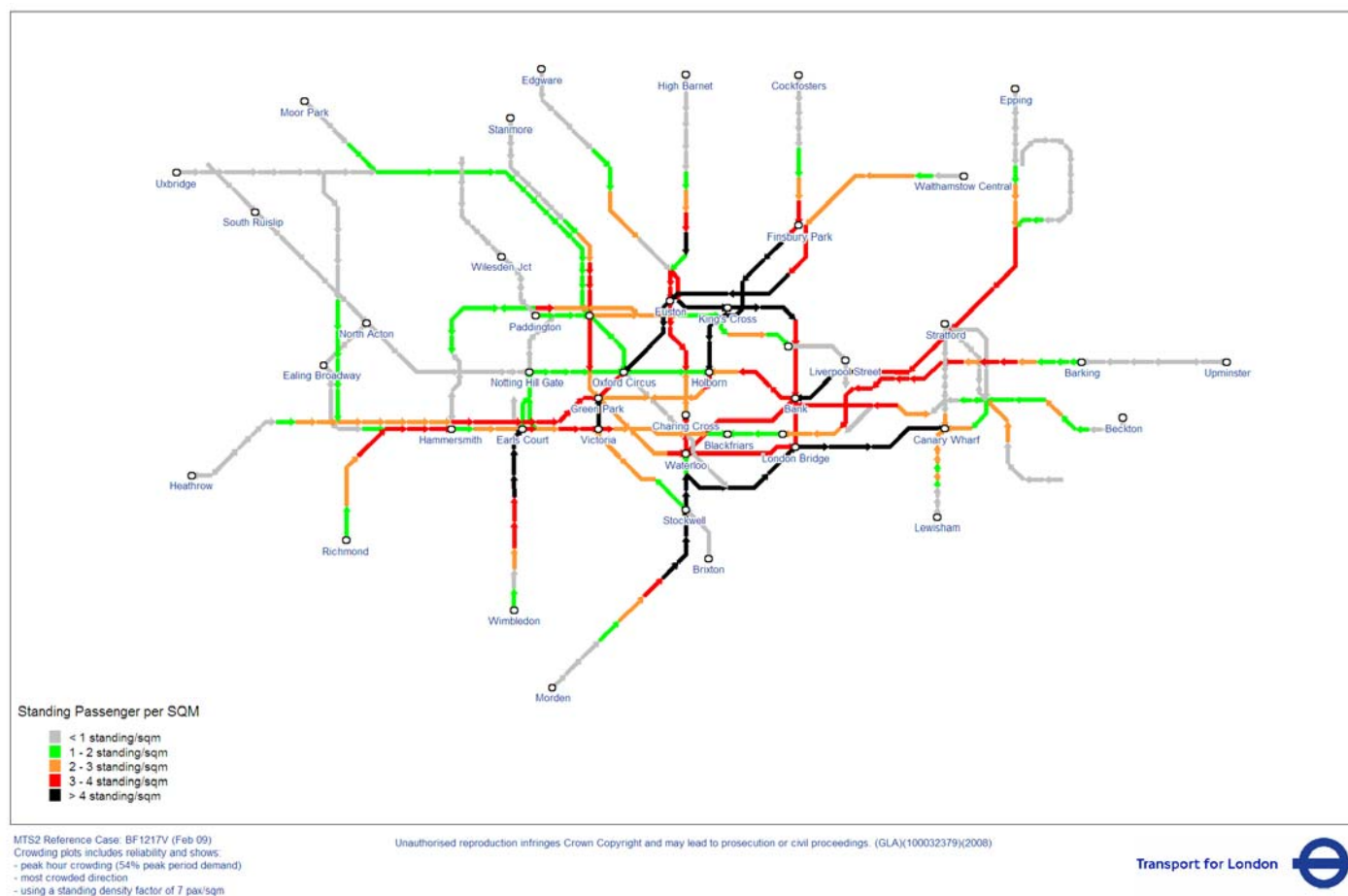
Figure 4-6 assumes the total growth in central area trips from 2006 based on a 21.5% increase in employment. Total trips in 2026 by mode are derived using assumptions derived from T2025 but these are indicative given the absence of specific forecasts for the central area. Rail trips are expected to increase significantly (27.9%) given the addition of Crossrail that will provide not only additional radial capacity but will also attract trips from the tube network within the central area.

Recent evidence given to the GLA Assembly by Transport for London (Cross River Tram, London Assembly Transport Committee, October 2008) included an update of the T2025 Reference Case rail crowding assessment. The revised assessment for 2026 includes all PPP upgrades, Crossrail and Cross River Tram (for which preparatory work has since been suspended) and shows projected crowding levels on the tube network.

Figure 4-6 shows only a marginal worsening of conditions compared with the base (2006) situation shown in **Figure 4-2**. The Northern line to the south has become noticeably more crowded but Crossrail, in particular, has helped to alleviate some of the crowding on east/west links. The omission of CRT is expected to increase crowding levels on the Victoria, Northern and Piccadilly lines within the central area by about 5%.

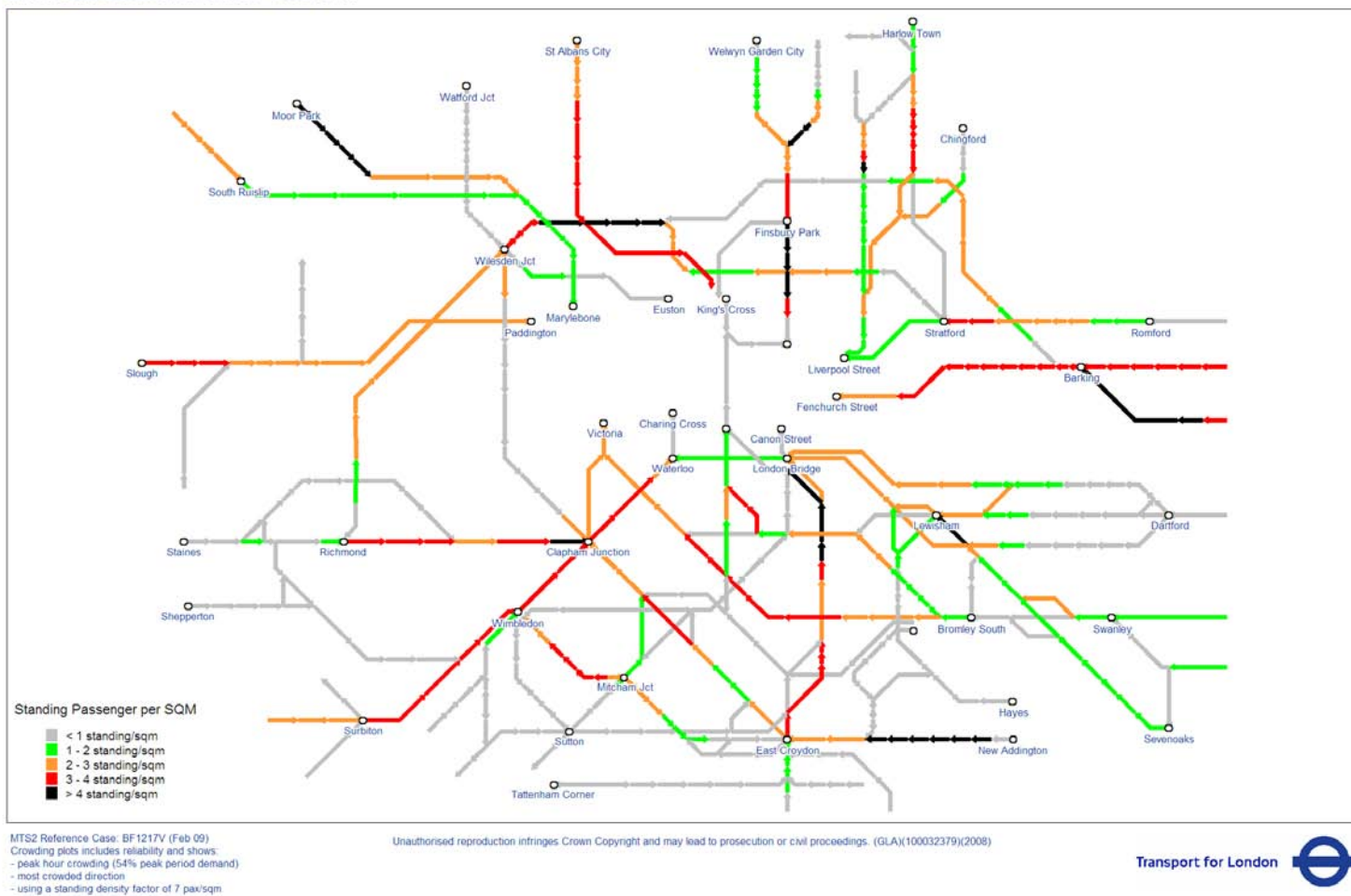
The equivalent rail crowding levels in 2026 are shown in **Figure 4-7**.

Figure 4-6: London Underground Crowding Levels, 2026



Source: Cross River Tram, London Assembly Transport Committee, October 2008

Figure 4-7: National Rail Crowding Levels, 2026



Source: Cross River Tram, London Assembly Transport Committee, October 2008

Crowding levels at London Bridge and Paddington are shown to have been alleviated by Thameslink and Crossrail respectively but high growth on services into Liverpool Street has increased levels of crowding on these routes.

London is generally regarded as having suffered many years of under-investment in transport infrastructure yet is still regarded as one of the most accessible cities in Europe (European Cities Monitor 2007, Cushman & Wakefield, October 2007). Since the opening of the Victoria Line in 1967, central London has seen little in the way of major investment projects. The Docklands Light Railway (1987), together with its extension to Bank (1991), and the extension of the Jubilee Line (1999) are the only major projects to have been completed.

In overall terms transport conditions have not deteriorated markedly. However, this masks several underlying problems such as high levels of crowding on some commuter routes, station congestion and bus reliability. The lack of investment, especially in tube modernisation, but also in service utilities buried beneath roads, has now resulted in a need for new infrastructure works that, at least in the short term, will result in some disruption for travellers. This is noticeable especially in the central area with roadworks to replace Victorian water mains.

The forward investment programme is outlined below and this now includes several high profile schemes (Crossrail, East London Line, Thameslink etc.) that will start to provide much needed capacity improvements. However, there will still be a number of issues that are not being addressed by current programmes and these problems will become more acute as growth occurs.

Bus trips into central London have increased markedly in recent years and T2025 is projecting a further 40% increase in bus patronage. In general, increased bus use is simply met by the provision of more frequent services on heavily used routes. There have been some changes to bus technology with higher capacity vehicles, although the Mayor has announced a phased reduction in articulated (bendy) buses that have the highest carrying capacity.

Way to Go! also recognises that wall to wall buses on some routes in central London (such as Oxford Street) can be counter-productive for pedestrians and the environment. A more efficient distribution of bus capacity is sought but there is no easy answer to this problem given the difficulties inherent in changing the bus network. It is likely that any changes to bus services will continue to be incremental. However, the cancellation of Cross River Tram would require extra capacity to be provided on the routes it would have served (especially Waterloo to Euston) in order to minimise over-crowding. The long term provision of terminating space for bus services will also need to be considered.

4.3. Forecast Costs and Planned Investment

The investment programmes that will impinge upon travel conditions in Central London are being delivered by national and regional governments and the local highway authorities. Network Rail is responsible for the national rail network, including the major rail termini, but its spending priorities are set by the Department for Transport and the

Office of the Rail Regulator. Transport for London is responsible for strategic roads and buses and manages the tube PPP contract. It is also now responsible for letting concessions to operate services on the London Overground rail network (including the East London Line).

For the purposes of defining infrastructure, these have been grouped into Network Rail, Transport for London and local authority schemes. Schemes are also grouped by status as either under construction, committed or planned. Committed schemes have completed all statutory processes and have a funding commitment. All schemes considered would increase transport provision in central London, including schemes that would provide additional capacity for travellers into the CAZ.

Network Rail forward plans are developed through its route utilisation strategies (RUS) that are specific to each line group or franchise. A RUS covers a ten year period – there are several that are relevant to central London although some, such as the West Coast Main Line (WCML) RUS, are still in preparation. In addition, a Cross London RUS was published in August 2006.

Rail priorities are set by the Department for Transport in its High Level Output Statement (HLOS), which are incorporated into the Network Rail Strategic Business Plan. The latter currently covers the period 2009 to 2014 and is known as Control Period 4 (CP4). **Table 4-2** summarises Network Rail projects programmed in CP4. Projects beyond CP4 are discussed below but any such schemes are subject to DfT approval and funding.

Table 4-2: Network Rail Infrastructure Projects

<i>Project</i>	<i>Description</i>	<i>Status</i>	<i>Opening Date</i>	<i>Cost¹</i>
Thameslink	Track and station upgrades to 12-car operation and 24 trains per hour in central section	U/C	2011 to 2015	£5.5 billion
CTRL Domestic Services	High speed trains on selected routes from Kent & Medway	U/C	2009	n/a
Integrated Kent Franchise	12-car trains to Charing Cross and Cannon Street/8-car trains to Victoria	C	2014	£56 million
Brighton and Sussex	12-car trains East Grinstead to Victoria/10-car suburban trains to Victoria and London Bridge	C	2014	£101 million
South West	10-car trains	C	2014	£192 million
West Anglia	12-car trains on Cambridge & Stansted services/9-car trains on suburban services	C	2014	£24 million
Thameside	12-car trains		2014	£16 million
Great Eastern	Additional 12-car services	C	2014	£5 million
East Coast Main Line	Additional 12-car services on outer suburban commuter services	C	2014	£51 million ²
Major Stations	King's Cross, Waterloo, Victoria, London Bridge and Euston	C/P	?	n/a

1 – Costs for 2014 schemes taken from Office of Rail Regulator Periodic Review PR08

2 – Finsbury Park to Alexandra Palace Improvements

Source: Network Rail Strategic Business Plan

Thameslink is a strategically important project for Network Rail in that it will allow many more stations north and south of London to be connected by direct services. It will, however, enable significantly more trains to be operated between King's Cross/St Pancras and London Bridge in peak periods and this should avoid the need for many passengers to interchange to tube services to cross the central area.

Service improvements are being introduced on most lines into central London termini to increase capacity on busy commuter routes. Train paths are limited and most improvements involve longer trains although, in some cases, frequencies will also be increased. Associated station lengthening works are being carried out at several suburban stations.

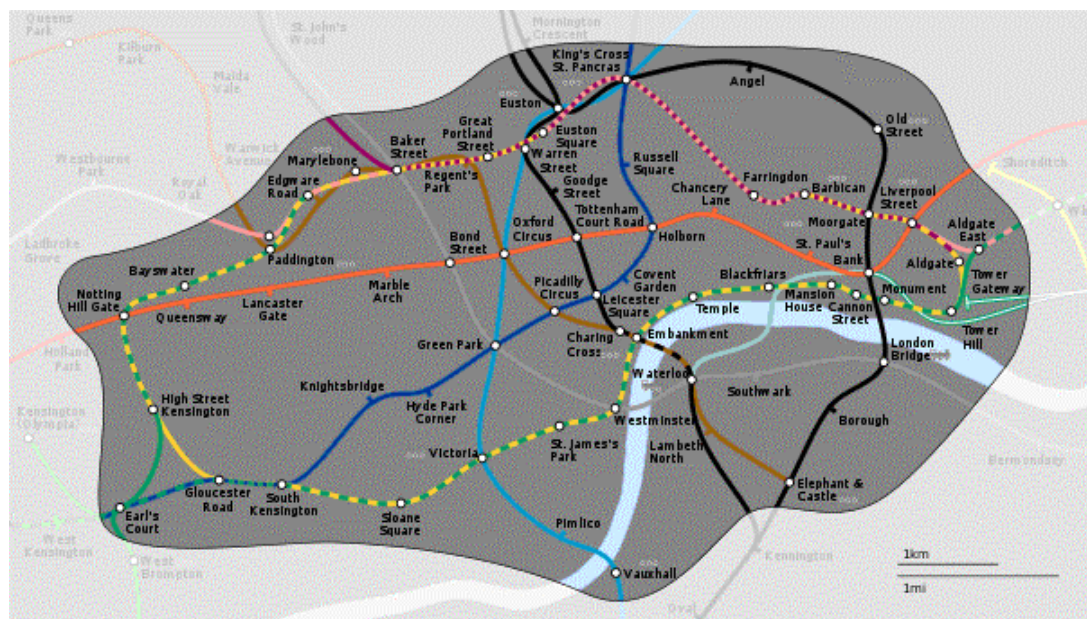
Network Rail has a programme of improvements at major rail termini. In most cases, major improvements are linked to station development masterplans and involve private sector partnerships. Such plans are at various stages of preparation. Short-term improvements are being carried out at several stations, such as Waterloo to increase concourse capacity and introduce Oyster-compliant gate-lines.

The Network Rail picture post-2014 is less clear and will depend upon the Strategic Business Plan for Control Period 5 (to 2019). The Route Utilisation Strategies (where available) do provide some indication of priorities and possible schemes but it is too early in the scheme development and funding process to put too much weight on possibilities. However, CP5 is likely to continue the theme of increasing capacity on routes into London terminals; for example, the four-tracking of the West Anglia line, increased terminal capacity at Waterloo etc.

Transport for London has varied responsibilities for transport services in London. The National Rail network is owned by Network Rail, as will Crossrail be, but Transport for London now has powers to let concessions to operate services on the West London, North London and East London lines plus Gospel Oak to Barking and Watford to Euston services. TfL is the sponsor responsible for delivering the Crossrail project and will let the contract to operate services.

TfL operates tube stations and trains but rolling stock, track and signalling systems are maintained and upgraded by the Private Public Partnership (PPP) companies that, in effect, make these systems available to London Underground. Payments to the PPP are based on availability and performance. However, the recent demise of Metronet has resulted in its contractual responsibilities being assumed by TfL. The remaining PPP Infraco, Tube Lines, remains responsible for the Jubilee, Northern and Piccadilly lines. **Figure 4-8** shows the extent of the tube network within the CAZ.

Figure 4-8: London Underground CAZ Network



Transport for London rail and tube projects that are relevant to the CAZ are summarised in **Table 4-3**. The list of schemes in **Table 4-3** is taken from the TfL Business Plan – this lists schemes that, in most cases, will be completed by 2018 and includes costs only to this date.

Table 4-3: Transport for London Infrastructure Projects

<i>Project</i>	<i>Description</i>	<i>Status</i>	<i>Opening Date</i>	<i>Cost¹⁰¹</i>
Crossrail	East/West rail link	C	2017	£17 billion
East London Line	Phase 1: Northern extension to Dalston/Highbury & Islington. Southern extension to West Croydon/Crystal Palace (100% increase in frequency)	U/C	2010	£600 million
	Phase 2: extension to connect Surrey Quays to Clapham Junction	C	2010	
Jubilee Line	New signalling system to allow 30 trains per hour in peak (25% increase in capacity)	U/C	2009	n/a
Victoria Line	Higher frequency and larger trains (19% increase in capacity)	C	2012	n/a
Northern Line	Phase 1 signalling system to improve speeds and frequency (20% increase in capacity)	U/C	2012	n/a
	Phase 2 separation of Bank and Charing Cross lines at Kennington	P	2020	n/a
Piccadilly Line	New signalling system and trains (25% increase in capacity)	C	2014	n/a
District Line	New train stock with longer and more frequent trains (47% increase in capacity)	C	2018	n/a
Metropolitan Line	New train stock and higher frequency services (49% increase in capacity)	C	2016	n/a
Circle and Hammersmith & City Lines	New train stock, longer trains and higher frequency with merged T-cup service (49% increase in capacity)	C	2016	n/a
Bakerloo Line	New trains, signalling and	C	2022	n/a

¹⁰¹ The costs of specific line upgrades have yet to be determined but the overall programme is currently estimated to be £30 billion.

<i>Project</i>	<i>Description</i>	<i>Status</i>	<i>Opening Date</i>	<i>Cost¹⁰¹</i>
	improved frequency (40% increase in capacity)			
Station Congestion Schemes	Victoria (2017), Paddington (2014), Tottenham Court Road (2016), Bank (2018), Bond Street (2016)	C		n/a
King's Cross Northern Ticket Hall	2010	U/C	2010	n/a

Source: TfL Business Plan

The above table does include one scheme that is post-2018 and that is the separation of the Northern line branches at Kennington. This is regarded as a priority by LUL as it would release additional capacity on the Northern line branches through central London. However, the definition of this scheme is still being considered and there are several options for how separation could be achieved. Full separation would also trigger additional station upgrade costs.

Beyond 2018, it is possible that further consideration could be given to Cross River. Other major projects that are ongoing include Cooling the Tube and the increasing roll-out of air conditioned carriages on sub-surface lines.

Way to Go! states that Transport for London will do everything in its power to facilitate an increase in the number of people walking in London. This will require the removal of physical or perceived barriers to walking including improving safety and security, the provision of high quality public space the removal of street clutter. A balance will need to be struck between pedestrian accessibility and capacity and traffic flows. Increasing the number of walking trips will reduce the need for some shorter journeys on the underground network and reduce the need to interchange at some key stations.

Continuing programmes to increase the number of cyclists are detailed in *T2025* and include:

- Upgrade and expand the cycle network
- Increase cycle safety, access and priority
- Improve facilities at origin, on route and destination
- Improve education and training
- Promote cycling as part of a healthy lifestyle.

This is promoted by the Mayor in *Way to Go!* and in *The Mayor's Transport Strategy Statement of Intent*. In addition the introduction of the London Cycle Hire Scheme and

Cycle Superhighways will further promote cycling. Conflict between cyclists and other road users, including pedestrians will need to be addressed.

4.4. **Assessment of Existing Growth Strategies**

Network Rail and Transport for London are both making provision for increased commuter demand on rail and tube routes into central London. The former through its Strategic Business Plan and the latter through its Business Plan, each of which delivers significant increases in capacity in the medium term.

The existing and future capacities on rail and tube lines into central London have been assessed and these are an accurate reflection of programmed improvements to 2014 and 2018 respectively. Network Rail gives rail forecasts to 2014 and beyond this an average rate of growth is assumed derived from DfT sources. Tube passenger growth has been profiled based on employment growth – this is a simplification given expected variations by corridor.

The Network Rail investment programme discussed above will deliver higher capacity on rail routes into the main London terminals. **Table 4-4** summarises an assessment of the effects of this programme and projects this forward to 2026. Load factors are given for each London terminal station (defined as seats plus standing space divided by 0.45 m^2 per passenger on commuter services).

Table 4-4: Load Factors on Rail Routes into London Terminals

<i>Terminal</i>	<i>De-mand 2008/9</i>	<i>Existin g Capa- city</i>	<i>Load Factor (%)</i>	<i>De-mand 2013/14</i>	<i>Capa- city 2013/14</i>	<i>Load Factor (%)</i>	<i>De-mand 2026¹</i>	<i>Load Factor (%)</i>
Blackfriars	11,200	9,700	116	12,400	11,800	105	14,800	125
Euston	10,600	14,500	73	12,200	16,900	72	14,600	86
Fenchurch Street	13,900	17,800	78	15,500	20,100	77	18,500	92
King's Cross	8,000	12,300	65	9,100	14,900	61	10,900	73
Liverpool Street	36,700	53,200	69	41,600	59,400	70	49,800	84
London Bridge	65,200	80,500	81	73,000	90,100	81	87,300	97
Marylebone	4,600	7,500	61	5,200	8,800	59	6,200	70
Moorgate	7,400	8,000	93	7,800	7,600	102	9,300	122
Paddington	11,500	11,900	97	12,900	13,400	96	15,400	115
St Pancras	13,100	12,800	102	18,800	22,900	82	22,500	98
Victoria	29,300	41,900	70	32,100	46,500	69	38,400	83
Waterloo	36,800	51,100	72	41,700	58,700	71	49,900	85
Total	248,300	321,200	77	282,300	371,100	76	337,600	91

Source: *Delivering Sustainable Railways – White Paper CM7176, DfT*

1 – Assumes 1.5% per annum growth on all routes

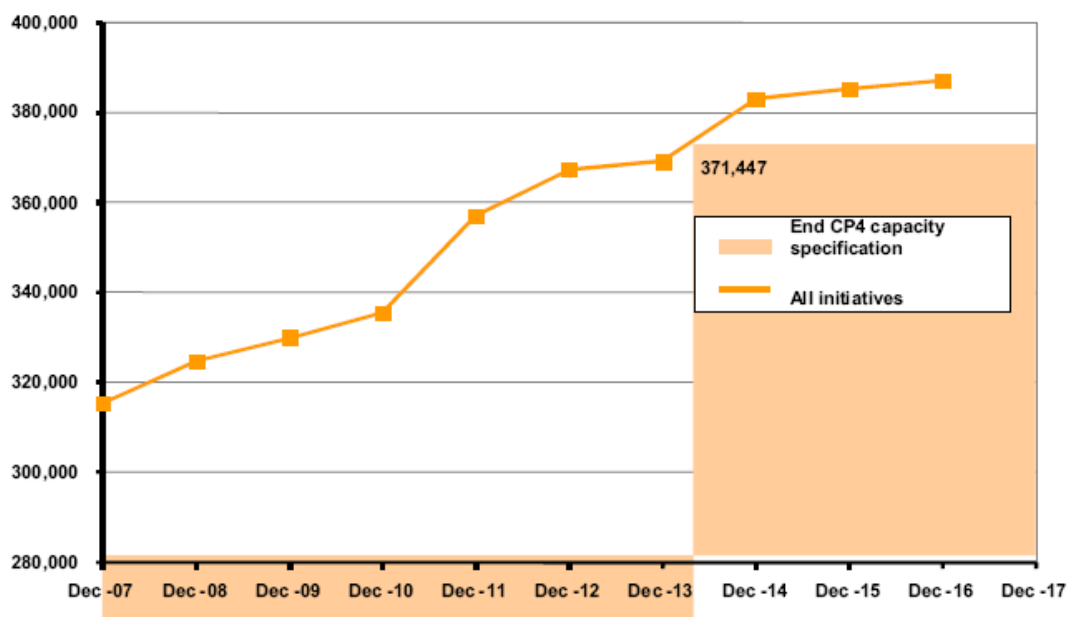
The current load factor (2008/9) for London terminal stations is 77%, with Blackfriars (Elephant & Castle services only) and St Pancras operating above capacity and Moorgate and Paddington operating in excess of 90%. The overall load factor is projected to rise to 83% based on demand projections but be reduced to 76% in 2014 based on improvements included in the Network Rail Strategic Business Plan, including Thameslink. However, Blackfriars and Moorgate would still be operating above capacity and Paddington operating in excess of 90%.

Transport for London has begun modelling the implications for rail overcrowding given that overcrowding on some areas of the network will still exist to 2026 and beyond even

after taking into account Crossrail and Thameslink. The GLA Transport Committee has reported that Transport for London has developed some initial proposals for inclusion of a follow on programme to the train and platform lengthening programme currently being taken forward, namely HLOS2. This programme would include longer and more frequent trains on most lines into London, associated platform enhancements and increases in station capacity to cater for the increased number of passengers.

Table 4-4 shows a 36% increase in passenger demand into London Terminals by 2026. By contrast, **Figure 4-9** shows the build-up of capacity over the period covered by CP4 and the completion of programmed projects – this equates to about an 18% increase in capacity to 386,000.

Figure 4-9: Network Rail Peak Hour Capacity to London Terminals (AM Peak Hour)



The above analysis suggests that while much is being done in CP4 to address capacity constraints, post-2014 the supply gap will start to grow again unless additional capacity is forthcoming. Route Utilisation Strategies that cover the post-2014 period do include several proposals for further improvements but these are still subject to Government approval for Control Period 5 (2014-2019).

Crossrail is not included in the above figures but this will provide additional rail capacity into Paddington and Liverpool Street from 2017/18 onwards. In theory, Crossrail will provide a peak hour capacity of 15,000 passengers into Paddington and 36,000 passengers into Liverpool Street (based on provisional capacity of 1,500 passengers per train). However, some of this capacity is a substitution for existing Great Western/Heathrow and Great Eastern/West Anglia services. Also, Crossrail will provide relief to London Underground services as much as to National Rail services. The analysis is consistent with the SPG but to make this more evident I would replace the last sentence with: Crossrail provides its greatest benefits from relief to overcrowded tube

lines within central London, which is consistent with the analysis carried out in support of the draft Supplementary Planning Guidance on planning obligations to fund Crossrail.

The contribution of Crossrail to rail and underground capacity is considered below following an analysis of conditions on London Underground services, specifically as this relates to Paddington and Liverpool Street services.

Transport for London PPP upgrades, as discussed above, will deliver significant additional capacity on tube lines into the central area. **Table 4-5** summarises load factors by line into an area that approximates to the CAZ as shown in **Table 4-4** above. Load factors are based on LUL planning standards and reflect committed line upgrade plans as discussed above.

Table 4-5: Load Factors on Tube Lines into Central Area

<i>Terminal</i>	<i>De-mand 2007</i>	<i>Existin g Capa- city</i>	<i>Load Factor (%)</i>	<i>De-mand 2018</i>	<i>Capa- city 2018¹</i>	<i>Load Factor (%)</i>	<i>De-mand 2026</i>	<i>Load Factor (%)</i>
Northern (North)	20,999	26,068	80	25,012	31,282	80	28,813	77
Victoria (North)	21,794	23,240	94	25,959	27,656	94	29,904	108
Piccadilly (North)	3,622	16,368	22	4,314	20,460	21	4,970	24
Central (East)	25,152	26,640	94	29,959	26,640	94	34,512	130
Hammersmith & City (East)	3,282	5,152	64	3,909	7,676	51	4,503	59
District (East)	9,089	17,304	53	10,826	25,437	43	12,471	49
DLR ²	6,260	11,160	56	7,460	14,850	50	8,590	58
Jubilee (East)	10,894	17,052	64	12,976	22,679	57	14,948	66
Northern (South)	18,796	28,812	65	22,388	34,574	65	25,791	62*
Bakerloo (South)	2,282	15,994	14	2,718	22,072	12	3,131	14
Victoria (South)	16,776	23,240	72	19,982	27,656	72	23,019	83
District (West)	1,510	5,768	26	1,799	8,479	21	2,072	24
Piccadilly (West)	13,244	16,368	81	15,775	20,460	77	18,173	89
Central (West)	12,574	23,976	52	14,977	23,976	62	17,253	72

<i>Terminal</i>	<i>De- mand 2007</i>	<i>Existin g Capa- city</i>	<i>Load Factor (%)</i>	<i>De- mand 2018</i>	<i>Capa- city 2018¹</i>	<i>Load Factor (%)</i>	<i>De- mand 2026</i>	<i>Load Factor (%)</i>
Bakerloo (North)	7,070	15,994	44	8,421	22,072	38	9,701	44
Metropolitan	11,938	14,588	82	14,220	21,736	65	16,381	75
Jubilee (North)	16,616	19,488	85	19,792	25,919	76	22,799	88
Total	198,886	305,464	65	236,896	382,840	62	272,899	69

1 – No capacity changes assumed post-2018 except for Northern Line

2 – DLR includes services to Tower Gateway and Bank

Source: RODS

London Underground (LUL) and Docklands Light Railway (DLR) services in central London are currently operating at 65% capacity. The Victoria Line from the north and the Central Line from the east are both operating in excess of 90% (N.B. Higher load factors are observed within the central area).

Planned line upgrades to 2018 will increase tube capacity into central London by 25% and this results in the load factor falling to 62%; however, the Victoria Line (north) and Central Line (east) will still be operating at 90% or above. Further growth in demand beyond 2018 will result in the load factor rising to 69%, with both the Victoria and Central lines being above capacity.

LUL services via Paddington are shown above to be operating well within capacity but **Table 4-5** shows National Rail services with a load factor of 115% in 2026. Crossrail will add some capacity on rail routes from the west but, at present, the 10 Crossrail trains in the peak hour will replace existing commuter services. The exception is an increase in Heathrow slow services from 2 to 4 trains per hour.

Table 4-5 shows that the Central line into Liverpool Street will be operating in excess of capacity in 2026. **Table 4-4** shows that National Rail services would be operating at 84%. As both Central and Crossrail trains pass through Stratford, there is considerable scope for interchange to spread the load. Crossrail will provide 12 trains in the peak hour via Stratford and these should enable Central line passengers to interchange to less crowded services. Crossrail effectively replaces slow Shenfield services but Gidea Park services will continue – this gives an increase in train frequency from 12 to 18 trains per hour on this line with Crossrail. In addition, it is proposed that six additional services will be operated on the West Anglia branch. Based on existing plans and the Route Utilisation Strategy plans, rail capacity into Liverpool Street on both tube and National Rail services should be adequate. It is worth noting that this analysis does not take account of the potential increase in passengers that would occur as a result of a second runway at Stansted, which would increase the number of passengers to c. 65 million per year.

The possibility of high speed rail links into central London from the West Midlands and beyond is being seriously considered. This would provide additional capacity and dramatically improve rail journey times into central London from the rest of the UK. The trips associated with these services would need to be accommodated in terms of the onward movement of people by other modes including walking.

International travel is important to central London businesses. Air travel is predicted to rise significantly above current airport capacity and as such requires additional capacity to be provided. Limiting air travel could have the effect of limiting London's economic growth. Links to/from airports and central London are therefore important, both by public transport and taxis. Crossrail will provide additional access to Heathrow. Additional capacity/links will be necessary to cater for additional demand, therefore schemes such as Airtrack will be required.

Rail and tube (including DLR) upgrades will provide most of the increase in public transport capacity to 2026. Transport for London expects to operate an additional 8% bus kilometres by 2018 but is projecting a 40% increase in patronage by 2026. The intention seems to be to bridge this gap by a more efficient distribution of services, with capacity switched to more popular routes.

Catering for the onward movement of people from Central London's mainline termini and key stations is important. The increased number of passengers travelling into these stations will in turn increase demand on the underground, bus, and street networks connecting into these stations as these passengers continue their onward journey. The knock on effect can be significant. Promoting walking rather than onward movement by underground or bus will be crucial to reducing congestion on these modes during peak hours. This will require investment in public realm and way finding

It is worth noting that the increased number of passengers travelling into Westminster's mainline termini will in turn increase demand on the tube, bus, and street networks connecting into Victoria and Charing Cross as these passengers continue their onward journey. It is possible that these additional numbers could negate planned improvements.

Crossrail is also important in terms of providing additional surface access to Heathrow.

A strategic review of bus services in London is commencing in 2009 and only after this has reported will it be possible to gauge the extent to which current investment plans are adequate.

The cancellation of Cross River Tram would remove the only tram/transit project in central London from the investment programme. It is unlikely in the short term, with current financial constraints, that any proposals will now come forward before 2018. LB Camden advises the consultants that TfL are still looking to alternative options to replace the scheme, and so the possibility of a scheme at some point in the future has not been completely ruled out.

There are no plans for major new highways in central London and the emphasis is now firmly on traffic management to improve capacity. Measures announced to increase

green time for vehicles at traffic signals and other signal improvements are expected to generate capacity increases. Schemes that could potentially have reduced capacity, such as Parliament Square and Euston Circus have been shelved.

The River Services concordat between London's pier owners, boat operators, boroughs and TfL to improve river services, ticketing and passenger information should improve the service and provide additional capacity for commuters. TfL are also funding the extension of Tower Pier to relieve overcrowding that has been caused by increasing passenger numbers.

4.5. Conclusions

London in general, and central London in particular, now has an infrastructure investment programme that should put it on a footing to meet the challenges posed by London 2012 and housing/employment growth to 2026, as well as reversing years of under-investment. Our analysis shows that committed schemes in central London, and on rail routes into the centre, should at least hold conditions on the rail network stable and, at the same time, providing much needed modernisation. The funding of this programme is subject to several factors, including central Government grants, private sector contributions and primary legislation on supplementary business rates, and its delivery is contingent upon target levels of funding being achieved.

However, several threats remain and the ability of rail systems to handle passenger increases facilitated by line upgrades will depend upon matching increases in station capacity. While several critical improvements are programmed at stations such as Victoria and Bank, and several others such as Liverpool Street and Tottenham Court Road will be delivered by Crossrail, there are still many stations where works are not programmed.

Bus patronage is projected to increase by 40% in London and by a broadly comparable amount in central London, yet London Buses expects bus kilometres operated to increase by only 8% to 2018. The placing of Cross River Tram in cold storage places even greater emphasis on the bus network to deliver full capacity for shorter distance trips within the central area, which is considered unrealistic so the need for the Cross River Tram is likely to remain. Way to Go! heralds a fresh look at bus services and Transport for London has already commended a review of how it procures bus services. It is expected that this will herald a more comprehensive strategic review of bus services.

Regardless of the number of buses and bus passengers circulating in central London, buses are just as prone as other vehicles to delays caused by congestion and roadworks. The Mayor has announced a blitz on roadworks but the reality is that the replacement of life-expired utilities will continue for many years. Buses, in recent years, have helped to relieve pressure on congested rail services and this should abate in coming years.

Initiatives such as Legible London, bikeability and the cycle hire and cycle super highway schemes should encourage higher levels of walking and cycling in central London both for commuters and visitors. Increases in the number of walk and cycle trips that occur will

result on a shift of the number of shorter distance trips made on the rail and underground network.

Increased pedestrian capacity and improvements to the pedestrian environment including way-finding will be necessary to cater for this increasingly important mode. This is particularly important around stations where there is a significant amount of onward movement of people such as at King's Cross, Victoria and Euston. This is a priority in the short term.

The Congestion Charging Scheme has reduced the number of vehicles entering the zone by 16% compared with 2002 levels, but still about 380,000 vehicles per day enter during the hours of charging. Of the vehicles (excluding pedal cycles) circulating within the zone, less than 63% are potentially chargeable (as measured by vehicle kilometres driven). The congestion benefits of the charging zone have been largely negated in recent years by roadworks and many highway routes within the zone are seriously congested. There are no plans for significant infrastructure investment in central London, but Transport for London makes a significant financial commitment to traffic management improvements, new signal systems (SCOOT) and real-time monitoring. The Mayor has announced a programme of re-timing traffic signals to increase capacity but this will take several years to complete.

Clearly, attempting to meet drivers' expectations within central London would be unrealistic and the current strategy based on high-tech traffic management solutions and focusing on blackspots is the correct approach.

The current investment plans to 2018, including Thameslink, the East London Line Extension and Crossrail clearly add significant additional public transport capacity but leaves several residual problems or issues. Post-2018, further capacity increases will be required but, at present, no firm proposals exist.

The main investment priorities from this analysis are considered to be as follows:

- More targeted traffic management measures to alleviate congestion hotspots in the central area.
- Strategic review of bus services to redistribute capacity and also to compensate for potential cancellation of Cross River Tram.
- Revisit Cross River Tram.
- Extension of LUL congestion relief programme and improvements to the station environs and access to stations such as Liverpool Street and Euston.
- Provision of step free access at LUL and National Rail stations
- Separation of the Northern Line (Bank and Charing Cross branches) which increases central area capacity.
- Possible further extensions to the DLR to Charing Cross and Victoria.

- Crossrail 2 Chelsea to Hackney line (although funding is unlikely to become available until 2025 so potentially this would not be within the current LDF plan periods).
- Interchange improvements at several stations, including Liverpool Street, Euston and Paddington.
- Public realm improvements at locations identified in Central London Pedestrian Study and other key locations and enhancement to pedestrian facilities to promote walking and to ensure that the needs of vulnerable people and people with disabilities are catered for.
- More positive measures to assist cyclists, including priority measures and cycle hire schemes
- Introduction of Legible London
- It is important that future transport strategies for each mode are closely linked.
- Finally, CLF boroughs identify the need for TfL to be more specific with planning authorities by identifying specific sites to safeguard for forthcoming transport schemes rather than non-specifically directing them to safeguard sites but without identifying where.

5. SOCIAL INFRASTRUCTURE ASSESSMENT

5.1. Adult Learning and Further Education

5.1.1. Baseline

There are 15 FE colleges in the six Central London authorities, as shown in **Table 5-1** and **Figure 5-1**.

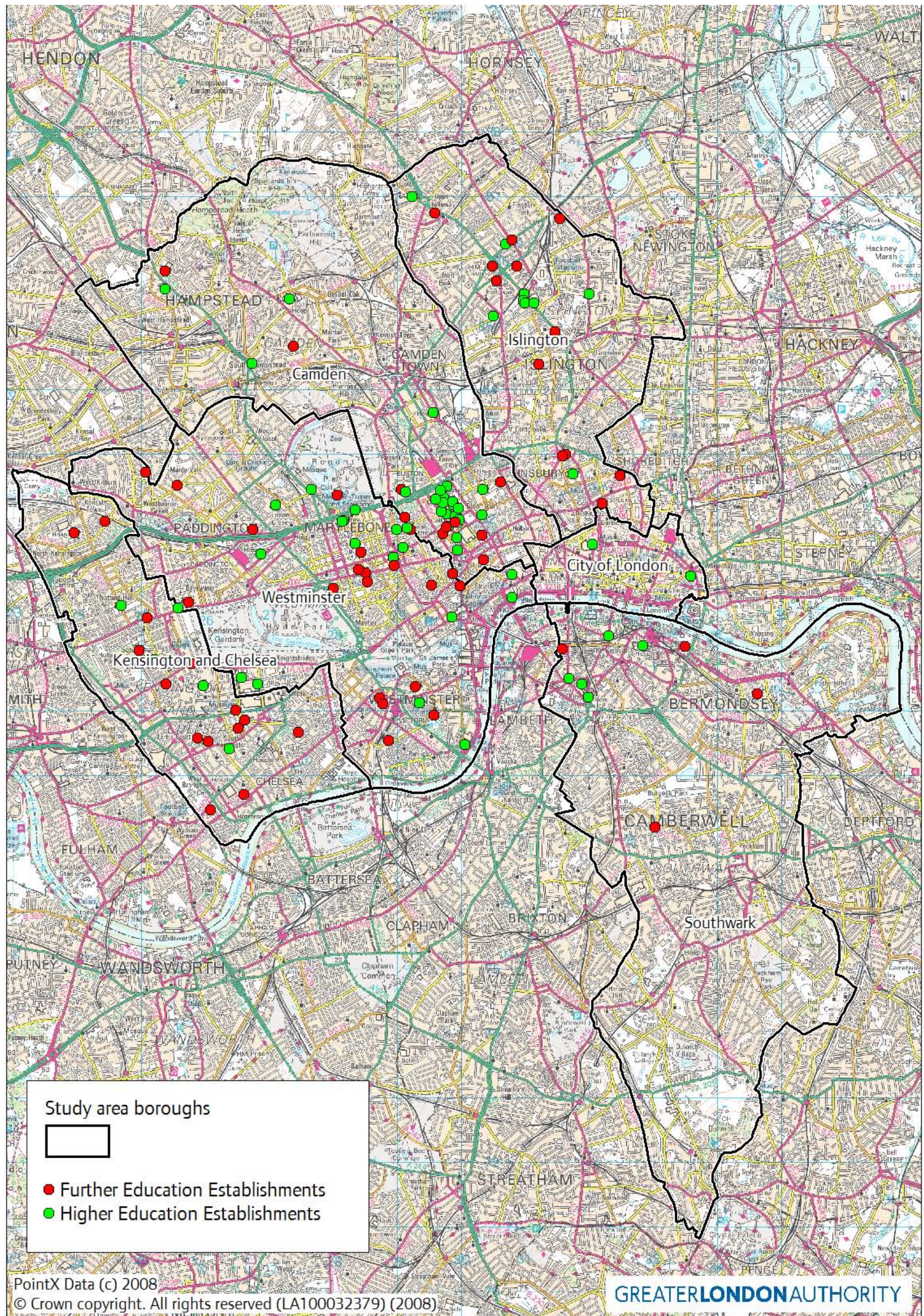
Table 5-1: FE Colleges in the Six Central London Local Authorities

<i>London Authority</i>	<i>Total Number of Colleges</i>	<i>Colleges</i>
Camden	4	City Lit
		Mary Ward Centre
		Working Men's College
		Westminster Kingsway College ¹⁰²
City of London	5	Institute of Masters of Wine
		Mountbatten Programmes Ltd
		Victoria English College (London) Ltd
		Williams College
		London East Bank College
		Bishopsgate Institute
Islington	1	City Lit
Islington	1	City and Islington College
Kensington & Chelsea	1	Kensington and Chelsea College
Southwark	1	Southwark College
Westminster	3	City of Westminster College
		Westminster Adult Education Service
		Westminster Kingsway College

Source: www.londoncolleges.com

¹⁰² Two centres are located at King's Cross and Regent's Park.

Figure 5-1: Distribution of Further and Higher Education Facilities in Central London

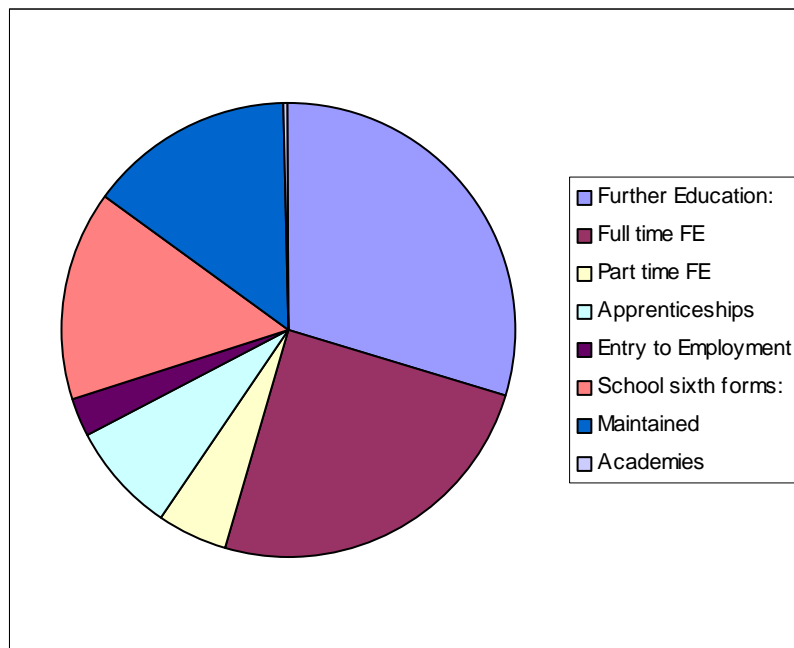


Source: GLA 2009

The LSC's London Strategic Analysis 2007-2008¹⁰³ highlights that London has 32% of existing provision renewed¹⁰⁴, below the national average of 45% and one of the lowest in the country. It states that local London needs are urgent so the pace of capital investment needs to increase. The analysis also indicates that FE and Work Based Learning success rates in London have improved but are still below the national average. Minimum levels of performance, Notices to Improve; Frameworks for Excellence, provider specialisation and National Skills Academies will be used to address poor quality and unresponsive learning. More detailed information on the scale and quality of current FE and AL provision in the Central London authorities was not available from the LSC.

Nationally there were 1,447,000 16-18 year old FE learners and 3,306,000 19-65 year old adult learners in 2007/08. **Figure 5-2** below illustrates the different categories of 16-18 learners.

Figure 5-2: Split of FE 16-18 Learners by Programme in England, 2007 – 2008



Source: LSC Statement of Priorities 2009-10

Figures on the current number of FE students and adult learners in Central London were not available. In our model of assessment, participation is estimated by applying current take up rates to the relevant age group within each authority (see **Appendix 1**). The UK has comparatively low levels of participation in learning among 15 – 19 year olds but has

¹⁰³ LSC London Strategic Analysis 2007/2008 (LSC, 2007)

¹⁰⁴ The term 'renewed' was not defined in the document, but is assumed to mean redevelopment, modernisation or refurbishment. A national programme of renewal is underway by the LSC.

seen some recent improvement. In London in 2004 147,400 of the 181,000 16 and 17 year olds residents were in education and training (82% - the highest ever proportion). In 2004 participation was highest in London North and South (both 84%); however in London Central participation actually fell from 80% in 2003 to 76% in 2004 – the lowest rate of the five London LSC areas¹⁰⁵.

London has a high proportion of jobs filled by people with higher level skills¹⁰⁶. **Table 5-2** outlines the number of working age adults in the London Central LSC area and their highest level of attainment. Level 2 is considered the basic measure of employability¹⁰⁷. In general Central London's residents have higher skills levels than the average recorded in London and England, with a greater proportion of residents qualified to Level 4+ than London and England (42% compared to 33% and 26% respectively). However a relatively large proportion of residents have below Level 2 skills (30%).

Table 5-2: Working Age Adults Highest Level of Attainment

Level of attainment	Level 4+	Level 3	Level 2	Below Level 2
<i>Definition of Level of Attainment</i>	<i>Equivalent to foundation degree level</i>	<i>Equivalent to 2 A-Levels</i>	<i>Equivalent to 5 grades A*-C at GCSE</i>	<i>Less than 5 grades A*-C at GCSE</i>
Central London ¹⁰⁸	42%	12%	15%	30%
London	33%	15%	18%	33%
England	26%	19%	22%	33%

Source: DfEs Local Estimates on Attainment 2005

5.1.2. Forecast Demand and Planned Provision

A core government target is to encourage more young people to stay in education until the age of 18; therefore it is essential to increase the number of 16-18 year olds in education at levels 2 and 3. One key growth area is in apprenticeships, with a focus on the Apprentice Programme¹⁰⁹. Almost 50% of jobs will require degree level qualifications by 2014 and there is a need to increase participation and achievement at Level 3 and progression pathways to HE are needed to improve the skills levels of young Londoners

¹⁰⁵ http://www.dcsf.gov.uk/rsgateway/DB/SFR/s000645/Addition2_lsc

¹⁰⁶ Working Futures 2004-2014 Qualifications Report

¹⁰⁷ Personal Communication, Stephen Bagley, LSC Partnership Director (by phone) December 2008

¹⁰⁸ Central London sub area includes: Camden, Islington, Royal Borough of Kensington & Chelsea, Southwark, Wandsworth and Westminster. The City of London is classed in the London East sub area.

¹⁰⁹ Personal Communication, Stephen Bagley, LSC Partnership Director (by phone) December 2008

and to meet employer needs¹¹⁰. The Leitch report identified the likely reduction in unskilled jobs in the future and an articulated ambition to ensure that by 2020 over 90% of adults are qualified to at least Level 2 and 68% are qualified to Level 3¹¹¹.

The LSC's *London Strategic Analysis 2007/2008*¹¹² contains forecast growth in the 16-18 age group in London. GLA 2006 population figures are used, and then growth is projected to 2008 and 2021¹¹³ **Table 5-3** below highlights the population growth in London divided by sub areas. LSC confirmed that the London Central sub area consists of the following Central London authorities: LB Camden, LB Islington, Royal Borough of Kensington & Chelsea, LB Southwark, LB Wandsworth and LB Westminster. (The City of London is classed in the London East sub area). The GLA projections indicate London Central has the highest estimated population growth for 16-18 age groups. In 2006 16% of Greater London's 16-18 year olds were resident in Central London. Central London has the most significant percentage change from 2006-2021 at 9.4% which is higher than all other London sub regions.

Table 5-3: 16-18 Age Group Population Growth, LSC Estimates up to 2021

<i>London Sub- Region</i>	<i>2006</i>	<i>2006-2008</i>	<i>2006-2021</i>	<i>Total number of learners by 2021</i>	<i>Percentage change 2006- 2021</i>
London Central	40,362	-266	+3,828	44,190	9.4%
London East	77,507	+454	+333	77,840	0.4%
London North	38,255	+212	+300	38,555	0.8%
London South	48,810	+572	-2,065	46,745	-4.2%
London West	51,276	-418	+676	51,952	1.3%
Greater London	256,211	+553	+3,072	259,283	1.2%

Source: LSC based on GLA Population Projections

The two tables below present the current participation and projected participation of 16-18 age group and number of adult learners (19-65) in FE and AL in England. **Table 5-4**

¹¹⁰ LSC London Strategic Analysis 2007/2008 (LSC, 2007)

¹¹¹ LSC Statement of Priorities (LSC, 2008)

¹¹² LSC London Strategic Analysis 2007/2008 (LSC, 2008)

¹¹³ GLA Population Projections Scenario 9.07, in *LSC London Strategic Analysis 2007/2008*

presents the current and projected participation 16-18 age group as a percentage of the total population of that age group. **Table 5-5** presents the total current and projected number of adult learners (19-65). Participation in LSC funded learning is predicted to increase for the 16-18 age group, though the number of adult learners will in fact fall from 2007/08 levels by 2009/10.

Table 5-4: Projected FE Participation Rates in England, by Age Group

Age Group	2007/08	2008/2009	2009/2010
16	88%	92%	95%
17	79%	81%	84%
18	56%	56%	56%

Source: LSC Statement of Priorities 2009-10

Table 5-5: Number of Adult Learners in England, 2007 – 2010

Total Learners	2007/08	2008/2009	2009/2010
Adults (19-65)	3,306,000	3,399,000	3,277,000

Source: LSC Statement of Priorities 2009-10

Table 5-6 below shows the projected demand as estimated through the Central London URS model. The model indicates a considerable increase in demand in the authorities where projected population growth is higher, namely in Southwark, Islington and Camden. The notable increase in demand in the neighbouring LB Hackney, LB Lambeth and LB Tower Hamlets may also increase the pressure on Central London FE and AL facilities.

Table 5-6: URS Assessment of Additional Demand for Further Education and Adult Learning from New Development, 2006 – 2026

<i>Local Authority</i>	<i>16-18 Years Olds Requiring Further Education</i>	<i>19+ Year Olds Requiring Adult Learning</i>	<i>Total Demand</i>
City of London	81	295	376
Camden ¹¹⁴	673	2,458	3,131
Islington	975	2,514	3,488
Kensington & Chelsea	315	1,149	1,463
Southwark	1,466	5,349	6,815
Westminster	564	1,679	2,243
Hackney	976	3,560	4,536
Tower Hamlets	2,833	10,337	13,169
Lambeth	989	3,610	4,599

Source: URS calculations see Children Population Estimate from Dwelling Number, R1 and A2 Sheet

5.1.3. Forecast Costs and Planned Investment

Table 5-7 below shows the projected cost of meeting demand as presented in as estimated through the Central London URS model.

¹¹⁴ The Central London sub area includes: Camden, Islington, Royal Borough of Kensington & Chelsea, Southwark, Wandsworth and Westminster. The City of London is classed in the London East sub area.

Table 5-7: URS Assessment of Cost of 16-18 and 19-65 Further Education and Adult Learning, 2006 – 2026

<i>Local Authority</i>	<i>Total Capital Cost</i>
City of London	9,406,602
Camden	78,278,603
Islington	87,207,192
Kensington & Chelsea	36,581,228
Southwark	170,364,006
Westminster	56,084,757
Hackney	113,401,808
Tower Hamlets	329,231,055
Lambeth	114,969,575

Source: URS calculations see Children Population Estimate from Dwelling Number, R1 and A2 Sheet

There is a lack of coherent data on the scale of investment planned for FE in Central London. Below we pull together the available data from the LSC. A further stage of work would involve contacting the FE colleges individually.

The Statement of Priorities 2008 highlights the LSC's capital programme will support the objectives outlined in **Table 5-8** below.

Table 5-8: Statement of Priorities 2008 Capital Programme Objectives

Delivering transformational change in the learning environment and experience for learners and employers, including (where appropriate) access to other services through co-location of facilities on school and college sites
Securing the right organisational solution in each local area
Ensuring that qualifying 14–19 capital projects in the FE and schools sector are funded appropriately
Supporting projects to enable colleges and providers to offer specialist training to respond to strategic skills needs
Supporting sustainability and reduction of the FE sector's carbon footprint and encouraging innovation in sustainable design and construction
Ensuring capital investment as a catalyst for community regeneration
Extending the availability of capital to private providers and encouraging new providers as part of securing new high quality provision
Enabling appropriate partnership working at local level so that maximum value can be secured from both LSC and Building Schools for the Future (BSF) investment to deliver the 14–19 offer across an area.

Source: LSC Statement of Priorities 2009-10

The LSC budget allocation is driven by historical rates of allocation to schools, FE providers and colleges¹¹⁵. The LSC Annual Report 2007-08 highlights that in terms of total programme expenditure (i.e. not just capital) Greater London had the most significant investment for the year ending March 2008 at £1,857.8m. On a national basis, the total programme capital investment in the year ending March 2008 (that is, the actual amount of money paid out to colleges for capital investment on a national basis in the financial year 2007-2008) was £497.8m. There is no regional breakdown of funds allocated for capital investment. It is reasonable to assume that the amount of money spent in each region is proportionate to the size of the region's learner population.¹¹⁶ Given that the total number of FE and AL learners for England in 2007/08 is 1,447,000 and 2.8% of that total number of learners are in Central London (2006 baseline figures)¹¹⁷, the estimated capital fund for the entire Central London area is £13.9m.

Table 5-9 below presents the LSC budget for total capital grants across the whole UK for the forth-coming years. The 2008/09 budget will increase by 18% to 2009/10, from £694.4m to £819.8m.

¹¹⁵ Personal Communication, LSC Partnership Director, December 2008

¹¹⁶ Personal Communication, LSC Partnership Director, December 2008

¹¹⁷ LSC Statement of Priorities 2008/09 (LSC, 2007)

Table 5-9: LSC Budget Line for National Capital Grants, £'000s

<i>Funding Stream</i>	<i>Budget 2008/2009</i>	<i>Budget 2009/2010</i>
14-19 age group Capital Grants (DCSF)	210,000	210,000
19+ Adult Learners Capital Grants (DIUS)	484,400	609,800
Total Capital Grants	694,400	819,800

Source: LSC Statement of Priorities 2009-10

The main capital programme for both 16-19 learners and 19-65 learners is the FE capital programme¹¹⁸. This is an application based system where colleges can apply either individually for funding for specific projects or as part of wider regional strategies for a 5-10 year period. The application process involves the colleges setting out the capital investment requirements by outlining how each will feed into the following three components; education (performance, learning and skills), finance (feasibility study conducted), property (the details of the proposal).

Capital funding for the 14-19 age group is under reform. There will be a major shift in the way education and training is delivered, with schools, colleges, higher education and work based providers involved in consortia to deliver the curriculum and qualifications entitlement. In particular the Diploma¹¹⁹ will require specialist facilities. Consortia will need to plan carefully, working out what should be built and where; and how the new facilities can be accessed by young people from across the area. The scale of, and the approach to, providing these facilities will vary across each area depending upon the current level of readiness¹²⁰.

In addition there are three types of funding available for adult learning:

- Employer Responsive Funding, such as the Train to Gain demand-led programme designed to support adults in work to deliver learning at level 1; this includes Adult Apprentices
- the Adult Learner Responsive Budget, such as the Skills for Life programmes primarily to support adults targeting level 2 and 3
- Skills for Jobs, which aims at supporting those people that need the most help in giving them the skills to acquire jobs.

¹¹⁸ Personal Communication, LSC Partnership Director, December 2008

¹¹⁹ The diploma is a new qualification which is set to expand in provision in forth-coming years, with an emphasis on practical and job-related experience.

¹²⁰ DCSF Capital Funding Information at webpage www.dcsf.gov.uk

The LSC London Strategic Analysis 2007/2008 identifies the need to increase the rate of capital developments to transform the learning estate to meet the LSC's vision. London has 32% of existing provision renewed, below the national average of 45% and one of the lowest in the country. The LSC London Strategic Analysis 2007/2008 states that local needs are urgent so the pace of capital investment needs to increase.

The LSC provided details of London Capital Applications in Detail Approved in 2007/2008 and 2008/2009. Approvals for Central London are shown in **Table 5-10**. There is a significant increase in both the total project cost of applications and the LSC contribution over the period shown. Total planned project costs increase from £15.9m in 2007/08 to £108.0m in 2008/09, while proposed LSC contributions to Central London projects increase from £11.1m in 2007/08 to £92.0m in 2008/09.

The delivery of Greater London projects is considered to be a relative priority in a 2008 National Audit Office report looking into the programme and its impact. The report did recognise the limited progress made in Greater London, and put forward some recommendation to address this as well as some other concerns the programme raises¹²¹.

In order to increase the number of facilities improved via the capital programme by 2016, the NAO recommends that the LSC considers the scope for encouraging and supporting colleges in using different procurement strategies, so as to reduce the amount of upfront funding required. Careful risk management and prioritisation of the capital funds available to the Council's successor bodies should also be a priority in view of the handover of the programme to 150 local authorities, a Skills Funding Agency and a Young People's Learning Agency. The report finds that programme has so far marginalised schemes for Colleges which are less financially strong or less able to contribute through applying reserves, disposing of assets or raising of loan finance. Also, it recognises that the cost of renewing the remaining colleges is becoming more expensive, putting the affordability of the programme at risk within the limits of the LSC's capital budgets.

¹²¹ National Audit Office, 'Renewing the physical infrastructure of English further education colleges', (NAO, 2008)

Table 5-10: London Capital Applications in Detail Approved 2007/2008 and 2008/2009 (as of 01/9/08)

<i>Year</i>	<i>College Name</i>	<i>Total Project Cost</i>	<i>Proposed LSC Contribution</i>	<i>Description</i>	<i>Application Approved</i>
2007/08	City of Westminster College	£12,703,953	£10,023,419	Phase 1 project to redevelop its Paddington site and refurbish the Maida Vale centre. Involves renting 13,000 m2 of temporary accommodation for decant purposes and refurbishment / adaptation of the space prior to occupation.	05-Sept-07
2007/08	City of Westminster College	£3,201,370	£1,120,480	Phase 2a: Demolition and clearance of the current Paddington Centre site and subsequent site preparation, including the expansion of the existing electricity substation.	13-Dec-07
<i>Total 2007/08</i>		<i>15,905,323</i>	<i>11,143,899</i>		
2008/09	City of Westminster College	£101,943,250	£87,668,000	Phase 2(b) of redevelopment of Paddington Green site. Construction of 23,320m2 of new accommodation at Paddington Green,	30-Jul-08
2008/09	St Charles Sixth Form College	£6,099,569	£4,391,690	Construction of new building containing a 4 badminton court gym, fitness suite and 6 classrooms. Relaying of MUGA. Removal of temporary accommodation.	17-Jul-08
<i>Total 2008/09</i>		<i>108,042,819</i>	<i>92,059,690</i>		

Source: LSC Capital Applications Approved 2007/2008 – 2008/2009 (as of 1/9/08)

LSC confirmed that there were no other approved capital projects in Central London¹²².

5.1.4. Conclusions

There is an expected increase across England in population at age groups 16-18 and 19-65 and similarly an increase in participation levels resulting in a forecast increase in demand for further education and adult education in England.

Based on our model we expect Central London to experience similar trends, particularly with population and increased participation rates for 16-18 age groups in Further Education. Southwark, Islington and Camden are likely to experience the highest level of growth in Central London, with potentially additional pressure deriving from projected growth in neighbouring Hackney, Tower Hamlets and Lambeth.

Funding for capital investment in England and in London is increasing and this is in line with the projected population and participation increase. For approved projects in Central London, total planned project costs increase from £15.9m in 2007/08 to £108.0m in 2008/09, while proposed LSC contributions to Central London projects increase from £11.1m in 2007/08 to £92.0m in 2008/09.

Based on our model the total capital costs of future space requirements for FE and AL will vary across the six Central London authorities from £9.4m in the City of London to £170.3m in Southwark. It is expected that Islington and Southwark will experience the greatest capital costs.

To ensure the projected demand for FE and AL in Central London is met there will need to be a sustained increase in funding. There is a risks to delivery associated with the availability of these capital funds. Moreover, funding is allocated based on historical rates and on a three year funding cycle, implying that local institutions may face funding gaps if growth in students is abrupt. The existing system whereby FE colleges submit bids to the LSC for capital funding has recent months fallen into crisis, illustrating how poor management and organisation of the funding regime can expose FE institutions to considerable risk.

The Central London authorities should engage early on in the planning process with the LSC and its replacement agencies as there is a lack of comprehensive published data on future investment plans which makes meaningful analysis of and planning for future needs difficult.

¹²² Personal Communication, LSC Capital Projects, (by email) December 2008

5.2. Higher Education

5.2.1. Baseline

There are in total 24 Universities in the six Central London authorities. These are listed in **Table 5-11** below, along with Higher Education Statistics Agency (HESA) data on the total number of student enrolments in the 2006/2007 year of entry. The total number of enrolled students in each of the authorities is broken down by: total student number in further education, total student number in higher education, total undergraduate and total postgraduate.

Key characteristics of the HE provision in the area are as follows:

- There are 24 Universities in the six Central London authorities with ten in Camden, six in Westminster¹²³, four in Kensington and Chelsea, two in the City of London, one in Islington, and one in Southwark
- There are a total of 218,420 enrolled students in the 24 universities, with a breakdown of 200,285 HE students, and 18,125 FE students
- The following Universities are the largest 6 units in terms of total students: University of the Arts London, London Metropolitan University, University of Westminster, London South Bank University, City University and University College London
- The majority of the Central London Universities do not have any students enrolled in FE, with the exception of Conservatoire for Dance and Drama, London Metropolitan University, London South Bank University, and University of the Arts London
- Most institutions have a mix of undergraduate and postgraduates within each university; however in total there are a greater number of students enrolled in undergraduate degree courses.

Table 5-11: Total Number of Students Breakdown, 2006

<i>University</i>	<i>Total Number of Students Enrolled</i>	<i>Total FE Students</i>	<i>Total HE Students</i>	<i>Total Under Graduate</i>	<i>Total Post Graduate</i>
University College London	19,385	0	19,385	11,805	7,580

¹²³ The University of the Arts is proposed to be relocated in King's Cross as part of the King's Cross Central Scheme. The move is due to be completed by 2011. See <http://www.kingscrosscentral.com/culture>, accessed 10/06/2009.

<i>University</i>	<i>Total Number of Students Enrolled</i>	<i>Total FE Students</i>	<i>Total HE Students</i>	<i>Total Under Graduate</i>	<i>Total Post Graduate</i>
University of London	470	0	470	0	470
The School of Pharmacy	1,385	0	1,385	730	655
The School of Oriental and African Studies	4,725	0	4,725	2,675	2,050
The Royal Veterinary College	1,805	0	1,805	1,345	465
London School of Hygiene and Tropical Medicine	1,140	0	1,140	0	1,140
London Business School	1,495	0	1,495	0	1,495
Institute of Education	6,440	0	6,440	195	6,245
Conservatoire for Dance and Drama	1,190	30	1,155	1,085	75
Central School of Speech and Drama	910	0	910	580	330
London School of Economics and Political Science	9,030	0	9,030	3,825	5,205
London Metropolitan University	29,495	675	28,815	21,955	6,860
City University	23,835	0	23,835	14,655	9,180
Imperial College of Science, Technology and Medicine	13,410	0	13,410	8,350	5,060
Royal Academy of Art/ Royal College of Art	920	0	920	0	920
Royal college of Music	650	0	650	350	300
The Institute of Cancer Research	290	0	290	0	290
London South Bank University	23,215	1,445	21,770	15,950	5,820
University of Westminster	24,710	0	24,710	17,850	6,860
Kings College London	21,230	0	21,230	14,010	7,220

<i>University</i>	<i>Total Number of Students Enrolled</i>	<i>Total FE Students</i>	<i>Total HE Students</i>	<i>Total Under Graduate</i>	<i>Total Post Graduate</i>
Royal Academy of Music	700	0	700	320	380
The Royal College of Nursing	650	0	650	460	190
University of the Arts London	30,885	15,975	14,910	12,460	2,450
Courtauld Institute of Art	455	0	455	155	300
TOTAL	218,420	18,125	200,285	128,755	71,540

Source: High Education Statistics Agency Limited (HESA) 2008

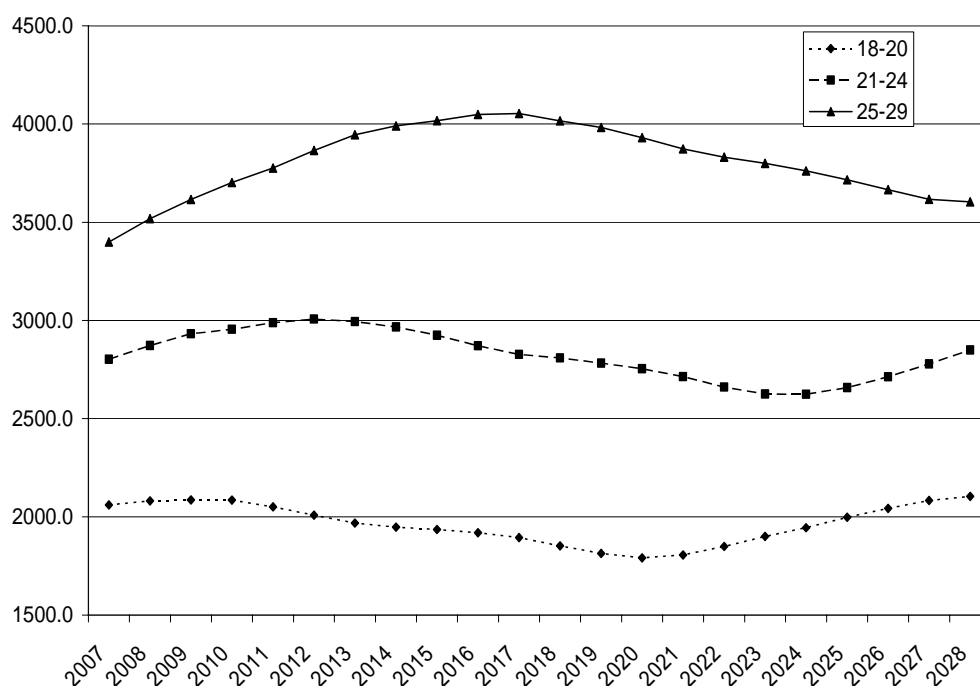
5.2.2. Forecast Demand and Planned Provision

The Higher Education Policy Institute (HEPI) identifies the forecast demand for HE up to 2029. HEPI have identified the main driver of demand in full time student numbers as population. HEPI have used assumptions based on the number of people aged 18+ and the potential proportion that will attend University¹²⁴.

Figure 5-3 identifies the total changes in three different age cohorts 2008-2029. All three experience a steady increase in numbers from 2008 until early the next decade. The largest age group is the 25-29 which continues to steadily increase until 2018 where it begins to slightly decline like the other two age cohorts.

¹²⁴ Personal Communication, (by email) HEPI, November 2008

Figure 5-3: Changes in Different Age Cohorts 2008-2029 (000s)



Source: ONS population estimates and GAD projections as in HEPI Demand for Higher Education to 2029 (2008)

Table 5-12 sets out the change in full time student numbers that would occur over the next two decades, if higher education numbers changed in line with demographic changes illustrated above in **Figure 5-3**. The trend illustrated in **Table 5-12** shows a decrease in student numbers to 2020/2021 followed by an increase in 2028/2029.

Table 5-12: Changes in Full Time English Domiciled Student Numbers at English HE Institutes up to 2029

	<i>Estimated Student Numbers 2007-08</i>	<i>Change in Numbers 2007-08 to 2020-21</i>	<i>Total Student Numbers 2020-21</i>	<i>Change in Numbers 2007-08 to 2028-29</i>	<i>Total Student Numbers 2028-29</i>
All males	375,043	-25,368	349,675	11,462	386,505
All females	482,405	-33,856	448,549	13,496	495,901
Total	857,448	-59,224	798,224	24,958	882,406

Source: HEPI Demand for Higher Education to 2029

HEPI has no information on the breakdown of forecast student numbers for Central London or at local authority level or by institution¹²⁵.

Table 5-13 identifies the proportion of full time first degree accepted applicants in 2007-08 who came from the region in which the institution was located. Greater London shows the highest proportion, along with the North West of England. The table also shows that 57% of applicants residing in Greater London go on to study in their home region.

Table 5-13: Proportion of Accepted Applicants from Institution's Region / Studying in Home Region, 2007-2008

<i>Region of Institution</i>	<i>Proportion of Institution's Students Coming from Institution's Region</i>	<i>Proportion of Region's Applicants Studying in Home Region</i>
North East	48%	65%
North West	63%	66%
Yorkshire and the Humber	40%	59%
East Midlands	34%	43%
West Midlands	54%	50%
East of England	49%	28%
<i>Greater London</i>	63%	57%
South East	47%	41%
South West	42%	47%

Source: UCAS Statistical Services

5.2.3. Forecast Costs and Planned Investment

Higher Education Funding Council for England (HEFCE) is the main funding body for universities capital investment. Funding is allocated on a four-year basis. The HEFCE Strategic Plan 2006-2011 identifies the key performance targets and measures for Higher Education, as illustrated in **Table 5-14**.

¹²⁵ Personal Communication, (by email) HEPI, November 2008

Table 5-14: Key performance targets and measures for Higher Education

<ul style="list-style-type: none"> -Enhancing excellence in teaching and learning -Widening participation and fair access -Enhancing excellence in research -Enhancing the contribution of Higher Education to the economy and society -Enhancing a high-quality Higher Education sector -Enabling excellence

Source HEFCE 2008, Strategic Plan 2006-2011

Capital expenditure plans for each institution in the Central London area were not available¹²⁶. However the Estates Strategy for each University provides some relevant information on future investment plans. The Estates Strategies contain an overview of the Estate Strategy and Master Plan, Corporate Plan & Financial Strategy, Changes to the Estate and Development & Refurbishment Opportunities. The Estates Strategies for each university in the Central London area with over 10,000 students were reviewed to identify major issues regarding future demand and provision of HE. Estate Strategies were not available for Kings University or London Metropolitan University.

The Estates Strategies highlight that considerable funds are required to maintain the existing estate. In addition ambitious major projects are underway and planned for future years. Needs for new space relate not just to academic uses but also student housing and support services, and to wider drivers such as the research sector and local regeneration initiatives.

A summary of the key findings emerging from these documents are outlined below.

University College London (UCL)

The Estates Strategy (published March 2008) highlights the following:

- UCL estates consist in 197 buildings, 5 million ft², £1.4 billion (81% academic the rest student housing)
- Capital funding remains largely dependent on the amount of future HEFCE capital funding (including the Capital Investment Fund - CIF) and criteria applied to that funding. The estates strategy assumes that in 2008-2012 UCL will receive broadly similar amounts to those available in the current and immediately previous SRIF (Science Research Investment Funds) rounds
- The aim is to ensure that the major developments which UCL will be undertaking during the planning period – funded through a combination of HEFCE Capital funding and philanthropic and other sources of income – are focused on building, supporting and developing UCL's academic strengths
- 29% of the Estate is in poor repair/condition or in need of repair/replacement soon

¹²⁶ The Higher Education Statistics Agency (HESA) hold this information but it is not publicly available.

- More and well-located student accommodation is required – up to 3,000 bed spaces, 1,000 in the next 2 – 5 years, a very small proportion of which might be provided on the Estate. This represents a doubling of the stock in the next 10 years to 7000-7500 bed spaces
- There are a number of significant developments/refurbishments underway or committed and a range of potential projects that are being planned and prioritised. These include the construction of an Institute for Cultural Heritage; improved facilities for the UCL Student Union; the development, in partnership with the LDA, LB Camden and others, a 'university quarter' in Bloomsbury.

City University

Key issues emerging from the Estates Strategy City University 2006/07 include:

- Teaching space accounts for 17% of the estate. Research 3%. Offices 34% and Communal space 27%. Currently the University is perceived to have very limited office space for expansion. Major effort to deliver office space efficiencies- estimates indicates we could accommodate 150 more staff within the existing estate
- It has a shortage of lecture theatres with more than 100 seats
- Provision of study, social and interaction space for students which matches the competition is essential, there is a need to define these spaces and create a more campus like feel for the main University site
- Detailed work is required to identify opportunities for re modelling the estate to accommodate growth with the minimum of additional space
- Options to reduce the requirement for office space and use this space more effectively and expand on it
- Increase residential spaces for students. An expansion of 400 bed spaces has been approved in principle. Many Universities offer a guaranteed place to first year undergraduates. City cannot do this and falls very short of this
- Opportunities to restructure and grow accommodation in Institute of Law.

Imperial College of Science, Technology and Medicine

The Imperial College of Science, Technology and Medicine has secured a £360 million Paddington Health Complex. This capital investment means the redevelopment of St. Mary's Hospital buildings, a new Royal Brompton and Harefield Hospital, and The development of a Science and Technology Park at Harefield in partnership with the University. The new Science and Technology Park development will be a first class centre, enabling scientists and leading edge companies to work together on heart

research. The scheme presents a unique opportunity to develop a truly first class service for the people of London¹²⁷.

University of Westminster

- The Estate Strategy 2008 indicates that while overall the Estate is in a reasonable condition, the cost of realising all of the university's ambitions is approximately £135 million over the period 2008-2018. The following major projects have been identified¹²⁸:
 - Maintain and improve the estate (2008-2018, c.£35 million)
 - Improve the utilisation of general teaching spaces (2008-2010, c.£7 million and embedded in other major projects)
 - Develop the Marylebone site (2008-2017, c.£16.3 million) and the Harrow site (2008-2013, £37 million)
 - Refocus the West End by developing 115 New Cavendish Street as a centre for undergraduate teaching and 309 Regent Street as a centre for high quality postgraduate teaching and interaction with industry and commerce
 - Develop additional bedrooms: 600 bedrooms at Harrow (2008-2017, £35.75 million); approximately 650 beds at Wembley for delivery in 2011 (via a nominations agreement with Quintain); development of the International House site to deliver approximately 250 beds
 - Develop sports & leisure facilities at the Harrow site. (2008-13).

London South Bank University

London South Bank University are currently working towards a new Estates Strategy (2008-2018), which they aim to complete and have signed-off by March 2009. This follows from the first stage of estates development that began in 2005¹²⁹ and proposed:

- The weather-proofing and stabilisation of the Georgian Terraces on London Road and Borough Road (The Terraces)
- The construction of a new state-of-the-art teaching building on Keyworth Street (Keyworth II). This eight-story building is meant to provide state-of-the-art new skills laboratories and office space for the University's Faculty of Health and Social care. It will also provide facilities for Sport and Exercise Science and LSBU's Education

¹²⁷ Imperial College London Website

¹²⁸ Westminster Estate Strategy 2008-2016

¹²⁹ Personal communication: LSBU Strategic Development Team (by phone and email). December 2008

Department The scheme is being developed in partnership with NHS London and is receiving funding from the Higher Education Funding Council for England (HEFCE), the London Development Agency (LDA), Dunhill Medical Trust, Guys' and St Thomas' Charity, Wolfson Foundation and M&E Sustainability¹³⁰

- Improvements to the public realm around our campus (Public Realm)¹³¹.

University of the Arts London

The Estates Strategy (2007) outlines strategic interventions comprising the consolidation and rationalisation of distant and disparate premises into a smaller number of purpose-built facilities, preferably on a single campus. Tactical interventions comprise adaptation, extension and improvement of existing premises, while operational interventions are more usually related to maintenance activities.

5.2.4. Conclusions

There are currently 24 universities in the six Central London authorities considered.

A meaningful strategic assessment of demand for HE across the Central London authorities is difficult as demand is not related directly to residential or commercial growth. Based on age cohort analysis, there is an expected decrease in demand across England for Higher Education up to 2021, following an increase up to 2029.

Estates Strategies for each university in the Central London area already identify major issues regarding future demand and provision of Higher Education highlighting that considerable funds are required to maintain the existing estate.

In addition ambitious major projects are underway and planned for future years. Needs for new space relate not just to academic uses but also student housing and support services, and to wider drivers such as the research sector and local regeneration initiatives. The documents however highlight the difficulty in meeting the required expansion of both academic and accommodation facilities, due to the pressing maintenance and refurbishment needs of the existing stock. City University appears to additionally suffer for the lack of spatial opportunities to expand its student accommodation facilities, which it considers to be hindering its competitiveness.

The Central London authorities should continue to work closely with HE institutions which are important partners in delivering expanded, higher quality education and associated infrastructure to meet growing demand in future years.

¹³⁰ London South Bank University at <http://www.lsbu.ac.uk/estatesdevelopments>

¹³¹ London South Bank University at <http://www.lsbu.ac.uk/estatesdevelopments>

5.3. Primary Healthcare

5.3.1. Baseline

Table 5-15 summarises the findings from the analysis of current provision, showing the total number of general practices, the total number of GPs FTE, the total residential population and the population per GP in each of the six Central London authorities. The baseline provision has been assessed against the ODPM standard of 1 GP per 1,700 residents, as set in the ODPM based on the standard levels of provision assumed by NHS and Department of Health planners. The table below illustrates whether current provision is above or below this standard. **Figure 5-4** shows the distribution of both primary and secondary health facilities throughout the study area.

The highest number of GPs FTE is in Southwark which also has the highest residential population. The lowest number of GPs FTE is in Kensington & Chelsea which also has the lowest residential population. All authorities are above the ODPM standard, except for Kensington & Chelsea and Westminster which fall slightly below the standard.

Table 5-15: Number of General Practices, GPs (FTE) and population per GP

<i>PCT</i>	<i>No. of general practices</i>	<i>GPs (FTE)¹³²</i>	<i>Total Residential Population</i>	<i>Population per GP¹³³</i>	<i>Above or Below the ODPM Standard</i>
City of London ¹³⁴	N/a	N/a	N/a	N/a	N/a
Camden PCT	45	152	231,900	1,526	Above
Islington PCT	40	130	187,800	1,445	Above
Kensington and Chelsea PCT	N/a	101	178,600	1,768	Below
Southwark PCT	48	174	274,400	1,577	Above
Westminster PCT	53	137	234,100	1,767	Below

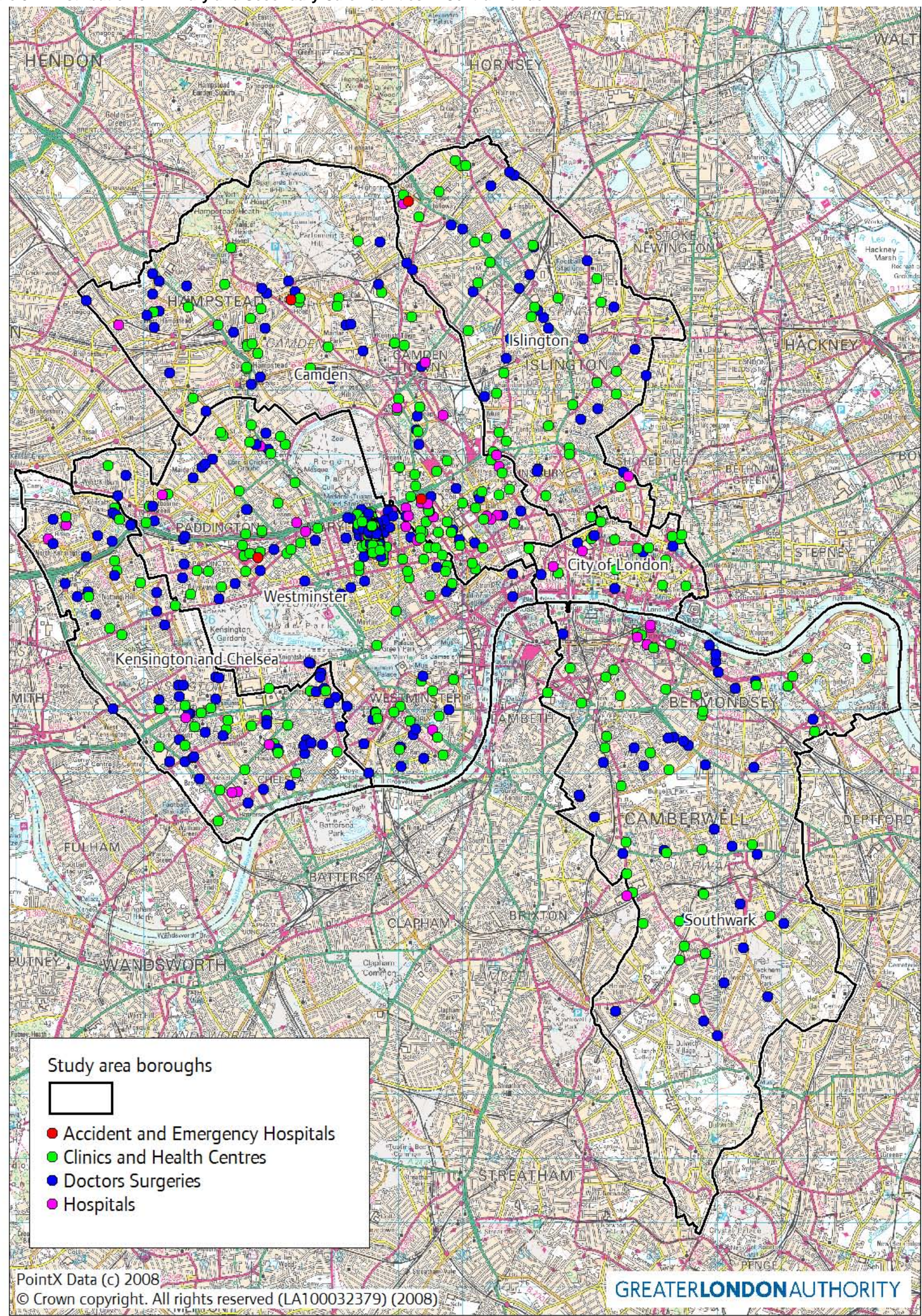
Source: Information Centre for Health and Social Care, September 2007.

¹³² Full Time Equivalent (FTE) data were collected from the Census based on the number of sessions or hours each GP works. Prior to 2006 these data were estimated and therefore may not be fully comparable.

¹³³ Population per GP is calculated using ONS 2007 mid year population estimates (Information Centre for Health and Social Care, September 2007)

¹³⁴ City of London falls under City and Hackney Teaching PCT and it was impossible to identify baseline figures, Personal communication Rosemary Philbert and Michael Walker, City and Hackney PCT, Head of Estates and Facilities (phone and email) January 2009.

Figure 5-4: Distribution of Primary and Secondary Care Facilities in Central London



Source: GLA 2009

Below we give a profile of services within each of the Central London PCT, based on the individual Services and Estates Strategy. These documents are not available for the Kensington and Chelsea PCT, for which the Ten Year Primary Care Strategy¹³⁵ has been reviewed instead. City of London is included in City and Hackney Teaching PCT and information has been gathered from its Commissioning Strategy and Resource Strategy¹³⁶.

Estates Strategies provide a ten year strategy for the PCTs estate portfolio. The strategy is aimed at ensuring that the PCT retains and supports the development of a high quality estate in the right locations to deliver modern, accessible primary care services. The strategies are at various stages of development and in addition contact was made with the different PCTs to obtain the relevant strategy documents and additional relevant information.

Many of the Primary Care facilities in Central London are reported to be of poor quality and in old buildings that are no longer suitable for modern health care. The PCT strategic intentions recognise the need to focus on improving the quality of buildings to ensure a high quality primary care service for Central London.

The key themes of all the PCTs are to improve the health of the local community by addressing health inequalities and developing local primary care and community services. With this in mind the PCTs have developed a vision that will ensure that services are well designed and of high quality to meet the needs of its patients.

City and Hackney Teaching PCT¹³⁷

An estimated 15% expansion in primary and community care capacity will be required to meet primary care access targets, improve chronic disease management in primary care and to enable those currently not registered to gain access to a GP. The number of GPs working in City and Hackney has increased from 129 to 155 over the past 3 years (2003-2006). City and Hackney along with other inner city authorities has historically been 'under doctored', however this trend seems to be reversing.

Camden PCT Primary Care Services¹³⁸

The Camden PCT Services and Estates Strategy (2007) indicate that there are in the region of 245,000 patients registered on GP lists in Camden. The PCT has organised GP Practices on a locality basis, and Camden is divided into 5 localities. The locations of

¹³⁵ Kensington & Chelsea PCT 10 Year Primary Health Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007)

¹³⁶ City and Hackney Teaching PCT Commissioning Strategy 2005-2008 and Resource Strategy 2005-2008 (City and Hackney Teaching PCT, 2005)

¹³⁷ City and Hackney Commissioning Strategy 2005-2008 and Resource Strategy 2005-2008 (City and Hackney Teaching PCT, 2005)

¹³⁸ Camden PCT Service and Estates Strategy (Camden PCT, 2007)

practices are unevenly distributed and there often is insufficient space for nurses and others to work alongside GPs.

There are currently 63 community pharmacies in Camden. A number of development schemes have been running locally, funded through Primary Care Development. These schemes provide access to medicines (both prescribed and bought over the counter), pharmaceutical advice, public health advice, and a range of enhanced services.

The general quality of ophthalmic services is good. Ophthalmic services rely on the commercial aspects of the optician's shop, and where there is competition smaller practices are being driven out of business by larger chains.

With the advent of the new Dental contract, and recurrent funding for quality access and choice the PCT will be better placed to agree premises issues with Dentists. Practice visits are currently being carried out to assess the status of premises, which will inform a strategy.

Kensington & Chelsea PCT Primary Care Services¹³⁹

Overall Kensington and Chelsea PCT are recognised as being an under doctored area this is evident in **Table 5-15** whereby the number of GPs falls under the ODPM standard of 1 GP per 1,700 residents.

Islington PCT Primary Care Services¹⁴⁰

The Islington PCT Commissioning Strategy Plan (2007/08-2011/12) highlights the substantial population growth forecast for the local authority and that growth will be greatest in the 40-59 year age group (13.2%) and least in the older age groups. Most local larger GP practices are of an excellent quality, but the general infrastructure of primary care is constrained mainly by old and not fit for purpose buildings resulting in a relatively large number of smaller practices.

Of Islington's 40 GP practices, 15 are single-handed. Many work out of small premises, which are not fit for purpose. The PCT wants to move to a smaller number of larger GP practices. To date Islington PCT has reduced the number of practices mainly through a reactive plan; now they intend to take proactive steps.

Southwark PCT Primary Care Services

The primary health care services provided in Southwark are well spread out throughout the borough, with some clustered around the main transport links. The number of GPs in the borough meets the current demand, and includes a mix of both single handed practices and larger practices. One aim is to have no single handed practices and, rather

¹³⁹ Kensington and Chelsea PCT 10 year Primary Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007)

¹⁴⁰ Islington PCT Commissioning Strategy Plan 2007/08-2011/12 (Islington PCT, 2007)

than replacing them, to instead focus on improving and enhancing larger practices which offer a wider range of services.¹⁴¹

The overall position in terms of the physical condition of the GP estate could be summarised as 'fair to good' with some remaining very poor premises. However, few of the existing premises have potential for major expansion. A significant number of properties are converted residential or other buildings in relatively land-locked sites. The other key feature of the existing premises profile is the large number of practice premises, providing care for a comparatively small number of patients. The median number of patients per GP practice building is only 5,500.¹⁴²

*Westminster PCT Primary Care Services*¹⁴³

The Westminster Strategic Service Development Plan (2008-2013) highlights that Westminster PCT serves more than 244,000 residents, but there are an estimated million people who live, work and visit Westminster each day and use some of its services, therefore there is an increased demand on the primary health services Westminster offers. Of Westminster's 53 GPs 23% of the practices are single handed, these are seen as unable to provide the access and the range of services which is appropriate for the modern provision of primary care.

5.3.2. Forecast Demand and Planned Provision

This section outlines forecast demand for primary health care services across Central London, as established through the PCT Strategies and consultation with the PCTs.

Forecast Demand for City and Hackney Teaching PCT Primary Care Services

An estimated 15% expansion in primary and community care capacity will be required to meet primary care access targets, improve chronic disease management in primary care and to enable those currently not registered to gain access to a GP¹⁴⁴.

City and Hackney Teaching PCT identifies its planning for health improvement and service delivery over the 2005-2008 period in its Commissioning Strategy. The work on developing the PCT's vision for health improvement and service delivery identified the need for shifts in both the nature of service delivery and PCT thinking; the paradigm shift. A paradigm may be described as a way of looking at the world. The PCT perspective on the local health 'world' or economy is that it should be characterised in the next 3-5 years, by movement away from existing models of service delivery and behaviour, towards a model which is patient centred and delivers the "right care in the right place, at the right time".

¹⁴¹ Personal Communication, Southwark PCT 17.12.2008

¹⁴² Southwark Primary Care Trust Asset Management Strategy 2005 (Southwark PCT, 2007)

¹⁴³ Westminster Strategic Service Development Plan 2008-2013 (Westminster PCT, 2008)

¹⁴⁴ City and Hackney Teaching PCT Commissioning Strategy 2005-2008 (City and Hackney PCT, 2005)

There are no details or specific data in terms of future planned service delivery is available.

Forecast Demand for Camden PCT Primary Care Services

In the Camden PCT Service and Estates Strategy (Jan 2007) the PCT states its vision to ensure that there is managed care across the health and social care system resulting in improved health and better value for public money. The capacity for growth needs to be built into services to address the predicted very significant population growth in Camden. No details or specific data in terms of future planned service delivery is available

Forecast Demand for Islington PCT Primary Care Services

Looking to the future Islington has a forecast population growth, incidence growth and needs, aspirations and targets which are going to make increasing demands on the resources available at the PCT.

The PCT has opened a number of new GP premises in recent years, working with the Local Improvement Finance Trust (LIFT) partner, but considerable capital investment is required to improve the infrastructure of primary care services.

Forecast Demand for Kensington & Chelsea PCT Primary Care Services¹⁴⁵

Initial workforce calculations predict that Kensington and Chelsea PCT will need to recruit a further 20 GPs and 5 nurses alone to be able to respond to the increased workload of improved care for people with long term conditions. The document has no further quantitative information on forecast demand for primary care in Kensington and Chelsea.

Forecast Demand for Southwark PCT Primary Care Services

Southwark has both an ageing population and a proportionately high number of young people in the borough, with a birth rate of 3.2%. There is a need to increase the number of primary health care services to cater for increased young and older age groups.¹⁴⁶ Southwark PCT is forecasting an increase in population of 11% to the year 2016 and an increase in population of around 20% by 2021. If list sizes remain at current levels Southwark forecasts it would need to recruit an additional 16 GPs and associated primary care teams.

Forecast Demand for Westminster PCT Primary Care Services

This information was requested and unavailable¹⁴⁷.

¹⁴⁵ Kensington and Chelsea PCT 10 year Primary Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007)

¹⁴⁶ Personal communication, Southwark PCT (by phone) 17.12.2008

¹⁴⁷ Personal communication, Westminster PCT (by phone and email), December 2008. It is understood that WCC is organising a meeting with the PCT to discuss the findings of this study, however no information was available at the time of submission.

The HUDU model was used to quantify and cost potential primary and secondary healthcare requirements in Central London. The assumptions under-lying the approach are laid out in **Appendix 4**.¹⁴⁸ While the HUDU model is a useful tool, it should be noted that it does not take the baseline position (i.e. existing capacity) into account. In addition, the model does not reflect evolving models of healthcare provision, for example the drive to better integrate health and care services and to shift care wherever possible out into the community, and the associated move towards polyclinics. Some of the Central London authorities have already started work to identify potential sites for polyclinics. For these reasons, the estimates of required provision and associated costs generated may be exaggerated and the units of provision used to express primary healthcare requirements (number of GPs) may in the future become less appropriate.

Table 5-16 shows the results of the analysis. Southwark appears to be the local authority requiring the highest number of GPs, followed by Islington, Camden and Westminster.

Table 5-16: HUDU Model Results, Primary Healthcare Additional Requirements from New Development, 2006 – 2026

<i>Local Authority</i>	<i>Total Requirements (number of GP and Primary Care units)</i>	<i>Space Requirements</i>
City ¹⁴⁹	3	428
Camden	18	2,971
Islington	25	4,120
Kensington & Chelsea	10	1,649
Southwark	33	5,427
Westminster	15	2,525

Source: HUDU Planning Contribution Model, EDAW/AECOM, 2007.

5.3.3. Forecast Costs and Planned Investment

Information on planned investment is available in the Strategic Service Delivery Plan (SSDP) and the Estates Strategy for each PCT.

Funding requirements for PCT capital allocations will be determined by robust and realistic expenditure plans submitted by individual PCTs and then agreed with their

¹⁴⁸ Key inputs / assumptions include: population estimates of baseline population based on GLA, DMAG, RLP (Review of the London Plan) forecasts (high case scenario); projected dwelling growth up to 2026 for each of the six Central London local authorities as per the URS model; occupancy rates by tenure and size as per the URS model; net population gain factor of 100%; GP to patient ratio of 1 GP per 1,700. HUDU model default assumptions have been used for all other variables, including build up rates and take up rates.

¹⁴⁹ City of London is part of the City and Hackney Teaching PCT

Strategic Health Authority (SHA)¹⁵⁰. The NHS London Strategic Plan 2008 outlines high level performance targets and goals but no planned or forecast investment costs or strategies. The NHS London annual report and statement of accounts 2007/08 outlines that in 2007/08, London's PCTs spent £11.5 billion commissioning health services for Londoners; however there is no breakdown of what this figure includes. During 2007/08 NHS London developed a five year strategic plan setting out the organisations strategy and goals only.

Forecast Costs and Planned Investment for City and Hackney PCT Primary Care Services

This information was requested but was unavailable¹⁵¹.

Forecast Costs and Planned Investment for Camden PCT Primary Care Services¹⁵²

The Service and Estates Strategy is driven by requirements relating to the need to provide accessible services to the appropriate patient populations, delivered within buildings and facilities that are fit for purpose and in compliance with all relevant building and service quality standards. Many of the Primary Care facilities in Central London are of poor quality and in old buildings that are no longer suitable for modern health care. Expanded and improved Primary Care facilities is essential to address the current inequalities in terms of local access to Primary Care services, as well as the future increased demand as a result of the projected population increase.

A sound Primary Care infrastructure will be developed to deliver high quality services from a wider range of locations and facilities in the community in line with the PCT's priorities and plans to ensure that wherever possible, high quality services are provided as close as possible to the service users' home and community, and that dependence on secondary care is reduced. General Practices will develop so that they are able to provide a range of services, appropriate to the diverse needs of the population, in a flexible manner.

Camden PCT Estates Strategy states that considerable capital investment has been afforded to some areas of the Provider Services estate, though it does not present precise figures for planned investment. It states that:

- Approximately 5% of the Provider Services estate in terms of physical condition is as new and can be expected to support the provision of health services adequately. 56% of the estate is sound and operationally safe exhibiting only minor deterioration whilst 27% of the estate though currently operational, will require major repair or replacement to support the current and proposed models of service

¹⁵⁰ Westminster PCT Estates Strategy 2008 (Westminster PCT, 2008)

¹⁵¹ Personal communication, City and Hackney PCT, Head of Estates and Facilities (phone and email) January 2009.

¹⁵² Camden PCT Services and Estates Strategy 2007 (Camden PCT, 2007)

- 74% of the Provider estate is fully utilised, approximately 5% is overcrowded whilst 21% is underused. This presents the directorate with an opportunity to realign some services to ensure efficient utilisation of space
- 70% of the estate will require general maintenance investment only. Most of the buildings within the Provider Services estate comply with statutory standards however approximately 53% of the estate will require minor non-structural and structural changes to achieve statutory compliance including Disability Discrimination Act (DDA). 37% of the estate will require moderate non structural changes to achieve full statutory compliance.

Forecast Costs and Planned Investment for Islington PCT Primary Care Services¹⁵³

A Long Term Conditions Strategy was developed two years ago, based on a bespoke study commissioned from the King's Fund. Working with the local trusts, the strategy builds on the integrated model for care co-ordination across health and social care developed between Islington PCT and LB Islington.

Forecast Costs and Planned Investment for Kensington & Chelsea PCT Primary Care Services¹⁵⁴

Kensington & Chelsea's PCT vision for the 10 year period 2008-2018 is to provide primary care services from the highest quality buildings as possible within a close proximity to patients' homes. The PCT carried out a survey of all GP, NHS dentists and community pharmacy facilities to assess the level of Disability Discrimination Act (DDA) compliance, existing capacity and potential for expansion and distribution of practices versus need. This survey identified one third of GP premises needed further work to be DDA compliant.

Kensington & Chelsea has an indicative budget for 2008/2009 to spend £500,000 on Infrastructure. The PCT Primary Care Implementation Strategy aims to provide modern and suitable facilities for primary care by identifying facilities that will support the hub and spoke model of primary care; this is a model of primary care that is best placed to deliver the vision of the 10 year primary care strategy for Kensington and Chelsea.

Forecast Costs and Planned Investment for Southwark PCT Primary Care Services

Throughout 2005 Southwark Primary Care Trust developed its Asset Management Strategy (AMS). This strategy encompasses a picture of what the community and primary care services could look like in 10 to 15 years time, and the premises that will be needed to house these services. 15 years time Southwark PCT expects to be delivering:

- High quality services to the local authority. The population will be a 1/3 as big again as it is now; a 1/4 of the borough will have been rebuilt

¹⁵³ Islington PCT Commissioning Strategy Plan 2007/08-2011/12 (Islington PCT, 2007)

¹⁵⁴ Kensington and Chelsea PCT 10 Year Primary Care Strategy 2008-2018 (Kensington & Chelsea PCT, 2007)

- Health and social care services will be delivered through high quality, modern, multi purpose buildings that bring together a range of services ensuring ease of access for the patient and carer
- The majority of care will be provided in the communities in which people live, not in hospital or institutional settings. It will be supported by the highest quality secondary care services, with maximum ease of access. It will be largely delivered in or close to people's homes.

The overall position in terms of the physical condition of the GP estate could be summarised as 'fair to good' with some remaining very poor premises. However, few of the existing premises have potential for major expansion. A significant number of properties are converted residential or other buildings in relatively land-locked sites. The other key feature of the existing premises profile is the large number of practice premises, providing care for a comparatively small number of patients. The median number of patients per GP practice building is only 5,500¹⁵⁵.

Forecast Costs and Planned Investment for Westminster PCT Primary Care Services

In line with Westminster's SSDP and Estates Strategy, Westminster PCT has four major priorities: planned and opportunistic developments which aim to achieve value for money, quality and efficiency.

GP led health centres are a planned development for GPs in Westminster to provide new and integrated services. The PCT has submitted a proposal to NHS London in line with operational requirement for the development of two GP-led health centres based on its two areas of greatest deprivation. A service specification and procurement plan are being prepared with a view to services being operational from March 2009.

Recent investments which have been completed include the following:

Current Proposals:

Victoria Medical Centre providing enhanced facility for an existing GP practice.

Brompton House GP led primary care centre relocated another GP onto its premises

Hallfield Clinic refurbished for use as GP surgery

Extension of a GP surgery in Victoria to enable practice to develop integrated service and become a training practice

Source: Westminster Estates Strategy 2008-2013

Table 5-17 is taken from Westminster PCT Estates Strategy 2008-2013. While it shows capital bids rather than funded projects, it illustrates the scale of planned investment by Westminster PCT in upkeep of the primary health estate. A total of £2,186,261 has been forecast for Estates capital bids for the period 2008/09, 2009/10, 2010/11.

¹⁵⁵ Southwark Primary Care Trust Asset Management Strategy 2005 (Southwark PCT, 2005)

Table 5-17: Total Westminster PCT Estates Capital Bids, £, 2008 – 2011

<i>2008/09 Building Condition</i>	<i>Statutory Compliance</i>	<i>2009/10 Building Condition</i>	<i>Statutory Compliance</i>	<i>2010/11 Building Condition</i>	<i>Statutory Compliance</i>	<i>Total</i>
356,017	838,415	748,543	153,705	339,147	434	2,186,261

Source: Westminster Estates Strategy 2008-2013

The HUDU model was used to quantify and cost potential primary and secondary healthcare requirements in Central London. **Table 5-18** shows the results of the analysis. It illustrates the likely building costs associated with providing primary health care services; it is interesting to note that for Kensington and Chelsea, the only authority for which some planned investment information is available, the estimated building costs are three times as much as the 2008/09 allocated capital budget.

Table 5-18: HUDU Model Results, Total Additional Capital Costs, 2006 – 2026¹⁵⁶

<i>Local Authority</i>	<i>Total Capital Costs (£)</i>
City ¹⁵⁷	1,157,369
Camden	15,794,634
Islington	22,631,295
Kensington & Chelsea	6,293,877
Southwark	34,482,966
Westminster	13,890,175

Source: HUDU Planning Contribution Model, EDAA/AECOM, 2007.

5.3.4. Conclusions

Most of the Central London PCTs have completed their PCT Commissioning Strategy Plan for the 2007-2012 period, with the exception of the City and Hackney and Kensington and Chelsea PCTs.

The available documents include valuable information on the current provision of primary healthcare services, but show a lack of analysis of likely future needs. City and Hackney,

¹⁵⁶ The HUDU model default capital costs are per sqm. The spatial requirement for primary care is 165 sqm per unit, inclusive of planning, engineering and circulation space. This also accounts for the changing role of primary care. The cost per sqm is £2,380,

All spatial requirements include planning, engineering and circulation allowance. Source: Edaw/Aecom 'HUDU Planning Contribution Model Guidance Notes', (2007).

¹⁵⁷ City of London is part of the City and Hackney Teaching PCT

Southwark and Kensington and Chelsea PCTs are the only ones to provide forecast additional requirements based on projected population growth.

Engagement with the PCTs to consult with them and obtain the relevant data was in general difficult. Joint working between the PCTs and Central London authorities needs to be improved to ensure primary health requirements are fully incorporated into strategic forward planning.

A run of the HUDU model identifies significant investment will be required to meet health requirements up to 2026. Funding for primary health is allocated on a three year basis, making assessment of planned long term future investment difficult. It should be noted that the HUDU model does not take the baseline position into account and also does not reflect evolving models of healthcare provision, and so the estimates of required provision and associated costs generated may be exaggerated. It is therefore recommended that the Central London authorities discuss all the results presented in this section with the relevant PCTs.

The evidence on current provision highlights that:

- Many of the Primary Care facilities in Central London are of poor quality and in old buildings that are no longer suitable for modern health care. As a result PCTs may need capital resources devoted to the upgrade and refurbishment of existing facilities, in turn potentially diverting resources from the expansion of capacity. This may be particularly relevant to Islington, Kensington and Chelsea and Camden
- Camden has an uneven distribution of GPs and a lack of space for provision of services. 27% of the estate require major repair or replacement to support the current and proposed models of service and only 21% of the surgeries show spare capacity
- Islington had a significant number of primary services that have premises which are old and in need of replacement. 38% of the surgeries are single-handed facilities, while the figure is 23% in Westminster. These PCTs may therefore need to provide the additional GP services estimated by the HUDU model (10 and 6 respectively) into entirely new premises
- Southwark records a good mix of size in its surgeries, but aims at consolidating them in larger centres offering a wider range of services than is currently the case.

In terms of forecast requirements:

- There is a drive not only to improve existing facilities but to change the model of delivery including a drive to decrease GPs operating in small practices / alone and to invest in expanded primary healthcare centres which offer a wider range of services. This is significant in steering future estate strategy e.g. Southwark's estate is mostly in fair to good condition but few practices have significant scope for expansion. The projected primary healthcare needs emerging up to 2026 may constitute an opportunity for the PCTs to deliver their vision

- There is a lack of workings quantifying requirements in future years. However most PCTs acknowledge the need for considerable investment in making the current estate fit for purpose and in providing for new future need
- Kensington & Chelsea have identified the need for 20 new GPs up to 2018, and Southwark for 16 new GPs up to 2021. City of London estimates a 15% expansion in primary care capacity will be required to meet primary care access targets. These figures appear in excess of the HUDU estimates, but PCT analysis takes advantage of a better local knowledge, and potentially incorporates evidence of existing shortfalls in provision that the HUDU model itself disregards.

As far as forecast costs and investment plans are concerned:

- None of the commissioning strategies develops a full investment strategy detailing the capital funding required to both upgrade and/or maintain existing facilities and to expand the current provision. Even when some forecasts have been produced on future needs they are not accompanied by the likely spatial and capital requirements
- There is a general lack of detailed information on capital spending in Central London and in London in general. London's PCTs for instance reports that it spent £11.5 billion commissioning health services for Londoners in 2007/08, but it does not provide a breakdown on what this amount has been spent on
- There are some recent expansions and investment into primary care however further investment will be required to improve the estate
- In Camden 70% of the estate will require general maintenance investment only, but according to HUDU model the net additional demand up to 2026 will result in additional £15.8m capital funding need to support 18 new GPs
- Kensington & Chelsea has an indicative budget for 2008/2009 to spend £500,000 on infrastructure. The HUDU model estimates Kensington and Chelsea will need an additional 3 GPs, and the associated building cost is estimated at £1.5m
- Westminster PCT has submitted a total of £2,186,261 in estates capital bids for the period 2008/09 to 2010/11. The HUDU model estimates Kensington and Chelsea will need an additional 6 GPs, and the associated building cost is estimated at £3.6m.

5.4. Secondary Healthcare

5.4.1. Baseline

NHS London is one of 10 strategic health authorities (SHAs) in England. It was established in July 2006 to lead the NHS across London. NHS London is accountable for the performance of 31 primary care trusts (PCTs); 24 acute trusts¹⁵⁸; five mental health trusts and the London Ambulance Service. In 2007/08, London's PCTs spent £11.5 billion commissioning health services for Londoners, however there is no breakdown of what this figure includes¹⁵⁹.

Table 5-19: Secondary health care providers for each of the 6 Central London Authorities

<i>Local Authority</i>	<i>Secondary Health Care Provider</i>
Camden	NHS 19
	FT 4
	Other 1
Islington	Whittington Hospital NHST (Islington PCT lead commissioner)
	U.C.L.H. (FT)
	Royal Free Hospital
	Moorfields FT (Islington PCT lead commissioner)
	Barts & The London, Homerton (FT)
	Guys & Thomas' (FT)
	Hammersmith Hospital
	R.N.O.H
	St. Mary's
	N.Middlesex University Hospital
	Barnet & Chase Farm
	Chelsea & Westminster FT
	North West London
	Royal Brompton
	King's (FT)
	Royal Marsden (FT)
	Whipps Cross University Hospital
	St. Georges
	Other acute.

¹⁵⁸ Acute trusts are responsible of the quality and efficiency of hospital services provisions. They also decide on a strategy for how the hospital will develop, so that services improve.

¹⁵⁹ NHS London annual report and statement of accounts 2007/08, (NHS, 2008).

Local Authority	Secondary Health Care Provider
Kensington & Chelsea	N/A ¹⁶⁰
Southwark	Kings Health care FT Guy's and St. Thomas' FT The Lewisham Hospital External service Agreements Other Acute
Westminster	Imperial Healthcare NHS FT Chelsea & Westminster NHS Trust University College London Hospital SLAs with 13 other Provider organisations

Source: PCT Commissioning Strategies for each authority: Southwark PCT Commissioning Strategy Plan 2007/08- 2011/12, Camden PCT Commissioning Strategy Plan 2007, Westminster PCT Strategic Service Delivery Plan 2008, Islington Commissioning Strategy Plan 2007

5.4.2. Forecast Demand and Planned Provision

Consultation was carried out with London Strategic Health Authority, which directed the consultant team towards individual PCTs. However no relevant information was given regarding the forecast demand for secondary health care¹⁶¹.

The HUDU model was used to quantify and cost potential primary and secondary healthcare requirements in Central London. The assumptions under-lying the approach is laid out in **Appendix 4**.¹⁶² While the HUDU model is a useful tool, it should be noted that it does not take the baseline position (i.e. existing capacity) into account. In addition, the model does not reflect evolving models of healthcare provision, in particular the drive to provide more acute services through health centres and GPs surgeries and to shift away from institutional care wherever possible in the future. For these reasons, the estimates of required provision and associated costs generated may be exaggerated.

Table 5-20 provides results in terms of additional units of service required, i.e. number of beds or of places as appropriate, and illustrates the space required to physically provide

¹⁶⁰ Following consultation with RBKC PCT and the two documents were outlined as holding all relevant information: Kensington & Chelsea PCT 10 year Primary Care Strategy 2008-2018 and Draft Framework for a Primary Care Strategy for Kensington and Chelsea Primary Care Trust 2007. However no hard data available on baseline figures for secondary health providers.

¹⁶¹ Personal communication, London Strategic Health Authority (by phone and email), December 2008

¹⁶² Key inputs / assumptions into the HUDU model include: population estimates of baseline population based on GLA, DMAG, RLP (Review of the London Plan) forecasts (high case scenario); projected dwelling growth up to 2026 for each of the six Central London local authorities as per the URS model; occupancy rates by tenure and size as per the URS model; net population gain factor of 100%; GP to patient ratio of 1 GP per 1,700. HUDU model default assumptions have been used for all other variables, including build up rates and take up rates.

them. Southwark appears to be the local authority requiring the highest number of units (beds and spaces) followed by Camden.¹⁶³

Table 5-20: HUDU Model Results, Additional Secondary Healthcare Requirements from New Development, 2006 – 2026

<i>Local Authority</i>	<i>Total Requirements (Number of Units)</i>		
	<i>Acute and Mental Beds</i>	<i>Intermediate Beds</i>	<i>Intermediate Day Spaces</i>
City ¹⁶⁴	18	1	1
Camden	90	18	18
Islington	134	25	25
Kensington & Chelsea	45	7	7
Southwark	154	28	28
Westminster	72	15	15

Source: HUDU Planning Contribution Model, EDAW/AECOM, 2007

5.4.3. Forecast Costs and Planned Investment

During 2007/08 NHS London developed a five year strategic plan setting out the organisations strategy and three main goals. These goals include:

- To increase average life expectancy of Londoners by at least two years for males and females
- To improve the ratio of GPs to population in the most deprived local authorities
- To reduce by 10% the difference in life expectancy between the best and worst local authorities in London.

Consultation was carried out with London Strategic Health Authority, which confirmed that the information is available from PCTs. However consultation with PCTs themselves was unfruitful with respect to both demand and planned investments in secondary care¹⁶⁵.

¹⁶³ LB Southwark comments that these projections do not take account of the likely loss of beds resulting from the redevelopment of Dulwich Hospital.

¹⁶⁴ City of London is part of the City and Hackney Teaching PCT

¹⁶⁵ Personal communication, Camden PCT, Islington PCT, Royal Borough of Kensington & Chelsea PCT, Southwark PCT, Westminster PCT (by phone and email) November and December 2008.

The HUDU model was used to quantify and cost potential primary and secondary healthcare requirements arising from projected growth in Central London¹⁶⁶. The assumptions under-lying the approach is laid out in **Appendix 2**.

Table 5-21 outlines the capital costs required to build the new facilities and operate them. Future requirements are most onerous for Southwark PCT, both for acute and intermediate care facilities, with building costs totalling £77.3m. Camden PCT is also estimated to face high additional needs totalling £39.5m of building costs. The total estimated building costs to satisfy additional demand arising in Islington PCT are approximately 45£m and in Kensington and Chelsea PCT are in the region of £13m, whereas in both the City and Westminster PCT's they are below £6m.

Table 5-21: HUDU Model Results, Total Additional Capital Costs, 2006 – 2026¹⁶⁷

<i>Capital Costs (£)</i>		
<i>Local Authority</i>	<i>Total Acute and Mental Care</i>	<i>Total Intermediate Care</i>
City ¹⁶⁸	2,696,674	294,106
Camden	26,720,083	12,803,969
Islington	41,597,392	17,912,172
Kensington & Chelsea		3,512,458
Southwark	54,966,992	22,313,406
Westminster	22,766,541	10,628,496

Source: HUDU Planning Contribution Model, EDAW/AECOM, 2007

Table 5-22 outlines the total revenue costs for primary and secondary healthcare required to operate new facilities. Future requirements for primary and secondary

¹⁶⁶ Because of the likely overestimate of the demand arising from the projected residential growth, it is reasonable to assume that at the strategic level the additional demand resulting from non residential uses would not pose a significant bearing on the overall assessment.

¹⁶⁷ The HUDU model default capital costs are per sqm, the spatial requirements and costs are therefore as follows:

- acute beds £2,995 per sqm, 47.5 sqm per bed
- mental health beds £2,165 per sqm, 48.9 sqm per bed
- intermediate care beds £2,940 per sqm, 65.3 sqm per bed
- intermediate places £2,200 per sqm, 54.4 sqm per place.

All spatial requirements include planning, engineering and circulation allowance. Source: Edaw/Aecom 'HUDU Planning Contribution Model Guidance Notes', (2007).

¹⁶⁸ City of London is part of the City and Hackney Teaching PCT

healthcare are highest for Southwark PCT with expected revenue costs of about £128.3m, whereas in comparison to City PCT's which require just £15.2m to operate new primary and secondary facilities.

Table 5-22: HUDU Model Results, Primary and Secondary Healthcare Total Revenue Cost, 2006 – 2026

Local Authority	Revenue Costs (£)	
	Total Primary and Secondary Health Care Revenue Costs	
City ¹⁶⁹	15,213,460	
Camden	76,971,205	
Islington	115,335,536	
Kensington & Chelsea	76,971,205	
Southwark	128,227,821	
Westminster	61,013,227	

Source: HUDU Planning Contribution Model, EDAW/AECOM, 2007

5.4.4. Conclusions

As with primary healthcare the major finding of the assessment is the lack of systematic information. For secondary healthcare even baseline information was difficult to gather. The PCTs' commissioning strategies list existing acute, mental and intermediate care providers; however no thorough evidence on their current capacity is available either through the individual PCTs or through the London Strategic Health Authority. The same holds for analysis of future demand and planned costs and investments.

It is possible that the individual trusts have specific plans and strategies which reflect strategic planning work. There is a need for further engagement with the individual organisations to review any such planning information and to discuss and develop this information with the trusts and other partners.

The lack of a unique source of information at the regional (London) or sub-regional (Central London) level may constitute an obstacle to the delivery of the additional infrastructure required to satisfy projected level of demand. Cross boundary movements can be considerable for secondary healthcare services, and integrated information may be essential in ensuring provision throughout Central London in time to meet additional demand.

The HUDU model requirements and costs for primary and secondary healthcare were analysed. In terms of primary healthcare requirements Camden is in need of the highest

¹⁶⁹ City of London is part of the City and Hackney Teaching PCT

number of GPs, and Southwark required the greatest secondary healthcare requirements in terms of acute, mental and intermediary care. Regarding the capital costs, Southwark PCT requires the highest amount to build the new facilities and operate them. Overall the revenue costs for Southwark PCT are the highest of all six authorities. The HUDU model does not take the baseline position into account and also does not reflect evolving models of healthcare provision, and so the estimates of required provision and associated costs generated may be exaggerated. As for primary healthcare requirements, it is therefore recommended that the Central London authorities discuss all the results presented in this section with the relevant PCTs.

5.5. Police

5.5.1. Baseline

The Metropolitan Police Service (MPS) is aiming to deliver a more effective and locally focused service. The Metropolitan Police Authority has overall responsibility for all MPS buildings and facilities in London and recognises the vital role the estate plays in supporting the delivery of effective and efficient policing across the capital¹⁷⁰.

Police numbers in London have risen in recent years, from 25,400 police officers in 2000 to over 31,000 in 2007, along with almost 4,000 Police Community Support Officers, almost 2,000 special constables and 14,000 members of police staff. This growth has placed demands on existing policing buildings and facilities¹⁷¹.

The Metropolitan Police places great emphasis on the importance of managing their estates, claiming that modernisation is necessary to ensure a more accessible, flexible and effective police service for each local authority. More detail on planned investment to achieve this is presented in section 5.5.3. There are currently over 380 operational buildings located throughout London's 32 local authorities¹⁷², from police stations and offices to boat sheds and training facilities¹⁷³. Figure 5-5: Distribution of Emergency Services Facilities in Central London shows the location of emergency services in Central London, including police, ambulance and fire brigade stations.

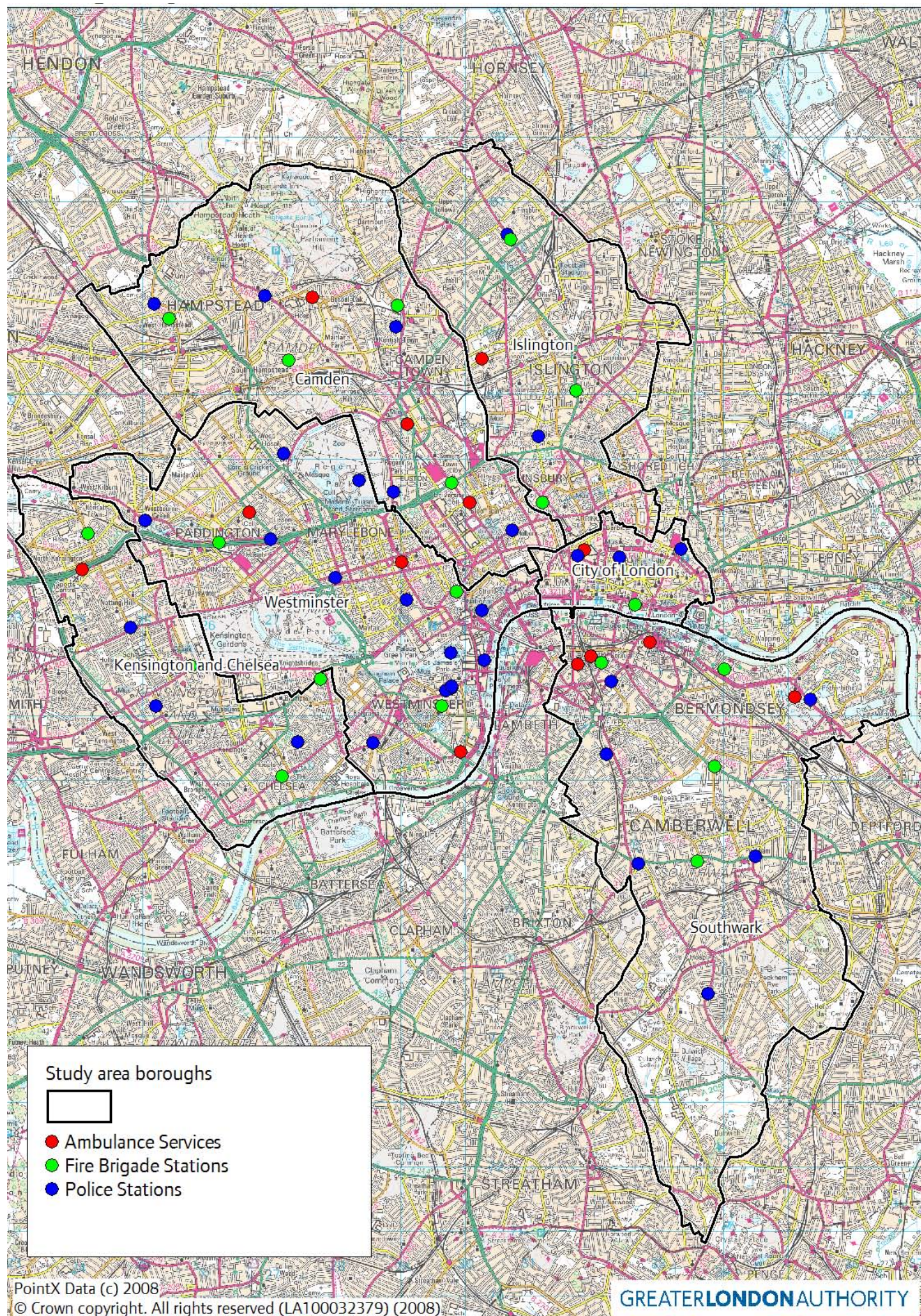
¹⁷⁰ Metropolitan Police Estate, Asset Management Plan Westminster, (Metropolitan Police Estate, 2007).

¹⁷¹ Ibid.

¹⁷² The City of London Police is separately responsible for police services in the City of London.

¹⁷³ Metropolitan Police Estate, Asset Management Plan Southwark, (Metropolitan Police Estate, 2007)

Figure 5-5: Distribution of Emergency Services Facilities in Central London



Source: GLA 2009

Table 5-23 shows the resident population and number of police officers and police staff for each of the six Central London authorities. The figures highlight that there is no direct positive correlation between the number of police officers and the number of residents.

Table 5-23: Police Numbers as at the End of September 2008, by Local Authority¹⁷⁴

<i>Local Authority</i>	<i>Resident Population (2007)</i>	<i>No of Police Officers</i>	<i>No. of Police Staff</i>	<i>PCSO Strength</i>
City of London	8,000	830		
Camden	231,900	793	178	93
Islington	187,800	655	73	85
Kensington&Chelsea	178,600	561	121	142
Southwark	274,400	849	169	105
Westminster	234,100	1,537	319	349
Total	1,114,800	6,816		

Source: Metropolitan Police Authority 2008.

5.5.2. Forecast Demand and Planned Provision

Quantitative forecasts for future police service requirements in the six central London authorities were not available. Consultation with the MPA indicated that estimated demand for police officers is based on the number of calls and the number of crimes within a local authority. This is then translated into how many officers would be required to respond to that crime and how many would need to investigate the crime. The number of officers in an area tends to be higher if there is a hospital in the area¹⁷⁵.

The police do not forecast the numbers of officers required in each authority on a population basis. This is too difficult as each authority varies in terms of demographics; they tend to work on assessing in combination the projected population and any large scale development coming forward in the authorities. An assessment is made in terms of the need and level of policing to determine the demand for each ward and therefore within the authorities' boundaries¹⁷⁶.

¹⁷⁴ A police officer is a member of the police force, police staff are all members involved within the police estate, PCSO is police community support officer, these members support the police officers.

¹⁷⁵ Personal communication, London Metropolitan Police Authority, (by phone) December 2008

¹⁷⁶ Personal communication, Cgms (by phone) December 2008

5.5.3. Forecast Costs and Planned Investment

According to the Metropolitan Police Asset Management Plan (AMP) the estate is ageing, with approximately 40% of the buildings pre-dating 1935 and many being inappropriately located for today's communities. Simply upgrading or renewing individual parts of the estate is not considered to be an option and there is an urgent need for major change¹⁷⁷. The Plan identifies some London authorities where the estate requires more urgent modernisation and expansion. Of the six Central London authorities the Metropolitan Police Service Property Services will treat Kensington & Chelsea as a priority.

All of the Central London local authorities, with the exception of City of London, have a Metropolitan Police Authority Asset Management Plan which sets out the future plans for the local authority: The City of London has local priorities as shown in the City of London Police Policing Plan 2008-2011:

- Safer Neighbourhoods Programme
- New custody provision
- Improved patrol services
- Front counters- a better environment for the public
- Better office accommodation.

These future plans act as a way to make a considerable progress in providing an estate suitable for the police service in the local authority. The AMPs do not provide any costing for future plans; it outlines its targets and future plans on a strategic basis. **Table 5-24** below summarises the key findings of the AMP. These are common throughout London and are reported throughout each of the AMP documents for all Central London authorities, with the exception of the City of London.

¹⁷⁷ Metropolitan Police, Planning for the Future Police Estate, 2005

Table 5-24: London Police Estates Challenges (2007)

London Police Estates

The estate is ageing – around 40% of the buildings pre-date 1940

A large number of buildings are poorly located

Many of the buildings are inefficient, expensive to maintain and fail to offer the space required for policing in 2007 and beyond

New demands are constantly being made for more space and better security

Much of the estate is no longer appropriate for a modern police service whose employees deserve good working conditions

It is not always possible to simply upgrade or renew an individual part of the estate in one local authority – there is an urgent need for major change in most local authorities

Source: Metropolitan Police Estate, Asset Management Plan Southwark, (Metropolitan Police Estate, 2007)

One of the key aims and objectives for the police estate in Central London is to move away from multifaceted centres, which include a front cover reporting desk, custody cells, space for police officers and community officers, and ancillary uses. The aim is to break these up and create one patrol centre for each local authority to include a space where all police officers for the local authority are based. This is considered to allow spreading clusters of custody cells in different parts of the local authority rather than a few in each police station¹⁷⁸, which is considered beneficial to providing safer environments and space for the public. No sites have been allocated as of yet, the plans are remain at a strategic level.

5.5.4. Conclusions

The police do not forecast the numbers of officers required in each local authority on a population basis, and there are no such workings available to quantify future demand. Central London authorities should engage with the Metropolitan Police to understand their future requirements and changing models of service delivery.

Consultation with the MET and strategic plans suggest a need to renew many Metropolitan Police stations across London as 40% of the buildings pre-date 1935 and are in inappropriate locations. LB Kensington and Chelsea is identified by the Metropolitan Police as a priority for future investment. However, the need is to improve the suitability of facilities for the current needs rather than increasing the available floorspace. As such any new facility provided is likely to replace existing and unsuitable facilities, so that no overall growth in the physical requirements is expected at this stage. Future plans to improve the police estate are strategic with one key aim to introduce the development of patrol centres in each local authority.

¹⁷⁸ Personal communication, CgMS, December 2008

5.6. Fire

5.6.1. Baseline

A total of 112 fire stations are scattered across London. There are also a total of 168 fire appliances (i.e. the number of fire pumps and hoses) and 70 other specialist fire appliances¹⁷⁹. Fire stations and fire engines work across local authority boundaries therefore it is hard to assess the fire station provision on a local authority basis. Central London is overall described as fire station rich with very good fire station coverage¹⁸⁰.

Figure 5-5 on page 172 illustrates the total number of brigade areas, local authority and station grounds for London, which are also listed in the table below.

Table 5-25: Fire Stations in Central London

<i>Local Authority</i>	<i>Total Number of Fire Stations</i>	<i>Locations of Fire Stations</i>
City of London	2	Downsgate and Whitechapel
Camden	4	West Hampstead, Belsize, Kentish Town and Euston
Islington	3	Holloway, Islington, and Clerkenwell
Kensington&Chelsea	4	North Kensington, Kensington, Knightsbridge and Chelsea
Southwark	4	Peckham, Old Kent Road, Southwark and Dockhead
Westminster	3	Westminster, Soho and Paddington
Total	20	

Source: GLA 2008

5.6.2. Forecast Demand and Planned Provision

Quantitative forecasts for future fire service requirements in the six Central London authorities were not available. Consultation with the London Fire Planning Authority indicated that estimated demand for fire services is based on the number of incidents that occur in a local authority¹⁸¹.

¹⁷⁹ Specialist fire appliances include: smoke seals, fire extinguishers, safety signs, fire alarms, emergency alarms.

¹⁸⁰ Personal communication, London Fire Planning Authority, (by phone and email), December 2008

¹⁸¹ Personal communication, London Fire Planning Authority (by phone), December 2008

The London Fire Safety Plan 2008 introduced new targets to measure the performance of London Fire crews in getting to emergency incidents. The Brigade measures the percentage of occasions when first and second fire engines arrive at emergency incidents within set time thresholds. These targets apply London-wide. The performance targets aim to get the first fire engine to reach an incident in five minutes on 65% of occasions and within eight minutes on 90% of occasions¹⁸².

Required demand for the forth-coming year is estimated based on historical data of the number of incidents attracting two or more fire engines in each area. There are on average approximately 160,000 calls across London each year which has remained an average even despite to the increased population in the Central London¹⁸³.

Although population is not used directly to assess demand, population growth is considered to potentially impact on the fire service provision. New developments and any urban regeneration project, together with consideration of how accessible the area in question is, affects fire service provision. Each new development is assessed in terms of the time it takes for fire services to reach them. This is one of the factors influencing increasing fire service provision in an area¹⁸⁴. Furthermore increases in the number of commercial buildings increases the number of false alarms and therefore pressure on the fire service.

5.6.3. Forecast Costs and Planned Investment

In 2007/08 the London Fire Brigade's gross capital programme totalled £47.7m, however no detail of what this covers is available¹⁸⁵. In addition the London Fire Brigades Asset Management Plan (AMP) establishes the framework for a multi year programme that identifies and prioritises the most important property projects up to 15 years.

The AMP 2008 states that there are currently 30 fire stations (pre 1940 and over 60 years old) which need to be updated at an estimated cost of £130 m (this figure includes the £47.7m 2007/08 capital programme). The document states the figure is likely to significantly grow in the next 15 years as 22 more stations move from a satisfactory to a poor status due to their age profile. It reports that preliminary work has estimated that a further £90m (this figure is in addition to the £130m). These indicative costs have been based on average cost of recent refurbishment/replacement fire station, the new fire station safety standard, to meet changes in functional requirements for refurbishments¹⁸⁶.

There are no plans to build additional fire stations in Central London whilst there is a focus on rebuilding and refurbishing the existing ones.

¹⁸² London Fire Brigade, Our Performance 2007/08 (London Fire Brigade, 2008)

¹⁸³ Personal communication, London Fire Planning Authority (by phone and email), December 2008

¹⁸⁴ Ibid.

¹⁸⁵ London Fire Brigade Fire Safety Plan 2008/09-2010/11 (London Fire Brigade, 2008)

¹⁸⁶ London Fire Brigade Draft Asset Management Property Plan 2008

The rebuilding of fire stations is one strand of capital investment in fire service provision. The London Fire Planning Authority rely on the private finance initiative (PFI) project to improve its property estate by rebuilding up to ten fire stations that are in an operationally poor and/or in a poor property condition.

The new stations will provide for mixed fire fighter accommodation and be capable of housing the latest fire fighting equipment. The Brigade aims to start advertising for a development partner in 2009 and start rebuilding in 2012/13 with the first new station operational in 2013/14. Work is currently underway on securing new sites for two of the stations in the PFI project. Site investigations are also underway for the existing sites. There will be no change in the number of firefighters or the number of fire engines serving an area once a station is rebuilt¹⁸⁷.

The new sites for new fire stations considered in the PFI project are in the Greater London area. Of the six Central London authorities LB Southwark is rebuilding its existing station, which will be knocked down and rebuilt; this will not involve expansion of the site. None of the other Central London authorities will receive PFI funding¹⁸⁸.

5.6.4. Conclusion

Fire stations and fire engines work across local authority boundaries therefore it is hard to assess the fire station provision on a local authority basis. Overall Central London is described as fire station rich with very good fire station coverage for Central London.

Required demand for fire stations is estimated based on historical data of the number of incidents attracting two or more fire engines in each area. Population is not used to assess demand.

Expansion of existing service may be required in the long term face of population and employment growth. At the moment however the LFEPA does not anticipate a need to increase the overall available floorspace. Plans to rebuild upgrade existing fire stations to reflect changing models of provision are instead in place, and deemed the way forward to address future needs. The total estimated costs stands at £130m to update the existing fire stations across London Fire and Emergency Planning Authority's area.

¹⁸⁷ London Fire Planning Authority website

¹⁸⁸ Personal communication, London Fire Planning Authority, January 2009

5.7. Ambulance

5.7.1. Baseline

Ambulance stations are not located within hospitals; instead each ambulance station is a separate premise and do not fall under hospital estate¹⁸⁹.

There is a total of eight ambulance stations in the six Central London authorities. **Figure 5-6** below and **Figure 5-5** on page 172 show the location of ambulance stations in the six Central London authorities considered and the surrounding ambulance area.

Figure 5-6: Ambulance Stations in LB Camden, City of London, LB Islington, RB Kensington & Chelsea, LB Southwark and City of Westminster.



Source: London Ambulance NHS, 2008

¹⁸⁹ Personal communication, London Ambulance NHS, (by phone), January 2009.

Table 5-26: Ambulance Stations in the Six Central London Local Authorities¹⁹⁰

<i>Local Authority</i>	<i>Total Number of Ambulance Stations</i>	<i>Ambulance Stations</i>
Camden	2	Camden Ambulance Station
		Bloomsbury Ambulance Station
City of London	1	Smithfield Ambulance Station
Islington	1	Islington Ambulance Station
Kensington & Chelsea	1	North Kensington Ambulance Station
Southwark	2	Rotherhithe Ambulance Station
		Deptford Ambulance Station
Westminster	2	Westminster Ambulance Station
		St. Johns Wood Ambulance Station
Total	9	

Source: London Ambulance Trust 2008

The London Ambulance Service is under pressure from the increased number of 999 calls. In 2008 the Service raised the declared pressure level at which it is operating from 'severe pressure' to 'critical' – the first time that it has reached this level since the capacity levels were introduced in late 2005. Despite the current levels of demand, the service is continuing to reach more patients, more quickly than ever before¹⁹¹.

5.7.2. Forecast Demand and Planned Provision

As for the other emergency services forecasts for future ambulance service requirements in the six Central London authorities were not available. The demand for ambulance provision in the local authorities is forecast using historical incident data. The number of ambulances, the location of hospitals and how well the hospitals are served all have an impact on the performance and delivery of ambulance provision in the local authorities. As it is hard to gather data particularly on London's day time and non residential population, population is not directly used to forecast future ambulance needs in Central London¹⁹².

Table 5-27 illustrates the number of incidents per local authority between January 2007 and November 2008. This highlights Westminster as having the highest number of incidents per local authority in both 2007 and 2008. Across all six Central London local

¹⁹⁰ Whilst hospitals generally also have some ambulance parking station, it is understood that they are not part of the LAS NHS Trust asset portfolio. For this reason such parking stations have not been included in this table.

¹⁹¹ Personal communication, (by phone) London Ambulance NHS Service Trust website, December 2008

¹⁹² Personal communication, (by phone and email) London Ambulance Service NHS Trust, December 2008

authorities there is a decrease in from 2007 to 2008, however it is important to identify that December 2008 is not included in the 2008 statistics.

Table 5-27: Incidents in Central London, January 2007-November 2008

<i>Local Authority</i>	<i>2007 (Jan-Dec)</i>	<i>2008 (Jan-Nov)</i>	<i>Total</i>
Camden	32,428	30,337	65,222
City of London	5,747	5,206	11,405
Islington	26,779	25,686	54,648
Kensington&Chelsea	17,506	16,470	35,364
Southwark	38,361	36,807	78,231
Westminster	43,640	40,423	87,685
Total	16,4461	15,4929	332,555

Source: London Ambulance Trust 2008

5.7.3. Forecast Costs and Planned Investment

Consultation with the London Ambulance Trust has revealed that the current Estates Strategy is being reviewed so there are no formal plans available for ambulance provision and planned investment for the future¹⁹³.

5.7.4. Conclusion

The London Ambulance Service is under pressure from the increased number of 999 calls. Of all the Central London authorities, Westminster had the highest number of incidents per authority in both 2007 and 2008.

The demand for ambulance provision in the authorities is forecast using historical incident data within the PCT they attend. However no data on forecast demand or estate strategy is available.

¹⁹³ Personal communication, London Ambulance Trust NHS, December 2008

6. INFRASTRUCTURE PRIORITIES

This section draws together our assessment of current and future demand, provision and investment for the different infrastructure areas in order to summarise the findings and to draw out key findings, issues and recommendations for the Central London Forward authorities.

6.1. Infrastructure Assessment Summary Matrices

Our findings are summarised in the matrices below, which identify proposed, planned and recommended infrastructure schemes as well as actions required within Central London up to 2026 (see **Tables 6-3 to 6-6** below). The matrices cover:

- **Infrastructure areas** (i.e. transport, social, utilities etc)
- **Infrastructure Priorities** – this includes required infrastructure needed within Central London to support forecast development growth as well as that needed to alleviate existing shortfalls or gaps. Schemes include those already proposed by third parties, schemes that are underway as well as those new ones that are recommended by the consultants. Also included are a number of actions
- **Locations** indicate the geographical coverage of the infrastructure items and those areas affected. Generally infrastructure items apply to the whole of the Central London area as per the project brief, however we have flagged up where relevant authorities will be particularly affected by infrastructure schemes. For example, the East London line extension will benefit the whole of Central London (as well as the South East and North East London sub regions), however Tower Hamlets and Southwark will benefit and be affected to a greater extent by both the end product and during the construction phases
- **Timeframes** cover the short (2009-2014) medium (2015-2020) and long term (2021-2026) periods. As well as providing expected timescales of planned infrastructure schemes these timescales also provide an indication of the level of priority that a recommended infrastructure item improvement required. For example flood defences graded as 'fair' are recommended for medium term action whereas those graded as poor or very poor are recommended for short term action given they are a more pressing priority
- **Drivers** reflect the key rationale for the required infrastructure items including alleviating existing gaps or replacement of existing infrastructure; in response to greater demand placed upon the infrastructure derived from forecast growth; as well as policy driven. The latter are primarily related to infrastructure items such as sustainable energy infrastructure initiatives that are not necessarily 'demanded' as such, rather they stem from EU and UK Government directives

- **Costs** are provided where the consultants have been able to obtain the information based on primary and secondary research tasks. This section also identifies whether or not the funding of the required infrastructure is identified.

6.2. Summary of URS Model of Infrastructure Quantum and Costs

Tables 6-1 and **6-2** below draw together the outcomes of the URS modelling exercise, which can be found in full in the appendices. In general it has not been possible to compare these forecasts of demand and cost with those of the infrastructure providers in a systematic way, as envisaged. This is because appropriate corresponding data was not available from many providers. The exception to this is the data on demand for gas; the figures and assumptions used were verified by National Grid. Nonetheless the estimates of quantum and cost provide an understanding of the scale and context of future growth, and a starting point for further analysis and consultation with partners.

We have also estimated the quantum of utilities infrastructure that could be required as a result of the scale of demand. This does not incorporate detailed considerations of existing spare capacity. This includes:

- For electricity, in the region of 20 primary substations, four to five grid sites (converting electricity from 132kV to 33kV), 531 one-MVA substations (i.e. secondary substation catering for residential demand) and between 350 and 400 two or three-MVA substations (i.e. secondary substations catering for commercial demand particularly where this is highly concentrated)
- For gas, the strategic gas network is assumed to be functional and without need of uprating for the most part, with the exception of local reinforcement works that may be applicable. Assuming no capacity is available in the existing network, the requirement may be for between eight and 10 pressure reducing stations (transforming the gas from medium pressure to low pressure)
- For water, new water mains and pumping stations (or at least upgraded pumping stations). As Thames Water are already planning for an additional reservoir and desalination plant, so it assumed that additional resources will be adequate to support the projected growth. There could be a requirement to include two local underground reservoirs in Central London each the size of a football pitch
- For sewage, 34 new or renovated sewage treatment works (SWT) as well as new and renovated sewers.

As the physical requirements for hard infrastructure are only indicative of the scale of the infrastructure needed we only provide indicative costing (2009 prices) associated with such requirements to suggest the scale of investment that may be required:

- For electricity a total of £40 million for the 20 primary substations, between £30 million and £37.5 million for the four to five grid sites, £48 million for 531 one-MVA substations and between £21 million and £24 million for the 350 and 400 two or three-MVA substations.

- For gas, in the region of £200K and £250K each for between eight and 10 pressure reducing stations
- For water, in the region of £40 million in total for two local underground reservoirs
- For sewage, £711 million for the 34 SWT and £888 million for new and renovated sewers.

There may be other significant costs for example associated with upgrading existing infrastructure and providing new capacity / pipes¹⁹⁴.

¹⁹⁴ URS has been commissioned by the City of London to look at the potential to develop a tunnel network for utilities and CHP.

Table 6-1: Summary of Estimated Infrastructure Demand Associated with New Development for the Central London Local Authorities, 2006 – 2026

<i>Local Authority</i>	<i>FE & AL FTE Places</i>	<i>GP and Primary Care</i>	<i>Acute and Mental Care Beds</i>	<i>Intermediate Care Beds and Spaces</i>	<i>Electricity kVA</i>	<i>Gas m³/hour</i>	<i>Water Litres/day</i>	<i>Sewerage Litres/day</i>
City of London	386	3	18	2	78,279	2,368	6,782,306	11,213,081
Camden	3,214	18	90	37	76,633	13,571	9,374,746	14,002,026
Islington	3,573	25	134	49	78,627	20,413	9,737,910	14,095,427
Royal Borough of Kensington and Chelsea	1,502	10	45	14	37,997	6,727	4,154,911	6,277,227
Southwark	6,995	33	154	57	108,991	28,374	15,756,359	22,619,426
Westminster City Council	2,300	4	19	30	150,740	12,498	13,163,847	21,179,897
Central London Total	17,970	93	460	189	531,267	83,951	58,970,079	89,387,084

Source: URS Calculations, see Results Sheet

Totals may not add up due to rounding

Table 6-2: Summary of Estimated Social Infrastructure Costs Associated with New Development for the Central London Local Authorities, £M (2009 Prices), 2006 – 2026

<i>Local Authority</i>	<i>FE & AL</i>	<i>GP and Primary Care</i>	<i>Acute and Mental Care</i>	<i>Intermediate Care</i>
	<i>FTE Places Required</i>		<i>Beds</i>	<i>Beds and Spaces</i>
City of London	9.7	1.2	2.7	0.3
Camden	80.3	15.8	26.7	12.8
Islington	89.3	22.6	41.6	17.9
Royal Borough of Kensington and Chelsea	37.5	6.3	9.4	3.5
Southwark	174.9	34.5	55.0	22.3
Westminster City Council	57.5	2.4	3.5	2.1
Central London Total	449.3	82.8	138.9	58.9

Source: URS Calculations, see Results Sheet

6.3. Geographic Distribution of Growth

Growth is likely to be concentrated in certain parts of Central London. The London Plan (2008) refers to Opportunity Areas and Areas for Intensification where jobs, population and associated infrastructure demand are likely to be greatest. In Central London these include:

- Opportunity Areas: City Fringe (City of London and LB Hackney), Euston (LB Camden), King's Cross (LB Camden), Paddington (City of Westminster), Tottenham Court Road (City of Westminster and London Borough of Camden), Victoria (City of Westminster), Elephant and Castle and London Bridge (London Borough of Southwark).
- Areas for Intensification: Arsenal/Holloway (LB Islington), Farringdon/Smithfield (LB Islington and LB Camden), Holborn (LB Camden), West Hampstead Interchange (LB Camden).

Given the strategic nature of the study, the majority of infrastructure requirements identified are likely to relate to the entire sub-region or its authorities in their entirety. Some particular needs were identified and these are presented below together with Central London and authority wide requirements as identified within the below matrices.

6.4. Infrastructure Priorities

Here we expand on the infrastructure assessment summary matrices to identify priorities for investment within the Central London authorities. Due to the lack of detailed data available, the comments on infrastructure priorities made here constitute general principles rather than a quantitative analysis. Nonetheless some key conclusions can be drawn relating to the magnitude of demand, the scale of investment required and the implications for the activities of Central London authorities and other agencies.

Transport

- Transport is fundamental to continuing not only to the sustainable delivery of new homes and jobs in Central London, but to improve accessibility of residents to existing and emerging employment opportunities, including residents in deprived communities. The assessment highlighted that Central London has an infrastructure investment programme to 2018, including Thameslink, the East London Line Extension and Crossrail, which adds significant additional public transport capacity. However several residual problems remain and post-2018 further capacity increases will be required and at present, no firm proposals exist to address these. Initiatives which encourage higher levels of walking and cycling in Central London, including public realm improvements, are cost effective and relatively simple measures which have the potential to divert pressure away from public transport while generating wider social benefits.

Energy and other utilities

- There was a general lack of detailed information on utilities but the assessment identified potential future supply deficits relating to electricity and potable water. These infrastructures can perhaps more than any others be described as 'showstoppers' in terms of their fundamental importance to the delivery of growth, as well as costs. Utilities companies largely operate in a reactive way when schemes come forward, and potential cost and efficiency benefits could be derived from a more strategic approach. This could include the approach to funding. Movement towards CIL and the introduction of forward-funding mechanisms such as the Regional Infrastructure Funds being introduced by a number of Regional Development Agencies could play a role here. These options would need to be explored further with utility companies who are currently expected to fund infrastructure provision. These options would need to be explored further with utility companies who are currently expected to fund infrastructure provision.
- The assessment highlights the potential role of renewable energy sources and combined heat and power to meet the future demand for energy. While a series of policy initiatives are now in place to promote this agenda, giving priority to developing this infrastructure could help yield major positive benefits

Other physical infrastructure

- A short term requirement for upgrades to flood defences in three of the six Central London authorities was identified, as well investment in sewage treatment works and reduced sewer flooding. Other agencies are taking the longer term agenda for provision of adequate flood and drainage infrastructure forward; the scale and costs of these schemes is significant, reflecting the magnitude of potential impacts should adequate mitigation not take place.
- The requirements around waste management emphasise the need for a strategic approach to infrastructure provision. To a greater degree than some other infrastructures it is the Central London authorities who will directly experience the disbenefits of failing to devise and implement a successful forward strategy, due to increasing landfill charges.

Social Infrastructure

- While in general the scale of required investment is smaller for social infrastructure, a potential deficit was identified in relation to FE and adult learning. FE and skills training is an important mechanism to ensure local people benefit from planned growth and for this reason should be considered a high priority.
- There was a lack of data relating to the social infrastructure areas. However it is clear that for a number of infrastructures, including primary healthcare, HE and police, there are considerable backlog costs associated with getting the existing estate up to a suitable standard; costs for expansion and improvement of

services are further to these existing investment requirements. There was also found to be a lack of information from Fire and Ambulance service authorities on forecast demand for infrastructure.

6.5. Risks to Delivery

The key risk identified to delivery of the infrastructure associated with growth in Central London relates to the difficulties experienced in obtaining the relevant data and engaging with infrastructure providers. The implication is that some providers are not engaged in strategic planning, or geared up to engage with the strategic planning agenda. For example, there was no document or plan containing the required information and data on healthcare planning across London which the Strategic Health Authority could supply. Equally, engaging with utility providers proved difficult as there did not appear to be capacity within organisations to respond to enquiries on strategic matters. This lack of information and engagement poses a fundamental risk to the joined up delivery of infrastructure for growth.

To some degree a lack of forward planning (at least as far forward as 2026) is to be expected, given that investment plans tend to look forward five or maybe 10 years. For many types of infrastructure, funding is not planned more than a few years ahead, with much depending on the outcome of the three-yearly Comprehensive Spending Review and evolving policy. However, development of the scale envisaged in Central London requires new ways of planning investment, because of the high risks of failing to deliver associated infrastructure with new dwellings and jobs. CLF and Central London authorities should lobby and must encourage infrastructure providers to proactively plan longer term, rather than continue with a short term mindset of reactive planning and improvements.

The economic downturn implies that lower levels of contributions can be expected from developers towards infrastructure at least in the short term. This implies an urgent need for the public sector to develop a robust and comprehensive forward strategy for investment.

6.6. Conclusions

As planning authorities, the Central London authorities also have a key role to play in applying high level policy principles within planning policies and decisions. Where infrastructure provision is concerned, fundamental shifts in approach are required to sustainably deliver growth (for example such as the promotion of alternative energy sources or walking / cycling) and therefore the importance of this role is highlighted. The strategic infrastructure analysis carried out as part of this study is likely to interest local planning authorities up and down the country so resultant LDF policy must be carefully considered in the context of required infrastructure needed to support growth and emerging technological improvements.

This study also emphasises the fundamental importance of joint working between the Central London authorities and other infrastructure providers and funders so that robust, comprehensive plans for provision and investment can be fed into the Local Development

Frameworks of the Central London authorities. Where providers are not able or willing to engage with the Central London authorities in the strategic planning agenda, the Central London authorities should promote reform within such sectors and highlight the risks of neglecting to plan in a strategic way.

This study should be used by the Central London authorities as an evidence base for their Local Development Frameworks, and also to lobby for appropriate action from others. The current property market and the related impacts on potential private sector contributions to infrastructure delivery illustrate the importance of a sound case for public sector investment.

Similarly, it is important to establish clear priorities for public funds which are available for investment and to consider where responsibilities for the provision of various infrastructure types and the fulfilment of various roles should lie. This is especially relevant in the light of the economic downturn and the associated likely drop in developer contributions.

This study also aims to provide identify anticipated planning and funding responsibilities in order to facilitate the forward planning process. Clearer identification of delivery roles will provide more certainty and increase the confidence of both private and public sector partners.

The study identified relatively little committed funding given the scale of likely required investment in Central London's infrastructure. This is partly because many providers do not plan beyond 2-3 years. Concerns about this system should be highlighted to central government.

There are a variety of funding streams for infrastructure including mainstream government funding and public-private partnerships. The Central London authorities should target investment according to strategic priorities, drawing in kind funding and resources from the voluntary and community and private sector where opportunities arise. If effectively targeted, public sector investment can be a catalyst to regeneration, increasing confidence and bringing land values up to a level whereby private sector investment becomes viable. Central London infrastructure provision should be a key priority for the Government given the strong influence it has upon driving the UK economy. New infrastructure provision is required to serve demands of not only residents, but also large numbers of commuters, visitors, tourists and students. Central London infrastructure provision should be a key priority for the Government given the strong influence it has upon driving the UK economy. New infrastructure provision is required to serve demands of not only residents, but also large numbers of commuters, visitors, tourists and students.

6.7. Recommendations for Further Work

Detailed Infrastructure Study and CIL Methodology

The findings of this study can be taken forward within the LDFs of the Central London authorities. In order to develop a more detailed infrastructure strategy and potentially take

it forward to develop a methodology for the CIL, further work will be needed to bottom out the issues identified and quantify future requirements. This would include covering other infrastructures not included within the scope of this study for which demand relates to more local catchments.

Sustainable Energy Research and Policy Development

Particular opportunities exist for developing the sustainable energy agenda within the Local Development Framework Process, including developing LDF and SPG documents to incorporate the Supplement to PPS1 and The London Plan 2008. Potential tasks include:

- Establishing programme for green waste utilisation schemes and identify scope for biomass energy production
- Establishing programme for waste utilisation schemes and identify scope for energy from waste (EfW) production
- Establishing programme for mapping of heat, coolth and power demands to facilitate the identification of effective decentralised energy centre locations, where local authorities have not already commenced on this work.

Regional / Sub-Regional Infrastructure Fund

URS can assist and advise CLF and Central London authorities on lobbying the LDA to set up a Regional Infrastructure Fund to forward fund and provide Central London wide infrastructure. Alternatively, a RIF could be devised for the Central London Forward authorities.

This would draw upon work undertaken for SEEDA and SWRDA in relation to mechanisms, types of infrastructure that might be provided, responsibilities and legislation. A London RIF could compliment local authority wide S106 and CIL levies and help fund strategic infrastructure where a known future deficit is anticipated. This might include, for example, helping increase the capacity in the energy network in advance of new development taking place, and forward funding flood defence measures and sewer improvements.

Investment Framework

In relation to funding, URS has helped develop an investment framework for local authorities to support strategic infrastructure required over their LDF timeframes. We can consult with funders in detail including Central Government departments, to explore the quantum, availability and criteria for accessing mainstream and grant funding, including mechanisms, opportunities and constraints.

Table 6-3: Physical Infrastructure Priorities

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions	Locations											Timeframes			Drivers			Delivery Agents	Costs					Notes (Note all costs are approximate)	
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed		
Flood defence																										
	Shoring up flood defences identified by the Environment Agency as fair, poor or very poor		✓				✓					✓	Grade 4/5 (poor/ v. poor)	Grade 3 (fair)		✓		✓	Local Planning Authorities (LPAs)	✓						
(Also a requirement for sewerage)	Ensure delivery of Thames Tideway overflow scheme	✓											✓	✓		✓			Thames Water		✓		✓			£176m has been made available
	Implementation of Sustainable Urban Drainage Systems (SUDS) and promotion of flood resistant architecture	✓											✓	✓	✓		✓	✓	LPAs					✓		
Waste management																										
	As per EU and UK Government legislation, ensure sufficient alternative waste management arrangements	✓											✓	✓				✓	LPAs and waste management contractors	✓						

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions	Locations											Timeframes			Drivers			Delivery Agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
	are in place up to 2020 to limit quantum of waste sent to landfill																								
	Ensure delivery of new Materials Recycling facility (MRF) at Smugglers Way									✓			✓			✓	✓	✓	LPAs / waste management contractors / developer		✓				
	Ensure delivery of new Mechanical Biological Treatment (MBT)							✓					✓			✓	✓	✓	LPAs / waste management contractors / developer		✓				
Sewerage																									
	New and refurbished treatment works including odour reduction	✓											✓	✓				✓	Thames Water		✓				£458m has been made identified from (net) future revenues to fund works
	New and renovated sewers including investment required reducing sewer flooding. This includes a requirement for	✓											✓	✓		✓	✓		Thames Water		✓				£583m has been made identified from (net) future revenues to fund works

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions	Locations											Timeframes			Drivers			Delivery Agents	Costs					Notes (Note all costs are approximate)	
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed		
	increased cycles of cleaning and prompt repairs where blockages are known.																									
	New and refurbished pumping stations required	✓											✓	✓		✓	✓		Thames Water		✓					£33m has been made identified from (net) future revenues to fund works

Table 6-4: Physical Infrastructure Priorities (Transport)

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions		Locations											Timeframes			Drivers			Delivery agents	Costs				
			Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Under Construction	Committed	Planned	Approximate cost	Unplanned but needed
TRANSPORT Network rail train service upgrades																									
	Thameslink 2000	Track and station upgrades to 12-car operation and 24 trains per hour in central section	✓											✓			✓	✓		Network Rail	✓			£5.5 billion	
	CTRL Domestic Services	High speed trains on selected routes from Kent & Medway	✓											✓			✓	✓		Network Rail	✓			n/a	
	Integrated Kent Franchise	12-car trains to Charing Cross and Cannon Street/8-car trains to Victoria	✓											✓			✓	✓		Network Rail		✓		£56 million	
	Brighton and Sussex	12-car trains East Grinstead to Victoria/10-car suburban trains to Victoria and London Bridge	✓											✓			✓	✓		Network Rail		✓		£101 million	
	South West	10-car trains	✓											✓			✓	✓		Network Rail		✓		£192 million	
	West Anglia	12-car trains on Cambridge & Stansted services/9-car trains on suburban services	✓											✓			✓	✓		Network Rail		✓		£24 million	
	Thameside	12-car trains	✓											✓			✓	✓		Network Rail	Not known			£16 million	
	Great Eastern	Additional 12-car services	✓											✓			✓	✓		Network Rail		✓		£5 million	

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions		Locations											Timeframes			Drivers			Delivery agents	Costs				
			Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand development	Policy		Under Construction	Committed	Planned	Approximate cost	Unplanned but needed
	East Coast Main Line	Additional 12-car services on outer suburban commuter services	✓											✓			✓	✓		Network Rail		✓		£51 million	
Major Station upgrade / redevelopments																									
	King's Cross, Waterloo, Victoria, London Bridge and Euston		✓			✓	✓		✓	✓	✓			✓	✓	✓	✓	✓		Network Rail / LPAs		✓	✓	-	
	Transport for London service upgrades																								
	Crossrail	East/West rail link	✓												✓					TfL					
	East London Line	Northern extension to Dalston/Highbury & Islington. Southern extension to West Croydon/ Crystal Palace (100% increase in frequency)	✓			✓			✓			✓	✓	✓			✓	✓		TfL	✓	✓		£17 billion	
	Jubilee Line	New signalling system to allow 30 trains per hour in peak (25% increase in capacity)	✓											✓			✓	✓		TfL	✓	✓		£600 million	
	Victoria Line	Higher frequency and larger trains (19% increase in capacity)	✓											✓			✓	✓		TfL		✓		-	
	Northern Line	Phase 1 signalling system to improve speeds and frequency (20% increase in capacity) Phase 2 separation of Bank and Charing Cross lines at Kennington	✓							✓				✓	✓		✓	✓		TfL	Phase 1 ✓		Phase 2 ✓	-	
	Piccadilly Line	New signalling system and trains (25% increase in capacity)	✓											✓			✓	✓		TfL		✓		-	

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions		Locations											Timeframes			Drivers			Delivery agents	Costs				
			Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand development	Policy		Under Construction	Committed	Planned	Approximate cost	Unplanned but needed
	District Line	New train stock with longer and more frequent trains (47% increase in capacity)	✓											✓	✓		✓	✓		TfL		✓		-	
	Metropolitan Line	New train stock and higher frequency services (49% increase in capacity)	✓											✓			✓	✓		TfL		✓		-	
	Circle and Hammersmith & City Lines	New train stock, longer trains and higher frequency with merged T-cup service (49% increase in capacity)	✓											✓			✓	✓		TfL		✓		-	
	Bakerloo Line	New trains, signalling and improved frequency (40% increase in capacity)	✓											✓	✓	✓	✓	✓		TfL		✓		-	
	Station Congestion Schemes	Victoria (2017), Paddington (2014), Tottenham Court Road (2016), Bank (2018), Bond Street (2016)	✓	✓										Not known			✓	✓				✓		-	
	King's Cross Northern Ticket Hall	2010	✓			✓	✓							✓	✓	✓				TfL	✓	✓		-	
	More targeted traffic management measures to alleviate congestion hotspots in the central area.		✓												✓	✓	✓	✓		TfL				-	✓
	Strategic review of bus services to redistribute capacity and to compensate for potential cancellation of Cross River Tram.		✓												✓	✓	✓	✓		TfL				-	✓
	Extension of LUL congestion relief programme to stations such as Liverpool Street and Euston.		✓												✓	✓	✓	✓		TfL				-	✓

Infrastructure Areas	Infrastructure Priorities: Schemes and Actions	Locations											Timeframes			Drivers			Delivery agents	Costs				
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand development	Policy		Under Construction	Committed	Planned	Approximate cost	Unplanned but needed
	Northern Line extension to Battersea to enable Bank and Charing Cross branches to be separated and central area capacity increased.	✓												✓	✓	✓	✓		TfL				-	✓
	Possible further extensions to the DLR to Charing Cross and Victoria.	✓												✓	✓	✓	✓		TfL				-	✓
	Crossrail 2 Chelsea to Hackney line.	✓												✓	✓	✓	✓		TfL				-	✓
	Interchange improvements at several stations, including Liverpool Street, Euston and Paddington.	✓												✓	✓	✓	✓		TfL				-	✓
	Public realm improvements at locations identified in Central London Pedestrian Study.	✓												✓	✓	✓	✓	✓	TfL				-	✓
	More positive measures to assist cyclists, including priority measures and cycle hire schemes	✓												✓	✓	✓	✓	✓	TfL				-	✓

Table 6-5: Utility Infrastructure Priorities

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
Sustainable Energy																									
	Establishing programme for green waste utilisation schemes and identify scope for biomass energy production	✓											✓			✓			LPA's / The London ESCO / RES / etc.	✓					authorities should be doing this anyway as in order to facilitate sustainable infrastructure
	Establishing programme for waste utilisation schemes and identify scope for energy from waste (EfW) production	✓											✓			✓		✓	LPA's	✓					As above
	Establishing programme for mapping of heat, coolth and power demands to facilitate the identification of effective decentralised energy centre locations	✓											✓			✓		✓	LPA's / The London ESCO / etc.						As above
	Developing LDF and SPG documents to incorporate the Supplement to PPS1 and The London Plan 2008	✓											✓			✓		✓	LPA's	✓					As above

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
	<ul style="list-style-type: none"> - Promote awareness of renewable energy sources - Encourage uptake - Advice on reducing overall energy consumption - Disseminate results 																								
	Establishing new partnership management arrangements between water, waste (liquid and solid) telecoms, power, heat and coolth suppliers to determine feasibility of MUSCo's	✓											✓	✓	✓	✓		✓	LPA's / The London ESCO / Thames Water / BT / etc.						As above
Existing and prospective schemes should be investigated for connectivity to create a more sustainable Central London energy infrastructure.	Euston Road District Heating Scheme					✓								✓			✓	✓	LDA / LPA				✓		Prospective scheme
	Bloomsbury and Gower Street Heat and Power Schemes					✓							✓			✓	✓		LDA / LPA / UCL			✓			Existing scheme – To be upgraded to support Euston Road District Heating Scheme

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
These are only initial schemes that have been identified and the possibility exists whereby further schemes currently in the pipeline can contribute to the overall infrastructure	Elephant and Castle							✓						✓			✓	✓	LPA / MUSCo consortium				✓		Prospective scheme but planning consent received for a proportion of the regeneration scheme
	Barkantine CHP										✓		✓	✓	✓	✓	✓	✓	LPA / LCCA / EDF Energy / Barkantine Heat and Power Company			✓			Existing scheme – Continually upgrading to support new customers
	Connect Whitehall District Heating Scheme with Pimlico District Heating Scheme		✓										✓			✓	✓		LPA			✓			Existing scheme
	Citigen (CCHP that supports City of London buildings)			✓									✓			✓	✓		LPA / e.on			✓			Existing scheme – New customers continually sought
	Imperial College						✓						✓			✓	✓		Imperial College London			✓			Existing scheme

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)	
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed		
Utilities Infrastructure																										
Electricity, Gas, Telecoms.																										
	CLF and Central London authorities to lobby utility providers and regulatory bodies to devise a strategic longer term planning approach to provision of required utilities, as oppose to the existing reactive short terms works, to ensure forecast demand is met.	✓	✓	✓				✓					✓			✓	✓		Utility Providers	✓					✓	City of London, Southwark, Tower Hamlets and Westminster will see the greatest levels of development growth, hence the greater urgency.
Water																										
	CLF and Central London authorities to monitor and where possible help facilitate leakage reduction techniques including replacement of Victorian mains.	✓											✓	✓	✓	✓	✓		Utility Providers	✓					✓	This includes assisting with programming and monitoring of progress.
	Central London authorities Development Control teams to impose compulsory metering on all new developments coming forward over the plan period to hep alleviate planned	✓											✓	✓	✓	✓	✓		Utility Providers and Local Planning Authorities	✓					✓	To be facilitated through the Development and Building Control processes

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
	shortfall in provision																								

Table 6-6: Social Infrastructure Priorities

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
Further Education and Adult Learning																									
	City of Westminster College redevelopment, St Charles College FE College		✓																LSC / City of Westminster College / St Charles FE College			✓			LSC have proposed to contribute £11.42m towards capital costs for these approved schemes.
	Redevelopment / reconfiguration / renewal of estate/ Expansion of capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		LSC / Individual Colleges / LPAs	✓					URS estimate costs for the identified additional FE and AL demand as £438m to 2026.
Higher Education																									
	UCL Redevelopment / reconfiguration / renewal of estate Expansion of student accommodation capacity					✓							✓			✓	✓		HEFCE / Third party funders / UCL	✓					

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
	City University Expansion			✓									✓	✓		✓	✓		HEFCE / Third party funders / City University	✓					
	University of Westminster		✓										✓	✓					HEFCE / Third party funders / University of Westminster		✓				University of Westminster identifies the need of £135 million over the period 2008-2018 to support expansion plans (for academic, accommodation and leisure space). It is unclear whether any funding has been already allocated.
Secondary Healthcare																									
	Expansion of capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A				✓			✓					HUDU model estimates cost at .£121m.
Primary Healthcare (GPs)	Repair or replacement to support proposed models of service provide additional capacity; quantum and cost of requirements has not yet been well-detailed by PCTs.	✓											✓	✓		✓	✓		PCT	✓					HUDU model estimates costs at £74.2m

Infrastructure Areas	Infrastructure Priorities: schemes and actions	Locations											Timeframes			Drivers			Delivery agents	Costs					Notes (Note all costs are approximate)
		Central London-wide/general	City of Westminster	City of London	Islington	Camden	Kensington and Chelsea	Southwark	Lambeth	Wandsworth	Tower Hamlets	Hackney	Short term	Medium term	Long term	Existing gap /replacement/ upgrade	Forecast demand for development	Policy		Not identified / not applicable	Identified	Planned and funded	Planned but not (fully) funded	Unplanned but needed	
Police	Redevelopment / reconfiguration / renewal of estate	✓					✓						✓			✓	✓		Met Police Service					✓	
Fire	Redevelopment and refurbishment of existing fire stations through capital planning process and PFI	✓					✓						✓ (South wark – PFI)	✓ (Capital Planning process – see AMP)	✓	✓	✓		London Fire Bridge / Developer						AMP: £130m London-wide for first stage; further £90m for second stage (20 stations over next 15 years).
Ambulance	Strategic plan required. Service operating under 'critical' pressure level; there are no plans available on future investment / estate.	✓											✓			✓	✓		NHS London Ambulance Trust	✓					

Appendix 1 - Technical Input

As noted within section 1, the Central London Infrastructure Assessment Study has involved a consultancy team headed by URS, but supported by sub-consultants including Integrated Services & Utilities Limited (utilities) and Steer Davis Gleave (transportation). The involvement of other sub consultancy team members i.e. David Langdon (costings) and Linklaters (planning law) will follow predominantly as part of the Part B report for the City of Westminster.

Section 2.2 to 2.12 infrastructure inputs are covered as follows:

Infrastructure Area	Consultant
Power (electricity and gas)	Integrated Services & Utilities Ltd
Transport	Steer Davies Gleeve
Water	
Sewerage	
Flood defences	
Waste management	
Adult learning and further education	URS Corporation Ltd
Higher education	
Emergency services	
Secondary and primary healthcare	

Appendix 2 - Approach and Parameters

Introduction

This Appendix sets out additional information on the infrastructure study parameters and approach, including:

- The scope of the assessment and definition of key terms
- The key information sources which formed the evidence base for the analysis
- Key assumptions which informed the analysis
- Additional background material relating to the policy context, drivers of demand and supply, etc.

We also outline the assumptions utilised within the URS Infrastructure Model, which constitutes a key element of assessing growth impacts on relevant strands of infrastructure, namely FE and adult learning, healthcare, electricity, gas, water and sewerage.

The model is laid out in full in **Appendix 3** including the assumptions utilised to estimate population growth, education, health and utilities demand; the growth rate in residential and non residential uses; and the analysis of such projected growth including data sources and the method.

The outputs of the model and a high level description of our workings are included in the body of the report. Below we set out additional details of our approach to quantifying the quantum and cost of required future provision for the various infrastructure areas considered.

Utilities

Contact, via ISU, has been made with the 'host' utility companies that cover each respective network. Within the study zone, there are two gas companies involved with a notional boundary between them, broadly split by the River Thames. The companies involved include EDF Energy, National Grid, Scotia Gas Networks, British Telecommunications and Thames Water.

Other utility companies have been identified as influencing factors but, at this stage, have been excluded from the commentary as the infrastructure present is considered as less complex. This includes cables companies such as Virgin Media, Cable and Wireless, Kingston Communications and Global Crossing to name but a few possible alternatives.

Generally, the approach considers what the network is doing currently, what plans are in place to cover 'organic' growth and what plans are in place to ensure that wider growth, based upon known development zones, can be catered for. These are all facets that regulator requires the incumbent provider to undertake as part of their operating licence.

There is a need however to clarify what impact the proposed growth to 2026, which is in excess of development schemes which are currently forth-coming, will subsequently have on each network in terms of funding and delivery in particular.

Electricity

The assessment of the electricity network includes strategic assets owned and operated by the 'host' electricity provider for the area, up to and including the 132kV (132,000 volts) network. The lower voltages of 400V and 11kV are not considered given that these reflect more local infrastructure associated with specific development proposals which are at present unknown and which are unlikely to be of consequence to the nature of the report.

URS modelled demand for electricity associated with residential and non-residential forecast growth in each of the Central London authorities.

Central London is unique in that the relative mix of employment, residential, retail, and community uses, when compared to more provincial areas. Office space, for example, is likely to represent a greater proportion of future development than, say, commercial or industrial uses, and the specification of these offices, when comparing location against location, is unlikely to be consistent across the CLF area.

However, the utility system works according to 'trigger points' at a strategic level, and utilises standard material / apparatus sizes. For this reason, the inconsistencies of load application becomes relatively insignificant and trying to establish an exact projected load is not necessarily required; the pertinence of the finer detail only becomes an issue if the trigger point is close to being reached. For this reason it is possible to use a linear assumption which places emphasis on varying load application to establish a starting point for projecting energy demand.

To secure a basic position, each type of additional requirement will need to have recognised energy consumption demand placed against it. This generally splits into two categories: firstly, a per unit approach and, secondly, a square metreage approach. The former is usually applied to residential although there is a secondary split between electrically heated and non electrically heated units (air conditioning or storage heaters attract greater energy demand figures than, say, a gas centrally heated unit). The latter approach of working against floor space is reflected better against employment and commercial uses, including leisure, although leisure, particularly when considering swimming pools, are somewhat disproportionate in demand to other types.

The resulting loads facilitate projections of energy demand against historical data so that shortfalls can be considered. The figures projected are extremely high, probably because the diversity assumed is not great enough for a strategic level analysis (the consultation response from EDF may confirm this and suggest a greater diversity assumption; however this response was not received in time for inclusion in this report).¹⁹⁵ The figures should therefore be treated with caution. ISU uses these figures as a starting point for analysis, and draws upon applying industry experience to draw informed judgements as far as is possible. The utility industry use their own computations when assessing demand and the likely impact; there are no published figures available.

¹⁹⁵ A response is expected before the end of March.

Regardless of the figures utilised, outturn figures only offer indicative engineering requirements until a formal design is completed against set network criteria. The electricity system, given its 'dynamic' nature, is always subject to change and re-configuration. Therefore, the assessments made will reflect reasonable judgements and / or scenarios so that the client team have an understanding of the requirements in order to deliver the greater growth.

Gas

The assessment of the gas network covers strategic assets owned and operated by the 'host' gas providers for the area. This includes up to intermediate or high pressure networks. Low pressure networks are not considered given that these reflect more local infrastructure which is unlikely to be of consequence for a strategic report.

Demand for gas to 2026 was modelled using the same principles described above for electricity.

Sustainable Energy

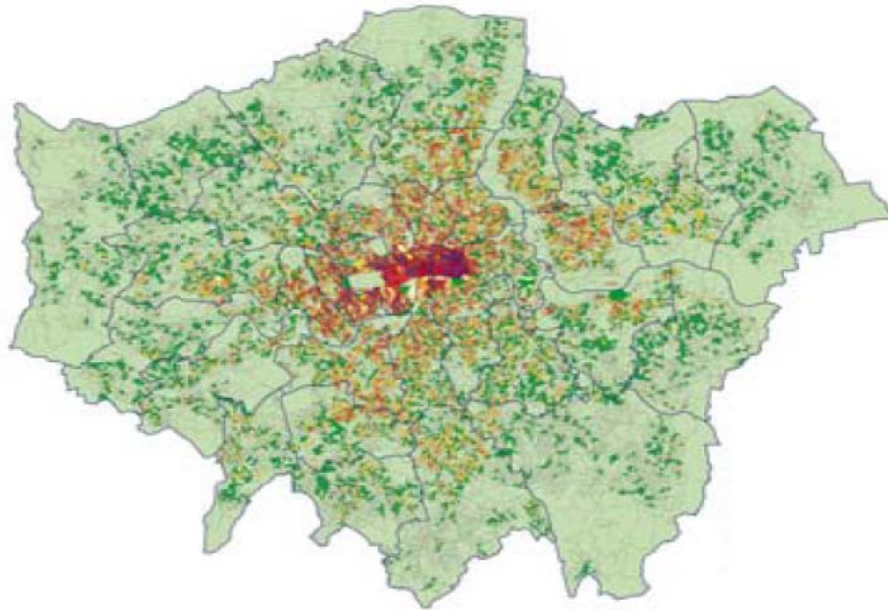
Mayor's Climate Change Action Plan, February 2007 (CCAP) focuses on improving efficiency and many of the measures advocated in this plan will deliver net financial benefits over a relatively short period of time, as well as cutting emissions. And as the government's comprehensive 'Stern Review: The Economics of Climate Change' demonstrated, it will be far cheaper to invest now to reduce carbon emissions, rather than ignore the problem and face far higher costs in the future.

The Mayor's top priority for reducing London's carbon emissions is to move as much as possible away from reliance on the national grid and on to local, low carbon energy supply, including combined cooling heat and power (CCHP), energy from waste (EfW), and on site renewable energy technologies. This approach is often termed 'decentralised energy'.

The carbon intensity of grid supplied electricity is higher than that of gas, thus electricity accounts for over half of the CO₂ emissions from energy consumption even though it only meets 28% of London's energy demand. This drives the impetus for the uptake of decentralised cooling, heat and power energy supply. A decentralised CCHP solution allows a shift to a more low carbon energy supply, i.e. a shift from carbon intensive electricity supplied from the national grid towards the utilisation of less carbon intensive gas to generate cooling, heat and electrical power. The cooling and electrical power generated would offset the grid supplied electricity, further driving down the resulting CO₂ emissions.

The Greater London Authority has mapped the density of heat loads across Greater London (see **Figure A-1** below), providing a starting point for more local-level assessment of combined heat and power opportunities.

Figure A-1: GLA Heat Density Map



Source – *'The London Community Heating Development Study-Summary Report', May 2005*

Saving 7.2 million tonnes of CO₂ emissions could be achieved through four key levers (see Figure 2 10):

- An increased contribution from combined cooling, heat and power. CCHP generated in London would save 2.2 million tonnes of CO₂ emissions per annum by 2025
- An increased contribution from energy from waste and biomass. Energy generated from waste and biomass using non-incineration based technologies and used to fuel biomass CCHP would save 1.1 million tonnes of CO₂ emissions per annum by 2025
- An increased contribution from micro generation in London's homes and businesses including micro-wind and PV would save 0.5 million tonnes of CO₂ emissions by 2025
- Projected changes to the mix of fuel sources in the national grid, which includes the achievement of the Government's target of 20 per cent of energy from renewables sources, would save 3.4 million tonnes of CO₂ emissions per annum by 2025.

London First has undertaken additional work in the development of a consultation report, 'Cutting the Capital's Carbon Footprint – Delivering Decentralised Energy', October 2008. The facts according to the London First consultation report are:

- In the UK enough heat is wasted in central power stations to heat all the buildings in the UK on an annual basis

- Meeting the target will require combined heat and power plants with an electrical generation capacity of around 1,800MW and a heat output of around 3,400MW. This is equivalent to the output of around 170 schemes of the scale being built for the Olympic Park.

The London First consultation report sets out key recommendations laid out below. This study aims to identify opportunities where these recommendations can be effectively implemented, and discusses the drivers for uptake of decentralised energy.

1. *'Economic incentives that recognise the carbon savings from decentralised energy*

We recommend an incentive for combined heat and power such as an obligation or minimum floor price for electricity output or support for low carbon heat supply. We welcome the ongoing work by OFGEM and DBERR in this area and in particular on the distributed/decentralised generation review, the renewable energy strategy and the heat strategy.

2. *Decentralised energy at district scale, where it is most efficiently delivered*

Whilst small scale low carbon and renewable energy sources have a role to play in providing decentralised energy, the greatest potential lies in using the waste heat from power stations, energy from waste plants and new dedicated combined heat and power plants. Critically this would also serve existing buildings, which is fundamental to meeting the 25% target. Existing buildings also act as anchor loads and most are energy inefficient, resulting in higher carbon savings.

3. *Establishment of a body within the London Development Agency (LDA) to deliver a strategic implementation plan for decentralised energy in London*

This body would act as the public sector lead and set out a plan to meet the 25% target. Working with boroughs, energy companies and developers, this body would give the LDA, the boroughs and public sector bodies the expertise to develop decentralised energy schemes to serve the existing stock

4. *Development of energy masterplans for each borough*

Heat loads would be mapped in order to assess where decentralised energy schemes should be built. Energy masterplans would identify specific decentralised energy projects (including sites for energy centres), and be incorporated into local development frameworks

5. *A partnership approach between public and private sectors for project delivery*

Using project specific public private partnerships (PPPs) would ensure the ability of the public sector to unlock decentralised energy schemes was matched by the investment and expertise of London's businesses. This approach could deliver the £7 billion of private sector investment required to build the necessary infrastructure'

Telecommunications

The assessment of the telecommunications network covers strategic assets owned and operated by British Telecommunications (BT) as they remain a significant 'host' provider for the area. The ability to consider protocols is limited as the telecommunications industry tends to be more reactive than proactive when considering new connections.

The scope of works therefore is to review whatever data BT can provide and assess this against delivery criteria, even if this subsequently ignores the cabling aspect and focuses on impact works such as highway excavation.

Water

The assessment of the water network covers strategic assets owned and operated by the 'host' water provider for the area. This includes strategic mains and supplies and does not necessarily reflect upon more local infrastructure which is unlikely to be of consequence to the nature of the report.

Demand for potable water to 2026 was modelled using the same principles described above for electricity.

Sewerage

Sewerage infrastructure comprises physical assets associated with conveying and treating surface and foul water and discharging the treated effluent to watercourses. Sewerage infrastructure can be identified as follows:

This infrastructure can be identified as follows:

- Sewerage treatment works (Beckton, Crossness and Mogden)
- Pumping stations
- Sewers
- Telemetry and control equipment
- IT and buildings
- The proposed Thames Tideway and Lee tunnels.

Private drainage networks within individual sites (i.e. non-adopted drainage) have been omitted because sewer records are generally not available from private owners. In addition it was not possible to extract precise details of plans relating to the Central

London area because Thames Water's investment plans relate not only Central London but also most of the Thames catchment area, from Warwickshire to Sussex and from Gloucestershire to Essex. Approximate investment figures for Central London are estimated where relevant, based on equivalent population.

The assessment has been carried out by reviewing the Thames Water 5 year¹⁹⁶ and 25 year¹⁹⁷ investment plans. Currently Thames Water is undertaking Asset Management Plan 4 or AMP 4, due to end in 2010. AMP 5 will run from 2010 to 2015, followed by AMP 6 in 2015-2020 and AMP 7 in 2020-2025. The assessment is based solely on information provided by Thames Water available in the public domain and subsequent consultations with Thames Water.

In order to estimate future loads resulting from population and commercial growth in Central London we have assumed provision standards based on the standard industry procedure used to design adoptable sewers¹⁹⁸ - these are illustrated on page A4 Utilities of the attached URS Central London Model.

Since most of the commercial development in Central London is expected to be office, retail and leisure, the water use is likely to be low and therefore a rate of 1.1 L/s per hectare has been used in the calculations.

With regards to Thames Water data with calculated foul flow rates, surface water flow is not accounted for although most of the sewers in Central London are combined and there will be a substantial amount of surface water generated by impermeable areas such as roofs and roads. Column 1 only accounts for foul flow rates; foul flow rates are only calculated for residential, office and retail developments. Other types of development are not accounted for and therefore column 1 is an underestimate of total foul flow rates; the overflow from the system into watercourses via combined sewer outfalls is not accounted for; only a proportion of foul and surface sewage from Central London reaches sewage treatment works.

The factors driving sewerage infrastructure improvements include legal obligations, population growth and climate change. Thames Water has legal obligations set at EU and national UK level to meet effluent quality targets. Population growth in recent years has increased pressure on treatment works, which increases the risk of breach in effluent quality targets. Currently, combined sewage overflows into the tidal reaches of the River Thames are an infringement of the EU Urban Wastewater Treatment Directive which has led to the proposed Thames Tideway scheme to intercept these outfalls. Finally, climate change will lead to increased rainfall intensities placing further pressure on the sewer system.

¹⁹⁶ 'Five-Year Plan from 2010 to 2015', Draft Report, (Thames Water)

¹⁹⁷ 'Taking Care of Water – The Next 25 Years (2010-2035)', (Thames Water)

¹⁹⁸ Sewers for Adoption 6th Edition, (Water Research Council, clause 2.12.2.

Flood Risk

The Flood Risk section reviews the Flood Defence and Flood Risk findings of the Strategic Flood Risk Assessments (SFRA) prepared by the City of Westminster and each Central London Forward authorities. Issues arising in the London authorities of Wandsworth, Lambeth, Hackney and Tower Hamlets are also considered as they partially fall within the CAZ boundaries. This chapter also highlights common flood risk concerns and opportunities for the local authorities to work together to help lessen flood risk in Central London.

During the production of this chapter data has been collected from the following sources:

- City of Westminster - *Westminster City Council Draft Strategic Flood Risk Assessment*, dated August 2008, by the City of Westminster and Halcrow
- London Boroughs of Camden, Hackney, and Islington - *North London Strategic Flood Risk Assessment*, dated August 2008, by Mouchel Parkman
- City of London - *City of London Strategic Flood Risk Assessment*, dated August 2007, by Mouchel Parkman
- Royal Borough of Kensington & Chelsea - *Royal Borough of Kensington & Chelsea and London Borough of Hammersmith & Fulham Strategic Flood Risk Assessment*, dated February 2008, by JBA Consulting and Entec
- London Borough of Lambeth - SFRA to be published in Dec 2008, by Scott Wilson
- London Borough of Southwark - *London Borough of Southwark Strategic Flood Risk Assessment*, dated February 2008, by JE Jacobs
- London Borough of Tower Hamlets - *London Borough of Tower Hamlets Strategic Flood Risk Assessment*, dated August 2008, by Capita Symonds
- Wandsworth Borough Council - SFRA to be published in Dec 2008, by Scott Wilson

An area's flood risk is defined as the likelihood that the area will flood now and in the future due to a particular storm event. Flood risk can come from a variety of sources such as groundwater, sewer, surface water, fluvial (river), and tidal. In the case of the London Central Activities Zone the River Thames poses the highest flood risk. Because of this flood defences have been built within and along the banks of the River Thames to protect London. A flood defence is either a hard defence of concrete or metal or a natural defence that reduces flood risk by building a barrier between a water body and development. The most well known flood defence in the Central London area is the Thames Barrier which is only be brought into operation when a high tide or flood is forecast or in progress.

Waste Management

The Waste Management section covers the Municipal Solid Waste (MSW) stream only, as this waste stream is collected by Waste Collection Authorities (WCAs) and

treated/disposed of by Waste Disposal Authorities. It should be noted that a number of private contractors collect and manage municipal waste, particularly in the City of London where MSW is a small component of the overall amount of generated waste. Information from these private contractors has not been included in this report.

Some data and information relating to MSW is available in the documentation listed below.

This study covers waste treatment and disposal facilities such as landfill sites, thermal treatment (e.g. energy from waste, incineration), anaerobic digestion and composting. In accordance with the London Plan, 2008, Consolidated with Alterations since 2004¹⁹⁹ this study has not included the current or future capacity of waste transfer stations as they are not classified as 'waste management' facilities.

This study is based on information and data obtained from the following documents:

- City of London Municipal Waste Strategy 2008-2020²⁰⁰
- Central London Forward, Infrastructure in Central London, Strategic Scoping Report: Capacity and Future Planning²⁰¹
- Greater London Authority; Mayor's Municipal Waste Management Strategy²⁰²
- London Borough of Southwark Waste Management Strategy 2003-2021²⁰³
- City of Westminster Municipal Waste Management Strategy Implementation Programme 2004-2016²⁰⁴
- Royal Borough of Kensington and Chelsea Municipal Waste Management Strategy and Action Plan 2004-2009²⁰⁵
- North London Waste Plan Issues and Options Technical Report²⁰⁶, North London Joint Waste Development Plan Document

¹⁹⁹ 'Early Alterations to the London Plan' (GLA, 2006)

²⁰⁰ 'City of London Municipal Waste Strategy 2008-2020' (AEA Energy & Environment for DEFRA and the City of London, 2008)

²⁰¹ 'Central London Forward, Infrastructure in Central London, Strategic Scoping Report: Capacity and Future Planning' (EDAW, 2008)

²⁰² 'Mayor's Municipal Waste Management Strategy' (GLA, 2003)

²⁰³ 'London Borough of Southwark Waste Management Strategy 2003-2021' (LB Southwark, 2003)

²⁰⁴ 'City of Westminster Mayor of London Municipal Waste Management Strategy Implementation Programme 2004-2016'

²⁰⁵ 'Royal Borough of Kensington and Chelsea Municipal Waste Management Strategy and Action Plan 2004-2009'

²⁰⁶ 'North London Waste Plan Issues and Options Technical Report, North London Joint Waste Development Plan Document'

- Early Alterations to the London Plan, Greater London Authority
- London Waste Apportionment Study – Update and further sensitivity testing PN21, dated April 2007, Jacobs UK Limited
- Planning Policy Statement 10 (PPS10): Planning for Sustainable Waste Management, July 2005.

In addition, the following web-sites were also referred to:

- North London Waste Authority: www.nlwa.gov.uk
- Western Riverside Waste Authority: www.wrwa.gov.uk
- Veolia Environmental Services: www.veoliaenvironmentalservices.co.uk

URS has not undertaken a consistency check on the data contained within each of the above documents reviewed. The data was reported in a number of different formats, which would make cross-comparisons difficult. All data in the assessment is as stated in the individual reports. It is highly likely that reported data is based upon limited available information and assumptions and this is openly acknowledged in the Greater London Authority (GLA) report in relation to estimated capacities for waste management.

In general detailed waste management data, specifically funding data for specific London authorities was found to be lacking.

In the UK, local authorities have responsibilities for waste collection and/or waste disposal for all households within their area and are referred to as Waste Collection Authorities and/or Waste Disposal Authorities. Waste Collection Authorities are usually a District or Borough Council, which has responsibility for collecting municipal solid waste, where as a Waste Disposal Authority is a local authority (usually a County Council) which is responsible for disposing of municipal solid waste. Unitary Authorities are responsible for both the collection and disposal of municipal solid wastes.

Greater London has four joint waste authorities, each of which is responsible for both the collection and disposal of wastes from households in their areas:

- East London Waste Authority, which includes the London Boroughs of Newham, Barking and Dagenham, Redbridge and Havering
- North London Waste Authority, which includes the London Boroughs of Barnet, Camden, Enfield, Islington, Hackney, Haringey and Waltham Forest
- West London Waste Authority, which includes the London Boroughs of Brent, Ealing, Harrow, Hillingdon, Hounslow and Richmond
- Western Riverside Waste Authority, which includes the London Boroughs of Hammersmith and Fulham, Kensington and Chelsea, Lambeth and Wandsworth.

In addition, a number of London authorities operate independently as both Waste Collection Authorities and Waste Disposal Authorities, including (but not limited to), the City of Westminster, the City of London and the London Borough of Southwark.

The London authorities which are included in this study fall within the North London Waste Authority (Camden and Islington), Western Riverside Waste Authority (Kensington and Chelsea) or are independent Waste Collection and Disposal Authorities in their own right (City of Westminster, London Borough of Southwark and the City of London).

In terms of the study area, the North London Waste Authority currently has a contract until 2014 with London Waste Limited to manage the waste arising in their area. Western Riverside Waste Authority entered into a long-term waste management contract with Cory Environmental Limited in 2002. Veolia Environmental Services Limited operates waste management contracts for Camden (seven year contract which commenced in 2003), Southwark (25 year contract which commenced in 2008) and Westminster (7 year contract which commenced in 2003). The City of London have contracts with various waste management contractors: Enterprise MRS has a contract for the collection of household waste which can be terminated at 6 months notice, and with Cory Environmental Limited for disposal until 2025.

Transport

The consideration of transport infrastructure for the purposes of this report includes: highways, the rail and underground networks, bus routes, stations and interchanges, pedestrian and cycle routes and riverboat piers. In addition, major public realm schemes are considered and these may involve improvements to several modal facilities.

Central London is defined in many different ways for the purposes of transport policy and monitoring but, in the context of this report, it refers to the Central Activities Zone (CAZ). Where schemes outside the CAZ have a direct bearing on the CAZ these have been included.

In the context of each mode, transport infrastructure relates to physical works and not strictly speaking to the vehicles or trains that operate on each network. However, in discussing transport capacity, this distinction is often arbitrary and where necessary reference is made to operations as well as infrastructure works.

This report is informed by the recent publication of Way To Go! (Mayor of London, November 2008) and the Transport for London Business Plan - 2009/10-2017/18 (November 2008). The two reports reflect the priorities and policies of the incoming Mayor but are also outputs of a wide-ranging review of infrastructure schemes in London in response to funding constraints.

These reports take a realistic view of schemes likely to be delivered over the course of the next ten years. Given the costs associated with Crossrail (now sponsored by Transport for London) and tube upgrades, and expected Government grant, several schemes have been omitted from the business plan. In some cases, this reflects an underlying lack of viability or absence of political support; in others, it reflects the lack of funding that is likely to be available.

The most significant scheme omitted from the plan affecting central London is Cross River Tram (CRT). This enjoys significant political support but, given its cost (£1.3 billion)

and earliest opening date (2016), the Mayor has decided to suspend all preparatory work. A more detailed appraisal of the Business Plan is given below.

Whilst the Business Plan looks ahead ten years, the planning horizon for London is dictated by the London Plan, which sets out policies to 2026. The most complete appraisal of transport in London over this period was contained in Transport 2025 – Transport vision for a growing world city (Transport for London, November 2006). T2025 identified a transport strategy for London that would match travel growth in London with transport infrastructure capacity improvements. The recent policy announcements potentially create a supply gap, as discussed in the Transport Section in the main body of the report.

Further Education and Adult Learning

The Learning and Skills Council (LSC) was established in 2001 to fund and plan post-16 education outside universities. In 2010 responsibility for 14-19 year old provision will be transferred from the LSC to local authorities supported by a new non-departmental public body, the Young Person's Learning Agency, reporting to the Department for Children, Schools and Families (DCSF). Funding of adult education and training will be overseen by the new Skills Funding Agency, which will be an agency of the Department for Innovation, Universities and Skills (DIUS)²⁰⁷.

The Learning and Skills Council (LSC) defines further education (FE) as covering the 16-18 age group and adult learning (AL) as all the remaining learners in working age. This assessment of FE and adult learning provision in the Central London authorities reflects these definitions.

The infrastructure assessment reviews information from key LSC strategic documents including:

- London Strategic Analysis 2007/2008
- LSC 'Government Investment Strategy 2009-10, LSC Grant Letters and LSC 'Statement of Priorities', 2008

Future demand for FE and adult education in the Central London authorities was modelled for 16-18 year olds (FE) and for 19-65 year olds (adult education). Further details on how we have calculated demand and costs are provided in sheet A2 Education of the attached URS Central London Infrastructure Model.

Higher Education

This section covers the universities within the Central London area, which provide further education and higher education to undergraduate and postgraduate students.

²⁰⁷ Personal Communication, LSC Head of Records and Rights December 2008

It should be noted that, while there are potential social infrastructure impacts associated with students, consideration of these impacts is outside the scope of this study, though the impact of students are considered in the model insofar as student numbers are incorporated in the projected population growth.

Primary Healthcare

URS have assessed both primary and secondary health requirements arising from projected population growth in the six Central London local authorities based on the NHS London Healthy Urban Development Unit (HUDU) model. Primary healthcare is accordingly considered to include all services that evolving policy aims at seeing provided at General Practices²⁰⁸.

The output of the assessment is therefore an understanding of the additional number of General Practitioners (GPs) required to satisfy the new demand arising from projected resident population growth. In addition the likely spatial requirements and building costs required to host such additional units will be provided. The analysis is conducted for each of the six Central London local authorities.

URS have contacted every Primary Care Trust (PCT) in each of the six Central London local authorities:

- City and Hackney Teaching PCT
- Camden PCT
- Islington PCT
- Kensington & Chelsea PCT
- Southwark PCT
- Westminster PCT

The strategic plans for each PCT have been reviewed to identify the primary health care services in each of the six Central London local authorities.

Each of the Central London local authorities has their own PCT, except for the City of London, which falls under the City and Hackney Teaching PCT.

NHS London is one of the ten Strategic Health Authorities (SHAs) in England established in July 2006 to lead NHS across London, providing strategic leadership for NHS in London and operates a PCT Commissioning Regime to enable the commissioning of world class health care. Strategic Health Authorities were created by the government in 2002 to manage the local NHS on behalf of the secretary of state, and were reduced to 10 from the original number of 28 on July 1 2006. SHAs are responsible for developing

²⁰⁸ 'HUDU Planning Contribution Model, Guidance Notes' (EDAW/AECOM, 2007)

plans for improving health services in their local area, making sure local health services are of a high quality and are performing well, increasing the capacity of local health services (so they can provide more services), and making sure national priorities are integrated into local health service plans. SHAs manage the NHS locally and are a key link between the Department of Health and the NHS.

As discussed the HUDU model was used to quantify and cost potential primary and secondary healthcare requirements in Central London. The HUDU model does not however consider the impact of non residential growth in Central London. Also, it does not account for any potential spare capacity in current provision and the baseline information made available to URS by consultees was inadequate to allow a full gap analysis; therefore a qualitative assessment of emerging key issues is presented. The findings of this quantitative assessment should therefore be considered as indicative of the order of magnitude of the net additional needs likely to arise from residential growth.

The projected dwelling growth up to 2026 for each of the six Central London local authorities was the key input into the HUDU model. For primary care, the Central London URS model occupancy rates by tenure and size were used and a net population gain factor of 100% was assumed. The high case scenario has been used for the population baseline based on GLA, DMAG, RLP (Review of the London Plan) forecasts. HUDU model default assumptions have been used for all other variables, including build up rates and take up rates²⁰⁹.

The GP to patient ratio was set at 1 GP per 1,700²¹⁰ has using the ODPM Reforming Planning Obligations which sets out the requirement as based on the standard levels of provision assumed by NHS and Department of Health planners.

All other healthcare needs assumptions are the HUDU model default ones, and these include:

- Spatial requirements, in the form of square metres per unit (e.g. per bed or day places)
- Build costs and build costs inflation assumptions, as well as revenue funding allocations assumptions.

²⁰⁹ This means that the housing trajectory assumed by the model is different from the one presented in the London Plan or proposed by Islington and Camden. The HUDU assumptions with this respect have been developed with the specific purpose of assessing health needs arising from new development, as opposed to the Central London URS model assumptions which were intended to provide the base for the assessment of impacts on a wider range of infrastructure areas. As a result URS have considered appropriate to utilise the standard HUDU assumptions. It should be however noted that this approach implies that the resulting housing trajectory may be spread across a different time frame from the 2006-2026 London Plan timeline. The model attached in Appendix 4 presents detailed information.

²¹⁰ As opposed the HUDU default of 1,800 patients per GP.

Secondary Healthcare

With regard to Secondary Healthcare URS have assessed health requirements arising from projected population growth in the six Central London local authorities based on the NHS London Healthy Urban Development Unit (HUDU) model. The HUDU model defines secondary healthcare as the combination of:

- Acute healthcare provision, covering acute elective and non elective in patients and acute day case
- Mental healthcare provision, covering mental health
- Intermediate²¹¹ healthcare provision, covering intermediate beds and day spaces.

Current Government health policy drives PCTs and secondary healthcare providers towards an integrated model of services provision, in order to achieve a shift of activity from the secondary into the primary sector²¹².

Accordingly URS have consulted with both the six relevant PCTs (see the Primary Healthcare section in this Appendix for the full list) and the London Strategic Health Authority. In addition they have reviewed any available strategic plans, including the individual PCTs Commissioning Strategies and the NHS London Strategic Plan and Annual Report and Statement of Accounts 2007/2008²¹³.

It should be noted that the HUDU model does however not consider the impact of non residential growth in Central London. Also, it does not allow to account for any potential spare capacity in current provision and the baseline information made available to URS by consultees was inadequate to allow a full gap analysis; therefore a qualitative assessment of emerging key issues will be presented. The findings of this quantitative assessment should therefore be considered as indicative of the order of magnitude of the net additional needs likely to arise from residential growth.

The output of the assessment is therefore an understanding of the additional number of secondary and intermediary care beds and places (for intermediate day care only) required to satisfy the new demand arising from projected resident population growth. In addition the likely spatial requirements and building costs required to host such additional units will be provided. The analysis is conducted for each of the six Central London local authorities.

²¹¹ Intermediate care is generally considered to include those services that do not require the resources of an acute general hospital, but are beyond the scope of traditional primary care.

²¹² 'HUDU Planning Contribution Model, Guidance Notes' (EDAW/AECOM, 2007). This is also evident from the PCT Commissioning Strategies produced for each borough between 2007 and 2008, see Southwark PCT Commissioning Strategy Plan 2007/08- 2011/12, Camden PCT Commissioning Strategy Plan 2007, Westminster PCT Strategic Service Delivery Plan 2008, Islington Commissioning Strategy Plan 2007.

²¹³ NHS London Strategic Plan (NHS, 2008); NHS London annual report and statement of accounts 2007/08, (NHS, 2008).

Emergency Services

The report aims to quantify the current and future needs for emergency service provision, in terms of police, fire and ambulances, in the six Central London local authorities.

URS approach to understanding future emergency services requirements included consulting with the Metropolitan Police Service, the London Fire Brigade and the London Ambulance NHS Trust.

URS have reviewed the following documents²¹⁴:

- City of London Police, Policing Plan 2008-2011
- Metropolitan Police Estate, Asset Management Plan Camden, Islington, Kensington & Chelsea, Southwark, and Westminster
- Home Office Statistical Bulletin- Police Service Strength 2008
- Fire Asset Management Plan
- London Safety Plan 2008-2011
- Fire Corporate Plan 2008-2011

The impact of residential and non residential growth on emergency infrastructure has not been assessed quantitatively within our model as consultation indicated that such an analysis would not be appropriate or robust. The information presented in the section is therefore predominantly qualitative, with quantitative evidence is presented wherever available.

For fire services for instance the key element is not only the extent of population growth, but also and more importantly its accessibility to existing fire stations in case of emergency. Furthermore increases in the number of commercial buildings increases the number of false alarms and therefore pressure on the fire service. This is likely to apply also to other emergency services.

²¹⁴ City of London Police, Policing Plan 2008-2011(City of London Police, 2008), Metropolitan Police Estate, Asset Management Plan Camden (Metropolitan Police,2007), Metropolitan Police Estate, Asset Management Plan Islington (Metropolitan Police,2007), Metropolitan Police Estate, Asset Management Plan Kensington & Chelsea (Metropolitan Police,2007), Metropolitan Police Estate, Asset Management Plan Southwark (Metropolitan Police,2007), Metropolitan Police Estate, Asset Management Plan Westminster (Metropolitan Police,2007), Home Office Statistical Bulletin- Police Service Strength 2008 (Home Office, 2007), Fire Asset Management Plan (London and Fire Emergency Planning, 2008), London Safety Plan 2008-2011 (London Fire Brigade, 2008), Fire Corporate Plan 2008-2011 (London Fire Brigade, 2008).

Appendix 3 - URS Central London Infrastructure Model

Below we present the model that has informed part of the analysis. The model is set out as follows:

- **Sheet Contents** presents the table of contents
- **Sheet Results** presents a summary of the model results
- **Sheet A1 Population** presents the assumptions adopted to calculate population out of the housing trajectory
- **Sheet A2 Education** presents the assumptions adopted to calculate further education and adult learning demand and requirements
- **Sheet A3 Health** presents the assumptions inputted in the HUDU model to calculate primary and secondary healthcare demand and requirements in addition to the HUDU standard assumptions
- **Sheet A4 Utilities** presents the assumptions used to calculate future load for electricity, gas, water and sewerage
- **Sheet I1 Growth Projections** presents the growth projections used to inform the model and the assessment
- **Sheet I2 Growth Analysis** presents an analysis of projected growth
- **Sheet R1 Population** presents the resulting population growth based on the housing trajectory
- **Sheet R2 Education** presents the resulting demand for FE and AL based on population growth and education assumptions
- **Sheet R3 Health** presents the resulting primary and secondary healthcare requirements based on population growth and health assumptions
- **Sheet R4 Utilities** presents the resulting electricity, gas, water and sewerage based on population growth and utilities assumptions.

Appendix 4 - HUDU Model Approach

Introduction

The NHS London Healthy Urban Development Unit (HUDU) has developed the so called HUDU model in 2005 to help quantify the impact of new development on the local health services and estimate the associated capital and revenue costs associated with such impact²¹⁵.

The model is intended for use by the 31 London Primary Care Trusts (PCTs) and is currently being used by about a third of them. In addition, it is employed by private developers and local authorities and therefore constitutes a common tool to assess health impacts of new population. For all these reasons it is considered appropriate to use it to the purpose of this social infrastructure assessment as opposed to developing a new model.

The HUDU model assumes that the additional health requirements as a result of population growth attributable to residential developments will need to be met through capital development. Illustrative healthcare requirements and the costs of meeting requirements through new build solutions are calculated. The HUDU model does not incorporate baseline data on the existing or planned health service provision for the individual PCTs. Having been designed to assist in calculating developers' contributions in new individual developments the model assumed that the reconciliation of current capacity and future demand is undertaken at a subsequent stage.

The HUDU model was run for the six Central London authorities to ascertain the likely quantum and cost of required future healthcare. It should be noted that the HUDU model, while used widely by PCTs both within and outside London, is a model providing indicative quantum and cost figures only. In particular its use have been challenged in the past in occasions where PCTs did not have an adopted estates strategy in place that could justify the need for additional health premises.

Assumptions

The model estimates future service, spatial and cost requirements in three stages. They are illustrated below together with the assumptions used in each of them.

- Stage 1: population and housing.
 - The projected dwelling growth up to 2026 for each of the six Central London local authorities was used to estimate the impact on primary health services.
 - The Central London URS model occupancy rates by tenure and size were used.
 - The age profile of new population has been assumed to follow the default HUDU age profile distribution. The HUDU assumption account for the

²¹⁵ 'HUDU Planning Contribution Model, Guidance Notes' (EDAW/AECOM, 2007).

dynamic evolution of population in the planning period as opposed to the static approach of the URS model. As a result population estimates based on the same dwelling numbers are lower in the HUDU model.

- A net population gain factor, that is the percentage of new population which is assumed to move into the PCT catchment area for the first time, was assumed to be 100% so as to ensure the worst case scenario (the highest number of people) is considered.
 - The high case scenario has been used for population projections based on GLA, DMAG, RLP (Review of the London Plan) forecasts.
 - Finally all new build has been assumed to be flats, as the occupancy rates used already combines flat and houses population yields. HUDU model default assumptions have been used for all other variables, including build up rates and take up rates²¹⁶.
- Stage 2: Healthcare
 - For primary healthcare the GP:patient ratio was set at 1 GP per 1,700 has using the ODPM Reforming Planning Obligations which sets out the requirement as based on the standard levels of provision assumed by NHS and Department of Health planners.
 - For secondary and intermediate healthcare the default HUDU model assumptions have been used.
 - Stage 3: Spatial requirements and costs:
 - The default HUDU model spatial requirements and cost requirements (considering building costs only) have been used
 - The HUDU model calculated building costs for each of the analysed healthcare item, whereas revenue costs are estimated as a total to support all of the new facilities. It should be noted that given the strategic level of this Central London study and the long time frame the figure is not considered to be robust.

²¹⁶ This means that the housing trajectory assumed by the model is different from the one presented in the London Plan or proposed by Islington and Camden. The HUDU assumptions with this respect have been developed with the specific purpose of assessing health needs arising from new development, as opposed to the Central London URS model assumptions which were intended to provide the base for the assessment of impacts on a wider range of infrastructure areas. As a result URS have considered appropriate to utilise the standard HUDU assumptions. It should be however noted that this approach implies that the resulting housing trajectory may be spread across a different time frame from the 2006-2026 London Plan timeline. The model attached in Appendix 1 presents detailed information.